Acknowledgements

Matrix Solutions Inc. prepared this Environmental Impact Assessment for North American Oil Sands Corporation in accordance with the requirements prescribed under the *Alberta Environmental Protection and Enhancement Act* and the Final Terms of Reference (TOR) for the Kai Kos Dehseh Project. The authors would like to acknowledge the efforts of the entire North American Oil Sands Corporation team. The following were the individuals responsible for writing and editing this report.

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1 IMPACT ASSESSMENT APPROACH

1.1 Introduction

The purpose of the North American Oil Sands Corporation (North American) Kai Kos Dehseh Project (Project) Environmental Impact Assessment (EIA) is to explain the environmental and socio-economic effects of the Project individually, as well as in conjunction with other existing and planned projects in the area.

The EIA has been prepared in accordance with the requirements prescribed under the *Alberta Environmental Protection and Enhancement Act* and the Final Terms of Reference (TOR) for the Project (Volume 1, Appendix D). The EIA forms part of North American's joint application to the Alberta Energy and Utilities Board (EUB) and Alberta Environment (AENV).

1.1.1 Terms of Reference

In January 2007, North American filed both the Public Disclosure Document (PDD) and the Proposed Terms of Reference (TOR) to AENV, the EUB and all community stakeholders as noted in Volume 1, Section 6.2. On January 16, 2007, advertisements inviting the public to comment on these TOR ran in the Fort McMurray Today, Edmonton Journal, Edmonton Sun, Calgary Herald, Calgary Sun, and Lac La Biche Post accompanying the release of these documents. The advertisement was also placed in the February issue of Willow Lake Newsletter (Anzac) and the Conklin Nakewin News. The advertisement also outlined the way interested parties could obtain a copy of the proposed TOR and the PDD and provide comments.

Copies of the advertisement, the proposed TOR and the PDD were also posted on North American's website www.NAOSC.com and were made available at the Chambers of Commerce in Fort McMurray and Lac La Biche, the Public libraries in Fort McMurray and Lac La Biche, the Chipewyan Prairie Dené First Nation Office, the Fort McMurray First Nation Office, the Municipal Office in Chard, and the Conklin, Anzac and Heart Lake First Nation Consultation Offices.

The final TOR for the Project was issued in July 2007, by AENV. A cross-reference between each term in the TOR and the various sections of the Application is provided as a concordance table in Volume 1, Section 2.10, Table 2.10-3.

1.1.2 Public Consultation

North American is committed to developing and maintaining constructive dialogue with all relevant stakeholders associated with the Project. The consultation process is designed to be ongoing from initial planning through construction, operation and decommissioning of the Project.

The objective of the public consultation is to establish a constructive and mutually beneficial relationship between North American and project affected stakeholders by implementing an effective process of information exchange and decision-making. Through this process, stakeholders have the opportunity to:

- Review information relative to the planning, development and implementation of projects;
- Identify issues and concerns relative to the planning and implementation of project processes;
- Provide feedback to the project planning process and, where possible, improve North American's overall plans in the area; and

- Receive feedback from North American on community concerns

1.1.3 Organization of the Project Joint Application/EIA

The Project joint application/EIA comprises five volumes (Table 1.1-1). The Application Volume (Volume 1) provides the TOR cross reference table as well as the detailed Project and process descriptions. Volumes 2 through 5 address the remaining EIA requirements prescribed in the TOR (Volume 1, Appendix D).

Table 1.1-1 Overview of the Joint Application/EIA Report Table of Contents

VOLUME 1	**APPLICATION**
	Introduction Overview Application for Approval Geology and Reservoir Process Description (engineering) Public Consultation EIA Summary Conservation and Reclamation Plan
VOLUME 2	**AIR AND HEALTH**
	Impact Assessment Approach Air Noise Health
VOLUME 3	**AQUATICS**
	Hydrogeology Hydrology Surface Water Quality Fish & Fish Habitat
VOLUME 4	**TERRESTRIAL**
	Soils and Terrain Vegetation Wildlife Biodiversity
VOLUME 5	**HUMAN ENVIRONMENT**
	Land and Resource Use Socio-Economic Impact Assessment Historical Resources Traditional Ecological Knowledge and Traditional Use

1.2 Project Overview

North American is a wholly owned subsidiary of Statoil ASA and operates in northeastern Alberta. North American is currently the working interest owner and operator of approximately 12 townships of oil sands leases between Lac La Biche and Fort McMurray. North American's goal is to develop the Project, ultimately producing approximately 35,000 m^3/d (220,000 barrels per day) of bitumen through steam assisted gravity drainage (SAGD) technology.

North American is also proposing to construct and operate a bitumen upgrader in Strathcona County, which will make North American a marketer of synthetic crude oil and bitumen blend. The upgrader project will be applied for under a separate regulatory application.

The North American oil sands leases are located in Townships 76 to 83, Ranges 8 to 13 West of the 4th Meridian. The oil sands leases are not contiguous and fall within the Rural Municipality of Wood Buffalo and Lakeland County.

Kai Kos Dehseh is a Chipewyan Dené name meaning Red Willow River, the local Dené name for the Christina River. A group of Dené elders honoured North American with this name for the Project in January 2006.

The Project will be developed in 10 hubs, which are distributed over oil sands leases situated in four development areas – Leismer, Corner, Thornbury and Hangingstone (Figure 1.2-1). Each hub is comprised of a central processing facility (CPF) (which may include steam generation, water treatment, emulsion gathering and treating, and sulphur removal) and field facilities (which includes well pads, connecting roads and utilities). Figure 1.2-2 also shows the initial development areas in each of the four development areas.

The following naming conventions are used in this document:

- **Project Area**: The area including the Kai Kos Dehseh leases and immediate surrounding area (Figures 1.2-1 and 1.2-2)
- **The Project**: The Kai Kos Dehseh Project
- **Development Area:** The Kai Kos Dehseh Project is split into four development areas (Leismer, Thornbury, Corner and Hangingstone) (Figure 1.2-1)
- **Hub:** CPF and associated field facilities over the life of the Project.
- **Initial Development Area:** The CPF and initial well pads required for production.

The purpose of the Project is to efficiently recover oil sands resources from the North American leases and to supply bitumen to growing Canadian and U.S. crude oil markets, in an environmentally sound and sustainable manner.

The Application document (Volume 1) and the EIA (Volumes 2-5) comprise the regulatory submission for the 35,000 m^3/d (220,000 barrels per day) Project. These documents should be read as a set, as North American has limited duplication between sections and volumes.

The first hub, the Leismer Demonstration Project was the subject of an earlier application made to the EUB and AENV in 2006, and was approved by the EUB in July 2007. Throughout this application, reference is made to 10 hubs for consistency with the project planning and design objectives (Table 1.2-1).

Table 1.2-1 Project and Development Areas and Hubs

Project Area	Development Areas (4)	Hubs (10)	Capacity (m^3/d)	Capacity (bpd)	First Steam Date
Kai Kos Dehseh	Leismer	Leismer Demonstration[1]	1,590	10,000	2009
		Leismer Commercial[2]	1,590	10,000	2010
		Leismer Expansion[3]	3,180	20,000	2011
	Corner	Corner[4]	6,360	40,000	2012
	Thornbury	Thornbury[5]	6,360	40,000	2013
		Corner Expansion[5]	6,360	40,000	2014
	Hangingstone	Hangingstone[5]	3,180	20,000	2016
		Thornbury Expansion[5]	3,180	20,000	2017
		Northwest Leismer[5]	3,180	20,000	2018
		South Leismer[5]	3,180	20,000	2034

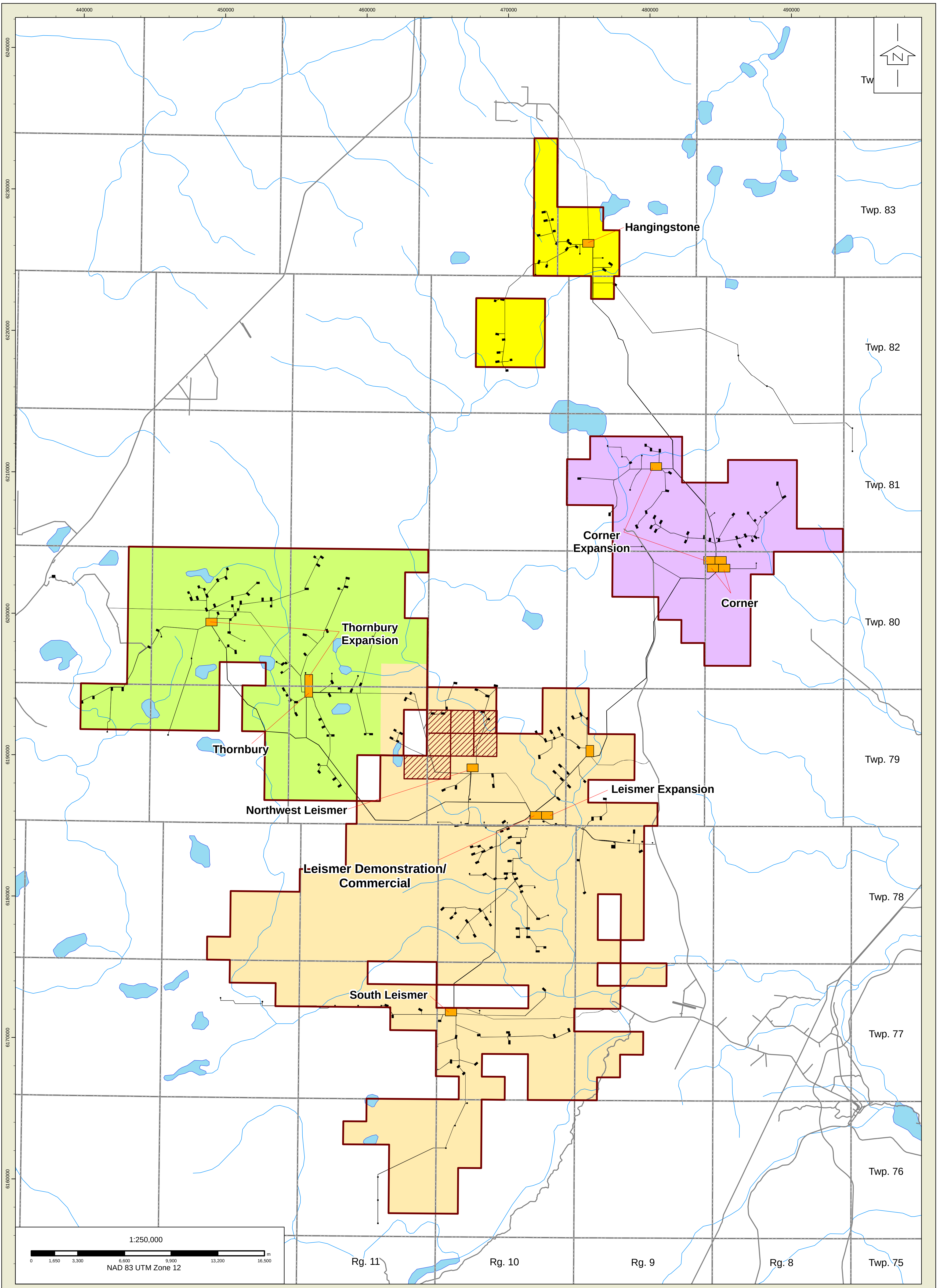
1 Prior application in 2006; approved by the EUB in July 2007.

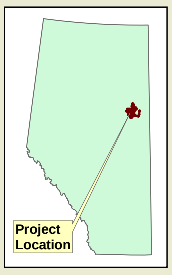
2 Application for the Leismer Commercial Hub is detailed in Appendix A.

3 Application for the Leismer Expansion Hub is detailed in Appendix B.

4 Application for the Corner Hub is detailed in Appendix C.

5 Amendment applications for these hubs will be the subject of future submissions.





Legend

- North American Lease Boundary/ Kai Kos Dehseh Project Area
- ATS Township / Range
- Roads
- Lake
- Stream
- 🟧 Hub
- Footprint Infrastructure
- ▨ Joint Venture Lands
- 🟪 Corner Developmet Area
- 🟨 Hangingstone Developmet Area
- 🟩 Thornbury Developmet Area
- 🟧 Leismer Developmet Area

Title:

PROJECT DEVELOPMENT AREAS AND HUB LOCATIONS

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Approved: RL	Revision Date: May 15, 2007
File: Figure 2.3-2 P&NG Holdings of 3rd Parties in the Area_TP_400k_20070515.mxd	

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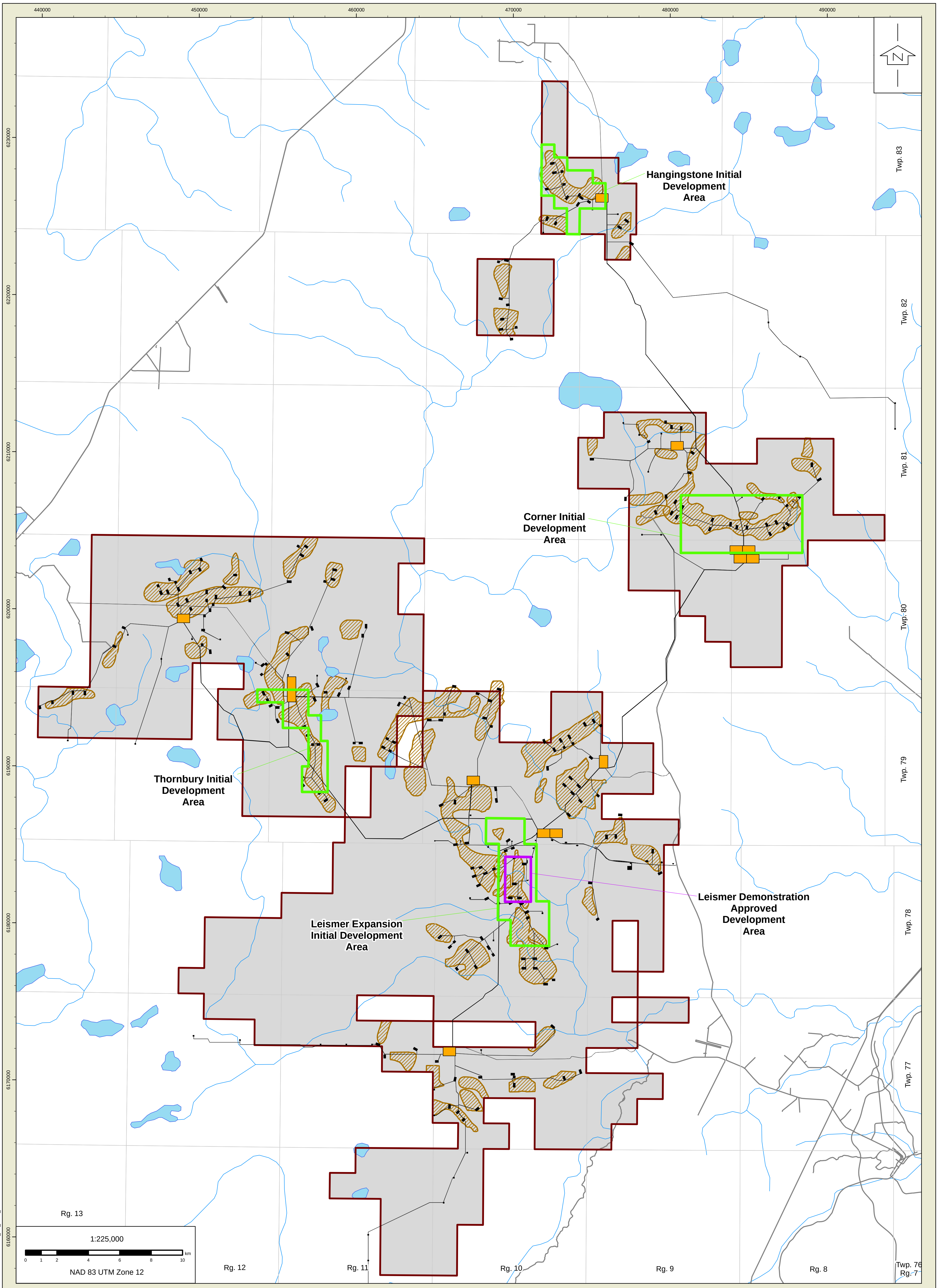
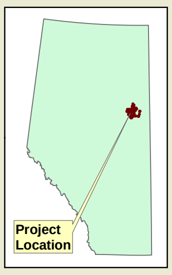
LZ	RL/LZ	1.2-1

I:\4455-514_NAOSC\NAOSC_Maps\Maps_Volume1\Figure 1-2 NAOSC Project and Develoment Areas and Hub Locations 1mil_LP_20070514.mxd





Legend

North American Project Area	Hub (Central Plant Facility)
ATS Township / Range	🟩 Initial Development Area
Roads	Approved Development Area
Lake	Footprint Infrastructure (other than CPF)
Stream	▨ Gross SAGD Pay

Title:

GROSS SAGD PAY

NORTH AMERICAN
OIL SANDS CORPORATION

Approved: **RL**

Revision Date: **May 15, 2007**

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Fig. No.: **1.2-2**

I:\4455-514_NAOSC\NAOSC_Maps\FINAL_MAY_2007\Figure 4.1-2 GROSS SAGD PAY_TP_225k_20070515.mxd

1.3 Kai Kos Dehseh Project Regulatory Approach

To ensure openness and transparency in the community, North American has undertaken a regional EIA that fully discloses the commercial development within the approximately 12 townships of bitumen leases held by North American. This Application and EIA discloses the development over the life of the Project (Figures 1.2-1 and 1.3-1).

The regional EIA regulatory approach was developed through consultation with regulatory agencies including the EUB, AENV and ASRD. The consultations included meetings and support, in principle, from the EUB's oil sands division, AENV's Deputy Minister and Assistant Deputy Minister, AENV's Regional Approvals Manager, AENV's Regional Environmental Manager, and ASRD Sustainable Resource and Environmental Management (SREM) office Executive Director EIA and Oil Sands.

An agreement was made, in principle, that North American would apply for the overall Project in one regional EIA followed by detailed Applications instead of phasing five stand alone EIAs over the life of the development. It was agreed that the regional EIA (Volumes 2 through 5) would be submitted with an overall Application (Volume 1) for the full scale development and specific applications for initial hub developments (Volume 1, Appendices A, B and C). Detailed amendment applications will be submitted in the future for each additional development hub. North American acknowledges that if significant changes in the region occur, AENV may request additional environmental studies up to and possibly including an EIA. Through this approach the regional EIA has provided the stakeholders full disclosure of North American's ultimate Project. North American believes this approach, of full disclosure, is in the public interest.

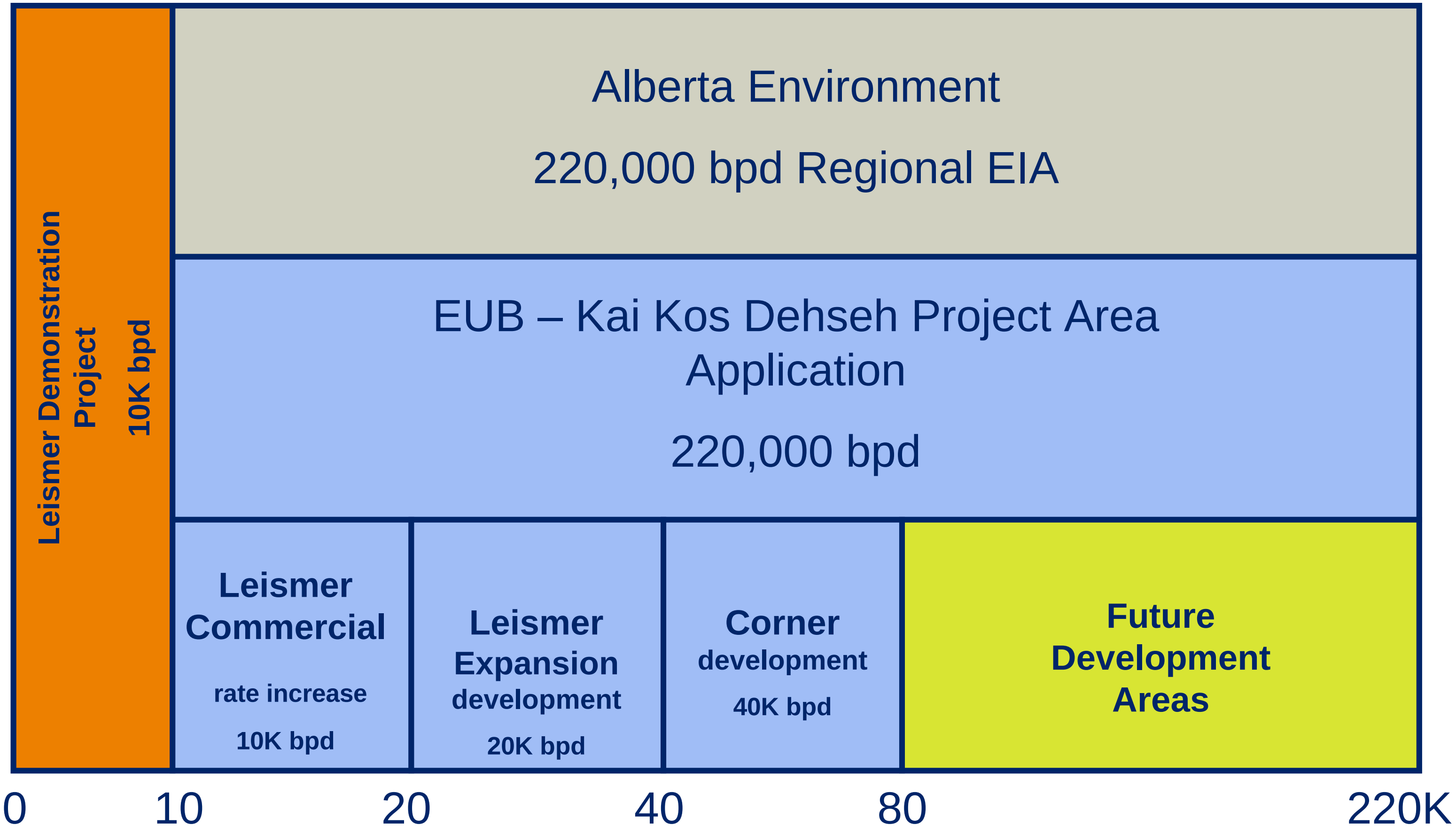
North American's regional EIA is based on regional data and a conceptual engineering and execution plan. The EIA has a regional focus and utilized a less intensive sampling protocol while still collecting sufficient environmental data to facilitate regulatory decisions. Several of the EIA programs, such as the wildlife monitoring for caribou, moose and wolf, were tailored to actively engage the local stakeholders and address their specific issues. The wildlife monitoring program is scientifically based and is focused on moose (based on First Nations concerns), caribou (based on endangered species concerns) and wolf (based on the predator prey relationship between them). The regional EIA approach is also clearly reflected in the soil sampling program designed for the Project. An appropriate soil sampling density was used to regionally map soils throughout the North American lands. Soil samples were initially collected based on a preliminary Project footprint as well as samples collected to verify the regional mapping. More detailed soil surveys were conducted in the initial development areas where the Project footprint was better defined. As engineering design progresses, North American is committed to conducting even more detailed soil surveys (e.g., Survey Intensity Level One) as part of the pre-disturbance assessment (PDA) process.

Hub applications will include site specific data. This concept, as illustrated in Figure 1.3-2 (a slide reproduced from the stakeholder consultation program), was to focus the level of data collected during the EIA (depicted with a "bite" out of the EIA block) and replace this detail with enhanced ongoing environmental and operational monitoring (thick line between application blocks). North American agreed to provide more specific data and a higher data density for the initial hubs and to provide subsequent enhanced amendment applications for future hubs. The intent of the future applications is to provide the standard level of application detail for each hub as their requisite geology and engineering progresses. North American also committed to including updated air and groundwater effects assessments (including cumulative effects assessment) as well as incorporating learnings (continuous improvement arrow) from previous hubs into future hub applications. Figure 1.3-3 is a slide, reproduced from the stakeholder consultation program, which illustrates the regional EIA and monitoring approach. A letter from AENV detailing their agreement to the regional EIA approach is presented in Volume 1, Appendix D.

Following the above model, the regional EIA has been prepared for the full 35,000 m^3/d (220,000 bpd) of bitumen production at ten hubs in four development areas. One hub, the Leismer Demonstration Hub, was previously applied for and approved. The Leismer Demonstration Hub has been included in the assessment for completeness. Appendices A, B and C (Volume 1) apply for the Leismer Commercial Hub, Leismer Expansion Hub and the Corner Hub, respectively. These appendices provide details specific to these hubs, including specific reservoir and geology information.

North American is committed to preparing annual reports to the community that will chart the progress of the company’s environmental stewardship and community engagement (Volume 1, Appendix D). These reports will be incorporated into all regulatory filings to ensure the community is actively involved in the regulatory process.

220,000 bpd Kai Kos Dehseh Project Area Development



Leismer Demonstration Project

10K bpd

Alberta Environment

220,000 bpd Regional EIA

EUB – Kai Kos Dehseh Project Area Application

220,000 bpd

Leismer Commercial

rate increase

10K bpd

Leismer Expansion

development

20K bpd

Corner

development

40K bpd

Future Development Areas

0 10 20 40 80 220K

Figure 1.3-1 Project Development Plan

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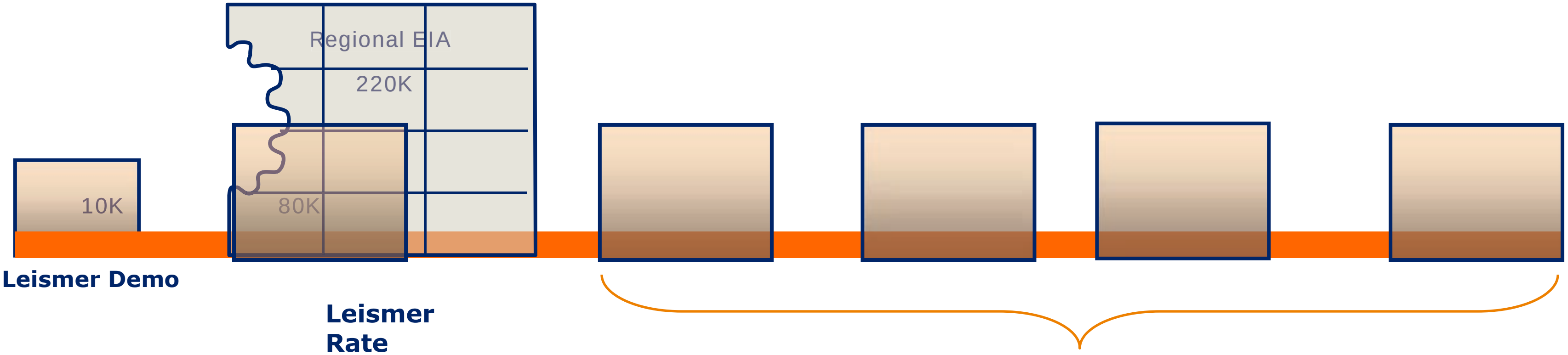
Our SAGD Approach

Regional EIA Approach



Regional EIA

220K

10K

80K

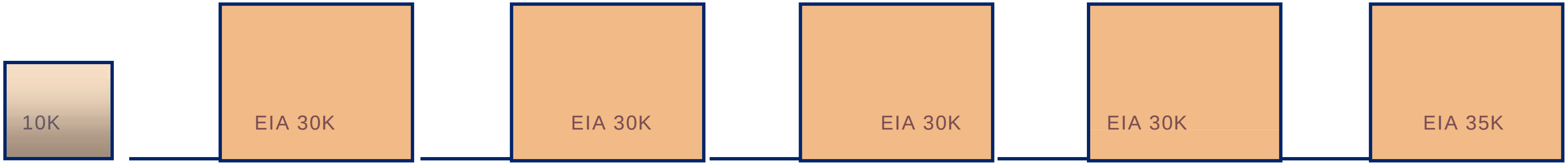
Leismer Demo

Leismer Rate increase

Leismer Expansion

Corner

Future development applications



10K

EIA 30K

EIA 30K

EIA 30K

EIA 30K

EIA 35K

Current EIA Approach

Figure 1.3-2 North American EIA Approach

NORTH AMERICAN OIL SANDS CORPORATION

EIA Approach

EIA

- Regional Approach
- Less Intensive Sampling
- Focused
- Tailor Specific Components to Engage Local Stakeholders

MONITORING

- More Comprehensive
- Long Term
- Innovative Monitoring Approaches
- More Engaged Local Community
- Annual Reporting to Community
- More Comprehensive Licence Requirements

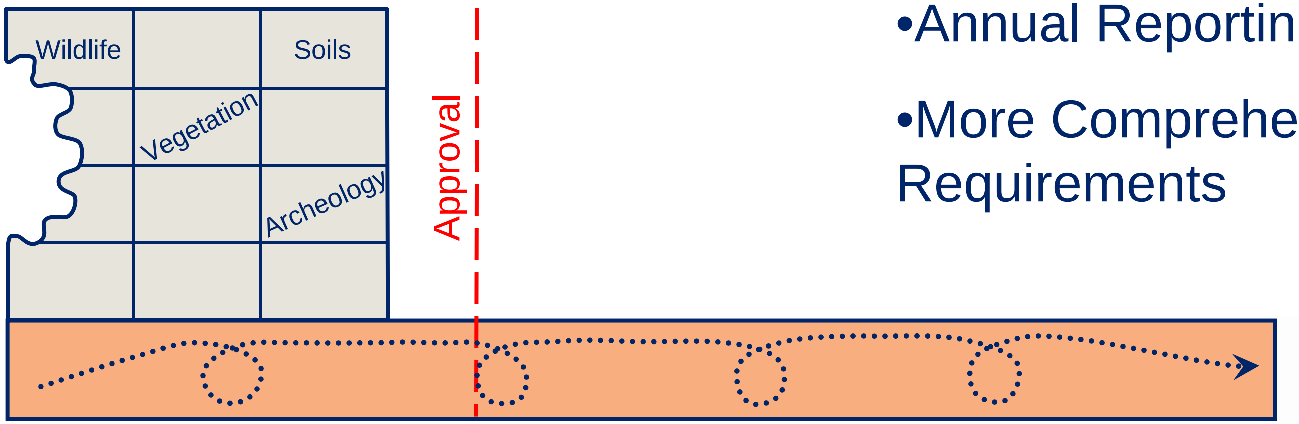


Figure 1.3-3 Regional EIA Approach

NORTH AMERICAN
OIL SANDS CORPORATION

1.4 Facility Description

The Project will be developed in ten hubs (Table 1.2-1), which are distributed over oil sands leases situated in four development areas – Leismer, Corner, Thornbury and Hangingstone. The components of each SAGD hub include horizontal production and injection wells on multi-well pads. In addition to the horizontal wells required for a SAGD project, each hub will have surface facilities required to generate and distribute steam, gather well production, process oil and emulsions, and treat water. These facilities are made up of four components: field facilities (production pads and horizontal wells), central processing facilities (CPF), offsite connections, services and camps. Each hub may consist of all or a portion of the following list:

Field Facilities:

- SAGD pads, wells and associated facilities;
- Production flowlines;
- Steam distribution flowlines;
- Electrical power distribution lines; and
- Pad access roads.

Central Processing Facility (CPF):

- Steam generation facilities;
- Production treatment (bitumen, water and gas) facilities;
- Sulphur removal equipment;
- Water treatment, recycle and disposal facilities;
- Electrical, air, water and instrumentation utility systems;
- Tankage; and
- Support buildings, including warehouses and operations camp.

Interconnecting Infrastructure:

- Access roads;
- In-field fuel gas pipelines;
- In-field water and gas redistribution pipelines
- In-field diluent supply pipelines;
- In-field diluted bitumen sales lines; and
- Electrical power distribution line.

Camps

- East permanent operations camp (Leismer);
- West permanent operations camp (Mariana Lakes); and
- Temporary construction/drilling camps.

Services (included in this application)

- Water disposal wells and related pipelines; and
- Source water wells and related pipelines.

Services (not included in this application)

- Fuel gas pipeline;
- Main diluent supply pipeline;
- Main diluted bitumen sales line; and
- Electrical power transmission lines.

1.4.1 Site Selection

Environmental factors were considered when situating the CPFs and well pads. Based on available drilling results plus interpreted seismic data, North American has carried out an extensive review of the options for well placement to:

- Maximize resource recovery;
- Minimize well pad footprint;
- Work with topographic features;
- Avoid open water bodies; and
- Avoid defined water course channels (i.e., having defined bed and bank material).

North American has examined each development area to determine the best well trajectories, giving consideration to variability in oil/water contact, reservoir quality, and character differences in the channels. Options for well pair placements in the channel trends have considered non-reservoir shale plugs and various types of potential thief zones, such as those that have been found in the Leismer development area.

The initial well pad locations will be further refined by using a constraints mapping approach. The results of this detailed well pad placement work will be presented in each future hub application. North American will combine the knowledge acquired from the soils and vegetation surveys, with the Alberta Vegetation Inventory/Ecological Land Classification mapping, survey imagery (i.e., still photography images, aerial video, line scans and high resolution LIDAR (Fli-Map®), including topography), and combined with the geological data to make any necessary modifications to the pad site selection. These modified locations will further minimize the disturbance to fens and bogs. Additional constraints that will be considered during the detailed well pad location selection process are as follows:

- High resolution LIDAR (Fli-Map®) Fli-Map® (Fast Laser Imaging Mapping and Profiling) is a proprietary image capture process that combines low level, high quality, high resolution LiDAR data with digital video and high resolution still imagery. The multiple sources of imagery data integrated with precise GPS data allow detailed assessment of ground conditions, elevation changes, and vegetation identification.
- Site soil conditions (i.e., to maximize the extent of mineral soils and minimize the extent of organic soils for each site);
- Archaeological, traditional ecological knowledge and traditional use;
- Topography (i.e., minimizing changes in elevation to limit need for cut and fill);
- Sufficient area for soil stockpiles; and
- Rare plants.

1.5 Impact Assessment Approach

Preliminary work for the Project was initiated in 2005 to evaluate Project alternatives, identify pertinent data sources and define required data collection programs. Initial discussions were held with government departments to scope out the Project requirements, application procedures and regulatory processes.

Consultation was conducted with local residents, government representatives, First Nations, Métis Associations and other public representatives during this period to identify biophysical and socio-economic issues and to confirm study requirements (Volume 1, Section 6).

Field work was undertaken from 2005 through 2007 to enhance regional water, fisheries, soil, vegetation, wildlife and historical information.

Potential environmental and socio-economic impacts for both the Project alone and the Project contribution to cumulative effects were identified and assessed by team members using the following steps:

- Issues of greatest concern to stakeholders and regulators were identified in each discipline in order to focus the assessment.
- Ecological or socio-economic indicators (i.e., selected variables or parameters for in-depth analysis) were identified for each discipline to help quantify or evaluate the potential effect of disturbances.
- Spatial and temporal boundaries were considered for each indicator. A Local Study Area (LSA) and a Regional Study Area (RSA) were spatially defined for the purpose of the environmental assessment. Similarly, temporal boundaries were defined for a number of the Project phases.

- Management methods including construction, design or scheduling principles were applied to prevent, minimize or mitigate adverse effects.
- Quantitative or qualitative assessments were made by comparing predicted residual effects (i.e., effects remaining after the application of management methods) to determine environmental or socio-economic consequence. Consequence and a final impact rating was defined based on established objectives or scientific criteria.
- Identification of monitoring or follow up programs, if required.

1.5.1 Environmental and Socio-Economic Issues

Scoping is an accepted technique that is used to focus an EIA on issues of concern identified by affected stakeholders including residents and federal, provincial and municipal regulatory and other agencies. Biophysical and socio-economic issues related to the construction, operation and reclamation of the Project were identified by examining a number of sources including:

- Knowledge of local public, industry, First Nations, Métis and government (municipal, provincial and federal) representatives;
- TOR for the Project EIA Report;
- Other recent EIAs completed in the region;
- Published literature on relevant impact sources and effects; and
- Professional knowledge of the Project EIA team.

1.5.2 Temporal Boundaries

The temporal scope of the EIA reflects the timing and nature of Project phases as well as information available on other proposed projects. Project and cumulative effects are assessed for the construction, operations, decommissioning and reclamation, and the closure phases of the Project. Each phase is assessed at the peak of Project activity. The timing of Project hubs are:

- Construction – 2008 through 2016;
- Operations – 2010 through 2050;
- Decommissioning and reclamation – progressive with final decommissioning in 2051 through 2053; and
- Closure – 2053.

The overall Project schedule is outlined in Volume 1 (Table 2.4-1). To establish a baseline time frame, the background conditions were assumed to be those existing on March 1, 2007, and include both unpublished data and readily-available published data.

For this EIA, existing projects are defined as those that are approved by the EUB and/or AENV. Planned developments include projects that have been publicly disclosed (but not approved) as of March 1, 2007. The projects and developments included within the scope of this assessment are listed in Table 1.5-1.

Table 1.5-1 Existing and Planned Projects in the Kai Kos Dehseh Project Regional Study Area

Assessment	Baseline	Impact Assessment (Application)	Cumulative Effects Assessment
Description	Existing and Approved Developments	Existing and Approved Developments + Kai Kos Dehseh Project	Existing and Approved Developments + Kai Kos Dehseh Project + Planned Developments
Existing and Approved	Nexen/OPTI Long Lake SAGD/Upgraders	Nexen/OPTI Long Lake SAGD	Nexen/OPTI Long Lake SAGD
	Petro-Canada Meadow Creek	Petro-Canada Meadow Creek	Petro-Canada Meadow Creek
	ConocoPhillips Canada Resources Corp. Surmont	ConocoPhillips Canada Resources Corp. Surmont	ConocoPhillips Canada Resources Corp. Surmont
	JACOS Hangingstone Pilot	JACOS Hangingstone Pilot	JACOS Hangingstone Pilot
	MEG Energy Christina Lake Regional Project (Pilot and first phase commercial)	MEG Energy Christina Lake Regional Project (Pilot and first phase commercial)	MEG Energy Christina Lake Regional Project (Pilot and first phase commercial)
	Petrobank Whitesands Pilot	Petrobank Whitesands Pilot	Petrobank Whitesands Pilot
	Devon Jackfish SAGD	Devon Jackfish SAGD	Devon Jackfish SAGD
	EnCana Christina Lake Pilot	EnCana Christina Lake Pilot	EnCana Christina Lake Pilot
	Connacher Great Divide Pilot	Connacher Great Divide Pilot	Connacher Great Divide Pilot
	CNRL Kirby Pilot Project	CNRL Kirby Pilot Project	CNRL Kirby Pilot Project
	Gas production facilities	Gas production facilities	Gas production facilities
	Non-industrial sources	Non-Industrial Sources	Non-industrial sources
	Municipalities	Municipalities	Municipalities
	Non-industrial sources	Non-industrial sources	Non-industrial sources
	Pipeline/roadway/electric transmission/other linear	Pipeline/roadway/electric transmission/other linear	Pipeline/roadway/electric transmission/other linear
	Forest harvest	Forest harvest	Forest harvest
	Trapping and hunting	Trapping and hunting	Trapping and hunting
	Recreation	Recreation	Recreation
Kai Kos Dehseh Project		Kai Kos Dehseh Project	Kai Kos Dehseh Project
Planned			Possible Highway 63 and Highway 881 connector west of Conklin
			CNRL Kirby Project
			Devon Jackfish II SAGD
			Nexen/OPTI Long Lake South SAGD
			Future oil sands exploration
			Future seismic exploration
			Other likely activities

1.5.3 Spatial Boundaries

The identification of appropriate study area boundaries is a critical component of impact assessment. Study area boundaries are based on physical, biophysical or social considerations, and how far from the source (the Project) effects are expected to occur. However, it is not efficient or economically practical to assess and sample overly large study areas. Therefore, more detailed data are collected on those areas that are directly affected or influenced by the Project (LSA) and broader resolution data are collected for the extent of the RSA to capture regional indirect influences for the cumulative effects assessment.

For the Project, each biophysical and socio-economic study area was selected to reflect the anticipated zone of influence for each potential impact and pathway. Therefore, each study area boundary was defined as the largest zone of influence applicable to that component that best demonstrates the likely impact(s). For most disciplines, both a LSA and a RSA were delineated to analyze impacts caused by the Project. The LSA is used to evaluate areas that may be directly affected by the Project development. The RSA provides a larger geographical and ecological framework to evaluate impacts of the Project in combination with other existing and planned projects or land uses. Discipline study areas are presented in their relevant sections.

1.5.4 Indicators

There are numerous measurable parameters which may contribute to the environmental or socio-economic conditions and potential effects. Measuring and assessing all of the possible parameters and interactions is impractical. An accepted approach is to select key parameters or variables that are indicators for a broader group of parameters. Indicators are useful in quantifying or evaluating the effects of disturbances on ecological and socio-economic conditions. Selected indicators for each component are described in the applicable section.

1.5.5 Effects Criteria

Assessment criteria were used to describe and evaluate the predicted significance of project effects and the cumulative effects for various indicators.

The evaluation of Project effects includes a predictive assessment on the response of resources and/or indicators to project-specific activities. The evaluation of effects includes a predictive assessment on the response of resources and/or indicators to multiple stresses. Cumulative effects assessment (CEA) differs from project-specific environmental assessment by considering a larger geographic study area to include interactions between existing projects, developments and land uses with activities of the Project and nearby future projects, and foreseeable environmental changes (Section 1.5.6).

Consistent with guidelines in the *Canadian Environmental Assessment Act* Responsible Authorities Guide (FEARO, 1994), Project-specific effects and cumulative effects were assessed using the following seven criteria. Where necessary, because of differences amongst the broad range of biophysical and social factors, the following criteria are further defined within relevant sections of the EIA.

- Direction;
- Extent;
- Magnitude;
- Duration;
- Frequency of Occurrence;
- Permanence; and,

- Prediction Confidence.

Direction describes if there is a net benefit, net loss or a net balance to the resource or affected party as result of the impact. The direction is classified as either a positive, neutral or negative effect.

Extent describes the area within which the effect occurs. It is classified as subregional (one watershed or natural subregion), regional (within the RSA), or extra-regional (effects extends beyond the RSA) effect. The classification of local is further defined and used in some sections of the EIA.

Magnitude describes the size and severity of the effect. Magnitude is classified as negligible (no discernible contribution), low (within acceptable protective standards and/or causes no detectable change to the resource), medium (within acceptable protective standards and/or causes a detectable change to the resource), or high (exceeds protective standards and/or causes a detectable change to the resource beyond the range of tolerance).

Duration describes how long the effect will occur. Duration is classified as short-term, medium-term or long-term. The time span of a duration will be defined as required by each discipline, for example, short-term (less than one year), medium-term (one to ten years), or long-term (greater than ten years) may be appropriate for some terrestrial disciplines but not appropriate for noise or air quality.

Frequency of occurrence describes how often an effect occurs within a set time period. It is classified as isolated (occurs at a specific time), occasional (intermittent and sporadic), regular (occurs recurrently during the assessment period), or continuous (occurs continually during the assessment period).

Permanence describes the potential for the recovery or reversibility of an effect. Permanence is classified as effects that are reversible in the short-term (within one year), reversible in the medium-term (one to ten years), reversible in the long-term (greater than ten years) or irreversible (permanent).

Prediction confidence describes the certainty of the effect assessment and considers data quality, rigor of the assessment/measurement approach, and/or the certainty of prescribed mitigation measures. Prediction confidence is classified as low (poor understanding of cause-effect relationships and poor quality data), medium (good understanding of cause-effect relationships and low quality data or high quality data but poor understanding of cause-effect relationships), or high (good understanding of cause-effect relationships and high quality data).

Conclusions for the project effects criteria are based on qualitative and quantitative assessments. Quantitative assessments include the results of measurable predictions or objective comparisons of residual project impacts with established limits (e.g., water quality guidelines, ambient air quality guidelines, environmental objectives, etc.) Qualitative assessments are subjective and consider conclusions based on best professional judgment. This is important when environmental objectives are not available or quantitative predictions are not feasible.

The integration of the various effects criteria ratings result in a final impact rating for each potential Project effect. The possible final impact ratings are: no impact, negligible impact, low impact, medium impact or high impact. The result of combining objective and quantitative assessments with subjective evaluations and best professional judgment provides a conclusion for each predicted Project effect.

1.5.6 Cumulative Effects Analysis

Cumulative effects are the result of multiple stresses affecting the parts and functions of ecosystems. Ecosystems can change abruptly and unexpectedly in response to the incremental accumulation and interaction of these impacts, often responding to seemingly small changes (AENV, 2000). Assessments of cumulative effects often require innovative methods to predict changes to unique or site specific circumstances.

Cumulative effects assessment (CEA) differs from project-specific environmental assessment by considering a larger geographic study area to include interactions between existing projects, developments and land uses with activities of the Project and nearby future projects, and foreseeable environmental changes. General guidance to evaluate cumulative effects in Alberta is provided in CEAA (1999), EUB and NRCB (2000), and AENV (1999).

In Alberta, Sections 47(d) and (e) of the *Alberta Environmental Assessment and Enhancement Act* state that EIAs required for oil sands development must include:

> "(d) a description of the potential positive and negative environmental, social, economic and cultural impacts of the proposed activity, including cumulative, regional, temporal and spatial considerations;
>
> (e) an analysis of the significance of the potential impacts identified under clause (d)."

There are inherent uncertainties in predicting future developments (CEARC, 1986; Sonntag et al., 1987; and AENV, 2000). Uncertainty such as the following can result in major limitations to the analysis of cumulative effects:

- Lack of site-specific data;
- Absence of defined resource use or ecological thresholds;
- Lack of availability of credible and defensible information on likely future development activities; and
- Difficulty in predicting synergistic, discontinuous or unanticipated resource and system effects.

1.5.6.1 CEA Methodology

The complexity of the incremental accumulation of multiple stresses on an ecosystem makes it difficult to prescribe a set of standard methods for the analysis of cumulative effects. Instead, selection of appropriate approaches and methods depends on specific objectives and issues associated with the project (Cocklin et al., 1992a,b; Shoemaker, 1994; Hegmann and Yarranton, 1995; Smit and Spaling, 1995; Hegmann et al., 1999; AENV, 2000). The scope and level of effort associated with an evaluation of cumulative environmental effects should be appropriate to the environmental setting, the nature of the project under assessment and its potential effects (AENV, 1999; AENV, 2000).

During early project notification and consultation, the key potential cumulative effects issues identified by the public, government representatives and the Project team were water use/disposal, air emissions and land disturbance.

Cumulative effects likely to result from the combination of the Project and other existing and proposed projects in the area and reasonably foreseeable environmental changes were considered and evaluated for each discipline using methods suitable to the discipline-specific issues. Environmental impacts in the LSA with a predicted magnitude of medium or higher, that temporally and spatially overlap, and that could act cumulatively with other environmental pressures, were included in the CEA of the appropriate environmental component. Background information on the environmental setting, methodology and evaluations of potential project-related and cumulative effects are provided in each discipline section.

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APPENDICES

Appendix 2A Air Emissions Inventory

Appendix 2B Ambient Air Quality Observations

Appendix 2C CALMET Meteorological Model

Appendix 2D CALPUFF Dispersion Model

2 AIR

2.1 Introduction

2.1.1 Overview and Scope of Assessment

The air quality assessment provides an understanding of the magnitude and the spatial variation of potential air quality changes associated with the Kai Kos Dehseh Project (the Project) emissions. These emissions will overlap with emissions from other local and more distant emission sources; therefore, the ambient air quality assessment for the Project considers all of these sources.

Air quality requires evaluation in the context of Project emissions, other local and regional emission sources, other users of the airshed and the current regulatory framework. In particular, the Alberta framework identifies ambient air quality objectives for a number of chemical compounds and deposition loads for acid forming emissions. Similarly, there is continuing provincial, national and international interest in documenting greenhouse gas emissions (GHG).

The Project will be a source of sulphur dioxide (SO_2), oxides of nitrogen (NO_X), particulate matter (PM), carbon monoxide (CO), volatile organic compound (VOC), polyaromatic hydrocarbon (PAH) and greenhouse gas (GHG) emissions that result from combustion processes. The approach used to evaluate these combustion emissions is consistent with assessments that have been adopted in EIAs for other oil sands developments in the region.

The Project will include a vapour recovery unit as well as a leak detection and repair (LDAR) program, and therefore, fugitive emissions are expected to be negligible. As a result, typical fugitive emissions, including hydrogen sulphide (H_2S), total reduced sulphur (TRS) and total hydrocarbons (THC), were not assessed. These compounds are the main odorants associated with oil and gas activities. Since emissions of these compounds are expected to be negligible, odours associated with the Project are also expected to be negligible, and therefore, were not assessed.

Emissions during construction will be localized, short-term and of much smaller magnitude than emissions during operations. Therefore, the focus of this assessment was on emissions from the Project during operations.

The air quality section focuses on determining air quality changes due to operation of the Project and providing the information required to assess the potential effects of these air quality changes on terrestrial resources, aquatic resources and human health.

2.1.2 Objectives

The objectives for this air quality section are to address the information requirements as set out in the final Terms of Reference concerning air quality matters, including the following:

- Define baseline air quality and climate in the vicinity of the Project;
- Identify and characterize atmospheric emission sources from existing, approved and proposed regional emission sources;
- Describe North American's plans to control air emissions from the Project facilities;

- Predict ambient air quality changes due to the Project and other operations in the region; and

- Compare the air quality changes to ambient air quality criteria.

The impacts of the predicted air quality changes are assessed in other sections, including surface water quality, soil, vegetation and human health.

2.2 Study Area

There are a number of operating, approved and planned oil sands developments in the immediate Project area, to the north in the Athabasca oil sands area and to the south in the Christina Lake and Cold Lake areas. Factors in selecting the regional study area for the Project include the need to:

- Include the overlapping effects of the developments located to the north in the Fort McMurray area and of the developments located to the south in the Christina Lake and Cold Lake areas;

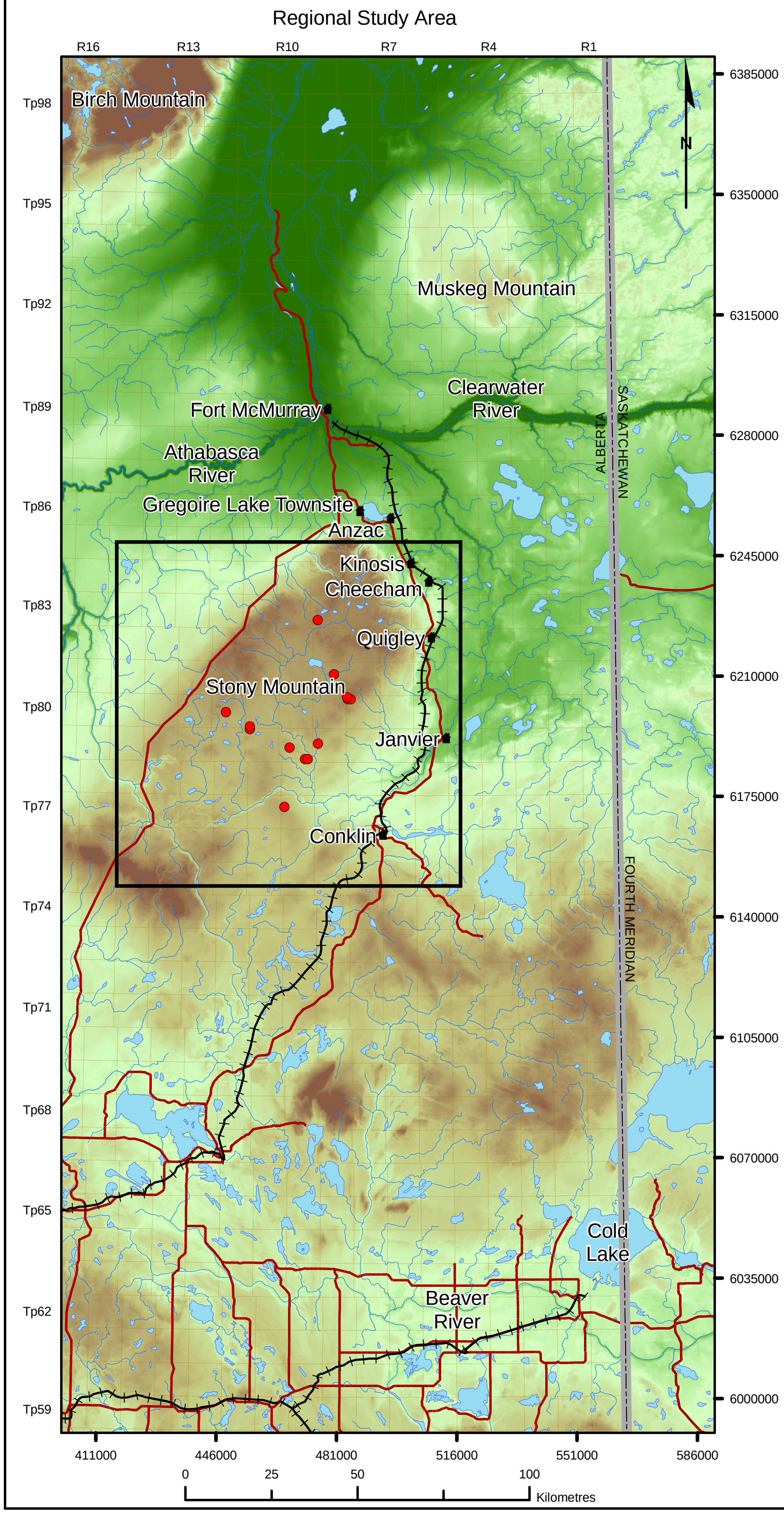
- Include the primary communities in the Project area (e.g., Fort McMurray, Anzac, Janvier and Conklin); and

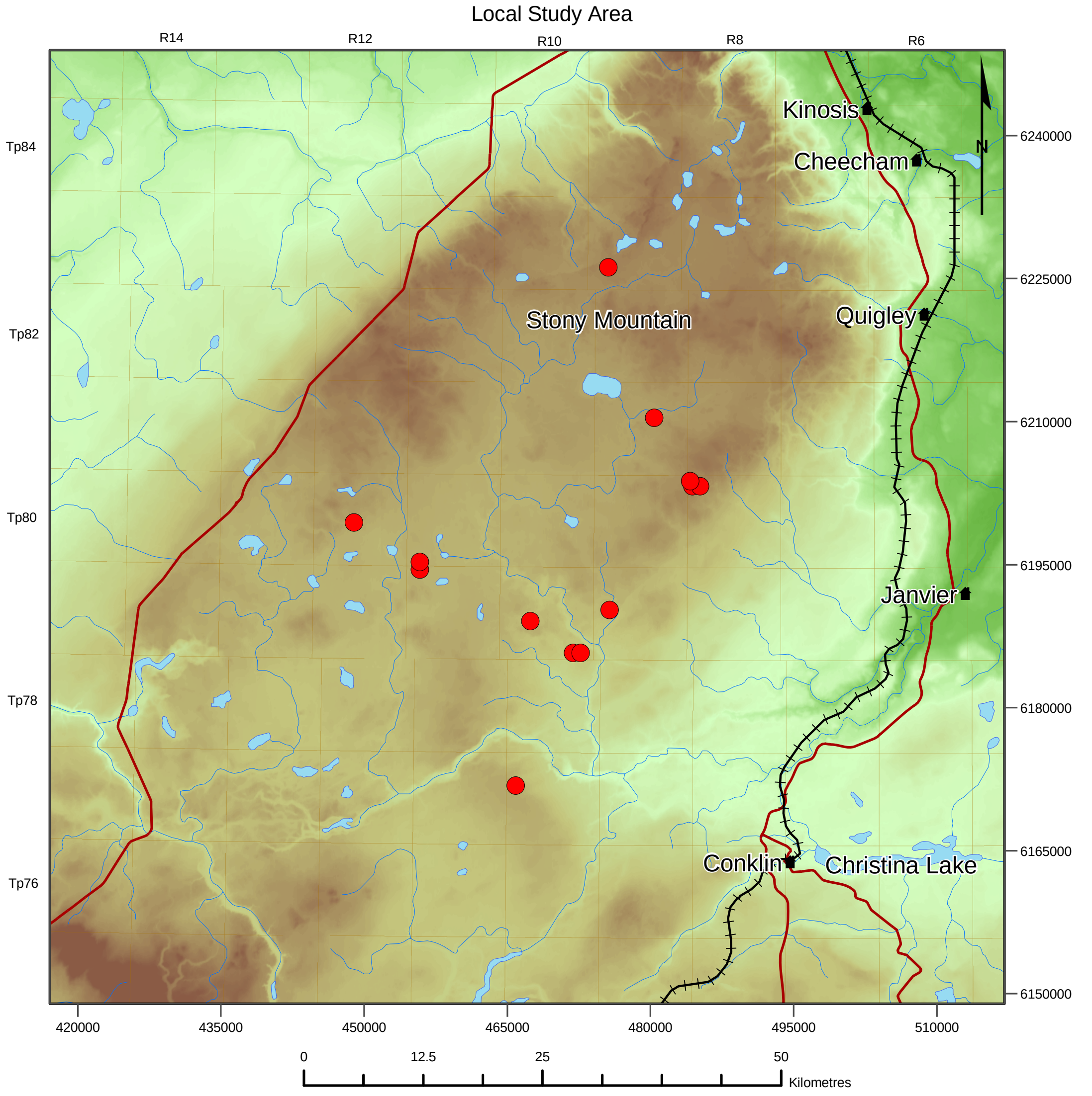
- Assess potential transboundary effects of emissions in Saskatchewan.

On this basis, a nominal 190 km x 400 km regional study area (i.e., the air RSA) was selected (Figure 2.2-1).

A local study area (i.e., the air LSA) was also selected to more clearly present local scale air quality predictions. The air LSA represents a 100 km by 100 km area which encompasses the Project as well as other oil and gas facilities in the vicinity. The boundary of the air LSA was selected to include the nearest communities (i.e., Conklin).

Key terrain features in the northern portion of the air RSA include valleys defined by the Athabasca and Clearwater Rivers, which intersect at Fort McMurray. Elevated terrain features in the northern portion of the RSA include Birch Mountain approximately 100 km to the northwest of Fort McMurray (peak elevation approximately 850 masl), Muskeg Mountain approximately 50 km to the northeast of Fort McMurray (peak elevation approximately 670 masl). Stony Mountain is encompassed by the Project area and has a peak elevation approximately 760 masl; with the Project being located at approximately 700 masl. The terrain in the central and southern portions of the air RSA is relatively flat with a general downhill slope from Stony Mountain south approximately 170 km toward Cold Lake and Beaver River (elevation approximately 540 masl).





Legend

● The Project

☗ Community

Railroad

Road

Lake

River

Terrain (mASL)

High : 953

Low : 216

PROJECT

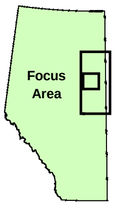
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Air Regional Study Area (RSA) &
Air Local Study Area (LSA)

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.2-1



UTM Zone 12 NAD83

2.3 Issues and Assessment Criteria

Potential air quality issues are evaluated in the context of the airshed, other sources of emissions in the airshed, other users of the airshed and the regulatory framework. In particular, the Alberta regulatory framework identifies the need to meet ambient air quality objectives for a number of chemical species that are potentially emitted and to meet deposition loads for acid forming emissions. There is also continuing provincial, national and international interest in minimizing GHG emissions.

Three scenarios were assessed including:

1. Baseline scenario, which included a review of existing climate and ambient air quality data as well as dispersion modelling of existing and approved sources;
2. Application scenario, which consisted of dispersion modelling of Project emissions in addition to baseline scenario emission sources, and
3. Cumulative scenario, which was based on dispersion modelling of all sources included in the application scenario and any other planned (or proposed) projects or activities.

Eight air quality issues were addressed in the scenario assessments and are detailed below.

1. Project Emissions to the Atmosphere – The Project will result in point emissions of gaseous chemicals and particulate matter to the atmosphere. The identification of these emissions forms the basis of the air quality assessment.
2. Impact of Project SO_2 Emissions on Ambient SO_2 Concentrations – Ambient SO_2 exposures at sufficiently high concentrations can have adverse impacts on human health, vegetation, soil and surface water.
3. Impact of Project NO_x Emissions on Ambient NO_2 Concentrations – Ambient NO_2 exposures at sufficiently high concentrations can have adverse impacts on human health, vegetation, soil and surface water.
4. Impact of Project PM Emissions on Ambient PM Concentrations – Particulate matter with aerodynamic diameters less than 2.5 um ($PM_{2.5}$) was used in this assessment to evaluate the potential impact of particulate matter emissions from the Project for three reasons. First and foremost, $PM_{2.5}$ is better correlated to potential health impacts than either PM_{10} or total suspended particulate (TSP). Second, the Canada-Wide Standard (CWS) for $PM_{2.5}$ is more restrictive than the TSP objective and Alberta does not have an objective for PM_{10}. Third, $PM_{2.5}$ is the size fraction most likely to result in impaired visibility. $PM_{2.5}$ can be emitted directly from industrial facilities or can be formed in the atmosphere from precursor emissions (e.g., SO_2 and NO_X).
5. Project Impact of Emissions on Regional Acid Deposition – Ambient SO_2 and NO_x can form acidifying chemicals in the atmosphere, which are removed by wet and dry deposition mechanisms. This potential acid input (PAI) can potentially change soil and surface water chemistry.
6. Impact of Project Emissions on Air Quality at Community and Recreational Area Receptor Locations – Combustion sources produce SO_2, NO_x, CO, PM, VOC and PAH emissions. Ambient exposures at sufficiently high concentrations of these chemicals can have adverse impacts on human health.

7. Impact of Project Emissions on Regional Ozone Formation – Ambient NO_x emissions may combine with anthropogenic and biogenic VOC emissions to form ground-level ozone downwind of the region. Naturally high ozone concentrations occur infrequently in rural areas of Alberta. In sufficiently high concentrations, ambient ozone exposures can have adverse impacts on human health and vegetation. The photochemistry reactions associated with ozone formation and destruction are very complex and require the use of research-grade meso-scale models that are typically used to assess ozone episodes – not long-term trends. Thus, modelling of ozone was considered beyond the scope of this assessment. However, the potential impact of Project emissions on regional ozone formation was assessed qualitatively.

8. Project Contribution to GHG Emissions – The combustion of produced gas and natural gas will result in the release of GHG (primarily carbon dioxide [CO_2]).

The air quality parameters and criteria used to evaluate the significance of the potential impacts of these issues are summarized in Table 2.3-1 and discussed in the following subsections.

2.3.1 Air Quality Parameters

Air quality is dependent on the chemical composition and the transfer (i.e., deposition) of contaminants from air to terrestrial or aquatic ecosystems. The composition and the deposition are related to natural and anthropogenic emissions, local meteorology and land use. Table 2.3-1 defines the indicator resources used to represent air quality.

Chemical composition is represented by concentrations in the atmosphere, expressed in terms of parts per billion on a volume basis (ppbv) or micrograms per cubic metre of air (ug/m^3).

Deposition is expressed in terms of mass of contaminant removed from the atmosphere per hectare of land area each year. For acid deposition, the units of keq H^+/ha/y are used where 1 keq H^+ = 1 kg of hydrogen ion equivalents.

Ambient air quality changes due to air emissions from a single source generally decrease with increasing distance from the source. Downwind ambient concentration changes over any period will depend on the prevailing meteorology during that period. Therefore, the ambient concentration pattern due to these emission sources varies considerably with location and time.

Maximum predicted values, which are specific to a single location and a narrow range of meteorological conditions, were selected as the primary air quality parameters for most issues. These parameters were used to assess the magnitude of the predicted concentrations and deposition by comparison with ambient air quality criteria. In addition, the changes due to the Project are presented as a percentage change, relative to the baseline scenario.

Table 2.3-1 Indicator Resources

Issue	Indicator Resources	Air Quality Parameters	Criteria for Evaluating Significance of Impacts
Project emissions to the atmosphere.	Emissions	SO_2, NO_2, CO, VOC and $PM_{2.5}$ emissions.	Change relative to baseline emissions.
Impact of Project SO_2 emissions on ambient SO_2 concentrations.	SO_2 concentration	Maximum 1-h, 24-h and annual average SO_2 concentrations. Geographic distribution of predicted values.	1-h, 24-h and annual ambient objectives.
Impact of Project NO_x emissions on ambient NO_2 concentrations.	NO_2 concentration	Maximum 1-h, 24-h and annual average NO_2 concentrations. Geographic distribution of predicted values.	1-h, 24-h and annual ambient objectives.
Impact of Project $PM_{2.5}$ emissions on ambient $PM_{2.5}$ concentrations.	$PM_{2.5}$ concentration	Maximum 24-h average $PM_{2.5}$ concentrations. Geographic distribution of predicted values.	24-h Canada-Wide Standards (CWS). Management triggers.
Project impact of SO_2 and NO_x emissions on regional acid deposition.	PAI	Maximum PAI. Geographic distribution of predicted values.	AENV deposition loads.
Impact of Project emissions on community and recreational receptors.	SO_2, NO_2, CO, VOC and $PM_{2.5}$ concentrations	Maximum 1-h, 8-h, 24-h and annual average concentrations at community and recreational locations. A number of individual VOC species (e.g., benzene) and VOC groups (e.g., alphatics C_5 to C_8) are evaluated.	Ambient guidelines for SO_2, NO_2, CO, benzene and formaldehyde. CWS for $PM_{2.5}$.
Impact of Project emissions on regional ozone formation.	Ozone concentration	Magnitude of precursor emissions. Expected change in ozone concentrations.	1-h ambient objective.
Project contribution to GHG emissions.	GHG emissions	GHG emissions expressed as carbon dioxide equivalent (CO_2E).	Change relative to Alberta and CWS emission rates.

2.4 Methods

2.4.1 Overall Approach

A standard assessment approach was used to determine air quality changes associated with the three assessment scenarios. The steps in this approach are summarized as follows:

- Review historical ambient air quality observations to define background air quality;
- Identify the emission sources and quantify emissions for each assessment scenario;
- Use dispersion models to predict ambient concentrations and deposition levels due to emissions associated with each assessment scenario;
- Compare the predictions with ambient air quality criteria and deposition management loads; and
- Compare scenario results to determine the incremental air quality changes due to the Project and express them as a percentage change.

Projects included in the three assessment scenarios are listed in Table 2.4-1 for the air LSA and additional projects for the air RSA are listed in Table 2.4-2. Locations of the existing, approved and proposed developments are shown in Figure 2.4-1. (ConocoPhillips Surmont Pilot and Phases 1, 2, 3 & 4 are all identified by an average coordinate and that the proposed ConocoPhillips Phases 1 & 2 will replace the already approved Phases 1, 2, 3 & 4.) Projects that have received regulatory approval were included in the baseline scenario. Projects that were proposed prior to January 2007 have been included in the cumulative scenario.

Mitigation measures planned for the Project are included in the emission estimates for the application scenario. Therefore, the assessment of Project effects is equivalent to a residual effects assessment.

The air quality assessment approach is summarized in Table 2.4-3. The approach is similar to that used for previous assessments in the region. Furthermore, dispersion modelling was conducted in accordance with the AENV Air Quality Model Guideline.

2.4.2 Evaluating Impact

Regulatory agencies have identified ambient air quality criteria for various desirable contaminant concentrations in the atmosphere. Maximum predicted and measured values are compared to these criteria.

Ambient Air Quality Criteria

Table 2.4-4 provides the Alberta ambient air quality objectives (AAAQO) for a number of compounds and the Canada-Wide Standards (CWS) for $PM_{2.5}$ and ozone. Alberta does not have an objective for PM_{10}. While Alberta has a TSP objective, $PM_{2.5}$ is better correlated to potential health impacts than either PM_{10} or TSP and the CWS is more restrictive than the TSP objective. Therefore $PM_{2.5}$ was used in this assessment to evaluate the potential impact of particulate matter emissions from the Project.

The CWS for $PM_{2.5}$ is based on 30 ug/m^3 as a 24-hour average. Achievement is based on the average of monitors within an identified population centre and the 98th percentile for a year, averaged over three consecutive years after year 2010. In determining compliance, natural sources or long-range transport contributions can be discounted. While the CWS focus is on population centres over 100,000, Alberta also applies the CWS to rural areas. As indicated in Table 2.4-4, two action levels are identified. The management trigger was selected to determine options to ensure that levels remain below the CWS level. The surveillance trigger was selected to ensure that appropriate monitoring is in place to assess the region's air quality.

The CWS for ozone is based on 65 ppb (127 ug/m^3), as an 8-hour average. Achievement is based on the 4thhighest daily value for a year, averaged over three consecutive years after year 2010. In determining compliance, natural sources or long-range contributions can be discounted. In the application of the CWS to Alberta, a management trigger was selected to ensure that levels remain below the CWS level.

Ambient air quality standards in Saskatchewan are either equivalent to or less stringent than the Alberta objectives listed in Table 2.4-4. Saskatchewan has also adopted the CWS for $PM_{2.5}$ and ozone.

Alberta Environment recognizes that extreme, rare and transient meteorological conditions can affect model predictions of hourly average ambient air quality (AENV, 2003). To address this issue, the AENV Air Quality Model Guideline recommends the eight highest predicted hourly average concentrations in a year be considered outliers and disregarded. The ninth-highest value (equivalent to the 99.9th percentile) is therefore used as the basis for determining compliance with the hourly average ambient guidelines. For this assessment, the 99.9th percentile hourly predictions are referred to as the maximum values.

Table 2.4-1 Projects Included in the Project Local Study Area

Status	Baseline	Application	Cumulative
Existing and Approved	Connacher Great Divide Project ConocoPhillips Surmont Pilot ConocoPhillips Surmont Phases 1, 2, 3 & 4 Devon Jackfish EnCana Christina Lake Phases 1, 2, & 3 Japan Canada Oil Sands Hangingstone 1, 2 & 3 MEG Christina Lake Pilot and Regional Project Nexen Inc./OPTI Long Lake North Petro-Canada Meadow Creek Whitesands in-situ Whitesands Gas Production Facilities Communities Roadways	Connacher Great Divide Project ConocoPhillips Surmont Pilot ConocoPhillips Surmont Phases 1, 2, 3 & 4 Devon Jackfish EnCana Christina Lake Phases 1, 2, & 3 Japan Canada Oil Sands Hangingstone 1, 2 & 3 MEG Christina Lake Pilot and Regional Project Nexen Inc./OPTI Long Lake North Petro-Canada Meadow Creek Whitesands in-situ Whitesands Gas Production Facilities Communities Roadways	Connacher Great Divide Project ConocoPhillips Surmont Pilot Devon Jackfish EnCana Christina Lake Phases 1, 2, & 3 Japan Canada Oil Sands Hangingstone 1, 2 & 3 MEG Christina Lake Pilot & Regional Project Nexen Inc./OPTI Long Lake North Petro-Canada Meadow Creek Whitesands in-situ Whitesands Gas Production Facilities Communities Roadways
Project		North American Kai Kos Dehseh	North American Kai Kos Dehseh
Proposed			ConocoPhillips Surmont Phases 1 & 2 Devon J2 Japan Canada Oil Sands Hangingstone Commercial Nexen/OPTI Long Lake South Phases 1 & 2

Table 2.4-2 Projects Included in the Project Regional Study Area and Outside Local Study Area

Status	Baseline	Application	Cumulative
Existing and Approved	Albian Muskeg River Mine Phases 1 & 2 Birch Mountain Resources Muskeg Valley Quarry Canadian Natural Burnt Lake Pilot Canadian Natural Horizon Canadian Natural Kirby Pilot Canadian Natural Primrose North & South Canadian Natural Wolf Lake Deer Creek Joslyn Phase II EnCana Foster Creek Pilot EnCana Foster Creek Phase 1 Husky Sunrise Phase 1, 2 & 3 Husky Tucker Lake Imperial Leming Imperial Mahihkan 2 & 4 Imperial Mahkeses Imperial Maskwa 1 & 3 Imperial Nabiye Northlands Forest Products Sawmill Petro-Canada Dover UTF Petro-Canada MacKay River Phase 1 Petro-Canada Fort Hills Shell Jackpine Phase 1 Shell Orion Hilda Lake Suncor Firebag Project Suncor Millennium Suncor Voyageur Syncrude Aurora North & South Syncrude Mildred Lake Williams Energy Fort McMurray Chemical Plant Gas Production Facilities Communities Roadways	Albian Muskeg River Mine Phases 1 & 2 Birch Mountain Resources Muskeg Valley Quarry Canadian Natural Burnt Lake Pilot Canadian Natural Horizon Canadian Natural Kirby Pilot Canadian Natural Primrose North & South Canadian Natural Wolf Lake Deer Creek Joslyn Phase II EnCana Foster Creek Pilot EnCana Foster Creek Phase 1 Husky Sunrise Phase 1, 2 & 3 Husky Tucker Lake Imperial Leming Imperial Mahihkan 2 & 4 Imperial Mahkeses Imperial Maskwa 1 & 3 Imperial Nabiye Northlands Forest Products Sawmill Petro-Canada Dover UTF Petro-Canada MacKay River Phase 1 Petro-Canada Fort Hills Shell Jackpine Phase 1 Shell Orion Hilda Lake Suncor Firebag Project Suncor Millennium Suncor Voyageur Syncrude Aurora North & South Syncrude Mildred Lake Williams Energy Fort McMurray Chemical Plant Gas Production Facilities Communities Roadways	Albian Muskeg River Mine Phases 1 & 2 Birch Mountain Resources Muskeg Valley Quarry Canadian Natural Burnt Lake Pilot Canadian Natural Horizon Canadian Natural Kirby Pilot Canadian Natural Primrose North & South Canadian Natural Wolf Lake Deer Creek Joslyn Phase II EnCana Foster Creek Pilot EnCana Foster Creek Phase 1 Husky Sunrise Phase 1, 2 & 3 Husky Tucker Lake Imperial Leming Imperial Mahihkan 2 & 4 Imperial Mahkeses Imperial Maskwa 1 & 3 Imperial Nabiye MEG Christina Lake Pilot and Regional Project Northlands Forest Products Sawmill Petro-Canada Dover UTF Petro-Canada Fort Hills Petro-Canada MacKay River Phase 1 Petro-Canada Meadow Creek Shell Jackpine Phase 1 Shell Orion Hilda Lake Suncor Firebag Project Suncor Millennium Suncor Voyageur Syncrude Aurora North & South Syncrude Mildred Lake Williams Energy Fort McMurray Chemical Plant Gas Production Facilities Communities Roadways
Project		North American Oil Sands Project	North American Oil Sands Project
Proposed			Canadian Natural Horizon In-Situ Canadian Natural Primrose Lake East Deer Creek Joslyn Phase IIIA Deer Creek Joslyn North Mine Imperial Kearl Mine Development Petro-Canada Lewis Petro-Canada MacKay River Phase 2 Petro-Canada Meadow Creek Expansion Shell Jackpine Phase 2 Synenco Energy Northern Lights Mining Project

Table 2.4-3 Summary of Air Quality Assessment Approach

Component of Approach	Description
Source Characterization	Characterization of emission sources focuses primarily on identifying and estimating combustion source SO_2, NO_2, CO, $PM_{2.5,}$ PAH and VOC emissions since they are forecast to increase due to the development proposed in the air RSA. Combustion source characterization requires information on the physical stack attributes (e.g., stack height, diameter and building dimensions), gross stack flow parameters (e.g., exit velocities, exit temperatures) and pollutant emission flow rates (e.g., SO_2, NO_x and $PM_{2.5}$ emissions). Source characterization data were produced for the three assessment scenarios (Appendix 2A).
Terrestrial Characterization	Terrain elevations for the air RSA were obtained from digital elevation models. The elevation data have a nominal horizontal resolution of 100 m, more than sufficient for air quality evaluation purposes. Vegetation cover characteristics are based on a review of digital vegetation cover data supplemented with a literature review of applicable land-use properties. One of the critical land-use parameters is the leaf area index (LAI), which is important for deposition predictions. As vegetation cover characteristics vary with the season, representative seasonal values (i.e., LAI) were assumed for the modelling (Appendix 2B).
Representative Meteorology	The CALMET meteorological model was used to predict temporally and spatially dependent wind, temperature and turbulence fields. The CALMET model input was based on the MM5 (a mesoscale meteorological model) wind and temperature profiles that were obtained from AENV. The CALMET/MM5 approach produces a full year (i.e., 2002) of high-resolution meteorological data for use by the CALPUFF model. The CALMET meteorological model also used surface data from ambient air quality monitoring stations (Appendix 2C).
Model Selection	The CALPUFF model was used to calculate ambient air quality changes for the assessment scenarios. The code and documentation for this model are available from the Earth Tech website (www.src.com/calpuff/calpuff1.htm). Guidelines for the selection and application of the models are available from Alberta Environment (2003) and U.S. EPA (2003) as well as the model manual (Scire et al., 1999). The CALPUFF model has been accepted by AENV and the EUB. The CALPUFF dispersion model has been used for previous applications in the region. It was first used in northeastern Alberta for the Albian Muskeg River Mine assessment; and more recently for the Devon Jackfish Project and the MEG Christina Lake assessments.
Model Application	The CALPUFF model was applied to the air RSA. Noteworthy items include: • A total of 28,329 receptors with an increased grid density surrounding the facilities of the Project Area were selected. Grid densities vary from 50 m to 10 km, depending on the distance from the Project areas. • An additional 79 community and recreational area locations were selected. The model was run on a seasonal basis to account for vegetation cover variation. Predicted SO_2 and NO_2 concentrations and PAI levels are presented as contours superimposed over the air RSA and air LSA base maps. Results for the community and recreational receptors are presented in tabular formats and are provided for 1-h, 8-h, 24-h and annual averaging periods, where applicable. Specifically, estimates of maximum SO_2, NO_2, CO, $PM_{2.5}$, 2-Methylnaphthalene, 3-Methylchloranthrene, 7,12-Dimethylbenz(a) anthracene, Acenaphthene, Acenaphthylene, Acetaldehyde, Acrolein, Anthracene, Benzaldehyde, Benzene, Benzo(a) anthracene, Benzo(a) pyrene, Benzo(b) fluoranthene, Benzo(e) pyrene, Benzo(g,h,i) perylene, Benzo(k) fluoranthene, Chrysene, Dibenz(a,h) anthracene, Dichloro benzene, Ethyl benzene, Fluoranthene, Fluorene, Formaldehyde, Hexane, Indeno(1,2,3-cd) pyrene, Naphthalene, Pentane, Perylene, Phenanthrene, Pyrene, Toluene, and Xylenes are provided for the community and recreational locations. Further details regarding the CALPUFF model are provided in Appendix 2D.
Presentation Limitations	The predictions are shown as a series of contours superimposed over base maps to provide an indication of spatial variability. The contours that are presented in the figures have been smoothed to 150 m resolutions (for the air LSA and air RSA). Therefore, there can be differences between the peak values given in the tables and those inferred from the contour plots. Priority is given to the values provided in the tables.

Table 2.4-4 Alberta Ambient Air Quality Objectives for Air Pollutants

Air Quality Parameter	Averaging Period	Concentration	
		(ug/m^3)	(ppbv)
Sulphur Dioxide (SO_2)	1-h 24-h Annual arithmetic mean	450 150 30	172 57 11
Hydrogen Sulphide (H_2S)	1-h 24-h	14 4	10 3
Nitrogen Dioxide (NO_2)	1-h 24-h Annual arithmetic mean	400 200 60	212 106 32
Carbon Monoxide (CO)	1-h 8-h	15,000 6,000	13,000 5,000
Ozone (O_3)			
– Ground Level	1-h	160	82
– CWS	8-h	127	65
– Management Trigger	8-h	113	58
Total Suspended Particulate (TSP)	24-h	100	–
$PM_{2.5}$			
– CWS	24-h	30	–
– Management Trigger	24-h	20	–
– Surveillance Trigger	24-h	15	–
Acetaldehyde	1-h	90	50
Benzene	1-h	30	9
Formaldehyde	1-h	65	53

Notes: Standard conditions of 25°C and 101.325 kPa are used as the basis for conversion from ug/m^3 to ppbv.

Source: AENV (2005) and CCME (2000).

2.4.2.1 Deposition Criteria

The predicted Potential Acid Input (PAI) values are compared to the critical, target and monitoring deposition loads in the Clean Air Strategic Alliance (CASA) and AENV (1999) Acid Deposition Management Framework. This framework refers to PAI averaged over a 1° longitude by 1° latitude grid cell. This grid cell corresponds to a region that is about 65 km by 112 km with a total area of 7,383 km^2. For comparison, the area of the air RSA has an east-west extent of 3.0° longitude and a north-south extent of 3.5° latitude (for a total area of 74,100 km^2). As such, a small scale comparison is used in lieu of the 1° longitude by 1° latitude grid cell. This is consistent with the use of the deposition loads as tools to identify areas that may be at risk of acid deposition effects; however, small-scale predicted deposition levels greater than the management loads are not equivalent to exceedances of provincial objectives for other substances.

CASA's three deposition management loads are shown in Table 2.4-5 and described as follows:

- Monitoring Load – If deposition to a grid cell is greater than the monitoring load, then AENV will require industry and non-industry stakeholders to discuss appropriate monitoring approaches. Monitoring loads are set below target loads to allow sufficient time for the development of a management plan before deposition levels reach target load levels.

- Target Load – Target loads are viewed as an environmental objective or regulatory instrument, similar to the ambient guidelines. If a grid cell deposition is greater than the target load, then an emission reduction plan will have to be developed.
- Critical Load – Critical loads identify a level of deposition that can lead to long-term harmful changes to the environment. In the event that a critical load is exceeded, an emission reduction plan will be developed and implemented on an accelerated schedule. However, exceeding a critical load does not indicate environmental damage is imminent, unless it is sustained over many years.

Table 2.4-5 Critical, Target and Monitoring Loads

Receptor Sensitivity	Deposition Load	Potential Acid Input (PAI) (keq H^+ /ha/y)
Low sensitivity	Critical	1.00
	Target	0.90
	Monitoring	0.70
Moderate sensitivity	Critical	0.50
	Target	0.45
	Monitoring	0.35
Sensitive	Critical	0.25
	Target	0.22
	Monitoring	0.17

Source: CASA and AENV (1999).

While the Acid Deposition Management Framework indicates that these loads may be used as benchmarks on a local scale (i.e., for distance scales less than the 1º longitude by 1º latitude grid cell), they are not intended to be applied as environmental objectives or as the basis for determining the acceptability of an individual project. However, values greater than guideline levels on a local scale can be used to determine the potential need for management options that could include monitoring or mitigation. The consequences of the predicted PAI levels are assessed under respective discipline assessments.

2.4.2.2 Impact Assessment

Potential impacts are described using the descriptors provided in Table 2.4-6. These descriptors have been adapted to assess changes relative to ambient air quality. The ambient air quality resource indicators are described in terms of pollutant emissions (expressed in t/d), ambient concentrations (expressed in ug/m^3) and PAI (expressed in keq H^+/ha/y). The concentration parameters are highly variable and can change in time and space depending on the location and level of activity of the emission source and on the meteorology. The maximum predicted changes are compared to ambient air quality criteria. Comments relative to the general descriptors are as follows:

- **Direction** – Direction addresses the expected change without regard for the magnitude of the change. The direction is interpreted as being adverse (i.e., negative) if there are any increases in the air quality parameters listed in Table 2.3-1. If there is no change, the direction is termed neutral, and if the air quality parameters decrease, the direction is considered positive.

- **Geographic Extent** – Generally, air quality changes decrease with increasing downwind distance from the emission source. The extent is identified as “local” to reflect changes in the vicinity of the Project that are limited to the air LSA, “regional” to reflect potential overlapping effects with other, more distant emission sources but limited to the air RSA, and “global” to reflect changes that extend beyond the air RSA.

- **Magnitude** – Ambient air quality levels are usually compared to ambient air quality criteria. A magnitude rating of ‘high’ is attributed to predicted values that exceed associated criteria that previously were not exceeded. Ambient air quality uncertainty is typically in the range of 10% (especially for low values); any changes in the predicted values less than this amount are rated as ‘low’. Predicted changes between the ‘low’ and ‘high’ definitions are rated as ‘medium’.

- **Duration** – If a predicted impact is expected to last for a period less than the Project life (i.e., about 40 years) it is considered short-term. If the impact is expected to last beyond the life of the Project it is given a long-term rating. Impacts that are expected to last for the duration of the Project life but cease when the Project is over are considered medium-term.

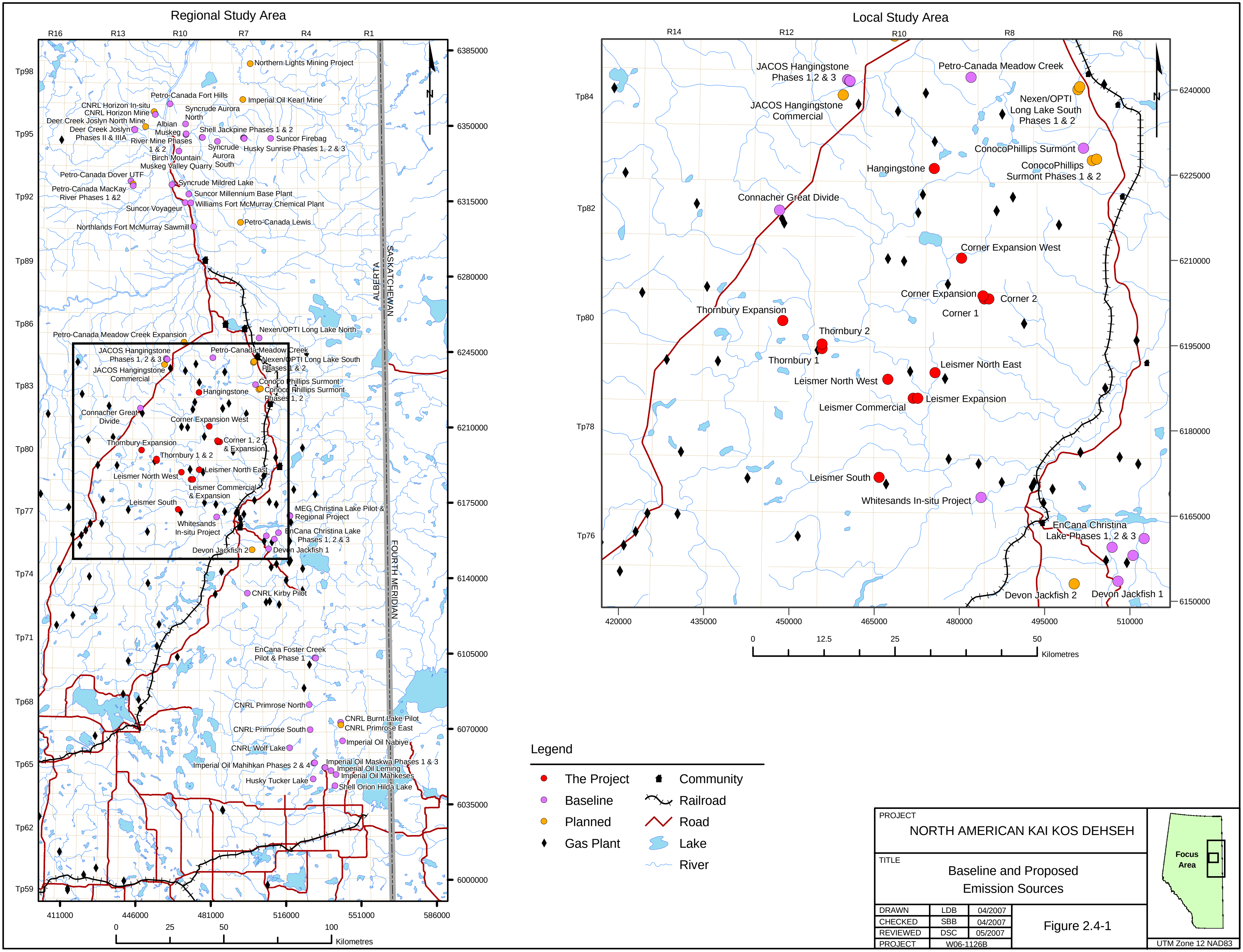
- **Frequency** – With respect to emissions, intermittent emissions associated with upsets are considered infrequent; planned or routine emissions that do not occur continuously (e.g., start-up, shut-down, maintenance activities) are defined as occasional; and emissions associated with normal operations are considered continuous. For predicted ambient concentrations, if the frequency of exceedance of an objective is expected to be less than 2%, it is considered infrequent; a frequency between 2% and 10% is considered occasional; and exceedances that occur more than 10% of the time or exceedances of annual average criteria are rated continuous.

- **Confidence** – The level of confidence with predicting air quality changes depends on the representativeness of the source characterization (e.g., emission rates), the meteorological characterization (e.g., transport and dispersion), chemical transformation (e.g., reaction rates and deposition) and on the model capability. The confidence rating is based on the assumption that, while dispersion models have limitations in predicting individual events, they provide reasonable predictions for air quality assessment purposes given representative input data.

- **Final rating** – The final rating integrates the individual descriptor ratings and is based on professional judgment and technical measurements/predictions. This accounts for the relative change and the absolute value along with the spatial and temporal variations.

Table 2.4-6 Impact Assessment Rating Descriptor Definitions

Assessment Category		**Descriptor**		
Direction		***Positive*** The emission, maximum ambient concentration or deposition is expected to *decrease*.	***Neutral*** The emission, maximum ambient concentration or deposition is expected to remain the same.	***Negative*** The emission, maximum ambient concentration or deposition is expected to *increase*.
Geographic Extent		***Local*** The expected changes are confined to the air LSA.	***Regional*** The expected changes extend beyond the air LSA but are within the air RSA.	***Global*** The expected changes extend beyond the air RSA.
Magnitude	**Concentrations**	***Low*** The predicted ambient concentration or deposition change is expected to be less than 10% of the Baseline.	***Medium*** The predicted ambient concentration or deposition change is expected to be more than 10% of the Baseline.	***High*** The predicted ambient concentration or deposition is expected to result in a *new exceedance* of the relevant criterion.
Duration		***Short-term*** Less than the life of the Project	***Medium-term*** Up to the life of the Project	***Long-term*** Beyond the life of the Project
Frequency	**Emissions**	***Infrequent*** Intermittent emissions associated with upsets.	***Occasional*** Occasional emissions associated with start-up, shut-down, and regular maintenance.	***Continuous*** Continuous emissions associated with normal operations.
	Concentrations	***Infrequent*** Exceedances of associated criterion expected to be less than 2%.	***Occasional*** Exceedances of associated criterion expected to be between 2% and 10%.	***Continuous*** Continuous exposure associated with annual average periods.
Confidence		***Poor*** There are limitations with the model approach or with the input data that compromise the ability to predict meaningful results and/or trends.	***Medium*** The modelling approach is standardized and the model has been evaluated. The input data are extrapolated.	***High*** The modelling approach is standardized and the model has been evaluated. The input data are viewed as representative.
Final Rating		***Low*** Local extent, moderate magnitude but infrequent or regional extent and low magnitude.	***Medium*** Regional extent and moderate magnitude but not continuous or local extent, moderate magnitude and continuous.	***High*** High magnitude or regional extent, high magnitude, continuous and long-term.



PROJECT	NORTH AMERICAN KAI KOS DEHSEH	
TITLE	Baseline and Proposed Emission Sources	
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.4-1

2.5 Existing Conditions

2.5.1 Introduction

The baseline air quality study focuses on:

- Defining ambient air quality levels based on a review of historical measurements in the air RSA;
- Providing an overview of the information required for air quality dispersion modelling; and
- Presenting air quality dispersion model predictions to provide an understanding of spatial concentration and deposition patterns for the baseline scenario.

2.5.2 Method for Determining Baseline Air Quality

The assessment of baseline conditions is based on the review of climate and ambient monitoring data and the application of dispersion modelling as complementary tools. The monitoring accounts for the sources that were operating during the period when monitoring was conducted (i.e., existing), while the modelling accounts for existing and approved projects. The following sections provide a summary of the baseline conditions.

2.5.3 Baseline Emissions in the Study Area

Emission information for the existing and approved operations in the air RSA was obtained from recent air quality assessments undertaken in the region. Additional confirmation of data for facilities located in the air LSA was obtained by contacting the facility operators. Appendix 2A provides a detailed listing of emissions from sources within the air LSA and air RSA, which are summarized in Tables 2.5-1 and 2.5-2, respectively. Although the MEG Christina Lake and OPTI Long Lake projects are within the RSA but outside the LSA, they were included in the LSA emission total given their proximity to the LSA boundary.

Table 2.5-1 Baseline Scenario Emissions for Sources Located Within the Air LSA

Operator – Facility	**SO_2 (t/d)**	**NO_x (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Connacher Oil and Gas Ltd.					
◆ Great Divide Project	0.80	0.45	0.27	0.02	0.04
ConocoPhillips Canada					
◆ Surmont Pilot	0.16	0.08	0.07	0.00	0.01
◆ Phases 1, 2, 3 & 4	2.85	3.99	1.97	0.08	0.27
Devon ARL Corp.					
◆ Jackfish 1	2.00	2.00	1.39	0.09	0.13
EnCana Corp.					
◆ Christina Lake Phases 1, 2 & 3	5.70	2.21	1.95	0.12	0.18
Japan Canada Oil Sands					
◆ Hangingstone Phases 1, 2 & 3	0.80	0.60	0.53	0.04	0.04
MEG Energy Corp.					
◆ Christina Lake Pilot & Regional Project	2.00	1.62	1.33	0.11	0.16
Nexen Inc./OPTI Canada Inc.					
◆ Long Lake North	18.42	10.71	8.96	0.48	0.74
Petro-Canada Oil and Gas					
◆ Meadow Creek	1.50	7.20	5.61	0.24	0.48
Whitesands In-situ Ltd.					
◆ Whitesands	0.08	0.04	9.23	0.00	0.00
Assorted					
◆ Gas Production Facilities (air LSA portion)	0.00	19.37	6.67	0.13	0.03
Non-industrial (air LSA Portion)					
◆ Conklin and Janvier	0.00	0.02	0.06	0.02	0.14
◆ Roadways	0.02	1.02	4.30	0.06	0.43
Air LSA Totals	**33.61**	**49.31**	**42.35**	**1.40**	**2.62**

Note: Numbers may not be exact due to rounding.

Table 2.5-2 Baseline Scenario Emissions for Sources Located Within the Air RSA

Operator	**SO_2 (t/d)**	**NO_x (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Albian Sands Energy Inc.					
◆ Muskeg River Mine Phases 1 & 2	0.61	31.68	27.05	26.83	1.63
Birch Mountain Resources Ltd.					
◆ Muskeg Valley Quarry	0.02	0.18	0.23	0.00	0.09
Canadian Natural Resources Ltd.					
◆ Burnt Lake Pilot	0.36	1.20	1.01	0.07	0.09
◆ Horizon Project	12.70	47.46	33.44	156.92	2.31
◆ Kirby Pilot	0.15	0.21	0.14	0.02	0.02
◆ Primrose North	1.90	2.88	1.64	0.11	0.15
◆ Primrose South	2.00	5.07	3.08	0.17	0.27
◆ Wolf Lake	2.00	1.80	1.10	0.08	0.10
Connacher Oil and Gas Ltd.					
◆ Great Divide Project	0.08	0.45	0.27	0.02	0.04
ConocoPhillips Canada Resources Corp.					
◆ Surmont Phases 1, 2, 3 & 4	2.85	3.99	1.97	0.08	0.27
◆ Surmont Pilot	0.16	0.08	0.07	0.00	0.01
Deer Creek Energy Ltd.					
◆ Joslyn Phase II	0.74	0.51	0.48	0.03	0.05
Devon ARL Corp.					
◆ Jackfish 1	2.00	2.00	1.39	0.09	0.13

Operator	**SO$_2$ (t/d)**	**NO$_x$ (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
EnCana Corp.					
◆ Christina Lake Phases 1, 2 & 3	5.70	2.21	1.95	0.12	0.18
◆ Foster Creek Phase 1 & 2	2.71	5.55	9.95	0.17	0.38
◆ Foster Creek Pilot	0.24	0.39	0.18	0.02	0.02
Husky Energy					
◆ Sunrise Phase 1, 2 & 3	1.18	6.61	20.59	0.45	0.37
◆ Tucker Lake	0.97	1.22	0.39	0.10	0.12
Imperial Oil Ltd.					
◆ Leming	0.52	1.02	0.99	0.07	0.09
◆ Mahihkan Phase 2 & 4	2.15	3.47	3.39	0.23	0.31
◆ Mahkeses	2.10	3.16	1.45	0.14	0.27
◆ Maskwa Phase 1 & 3	1.60	2.40	2.34	0.15	0.21
◆ Nabiye	3.81	2.42	2.70	0.13	0.67
Japan Canada Oil Sands Ltd.					
◆ Hangingstone Phases 1, 2 & 3	0.80	0.60	0.53	0.04	0.04
MEG Energy Corp.					
◆ Christina Lake Pilot and Regional Project	2.00	1.62	1.33	0.11	0.16
Nexen Inc./OPTI Canada Inc.					
◆ Long Lake North	18.42	10.71	8.96	0.48	0.74
Northlands Forest Products Ltd.					
◆ Fort McMurray Sawmill	0.02	0.19	25.00	1.71	0.19
Petro-Canada Oil and Gas					
◆ Dover UTF	0.50	0.32	0.11	0.03	0.02
◆ Fort Hills	1.69	24.14	5.15	15.32	0.71
◆ MacKay River Phase 1	1.00	5.01	4.45	0.18	0.19
◆ Meadow Creek	1.50	7.20	5.61	0.24	0.48
Shell Canada Ltd.					
◆ Jackpine Phase 1	0.22	18.45	12.61	18.03	0.88
◆ Orion Hilda Lake	0.90	1.15	0.40	0.10	0.10
Suncor Energy Inc.					
◆ Firebag Project	4.42	16.77	10.75	0.55	0.94
◆ Millennium Base Plant	60.11	67.38	33.80	207.32	6.24
◆ Voyageur	14.47	22.70	22.79	8.40	1.30
Syncrude Canada Ltd.					
◆ Aurora North	0.59	15.48	3.74	15.22	0.51
◆ Aurora South	0.45	12.28	2.94	15.10	0.44
◆ Mildred Lake Mines	100.95	61.68	80.85	58.23	6.51
Whitesands In-situ Ltd.					
◆ Whitesands	0.08	0.04	9.23	0.00	0.00
Williams Energy (Canada), Inc.					
◆ Fort McMurray Chemical Plant	0.00	0.02	0.02	0.24	0.00
Gas Production Facilities (air RSA portion)	0.00	46.93	24.49	0.36	0.10
Non-Industrial (air RSA portion)	2.04	8.64	25.75	2.03	3.34
Total Air LSA	**33.61**	**49.31**	**42.35**	**1.40**	**2.62**
Total Air RSA	**256.72**	**447.41**	**394.29**	**529.68**	**30.63**

Note: Numbers may not be exact due to rounding.

2.5.4 Climate and Meteorology

The oil sands region experiences a continental climate. It has fairly warm summers and cool winters. In winter, this region is affected by the continental arctic air mass that brings extremely cold conditions from the Arctic. In summer, the region is influenced by the maritime pacific cool and moist air mass. As air masses travel over the land, which has been warmed by the sun, they increase in temperature. This occurs particularly in summer.

Considering that most of the emission sources in the Oil Sands region are low-level sources, the best meteorological conditions to disperse these emissions would be an overcast sky with moderate wind speed. Fortunately, these conditions frequently occur in this region, where the air stability is neutral (PG class D) 36.5% of the time, as shown in Table 2C5-1 (Appendix 2C). However, the wind speed tends to be low in this area, with an annual average of 3.7 m/s (13 km/h). Lower wind speeds will result in less dispersion and therefore higher ground-level concentrations.

The CALMET model was used to provide three-dimensionally varying wind, temperature and turbulence fields for use by the CALPUFF model. The CALMET model results are based on:

- MM5 wind and temperature profiles generated on a 12 km grid supplemented with 2002 surface data from regional airports and additional concurrent surface data as provided by Environment Canada;
- Precipitation data extracted from the 2002 MM5 data;
- Regional terrain variation and spatially varying land-use information to account for deposition; and
- Seasonal variation in vegetation cover properties.

Details of the approach and the CALMET results are provided in Appendix 2C.

While comparisons between measured and predicted winds can provide an indication of CALMET model performance, the comparison should be undertaken with caution since the predicted values will not account for micro-scale terrain and tree canopy influences. Specifically, the predicted values represent the average wind over a 5 km grid area. Notwithstanding this limitation, Figure 2.5-1 compares the combined wind speed and wind direction frequency distribution (in the form of a wind rose) measured at the Conklin site with the wind rose based on the CALMET results at the same location. The measured winds are primarily from the SE (southeast) to WNW (west-northwest); the least frequent winds are from the NNE (north-northeast) to ESE (east-southeast). In contrast, the predicted winds occur primarily from the SW (southwest) to W (west); the least frequent winds are from the NNE (north-northeast). The differences are likely due to numerical model limitations in predicting micro-scale terrain influences. Furthermore, the location of the predicted and observed winds not being the same will also lead to some differences.

Figure 2.5-2 shows the predicted wind roses for the vicinity of the Project at varying heights above the ground. The CALMET grid cell selected is approximately 8.5 km south of the Hangingstone central processing facility. Generally, the predicted winds shift to a more northwesterly direction with increasing height above the ground. This trend has been confirmed by measurements in the region.

2.5.5 Baseline Ambient Air Quality Monitoring Results

The Project area lies between two regions where air quality monitoring networks have been implemented. The Wood Buffalo Environmental Association (WBEA) conducts an extensive monitoring program that focuses primarily on the area to the north of Fort McMurray. For the purpose of this assessment, this area is referred to as the primary oil sands operating area. The Lakeland Industry and Community Association (LICA) conducts a monitoring program between the Cold Lake Air Weapons Range and Cold Lake area. For the purpose of this assessment, the area is referred to as the Cold Lake operating area. Due to lower levels of industrial activity, ambient monitoring in the Project area has been more limited and undertaken for shorter periods. The most complete air quality data that have been collected in this area are from the ambient air quality monitoring program undertaken by Nexen/OPTI in the Anzac area for the Long Lake Project.

Ambient air quality data from WBEA, LICA and other programs were reviewed (Appendix 2B) and the summary in Table 2.5-3 provides an overview of ambient air quality near the primary oil sands operating area, in the community of Fort McMurray, the Project operating area and the Cold Lake operating area.

Table 2.5-3 Baseline Scenario Air Quality Observations for the Regional Study Area

Compound	Primary Oil Sands Operating Area	Fort McMurray	Project Area	Cold Lake Operating Area	Remote	Ambient Criteria
Ambient Air Quality Observations						
SO_2 (ug/m^3)						
- Annual Average	3.2 to 7.8	2.6 to 2.8	-	–	0.0 to 1.0	30
- Maximum Hourly	274.7 to 1,841.9	220 to 395	75	57.0 to 104.7	47.1 to 64.1	450
NO_2 (ug/m^3)						
- Annual Average	8.7 to 17.4	9.9 to 18.1	-	–	1.4 to 1.9	60
- Maximum Hourly	56.6 to 304.3	69.8 to 345.3	109	56.6 to 132.1	44.3 to 64.2	400
THC (mg/m^3)						
- Annual Average	1.3 to 1.4	1.2 to 1.3	-	–	–	N/A
- Maximum Hourly	5.9 to 32.6	4.1 to 4.4	-	12.3 to 15.0	–	N/A
$PM_{2.5}$ (ug/m^3)						
- Annual Average	2.8 to 5.3	4.4 to 4.5	-	–	2.4 to 4.4	N/A
- Maximum Hourly	203.5 to 445.0	266.7 to 274.0	-	–	48.6 to 118.8	N/A
Ozone (ug/m^3)						
- Annual Average	36.5 to 41.2	37.8 to 42.6	-	55.0	51.4 to 58.5	N/A
- Maximum Hourly	158.0 to 163.9	160.0 to 169.8	-	124.1	103.4 to 128.8	160
TRS/H_2S (ug/m^3)						
- Annual Average	0.3 to 1.0	0.5 to 0.8	–	–	–	N/A
- Maximum Hourly	16.8 to 112.0	15.5 to 21.0	4.2	4.2 to 36.4	–	14
Deposition Derived from Observations						
Dry SO_2 (keq H^+/ha/y)	0.33	0.17	0.07	–	0.06	N/A
Dry NO_2 (keq H^+/ha/y)	0.24	0.18	0.03	–	0.02	N/A
Wet PAI (keq H^+/ha/y)	0.06	0.06	0.05	0.07	0.04	N/A
Dry Cation (keq H^+/ha/y)	0.06	0.06	0.06	0.05	0.06	N/A
PAI* (keq H^+/ha/y)	0.57	0.35	0.09	–	0.06	0.22 to 0.90

Notes: “Primary Oil Sands Operating Area” refers to stations located in the vicinity of the Suncor and Syncrude facilities for the period January 2001 to December 2006 and is located north of the air LSA.

“Fort McMurray” refers to the Athabasca Valley and Patricia McInnes stations for the period January 2001 to December 2006 and is located north of the air LSA.

“Project Area” values, for the most part, are based on Conklin data collected by EnCana for the Christina Lake Project for the period of March 2001 to August 2002.

“Cold Lake Operating Area” refers to air quality in the vicinity of Cold Lake located south of the air LSA.

“Remote”, for the most part, is based on the Fort Chipewyan station for the period, January 2001 to December 2006 and is located north of the air LSA.

* The deposition loads (as PAI) are based on target loads (as defined by CASA and AENV, 1999) because these are viewed as being philosophically similar to environmental objectives.

THC = total hydrocarbons.

TRS = total reduced sulphur.

Based on the data presented in Table 2.5-3, the following conclusions are provided:

- Ambient SO_2 concentrations in excess of the 1-hour 450 ug/m^3 AAAQO objective occur in the vicinity of the primary oil sands operating area. In contrast, the maximum observed SO_2 concentrations in Fort McMurray are less than the ambient objective. Maximum hourly average SO_2 concentrations in more remote areas are in the 47 ug/m^3 to 64 ug/m^3 range. The maximum hourly value observed in the Project operating area is 75 ug/m^3. The annual average SO_2 concentration in the Project operating area is currently expected to be in the 1 ug/m^3 to 2 ug/m^3 range. Thus, ambient SO_2 concentrations observed in the air LSA are less than the AAAQO.

- The maximum ambient NO_2 concentrations observed in all areas are less than the 1-hour 400 ug/m^3 AAAQO objective. In the Project operating area, the maximum values are expected to be slightly higher as those observed in more remote areas. The annual average NO_2 concentration in the Project operating area is expected to be in the 1 ug/m^3 to 2 ug/m^3 range. Thus, ambient NO_2 concentrations observed in the air LSA are less than the AAAQO objective.

- While higher THC concentrations can occur in the vicinity of the existing mining and upgrading operations and community sources, the THC concentrations in the Project operating area are expected to be near typical background levels of between 1 ug/m^3 and 2 ug/m^3.

- While high $PM_{2.5}$ concentrations have been observed in the air RSA, these values have been attributed to forest fires, combustion sources and road dust. Forest fire emissions, depending on the wind direction, would also affect the Project operating area. The annual average $PM_{2.5}$ concentration in the Project operating area is expected to be in the 2 ug/m^3 to 5 ug/m^3 range.

- Ambient ozone concentrations tend to be greater in remote, rural areas than in urban or industrial areas. For the periods reviewed, the maximum hourly ozone concentrations at four of the stations were greater than the AAAQO (160 ug/m^3). Specifically, one hourly exceedance (176 ug/m^3) was observed in the air LSA at the Anzac station during the 14-month monitoring period. Also, one hourly exceedance (164 ug/m^3) was observed at the Fort MacKay station during 2003. Two of the stations in the Fort McMurray area recorded exceedances in 2006. High naturally occurring ozone concentrations have historically occurred in the air RSA on a periodic basis and therefore can potentially occur in the Project operating area. An annual average of 40 ug/m^3 to 60 ug/m^3 is expected for the Project operating area.

- Exceedances of the H_2S objective have been observed in Fort McMurray, the primary oil sands operating area and the Cold Lake area. Based on the closest monitoring station to the Project operating area (Conklin), low annual H_2S values (<1 ug/m^3) are expected in the Project operating area.

- The calculated PAI in the Project operating area is comparable to a remote location. The value is less than the target load for sensitive receptors.

In summary, while there is evidence of local source influences in the air LSA, the air quality in air LSA appears to be similar to that of remote areas.

2.5.6 Baseline Predictions

The maximum values predicted for the baseline scenario using the CALPUFF model are summarized in Table 2.5-4 and the predicted concentrations and deposition are also depicted as contours that are superimposed over the air RSA and the air LSA to show their respective spatial variations.

2.5.6.1 Ambient SO_2 Concentrations

Table 2.5-4 summarizes the maximum predicted SO_2 concentrations in the air RSA and the air LSA and compares the maximum values to their respective ambient air quality objectives. Figures 2.5-3, 2.5-4 and 2.5-5 show the maximum predicted SO_2 concentration contours for 1-hour, 24-hour and annual averaging periods, respectively. The results indicate that the:

- Maximum predicted hourly average SO_2 concentration is above the corresponding ambient air quality objectives in the air RSA and the frequency of exceedance is 0.05%;
- Maximum daily and annual average SO_2 concentrations are below their respective ambient air quality objectives in the air RSA;
- Maximum predicted values in the RSA occur in the vicinity of the primary oil sands operating area north of Fort McMurray;
- Maximum hourly, daily and annual average SO_2 values in the air LSA are less than their respective ambient objectives; and
- Maximum predicted values in the LSA occur to the southeast of the Project in the vicinity of Christina Lake.

The maximum predicted SO_2 concentration in the air RSA, as a 1-hour average, is 580 ug/m^3 in the primary oil sands operating area. This value is greater than maximum values that have been observed in the region (e.g., in 2004, the maximum measured values were 453 ug/m^3 and 465 ug/m^3 at Mildred Lake and Buffalo Viewpoint, respectively).

Table 2.5-4 Maximum Predicted SO_2, NO_2 and $PM_{2.5}$ Concentrations and PAI Values Associated With the Baseline Scenario

Maximum Predicted SO_2 Concentrations	**Maximum Air RSA**	**Maximum Air LSA**	**AAAQO**
1-h concentration (ug/m^3)	**580**	284	450
24-h concentration (ug/m^3)	113	104	150
Annual concentration (ug/m^3)	8.8	8.8	30

Notes: Values that exceed the ambient objective are shown in boldface text.

The values do not include a background value.

Maximum Predicted NO_2 Concentrations	**Maximum Air RSA**	**Maximum Air LSA**	**AAAQO**
1-h concentration (ug/m^3)	230	177	400
24-h concentration (ug/m^3)	98	87	200
Annual concentration (ug/m^3)	37.6	10.4	60

Notes: Values that exceed the ambient objective are shown in boldface text.

The values do not include a background value.

Maximum Predicted $PM_{2.5}$ Concentrations	**Maximum Air RSA**	**Maximum Air LSA**	**CWS**
24-h concentration (ug/m^3)	27.5	17.9	30

Notes: Values that exceed the CWS are shown in boldface text.

The values do not include a background value.

Maximum Predicted PAI (small-scale)	**Maximum Air RSA**	**Maximum Air LSA**	**Target Loading (1° by 1° Scale)**
Sulphate (keq H^+/ha/y)	0.21	0.21	–
Nitrate (keq H^+/ha/y)	1.53	0.51	–
PAI (No background) (keq H^+/ha/y)	1.72	0.57	0.22 to 0.90
PAI (With background) (keq H^+/ha/y)	1.76	0.65	0.22 to 0.90

Notes: The sulphate and nitrate values do not include a background value.

The background PAI is based on the Alberta Environment (Cheng 2001) predicted deposition contours.

The maximum sulphate and nitrate are not additive since they may occur at different locations.

The target loads (as defined by CASA and AENV, 1999) include low, moderately sensitive and sensitive receptors.

2.5.6.2 Ambient NO_2 Concentrations

Table 2.5-4 summarizes the maximum predicted NO_2 concentrations in the air RSA and the air LSA and compares the maximum values to their respective ambient air quality objectives. Figures 2.5-6, 2.5-7 and 2.5-8 show the maximum predicted NO_2 concentration contours for 1-hour, 24-hour and annual averaging periods, respectively. The results indicate that the:

- Maximum predicted hourly, daily and annual average NO_2 concentrations are less than their representative ambient air quality objectives in both the air RSA and the air LSA; and

- Maximum predicted values tend to occur in the vicinity of the primary oil sands operating area.

The overall maximum predicted 1-hour NO_2 concentration is 230 ug/m^3, which is in a similar range as the maximum values measured in the region (e.g., in 2001, the Albian Mine Station reported a maximum value of 205 ug/m^3 and the Millennium site reported 304 ug/m^3).

2.5.6.3 Ambient $PM_{2.5}$ Concentrations

Table 2.5-4 summarizes the 98th percentile predicted $PM_{2.5}$ concentrations in the air RSA and the air LSA and compares these values to the CWS. The values in the Table 2.5-4 and Figure 2.5-9 represent the sum of primary $PM_{2.5}$ emissions and the secondary formation of particulates containing sulphate and nitrate. Figure 2.5-9 shows the 98th percentile predicted 24-hour average $PM_{2.5}$ concentration contours. The results indicate that the:

- 98th percentile predicted 24-hour average $PM_{2.5}$ concentrations are less than the CWS in the air RSA and air LSA; and

- Highest predicted values tend to occur in the vicinity of the mining operations associated with the primary oil sands operating area.

$PM_{2.5}$ concentrations up to 301 ug/m^3 were measured in the primary oil sands mining areas during 2001 and values up to 267 ug/m^3 were measured in Fort McMurray during the same year. It should be noted that the model predictions are based on industrial combustion emission estimates, while the field measurements include $PM_{2.5}$ emissions from other sources (e.g., communities, unpaved roads and forest fires).

2.5.6.4 Potential Acid Input

Table 2.5-4 summarizes the maximum predicted annual PAI values in the air RSA and the air LSA and compares the maximum values to the target loads. Figure 2.5-10 shows the maximum predicted annual average PAI (with background). The results indicate that:

- There are areas in the air RSA and the air LSA where the predicted PAI is greater than the deposition loads for sensitive receptors (i.e., the 0.17 keq H^+/ha/y, 0.22 keq H^+/ha/y and 0.25 keq H^+/ha/y contours that are shown in shades of grey);

- The areas where the predicted PAI is greater than the deposition loads for moderately sensitive receptors (i.e., the 0.35 keq H^+/ha/y, 0.45 keq H^+/ha/y and 0.50 keq H^+/ha/y contours, which are shown in shades of green) are limited to the region in the vicinity of primary oil sand mining operations and to a small region east of the Projects' operations; and

- The areas where the predicted PAI is greater than the deposition loads for low-sensitivity receptors (i.e., the 0.70 keq H^+/ha/y and 0.90 keq H^+/ha/y contours that are shown in shades of red) are limited to two regions in the vicinity of primary oil sands mining operations and to a very small region east of the facilities (small areas of high concentrations are difficult to resolve on the figures, due to isolated points).

On a local scale, the maximum PAI values are predicted to be higher than the deposition criteria. Note that small-scale PAI values greater than the deposition loads are not viewed as an exceedance of a regulatory guideline (objective), since the loads are to be applied to a 1º latitude by a 1º longitude scale. The effects of these predicted PAI values on soil and water chemistry will depend on the sensitivities of the receiving systems and such potential effects are discussed in the water and soil sections (Volume 3 and Volume 4).

2.5.7 Baseline Conclusion

A review of local and regional information provides an understanding of baseline air quality conditions.

Air LSA SO_2 and NO_x emissions of approximately 32 t/d and 49 t/d, respectively, are an order of magnitude less than the total air RSA values of approximately 257 t/d and 447 t/d, respectively. Most of the air RSA emissions are associated with existing and approved facilities in the vicinity of and to the north of Fort McMurray.

Meteorological information required for dispersion modelling is based on the CALMET model, which has been applied for developments in the vicinity of and to the north of Fort McMurray. The following observations are noted relative to the use of this model:

- There are slight differences between the CALMET generated surface winds and those measured in the vicinity of the proposed Project site due to micro-scale influences; and

- Wind directions tend to become more northwesterly with increasing height above the ground.

A review of ambient air quality observations in the air RSA and air LSA indicates that:

- Exceedances of the SO_2 ambient air quality objectives have been observed in the developed area north of Fort McMurray;

- Although maximum ambient SO_2 and NO_2 concentrations in the Project area are higher than remote background values, the maximum values are less than the ambient air quality objectives;

- High $PM_{2.5}$ concentrations have been observed at all monitoring locations in the air RSA and air LSA. These could occur in the Project area and are primarily due to forest fires, local activities and non-industrial combustion sources;

- THC concentrations in the Project area are expected to be similar to the background methane concentration of 1.2 mg/m^3. The monitoring data indicate periodic THC values above the background value in the vicinity of developments;

- High ozone concentrations have been observed in the air LSA. While for the most part, the maximum hourly average ozone values are typically less than the ambient objective, values in excess of the objective may occur on occasion in the air RSA (e.g., typically less than one hour per year). These values can be attributed to natural background or to precursor emissions;

- The monitoring data indicate relatively high TRS/H_2S values can occur periodically in the vicinity of oil sands developments; and

- The background PAI in the Project area is less than the target loads.

In conclusion, existing air quality in the vicinity of the Project is good. The review of the monitoring data in the vicinity of the existing in-situ developments indicates higher concentrations tend to occur near each respective central processing facility.

Dispersion modelling based on the CALPUFF model was conducted to provide a better understanding of the magnitude and spatial variation of concentration patterns in the air RSA and the air LSA. The modelling accounts for approved but not yet operating sources and focused on predicting ambient SO_2, NO_2 and $PM_{2.5}$ concentrations and PAI. The results for these contaminants indicate that:

- The highest ambient SO_2 concentrations are predicted to occur in the air RSA primary oil sands operating area, which is to the north of Fort McMurray. The maximum predicted 1-hour SO_2 concentration exceeds the AAAQO for 4 hours of the year or 0.05% of the time in the air RSA. Maximum predicted 24-hour SO_2 concentrations and the annual average SO_2 concentrations are less than their corresponding AAAQO;

- The highest ambient NO_2 concentrations are predicted to occur in the air RSA primary oil sands operating area. Maximum predicted ambient NO_2 concentrations for all averaging periods in the air RSA are less than their respective AAAQO;

- The highest ambient $PM_{2.5}$ concentrations are predicted to occur in the area to the north of Fort McMurray. Maximum predicted ambient $PM_{2.5}$ concentrations in the air LSA and air RSA are less than the CWS; and

- The highest PAI is predicted to occur in the air RSA primary oil sands operating area. On a small scale, the maximum predicted PAI in the air LSA is greater than the target loads for moderately sensitive and sensitive receptors (i.e., 0.45 keq H^+/ha/y and 0.22 keq H^+/ha/y, respectively). Small-scale PAI values greater than the deposition loads are not viewed as exceedances, since the loads are to be applied to a 1º latitude by a 1º longitude scale as estimated by the use of the RELAD model.

Predicted concentrations of other compounds at sensitive receptors are provided in Section 2.7.3.

Figure 2.5-1 Comparison of Measured and CALMET Predicted Winds at the Conklin Site for Year 2002

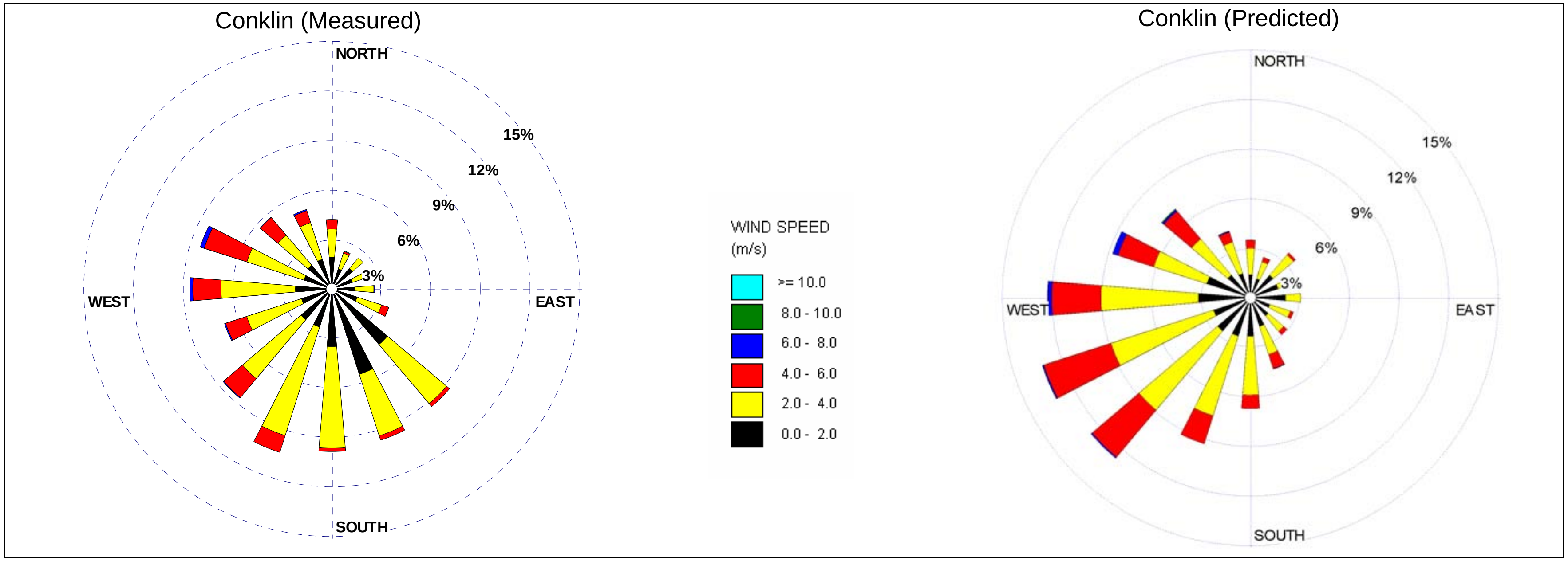
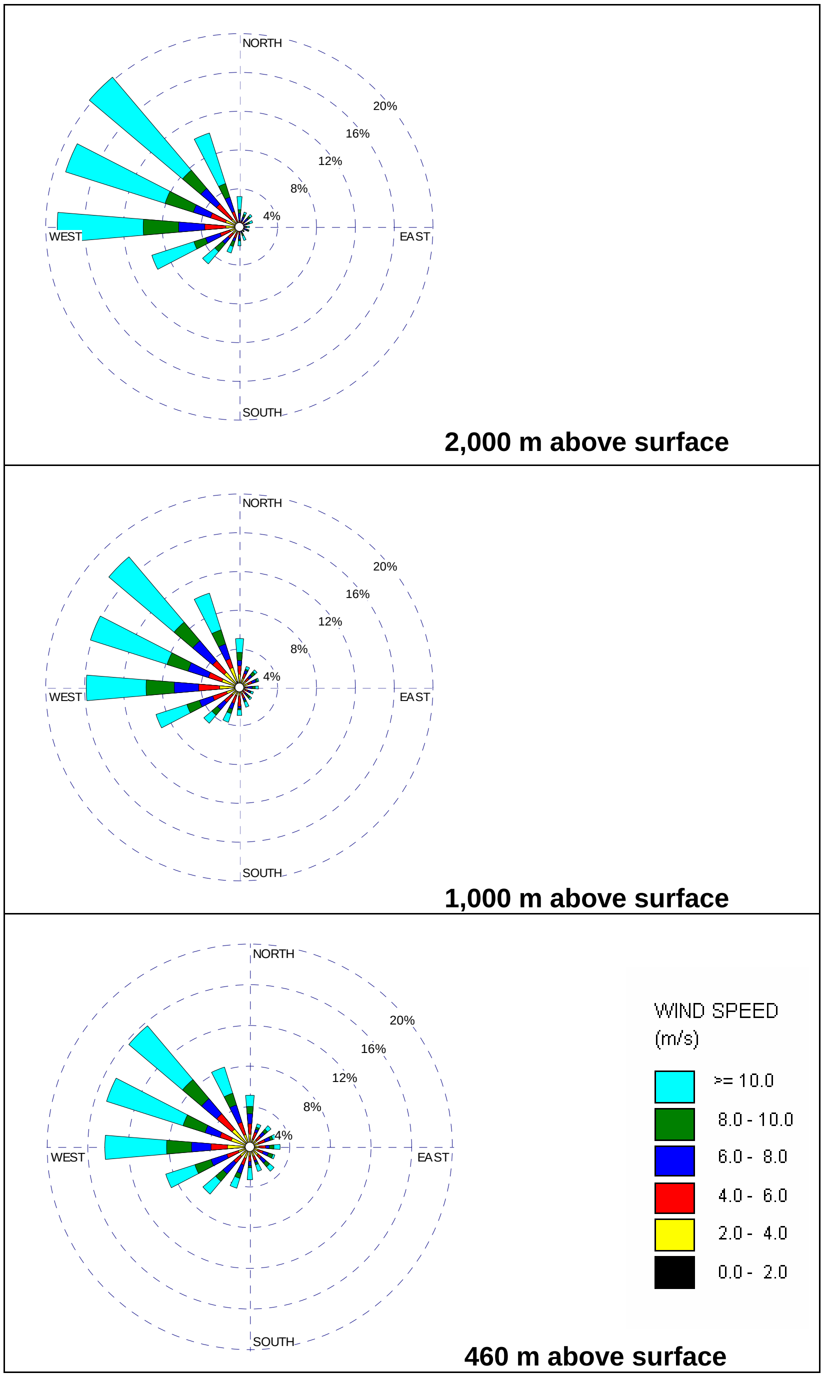
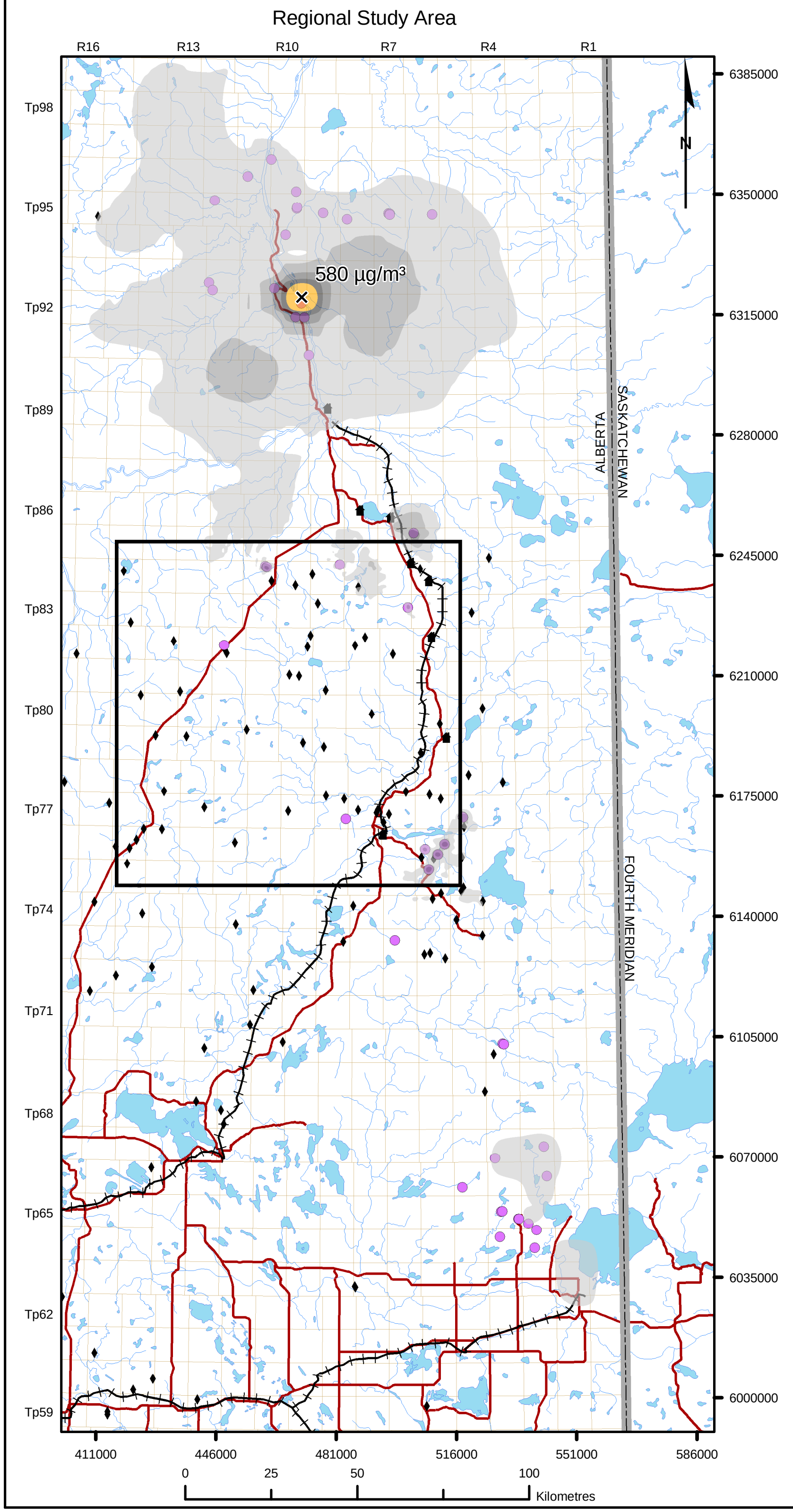
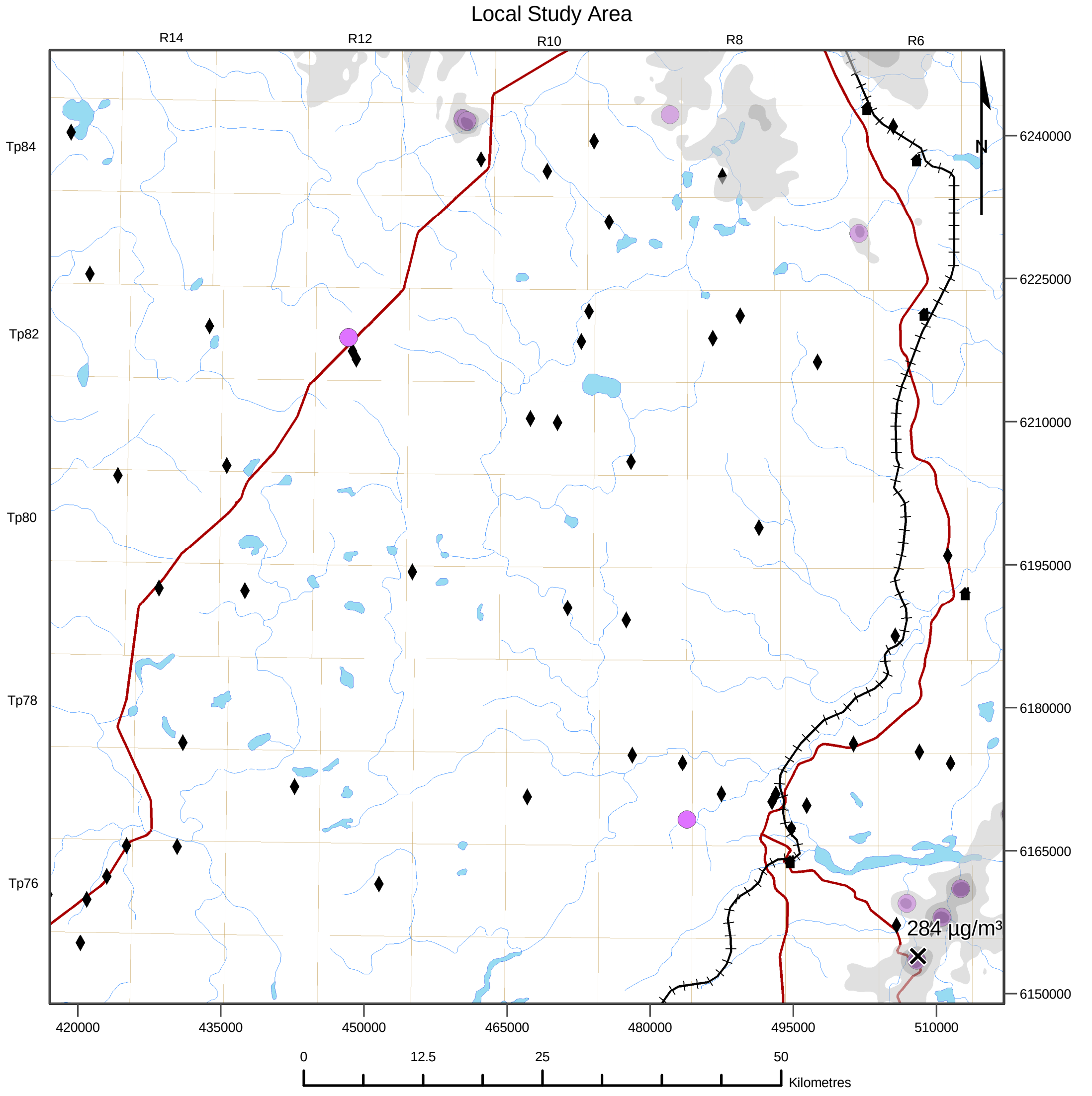


Figure 2.5-2 **Predicted Wind Roses by the CALMET Model for Varying Elevations above the Surface in the vicinity of the Project (CALMET Grid Cell 14, 42) for Year 2002**







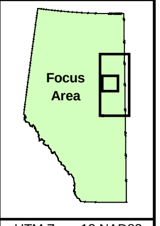
Concentration
(µg/m³)

🟧 450
⬛ 340
▩ 225
▨ 110
░ 55
☐ 0

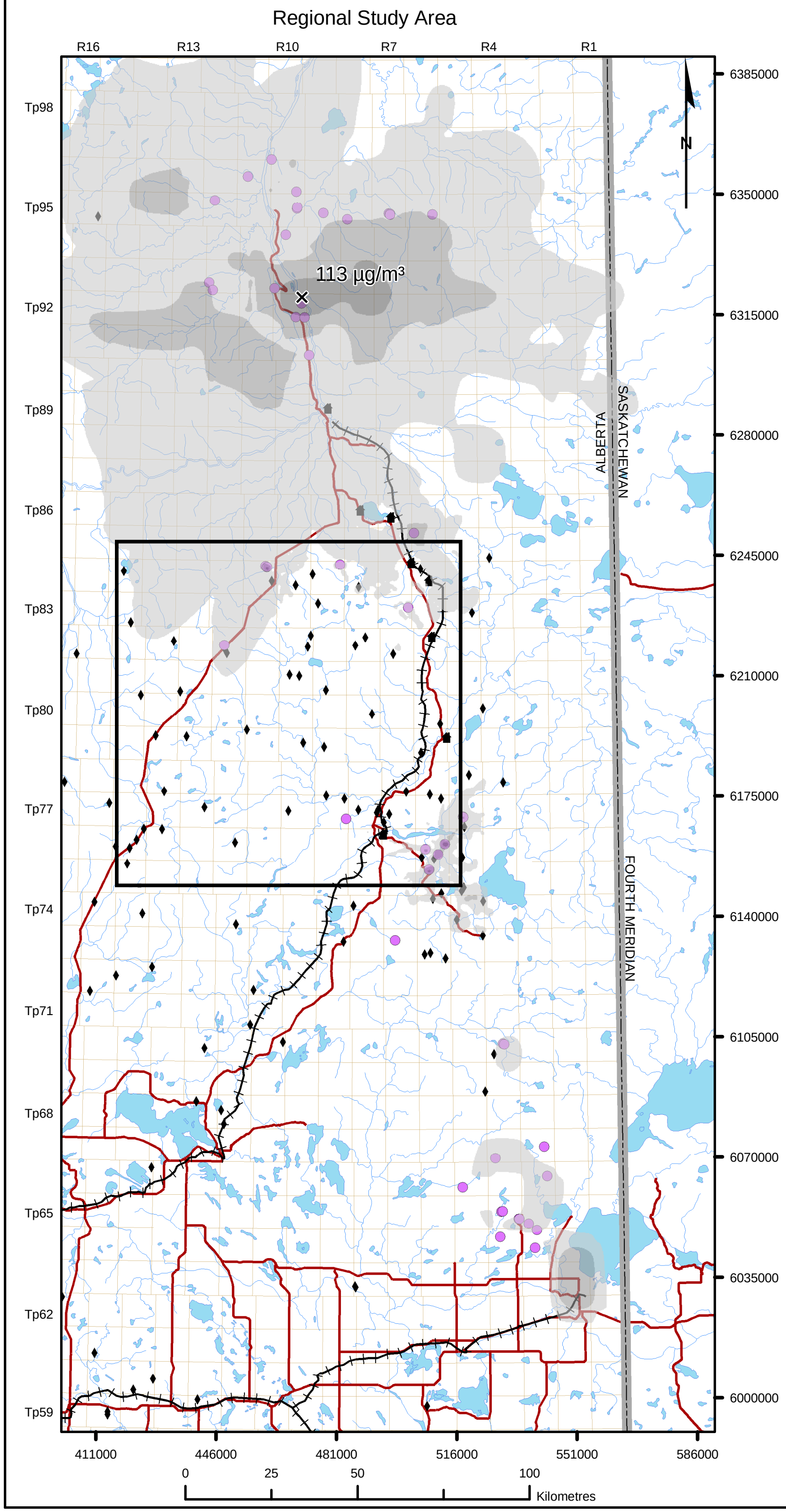
Legend

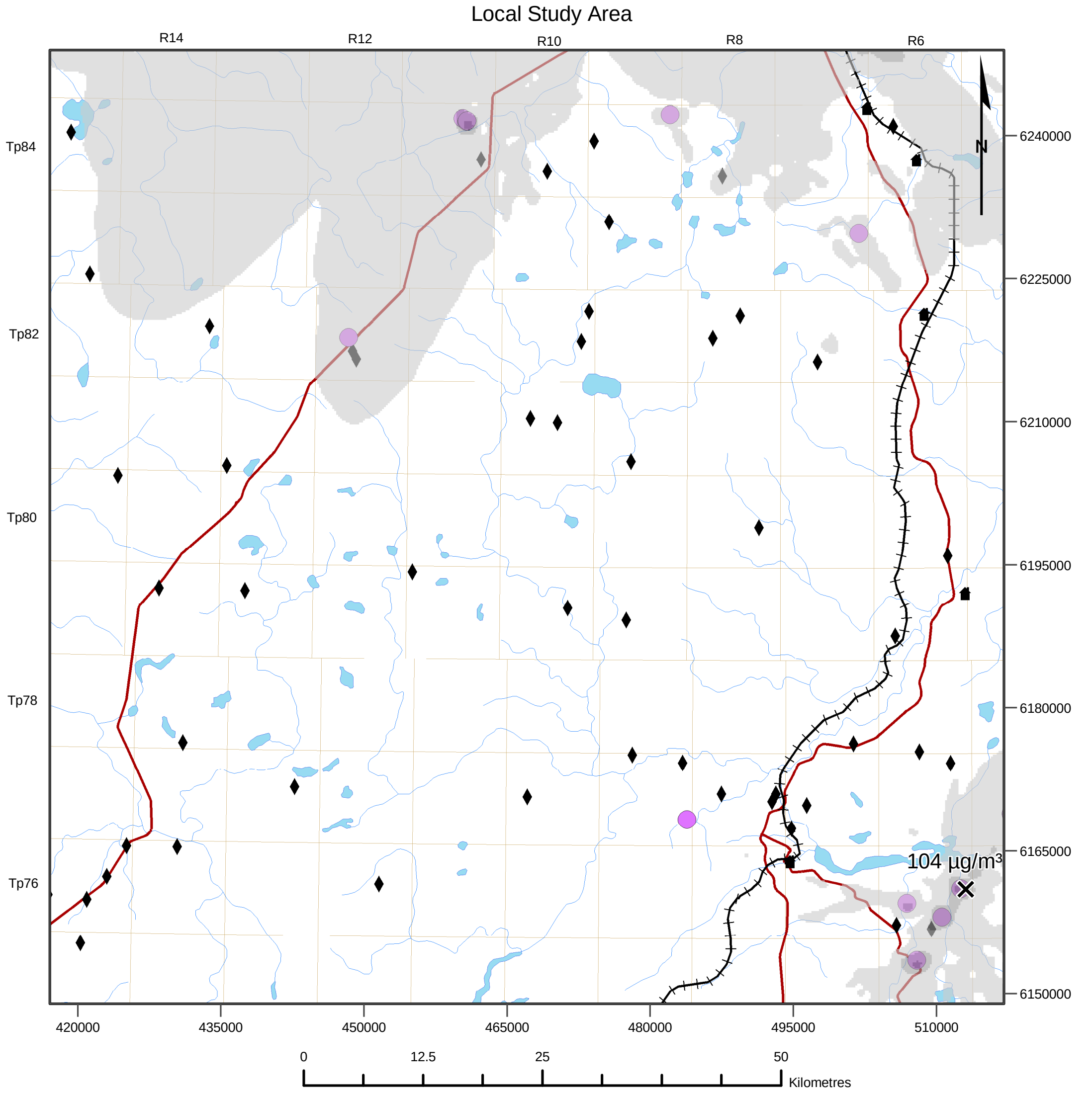
× Maximum Point of Impingement
● Baseline Source
♦ Gas Plant
⌂ Community
Railroad
Road
Lake
River

PROJECT NORTH AMERICAN KAI KOS DEHSEH			
TITLE Baseline Scenario Maximum 1-h SO_2 Concentration			
DRAWN	LDB	04/2007	Figure 2.5-3
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		



UTM Zone 12 NAD83





Concentration
(µg/m³)

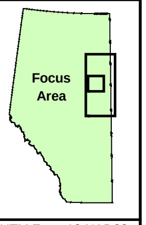
🟧 150
■ 115
■ 75
■ 35
■ 15
□ 0

Legend

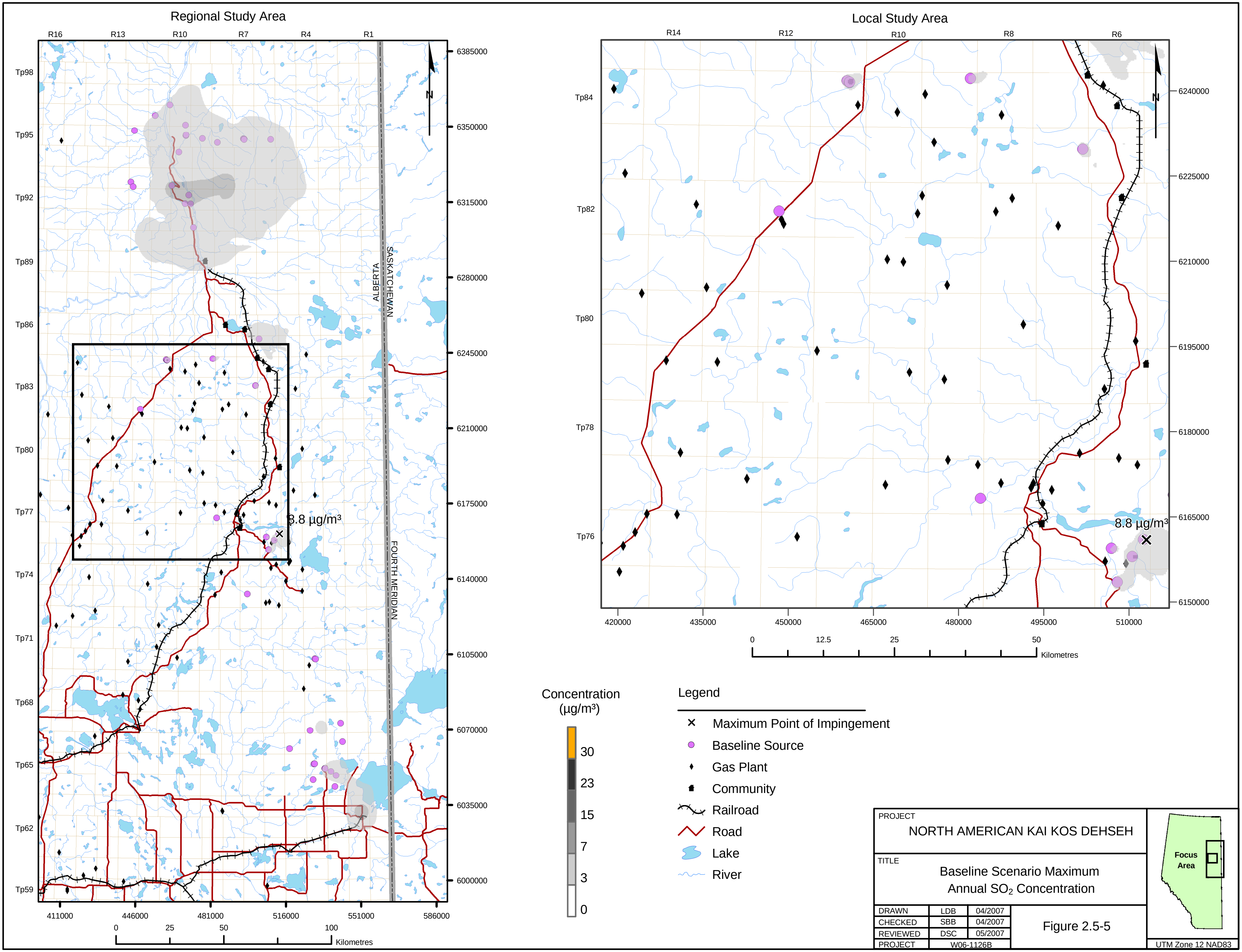
× Maximum Point of Impingement
● Baseline Source
♦ Gas Plant
■ Community
Railroad
Road
Lake
River

PROJECT		
NORTH AMERICAN KAI KOS DEHSEH		
TITLE		
Baseline Scenario Maximum 24-h SO_2 Concentration		
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.5-4



UTM Zone 12 NAD83



PROJECT

NORTH AMERICAN KAI KOS DEHSEH

TITLE

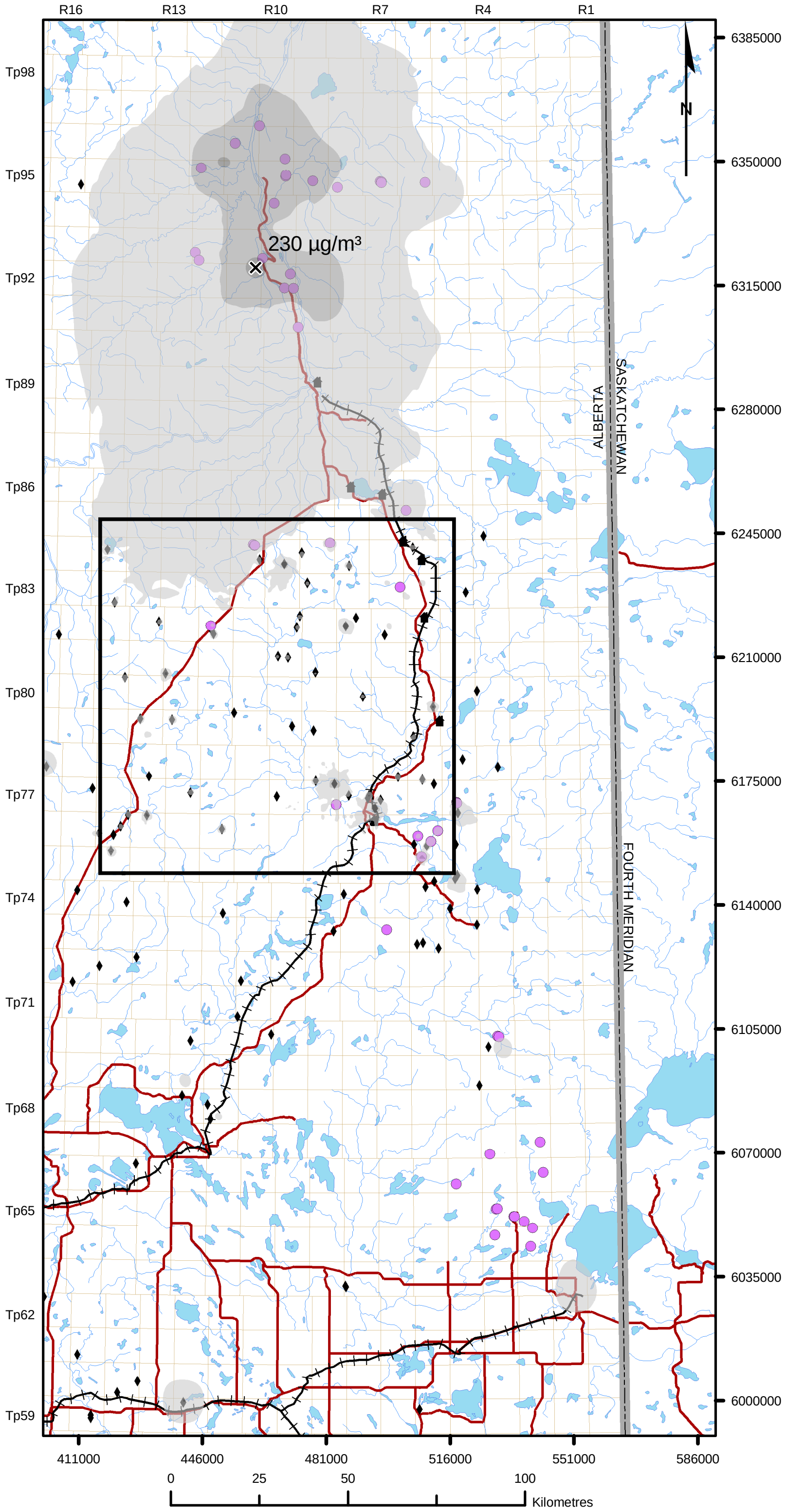
Baseline Scenario Maximum Annual SO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

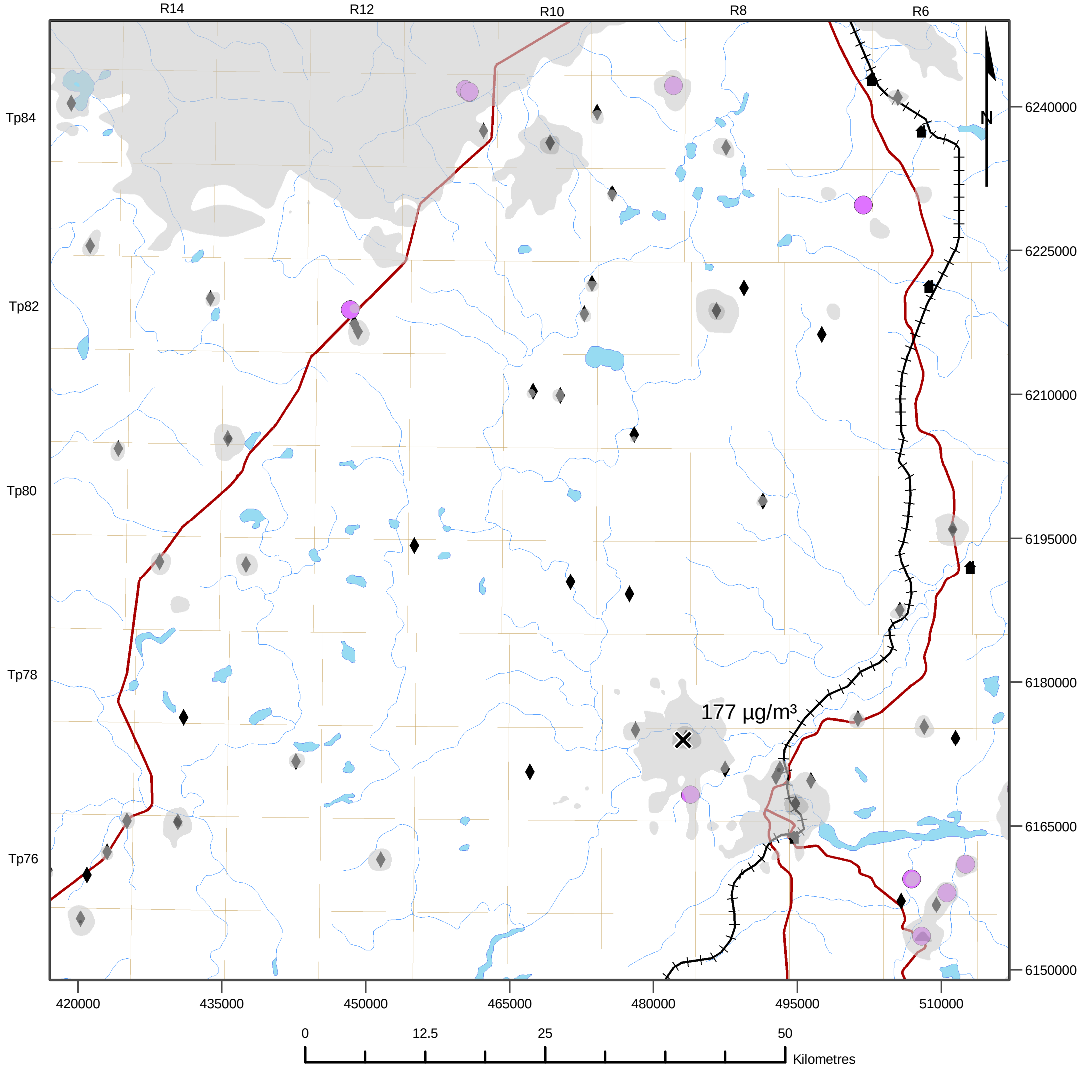
Figure 2.5-5

UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Concentration
(µg/m³)

- 400
- 300
- 200
- 100
- 5
- 0

Legend

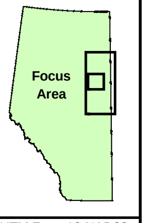
- × Maximum Point of Impingement
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

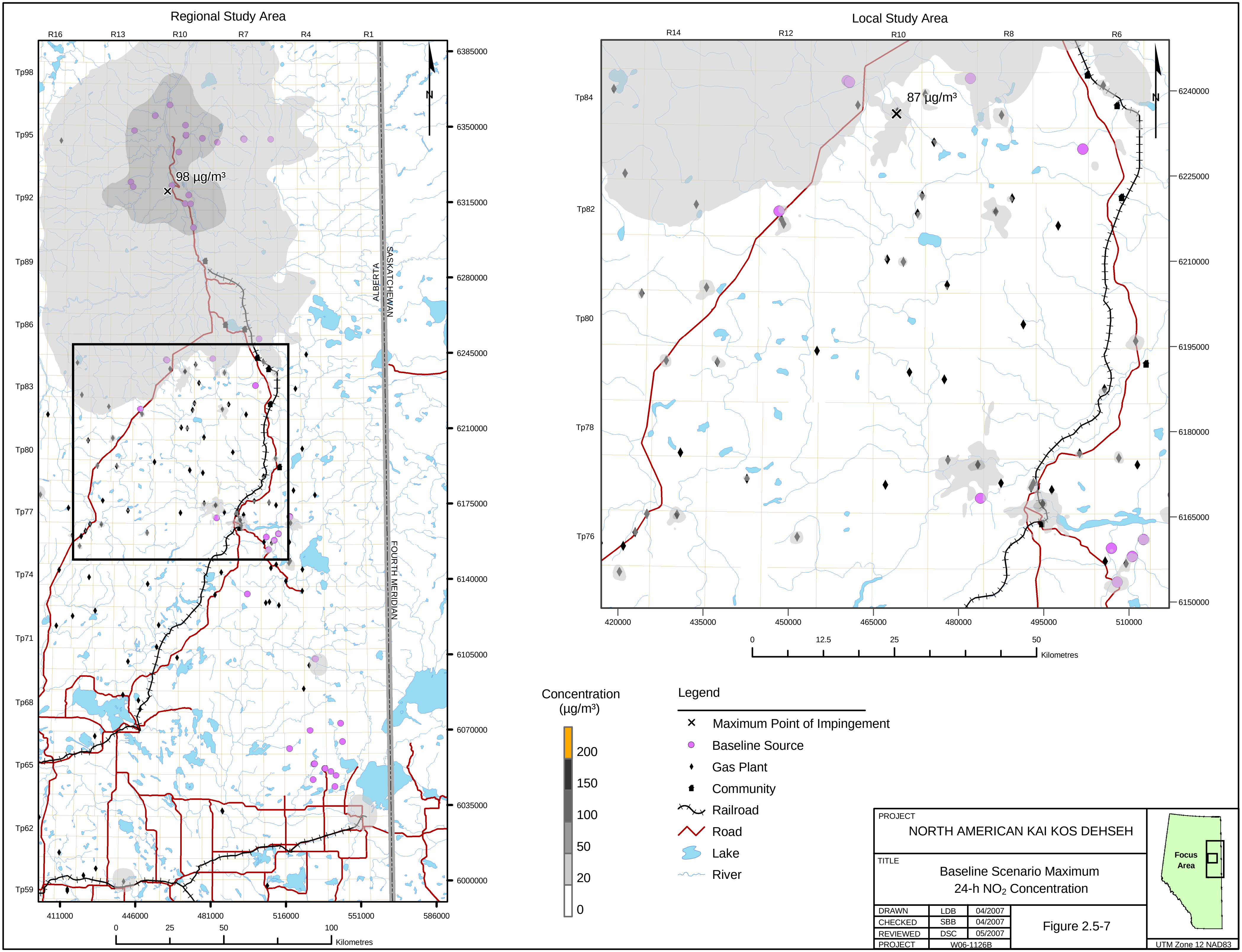
TITLE
Baseline Scenario Maximum
1-h NO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.5-6



UTM Zone 12 NAD83



PROJECT

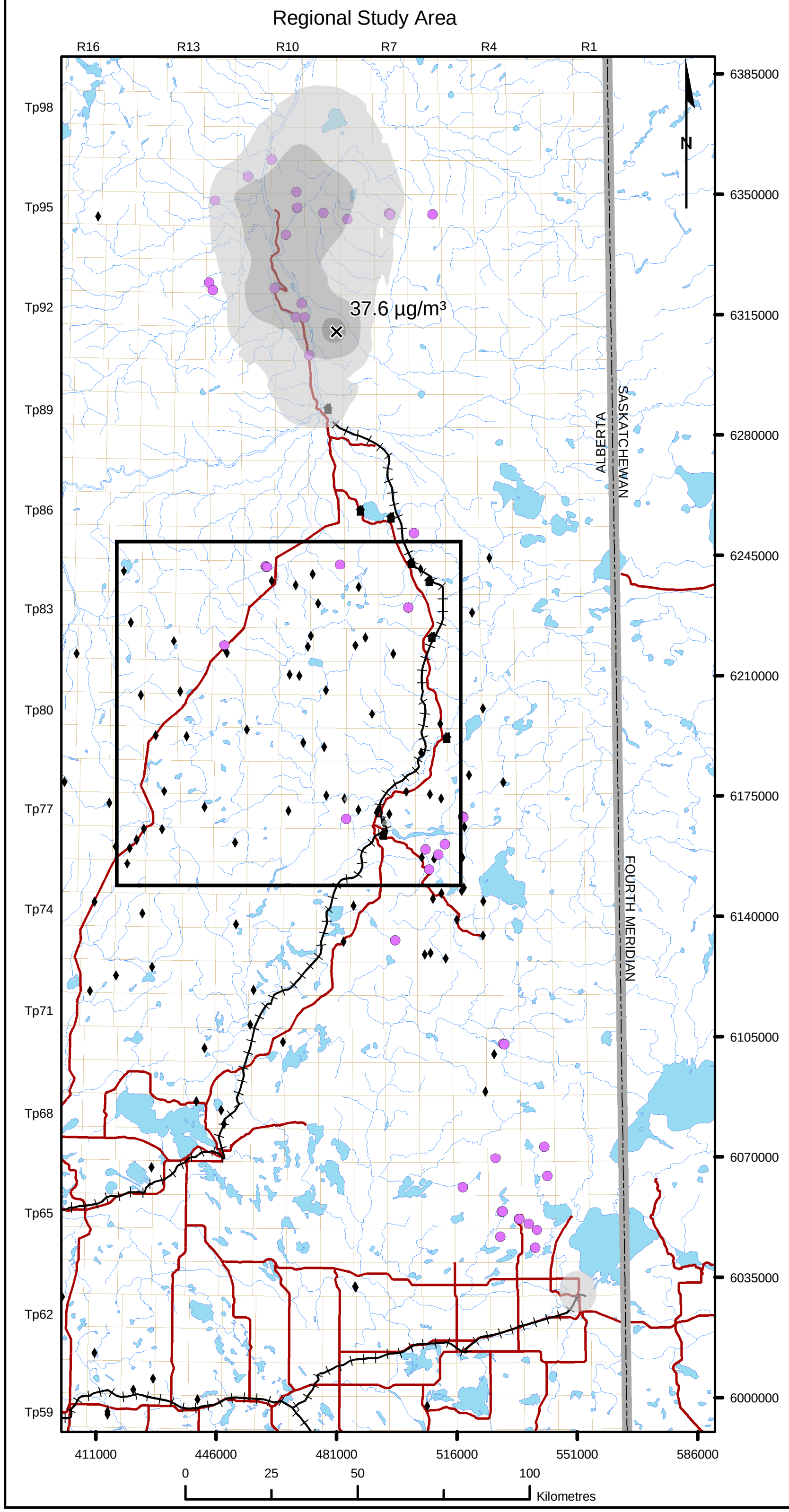
NORTH AMERICAN KAI KOS DEHSEH

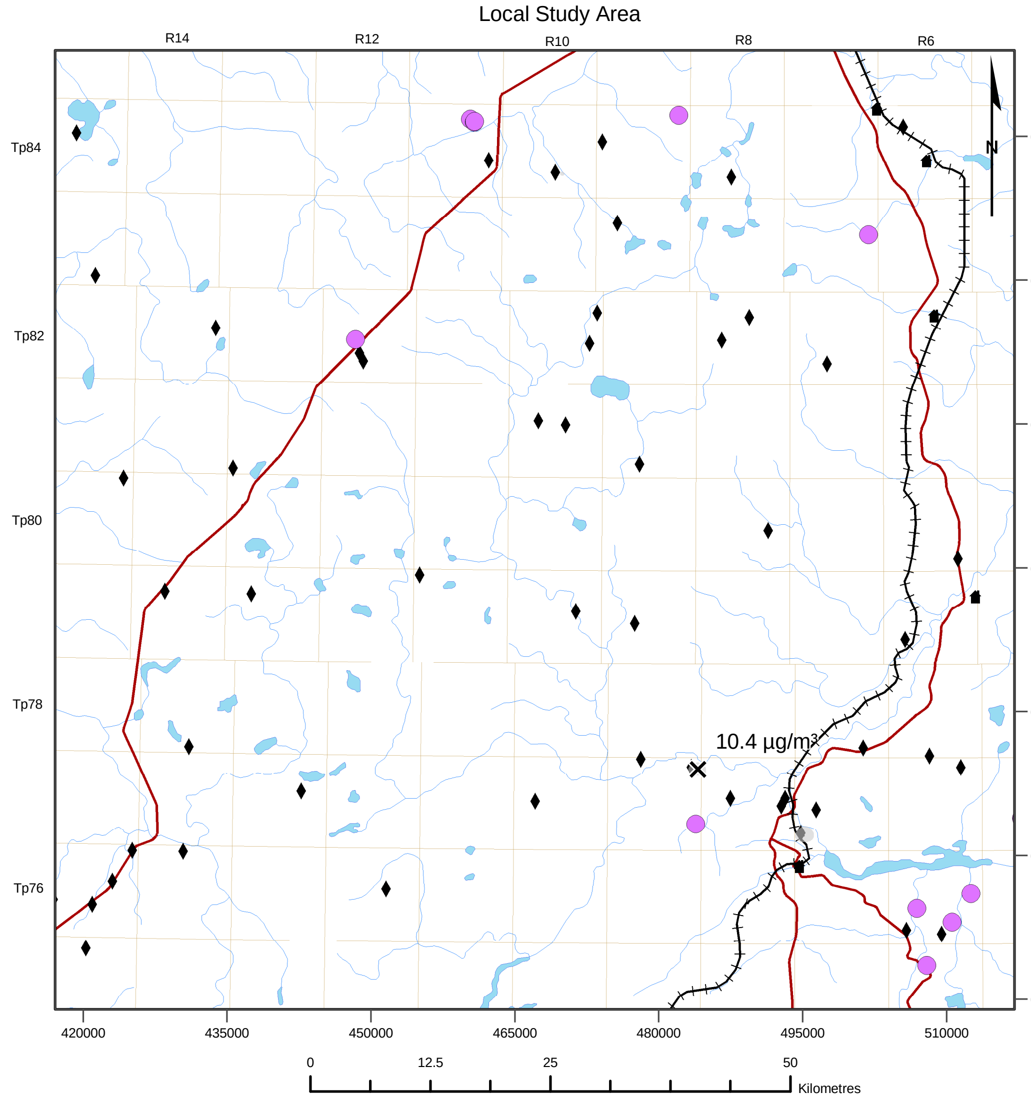
TITLE

Baseline Scenario Maximum
24-h NO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.5-7



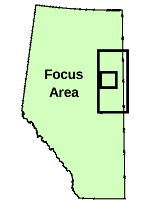


Concentration (µg/m³)

60
45
30
15
7
0

Legend

- × Maximum Point of Impingement
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River



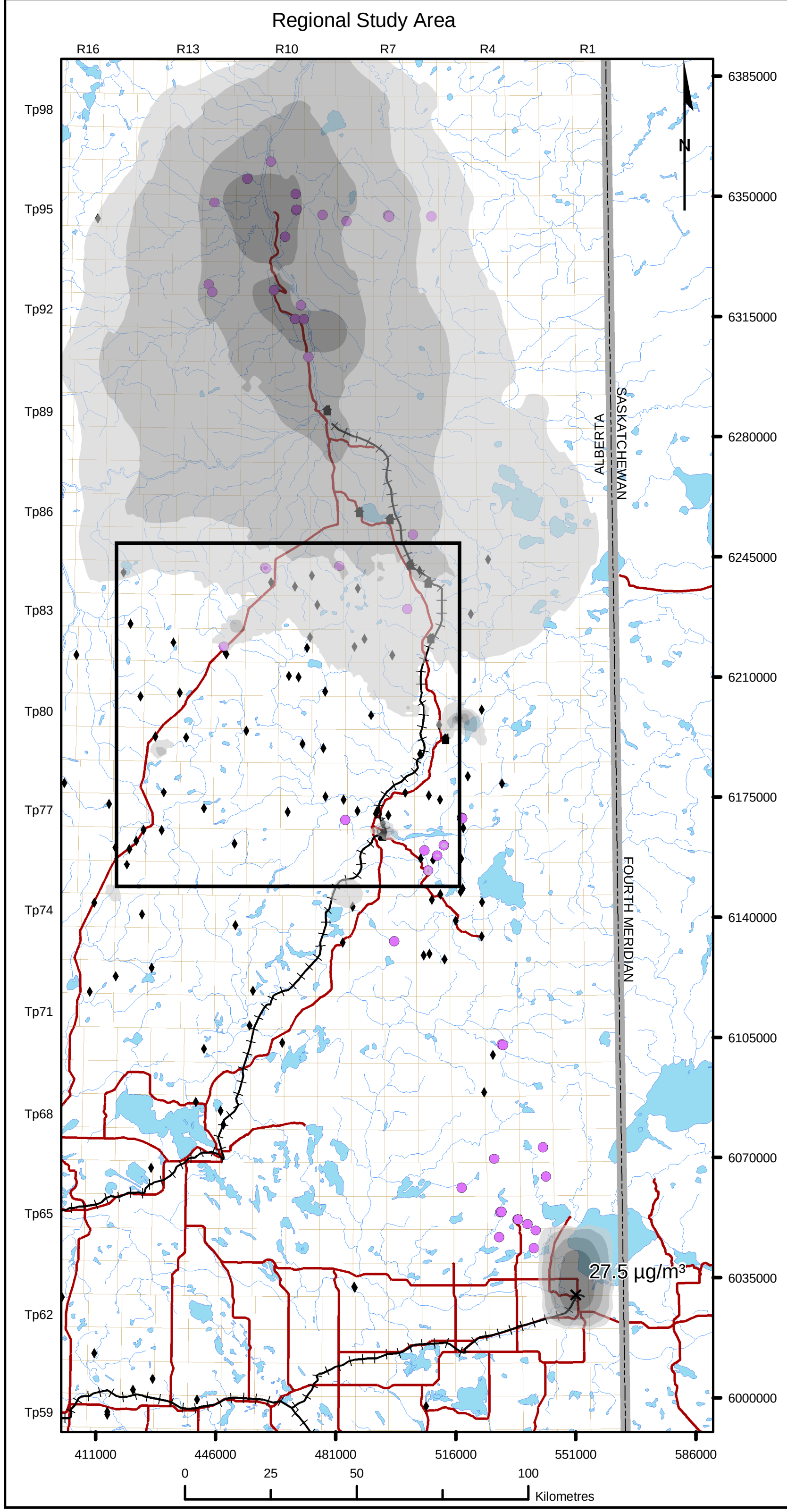
UTM Zone 12 NAD83

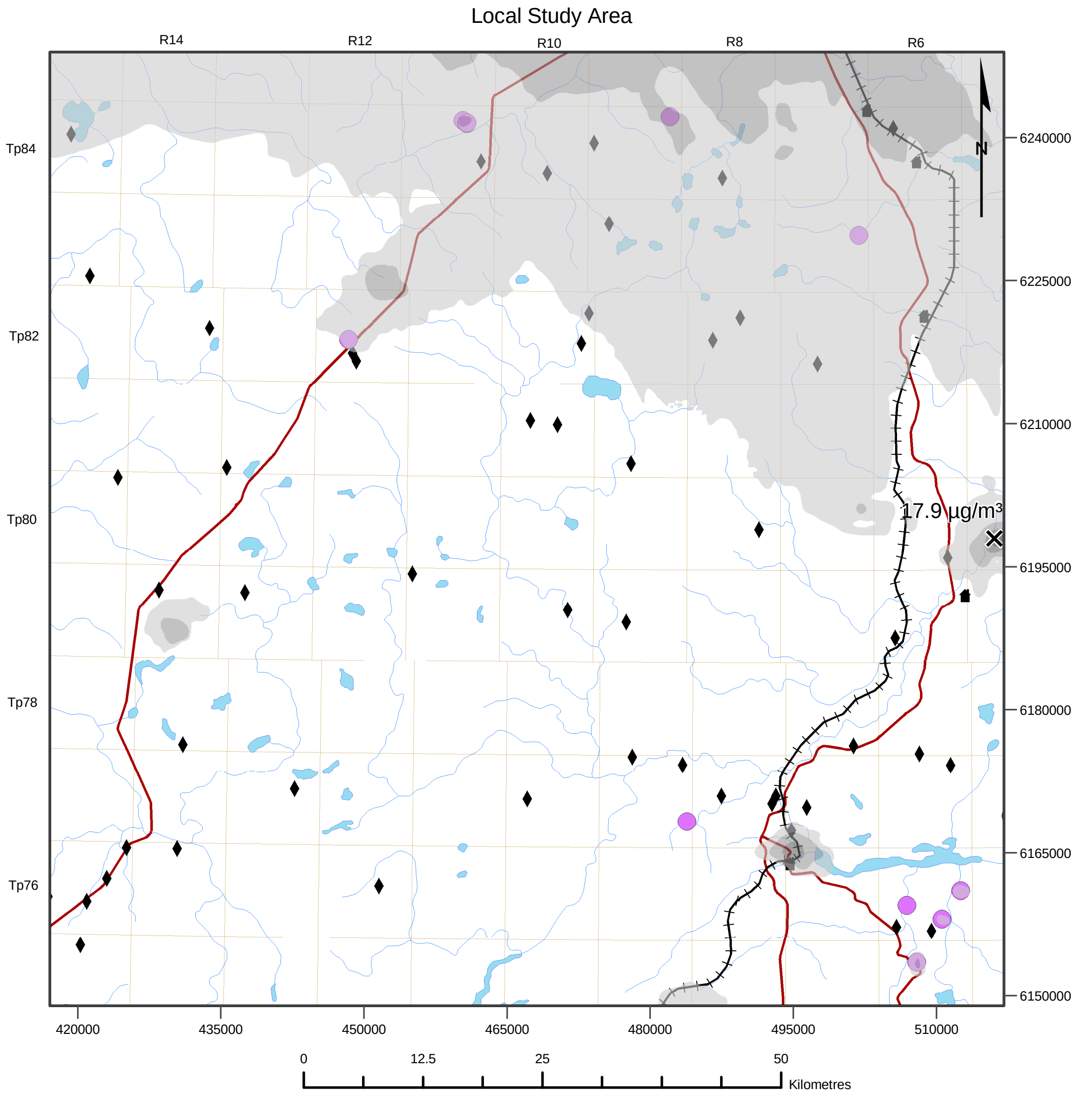
PROJECT
NORTH AMERICAN KAI KOS DEHSEH

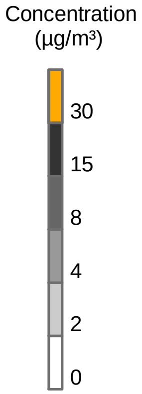
TITLE
Baseline Scenario Maximum Annual NO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.5-8







Legend

- × Maximum Point of Impingement
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT

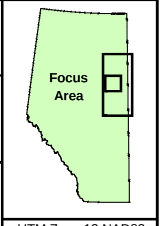
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Baseline Scenario 98th Percentile 24-h $PM_{2.5}$ Concentration

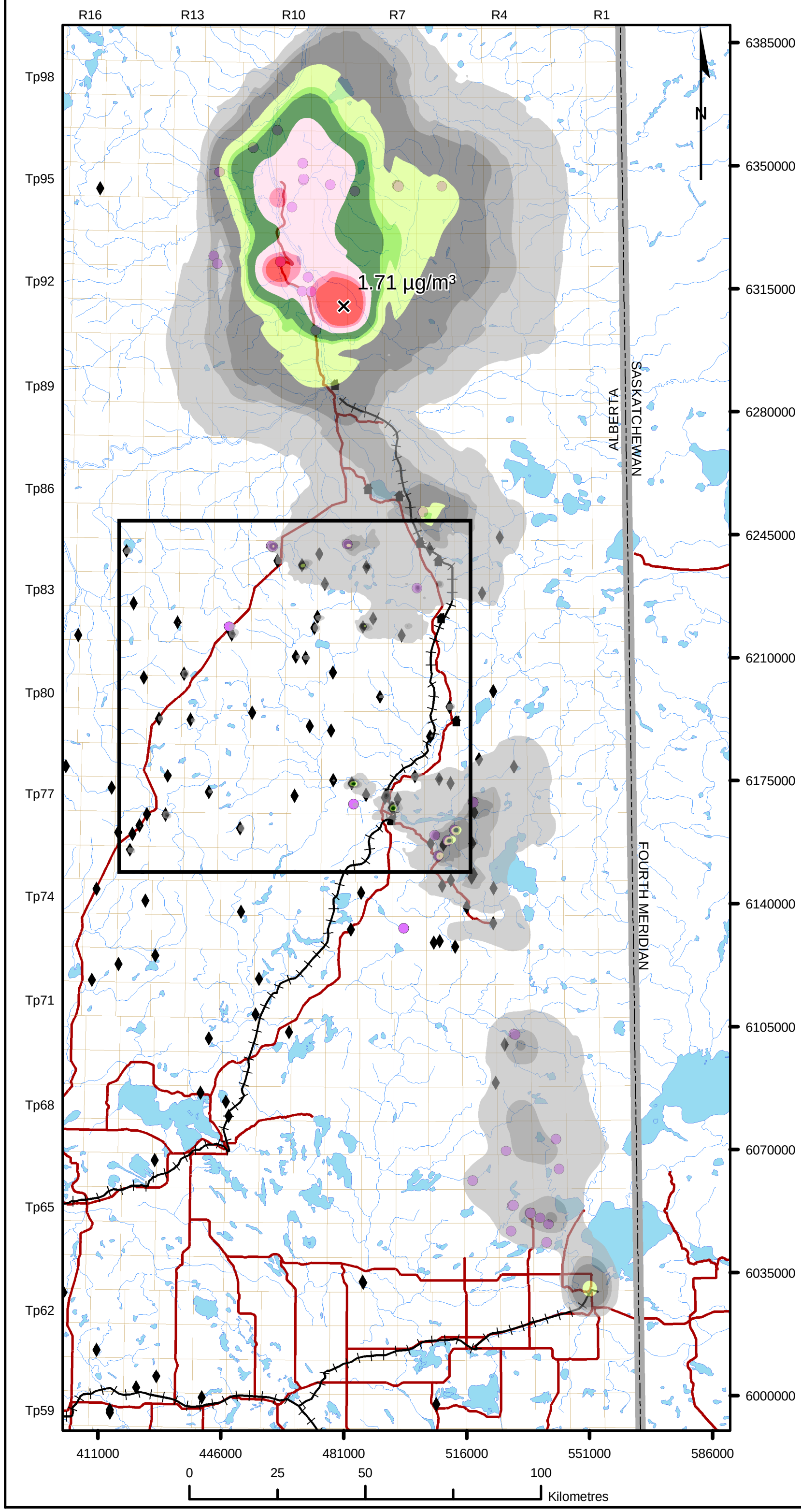
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.5-9

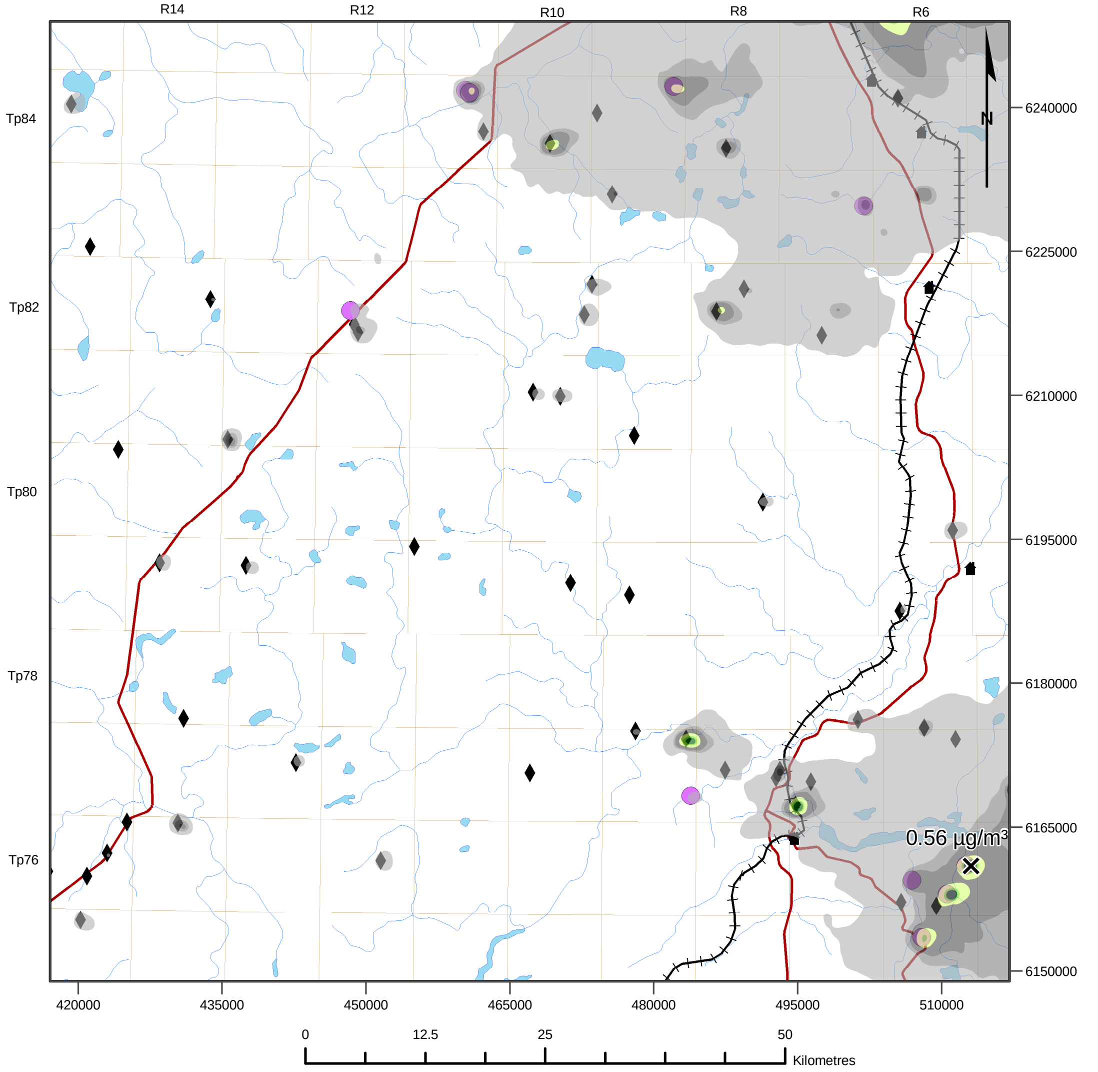


UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Deposition
(keq H+/ha/a)

- 🟥 1.00
- 🟥 0.90
- ⬜ 0.70
- 🟩 0.50
- 🟩 0.45
- 🟨 0.35
- ⬛ 0.25
- ⬛ 0.22
- ⬜ 0.17
- ⬜ 0.00

Legend

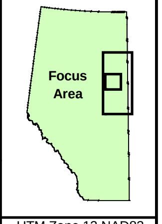
- × Maximum Point of Impingement
- ● Baseline Source
- ◆ Gas Plant
- ⌂ Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
Baseline Scenario Annual PAI
(background included)

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.5-10



UTM Zone 12 NAD83

2.6 Impact Assessment and Mitigative Measures

2.6.1 Project Emissions

2.6.1.1 Introduction

The proposed Project will add nine new hubs to serve the proposed field operations. The hubs will include modularized central processing facilities based on 20,000 bpd modules, as described in Volume 1. In total, there will be 12 CPF modules within the 10 hubs. Central processing facility emissions will overlap with emissions from other existing and approved sources in the air LSA and air RSA.

North American's engineering design estimates were applied to identify and quantify emissions from the proposed Project. The main sources of emissions will be combustion sources during both normal operations and upset conditions. Since the produced gas will be captured and burned in steam generators instead of being vented to the atmosphere and there will be a leak detection and repair (LDAR) program, fugitive hydrocarbon emissions from the Project are expected to be minimal and therefore, were not considered.

2.6.1.2 Normal Operations

The SO_2 emitted from the Project will vary with the produced gas flow rate and the associated H_2S content. Other combustion products such as NO_X, CO, VOC and $PM_{2.5}$ are less dependent on the fuel composition and are more dependent on the combustion process. The primary fuel source for continuous operation is natural gas. Continuously operating combustion sources at all 12 of the proposed CPF modules of the Project include:

- 48 steam generator boilers;
- 12 glycol trim heaters;
- 12 slop treaters;
- 5 sulphur plant process heaters;
- 12 high pressure emergency flare stacks; and
- 12 low pressure emergency flare stacks.

Not all CPFs will be constructed at the same time; however, to assess a worst-case scenario, it was assumed that all proposed emission sources were concurrently running at full capacity. The emission profile modelled for the EIA conservatively includes the South Leismer hub at the same time as the other hubs. As such, emissions for the full 240,000 bpd operation have been included in the dispersion modelling as part of the Project. No air emissions were allocated to the Northeast Leismer facility as this facility is identified as a future steam generation facility with steam generators re-located from the Leismer Expansion site and as such, the emissions from the Leismer expansion and the Northeast Leismer site will not occur concurrently. Emergency generators will be used to provide electrical power during periods of power outages, as these are not continuous sources; they were not assessed under normal operations.

2.6.1.3 Mitigative Measures

The following design features were used to reduce combustion emissions from the proposed Project:

- The steam boilers will use low NOx burner technology; and
- To reduce GHG emissions, produced gas will be captured and used as a fuel gas instead of being flared.

Since the effect of these mitigation measures were included in the emission estimates for the Project, the assessment of the Project effects is equivalent to a residual effects assessment.

2.6.1.4 Upset Conditions

The following three upset cases were identified as possible occurrences during the operation of the Project:

- Upset Case 1 – High pressure flare relief upstream of the sulphur recovery facility resulting in the combustion of a 1,600 m^3/h produced sour gas stream with 0.05% H_2S content in the flare stack. This event would typically last approximately 20 minutes, once every five years;
- Upset Case 2 - High pressure flare relief downstream of the sulphur recovery facility resulting in the combustion of a 1,600 m^3/h produced sour gas stream with 0.005% H_2S content in the flare stack. This event would typically last approximately 20 minutes, once every two years; and
- Upset Case 3 - Low pressure flare relief due to the loss of the VRU compressor for the tank vapours. The tank vapours contain some H_2S that is not removed by the sulphur recovery unit. The flow rate to be flared would be 96 m^3/h, with 0.28% H_2S content. This event would typically last approximately 20 minutes, once every two years.

Since there are many CPFs associated with the Project, only one CPF was assessed for the upset scenarios as it was assumed that one CPF at a time would be under upset conditions. During upset conditions, only the upset flares were modelled individually as other sources on site would not be operating.

2.6.1.5 Results

Table 2.6-1 provides the estimated Project emissions and compares them to air RSA and air LSA emission totals for the baseline and the application assessment scenarios. The change values provided in the table represent the increases due to the addition of the Project relative to the baseline scenario. The following are noted:

- In the air RSA, the Project contribution to emissions is in the 0.2% to 4.0% range relative to the baseline, depending on the compound;
- The air LSA emissions represent a small fraction of the total air RSA emissions; and
- In the air LSA, the Project contribution to emissions is in the 22% to 113% range relative to the baseline, depending on the compound.

These comparisons indicate that the percentage Project emission increase is greater for the air LSA than for the air RSA.

Table 2.6-1 Study Area Emission Changes Due to the Project

Scenario	SO_2	NO_x	CO	VOC	$PM_{2.5}$
Project					
Project (t/d)	2.86	16.19	9.73	0.91	1.23
Air RSA					
Baseline (t/d)	256.72	447.41	394.29	529.68	30.63
Application (t/d)	259.58	463.60	404.02	530.59	31.86
Increase Due to Project (%)	+1.1	+3.6	+2.5	+0.2	+4.0
Air LSA					
Baseline (t/d)	33.61	49.31	42.35	1.40	2.62
Application (t/d)	36.47	65.51	52.07	2.31	3.84
Increase Due to Project (%)	+8.5	+32.8	+23.0	+64.8	+46.8

2.6.2 Project Effects

2.6.2.1 Introduction

The addition of the Project will increase industrial emissions in the region. The Project contribution to SO_2, NO_2 and $PM_{2.5}$ concentrations and to PAI values can be determined by comparing the baseline and application scenario predicted concentrations. The maximum predicted values associated with the application scenario are shown in Table 2.6-2.

Table 2.6-2 Maximum Predicted SO_2, NO_2 and $PM_{2.5}$ Concentrations and PAI Values Associated With the Application Scenario

Maximum Predicted SO_2 Concentrations	Maximum Air RSA	Maximum Air LSA	AAAQO
1-h concentration (ug/m^3)	**580**	284	450
24-h concentration (ug/m^3)	113	104	150
Annual concentration (ug/m^3)	8.8	8.8	30

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

Maximum Predicted NO_2 Concentrations	Maximum Air RSA	Maximum Air LSA	AAAQO
1-h concentration (ug/m^3)	230	177	400
24-h concentration (ug/m^3)	98	87	200
Annual concentration (ug/m^3)	37.6	10.9	60

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

Maximum Predicted $PM_{2.5}$ Concentrations	Maximum Air RSA	Maximum Air LSA	CWS
24-h concentration (ug/m^3)	27.5	17.9	30

Notes: Values that exceed the CWS are shown in boldface text.

The values do not include a background value.

Maximum Predicted PAI (small-scale)	Maximum Air RSA	Maximum Air LSA	Target Loading (1° by 1° scale)
Sulphate (keq H^+/ha/y)	0.22	0.22	–
Nitrate (keq H^+/ha/y)	1.54	0.51	–
PAI (No background) (keq H^+/ha/y)	1.72	0.58	0.22 to 0.90
PAI (With background) (keq H^+/ha/y)	1.76	0.65	0.22 to 0.90

Notes: The sulphate and nitrate values do not include a background value.

The background PAI is based on the AENV (Cheng, 2001) predicted deposition contours.

The maximum sulphate and nitrate are not additive since they may occur at different locations.

The target loads (as defined by CASA and AENV, 1999) include low, moderately sensitive and sensitive receptors.

2.6.2.2 Sulphur Dioxide Impacts

Sulphur dioxide emissions due to the Project result from the combustion of produced gas, which contains H_2S. Maximum ambient SO_2 concentration patterns are evaluated for the three averaging periods associated with the ambient air quality criteria (1-hour, 24-hour and annual).

Application scenario predictions are summarized in a tabular format for the air RSA and the air LSA. Predictions are also provided as contours superimposed over the air RSA and air LSA maps for the three averaging periods (Figures 2.6-1 to 2.6-3). The maximum predicted 1-hour average SO_2 concentration exceeded the AAAQO during one hour in the air RSA. These exceedances were also predicted for the baseline scenario and are not due to the Project. No 1-hour average SO_2 exceedances are predicted to occur in the air LSA. As was the case for the baseline scenario, the maximum predicted 24-hour and predicted annual average SO_2 concentrations are less than their respective AAAQO.

Comparison of Baseline and Application Scenarios

Table 2.6-3 compares maximum predicted SO_2 concentrations for the baseline and application assessment scenarios for the three averaging periods. The difference between predicted concentrations for the two scenarios indicates the relative contribution of the Project.

Table 2.6-3 Maximum SO_2 Concentrations Due to the Project

Scenario	**Air RSA**			**Air LSA**		
	1-h	**24-h**	**Annual**	**1-h**	**24-h**	**Annual**
Baseline (ug/m^3)	**580**	113	8.8	284	104	8.8
Application (ug/m^3)	**580**	113	8.8	284	104	8.8
Increase Due to Project (%)	<1	<1	<1	<1	<1	<1
AAAQO (ug/m^3)	450	150	30	450	150	30

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

The maximum predicted SO_2 concentrations for both scenarios exceed the 1-hour ambient air quality objectives in the air RSA. The maximum 1-hour SO_2 concentration is predicted to exceed the 1-hour AAAQO for 4 hours or 0.05% of the time. The Project contribution to the maximum predicted 1-hour, 24-hour, and annual average concentrations in the air RSA and air LSA are less than 1%. There is no difference between the predicted annual SO_2 concentration in the air RSA and air LSA in the application scenario as the maximum predicted values occur outside of the air LSA.

The concentration contour plots for the three averaging periods for the application scenario are shown in the following figures:

- Figures 2.6-1, 2.6-2 and 2.6-3 show the maximum 1-hour, 24-hour and the annual average SO_2 concentrations, respectively. The differences between the predicted baseline and application concentrations external to the air LSA are minimal. Within the air LSA, there are slight changes due to the addition of the Project SO_2 emissions.

The maximum 1-hour, 24-hour and annual average air RSA concentration patterns for the application scenario are virtually identical to their respective baseline scenario patterns, indicating the small contribution of the Project to ambient concentrations beyond the air LSA. In the air

LSA, the effect of the Project is discernable; however, the magnitude of the impact of Project SO_2 emissions is low.

SO_2 Concentrations Due to Project Upset Flaring

There are three possible cases under which an upset flaring event may occur:

- The first case involves high pressure flare relief upstream of the sulphur recovery facility resulting in the combustion of a 1,600 m^3/h produced sour gas stream with 0.05% H_2S content in the flare stack. This event will typically last approximately 20 minutes, once every five years and releases 0.59 g/s of SO_2 (Appendix 2A).
- The second case involves high pressure flare relief downstream of the sulphur recovery facility resulting in the combustion of a 1,600 m^3/h produced sour gas stream with 0.005% H_2S content in the flare stack. This event will typically last approximately 20 minutes, once every two years and will emit 0.06 g/s of SO_2 (Appendix 2A).
- The third case involves low pressure flare relief due to the loss of the VRU compressor for the tank vapours. The tank vapours contain some H_2S that is not removed by the sulphur recovery unit. The flow rate to be flared is 96 m^3/h, with 0.28% H_2S content. This event will typically last approximately 20 minutes, once every two years and will emit 0.002 g/s of SO_2 (Appendix 2A).

Table 2.6-4 shows the maximum predicted 1-hour average SO_2 concentrations during all three upset cases. No exceedances are predicted for the upset scenarios. As the predictions for the upset scenarios are low, there is no increase in the maximum predicted concentration for the application scenario.

Table 2.6-4 Maximum Predicted SO_2 Concentrations Associated with Upset Flaring

Case	Averaging Period	Project Scenario (ug/m^3)	AAAQO (ug/m^3)
Upset Case 1	1-h Maximum	9.46	450
	1-h 9th Highest	7.91	450
Upset Case 2	1-h Maximum	0.97	450
	1-h 9th Highest	0.81	450
Upset Case 3	1-h Maximum	33.05	450
	1-h 9th Highest	18.86	450

Overall SO_2 Results

Table 2.6-5 provides the impact ratings for ambient SO_2 concentration changes due to the Project. Project emissions increase the maximum predicted 1-hour, 24-hour and annual average SO_2 concentrations in the air LSA by less than 1%. The addition of the Project emissions does not result in additional exceedances of ambient air quality objectives compared to the baseline scenario. Since the increase in 1-hour, 24-hour and annual average SO_2 concentrations are less than 1% and no new exceedances are predicted, the magnitude of the impact is rated low. Since the potential impact is negative in direction, local in extent, low in magnitude and infrequent, the final rating is assessed as low for both the air RSA and the air LSA.

Table 2.6-5 Impact Ratings for Ambient SO_2 Concentration Changes Due to the Project

Impact Attribute	Rating	Comment
Direction	Negative	Predicted maximum ambient concentrations within the air RSA are unchanged but the extent of the SO_2 contours in the air LSA is slightly larger. The location of the highest predicted annual value occurs within the air LSA.
Geographic Extent	Local	The changes are limited to the vicinity of the Project.
Magnitude	Low	Air RSA: the changes are less than 1% for 1-h, 24-h and annual values. Exceedances are present in the baseline and are not due to Project emissions.
	Low	Air LSA: There are no exceedances in the air LSA and the Project contributions to predict concentrations are less than 1%.
Duration	Medium-term	The increase in ambient SO_2 concentrations will cease at the end of the Project life.
Frequency	Infrequent	1-h exceedances in the air RSA are expected to occur 0.05% of the time.
Confidence	High	The model and associated input parameters are sufficiently well understood.
Final Rating	Low	Air RSA: Local geographic extent, low magnitude, and infrequent.
	Low	Air LSA: Local geographic extent, low magnitude and infrequent.

2.6.2.3 Nitrogen Oxide Impacts

NO_x emissions due to the Project result from the combustion of natural gas and produced gas. Maximum ambient nitrogen dioxide (NO_2) concentration patterns are predicted for the three averaging periods associated with the ambient air quality objectives (namely 1-hour, 24-hour and annual). Section 3.5 of Appendix 2D reviews the chemistry associated with the conversion of NO_X to NO_2.

Application scenario predictions are shown in a tabular format for the air RSA and the air LSA (Table 2.6-2). Predictions are also provided as contours superimposed over the air RSA and air LSA maps (Figures 2.6-4 to 2.6-6). The maximum predicted NO_2 concentrations in the air RSA and air LSA are less than the AAAQO.

Comparison of Baseline and Application Scenarios

Table 2.6-6 compares maximum predicted NO_2 concentrations for the baseline and the application scenarios for the three averaging periods. The difference between predicted concentrations for the two scenarios indicates the contribution of the Project. For the air RSA, the Project contribution to the maxima is less than 1%. In the air LSA, Project emissions result in increases, in the maximum 1-hour and 24-hour predicted concentration by less than 1%. Project emissions result in increases of the predicted annual average by 4.3%. Nonetheless, the maximum predicted concentrations in the air LSA for the application scenario are all less than half of their corresponding air quality objectives.

Table 2.6-6 Maximum NO_2 Concentration Changes Due to the Project

Scenario	Air RSA			Air LSA		
	1-h	24-h	Annual	1-h	24-h	Annual
Baseline (ug/m^3)	230	98	37.6	177	87	10.4
Application (ug/m^3)	230	98	37.6	177	87	10.9
Increase Due to Project (%)	<1	<1	<1	<1	<1	+4.3
AAAQO (ug/m^3)	400	200	60	400	200	60

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

The concentration contour plots for the different averaging periods and the application scenario are shown in the following figures:

- Figures 2.6-4, 2.6-5, and 2.6-6 show the maximum 1-hour, 24-hour, and annual average NO_2 concentrations, respectively, for the application scenario. The differences between the predicted baseline and application concentrations external to the air LSA are minimal. Within the air LSA, changes are evident in the near vicinity of the Project site.

Overall NO_2 Results

Table 2.6-7 provides the impact ratings for ambient NO_2 concentration changes due to the Project.

The effects of the Project NO_x emissions are minimal outside the air LSA. In the air LSA, ambient NO_2 exposures near the Project are predicted to increase. The maximum NO_2 concentrations in the vicinity of the Project are predicted to be less than the AAAQO.

Since the geographic extent is local, the magnitude is low and the impact is infrequent, the final rating is low for both the air LSA and the air RSA.

Table 2.6-7 Impact Ratings for Ambient NO_2 Concentration Changes Due to the Project

Impact Attribute	Rating	Comment
Direction	Negative	Although predicted maximum ambient NO_2 concentrations within the air RSA remain the same, predicted ambient NO_2 concentrations within the air LSA increase.
Geographic Extent	Local	The changes are limited to the vicinity of the Project.
Magnitude	Low	Air RSA: The change is less than 1%. Predicted concentrations do not exceed the ambient air quality objectives.
	Moderate	Air LSA: Ambient NO_2 concentration changes due to the Project are less than 5%; however no exceedances are predicted.
Duration	Medium-term	The increase in ambient NO_2 concentrations will cease at the end of the Project life.
Frequency	Infrequent	No exceedances are predicted to occur.
Confidence	High	The model and associated input parameters are sufficiently well understood.
Final Rating	Low	Air RSA: Local geographic extent and low magnitude.
	Low	Air LSA: Local geographic extent, low magnitude and infrequent.

2.6.2.4 Particulate Matter Impacts

Fine particulate matter ($PM_{2.5}$) concentrations due to the Project result directly from combustion emissions (i.e., primary) and indirectly from the formation of sulphates and nitrates in the atmosphere from SO_2 and NO_x emissions (i.e., secondary). Ambient $PM_{2.5}$ concentration patterns were predicted for the 24-hour averaging period associated with the CWS. The predicted values represent the sum of the predicted primary and secondary values, calculated by the CALPUFF model.

Application scenario predictions are summarized in a tabular format for the air RSA and the air LSA (Table 2.6-2). Predictions are also provided as contours superimposed over the air RSA and air LSA maps (Figure 2.6-7). The 98th percentile predicted $PM_{2.5}$ concentrations in the air RSA and air LSA are less than the CWS.

Comparison of Baseline and Application Scenarios

Table 2.6-8 compares 98th percentile predicted $PM_{2.5}$ concentrations for the baseline and the application scenarios. The comparison of the two scenarios shows the contribution of the Project. For both the air RSA and air LSA, the Project contribution is less than 1%.

Table 2.6-8 98th Percentile $PM_{2.5}$ Concentration Changes Due to the Project

Scenario	Air RSA 24-h	Air LSA 24-h
Baseline (ug/m^3)	27.5	17.9
Application (ug/m^3)	27.5	17.9
Increase Due to Project (%)	<1	<1

Notes: Values that exceed the ambient objective are shown in boldface text.

The values do not include a background value.

Figure 2.6-7 shows the 98th percentile 24-hour average $PM_{2.5}$ concentrations for the application scenario. The differences between the predicted baseline and application concentrations external to the air LSA are minimal. Within the air LSA, and relative to Figure 2.5-9, there are slight changes due to the addition of the Project $PM_{2.5}$ and $PM_{2.5}$-precursor emissions.

Overall $PM_{2.5}$ Results

Table 2.6-9 provides the impact ratings for ambient $PM_{2.5}$ concentration changes due to the Project.

Table 2.6-9 Impact Ratings for Ambient $PM_{2.5}$ Concentration Changes Due to the Project

Impact Attribute	Rating	Comment
Direction	Negative	Although maximum predicted ambient $PM_{2.5}$ concentrations within the air RSA and air LSA remain the same; the extent of the concentration contours increases.
Geographic Extent	Local	The changes are limited to the vicinity of the Project.
Magnitude	Low	Air RSA: The change is less than 1%. The maximum predicted values in the air RSA are less than the CWS.
	Low	Air LSA: The change is less than 1%. The maximum predicted values in the air LSA are less than the CWS.
Duration	Medium-term	The contribution of Project emissions to ambient $PM_{2.5}$ concentrations will cease at the end of the Project life.
Frequency	Infrequent	No exceedances are expected to occur.
Confidence	High	The model and associated input parameters are sufficiently well understood.
Final Rating	Low	Air RSA: Local geographic extent and low magnitude.
	Low	Air LSA: Local geographic extent and low magnitude.

The effects of the Project $PM_{2.5}$ and $PM_{2.5}$-precursor emissions are low in the air RSA. In the air LSA, ambient $PM_{2.5}$ exposures near the Project are predicted to slightly increase. The maximum $PM_{2.5}$ concentrations in the vicinity of the Project are predicted to be less than the associated CWS. Furthermore, the change in ambient $PM_{2.5}$ concentrations is sufficiently low that it is not expected to impact visibility in the region. Since the magnitude of the effect is low and the geographic extent is local, the final rating is low for both the air RSA and air LSA.

2.6.2.5 Acid Deposition Impacts

Emissions of SO_2 and NO_x result in the deposition of acidifying compounds (i.e., SO_2, SO_4, NO, NO_2, HNO_3 and nitrate) that are quantified as PAI.

Application scenario results for the air RSA and air LSA are summarized in Table 2.6-2. Predictions are also provided as PAI contours superimposed over the air RSA and air LSA maps, expressed as an annual value and including background values (Figure 2.6-8).

Comparison of Baseline and Application Scenarios

Table 2.6-10 summarizes the maximum small-scale (i.e., representing distance scales that are much less than the 1º longitude by 1º latitude grid cell) sulphate equivalent deposition, nitrate equivalent deposition and PAI for the baseline and the application scenarios. Also shown is the predicted increase due to the Project. For the air RSA, the Project contribution to the maximum values is low for nitrates, sulphates, and PAI (i.e., less than 1%). For the air LSA, the Project contribution to the maximum values is low for nitrates, sulphates, and PAI (i.e., less than 2%).

Table 2.6-10 Maximum Small-Scale Acid Deposition Changes Due to Project

Scenario	Air RSA			Air LSA		
	Sulphate	Nitrate	PAI	Sulphate	Nitrate	PAI
Baseline (keq H^+/ha/y)	0.21	1.53	1.76	0.21	0.51	0.65
Application (keq H^+/ha/y)	0.22	1.54	1.76	0.22	0.51	0.65
Increase Due to Project (%)	<5	<1	<1	<5	<1	<1
Low Sensitivity Receptor Target Load (1° by 1°) (keq H^+/ha/y)	–	–	0.90	–	–	0.90
Moderately Sensitive Receptor Target Load (1° by 1°) (keq H^+/ha/y)	–	–	0.45	–	–	0.45
Sensitive Receptor Target Load (1° by 1°) (keq H^+/ha/y)	–	–	0.22	–	–	0.22

Notes: Maximum values represent small-scale peaks; whereas CASA Target Loads are for a 1º latitude by 1º longitude area.

Sulphate equivalent and nitrate equivalent deposition without background.

PAI = Potential Acid Input (includes background).

Figure 2.6-8 shows the annual PAI for the application scenario. The predicted baseline and application deposition patterns external to the air LSA are virtually identical. Within the air LSA, there are noticeable changes due to the addition of the Project emissions.

Overall PAI Results

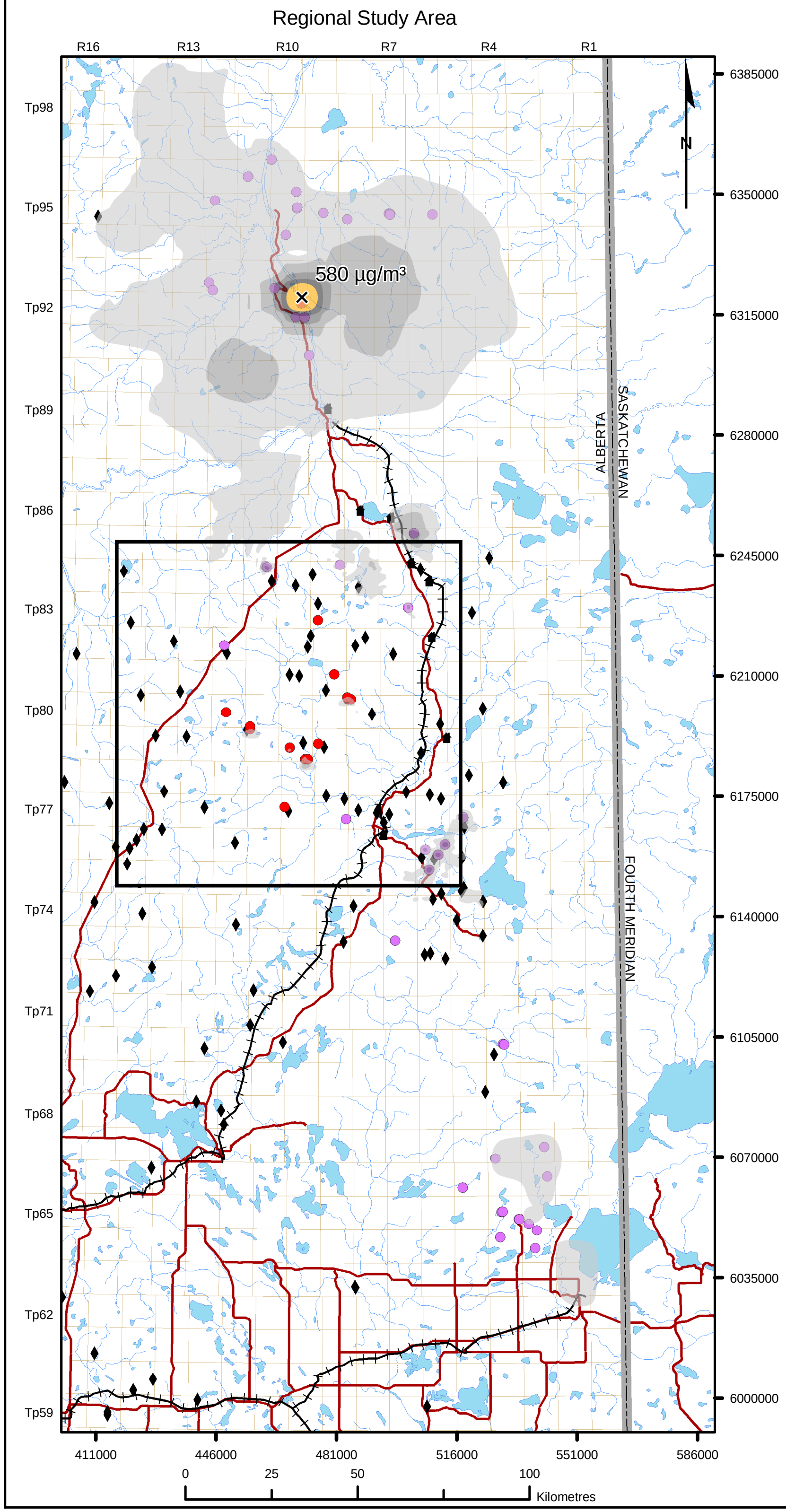
Table 2.6-11 provides the impact ratings for ambient PAI changes due to the Project.

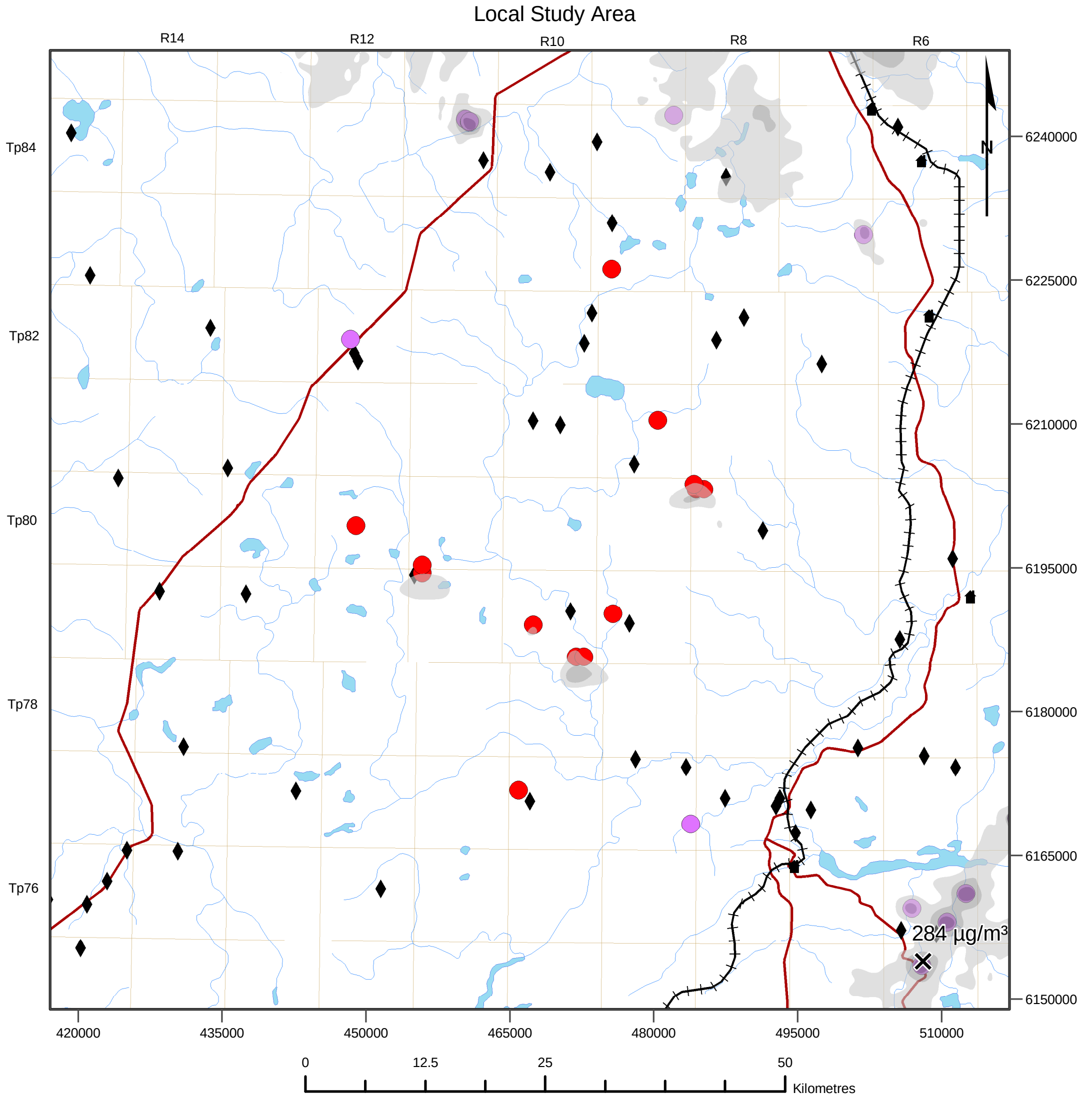
The effects of the Project SO_2 and NO_x precursor emissions on the predicted PAI values are low outside the air LSA. Some small-scale values higher than the target loads for the various receptor sensitivities are predicted to occur in the air RSA and air LSA.

In the air LSA, the maximum PAI near the Project is predicted to increase and the maximum small-scale values in the vicinity of the Project are predicted to be higher than target loads for moderately sensitive and sensitive receptors. Note that small-scale PAI values greater than the deposition loads are not viewed as an exceedance, since the loads are to be applied to a 1º latitude by a 1º longitude scale and estimated using the RELAD model applied at a sub-continental scale. The final ratings for the air RSA and LSA are both low due to the local geographic extent and low magnitude.

Table 2.6-11 Impact Ratings for PAI Changes Due to the Project

Impact Attribute	Rating	Comment
Direction	Negative	Predicted PAI increases in the air LSA.
Geographic Extent	Local	The changes are mainly limited to the vicinity of the Project.
Magnitude	Low	Air RSA: The change is less than 1%.
	Low	Air LSA: The small-scale deposition change is less than 1%. On a small scale, the maximum PAI is higher than the CASA Target Loads; however, these elevated values are not considered to be exceedances.
Duration	Long-Term	Acidifying emissions from the Project will cease at the end of the Project life; however, acidification impacts may potentially occur beyond the life of the project.
Frequency	Continuous	Annual values, by definition, represent a continuous exposure. Nonetheless, higher deposition tends to occur during the spring and summer when vegetation activity is greater.
Confidence	Moderate	While the model and associated input parameters are sufficiently well understood, there is less certainty with the prediction of deposition.
Final Rating	Low	Air RSA: Local geographic extent and low magnitude.
	Low	Air LSA: Local geographic extent, moderate magnitude, long term and continuous.





Concentration (µg/m³)

- 450
- 340
- 225
- 110
- 55
- 0

Legend

- × Maximum Point of Impingement
- ● The Project
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT

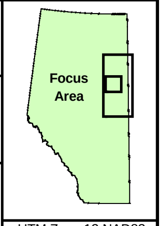
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Application Scenario Maximum
1-h SO_2 Concentration

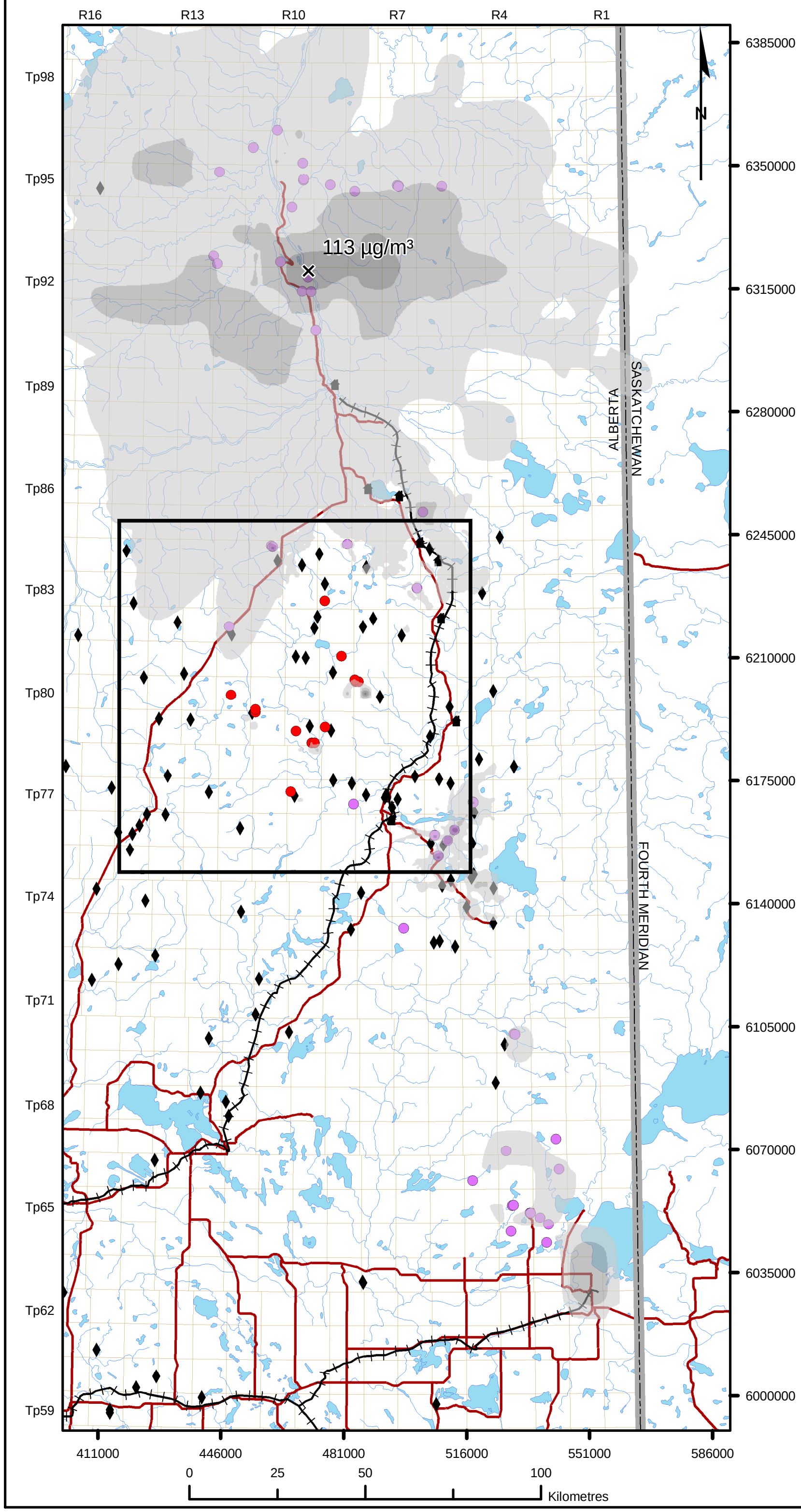
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.6-1

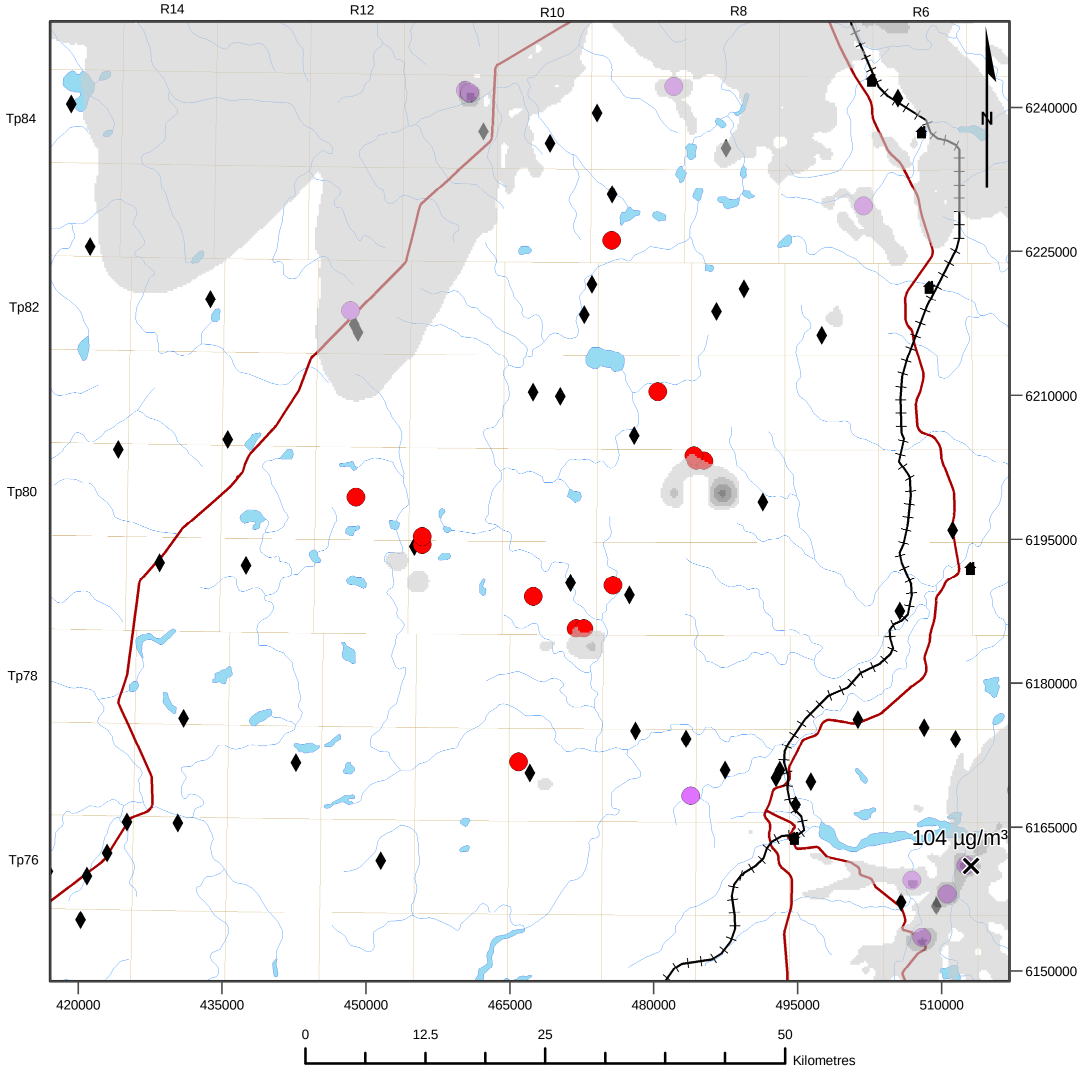


UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Concentration
(µg/m³)

🟧	150
⬛	115
▨	75
▨	35
▨	15
☐	0

Legend

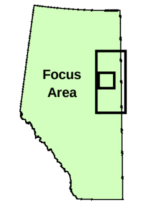
- × Maximum Point of Impingement
- ● The Project
- ● Baseline Source
- ♦ Gas Plant
- ■ Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

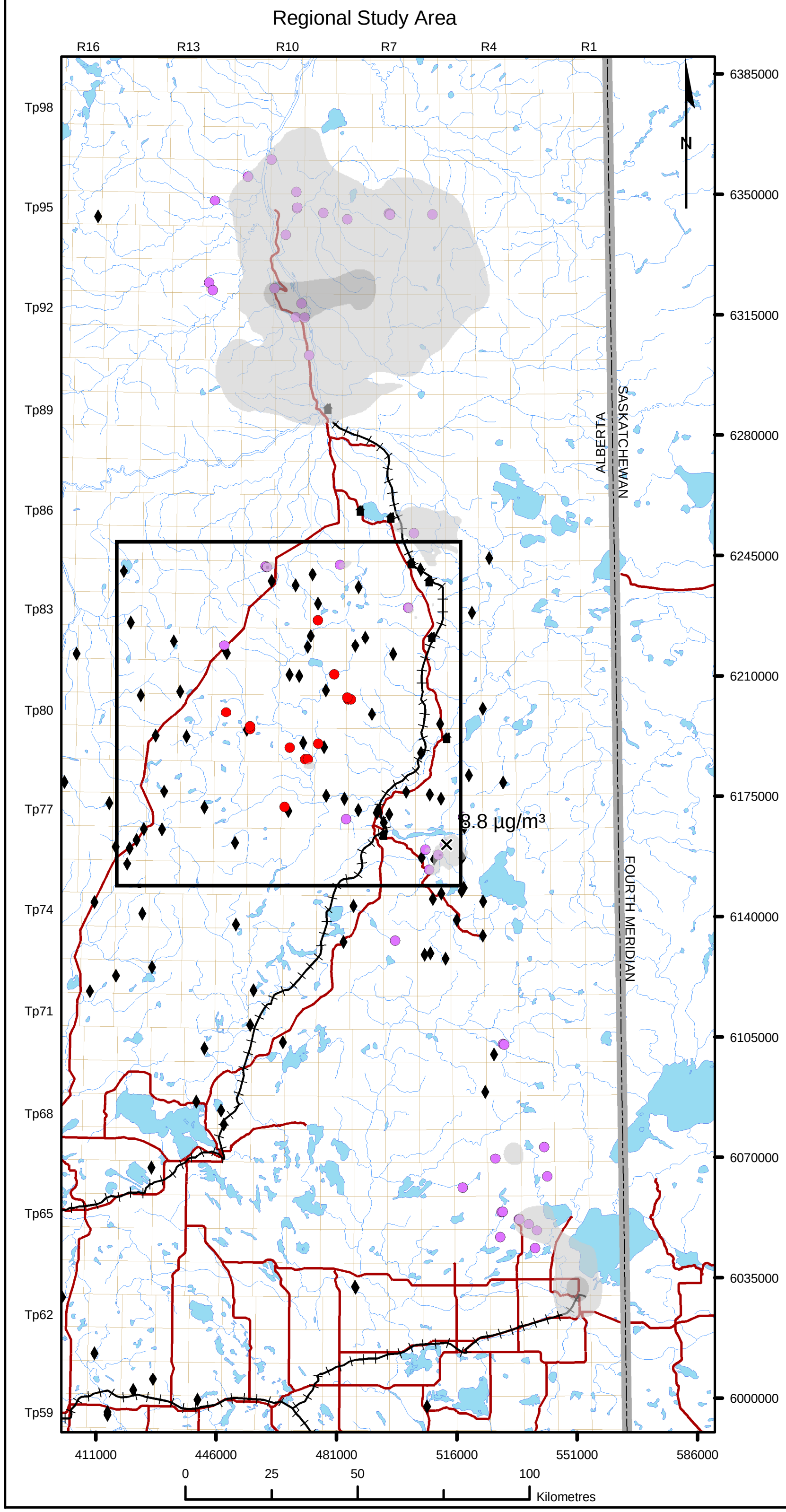
TITLE
Application Scenario Maximum
24-h SO_2 Concentration

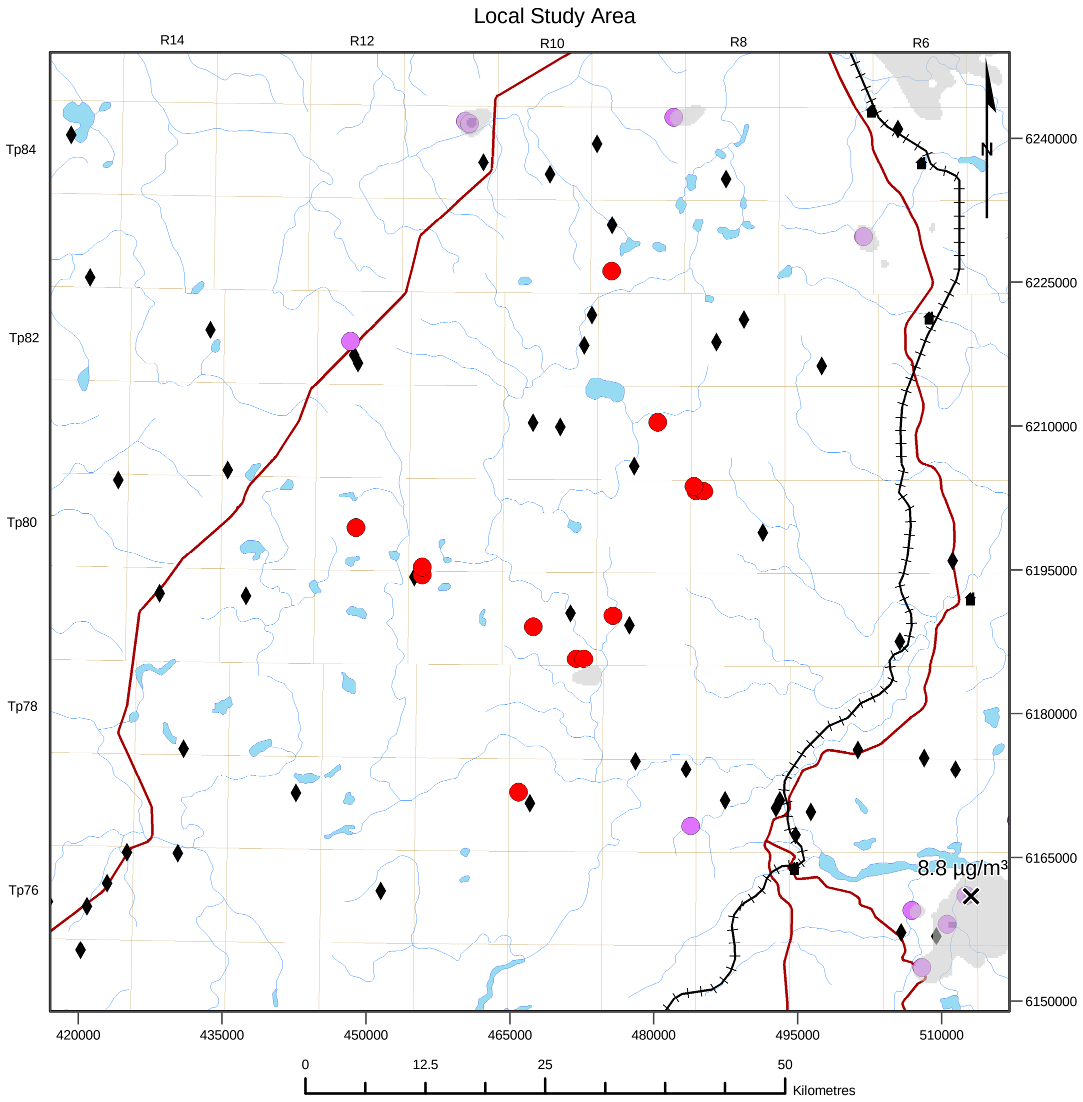
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.6-2

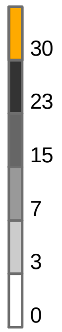


UTM Zone 12 NAD83





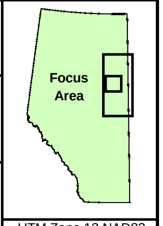
Concentration (µg/m³)



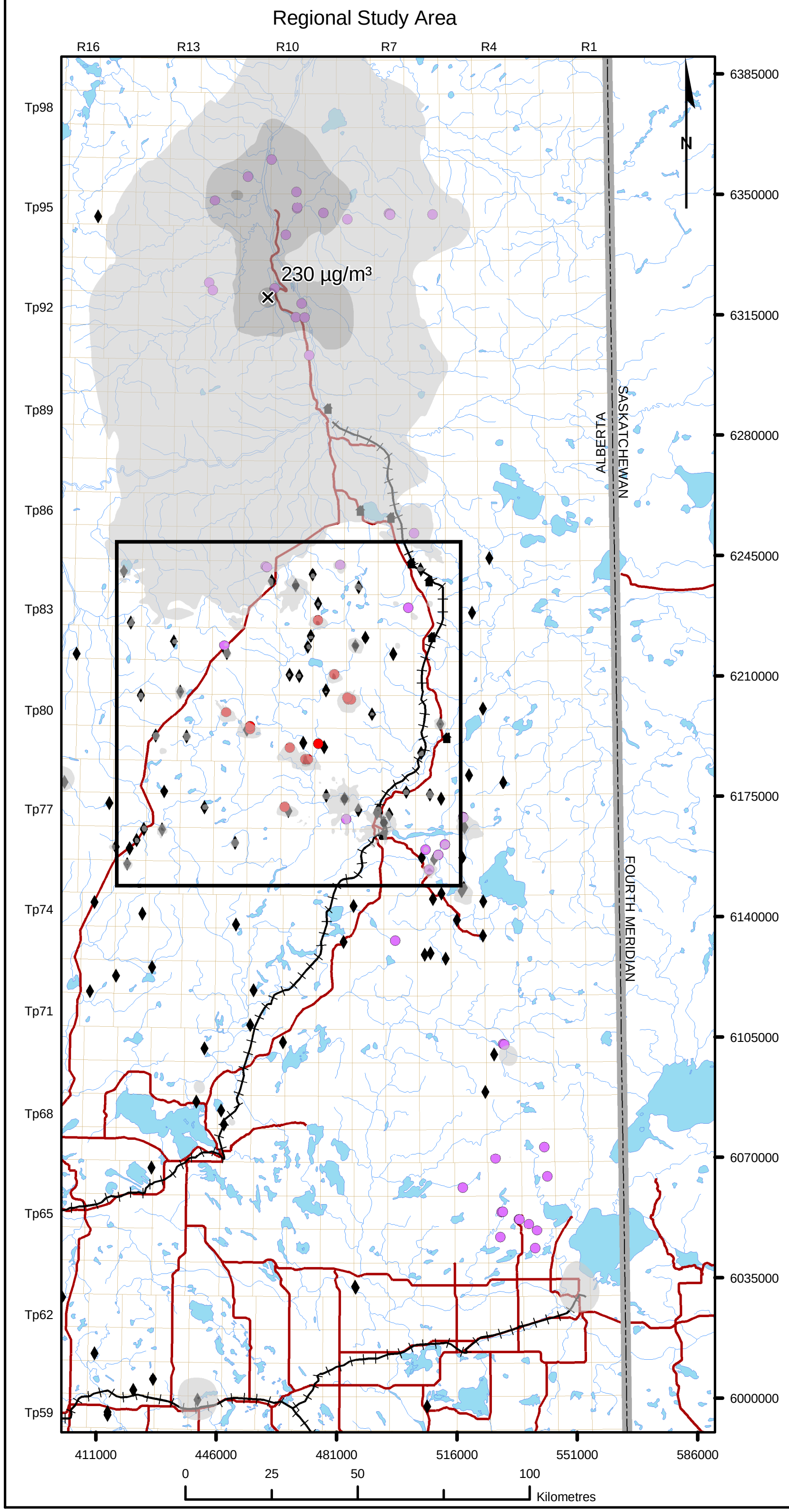
Legend

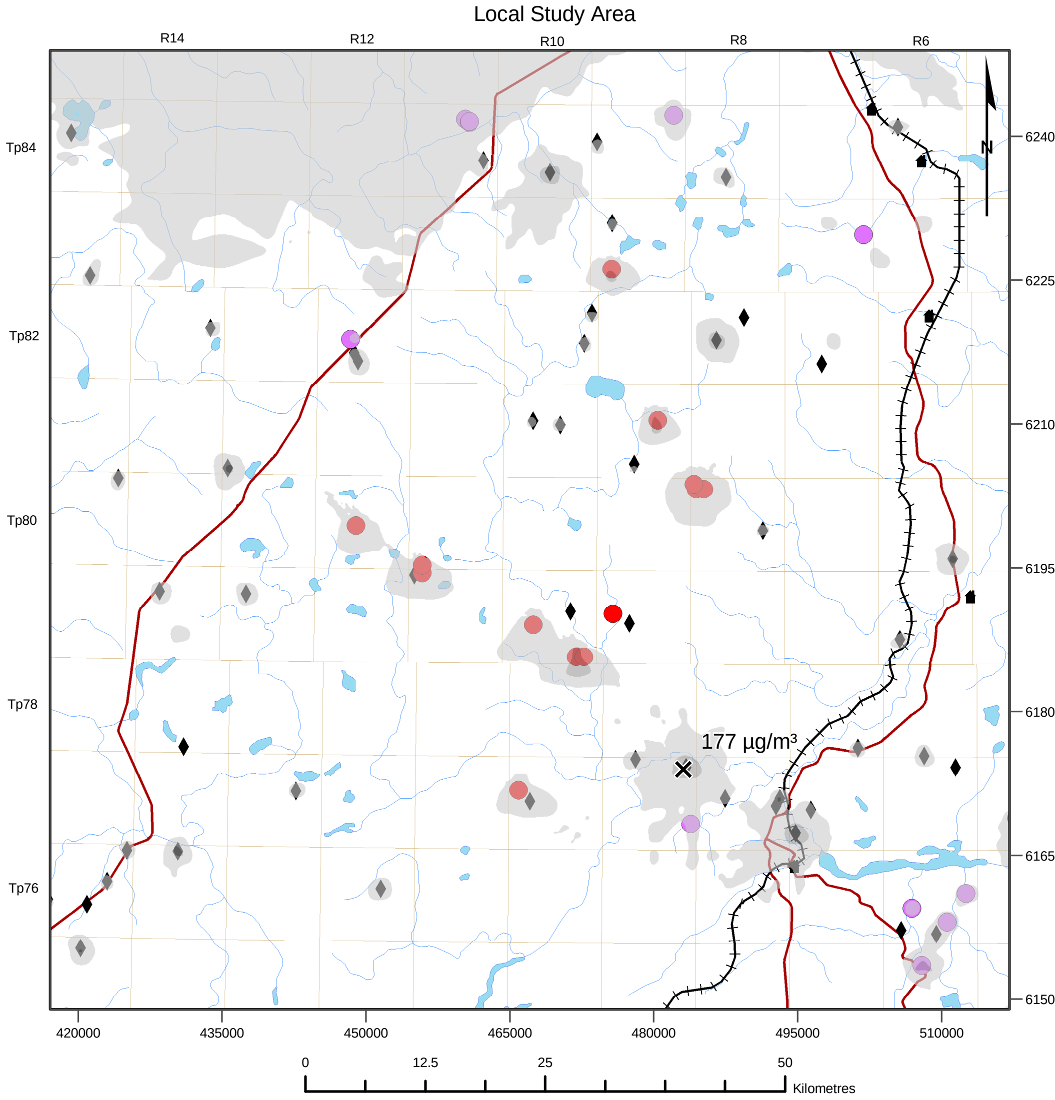
- × Maximum Point of Impingement
- ● The Project
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT	NORTH AMERICAN KAI KOS DEHSEH		
TITLE	Application Scenario Maximum Annual SO_2 Concentration		
DRAWN	LDB	04/2007	Figure 2.6-3
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		

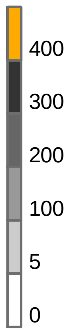


UTM Zone 12 NAD83





Concentration (µg/m³)

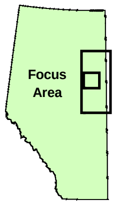


Legend

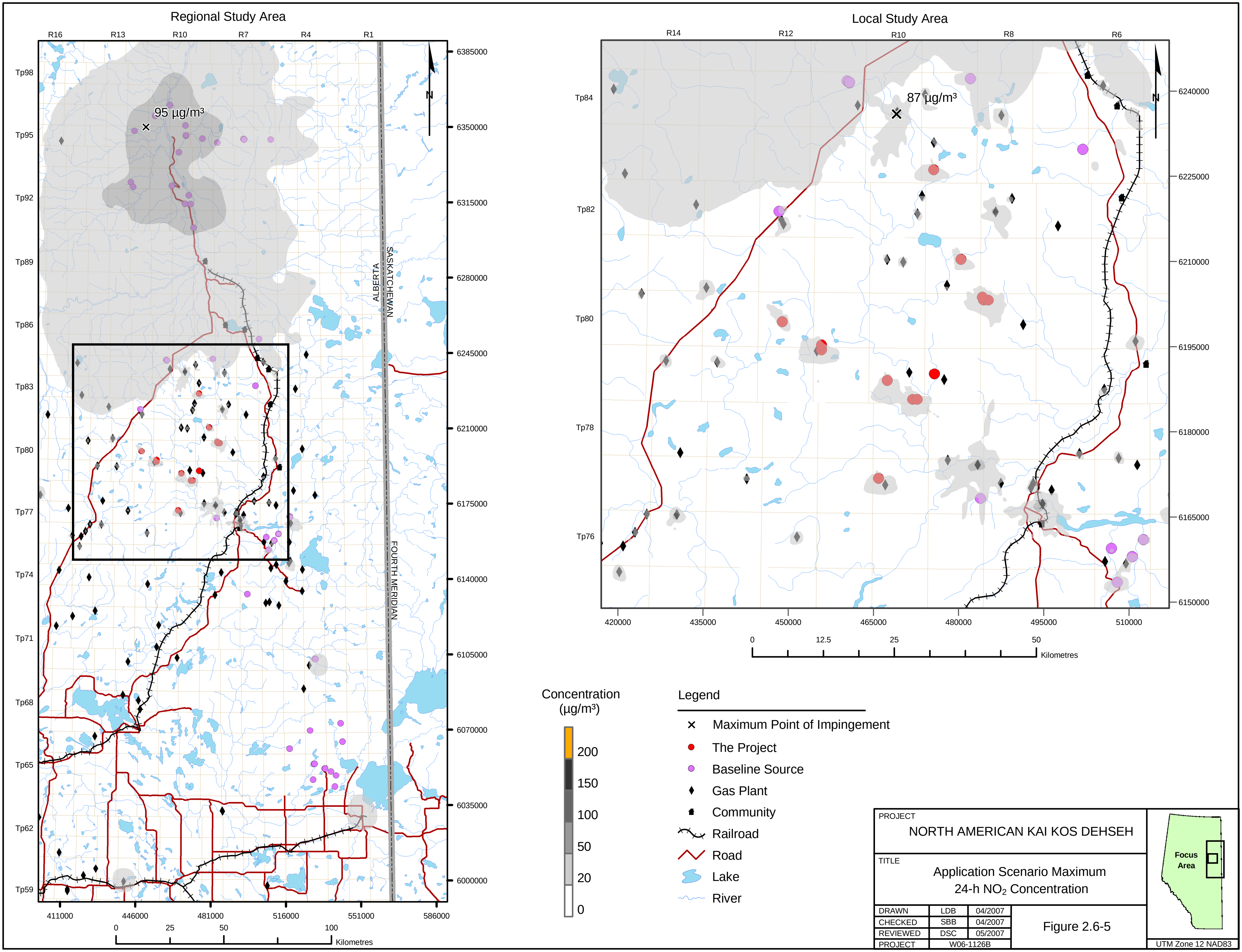
- × Maximum Point of Impingement
- ● The Project
- ● Baseline Source
- ◆ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT		
NORTH AMERICAN KAI KOS DEHSEH		
TITLE		
Application Scenario Maximum 1-h NO_2 Concentration		
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.6-4



UTM Zone 12 NAD83



PROJECT

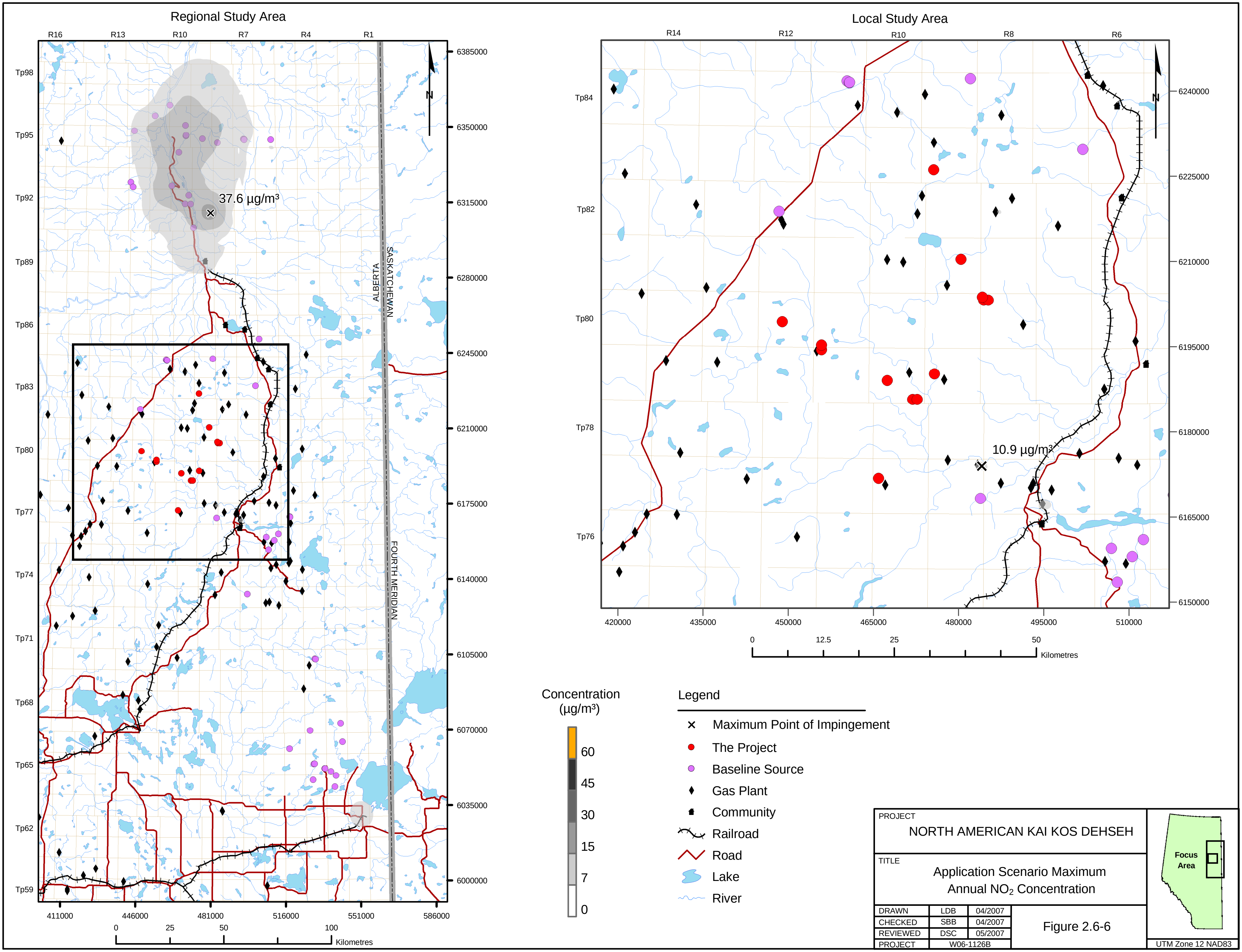
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Application Scenario Maximum 24-h NO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.6-5

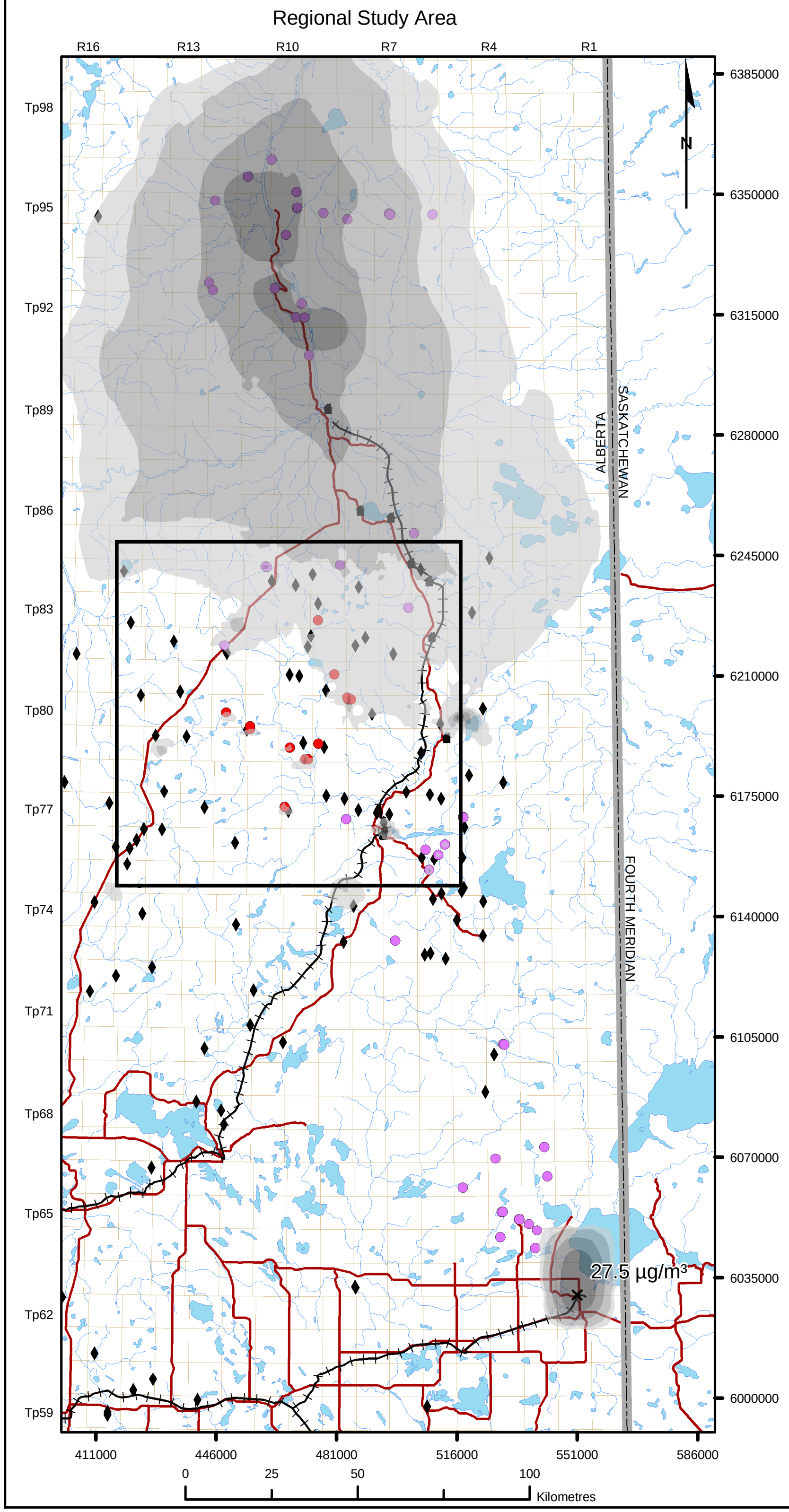


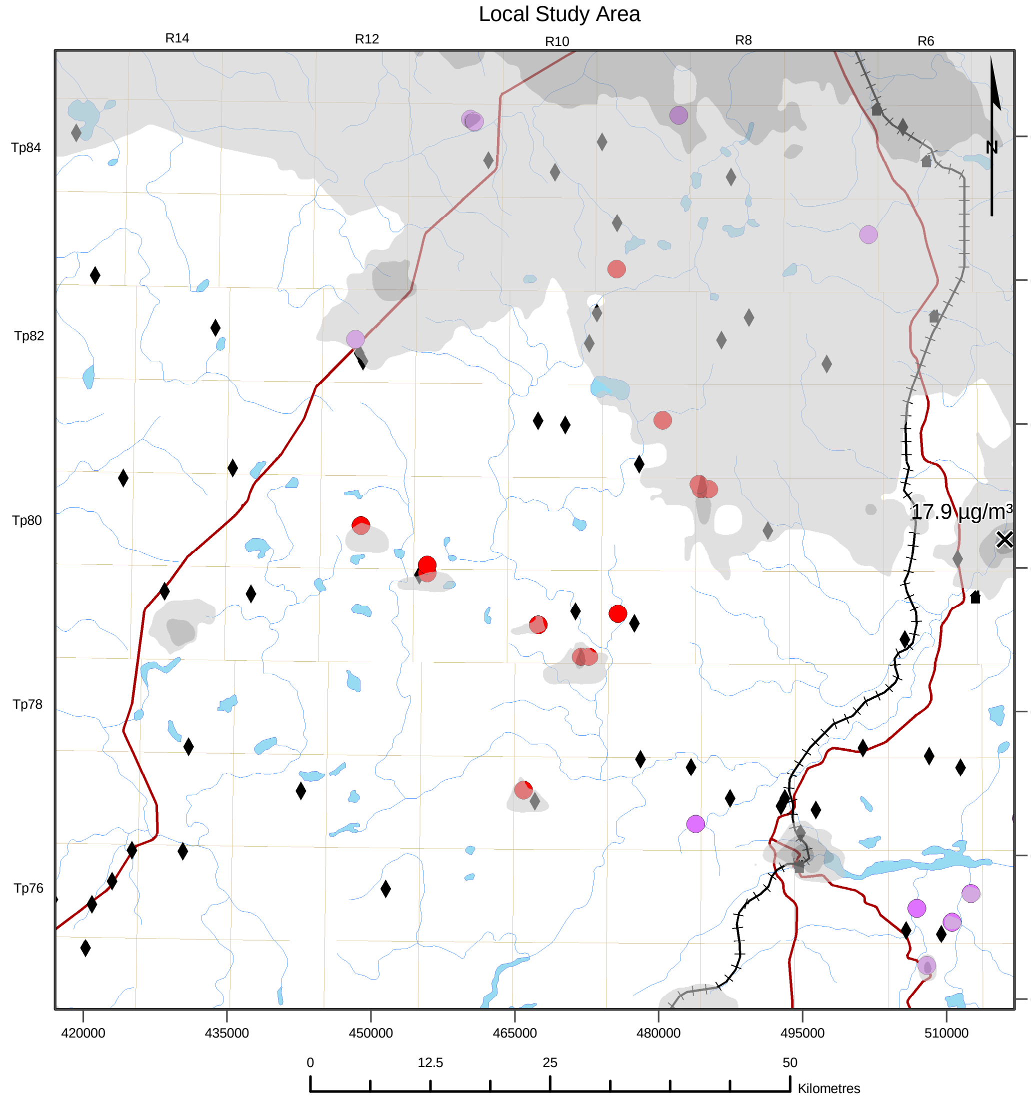
PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
Application Scenario Maximum Annual NO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.6-6





Concentration
(µg/m³)

- 30
- 15
- 8
- 4
- 2
- 0

Legend

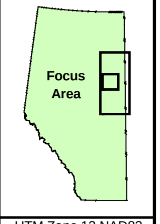
- × Maximum Point of Impingement
- ● The Project
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

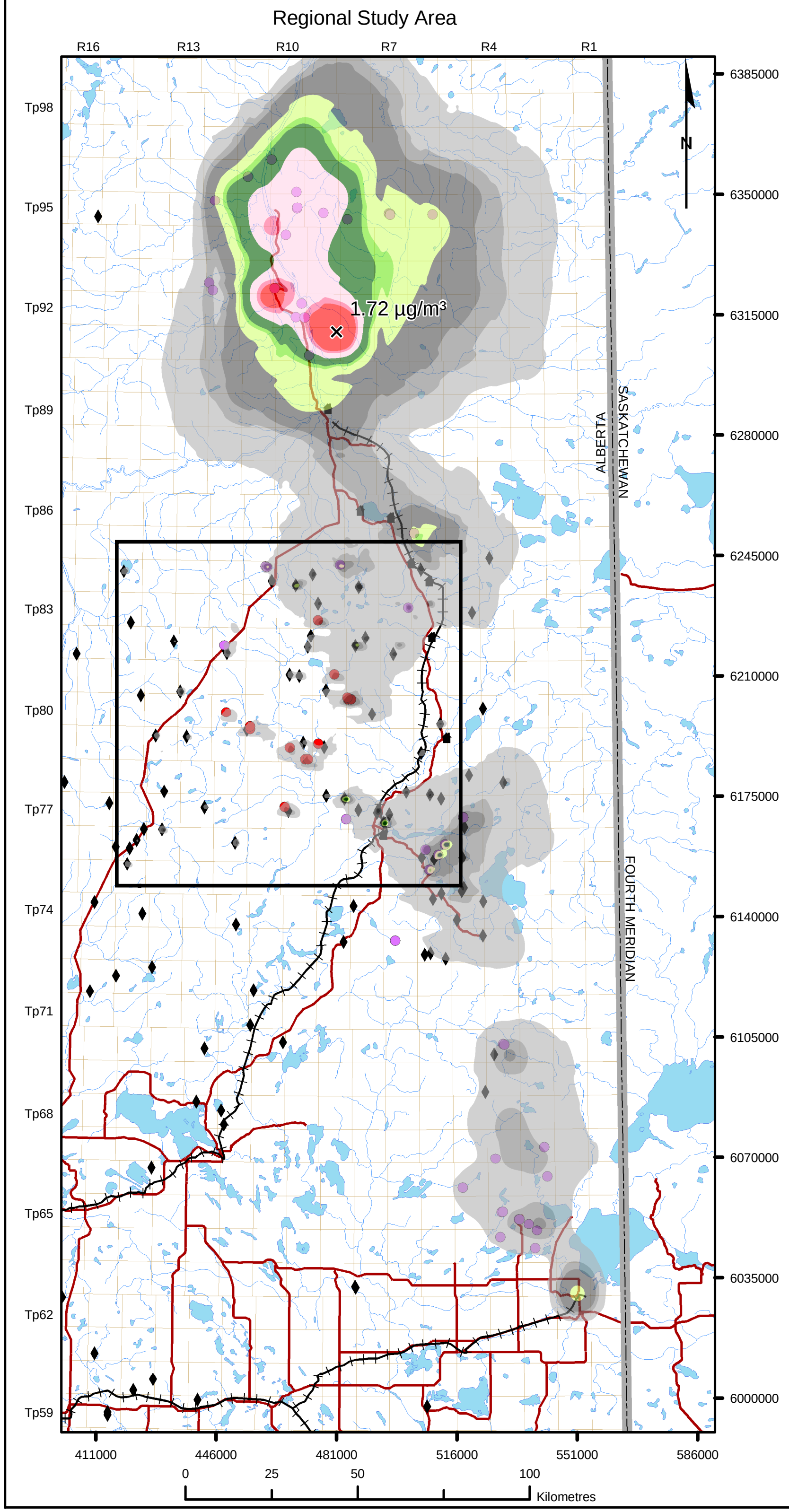
TITLE
Application Scenario 98th Percentile
24-h $PM_{2.5}$ Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

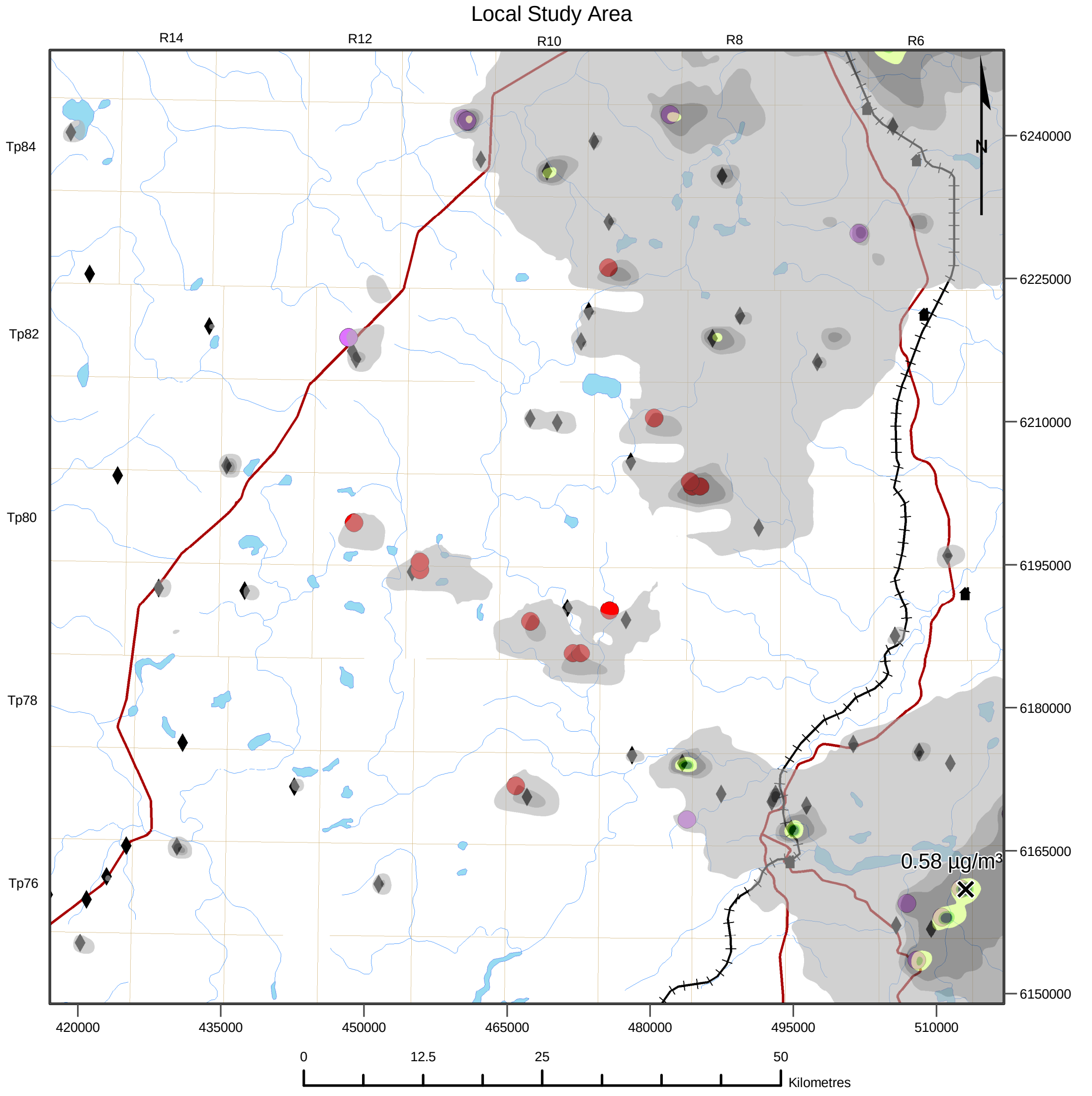
Figure 2.6-7



UTM Zone 12 NAD83



Regional Study Area



Local Study Area

Deposition
(keq H+/ha/a)

- 🟥 1.00
- 🟥 0.90
- ▢ 0.70
- 🟩 0.50
- 🟩 0.45
- 🟨 0.35
- ■ 0.25
- ■ 0.22
- ■ 0.17
- ▢ 0.00

Legend

- × Maximum Point of Impingement
- ● The Project
- ● Baseline Source
- ♦ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

PROJECT

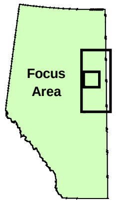
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Application Scenario Annual PAI
(background included)

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.6-8



UTM Zone 12 NAD83

2.7 Cumulative Effects Assessment

2.7.1 Cumulative Emissions

2.7.1.1 Introduction

In addition to the existing and approved projects, there are a number of proposed projects located in the air RSA that are currently in the approval process or have been publicly disclosed (as of January 2007). Combustion and other source emissions from the Project and from other existing, approved and proposed sources in the air RSA have been identified and quantified. The cumulative effects of these sources on ambient air quality have been evaluated.

2.7.1.2 Results

Table 2.7-1 compares air RSA and air LSA emission totals for the baseline, application and cumulative scenarios.

The percent change values provided in the table represent the increases due to the addition of the Project relative to the baseline scenario and the cumulative increases relative to the baseline scenario. The following are noted:

- In the air RSA, the cumulative increase in emissions relative to the baseline scenario is in the 10.7% to 53.1% range, depending on the compound; and
- In the air LSA, the cumulative increase in emissions relative to the baseline scenario is in the 69% to 288% range, depending on the compound.

These comparisons indicate that the percentage emission increase in both the air RSA and air LSA can be greater than 50%.

The air RSA cumulative emissions are factors of 9 (for SO_2) to 261 (for VOC) times greater than the air LSA cumulative emissions. For the application scenario, the proposed Project emissions were found to be low when compared to total air RSA emissions (e.g., 2.9 t/d SO_2 due to Project and 260 t/d SO_2 for the application scenario or 1.1% of the total). For the cumulative scenario, the Project contribution is even less on a relative basis when compared to air RSA emissions (e.g., 2.9 t/d SO_2 due to the Project and 284 t/d SO_2 for the cumulative scenario or 1.0% of the total). On an air LSA basis, the proposed Project emissions are low when compared to total air LSA emissions (e.g., 2.9 t/d SO_2 due to the Project and 36 t/d SO_2 for the application scenario or 8.1% of the total). For the cumulative scenario, the Project contribution is even less on a relative basis when compared to air LSA emissions (e.g., 2.9 t/d SO_2 due to the Project and 51 t/d SO_2 for the cumulative scenario or 5.7% of the total).

Table 2.7-1 Cumulative Scenario Emissions

Operator	**SO_2 (t/d)**	**NO_x (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Albian Sands Energy Inc.	0.61	31.68	27.05	26.83	1.63
Birch Mountain Resources Ltd.	0.02	0.18	0.23	0.00	0.09
Canadian Natural Resources Ltd.	21.75	71.33	42.55	157.48	4.23
Connacher Oil and Gas Limited (Air LSA)	0.08	0.45	0.27	0.02	0.04
ConocoPhillips Canada Resources (Air LSA)	6.63	3.26	5.11	0.13	0.45
Deer Creek Energy Ltd.	1.80	13.45	11.04	46.91	0.56
Devon ARL Corp. (Air LSA)	4.00	3.99	2.78	0.18	0.25
EnCana Corp.	2.94	5.95	10.12	0.19	0.40
EnCana Corp. (Air LSA)	5.70	2.21	1.95	0.12	0.18
Husky Energy Inc.	2.15	7.95	20.98	0.56	0.49
Imperial Oil Resources Ventures Ltd.	10.84	55.16	39.46	157.30	3.52
Japan Canada Oil Sands Ltd. (Air LSA)	3.93	4.49	4.75	1.00	0.30
MEG Energy Corp. (Air LSA)	2.00	1.62	1.33	0.11	0.16
Nexen Inc./OPTI Canada Inc. (Air LSA)	25.66	24.09	20.34	1.46	1.61
North American Oil Sands Corporation	2.86	16.19	9.73	0.91	1.23
Northlands Forest Products Ltd.	0.02	0.19	25.00	1.71	0.19
Petro-Canada Oil and Gas	5.41	40.93	16.61	15.87	1.61
Petro-Canada Oil and Gas (Air LSA)	3.01	14.41	11.23	0.48	0.95
Shell Canada Ltd.	1.23	28.83	19.32	27.14	1.43
Suncor Energy Inc.	79.00	106.85	67.33	216.26	8.48
Syncrude Canada Ltd.	101.99	89.44	87.53	88.55	7.46
Synenco Energy Inc.	0.39	15.72	11.40	64.93	0.76
Whitesands In-situ Ltd. (Air LSA)	0.08	0.04	9.23	0.00	0.00
Williams Energy (Canada), Inc.	0.00	0.02	0.02	0.24	0.00
Gas Production Facilities	0.00	27.56	17.81	0.24	0.07
Gas Production Facilities (Air LSA)	0.00	19.37	6.67	0.13	0.03
Non-Industrial Sources	2.02	7.60	21.39	1.95	2.77
Non-Industrial Sources (Air LSA)	0.02	1.04	4.36	0.08	0.57
Air LSA Total	*51.10*	*74.97*	*68.02*	*3.71*	*4.53*
Air RSA Total	**284.14**	**594.00**	**495.60**	**810.78**	**39.45**

Air RSA Summary					
Baseline Total	256.72	447.41	394.29	529.68	30.63
Application Total	259.58	463.60	404.02	530.59	31.86
Increase due to Project Relative to Baseline (%)	***1.1***	***3.6***	***2.5***	***0.2***	***4.0***
Cumulative Total	284.14	594.00	495.60	810.78	39.45
Cumulative Increase Relative to Baseline (%)	***10.7***	***32.8***	***25.7***	***53.1***	***28.8***

Air LSA Summary					
Baseline Total	33.61	49.31	42.35	1.40	2.62
Application Total	36.47	65.51	52.07	2.31	3.84
Increase due to Project Relative to Baseline (%)	***8.5***	***32.8***	***23.0***	***64.8***	***46.8***
Cumulative Total	51.10	74.97	68.02	3.71	4.53
Cumulative Increase Relative to Baseline (%)	***52.0***	***52.0***	***60.6***	***165.4***	***73.0***

2.7.2 Cumulative Impacts

2.7.2.1 Introduction

The CALPUFF dispersion model was used to predict the SO_2, NO_2 and $PM_{2.5}$ concentrations and the PAI for the cumulative scenario. Maximum predicted SO_2, NO_2 and $PM_{2.5}$ concentrations and PAI values associated with the cumulative scenario are summarized in Table 2.7-2 and the predicted concentrations and depositions are depicted as contours that are superimposed over air RSA and air LSA maps to show the spatial variation.

As indicated earlier, the CALPUFF model was applied with variable receptor grid spacing; the density being greatest in the vicinity of the Project (i.e., 50 m spacing) and decreasing with increasing distance from the Project area (i.e., 10 km spacing). As the primary objective for this assessment focuses on the Project air LSA, this decreasing density is not seen as a limitation. The reader, however, is cautioned in drawing comparisons between the predictions provided in this assessment with those provided in other assessments that focus on these more distant regions.

Table 2.7-2 Maximum Predicted SO_2, NO_2 and $PM_{2.5}$ Concentrations and PAI Values Associated With the Cumulative Scenario

Maximum Predicted SO_2 Concentrations	**Maximum Air RSA**	**Maximum Air LSA**	**AAAQO**
1-h concentration (ug/m^3)	**580**	**562**	450
24-h concentration (ug/m^3)	**179**	**179**	150
Annual concentration (ug/m^3)	12.5	12.5	30

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

Maximum Predicted NO_2 Concentrations	**Maximum Air RSA**	**Maximum Air LSA**	**AAAQO**
1-h concentration (ug/m^3)	314	177	400
24-h concentration (ug/m^3)	140	87	200
Annual concentration (ug/m^3)	58.7	11.1	60

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

Maximum Predicted $PM_{2.5}$ Concentrations	**Maximum Air RSA**	**Maximum Air LSA**	**CWS**
24-h concentration (ug/m^3)	**40.6**	18.5	30

Notes: Values that exceed the ambient guideline are shown in boldface text.

The values do not include a background value.

Maximum Predicted PAI (small-scale)	**Maximum Air RSA**	**Maximum Air LSA**	**Target Loading (1° by 1° scale)**
Sulphate (keq H$^+$/ha/y)	0.22	0.22	–
Nitrate (keq H$^+$/ha/y)	1.97	0.52	–
PAI (No background) (keq H$^+$/ha/y)	2.09	0.63	0.22 to 0.90
PAI (With background) (keq H$^+$/ha/y)	2.13	0.69	0.22 to 0.90

Notes: Values that exceed the ambient objective are shown in boldface text.

The sulphate and nitrate values do not include a background value.

The background PAI is based on the AENV (Cheng, 2001) predicted deposition contours.

The maximum sulphate and nitrate are not additive since they occur at different locations.

The target loads (as defined by CASA and AENV, 1999) includes low, moderately sensitive and sensitive receptors.

2.7.2.2 Sulphur Dioxide Impacts

Cumulative scenario predictions are summarized for the air RSA and the air LSA (Table 2.7-2). Predictions are also provided as contours superimposed over the air RSA and air LSA maps (Figures 2.7-1 to 2.7-3).

Comparison of Baseline, Application and Cumulative Scenarios

Table 2.7-3 compares maximum predicted SO_2 concentrations for the baseline, application and cumulative scenarios for the three averaging periods. The changes in overall maximum predicted values associated with the cumulative scenario are considerable relative to the application and baseline scenarios for the air RSA and air LSA. In the air LSA, the 1-hour, 24-hour and annual predicted concentrations increase by 98%, 73% and 43%, respectively. Similarly, air RSA predicted 1-hour, 24-hour and annual SO_2 concentrations increase by 1%, 59% and 43%, respectively. However, the frequencies of exceedance in the air LSA are only 0.05% and 0.27% for the 1-hour and 24-hour averages, respectively. The frequencies of exceedance in the air RSA are only 0.13% and 0.27% for the 1-hour and 24-hour averages, respectively.

Table 2.7-3 Comparison of Maximum SO_2 Concentrations for the Baseline, Application and Cumulative Scenarios

Scenario	Air RSA			Air LSA		
	1-h	24-h	Annual	1-h	24-h	Annual
Baseline (ug/m^3)	**580**	113	8.8	284	104	8.8
Application (ug/m^3)	**580**	113	8.8	284	104	8.8
Increase due to Project Relative to Baseline (%)	<1	<1	<1	<1	<1	<1
Cumulative (ug/m^3)	**580**	**179**	12.5	**562**	**179**	12.5
Cumulative Increase Relative to Baseline (%)	<1	+59.1	+42.7	+97.7	+72.7	+42.7
AAAQO (ug/m^3)	450	150	30	450	150	30

Notes: Values that exceed the ambient objective are shown in boldface text.

The values do not include a background value.

The concentration contour plots for the different averaging periods for the cumulative scenario are shown in the following figures:

- Figures 2.7-1, 2.7-2, and 2.7-3 show the maximum 1-hour, 24-hour, and annual average SO_2 concentrations, respectively, for the cumulative scenario. The area within any concentration contour increases for the cumulative scenario relative to the baseline scenario both within the air LSA and external to the air LSA.

The maximum 1-hour, 24-hour and annual average air RSA and air LSA concentration patterns for the cumulative scenario change relative to the baseline scenario, indicating a greater extent of elevated ambient SO_2 concentrations.

Overall SO_2 Results

The cumulative scenario evaluation indicates that ambient concentrations will increase across the air RSA, especially in the vicinity of proposed SO_2 sources. The overall maximum cumulative values are predicted to increase substantially, relative to the baseline scenario.

The cumulative scenario emissions result in an increase in the maximum 1-hour SO_2 concentration predicted in the air LSA by 98% (i.e., from 284 ug/m^3 to 562 ug/m^3). The frequency of exceedance of the 1-hour objective is 0.7%. With the addition of the cumulative SO_2 emissions, the maximum 24-hour SO_2 concentration increases by 73% (i.e., from 104 ug/m^3 to 179 ug/m^3). The frequency of exceedance of the 24-hour objective is 1.4%.

The cumulative scenario emissions increase the maximum annual SO_2 concentration predicted in the air LSA by 43% (i.e., from 8.8 ug/m^3 to 12.5 ug/m^3). The maximum annual value for the air LSA is less than half of the AAAQO.

The comparison between the baseline and application scenarios indicates that the effect of the Project emissions on ambient SO_2 concentrations outside the air LSA is so small that it is unlikely to be detected. This conclusion is further validated in the cumulative scenario. The Project emissions have little to no effect on the maximum SO_2 concentrations predicted within the air RSA for either the application or the cumulative scenarios.

2.7.2.3 Nitrogen Oxide Impacts

Cumulative scenario predictions are summarized for the air RSA and the air LSA (Table 2.7-2). Predictions are also provided as contours superimposed over the air RSA and air LSA maps (Figures 2.7-4 to 2.7-6).

Comparison of Baseline, Application and Cumulative Scenarios

Table 2.7-4 compares maximum predicted NO_2 concentrations for the baseline, application, and cumulative assessment scenarios for the three averaging periods. External to the air LSA, the overall maximum predicted 1-hour, 24-hour and annual values associated with the cumulative scenario increase by up to 56% relative to the baseline. Within the air LSA, the primary change is associated with the predicted annual average value which increases by 6.6%. The increase to the predicted annual average value is associated with the Project (as seen in the application scenario). The addition of proposed sources in the cumulative scenario affects primarily the annual average which increases by 2.3% over the application scenario.

The concentration contour plots for the different averaging periods for the cumulative scenario are shown in the following figures:

- Figures 2.7-4, 2.7-5, and 2.7-6 show the maximum 1-hour, 24-hour, and annual average NO_2 concentrations, respectively, for the cumulative scenario. The area within any concentration contour increases for the cumulative scenario relative to the baseline scenario both within the air LSA and external to the air LSA.

The maximum 1-hour, 24-hour and annual average air RSA and air LSA concentration patterns for the cumulative scenario change relative to the baseline scenario, indicating an extension of increased ambient NO_2 concentrations.

Table 2.7-4 Comparison of Maximum NO_2 Concentrations for the Baseline, Application and Cumulative Scenarios

Scenario	Air RSA			Air LSA		
	1-h	24-h	Annual	1-h	24-h	Annual
Baseline (ug/m^3)	230	98	37.6	177	87	10.4
Application (ug/m^3)	230	98	37.6	177	87	10.9
Increase due to Project Relative to Baseline (%)	<1	<1	<1	<1	<1	+4.3
Cumulative (ug/m^3)	314	140	58.7	177	87	11.1
Cumulative Increase Relative to Baseline (%)	+37.0	+42.7	+56.4	<1	<1	+6.6
AAAQO (ug/m^3)	400	200	60	400	200	60

Notes: Values that exceed the ambient objective are shown in boldface text.

The values do not include a background value.

Overall NO_2 Results

The cumulative scenario evaluation indicates that maximum ambient NO_2 concentrations will increase in the vicinity of NO_X sources. Maximum 1-hour, 24-hour and annual values are all within the respective ambient air quality criteria.

2.7.2.4 Particulate Matter Impacts

Cumulative scenario predictions of $PM_{2.5}$ are summarized for the air RSA and the air LSA (Table 2.7-2). Predictions are also provided as contours superimposed over the air RSA and air LSA maps (Figure 2.7-7).

Comparison of Baseline, Application and Cumulative Scenarios

Table 2.7-5 compares 98th percentile predicted $PM_{2.5}$ concentrations for the baseline, application and cumulative scenarios. External to the air LSA, the 98th percentile predicted 24-hour values associated with the cumulative scenario increase by 48%, relative to baseline. Within the air LSA, the 98th predicted 24-hour value associated with the cumulative scenario increases by 3.3%, relative to baseline. The predicted 98th percentile $PM_{2.5}$ value in the air RSA exceeds the CWS 3.0% of the time or 11 days of the year. These exceedances occur to the north of the Air LSA and are associated with mining activities in the vicinity of Fort McMurray.

Table 2.7-5 Comparison of 98th Percentile $PM_{2.5}$ Concentrations for the Baseline, Application and Cumulative Scenarios

Scenario	**Air RSA**	**Air LSA**
	24-h	
Baseline (ug/m^3)	27.5	17.9
Application (ug/m^3)	27.5	17.9
Increase due to Project Relative to Baseline (%)	<1	<1
Cumulative (ug/m^3)	**40.6**	18.5
Cumulative Increase Relative to Baseline (%)	+47.5	+3.3
CWS (ug/m^3)	30	30

Notes: Values that exceed the CWS are shown in boldface text.

The values do not include a background value.

Figure 2.7-7 shows the maximum 24-hour average $PM_{2.5}$ concentrations for the cumulative scenario. The area within any concentration contour increases for the cumulative scenario, relative to the baseline scenario.

The 98th percentile 24-hour average air RSA and air LSA concentration patterns for the cumulative scenario change relative to the baseline scenario, indicating a spreading out of increased ambient $PM_{2.5}$ concentrations.

Overall $PM_{2.5}$ Results

The cumulative scenario evaluation indicates that maximum ambient concentrations will increase across the air RSA. Exceedances of the CWS are predicted in a region north of Fort McMurray. The potential impact of increases in ambient $PM_{2.5}$ concentrations on human health is addressed in Volume 2, Section 4. The elevated $PM_{2.5}$ concentrations associated with the cumulative scenario indicate the potential for reduced visibility as a result of $PM_{2.5}$ precursor emissions.

Within the air LSA, the maximum 24-hour concentration for the cumulative scenario is less than the CWS. The cumulative scenario emissions increase the 98th percentile predicted air LSA 24-hour concentration by 3.3% (i.e., from 17.9 ug/m^3 to 18.5 ug/m^3) relative to the baseline and application scenarios.

The comparison between the baseline and application scenarios indicates that the effect of the Project emissions on ambient $PM_{2.5}$ concentrations within the air RSA is sufficiently small that it is unlikely to be detected. This conclusion is still valid for the cumulative scenario. The predicted $PM_{2.5}$ concentrations, due to the Project emissions, have little to no effect within the air RSA for either the application or the cumulative scenarios.

2.7.2.5 Acid Deposition Impacts

Cumulative scenario results are summarized in tabular format for the air LSA and the air RSA (Table 2.7-2). Predictions are also provided as PAI contours superimposed over the air LSA and air RSA maps, are expressed as an annual value and include the assumed background values (Figure 2.7-8).

Comparison of Baseline, Application and Cumulative Scenarios

Table 2.7-6 summarizes the maximum small-scale (i.e., representing distance scales that are much less than the 1º longitude by 1º latitude grid cell) sulphate equivalent deposition, nitrate equivalent deposition and PAI for the three scenarios. For the air RSA, the cumulative scenario increases the maximum PAI by 21% relative to the baseline scenario. For the air LSA, the cumulative scenario increases the maximum PAI by 7% relative to the baseline scenario.

Table 2.7-6 Comparison of Maximum Small-Scale Deposition Values for the Baseline, Application and Cumulative Scenarios

Scenario	Air RSA			Air LSA		
	Sulphate	Nitrate	PAI	Sulphate	Nitrate	PAI
Baseline (keq H^+/ha/y)	0.21	1.53	1.76	0.21	0.51	0.65
Application (keq H^+/ha/y)	0.22	1.54	1.76	0.22	0.51	0.65
Increase due to Project Relative to Baseline (%)	<1	<1	<1	<1	+1.6	<1
Cumulative (keq H^+/ha/y)	0.22	1.97	2.13	0.22	0.52	0.69
Cumulative Increase Relative to Baseline (%)	+4.8	+28.2	+21.1	+4.8	+3.1	+7.3
Low Sensitivity Receptor Target Load (1° by 1°) (keq H^+/ha/y)	–	–	0.90	–	–	0.90
Moderate Sensitivity Receptor Target Load (1° by 1°) (keq H^+/ha/y)	–	–	0.45	–	–	0.45
Sensitive Receptor Target Load (1° by 1°) (keq H^+/ha/y)	–	–	0.22	–	–	0.22

Notes: Maximum values represent small-scale peaks; whereas CASA Target Loads are for a 1º latitude by 1º longitude area.

Sulphate equivalent and nitrate equivalent deposition without background.

PAI = Potential Acid Input (includes background).

Figure 2.7-8 shows the annual PAI for the cumulative scenario. The predicted baseline and cumulative deposition patterns within and external to the air LSA are different. Specifically, the aerial extent within a given deposition contour has increased with the increased emissions associated with the cumulative scenario.

While the main location where the predicted PAI is greater than target loads occurs in the area north of Fort McMurray, deposition values greater than target loads on a smaller scale are also predicted to occur in the Project operating area.

Overall PAI Results

While deposition greater than target loads for low sensitivity to sensitive receptors (on a small-scale) are predicted to occur primarily in the Fort McMurray area, deposition greater than target loads (on a small scale) to moderate sensitivity to sensitive receptors is predicted within the Project operating area and within the Cold Lake area.

On an air LSA basis, the maximum small-scale PAI near the Project is predicted to increase by about 7%. A small-scale PAI value greater than the target loads is not viewed as an exceedance, since the target load criteria are to be applied to a 1º latitude by a 1º longitude scale, as predicted by RELAD modelling applied on a sub-continental scale.

2.7.3 Emissions and Community and Recreational Area Location Impacts

2.7.3.1 Introduction

In addition to SO_2, NO_x, CO and $PM_{2.5}$ emissions, the combustion of natural gas and produced gas can generate other trace gas emissions (e.g., VOC and PAH). The chemicals identified in Table 2.7-7 were selected to determine potential human health implications of the Project emissions. These chemicals were selected through consideration of the trace chemicals that could be emitted by the proposed facilities and potential health effects (Volume 2, Section 4).

Table 2.7-7 Chemicals Evaluated at Community and Recreational Area Locations

Chemical Name		
SO_2[1]	Benzaldehyde	Fluoranthene[1,3]
NO_2[1]	Benzene[1,2]	Fluorene
CO[1]	Benzo(a) anthracene[1,3]	Formaldehyde[1,2]
$PM_{2.5}$[1]	Benzo(a) pyrene[1,3]	Hexane[1]
2-Methylnaphthalene	Benzo(b) fluoranthene[1,3]	Indeno(1,2,3-cd) pyrene[3]
3-Methylchloranthrene	Benzo(e) pyrene[1,3]	Naphthalene[1]
7,12-Dimethylbenz(a) anthracene[3]	Benzo(g,h,i) perylene[1,3]	Pentane[1]
Acenaphthene	Benzo(k) fluoranthene[1,3]	Perylene[1,3]
Acenaphthylene	Chrysene[3]	Phenanthrene[1,3]
Acetaldehyde[1,2,3]	Dibenz(a,h) anthracene[1,3]	Pyrene[1,3]
Acrolein[1,3]	Dichloro benzene[1]	Toluene[1,2]
Anthracene[1,3]	Ethyl benzene[1]	Xylenes[1,2]

[1] National Pollutant Release Inventory (NPRI) substance

[2] Priority Substance List (PSL1) or PSL2

[3] Accelerated Reduction / Elimination of Toxics (ARET) substance.

2.7.3.2 Methods

Maximum 1-hour, 24-hour and annual average concentrations for each chemical species or group were predicted at the 70 community and recreational area locations depicted in Figure 2.7-9 using the CALPUFF dispersion model. These averaging periods represent the time periods that are frequently used for air quality management purposes. A maximum 8-hour averaging concentration was also predicted for CO to coincide with the 8-hour AAAQO.

The CALPUFF model was used to predict the maximum contribution at these locations from all emission sources that were considered for the criteria air contaminant assessment (i.e., within the air RSA). From an impact perspective, the focus of these predictions was the communities and recreational areas located within the air LSA. This approach not only ensures that the impacts associated with the operations in the air LSA are documented, but also takes into account the background influences associated with the industrial facilities located to the north.

2.7.3.3 Results

The maximum predicted concentrations at each community and recreational receptor are presented Volume 2, Section 4. Maximum predicted concentrations for the application and cumulative scenarios are compared to the baseline scenario to assess impacts associated with the Project and other proposed facilities, respectively.

The Project can increase the maximum predicted concentrations at the recreational areas and communities for certain compounds relative to the baseline scenario for all averaging periods. The cumulative scenario results will be more variable as certain existing operators in the air RSA plan to shift their operations to new mining areas. This shift will displace the emissions, which can result in lower maximum concentrations than those predicted for the application scenario. Like the application scenario, the cumulative scenario results show an increase in maximum predicted concentrations for certain compounds relative to the baseline scenario.

In general, the maximum ambient concentration at any given community or recreational location depends on the assessment scenario, the distance from emission sources and the averaging period. As expected, the Project emissions result in slightly higher concentrations at the community and recreational locations closest to the Project.

2.7.4 Production of Ozone

2.7.4.1 Introduction

Ozone is not emitted directly to the atmosphere by the Project or other air RSA facilities. Ozone, however, has the potential to form downwind of urban or industrial areas due to precursor NO_X and VOC emissions under high solar radiation, high temperature and low wind speed conditions (i.e., on a hot summer day). High ozone concentrations are observed under these conditions in some parts of Canada (i.e., the Lower Fraser Valley in British Columbia; the Windsor to Québec corridor in Ontario and Québec; and the St John area in New Brunswick). However, field studies conducted in the oil sands region have not indicated any appreciable ozone formation due to precursor emissions.

The Project and other facilities emit NO_X precursor emissions from combustion sources and VOCs from fugitive and combustion sources. Biogenic sources can also result in significant precursor VOC emissions. The ozone issue is addressed in a qualitative manner relative to the precursor emissions.

Ozone in the Atmosphere

Ozone can be found in the atmosphere in the following locations:

- Ozone concentrations peak in the stratosphere at an elevation of 25 km with a maximum concentration of about 12 ppmv. This ozone shields the earth's surface from ultraviolet radiation. This is beneficial since this radiation has sufficient energy to cause skin cancer in humans and to destroy acids in DNA; and

- Near the surface (i.e., in the troposphere), ozone can form as a result of a complex set of photochemical reactions between NO_x and VOC. In this case, ozone is referred to as a secondary pollutant. At sufficiently high concentrations, surface ozone can have adverse effects on vegetation and human health.

While there is minimal mixing between the stratosphere and the troposphere, stratospheric ozone can be mixed into the upper troposphere (Angle and Sandhu 1986, 1989; Davies and Schuepbach, 1994).

Natural Sources of Ozone

For Northern Canada, the following natural sources of surface ozone have been identified:

- Long-range transport of tropical Pacific air, which has concentrations in the 40 ppbv to 50 ppbv (80 ug/m3 to 100 ug/m3) range;
- Long-range transport of polar air that contains air mixed downward from the upper troposphere. Ozone concentrations in this air mass are in the 80 ppbv to 100 ppbv (160 ug/m3 to 200 ug/m3) range;
- Biomass burning (i.e., forest fires) and resulting photochemical reactions that produce typical ozone enrichments of 10 ppbv to 15 ppbv (20 ug/m3 to 30 ug/m3) above background; and
- Short duration stratospheric intrusions can lead to sudden increases of ground-level ozone.

In Alberta, there is a general tendency for greater ozone concentrations during the spring (March to April) and for greater values during the day. Ozone concentrations in and adjacent to urban areas are generally less than those in the surrounding rural areas due to ozone depletion through scavenging reactions with the urban NO_x emissions (e.g., urban areas act as ozone sinks). There has been limited ozone monitoring downwind of urban source regions in Alberta. A review of some of the available data indicates photochemical ozone production is limited to a few hours per year during the summer period (Davies and Fellin, 1999). Specifically:

- A review of data near the Calgary airshed indicated an enhancement of 20 ppbv (40 ug/m3) due to urban emissions;
- A review of data near the Edmonton airshed indicated an enhancement of 10 ppbv to 15 ppbv (20 ug/m3 to 30 ug/m3) due to urban and industrial emissions;
- A review of data downwind of the Athabasca oil sands region indicated an enhancement of 9 ppbv to 42 ppbv (18 ug/m to 82 ug/m3) over the upwind values;
- Ambient measurements in the Suncor power plant plume indicated enhancements of 10 ppbv (20 ug/m3) 24 km downwind of the stack; and
- Comparison of seasonal ozone concentrations downwind of a forest fire in northeast Alberta indicated potential ozone enhancements of about 15 ppbv (30 ug/m3).

In some cases, these enhancements resulted in values in excess of the 160 ug/m^3 (82 ppbv) ambient objective and in other cases the ambient objective was not exceeded.

2.7.4.2 Methods

Photochemical models can be used to predict the secondary formation of ozone based on precursor NO_x and VOC emissions. These models have been applied to the Athabasca oil sands region to determine the potential for ozone formation due to the developments proposed for the region. Specifically, two California Air Resources Board models (SMOG and CALGRID) have been applied to the oil sands region (Davies and Fellin, 1999).

Both modelling exercises focused on summer periods when the photochemical production of ozone is expected to be the greatest. The results of the modelling relative to the NO_x and VOC emissions are provided in Table 2.7-8 and Figure 2.7-10. The results show a consistent trend of increasing ozone with increasing NO_x even with differing models and differing assumptions. Most of the VOC emissions appear to originate from biogenic rather than anthropogenic sources.

Table 2.7-8 Comparison of SMOG and CALGRID Photochemical Model Predictions of Maximum Ozone Concentrations

Model	NO_x Emissions (t/d)	Anthropogenic VOC Emissions (t/d)	Biogenic VOC Emissions (t/d)	Maximum Predicted Ozone (ppb)
SMOG	31	10	1 010	76
	59	29	1 010	95
	78	289	1 010	98
	66	37	1 010	85
	87	50	1 010	95
	107	62	1 010	100
	114	61	1 010	100
CALGRID	3.7	0	1 087	65
	74	172	1 087	92
	111	212	1 087	104
	222	435	1 087	111

Notes: The SMOG biogenic emissions are normalized to represent a full day and the 148 km by 159 km grid used by CALGRID.

The CALGRID biogenic emissions are the average for the summer period based on a 148 km by 159 km grid. The CALGRID predictions represent the maximum 1-h value during the 6-d modelling period.

Source: Davies and Fellin (1999).

2.7.4.3 Results

Tables 2.7-9 provides the impact ratings for ambient ozone concentration changes due to the Project.

Table 2.7-9 Impact Ratings for Ambient Ozone Concentration Changes Due to the Project

Impact Attribute	Rating	Comment
Direction	Positive/Negative	Immediately downwind of NO_x emission sources, natural ambient ozone concentrations would decrease due to scavenging reactions. Further downwind, the precursor NO_x and VOC emissions could increase ambient ozone concentrations.
Geographic Extent	Regional	The greatest changes are expected to occur several tens of kilometres downwind.
Magnitude	Low	The incremental change due to the Project precursor emissions will be low (i.e., NO_x emissions increase by 3.6% or 16.2 t/d).
Duration	Medium-term	Natural ozone concentrations vary due to meteorological variations; however, they can occur throughout the life of the Project.
Frequency	Infrequent	High ozone concentrations tend to occur in the spring with the occasional peak in the summer. However, exceedances of the Canada-Wide Standard for ozone are expected to occur infrequently due to Project emissions.
Confidence	Moderate	While recent regional monitoring has not indicated elevated photochemical ozone production, other evidence has indicated elevated ozone levels in Alberta.
Final Rating	Low	Regional extent, low magnitude and infrequent.

Given the rural location of the Project operating area, higher ozone concentrations due to natural sources are expected. The potential photochemical formation of ozone is an air RSA rather than an air LSA issue due to the time scale associated with the photochemical reactions. The incremental NO_x emissions due to the Project are low (i.e., maximum of 4.0% increase relative to the baseline scenario) and, therefore, the incremental formation of ozone due to the Project is expected to be low. The final rating is low.

2.7.5 GHG Emissions and Impacts

2.7.5.1 Introduction

North American's operations will result in GHG emissions. GHG emissions result from the combustion of fossil fuels that produce CO_2, CH_4 and N_2O.

2.7.5.2 Methods

GHG emissions are expressed in carbon dioxide equivalents (CO_2E). Factors for global-warming potential used in generating the GHG estimates are 1 for CO_2, 21 for CH_4 and 310 for N_2O emissions. The GHG emissions from the Project were estimated and compared to total Alberta and total Canada GHG emissions.

2.7.5.3 Results

The highest GHG emission total for the Project will occur in the year 2018 is estimated to be 4.29 Mt/y CO_2E. Table 2.7-10 compares this estimate to the total Alberta and Canadian GHG estimates for 2003 and 2004, respectively. At peak production, the Project operations are estimated to contribute 1.8% and 0.6% to the 2003 provincial and 2004 national totals, respectively. The Project GHG emissions are not expected to begin until 2010, and the peak emission will not be reached until 2018. By this time, total GHG emissions in Alberta and Canada may increase relative to 2003 and 2004 levels, although recent initiatives proposed by AENV and

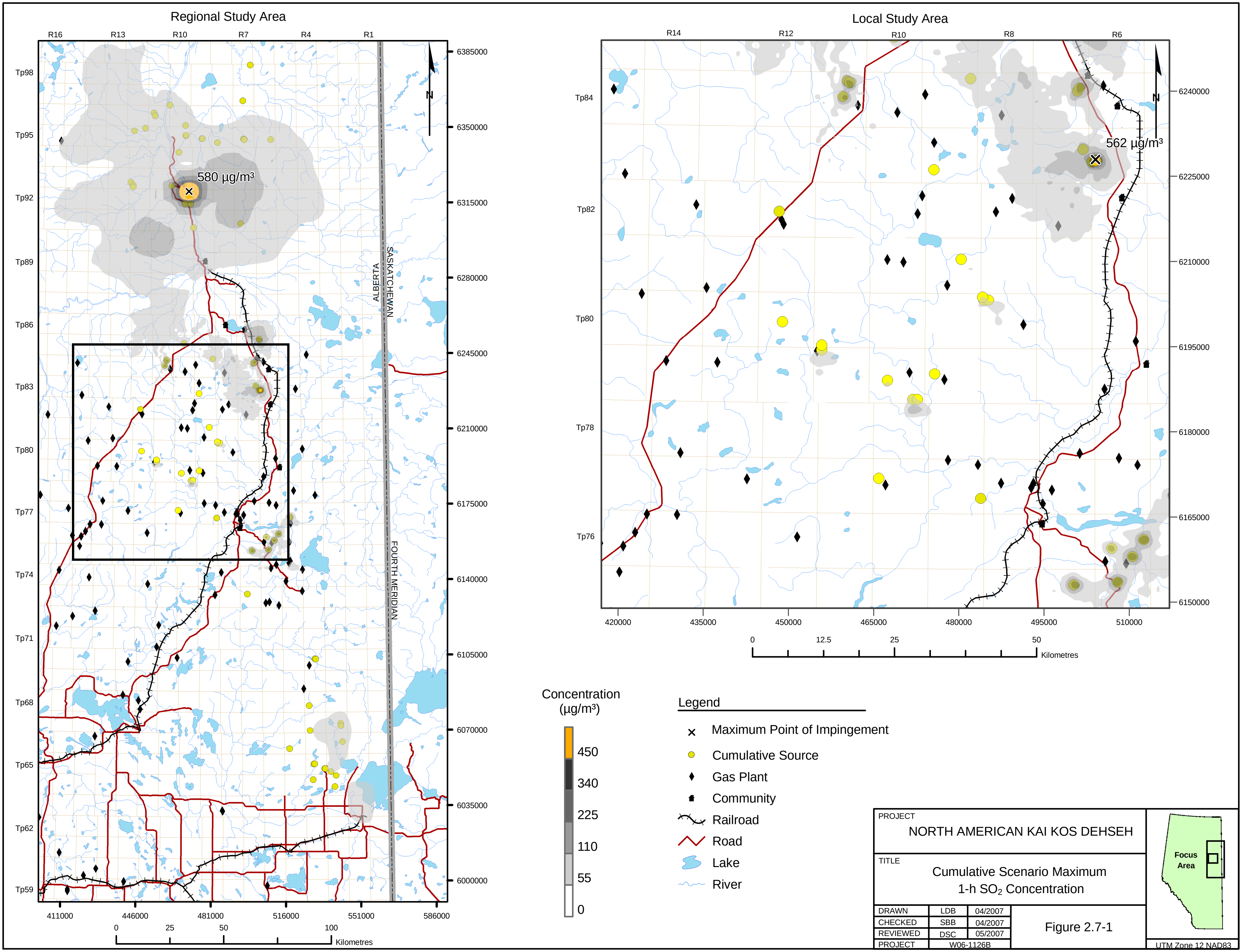
Environment Canada may lead to emission reductions. Therefore, the percentages shown in Table 2.7-10 are most likely overestimates of the actual contribution of the Project relative to provincial and national total GHG emissions. Volume 1 provides further information on North American's GHG Management Plan.

Table 2.7-10 Comparison of North American GHG Emissions

North American GHG Emissions Comparison	**Total GHG Emissions (Mt/y CO_2E)**
Alberta's GHG Emissions (2003)	234.5
Canada's GHG Emissions (2004)	758
Project Estimated GHG Emissions	4.29
Project GHG Emissions as a Percentage	**Percent of Total GHG Emissions (%)**
Percent of Alberta Total	1.8
Percent of Canada Total	0.6

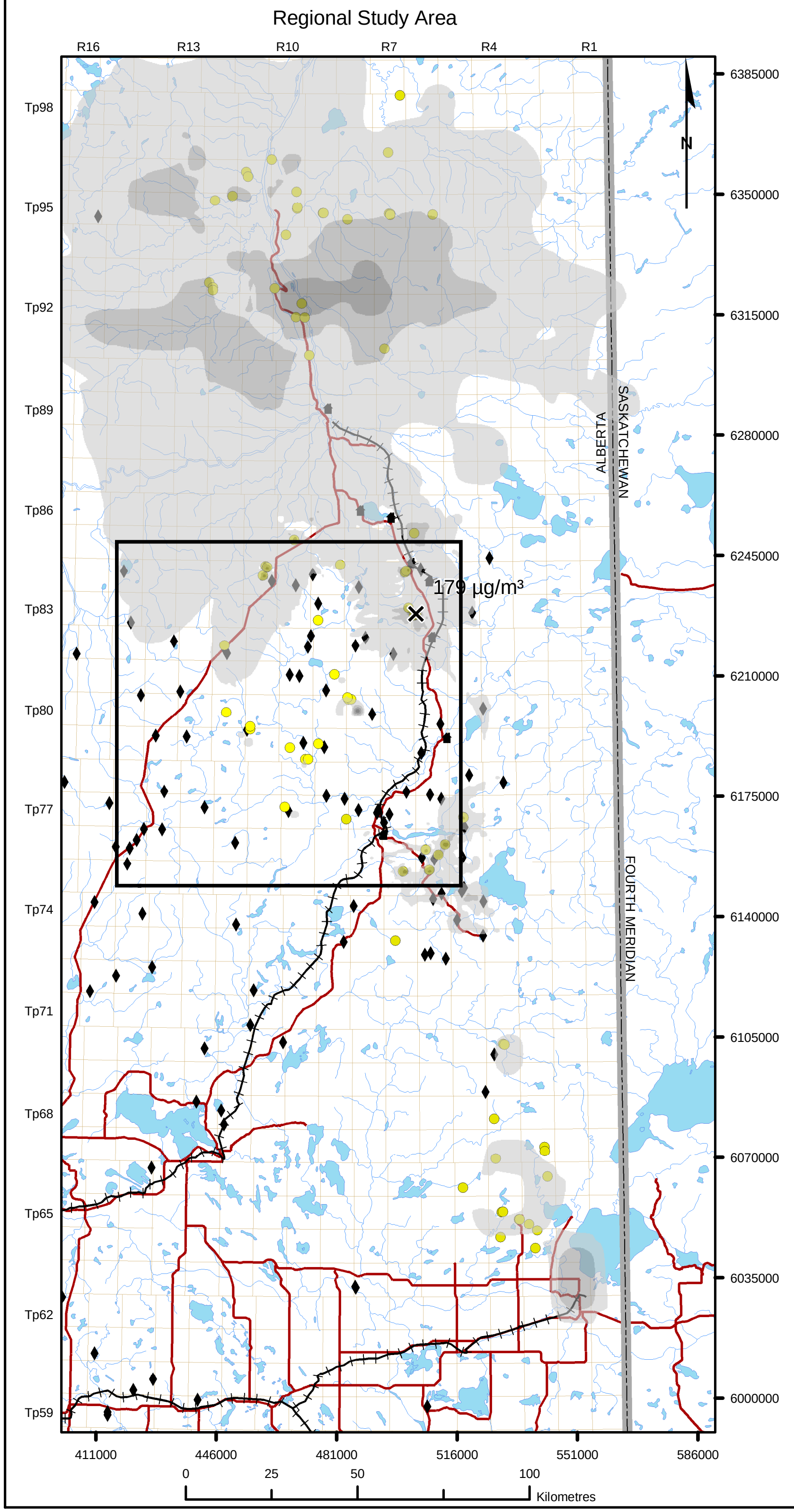
Notes: CO_2E = global warming equivalent that includes CO_2 and CH_4

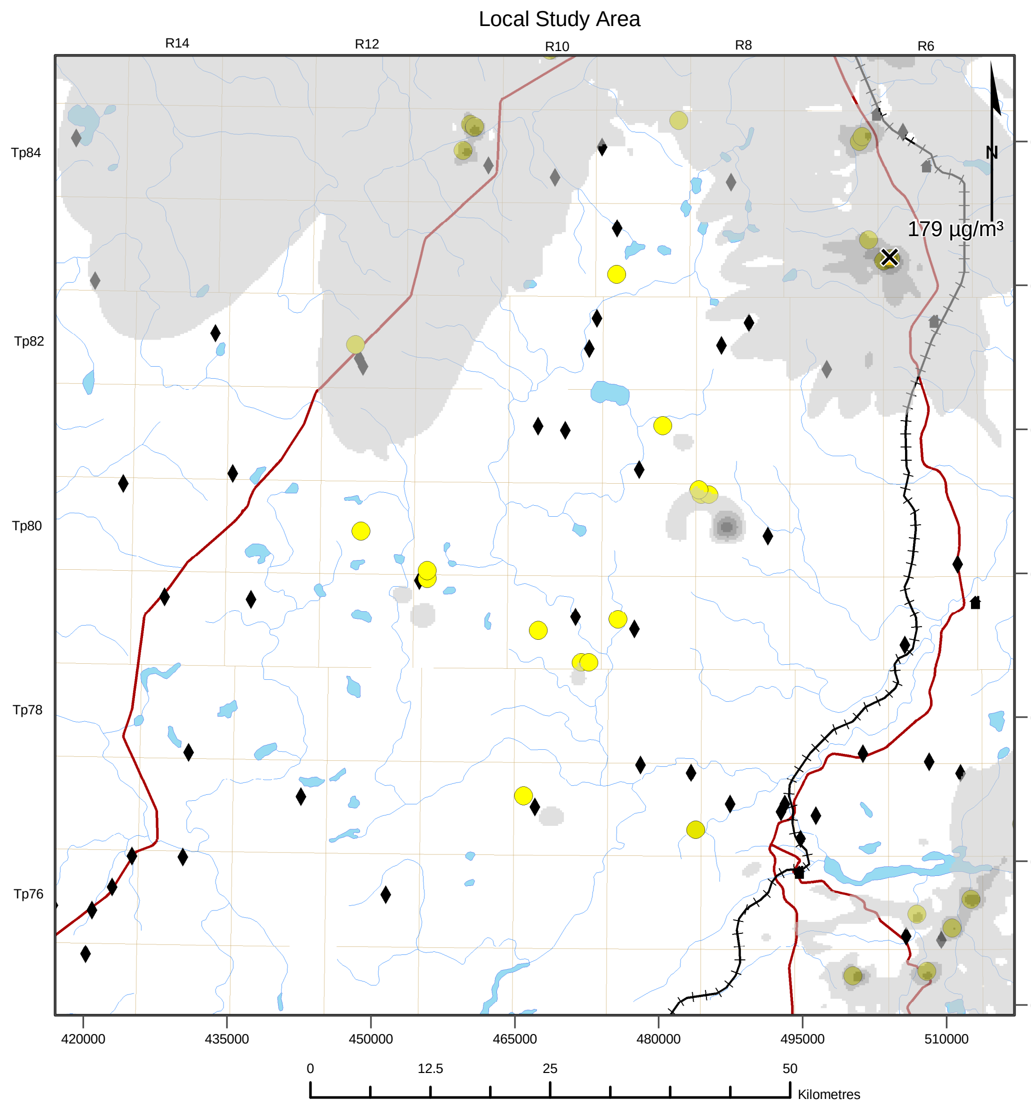
Source: Alberta and Canada totals are from Environment Canada http://www.ec.gc.ca/ghg/inventory_e.cfm (2004).



PROJECT		
NORTH AMERICAN KAI KOS DEHSEH		
TITLE		
Cumulative Scenario Maximum 1-h SO_2 Concentration		
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-1





Concentration (µg/m³)

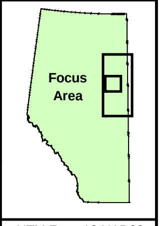
150
115
75
35
15
0

Legend

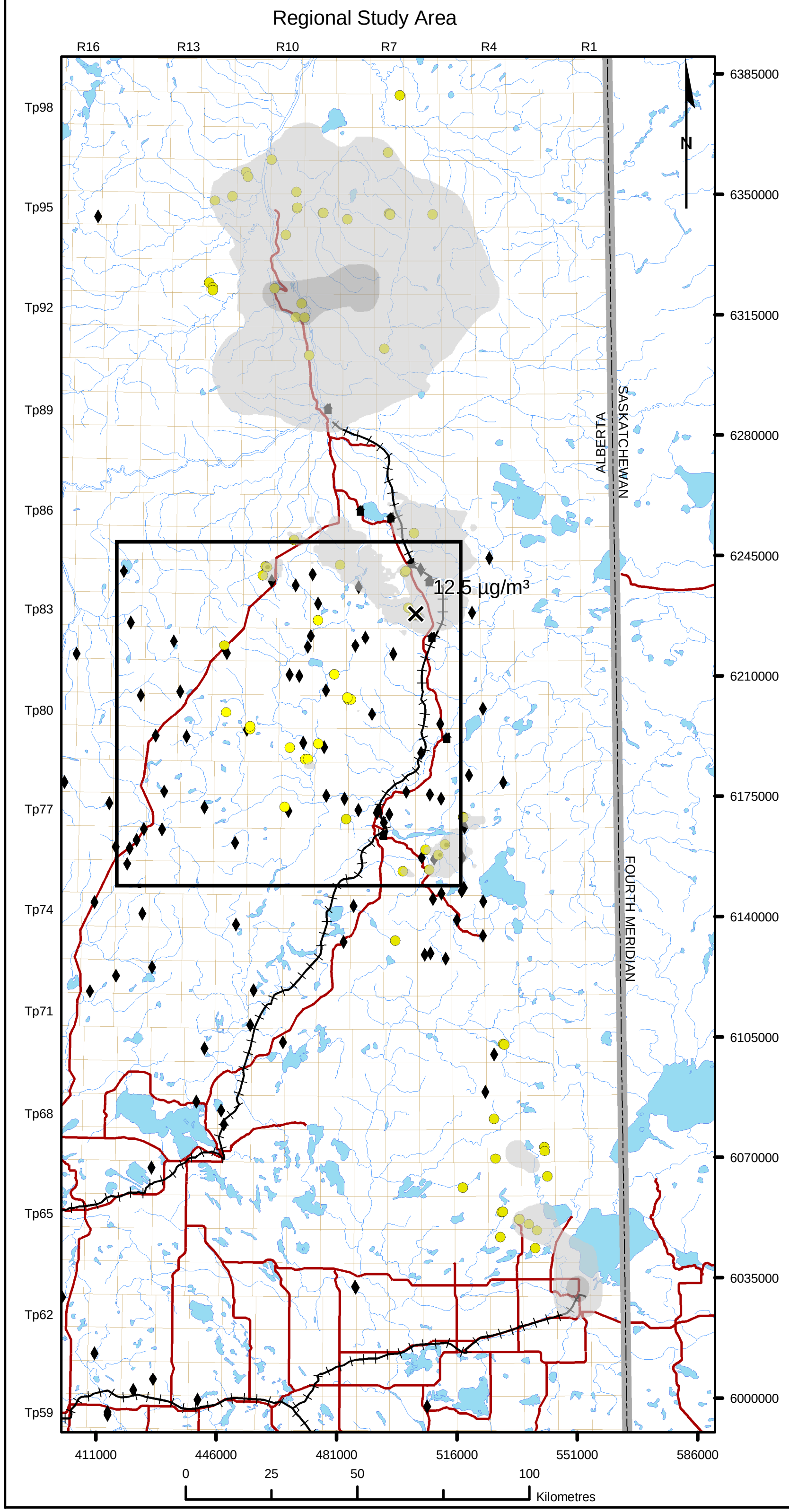
- × Maximum Point of Impingement
- ● Cumulative Source
- ◆ Gas Plant
- ☗ Community
- Railroad
- Road
- Lake
- River

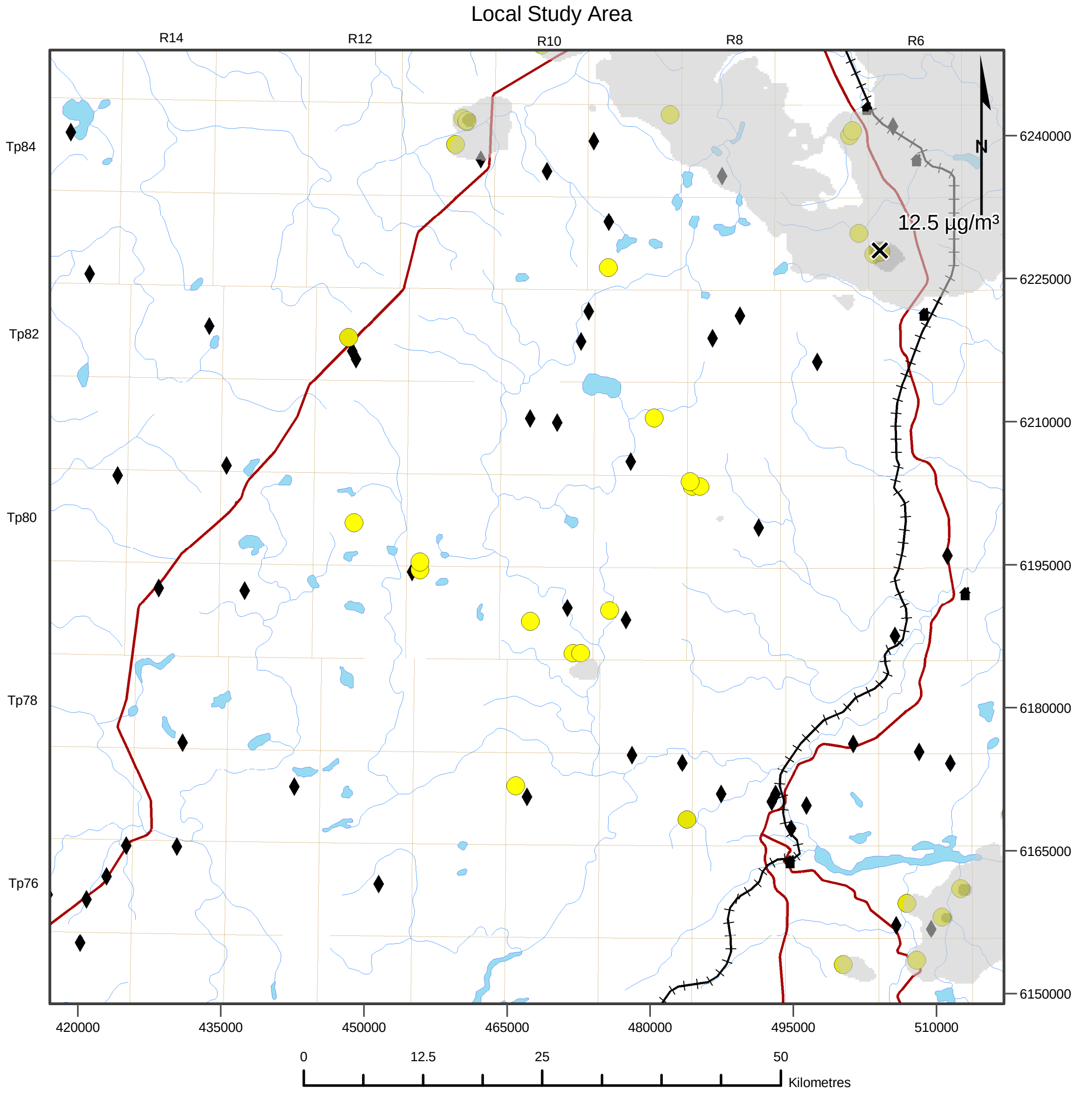
PROJECT	NORTH AMERICAN KAI KOS DEHSEH	
TITLE	Cumulative Scenario Maximum 24-h SO_2 Concentration	

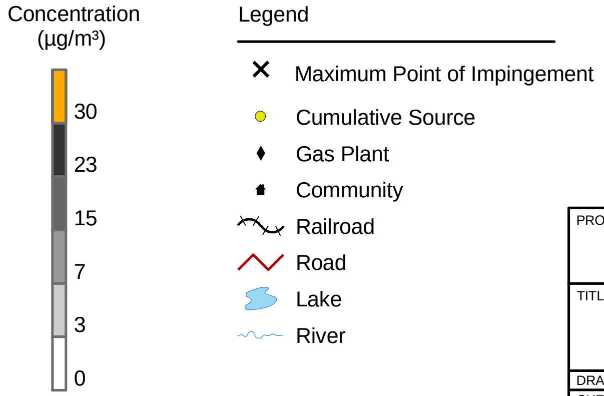
DRAWN	LDB	04/2007	Figure 2.7-2
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		



UTM Zone 12 NAD83







PROJECT

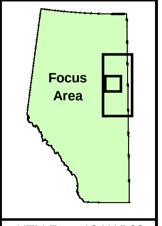
NORTH AMERICAN KAI KOS DEHSEH

TITLE

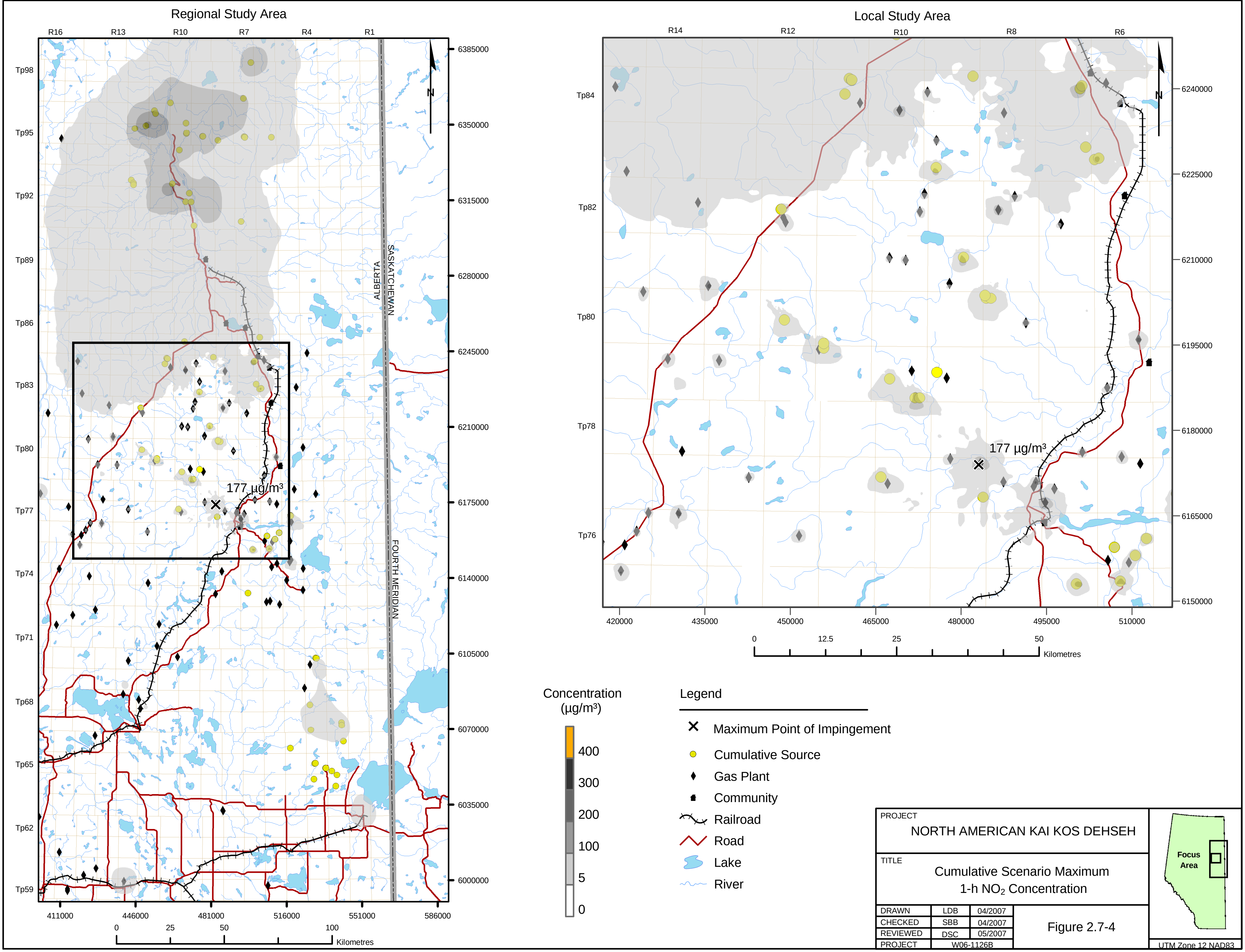
Cumulative Scenario Maximum Annual SO_2 Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-3



UTM Zone 12 NAD83



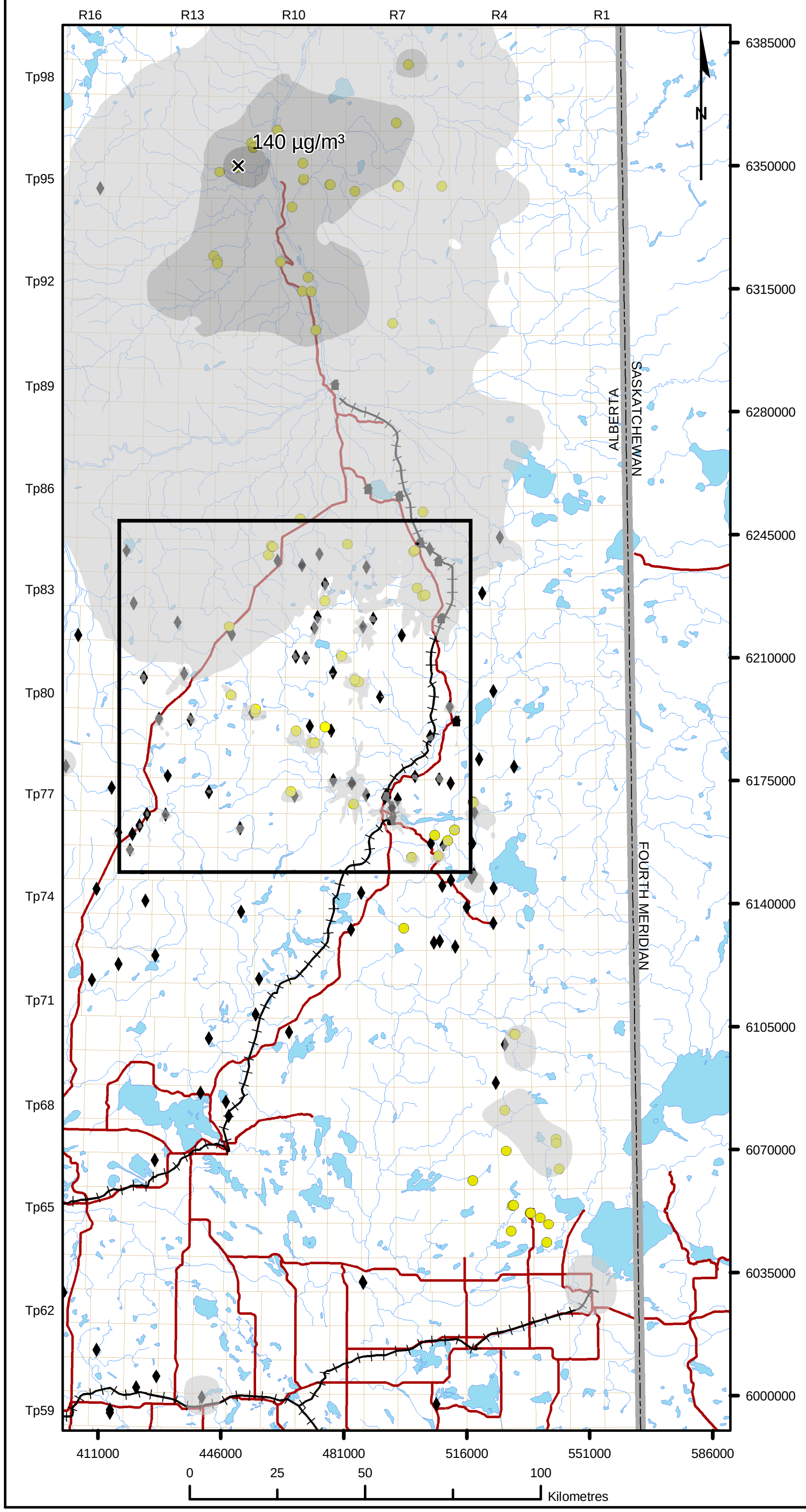
PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
Cumulative Scenario Maximum
1-h NO_2 Concentration

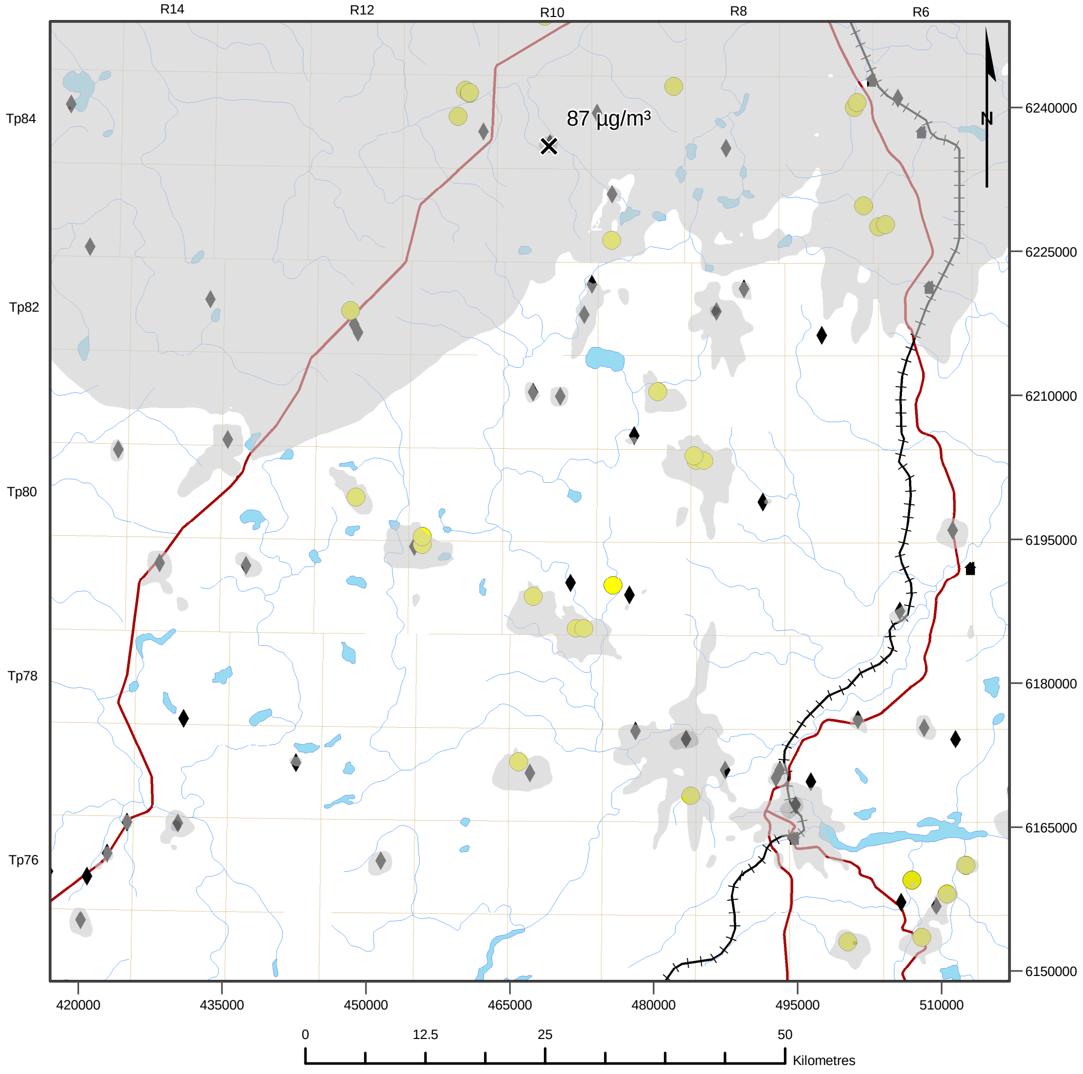
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-4

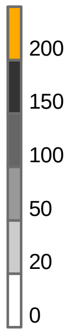
Regional Study Area



Local Study Area



Concentration (µg/m³)



Legend

× Maximum Point of Impingement

● Cumulative Source

♦ Gas Plant

⌂ Community

Railroad

Road

Lake

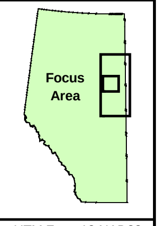
River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

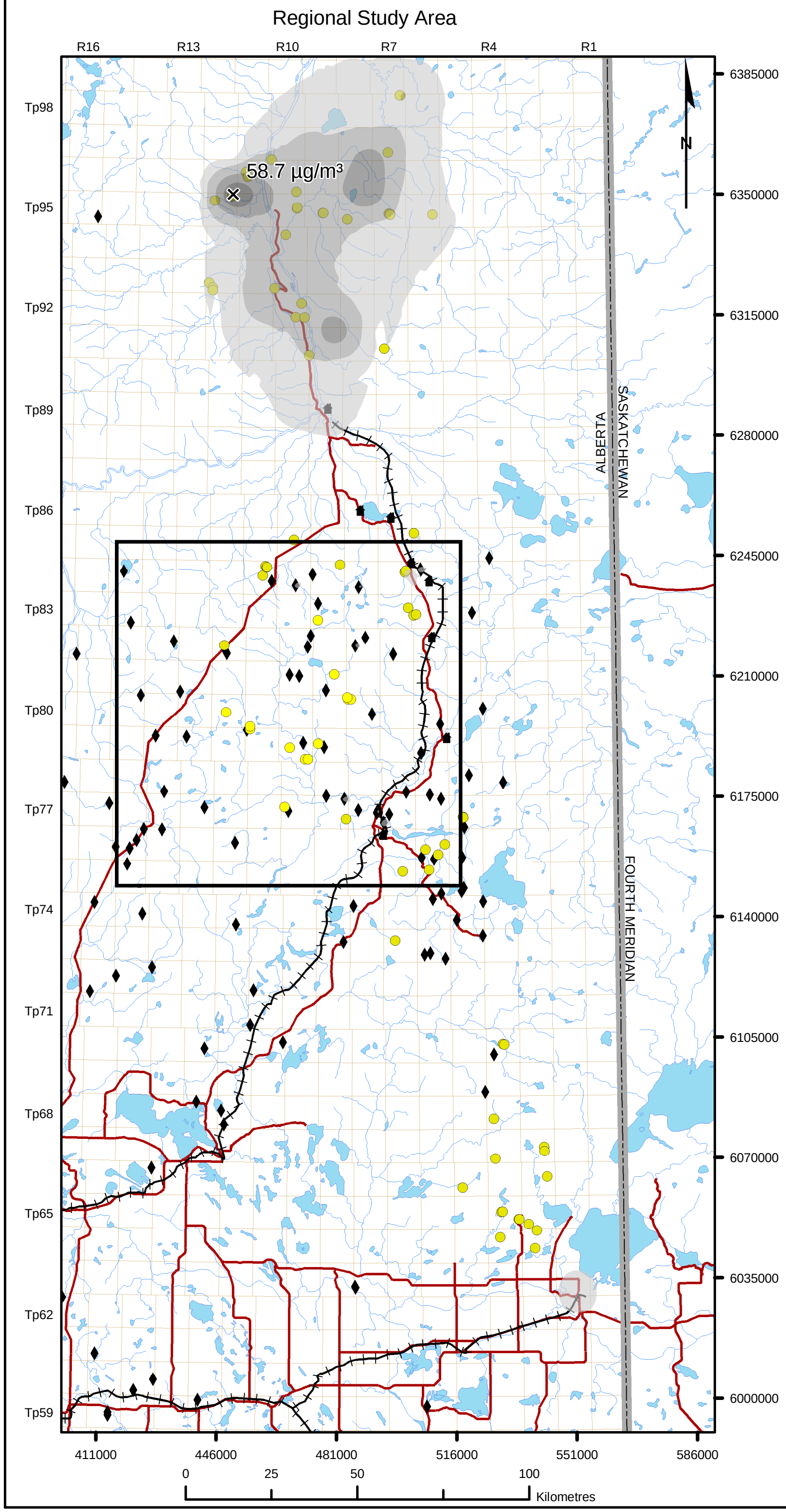
TITLE
Cumulative Scenario Maximum
24-h NO_2 Concentration

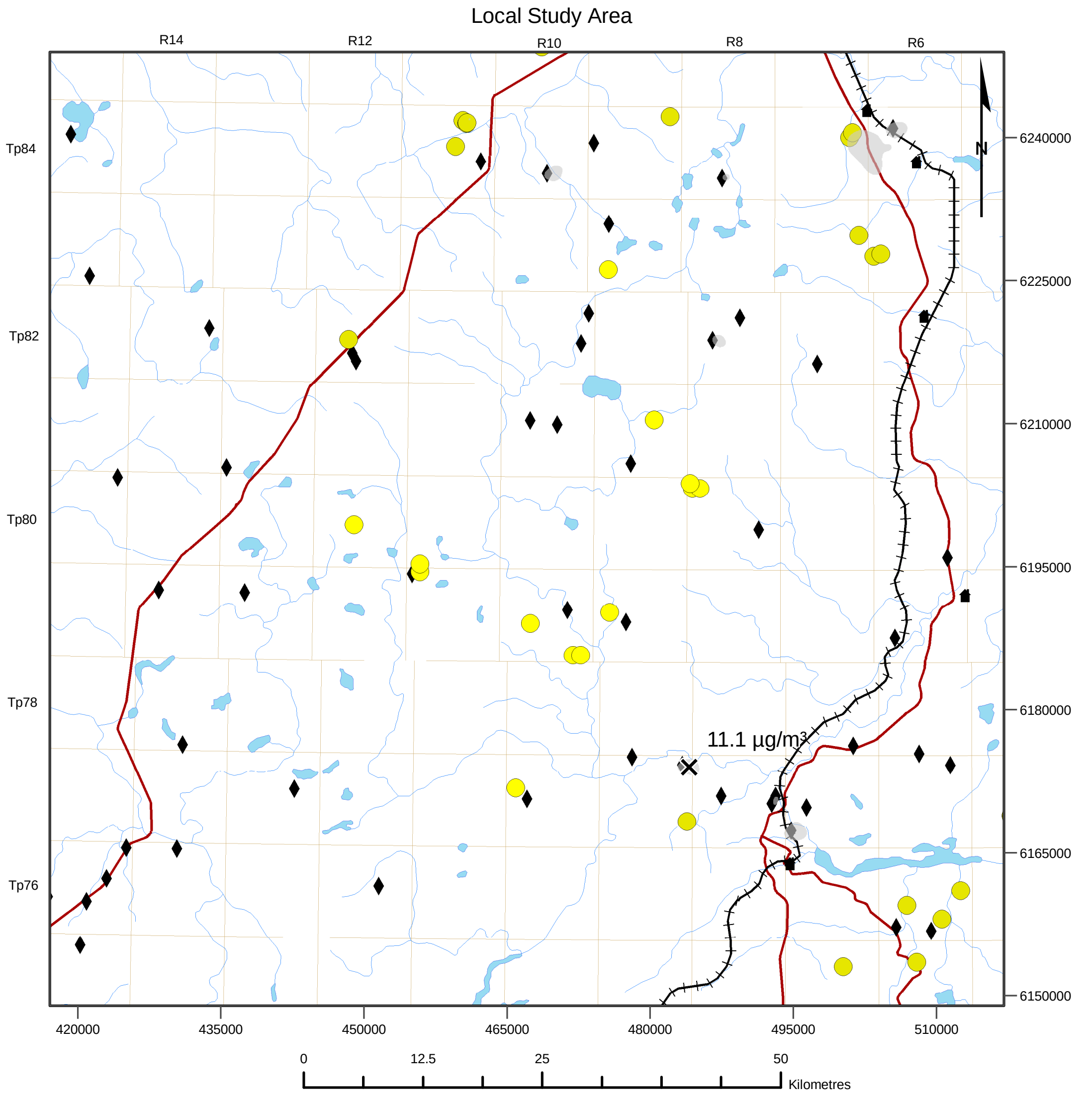
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-5



UTM Zone 12 NAD83





Concentration (µg/m³)

- 60
- 45
- 30
- 15
- 7
- 0

Legend

- × Maximum Point of Impingement
- ● Cumulative Source
- ♦ Gas Plant
- ⌂ Community
- Railroad
- Road
- Lake
- River

PROJECT

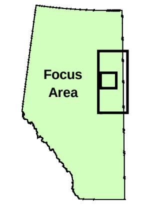
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Cumulative Scenario Maximum
Annual NO_2 Concentration

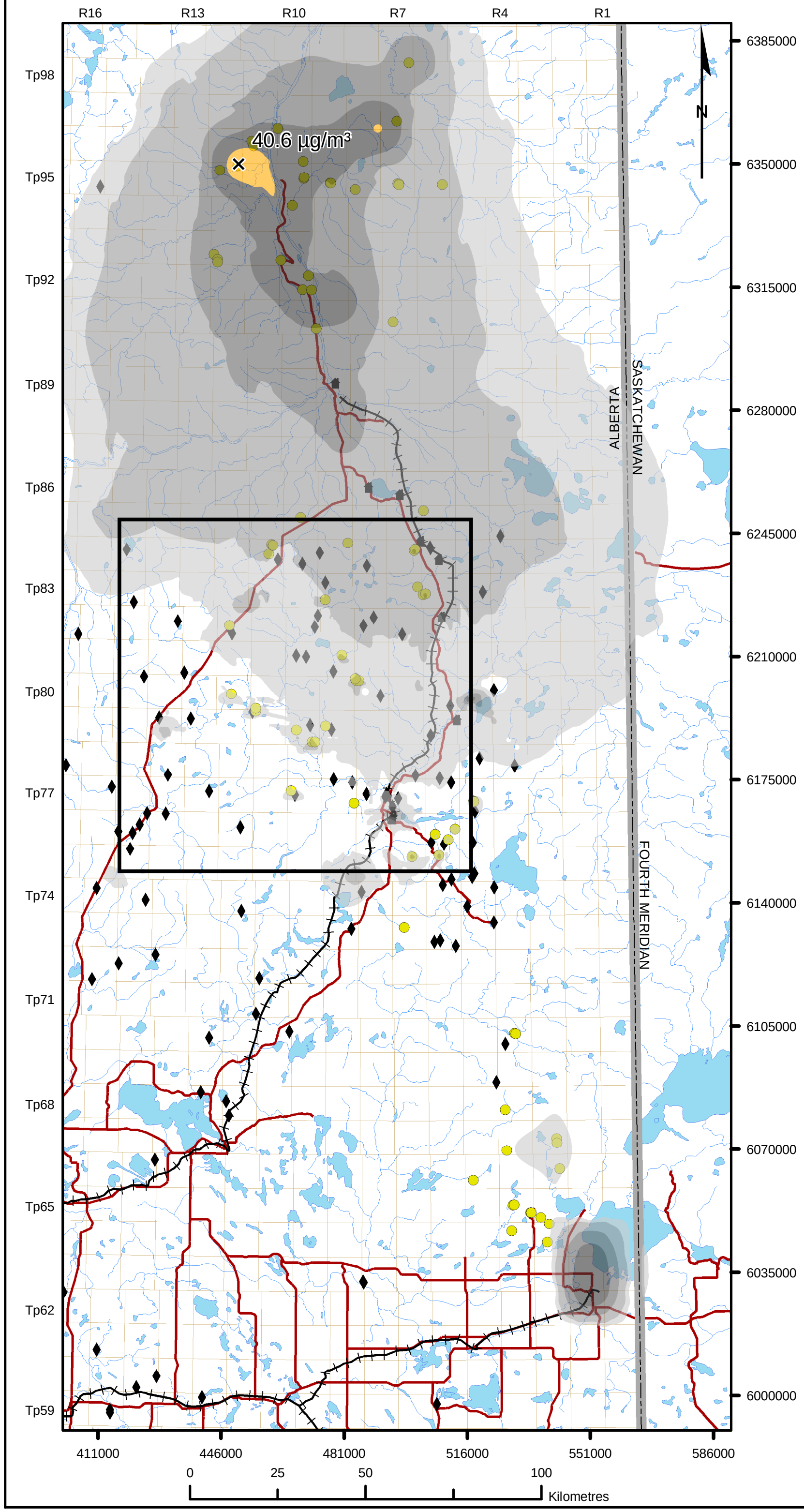
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-6

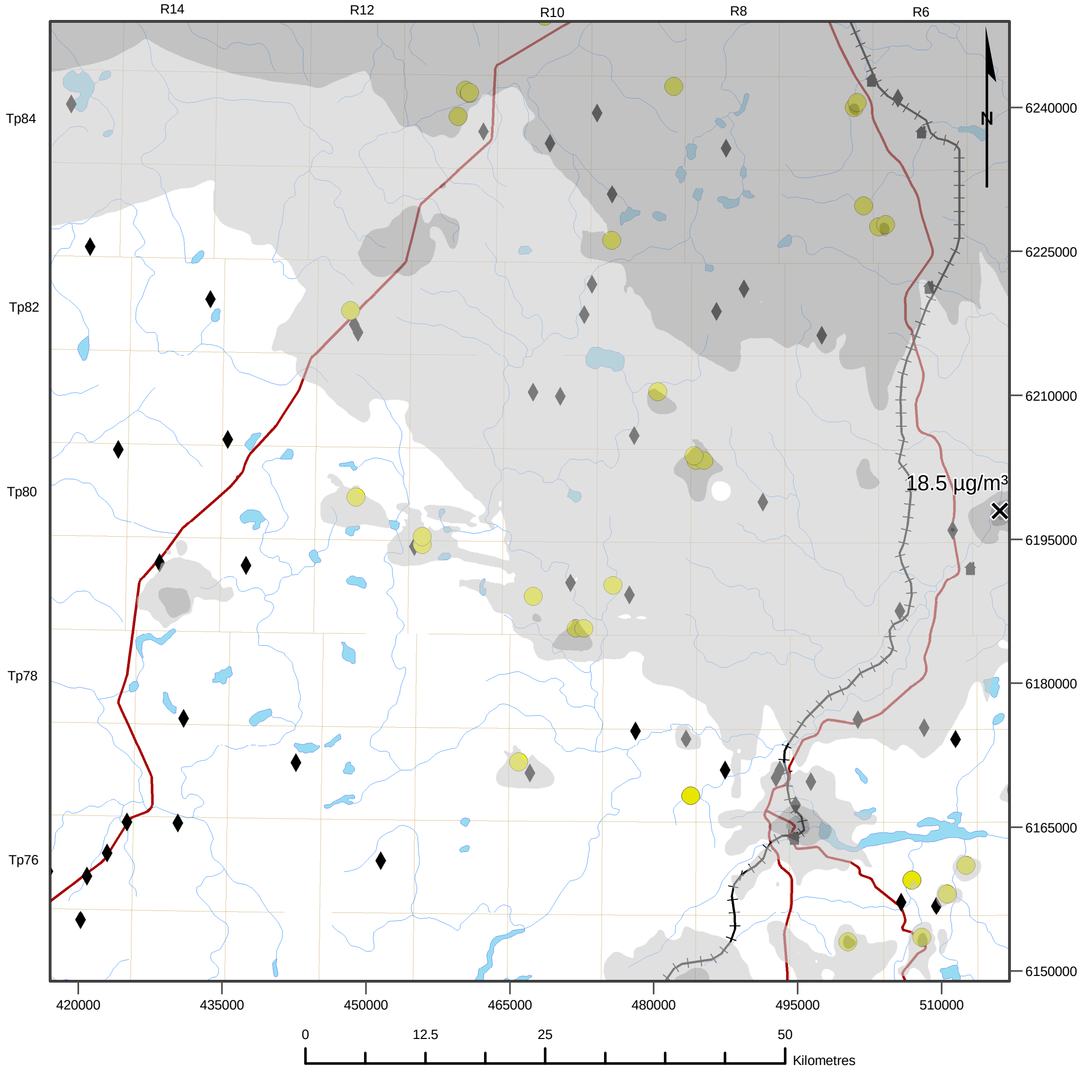


UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Concentration
(µg/m³)

🟧	30
■	15
■	8
■	4
▨	2
☐	0

Legend

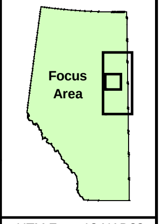
×	Maximum Point of Impingement
●	Cumulative Source
♦	Gas Plant
☗	Community
┼┼	Railroad
╱╲	Road
●	Lake
～	River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

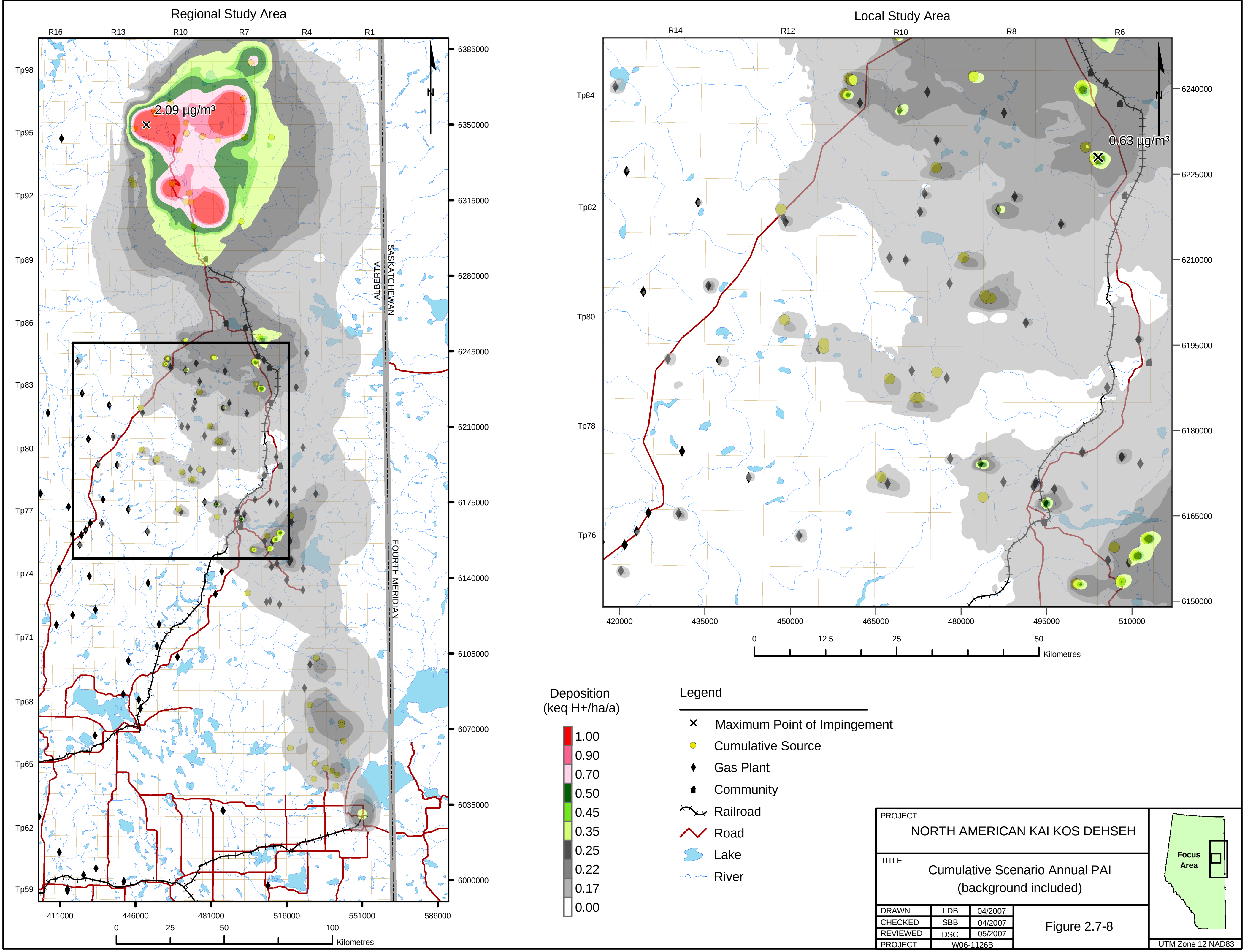
TITLE
Cumulative Scenario 98th Percentile
24-h $PM_{2.5}$ Concentration

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-7



UTM Zone 12 NAD83



PROJECT

NORTH AMERICAN KAI KOS DEHSEH

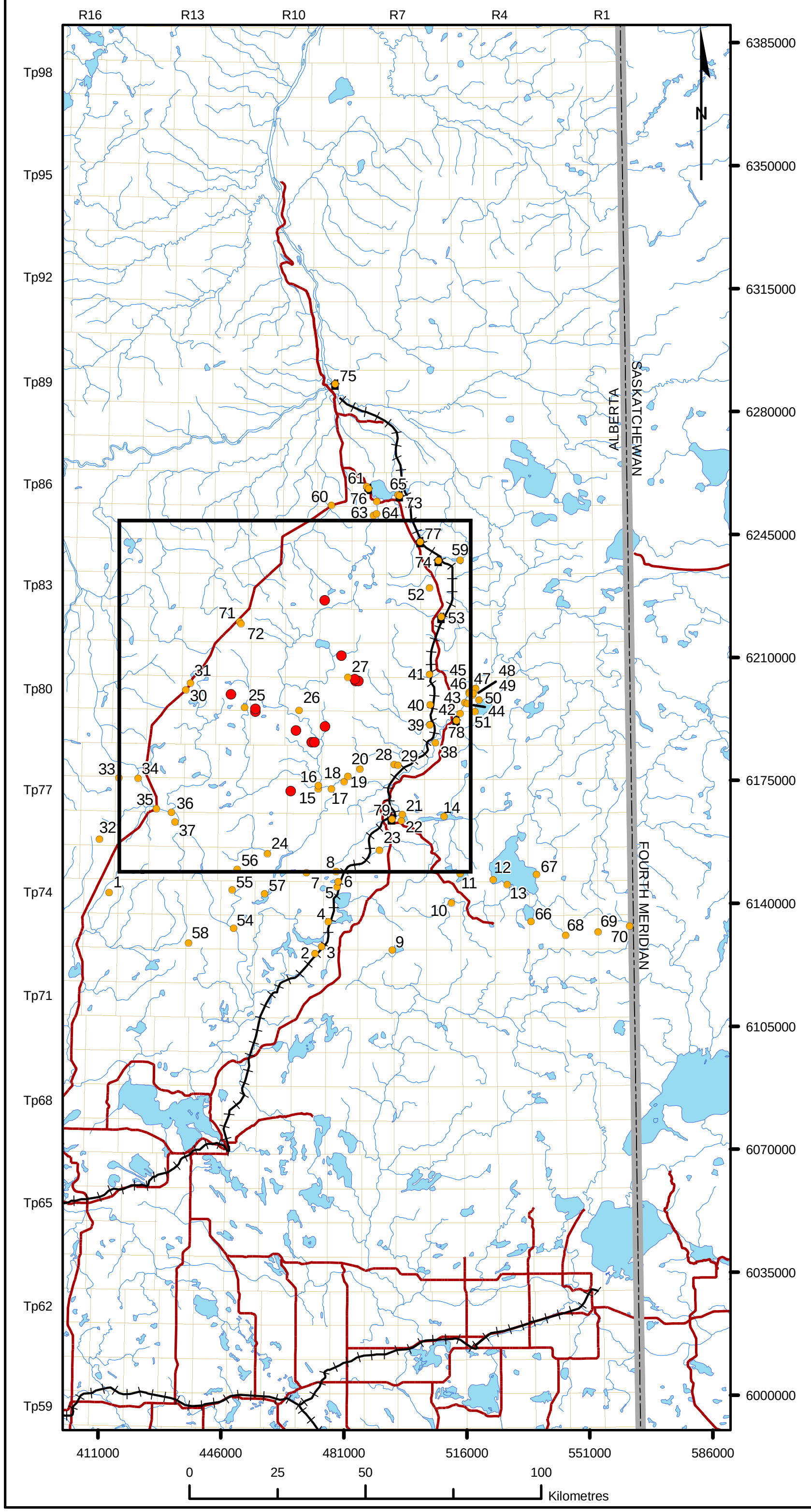
TITLE

Cumulative Scenario Annual PAI
(background included)

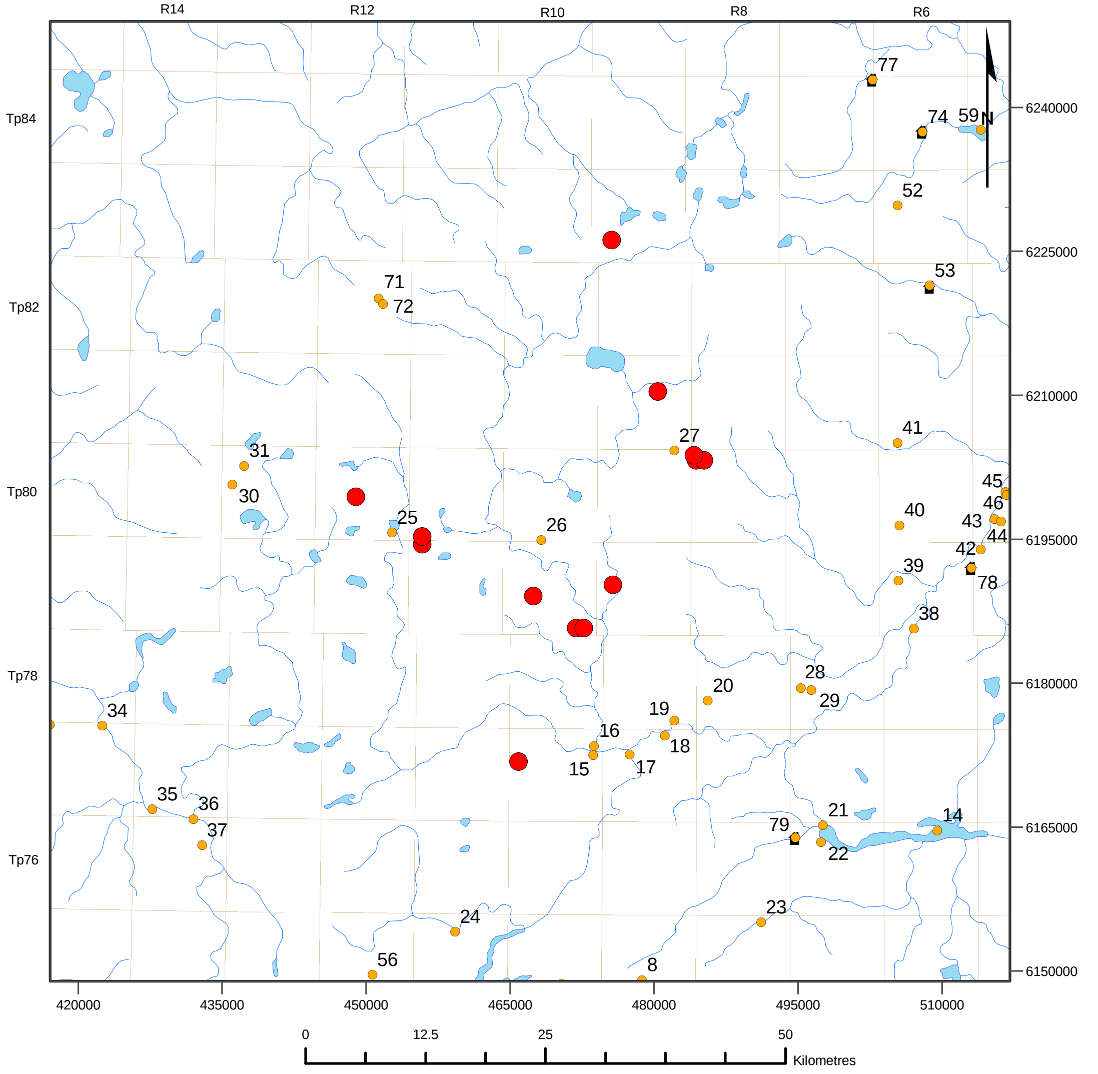
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-8

Regional Study Area



Local Study Area



Legend

• Receptor

● The Project

⌂ Community

Railroad

Road

Lake

River

PROJECT

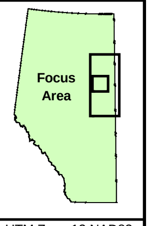
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Location of the Recreational Area
and Community Receptors

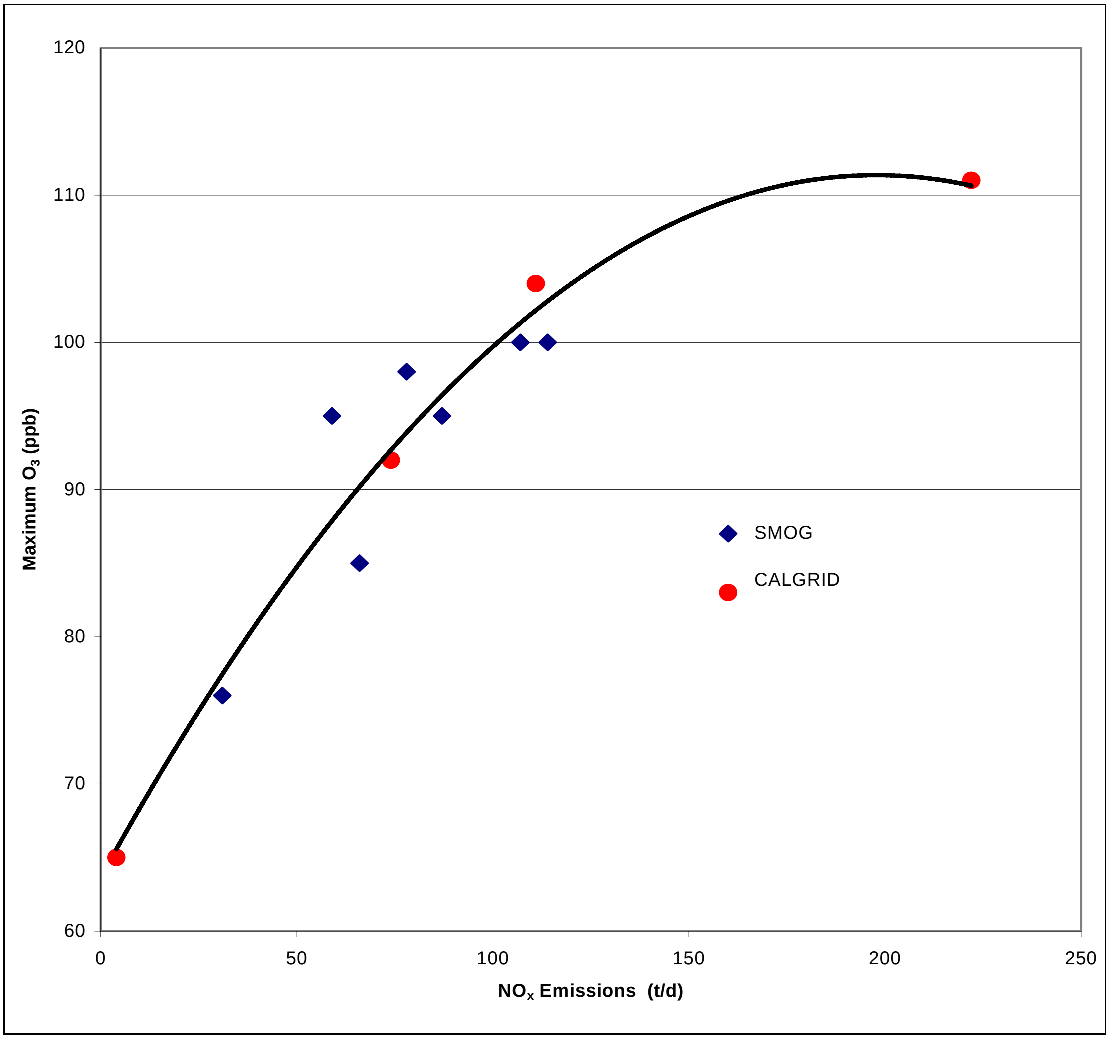
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2.7-9



UTM Zone 12 NAD83

Figure 2.7-10 **Maximum Predicted Ozone Concentration Dependence on Regional NO_x Emissions Based on the SMOG and CALGRID Photochemical Models**



Note: 82 ppb = 160 ug/m^3.

2.8 Follow-up and Monitoring

2.8.1 Introduction

Monitoring is part of North American's adaptive management program identifying and responding to environmental concerns that may arise over the lifetime of the Project. Monitoring also allows North American to verify the prediction of impacts.

Monitoring can be classified as source or ambient. Source monitoring relates to emission sources and can range from visual inspections to more formal stack measurement surveys or continuous emission monitoring. Ambient monitoring relates to the measurement of air quality in the vicinity of the facility.

2.8.2 Local Monitoring Commitments

Upon Project commissioning and at regular intervals thereafter, North American will conduct source monitoring to confirm the emissions from the steam boilers. The produced gas flow rates and H_2S contents will be measured and reported on a routine basis. Also, continuous emissions monitoring systems may be set up on representative exhaust stacks.

2.8.3 Regional Monitoring Commitments

North American will participate in regional monitoring programs conducted in the southern oil sands area. In addition, North American's ambient air monitoring data will be made available to all regional monitoring organizations in the southern oil sands area. Other oil sands producers in the southern region of the air RSA have also undertaken monitoring programs and have made their data available to other area operators and organizations such as LICA and WBEA.

2.9 Summary

2.9.1 Overall Conclusion

The maximum effects of the Project emissions tend to be limited to the vicinity of the operations (i.e., within 10 km). Although the maximum PAI predicted in the vicinity of the North American's operations is less than that to the north of Fort McMurray, the maximum small-scale PAI values in the vicinity of the Project are predicted to be greater than some of the target loads. For the Project alone, the maximum predicted small-scale PAI due to the Project emissions have little to no effect within the air RSA for either the application or the cumulative scenarios.

Ambient concentrations due to air emissions from the Project and other existing, approved and proposed facilities will tend to decrease with increasing distance from the respective operations. The concentrations at any time will depend on the prevailing meteorology. Ambient concentrations can therefore vary considerably with location and time. This assessment focused on predicting maximum concentrations in the defined air RSA and air LSA regions.

Tables 2.9-1 to 2.9-4 provide a summary of the impacts on a quantitative basis and the predicted values are compared to the ambient criteria and deposition loadings. When no criteria are available, the relative changes are expressed in percent. Table 2.9-5 provides a summary of the impacts on a qualitative basis.

2.9.1.1 Changes in Air RSA and Air LSA Emissions

The Project will increase air RSA SO_2, NO_x, CO, VOC and $PM_{2.5}$ emissions up to 4% relative to the baseline scenario. The corresponding air LSA increases are in the 9% to 65% range. The Project effect ratings, which were determined by comparing emissions for the application and baseline scenarios and are equivalent to residual effect ratings, are low for the air RSA and moderate for the air LSA.

Table 2.9-1 Quantification of Emission and SO_2 Concentration Changes Due to the Project

Issues	Parameter	Assessment Scenarios		Regulatory Criteria	Comments
		Application Relative to Baseline	Cumulative Relative to Baseline		
Project emissions to the atmosphere	Air RSA SO_2 emission (t/d) Air RSA NO_x emission (t/d) Air RSA CO emission (t/d) Air RSA VOC emission (t/d) Air RSA $PM_{2.5}$ emission (t/d)	259.58 (+1.1%) 463.60 (+3.6%) 404.02 (+2.5%) 530.59 (+0.2%) 31.86 (+4.0%)	284.14(+10.7%) 594.00 (+32.8%) 495.60 (+25.7%) 810.78 (+51.3%) 39.45 (+28.8%)	– – – – –	The Project emissions are low relative to other sources in the air RSA.
	Air LSA SO_2 emission (t/d) Air LSA NO_X emission (t/d) Air LSA CO emission (t/d) Air LSA VOC emission (t/d) Air LSA $PM_{2.5}$ emission (t/d)	36.47 (+8.5%) 65.51 (+32.8%) 52.07 (+23.0%) 2.31 (+64.8%) 3.84 (+46.8%)	51.10 (+52.0%) 74.97 (+52.0%) 68.02 (+60.6%) 3.71 (+165.4%) 4.53 (+73.0%)	– – – – –	The Project emissions contribute to a greater proportion in the air LSA than the air RSA. The air LSA emissions are an order of magnitude less than those outside the air LSA.
Impacts of Project SO_2 emissions on regional SO_2 concentrations	Air RSA Maximum 1-h (ug/m^3) Air RSA Maximum 24-h (ug/m^3) Air RSA Maximum annual (ug/m^3)	**580** (<1%) 113 (<1%) 8.8 (<1%)	**580** (<1%) **179** (+59.1%) 12.5 (+42.7%)	450 150 30	The Project has less than 1% contribution to the maximum air RSA and air LSA 1-h and 24-h concentrations. The predicted air RSA and air LSA annual concentrations occur in the same location and are due to the Project. SO_2 concentrations increase substantially due to cumulative sources.
	Air LSA Maximum 1-h (ug/m^3) Air LSA Maximum 24-h (ug/m^3) Air LSA Maximum annual (ug/m^3)	284 (<1%) 104 (<1%) 8.8 (<1%)	**562** (+97.7%) **179** (+72.7%) 12.5 (+42.7%)	450 150 30	

Notes: A dash (–) indicates no regulatory criteria.

Boldface text indicates that the regulatory criteria are exceeded.

Table 2.9-2 Quantification of NO_2 and $PM_{2.5}$ Concentration and PAI Changes Due to the Project

Key Impact Question	Parameter	Assessment Scenario		Regulatory Criteria	Comments
		Application Relative to Baseline	Cumulative Relative to Baseline		
Impacts of Project NO_x emissions on regional NO_2 concentrations	Air RSA Maximum 1-h (ug/m^3) Air RSA Maximum 24-h (ug/m^3) Air RSA Maximum annual (ug/m^3)	230 (<1%) 98 (<1%) 37.6 (<1%)	314 (+37.0%) 140 (+42.7%) 58.7 (+56.4%)	400 200 60	The Project contributes minimally to the maximum 1-h, 24-h and annual average values in the air RSA. Maximum predicted values in the air LSA are all less than their ambient air quality guidelines. The relative Project contribution is much greater in the air LSA than the air RSA. NO_2 concentrations increase substantially due to cumulative sources.
	Air LSA Maximum 1-h (ug/m^3) Air LSA Maximum 24-h (ug/m^3) Air LSA Maximum annual (ug/m^3)	177 (<1%) 87 (<1%) 10.9 (+4.3%)	177 (<1%) 87 (<1%) 11.1 (+6.6%)	400 200 60	
Impacts of Project $PM_{2.5}$ emissions on regional $PM_{2.5}$ concentrations	Air RSA Maximum 24-h (ug/m^3)	27.5 (<1%)	**40.6** (+47.5%)	30	The Project contributes minimally to the maximum 24-h average value in the air RSA and air LSA. Maximum predicted air LSA values do not exceed the CWS. $PM_{2.5}$ concentrations in the air RSA increase substantially due to cumulative sources.
	Air LSA Maximum 24-h (ug/m^3)	17.9 (<1%)	18.5 (+3.3%)	30	
Impacts of Project SO_2 and NO_x emissions on regional acid deposition (PAI)	Air RSA Maximum (keq H$^+$/ha/y)	1.76 (<1%)	2.13 (+21.1%)	–	The Project has little effect on maximum small-scale deposition in the air RSA. The Project has a moderate effect on maximum small-scale deposition in the air LSA .
	Air LSA Maximum (keq H$^+$/ha/y)	0.65 (+1.2%)	0.69 (+7.3%)	–	

Notes: Boldface text indicates that the regulatory criteria are exceeded.

A dash (-) indicates no regulatory deposition criteria measured on a small-scale basis.

Table 2.9-3 Quantification of Community and Recreational Area Location Concentration Changes Due to the Project

Key Impact Question		**Location**	**Assessment Scenario**		**Regulatory Criteria**	**Comments**
			Application Relative to Baseline	**Cumulative Relative to Baseline**		
Impacts of Project combustion emissions on air quality at community and recreational area receptors.	SO_2 concentrations (1-h average) ug/m^3	Conklin	18 (<1%)	19 (+8.7%)	450	Maximum predicted values are due to air LSA sources; however, the Project has a minimal (<1%) impact on predicted values. Maximum predicted values are below the applicable criteria for all scenarios.
	NO_2 concentrations (1-h average) ug/m^3	Conklin	48 (<1%)	49 (<1%)	400	
	CO concentrations (1-h average) ug/m^3	Conklin	122 (+2.8%)	123 (+3.3%)	15 000	
	$PM_{2.5}$ concentrations (24-h average) ug/m^3	Conklin	4.4 (+3.6%)	4.8 (+11.4%)	30	
	Acetaldehyde concentrations (1-h average) ug/m^3	Conklin	0.04 (<1%)	0.04 (+4.4%)	90	
	Benzene concentrations (1-h average) ug/m^3	Conklin	0.75 (<1%)	1.57 (+109.1%)	30	
	Formaldehyde concentrations (1-h average) ug/m^3	Conklin	0.37 (<1%)	0.40 (+8.9%)	65	

Notes: The above summary focuses on the predictions at the community of Conklin and on the pollutants for which there are AENV objectives or CWS.

Values in brackets represent the percent change relative to the baseline scenario.

Table 2.9-4 Quantification of Ozone Concentration and GHG Emission Changes Due to the Project

Key Impact Question	Parameter	Assessment Scenario		Regulatory Criteria	Comments
		Application Relative to Baseline	Cumulative Relative to Baseline		
Impacts of Project emissions on regional ozone concentrations.	Ozone concentration (ug/m^3)	Not evaluated	Not evaluated	160	The Project NO_x emissions are not expected to result in ambient ozone exceedances. The NSMWG is continuing a program to determine the ozone production potential in the primary oil sands region.

Key Impact Question	Parameter	North American Project	Regulatory Criteria	Comments
Project contribution to GHG emissions.	GHG Emissions (Mty CO_2E)	The Project GHG emissions are 4.29 Mt/y CO_2E (1.8% of 2003 Alberta total and 0.6% of 2004 Canada total GHG). Volume 1 provides more details on Project GHG emissions.	–	The Project design incorporates features to minimize increases of GHG emissions.

Notes: A dash (–) indicates no regulatory criteria.

Table 2.9-5 Summary of Key Issues, Mitigation, Impacts and Monitoring Related to Air Quality

Issue	Project Design Features and Mitigation Measures	Air LSA Cumulative Implications	Air RSA Cumulative Implications	Monitoring
Impact of Project SO_2 emissions on regional SO_2 concentrations.	Design to ensure sufficient dispersion.	Maximum air LSA annual average concentration is less than the ambient objective. The frequencies of exceedance of the 1-h and 24-h objectives are 0.05% and 0.27%, respectively. The Project contribution to these exceedances is less than 1%.	Maximum air RSA 1-h and 24-h average concentrations exceed the ambient objectives. The frequencies of exceedance of the 1-h and 24-h objectives are 0.13% and 0.27%, respectively. The Project contributes less than 1% to the exceedances.	Periodic source monitoring and measurements to document SO_2 emissions. Passive integrated SO_2 monitors to measure monthly average concentrations. Cooperation and data sharing for local and regional air quality monitoring.
Impact of Project NO_x emissions on regional NO_2 concentrations.	Low NO_x burners on steam boilers and dry low NO_x burner technology on gas turbines. Efficiencies to reduce fuel use.	Maximum air LSA 1-h, 24-h and annual average concentrations are less than the ambient objectives.	Maximum air RSA 1-h, 24-h and annual average concentrations are less than the ambient objectives. The Project contributes less than 1% to the maxima external to the air LSA.	Periodic source monitoring and measurements to document NO_x emissions. Cooperation and data sharing for local and regional air quality monitoring.
Impact of Project emissions on regional acid deposition.	Low NO_x burners on steam boilers and dry low NO_x burner technology on gas turbines. Efficiencies to reduce fuel use.	Maximum small-scale air LSA PAI values are greater than the CASA and AENV (1999) loads. The Project has a moderate contribution to the air LSA maxima.	Maximum small-scale air RSA PAI values are greater than the CASA and AENV (1999) loads. The Project contributes less than 1% to the maxima external to the air LSA.	Passive integrated SO_2 monitors to measure monthly average concentrations. Cooperation and data sharing for local and regional air quality monitoring.
Impact of Project combustion emissions on community and recreational area locations.	Design to ensure sufficient dispersion. Low NO_x burners on steam boilers and dry low NO_x burner technology on gas turbines. Efficiencies to reduce fuel use.	All predicted concentrations are less than the relevant ambient air quality criteria at all air LSA community and recreational area receptors.	Not evaluated.	None.
Impact of Project emissions on regional ozone concentrations.	Low NO_x burners on steam boilers and dry low NO_x burner technology on gas turbines. Vent gas is collected rather than being emitted to the atmosphere.	Not applicable.	The Project NO_x emissions will have a low effect on photochemical production of ozone due to low precursor emissions.	Monitoring efforts to confirm future cumulative implications. Cooperation and data sharing for local and regional air quality monitoring.
Project contribution to GHG emissions.	Efficiencies to reduce fuel use. Control of fugitive plant and field emissions. Capture and use of produced gas as fuel gas rather than flaring.	Not applicable.	Not applicable.	Continued fuel efficiency monitoring.

2.9.1.2 Ambient SO_2, NO_2 and $PM_{2.5}$ Concentrations

Higher SO_2, NO_2 and $PM_{2.5}$ concentrations due to the operation of the Project are predicted to occur in the vicinity of the operating area. The final impact ratings for the Project (i.e., application scenario relative to the baseline scenario), which are equivalent to residual effects ratings are as follows:

• SO_2 Concentrations:	Low in the air RSA Low in the air LSA
• NO_2 Concentrations:	Low in the air RSA Low in the air LSA
• $PM_{2.5}$ Concentrations:	Low in the air RSA Low in the air LSA

The comparison between the baseline and application scenarios indicates that the effect of the Project emissions on ambient concentrations beyond the air LSA is sufficiently small that they are unlikely to be detected.

2.9.1.3 PAI

On an air RSA basis, the highest deposition is predicted near the primary oil sands area located north of Fort McMurray. In the southern area, PAI values predicted on a small-scale basis are greater than some of the CASA Target loads. The final impact ratings for the Project relative to the baseline scenario are:

• PAI:	Low in the air RSA Low in the air LSA

The comparison between the baseline and application scenarios indicates that the effect of the Project emissions on small-scale PAI beyond the air LSA is sufficiently small that it is unlikely to be detected.

2.9.1.4 Community and Recreational Area Air Quality

Ambient concentrations of selected compounds at representative community and recreational area locations in the air LSA are predicted to be less than the applicable ambient air quality objectives. Potential impacts of community exposure to changes in ambient air quality due to the Project are rated in the human health assessment.

2.9.1.5 Ambient Ozone

While naturally high ozone concentrations can occur in the area, the incremental impact due to the Project NO_x emissions is expected to be low. The final ozone impact rating for the Project is low given the small relative increase in Project precursor emissions.

2.9.1.6 GHG Emissions

GHG emissions from the Project, which are expected to commence in 2010, are estimated to contribute 1.8% and 0.6% to the 2003 provincial and 2004 national totals, respectively. Although a final impact rating is not assigned to GHG emissions, North American is committed to environmental stewardship and environmental protection initiatives including energy management and emissions reduction (Volume 1).

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2.10.1 Personal Communications

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2.10.2 Websites

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APPENDICES

Appendix 3A Assessment of Environmental Noise (General)
Appendix 3B Sound Levels of Common Noise Sources
Appendix 3C Central Processing Facility Noise Sources

3 NOISE

3.1 Introduction

This section of the EIA addresses the environmental noise aspects of the Project. The TOR requires a Noise Impact Assessment (NIA) satisfying the requirements of EUB Directive 038 (Directive 038 supercedes the Interim Directive on Noise Control [ID99-8]) on Noise Control. The NIA contains a description of the modelling approach used to identify and quantify noise emissions from the Project during the construction phase, normal operations, and also during non-routine operations. The results of the assessment are compared to EUB allowable sound levels.

3.2 Study Area

The noise study area for the Project, as shown in Figure 3.2-1, spans eight townships (approximately 77 km) and six ranges (approximately 58 km). Historical experience with noise levels from similar designed facilities indicates that at distances beyond 5 km, noise levels are at typical ambient levels for the area. Each of the proposed ten central processing facilities (CPFs), including the Leismer Demonstration Project, is sufficiently far from the others that the noise climate from one does not impact the others. As such, each one was modelled as a separate case. Within this study area, the only other industrial noise sources are those associated with the Canadian Natural Resources Ltd. (CNRL) facility, located near the Thornbury Hub, the Paramount Resources Ltd. (Paramount) facilities, located near the Corner and Corner Expansion Hubs and the Paramount Energy Operating Corp. (Paramount Trust) located near the Northeast Leismer Hub. The Paramount facility near the Corner and Corner Expansion Hubs is far enough away that the noise levels do not affect the noise climate near the hubs. The noise associated with the other CNRL and Paramount Trust facilities is not significant enough to affect the noise climate in the area relative to the nearest hub. At the Northeast Leismer and Thornbury locations, the CNRL and Paramount Trust facilities may have an impact. However, noise level data and equipment data for these facilities were not obtained and the noise levels from the hubs will be shown to be well below the noise criteria. Hence, since there are no significant receptors nearby, it is likely that there will be no additional noise concerns.

The only major roads in the area are Highway 63 which runs generally northeast-southwest and Highway 881 which runs generally north-south. However, each of these roads is still more than 10 km from the closest CPF. As such, neither road is of concern for the noise climate.

Topographically, the land in the study area consists of varying terrain with rolling hills. In terms of noise propagation, these hills are sufficient to cause only minor shielding. The vegetation in the area consists of dense trees and bushes with field grasses in the minimal open areas. As such, the vegetation is sufficient to provide a level of vegetative sound absorption.

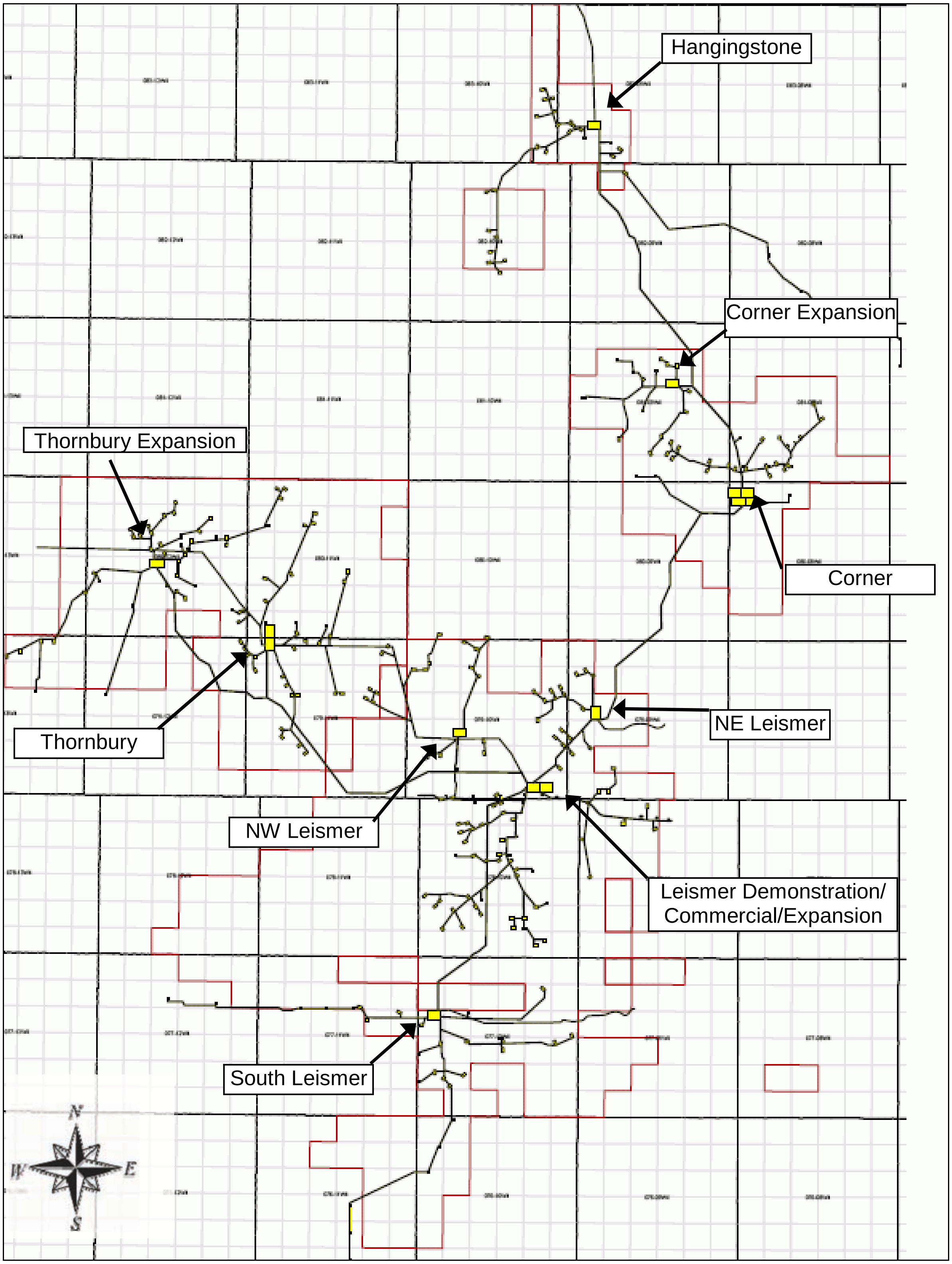
Currently, there are no permanent dwellings within the study area. The only temporarily occupied dwellings are the various Trapper’s Cabins located throughout, as identified in Table 3.2-1. The table provides the Universal Transverse Mercator (UTM) coordinates of each Trapper’s Cabin and the approximate distance from the nearest CPF. It can be seen that most of the Trapper’s Cabins are far enough from any CPF that the noise will not be audible. Those which are located within 10 km of a CPF have been considered in the noise modelling.

Table 3.2-1 Noise Study Area Trapper's Cabin Locations

Trapper Number	Easting* (m)	Northing* (m)	Distance From Nearest Hub (km)
2675	505081	6204804	19.5
2318	452405	6195276	3.2
2751	481062	6203992	2.8
1659	473519	6173513	7.5
1569	473808	6172495	7.5
2622	477218	6172748	11.0
1474	485808	6178071	15.0
1474	467979	6195052	5.8
2319	460747	6162625	10.3
2144	472541	6161116	12.2
1303	450682	6192898	5.0
2097	478043	6229144	3.5
2820	474859	6230316	4.0
69	471297	6223501	4.7
1523	477451	6179673	7.5
2277	472123	6222726	4.5

* Coordinates referenced to NAD 83

Figure 3.2-1 Noise Study Area



3.3 Temporal Boundaries

A description of the schedule for construction, operation, decommissioning and reclamation can be found in Volume I. During construction, noise levels will vary depending on the type, number and location of construction equipment operating, as well as timing and location of drilling operations at well pad sites. When construction of the CPF is complete and the new well pads are operational, the sound level will be of a continuous nature. Exceptions will occur during occasional abnormal operating conditions at the CPFs and for well servicing activities at the well pad sites.

3.4 Issues and Assessment Criteria

3.4.1 Issues

Noise from production and processing facilities can be an irritant to residents and, potentially, a sensory disturbance to animals. Activities associated with the Project will generate noise as follows:

- Construction of the well pads and access roads;
- Construction of the CPFs;
- Operational noise associated with the CPFs and well pads;
- Facility-related vehicle traffic; and
- Abnormal and/or upset conditions that require flaring, steam blowdown, or emergency operations.

3.4.2 Noise Descriptors

Environmental noise levels from various sources (including industry, road traffic, and rail traffic) are commonly described in terms of equivalent sound levels or L_{eq}. The equivalent sound level is the level of a steady sound having the same acoustic energy, over a given time period, as the fluctuating sound. In addition, this energy averaged level is A–weighted to account for the reduced sensitivity of average human hearing to low frequency sounds. These L_{eq} in dBA, which are the most common environmental noise measure, are often given for daytime (07:00 to 22:00) L_{eq}Day and nighttime (22:00 to 07:00) L_{eq}Night while other criteria use the entire 24-hour period as L_{eq}24. A detailed description of the acoustical terms used is provided in Appendix 3A, while a list of common noise levels is provided in Appendix 3B.

3.4.3 Assessment Criteria

The impact assessment criteria, as outlined in Volume 2, Section 1, were used to assess the noise impacts. Magnitude of impact was assessed in accordance with EUB requirements, as described below.

The document which most directly relates to the Permissible Sound Levels (PSLs) for this Project is EUB Directive 038. This Directive sets the PSL at the receiver location based on population density and relative distances to heavily travelled road and rail as shown in Table 3.4-1. In all instances, there is a Basic Sound Level (BSL) of 40 dBA for the nighttime and 50 dBA for the daytime. This basic sound level can then be adjusted, according to Table 3.4-1, for each receptor to determine their individual PSL. For the purposes of this assessment, all of the Trapper's

Cabins result in a PSL-Night of 40 dBA, and a PSL-Day of 50 dBA. In addition, Directive 038 specifies that new facilities must meet a PSL-Night of 40 dBA at 1.5 km from the facility fence-line if there are no closer dwellings. It is further recommended in Directive 038 that the design noise levels be approximately 5 dBA lower than the PSL to provide a suitable margin of safety.

Table 3.4-1 EUB Directive 038 Permissible Sound Level Determination Criteria (dBA)

	Dwelling Density per Quarter Section of Land		
Proximity to Transportation	**1-8 Dwellings**	**9-160 Dwellings**	**>160 Dwellings**
Category 1	40	43	46
Category 2	45	48	51
Category 3	50	53	56

Notes:

Category 1	Dwelling units more than 500 m from heavily traveled roads and/or rail lines and not subject to frequent aircraft flyovers
Category 2	Dwelling units more than 30 m but less than 500 m from heavily traveled roads and/or rail lines and not subject to frequent aircraft flyovers
Category 3	Dwelling units less than 30 m from heavily traveled roads and/or rail lines and not subject to frequent aircraft flyovers

The PSLs provided are related to noise associated with activities and processes on the plant site and are not related to vehicle traffic on nearby highways (or access roads) or rail traffic. Noises from traffic sources are not covered by any regulations or guidelines on the municipal, provincial, or federal levels. As such, an assessment of the noises related to vehicle and rail traffic was not conducted. Recommendations for mitigation of vehicle traffic noise are, however, provided in Section 3.6.2.3

In addition, the Trapper’s Cabins listed in Table 3.4-1 are not considered to be fully occupied dwellings (in accordance with Directive 038). As such, the normal PSLs do not strictly apply, and higher sound levels are generally allowed. North American, however, considers these cabins as occupied dwellings for the purposes of this assessment, thus providing a level of noise assessment more stringent than required by Directive 038.

3.5 Methods

3.5.1 Modelling Methods

The computer noise modelling was conducted using the CADNA/A (version 3.5.119) software package. CADNA/A allows for the modelling of various noise sources such as road, rail, and various stationary sources. In addition, topographical features such as land contours, vegetation, and bodies of water were included. Finally, meteorological conditions such as temperature, relative humidity, wind speed and wind direction were included in the calculations.

Under EUB requirements, noise modelling is not conducted using worst case scenarios, rather the modelling is conducted using representative conditions. As such, the calculation method used for noise propagation follows ISO Standard 9613, *Attenuation of Sound During Propagation Outdoors* (ISO, 1993 and 1996). All receiver locations were assumed to be downwind from the source(s). In particular, as stated in section 5 of the ISO 9613-2:

> “Downwind propagation conditions for the method specified in this part of IS0 9613 are as specified in 5.4.3.3 of IS0 1996-2:1987, namely

> - wind direction within an angle of ± 45° of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region, with the wind blowing from source to receiver, and
> - wind speed between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground.
>
> The equations for calculating the average downwind sound pressure level LAT(DW) in this part of IS0 9613, including the equations for attenuation given in clause 7, are the average for meteorological conditions within these limits. The term average here means the average over a short time interval, as defined in 3.1.
>
> These equations also hold, equivalently, for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights."

A temperature of 10°C and relative humidity of 70 percent were used as model inputs. The ground absorption was assumed to be 0.6 (i.e., typical of summer vegetation conditions). All sound level propagation calculations are considered conservative for all surrounding receptors.

As stated earlier, each of the CPFs is sufficiently far from the others that each one can be considered independent (i.e., the noise from one does not affect the others). Thus, each one was modelled as a separate case with noise sources from all others turned off. In addition, as will be detailed below, the noise levels generated from the well pads is insufficient to affect the noise climate beyond a few hundred metres from each pad. Since the pads are typically several hundred metres from their respective CPF, well pad noise sources were not included in the modelling scenarios.

The computer noise modelling results were calculated in two ways. First, sound levels were calculated at specific receptor locations. These included 1.5 km from the CPF boundary in each of the four main directions (i.e., north, east, south and west). In addition, Trapper's Cabins within 10 km of the specific CPF were included. Secondly, the sound levels were calculated using a 10 m x 10 m grid over the specific CPF study area. This provided colour noise contours for easier visualization of the results.

As part of the study, the following cases were reviewed and modelled where appropriate. These include:

Baseline Case. There are no facilities close enough to any of the CPFs to result in an impact on the noise climate. As such, no baseline case assessment was conducted for noise.

Application Case. This case includes the noise sources associated with each CPF for the Project.

Cumulative Case. There are no other facilities proposed near the Project that would have any noise effect in the study area. As such, no cumulative effects assessment was conducted for noise.

3.5.2 Noise Sources

The noise sources for the equipment associated with the Project (application case) are provided in Appendix 3C. The data were obtained from the sound levels of similar equipment associated with various other noise assessments conducted nearby, as well as by using the noise consultant's in-house information and calculations methods presented in various texts. All sound power levels (SWLs) used in the modelling are considered conservative, particularly the SWLs associated with the once through steam generator (OTSG) stack exhaust and combustion air fans (the two loudest noise sources).

All noise sources have been modelled as point sources at the various heights provided by North American. Large buildings and storage tanks were included because of their ability to provide shielding as well as reflection for noise. Equipment located within buildings was modelled using the determined sound power levels and a 30 dBA reduction to account for noise reduction through the building envelope. Noise from stacks and vent fans were modelled at their appropriate heights. Noise from rooftop air handling units (AHUs) was modelled at 1 m above their respective building height.

Types and sizes of equipment at each CPF are identical; however, numbers of individual pieces of equipment (OTSGs, heaters, treaters, etc.) were adjusted depending on the capacity of the CPF. The most important factor was the number of OTSGs (and associated equipment) at each CPF, due to their size. Table 3.5-1 lists the number of OTSGs modelled at each CPF.

No noise source associated with the individual SAGD well pads was included in the model. The design calls for electric downhole pumps and/or surface mounted pump-jacks for each of the well pairs. The electric downhole pumps emit no noise at the surface and if maintained properly (i.e., properly lubed to minimize squeaking), the surface mounted pump-jacks typically emit minimal noise. There is some noise producing equipment at the surface (small pumps and air compressors); however, all of the equipment is located within buildings. Given the typical noise levels associated with the equipment and the reduction from the building, the noise levels would be essentially inaudible only a few hundred metres away. This is insufficient to impact the noise levels near the CPFs.

A requirement of Directive 038 is to include typical ambient noise levels in the model along with the specific equipment noise levels. In most rural areas of Alberta, where there is a typical structure of Township and Range roads and there are residents (scattered on the various nearby sections of land), the typical nighttime ambient noise level is 35 dBA. At the study area, however, there are limited local roads and no permanent dwellings. There is also a limited industrial presence. As such, the ambient noise levels were assumed to be 20 dBA during the nighttime, based on historical noise measurement data from studies conducted in similar areas.

Table 3.5-1 Central Processing Facility OTSG Units

Central Processing Facility	OTSG Quantity
Hangingstone	4
Corner Expansion	4
Corner	12
Northwest Leismer	4
Northeast Leismer	4
Leismer Demonstration, Commercial/Expansion	8
South Leismer	4
Thornbury Expansion	4
Thornbury	8

3.5.3 Modelling Confidence

As mentioned previously, the algorithms used for the noise modelling follow the ISO 9613 standard. The published accuracy for this standard is ±3 dBA between 100 m and 1,000 m. Accuracy levels beyond 1,000 m are not published. Experience on similar noise models over large distances shows that, as expected, accuracy in prediction decreases as distance increases. Environmental factors such as wind, temperature inversions, topography and ground cover all have increasing effects over distances larger than approximately 1,500 m. As such, the prediction confidence for all receptors within approximately 1,500 m of the various noise sources is considered high, while it is considered moderate for all receptors beyond 1,500 m. The noise levels calculated in the model must meet the PSLs at 1,500 m. Thus, the noise levels will be even lower for receptors further away. Therefore, the decreasing accuracy associated with the model will not be as significant.

3.6 Impact Assessment and Mitigative Measures

3.6.1 Application Case Results

The application case noise modelling results for each of the nine CPF areas are presented in Table 3.6-1. Shown in the table are the resultant noise levels at 1.5 km in each of the four main directions as well as at any Trapper's Cabins within 10 km. The results provided are for daytime and nighttime since the operations will be continuous and, therefore, the noise level will remain steady. In addition to the tabulated results, the noise modelling colour contours for each station are presented in Figures 3.6-1 to 3.6-9 (1.5 km receptors are denoted by the black/white circles). The results indicate that, at all locations, the projected noise levels are well below the PSLs. In all but one location, the noise levels are more than 5 dBA below the PSL. The only location that yielded a number less than 5 dBA below the PSL was 1.5 km west of the Thornbury CPF. Even still, the resultant sound level of 35.6 dBA provides enough of a safety factor. As a result, the noise impact at all locations within the study area is considered minimal.

As determined by the modelling, the dominant noise sources on the CPF sites were associated with the OTSG combustion air fans. These were followed closely by noise emanating from the OTSG boiler stacks and then the fans associated with the glycol heater aerial cooler. The next loudest noise sources were the roof top AHUs, which were well below the three items mentioned.

Table 3.6-1 Application Case Noise Modelling Results

Hangingstone	L_{eq} Day/Night (dBA)
North (1.5km)	32.4
East (1.5km)	28.4
South (1.5km)	28.1
West (1.5km)	30.6
Trapper 2097	21.8
Trapper 2820	21.9
Trapper 69	20.0
Trapper 2277	20.0

Northwest Leismer	L_{eq} Day/Night (dBA)
North (1.5km)	30.1
East (1.5km)	27.4
South (1.5km)	28.3
West (1.5km)	30.2
Trapper 1474	21.3

South Leismer	L_{eq} Day/Night (dBA)
North (1.5km)	30.4
East (1.5km)	27.7
South (1.5km)	29.4
West (1.5km)	30.4
Trapper 1659	20.7
Trapper 1569	20.7

Southeast Corner	**L_{eq} Day/Night (dBA)**
North (1.5km)	32.3
East (1.5km)	29.9
South (1.5km)	33.5
West (1.5km)	33.3
Trapper 2751	26.9

Northeast Leismer	**L_{eq} Day/Night (dBA)**
North (1.5km)	28.8
East (1.5km)	29.2
South (1.5km)	30.9
West (1.5km)	29.1
Trapper 1474	20.7

Thornbury Expansion	**L_{eq} Day/Night (dBA)**
North (1.5km)	30.8
East (1.5km)	29.5
South (1.5km)	30.8
West (1.5km)	30.4
Trapper 2318	21.2
Trapper 1303	20.8

Northwest Corner	**L_{eq} Day/Night (dBA)**
North (1.5km)	32.3
East (1.5km)	28.2
South (1.5km)	29.3
West (1.5km)	30.4
Trapper 2751	20.9

Leismer Demonstration, Commercial and Expansion	**L_{eq} Day/Night (dBA)**
North (1.5km)	31.5
East (1.5km)	25.1
South (1.5km)	30.0
West (1.5km)	32.6
Trapper 1474	20.7
Trapper 1523	20.8

Thornbury	**L_{eq} Day/Night (dBA)**
North (1.5km)	28.0
East (1.5km)	33.2
South (1.5km)	32.7
West (1.5km)	35.6
Trapper 2318	26.5
Trapper 1303	22.5

3.6.2 Noise Mitigation Measures

3.6.2.1 Operational Equipment Mitigation

The results of the computer modelling indicated that operational noise levels were well below the PSLs at all locations. In addition, the noise levels were either at or greater than 5 dBA below the PSLs as recommended in Directive 038 to add a factor of safety to the equipment noise sources and sound propagation calculations. This also provides a safety factor for the low frequency noise likely to result from the OTSGs. Given the calculated noise levels, no noise mitigation is required.

The modelling was conducted assuming approximately 30 dBA of attenuation from the various buildings housing noise producing equipment. This is based on a typical construction of a metal clad, insulated building with minimal windows and some man-doors and overhead doors. It was also assumed that the doors and windows would remain closed at most times. Louvers or doors on steam generation buildings may be left open during peak temperature events during the summer months. The building ventilation systems will be adequate, enabling the doors and windows to remain closed. All doors will be metal, insulated type doors, and all windows will be non-operating, fixed type windows.

3.6.2.2 Construction Noise

Although there are no specific construction noise level limits detailed by Directive 038, there are general recommendations for construction noise mitigation. The document states:

> “While Directive 038 is not applicable to construction noise, licensees should attempt to take the following reasonable mitigating measures to reduce the impact on nearby dwellings of construction noise from new facilities or modifications to existing facilities. Licensees should:
>
> - Limit construction activity to the hours of between 07:00 and 22:00 to reduce the potential impact of construction noise.

> - Advise nearby residents of significant noise-causing activities and schedule these to create the least disruption to neighbours.
>
> - Ensure all internal combustion engines are fitted with appropriate muffler systems.
>
> - Take advantage of acoustical screening from existing on-site buildings to shield residential locations from construction equipment noise.
>
> - Where possible, schedule steam blow downs and venting to the daytime period of between 07:00 and 22:00 hours
>
> Should a complaint be made during construction, the licensee will be expected to respond expeditiously and take appropriate action to ensure that the issue has been managed responsibly."

Further to the information listed above, if construction activities are scheduled between the hours of 22:00 – 07:00, they should be limited as much as possible to "quiet" operations.

3.6.2.3 Transportation Noise

During construction and regular operation activities at the Project, most material deliveries will be made during the hours of 07:00 – 22:00. While the movement of heavy loads during nighttime will increase the nighttime sound levels, the duration will be short and frequency relatively low. Large dimensional heavy loads requiring specific traffic control measures will be limited to nighttime (01:00 – 5:00) and will be announced to the community. As such, the noise associated with them is not typically the source of noise complaints.

3.6.2.4 Drilling Noise

Drilling activities will be conducted at all hours of the day. Noise during drilling has the potential to affect Trapper's Cabins in close proximity to well pads. North American will work with stakeholders on an individual basis to address any identified issues with drilling-related noise.

3.6.2.5 Upset Operations Potential Noise Sources

Upset operational noise could occur during operational upset/emergency conditions. The following upset conditions with the potential to create noise have been identified:

- Conditions that require steam blowdowns;
- Conditions that require flaring at the CPF; and
- During an emergency situation, the first priorities will always be to safeguard life and property. In the event that an emergency situation also results in excessive short term noise levels, North American will consult with any affected parties, on a case by case basis.

Figure 3.6-1 Hangingstone Hub Modelled Noise Climate

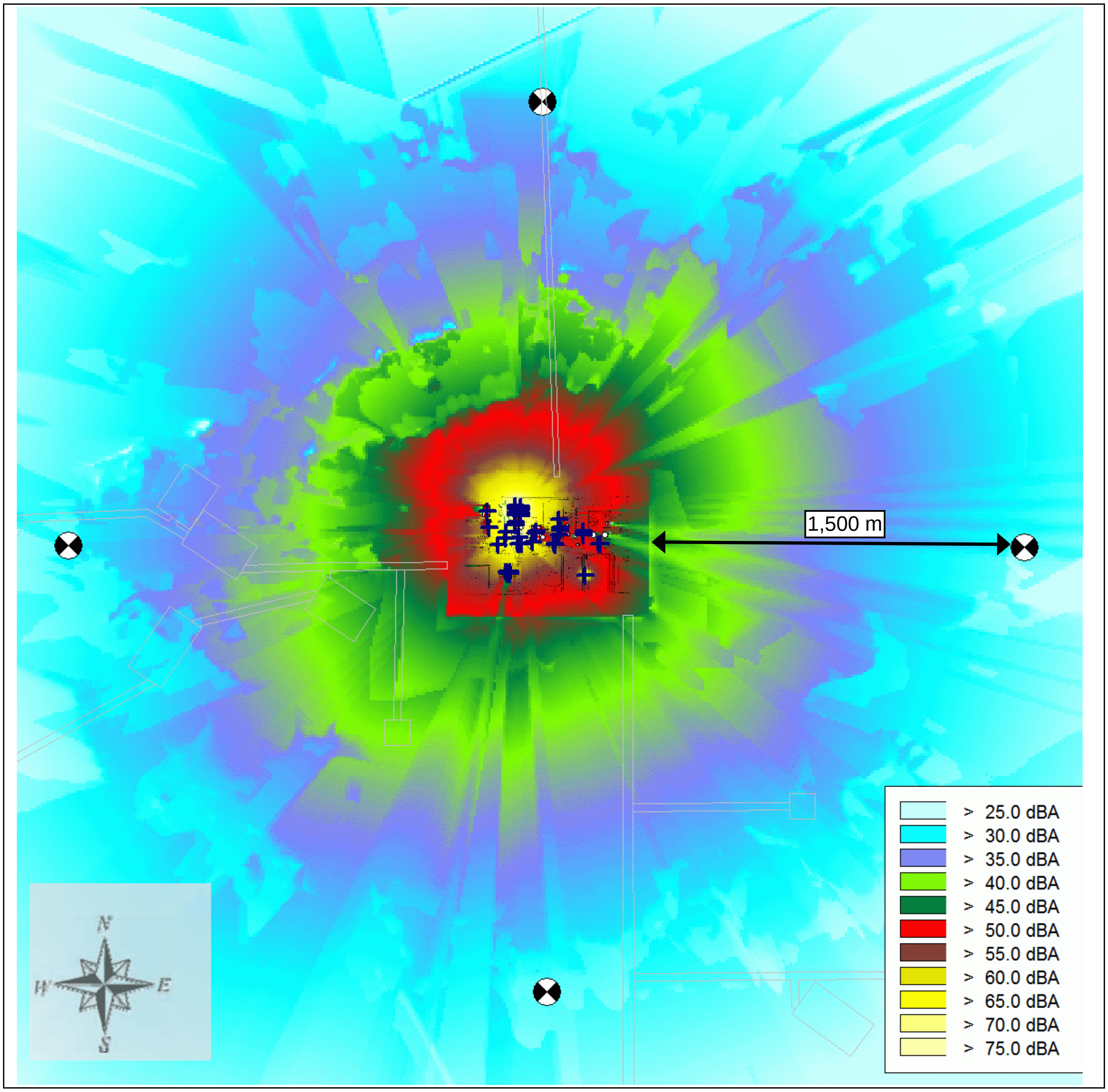


Figure 3.6-2 Corner Expansion Hub Modelled Noise Climate

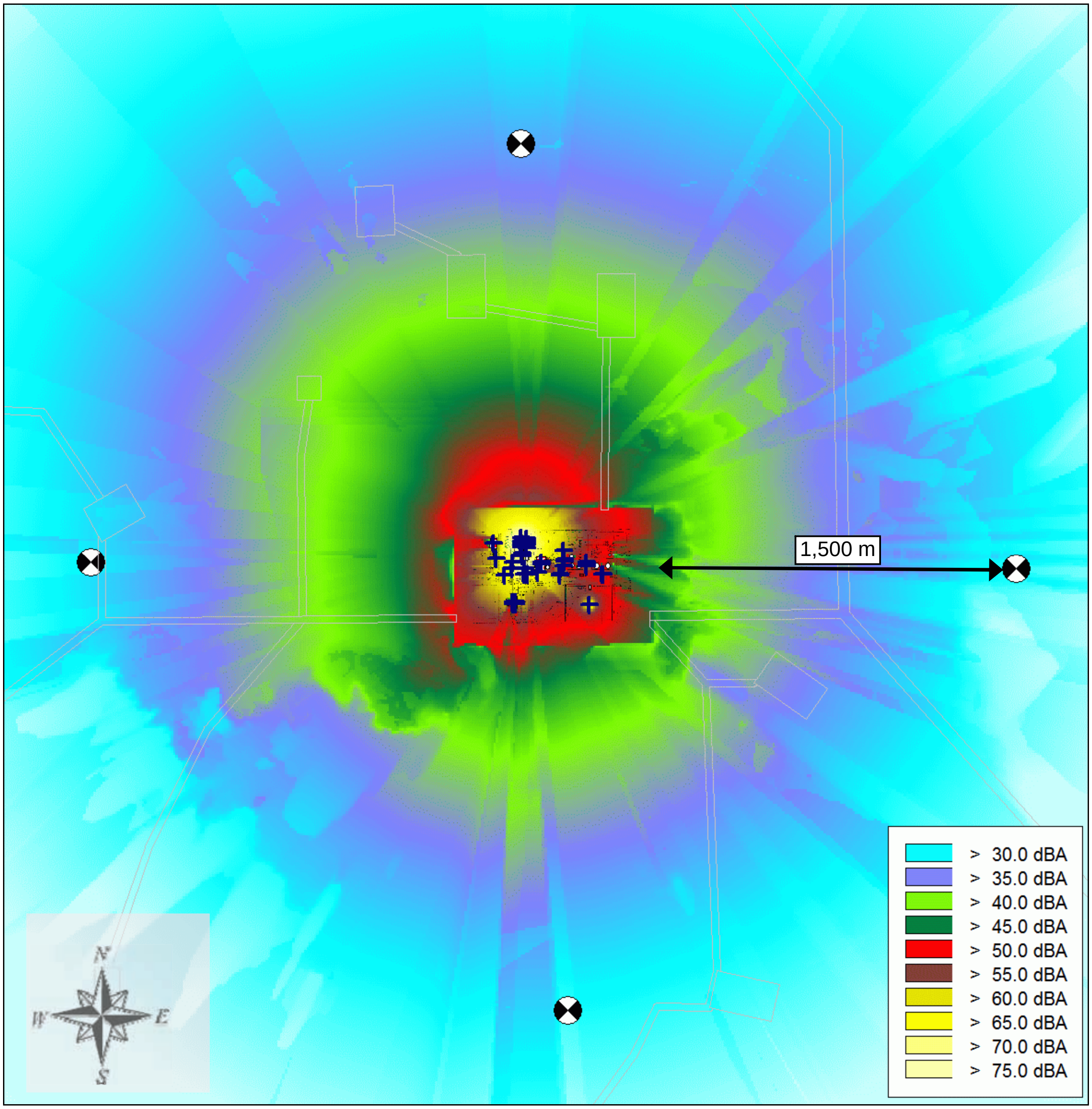


Figure 3.6-3 Corner Hub Modelled Noise Climate

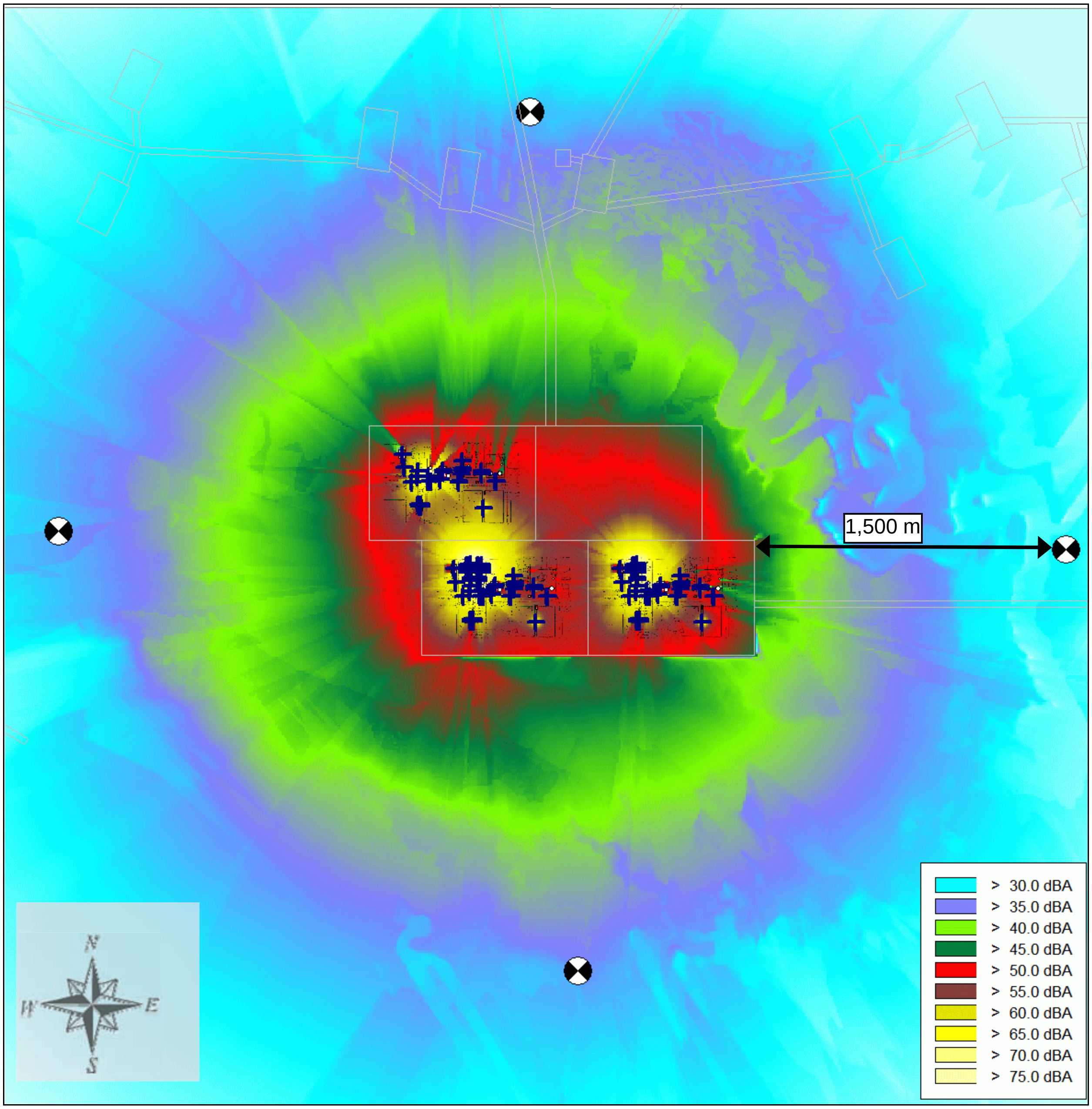


Figure 3.6-4 Northwest Leismer Hub Modelled Noise Climate

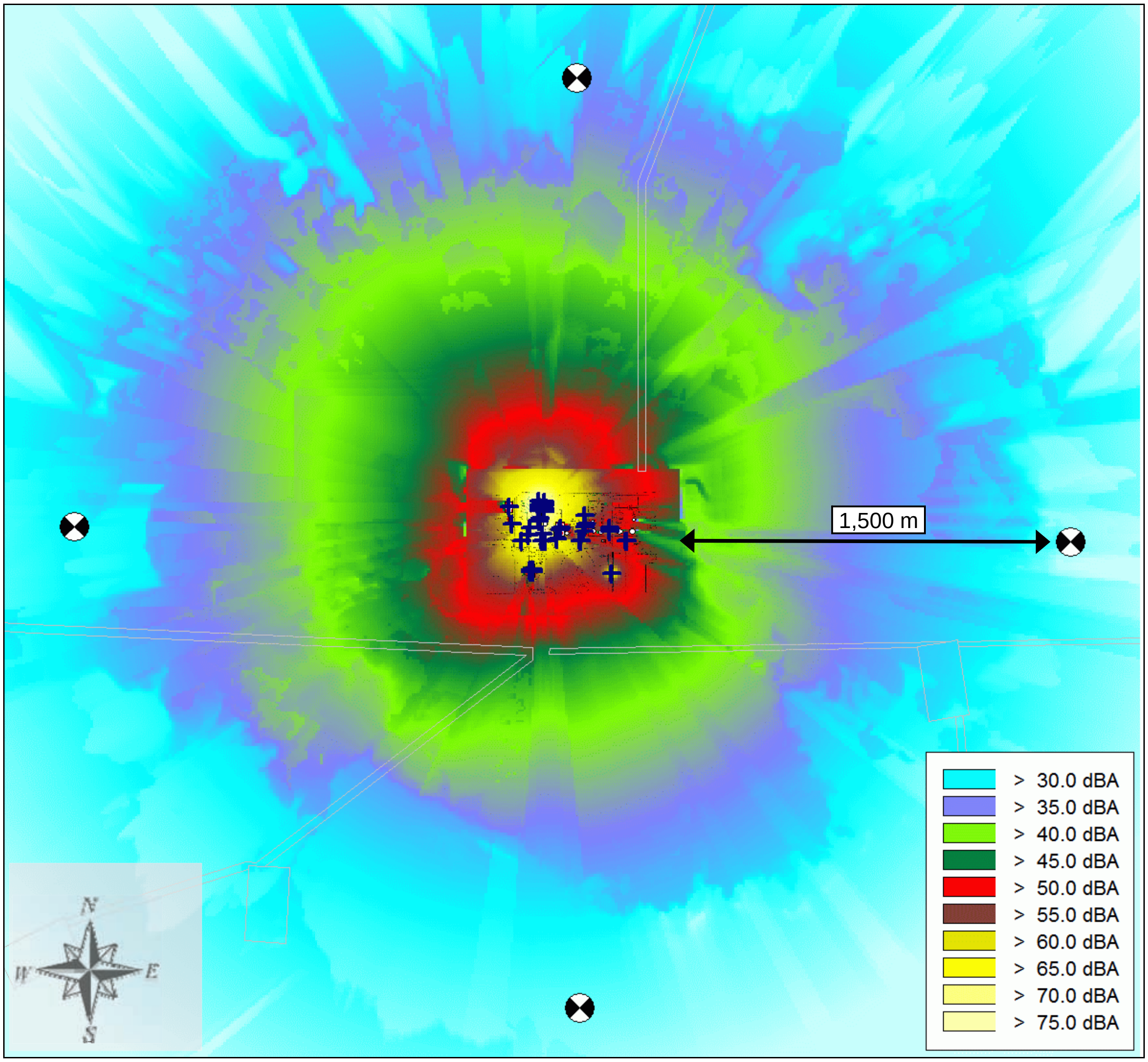


Figure 3.6-5 Northeast Leismer CPF Modelled Noise Climate

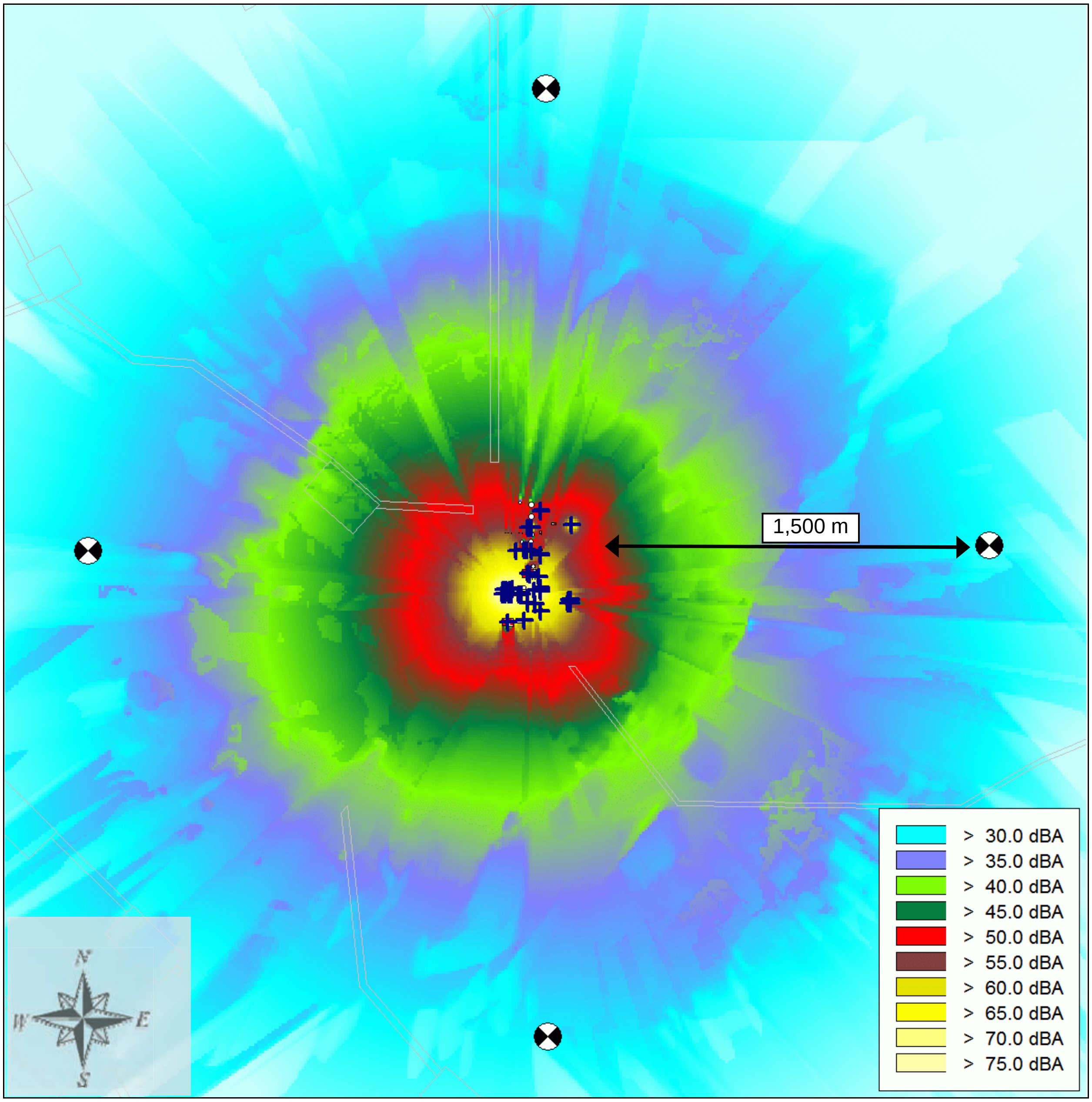


Figure 3.6-6 Leismer Demonstration, Commercial and Expansion Hub Modelled Noise Climate

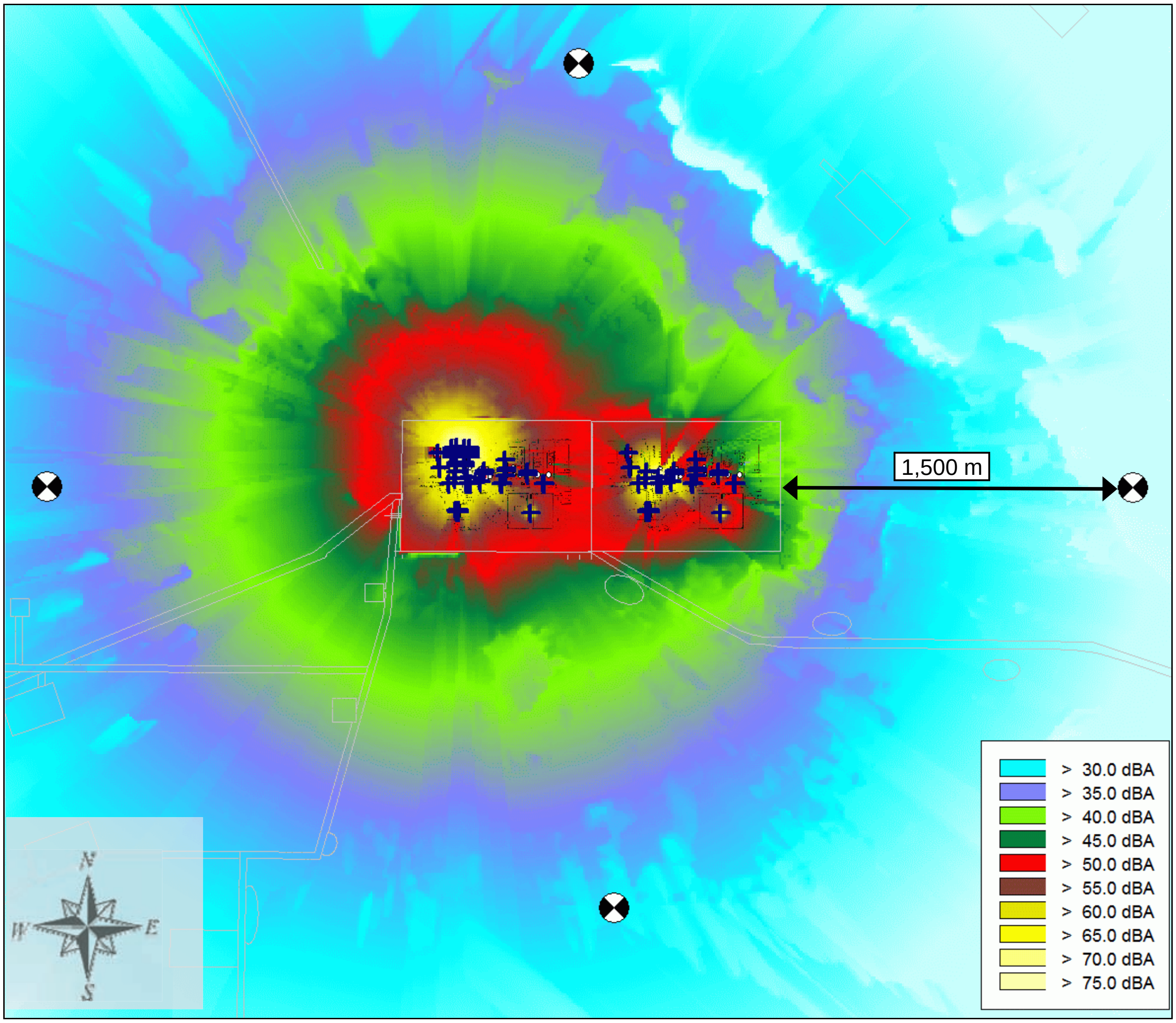


Figure 3.6-7 South Leismer Hub Modelled Noise Climate

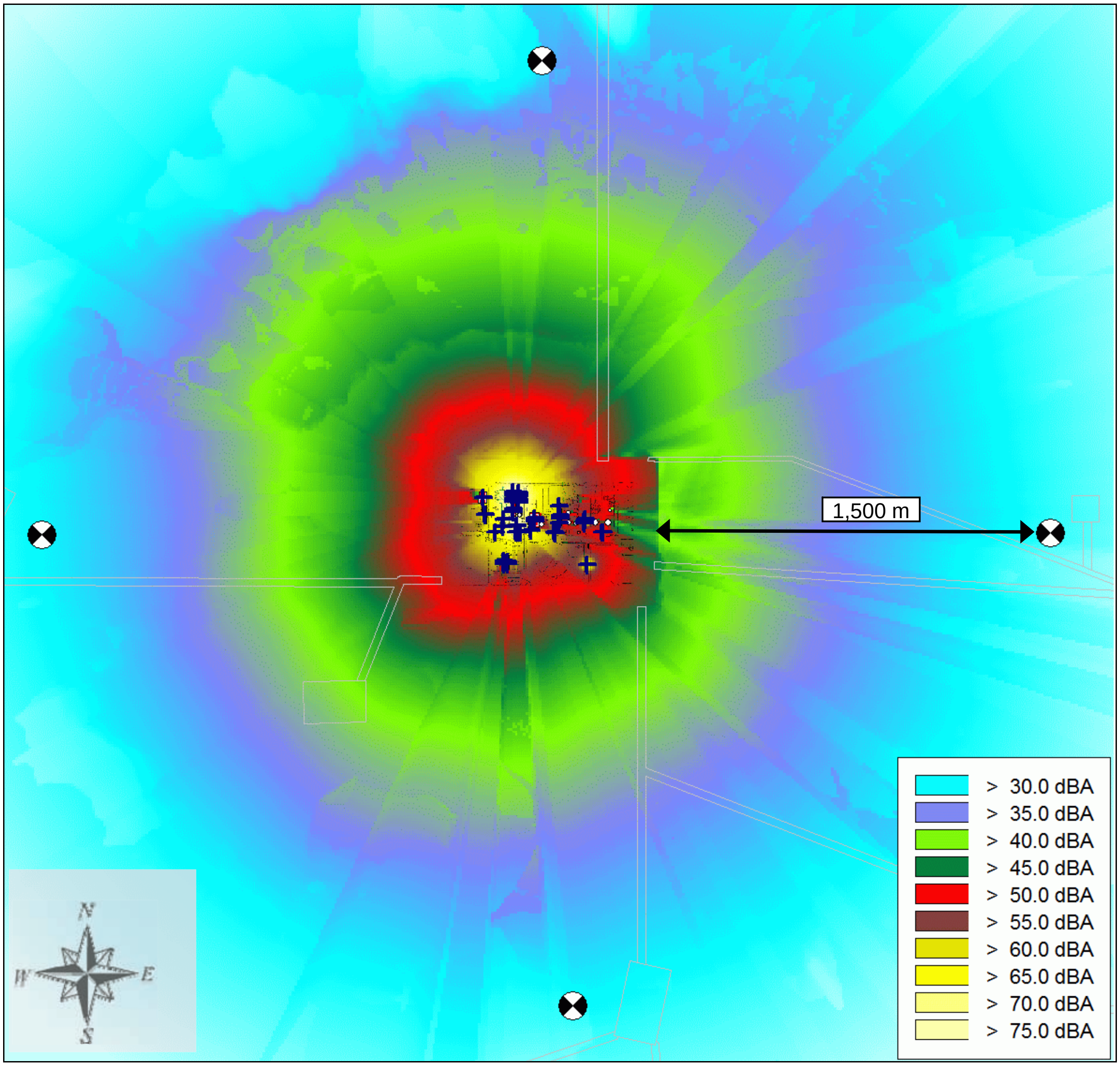


Figure 3.6-8 Thornbury Expansion Hub Modelled Noise Climate

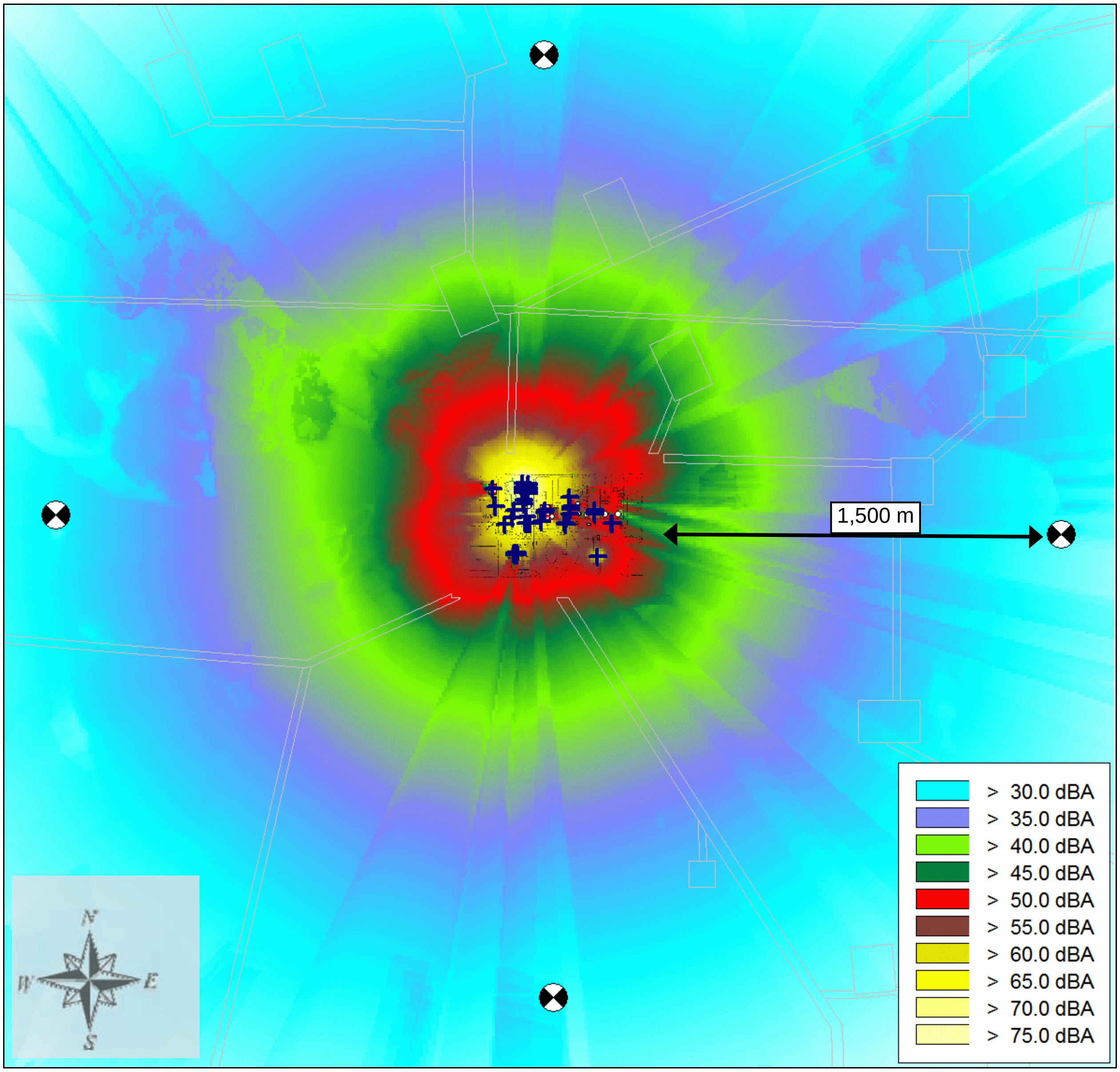
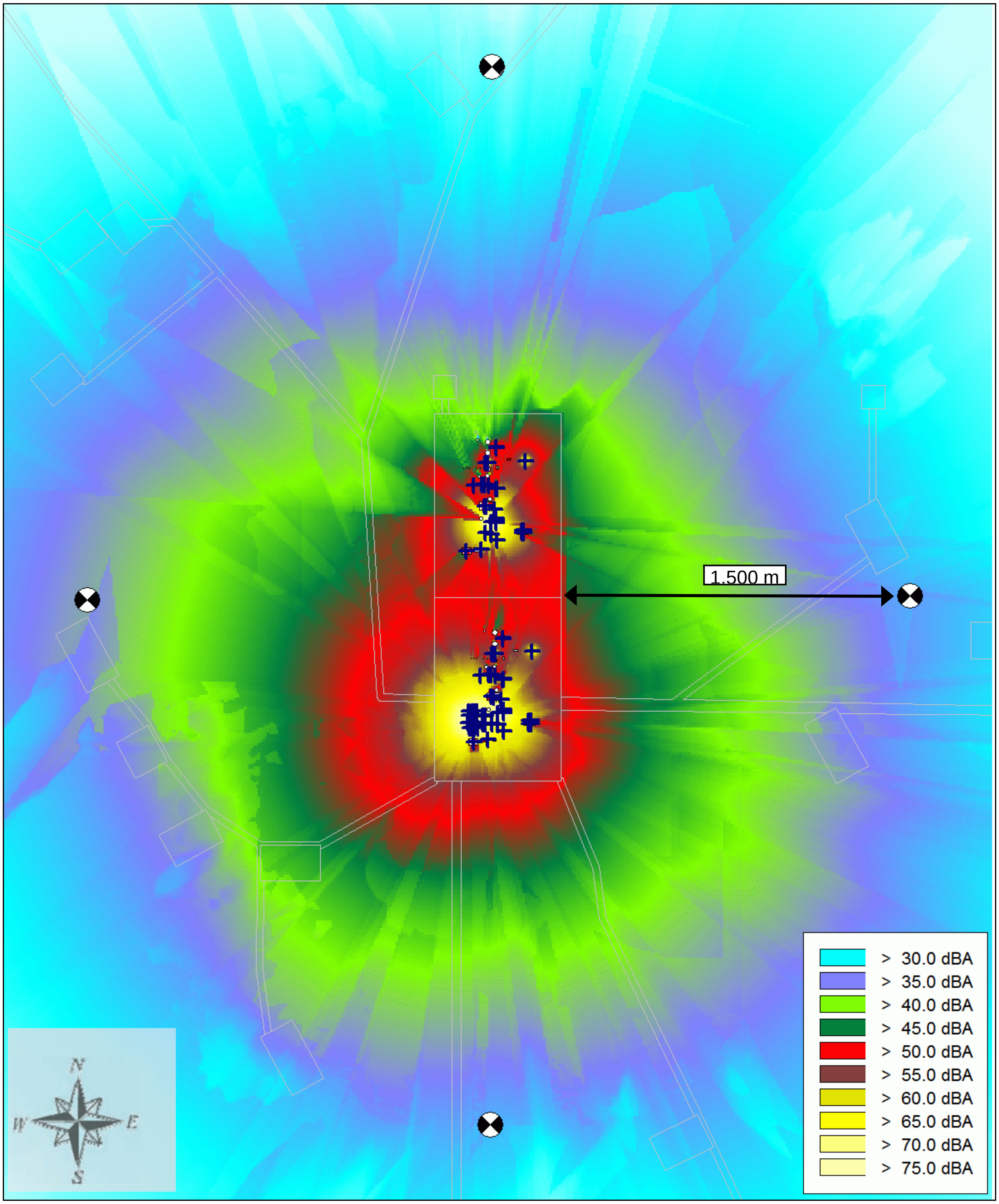


Figure 3.6-9 Thornbury Hub Modelled Noise Climate



3.7 Follow-up and Monitoring

EUB Directive 038 states that follow-up noise monitoring is not required for new facility construction to ensure compliance with the PSLs. Noise monitoring is only required in response to a noise complaint. Given that there are no permanent residents in the area, a complaint is unlikely. In addition, the noise modelling indicated noise levels well below the PSLs at all locations. Given the above, no monitoring is planned.

3.8 Summary

The results of the noise modelling for each of the nine separate CPFs indicate noise levels at 1.5 km from the fence-line are well below the EUB Directive 038 PSL of 40 dBA L_{eq}Night. In all but one case, the noise levels were less than 35 dBA, allowing for an acceptable factor of safety for modelling error and potential low frequency tonal components typically associated with large boiler and heater exhaust units. Further, the noise levels at the nearby Trapper's Cabins are even lower than at the 1.5 km perimeter, with most at the typical ambient noise levels for the area. As such, the overall impact on the surrounding area will be minimal. Table 3.8-1 presents a summary of effects for both construction and operation of the various CPFs.

Table 3.8-1 Summary of Project Effects

Nature of Disturbance	Direction[1]	Extent[2]	Magnitude[3]	Duration[4]	Frequency of Occurrence[5]	Permanence[6]	Prediction Confidence[7]	Final Impact Rating[8]
Construction Noise Disturbance	Negative	Subregional	Low	Short-term	Occasional	Reversible in Short-Term	High	Low
Operational Noise Disturbance	Negative	Subregional	Low	Long-term	Continuous	Reversible in Long-Term	High	Low

1. Positive, Neutral, Negative
2. Subregional, Regional, Extra-Regional
3. Negligible, Low, Medium, High
4. Short-term, Medium-term, Long-term
5. Isolated, Occasional, Regular, Continuous
6. Reversible in Short Term, Reversible in Long Term, Irreversible
7. Low, Medium, High
8. Low, Medium, High

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4 HEALTH

4.1 Introduction

The goal of North American Oil Sands Corporation (North American) is to develop the Kai Kos Dehseh project (the Project) near Conklin, Alberta, ultimately producing 220,000 barrels of bitumen per day through SAGD technology. A human health risk assessment (HHRA) is required by the terms of reference for the EIA as outlined in Section 3.1 (AENV, 2007).

4.2 Study Area

The Project study area spans a large area that includes several communities, residences/cabins, traplines, commercial and recreational sites. Ten communities were included as receptor locations: Anzac, Behan, Cheecham, Conklin, Fort McMurray, Gregoire Lake Townsite, Janvier/Chard, Kinosis, Pingle and Quigley. Several recreational areas were also evaluated in the assessment, including Washahigan Provincial Forest Recreational Area, House River Provincial Forest Recreational Area, Caribou Creek Remote Provincial Forest Recreational Area, and Gregoire Lake Provincial Park. The remaining locations were classified as residential or commercial sites for the HHRA.

A total of 79 discrete receptor locations were identified where people may reside, work or spend time in. A list of these locations is provided in Table 4.2-1, with corresponding coordinates and description (where available).

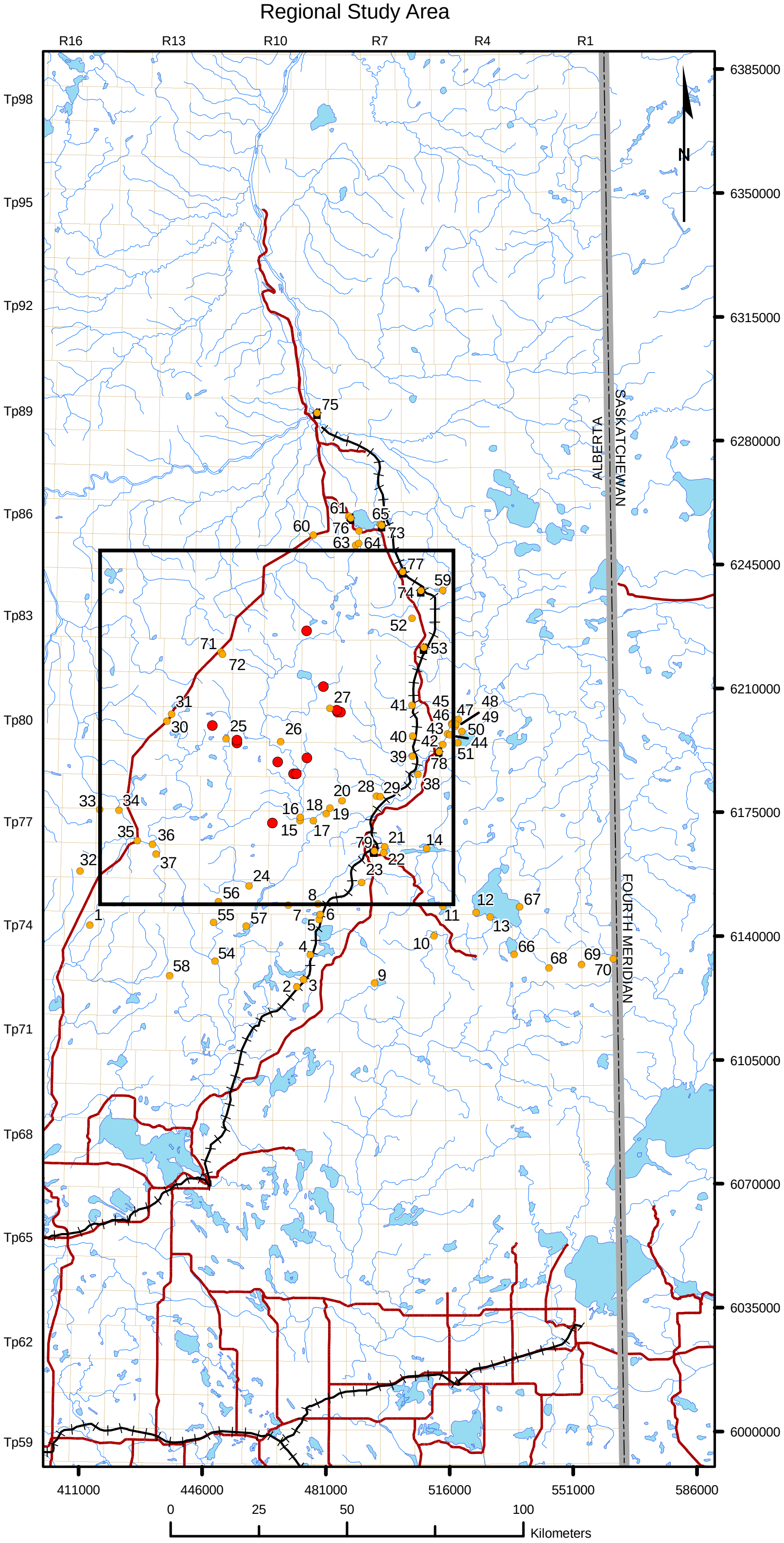
Table 4.2-1 Summary of Receptor Locations

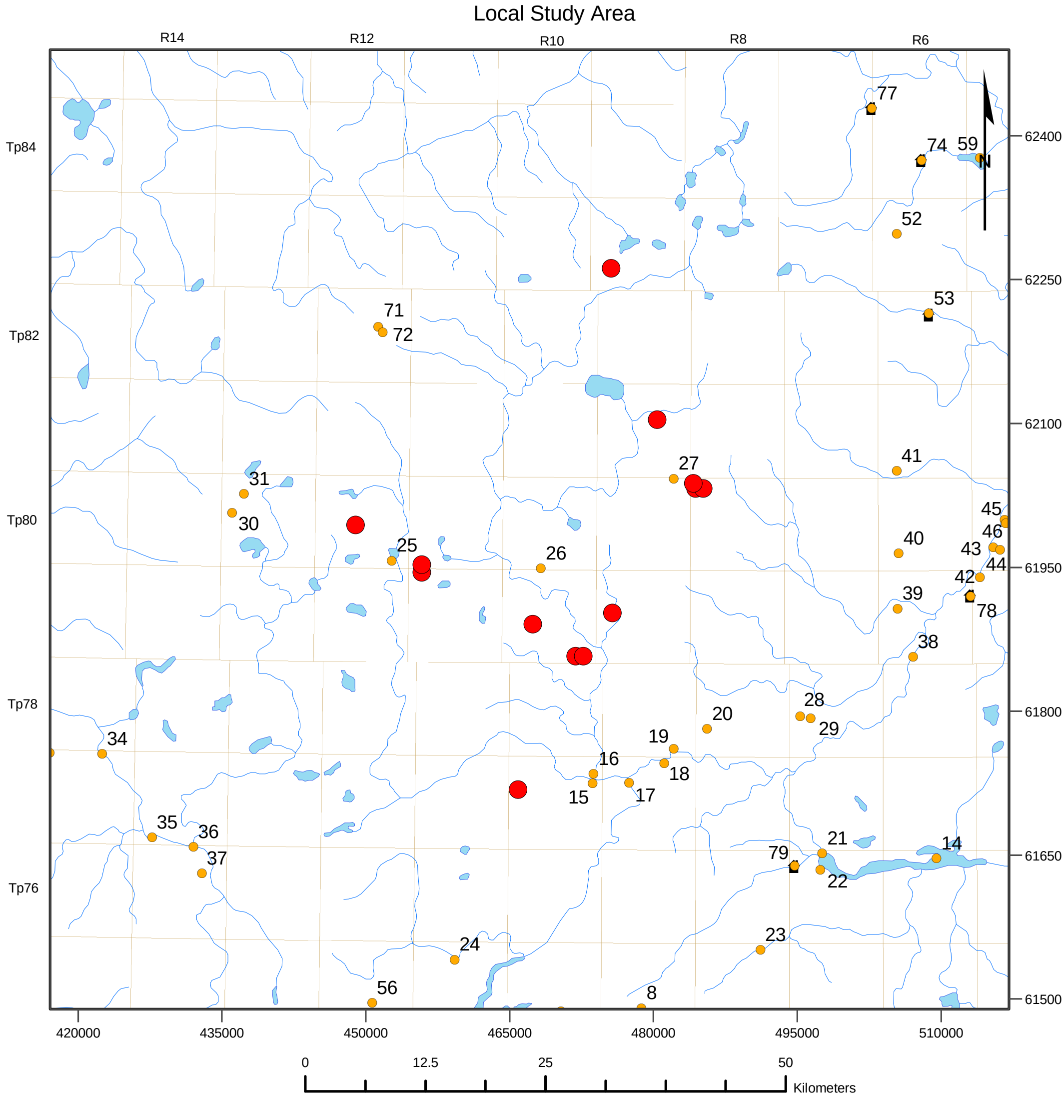
Number	Easting	Northing	Description
R01	414085	6143072	
R02	472735	6125622	Behan
R03	474635	6127672	
R04	476565	6134672	
R05	479035	6144622	
R06	479335	6146122	
R07	470285	6148722	
R08	478685	6149072	
R09	494735	6126672	
R10	511586	6140072	
R11	513986	6148422	Cabin
R12	523436	6146622	Fish Plant
R13	527436	6145322	Cabin
R14	509435	6164672	
R15	473585	6172522	
R16	473685	6173472	
R17	477385	6172572	
R18	481035	6174572	
R19	482035	6176122	
R20	485535	6178172	Cabin
R21	497535	6165222	
R22	497335	6163472	
R23	491085	6155122	
R24	459185	6154122	

Number	Easting	Northing	Description
R25	452635	6195722	
R26	468185	6194922	
R27	482035	6204272	
R28	495235	6179522	
R29	496335	6179272	
R30	435985	6200722	Gravel Pit
R31	437235	6202672	
R32	411385	6158272	May Hill Fire Lookout
R33	416985	6175672	
R34	422435	6175572	Waskahigan Provincial Forest Recreational Area
R35	427635	6166872	House River Provincial Forest Recreational Area
R36	431935	6165872	Caribou Creek Remote Provincial Forest Recreational Area
R37	432835	6163122	
R38	506985	6185672	
R39	505385	6190722	
R40	505485	6196472	Pingle
R41	505285	6205072	
R42	513986	6193972	
R43	515386	6197122	
R44	516086	6196872	
R45	516536	6199972	
R46	516686	6199622	
R47	518436	6201172	
R48	517536	6199172	
R49	517736	6199722	
R50	519386	6197822	
R51	518286	6194572	
R52	505285	6229772	
R53	508635	6221472	Quigley
R54	449585	6132822	
R55	449135	6143772	
R56	450585	6149622	
R57	458385	6142672	
R58	436785	6128722	Round Hill Airfield Tower
R59	513986	6237672	
R60	477435	6253222	Provincial Campsite
R61	487485	6258572	Gregoire Lake Provincial Park
R62	490335	6254422	
R63	489335	6250322	Gregoire Lake Reserve 1
R64	490235	6250872	Gregoire Lake Reserve 2
R65	496335	6256222	Campsite
R66	534186	6134772	
R67	535736	6148122	
R68	544036	6130922	
R69	553236	6131872	
R70	562236	6133472	
R71	451235	6220122	Algar Tower Airfield 1
R72	451685	6219522	Algar Tower Airfield 2
R73	496800	6256009	Anzac
R74	507900	6237457	Cheecham
R75	478500	6287739	Fort McMurray

Number	Easting	Northing	Description
R76	487935	6258023	Gregoire Lake Townsite
R77	502700	6242857	Kinosis
R78	513001	6192009	Janvier/Chard
R79	494650	6163889	Conklin

A map of these receptor locations, including the boundaries of the local study area (LSA) and regional study area (RSA), which correspond to those adopted for the air quality assessment, is included as Figure 4.2-1.





Legend

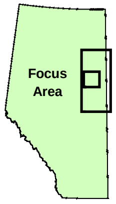
- ● Receptor
- ● Kai Kos Dehseh Project
- ⌂ Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
Location of the Recreational Area and Community Receptors

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 4.2-1



UTM Zone 12 NAD83

4.3 Issues and Assessment Criteria

The primary objective of the HHRA is to describe the nature and significance of any potential risks to humans from the release of chemicals of potential concern (COPCs) by the Project.

The HHRA examined both the potential short term (acute) and long term (chronic) effects associated with the Project's emissions. Future Project emissions were evaluated in combination with existing or approved developments in the region, as well as in combination with proposed or planned future developments. Predicted ground-level air concentrations were compared to reputable exposure limits protective of human health to quantify the potential risks. The primary objective of the HHRA is to describe the nature and significance of any potential risks to humans from the release of COPCs by the Project.

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The overall scope of the HHRA considered Provincial regulatory requirements provided by Alberta Environment (AENV). Specific health-related issues and concerns addressed in the HHRA are outlined in Section 5.0 (Public Health and Safety) of the TOR (AENV, 2007).

The scope of the HHRA incorporated the TOR within a framework that includes the Project air emissions, in combination with other existing and planned future emission sources in the region.

4.4 Methods

4.4.1 Assessment Cases

Consistent with the air quality assessment (Volume 2, Section 2), the potential health risks were assessed based on the following three assessment cases:

- **Baseline Case:** includes existing ambient air quality from community and traffic sources, as well as approved and existing commercial and industrial projects or activities in the air quality study area. The approved projects include facilities that have received regulatory approval, but are not yet operating.

- **Application Case:** includes existing ambient air quality, existing and approved regional sources, as well as the proposed Project (i.e., baseline case plus the Project).

- **Cumulative Effects Assessment (CEA) Case:** includes existing ambient air quality, existing and approved regional sources, the proposed Project (i.e., application case), as well as all other planned or proposed industrial activities or projects in the air quality study area.

Project-specific potential health risks were evaluated by comparing the application case to the baseline case. Cumulative potential health risks were assessed by comparing the CEA case to the baseline case.

In addition, the risks associated with existing background conditions (attributable to a combination of natural and anthropogenic sources) also were evaluated within the HHRA. Additional detail regarding the assessment of background conditions is provided in Section 4.5.

4.4.2 Assumptions and Guiding Principles

A number of guiding principles were applied in the HHRA that are common to the study of the potential health effects of all chemicals, regardless of source, that have been proven through years of scientific investigation and observation. These principles are as follows:

- All chemicals, regardless of type or source, possess some degree of intrinsic toxicity (i.e., all chemicals have the capacity to cause some level of harm or injury).
- The health effects produced by any chemical are equally dependent on the toxicological properties of the substance and the exposure, or dose, of that is received.
- In general, for non-carcinogenic substances (i.e., chemicals that do not cause cancer), the intrinsic toxicity of a chemical (i.e., the capacity to produce a harmful effect or physiological injury) is only expressed if the exposure exceeds a critical threshold level. Below this threshold dose, adverse health effects are unlikely to occur.
- If the threshold dose is exceeded, health effects may occur. The severity of these effects will depend on the level of exposure received, with more severe effects occurring with increasing dose, and the sensitivity of an individual to the particular substance.
- The toxicity of a chemical largely depends on its molecular structure. Within limits, chemicals having similar structures will produce similar toxicological effects. This principle allows the health effects of a chemical of unknown toxicity to be predicted by comparison to the known health effects produced by a second surrogate chemical with similar molecular structure.
- The health effects produced by a chemical depend on the nature, extent and duration of exposure. It is important to distinguish between the health effects that may result from acute exposures of short duration and effects that may occur following chronic or long term exposure. Also, health effects may differ according to the route of exposure (i.e., inhalation vs. oral ingestion exposure).

Uncertainty was addressed in the HHRA process through the use of conservative assumptions that were applied, to help ensure that potential human health risks were not underestimated. However, the use of such conservative assumptions may result in the results of the HHRA over-predicting risks.

4.4.3 Approach

Potential human health risks associated with Project emissions were examined using a conventional risk assessment paradigm along with conservative assumptions. The risk assessment paradigm is consistent with those developed by Health Canada (2004a), the Canadian Council of Ministers of the Environment (CCME, 1996), the U.S. National Research Council (U.S. NRC 1983, 1996) and the U.S. Environmental Protection Agency (U.S. EPA 1991, 2004). This methodology has also been endorsed by a number of provincial regulatory authorities, including AENV, Alberta Health and Wellness (AHW) and the Alberta Energy and Utilities Board (EUB). There are four steps or phases to the risk assessment paradigm (Figure 4.4-1), which include:

- **Problem Formulation:** Characterization of the Project and site, characterization of potential human receptors, determination of the relevant exposure pathways, and identification of the COPCs associated with Project emissions;

- **Toxicity Assessment:** Identification of potential adverse health effects associated with each of the COPCs, the conditions under which these effects are observed and determination of the maximum safe dose for the chemical for the most sensitive subjects following exposure for a prescribed time period (i.e., identification of acute and chronic exposure limits for COPCs);
- **Exposure Assessment:** Quantification of the amount or dose of each COPC received by human receptors via all relevant exposure pathways; and,
- **Risk Characterization:** Comparison of exposure limits (established in step 2) with estimated exposures (established in step 3) to identify potential health risks for the different assessment cases, as well as discussion of sources of uncertainty and how these were addressed in the risk assessment.

Figure 4.4-1 provides a visual diagram to further explain how these four steps relate to each other and the overall assessment. Additional detail regarding each step of the risk assessment is provided below.

4.4.3.1 Problem Formulation

The purpose of the problem formulation is to focus the HHRA on key areas of interest by further defining the following issues:

- Receptor characterization: human receptors potentially exposed to emissions from the Project are identified, with special consideration given to sensitive and more susceptible individuals (e.g., infants and young children, the elderly, individuals with compromised health).
- Identification of COPCs: identification of Project emission COPCs that may contribute to potential human health risks
- Identification of exposure pathways: all applicable exposure pathways are identified, with consideration given to the physico-chemical properties of the COPCs, their fate and transport and their persistence in the environment.

4.4.3.2 Receptor Characterization

In health risk assessments, potential receptors that have the greatest potential to be adversely affected by the release of chemicals are selected to represent a reasonable maximum exposure scenario. The rationale for this approach is that if unacceptable risks are not predicted for the most highly exposed and susceptible individuals, then unacceptable risks would be unlikely for those individuals that experience less of an exposure, or may be less susceptible to the effects of the chemicals.

This HHRA evaluated the potential for adverse health risks associated with the Project’s emissions that may occur in people residing in the area, 24 hours/day, 7 days/week, 52 weeks/year as well as those who may work at commercial locations (such as air towers, gravel pits, fish plant), or may visit the area for recreational purposes.

Four hypothetical receptor types were included in the risk assessment: First Nations Receptor (FNR), Residential Receptor (RESI), Commercial Receptor (COMM) and Recreational Receptor (RECR). The Gregoire Lake Reserves were both considered to represent First Nations communities, thus these receptor locations were categorized as FNR. When it was not possible to differentiate what receptor type may be residing at a location, it was conservatively assumed by default that the receptor location was an FNR.

The distinction between the receptor types is necessary, as food consumption patterns and behaviours (e.g., time spent at site) vary between the groups. The FNR and RESI receptors were both assumed to represent an individual who resides in the area over a lifetime, with the only differences between the groups being a higher proportion of locally obtained foods being consumed, with higher consumption rates for the FNR receptor. The communities of Anzac, Behan, Cheecham, Conklin, Fort McMurray, Gregoire Lake Townsite, Janvier, Kinosis, Pingle and Quigley. were assumed to be RESI receptors. Commercial locations included sites such as gravel pits, air towers, etc., while recreational sites were limited to parkland and public campsites.

Table 4.4-1 provides a brief description of the 79 receptor locations from the air quality assessment (Volume 2, Section 2) and the associated receptor type for each.

Table 4.4-1 Summary of Receptor Location Categories

Number	Description	Receptor Group
R01		FNR
R02	Behan	FNR
R03		FNR
R04		FNR
R05		FNR
R06		FNR
R07		FNR
R08		FNR
R09		FNR
R10		FNR
R11	Cabin	FNR
R12	Fish Plant	COMM
R13	Cabin	FNR
R14		FNR
R15		FNR
R16		FNR
R17		FNR
R18		FNR
R19		FNR
R20	Cabin	FNR
R21		FNR
R22		FNR
R23		FNR
R24		FNR
R25		FNR
R26		FNR
R27		FNR
R28		FNR
R29		FNR
R30	Gravel Pit	COMM
R31		FNR
R32	May Hill Fire Lookout	RESI
R33		FNR
R34	Waskahigan Provincial Forest Recreational Area	RECR
R35	House River Provincial Forest Recreational Area	RECR

Number	Description	Receptor Group
R36	Caribou Creek Remote Provincial Forest Recreational Area	RECR
R37		FNR
R38		FNR
R39		FNR
R40	Pingle	RESI
R41		FNR
R42		FNR
R43		FNR
R44		FNR
R45		FNR
R46		FNR
R47		FNR
R48		FNR
R49		FNR
R50		FNR
R51		FNR
R52		FNR
R53	Quigley	RESI
R54		FNR
R55		FNR
R56		FNR
R57		FNR
R58	Round Hill Airfield Tower	COMM
R59		FNR
R60	Provincial Campsite	RECR
R61	Gregoire Lake Provincial Park	RECR
R62		RESI
R63	Gregoire Lake Reserve 1	FNR
R64	Gregoire Lake Reserve 2	FNR
R65	Campsite	RECR
R66		FNR
R67		FNR
R68		FNR
R69		FNR
R70		FNR
R71	Algar Tower Airfield 1	COMM
R72	Algar Tower Airfield 2	COMM
R73	Anzac	RESI
R74	Cheecham	RESI
R75	Fort McMurray	RESI
R76	Gregoire Lake Townsite	RESI
R77	Kinosis	RESI
R78	Janvier/Chard	RESI
R79	Conklin	RESI

Within the multi-pathway model, it was conservatively assumed that FNR individuals obtained 100% of their game, fish, fruit and vegetables from local traditional country food sources. In contrast, individuals within the RESI group were assumed to obtain only 10% of their fruits and vegetables from local country food sources (in accordance with guidance from CCME, 1996). Food consumption was not evaluated for either the COMM or RECR receptor, as it was assumed that these individuals are also residents (and thus are considered within the FNR or RESI assessments) or are only visiting the area on a short term basis. Additional information regarding specific environmental media intake rates (including food consumption) is provided within Appendix 4B.

When characterizing the potentially exposed individuals for the multiple exposure pathway assessment, it is also important to consider age and gender classes. For the current assessment, receptors of all life stages were assessed and highest risk estimates were reported for the receptor group. The five human receptor life stages that were assessed include (Health Canada, 2004a):

- Infant (0 to 6 months)
- Toddler (7 months to 4 years)
- Child (5 years to 11 years)
- Adolescent (12 to 19 years)
- Adult (20 years and over)

For the multimedia assessment of carcinogenic chemicals (e.g., benzo(a)pyrene and carcinogenic PAHs), a composite receptor (composed of all life stages from infant to adult) was used to represent cumulative exposure over a lifetime of 75 years.

4.4.3.3 Identification of Chemicals of Potential Concern (COPCs)

The identification of COPCs began with the development of an inventory of chemicals that may be emitted to the atmosphere from the Project and to which nearby humans might be exposed. The air quality assessment (Volume 2, Section 2) predicted maximum COPC emission rates based upon the assumption that the various phases of the Project were in operation at the same time. This is conservative given that, as outlined in the introduction and other sections of the EIA, the various phases of the project will operate at different times with some overlap.

COPCs selected for the HHRA included sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and fine particulate matter 2.5 um in diameter and smaller ($PM_{2.5}$). These COPCs are typically referred to as criteria air contaminants (CACs) (Environment Canada, 2006). In general, particles resulting from combustion processes are less than 2.5 um, while particles greater than 2.5 um are mechanically generated from agriculture, mining, and road traffic (Schwartz et al. 1996). The only anticipated sources of particulate emissions from the Project are the direct emission of $PM_{2.5}$ and the formation of secondary particulates. Given that the emissions from the Project will be combustion-related and that the primary and secondary particulates fall within the $PM_{2.5}$ size fraction, it was determined that the assessment would focus on $PM_{2.5}$ only. In addition, recent evidence suggests that $PM_{2.5}$ is a better predictor of health effects than PM_{10} (WHO, 2000). The air quality assessment and HHRA conservatively assumed that all fine particulate matter (i.e., less than PM_{10}) was less than or equal to 2.5 microns in diameter (i.e., all fine PM = $PM_{2.5}$). Therefore, PM_{10} was not assessed in the HHRA.

The remaining COPCs, referred to as non-criteria air contaminants (or non-CACs), include individual volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). Individual COPCs with little or no toxicological information were grouped on the basis of molecular structure and were assigned a surrogate compound to represent the entire group. When possible, the COPC in the group with the highest known toxicity was selected as the surrogate. Using this principle, it was assumed that all COPCs in the group exhibit toxicity equivalent to that possessed by the surrogate. The final, complete list of COPCs evaluated within the HHRA is presented in Table 4.4-2.

Table 4.4-2 Summary of Chemicals of Potential Concern (COPCs)

COPC	Group	Surrogate
3-methylcholanthrene	Aromatic C_{17}-C_{34}	NA
7,12-dimethylbenzo(a)anthracene	Aromatic C_{17}-C_{34}	NA
Acenaphthene	Individual	NA
Acenaphthylene	Individual	Acenaphthene
Acetaldehyde	Individual	NA
Acrolein	Individual	NA
Anthracene	PAH Group[1]	Benzo(a)pyrene
Benzaldehyde	Individual	NA
Benzene	Individual	NA
Benz(a)anthracene	PAH Group[1]	Benzo(a)pyrene
Benzo(a)pyrene	PAH Group[1]	Benzo(a)pyrene
Benzo(b)fluoranthene	PAH Group[1]	Benzo(a)pyrene
Benzo(e)pyrene	PAH Group[1]	Benzo(a)pyrene
Benzo(g,h,i)perylene	PAH Group[1]	Benzo(a)pyrene
Benzo(k)fluoranthene	PAH Group[1]	Benzo(a)pyrene
Carbon monoxide	Individual	NA
Chrysene	PAH Group[1]	Benzo(a)pyrene
Dibenz(a,h)anthracene	PAH Group[1]	Benzo(a)pyrene
Dichlorobenzene	Individual	NA
Ethylbenzene	Individual	NA
Fluoranthene	PAH Group[1]	Benzo(a)pyrene
Fluorene	PAH Group[1]	Benzo(a)pyrene
Formaldehyde	Individual	NA
Indeno(1,2,3-cd)pyrene	PAH Group[1]	Benzo(a)pyrene
Naphthalene	Individual	NA
n-Hexane	Individual	NA
Nitrogen dioxide	Individual	NA
n-Pentane	Individual	Aliphatic C5-C8
Perylene	PAH Group[1] (chronic) Aromatic C_{17}-C_{34} (acute)	Benzo(a)pyrene (chronic)
Phenanthrene	PAH Group[1]	Benzo(a)pyrene
Particulate matter ($PM_{2.5}$)	Individual	NA
Pyrene	PAH Group[1]	Benzo(a)pyrene
Sulphur dioxide	Individual	NA
Toluene	Individual	NA
Xylene (Total)	Individual	NA

[1] The PAH group represents PAHs that exhibit the potential to cause cancer. These PAHs were assessed via the benzo(a)pyrene whole mixture model (WMM) and/or the individual PAH model (IPM).

[2] Includes both primary and secondary particulate matter.

All of the COPCs listed in Table 4.4-2 were included in the inhalation assessment.

A separate assessment was completed using a multi-media model for the COPCs that could enter the food chain via soil, plants and other organisms. To focus the multi-media assessment, environmental fate and persistence screening was conducted. Environment Canada (2007) has established criteria for evaluating the potential of a substance to persist or accumulate in the environment:

- Half-life in soil ≥ 182 days
- Octanol-water partition coefficient ($\log K_{ow}$) ≥ 5
- Bioconcentration Factor (BCF) ≥ 5000

The premise of this screening is that if a COPC does not meet these criteria, negligible uptake into environmental media (e.g., soil, vegetation, wildlife, etc.) is anticipated, and potential oral exposures are not estimated as a result. However, if a COPC meets one of these criteria, the compound is assessed via the multiple exposure pathways.

The results of the fate and persistence screening are presented in Table 4.4-3.

Table 4.4-3 Summary of Environmental Fate and Persistence Screening

	Half-Life Soil (d or y)	**BCF**	**$\log K_{ow}$**	**Included in Multi-pathway**
2-methylnaphthalene	ND	70 - 2800	2.3	N
3-methylcholanthrene	609-1400 d	ND	6.42 - 7.11	**Y**
7,12-dimethylbenz(a)anthracene	20 - 28 d	ND	5.8 - 6.95	**Y**
acenaphthene	12-102 d	282 - 1202	3.32 - 4.45	N
acenaphthylene	43-60 d	380 -1000	3.55 - 4.08	N
acetaldehyde	ND	ND	0.43	N
acrolein	ND	3 - 344	-0.01	N
anthracene	3.3 - 175 d	24 - 16600	3.45 - 4.67	**Y**
benzaldehyde	ND	ND	1.48	N
benzene	5 - 16 d	10 - 1698	1.5 - 2.27	N
benzo(a)anthracene	4 - 6250 d	347 - 100000	5.5 - 7.5	**Y**
benzo(a)pyrene	229 d - 8 y	0.7 - 8912510	5.81 - 8.5	**Y**
benzo(b)fluoranthene	211-294 d	1.7 - 141254	5.78 - 6.57	**Y**
benzo(e)pyrene	ND	ND	6.44 - 7.40	**Y**
benzo(ghi)perylene	590-650 d	28184-34673	6.5 - 7.6	**Y**
benzo(k)fluoranthene	2.5 - 8.7 y	1.8 - 141254	6.06 - 7.2	**Y**
chrysene	328 - 1000d	14.7 - 52480	5.01 - 7.1	**Y**
CO	ND	ND		N
dibenz(ah)anthracene	361-420 d	10 - 691830	6.5 - 7.19	**Y**
dichlorobenzene	28-180 d	0.5 - 4365	3.17 - 3.67	N
ethylbenzene	3 - 10 d	4.67 - 468	2.98 - 3.3	N
fluoranthene	34 d- 7.8 y	5.7 - 79433	4.78 - 6.5	**Y**
fluorene	32-60 d	415 - 4677	4.12 - 4.47	**Y**
formaldehyde	ND	ND	ND	N
hexane	ND	ND	2.98 - 3	N
indeno(1,2,3cd)pyrene	139 d	ND	6.7	**Y**

	Half-Life Soil (d or y)	**BCF**	**log K_{ow}**	**Included in Multi-pathway**
naphthalene	2.1d - > 80 d	30 - 17782	0.47 - 0.67	**Y**
NO_2	ND	ND	ND	N
pentane	ND	ND	2.5 - 3.39	N
perylene	ND	0.4 - 22910	4.8 - 6.5	**Y**
phenanthrene	2.5d - 5.7 y	5.7 - 37155	3.6- 5.92	**Y**
$PM_{2.5}$	ND	ND	ND	N
pyrene	0.1 d - 8.5 y	13 - 44670	4.45 - 6.7	**Y**
SO_2	ND	ND	ND	N
toluene	4 -22 d	1.65 - 1905	1.83 - 2.79	N
xylenes	7 - 28 d	6.16 - 219	2.1 - 3.14	N

Note: ND: No data/information available

4.4.3.4 Identification of Exposure Pathways

In order for exposure to take place (and potential health risks to be realized), exposure pathways for chemicals must exist to ‘connect’ the point of release into the environment (i.e., from the Project) to the point of contact with humans (Health Canada, 1995). The HHRA examines each of the environmental media that could serve as a conduit between the Project and humans in order to determine which exposure pathways are applicable to the Project. The environmental media considered in the HHRA include:

- Air
- Surface Water
- Ground Water
- Soil
- Food

Each of these media and related pathways are discussed individually in the following sections. Figure 4.4-2 presents a visual description of the relationship between the exposure pathways and human receptors.

Air

Potential impacts to air quality were predicted in the air quality assessment (Volume 2, Section 2) thus people may be exposed to emissions from the Project via inhalation of air. Both acute ($\leq$ 24 h) and chronic (long term) inhalation exposures were quantitatively evaluated for all COPCs.

Surface Water

Surface water is an important drinking water source in the region. No potential impacts to surface water were identified in association with the Project (Volume 3, Section 7) as produced water will be recycled or retained in holding ponds. However, due to the level of concern associated with this pathway expressed by AHW in recent EIAs, the surface water pathway has been included in the quantitative HHRA within the background assessment.

Groundwater

Groundwater quality within the oil sands region is generally poor and as such is not a primary source of drinking water, as communities in the area draw their water supply from surface water bodies. Negligible to low impacts to groundwater quality were predicted in association with the Project (Volume 3, Section 7). For these reasons, groundwater ingestion was considered to be a closed exposure pathway and was not evaluated within the quantitative HHRA.

Soil

Airborne deposition of COPCs emitted from the Project and other developments in the area may affect soil quality pathways of relevance to human health. However, only the COPCs that may exhibit a tendency to persist and/or accumulate in soils were quantitatively assessed. Soil may be inhaled as dust, ingested, or come into contact with the skin. Soil inhalation, ingestion and dermal contact pathways were included in the quantitative HHRA for the COPCs remaining after fate and persistence screening (Table 4.4-3).

Food

As some COPCs may enter the food chain via deposition onto soils from the air, there is some potential that COPCs emitted from the Project may ultimately transfer and accumulate in plant and animal tissue (Table 4.4-3). People within the study area may rely on local foods as food sources, such as small and large game animals and birds, and plant foods (e.g., berries, teas). Plants may take up substances present in soil via roots and from airborne deposition onto leaves and fruits. When available, measured data were used (e.g., water and fish), and the intake of COPCS via plant foods was predicted within the quantitative HHRA. Animals and birds that ingest terrestrial plants and organisms as a food source may also accumulate some of the COPCs. Several representative game species were evaluated within the HHRA with respect to ingestion exposure to the COPCs by people in the area.

Although surface water quality impacts are not predicted (Volume 3, Section 7), fish consumption was evaluated within the background assessment to obtain a more complete assessment of potential background multi-media exposures.

Non-local foods and beverages were not evaluated within the HHRA, due to limited information regarding the intake of these foods within the study area and about the levels of COPCs within such items.

Summary of Applicable Exposure Pathways

Table 4.4-4 summarizes the open and closed exposure pathways for the four receptor groups.

Table 4.4-4 Summary of Relevant Exposure Pathways for the Receptor Groups

Pathway	FNR	RESI	COMM	RECR
Outdoor vapour inhalation	✓	✓	✓	✓
Indoor vapour inhalation	✓	✓	✓	☒
Outdoor dust inhalation	✓	✓	✓	☒
Indoor dust inhalation	✓	✓	✓	☒
Outdoor soil ingestion	✓	✓	✓	☒
Indoor dust ingestion	✓	✓	✓	☒

Pathway	FNR	RESI	COMM	RECR
Drinking water consumption	✓	✓	⊗	⊗
Fish consumption	✓	✓	⊗	⊗
Game meat consumption	✓	✓	⊗	⊗
Fruit and vegetable consumption	✓	✓	⊗	⊗
Outdoor dermal exposure	✓	✓	✓	⊗
Indoor dermal exposure	✓	✓	✓	⊗

✓ = Exposure route open ⊗ = exposure route closed/not applicable

All exposure pathways were evaluated for the FNR and RESI receptors, as these individuals are presumed to live in the area continuously over a lifetime. Commercial receptors may be exposed at sites associated with commercial activities, and would be unlikely to consume local food and water over a long duration of time, as it is assumed that individuals do not continuously reside at the commercial receptor locations. In the event that commercial receptors also live in the area, the FNR and RESI assessments cover all other relevant pathways. Recreational receptors were assumed to be occasional visitors to the area as it is feasible that these individuals may be exposed to outdoor air exposures over a one day or multi-day period, but are not likely to be exposed over a lifetime. Thus, only the inhalation pathway was assessed for the RECR receptor.

4.4.4 Exposure Assessment

Potential exposures to the identified COPCs were estimated for the receptors under all of the assessment cases (baseline, application and CEA). For each pathway, exposures were estimated on both an acute (short term) and chronic (long term) basis. As described previously, acute exposures were assumed to range from minutes to 24 hours, and long term exposures were evaluated on an annual basis. Predicted ground-level air concentrations for the COPCs are provided in Appendix 4D.

The exposure estimates for the HHRA were determined through a combination of ambient air measurements and predictive modelling results. Determination of the extent of COPC exposure to humans relied on a series of mathematical equations or algorithms that represent the assumed transfer of each COPC from the source to the receptor. These equations required the input of several important variables including:

- Concentration of the chemical in environmental media;
- Physico-chemical properties of the chemical (e.g., vapour pressure, solubility);
- Environmental fate (e.g., uptake and distribution);
- Local environmental conditions (e.g., meteorology);
- Source characteristics (e.g., emission rates, operational life of the Project); and
- Receptor characteristics (e.g., exposure frequency, food consumption patterns).

The primary objective of the exposure assessment was to predict, based on the use of conservative assumptions, the potential acute and chronic COPC exposures at the receptor locations identified in the problem formulation. Acute and chronic exposure estimates were based on the maximum predicted ground-level air concentrations at receptor locations for each receptor group (i.e., Cabin, First Nations, Residential, Recreational and Commercial) for each COPC. The following factors were considered in estimating COPC exposures to human receptors:

- Concentration of a COPC in air as a result of atmospheric emissions from the Project, in combination with those from other regional sources;
- The use of predicted air concentrations based on the assumption that all phases of the Project would be in operation at once, resulting in a worst-case prediction of risk in all three development cases;
- Background exposures of the COPC to which a receptor might receive via inhalation, consumption of local fish, country foods and drinking water;
- Operational life of the Project, which was assumed to be equal to a typical human lifespan (75 years);
- Various physical and chemical characteristics (e.g., water solubility, volatility, deposition rates) which determine the fate and transport of the COPC in various environmental media and the food chain;
- Concentration of a COPC transported from air to other environmental media (i.e., soil, vegetation, wildlife);
- Various exposure pathways that could potentially contribute to uptake by humans;
- Absorption characteristics of a COPC once exposure has occurred; and,
- The activity patterns and characteristics of human receptors (e.g., respiration rate, food consumption, etc.)

4.4.4.1 Assessment of Existing Conditions (Background)

Chemical exposures are typically associated with multiple sources in the environment, both natural and anthropogenic. Thus, the exposure assessment included measured background exposures to the COPCs, which were combined with the results from the assessment of the predicted concentrations from the Project and future developments (i.e., baseline, application and CEA cases) to ensure that health risks were not under-predicted.

Air

Within the chronic assessment of the inhalation pathway alone, reported indoor and outdoor background air concentrations were summed to yield a total background air concentration. It is this total background air concentration that was added to the predicted air concentration. Background indoor air concentrations were not evaluated within the acute assessment, as the acute inhalation assessment is intended to evaluate worst-case acute (< 24 h) exposure conditions to the COPCs in outdoor air. On a chronic basis, individuals are likely to spend a significant portion of time indoors thus indoor air concentrations of the COPCs were included.

For the multi-media pathway, both indoor and outdoor background air concentrations were considered. It was assumed that all individuals (i.e., all receptor groups) spend the equivalent of 182.5 days/year breathing outdoor air, and 182.5 days/year breathing indoor air (e.g., 6 months/year of a year for each).

Preference was given to rural Alberta and Canadian background air concentrations of the COPCs, as such values are more relevant estimates of background exposures within the study area than background measurements from large urban centres. In the absence of rural data, the most appropriate and relevant information was selected for each COPC. Table 4.4-5 summarizes the background air concentrations included in the HHRA.

For the (CACs), non-industrial area and mobile sources already were incorporated in the dispersion modelling. The predicted air concentrations for the CACs were considered to adequately represent background sources in the study area. Some examples of typical area and mobile emission sources include urban traffic, highway traffic, and natural gas combustion for heating.

Table 4.4-5 Summary of Indoor, Outdoor and Total Background Air Concentrations

COPC	Averaging	Indoor	Outdoor	Total Background	References
2-methylnaphthalene	1 h			No Data	Assumed zero
2-methylnaphthalene	24 h			No Data	Assumed zero
2-methylnaphthalene	annual			No Data	Assumed zero
3-methylcholanthrene	1 h			No Data	Assumed zero
3-methylcholanthrene	24 h			No Data	Assumed zero
3-methylcholanthrene	annual			No Data	Assumed zero
7,12-dimethylbenz(a)anthracene	1 h			No Data	Assumed zero
7,12-dimethylbenz(a)anthracene	24 h			No Data	Assumed zero
7,12-dimethylbenz(a)anthracene	annual			No Data	Assumed zero
acenaphthene	1 h		4.60E-03	4.60E-03	Maximum, AHW (2002)
acenaphthene	24 h		4.60E-03	4.60E-03	Maximum, AHW (2002)
acenaphthene	annual	7.00E-04	1.60E-04	8.60E-04	Average, AHW (2002)
acenaphthylene	1 h		1.00E-03	1.00E-03	Maximum, AHW (2002)
acenaphthylene	24 h		1.00E-03	1.00E-03	Maximum, AHW (2002)
acenaphthylene	annual	2.90E-04	1.60E-04	4.50E-04	Average, AHW (2002)
acetaldehyde	1 h		1.54E+01	1.54E+01	AENV (2004). Air Quality Monitoring: Near three residences in the Fort Saskatchewan area (August 2001-August 2002). ISBN 0-7785-3079-5.
acetaldehyde	24 h		1.54E+01	1.54E+01	AENV (2004). Air Quality Monitoring: Near three residences in the Fort Saskatchewan area (August 2001-August 2002). ISBN 0-7785-3079-5.
acetaldehyde	annual	2.15E+01	1.00E+00	2.25E+01	CEPA (2000). Mean long term air concentrations from Canadian rural areas (outdoor); Mean indoor air concentrations from homes, Windsor ON (indoor)
acrolein	1 h		1.00E-01	1.00E-01	CEPA (2000). Maximum average detected level in rural areas of Canada
acrolein	24 h		1.00E-01	1.00E-01	CEPA (2000). Maximum average detected level in rural areas of Canada
acrolein	annual	1.30E+00	1.00E-01	1.40E+00	Cantox (2006) (indoor); CEPA, 2000, maximum average detected level in rural areas of Canada
anthracene	1 h		5.20E-03	5.20E-03	Maximum, AHW (2002)
anthracene	24 h		5.20E-03	5.20E-03	Maximum, AHW (2002)
anthracene	annual	5.98E-04	1.23E-03	1.83E-03	Average, AHW (2002)
benzaldehyde	1 h			No Data	Not evaluated on acute basis
benzaldehyde	24 h			No Data	Not evaluated on acute basis
benzaldehyde	annual	No Data	2.00E-02	2.00E-02	Average 24 h air concentration measured in Tilson, Manitoba; August 1999-May 2000; MIEDM (2000)

COPC	Averaging	Indoor	Outdoor	Total Background	References
benzene	1 h		2.40E+00	2.40E+00	WBEA (2007). Fort McMurray 95th percentile of passive data
benzene	24 h		2.40E+00	2.40E+00	WBEA (2007). Fort McMurray 95th percentile of passive data
benzene	annual	1.80E+00	1.30E+00	3.10E+00	WBEA (2007). Fort McMurray Medians
benzo(a)anthracene	1 h		1.60E-04	1.60E-04	Maximum, AHW (2002)
benzo(a)anthracene	24 h		1.60E-04	1.60E-04	Maximum, AHW (2002)
benzo(a)anthracene	annual	3.08E-05	5.88E-05	8.95E-05	Average, AHW (2002)
benzo(a)pyrene	1 h		1.90E-04	1.90E-04	Maximum, AHW (2002)
benzo(a)pyrene	24 h		1.90E-04	1.90E-04	Maximum, AHW (2002)
benzo(a)pyrene	annual	1.80E-05	7.30E-05	9.10E-05	Average, AHW (2002)
B(a)P WMM	annual			9.10E-05	Assumed BaP
B(a)P IPM	annual			2.80E-04	Not applicable
benzo(b)fluoranthene	1 h		3.60E-04	3.60E-04	Maximum, AHW (2002)
benzo(b)fluoranthene	24 h		3.60E-04	3.60E-04	Maximum, AHW (2002)
benzo(b)fluoranthene	annual	7.85E-05	9.45E-05	1.73E-04	Average, AHW (2002)
benzo(e)pyrene	1 h		2.60E-04	2.60E-04	Maximum, AHW (2002)
benzo(e)pyrene	24 h		2.60E-04	2.60E-04	Maximum, AHW (2002)
benzo(e)pyrene	annual	4.1E-05	8.86E-05	1.29E-04	Average, AHW (2002)
benzo(ghi)perylene	1 h		2.10E-04	2.10E-04	Maximum, AHW (2002)
benzo(ghi)perylene	24 h		2.10E-04	2.10E-04	Maximum, AHW (2002)
benzo(ghi)perylene	annual	6.0E-05	7.89E-05	1.39E-04	Average, AHW (2002)
benzo(k)fluoranthene	1 h		3.60E-04	3.60E-04	Maximum, AHW (2002)
benzo(k)fluoranthene	24 h		3.60E-04	3.60E-04	Maximum, AHW (2002)
benzo(k)fluoranthene	annual	7.8E-05	9.45E-05	1.73E-04	Average, AHW (2002)
chrysene	1 h		3.90E-04	3.90E-04	Maximum, AHW (2002)
chrysene	24 h		3.90E-04	3.90E-04	Maximum, AHW (2002)
chrysene	annual	7.2E-05	1.04E-04	1.76E-04	Average, AHW (2002)
CO	1 h			NA	Community sources included in assessment
CO	8hr			NA	Community sources included in assessment
dibenz(ah)anthracene	1 h		5.00E-05	5.00E-05	Maximum, AHW (2002)
dibenz(ah)anthracene	24 h		5.00E-05	5.00E-05	Maximum, AHW (2002)
dibenz(ah)anthracene	annual	1.0E-05	3.50E-05	4.50E-05	Average, AHW (2002)
dichlorobenzene	1 h		1.70E-01	1.70E-01	AENV (2004). Air Quality Monitoring: Near 3 residences in the Fort Saskatchewan area (August 2001-August 2002). ISBN 0-7785-3079-5.

COPC	Averaging	Indoor	Outdoor	Total Background	References
dichlorobenzene	24 h		1.70E-01	1.70E-01	AENV (2004). Air Quality Monitoring: Near three residences in the Fort Saskatchewan area (August 2001-August 2002). ISBN 0-7785-3079-5.
dichlorobenzene	annual	3.60E+01	1.20E-02	3.60E+01	AENV (2004). Air Quality Monitoring: Near 3 residences in the Fort Saskatchewan area (August 2001-August 2002). ISBN 0-7785-3079-5 (outdoor); Cantox (2006) mean indoor air concentrations in Ottawa (indoor)
ethylbenzene	1 h		1.00E+00	1.00E+00	WBEA (2007). Fort McMurray, 95th percentile for outdoor air.
ethylbenzene	24 h		1.00E+00	1.00E+00	WBEA (2007). Fort McMurray, 95th percentile for outdoor air.
ethylbenzene	annual	1.30E+00	2.00E-01	1.50E+00	WBEA (2007). Fort McMurray Medians
fluoranthene	1 h		2.00E-03	2.00E-03	Maximum, AHW (2002)
fluoranthene	24 h		2.00E-03	2.00E-03	Maximum, AHW (2002)
fluoranthene	annual	5.4E-04	1.02E-03	1.57E-03	Average, AHW (2002)
fluorene	1 h		7.20E-03	7.20E-03	Maximum, AHW (2002)
fluorene	24 h		7.20E-03	7.20E-03	Maximum, AHW (2002)
fluorene	annual	5.82E-04	2.32E-03	2.90E-03	Average, AHW (2002)
formaldehyde	1 h		2.75E+01	2.75E+01	CEPA (2001); Maximum of 24 h data for 8 urban sites including Montreal (2 sites), Ottawa, Windsor (2 sites), Toronto, Winnipeg and Vancouver between 1989 and 1998.
formaldehyde	24 h		2.75E+01	2.75E+01	CEPA (2001); Maximum of 24 h data for 8 urban sites including Montreal (2 sites), Ottawa, Windsor (2 sites), Toronto, Winnipeg and Vancouver between 1989 and 1998.
formaldehyde	annual	3.60E+01	8.76E+00	4.48E+01	CEPA (2001). Maximum monthly/annual concentration for various Canadian sites (outdoor); mean Canadian indoor air concentrations (indoor)
hexane	1 h		8.00E-01	8.00E-01	WBEA (2007). Fort McMurray 95th percentile of passive data
hexane	24 h		8.00E-01	8.00E-01	WBEA (2007). Fort McMurray 95th percentile of passive data
hexane	annual	1.40E+00	4.00E-01	1.80E+00	WBEA (2007). Fort McMurray Median
indeno(1,2,3cd)pyrene	1 h		1.90E-04	1.90E-04	Maximum, AHW (2002)
indeno(1,2,3cd)pyrene	24 h		1.90E-04	1.90E-04	Maximum, AHW (2002)
indeno(1,2,3cd)pyrene	annual	4.5E-05	7.00E-05	1.15E-04	Average, AHW (2002)
naphthalene	1 h		8.80E-03	8.80E-03	Maximum, AHW (2002)
naphthalene	24 h		8.80E-03	8.80E-03	Maximum, AHW (2002)

COPC	Averaging	Indoor	Outdoor	Total Background	References
naphthalene	annual	8.75E-04	2.73E-03	3.61E-03	Average, AHW (2002)
NO_2	1 h			NA	Community sources included in assessment
NO_2	24 h			NA	Community sources included in assessment
NO_2	annual			NA	Community sources included in assessment
pentane	1 h			1.10E+00	Assumed annual average value
pentane	24 h			1.10E+00	Assumed annual average value
pentane	annual	No Data	1.10E+00	1.10E+00	Environment Canada (2006) Fort Saskatchewan average for 2006
perylene	1 h		4.00E-05	4.00E-05	Maximum, AHW (2002)
perylene	24 h		4.00E-05	4.00E-05	Maximum, AHW (2002)
perylene	annual	1.00E-05	2.00E-05	3.00E-05	Average, AHW (2002)
phenanthrene	1 h		4.00E-02	4.00E-02	Maximum, AHW (2002)
phenanthrene	24 h		4.00E-02	4.00E-02	Maximum, AHW (2002)
phenanthrene	annual	3.18E-03	1.57E-02	1.88E-02	Average, AHW (2002)
$PM_{2.5}$	1 h			NA	Community sources included in assessment
$PM_{2.5}$	24 h			NA	Community sources included in assessment
$PM_{2.5}$	annual			NA	Community sources included in assessment
pyrene	1 h		3.50E-03	3.50E-03	Maximum, AHW (2002)
pyrene	24 h		3.50E-03	3.50E-03	Maximum, AHW (2002)
pyrene	annual	7.82E-04	1.92E-03	2.71E-03	Average, AHW (2002)
SO_2	1 h			NA	Community sources included in assessment
SO_2	10min			NA	Community sources included in assessment
SO_2	24 h			NA	Community sources included in assessment
SO_2	annual			NA	Community sources included in assessment
toluene	1 h		4.70E+00	4.70E+00	WBEA (2007). Fort McMurray 95th percentile of passive data
toluene	24 h		4.70E+00	4.70E+00	WBEA (2007). Fort McMurray 95th percentile of passive data
toluene	annual	7.60E+00	1.50E+00	9.10E+00	WBEA (2007). Fort McMurray medians
xylenes	1 h		6.00E+00	6.00E+00	WBEA (2007). Fort McMurray, sum of 95th percentiles for m,p, and o-xylenes.
xylenes	24 h		6.00E+00	6.00E+00	WBEA (2007). Fort McMurray, sum of 95th percentiles for m,p, and o-xylenes.
xylenes	annual	7.60E+00	1.90E+00	9.50E+00	WBEA (2007). Fort McMurray medians, sum of m,p and o-xylenes

Note: NA = Not applicable for reasons stated.

4.4.4.2 Surface Water

Drinking water was incorporated within the assessment in order to characterize “total” exposure. It was conservatively assumed that all receptors would drink untreated surface water directly from a number of water bodies that have been sampled as part of the oil sands Regional Aquatic Monitoring Program (RAMP).

Table 4.4-6 summarizes the surface water concentrations used in the background assessment. As the predicted impacts to surface water quality from the project were determined to be negligible, the predicted change in drinking water quality was assumed to be zero. Thus, the drinking water pathway was only evaluated within the background scenario, and was added to the other development cases.

No background water information was available for the VOC compounds.

Table 4.4-6 Surface Water Concentrations

COPC	Concentration (mg/L)
3-methylcholanthrene	No Data
7,12-dimethylbenz(a)anthracene	No Data
anthracene	0.00002
benz(a)anthracene	0.00005
benzo(a)pyrene	0.00003
benzo(b)fluoranthene	0.00001
benzo(e)pyrene	No Data
benzo(ghi)perylene	0.00005
benzo(k)fluoranthene	0.00001
chrysene	0.00005
dibenz(ah)anthracene	0.00005
dichlorobenzene	0.00005
fluoranthene	0.00002
fluorene	0.00005
Indeno(1,2,3cd)pyrene	0.00005
naphthalene	0.00005
perylene	No Data
phenanthrene	0.00001
pyrene	0.00001

Source: RAMP 2002, 2003, 2004

In the Table 4.4-6, when COPC concentrations were below detection limits, a concentration of one-half the detection limit was assumed.

4.4.4.3 Soil

Background concentrations in soil were investigated from previous EIAs in the oil sands region. Soil concentrations measured from the following EIAs were surveyed for background soil concentrations:

- Petro-Canada, Meadow Creek 2001
- Shell Jackpine Mine Phase 1 2002

- CNRL Horizon Project 2002
- Imperial Oil Kearl Oil Sands Project - Mine Development 2005
- Albian Sands Energy Inc., Muskeg River Mine Expansion 2005
- Suncor Energy Inc. Voyageur Project 2005

PAH and VOC concentrations in soil have either been reported as non-detect values or as not measured. Therefore, background PAH and VOC concentrations in soil were predicted based on measured background air concentrations.

4.4.4.4 Food

In general, background concentrations of PAHs in game meat and plant foods have presented non-detectable levels of the COPCs. To obtain the most realistic estimate of background COPC concentrations in game meat, surface water and predicted background soil concentrations were used to predict plant and animal tissue concentrations. Additional detail regarding the models employed for these calculations is provided in Appendix 4B.

Limited information regarding fish concentrations in the area is available; however some information is available from the Regional Aquatic Monitoring Program (RAMP). Table 4.4-7 summarizes the measured fish tissue concentrations from the oil sands region between 2002 and 2004 for PAHs that could bioaccumulate in tissue. Samples of lake whitefish, walleye and northern pike were collected by RAMP (2007) from the Athabasca and Clearwater River system. In instances where the concentration was below detectable levels, a concentration of one-half the detection limit was assumed.

Table 4.4-7 Summary of Fish Tissue Concentrations

COPC	Concentration (ug/kg ww)
3-methylcholanthrene	No Data
7,12-dimethylbenz(a)anthracene	No Data
anthracene	5.00E-06
benz(a)anthracene	5.00E-06
benzo(a)pyrene	5.00E-06
benzo(a)pyrene	5.00E-06
benzo(b)fluoranthene	5.00E-06
benzo(e)pyrene	5.00E-06
benzo(ghi)perylene	5.00E-06
benzo(k)fluoranthene	5.00E-06
chrysene	5.00E-06
dibenz(ah)anthracene	5.00E-06
fluoranthene	5.00E-06
fluorene	5.00E-06
indeno(1,2,3cd)pyrene	5.00E-06
naphthalene	0.5
benzo(a)pyrene	5.00E-06
perylene	5.00E-06
phenanthrene	5.00E-06
pyrene	5.00E-06

Source: RAMP 2002, 2003, 2004

4.4.5 Assessment of Residual Project and Cumulative Effects

For the assessment of the inhalation pathway alone, the maximum predicted air concentrations in each receptor category (e.g., the highest air concentration of a COPC out of all the FNR locations was used to assess all FNR locations) such that the maximum concentration for each receptor category was assessed on both an acute and chronic basis.

Within the multi-pathway model, the maximum air concentration for each COPC out of all 79 receptor locations was selected and used to predict inhalation exposures, as well as to calculate multi-media concentrations of the COPCs for soil, plants and animal tissue. Although conservative, this approach is intended to provide a maximum estimate of multi-pathway exposure from environmental media. Additional detail regarding the modelling and approaches used is provided in Appendix 4B.

4.4.6 Assumptions and Uncertainty

Due to inherent uncertainties associated with exposure assessment, conservative modelling assumptions were applied to reduce the possibility of potential exposures being underestimated. Conservative assumptions include:

- Use of predicted maximum short term and long term ground-level air concentrations at the 79 discrete receptor locations (Volume 2, Section 2);
- Air dispersion modelling incorporated meteorological data that captured conditions contributing to maximum ground-level air concentrations (Volume 2, Section 2);
- Predicted chronic health risks assumed that individuals would be exposed continuously (i.e., 24 hours per day, 365 days per year, for 75 years) to the maximum of the predicted COPC concentrations for each receptor category (inhalation assessment) or the maximum out of all receptor locations (multi-pathway assessment);
- Potential exposures to chemical mixtures were estimated with the assumption that location-specific maximum exposures to each chemical occurred simultaneously for the acute assessment, and that mixture components produced an additive response equal to the sum of the predicted effects of each individual component;
- Receptors that are often the most sensitive to chemical exposure were assessed via the multiple exposure pathway model;
- That all FNR receptors obtain 100 percent of their fruits, vegetables and wild game diet (i.e., grouse, snowshoe hare, moose) from the local study area;
- All RESI receptors obtain 10 percent of fruits and vegetables, and 100 percent of game meat from local sources;
- Estimated changes in tissue quality (vegetation, local fruits, wild game) were based on maximum predicted annual air concentrations, and were based on algorithms that incorporate conservative assumptions regarding COPC uptake; and,
- Predicted environmental media (water, soil, plant, wild game tissue) concentrations were based on an assumed 75 years of continuous operation and chemical deposition to soil.

An assessment of the construction phase of the Project was not conducted, as the worst-case assumptions (all Project phases in operation at once) presents an exposure estimate that would be much higher than what a worker might receive while building the Project components before the Project is even in operation and potentially emitting the COPCs. The assessment of the four receptor types included in this assessment is both adequately representative and conservative.

4.4.7 Toxicity Assessment

The toxicity assessment requires understanding of the critical toxicological effects that can result from exposure to the COPCs. Such information is generally obtained from published scientific studies conducted in animals or humans under controlled experimental conditions, or observations from human epidemiological studies that examine the relationship between medical conditions of interest and exposure. Potential health effects associated with excessive exposures to the COPCs, along with the basis of the exposure limits, are described in further detail in the toxicity profiles contained in Appendix 4A.

When evaluating the potential for a substance to cause an adverse effect, consideration must be given to the dose to which a receptor is exposed, as the dose determines the type and potentially the severity of any adverse effects that may be observed. Specifically, it is the amount of the substance that is absorbed and reaches the toxicological site of interest in the organism that determines the probability of an adverse effect occurring.

Substances may differ greatly with respect to the dosage required to result in an adverse effect, as well as in the mechanism(s) by which the adverse effects are elicited. Two categories are used to divide substances based upon their mechanism of toxicity: threshold and non-threshold.

In general, threshold substances require that a certain threshold level of exposure (or minimum dose) be exceeded before toxic effects occur. For these substances, it is necessary to evaluate the available information to identify effect-levels at which either no effects are observed (e.g., a no observed adverse effect level (NOAEL) or a no observed effect level) or adverse effects are first observed (e.g., a lowest observed adverse effect level (LOAEL) or lowest observed effect level (LOEL). Benchmark doses (BMDs), which represent a dose level associated with a specified degree of response (i.e., 5% or 10% incidence of an effect within a population), are becoming more commonly used in risk assessment, and are analogous to study NOAELs. All of these types of endpoints (NOAELs, LOAELs and BMDs) provide an indication of exposure levels that are associated with minimal or negligible health risks, and are often used by jurisdictional agencies in the derivation of exposure limits (discussion follows).

The application of uncertainty or safety factors to an effect-level provides an added level of protection, allowing for the derivation of an exposure limit that is expected to be safe to the most sensitive subjects following exposure over a prescribed time period.

Consideration must also be given to duration of time to which exposure to a substance occurs, as the effects of short term and long term exposures to substances may be different. Within the HHRA, substances were evaluated on an acute (1-hour, 8-hour or 24-hour) and chronic (annual) basis.

4.4.7.1 Exposure Limits

Exposure limits (also known as toxicological reference values) that have been developed by scientific and/or regulatory agencies aimed at the protection of human health were identified for each COPC on both an acute and chronic basis. Emphasis was given to those limits which had adequate supporting documentation, so that the limits could be evaluated to ensure that their basis was relevant and sufficient. The scientific and regulatory authorities that were consulted included:

- Alberta Environment (AENV)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Canadian Council of Ministers of the Environment (CCME)
- Health Canada
- California's Office of Environmental Health Hazard Assessment (OEHHA)
- Ontario Ministry of the Environment (OMOE)
- Netherlands National Institute of Public Health and the Environment (RIVM)
- U.S. Environmental Protection Agency (U.S. EPA)
- World Health Organization (WHO)

The toxicity of a chemical has been observed to vary between acute (short term) and chronic (long term) exposure. Thus, it is important to differentiate exposure limits on the basis of duration of exposure. The two exposure limit durations used in the HHRA can be described as follows:

- **Acute Exposure Limit:** the amount or dose of a chemical that can be tolerated without evidence of adverse health effects on a short term basis. These limits are routinely applied to conditions in which exposures extend over several hours or several days only (ATSDR 2005a).
- **Chronic Exposure Limit:** the amount of a chemical that is expected to be without effect, even when exposure occurs continuously or regularly over extended periods, lasting for periods of at least a year, and possibly extending over an entire lifetime (ATSDR, 2005a).

The criteria used in the determination of exposure limits may differ depending on the responsible scientific authority or regulatory jurisdiction charged with developing the safe level of exposure. The limits also may differ in terms of the primary determinant(s) of concern (e.g., health effects versus nuisance effects such as odour). In addition, the limits may vary depending on the level of protection required.

Separate assessments were completed for both the acute and chronic exposure scenarios in recognition of the fact that the toxic response produced by chemicals and the target tissues affected can change, depending on whether exposure is short term or long term.

The exposure limits for the HHRA were selected based on the criteria below. The selected values must be:

- Protective of the health of the general public based on current scientific knowledge of the health effects associated with exposure to the COPC;
- Adequately protective of sensitive individuals (i.e., children and the elderly) through the incorporation of uncertainty or safety factors;
- Derived or recommended by reputable scientific or regulatory authorities; and

- Supported by adequate and available documentation.

When these criteria were satisfied by more than one objective, guideline or standard, the most stringent exposure limit was typically selected. In the event that the most stringent limit was not selected, the rationale for doing so was based upon the overall quality of the limits and the information available. Additional detail is provided on a substance-specific basis within the toxicological profiles.

Tables 4.4-8 and Table 4.4-9 summarize the selected acute and chronic exposure limits used in the HHRA.

Table 4.4-8 Summary of Acute Exposure Limits

Chemical	Averaging Period	Value (ug/m^3)	Reference/Comment
2-methylnaphthalene	1 h	9000	CCME (2000a) ; Clark et al. (1989) assumed C_9-C_{16} aromatic group as a surrogate
3-methylcholanthrene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
7,12-dimethylbenz(a)anthracene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
acenaphthene	24 h	830	ATSDR (2005, 1995)
acenaphthylene	24 h	830	ATSDR (2005, 1995); used acenaphthene as a surrogate
acetaldehyde	1 h	2300	ACGIH (1996, 2006)
Acrolein	1 h	0.29	Darley et al. (1960); OEHHA (1999b, 2000a)
Anthracene	1 h	9000	CCME (2000a) ; Clark et al. (1989); assumed C_6-C_{16} aromatic group as a surrogate
benzaldehyde			
benzene	24 h	30	ATSDR (2005b, 2006a)
benzo(a)anthracene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
benzo(a)pyrene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
benzo(b)fluoranthene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
benzo(e)pyrene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
benzo(ghi)perylene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
benzo(k)fluoranthene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
chrysene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
CO	1 h	15000	AENV (2005)
CO	8 h	6000	AENV (2005)
dibenz(ah)anthracene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
dichlorobenzene	1 h	12000	ATSDR (2006)
ethylbenzene	24 h	4340	ATSDR (1999b, 2006a)
fluoranthene	1 h	9000	CCME (2000a) ; Clark et al. (1989); assumed C_9-C_{16} aromatics as a surrogate
fluorene	1 h	9000	CCME (2000a) ; Clark et al. (1989); assumed C_9-C_{16} aromatics as a surrogate
formaldehyde	1 h	50	ATSDR (1999c, 2006a)
hexane	1 h	4300	U.S. EPA (2007)

Chemical	Averaging Period	Value (ug/m^3)	Reference/Comment
indeno(1,2,3cd)pyrene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
naphthalene	1 h	2000	ACGIH (1991, 2006)
NO_2	1 h	400	AENV (2005)
NO_2	24 h	200	AENV (2005)
pentane	1 h	100000	CCME (2000a); TPHCWG (1997); assumed C_5-C_8 limit for hexane mixture
perylene	24 h	1100	CCME (2000a); assumed C_{17}-C_{14} aromatic group as a surrogate
phenanthrene	1 h	9000	CCME (2000a); Clark et al. (1989); assumed C_9-C_{16} aromatics as a surrogate
$PM_{2.5}$	24 h	30	CCME CWS 2000
pyrene	1 h	9000	CCME (2000a); Clark et al. (1989); assumed C_9-C_{16} aromatics as a surrogate
SO_2	10 min	500	WHO (2000)
SO_2	1 h	450	AENV (2005)
SO_2	24 h	150	AENV (2005)
toluene	1 h	37000	OEHHA (1999f, 2000a)
xylenes	1 h	8700	ATSDR (2005c, 2006a)

Table 4.4-9 Summary of Chronic Exposure Limits

COPC	Route and Units	Value	References
2-methylnaphthalene	Inhalation (ug/m^3)	200	CCME (2000), MA DEP (2003); assumed C_9-C_{16} as a surrogate
3-methylcholanthrene	Inhalation (ug/m^3)	110	CCME (2000); assumed C_{17}-C_{34} aromatic group as a surrogate
	Oral (ug/kg bw)	30	CCME (2000); assumed C_{17}-C_{34} aromatic group as a surrogate
7,12-dimethylbenz(a)anthracene	Inhalation (ug/m^3)	110	CCME (2000); assumed C_{17}-C_{34} aromatic group as a surrogate
	Oral (ug/kg bw)	30	CCME (2000); assumed C_{17}-C_{34} aromatic group as a surrogate
acenaphthene	Inhalation (ug/m^3)	830	ATSDR (2005, 1995)
acenaphthylene	Inhalation	830	ATSDR (2005, 1995); assumed acenaphthene as a surrogate
acetaldehyde	Inhalation (ug/m^3)	17.2	Health Canada (2004b); CEPA (2000a)
acrolein	Inhalation (ug/m^3)	0.02	U.S. EPA (2007)
B(a)P IPM	Inhalation (ug/m^3)	0.32	Health Canada (2004b)
	Oral (ug/kg bw)	0.0014	U.S. EPA (2007)
B(a)P WMM	Inhalation (ug/m^3)	0.00012	Health Canada (2003); Health Canada (2004b)
	Oral (ug/kg bw)	0.0034	OMOE (1997)
benzaldehyde	Inhalation (ug/m^3)	360	U.S. EPA (2007)
benzene	Inhalation (ug/m^3)	1.3	U.S. EPA (2007)

COPC	Route and Units	Value	References
dichlorobenzene	Inhalation (ug/m^3)	60	ATSDR (2006)
ethylbenzene	Inhalation (ug/m^3)	1000	U.S. EPA (2007)
formaldehyde	Inhalation (ug/m^3)	0.77	U.S. EPA (2007)
hexane	Inhalation (ug/m^3)	700	U.S. EPA (2007)
naphthalene	Inhalation (ug/m^3)	3	U.S. EPA IRIS (2007)
	Oral (ug/kg bw)	20	U.S. EPA IRIS (2007)
NO_2	Inhalation (ug/m^3)	60	AENV (2004)
pentane	Inhalation (ug/m^3)	18400	CCME (2000), MA DEP (2003); assumed C_5-C_8 aliphatics group as a surrogate
$PM_{2.5}$	Inhalation (ug/m^3)	12	CARB (2002)
SO_2	Inhalation (ug/m^3)	30	AENV (2005)
toluene	Inhalation (ug/m^3)	5000	U.S. EPA (2007)
xylenes	Inhalation (ug/m^3)	100	U.S. EPA (2007)

4.4.7.2 Particulate Matter

Particulate matter (PM) is the generic term applied to a broad class of chemically and physically diverse substances that exist as discrete particles (liquid droplets or solids) over a range of sizes. Particles less than 2.5 micrometres (<2.5 um) are called “fine” particles (i.e., $PM_{2.5}$), while those larger than 2.5 um but smaller than 10 um are known as “coarse” particles (i.e., $PM_{2.5}$-10). When inhaled, these particles can reach the deepest regions of the lungs (U.S. EPA 2006).

A significant amount of research has been, and is being conducted on the health effects associated with both fine and coarse PM in the ambient air. Short term exposure to ambient PM in numerous urban areas has been associated with a range of health outcomes including:

- premature death in people with heart and lung disease;
- non-fatal heart attacks;
- respiratory and cardiovascular hospitalizations;
- lung function changes;
- adverse respiratory symptoms (e.g., cough, wheeze);
- aggravated asthma; and,
- irregular heartbeats (U.S. EPA, 2004).

Long term exposure to fine particles ($PM_{2.5}$) has been associated in some studies with cardiovascular and lung cancer mortality, effects on lung function and increases in respiratory symptoms (Brauer et al., 2002; Gauderman et al., 2004; Krewski et al. 2003; 2005a,b; Pope et al. 2002, 2004).

The latest $PM_{2.5}$ standards, along with their supporting scientific rationale, were reviewed as part of the HHRA. A detailed discussion of the most recent regulatory standards and the associated health implications is presented in Appendix 4A.

For the current assessment, predicted 24-hour $PM_{2.5}$ concentrations were compared to the Canada wide standard (CWS) of 30 ug/m^3, which falls within the range of recent standards recommended by the WHO and the U.S. EPA. Predicted annual average concentrations were compared against the California Air Resources Board annual standard of 12 ug/m^3, which also falls within the range of standards recommended by the WHO and the U.S. EPA. The choice of standards in the middle of the range of available guidelines or standards respects both the need to be conservative and the uncertainty which still remains regarding the types of PM that are most toxic and the existence of a threshold for PM-associated adverse effects.

Taken together, these health-based limits should offer an acceptable level of protection to the area residents.

As per AHW's request, potential changes to the baseline mortality and morbidity rates associated with the predicted $PM_{2.5}$ air concentrations were calculated using Health Canada's SUM15 method, the results of which are presented in Appendix 4C.

4.4.7.3 Chemical Mixtures

Three different chemical mixture approaches were used in this HHRA.

For carcinogenic PAHs, two different modelling approaches were used to evaluate carcinogenic potential: (1) the whole mixture model (WMM) and (2) the individual PAH model (IPM). The WMM approach is based on the assumption that the potency of the PAH fraction of any environmental mixture is proportional to its benzo(a)pyrene content (OMOE 1997). The IPM approach is based upon the addition of the risks for each individual PAH. The first step in the IPM requires an estimate of the inhalation potency of benzo(a)pyrene and other PAHs relative to benzo(a)pyrene. This step involves the use of Toxic Equivalency Factors (TEFs) to denote the cancer potency of specific PAH compounds relative to the potency of benzo(a)pyrene. Additional detail regarding carcinogenic PAH mixtures may be found in Appendix A under benzo(a)pyrene.

For all other compounds, as per guidance from Health Canada (2004), chemical interactions were assumed to be additive (3) in nature. Possible additive interactions were identified for those COPCs known to cause irritation (eye, nasal, respiratory), effects on the liver or kidney, neurological effects and cancer. The inclusion of a COPC in the chemical mixture was based upon the endpoint of the exposure limit used in the current HHRA. Additional information regarding the mixtures assessment may be found in Appendix A.

4.4.8 Risk Characterization

Risk estimates are presented as potential project-specific effects and cumulative effects for both acute and chronic exposures. The potential health effects associated with COPC releases from the Project are expressed as Risk Quotients (RQs) for the non-carcinogenic COPCs. Potential cancer risks are expressed as lifetime cancer risks (LCRs) for the three development cases (baseline, application and CEA), or as incremental lifetime cancer risks (ILCRs) in the case of project-specific effects. Descriptions regarding the calculation of these values are provided below.

Risk Quotients were calculated by comparing the predicted levels of exposure for the non-carcinogenic COPCs to their respective exposure limits (described in Section 4.3.1 and Appendix 4A) that have been developed by regulatory and scientific authorities. The RQs for the baseline, application and CEA cases had background exposures added. To clearly describe the potential health risks of the Project in relation to background and the three development cases, RQs for the Project do not incorporate background. RQs were calculated using Equation 1:

$$\textbf{Risk Quotient (RQ)} = \frac{\textbf{Predicted Exposure (ug/kg or ug/m}^3\textbf{)}}{\textbf{Exposure Limit}} \qquad \textit{Equation 1}$$

Interpretation of the RQ values proceeded as follows:

RQ ≤ 1.0 Indicates that the estimated exposure is less than or equal to the exposure limit (i.e., the assumed safe level of exposure). RQs ≤ are associated with negligible health risks, even in sensitive individuals given the level of conservatism incorporated in the derivation of the exposure limit and exposure estimate.

RQ > 1.0 Indicates that the exposure estimate exceeds the exposure limit. This suggests an elevated level of risk, the significance of which must be balanced against the high degree of conservatism incorporated into the risk assessment (i.e., the margin of safety is reduced but not removed entirely).

Risks associated with the COPCs that are deemed to be carcinogenic are expressed as LCRs for the baseline, application and CEA cases, or ILCRs for the Project alone (i.e., application case minus baseline case). The key difference between LCR and ILCR estimates is in how they should be interpreted.

For the background, baseline, application and CEA, cancer risks are expressed as LCRs. The LCRs simply refer to the number of cancer cases that could potentially result from the estimated exposures to the carcinogenic COPCs in a population of 100,000 people. There is no clear benchmark for what is an acceptable risk for LCR, given that the predicted LCRs for these cases not only include background levels (both natural and anthropogenic), but also include emissions from multiple different sources that may impact various environmental media. The probability of a person developing cancer in Canada is about 0.4 or 40% (Health Canada, 2004). This probability could be interpreted as a comparative cancer incidence rate in the population; however, no guidance is provided to this effect. Some individuals may be more susceptible to developing cancer than others, and background exposures alone may exceed reasonably safe exposure levels and may result in the development of cancer in such sensitive individuals (Graham, 1993). The calculation of cancer risk estimates from exposures that include background exposures, and do not distinguish background risks from potential risks due to other sources. Thus, the LCR is a predicted incidence rate per 100,000 people in a population, but does not readily distinguish an acceptable vs. unacceptable increased cancer risk above background. The LCR values have been calculated according to Equation 2.

The regulatory benchmark of an acceptable cancer risk of 1 in 100,000 (or 1 in 1,000,000 in some jurisdictions) is policy-based, and its interpretation by various regulatory agencies differs. The origin of this benchmark was in the 1970s for assessing individual animal drug residues in the U.S., and has since been applied in different ways in risk assessment (Kelley, 1991). Health Canada (2004) requires that carcinogens be assessed on an incremental basis, and mandate an acceptable ILCR of 1 in 100,000. For the purposes of this assessment, ILCR estimates have been determined for the Kai Kos Dehseh Project alone. Interpretation of these ILCRs was based on comparison of ILCR values associated with the Project against the Health Canada (2004) *de minimus* ILCR of one in 100,000 (i.e., one extra cancer case in a population of 100,000 people). Background exposures were not included in the ILCR calculation such that the potential incremental impact on health due the Project alone could be assessed. The ILCR values were calculated using Equation 3.

$$\mathbf{LCR} = \frac{\textbf{Background or Predicted Exposure (ug/kg or ug/m}^{3}\textbf{)}}{\textbf{Carcinogenic Exposure Limit}} \qquad \textbf{\textit{Equation 2}}$$

$$\mathbf{ILCR} = \frac{\textbf{Project-related exposure (ug/kg or ug/m}^{3}\textbf{)}}{\textbf{Carcinogenic Exposure Limit}} \qquad \textbf{\textit{Equation 3}}$$

Interpretation of the ILCR values in this instance proceeded as follows:

ILCR ≤ 1.0	Denotes an incremental lifetime cancer risk that is below the benchmark ILCR of one in 100,000 (i.e., within the accepted level of risk set by provincial and federal regulatory agencies).
ILCR > 1.0	Indicates an incremental lifetime cancer risk that is greater than the *de minimus* risk level of one in 100,000, the interpretation of which must consider the conservatism incorporated into the assessment.

As described in Section 4.3.3, COPCs with common toxicological endpoints were evaluated as chemical mixtures, assuming additivity in accordance with Health Canada (2004) guidance. Mixture calculations were completed by summing the RQs for the components of each mixture to calculate a risk index (RI) for each type of mixture. RIs may be interpreted in the same manner as RQs (e.g., an RI value greater than 1 indicates that the mixture exposure estimate exceeds the exposure limit, suggesting a potentially elevated level of risk).

Additional information regarding the mixture components and endpoints is provided in Appendix 4A.

Figure 4.4-1 Risk Assessment Paradigm

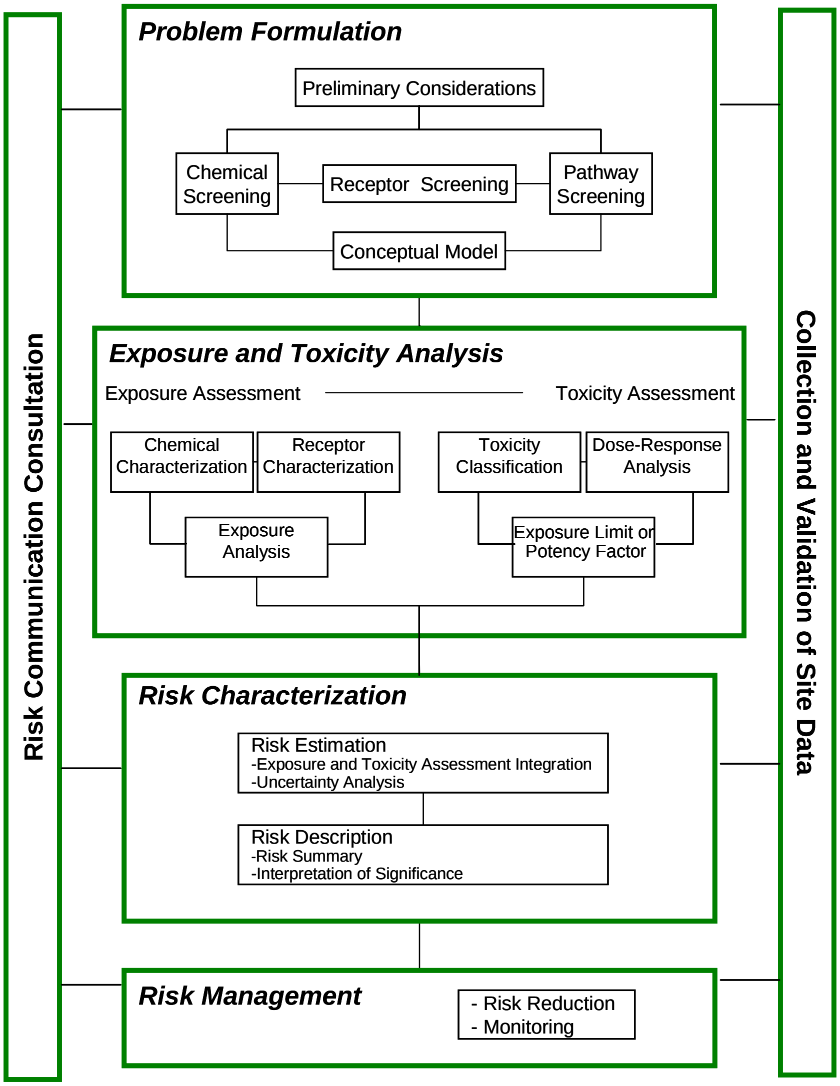
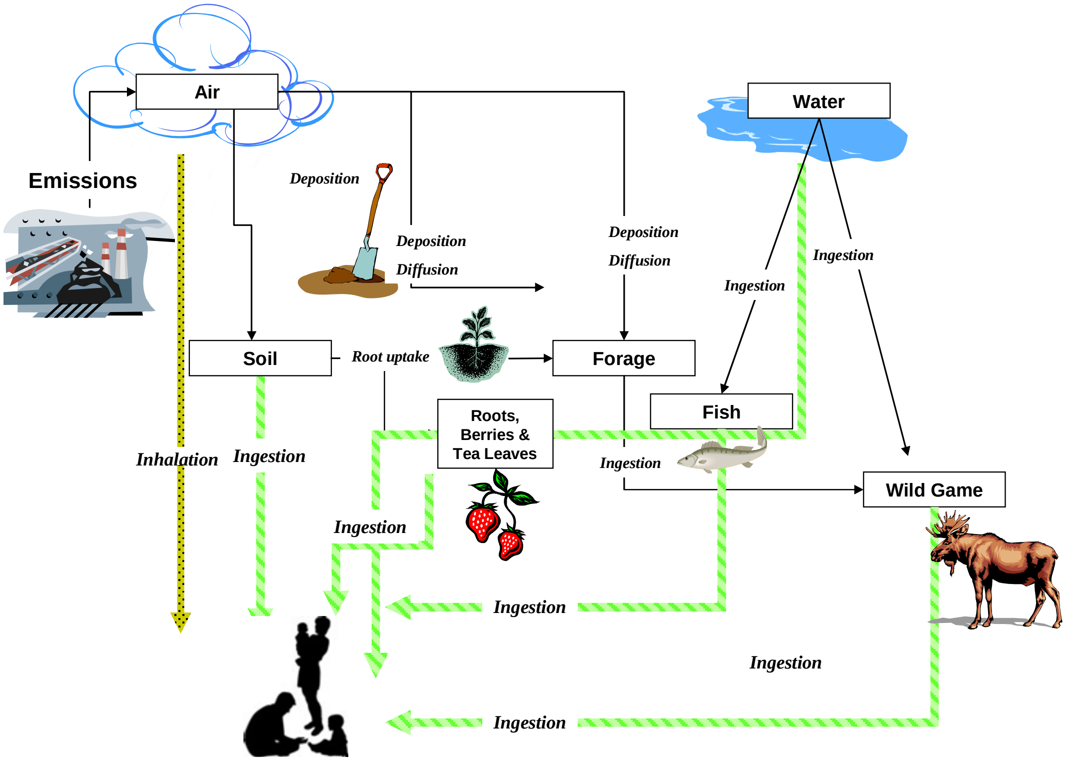


Figure 4.4-2 Summary of Relevant Exposure Pathways



4.5 Existing Conditions

As described in Section 4.4, background exposures arising from ambient levels of the COPCs from natural and anthropogenic sources were evaluated separately, in addition to being added to the predicted exposures from the baseline, application and CEA cases. The purpose of this background assessment is to gain an understanding of how existing conditions may impact human health, as well as contribute to future exposures.

4.5.1 Regional Health Status

The Project will be situated in the Northern Lights Health Region. In 2000 to 2002, the age-standardized incidence rates (ASIR) for all invasive cancers (per 100,000 population, all ages) was lower in this health region than the provincial average, while the age-standardized mortality rates (ASMR) was higher than the province of Alberta (ACB, 2005). In general, the likelihood of developing one of the four most common cancers in Alberta (prostate, breast, colorectal and lung) increases with age (ACB, 2005).

A number of studies have looked at regional differences in asthma or respiratory disease prevalence in Alberta (Svenson et al., 1993; Wang et al., 1996). Based on physician visit claims, Svenson et al. (1993) reported that asthma prevalence was slightly higher than the provincial average in census division 16, which contains the oils sands region. However, analysis of physician visits by Wang et al. (1996) showed lower than average rates for asthma, bronchitis and emphysema in the oil sands census division. Nevertheless, Wang et al. (1996) found that hospital admission rates for asthma and bronchitis from 1990 to 1994 were higher in northern Alberta and specifically in Fort McMurray. As well, in Fort McMurray, a higher rate of physician visits for asthma but a lower rate for bronchitis and emphysema was found. It has been suggested that a diagnostic shift may be responsible for simultaneous increases in asthma cases and decreases in bronchitis cases (Wang et al., 1996). There are also factors that influence whether people are more likely to visit a physician versus going to the hospital. Wang et al. (1996) point out that the rate of mortality, hospital admissions and physician visits may depend up on several factors, including:

- Underlying incidence and prevalence of disease studied;
- Diagnostic patterns among physicians;
- Public and individual awareness of disease;
- Severity of disease;
- Accessibility to physician/hospital services;
- Patterns of seeking medical services among population groups;
- Practice patterns of physicians, emergency rooms and/or hospitals; and,
- Disease reporting and coding practices.

A true elevation in a particular disease outcome in an area would likely be reflected in both hospitalization rates and physician visits (AHW, 1999).

4.5.2 Regional Air Quality and Human Health Studies

The Alberta Oil Sands Community Exposure and Health Effects Assessment Program was a joint industry, government and community initiative that was established to investigate possible links between air quality and human health outcomes in the Fort McMurray region (AHW, 2000). In addition, the Wood Buffalo Environmental Association (WBEA) is promoting an ongoing Human Exposure Monitoring Program (HEMP) to continuously monitor particular air contaminants that individuals are exposed to on a chronic basis during daily activities and in various environments in the oil sands region. It was developed to ensure a long term systematic approach to data gathering that would improve knowledge about the potential link between the air quality and human health in the region. The HEMP began in 2005 in Fort McMurray and Fort Chipewyan, and a report was released in February 2007 (WBEA, 2007).

Results from the AHW study (AHW, 2000) showed chemical air concentrations to be generally low in the Fort McMurray region, compared to air quality guidelines, regardless of whether they were measured indoors or outdoors. Air concentrations were not significantly different in Fort McMurray compared to Lethbridge, despite the high degree of oil and gas development in the Fort McMurray region. Secondly, no significant differences in health status were found between the two community populations regarding physician visits or prevalence of disease.

The AHW (2000) report and the more recent information from the WBEA HEMP Report (WBEA, 2007) suggest the following:

- NO_2 concentrations were low compared to air quality guidelines, although levels have increased since the AHW (2000) study. Indoor concentrations were lower than outdoor concentrations The most important exposure sources were local, suggesting that regional development has little influence;
- SO_2 concentrations were low compared to air quality guidelines, and in general, outdoor air concentrations were similar to the AHW (2000) levels. Indoor concentrations were lower than outdoor levels. The most important significant exposure sources were determined to be local, followed by regional sources. As regional emissions contribute to exposure, industrial emissions in the area must be incorporated into the air quality;
- Ozone indoor and personal concentrations were low; outdoor ambient levels were an order of magnitude higher with the most important exposure source being background sources (naturally-occurring);
- Indoor concentrations were the predominant factor affecting personal exposure to volatile organic compounds (including but not limited to benzene, ethylbenzene, hexane, toluene, and xylenes); and
- $PM_{2.5}$ outdoor concentrations were not important as either a driver or a pathway of personal exposure. The most important exposure source was personal activity and indoor sources.

4.5.2.1 Background Acute Inhalation Risk Assessment Results

The acute inhalation RQ values for the COPCs are presented in Table 4.5-1. As described in Section 4.4, background concentrations in the acute assessment consisted only of measured concentrations for outdoor air from the scientific literature. Rural and Canadian data were included where possible. Risks are only presented for those COPCs for which background (measured) air concentrations were available. Because background air concentrations of the

CACs were accounted for in the baseline air quality assessment, background risks for these compounds (CO, SO_2, NO_2 and $PM_{2.5}$) are presented as part of the baseline case discussion.

Table 4.5-1 Summary of Acute Inhalation Background RQ Values

COPC	Averaging Period	Value (unitless)
Aromatic C_9-C_{16} group	1 h	6.7E-06
Aromatic C_{17}-C_{34} group	24 h	6.4E-06
Acenaphthene Group	24 h	2.0E-06
Acetaldehyde	1 h	6.7E-03
Acrolein	1 h	3.4E-01
Dichlorobenzene	24 h	1.4E-05
Formaldehyde	1 h	5.5E-01
n-Hexane	1 h	1.9E-04
Pentane	1 h	1.1E-05
Toluene	1 h	1.3E-04
Xylenes	1 h	6.9E-04
Mixtures		
Irritants		
Eye irritants		9.0E-01
Nasal irritants		5.5E-01
Respiratory irritants		7.4E-03
Hepatotoxicants		1.3E-05
Nephrotoxicants		8.4E-06
Neurotoxicants		1.0E-03

Note: No RQ values above 1 were presented for the acute background assessment.

4.5.2.2 Background Chronic Inhalation Risk Assessment Results

The chronic background inhalation RQ and LCR values for the COPCs are presented in Tables 4.5-2 and 4.5-3. As discussed in Section 4.4.4.1, background air concentrations used in the chronic inhalation assessment represented the sum of measured indoor and outdoor concentrations reported in the scientific literature.

Risks are only presented for those COPCs for which background (measured) air concentrations were available. Because background air concentrations of the CACs were accounted for in the baseline air quality assessment, background risks for these compounds (CO, SO_2, NO_2 and $PM_{2.5}$) are presented as part of the baseline case discussion.

Table 4.5-2 Summary of Chronic Inhalation Background RQ Values

COPCs	RQ Values (unitless)
Acenaphthene group	1.0E-06
Acrolein	**7.0E+01**
Benzaldehyde	5.6E-05
Dichlorobenzene	6.0E-01
Ethylbenzene	1.5E-03
n-Hexane	2.6E-03
Naphthalene	1.2E-03
Pentane	6.0E-05
Toluene	1.8E-03

COPCs	**RQ Values (unitless)**
Xylenes	9.5E-02
Mixtures	
Irritants	
Nasal irritants	**7.1E+01**
Hepatotoxicants	1.6E-06
Neurotoxicants	2.2E-02

Note: **Bold:** Indicates exceedance of RQ = 1.0.

Table 4.5-3 Summary of Chronic Inhalation Background LCR

COPC	**LCR (unitless)**
Acetaldehyde	**1.3E+00**
B(a)P IPM or TEF	8.8E-04
B(a)P WMM	7.6E-01
Benzene	**2.4E+00**
Formaldehyde	**5.8E+01**
Mixtures	
Carcinogens	**6.2E+01**

Note: **Bold:** Indicates exceedance of LCR = 1.0.

These findings are discussed below.

Acetaldehyde

An LCR of 1.3 was identified for background levels of acetaldehyde. This value suggests that background acetaldehyde levels may contribute slightly more than 1 case of cancer per 100,000.

As described in the risk characterization section, LCR values refer to the number of cancer cases that could potentially result from the estimated exposures to these carcinogenic COPCs in a population of 100,000 people. The regulatory benchmark of an acceptable incremental lifetime cancer risk of one in 100,000 is policy-based, and in this assessment has been used to describe incremental risks associated with the Project alone and does not apply to background risks. An acceptable cancer incidence rate for use as a benchmark when evaluating carcinogenic risk associated with background or baseline conditions has yet to be defined by regulatory agencies. Thus, it is important that background cancer risk estimates be interpreted only as risks per 100,000 individuals.

The exposure limit for acetaldehyde is based on the incidence of nasal tumours (nasal adenocarcinomas and squamous cell carcinomas) in rats (Government of Canada, 2000), as the database associated with the long term effects of acetaldehyde in humans is limited. The Alberta Cancer Registry (ACB, 2005) report that describes the most recent data for cancer incidence in Alberta notes that 8 cancer cases due to tumours of the nasal cavity were diagnosed per 100,000 people (male and female) in 2003. The total number of cases of cancer diagnosed in Alberta for that year was 12,571 per 100,000, indicating that nasal cavity tumours accounted for about 0.06% of these tumours. The potential contribution of background acetaldehyde exposures, as described in this assessment, theoretically would contribute 1.3 nasal tumours per 100,000. Overall, this tumour type seems to have a relatively low frequency of occurrence within the general population, and potential contributions from background acetaldehyde exposure appear to be minimal.

The exposure level in this assessment for background acetaldehyde represents the total of background indoor and outdoor exposures, and is dominated by indoor exposure. The background indoor air level of 21.5 ug/m^3 was obtained from Government of Canada (2000), and represents the mean level of indoor acetaldehyde levels in Canadian urban homes (Windsor, Ontario) as local and rural data were not available. As such, this exposure estimate may be overly conservative for rural homes and represents a worst-case scenario.

Acrolein

Background acrolein concentrations were associated with an RQ of 70 in this assessment.

The chronic exposure limit for acrolein is based upon the incidence of non-cancerous nasal lesions in rats. The notion that background acrolein concentrations may result in sensitive and healthy individuals experiencing nasal irritation under worst-case exposure conditions is examined further below.

No long term studies of the long term effects of acrolein are available (U.S. EPA, 2003; WHO, 2002; Government of Canada, 2000; WHO, 1991), thus the true threshold of effects in humans is unknown. As a result, studies have been based upon animal exposures, and the threshold of effect in humans is unknown. Through the application of uncertainty factors in the derivation of the exposure limit, the effect-threshold for nasal lesions in rats has been adjusted such that the estimated human threshold is about 1,000-times lower than in rats. As such, the true risk of experiencing adverse nasal irritation as a result of current background exposures is likely much less than predicted. Appendix 4A provides additional information regarding the chronic acrolein exposure limit.

The background risk for acrolein is primarily due to the use of an indoor air concentration of 1.3 ug/m^3. This value is based upon 59 indoor air samples collected from Canadian cities during 2005 (CEI, 2006). The background outdoor air concentration of 0.18 ug/m^3 is based on the mean of samples collected from seven Canadian cities (CEPA, 2000a). The indoor and outdoor background air concentrations were added together to yield a total background air concentration, which was used in the chronic inhalation assessment. This approach is likely over conservative, as it is feasible that individuals would spend part of their day outdoors. Table 4.5-4 presents a summary of some acrolein indoor air concentrations from various locations, and associated RQ values assuming the same exposure limit of 0.02 ug/m^3 that was used in the chronic assessment.

Table 4.5-4 Mean Acrolein Concentrations Measured in Indoor Air and Associated RQ

Location	Air Concentration (ug/m^3)	Number of Residences Evaluated	Risk Quotient
Hamilton, Ontario	1.1	11	55
Windsor, Ontario	3.0	29	150
Los Angeles, California	1.2	134	60
Elizabeth, New Jersey	0.96	139	48
Houston, Texas	3.1	125	155
Japan	8.3	1,417	415

The background air concentration for acrolein appears to be within the range of values estimated for other areas in Canada and the world.

Benzene

Background benzene concentrations present a LCR of 2.4, suggesting that indoor and outdoor exposures to current background levels of benzene may contribute to about 2.4 in 100,000 cancer cases per year.

The critical toxicological effect associated with chronic benzene exposure is cancer, particularly leukemia and other tumours of the hematological system (U.S. EPA, 2007). Based upon the most recently published cancer data from the Alberta Cancer Board (ACB, 2005) for the year 2003, a total of 392 cases attributable to leukemia (men and women combined) out of a total number of cases of all cancers of 12,571 per 100,000 (ACB, 2005). This indicates that in 2003, 3% of cancer diagnoses were associated with leukemia. The current assessment suggests that background benzene exposures may contribute to the development of about 2.4 per 100,000 cases. This further suggests that benzene appears to contribute a relatively small proportion to the overall risk of developing leukemia.

The chronic background indoor and outdoor air concentrations used in this assessment were obtained from the recently released WBEA (2007) monitoring program report. The median was selected to represent the concentration to which a person might reasonably be exposed over a 75 year lifetime. Estimated indoor air exposures were slightly higher than outdoor exposures, but the two median concentrations were fairly similar.

Formaldehyde

Chronic background formaldehyde exposure was associated with an LCR of 58, suggesting that background formaldehyde exposure contributes to about 58 cases of cancer per 100,000 people.

Nasopharyngeal tumours are the critical chronic toxicological effect for formaldehyde, although reports of other respiratory tumour types have been noted sporadically (Government of Canada, 2001). The ACB (2005) data for 2003 indicates that a total of 27 new tumours attributable to cancers per 100,000 (males and females combined) of the nasopharynx and nasal cavity were diagnosed. Out of all cases of cancer in 2003 for Alberta, about 0.2% were of the nasopharynx and nasal cavity (27 out of 15,571). The estimated LCR of 58 per 100,000 for background formaldehyde suggests that formaldehyde may contribute to the background cancer incidence rate. However, consideration must be given to the degree of conservatism incorporated into the exposure limit used for the assessment of formaldehyde.

Although formaldehyde is recognized as a human carcinogen (IARC, 2006), the majority of the evidence appears to be from animal studies with exposure levels greater than 7,300 ug/m^3 and from epidemiologic (occupational) case control studies. It is important to recognize that the weight of evidence with respect to the potential for formaldehyde to cause cancer in humans is affected by:

- Differences between rats and humans, such as nasal vs. oronasal breathing patterns, and anatomical differences in relation to dosimetry that may affect the integrity of extrapolating of animal data to humans (Government of Canada, 2001).

- Limited weight of evidence of an association between human cancers and formaldehyde exposure (Hauptmann et al., 2004; Liteplo and Meek, 2003). Health Canada and Environment Canada (Government of Canada, 2001) concluded that although some human case control studies suggest an increased incidence of nasal and nasopharangeal tumours, the findings of these human studies are "less reliable" as a result of limitations in study methodology and design. In contrast to the case studies, larger human cohort studies have not found an association between exposure and nasal cancers (Government of Canada, 2001).

The indoor and outdoor background concentrations used in this assessment consisted of measurements from urban Canadian areas, as no rural or relevant local information was available. Thus, these exposure levels may be overly conservative for rural areas and as such, the LCR is likely an overestimate.

Nasal Irritant Mixture

The nasal irritant mixture, consisting of acrolein, dichlorobenzene, and naphthalene, presented an RI of 71. The nasal irritant mixture RI is dominated by acrolein, given that the RQ of acrolein is 70 and the RQ values for dichlorobenzene and naphthalene are both less than one.

As discussed above in relation to the acrolein results, this prediction is likely overly conservative given that the exposure limit assumes that the effect-threshold in humans is about 1,000-times lower than in rats. There is a potential risk that sensitive individuals may experience nasal irritation in association with the assumed background concentrations of the nasal irritants. However, the predicted risks are likely over stated.

Carcinogen Mixture

Background carcinogens, when added together, resulted in an RI of 62. The primary contributors to the overall carcinogenic risk are formaldehyde, benzene and acetaldehyde (in relative order of their contribution to the RI). Although the tumour types associated with these three COPCs are different, this RI value indicates that existing background exposures appear to contribute to an individual's risk of developing cancer within a lifetime.

4.5.2.3 Background Multi-Media Risk Assessment Results

The multiple-pathway exposure assessment focused on those COPCs that potentially may enter the human food chain. To estimate the exposure to carcinogens that an individual may receive over a lifetime, receptors were evaluated not only by individual life stage but also using a composite receptor where risks were amortized across life stages.

Three of the four receptor types were evaluated within the multi-media exposure model: FNR, RESI and COMM. Chronic RQ and LCR values for the background scenarios were calculated based upon exposures from multiple routes of exposure. More information on this model is presented in Appendix 4B. The calculated chronic RQ and LCR values for background exposures are presented in Table 4.5-5 and Table 4.5-6, respectively.

Table 4.5-5 Summary of RQ for Multi-Media Background Exposures

	FNR	RESI	COMM
Naphthalene	3.5E-02	2.1E-02	1.5E-03

Note: There are no background RQs calculated for the Aromatic C_{17}-C_{34} group because background values were assumed to be “zero” (Table 4.4-5).

Table 4.5-6 Summary of LCR for Multi-Media Background Exposures

	FNR	RESI	COMM
Benzo(a)pyrene (IPM or TEF)	3.0E-01	5.8E-02	4.8E-03
Benzo(a)pyrene (WMM)	5.1E-01	4.8E-01	4.7E-01

Background exposures to the COPCs in the Tables 4.6-5 and 4.6-6 did not exceed their respective exposure limits for any of the receptor groups.

These results suggest that background exposure to these COPCs through multiple environmental media (i.e., air, water, soil or local country food consumption) are associated with negligible risk of non-carcinogenic and carcinogenic health effects.

4.6 Impact Assessment and Mitigative Measures

This section describes the potential risks of the Project on human health. The findings of the acute and chronic assessments of the baseline and application scenarios are presented for each receptor group individually. Background exposures are also discussed for comparison purposes.

Each of the tables within this section have a separate column for Project results. Although not specifically predicted by the Air Quality team, the estimated health risks from the Project were calculated by subtracting baseline RQ/LCR values from application RQ/LCR values, as the Project represents the difference between the two development cases. The Project-specific information and background results are presented within the tables to aid in the evaluation of relative contribution of risk from existing conditions, the Project emissions and other sources in the area.

4.6.1 First Nations Receptor (FNR)

4.6.1.1 Acute Inhalation Assessment Results

Table 4.6-1 presents the RQ values for the acute effects assessment of the FNR. Baseline and application cases are presented with background RQs included in the value. RQs for background are presented in a separate column for comparison purposes. RQ values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-1 Summary of Acute Inhalation RQ Values for the First Nations Receptor

COPC	Averaging Time	Background	Baseline (with Background	Application (with Background)	Project (no Background)
Acenaphthene Group	24 h	6.7E-06	7.1E-06	7.1E-06	0.0E+00
Aromatic C_9-C_{16} Group	1 h	6.4E-06	6.8E-06	6.8E-06	4.4E-12
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.3E-06	2.3E-06	7.3E-11
Acetaldehyde	1 h	6.7E-03	6.7E-03	6.7E-03	0.0E+00
Acrolein	1 h	3.4E-01	5.4E-01	5.4E-01	2.0E-03
Benzaldehyde	ND	-	-	-	-
Benzene	24 h	8.0E-02	1.1E-01	1.1E-01	2.0E-06
CO	1 h	NA	1.9E-02	1.9E-02	2.7E-06
CO	8 h	NA	4.7E-02	4.7E-02	6.7E-06
Dichlorobenzene	24 h	1.4E-05	1.4E-05	1.4E-05	5.3E-11

COPC	**Averaging Time**	**Background**	**Baseline (with Background**	**Application (with Background)**	**Project (no Background)**
Ethylbenzene	24 h	2.3E-04	7.5E-04	7.5E-04	0.0E+00
Formaldehyde	1 h	5.5E-01	5.7E-01	5.7E-01	0.0E+00
Hexane	1 h	1.9E-04	4.5E-02	4.5E-02	0.0E+00
Naphthalene	1 h	4.4E-06	2.0E-03	2.0E-03	0.0E+00
NO_2	1 h	NA	1.8E-01	1.8E-01	0.0E+00
NO_2	24 h	NA	1.3E-01	1.3E-01	2.6E-03
Pentane	1 h	***	9.6E-04	9.6E-04	7.0E-08
$PM_{2.5}$	24 h	NA	4.1E-01	4.1E-01	0.0E+00
SO_2	10 min	NA	1.2E-01	1.2E-01	0.0E+00
SO_2	1 h	NA	9.4E-02	9.4E-02	0.0E+00
SO_2	24 h	NA	1.3E-01	1.3E-01	0.0E+00
Toluene	1 h	1.3E-04	3.9E-04	3.9E-04	5.4E-09
Xylenes	1 h	6.9E-04	1.8E-03	1.8E-03	1.1E-08
Mixtures					
Irritants					
Eye irritants		9.0E-01	**1.1E+00**	**1.1E+00**	2.0E-03
Nasal irritants		5.5E-01	5.7E-01	5.7E-01	2.0E-03
Respiratory irritants		7.4E-03	2.3E-01	2.3E-01	2.6E-03
Hepatotoxicants		1.3E-05	9.7E-04	4.5E-02	4.4E-02
Nephrotoxicants		8.4E-06	9.7E-04	9.7E-04	7.0E-08
Neurotoxicants		1.0E-03	4.7E-02	4.7E-02	1.7E-08

Note: ND: No exposure limit evaluated. Parameter not evaluated.

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

None of the COPCs presented an RQ value greater than 1 for the Project alone, or for either the baseline or application case.

The eye irritant mixture presented an RQ of 1.1 in the baseline and application cases. As the Project contribution to the eye irritant mixture is very small, it appears that background levels of eye irritants contribute the most to the RQ values for baseline and application. The background RI for the eye irritants mixture is 0.9, which appears to be primarily attributable to background formaldehyde and acrolein concentrations.

Risk of adverse effects to the FNR associated with acute inhalation of the Project-related COPCs are anticipated to be low.

4.6.1.2 Chronic Inhalation Assessment Results

Table 4.6-2 and Table 4.6-3 present the RQ, LCR and ILCR values for the chronic inhalation assessment for the FNR. Baseline and application cases are presented with background risks included in the value. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-2 Summary of Chronic Inhalation RQ Values for the First Nations Receptor

COPC	Background	Baseline with Background	Application (with background)	Project Alone
Acenaphthene Group	1.6E-06	1.6E-06	1.6E-06	5.8E-11
Aromatic C_{17}-C_{34} Group	0.0E+00	1.1E-08	1.1E-08	6.9E-10
2-methylnaphthalene	0.0E+00	1.2E-08	1.2E-08	5.2E-10
Acrolein	**7.0E+01**	**7.0E+01**	**7.0E+01**	4.9E-03
Benzaldehyde	5.6E-05	6.1E-05	6.1E-05	3.2E-07
Dichlorobenzene	6.0E-01	6.0E-01	6.0E-01	8.6E-08
Ethylbenzene	1.5E-03	1.6E-03	1.6E-03	0.0E+00
Hexane	2.6E-03	5.8E-03	5.8E-03	3.6E-06
Naphthalene	1.2E-03	1.6E-02	1.6E-02	1.3E-06
NO_2	NA	6.2E-02	6.8E-02	5.2E-03
Pentane	6.0E-05	1.2E-04	1.2E-04	2.0E-07
$PM_{2.5}$	NA	2.1E-01	2.1E-01	3.8E-03
SO_2	NA	7.6E-02	7.7E-02	1.4E-03
Toluene	1.8E-03	1.8E-03	1.8E-03	2.0E-08
Xylenes	9.5E-02	9.6E-02	9.6E-02	4.0E-07
Mixtures				
Irritants				
Eye irritants	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.1E+01**	**7.1E+01**	4.9E-03
Respiratory irritants	3.1E-01	1.4E-01	1.4E-01	6.6E-03
Hepatotoxicants	1.6E-06	1.6E-06	1.6E-06	5.7E-10
Nephrotoxicants	0.0E+00	2.2E-08	2.3E-08	1.2E-09
Neurotoxicants	2.2E-02	1.0E-01	1.0E-01	4.2E-06

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.6-3 Summary of the Cancer Risks for the First Nations Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	Application (with Background, LCR)	Project Alone (ILCR)
Acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**	1.2E-05
B(a)P IPM	8.8E-04	8.9E-04	8.9E-04	5.9E-08
B(a)P WMM	7.6E-01	7.7E-01	7.7E-01	4.9E-05
Benzene	**2.4E+00**	**2.4E+00**	**2.4E+00**	4.2E-05
Formaldehyde	**5.8E+01**	**5.8E+01**	**5.8E+01**	3.7E-03
Mixtures				
Carcinogens	**6.2E+01**	**6.2E+01**	**6.2E+01**	3.8E-03

Note: **Bold**: Indicates exceedance of LCR = 1.0.

Acrolein was the only individual COPC that presented an RQ value above 1 (the RQ in both the baseline and application cases was 70). This suggests that there is some potential risk of nasal irritation in sensitive individuals. However, as the RQ value for the Project alone is relatively small, and the RQ value for background is the same as the RQ values for baseline and application, background sources of acrolein are primarily influencing the RQ values. Section 4.5.2.2 provides a discussion of background acrolein.

Similarly, the nasal irritants mixture in the baseline and application cases present RI values of 71 in each case. As the RQ for the project contribution to the nasal irritant mixture is very low, and the RQ for background eye irritant mixtures is 71, it is apparent that the background concentrations are “responsible” for the elevated RQ values. Acrolein is a component of this mixture, and given that it has a background RQ value of 70, this COPC is the major determinant of the potential nasal irritation.

With respect to carcinogenic risks, acetaldehyde, benzene, and formaldehyde all presented baseline and application LCR values greater than 1 (i.e., greater than 1 in 100,000). The Project ILCR values for these three COPCs are all lower than 1, while the background LCR values are equivalent to the baseline and application LCR values. This suggests that background exposures to formaldehyde, acetaldehyde and benzene (in relative order of their contribution to the mixture risk) are primarily responsible for the risks associated with the baseline and application cases. Similarly, the carcinogen mixture presents an LCR of 6.2 for each of the background, baseline and application cases while the ILCR associated with the Project alone is much lower than 1. The results for the carcinogen mixture appear to be dominated by background LCR for acetaldehyde, benzene and formaldehyde. Section 4.5.2.2 provides a discussion of these background carcinogens.

With respect to ongoing, long term inhalation, the Project does not appear to present unacceptable health risks to local and regional First Nations groups.

4.6.1.3 Chronic Multi-Pathway Assessment Results

Table 4.6-4 and Table 4.6-5 present the RQ, LCR and ILCR values for the chronic multi-pathway assessment for the FNR. Baseline and application cases are presented with background risks included in the value. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-4 Summary of RQ for Multi-Media Exposures for the First Nation Receptor

	Background	**Baseline (with background**	**Application (with background)**	**Project Alone**
Aromatic C_{17}-C_{34} Group	0.0E+00	3.3E-06	3.3E-06	8.1E-09
Naphthalene	3.5E-02	1.7E-01	1.7E-01	0.0E+00

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Table 4.6-5 Summary of Cancer Risk for Multi-Media Exposure for the First Nations Receptor

	Background (LCR)	Baseline (with background, LCR)	Application (with background, LCR)	Project Alone (ILCR)
Benzo(a)pyrene (IPM or TEF)	3.0E-01	5.6E-01	5.6E-01	0.0E+00
Benzo(a)pyrene (WMM)	5.1E-01	3.5E-01	3.5E-01	0.0E+00

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

All RQ values for non-carcinogenic COPCs were less than one. Adverse health effects in association with chronic exposure to these substances are unlikely.

LCR values indicate that less than one per 100,000 cases of cancer are anticipated in association with exposures in the baseline and application cases. The LCR values for both the baseline and application cases appear to be dominated by the contributions from background. Evaluation of the Project case alone (without background) indicates that the Project emissions are associated with a negligible incremental lifetime cancer risk in the multi-pathway model (i.e., well below the benchmark for acceptable ILCR of 1 in 100,000).

4.6.2 Residential Receptor

4.6.2.1 Acute Inhalation Assessment Results

Table 4.6-6 presents the RQ values for the acute effects assessment of the RESI receptor. Baseline and application cases are presented with background RQs included in the value. RQs for background are presented in a separate column for comparison purposes. RQ values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-6 Summary of Acute Inhalation RQ Values for the Residential Receptor

COPC	Averaging Time	Background	Baseline with Background	Application (with Background)	Project Alone (no Background)
Acenaphthene Group	24 h	6.7E-06	8.3E-06	8.3E-06	0.0E+00
Aromatic C_9-C_{16} Group	1 h	6.4E-06	7.9E-06	7.9E-06	1.1E-11
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.7E-06	2.7E-06	1.4E-11
acetaldehyde	1 h	6.7E-03	7.7E-03	7.7E-03	0.0E+00
acrolein	1 h	3.4E-01	**3.7E+00**	**3.7E+00**	0.0E+00
benzaldehyde	ND	-	-	-	-
benzene	24 h	8.0E-02	2.3E-01	2.3E-01	0.0E+00
CO	1 h	NA	1.2E-01	1.2E-01	0.0E+00
CO	8 h	NA	1.8E-01	1.8E-01	0.0E+00
dichlorobenzene	24 h	1.4E-05	1.6E-05	1.6E-05	0.0E+00
ethylbenzene	24 h	2.3E-04	3.3E-03	3.3E-03	0.0E+00

COPC	**Averaging Time**	**Background**	**Baseline with Background**	**Application (with Background)**	**Project Alone (no Background)**
formaldehyde	1 h	5.5E-01	**1.1E+00**	**1.1E+00**	0.0E+00
hexane	1 h	1.9E-04	1.5E-01	1.5E-01	0.0E+00
naphthalene	1 h	4.4E-06	6.2E-03	6.2E-03	0.0E+00
NO_2	1 h	NA	2.0E-01	2.0E-01	0.0E+00
NO_2	24 h	NA	2.3E-01	2.3E-01	0.0E+00
pentane	1 h	0.0E+00	3.3E-03	3.3E-03	0.0E+00
$PM_{2.5}$	24 h	0.0E+00	**1.5E+00**	**1.5E+00**	2.9E-03
SO_2	10 min	NA	1.5E-01	1.5E-01	0.0E+00
SO_2	1 h	NA	1.1E-01	1.1E-01	0.0E+00
SO_2	24 h	NA	1.6E-01	1.6E-01	2.0E-05
toluene	1 h	1.3E-04	1.1E-03	1.1E-03	0.0E+00
xylenes	1 h	6.9E-04	4.6E-03	4.6E-03	0.0E+00
Mixtures					
Irritants					
Eye irritants		9.0E-01	**4.8E+00**	**4.8E+00**	0.0E+00
Nasal irritants		5.5E-01	**1.1E+00**	**1.1E+00**	6.2E-03
Respiratory irritants		7.4E-03	3.6E-01	3.6E-01	0.0E+00
Hepatotoxicants		1.3E-05	3.3E-03	1.6E-01	1.5E-01
Nephrotoxicants		8.4E-06	3.3E-03	3.3E-03	2.5E-11
Neurotoxicants		1.0E-03	1.6E-01	1.6E-01	1.1E-11

Note: NA: No exposure limit evaluated. Parameter not evaluated.

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

All RQ values, with the exception of three individual COPCs, are less than 1.

Acrolein presented an RQ of 3.7 in both the baseline and application cases, suggesting that sensitive individuals may be at increased risk of experiencing eye irritation as a result of acute exposure. This RQ (in both development cases) is based upon the maximum predicted acrolein concentration out of all residential areas, and thus is a conservative estimate. Although background concentrations contribute to these RQ values, other area sources included in the baseline and application air quality predictions appear to be the major contributors to the acrolein concentrations for this receptor in the acute assessment. Given that the assessment of the Project alone (without background added) presents an RQ of zero, the Project itself does not appear to pose an acrolein-related short term health risk to residents in the area. Section 4.5.2.2, Section 4.6.5.1 and Appendix 4A provide more information regarding acrolein.

Acute formaldehyde exposure in the baseline and application cases was associated with an RQ value of 1.1. This indicates that sensitive individuals may be at a slightly increased risk of experiencing nasal irritation in association with acute formaldehyde exposures. The background case contributes almost 50% of the risk associated with the RQ of 1.1, while the Project is associated with an RQ of zero. The emissions of formaldehyde from the Project alone are not likely to result in adverse health effects.

$PM_{2.5}$ is associated with an RQ value of 1.5 in both the baseline and application cases. The primary contributors to both the baseline and application cases are other sources in the area that were included in the air quality assessment. The Project alone was associated with an RQ of about 0.003. As such, primary and secondary $PM_{2.5}$ levels from the Project are not anticipated to adversely affect health. Section 4.5.2 and Appendices 4A and 4C provide additional information on the potential health effects of particulate matter.

Eye and nasal irritant mixtures both presented RI values greater than one. The eye irritant RI values in both the baseline and application cases are primarily due to the acrolein content of the mixture. As described previously, the predicted acrolein concentration represents a conservative estimate. The nasal irritant RI for both the baseline and application cases was 1.1. This value is equivalent to the formaldehyde RQ of 1.1 for these cases, indicating that formaldehyde is the major contributor to this mixture.

4.6.2.2 Chronic Inhalation Assessment Results for the Residential Receptor (RESI)

Table 4.6-7 and Table 4.6-8 present the RQ, LCR and ILCR values for the chronic inhalation effects assessment for the RESI receptor. Baseline and application cases are presented with background risks included. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-7 Summary of Chronic Inhalation RQ Values for the Residential Receptor

COPC	Background	Baseline with Background	Application (with Background)	Project Alone
Acenaphthene Group	1.6E-06	1.8E-06	1.8E-06	3.7E-11
Aromatic C_{17}-C_{34} Group	0.0E+00	3.8E-07	3.8E-07	1.3E-10
2-methylnaphthalene	0.0E+00	2.9E-07	2.9E-07	9.5E-11
acrolein	**7.0E+01**	**7.3E+01**	**7.3E+01**	9.0E-04
benzaldehyde	5.6E-05	2.3E-04	2.3E-04	5.8E-08
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01	1.5E-08
ethylbenzene	1.5E-03	1.9E-03	1.9E-03	0.0E+00
hexane	2.6E-03	2.0E-02	2.0E-02	1.4E-06
naphthalene	1.2E-03	5.6E-02	5.6E-02	0.0E+00
NO_2	NA	2.3E-01	2.3E-01	6.8E-04
pentane	6.0E-05	6.1E-04	6.1E-04	1.6E-07
$PM_{2.5}$	NA	**1.2E+00**	**1.2E+00**	1.2E-03
SO_2	NA	1.6E-01	1.6E-01	3.3E-04
toluene	1.8E-03	2.0E-03	2.0E-03	1.2E-08
xylenes	9.5E-02	1.0E-01	1.0E-01	2.0E-07
Mixtures				
Irritants				
Eye irritants	0.0E+00	0.0E+00	0.0E+00	9.0E-04
Nasal irritants	**7.1E+01**	**7.3E+01**	**7.3E+01**	1.0E-03
Respiratory irritants		7.0E-01	7.0E-01	1.3E-10
Hepatotoxicants	1.6E-06	2.1E-06	2.1E-06	0.0E+00
Nephrotoxicants	0.0E+00	6.7E-07	6.7E-07	2.3E-10
Neurotoxicants	2.2E-02	4.6E-02	4.6E-02	8.1E-04

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.6-8 Summary of Inhalation Cancer Risks for the Residential Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	Application (with Background, LCR)	Project Alone (ILCR)
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**	2.3E-06
B(a)P IPM	8.8E-04	9.4E-04	9.4E-04	1.1E-08
B(a)P WMM	7.6E-01	8.0E-01	8.0E-01	1.0E-05
benzene	**2.4E+00**	**2.6E+00**	**2.6E+00**	2.3E-05
formaldehyde	**5.8E+01**	**6.0E+01**	**6.0E+01**	7.8E-04
Mixtures				
Carcinogens	**6.2E+01**	**6.4E+01**	**6.4E+01**	8.1E-04

Note: **Bold**: Indicates exceedance of LCR = 1.0.

With the exception of two COPCs (acrolein and $PM_{2.5}$), all chronic air concentrations were determined to be less than their respective exposure limits.

Acrolein presented an RQ value of 73 in both the baseline and application cases, suggesting an increased risk of nasal irritation with chronic exposure. Given that the RQ for background acrolein is 70, it may be reasonably assumed that the primary component of the predicted acrolein concentrations in these two cases is from background sources, with some added impact from other area sources. The acrolein RQ values associated with the Project itself were determined to be negligible for both the baseline and application cases. Section 4.5.2.2, Section 4.6.5.1 and Appendix 4A provide additional information on potential long term acrolein health effects.

$PM_{2.5}$ presented an RQ value of 1.2 for both the baseline and application cases, suggesting a slightly elevated risk to sensitive individuals exposed on a long term basis. Both background and Project $PM_{2.5}$ concentrations appear to be associated with negligible health risks. Thus, the RQ value of 1.2 seems to be driven by contributions from other area sources. Section 4.5.2 and Appendices 4A and 4C provide additional information on the health effects of particulate matter.

The maximum RQ values for the baseline and application cases correspond to annual $PM_{2.5}$ air concentrations of 14.29 ug/m^3 and 14.30 ug/m^3 at Anzac, respectively. No other exceedances of the CARB 12 ug/m^3 standard were predicted at any of the other locations.

The nasal irritant mixture presented an RI of 73 in the baseline and application cases. When compared to the nasal irritant RI of 71 for background, it appears that the risks for this mixture are primarily attributable to background sources of exposure, particularly to acrolein. Project contributions to the risk of nasal irritation are negligible.

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1 for the baseline and application cases. Upon comparison of the LCR values for each of these COPCs to their respective background LCR estimates, it is apparent that the majority of the calculated cancer risk is associated with background exposures. Section 4.7 provides interpretation of these cancer risks in relation to human health.

The Project emissions of the carcinogenic COPCs present ILCR values less than 1, indicating that the project is associated with essentially negligible incremental cancer risks (i.e., less than 1 in 100,000).

The carcinogenic mixture assessment reveals an LCR of 6.4 for the baseline and application cases. Formaldehyde, benzene and acetaldehyde are the three carcinogenic COPCs that primarily contribute to the total LCR (in relative order of their contribution). When compared to the LCR for background carcinogen mixtures (LCR 6.2), it is apparent that background LCR is the primary determinant of the baseline and application LCR values. Section 4.7 provides an interpretation of these risks in relation to human health.

Overall, the emissions from the Project itself are unlikely to result in adverse chronic air-related health risks.

4.6.2.3 Chronic Multi-Pathway Assessment Results for the Residential Receptor

Table 4.6-9 and Table 4.6-10 present the RQ, LCR and ILCR values for the chronic multi-pathway assessment for the Residential Receptor group. As before, baseline and application cases are presented with background risks included in the value. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-9 Summary of RQ for Multi-Media Exposures for the Residential Receptor

	Background	Baseline (with background	Application (with background)	Project Alone
Aromatic C_{17}-C_{34} Group	0.0E+00	2.3E-06	2.3E-06	5.9E-09
Naphthalene	2.1E-02	1.6E-01	1.6E-01	0.0E+00

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Table 4.6-10 Summary of Multi-Media Cancer Risks for the Residential Receptor

	Background (LCR)	Baseline (with background, LCR)	Application (with background, LCR)	Project Alone (ILCR)
Benzo(a)pyrene (IPM or TEF)	5.8E-02	6.5E-02	6.5E-02	0.0E+00
Benzo(a)pyrene (WMM)	4.8E-01	5.3E-01	5.3E-01	0.0E+00

All RQ values for the non-carcinogenic COPCs were less than 1. Adverse health effects in association with chronic multiple-exposure to these substances are unlikely.

LCR values indicate that less than 1 per 100,000 cases of cancer are anticipated for the baseline and application cases. The LCR values for both the baseline and application cases appear to be dominated by the contributions from background. Evaluation of the Project Case alone (without background) indicates that the Project emissions are associated with an ILCR of less than 1 in 100,000.

4.6.3 Commercial Receptor

4.6.3.1 Acute Inhalation Assessment Results

Table 4.6-11 presents the RQ values for the acute effects assessment of the commercial (COMM) receptor. Baseline and application cases are presented with background RQs included. RQs for background are presented in a separate column for comparison purposes. RQ values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-11 Summary of Acute Inhalation RQ Values for the Commercial Receptor

COPC	Averaging Time	Background	Baseline with Background	Application (with Background)	Project Alone (no Background)
Acenaphthene Group	24h	6.7E-06	6.7E-06	7.0E-06	1.3E-11
Aromatic C_9-C_{16} Group	1 h	6.4E-06	6.4E-06	6.6E-06	1.1E-12
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.0E-06	2.1E-06	4.6E-12
acetaldehyde	1 h	6.7E-03	6.7E-03	6.7E-03	9.8E-08
acrolein	1 h	3.4E-01	3.4E-01	4.4E-01	0.0E+00
benzaldehyde	ND	-	-	-	-
benzene	24 h	8.0E-02	8.0E-02	9.7E-02	1.7E-06
CO	1 h	NA	0.0E+00	6.3E-03	8.3E-05
CO	8 h	NA	0.0E+00	1.2E-02	1.4E-04
dichlorobenzene	24 h	1.4E-05	1.4E-05	1.4E-05	2.8E-11
ethylbenzene	24 h	2.3E-04	2.3E-04	5.7E-04	0.0E+00
formaldehyde	1 h	5.5E-01	5.5E-01	5.6E-01	9.9E-05
hexane	1 h	1.9E-04	1.9E-04	3.4E-02	0.0E+00
naphthalene	1 h	4.4E-06	4.4E-06	1.4E-03	0.0E+00
NO_2	1 h	NA	0.0E+00	1.0E-01	0.0E+00
NO_2	24 h	NA	0.0E+00	9.3E-02	8.0E-05
pentane	1 h	0.0E+00	0.0E+00	7.3E-04	0.0E+00
$PM_{2.5}$	24 h	0.0E+00	0.0E+00	9.5E-02	3.2E-03
SO_2	10 min	NA	0.0E+00	1.1E-01	0.0E+00
SO_2	1 h	NA	0.0E+00	8.2E-02	0.0E+00
SO_2	24 h	NA	0.0E+00	1.2E-01	2.7E-05
toluene	1 h	1.3E-04	1.3E-04	3.3E-04	0.0E+00
xylenes	1 h	6.9E-04	6.9E-04	1.5E-03	0.0E+00
Mixtures					
Irritants					
Eye irritants		9.0E-01	9.0E-01	**1.0E+00**	9.9E-05
Nasal irritants		5.5E-01	5.5E-01	5.6E-01	1.5E-03
Respiratory irritants		7.4E-03	7.4E-03	1.8E-01	8.0E-05
Hepatotoxicants		1.3E-05	1.3E-05	7.5E-04	3.4E-02
Nephrotoxicants		8.4E-06	8.4E-06	7.4E-04	5.7E-12
Neurotoxicants		1.0E-03	1.0E-03	3.6E-02	1.1E-12

Note: ND: No exposure limit evaluated. Parameter not evaluated.

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

None of the individual COPCs or chemical mixtures presented RQ values greater than 1 in any of the development cases.

4.6.3.2 Chronic Inhalation Assessment Results for the Commercial Receptor

Table 4.6-12 and Table 4.6-13 present the RQ, LCR and ILCR values for the chronic effects assessment for the COMM receptor. Baseline and application cases are presented with background risks included in the values. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-12 Summary of Chronic Inhalation RQ Values for the Commercial Receptor

COPC	Background	Baseline with Background	Application (with Background)	Project Alone
Acenaphthene Group	1.6E-06	1.6E-06	1.6E-06	1.7E-10
Aromatic C_{17}-C_{34} Group	0.0E+00	2.2E-09	2.9E-09	6.7E-10
2-methylnaphthalene	0.0E+00	6.1E-09	6.6E-09	5.0E-10
acrolein	**7.0E+01**	**7.0E+01**	**7.0E+01**	2.7E-03
benzaldehyde	5.6E-05	5.7E-05	5.8E-05	3.1E-07
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01	8.3E-08
ethylbenzene	1.5E-03	1.5E-03	1.5E-03	9.0E-09
hexane	2.6E-03	3.8E-03	3.8E-03	1.0E-05
naphthalene	1.2E-03	6.8E-03	6.9E-03	3.7E-06
NO_2	NA	5.3E-02	5.8E-02	5.3E-03
pentane	6.0E-05	8.5E-05	8.6E-05	5.7E-07
$PM_{2.5}$	NA	7.1E-02	7.4E-02	3.5E-03
SO_2	NA	4.5E-02	4.6E-02	1.2E-03
toluene	1.8E-03	1.8E-03	1.8E-03	6.0E-08
xylenes	9.5E-02	9.5E-02	9.5E-02	1.2E-06
Mixtures				
Irritants				
Eye irritants	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.1E+01**	**7.1E+01**	2.7E-03
Respiratory irritants		9.7E-02	1.0E-01	6.4E-03
Hepatotoxicants	1.6E-06	1.6E-06	1.6E-06	6.8E-10
Nephrotoxicants	0.0E+00	8.3E-09	9.5E-09	1.2E-09
Neurotoxicants	2.2E-02	1.0E-01	1.0E-01	1.2E-05

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.6-13 Summary of Inhalation Cancer Risks for the Commercial Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	Application (with Background, LCR)	Project Alone (ILCR)
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**	1.2E-05
B(a)P IPM	8.8E-04	8.8E-04	8.8E-04	3.5E-08
B(a)P WMM	7.6E-01	7.7E-01	7.7E-01	2.9E-05
benzene	**2.4E+00**	**2.4E+00**	**2.4E+00**	1.2E-04

COPCs	**Background (LCR)**	**Baseline (with Background, LCR)**	**Application (with Background, LCR)**	**Project Alone (ILCR)**
formaldehyde	**5.8E+01**	**5.8E+01**	**5.8E+01**	3.6E-03
Mixtures				
Carcinogens	**6.2E+01**	**6.2E+01**	**6.2E+01**	3.8E-03

Note: **Bold**: Indicates exceedance of LCR = 1.0.

With the exception of acrolein, chronic air concentrations for all COPCs were less than their respective exposure limits.

Acrolein presented an RQ value of 70 in both the baseline and application cases, suggesting an increased risk of nasal irritation with chronic exposure. Given that the RQ for background acrolein is also 70, it is clear that the primary component of the predicted acrolein concentrations in these two cases is from background sources. The acrolein RQ values associated with the Project itself were determined to be negligible for both the baseline and application cases. Sections 4.5.2.2 and 4.6.5.1 and Appendix 4A provide additional information on the health effects of acrolein.

The nasal irritant mixture presented an RI of 71 in the baseline and application cases. When compared to the nasal irritant RI of 71 for background, the risks for this mixture are almost entirely due to background sources of acrolein. Project contributions to the risk of nasal irritation are negligible.

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1 for the baseline and application cases. Upon comparison of the LCR values for each of these COPCs to their respective background LCR estimates, it is apparent that the majority of the estimated cancer risk is due to background exposures. Section 4.7 provides interpretation of these background cancer risks in relation to human health. The Project emissions of the carcinogenic COPCs present ILCR values less than 1, indicating that the project is associated with negligible incremental cancer risks (i.e., less than 1 in 100,000).

The carcinogenic mixture assessment reveals an LCR of 6.2 for the baseline and application cases. Formaldehyde, benzene and acetaldehyde are the three carcinogenic COPCs that contribute to the summed LCR (in relative order of their contribution to the mixture risk). When compared to the LCR for background carcinogen mixtures of 6.2, it is apparent that background LCR is the primary determinant of the baseline and application LCR values. Section 4.7 provides interpretation of these risks in relation to human health.

Overall, the emissions from the Project itself are unlikely to result in adverse chronic air-related health risks.

4.6.3.3 Chronic Multi-Pathway Assessment Results for the Commercial Receptor

Table 4.6-14 and Table 4.6-15 present the RQ, LCR and ILCR values for the chronic multi-pathway assessment for the COMM group. As before, baseline and application cases are presented with background risks included in the value. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-14 Summary of RQ for Multi-Media Exposures for the Commercial Receptor

	Background	Baseline with Background	Application (with background)	Project Alone
Aromatic C_{17}-C_{34} Group	0.0E+00	1.9E-06	1.9E-06	4.8E-09
Naphthalene	1.5E-03	1.4E-01	1.4E-01	0.0E+00

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Table 4.6-15 Summary of Multi-Media Cancer Risks for the Commercial Receptor

	Background (LCR)	Baseline (with background, LCR)	Application (with background, LCR)	Project Alone (ILCR)
Benzo(a)pyrene (IPM or TEF)	4.8E-03	5.5E-03	5.5E-03	0.0E+00
Benzo(a)pyrene (WMM)	4.7E-01	5.3E-01	5.3E-01	0.0E+00

Note: A value of zero indicates that for this COPC, the exposure level is either estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

The RQ values for the aromatic C_{17}-C_{34} group and naphthalene were less than 1 for all development cases. As a result, no adverse health effects in association with chronic exposure to these substances are expected.

LCR values indicate that less than 1 per 100,000 cases of cancer are anticipated as a result of exposures to carcinogens in the baseline and application cases. The LCR values for both the baseline and application cases are dominated by the contributions from background. Evaluation of the Project case alone (without background) indicates that the Project emissions are associated with an ILCR of less than 1 in 100,000.

4.6.4 Recreational Receptor

4.6.4.1 Acute Inhalation Assessment Results

Table 4.6-16 presents the RQ values for the acute effects assessment of the Recreational (RECR) Receptor. Baseline and application cases are presented with background RQs included. RQs for background are presented in a separate column for comparison purposes. RQ values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-16 Summary of Acute Inhalation RQ Values for the Recreational Receptor

COPC	Averaging Time	Background	Baseline (with Background	Application (with Background)	Project Alone
Acenaphthene Group	24 h	6.7E-06	7.2E-06	7.2E-06	0.0E+00
Aromatic C_9-C_{16} Group	1 h	6.4E-06	6.9E-06	6.9E-06	0.0E+00
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.2E-06	2.2E-06	1.9E-11
acetaldehyde	1 h	6.7E-03	6.7E-03	6.7E-03	1.5E-08
acrolein	1 h	3.4E-01	4.8E-01	4.8E-01	5.2E-05

COPC	**Averaging Time**	**Background**	**Baseline (with Background**	**Application (with Background)**	**Project Alone**
benzaldehyde	ND	-	-	-	-
benzene	24 h	8.0E-02	1.3E-01	1.3E-01	1.3E-05
CO	1 h	NA	7.9E-03	7.9E-03	0.0E+00
CO	8 h	NA	1.2E-02	1.2E-02	2.5E-06
dichlorobenzene	24 h	1.4E-05	1.4E-05	1.4E-05	1.7E-12
ethylbenzene	24 h	2.3E-04	1.2E-03	1.2E-03	2.3E-08
formaldehyde	1 h	5.5E-01	5.7E-01	5.7E-01	8.0E-06
hexane	1 h	1.9E-04	7.9E-02	7.9E-02	0.0E+00
Naphthalene	1 h	4.4E-06	3.2E-03	3.2E-03	0.0E+00
NO_2	1 h	NA	1.3E-01	1.3E-01	0.0E+00
NO_2	24 h	NA	1.4E-01	1.4E-01	0.0E+00
pentane	1 h	0.0E+00	1.7E-03	1.7E-03	0.0E+00
$PM_{2.5}$	24 h	0.0E+00	8.0E-01	8.1E-01	4.6E-03
SO_2	10 min	NA	1.4E-01	1.4E-01	0.0E+00
SO_2	1 h	NA	1.1E-01	1.1E-01	0.0E+00
SO_2	24 h	NA	1.5E-01	1.5E-01	1.0E-04
toluene	1 h	1.3E-04	6.0E-04	6.0E-04	0.0E+00
xylenes	1 h	6.9E-04	2.7E-03	2.7E-03	0.0E+00
Mixtures					
Irritants					
Eye irritants		9.0E-01	**1.1E+00**	**1.1E+00**	6.0E-05
Nasal irritants		5.5E-01	5.7E-01	5.8E-01	3.2E-03
Respiratory irritants		7.4E-03	2.6E-01	2.6E-01	1.5E-08
Hepatotoxicants		1.3E-05	1.7E-03	8.0E-02	7.8E-02
Nephrotoxicants		8.4E-06	1.7E-03	1.7E-03	1.9E-11
Neurotoxicants		1.0E-03	8.2E-02	8.2E-02	0.0E+00

Note: NA: No exposure limit evaluated. Parameter not evaluated

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

None of the individual COPCs presented RQ values greater than one in the baseline, application or Project cases.

The eye irritant mixture in the baseline and application cases presented an RQ of 1.1, suggesting that there may be a slight risk of eye irritation in sensitive individuals. Formaldehyde and acrolein appear to be the mixture components associated with the largest RQ values for eye irritation. Risks associated with background exposures to these two COPCs are the primary contributors to the mixture given the RI for background eye irritant mixtures, and their individual background RQ values. Project emissions alone were associated with an RI for nasal irritants of less than one, indicating that no adverse health effects are likely to result from the Project.

4.6.4.2 Chronic Inhalation Assessment Results for the Recreational Receptor

Table 4.6-17 and Table 4.6-18 present the RQ, LCR and ILCR values for the chronic effects assessment for the RECR receptor. Baseline and application cases are presented with background risks included in the values. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

Table 4.6-17 Summary of Chronic Inhalation RQ Values for the Recreational Receptor

COPC	Background	Baseline with Background	Application (with Background)	Project Alone
Acenaphthene Group	1.6E-06	1.6E-06	1.6E-06	4.8E-11
Aromatic C_{17}-C_{34} Group	0.0E+00	1.5E-08	1.5E-08	2.0E-10
2-methylnaphthalene	0.0E+00	1.9E-08	1.9E-08	1.5E-10
Acrolein	**7.0E+01**	**7.0E+01**	**7.0E+01**	1.4E-03
benzaldehyde	5.6E-05	6.3E-05	6.3E-05	9.3E-08
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01	2.5E-08
ethylbenzene	1.5E-03	1.7E-03	1.7E-03	0.0E+00
hexane	2.6E-03	6.8E-03	6.8E-03	3.0E-06
naphthalene	1.2E-03	2.0E-02	2.0E-02	1.0E-06
NO_2	NA	7.1E-02	7.2E-02	1.3E-03
pentane	6.0E-05	1.4E-04	1.4E-04	1.6E-07
$PM_{2.5}$	NA	3.6E-01	3.6E-01	1.2E-03
SO_2	NA	8.4E-02	8.4E-02	5.6E-04
toluene	1.8E-03	1.9E-03	1.9E-03	1.8E-08
xylenes	9.5E-02	9.7E-02	9.7E-02	4.0E-07
Mixtures				
Irritants				
Eye irritants	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.1E+01**	**7.1E+01**	1.4E-03
Respiratory irritants	0.0E+00	1.5E-01	1.6E-01	1.9E-03
Hepatotoxicants	1.6E-06	1.6E-06	1.6E-06	2.0E-10
Nephrotoxicants	0.0E+00	3.5E-08	3.5E-08	3.5E-10
Neurotoxicants	9.9E-02	1.1E-01	1.1E-01	3.6E-06

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.6-18 Summary of Inhalation Cancer Risks for the Recreational Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	Application (with Background, LCR)	Project Alone (ILCR)
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**	3.6E-06
B(a)P IPM	8.8E-04	8.9E-04	8.9E-04	1.7E-08
B(a)P WMM	7.6E-01	7.7E-01	7.7E-01	1.4E-05
benzene	**2.4E+00**	**2.4E+00**	**2.4E+00**	3.6E-05
formaldehyde	**5.8E+01**	**5.8E+01**	**5.8E+01**	1.1E-03
Mixtures				
Carcinogens	**6.2E+01**	**6.2E+01**	**6.2E+01**	1.1E-03

Note: **Bold**: Indicates exceedance of LCR = 1.0.

With the exceptions of acrolein and the nasal irritant group, all RQ values were less than one.

Acrolein presented an RQ value of 70 in both the baseline and application cases, suggesting an increased risk of nasal irritation with chronic exposure. Given that the RQ for background acrolein is also 70, it is apparent that the predicted acrolein concentrations and resultant risks are primarily due to the assumed background concentrations. The acrolein RQ values associated with the Project itself were determined to be negligible for both the baseline and application cases. Sections 4.5.2.2 and 4.6.5.1, and Appendix 4A provide more information regarding the health effects of acrolein.

The nasal irritant mixture presented an RI of 71 in the baseline and application cases. When compared to the nasal irritant RI of 71 for background, it appears that the risks for this mixture are primarily attributable to background sources of exposure, particularly to background acrolein concentrations. Project contributions to the risk of nasal irritation are negligible.

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1 for the baseline and application cases. Upon comparison of the LCR values for each of these COPCs to their respective background LCR estimates, it is apparent that the majority of the cancer risk is associated with background exposures. Section 4.7 provides interpretation of these background cancer risks in relation to human health. The Project emissions of the carcinogenic COPCs present ILCR values less than 1, indicating that the project is associated with essentially negligible incremental cancer risks.

The carcinogenic mixture assessment reveals an LCR of 6.2 for the baseline and application cases. Formaldehyde, benzene and acetaldehyde are the three carcinogenic COPCs that contribute most to the mixture LCR (in relative order of their contribution). When compared to the LCR for background sources (=6.2), it is apparent that background LCR is the primary determinant of the baseline and application LCR values. Section 4.7 provides interpretation of these risks in relation to human health.

Overall, the emissions from the Project itself are unlikely to result in adverse chronic health risks to Recreational Receptors.

4.6.4.3 Chronic Multi-Pathway Assessment Results

Exposure pathways other than acute and chronic inhalation were not evaluated for the recreational receptor, as given that these types of receptors are likely to only be occasional visitors to the area. Recreational receptors are not expected to regularly consume local foods and water or to come into regular contact with soils. Although it is feasible that visitors to the area may occasionally consume local food and water, the assessment of the residents (First Nations and Residential receptors) would be protective of these individuals with respect to evaluating the potential risk of multi-media exposure to their health.

4.6.5 Discussion

All RQ and ILCR values for the Project alone were determined to be less than 1.

A few RQ and LCR values above 1 were identified for some of the COPCs in the acute and chronic inhalation assessments. In most cases, these exceedances were attributable to background concentrations. Discussion of background health risks was provided in Section 4.7.

Exceedances for two COPCs (acrolein and $PM_{2.5}$) were identified and appear to be attributable to sources other than background or the Project that were included in the baseline and application cases. The potential health implications associated with exposure to these two COPCs are discussed below.

4.6.5.1 Acrolein

Acrolein exceedances were identified in the acute assessment for the residential receptor, and in the chronic assessment for all four receptor groups. Within the acute assessment of the residential receptor, area sources contributed the most risk, while background indoor acrolein concentrations were the determinant of the chronic RQ values. Section 4.5.2.2 provides a discussion on background acrolein.

The maximum predicted acute acrolein concentration (~1 ug/m^3) of all residential receptor locations was used to evaluate the RESI group within the baseline and application cases. This concentration was predicted at the Fort McMurray receptor location, and resulted in an RQ value of 3.4 (before the addition of background).

This maximum concentration represents a peak concentration that is not anticipated to occur frequently. In a study of the oil sands region by Golder Associates (2005), acrolein was not detected in ambient air samples taken within the region. This comprehensive ambient air monitoring program for acrolein that was implemented at the Suncor Steepbank Mine, Albian Sands Muskeg River Mine, Fort MacKay, Fort McMurray and Suncor Borealis Camp (Golder, 2005). The analytical detection limits for acrolein ranged from 0.05 ug/m^3 to 0.75 ug/m^3. Ambient acrolein concentrations appeared to be below the lowest detection limit of 0.05 ug/m^3, which is below the acute health based guideline of 0.29 ug/m^3.

Table 4.6-19 summarizes some of the health effects associated with acrolein exposure in the scientific literature. As no long term studies of the effects of acrolein are available (U.S. EPA, 2003; WHO, 2002; Government of Canada, 2000; WHO, 1991), a separate table for chronic health effects has not been developed.

Table 4.6-19 Summary of the Potential Health Effects of Acrolein Exposure

Exposure Concentration (ug/m^3)	**Effects**	**References**
70	Odour perception	WHO IPCS, 1991
130	Eye irritation	WHO IPCS, 1991; Darley et al., 1960
340	Nasal irritation	Weber-Tschopp et al., 1977
480	Odour recognition	Sinkuvene, 1970
600-700	Reduced respiratory rate, coughing, nasal irritation, chest pain, difficult breathing	Kirk ,et al., 1991; WHO, IPCS 1991; Weber-Tschopp et al., 1977
>700	Respiratory and eye irritation, degeneration of respiratory epithelium, edema of tracheal and bronchial mucosa	WHO 1991
> 5,000	Intolerable to humans	Einhorn, 1975; Kirk et al., 1991
>20,000	Lethal	Einhorn, 1975; Kirk et al., 1991

The exposure limits used in the acute and chronic effects assessment of acrolein are protective of sensitive individuals, and potentially over-conservative.

The California OEHHA 1-hour limit of 0.29 ug/m^3 used in this assessment was based upon eye irritation in healthy human subjects. A LOAEL of 138 ug/m^3 was identified following a 5 minute exposure. Using Haber's Law this LOAEL was extrapolated to a 1-hour LOAEL of 11.5 ug/m^3. An uncertainty factor of 60 was applied to account for intra-species variability (10) and the use of a LOAEL (6). OEHHA (1999) notes that this limit is associated with significant uncertainty due to the lack of an observed study NOAEL, and the short exposure period.

The U.S. EPA reference concentration (RfC) was developed from a LOAEL of 900 ug/m^3, based upon the incidence of nasal lesions in a sub-chronic rat inhalation study. The U.S. EPA adjusted the LOAEL for continuous exposure (6 hours/24 hours x 5 days/7 days). This adjusted LOAEL of 160 ug/m^3 was then used to calculate the human equivalent concentration (HEC) of 20 ug/m^3. An uncertainty factor of 1,000 was applied to the HEC to account for inter-species differences (3), intra-species differences (10), sub-chronic to chronic exposure (10), and for use of a LOAEL instead of a NOAEL (3). In the supporting documentation for the RfC derivation, the U.S. EPA acknowledges that the principal study had several shortcomings, including a limited number of nasal histopathological specimens, small sample size, and a lack of incidence data (U.S. EPA, 2007). Thus, the exposure limit used in the chronic effects assessment is considered highly conservative.

Overall, the risk of adverse health effects in association with acute acrolein exposure are anticipated to be low due to the following:

- Predicted maximum air concentrations are likely over-estimates, due to conservative assumptions used in the air quality assessment model;
- Measured ambient concentrations of acrolein in the region are lower than the predicted baseline concentrations;
- The exceedances are based on peak acrolein concentrations that are unlikely to occur frequently;
- The acute and chronic acrolein exposure limits incorporate margins of safety, but are both associated with uncertainty; and
- The highest RQ associated with Project emissions for acrolein out of all of the four receptor groups was 0.002.

4.6.5.2 PM$_{2.5}$

Slight PM$_{2.5}$ exceedances were observed for the RESI receptor group within both the acute (RQ 1.5) and chronic (RQ 1.2) assessments for the baseline, application and CEA cases. The maximum air concentration used in the inhalation assessment of all residential receptors was for the Anzac receptor, which is within the RSA but is outside of the LSA. The RQ for the Project alone (representing the difference between the baseline and application cases) for this receptor was about 0.003, indicating that the Project has a negligible impact on PM$_{2.5}$ concentrations.

With the exception of the Anzac and Fort McMurray locations, the probability of exceeding the CCME (2000) Canada-Wide Standard of 30 ug/m^3 is zero at all locations. At the Anzac and Fort McMurray receptor locations, the probabilities of exceeding this standard are about 9% and 0.3%, respectively. However, to put these values into perspective, consideration must be given to urban and other area sources.

The 24-h (8th) baseline PM$_{2.5}$ concentration was 46.3 ug/m^3 at the Anzac location and 20.9 ug/m^3 at the Fort McMurray location. Within the chronic assessment, these locations were associated with PM$_{2.5}$ concentrations of 14 ug/m^3 and 5.9 ug/m^3, respectively. These concentrations may be compared to the values in Table 4.6-20 for various locations in Canada.

Table 4.6-20 Ambient $PM_{2.5}$ Concentrations in the Form of the Canada-Wide Standard (2003-2005)

Location	Range in Ambient Air Concentrations[1] (ug/m^3)	Risk Quotient (RQ)[2]
Yukon and Northwest Territories	17 to 23	0.57 to 0.77
British Columbia	10 to 34	0.33 to 1.1
Alberta	11 to 22	0.37 to 0.73
Saskatchewan and Manitoba	9 to 15	0.30 to 0.50
Ontario	28 to 34	0.93 to 1.1
Quebec	23 to 40	0.77 to 1.3
Atlantic Canada	10 to 16	0.33 to 0.53

[1] Averaging times not evident from data source.

[2] Risk quotients were calculated using the Health Canada CWS of 30 ug/m^3 (CCME, 2000b)

Source: Environment Canada, 2006.

The recent WBEA HEMP (2007) monitoring report for the Wood Buffalo region noted that the 95th percentile of $PM_{2.5}$ concentrations within the Fort McMurray area were 74.8 ug/m^3 (indoor air) and 20.5 ug/m^3 (outdoor air). In Fort Chipewyan, these concentrations were even higher, with the 95th percentile for indoor air being 86.4 ug/m^3, and outdoor air at 46.4 ug/m^3. The chronic Anzac baseline maximums of 46 ug/m^3 (acute) and 14 ug/m^3 (chronic) both appear to be similar or below the measurements reported in WBEA 2007.

Overall, the potential contribution of the Project to health risks associated with short and long term exposures to $PM_{2.5}$ is minimal. The following factors contributed to this conclusion.

- There is little to no difference in the RQ values predicted for the baseline and application;
- Predicted concentrations are similar to or below measured ambient concentrations; and
- The highest RQ predicted for the Project alone (i.e., application case minus baseline case) is 0.003.

4.7 Cumulative Effects Assessment

This section describes the potential future health risks within the study area for the CEA case. Background and baseline information is presented with predictions for the CEA case for comparative purposes.

As in Section 4.4.3.2, the results for the four receptor categories are discussed separately.

4.7.1 First Nations Receptor

Sections 4.7.1.1 to 4.7.1.3 present the estimated cumulative health risks for the FNR receptor. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

4.7.1.1 Acute Inhalation Assessment Results

Table 4.7-1 Summary of Acute Inhalation RQ Values for the First Nations Receptor

COPC	**Averaging Time**	**Background**	**Baseline with Background**	**CEA with Background**
Acenaphthene Group	24 h	6.7E-06	7.1E-06	7.4E-06
Aromatic C_9-C_{16} Group	1 h	6.4E-06	6.8E-06	7.0E-06
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.3E-06	3.2E-06
acetaldehyde	1 h	6.7E-03	6.7E-03	6.7E-03
acrolein	1 h	3.4E-01	5.4E-01	5.4E-01
benzaldehyde	ND	-	-	-
benzene	24 h	8.0E-02	1.1E-01	1.1E-01
CO	1 h	NA	1.9E-02	1.9E-02
CO	8 h	NA	4.7E-02	4.7E-02
dichlorobenzene	24 h	1.4E-05	1.4E-05	1.4E-05
ethylbenzene	24 h	2.3E-04	7.5E-04	8.2E-04
formaldehyde	1 h	5.5E-01	5.7E-01	5.7E-01
hexane	1 h	1.9E-04	4.5E-02	6.4E-02
naphthalene	1 h	4.4E-06	2.0E-03	2.6E-03
NO_2	1 h	NA	1.8E-01	1.8E-01
NO_2	24 h	NA	1.3E-01	1.7E-01
pentane	1 h	0.0E+00	9.6E-04	1.4E-03
$PM_{2.5}$	24 h	0.0E+00	4.1E-01	4.3E-01
SO_2	10 min	NA	1.2E-01	3.1E-01
SO_2	1 h	NA	9.4E-02	2.4E-01
SO_2	24 h	NA	1.3E-01	1.8E-01
toluene	1 h	1.3E-04	3.9E-04	5.1E-04
xylenes	1 h	6.9E-04	1.8E-03	2.3E-03
Mixtures				
Irritants				
Eye irritants		9.0E-01	**1.1E+00**	**1.1E+00**
Nasal irritants		5.5E-01	5.7E-01	5.8E-01
Respiratory irritants		7.4E-03	2.3E-01	4.2E-01
Hepatotoxicants		1.3E-05	9.7E-04	6.5E-02
Nephrotoxicants		8.4E-06	9.7E-04	1.4E-03
Neurotoxicants		1.0E-03	4.7E-02	6.7E-02

Note: ND: No exposure limit evaluated. Parameter not evaluated

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

No RQ values greater than one were identified for the CEA case. The risk of acute adverse health effects for this receptor group is therefore negligible.

The eye irritant mixture is associated with an RI of 1.1, which suggests that sensitive individuals may be at an increased risk of experiencing eye irritation. When compared to the RI for background eye irritants, there is a relatively small difference between the CEA RI and the background RI, demonstrating that background eye irritants are the primary contributors to the CEA case. Background concentrations of acrolein and formaldehyde appear to be the most significant components in the eye irritant mixtures. The eye irritant RI for the baseline case is also 1.1, indicating that there is no change in the concentrations of eye irritants between the baseline case and the CEA Case.

4.7.1.2 Chronic Inhalation Assessment Results

Table 4.7-2 and Table 4.7-3 present the RQ and LCR values for the chronic effects assessment for the FNR receptor. The results for the CEA are presented with background added, and the background and baseline RQ values are provided for comparison purposes.

Table 4.7-2 Summary of Chronic Inhalation RQ Values for the First Nations Receptor

COPC	Background	Baseline with Background	CEA with Background
Acenaphthene Group	1.6E-06	1.6E-06	1.6E-06
Aromatic C_{17}-C_{34} Group	0.0E+00	1.1E-08	1.2E-08
2-methylnaphthalene	0.0E+00	1.2E-08	2.5E-08
acrolein	**7.0E+01**	**7.0E+01**	**7.0E+01**
benzaldehyde	5.6E-05	6.1E-05	6.1E-05
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01
ethylbenzene	1.5E-03	1.6E-03	1.6E-03
hexane	2.6E-03	5.8E-03	6.7E-03
naphthalene	1.2E-03	1.6E-02	2.0E-02
NO_2	NA	6.2E-02	8.6E-02
pentane	6.0E-05	1.2E-04	1.4E-04
$PM_{2.5}$	NA	2.1E-01	2.2E-01
SO_2	NA	7.6E-02	1.5E-01
toluene	1.8E-03	1.8E-03	1.9E-03
xylenes	9.5E-02	9.6E-02	9.7E-02
Mixtures			
Irritants			
Eye irritants	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.1E+01**	**7.1E+01**
Respiratory irritants	0.0E+00	1.4E-01	2.4E-01
Hepatotoxicants	1.6E-06	1.6E-06	1.7E-06
Nephrotoxicants	0.0E+00	2.2E-08	3.7E-08
Neurotoxicants	2.2E-02	1.0E-01	1.1E-01

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.7-3 Summary of the Lifetime Cancer Risks for the First Nations Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	CEA (with Background, LCR)
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**
B(a)P IPM	8.8E-04	8.9E-04	9.6E-04
B(a)P WMM	7.6E-01	7.7E-01	8.5E-01
benzene	**2.4E+00**	**2.4E+00**	**2.4E+00**

COPCs	**Background (LCR)**	**Baseline (with Background, LCR)**	**CEA (with Background, LCR)**
formaldehyde	**5.8E+01**	**5.8E+01**	**5.8E+01**
Mixtures			
Carcinogens	**6.2E+01**	**6.2E+01**	**6.2E+01**

Note: **Bold**: Indicates exceedance of LCR = 1.0.

Acrolein presented an RQ value of 70 in the CEA case, suggesting an increased risk of nasal irritation with chronic exposure. Given that the RQ values for both background and baseline acrolein are 70, background sources are the primary component of the predicted acrolein concentrations in the baseline and CEA cases. There is no significant change between baseline and CEA for acrolein, indicating minimal cumulative impact from area sources. Sections 4.5.2.2 and 4.6.5.1, and Appendix 4A provide more information regarding the potential health effects of acrolein.

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1, indicating that exposure to each of these individual COPCs is associated with more than 1 case of cancer per 100,000. There is no change in the LCRs between baseline and CEA or background and CEA. This indicates that background levels of these three COPCs dominate the LCR estimate. Section 4.5 provides the interpretation of these background LCR risks. Section 4.5.2.2 provides additional information on these background carcinogens.

Similarly, the carcinogen mixture RI for the CEA case indicates a potential LCR of 6.2 cases of cancer per 100,000 people. Again, there is no change in risk between the CEA and baseline cases, or between the CEA and background cases. This demonstrates that background exposures to carcinogenic mixtures dominate the CEA LCR estimate.

4.7.1.3 Chronic Multi-Pathway Assessment Results for the First Nations Receptor

Table 4.7-4 Summary of RQ for Multi-Media Exposures for the First Nations Receptor

	Background	**Baseline (with background**	**CEA with Background**
Aromatic C_{17}-C_{34} Group	0.0E+00	3.3E-06	3.3E-06
Naphthalene	3.5E-02	1.7E-01	1.9E-01

Table 4.7-5 Summary of Multi-Media Cancer Risks for the First Nations Receptor

	Background (LCR)	**Baseline (with background, LCR)**	**CEA (with background, LCR)**
Benzo(a)pyrene (IPM or TEF)	3.0E-01	3.5E-01	4.2E-01
Benzo(a)pyrene (WMM)	5.1E-01	5.6E-01	6.9E-01

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

All RQ values for the non-carcinogenic COPCs were less than 1. Adverse health effects in association with chronic exposure to these substances are unlikely.

LCR values indicate that less than one per 100,000 cases of cancer are anticipated in association with exposures in the CEA case. The LCR values for both the baseline and CEA cases are dominated by the contributions from background.

4.7.2 Residential Receptor

Sections 4.7.2.1 to 4.7.2.3 present the estimated cumulative health risks for the Residential (RESI) receptor. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

4.7.2.1 Acute Inhalation Assessment Results for the Residential Receptor

Table 4.7-6 presents the RQ values for the acute effects assessment of the RESI Receptor. RQ values for the CEA case are presented with background added, and background and baseline values are provided separately for comparison purposes.

Table 4.7-6 Summary of Acute Inhalation RQ Values for the Residential Receptor

COPC	Averaging Time	Background	Baseline (with Background	CEA with Background
Acenaphthene Group	24 h	6.7E-06	8.3E-06	8.6E-06
Aromatic C_9-C_{16} Group	1 h	6.4E-06	7.9E-06	8.4E-06
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.7E-06	4.7E-06
acetaldehyde	1 h	6.7E-03	7.7E-03	7.7E-03
acrolein	1 h	3.4E-01	**3.7E+00**	**3.7E+00**
benzaldehyde	ND	-	-	-
benzene	24 h	8.0E-02	2.3E-01	2.4E-01
CO	1 h	NA	1.2E-01	1.2E-01
CO	8 h	NA	1.8E-01	1.8E-01
dichlorobenzene	24 h	1.4E-05	1.6E-05	1.6E-05
ethylbenzene	24 h	2.3E-04	3.3E-03	3.5E-03
formaldehyde	1 h	5.5E-01	**1.1E+00**	**1.1E+00**
hexane	1 h	1.9E-04	1.5E-01	1.8E-01
naphthalene	1 h	4.4E-06	6.2E-03	7.0E-03
NO_2	1 h	NA	2.0E-01	2.0E-01
NO_2	24 h	NA	2.3E-01	2.4E-01
pentane	1 h	0.0E+00	3.3E-03	3.9E-03
$PM_{2.5}$	24 h	NA	**1.5E+00**	**1.6E+00**
SO_2	10 min	NA	1.5E-01	2.2E-01
SO_2	1 h	NA	1.1E-01	1.7E-01
SO_2	24 h	NA	1.6E-01	1.6E-01
toluene	1 h	1.3E-04	1.1E-03	1.2E-03
xylenes	1 h	6.9E-04	4.6E-03	5.2E-03
Mixtures				
Irritants				
Eye irritants		9.0E-01	**4.8E+00**	**4.8E+00**
Nasal irritants		5.5E-01	**1.1E+00**	**1.1E+00**
Respiratory irritants		7.4E-03	3.6E-01	4.3E-01
Hepatotoxicants		1.3E-05	3.3E-03	1.8E-01

COPC	Averaging Time	Background	Baseline (with Background	CEA with Background
Nephrotoxicants		8.4E-06	3.3E-03	3.9E-03
Neurotoxicants		1.0E-03	1.6E-01	1.9E-01

Note: NA: No exposure limit evaluated. Parameter not evaluated

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

With the exceptions of acrolein, formaldehyde and $PM_{2.5}$, predicted short term air concentrations for the COPCs were less than their respective exposure limits.

Acrolein presented an RQ value of 3.7 for the CEA case, indicating that there is a slight risk of eye irritation to sensitive individuals. However, the RQ value for baseline is also 3.7, implying that there is no change in acrolein concentrations between the baseline and CEA cases. The background acrolein RQ value is 0.34. Given the difference between background and the baseline/CEA case RQ values, area sources are likely “responsible” for the risk to the baseline and CEA RQ values. Sections 4.5.2.2 and 4.6.5.1, and Appendix 4A provide more information regarding the potential health effects of acrolein.

Acute formaldehyde exposure is associated with an RQ of 1.1, suggesting that there is a slightly increased risk of nasal irritation in sensitive individuals. The RQ value for formaldehyde in the baseline case is also 1.1, thus there is no significant change in formaldehyde concentrations between the two cases. As the background RQ for formaldehyde is 0.55, local sources included in the baseline and CEA assessment are primarily contributing to the risk.

$PM_{2.5}$ exposure is associated with an RQ of 1.6 in the CEA case. This value represents a small (0.1) increase over the baseline case RQ. The most significant contributors to $PM_{2.5}$ levels are sources modelled in the baseline and CEA cases, and not background. Section 4.6.5.2 and Appendices 4A and 4C provide additional information regarding the potential health effects of $PM_{2.5}$.

The eye irritants mixture in the CEA cases presented an RI of 4.8, which is the same as the RI for baseline. Acrolein and formaldehyde are the mixture components contributing the most risk to the mixture, and the risks for both COPCs are attributable to concentrations from sources included in the baseline and CEA cases.

The nasal irritants mixture presented an RQ of 1.1 for the CEA case, signifying a slightly increased risk of nasal irritation with acute exposure. Again, the RQ value for the CEA nasal irritants mixture is the same as the RQ value for the baseline mixture.

4.7.2.2 Chronic Inhalation Assessment Results for the Residential Receptor

Table 4.7-7 and Table 4.7-8 present the RQ values for the chronic effects assessment for the RESI receptor. The CEA case is presented with background values included, and the background and baseline RQ values.

Table 4.7-7 Summary of Chronic Inhalation RQ Values for the Residential Receptor

COPC	Background	Baseline with Background	CEA with Background
Acenaphthene Group	1.6E-06	1.8E-06	1.8E-06
Aromatic C_{17}-C_{34} Group	0.0E+00	3.8E-07	3.8E-07
2-methylnaphthalene	0.0E+00	2.9E-07	2.9E-07
acrolein	**7.0E+01**	**7.3E+01**	**7.3E+01**
benzaldehyde	5.6E-05	2.3E-04	2.4E-04
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01
ethylbenzene	1.5E-03	1.9E-03	2.0E-03
hexane	2.6E-03	2.0E-02	2.2E-02
naphthalene	1.2E-03	5.6E-02	6.4E-02
NO_2	NA	2.3E-01	2.5E-01
pentane	6.0E-05	6.1E-04	6.4E-04
$PM_{2.5}$	NA	**1.2E+00**	**1.2E+00**
SO_2	NA	1.6E-01	1.6E-01
toluene	1.8E-03	2.0E-03	2.0E-03
xylenes	9.5E-02	1.0E-01	1.0E-01
Mixtures			
Irritants			
Eye irritants	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.3E+01**	**7.3E+01**
Respiratory irritants	0.0E+00	3.9E-01	4.1E-01
Hepatotoxicants	1.6E-06	2.1E-06	2.1E-06
Nephrotoxicants	0.0E+00	6.7E-07	6.8E-07
Neurotoxicants	2.2E-02	1.2E-01	1.3E-01

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.7-8 Summary of Inhalation Cancer Risks for the Residential Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	CEA (with Background, LCR)
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**
B(a)P IPM	8.8E-04	9.4E-04	1.0E-03
B(a)P WMM	7.6E-01	8.0E-01	9.0E-01
benzene	**2.4E+00**	**2.6E+00**	**2.6E+00**
formaldehyde	**5.8E+01**	**6.0E+01**	**6.0E+01**
Mixtures			
Carcinogens	**6.2E+01**	**6.4E+01**	**6.4E+01**

Note: **Bold**: Indicates exceedance of LCR = 1.0.

With the exceptions of acrolein and $PM_{2.5}$, all predicted long term non-carcinogenic COPC air concentrations were less than their respective exposure limits.

Acrolein presented an RQ value of 73 in the CEA case suggesting a risk of nasal irritation with chronic exposure in sensitive individuals. Given that the acrolein RQ value for baseline is the same as for the CEA, and the RQ for background acrolein is 70, the risk is primarily attributable to background sources, with some contribution from other area sources. Sections 4.5.2.2 and 4.6.5.1 and Appendix 4A provide additional information regarding the potential health effects of acrolein.

$PM_{2.5}$ presented an RQ value of 1.2 for both the baseline and CEA cases. As background $PM_{2.5}$ concentrations appear to be associated with negligible health risk, the RQ value of 1.2 seems to be driven by contributions from other area sources. Section 4.8.5.2 and Appendices 4A and 4C provide additional information regarding the potential health effects of particulate matter.

The nasal irritant mixture presented an RI of 73 in the baseline and application cases. When compared to the nasal irritant mixture RI of 71 for background, it is clear that the risks for this mixture are primarily due to the background sources of exposure, particularly to acrolein.

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1 for the CEA case. Upon comparison of the LCR values for each of these COPCs to their respective baseline and background LCR estimates, it is apparent that the majority of the cancer risk is associated with background exposures. Section 4.5.2.2 provides interpretation of these cancer risks in relation to human health.

The carcinogenic mixture assessment reveals an LCR of 6.4 for the CEA case, which is the same as the carcinogen mixture LCR for baseline. There is no change in risks associated with carcinogen mixtures between the two development cases. Formaldehyde, benzene and acetaldehyde are the three carcinogenic COPCs that contribute the most to the mixture LCR (in relative order of their contribution). When compared to the LCR for background carcinogen mixtures of 6.2, it is apparent that background LCR is the primary determinant of the baseline and application LCR values. Section 4.5.2.2 provides interpretation of these risks in relation to human health.

4.7.2.3 Chronic Multi-Pathway Assessment Results

Table 4.7-9 and Table 4.7-10 present the RQ and LCR values for the chronic multi-pathway effects assessment for the RESI receptor. The CEA case is presented with background risks included.

Table 4.7-9 Summary of RQ for Multi-Media Exposures for the Residential Receptor

	Background	Baseline with Background	CEA with Background
Aromatic C_{17}-C_{34} Group	0.0E+00	2.3E-06	2.3E-06
Naphthalene	2.1E-02	1.6E-01	1.8E-01

Table 4.7-10 Summary of Multi-Media Cancer Risks for the Residential Receptor

	Background (LCR)	Baseline (with background, LCR)	CEA (with background, LCR)
Benzo(a)pyrene (IPM or TEF)	5.8E-02	6.5E-02	7.7E-02
Benzo(a)pyrene (WMM)	4.8E-01	5.3E-01	6.5E-01

The exposure estimates for naphthalene and the aromatic C_{17}-C_{34} group were less than their chronic exposure limits. Therefore, adverse health effects in association with chronic exposure to these substances are unlikely.

The predicted LCR values indicate that less than 1 per 100,000 additional cases of cancer are anticipated as a result of the estimated exposures in the CEA case. The LCR values for both the baseline and application cases are dominated by the contributions from background.

4.7.3 Commercial Receptor

Sections 4.7.3.1 to 4.7.3.3 present the estimated cumulative health risks for the Commercial (COMM) receptor. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

4.7.3.1 Acute Inhalation Assessment Results for the Commercial Receptor

Table 4.7-11 presents the RQ values for the acute effects assessment of the COMM Receptor. The CEA case is presented with background included. RQs for baseline and background are presented in separate columns for comparison purposes.

Table 4.7-11 Summary of Acute Inhalation RQ Values for the Commercial Receptor

COPC	Averaging Time	Background	Baseline (with Background	CEA with Background
Acenaphthene Group	24 h	6.7E-06	7.0E-06	7.1E-06
Aromatic C_9-C_{16} Group	1 h	6.4E-06	6.6E-06	6.8E-06
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.1E-06	2.2E-06
acetaldehyde	1 h	6.7E-03	6.7E-03	6.8E-03
acrolein	1 h	3.4E-01	4.4E-01	4.5E-01
benzaldehyde	ND	-	-	-
benzene	24 h	8.0E-02	9.7E-02	1.1E-01
CO	1 h	0.0E+00	6.3E-03	7.3E-03
CO	8 h	0.0E+00	1.2E-02	1.2E-02
dichlorobenzene	24 h	1.4E-05	1.4E-05	1.4E-05
ethylbenzene	24 h	2.3E-04	5.7E-04	8.1E-04
formaldehyde	1 h	5.5E-01	5.6E-01	5.8E-01
hexane	1 h	1.9E-04	3.4E-02	4.7E-02
naphthalene	1 h	4.4E-06	1.4E-03	1.9E-03
NO_2	1 h	NA	1.0E-01	1.2E-01
NO_2	24 h	NA	9.3E-02	1.3E-01
pentane	1 h	0.0E+00	7.3E-04	1.0E-03
$PM_{2.5}$	24 h	NA	9.5E-02	1.2E-01
SO_2	10 min	NA	1.1E-01	1.1E-01
SO_2	1 h	NA	8.2E-02	8.8E-02
SO_2	24 h	NA	1.2E-01	1.2E-01
toluene	1 h	1.3E-04	3.3E-04	4.1E-04
xylenes	1 h	6.9E-04	1.5E-03	1.9E-03
Mixtures				
Irritants				
Eye irritants		9.0E-01	**1.0E+00**	**1.0E+00**
Nasal irritants		5.5E-01	5.6E-01	5.9E-01
Respiratory irritants		7.4E-03	1.8E-01	2.2E-01
Hepatotoxicants		1.3E-05	7.5E-04	4.8E-02

COPC	Averaging Time	Background	Baseline (with Background	CEA with Background
Nephrotoxicants		8.4E-06	7.4E-04	1.0E-03
Neurotoxicants		1.0E-03	3.6E-02	4.9E-02

Note: ND: No exposure limit evaluated. Parameter not evaluated

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Predicted short term air concentrations met health-based guidelines (i.e., exposure limits) for all COPCs.

The eye irritant mixture in the CEA case produced an RI of 1.0. However, there was no change in this mixture RI value between the baseline and CEA cases. Formaldehyde and acrolein are the mixture components associated with the largest RQ values for eye irritation, and exposures associated with these two COPCs are driven by background concentrations with some contribution from area sources.

4.7.3.2 Chronic Inhalation Assessment Results for the Commercial Receptor

Table 4.7-12 and Table 4.7-13 present the RQ and LCR values for the chronic effects assessment for the COMM receptor. The CEA case is presented with background risks included.

Table 4.7-12 Summary of Chronic Inhalation RQ Values for the Commercial Receptor

COPC	Background	Baseline with Background	CEA with Background
Acenaphthene Group	1.6E-06	1.6E-06	1.6E-06
Aromatic C_{17}-C_{34} Group	0.0E+00	2.2E-09	3.6E-09
2-methylnaphthalene	0.0E+00	6.1E-09	8.6E-09
Acrolein	**7.0E+01**	**7.0E+01**	**7.0E+01**
Benzaldehyde	5.6E-05	5.7E-05	5.8E-05
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01
Ethylbenzene	1.5E-03	1.5E-03	1.6E-03
hexane	2.6E-03	3.8E-03	4.3E-03
naphthalene	1.2E-03	6.8E-03	9.1E-03
NO_2	NA	5.3E-02	6.5E-02
pentane	6.0E-05	8.5E-05	9.5E-05
$PM_{2.5}$	NA	7.1E-02	8.1E-02
SO_2	NA	4.5E-02	5.3E-02
toluene	1.8E-03	1.8E-03	1.8E-03
xylenes	9.5E-02	9.5E-02	9.6E-02
Mixtures			
Irritants			
Eye irritants	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.1E+01**	**7.1E+01**
Respiratory irritants	0.0E+00	9.7E-02	1.2E-01
Hepatotoxicants	1.6E-06	1.6E-06	1.6E-06

COPC	**Background**	**Baseline with Background**	**CEA with Background**
Nephrotoxicants	0.0E+00	8.3E-09	1.2E-08
Neurotoxicants	2.2E-02	1.0E-01	1.0E-01

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.7-13 Summary of Inhalation Cancer Risks for the Commercial Receptor

COPCs	**Background (LCR)**	**Baseline (with Background, LCR)**	**CEA (with Background, LCR)**
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**
B(a)P IPM	8.8E-04	8.8E-04	8.9E-04
B(a)P WMM	7.6E-01	7.7E-01	7.7E-01
benzene	**2.4E+00**	**2.4E+00**	**2.4E+00**
formaldehyde	**5.8E+01**	**5.8E+01**	**5.8E+01**
Mixtures			
Carcinogens	**6.2E+01**	**6.2E+01**	**6.2E+01**

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of LCR = 1.0.

With the exception of acrolein, all chronic RQ values were below 1.

Acrolein presented an RQ value of 70 in the CEA case, suggesting an increased risk of nasal irritation with chronic exposure for the COMM receptor. Given that the RQs for acrolein in the baseline and background cases are also 70, it is clear that the primary component of the predicted acrolein concentrations in both the CEA and baseline cases is from background sources. Sections 4.5.2.2 and 4.6.5.1 and Appendix 4A provide additional information regarding the health effects of acrolein.

The nasal irritant mixture presented an RI of 71 in the baseline and application cases. The risks for this mixture are primarily attributable to background sources, particularly to background acrolein concentrations.

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1 for the CEA case. The majority of the apparent cancer risk is associated with background exposures rather than local sources. Section 4.5 provides interpretation of these background cancer risks in relation to human health. The carcinogenic mixture assessment reveals an LCR of 6.2 for the baseline and application cases. Again, formaldehyde, benzene and acetaldehyde are the three carcinogenic COPCs that contribute the most to this mixture LCR (in relative order of their contribution to the mixture risk). When compared to the LCR for background carcinogen mixtures of 6.2, it is apparent that background LCR is the primary determinant of the baseline and application LCR values. Section 4.5.2.2 provides interpretation of these risks in relation to human health.

4.7.3.3 Chronic Multi-Pathway Assessment Results for the Commercial Receptor

Table 4.7-14 and Table 4.7-15 present the RQ and LCR values for the chronic multi-pathway effects assessment for the COMM receptor. The CEA case is presented with background risks included.

Table 4.7-14 Summary of RQ for Multi-Media Exposures for the Commercial Receptor

	Background	Baseline with Background	CEA with Background
Aromatic C_{17}-C_{34} Group	0.0E+00	1.9E-06	1.9E-06
Naphthalene	1.5E-03	1.4E-01	3.0E-01

Table 4.7-15 Summary of Multi-Media Cancer Risks for the Commercial Receptor

	Background (LCR)	Baseline (with background, LCR)	CEA (with background, LCR)
Benzo(a)pyrene (IPM or TEF)	4.8E-03	5.5E-03	6.4E-03
Benzo(a)pyrene (WMM)	4.7E-01	5.3E-01	6.4E-01

The RQ values for naphthalene and the aromatic C_{17}-C_{34} group were less than 1, suggesting that health effects in association with chronic exposure to these substances are unlikely.

LCR values indicate that less than one per 100,000 cases of cancer are anticipated as a result of baseline and application case multi-pathway exposures. The LCR values for both the baseline and application cases are dominated by contribution from background sources. Evaluation of the Project case alone (without background) indicates that the Project emissions are associated with an ILCR of less than 1 in 100,000 for the multi-pathway model.

4.7.4 Recreational Receptor

Sections 4.7.4.1 to 4.7.4.3 present the estimated cumulative health risks for the Recreational (RECR) receptor. Values in the Project column do not include background, and represent an assessment of the potential health effects of the Project emissions alone.

4.7.4.1 Acute Inhalation Assessment Results for the Recreational Receptor

Table 4.7-16 presents the RQ values for the acute effects assessment of the RECR receptor. The CEA case is presented with background exposures included. The RQs for background and baseline are presented in separate columns for comparison purposes.

Table 4.7-16 Summary of Acute Inhalation RQ Values for the Recreational Receptor

COPC	Averaging Time	Background	Baseline (with Background	CEA with Background
Acenaphthene Group	24 h	0.0E+00	4.1E-07	6.9E-07
Aromatic C_9-C_{16} Group	1 h	5.2E-06	5.7E-06	5.9E-06
Aromatic C_{17}-C_{34} Group	24 h	2.0E-06	2.2E-06	2.5E-06
acetaldehyde	1 h	6.7E-03	6.7E-03	6.7E-03
acrolein	1 h	3.4E-01	4.8E-01	4.9E-01
benzaldehyde	ND	-	-	-

COPC	**Averaging Time**	**Background**	**Baseline (with Background**	**CEA with Background**
benzene	24 h	8.0E-02	1.3E-01	1.3E-01
CO	1 h	NA	7.9E-03	8.3E-03
CO	8 h	NA	1.2E-02	1.3E-02
dichlorobenzene	24 h	1.4E-05	1.4E-05	1.4E-05
ethylbenzene	24 h	2.3E-04	1.2E-03	1.3E-03
formaldehyde	1 h	5.5E-01	5.7E-01	5.8E-01
hexane	1 h	1.9E-04	7.9E-02	9.2E-02
naphthalene	1 h	4.4E-06	3.2E-03	3.9E-03
NO_2	1 h	NA	1.3E-01	1.4E-01
NO_2	24 h	NA	1.4E-01	1.6E-01
pentane	1 h	0.0E+00	1.7E-03	2.0E-03
$PM_{2.5}$	24 h	0.0E+00	8.0E-01	8.4E-01
SO_2	10 min	NA	1.4E-01	1.4E-01
SO_2	1 h	NA	1.1E-01	1.1E-01
SO_2	24 h	NA	1.5E-01	1.5E-01
toluene	1 h	1.3E-04	6.0E-04	6.7E-04
xylenes	1 h	6.9E-04	2.7E-03	3.0E-03
Mixtures				
Irritants				
Eye irritants		9.0E-01	**1.1E+00**	**1.1E+00**
Nasal irritants		5.5E-01	5.7E-01	5.8E-01
Respiratory irritants		7.4E-03	2.6E-01	2.8E-01
Hepatotoxicants		5.2E-06	1.7E-03	9.3E-02
Nephrotoxicants		7.3E-06	1.7E-03	2.0E-03
Neurotoxicants		1.0E-03	8.2E-02	9.5E-02

Note: NA: No exposure limit evaluated. Parameter not evaluated

A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Predicted short term air concentrations for all COPCs were less than their respective exposure limits.

The eye irritant mixture in the CEA and baseline cases presented an RI of 1.1, suggesting that there may be a slight risk of eye irritation in sensitive individuals, but that there is no significant change in the mixture concentration between the baseline and CEA cases. Formaldehyde and acrolein are the mixture components associated with the largest RQ values for eye irritation. Risks associated with background exposures to these two COPCs are the primary contributors to the mixture, along with some contribution from area sources.

4.7.4.2 Chronic Inhalation Assessment Results

Table 4.7-17 and Table 4.7-18 present the RQ and LCR values for the chronic effects assessment for the RECR receptor. CEA values are presented with background included, and background and baseline values are provided for comparison purposes.

Table 4.7-17 Summary of Chronic Inhalation RQ Values for the Recreational Receptor

COPC	Background	Baseline with Background	CEA with Background
Acenaphthene Group	1.6E-06	1.6E-06	1.6E-06
Aromatic C_{17}-C_{34} Group	0.0E+00	1.5E-08	1.7E-08
2-methylnaphthalene	0.0E+00	1.9E-08	2.4E-08
acrolein	**7.0E+01**	**7.0E+01**	**7.0E+01**
benzaldehyde	5.6E-05	6.3E-05	6.4E-05
dichlorobenzene	6.0E-01	6.0E-01	6.0E-01
ethylbenzene	1.5E-03	1.7E-03	1.7E-03
hexane	2.6E-03	6.8E-03	8.0E-03
naphthalene	1.2E-03	2.0E-02	2.6E-02
NO_2	NA	7.1E-02	8.9E-02
pentane	6.0E-05	1.4E-04	1.7E-04
$PM_{2.5}$	NA	3.6E-01	3.8E-01
SO_2	NA	8.4E-02	9.9E-02
toluene	1.8E-03	1.9E-03	1.9E-03
xylenes	9.5E-02	9.7E-02	9.7E-02
Mixtures			
Irritants			
Eye irritants	0.0E+00	0.0E+00	0.0E+00
Nasal irritants	**7.1E+01**	**7.1E+01**	**7.1E+01**
Respiratory irritants	0.0E+00	1.5E-01	1.9E-01
Hepatotoxicants	1.6E-06	1.6E-06	1.7E-06
Nephrotoxicants	0.0E+00	3.5E-08	4.1E-08
Neurotoxicants	2.2E-02	1.1E-01	1.1E-01

Note: A value of zero indicates that for this COPC, either the exposure level is estimated to be zero (background case), or there is no difference between the baseline and application cases (Project case) indicating that the risk associated with the Project emissions is essentially zero.

Bold: Indicates exceedance of RQ = 1.0.

Table 4.7-18 Summary of Inhalation Cancer Risks for the Recreational Receptor

COPCs	Background (LCR)	Baseline (with Background, LCR)	CEA (with Background, LCR)
acetaldehyde	**1.3E+00**	**1.3E+00**	**1.3E+00**
B(a)P IPM	8.8E-04	8.9E-04	9.2E-04
B(a)P WMM	7.6E-01	7.7E-01	8.0E-01
benzene	**2.4E+00**	**2.4E+00**	**2.4E+00**
formaldehyde	**5.8E+01**	**5.8E+01**	**5.8E+01**
Mixtures			
Carcinogens	**6.2E+01**	**6.2E+01**	**6.2E+01**

Note: **Bold**: Indicates exceedance of LCR = 1.0.

With the exception of acrolein, all individual RQ values were less than one.

Acrolein presented an RQ value of 70 in the CEA, suggesting an increased risk of nasal irritation with chronic exposure. Given that the RQs for both background and the baseline cases for acrolein are also 70, it is clear that the primary component of the predicted acrolein concentrations in both the baseline and CEA cases is from background sources. There is no change in the acrolein RQ between baseline and CEA. Sections 4.7.1.4 and 4.8.5.1, and Appendix 4A provide additional information regarding the potential health effects of acrolein.

The nasal irritant mixture presented an RI of 71 for both the baseline and CEA cases. When compared to the nasal irritant RI of 71 for background, it is clear that the risks for this mixture are primarily due to background sources, particularly to background acrolein concentrations (discussed previously).

Acetaldehyde, benzene and formaldehyde all presented LCR values greater than 1 for the CEA case. Upon comparison of the LCR values for each of these COPCs to their respective baseline and background LCR estimates, it is apparent that cancer risk is associated with background exposures for all three COPCs, as baseline and CEA LCR values are the same. Section 4.5.2.2 provides an interpretation of these background cancer risks in relation to human health.

The carcinogenic mixture assessment predicted an LCR of 6.2 for the CEA case. Formaldehyde, benzene and acetaldehyde are the three carcinogenic COPCs that contribute the most to this mixture LCR (in relative order of their contribution). When compared to the LCRs for baseline and background carcinogen mixtures, it is apparent that background LCR is the primary determinant of the baseline and application LCR values, given that the LCR value for the mixture in baseline and background are also 6.2. Section 4.5.2.2 provides an interpretation of background risks in relation to human health.

4.7.4.3 Chronic Multi-Pathway Assessment Results

Exposure pathways other than acute and chronic inhalation were not evaluated for the recreational receptor, given that recreational receptors only will occasionally visit the area. Recreational receptors are not expected to regularly consume local foods and water or be in contact with soils. Although it is feasible that visitors to the area may occasionally consume local food and water, the assessment of the residents (First Nations and Residential receptors) would be protective of these individuals with respect to evaluating the potential risk of multi-media exposure.

4.8 Follow-up and Management

As part of its baseline assessment, North American is committed to sampling soils and vegetation from the Project area and testing for PAHs and metals. The results of the sampling program will be used to validate the results of the HHRA.

The soil/vegetation sampling program will be conducted prior to project start-up. A detailed work plan for the program will be developed in consultation with AHW. Various species of vegetation known to be consumed by people will be collected for chemical analysis. The sampling program will be refined upon review of the following:

- Soils, vegetation and ecosite mapping for the region;
- Traditional use information based on available reported information and ongoing First Nations consultation; and,
- Air modelling and any existing terrestrial monitoring program information.

This information will be used to finalize the number and location of samples and to develop a sampling and analytical plan based on the best available information. Consideration also will be given to selecting sampling areas that are either coordinated with existing environmental monitoring initiatives or have potential to be incorporated into a future monitoring program.

Project-specific air and water monitoring will assist in addressing human health concerns through the detection and subsequent response in case of chemical emissions or releases of concern.

On a cumulative basis, there are a number of collaborative monitoring and management initiatives active in the region. North American plans to participate in relevant regional initiatives that aim to address issues related to health and environmental pollution in the southern oil sands area. Ambient air and water quality monitoring will help reduce uncertainties associated with environmental exposures and risks and allow North American to verify its impact predictions for human health.

4.9 Summary

The HHRA for the Project focused on direct and indirect health risks associated with industrial and community air emissions in the RSA. In addition, an assessment of potential health effects associated with existing background conditions was conducted. Health risks associated with airborne emissions of the COPCs were characterized through the comparison of predicted acute and chronic air concentrations with exposure limits considered protective of sensitive individuals. Health risks from the consumption of traditional foods and wild game were characterized using a multi-media exposure model, which was used to predict long term exposures from COPCs that exhibit tendencies to persist and/or bio-accumulate in the environment. Estimated long term exposures also were compared to recognized exposure limits that are considered protective for sensitive individuals.

Overall, the Project is anticipated to have a negligible effect on human health.

4.9.1 Acute Health Risk Assessment

Predicted air concentrations were determined to be above one for acrolein, $PM_{2.5}$ and the eye irritant mixture at one or more receptor location.

Exceedances were identified for acrolein and $PM_{2.5}$ at the maximum residential receptor location. Area sources other than the Project appear to be responsible for the elevated risks, given that the contribution from the Project alone appears to be negligible. No change in risks between the baseline and CEA cases were observed for either acrolein or $PM_{2.5}$.

Slightly elevated health risks were predicted for the eye irritants mixture (all receptor groups). These mixture values appear to be driven by background acrolein and formaldehyde concentrations, with some contribution from area sources other than the Project. A slightly elevated nasal irritant risk was predicted for the residential receptor. This mixture seems to be affected by background and area sources of formaldehyde.

No adverse health effects were associated with the Project emissions alone.

4.9.1.1 Chronic Health Risk Assessment

Background exposures to acrolein, acetaldehyde, benzene, and formaldehyde contributed to elevated risks in the baseline, application and CEA cases for all receptor groups. Risks associated with carcinogen mixtures for all four receptor groups were due to the contributions by background concentrations of acetaldehyde, benzene and formaldehyde. The difference between the RQ and LCR values for background and each of the development cases for these four COPCs was quite small, indicating that background concentrations rather than area or Project related sources contributed the most risk. The Project was associated with RQ and ILCR values less than one, and was not associated with any adverse health risks.

$PM_{2.5}$ presented an exceedance of the exposure limit for the residential receptor group as a result of contributions from area sources. The Project itself was not associated with potential health risks due to PM.

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2A AIR EMISSIONS INVENTORY

2A1 Introduction and Methodology

Within both the Local Study Area (LSA) and Regional Study Area (RSA), there are numerous bitumen, synthetic crude oil and gas production facilities that release gaseous and particulate emissions to the atmosphere. In addition to industrial sources, other sources of air emissions include urban centres, vehicular traffic and agriculture. Knowledge of these emission sources and associated emission parameters is required for effective air quality management. This section identifies and provides a representative characterization for these sources.

The air emission information is first provided for the North American Oil Sands Corporation (North American) Kai Kos Dehseh Project (the Project). Then it is provided for the baseline case (i.e., existing and approved operations) and the cumulative effects assessment (CEA) case (i.e., existing, approved and planned operations), on an operator basis (in alphabetical order) for all air emission sources located within the 190 km by 400 km RSA. Figure 2A1-1 shows the locations of the air emission sources within the RSA.

2A1.1 Approach

Information for the air emission sources was obtained through measurements, engineering estimates, extrapolation and emission factors. While numerous emission estimates have been prepared for the bitumen and synthetic crude production facilities in the northeastern Alberta region, the values provided have varied depending on the specific size of the study area, the assumed development phasing, the level of available engineering data and the overall approach for representing a source or group of sources. More representative and detailed data tend to be available for existing operations; whereas, emissions calculated for proposed facilities are more uncertain as the designs of these facilities are in the initial engineering stages.

In some cases, multiple sources are combined into a single surrogate source to aid dispersion model execution. This approach is more appropriate for sources that are more distant from the primary study area. For this assessment, this means more distant from the Project. A larger level of effort was undertaken to describe the more significant, local sources in the region. The primary focus of this study is industrial sources. Natural sources such as forest fires are typically not considered in the emission inventory since air quality management practices are not applicable to these events.

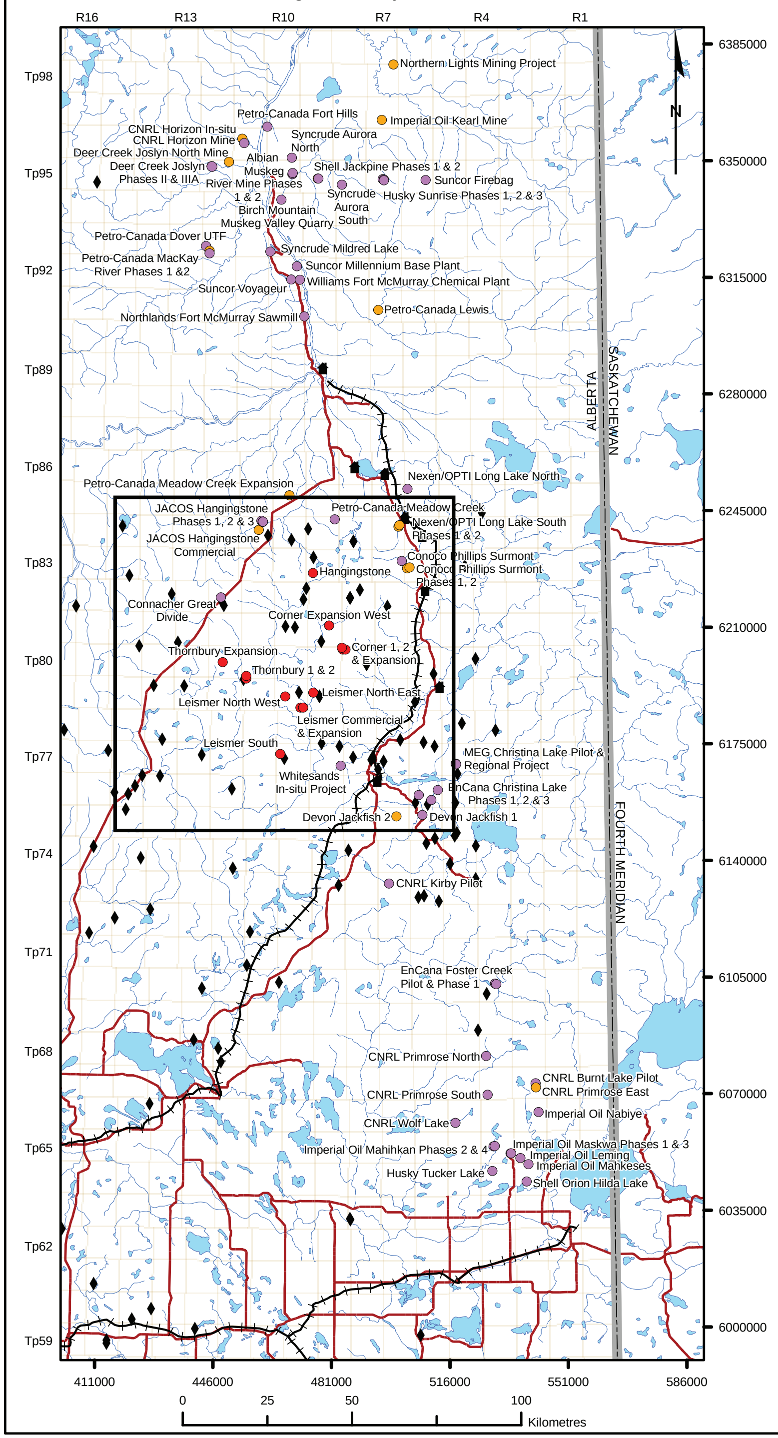
The following approach was adopted for estimating emissions for the Project assessment.

- Efforts were made to include the most recent estimates from the respective operators for sources located within the LSA. The Nexen Inc./OPTI Canada Inc. Long Lake South Project Application (2006) served as a starting point to determine LSA emission parameters.

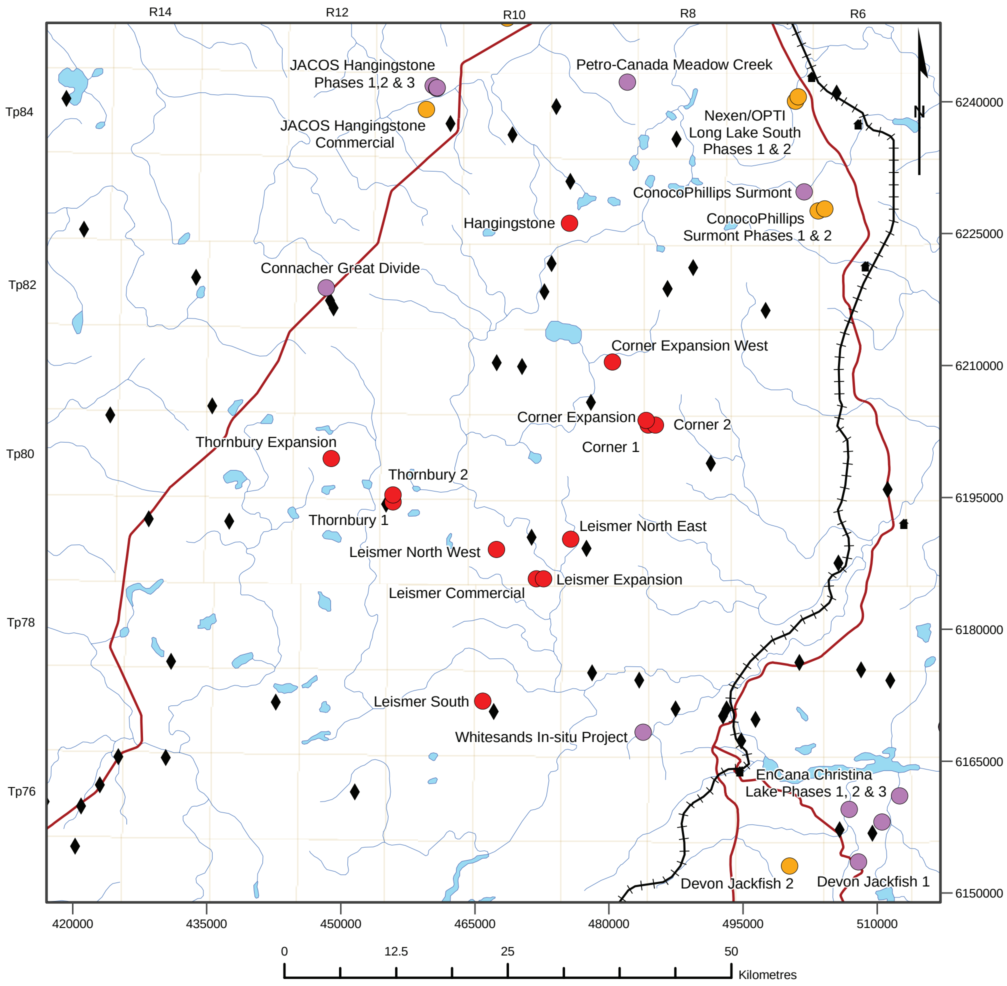
- The Northern Lights Partnership Northern Lights Mining and Extraction Project Application (June 2006) was used to identify and quantify emissions from sources located to the north of the LSA.

- The Canadian Natural Primrose In-situ Oil Sands Project, Primrose East Expansion Application for Approval (January 2006) was used to identify and quantify emissions for sources located to the south of the LSA.

Regional Study Area



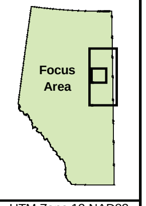
Local Study Area



Legend

🔴	The Project	☗	Community
●	Baseline	✕	Railroad
●	Planned	∧	Road
◆	Gas Plant	≈	Lake
		~	River

PROJECT	NORTH AMERICAN KAI KOS DEHSEH		
TITLE	Location of Air Emission Sources within the RSA		
DRAWN	LDB	04/2007	Figure 2A1-1
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		



UTM Zone 12 NAD83

- All emission source locations are referenced to the UTM NAD 83 coordinate system. Base elevations for the facilities were derived from electronic terrain data with a 3 arc second resolution, obtained from the NASA Shuttle Radar Topography Mission (SRTM).

- For point sources (i.e., stacks), the following information is presented: location, base elevation, stack height, stack diameter, exit velocity, exit temperature and contaminant emission rates.

- All area sources (e.g., mine pits and tailings ponds) are assumed to be quadrilateral polygons and the following information is provided: northwest corner, northeast corner, southwest corner, southeast corner, base elevation, source area and contaminant emission rates.

- Tailings pond emissions are provided as peak emission rates. To account for the temporal variability of fugitive emissions from these sources, the monthly variation of emission rates as presented in Table 2A1-1 was incorporated in the dispersion modelling. This seasonal emission profile for tailings ponds was taken from the Technical Reference for the Meteorology, Emissions and Ambient Air Quality in the Athabasca Oil Sands Region (Golder Associates Ltd., 1998).

- Abnormal emissions from other facilities, which are typically infrequent and of limited duration, were not included. The focus for non-North American facilities was placed on identifying representative emissions that occur on a continuous basis.

- A primary focus of the source characterization was the quantification of criteria air contaminants (CACs) such as sulphur dioxide (SO_2), oxides of nitrogen (NO_X), carbon monoxide (CO), volatile organic compounds (VOC) and fine particulate matter ($PM_{2.5}$) emissions, which are all expressed in units of tonnes per day (t/d) to facilitate comparison.

- When actual emission information was not available, emission factors obtained from the U.S. EPA AP-42 website (2007) were used to obtain a first order indication of the emission rates. In some cases, the emission factors were applied directly to the process, while in other cases, the emission factors were used to scale the NO_X emission data that were supplied.

- Additional VOC speciation was undertaken to quantify emissions for chemical species that were selected to allow potential human health effects to be determined. For point sources, VOC speciation was based on the emission factors provided in Table 2A1-2 and obtained from either the U.S. EPA AP-42 website (2007) or the California Air Toxics Emission Factors (CATEF) database (CARB, 2007). To be conservative, if both the U.S. EPA AP-42 and CATEF databases contained emission factors for the same chemical species, the higher of the two was used for emission estimation purposes.

- For area sources (e.g., mine pits, mine face, tailings ponds), additional VOC speciation was based on the Syncrude and Suncor operations' emission data provided in the Technical Reference for the Meteorology, Emissions and Ambient Air Quality in the Athabasca Oil Sands Region (Golder Associates Ltd., 1998).

The selected approach is viewed as sufficient to allow the incremental effects of the Project to be evaluated in the context of other air emission sources in the region.

Table 2A1-1 Seasonal Variation of Fugitive Hydrocarbon and Reduced Sulphur Emissions from Tailings Ponds Based on Monthly Average Temperatures and Wind Speeds

Month	Temperature (^{o}C)	Wind Speed (m/s)	Percentage of July Value
January	-15.0	3.2	65
February	-15.0	3.5	76
March	-1.4	3.6	98
April	4.9	3.8	120
May	11.5	1.0	158
June	16.9	3.0	123
July	18.3	2.9	100
August	17.9	3.1	113
September	10.5	4.0	158
October	3.7	3.4	99
November	-5.2	3.2	77
December	-13.2	3.0	63
Average	**2.8**	**3.4**	**105**

Table 2A1-2 Emission Factors Used to Estimate VOC Species Emissions from the Project and Other Point Sources within the RSA

VOC Species		Emission Factors (lb/MMscf)			
		Heaters, Boilers and Steam Generators	**Flares**	**Turbine Engines**	**Reciprocating Engines**
1	2-Methylnaphthalene	0.000024	0.0164	0.0000063	–
2	3-Methylchoranthrene	0.0000018	–	–	–
3	7,12-Dimethylbenz(a)anthracene	0.000016	–	–	–
4	Acenaphthene	0.0000018	0.056	0.000122	0.00339
5	Acenaphthylene	0.0000323	0.056	0.0000825	0.0162
6	Acetaldehyde	0.05	0.653	0.511	2.8458
7	Acrolein	0.0222	0.0933	0.0693	2.6826
8	Anthracene	0.0000024	0.056	0.000153	0.00226
9	Benzaldehyde	0.0272	–	–	–
10	Benzene	0.04	0.859	0.099	10.20
11	Benzo(a)anthracene	0.00000285	0.056	0.000134	0.000339
12	Benzo(a)pyrene	0.0000012	0.056	0.0000916	0.000151
13	Benzo(b)fluoranthene	0.0000018	0.056	0.0000672	0.000301
14	Benzo(e)pyrene	–	0.0000748	0.000000733	–
15	Benzo(g,h,i)perylene	0.00000142	0.056	0.0000825	0.000245
16	Benzo(k)fluoranthene	0.0000018	0.056	0.0000672	0.000117
17	Chrysene	0.00000183	0.056	0.00015	0.000395
18	Dibenz(a,h)anthracene	0.0000012	0.056	0.000134	0.0000145
19	Dichlorobenzene	0.0012	–	–	–
20	Ethylbenzene	0.00225	–	0.057	0.025296
21	Fluoranthene	0.0000179	0.056	0.000305	0.0012
22	Fluorene	0.00000582	0.056	0.000458	0.0094
23	Formaldehyde	0.672	67.40	6.87	20.91
24	Hexane	1.80	–	0.382	–
25	Indeno(1,2,3-cd)pyrene	0.0000018	0.056	0.000134	0.000207
26	Naphthalene	0.00247	35.40	0.00788	0.099042
27	Pentane	2.60	–	–	–
28	Perylene	–	0.0000748	0.000000968	–
29	Phenanthrene	0.0000474	0.056	0.00235	0.00885
30	Pyrene	0.0000116	0.056	0.000127	0.00264
31	Toluene	0.0747	109.00	0.168	2.62
32	Xylenes	0.0297	0.796	0.06528	0.1989
Total VOCs		**5.5**	**215.1**	**8.3**	**40.3**

Emission factors in units of pounds (lbs) of contaminant per million standard cubic feet (MMscf) of natural gas combusted.

2A2 Kai Kos Dehseh Project – Air Emission Sources

North American proposes to develop the Project in the oil sands region of Alberta. The Project's total production capacity will amount to approximately 220,000 bpd of bitumen using Steam Assisted Gravity Drainage (SAGD) technology.

2A2.1 Kai Kos Dehseh Project Air Emissions – CACs

The Project is proposed to include the following four development areas in the Alberta oil sands: Leismer, Corner, Thornbury and Hangingstone. Although the development of various Project sites will extend over 25 years or more, air emissions from 10 hubs (12 CPFs) were considered to occur concurrently for the purposes of the air quality assessment.

Air emissions from the thirteenth proposed site (i.e., Leismer Northeast) were not included in the air quality assessment because this site will be developed later on, after the year 2034, when some of the other project sites have already been decommissioned. Consequently, the total air emissions generated by the Project at that time are expected to be much less than the values considered in this assessment.

The following continuous air emission sources were included in the air quality assessment of the Project (12 CPFs):

- 48 Once-Through Steam Generators (OTSGs) (75.41 MW);
- 12 glycol heaters (2.78 MW);
- 12 slop treaters (0.55 MW);
- 5 sulphur plant process heaters (2.78 MW);
- 12 high pressure (HP) flares; and
- 12 low pressure (LP) flares.

Based on information provided by North American, the stack and emission parameters associated with these continuous sources are presented in Table 2A2-1. Under normal operating conditions, the flare stacks will have continuous pilots fuelled by sweet natural gas. Table 2A2-2 provides the parameters associated with the high and low pressure flare stacks.

Under normal operating conditions, since the produced gas is captured and burned in steam generators instead of being vented to the atmosphere and vapour emissions from storage tanks are managed through vapour recovery systems, fugitive hydrocarbon emissions from the Project are expected to be minimal.

Table 2A2-1 Kai Kos Dehseh Project Stack and Emission Parameters for Continuous Sources

Point Sources														
Kai Kos Dehseh Project Site	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X [a] (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Corner 1	Steam Generator OTSG 1	484246	6203282	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	484245	6203270	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	484245	6203258	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	484246	6203246	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 5	484344	6203282	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 6	484344	6203270	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 7	484344	6203259	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 8	484344	6203246	726	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	484327	6203124	726	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	484524	6203207	726	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	Sulphur Plant Process Heater	484396	6203236	726	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	HP Flare Continuous	484464	6203024	726	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	484464	6203025	726	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Corner 2	Steam Generator OTSG 1	485144	6203282	728	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	485144	6203270	728	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	485144	6203259	728	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	485144	6203246	728	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	485127	6203124	728	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	485324	6203207	728	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	Sulphur Plant Process Heater	485196	6203236	728	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	HP Flare Continuous	485264	6203024	728	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	485264	6203025	728	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Corner Expansion	Glycol Heater	484077	6203674	731	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	484274	6203757	731	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	484214	6203574	731	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	484214	6203575	731	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000

[a] NO_X expressed as NO_2 equivalent.

Table 2A2-1 Kai Kos Dehseh Project Stack and Emission Parameters for Continuous Sources (continued)

Point Sources													
Kai Kos Dehseh Project Site	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X [a] (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Corner Expansion West	Steam Generator OTSG 1	480326	6210475	705	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	480326	6210463	705	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	480327	6210451	705	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	480327	6210439	705	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	480309	6210317	705	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	480507	6210399	705	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	480446	6210217	705	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	480446	6210218	705	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Hangingstone	Steam Generator OTSG 1	475538	6226253	723	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	475538	6226241	723	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	475539	6226229	723	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	475539	6226217	723	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	475521	6226095	723	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	475719	6226178	723	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	Sulphur Plant Process Heater	475590	6226207	723	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	HP Flare Continuous	475658	6225995	723	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	475658	6225996	723	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Leismer Demo/ Commercial	Steam Generator OTSG 1	471728	6185804	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	471728	6185792	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	471728	6185780	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	471728	6185768	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 5	471826	6185804	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 6	471826	6185792	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 7	471827	6185780	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 8	471827	6185768	644	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	471809	6185646	644	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	472007	6185728	644	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	Sulphur Plant Process Heater	471878	6185758	644	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	HP Flare Continuous	471946	6185545	644	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	471946	6185546	644	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000

[a] NO_X expressed as NO_2 equivalent.

Table 2A2-1 Kai Kos Dehseh Project Stack and Emission Parameters for Continuous Sources (continued)

Point Sources													
Kai Kos Dehseh Project Site	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO$_2$ (t/d)**	**NO$_X$ [a] (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
Leismer Expansion	Glycol Heater	472609	6185646	660	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	472807	6185728	660	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	472746	6185545	660	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	472746	6185546	660	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Leismer North West	Steam Generator OTSG 1	467349	6189167	672	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	467349	6189155	672	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	467350	6189143	672	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	467350	6189131	672	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	467333	6189009	672	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	467530	6189091	672	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	467469	6188908	672	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	467469	6188909	672	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Leismer South	Steam Generator OTSG 1	465824	6171911	674	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	465824	6171899	674	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	465825	6171887	674	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	465825	6171875	674	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	465808	6171753	674	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	466005	6171835	674	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	465944	6171652	674	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	465944	6171653	674	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000

[a] NO$_X$ expressed as NO$_2$ equivalent.

Table 2A2-1 Kai Kos Dehseh Project Stack and Emission Parameters for Continuous Sources (continued)

Point Sources													
Kai Kos Dehseh Project Site	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X [a] (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Thornbury 1	Steam Generator OTSG 1	455774	6194258	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	455786	6194257	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	455799	6194257	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	455810	6194258	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 5	455774	6194356	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 6	455786	6194356	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 7	455798	6194356	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 8	455810	6194356	683	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	455932	6194339	683	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	455850	6194536	683	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	Sulphur Plant Process Heater	455821	6194408	683	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	HP Flare Continuous	456033	6194475	683	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	456032	6194475	683	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
Thornbury 2	Glycol Heater	455932	6195139	678	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	455850	6195336	678	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	456033	6195275	678	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	456032	6195275	678	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000

[a] NO_X expressed as NO_2 equivalent.

Table 2A2-1 Kai Kos Dehseh Project Stack and Emission Parameters for Continuous Sources (continued)

Point Sources													
Kai Kos Dehseh Project Site	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X [a] (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Thornbury Expansion	Steam Generator OTSG 1	448888	6199480	704	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 2	448888	6199468	704	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 3	448888	6199456	704	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Steam Generator OTSG 4	448888	6199444	704	27.0	1.68	16.7	444	0.060	0.334	0.200	0.019	0.025
	Glycol Heater	448871	6199322	704	16.0	0.76	5.1	616	0.000	0.008	0.005	0.001	0.001
	Slop Treater	449068	6199405	704	10.0	0.32	11.0	532	0.000	0.002	0.001	0.000	0.000
	HP Flare Continuous	449007	6199222	704	32.4	3.78	0.01	1273	0.000	0.000	0.001	0.000	0.000
	LP Flare Continuous	449007	6199223	704	32.3	1.89	0.03	1273	0.000	0.000	0.000	0.000	0.000
North American Kai Kos Dehseh Project Application and CEA Totals									**2.86**	**16.19**	**9.73**	**0.91**	**1.23**

[a] NO_X expressed as NO_2 equivalent.

Table 2A2-2 Kai Kos Dehseh Project Flare Stack and Emission Parameters under Normal Operating Conditions

Parameter	Flares (Continuous Purge & Pilot)	
	HP Flare	**LP Flare**
Sweet Natural Gas Flow Rate (std m^3/h)	4.35	3.85
Stack Dimensions:		
Height (m)	32.0	32.0
Diameter (m)	0.406	0.203
Stack Exhaust:		
Exit Velocity (m/s)	0.01	0.03
Pseudo-Parameters[b]:		
Effective Stack Height (m)	32.36	32.34
Equivalent Diameter (m)	3.778	1.889
Exit Temperature (K)	1273	1273
Emission Rates (t/d):		
SO_2	0.00000	0.00000
NO_X [a]	0.00010	0.00009
CO	0.00054	0.00048
VOC	0.00001	0.00000
$PM_{2.5}$	0.00001	0.00001

[a] NO_X expressed as NO_2 equivalent.

[b] Pseudo-parameters are calculated using the AENV Calculation Sheet for Flares Ver. 3.0. Effective stack height equals actual stack height plus flame height. Equivalent diameter is calculated based on energy balance considerations that allow the CALPUFF model to represent plume rise from a flare stack.

2A2.2 Kai Kos Dehseh Project Air Emissions – Trace Contaminants

The primary continuous sources of air emissions from the Project comprise a number of natural gas-fuelled combustion sources (i.e., steam generators, heaters and flares). The natural gas combustion products will be mostly criteria air contaminants (CACs) such as SO_2, NO_X, CO and $PM_{2.5}$, as well as trace VOC species.

While the CAC emission rates can be determined from engineering considerations and commonly available emission factors, the emission factors associated with VOC species are not as well defined. The emission factors used to speciate VOC emissions are shown in Table 2A1-2 and are based on the higher of the U.S. EPA AP-42 Emission Factors and the CATEF to be conservative.

Table 2A2-3 presents the total emission rates for VOC species that could be emitted during the operation of the Project. These VOC species were selected to allow potential human health effects to be assessed.

Table 2A2-3 Kai Kos Dehseh Project Total Emissions of VOC Species

VOC Species		Kai Kos Dehseh Project Total Emissions Rates (t/d)
1	2-Methylnaphthalene	3.97E-06
2	3-Methylchoranthrene	2.97E-07
3	7,12-Dimethylbenz(a)anthracene	2.64E-06
4	Acenaphthene	3.29E-07
5	Acenaphthylene	5.36E-06
6	Acetaldehyde	8.24E-03
7	Acrolein	3.66E-03
8	Anthracene	4.28E-07
9	Benzaldehyde	4.48E-03
10	Benzene	6.59E-03
11	Benzo(a)anthracene	5.02E-07
12	Benzo(a)pyrene	2.30E-07
13	Benzo(b)fluoranthene	3.29E-07
14	Benzo(e)pyrene	4.27E-11
15	Benzo(g,h,i)perylene	2.66E-07
16	Benzo(k)fluoranthene	3.29E-07
17	Chrysene	3.34E-07
18	Dibenz(a,h)anthracene	2.30E-07
19	Dichlorobenzene	1.98E-04
20	Ethylbenzene	3.71E-04
21	Fluoranthene	2.98E-06
22	Fluorene	9.91E-07
23	Formaldehyde	1.11E-01
24	Hexane	2.97E-01
25	Indeno(1,2,3-cd)pyrene	3.29E-07
26	Naphthalene	4.27E-04
27	Pentane	4.29E-01
28	Perylene	4.27E-11
29	Phenanthrene	7.84E-06
30	Pyrene	1.94E-06
31	Toluene	1.24E-02
32	Xylenes	4.90E-03
Total VOC Species		**0.877**

2A2.3 Kai Kos Dehseh Project Air Emissions – Upset Conditions

One low pressure (LP) flare and one high pressure (HP) flare will operate at each CPF module. The following three upset scenarios were identified as possible to occur during the operation of the Project:

- Upset Case 1 – High pressure flare relief upstream of the sulphur recovery facility resulting in the combustion of a 1600 m^3/h produced sour gas stream with 0.05% H_2S content in the flare stack. This event would typically last approximately 20 minutes, once per every five years;

- Upset Case 2 - High pressure flare relief downstream of the sulphur recovery facility resulting in the combustion of a 1600 m^3/h produced sour gas stream with 0.005% H_2S content in the flare stack. This event would typically last approximately 20 minutes, once per every two years; and

- Upset Case 3 - Low pressure flare relief due to the loss of the VRU compressor for the tank vapours. The tank vapours contain some H_2S that is not removed by the sulphur recovery unit. The flow rate to be flared would be 96 m^3/h, with 0.28% H_2S content. This event would typically last approximately 20 minutes, once per every two years.

Based on information provided by North American, Table 2A2-4 presents a summary of the stack and emission parameters for the three upset scenarios associated with the Project.

Table 2A2-4 Kai Kos Dehseh Project Flare Stack and Emission Parameters under Upset Conditions

Flaring Scenario	**Upset Scenario 1**	**Upset Scenario 2**	**Upset Scenario 3**
Emission Source	**HP Flare**	**HP Flare**	**LP Flare**
Flaring Event Duration (min)	***20***	***20***	***20***
Actual Stack Height (m)	32.0	32.0	32.0
Actual Stack Diameter (m)	0.406	0.406	0.457 [a]
Sour Gas Flow Rate (10^3 std m^3/d)	38.26	38.26	2.22
Purge & Pilot Gas Flow Rate (10^3 std m^3/d)	0.10	0.10	0.09
Total Gas Flow Rate (10^3 std m^3/d)	***38.37***	***38.37***	***2.31***
Flared Gas Composition (mol %):			
Hydrogen (H_2)	0.020	0.020	0.010
Helium (He)	0.020	0.020	0.001
Water (H_2O)	0.000	0.000	20.832
Nitrogen (N_2)	2.380	2.381	1.530
Carbon Dioxide (CO_2)	2.699	2.700	4.015
Hydrogen Sulphide (H_2S)	***0.050***	***0.005***	***0.269***
Methane (CH_4)	93.165	93.207	66.475
Ethane (C_2H_6)	0.040	0.040	0.068
Propane (C_3H_8)	0.070	0.070	0.222
i-Butane (*i*-C_4H_{10})	0.100	0.100	0.203
n-Butane (*n*-C_4H_{10})	0.389	0.389	1.008
i-Pentane (*i*-C_5H_{12})	0.568	0.568	1.334
n-Pentane (*n*-C_5H_{12})	0.489	0.489	1.190
n-Hexane (*n*-C_6H_{14})	0.010	0.010	0.010
n-Heptane (*n*-C_7H_{16}+)	0.000	0.000	2.794
Total	100	100	100
Flared Gas Net Heating Value (MJ/m^3)	33.75	33.76	33.05
Effective Stack Height (m)[b]	***38.19***	***38.19***	***33.60***
Equivalent Stack Diameter (m)[b]	***3.857***	***3.857***	***4.295***
Actual Exit Velocity (m/s)	***3.4***	***3.4***	***0.16***
Equivalent Stack Temperature (K)[b]	***1273***	***1273***	***1273***
Event SO_2 Emission Rate (g/s)	0.588	0.059	0.191
Hourly SO_2 Emission Rate (g/s)	***0.196***	***0.020***	***0.064***

[a] Revised design LP flare stack diameter.

[b] Pseudo-parameters are calculated using the AENV Calculation Sheet for Flares Ver. 3.0. Effective stack height equals actual stack height plus flame height. Equivalent diameter is calculated based on energy balance considerations that allow the CALPUFF model to represent plume rise from a flare stack.

2A3 Regional Study Area Air Emission Sources

The following sections (2A4 to 2A26) identify air emission sources located within the 190 km by 400 km RSA. The emission information is presented in terms of the baseline and cumulative environmental assessment (CEA) cases.

2A4 Albian Sands Energy Inc. (Albian Sands)

2A4.1 Baseline and CEA – Muskeg River Mine

Albian Sands was established as a joint venture between Shell Canada Limited (60%), Chevron Canada Limited (20%) and Western Oil Sands Inc. (20%) to develop and operate the Muskeg River Mine.

Phase 1 of the Muskeg River Mine is located within the RSA, 75 km north of Fort McMurray and east of the Athabasca River. First bitumen production started in December 2002. At full production of Phase 1, the Muskeg River Mine yields 155,000 bpd of bitumen (Albian Sands website, 2007). The extraction and utilities emissions originate primarily from mine fleet/fugitives, the tailings pond, as well as cogeneration units, boilers and fuel heaters.

The expansion of the Muskeg River Mine (Phase 2) will be located on the west side of the Muskeg River. Phase 2 has received approval from the Alberta Energy and Utilities Board and is planned to raise the total production to 225,000 bpd of bitumen. Its completion is scheduled to occur by year 2010.

Table 2A4-1 summarizes the baseline and CEA emissions for the Albian Sands facilities.

Table 2A4-1 Summary of Albian Sands Baseline and CEA Air Emissions

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Muskeg River Mine Phase 1	Boiler 1	469600	6346125	276	37.5	2.40	18.3	448	0.00	0.95	0.62	0.06	0.08
	Boiler 2	469575	6346125	276	37.5	2.40	18.3	448	0.00	1.07	0.69	0.06	0.10
	Cogeneration Unit 1	469565	6346240	276	37.5	5.00	18.3	448	0.00	2.13	0.99	0.06	0.12
	Cogeneration Unit 2	469580	6346240	276	37.5	5.00	18.3	448	0.00	2.13	0.99	0.06	0.12
	Fuel Heater 1	469625	6346240	276	8.0	0.30	18.3	448	0.00	0.01	0.01	0.00	0.00
	Fuel Heater 2	469640	6346240	276	8.0	0.30	18.3	448	0.00	0.01	0.01	0.00	0.00
Muskeg River Mine Phase 2	Boiler 1	469565	6345851	275	38.0	2.00	18.0	442	0.00	0.51	0.45	0.03	0.05
	Boiler 2	469581	6345855	275	38.0	2.00	18.0	442	0.00	0.51	0.45	0.03	0.05
	Boiler 3	469578	6345802	275	38.0	2.00	18.0	442	0.00	0.46	0.39	0.03	0.04
	Boiler 4	469594	6345806	275	38.0	2.00	18.0	442	0.00	0.46	0.39	0.03	0.04
	Boiler 5	469549	6345847	275	38.0	2.00	18.0	442	0.00	0.45	0.38	0.03	0.03
	Boiler 6	469562	6345798	275	38.0	2.00	18.0	442	0.00	0.45	0.38	0.03	0.03
	Fuel Heater	469571	6345606	274	8.0	0.30	18.0	453	0.00	0.01	0.01	0.00	0.00

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Muskeg River Mine Phase 1	Tailings Pond	NW	464930	6344288	272	6,801,664	0.00	0.00	0.00	14.38 [a]	0.00
		NE	467538	6344288							
		SW	464930	6341680							
		SE	467538	6341580							
Muskeg River Mine Phases 1 & 2	Mine Fleet NW Pit	NW	461781	6349779	266	4,498,641	0.56	20.60	19.45	2.78	0.88
		NE	463902	6349779							
		SW	461781	6347658							
		SE	463902	6347658							

[a] Peak emission rate

Table 2A4-1 Summary of Albian Sands Baseline and CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Muskeg River Mine Phases 1 & 2 (continued)	Mine Fleet Lease 90	NW	467009	6339217	280	4,534,313	0.05	1.94	1.84	0.26	0.081
		NE	469266	6339217							
		SW	467009	6337208							
		SE	469266	6337208							
	Mine Fugitives NW Pit	NW	461781	6349779	266	4,498,641	0.00	0.00	0.00	8.22	0.00
		NE	463902	6349779							
		SW	461781	6347658							
		SE	463902	6347658							
	Mine Fugitives Lease 90	NW	467009	6339217	280	4,534,313	0.00	0.00	0.00	0.78	0.00
		NE	469266	6339217							
		SW	467009	6337208							
		SE	469266	6337208							
Albian Sands Baseline and CEA Totals							**0.61**	**31.68**	**27.05**	**26.83**	**1.63**

2A5 Birch Mountain Resources Ltd. (Birch Mountain)

2A5.1 Baseline and CEA – Muskeg Valley Quarry

Birch Mountain operates an open pit quarry within the RSA, approximately 5 km east of Fort MacKay. Construction of the initial phase of the Muskeg Valley Quarry was completed in December 2005 (Birch Mountain website, 2007). Limestone from the quarry is marketed as construction aggregate and as rock for making concrete and asphalt. Table 2A5-1 presents emissions (all sources combined into a single surrogate area source) from the Birch Mountain facility.

2A5.2 CEA – Hammerstone

In February 2007, Birch Mountain filed their Hammerstone Project Update with the Alberta NRCB, AENV and the AEUB. Birch Mountain has renewed their request for regulatory approval for facilities to produce cement, recalcine spent lime and permanently store solids derived from flue gas desulphurization.

The Birch Mountain Hammerstone Project, which will be located within the RSA, was not included in this air quality assessment.

Table 2A5-1 Summary of Birch Mountain Resources Baseline and CEA Air Emissions

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Muskeg Valley Quarry	All Sources [a]	NW	466156	6338297	256	62,500	0.02	0.18	0.23	0.00	0.09
		NE	466406	6338297							
		SW	466156	6338047							
		SE	466406	6338047							
Birch Mountain Baseline and CEA Totals							**0.02**	**0.18**	**0.23**	**0.00**	**0.09**

[a] Grouped sources

2A6 Canadian Natural Resources Ltd. (CNRL)

2A6.1 Baseline and CEA

2A6.1.1 Burnt Lake Pilot Plant

The Burnt Lake Pilot Plant is a small scale SAGD operation within the RSA, located adjacent to the Primrose and Wolf Lake Development. Emissions from the Burnt Lake Pilot Plant (combined into a single surrogate point source) are summarized in Tables 2A6-1 and 2A6-2 for the baseline and CEA cases, respectively. The values are the same for both cases as there is no further planned development.

2A6.1.2 Horizon Oil Sands Project

CNRL has received regulatory approval to develop the Horizon Oil Sands project (Horizon project). The project includes an oil sands mine, bitumen extraction plant, a bitumen upgrader and associated facilities. The site is located within the RSA, 30 km north of Fort MacKay on the west side of the Athabasca River (CNRL, 2002). CNRL has publicly disclosed their plans for expanding the Horizon project through Phases 4 and 5. However, since air emission information for the expansion was not available, Phases 4 and 5 were not included in this air quality assessment.

The baseline and CEA emissions for the Horizon project are provided in Tables 2A6-1 and 2A6-2, respectively. Table 2A6-2 includes the Horizon In-situ SAGD project.

2A6.1.3 Kirby Thermal Pilot Plant

The Kirby Thermal Pilot Plant, within the RSA, is a 20,000 bpd SAGD in-situ oil sands facility. CNRL received regulatory approval for construction and operation of the facility in December 2002. Tables 2A6-1 and 2A6-2 provide summaries of its baseline and CEA emissions. The values are the same for both cases.

2A6.1.4 Primrose and Wolf Lake Operations

CNRL's Primrose and Wolf Lake thermal heavy oil operations are located within the RSA, approximately 55 km north of Bonnyville, Alberta. The existing and approved facilities include the Primrose North, Primrose South and Wolf Lake operations. Primrose North was expected to reach a bitumen production of 80,000 bpd by mid-2006, while Primrose South produces 55,000 bpd. The Wolf Lake Central Processing Facility is currently approved to produce 88,000 bpd (CNRL website, 2007a).

CNRL is planning to increase the Primrose and Wolf Lake bitumen production capacity by 30,000 bpd through the development of the Primrose East Expansion Project (CNRL, 2006). The Wolf Lake facility will also be expanded to increase bitumen processing capacity to 120,000 bpd. The project will also include changes at the Primrose North and Primrose South thermal heavy oil operations. CNRL intends to begin construction in 2007 with subsequent start-up in 2009.

Emission information for the Primrose and Wolf Lake operations was obtained from the CNRL Primrose In-situ Oil Sands Project, Primrose East Expansion Application for Approval (CNRL, 2006). Tables 2A6-1 and 2A6-2 summarize the Primrose and Wolf Lake emissions for the baseline and CEA cases, respectively. Table 2A6-2 includes the Primrose East Expansion project.

2A6.2 CEA – Kirby In-situ

CNRL publicly disclosed their Kirby In-situ Oil Sands project in December 2006. This SAGD project with a processing capacity of 30,000 bpd will be located within the RSA, approximately 85 km northeast of Lac La Biche, in the Regional Municipality of Wood Buffalo.

CNRL will submit a regulatory application for the Kirby In-situ project in the third quarter of 2007 (CNRL website, 2007b). Since air emission information for the project was not available, it was not included in this air quality assessment.

Table 2A6-1 Summary of CNRL Baseline Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Burnt Lake Pilot	Pilot Plant [a]	541402	6072999	679	13.5	1.10	6.1	423	0.36	1.20	1.0	0.07	0.09
Horizon	Dilutent Recovery Unit Heater 1	455002	6355298	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Dilutent Recovery Unit Heater 2	455007	6355298	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Dilutent Recovery Unit Heater 3	455155	6355364	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Dilutent Recovery Unit Heater 4	455160	6355364	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Vacuum Tower Heater 1	455166	6355410	277	30.5	1.90	6.2	474	0.02	0.12	0.10	0.01	0.01
	Vacuum Tower Heater 2	455171	6355410	277	30.5	1.40	6.2	474	0.01	0.04	0.05	0.02	0.01
	Delayed Coking Unit Heater 1	454965	6355355	277	70.0	2.70	9.1	523	0.06	0.40	0.35	0.02	0.03
	Delayed Coking Unit Heater 2	455015	6355355	277	70.0	2.70	9.1	523	0.06	0.40	0.35	0.02	0.03
	Delayed Coking Unit Heater 3	455065	6355355	277	70.0	2.70	9.1	523	0.06	0.40	0.35	0.02	0.03
	Hydrogen Plant Furnace 1	455448	6355106	276	61.0	3.90	15.0	421	0.03	1.37	1.22	0.08	0.11
	Hydrogen Plant Furnace 2	455573	6355106	276	61.0	4.40	15.0	421	0.03	1.37	1.54	0.10	0.14
	Naphtha Hydrotreater Heater 1	455166	6355014	278	30.5	0.90	12.4	555	0.01	0.04	0.05	0.00	0.01
	Naphtha Hydrotreater Heater 2	454854	6355014	279	30.5	1.50	11.6	799	0.01	0.11	0.09	0.01	0.01
	Gas Oil Hydrotreater Heater 1	455052	6355014	278	30.5	1.50	13.7	799	0.02	0.12	0.11	0.01	0.01
	Gas Oil Hydrotreater Heater 2	454860	6354843	279	30.5	1.30	10.0	688	0.01	0.06	0.08	0.01	0.01
	Isomer Hydrotreater Heater 1	455154	6354852	279	30.5	1.50	12.9	799	0.02	0.12	0.10	0.01	0.01
	Isomer Hydrotreater Heater 2	455184	6354840	279	30.5	1.50	12.1	799	0.02	0.11	0.10	0.01	0.01
	Utility Boilers (three units) [a]	455924	6354887	277	30.0	4.00	11.7	393	0.01	1.27	1.15	0.09	0.10
	Cogeneration Unit 1	455922	6354992	277	38.0	5.50	21.7	405	0.01	2.16	1.69	0.06	0.14
	Cogeneration Unit 2	455922	6354948	277	38.0	5.50	21.7	405	0.01	2.16	1.69	0.06	0.14
	Sulphur Recovery Unit Incinerator	455573	6355395	277	106.7	3.40	17.0	811	11.71	0.28	0.12	0.01	0.01

[a] Grouped sources

Table 2A6-1 Summary of CNRL Baseline Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Kirby Pilot	Power Unit	498113	6132970	732	9.1	0.10	93.2	1005	0.01	0.14	0.03	0.01	0.01
	Continuous Flare	498119	6132880	732	30.5	0.19	0.6	1273	0.02	0.00	0.01	0.00	0.00
	Fire Tube Heater	498031	6133003	731	6.1	0.61	1.8	573	0.00	0.00	0.00	0.00	0.00
	Glycol Heater	498059	6132907	732	6.1	0.31	13.0	492	0.00	0.01	0.01	0.00	0.00
	Steam Generator 1	498085	6132958	732	12.3	1.52	5.1	480	0.06	0.03	0.07	0.00	0.01
	Steam Generator 2	498098	6132966	732	10.5	0.76	10.2	480	0.03	0.02	0.01	0.00	0.00
	Steam Generator 3	498106	6132970	732	10.5	0.76	10.2	480	0.03	0.02	0.01	0.00	0.00
Primrose North	Glycol Heater	526764	6081140	693	7.6	0.48	7.8	393	0.00	0.04	0.01	0.00	0.00
	Steam Generator 1	526716	6081213	693	29.4	1.68	19.2	420	0.32	0.34	0.27	0.02	0.03
	Steam Generator 2	526720	6081202	693	29.4	1.68	19.2	420	0.32	0.34	0.27	0.02	0.03
	Steam Generator 3	526724	6081190	693	29.4	1.68	19.2	420	0.32	0.34	0.27	0.02	0.03
	Steam Generator 4	526729	6081178	693	29.4	1.68	19.2	420	0.32	0.34	0.27	0.02	0.03
	Steam Generator 5	526745	6081172	693	26.1	1.50	11.8	441	0.15	0.37	0.13	0.01	0.01
	Steam Generator 6	526748	6081163	693	26.1	1.50	11.8	441	0.15	0.37	0.13	0.01	0.01
	Steam Generator 7	526751	6081155	693	26.1	1.50	11.8	441	0.15	0.37	0.13	0.01	0.01
	Steam Generator 8	526754	6081146	693	26.1	1.50	11.8	441	0.15	0.37	0.13	0.01	0.01

Table 2A6-1 Summary of CNRL Baseline Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Primrose South	Cogeneration Unit	527013	6069627	676	27.0	5.10	18.3	375	0.00	1.85	1.20	0.04	0.10
	Fuel Gas Heater 1	527190	6069243	676	15.3	0.71	1.2	423	0.00	0.01	0.01	0.00	0.00
	Fuel Gas Heater 2	527194	6069239	676	7.6	0.61	1.6	423	0.00	0.01	0.01	0.00	0.00
	Steam Generator 1	527154	6069596	677	27.0	1.37	17.1	444	0.31	0.46	0.20	0.01	0.02
	Steam Generator 2	527141	6069648	677	30.0	1.37	18.5	448	0.00	0.19	0.16	0.01	0.02
	Steam Generator 3	527041	6069619	676	27.0	1.37	18.5	444	0.00	0.28	0.16	0.01	0.02
	Steam Generator 4	527042	6069679	676	27.0	1.37	18.5	444	0.00	0.28	0.16	0.01	0.02
	Steam Generator 5	527226	6069608	677	27.0	1.37	18.5	444	0.26	0.28	0.17	0.01	0.02
	Steam Generator 6	527157	6069607	677	27.0	1.37	18.5	444	0.26	0.28	0.17	0.01	0.02
	Steam Generator 7	527226	6069619	677	27.0	1.37	18.5	444	0.26	0.28	0.17	0.01	0.02
	Steam Generator 8	527157	6069618	677	27.0	1.37	18.5	444	0.26	0.28	0.17	0.01	0.02
	Steam Generator 9	527226	6069630	677	27.0	1.37	18.5	444	0.26	0.28	0.17	0.01	0.02
	Steam Generator 10	527157	6069629	677	27.0	1.37	18.5	444	0.26	0.28	0.17	0.01	0.02
	Steam Generator 11	527225	6069597	677	27.0	1.37	14.8	444	0.14	0.21	0.09	0.01	0.01
	Utility Boiler 1	527383	6069578	678	6.8	0.46	8.2	533	0.00	0.04	0.03	0.00	0.00
	Utility Boiler 2	527391	6069578	678	6.8	0.46	8.2	533	0.00	0.04	0.03	0.00	0.00
	Wellpad Flare	526602	6069810	674	14.6	1.60	0.5	1273	0.00	0.01	0.01	0.00	0.00
Wolf Lake	Continuous Flare	517870	6061226	640	44.0	4.41	0.5	1273	0.09	0.08	0.05	0.01	0.01
	Fuel Gas Heater	517613	6061136	642	8.0	0.40	0.8	423	0.00	0.01	0.00	0.00	0.00
	Steam Generator 1	517568	6061052	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator 2	517568	6061061	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator 3	517624	6061042	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator 4	517624	6061052	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator 5	517624	6061061	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Utility Boiler 1	517617	6061087	643	16.0	1.12	10.7	423	0.00	0.17	0.10	0.01	0.01
	Utility Boiler 2	517695	6061127	642	16.4	0.96	8.8	443	0.00	0.07	0.05	0.00	0.00
	Utility Boiler 3	517700	6061127	642	16.4	0.96	8.8	443	0.00	0.07	0.05	0.00	0.00

Table 2A6-1 Summary of CNRL Baseline Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Horizon	Mine Fleet/Fugitives	NW	454000	6353683	267	7,282,341	0.43	33.12	20.89	4.59	1.21
		NE	458327	6353683							
		SW	454000	6352000							
		SE	458327	6352000							
	Tailings Pond	NW	44375	6357500	347	16,875,000	0.00	0.00	0.00	139.00[a]	0.00
		NE	447500	6357500							
		SW	443750	6353000							
		SE	447500	6353000							
	Mine Face Fugitives	NW	454000	6353683	267	7,282,341	0.00	0.00	0.00	8.46	0.00
		NE	458327	6353683							
		SW	454000	6352000							
		SE	458327	6352000							
	Space Heating (Bitumen Production)	NW	453506	6355399	274	387,340	0.00	0.32	0.28	0.02	0.03
		NE	454230	6355399							
		SW	453506	6354864							
		SE	454230	6354864							
	Space Heating (Mine)	NW	452191	6355617	280	163,592	0.01	0.98	0.89	0.06	0.08
		NE	452675	6355617							
		SW	452191	6355279							
		SE	452675	6355279							
	Space Heating (Infrastructure, administration)	NW	6355391	453495	275	376,232	0.01	0.82	0.78	0.05	0.07
		NE	6355391	452777							
		SW	6354867	453495							
		SE	6354867	376232							

[a] Peak emission rate

Table 2A6-1 Summary of CNRL Baseline Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Horizon (continued)	Space Heating (Infrastructure)	NW	455009	6354332	282	79,191	0.00	0.25	0.22	0.01	0.02
		NE	455428	6354332							
		SW	455009	6354143							
		SE	455428	6354143							
	Space Heating (Infrastructure)	NW	455621	6354536	278	151,929	0.00	0.25	0.22	0.01	0.02
		NE	456080	6354536							
		SW	455620	6354205							
		SE	456080	6354205							
	Plant Fugitives	NW	454754	635510	278	977,900	0.00	0.00	0.00	4.13	0.00
		NE	456024	6355510							
		SW	454754	6354740							
		SE	456024	6354740							
CNRL Baseline Totals							**19.11**	**58.62**	**40.40**	**157.36**	**2.93**

Table 2A6-2 Summary of CNRL CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Burnt Lake Pilot	Pilot Plant [a]	541402	6072999	679	13.5	1.10	6.1	423	0.36	1.20	1.0	0.07	0.09
Horizon	Dilutent Recovery Unit Heater 1	455002	6355298	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Dilutent Recovery Unit Heater 2	455007	6355298	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Dilutent Recovery Unit Heater 3	455155	6355364	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Dilutent Recovery Unit Heater 4	455160	6355364	277	30.5	3.00	6.2	474	0.04	0.30	0.25	0.02	0.02
	Vacuum Tower Heater 1	455166	6355410	277	30.5	1.90	6.2	474	0.02	0.12	0.10	0.01	0.01
	Vacuum Tower Heater 2	455171	6355410	277	30.5	1.40	6.2	474	0.01	0.04	0.05	0.02	0.01
	Delayed Coking Unit Heater 1	454965	6355355	277	70.0	2.70	9.1	523	0.06	0.40	0.35	0.02	0.03
	Delayed Coking Unit Heater 2	455015	6355355	277	70.0	2.70	9.1	523	0.06	0.40	0.35	0.02	0.03
	Delayed Coking Unit Heater 3	455065	6355355	277	70.0	2.70	9.1	523	0.06	0.40	0.35	0.02	0.03
	Hydrogen Plant Furnace 1	455448	6355106	276	61.0	3.90	15.0	421	0.03	1.37	1.22	0.08	0.11
	Hydrogen Plant Furnace 2	455573	6355106	276	61.0	4.40	15.0	421	0.03	1.37	1.54	0.10	0.14
	Naphtha Hydrotreater Heater 1	455166	6355014	278	30.5	0.90	12.4	555	0.01	0.04	0.05	0.00	0.01
	Naphtha Hydrotreater Heater 2	454854	6355014	279	30.5	1.50	11.6	799	0.01	0.11	0.09	0.01	0.01
	Gas Oil Hydrotreater Heater 1	455052	6355014	278	30.5	1.50	13.7	799	0.02	0.12	0.11	0.01	0.01
	Gas Oil Hydrotreater Heater 2	454860	6354843	279	30.5	1.30	10.0	688	0.01	0.06	0.08	0.01	0.01
	Isomer Hydrotreater Heater 1	455154	6354852	279	30.5	1.50	12.9	799	0.02	0.12	0.10	0.01	0.01
	Isomer Hydrotreater Heater 2	455184	6354840	279	30.5	1.50	12.1	799	0.02	0.11	0.10	0.01	0.01
	Utility Boilers (three units) [a]	455924	6354887	277	30.0	4.00	11.7	393	0.01	1.27	1.15	0.09	0.10
	Cogeneration Unit 1	455922	6354992	277	38.0	5.50	21.7	405	0.01	2.16	1.69	0.06	0.14
	Cogeneration Unit 2	455922	6354948	277	38.0	5.50	21.7	405	0.01	2.16	1.69	0.06	0.14
	Sulphur Recovery Unit Incinerator	455573	6355395	277	106.7	3.40	17.0	811	11.71	0.28	0.12	0.01	0.01

[a] Grouped sources

Table 2A6-2 Summary of CNRL CEA Air Emissions (continued)

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Horizon In-situ	Steam Generator 1	454700	6356500	278	27.0	1.34	27.5	553	0.08	0.42	0.03	0.04	0.04
	Steam Generator 2	454720	6356500	278	27.0	1.34	27.5	553	0.08	0.42	0.03	0.04	0.04
	Steam Generator 3	454740	6356500	278	27.0	1.34	27.5	553	0.08	0.42	0.03	0.04	0.04
	Steam Generator 4	454760	6356500	278	27.0	1.34	27.5	553	0.08	0.42	0.03	0.04	0.04
	Steam Generator 5	454780	6356500	278	27.0	1.34	27.5	553	0.08	0.42	0.03	0.04	0.04
Kirby Pilot	Power Unit	498113	6132970	732	9.1	0.10	93.2	1005	0.01	0.14	0.03	0.01	0.01
	Continuous Flare	498119	6132880	732	30.5	0.19	0.6	1273	0.02	0.00	0.01	0.00	0.00
	Fire Tube Heater	498031	6133003	731	6.1	0.61	1.8	573	0.00	0.00	0.00	0.00	0.00
	Glycol Heater	498059	6132907	732	6.1	0.31	13.0	492	0.00	0.01	0.01	0.00	0.00
	Steam Generator 1	498085	6132958	732	12.3	1.52	5.1	480	0.06	0.03	0.07	0.00	0.01
	Steam Generator 2	498098	6132966	732	10.5	0.76	10.2	480	0.03	0.02	0.01	0.00	0.00
	Steam Generator 3	498106	6132970	732	10.5	0.76	10.2	480	0.03	0.02	0.01	0.00	0.00
Primrose East	Steam Generator OTSG 1 (mixed gas)	541430	6132970	697	29.4	1.68	19.2	420	0.12	0.34	0.28	0.02	0.03
	Steam Generator OTSG 2 (mixed gas)	541443	6071861	697	29.4	1.68	19.2	420	0.12	0.34	0.28	0.02	0.03
	Flue Gas Desulphurization 1 (OTSGs 3 and 4)	541466	6071861	691	30.0	2.64	25.9	330	0.85	2.01	0.22	0.01	0.20
	Flue Gas Desulphurization 2 (OTSGs 5 and 6)	541441	6071727	691	30.0	2.64	25.9	330	0.85	2.01	0.22	0.01	0.20
	Flue Gas Desulphurization 3 (OTSGs 7 and 8)	541416	6071727	691	30.0	2.25	25.9	330	0.62	1.46	0.16	0.01	0.14
	Glycol Heater	541537	6071834	696	7.6	0.26	7.8	393	0.00	0.01	0.01	0.00	0.00

Table 2A6-2 Summary of CNRL CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Primrose North	Glycol Heater	526764	6081140	693	7.6	0.48	7.8	393	0.00	0.04	0.01	0.00	0.00
	Flue Gas Desulphurization 1 (OTSGs 1 and 2)	526706	6081204	693	30.0	2.64	13.0	330	0.85	2.01	0.22	0.01	0.20
	Flue Gas Desulphurization 2 (OTSGs 3 and 4)	526715	6081181	693	30.0	2.64	13.0	330	0.85	2.01	0.22	0.01	0.20
	Steam Generator OTSG 5 (mixed gas)	526745	6081172	693	26.1	1.50	11.8	441	0.05	0.37	0.13	0.01	0.01
	Steam Generator OTSG 6 (mixed gas)	526748	6081163	693	26.1	1.50	11.8	441	0.05	0.37	0.13	0.01	0.01
	Steam Generator OTSG 7 (mixed gas)	526751	6081155	693	26.1	1.50	11.8	441	0.05	0.37	0.13	0.01	0.01
	Steam Generator OTSG 8 (mixed gas)	526754	6081146	693	26.1	1.50	11.8	441	0.05	0.37	0.13	0.01	0.01
Primrose South	Cogeneration Unit	527013	6069627	676	27.0	5.10	18.3	375	0.00	1.85	1.20	0.04	0.10
	Fuel Gas Heater 1	527190	6069243	676	15.3	0.71	1.2	423	0.00	0.01	0.01	0.00	0.00
	Fuel Gas Heater 2	527194	6069239	676	7.6	0.61	1.6	423	0.00	0.01	0.01	0.00	0.00
	Flue Gas Desulphurization 1 (OTSGs 1 and 2)	527142	6069603	677	30.0	2.18	13.0	330	0.58	1.34	0.15	0.01	0.13
	Flue Gas Desulphurization 2 (OTSGs 3, 4 and 5)	527143	6069624	677	30.0	2.52	13.0	330	0.78	1.78	0.20	0.01	0.17
	Steam Generator OTSG 6 (mixed gas)	527157	6069607	677	27.0	1.37	18.5	444	0.00	0.28	0.17	0.01	0.02
	Steam Generator OTSG 7 (mixed gas)	527226	6069619	677	27.0	1.37	18.5	444	0.00	0.28	0.17	0.01	0.02
	Steam Generator OTSG 8 (mixed gas)	527157	6069618	677	27.0	1.37	18.5	444	0.10	0.28	0.17	0.01	0.02
	Steam Generator OTSG 9 (mixed gas)	527226	6069630	677	27.0	1.37	18.5	444	0.10	0.28	0.17	0.01	0.02
	Steam Generator OTSG 10 (mixed gas)	527157	6069629	677	27.0	1.37	18.5	444	0.10	0.28	0.17	0.01	0.02
	Steam Generator OTSG 11 (mixed gas)	527225	6069597	677	27.0	1.37	14.8	444	0.05	0.21	0.09	0.01	0.01
	Utility Boiler 1	527383	6069578	678	6.8	0.46	8.2	533	0.00	0.04	0.03	0.00	0.00
	Utility Boiler 2	527391	6069578	678	6.8	0.46	8.2	533	0.00	0.04	0.03	0.00	0.00
	Wellpad Flare	526602	6069810	674	14.6	1.60	0.5	1273	0.01	0.01	0.01	0.00	0.00

Table 2A6-2 Summary of CNRL CEA Air Emissions (continued)

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Wolf Lake	Continuous Flare	517870	6061226	640	44.5	4.41	0.8	1273	0.13	0.12	0.07	0.02	0.01
	Fuel Gas Heater	517613	6061136	642	8.0	0.40	0.8	423	0.00	0.01	0.00	0.00	0.00
	Steam Generator OTSG 1 (mixed gas)	517568	6061052	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator OTSG 2 (mixed gas)	517568	6061061	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator OTSG 3 (mixed gas)	517624	6061042	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator OTSG 4 (mixed gas)	517624	6061052	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Steam Generator OTSG 5 (mixed gas)	517624	6061061	643	30.0	1.37	20.5	444	0.38	0.28	0.17	0.01	0.02
	Utility Boiler 1	517617	6061087	643	16.0	1.12	10.7	423	0.00	0.17	0.10	0.01	0.01
	Utility Boiler 2	517695	6061127	642	16.4	0.96	8.8	443	0.00	0.07	0.05	0.00	0.00
	Utility Boiler 3	517700	6061127	642	16.4	0.96	8.8	443	0.00	0.07	0.05	0.00	0.00
	Utility Boiler 4	517700	6061123	642	16.0	1.12	10.7	423	0.00	0.13	0.10	0.01	0.01

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Horizon	Mine Fleet	NW	454000	6353683	267	7,282,341	0.43	33.12	20.89	4.59	1.21
		NE	458327	6353683							
		SW	454000	6352000							
		SE	458327	6352000							
	Tailings Pond	NW	443750	6357500	347	16,875,000	0.00	0.00	0.00	139.00[a]	0.00
		NE	447500	6357500							
		SW	443750	6353000							
		SE	447500	6353000							

[a] Peak emission rate

Table 2A6-2 Summary of CNRL CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Horizon (continued)	Mine Face Fugitives	NW	454000	6353683	267	7,282,341	0.00	0.00	0.00	8.46	0.00
		NE	458327	6353683							
		SW	454000	6352000							
		SE	458327	6352000							
	Space Heating (Bitumen Production)	NW	453506	6355399	274	387,340	0.00	0.32	0.28	0.02	0.03
		NE	454230	6355399							
		SW	453506	6354864							
		SE	454230	6354864							
	Space Heating (Mine)	NW	452191	6355617	280	163,592	0.01	0.98	0.89	0.06	0.08
		NE	452675	6355617							
		SW	452191	6355279							
		SE	452675	6355279							
	Space Heating (Infrastructure administration)	NW	452777	6355391	275	376,232	0.01	0.82	0.78	0.05	0.07
		NE	453495	6355391							
		SW	452777	6354867							
		SE	453495	6354867							
	Space Heating (Infrastructure)	NW	455009	6354332	282	79,191	0.00	0.25	0.22	0.01	0.02
		NE	455428	6354332							
		SW	455009	6354143							
		SE	455428	6354143							

Table 2A6-2 Summary of CNRL CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Horizon (continued)	Space Heating (Infrastructure)	NW	455621	6354536	278	151,929	0.00	0.25	0.22	0.01	0.02
		NE	456080	6354536							
		SW	455621	6354205							
		SE	456080	6354205							
	Plant Fugitives	NW	454754	6355510	278	977,900	0.00	0.00	0.00	4.13	0.00
		NE	456024	6355510							
		SW	454754	6354740							
		SE	456024	6354740							
CNRL CEA Totals							**21.75**	**71.33**	**42.55**	**157.48**	**4.23**

2A7 Connacher Oil and Gas Limited (Connacher)

2A7.1 Baseline and CEA – Great Divide

Connacher is planning to develop their Great Divide SAGD project within the LSA, on land situated 80 km southeast of Fort McMurray. The Great Divide project has received approval from the Alberta Energy and Utilities Board, and its baseline and CEA emissions are presented in Table 2A7-1.

Table 2A7-1 Summary of Connacher Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Great Divide	Steam Generator 1	448377	6218843	707	30.5	1.83	14.3	473	0.04	0.21	0.13	0.01	0.02
	Steam Generator 2	448396	6218843	708	30.5	1.83	14.3	473	0.04	0.21	0.13	0.01	0.02
	Utility Boiler	448474	6218793	711	13.2	1.07	1.9	588	0.00	0.01	0.01	0.00	0.00
	Glycol Heater	448356	6218829	707	5.0	0.61	3.1	700	0.00	0.01	0.01	0.00	0.00
	Treater	448367	6218767	709	6.7	0.61	4.0	588	0.00	0.01	0.00	0.00	0.00
Connacher Baseline and CEA Totals									**0.08**	**0.45**	**0.27**	**0.02**	**0.04**

2A8 ConocoPhillips Canada Resources Corp. (ConocoPhillips)

2A8.1 Baseline and CEA – Surmont

ConocoPhillips currently operates the Surmont Pilot SAGD facility located within the LSA, approximately 60 km southeast of Fort McMurray. The Surmont Pilot bitumen production capacity is 2,000 bpd.

In 2003, ConocoPhillips received regulatory approval for the Surmont Commercial Oil Sands project to be developed in four phases targeting a bitumen production of 100,000 bpd by year 2012. The ConocoPhillips Surmont facility shown in Figure 2A1-1 is representative for all baseline plants (i.e., Surmont Pilot and Commercial Phases 1, 2, 3 and 4). Table 2A8-1 provides a summary of baseline emissions for the ConocoPhillips facilities based on their regulatory approval.

ConocoPhillips is currently planning a change to the Surmont Commercial project that will result in a two-phase development (Jan Shi, personal communication, 2006). Emission information for the Surmont CEA case obtained from AMEC Earth and Environmental Limited is presented in Table 2A8-2.

Table 2A8-1 Summary of ConocoPhillips Baseline Air Emissions

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO$_2$ (t/d)**	**NO$_X$ (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
Surmont Phase 1	Continuous Flare	503560	6227150	637	37.0	0.76	20.0	1273	0.02	0.02	0.00	0.00	0.00
	Flash Treater	503519	6227263	635	15.0	0.75	52.2	811	0.00	0.04	0.02	0.00	0.00
	Glycol Heater	503328	6227073	637	15.0	0.56	40.2	623	0.03	0.02	0.01	0.00	0.00
	Steam Generator 1	503519	6227382	633	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 2	503519	6227369	633	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 3	503519	6227356	633	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 4	503519	6227343	634	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 5	503519	6227330	634	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
Surmont Phase 2	Continuous Flare	498652	6231013	661	37.0	0.76	20.0	1273	0.02	0.02	0.00	0.00	0.00
	Flash Treater	498334	6231108	676	15.0	0.75	52.2	811	0.00	0.04	0.02	0.00	0.00
	Glycol Heater	498447	6231149	669	15.0	0.56	40.2	623	0.03	0.02	0.01	0.00	0.00
	Steam Generator 1	498215	6231108	678	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 2	498228	6231108	678	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 3	498241	6231108	678	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 4	498254	6231108	678	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 5	498267	6231108	677	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
Surmont Phase 3	Continuous Flare	499318	6218876	720	37.0	0.76	20.0	1273	0.02	0.02	0.00	0.00	0.00
	Flash Treater	499000	6218971	723	15.0	0.75	52.2	811	0.00	0.04	0.02	0.00	0.00
	Glycol Heater	499113	6219012	720	15.0	0.56	40.2	623	0.03	0.02	0.01	0.00	0.00
	Steam Generator 1	498881	6218971	726	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 2	498894	6218971	726	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 3	498907	6218971	725	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 4	498920	6218971	725	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 5	498933	6218971	725	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01

Table 2A8-1 Summary of ConocoPhillips Baseline Air Emissions (continued)

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Surmont Phase 4	Continuous Flare	508444	6230930	568	37.0	0.76	20.0	1273	0.02	0.02	0.00	0.00	0.00
	Flash Treater	508126	6231025	574	15.0	0.75	52.2	811	0.00	0.04	0.02	0.00	0.00
	Glycol Heater	508239	6231066	570	15.0	0.56	40.2	623	0.03	0.02	0.01	0.00	0.00
	Steam Generator 1	508007	6231025	577	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 2	508020	6231025	577	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 3	508033	6231025	576	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 4	508046	6231025	576	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
	Steam Generator 5	508059	6231025	576	27.0	1.53	28.9	448	0.13	0.18	0.09	0.00	0.01
Surmont Pilot	Steam Generator [a]	501850	6229700	572	13.3	0.91	8.3	423	0.16	0.08	0.07	0.00	0.01
ConocoPhillips Baseline Totals									**3.01**	**4.07**	**2.04**	**0.08**	**0.27**

[a] Grouped sources

Table 2A8-2 Summary of ConocoPhillips CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Surmont Phase 1	Steam Generator 1	503363	6227513	627	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 2	503363	6227528	627	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 3	503434	6227513	629	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 4	503434	6227528	629	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Slop Treater X-240	503448	6227575	628	10.2	0.39	3.7	811	0.00	0.00	0.00	0.00	0.00
	Glycol Trim Heater H-601	503440	6227633	627	15.0	0.90	7.8	652	0.04	0.02	0.02	0.00	0.00
	Continuous Flare FS-701	503418	6227513	629	48.8	0.76	20.0	1273	0.04	0.02	0.00	0.00	0.00
Surmont Phase 2	Steam Generator 531A	504118	6227777	616	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531C	504118	6227792	616	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531E	504118	6227807	616	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531G	504118	6227822	615	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531I	504118	6227837	615	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531K	504118	6227852	615	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531M	504118	6227867	615	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531B	504200	6227777	610	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531D	504200	6227792	610	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531F	504200	6227807	610	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531H	504200	6227822	610	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531J	504200	6227837	609	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531L	504200	6227852	609	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Steam Generator 531N	504200	6227867	609	27.0	1.68	20.1	469	0.33	0.17	0.27	0.01	0.02
	Slop Treater 2X-240	504144	6227407	618	10.2	0.39	3.7	811	0.00	0.00	0.00	0.00	0.00

Table 2A8-2 Summary of ConocoPhillips CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Surmont Phase 2 (continued)	Glycol Trim Heater 2H-601A	504058	6227733	619	15.0	0.90	7.8	652	0.04	0.02	0.02	0.00	0.00
	Glycol Trim Heater 2H-601B	504058	6227741	619	15.0	0.90	7.8	652	0.04	0.02	0.02	0.00	0.00
	Glycol Trim Heater 2H-601C	504058	6227749	619	15.0	0.90	7.8	652	0.04	0.02	0.02	0.00	0.00
	Continuous Flare 2FS-701	504488	6227645	603	48.8	0.76	20.0	1273	0.04	0.02	0.00	0.00	0.00
	Sulphur Plant Incinerator	504344	6227647	606	30.5	0.92	0.9	923	0.26	0.00	0.12	0.00	0.00
Surmont Pilot	Steam Generator [a]	501850	6229700	572	13.3	0.91	8.3	423	0.16	0.08	0.07	0.00	0.01
ConocoPhillips CEA Totals									**6.63**	**3.26**	**5.11**	**0.13**	**0.45**

[a] Grouped sources

2A9 Deer Creek Energy Limited (Deer Creek)

2A9.1 Baseline and CEA – Joslyn Creek

Deer Creek (a wholly-owned subsidiary of Total E&P Canada Ltd.) currently operates the Joslyn Creek Phase I in-situ SAGD project. The Deer Creek lease is situated within the RSA, 60 km north of Fort McMurray and 16 km from Fort MacKay. The company has received regulatory approval to construct and operate the Josyln Creek Phase II SAGD project, which will have a bitumen production capacity of 12,000 bpd (Deer Creek, 2006). Table 2A9-1 summarizes the Joslyn Creek emissions for the baseline case. Since the Joslyn Phase I plant will be decommissioned once the Phase II becomes operational, the two plants will not operate simultaneously. Therefore, emissions from Phase I are not included in the baseline case.

Deer Creek has also filed an application for approval to develop a 100,000 bpd mine and bitumen extraction facility on the eastern side of their Joslyn Creek lease area. Emissions for the proposed Deer Creek mine were obtained from the Air Quality Assessment of the Deer Creek Energy Limited Joslyn North Mine Project (Deer Creek, 2006). Table 2A9-2 provides a summary of the CEA emissions for the Deer Creek facilities.

Table 2A9-1 Summary of Deer Creek Baseline Air Emissions

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Joslyn Phase II	Steam Generator 1	445741	6348200	327	30.0	3.50	5.0	553	0.37	0.23	0.23	0.02	0.02
	Steam Generator 2	445753	6348200	326	30.0	3.50	5.0	553	0.37	0.23	0.23	0.02	0.02
	Utility Boiler	445631	6348261	327	11.0	0.40	22.6	475	0.00	0.03	0.01	0.00	0.00
	Glycol Heater 1	445778	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Glycol Heater 2	445780	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Glycol Heater 3	445782	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Glycol Heater 4	445784	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Recycle Treater	445687	6348295	327	10.0	0.80	2.7	476	0.00	0.01	0.01	0.00	0.00
	Slop Heater	445688	6348272	327	4.9	0.50	3.3	476	0.00	0.01	0.00	0.00	0.00
Deer Creek Baseline Totals									**0.74**	**0.51**	**0.48**	**0.03**	**0.05**

Table 2A9-2 Summary of Deer Creek CEA Air Emissions

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Joslyn Phase II	Steam Generator 1	445741	6348200	327	30.0	3.50	5.0	553	0.37	0.23	0.23	0.02	0.02
	Steam Generator 2	445753	6348200	326	30.0	3.50	5.0	553	0.37	0.23	0.23	0.02	0.02
	Utility Boiler	445631	6348261	327	11.0	0.40	22.6	475	0.00	0.03	0.01	0.00	0.00
	Glycol Heater 1	445778	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Glycol Heater 2	445780	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Glycol Heater 3	445782	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Glycol Heater 4	445784	6348220	326	5.0	0.50	2.1	476	0.00	0.00	0.00	0.00	0.00
	Recycle Treater	445687	6348295	327	10.0	0.80	2.7	476	0.00	0.01	0.01	0.00	0.00
	Slop Heater	445688	6348272	327	4.9	0.50	3.3	476	0.00	0.01	0.00	0.00	0.00
Joslyn Phase IIIA	Steam Generator 1	445794	6348200	326	30.0	1.83	17.3	437	0.48	0.33	0.33	0.02	0.03
	Steam Generator 2	445806	6348200	326	30.0	1.83	17.3	437	0.48	0.33	0.33	0.02	0.03
	Utility Heater	445782	6348221	326	5.0	0.46	8.0	533	0.00	0.01	0.01	0.00	0.00
	Evaporator Boiler	445633	6348261	327	11.0	0.41	22.3	533	0.00	0.03	0.01	0.00	0.00
	Slop Heater	445689	6348182	327	4.9	0.51	4.1	533	0.01	0.01	0.00	0.00	0.00
Joslyn North Mine Project	Cogeneration Unit	450875	6349645	307	38.0	4.60	22.0	383	0.09	1.57	0.96	0.36	0.12
	Steam Generator 1	450815	6349425	306	38.0	1.80	18.0	383	0.00	0.36	0.28	0.02	0.03
	Steam Generator 2	450815	6349455	306	38.0	1.80	18.0	383	0.00	0.36	0.28	0.02	0.03
	Steam Generator 3	450815	6349485	306	38.0	1.80	18.0	383	0.00	0.36	0.28	0.02	0.03

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Joslyn North Mine Project	Mine Fleet/Fugitives	NW	452000	6351000	302	6,590,220	0.01	9.20	7.82	3.21	0.24
		NE	453988	6351000							
		SW	452000	6347685							
		SE	453988	6347685							

Table 2A9-2 Summary of Deer Creek CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Joslyn North Mine Project (continued)	Space Heating	NW	450864	6350088	307	53,280	0.00	0.36	0.28	0.00	0.02
		NE	451086	6350088							
		SW	450864	6349848							
		SE	451086	6349848							
	Tailings Pond	NW	450384	6347544	308	3,427,312	0.00	0.00	0.00	43.20 [a]	0.00
		NE	452372	6347544							
		SW	450384	6345820							
		SE	452372	6345820							
Deer Creek CEA Totals							**1.80**	**13.45**	**11.04**	**46.91**	**0.56**

[a] Peak emission rate

2A10 Devon ARL Corporation (Devon)

2A10.1 Baseline and CEA – Jackfish

Pursuant to the Application for Approval of the Devon Jackfish Project (Devon, 2003), in December 2004, Devon received regulatory approval to construct and operate their Jackfish 1 SAGD Project located within the LSA, 140 km south of Fort McMurray. Construction of the project began in the first quarter of 2005 with full bitumen production (35,000 bpd) targeted for year 2008 (Devon website, 2007). The facility will include six steam generators, two glycol trim heaters, a flash treater and a central utilities flare stack. Table 2A10-1 summarizes the Devon Jackfish 1 baseline emissions. These emissions have been updated for the application values due to the availability of refined engineering information (Devon, 2006).

The proposed Jackfish 2 project will be located approximately 15 km southeast of Conklin, adjacent to the Jackfish 1 project. The Jackfish 2 project is anticipated to produce an additional 35,000 bpd of bitumen. Construction of Jackfish 2 is scheduled to begin in 2008 with initial production targeted for 2010. Table 2A10-2 provides a summary of the Devon CEA emissions.

Table 2A10-1 Summary of Devon Baseline Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Jackfish 1	Steam Generator 1	507855	6153524	612	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 2	507846	6153515	612	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 3	507838	6153507	612	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 4	507830	6153498	611	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 5	507821	6153490	611	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 6	507813	6153481	611	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Flash Treater	508009	6153513	613	6.0	0.15	23.2	443	0.00	0.01	0.00	0.00	0.00
	Glycol Trim Heater 1	508036	6153691	612	6.7	0.71	27.7	399	0.00	0.07	0.02	0.00	0.00
	Glycol Trim Heater 2	508028	6153684	612	6.7	0.71	27.7	399	0.00	0.07	0.02	0.00	0.00
	Continuous Flare	508148	6153476	613	41.7	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
Devon Baseline Totals									**2.00**	**2.00**	**1.39**	**0.09**	**0.13**

Table 2A10-2 Summary of Devon CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Jackfish 1	Steam Generator 1	507855	6153524	612	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 2	507846	6153515	612	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 3	507838	6153507	612	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 4	507830	6153498	611	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 5	507821	6153490	611	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 6	507813	6153481	611	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Flash Treater	508009	6153513	613	6.0	0.15	23.2	443	0.00	0.01	0.00	0.00	0.00
	Glycol Trim Heater 1	508036	6153691	612	6.7	0.71	27.7	399	0.00	0.07	0.02	0.00	0.00
	Glycol Trim Heater 2	508028	6153684	612	6.7	0.71	27.7	399	0.00	0.07	0.02	0.00	0.00
	Continuous Flare	508148	6153476	613	41.7	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
Jackfish 2	Steam Generator 1	507855	6153524	673	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 2	507846	6153515	673	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 3	507838	6153507	673	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 4	507830	6153498	673	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 5	507821	6153490	673	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Steam Generator 6	507813	6153481	673	28.9	1.83	15.5	443	0.33	0.31	0.22	0.01	0.02
	Flash Treater	508009	6153513	671	6.0	0.15	23.2	443	0.00	0.01	0.00	0.00	0.00
	Glycol Trim Heater 1	508036	6153691	670	6.7	0.71	27.7	399	0.00	0.07	0.02	0.00	0.00
	Glycol Trim Heater 2	508028	6153684	670	6.7	0.71	27.7	399	0.00	0.07	0.02	0.00	0.00
	Continuous Flare	508148	6153476	670	41.7	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
Devon CEA Totals									**4.00**	**3.99**	**2.78**	**0.18**	**0.25**

2A11 EnCana Corporation (EnCana)

2A11.1 Baseline and CEA

2A11.1.1 Christina Lake Thermal Project

The Christina Lake Thermal project within the LSA has been operational for approximately five years. The total design capacity of Phase 1 is 10,000 bpd. In November 2005, EnCana announced that the company sanctioned an expansion of the Christina Lake project from 7,000 bpd to 18,000 bpd by the first quarter of 2008 (EnCana website, 2005). The regulatory approval for the Christina Lake project (Phases 1A & 1B, Phase 2 and Phase 3) was amended in December 2005.

Emission information provided in Table 2A11-1 was taken from the amendment application for the Christina Lake Thermal Project Phase 1B Expansion (EnCana, 2005a). The values are the same for both the baseline and CEA cases as no further developments are planned.

2A11.1.2 Foster Creek Pilot Plant

EnCana’s Foster Creek Pilot Plant, within the RSA, has been operating for several years on leases within the Cold Lake Air Weapons Range. Operation of the Phase 1 Foster Creek Commercial Plant began in October 2001. Production of bitumen was increased to 25,000 bpd with the completion of Phase 1.

EnCana has received regulatory approval for the development of two additional phases (Phase 1C and Phase 1D/1E) based on in-situ SAGD technology. In November 2005, EnCana announced that the Foster Creek project was in the midst of doubling its planned production to an estimated 60,000 bpd by the end of 2006 (EnCana website, 2005).

Table 2A11-1 summarizes the EnCana Foster Creek emissions for the baseline and CEA cases. Emission data were taken from the Foster Creek Application for Phase 1D/1E (EnCana, 2005b).

2A11.2 CEA – Borealis

EnCana publicly disclosed their Borealis project in November 2005. This in-situ project, which will be located within the RSA, has the potential to reach a production of 100,000 bpd (EnCana website, 2005).

The filing of the regulatory application for the Borealis project is expected in the fourth quarter of 2007 (Kathy Steiert, personal communication, 2007). Since air emission information was not available at this stage of the Borealis project, it was not included in this air quality assessment.

Table 2A11-1 Summary of EnCana Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Christina Lake Phase 1	Steam Generator 1	506877	6159497	573	25.9	1.37	24.7	501	0.35	0.23	0.19	0.01	0.02
	Steam Generator 2	506871	6159489	573	15.2	0.91	16.3	495	0.10	0.04	0.06	0.00	0.01
	Steam Generator 3	506892	6159505	573	27.0	1.68	21.0	495	0.45	0.29	0.25	0.01	0.02
	Sulphur Recovery Unit	506986	6159444	574	13.2	0.50	6.8	950	0.00	0.01	0.01	0.00	0.00
Christina Lake Phase 2	Heat Medium Heater	512508	6161018	573	5.5	0.91	8.8	603	0.14	0.09	0.08	0.00	0.01
	Steam Generator 1	512530	6161023	573	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
	Steam Generator 2	512528	6161023	573	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
	Steam Generator 3	512526	6161023	573	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
	Steam Generator 4	512524	6161023	573	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
Christina Lake Phase 3	Heat Medium Heater	510567	6158032	577	5.5	0.91	8.8	603	0.14	0.09	0.08	0.00	0.01
	Steam Generator 1	510589	6158047	577	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
	Steam Generator 2	510587	6158047	577	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
	Steam Generator 3	510585	6158047	577	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
	Steam Generator 4	510583	6158047	577	25.9	1.37	26.1	458	0.57	0.18	0.16	0.01	0.01
Foster Creek Phase 1	Cogeneration Unit #1	529657	6102420	670	25.9	3.66	21.1	448	0.71	0.92	0.63	0.01	0.05
	Cogeneration Unit #2	529634	6102385	670	25.9	3.66	21.1	448	0.71	0.92	0.63	0.01	0.05
	Steam Generator (B-0201)	529725	6102556	671	27.0	1.37	15.6	447	0.26	0.20	0.14	0.01	0.02
	Steam Generator (B-0202)	529718	6102546	671	27.0	1.37	15.6	447	0.26	0.20	0.14	0.01	0.02
	Steam Generator (B-0203)	529675	6102590	671	27.0	1.37	15.6	447	0.26	0.20	0.14	0.01	0.02
	Steam Generator (B-0204)	529668	6102580	671	27.0	1.37	15.6	447	0.26	0.20	0.14	0.01	0.02
	Steam Generator (B-0205)	529702	6102520	671	27.0	1.37	15.6	447	0.26	0.20	0.14	0.01	0.02
	Steam Generator (B-0206)	529787	6102902	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0207)	529775	6102911	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0208)	529763	6102919	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0209)	529750	6102928	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0210)	529824	6102847	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02

Table 2A11-1 Summary of EnCana Baseline and CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Foster Creek Phase 1 (continued)	Steam Generator (B-0211)	529833	6102859	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0212)	529841	6102871	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0213)	529850	6102884	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0214)	529858	6102896	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	Steam Generator (B-0215)	529867	6102909	671	27.0	1.68	19.7	490	0.00	0.26	0.78	0.01	0.02
	SRU Heater	529826	6102625	670	7.1	0.50	6.8	950	0.00	0.01	0.01	0.00	0.00
	Glycol Heater (H-0501)	529706	6102616	671	8.2	0.76	12.0	533	0.00	0.04	0.02	0.00	0.00
	Glycol Heater (H-0501B)	529757	6102825	671	8.2	0.91	4.1	580	0.00	0.02	0.03	0.00	0.00
	Glycol Heater (H-0501C)	529761	6102820	671	8.2	0.91	4.1	580	0.00	0.02	0.04	0.00	0.00
	Fuel Gas Heater (H-0502)	529787	6102617	670	8.0	0.61	2.0	533	0.00	0.00	0.00	0.00	0.00
	Fuel Gas Heater (H-0514)	529781	6102620	670	9.1	0.61	2.4	533	0.00	0.03	0.00	0.00	0.00
	Hot Oil Heater	529653	6102658	671	8.0	0.61	4.6	533	0.00	0.01	0.01	0.00	0.00
	Wellpad Heater 1	528891	6102773	665	6.6	0.41	3.6	533	0.00	0.00	0.00	0.00	0.00
	Wellpad Heater 2	529849	6102468	670	6.6	0.41	3.6	533	0.00	0.00	0.00	0.00	0.00
	Wellpad Heater 3	530494	6102850	662	6.6	0.41	3.6	533	0.00	0.00	0.00	0.00	0.00
	Wellpad Heater 4	529019	6102763	666	6.6	0.41	3.6	533	0.00	0.00	0.00	0.00	0.00
Foster Creek Pilot	Steam Generator 1	529437	6102950	671	12.2	1.07	10.8	467	0.07	0.15	0.05	0.01	0.00
	Steam Generator 2	529437	6102963	671	8.5	0.91	14.7	467	0.07	0.15	0.05	0.01	0.00
	Steam Generator 3	529437	6102972	671	8.9	1.00	12.8	467	0.07	0.04	0.05	0.00	0.00
	Utility Boiler 1	529405	6102951	671	6.1	0.46	4.0	672	0.01	0.02	0.01	0.00	0.00
	Utility Boiler 2	529404	6102970	671	6.1	0.46	4.0	672	0.01	0.02	0.01	0.00	0.00
	Utility Boiler 3	529407	6102970	671	6.1	0.46	4.0	672	0.01	0.02	0.01	0.00	0.00
	Glycol Reboiler	529359	6102935	670	5.3	0.22	2.4	672	0.00	0.00	0.00	0.00	0.00
EnCana Baseline and CEA Totals									**8.64**	**8.16**	**12.08**	**0.31**	**0.57**

2A12 Husky Energy Inc. (Husky)

2A12.1 Baseline and CEA

2A12.1.1 Sunrise Thermal Project

Husky obtained regulatory approval in October 2006 to develop the Sunrise Thermal project located within the RSA, approximately 60 km northeast of Fort McMurray. The SAGD project to be developed in three phases will produce 200,000 bpd bitumen (Husky website, 2007). Initial production from the Sunrise project is anticipated in 2010 to 2012.

Emission data for the Sunrise project were obtained from the Husky Energy Sunrise Thermal Project Environmental Impact Assessment (Husky, 2004). Baseline and CEA emissions from the Sunrise Thermal project are provided in Table 2A12-1.

2A12.1.2 Tucker Thermal Project

In August 2004, Husky received regulatory approval to proceed with commercial development of the Tucker Thermal project located within the RSA, 30 km northwest of Cold Lake. Construction has been completed on the facility and steam injection has commenced. Tucker will ramp up production over the next two years to achieve peak production of more than 30,000 bpd expected (Husky website, 2007).

Emission data for the Husky Tucker project were obtained from the Husky Energy Tucker Thermal Project Environmental Impact Assessment (Husky, 2003). Table 2A12-1 provides a summary of baseline and CEA emissions from the Tucker facility.

2A12.2 CEA – Caribou Lake Thermal Demonstration Project

Husky submitted the regulatory application for the Caribou Lake Thermal Demonstration Project in December 2006 (Husky, 2006). The proposed project will be developed on land located within the RSA, on the Cold Lake Air Weapons Range, in the vicinity of EnCana's Foster Creek facility.

The Caribou Lake project will be a demonstration-sized facility capable of producing up to 10,000 bpd using a hybrid process incorporating both SAGD and CSS (Cyclic Steam Stimulation) technologies. Air emission sources will be limited to the central processing facility including two 72.8 MW steam generators, one glycol heater, one emergency diesel generator and co-located flare stacks (Husky, 2006).

Given the small size of the Caribou Lake Thermal Demonstration project and its location further away from the LSA, the Caribou Lake project was not included in this air quality assessment.

Table 2A12-1 Summary of Husky Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Sunrise Phase 1	Glycol Heater 1	496234	6344291	479	14.8	1.16	7.1	473	0.00	0.03	0.11	0.00	0.00
	Glycol Heater 2	496235	6344279	479	14.8	1.16	7.1	473	0.00	0.03	0.11	0.00	0.00
	HP Flare	495932	6344467	473	40.0	0.25	1.0	1273	0.00	0.00	0.00	0.02	0.00
	LP Flare	495938	6344467	473	40.0	0.31	1.0	1273	0.00	0.00	0.00	0.02	0.00
	Steam Generator 1	496251	6344268	479	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 2	496251	6344254	479	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 3	496251	6344240	479	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 4	496251	6344226	479	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 5	496251	6344212	479	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 6	496251	6344198	479	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
Sunrise Phase 2	Glycol Heater 1	496498	6344271	484	14.8	1.16	10.7	473	0.00	0.05	0.16	0.00	0.00
	Glycol Heater 2	496498	6344258	484	14.8	1.16	10.7	473	0.00	0.05	0.16	0.00	0.00
	HP Flare	496794	6344467	490	40.0	0.25	1.0	1273	0.00	0.01	0.01	0.04	0.00
	LP Flare	496800	6344467	490	40.0	0.31	1.0	1273	0.00	0.01	0.01	0.04	0.00
	Steam Generator 1	496482	6344247	484	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 2	496482	6344233	484	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 3	496482	6344219	484	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 4	496482	6344205	484	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 5	496482	6344191	484	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 6	496482	6344177	484	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 7	496482	6344163	483	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 8	496482	6344149	483	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02

Table 2A12-1 Summary of Husky Baseline and CEA Air Emissions (continued)

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO$_2$ (t/d)**	**NO$_X$ (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
Sunrise Phase 3	Glycol Heater 1	496498	6343966	482	14.8	1.16	10.7	473	0.00	0.05	0.16	0.00	0.00
	Glycol Heater 2	496498	6343955	482	14.8	1.16	10.7	473	0.00	0.05	0.16	0.00	0.00
	HP Flare	496794	6343757	486	40.0	0.25	1.0	1273	0.00	0.01	0.01	0.04	0.00
	LP Flare	496800	6343757	486	40.0	0.31	1.0	1273	0.00	0.01	0.01	0.04	0.00
	Steam Generator 1	496482	6344076	483	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 2	496482	6344062	483	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 3	496482	6344048	483	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 4	496482	6344034	482	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 5	496482	6344020	482	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 6	496482	6344006	482	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 7	496482	6343992	482	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
	Steam Generator 8	496482	6343978	482	27.0	1.65	24.0	458	0.05	0.29	0.90	0.01	0.02
Tucker	Steam Generator 1	528572	6046671	618	26.0	1.60	21.0	421	0.19	0.23	0.07	0.02	0.02
	Steam Generator 2	528585	6046671	618	26.0	1.60	21.0	421	0.19	0.23	0.07	0.02	0.02
	Steam Generator 3	528609	6046671	618	26.0	1.60	21.0	421	0.19	0.23	0.07	0.02	0.02
	Steam Generator 4	528621	6046671	618	26.0	1.60	21.0	421	0.19	0.23	0.07	0.02	0.02
	Steam Generator 5	528633	6046671	618	26.0	1.60	21.0	421	0.19	0.23	0.07	0.02	0.02
	Glycol Heater 1	528530	6046600	617	8.2	0.40	10.0	423	0.00	0.02	0.02	0.00	0.00
	Glycol Heater 2	528542	6046600	617	8.2	0.40	10.0	423	0.00	0.02	0.02	0.00	0.00
Husky Baseline and CEA Totals									**2.15**	**7.95**	**20.98**	**0.56**	**0.49**

2A13 Imperial Oil Resources Ventures Limited (Imperial Oil)

2A13.1 Baseline and CEA – Cold Lake

Imperial Oil Cold Lake operations comprise seven currently operating and approved plants within the RSA. Emissions result primarily from the combustion of natural gas. The Cold Lake plants include:

- The Leming Plant includes eleven steam generators, three of which burn a mixture of produced and sweet gas;
- The Mahihkan 2 Plant includes six steam generators (three of which burn a mixture of produced and sweet gas) and two utility steam generators. The Mahihkan 4 Plant comprises twelve steam generators, six of which burn a mixture of produced and sweet gas. The Mahihkan 4 Plant is located adjacent to the Mahihkan 2 Plant;
- The Mahkeses Plant consists of two cogeneration units, one OTSG and two glycol heaters;
- The Maskwa 1 Plant consists of six steam generators (three burning a mixture of produced and sweet gas) and two utility steam generators. The Maskwa 3 Plant includes six steam generators, three of which burn a mixture of produced and sweet gas. The Maskwa 3 Plant is located adjacent to the Maskwa 1 Plant; and
- Nabiye will consist of a new central processing facility with associated steam generation, bitumen processing, water treatment and field facilities. The Nabiye development will be located northeast of the Imperial Oil existing plant sites, directly north of Marie Lake (Imperial Oil, 2002).

Tables 2A13-1 and 2A13-2 provide summaries of emissions for the baseline and CEA Imperial Oil Cold Lake facilities. The values are the same for both cases as no further developments are planned.

2A13.2 CEA – Kearl Oil Sands Mine Project

Imperial Oil plans to develop their proposed Kearl Oil Sands Mine project located north of Kearl Lake, within the RSA. The project includes an initial mine development with a production capacity of 100,000 bpd to be completed by the end of 2010, with a second 100,000 bpd development by the end of 2012. A third mine train would be added in 2018 (Imperial Oil, 2005). Table 2A13-2 summarizes CEA emissions from the Imperial Oil Kearl Oil Sands Mine project.

Table 2A13-1 Summary of Imperial Oil Baseline Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Leming	Steam Generator 1	536909	6050493	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 2	536910	6050498	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 3	536910	6050503	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 4	536910	6050508	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 5	536909	6050512	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 6	536908	6050517	611	9.0	0.84	14.3	473	0.00	0.05	0.05	0.00	0.00
	Steam Generator 7	536887	6050527	610	18.3	1.49	14.3	413	0.00	0.17	0.17	0.01	0.02
	Steam Generator 8	536892	6050539	610	18.3	1.37	14.3	443	0.17	0.17	0.17	0.01	0.02
	Steam Generator 9	536892	6050547	610	18.3	1.37	14.3	443	0.17	0.17	0.17	0.01	0.02
	Steam Generator 10	536881	6050517	610	15.2	0.85	14.3	473	0.00	0.05	0.05	0.00	0.00
	Steam Generator 11	536881	6050441	611	27.0	1.37	14.3	443	0.17	0.19	0.18	0.01	0.02
Mahihkan Phase 2	Steam Generator 1	529392	6054203	615	22.9	1.37	19.2	443	0.13	0.19	0.18	0.01	0.02
	Steam Generator 2	529382	6054202	615	22.9	1.37	19.2	443	0.13	0.19	0.18	0.01	0.02
	Steam Generator 3	529371	6054201	615	22.9	1.37	19.2	443	0.13	0.19	0.18	0.01	0.02
	Steam Generator 4	529336	6054197	615	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 5	529326	6054196	615	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 6	529315	6054195	615	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Utility Steam Generator 1	529302	6054174	615	16.0	1.30	11.0	523	0.00	0.07	0.07	0.00	0.01
	Utility Steam Generator 2	529296	6054174	615	16.0	1.30	11.0	523	0.00	0.07	0.07	0.00	0.01
Mahihkan Phase 4	Steam Generator 1	528940	6054059	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 2	528950	6054060	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 3	528960	6054061	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 4	528971	6054063	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 5	528982	6054064	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 6	528993	6054065	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 7	528948	6053996	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 8	528958	6053997	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 9	528969	6053998	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02

Table 2A13-1 Summary of Imperial Oil Baseline Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Mahihkan Phase 4 (continued)	Steam Generator 10	528979	6053999	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 11	528990	6054000	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 12	529000	6054002	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
Mahkeses	Cogeneration Unit 1	539202	6048676	645	24.0	5.18	20.3	417	0.64	1.47	0.60	0.06	0.11
	Cogeneration Unit 2	539191	6048695	645	24.0	5.18	20.3	417	0.64	1.47	0.60	0.06	0.11
	Steam Generator	539197	6048669	645	24.0	1.52	15.3	479	0.82	0.20	0.20	0.01	0.05
	Glycol Heater 1	539280	6048721	645	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.00
	Glycol Heater 2	539241	6048749	644	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.00
Maskwa Phase 1	Steam Generator 1	534185	6051945	608	22.9	1.37	19.2	443	0.31	0.19	0.18	0.01	0.02
	Steam Generator 2	534175	6051945	608	22.9	1.37	19.2	443	0.31	0.19	0.18	0.01	0.02
	Steam Generator 3	534164	6051945	609	22.9	1.37	19.2	443	0.31	0.19	0.18	0.01	0.02
	Steam Generator 4	534129	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 5	534118	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 6	534108	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Utility Steam Generator 1	534091	6051929	608	18.5	1.30	11.0	503	0.00	0.07	0.07	0.00	0.01
	Utility Steam Generator 2	534087	6051929	608	18.5	1.30	11.0	503	0.00	0.07	0.07	0.00	0.01
Maskwa Phase 3	Steam Generator 1	534042	6051945	609	22.9	1.37	19.2	443	0.22	0.19	0.18	0.01	0.02
	Steam Generator 2	534032	6051945	609	22.9	1.37	19.2	443	0.22	0.19	0.18	0.01	0.02
	Steam Generator 3	534021	6051945	609	22.9	1.37	19.2	443	0.22	0.19	0.18	0.01	0.02
	Steam Generator 4	533985	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 5	533975	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 6	533965	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02

Table 2A13-1 Summary of Imperial Oil Baseline Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Nabiye	Steam Generator 1	542191	6064322	627	24.0	1.52	15.3	479	1.27	0.24	0.26	0.01	0.07
	Steam Generator 2	542197	6064357	628	24.0	1.52	15.3	479	1.27	0.24	0.26	0.01	0.07
	Steam Generator 3	542203	6064381	629	24.0	1.52	15.3	479	1.27	0.24	0.26	0.01	0.07
	Steam Generator 4	542209	6064401	629	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 5	542214	6064421	630	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 6	542248	6064319	627	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 7	542254	6064338	627	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 8	542261	6064363	628	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 9	542267	6064383	628	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 10	542272	6064403	629	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Glycol Heater 1	542325	6064282	625	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.01
	Glycol Heater 2	542337	6064279	625	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.01
Imperial Oil Baseline Totals									**10.19**	**12.47**	**10.87**	**0.72**	**1.55**

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Leming	Steam Generator 1	536909	6050493	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 2	536910	6050498	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 3	536910	6050503	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 4	536910	6050508	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 5	536909	6050512	611	9.0	0.79	14.3	473	0.00	0.04	0.04	0.00	0.00
	Steam Generator 6	536908	6050517	611	9.0	0.84	14.3	473	0.00	0.05	0.05	0.00	0.00
	Steam Generator 7	536887	6050527	610	18.3	1.49	14.3	413	0.00	0.17	0.17	0.01	0.02
	Steam Generator 8	536892	6050539	610	18.3	1.37	14.3	443	0.17	0.17	0.17	0.01	0.02
	Steam Generator 9	536892	6050547	610	18.3	1.37	14.3	443	0.17	0.17	0.17	0.01	0.02
	Steam Generator 10	536881	6050517	610	15.2	0.85	14.3	473	0.00	0.05	0.05	0.00	0.00
	Steam Generator 11	536881	6050441	611	27.0	1.37	14.3	443	0.17	0.19	0.18	0.01	0.02
Mahihkan Phase 2	Steam Generator 1	529392	6054203	615	22.9	1.37	19.2	443	0.13	0.19	0.18	0.01	0.02
	Steam Generator 2	529382	6054202	615	22.9	1.37	19.2	443	0.13	0.19	0.18	0.01	0.02
	Steam Generator 3	529371	6054201	615	22.9	1.37	19.2	443	0.13	0.19	0.18	0.01	0.02
	Steam Generator 4	529336	6054197	615	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 5	529326	6054196	615	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 6	529315	6054195	615	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Utility Steam Generator 1	529302	6054174	615	16.0	1.30	11.0	523	0.00	0.07	0.07	0.00	0.01
	Utility Steam Generator 2	529296	6054174	615	16.0	1.30	11.0	523	0.00	0.07	0.07	0.00	0.01
Mahihkan Phase 4	Steam Generator 1	528940	6054059	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 2	528950	6054060	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 3	528960	6054061	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 4	528971	6054063	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 5	528982	6054064	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 6	528993	6054065	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 7	528948	6053996	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 8	528958	6053997	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 9	528969	6053998	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Mahihkan Phase 4 (continued)	Steam Generator 10	528979	6053999	614	27.0	1.52	12.9	433	0.29	0.18	0.18	0.01	0.02
	Steam Generator 11	528990	6054000	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
	Steam Generator 12	529000	6054002	614	27.0	1.52	12.9	398	0.00	0.18	0.18	0.01	0.02
Mahkeses	Cogeneration Unit 1	539202	6048676	645	24.0	5.18	20.3	417	0.64	1.47	0.60	0.06	0.11
	Cogeneration Unit 2	539191	6048695	645	24.0	5.18	20.3	417	0.64	1.47	0.60	0.06	0.11
	Steam Generator	539197	6048669	645	24.0	1.52	15.3	479	0.82	0.20	0.20	0.01	0.05
	Glycol Heater 1	539280	6048721	645	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.00
	Glycol Heater 2	539241	6048749	644	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.00
Maskwa Phase 1	Steam Generator 1	534185	6051945	608	22.9	1.37	19.2	443	0.31	0.19	0.18	0.01	0.02
	Steam Generator 2	534175	6051945	608	22.9	1.37	19.2	443	0.31	0.19	0.18	0.01	0.02
	Steam Generator 3	534164	6051945	609	22.9	1.37	19.2	443	0.31	0.19	0.18	0.01	0.02
	Steam Generator 4	534129	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 5	534118	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 6	534108	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Utility Steam Generator 1	534091	6051929	608	18.5	1.30	11.0	503	0.00	0.07	0.07	0.00	0.01
	Utility Steam Generator 2	534087	6051929	608	18.5	1.30	11.0	503	0.00	0.07	0.07	0.00	0.01
Maskwa Phase 3	Steam Generator 1	534042	6051945	609	22.9	1.37	19.2	443	0.22	0.19	0.18	0.01	0.02
	Steam Generator 2	534032	6051945	609	22.9	1.37	19.2	443	0.22	0.19	0.18	0.01	0.02
	Steam Generator 3	534021	6051945	609	22.9	1.37	19.2	443	0.22	0.19	0.18	0.01	0.02
	Steam Generator 4	533985	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 5	533975	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02
	Steam Generator 6	533965	6051945	609	22.9	1.37	19.2	443	0.00	0.19	0.18	0.01	0.02

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions (continued)

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Nabiye	Steam Generator 1	542191	6064322	627	24.0	1.52	15.3	479	1.27	0.24	0.26	0.01	0.07
	Steam Generator 2	542197	6064357	628	24.0	1.52	15.3	479	1.27	0.24	0.26	0.01	0.07
	Steam Generator 3	542203	6064381	629	24.0	1.52	15.3	479	1.27	0.24	0.26	0.01	0.07
	Steam Generator 4	542209	6064401	629	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 5	542214	6064421	630	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 6	542248	6064319	627	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 7	542254	6064338	627	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 8	542261	6064363	628	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 9	542267	6064383	628	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Steam Generator 10	542272	6064403	629	24.0	1.52	15.3	479	0.00	0.24	0.26	0.01	0.07
	Glycol Heater 1	542325	6064282	625	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.01
	Glycol Heater 2	542337	6064279	625	16.0	0.76	7.5	552	0.00	0.01	0.03	0.00	0.01
Kearl Mine Development	Auxiliary Boiler 1	495784	6362017	347	30.0	3.50	17.0	387	0.01	1.56	1.23	0.08	0.11
	Auxiliary Boiler 2	495784	6362117	347	30.0	3.50	17.0	387	0.01	1.56	1.23	0.08	0.11
	Auxiliary Boiler 3	495784	6362217	348	30.0	3.50	17.0	387	0.01	1.56	1.23	0.08	0.11
	Cogeneration Unit 1	496039	6362017	356	30.0	5.00	18.3	387	0.01	2.19	1.38	0.06	0.12
	Cogeneration Unit 2	496039	6362117	356	30.0	5.00	18.3	387	0.01	2.19	1.38	0.06	0.12
	Cogeneration Unit 3	496039	6362217	357	30.0	5.00	18.3	387	0.01	2.19	1.38	0.06	0.12

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Kearl Mine Development	Space Heating - Plant	NW	495000	6362500	355	1,500,000	0.00	0.58	0.25	0.02	0.02
		NE	496500	6362500							
		SW	495000	6361500							
		SE	496500	6361500							

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Kearl Mine Development (continued)	Space Heating - Mine	NW	496237	6361486	370	318,936	0.02	2.41	2.47	0.17	0.23
		NE	496625	6361486							
		SW	496237	6360664							
		SE	496625	6360664							
	Mine Fleet Area West 1	NW	483320	6351937	314	2,550,345	0.02	0.88	0.00	0.00	0.00
		NE	484925	6351937							
		SW	483320	6350348							
		SE	484925	6350348							
	Mine Fleet Area West 2	NW	483686	6354017	311	5,014,269	0.04	1.72	0.00	0.00	0.00
		NE	486207	6354017							
		SW	483686	6352028							
		SE	486207	6352028							
	Mine Fleet Area East 1	NW	497378	6361723	391	2,935,312	0.02	1.01	0.00	0.00	0.00
		NE	498336	6361723							
		SW	497378	6358659							
		SE	498336	6358659							
	Mine Fleet Area East 2	NW	498699	6358237	372	4,162,510	0.03	1.43	0.00	0.00	0.00
		NE	500437	6358237							
		SW	498699	6355842							
		SE	500437	6355842							

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Kearl Mine Development (continued)	Mine Fleet Area East 3	NW	498728	6359944	371	1,720,278	0.01	0.59	0.00	0.00	0.00
		NE	499862	6359944							
		SW	498728	6358427							
		SE	499862	6358427							
	Mine Fleet/Fugitives Area North 1	NW	489229	6365144	299	3,027,380	0.02	1.04	1.91	1.54	0.11
		NE	490145	6365144							
		SW	489229	6361839							
		SE	490145	6361839							
	Mine Fleet/Fugitives Area North 2	NW	490165	6363903	305	6,732,000	0.05	2.31	4.24	3.43	0.24
		NE	492409	6363903							
		SW	490165	6360903							
		SE	492409	6360903							
	Mine Fleet/Fugitives Area North 3	NW	492710	6362440	320	3,114,368	0.02	1.07	1.96	1.59	0.11
		NE	494566	6362440							
		SW	492710	6360762							
		SE	494566	6360762							
	Mine Fleet/Fugitives Area North 4	NW	490698	6360629	331	7,974,720	0.06	2.74	5.03	4.07	0.29
		NE	495378	6360629							
		SW	490698	6358925							
		SE	495378	6358925							

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Kearl Mine Development (continued)	Mine Fleet/Fugitives Area North 5	NW	491492	6358833	336	7,780,087	0.05	2.67	4.90	3.97	0.28
		NE	494695	6358833							
		SW	491492	6356404							
		SE	494695	6356404							
	Mine Fleet Area South 1	NW	486699	6349923	338	1,999,032	0.01	0.69	0.00	0.00	0.00
		NE	488232	6349923							
		SW	486699	6348619							
		SE	488232	6348619							
	Mine Fleet Area South 2	NW	490292	6356349	323	1,590,450	0.01	0.55	0.00	0.00	0.00
		NE	491214	6356349							
		SW	490292	6354624							
		SE	491214	6354624							
	Mine Fleet Area South 3	NW	488647	6354385	332	3,301,060	0.02	1.13	0.00	0.00	0.00
		NE	491877	6354385							
		SW	488647	6353363							
		SE	491877	6353363							
	Mine Fleet Area South 4	NW	487833	6353251	343	16,176,216	0.11	5.56	0.00	0.00	0.00
		NE	493109	6353251							
		SW	487833	6350185							
		SE	493109	6350185							

Table 2A13-2 Summary of Imperial Oil CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Kearl Mine Development (continued)	Mine Fleet Area South 5	NW	493391	6353400	361	3,472,343	0.02	1.19	0.00	0.00	0.00
		NE	495442	6353400							
		SW	493391	6351707							
		SE	495442	6351707							
	Mine Fleet Area South 6	NW	492193	6355753	349	11,299,708	0.08	3.88	0.00	0.00	0.00
		NE	497051	6355753							
		SW	492193	6353427							
		SE	497051	6353427							
	Tailings Pond	NW	494246	6366687	357	19,161,576	0.00	0.00	0.00	137.83 [a]	0.00
		NE	499118	6366687							
		SW	494246	6362754							
		SE	499118	6362754							
	Plant Fugitives	NW	495000	6362500	355	1,500,000	0.00	0.00	0.00	3.55	0.00
		NE	496500	6362500							
		SW	495000	6361500							
		SE	496500	6361500							
Imperial Oil CEA Totals							**10.84**	**55.16**	**39.46**	**157.30**	**3.52**

[a] Peak emission rate

2A14 Japan Canada Oil Sands Limited (JACOS)

2A14.1 Baseline and CEA – Hangingstone

JACOS has been operating the Hangingstone Demonstration project since 1997. The pilot project produces approximately 11,000 bpd of bitumen using SAGD technology. The Hangingstone site is located approximately within the LSA, 50 km southwest of Fort McMurray. Tables 2A14-1 and 2A14-2 summarize the emissions for the baseline and CEA cases, respectively. The values are the same for both cases as no further development is planned.

2A14.2 CEA – Hangingstone Commercial

JACOS (75%) and Nexen (25%) are pursuing development plans for the larger portion of the Hangingstone lease. Additional exploration core hole drilling and a 3-D seismic survey are planned to commence in the winters of 2007 and 2008 to further delineate and define the size and extent of the bitumen resource. Filing of the necessary regulatory applications will follow the commercial reserve confirmation, with potential start-up of the new facilities in 2014 (JACOS website, 2007). The CEA emissions presented in Table 2A14-2 are based on conceptual engineering data.

Table 2A14-1 Summary of JACOS Baseline Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Hangingstone Phase 1	Glycol Heater H-701	460340	6241771	560	9.0	0.46	4.5	416	0.00	0.01	0.01	0.00	0.00
	HP Flare FS-701N Continuous	460367	6241846	560	27.4	2.01	0.6	1273	0.16	0.00	0.01	0.00	0.00
	LP Flare FS-702 Continuous	460353	6241838	560	21.0	1.80	0.4	1273	0.03	0.00	0.00	0.00	0.00
	Line Heater H-702	460401	6241713	560	4.6	0.46	2.6	416	0.00	0.01	0.00	0.00	0.00
	Steam Generator B-201A	460379	6241764	560	12.0	0.91	9.3	416	0.00	0.10	0.05	0.00	0.00
	Steam Generator B-201B	460377	6241755	560	12.0	0.91	9.3	416	0.00	0.10	0.05	0.00	0.00
Hangingstone Phase 2	Glycol Heater H-755	460765	6241530	563	9.0	0.41	17.6	578	0.00	0.01	0.01	0.00	0.00
	HP Flare 801 Continuous	460787	6241403	563	21.4	2.00	3.1	1273	0.60	0.01	0.05	0.01	0.00
	LP Flare 804 Continuous	460787	6241402	563	20.1	2.02	0.9	1273	0.02	0.00	0.02	0.00	0.00
	Steam Generator B-510	460798	6241556	563	30.0	1.37	20.8	475	0.00	0.18	0.16	0.01	0.01
Hangingstone Phase 3	Steam Generator B-520	460813	6241556	563	30.0	1.37	20.8	475	0.00	0.18	0.16	0.01	0.01
JACOS Baseline Totals									**0.80**	**0.60**	**0.53**	**0.04**	**0.04**

Table 2A14-2 Summary of JACOS CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Hangingstone Phase 1	Glycol Heater H-701	460340	6241771	560	9.0	0.46	4.5	416	0.00	0.01	0.01	0.00	0.00
	HP Flare FS-701N Continuous	460367	6241846	560	27.4	2.01	0.6	1273	0.16	0.00	0.01	0.00	0.00
	LP Flare FS-702 Continuous	460353	6241838	560	21.0	1.80	0.4	1273	0.03	0.00	0.00	0.00	0.00
	Line Heater H-702	460401	6241713	560	4.6	0.46	2.6	416	0.00	0.01	0.00	0.00	0.00
	Steam Generator B-201A	460379	6241764	560	12.0	0.91	9.3	416	0.00	0.10	0.05	0.00	0.00
	Steam Generator B-201B	460377	6241755	560	12.0	0.91	9.3	416	0.00	0.10	0.05	0.00	0.00
Hangingstone Phase 2	Glycol Heater H-755	460765	6241530	563	9.0	0.41	17.6	578	0.00	0.01	0.01	0.00	0.00
	HP Flare 801 Continuous	460787	6241403	563	21.4	2.00	3.1	1273	0.60	0.01	0.05	0.01	0.00
	LP Flare 804 Continuous	460787	6241402	563	20.1	2.02	0.9	1273	0.02	0.00	0.02	0.00	0.00
	Steam Generator B-510	460798	6241556	563	30.0	1.37	20.8	475	0.00	0.18	0.16	0.01	0.01
Hangingstone Phase 3	Steam Generator B-520	460813	6241556	563	30.0	1.37	20.8	475	0.00	0.18	0.16	0.01	0.01
Hangingstone Commercial	Cogeneration Unit GT-500/B-505	459789	6239133	579	24.5	5.18	20.5	419	0.85	1.59	0.83	0.46	0.11
	Cogeneration Unit GT-510/B-515	459758	6239133	579	24.5	5.18	20.5	419	0.85	1.59	0.83	0.46	0.11
	Dehydration Incinerator I-270	459555	6239059	581	10.7	1.23	7.9	1088	0.05	0.02	0.01	0.00	0.00
	HP Flare FL-800 Cont. Purge & Pilot	459382	6239123	578	43.3	3.73	0.2	1273	0.00	0.00	0.01	0.00	0.00
	LP Flare FL-801 Cont. Purge & Pilot	459382	6239123	578	42.7	1.95	0.2	1273	0.00	0.00	0.00	0.00	0.00
	Heat Medium Heater H-902A	459537	6239060	581	5.9	0.60	10.7	482	0.00	0.01	0.02	0.00	0.00
	Heat Medium Heater H-902B	459531	6239060	581	5.9	0.60	10.7	482	0.00	0.01	0.02	0.00	0.00
	Steam Generator OTSG B-530	459735	6239089	580	29.7	1.52	18.2	475	0.46	0.22	0.84	0.01	0.01
	Steam Generator OTSG B-540	459717	6239090	580	29.7	1.52	18.2	475	0.46	0.22	0.84	0.01	0.01
	Steam Generator OTSG B-550	459701	6239089	580	29.7	1.52	18.2	475	0.46	0.22	0.84	0.01	0.01
JACOS CEA Totals									**3.93**	**4.49**	**4.75**	**1.00**	**0.30**

2A15 MEG Energy Corporation (MEG)

2A15.1 Baseline – Christina Lake Regional Project

MEG has received regulatory approval to develop the Christina Lake Pilot project located within the RSA, approximately 150 km south of Fort McMurray. In addition, in February 2007, MEG obtained regulatory approval for site preparation for the Christina Lake Regional project.

Emission parameters were obtained from the MEG Energy Application for Approval of the Christina Lake Regional Project (MEG, 2005). Table 2A15-1 provides a summary of baseline and CEA emissions from the MEG Christina Lake Regional project facilities.

Table 2A15-1 Summary of MEG Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Christina Lake Pilot	Steam Generator OTSG	517795	6168842	579	30.0	1.38	14.4	378	0.22	0.11	0.16	0.01	0.01
	Glycol Heater	517828	6168817	579	7.5	0.51	5.8	618	0.00	0.01	0.01	0.00	0.00
	LP Flare Continuous	517870	6168764	579	13.2	2.41	0.2	1273	0.00	0.00	0.01	0.01	0.00
	HP Flare Continuous	517850	6168732	579	31.0	2.89	0.1	1273	0.00	0.00	0.01	0.01	0.00
Christina Lake Regional Project	Steam Generator OTSG	517732	6168808	579	30.0	1.83	12.9	420	0.59	0.16	0.22	0.01	0.02
	Cogeneration Unit	517662	6168865	579	24.0	5.18	9.8	423	1.19	1.31	0.88	0.05	0.12
	Glycol Heater	517863	6168917	579	4.9	1.02	7.3	618	0.00	0.03	0.03	0.00	0.00
	HP Flare Continuous	517992	6168967	579	55.2	5.77	0.1	1273	0.00	0.00	0.01	0.01	0.00
MEG Baseline and CEA Totals									**2.00**	**1.62**	**1.33**	**0.11**	**0.16**

2A16 Nexen Inc./OPTI Canada Inc. (Nexen/OPTI)

2A16.1 Baseline and CEA – Long Lake Project

Nexen/OPTI has regulatory approval for construction and operation of their Long Lake project located within the RSA, 40 km southeast of Fort McMurray, in the Athabasca oil sands region. The project is currently under construction. This bitumen SAGD recovery and upgrading facility will be operated by joint-venture partners Nexen Inc. and OPTI Canada Inc. The Long Lake development will include 70,000 bpd of bitumen production and 140,000 bpd of upgrading capacity (Long Lake Project website, 2007).

Emission data for the Long Lake project were obtained from the Air Quality Assessment of the Long Lake Project (OPTI, 2006). The baseline emissions are provided in Table 2A16-1. The Long Lake North emission values are the same for the CEA case presented in Table 2A16-2.

2A16.2 CEA – Long Lake South

The proposed Long Lake South project (to be developed in two phases) will be located within the LSA, approximately 11 km south of the Long Lake project, and is targeted to produce an additional 70,000 bpd of bitumen, essentially doubling the Long Lake facilities' production (Nexen/OPTI, 2007).

The Long Lake South project will consist of horizontal well pairs, related processing facilities and cogeneration facilities. Table 2A16-2 provides a summary for the Nexen/OPTI CEA case, which includes the Long Lake South project emissions based on information from the Long Lake South Project Application (Nexen/OPTI, 2007). During the first year of operation of either Phase 1 or Phase 2, the produced gas stream will be continuously sent to flare.

Table 2A16-1 Summary of Nexen/OPTI Baseline Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Long Lake	Cogeneration Unit 1	503159	6251532	499	30.0	5.18	18.2	433	0.59	2.42	1.83	0.08	0.13
	Cogeneration Unit 2	503193	6251498	500	30.0	5.18	18.2	433	0.59	2.42	1.83	0.08	0.13
	Steam Generator 1	503237	6251626	498	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 2	503248	6251616	498	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 3	503258	6251605	498	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 4	503270	6251593	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 5	502738	6251665	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 6	502750	6251654	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 7	502761	6251643	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Glycol Heater	503164	6251722	496	30.0	1.80	6.0	422	0.00	0.12	0.10	0.01	0.01
	Glycol Reboiler	502803	6251623	499	5.0	0.22	6.0	422	0.00	0.00	0.00	0.00	0.00
	Vacuum Tower Heater 1	503468	6251604	498	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Vacuum Tower Heater 2	503477	6251596	498	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Vacuum Tower Heater 3	503871	6251113	487	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Vacuum Tower Heater 4	503862	6251105	487	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Primary Thermal Cracker Heater 1	503497	6251579	498	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01
	Primary Thermal Cracker Heater 2	503506	6251570	498	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01
	Primary Thermal Cracker Heater 3	503846	6251086	488	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01
	Primary Thermal Cracker Heater 4	503836	6251077	488	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01

Table 2A16-1 Summary of Nexen/OPTI Baseline Air Emissions (continued)

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Long Lake (continued)	Thermal Oil Heater 1	503567	6251482	498	44.2	1.47	7.4	611	0.02	0.05	0.06	0.00	0.01
	Thermal Oil Heater 2	503719	6251037	490	44.2	1.47	7.4	611	0.02	0.05	0.06	0.00	0.01
	Hydrocracker Heater 1	503478	6251249	499	30.0	1.82	6.0	582	0.02	0.06	0.07	0.00	0.01
	Hydrocracker Heater 2	503946	6251042	485	30.0	1.82	6.0	582	0.02	0.06	0.07	0.00	0.01
	Utility Boiler 1	503307	6251379	500	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Utility Boiler 2	503295	6251391	500	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Utility Boiler 3	504012	6250876	483	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Utility Boiler 4	504024	6250887	483	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Steam Superheater 1	503336	6251343	500	51.4	1.89	6.5	578	0.03	0.06	0.07	0.00	0.01
	Steam Superheater 2	503984	6250844	483	51.4	1.89	6.5	578	0.03	0.06	0.07	0.00	0.01
	Steam Superheater 3	503578	6251492	498	34.7	1.02	6.2	523	0.01	0.02	0.02	0.00	0.00
	Steam Superheater 4	503729	6251027	490	34.7	1.02	6.2	523	0.01	0.02	0.02	0.00	0.00
	Sulphur Recovery Unit Incinerator 1	503410	6251145	498	115.0	1.52	30.0	811	7.76	0.04	0.03	0.00	0.00
	Sulphur Recovery Unit Incinerator 2	503732	6250845	488	115.0	1.52	30.0	811	7.76	0.04	0.03	0.00	0.00
	HP Flare	503801	6251754	489	28.7	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
	LP Flare	504016	6251410	485	38.0	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
	Sour Gas Flare	504016	6251331	485	115.5	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
Nexen/OPTI Baseline Totals									**18.42**	**10.71**	**8.96**	**0.48**	**0.74**

Table 2A16-2 Summary of Nexen/OPTI CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO$_2$ (t/d)**	**NO$_X$ (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
Long Lake	Cogeneration Unit 1	503159	6251532	499	30.0	5.18	18.2	433	0.59	2.42	1.83	0.08	0.13
	Cogeneration Unit 2	503193	6251498	500	30.0	5.18	18.2	433	0.59	2.42	1.83	0.08	0.13
	Steam Generator 1	503237	6251626	498	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 2	503248	6251616	498	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 3	503258	6251605	498	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 4	503270	6251593	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 5	502738	6251665	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 6	502750	6251654	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Steam Generator 7	502761	6251643	499	30.0	1.68	18.8	464	0.09	0.32	0.28	0.02	0.03
	Glycol Heater	503164	6251722	496	30.0	1.80	6.0	422	0.00	0.12	0.10	0.01	0.01
	Glycol Reboiler	502803	6251623	499	5.0	0.22	6.0	422	0.00	0.00	0.00	0.00	0.00
	Vacuum Tower Heater 1	503468	6251604	498	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Vacuum Tower Heater 2	503477	6251596	498	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Vacuum Tower Heater 3	503871	6251113	487	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Vacuum Tower Heater 4	503862	6251105	487	40.6	2.84	6.0	628	0.06	0.19	0.17	0.01	0.02
	Primary Thermal Cracker Heater 1	503497	6251579	498	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01
	Primary Thermal Cracker Heater 2	503506	6251570	498	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01
	Primary Thermal Cracker Heater 3	503846	6251086	488	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01
	Primary Thermal Cracker Heater 4	503836	6251077	488	37.7	2.36	8.9	422	0.05	0.17	0.15	0.01	0.01

Table 2A16-2 Summary of Nexen/OPTI CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (m sl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Long Lake (continued)	Thermal Oil Heater 1	503567	6251482	498	44.2	1.47	7.4	611	0.02	0.05	0.06	0.00	0.01
	Thermal Oil Heater 2	503719	6251037	490	44.2	1.47	7.4	611	0.02	0.05	0.06	0.00	0.01
	Hydrocracker Heater 1	503478	6251249	499	30.0	1.82	6.0	582	0.02	0.06	0.07	0.00	0.01
	Hydrocracker Heater 2	503946	6251042	485	30.0	1.82	6.0	582	0.02	0.06	0.07	0.00	0.01
	Utility Boiler 1	503307	6251379	500	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Utility Boiler 2	503295	6251391	500	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Utility Boiler 3	504012	6250876	483	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Utility Boiler 4	504024	6250887	483	30.0	1.51	29.5	416	0.12	0.45	0.36	0.02	0.03
	Steam Superheater 1	503336	6251343	500	51.4	1.89	6.5	578	0.03	0.06	0.07	0.00	0.01
	Steam Superheater 2	503984	6250844	483	51.4	1.89	6.5	578	0.03	0.06	0.07	0.00	0.01
	Steam Superheater 3	503578	6251492	498	34.7	1.02	6.2	523	0.01	0.02	0.02	0.00	0.00
	Steam Superheater 4	503729	6251027	490	34.7	1.02	6.2	523	0.01	0.02	0.02	0.00	0.00
	Sulphur Recovery Unit Incinerator 1	503410	6251145	498	115.0	1.52	30.0	811	7.76	0.04	0.03	0.00	0.00
	Sulphur Recovery Unit Incinerator 2	503732	6250845	488	115.0	1.52	30.0	811	7.76	0.04	0.03	0.00	0.00
	HP Flare	503801	6251754	489	28.7	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
	LP Flare	504016	6251410	485	38.0	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00
	Sour Gas Flare	504016	6251331	485	115.5	3.85	0.02	1273	0.00	0.00	0.00	0.00	0.00

Table 2A16-2 Summary of Nexen/OPTI CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Long Lake South Phase 1	Steam Generator 1	500521	6239541	502	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 2	500539	6239530	502	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 3	500557	6239520	502	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 4	500575	6239509	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 5	500593	6239499	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 6	500554	6239619	502	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 7	500572	6239608	502	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 8	500590	6239598	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 9	500606	6239588	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 10	500624	6239578	504	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 11	500642	6239568	504	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Cogeneration Unit	500465	6239611	500	30.0	5.18	18.2	433	0.590	2.436	1.834	0.081	0.127
	Glycol Trim Heater	500689	6239602	506	30.0	1.80	6.0	422	0.001	0.117	0.104	0.006	0.009
	Line Heater 1	500941	6240033	508	7.4	0.51	1.4	477	0.000	0.002	0.002	0.000	0.000
	Line Heater 2	504806	6246080	453	7.4	0.51	1.4	477	0.000	0.002	0.002	0.000	0.000
	Continuous Flare	501160	6239853	513	37.5	3.85	0.02	1273	0.000	0.000	0.001	0.001	0.000
Long Lake South Phase 2	Steam Generator 1	501084	6240393	504	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 2	501102	6240383	504	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 3	501120	6240372	504	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 4	501117	6240471	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 5	501134	6240462	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 6	501152	6240451	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Steam Generator 7	501170	6240441	503	30.0	1.68	18.8	464	0.094	0.318	0.282	0.017	0.026
	Cogeneration Unit 1	500993	6240485	503	30.0	5.18	18.2	433	0.590	2.436	1.834	0.081	0.127
	Cogeneration Unit 2	501033	6240460	503	30.0	5.18	18.2	433	0.590	2.436	1.834	0.081	0.127
	Glycol Trim Heater	501217	6240475	502	30.0	1.80	6.0	422	0.001	1.117	0.104	0.006	0.009
	Line Heater	501474	6240603	507	7.4	0.51	1.4	477	0.000	0.002	0.002	0.000	0.000
	Continuous Flare [a]	501688	6240726	502	47.2	3.73	10.4	1273	3.781	0.108	0.587	0.402	0.008
Nexen/OPTI CEA Totals									**25.66**	**24.09**	**20.34**	**1.46**	**1.61**

[a] Worst case scenario during the first year of operation of Phase 2 when the produced gas stream is continuously sent to flare.

2A17 Northern Lights Partnership

2A17.1 CEA – Northern Lights

The Northern Lights Partnership was formed on May 30, 2005, between Synenco Energy Inc. and SinoCanada Petroleum Corporation, the Canadian subsidiary of China-based Sinopec International Petroleum Exploration and Production Corporation. Synenco is the Managing Partner and holds a 60% interest in the Partnership, with the remaining 40% held by SinoCanada (Synenco website, 2007).

The Northern Lights project consists of an oil sands mining and bitumen extraction project located within the RSA, approximately 100 km north of Fort McMurray, and an upgrading facility in Sturgeon County, near Edmonton. When fully completed, Northern Lights will produce 100,000 bpd of light, sweet synthetic crude oil for 30 years (Synenco website, 2007). The lands comprising the mining and extraction components of the Northern Lights project are the most northerly of any oil sands project proposed in the region to date.

Table 2A17-1 presents the Northern Lights project CEA emission information obtained from the Northern Lights Mining and Extraction Project Application (Northern Lights Partnership, 2006).

Table 2A17-1 Summary of Northern Lights Partnership CEA Air Emissions

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Northern Lights	Auxiliary Boiler 1	499435	6378780	293	25.0	2.44	25.4	468	0.01	0.72	0.64	0.04	0.06
	Auxiliary Boiler 2	499435	6378820	293	25.0	2.44	25.4	468	0.01	0.72	0.64	0.04	0.06
	Cogeneration Unit 1	499275	6378640	293	30.0	3.35	25.5	483	0.01	1.35	1.16	0.04	0.10
	Cogeneration Unit 2	499275	6378680	293	30.0	3.35	25.5	483	0.01	1.35	1.16	0.04	0.10

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Northern Lights	Mine Fleet	NW	499100	6376400	303	3,600,000	0.35	11.57	7.79	1.67	0.45
		NE	501100	6376400							
		SW	499100	6374600							
		SE	501100	6374600							
	Mine Fugitives	NW	499100	6376400	303	3,600,000	0.00	0.00	0.00	2.99	0.00
		NE	501100	6376400							
		SW	499100	6374600							
		SE	501100	6374600							
	Tailings Pond	NW	505200	6385300	302	5,160,000	0.00	0.00	0.00	58.59[a]	0.00
		NE	507800	6385300							
		SW	506100	6382900							
		SE	507800	6382900							
	Plant Fugitives	NW	499550	6379100	296	500,000	0.00	0.00	0.00	1.50	0.00
		NE	500550	6379100							
		SW	499550	6378600							
		SE	500550	6378600							
Northern Lights Partnership CEA Totals							**0.39**	**15.72**	**11.40**	**64.93**	**0.76**

[a] Peak emission rate

2A18 Northlands Forest Products Ltd.

2A18.1 Baseline and CEA – Fort McMurray Sawmill

Northlands Forest Products operates a sawmill located within the RSA, approximately 15 km north of Fort McMurray. Its main emission source is the beehive burner that operates from 8 am to 6 pm daily. Emissions were only assumed to occur during these hours. Table 2A18-1 provides a summary of the Northlands Forest Products' emissions for the baseline and CEA cases.

Table 2A18-1 Summary of Northlands Forest Products Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Fort McMurray Sawmill	Beehive Burner	473110	6303164	242	24.0	11.00	3.0	773	0.02	0.19	25.00	1.71	0.19
Northlands Forest Products Baseline and CEA Totals									**0.02**	**0.19**	**25.00**	**1.71**	**0.19**

2A19 Petro-Canada

2A19.1 Baseline and CEA

2A19.1.1 Dover UTF

Petro-Canada took over the operation of the Dover Underground Test Facility (UTF) from Devon Canada Corporation in March 2005. The facility within the RSA includes a glycol heater, a mine air heater, four steam generators and a central utilities flare stack. Tables 2A19-1 and 2A19-2 provide summaries of emissions from the baseline and CEA Dover UTF. The values are the same for both cases.

2A19.1.2 Fort Hills Mining Project

In March 2005, Petro-Canada added the Fort Hills mining project to their oil sands assets. Through a joint venture agreement with UTS Energy Corporation and Teck Cominco, Petro-Canada now operates and leads the development of the Fort Hills facility within the RSA (Petro-Canada website, 2007a). Emission data for the project were obtained from the TrueNorth Energy Application for Approval of the Fort Hills Oil Sands Project (TrueNorth Energy L.P., 2001). Baseline and CEA emissions from the approved Fort Hills mining project are presented in Tables 2A19-1 and 2A19-2. Since no further development is planned, the values are the same for both cases.

2A19.1.3 MacKay River SAGD Project

The Mackay River SAGD project located within the RSA, 60 km northwest of Fort McMurray, is currently in operation. Plateau bitumen production of 27,000 bpd to 30,000 bpd is expected in 2007 (Petro-Canada website, 2007b). In 2005, Petro-Canada submitted an application to Alberta Energy and Utilities Board and Alberta Environment for the approval of MacKay River Expansion (Petro-Canada, 2005), which will allow an increase of bitumen production of 40,000 bpd. Tables 2A19-1 and 2A19-2 present the MacKay River project emission parameters for the baseline and CEA cases, respectively.

2A19.1.4 Meadow Creek

In 2003, Petro-Canada received approval from the Alberta Energy and Utilities Board for an 80,000 bpd SAGD project within the Meadow Creek area, located within the LSA, approximately 45 km south of Fort McMurray. Petro-Canada is also considering an expansion of their Meadow Creek facility. Baseline and CEA emissions from the Meadow Creek project are provided in Tables 2A19-1 and 2A19-2, respectively.

2A19.2 CEA – Lewis

The Lewis project is a proposed SAGD facility to be located within the RSA, approximately 40 km northeast of Fort McMurray. The Lewis project emissions would originate mainly from steam generators, cogeneration units and glycol heaters. Table 2A19-2 provides a summary for the Petro-Canada CEA case, which includes the Lewis project emissions.

Table 2A19-1 Summary of Petro-Canada Baseline Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Dover UTF	Mine Air Heater	443864	6324337	428	2.4	1.93	12.0	293	0.00	0.01	0.01	0.00	0.00
	Continuous Flare	444050	6324440	428	21.3	0.52	20.0	1273	0.25	0.01	0.05	0.01	0.00
	Glycol Heater	444000	6324250	429	7.3	0.31	15.1	573	0.01	0.01	0.00	0.00	0.00
	Steam Generator 1	444012	6324240	429	10.9	0.54	39.7	466	0.08	0.10	0.02	0.01	0.01
	Steam Generator 2	444042	6324240	429	11.8	0.91	14.1	466	0.08	0.10	0.02	0.01	0.01
	Steam Generator 3	444022	6324240	429	10.9	0.54	29.0	533	0.04	0.05	0.01	0.00	0.00
	Steam Generator 4	444032	6324240	429	10.9	0.54	29.0	533	0.04	0.05	0.01	0.00	0.00
Fort Hills	Auxiliary Boiler 1	462200	6360100	279	38.0	2.00	28.9	486	0.00	0.19	0.04	0.01	0.01
	Auxiliary Boiler 2	462100	6360200	280	38.0	2.00	28.9	486	0.00	0.19	0.04	0.01	0.01
	Cogeneration Unit 1	462000	6360000	280	38.0	4.00	31.4	486	0.00	1.18	0.13	0.03	0.07
	Cogeneration Unit 2	462500	6360100	279	38.0	4.00	31.4	486	0.00	1.18	0.13	0.03	0.07
MacKay River Phase 1	Steam Generator 1	445136	6322011	415	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 2	445136	6322021	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 3	445136	6322031	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 4	445136	6322041	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 5	445136	6322051	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 6	445136	6322061	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Main Glycol Heater	444925	6322092	420	8.5	0.81	1.0	589	0.00	0.04	0.03	0.00	0.00
	Glycol Trim Heater	444942	6322074	419	9.2	0.30	2.1	589	0.00	0.00	0.00	0.00	0.00
	Cogeneration Unit	445067	6322175	418	26.2	6.31	20.0	452	0.00	3.60	3.72	0.09	0.16

Table 2A19-1 Summary of Petro-Canada Baseline Air Emissions (continued)

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Meadow Creek	Cogeneration Unit 1	482144	6242326	719	30.5	6.10	23.6	478	0.35	2.98	2.14	0.08	0.18
	Cogeneration Unit 2	482144	6242261	719	30.5	6.10	23.6	478	0.35	2.98	2.14	0.08	0.18
	Glycol Heater 1	481869	6242361	720	8.1	0.69	20.6	478	0.03	0.03	0.05	0.00	0.00
	Glycol Heater 2	481869	6242354	720	8.1	0.69	20.6	478	0.03	0.03	0.05	0.00	0.00
	Glycol Trim Heater 1	481880	6242339	720	7.8	0.25	10.5	478	0.00	0.00	0.00	0.00	0.00
	Steam Generator 1	482251	6242013	718	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 2	482251	6242025	718	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 3	482162	6242013	719	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 4	482162	6242025	719	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Fort Hills	North Mine Fleet	NW	461050	6360450	265	4,000,000	0.84	10.70	2.40	0.52	0.27
		NE	463050	6360450							
		SW	461050	6358450							
		SE	463050	6358450							
	South Mine Fleet	NW	464550	6357700	289	8,125,000	0.84	10.70	2.40	0.52	0.27
		NE	464800	6357700							
		SW	461550	6355200							
		SE	464800	6355200							
	Tailings Pond	NW	466550	6362000	327	1,000,000	0.00	0.00	0.00	14.20[a]	0.00
		NE	467550	6362000							
		SW	466550	6361000							
		SE	467550	6361000							
Petro-Canada Baseline Totals							**4.69**	**36.66**	**15.31**	**15.76**	**1.40**

[a] Peak emission rate

Table 2A19-2 Summary of Petro-Canada CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Dover UTF	Mine Air Heater	443864	6324337	428	2.4	1.93	12.0	293	0.00	0.01	0.01	0.00	0.00
	Continuous Flare	444050	6324440	428	21.3	0.52	20.0	1273	0.25	0.01	0.05	0.01	0.00
	Glycol Heater	444000	6324250	429	7.3	0.31	15.1	573	0.01	0.01	0.00	0.00	0.00
	Steam Generator 1	444012	6324240	429	10.9	0.54	39.7	466	0.08	0.10	0.02	0.01	0.01
	Steam Generator 2	444042	6324240	429	11.8	0.91	14.1	466	0.08	0.10	0.02	0.01	0.01
	Steam Generator 3	444022	6324240	429	10.9	0.54	29.0	533	0.04	0.05	0.01	0.00	0.00
	Steam Generator 4	444032	6324240	429	10.9	0.54	29.0	533	0.04	0.05	0.01	0.00	0.00
Fort Hills	Auxiliary Boiler 1	462200	6360100	279	38.0	2.00	28.9	486	0.00	0.19	0.04	0.01	0.01
	Auxiliary Boiler 2	462100	6360200	280	38.0	2.00	28.9	486	0.00	0.19	0.04	0.01	0.01
	Cogeneration Unit 1	462000	6360000	280	38.0	4.00	31.4	486	0.00	1.18	0.13	0.03	0.07
	Cogeneration Unit 2	462500	6360100	279	38.0	4.00	31.4	486	0.00	1.18	0.13	0.03	0.07
Lewis	Cogeneration Unit 1	494816	6305173	461	30.5	6.10	24.8	478	0.62	2.99	2.14	0.10	0.18
	Cogeneration Unit 2	495049	6305173	461	30.5	6.10	24.8	478	0.62	2.99	2.14	0.10	0.18
	Glycol Heater 1	494675	6305264	461	8.1	0.85	21.6	478	0.03	0.07	0.07	0.00	0.01
	Glycol Heater 2	494675	6305271	461	8.1	0.85	21.6	478	0.03	0.07	0.07	0.00	0.01
	Glycol Trim Heater	494695	6305250	461	7.8	0.25	11.0	478	0.00	0.00	0.00	0.00	0.00
	HP Flare	495052	6304877	461	39.6	0.58	0.4	323	0.00	0.01	0.05	0.00	0.00
	LP Flare	494747	6304774	460	24.4	0.39	0.4	323	0.00	0.01	0.02	0.00	0.00
	Steam Generator 1	495045	6304972	461	27.0	1.76	21.6	478	0.11	0.29	0.30	0.01	0.03
	Steam Generator 2	495045	6304961	461	27.0	1.76	21.6	478	0.11	0.29	0.30	0.01	0.03

Table 2A19-2 Summary of Petro-Canada CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
MacKay River Phase 1	Steam Generator 1	445136	6322011	415	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 2	445136	6322021	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 3	445136	6322031	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 4	445136	6322041	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 5	445136	6322051	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Steam Generator 6	445136	6322061	416	27.0	1.34	27.5	553	0.17	0.23	0.11	0.01	0.01
	Main Glycol Heater	444925	6322092	420	8.5	0.81	1.0	589	0.00	0.04	0.03	0.00	0.00
	Glycol Trim Heater	444942	6322074	419	9.2	0.30	2.1	589	0.00	0.00	0.00	0.00	0.00
	Cogeneration Unit	445067	6322175	418	26.2	6.31	20.0	452	0.00	3.60	3.72	0.09	0.16
MacKay River Phase 2	Cogeneration Unit 1	445083	6322944	417	27.0	5.49	32.5	460	0.19	1.98	0.62	0.05	0.09
	Cogeneration Unit 2	445083	6322890	417	27.0	5.49	32.5	460	0.19	1.98	0.62	0.05	0.09
	Steam Generator 1	445167	6322830	416	27.0	1.68	18.7	444	0.12	0.23	0.13	0.01	0.03
	Steam Generator 2	445167	6322758	416	27.0	1.68	18.7	444	0.12	0.23	0.13	0.01	0.03
	Glycol Trim Heater	444900	6322816	420	5.8	0.91	8.2	589	0.00	0.02	0.04	0.00	0.00
Meadow Creek	Cogeneration Unit 1	482144	6242326	719	30.5	6.10	23.6	478	0.35	2.98	2.14	0.08	0.18
	Cogeneration Unit 2	482144	6242261	719	30.5	6.10	23.6	478	0.35	2.98	2.14	0.08	0.18
	Glycol Heater 1	481869	6242361	720	8.1	0.69	20.6	478	0.03	0.03	0.05	0.00	0.00
	Glycol Heater 2	481869	6242354	720	8.1	0.69	20.6	478	0.03	0.03	0.05	0.00	0.00
	Glycol Trim Heater 1	481880	6242339	720	7.8	0.25	10.5	478	0.00	0.00	0.00	0.00	0.00
	Steam Generator 1	482251	6242013	718	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 2	482251	6242025	718	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 3	482162	6242013	719	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 4	482162	6242025	719	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03

Table 2A19-2 Summary of Petro-Canada CEA Air Emissions (continued)

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Meadow Creek Expansion	Cogeneration Unit 3	468700	6249600	518	30.5	6.10	23.6	478	0.35	2.98	2.14	0.08	0.18
	Cogeneration Unit 4	468700	6249535	519	30.5	6.10	23.6	478	0.35	2.98	2.14	0.08	0.18
	Glycol Heater 3	468425	6249635	521	8.1	0.69	20.6	478	0.03	0.03	0.05	0.00	0.00
	Glycol Heater 4	468425	6249628	521	8.1	0.69	20.6	478	0.03	0.03	0.05	0.00	0.00
	Glycol Trim Heater 2	468436	6249613	521	7.8	0.25	10.5	478	0.00	0.00	0.00	0.00	0.00
	Steam Generator 5	468807	6249287	522	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 6	468807	6249299	522	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 7	468718	6249287	522	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03
	Steam Generator 8	468718	6249299	522	27.0	1.76	20.6	478	0.18	0.29	0.31	0.02	0.03

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Fort Hills	North Mine Fleet	NW	461050	6360450	265	4,000,000	0.84	10.70	2.40	0.52	0.27
		NE	463050	6360450							
		SW	461050	6358450							
		SE	463050	6358450							
	South Mine Fleet	NW	461550	6357700	289	8,125,000	0.84	10.70	2.40	0.52	0.27
		NE	464800	6357700							
		SW	461550	6355200							
		SE	464800	6355200							
	Tailings Pond	NW	466550	6362000	327	1,000,000	0.00	0.00	0.00	14.20[a]	0.00
		NE	467550	6362000							
		SW	466550	6361000							
		SE	467550	6361000							
Petro-Canada CEA Totals							**8.42**	**55.34**	**27.84**	**16.35**	**2.57**

[a] Peak emission rate

2A20 Shell Canada Limited (Shell)

2A20.1 Baseline and CEA

2A20.1.1 Jackpine Mine

In 2004, Shell received regulatory approval for the proposed Jackpine Mine Phase 1 development within the RSA. The project is an integrated mining and processing operation, which will recover approximately 200,000 bpd of bitumen (Shell, 2002). Jackpine Mine Phase 1 is planned to be a stand-alone mining and extraction facility. A cogeneration unit onsite will primarily satisfy electrical power requirements. Table 2A20-1 summarizes the Jackpine Mine baseline emissions.

The Jackpine Mine Phase 2 will have a future production of 100,000 bpd starting in late 2014. The emissions from all sources except the mine fleet have been scaled from Phase 1 on the basis of bitumen production. The mine fleet emissions were based on the 2006 Tier 2 and Tier 3 emission standards set by the U.S. EPA (1998) presented in the Shell Jackpine Mine Phase 1 Application for Approval (Shell, 2002). Table 2A20-2 presents a summary of the Jackpine Mine CEA emissions.

2A20.1.2 Hilda Lake Pilot Project & Orion EOR Project

Shell acquired the Orion Hilda Lake as part of their acquisition of BlackRock Ventures Inc. in 2006. BlackRock received regulatory approval in August 2005 for commercial development of their Hilda Lake Pilot project. The commercial development, known as the Orion EOR (Enhanced Oil Recovery) project, uses the SAGD recovery process. The Orion Hilda Lake site is located within the RSA, approximately 40 km northwest of Cold Lake. The two-phased expansion will increase production to 20,000 bpd at full production, which is scheduled for 2010.

The emission parameters for Orion Hilda Lake were obtained from the BlackRock Orion EOR Project Application for Commercial Approval (BlackRock, 2001). Baseline and CEA emissions from the Orion Hilda Lake project are provided in Tables 2A20-1 and 2A20-2, respectively.

2A20.2 CEA

2A20.2.1 Pierre River Mine

In January 2007, Shell publicly disclosed their intention to develop the Pierre River Mine, which includes mining and bitumen processing extended to the west side of the Athabasca River, within the RSA. The project will expand the production base by 200,000 bpd (Shell website, 2007).

Shell will submit the Pierre River Mine application to the regulators in late 2007. Since air emission information for the project was not available, it was not included in this air quality assessment.

Table 2A20-1 Summary of Shell Baseline Air Emissions

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Jackpine Phase 1	Cogeneration Unit	477158	6344508	314	30.0	5.50	15.0	393	0.02	3.38	1.96	0.07	0.16
	Utility Boiler 1	477174	6344545	314	25.0	4.51	15.0	453	0.01	1.73	1.47	0.10	0.13
	Utility Boiler 2	477174	6344530	314	25.0	4.51	15.0	453	0.01	1.73	1.47	0.10	0.13
Orion Hilda Lake	Steam Generator 1	538730	6043490	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 2	538730	6043480	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 3	538730	6043470	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 4	538730	6043460	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 5	538730	6043460	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Jackpine Phase 1	Mine Fleet	NW	477783	6348249	313	13,182,656	0.18	11.61	7.71	1.63	0.45
		NE	480595	6348249							
		SW	477783	6343561							
		SE	480595	6343561							
	Mine Fugitives	NW	477783	6348249	313	13,182,656	0.00	0.00	0.00	6.21	0.00
		NE	480595	6348249							
		SW	477783	6343561							
		SE	480595	6343561							
	Tailings Pond	NW	477783	6343187	324	6,855,656	0.00	0.00	0.00	9.92 [a]	0.00
		NE	480595	6343187							
		SW	477783	6340749							
		SE	480595	6340749							
Shell Baseline Totals							**1.12**	**19.60**	**13.01**	**18.13**	**0.98**

[a] Peak emission rate

Table 2A20-2 Summary of Shell CEA Air Emissions

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Jackpine Phase 1	Cogeneration Unit	477158	6344508	314	30.0	5.50	15.0	393	0.02	3.38	1.96	0.07	0.16
	Utility Boiler 1	477174	6344545	314	25.0	4.51	15.0	453	0.01	1.73	1.47	0.10	0.13
	Utility Boiler 2	477174	6344530	314	25.0	4.51	15.0	453	0.01	1.73	1.47	0.10	0.13
Jackpine Phase 2	Cogeneration Unit	477058	6344508	314	30.0	3.89	15.0	393	0.01	1.69	0.98	0.04	0.08
	Utility Boiler	477021	6344420	315	25.0	4.51	15.0	453	0.01	1.73	1.47	0.10	0.13
Orion Hilda Lake	Steam Generator 1	538730	6043490	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 2	538730	6043480	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 3	538730	6043470	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 4	538730	6043460	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02
	Steam Generator 5	538730	6043460	554	27.4	1.68	21.0	471	0.18	0.23	0.08	0.02	0.02

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Jackpine Phase 1	Mine Fleet	NW	477783	6348249	313	13,182,656	0.18	11.61	7.71	1.63	0.45
		NE	480595	6348249							
		SW	477783	6343561							
		SE	480595	6343561							
	Mine Fugitives	NW	477783	6348249	313	13,182,656	0.00	0.00	0.00	6.21	0.00
		NE	480595	6348249							
		SW	477783	6343561							
		SE	480595	6343561							
	Tailings Pond	NW	477783	6343187	324	6,855,656	0.00	0.00	0.00	9.92 [a]	0.00
		NE	480595	6343187							
		SW	477783	6340749							
		SE	480595	6340749							

[a] Peak emission rate

Table 2A20-2 Summary of Shell CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Jackpine Phase 2	Mine Fleet	NW	481900	6361107	296	6,643,396	0.09	5.80	3.86	0.82	0.23
		NE	484467	6361107							
		SW	481900	6358519							
		SE	484467	6358519							
	Mine Fugitives	NW	481900	6361107	296	6,643,396	0.00	0.00	0.00	3.10	0.00
		NE	484467	6361107							
		SW	481900	6358519							
		SE	484467	6358519							
	Tailings Pond	NW	482258	6358419	299	3,426,201	0.00	0.00	0.00	4.96 [a]	0.00
		NE	484109	6358419							
		SW	482258	6356568							
		SE	484109	6356568							
Shell CEA Totals							**1.23**	**28.83**	**19.32**	**27.14**	**1.43**

[a] Peak emission rate

2A21 Suncor Energy Inc. (Suncor)

2A21.1 Baseline and CEA

2A21.1.1 Firebag

The Firebag in-situ operations are located within the RSA, approximately 40 km northeast of Suncor's original oil sands plant. Suncor has received regulatory approval to construct a commercial SAGD operation and upgrading facilities on the Firebag site (Suncor, 2000). The first phase of Firebag and expanded upgrader are expected to bring Suncor's production capacity to 260,000 bpd. Table 2A21-1 includes a summary of emissions from the baseline and CEA Firebag facilities.

2A21.1.2 Millennium

The Millennium project oil sands expansion within the RSA is operational and the targeted plant production is 225,000 bpd. The primary combustion point sources at the facility are the Flue Gas Desulphurization (FGD) stack, the powerhouse stack, as well as numerous secondary stacks. Table 2A21-1 summarizes emissions from the baseline and CEA Millennium facilities.

2A21.1.3 Voyageur

Suncor has received approval from the Alberta Energy and Utilities Board for their Voyageur project, which is an expansion of Suncor's oil sands mining and in-situ developments within the RSA. Emission data for the project were obtained from the Suncor Voyageur Project Application and Environmental Impact Assessment (Suncor, 2005). Table 2A21-1 presents a summary of baseline and CEA emissions from the Suncor facilities, including the Voyager project.

2A21.2 CEA – Voyageur South

Suncor publicly disclosed their Voyageur South project in February 2007. The project, targeting production of 120,000 bpd, will be located within the RSA, north of Fort McMurray, about 3 km southwest of Suncor's existing oil sands operations, directly south of the proposed Voyageur upgrader. Suncor plans to begin construction in 2009 and commence production in 2011 (Suncor website, 2007).

By mid-2007, Suncor expects to submit to regulators a formal application to proceed with the Voyageur South project. Since air emission information for the project was not available, it was not included in this air quality assessment.

Table 2A21-1 Summary of Suncor Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Firebag Project	Steam Generator 1	509151	6343659	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 2	509179	6343659	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 3	509179	6343582	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 4	509151	6343582	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 5	508931	6343659	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 6	508955	6343659	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 7	508955	6343582	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 8	508931	6343582	582	29.7	1.70	22.2	436	0.43	0.40	0.30	0.02	0.03
	Steam Generator 9	508838	6344591	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 10	508838	6344583	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 11	508879	6344616	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 12	508879	6344599	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 13	508704	6344591	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 14	508704	6344583	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 15	508704	6344611	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Steam Generator 16	508704	6344603	583	29.7	1.70	22.2	436	0.43	0.36	0.30	0.02	0.03
	Cogeneration Unit 1	508878	6343062	581	27.2	5.50	14.5	383	0.59	2.14	1.20	0.05	0.10
	Cogeneration Unit 2	508854	6344324	583	27.2	5.50	14.5	383	0.59	2.14	1.20	0.05	0.10
	Cogeneration Unit 3	508908	6344324	583	27.2	5.50	14.5	383	0.59	2.14	1.20	0.05	0.10
	Cogeneration Unit 4	508721	6344324	583	27.2	5.50	14.5	383	0.59	2.14	1.20	0.05	0.10
	Cogeneration Unit 5	508638	6344324	583	27.2	5.50	14.5	383	0.59	2.14	1.20	0.05	0.10

Table 2A21-1 Summary of Suncor Baseline and CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Millennium Base Plant	FGD Stack	471043	6317825	248	137.2	7.01	13.1	322	18.75	31.97	0.78	0.17	4.05
	Powerhouse Stack	471026	6317764	251	106.7	5.79	7.0	466	16.15	4.78	2.05	0.14	0.49
	Gas Turbine Generators a	470360	6318450	267	30.5	6.10	15.9	383	0.00	4.51	3.46	0.13	0.29
	Millennium Thermal Oxidizer	470933	6318211	247	106.1	3.05	29.0	811	6.64	0.33	0.11	0.01	0.01
	Base Plant Thermal Oxidizer	471003	6318016	245	106.7	1.98	29.3	728	9.29	0.11	0.03	0.00	0.00
	Plant 5 and Plant 6 a	470986	6317928	247	48.8	1.80	5.5	733	0.69	3.62	1.72	0.11	0.16
	Plant 7 [a]	470971	6317907	249	41.1	1.27	6.7	728	0.14	0.40	0.34	0.02	0.03
	Plant 25 [a]	470750	6318076	256	67.0	1.49	9.1	487	0.14	0.65	0.34	0.02	0.03
	Plant 52 [a]	470804	6318588	246	54.9	2.97	7.6	489	0.32	0.71	0.80	0.05	0.07
	Plant 54 and Plant 55 [a]	470529	6318514	258	38.1	2.84	15.2	567	0.24	0.58	0.59	0.04	0.05
	Plant 57 [a]	470733	6318662	247	49.1	1.73	10.1	483	0.54	0.57	0.52	0.03	0.05
	MCU Coker Charge Heaters [a]	470912	6318381	245	60.7	3.28	7.6	487	0.32	0.34	0.31	0.02	0.03
	Base Plant Acid Gas Flare	471202	6318106	243	87.1	3.88	11.3	1273	3.06	0.02	0.11	0.03	0.00
	Millennium Acid Gas Flare	471157	6318390	239	131.4	10.78	1.1	1273	1.86	0.00	0.00	0.00	0.00
	MCU Acid Gas Flare	471121	6318473	236	131.4	10.78	1.1	1273	1.86	0.00	0.00	0.00	0.00
Voyageur	Thermal Oxidizer Stack	469421	6313980	323	89.9	3.01	23.5	810	7.17	0.24	0.07	0.01	0.01
	SRU Steam Superheater	469323	6313917	322	39.6	2.26	7.6	478	0.11	0.15	0.13	0.01	0.01
	Hydrogen Plant Train Heaters [a]	468979	6314409	320	42.7	3.91	17.7	422	0.02	2.37	1.90	0.12	0.17
	Delayed Coker Units [a]	469097	6314083	321	39.6	4.28	7.6	444	1.12	1.56	1.38	0.09	0.13
	Combined Hydrotreater 1	469329	6314185	323	39.6	1.67	7.6	478	0.12	0.11	0.15	0.01	0.01
	Combined Hydrotreater 2	469351	6314172	323	45.7	1.96	7.6	444	0.08	0.11	0.10	0.01	0.01
	Combined Hydrotreater 3	469370	6314163	323	42.7	3.07	7.6	444	0.20	0.27	0.24	0.02	0.02
	Naphtha Hydrotreater Units [a]	469508	6313930	323	37.5	1.22	7.9	625	0.07	0.06	0.09	0.01	0.01
	Boiler Package Heater	469535	6314154	324	38.1	2.97	7.6	478	0.18	0.25	0.22	0.02	0.02
	Steam Superheater	469500	6314079	324	45.7	0.65	7.6	478	0.01	0.01	0.01	0.00	0.00
	Fuel Gas Pipeline Heater	469053	6314690	320	45.7	0.69	7.6	478	0.01	0.01	0.01	0.00	0.00
	LP Flare 1	468616	6314500	316	119.2	9.08	2.1	1273	2.65	0.00	0.00	0.00	0.00
	LP Flare 2	468657	6314436	316	119.2	9.08	2.1	1273	2.65	0.00	0.00	0.00	0.00

[a] Grouped sources

Table 2A21-1 Summary of Suncor Baseline and CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Millennium Base Plant	Mine Fleet & Mine Face Fugitives - Millennium Area 1	NW	474431	6311147	296	16,928,244	0.03	5.33	6.43	2.26	0.28
		NE	478254	6311147							
		SW	474431	6306719							
		SE	478254	6306719							
	Mine Fleet & Mine Face Fugitives - Millennium Area 2	NW	478373	6311147	359	12,205,868	0.02	3.83	4.62	1.62	0.20
		NE	481401	6311147							
		SW	478373	6307116							
		SE	481401	6307116							
	Mine Fleet & Mine Face Fugitives - Millennium Area 3	NW	477865	6314587	351	10,583,788	0.02	3.33	4.02	1.41	0.18
		NE	481033	6314560							
		SW	477865	6311254							
		SE	481075	6311254							
	Mine Fleet & Mine Face Fugitives - Millennium Area 4	NW	473940	6315427	287	16,121,151	0.03	5.08	6.12	2.15	0.27
		NE	477810	6315427							
		SW	473954	6311254							
		SE	477797	6311240							
	Mine Fleet & Mine Face Fugitives - Millennium Area 5	NW	473885	6316612	295	1,588,191	0.00	0.50	0.60	0.21	0.03
		NE	475317	6316584							
		SW	473885	6315510							
		SE	475372	6315510							
	Mine Fleet & Mine Face Fugitives - Millennium Area 6	NW	472714	6317590	286	1,203,634	0.00	0.38	0.46	0.16	0.02
		NE	473348	6318251							
		SW	473706	6316667							
		SE	474312	6317245							

Table 2A21-1 Summary of Suncor Baseline and CEA Air Emissions (continued)

Area Sources												
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Millennium Base Plant (continued)	Mine Fleet & Mine Face Fugitives - Millennium Area 7	NW	471819	6319077	268	1,073,979	0.00	0.34	0.41	0.14	0.02
		NE	472480	6319546							
		SW	472590	6317920							
		SE	473182	6318457							
	Tailings Ponds 2/3	NW	468233	6317061	316	1,596,252	0.00	0.00	0.00	176.87 [a]	0.00
		NE	469459	6317061							
		SW	468233	6315759							
		SE	469459	6315759							
	South Tailings Pond	NW	478109	6305130	364	13,498,276	0.00	0.00	0.00	4.54 [a]	0.00
		NE	481783	6305130							
		SW	478109	6301456							
		SE	481783	6301456							
	Plant Fugitives	NW	470238	6318402	263	795,855	0.00	0.00	0.00	17.17	0.00
		NE	470728	6318693							
		SW	470953	6317203							
		SE	471443	6317492							
Voyageur	Mine Fleet & Mine Face Fugitives - Pit 4 Mine Area 1	NW	474503	6320144	333	3,423,903	0.04	7.20	7.73	3.05	0.38
		NE	475436	6321077							
		SW	476341	6318310							
		SE	477273	6319240							
	Mine Fleet & Mine Face Fugitives - Pit 4 Mine Area 2	NW	477771	6318332	336	2,759,239	0.03	5.80	6.23	2.46	0.30
		NE	479603	6318332							
		SW	477635	6316955							
		SE	479603	6316809							

[a] Peak emission rate

Table 2A21-1 Summary of Suncor Baseline and CEA Air Emissions (continued)

Area Sources												
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Voyageur (continued)	Mine Fleet & Mine Face Fugitives - Pit 4 Mine Area 3	NW	475672	6318712	331	1,800,591	0.02	3.79	4.06	1.61	0.20
		NE	477685	6317490							
		SW	475241	6318058							
		SE	477361	6316846							
	Coke Handling Fleet	NW	468667	6313491	318	2,696,581	0.01	0.77	0.48	0.11	0.03
		NE	469044	6314095							
		SW	469325	6311351							
		SE	470775	6312095							
	Plant Fugitives	NW	468970	6314830	321	772,176	0.00	0.00	0.00	0.89	0.00
		NE	469922	6314350							
		SW	468647	6314184							
		SE	469599	6313701							
Suncor Baseline and CEA Totals							**79.00**	**106.85**	**67.33**	**216.26**	**8.48**

2A22 Syncrude Canada Ltd.

2A22.1 Baseline and CEA

2A22.1.1 Aurora Mine

Aurora Mine's first production train opened in July 2000. Aurora is located within the RSA, 35 km northeast of Syncrude's existing plant, across the Athabasca River. Aurora North has the potential to produce some 2.5 billion barrels of Syncrude Sweet Blend. Aurora's Train 2 began operation in late 2003 and the approved Train 3 (Aurora South) is planned for 2008 (Syncrude website, 2007). Table 2A22-1 provides a summary of emissions from the baseline and CEA Aurora Mine facilities. The values are the same for both cases because there is no further planned development.

2A22.1.2 Mildred Lake

The Mildred Lake facility within the RSA produces approximately 480,000 bpd of synthetic crude oil. The North Mine production is around 160,000 bpd of bitumen, while the West Mine production is about 110,000 bpd of bitumen. The combustion point sources at the Syncrude plant are the main stack, FGD stack and numerous secondary stacks. Area emission sources from the mine fleet, mine face and tailings ponds are a major contributor to air emissions associated with the Syncrude operations.

Syncrude emission data are primarily taken from the Environmental Impact Assessment for the Syncrude Canada Limited Mildred Lake Upgrader Expansion Project (Syncrude, 1998). The SO_2 emissions were updated to reflect the current emissions reported in the Mid-Term Emission Report (Syncrude, 2001). In 2004, Syncrude received regulatory approval for their Emissions Reduction project at the Mildred Lake Facility. This project has reduced SO_2 and PM emissions from the Main Stack at the plant. A summary of emissions from the baseline and CEA Mildred Lake facilities is included in Table 2A22-1. The values are the same for both cases because there is no further planned development.

Table 2A22-1 Summary of Syncrude Baseline and CEA Air Emissions

Point Sources														
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Aurora North	Boiler 1	469370	6350733	288	25.0	2.74	37.7	455	0.00	0.57	0.13	0.01	0.05
	Boiler 2	469390	6350733	288	25.0	2.74	37.7	455	0.00	0.57	0.13	0.01	0.05
	Steam Generator 1	469402	6350746	288	25.0	3.27	33.9	460	0.00	0.62	0.14	0.01	0.06
	Steam Generator 2	469402	6350779	288	25.0	3.27	33.9	460	0.00	0.62	0.14	0.01	0.06
Aurora South	Boiler 1	484151	6342653	348	25.0	2.74	37.7	455	0.00	0.57	0.13	0.01	0.05
	Boiler 2	484131	6342653	348	25.0	2.74	37.7	455	0.00	0.57	0.13	0.01	0.05
	Steam Generator 1	484164	6342667	348	25.0	3.27	33.9	460	0.00	0.62	0.14	0.01	0.06
	Steam Generator 2	484164	6342700	348	25.0	3.27	33.9	460	0.00	0.62	0.14	0.01	0.06
Mildred Lake	FGD Stack 8-3	462807	6322880	305	76.2	6.60	10.5	348	18.00	3.50	13.50	0.11	2.10
	Bitumen Column Feed Heater 1	462596	6322427	308	51.8	3.20	5.7	422	0.00	0.43	0.12	0.00	0.04
	Bitumen Column Feed Heater 2	462617	6322434	308	51.8	3.20	5.7	422	0.00	0.43	0.12	0.00	0.04
	Bitumen Column Feed Heater 3	462578	6322476	308	51.8	3.20	5.7	422	0.00	0.43	0.12	0.00	0.04
	Bitumen Column Feed Heater 4	462605	6322485	308	51.8	3.20	5.7	422	0.00	0.43	0.12	0.00	0.04
	Bitumen Column Feed Heater 5	462782	6322688	306	51.8	3.20	4.0	422	0.00	0.65	0.07	0.01	0.03
	Bitumen Column Feed Heater 6	462777	6322702	306	51.8	3.20	4.0	422	0.00	0.65	0.07	0.01	0.03
	Bitumen Column Feed Heater 7	462777	6322688	306	51.8	3.20	3.7	422	0.00	0.19	0.07	0.01	0.03
	Bitumen Column Feed Heater 8	462782	6322702	306	51.8	3.20	3.7	422	0.00	0.19	0.07	0.01	0.03
	Bitumen Feed	463038	6322626	305	45.7	1.70	8.2	652	0.00	0.09	0.03	0.00	0.01
	Bitumen Heater 1	462966	6322841	305	6.1	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 2	463964	6322778	305	7.6	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 3	464025	6322590	304	7.6	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 4	464062	6322477	305	7.6	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 5	463997	6322675	304	7.6	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 6	462865	6323038	305	6.1	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 7	462898	6323049	305	6.1	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Bitumen Heater 8	462933	6322830	305	6.1	0.30	29.0	839	0.00	0.03	0.01	0.00	0.00
	Diluent Reboiler	462647	6322475	308	30.5	1.10	7.8	618	0.00	0.15	0.01	0.00	0.00

Table 2A22-1 Summary of Syncrude Baseline and CEA Air Emissions (continued)

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO$_2$ (t/d)**	**NO$_X$ (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
Mildred Lake (continued)	Fractionator Reboiler 1	462820	6322545	307	45.7	1.90	8.0	653	0.00	0.13	0.03	0.00	0.01
	Fractionator Reboiler 2	462850	6322555	306	45.7	1.90	8.0	653	0.00	0.13	0.03	0.00	0.01
	Fractionator Reboiler 3	463495	6322663	305	45.7	1.90	8.0	653	0.00	0.13	0.03	0.00	0.01
	Fractionator Reboiler 4	463247	6322494	305	42.7	1.80	4.1	433	0.00	0.05	0.02	0.00	0.01
	Fractionator Reboiler 5	463422	6322640	305	42.7	1.80	4.1	433	0.00	0.05	0.02	0.00	0.01
	Fractionator Reboiler 6	463032	6322644	305	45.7	1.10	6.1	585	0.00	0.03	0.01	0.00	0.00
	Gas Turbine 1	462693	6322003	308	45.7	3.30	15.8	423	0.00	2.28	0.36	0.01	0.14
	Gas Turbine 2	462721	6322012	308	45.7	3.30	15.8	423	0.00	2.28	0.36	0.01	0.14
	Hydrogen Heater 1	462879	6322400	307	41.8	1.70	7.7	426	0.00	0.15	0.04	0.00	0.01
	Hydrogen Heater 2	462904	6322408	307	41.8	1.70	7.7	426	0.00	0.15	0.04	0.00	0.01
	Hydrogen Heater 3	463509	6322668	305	41.8	1.70	7.7	426	0.00	0.15	0.04	0.00	0.01
	Hydrogen Heater 4	463221	6322485	305	42.7	1.80	3.8	433	0.00	0.04	0.02	0.00	0.01
	Hydrogen Heater 5	463311	6322539	305	42.7	1.80	6.9	433	0.00	0.08	0.04	0.00	0.01
	Hydrogen Heater 6	463393	6322630	305	42.7	1.80	3.8	433	0.00	0.04	0.02	0.00	0.01
	Hydrogen Heater 7	463408	6322635	305	42.7	1.80	6.9	433	0.00	0.08	0.04	0.00	0.01
	Hydrogen Heater 8	463028	6322657	305	45.7	1.70	7.2	569	0.00	0.09	0.03	0.00	0.01
	Main Stack	462632	6322111	308	183.0	7.90	28.8	513	82.00	14.80	55.20	7.88	1.60
	Reformer Furnace 1	463084	6322453	306	23.5	4.10	11.6	540	0.00	2.10	0.32	0.01	0.10
	Reformer Furnace 2	462947	6322612	306	23.5	4.10	11.6	540	0.00	2.10	0.32	0.01	0.10
	Reformer Furnace 3	463167	6322474	305	22.9	3.70	18.5	433	0.00	1.79	1.12	0.04	0.35
	Reformer Furnace 4	463355	6322650	305	22.9	5.50	12.5	433	0.00	4.29	1.67	0.06	0.52
	Reformer Furnace 5	463528	6322658	305	22.9	5.50	10.5	433	0.00	3.37	1.40	0.05	0.44
	Steam Superheater 1	462662	6322261	308	39.6	2.10	5.2	616	0.00	0.08	0.03	0.00	0.01
	Steam Superheater 2	462683	6322268	308	44.7	1.10	6.1	616	0.00	0.03	0.01	0.00	0.00
	Steam Superheater 3	462570	6322231	308	39.6	2.10	5.2	616	0.00	0.08	0.03	0.00	0.01
	Steam Superheater 4	462588	6322237	308	44.7	1.10	6.1	616	0.00	0.03	0.01	0.00	0.00

Table 2A22-1 Summary of Syncrude Baseline and CEA Air Emissions (continued)

Point Sources

Facility	Emission Source	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Mildred Lake (continued)	Steam Superheater 5	462970	6322749	305	39.6	2.10	5.2	616	0.00	0.08	0.03	0.00	0.01
	Steam Superheater 6	462965	6322764	305	44.7	1.10	6.1	616	0.00	0.03	0.01	0.00	0.00
	Sulfreen Regeneration	462741	6322333	308	15.4	0.50	37.2	616	0.00	0.06	0.01	0.00	0.00
	VDU Bitumen Feed Heater 1	462578	6322525	308	54.3	3.30	4.0	435	0.00	0.20	0.10	0.00	0.03
	VDU Bitumen Feed Heater 2	462607	6322535	308	54.3	3.30	4.0	435	0.00	0.20	0.10	0.00	0.03

Area Sources

Facility	Emission Source	Corner	NAD 83 UTM E (m)	NAD 83 UTM N (m)	Base Elevation (masl)	Area (m^2)	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Aurora North	Mine Fleet	NW	466965	6354537	299	6,000,000	0.59	13.10	3.20	0.54	0.29
		NE	468965	6354537							
		SW	466965	6351537							
		SE	468965	6351537							
	Mine Fugitives	NW	466965	6354537	299	6,000,000	0.00	0.00	0.00	12.40	0.00
		NE	468965	6354537							
		SW	466965	6351537							
		SE	468965	6351537							
	Tailings Pond	NW	472990	6352490	286	3,610,000	0.00	0.00	0.00	2.24 [a]	0.00
		NE	474890	6352490							
		SW	472990	6350590							
		SE	474890	6350590							

[a] Peak emission rate

Table 2A22-1 Summary of Syncrude Baseline and CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Aurora South	Mine Fleet	NW	482935	6347587	328	6,000,000	0.45	9.90	2.40	0.41	0.22
		NE	484935	6347587							
		SW	482935	6344587							
		SE	484935	6344587							
	Mine Fugitives	NW	482935	6347587	328	6,000,000	0.00	0.00	0.00	12.41	0.00
		NE	484935	6347587							
		SW	482935	6344587							
		SE	484935	6344587							
	Tailings Pond	NW	486630	6340330	381	3,610,000	0.00	0.00	0.00	2.24 [a]	0.00
		NE	488530	6340330							
		SW	486630	6338430							
		SE	488530	6338430							
Mildred Lake	Effluent Tailings Pond	NW	462004	6322243	296	100,000	0.00	0.00	0.00	0.53 [a]	0.00
		NE	462254	6322243							
		SW	462004	6321843							
		SE	462254	6321843							
	Tailings - East In-Pit	NW	464150	6320450	309	10,240,000	0.00	0.00	0.00	0.71 [a]	0.00
		NE	467350	6320450							
		SW	464150	6317250							
		SE	467350	6317250							
	Tailings - West In-Pit	NW	461460	6319880	307	6,250,000	0.00	0.00	0.00	0.46 [a]	0.00
		NE	463960	6319880							
		SW	461460	6317380							
		SE	463960	6317380							

[a] Peak emission rate

Table 2A22-1 Summary of Syncrude Baseline and CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Mildred Lake (continued)	Tailings Pond - Settling Basin Beach	NW	459340	6327610	304	18,490,000	0.00	0.00	0.00	0.32 [a]	0.00
		NE	463640	6327610							
		SW	459340	6323310							
		SE	463640	6323310							
	Tailings Pond - Settling Basin Water	NW	460470	6327060	302	11,560,000	0.00	0.00	0.00	33.20[a]	0.00
		NE	463870	6327060							
		SW	460470	6323660							
		SE	463870	6323660							
	Tailings - SW Sand Storage Beach	NW	452650	6319190	357	23,040,000	0.00	0.00	0.00	7.50 [a]	0.00
		NE	457450	6319190							
		SW	452650	6314390							
		SE	457450	6314390							
	Tailings - SW Sand Storage Water	NW	452780	6316480	374	1,960,000	0.00	0.00	0.00	0.65 [a]	0.00
		NE	454180	6316480							
		SW	452780	6315080							
		SE	454180	6315080							
	North Mine Fleet	NW	457555	6323299	328	3,500,641	0.85	17.20	4.50	0.77	0.41
		NE	459426	6323299							
		SW	457555	6321428							
		SE	459426	6321428							
	North Mine Fugitives	NW	457555	6323299	328	3,500,641	0.00	0.00	0.00	4.29	0.00
		NE	459426	6323299							
		SW	457555	6321428							
		SE	459426	6321428							

[a] Peak emission rate

Table 2A22-1 Summary of Syncrude Baseline and CEA Air Emissions (continued)

Area Sources											
Facility	**Emission Source**	**Corner**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Area (m^2)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Mildred Lake (continued)	West Mine Fleet	NW	460474	6318807	312	7,502,121	0.10	2.00	0.50	0.09	0.05
		NE	463213	6318807							
		SW	460474	6316068							
		SE	463213	6316068							
	West Mine Fugitives	NW	460474	6318807	312	7,502,121	0.00	0.00	0.00	1.43	0.00
		NE	463213	6318807							
		SW	460474	6316068							
		SE	463213	6316068							
Syncrude Baseline and CEA Totals							**101.99**	**89.44**	**87.53**	**88.55**	**7.46**

2A23 Whitesands In-situ Ltd. (Whitesands)

2A23.1 Baseline and CEA – Whitesands

In 2004, Whitesands (84% owned by Petrobank Energy and Resources Ltd.) received regulatory approval to develop the Whitesands Experimental project. The project will be the first field-scale application of the patented Toe-to-Heel Air Injection (THAI) in-situ heavy oil recovery technology. It will be developed in the Christina Lake area within the LSA, south of Fort McMurray. Table 2A23-1 provides a summary of emissions from the baseline and CEA Whitesands project. The values are the same for both cases because there is currently no announced additional development.

Table 2A23-1 Summary of Whitesands Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Whitesands	LP Flare	483752	6168334	612	13.0	0.15	0.3	1273	0.00	0.00	0.00	0.00	0.00
	Steam Generator	483885	6168281	611	12.3	1.52	5.5	477	0.00	0.04	0.06	0.00	0.00
	Vent	483910	6168229	610	35.0	0.20	111.0	323	0.08	0.00	9.17	0.00	0.00
Whitesnads Baseline and CEA Totals									**0.08**	**0.04**	**9.23**	**0.00**	**0.00**

2A24 Williams Energy (Canada) Inc. (Williams)

2A24.1 Baseline and CEA – Fort McMurray Chemical Plant

Williams operates the Fort McMurray Chemical Manufacturing Plant, which is a liquid olefin extraction plant. The facility is located within the RSA, approximately 30 km north of Fort McMurray. Table 2A24-1 presents the Williams facility emission parameters for the baseline and CEA cases. The values are the same for both cases because there is no planned development.

Table 2A24-1 Summary of Williams Baseline and CEA Air Emissions

Point Sources													
Facility	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Fort McMurray Chemical Plant	Heat Medium Heater	471754	6314125	322	32.4	1.40	6.2	553	0.00	0.02	0.02	0.24	0.00
Williams Baseline and CEA Totals									**0.00**	**0.02**	**0.02**	**0.24**	**0.00**

2A25 Gas Production Facilities

2A25.1 Baseline and CEA

There are many gas production facilities located within the 190 km by 400 km RSA. Emissions from these facilities result primarily from the combustion of natural gas by compressors and process heaters. Available data for these facilities usually include power ratings and their NO_X emission rates for the compressors. Although process heaters may be present at these facilities, they were not assessed since their emission rates tend to be much less than those due to compressor engines. Reciprocating compressor engines, which are most commonly used in the upstream oil and gas sector, have higher NO_X emission rates compared to other prime movers, such as gas turbines.

The following approach was adopted to obtain representative emission parameters from these facilities:

- U.S. EPA AP-42 emission factors for natural gas-fired reciprocating engines were used to calculate VOC and $PM_{2.5}$ emission rates. All units were assumed to burn sweet gas (i.e., the SO_2 emissions were assumed to be zero);

- Stack heights, stack diameters and exit temperatures were not readily available. Values were assigned based on representative operating practices; and

- Base elevations for the facilities were derived from electronic terrain data with a 3 arc second resolution, obtained from the NASA Shuttle Radar Topography Mission (SRTM).

Table 2A25-1 provides a summary of the baseline and CEA gas production facility emissions.

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
AltaGas Services Inc.	Compressor Station	Compressor Engine	517619	6157241	601	10.0	0.50	7.7	773	0.00	0.08	0.03	0.00	0.00
		Compressor Engine	428498	6192584	701	10.0	0.50	11.7	773	0.00	0.26	0.04	0.00	0.00
		Compressor Engine	424212	6204393	586	10.0	0.50	11.6	773	0.00	0.19	0.04	0.00	0.00
		Compressor Engine	435630	6205421	668	10.0	0.50	6.2	773	0.00	0.12	0.02	0.00	0.00
		Compressor Engine	435630	6205421	668	10.0	0.50	9.6	773	0.00	0.38	0.03	0.00	0.00
		Compressor Engine	449199	6216577	740	10.0	0.50	6.2	773	0.00	0.24	0.02	0.00	0.00
	Thornbury South Compressor Station	Waukesha L7042 GSI	437521	6192311	688	10.0	0.50	47.5	773	0.00	0.64	0.15	0.00	0.00
		Waukesha F3521 GL	437521	6192311	688	10.0	0.50	23.7	773	0.00	0.03	0.08	0.00	0.00
	Winefred North Sweet Compressor Station	Waukesha L7042 GSI	529516	6179016	573	10.0	0.50	39.6	773	0.00	0.53	0.13	0.00	0.00
		Caterpillar G3516 TA	529516	6179016	573	10.0	0.50	40.7	773	0.00	0.54	0.13	0.00	0.00
		Caterpillar G3304 NA	529516	6179016	573	10.0	0.50	2.9	773	0.00	0.04	0.01	0.00	0.00
Anadarko Canada Corp.	Vilna Sweet Compressor Station	Waukesha L7042 GSIU	440647	5999476	651	10.0	0.50	38.6	773	0.00	0.52	0.12	0.00	0.00
		Waukesha L7042 GSIU	440647	5999476	651	10.0	0.50	38.6	773	0.00	0.52	0.12	0.00	0.00
ARC Resources Ltd.	Cessford 3-6 Compressor Station	Waukesha F3521	486436	6032400	577	10.0	0.50	22.6	773	0.00	0.30	0.07	0.00	0.00
		Caterpillar G3306 TA	486436	6032400	577	10.0	0.50	6.3	773	0.00	0.11	0.02	0.00	0.00
BP Canada Energy Co.	Amoco Sweet Compressor Station	Compressor Engine	483400	6174232	580	10.0	0.50	15.0	773	0.00	0.20	0.05	0.00	0.00
		MEP 12 Cyl.	483400	6174232	580	12.2	0.66	34.3	672	0.00	1.47	0.01	0.00	0.00
		MEP 12 Cyl.	483400	6174232	580	12.2	0.66	34.3	672	0.00	1.47	0.01	0.00	0.00
		MEP 12 Cyl.	483400	6174232	580	14.8	0.61	40.2	672	0.00	0.73	0.01	0.00	0.00
		Superior 16SGTB	483400	6174232	580	12.2	0.46	43.5	691	0.00	0.09	0.01	0.00	0.00
		Heat Medium Boiler	483400	6174232	580	5.5	0.51	1.5	477	0.00	0.00	0.00	0.00	0.00
		Heat Medium Boiler	483400	6174232	580	5.5	0.51	1.0	477	0.00	0.00	0.00	0.00	0.00
		Glycol Reboiler	483400	6174232	580	5.6	0.31	2.8	477	0.00	0.00	0.00	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
BP Canada Energy Co. (continued)	BP Compressor Station	Compressor Engine	492746	6170164	557	10.0	0.50	6.4	773	0.00	0.10	0.02	0.00	0.00
		Compressor Engine	487456	6170984	559	10.0	0.50	25.7	773	0.00	0.05	0.08	0.00	0.00
		Compressor Engine	493153	6170971	551	10.0	0.50	6.4	773	0.00	0.12	0.02	0.00	0.00
		Compressor Engine	478121	6175059	582	10.0	0.50	12.8	773	0.00	0.19	0.04	0.00	0.00
		Compressor Engine	509104	6145080	639	10.0	0.50	17.5	773	0.00	0.01	0.06	0.00	0.00
	Kirby South Sweet Compressor Station	White Superior 16SGT	523574	6134466	671	10.0	0.50	85.1	773	0.00	1.14	0.27	0.00	0.00
		Waukesha L7044 GSI	523574	6134466	671	10.0	0.50	54.0	773	0.00	0.05	0.17	0.00	0.00
		Waukesha F3521 G	523574	6134466	671	10.0	0.50	13.7	773	0.00	0.18	0.04	0.00	0.00
		Waukesha F3521 G	523574	6134466	671	10.0	0.50	13.7	773	0.00	0.18	0.04	0.00	0.00
		Waukesha F3521 G	523574	6134466	671	10.0	0.50	13.7	773	0.00	0.18	0.04	0.00	0.00
		White Superior 16SGT	523574	6134466	671	10.0	0.50	85.1	773	0.00	1.14	0.27	0.00	0.00
		Solar Centaur TYPE H	523574	6134466	671	10.0	0.50	78.3	773	0.00	0.23	0.57	0.00	0.00
		White Superior 16SGT	523574	6134466	671	10.0	0.50	85.1	773	0.00	1.14	0.27	0.00	0.00
	Primrose/ Kirby Sweet Compressor Station	Waukesha L5790 GL	516021	6139028	623	8.6	0.30	43.9	644	0.00	0.13	0.12	0.00	0.00
		Waukesha L5790 GL	516021	6139028	623	8.6	0.30	43.9	644	0.00	0.13	0.12	0.00	0.00
		Waukesha L5790 GL	516021	6139028	623	8.6	0.30	43.9	644	0.00	0.13	0.12	0.00	0.00
	St. Lina North Sweet Compressor Station	White Superior 8G-825	486624	6032149	565	14.0	0.25	34.3	793	0.00	0.28	0.08	0.00	0.00
		Waukesha L7042 GSIU	486624	6032149	565	14.0	0.25	56.0	862	0.00	0.53	0.13	0.00	0.00
		Waukesha F18 GL	486624	6032149	565	5.5	0.25	54.6	720	0.00	0.02	0.04	0.00	0.00
		Waukesha F3521 GL	486624	6032149	565	6.8	0.31	40.0	683	0.00	0.02	0.06	0.00	0.00
		Waukesha L7042 GL	486624	6032149	565	9.1	0.33	47.6	978	0.00	0.05	0.15	0.00	0.00
Canadian Abraxas Petroleum Ltd.	Bellis Sweet Compressor Station	Waukesha F3521 GSI	414534	5995975	591	6.9	0.20	50.7	886	0.00	0.32	0.08	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Canadian Natural Resources Ltd.	Algar Lake Sweet Compressor Station	Waukesha L5790 GSI	419323	6240371	534	10.0	0.50	40.6	773	0.00	0.21	0.13	0.00	0.00
		Caterpillar G3412 TA	419323	6240371	534	10.0	0.50	19.3	773	0.00	0.27	0.06	0.00	0.00
	Chard Sweet Compressor Station	Waukesha F3521 GL	511175	6195915	487	10.0	0.50	23.7	773	0.00	0.03	0.08	0.00	0.00
		Waukesha L7042 GSI	511175	6195915	487	10.0	0.50	39.6	773	0.00	0.21	0.13	0.00	0.00
		Waukesha L7042 GSI	511175	6195915	487	10.0	0.50	39.6	773	0.00	0.21	0.13	0.00	0.00
		Waukesha L7042 GSI	511175	6195915	487	10.0	0.50	39.6	773	0.00	0.21	0.13	0.00	0.00
		Waukesha L7042 GSI	511175	6195915	487	10.0	0.50	39.6	773	0.00	0.21	0.13	0.00	0.00
		Compressor Engine	455056	6194251	699	10.0	0.50	23.6	773	0.00	0.30	0.08	0.00	0.00
	Cowpar Sour Gas Plant	Compressor Engine	523587	6200557	483	12.7	0.50	39.6	773	0.00	0.21	0.13	0.00	0.00
		Compressor Engine	523593	6200563	483	12.7	0.50	39.6	773	0.00	0.21	0.13	0.00	0.00
	Edwand Sweet Compressor Station	Caterpillar G3512 TA	410788	6013035	701	8.5	0.20	83.0	726	0.00	0.04	0.10	0.00	0.00
	House Algar Sweet Compressor Station	White Superior 16G-825	405535	6216353	527	10.0	0.50	51.3	773	0.00	0.57	0.16	0.00	0.00
	Hylo Sweet Compressor Station	White Superior 8GT-825	427310	6066914	579	10.0	0.50	35.3	773	0.00	0.40	0.11	0.00	0.00
	Newby Sour Gas Plant	Waukesha F11 G	520417	6228335	479	6.1	0.50	2.5	773	0.00	0.04	0.01	0.00	0.00
		Waukesha F11 G	520417	6228335	479	6.1	0.50	2.5	773	0.00	0.04	0.01	0.00	0.00
		Waukesha F11 G	520417	6228335	479	6.1	0.50	2.5	773	0.00	0.04	0.01	0.00	0.00
		Waukesha L7042 GL	520417	6228335	479	9.1	0.50	45.0	773	0.00	0.05	0.14	0.00	0.00
		Waukesha L7042 GL	520417	6228335	479	9.1	0.50	45.0	773	0.00	0.05	0.14	0.00	0.00
		Waukesha L7042 GL	520417	6228335	479	9.1	0.50	45.0	773	0.00	0.05	0.14	0.00	0.00
		Waukesha L7042 GL	520417	6228335	479	9.1	0.50	45.0	773	0.00	0.05	0.14	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Canadian Natural Resources Ltd. (continued)	Rio Alto Compressor Station	Compressor Engine	415087	6173000	672	10.0	0.50	6.4	773	0.00	0.09	0.02	0.00	0.00
		Compressor Engine	519552	6181119	580	10.0	0.50	6.3	773	0.00	0.14	0.02	0.00	0.00
		Compressor Engine	431002	6176362	670	10.0	0.50	70.6	773	0.00	0.21	0.23	0.01	0.00
		Compressor Engine	505668	6187543	506	10.0	0.50	12.8	773	0.00	0.19	0.04	0.00	0.00
		Compressor Engine	421287	6225510	547	10.0	0.50	6.3	773	0.00	0.11	0.02	0.00	0.00
		Compressor Engine	505480	6240981	478	10.0	0.50	6.3	773	0.00	0.11	0.02	0.00	0.00
		Compressor Engine	525427	6244291	434	10.0	0.50	47.4	773	0.00	0.05	0.15	0.00	0.00
		Compressor Engine	456949	6118580	642	10.0	0.50	6.3	773	0.00	0.09	0.02	0.00	0.00
		Compressor Engine	451561	6161520	692	10.0	0.50	3.1	773	0.00	0.23	0.01	0.00	0.00
		Compressor Engine	430421	6165444	685	10.0	0.50	6.3	773	0.00	0.48	0.02	0.00	0.00
		Compressor Engine	416882	6160420	707	10.0	0.50	47.4	773	0.00	0.31	0.15	0.00	0.00
		Compressor Engine	423033	6162331	699	10.0	0.50	12.8	773	0.00	0.19	0.04	0.00	0.00
		Compressor Engine	425127	6165531	673	10.0	0.50	44.7	773	0.00	0.37	0.14	0.00	0.00
		Compressor Engine	442725	6171740	673	10.0	0.50	14.6	773	0.00	0.21	0.05	0.00	0.00
Delek Resources Ltd.	Compressor Station	Compressor Engine	417048	6122787	580	10.0	0.50	7.4	773	0.00	0.02	0.02	0.00	0.00
Devon ARL Corp.	Chard 11-02 Booster	Caterpillar G3406 Turbo	501285	6176231	552	10.0	0.50	10.4	773	0.00	0.17	0.03	0.00	0.00
	Chard Sweet Compressor Station	Caterpillar G3406Turbo	508197	6175417	613	10.0	0.50	10.5	773	0.00	0.23	0.03	0.00	0.00
	Compressor Station	Caterpillar G3306TA	487543	6235738	730	10.0	0.50	7.1	773	0.00	0.09	0.02	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Devon ARL Corp. (continued)	Hangingstone 05-13 Booster	Caterpillar G3306TA	462278	6237500	610	10.0	0.50	7.1	773	0.00	0.09	0.02	0.00	0.00
	Hangingstone 06-29 Booster	Caterpillar G3306TA	475691	6230930	709	10.0	0.50	7.1	773	0.00	0.09	0.02	0.00	0.00
	Hangingstone 11-19 Booster	Caterpillar G3306TA	474109	6239435	662	10.0	0.50	7.1	773	0.00	0.09	0.02	0.00	0.00
	Hangingstone Sweet Compressor Station	Waukesha L7042 GSI	469198	6236234	648	11.6	0.31	37.4	862	0.00	0.52	0.12	0.00	0.00
		Waukesha L7042 GSI	469198	6236234	648	11.6	0.31	37.4	862	0.00	0.52	0.12	0.00	0.00
		Caterpillar G3412	469198	6236234	648	6.9	0.20	73.0	772	0.00	0.03	0.07	0.00	0.00
		Caterpillar G3412	469198	6236234	648	6.9	0.20	73.0	772	0.00	0.03	0.07	0.00	0.00
		Waukesha L7042 GSI	469198	6236234	648	11.6	0.31	37.4	862	0.00	0.05	0.12	0.00	0.00
	Kirby North 11-03 Booster	Caterpillar 3412 Turbo	509457	6156810	590	10.0	0.50	20.1	773	0.00	0.32	0.06	0.00	0.00
	Kirby North Sweet Compressor Station	Waukesha 7042 GSI	505784	6157210	581	10.0	0.50	43.8	773	0.00	0.04	0.14	0.00	0.00
	Kirby South 07-02A Booster	Caterpillar 3406 Turbo	511525	6146696	655	10.0	0.50	10.5	773	0.00	0.08	0.03	0.00	0.00
	Kirby South 07-09 Booster	Waukesha 3521 GSI Turbo	518064	6148339	636	10.0	0.50	19.0	773	0.00	0.26	0.06	0.00	0.00
	Kirby South 16-25 Booster	Waukesha H24GL	523720	6144328	613	10.0	0.50	17.2	773	0.00	0.03	0.05	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Devon ARL Corp. (continued)	Kirby Sweet Compressor Station	Waukesha F3521 GSI Turbo	517473	6147380	640	11.0	0.25	34.5	878	0.00	0.32	0.08	0.00	0.00
		Waukesha F3521 GSI Turbo	517473	6147380	640	11.0	0.25	34.5	878	0.00	0.32	0.08	0.00	0.00
		Waukesha F3521 GL Turbo	517473	6147380	640	11.0	0.25	41.1	683	0.00	0.03	0.08	0.00	0.00
		Waukesha 9390 GL Turbo	517473	6147380	640	11.0	0.34	57.5	679	0.00	0.07	0.20	0.00	0.00
		Glycol Heater	517473	6147380	640	4.6	0.25	1.1	946	0.00	0.00	0.00	0.00	0.00
		Glycol Heater	517473	6147380	640	4.3	0.15	1.5	946	0.00	0.00	0.00	0.00	0.00
		Utility Boiler	517473	6147380	640	4.6	0.25	4.8	946	0.00	0.00	0.00	0.00	0.00
	Leismer East Sweet Compressor Station	MEP 10 NA	494777	6167326	555	13.8	0.59	35.8	644	0.00	0.60	0.23	0.00	0.00
		MEP 10 NA	494777	6167326	555	13.8	0.59	35.8	644	0.00	0.60	0.23	0.00	0.00
		MEP 10 Turbo	494777	6167326	555	13.8	0.59	33.5	644	0.00	0.13	0.28	0.00	0.00
		MEP 10 Turbo	494777	6167326	555	13.8	0.59	33.5	644	0.00	0.13	0.28	0.00	0.00
		Waukesha F2895GU	494777	6167326	555	5.8	0.20	25.9	861	0.00	0.16	0.00	0.00	0.00
		Waukesha F2895GU	494777	6167326	555	5.8	0.20	25.9	861	0.00	0.16	0.00	0.00	0.00
		Waukesha F2895GU	494777	6167326	555	5.8	0.20	25.9	861	0.00	0.16	0.00	0.00	0.00
		Heat Medium Boiler	494777	6167326	555	6.4	0.38	32.8	728	0.00	0.01	0.00	0.00	0.00
		Heat Medium Boiler	494777	6167326	555	6.4	0.38	32.8	728	0.00	0.01	0.00	0.00	0.00
		Glycol Reboiler	494777	6167326	555	5.8	0.26	8.1	728	0.00	0.00	0.00	0.00	0.00
		Glycol Reboiler	494777	6167326	555	5.8	0.26	8.1	728	0.00	0.00	0.00	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Devon ARL Corp. (continued)	Leismer Stn 4 Booster	Waukesha L5790GL	496406	6169752	556	10.0	0.50	32.1	773	0.00	0.04	0.10	0.00	0.00
	Leismer Stn 8 Booster	Waukesha L5790GL	511453	6174214	576	10.0	0.50	32.1	773	0.00	0.04	0.10	0.00	0.00
	Pony Creek Sweet Compressor Station	Caterpillar G3516TA	491392	6198887	649	10.0	0.50	34.9	773	0.00	0.04	0.11	0.00	0.00
		Caterpillar G3516TA	491392	6198887	649	10.0	0.50	34.9	773	0.00	0.04	0.11	0.00	0.00
	West Surmont 06-09 Booster	Caterpillar G3406TA	497517	6216281	729	10.0	0.50	7.1	773	0.00	0.09	0.02	0.00	0.00
	West Surmont 6-27 Booster	Caterpillar G3306TA	489408	6221146	739	10.0	0.50	7.1	773	0.00	0.09	0.02	0.00	0.00
	West Surmont Sweet Compressor Station	Waukesha L7042 GSI	486562	6218730	740	10.0	0.50	39.6	773	0.00	0.30	0.13	0.00	0.00
		Waukesha L7042 GSI	486562	6218730	740	10.0	0.50	39.6	773	0.00	0.30	0.13	0.00	0.00
		Waukesha L7042 GSI	486562	6218730	740	10.0	0.50	39.6	773	0.00	0.30	0.13	0.00	0.00
		Waukesha L7042 GSI	486562	6218730	740	10.0	0.50	39.6	773	0.00	0.30	0.13	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
EnCana Corp.	Caribou North Compressor Station	White Superior 2408 G	526843	6099985	674	7.8	0.41	30.6	632	0.00	0.03	0.13	0.00	0.00
		White Superior 2412 G	526855	6099971	674	8.8	0.51	29.6	632	0.00	0.05	0.19	0.01	0.00
		White Superior 2408 G	526828	6099952	674	8.8	0.41	30.6	632	0.00	0.03	0.13	0.00	0.00
		White Superior 2412 G	526804	6099934	674	8.8	0.51	29.6	632	0.00	0.05	0.19	0.01	0.00
		White Superior 2408 G	526816	6099943	674	8.8	0.41	30.6	632	0.00	0.03	0.13	0.00	0.00
		White Superior 2408 G	526867	6099979	674	8.8	0.41	30.6	632	0.00	0.03	0.13	0.00	0.00
		White Superior 2408 G	526841	6099959	674	8.8	0.41	30.6	632	0.00	0.03	0.13	0.00	0.00
		White Superior 2408 G	526790	6099922	674	8.8	0.41	30.6	632	0.00	0.03	0.13	0.00	0.00
		Caterpillar G3408	526774	6099932	674	6.6	0.15	39.7	763	0.00	0.21	0.02	0.00	0.00
		White Superior 2406 G	526855	6099995	674	6.9	0.31	10.1	632	0.00	0.03	0.10	0.00	0.00
		Caterpillar G3612 TAW	526881	6099989	674	6.4	0.61	35.9	728	0.00	0.06	0.20	0.01	0.00
		Caterpillar G3612 TAW	526866	6100006	674	6.4	0.61	35.9	728	0.00	0.06	0.20	0.01	0.00
		Caterpillar G3606	526874	6099915	674	6.4	0.61	35.9	728	0.00	0.06	0.10	0.00	0.00
		Caterpillar G3606	526891	6099927	674	6.4	0.61	35.9	728	0.00	0.06	0.20	0.00	0.00
		Dehydrator 1	526815	6099965	674	6.4	0.40	3.6	533	0.00	0.00	0.00	0.00	0.00
		Dehydrator 2	526813	6099957	674	6.4	0.40	3.6	533	0.00	0.00	0.00	0.00	0.00
		Dehydrator 3	526822	6099970	674	6.4	0.40	3.6	533	0.00	0.00	0.00	0.00	0.00
		Caterpillar G3608	526887	6099902	674	8.6	0.51	35.4	728	0.00	0.04	0.13	0.00	0.00
		Caterpillar G3608	526901	6099915	674	8.6	0.51	35.4	728	0.00	0.04	0.13	0.00	0.00
	Caribou South Compressor Station	Waukesha L7042 GSI	524250	6089030	701	10.7	0.36	35.1	800	0.00	0.07	0.12	0.00	0.00
		Caterpillar G3612 TAW	524275	6089050	701	6.6	0.61	35.9	508	0.00	0.06	0.20	0.01	0.00
		Waukesha L7044 GSI	524300	6089040	701	4.6	0.36	37.9	895	0.00	0.04	0.13	0.00	0.00
		Caterpillar G3408	524300	6089030	701	4.6	0.20	18.2	740	0.00	0.02	0.03	0.00	0.00
		White Superior 2408 G	524275	6089020	701	8.8	0.41	33.6	630	0.00	0.03	0.13	0.00	0.00
		White Superior 2412 G	524250	6089040	701	8.8	0.51	33.0	630	0.00	0.05	0.19	0.01	0.00
		European Gas Tornado	524250	6089020	701	12.2	1.52	32.3	733	0.00	0.35	0.68	0.00	0.00
		White Superior 2408 G	524250	6089050	701	8.8	0.41	33.6	630	0.00	0.03	0.13	0.00	0.00
		Utilities	524275	6089030	701	6.4	0.41	3.7	672	0.00	0.01	0.00	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
EnCana Corp. (continued)	Compressor Station	Compressor Engine	506695	6128893	697	10.0	0.50	7.1	773	0.00	0.11	0.02	0.00	0.00
		Compressor Engine	508322	6129299	675	10.0	0.50	7.1	773	0.00	0.11	0.02	0.00	0.00
		Compressor Engine	411786	6343518	565	10.0	0.50	9.4	773	0.00	0.26	0.03	0.00	0.00
	North Primrose Compressor Station	Compressor Engine	512802	6127692	703	10.0	0.50	19.5	773	0.00	0.43	0.06	0.00	0.00
		Caterpillar G3516 TA	512802	6127692	703	10.0	0.50	40.7	773	0.00	0.06	0.13	0.00	0.00
		Solar Saturn CSI-SB	512802	6127692	703	10.0	0.50	36.1	773	0.00	0.03	0.12	0.00	0.00
		Solar Saturn CSI-SB	512802	6127692	703	10.0	0.50	36.1	773	0.00	0.03	0.12	0.00	0.00
		White Superior 12SGTB-825	512802	6127692	703	10.0	0.50	64.2	773	0.00	0.05	0.21	0.00	0.00
		White Superior 12SGTB-825	512802	6127692	703	10.0	0.50	64.2	773	0.00	0.05	0.21	0.00	0.00
		White Superior 12SGTB-825	512802	6127692	703	10.0	0.50	64.2	773	0.00	0.05	0.21	0.00	0.00
		White Superior 8GTL-825	512802	6127692	703	10.0	0.50	35.3	773	0.00	0.11	0.11	0.00	0.00
		Waukesha F2895 G	512802	6127692	703	10.0	0.50	19.5	773	0.00	0.10	0.06	0.00	0.00
		White Superior 8GTL-825	512802	6127692	703	10.0	0.50	35.3	773	0.00	0.11	0.11	0.00	0.00
		White Superior 2408	512802	6127692	703	10.0	0.50	51.4	773	0.00	0.04	0.16	0.00	0.00
		Caterpillar G3516 TA	512802	6127692	703	10.0	0.50	40.7	773	0.00	0.06	0.13	0.00	0.00
	Tweedie Sweet Compressor Station	White Superior 12GT-825	448366	6079601	585	11.2	0.31	36.0	862	0.00	0.41	0.12	0.00	0.00
		Waukesha L5108 GU	448366	6079601	585	9.1	0.20	52.0	862	0.00	0.23	0.06	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Husky Energy Inc.	Compressor Station	Compressor Engine	448802	6217386	732	10.0	0.50	37.9	773	0.00	0.06	0.12	0.00	0.00
		Compressor Engine	433820	6220022	587	10.0	0.50	19.5	773	0.00	0.12	0.06	0.00	0.00
	Figure Lake Sweet Compressor Station	Waukesha F3521 GL	401360	6029415	692	10.0	0.50	19.8	773	0.00	0.02	0.06	0.00	0.00
		Waukesha F3521 GSI	401360	6029415	692	10.0	0.50	19.8	773	0.00	0.15	0.06	0.00	0.00
ICG Resources Ltd.	Tweedie Sweet Gas Compressor Station	Waukesha L7042 GSI	447588	6083650	599	10.0	0.50	35.3	773	0.00	0.48	0.11	0.00	0.00
		Waukesha L7042 GSI	447588	6083650	599	10.0	0.50	35.3	773	0.00	0.48	0.11	0.00	0.00
Ish Energy Ltd.	Compressor Station	Compressor Engine	485989	6143073	672	10.0	0.50	17.0	773	0.00	0.27	0.05	0.00	0.00
Northstar Energy Corp.	Compressor Station	Compressor Engine	491392	6198887	649	10.0	0.50	37.9	773	0.00	0.17	0.12	0.00	0.00
		Compressor Engine	486562	6218730	740	10.0	0.50	37.9	773	0.00	0.16	0.12	0.00	0.00
		Compressor Engine	487543	6235738	730	10.0	0.50	6.3	773	0.00	0.11	0.02	0.00	0.00
		Compressor Engine	486562	6218730	740	10.0	0.50	37.9	773	0.00	0.24	0.12	0.00	0.00
NOVA Gas Transmission Ltd.	Smoky Lake Sweet Compressor Station	Solar Saturn T1302	414519	5995172	602	11.3	2.65	54.0	752	0.00	0.04	0.13	0.00	0.00
		Caterpillar G3408	414519	5995172	602	3.2	0.20	43.0	790	0.00	0.11	0.05	0.00	0.00
		Solar Saturn T1302	414519	5995172	602	11.3	2.65	54.0	752	0.00	0.04	0.13	0.00	0.00
		Solar Saturn T1302	414519	5995172	602	11.3	2.65	54.0	752	0.00	0.04	0.13	0.00	0.00
		Solar Mars T12600	414519	5995172	602	11.3	2.65	54.0	752	0.00	0.64	1.27	0.01	0.00
		Rolls Royce Avon 1535E-161G	414519	5995172	602	15.8	2.96	22.9	714	0.00	0.56	1.85	0.01	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
NOVA Gas Transmission Ltd. (continued)	Smoky Lake Sweet Compressor Station (continued)	Caterpillar G3412	414519	5995172	602	7.0	0.20	27.0	823	0.00	0.15	0.07	0.00	0.00
		Raypack Thermonics 3690 WTD	414519	5995172	602	6.8	0.74	2.4	473	0.00	0.01	0.00	0.00	0.00
		Saskatoon Boiler FWG 70	414519	5995172	602	7.1	0.33	2.4	473	0.00	0.01	0.00	0.00	0.00
		Hydrotherm MR-1800B	414519	5995172	602	7.1	0.58	2.4	473	0.00	0.00	0.00	0.00	0.00
Paramount Resources Ltd.	Compressor Station	Compressor Engine	483109	6132567	668	10.0	0.50	38.8	773	0.00	0.05	0.12	0.00	0.00
		Compressor Engine	477480	6189226	673	10.0	0.50	34.9	773	0.00	0.35	0.11	0.00	0.00
		Compressor Engine	467119	6170683	675	10.0	0.50	19.3	773	0.00	0.24	0.06	0.00	0.00
		Compressor Engine	477480	6189226	673	10.0	0.50	51.4	773	0.00	0.20	0.16	0.01	0.00
		Compressor Engine	471359	6190475	647	10.0	0.50	47.5	773	0.00	0.06	0.15	0.00	0.00
		Compressor Engine	477974	6205816	700	10.0	0.50	61.7	773	0.00	0.37	0.20	0.01	0.00
		Compressor Engine	467424	6210328	701	10.0	0.50	10.4	773	0.00	0.15	0.03	0.00	0.00
		Compressor Engine	470268	6209906	706	10.0	0.50	7.1	773	0.00	0.12	0.02	0.00	0.00
		Compressor Engine	472762	6218386	714	10.0	0.50	12.8	773	0.00	0.19	0.04	0.00	0.00
		Compressor Engine	473593	6221618	718	10.0	0.50	12.8	773	0.00	0.19	0.04	0.00	0.00
Seagull Energy Canada Ltd.	Kehiwin Sweet Compressor Station	Waukesha L7042 GSI	507406	5997602	589	11.0	0.30	21.0	928	0.00	0.48	0.11	0.00	0.00
		Dehydrator Reboiler	507406	5997602	589	6.7	0.18	0.6	503	0.00	0.01	0.00	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Suncor Energy Inc.	Portage Sweet Compressor Station	Waukesha L7042 GU	402021	6179200	553	16.7	0.29	18.6	728	0.00	0.32	0.08	0.00	0.00
		Waukesha L7042 GU	402021	6179200	553	16.7	0.29	18.6	728	0.00	0.32	0.08	0.00	0.00
		Caterpillar G3408	402021	6179200	553	5.9	0.20	27.0	728	0.00	0.17	0.04	0.00	0.00
	Tweedie Sweet Compressor Station	Waukesha L7042 GU	440297	6086174	590	21.3	0.29	21.6	700	0.00	0.30	0.07	0.00	0.00
		Waukesha L7042 GU	440297	6086174	590	21.3	0.29	21.6	700	0.00	0.30	0.07	0.00	0.00
		Waukesha L7042 GU	440297	6086174	590	21.3	0.29	21.6	700	0.00	0.30	0.07	0.00	0.00
		White Superior 8G-825	440297	6086174	590	15.3	0.29	21.6	700	0.00	0.30	0.07	0.00	0.00
		White Superior 8G-825	440297	6086174	590	15.3	0.29	21.6	700	0.00	0.30	0.07	0.00	0.00
Talisman Energy Inc.	Bellis 2 Sweet Compressor Station	White Superior 8G-825	421997	6002314	672	8.0	0.20	20.0	643	0.00	0.28	0.08	0.00	0.00
		White Superior 8G-825	421997	6002314	672	8.0	0.20	20.0	643	0.00	0.28	0.08	0.00	0.00
	Bellis Non-Unit Sweet Compressor Station	White Superior 8G-825	427745	6005454	676	18.0	0.27	37.0	726	0.00	0.28	0.08	0.00	0.00
		White Superior 8G-825	427745	6005454	676	18.0	0.27	37.0	726	0.00	0.28	0.08	0.00	0.00
		White Superior 8G-825	427745	6005454	676	18.0	0.27	37.0	726	0.00	0.28	0.08	0.00	0.00
	Lyle Lake Sweet Compressor Station	White Superior 8GTL-825	420261	6155353	833	10.0	0.50	35.3	773	0.00	0.40	0.11	0.00	0.00
		Caterpillar G3512	420261	6155353	833	10.0	0.50	25.9	773	0.00	0.04	0.08	0.00	0.00
		White Superior 8GT-825	420261	6155353	833	10.0	0.50	35.3	773	0.00	0.44	0.11	0.00	0.00
	Talisman - Compressor Station	Compressor Engine	465471	6103472	640	10.0	0.50	4.4	773	0.00	0.17	0.01	0.00	0.00
		Compressor Engine	424694	6140860	708	10.0	0.50	9.6	773	0.00	0.01	0.03	0.00	0.00
		Compressor Engine	420951	6159939	712	10.0	0.50	5.2	773	0.00	0.00	0.02	0.00	0.00

Table 2A25-1 Summary of Gas Production Facilities Baseline and CEA Air Emissions (continued)

Point Sources														
Operator	**Facility**	**Emission Source**	**NAD 83 UTM E (m)**	**NAD 83 UTM N (m)**	**Base Elevation (masl)**	**Stack Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temp (K)**	**SO$_2$ (t/d)**	**NO$_X$ (t/d)**	**CO (t/d)**	**VOC (t/d)**	**PM$_{2.5}$ (t/d)**
Talisman Energy Inc. (continued)	Wandering River 1 Sweet Compressor Station	White Superior 8GT-825	409422	6118341	582	8.1	0.31	41.0	705	0.00	0.44	0.11	0.00	0.00
		White Superior 8GT-825	409422	6118341	582	8.1	0.31	41.0	705	0.00	0.44	0.11	0.00	0.00
	Wandering River 2 Sweet Compressor Station	White Superior 8GTL-825	410775	6144224	648	8.1	0.31	41.0	727	0.00	0.44	0.11	0.00	0.00
		White Superior 8GTLE	410775	6144224	648	8.5	0.31	45.5	693	0.00	0.05	0.11	0.00	0.00
		Centaco Reboiler	410775	6144224	648	5.0	0.25	39.0	553	0.00	0.00	0.00	0.00	0.00
	Wandering River Sweet Compressor Station	White Superior 8GTL-825	427489	6125290	609	10.0	0.50	35.4	773	0.00	0.12	0.11	0.00	0.00
		Waukesha L3711	427489	6125290	609	10.0	0.50	11.4	773	0.00	0.18	0.04	0.00	0.00
		Waukesha L3711	427489	6125290	609	10.0	0.50	11.4	773	0.00	0.18	0.04	0.00	0.00
Transwest Energy Inc.	Winefred South Compressor Station	Waukesha L7042 GSI	518199	6166002	573	22.9	0.30	46.1	880	0.00	0.64	0.15	0.00	0.00
		Waukesha L7042 GSI	518199	6166002	573	15.3	0.30	43.2	874	0.00	0.53	0.13	0.00	0.00
		Caterpillar G3306 NA	518199	6166002	573	3.4	0.10	46.5	839	0.00	0.05	0.01	0.00	0.00
		Caterpillar G3306 NA	518199	6166002	573	3.4	0.10	46.5	839	0.00	0.05	0.01	0.00	0.00
Viking Energy Ltd.	Chard Sweet Compressor Station	Compressor Engine	442716	6101653	600	10.0	0.50	25.9	773	0.00	0.29	0.08	0.00	0.00
	Viking - Compressor Station	Compressor Engine	442716	6101653	600	10.0	0.50	38.3	773	0.00	0.33	0.12	0.00	0.00
		Compressor Engine	456033	6108455	592	10.0	0.50	12.8	773	0.00	0.18	0.04	0.00	0.00
		Compressor Engine	451854	6137651	655	10.0	0.50	39.6	773	0.00	0.36	0.13	0.00	0.00
Gas Production Facilities Baseline and CEA Totals										**0.00**	**46.93**	**24.49**	**0.36**	**0.10**

2A26 Non-Industrial Air Emission Sources

2A26.1 Baseline and CEA

2A26.1.1 Northern Area

Residential and local traffic associated with communities in the RSA will result in emissions to the atmosphere. The primary communities in the RSA are Fort McMurray (2004 population 56,000) to the north of the Project area and Cold Lake (2001 population 12,000) to the south. Smaller communities in the RSA include Fort MacKay, the Gregoire Lake/Anzac area, the Janvier/Chard area and Conklin. The last two communities are the closest to the Project and are within the LSA.

Emission estimates for the communities within and to the north of the LSA were provided from year 2010 residential and transportation estimates, Alberta Census Region 16 (Cheminfo Services, 2002). The community emissions were prorated from the Census Division values based on population (Table 2A26-1). The $PM_{2.5}$ emissions from the smaller communities were enhanced by a factor of 31, which assumes that wood heating is the primary source of these emissions (Houck and Tiegs, 1998). Highway traffic emissions from Highways 63, 69 and 881 were included. Table 2A26-1 provides the summary of the baseline and CEA case emissions.

2A26.1.2 Cold Lake Area

Community and traffic emissions for the Cold Lake area to the south were treated as area sources in the identical manner that they were considered for the two Imperial Oil Cold Lake Expansion projects, Nabiye and Mahihkan North (Imperial Oil, 2002). Specifically, all of the area emissions were assumed to occur from the six highest 3 km by 3 km areas. These grid cells and associated emissions are identified in Table 2A26-2.

Table 2A26-1 Estimated Community and Highway Emissions in the Area North of the Cold Lake Air Weapons Range (Year 2010 Emission Estimates for Census Division 16)

Emission Source Type	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Residential	0.02	0.25	2.82	1.68	0.39
Transportation	0.32	3.19	4.73	0.37	0.12
Paved Road Dust	–	–	–	–	0.12
Total Census Division	0.34	3.44	7.55	2.05	0.63
Fort McMurray	0.28	2.88	6.31	1.71	0.53

Note: The Fort McMurray emission estimates were prorated from the Census Division 16 values on the basis of 2004 population (56,111/67,105 = 84%).

Community	Population	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Fort McMurray	56,111	0.280	2.88	6.31	1.71	0.53
Fort MacKay	500	0.002	0.03	0.06	0.02	0.15
Anzac	750	0.004	0.04	0.08	0.02	0.22
Janvier	250	0.001	0.01	0.03	0.01	0.07
Conklin	250	0.001	0.01	0.03	0.01	0.07
Highway 63	–	0.053	2.65	17.00	0.23	0.85
Highway 69	–	0.001	0.07	0.55	0.01	0.02
Highway 881	–	0.009	0.47	1.69	0.02	0.22
Totals	**57,861**	**0.35**	**6.15**	**25.75**	**2.02**	**2.13**

Notes: Population for smaller communities is rounded up to nearest 250.

The total population does not equal 67,105 since it does not include work camps or Fort Chipewyan.

$PM_{2.5}$ scaled up by a factor of 31, which accounts for increased emissions due to wood heating.

Emissions are assumed to be uniformly distributed in time.

Table 2A26-2 Estimated Community and Highway Emissions in the Area South of the Cold Lake Air Weapons Range

Community Area Source	UTM Coordinates of SW Corner		SO_2 (t/d)	NO_X (t/d)	$PM_{2.5}$ (t/d)
	m E	m N			
1	551900	6033850	0.56	0.67	0.30
2	548600	6036600	0.52	0.49	0.38
3	548700	6028300	0.26	0.67	0.23
4	551850	6036650	0.15	0.14	0.11
5	551950	6028300	0.11	0.24	0.11
6	548750	6025500	0.09	0.28	0.08
Totals			**1.69**	**2.51**	**1.20**

Notes: Each grid cell is approximately 3 km by 3 km area.

Emissions are assumed to be uniformly distributed in time.

2A27 Regional Air Emission Summary

Total emissions for the LSA and RSA are summarized on the basis of selected assessment scenarios. Specifically, these scenarios are the following:

- Baseline (existing and approved operations);
- Application (baseline + Project); and
- Cumulative (application + other planned operations).

2A27.1 Summary of Baseline CAC Emissions

Table 2A27-1 summarizes the baseline air emissions for the LSA and RSA.

Table 2A27-1 Summary of Baseline Air Emissions (LSA and RSA)

Operator	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Albian Sands Energy Inc.	0.61	31.68	27.05	26.83	1.63
Birch Mountain Resources Ltd.	0.02	0.18	0.23	0.00	0.09
Canadian Natural Resources Ltd.	19.11	58.62	40.40	157.36	2.93
Connacher Oil and Gas Limited	0.08	0.45	0.27	0.02	0.04
ConocoPhillips Canada Resources Corp.	3.01	4.07	2.04	0.08	0.27
Deer Creek Energy Limited	0.74	0.51	0.48	0.03	0.05
Devon ARL Corporation	2.00	2.00	1.39	0.09	0.13
EnCana Corporation	8.64	8.16	12.08	0.31	0.57
Husky Energy Inc.	2.15	7.95	20.98	0.56	0.49
Imperial Oil Resources Ventures Limited	10.19	12.47	10.87	0.72	1.55
Japan Canada Oil Sands Limited	0.80	0.60	0.53	0.04	0.04
MEG Energy Corporation	2.00	1.62	1.33	0.11	0.16
Nexen Inc./OPTI Canada Inc.	18.42	10.71	8.96	0.48	0.74
Northlands Forest Products Ltd.	0.02	0.19	25.00	1.71	0.19
Petro-Canada	4.69	36.66	15.31	15.76	1.40
Shell Canada Limited	1.12	19.60	13.01	18.13	0.98
Suncor Energy Inc.	79.00	106.85	67.33	216.26	8.48
Syncrude Canada Ltd.	101.99	89.44	87.53	88.55	7.46
Whitesands In-situ Ltd.	0.08	0.04	9.23	0.00	0.00
Williams Energy (Canada), Inc.	0.00	0.02	0.02	0.24	0.00
Gas Production Facilities	***0.00***	***46.93***	***24.49***	***0.36***	***0.10***
Communities and Highways	***2.04***	***8.64***	***25.75***	***2.03***	***3.34***
Baseline Totals [a]	**256.7**	**447.4**	**394.3**	**529.7**	**30.6**

[a] Some numbers are rounded for presentation purposes; consequently, it may appear that the totals do not equal the sums of the individual values.

2A27.2 Summary of Application CAC Emissions

The application case summary includes the baseline air emissions and the Project emissions. Table 2A27-2 summarizes the application air emissions.

Table 2A27-2 Summary of Application Air Emissions (LSA and RSA)

Operator	SO_2 (t/d)	NO_X (t/d)	CO (t/d)	VOC (t/d)	$PM_{2.5}$ (t/d)
Albian Sands Energy Inc.	0.61	31.68	27.05	26.83	1.63
Birch Mountain Resources Ltd.	0.02	0.18	0.23	0.00	0.09
Canadian Natural Resources Ltd.	19.11	58.62	40.40	157.36	2.93
Connacher Oil and Gas Limited	0.08	0.45	0.27	0.02	0.04
ConocoPhillips Canada Resources Corp.	3.01	4.07	2.04	0.08	0.27
Deer Creek Energy Limited	0.74	0.51	0.48	0.03	0.05
Devon ARL Corporation	2.00	2.00	1.39	0.09	0.13
EnCana Corporation	8.64	8.16	12.08	0.31	0.57
Husky Energy Inc.	2.15	7.95	20.98	0.56	0.49
Imperial Oil Resources Ventures Limited	10.19	12.47	10.87	0.72	1.55
Japan Canada Oil Sands Limited	0.80	0.60	0.53	0.04	0.04
MEG Energy Corporation	2.00	1.62	1.33	0.11	0.16
Nexen Inc./OPTI Canada Inc.	18.42	10.71	8.96	0.48	0.74
North American Oil Sands Corporation	**2.86**	**16.19**	**9.73**	**0.91**	**1.23**
Northlands Forest Products Ltd.	0.02	0.19	25.00	1.71	0.19
Petro-Canada	4.69	36.66	15.31	15.76	1.40
Shell Canada Limited	1.12	19.60	13.01	18.13	0.98
Suncor Energy Inc.	79.00	106.85	67.33	216.26	8.48
Syncrude Canada Ltd.	101.99	89.44	87.53	88.55	7.46
Whitesands In-situ Ltd.	0.08	0.04	9.23	0.00	0.00
Williams Energy (Canada), Inc.	0.00	0.02	0.02	0.24	0.00
Gas Production Facilities	***0.00***	***46.93***	***24.49***	***0.36***	***0.10***
Communities and Highways	***2.04***	***8.64***	***25.75***	***2.03***	***3.34***
Application Totals [a]	**259.6**	**463.6**	**404.0**	**530.6**	**31.9**

[a] Some numbers are rounded for presentation purposes; consequently, it may appear that the totals do not equal the sums of the individual values.

2A27.3 Summary of Cumulative CAC Emissions

The cumulative case summary includes the application and other planned air emission sources within the study area. Table 2A27-3 summarizes the CEA air emissions by operator.

Table 2A27-3 Summary of CEA Air Emissions (LSA and RSA)

Operator	**SO_2 (t/d)**	**NO_X (t/d)**	**CO (t/d)**	**VOC (t/d)**	**$PM_{2.5}$ (t/d)**
Albian Sands Energy Inc.	0.61	31.68	27.05	26.83	1.63
Birch Mountain Resources Ltd.	0.02	0.18	0.23	0.00	0.09
Canadian Natural Resources Ltd.	21.75	71.33	42.55	157.48	4.23
Connacher Oil and Gas Limited	0.08	0.45	0.27	0.02	0.04
ConocoPhillips Canada Resources Corp.	6.63	3.26	5.11	0.13	0.45
Deer Creek Energy Limited	1.80	13.45	11.04	46.91	0.56
Devon ARL Corporation	4.00	3.99	2.78	0.18	0.25
EnCana Corporation	8.64	8.16	12.08	0.31	0.57
Husky Energy Inc.	2.15	7.95	20.98	0.56	0.49
Imperial Oil Resources Ventures Limited	10.84	55.16	39.46	157.30	3.52
Japan Canada Oil Sands Limited	3.93	4.49	4.75	1.00	0.30
MEG Energy Corporation	2.00	1.62	1.33	0.11	0.16
Nexen Inc./OPTI Canada Inc.	25.66	24.09	20.34	1.46	1.61
North American Oil Sands Corporation	**2.86**	**16.19**	**9.73**	**0.91**	**1.23**
Northern Lights Partnership	0.39	15.72	11.40	64.93	0.76
Northlands Forest Products Ltd.	0.02	0.19	25.00	1.71	0.19
Petro-Canada	8.42	55.34	27.84	16.35	2.57
Shell Canada Limited	1.23	28.83	19.32	27.14	1.43
Suncor Energy Inc.	79.00	106.85	67.33	216.26	8.48
Syncrude Canada Ltd.	101.99	89.44	87.53	88.55	7.46
Whitesands In-situ Ltd.	0.08	0.04	9.23	0.00	0.00
Williams Energy (Canada), Inc.	0.00	0.02	0.02	0.24	0.00
Gas Production Facilities	***0.00***	***46.93***	***24.49***	***0.36***	***0.10***
Communities and Highways	***2.04***	***8.64***	***25.75***	***2.03***	***3.34***
CEA Totals [a]	**284.1**	**594.0**	**495.6**	**810.8**	**39.5**

[a] Some numbers are rounded for presentation purposes; consequently, it may appear that the totals do not equal the sums of the individual values.

2A28 Literature Cited

2A28.1 Literature

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2B AMBIENT AIR QUALITY OBSERVATIONS

2B1 Data Sources

A review of ambient air quality data collected in the RSA was undertaken to determine ambient air quality levels of the air entering and within the study area. Figure 2B1-1 shows the location of ambient air quality monitoring stations relative to the North American Kai Kos Dehseh Project (the Project) area and local communities. The closest monitoring station to the Project area was located near Conklin. Most of the RSA monitoring efforts focus on either the Athabasca oil sands area to the north or the Cold Lake area to the south. The monitoring stations include:

- The Anzac ambient air quality station, which operated from April 2000 to April 2001. Air quality data and an associated report were supplied by Nexen/OPTI Canada Inc. (Golder Associates, 2001).

- The Conklin ambient air quality station, which operated from May 2001 to August 2002. Air quality data were supplied by EnCana Corporation (Golder Associates, 2002).

- The twelve Wood Buffalo Environmental Association (WBEA) ambient air quality stations in community (e.g., Fort McMurray, Fort MacKay and Fort Chipewyan) and non-community locations. Summaries of the ambient air quality data for 2001, 2002, 2003, and 2004 were obtained from the respective annual reports (WBEA 2002, 2003, 2004, 2005, 2006). Monitoring data for 2005 and 2006 were obtained from the Clean Air Strategic Alliance (CASA) website.

- The Foster Creek monitoring station, which operated from March 1999 to March 2000. Air quality information was obtained from the Foster Creek Phases 2/3 Environmental Impact Assessment (EnCana, 2001).

- The Canadian Natural Resources Limited Wolf Lake monitoring station. Air quality information for the 1992 to 1999 period, was obtained from the Primrose and Wolf Lake Expansion Environmental Impact Assessment (CNRL, 2000).

- The Imperial Oil Cold Lake May, Moore and Mahihkan monitoring stations. Data from January 1992 to February 2001, were obtained from the Mahihkan North and Nabiye Environmental Impact Assessment (Imperial Oil, 2001).

- The Alberta Environment (AENV) precipitation chemistry sites in Fort McMurray, Cold Lake in Northern Alberta. Precipitation sampling results are summarized in the Alberta Environment annual monitoring reports and data were obtained from AENV.

- The passive sampling system conducted at 10 forest monitoring locations in support of the Terrestrial Environmental Effects Monitoring (TEEM) program. The values are summarized in the WBEA annual reports (2002, 2003 and 2004) and also evaluated in EPCM Associated Ltd. (2002).

Figure 2B1-1 shows the locations of these stations relative to the Project. While the Conklin data are the most representative of the Project area, ambient data from the more northerly and southerly sites help place the Conklin data in perspective. Table 2B1-1 provides a summary of the parameters that are measured at each station.

Table 2B1-1 Summary of Ambient Air Quality Parameters Measured in the Regional Study Area

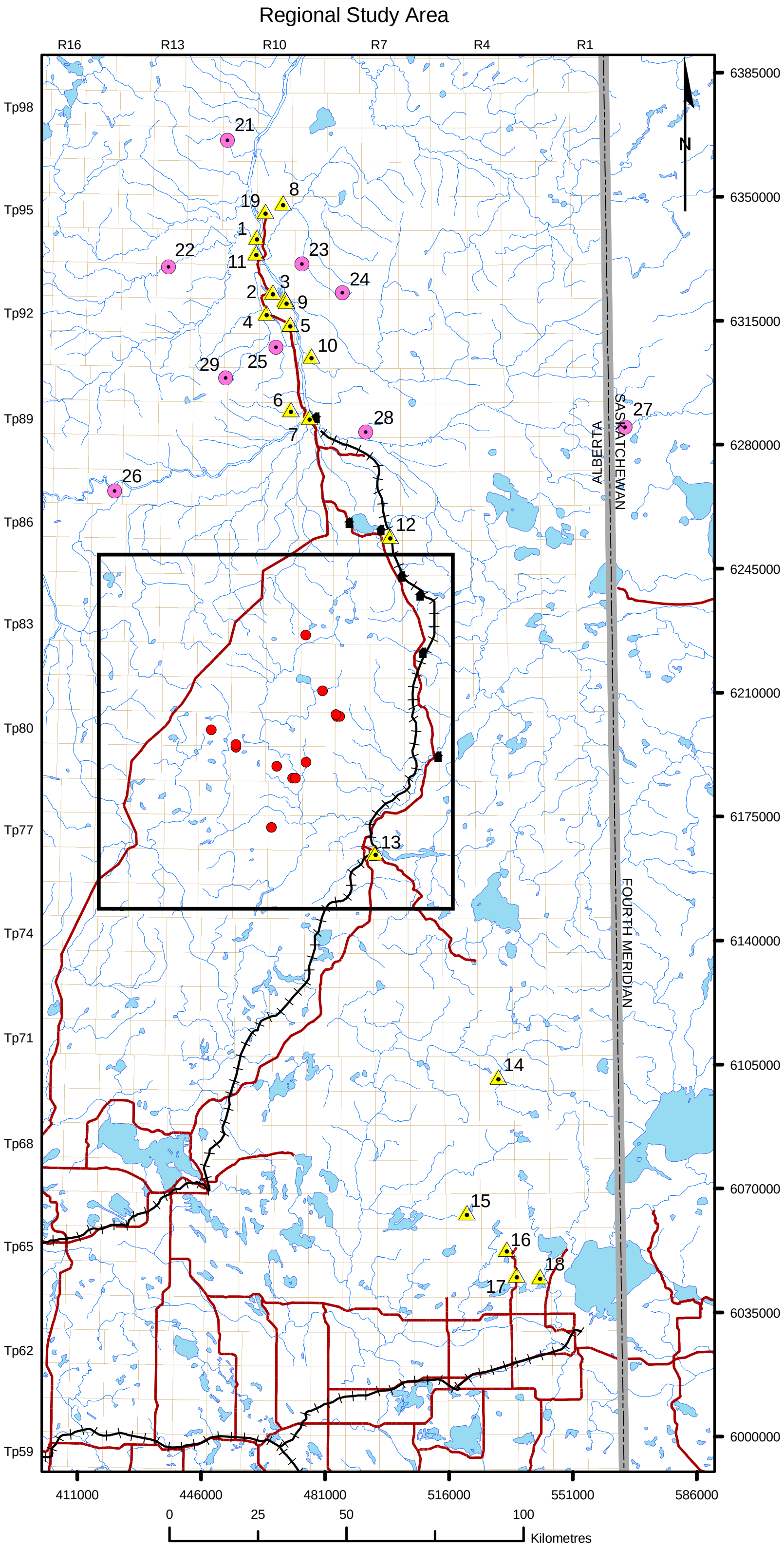
Continuous Stations	SO_2	NO_2	THC	H_2S	TRS	O_3	$PM_{2.5}$
Fort MacKay **(WBEA)**	√	√	√	-	√	√	√
Mildred Lake (WBEA)	√	-	√	√	-	-	-
Lower Camp B (WBEA)	√	-	√	√	-	-	-
Buffalo Viewpoint (WBEA)	√	-	√	√	-	-	-
Mannix (WBEA)	√	-	√	√	-	-	-
Fort Chipewyan (WBEA)	√	√	-	-	-	√	√
Patricia McInnes (WBEA)	√	√	√	-	√	√	√
Athabasca Valley (WBEA)	√	√	√	-	√	√	√
Barge Landing (WBEA)	-	-	√	-	√	-	-
Albian Mine (WBEA)	√	√	-	√	-	-	√
Lower Camp A (WBEA)	√	-	√	√	-	-	-
Millennium (WBEA)	√	√	√	√	-	-	√
Syncrude UE1	√	√	√	√	-	√	√
Anzac (OPTI)	√	√	√	-	-	√	√
Conklin (EnCana)	√	√	-	√	-	-	-
Foster Creek (EnCana)	√	√	√	-	√	√	-
Mahihkan (Imperial Oil)	√	√	√	√	-	-	-
Moore (Imperial Oil)	√	√	√	√	-	-	-
May (Imperial Oil)	√	√	√	√	-	-	-

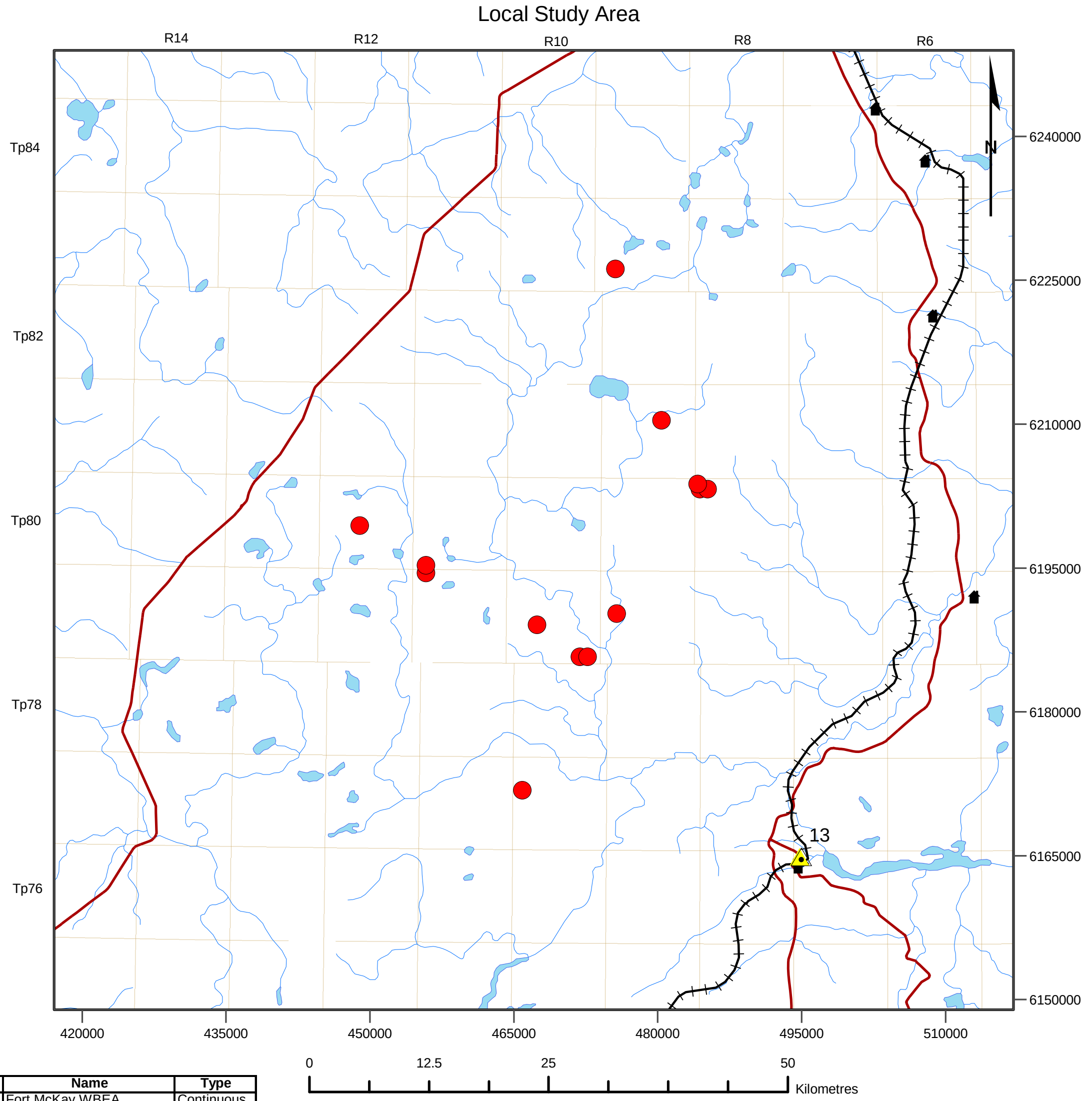
Note: Summaries are based on monthly average observations.

Passive Sampling Stations	NO_2	SO_2	O_2
AH6	√	√	√
AL8	√	√	√
PH4	√	√	√
AH8	√	√	√
PH2	√	√	√
PL1	√	√	√
PL8	√	√	√
AH3	√	√	√
AH7	√	√	√

Note: Summaries are based on monthly average observations.

AENV Precipitation Stations	p	PI	Sulphate	Nitrate	Calcium	Magnesium	Potassium
Fort McMurray	√	√	√	√	√	√	√
Cold Lake	√	√	√	√	√	√	√





Number	Name	Type
1	Fort McKay WBEA	Continuous
2	Mildred Lake WBEA	Continuous
3	Lower Camp B WBEA	Continuous
4	Buffalo Viewpoit WBEA	Continuous
5	Mannix WBEA	Continuous
6	Patricia McInnes WBEA	Continuous
7	Athabasca Valley WBEA	Continuous
8	Albian Mine WBEA	Continuous
9	Lower Camp A WBEA	Continuous
10	Millennium WBEA	Continuous
11	Syncrude UE1 WBEA	Continuous
12	Anzac OPTI	Continuous
13	Conklin EnCana	Continuous
14	Foster Creek EnCana	Continuous
15	Wolf Lake CNRL	Continuous
16	Mahihkan Imperial Oil	Continuous
17	Moore Imperial Oil	Continuous
18	May Imperial Oil	Continuous
19	Barge Landing WBEA	Continuous
20	PL7 TEEM	Passive
21	PH6 TEEM	Passive
22	AL8 TEEM	Passive
23	PH4 TEEM	Passive
24	AH8 TEEM	Passive
25	PH2 TEEM	Passive
26	PL1 TEEM	Passive
27	PL8 TEEM	Passive
28	AH3 TEEM	Passive
29	AH7 TEEM	Passive

Legend

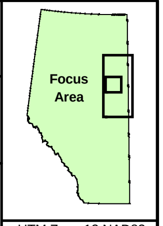
▲	Continuous	⌇	Railroad
●	Passive	╱	Road
●	The Project	▨	Lake
⌂	Community	~	River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
Location of Ambient Air Quality
Monitoring Stations

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2B1-1



UTM Zone 12 NAD83

2B2 Ambient Concentration Observations

There are few ambient monitoring stations located in the vicinity of the Project. The closest station was located in Conklin and was established for monitoring purposes for EnCana for 2001 to 2002. Most continuous monitoring occurs in the Athabasca oil sands region and the Cold Lake region. Monitoring is conducted on a volumetric basis, while the ambient objectives and dispersion modelling predictions are expressed on a mass basis. All particulate matter (PM) concentrations are expressed on a mass basis. The monitored values are discussed for various species within the RSA and LSA in the following sections.

2B2.1 Ambient SO_2 Concentrations

Table 2B2-1 provides a summary of the ambient hourly SO_2 concentrations observed at the various monitoring locations in terms of the average, 99th percentile and maximum values. The stations are grouped according to the location relative to the air Local Study Area (LSA). The ambient air quality objective for SO_2 is 450 ug/m^3, as a one-hour average. The results in the table indicate:

- The maximum LSA value of 76 ug/m^3, from Conklin data, is reasonable for remote areas south of Fort McMurray;
- South of the LSA, maximum values up to 105 ug/m^3 represent maximum values associated with burning sour gas in steam generator boilers; and
- The highest values occur to the north of the LSA (primary oil sands) and are due to the larger SO_2 emission sources in this area. In some cases, the maximum observed values exceed the ambient air quality guideline of 450 ug/m^3 (up to 1842 ug/m^3). These maximum values are associated with operations located north of the LSA.

The average concentrations shown in Table 2B2-1, and all similar tables, represent the annual average observed concentrations. On an annual basis, SO_2 concentrations range from 0.6 ug/m^3 to 1.0 ug/m^3 in background locations (e.g., Fort Chipewyan and Anzac) to 5 ug/m^3 to 8 ug/m^3 in locations near large SO_2 emission sources (e.g., Mildred Lake, Mannix and Lower Camp).

Ambient SO_2 concentrations for the majority of the LSA are expected to be near background levels of 1.0 ug/m^3 to 2.0 ug/m^3.

2B2.2 Ambient NO_2 Concentrations

Table 2B2-2 provides a summary of the ambient hourly NO_2 concentrations observed at the various monitoring locations in terms of the average, 99th percentile and maximum values. The stations are grouped according to the location relative to the air LSA. Note that fewer stations measure NO_2 than SO_2. The ambient air quality objective for NO_2 is 400 ug/m^3, as a one-hour average. The results in the tables indicate:

- The maximum LSA value of 109 ug/m^3, from Conklin data, is consistent with other remote areas. Values in this area are a factor of two to three times smaller than other locations in the primary oil sands region (e.g., Millennium and Albian Mine);
- South of the LSA, the higher maximum values (up to 132 ug/m^3) are likely associated with burning natural gas in steam generator boilers;

- The highest values occur to the north of the LSA and are due to the larger NO_x emission sources associated with open-pit bitumen mining operations in this area; and

- All maximum observed values are less than the ambient air quality guideline.

On an annual basis, NO_2 concentrations range from 1.0 ug/m^3 to 2.0 ug/m^3 in background locations (e.g., Fort Chipewyan and Anzac), to 10.0 ug/m^3 to 23.0 ug/m^3 in locations near NO_x emission sources (e.g., Fort McMurray and the Albian Mine location). Ambient NO_2 concentrations for the majority of the LSA are expected to be near background levels.

Table 2B2-1 Maximum and 99th Percentile One-hour and Annual Average SO_2 Concentrations

Location	Station	Years	Annual Average		99% Percentile 1-h		Maximum 1-h	
			ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
North of LSA	Fort MacKay (WBEA)	2001-2006	1.2	3.2	22.8	59.6	157.9	413.1
	Mildred Lake (WBEA)	2001-2006	2.6	6.9	37.4	97.7	**382.0**	**999.4**
	Lower Camp B(WBEA)	2001-2006	1.6	4.2	18.3	47.9	105.0	274.7
	Buffalo Viewpoint (WBEA)	2001-2006	1.4	3.6	21.7	56.7	**231.2**	**604.9**
	Mannix (WBEA)	2001-2006	3.0	7.8	38.7	101.3	**704.0**	**1841.9**
	Fort Chipewyan (WBEA)	2001-2006	0.2	0.6	5.5	14.3	24.5	64.1
	Albian Mine (WBEA)	2001-2006	1.7	4.6	24.4	63.8	**267.0**	**698.5**
	Lower Camp A (WBEA)	2001-2006	2.2	5.7	33.9	88.8	**289.0**	**756.1**
	Millennium (WBEA) *	2001-2006	1.3	3.7	23.6	61.8	**288.0**	**753.5**
	Syncrude UE1 (WBEA)	2002-2006	1.1	3.0	25.7	71.9	**231.0**	**604.4**
	Patricia McInnes (WBEA)	2001-2006	1.1	2.8	13.7	35.8	151.0	395.1
	Athabasca Valley (WBEA)	2001-2006	1.0	2.6	12.9	33.7	84.0	219.8
	Anzac (OPTI)	2000-2001	0.3	0.8	6.0	15.7	38.0	99.4
LSA	Conklin (EnCana)	2001-2002	-	-	-	-	29.0	75.9
South of LSA	Foster Creek (EnCana)	1999-2000	5.7	2.2	-	-	25.6	67.0
	Wolf Lake (CNRL)	1992-1999	-	-	-	-	21.8	57.0
	Mahihkan (Imperial Oil)	1992-2002	-	-	-	-	30.0	78.5
	Moore (Imperial Oil)	1992-2002	-	-	-	-	40.0	104.7
	May (Imperial Oil)	1992-2002	-	-	-	-	40.0	104.7

Notes: * Began operation September 1, 2001
Anzac data represent the period March 2000 to April 2001
Conklin data represent the period March 2001 to August 2002
Foster Creek data represent the period March 1999 to March 2000
Wolf Lake data represent the period January 1992 to December 1999
Imperial Oil Limited data represent the period January 1992 to February 2002
“-“ represents missing data
Bolded values exceed the 1-h AAAQO of 45 ug/m^3

Table 2B2-2 Maximum and 99th Percentile One-hour and Annual Average NO_2 Concentrations

Location	Station	Years	Annual Average		99% Percentile		Maximum	
			ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
North of LSA	Fort MacKay (WBEA)	2001-2006	5.8	10.9	29.7	55.9	53.0	100.0
	Fort Chipewyan (WBEA)	2001-2006	0.9	1.7	9.6	18.1	34.0	64.2
	Albian Mine (WBEA)	2001-2006	9.2	17.4	41.7	78.6	111.0	209.4
	Millennium (WBEA) *	2001-2006	8.8	16.5	38.7	73.0	161.3	304.3
	Syncrude UE1 (WBEA)	2002-2006	4.6	8.7	24.7	46.5	39.0	73.6
	Patricia McInnes (WBEA)	2001-2006	5.2	9.9	26.6	50.2	72.7	137.2
	Athabasca Valley (WBEA)	2001-2006	9.6	18.1	37.4	70.6	183.0	345.3
	Anzac (OPTI)	2000-2001	0.6	1.1	7.0	13.2	22.0	41.5
LSA	Conklin (EnCana)	2001-2002	-	-	-	-	58.0	109.4
South of LSA	Foster Creek (EnCana)	1999-2000	8.3	4.4	-	-	46.6	87.9
	Wolf Lake (CNRL)	1992-1999	-	-	-	-	54.4	102.6
	Mahihkan (Imperial Oil)	1992-2002	-	-	-	-	30.0	56.6
	Moore (Imperial Oil)	1992-2002	-	-	-	-	70.0	132.1
	May (Imperial Oil)	1992-2002	-	-	-	-	40.0	75.5

Notes: * Began operation September 1, 2001

Anzac data represent the period March 2000 to April 2001

Conklin data represent the period March 2001 to August 2002

Foster Creek data represent the period March 1999 to March 2000

Wolf Lake data represent the period January 1992 to December 1999

Imperial Oil Limited data represent the period January 1992 to February 2002

“-“ represents missing data

2B2.3 Ambient THC Concentrations

Table 2B2-3 provides a summary of the ambient hourly THC concentrations observed at the various monitoring locations in terms of the annual average, 99th percentile and maximum values. The stations are grouped according to the location relative to the air LSA. There are no ambient air quality objectives for THC. Comments related to THC are as follows:

- The Anzac site indicated relatively little variation with the maximum value being 2.5 ppmv (or 1.6 mg/m^3). This site could potentially be regarded as a background location for THC and is representative of typical LSA values; and
- Values greater than 7.5 ppmv (or 5 mg/m^3) are likely due to fugitive emissions associated with oil and gas operations.

Ambient THC concentrations indicate the presence of fugitive hydrocarbon emissions in both the LSA and RSA.

2B2.4 Ambient TRS and H_2S Concentrations

Table 2B2-4 provides a summary of the ambient hourly TRS and H_2S concentrations observed at the various monitoring locations in terms of the average, 99th percentile and maximum values. H_2S is one component of TRS, others being CS_2, COS and mercaptans. Like H_2S, mercaptans have very low odour thresholds. The stations are grouped according to the location relative to the air LSA. The 1-hour ambient air quality objective for H_2S is 14 ug/m^3 (or 10 ppbv); there is no ambient air quality objective for TRS. The results in the table indicate:

- Like THC, high ambient H_2S and TRS concentrations are an indication of fugitive emissions from oil and gas industry operations; and
- Values in excess of the ambient H_2S guideline have not occurred within the LSA; however, exceedances have occurred to the south and to the north of the LSA.

Values in excess of the ambient objective indicate the potential for odours, assuming all of the TRS is in the form of H_2S or mercaptans. For some mercaptans, a concentration less than 10 ppb can exceed odour thresholds

2B2.5 Ambient O_3 Concentrations

Table 2B2-5 provides a summary of the ambient hourly O_3 concentrations observed at the various monitoring locations in terms of the annual average, 99th percentile and maximum values. The stations are grouped according to the location relative to the air LSA. The ambient air quality objective for O_3 is 160 ug/m^3 (82 ppbv), as a one-hour average. The results in the table indicate:

- On average, the lowest O_3 concentrations tend to occur in the Fort McMurray and Fort MacKay areas (i.e., 19.4 ppbv to 21.1 ppbv) where local and nearby NO_X emissions can react with rural O_3 to reduce the O_3 concentrations; and
- Exceedances have occurred at four of the stations that monitor O_3. The closest station to the LSA is Anzac which observed an exceedance (90 ppbv or 176.7 ug/m^3) on May 19, 2000.

Table 2B2-6 provides the monthly average O_3 concentrations measured at TEEM locations. All of the TEEM locations are located north of the LSA. The measured values in the table indicate:

- On average, the monthly concentrations range from 26.9 ppbv to 42.8 ppbv. These high values may be due to the remoteness from adjacent NO_X sources, due to increased elevation locations, and/or differences in the monitoring technology.

High ambient O_3 levels can occur naturally in the atmosphere with the highest values tending to occur in rural areas, in the spring, and at higher elevations. Relative to the LSA, peak O_3 concentration in the 50 ppbv to 75 ppbv are likely with the occasional exceedance once every few years.

Table 2B2-3 Maximum and 99th Percentile One-hour and Annual Average THC Concentrations

Location	Station	Years	Annual Average		99% Percentile		Maximum	
			ppmv	mg/m^3	ppmv	mg/m^3	ppmv	mg/m^3
North of LSA	Fort MacKay (WBEA)	2001-2006	1.9	1.3	3.0	2.0	11.1	7.3
	Mildred Lake (WBEA)	2001-2006	2.1	1.4	3.7	2.4	18.2	11.9
	Buffalo Viewpoint (WBEA)	2001-2006	2.0	1.3	3.3	2.2	11.8	7.7
	Mannix (WBEA)	2001-2006	2.0	1.3	3.3	2.1	9.0	5.9
	Barge Landing (WBEA)	2001-2006	2.0	1.3	2.9	1.9	30.8	20.1
	Albian Mine (WBEA)	2001-2006	2.2	1.4	4.1	2.7	49.9	32.6
	Lower Camp A (WBEA)	2001-2006	2.1	1.4	3.4	2.2	13.2	8.6
	Millennium (WBEA) *	2001-2006	2.2	1.4	3.9	2.5	11.2	7.3
	Syncrude UE1 (WBEA)	2002-2006	2.1	1.4	3.4	2.2	15.4	10.1
	Patricia McInnes (WBEA)	2001-2006	1.9	1.2	2.5	1.6	6.3	4.1
	Athabasca Valley (WBEA)	2001-2006	2.0	1.3	2.6	1.7	6.7	4.4
	Anzac (OPTI)	2000-2001	1.6	1.0	2.1	1.4	2.5	1.6
LSA	Conklin (EnCana)	2001-2002	-	-	-	-	-	-
South of LSA	Foster Creek (EnCana)	1999-2000	1.6	1.0	-	-	45.9	30.0
	Wolf Lake (CNRL)	1992-1999	2.1	1.4	-	-	18.8	12.3
	Mahihkan (Imperial Oil)	1992-2002	2.0	1.3	-	-	22.7	14.8
	Moore (Imperial Oil)	1992-2002	1.8	1.2	-	-	22.9	15.0
	May (Imperial Oil)	1992-2002	-	-	-	-	-	-

Notes: * Began operation September 1, 2001

Anzac data represent the period March 2000 to April 2001

Conklin data represent the period March 2001 to August 2002

Foster Creek data represent the period March 1999 to March 2000

Wolf Lake data represent the period January 1992 to December 1999

Imperial Oil Limited data represent the period January 1992 to February 2002

“-“ represents missing data or no available guideline

Table 2B2-4 Maximum and 99th Percentile One-hour and Annual Average H_2S/TRS Concentrations

Location	Station	Species	Years	Annual Average		99% Percentile		Maximum	
				ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³
North of LSA	Fort MacKay (WBEA)	TRS	2001-2006	0.6	0.8	3.0	4.1	40.0	56.0
	Mildred Lake (WBEA)	H_2S	2001-2006	0.7	0.9	**13.0**	**18.1**	**80.0**	**112.0**
	Buffalo Viewpoint (WBEA)	H_2S	2001-2006	0.2	0.3	2.6	3.7	**27.0**	**37.8**
	Mannix (WBEA)	H_2S	2001-2006	0.7	1.0	6.2	8.7	**56.0**	**78.4**
	Barge Landing (WBEA)	TRS	2001-2006	0.5	0.7	2.4	3.4	101.0	141.4
	Lower Camp A (WBEA)	H_2S	2001-2006	0.7	0.9	4.2	5.9	**64.0**	**89.6**
	Millennium (WBEA) *	H_2S	2001-2006	0.3	0.4	3.1	4.3	**12.0**	**16.8**
	Syncrude UE1 (WBEA) **	H_2S	2002-2006	0.4	0.5	2.7	3.7	**25.0**	**35.0**
	Patricia McInnes (WBEA)	H_2S	2001-2006	0.4	0.5	1.2	1.7	**11.1**	**15.5**
	Athabasca Valley (WBEA)	TRS	2001-2006	0.6	0.8	2.1	2.9	**15.0**	**21.0**
LSA	Conklin (EnCana)	H_2S	2001-2002	-	-	-	-	3.0	4.2
South of LSA	Foster Creek (EnCana)	TRS	1999-2000	-	-	-	-	**16.4**	**23.0**
	Wolf Lake (CNRL)	H_2S	1992-1999	-	-	-	-	**13.0**	**18.2**
	Mahihkan (Imperial Oil)	H_2S	1992-2002	-	-	-	-	**15.0**	**21.0**
	Moore (Imperial Oil)	H_2S	1992-2002	-	-	-	-	**24.0**	**33.6**
	May (Imperial Oil)	H_2S	1992-2002	-	-	-	-	**26.0**	**36.4**

Note: * Began operation September 1, 2001

** Began operation September 1, 2002. 2005 data are TRS measurements

Anzac data represent the period March 2000 to April 2001

Conklin data represent the period March 2001 to August 2002

Foster Creek data represent the period March 1999 to March 2000

Wolf Lake data represent the period January 1992 to December 1999

Imperial Oil Limited data represent the period January 1992 to February 2002

"-" represents missing data or no available guideline

Bolded values indicate levels in excess of 1-hour AAAQO of 10 ppb (14 ug/m^3)

Table 2B2-5 Maximum and 99th Percentile One-hour and Annual Average O_3 Concentrations

Location	Station	Years	Annual Average		99% Percentile		Maximum	
			ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
North of LSA	Fort MacKay (WBEA)	2001-2006	21.1	41.2	50.0	97.6	**84.0**	**163.9**
	Fort Chipewyan (WBEA)	2001-2006	28.5	55.7	49.3	96.3	66.0	128.8
	Syncrude UE1 (WBEA) **	2002-2006	18.7	36.5	50.0	97.6	81.0	158.0
	Patricia McInnes (WBEA)	2001-2006	21.8	42.6	50.4	98.3	**82.0**	**160.0**
	Athabasca Valley (WBEA)	2001-2006	19.4	37.8	50.6	98.6	**87.0**	**169.8**
	Anzac (OPTI)	2000-2001	26.9	52.5	53.0	103.4	**90.0**	**175.6**
South of LSA	Foster Creek (EnCana)	1999-2000	28.2	55.0	-	-	63.6	124.1

Note: * Began operation September 1, 2001

** Began operation September 1, 2002

Anzac data represent the period March 2000 to April 2001

Foster Creek data represent the period March 1999 to March 2000

“-“ represents missing data or no available guideline

Table 2B2-6 Monthly Average O_3 Concentrations Measured at TEEM Locations

Location	Station	Monthly Average O_3 Concentrations							
		ppbv				ug/m^3			
		2001	2002	2003	2004	2001	2002	2003	2004
North of LSA	PL7 (TEEM)	36.6	26.9	27.2	29.9	71.4	52.5	53.1	58.3
	PH6 (TEEM)	34.7	26.3	26.1	27.7	67.8	51.4	50.9	54.0
	AL8 (TEEM)	38.9	26.6	24.6	32.5	75.9	51.8	48.0	63.4
	PH4 (TEEM)	34.9	26.7	28.8	28.2	68.1	52.2	56.1	55.0
	AH8 (TEEM)	37.5	26.8	29.3	29.6	73.2	52.2	57.2	57.8
	PH2 (TEEM)	32.6	26.0	26.0	26.9	63.6	50.6	50.7	52.5
	PL1 (TEEM)	39.4	31.4	28.9	31.0	77.0	61.3	56.5	60.5
	PL8 (TEEM)	29.4	23.3	23.4	27.3	57.4	45.5	45.7	53.3
	AH7 (TEEM)	42.8	31.5	29.4	31.9	83.5	61.5	57.3	62.2
	AH3 (TEEM)	34.2	29.0	29.6	30.2	66.7	56.6	57.8	58.9

2B2.6 $PM_{2.5}$ Concentrations

Table 2B2-7 provides a summary of the ambient $PM_{2.5}$ concentrations observed at the various monitoring locations in terms of the annual average, 24-hour maximum values, 98th percentile and maximum hourly values. The stations are grouped according to the location relative to the air LSA. The ambient air quality objectives for total suspended particulates (TSP) are 100 ug/m^3 (24-hour average) and 60 ug/m^3 (annual average). TSP includes PM_{10} and larger particulates (typically up to 30 to 40 um in diameter. The Canada Wide Standard (CWS) for $PM_{2.5}$ is 30 ug/m^3 (as a 24-hour average). Comments with respect to $PM_{2.5}$ are as follows:

- The annual average $PM_{2.5}$ concentrations are less than the 60 ug/m^3 TSP objective value;
- The 24-hour $PM_{2.5}$ concentrations are greater than the numerical value of the CWS at least once for the majority of the monitoring sites; and
- Relatively high 1-hour $PM_{2.5}$ concentrations (greater than 100 ug/m^3) have been observed in the RSA; both high 1-hour and 24-hour values are likely due to forest fire activity and/or controlled burn activities.

High 1-hour and 24-hour $PM_{2.5}$ values due to forest fire and/or controlled burn activities have and will likely continue to occur in the LSA. The Anzac data are viewed as being the most representative for the LSA and average $PM_{2.5}$ values for the LSA are expected to be below 7 ug/m^3.

Table 2B2-7 Monitored Ambient $PM_{2.5}$ Concentrations

Location	Station	Years	Annual Average	24-h Maximum	1-h 98% Percentile	1-h Maximum
			ug/m^3	ug/m^3	ug/m^3	ug/m^3
North of LSA	Fort MacKay (WBEA)	2001-2006	4.9	**74.7**	27.0	203.5
	Fort Chipewyan (WBEA)	2001-2006	2.8	**46.4**	19.1	214.4
	Albian Mine (WBEA)	2001-2006	5.3	**62.3**	34.0	301.3
	Millennium (WBEA) *	2001-2006	4.9	**111.2**	36.9	281.2
	Syncrude UE1 (WBEA) **	2002-2006	3.4	**63.7**	25.3	445.0
	Patricia McInnes (WBEA)	2001-2006	4.4	**78.5**	26.2	274.0
	Athabasca Valley (WBEA)	2001-2006	4.5	**77.9**	23.7	266.7
	Anzac (OPTI)	2000-2001	7.7	17.0	27.0	45.9

Note: * Began operation September 1, 2001

** Began operation September 1, 2002

Anzac data represent the period March 2000 to April 2001

Bolded values exceed the CWS of 30 ug/m^3

2B3 Acidifying Deposition

2B3.1 Dry SO_2 Deposition

Passive monitoring devices that measure monthly average SO_2 concentrations are deployed at the TEEM sites. These monthly values were reviewed to determine the associated SO_2 dry deposition (EPCM Associated Ltd., 2002) and, where possible, were extrapolated to other sites where reliable annual average SO_2 concentration data are available. Dry deposition as a result of SO_2 is derived from the deposition velocity and annual concentration. Dry deposition expressed as keq H+/ha/y is based on the SO_2 values and the SO_4^{2-} equivalent. Table 2B3-1 shows the derived dry SO_2 deposition values for the TEEM and non-TEEM locations. The results indicate:

- In the vicinity of the existing developments, the SO_2 dry deposition rate is in the 0.21 keq H^+/ha/y to 0.43 keq H^+/ha/y range. This is equivalent to a 10.2 kg SO_4^{2-}/ha/y to 20.9 kg SO_4^{2-}/ha/y range.

- In the community of Fort McMurray, the dry deposition rate is in the 0.15 keq H^+/ha/y to 0.18 keq H^+/ha/y range. This is equivalent to 7.1 kg SO_4^{2-}/ha/y to 8.5 kg SO_4^{2-}/ha/y range.

- At the more remote sites, the SO_2 dry deposition rate is in the 0.05 keq H^+/ha/y to 0.09 keq H^+/ha/y range. This is equivalent to a 2.2 kg SO_4^{2-}/ha/y to 4.4 kg SO_4^{2-}/ha/y.

Based on remote site and Anzac data, the current dry SO_2 deposition rate in the LSA is likely in the 0.05 keq H^+/ha/y to 0.09 keq H^+/ha/y range.

2B3.2 Dry NO_2 Deposition

Passive monitoring devices that measure monthly average NO_2 concentrations are also deployed at the TEEM sites. These monthly values were reviewed to determine the associated NO_2 dry deposition rate (EPCM, 2002), and where possible, extrapolated to other sites where reliable annual average NO_2 concentration data are available. Dry deposition as a result of NO_2 is derived from the deposition velocity and annual concentration. Dry deposition expressed as keq H^+/ha/y is based on the NO_2 values and the HNO_3^- equivalent. Table 2B3-2 shows the dry NO_2 deposition values for the TEEM and non-TEEM locations. These results indicate:

- The highest NO_2 dry deposition rate occurs in the vicinity of the community sources (being in the 0.12 keq H^+/ha/y to 0.24 keq H^+/ha/y range) and near the Albian mining operation (0.24 keq H^+/ha/y). This is equivalent to a range of 7.4 kg NO_3^-/ha/y to 14.8 kg NO_3^-/ha/y; and

- At the more remote sites, the NO_2 deposition rate is in the 0.01 keq H^+/ha/y to 0.05 keq H^+/ha/y range. This is equivalent to a 0.9 kg NO_3^-/ha/y to 3.2 kg NO_3^-/ha/y range.

Based on remote site and Anzac data, the current dry NO_2 deposition rate in the LSA is expected to be in the 0.01 to 0.05 keq H^+/ha/y range.

2B3.3 Nitrogen Deposition

Nitrogen compounds are an important plant nutrient and the vegetation in many habitats are adapted to nutrient-poor soil conditions and can compete successfully in areas with low nitrogen levels. Increases in nitrogen deposition can shift the vegetation composition as some species respond more efficiently to the nitrogen deposition. Similarly, changes can also take place in aquatic systems. For this reason, it is useful to have an understanding of the nitrogen deposition rate (expressed as kg N/ha/y).

2B3.3.1 Dry Nitrogen Deposition

Table 2B3-3 provides a summary of the estimated annual dry nitrogen deposition rate expressed in kg N/ha/y; the results are based on the values given in Table 2B3-2. Exposed sites (e.g., Fort McMurray and Albian) are in the 3.3 kg N/ha/y to 3.4 kg N/ha/y range; while more remote sites values are more than a factor of 10 lower (i.e., 0.2 kg N/ha/y to 0.3 kg N/ha/y). The majority of the air LSA is anticipated to have dry nitrogen values similar to remote areas.

2B3.3.2 Wet Nitrogen Deposition

Table 2B3-4 provides a summary of the wet nitrogen deposition based on precipitation measurements in Fort McMurray and Cold Lake. The average Fort McMurray and Cold Lake values are 0.4 kg N/ha/y and 0.5 kg N/ha/y, respectively. These wet deposition values are based on the nitrate (i.e., NO_3^-) ion and exclude the contribution of the ammonium (i.e., NH_4^+) ion. As the contribution by both ions can be similar; the total wet N deposition is in the 0.8 kg N/ha/y to 1.0 kg N/ha/y range.

Table 2B3-1 Estimated Annual Dry SO_2 Deposition

Location	Station	Vd	SO_2		SO_4^{2-}	keq H^+/ha/y
		cm/s	ug/m^3	kg/ha/y	kg/ha/y	
North of LSA	Fort MacKay (WBEA)	0.58	3.4	6.2	9.3	0.19
	Mildred Lake (WBEA)	0.58	7.6	13.9	20.9	0.43
	Lower Camp (WBEA)	0.58	4.2	7.7	11.5	0.24
	Buffalo Viewpoint (WBEA)	0.58	3.7	6.8	10.2	0.21
	Mannix (WBEA)	0.58	5.2	9.5	14.3	0.30
	Fort Chipewyan (WBEA)	0.58	1.0	1.8	2.7	0.06
	Lower Camp (WBEA)	0.58	5.8	10.6	15.9	0.33
	Albian Mine (WBEA)	0.58	4.4	8.0	12.1	0.25
	PL7 (TEEM)	0.65	2.4	3.8	5.7	0.12
	PH6 (TEEM)	0.65	3.0	5.2	7.8	0.16
	AL8 (TEEM)	0.50	2.0	2.9	4.4	0.09
	PH4 (TEEM)	0.54	6.0	9.9	14.9	0.31
	AH8 (TEEM)	0.65	5.1	9.5	14.3	0.30
	PH2 (TEEM)	0.54	4.3	7.6	11.5	0.24
	PL1 (TEEM)	0.53	2.8	3.9	5.8	0.12
	PL8 (TEEM)	0.65	1.5	2.8	4.1	0.09
	AH7 (TEEM)	0.50	4.2	6.0	9.0	0.19
	Anzac (OPTI)	0.58	0.8	1.5	2.2	0.05
	Patricia McInnes (WBEA)	0.58	3.1	5.7	8.5	0.18
	Athabasca Valley (WBEA)	0.58	2.6	4.8	7.1	0.15
	AH3 (TEEM)	0.50	2.0	2.7	4.1	0.09

Note: The TEEM site deposition velocities and concentrations are based on a 1999 to 2000 average from EPCM Associated Ltd. (2002)

For the non-TEEM sites, an average deposition velocity of 0.58 cm/s is used

Table 2B3-2 Estimated Annual Dry NO_2 Deposition

Location	Station	Vd	NO_2		HNO_3^-	keq H^+/ha/y
		cm/s	$\mu g/m^3$	kg/ha/y	kg/ha/y	
North of LSA	Fort MacKay (WBEA)	0.19	10.4	6.2	8.4	0.14
	Fort Chipewyan (WBEA)	0.19	1.7	1.0	1.4	0.02
	Albian Mine (WBEA)	0.19	18.7	11.2	15.1	0.24
	PL7 (TEEM)	0.24	2.0	1.5	2.1	0.03
	PH6 (TEEM)	0.24	2.6	2.0	2.7	0.04
	AL8 (TEEM)	0.13	1.9	1.9	2.6	0.04
	PH4 (TEEM)	0.18	4.6	2.6	3.4	0.06
	AH8 (TEEM)	0.24	3.1	2.4	3.2	0.05
	PH2 (TEEM)	0.18	4.4	2.4	3.2	0.05
	PL1 (TEEM)	0.17	2.0	1.1	1.4	0.02
	PL8 (TEEM)	0.24	0.7	0.5	0.7	0.01
	AH7 (TEEM)	0.13	2.2	0.8	1.1	0.02
	Anzac (OPTI)	0.19	1.1	0.7	0.9	0.01
	Patricia McInnes (WBEA)	0.19	9.2	5.5	7.4	0.12
	Athabasca Valley (WBEA)	0.19	18.3	11.0	14.8	0.24
	AH3 (TEEM)	0.13	1.9	0.7	0.7	0.01

Note: The TEEM site deposition velocities and concentrations are based on a 1999 to 2000 average from EPCM Associated Ltd. (2002)

For the non-TEEM sites, an average deposition velocity of 0.19 cm/s is used

Table 2B3-3 Estimated Annual Dry Nitrogen Deposition (Based on NO_2)

Location	Station	N
		(keq N/ha/y)
North of LSA	Fort MacKay (WBEA)	1.9
	Fort Chipewyan (WBEA)	0.3
	Albian Mine (WBEA)	3.4
	PL7 (TEEM)	0.5
	PH6 (TEEM)	0.6
	AL8 (TEEM)	0.6
	PH4 (TEEM)	0.8
	AH8 (TEEM)	0.7
	PH2 (TEEM)	0.7
	PL1 (TEEM)	0.3
	PL8 (TEEM)	0.2
	AH7 (TEEM)	0.2
	Anzac (OPTI)	0.2
	Patricia McInnes (WBEA)	1.7
	Athabasca Valley (WBEA)	3.3
	AH3 (TEEM)	0.2

Table 2B3-4 Estimated Wet Nitrogen Deposition for Fort McMurray and Cold Lake

Year	N (kg N/ha/y)
Fort McMurray	
1993	0.4
1994	0.3
1995	0.4
1996	0.5
1997	0.2
1998	0.3
1999	0.4
Average	**0.4**
Cold Lake	
1993	0.3
1994	0.6
1995	0.4
1996	0.7
1997	0.6
1998	0.5
1999	0.4
Average	**0.5**

2B3.4 Wet SO_x and NO_x Deposition

Alberta Environment conducts a precipitation monitoring program at selected sites across Alberta. The stations in the air RSA include Fort McMurray and Cold Lake. Table 2B3-5 provides a summary of the wet sulphate (SO_4^{2-}) and nitrate (NO_3^-) deposition for the period 1993 to 2002. The results indicate:

- The sulphate deposition rate observed in Fort McMurray decreased by a factor of four from about 0.11 keq H^+/ha/y in 1993 to 0.03 keq H^+/ha/y in 1998 due to reduced SO_2 emissions from major oil sands operations. However, since 1999, sulphate deposition has returned to its pre-1997 values. The wet sulphate deposition rate in Fort McMurray in 2002 is 0.08 keq H^+/ha/y (3.70 kg SO_4^{2-}/ha/y). This is higher than the average Cold Lake value of 0.04 keq H^+/ha/y (2.10 kg SO_4^{2-}/ha/y).

- The wet nitrate deposition rate observed in Fort McMurray in 2002 is 0.03 keq H^+/ha/y (1.6 kg NO_3^-/ha/y), and that in Cold Lake is about 0.04 keq H^+/ha/y (2.25 kg NO_3^-/ha/y). These values are influenced by adjacent urban activities (i.e., traffic and domestic heating) and industrial activity.

- The average wet PAI values for Fort McMurray (post-1997) and Cold Lake are 0.06 keq H^+/ha/y and 0.07 keq H^+/ha/y, respectively. These values represent an upper range of the PAI expected in the LSA.

For the purposes of this assessment, a wet PAI of 0.05 keq H^+/ha/y is assumed to represent the LSA, as a more remote location.

Table 2B3-5 Wet Deposition Chemistry Statistics for Fort McMurray and Cold Lake

Year	**Sulphate**		**Nitrate**		**PAI**
	kg SO_4^{-2}/ha/y	**keq H^+/ha/y**	**kg NO_3^-/ha/y**	**keq H^+/ha/y**	**keq H^+/ha/y**
Fort McMurray					
1993	5.28	0.11	1.72	0.03	0.08
1994	3.00	0.06	1.45	0.02	0.06
1995	4.54	0.09	1.95	0.03	0.10
1996	3.89	0.08	2.31	0.04	0.09
1997	1.47	0.03	1.18	0.02	0.03
1998	1.28	0.03	1.27	0.02	0.02
1999	2.19	0.05	1.58	0.03	0.06
2000	2.98	0.06	1.77	0.03	0.04
2001	3.78	0.08	2.07	0.03	0.07
2002	3.70	0.08	1.56	0.03	0.09
Averages (1993 to 2002)	3.21	0.07	1.69	0.03	0.06
Cold Lake					
1993	1.97	0.04	1.52	0.02	0.06
1994	2.66	0.06	2.51	0.04	0.07
1995	1.52	0.03	1.76	0.03	0.05
1996	2.67	0.06	3.05	0.05	0.09
1997	2.30	0.05	2.82	0.05	0.07
1998	2.07	0.04	2.24	0.04	0.06
1999	1.57	0.03	1.86	0.03	0.06
2000	1.72	0.04	2.07	0.03	0.06
2001	2.70	0.06	2.48	0.04	0.10
2002	1.85	0.04	2.18	0.04	0.11
Averages (1993 to 2002)	2.10	0.04	2.25	0.04	0.07

Note: Reduction in sulphate deposition from 1997 – 1999 likely due to reduced SO2 emissions associated with the commissioning of the Suncor flue gas desulphurization (FGD) system.

Wet PAI includes acidifying and neutralizing (e.g., base cations) compounds.

2B3.5 Base Cation Deposition

A draft study by Chaikowsky (2001) estimated the base cation deposition for various Western Canada locations. Estimated base cation depositions for locations within the air RSA are in Table 2B3-6.

Table 2B3-6 Estimated Base Cation Deposition for Fort McMurray and Cold Lake

Location	Wet (keq H^+/ha/y)	Dry (keq H^+/ha/y)	Totals (keq H^+/ha/y)
Fort McMurray	0.062	0.062	0.124
Cold Lake	0.079	0.050	0.129
Averages	0.070	0.056	0.126

For the purposes of this assessment, the average values were assumed to represent the LSA.

2B3.6 Potential Acidifying Input

The PAI is the sum of the sulphur compound deposition (wet & dry); the nitrogen compound deposition (wet & dry) minus the neutralization effects of base cation deposition (wet & dry). Figure 2B3-1 shows the estimated PAI values based on the sum of the acidifying compounds in Table 2B3-7.

Table 2B3-7 Estimated Base Cation Deposition for Fort McMurray and Cold Lake

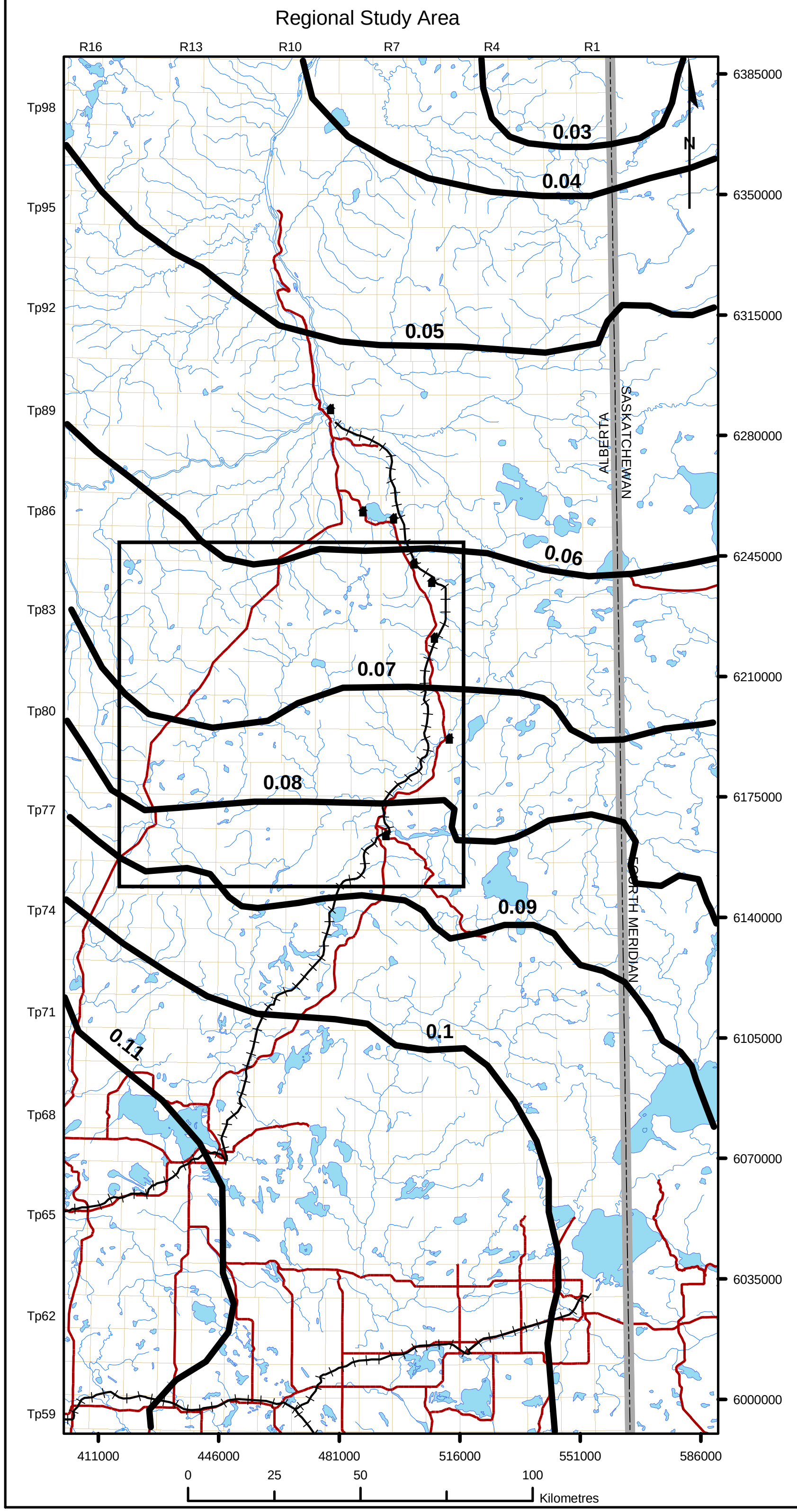
Location	Dry SO_2 Deposition (A) (keq H^+/ha/y)	Dry NO_2 Deposition (B) (keq H^+/ha/y)	Wet PAI Deposition (C) (keq H^+/ha/y)	Dry Base Cation Deposition (D) (keq H^+/ha/y)	Total PAI (E) (keq H^+/ha/y)
Remote	0.09	0.02	0.04	0.06	0.09
Oil Sands	0.33	0.24	0.06	0.06	0.57
Fort McMurray	0.17	0.18	0.06	0.06	0.35
LSA	0.07	0.03	0.05	0.06	0.09

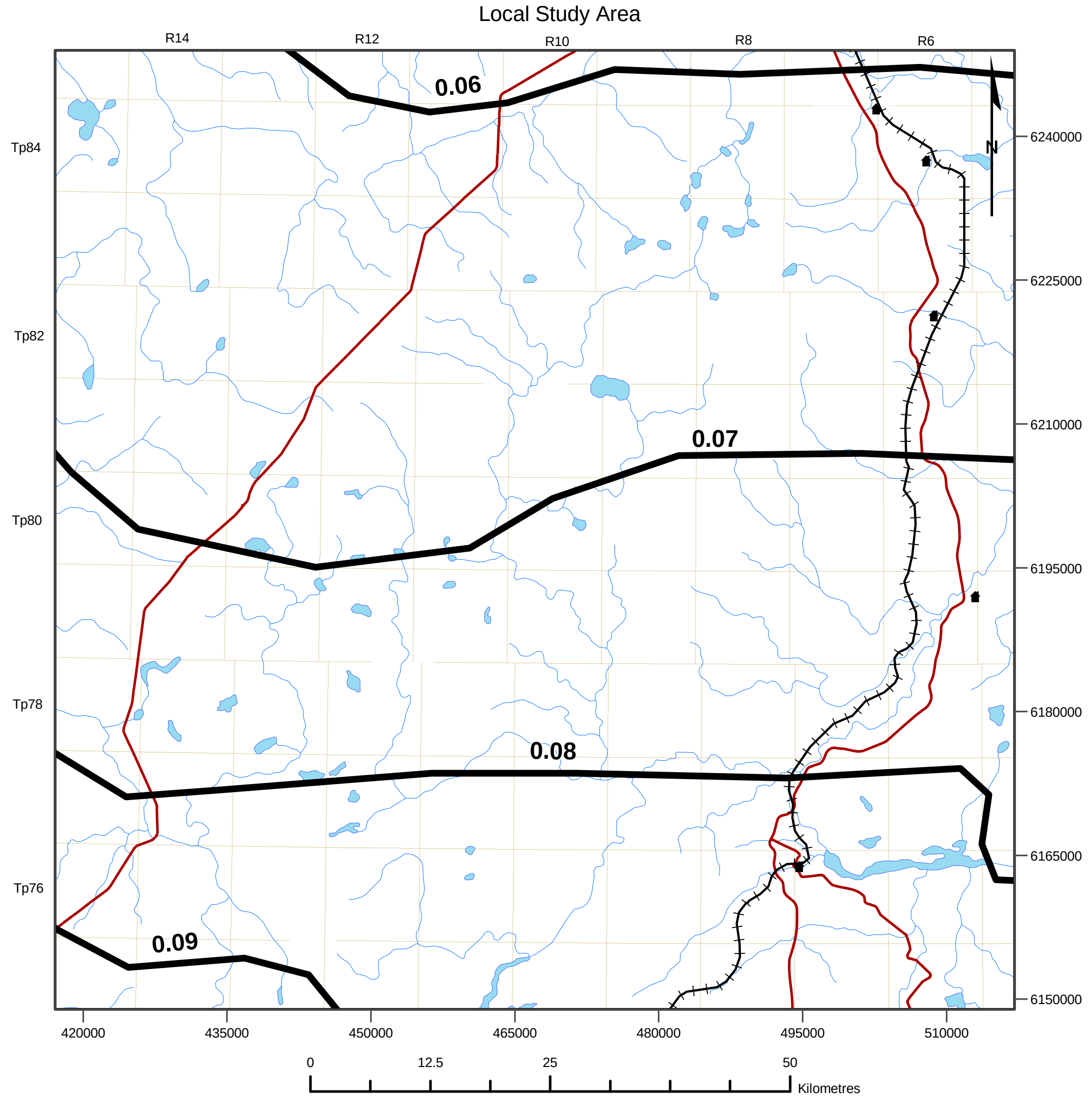
Note: E = A + B + C - D

Wet PAI includes wet base cations.

The sum provides an indication of the PAI for the selected regions based on an interpretation of data, derived from field monitoring programs. The current PAI in the LSA is expected to be representative of a remote area, and be much less than that occurring in the primary oil sands operating area to the north. While a number of approximations (e.g., spatial extrapolations, not including dry sulphate and dry nitrate deposition) have been made, this information is viewed as being sufficient to delineate PAI deposition trends within the RSA and the LSA.

For the purposes of comparison, PAI values resulting from sources external to the northern portion of the RSA are shown in Figure 2B3-1. These predictions are based on Western Canada scale RELAD model results conducted by Alberta Environment (Cheng 2005). Specifically, the base map provides an indication of background values that range from a high of 0.11 keq H^+/ha/y in the southwest corner of the air RSA to a low of 0.04 keq H^+/ha/y in the northeast corner of the air RSA. The LSA values are in the 0.06 keq H^+/ha/y to 0.09 keq H^+/ha/y range, similar to that derived from the available monitoring data.





Legend

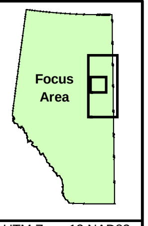
- PAI Contours
- Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
The Alberta Environment Background
PAI Deposition Contours Based
on the RELAD Model

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2B3-1



UTM Zone 12 NAD83

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2C APPENDIX C – CALMET MODEL

2C1 Introduction

Meteorological information is required by the CALPUFF air quality simulation model to provide the transport and dispersion characteristics for the air RSA and LSA. Meteorological characteristics vary with time (e.g., season and time of day) and location (e.g., height, terrain and land use). The CALMET meteorological pre-processing program was used to provide representative temporally and spatially varying meteorological parameters for the CALPUFF model. This appendix provides an overview of the technical details and options selected for the CALMET modelling.

2C1.1 Study Domain

The CALMET study domain (i.e., the air RSA) adopted for this assessment extends from approximately 54.0 degrees latitude in the south to 57.5 degrees latitude in the north, and from 112.5 degrees longitude in the west to 109.5 degrees longitude in the east, as shown in Figure 2C1-1.

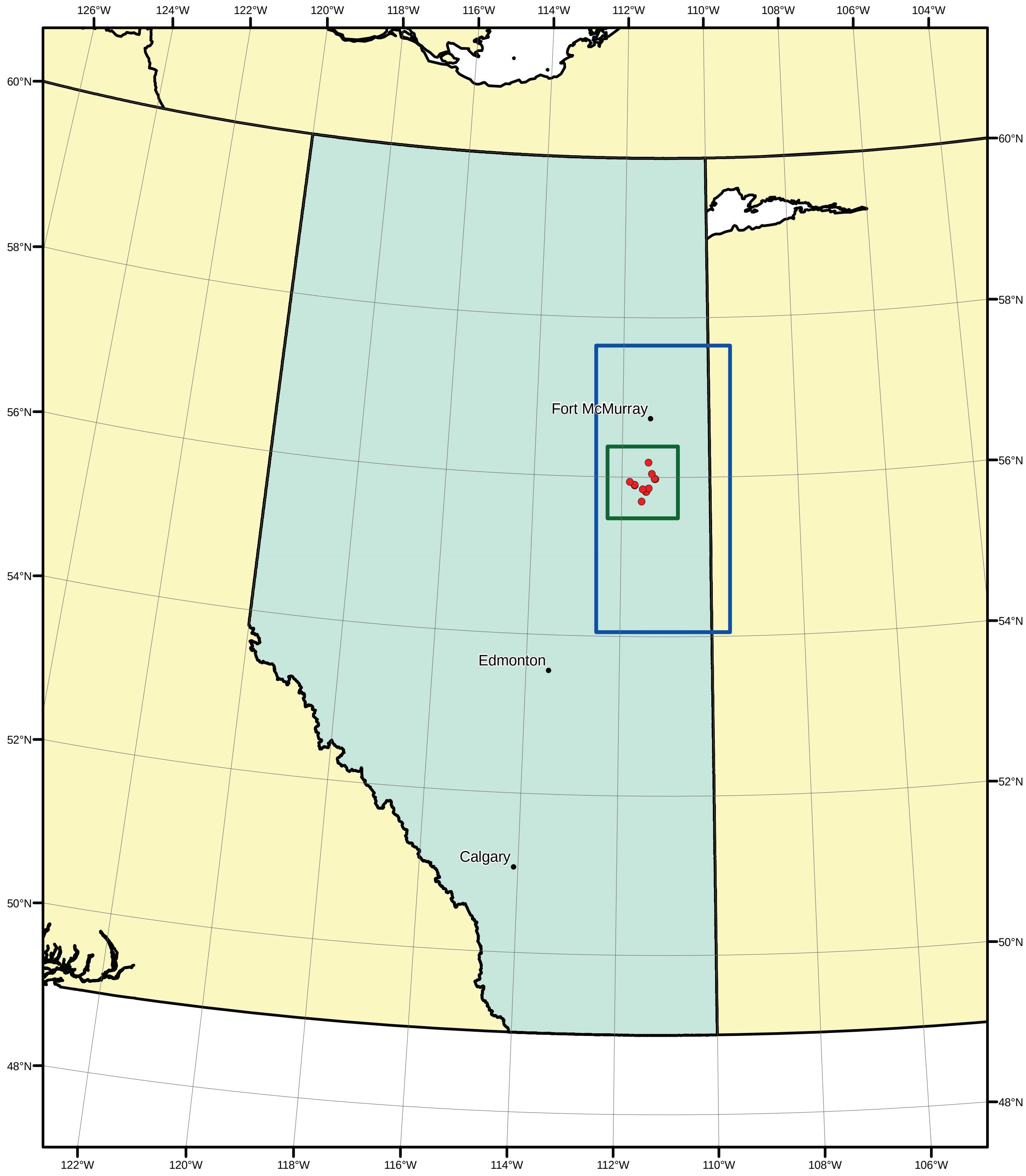
The RSA includes the communities of Fort MacKay and Fort McMurray towards the north of the domain, and the communities of Cold Lake, Lac La Biche, and Bonnyville towards the south. The RSA covers an area of 76,000 km^2. The UTM (NAD 83) coordinates of the four corners of the RSA are provided in Table 2C1-1.

Table 2C1-1 CALMET Model Domain Coordinates (UTM Zone 12; NAD 83)

Domain Extent	Easting (km)	Northing (km)
Southwest	401.000	5990.000
Northwest	401.000	6390.000
Southeast	591.000	5990.000
Northeast	591.000	6390.000

A horizontal grid spacing of 5 km was adopted for the CALMET modelling, corresponding to a 80-row by a 38-column resolution. With this grid spacing, it was possible to maximize run time and file size efficiencies while still capturing major terrain feature influences (e.g., Birch Mountain and Stony Mountain) on wind flow patterns.

To simulate pollutant transport and dispersion accurately, it is important to simulate the vertical profiles of wind speed, temperature, turbulence intensity, and wind direction within the atmospheric boundary layer (i.e., within approximately 2,000 m above the Earth's surface). In an effort to limit the size of the CALMET output files and still capture this vertical structure, eight vertical layers were selected. Within CALMET, a vertical layer is defined as the midpoint between two layers or faces (i.e., nine faces = eight layers, with the lowest face always being ground level or zero). The vertical faces used in this study are: 0 m, 20 m, 40 m, 80 m, 160 m, 320 m, 600 m, 1,400 m, and 2,600 m.

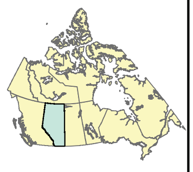


Legend

- 🔴 The Project
- ● Cities
- 🟦 Calmet Study Domain
- 🟩 Local Study Area

0 60 120 180 240 300 Kilometres

PROJECT	NORTH AMERICAN KAI KOS DEHSEH		
TITLE	CALMET Study Domain		
DRAWN	LDB	04/2007	Figure 2C1-1
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		



UTM ZONE 12 NAD83

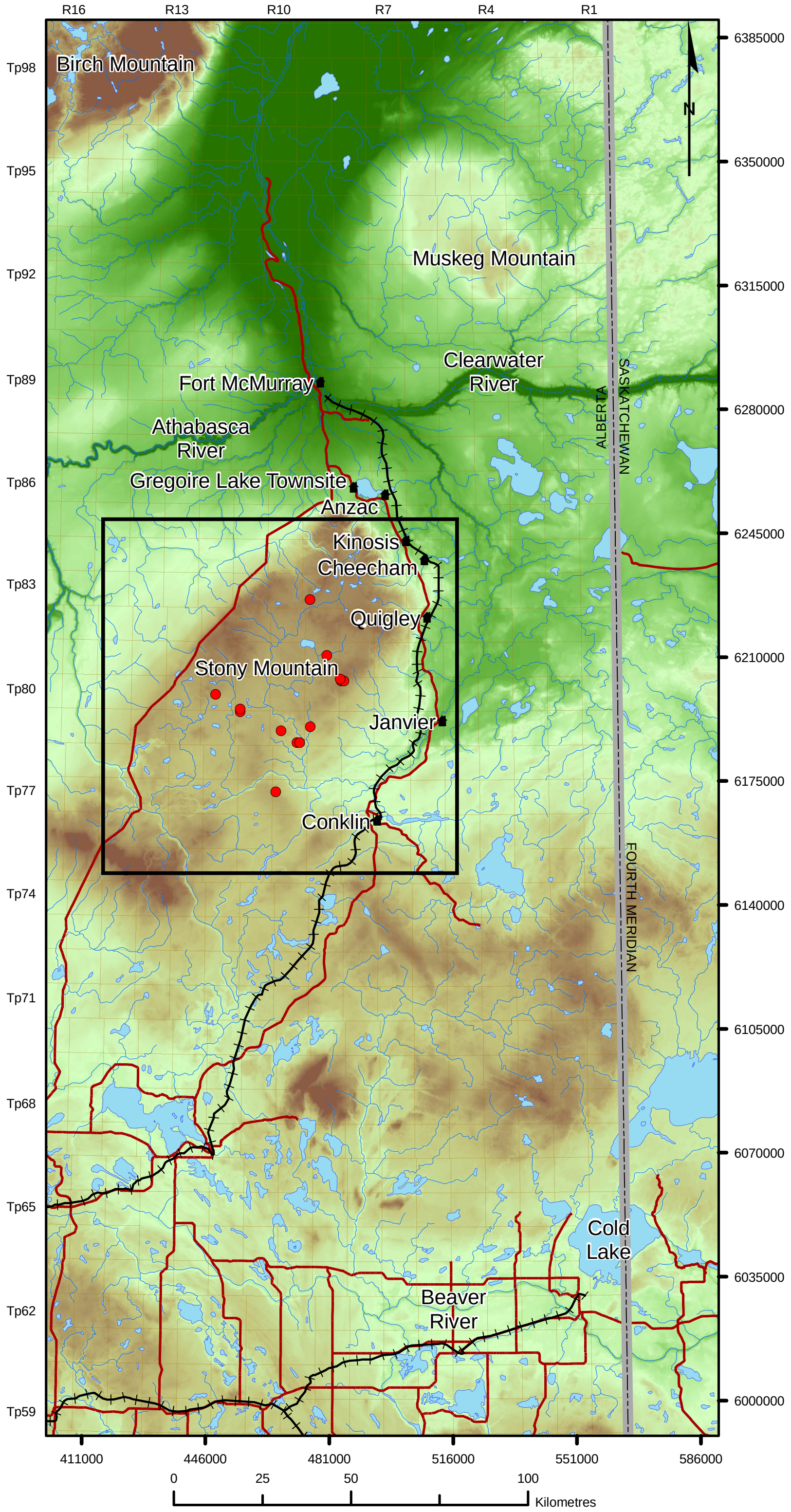
2C2 Regional Geography

A general overview of the terrain within the CALMET RSA is presented in Figure 2C2-1. Dominant landforms include:

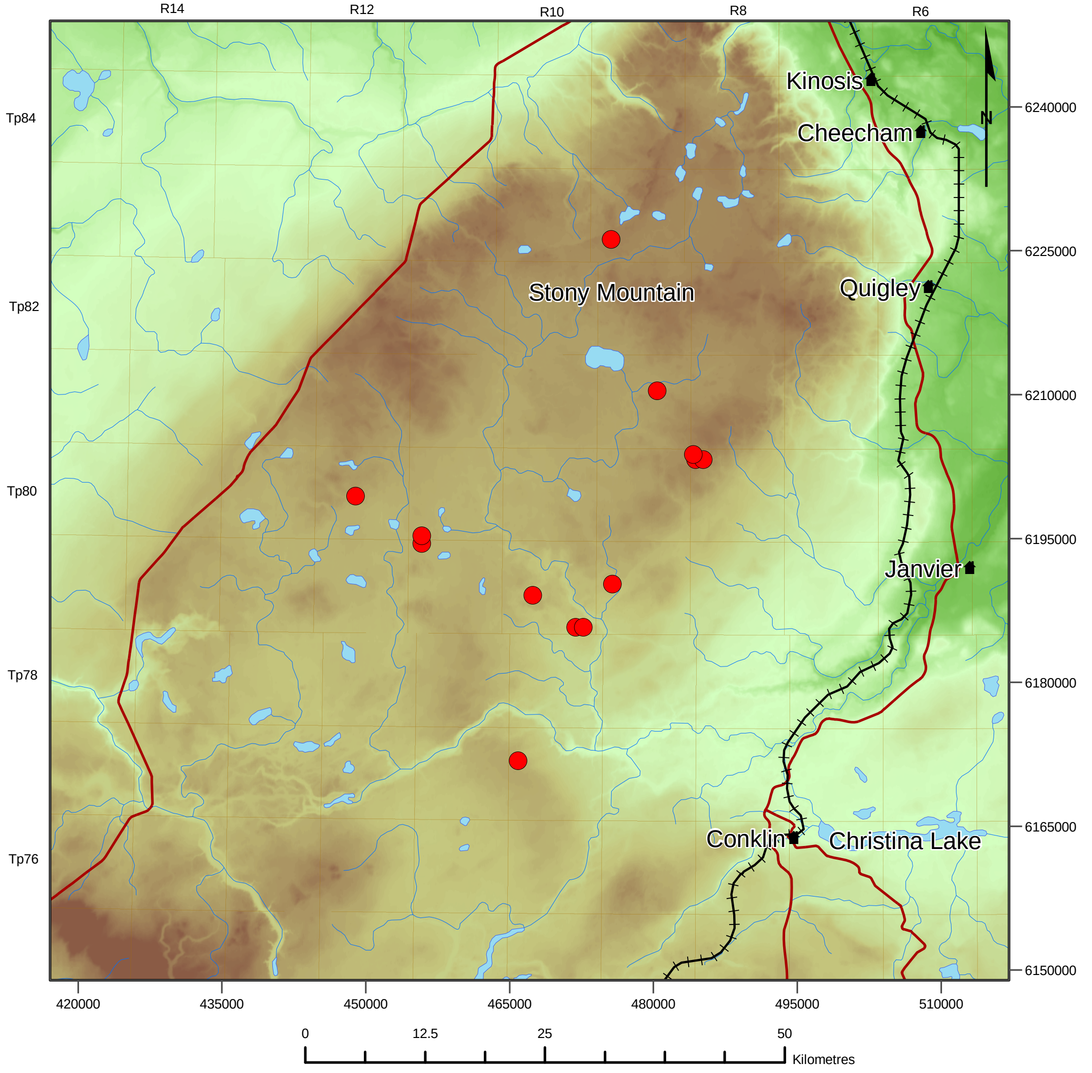
- Birch Mountain is located in the northwest portion of the RSA;
- Muskeg Mountain is located in the eastern portion of the RSA;
- Stony Mountain is located slightly north of center of the RSA. Stony Mountain has a maximum elevation of 850 masl;
- The Athabasca and Clearwater rivers and associated valleys are significant in the northern third of the RSA; and
- Cold Lake is located in the southeast corner, with Beaver River feeding into it from the west.

The valleys and elevated terrain features can affect local surface wind flow patterns.

Regional Study Area



Local Study Area



Legend

- ● The Project
- Community
- Railroad
- Road
- Lake
- River

Terrain (mASL)

High : 953

Low : 216

PROJECT

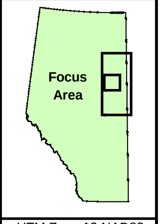
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Terrain Features in the
Air Regional Study Area

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2C2-1



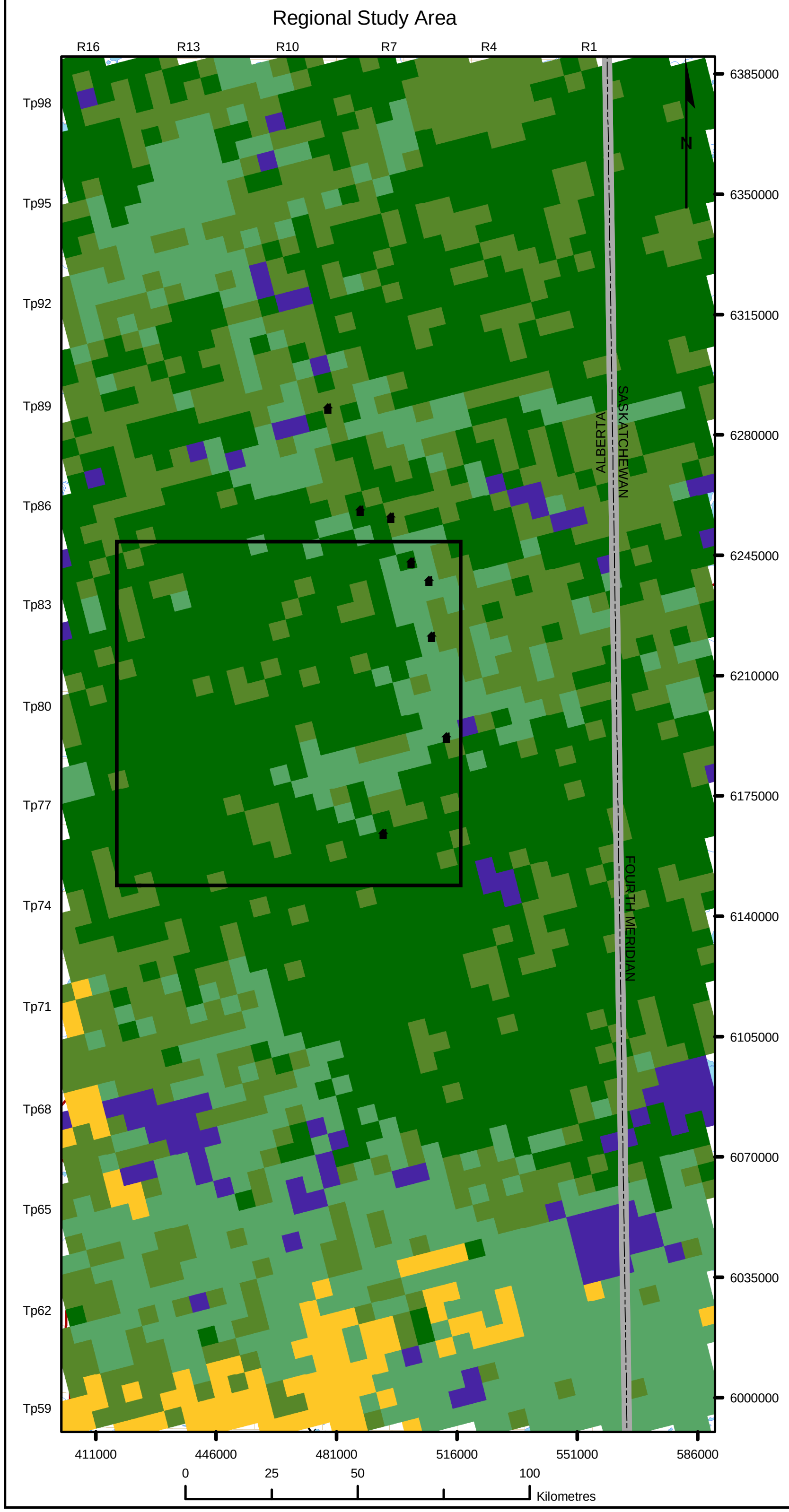
UTM Zone 12 NAD83

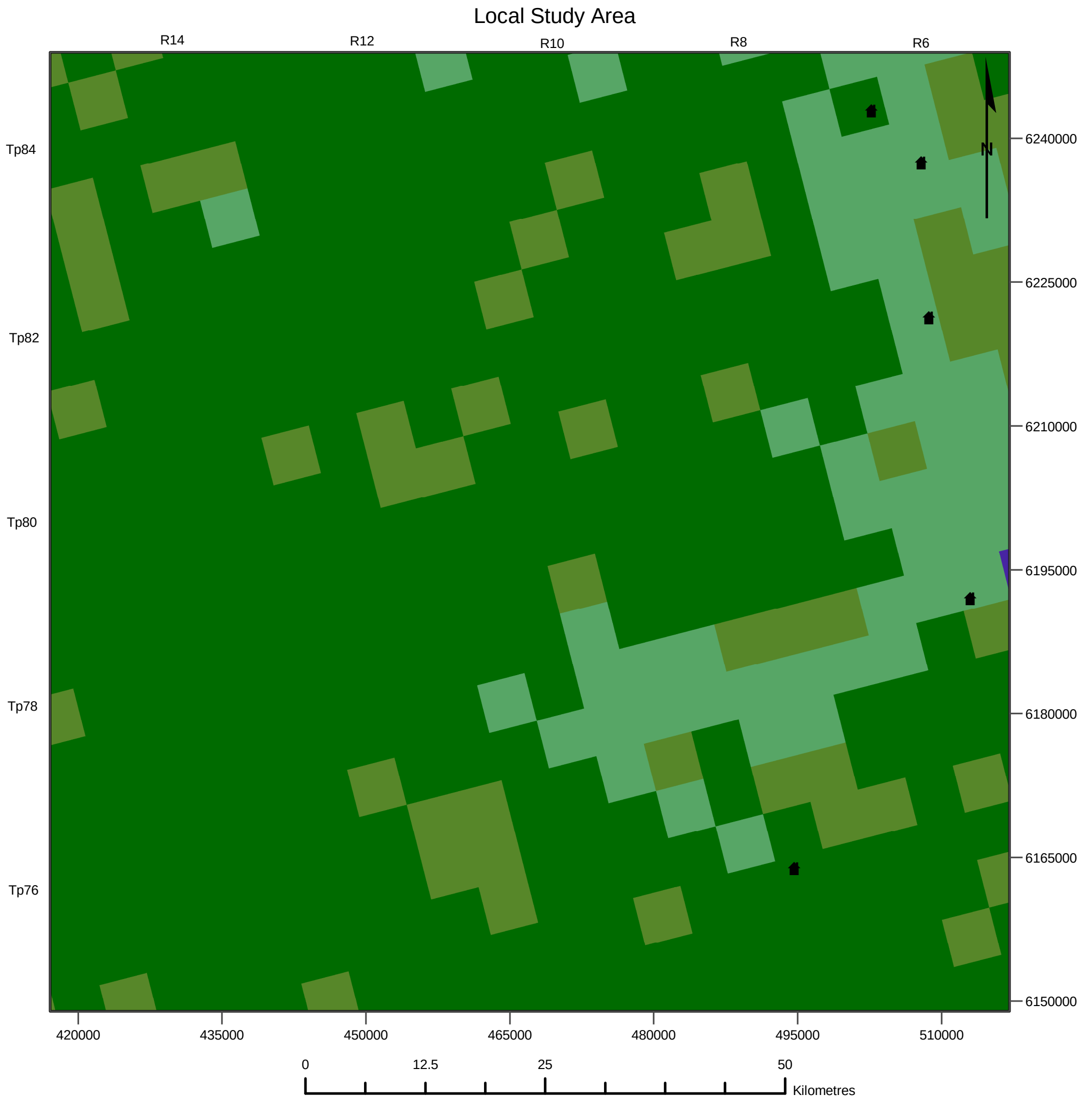
2C3 Land Use Data

The RSA is characterized by coniferous forest (46.6 %), mixed forest (25.1%), deciduous forest (22.2%), agricultural (3.1% - cropland and rangeland combined), and water (3.1%). Figure 2C3-1 depicts the land-use at 5 km resolution for the study area.

To take advantage of recent studies in the northern regions (e.g., Brook et al., 1999, Betts and Ball 1997), CALMET was set up using five “seasons”. Winter was defined as two seasons: one associated with frozen, snow-covered water bodies, and the other associated with open water. Gridded fields were produced for terrain and land use (based on the USGS LU/LC - 52 category system), as well as seasonally specific parameters of surface roughness (z0), leaf area index, albedo, Bowen ratio, soil heat flux, and anthropogenic heat flux.

Table 2C3-1 depicts the specific parameters used for each land-use type for the five seasons. Anthropogenic heat flux was excluded from the table since all values were set to zero given the low population density (i.e., there is no ‘urban’ land use in the study area).



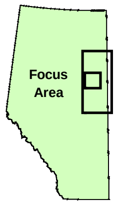


Legend

- ⌂ Community
- 🟩 Mixed Forest
- 🟩 Deciduous Trees
- 🟪 Water
- 🟩 Coniferous Forest
- 🟨 Agricultural Cropland

PROJECT NORTH AMERICAN KAI KOS DEHSEH		
TITLE Gridded Land Use Classes in the Air Regional Study Area		
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2C3-1



UTM Zone 12 NAD83

Table 2C3-1 Season-Specific Land-Use Parameters

Season	**Winter 1**	**Spring**	**Summer**	**Fall**	**Winter 2**
Description	Snow Cover (Water Frozen)	Partial Vegetation	Lush Vegetation	Prior to Snow Cover	Snow Cover (Open Water)
Julian Day	1 to 90	91 to 151	152 to 243	244 to 304	305 to 365
Month	January to March	April and May	June to August	September and October	November and December

Land use	**Surface Roughness (Z_0) (m)**				**Albedo (Fraction)**				**Bowen Ratio**			
	Winter 1&2	**Spring**	**Summer**	**Fall**	**Winter 1&2**	**Spring**	**Summer**	**Fall**	**Winter 1&2**	**Spring**	**Summer**	**Fall**
Deciduous	0.55	0.75	1.05	0.95	0.21	0.15	0.15	0.15	2.0	1.5	0.6	0.6
Coniferous	0.90	0.90	0.80	0.90	0.13	0.11	0.083	0.083	2.0	1.5	1.4	1.4
Mixed	1.20	1.20	1.15	1.15	0.17	0.13	0.117	0.117	2.0	1.5	0.9	0.9
Agriculture	0.15	0.22	0.5	0.32	0.75	0.20	0.20	0.20	2.0	0.4	04	0.4
Water	0.20 /0.001	0.001	0.001	0.001	0.70 / 0.75	0.10	0.10	0.10	0.5 / 0.0	0.0	0.0	0.0

Land use	**Soil Heat Flux (Fraction)**				**Leaf Area Index**			
	Winter 1&2	**Spring**	**Summer**	**Fall**	**Winter 1&2**	**Spring**	**Summer**	**Fall**
Deciduous	0.1	0.1	0.1	0.1	0.1	1.0	3.4	0.1
Coniferous	0.1	0.1	0.1	0.1	4.5	5.2	5.2	4.7
Mixed	0.1	0.1	0.1	0.1	2.3	3.3	4.5	2.3
Agriculture	0.1	0.1	0.1	0.1	0.8	2.2	2.8	0.3
Water	0.15 / 1.0	1.0	1.0	1.0	0.0 / 0.0	0.0	0.0	0.0

2C4 Meteorological Data

Modelling for this study was based on one full year of meteorological information from January 1 to December 31, 2002 (i.e., 8760 hours). The diagnostic wind field model within CALMET contains options that allow the use of wind fields produced by Mesoscale Model 5 (MM5) (a prognostic wind field model with four-dimensional data assimilation produced by Penn State/NCAR) to be incorporated into CALMET as an initial guess field (Scire et al., 2000). When included in this way, the prognostic module in CALMET adjusts the initial guess field for kinematic effects of terrain, slope flows and terrain blocking effects using the finer scale CALMET terrain data to produce a modified first guess wind field.

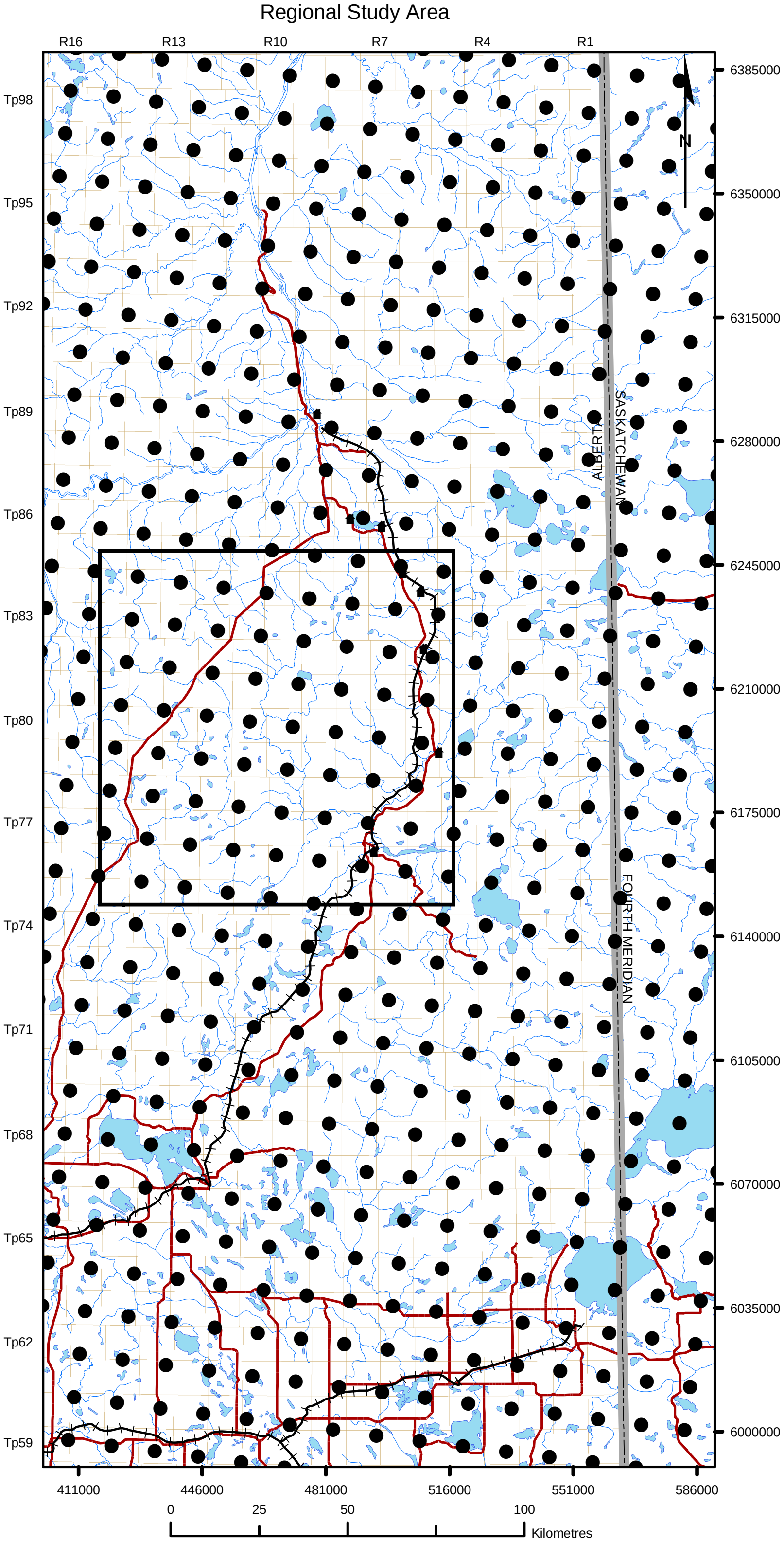
MM5 model output data were obtained from AENV. They have made publicly available a full year of MM5 dataset for Western Canada with a 12 km grid resolution. This dataset is based on the year 2002, which is the most current dataset from AENV. AENV has also released an MM5 dataset for the year 1995. The 2002 dataset was preferred as it was created using a finer resolution (i.e., 12 km vs. 20 km) and so is a much more comprehensive dataset. The MM5 output data were used for the CALMET initial guess wind field for this model application. The MM5 output data were processed for input to CALMET using a pre-processor. The MM5 output data locations (i.e., MM5 grid cell centroids) are shown in Figure 2C4-1. The Fort McMurray airport and Cold Lake airport surface meteorological stations were incorporated in the 2002 MM5 data.

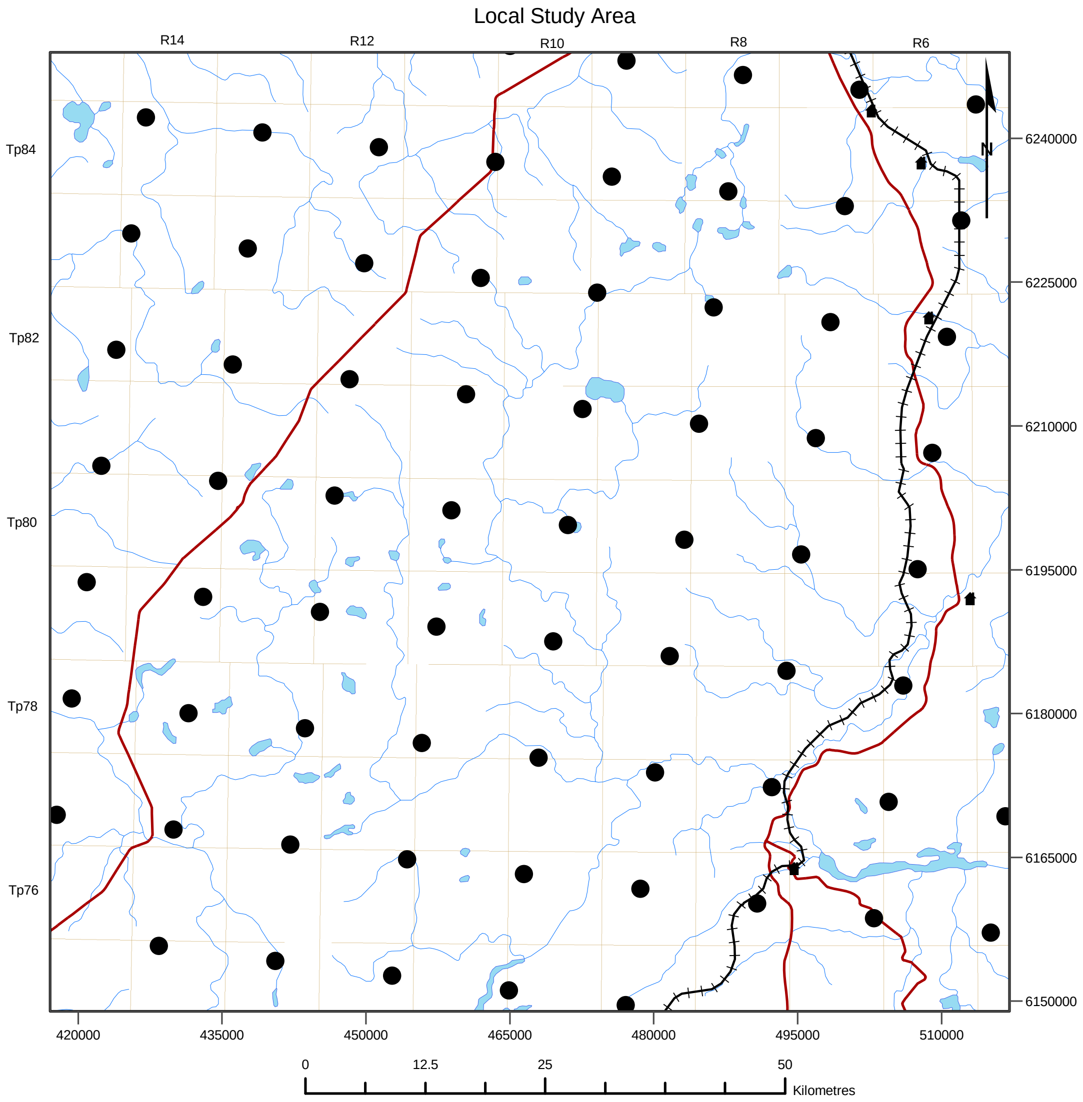
The MM5 output data were supplemented with surface ambient air quality station data using hourly wind speed and wind direction based on 2002 measurements. These air quality monitoring stations are operated by the Wood Buffalo Environmental Association and include the following:

- Fort MacKay,
- Mildred Lake,
- Lower Camp A,
- Buffalo Viewpoint,
- Mannix,
- Patricia McInnes,
- Athabasca Valley,
- Fort Chipewyan,
- Barge Landing,
- Albian Mine,
- Lower Camp B,
- Millennium, and
- Syncrude UE1 monitoring stations.

Additional concurrent meteorological data from Conklin, as provided by Golder Associates, were incorporated in the CALMET model simulations. Figure 2C4-2 shows the locations of these stations in the RSA.

To account for the wet deposition of airborne pollutants in the subsequent CALPUFF runs, hourly precipitation amounts were extracted from the MM5 output. Figure 2C4-3 presents the historical and the 2002 precipitation record as a monthly time history as recorded at the Fort McMurray Airport.



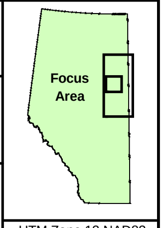


Legend

- ● MM5
- ⌂ Community
- Railroad
- Road
- Lake
- River

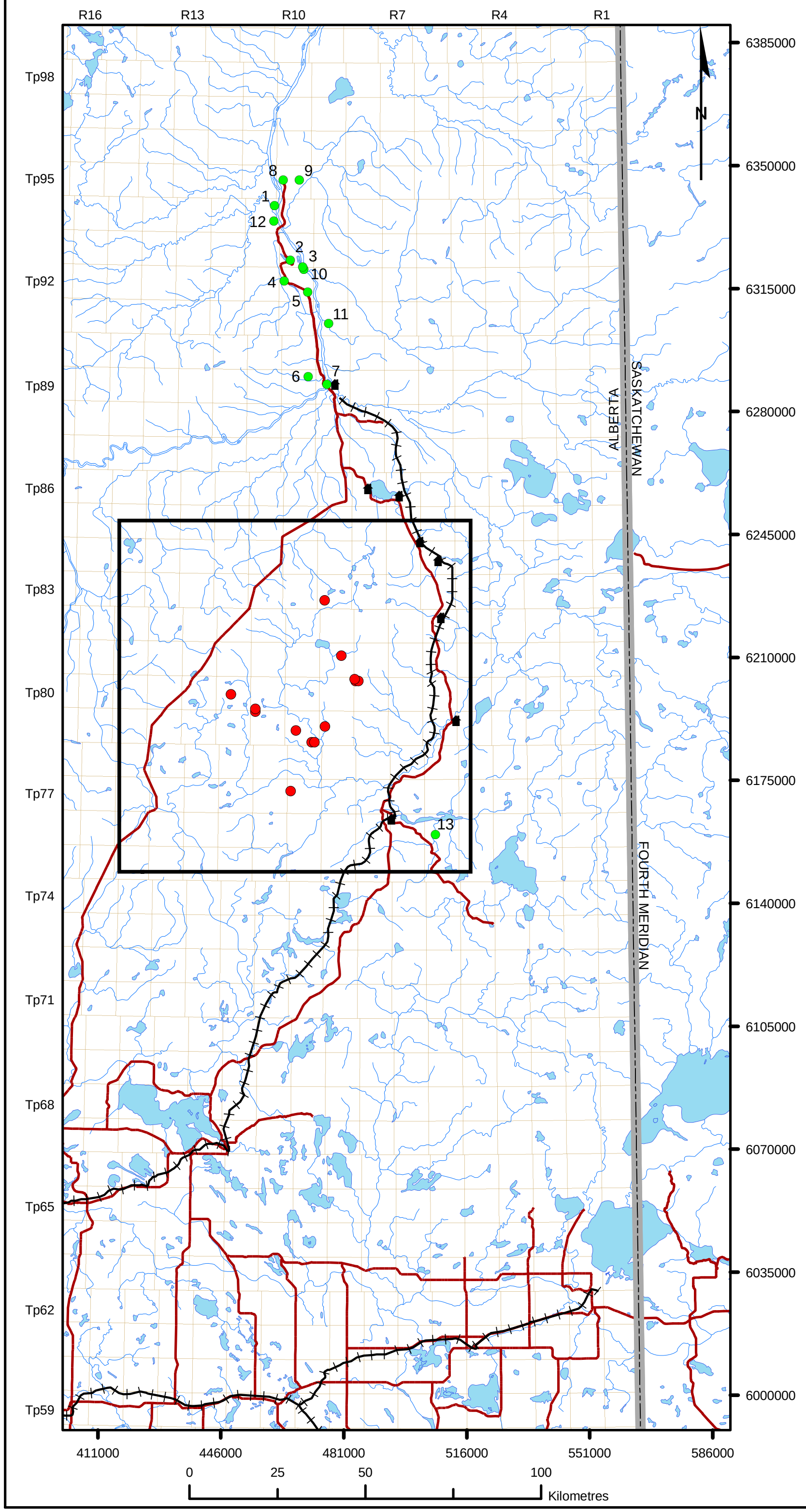
PROJECT	NORTH AMERICAN KAI KOS DEHSEH
TITLE	MM5 Output Locations Using 12 km Grid Resolution for the 2002 Model Year

DRAWN	LDB	04/2007	Figure 2C4-1
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		

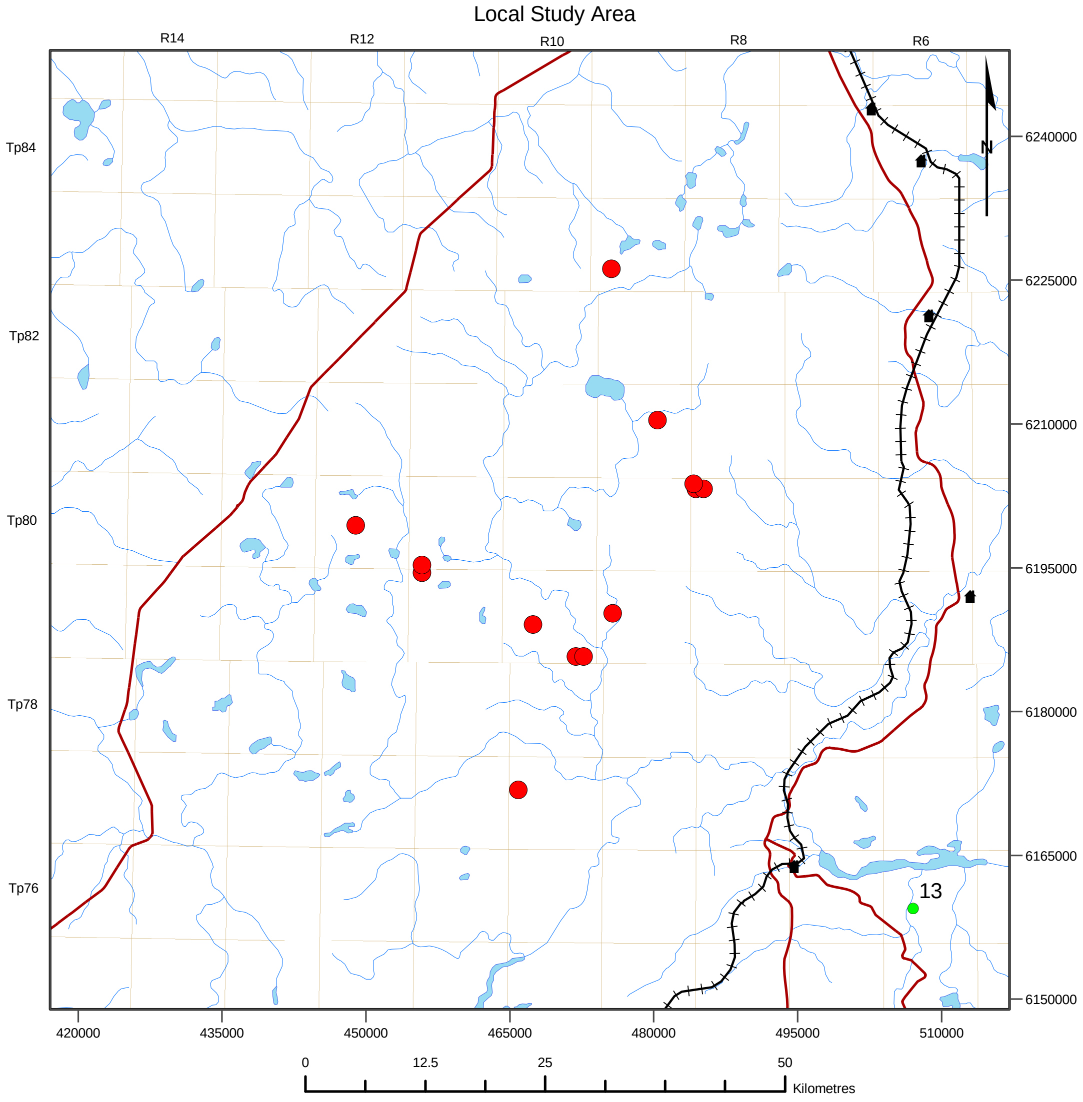


UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Number	Name
1	Fort McKay WBEA
2	Mildred Lake WBEA
3	Lower Camp A WBEA
4	Buffalo Viewpoint WBEA
5	Mannix WBEA
6	Patricia McInnes WBEA
7	Athabasca Valley WBEA
8	Barge Landing WBEA
9	Albian Mine WBEA
10	Lower Camp B WBEA
11	Millennium WBEA
12	Syncrude UE1 WBEA
13	Conklin Encana

Legend

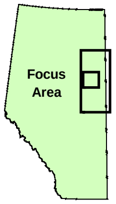
- ● Meteorological Station
- ● The Project
- Community
- Railroad
- Road
- Lake
- River

PROJECT
NORTH AMERICAN KAI KOS DEHSEH

TITLE
Location of Surface Meteorological Stations in the Air Regional Study Area

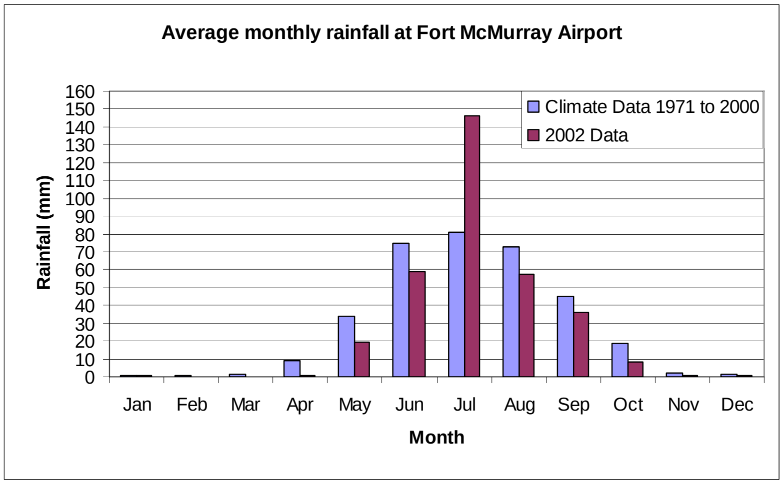
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

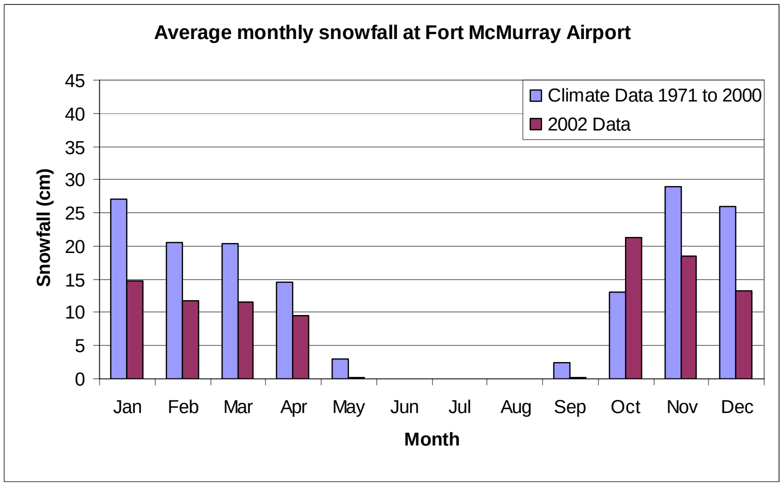
Figure 2C4-2

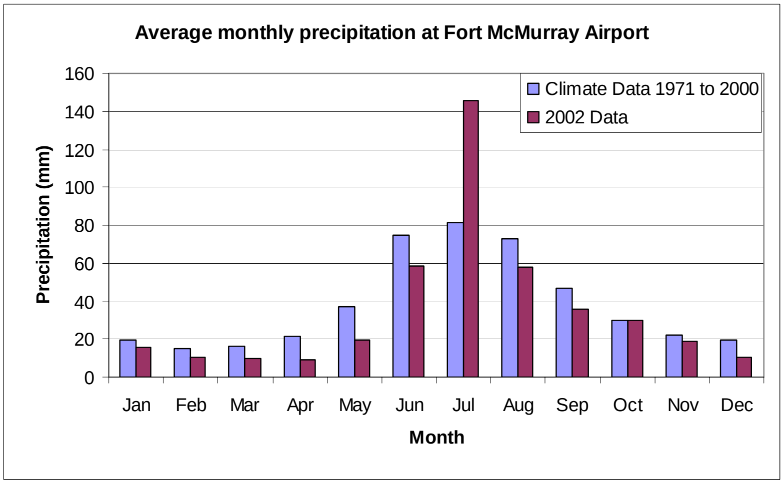


UTM Zone 12 NAD83

Figure 2C4-3 **Comparison of Precipitation Record (Monthly Time History) at the Fort McMurray Airport for 2002 and Long Term Normals**


Average monthly rainfall at Fort McMurray Airport


Average monthly snowfall at Fort McMurray Airport


Average monthly precipitation at Fort McMurray Airport

2C5 CALMET Model Results

2C5.1 Observed Surface Wind Roses

Wind direction and wind speed play an important role in determining the overall transport of airborne pollutants. The 2002 annual wind roses of two surface stations used by the CALMET model are shown in Figure 2C5-1. Wind roses for the stations can be summarized as follows:

- Fort MacKay - most common winds are from the north and from the south; and
- Conklin - most common winds are from the southeast to west quadrants.

The significant differences i wind direction and speed between these stations strongly reflect the impact of the local terrain. For example, the preferential north/south wind flows measured at Fort MacKay are attributed to the Athabasca River valley that exhibits the same north/south orientation. The Conklin station is located in a broad valley that has an east-west orientation, and is in an area with more uniform terrain than the other sites. To the south of the domain, lower wind speeds and an east-west dominance indicate that Stony Mountain plays an important role on terrain blocking effects in this area. Therefore, there are visible differences in the wind roses from the southern and northern portions of the RSA.

2C5.2 CALMET Surface (10 m) Wind Roses

Wind roses based on the CALMET predictions are shown in Figure 2C5-2 for the Fort MacKay station (CALMET grid cell 13, 70) and for the centre of the air LSA (CALMET grid cell 14, 42). As the Project consists of 10 hubs, the centre of the air LSA was selected as a location that was representative of the area. This point is approximately 8.5 km south of the Hangingstone hub. CALMET consistently predicts slightly lower wind speeds than the measured values shown in Figure 2C5-1. For the Fort MacKay station, the measured and predicted wind directions suggest a north-south oriented distribution pattern and have high frequencies of south-southwesterly and north-northwesterly winds. However, the CALMET predictions show fewer northwesterly winds (measured approximately 9% versus predicted approximately 6%) and more south-southwesterly winds (measured approximately 7.5% versus predicted approximately 12%).

The Conklin surface wind data are the nearest available to the Project location. The predicted wind rose for the centre of the air LSA (CALMET grid cell 14, 42) indicates winds dominated from the west, with stronger winds than those measured at Conklin.

2C5.3 CALMET Wind Roses for Elevated Levels

Both upper air and surface wind characteristics are important to dispersion modelling. Consequently, annual wind roses were generated from the CALMET predictions for elevations of 460 m, 1,000 m, and 2,000 m above the surface for the Fort MacKay location (CALMET grid cell 13, 70), and for the centre of the air LSA (CALMET grid cell 14, 42), shown in Figures 2C5-3 and 2C5-4, respectively.

At the Fort MacKay location, the 460 m wind rose shows the majority of winds blowing from the west through to the north-northwest. At the centre of the air LSA, the 460 m wind rose pattern differs slightly from the Fort MacKay wind pattern. At this height, both the topography and the synoptic system may influence wind fields. Specifically, the wind directions around Fort MacKay are influenced by the Athabasca River valley. The dominance of northwestern wind direction in the air LSA could indicate the influence of Stony Mountain. At both locations, easterly winds are least frequent.

At the Fort MacKay location, the differences between the 460 m and the 1,000 m wind roses essentially reflect decreasing topographic influences with increasing height resulting in higher wind speed with height. The Fort MacKay wind roses lose their terrain influence and shift to reflect the geostrophic[1] wind, blowing in from the northwest. The Air LSA wind rose shows a high frequency of winds from the northwest. These observations indicate that the northwesterly winds dominate the overall upper air synoptic wind regime in this part of Alberta (Davison et al. 1981).

2C5.4 Atmospheric Stability and Mixing Height

In CALMET, the Pasquill-Gifford (PG) stability scheme can be used to classify atmospheric turbulence in the boundary layer. These classes range from unstable (Classes A, B and C), through neutral (Class D) to stable (Classes E and F). Normally, unstable conditions are associated with daytime ground-level heating which produces thermal turbulence in the boundary layer. Stable conditions are primarily associated with night-time cooling which suppresses the turbulence levels and produces temperature inversions at lower levels. Neutral conditions are mostly associated with high wind speeds and/or overcast sky conditions.

The mixing heights under different stability conditions are estimated through different methods that are based on either surface heat flux (thermal turbulence) and vertical temperature profile, or the friction velocity (mechanical turbulence). Detailed information on how this is accounted for in CALMET can be found in ‘User’s Guide for CALMET Meteorological Model’ (Scire et al., 2000).

Table 2C5-1 provides a summary of the frequencies predicted by CALMET at the centre of the air LSA (CALMET grid cell 14, 42) for each Pasquill-Gifford (PG) stability class and the respective average mixing height. Figure 2C5-5 shows a plot of predicted stability class frequency versus time of day, while a box plot of predicted mixing heights is given in Figure 2C5-6. Mixing heights are greater during the day (i.e., those associated with PG classes A, B and C) and lower during the night (i.e., those associated with PG classes E and F).

Table 2C5-1 PG Stability Classes and Average Mixing Heights Predicted to Occur in the Air LSA (CALMET Grid Cell 14, 42)

PG Class	A	B	C	D	E	F
PG Frequency (%)	3.2	9.5	12.2	36.5	26.2	12.3
Average Mixing Height (m)	1,806	1,284	967	959	606	168

2C5.5 Surface Wind Vector Plots

Surface wind vector plots are displayed to provide an overview of how the wind fields predicted by CALMET vary across the RSA. Table 2C5-2 provides an overview of the meteorological conditions specific to each case. The meteorological conditions are defined in terms of wind and atmospheric stability, the latter of which is expressed as a PG stability class (Section 2C5.4). The vector plots were not selected to illustrate representative conditions, but were selected at random to demonstrate the wind variation that can occur across the RSA during a given hour.

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[1] Geostrophic winds: winds that are not very much influenced by the surface of the earth.

Table 2C5-2 Surface Wind Vector Plot Case Shown

Figure Number	Date and Time	Wind Direction (degrees)	Wind Speed Range (m/s)	PG Stability Class
5.5	0800 LST February 12	W	1.3~7.6	D
5.6	1500 LST September 7	N	0.0~5.3	C
5.7	1400 LST July 14	W (north)	0.6~5.5	B
5.8	0100 LST November 16	NW (north)	0.5~5.0	E

Figure 2C5-7 shows the wind field at 0800 LST on February 12, 2002, under neutral conditions (PG class D). Neutral conditions are associated with strong wind speeds, which are evident over the site location and through most of the RSA. Winds tend to be from the west but are deflected towards the north and decrease in magnitude in the Athabasca valley.

Figure 2C5-8 shows the wind vector field at 1500 LST on September 7, 2002, under near neutral conditions (PG class C), with winds from the south dominating the surface wind field over the northern portion of the RSA. Winds are lighter in the southern portion of the domain.

Figure 2C5-9 shows the wind field at 1400 LST on July 14 under unstable conditions (PG class B). Unstable conditions are associated with convective heating. Overall, the winds are blowing from the west with more variability in direction and speeds in the northern portion of the domain.

Figure 2C5-10 shows the surface wind field at 0100 LST on November 16, under stable conditions (PG class F). Stable conditions occur during the night. Wind directions vary throughout the study area. The northern portion shows winds from the west with a switch to the north through the Athabasca valley. The middle portion of the domain has mainly southwest winds. In the south, the winds again show variation, blowing from the southwest, south and southeast.

Figure 2C5-1 2002 Annual Wind Roses for Two Surface Stations Based on Measurements

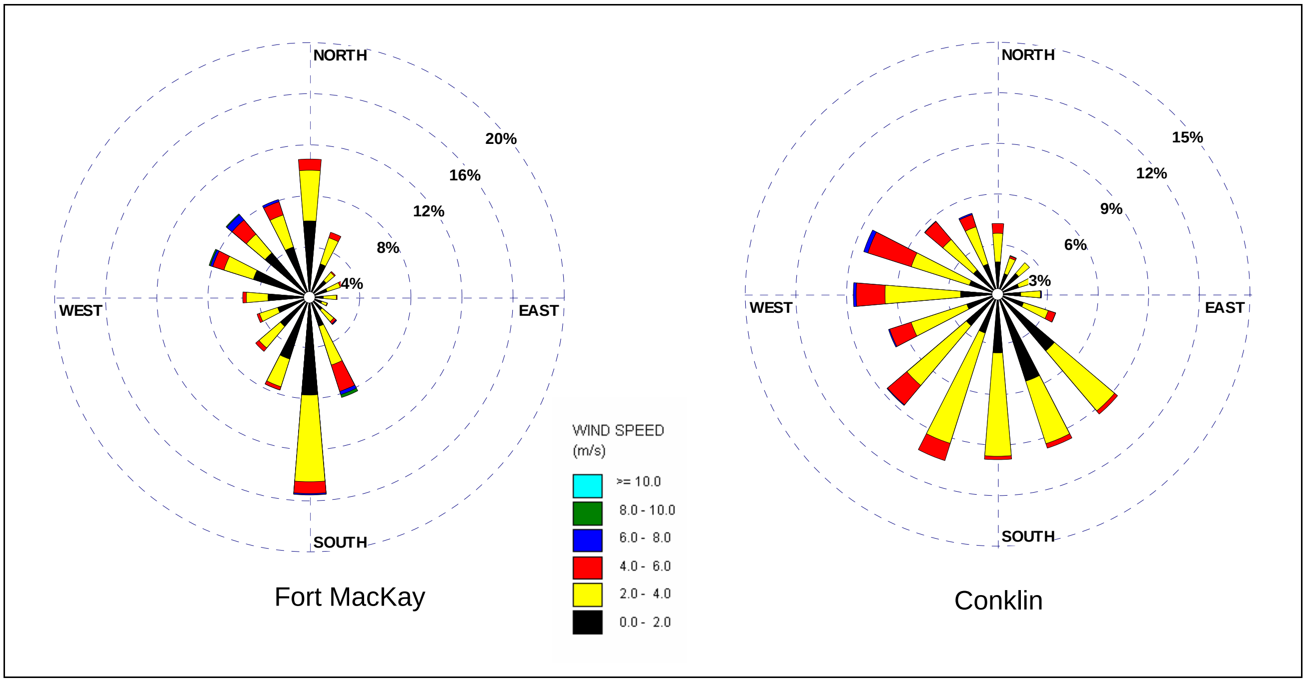
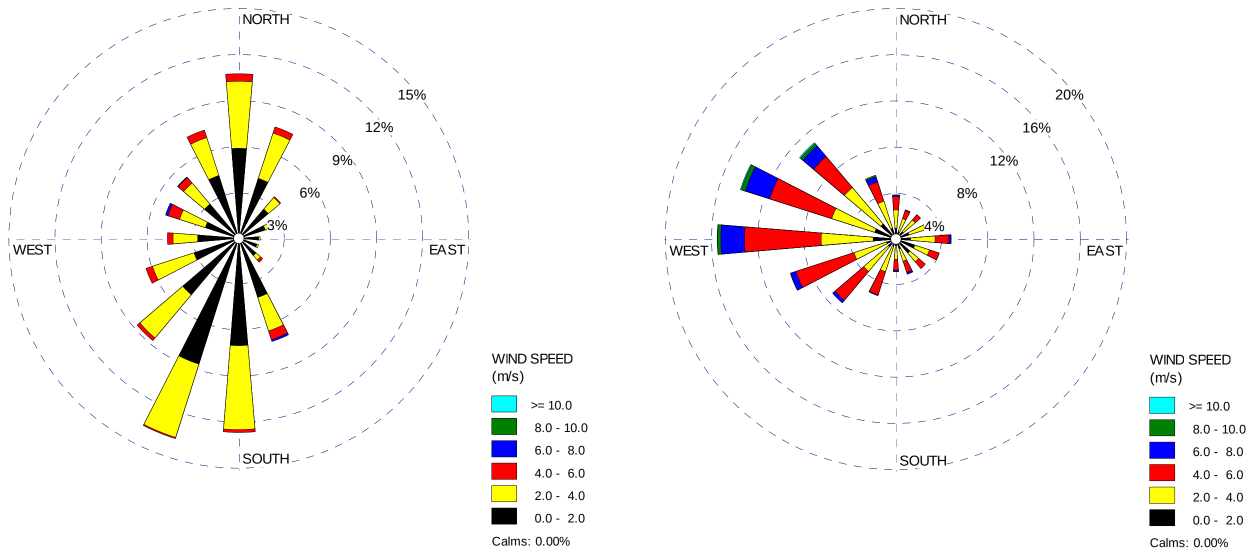


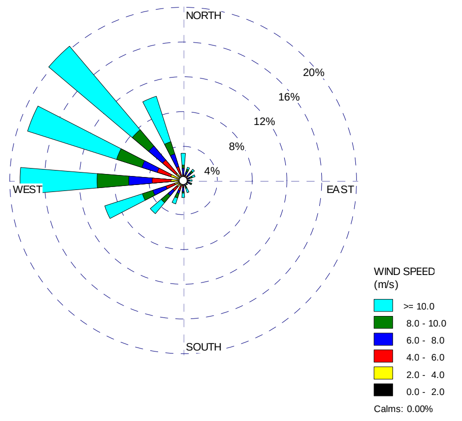
Figure 2C5-2 2002 Annual Wind Roses Predicted by the CALMET Model (Surface Level at 10 m)



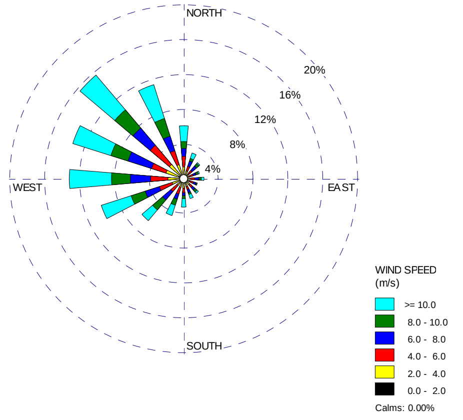
Fort MacKay (CALMET grid cell 13, 70)

Centre of air LSA (CALMET grid cell 14, 42)

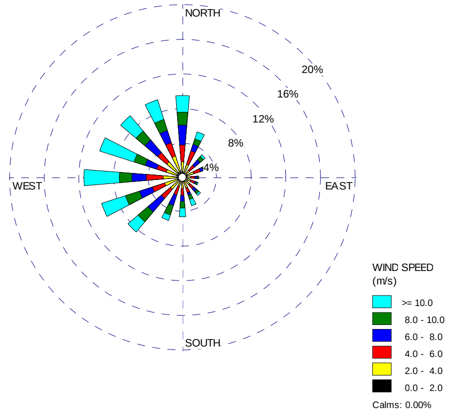
Figure 2C5-3 **2002 Annual Wind Roses Predicted by the CALMET Model at Varying Elevations above Fort MacKay (CALMET grid cell 13, 70)**



2,000 m above surface

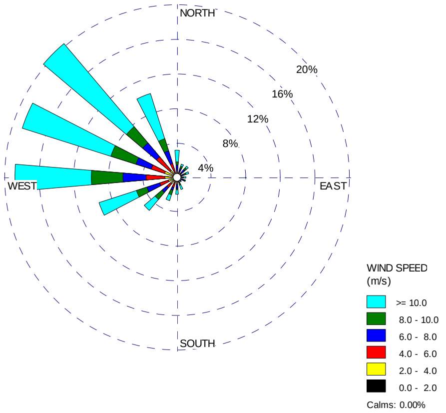


1,000 m above surface

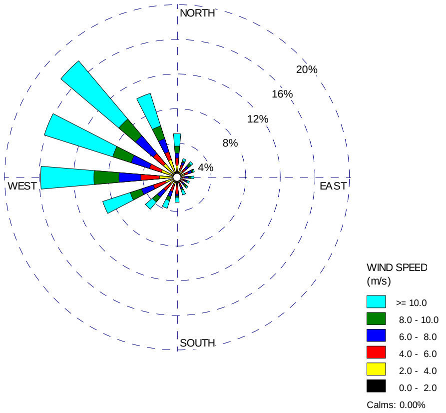


460 m above surface

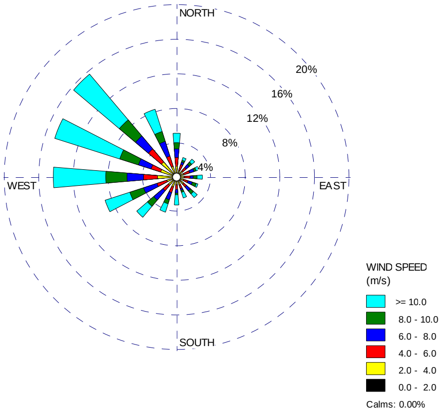
Figure 2C5-4 **2002 Annual Wind Roses Predicted by the CALMET Model at Varying Elevations above the Centre of the Air LSA (CALMET grid cell 14, 42)**



2,000 m above surface



1,000 m above surface



460 m above surface

Figure 2C5-5 Frequency of Stability Class for Time of Day as Modelled by CALMET at the Centre of the Air LSA (CALMET grid cell 14, 42)

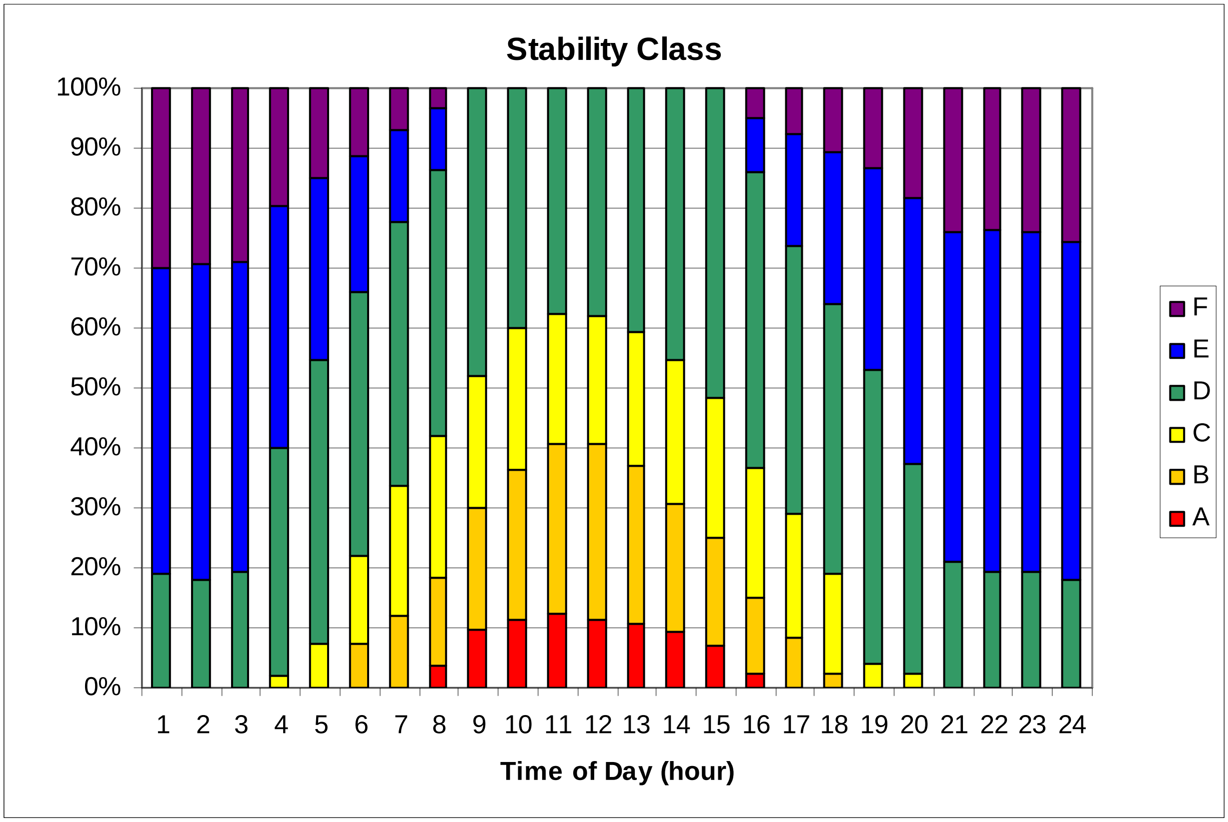
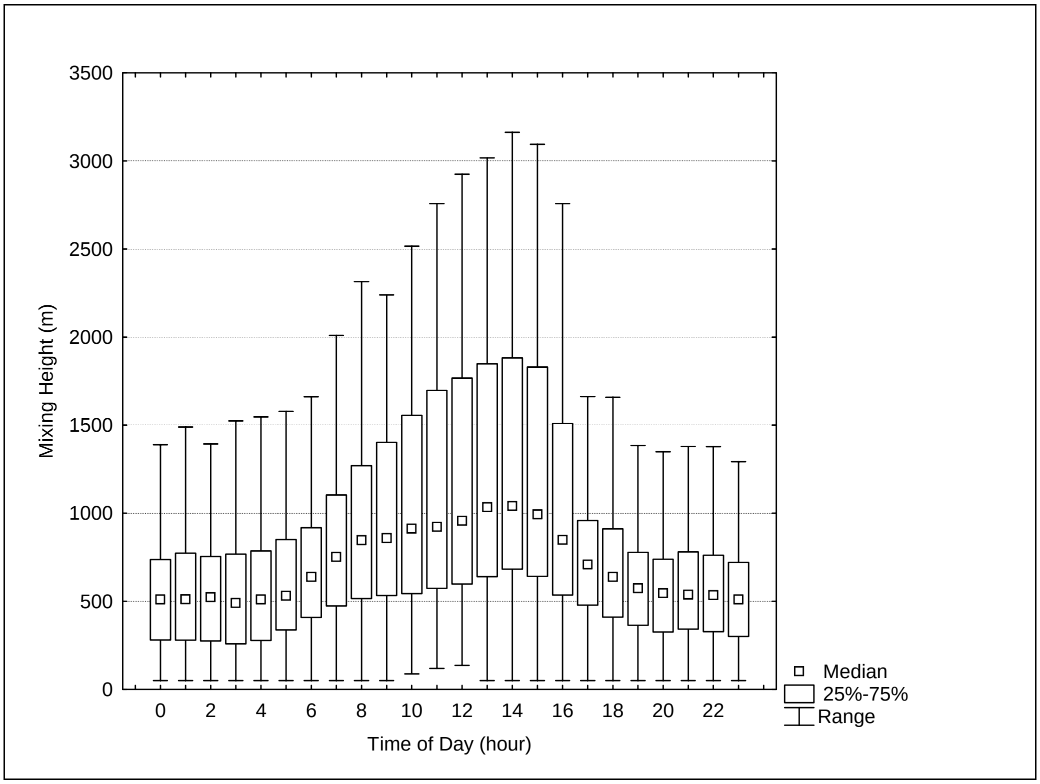
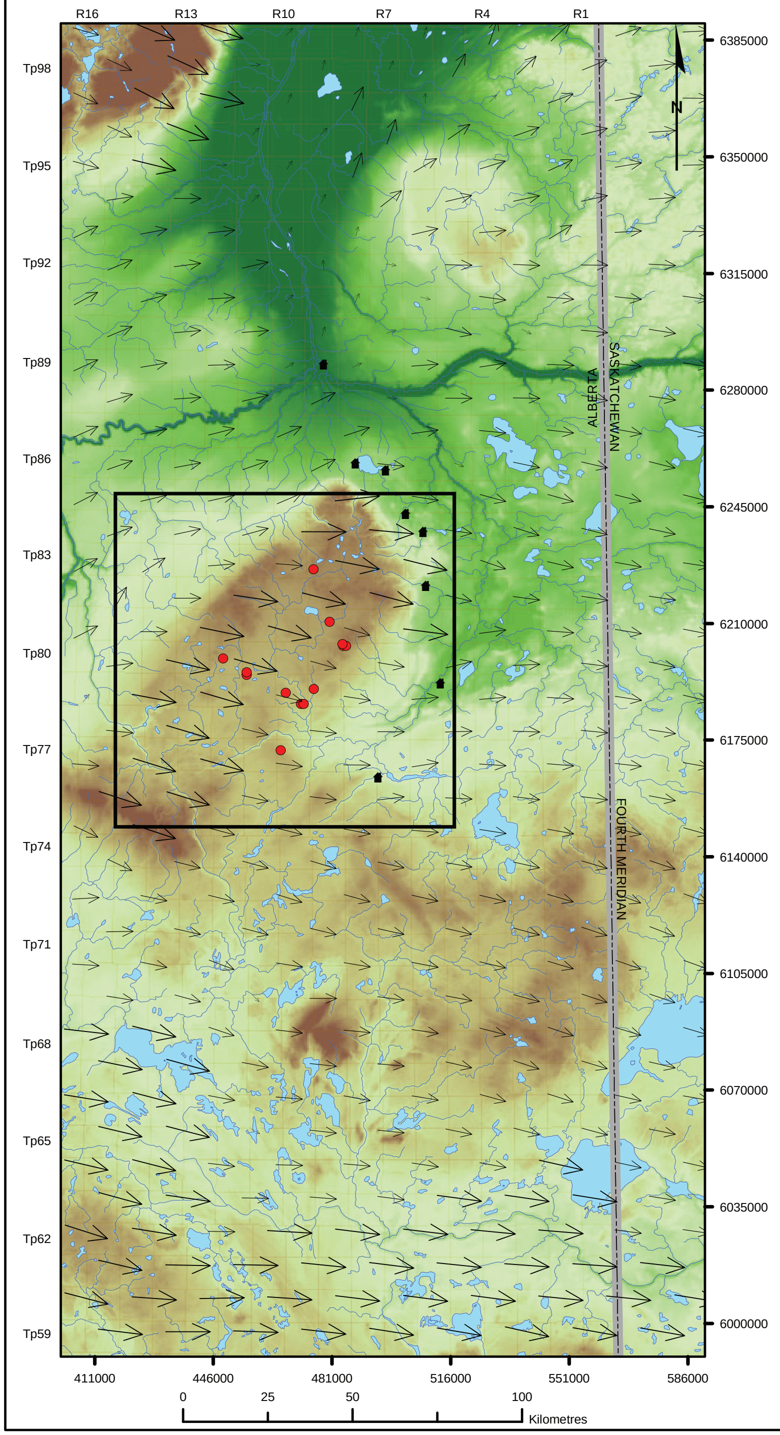


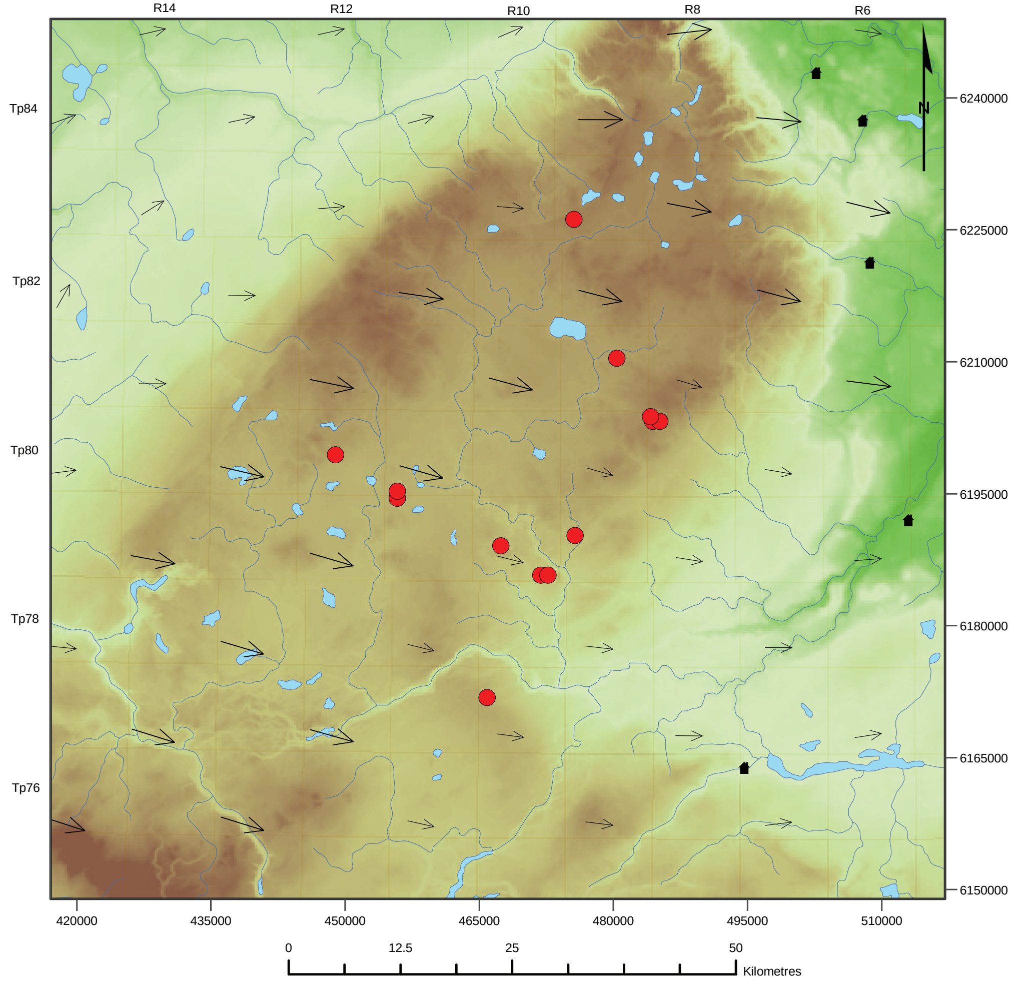
Figure 2C5-6 Mixing Height and Time of Day as Modelled by CALMET at the Centre of the Air LSA (CALMET grid cell 14, 42)



Regional Study Area



Local Study Area



Legend

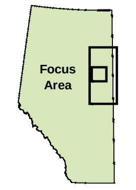
		Windspeed m/s	
●	The Project	↓	1
☗	Community	↓	4
🟦	Lake	↓	7.5
～	River		

Terrain (mASL)

High : 953

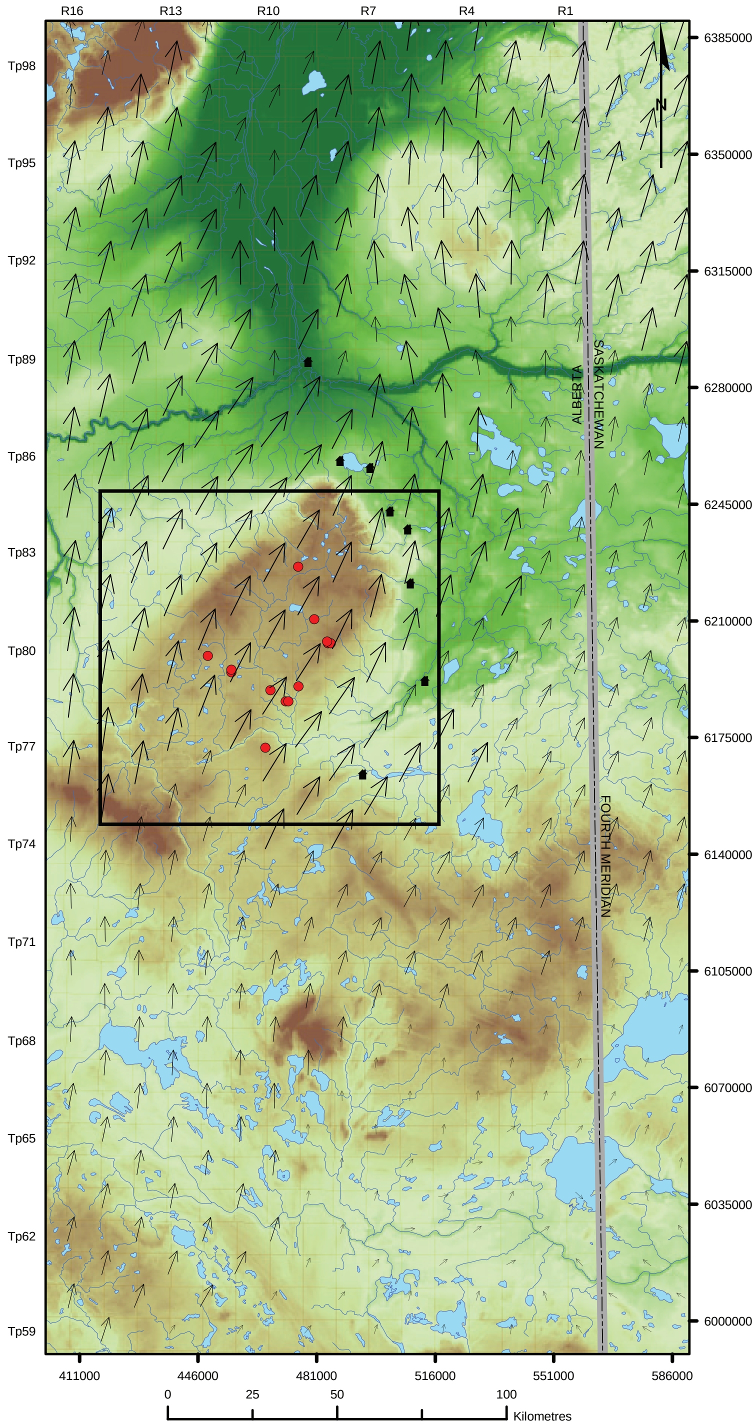
Low : 216

PROJECT	NORTH AMERICAN KAI KOS DEHSEH		
TITLE	Predicted Surface Wind Field for Neutral Conditions (0800 LST, February 12, 2002)		
DRAWN	LDB	04/2007	Figure 2C5-7
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		

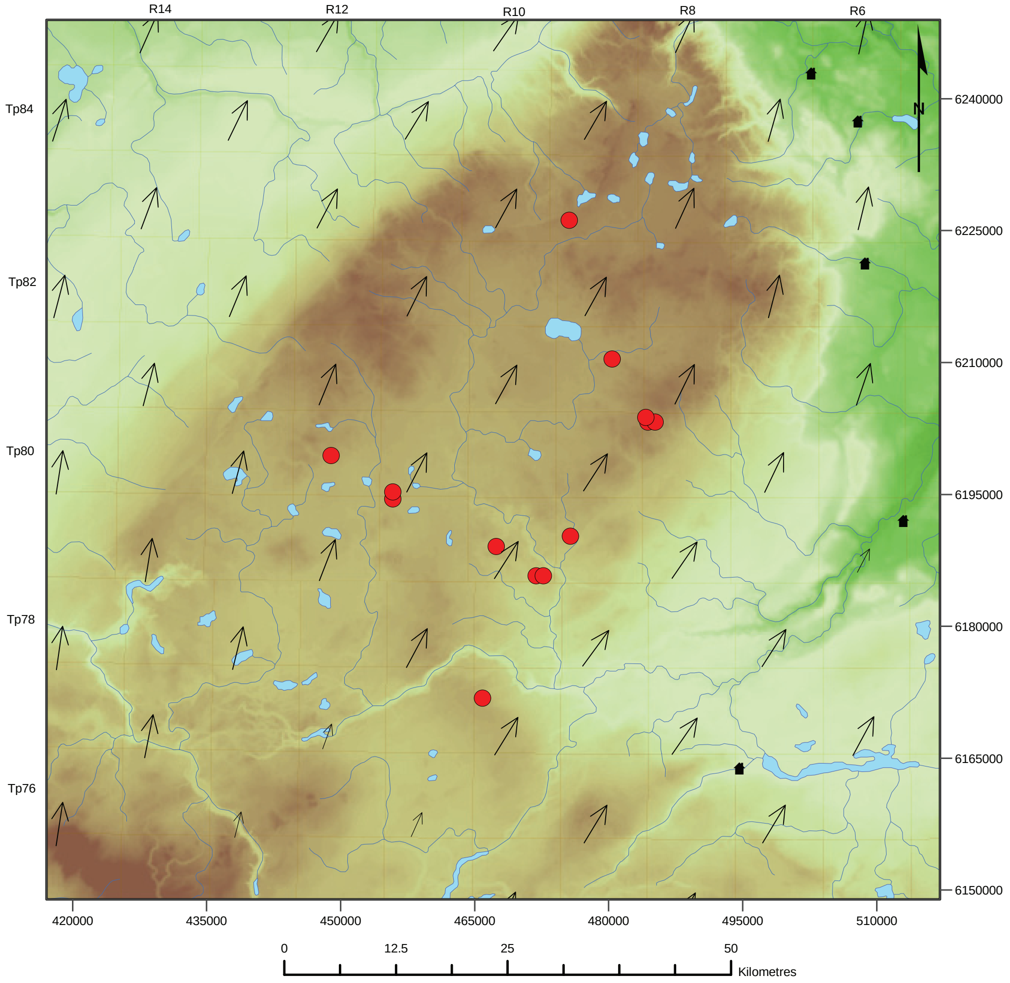


UTM Zone 12 NAD83

Regional Study Area



Local Study Area

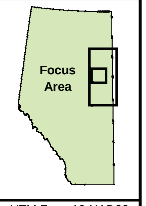


Legend

● The Project
☗ Community
Lake
River
Terrain (mASL)
High : 953
Low : 216

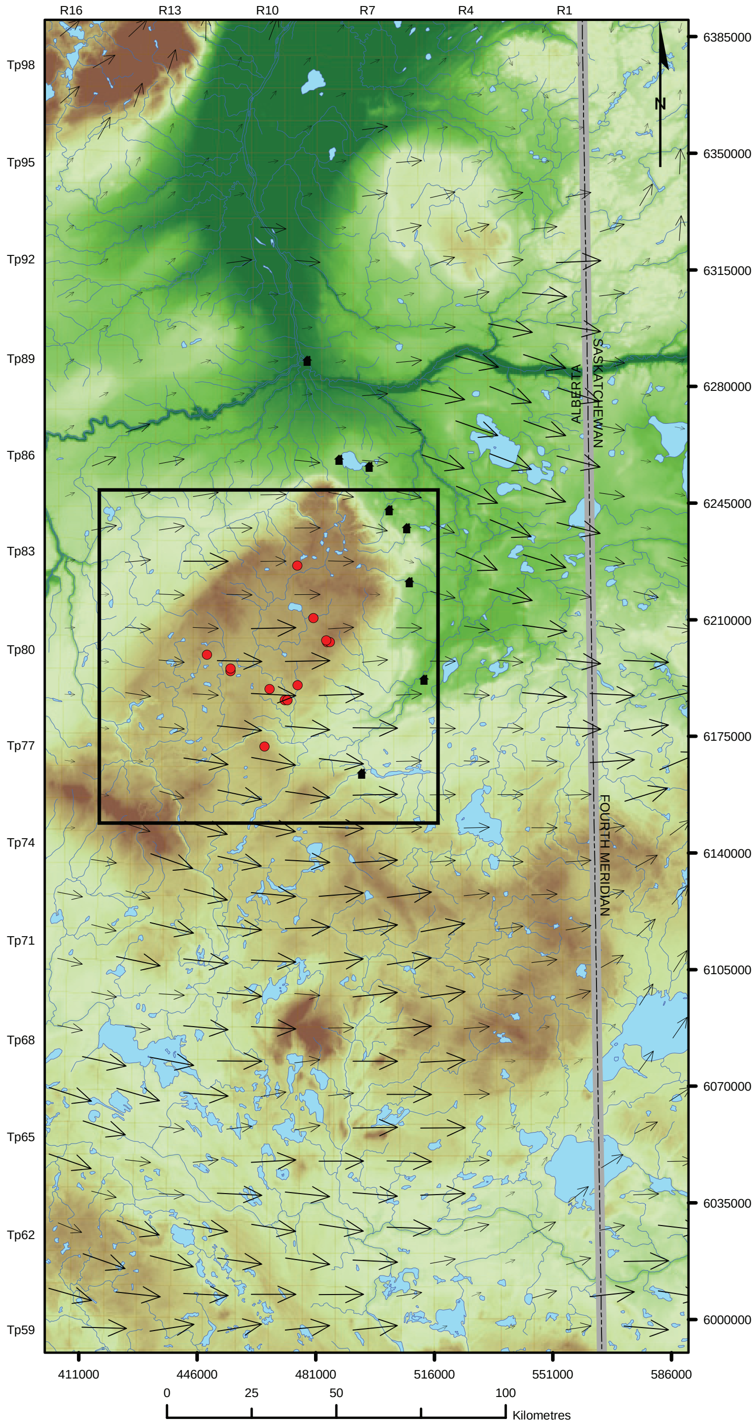
Windspeed m/s
↓ 1
↓ 4
↓ 7.5

PROJECT NORTH AMERICAN KAI KOS DEHSEH			
TITLE Predicted Surface Wind Field for Near-Neutral Conditions (1500 LST, September 7, 2002)			
DRAWN	LDB	04/2007	Figure 2C5-8
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		

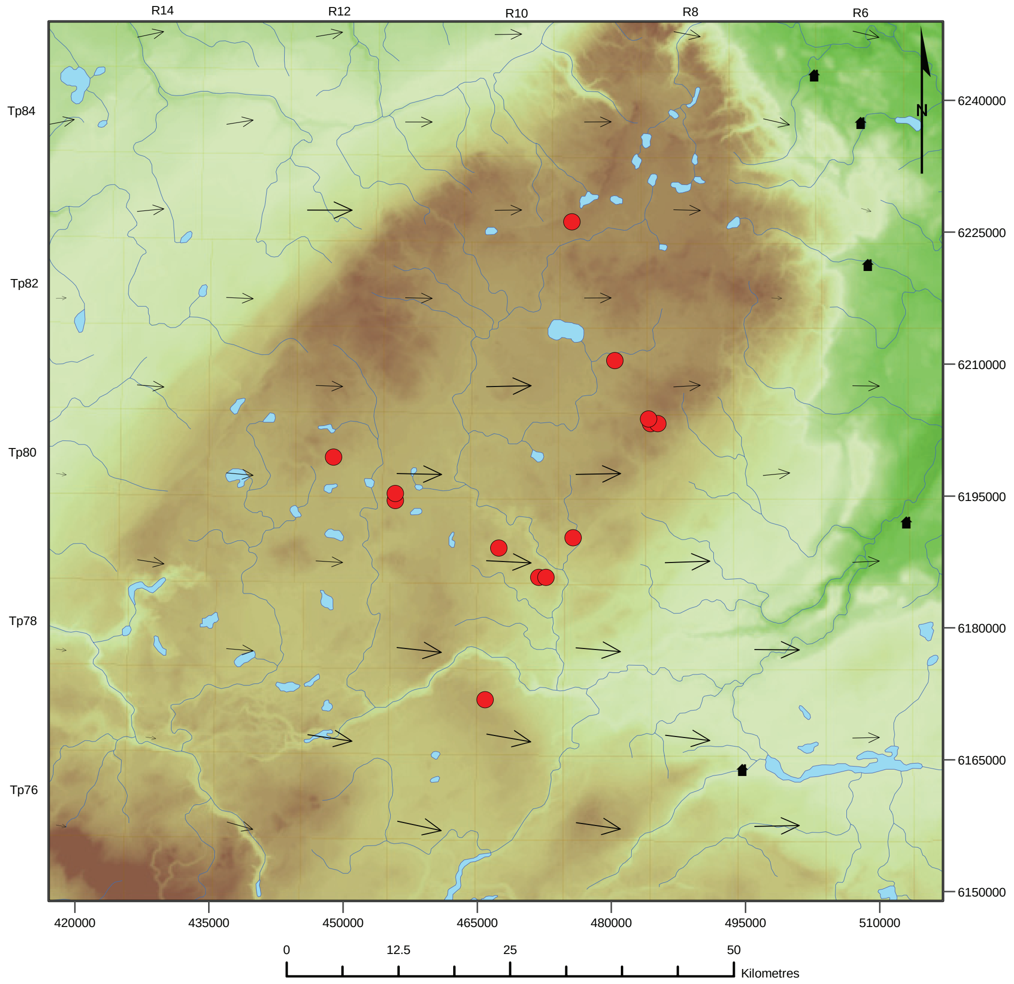


UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Legend

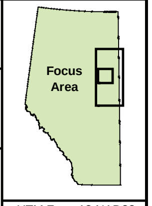
●	The Project	Windspeed m/s	
☗	Community	↓	1
	Lake	↓	4
	River	↓	7.5

Terrain (mASL)

High : 953

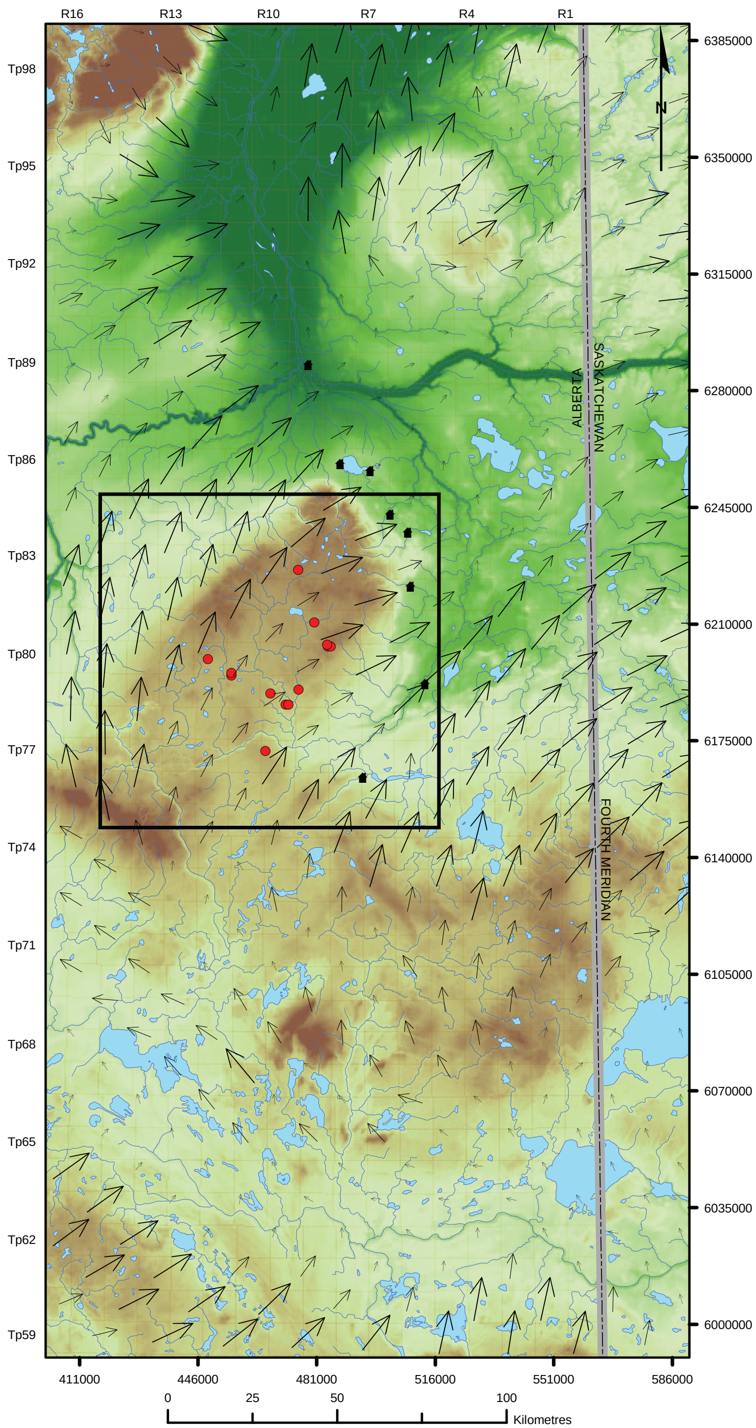
Low : 216

PROJECT	NORTH AMERICAN KAI KOS DEHSEH		
TITLE	Predicted Surface Wind Field Under Unstable Conditions (1400 LST, July 14, 2002)		
DRAWN	LDB	04/2007	Figure 2C5-9
CHECKED	SBB	04/2007	
REVIEWED	DSC	05/2007	
PROJECT	W06-1126B		

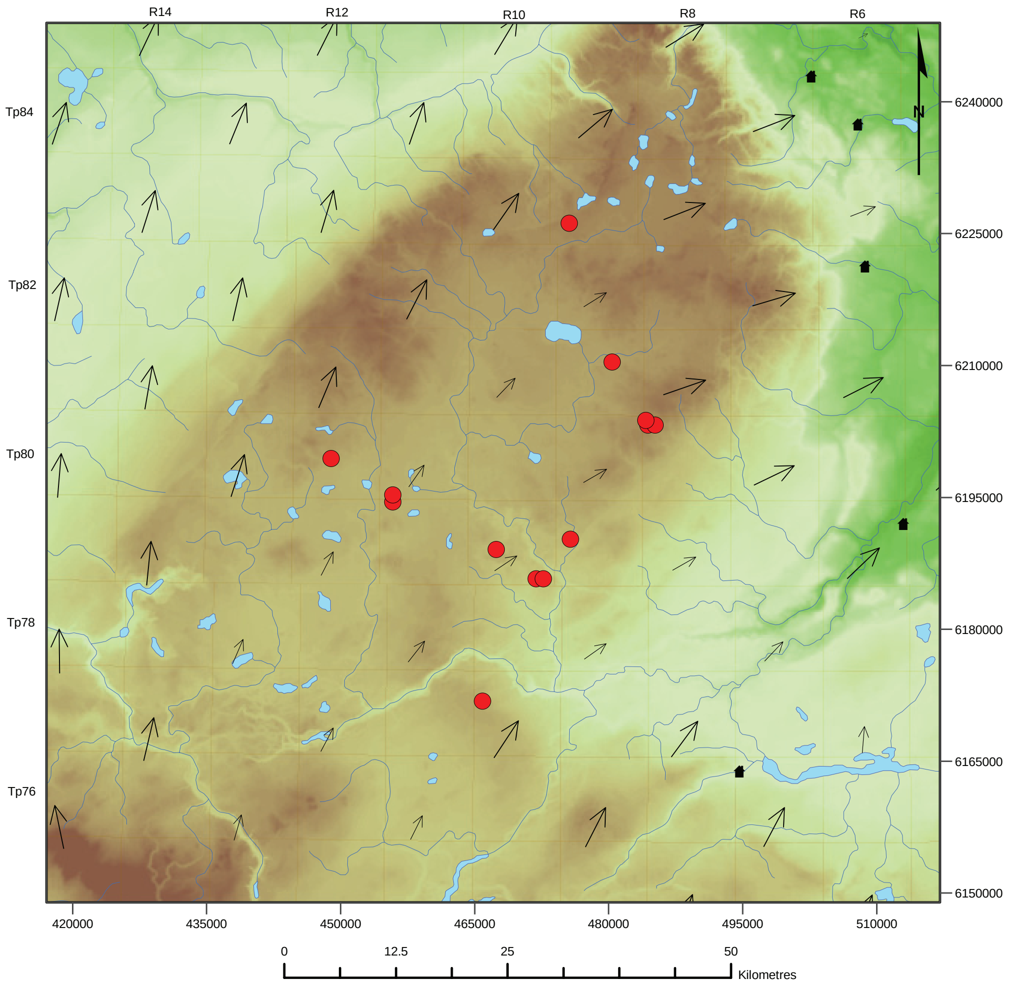


UTM Zone 12 NAD83

Regional Study Area



Local Study Area



Legend

●	The Project	Windspeed m/s	
☗	Community	↓	1
	Lake	↓	4
	River	↓	7.5
Terrain (mASL)			
	High : 953		
	Low : 216		

PROJECT

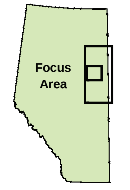
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Predicted Surface Wind Field Under Stable Conditions (0100 LST, November 16, 2002)

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2C5-10



UTM Zone 12 NAD83

2C6 CALMET Technical Options

The input parameters for the CALMET control file (Season 1) used in the Project assessment are provided in Tables 2C6-1 to 2C6-8.

Table 2C6-1 Input Groups in the CALMET Control File

Input Group	Description	Applicable to Project
0	Input and output file names	Yes
1	General run control parameters	Yes
2	Map Projection and Grid control parameters	Yes
3	Output Options	Yes
4	Meteorological data options	Yes
5	Wind Field Options and Parameters	Yes
6	Mixing Height, Temperature and Precipitation Parameters	Yes
7	Surface meteorological station parameters	Yes
8	Upper air meteorological station parameters	No
9	Precipitation parameters	No

Table 2C6-2 CALMET Model Options Input Group 1: General Run Control Parameters

Parameter	Default	Project	Comment
IBYR	-	2002	Starting year
IBMO	-	1	Starting month
IBDY	-	1	Starting day
IBHR	-	1	Starting hour
IBTZ	-	7	Base time zone
IRLG	-	8760	Length of run (hours)
IRTYPE	1	1	Run type
LCALGRD	T	T	Special data fields
ITEST	2	2	Flag to stop run after SETUP phase

Table 2C6-3 CALMET Model Options Input Group 2: Grid Control Parameters

Parameter	Default	Project	Comment
PMAP	UTM	UTM	Map Projection
FEAST	0.0	-	False easting (km) at the projection origin
FNORTH	0.0	-	False northing (km) at the projection origin
IUTMZN	-	12	UTM zone
UTMHEM	N	N	Hemisphere for UTM projection
RLAT0	-	-	Latitude (decimal degrees) of projection origin
RLON0	-	-	Longitude (decimal degrees) of projection origin
XLAT1	-	-	Matching parallel(s) of latitude (decimal degrees) for projection
XLAT2	-	-	Matching parallel(s) of latitude (decimal degrees) for projection
DATUM	WGS-G	NAR-C	Datum-region for output coordinates
NX	-	38	No. X grid cells
NY	-	80	No. Y grid cells
DGRIDKM	-	5	Grid spacing (km)
XORIGKM	-	401	Reference coordinate of SW corner of grid cell (1,1) -X coordinate (km)
YORIGKM	-	5990	Reference coordinate of SW corner of grid cell (1,1) -Y coordinate (km)
NZ	-	8	Vertical grid definition: Number of vertical layers
ZFACE	-	0,20,40,80,160, 320,600,1400, 2600	Vertical grid definition: Cell face heights in arbitrary vertical grid (m)

Table 2C6-4 CALMET Model Options Input Group 3: Output Options

<table>
<tr><th>Parameter</th><th>Default</th><th>Project</th><th>Comment</th></tr>
<tr><td colspan="4">Disk Output:</td></tr>
<tr><td>LSAVE</td><td>T</td><td>T</td><td>Save met. Fields in the unformatted output files</td></tr>
<tr><td>IFORMO</td><td>1</td><td>1</td><td>Type of unformatted output file</td></tr>
<tr><td colspan="4">Line Printer Output:</td></tr>
<tr><td>LPRINT</td><td>F</td><td>T</td><td>Print meteorological fields</td></tr>
<tr><td>IPRINF</td><td>1</td><td>12</td><td>Print intervals (hrs)</td></tr>
<tr><td>IUVOUT (NZ)</td><td>0</td><td>1,0,0,0,0, 0,0,0</td><td>Specify which layers of u,v wind component to print</td></tr>
<tr><td>IWOUT (NZ)</td><td>0</td><td>0,0,0,0,0, 0,0,1</td><td>Specify which level of the w wind component to print</td></tr>
<tr><td>ITOUT (NZ)</td><td>0</td><td>1,0,0,0,0, 0,0,0</td><td>Specify which levels of the 3-D temperature field to print</td></tr>
<tr><td colspan="4">Meteorological fields to print
<table>
<tr><th>Variable</th><th>Print ?
0 = no print 1 = print</th><th>Comment</th></tr>
<tr><td>STABILITY</td><td>0</td><td>PGT stability</td></tr>
<tr><td>USTAR</td><td>0</td><td>Friction velocity</td></tr>
<tr><td>MONIN</td><td>0</td><td>Monin-Obukhov length</td></tr>
<tr><td>MIXHT</td><td>0</td><td>Mixing height</td></tr>
<tr><td>WSTAR</td><td>0</td><td>Convective velocity scale</td></tr>
<tr><td>PRECIP</td><td>1</td><td>Precipitation rate</td></tr>
<tr><td>SENSHEAT</td><td>0</td><td>Sensible heat flux</td></tr>
<tr><td>CONVZI</td><td>0</td><td>Convective mixing height</td></tr>
</table>
</td></tr>
<tr><td colspan="4">Testing and debug print options for micrometeorological module:</td></tr>
<tr><td>LDB</td><td>F</td><td>F</td><td>Print input meteorological data and internal variables</td></tr>
<tr><td>NN1</td><td>1</td><td>1</td><td>First time step for which debug data are printed</td></tr>
<tr><td>NN2</td><td>1</td><td>1</td><td>Last time step for which debug data are printed</td></tr>
<tr><td colspan="4">Testing and debug print options for wind field module:</td></tr>
<tr><td>IOUTD</td><td>0</td><td>0</td><td>Control variable for writing the test/debug wind fields to disk files</td></tr>
<tr><td>NZPRN2</td><td>1</td><td>0</td><td>Number of levels, starting at surface, to print</td></tr>
<tr><td>IPR0</td><td>0</td><td>0</td><td>Print the interpolated wind components</td></tr>
<tr><td>IPR1</td><td>0</td><td>0</td><td>Print the terrain adjusted surface wind components</td></tr>
<tr><td>IPR2</td><td>0</td><td>0</td><td>Print the smoothed wind components and the initial divergence fields</td></tr>
<tr><td>IPR3</td><td>0</td><td>0</td><td>Print the final wind speed and direction</td></tr>
<tr><td>IPR4</td><td>0</td><td>0</td><td>Print the final divergence fields</td></tr>
<tr><td>IPR5</td><td>0</td><td>0</td><td>Print the winds after kinematic effects are added</td></tr>
<tr><td>IPR6</td><td>0</td><td>0</td><td>Print the winds after the Froude number adjustment is made</td></tr>
<tr><td>IPR7</td><td>0</td><td>0</td><td>Print the winds after slope flows are added</td></tr>
<tr><td>IPR8</td><td>0</td><td>0</td><td>Print the final wind field components</td></tr>
</table>

Table 2C6-5 CALMET Model Option Group 4: Meteorological Data Options

Parameter	Default	Project	Comment
Number of Surface & Precipitation Meteorological Stations:			
NOOBS	0	1	No Observation Mode
NSSTA	-	15	Number of surface stations
NPSTA	-	-1	Number of precipitation stations
Cloud Data Options:			
ICLOUD	0	3	Gridded cloud fields
File Formats:			
IFORMS	2	2	Surface meteorological data file format
IFORMP	2	2	Precipitation data file format
IFORMC	2	2	Cloud data file format

Table 2C6-6 CALMET Model Option Group 5: Wind Field Options and Parameters

Parameter	Default	Project	Comment
Wind Field Model Options:			
IWFCOD	1	1	Model selection variables
IFRADJ	1	1	Compute Froude number adjustment
IKINE	0	0	Compute kinematic effects
IOBR	0	0	Use O'Brien procedure for adjustment of the vertical velocity
ISLOPE	1	1	Compute slope flow effects
IEXTRP	-4	-4	Extrapolate surface wind observations to upper layers (similarity theory used with layer 1 data at upper air stations ignored)
ICALM	0	0	Extrapolate surface winds even if calm
BIAS	0	0, 0, 0, 0, 0, 0, 0, 0	Zero bias leaves weights unchanged (1/R^2 interpolation)
RMIN2	4	-1.0	Minimum distance from nearest upper air station to surface station for which extrapolation of surface winds at surface station will be allowed
IPROG	0	14	Use gridded prognostic wind field model output fields as input to the diagnostic wind field model (14=use winds from MM5.DAT file as initial guess field)
Radius of Influence Parameters:			
LVARY	F	F	Use varying radius of influence
RMAX1	-	10	Maximum radius of influence over land in the surface layer (km)
RMAX2	-	10	Maximum radius of influence over land aloft (km)
RMAX3	-	5	Maximum radius of influence over water (km)
Other Wind Field Input Parameters:			
RMIN	0.1	0.1	Minimum radius of influence used in the wind field interpolation (km)
TERRAD	-	30	Radius of influence of terrain features (km)
R1	-	5	Relative weighting of the first guess field and observations in the surface layer (km)
R2	-	5	Relative weighting of the first guess field and observations in the layers aloft (km)
RPROG	-	54	Relative weighting parameter of the prognostic wind field data (km)
DIVLIM	5.0E-6	5.0E-6	Maximum acceptable divergence in the divergence minimization procedure
NITER	50	50	Maximum number of iterations in the divergence minimization procedure
NSMTH (NZ)	2, (mxnz-1)*4	2,7,7,14, 14,28,28, 28	Number of passes in the smoothing procedure
NINTR2	99	99,99,99,99, 99,99,99,0	Maximum number of stations used in each layer for the interpolation of data to a grid point
CRITFN	1.0	1.0	Critical Froude number
ALPHA	0.1	0.1	Empirical factor controlling the influence of kinematic effects
FEXTR2(NZ)	0.0	0.0,0.0,0.0,0. 0,0.0,0.0,0.0, 0.0	Multiplicative scaling factor for extrapolation of surface observations to upper layers

Table 2C6-6 CALMET Model Option Group 5: Wind Field Options and Parameters (continued)

Barrier Information:			
NBAR	0	0	Number of barriers to interpolation of the wind fields
Diagnostic Module Data Input Options:			
IDIOPTI	0	0	Surface temperature (0 = compute internally from hourly surface observation)
ISURFT	-	14	Surface meteorological station to use for the surface temperature
IDIOPT2	0	0	Domain-averaged temperature lapse (0 = compute internally from hourly surface observation)
IUPT	-	0	Upper air station to use for the domain-scale lapse rate
ZUPT	200	200	Depth through which the domain-scale lapse rate is computed (m)
IDIOPT3	0	0	Domain-averaged wind components
IUPWND	-1	-1	Upper air station to use for the domain-scale winds
ZUPWND	1.0, 1000	1.0, 1000	Bottom and top of layer through which domain-scale winds are computed (m)
IDIOPT4	0	0	Observed surface wind components for wind field module
IDIOPT5	0	0	Observed upper air wind components for wind field module
Lake Breeze Information:			
LLBREZE	F	F	Use lake breeze module
NBOX	-	0	Number of lake breeze regions
XG1	-	0	X Grid line 1 defining the region of interest
XG2	-	0	X Grid line 2 defining the region of interest
YG1	-	0	Y Grid line 1 defining the region of interest
YG2	-	0	Y Grid line 2 defining the region of interest
XBCST	-	0	X Point defining the coastline in kilometres (Straight line)
YBCST	-	0	Y Point defining the coastline in kilometres (Straight line)
XECST	-	0	X Point defining the coastline in kilometres (Straight line)
YECST	-	0	Y Point defining the coastline in kilometres (Straight line)
NLB	-	0	Number of stations in the region
METBXID	-	0	Station ID's in the region

Table 2C6-7 CALMET Model Option Group 6

Input Group 6: Mixing Height, Temperature and Precipitation Parameters

Parameter	Default	Project	Comment
Empirical Mixing Height Constants:			
CONSTB	1.41	1.41	Neutral, mechanical equation
CONSTE	0.15	0.15	Convective mixing height equation
CONSTN	2400	2400	Stable mixing height equation
CONSTW	0.16	0.16	Over water mixing height equation
FCORIO	1.0E-4	1.2E-04	Absolute value of Coriolis (1/s)
Spatial Averaging of Mixing Heights			
IAVEZI	1	1	Conduct spatial averaging
MNMDAV	1	3	Maximum search radius in averaging
HAFANG	30	30	Half-angle of upwind looking cone for averaging
ILEVZI	1	1	Layer of winds used in upwind averaging
Other Mixing Heights Variables:			
DPTMIN	0.001	0.001	Minimum potential temperature lapse rate in the stable layer above the current convective missing height (K/m)
DZZI	200	200	Depth of layer above current convective mixing height through which lapse rate is computed (m)
ZIMIN	50	50	Minimum overland mixing height (m)
ZIMAX	3000	3200	Maximum overland mixing height (m)
ZIMINW	50	100	Minimum over-water mixing height (m)
ZIMAXW	3000	3200	Maximum over-water mixing height (m)
Temperature Parameters			
ITPROG	0	1	3D temperature from surface stations and MM5
IRAD	1	1	Interpolation type
TRADKM	500	500	Radius of influence for temperature interpolation (km)
NUMTS	5	6	Maximum number of stations to include in temperature interpolation
IAVET	1	1	Conduct spatial averaging of temperatures (1 = yes)
TGDEFB	-.0098	-.0098	Default temperature gradient below the mixing height over water (K/m)
TGDEFA	-.0045	-.0045	Default temperature gradient above the mixing height over water (K/m)
JWAT1	-	55	Beginning land use categories for temperature interpolation over water
JWAT2	-	55	Ending land use categories for temperature interpolation over water
Precipitation Interpolation Parameters			
NFLAGP	2	2	Method of interpolation
SIGMAP	100	500	Radius of Influence (km)
CUTP	0.01	0.01	Minimum Precipitation rate cut-off (mm/h)

Table 2C6-8 CALMET Model Option Group 7: Surface Meteorological Station Parameters

Name	ID	X coordinate (km)	Y coordinate (km)	Time zone	Anemometer. Height
FTMK	1001	461.287	6338.622	7	10
MLK	1002	465.766	6323.084	7	10
LCA	1003	469.599	6320.486	7	10
BV	1004	464.000	6317.177	7	10
MNX	1005	470.695	6314.020	7	20
PMI	1006	470.884	6289.916	7	10
AV	1007	476.129	6287.709	7	10
FTC	1008	489.780	6507.592	7	10
BL	1009	463.779	6345.872	7	10
AM	1010	468.306	6345.872	7	10
LCB	1011	469.251	6321.053	7	20
MLL	1012	476.658	6305.101	7	10
SYN	1013	461.143	6334.167	7	10
CONK	1014	507.041	6159.469	7	10
YMM	71932	350.000	6500.000	7	10

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2D CALPUFF DISPERSION MODEL

2D1 Introduction

This section discusses the selection and application of the dispersion models used for the North American Kai Kos Dehseh Project (the Project) air quality assessment.

2D1.1 Model Types

Air quality simulation (or dispersion) models provide a scientific means of relating industrial emissions to air quality changes through the use of mathematical equations that simulate transport, dispersion, transformation, and deposition processes. Dispersion models can address a range of spatial scales (hundreds of metres to thousands of kilometres) and temporal scales (minutes to years). There are two principal modelling approaches:

- **Screening models** estimate maximum short-term (~1-hour) average concentrations for a wide range of pre-selected meteorological conditions. These models are typically limited to single sources and downwind distances up to 10 km; and

- **Refined models** are based on the use of sequential hourly meteorological data for a one to five year period (8,760 hours to 47,800 hours, respectively). These models address multiple sources, and predict hourly average concentrations for all source, meteorology and receptor combinations. The hourly concentrations can be used to predict concentrations for averaging periods that are factors of 24 (i.e., 2 hours, 3 hours, 4 hours, 6 hours, 8 hours or 12 hours), or for longer periods (i.e., seasonal or annual). Refined models can also account for elevated terrain, chemical transformation, and deposition processes.

Regulatory agencies have relied on dispersion model predictions to address air quality management issues as part of the approval process. Numerous models are available for the air quality predictions and the appropriate selection depends on project-specific needs. In response to the regulatory use of these models, formal guidelines regarding the selection and application of these models have been developed (e.g., AENV, 2003a; AENV, 2003b; U.S. EPA, 2005a).

2D1.2 Model Application

The application of a dispersion model requires the preparation of input files and the analysis of output files. Figure 2D1-1 provides a schematic of the input and output processing needs.

The input files include:

- Control/Option information to identify the model run, and to select the available technical and output options;

- Source data to identify the location, the characteristics (e.g., stack height), and the emissions (e.g., SO_2 emission) of all sources;

- Terrain and Receptor data to account for elevated terrain airflow and to provide the deposition characteristics for the vegetation canopy; and

- Meteorological data to characterize the airflow and turbulence on an hourly basis.

The output files include:

- A summary file to identify the model run and provide an overview of the run;
- Hourly concentration files for each receptor and meteorological combination; and
- Hourly deposition files for each receptor and meteorological combination.

Presentation software is used to re-format the output and to provide concentration and deposition contour plots superimposed over regional base maps.

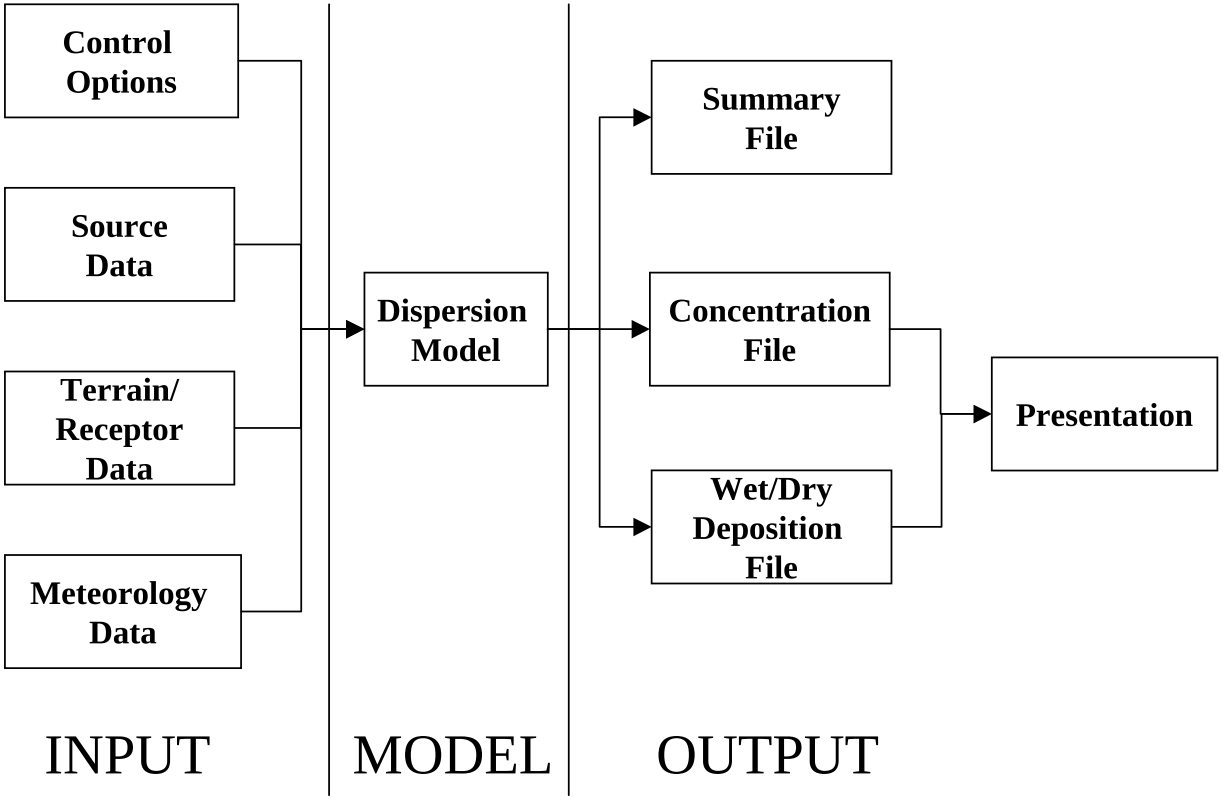
2D1.3 Model Limitations

By definition, air quality models can only approximate atmospheric processes and simplifications are required to describe real phenomena. Model uncertainties can result from:

- Simplifications and accuracy limitations related to source data;
- Extrapolation of meteorological data from a single location to a larger area;
- Simplifications to the model physics to replicate the random nature of atmospheric dispersion processes; and
- Proximity of receptors to source locations.

Models are reasonable and reliable in estimating the maximum concentrations occurring sometime, somewhere within an area, with reported uncertainties that range from ± 10% to ± 40% (U.S. EPA, 2005a). With models, such as CALPUFF and ISCST3, placement of receptors too close to a source results in over-estimation of concentrations. This is particularly true in the case of area sources where it is recommended that receptors should not be located closer to an area source than the area source’s width (New Zealand Ministry for the Environment, 2004). Typically, a model is viewed as replicating dispersion processes if it can predict within a factor of two, and if it can replicate the temporal and meteorological variations associated with monitoring data. Model predictions at a specific site and for a specific hour, however, may poorly correlate with the associated observations due to the above-indicated uncertainties.

Figure 2D1-1 Schematic of Dispersion Model Application



2D2 Model Selection

2D2.1 Model Requirements

For the air RSA emission sources, the following model requirements are considered necessary:

- Ability to handle multiple point sources located in the rural area;
- Ability to handle flat and elevated terrain features;
- Ability to handle SO_2 to sulphate (SO_4^{2-}), and NO_x to nitrate (NO^{3-}) conversion; and
- Ability to handle wet, dry, gaseous, and particulate deposition.

These features are required to predict ambient concentrations and potential acid input (PAI). According to Alberta Environment's definition (AENV, 2003a), a refined model is required to address these needs.

2D2.2 Candidate Models

Table 2D2-1 describes the refined dispersion models outlined in the Alberta Air Quality Model Guideline (AENV, 2003a). Only the CALPUFF model can be used to predict deposition of acidifying compounds. If deposition was not a requirement, then ISC-PRIME or AERMOD could be used. AERMOD provides a more refined treatment of dispersion relative to ISC-PRIME. While CALPUFF is sometimes viewed as a mesoscale plume model, it is capable of simulating dispersion in the near field like the ISC-PRIME or AERMOD models. Especially for convective conditions, the CALPUFF model was deemed appropriate for the Project area. CALPUFF has two major options with respect to simulating meteorological conditions:

- The ISC mode assumes a uniform meteorological field over the modelling domain during a given hour. While this is consistent with the ISC-PRIME and AERMOD models, CALPUFF has the advantage of allowing the plume trajectory to vary from hour-to-hour in a systematic manner; and
- The CALMET mode allows for three-dimensional meteorological field over the modelling domain during a given hour.

For this assessment, the CALPUFF model was selected using the CALMET mode option (details are provided in Appendix 2C).

Table 2D2-1 Refined Dispersion Models Identified in the Alberta Air Quality Model Guideline

Industrial Source Complex (ISC-PRIME and ISC-OLM) with refined meteorological data – This is a U.S. EPA multi-source Gaussian model capable of predicting both long-term (annual) and short-term (down to 1-h mean) concentrations arising from point, area, and volume sources. Gravitational settling of particles can be accounted for using a dry deposition algorithm; wet deposition and depletion due to rainfall can also be treated. Effects of buildings can be considered. The model has urban and rural dispersion coefficients.
AERMOD – This is the new-generation U.S. air quality modelling system. It contains improved algorithms for convective boundary layers; for computing vertical profiles of wind, turbulence, and temperature; and for the treatment of all types of terrain. It was developed by the U.S. EPA, in collaboration with the American Meteorological Society.
Rough Terrain Diffusion Model (RTDM) – This is a U.S. EPA Gaussian model capable of predicting short-term concentrations arising from point sources in complex terrain. The model cannot address building wake effects. RTDM can be used with routinely available meteorological data relating to wind velocity and stability categories.
Complex Terrain Diffusion Model (CTDMPLUS) – This model is a refined air quality model that is preferred for use in all stability conditions for complex terrain applications. CTDMPLUS is applicable to all receptors on terrain elevations greater than stack top height. However, the model contains no algorithms for simulating building downwash, or the mixing and recirculation found in cavity zones in the lee of a hill.
CALPUFF – This model is a multi-layer, multi-species, non-steady state puff dispersion model that can simulate the effects of time and space-varying meteorological conditions on substance transport, transformation, and removal. CALPUFF can use the three-dimensional meteorological fields developed by the CALMET model or simple, single station winds in a format consistent with the meteorological files used to derive ISCST3 steady-state Gaussian models.

2D2.3 CALPUFF Model

CALPUFF (Scire et al., 2003) is a multi-layer, multi-species, non-steady-state puff dispersion model that can simulate the effects of time- and space-varying meteorological conditions on pollutant transport, transformation, and deposition. CALPUFF can use the three-dimensional meteorological fields developed by CALMET model, or simple, single-station winds in a format consistent with the meteorological files used to drive the ISCST3 steady-state Gaussian model. However, single-station ISCST3 winds do not allow CALPUFF to take advantage of its capabilities to treat spatially varying meteorological fields.

CALPUFF contains algorithms for near-source effects such as building downwash, transitional plume rise, partial plume penetration, sub-grid scale terrain interactions as well as longer-range effects such as pollutant removal (wet scavenging and dry deposition), chemical transformation, vertical wind shear, over-water transport, and coastal interaction effects. It can accommodate arbitrarily varying point source and area source emissions. Most of the algorithms contain options to treat the physical processes at different levels of detail depending on the model application.

The major features and options of the CALPUFF model are summarized in Table 2D2-2. Some of the technical algorithms of relevance include:

- **Dry Deposition**: A full resistance model is provided in CALPUFF for the computation of dry deposition rates of gases and particulate matter as a function of geophysical parameters, meteorological conditions, and pollutant species. Options are provided to allow user-specified, diurnally varying deposition velocities to be used for one or more pollutants instead of the resistance model (e.g., for sensitivity testing) or to bypass the dry deposition model completely.

- **Wet Deposition**: An empirical scavenging coefficient approach is used in CALPUFF to compute the depletion and wet deposition fluxes due to precipitation scavenging. The scavenging coefficients are specified as a function of the pollutant and precipitation type (i.e., frozen vs. liquid precipitation).

- **Chemical Transformation**: CALPUFF includes options to parameterize chemical transformation effects using the five-species scheme (SO_2, SO_4^{2-}, NO_X, HNO_3 and NO^{3-}) employed in the MESOPUFF II model, a modified six-species scheme (SO_2, SO_4^{2-}, NO, NO_2, HNO_3 and NO^{3-}) adapted from the RIVAD/ARM3 method, or a set of user-specified, diurnally varying transformation rates.

- **Building Downwash**: The Huber-Snyder and Schulman-Scire downwash models are both incorporated into CALPUFF. An option is provided to use either model for all stacks, or make the choice on a stack-by-stack and wind-sector-by-wind-sector basis. Both algorithms have been implemented in such a way as to allow the use of wind-direction-specific building dimensions. In addition, there is an option to use PRIME (Plume Rise Model Enhancements) as the method of calculating building downwash. PRIME includes two important features in downwash calculations: (1) enhanced plume dispersion coefficients due to turbulent wake effects, and (2) reduced plume rise due to descending streamlines and increased entrainment in the wake of the building.

- **Dispersion Coefficients**: Several options are provided in CALPUFF for the computation of dispersion coefficients: the use of turbulence measurements (σ_v and σ_w); the use of similarity theory to estimate σ_v and σ_w from modelled surface heat and momentum fluxes; the use of Pasquill-Gifford (PG) or McElroy-Pooler (MP) dispersion coefficients; or dispersion equations based on the Complex Terrain Dispersion Model (CDTM). Options are provided to apply an averaging-time correction or surface roughness length adjustments to the PG coefficients.

Table 2D2-2 Major Features of the CALPUFF Model

Source Types	Point sources (constant or variable emissions) Line sources (constant or variable emissions) Volume sources (constant or variable emissions) Area sources (constant or variable emissions)
Non-steady-state Emissions and Meteorological Conditions	Gridded 3-D fields of meteorological variables (winds, temperature) Spatially variable fields of mixing height, friction velocity scale, Monin-Obukhov length, precipitation rate Vertically and horizontally varying turbulence and dispersion rates Time-dependant source and emissions data
Efficient Sampling Functions	Integrated puff formulation Elongated puff (slug) formulation
Dispersion Coefficient (σ_y,σ_z) Options	Direct measurements of σ_v and σ_w Estimated values of σ_v and σ_w based on similarity theory Pasquill-Gifford (PG) dispersion coefficients (rural areas) McElroy-Pooler (MP) dispersion coefficients (rural areas) CTDM dispersion coefficients (neutral / stable) PDF formulation for the convective boundary layer
Vertical Wind Shear	Puff splitting Differential advection and dispersion
Plume Rise	Partial penetration Buoyant and momentum rise Stack tip effects Vertical wind shear Building downwash effects
Building Downwash	Huber-Snyder method Schulman-Scire method
Sub-grid Scale Complex Terrain	CTDM flow module Dividing streamline, H_d - Above H_d puff flows over the hill and experiences altered diffusion rates - Below H_d puff deflects around the hill, splits, and wraps around the hill
Interface to the Emissions Production Model (EPM)	Time-varying heat flux and emissions from controlled burns and wildfires
Dry Deposition	Gases and particulate matter Three options: - Full treatment of space and time variations of deposition with a resistance model - User-specified diurnal cycles for each pollutant - No dry deposition
Over Water and Coastal Interaction Effects	Over water boundary layer parameters Abrupt change in meteorological conditions, plume dispersion at coastal boundary Plume fumigation Option to introduce sub-grid scale Thermal Internal Boundary Layers (TIBLs) into coastal grid cells
Chemical Transformation Options	Pseudo-first-order chemical mechanism for SO_2, SO_4^{2-}, NO_X, HNO_3 and NO_3^- (MESOPUFF II method) Pseudo-first-order chemical mechanism for SO_2, SO_4^{2-}, NO, NO_2, HNO_3 and NO_3^- (RIVAD/ARM3 method) User-specified diurnal cycles of transformation rates No chemical conversion
Wet Removal	Scavenging coefficient approach Removal rate a function of precipitation intensity and precipitation type
Graphical User Interface	Point-and-click set-up and data input Enhanced error checking of model inputs On-line Help files

2D3 Model Application

2D3.1 Model Domain

The CALPUFF model requires the user to define locations where concentrations are to be calculated. The CALPUFF model domain was selected to represent the same 190 km by 400 km regional study area (RSA) used by CALMET. In addition, for the purpose of presentation, a smaller local study area (LSA) was selected to provide a close-up in the vicinity of the Project operating area. Table 2D3-1 provides the coordinates of the LSA, which represent a 100 km by 100 km area and includes the communities of Anzac and Fort McMurray.

Table 2D3-1 CALPUFF LSA Study Domain Coordinates (UTM Z12; NAD 83)

Domain Extents	Easting (m)	Northing (m)
Southwest	417073	6148954
Northwest	417073	6248954
Southeast	517073	6148954
Northeast	517073	6248954

Two types of receptors within the modelling domain were selected:

- A series of nested Cartesian grid points; and
- Community and recreational locations.

Figure 2D3-1 shows the nested Cartesian receptor grids used to provide an understanding of the spatial concentration and deposition patterns. Each of the Project Hubs assessed in this Project had a refined grid spacing surrounding the facility as follows:

- 20 m receptor spacing along the fenceline;
- 50 m for 0.5 km distance from the fenceline for each individual facility;
- 250 m for 2 km distance from the fenceline for each individual facility;
- 500 m for 5 km distance from the fenceline for each individual facility;
- 1 km for 100 by 100 km area centred on the LSA; and
- 10 km for all other areas in the model domain (RSA).

The receptor density is increased near the Project Hubs to provide a greater resolution and facilitate the determination of the maximum concentrations due to the plant facilities. The described grid provides 28,329 receptor points.

Table 2D3-2 and Figure 2D3-2 indicate the community and recreation locations near the Project operating area. The table also provides the coordinates of the receptors.

With respect to the adopted receptor grids, the Alberta modelling guidelines recommend 1,000 m grid spacing for distances beyond 5 km. The selected value of 10 km, while not meeting the recommendations, was required for the larger air study area. Given the height of stacks in the region of the Project (less than 50 m) and the moderately complex terrain, the maximum predicted concentrations due to the Project are expected to occur within 25 km.

This assessment focuses primarily on the Project emission sources, hence the greater receptor density near these sources. Near the more distant, non-Project sources; the lower receptor density may not identify maximum impacts from these non-North American projects. While the assessment addresses overlapping effects, a reader who is interested in maximum effects adjacent to other sources is directed to the respective non-North American air quality assessments.

Table 2D3-2 Location of the Community Receptors Relative to the Proposed North American Kai Kos Dehseh Project

Receptor ID	EIA Community Receptors	UTM E	UTM N	Elevation (m)
R01		414150	6142850	656
R02	**Behan**	472800	6125400	671
R03		474700	6127450	662
R04		476630	6134450	655
R05		479100	6144400	660
R06		479400	6145900	663
R07		470350	6148500	670
R08		478750	6148850	649
R09		494800	6126450	686
R10		511650	6139850	627
R11	**Cabin**	514050	6148200	633
R12	**Fish Plant**	523500	6146400	583
R13	**Cabin**	527500	6145100	589
R14		509500	6164450	558
R15		473650	6172300	600
R16		473750	6173250	571
R17		477450	6172350	575
R18		481100	6174350	579
R19		482100	6175900	559
R20	**Cabin**	485600	6177950	575
R21		497600	6165000	558
R22		497400	6163250	575
R23		491150	6154900	621
R24		459250	6153900	648
R25		452700	6195500	676
R26		468250	6194700	675
R27		482100	6204050	719
R28		495300	6179300	546
R29		496400	6179050	549
R30	**Gravel Pit**	436050	6200500	689
R31		437300	6202450	700
R32	**May Hill Fire Lookout**	411450	6158050	855
R33		417050	6175450	673
R34	**Waskahigan Provincial Forest Recreational Area**	422500	6175350	572
R35	**House River Provincial Forest Recreational Area**	427700	6166650	651
R36	**Caribou Creek Remote Provincial Forest Recreational Area**	432000	6165650	642
R37		432900	6162900	662
R38		507050	6185450	478
R39		505450	6190500	521

Table 2D3-2 Location of the Community Receptors Relative to the Proposed North American Kai Kos Dehseh Project (continued)

Receptor ID	EIA Community Receptors	UTM E	UTM N	Elevation (m)
R40	**Pingle**	505550	6196250	541
R41		505350	6204850	502
R42		514050	6193750	458
R43		515450	6196900	452
R44		516150	6196650	458
R45		516600	6199750	451
R46		516750	6199400	451
R47		518500	6200950	455
R48		517600	6198950	463
R49		517800	6199500	460
R50		519450	6197600	490
R51		518350	6194350	484
R52		505350	6229550	560
R53	**Quigley**	508700	6221250	494
R54		449650	6132600	632
R55		449200	6143550	682
R56		450650	6149400	682
R57		458450	6142450	655
R58	**Round Hill Airfield Tower**	436850	6128500	672
R59		514050	6237450	455
R60	**Provincial Campsite**	477500	6253000	516
R61	**Gregoire Lake Provincial Park**	487550	6258350	480
R62		490400	6254200	478
R63	**Gregoire Lake Indian Reserve 1**	489400	6250100	544
R64	**Gregoire Lake Indian Reserve 2**	490300	6250650	495
R65	**Campsite**	496400	6256000	471
R66		534250	6134550	614
R67		535800	6147900	599
R68		544100	6130700	693
R69		553300	6131650	732
R70		562300	6133250	671
R71	**Algar Tower Airfield 1**	451300	6219900	762
R72	**Algar Tower Airfield 2**	451750	6219300	761
R73	**Anzac**	496800	6256000	480
R74	**Cheecham**	507900	6237448	488
R75	**Fort McMurray**	478500	6287730	337
R76	**Gregoire Lake Townsite**	487935	6258014	480
R77	**Kinosis**	502700	6242848	470
R78	**Janvier**	513001	6192009	462
R79	**Conklin**	494650	6163889	564

2D3.2 Meteorology

CALMET output was used to provide representative wind, temperature and turbulence fields. The three-dimensionally varying fields account for seasonal land-use differences (detailed in Appendix 2C). Dispersion was estimated using the PG dispersion coefficients adjusted for a surface roughness specific to the land uses specified in Appendix 2C.

2D3.3 Terrain Coefficients

As a plume moves over elevated terrain, it has the potential to move closer to the ground. The plume path coefficient (PPC) method can be used to account for this potential decrease in height above the ground. A PPC of 1.0 assumes that the plume trajectory is parallel to the terrain features. Lott (1984) recommended PPC values of 0.8, 0.7, 0.6, 0.5, 0.4, and 0.3 for PG stability categories A, B, C, D, E and F, respectively. For this assessment, PPC values of 0.8, 0.7, 0.6, 0.5, 0.4, and 0.35 for PG stability categories A, B, C, D, E, and F, respectively, are assumed based on previous assessments for the region. The Lott assumptions for stable conditions (PG classes E and F) are more conservative than the selected values. However, given the shallow terrain in the region, the selected values are expected to be more realistic and consistent with the other regional assessments.

2D3.4 Building Effects

For cases where the stack height is relatively short in comparison to an adjacent building structure, there is the potential for a plume from the stack to be influenced by the presence of the building wake. The CALPUFF model can account for building wake effects. The U.S. EPA (1995b) Building Profile Input Program for PRIME (BPIPPRM) was used to process the building information and prepare the data for input into CALPUFF. Building effects were considered for Project sources. The building parameters for the Project facilities are shown in Table 2D3-3. As the buildings for the twelve facilities are the same, only buildings from one facility are presented.

2D3.5 NO to NO_2 Chemistry

While the CALPUFF model can predict ambient NO and NO_2 concentrations, the calculation has been shown to overestimate ambient NO_2 concentrations. For this assessment, the ozone limiting method (OLM) was applied. The OLM assumes that the conversion of NO to NO_2 in the atmosphere can be limited by the ambient ozone (O_3) concentration in the atmosphere. The approach assumes that 10% (on a volume basis) of the NO is converted to NO_2 prior to discharge into the atmosphere. For the remaining NO, the following is adopted:

- If 0.9 $[NO_x]$ is greater than the ambient O_3 concentration then $NO_2 = 0.1 [NO_x] + [O_3]$. For this case the conversion is not complete; and

- If 0.9 $[NO_x]$ is less than the ambient O_3 concentration then $NO_2 = 0.1 [NO_x] + 0.9 [NO_x] = NO_x$. This is equivalent to the total conversion approach, since there is sufficient ozone to effect the complete conversion.

In the application of the OLM, the above relationships are calculated on a parts per billion (ppb) basis, with the appropriate conversions for concentrations given in units of micrograms per cubic metre (ug/m^3). Alberta Environment (2003a) has recommended ambient ozone concentrations to be used for 1-hour, 24-hour and annual averaging periods (i.e., 50 ppb, 40 ppb and 35 ppb for rural areas, and 50 ppb, 35 ppb and 20 ppb for urban areas). Alternately, hourly ambient ozone data can be used to calculate the NO to NO_2 conversion on an hourly basis. For consistency, the hourly ozone data should coincide with the meteorological data used in the modelling. For this assessment, the OLM approach based on hourly ozone data from Fort McMurray for 2002 was used to estimate hourly NO_2 concentrations.

Table 2D3-3 Dimensions of Significant Structures at Each Proposed North American Kai Kos Dehseh Facility

Buildings	Model ID	Height (m)	Width (m)	Length (m)
Control Room Building	Control	6.73	16.2	29.9
Office	Office	5.12	10.2	35.7
Emergency Generator Building	EGen	5.75	10.2	29.9
MCC Building 1	MCC1	6.16	12.1	20.9
Steam Generator Building 1	StGen1	10.00	16.5	83.9
Steam Generator Building 2	StGen2	10.00	16.5	83.9
Water Treatment Building	Water	14.00	33.2	49.8
Fuel Gas Building	Fuel	5.23	7.2	20.9
Process/Inlet Building	Inlet	7.60	12.3	51.5
High Pressure Flare Knockout Drum	HPFKOD	3.85	6.0	6.0
Glycol Heating/Cooling Building	Glycol	5.23	6.8	32.0
MCC Building 2	MCC2	6.16	11.8	28.1
Low Pressure Flare Knockout Drum	LPFKOD	3.85	6.0	6.0
VRU Building	VRU	5.66	9.1	11.5
Deoiling Building	Deoil	5.73	10.0	24.0
Disposal Building	Dispos	5.23	6.8	24.0
Diluent Building	Diluent	5.23	6.9	20.0
Slop Building	Slop	5.23	7.1	14.3
Maintenance/Warehouse Building	Ware	10.00	30.3	41.8

Note: Facilities that have only four steam generators have only one steam generator building.

Facilities that have no steam generators have no steam generator buildings.

2D3.6 $PM_{2.5}$ Formation

The CALPUFF model is frequently used to predict secondary $PM_{2.5}$ formation due to precursor SO_2 and NO_x emissions. The model predicts particulate nitrate NO_3^-, which can exist as an aerosol (i.e., dissolved in a water droplet) or as a particle (e.g., NH_4NO_3). Similarly, sulphate SO_4^{2-} can also exist as an aerosol or as a particle (e.g., $(NH_4)_2SO_4$). The predicted NO_3^- and SO_4^{2-} concentrations can be summed to provide the contribution to the $PM_{2.5}$ loading; this approach does not reflect the nature of the end particle. For example, if reactions with NH_3 produce the end products NH_4NO_3 and $(NH_4)_2SO_4$, then the predicted sulphate and nitrate concentrations need to be multiplied by the factors indicated in Table 2D3-4. This approach was adopted and is consistent with that provided by Malm (2000).

Table 2D3-4 $PM_{2.5}$ Multipliers for SO_4^{2-} and NO_3

Predicted Parameter	**SO_4^{2-}**	**NO_3^-**
Molecular Mass	96	62
End Product	**$(NH_4)_2SO_4$**	**NH_4NO_3**
Molecular Mass	132	80
Multiplier	1.375	1.290

Note: Multiplier = (Molecular Mass of End Product)/(Molecular Mass of Predicted Parameter).

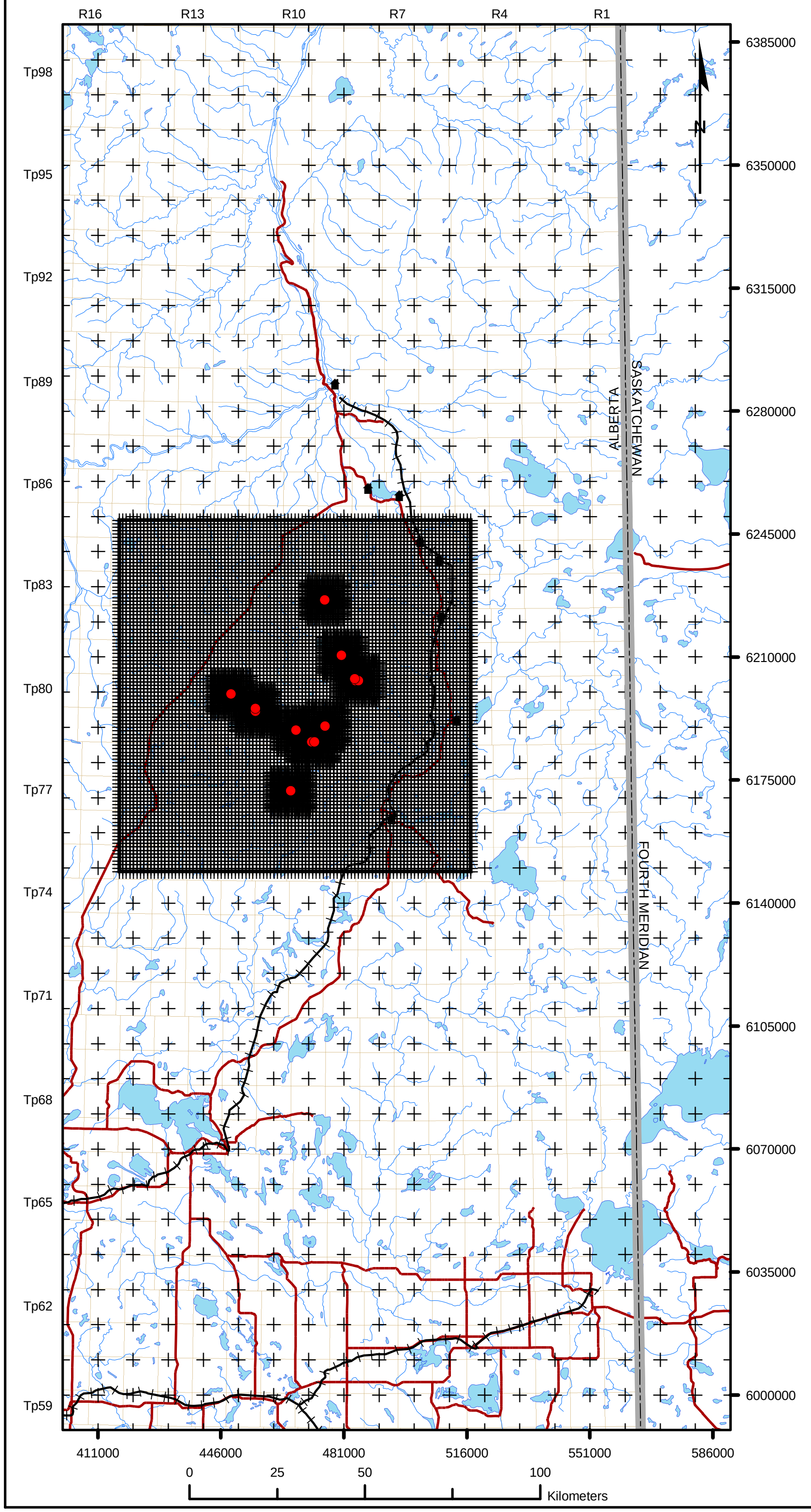
2D3.7 Plume Deposition

Nitrogen and sulphur gases and particles (primary and secondary) can be removed from the atmosphere via dry or wet deposition processes. Wet deposition is dependent on the interaction of the gases and/or particles with precipitation. CALPUFF uses scavenging coefficients for each compound relative to whether the precipitation is liquid or frozen. The scavenging coefficient is defined as the rate at which gases and particles are removed from the air by precipitation processes. The scavenging coefficients used can be found in Table 2D6-11 of this Appendix. Dry deposition can also remove gases and particles from the air by adsorption and interaction with the surface features such as vegetation. CALPUFF requires several parameters pertaining to the characteristics of the surface as well as the chemicals. The parameters used by CALPUFF to calculate dry deposition can be found in Tables 2D6-8, 2D6-9 and 2D6-10. The deposition parameters used were derived for a recent Trace Metal and Air Contaminant (TMAC) report (RWDI AIR Inc., 2007) based on values provided by ENSOR International from their review of the Design Institute for Physical Properties Data (DIPPR®) of the American Institute of Chemical Engineers data bank and the U.S. EPA (2005b) human health risk assessment protocols.

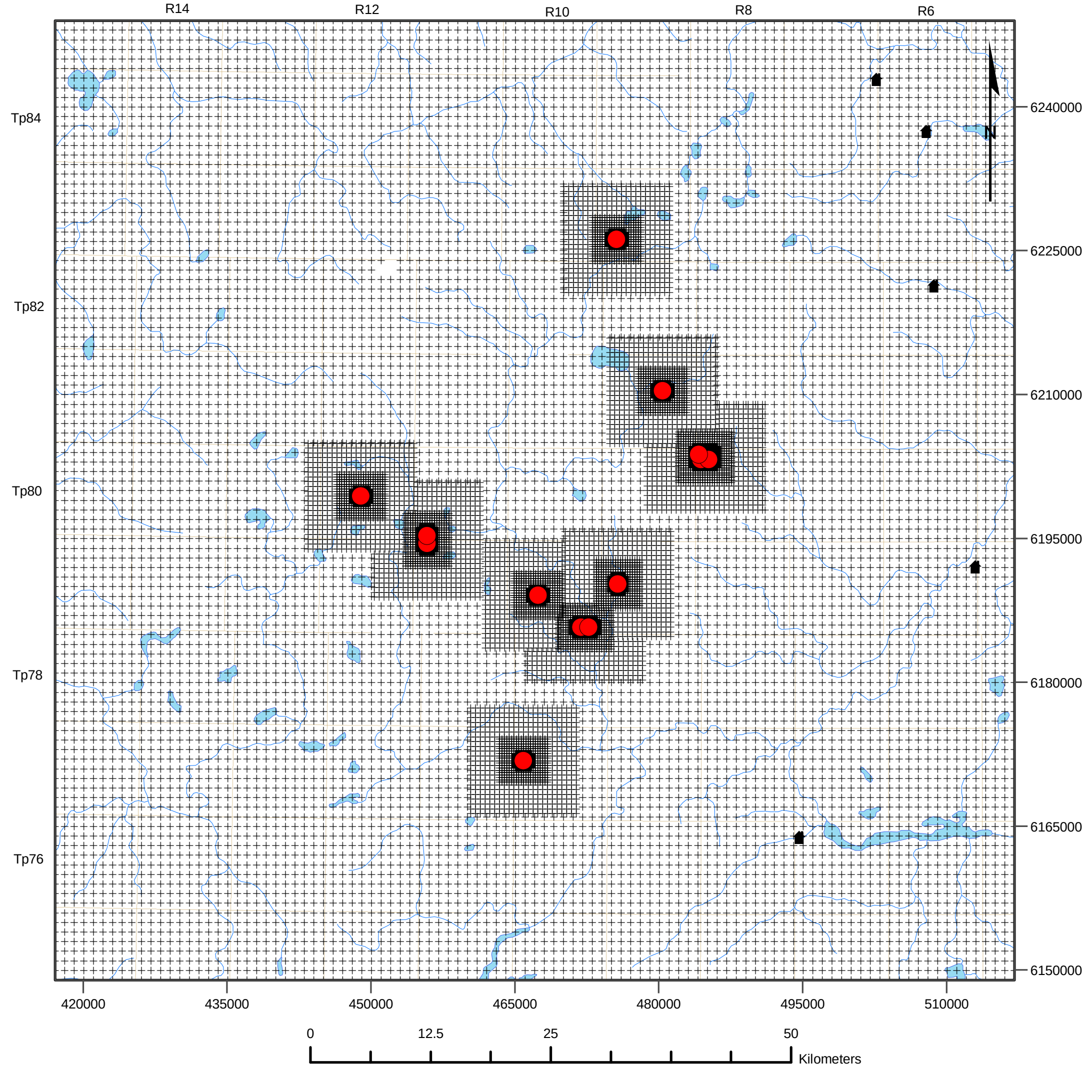
2D3.8 Interpretation of Predictions

Alberta Environment (2003a) recommends discarding the eight highest one-hour predictions during any given year at each receptor location, as these values "are considered outliers and should not be used as the basis for selecting stack height". This means that the hourly AAAQO values should be compared to the 9th highest prediction, not the highest prediction. The 9th highest value corresponds to the 99.9th percentile prediction. This interpretation is only applicable to the CALPUFF predictions. With regards to 24-hour particulate predictions, the 8th highest value is considered as this corresponds to the 98th percentile prediction.

Regional Study Area



Local Study Area

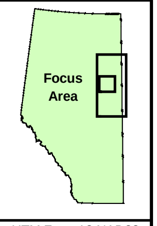


Legend

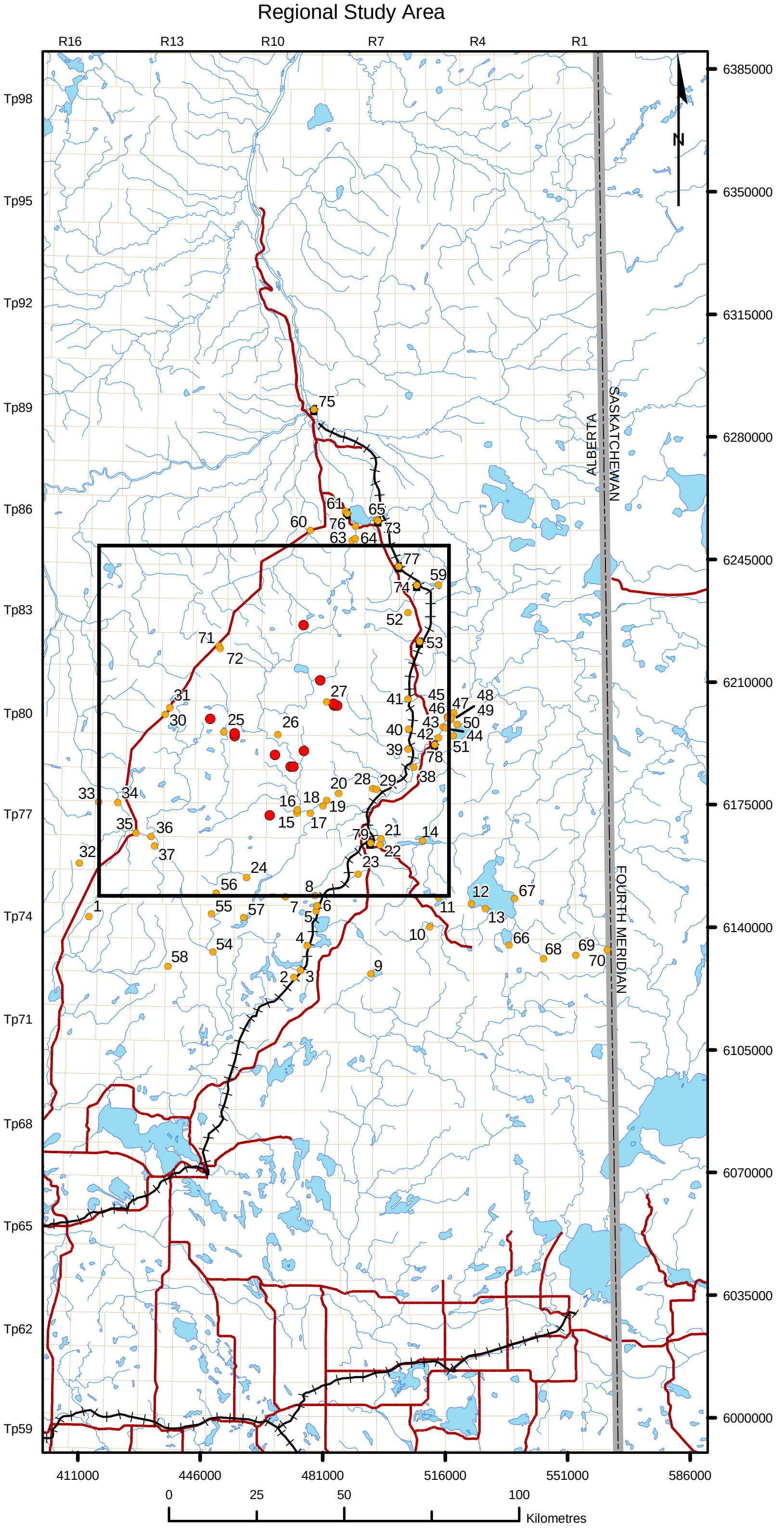
+	Receptor
●	Kai Kos Dehseh Project
☗	Community
	Railroad
	Road
	Lake
	River

PROJECT	NAOSC KAI KOS DEHSEH	
TITLE	Location of Receptors Used for the CALPUFF Dispersion Model	
DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

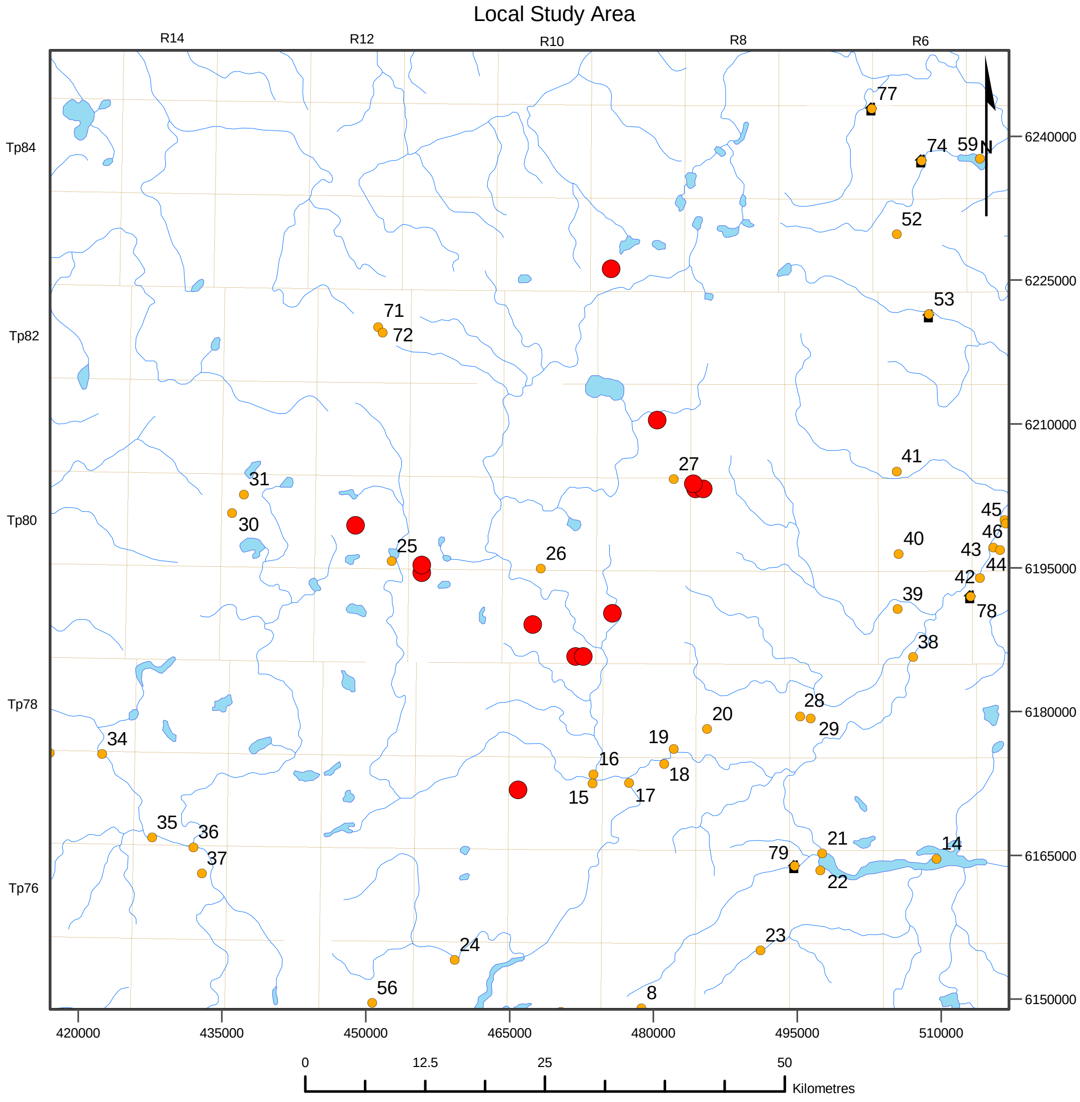
Figure 2D.3-1



UTM Zone 12 NAD83



Regional Study Area



Local Study Area

Legend

- ● Receptor
- 🟥 The Project
- ⌂ Community
- Railroad
- Road
- Lake
- River

PROJECT

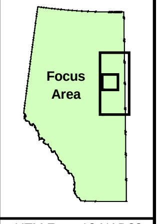
NORTH AMERICAN KAI KOS DEHSEH

TITLE

Location of the Discrete Receptors Relative to the North American Kai Kos Dehseh Project

DRAWN	LDB	04/2007
CHECKED	SBB	04/2007
REVIEWED	DSC	05/2007
PROJECT	W06-1126B	

Figure 2D3-2



UTM Zone 12 NAD83

2D4 Upset Conditions

There are three potential upset scenarios identified for the Project. These upset scenarios involve flaring from the high pressure flare (2 scenarios) and low pressure flare (1 scenario).

These scenarios were modeled for SO_2 using the CALPUFF model. As the upset scenarios are unlikely to occur at more than one facility at a time, the Leismer Expansion facility was used as the representative facility. Modelling was conducted for the upset flares alone as emissions from the upset cases are minimal and are not expected to increase predicted SO_2 concentrations from that of normal operations.

2D4.1 Upset Scenario 1 – High Pressure Flare, Sour Stream

The potential flaring event of the sour stream from the high pressure flare is anticipated to occur for a 20 minute duration with a frequency of once per five years. The parameters used in modelling can be found in Table 2A.2-4 of Appendix 2A. The maximum predicted SO_2 concentration of 9.5 ug/m^3 is well below the AAAQO (Table 2D4-1).

Table 2D4-1 Maximum Predicted SO_2 Concentrations Associated with Upset Flaring Associated with the HP Flare (Sour Stream)

	Averaging Period	Upset Scenario 1 (ug/m^3)	AAAQO (ug/m^3)
SO_2	1-h Max	9.5	-
SO_2	1-h 9th	7.9	450

2D4.2 Upset Scenario 2 – High Pressure Flare, Sweet Stream

The potential flaring event of the sweet stream from the high pressure flare is anticipated to occur for a 20 minute duration with a frequency of once per two years. The parameters used in modelling can be found in Table 2A.2-4 of Appendix 2A. The maximum predicted SO_2 concentration of 1.0 ug/m^3 is well below the AAAQO (Table 2D4-2).

Table 2D4-2 Maximum Predicted SO_2 Concentrations Associated with Upset Flaring Associated with the HP Flare (Sweet Stream)

	Averaging Period	Upset Scenario 1 (ug/m^3)	AAAQO (ug/m^3)
SO_2	1-h Max	1.0	-
SO_2	1-h 9th	0.8	450

2D4.3 Upset Scenario 3 – Low Pressure Flare

The potential flaring event from the low pressure flare is anticipated to occur for a 20 minute duration with a frequency of once per two years. The upset condition occurs when the VRU compressor is down. The tank vapours, that contain H_2S not removed by sulphur recovery, is sent to the low pressure flare. The parameters used in modelling can be found in Table 2A.2-4 of Appendix 2A. The maximum predicted SO_2 concentration of 33.1 ug/m^3 is well below the AAAQO (Table 2D4-3).

Table 2D4-3 Maximum Predicted SO_2 Concentrations Associated with Upset Flaring Associated with the LP Flare

	Averaging Period	Upset Scenario 1 (ug/m^3)	AAAQO (ug/m^3)
SO_2	1-h Max	33.1	-
SO_2	1-h 9th	18.9	450

2D5 Summary and Conclusions

The CALPUFF dispersion model was selected as the primary air quality assessment tool to predict ambient concentrations and deposition. The following were adopted for the application of the model:

- 28,329 receptor grid points were selected for a 190 km by 400 km modelling area. Receptor density is increased near each facility of the Project. Receptor spacing varies from 50 m to 10,000 m;
- An additional 77 community and recreational receptors were selected;
- One year of meteorological data for the period, January 2002 to December 2002, was selected;
- Land-use characteristics were allowed to vary on a seasonal basis;
- Hourly ozone concentrations measured in 2002 at Fort McMurray were used; and
- The ozone limiting method was selected to estimate ambient NO_2 concentrations from the predicted NO_x values.

2D6 CALPUFF Model Options

For the purposes of organization, the CALPUFF control file defines the 17 input groups as identified in Table 2D6-1. For many of the options, default values are used in the absence of site/project specific data. Tables 2D6-2 to 2D6-9 identify the input parameters, the default options, and the values used for the Project assessment.

The chemistry option was invoked in CALPUFF when SO_2 and NO_X sources were predicted. The option accounted for six species (SO_2, SO_4^{2-}, NO, NO_2, HNO_3, and NO^{3-}). The chemistry option was not used to predict ambient CO, VOC and $PM_{2.5}$ (primary) concentrations (3 species).

Table 2D6-1 Input Groups in the CALPUFF Control File

Input Group	Description	Applicable to the North American Kai Kos Dehseh Project?
0	Input and output file names	Yes
1	General run control parameters	Yes
2	Technical options	Yes
3	Species list	Yes
4	Grid control parameters	Yes
5	Output options	Yes

Input Group	Description	Applicable to the North American Kai Kos Dehseh Project?
6	Sub grid scale complex terrain inputs	No
7	Dry deposition parameters for gases	Yes
8	Dry deposition parameters for particles	Yes
9	Miscellaneous dry deposition for parameters	Yes
10	Wet deposition parameters	Yes
11	Chemistry parameters	Yes
12	Diffusion and computational parameters	Yes
13	Point source parameters	Yes
14	Area source parameters	Yes
15	Line source parameters	No
16	Volume source parameters	No
17	Discrete receptor information	Yes

Table 2D6-2 CALPUFF Model Options Group 1: General Run Control Parameters

Parameter	Default	North American Kai Kos Dehseh	Comments
METRUN	0	0	All model periods in met file(s) will be run
IBYR	-	02	Starting year
IBMO	-	1	Starting month
IBDY	-	1	Starting day
IBHR	-	1	Starting hour
IRLG	-	8760	Length of run
NSPEC	5	10	Number of chemical species
NSE	3	7	Number of chemical species to be emitted
ITEST	2	2	Program is executed after SETUP phase
MRESTART	0	2	Does read or write a restart file
NRESPD	0	24	Restart file written every NRESPD period
METFM	1	1	CALMET binary file (CALMET.MET)
AVET	60	60	Averaging time in minutes
PGTIME	60	60	PG Averaging time in minutes

Table 2D6-3 CALPUFF Model Options Group 2: Technical Options

Parameter	Default	North American Kai Kos Dehseh	Comments
MGAUSS	1	1	Gaussian distribution used in near field
MCTADJ	3	3	Partial plume path terrain adjustment
MCTSG	0	0	Scale-scale complex terrain not modelled
MSLUG	0	0	Near-field puffs not modelled as elongated
MTRANS	1	1	Transitional plume rise modelled
MTIP	1	1	Stack tip downwash used
MBDW	1	2	Building downwash simulated using PRIME method
MSHEAR	0	1	Vertical wind shear modelled
MSPLIT	0	0	Puffs are not split
MCHEM	1	3	Transformation rates computed internally using (RIVID/ARM3) scheme
MAQCHEM	0	0	Aqueous phase transformation not modelled
MWET	1	1	Wet removal modelled
MDRY	1	1	Dry deposition modelled
MDISP	3	3	PG dispersion coefficients for rural areas (computed using ISCST

Parameter	Default	North American Kai Kos Dehseh	Comments
			approximation) and MP coefficients in urban areas
MTURBVW	3	3	Use both σ_v and σ_w from PROFILE.DAT to compute σ_y and σ_z (n/a)
MDISP2	3	3	PG dispersion coefficients for rural areas (computed using ISCST3 approximation) and MP coefficients in urban areas when measured turbulence data is missing
MCTURB	1	1	Standard CALPUFF subroutines used to compute turbulence σ_v and σ_w
MROUGH	0	1	PG σ_y and σ_z adjusted for roughness
MPARTL	1	1	Partial plume penetration of elevated inversion
MTINV	0	0	Strength of temperature inversion computed from default gradients
MPDF	0	0	PDF used for dispersion under convective conditions
MSGTIBL	0	0	Sub-grid TIBL module not used for shoreline
MBCON	0	0	Boundary concentration conditions not modelled
MFOG	0	0	Do not configure for FOG model output
MREG	1	0	Do not test options specified to see if they conform to regulatory values

Table 2D6-4 CALPUFF Model Options Groups 3: Species List-Chemistry options

CSPEC	Modelled (0=no, 1=yes)	Emitted (0=no, 1=yes)	Dry deposition (0=none, 1=computed-gas, 2=computed particle, 3=user-specified)	Output Group Number
SO_2	1	1	1	0
SO_4^{-2}	1	0	2	0
NO	1	1	1	0
NO_2	1	1	1	0
HNO_3	1	0	1	0
NO_3^-	1	0	2	0
PM	1	1	0	0
CO	1	1	0	0
VOC	1	1	0	0
NO_x	1	1	1	0

Table 2D6-5 CALPUFF Model Options Groups 4: Grid Control Parameters

Parameter	Default	North American Kai Kos Dehseh	Comments
NX	-	38	Number of X grid cells in meteorological grid
N		78	Number of Y grid cells in meteorological grid
NZ	-	8	Number of vertical layers in meteorological grid
DGRIDKM	-	5	Grid spacing (km)
ZFACE	-	0,20,40,80, 160,320,600, 1400,2600	Cell face heights in meteorological grid (m)
XORIGKM	-	401	Reference X coordinate for SW corner of grid cell (1,1) of meteorological grid (km)
YORIGKM	-	5980	Reference Y coordinate for SW corner of grid cell (1,1) of meteorological grid (km)
IUTMZN	-	12	UTM zone of coordinates
IBCOMP	-	1	X index of lower left corner of the computational grid
JBCOMP	-	1	Y index of lower left corner of the computational grids

Parameter	Default	North American Kai Kos Dehseh	Comments
IECOMP	-	38	X index of the upper right corner of the computational grid
JECOMP	-	78	Y index of the upper right corner of the computational grid
LSAMP	T	F	Sampling grid is not used
IBSAMP	-	-	X index of lower left corner of the sampling grid
JBSAMP	-	-	Y index of lower left corner of the sampling grid
IESAMP	-	-	X index of upper right corner of the sampling grid
JESAMP	-	-	Y index of upper right corner of the sampling grid
MESHDN	1	1	Nesting factor of the sampling grid

Table 2D6-6 CALPUFF Model Option Group 5: Output Option

Parameter	Default	North American Kai Kos Dehseh	Comments
ICON	-	1	Output file CONC.DAT containing concentrations is created
IDRY	-	1	Output file DFLX.DAT containing dry fluxes is created
IWET	-	1	Output file WFLX.DAT containing wet fluxes is created
IVIS	-	0	Output file containing relative humidity data is not created
LCOMPRS	T	T	Perform data compression in output file
IMFLX	0	0	Do not calculate mass fluxes across specific boundaries
IMBAL	0	0	Do not report mass balances
ICPRT	0	0	Do not print concentration fields to the output list file
IDPRT	0	0	Do not print dry flux fields to the output list file
IWPRT	0	0	Do not print wet flux fields to the output list file
ICFRQ	1	1	Concentration fields are printed to output list file every 1 hour
IDFRQ	1	1	Dry flux fields are printed to output list file every 1 hour
IWFRQ	1	1	Wet flux fields are printed to output list file every 1 hour
IPRTU	1	3	Units for line printer output are in µg/m_3 for concentration and µg/m^2/s for deposition
IMESG	1	2	Messages tracking the progress of run are written on screen

Species	**Concentrations printed (0=no, 1=yes)**		**Dry Fluxes printed (0=no, 1=yes)**		**Wet Fluxes printed (0=no, 1=yes)**	
	output list file	**saved to disk**	**output list file**	**saved to disk**	**output list file**	**saved to disk**
SO_2	0	1	0	1	0	1
SO_4^{-2}	0	1	0	1	0	1
NO	0	1	0	1	0	1
NO_2	0	1	0	1	0	1
HNO_3	0	1	0	1	0	1
NO_3^-	0	1	0	1	0	1
PM	0	1	0	1	0	1
CO	0	1	0	1	0	1
VOC	0	1	0	1	0	1
NO_x	0	1	0	1	0	1

LDEBUG	F	F	Logical value for debug output
IPFDEB	1	1	First puff to track
NPFDEB	1	1	Number of puffs to track
NN1	1	1	Meteorological period to start output
NN2	10	10	Meteorological period to end output

Table 2D6-7 CALPUFF Model Option Group 6: Sub Grid Scale Complex Terrain Inputs

Parameter	Default	North American Kai Kos Dehseh	Comments
NHILL	0	-	Number of terrain features
NCTREC	0	-	Number of special complex terrain receptors
MHILL	-	-	Input terrain and receptor data for CTSG hills input in CTDM format
XHILL2M	1	-	Conversion factor for changing horizontal dimensions to meters
ZHILL2M	1	-	Conversion factor for changing vertical dimensions to meters
XCTDMKM	-	-	X origin of CTDM system relative to CALPUFF coordinate system (km)
YCTDMKM	-	-	Y origin of CTDM system relative to CALPUFF coordinate system (km)

Note: '-' symbol indicates that the parameter was not applicable to the North American Kai Kos Dehseh Project

Table 2D6-8 CALPUFF Model Option Group 7: Dry Deposition Parameters for Gases

Species	Default	North American Kai Kos Dehseh	Comments
SO_2	0.1509	0.1372	Diffusivity
	10000.0	1000	Alpha star
	8.0	8.0	Reactivity
	0.0	0.0	Mesophyll resistance
	0.4	0.033	Henry's Law coefficient
NO	-	0.2203	Diffusivity
	-	1.0	Alpha star
	-	2	Reactivity
	-	94	Mesophyll resistance
	-	18	Henry's Law coefficient
NO_2	0.1656	0.1585	Diffusivity
	1.0	1.0	Alpha star
	8.0	8	Reactivity
	5.0	5	Mesophyll resistance
	3.5	3.5	Henry's Law coefficient
HNO_3	0.1628	0.1041	Diffusivity
	1.0	1.0	Alpha star
	18.0	18.0	Reactivity
	0.0	0	Mesophyll resistance
	0.00000008	0.00000008	Henry's Law coefficient
NO_X		0.1960	Diffusivity
		1.0	Alpha star
		8	Reactivity
		5	Mesophyll resistance
		3.5	Henry's Law coefficient

Table 2D6-9 CALPUFF Model Option Group 8: Dry Deposition Parameters for Particles

Species	Default	North American Kai Kos Dehseh	Comments
SO_4^{2}	0.48	0.48	Geometric mass mean diameter of SO_4^{2}[um]
SO_4^{2}	2.0	2.0	Geometric standard deviation of SO_4^{2} [um]
NO_3^{-}	0.48	0.48	Geometric mass mean diameter of NO_3^{-}[um]
NO_3^{-}	2.0	2.0	Geometric standard deviation of NO_3^{-} [um]

Table 2D6-10 CALPUFF Model Option Groups 9: Miscellaneous Dry Deposition Parameters

Parameters	Default	North American Kai Kos Dehseh	Comments
RCUTR	30	30	Reference cuticle resistance (s/cm)
RGR	10	10	Reference ground resistance (s/cm)
REACTR	8	8	Reference pollutant reactivity
NINT	9	9	Number of particle size intervals for effective particle deposition velocity
IVEG	1	1	Vegetation in non-irrigated areas is active and unstressed

Table 2D6-11 CALPUFF Model Option Groups 10: Wet Deposition Parameters

Species	Default	North American Kai Kos Dehseh	Comments
SO_2	0.00003	0.0000321	Scavenging coefficient for liquid precipitation [s^{-1}]
	0.0	0.0	Scavenging coefficient for frozen precipitation [s^{-1}]
SO_4^{-2}	0.0001	0.0001	Scavenging coefficient for liquid precipitation [s^{-1}]
	0.00003	0.00003	Scavenging coefficient for frozen precipitation [s^{-1}]
NO		0.0000285	Scavenging coefficient for liquid precipitation [s^{-1}]
		0.0	Scavenging coefficient for frozen precipitation [s^{-1}]
HNO_3	0.00006	0.00006	Scavenging coefficient for liquid precipitation [s^{-1}]
	0.0	0.0	Scavenging coefficient for frozen precipitation [s^{-1}]
NO_3^-	0.0001	0.0001	Scavenging coefficient for liquid precipitation [s^{-1}]
	0.00003	0.00003	Scavenging coefficient for frozen precipitation [s^{-1}]
NO_X		0.0000376	Scavenging coefficient for liquid precipitation [s^{-1}]
		0.0	Scavenging coefficient for frozen precipitation [s^{-1}]

Table 2D6-12 CALPUFF Model Option Groups 11: Chemistry Parameters

Parameters	Default	North American Kai Kos Dehseh	Comments
MOZ	1	1	Hourly ozone values from Fort McMurray were used
BCKO3	-	-	Background ozone concentration (ppb)
BCKNH3	10	12*0.22	Background ammonia concentration (ppb)
RNITE1	0.2	0.2	Nighttime NO_2 loss rate in percent/hour
RNITE2	2	2	Nighttime NO_X loss rate in percent/hour
RNITE3	2	2	Nighttime HNO_3 loss rate in percent/hour
MH202	-	-	Background H_2O_2 concentrations (Aqueous phase transformations not modelled)
BCKH202	-	-	Background monthly H_2O_2 concentrations (Aqueous phase transformations not modelled)
BCKPMF	-	-	Fine particulate concentration for Secondary Organic Aerosol Option
OFRAC	-	-	Organic fraction of fine particulate for SOA Option
VCNX	-	-	VOC/NO_x ratio for SOA Option

Table 2D6-13 CALPUFF Model Option Group 12: Diffusion/Computational Parameters

Parameters	Default	North American Kai Kos Dehseh	Comments
SYDEP	550	550	Horizontal size of a puff in metres beyond which the time dependant dispersion equation of Heffter (1965) is used
MHFTSZ	0	0	Do not use Heffter formulas for sigma z
JSUP	5	5	Stability class used to determine dispersion rates for puffs above boundary layer
CONK1	0.01	0.01	Vertical dispersion constant for stable conditions
CONK2	0.1	0.1	Vertical dispersion constant for neutral/stable conditions
TBD	0.5	0.5	Use ISC transition point for determining the transition point between the Schulman-Scire to Huber-Snyder Building Downwash scheme
IURB1	10	10	Lower range of land use categories for which urban dispersion is assumed
IURB2	19	19	Upper range of land use categories for which urban dispersion is assumed
ILANDUIN	20		Land use category for modelling domain
XLAIIN	3.0	*	Leaf area index for modelling domain
ZOIN	-0.25	*	Roughness length in metres for modelling domain
ELEVIN	0.0	*	Elevation above sea level
XLATIN	-999	-	North latitude of station in degrees
XLONIN	-999	-	South latitude of station in degrees
ANEMHT	10	10	Anemometer height in metres
ISIGMAV	1	-	Sigma-v is read for lateral turbulence data
IMIXCTDM	0	-	Predicted mixing heights are used
XMXLEN	1	1	Maximum length of emitted slug in meteorological grid units
XSAMLEN	1	10	Maximum travel distance of slug or puff in meteorological grid units during one sampling unit
MXNEW	99	60	Maximum number of puffs or slugs released from one source during one time step
MXSAM	99	60	Maximum number of sampling steps during one time step for a puff or slug
NCOUNT	2	2	Number of iterations used when computing the transport wind for a sampling step that includes transitional plume rise
SYMIN	1	1	Minimum sigma y in metres for a new puff or slug
SZMIN	1	1	Minimum sigma z in metres for a new puff or slug

Values indicated by an asterisk (*) were allowed to vary spatially across the domain and were obtained from CALMET

PG Stability Class	Parameter	
	SVMIN	SWMIN
	Minimum turbulence (σ_v) (m/s)	Minimum turbulence (σ_w) (m/s)
A	0.5	0.2
B	0.5	0.12
C	0.5	0.08
D	0.5	0.06
E	0.5	0.03
F	0.5	0.016

Table 2D6-13 CALPUFF Model Option Group 12 (continued)

Parameters	Default	North American Kai Kos Dehseh	Comments
CDIV	0.0, 0.0	0.0, 0.0	Divergence criteria for dw/dz in met cells
WSCALM	0.5	0.5	Minimum wind speed allowed for non-calm conditions (m/s)
XMAXZI	3000	3000	Maximum mixing height in metres
XMINZI	50	50	Minimum mixing height in metres
WSCAT	-	1.54	wind speed category 1 [m/s]
	-	3.09	wind speed category 2 [m/s]
	-	5.14	wind speed category 3 [m/s]
	-	8.23	wind speed category 4 [m/s]
	-	10.80	wind speed category 5 [m/s]

Stability Class	**Parameter**	
	PLX0	**PPC**
	Wind speed profile exponent	**Plume path coefficient**
A	0.07	0.8
B	0.07	0.7
C	0.10	0.6
D	0.15	0.5
E	0.35	0.4
F	0.55	0.35

PTG0	0.020	0.020	potential temperature gradient for E stability [K/m]
	0.035	0.035	potential temperature gradient for F stability [K/m]
SL2PF	10	10	Slug-to-puff transition criterion factor equal to sigma y/length of slug
NSPLIT	3	3	Number of puffs that result every time a puff is split
IRESPLIT	0,0,0,0,0,0,0, 0,0,0,0,0,0,0, 0,0,0,1,0,0,0, 0,0,0	0,0,0,0,0,0,0, 0,0,0,0,0,0,0, 0,0,0,1,0,0,0, 0,0,0	Time(s) of day when split puffs are eligible to be split once again
ZISPLIT	100	100	Minimum allowable last hour's mixing height for puff splitting
ROLDMAX	0.25	0.25	Maximum allowable ratio of last hour's mixing height and maximum mixing height experienced by the puff for puff splitting
NSPLITH	5	5	Number of puffs that result every time a puff is horizontally split
SYSPLITH	1	1	Minimum sigma-y of puff before it may be horizontally split
SHSPLITH	2	2	Minimum puff elongation rate due to wind shear before it may be horizontally split
CNSPLITH	1.0e-7	1.0e-7	Minimum concentration of each species in puff before it may be horizontally split
EPSSLUG	1.00E-04	1.00E-04	Fractional convergence criterion for numerical SLUG sampling iteration
EPSAREA	1.00E-06	1.00E-06	Fractional convergence criterion for numerical AREA sampling iteration
DRISE	1.0	1.0	Trajectory step length for numerical rise

Note: '-' symbol indicates that the parameter was not applicable to the North American Kai Kos Dehseh Project

Table 2D6-14 CALPUFF Model Option Group 13: Point Source Parameters

Parameters	Default	North American Kai Kos Dehseh	Comments
NPT1	-	Varies by scenario	Number of point sources with constant stack parameters or variable emission rate scale factors
IPTU	1	1	Units for point source emission rates are g/s
NSPT1	0	-	Number of source-species combinations with variable emissions scaling factors
NPT2	-	-	Number of point sources with variable emission parameters provided in external file

Note: Point source parameters are given in Part A

'-' symbol indicates that the parameter was not applicable to the North American Kai Kos Dehseh Project

Table 2D6-15 CALPUFF Model Option Group 14: Area Source Parameters

Parameters	Default	North American Kai Kos Dehseh	Comments
NAR1	-	Varies by scenario	Number of polygon area sources
IARU	1	1	Units for area source emission rates are $g/m^2/s$
NSAR1	0	-	Number of source species combinations with variable emissions scaling factors
NAR2	-	-	Number of buoyant polygon area sources with variable location and emission parameters

Note: Area source parameters are given in Part A

Table 2D6-16 CALPUFF Model Option Group 15: Line Source Parameters

Parameters	Default	North American Kai Kos Dehseh	Comments
NLN2	-	-	Number of buoyant line sources with variable location and emission parameters
NLINES	-	-	Number of buoyant line sources
ILNU	1	-	Units for line source emission rates is g/s
NSLN1	0	-	Number of source-species combinations with variable emissions scaling factors
MXNSEG	7	-	Maximum number of segments used to model each line
NLRISE	6	-	Number of distance at which transitional rise is computed
XL	-	-	Average line source length (m)
HBL	-	-	Average height of line source height (m)
WBL	-	-	Average building width (m)
WML	-	-	Average line source width (m)
DXL	-	-	Average separation between buildings (m)
FPRIMEL	-	-	Average buoyancy parameter (m^4/s^3)

Note: '-' symbol indicates that the parameter was not applicable to the North American Kai Kos Dehseh Project

Table 2D6-17 CALPUFF Model Option Group 16: Volume Source Parameters

Parameter	Default	North American Kai Kos Dehseh	Comments
NVL1	-	-	Number of volume sources
IVLU	1	-	Units for volume source emission rates is grams per second
NSVL1	0	-	Number of source-species combinations with variable emissions scaling factors
IGRDVL	-	-	Gridded volume source data is not used
VEFFHT	-	-	Effective height of emissions (m)
VSIGYI	-	-	Initial sigma y value (m)
VSIGZI	-	-	Initial sigma z value (m)

Note: '-' symbol indicates that the parameter was not applicable to the North American Kai Kos Dehseh Project

Table 2D6-18 CALPUFF Model Option Group 17: Discrete Receptor Information

Parameter	Default	North American Kai Kos Dehseh	Comments
NREC	-	28,329	Number of non-gridded receptors

Note: Discrete receptors are identified on Figure 2-1 and Table 2-4

2D7 Literature Cited

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3A ASSESSMENT OF ENVIRONMENTAL NOISE (GENERAL)

3A.1 Sound Pressure Level

Sound pressure is initially measured in Pascal's (Pa). Humans can hear several orders of magnitude in sound pressure levels, so a more convenient scale is used. This scale is known as the decibel (dB) scale, named after Alexander Graham Bell (telephone guy). It is a base 10 logarithmic scale. When we measure pressure we typically measure the RMS sound pressure.

$$SPL = 10\log_{10}\left[\frac{P_{RMS}^{2}}{P_{ref}^{2}}\right] = 20\log_{10}\left[\frac{P_{RMS}}{P_{ref}}\right]$$

Where: SPL = Sound Pressure Level in dB

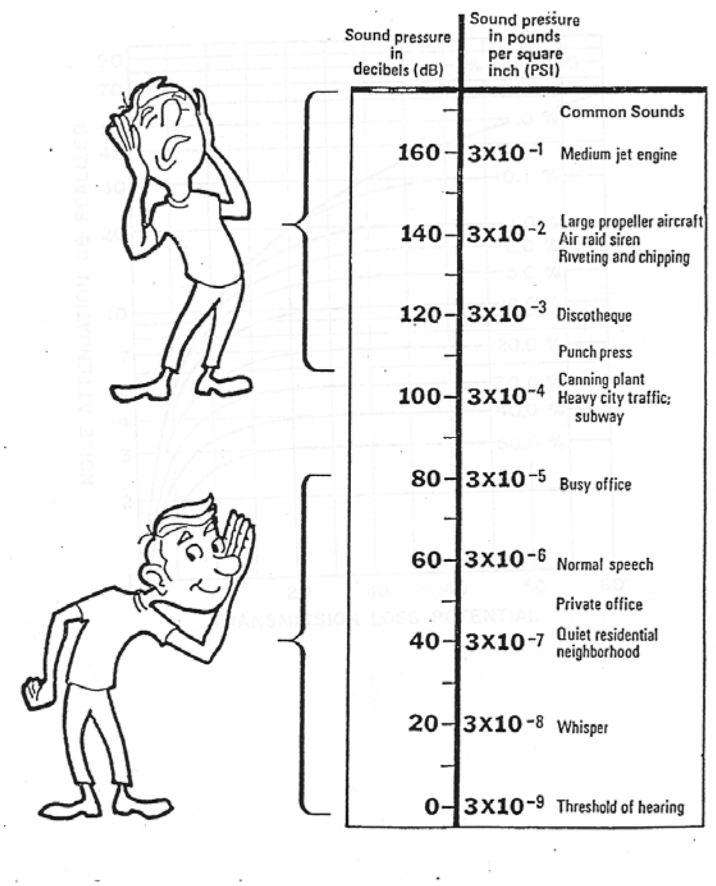
P_{RMS} = Root Mean Square measured pressure (Pa)

P_{ref} = Reference sound pressure level (P_{ref} = 2x10^{-5} Pa = 20 uPa)

This reference sound pressure level is an internationally agreed upon value. It represents the threshold of human hearing for typical people based on numerous testing. It is possible to have a threshold which is lower than 20 uPa which will result in negative dB levels. As such, 0 dB does not mean there is no sound.

In general, a difference of 1 dB to 2 dB is the threshold for humans to notice that there has been a change in sound level. A difference of 3 dB (factor of 2 in acoustical energy) is perceptible, and a change of 5 dB is strongly perceptible. A change of 10 dB is typically considered a factor of 2, quite remarkable considering that 10 dB is 10-times the acoustical energy.

Figure 3A.1-1 Decibel Scale



3A.2 Frequency

The range of frequencies audible to the human ear ranges from approximately 20 Hz to 20 kHz. Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency sounds. Due to the large frequency range of human hearing, the entire spectrum is often divided into 31 bands, each known as a 1/3 octave band.

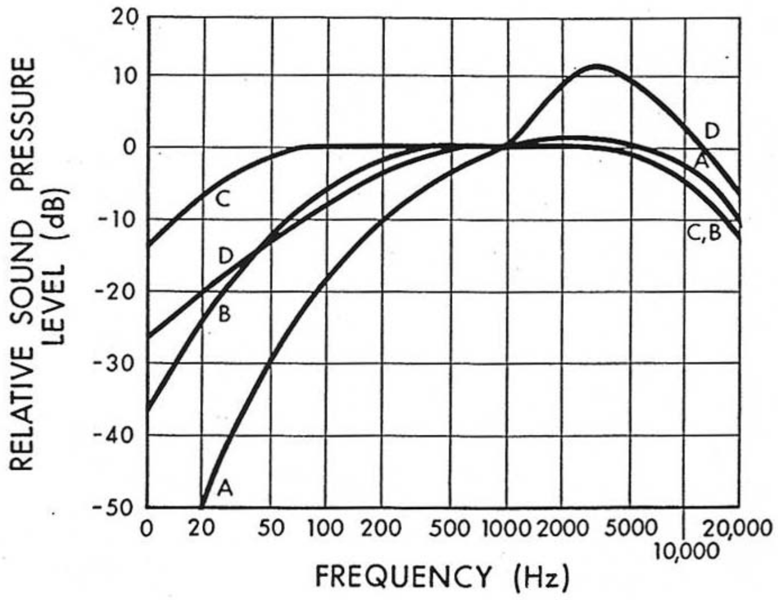
The internationally agreed upon center frequencies and upper and lower band limits for the 1/1 (whole octave) and 1/3 octave bands are provided in Table 3A.2-1.

Table 3A.2-1 Center Frequencies and upper and Lower Band Limits

	Whole Octave			**1/3 Octave**	
Lower Band Limit	**Center Frequency**	**Upper Band Limit**	**Lower Band Limit**	**Center Frequency**	**Upper Band Limit**
11	**16**	22	14.1	**16**	17.8
			17.8	**20**	22.4
22	**31.5**	44	22.4	**25**	28.2
			28.2	**31.5**	35.5
			35.5	**40**	44.7
44	**63**	88	44.7	**50**	56.2
			56.2	**63**	70.8
			70.8	**80**	89.1
88	**125**	177	89.1	**100**	112
			112	**125**	141
			141	**160**	178
177	**250**	355	178	**200**	224
			224	**250**	282
			282	**315**	355
355	**500**	710	355	**400**	447
			447	**500**	562
			562	**630**	708
710	**1000**	1420	708	**800**	891
			891	**1000**	1122
			1122	**1250**	1413
1420	**2000**	2840	1413	**1600**	1778
			1778	**2000**	2239
			2239	**2500**	2818
2840	**4000**	5680	2818	**3150**	3548
			3548	**4000**	4467
			4467	**5000**	5623
5680	**8000**	11360	5623	**6300**	7079
			7079	**8000**	8913
			8913	**10000**	11220
11360	**16000**	22720	11220	**12500**	14130
			14130	**16000**	17780
			17780	**20000**	22390

Human hearing is most sensitive at approximately 3,500 Hz which corresponds to the one quarter wavelength of the ear canal (approximately 2.5 cm). Because of this range of sensitivity to various frequencies, we typically apply various weighting networks to the broadband measured sound to more appropriately account for the way humans hear. By default, the most common weighting network used is the so-called A-weighting. It can be seen in Figure 3A.2-1 that the low frequency sounds are reduced significantly with the A-weighting.

Figure 3A.2-1 A-Weighting Network



3A.3 Combination of Sounds

When combining multiple sound sources the general equation is:

$$\Sigma SPL_n = 10\log_{10}\left[\sum_{i=1}^{n} 10^{\frac{SPL_i}{10}}\right]$$

<u>Examples:</u>

- Two sources of 50 dB each add together to result in 53 dB.
- Three sources of 50 dB each add together to result in 55 dB.
- Ten sources of 50 dB each add together to result in 60 dB.
- One source of 50 dB added to another source of 40 dB results in 50.4 dB

It can be seen that, if multiple similar sources exist, removing or reducing only one source will have little effect.

3A.4 Sound Level Measurements

Over the years a number of methods for measuring and describing environmental noise have been developed. The most widely used and accepted is the concept of the Energy Equivalent Sound Level (L_{eq}) which was developed in the US (1970's) to characterize noise levels near US

Air Force bases. This is the level of a steady state sound which, for a given period of time, would contain the same energy as the time varying sound. The concept is that the same amount of annoyance occurs from a sound having a high level for a short period of time as from a sound at a lower level for a longer period of time.

The L_{eq} is defined as:

$$L_{eq} = 10\log_{10}\left[\frac{1}{T}\int_0^T 10^{\frac{dB}{10}}\,dT\right] = 10\log_{10}\left[\frac{1}{T}\int_0^T \frac{P^2}{P_{ref}^2}\,dT\right]$$

We must specify the time period over which to measure the sound (i.e., 1-second, 10-seconds, 15-seconds, 1-minute, 1-day, etc.) **An L_{eq} is meaningless if there is no time period associated**.

In general there a few very common L_{eq} sample durations which are used in describing environmental noise measurements. These include:

- L_{eq}24 - Measured over a 24-hour period
- L_{eq}Night - Measured over the nighttime (typically 22:00 – 07:00)
- L_{eq}Day - Measured over the daytime (typically 07:00 – 22:00)
- L_{DN} - Same as L_{eq}24 with a 10 dB penalty added to the nighttime

3A.5 Statistical Descriptor

Another method of conveying long term noise levels utilizes statistical descriptors. These are calculated from a cumulative distribution of the sound levels over the entire measurement duration and then determining the sound level at xx % of the time.

Figure 3A.5-1 Statistically Processed Community Noise

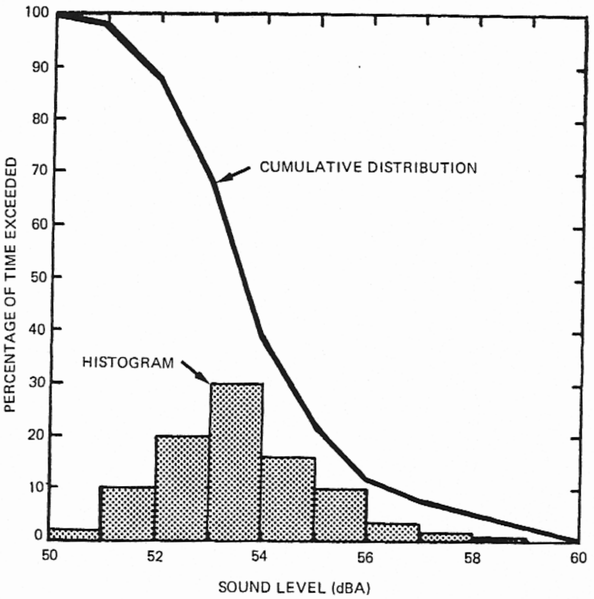


Figure 16.6 Statistically processed community noise showing histogram and cumulative distribution of A weighted sound levels.

Source: Industrial Noise Control, Lewis Bell, Marcel Dekker, Inc. 1994

The most common statistical descriptors are:

L_{min} - minimum sound level measured

L_{01} - sound level that was exceeded only 1% of the time

L_{10} - sound level that was exceeded only 10% of the time
  - Good measure of intermittent or intrusive noise
  - Good measure of Traffic Noise

L_{50} - sound level that was exceeded 50% of the time (arithmetic average)
  - Good to compare to L_{eq} to determine steadiness of noise

L_{90} - sound level that was exceeded 90% of the time
  - Good indicator of typical “ambient” noise levels

L_{99} - sound level that was exceeded 99% of the time

L_{max} - maximum sound level measured

These descriptors can be used to provide a more detailed analysis of the varying noise climate:

- If there is a large difference between the L_{eq} and the L_{50} (L_{eq} can never be any lower than the L_{50}) then it can be surmised that one or more short duration, high level sound(s) occurred during the time period.

- If the gap between the L_{10} and L_{90} is relatively small (less than 15 dBA to 20 dBA) then it can be surmised that the noise climate was relatively steady.

3A.6 Sound Propagation

In order to understand sound propagation, the nature of the source must first be discussed. In general, there are three types of sources, known as ‘point’, ‘line’, and ‘area’. This discussion will concentrate on point and line sources since area sources are much more complex and can usually be approximated by point sources at large distances.

3A.6.1 Point Source

As sound radiates from a point source, it dissipates through geometric spreading. The basic relationship between the sound levels at two distances from a point source is:

$$\therefore SPL_1 - SPL_2 = 20\log_{10}\left(\frac{r_2}{r_1}\right)$$

Where: SPL_1 = sound pressure level at location 1, SPL_2 = sound pressure level at location 2

r_1 = distance from source to location 1, r_2 = distance from source to location 2

Thus, the reduction in sound pressure level for a point source radiating in a free field is 6 dB per doubling of distance. This relationship is independent of reflectivity factors provided they are always present. This only considers geometric spreading and does not take into account atmospheric effects. Point sources still have some physical dimension associated with them and typically do not radiate sound equally in all directions in all frequencies. The directionality of a source is also highly dependent on frequency. As frequency increases, directionality increases.

Examples (note no atmospheric absorption)

- A point source measuring 50 dB at 100 m will be 44 dB at 200 m.
- A point source measuring 50 dB at 100 m will be 40.5 dB at 300 m.
- A point source measuring 50 dB at 100 m will be 38 dB at 400 m.
- A point source measuring 50 dB at 100 m will be 30 dB at 1,000 m.

3A.6.2 Line Source

A line source is similar to a point source in that it dissipates through geometric spreading. The difference is that a line source is equivalent to a long line of many point sources. The basic relationship between the sound levels at two distances from a line source is:

$$SPL_1 - SPL_2 = 10\log_{10}\left(\frac{r_2}{r_1}\right)$$

The difference from the point source is that the 20 term in front of the log is now only 10. Thus, the reduction in sound pressure level for a line source radiating in a free field is 3 dB per doubling of distance.

Examples (note no atmospheric absorption)

- A line source measuring 50 dB at 100 m will be 47 dB at 200 m.
- A line source measuring 50 dB at 100 m will be 45 dB at 300 m.
- A line source measuring 50 dB at 100 m will be 34 dB at 400 m.
- A line source measuring 50 dB at 100 m will be 40 dB at 1,000 m.

3A.7 Atmospheric Absorption

As sound transmits through a medium, there is an attenuation (or dissipation of acoustic energy) which can be attributed to three mechanisms:

- **Viscous Effects** - Dissipation of acoustic energy due to fluid friction which results in thermodynamically irreversible propagation of sound.
- **Heat Conduction Effects** - Heat transfer between high and low temperature regions in the wave which result in non-adiabatic propagation of the sound.
- **Inter Molecular Energy Interchanges** - Molecular energy relaxation effects which result in a time lag between changes in translational kinetic energy and the energy associated with rotation and vibration of the molecules.

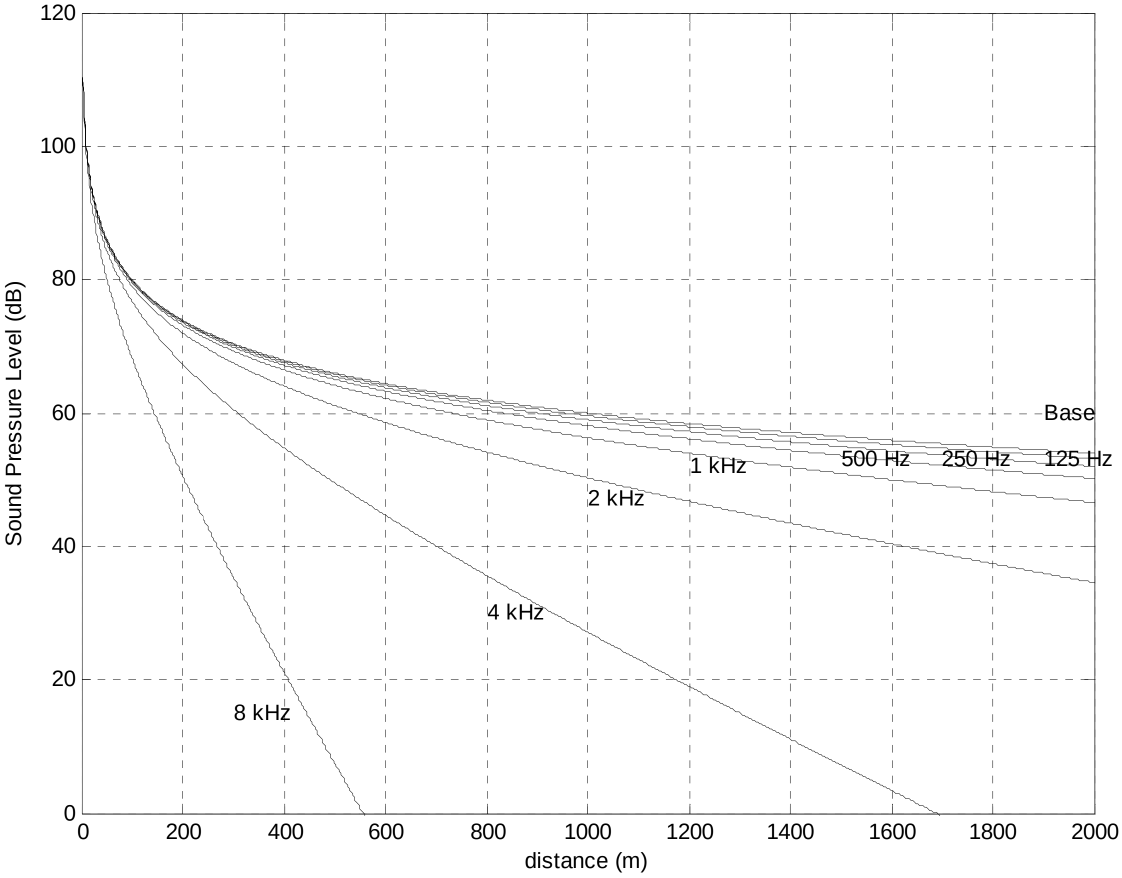
Table 3A.7-1 Attenuation Coefficient of Sound at Standard Pressure in Units of dB/100 m

Temperature °C	Relative Humidity (%)	Frequency (Hz)					
		125	250	500	1000	2000	4000
30	20	0.06	0.18	0.37	0.64	1.40	4.40
	50	0.03	0.10	0.33	0.75	1.30	2.50
	90	0.02	0.06	0.24	0.70	1.50	2.60
20	20	0.07	0.15	0.27	0.62	1.90	6.70
	50	0.04	0.12	0.28	0.50	1.00	2.80
	90	0.02	0.08	0.26	0.56	0.99	2.10
10	20	0.06	0.11	0.29	0.94	3.20	9.00
	50	0.04	0.11	0.20	0.41	1.20	4.20
	90	0.03	0.10	0.21	0.38	0.81	2.50
0	20	0.05	0.15	0.50	1.60	3.70	5.70
	50	0.04	0.08	0.19	0.60	2.10	6.70
	90	0.03	0.08	0.15	0.36	1.10	4.10

- As frequency increases, absorption increases.
- As relative humidity increases, absorption decreases.
- There is no direct relationship between absorption and temperature.

- The net result of atmospheric absorption is to modify the sound propagation of a point source from 6 dB per doubling of distance to approximately 7 dB to 8 dB per doubling of distance (based on anecdotal experience).

Figure 3A.7-1 Atmospheric Absorption at 10°C and 70% RH



3A.8 Meteorological Effects

There are many meteorological factors which can affect how sound propagates over large distances. These various phenomena must be considered when trying to determine the relative impact of a noise source either after installation or during the design stage.

3A.8.1 Wind

- Can greatly alter the noise climate away from a source depending on direction.
- Sound levels downwind from a source can be increased due to refraction of sound back down towards the surface. This is due to the generally higher velocities as altitude increases.

- Sound levels upwind from a source can be decreased due to a ‘bending’ of the sound away from the earth’s surface.

- Sound level differences of ±10 dB are possible depending on severity of wind and distance from source.

- Sound levels crosswind are generally not disturbed by an appreciable amount.

- Wind tends to generate its own noise and can provide a high degree of masking relative to a noise source of particular interest.

3A.8.2 Temperature

- Temperature effects can be similar to wind effects.

- Typically, the temperature is warmer at ground level than it is at higher elevations.

- If there is a very large difference between the ground temperature (very warm) and the air aloft (only a few hundred meters) then the transmitted sound refracts upward due to the changing speed of sound.

- If the air aloft is warmer than the ground temperature (known as an *inversion*) the resulting higher speed of sound aloft tends to refract the transmitted sound back down towards the ground. This essentially works on Snell’s law of reflection and refraction.

- Temperature inversions typically happen early in the morning and are most common over large bodies of water or across river valleys.

- Sound level differences of ±10dB are possible depending on gradient of temperature and distance from source.

3A.8.3 Rain

- Rain does not affect sound propagation by an appreciable amount unless it is very heavy.

- The larger concern is the noise generated by the rain itself. A heavy rain striking the ground can cause a significant amount of highly broadband noise. The amount of noise generated is difficult to predict.

- Rain can also affect the output of various noise sources such as vehicular traffic.

3A.8.4 Summary

- In general, these wind and temperature effects are difficult to predict.

- Empirical models (based on measured data) have been generated to attempt to account for these effects.

- Environmental noise measurements must be conducted with these effects in mind. Sometimes it is desired to have completely calm conditions, other times a worst case of downwind noise levels is desired.

3A.9 Topographical Effects

Similar to the various atmospheric effects outlined in the previous section, the effect of various geographical and vegetative factors must also be considered when examining the propagation of noise over large distances.

3A.9.1 Topography

- Topography is one of the most important factors in sound propagation.
- It can provide a natural barrier between source and receiver (i.e., if there is a berm or hill in between).
- It can provide a natural amplifier between source and receiver (i.e., a large valley or a hard reflective surface in between).
- The location of the topographical features relative to the source and receiver must be looked at to determine its importance (i.e., a small berm 1 km away from source and 1 km away from receiver will make negligible impact).

3A.9.2 Grass

- Grass can be an effective absorber due to large area covered.
- Grass only has an effective at low height above the ground. It does not affect sound transmitted direct from source to receiver if there is line of sight.
- Typically, grass has less absorption than atmospheric absorption when there is line of sight.
- An approximate rule of thumb based on empirical data is:

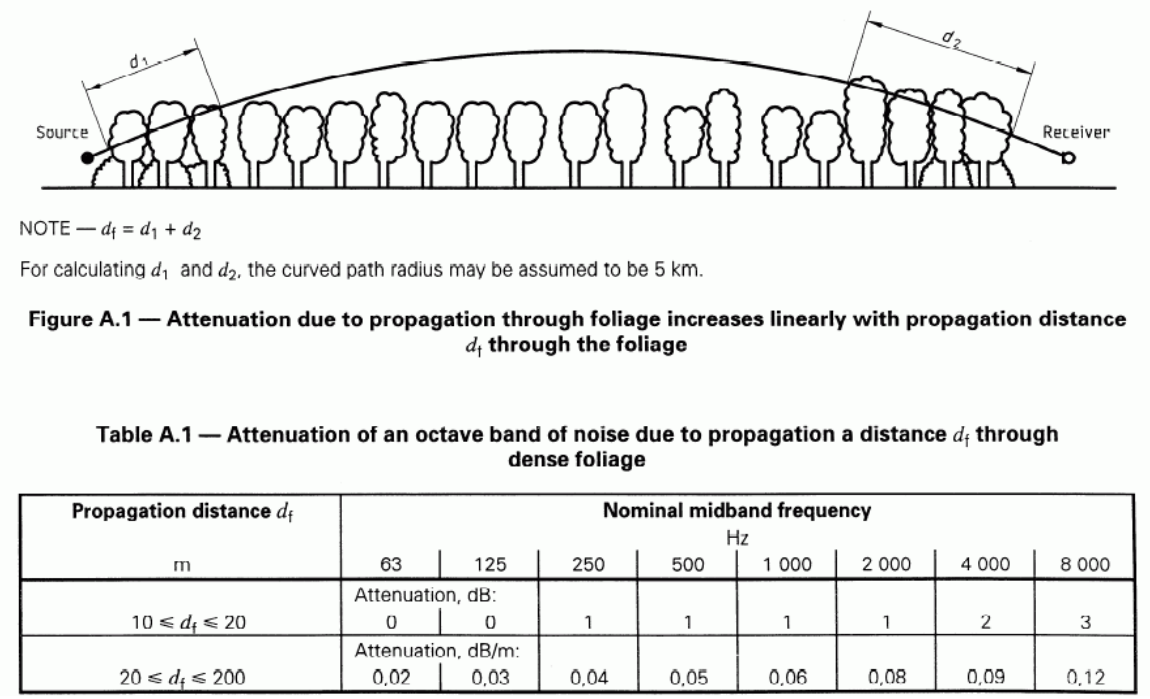
$$A_g = 18\log_{10}(f) - 31 \qquad (dB/100m)$$

Where: A_g is the absorption amount

3A.9.3 Trees

- Trees provide absorption due to foliage.
- Deciduous trees are essentially ineffective in the winter.
- Absorption depends heavily on density and height of trees.
- No data was found on absorption of various kinds of trees.
- Large spans of trees are required to obtain even minor amounts of sound reduction.
- In many cases, trees can provide an effective visual barrier, even if the noise attenuation is negligible.

Figure 3A.9-1 Attenuation due to Vegetation



NOTE — $d_f = d_1 + d_2$

For calculating d_1 and d_2, the curved path radius may be assumed to be 5 km.

Figure A.1 — Attenuation due to propagation through foliage increases linearly with propagation distance d_f through the foliage

Table A.1 — Attenuation of an octave band of noise due to propagation a distance d_f through dense foliage

Propagation distance d_f m	**Nominal midband frequency** Hz 63	125	250	500	1 000	2 000	4 000	8 000
$10 \leq d_f \leq 20$	Attenuation, dB: 0	0	1	1	1	1	2	3
$20 \leq d_f \leq 200$	Attenuation, dB/m: 0,02	0,03	0,04	0,05	0,06	0,08	0,09	0,12

Source: Tree/Foliage attenuation from ISO 9613-2:1996

3A.9.4 Bodies of Water

- Large bodies of water can provide the opposite effect to grass and trees.
- Reflections caused by small incidence angles (grazing) can result in larger sound levels at great distances (increased reflectivity, Q).
- Typically air temperatures are warmer high aloft since air temperatures near water surface tend to be more constant. Result is a high probability of temperature inversion.
- Sound levels can carry much further across bodies of water.

3A.9.5 Snow

- Covers the ground for much of the year in northern climates.
- Can act as an absorber or reflector (and varying degrees in between).
- Freshly fallen snow can be quite absorptive.
- Snow which has been sitting for a while and hard packed due to wind can be quite reflective.
- Falling snow can be more absorptive than rain, but does not tend to produce its own noise.

- Snow can cover grass which might have provided some means of absorption.
- Typically sound propagates with less impedance in winter due to hard snow on ground and no foliage on trees/shrubs.

3A.10 Literature Cited

International Organization for Standardization (ISO). 1996. Standard 9613-2, Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. Geneva, Switzerland.

Lewis Bell, Marcel Dekker, Inc. 1994. Industrial Noise Control.

3B1 Sound Levels of Familiar Noise Sources

Used with Permission Obtained from EUB Guide 38: Noise Control Directive User Guide (November 1999)

Source[1]	**Sound Level (dBA)**
Bedroom of a country home	30
Soft whisper at 1.5 m	30
Quiet office or living room	40
Moderate rainfall	50
Inside average urban home	50
Quiet street	50
Normal conversation at 1 m	60
Noisy office	60
Noisy restaurant	70
Highway traffic at 15 m	75
Loud singing at 1 m	75
Tractor at 15 m	78-95
Busy traffic intersection	80
Electric typewriter	80
Bus or heavy truck at 15 m	88-94
Jackhammer	88-98
Loud shout	90
Freight train at 15 m	95
Modified motorcycle	95
Jet taking off at 600 m	100
Amplified rock music	110
Jet taking off at 60 m	120
Air-raid siren	130

---

[1] Cottrell, T. 1980. Noise in Alberta. Table 1, p.8, ECA80 - 16/1B4 (Edmonton: Environment Council of Alberta).

3B.2 Sound Levels Generated by Common Appliances

Used with Permission Obtained from EUB Guide 38: Noise Control Directive User Guide (November 1999)

Source[2]	**Sound level at 3 feet (dBA)**
Freezer	38-45
Refrigerator	34-53
Electric heater	47
Hair clipper	50
Electric toothbrush	48-57
Humidifier	41-54
Clothes dryer	51-65
Air conditioner	50-67
Electric shaver	47-68
Water faucet	62
Hair dryer	58-64
Clothes washer	48-73
Dishwasher	59-71
Electric can opener	60-70
Food mixer	59-75
Electric knife	65-75
Electric knife sharpener	72
Sewing machine	70-74
Vacuum cleaner	65-80
Food blender	65-85
Coffee mill	75-79
Food waste disposer	69-90
Edger and trimmer	81
Home shop tools	64-95
Hedge clippers	85
Electric lawn mower	80-90

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[2] Reif, Z. F. and P.J. Vermeulen. 1979. Noise from domestic appliances, construction, and industry, Table 1, p.166, in Jones, H. W., ed., *Noise in the Human Environment*, vol. 2, ECA79-SP/1 (Edmonton: Environment Council of Alberta).

3C CENTRAL PROCESSING FACILITY NOISE SOURCES

TAG	DESCRIPTION	TYPE	LOCATION	RATING	UNITS	HEIGHT (mm)	Qty	MOTOR RATING (KW)	SWL (dBA)	Building Reduction (dBA)	Resultant SWL (dBA)
AH-200	Office Building 11-BU-0200 Air Make Up Unit	Air Make Up	11-BU-0200 Office Building	18	m^3/min	5400	1	8	91	0	**91**
AGM-2302 A/B	Oil Removal Filter Agitator	Mixer	De-Oiling Building 11-BU-1301			2000	2	45	99	30	**69**
P-1301	Deoiling Building Sump Pump	Pump	De-Oiling Building 11-BU-1301	49.5 450	m^3 / h kPa	2000	1	12	90	30	**60**
P-1302 A/B	ORF Feed Pump	Pump	De-Oiling Building 11-BU-1301	483 441	m^3 / h kPa	2000	2	94	105	30	**75**
P-1307 A/B	Skim Oil Pumps	Pump	De-Oiling Building 11-BU-1301	17 203	m^3 / h kPa	2000	2	6	90	30	**60**
P-1311 A/B	Induced Gas Flotation Eductor Pump	Pump	De-Oiling Building 11-BU-1301	50 700	m^3 / h kPa	2000	2	38	98	30	**68**
P-2303 A/B	WLS Feed Pump	Pump	De-Oiling Building 11-BU-1301	503 335	m^3 / h kPa	2000	2	75	104	30	**74**
AH-1301	Deoiling Building 11-BU-1301 Air Make Up Unit	Air Make Up	De-Oiling Building 11-BU-1301	41	m^3/min	7800	1	8	95	0	**95**
P-8905 A/B	Off-Spec Recycle Pump	Pump	Diluent Sales Oil Pump Bldg 11-BU-8901	27 1100	m^3 / h kPa	2000	2	23	96	30	**66**
P-8906 A/B	Bottoms Water / Sludge Pump	Pump	Diluent Sales Oil Pump Bldg 11-BU-8901	7.7 300	m^3 / h kPa	2000	2	4	88	30	**58**
P-8910 A/B	Truck Loading Pump	Pump	Diluent Sales Oil Pump Bldg 11-BU-8901	180 450	m^3 / h kPa	2000	2	30	97	30	**67**
P-8911 A/B/C	Diluent Pump	Pump	Diluent Sales Oil Pump Bldg 11-BU-8901	59 1250	m^3 / h kPa	2000	3	45	103	30	**73**
AH-8901	Diluent Sales Oil Pump Bldg 11-BU-8901 Air Make Up Unit	Air Make Up	Diluent Sales Oil Pump Bldg 11-BU-8901	11	m^3/min	6900	1	8	89	0	**89**
AH-861	Emergency Generator Building 11-BU-0861 Air Make Up Unit	Air Make Up	Emergency Gen Building 11-BU-0861	25	m^3/min	5000	1	4	92	0	**92**
P-1305 A/B	Induced Static Flotation Froth Pump	Pump	ISF / DGF Pump Building 11-BU-1302	49.5 176	m^3 / h kPa	2000	2	6	90	30	**60**
P-1309 A/B	Skim Tank DGF Pump	Pump	ISF / DGF Pump Building 11-BU-1302	50 700	m^3 / h kPa	2000	2	45	102	30	**72**
AH-1260	Oil Treating Laboratory Building 11-BU-1260 Air Make Up Unit	Air Make Up	Oil Treating Lab Building 11-BU-1260	3.5	m^3/min	5000	1	3	84	0	**84**
P-2417 A/B	Supernatant Pump	Pump	Outside in sump in between sludge ponds	83 502	m^3 / h kPa	1000	2	19	95	0	**95**
P-1208 A/B/C	Interface Recycle Pump	Pump	Process Building 11-BU-1201	35 400	m^3 / h kPa	2000	3	23	97	30	**67**
P-1231	Desand Jet Pump	Pump	Process Building 11-BU-1201	27 500	m^3 / h kPa	2000	1	30	94	30	**64**
P-1253 A/B/C	Sales Oil Pump	Pump	Process Building 11-BU-1201	149 430	m^3 / h kPa	2000	3	38	100	30	**70**
AH-1201 A/B	Process Building 11-BU-1201 Air Make Up Unit	Air Make Up	Process Building 11-BU-1201	75	m^3/min	11500	2	19	100	0	**100**
P-1601 A/B	Disposal Booster Pump	Pump	Slop Building 11-BU-1601	46.7 804	m^3 / h kPa	2000	2	75	104	30	**74**
P-1602 A/B	Disposal Pumps	Pump	Slop Building 11-BU-1601	42.5 5554	m^3 / h kPa	2000	2	149	107	30	**77**
P-6701 A/B	Slop Water Pump	Pump	Slop Building 11-BU-1601	33 400	m^3 / h kPa	2000	2	12	93	30	**63**
P-6702 A/B	Slop Oil Pump	Pump	Slop Building 11-BU-1601	9 1273	m^3 / h kPa	2000	2	12	93	30	**63**
P-6711 A/B	Dry Oil Transfer Pump	Pump	Slop Building 11-BU-1601		m^3 / h kPa	2000	2	12	93	30	**63**
P-6732	Desand Quench Pump	Pump	Slop Building 11-BU-1601	264 600	m^3 / h kPa	2000	1	75	101	30	**71**
P-6736	Desand Recycle Pump	Pump	Slop Building 11-BU-1601	20.7 450	m^3 / h kPa	2000	1	8	88	30	**58**
B-3501 / 3502 / 3503 / 3504	Steam Generator Exhaust	Boiler	Stack at Steam Gen Building 11-BU-3501	264	Gj / h	27000	1	N/A	107	0	**107**
K-3501 / 3502 / 3503 / 3504	Steam Gen Combustion Air Blower	Fan Cent	Steam Gen Building 11-BU-3501	298.4 4160	kW V	8000	1	298	108	0	**108**

TAG	DESCRIPTION	TYPE	LOCATION	RATING	UNITS	HEIGHT (mm)	Qty	MOTOR RATING (KW)	SWL (dBA)	Building Reduction (dBA)	Resultant SWL (dBA)
B-3501 / 3502 / 3503 / 3504	Steam Generator Casing	Boiler	Steam Gen Building 11-BU-3501	264	Gj / h	2000	1	N/A	107	30	**77**
P-2421 A/B	Backwash Water Supply Pump	Pump	Steam Gen Building 11-BU-3501	502 685	m^3 / h kPa	2000	2	149	107	30	**77**
P-3502 A/B	Boiler Feed Water Booster Pump	Pump	Steam Gen Building 11-BU-3501	545 2890	m^3 / h kPa	2000	2	630	113	30	**83**
P-3503 A/B	Boiler Feed Water Charge Pump	Pump	Steam Gen Building 11-BU-3501	608 11173	m^3 / h kPa	2000	2	2,610	119	30	**89**
P-3504 A/B	Boiler Feed Water Lube Oil Pump - Electric Motor Drive	Pump	Steam Gen Building 11-BU-3501	2	m^3 / h kPa	2000	4	4	91	30	**61**
P-3505	Steam Generation Building Sump Pump	Pump	Steam Gen Building 11-BU-3501	49.5 450	m^3 / h kPa	2000	1	8	88	30	**58**
AH-3501 A/B	Steam Generation Building 11-BU-3501 Air Make Up Unit	Air Make Up	Steam Gen Building 11-BU-3501	75	m^3/min	16750	2	19	100	0	**100**
AH-3500	Steam Generation MCC Building 11-BU-3500 Air Make Up Unit	Air Make Up	Steam Gen MCC Building 11-BU-3500	7	m^3/min	5600	1	4	87	0	**87**
AH-3560	Steam Generation Lab. Building 11-BU-3560 Air Make Up Unit	Air Make Up	Steam Gen. Lab Building 11-BU-3560	7	m^3/min	4000	1	3	87	0	**87**
H-5801	Glycol Heater Exhaust	Heater Glycol	Stack Of Utility Building 11-BU-5801	30	Gj / h	16000	1	N/A	93	0	**93**
K-5801	Glycol Heater Combustion Air Blower	Blower	Utility Building 11-BU-5801	30	Gj / h	3500	1	38	100	0	**100**
H-5801	Glycol Heater Casing	Heater Glycol	Utility Building 11-BU-5801	30	Gj / h	2000	1	N/A	93	30	**63**
K-5851 A/B	Plant Instrument Air Compressors	Comp.	Utility Building 11-BU-5801	983	sm^3/hr	2000	2	149	105	30	**75**
P-5801	Glycol Make-Up Pump	Pump	Utility Building 11-BU-5801	11 504	m^3 / h kPa	2000	1	8	88	30	**58**
P-5802 A/B	Glycol Circulation Pumps	Pump	Utility Building 11-BU-5801	646 950	m^3 / h kPa	2000	2	261	109	30	**79**
AH-5801	Utility Building 11-BU-5801 Air Make Up Unit	Air Make Up	Utility Building 11-BU-5801	7.25	m^3/min	7000	1	4	87	0	**87**
EAM-5801 A11 to A18	Glycol Cooler Fans	Aerial Cooler	Outside	37.3 575	kW V	6000	18	38	112	0	**112**
K-7821 A/B	VRU Compressor	Comp.	VRU Building 11-BU-7821		Sm3 / h kPa	2000	2	373	109	30	**79**
AH-7821	VRU Building 11-BU-7821 Air Make Up Unit	Air Make Up	VRU Building 11-BU-7821	11	m^3/min	7100	1	8	89	0	**89**
AH-700	Warehouse Building 11-BU-0700 Air Make Up Unit	Air Make Up	Warehouse 11-BU-0700	16	m^3/min	11700	1	6	91	0	**91**
AH-1601	Water Disposal Building 11-BU-1601 Air Make Up Unit	Air Make Up	Water Disposal Building 11-BU-1601	21	m^3/min	5600	1	8	92	0	**92**
AGM-2413 A/B/C/D	After Filter Agitator	Mixer	Water Treatment Building 11-BU-2401			2000	4	45	102	30	**72**
P-2400	Water Treatment Building Sump Pump	Pump	Water Treatment Building 11-BU-2401	49.5 450	m^3 / h kPa	2000	1	12	90	30	**60**
P-2405 A/B	Raw Water Supply Pumps	Pump	Water Treatment Building 11-BU-2401	22.2 350	m^3 / h kPa	2000	2	6	90	30	**60**
P-2407 A/B	Utility Water Pump	Pump	Water Treatment Building 11-BU-2401	25 455	m^3 / h kPa	2000	2	23	96	30	**66**
P-2411 A/B	UF Backwash Pump	Pump	Water Treatment Building 11-BU-2401		m^3 / h kPa	2000	2	12	93	30	**63**
P-2412 A/B	Warm Lime Softener Overflow Pump	Pump	Water Treatment Building 11-BU-2401	564 858	m^3 / h kPa	2000	2	149	107	30	**77**
P-2415 A/B	Sludge Recirculation Pump	Pump	Water Treatment Building 11-BU-2401	139 239	m^3 / h kPa	2000	2	15	94	30	**64**
P-2425 A/B	Regeneration Caustic Pumps	Pump	Water Treatment Building 11-BU-2401	3.08 581	m^3 / h kPa	2000	2	6	90	30	**60**

TAG	**DESCRIPTION**	**TYPE**	**LOCATION**	**RATING**	**UNITS**	**HEIGHT (mm)**	**Qty**	**MOTOR RATING (KW)**	**SWL (dBA)**	**Building Reduction (dBA)**	**Resultant SWL (dBA)**
P-2427 A/B	Regen Acid Pumps	Pump	Water Treatment Building 11-BU-2401	8 585	m^3 / h kPa	2000	2	6	90	30	**60**
P-2428 A/B	Regeneration Waste Pump	Pump	Water Treatment Building 11-BU-2401	45 450	m^3 / h kPa	2000	2	23	96	30	**66**
P-2441 A/B	Lime Slurry Pump	Pump	Water Treatment Building 11-BU-2401	120	m^3 / d	2000	2	6	90	30	**60**
P-2442 A/B	MagOx Slurry Pump	Pump	Water Treatment Building 11-BU-2401	120	m^3 / d	2000	2	6	90	30	**60**
AH-2401 A/B	Water Treatment Building 11-BU-2401 Air Make Up Unit	Air Make Up	Water Treatment Building 11-BU-2401	107	m^3/min	10400	2	19	102	0	**102**
AH-2460	Water Treating Lab. Building 11-BU-2460 Air Make Up Unit	Air Make Up	Water Treatment Lab 11-BU-2460	20	m^3/min	4000	1	8	92	0	**92**
AH-2400	Water Treatment MCC Building 11-BU-2400 Air Make Up Unit	Air Make Up	Water Treatment MCC 11-BU-1601	7	m^3/min	5800	1	4	87	0	**87**
	Salt Bath Heater	Heater	Sulphur Recovery Unit	0.5	MW	16000	1	N/A	87	0	**87**
	Waste Heat Glycol Cooler	Aerial Cooler	Sulphur Recovery Unit	8	kW	6000	1	8	94	0	**94**

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4A1 INTRODUCTION

This appendix provides additional information regarding the available exposure limits for the chemicals of potential concern (COPCs) identified within the human health risk assessment and the toxicological endpoints of concern upon which they are based.

4A1.1 Selection of Chemicals of Potential Concern

The complete inventory of chemicals that may be emitted from the Project are presented in Table 4A1-1, listed by category. Only airborne releases of COPCs were determined to be relevant to the Project.

Table 4A1-1 Inventory of Identified Chemicals of Potential Concern

Chemical Category	Individual Chemicals in Emissions Inventory
Volatile Organic Compounds (VOCs)	2-methylnaphthalene, acenapthene, acenaphthylene, acetaldehyde, acrolein, benzaldehyde, benzene, dichlorobenzene, ethylbenzene, formaldehyde, hexane, naphthalene, pentane, toluene, xylenes
Polycyclic Aromatic Hydrocarbons (PAHs)	3-methylcholanthrene, 7,12-dimethylbenz(a)anthracene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, perylene, phenanthrene, pyrene
Sulphur Compounds	Sulphur dioxide
Other	Carbon monoxide, nitrogen dioxide, $PM_{2.5}$[1]

[1] $PM_{2.5}$ represents both primary and secondary particulate

4A1.2 Selection of Exposure Limits

Exposure limits based upon toxicological information were then identified for the COPCs. In the event that exposure limits were not available for some COPCs, groups of similar substances were created based upon physico-chemical properties. These actions are described in more detail below.

Different durations of exposure (e.g., short-term vs. long-term exposure) involved may produce different types of adverse effects. Exposure duration in risk assessments is typically divided into two general categories – acute and chronic exposure. Acute exposure is generally defined as exposure period less than or equal to 24 hours. Typically, the term acute implies a single exposure to a substance; however, acute exposure may also refer to repeated exposures within a 24 hour period. In some situations, sub-acute exposure may be evaluated (also known as short-term toxicity) in association with exposure durations that fall between < 24 hours and 1 month. Chronic exposures may be subdivided into the sub-categories of sub-chronic and chronic toxicity. Sub-chronic exposures involved repeated exposure to the substance over a period of one to three months, while chronic exposures generally are repeated exposures of a period of greater than three months (90 days).

The toxicity assessment requires understanding of the critical toxicological effects that can be caused by the COPCs. Such information is generally obtained from published scientific studies conducted in animals or humans under controlled experimental conditions, or observations from human epidemiological studies that examine the relationship between medical conditions of interest and exposure.

When evaluating the potential for a substance to cause an adverse effect, consideration must be given to the dose to which a receptor is exposed, as the dose determines the type and potentially the severity any adverse effects that may be observed. Specifically, it is the amount of the substance that is absorbed and reaches the toxicological site of interest in the organism that determines the probability of an adverse effect occurring.

Substances may differ greatly with respect to the dosage required to result in an adverse effect, as well as in the mechanism(s) by which the adverse effects are elicited. Two categories are used to divide substances based upon their mechanism of toxicity: threshold and non-threshold. In general, threshold substances require that a certain threshold level of exposure (or minimum dose) be exceeded before toxic effects occur. Most substances fall into this category. Non-threshold substances are a select group of substances that elicit adverse effects via a mechanism that does not have clearly distinguished threshold dose. Various regulatory agencies suggest that no safe levels of exposure to non-threshold substances exist. Carcinogens that act via a mutagenic or genotoxic mode of action are examples of non-threshold substances.

For non-threshold substances, it is necessary to evaluate the available information to identify effect-levels at which either no effects are observed (e.g., a no observed adverse effect level (NOAEL) or a no observed effect level) or adverse effects are first observed (e.g., a lowest observed adverse effect level (LOAEL) or lowest observed effect level (LOEL). Benchmark doses (BMD) are also becoming more commonly used in risk assessment as well, and represent the lower confidence limit on the dose that results in a pre-determined change in a specific adverse response (e.g., 5%) in the study population relative to background. The most appropriate, available effect-level may then be used to derive an exposure limit or ‘safe’ level of exposure, using the formula below:

$$Exposure\ Limit = \frac{Effect\,Level}{Uncertainty Factor(s)}$$

Uncertainty factors (also known as safety factors) are values that are applied with the intention of providing an added level of conservatism when determining what level of exposure is ‘safe’. Additional information regarding uncertainty factors is provided in Table 4A1-2.

Table 4A1-2 Description of Various Toxicological Uncertainty Factors

Nature of Uncertainty	Factor	Comments
Differences in sensitivity between species	10-fold	Used to accommodate the uncertainty surrounding the use of laboratory animal data to predict the responses that might be observed among humans. It conservatively assumes that people are 10 times more sensitive to the chemical than the most sensitive laboratory animal species.
Differences in sensitivity within a single species	10-fold	Used to account for the fact that some individuals within a population may show higher sensitivity to chemicals than the “average” person. It acts as an added measure to ensure the protection of such sensitive individuals, and assumes these individuals are 10 times more responsive. Its use is generally confined to assessments involving human receptors. .
LOAEL to NOAEL	10-fold	Used in instances in which a NOAEL is not demonstrated in the most sensitive laboratory animal species. It permits the ‘lowest-observed-adverse-effect level’ (LOAEL) observed in the sensitive test species to be translated to a NOAEL, from which an exposure limit can then be derived. It assumes that had the lowest dose administered in the most definitive toxicity study been 10-fold lower, no responses would have been observed in the test species.

Nature of Uncertainty	Factor	Comments
Subchronic to chronic	10-fold	Reserved for cases in which exposures are expected to occur for long periods, and chronic toxicity data, involving repeated exposures of test animals to the chemical for much of their lifespan, are unavailable. It permits the use of sub-chronic data, involving exposures over shorter periods, to predict the responses that might be observed after more prolonged exposure.
Uncertainty or limitations of database	1-10-fold	This factor permits adjustment in association with how well characterized the effects of the substance are, and is intended to protect against deriving an under-protective exposure limit when only limited toxicity information is available. May be based upon professional judgment.

In general, an exposure limit (or toxicological reference value –TRV) represents the dose of a substance to which a person could be exposed without significant risk of adverse effects. Given the level of conservatism incorporated into the derivation of these values (i.e., selection of sensitive endpoints, application of uncertainty factors, slope based on upper confidence limit from low-dose extrapolation), it is reasonable that these values are protective of sensitive individuals within a population. The terminology assigned to exposure limits may vary in relation to the exposure route (ingestion, inhalation) or with regulatory jurisdiction. Exposure limits may be described as the following:

- Reference Concentration (RfC) **–** Refers to the safe levels of airborne chemicals in which the primary (and almost exclusive) avenue of exposure is through inhalation (e.g., gases, vapours, aerosols, suspended dusts). The RfC is expressed as a concentration of the chemical in air (e.g., microgram per cubic metre - ug/m^3).

- Reference Dose (RfD) – Refers to the safe levels of threshold-type chemicals to which exposure occurs through multiple pathways, both primary and secondary. It is most commonly expressed as the dose of the chemical per unit body weight of the receptor per day (i.e., microgram per kilogram of body weight per day - ug/kg·bw/d).

- Risk-specific Concentration (RsC)/Risk-specific Dose (RsD) – Reserved for non-threshold carcinogens, and refers to the dose or concentration of the carcinogen that corresponds to an increase of one extra case in a population of 100,000 people.

Chemicals of potential concern were assessed on an individual basis if a standard, guideline or objective was available from a regulatory agency or leading scientific authority that is protective of air quality and human health. Selection of each exposure limit required that the limit be:

- Protective of the health of the general public based on the current scientific understanding of the health effects known to be associated with exposures to the COPC;

- Protective of sensitive individuals, including children and the elderly, through the use of safety or uncertainty factors;

- Established or recommended by reputable scientific authorities; and,

- Supported by adequate documentation.

In the case that the above criteria were supported by more than one standard, guideline or objective, the most scientifically defensible limit was selected. The rationale for selection of an alternative exposure limit (limit other than the most stringent) is provided.

4A2 CHEMICAL GROUPING AND MIXTURES

4A2.1 Groups and Surrogates

In some instances there is a COPC for which little or no toxicological information exists to be predicted on the basis of information available on another chemical of similar molecular structure. The second chemical is often termed a ‘surrogate’ The principle is also often applied to groups of chemicals of similar structure in which toxicity data on many of the individual constituents of the group may be lacking. In such cases, all of the constituents are assumed to share the same toxic potency as the most toxic chemical in the group for which toxicity information is known. Also, toxicological information for a similar mixture of substances may also be available and serve as the basis for an exposure limit.

Descriptions of how COPCs were evaluated within this assessment are provided in Table 4A2-1.

Table 4A2-1 Chemicals of Potential Concern, Groups and Surrogates

COPC	Averaging Period	Group	Surrogate
2-Methylnaphthalene	1-h 9th, Annual	Aromatic C_9-C_{16}	Aromatic C_9-C_{16}
3-methylcholanthrene	1-h 9th, Annual	Aromatic C_{17}-C_{34}	Aromatic C_{17}-C_{34}
7,12-dimethylbenzo(a)anthracene	1-h, 9th, Annual	Aromatic C_{17}-C_{34}	Aromatic C_{17}-C_{34}
Acenaphthene	1-h 9th, Annual	Acenaphthene group	NA
Acenaphthylene	1-h 9th, Annual	Acenaphthene group	Acenaphthene
Acetaldehyde	1-h 9th, Annual	Individual	NA
Acrolein	1-h 9th, Annual	Individual	NA
Anthracene	1-h 9th, Annual	Aromatic C_9-C_{16} Group, PAH Group	Aromatic C9-C16 (acute), Benzo(a)pyrene (chronic)
Benzaldehyde	1-h 9th, Annual	Individual	NA
Benzene	1-h 9th, Annual	Individual	NA
Benz(a)anthracene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Benzo(a)pyrene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Benzo(b)fluoranthene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Benzo(e)pyrene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Benzo(g,h,i)perylene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Benzo(k)fluoranthene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Carbon monoxide	1-h 9th, 8-h	Individual	NA
Chrysene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Dibenz(a,h)anthracene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Dichlorobenzene	1-h 9th, Annual	Individual	NA
Ethylbenzene	1-h 9th, Annual	Individual	NA

COPC	Averaging Period	Group	Surrogate
Fluoranthene	1-h 9th, Annual	Aromatic C_9-C_{16} Group, PAH Group	Aromatic C_9-C_{16} Group (acute), Benzo(a)pyrene (chronic)
Fluorene	1-h 9th, Annual	Aromatic C_9-C_{16} Group, PAH Group	Aromatic C_9-C_{16} Group (acute), Benzo(a)pyrene (chronic)
Formaldehyde	1-h 9th, Annual	Individual	NA
Indeno(1,2,3-cd)pyrene	Annual	Aromatic C_{17}-C_{34} Group, PAH Group	Aromatic C_{17}-C_{34} Group (acute), Benzo(a)pyrene (chronic)
Naphthalene	1-h 9th, Annual	Individual	NA
n-Hexane	1-h 9th, Annual	Individual	NA
Nitrogen dioxide	1-h 9th, Daily, Annual	Individual	NA
n-Pentane	1-h 9th, Annual	Individual	Aliphatic C_5-C_8
Perylene	1-h, 9th, Annual	PAH Group (chronic)	Aromatic C_{17}-C_{34} (acute)
Phenanthrene	Annual	Aromatic C_9-C_{16} Group, PAH Group	Aromatic C_9-C_{16} (acute), Benzo(a)pyrene (chronic)
Particulate matter ($PM_{2.5}$)	Daily 8th, Annual	Individual	NA
Pyrene	1-h 9th, Annual	Aromatic C_9-C_{16} Group, PAH Group	Aromatic C_9-C_{16} Group (acute), Benzo(a)pyrene (chronic)
Sulphur dioxide	10-min, 1-h 9th, Daily, Annual	Individual	NA
Toluene	1-h 9th, Annual	Individual	NA
Xylene (Total)	1-h 9th, Annual	Individual	NA

4A2.2 Mixtures

As exposure to chemicals typically does not occur in isolation, consideration was given to the potential health risks that might be presented by chemicals acting in combination. The interaction between chemicals can take many forms, all of which are of toxicological interest and some of which might be relevant to assessing potential health risks. The most common forms of interaction are:

- **Additivity**: where the effect may be estimated through the addition of the potency-weighted exposure levels (dose addition), or of the response (response addition);
- **Synergism:** the combined effects of two chemicals are much greater than additive;
- **Antagonism**: the effect of the mixture is less than additive;
- **Potentiation:** one chemical does not have a toxic effect but in the presence of a second chemical, increases the effect of the second chemical; or
- **Masking:** the mixture components produce opposite effects on an organ system, decreasing or cancelling the effects of one or more of the components (ATSDR, 2004; U.S. EPA, 2000).

Toxicological interactions between mixture components depend on each component, their mode of action, and their concentrations. The primary mechanisms for chemical interactions are chemical-chemical, pharmacokinetic, and pharmacodynamic (ATSDR, 2004).

Within this HHRA, as per Health Canada's guidance, chemical interactions were assumed to be additive in nature (Health Canada, 2004a). The mixture types that were evaluated are summarized in Table A3-1 at the end of this Appendix.

For carcinogenic PAH mixtures, two different modeling approaches were used to evaluate carcinogenic potential - The whole mixture model (WMM) and the individual PAH model (IPM). The WMM approach is based on the assumption that the potency of the PAH fraction of any environmental mixture is proportional to its benzo(a)pyrene content (OMOE, 1997), while the IPM approach is based on the sum of the attributable risks for each individual PAH. Additional information is available in the benzo(a)pyrene summary below.

4A2.3 Selection of Exposure Limits

Summarized below is the general approach applied in the selection of exposure limits (toxicological reference values) for the HHRA. Acute and chronic exposure limits are discussed separately.

4A2.3.1 Acute

For acute exposure durations, the sources of the exposure limits that were evaluated for this HHRA include:

- Ambient Air Quality Objectives (AAQOs) developed by AENV;
- Acute Minimal Risk Levels (MRLs) for Hazardous Substances developed by the Agency for Toxic Substances and Disease Registry (ATSDR);
- Reference Levels (RELs) recommended by the California Office of Environmental Health Hazard Assessment (OEHHA);
- Ontario Reg. 419/05 Standards and POI Standards, Ambient Air Quality Criteria (AAQCs) of the Ontario Ministry of the Environment (OMOE); and
- Air Quality Guidelines for Europe (Second Edition) developed by the World Health Organization (WHO).

If an acute exposure limit that meets the four selection criteria (listed above) could not be identified from any of these regulatory agencies, then the search was expanded to include:

- Intermediate MRLs for Hazardous Substances developed by the Agency for Toxic Substances and Disease Registry (ATSDR);
- Threshold Limit Values (TLVs) developed by the American Conference of Governmental Industrial Hygienists (ACGIH); and
- Temporary Emergency Exposure Limits (TEEL-0s) provided by the United States Department of Energy Subcommittee on Consequence Assessment and Protective Actions (U.S. DOE).

4A2.3.2 Chronic

The sources of the chronic exposure limits used in the HHRA include the regulatory agencies outlined in the *Federal Contaminated Site Risk Assessment in Canada* (Health Canada, 2004a):

- Toxicological Reference Values (TRVs) and Health-Based Guidance Values established by Health Canada
- MRLs for Hazardous Substances developed by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR)
- Maximum Permissible Risk Levels established by the Netherlands National Institute of Public Health and the Environment (RIVM)
- TRVs presented in the Integrated Risk Information System (IRIS) developed by the United States Environmental Protection Agency (U.S. EPA)
- Air Quality Guidelines for Europe (Second Edition) developed by the World Health Organization (WHO)

Similar to the acute assessment, chronic exposure limits were required to satisfy the four selection criteria listed above. If a limit that met each of these criteria was not available from the aforementioned agencies, the search for a chronic exposure limit was expanded to the following agencies:

- Chronic RELs recommended by the California Office of Environmental Health Hazard Assessment (OEHHA)
- Documentation of the Threshold Limit Values and Biological Exposure Indices (Sixth Edition) developed by the American Conference of Governmental Industrial Hygienists (ACGIH)

4A2.4 Chemical Profiles

4A2.4.1 Acenaphthene Group

- Acenaphthene, acenaphthylene

Table 4A2-2 Acute Inhalation Exposure Limits for the Acenaphthene Group

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	--	--	ATSDR (2005a)
OEHHA	--	--	OEHHA (2000)
OMOE	--	--	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

No acute guidelines or exposure limits were identified for acenaphthene.

However, the ATSDR provides an intermediate MRL of 0.6 mg/kg bw/d for hepatic effects in mice. The MRL is based on an oral LOAEL of 175 mg/kg bw/d in mice (ATSDR 1995, 2005a). The ATSDR applied an uncertainty factor of 300 to the study LOAEL to account for use of a minimum LOAEL (3-fold), extrapolation from mice to humans (10-fold), and human variability (10-fold). The use of an intermediate LOAEL when characterizing acute exposure is considered to be conservative, as a higher exposure over a shorter time-period (i.e., acute exposure) presumably could occur without risk of adverse effects. The MRL of 0.6 mg/kg bw/d is equivalent to an air concentration of 830 ug/m^3, with adjustment made for chemical bioavailability, (chronic exposure limit). This modified 24-hour exposure limit was used in the acute effects assessment.

Table 4A2-3 Chronic Inhalation Exposure Limits for the Acenaphthene Group

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	-	-	ATSDR (2005a)
Health Canada	-	-	HC (2004)
OEHHA	-	-	OEHHA (2000)
RIVM	-	-	
U.S. EPA	-	-	U.S. EPA IRIS (2006)
WHO	-	-	WHO (2000)

-- = not available

No chronic inhalation exposure limits were identified for acenaphthene.

The U.S. EPA has developed an oral RfD of 60 ug/kg bw/d for hepatotoxicity based on a subchronic study (U.S. EPA 2006A). In this case, the U.S. EPA identified an oral dose of 175 mg/kg bw/d as the NOAEL, and of 350 mg/kg bw/d as the LOAEL. The U.S. EPA applied an uncertainty factor of 3,000 to the NOAEL to account for interspecies variability (10-fold), intra-species variability (10-fold), use of a subchronic study for chronic RfD derivation (10-fold), and lack of adequate data in a second species and reproductive and developmental data (3-fold).

Given that there were no available inhalation guidelines for acenaphthene, the oral RfD derived by the U.S. EPA was used for the inhalation assessment, with adjustments made for chemical bioavailability. In derivation of the subchronic exposure limit, the uncertainty factor of 10 applied by the U.S. EPA for use of a subchronic study was removed. The result is a subchronic exposure limit of 600 ug/kg bw/day for acenaphthene. The chronic oral limit identified previously was modified to an equivalent inhalation limit of 830 ug/m^3 based on the following adjustments and assumptions:

- Inhalation bioavailability of 100% (assumed)
- Oral bioavailability of 31% (RAIS, 2006)
- Adult body weight of 70.7 kg (Health Canada, 2004a)
- Adult inhalation rate of 15.8 m^3/d (Health Canada, 2004a)

This modified exposure limit of 830 ug/m^3 was used in the chronic inhalation effects assessment.

4A2.4.2 Acetaldehyde

Table 4A2-4 Acute Inhalation Exposure Limits for Acetaldehyde

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	90	1-hour	AENV (2005)
ATSDR	--	--	ATSDR (2005a)
OEHHA	--	--	OEHHA (2000)
OMOE	500	½-hour, 1-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The AENV (2005) recommends a 1-hour AAQO for exposure to acetaldehyde of 90 ug/m^3. However, this objective was adopted from the Texas Natural Resource Conservation Commission, which is odour based (TCEQ, 2003). Given that this guideline is not health-based, it was not used in the current assessment.

The OMOE (2005a) provides both a ½-hour and 24-hour standard of 500 ug/m^3, presumably because the short-term toxicity of acetaldehyde is more dependent on concentration than duration of exposure (CEPA, 2000a). These AAQC were not used in the acute effects assessment as the adequate supporting documentation is not available.

As a result, the toxicity search was expanded to include intermediate MRLs provided by the ATSDR and occupational exposure values established by the ACGIH and the U.S. DOE for acetaldehyde.

The ACGIH provides a TLV-Ceiling of 25 ppm (45 mg/m^3) for eye and upper respiratory tract irritation (ACGIH 1996, 2006). A TLV-Ceiling represents the chemical concentration that should not be exceeded at any part of the working exposure. Sensitive individuals are reported to experience eye irritation at concentrations as low as 25 ppm of acetaldehyde after a 15-minute exposure, with most people only experiencing irritation at concentrations greater than 50 ppm. On this basis, the ACGIH developed the TLV-Ceiling of 25 ppm (45 mg/m^3).

While this TLV-Ceiling is based on 15-minute exposure, in the health risk assessment they were compared to the 1-hour predicted ground-level air concentration. The TLV-Ceiling was adjusted from 15-minute exposure to 1-hour exposure using a modified Haber's Law (OEHHA, 1999a).

$$C_{ADJ}^{n} \text{ x } T_{ADJ} = C^{n} \text{ x } T$$

$$C^{1} \text{ x 60 minutes} = 45^{1} \text{ mg/m}^{3} \text{ x 3 minutes}$$

where:

C_{ADJ} = duration-adjusted concentration
T_{ADJ} = desired time of exposure (60 minutes)
C = concentration of exposure (45 mg/m^3)
T = time of exposure (3 minutes)
n = chemical-specific modification factor designed to account for the toxicity of a chemical being concentration and/or deputation dependant (1)

The OEHHA (1999a) recommends using a default “n” value of 1 in the adjustment for less than 1 hour exposure. Based on the above conversion factor, the TLV-Ceiling is adjusted to a concentration of 2.3 mg/m^3.

Generally, a 10-fold uncertainty factor would be applied by the study team to this limit, however, as the study was completed in sensitive individuals, the application of this factor was not necessary. Thus, a modified 1 hour limit of 2,300 ug/m^3 was adopted as the short-term exposure limit for this assessment.

Table 4A2-5 Chronic Inhalation Exposure Limits for Acetaldehyde

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	--	--	ATSDR (2005a)
Health Canada	390 17.2	RfC RsC	Health Canada (2004c)
RIVM	--	--	RIVM (2001)
U.S. EPA	9 5	RfC RsC	U.S. EPA (2006)
WHO	--	--	WHO (2000)

-- = not available

The Health Canada and the International Association for Research on Cancer (IARC) classify acetaldehyde as possibly carcinogenic to humans (CEPA, 2000a; IARC, 1999). As a result, acetaldehyde was included as a carcinogen in the chronic effects assessment.

An RsC of 17.2 ug/m^3 was developed from a tumorigenic concentration (TC_{05}) of 86 mg/m^3, which was associated with a 5% increase in nasal adenocarcinomas and squamous cell carcinomas (combined) in the most sensitive sex (males) of Wistar rats exposed for up to 28 months (Health Canada, 2004c; CEPA, 2000a). The TC_{05} was derived by Health Canada using a multistage model, with adjustment for intermittent to continuous exposure (6 hours/24 hours × 5 days/7 days). The RsC represents the daily dose *via* inhalation that is associated with an increased cancer risk of one in 100,000.

The U.S. EPA (2006) also presents a quantitative estimate of carcinogenic risk from inhalation exposure. Its inhalation unit risk of 2.2×10^{-6} per ug/m^3 equates to an RsC of 5 ug/m^3 (corresponding to a risk level of one in 100,000). This unit risk was not used for the current assessment for the following reasons.

- The U.S. EPA last reviewed the carcinogenicity of acetaldehyde in 1991, while the Health Canada value is more recent (published in 2000).
- The Health Canada and U.S. EPA limits are based on studies conducted by the same researchers. However, the Health Canada limit is based on a 1986 study by Woutersen et al. (1986), which is more recent than the work completed by Woutersen and Appelman in 1984, upon which the U.S. EPA limit is based.
- The scientific rationale for the Health Canada limit is considerably more detailed than what the U.S. EPA provides in support of its limit.

Therefore, the Health Canada RsC of 17.2 ug/m^3 was selected for the chronic inhalation assessment of acetaldehyde. The mechanism of action appears to be mediate through genotoxicity (GENETOX, 2007).

A chronic oral exposure limit was not required for the assessment of acetaldehyde, because it did not exceed any of the persistence and bioaccumulation parameters established by Environment Canada (2007) and thus was not incorporated into the multiple exposure pathway model. As well, acetaldehyde is expected to remain in the medium to which it is discharged (i.e., air). Fugacity modelling predicts that when acetaldehyde is released into ambient air, the distribution of mass is 97.1% in air, 2.6% in water and 0.3% in soil (CEPA, 2000a).

4A2.4.3 Acrolein

Table 4A2-6 Acute Inhalation Exposure Limits for Acrolein

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	6.9	1-hour	ATSDR (2005a)
OEHHA	0.19	1-hour	OEHHA (2000)
OMOE	0.24 0.08	½-hour 24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The OEHHA provides an acute REL of 0.19 ug/m^3 based on a LOAEL of 0.06 ppm for eye irritation in 36 healthy human workers exposed to acrolein for 5 minutes (Darley et al., 1960; OEHHA 1999b, 2000). In deriving the REL, the OEHHA adjusted the LOAEL to a 1 hour concentration of 0.005 ppm using a modified Haber's Law.

$$\text{CADJn} \times \text{TADJ} = \text{Cn} \times \text{T}$$

$$\text{C1} \times 60 \text{ minutes} = 0.061 \text{ ppm} \times 5 \text{ minutes}$$

where:

C_{ADJ} = duration-adjusted concentration
T_{ADJ} = desired time of exposure (60 minutes)
C = concentration of exposure (0.06 ppm)
T = time of exposure (5 minutes)
n = chemical-specific modification factor designed to account for the toxicity of a chemical being concentration and/or deputation dependant (1)

According to Haber's Law, the magnitude of "n" is determined by evaluating the concentration versus response relationships for several different exposure durations (OEHHA, 1999a). The time-concentration-response relationship will depend on the time-frame considered as well as the endpoint measured. Thus, there are many "n" values for a single chemical that are applicable to different endpoints. The OEHHA (1999a) provides an example using ammonia which has an "n" value of 4.6 for irritation and 2 for lethality. In the case of acrolein, an "n" value of 1.2 is reported for lethality, but an "n" value is not reported for irritation. As such, in all likelihood by defaulting to an "n" value of 1 the OEHHA is overestimating the actual toxicity of acrolein on a 1 hour basis. The study team suggests examining the range of 1 hour concentrations calculated using more probable values of n for irritation, such as 1.2 (actual value identified for lethality) to 2.

Using an "n" value of 1.2 in combination with the cumulative uncertainty factor of 60 applied by the OEHHA in the original REL derivation, a modified 1 hour exposure limit of 0.29 ug/m^3 was calculated, and was used in the acute effects assessment for acrolein.

Table 4A2-7 Chronic Inhalation Exposure Limits for Acrolein

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	--	--	ATSDR (2005a)
Health Canada	0.4	TC	Health Canada (2004c)
OEHHA	0.06	REL	OEHHA (2005)
RIVM	--	--	RIVM (2001)
U.S. EPA	0.02	RfC	U.S. EPA (2006)
WHO	--	--	WHO (2000)

-- = not available

Health Canada provides a tolerable concentration (TC) of 0.4 ug/m^3 based on the lower benchmark concentration of 0.14 mg/m^3 associated with a 5% increase in non-neoplastic lesions in the nasal respiratory epithelium of rats exposed for 6 hours/day for 3 consecutive days (Health Canada, 2004c; CEPA 2000b; Cassee et al., 1996). A safety factor of 100 was incorporated to account for interspecies variation (10-fold) and intra-species variation (10-fold). The limit was further adjusted by Health Canada to account for continuous exposure (6 hours/24 hours). Given that Health Canada's tolerable concentration is based on a short-term exposure (3 days), it was not used in the current chronic assessment of acrolein.

The OEHHA (2005) provides a chronic REL of 0.06 ug/m^3 based on a LOAEL of 0.4 ppm for histological lesions in the upper airways of male Fischer-344 rats exposed for 6 hours/day, 5 days/week for 62 days (Kutzman, 1981; Kutzman et al., 1985; OEHHA, 2005). The OEHHA (2005) adjusted the studies' LOAEL for continuous exposure (6 hours/24 hours x 5 days/7 days) to a concentration of 0.071 ppm. In addition, the OEHHA (2005) calculated the $\text{LOAEL}_{\text{HEC}}$ using the RGDR approach, a factor of 0.14, to determine a human equivalency concentration. The resultant $\text{LOAEL}_{\text{HEC}}$ of 0.0099 ppm was then divided by an uncertainty factor of 300 to account for interspecies variability (3-fold), intra-species variability (10-fold), subchronic to chronic (3-fold), and for use of a minimal LOAEL (3-fold).

The U.S. EPA (2006) provides an inhalation RfC of 0.02 ug/m^3 based upon a subchronic (i.e., 3 month) rat inhalation study conducted by Feron et al. in 1978. The U.S. EPA adjusted the study LOAEL of 900 ug/m^3 by adjusting for continuous exposure (6 hours/24 hours x 5 days/7 days) and a factor of 0.14 to determine a human equivalency concentration. The resultant $\text{LOAEL}_{\text{HEC}}$ of 20 ug/m^3 was then divided by an uncertainty factor of 1,000 to account for extrapolation from rat to human (3-fold), intra-species variability (10-fold), subchronic to chronic (10-fold), and for use of a minimal LOAEL (3-fold).

Both the OEHHA (2005) and U.S. EPA (2006) provide guidelines based on a LOAEL of 0.4 ppm. However, the U.S. EPA provides a more conservative uncertainty factor for extrapolation from subchronic to chronic. For this reason the current assessment adopted the U.S. EPA RfC of 0.02 ug/m^3 to evaluate the long-term health risks associated with acrolein.

4A2.4.4 Aromatic C_9-C_{16} Group

This group of compounds served as a toxicological surrogate on an acute basis for the following COPCs: 2-methylnaphthalene, anthracene, fluoranthene, fluorene, phenanthrene, and pyrene.

4A2.4.4.1 Acute Exposure Limit

After reviewing available information and determining that an acute inhalation limit was not available for this group of compounds, a modified acute inhalation exposure limit was developed from the sub-chronic NOAEL that formed the basis of the CCME's chronic RfC.

The CCME and TPHCWG developed a chronic RfC for the aliphatic C_9-C_{16} group from a sub-chronic inhalation study, in which rats were exposed to a mixture of C_9 aromatics (high flash aromatic naphtha [HFAN]) at concentrations of 0 mg/m^3, 450 mg/m^3, 900 mg/m^3 or 1,800 mg/m^3 for six hours per day, five days per week for 12 months (CCME, 2000a; TPHCWG, 1997; Clark et al., 1989). Increased liver and kidney weights were reported for male rats in the 1,800 mg/m^3 exposure group. The MA DEP also reviewed the Clark et al. study and, in addition to liver toxicity, identified central nervous system (CNS) effects associated with the LOAEL of 1,800 mg/m^3 (MA DEP 2003).

In the derivation of the modified acute inhalation exposure limit, an uncertainty factor of 100 was applied to the NOAEL of 900 mg/m^3 to account for the intra-species variability (10-fold) and interspecies variability (10-fold). The result is an acute inhalation exposure limit of 9,000 ug/m^3. This modified limit was used as a 1 hour exposure limit in the acute effects assessment of the aromatic C_9-C_{16} group.

Use of a sub-chronic study in the derivation of an acute exposure limit is considered conservative since a higher exposure over a shorter time-period (i.e., acute exposure) presumably could occur without risk of adverse effects.

4A2.4.4.2 Chronic Exposure Limit

The search for chronic inhalation and oral exposure limits was limited to three regulatory agencies: CCME (2000a), MA DEP (2003) and TPHCWG (1997). These agencies have developed chronic exposure limits for the aliphatic and aromatic groups as a whole.

Table 4A2-8 Chronic Inhalation Exposure Limits for the Aromatic C_9-C_{16} Group

Regulatory Agency	Value (ug/m^3)	Type	Reference
CCME	200	RfC	CCME (2000a)
MA DEP	50	RfC	MA DEP (2003)
TPHCWG	200	RfC	TPHCWG (1997)

The CCME (2000a) provides a chronic RfC for C_9-C_{16} aromatics of 200 ug/m^3 based on increased liver and kidney weights in male rats exposed to high flash aromatic naphtha (HFAN), which is primarily composed of 9-carbon aromatic compounds. The RfC was adopted from the TPHCWG (1997) and derived from a study that exposed rats to a mixture of C_9 aromatics at concentrations of 0 mg/m^3, 450 mg/m^3, 900 mg/m^3 or 1,800 mg/m^3 for six hours per day, five days per week for 12 months (Clark et al., 1989). A NOAEL of 900 mg/m^3 was derived and converted to continuous exposure (6 hours/24 hours × 5 days/7 days). An uncertainty factor of 1,000 was applied to the duration-adjusted NOAEL of 160 mg/m^3 to account for the most sensitive (10-fold), interspecies variability (10-fold), and use of a sub-chronic study (10-fold).

The MA DEP (2003) provides an RfC of 50 ug/m^3 based on the same Clark et al. (1989) study as the TPHCWG and the CCME. However, the MA DEP applies an extra 3-fold uncertainty factor for database deficiency. The partial uncertainty factor was applied to account for the lack of toxicity information on non-PAH compounds in the C_9-C_{16} aromatic fraction range (MA DEP, 2003).

For the purpose of assessing chronic inhalation effects, the TPHCWG and CCME both consider there to be an adequate database for the derivation of an RfC that is representative of the C_9-C_{16} aromatics. As a result, the CCME RfC of 200 ug/m^3 was used in the chronic inhalation effects assessment. This RfC equates to an inhaled dose of 45 ug/kg bw/d based on an average adult body weight of 70.7 kg and an inhalation rate of 15.8 m^3/d (Health Canada, 2004a).

It was determined that 2-methylnaphthalene was neither persistent nor bioaccumulative using Environment Canada (2007) criteria. The other aromatic C_9-C_{16} substances anthracene, fluoranthene, fluorene, phenanthrene, and pyrene were determined to be persistent and bioaccumulative. However, as all of the latter are carcinogenic PAHs, these compounds were evaluated in the multi-pathway model using the PAH TEF approach and were not assessed on a non-carcinogenic basis. Thus the chronic assessment does not contain an aromatic C_9-C_{16} group.

4A2.4.5 Aromatic C_{17}-C_{34} Compounds

This group served as a surrogate for 3-methylcholanthrene, 7,12-dimetylbenz(a)anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(e)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, chrysene, dibenz(ah)anthracene, indeno(123cd)pyrene and perylene on an acute basis only, and for 3-methylcholanthrene, 7,12-dimetylbenz(a)anthracene on a chronic basis.

4A2.4.5.1 Acute Exposure Limit

After reviewing available information and determining that an acute inhalation limit is not available for this group of compounds, a modified acute inhalation limit was developed from the sub-chronic oral NOAEL that formed the basis of the CCME's chronic RfD.

The CCME and TPHCWG identified pyrene as a surrogate for the fraction because it has a lower carbon number than any of the compounds in this fraction (CCME, 2000a; TPHCWG, 1997). Both regulatory agencies adopted the U.S. EPA RfD as its RfD. The U.S. EPA identified a NOAEL of 75 mg/kg bw/d for kidney effects (renal tubular pathology, decreased kidney weights) in a mouse sub-chronic oral bioassay. Male and female CD-1 mice (20/sex/group) were gavaged with 0 mg/kg bw/d, 75 mg/kg bw/d, 125 mg/kg bw/d or 250 mg/kg bw/d pyrene in corn oil for 13 weeks.

In the derivation of the modified acute inhalation limit, an uncertainty factor of 300 applied to the NOAEL to account for interspecies variability (10-fold), intra-species variability (10-fold), and lack of adequate toxicity data (3-fold). The acute oral limit of 300 ug/kg/bw/d was converted to an inhaled concentration based on the following adjustments and assumptions:

- Inhalation bioavailability and oral bioavailability of 100% (assumed)
- Adult body weight of 70.7 kg (Health Canada, 2004a)
- Adult inhalation rate of 15.8 m3/d (Health Canada, 2004a)

This modified acute inhalation limit of 1,100 ug/m^3 was used as a 24-hour limit in the acute effects assessment of the aromatic C_{17}-C_{34} group.

Use of a sub-chronic study in the derivation of an acute exposure limit is considered conservative since a higher exposure over a shorter time-period (i.e., acute exposure) presumably could occur without risk of adverse effects.

4A2.4.5.2 Chronic Exposure Limit

The search for chronic inhalation and oral exposure limits was limited to three regulatory agencies: CCME (2000a), MA DEP (2003) and TPHCWG (1997). These agencies have developed chronic exposure limits for the aliphatic and aromatic groups as a whole.

According to CCME (2000a), appropriate inhalation toxicity data were not identified for the individual constituents or fractions in the C_{17}-C_{34} carbon range. The CCME suggests that this could be the result of the hydrocarbons in this group not being volatile and inhalation not being the likely exposure pathway. The MA DEP (2003) does not provide an RfC for exposure to C_{19}-C_{32} aromatics either. The MA DEP attributes this to the limited volatility of the group. Nevertheless, the C_{17}-C_{34} aromatics will be emitted to the atmosphere from the proposed facility and thus requires an inhalation limit. Given that a chronic inhalation limit is not provided by CCME (2000a), MA DEP (2003) or TPHCWG (1997), the toxicity search was expanded to include the chronic oral criteria or guidelines provided by any of these regulatory agencies (Table 4A2-9).

Table 4A2-9 Chronic Oral Exposure Limits for the Aromatic C_{17}-C_{34} Group

Regulatory Agency	Value (ug/kg bw/d)	Type	Reference
CCME	30	RfD	CCME (2000a)
MA DEP	30	RfD	MA DEP (2003)
TPHCWG	30	RfD	TPHCWG (1997)

The CCME (2000a) recommends an oral RfD of 30 ug/kg bw/d for the aromatic C_{17}-C_{34} fraction. This RfD was adopted from the TPHCWG (1997) and is based on the nephrotoxicity of pyrene. There are no previously developed RfDs or appropriate data for compounds within the C_{17}-C_{34} fraction. The RfD for pyrene was derived from a NOAEL of 75 mg/kg bw/d with an uncertainty factor of 1,000 applied to the NOAEL to account for interspecies variability (10-fold), intra-species variability (10-fold), and use of a sub-chronic study (10-fold). A modifying factor of 3 was also applied to the RfD because of the lack of adequate toxicity data. The oral RfD provided by CCME (2000a) was converted to a modified chronic inhalation limit of 110 ug/m^3 based on the following adjustments and assumptions:

- Inhalation bioavailability and oral bioavailability of 100% (assumed)
- Adult body weight of 70.7 kg (Health Canada, 2004a)
- Adult inhalation rate of 15.8 m^3/d (Health Canada, 2004a)

As no data were identified in the literature regarding the absorption of aromatic C_{17}-C_{34} group or any of the individual constituents, oral and dermal bioavailability were also assumed to be 100% in the multiple-pathway exposure model.

3-methylcholanthrene, 7,12-dimethyldibenz(a,h)anthracene and perylene all were determined to be persistent and bioaccumulative, and all are PAHs. TEF values were not available for 3-methylcholanthrene or 7,12-dimethyldibenz(a,h)anthracene, and these two compounds were assessed using the CCME (2000a) oral RfD of 30 ug/kg bw/d for aromatic C_{17}-C_{34} compounds as a surrogate. Perylene was assessed along with the carcinogenic PAHs using benzo(a)pyrene as a surrogate.

4A2.4.6 Benzaldehyde

Table 4A2-10 Acute Inhalation Exposure Limits for Benzaldehyde

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	-	-	ATSDR (2005a)
OEHHA	-	-	OEHHA (2000)
OMOE	-	-	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

No values from the above agencies were available for benzaldehyde. Thus, the search was expanded to include acute and intermediate limits from the ACGIH and ATSDR. As no appropriate limits were identified, this suggests that the toxicological database regarding the acute toxicity of benzaldehyde is limited. Thus, benzaldehyde was not evaluated on an acute basis.

Table 4A2-11 Chronic Inhalation Exposure Limits for Benzaldehyde

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	--	--	ATSDR (2005a)
Health Canada	-	-	Health Canada (2004c)
OEHHA	-	-	OEHHA (2005)
RIVM	-	-	RIVM (2001)
U.S. EPA	-	-	U.S. EPA (2006)
WHO	-	-	WHO (2000)

-- = not available

There are no published guidelines available for subchronic or chronic inhalation exposure. However, the U.S. EPA assessment of benzaldehyde reports an RfD of 0.1 mg/kg bw/d based on a NOAEL of 200 mg/kg bw/d for stomach lesions and kidney toxicity in a subchronic oral toxicity study in rats (U.S. EPA 2006a). The NOAEL was dose-adjusted for gavage schedule of 5 days per week to a concentration of 143 mg/kg bw/d (i.e., 5 days/7 days). An uncertainty factor of 1,000 was applied to the NOAEL to account for interspecies variation (10-fold), intra-species variation (10-fold), and extrapolation from subchronic to chronic exposure (10-fold). The result is a chronic exposure limit of 100 ug/kg bw/d for benzaldehyde.

The chronic exposure limit of 100 ug/kg bw/d is equivalent to an air concentration of 360 ug/m^3, based on the following adjustments and assumptions:

- Inhalation bioavailability of 100% (assumed)
- Oral bioavailability of 80% (RAIS, 2006)
- Adult body weight of 70.7 kg (Health Canada, 2004a)
- Adult inhalation rate of 15.8 m^3/d (Health Canada, 2004a)

This modified exposure limit of 360 ug/m^3 was used in the chronic inhalation effects assessment.

4A2.4.7 Benzene

Table 4A2-12 Acute Inhalation Exposure Limits for Benzene

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	30	1-hour	AENV (2005)
ATSDR	28.8	24-hour	ATSDR (2005a)
OEHHA	1,300	6-hour	OEHHA (2000)
OMOE	--	--	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The current assessment used the AENV 1 hour exposure limit of 30 ug/m^3 (AENV, 2005). Alberta's AAQO was adopted from the Texas Natural Resource Conservation Commission, but the specific basis of the derivation remains unknown. Although supporting documentation is not available, this AAQO was used in the current short-term assessment of benzene in air, as per discussions with Alberta Health and Wellness. As a result, the study team is unable to comment on the scientific merit of this limit, and it was not used in this assessment.

The ATSDR provides an acute MRL of 0.009 ppm (0.03 mg/m^3) based on immunological effects. Male C57BL/6J mice (7 or 8/concentration) were exposed to 0 ppm, 10.2 ppm, 31 ppm, 100 ppm or 301 ppm (0 mg/m^3, 32.6 mg/m^3, 99 mg/m^3, 320 mg/m^3 or 960 mg/m^3) benzene in whole-body dynamic inhalation chambers for six hours per day on six consecutive day. The control group was exposed to filtered, conditioned air only. Significant depression of femoral lipopolysaccharide-induced B-colony-forming ability was observed at the 10.2 ppm exposure level in the absence of a significant depression of total number of B cells. Peripheral lymphocyte counts were depressed at all exposure levels. A LOAEL of 10.2 ppm (32.6 mg/m^3) was identified and adjusted from intermittent to continuous exposure (6 hours/24 hours) to a concentration of 2.55 ppm (8.16 mg/m^3). The duration-adjusted LOAEL (LOAEL$_{ADJ}$) was converted to a HEC (LOAEL$_{HEC}$) for a category 3 gas causing respiratory effects. The average ratio of the animal-blood:air partition coefficient would be greater than 1; thus, a default value of 1 was used in calculating the HEC. As a result, the LOAEL$_{HEC}$ of 2.55 ppm (8.16 mg/m^3) was also identified. Finally, a cumulative uncertainty factor of 300 was applied to the LOAEL$_{HEC}$ to account for interspecies variability (3-fold), intra-species variability (10-fold), and use of a LOAEL (10-fold). A factor of 3 was applied for the extrapolation of laboratory animal data to humans since the calculation of a HEC addressed the pharmacokinetic aspects of the interspecies uncertainty factor. Accordingly, only the pharmacodynamic aspects of uncertainty remain as a partial factor for interspecies uncertainty. The acute inhalation MRL of 30 ug/m^3 was used as a 24 hour limit in the acute effects assessment of benzene.

Table 4A2-13 Chronic Inhalation Exposure Limits for Benzene

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	9.6	RsC	ATSDR (2005a)
Health Canada	3	RsC	Health Canada (2004b)
RIVM	20	RsC	RIVM (2001)
U.S. EPA	1.3 to 4.5	RsC	U.S. EPA (2006)
WHO	1.7	RsC	WHO (2000)

An RsC of 3 ug/m^3 is reported by Health Canada (2004b) based on an inhalation unit risk of 0.0033 per mg/m^3. This RsC represents the daily dose via inhalation that is associated with an increased cancer risk of 1 in 100,000.

The WHO (2000) provides an RsC of 1.7 ug/m^3, which is associated with an increased cancer risk of one in 100,000. Using multiplicative risk estimates and a cumulative exposure model, a unit risk for lifetime exposure of 1.4 x 10^{-5} per ppb to 1.5 x 10^{-5} per ppb was derived with the Paustenbach exposure matrix and 2.4 x 10^{-5} per ppb with the Crump and Allen exposure matrix (WHO, 2000). These unit risks equate to a range of 4.4 x 10^{-6} per ug/m^3 to 7.5 x 10^{-6} per ug/m^3. From this the WHO (2000) selected a representative unit risk of 6 x 10^{-6} per ug/m^3.

The U.S. EPA (2006) presents a range of potential carcinogenic risks from inhalation of benzene based on the incidence of leukemia from human occupational studies. Its inhalation unit risks of 2.2 x 10^{-6} per ug/m^3 to 7.8 x 10^{-6} per ug/m^3 equate to an RsC of 1.3 ug/m^3 to 4.5 ug/m^3 (corresponding to risk levels of one in 100,000). Benzene is noted to have a genotoxic mechanism of action that is potentially mediated via the primary benzene metabolites phenol, hydroquinone and catechol and possibly an intermediate – benzene oxide. The most stringent RsC of 1.3 ug/m^3 has been selected for use in this assessment.

4A2.4.8 Benzo(a)pyrene (IPM and WMM)

Table 4A2-14 Acute Inhalation Exposure Limits for Benzo(a)pyrene

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	--	--	ATSDR (2006a)
OEHHA	--	--	OEHHA (2000)
OMOE	0.0011	24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The only regulatory agency that has a public acute exposure limit for benzo(a)pyrene is the OMOE (2005a), which provides a 24-hour standard of 0.0011 ug/m^3 for benzo(a)pyrene. This limit is based on the carcinogenic potential for benzo(a)pyrene and was derived based on an annual exposure limit of 0.00022 ug/m^3 for protection against carcinogenic effects using a simple extrapolation factor generally considered to be overly conservative. This limit was not used in the acute effects assessment for the benzo(a)pyrene group, as it did not account for the influence of duration of exposure on the carcinogenic action of a chemical. As no other appropriate limits were identified, an acute effects assessment was not completed for the benzo(a)pyrene group.

4A2.4.8.1 Chronic Exposure Limit(s)

As recommended in OMOE (1997), the assessment of carcinogenic PAHs can be based on two approaches: the Whole-Mixture Model (WMM), and the Individual PAH Model (IPM).

The WMM approach is based on the conservative assumption that the potency of the PAH fraction of any environmental mixture is proportional to the benzo(a)pyrene content of the mixture (OMOE 1997). The WMM was derived from the methodology of the OMOE (1997), using the concentration of benzo(a)pyrene together with the toxic potency of the PAH-WMM group. The cancer slope factor for oral exposure to benzo(a)pyrene was estimated by OMOE, based on an examination of the composition and toxic potency of PAH mixtures derived from many different sources (e.g., coal tar, coke oven emissions, diesel emissions and wood burning). The unit risk for inhalation exposure to benzo(a)pyrene was developed based on a weight-of-evidence review of numerous epidemiology and rodent toxicity studies of benzo(a)pyrene. Critical effects included lung cancer and genitourinary tract cancer in humans. This approach, used in conjunction with the IPM, ensures that potential risks are not underestimated in the current assessment (OMOE, 1997).

The IPM approach is based upon the addition of the risks for each individual PAH. The first step in the IPM requires an estimate of the inhalation potency of benzo(a)pyrene and other PAHs relative to benzo(a)pyrene. This step involves the use of Toxic Equivalency Factors (TEFs) to denote the cancer potency of specific PAH compounds relative to the potency of benzo(a)pyrene (Bostrom et al., 2002). Toxic Equivalency Factors allow large groups of compounds with a common mechanism of action such as PAHs to be assessed when limited data is available for all but one of the compounds (i.e., benzo(a)pyrene). Table 4A2-15 shows the TEFs used in the current assessment of PAHs via the IPM approach.

Table 4A2-15 Relative Potency of Individual Polycyclic Aromatic Hydrocarbons Compared with Benzo(a)pyrene

Compound[1]	**Toxic Equivalency Factors (TEFs)[2]**
Anthracene	0.0005
Benz(a)anthracene	0.005
Benzo(a)pyrene	1
Benzo(e)pyrene	0.002
Benzo(b)fluoranthene	0.1
Benzo(g,h,i)perylene	0.02
Benzo(k)fluoranthene	0.05
Chrysene	0.03
Dibenz(a,h)anthracene	1.1
Fluoranthene	0.05
Fluorene	0.0005
Indeno(1,2,3-cd)pyrene	0.1
Perylene	0.02
Phenanthrene	0.0005
Pyrene	0.001

[1] All compounds for which TEFs were identified in Larsen and Larsen (1998) were assessed as a part of the IPM approach.

[2] Source: Larsen and Larsen (1998).

For the chronic assessment, benzo(a)pyrene was evaluated along with all other carcinogenic PAHs.

Table 4A2-16 Chronic Inhalation Exposure Limits for Benzo(a)pyrene

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	--	--	ATSDR (2006a)
Health Canada	0.32	RsC	Health Canada (2004b)
U.S. EPA	--	--	U.S. EPA (2007)
WHO	0.00012	RsC	WHO (2000)

-- = not available

The WHO (2000) recommends an inhalation unit risk of 0.087 per ug/m^3 based on a benzo(a)pyrene concentration of 1 ug/m^3 in air as a component of benzene-soluble coke-oven emissions. This RsC of 0.00012 ug/m^3 is associated with an acceptable incremental lifetime cancer risk of development of lung tumours of one in 100,000. This RsC was selected for the chronic effects assessment of benzo(a)pyrene (WMM). It is equivalent to an inhaled dose of 0.000026 ug/kg bw/d based on the following assumptions:

- Inhalation bioavailability and oral bioavailability of 100% (assumed)
- Adult body weight of 70.7 kg (Health Canada, 2004a)
- Adult inhalation rate of 15.8 m^3/d (Health Canada, 2004a)

The Health Canada (2004b) provided an inhalation unit risk of 0.0033 per ug/m^3. The RsC of 0.32 ug/m^3 is associated with an acceptable incremental lifetime cancer risk of development of lung tumours of one in 100,000. This RsC was selected for the chronic effects assessment of benzo(a)pyrene (IPM) and is equivalent to an inhaled dose of 0.072 ug/kg bw/d (based on the above adjustments).

Although Health Canada (2004b) has established inhalation unit risks for benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene, these TRVs were not used in the current assessment of PAHs. The IPM approach provides a more conservative assessment of the potential cancer risk to humans than the inhalation unit risk values for the same end point (i.e., cancer). As well, the scientific basis for these inhalation unit risk values is unknown.

Based on the Environment Canada (2007) fate and persistence screening benzo(a)pyrene (IPM and WMM) was assessed via multiple exposure pathways, requiring an oral exposure limit.

Table 4A2-17 Chronic Oral Exposure Limits for Benzo(a)pyrene

Regulatory Agency	Value (ug/kg bw/d)	Type	Reference
ATSDR	--	--	ATSDR (2006a)
Health Canada	0.0043	RsD	Health Canada (2004b)
RIVM	0.5	RsD	RIVM (2001)
U.S. EPA	0.0014	RsD	U.S. EPA (2007)
WHO	0.023	RsD	WHO (2000)

-- = not available

Health Canada provides an oral slope factor of 2.3 per mg/kg bw/d based on the Canadian guidelines for drinking water quality of 0.00001 mg/L (Health Canada 2004b, 1988). The Canadian drinking water quality guideline for benzo(a)pyrene was established based on an increased incidence of stomach tumours (squamous cell papillomas and some carcinomas) (Health Canada 1988; Neal and Rigdon, 1967). In the key study, male and female CFW-Swiss mice were fed concentrations of 0 ppm, 1 ppm, 10 ppm, 20 ppm, 40 ppm, 45 ppm, 50 ppm, 100 ppm or 250 ppm benzo(a)pyrene in the diet (purity was not reported). The control group contained 289 mice (number of mice/sex was not specified). No forestomach tumours were reported in the 0 ppm, 1 ppm, or 10 ppm dose groups. The incidence of forestomach tumours in the 20 ppm, 40 ppm, 45 ppm, 50 ppm, 100 ppm or 250 ppm dose groups were 1/23, 0/37, 1/40, 4/40, 23/40, 19/23 and 66/73, respectively. Incorporating a surface area correction and using the robust linear extrapolation model, the unit lifetime risk associated with the ingestion of 1 ug/L benzo(a)pyrene in drinking water was estimated as 5×10^{-5}. Using an adult body weight of 70.7 kg and an adult water ingestion rate of 1.5 L/d (Health Canada, 2004a), an oral slope factor of 2.3 per mg/kg bw/d was calculated. The Health Canada oral slope factor equates to an RsD of 0.0043 ug/kg bw/d that is associated with an acceptable incremental lifetime cancer risk of 1 in 100,000.

The U.S. EPA provides an oral slope factor of 7.3 per mg/kg bw/d based on the geometric mean of four slope factors obtained by different modelling procedures and multiple datasets from two different studies, including the Neal and Rigdon (1967) study that was used in the Health Canada assessment (U.S. EPA, 2007; Health Canada, 1988). The U.S. EPA considered each of these datasets to be acceptable for the derivation of an oral slope factor, but less-than-optimal. As a result, the use of a geometric mean of the four slope factors was preferred because it made use of more of the available data (U.S. EPA 2007). The four slope factors were calculated as follows.

- The Neal and Rigdon (1967) data were fit to a two-stage dose response model that included a term to permit the modeling of benzo(a)pyrene as its own promoter (modification of Moolgavkar-Venson-Knudson, generalized forms of two-stage model). In this model, the transition rates and the growth rate of preneoplastic cells were both considered to be exposure-dependent. In addition to the Neal and Rigdon (1967) control group, historical control stomach tumor data from a related, but not identical, mouse strain (SWR/J Swill) was used in the modeling (Rabstein et al., 1973). In the historical control data, the forestomach tumor incidence rate was 2/268 and 1/402 for males and females, respectively. The lifetime unit risk for humans was calculated based on the following standard assumptions: mouse food consumption was 13% of its body weight per day, human body weight was assumed to be 70 kg, and the assumed body weight of the mouse 0.034 kg. The standard assumption of surface area equivalence between mice and humans was the cube root of 70 kg/0.034 kg. A conditional upper-bound estimate was calculated to be 5.9 per mg/kg bw/day.

- The same dataset as above was used to generate an upper-bound estimate extrapolated linearly from the 10% response point to the background of an empirically fitted dose-response curve (modification of Moolgavkar-Venson-Knudson, generalized forms of two-stage model). An upper-bound was calculated to be 9.0 per mg/kg bw/day.
- In order to reflect the partial lifetime exposure pattern over different parts of the animals' lifetimes, a generalized Weibull-type dose-response model was selected to assess the Neal and Rigdon (1967) data alone (i.e., excluding the two additional control groups from Rabstein et al.). An upper-bound was calculated to be 4.5 per mg/kg bw/d.
- A linearized multistage procedure was used to calculate an upper bound estimate for humans from the Brune et al. (1981) rat dataset. Thirty-two Sprague-Dawley (rats/sex/group) were fed 0.15 mg/kg benzo(a)pyrene (reported to be highly pure) in the diet of either every 9th day or five times per week. These treatments resulted in annual average doses of 6 or 39 mg/kg, respectively. The control group contained 32 rats per sex. Treatment continued until the rats were moribund or dead; survival was similar in all groups. The combined incidence of tumors of the forestomach, esophagus and larynx was 3/64, 3/64 and 10/64 in the control group, the group fed benzo(a)pyrene every 9th day, and the group fed benzo(a)pyrene five times per week, respectively. A trend analysis showed a statistically significant tendancy for the proportion of animals with tumors of the forestomach, esophagus or larynx to increase steadily with dose. An oral slope factor of 11.7 per mg/kg bw/d was calculated.

The U.S. EPA IRIS value differs from the other available limits as a result of various factors considered in its development of an oral slope factor (i) different modelling procedures, (ii) multiple datasets from two different studies, and (iii) both sexes of more than one strain of mice and species of outbred rodents, the U.S. EPA RsD of 0.0014 ug/kg bw/d was selected as the chronic oral limit for benzo(a)pyrene (IPM).

The toxicity search was expanded to include the OMOE (1997) for the benzo(a)pyrene (WMM) since the chronic oral limits listed in Table A-25 were developed for benzo(a)pyrene alone and thus are not representative of the whole PAH mixture. The OMOE (1997) provides an oral slope factor of 4.2 x 10^{-8} per ug/day for stomach tumours. Assuming an adult body weight of 70.7 kg, an RsD of 0.0034 ug/kg bw/d was calculated that is associated with an acceptable incremental lifetime cancer risk of one in 100,000. The OMOE RsD of 0.0034 ug/kg bw/d was selected as the chronic oral limit for benzo(a)pyrene (WMM).

The bioavailability of benzo(a)pyrene was assessed for the various exposure pathways (i.e., inhalation, ingestion and dermal contact). In order to incorporate benzo(a)pyrene in the multiple exposure pathway model, bioavailability was assessed for the various exposure pathways (i.e., inhalation, ingestion and dermal contact). No specific data were identified in the literature regarding the amount of benzo(a)pyrene that is absorbed via inhalation; therefore it was conservatively assumed that 100% of the inhaled group is absorbed. Oral bioavailability in humans was assumed to be 31% and dermal bioavailability was assumed to be 13% for this assessment (RAIS 2007).

4A2.4.9 Carbon Monoxide

Table 4A2-18 Acute Inhalation Exposure Limits for Carbon Monoxide

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	15,000	1-hour	AENV (2005)
	6,000	8-hour	AENV (2005)
ATSDR	--	--	ATSDR (2005a)
OEHHA	23,000	1-hour	OEHHA (1999)
OMOE	36,200	1-hour	OMOE (2005a)
	15,700	8-hour	
WHO	100,000	15-min	WHO (2000)
	60,000	30-min	
	30,000	1-hour	
	10,000	8-hour	

-- = not available

AENV provides a 1 hour AAQO of 15,000 ug/m^3 and an 8-hour AAQO of 6,000 ug/m^3 for carbon monoxide (CO) (AENV 2005). These AAQOs were adopted from the CEPA/FPAC Working Group on Air Quality Objectives and Guidelines, who recommends maximum desirable, acceptable and tolerable objectives for CO. The Alberta objectives are based on the maximum desirable levels (i.e., the lowest objective). These objectives were developed to protect the subpopulation sensitive to cardio-respiratory effects (CEPA/FPAC 1994). Although WHO (2000) presents several acute guidelines for carbon monoxide, values are also available from OEHHA and the OMOE, the AENV values are more conservative and thus were used in the HHRA.

As there were no 24-hour guidelines available, the acute assessment was completed on a 1 hour and 8 hour basis only.

Table 4A2-19 Chronic Inhalation Exposure Limits for Carbon Monoxide

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	--	--	ATSDR (2005a)
Health Canada	-	-	HC (2004)
OEHHA			OEHHA (2000)
RIVM	-	-	RIVM (2000)
U.S. EPA			U.S. EPA IRIS
WHO			WHO (2000)

-- = not available

No regulatory exposure limits were available for chronic exposure to CO. The critical effect of CO exposure is the formation of carboxyhemoglobin (COHb) in blood. As COHb concentrations reach a steady-state after six to eight hours of exposure, CO exposure for longer periods of time (i.e., chronic exposure) is not expected to cause accumulation of COHb in the blood (WHO, 2000).

Epidemiological studies have identified associations between ambient low-level CO concentrations and various health effects (Burnett et al., 2000; Moolgavkar, 2000). However, the results across studies are inconsistent and it has been suggested that CO might represent only a surrogate compound for particulate emissions from mobile sources (Sarnat et al., 2001; Schwartz, 1999).

Carbon monoxide was assessed only for the inhalation route of exposure as the principal health effects are strictly related to inhalation, and is unlikely to bioaccumulate into environmental media.

4A2.4.10 Dichlorobenzenes

Table 4A2-20 Acute Inhalation Exposure Limits for Dichlorobenzenes

Regulatory Agency	**Value (ug/m^3)**	**Averaging Time**	**Reference**
AENV	--	--	AENV (2005)
ATSDR	12,000	8-hour	ATSDR (2005a)
OEHHA	--	--	OEHHA (2000)
OMOE	285 95	½-hour 24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The OMOE (2005a) provides ½-hour and 24-hour standards for 1,4-dichlorobenzene; however, no scientific basis is provided. As a result, the study team is unable to comment on the scientific merit of these limits and did not use them in the short-term assessment of 1,4-dichlorobenzene.

The ATSDR has developed an acute inhalation MRL for 1,4-dichlorobenzene of 12,000 ug/m^3 based on a NOAEL of 15 ppm for eye and nose irritation in occupationally exposed workers (ATSDR 2005a,b). The study consisted of 58 men who had worked in unspecified industrial operations involving the handling of 1,4-dichlorobenzene for 8 hours per day, 5 days per week for a period of 8 months to 25 years (average 4.75 years). An uncertainty factor of 10 was applied to the NOAEL to account for intra-species variability.

This MRL of 12,000 ug/m^3 was used as a 24-hour exposure limit in the acute effects assessment of dichlorobenzene in air.

Table 4A2-21 Chronic Inhalation Exposure Limits for Dichlorobenzenes

Regulatory Agency	**Value (ug/m^3)**	**Type**	**Reference**
ATSDR	60	MRL	ATSDR (2005a)
Health Canada	95	RfC	Health Canada (2004b)
RIVM	670	TCA	RIVM (2001)
U.S. EPA	800	RfC	U.S. EPA (2006)
WHO	--	--	WHO (2000)

-- = not available

The ATSDR has developed a chronic MRL of 0.01 ppm (60 ug/m^3) based upon a $BMCL_{10}$ of 9.51 ppm for the increased incidence of nasal lesions in female rats. This $BMCL_{10}$ was adjusted for exposure duration (6-hours/day, 5-days week) and converted to a HEC of 0.27 ppm. This

HEC was divided by a cumulative uncertainty factor of 30 (to account for inter- and intra-species differences) to calculate the MRL.

Health Canada (2004b) provides a tolerable concentration of 95 ug/m^3 for 1,4-dichlorobenzene. Although this tolerable concentration is based on health considerations, the specific basis of its derivation remains unknown. As a result, the study team is unable to comment on the scientific merit of this limit.

RIVM presents a tolerable concentration of 670 ug/m^3 for 1,4-dichlorobenzene, based upon a NOAEL of 450 mg/m^3. Following correction for exposure duration (5-hours/day, 5-days/week), this NOAEL was adjusted to 67 mg/m^3. A cumulative uncertainty factor of 100 was applied (presumably for inter-and intra-species differences).

The U.S. EPA has derived an RfC of 800 ug/m^3 based upon increased liver weights in male rats, based upon a NOAEL of 50 ppm (301 mg/m^3). A NOAEL HEC of 75 mg/m^3 was derived from the study NOAEL, and a cumulative uncertainty factor of 90 was applied to account for interspecies and intraspecies differences, and the extrapolation of a sub-chronic study.

Of the above listed chronic exposure limits, the chronic MRL of 60 ug/m^3 is the most conservative value that is adequately supported by documentation by ATSDR (2005).

4A2.4.11 Ethylbenzene

Table 4A2-22 Acute Inhalation Exposure Limits for Ethylbenzene

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	2,000	1-hour	AENV (2005)
ATSDR	--	--	ATSDR (2005a)
OEHHA	--	--	OEHHA (2000)
OMOE	1,400 1,000	½-hour 24-hour	OMOE (2005a) OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

An AAQO of 2,000 ug/m^3 for a 1-hour average exposure was recommended by AENV (2005). This limit was adopted from the Texas Natural Resource Conservation Commission based on odour perception, but no specific basis was provided. Given that this objective is not health based, the AENV AAQO was not used in the short-term assessment of ethylbenzene.

The OMOE (2005a) provides a lower ½-hour standard based on odour and a health-based 24-hour standard for ethylbenzene. However, no scientific basis is provided for these standards. As a result, the study team is unable to comment on the scientific merit of these limits and did not use them in the short-term assessment of ethylbenzene.

Acute values were not available from ATSDR or WHO. As a result, the toxicity search was therefore expanded to include intermediate MRLs provided by the ATSDR and occupational exposure values established by the ACGIH.

An acute exposure limit for ethylbenzene of 4,340 ug/m^3 corresponds to the MRL recommended for intermediate inhalation exposure to ethylbenzene by the ATSDR (1999a, 2005a). This MRL was derived from a NOAEL of 97 ppm for developmental effects in Wistar mice following inhalation exposure for 7 hours per day, 5 days per week for 3 weeks. The ATSDR applied an uncertainty factor of 100 to the study NOAEL to account for interspecies (10-fold) and intra-species variation (10-fold). Use of an intermediate NOAEL when characterizing acute exposure is typically considered conservative, because a higher exposure over a shorter period (i.e., acute exposure) presumably could occur without the risk of adverse effects. The use of this intermediate MRL as a 24-hour exposure limit is considered appropriate, as the health effects associated with ethylbenzene have been observed to be concentration dependant, rather than duration-dependant.

Table 4A2-23 Chronic Inhalation Exposure Limits for Ethylbenzene

Regulatory Agency	Value (ug/m^3)	Type	Reference
Health Canada	--	--	Health Canada (2004b,c)
ATSDR	--	--	ATSDR (2005a)
RIVM	770	TCA	RIVM (2001)
U.S. EPA	1,000	RfC	U.S. EPA (2006)
WHO	--	--	WHO (2000)

-- = not available

The RIVM (2001) provides a TCA of 770 ug/m^3 based on kidney and liver effects in rats and mice. A NOAEL of 430 mg/m^3 was identified in the 1992 semi chronic NTP study (NTP 1996). The RIVM adjusted the NOAEL of intermittent applied an uncertainty factor of 100 to the NOAEL to account for interspecies variation (10-fold) and intra-species variation (10-fold). An uncertainty factor was not applied to the NOAEL by the RIVM for use of a sub-chronic study because the chronic NTP study reported a higher NOAEL of 1,075 mg/m^3.

The U.S. EPA assessment of ethylbenzene reports an RfC of 1,000 ug/m^3 based on a NOAEL of 434 mg/m^3 for developmental toxicity in rats and rabbits (U.S. EPA 2006a). Wistar rats and New Zealand white rabbits exposed to concentrations of 0, 100, or 1,000 ppm (434 or 4,342 mg/m^3) for 6 hours per day to 7 hours per day, 7 days per week during days 1-19 and 1-24 of gestation, respectively. According to the U.S. EPA methodology, a NOAEL based on developmental effects is not adjusted for intermittent exposure. A NOAEL$_{HEC}$ was calculated assuming a default value of 1.0 since b:a lambda values are unknown for the experimental animal species (a) and humans (h) (U.S. EPA 2006a). An uncertainty factor of 300 was applied to the study NOAEL$_{HEC}$ to account for interspecies variation (3-fold), intra-species variation (10-fold), and the absence of multigenerational reproductive and chronic studies (10-fold). A 3-fold uncertainty factor for interspecies variability was considered appropriate by the U.S. EPA since the HEC adjustment addresses the pharmacokinetic component of the extrapolation factor, leaving the pharmacodynamic area of uncertainty.

The TCA of 770 ug/m^3 from RIVM was based upon a sub-chronic NOAEL of 430 mg/m3 for liver and kidney effects in rats. A chronic inhalation study was also evaluated for ethylbenzene, however, the NOAEL (1075 mg/m^3) was less conservative than the sub-chronic NOAEL. RIVM adjusted this number for exposure duration (6-hours/day, 5-days/week) to a NOAEL of 77 mg/m^3 and applied a cumulative uncertainty factor of 100 (for inter-and intra-species differences). The TCA provided by RIVM was not used in the chronic inhalation effects assessment as it is based on a NOAEL from a sub-chronic study, rather than based on a NOAEL from a chronic study (i.e., U.S. EPA). As a result, the U.S. EPA RfC of 1,000 ug/m^3 was used in the chronic inhalation effects assessment for ethylbenzene.

A chronic oral exposure limit was not required for the assessment of ethylbenzene because it did not exceed any of the persistence and bioaccumulation parameters established by Environment Canada (2007) and thus was not incorporated into the multi-media exposure model.

4A2.4.12 Formaldehyde

Table 4A2-24 Acute Inhalation Exposure Limits for Formaldehyde

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	65	1-hour	AENV (2005)
ATSDR	49.3	2-hour	ATSDR (2006a)
OEHHA	94	1-hour	OEHHA (2000)
OMOE	65	24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The ATSDR has developed an acute inhalation MRL for formaldehyde of 50 ug/m^3 (0.04 ppm) based on a LOAEL of 0.4 ppm for nasal and eye irritation (ATSDR 1999b, 2005a). Occupationally exposed patients with skin hypersensitivity to formaldehyde and unexposed (control) patients, all of whom were non-smokers, were separated into two groups. The first group included seven male and three female volunteers with skin hypersensitivity to formaldehyde and the second included 11 healthy males with no history of allergic diseases. Nasal washings were performed in both groups immediately before and after a 2 hour exposure to 0 (placebo) or 0.5 mg/m^3 (0.4 ppm) formaldehyde, and again four and 18 hours after the exposure period. A cumulative uncertainty factor of 10 was incorporated by the ATSDR (1999b) to account for the use of a minimal LOAEL (3-fold) and to account for intra-species variability (3-fold). An uncertainty factor of 3 was considered adequately protective of human variability as the observed symptoms of irritation were observed in a potentially sensitive group of subjects. This 2 hour MRL was conservatively used as the 1 hour exposure limit in the acute effects assessment for formaldehyde.

Table 4A2-25 Chronic Inhalation Exposure Limits for Formaldehyde

Regulatory Agency	Value (ug/m^3)	Type	Reference
Health Canada	1.9	RsC	CEPA (2001)
ATSDR	0.01	MRL	ATSDR (2006a)
RIVM	--	--	RIVM (2001)
U.S. EPA	0.8	RsC	U.S. EPA (2007)
WHO	--	--	WHO (2000)

-- = not available

The IARC classifies formaldehyde as carcinogenic to humans (Group 1), on the basis of sufficient evidence in humans and sufficient evidence in experimental animals (IARC, 2004). Health Canada previously derived tumorigenic concentration (TC_{05}) of 9.5 mg/m^3 (CEPA, 2001). This TC_{05} represents the total intake associated with a 5% increase in incidence of nasal squamous tumours in rats exposed to formaldehyde for up to 24 months. The TC_{05} corresponds to an RsC of 1.9 ug/m^3, which is associated with an increased cancer risk of one in 100,000.

The U.S. EPA has derived a URE of 1.3 x 10^{-5} $(ug/m^3)^{-1}$ based upon the incidence of squamous cell carcinoma in rats (U.S. EPA 1991), although this limit is under re-evaluation.

However, there is some controversy over whether carcinogenic effects are the most sensitive and relevant endpoint to humans. A recent review by Health Canada (2005) established an 8 hour indoor air quality objective of 50 ug/m^3 for formaldehyde that was also based upon respiratory effects but is also protective of carcinogenic effects (HC, 2005). The OMOE has established a 24 hour AAQC of 65 ug/m^3 based on respiratory irritation and odour (OMOE, 1998). In addition the WHO has established a 30 minute criteria of 100 ug/m^3, based upon respiratory irritation (although the limit is noted to also protective of upper respiratory tract cancers) (WHO, 2000). The ATSDR (2005) presents a chronic inhalation MRL of 0.01 ug/m^3

Both Health Canada and the U.S. EPA have determined that formaldehyde is carcinogenic. The most conservative carcinogenic exposure limit is the U.S. EPA URE of 1.3 x 10^{-5} $(ug/m^3)^{-1}$, which translates to a RsD of 0.77 ug/m^3 in association with a 1 in 100,000 ILCR. This limit has been incorporated into the assessment.

4A2.4.13 n-Hexane

Table 4A2-26 Acute Inhalation Exposure Limits for n-Hexane

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	--	--	ATSDR (2005a)
OEHHA	--	--	OEHHA (2000)
OMOE	*n-Hexane mixture*:		
	7,500	½-hour	OMOE (2005a)
	2,500	24-hour	OMOE (2005a)
	n-Hexane and n-hexane isomers only:		
	22,500	½-hour	OMOE (2005a)
	7,500	24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The OMOE provides a 24-hour standard of 7,500 ug/m^3 for n-hexane and n-hexane isomers (OMOE 2005a,b). This standard was developed from a NOAEL of 58 ppm (204 mg/m^3) for polyneuropathy in humans (Sanagi et al., 1980). Workers were exposed to a low concentration of n-hexane and acetone in a tungsten carbide alloys facility for an average of 6.2 years. Significant decreases were observed in mean motor nerve conduction velocities and slowed residual latency of motor conduction of the lower extremities. The NOAEL was adjusted from an eight-hour time weighted average for occupational exposure to a value of 73 mg/m^3 for continuous exposure in the general population as follows.

$$\text{NOAEL}_{ADJ} = \text{NOAEL} \times \frac{MV_{ho}}{MV_{h}} \times \frac{Exp_{ho}}{Exp_{h}}$$

where:

NOAEL_{ADJ} = NOAEL in the human population from continuous exposure (mg/m^3)
NOAEL = NOAEL for discontinuous exposure in an occupational setting (204 mg/m^3)
MV_{ho} = amount of air used by a worker during an 8-hour work period (10 m^3/d)

MV_h = amount of air used by an individual in the general population during a day (20 m^3/d)
Exp_{ho} = days per week a worker is exposed (5 days)
Exp_h = days per week an individual in the general population is exposed (7 days)

An uncertainty factor of 30 was applied to the $NOAEL_{ADJ}$ to account for individual sensitivity (10-fold) and potential interaction with other hydrocarbon solvents in commercial n-hexane (3-fold) (OMOE, 2005b). This results in an AAQC of 2,500 ug/m^3 for an n-hexane mixture. The OMOE (2005b) adjusted this value based on the composition of hexane isomers in n-hexane to derive the AAQC of 7,500 ug/m^3 for n-hexane and n-hexane isomers. As the study team does not support the use of chronic toxicity data in the derivation of an acute limit, this acute guideline was not used in the acute effects assessment.

Thus, the toxicity search was expanded to include intermediate MRLs provided by the ATSDR and short-term occupational limit values (i.e., STEL and ceiling) (ATSDR, 2006a; ACGIH, 2006). After reviewing available information and determining that there are no available criteria, guidelines or objectives for hexane with adequate supporting documentation, a modified acute inhalation limit was developed from the sub-chronic inhalation benchmark concentration level (BMCL) that formed the basis of the U.S. EPA's chronic RfC.

The U.S. EPA developed a chronic RfC from a BMCL of 430 mg/m^3 for peripheral neuropathy (decreased mean cell volume at 12 weeks) in a rat sub-chronic inhalation study. Male Wistar rats (eight/group) were exposed to 0 ppm, 500 ppm, 1,200 ppm, or 3,000 ppm (0 mg/m^3, 1,762 mg/m^3, 4,230 mg/m^3, 10,574 mg/m^3) n-hexane (>99% pure) for 12 hours per day, seven days per week for 16 weeks (Huang et al., 1989). The human equivalent BMCL ($BMCL_{HEC}$) was calculated for an extrarespiratory effect of a category 3 gas. The blood:gas (air) partition coefficient ($H_{b/g}$) value for n-hexane in humans (H) is 0.8, whereas a value of 2.29 has been reported in rats (A). According to the RfC methodology, where the ratio of animal to human blood:air partition coefficients $[(H_{b/g})_A/(H_{b/g})_H]$ is greater than one, a value of one is used for the ratio by default. Thus, the $BMCL_{HEC}$ is equal to 430 mg/m^3. An uncertainty factor of 100 was applied to the $BMCL_{HEC}$ to account for intra-species variation (10-fold), interspecies variation (3-fold), and database deficiencies (3-fold). The result is a modified limit of 4,300 ug/m^3, which was used as a 1 hour inhalation limit in the acute health effects assessment.

The modified acute inhalation limit of 4,300 ug/m^3 for hexane is lower then the modified acute inhalation limit of 100,000 ug/m^3 for the aliphatic C_5-C_8 group. As a result, hexane was assessed on its own.

Table 4A2-27 Chronic Inhalation Exposure Limits for n-Hexane

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	2100	MRL	ATSDR (2006a)
Health Canada	-	-	Health Canada (2004b)
RIVM	--	--	RIVM (2001)
U.S. EPA	700	RfC	U.S. EPA (2007)
WHO	--	--	WHO (2000)

-- = not available

The U.S. EPA (2007) developed a chronic RfC of 700 ug/m^3 for neurotoxicity. This RfC was based on a benchmark concentration level (BMCL) of 430 mg/m^3 for peripheral neuropathy (decreased mean cell volume at 12 weeks) in a rat sub-chronic inhalation study (U.S. EPA, 2007). The BMCL was adjusted from intermittent to continuous exposure (12 hours/24 hours × 7 days/7 days) to a concentration of 215 mg/m^3 (U.S. EPA, 2007). The human equivalent BMCL (BMCL_{HEC}) was calculated for an extrarespiratory effect of a category 3 gas. The blood:gas (air) partition coefficient ($H_{b/g}$) value for n-hexane in humans (H) is 0.8, whereas a value of 2.29 has been reported in rats (A) (U.S. EPA 2007). According to the RfC methodology, where the ratio of animal to human blood:air partition coefficients $[(H_{b/g})_A/(H_{b/g})_H]$ is greater than one, a value of one is used for the ratio by default. Thus, the BMCL_{HEC} is equal to 215 mg/m^3. The U.S. EPA (2007) applied an uncertainty factor of 300 to the BMCL_{HEC} to account for intra-species variation (10-fold), interspecies variation (3-fold), extrapolation to chronic exposure from data in a less-than lifetime study (3-fold) and database deficiencies (3-fold).

Application of a full uncertainty factor of 10 for interspecies variation depends on two areas of uncertainty (i.e., toxicokinetic and toxicodynamic uncertainties). In this assessment, the toxicokinetic component is mostly addressed by the determination of a human equivalent concentration (HEC) (U.S. EPA, 2007). The toxicodynamic uncertainty is also accounted for to a certain degree by the use of the applied dosimetry method. Thus a partial uncertainty factor of 3 was applied.

A sub-chronic (16 weeks) study was used for the derivation of the RfC. However, 16 weeks is half of the time required for a newly synthesized neurofilament protein to be transported from the neuronal cell body to the axon terminal in the longest axons of the central nervous system (CNS) and the peripheral nervous system of an adult rat (Griffin et al., 1984). Since the lifetime of neurofilaments (target of toxicity of n-hexane) is shorter than the lifetime of an adult rat, extrapolation from sub-chronic to chronic exposure is not necessary and an uncertainty factor of 3 was applied.

The database for n-hexane lacks a developmental neurotoxicity study and a multigeneration reproductive and developmental toxicity study following inhalation exposure to pure n-hexane alone. On this basis, an uncertainty factor of 3 was applied.

This chronic RfC of 700 ug/m^3 was used in the chronic inhalation effects assessment of n-hexane alone.

A chronic oral exposure limit was not required for the assessment of n-hexane, because it did not exceed any of the persistence and bioaccumulation parameters established by Environment Canada (2007), and thus was not incorporated into the multi-media exposure model.

A chronic oral exposure limit was not required for the assessment of n-hexane, because it did not exceed any of the persistence and bioaccumulation parameters established by Environment Canada (2007), and thus was not incorporated into the multi-media exposure model.

4A2.4.14 Naphthalene

Table 4A2-28 Acute Inhalation Exposure Limits for Naphthalene

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	--	--	ATSDR (2006a)
OEHHA	--	--	OEHHA (2000a)
OMOE	22.5	24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The OMOE (2005a) has developed an AAQC for naphthalene of 22.5 ug/m^3 based on a 24-hour averaging period. Although the 24-hour criterion is based on health consideration, the specific basis of its derivation remains unknown. Thus, the toxicity search was expanded to include intermediate MRLs provided by the ATSDR and short-term occupational limit values (i.e., STEL and ceiling) (ATSDR, 2006a; ACGIH, 2006).

The ACGIH (1991; 2006) recommends a STEL of 15 ppm (79 mg/m^3) based on ocular irritation as a result of occupational exposure to naphthalene. The STEL equates to a 15 minute air concentration that should not be exceeded at any time during a workday. The 15 minute STEL can be adjusted to an equivalent 1 hour concentration using a modified Haber's Law.

$$C_{ADJ}^{n} \times T_{ADJ} = C^{n} \times T$$

$$C^{1} \times 60 \text{ minutes} = (79 \text{ mg/m}^{3})^{1} \times 15 \text{ minutes}$$

Where:

C_{ADJ} = duration-adjusted concentration
T_{ADJ} = desired time of exposure (60 minutes)
C = concentration of exposure (79 mg/m^3)
T = time of exposure (15 minutes)
N = chemical-specific modification factor designed to account for the toxicity of a chemical being concentration and/or duration dependant. The OEHHA recommends using a default "n" value of 1 in the adjustment for less than 1-hour exposure (OEHHA 1999a).

Based on the above conversion factor, the STEL was adjusted to a concentration of 20 mg/m^3. A cumulative uncertainty factor of 10 was applied to the duration-adjusted STEL to account for intra-species variability (10-fold). On this basis, the adjusted STEL of 2,000 ug/m^3 was adopted as a 1-hour exposure limit in the acute effects assessment.

Table 4A2-29 Chronic Inhalation Exposure Limits for Naphthalene

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	3.7	RfC	ATSDR (2005a)
Health Canada	--	--	Health Canada (2004b,c)
RIVM	--	--	RIVM (2001)
U.S. EPA	3	RfC	U.S. EPA (2006)
WHO	--	--	WHO (2000)

-- = not available

The U.S. EPA has derived a chronic inhalation RfC for naphthalene of 3 ug/m^3 (U.S. EPA, 2006). This RfC was estimated from a chronic inhalation mouse study that reported the LOAEL of 9.3 mg/m^3 based on nasal effects including hyperplasia and metaplasia in respiratory and olfactory epithelium (NTP, 1992). The U.S. EPA incorporated an uncertainty factor of 3,000 to account for interspecies differences (10-fold), sensitive human individuals in the population (10-fold), to extrapolate from a NOAEL to a LOAEL (10-fold), and for database uncertainties (3-fold). Database uncertainties included the lack of a 2-generation reproductive toxicity study and chronic inhalation data for other animal species. This limit was selected as the exposure limit for the chronic risk assessment.

The ATSDR MRL of 3.7 ug/m^3 is based upon a LOAEL of 10 ppm for the incidence of non-neoplastic lesions in rats. This LOAEL was adjusted for exposure duration (6-hours/day, 5-days/week), and converted to a HEC of 0.2 ppm. A cumulative uncertainty factor of 300 was applied to account for the use of a LOAEL, and inter-and intra-species differences.

Naphthalene exceeded one of the criteria for persistence and bioaccumulation by Environment Canada (2007), and was included in the multi-pathway assessment.

Table 4A2-30 Chronic Oral Exposure Limits for Naphthalene

Regulatory Agency	Value (ug/kg)	Type	Reference
ATSDR	600	MRL	ATSDR 2005
HC	-	-	HC 2004
RIVM	-	-	RIVM 2001
U.S. EPA IRIS	20	RfD	U.S. EPA IRIS 2007

-- = not available

The ATSDR has developed an intermediate oral MRL of 600 ug/kg-day for naphthalene based upon a reproductive study in female rats from gestational days 6-15. A LOAEL of 50 mg/kg was established for signs of clinical toxicity in maternal rats. Uncertainty factors were applied for the use of a minimal LOAEL (3), for human variability (3), and a factor of 10 for inter-species differences

An oral RfD for naphthalene is available from the U.S. EPA IRIS (2007), and is based upon decreased body weights in male rats in a 13-week study. A NOAEL of 100 mg/kg was identified, and adjusted to 71 mg/kg due to adjustments for continuous exposure. An uncertainty factor of 3,000 was applied to account for inter-species (10) and intra-species (10) differences, extrapolation from a sub-chronic to a chronic endpoint (10), and a limited toxicological database for oral exposures (3).

Although both values were based upon less-than-chronic exposures, the U.S. EPA IRIS value incorporated an uncertainty factor to account for this. Thus, the U.S. EPA IRIS value of 20 ug/kg-day was incorporated into the multi-pathway assessment.

Inhalation bioavailability was assumed to be 100%, oral bioavailability 80%, and dermal bioavailability 13% based upon RAIS (2007).

4A2.4.15 Nitrogen Dioxide

4A2.4.15.1 Acute Exposure Limit

The exposure limits used for the acute effects assessment of nitrogen dioxide (NO_2) were based on AENV's AAQOs (AENV, 2005). These include a 1-hour objective of 400 ug/m^3 and a 24-hour objective of 200 ug/m^3. These AAQOs were adopted from the Health Canada's NAAQOs for NO_2. The NAAQOs are developed in 3 tiers: maximum desirable, acceptable and tolerable objectives. The Alberta Objectives are based on the maximum acceptable levels, as maximum desirable NAAQOs (i.e., the lowest objectives) have not been developed for NO_2 on an acute-basis. These NAAQOs are health-based, and rely on controlled studies of the most sensitive population (i.e., asthmatics) to NO_2.

Using the above objectives and guidelines, the acute assessment for NO_2 was completed on a 1-hour and 24-hour basis.

4A2.4.15.2 Chronic Exposure Limit(s)

The chronic exposure limit used for the assessment of NO_2 concentrations in air was based on AENV's AAQO of 60 ug/m^3 (AENV 2005). This guideline was adopted from Health Canada's NAAQO for NO_2 based on an annual averaging time. The NAAQOs are developed in 3 tiers: maximum desirable, acceptable and tolerable objectives. The maximum desirable level (i.e., the lowest objective) was adopted as the annual objective in Alberta. This objective is health-based and relies on controlled studies of the most sensitive population (i.e., asthmatics) to NO_2.

Nitrogen dioxide was assessed only for the inhalation route of exposure as the principal health effects are strictly related to inhalation.

4A2.4.16 Polycyclic Aromatic Hydrocarbon Group (PAH Group)

The benzo(a)pyrene group discussion was discussed previously.

4A2.4.17 Particulate Matter

Particulate matter (PM) is the generic term applied to a broad class of chemically and physically diverse substances that exist as discrete particles (liquid droplets or solids) over a range of sizes. Particles less than 2.5 um are called "fine" particles (i.e., $PM_{2.5}$), while those larger than 2.5 um but smaller than 10 um are known as "coarse" particles (i.e., $PM_{2.5-10}$). When inhaled, these particles can reach the deepest regions of the lungs (U.S. EPA, 2006b).

A significant amount of research has been, and is being conducted on the health effects associated with both fine and coarse PM in the ambient air. Short-term exposure to ambient PM in numerous urban areas has been associated with a range of health outcomes including:

- Premature death in people with heart and lung disease;
- Non-fatal heart attacks;

- Respiratory and cardiovascular hospitalizations;
- Lung function changes;
- Adverse respiratory symptoms (e.g., cough, wheeze);
- Aggravated asthma; and,
- Irregular heartbeats (U.S. EPA 2004b).

Long-term exposure to fine particles ($PM_{2.5}$) has been associated in some studies with cardiovascular and lung cancer mortality, effects on lung function and increases in respiratory symptoms (Brauer et al., 2002; Gauderman et al., 2004; Krewski et al., 2003; 2005a,b; Pope et al., 2002, 2004). These associations do not appear to be explainable by other factors (e.g., weather and other compounds) and after careful review of the evidence, most scientists agree that these seem to be causal in nature (Samet et al., 2000 [reanalyzed in HEI 2003]; CEPA, 2000b; U.S. EPA, 2004a,b). This presents a difficult problem because PM is ubiquitous in the environment and sources are both natural and anthropogenic. Populations identified as being more sensitive to the adverse health effects of PM include individuals with existing respiratory or cardiovascular disease, the elderly, children and asthmatics (U.S. EPA, 2004a,b).

Existing epidemiological studies on large populations have been unable to identify a threshold concentration below which ambient PM has no effect on health. It is likely that thresholds for specific responses exist for specific individuals, but these may vary markedly in the general population resulting in such a wide range in susceptibility that the identification of an explicit threshold for the general population may be impossible (WHO, 2003). The U.S. EPA has noted that a convincing mathematical demonstration of a clear threshold in the population studies available is both complex and difficult to verify. They concluded that available evidence does not support or refute the existence of thresholds for the effects of PM on mortality across the range of concentrations in the studies (U.S. EPA, 2004b).

The health impacts from exposure to PM are generally small in terms of measurable or relative risk. For example, the magnitude of the effect of PM exposure is much smaller than the effects of tobacco smoke (HEI, 2001). However, because exposure to PM is widespread, the public health impact of increased air pollution (and in turn PM) can be significant. A recent large study of hospital admissions in 204 counties across the U.S. found a 10 ug/m^3 same day increase in $PM_{2.5}$ was associated with 0.5 to 2 % increased hospital admissions for cardiovascular and respiratory diseases by region (Dominici et al., 2006). Variation in risk across regions was found. For example, positive associations with cardiovascular hospital admissions were found only in the Eastern region of the U.S. By contrast, relative risk estimates for respiratory tract infections were larger in the Western region (Dominici et al. 2006).

The emphasis of PM research has been shifting in recent years to address the many unanswered questions about how particles cause the health effects observed in epidemiological studies. Primary among these are questions related to a) the biological mechanisms responsible for the effects observed and; b) the types and sources of particles most likely causing the effects observed. At present, PM standards are based solely on size fraction (e.g., PM_{10}, $PM_{2.5}$, $PM_{2.5-10}$) but future standards could target the particle components or characteristics that are most toxic.

The primary biological mechanisms thought to underlie the reported health effects from ambient PM include oxidative stress and pulmonary or systemic inflammation (NRC, 2004). Clinical and toxicological studies suggest that PM exposure is associated with increased airway hyperactivity, oxidative stress, inflammation, arrhythmias, atherosclerosis, heart rate variability, blood pressure and changes in blood characteristics (e.g., levels of C-reactive protein, fibrinogen, blood viscosity). This provides the important biological plausibility required to explain the morbidity and mortality observed in susceptible individuals in epidemiological studies. However, uncertainty remains in the degree to which toxicological findings from in vitro systems and high dose animal studies apply to real world human exposures, which are often orders of magnitude lower (NRC 2004). The National Research Council (NRC) states that: "The findings from the clinical, animal and in vitro experimental work have often not addressed dose-response relationships, which may provide critical insights into the relevance of the experimental findings for interpreting epidemiological research" (NRC, 2004). Many studies also used a non-physiologic route of exposure such as intratracheal instillation, which the U.S. EPA (2004b) notes can result in very high individual cellular concentrations, requiring much caution in the extrapolation of findings.

Determining the characteristics of PM that are associated with adverse health effects is challenging. PM in ambient air is a complex mixture that varies in size and chemical composition, as well as varying spatially and temporally. Different types of particles may cause different effects with different time courses, and perhaps only in susceptible individuals. The interaction between PM and gaseous co-pollutants adds additional complexity because in ambient air pollution, a number of pollutants tend to co-occur and have strong inter-relationships with each other (e.g., PM, SO_2, NO_2, CO, and O_3) as well as different levels of measurement error (Peel et al., 2005; U.S. EPA, 2004b). As a result it is difficult to attribute the effects of air pollution as a mixture to any one of these particular pollutants. A pollutant that exhibits a relatively strong association in a multi-pollutant model may be acting as a surrogate for an unmeasured or poorly measured pollutant (Metzger et al., 2004). Several investigators have noted that the effects observed in their studies are likely due to the mixture of air pollutants and not just one component (Chen et al., 2004; Goldberg et al., 2006).

Considerable research effort has gone into understanding the PM sources, components and size fractions likely to be responsible for the health effects observed in epidemiology studies. Characteristics that have been found to contribute to toxicity include: metal content, presence of polycyclic aromatic hydrocarbons and other organic components, endotoxin content and small (less than 2.5 um) and extremely small (less than 0.1 um) size (CAFÉ, 2004).

Several studies using factor analyses indicate that combustion particles in the fine fraction but not fine crustal particles are associated with increased mortality (Laden et al., 2000; Schwartz et al., 1999; Mar et al., 2000; Tsai et al., 2000; Ozkaynak et al., 1996; Janssen et al., 2002). Crustal particles (also referred to as geological particles) are products of the natural abrasion of the earth's crust and are mainly mechanically generated from agriculture, mining, construction, road dust and related sources. Particles associated with motor vehicle emissions stand out clearly as a source category associated with mortality in the factor analyses studies, but associations with an oil combustion factor, a regional sulphate factor and a source category related to vegetative burning have also been identified. Regional sulfate is highly correlated with $PM_{2.5}$, however, so it may be acting as a surrogate for $PM_{2.5}$ (U.S. EPA, 2004b).

A number of studies have reported significant associations between adverse health effects and either traffic density or close proximity to major roads, including total and cardiopulmonary mortality, heart attacks, and adverse respiratory health effects (Brauer et al., 2002; Finkelstein et al., 2004; Hoek et al., 2002; Kim et al., 2004; Lipfert et al., 2006; Tonne et al., 2006; Venn et al., 2001). For example, in Hamilton, Ontario, living within 100 m of a freeway or 50 m of a major urban road was associated with increased all cause mortality (RR = 1.18; 1.02-1.38) (Finkelstein, et al., 2004). The mortality rate advancement associated with residence near a major road was 2.5 years in this study, which is similar to that associated with chronic respiratory and pulmonary diseases and diabetes. In a study of 70,000 male U.S. veterans, Lipfert et al. (2006) reported that county-level traffic density was a better predictor of mortality than with ambient $PM_{2.5}$ levels. In multi-pollutant models including traffic density, the association with $PM_{2.5}$ was reduced and lost statistical significance (Lipfert et al. 2006). Another study reported that time spent in traffic (e.g., cars, public transport, bicycles) two hours prior was much more strongly associated with induction of nonfatal myocardial infarctions than any of the air pollutants measured at a central monitoring site (Peters et al., 2005).

Future epidemiological studies and studies currently in progress should provide important information on the relative role of various PM size fractions and components in adverse health effects. A collection of studies in Atlanta is using extensive air quality data, including detailed PM composition and size fraction information from a monitoring station operated by the Aerosol Research and Inhalation Epidemiology Study (ARIES). Parameters measured include several gases and many PM components, including total metals, water-soluble metals, organic carbon (OC) and elemental carbon (EC), sulphates, nitrates, several speciated hydrocarbons, and polar volatile organic compounds (VOCs) (Metzger et al., 2004; Peel et al., 2005). Time series studies using ARIES data that examined associations with emergency department visits suggest the strongest and most consistent associations are with traffic related pollutants such as NO_2, CO, $PM_{2.5}$, OC, EC and oxygenated carbons (Metzger et al., 2004; Peel et al., 2005). Consistent associations with sulphates were not demonstrated.

A recent time-series analysis of PM in California indicated that ambient concentrations of several constituents of $PM_{2.5}$ were associated with daily mortality, specifically EC, OC, nitrates, copper, potassium, titanium and zinc (Ostro et al., 2006). Many of these constituents were associated with higher relative risks than $PM_{2.5}$ mass. The authors noted that their results support the hypothesis that pollution from motor vehicles and other sources of combustion may be of particular concern (Ostro et al., 2006).

Seagrave et al. (2006) examined the lung toxicity of ambient PM from various U.S. sites with different contributing sources and reported on the relationship between composition and effects. Summer and winter samples from each site were collected for toxicity testing, chemical analysis and source apportionment. After instillation into rat lungs, general toxicity, acute cytotoxicity and inflammation were assessed. The results support the concept that $PM_{2.5}$ composition affects its toxicity (Seagrave et al., 2006). Source apportionment suggested that the most potent samples were those with the largest contributions from diesel and gasoline exhaust. Wood burning was only weakly correlated with toxicity end points, while sulphate (SO_4^{2-}), secondary organic aerosols, meat cooking and vegetation burning were not correlated with the biological responses.

Untangling the relationships among components of mixtures of PM requires a sophisticated integration of air quality and health research and a systematic study of PM components (Samet et al., 2005). The Health Effects Institute (HEI) has noted that a systematic approach to these topics will generate more specific PM standards, and ones that target the types and inventories of particles most likely to contribute to health effects. Such a research initiative may lead to the identification of critical PM sources, enabling industry-specific guidance for control of those specific PM components that have been attributed with the greatest fraction of risk to health (HEI, 2005).

4A2.4.17.1 Exposure Limit for Particulate Matter

The Scientific Assessment Document (Part 1) of the National Ambient Air Quality Objectives for Particulate Matter (1999) prepared by the Canadian Environmental Protection Act and Federal Provincial Advisory Committee (CEPA/FPAC) Working Group on Air Quality Objectives and Guidelines concluded that both the mortality and hospitalization studies support the identification of 15 ug/m^3 averaged over 24 hours as the reference level for $PM_{2.5}$ (CEPA/FPAC, 1999). The reference level was considered an estimate of the lowest ambient particulate matter level at which statistically significant increases in health responses can be detected based on data available up to 1996. It was derived based on the average 24-hour concentrations measured in the cities where these effects were found. The CEPA/FPAC Working Group states that reference levels should not be interpreted as thresholds of effects, or levels at which impacts do not occur. They are defined under Canada's NAAQOs as levels above which there are demonstrated effects on human health and/or the environment (CEPA/FPAC, 1999).

A Canada-Wide Standard (CWS) of 30 ug/m^3 $PM_{2.5}$ averaged over 24 hours was developed by the CCME under the auspices of the Canadian Environmental Protection Agency (CEPA) (CCME, 2000c). Under this standard, the government is committed to reduce levels of $PM_{2.5}$ significantly by 2010. Achievement of this standard is based on the 24-hour 98th percentile of the ambient measurement annually, measured over three consecutive years. The CWS is considered to be an important step towards the long-term goal of reducing the health risks of $PM_{2.5}$. It represents a balance between achieving the best health and environmental protection possible, and the feasibility and costs of reducing pollutant emissions that contribute to $PM_{2.5}$ in ambient air.

The California Air Resources Board (CARB) has identified an air quality annual average standard for $PM_{2.5}$ of 12 ug/m^3 (CARB, 2002ab). This recommended arithmetic mean value was "based on a growing body of epidemiological and toxicological studies showing significant toxicity (resulting in mortality and morbidity) related to exposure to fine particles". Similar to the CEPA/FPAC reference level, the value was derived mainly based on the average 24 hour concentrations in cities where statistically significant increases in health responses were detected. The CARB staff report recommendation was adopted by the State of California as an ambient air quality standard in June of 2002.

In 1997, the U.S. EPA first set National Ambient Air Quality Standards (NAAQS) for fine particles. Two primary $PM_{2.5}$ standards were set: an annual standard of 15 ug/m^3 to protect against health effects that caused by exposures ranging from days to years, and a 24-hour standard of 65 ug/m^3 to provide additional protection on days with high peak $PM_{2.5}$ concentrations. In September 2006, the U.S. EPA issued a new suite of standards to better protect public health from particle pollution. The revised NAAQS for $PM_{2.5}$ reduced the 24 hour standard from 65ug/m^3 to 35 ug/m^3 and retained the annual standard of 15 ug/m^3 (U.S. EPA, 2006b). The 24-hour standard is based on the 98th percentile annual measurement, averaged over 3 years, while the annual standard is met when the 3-year average of the annual average $PM_{2.5}$ concentration is less than or equal to 15 ug/m^3. The U.S. EPA also retained the existing 24-hour NAAQS for PM_{10} of 150 ug/m^3 and revoked the annual PM_{10} standard of 50 ug/m^3.

The final NAAQSs were selected by the U.S. EPA after completing an extensive review of thousands of scientific studies on the impact of fine and course particles on public health. The criteria document (i.e., the review) and the staff paper containing the U.S. EPA's recommendations on the range of alternative standards that should be considered, received extensive review by representatives of the scientific community, industry and public interest groups as well as the Clean Air Scientific Advisory Committee (CASAC) – a group of independent scientific and technical experts established by Congress (U.S. EPA, 2006b).

The final annual standard for $PM_{2.5}$ selected by the U.S. EPA does not reflect the advice of the CASAC PM panel, who recommended a 24-hour standard in the range of 30 ug/m^3 to 35 ug/m^3 and an annual standard in the range of 13 ug/m^3 to 14 ug/m^3 (CASAC, 2006). They noted that clear and convincing scientific evidence as well as the U.S. EPA's own risk analyses (U.S. EPA, 2005) indicated health risks at the current annual standard of 15 ug/m^3. Risk analyses indicated that uncertainties increase rapidly below an annual level of 13 ug/m^3 and that was the basis for CASAC's recommendation of 13 ug/m^3 as the lower bound for the annual $PM_{2.5}$ standard. The provisions do not require U.S. EPA standards to be set at a zero risk level but rather at a level that avoids unacceptable risks to public health. However, previously the U.S. EPA has accepted CASAC's advice with respect to NAAQS decisions (CASAC, 2006).

The WHO (2005) suggests that PM guidelines cannot ensure the complete protection against adverse health effects because thresholds have not been identified and it is unlikely that any PM guideline will provide adequate protection for every individual against all possible adverse effects. Instead, guidelines need to achieve the lowest concentrations possible considering local constraints, capabilities and public health priorities.

With respect to air quality guidelines for $PM_{2.5}$, the WHO recommends an annual average of 10 ug/m^3 and a daily 99th percentile of 25 ug/m^3 for the protection of public health. The WHO (2005) suggests the annual average should take precedence over the daily guideline because at low levels there is less concern for episodic excursions. The annual average guideline is based on long-term exposure studies using the American Cancer Society (ACS) data (Pope et al., 2002) and Harvard Six-Cities data (Dockery et al., 1993). The studies reported a robust association between PM exposure and mortality. Historical mean $PM_{2.5}$ concentrations across cities in these two studies were 18 ug/m^3 and 20 ug/m^3, respectively, but average concentrations in individual cities were as low 11 ug/m^3 over the period of study. An annual mean guideline concentration of 10 ug/m^3 was therefore noted to be below the mean for most likely effects (WHO, 2005). However, both the WHO (2005) and the U.S. EPA (2005) note that statistical uncertainties in the risk estimates become apparent at concentrations of about 13 ug/m^3, below which confidence bounds significantly widen, indicating the possibility of an effects threshold. In their staff paper, the U.S. EPA (2005) noted that an annual standard of 12 ug/m^3 would be precautionary, but a standard set below the range of 12 ug/m^3 to 15 ug/m^3 would be highly precautionary, “giving little weight to the remaining uncertainties in the broader body of evidence, including other long-term exposure studies that provide far more inconsistent results”.

It is apparent that the health protection afforded by the reference level for $PM_{2.5}$ of 15 ug/m^3 that was established by the CEPA/FPAC in 1999 should be considered generally equivalent to the intended or effective health protection of the Ambient Air Standard of California (12 ug/m^3), the annual NAAQS retained by the U.S. EPA (15 ug/m^3) or the new WHO annual guideline of 10 ug/m^3 $PM_{2.5}$.

The short-term value represented by the CWS of 30 ug/m^3 is analogous to the new 24 hour NAAQS identified by U.S. EPA of 35 ug/m^3, which was determined to better protect the public from the health effects associated with short-term fine particle exposures. The CWS is within the range set by the WHO annual guideline for $PM_{2.5}$ of 10 ug/m^3 and the U.S. EPA NAAQS of 35 ug/m^3. CARB refrained from setting a 24-hour standard in 2002, and has deferred a decision on this matter (CARB, 2002b).

For the current assessment, predicted 24-hour $PM_{2.5}$ concentrations are compared to the CWS of 30 ug/m^3, which falls within the range of recent standards recommended by the WHO and the U.S. EPA. Predicted annual average concentrations were compared against the CARB annual standard of 12 ug/m^3**,** which also falls within the range of standards recommended by the WHO and the U.S. EPA. The choice of standards in the middle of the range of available guidelines or standards respects both the need to be conservative and the uncertainty which still remains regarding the types of PM that are most toxic and the existence of a threshold for PM-associated adverse effects.

Taken together, these health-based limits should offer an acceptable level of protection to the area residents.

4A2.4.18 Pentane

No acute or chronic exposure limits for pentane were identified. The aliphatic C_5-C_8 compounds were selected for use as a surrogate for pentane given the physico-chemical similarities. Summarized below are the acute and chronic exposure limits for aliphatic C_5-C_8 compounds.

n-Hexane was not combined with pentane in this assessment, as it is evaluated independently using an exposure limit specifically for the n-hexane isomer, which is toxicologically unique relative to other hexane isomers and C_5-C_8 compounds.

Table 4A2-31 Acute Inhalation Exposure Limits for Pentane

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	--	--	ATSDR (2006a)
OEHHA	--	--	OEHHA (2000a)
OMOE	2,5001	24-hour	OMOE (2005a)[1]
WHO	--	--	WHO (2000)

[1] The OMOE standard was developed for hexane mixture (OMOE, 2005c).

-- = not available

The OMOE provides a 24-hour standard of 2,500 ug/m^3 for a hexane mixture (OMOE, 2005ab). This standard was developed from a NOAEL of 58 ppm (204 mg/m^3) for polyneuropathy in humans (Sanagi et al., 1980). Workers were exposed to low concentrations of n-hexane and acetone in a tungsten carbide alloys facility for an average of 6.2 years. Significant decreases in mean motor nerve conduction velocities and slowed residual latency of motor conduction of lower extremity. The NOAEL was adjusted from an eight-hour time weighted average for occupational exposure to a value of 73 mg/m^3 for continuous exposure in the general population as follows.

$$NOAEL_{ADJ} = NOAEL \times \frac{MV_{ho}}{MV_h} \times \frac{Exp_{ho}}{Exp_h}$$

where:

$NOAEL_{ADJ}$ = NOAEL in the human population from continuous exposure (mg/m^3)
NOAEL = NOAEL for discontinuous exposure in an occupational setting (204 mg/m^3)
MV_{ho} = amount of air used by a worker during an 8-hour work period (10 m^3/d)
MV_h = amount of air used by an individual in the general population during a day (20 m^3/d)
Exp_{ho} = days per week a worker is exposed (5 days)
Exp_h = days per week an individual in the general population is exposed (7 days)

An uncertainty factor of 30 was applied to the $NOAEL_{ADJ}$ to account for individual sensitivity (10-fold) and potential interaction with other hydrocarbon solvents in commercial n-hexane (3-fold) (OMOE, 2005b). As it is not appropriate to use chronic toxicity data in the derivation of an acute limit, a modified acute limit was developed for the aliphatic C_5-C_8 group (described below).

The CCME (2000a) and TPHCWG (1997) developed a chronic RfC for C_5-C_8 aliphatics based on a NOAEL of 3,000 ppm (10,000 mg/m^3) identified in four of sub-chronic and chronic studies. The NOAELs identified from the sub-chronic studies are based on increased liver weights in rats and mice and nephropathy in rats exposed to 0 ppm, 900 ppm, 3,000 ppm, or 9,000 ppm (0 mg/m^3, 3,000 mg/m^3, 10,000 mg/m^3, 30,000 mg/m^3) commercial hexane for six hours per day, five days per week for 13 weeks (Duffy et al., 1991). An uncertainty factor of 100 was applied to the sub-chronic NOAEL of 3,000 ppm (10,000 mg/m^3) to account for interspecies and intra-species variability (10-fold each). Given that the C_5-C_8 aliphatic group includes a variety of organic compounds with six to eight carbon atoms joined together in a straight or branched chain and is not limited to n-hexane and its isomers, a modified limit of 100,000 ug/m^3 was used as a 1 hour exposure limit in the acute effects assessment of the aliphatic C_5-C_8 group.

Use of a sub-chronic NOAEL in the derivation of an acute exposure limit is considered conservative since a higher exposure over a shorter time-period (i.e., acute exposure) presumably could occur without risk of adverse effects.

4A2.4.19 Chronic Exposure Limit

In the case of the aliphatic and aromatic petroleum hydrocarbon (PHC) groups, the search for chronic inhalation and oral exposure limits was limited to three regulatory agencies: CCME (2000a), MA DEP (2003) and TPHCWG (1997). These agencies have developed chronic exposure limits for the aliphatic and aromatic groups as a whole.

Table 4A2-32 Chronic Inhalation Exposure Limits for Pentane

Regulatory Agency	Value (ug/m^3)	Type	Reference
CCME	18,400	RfC	CCME (2000a)
MA DEP	200	RfC	MA DEP (2003)
TPHCWG	18,400	RfC	TPHCWG (1997)

The CCME (2000a) provides an RfC of 18,400 ug/m^3 for the C5-C8 aliphatic group based on the neurotoxic endpoint of commercial hexane. This exposure limit was adopted from the TPHCWG (1997) and was developed from the NOAEL of 10,307 mg/m^3 for two (rat and mice) chronic bioassays involving lifetime exposure. The NOAEL was adjusted for continuous exposure (6 hours/24 hours × 5 days/7 days) to a concentration of 1,840 mg/m^3. An uncertainty factor of 100 was applied by the TPHCWG to account for interspecies (10-fold) and intra-species (10-fold) variability. The TPHCWG (1997) recommends using the RfC derived for commercial hexane over an RfC specific to n-hexane (as is the case of the MA DEP RfC) as it is more representative of the C_5-C_8 aliphatic fraction. According to the TPHCWG, using n-hexane alone results in an overestimation of the toxicity of the fraction since n-hexane is the most toxic of the group's constituents, it is uniquely toxic, and its interaction with other petroleum compounds influences its toxicity. On this basis, the RfC of 18,400 ug/m^3 for commercial hexane was used to evaluate the risks associated with this petroleum mixture. This RfC corresponds to an inhalation dose of 4,100 ug/kg bw/d based on an average adult body weight of 70.7 kg and an inhalation rate of 15.8 m^3/d (Health Canada, 2004a).

The MA DEP RfC of 200 ug/m^3 was developed from toxicity data specific to n-hexane, which is considered overly conservative and inappropriate when characterizing the toxicity of the aliphatic C_5-C_8 group as a whole (MA DEP, 2003). Furthermore, the MA DEP adopted the 1993 U.S. EPA RfC for n-hexane, which was increased in 2005 to a value of 700 ug/m^3 for peripheral neuropathy in a sub-chronic rat inhalation study (U.S. EPA, 2007).

Pentane was determined to be neither persistent nor bioaccumulative in association with Environment Canada (2007) criteria, thus was not assessed in the multi-pathway assessment.

4A2.4.20 Sulphur Dioxide

For the criteria air contaminants identified by Health Canada, the AAQOs developed by AENV (2005) were given priority when available.

4A2.4.20.1 Acute Exposure Limits

The acute exposure limits used for the assessment of sulphur dioxide (SO_2) concentrations in air were based primarily on AENV's AAQOs (AENV 2005). These include a 1 hour objective of 450 ug/m^3 and a 24 hour objective of 150 ug/m^3. These AAQOs were adopted from the Health

Canada NAAQOs, which recommends maximum desirable, acceptable and tolerable objectives for SO_2. The Alberta objectives are based on the maximum desirable levels (i.e., the lowest objective). These guidelines are health-based and rely on controlled studies of the most sensitive population (i.e., asthmatics) to air pollutants such as SO_2.

Sulphur dioxide also was assessed using a 10-minute air quality guideline of 500 ug/m^3 developed by the WHO (2000). This guideline is based on changes in lung function in asthmatics (WHO, 2000).

Using the above objectives and guidelines, the acute assessment for SO_2 was completed on a 10 minute, 1 hour and 24 hour basis.

4A2.4.20.2 Chronic Exposure Limits

The chronic exposure limit used for the assessment of SO_2 concentrations in air was based on AENV's annual ambient air quality objective for SO_2 of 30 ug/m^3 (AENV, 2005). This AAQO was adopted from the Health Canada annual NAAQO, which includes maximum desirable, acceptable and tolerable objectives for SO_2. The Alberta objectives are based on the maximum desirable levels (i.e., the lowest objective). This guideline is health-based and relies on controlled studies of the most sensitive population (i.e., asthmatics) to air pollutants such as SO_2.

Sulphur dioxide was assessed only on an inhalation exposure basis because potential health effects relate directly to inhalation exposure.

4A2.4.21 Toluene

Table 4A2-33 Acute Exposure Limits for Toluene

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	1,880 400	1-hour 24-hour	AENV (2005) AENV (2005)
ATSDR	3,800	24-hour	ATSDR (2006a)
OEHHA	37,000	1-hour	OEHHA (2000)
OMOE	2,000	½-hour, 24-hour	OMOE (2005a)
WHO	260	1-week	WHO (2000)

The AENV (2005) provides a 1-hour AAQO of 1,880 ug/m^3, which was adopted from the Texas Natural Resource Conservation Commission. The Texas value was based on the ACGIH TLV-TWA of 50 ppm (188 mg/m^3) (ACGIH 1991, 2006a). The AENV (2005) adjusted the TLV-TWA by applying a 100-fold uncertainty factor (the basis of the 100-fold uncertainty factor is unknown). The 24-hour AAQO was adopted from the Michigan Department of Environmental Quality and the Washington Department of Ecology (AENV, 2005). These regulatory agencies based their 24-hour guidelines on the U.S. EPA chronic inhalation RfC of 400 ug/m^3 (U.S. EPA, 1998). The U.S. EPA RfC has since been revised to an inhalation RfC of 5,000 ug/m^3 for neurological effects. As this 24 hour AAQO was based on a chronic inhalation exposure limit that has recently been raised by more than a factor of 10, this objective was not used in the acute effects assessment.

The OMOE (2005a) has developed a 24-hour AAQC of 2,000 ug/m^3 for toluene based on odour perception, and thus was not used in the acute effects assessment.

The WHO (2000) provides a guideline of 260 ug/m^3 based on a 1-week averaging time. A LOAEL of 332 mg/m^3 (88 ppm) was identified for CNS effects from occupational studies. The LOAEL was adjusted for continuous exposure (8 hour/24 hour x 5 days/7 days) to a concentration of 79 mg/m^3. The duration-adjusted LOAEL was divided by an uncertainty factor of 300 to account for intra-species variation (10-fold), for use of a LOAEL (10-fold) and the given effects on the developing CNS (3-fold). This guideline was not used in the short-term assessment of toluene as the ATSDR (2006a) and OEHHA (2000) both provide acute exposure limits based on a NOAEL.

The ATSDR (2000, 2006a) has derived an acute MRL 1 ppm (3,800 ug/m^3) for neurological effects. A NOAEL of 40 ppm (150 mg/m^3) was reported based on a study by Andersen et al. (1983), wherein 16 healthy young subjects with no previous exposure to organic solvents were exposed to toluene for six hours per day on four consecutive days. The NOAEL was adjusted for intermittent exposure (8 hour/24 hours x 5 days/7 days). A 10-fold uncertainty factor was applied to the duration-adjusted NOAEL to account for intra-species variation.

The OEHHA (1999n, 2000) provides an acute REL of 37,000 ug/m^3 for toluene based on the same study NOAEL identified in the ATSDR assessment. The difference between the limit values of the OEHHA and the ATSDR arises from a different way of extrapolating a 6-hour exposure to an acute exposure duration. The ATSDR adjusts the 6-hour exposure to a 24-hour limit using 8 hours/24 hours x 5 days/7days, which is a common approach for deriving a chronic limit from intermittent occupational exposure of eight hours per day, five days per week; however, this adjustment is inappropriate when deriving a 24-hour limit from 6-hour exposure.

In contrast, the OEHHA converts the 6-hour exposure duration to a 1-hour REL of 98 ppm (370 mg/m^3) based on the following calculation.

$$C2 \text{ x } 1 \text{ hour } = (40 \text{ ppm}) 2 \text{ x } 6 \text{ hours}$$

An uncertainty factor of 10 was then applied by the OEHHA to the duration-adjusted NOAEL. This acute REL of 37,000 ug/m^3 was used as the 1-hour exposure limit in acute effects assessment for toluene.

Table 4A2-34 Chronic Exposure Limits for Toluene

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	300	MRL	ATSDR (2006a)
Health Canada	3,800	RfC	Health Canada (2004b)
RIVM	400	RfC	RIVM (2001)
U.S. EPA	5,000	RfC	U.S. EPA (2007)
WHO	--	--	WHO (2000)

-- = not available

The ATSDR (2000, 2005a) chronic inhalation MRL of 0.08 ppm (300 ug/m^3) was based on colour vision impairment in workers exposed to toluene. Three groups of Croatian workers were examined through interviews, medical examinations, and colour vision testing (ATSDR, 2000; Zavalic et al., 1998). A LOAEL of 35 ppm (130 mg/m^3) was determined for alcohol- and age-adjusted colour vision impairment. The LOAEL was adjusted for intermittent exposure (8 hours/24 hours x 5 days/7 days) to a concentration of 8 ppm (30 mg/m^3). An uncertainty factor of 100 was applied to the duration-adjusted LOAEL to account for use of a LOAEL (10-fold) and intra-species variation (10-fold). This MRL was not used as the chronic exposure limit for toluene because it was developed from a LOAEL and thus required the use of a 10-fold uncertainty factor acknowledging the uncertainty associated with use of a LOAEL instead of a NOAEL. Thus, the RfCs developed by Health Canada and the U.S. EPA from NOAELs were given preference.

The RIVM has also developed a TCA of 400 ug/m^3 for toluene (RIVM, 2001). This TCA was adopted from the U.S. EPA RfC of 400 ug/m^3, which was revised in 2005 to a value of 5,000 ug/m^3 (U.S. EPA, 2007). As a result, this TCA was not used in the chronic inhalation effects assessment for toluene.

Health Canada bases its chronic tolerable concentration of 3,800 ug/m^3 on the same (ATSDR acute MRL) lowest reported NOAEL of 150 mg/m^3 (40 ppm) for neurological effects and respiratory irritation in human volunteers (Andersen et al., 1983; CEPA, 1992). The study NOAEL was adjusted from 6-hour daily dosing to continuous exposure and an uncertainty factor of 10 was applied to account for intra-species variation.

The U.S. EPA has derived an inhalation RfC based upon the findings of 10 human studies, each of which examined the neurological effects in occupationally exposed workers (U.S. EPA, 2007). These studies were all more recent than the Andersen et al. 1983 study used in the Health Canada assessment and included the study used as the basis of the ATSDR assessment. The analysis of the multiple studies resulted in an average NOAEL of 34 ppm (128 mg/m^3). This NOAEL was adjusted for the differences in breathing rates between workers and members of the public (i.e., 10/20 m^3/d) and the reduced weekly exposure time (i.e., 5 days/7 days). The U.S. EPA also applied an uncertainty factor of 10 to account for human variation. The U.S. EPA RfC of 5,000 ug/m^3 represents the most recent analysis of the available scientific literature, and this value used in the chronic inhalation assessment.

A chronic oral exposure limit was not required for the assessment of toluene since it did not exceed any of the persistence and bioaccumulation parameters established by Environment Canada (2007) and thus was not incorporated into the multi-media exposure model.

4A2.4.22 Xylene (total)

Table 4A2-35 Acute Exposure Limits for Xylenes

Regulatory Agency	Value (µg/m^3)	Averaging Time	Reference
AENV	2,300 700	1-hour 24-hour	AENV (2005)
ATSDR	8,700	2-hour	ATSDR (2006a)
OEHHA	22,000	1-hour	OEHHA (2000)
OMOE	730	24-hour	OMOE (2005a)
WHO	--	--	WHO (2000)

-- = not available

The AENV (2005) adopted the OMOE's ½-hour POI of 2,300 ug/m^3 as its 1-hour AAQO. However, this POI was based on odour perception and has since been updated (OMOE 2005d). The AENV (2005) also provides a 24-hour AAQO of 700 ug/m^3. This guideline was not used in the acute effects assessment because it was taken from the chronic REL provided by the OEHHA (2005).

The OMOE (2005ae) currently provides a 24-hour limit of 730 ug/m^3 based on adverse neurological effects. A LOAEL of 62 mg/m^3 was established for headaches, eye and nasal irritation, and light headedness (floating sensation) in approximately 300 workers, 175 of whom were occupationally exposed for an average of seven years. The LOAEL was adjusted by the OMOE to account for discontinuous exposure (10 m^3/20 m^3 × 5 days/7 days) to a concentration of 22.1 mg/m^3. It should be noted that the scientific merit for the discontinuous exposure adjustment is questionable, considering that the OMOE standard is intended to be protective of short-term exposures and that the study subjects were exposed to xylene for seven years, on average. Regardless, the OMOE applied an uncertainty factor of 30 to the adjusted LOAEL to account for intra-species variability (10-fold) and use of a LOAEL (3-fold).

The ATSDR recently reviewed the short-term toxicity of xylenes (ATSDR 2005a, 2006a). Based on a study by Ernstgard et al. (2002), 50 ppm (200 mg/m^3) was designated as a LOAEL for slight respiratory effects (e.g., reduced forced vital capacity, increased discomfort in throat and airways in women, and breathing difficulties in both sexes) and subjective symptoms of neurotoxicity (e.g., headache, dizziness, feelings of intoxication). Fifty-six healthy volunteers (28 per sex) between the ages of 20 and 49 years were exposed to 50 ppm m-xylene, clean air (controls) or 150 ppm 2-propanol in a dynamic chamber for 2 hours. Each subject received three treatments separated by intervals of two weeks. The LOAEL was considered minimal because the magnitude of the changes was small. The ATSDR applied an uncertainty factor of 30 for use of a (minimal) LOAEL (3-fold) and human variability (10-fold), resulting in an acute MRL of 2 ppm (8,700 ug/m^3). This 2-hour MRL of 8,700 ug/m^3 was conservatively adopted as the 1 hour exposure limit used in the acute effects assessment.

Table 4A2-36 Chronic Inhalation Exposure Limits for Xylenes

Regulatory Agency	Value (ug/m^3)	Type	Reference
ATSDR	650	RfC	ATSDR (2006a)
Health Canada	180	RfC	Health Canada (2004b)
RIVM	870	RfC	RIVM (2001)
U.S. EPA	100	RfC	U.S. EPA (2007)
WHO	--	--	WHO (2000)

-- = not available

Although Health Canada (2004b) recommends a tolerable concentration of 180 ug/m^3 for xylenes, the specific basis is unknown. Therefore, the chronic inhalation RfC derived by the U.S. EPA (2007) of 100 ug/m^3 was used in the chronic effects assessment. The RfC was derived from a NOAEL of 217 mg/m^3 for impaired motor coordination from a sub-chronic inhalation study in male rats (Korsak et al., 1994). The NOAEL was adjusted from intermittent to continuous exposure by the U.S. EPA, resulting in an adjusted NOAEL of 39 mg/m^3. A safety factor of 300 was applied by the U.S. EPA to the adjusted NOAEL to account for laboratory animal-to-human interspecies differences (3-fold), intra-species uncertainty to account for human variability and sensitive populations (10-fold), extrapolation from sub-chronic to chronic duration (3-fold), and uncertainties in the database (3-fold).

A chronic oral exposure limit was not required for the xylenes assessment because it did not exceed any of the persistence and bioaccumulation parameters established by Environment Canada (2007), and thus was not incorporated into the multi-media exposure model.

4A3 MIXTURES ASSESSMENT

Possible additive interactions were identified for those COPCs known to cause irritation (eye, nasal, respiratory), effects on the liver or kidney, neurological effects, and cancer. The inclusion of a COPC in the chemical mixture was based upon the endpoint of the exposure limit used in the current HHRA.

Table 4A3-1 Potential Additive Health Effects

Exposure Duration	Potential Health Effect	Toxicant Designation	COPCs
Acute inhalation	Irritation	Eye irritants	acetaldehyde, acrolein, dichlorobenzenes, formaldehyde, naphthalene
		Nasal irritants	dichlorobenzenes, formaldehyde
		Respiratory irritants	acetaldehyde, nitrogen dioxide, sulphur dioxide, xylenes
	Liver effects	Hepatotoxicants	acenaphthene group, pentane, aromatic C_9-C_{16} group
	Kidney effects	Nephrotoxicants	aromatic C_9-C_{16} group, aromatic C_{17}-C_{34} group, pentane
	Neurological effects	Neurotoxicants	aromatic C_9-C_{16} group, n-hexane, toluene, xylenes
Chronic inhalation	Irritation	Eye irritants	--
		Nasal irritants	acrolein, dichlorobenzenes, naphthalene
		Respiratory irritants	nitrogen dioxide, sulphur dioxide
	Liver effects	Hepatotoxicants	acenaphthene group, aromatic C_9-C_{16}
	Kidney effects	Nephrotoxicants	aromatic C_9-C_{16} group, aromatic C_{17}-C_{34} group, benzaldehyde
	Neurological effects	Neurotoxicants	n-hexane, pentane, toluene, xylenes
	Cancer via genotoxic mechanisms	Genotoxic carcinogens	acetaldehyde, benzene, benzo(a)pyrene (IPM and WMM) group, formaldehyde
	Cancer via non-genotoxic mechanisms	Non-genotoxic carcinogens	--

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4B1 INTRODUCTION

This appendix provides technical information related to the quantitative assessment of chronic exposure and the potential risks to humans from chemicals associated with the Project.

Exposures to chemicals of potential concern (COPCs), at specified receptor locations, were estimated based on the following factors:

- Background or existing exposure to be estimated with relevant and available measured information;
- Specific physical, chemical and biological factors that determine the rate and amount of uptake of chemicals into the body;
- Physical and chemical characteristics which determine the interaction and behaviour of a chemical with its surrounding environment (e.g., water solubility, volatility, tendency to bind to particles);
- Characteristics of the sites and surrounding areas;
- Characteristics of the environmental media at the sites (e.g., air and soil), as well as the concentrations of chemicals entering the environment from various sources, and their persistence in the environment;
- Behavioural and lifestyle characteristics of potentially exposed human receptors (e.g., respiration rate, body weight); and,
- Assumed empirical or theoretical mathematical or statistical relationships between human exposure variables.

Background exposures were estimated based on available environmental data from the Oil Sands region. A summary of the available data (chemical concentrations) in soil, water, plants and game that were used to characterize background exposures is included within this Appendix. Background exposures were estimated separately from exposures associated with the three development cases (i.e., baseline, application and CEA) which were estimated from exposure modelling.

Background exposures were added to baseline, application and CEA cases for threshold chemicals. Incremental cancer risks (not including background risks) were estimated for non-threshold chemicals (i.e., carcinogens) as recommended by Health Canada (2006) and AENV (2006).

Polycyclic aromatic hydrocarbons (PAHs) have been measured in the region but were seldom detected. Volatile organic compounds (VOCs) have typically not been measured in background assessments, as they are highly volatile and are generally not deposited to the terrestrial or aquatic environments. Background exposures to PAHs and VOCs were estimated from models that predicted uptake to environmental media (i.e., soil, water, plants and game) from predicted and/or measured air concentrations.

In order to facilitate the understanding of the multimedia exposure model, a “worked example” is provided for a hypothetical adult First Nations Receptor exposed to a specific COPC (the example was based on naphthalene) for the application case of the project.

4B2 ASSUMPTIONS AND METHODS USED WITH ENVIRONMENTAL MEDIA CONCENTRATIONS

In order to quantify potential human exposures (and associated health impacts) as a result of emissions from the Project, measured and predicted chemical concentrations in various environmental media were required to estimate exposures and characterize risks. Chemical concentrations in the following media were estimated based on air concentrations:

- Soil;
- Soil pore water;
- Indoor air and dusts;
- Traditional plants (i.e., cattail root, mint tea, and berries); and,
- Wildlife game (i.e., moose, ruffed grouse and snowshoe hare).

Similarly, chemical concentrations in fish were estimated based on predicted water quality in the LSA.

Many of the equations and assumptions used to predict environmental media concentrations were provided by the U.S. EPA OSW (2005). In addition to providing the equations and algorithms used to estimate environmental media concentrations, the following sections provide the methods used to estimate human chemical exposures, and to predict risks.

Maximum annual average ground level air concentrations were predicted at several human receptor locations identified in the problem formulation of the main report, and the maximum reported concentration for each COPC out of all 79 receptor locations was included in the multi-media assessment. The assessment of inhalation exposures alone involved the use of the maximum detected air concentrations for each receptor group (e.g., the maximum detected concentration of a COPC). The chronic health risk assessment included potential country food exposures for First Nations and Residential receptor locations. Similar methodologies were applied to all receptors, receptor locations, and the COPCs evaluated.

4B2.1 Chemical Concentrations in Soil

4B2.1.1 Background Soil Concentrations

Background concentrations in soil were investigated from previous environmental impact assessments in the oil sands region. Soil concentrations measured from the following EIAs were surveyed for background soil concentrations:

- Petro-Canada, Meadow Creek 2001
- Shell Jackpine Mine Phase 1 2002
- CNRL Horizon Project 2002
- Imperial Oil Kearl Oil Sands Project - Mine Development 2005
- Albian Sands Energy Inc., Muskeg River Mine Expansion 2005

- Suncor Energy Inc. Voyageur Project 2005

PAH and VOC concentrations in soil have either reported non-detect values or were not measured. Therefore, background PAH and VOC concentrations in soil were predicted based on measured background air concentrations.

4B2.1.2 Predicted Soil Concentrations

Predicted chemical concentrations in soil were based on predicted maximum annual average ground level air concentrations. Soil concentrations were estimated by applying deposition rates to air quality modelling results, and then calculating soil concentrations based on equations described below. Predicted soil concentrations are presented in Appendix 4D.

4B2.1.2.1 Background Deposition

Atmospheric deposition of organic and inorganic chemicals occurs in two modes: wet and dry deposition (Golomb et al., 1997). In wet deposition, aerosols and gases are dissolved or suspended in precipitation: rain, snow, hail, fog and mist. Dry deposition of particles occurs by direct impaction and gravitational settling on land or water surfaces.

Calculating the Wet Vapour Deposition Velocity:

$$V_{wvd} = P_a \times SR \times CF$$

where:

V_{wvd} = velocity of wet vapour deposition [m/s]
P_a = annual precipitation rate [m/year]
SR = scavenging ratio [200,000 unitless]
CF = conversion factor from years to seconds [3.1709979E-08 year/s]

The scavenging ratio represents the ratio between the volume of air a typical raindrop will sweep through as it falls to the earth relative to the volume of the rain drop. Therefore, a typical raindrop will fall through a volume equal to 200,000 (Mackay, 1991) times its volume prior to landing on land or water. Canadian climate normals recorded at Fort McMurray, Alberta between 1971 and 2000 provides a precipitation rate of 455.5 mm/year (Environment Canada, 2007). Using this value the wet deposition velocity is estimated to be 0.003 m/s. The human health risk assessment assumed a wet deposition velocity of 0.004 m/s which is conservative and consistent with previous assessments.

0.003 = 0.4555 × 200,000 × 3.17E-08

4B2.1.2.2 Converting the Air Concentration to a Deposition Rate

Combining the predicted ground level air concentration with the wet vapour deposition velocity will yield the loading rate of chemical to soil.

$$D = C_a \times VP_f \times V \times CF1 \times CF2$$

where:

D = vapour or particulate deposition rate [mg/m^2/year]
C_a = concentration in air [ug/m^3]
VP_f = vapour or particulate phase fraction [%]
V = vapour or particulate phase deposition velocity [m/s]
CF1 = conversion factor 3.1536E+07 [s/year]
CF2 = conversion factor 0.001 [mg/ug]

The above equation can be used to calculate the following forms of chemical deposition to soil:

- Wet vapour deposition (D_{wv})

$$D_{wv} = 21 = 1.66\text{E-}01 \times 100\% \times 0.004 \times 3.1536\text{E+}07 \times 0.001$$

- Wet particle deposition (D_{wp})

$$D_{wp} = 0 = 1.66\text{E-}01 \times 0\% \times 0.004 \times 3.1536\text{E+}07 \times 0.001$$

- Dry vapour deposition (D_{dv})

$$D_{dv} = 78 = 1.66\text{E-}01 \times 100\% \times 0.015 \times 3.1536\text{E+}07 \times 0.001$$

- Dry particle deposition (D_{dp})

$$D_{dp} = 0 = 1.66\text{E-}01 \times 0\% \times 0.03 \times 3.1536\text{E+}07 \times 0.001$$

- Total deposition = 99 mg/m^2/year = 21 + 0 + 78 + 0

4B2.1.2.3 Calculating Chemical Loss Constants

There are several processes by which chemical concentrations may be reduced in soil through losses. These processes may or may not occur simultaneously. The total rate at which a chemical is lost from soil was designated as *ks*. There are five mechanisms by which compounds may be lost from soil: leaching, runoff, erosion, biotic and abiotic degradation, and volatilization. Only abiotic and biotic degradation and volatilization processes were considered for PAHs and VOCs in this assessment.

Chemical Loss via *Biotic and Abiotic Degradation*

The degradation rate can be calculated as follows if the soil half-life ($t_{1/2}$) is known:

$$k_{sg} = \frac{0.693}{t_{1/2}}$$

For organics, soil half-life values for abiotic and biotic degradation were obtained from U.S. EPA OSW 2005; Howard et al., 1991; and Mackay et al., 1992.

$$\boxed{k_{sg} = 1.4 \times 10^{-02}\ \text{yr}^{-1}}$$

Chemical Loss via *Volatilization*

The $t_{1/2}$ can also be predicted with established relationships between vapour pressure, water solubility, and soil adsorption coefficient as follows (Swan et al., 1979):

$$t_{1/2} = 1.58 \times 10^{-8} \left(\frac{K_{oc} S}{P_{vp}} \right) \quad days$$

where:

$t_{1/2}$ = soil half-life (volatilization) [days]
K_{oc} = soil sorption coefficient [(ug/g) / (ug/mL)]
S = water solubility [mg/L]
P_{vp} = vapour pressure [mm Hg]

$$t_{1/2} = 0.006 = 1.58 \times 10^{-8} \times \left(\frac{1190 \times 31}{0.085} \right)$$

The half-life is then converted to a rate constant using the following equation:

$$k_{sv} = \frac{0.693}{t_{1/2} / CF}$$

where:

k_{sv} = volatilization loss rate [years^{-1}]
$t_{1/2}$ = volatilization half life [days]
CF = conversion factor [365 days/year]

$$k_{sv} = 4.0E + 04 = \frac{0.693}{0.006 / 365}$$

Total Soil Loss Constant

$$ks = ksg + ksv$$

where:

k_s = chemical-specific soil loss constant due to all processes (year^{-1})
k_{sg} = chemical-specific soil loss constant due abiotic and biotic degradation (year^{-1})
k_{sv} = chemical-specific soil loss constant due to volatilization (year^{-1})

$$k_s = 4.0E+04 \quad = 0.014 + 4.0E+04$$

4B2.1.2.4 Calculating the Deposition Term and Predicted Soil Concentration

The following illustrates the methodology used to derive soil concentrations on a mass per mass basis (ug/g), given the appropriate air dispersion data. Deposition to soil was calculated using the following equation:

$$D_s = \frac{(D_{dp} + D_{wp} + D_{dv} + D_{wv})}{Z_s \times BD}$$

where:

D_s = chemical-specific deposition (mg of chemical /kg of soil/year)
Ddp = chemical-specific dry particle deposition rate (mg/m^2/year)
Dwp = chemical-specific wet particle deposition rate (mg/m^2/year)
Ddv = chemical-specific dry vapour deposition rate (mg/m^2/year)
Dwv = chemical-specific wet vapour deposition rate (mg/m^2/year)
Z_s = soil mixing zone depth (m)
BD = soil bulk density (kg soil/m^3 soil)

$$D_s = 3E-01 = \frac{99}{0.2 \times 1500}$$

$$C_s = \frac{D_s \times [1 - \exp(-ks \times tD)]}{ks}$$

where:

C_s = average soil concentration over exposure duration (mg/kg soil)
D_s = deposition term (mg of chemical/kg soil/year for untilled and tilled soils, respectively)
k_s = chemical soil loss constant due to all processes (year^{-1})
tD = time period over which deposition occurs (years)

$$C_s = 7 \times 10^{-6} = \frac{0.3 \times [1 - \exp(-(4.0E+04) \times 75)]}{4.0E+04}$$

4B2.1.2.5 Application Case Deposition

COPC deposition rates were estimated using methods described previously.

4B2.2 Surface Water Concentrations for Wildlife Ingestion

Baseline water quality predicted from the surface water quality assessment was assumed equivalent to background concentrations in the local study area. Maximum concentrations from the water quality nodes were used for estimating tissue concentrations in wild game. Surface water data was obtained from the following water bodies: Athabasca, Christina, Clearwater and Muskeg rivers; Jackpine, Muskeg and Stanley creeks. The maximum detected concentration or one-half of the highest detection limit were selected for each COPC.

Table 4B2.2-1 provides the background water concentrations used in this assessment.

Table 4B2.2-1 Surface Water Concentrations

	Concentration (mg/L)
3-methylcholanthrene	0
7,12-dimethylbenz(a)anthracene	0
Anthracene	0.00002
Benz(a)anthracene	0.00005
benzo(a)pyrene	0.00003
benzo(a)pyrene	0.00003
Benzo(b)fluoranthene	0.00001
benzo(e)pyrene	0
Benzo(ghi)perylene	0.00005
Benzo(k)fluoranthene	0.00001
Chrysene	0.00002
Dibenz(ah)anthracene	0.00005
Fluoranthene	0.00002
fluorene	0.00005
Indeno(1,2,3cd)pyrene	0.00005
naphthalene	0.00005
benzo(a)pyrene	0.00003
perylene	0.00002
Phenanthrene	0.00001
Pyrene	0.00001

Source: RAMP 2002, 2003, 2004.

As no impact to surface water was predicted, the surface water concentrations in the baseline, application and CEA cases (without background included) were all assumed to be zero.

4B2.3 Plant Concentrations

4B2.3.1 Background Plant Concentrations

Measured traditional plant concentrations are available from the following EIAs:

- Petro-Canada, Meadow Creek 2001
- Shell Jackpine Mine Phase 1 2002

- CNRL Horizon Project 2002
- Imperial Oil Kearl Oil Sands Project - Mine Development 2005
- Albian Sands Energy Inc., Muskeg River Mine Expansion 2005
- Suncor Energy Inc. Voyageur Project 2005

Upon evaluation of these sources, it was apparent that plant concentrations of PAHs and VOCs are below analytical detection limits. Thus, background plant concentrations were estimated using background air concentrations, applying the methodology described in section 4B2.3.2.

4B2.3.2 Predicting Chemical Concentrations in Plants

The uptake of chemicals into vegetation (i.e., root vegetables, leafy vegetables, forage, grain and fruit) is a topic that has been extensively reviewed in the literature. Chemical emissions to the atmosphere may be taken up by vegetation from three sources: particulate in air (dust or aerosols); vapours in air (gases); and, subsurface compartments (soil, water) (Rolfe, 1972; Baes, 1982; Travis and Hattemer-Frey, 1988; Boon and Sultanpour, 1992; Muller et al., 1993; Schroll and Scheunert, 1993; McCrady and Maggard, 1993). The magnitude of uptake from these sources has been correlated with physical/chemical parameters (vapour pressure, octanol water partition coefficient, etc.), soil parameters (fraction of organic carbon, soil moisture, clay content, etc.), plant parameters (lipid content, moisture content, etc.) and with chemical concentrations in air and other environmental media (U.S. EPA OSW, 2005).

The methodology used to estimate the contribution from each route of chemical uptake in vegetation is described in the following sections. Predicted plant tissue concentrations are presented in Appendix 4D, based on the maximum air concentration predicted from the 79 receptor locations.

The following sources of chemical uptake into the tissues of plants were considered, and are described in detail below:

- Direct deposition of particles onto plant produce;
- Air to aboveground plant produce (vapour transfer to leaves / foliage);
- Soil to aboveground plant produce; and
- Soil to belowground plant produce.

4B2.3.3 Plant Chemical Concentration Due to Direct Deposition

Atmospheric deposition was only considered for plants whose edible portions are above the ground and where the chemical potentially exists in particulate form. The following equations were used to predict produce concentration due to direct wet and dry deposition processes.

$$P_d = \frac{0.001 \times \left[D_{dp} + \left(F_w \times D_{wp}\right)\right] \times R_p \times \left[1.0 - \exp\left(-k_p \times T_p\right)\right]}{Y_p \times k_p}$$

where:

Pd = plant (aboveground produce) concentration due to direct (wet and dry) deposition (mg of chemical/ kg DW)
Ddp = yearly average dry deposition from particle phase (ug/m^2/year)
Dwp = yearly average wet deposition from particle phase (ug/m^2/year)
0.001 = mg/ug conversion factor
R_p = intercept fraction of edible portions of plant (unitless)
kp = plant surface loss coefficient ($year^{-1}$)
Tp = length of plant exposure to deposition per harvest of the edible portion of the ith plant group (unitless)
Yp = crop yield or productivity (kg DW(dry weight)/m^2)
Fw = fraction of chemical wet deposition that adheres to plant (unitless; 0.2 for anions and 0.6 for cations and most organics recommended; used 0.6)

$$\boxed{P_d = 0}$$

4B2.3.3.1 Intercept Fraction

The U.S. EPA OSW recommends the use of the default Rp value since it represents the most current information available with respect to productivity and relative ingestion rates. Experimental studies as summarized by Baes et al. (1984), suggested a correlation between interception fractions and productivity (standing crop biomass (Yp) Chamberlain, 1970):

$$R_p = 1 - e^{-\gamma Yp}$$

where:

R_p = intercept fraction of the edible portion of the plant (unitless)
e = empirical constant Chamberlain (1970) presents a range of 2.3 to 3.3
Y_p = yield or standing crop biomass (productivity) (kg WW/m^2)

Initially, Baes et al. (1984) developed intercept fractions values for three classes of vegetation (vegetables, silage and exposed produce). These intercept fractions were independent of plant specific crop yields and as a result led to surface plant concentration predictions that were unreasonable. Baes et al. (1984) used an empirical constant developed by Chamberlain (1970), which was then used to generate class-specific empirical constants (e). The U.S. EPA (1994c) and U.S. EPA (1995b) proposed a default aboveground R_p value of 0.05. These values were weighted by relative ingestion of each class to derive a weighted average. The relative ingestion rates used by U.S. EPA (1994c) and U.S. EPA (1995b) were not consistent with the Exposure Factors Handbook (U.S. EPA 1997), and therefore the suggested value of 0.05 is no longer used. As a result, produce classes were combined into two groups - exposed fruit and exposed vegetables. The exposed produce constant ( ) of 0.0324 developed by Baes et al. (1984) was used to estimate an R_p value. As the exposed produce category includes leafy vegetables and fruiting vegetables, Ry was calculated for both leafy and fruiting vegetables. For exposed vegetables, Ry was determined by a weighted average of the crop yields of leafy and fruiting vegetables. Relative ingestion rates from the Exposure Factors Handbook (U.S. EPA 1997) were then used to derive a weighted Ry value 0.39 for garden produce and 0.5 for forage (U.S. EPA OSW 2005).

4B2.3.3.2 Plant Surface Loss Coefficient

The U.S. EPA (1990) identified several processes that contributed to the loss of contaminants on vegetative surfaces. The three mechanisms of removal considered included wind removal, water removal and growth dilution. These three mechanisms or processes contribute to the reduction of contaminant that has deposited on vegetative surfaces. The k_p value is a measure of the amount of contaminant loss due to these three mechanisms. Miller and Hoffman (1983) used the following relationship to relate half-life times to k_p values.

$$kp = (\ln 2 / t_{1/2}) \times 365\, days / year$$

where:

$t_{1/2}$ = half-life (days)

Miller and Hoffman (1983) reported half-life values of 2.8 to 34 days for a number of different chemicals on vegetative surfaces, which resulted in *kp* values of 7.44 to 90.36 (year^{-1}). As a result, the U.S. EPA (1993), U.S. EPA (1994a) and the U.S. EPA OSW (2005) recommend a default *kp* value of 18, which corresponds to a 14 day half-life.

4B2.3.3.3 Growing Season or Length of Plant Exposure per Year

Belcher and Travis (1989) estimated that forage crops are exposed on average approximately 60 days during the growing season, before harvest. U.S. EPA (1990), U.S. EPA (1993) and the NC DEHNR (1997) recommend a value of 60 days or 0.164 years. Similar assumptions were made for the growing season of garden produce.

4B2.3.3.4 Yield or Standing Crop Biomass or Productivity

The U.S. EPA OSW (2005) recommends using a value of 0.24 kg DW/m^2 for forage and 2.24 kg DW/m^2 for garden produce. Based on a review of recent literature, these values appeared to be the most appropriate. The following equation is used to estimate the forage or crop yield:

$$Yp = \frac{Yh_i}{Ah_i}$$

where:

Y_p = yield (kg/ DW/m^2)
Yh_i = harvest yield of the ith crop (kg DW)
Ah_i = area planted to the ith crop (m^2)

4B2.3.3.5 Fraction of Chemical that Adheres to Plant Surfaces

The U.S. EPA OSW (2005) recommends using the chemical class-specific values of 0.2 for anions and 0.6 for cationic compounds. This parameter describes the fraction of wet deposition that would adhere to plant surfaces.

4B2.3.3.6 Empirical Correction Factor

Lipophilic compounds (i.e., those compounds with Log K_{ow} greater than 4) are generally not able to pass through the skin to the inner portions of bulky produce as easily as those compounds which tend to be more water soluble (i.e., with Log K_{ow} less than 4). Therefore the U.S. EPA OSW (2005) recommends using an empirical constant of 0.01 for those compounds considered more lipophilic (i.e., Log K_{ow} greater than 4) and a constant of 1 for those with Log K_{ow} less than 4.

4B2.3.4 Air-to-Plant Biotransfer Factor for Aboveground Produce

The air-to-plant biotransfer factor (Bv) can be defined as the ratio of chemical in aboveground plant parts to the concentration of chemical in ground-level air (U.S. EPA OSW, 2005). According to the U.S. EPA (1995a), root vegetables are protected from this mechanism of uptake. For all organic chemicals, the air-to-plant transfer factors were based on work with azalea leaves by Bacci et al. (1990 and 1992).

The following equation was used to calculate aboveground plant tissue concentrations:

$$P_v = \frac{C_{air} \times B_v \times F_v \times VG_{ag}}{\rho_{air}}$$

where:

P_v = COPC concentration in plant (mg/kg wet weight)
C_{air} = COPC concentration in air (mg/m^3)
B_v = mass-based air-to-plant biotransfer factor (ug/g dry-weight plant / ug/g air)
F_v = Fraction of chemical in vapour phase
VG_{ag} = Empirical correction factor for aboveground forage (unitless)

$$P_v = 5E\text{-}05 = \frac{0.166 \times 0.4 \times 100\,\% \times 1.00}{1200}$$

Conversion to wet weight (WW):

$$P_v\ (wet\ weight) = P_v\ (dry\ weight) \times (1 - MC)$$

where:

MC = fraction of plant that is water (0.85; McCrady and Maggard, 1993)

$$P_v = 7E - 06\ mg/kg\ WW = 5\text{E - }05\quad DW \times (1 - 0.85)$$

Studies based on the Welsch-Pausch et al. (1995) experiments, as by Lorber (1995), suggested a factor of 100 be applied to all biotransfer factors for organics estimated using the Bacci et al. (1992) methodology.

The following equation was derived by Bacci et al. (1992) and is based on the evaluation of 14 different compounds to develop a relationship with K_{ow} and Henry's Law.

$$\log B_{vol} = 1.065 \log K_{ow} - \log\left(\frac{H}{RT}\right) - 1.654$$

where:

B_{vol} = volumetric air-to-plant biotransfer factor (fresh-weight basis)
log K_{ow} = log of the octanol-water partition coefficient (unitless)
H = Henry's Law constant of the compound (atm m^3/mol)
R = gas constant (8.207E-05 atm m^3/K mol)
T = room temperature in Kelvin (293 K)

$$\log B_{vol} = 3.6 = 1.065 \times \log(2000) - \log\left(\frac{0.00048}{0.000082 \times 288}\right) - 1.654$$

The mass based air-to-plant biotransfer factor is calculated with the following equation:

$$B_v = \frac{\rho_{air} \times {}^{B_{vol}}\!/\!_{RF}}{\left(1 - \int_{water}\right) \times \rho_{forage}}$$

where:

B_v = mass-based air-to-plant biotransfer factor (ug/g dry-weight plant / ug/g air)
ρ_{air} = density of air 1.19 g/L (Weast, 1981)
RF = reduction factor (100 for organics; U.S. EPA OSW, 2005)
f_{water} = 0.85 (fraction of forage that is water; McCrady and Maggard, 1993)
ρ_{forage} = 770 g/L (McCrady and Maggard, 1993) density of forage

$$B_v = 0.4 = \frac{1.19 \times {}^{3548}\!/\!_{100}}{(1 - 0.85) \times 770}$$

4B2.3.5 Aboveground and Belowground Vegetation Concentrations

Contaminants present in soil may be taken up into edible portions of above and belowground plants. As a result, two methods of predicting contaminated concentration in edible plant concentrations have been recommended by the U.S. EPA OSW (2005). These methods are consistent with other U.S. EPA guidance documents (U.S. EPA, 1994b; U.S. EPA, 1994c; U.S. EPA, 1995b).

Aboveground Plants

$$\mathrm{Pr} = \left(Cs \times Br_{ag} \right) \times \left(1 - MC\right)$$

where:

Pr = contaminant concentration in produce as a result of root uptake (mg/kg)
Cs = tilled soil concentration (mg/kg soil)
Br_{ag} = plant-soil bioconcentration factor for aboveground produce (unitless; calculated below for organics)
MC = 0.85 (fraction of forage that is water; McCrady and Maggard, 1993)

Pr =5E-07 = (7E-06 x0.479) × (1-0.85)

A substantial amount of empirical data available in the literature demonstrates there is significant uptake of organics into plants. Organic chemicals in soils were reported to be taken up by vegetation (i.e., carrots, tomatoes, potatoes and narcissus) through the roots (Iwata and Gunther, 1976; Cocucci et al., 1979; Bacci and Gaggi, 1985; Travis and Arms, 1988; Schroll and Scheunert, 1993). Travis and Arms (1988) reported that uptake of organic chemicals by vegetation is correlated to octanol-water partition coefficients (K_{ow}).

The method of Travis and Arms (1988), as modified by Travis and Blaylock (1992), was used to estimate the bioconcentration of organic chemicals from soil to vegetation via root uptake. This method was based on measured data that demonstrated that the bioconcentration factor for an organic chemical in vegetation is inversely proportional to the square root of the octanol-water partition coefficient (K_{ow}). Root uptake of organics has been correlated with K_{ow} and has been shown to decrease as K_{ow} increases (Briggs et al., 1982; in Travis and Blaylock, 1992). A geometric mean regression analysis of data for 29 different organic chemicals demonstrated a relationship between bioconcentration factors in vegetation and octanol-water partition coefficients (r = 0.73) (Travis and Arms, 1988). The first step of the method of Travis and Arms (1988), as modified by Travis and Blaylock (1992), is to calculate a chemical-specific bioconcentration factor for vegetation. The bioconcentration factor for aboveground vegetation (Br_{ag}) is defined as the ratio of the concentration in the plant (ug of chemical/g of dry plant) to the concentration of the chemical in the soil (ug of chemical/g of dry soil). The Br_{ag} can be calculated for organic chemicals according to the formula:

For organics only:

$$Br_{ag} = 38.73 K_{ow}^{-0.578}$$

Br_{ag} = 0.479 = 38.73(2000)$^{-0.578}$

4B2.3.6 Belowground Produce

Belowground produce would refer to all root-vegetables and therefore concentrations derived using this methodology would only be applied to root-vegetable consumption rates.

$$\mathrm{Pr}_{bg} = \left(Cs \times Br_{rootveg} \times Vg_{root} \right) \times (1 - MC)$$

where:

Pr_{bg}	=	contaminant concentration in belowground produce as a result of root uptake (mg/kg)
Cs	=	soil concentration (mg/kg soil)
$\mathrm{Br}_{rootveg}$	=	plant-soil bioconcentration factor for belowground produce (unitless; calculated below for organics only)
Vg_{root}	=	empirical correction factor for belowground produce (1; unitless)
MC	=	0.85 (fraction of forage that is water; McCrady and Maggard, 1993)

Pr_{bg} = 8E-07 = (7E-06 × 0.8 × 1.0) × (1-0.85)

Vg_{root} is dependant on the lipophilic nature of the chemical of concern. For compounds with a Log K_{ow} greater than 4, an empirical correction factor of 0.01 was assigned. For a compound with a Log K_{ow} less than 4, a value of 1.0 was applied.

Where the plant-soil bioconcentration factor for belowground produce is as follows:

$$Br_{rootveg} = \frac{RCF}{Kd_s}$$

$\mathrm{Br}_{rootveg}$ = 0.8 = 10/11.9

The root concentration factor (RCF) for organic compounds has been obtained from Briggs et al., 1982.

The following equation estimates a RCF value in fresh weight. The following equation must be adjusted to a dry weight basis using a moisture content of 85 percent in root vegetables (Pennington, 1994). This relationship is recommended by other regulatory documents such as U.S. EPA (1994a).

$$Log(RCF - 0.85) = 0.77 LogK_{ow} - 1.52$$

RCF = 10 = $10^{(0.77 \times \log(2000) - 1.52)}$

The soil-water partitioning coefficient (Kd_s) describes the partitioning of a chemical between soil pore-water and soil particles. For organics, Kd_s has been defined by the following equation:

$$Kd_s = K_{oc} \times f_{oc,s}$$

where:

K_{oc}	=	soil organic carbon-water partition coefficient (mL/g)

$f_{oc,s}$ = fraction organic carbon in soil (U.S. EPA OSW, 1998)

$$Kd_s = 12 = 1190 \times 0.01$$

4B2.4 Game Tissue Concentrations

4B2.4.1 Background Game Concentrations

Background game meat concentrations were determined from food studies conducted in the Oil Sands region (Golder, 2002). Media concentrations used to estimate background risks are provided in Appendix 4C for moose, grouse and snowshoe hare, respectively. The measured background concentrations (surface water) and estimated exposures (forage, invertebrates) were used to calculate site-specific bio-transfer factors (BTFs). These values are provided in Appendix 4C. Thus, background game concentrations were estimated using background air concentrations and the methodology described in section 2.4.2.

4B2.4.2 Predicted Game Concentrations

Wildlife game tissue concentrations were calculated based on U.S. EPA OSW (2005) guidance. For the purpose of estimating wildlife tissue residue levels, it was assumed that wildlife were exposed to the COPCs through the consumption of food, drinking water and incidental soil ingestion. Forage concentration estimates were based on a similar methodology to that used for predicting vegetation concentrations as described previously. Predicted wildlife game tissue concentrations are listed in Appendix 4C.

The following equations were used to calculate the total daily dose of a chemical of concern via the ingestion of forage and soil for an animal. Biotransfer factors (BTF) have been included based on the U.S. EPA OSW (2005) to translate the estimated daily dose of a chemical to a tissue concentration. When empirical data are lacking, one of the most widely used approaches is the regression model developed by Travis and Arms (1988), however these regressions are hampered by the limited log Kow range and questions surrounding the validity of the underlying biotransfer data set.

The following equations were used to calculate the total daily dose of a chemical for an animal via the ingestion of soil, food and water, as well as the inhalation of air. Biotransfer factors (BTF) have been included based on the U.S. EPA OSW (2005) to translate the estimated daily dose of a chemical (mg of chemical/day) to a tissue concentration. When empirical data are lacking, one of the most widely used approaches is the regression model developed by Travis and Arms (1988), however these regressions are hampered by the limited log K_{ow} range and questions surrounding the validity of the underlying biotransfer data set. New biotransfer models have been developed (RTI 2005) and incorporated within the assessment as recommended by the U.S. EPA OSW (2005). The following equation was developed to predict the transfer rate of chemical intake into fat tissue. The fat tissue concentration is converted to a tissue concentration based on the fat content of the desired tissue (i.e., muscle or milk).

4B2.4.2.1 Determination of Biotransfer Factors

$$\log(BTF) = -0.099 \times \log(K_{ow})^2 + 1.07 \times \log(K_{ow}) - 3.56$$

where:

BTF = biotransfer factor ([mg/kg-fat] / [mg/day])
K_{ow} = octanol water coefficient

$$\boxed{\text{Log(BTF)} = -1.1 = -0.099 \times \log(2000)^{2} + 1.07 \times (\log(2000)) - 3.56}$$

The BTF was adjusted to account for the fat content of milk or muscle. Game, snowshoe hare and grouse meat fat content was assumed to be 19%, 19% and 14% respectively (U.S. EPA OSW, 2005). The BTF equation is appropriate for organic chemicals lacking empirical biotransfer data and having a log K_{ow} between -0.67 and 8.2.

The BTF was adjusted to account for the amount of fat in the tissue based on the following equation:

$$BTF_a = BTF \times FC \text{ x MF}$$

where:

BTF_a = adjusted BTF for fat content of tissue ([mg/kg-tissue] / [mg/day])
BTF = biotransfer factor ([mg/kg-fat] / [mg/day])
FC = fat content of tissue (%)
MF = metabolizing factor (0.01, Hofelt et al., 2001)

$$\boxed{BTF_a = 1.5E\text{-}04 = 0.08 \times 0.19 \times 0.01}$$

4B2.4.2.2 Determination of Surface Water Concentration

Surface water concentrations for all scenarios except background (where measured concentrations were used) were calculated using the following formula:

$$C_w = C_s \times \frac{BD}{P_w + (k_d \times BD) + (H \times Pa)}$$

where:

C_w = future water concentration (ug/L)
C_s = soil concentration
BD =soil bulk density (1500; AENV, 2006)
P_w = moisture filled porosity for fine soils (dimensionless) from AENV (2006)
k_d = soil to water partition coefficient from AENV (2006)
H = Henry's Law Constant (unitless)
Pa = vapour filled porosity for fine soils (dimensionless) from AENV (2006)

$$\boxed{C_w = 3.0E - 09 = 8.97E - 06 \times \frac{1500}{0.168 + (300 \times 1500) + (0.0198 \times 0.32)}}$$

4B2.4.2.3 Determination of Game Meat Concentrations

Chemical concentrations in game meat were then predicted based on the following equation:

$$C_{animal} = BTF_a \times \sum \left(C_{Pi} \times P_{Pi} \times F_{Pi} \times FIR\right) + \left(C_{soil} \times SIR \times P_{Soil}\right) + \left(C_{water} \times WIR\right)$$

where:

C_{animal}	=	chemical concentration in animal (mg/kg)
BTF_a	=	adjusted BTF for fat content of tissue ([mg/kg-tissue] / [mg/day])
C_{Pi}	=	COPC concentration in ith plant food item (mg/kg)
P_{Pi}	=	proportion of ith plant food item in diet that is contaminated (unitless)
F_{Pi}	=	fraction of diet consisting of ith plant food item (unitless)
FIR	=	food ingestion rate (kg/day)
C_{soil}	=	COPC concentration in soil (mg/kg)
SIR	=	soil ingestion rate (kg/day)
P_{soil}	=	proportion of soil in diet that is contaminated (unitless)
C_{water}	=	COPC concentration in water (calculated below) (mg/L)
WIR	=	water ingestion rate (L/day)

Moose C_{animal} =5.6E-08 = 1.5E-04 × ((5.52E-05× 100% × 100% × 6.58) + (8.97E-06 × 1.32E-01×100%)+ (3.0E-09×20.8))

4B2.5 Calculation of Breast Milk Biotransfer Factor

The potential health effects associated with the ingestion of chemical-impacted breast milk by nursing infants was considered in the current assessment. COPCs with the tendency to bio-accumulate were assessed for the infant's exposure to the mother's milk. The maximum fraction of each COPC expected to bioaccumulate was calculated using the following approach (example given for naphthalene):

$BM_{BTF} = 2.0E\text{-}07 \times K_{ow}$ (McKone, 1992)

where:

BM_{BTF}	=	breast milk biotransfer factor ([ug/kg milk]/[ug/day intake])
K_{ow}	=	octanol-water partition coefficient

BM_{BTF} = 0.0004 = 2.0E-07 × 2000

4B2.5.1 Calculation of Chemical Concentration in Breast Milk

$$CBM = \frac{EXP_{mother} \times BW_{mother} \times BM_{BTF}}{1000}$$

where:

CBM	=	chemical concentration in breast milk (ug/g milk)
EXP_{mother}	=	mother's total daily exposure to chemical via all routes (ug/kg/day)

BW_{mother} = mother's body weight (kg)
BM_{BTF} = breast milk biotransfer factor (ug/kg milk)/(ug/day intake)
1000 = unit conversion factor (g/kg)

$$\text{CBM} = 1.1\text{E-}06 = \frac{0.04 \times 70.9 \times 0.0004}{1000}$$

4B2.6 Background Air Concentrations

Background air concentrations were included for predicting total exposures to the COPCs, including indoor air concentrations. Given the location of the study area, preference was given to background data from the oil sands region and rural areas where possible. In the event that such data was not available, urban Canadian data was applied as necessary.

Acute background air concentrations were not evaluated within this assessment, as the available data represented sampling periods over a number of days. Thus, maximum, median or mean indoor and outdoor air concentrations were evaluated within the chronic assessment only as appropriate.

Table 4B2.6-1 summarizes background concentrations used in the assessment.

Table 4B2.6-1 Background Indoor and Outdoor Air Concentrations

COPC	Averaging	Indoor	Outdoor	Total Background	References
3-methylcholanthrene	annual	0.00E+00	0.00E+00	0.00E+00	
7,12-dimethylbenz(a)anthracene	annual	0.00E+00	0.00E+00	0.00E+00	
acenaphthene	annual	7.00E-04	1.60E-04	8.60E-04	Average, Alberta Health and Wellness (2002)
acenaphthylene	annual	2.90E-04	1.60E-04	4.50E-04	Average, Alberta Health and Wellness (2002)
anthracene	annual	5.98E-04	1.23E-03	1.83E-03	Average, Alberta Health and Wellness (2002)
benzo(a)anthracene	annual	3.08E-05	5.88E-05	8.95E-05	Average, Alberta Health and Wellness (2002)
benzo(a)pyrene	annual	1.80E-05	7.30E-05	9.10E-05	Average, Alberta Health and Wellness (2002)
B(a)P WMM	annual			9.10E-05	Assumed BaP
B(a)P IPM	annual			2.80E-04	TEQ
benzo(b)fluoranthene	annual	7.85E-05	9.45E-05	1.73E-04	Average, Alberta Health and Wellness (2002)
benzo(e)pyrene	annual	4.1E-05	8.86E-05	1.29E-04	Average, Alberta Health and Wellness (2002)
benzo(ghi)perylene	annual	6.0E-05	7.89E-05	1.39E-04	Average, Alberta Health and Wellness (2002)
benzo(k)fluoranthene	annual	7.8E-05	9.45E-05	1.73E-04	Average, Alberta Health and Wellness (2002)
chrysene	annual	7.2E-05	1.04E-04	1.76E-04	Average, Alberta Health and Wellness (2002)
dibenz(ah)anthracene	annual	1.0E-05	3.50E-05	4.50E-05	Average, Alberta Health and Wellness (2002)
fluoranthene	annual	5.4E-04	1.02E-03	1.57E-03	Average, Alberta Health and Wellness (2002)
fluorene	annual	5.82E-04	2.32E-03	2.90E-03	Average, Alberta Health and Wellness (2002)

COPC	Averaging	Indoor	Outdoor	Total Background	References
indeno(1,2,3cd)pyrene	annual	4.5E-05	7.00E-05	1.15E-04	Average, Alberta Health and Wellness (2002)
naphthalene	annual	8.75E-04	2.73E-03	3.61E-03	Average, Alberta Health and Wellness (2002)
perylene	annual	1.00E-05	2.00E-05	3.00E-05	Average, Alberta Health and Wellness (2002)
phenanthrene	annual	3.18E-03	1.57E-02	1.88E-02	Average, Alberta Health and Wellness (2002)
pyrene	annual	7.82E-04	1.92E-03	2.71E-03	Average, Alberta Health and Wellness (2002)

Notes: ND - no data

NA - not applicable

4B2.7 Drinking Water Concentrations

Drinking water was incorporated within the assessment to improve characterization of total exposure to the COPCs. Surface water serves as the primary drinking water source for the oil sands region. Surface water data was obtained from RAMP for the period from 2002-2004 for the following waterbodies: Athabasca, Christina, Clearwater and Muskeg rivers; Jackpine and Muskeg creeks. The maximum detected concentration was selected. In the event that all results for a COPC were below detection limits, one-half of the highest detection limit was used by default.

Table 4B2.7-1 summarizes the surface water concentrations used in the background assessment. As the predicted impacts to surface water quality from the project were determined to be negligible, the predicted change in drinking water quality was assumed to be zero. Thus, the drinking water pathway was only evaluated within the background scenario.

Table 4B2.7-1 Surface Water Concentrations

	Concentration (mg/L)
3-methylcholanthrene	ND
7,12-dimethylbenz(a)anthracene	ND
Anthracene	0.00002
Benz(a)anthracene	0.00005
benzo(a)pyrene	0.00003
benzo(a)pyrene	0.00003
Benzo(b)fluoranthene	0.00001
benzo(e)pyrene	ND
Benzo(ghi)perylene	0.00005
Benzo(k)fluoranthene	0.00001
Chrysene	0.00002
Dibenz(ah)anthracene	0.00005
Fluoranthene	0.00005
Fluorene	0.00005
Indeno(1,2,3cd)pyrene	0.00005
Naphthalene	0.00002
Perylene	0.00001

	Concentration (mg/L)
Phenanthrene	0.00003
Pyrene	0.00003

Source: RAMP 2002, 2003, 2004

4B2.8 Fish Concentrations

4B2.8.1 Background Fish Concentrations

Table B2.8-1 provides a summary of fish concentrations measured by the Regional Aquatics Monitoring Program (RAMP) from the oil sands region between 2002 to 2004 for PAHs that are likely to bioaccumulate in tissue. Samples of lake whitefish, walleye, and northern pike were collected by RAMP (2007) from the Athabasca and Clearwater River system. As few COPCs were detected in fish, samples were assumed to contain half of the detection limit associated with a non-detect value.

Table 4B2.8-1 Summary of Fish Tissue Concentrations

COPC	Concentration (ug/kg ww)
3-methylcholanthrene	0
7,12-dimethylbenz(a)anthracene	0
Anthracene	5.00E-06
Benz(a)anthracene	5.00E-06
Benzo(a)pyrene	5.00E-06
Benzo(a)pyrene	5.00E-06
Benzo(b)fluoranthene	5.00E-06
Benzo(e)pyrene	5.00E-06
Benzo(ghi)perylene	5.00E-06
Benzo(k)fluoranthene	5.00E-06
Chrysene	5.00E-06
Dibenz(ah)anthracene	5.00E-06
Fluoranthene	5.00E-06
Fluorene	5.00E-06
Indeno(1,2,3cd)pyrene	5.00E-06
Naphthalene	0.5
Perylene	5.00E-06
Phenanthrene	5.00E-06
Pyrene	5.00E-06

Note: ND: No data; assumed zero

Source: RAMP 2002, 2003, 2004

4B2.8.2 Predicted Fish Concentrations

As no impacts on water quality or fish health were anticipated in association with the Project, the change in fish concentrations from background were assumed to be zero. Thus, fish consumption was assessed in the background scenario only, and added to the baseline, application and CEA cases through the addition of the background risk estimates with the case-specific risk estimates.

4B2.9 Conversion from Dry Weight to Wet Weight

The current methodology estimates vegetation concentrations on a dry weight basis. Since home-grown produce will be consumed on a fresh weight basis, dry weight concentration estimates were converted to a fresh (or wet) weight basis. A moisture content of 85% was used to represent average moisture content of vegetation. The following equation was used to estimate media concentrations on a fresh (or wet) weight basis:

$$\left(Wet\ Weight\ Conc.\right) = \left(Dry\ Weight\ Conc.\right) \times \left(1 - \frac{moisture\ content}{100}\right)$$

4B3 HUMAN RECEPTOR CHARACTERISTICS

4B3.1 Receptor Selection

Four hypothetical receptor types were included in the risk assessment: First Nations Receptor (FNR), Residential Receptor (RESI), Commercial Receptor (COMM) and Recreational (RECR). Table 4B3.1-1 provides a brief description of the 79 receptor locations from the air quality assessment (Volume 2, Section 2) and the associated receptor type. When no information was available as to the characteristics of a particular receptor location, it was conservatively assumed that these locations represented First Nations receptors.

The communities of Anzac, Behan, Cheecham, Conklin, Fort McMurray, Gregoire Lake Townsite, Janvier, Kinosis, Pingle and Quigley were assumed to be Residential, while all other residences were assumed to represent First Nations. Commercial locations included sites such as gravel pits, air towers etc., while recreational sites were limited to parkland and short-term campsites.

Table 4B3.1-1 Summary of Receptor Locations

Number	Easting	Northing	Description	Receptor Group
R01	414085	6143072		FNR
R02	472735	6125622	Behan	FNR
R03	474635	6127672		FNR
R04	476565	6134672		FNR
R05	479035	6144622		FNR
R06	479335	6146122		FNR
R07	470285	6148722		FNR
R08	478685	6149072		FNR
R09	494735	6126672		FNR
R10	511586	6140072		FNR
R11	513986	6148422	Cabin	FNR
R12	523436	6146622	Fish Plant	COMM
R13	527436	6145322	Cabin	FNR
R14	509435	6164672		FNR
R15	473585	6172522		FNR
R16	473685	6173472		FNR
R17	477385	6172572		FNR
R18	481035	6174572		FNR

Number	Easting	Northing	Description	Receptor Group
R19	482035	6176122		FNR
R20	485535	6178172	Cabin	FNR
R21	497535	6165222		FNR
R22	497335	6163472		FNR
R23	491085	6155122		FNR
R24	459185	6154122		FNR
R25	452635	6195722		FNR
R26	468185	6194922		FNR
R27	482035	6204272		FNR
R28	495235	6179522		FNR
R29	496335	6179272		FNR
R30	435985	6200722	Gravel Pit	COMM
R31	437235	6202672		FNR
R32	411385	6158272	May Hill Fire Lookout	RESI
R33	416985	6175672		UNK
R34	422435	6175572	Waskahigan Provincial Forest Recreational Area	RECR
R35	427635	6166872	House River Provincial Forest Recreational Area	RECR
R36	431935	6165872	Caribou Creek Remote Provincial Forest Recreational Area	RECR
R37	432835	6163122		FNR
R38	506985	6185672		FNR
R39	505385	6190722		FNR
R40	505485	6196472	Pingle	RESI
R41	505285	6205072		FNR
R42	513986	6193972		FNR
R43	515386	6197122		FNR
R44	516086	6196872		FNR
R45	516536	6199972		FNR
R46	516686	6199622		FNR
R47	518436	6201172		FNR
R48	517536	6199172		FNR
R49	517736	6199722		FNR
R50	519386	6197822		FNR
R51	518286	6194572		FNR
R52	505285	6229772		FNR
R53	508635	6221472	Quigley	RESI
R54	449585	6132822		FNR
R55	449135	6143772		FNR
R56	450585	6149622		FNR
R57	458385	6142672		FNR
R58	436785	6128722	Round Hill Airfield Tower	COMM
R59	513986	6237672		FNR
R60	477435	6253222	Provincial Campsite	RECR
R61	487485	6258572	Gregoire Lake Provincial Park	RECR
R62	490335	6254422		RESI
R63	489335	6250322	Gregoire Lake Indian Reserve 1	FNR
R64	490235	6250872	Gregoire Lake Indian Reserve 2	FNR
R65	496335	6256222	Campsite	RECR
R66	534186	6134772		FNR
R67	535736	6148122		FNR
R68	544036	6130922		FNR
R69	553236	6131872		FNR
R70	562236	6133472		FNR
R71	451235	6220122	Algar Tower Airfield 1	COMM
R72	451685	6219522	Algar Tower Airfield 2	COMM
R73	496800	6256009	Anzac	RESI

Number	Easting	Northing	Description	Receptor Group
R74	507900	6237457	Cheecham	RESI
R75	478500	6287739	Fort McMurray	RESI
R76	487935	6258023	Gregoire Lake Townsite	RESI
R77	502700	6242857	Kinosis	RESI
R78	513001	6192009	Janvier	RESI
R79	494650	6163889	Conklin	RESI

Receptor characteristics for a typical Canadian were based on O'Connor Associates Environmental Inc. and G. Mark Richardson (O'Connor and Richardson, 1997), CCME (2000), Health Canada (1994; 2004, 2006) and Wein (1989).

4B3.1.1 First Nations Receptor

Adult moose, grouse and snowshoe hare consumption rates are based on the average consumption rate of 207 grams per day of food consisting of wild meat, meat, poultry and fish, and the frequency or number of occasions when country foods were used (Wein, 1989). Table 4B3.1-2 provides a summary of number of occasions when country foods were consumed based on a survey of 120 Native households. The percentage of total moose, hare and grouse was then multiplied by the average consumption of 207 g/day to derive the respective consumption rates provided in Table 4B3.1-4. Consumption rates for the adolescent, child and toddler were adjusted relative the adult rate based on body weight ratios. Infants were not assumed to consume game meat, consistent with Health Canada (2004).

Table 4B3.1-2 Number of Occasions when Country Foods were Consumed and Calculated Country Food Consumption Rates for the Adult Fort MacKay Receptor

Food	Frequency (Occasions/Year)	Percentage of Total	Adult Consumption Rate (grams/day)
Large mammals (moose)	128	51	106
Small mammals (hare)	27	11	22
Upland birds (grouse)	13	5	11
Fish	62	25	52(1)
Waterfowl	19	8	16(1)
Total	249	100	207

Note: Table 4B3.1-3 provides fish consumption rates used in assessment. Waterfowl consumption rate not required for assessment.

Source: Wein, 1989

The fish consumption rates found in tables above are not considered representative for a First Nations receptor in the oil sands region. Therefore, an assumed fish consumption rate was estimated based on a survey of the consumption use of traditional foods in the community of Fort MacKay (AHW, 1997). The mean frequency of fish consumed within one year were provided for lakes with whitefish, northern pike, trout, grayling, walleye, yellow perch, ling cod, goldeye and sucker. The overall fish consumption frequency was 85 times per year. The assumed daily fish consumption frequency of 23% (85/365 days) is for people aged 19 to 54 years. A daily fish consumption rate was calculated based on the frequency reported for Fort MacKay people and the fish consumption rates for First Nation populations from HC 2004, assuming that the quantities of fish consumed in each serving were equivalent. Table 4B3.1-3 identifies the adjusted consumption rates used for the exposure assessment.

Table 4B3.1-3 Assumed Daily Fish Consumption Rates for the First Nation Receptor

Variable	Units	Adult	Adolescent	Child	Toddler	Infant
Fish	g/day	51	47	40	22	0

The units provided for summer/winter indoors/outdoors refer to the exposed surface area of the receptor. These surface areas were calculated by applying seasonal percentages of skin exposed (provided by U.S. EPA 1997) to the whole body surface area (provided by O'Connor and Richardson, 1997). The U.S. EPA (1997) suggests refining estimates of surface area exposed on the basis of seasonal climates; "…it may be reasonable to assume that 5% of the skin is exposed during the winter, 10 percent during the spring and fall, and 25% during the summer". For the risk assessment, it was assumed that 10% of the skin is exposed during the winter and 25% during the summer. These percentages were multiplied by the whole body surface areas for each age group to derive the seasonal exposed surface area.

A fruit consumption rate for the Wood Buffalo region was obtained from Wein (1989). Berry or fruit consumption rates are reported to be 23 grams of berries per person, per day. This consumption rate was assumed to represent a human adult and the body weight ratios were used to estimate consumption rates for the remaining life stages (i.e., infant to adolescent). This consumption rate was used in the assessment for the First Nation Receptor.

Table 4B3.1-4 summarizes the assumptions and consumption rates for all foods and environmental media applied to the First Nations Receptor.

Table 4B3.1-4 Assumptions and Consumption Rates Applied to the First Nations Receptor

Parameter	Unit	Adult	Adolescent	Child	Toddler	Infant	References
Body weight	kg	70.7	59.7	32.9	16.5	8.2	HC 2004
Inhalation rate	m^3/d	15.8	15.8	14.5	9.3	2.1	HC 2004
Soil ingestion	g/day	0.02	0.02	0.02	0.08	0.02	HC 2004
Water ingestion	L/day	1.5	1	0.8	0.6	0.3	HC 2004
Root Vegetables	g/day	188	227	161	105	83	HC 2004
Leafy Vegetables	g/day	137	120	98	67	72	HC 2004
Fruit	g/day	23	19	11	5	3	Wein 1989
Fish	g/day	51	47	40	22	0	HC 2004, adjusted with consumption frequency from FMES 1997
Breast milk	g/day	0	0	0	0	664	O'Connor and Richardson 1997
Moose	g/day	106	90	42	10	1	Wein 1989, adjusted for relative body weight
Grouse	g/day	11	9	5	3	0	Wein 1989, adjusted for relative body weight
Snowshoe hare	g/day	22	19	10	5	0	Wein 1989, adjusted for relative body weight

Note: Skin surface area and soil loading rates were obtained from Health Canada (2004).

Within the multi-pathway model, it was conservatively assumed that these individuals obtained 100% of their game, fish, fruit and vegetables from local sources.

4B3.1.2 Residential Receptor

The game, fish, fruit and vegetable intake rates assumed for the First Nations Receptor were not suitable to individuals who live in communities with access to store bought foods. However, it was assumed that a portion of garden fruit and vegetables, fish and meat were obtained locally.

Fruit consumption rates for residential receptors represent the sum of the consumption rate for apples, applesauce, cherries, strawberries, blueberries, jams and honey from Health Canada (1994). Leafy and root vegetable rates were obtained from Health Canada (2004). All fruit and vegetable consumption rates were adjusted using a factor from CCME (2006) such that 10% of daily fruit and vegetable intake is attributable to local gardens. The fish consumption rate from Health Canada (2004) for non-First Nations receptors was also applied, however, was adjusted for the fish consumption frequency of 23% reported in AHW (1997).

The mean game consumption rate for ‘medium’ game consumers from AHW (1997) was assumed as the moose intake rate for adult residents, and adjusted for relative body weights for the other age groups. The grouse consumption rate represents 50% of the chicken consumption rate from Health Canada (1994). Snowshoe hare was assumed to be consumed at the same frequency as the First Nations Receptor due to a lack of information.

Table4B3.1-5 summarizes the characteristics of the residential receptor that were applied in the multi-pathway exposure model.

Table 4B3.1-5 Residential Receptor Applied in the Multi-pathway Exposure Model

Parameter	Unit	Adult	Adolescent	Child	Toddler	Infant	References
Body weight	kg	70.7	59.7	32.9	16.5	8.2	HC 2004
Inhalation rate	m^3/d	15.8	15.8	14.5	9.3	2.1	HC 2004
Soil ingestion	g/day	0.02	0.02	0.02	0.08	0.02	HC 2004
Water ingestion	L/day	1.5	1	0.8	0.6	0.3	HC 2004
Root Vegetables	g/day	19	23	16	11	8	HC 2004 x CCME 1996 factor
Leafy Vegetables	g/day	14	12	10	7	7	HC 2004 x CCME 1996 factor
Fruits	g/day	5	6	7	4	1	HC 1994 x CCME 1996 factor
Fish	g/day	26	24	21	13	0	HC 2004 fish consumption rate, adjusted for consumption frequency of 23% from AHW 1997
Breast milk	g/day	0	0	0	0	664	O’Connor and Richardson 1997
Moose	g/day	58	49	27	14		AHW 1997. Mean for medium game muscle consumption.
Grouse	g/day	11	10	8	7	0	Assumed 50% of chicken consumption from HC 1994
Snowshoe hare	g/day	22	19	10	5	0	Wein 1989, adjusted for relative body weight

Note: Skin surface area and soil loading rates were obtained from Health Canada (2004).

4B3.1.3 Commercial Receptor

Commercial receptors were assumed to represent workers at various non-residential/non-recreational sites within the study area, such as airfields, air towers, gravel pits, fish plants, etc. Inhalation pathways, and the dermal contact and dust ingestion exposure pathways were assumed to be relevant to this receptor, while the consumption of local foods and water were not.

The assessment of the First Nations and Residential receptors cover any exposure that workers who live in the study area for an extended period of time may receive. The assessment completed for the commercial receptor evaluates individuals who may not live in the area for an extended period of time, but may be exposed while working in the area over regular periods.

The body weights, soil ingestion rate, and inhalation rates for the residential receptors (presented above) were applied for the commercial receptors. Skin surface area and soil loading rates were obtained from Health Canada (2004).

4B3.1.4 Recreational Receptor

The Recreational receptor was assessed only in relation to the inhalation pathway, as the behaviour characteristics of this receptor type is such that the duration of time that a person would be in the area would be limited, and their exposure to COPCs via the dermal and oral pathways would be negligible. Thus, receptor characteristics for this receptor related to the oral and dermal contact pathways are not provided as for the other receptor types.

4B4 EQUATIONS AND ALGORITHMS USED TO ESTIMATE HUMAN EXPOSURE RATES

The following section identifies the algorithms used to estimate human exposure. Similar methods were used to evaluate all receptors, receptor locations, and COPCs. The example calculations are based on estimated naphthalene exposure.

4B4.1 Total Exposure from Consumption of Traditional Foods

4B4.1.1 Consumption of Belowground Produce

$$EVR = \frac{CVR \times AVC \times WP \times RF_{oral} \times FHP}{BW}$$

where:

EVR = daily exposure from belowground vegetables (ug/kg/day)
CVR = total plant concentration as a result of root uptake (ug/g fresh weight)
AVC = amount of root vegetables consumed per day (g/day)
WP = washing and food preparation factor (15% reduction, U.S. EPA OSW 1998; 100 - 15 = 85% or 0.85).
RF_{oral} = relative bioavailability of compound (%)
FHP = fraction of vegetation that is from home garden (%)
BW = receptor body weight (kg)

EVR =1.4E-06 $= \frac{(8E-07)\times 188\times 0.85\times 80\%\times 100\%}{70.7}$

4B4.1.2 Consumption of Aboveground Leafy Vegetables

$$EVL = \frac{CVL \times AVL \times WP \times RF_{oral} \times FHP}{BW}$$

where:

EVL = daily exposure from aboveground leafy vegetables (ug/kg/day)
CVL = total plant concentration (ug/g fresh weight)
AVL = amount of leafy vegetables consumed per day (g/day)
WP = washing and food preparation factor (15% reduction, U.S. EPA OSW 1998; 100 – 15 = 85% or 0.85)
RF_{oral} = relative oral bioavailability of compound (%)
FHP = fraction of vegetation that is from home garden (%)
BW = receptor body weight (kg)

EVL = 9.9E-06 = $\frac{(7.5E-06)\times 137\times 0.85\times 80\%\times 100\%}{70.7}$

4B4.1.3 Consumption of Fruit/Berries

$$EVF = \frac{CVF \times AVF \times WP \times RF_{oral} \times FHP}{BW}$$

where:

EVF = daily exposure from fruits (ug/kg/day)
CVF = total fruit concentration (ug/g fresh weight)
AVF = amount of fruit consumed per day (g/day)
WP = washing and food perpetration factor (0% reduction for fruits; U.S. EPA OSW 1998; 100 - 0 = 100% or 1.0).
RF_{oral} = relative oral bioavailability of compound (%)
FHP = fraction of fruit that is from impacted site (%)
BW = receptor body weight (kg)

EVF =2.2E-06 $= \frac{8.4E-06\times 23\times 80\%\times 100\%}{70.7}$

4B4.1.4 Total Home-grown Produce Exposure

$$EVT = EVL + EVF + EVR$$

where:

EVT = total exposure from fruits and vegetables (ug/kg/day)
EVL = daily exposure from aboveground leafy vegetables (ug/kg/day)
EVF = daily exposure from fruits (ug/kg/day)
EVR = daily exposure from belowground vegetables (ug/kg/day)

$$EVT = 1.3\text{E-}05 = 1.4\text{E-}06 + 9.9\text{E-}06 + 2.2\text{E-}06$$

4B4.1.5 Calculation of Human Exposure via Consumption of Game or Fish Tissue

The chemical exposure from consumption of game is shown below (moose is used as an example).

$$Exp_{tissue} = \frac{C_{tissue} \times R_{tissue} \times BIO_{oral}}{BW}$$

where:

Exp_{tissue} = receptor's daily exposure to chemical (ug/kg/day)
C_{tissue} = chemical concentration in tissue (ug/g fresh weight)
R_{tissue} = amount game tissue consumed (g/day)
BIO_{oral} = relative oral bioavailability of the compound (%)
BW = receptors body weight (kg)

$$Exp_{tissue} = 7\text{E-}08 = \frac{5.6\text{E - }08 \times 106 \times 80\%}{70.7}$$

4B4.2 Estimation of Exposure from Air

4B4.2.1 Direct Air Inhalation

Direct air inhalation exposure on outdoor days:

$$AirInh_{outdoor} = \frac{AIAct \times RF_{inh} \times cair \times \left(rSAS + rSAW\right)}{BW \times DPY}$$

where:

$Air_{Inhoutdoor}$ = inhalation exposure from chemicals in the air during outdoor days (ug/kg/day)
AIAct = amount of air inhaled on outdoor days (m^3/day)
RF_{Inh} = relative inhalation bioavailability of the compound (%)
c_{air} = site air concentration (ug/m^3)
rSAS = outdoor summer days spent (days/year)

rSAW = outdoor winter days spent (days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$\boxed{AirInh_{outdoor} = 1.8\text{E-}02 = \frac{15.8 \times 100\% \times 1.66 \times 10^{-1} \times (106.46 + 76.04)}{70.7 \times 365}}$$

4B4.2.2 Inhalation Exposure Calculations on Indoor days

$$AirInh_{indoor} = \frac{AIPass \times RF_{inh} \times cair \times (rSPS + rSPW) \times Inf}{BW \times DPY}$$

where:

$AirInh_{indoor}$ = inhalation exposure from chemicals in the air during indoor day (ug/kg/day)
AIPass = amount of air inhaled on indoor days (m^3/day)
RF_{inh} = relative inhalation bioavailability of the compound (1; unitless)
c_{air} = site air concentration (ug/m^3)
rSPS = indoor summer days spent (days)
rSPW = indoor winter days spent (days)
Inf = fraction of indoor air that is from outdoor air (0.75; Hawley, 1985)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$\boxed{AirInh_{indoor} = 1.4\text{E-}02 = \frac{15.8 \times 100\% \times 1.66 \times 10^{-1} \times (106.46 + 76.04) \times 0.75}{70.7 \times 365}}$$

4B4.2.3 Exposure via Direct Air Inhalation

$$Air_{Total} = AirInh_{indoor} + AirInh_{outdoor}$$

where:

Air_{Total} = total inhalation exposure from chemical as vapour in air (ug/kg/day)
$AirInh_{outdoor}$ = inhalation exposure from chemicals in the air during outdoor days (ug/kg/day)
$AirInh_{indoor}$ = inhalation exposure from chemicals in the air during indoor day (ug/kg/day)

$$\boxed{Air_{total} = 3.2\text{E-}02 = 1.8\text{E-}02 + 1.4\text{E-}02}$$

4B4.3 Calculation of Exposure from Soil/Dust

4B4.3.1 Assumptions Defining Dust Levels Generated by Soils

Background outside dust levels:	42 ug/m³ (MOEE, 1994)
Percent of dust produced from soil:	50% (Hawley, 1985)
Percent of outside dust level indoors:	75% (Roberts et al., 1974)

Sample calculation concerning the level of dust generated from soil alone (i.e., background levels), suspended in air:

- Outside: 42 ug/m³ x 0.50 / 1,000,000 ug/g = 2.1E-05 g/m³

The exposure contributions from chemically impacted soil were considered for three routes of exposure: i) inhalation of re-suspended dusts, ii) incidental ingestion of soil, and iii) dermal contact with skin.

4B4.3.2 Inhalation Exposure from Dust on Outdoor Summer Days

Contribution from outside airborne dust:

$$EXP_{SIAO} = \frac{AI \times SL \times RF_{inh} \times SODL \times Fd \times SOD}{BW \times DPY}$$

where:

EXP_{SIAO} = inhalation exposure to chemical from summer outside airborne dust (ug/kg/day)
AI = amount of air inhaled (m^3/day)
SL = concentration of chemical in untilled surficial soil (ug/g)
RF_{inh} = relative inhalation bioavailability (1; unitless)
SODL = background dust level in outside air (g/m^3)
Fd = Fraction of outdoor dust attributable to outdoor soil (50%)
SOD = number of summer days spent outside per year (days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$\boxed{EXP_{SIAO} = 1\text{ E-10} = \frac{15.8 \times (7E-05) \times 100\% \times (4.2 \times 10^{-5}) \times 0.5 \times 106.46}{70.7 \times 365}}$$

Contribution from Indoor airborne dust on summer days:

$$EXP_{SIAI} = \frac{AI \times SL \times RF_{inh} \times SIDL \times SID}{BW \times DPY}$$

where:

EXP_{SIAI} = summer inhalation exposure to chemical from summer indoor airborne dust (ug/kg/day)
AI = amount of air inhaled (m^3/day)
SL = concentration of chemical in soil (ug/g)
RF_{inh} = relative inhalation bioavailability (1; unitless)
SIDL = background dust level in indoor air (g/m^3)
Fd = fraction of outdoor dusts attributable to outdoor soil
SID = number of summer days spent indoors (days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$\boxed{\mathrm{EXP_{SIAI}} = \mathrm{1E\text{-}10} = \frac{15.8\times(7E-05)\times100\%\times(4.2E\text{ - }05)\times0.5\times106.46}{70.7\times365}}$$

4B4.3.3 Inhalation Exposure from Dust on Outdoor Winter Days

It was assumed that 10% of the summer outside dust level was available during the winter months.

Contribution from outside airborne dust:

$$EXP_{WIAO} = \frac{AI\times SL\times RF_{inh}\times WODL\times PWS\times WOD}{BW\times DPY}$$

where:

EXP_{WIAO} = winter inhalation exposure from outside airborne dust (ug/kg/day)
AI = amount of air inhaled (m^3/day)
SL = concentration of chemical in soil (ug/g)
RF_{inh} = relative inhalation bioavailability (1; unitless)
WODL = background dust level in outside air (g/m^3)
PWS = percentage of winter soil available (10%)
Fd = fraction of outdoor dusts attributable to outdoor soil
WOD = number of winter days spent outside per year (days/years)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$\boxed{\mathrm{EXP_{WIAO}} = \mathrm{7E\text{-}12} = \frac{15.8\times(7E-05)\times100\%\times(4.2\times10^{-5})\times10\%\times50\%\times76.04}{70.7\times365}}$$

Contribution from indoor airborne dust on winter days:

$$EXP_{WIAI} = \frac{AI\times SL\times RF_{inh}\times WIDL\times PWS\times F_d\times WID}{BW\times DPY}$$

where:

EXP_{WIAI} = winter inhalation exposure to chemical from indoor airborne dust (ug/kg/day)
AI = amount of air inhaled (m^3/day)
SL = concentration of chemical in soil (ug/g)
RF_{inh} = relative inhalation bioavailability (1; unitless)
WIDL = background dust level in indoor air (g/m^3)
PWS = percentage of winter soil available (10%)
F_d = fraction of outdoor dust attributable to outdoor soils (50%)
WID = number of winter days spent indoors (days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$EXP_{WIAI} = 7E\text{-}12 = \frac{15.8\times(7E-05)\times100\%\times(4.2\times10^{-5})\times10\%\times50\%\times76.04}{70.7\times365}$$

Total exposure (inhalation of vapour and dusts):

$$EXP_{INH} = EXP_{SIAO} + EXP_{SIAI} + EXP_{WIAO} + EXP_{WAIA} + Air_{Total}$$

where:

EXP_{INH} = total inhalation exposure (ug/kg/day)
EXP_{SIAO} = summer inhalation exposure to chemical from outside airborne dust (ug/kg/day)
EXP_{SIAI} = summer inhalation exposure to chemical from indoor airborne dust (ug/kg/day)
EXP_{WIAO} = winter inhalation exposure to chemical from outside airborne dust (ug/kg/day)
EXP_{WAIA} = winter inhalation exposure to chemical from indoor airborne dust (ug/kg/day)
Air_{Total} = total inhalation exposure from chemical as vapour in air (ug/kg/day)

$$EXP_{INH} = 3.2E\text{-}02 = 1E\text{-}10 + 1E\text{-}10 + 7E\text{-}12 + 7E\text{-}12 + 3.2E\text{-}02$$

4B4.3.4 Ingestion of Soil/Dusts

The following provides the equations used to calculate exposures via ingestion of soil/dust: incidental outdoor soil ingestion during summer months.

4B4.3.4.1 Incidental Outdoor Dust Ingestion during Summer Months:

$$EXP_{SGAO} = \frac{AO\times SL\times RF_{oral}\times SOD}{BW\times DPY}$$

where:

EXP_{SGAO} = exposure from incidental ingestion of outside soil during summer (ug/kg/day)

AO = amount of dust ingested (g/day)
F = fraction of outdoor soil/dust ingestion rate from outdoor soil (45%)
SL = concentration of chemical in soil (ug/g)
RF_{oral} = relative oral bioavailability (80%; unitless)
SOD = total number of days spent on the site during the summer (212.92 days/year)
BW = receptor body weight (kg)
DPY = averaging time (365 days)

$$\boxed{EXP_{SGAO} = 4E\text{-}09 = \frac{0.02 \times 45\% \times (7E-05) \times 80\% \times (212.92)}{70.7 \times 365}}$$

4B4.3.4.2 Incidental Indoor Dust Ingestion during Summer Months

Contribution from indoor dust:

$$EXP_{SGAI} = \frac{AO \times F \times SL \times FR_{out} \times RF_{oral} \times SOD}{BW \times DPY}$$

where:

EXP_{SGAI} = exposure from incidental ingestion of indoor dust during summer (ug/kg/day)
AO = amount of soil/dust ingested (g/day)
F = fraction of Soil/Dust Ingestion Rate for Indoor Dust (55% for indoors)
SL = concentration of chemical in soil (ug/g)
FR_{out} = fraction of dust originating from outdoor soil sources (Assumed 100%)
RF_{oral} = relative oral bioavailability (80%; unitless)
SOD = total number of days spent on the site during the summer (212.92 days/year)
BW = receptor body weight (kg)
DPY = averaging time (365 days)

$$\boxed{EXP_{SGAI} = 5E\text{-}09 = \frac{0.02 \times 55\% \times (7E-05) \times 100\% \times 80\% \times (212.92)}{70.7 \times 365}}$$

4B4.3.4.3 Incidental Outdoor Soil Ingestion during Winter Months

Contribution from outside soil:

$$EXP_{WGAO} = \frac{AO \times F \times SL \times WDF \times RF_{oral} \times WOD}{BW \times DPY}$$

Where:

EXP_{WGAO} = exposure from incidental ingestion soil in winter (ug/kg/day)
AO = amount of dust ingested (g/day)

F = fraction of outdoor Soil/Dust Ingestion Rate from outdoor Soil (45%)
SL = concentration of chemical in soil (ug/g)
WDF = winter soil/dust covering factor (0.10)
RF_{oral} = relative oral bioavailability (1; unitless)
WOD = total number of days spent on the site during the winter (152.08 days/year)
BW = receptor body weight (kg)
DPY = averaging time (365 days)

$$\boxed{EXP_{WGAO} = 3E\text{-}10 = \frac{0.02 \times 45\% \times (7E-05) \times 0.10 \times 80\% \times (152.08)}{70.7 \times 365}}$$

4B4.3.4.4 Incidental Indoor Dust Ingestion during Winter Months

Contribution from indoor dust:

$$EXP_{WGAI} = \frac{AO \times SL \times WDF \times RF_{oral} \times Fd \times WOD}{BW \times DPY}$$

where:

EXP_{WGAI} = exposure from incidental ingestion of indoor dust during winter (ug/kg/day)
AO = amount of soil/dust ingested (g/day)
F_d = fraction of soil/dust ingestion rate from indoor dust (55%)
SL = concentration of chemical in dust (ug/g)
WDF = winter dust covering factor (10%)
RF_{oral} = relative oral bioavailability (1; unitless)
WOD = total number of days spent on the site (indoors and outdoors) during the winter months (152.08 days/year)
BW = receptor body weight (kg)
DPY = averaging time (365 days)

$$\boxed{EXP_{WGAI} = 4E\text{-}10 = \frac{0.02 \times 55\% \times (7E-05) \times 10\% \times 80\% \times (152.08)}{70.7 \times 365}}$$

Total exposure via incidental ingestion:

$$EXP_{ING} = EXP_{SGAO} + EXP_{WGAO} + EXP_{SGAI} + EXP_{WGAI}$$

where:

EXP_{ING} = total oral exposure from incidental ingestion of indoor soil/dust ug/kg/day)
EXP_{SGAO} = oral exposure from incidental ingestion of summer outside dust/soil (ug/kg/day)
EXP_{WGAO} = oral exposure from incidental ingestion of outside dust/soil in winter (ug/kg/day)

EXP_{SGAI} = oral exposure from incidental ingestion of inside dust during the summer (ug/kg/day)
EXP_{WGAI} = oral exposure from incidental ingestion of inside dust during winter (ug/kg/day)

$$EXP_{ING} = 9E\text{-}09 = 4E\text{-}09 = 5E\text{-}09 + 3E\text{-}10 + 4E\text{-}10$$

4B4.3.4.5 Dermal Contact with Soil/Dust

Dermal Exposure from Soil/Dust on Outdoor Summer Days

Contribution from outside soil/dust:

$$EXP_{SDAO} = \frac{\left[\left(AS_s \times DAF_B\right) + \left(AH \times DAF_H\right)\right] \times SL \times AF_{Dermal} \times SOD}{BW \times DPY}$$

where:

EXP_{SDAO} = dermal exposure to chemical from contact with outside soil/dust in summer (ug/kg/day)
AS_s = area of exposed skin when outside (m^2)
DAF_B = soil/dust adherence factor (g/m^2)
AH = area of exposed hands (m^2)
DAF_H = soil adherence factor hands only (g/m^2/event)
SL = concentration of chemical in soil (ug/g)
AF_{Dermal} = relative dermal bioavailability (unitless)
SOD = number of summer days spent outdoors (106.46 days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$EXP_{SDAO} = 3E\text{-}08 = \frac{\left[\left((0.44 - 0.083) \times 0.1\right) + \left(0.083 \times 1\right)\right] \times (7E - 05) \times 100\% \times (106.46)}{70.7 \times 365}$$

Contributions from indoor soil/dust:

$$EXP_{SDPI} = \frac{\left[\left(AS_s \times DAF_B\right) + \left(AH \times DAF_H\right)\right] \times SL \times AF_{Dermal} \times SID}{BW \times DPY}$$

where:

EXP_{SDPI} = dermal exposure to chemical from contact with indoor soil/dust in summer (ug/kg/day)
AS_s = area of exposed skin when indoors (m^2)
DAF_B = soil/dust adherence factor (g/m^2)
AH = area of exposed hands (m^2)
DAF_H = soil adherence factor hands only (g/m^2/event)
SL = concentration of chemical in soil (ug/g)
AF_{Dermal} = relative dermal bioavailability (unitless)

SID = number of days spent indoors (106.46 days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)
0.70 = fraction of dust originating from outdoor soil sources (U.S. EPA, 1994a)

$$EXP_{SDPI} = 3E\text{-}08 = \frac{[((0.176-0.083)\times 0.1)+(0.083\times 1)]\times(7E-05)\times 100\%\times(106.46)}{70.7\times 365}$$

Dermal Exposure from Soil/Dust on Outdoor Winter Days

Contribution from outside soil/dust:

$$EXP_{WDAO} = \frac{[(AS_w \times DAF_B)+(AH\times DAF_H)]\times SL\times PWS\times AF_{Dermal}\times WOD}{BW\times DPY}$$

where:

EXP_{WDAO} = dermal exposure to chemical from contact with outside soil/dust in winter (ug/kg/day)
AS_w = area of exposed skin when indoors (m^2)
DAF_B = soil/dust adherence factor (g/m^2)
AH = area of exposed hands (m^2)
DAF_H = soil adherence factor hands only (g/m^2/event)
SL = concentration of chemical in soil (ug/g)
PWS = percentage of winter soil available (10%)
AF_{Dermal} = relative dermal bioavailability (unitless)
WOD = number of winter days spent outdoors (days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$EXP_{WDAO} = 2E\text{-}09 = \frac{[((0.176-0.083)\times 0.1)+(0.083\times 1)]\times(7E-05)\times 10\%\times 100\%\times 76.04}{70.7\times 365}$$

Contribution from indoor soil/dust:

$$EXP_{WDPI} = \frac{[(AS_w \times DAF_B)+(AH\times DAF_H)]\times SL\times PWS\times F_d\times AF_{Dermal}\times WID}{BW\times DPY}$$

where:

EXP_{WDPI} = dermal exposure to chemical from contact with indoor soil/dust in winter (ug/kg/day)
AS_w = area of exposed skin when indoors (m^2)
DAF_B = soil/dust adherence factor (g/m^2)
AH = area of exposed hands (m^2)
DAF_H = soil adherence factor hands only (g/m^2 event)
SL = concentration of chemical in soil (ug/g)

PWS = percentage of winter soil available (10%)
F_d = fraction of dust originating from outdoor soil sources (U.S. EPA, 1994a)
AF_{Dermal} = fraction of chemical absorbed by receptor by dermal contact with soil/dust (unitless)
WID = number of days spent indoors on site (days/year)
BW = receptor body weight (kg)
DPY = days per year (365 days/year)

$$EXP_{WDPI} = 2E\text{-}9 = \frac{\left[\left((0.176-0.083)\times 0.1\right)+\left(0.083\times 1\right)\right]\times(7E-05)\times 0.10\times 100\%\times 76.04}{70.7\times 365}$$

4B4.3.4.6 Total Exposure (Dermal)

$$EXP_{DERM} = EXP_{SDAO} + EXP_{SDPI} + EXP_{WDAO} + EXP_{WDPI}$$

where:

EXP_{DERM} = total dermal exposure to chemical from contact with outside/dust (ug/kg/day)
EXP_{SDAO} = dermal exposure to chemical from contact with summer outside soil/dust (ug/kg/day)
EXP_{SDPI} = dermal exposure to chemical from contact with summer indoor soil/dust (ug/kg/day)
EXP_{WDAO} = dermal exposure to chemical from contact with winter outside soil/dust (ug/kg/day)
EXP_{WDPI} = dermal exposure to chemical from contact with winter indoor soil/dust (ug/kg/day)

$$EXP_{DERM} = 7E\text{-}08 = 3E\text{-}08 + 3E\text{-}08 + 2E\text{-}09 + 2E\text{-}09$$

4B5 RISK CHARACTERIZATION

4B5.1 Human Risk Characterization

Total exposure was calculated by summing the individual exposures from each media (air, soil, game and vegetation) for all relevant exposure pathways on a chemical and receptor basis. Risk estimates or threshold and non-threshold COPCs were estimated using the equations provided below and the calculated exposure estimates.

Both non-cancer and cancer risks were estimated and presented for appropriate oral, dermal and inhalation exposures.

4B5.2 Calculating Risks for Non-Carcinogens

Oral risks were estimated based on the following equation.

$$RQ = \frac{E_{ORAL} \times RAF}{EL_{ORAL}}$$

where:

RQ = risk quotient (unitless)
E_{ORAL} = total daily oral exposure from all pathways (ug/kg/day)
RAF = relative absorption factor (80%)
EL_{ORAL} = chemical-specific oral exposure limit (ug/kg/day)

$$RQ_{oral} = 8.5E-07 = \frac{1.7E-05 \times 80\%}{20}$$

Dermal risks were estimated based on the following equation.

$$RQ = \frac{E_{DERMAL} \times RAF}{EL_{ORAL}}$$

where:

RQ = risk quotient (unitless)
E_{DERMAL} = total daily dermal exposure from all pathways (ug/kg/day)
RAF = relative absorption factor (0.13 / 0.8 = 0.1625 or 16.255%)
EL_{ORAL} = chemical-specific oral exposure limit (ug/kg/day)

$$RQ_{dermal} = 5.8E-10 = \frac{7.2E-08 \times 16.25\%}{20}$$

Inhalation risks were calculated based on the following equation.

$$RQ = \frac{EI_{Inhalation} \times RAF}{EL_{Inhalation}}$$

where:

RQ = risk quotient (unitless)
$EI_{Inhalation}$ = total daily inhalation exposure from all pathways (ug/kg/day)
RAF = relative absorption factor (1.0 / 1.0 = 1.0 or 100%)
$EL_{Inhalation}$ = chemical-specific inhalation exposure limit (ug/kg/day)

$$RQ_{inh} = 5.5E-02 = \frac{3.7E-02 \times 100\%}{0.67}$$

Total risk quotient values for all assessed pathways were calculated based on the following equation:

$$RQ_{tot} = RQ_{oral} + RQ_{der} + RQ_{inh}$$

$$\boxed{RQ_{tot} = 5.5E-02 = 8.5E\text{-}07 + 5.8E\text{-}10 + 5.5E-02}$$

4B5.2.1 Calculating Risks for Carcinogens

As discussed in the main report, differentiation between lifetime cancer risks (LCR) and incremental lifetime cancer risks (ILCR) has been made in the risk assessment. LCR values describe the estimated number of cancers per 100,000 people to which exposure to the COPC may contribute. There is no acceptable ‘benchmark’ for LCR, and LCR is evaluated in cases where background exposures are included (e.g., background, baseline, application and CEA cases).

In contrast, ILCR values were calculated for the Project alone (determined by subtracting the baseline LCR from the application LCR), and were compared to the acceptable level of risk of 1 new case per 100,000 people. Thus, the key differences between LCR and ILCR are: whether or not background exposures are included, evaluation of the project alone, and one represents an incidence rate while the other represents the number of cancer cases per 100,000 attributable to the Project.

Carcinogenic risks from oral and dermal exposures (although not for naphthalene) were calculated based on the following equation:

$$LCR = EXP_{Oral+Dermal} \times AMT \times q_1^*$$

where:

LCR = number of estimated cancer cases per 100,000 population associated with exposure to the COPC
$EXP_{Oral+Dermal}$ = total daily exposure via oral and dermal pathways (ug/kg/day)
q_1* = chemical-specific cancer slope factor for oral (ug/kg bw/day)$^{-1}$
AMT = receptor specific amortization factor (years exposed / life expectancy (75 years)

Similarly,

$$ILCR = EXP_{Oral+Dermal} \times AMT \times q_1^*$$

Carcinogenic risks from inhalation exposures were calculated based on the following equation:

$$LCR = EXP_{inhal} \times AMT \times q_1^*$$

where:

LCR = number of estimated cancer cases per 100,000 population associated with exposure to the COPC
EXP_{inhal} = total daily exposure via inhalation (ug/kg/day)

AMT = receptor specific amortization factor (years exposed / life expectancy (75 years)
q_1* = chemical-specific cancer slope factor for inhalation (ug/kg bw/day)$^{-1}$

Similarly,

$$ILCR = EXP_{inhal} \times AMT \times q_1^{*}$$

ILCR = incremental lifetime cancer risk
EXP_{inhal} = total daily exposure via inhalation (ug/kg/day)
AMT = receptor specific amortization factor (years exposed / life expectancy (75 years)
q_1* = chemical-specific cancer slope factor for inhalation (ug/kg bw/day)$^{-1}$

4B6 MODIFICATIONS OF EXPOSURE ESTIMATES BASED ON RELATIVE BIOAVAILABILITY

One of the most important factors in determining exposure of target tissues to chemicals is bioavailability, or the proportion of a chemical dose entering the blood stream (i.e., absorbed dose) following administration via a particular route (i.e., oral, inhalation or dermal). Systemic absorption of chemicals can differ according to whether the dose was received via the dermal, oral or the inhalation route. Also, the systemic absorption will differ depending on whether the exposure occurs in water, in soil, in food, etc.

It is not considered appropriate to convert exposure estimates to absorbed doses if toxicity values (from recognized agencies) are based on administered doses. However, if an exposure estimate is adjusted for bioavailability and is expressed as an absorbed dose, then it must be compared to an exposure limit that is based on an absorbed dose, not administered dose. Since most exposure limits are based on administered doses, it may not always be appropriate to consider absolute bioavailability (fraction or percentage of an external dose which reaches the systemic circulation) during the assessment of exposure. Therefore relative bioavailability may be determined by comparing the extent of absorption among several routes of exposure, forms of the same chemical, or exposure medium (food, soil, or water).

As a specific example, it is often necessary to consider route-to-route extrapolation when an exposure limit is not available for the exposure route of concern and no other data (such as pharmacokinetics) are available. It is common to assess the risks posed by dermal absorption of a chemical based on the exposure limit established for oral exposure. The systemic dose via dermal absorption is scaled to the ‘equivalent’ oral dose by correcting for the bioavailability of dermally-applied chemical relative to an orally-administered dose.

Toxicity information used to derive exposure limits is usually based on the administered dose, the absorbed dose or the internal dose. Incorporating bioavailability is dependant on which form the chemical was introduced to the test organism or toxicity study. For the most part, toxicity studies are based on the chemical given orally in food or water. In addition, these studies will use a form of chemical that is highly bioavailable to promote the most efficient toxic effect to the test organism at a given concentration. For example, in studies involving metal toxicity, the compound is often administered as a very soluble salt in water or food. Differences in the adsorption of chemicals between laboratory organisms and wildlife as well as between different mediums of exposure will invariably exist. The relative absorption factor (RAF) is the variable used to incorporate bioavailability information to exposure assessment (Menzie et al., 2000).

The RAF is used to adjust the absorption of a chemical from an exposure medium to that of the absorption of the chemical used in the toxicity study. The following equation was used to calculate the RAF:

$$RAF = \frac{BA_M}{BA_{EL}}$$

where:

RAF = relative adsorption factor (unitless)
BA_M = absorption of the chemical form in the exposure medium (%)
BA_{EL} = absorption of the chemical form in the study medium (%)

An RAF can be less than or greater than one. An RAF of one does not indicate that the bioavailability is 100%, but the estimated bioavailability for the chemical in the exposure medium is the same as that used in the toxicity study for developing the toxicity reference value (TRV). In circumstances where the bioavailability is unknown for a particular medium, it is acceptable to conservatively default to an RAF of one. In this case, there is no adjustment of the exposure route relative to the toxicity study. Table 4B5.2-1 provides the bioavailability adjustments that were applied in the HHRA.

Table 4B6-1 Bioavailability (BA) Adjustments (%)

Chemical	Type	Inhalation (BA)	Oral (BA)	Dermal (BA)
PAHs				
3-methylcholanthrene	Route	100	100	100
	Study	100	100	100
7,12-dimethylbenz(a,h)anthracene	Route	100	100	100
	Study	100	100	100
Anthracene	Route	100	76	13
	Study	100	76	76
Benz(a)anthracene	Route	100	31	13
	Study	100	31	31
Benzo(a)pyrene	Route	100	31	13
	Study	100	31	31
Benzo(e)pyrene	Route	100	31	13
	Study	100	31	31
Benzo(b)fluoranthene	Route	100	31	13
	Study	100	31	31
Benzo(g,h,i)perylene	Route	100	31	13
	Study	100	31	31
Benzo(k)fluoranthene	Route	100	31	13
	Study	100	31	31
Chrysene	Route	100	31	13
	Study	100	31	31
Dibenz(a,h)anthracene	Route	100	31	13
	Study	100	31	31
Fluoranthene	Route	100	31	13
	Study	100	31	31
Fluorene	Route	100	31	13
	Study	100	31	31

Chemical	Type	Inhalation (BA)	Oral (BA)	Dermal (BA)
Indeno(1,2,3-cd)pyrene	Route	100	31	13
	Study	100	31	31
Perylene	Route	100	31	13
	Study	100	31	31
Phenanthrene	Route	100	31	13
	Study	100	31	31
Pyrene	Route	100	31	13
	Study	100	31	31
VOCS				
Naphthalene	Route	100	80	13
	Study	100	80	13

4B7 CANCER RISKS FOR RECEPTORS EXPOSED TO CHEMICALS FROM THE SITE FOR THEIR ENTIRE LIFETIME

The level of risk for the composite receptor was calculated by adding the adjusted exposure ratio (ER) values calculated for each individual life stage (adjusted for duration of exposure) in order to estimate the lifetime cancer risk. The compilation of all five individual life stages (infant, 0.5/75; toddler, 4.5/75; child, 7/75; youth/adolescent, 8/75; adult, 56/75) results in a risk estimate for the composite receptor over a 75-year lifetime.

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4C1 ASSESSMENT OF POTENTIAL CHANGES IN BASELINE MORTALITY AND MORBIDITY RATES FROM PREDICTED $PM_{2.5}$ AIR CONCENTRATIONS

4C1.1 Introduction

Within the acute inhalation assessment, predicted 98th percentile $PM_{2.5}$ exposures were compared to the Canada Wide Standard (CWS) of 30 ug/m^3 (CCME, 2000). Predicted chronic exposures were compared to the California Air Resource Board's (CARB) standard of 12 ug/m^3 (annual average) (CARB, 2002). In addition to the chronic inhalation assessment using these two exposure limits, an evaluation of potential health effects associated with PM using Health Canada's SUM15 method has been completed (Health Canada, 1999).

Other governmental organizations (U.S. EPA, 2005; WHO, 2005) and academic researchers (e.g., Samet., 2000; Cohen., 2004) have investigated and determined the excess risk of mortality and morbidity effects from exposure to daily or short-term changes in ambient PM concentrations. For example, the World Health Organization (WHO) estimates that health risks increase 0.5% for every 10 ug/m^3 increase in daily $PM_{2.5}$ concentrations above 25 ug/m^3 (WHO, 2005). Health Canada's SUM15 method is different from more recent methods and calculates excess health risk when $PM_{2.5}$ air concentrations exceed a daily threshold of 15 ug/m^3 (Health Canada, 1999).

4C1.2 Methods

Measured 24-hour $PM_{2.5}$ air concentrations for all 79 receptor locations were evaluated for each development case (baseline, application and CEA). These time series data included predicted air concentrations for 364 days. All receptor locations were evaluated in order to provide a comprehensive SUM15 assessment. The predicted air concentrations in Tables 4C-1 to 4C-3 for the baseline, application and CEA cases are based on the air quality assessment which included all existing and approved industrial sources in the oil sands area, in addition to community sources. Although all receptor locations were assessed, only select receptor locations from each receptor group (FNR, RESI, COMM and RECR) were selected, with several locations from within the local and regional study areas being included. Many of the locations included in the tables that follow represent locations that are closest to the Project.

Table 4C-1 Summary of Predicted Baseline $PM_{2.5}$ Concentrations

Receptor ID, Location, and Group	Annual Average	Median	98th Percentile	SUM15 [ug/m^3 - 15]
R12 (Fish Plant, COMM)	0.4	0	1.7	0
R15 (NS, FNR)	0.3	0	1.8	0
R20 (Cabin, RESI)	0.3	0	2.1	0
R25 (NS, FNR)	0.3	0	2.1	0
R27 (NS, FNR)	0.4	0.2	2.6	0
R30 (Gravel Pit, COMM)	0.4	0.2	2	0
R36 (Caribou Creek Provincial Park, RECR)	0.2	0	1.2	0
R40 (Pingle, RESI)	0.4	0.2	2.7	0
R50 (NS, FNR)	1.0	0.5	4.4	0
R61 (Gregoire Lake Provincial Park, RECR)	0.9	0.4	4.7	0

Receptor ID, Location, and Group	**Annual Average**	**Median**	**98th Percentile**	**SUM15 [ug/m^3 - 15]**
R63 (Gregoire Lake Reserve 1, FNR)	0.9	0.4	4.5	0
R71 (Algar Tower Airfield, COMM)	0.8	0.6	2.9	0
R73 (Anzac, RESI)	14.3	0	45.8	1407.0
R79 (Conklin, RESI)	1	0.5	4.2	0

Table 4C-2 Summary of Predicted Application PM2.5 Concentrations

Receptor ID	**Annual Average**	**Median**	**98th Percentile**	**SUM15 [ug/m^3 -15]**
R12 (Fish Plant, COMM)	0.4	0	1.8	0
R15 (NS, FNR)	0.4	0	2.0	0
R20 (Cabin, RESI)	0.4	0.2	2.2	0
R25 (NS, FNR)	0.4	0	2.4	0
R27 (NS, FNR)	0.6	0.3	3.0	0
R30 (Gravel Pit, COMM)	0.4	0.2	2.1	0
R36 (Caribou Creek Provincial Park, RECR)	0.2	0.0	1.3	0
R40 (Pingle, RESI)	0.6	0.3	2.7	0
R50 (NS, FNR)	1.1	0.5	4.4	0
R61 (Gregoire Lake Provincial Park, RECR)	0.9	0.4	4.7	0
R63 (Gregoire Lake Reserve 1, FNR)	0.9	0.4	4.5	0
R71 (Algar Tower Airfield, COMM)	0.9	0.6	3.0	0
R73 (Anzac, RESI)	14.3	0	45.7	1410.5
R79 (Conklin, RESI)	1.1	0.6	4.4	0

Table 4C-3 Summary of Predicted CEA $PM_{2.5}$ Concentrations

Receptor ID	**Annual Average**	**Median**	**98th Percentile**	**SUM15 [ug/m^3 - days]**
R12 (Fish Plant, COMM)	0.5	0	2.3	0
R15 (NS, FNR)	0.4	0.2	2.3	0
R20 (Cabin, RESI)	0.5	0.2	2.8	0
R25 (NS, FNR)	0.5	0.1	2.8	0
R27 (NS, FNR)	0.7	0.3	3.5	0
R30 (Gravel Pit, COMM)	0.5	0.2	2.5	0
R36 (Caribou Creek Provincial Park, RECR)	0.3	0	1.5	0
R40 (Pingle, RESI)	0.7	0.4	3.7	0
R50 (NS, FNR)	1.2	0.6	5.1	0
R61 (Gregoire Lake Provincial Park, RECR)	1.1	0.5	5.7	0
R63 (Gregoire Lake Reserve 1, FNR)	1.1	0.6	5.2	0
R71 (Algar Tower Airfield, COMM)	1.0	0.7	3.5	0
R73 (Anzac, RESI)	14.5	0	46.6	1453.1
R79 (Conklin, RESI)	1.1	0.6	4.7	0

4C2 RESULTS OF SUM15 ASSESSMENT

Health risks were calculated using SUM15 methods in combination with predicted $PM_{2.5}$ concentrations, in accordance with Health Canada's Addendum to the Science Assessment Document for Particulate Matter (Health Canada SUM15 method; Health Canada, 1999) at all receptor locations. Health risks were estimated for mortality, respiratory hospital admissions (RHA) and cardiac hospital admissions (CHA).

The type of information that is required to calculate the health risks includes:

- Cumulative air concentrations of $PM_{2.5}$: the one-year sum (i.e., 364 days) of 24-hour $PM_{2.5}$ concentrations that exceed the Health Canada reference level of 15 ug/m^3 (i.e., ∑ [24-hour $PM_{2.5}$ air concentration – 15 ug/m^3]);
- Relative risk estimates for mortality, RHA and CHA; and
- Baseline mortality, RHA and CHA incidence rates.

Table 4C-4 outlines the cumulative concentrations that were determined for the different receptor locations.

Table 4C-4 Cumulative Daily $PM_{2.5}$ Air Concentrations (ug/m^3) Exceeding Health Canada's Reference Level of 15 ug/m^3

Receptor ID	Baseline	Application	CEA
R12 (Fish Plant, COMM)	0	0	0
R15 (NS, FNR)	0	0	0
R20 (Cabin, RESI)	0	0	0
R25 (NS, FNR)	0	0	0
R27 (NS, FNR)	0	0	0
R30 (Gravel Pit, COMM)	0	0	0
R36 (Caribou Creek Provincial Park, RECR)	0	0	0
R40 (Pingle, RESI)	0	0	0
R50 (NS, FNR)	0	0	0
R61 (Gregoire Lake Provincial Park, RECR)	0	0	0
R63 (Gregoire Lake Reserve 1, FNR)	0	0	0
R71 (Algar Tower Airfield, COMM)	0	0	0
R73 (Anzac, RESI)	1,407.0	1,410.5	1,453.1
R79 (Conklin, RESI)	0	0	0

Health Canada's baseline incidence rates for mortality, CHA and RHA are presented in Tables 4C-5 and 4C-6.

Table 4C-5 Baseline Incidence Rates and Relative National Risk Estimates

Health Endpoint	Incidence Rate per 1,000,000 Population per Day	Relative risk per 1 ug/m^3 change in $PM_{2.5}$	
		Point Estimate	95% Confidence Interval
Mortality	18.4	1.0014	1.001 to 1.0018
Respiratory Hospital Admissions (RHA)	16	1.00074	1.00049 to 1.00099
Cardiovascular Hospital Admissions (CHA)	14.4	1.0007	1.00036 to 1.001

Source: Health Canada 1999

Health Canada uses this information to calculate potential health risks related to mortality, RHA, and CHA that may be attributable to $PM_{2.5}$ as follows:

Cumulative $PM_{2.5}$ concentration × incidence rate × (relative risk -1) (Equation 1)

Using Equation 1, risks were estimated for each health endpoint. For example, the predicted change in the daily mortality rate at Receptor Location 12 for the baseline case that would be attributable to $PM_{2.5}$ was calculated as follows:

Change in mortality rate = 0.4 × 18.4 per 1,000,000 × (1.0014-1) = 0.01 per 1,000,000

This calculation illustrates that the cumulative $PM_{2.5}$ concentration of 0.4 ug/m^3 predicted for the baseline case at Receptor Location 12 was associated with a predicted increase in the non-accident mortality rate of 0.01 per 1,000,000.

The remaining results for mortality, RHA and CHA are outlined in the tables that follow.

Table 4C-6 Mortality (per 1,000,000 people) Attributed to Changes in Daily $PM_{2.5}$

Receptor ID	Baseline	Application	CEA
R12 (Fish Plant, COMM)	0	0	0
R15 (NS, FNR)	0	0	0
R20 (Cabin, RESI)	0	0	0
R25 (NS, FNR)	0	0	0
R27 (NS, FNR)	0	0	0
R30 (Gravel Pit, COMM)	0	0	0
R36 (Caribou Creek Provincial Park, RECR)	0	0	0
R40 (Pingle, RESI)	0	0	0
R50 (NS, FNR)	0	0	0
R61 (Gregoire Lake Provincial Park, RECR)	0	0	0
R63 (Gregoire Lake Reserve 1, FNR)	0	0	0
R71 (Algar Tower Airfield, COMM)	0	0	0
R73 (Anzac, RESI)	36.2	36.3	37.4
R79 (Conklin, RESI)	0	0	0

Table 4C-7 Respiratory Hospital Admissions (per 1,000,000 people) Attributed to Changes in Daily $PM_{2.5}$

Receptor ID	Baseline	Application	CEA
R12 (Fish Plant, COMM)	0	0	0
R15 (NS, FNR)	0	0	0
R20 (Cabin, RESI)	0	0	0
R25 (NS, FNR)	0	0	0
R27 (NS, FNR)	0	0	0
R30 (Gravel Pit, COMM)	0	0	0
R36 (Caribou Creek Provincial Park, RECR)	0	0	0
R40 (Pingle, RESI)	0	0	0
R50 (NS, FNR)	0	0	0
R61 (Gregoire Lake Provincial Park, RECR)	0	0	0
R63 (Gregoire Lake Reserve 1, FNR)	0	0	0
R71 (Algar Tower Airfield, COMM)	0	0	0
R73 (Anzac, RESI)	16.7	16.7	17.2
R79 (Conklin, RESI)	0		

Table 4C-8 Cardiac Hospital Admissions (per 1,000,000 people) Attributed to Changes in Daily $PM_{2.5}$

Receptor ID	Baseline	Application	CEA
R12 (Fish Plant, COMM)	0	0	0
R15 (NS, FNR)	0	0	0
R20 (Cabin, RESI)	0	0	0
R25 (NS, FNR)	0	0	0
R27 (NS, FNR)	0	0	0
R30 (Gravel Pit, COMM)	0	0	0
R36 (Caribou Creek Provincial Park, RECR)	0	0	0
R40 (Pingle, RESI)	0	0	0
R50 (NS, FNR)	0	0	0
R61 (Gregoire Lake Provincial Park, RECR)	0	0	0
R63 (Gregoire Lake Reserve 1, FNR)	0	0	0
R71 (Algar Tower Airfield, COMM)	0	0	0
R73 (Anzac, RESI)	14.2	14.2	14.6
R79 (Conklin, RESI)	0	0	0

The risk estimates are presented in terms of “health effects per 1,000,000 people”. It is unlikely that health effects attributable to potential $PM_{2.5}$ health effects could be detected at any of the listed receptor locations, considering the size of the population within the study area when compared to a population of 1,000,000. Further, there appears to be little to no difference between the estimated $PM_{2.5}$ related changes to the baseline and application case mortality and morbidity rates at any of the receptor locations, with the exception of the Anzac receptor.

For the Anzac receptor, there is a slight change in SUM15 value between the baseline and application cases. However, $PM_{2.5}$ emissions associated with the Project do not appear to be increasing the baseline mortality and morbidity rates to an appreciable extent. There was no change in the number of CHA and RHA between baseline and application that would be attributable to the Project.

4C3 CONCLUSIONS

The SUM15 assessment indicates that incremental changes in mortality and morbidity are expected to be small. Area sources within Anzac rather than the Project appear to dominate the estimates for this receptor location.

The Project's $PM_{2.5}$ emissions are not expected to increase the baseline mortality and morbidity rates to an appreciable extent.

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Appendix 4D
Game Tissue Model

Table 4D-1 Predicted game concentration [mg/kg-ww]

Game	ERAM	Spreadsheet	Background	Baseline	Application	CEA	Max
Ruffed_Grouse	3-methylcholanthrene	3-methylcholanthrene	0.00E+00	3.00E-06	3.01E-06	3.01E-06	3.01E-06
Ruffed_Grouse	7,12-dimethylbenz(a)anthracene	7,12-dimethylbenz(a)anthracene	0.00E+00	3.89E-06	3.90E-06	3.90E-06	3.90E-06
Ruffed_Grouse	Anthracene	Anthracene	4.30E-08	6.17E-10	6.17E-10	7.17E-10	7.17E-10
Ruffed_Grouse	Benz(a)anthracene	Benz(a)anthracene	2.31E-08	4.09E-09	4.09E-09	6.57E-09	6.57E-09
Ruffed_Grouse	Benzo(a)pyrene (IPM or TEF)	benzo(a)pyrene	4.98E-08	3.52E-09	3.52E-09	1.12E-08	1.12E-08
Ruffed_Grouse	Benzo(a)pyrene (WMM)	benzo(a)pyrene	4.98E-08	3.52E-09	3.52E-09	1.12E-08	1.12E-08
Ruffed_Grouse	Benzo(b)fluoranthene	Benzo(b)fluoranthene	3.19E-09	4.60E-10	4.60E-10	5.90E-10	5.90E-10
Ruffed_Grouse	Benzo(e)pyrene	benzo(e)pyrene	5.00E-07	9.26E-10	9.26E-10	1.08E-09	1.08E-09
Ruffed_Grouse	Benzo(g,h,i)perylene	Benzo(ghi)perylene	2.41E-07	1.48E-08	1.48E-08	4.99E-08	4.99E-08
Ruffed_Grouse	Benzo(k)fluoranthene	Benzo(k)fluoranthene	8.69E-08	6.02E-09	6.02E-09	1.52E-08	1.52E-08
Ruffed_Grouse	Chrysene	Chrysene	2.39E-08	2.93E-09	2.93E-09	4.16E-09	4.16E-09
Ruffed_Grouse	Dibenz(a,h)anthracene	Dibenz(ah)anthracene	1.70E-08	3.25E-09	3.25E-09	8.06E-09	8.06E-09
Ruffed_Grouse	Fluoranthene	Fluoranthene	1.25E-08	8.25E-10	8.25E-10	8.94E-10	8.94E-10
Ruffed_Grouse	fluorene	fluorene	9.19E-10	2.03E-11	2.03E-11	2.37E-11	2.37E-11
Ruffed_Grouse	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3cd)pyrene	3.20E-08	3.28E-09	3.28E-09	7.60E-09	7.60E-09
Ruffed_Grouse	naphthalene	naphthalene	2.59E-10	2.41E-10	2.41E-10	2.73E-10	2.73E-10
Ruffed_Grouse	PAH TEF	benzo(a)pyrene	4.98E-08	3.52E-09	3.52E-09	1.12E-08	1.12E-08
Ruffed_Grouse	perylene	perylene	1.11E-08	2.16E-11	2.16E-11	2.47E-11	2.47E-11
Ruffed_Grouse	Phenanthrene	Phenanthrene	2.87E-08	7.41E-10	7.41E-10	8.41E-10	8.41E-10
Ruffed_Grouse	Pyrene	Pyrene	7.10E-08	1.81E-09	1.81E-09	1.98E-09	1.98E-09
Moose	3-methylcholanthrene	3-methylcholanthrene	0.00E+00	4.38E-07	4.39E-07	4.39E-07	4.39E-07
Moose	7,12-dimethylbenz(a)anthracene	7,12-dimethylbenz(a)anthracene	0.00E+00	1.26E-06	1.26E-06	1.26E-06	1.26E-06
Moose	Anthracene	Anthracene	6.05E-07	6.69E-09	6.69E-09	7.78E-09	7.78E-09
Moose	Benz(a)anthracene	Benz(a)anthracene	6.14E-06	1.04E-06	1.04E-06	1.68E-06	1.68E-06
Moose	Benzo(a)pyrene (IPM or TEF)	benzo(a)pyrene	1.29E-05	9.02E-07	9.02E-07	2.87E-06	2.87E-06
Moose	Benzo(a)pyrene (WMM)	benzo(a)pyrene	1.29E-05	9.02E-07	9.02E-07	2.87E-06	2.87E-06
Moose	Benzo(b)fluoranthene	Benzo(b)fluoranthene	8.16E-07	1.11E-07	1.11E-07	1.43E-07	1.43E-07
Moose	Benzo(e)pyrene	benzo(e)pyrene	1.35E-04	2.50E-07	2.50E-07	2.92E-07	2.92E-07
Moose	Benzo(g,h,i)perylene	Benzo(ghi)perylene	6.46E-05	3.96E-06	3.96E-06	1.34E-05	1.34E-05
Moose	Benzo(k)fluoranthene	Benzo(k)fluoranthene	2.05E-05	1.42E-06	1.42E-06	3.56E-06	3.56E-06
Moose	Chrysene	Chrysene	4.63E-06	5.53E-07	5.53E-07	7.85E-07	7.85E-07
Moose	Dibenz(a,h)anthracene	Dibenz(ah)anthracene	4.22E-06	7.68E-07	7.68E-07	1.90E-06	1.90E-06
Moose	Fluoranthene	Fluoranthene	3.01E-06	1.93E-07	1.93E-07	2.09E-07	2.09E-07
Moose	fluorene	fluorene	4.03E-07	4.78E-09	4.78E-09	5.58E-09	5.58E-09
Moose	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3cd)pyrene	8.03E-06	8.04E-07	8.04E-07	1.86E-06	1.86E-06
Moose	naphthalene	naphthalene	1.55E-07	5.57E-08	5.57E-08	6.31E-08	6.31E-08
Moose	PAH TEF	benzo(a)pyrene	1.29E-05	9.02E-07	9.02E-07	2.87E-06	2.87E-06
Moose	perylene	perylene	2.83E-06	5.32E-09	5.32E-09	6.07E-09	6.07E-09
Moose	Phenanthrene	Phenanthrene	6.59E-06	1.69E-07	1.69E-07	1.92E-07	1.92E-07
Moose	Pyrene	Pyrene	7.76E-06	1.96E-07	1.96E-07	2.14E-07	2.14E-07
Snowshoe_Hare	3-methylcholanthrene	3-methylcholanthrene	0.00E+00	8.19E-09	8.21E-09	8.21E-09	8.21E-09
Snowshoe_Hare	7,12-dimethylbenz(a)anthracene	7,12-dimethylbenz(a)anthracene	0.00E+00	2.44E-08	2.45E-08	2.45E-08	2.45E-08
Snowshoe_Hare	Anthracene	Anthracene	9.71E-09	1.27E-10	1.27E-10	1.48E-10	1.48E-10
Snowshoe_Hare	Benz(a)anthracene	Benz(a)anthracene	1.02E-07	1.82E-08	1.82E-08	2.92E-08	2.92E-08
Snowshoe_Hare	Benzo(a)pyrene (IPM or TEF)	benzo(a)pyrene	2.21E-07	1.57E-08	1.57E-08	4.99E-08	4.99E-08
Snowshoe_Hare	Benzo(a)pyrene (WMM)	benzo(a)pyrene	2.21E-07	1.57E-08	1.57E-08	4.99E-08	4.99E-08
Snowshoe_Hare	Benzo(b)fluoranthene	Benzo(b)fluoranthene	1.37E-08	1.98E-09	1.98E-09	2.54E-09	2.54E-09
Snowshoe_Hare	Benzo(e)pyrene	benzo(e)pyrene	2.29E-06	4.24E-09	4.24E-09	4.97E-09	4.97E-09
Snowshoe_Hare	Benzo(g,h,i)perylene	Benzo(ghi)perylene	1.10E-06	6.75E-08	6.75E-08	2.28E-07	2.28E-07
Snowshoe_Hare	Benzo(k)fluoranthene	Benzo(k)fluoranthene	3.68E-07	2.55E-08	2.55E-08	6.41E-08	6.41E-08
Snowshoe_Hare	Chrysene	Chrysene	9.06E-08	1.11E-08	1.11E-08	1.58E-08	1.58E-08
Snowshoe_Hare	Dibenz(a,h)anthracene	Dibenz(ah)anthracene	7.21E-08	1.38E-08	1.38E-08	3.42E-08	3.42E-08
Snowshoe_Hare	Fluoranthene	Fluoranthene	5.25E-08	3.48E-09	3.48E-09	3.77E-09	3.77E-09
Snowshoe_Hare	fluorene	fluorene	3.73E-09	8.59E-11	8.59E-11	1.00E-10	1.00E-10
Snowshoe_Hare	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3cd)pyrene	1.38E-07	1.42E-08	1.42E-08	3.29E-08	3.29E-08
Snowshoe_Hare	naphthalene	naphthalene	1.01E-09	1.01E-09	1.01E-09	1.14E-09	1.14E-09
Snowshoe_Hare	PAH TEF	benzo(a)pyrene	2.21E-07	1.57E-08	1.57E-08	4.99E-08	4.99E-08
Snowshoe_Hare	perylene	perylene	4.82E-08	9.39E-11	9.39E-11	1.07E-10	1.07E-10
Snowshoe_Hare	Phenanthrene	Phenanthrene	1.19E-07	3.08E-09	3.08E-09	3.50E-09	3.50E-09
Snowshoe_Hare	Pyrene	Pyrene	2.09E-07	5.33E-09	5.33E-09	5.83E-09	5.83E-09

Table 4D-2 Predicted plant concentration [mg/kg-ww]

Chemical	Background Moose	Baseline Moose	Application Moose	CEA Moose	Max
3-methylcholanthrene	0.00E+00	2.58E-04	2.58E-04	2.58E-04	2.58E-04
7,12-dimethylbenz(a)anthracene	0.00E+00	5.25E-04	5.27E-04	5.27E-04	5.27E-04
Anthracene	1.97E-04	2.84E-06	2.84E-06	3.31E-06	3.31E-06
Benz(a)anthracene	2.15E-03	3.92E-04	3.92E-04	6.30E-04	6.30E-04
Benzo(a)pyrene (WMM)	5.05E-03	3.61E-04	3.61E-04	1.15E-03	1.15E-03
Benzo(b)fluoranthene	8.49E-02	1.57E-04	1.57E-04	1.84E-04	1.84E-04
Benzo(e)pyrene	3.04E-04	4.57E-05	4.57E-05	5.85E-05	5.85E-05
Benzo(g,h,i)perylene	4.28E-02	2.64E-03	2.64E-03	8.90E-03	8.90E-03
Benzo(k)fluoranthene	8.26E-03	5.73E-04	5.73E-04	1.44E-03	1.44E-03
Chrysene	1.55E-03	1.93E-04	1.93E-04	2.73E-04	2.73E-04
Dibenz(a,h)anthracene	1.86E-03	3.66E-04	3.66E-04	9.09E-04	9.09E-04
Fluoranthene	1.07E-03	7.25E-05	7.25E-05	7.86E-05	7.86E-05
fluorene	4.95E-05	2.41E-06	2.41E-06	2.81E-06	2.81E-06
Indeno(1,2,3-cd)pyrene	3.92E-03	4.08E-04	4.08E-04	9.45E-04	9.45E-04
naphthalene	9.08E-07	5.52E-05	5.52E-05	6.25E-05	6.25E-05
Benzo(a)pyrene IPM	3.75E-03	3.61E-04	3.61E-04	1.15E-03	1.15E-03
perylene	1.10E-03	2.19E-06	2.19E-06	2.50E-06	2.50E-06
Phenanthrene	2.83E-03	7.33E-05	7.33E-05	8.32E-05	8.32E-05
Pyrene	2.18E-03	5.57E-05	5.57E-05	6.10E-05	6.10E-05

Table 4D-3: Predicted soil concentration [mg/kg]

	Background	Baseline	Application	CEA	
	Moose	Moose	Moose	Moose	Max
3-methylcholanthrene	0.0E+00	6.4E-05	6.4E-05	6.4E-05	6.4E-05
7,12-dimethylbenz(a)anthracene	0.0E+00	1.8E-04	1.9E-04	1.9E-04	1.9E-04
Anthracene	5.7E-05	8.2E-07	8.2E-07	9.5E-07	9.5E-07
Benz(a)anthracene	1.3E-04	2.4E-05	2.4E-05	3.8E-05	3.8E-05
Benzo(a)pyrene (WMM)	2.7E-04	1.9E-05	1.9E-05	6.2E-05	6.2E-05
Benzo(b)fluoranthene	1.8E-04	3.2E-07	3.2E-07	3.8E-07	3.8E-07
Benzo(e)pyrene	3.4E-05	5.2E-06	5.2E-06	6.6E-06	6.6E-06
Benzo(g,h,i)perylene	3.6E-04	2.2E-05	2.2E-05	7.4E-05	7.4E-05
Benzo(k)fluoranthene	1.2E-03	8.2E-05	8.2E-05	2.1E-04	2.1E-04
Chrysene	7.2E-04	8.9E-05	8.9E-05	1.3E-04	1.3E-04
Dibenz(a,h)anthracene	2.6E-04	5.1E-05	5.1E-05	1.3E-04	1.3E-04
Fluoranthene	1.6E-04	1.1E-05	1.1E-05	1.2E-05	1.2E-05
fluorene	7.0E-06	3.4E-07	3.4E-07	4.0E-07	4.0E-07
Indeno(1,2,3-cd)pyrene	3.7E-04	3.9E-05	3.9E-05	9.0E-05	9.0E-05
naphthalene	1.5E-07	9.0E-06	9.0E-06	1.0E-05	1.0E-05
Benzo(a)pyrene IPM	2.0E-04	1.9E-05	1.9E-05	6.2E-05	6.2E-05
perylene	1.0E-04	2.0E-07	2.0E-07	2.3E-07	2.3E-07
Phenanthrene	5.1E-04	1.3E-05	1.3E-05	1.5E-05	1.5E-05
Pyrene	4.3E-03	1.1E-04	1.1E-04	1.2E-04	1.2E-04

Table 4D-4: Summary of Air Concentrations Used in Model

Scenario	Site	Chemical in ERAM	Chemical in Spreadsheet	Air mg/m^3
Baseline	Max	3-methylcholanthrene	3-methylcholanthrene	4.23E-06
Baseline	Max	7,12-dimethylbenz(a)anthracene	7,12-dimethylbenz(a)anthracene	3.75E-05
Baseline	Max	Anthracene	Anthracene	1.78E-05
Baseline	Max	Benz(a)anthracene	Benz(a)anthracene	1.07E-05
Baseline	Max	Benzo(a)pyrene (WMM)	benzo(a)pyrene	5.21E-06
Baseline	Max	Benzo(b)fluoranthene	Benzo(b)fluoranthene	1.42E-05
Baseline	Max	Benzo(e)pyrene	benzo(e)pyrene	1.64E-07
Baseline	Max	Benzo(g,h,i)perylene	Benzo(ghi)perylene	4.86E-06
Baseline	Max	Benzo(k)fluoranthene	Benzo(k)fluoranthene	6.56E-06
Baseline	Max	Chrysene	Chrysene	1.29E-05
Baseline	Max	Dibenz(a,h)anthracene	Dibenz(ah)anthracene	6.89E-06
Baseline	Max	Fluoranthene	Fluoranthene	6.93E-05
Baseline	Max	fluorene	fluorene	1.13E-04
Baseline	Max	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3cd)pyrene	7.29E-06
Baseline	Max	naphthalene	naphthalene	1.66E-01
Baseline	Max	PAH TEF	benzo(a)pyrene	5.21E-06
Baseline	Max	perylene	perylene	3.98E-08
Baseline	Max	Phenanthrene	Phenanthrene	4.06E-04
Baseline	Max	Pyrene	Pyrene	4.91E-05
Application	Max	3-methylcholanthrene	3-methylcholanthrene	4.24E-06
Application	Max	7,12-dimethylbenz(a)anthracene	7,12-dimethylbenz(a)anthracene	3.76E-05
Application	Max	Anthracene	Anthracene	1.78E-05
Application	Max	Benz(a)anthracene	Benz(a)anthracene	1.07E-05
Application	Max	Benzo(a)pyrene (WMM)	benzo(a)pyrene	5.21E-06
Application	Max	Benzo(b)fluoranthene	Benzo(b)fluoranthene	1.42E-05
Application	Max	Benzo(e)pyrene	benzo(e)pyrene	1.64E-07
Application	Max	Benzo(g,h,i)perylene	Benzo(ghi)perylene	4.86E-06
Application	Max	Benzo(k)fluoranthene	Benzo(k)fluoranthene	6.56E-06
Application	Max	Chrysene	Chrysene	1.29E-05
Application	Max	Dibenz(a,h)anthracene	Dibenz(ah)anthracene	6.89E-06
Application	Max	Fluoranthene	Fluoranthene	6.93E-05
Application	Max	fluorene	fluorene	1.13E-04
Application	Max	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3cd)pyrene	7.29E-06
Application	Max	naphthalene	naphthalene	1.66E-01
Application	Max	PAH TEF	benzo(a)pyrene	5.21E-06
Application	Max	perylene	perylene	3.98E-08
Application	Max	Phenanthrene	Phenanthrene	4.06E-04
Application	Max	Pyrene	Pyrene	4.91E-05
CEA	Max	3-methylcholanthrene	3-methylcholanthrene	4.24E-06
CEA	Max	7,12-dimethylbenz(a)anthracene	7,12-dimethylbenz(a)anthracene	3.76E-05
CEA	Max	Anthracene	Anthracene	2.07E-05
CEA	Max	Benz(a)anthracene	Benz(a)anthracene	1.72E-05
CEA	Max	Benzo(a)pyrene (WMM)	benzo(a)pyrene	1.66E-05
CEA	Max	Benzo(b)fluoranthene	Benzo(b)fluoranthene	1.82E-05
CEA	Max	Benzo(e)pyrene	benzo(e)pyrene	1.92E-07
CEA	Max	Benzo(g,h,i)perylene	Benzo(ghi)perylene	1.64E-05
CEA	Max	Benzo(k)fluoranthene	Benzo(k)fluoranthene	1.65E-05
CEA	Max	Chrysene	Chrysene	1.83E-05
CEA	Max	Dibenz(a,h)anthracene	Dibenz(ah)anthracene	1.71E-05
CEA	Max	Fluoranthene	Fluoranthene	7.51E-05
CEA	Max	fluorene	fluorene	1.32E-04
CEA	Max	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3cd)pyrene	1.69E-05
CEA	Max	naphthalene	naphthalene	1.88E-01
CEA	Max	PAH TEF	benzo(a)pyrene	1.66E-05
CEA	Max	perylene	perylene	4.54E-08
CEA	Max	Phenanthrene	Phenanthrene	4.61E-04
CEA	Max	Pyrene	Pyrene	5.37E-05

Table 4D-5: Summary of predicted tissue concentrations for each receptor, scenario, location and chemical

									Dietary Concentrations Concentrations				EDI					
						Surface			Browse	Browse	Browse	Invertebrate	Soil	Browse	Invertebrate	Water	Total	Tissue
				Soil	Surface Soil	Water	Air	Deposition	Deposition	Air	Aboveground	Terrestrial	EDI	EDI	EDI	EDI	EDI	Concentration
Scenario	Site	Receptor	Chemical	mg/kg	mg/kg	mg/L	mg/m3	mg/m2/yr	mg/kg dw	mg/kg dw	mg/kg dw	mg/kg dw	mg/day	mg/day	mg/day	mg/day	mg/day	mg/kg ww
Application	Max	Moose	3-methylcholanthrene	6.39E-05	6.39E-04	1.19E-09	4.24E-06	0.00E+00	0.00E+00	2.58E-04	2.58E-07	2.01E+00	8.41E-05	1.70E-03	0.00E+00	2.48E-08	1.78E-03	4.39E-07
Application	Max	Moose	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.07E-08	3.76E-05	0.00E+00	0.00E+00	5.25E-04	1.66E-06	1.88E+00	2.44E-04	3.47E-03	0.00E+00	2.22E-07	3.71E-03	1.26E-06
Application	Max	Moose	Anthracene	8.21E-07	8.21E-06	1.82E-11	1.78E-05	0.00E+00	2.00E-06	7.62E-07	7.97E-08	2.84E-04	1.08E-06	1.87E-05	0.00E+00	3.80E-10	1.98E-05	6.69E-09
Application	Max	Moose	Benz(a)anthracene	2.39E-05	2.39E-04	3.98E-11	1.07E-05	0.00E+00	3.11E-04	8.04E-05	4.70E-07	4.29E-06	3.15E-05	2.58E-03	0.00E+00	8.29E-10	2.61E-03	1.04E-06
Application	Max	Moose	Benzo(a)pyrene	1.94E-05	1.94E-04	1.21E-11	5.21E-06	0.00E+00	2.07E-04	1.54E-04	2.56E-07	8.13E-06	2.55E-05	2.37E-03	0.00E+00	2.52E-10	2.40E-03	9.02E-07
Application	Max	Moose	benzo(e)pyrene	3.24E-07	3.24E-06	8.14E-12	1.64E-07	0.00E+00	0.00E+00	1.57E-04	1.26E-09	1.36E-07	4.27E-07	1.03E-03	0.00E+00	1.69E-10	1.03E-03	2.50E-07
Application	Max	Moose	Benzo(b)fluoranthene	5.15E-06	5.15E-05	4.92E-11	1.42E-05	0.00E+00	2.71E-05	1.85E-05	5.76E-08	2.16E-06	6.78E-06	3.01E-04	0.00E+00	1.02E-09	3.08E-04	1.11E-07
Application	Max	Moose	Benzo(ghi)perylene	2.20E-05	2.20E-04	1.39E-10	4.86E-06	0.00E+00	2.58E-04	2.38E-03	7.67E-08	9.23E-06	2.90E-05	1.74E-02	0.00E+00	2.90E-09	1.74E-02	3.96E-06
Application	Max	Moose	Benzo(k)fluoranthene	8.17E-05	8.17E-04	4.30E-11	6.56E-06	0.00E+00	2.68E-04	3.04E-04	9.43E-07	3.92E-05	1.08E-04	3.77E-03	0.00E+00	8.96E-10	3.88E-03	1.42E-06
Application	Max	Moose	Chrysene	8.91E-05	8.91E-04	1.48E-10	1.29E-05	0.00E+00	1.86E-04	5.34E-06	1.75E-06	2.13E-05	1.17E-04	1.27E-03	0.00E+00	3.09E-09	1.39E-03	5.53E-07
Application	Max	Moose	Dibenz(ah)anthracene	5.09E-05	5.09E-04	8.78E-12	6.89E-06	0.00E+00	3.66E-04	0.00E+00	3.45E-07	2.13E-05	6.70E-05	2.41E-03	0.00E+00	1.83E-10	2.48E-03	7.68E-07
Application	Max	Moose	Fluoranthene	1.09E-05	1.09E-04	9.89E-11	6.93E-05	0.00E+00	3.11E-05	4.08E-05	5.43E-07	4.56E-06	1.43E-05	4.78E-04	0.00E+00	2.06E-09	4.92E-04	1.93E-07
Application	Max	Moose	fluorene	3.43E-07	3.43E-06	1.63E-11	1.13E-04	0.00E+00	0.00E+00	2.36E-06	4.96E-08	1.44E-07	4.51E-07	1.59E-05	0.00E+00	3.40E-10	1.63E-05	4.78E-09
Application	Max	Moose	Indeno(1,2,3cd)pyrene	3.90E-05	3.90E-04	7.35E-12	7.29E-06	0.00E+00	4.08E-04	0.00E+00	2.31E-07	1.87E-05	5.13E-05	2.68E-03	0.00E+00	1.53E-10	2.74E-03	8.04E-07
Application	Max	Moose	naphthalene	8.97E-06	8.97E-05	2.99E-09	1.66E-01	0.00E+00	0.00E+00	5.09E-05	4.30E-06	3.76E-06	1.18E-05	3.63E-04	0.00E+00	6.23E-08	3.75E-04	5.57E-08
Application	Max	Moose	perylene	2.04E-07	2.04E-06	1.29E-12	3.98E-08	0.00E+00	2.11E-06	7.47E-08	2.29E-09	8.54E-08	2.68E-07	1.44E-05	0.00E+00	2.68E-11	1.47E-05	5.32E-09
Application	Max	Moose	Phenanthrene	1.31E-05	1.31E-04	3.55E-10	4.06E-04	0.00E+00	2.28E-05	4.92E-05	1.28E-06	5.51E-06	1.73E-05	4.82E-04	0.00E+00	7.39E-09	5.00E-04	1.69E-07
Application	Max	Moose	Pyrene	1.09E-04	1.09E-03	1.14E-09	4.91E-05	0.00E+00	1.66E-05	3.30E-05	6.19E-06	4.55E-05	1.43E-04	3.67E-04	0.00E+00	2.38E-08	5.10E-04	1.96E-07
Application	Max	Ruffed_Grouse	3-methylcholanthrene	6.39E-05	6.39E-04	1.19E-09	4.24E-06	0.00E+00	0.00E+00	2.58E-04	2.58E-07	2.01E+00	2.45E-06	8.53E-06	1.66E-02	5.54E-11	1.66E-02	3.01E-06
Application	Max	Ruffed_Grouse	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.07E-08	3.76E-05	0.00E+00	0.00E+00	5.25E-04	1.66E-06	1.88E+00	7.12E-06	1.74E-05	1.55E-02	4.96E-10	1.55E-02	3.90E-06
Application	Max	Ruffed_Grouse	Anthracene	8.21E-07	8.21E-06	1.82E-11	1.78E-05	0.00E+00	2.00E-06	7.62E-07	7.97E-08	2.84E-04	3.16E-08	9.40E-08	2.35E-06	8.49E-13	2.48E-06	6.17E-10
Application	Max	Ruffed_Grouse	Benz(a)anthracene	2.39E-05	2.39E-04	3.98E-11	1.07E-05	0.00E+00	3.11E-04	8.04E-05	4.70E-07	4.29E-06	9.18E-07	1.29E-05	3.55E-08	1.85E-12	1.39E-05	4.09E-09
Application	Max	Ruffed_Grouse	Benzo(a)pyrene	1.94E-05	1.94E-04	1.21E-11	5.21E-06	0.00E+00	2.07E-04	1.54E-04	2.56E-07	8.13E-06	7.45E-07	1.19E-05	6.72E-08	5.64E-13	1.27E-05	3.52E-09
Application	Max	Ruffed_Grouse	benzo(e)pyrene	3.24E-07	3.24E-06	8.14E-12	1.64E-07	0.00E+00	0.00E+00	1.57E-04	1.26E-09	1.36E-07	1.25E-08	5.19E-06	1.12E-09	3.79E-13	5.21E-06	9.26E-10
Application	Max	Ruffed_Grouse	Benzo(b)fluoranthene	5.15E-06	5.15E-05	4.92E-11	1.42E-05	0.00E+00	2.71E-05	1.85E-05	5.76E-08	2.16E-06	1.98E-07	1.51E-06	1.79E-08	2.29E-12	1.73E-06	4.60E-10
Application	Max	Ruffed_Grouse	Benzo(ghi)perylene	2.20E-05	2.20E-04	1.39E-10	4.86E-06	0.00E+00	2.58E-04	2.38E-03	7.67E-08	9.23E-06	8.46E-07	8.72E-05	7.63E-08	6.48E-12	8.81E-05	1.48E-08
Application	Max	Ruffed_Grouse	Benzo(k)fluoranthene	8.17E-05	8.17E-04	4.30E-11	6.56E-06	0.00E+00	2.68E-04	3.04E-04	9.43E-07	3.92E-05	3.14E-06	1.90E-05	3.24E-07	2.00E-12	2.24E-05	6.02E-09
Application	Max	Ruffed_Grouse	Chrysene	8.91E-05	8.91E-04	1.48E-10	1.29E-05	0.00E+00	1.86E-04	5.34E-06	1.75E-06	2.13E-05	3.42E-06	6.37E-06	1.76E-07	6.91E-12	9.97E-06	2.93E-09
Application	Max	Ruffed_Grouse	Dibenz(ah)anthracene	5.09E-05	5.09E-04	8.78E-12	6.89E-06	0.00E+00	3.66E-04	0.00E+00	3.45E-07	2.13E-05	1.96E-06	1.21E-05	1.76E-07	4.08E-13	1.42E-05	3.25E-09
Application	Max	Ruffed_Grouse	Fluoranthene	1.09E-05	1.09E-04	9.89E-11	6.93E-05	0.00E+00	3.11E-05	4.08E-05	5.43E-07	4.56E-06	4.18E-07	2.40E-06	3.77E-08	4.60E-12	2.85E-06	8.25E-10
Application	Max	Ruffed_Grouse	fluorene	3.43E-07	3.43E-06	1.63E-11	1.13E-04	0.00E+00	0.00E+00	2.36E-06	4.96E-08	1.44E-07	1.32E-08	7.96E-08	1.19E-09	7.60E-13	9.40E-08	2.03E-11
Application	Max	Ruffed_Grouse	Indeno(1,2,3cd)pyrene	3.90E-05	3.90E-04	7.35E-12	7.29E-06	0.00E+00	4.08E-04	0.00E+00	2.31E-07	1.87E-05	1.50E-06	1.35E-05	1.54E-07	3.42E-13	1.51E-05	3.28E-09
Application	Max	Ruffed_Grouse	naphthalene	8.97E-06	8.97E-05	2.99E-09	1.66E-01	0.00E+00	0.00E+00	5.09E-05	4.30E-06	3.76E-06	3.45E-07	1.82E-06	3.11E-08	1.39E-10	2.20E-06	2.41E-10
Application	Max	Ruffed_Grouse	perylene	2.04E-07	2.04E-06	1.29E-12	3.98E-08	0.00E+00	2.11E-06	7.47E-08	2.29E-09	8.54E-08	7.83E-09	7.24E-08	7.06E-10	6.00E-14	8.09E-08	2.16E-11
Application	Max	Ruffed_Grouse	Phenanthrene	1.31E-05	1.31E-04	3.55E-10	4.06E-04	0.00E+00	2.28E-05	4.92E-05	1.28E-06	5.51E-06	5.05E-07	2.42E-06	4.55E-08	1.65E-11	2.97E-06	7.41E-10
Application	Max	Ruffed_Grouse	Pyrene	1.09E-04	1.09E-03	1.14E-09	4.91E-05	0.00E+00	1.66E-05	3.30E-05	6.19E-06	4.55E-05	4.17E-06	1.84E-06	3.76E-07	5.32E-11	6.39E-06	1.81E-09
Application	Max	Snowshoe_Hare	3-methylcholanthrene	6.39E-05	6.39E-04	1.19E-09	4.24E-06	0.00E+00	0.00E+00	2.58E-04	2.58E-07	2.01E+00	4.50E-06	2.89E-05	0.00E+00	1.59E-10	3.34E-05	8.21E-09
Application	Max	Snowshoe_Hare	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.07E-08	3.76E-05	0.00E+00	0.00E+00	5.25E-04	1.66E-06	1.88E+00	1.30E-05	5.89E-05	0.00E+00	1.43E-09	7.19E-05	2.45E-08
Application	Max	Snowshoe_Hare	Anthracene	8.21E-07	8.21E-06	1.82E-11	1.78E-05	0.00E+00	2.00E-06	7.62E-07	7.97E-08	2.84E-04	5.78E-08	3.18E-07	0.00E+00	2.45E-12	3.76E-07	1.27E-10
Application	Max	Snowshoe_Hare	Benz(a)anthracene	2.39E-05	2.39E-04	3.98E-11	1.07E-05	0.00E+00	3.11E-04	8.04E-05	4.70E-07	4.29E-06	1.68E-06	4.38E-05	0.00E+00	5.34E-12	4.55E-05	1.82E-08
Application	Max	Snowshoe_Hare	Benzo(a)pyrene	1.94E-05	1.94E-04	1.21E-11	5.21E-06	0.00E+00	2.07E-04	1.54E-04	2.56E-07	8.13E-06	1.37E-06	4.03E-05	0.00E+00	1.62E-12	4.17E-05	1.57E-08
Application	Max	Snowshoe_Hare	benzo(e)pyrene	3.24E-07	3.24E-06	8.14E-12	1.64E-07	0.00E+00	0.00E+00	1.57E-04	1.26E-09	1.36E-07	2.28E-08	1.76E-05	0.00E+00	1.09E-12	1.76E-05	4.24E-09
Application	Max	Snowshoe_Hare	Benzo(b)fluoranthene	5.15E-06	5.15E-05	4.92E-11	1.42E-05	0.00E+00	2.71E-05	1.85E-05	5.76E-08	2.16E-06	3.63E-07	5.11E-06	0.00E+00	6.59E-12	5.47E-06	1.98E-09
Application	Max	Snowshoe_Hare	Benzo(ghi)perylene	2.20E-05	2.20E-04	1.39E-10	4.86E-06	0.00E+00	2.58E-04	2.38E-03	7.67E-08	9.23E-06	1.55E-06	2.95E-04	0.00E+00	1.87E-11	2.96E-04	6.75E-08
Application	Max	Snowshoe_Hare	Benzo(k)fluoranthene	8.17E-05	8.17E-04	4.30E-11	6.56E-06	0.00E+00	2.68E-04	3.04E-04	9.43E-07	3.92E-05	5.76E-06	6.41E-05	0.00E+00	5.76E-12	6.98E-05	2.55E-08
Application	Max	Snowshoe_Hare	Chrysene	8.91E-05	8.91E-04	1.48E-10	1.29E-05	0.00E+00	1.86E-04	5.34E-06	1.75E-06	2.13E-05	6.27E-06	2.15E-05	0.00E+00	1.99E-11	2.78E-05	1.11E-08
Application	Max	Snowshoe_Hare	Dibenz(ah)anthracene	5.09E-05	5.09E-04	8.78E-12	6.89E-06	0.00E+00	3.66E-04	0.00E+00	3.45E-07	2.13E-05	3.58E-06	4.09E-05	0.00E+00	1.18E-12	4.45E-05	1.38E-08
Application	Max	Snowshoe_Hare	Fluoranthene	1.09E-05	1.09E-04	9.89E-11	6.93E-05	0.00E+00	3.11E-05	4.08E-05	5.43E-07	4.56E-06	7.66E-07	8.11E-06	0.00E+00	1.33E-11	8.87E-06	3.48E-09
Application	Max	Snowshoe_Hare	fluorene	3.43E-07	3.43E-06	1.63E-11	1.13E-04	0.00E+00	0.00E+00	2.36E-06	4.96E-08	1.44E-07	2.41E-08	2.69E-07	0.00E+00	2.19E-12	2.94E-07	8.59E-11
Application	Max	Snowshoe_Hare	Indeno(1,2,3cd)pyrene	3.90E-05	3.90E-04	7.35E-12	7.29E-06	0.00E+00	4.08E-04	0.00E+00	2.31E-07	1.87E-05	2.74E-06	4.56E-05	0.00E+00	9.85E-13	4.83E-05	1.42E-08
Application	Max	Snowshoe_Hare	naphthalene	8.97E-06	8.97E-05	2.99E-09	1.66E-01	0.00E+00	0.00E+00	5.09E-05	4.30E-06	3.76E-06	6.32E-07	6.17E-06	0.00E+00	4.01E-10	6.80E-06	1.01E-09
Application	Max	Snowshoe_Hare	perylene	2.04E-07	2.04E-06	1.29E-12	3.98E-08	0.00E+00	2.11E-06	7.47E-08	2.29E-09	8.54E-08	1.43E-08	2.45E-07	0.00E+00	1.73E-13	2.59E-07	9.39E-11
Application	Max	Snowshoe_Hare	Phenanthrene	1.31E-05	1.31E-04	3.55E-10	4.06E-04	0.00E+00	2.28E-05	4.92E-05	1.28E-06	5.51E-06	9.26E-07	8.19E-06	0.00E+00	4.76E-11	9.12E-06	3.08E-09
Application	Max	Snowshoe_Hare	Pyrene	1.09E-04	1.09E-03	1.14E-09	4.91E-05	0.00E+00	1.66E-05	3.30E-05	6.19E-06	4.55E-05	7.65E-06	6.23E-06	0.00E+00	1.53E-10	1.39E-05	5.33E-09
Baseline	Max	Moose	3-methylcholanthrene	6.37E-05	6.37E-04	1.19E-09	4.23E-06	0.00E+00	0.00E+00	2.57E-04	2.57E-07	2.00E+00	8.39E-05	1.70E-03	0.00E+00	2.47E-08	1.78E-03	4.38E-07
Baseline	Max	Moose	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.06E-08	3.75E-05	0.00E+00	0.00E+00	5.24E-04	1.66E-06	1.87E+00	2.43E-04	3.46E-03	0.00E+00	2.21E-07	3.70E-03	1.26E-06
Baseline	Max	Moose	Anthracene	8.21E-07	8.21E-06	1.82E-11	1.78E-05	0.00E+00	2.00E-06	7.62E-07	7.97E-08	2.84E-04	1.08E-06	1.87E-05	0.00E+00	3.80E-10	1.98E-05	6.69E-09
Baseline	Max	Moose	Benz(a)anthracene	2.39E-05	2.39E-04	3.98E-11	1.07E-05	0.00E+00	3.11E-04	8.04E-05	4.70E-07	4.29E-06	3.15E-05	2.58E-03	0.00E+00	8.29E-10	2.61E-03	1.04E-06
Baseline	Max	Moose	Benzo(a)pyrene	1.94E-05	1.94E-04	1.21E-11	5.21E-06	0.00E+00	2.07E-04	1.54E-04	2.56E-07	8.13E-06	2.55E-05	2.37E-03	0.00E+00	2.52E-10	2.40E-03	9.02E-07
Baseline	Max	Moose	benzo(e)pyrene	3.24E-07	3.24E-06	8.14E-12	1.64E-07	0.00E+00	0.00E+00	1.57E-04	1.26E-09	1.36E-07	4.27E-07	1.03E-03	0.00E+00	1.69E-10	1.03E-03	2.50E-07
Baseline	Max	Moose	Benzo(b)fluoranthene	5.15E-06	5.15E-05	4.92E-11	1.42E-05	0.00E+00	2.71E-05	1.85E-05	5.76E-08	2.16E-06	6.78E-06	3.01E-04	0.00E+00	1.02E-09	3.08E-04	1.11E-07
Baseline	Max	Moose	Benzo(ghi)perylene	2.20E-05	2.20E-04	1.39E-10	4.86E-06	0.00E+00	2.58E-04	2.38E-03	7.67E-08	9.23E-06	2.90E-05	1.74E-02	0.00E+00	2.90E-09	1.74E-02	3.96E-06

Table 4D-5: Summary of predicted tissue concentrations for each receptor, scenario, location and chemical

									Dietary Concentrations Concentrations				EDI					
Scenario	Site	Receptor	Chemical	Soil mg/kg	Surface Soil mg/kg	Surface Water mg/L	Air mg/m3	Deposition mg/m2/yr	Browse Deposition mg/kg dw	Browse Air mg/kg dw	Browse Aboveground mg/kg dw	Invertebrate Terrestrial mg/kg dw	Soil EDI mg/day	Browse EDI mg/day	Invertebrate EDI mg/day	Water EDI mg/day	Total EDI mg/day	Tissue Concentration mg/kg ww
Baseline	Max	Moose	Benzo(k)fluoranthene	8.17E-05	8.17E-04	4.30E-11	6.56E-06	0.00E+00	2.68E-04	3.04E-04	9.43E-07	3.92E-05	1.08E-04	3.77E-03	0.00E+00	8.96E-10	3.88E-03	1.42E-06
Baseline	Max	Moose	Chrysene	8.91E-05	8.91E-04	1.48E-10	1.29E-05	0.00E+00	1.86E-04	5.34E-06	1.75E-06	2.13E-05	1.17E-04	1.27E-03	0.00E+00	3.09E-09	1.39E-03	5.53E-07
Baseline	Max	Moose	Dibenz(ah)anthracene	5.09E-05	5.09E-04	8.78E-12	6.89E-06	0.00E+00	3.66E-04	0.00E+00	3.45E-07	2.13E-05	6.70E-05	2.41E-03	0.00E+00	1.83E-10	2.48E-03	7.68E-07
Baseline	Max	Moose	Fluoranthene	1.09E-05	1.09E-04	9.89E-11	6.93E-05	0.00E+00	3.11E-05	4.08E-05	5.43E-07	4.56E-06	1.43E-05	4.78E-04	0.00E+00	2.06E-09	4.92E-04	1.93E-07
Baseline	Max	Moose	fluorene	3.43E-07	3.43E-06	1.63E-11	1.13E-04	0.00E+00	0.00E+00	2.36E-06	4.96E-08	1.44E-07	4.51E-07	1.59E-05	0.00E+00	3.40E-10	1.63E-05	4.78E-09
Baseline	Max	Moose	Indeno(1,2,3cd)pyrene	3.90E-05	3.90E-04	7.35E-12	7.29E-06	0.00E+00	4.08E-04	0.00E+00	2.31E-07	1.87E-05	5.13E-05	2.68E-03	0.00E+00	1.53E-10	2.74E-03	8.04E-07
Baseline	Max	Moose	naphthalene	8.97E-06	8.97E-05	2.99E-09	1.66E-01	0.00E+00	0.00E+00	5.09E-05	4.30E-06	3.76E-06	1.18E-05	3.63E-04	0.00E+00	6.23E-08	3.75E-04	5.57E-08
Baseline	Max	Moose	perylene	2.04E-07	2.04E-06	1.29E-12	3.98E-08	0.00E+00	2.11E-06	7.47E-08	2.29E-09	8.54E-08	2.68E-07	1.44E-05	0.00E+00	2.68E-11	1.47E-05	5.32E-09
Baseline	Max	Moose	Phenanthrene	1.31E-05	1.31E-04	3.55E-10	4.06E-04	0.00E+00	2.28E-05	4.92E-05	1.28E-06	5.51E-06	1.73E-05	4.82E-04	0.00E+00	7.39E-09	5.00E-04	1.69E-07
Baseline	Max	Moose	Pyrene	1.09E-04	1.09E-03	1.14E-09	4.91E-05	0.00E+00	1.66E-05	3.30E-05	6.19E-06	4.55E-05	1.43E-04	3.67E-04	0.00E+00	2.38E-08	5.10E-04	1.96E-07
Baseline	Max	Ruffed_Grouse	3-methylcholanthrene	6.37E-05	6.37E-04	1.19E-09	4.23E-06	0.00E+00	0.00E+00	2.57E-04	2.57E-07	2.00E+00	2.45E-06	8.51E-06	1.65E-02	5.52E-11	1.65E-02	3.00E-06
Baseline	Max	Ruffed_Grouse	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.06E-08	3.75E-05	0.00E+00	0.00E+00	5.24E-04	1.66E-06	1.87E+00	7.10E-06	1.74E-05	1.55E-02	4.95E-10	1.55E-02	3.89E-06
Baseline	Max	Ruffed_Grouse	Anthracene	8.21E-07	8.21E-06	1.82E-11	1.78E-05	0.00E+00	2.00E-06	7.62E-07	7.97E-08	2.84E-04	3.16E-08	9.40E-08	2.35E-06	8.49E-13	2.48E-06	6.17E-10
Baseline	Max	Ruffed_Grouse	Benz(a)anthracene	2.39E-05	2.39E-04	3.98E-11	1.07E-05	0.00E+00	3.11E-04	8.04E-05	4.70E-07	4.29E-06	9.18E-07	1.29E-05	3.55E-08	1.85E-12	1.39E-05	4.09E-09
Baseline	Max	Ruffed_Grouse	Benzo(a)pyrene	1.94E-05	1.94E-04	1.21E-11	5.21E-06	0.00E+00	2.07E-04	1.54E-04	2.56E-07	8.13E-06	7.45E-07	1.19E-05	6.72E-08	5.64E-13	1.27E-05	3.52E-09
Baseline	Max	Ruffed_Grouse	benzo(e)pyrene	3.24E-07	3.24E-06	8.14E-12	1.64E-07	0.00E+00	0.00E+00	1.57E-04	1.26E-09	1.36E-07	1.25E-08	5.19E-06	1.12E-09	3.79E-13	5.21E-06	9.26E-10
Baseline	Max	Ruffed_Grouse	Benzo(b)fluoranthene	5.15E-06	5.15E-05	4.92E-11	1.42E-05	0.00E+00	2.71E-05	1.85E-05	5.76E-08	2.16E-06	1.98E-07	1.51E-06	1.79E-08	2.29E-12	1.73E-06	4.60E-10
Baseline	Max	Ruffed_Grouse	Benzo(ghi)perylene	2.20E-05	2.20E-04	1.39E-10	4.86E-06	0.00E+00	2.58E-04	2.38E-03	7.67E-08	9.23E-06	8.46E-07	8.72E-05	7.63E-08	6.48E-12	8.81E-05	1.48E-08
Baseline	Max	Ruffed_Grouse	Benzo(k)fluoranthene	8.17E-05	8.17E-04	4.30E-11	6.56E-06	0.00E+00	2.68E-04	3.04E-04	9.43E-07	3.92E-05	3.14E-06	1.90E-05	3.24E-07	2.00E-12	2.24E-05	6.02E-09
Baseline	Max	Ruffed_Grouse	Chrysene	8.91E-05	8.91E-04	1.48E-10	1.29E-05	0.00E+00	1.86E-04	5.34E-06	1.75E-06	2.13E-05	3.42E-06	6.37E-06	1.76E-07	6.91E-12	9.97E-06	2.93E-09
Baseline	Max	Ruffed_Grouse	Dibenz(ah)anthracene	5.09E-05	5.09E-04	8.78E-12	6.89E-06	0.00E+00	3.66E-04	0.00E+00	3.45E-07	2.13E-05	1.96E-06	1.21E-05	1.76E-07	4.08E-13	1.42E-05	3.25E-09
Baseline	Max	Ruffed_Grouse	Fluoranthene	1.09E-05	1.09E-04	9.89E-11	6.93E-05	0.00E+00	3.11E-05	4.08E-05	5.43E-07	4.56E-06	4.18E-07	2.40E-06	3.77E-08	4.60E-12	2.85E-06	8.25E-10
Baseline	Max	Ruffed_Grouse	fluorene	3.43E-07	3.43E-06	1.63E-11	1.13E-04	0.00E+00	0.00E+00	2.36E-06	4.96E-08	1.44E-07	1.32E-08	7.96E-08	1.19E-09	7.60E-13	9.40E-08	2.03E-11
Baseline	Max	Ruffed_Grouse	Indeno(1,2,3cd)pyrene	3.90E-05	3.90E-04	7.35E-12	7.29E-06	0.00E+00	4.08E-04	0.00E+00	2.31E-07	1.87E-05	1.50E-06	1.35E-05	1.54E-07	3.42E-13	1.51E-05	3.28E-09
Baseline	Max	Ruffed_Grouse	naphthalene	8.97E-06	8.97E-05	2.99E-09	1.66E-01	0.00E+00	0.00E+00	5.09E-05	4.30E-06	3.76E-06	3.45E-07	1.82E-06	3.11E-08	1.39E-10	2.20E-06	2.41E-10
Baseline	Max	Ruffed_Grouse	perylene	2.04E-07	2.04E-06	1.29E-12	3.98E-08	0.00E+00	2.11E-06	7.47E-08	2.29E-09	8.54E-08	7.83E-09	7.24E-08	7.06E-10	6.00E-14	8.09E-08	2.16E-11
Baseline	Max	Ruffed_Grouse	Phenanthrene	1.31E-05	1.31E-04	3.55E-10	4.06E-04	0.00E+00	2.28E-05	4.92E-05	1.28E-06	5.51E-06	5.05E-07	2.42E-06	4.55E-08	1.65E-11	2.97E-06	7.41E-10
Baseline	Max	Ruffed_Grouse	Pyrene	1.09E-04	1.09E-03	1.14E-09	4.91E-05	0.00E+00	1.66E-05	3.30E-05	6.19E-06	4.55E-05	4.17E-06	1.84E-06	3.76E-07	5.32E-11	6.39E-06	1.81E-09
Baseline	Max	Snowshoe_Hare	3-methylcholanthrene	6.37E-05	6.37E-04	1.19E-09	4.23E-06	0.00E+00	0.00E+00	2.57E-04	2.57E-07	2.00E+00	4.49E-06	2.88E-05	0.00E+00	1.59E-10	3.33E-05	8.19E-09
Baseline	Max	Snowshoe_Hare	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.06E-08	3.75E-05	0.00E+00	0.00E+00	5.24E-04	1.66E-06	1.87E+00	1.30E-05	5.87E-05	0.00E+00	1.42E-09	7.17E-05	2.44E-08
Baseline	Max	Snowshoe_Hare	Anthracene	8.21E-07	8.21E-06	1.82E-11	1.78E-05	0.00E+00	2.00E-06	7.62E-07	7.97E-08	2.84E-04	5.78E-08	3.18E-07	0.00E+00	2.45E-12	3.76E-07	1.27E-10
Baseline	Max	Snowshoe_Hare	Benz(a)anthracene	2.39E-05	2.39E-04	3.98E-11	1.07E-05	0.00E+00	3.11E-04	8.04E-05	4.70E-07	4.29E-06	1.68E-06	4.38E-05	0.00E+00	5.34E-12	4.55E-05	1.82E-08
Baseline	Max	Snowshoe_Hare	Benzo(a)pyrene	1.94E-05	1.94E-04	1.21E-11	5.21E-06	0.00E+00	2.07E-04	1.54E-04	2.56E-07	8.13E-06	1.37E-06	4.03E-05	0.00E+00	1.62E-12	4.17E-05	1.57E-08
Baseline	Max	Snowshoe_Hare	benzo(e)pyrene	3.24E-07	3.24E-06	8.14E-12	1.64E-07	0.00E+00	0.00E+00	1.57E-04	1.26E-09	1.36E-07	2.28E-08	1.76E-05	0.00E+00	1.09E-12	1.76E-05	4.24E-09
Baseline	Max	Snowshoe_Hare	Benzo(b)fluoranthene	5.15E-06	5.15E-05	4.92E-11	1.42E-05	0.00E+00	2.71E-05	1.85E-05	5.76E-08	2.16E-06	3.63E-07	5.11E-06	0.00E+00	6.59E-12	5.47E-06	1.98E-09
Baseline	Max	Snowshoe_Hare	Benzo(ghi)perylene	2.20E-05	2.20E-04	1.39E-10	4.86E-06	0.00E+00	2.58E-04	2.38E-03	7.67E-08	9.23E-06	1.55E-06	2.95E-04	0.00E+00	1.87E-11	2.96E-04	6.75E-08
Baseline	Max	Snowshoe_Hare	Benzo(k)fluoranthene	8.17E-05	8.17E-04	4.30E-11	6.56E-06	0.00E+00	2.68E-04	3.04E-04	9.43E-07	3.92E-05	5.76E-06	6.41E-05	0.00E+00	5.76E-12	6.98E-05	2.55E-08
Baseline	Max	Snowshoe_Hare	Chrysene	8.91E-05	8.91E-04	1.48E-10	1.29E-05	0.00E+00	1.86E-04	5.34E-06	1.75E-06	2.13E-05	6.27E-06	2.15E-05	0.00E+00	1.99E-11	2.78E-05	1.11E-08
Baseline	Max	Snowshoe_Hare	Dibenz(ah)anthracene	5.09E-05	5.09E-04	8.78E-12	6.89E-06	0.00E+00	3.66E-04	0.00E+00	3.45E-07	2.13E-05	3.58E-06	4.09E-05	0.00E+00	1.18E-12	4.45E-05	1.38E-08
Baseline	Max	Snowshoe_Hare	Fluoranthene	1.09E-05	1.09E-04	9.89E-11	6.93E-05	0.00E+00	3.11E-05	4.08E-05	5.43E-07	4.56E-06	7.66E-07	8.11E-06	0.00E+00	1.33E-11	8.87E-06	3.48E-09
Baseline	Max	Snowshoe_Hare	fluorene	3.43E-07	3.43E-06	1.63E-11	1.13E-04	0.00E+00	0.00E+00	2.36E-06	4.96E-08	1.44E-07	2.41E-08	2.69E-07	0.00E+00	2.19E-12	2.94E-07	8.59E-11
Baseline	Max	Snowshoe_Hare	Indeno(1,2,3cd)pyrene	3.90E-05	3.90E-04	7.35E-12	7.29E-06	0.00E+00	4.08E-04	0.00E+00	2.31E-07	1.87E-05	2.74E-06	4.56E-05	0.00E+00	9.85E-13	4.83E-05	1.42E-08
Baseline	Max	Snowshoe_Hare	naphthalene	8.97E-06	8.97E-05	2.99E-09	1.66E-01	0.00E+00	0.00E+00	5.09E-05	4.30E-06	3.76E-06	6.32E-07	6.17E-06	0.00E+00	4.01E-10	6.80E-06	1.01E-09
Baseline	Max	Snowshoe_Hare	perylene	2.04E-07	2.04E-06	1.29E-12	3.98E-08	0.00E+00	2.11E-06	7.47E-08	2.29E-09	8.54E-08	1.43E-08	2.45E-07	0.00E+00	1.73E-13	2.59E-07	9.39E-11
Baseline	Max	Snowshoe_Hare	Phenanthrene	1.31E-05	1.31E-04	3.55E-10	4.06E-04	0.00E+00	2.28E-05	4.92E-05	1.28E-06	5.51E-06	9.26E-07	8.19E-06	0.00E+00	4.76E-11	9.12E-06	3.08E-09
Baseline	Max	Snowshoe_Hare	Pyrene	1.09E-04	1.09E-03	1.14E-09	4.91E-05	0.00E+00	1.66E-05	3.30E-05	6.19E-06	4.55E-05	7.65E-06	6.23E-06	0.00E+00	1.53E-10	1.39E-05	5.33E-09
CEA	Max	Moose	3-methylcholanthrene	6.39E-05	6.39E-04	1.19E-09	4.24E-06	0.00E+00	0.00E+00	2.58E-04	2.58E-07	2.01E+00	8.41E-05	1.70E-03	0.00E+00	2.48E-08	1.78E-03	4.39E-07
CEA	Max	Moose	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.07E-08	3.76E-05	0.00E+00	0.00E+00	5.25E-04	1.66E-06	1.88E+00	2.44E-04	3.47E-03	0.00E+00	2.22E-07	3.71E-03	1.26E-06
CEA	Max	Moose	Anthracene	9.55E-07	9.55E-06	2.12E-11	2.07E-05	0.00E+00	2.33E-06	8.86E-07	9.27E-08	3.31E-04	1.26E-06	2.18E-05	0.00E+00	4.42E-10	2.30E-05	7.78E-09
CEA	Max	Moose	Benz(a)anthracene	3.84E-05	3.84E-04	6.40E-11	1.72E-05	0.00E+00	5.00E-04	1.29E-04	7.55E-07	6.90E-06	5.06E-05	4.15E-03	0.00E+00	1.33E-09	4.20E-03	1.68E-06
CEA	Max	Moose	Benzo(a)pyrene	6.18E-05	6.18E-04	3.86E-11	1.66E-05	0.00E+00	6.58E-04	4.90E-04	8.14E-07	2.59E-05	8.13E-05	7.57E-03	0.00E+00	8.04E-10	7.65E-03	2.87E-06
CEA	Max	Moose	benzo(e)pyrene	3.79E-07	3.79E-06	9.53E-12	1.92E-07	0.00E+00	0.00E+00	1.84E-04	1.47E-09	1.59E-07	5.00E-07	1.21E-03	0.00E+00	1.98E-10	1.21E-03	2.92E-07
CEA	Max	Moose	Benzo(b)fluoranthene	6.60E-06	6.60E-05	6.30E-11	1.82E-05	0.00E+00	3.48E-05	2.37E-05	7.38E-08	2.77E-06	8.70E-06	3.85E-04	0.00E+00	1.31E-09	3.94E-04	1.43E-07
CEA	Max	Moose	Benzo(ghi)perylene	7.43E-05	7.43E-04	4.70E-10	1.64E-05	0.00E+00	8.71E-04	8.03E-03	2.59E-07	3.11E-05	9.78E-05	5.86E-02	0.00E+00	9.78E-09	5.87E-02	1.34E-05
CEA	Max	Moose	Benzo(k)fluoranthene	2.06E-04	2.06E-03	1.08E-10	1.65E-05	0.00E+00	6.74E-04	7.66E-04	2.37E-06	9.85E-05	2.71E-04	9.49E-03	0.00E+00	2.25E-09	9.77E-03	3.56E-06
CEA	Max	Moose	Chrysene	1.26E-04	1.26E-03	2.11E-10	1.83E-05	0.00E+00	2.63E-04	7.58E-06	2.48E-06	3.03E-05	1.66E-04	1.80E-03	0.00E+00	4.38E-09	1.97E-03	7.85E-07
CEA	Max	Moose	Dibenz(ah)anthracene	1.26E-04	1.26E-03	2.18E-11	1.71E-05	0.00E+00	9.08E-04	0.00E+00	8.56E-07	5.30E-05	1.66E-04	5.98E-03	0.00E+00	4.53E-10	6.15E-03	1.90E-06
CEA	Max	Moose	Fluoranthene	1.18E-05	1.18E-04	1.07E-10	7.51E-05	0.00E+00	3.38E-05	4.43E-05	5.88E-07	4.94E-06	1.55E-05	5.18E-04	0.00E+00	2.23E-09	5.33E-04	2.09E-07
CEA	Max	Moose	fluorene	4.00E-07	4.00E-06	1.91E-11	1.32E-04	0.00E+00	0.00E+00	2.76E-06	5.79E-08	1.68E-07	5.27E-07	1.85E-05	0.00E+00	3.97E-10	1.91E-05	5.58E-09
CEA	Max	Moose	Indeno(1,2,3cd)pyrene	9.03E-05	9.03E-04	1.70E-11	1.69E-05	0.00E+00	9.45E-04	0.00E+00	5.36E-07	4.33E-05	1.19E-04	6.22E-03	0.00E+00	3.55E-10	6.34E-03	1.86E-06
CEA	Max	Moose	naphthalene	1.02E-05	1.02E-04	3.39E-09	1.88E-01	0.00E+00	0.00E+00	5.76E-05	4.87E-06	4.26E-06	1.34E-05	4.11E-04	0.00E+00	7.05E-08	4.25E-04	6.31E-08
CEA	Max	Moose	perylene	2.32E-07	2.32E-06	1.47E-12	4.54E-08	0.00E+00	2.41E-06	8.52E-08	2.61E-09	9.74E-08	3.06E-07	1.64E-05	0.00E+00	3.06E-11	1.68E-05	6.07E-09

Table 4D-5: Summary of predicted tissue concentrations for each receptor, scenario, location and chemical

									Dietary Concentrations Concentrations				EDI					
Scenario	Site	Receptor	Chemical	Soil mg/kg	Surface Soil mg/kg	Surface Water mg/L	Air mg/m3	Deposition mg/m2/yr	Browse Deposition mg/kg dw	Browse Air mg/kg dw	Browse Aboveground mg/kg dw	Invertebrate Terrestrial mg/kg dw	Soil EDI mg/day	Browse EDI mg/day	Invertebrate EDI mg/day	Water EDI mg/day	Total EDI mg/day	Tissue Concentration mg/kg ww
CEA	Max	Moose	Phenanthrene	1.49E-05	1.49E-04	4.03E-10	4.61E-04	0.00E+00	2.59E-05	5.59E-05	1.45E-06	6.26E-06	1.96E-05	5.48E-04	0.00E+00	8.40E-09	5.67E-04	1.92E-07
CEA	Max	Moose	Pyrene	1.19E-04	1.19E-03	1.25E-09	5.37E-05	0.00E+00	1.81E-05	3.61E-05	6.77E-06	4.98E-05	1.56E-04	4.01E-04	0.00E+00	2.60E-08	5.58E-04	2.14E-07
CEA	Max	Ruffed_Grouse	3-methylcholanthrene	6.39E-05	6.39E-04	1.19E-09	4.24E-06	0.00E+00	0.00E+00	2.58E-04	2.58E-07	2.01E+00	2.45E-06	8.53E-06	1.66E-02	5.54E-11	1.66E-02	3.01E-06
CEA	Max	Ruffed_Grouse	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.07E-08	3.76E-05	0.00E+00	0.00E+00	5.25E-04	1.66E-06	1.88E+00	7.12E-06	1.74E-05	1.55E-02	4.96E-10	1.55E-02	3.90E-06
CEA	Max	Ruffed_Grouse	Anthracene	9.55E-07	9.55E-06	2.12E-11	2.07E-05	0.00E+00	2.33E-06	8.86E-07	9.27E-08	3.31E-04	3.67E-08	1.09E-07	2.73E-06	9.88E-13	2.88E-06	7.17E-10
CEA	Max	Ruffed_Grouse	Benz(a)anthracene	3.84E-05	3.84E-04	6.40E-11	1.72E-05	0.00E+00	5.00E-04	1.29E-04	7.55E-07	6.90E-06	1.48E-06	2.08E-05	5.70E-08	2.98E-12	2.23E-05	6.57E-09
CEA	Max	Ruffed_Grouse	Benzo(a)pyrene	6.18E-05	6.18E-04	3.86E-11	1.66E-05	0.00E+00	6.58E-04	4.90E-04	8.14E-07	2.59E-05	2.37E-06	3.80E-05	2.14E-07	1.80E-12	4.06E-05	1.12E-08
CEA	Max	Ruffed_Grouse	benzo(e)pyrene	3.79E-07	3.79E-06	9.53E-12	1.92E-07	0.00E+00	0.00E+00	1.84E-04	1.47E-09	1.59E-07	1.46E-08	6.08E-06	1.31E-09	4.44E-13	6.10E-06	1.08E-09
CEA	Max	Ruffed_Grouse	Benzo(b)fluoranthene	6.60E-06	6.60E-05	6.30E-11	1.82E-05	0.00E+00	3.48E-05	2.37E-05	7.38E-08	2.77E-06	2.54E-07	1.94E-06	2.29E-08	2.93E-12	2.21E-06	5.90E-10
CEA	Max	Ruffed_Grouse	Benzo(ghi)perylene	7.43E-05	7.43E-04	4.70E-10	1.64E-05	0.00E+00	8.71E-04	8.03E-03	2.59E-07	3.11E-05	2.85E-06	2.94E-04	2.57E-07	2.19E-11	2.97E-04	4.99E-08
CEA	Max	Ruffed_Grouse	Benzo(k)fluoranthene	2.06E-04	2.06E-03	1.08E-10	1.65E-05	0.00E+00	6.74E-04	7.66E-04	2.37E-06	9.85E-05	7.90E-06	4.77E-05	8.14E-07	5.04E-12	5.64E-05	1.52E-08
CEA	Max	Ruffed_Grouse	Chrysene	1.26E-04	1.26E-03	2.11E-10	1.83E-05	0.00E+00	2.63E-04	7.58E-06	2.48E-06	3.03E-05	4.86E-06	9.03E-06	2.50E-07	9.80E-12	1.41E-05	4.16E-09
CEA	Max	Ruffed_Grouse	Dibenz(ah)anthracene	1.26E-04	1.26E-03	2.18E-11	1.71E-05	0.00E+00	9.08E-04	0.00E+00	8.56E-07	5.30E-05	4.85E-06	3.00E-05	4.38E-07	1.01E-12	3.53E-05	8.06E-09
CEA	Max	Ruffed_Grouse	Fluoranthene	1.18E-05	1.18E-04	1.07E-10	7.51E-05	0.00E+00	3.38E-05	4.43E-05	5.88E-07	4.94E-06	4.53E-07	2.60E-06	4.08E-08	4.99E-12	3.09E-06	8.94E-10
CEA	Max	Ruffed_Grouse	fluorene	4.00E-07	4.00E-06	1.91E-11	1.32E-04	0.00E+00	0.00E+00	2.76E-06	5.79E-08	1.68E-07	1.54E-08	9.30E-08	1.39E-09	8.88E-13	1.10E-07	2.37E-11
CEA	Max	Ruffed_Grouse	Indeno(1,2,3cd)pyrene	9.03E-05	9.03E-04	1.70E-11	1.69E-05	0.00E+00	9.45E-04	0.00E+00	5.36E-07	4.33E-05	3.47E-06	3.12E-05	3.58E-07	7.93E-13	3.51E-05	7.60E-09
CEA	Max	Ruffed_Grouse	naphthalene	1.02E-05	1.02E-04	3.39E-09	1.88E-01	0.00E+00	0.00E+00	5.76E-05	4.87E-06	4.26E-06	3.91E-07	2.07E-06	3.52E-08	1.58E-10	2.49E-06	2.73E-10
CEA	Max	Ruffed_Grouse	perylene	2.32E-07	2.32E-06	1.47E-12	4.54E-08	0.00E+00	2.41E-06	8.52E-08	2.61E-09	9.74E-08	8.93E-09	8.26E-08	8.05E-10	6.85E-14	9.23E-08	2.47E-11
CEA	Max	Ruffed_Grouse	Phenanthrene	1.49E-05	1.49E-04	4.03E-10	4.61E-04	0.00E+00	2.59E-05	5.59E-05	1.45E-06	6.26E-06	5.73E-07	2.75E-06	5.17E-08	1.88E-11	3.38E-06	8.41E-10
CEA	Max	Ruffed_Grouse	Pyrene	1.19E-04	1.19E-03	1.25E-09	5.37E-05	0.00E+00	1.81E-05	3.61E-05	6.77E-06	4.98E-05	4.56E-06	2.02E-06	4.11E-07	5.82E-11	6.99E-06	1.98E-09
CEA	Max	Snowshoe_Hare	3-methylcholanthrene	6.39E-05	6.39E-04	1.19E-09	4.24E-06	0.00E+00	0.00E+00	2.58E-04	2.58E-07	2.01E+00	4.50E-06	2.89E-05	0.00E+00	1.59E-10	3.34E-05	8.21E-09
CEA	Max	Snowshoe_Hare	7,12-dimethylbenz(a)anthracene	1.85E-04	1.85E-03	1.07E-08	3.76E-05	0.00E+00	0.00E+00	5.25E-04	1.66E-06	1.88E+00	1.30E-05	5.89E-05	0.00E+00	1.43E-09	7.19E-05	2.45E-08
CEA	Max	Snowshoe_Hare	Anthracene	9.55E-07	9.55E-06	2.12E-11	2.07E-05	0.00E+00	2.33E-06	8.86E-07	9.27E-08	3.31E-04	6.73E-08	3.70E-07	0.00E+00	2.84E-12	4.37E-07	1.48E-10
CEA	Max	Snowshoe_Hare	Benz(a)anthracene	3.84E-05	3.84E-04	6.40E-11	1.72E-05	0.00E+00	5.00E-04	1.29E-04	7.55E-07	6.90E-06	2.71E-06	7.04E-05	0.00E+00	8.58E-12	7.31E-05	2.92E-08
CEA	Max	Snowshoe_Hare	Benzo(a)pyrene	6.18E-05	6.18E-04	3.86E-11	1.66E-05	0.00E+00	6.58E-04	4.90E-04	8.14E-07	2.59E-05	4.35E-06	1.28E-04	0.00E+00	5.17E-12	1.33E-04	4.99E-08
CEA	Max	Snowshoe_Hare	benzo(e)pyrene	3.79E-07	3.79E-06	9.53E-12	1.92E-07	0.00E+00	0.00E+00	1.84E-04	1.47E-09	1.59E-07	2.67E-08	2.06E-05	0.00E+00	1.28E-12	2.06E-05	4.97E-09
CEA	Max	Snowshoe_Hare	Benzo(b)fluoranthene	6.60E-06	6.60E-05	6.30E-11	1.82E-05	0.00E+00	3.48E-05	2.37E-05	7.38E-08	2.77E-06	4.65E-07	6.54E-06	0.00E+00	8.45E-12	7.01E-06	2.54E-09
CEA	Max	Snowshoe_Hare	Benzo(ghi)perylene	7.43E-05	7.43E-04	4.70E-10	1.64E-05	0.00E+00	8.71E-04	8.03E-03	2.59E-07	3.11E-05	5.23E-06	9.95E-04	0.00E+00	6.30E-11	1.00E-03	2.28E-07
CEA	Max	Snowshoe_Hare	Benzo(k)fluoranthene	2.06E-04	2.06E-03	1.08E-10	1.65E-05	0.00E+00	6.74E-04	7.66E-04	2.37E-06	9.85E-05	1.45E-05	1.61E-04	0.00E+00	1.45E-11	1.76E-04	6.41E-08
CEA	Max	Snowshoe_Hare	Chrysene	1.26E-04	1.26E-03	2.11E-10	1.83E-05	0.00E+00	2.63E-04	7.58E-06	2.48E-06	3.03E-05	8.90E-06	3.06E-05	0.00E+00	2.82E-11	3.94E-05	1.58E-08
CEA	Max	Snowshoe_Hare	Dibenz(ah)anthracene	1.26E-04	1.26E-03	2.18E-11	1.71E-05	0.00E+00	9.08E-04	0.00E+00	8.56E-07	5.30E-05	8.90E-06	1.02E-04	0.00E+00	2.92E-12	1.10E-04	3.42E-08
CEA	Max	Snowshoe_Hare	Fluoranthene	1.18E-05	1.18E-04	1.07E-10	7.51E-05	0.00E+00	3.38E-05	4.43E-05	5.88E-07	4.94E-06	8.30E-07	8.79E-06	0.00E+00	1.44E-11	9.62E-06	3.77E-09
CEA	Max	Snowshoe_Hare	fluorene	4.00E-07	4.00E-06	1.91E-11	1.32E-04	0.00E+00	0.00E+00	2.76E-06	5.79E-08	1.68E-07	2.82E-08	3.15E-07	0.00E+00	2.56E-12	3.43E-07	1.00E-10
CEA	Max	Snowshoe_Hare	Indeno(1,2,3cd)pyrene	9.03E-05	9.03E-04	1.70E-11	1.69E-05	0.00E+00	9.45E-04	0.00E+00	5.36E-07	4.33E-05	6.36E-06	1.06E-04	0.00E+00	2.28E-12	1.12E-04	3.29E-08
CEA	Max	Snowshoe_Hare	naphthalene	1.02E-05	1.02E-04	3.39E-09	1.88E-01	0.00E+00	0.00E+00	5.76E-05	4.87E-06	4.26E-06	7.16E-07	6.98E-06	0.00E+00	4.54E-10	7.70E-06	1.14E-09
CEA	Max	Snowshoe_Hare	perylene	2.32E-07	2.32E-06	1.47E-12	4.54E-08	0.00E+00	2.41E-06	8.52E-08	2.61E-09	9.74E-08	1.64E-08	2.79E-07	0.00E+00	1.97E-13	2.96E-07	1.07E-10
CEA	Max	Snowshoe_Hare	Phenanthrene	1.49E-05	1.49E-04	4.03E-10	4.61E-04	0.00E+00	2.59E-05	5.59E-05	1.45E-06	6.26E-06	1.05E-06	9.30E-06	0.00E+00	5.40E-11	1.04E-05	3.50E-09
CEA	Max	Snowshoe_Hare	Pyrene	1.19E-04	1.19E-03	1.25E-09	5.37E-05	0.00E+00	1.81E-05	3.61E-05	6.77E-06	4.98E-05	8.36E-06	6.82E-06	0.00E+00	1.68E-10	1.52E-05	5.83E-09
Background	Max	Moose	3-methylcholanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Background	Max	Moose	7,12-dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Background	Max	Moose	Anthracene	5.69E-05	5.69E-04	2.00E-05	1.23E-03	0.00E+00	1.39E-04	5.28E-05	5.52E-06	1.97E-02	7.50E-05	1.30E-03	0.00E+00	4.16E-04	1.79E-03	6.05E-07
Background	Max	Moose	Benz(a)anthracene	1.31E-04	1.31E-03	5.00E-05	5.88E-05	0.00E+00	1.71E-03	4.42E-04	2.58E-06	2.36E-05	1.73E-04	1.42E-02	0.00E+00	1.04E-03	1.54E-02	6.14E-06
Background	Max	Moose	Benzo(a)pyrene	2.72E-04	2.72E-03	3.00E-05	7.30E-05	0.00E+00	2.90E-03	2.15E-03	3.58E-06	1.14E-04	3.58E-04	3.33E-02	0.00E+00	6.25E-04	3.43E-02	1.29E-05
Background	Max	Moose	benzo(e)pyrene	1.75E-04	1.75E-03	4.40E-09	8.86E-05	0.00E+00	0.00E+00	8.49E-02	6.78E-07	7.34E-05	2.30E-04	5.59E-01	0.00E+00	9.15E-08	5.59E-01	1.35E-04
Background	Max	Moose	Benzo(b)fluoranthene	3.43E-05	3.43E-04	1.00E-05	9.45E-05	0.00E+00	1.81E-04	1.23E-04	3.83E-07	1.44E-05	4.52E-05	2.00E-03	0.00E+00	2.08E-04	2.26E-03	8.16E-07
Background	Max	Moose	Benzo(ghi)perylene	3.57E-04	3.57E-03	5.00E-05	7.89E-05	0.00E+00	4.19E-03	3.86E-02	1.24E-06	1.50E-04	4.70E-04	2.82E-01	0.00E+00	1.04E-03	2.83E-01	6.46E-05
Background	Max	Moose	Benzo(k)fluoranthene	1.18E-03	1.18E-02	1.00E-05	9.45E-05	0.00E+00	3.86E-03	4.39E-03	1.36E-05	5.64E-04	1.55E-03	5.44E-02	0.00E+00	2.08E-04	5.62E-02	2.05E-05
Background	Max	Moose	Chrysene	7.18E-04	7.18E-03	2.00E-05	1.04E-04	0.00E+00	1.50E-03	4.31E-05	1.41E-05	1.72E-04	9.46E-04	1.02E-02	0.00E+00	4.16E-04	1.16E-02	4.63E-06
Background	Max	Moose	Dibenz(ah)anthracene	2.59E-04	2.59E-03	5.00E-05	3.50E-05	0.00E+00	1.86E-03	0.00E+00	1.75E-06	1.08E-04	3.40E-04	1.22E-02	0.00E+00	1.04E-03	1.36E-02	4.22E-06
Background	Max	Moose	Fluoranthene	1.61E-04	1.61E-03	2.00E-05	1.02E-03	0.00E+00	4.60E-04	6.03E-04	8.01E-06	6.74E-05	2.12E-04	7.05E-03	0.00E+00	4.16E-04	7.68E-03	3.01E-06
Background	Max	Moose	fluorene	7.05E-06	7.05E-05	5.00E-05	2.32E-03	0.00E+00	0.00E+00	4.85E-05	1.02E-06	2.96E-06	9.28E-06	3.26E-04	0.00E+00	1.04E-03	1.38E-03	4.03E-07
Background	Max	Moose	Indeno(1,2,3cd)pyrene	3.74E-04	3.74E-03	5.00E-05	7.00E-05	0.00E+00	3.91E-03	0.00E+00	2.22E-06	1.79E-04	4.93E-04	2.58E-02	0.00E+00	1.04E-03	2.73E-02	8.03E-06
Background	Max	Moose	naphthalene	1.48E-07	1.48E-06	5.00E-05	2.73E-03	0.00E+00	0.00E+00	8.37E-07	7.08E-08	6.19E-08	1.95E-07	5.98E-06	0.00E+00	1.04E-03	1.05E-03	1.55E-07
Background	Max	Moose	perylene	1.02E-04	1.02E-03	2.00E-05	2.00E-05	0.00E+00	1.06E-03	3.75E-05	1.15E-06	4.29E-05	1.35E-04	7.25E-03	0.00E+00	4.16E-04	7.80E-03	2.83E-06
Background	Max	Moose	Phenanthrene	5.07E-04	5.07E-03	1.00E-05	1.57E-02	0.00E+00	8.80E-04	1.90E-03	4.92E-05	2.13E-04	6.68E-04	1.86E-02	0.00E+00	2.08E-04	1.95E-02	6.59E-06
Background	Max	Moose	Pyrene	4.25E-03	4.25E-02	1.00E-05	1.92E-03	0.00E+00	6.48E-04	1.29E-03	2.42E-04	1.78E-03	5.60E-03	1.44E-02	0.00E+00	2.09E-04	2.02E-02	7.76E-06
Background	Max	Ruffed_Grouse	3-methylcholanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Background	Max	Ruffed_Grouse	7,12-dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Background	Max	Ruffed_Grouse	Anthracene	5.69E-05	5.69E-04	2.00E-05	1.23E-03	0.00E+00	1.39E-04	5.28E-05	5.52E-06	1.97E-02	2.19E-06	6.51E-06	1.63E-04	9.31E-07	1.73E-04	4.30E-08
Background	Max	Ruffed_Grouse	Benz(a)anthracene	1.31E-04	1.31E-03	5.00E-05	5.88E-05	0.00E+00	1.71E-03	4.42E-04	2.58E-06	2.36E-05	5.04E-06	7.11E-05	1.95E-07	2.33E-06	7.87E-05	2.31E-08
Background	Max	Ruffed_Grouse	Benzo(a)pyrene	2.72E-04	2.72E-03	3.00E-05	7.30E-05	0.00E+00	2.90E-03	2.15E-03	3.58E-06	1.14E-04	1.04E-05	1.67E-04	9.41E-07	1.40E-06	1.80E-04	4.98E-08

Table 4D-5: Summary of predicted tissue concentrations for each receptor, scenario, location and chemical

									Dietary Concentrations Concentrations				EDI					
						Surface			Browse	Browse	Browse	Invertebrate	Soil	Browse	Invertebrate	Water	Total	Tissue
				Soil	Surface Soil	Water	Air	Deposition	Deposition	Air	Aboveground	Terrestrial	EDI	EDI	EDI	EDI	EDI	Concentration
Scenario	Site	Receptor	Chemical	mg/kg	mg/kg	mg/L	mg/m3	mg/m2/yr	mg/kg dw	mg/kg dw	mg/kg dw	mg/kg dw	mg/day	mg/day	mg/day	mg/day	mg/day	mg/kg ww
Background	Max	Ruffed_Grouse	benzo(e)pyrene	1.75E-04	1.75E-03	4.40E-09	8.86E-05	0.00E+00	0.00E+00	8.49E-02	6.78E-07	7.34E-05	6.72E-06	2.81E-03	6.06E-07	2.05E-10	2.81E-03	5.00E-07
Background	Max	Ruffed_Grouse	Benzo(b)fluoranthene	3.43E-05	3.43E-04	1.00E-05	9.45E-05	0.00E+00	1.81E-04	1.23E-04	3.83E-07	1.44E-05	1.32E-06	1.01E-05	1.19E-07	4.65E-07	1.20E-05	3.19E-09
Background	Max	Ruffed_Grouse	Benzo(ghi)perylene	3.57E-04	3.57E-03	5.00E-05	7.89E-05	0.00E+00	4.19E-03	3.86E-02	1.24E-06	1.50E-04	1.37E-05	1.41E-03	1.24E-06	2.33E-06	1.43E-03	2.41E-07
Background	Max	Ruffed_Grouse	Benzo(k)fluoranthene	1.18E-03	1.18E-02	1.00E-05	9.45E-05	0.00E+00	3.86E-03	4.39E-03	1.36E-05	5.64E-04	4.53E-05	2.73E-04	4.66E-06	4.66E-07	3.24E-04	8.69E-08
Background	Max	Ruffed_Grouse	Chrysene	7.18E-04	7.18E-03	2.00E-05	1.04E-04	0.00E+00	1.50E-03	4.31E-05	1.41E-05	1.72E-04	2.76E-05	5.13E-05	1.42E-06	9.31E-07	8.13E-05	2.39E-08
Background	Max	Ruffed_Grouse	Dibenz(ah)anthracene	2.59E-04	2.59E-03	5.00E-05	3.50E-05	0.00E+00	1.86E-03	0.00E+00	1.75E-06	1.08E-04	9.94E-06	6.15E-05	8.96E-07	2.33E-06	7.46E-05	1.70E-08
Background	Max	Ruffed_Grouse	Fluoranthene	1.61E-04	1.61E-03	2.00E-05	1.02E-03	0.00E+00	4.60E-04	6.03E-04	8.01E-06	6.74E-05	6.17E-06	3.54E-05	5.57E-07	9.31E-07	4.31E-05	1.25E-08
Background	Max	Ruffed_Grouse	fluorene	7.05E-06	7.05E-05	5.00E-05	2.32E-03	0.00E+00	0.00E+00	4.85E-05	1.02E-06	2.96E-06	2.71E-07	1.64E-06	2.44E-08	2.33E-06	4.26E-06	9.19E-10
Background	Max	Ruffed_Grouse	Indeno(1,2,3cd)pyrene	3.74E-04	3.74E-03	5.00E-05	7.00E-05	0.00E+00	3.91E-03	0.00E+00	2.22E-06	1.79E-04	1.44E-05	1.29E-04	1.48E-06	2.33E-06	1.48E-04	3.20E-08
Background	Max	Ruffed_Grouse	naphthalene	1.48E-07	1.48E-06	5.00E-05	2.73E-03	0.00E+00	0.00E+00	8.37E-07	7.08E-08	6.19E-08	5.68E-09	3.00E-08	5.12E-10	2.33E-06	2.36E-06	2.59E-10
Background	Max	Ruffed_Grouse	perylene	1.02E-04	1.02E-03	2.00E-05	2.00E-05	0.00E+00	1.06E-03	3.75E-05	1.15E-06	4.29E-05	3.93E-06	3.64E-05	3.55E-07	9.31E-07	4.16E-05	1.11E-08
Background	Max	Ruffed_Grouse	Phenanthrene	5.07E-04	5.07E-03	1.00E-05	1.57E-02	0.00E+00	8.80E-04	1.90E-03	4.92E-05	2.13E-04	1.95E-05	9.34E-05	1.76E-06	4.66E-07	1.15E-04	2.87E-08
Background	Max	Ruffed_Grouse	Pyrene	4.25E-03	4.25E-02	1.00E-05	1.92E-03	0.00E+00	6.48E-04	1.29E-03	2.42E-04	1.78E-03	1.63E-04	7.22E-05	1.47E-05	4.68E-07	2.51E-04	7.10E-08
Background	Max	Snowshoe_Hare	3-methylcholanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Background	Max	Snowshoe_Hare	7,12-dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Background	Max	Snowshoe_Hare	Anthracene	5.69E-05	5.69E-04	2.00E-05	1.23E-03	0.00E+00	1.39E-04	5.28E-05	5.52E-06	1.97E-02	4.01E-06	2.20E-05	0.00E+00	2.68E-06	2.87E-05	9.71E-09
Background	Max	Snowshoe_Hare	Benz(a)anthracene	1.31E-04	1.31E-03	5.00E-05	5.88E-05	0.00E+00	1.71E-03	4.42E-04	2.58E-06	2.36E-05	9.24E-06	2.40E-04	0.00E+00	6.70E-06	2.56E-04	1.02E-07
Background	Max	Snowshoe_Hare	Benzo(a)pyrene	2.72E-04	2.72E-03	3.00E-05	7.30E-05	0.00E+00	2.90E-03	2.15E-03	3.58E-06	1.14E-04	1.91E-05	5.65E-04	0.00E+00	4.02E-06	5.88E-04	2.21E-07
Background	Max	Snowshoe_Hare	benzo(e)pyrene	1.75E-04	1.75E-03	4.40E-09	8.86E-05	0.00E+00	0.00E+00	8.49E-02	6.78E-07	7.34E-05	1.23E-05	9.49E-03	0.00E+00	5.89E-10	9.50E-03	2.29E-06
Background	Max	Snowshoe_Hare	Benzo(b)fluoranthene	3.43E-05	3.43E-04	1.00E-05	9.45E-05	0.00E+00	1.81E-04	1.23E-04	3.83E-07	1.44E-05	2.42E-06	3.40E-05	0.00E+00	1.34E-06	3.78E-05	1.37E-08
Background	Max	Snowshoe_Hare	Benzo(ghi)perylene	3.57E-04	3.57E-03	5.00E-05	7.89E-05	0.00E+00	4.19E-03	3.86E-02	1.24E-06	1.50E-04	2.52E-05	4.79E-03	0.00E+00	6.70E-06	4.82E-03	1.10E-06
Background	Max	Snowshoe_Hare	Benzo(k)fluoranthene	1.18E-03	1.18E-02	1.00E-05	9.45E-05	0.00E+00	3.86E-03	4.39E-03	1.36E-05	5.64E-04	8.30E-05	9.24E-04	0.00E+00	1.34E-06	1.01E-03	3.68E-07
Background	Max	Snowshoe_Hare	Chrysene	7.18E-04	7.18E-03	2.00E-05	1.04E-04	0.00E+00	1.50E-03	4.31E-05	1.41E-05	1.72E-04	5.06E-05	1.74E-04	0.00E+00	2.68E-06	2.27E-04	9.06E-08
Background	Max	Snowshoe_Hare	Dibenz(ah)anthracene	2.59E-04	2.59E-03	5.00E-05	3.50E-05	0.00E+00	1.86E-03	0.00E+00	1.75E-06	1.08E-04	1.82E-05	2.08E-04	0.00E+00	6.70E-06	2.33E-04	7.21E-08
Background	Max	Snowshoe_Hare	Fluoranthene	1.61E-04	1.61E-03	2.00E-05	1.02E-03	0.00E+00	4.60E-04	6.03E-04	8.01E-06	6.74E-05	1.13E-05	1.20E-04	0.00E+00	2.68E-06	1.34E-04	5.25E-08
Background	Max	Snowshoe_Hare	fluorene	7.05E-06	7.05E-05	5.00E-05	2.32E-03	0.00E+00	0.00E+00	4.85E-05	1.02E-06	2.96E-06	4.96E-07	5.54E-06	0.00E+00	6.70E-06	1.27E-05	3.73E-09
Background	Max	Snowshoe_Hare	Indeno(1,2,3cd)pyrene	3.74E-04	3.74E-03	5.00E-05	7.00E-05	0.00E+00	3.91E-03	0.00E+00	2.22E-06	1.79E-04	2.63E-05	4.38E-04	0.00E+00	6.70E-06	4.71E-04	1.38E-07
Background	Max	Snowshoe_Hare	naphthalene	1.48E-07	1.48E-06	5.00E-05	2.73E-03	0.00E+00	0.00E+00	8.37E-07	7.08E-08	6.19E-08	1.04E-08	1.02E-07	0.00E+00	6.70E-06	6.81E-06	1.01E-09
Background	Max	Snowshoe_Hare	perylene	1.02E-04	1.02E-03	2.00E-05	2.00E-05	0.00E+00	1.06E-03	3.75E-05	1.15E-06	4.29E-05	7.21E-06	1.23E-04	0.00E+00	2.68E-06	1.33E-04	4.82E-08
Background	Max	Snowshoe_Hare	Phenanthrene	5.07E-04	5.07E-03	1.00E-05	1.57E-02	0.00E+00	8.80E-04	1.90E-03	4.92E-05	2.13E-04	3.57E-05	3.16E-04	0.00E+00	1.34E-06	3.53E-04	1.19E-07
Background	Max	Snowshoe_Hare	Pyrene	4.25E-03	4.25E-02	1.00E-05	1.92E-03	0.00E+00	6.48E-04	1.29E-03	2.42E-04	1.78E-03	3.00E-04	2.44E-04	0.00E+00	1.35E-06	5.45E-04	2.09E-07

Table 4D-6 Receptor exposure variables

Receptor	Variable	Abbreviation	Value	Units	Reference
Moose	BW	BW_Moose	3.81E+02	kg	Pattie and Fisher 1999
Ruffed_Grouse	BW	BW_Ruffed_Grouse	7.02E-01	kg	USEPA 1993
Snowshoe_Hare	BW	BW_Snowshoe_Hare	1.40E+00	kg	USEPA 1993
Moose	IR_f	IRf_Moose	6.58E+00	kg dry weight/day	P. 3-6, eq'n: 3-9 (USEPA 1993)
Ruffed_Grouse	IR_f	IRf_Ruffed_Grouse	4.13E-02	kg dry weight/day	P. 3-5, eq'n: 3-5 (USEPA 1993)
Snowshoe_Hare	IR_f	IRf_Snowshoe_Hare	1.12E-01	kg dry weight/day	P. 3-6, eq'n: 3-9 (USEPA 1993)
Moose	IR_w	IRw_Moose	2.08E+01	L/day	P. 3-10, eq'n: 3-17 (USEPA 1993)
Ruffed_Grouse	IR_w	IRw_Ruffed_Grouse	4.65E-02	L/day	P. 3-8, eq'n: 3-15 (USEPA 1993)
Snowshoe_Hare	IR_w	IRw_Snowshoe_Hare	1.34E-01	L/day	P. 3-10, eq'n: 3-17 (USEPA 1993)
Moose	IR_s	IRs_Moose	1.32E-01	kg/day	2.0% of food ingestion rate (Suter et al 2000)
Ruffed_Grouse	IR_s	IRs_Ruffed_Grouse	3.84E-03	kg/day	9.3% of food ingestion rate (based on Wild turkey from Suter et al 2000)
Snowshoe_Hare	IR_s	IRs_Snowshoe_Hare	7.04E-03	kg/day	6.3% of food ingestion rate (based on Black-tailed jackrabbit from Suter et al 2000)

BW = Body Weight

IRs = Ingestion rate soil

IRf = Ingestion rate food

IRw = Ingestion rate of water

Table 4D-7 Receptor dietary composition [media % of diet]

Receptor	Media	Abbreviation	Value
Moose	Browse	Moose_Browse	100%
Moose	Invertebrate	Moose_Invertebrate	0%
Ruffed_Grouse	Browse	Ruffed_Grouse_Browse	80%
Ruffed_Grouse	Invertebrate	Ruffed_Grouse_Invertebrate	20%
Snowshoe_Hare	Browse	Snowshoe_Hare_Browse	100%
Snowshoe_Hare	Invertebrate	Snowshoe_Hare_Invertebrate	0%

Table 4D-8 Vapour pressure [mmHg]

Chemical	Value	VP[atm]	VP[Pa]	VP[kPa]	Reference
3-methylcholanthrene	7.73E-10	1.02E-12	1.03E-07	1.03E-10	Mackay et al 1992
7,12-dimethylbenz(a)anthracene	2.69E-08	3.53E-11	3.58E-06	3.58E-09	Mackay et al 1992; mean of values
Anthracene	2.70E-06	3.55E-09	3.60E-04	3.60E-07	US EPA OSW 2005
Benz(a)anthracene	1.10E-07	1.45E-10	1.47E-05	1.47E-08	US EPA OSW 2005
Benzo(a)pyrene	5.50E-09	7.24E-12	7.34E-07	7.34E-10	US EPA OSW 2005
benzo(e)pyrene	6.60E-08	8.68E-11	8.80E-06	8.80E-09	Mackay et al 1992; mean of values
Benzo(b)fluoranthene	5.00E-07	6.58E-10	6.67E-05	6.67E-08	US EPA OSW 2005
Benzo(ghi)perylene	1.33E-09	1.75E-12	1.775E-07	1.78E-10	Mackay et al 1992
Benzo(k)fluoranthene	2.00E-09	2.63E-12	2.66E-07	2.66E-10	US EPA OSW 2005
Chrysene	6.20E-09	8.16E-12	8.27E-07	8.27E-10	US EPA OSW 2005
Dibenz(ah)anthracene	1.00E-10	1.32E-13	1.34E-08	1.34E-11	US EPA OSW 2005
Fluoranthene	7.83E-06	1.03E-08	1.04E-03	1.04E-06	US EPA OSW 2005
Fluorene	6.30E-04	8.29E-07	8.40E-02	8.40E-05	US EPA OSW 2006
Indeno(1,2,3cd)pyrene	1.00E-10	1.32E-13	1.34E-08	1.34E-11	US EPA OSW 2005
naphthalene	8.51E-02	0.000112	1.13E+01	1.13E-02	US EPA OSW 2006
Phenanthrene	1.10E-04	1.45E-07	1.47E-02	1.47E-05	US EPA OSW 2005
perylene	3.98E-11	5.24E-14	5.31E-09	5.31E-12	Mackay et al 1992
Pyrene	4.60E-06	6.05E-09	6.13E-04	6.13E-07	US EPA OSW 2005

Table 4D-9 Solubility [mg/L] or [ppm]

Chemical	Value	S[kg/m3]	Reference
3-methylcholanthrene	0.009	9.00E-06	Mackay et al 1992; mean
7,12-dimethylbenz(a)anthracene	0.07	7.00E-05	Mackay et al 1992;mean
Anthracene	4.30E-02	4.30E-05	US EPA OSW 2005
Benz(a)anthracene	9.40E-03	9.40E-06	US EPA OSW 2005
Benzo(a)pyrene	1.60E-03	1.60E-06	US EPA OSW 2005
Benzo(e)pyrene	5.00E-03	5.00E-06	Mackay et al 1992; mean
Benzo(b)fluoranthene	1.50E-03	1.50E-06	US EPA OSW 2005
Benzo(ghi)perylene	2.60E-04	2.60E-07	Mackay et al 1992
Benzo(k)fluoranthene	8.00E-04	8.00E-07	US EPA OSW 2005
Chrysene	6.30E-03	6.30E-06	US EPA OSW 2005
Dibenz(ah)anthracene	2.50E-03	2.50E-06	US EPA OSW 2005
Fluoranthene	2.10E-01	2.10E-04	US EPA OSW 2005
fluorene	2.00E+00	2.00E-03	US EPA OSW 2006
Indeno(1,2,3cd)pyrene	2.20E-05	2.20E-08	US EPA OSW 2005
naphthalene	3.10E+01	3.10E-02	US EPA OSW 2006
perylene	4.00E-04	4.00E-07	Mackay et al 1992; mean
Phenanthrene	1.10E+00	1.10E-03	US EPA OSW 2005
Pyrene	1.40E+00	1.40E-03	US EPA OSW 2005

Table 4D-10 Koc [(mg/g) / (mg/mL)] or [L/kg]

Chemical	Value	Log(Koc)	Reference
3-methylcholanthrene	5.37E+05	5.73E+00	Mackay et al 1992; mean
7,12-dimethylbenz(a)anthracene	1.74E+05	5.24E+00	Mackay et al 1992; mean
Anthracene	2.35E+04	4.37E+00	US EPA OSW 2005
Benz(a)anthracene	3.58E+05	5.55E+00	US EPA OSW 2005
Benzo(a)pyrene	9.69E+05	5.99E+00	US EPA OSW 2005
benzo(e)pyrene	3.98E+05	5.60E+00	Mackay et al 1992; mean
Benzo(b)fluoranthene	1.05E+06	6.02E+00	US EPA OSW 2005
Benzo(ghi)perylene	1.58E+06	6.20E+00	Mackay et al 1992
Benzo(k)fluoranthene	9.92E+05	6.00E+00	US EPA OSW 2005
Chrysene	4.01E+05	5.60E+00	US EPA OSW 2005
Dibenz(ah)anthracene	1.79E+06	6.25E+00	US EPA OSW 2005
Fluoranthene	4.91E+04	4.69E+00	US EPA OSW 2005
fluorene	7.71E+03	3.89E+00	US EPA OSW 2005
Indeno(1,2,3cd)pyrene	3.08E+06	6.49E+00	US EPA OSW 2005
naphthalene	1.19E+03	3.08E+00	US EPA OSW 2005
perylene	1.58E+06	6.20E+00	Mackay et al 1992; assumed benzo(ghi)perylene as a surrogate
Phenanthrene	2.65E+04	4.42E+00	US EPA OSW 2005
Pyrene	6.80E+04	4.83E+00	US EPA OSW 2005

Table 4D-11   Fraction of Chemical in the Vapour Phase

Chemical	Value	Reference
3-methylcholanthrene	100%	Assumed
7,12-dimethylbenz(a)anthracene	100%	Assumed
Anthracene	100%	US EPA OSW 2005
Benz(a)anthracene	48%	US EPA OSW 2005
Benzo(a)pyrene	29%	US EPA OSW 2005
benzo(e)pyrene	100%	Assumed
Benzo(b)fluoranthene	97%	US EPA OSW 2005
Benzo(ghi)perylene	6%	Assumed dibenz(a,h)anthracene as a surrogate
Benzo(k)fluoranthene	27%	US EPA OSW 2005
Chrysene	74%	US EPA OSW 2005
Dibenz(ah)anthracene	6%	US EPA OSW 2005
Fluoranthene	99%	US EPA OSW 2005
fluorene	100%	US EPA OSW 2005
Indeno(1,2,3cd)pyrene	1%	US EPA OSW 2005
naphthalene	100%	US EPA OSW 2005
perylene	6%	Assumed dibenz(a,h)anthracene as a surrogate
Phenanthrene	100%	US EPA OSW 2005
Pyrene	99%	US EPA OSW 2005

Table 4D-12 Kow

Chemical	Value	Log(Kow)	Reference
3-methylcholanthrene	7.76E+06	6.89E+00	Mackay et al 1992; mean
7,12-dimethylbenz(a)anthracene	1.95E+06	6.29E+00	Mackay et al 1992; mean
Anthracene	3.16E+04	4.50E+00	US EPA OSW 2005
Benz(a)anthracene	5.01E+05	5.70E+00	US EPA OSW 2005
Benzo(a)pyrene	1.00E+06	6.00E+00	US EPA OSW 2005
benzo(e)pyrene	8.32E+06	6.92E+00	Mackay et al 1992; mean
Benzo(b)fluoranthene	1.33E+06	6.12E+00	US EPA OSW 2005
Benzo(ghi)perylene	1.00E+07	7.00E+00	Mackay et al 1992; mean
Benzo(k)fluoranthene	1.26E+06	6.10E+00	US EPA OSW 2005
Chrysene	5.01E+05	5.70E+00	US EPA OSW 2005
Dibenz(ah)anthracene	3.16E+06	6.50E+00	US EPA OSW 2005
Fluoranthene	1.00E+05	5.00E+00	US EPA OSW 2005
fluorene	1.58E+04	4.20E+00	US EPA OSW 2005
Indeno(1,2,3cd)pyrene	3.98E+06	6.60E+00	US EPA OSW 2005
naphthalene	2.00E+03	3.30E+00	US EPA OSW 2005
perylene	1.32E+06	6.12E+00	Mackay et al 1992; mean
Phenanthrene	3.16E+04	4.50E+00	US EPA OSW 2005
Pyrene	7.94E+04	4.90E+00	US EPA OSW 2005

Table 4D-13 Forage adjustment factor [Unitless]

Chemical	Value	Log(Kow)	Reference
3-methylcholanthrene	1.00	6.89	Assumed
7,12-dimethylbenz(a)anthracene	1.00	6.29	Assumed
Anthracene	1.00	4.50	US EPA OSW 2005
Benz(a)anthracene	1.00	5.70	US EPA OSW 2005
Benzo(a)pyrene	1.00	6.00	US EPA OSW 2005
benzo(e)pyrene	1.00	6.92	Assumed
Benzo(b)fluoranthene	1.00	6.12	US EPA OSW 2005
Benzo(ghi)perylene	1.00	7.00	Assumed
Benzo(k)fluoranthene	1.00	6.10	US EPA OSW 2005
Chrysene	1.00	5.70	US EPA OSW 2005
Dibenz(a,h)anthracene	1.00	6.50	US EPA OSW 2005
Fluoranthene	1.00	5.00	US EPA OSW 2005
fluorene	1.00	4.20	Assumed
Indeno(1,2,3-cd)pyrene	1.00	6.60	US EPA OSW 2005
naphthalene	1.00	3.30	Assumed
perylene	1.00	6.12	Assumed
Phenanthrene	1.00	4.50	US EPA OSW 2005
Pyrene	1.00	4.90	US EPA OSW 2005

Table 4D-14 Deposition velocities [m/s]

Chemical	Wet	Dry	Reference Wet	Reference Dry
3-methylcholanthrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
7,12-dimethylbenz(a)anthracene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Anthracene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benz(a)anthracene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(a)pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
benzo(e)pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(b)fluoranthene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(ghi)perylene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(k)fluoranthene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Chrysene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Dibenz(ah)anthracene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Fluoranthene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
fluorene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Indeno(1,2,3cd)pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
naphthalene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
perylene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Phenanthrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000

Table 4D-15 Henry's Constant [atm m^3 / mol]

Chemical	Value	H [Pa m3/mol]	H' [Unitless]	Reference
3-methylcholanthrene	1.61E-05	1.63E+00	6.60E-04	CCME 2000; Most conservative value from CCME for the aromatic C17-C34 fraction
7,12-dimethylbenz(a)anthracene	1.61E-05	1.63E+00	6.60E-04	CCME 2000; Most conservative value from CCME for the aromatic C17-C34 fraction
Anthracene	6.50E-05	6.59E+00	2.67E-03	US EPA OSW 2005
Benz(a)anthracene	3.40E-06	3.45E-01	1.39E-04	US EPA OSW 2005
Benzo(a)pyrene	1.10E-06	1.11E-01	4.51E-05	US EPA OSW 2005
benzo(e)pyrene	1.10E-06	1.11E-01	4.51E-05	assumed benzo(a)pyrene as a surrogate
Benzo(b)fluoranthene	1.11E-04	1.12E+01	4.55E-03	US EPA OSW 2005
Benzo(ghi)perylene	1.44E-07	1.46E-02	5.91E-06	Mackay et al 1992
Benzo(k)fluoranthene	8.30E-07	8.41E-02	3.40E-05	US EPA OSW 2005
Chrysene	9.50E-05	9.63E+00	3.90E-03	US EPA OSW 2005
Dibenz(ah)anthracene	1.50E-08	1.52E-03	6.15E-07	US EPA OSW 2005
Fluoranthene	1.60E-05	1.62E+00	6.56E-04	US EPA OSW 2005
fluorene	0.000064	6.48E+00	2.62E-03	US EPA OSW 2005
Indeno(1,2,3cd)pyrene	1.60E-06	1.62E-01	6.56E-05	US EPA OSW 2005
naphthalene	0.00048	4.86E+01	1.97E-02	US EPA OSW 2005
perylene	4.34E-06	4.40E-01	1.78E-04	Mackay et al 1992
Phenanthrene	2.30E-05	2.33E+00	9.43E-04	US EPA OSW 2005
Pyrene	1.10E-05	1.11E+00	4.51E-04	US EPA OSW 2005

Table 4D-16 Soil loss constant (k_s) [yr^{-1}]

Chemical	Value	Half-life [Days]	Reference
3-methylcholanthrene	1.30E-01	1.95E+03	Assumed pyrene as a surrogate
7,12-dimethylbenz(a)anthracene	3.70E-01	6.72E+02	Mackay et al 1992; assumed maximum
anthracene	5.50E-01	4.60E+02	US EPA OSW 2005
Benz(a)anthracene	3.70E-01	6.84E+02	US EPA OSW 2005
Benzo(a)pyrene	4.80E-01	5.27E+02	US EPA OSW 2005
benzo(e)pyrene	4.80E-01	5.27E+02	assumed benzo(a)pyrene as a surrogate
Benzo(b)fluoranthene	4.10E-01	6.17E+02	US EPA OSW 2005
Benzo(ghi)perylene	3.89E-01	6.50E+02	Mackay et al 1992
Benzo(k)fluoranthene	1.20E-01	2.11E+03	US EPA OSW 2005
Chrysene	2.50E-01	1.01E+03	US EPA OSW 2005
Dibenz(ah)anthracene	2.70E-01	9.38E+02	US EPA OSW 2005
Fluoranthene	5.70E-01	4.44E+02	US EPA OSW 2005
fluorene	4.22E+00	6.00E+01	US EPA OSW 2005
Indeno(1,2,3cd)pyrene	3.50E-01	7.23E+02	US EPA OSW 2005
naphthalene	5.27E+00	4.80E+01	US EPA OSW 2005
perylene	3.89E-01	6.50E+02	Assumed benzo(ghi)perylene as a surrogate
Phenanthrene	1.26E+00	2.01E+02	US EPA OSW 2005
Pyrene	1.30E-01	1.95E+03	US EPA OSW 2005

Table 4D-17 Soil to water partition coefficient [L/kg]

Chemical	Kd	Comment/Reference
3-methylcholanthrene	5.37E+03	Calculated; US EPA 2005
7,12-dimethylbenz(a)anthracene	1.74E+03	Calculated; US EPA 2005
Anthracene	4.50E+03	US EPA 2005
Benz(a)anthracene	6.00E+04	US EPA 2005
Benzo(a)pyrene	1.60E+05	US EPA 2005
benzo(e)pyrene	3.98E+03	Calculated; US EPA 2005
Benzo(b)fluoranthene	1.05E+04	US EPA 2005
Benzo(ghi)perylene	1.58E+04	Calculated; US EPA 2005
Benzo(k)fluoranthene	1.90E+05	US EPA 2005
Chrysene	6.00E+04	US EPA 2005
Dibenz(ah)anthracene	5.80E+05	US EPA 2005
Fluoranthene	1.10E+04	US EPA 2005
fluorene	2.10E+03	US EPA 2005
Indeno(1,2,3cd)pyrene	5.30E+05	US EPA 2005
naphthalene	3.00E+02	US EPA 2005
perylene	1.58E+04	Calculated; US EPA 2005
Phenanthrene	3.70E+03	US EPA 2005
Pyrene	9.50E+03	US EPA 2005

Calculated Kd = Koc x foc

foc(g/g) = 0.01

Table 4D-18   Percent of exposure derived from impacted area

Receptor	Value	Comment
Moose	100%	Assumed
Ruffed_Grouse	100%	Assumed
Snowshoe_Hare	100%	Assumed
Moose	100%	Assumed
Ruffed_Grouse	100%	Assumed
Snowshoe_Hare	100%	Assumed

Table 4D-19 Water content in wildlife food [%]

Receptor	Value	Reference
Aquatic	79%	US EPA 1993; pg. 4-13
Browse	85%	US EPA 1993; pg. 4-13
Invertebrate	71%	US EPA 1993; pg. 4-13
Mammal	68%	US EPA 1993; pg. 4-13
Mollusc	79%	US EPA 1993; pg. 4-13

Table 4D-20 Equation variables plant concentration due to direct deposition

Variable	Value	Units	Reference
Empirical Constant - (y)	2.88	Unitless	EPA 2005
Yield or Standing Biomass (Yp)	0.24	kg DW/m^2	EPA 2005
Plant Surface Loss Coefficient - (kp)	18	yr^{-1}	EPA 2005
Period of Browse Exposure - (Tp)	0.12	yr	EPA 2005
Fraction of COPC in Vapour Phase	NA	Chemical Specific	
Deposition Velocity	NA	Chemical Specific	

Table 4D-21 Time period of deposition [years]

Variable	Value	Comment
Time	75	Life of facility

Table 4D-22 Soil properties

Variable	Value	Units
Surface Soil Mixing Depth = Depth1	0.02	m
Soil Mixing Depth for Plants = Depth2	0.2	m
Soil Bulk Density	1500	kg/m3

Table 4D-23 Gas constants

Variable	Value	Units
Universal Gas Constant (R)	8.21E-05	atm m^3 / mol
Temperature (T)	288	Kelvin
R x T	2.36E-02	Kelvin atm m3 / mol

Table 4D-24 Chemical group

Chemical	Group
3-methylcholanthrene	PAH
7,12-dimethylbenz(a)anthracene	PAH
Anthracene	PAH
Benz(a)anthracene	PAH
Benzo(a)pyrene	PAH
Benzo(e)pyrene	PAH
Benzo(b)fluoranthene	PAH
Benzo(ghi)perylene	PAH
Benzo(k)fluoranthene	PAH
Chrysene	PAH
Dibenz(ah)anthracene	PAH
Fluoranthene	PAH
fluorene	PAH
Indeno(1,2,3cd)pyrene	PAH
naphthalene	VOC
Perylene	PAH
Phenanthrene	PAH
Pyrene	PAH

Table 4D-25 Literature derived regression models and bio-concentration factors from soil to selected media [DW Basis]

Media	Chemical	Abbreviation	Constant	Slope	UF	Reference Uptake Factor
Browse	3-methylcholanthrene	Browse_3-methylcholanthrene	0	0	4.03E-03	Travis and Arms 1988
Browse	7,12-dimethylbenz(a)anthracene	Browse_7,12-dimethylbenz(a)anthracene	0	0	8.96E-03	Travis and Arms 1988
Browse	Anthracene	Browse_Anthracene	0	0	9.71E-02	Travis and Arms 1988
Browse	Benz(a)anthracene	Browse_Benz(a)anthracene	0	0	1.97E-02	Travis and Arms 1988
Browse	Benzo(b)fluoranthene	Browse_Benzo(b)fluoranthene	0	0	1.12E-02	Travis and Arms 1988
Browse	Benzo(ghi)perylene	Browse_Benzo(ghi)perylene	0	0	3.48E-03	Travis and Arms 1988
Browse	Benzo(k)fluoranthene	Browse_Benzo(k)fluoranthene	0	0	1.15E-02	Travis and Arms 1988
Browse	Benzo(a)pyrene	Browse_Benzo(a)pyrene	0	0	1.32E-02	Travis and Arms 1988
Browse	benzo(e)pyrene	Browse_benzo(e)pyrene	0	0	3.87E-03	Travis and Arms 1988
Browse	Chrysene	Browse_Chrysene	0	0	1.97E-02	Travis and Arms 1988
Browse	Dibenz(ah)anthracene	Browse_Dibenz(ah)anthracene	0	0	6.78E-03	Travis and Arms 1988
Browse	Fluoranthene	Browse_Fluoranthene	0	0	4.99E-02	Travis and Arms 1988
Browse	Fluorene	Browse_Fluorene	0	0	1.45E-01	Travis and Arms 1988
Browse	Indeno(1,2,3cd)pyrene	Browse_Indeno(1,2,3cd)pyrene	0	0	5.93E-03	Travis and Arms 1988
Browse	naphthalene	Browse_naphthalene	0	0	4.79E-01	Travis and Arms 1988
Browse	perylene	Browse_perylene	0	0	1.12E-02	Travis and Arms 1989
Browse	Phenanthrene	Browse_Phenanthrene	0	0	9.71E-02	Travis and Arms 1990
Browse	Pyrene	Browse_Pyrene	0	0	5.70E-02	Travis and Arms 1988
Invertebrate	3-methylcholanthrene	Invertebrate_3-methylcholanthrene	0	0	3.14E+04	Southworth et al. 1978
Invertebrate	7,12-dimethylbenz(a)anthracene	Invertebrate_7,12-dimethylbenz(a)anthracene	0	0	1.01E+04	Southworth et al. 1978
Invertebrate	Anthracene	Invertebrate_Anthracene	0	0	3.46E+02	Southworth et al. 1978
Invertebrate	Benz(a)anthracene	Invertebrate_Benz(a)anthracene	0	0	1.80E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	Benzo(b)fluoranthene	Invertebrate_Benzo(b)fluoranthene	0	0	4.19E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	Benzo(ghi)perylene	Invertebrate_Benzo(ghi)perylene	0	0	4.19E-01	Assumed equal to B(a)P
Invertebrate	Benzo(k)fluoranthene	Invertebrate_Benzo(k)fluoranthene	0	0	4.79E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	Benzo(a)pyrene	Invertebrate_Benzo(a)pyrene	0	0	4.19E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	benzo(e)pyrene	Invertebrate_benzo(e)pyrene	0	0	4.19E-01	Assumed benzo(a)pyrene as a surrogate
Invertebrate	Chrysene	Invertebrate_Chrysene	0	0	2.40E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	Dibenz(ah)anthracene	Invertebrate_Dibenz(ah)anthracene	0	0	4.19E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	Fluoranthene	Invertebrate_Fluoranthene	0	0	4.19E-01	Assumed equal to B(a)P
Invertebrate	fluorene	Invertebrate_fluorene	0	0	4.19E-01	Assumed equal to B(a)P
Invertebrate	Indeno(1,2,3cd)pyrene	Invertebrate_Indeno(1,2,3cd)pyrene	0	0	4.79E-01	US EPA 1999; BCF x 5.99 to convert from WW to DW
Invertebrate	naphthalene	Invertebrate_naphthalene	0	0	4.19E-01	Assumed equal to B(a)P
Invertebrate	perylene	Invertebrate_perylene	0	0	4.19E-01	Assumed equal to B(a)P
Invertebrate	Phenanthrene	Invertebrate_Phenanthrene	0	0	4.19E-01	Assumed equal to B(a)P
Invertebrate	Pyrene	Invertebrate_Pyrene	0	0	4.19E-01	Assumed equal to B(a)P

Notes:

Predicted Linear Uptake Factors:

UF Soil - Plant [dry weight] = logBCF = 1.588 - 0.578log(Kow); Travis and Arms 1988

UF Soil - Invertebrate [dry weight] = logBCF = 1.146 - 0.819log(Kow); Southworth et al.1978

Table 4D-26 Fat content

Receptor	%	Reference/Comment
Moose	0.19	US EPA 2005;Assumed equal to beef
Ruffed_Grouse	0.14	US EPA 2005;Assumed equal to chicken
Snowshoe_Hare	0.19	US EPA 2005;Assumed equal to beef

Table 4D-27 Bio transfer factors [day/kg FW]

Media	Chemical	Abbreviation	Value	Comment
Moose	3-methylcholanthrene	Moose_3-methylcholanthrene	2.46E-04	US EPA 2005
Moose	7,12-dimethylbenz(a)anthracene	Moose_7,12-dimethylbenz(a)anthracene	3.41E-04	US EPA 2005
Moose	Anthracene	Moose_Anthracene	3.38E-04	US EPA 2005
Moose	Benz(a)anthracene	Moose_Benz(a)anthracene	3.99E-04	US EPA 2005
Moose	Benzo(a)pyrene	Moose_Benzo(a)pyrene	3.76E-04	US EPA 2005
Moose	benzo(e)pyrene	Moose_benzo(e)pyrene	2.41E-04	US EPA 2005
Moose	Benzo(b)fluoranthene	Moose_Benzo(b)fluoranthene	3.62E-04	US EPA 2005
Moose	Benzo(ghi)perylene	Moose_Benzo(ghi)perylene	2.28E-04	US EPA 2005
Moose	Benzo(k)fluoranthene	Moose_Benzo(k)fluoranthene	3.65E-04	US EPA 2005
Moose	Chrysene	Moose_Chrysene	3.99E-04	US EPA 2005
Moose	Dibenz(ah)anthracene	Moose_Dibenz(ah)anthracene	3.10E-04	US EPA 2005
Moose	Fluoranthene	Moose_Fluoranthene	3.92E-04	US EPA 2005
Moose	fluorene	Moose_fluorene	2.93E-04	US EPA 2005
Moose	Indeno(1,2,3cd)pyrene	Moose_Indeno(1,2,3cd)pyrene	2.94E-04	US EPA 2005
Moose	naphthalene	Moose_naphthalene	1.48E-04	US EPA 2005
Moose	perylene	Moose_perylene	3.62E-04	US EPA 2005
Moose	Phenanthrene	Moose_Phenanthrene	3.38E-04	US EPA 2005
Moose	Pyrene	Moose_Pyrene	3.84E-04	US EPA 2005
Ruffed_Grouse	3-methylcholanthrene	Ruffed_Grouse_3-methylcholanthrene	1.81E-04	US EPA 2005
Ruffed_Grouse	7,12-dimethylbenz(a)anthracene	Ruffed_Grouse_7,12-dimethylbenz(a)anthracene	2.51E-04	US EPA 2005
Ruffed_Grouse	Anthracene	Ruffed_Grouse_Anthracene	2.49E-04	US EPA 2005
Ruffed_Grouse	Benz(a)anthracene	Ruffed_Grouse_Benz(a)anthracene	2.94E-04	US EPA 2005
Ruffed_Grouse	Benzo(a)pyrene	Ruffed_Grouse_Benzo(a)pyrene	2.77E-04	US EPA 2005
Ruffed_Grouse	benzo(e)pyrene	Ruffed_Grouse_benzo(e)pyrene	1.78E-04	US EPA 2005
Ruffed_Grouse	Benzo(b)fluoranthene	Ruffed_Grouse_Benzo(b)fluoranthene	2.67E-04	US EPA 2005
Ruffed_Grouse	Benzo(ghi)perylene	Ruffed_Grouse_Benzo(ghi)perylene	1.68E-04	US EPA 2005
Ruffed_Grouse	Benzo(k)fluoranthene	Ruffed_Grouse_Benzo(k)fluoranthene	2.69E-04	US EPA 2005
Ruffed_Grouse	Chrysene	Ruffed_Grouse_Chrysene	2.94E-04	US EPA 2005
Ruffed_Grouse	Dibenz(ah)anthracene	Ruffed_Grouse_Dibenz(ah)anthracene	2.28E-04	US EPA 2005
Ruffed_Grouse	Fluoranthene	Ruffed_Grouse_Fluoranthene	2.89E-04	US EPA 2005
Ruffed_Grouse	fluorene	Ruffed_Grouse_fluorene	2.16E-04	US EPA 2005
Ruffed_Grouse	Indeno(1,2,3cd)pyrene	Ruffed_Grouse_Indeno(1,2,3cd)pyrene	2.17E-04	US EPA 2005
Ruffed_Grouse	naphthalene	Ruffed_Grouse_naphthalene	1.09E-04	US EPA 2005
Ruffed_Grouse	perylene	Ruffed_Grouse_perylene	2.67E-04	US EPA 2005
Ruffed_Grouse	Phenanthrene	Ruffed_Grouse_Phenanthrene	2.49E-04	US EPA 2005
Ruffed_Grouse	Pyrene	Ruffed_Grouse_Pyrene	2.83E-04	US EPA 2005

Table 4D-27 Bio transfer factors [day/kg FW]

Media	Chemical	Abbreviation	Value	Comment
Snowshoe_Hare	3-methylcholanthrene	Snowshoe_Hare_3-methylcholanthrene	2.46E-04	US EPA 2005
Snowshoe_Hare	7,12-dimethylbenz(a)anthracene	Snowshoe_Hare_7,12-dimethylbenz(a)anthracene	3.41E-04	US EPA 2005
Snowshoe_Hare	Anthracene	Snowshoe_Hare_Anthracene	3.38E-04	US EPA 2005
Snowshoe_Hare	Benz(a)anthracene	Snowshoe_Hare_Benz(a)anthracene	3.99E-04	US EPA 2005
Snowshoe_Hare	Benzo(a)pyrene	Snowshoe_Hare_Benzo(a)pyrene	3.76E-04	US EPA 2005
Snowshoe_Hare	benzo(e)pyrene	Snowshoe_Hare_benzo(e)pyrene	2.41E-04	US EPA 2005
Snowshoe_Hare	Benzo(b)fluoranthene	Snowshoe_Hare_Benzo(b)fluoranthene	3.62E-04	US EPA 2005
Snowshoe_Hare	Benzo(ghi)perylene	Snowshoe_Hare_Benzo(ghi)perylene	2.28E-04	US EPA 2005
Snowshoe_Hare	Benzo(k)fluoranthene	Snowshoe_Hare_Benzo(k)fluoranthene	3.65E-04	US EPA 2005
Snowshoe_Hare	Chrysene	Snowshoe_Hare_Chrysene	3.99E-04	US EPA 2005
Snowshoe_Hare	Dibenz(ah)anthracene	Snowshoe_Hare_Dibenz(ah)anthracene	3.10E-04	US EPA 2005
Snowshoe_Hare	Fluoranthene	Snowshoe_Hare_Fluoranthene	3.92E-04	US EPA 2005
Snowshoe_Hare	fluorene	Snowshoe_Hare_fluorene	2.93E-04	US EPA 2005
Snowshoe_Hare	Indeno(1,2,3cd)pyrene	Snowshoe_Hare_Indeno(1,2,3cd)pyrene	2.94E-04	US EPA 2005
Snowshoe_Hare	naphthalene	Snowshoe_Hare_naphthalene	1.48E-04	US EPA 2005
Snowshoe_Hare	perylene	Snowshoe_Hare_perylene	3.62E-04	US EPA 2005
Snowshoe_Hare	Phenanthrene	Snowshoe_Hare_Phenanthrene	3.38E-04	US EPA 2005
Snowshoe_Hare	Pyrene	Snowshoe_Hare_Pyrene	3.84E-04	US EPA 2005
log(BTF) [day/kg FW] = {-0.099 x Log(Kow)^2 + 1.07 x LOG(Kow) - 3.56} x Fat Content of Tissue x Metabolism Factor				US EPA 2005

Table 4D-28 Metabolism factor		
Chemical	**Value**	**Reference**
3-methylcholanthrene	0.01	Hofelt et al 2001
7,12-dimethylbenz(a)anthracene	0.01	Hofelt et al 2001
Anthracene	0.01	Hofelt et al 2001
Benz(a)anthracene	0.01	Hofelt et al 2001
Benzo(a)pyrene	0.01	Hofelt et al 2001
Benzo(e)pyrene	0.01	Hofelt et al 2001
Benzo(b)fluoranthene	0.01	Hofelt et al 2001
Benzo(ghi)perylene	0.01	Hofelt et al 2001
Benzo(k)fluoranthene	0.01	Hofelt et al 2001
Chrysene	0.01	Hofelt et al 2001
Dibenz(ah)anthracene	0.01	Hofelt et al 2001
Fluoranthene	0.01	Hofelt et al 2001
fluorene	0.01	Hofelt et al 2001
Indeno(1,2,3cd)pyrene	0.01	Hofelt et al 2001
naphthalene	0.01	Hofelt et al 2001
Perylene	0.01	Hofelt et al 2001
Phenanthrene	0.01	Hofelt et al 2001
Pyrene	0.01	Hofelt et al 2001

Table 4D-29 Summary of Environmental Media Concentrations Used in Tissue Model

Column1	Chemical	Media	Type	Period	Abbreviation	Maximum (all RL)
background	3-methylcholanthrene	air			background_3-methylcholanthrene_air	0.00E+00
baseline	3-methylcholanthrene	air	max	annual	baseline_3-methylcholanthrene_air	4.23E-06
application	3-methylcholanthrene	air	max	annual	application_3-methylcholanthrene_air	4.24E-06
CEA	3-methylcholanthrene	air	max	annual	CEA_3-methylcholanthrene_air	4.24E-06
background	7,12-dimethylbenz(a)anthracene	air			background_7,12-dimethylbenz(a)anthracene_air	0.00E+00
baseline	7,12-dimethylbenz(a)anthracene	air	max	annual	baseline_7,12-dimethylbenz(a)anthracene_air	3.75E-05
application	7,12-dimethylbenz(a)anthracene	air	max	annual	application_7,12-dimethylbenz(a)anthracene_air	3.76E-05
CEA	7,12-dimethylbenz(a)anthracene	air	max	annual	CEA_7,12-dimethylbenz(a)anthracene_air	3.76E-05
background	anthracene	air			background_anthracene_air	1.23E-03
baseline	anthracene	air	max	annual	baseline_anthracene_air	1.78E-05
application	anthracene	air	max	annual	application_anthracene_air	1.78E-05
CEA	anthracene	air	max	annual	CEA_anthracene_air	2.07E-05
background	benz(a)anthracene	air			background_benz(a)anthracene_air	5.88E-05
baseline	benz(a)anthracene	air	max	annual	baseline_benz(a)anthracene_air	1.07E-05
application	benz(a)anthracene	air	max	annual	application_benz(a)anthracene_air	1.07E-05
CEA	benz(a)anthracene	air	max	annual	CEA_benz(a)anthracene_air	1.72E-05
background	benzo(a)pyrene	air			background_benzo(a)pyrene_air	7.30E-05
baseline	benzo(a)pyrene	air	max	annual	baseline_benzo(a)pyrene_air	5.21E-06
application	benzo(a)pyrene	air	max	annual	application_benzo(a)pyrene_air	5.21E-06
CEA	benzo(a)pyrene	air	max	annual	CEA_benzo(a)pyrene_air	1.66E-05
background	benzo(b)fluoranthene	air			background_benzo(b)fluoranthene_air	9.45E-05
baseline	benzo(b)fluoranthene	air	max	annual	baseline_benzo(b)fluoranthene_air	1.42E-05
application	benzo(b)fluoranthene	air	max	annual	application_benzo(b)fluoranthene_air	1.42E-05
CEA	benzo(b)fluoranthene	air	max	annual	CEA_benzo(b)fluoranthene_air	1.82E-05
background	benzo(e)pyrene	air			background_benzo(e)pyrene_air	8.86E-05
baseline	benzo(e)pyrene	air	max	annual	baseline_benzo(e)pyrene_air	1.64E-07
application	benzo(e)pyrene	air	max	annual	application_benzo(e)pyrene_air	1.64E-07
CEA	benzo(e)pyrene	air	max	annual	CEA_benzo(e)pyrene_air	1.92E-07
background	benzo(ghi)perylene	air			background_benzo(ghi)perylene_air	7.89E-05
baseline	benzo(ghi)perylene	air	max	annual	baseline_benzo(ghi)perylene_air	4.86E-06
application	benzo(ghi)perylene	air	max	annual	application_benzo(ghi)perylene_air	4.86E-06
CEA	benzo(ghi)perylene	air	max	annual	CEA_benzo(ghi)perylene_air	1.64E-05
background	benzo(k)fluoranthene	air			background_benzo(k)fluoranthene_air	9.45E-05
baseline	benzo(k)fluoranthene	air	max	annual	baseline_benzo(k)fluoranthene_air	6.56E-06
application	benzo(k)fluoranthene	air	max	annual	application_benzo(k)fluoranthene_air	6.56E-06
CEA	benzo(k)fluoranthene	air	max	annual	CEA_benzo(k)fluoranthene_air	1.65E-05
background	chrysene	air			background_chrysene_air	1.04E-04
baseline	chrysene	air	max	annual	baseline_chrysene_air	1.29E-05
application	chrysene	air	max	annual	application_chrysene_air	1.29E-05
CEA	chrysene	air	max	annual	CEA_chrysene_air	1.83E-05
background	dibenz(ah)anthracene	air			background_dibenz(ah)anthracene_air	3.50E-05
baseline	dibenz(ah)anthracene	air	max	annual	baseline_dibenz(ah)anthracene_air	6.89E-06
application	dibenz(ah)anthracene	air	max	annual	application_dibenz(ah)anthracene_air	6.89E-06
CEA	dibenz(ah)anthracene	air	max	annual	CEA_dibenz(ah)anthracene_air	1.71E-05
background	fluoranthene	air			background_fluoranthene_air	1.02E-03
baseline	fluoranthene	air	max	annual	baseline_fluoranthene_air	6.93E-05
application	fluoranthene	air	max	annual	application_fluoranthene_air	6.93E-05
CEA	fluoranthene	air	max	annual	CEA_fluoranthene_air	7.51E-05
background	fluorene	air			background_fluorene_air	2.32E-03
baseline	fluorene	air	max	annual	baseline_fluorene_air	1.13E-04
application	fluorene	air	max	annual	application_fluorene_air	1.13E-04
CEA	fluorene	air	max	annual	CEA_fluorene_air	1.32E-04
background	indeno(1,2,3cd)pyrene	air			background_indeno(1,2,3cd)pyrene_air	7.00E-05
baseline	indeno(1,2,3cd)pyrene	air	max	annual	baseline_indeno(1,2,3cd)pyrene_air	7.29E-06
application	indeno(1,2,3cd)pyrene	air	max	annual	application_indeno(1,2,3cd)pyrene_air	7.29E-06
CEA	indeno(1,2,3cd)pyrene	air	max	annual	CEA_indeno(1,2,3cd)pyrene_air	1.69E-05
background	naphthalene	air			background_naphthalene_air	2.73E-03
baseline	naphthalene	air	max	annual	baseline_naphthalene_air	1.66E-01
application	naphthalene	air	max	annual	application_naphthalene_air	1.66E-01
CEA	naphthalene	air	max	annual	CEA_naphthalene_air	1.88E-01
background	perylene	air			background_perylene_air	2.00E-05
baseline	perylene	air	max	annual	baseline_perylene_air	3.98E-08
application	perylene	air	max	annual	application_perylene_air	3.98E-08
CEA	perylene	air	max	annual	CEA_perylene_air	4.54E-08
background	phenanthrene	air			background_phenanthrene_air	1.57E-02
baseline	phenanthrene	air	max	annual	baseline_phenanthrene_air	4.06E-04
application	phenanthrene	air	max	annual	application_phenanthrene_air	4.06E-04
CEA	phenanthrene	air	max	annual	CEA_phenanthrene_air	4.61E-04
background	pyrene	air			background_pyrene_air	1.92E-03
baseline	pyrene	air	max	annual	baseline_pyrene_air	4.91E-05
application	pyrene	air	max	annual	application_pyrene_air	4.91E-05
CEA	pyrene	air	max	annual	CEA_pyrene_air	5.37E-05
background	3-methylcholanthrene	surface water	max	annual	background_3-methylcholanthrene_surface water	0
baseline	3-methylcholanthrene	surface water	max	annual	baseline_3-methylcholanthrene_surface water	0
application	3-methylcholanthrene	surface water	max	annual	application_3-methylcholanthrene_surface water	0
CEA	3-methylcholanthrene	surface water	max	annual	CEA_3-methylcholanthrene_surface water	0
background	7,12-dimethylbenz(a)anthracene	surface water	max	annual	background_7,12-dimethylbenz(a)anthracene_surface	0
baseline	7,12-dimethylbenz(a)anthracene	surface water	max	annual	baseline_7,12-dimethylbenz(a)anthracene_surface wa	0

Column1	Chemical	Media	Type	Period	Abbreviation	Maximum (all RL)
application	7,12-dimethylbenz(a)anthracene	surface water	max	annual	application_7,12-dimethylbenz(a)anthracene_surface	0
CEA	7,12-dimethylbenz(a)anthracene	surface water	max	annual	CEA_7,12-dimethylbenz(a)anthracene_surface water	0
background	anthracene	surface water	max	annual	background_anthracene_surface water	0.00002
baseline	anthracene	surface water	max	annual	baseline_anthracene_surface water	0
application	anthracene	surface water	max	annual	application_anthracene_surface water	0
CEA	anthracene	surface water	max	annual	CEA_anthracene_surface water	0
background	benz(a)anthracene	surface water	max	annual	background_benz(a)anthracene_surface water	0.00005
baseline	benz(a)anthracene	surface water	max	annual	baseline_benz(a)anthracene_surface water	0
application	benz(a)anthracene	surface water	max	annual	application_benz(a)anthracene_surface water	0
CEA	benz(a)anthracene	surface water	max	annual	CEA_benz(a)anthracene_surface water	0
background	benzo(a)pyrene	surface water	max	annual	background_benzo(a)pyrene_surface water	0.00003
baseline	benzo(a)pyrene	surface water	max	annual	baseline_benzo(a)pyrene_surface water	0
application	benzo(a)pyrene	surface water	max	annual	application_benzo(a)pyrene_surface water	0
CEA	benzo(a)pyrene	surface water	max	annual	CEA_benzo(a)pyrene_surface water	0
background	benzo(b)fluoranthene	surface water	max	annual	background_benzo(b)fluoranthene_surface water	0.00001
baseline	benzo(b)fluoranthene	surface water	max	annual	baseline_benzo(b)fluoranthene_surface water	0
application	benzo(b)fluoranthene	surface water	max	annual	application_benzo(b)fluoranthene_surface water	0
CEA	benzo(b)fluoranthene	surface water	max	annual	CEA_benzo(b)fluoranthene_surface water	0
background	benzo(e)pyrene	surface water	max	annual	background_benzo(e)pyrene_surface water	0
baseline	benzo(e)pyrene	surface water	max	annual	baseline_benzo(e)pyrene_surface water	0
application	benzo(e)pyrene	surface water	max	annual	application_benzo(e)pyrene_surface water	0
CEA	benzo(e)pyrene	surface water	max	annual	CEA_benzo(e)pyrene_surface water	0
background	benzo(ghi)perylene	surface water	max	annual	background_benzo(ghi)perylene_surface water	0.00005
baseline	benzo(ghi)perylene	surface water	max	annual	baseline_benzo(ghi)perylene_surface water	0
application	benzo(ghi)perylene	surface water	max	annual	application_benzo(ghi)perylene_surface water	0
CEA	benzo(ghi)perylene	surface water	max	annual	CEA_benzo(ghi)perylene_surface water	0
background	benzo(k)fluoranthene	surface water	max	annual	background_benzo(k)fluoranthene_surface water	0.00001
baseline	benzo(k)fluoranthene	surface water	max	annual	baseline_benzo(k)fluoranthene_surface water	0
application	benzo(k)fluoranthene	surface water	max	annual	application_benzo(k)fluoranthene_surface water	0
CEA	benzo(k)fluoranthene	surface water	max	annual	CEA_benzo(k)fluoranthene_surface water	0
background	chrysene	surface water	max	annual	background_chrysene_surface water	0.00002
baseline	chrysene	surface water	max	annual	baseline_chrysene_surface water	0
application	chrysene	surface water	max	annual	application_chrysene_surface water	0
CEA	chrysene	surface water	max	annual	CEA_chrysene_surface water	0
background	dibenz(ah)anthracene	surface water	max	annual	background_dibenz(ah)anthracene_surface water	0.00005
baseline	dibenz(ah)anthracene	surface water	max	annual	baseline_dibenz(ah)anthracene_surface water	0
application	dibenz(ah)anthracene	surface water	max	annual	application_dibenz(ah)anthracene_surface water	0
CEA	dibenz(ah)anthracene	surface water	max	annual	CEA_dibenz(ah)anthracene_surface water	0
background	fluoranthene	surface water	max	annual	background_fluoranthene_surface water	0.00002
baseline	fluoranthene	surface water	max	annual	baseline_fluoranthene_surface water	0
application	fluoranthene	surface water	max	annual	application_fluoranthene_surface water	0
CEA	fluoranthene	surface water	max	annual	CEA_fluoranthene_surface water	0
background	fluorene	surface water	max	annual	background_fluorene_surface water	0.00005
baseline	fluorene	surface water	max	annual	baseline_fluorene_surface water	0
application	fluorene	surface water	max	annual	application_fluorene_surface water	0
CEA	fluorene	surface water	max	annual	CEA_fluorene_surface water	0
background	indeno(1,2,3cd)pyrene	surface water	max	annual	background_indeno(1,2,3cd)pyrene_surface water	0.00005
baseline	indeno(1,2,3cd)pyrene	surface water	max	annual	baseline_indeno(1,2,3cd)pyrene_surface water	0
application	indeno(1,2,3cd)pyrene	surface water	max	annual	application_indeno(1,2,3cd)pyrene_surface water	0
CEA	indeno(1,2,3cd)pyrene	surface water	max	annual	CEA_indeno(1,2,3cd)pyrene_surface water	0
background	naphthalene	surface water	max	annual	background_naphthalene_surface water	0.00005
baseline	naphthalene	surface water	max	annual	baseline_naphthalene_surface water	0
application	naphthalene	surface water	max	annual	application_naphthalene_surface water	0
CEA	naphthalene	surface water	max	annual	CEA_naphthalene_surface water	0
background	perylene	surface water	max	annual	background_perylene_surface water	0.00002
baseline	perylene	surface water	max	annual	baseline_perylene_surface water	0
application	perylene	surface water	max	annual	application_perylene_surface water	0
CEA	perylene	surface water	max	annual	CEA_perylene_surface water	0
background	phenanthrene	surface water	max	annual	background_phenanthrene_surface water	0.00001
baseline	phenanthrene	surface water	max	annual	baseline_phenanthrene_surface water	0
application	phenanthrene	surface water	max	annual	application_phenanthrene_surface water	0
CEA	phenanthrene	surface water	max	annual	CEA_phenanthrene_surface water	0
background	pyrene	surface water	max	annual	background_pyrene_surface water	0.00001
baseline	pyrene	surface water	max	annual	baseline_pyrene_surface water	0
application	pyrene	surface water	max	annual	application_pyrene_surface water	0
CEA	pyrene	surface water	max	annual	CEA_pyrene_surface water	0
background	3-methylcholanthrene	deposition			background_3-methylcholanthrene_deposition	0
baseline	3-methylcholanthrene	deposition			baseline_3-methylcholanthrene_deposition	0
application	3-methylcholanthrene	deposition			application_3-methylcholanthrene_deposition	0
CEA	3-methylcholanthrene	deposition			CEA_3-methylcholanthrene_deposition	0
background	7,12-dimethylbenz(a)anthracene	deposition			background_7,12-dimethylbenz(a)anthracene_deposit	0
baseline	7,12-dimethylbenz(a)anthracene	deposition			baseline_7,12-dimethylbenz(a)anthracene_deposition	0
application	7,12-dimethylbenz(a)anthracene	deposition			application_7,12-dimethylbenz(a)anthracene_depositio	0
CEA	7,12-dimethylbenz(a)anthracene	deposition			CEA_7,12-dimethylbenz(a)anthracene_deposition	0
background	anthracene	deposition			background_anthracene_deposition	0
baseline	anthracene	deposition			baseline_anthracene_deposition	0
application	anthracene	deposition			application_anthracene_deposition	0
CEA	anthracene	deposition			CEA_anthracene_deposition	0
background	benz(a)anthracene	deposition			background_benz(a)anthracene_deposition	0

Column1	Chemical	Media	Type	Period	Abbreviation	Maximum (all RL)
baseline	benz(a)anthracene	deposition			baseline_benz(a)anthracene_deposition	0
application	benz(a)anthracene	deposition			application_benz(a)anthracene_deposition	0
CEA	benz(a)anthracene	deposition			CEA_benz(a)anthracene_deposition	0
background	benzo(a)pyrene	deposition			background_benzo(a)pyrene_deposition	0
baseline	benzo(a)pyrene	deposition			baseline_benzo(a)pyrene_deposition	0
application	benzo(a)pyrene	deposition			application_benzo(a)pyrene_deposition	0
CEA	benzo(a)pyrene	deposition			CEA_benzo(a)pyrene_deposition	0
background	benzo(b)fluoranthene	deposition			background_benzo(b)fluoranthene_deposition	0
baseline	benzo(b)fluoranthene	deposition			baseline_benzo(b)fluoranthene_deposition	0
application	benzo(b)fluoranthene	deposition			application_benzo(b)fluoranthene_deposition	0
CEA	benzo(b)fluoranthene	deposition			CEA_benzo(b)fluoranthene_deposition	0
background	benzo(e)pyrene	deposition			background_benzo(e)pyrene_deposition	0
baseline	benzo(e)pyrene	deposition			baseline_benzo(e)pyrene_deposition	0
application	benzo(e)pyrene	deposition			application_benzo(e)pyrene_deposition	0
CEA	benzo(e)pyrene	deposition			CEA_benzo(e)pyrene_deposition	0
background	benzo(ghi)perylene	deposition			background_benzo(ghi)perylene_deposition	0
baseline	benzo(ghi)perylene	deposition			baseline_benzo(ghi)perylene_deposition	0
application	benzo(ghi)perylene	deposition			application_benzo(ghi)perylene_deposition	0
CEA	benzo(ghi)perylene	deposition			CEA_benzo(ghi)perylene_deposition	0
background	benzo(k)fluoranthene	deposition			background_benzo(k)fluoranthene_deposition	0
baseline	benzo(k)fluoranthene	deposition			baseline_benzo(k)fluoranthene_deposition	0
application	benzo(k)fluoranthene	deposition			application_benzo(k)fluoranthene_deposition	0
CEA	benzo(k)fluoranthene	deposition			CEA_benzo(k)fluoranthene_deposition	0
background	chrysene	deposition			background_chrysene_deposition	0
baseline	chrysene	deposition			baseline_chrysene_deposition	0
application	chrysene	deposition			application_chrysene_deposition	0
CEA	chrysene	deposition			CEA_chrysene_deposition	0
background	dibenz(ah)anthracene	deposition			background_dibenz(ah)anthracene_deposition	0
baseline	dibenz(ah)anthracene	deposition			baseline_dibenz(ah)anthracene_deposition	0
application	dibenz(ah)anthracene	deposition			application_dibenz(ah)anthracene_deposition	0
CEA	dibenz(ah)anthracene	deposition			CEA_dibenz(ah)anthracene_deposition	0
background	fluoranthene	deposition			background_fluoranthene_deposition	0
baseline	fluoranthene	deposition			baseline_fluoranthene_deposition	0
application	fluoranthene	deposition			application_fluoranthene_deposition	0
CEA	fluoranthene	deposition			CEA_fluoranthene_deposition	0
background	fluorene	deposition			background_fluorene_deposition	0
baseline	fluorene	deposition			baseline_fluorene_deposition	0
application	fluorene	deposition			application_fluorene_deposition	0
CEA	fluorene	deposition			CEA_fluorene_deposition	0
background	indeno(1,2,3cd)pyrene	deposition			background_indeno(1,2,3cd)pyrene_deposition	0
baseline	indeno(1,2,3cd)pyrene	deposition			baseline_indeno(1,2,3cd)pyrene_deposition	0
application	indeno(1,2,3cd)pyrene	deposition			application_indeno(1,2,3cd)pyrene_deposition	0
CEA	indeno(1,2,3cd)pyrene	deposition			CEA_indeno(1,2,3cd)pyrene_deposition	0
background	naphthalene	deposition			background_naphthalene_deposition	0
baseline	naphthalene	deposition			baseline_naphthalene_deposition	0
application	naphthalene	deposition			application_naphthalene_deposition	0
CEA	naphthalene	deposition			CEA_naphthalene_deposition	0
background	perylene	deposition			background_perylene_deposition	0
baseline	perylene	deposition			baseline_perylene_deposition	0
application	perylene	deposition			application_perylene_deposition	0
CEA	perylene	deposition			CEA_perylene_deposition	0
background	phenanthrene	deposition			background_phenanthrene_deposition	0
baseline	phenanthrene	deposition			baseline_phenanthrene_deposition	0
application	phenanthrene	deposition			application_phenanthrene_deposition	0
CEA	phenanthrene	deposition			CEA_phenanthrene_deposition	0
background	pyrene	deposition			background_pyrene_deposition	0
baseline	pyrene	deposition			baseline_pyrene_deposition	0
application	pyrene	deposition			application_pyrene_deposition	0
CEA	pyrene	deposition			CEA_pyrene_deposition	0
background	dichlorobenzene	surface water	max	annual	background_dichlorobenzene_surface water	0.00005

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Appendix 4E
Air Concentrations

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
1	2-methylnaphthalene	1hr	max	2.6E-05	2.6E-05	2.6E-05
2	2-methylnaphthalene	1hr	max	1.7E-05	1.8E-05	2.2E-05
3	2-methylnaphthalene	1hr	max	1.7E-05	1.7E-05	2.3E-05
4	2-methylnaphthalene	1hr	max	1.8E-05	1.8E-05	2.4E-05
5	2-methylnaphthalene	1hr	max	1.9E-05	2.0E-05	2.5E-05
6	2-methylnaphthalene	1hr	max	2.0E-05	2.1E-05	2.5E-05
7	2-methylnaphthalene	1hr	max	1.9E-05	2.0E-05	2.3E-05
8	2-methylnaphthalene	1hr	max	2.1E-05	2.2E-05	2.5E-05
9	2-methylnaphthalene	1hr	max	1.5E-05	1.6E-05	2.2E-05
10	2-methylnaphthalene	1hr	max	2.1E-05	2.2E-05	2.4E-05
11	2-methylnaphthalene	1hr	max	3.0E-05	3.0E-05	3.0E-05
12	2-methylnaphthalene	1hr	max	2.3E-05	2.3E-05	2.8E-05
13	2-methylnaphthalene	1hr	max	2.4E-05	2.4E-05	3.2E-05
14	2-methylnaphthalene	1hr	max	1.0E-04	1.0E-04	1.1E-04
15	2-methylnaphthalene	1hr	max	2.4E-05	2.5E-05	2.6E-05
16	2-methylnaphthalene	1hr	max	2.4E-05	2.5E-05	2.6E-05
17	2-methylnaphthalene	1hr	max	2.5E-05	2.7E-05	2.8E-05
18	2-methylnaphthalene	1hr	max	2.6E-05	2.6E-05	2.7E-05
19	2-methylnaphthalene	1hr	max	2.5E-05	2.5E-05	2.7E-05
20	2-methylnaphthalene	1hr	max	2.3E-05	2.4E-05	2.7E-05
21	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	3.5E-05
22	2-methylnaphthalene	1hr	max	2.7E-05	2.7E-05	3.6E-05
23	2-methylnaphthalene	1hr	max	1.9E-05	2.0E-05	3.1E-05
24	2-methylnaphthalene	1hr	max	2.1E-05	2.2E-05	2.4E-05
25	2-methylnaphthalene	1hr	max	3.0E-05	3.4E-05	3.8E-05
26	2-methylnaphthalene	1hr	max	3.0E-05	3.0E-05	3.7E-05
27	2-methylnaphthalene	1hr	max	3.4E-05	6.3E-05	6.7E-05
28	2-methylnaphthalene	1hr	max	2.1E-05	2.2E-05	3.4E-05
29	2-methylnaphthalene	1hr	max	2.2E-05	2.2E-05	3.7E-05
30	2-methylnaphthalene	1hr	max	5.0E-05	5.0E-05	5.0E-05
31	2-methylnaphthalene	1hr	max	5.1E-05	5.1E-05	5.1E-05
32	2-methylnaphthalene	1hr	max	2.8E-05	2.8E-05	2.8E-05
33	2-methylnaphthalene	1hr	max	3.2E-05	3.2E-05	3.2E-05
34	2-methylnaphthalene	1hr	max	3.3E-05	3.3E-05	3.3E-05
35	2-methylnaphthalene	1hr	max	3.6E-05	3.6E-05	3.6E-05
36	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	3.5E-05
37	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	3.4E-05
38	2-methylnaphthalene	1hr	max	2.2E-05	2.2E-05	4.6E-05
39	2-methylnaphthalene	1hr	max	2.6E-05	2.6E-05	4.4E-05
40	2-methylnaphthalene	1hr	max	2.8E-05	2.8E-05	4.5E-05
41	2-methylnaphthalene	1hr	max	2.9E-05	2.9E-05	4.4E-05
42	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	5.5E-05
43	2-methylnaphthalene	1hr	max	3.6E-05	3.7E-05	5.6E-05
44	2-methylnaphthalene	1hr	max	6.2E-05	6.2E-05	6.4E-05
45	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	4.5E-05
46	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	4.5E-05
47	2-methylnaphthalene	1hr	max	3.3E-05	3.3E-05	4.6E-05
48	2-methylnaphthalene	1hr	max	4.1E-05	4.1E-05	4.7E-05
49	2-methylnaphthalene	1hr	max	4.9E-05	4.9E-05	5.9E-05
50	2-methylnaphthalene	1hr	max	3.4E-05	3.4E-05	4.6E-05
51	2-methylnaphthalene	1hr	max	3.5E-05	3.5E-05	4.0E-05
52	2-methylnaphthalene	1hr	max	4.2E-05	4.2E-05	2.5E-04
53	2-methylnaphthalene	1hr	max	4.3E-05	4.3E-05	1.1E-04
54	2-methylnaphthalene	1hr	max	1.5E-05	1.6E-05	1.8E-05
55	2-methylnaphthalene	1hr	max	1.9E-05	2.0E-05	2.5E-05
56	2-methylnaphthalene	1hr	max	2.0E-05	2.0E-05	3.2E-05
57	2-methylnaphthalene	1hr	max	1.7E-05	1.9E-05	1.9E-05
58	2-methylnaphthalene	1hr	max	1.9E-05	2.0E-05	2.2E-05
59	2-methylnaphthalene	1hr	max	6.2E-05	6.2E-05	1.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
60	2-methylnaphthalene	1hr	max	7.1E-05	7.1E-05	8.3E-05
61	2-methylnaphthalene	1hr	max	7.3E-05	7.3E-05	7.4E-05
62	2-methylnaphthalene	1hr	max	5.4E-05	5.4E-05	8.5E-05
63	2-methylnaphthalene	1hr	max	5.4E-05	5.4E-05	1.3E-04
64	2-methylnaphthalene	1hr	max	4.6E-05	4.6E-05	8.9E-05
65	2-methylnaphthalene	1hr	max	6.4E-05	6.4E-05	8.2E-05
66	2-methylnaphthalene	1hr	max	2.6E-05	2.6E-05	2.6E-05
67	2-methylnaphthalene	1hr	max	2.3E-05	2.3E-05	2.7E-05
68	2-methylnaphthalene	1hr	max	2.7E-05	2.7E-05	2.8E-05
69	2-methylnaphthalene	1hr	max	2.2E-05	2.2E-05	2.9E-05
70	2-methylnaphthalene	1hr	max	2.1E-05	2.1E-05	2.6E-05
71	2-methylnaphthalene	1hr	max	5.4E-05	5.4E-05	5.4E-05
72	2-methylnaphthalene	1hr	max	5.2E-05	5.2E-05	5.2E-05
73	2-methylnaphthalene	1hr	max	1.0E-04	1.0E-04	1.0E-04
74	2-methylnaphthalene	1hr	max	5.1E-05	5.1E-05	3.5E-04
75	2-methylnaphthalene	1hr	max	1.3E-03	1.3E-03	1.3E-03
76	2-methylnaphthalene	1hr	max	6.8E-05	6.8E-05	7.3E-05
77	2-methylnaphthalene	1hr	max	4.9E-05	4.9E-05	1.2E-03
78	2-methylnaphthalene	1hr	max	3.2E-05	3.2E-05	5.1E-05
79	2-methylnaphthalene	1hr	max	2.4E-05	2.4E-05	3.5E-05
1	2-methylnaphthalene	1hr	9th	1.2E-05	1.3E-05	1.7E-05
2	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.7E-05
3	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.7E-05
4	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.9E-05
5	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	2.1E-05
6	2-methylnaphthalene	1hr	9th	1.5E-05	1.6E-05	2.1E-05
7	2-methylnaphthalene	1hr	9th	1.6E-05	1.7E-05	1.9E-05
8	2-methylnaphthalene	1hr	9th	1.5E-05	1.6E-05	2.0E-05
9	2-methylnaphthalene	1hr	9th	1.3E-05	1.3E-05	1.9E-05
10	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.9E-05
11	2-methylnaphthalene	1hr	9th	2.1E-05	2.1E-05	2.6E-05
12	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.3E-05
13	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.4E-05
14	2-methylnaphthalene	1hr	9th	4.3E-05	4.3E-05	4.3E-05
15	2-methylnaphthalene	1hr	9th	1.6E-05	1.6E-05	2.0E-05
16	2-methylnaphthalene	1hr	9th	1.6E-05	1.7E-05	2.0E-05
17	2-methylnaphthalene	1hr	9th	1.6E-05	1.6E-05	2.0E-05
18	2-methylnaphthalene	1hr	9th	1.6E-05	1.7E-05	1.9E-05
19	2-methylnaphthalene	1hr	9th	1.6E-05	1.7E-05	1.9E-05
20	2-methylnaphthalene	1hr	9th	1.8E-05	1.8E-05	2.0E-05
21	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.4E-05
22	2-methylnaphthalene	1hr	9th	1.8E-05	1.9E-05	2.5E-05
23	2-methylnaphthalene	1hr	9th	1.7E-05	1.7E-05	2.2E-05
24	2-methylnaphthalene	1hr	9th	1.5E-05	1.6E-05	1.9E-05
25	2-methylnaphthalene	1hr	9th	2.8E-05	2.9E-05	3.0E-05
26	2-methylnaphthalene	1hr	9th	2.1E-05	2.1E-05	3.0E-05
27	2-methylnaphthalene	1hr	9th	2.6E-05	2.9E-05	5.2E-05
28	2-methylnaphthalene	1hr	9th	1.8E-05	1.8E-05	2.3E-05
29	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.3E-05
30	2-methylnaphthalene	1hr	9th	2.8E-05	2.8E-05	2.8E-05
31	2-methylnaphthalene	1hr	9th	2.8E-05	2.8E-05	3.1E-05
32	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.8E-05
33	2-methylnaphthalene	1hr	9th	2.0E-05	2.0E-05	2.2E-05
34	2-methylnaphthalene	1hr	9th	1.8E-05	1.8E-05	2.0E-05
35	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.0E-05
36	2-methylnaphthalene	1hr	9th	2.1E-05	2.1E-05	2.2E-05
37	2-methylnaphthalene	1hr	9th	2.1E-05	2.1E-05	2.2E-05
38	2-methylnaphthalene	1hr	9th	1.8E-05	1.8E-05	2.5E-05
39	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.8E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
40	2-methylnaphthalene	1hr	9th	2.1E-05	2.1E-05	3.2E-05
41	2-methylnaphthalene	1hr	9th	2.1E-05	2.1E-05	3.0E-05
42	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.6E-05
43	2-methylnaphthalene	1hr	9th	2.8E-05	2.8E-05	3.4E-05
44	2-methylnaphthalene	1hr	9th	4.4E-05	4.4E-05	4.8E-05
45	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	3.2E-05
46	2-methylnaphthalene	1hr	9th	2.4E-05	2.4E-05	3.3E-05
47	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	3.5E-05
48	2-methylnaphthalene	1hr	9th	3.3E-05	3.3E-05	4.0E-05
49	2-methylnaphthalene	1hr	9th	2.7E-05	2.7E-05	3.5E-05
50	2-methylnaphthalene	1hr	9th	2.0E-05	2.0E-05	3.6E-05
51	2-methylnaphthalene	1hr	9th	2.0E-05	2.0E-05	3.2E-05
52	2-methylnaphthalene	1hr	9th	3.0E-05	3.0E-05	1.2E-04
53	2-methylnaphthalene	1hr	9th	2.6E-05	2.6E-05	5.9E-05
54	2-methylnaphthalene	1hr	9th	1.4E-05	1.4E-05	1.6E-05
55	2-methylnaphthalene	1hr	9th	1.5E-05	1.6E-05	1.8E-05
56	2-methylnaphthalene	1hr	9th	1.6E-05	1.6E-05	1.9E-05
57	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.7E-05
58	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	1.9E-05
59	2-methylnaphthalene	1hr	9th	3.1E-05	3.1E-05	7.1E-05
60	2-methylnaphthalene	1hr	9th	4.6E-05	4.6E-05	4.8E-05
61	2-methylnaphthalene	1hr	9th	4.9E-05	4.9E-05	5.7E-05
62	2-methylnaphthalene	1hr	9th	4.2E-05	4.2E-05	5.6E-05
63	2-methylnaphthalene	1hr	9th	4.4E-05	4.4E-05	8.3E-05
64	2-methylnaphthalene	1hr	9th	4.1E-05	4.1E-05	7.9E-05
65	2-methylnaphthalene	1hr	9th	5.0E-05	5.0E-05	6.5E-05
66	2-methylnaphthalene	1hr	9th	1.7E-05	1.7E-05	2.2E-05
67	2-methylnaphthalene	1hr	9th	1.7E-05	1.7E-05	2.2E-05
68	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	2.0E-05
69	2-methylnaphthalene	1hr	9th	1.5E-05	1.5E-05	2.0E-05
70	2-methylnaphthalene	1hr	9th	1.4E-05	1.4E-05	1.8E-05
71	2-methylnaphthalene	1hr	9th	4.0E-05	4.0E-05	4.1E-05
72	2-methylnaphthalene	1hr	9th	4.0E-05	4.0E-05	4.1E-05
73	2-methylnaphthalene	1hr	9th	8.7E-05	8.7E-05	8.9E-05
74	2-methylnaphthalene	1hr	9th	3.3E-05	3.3E-05	1.5E-04
75	2-methylnaphthalene	1hr	9th	1.0E-03	1.0E-03	1.0E-03
76	2-methylnaphthalene	1hr	9th	4.8E-05	4.8E-05	5.2E-05
77	2-methylnaphthalene	1hr	9th	3.5E-05	3.5E-05	5.4E-04
78	2-methylnaphthalene	1hr	9th	1.9E-05	1.9E-05	2.6E-05
79	2-methylnaphthalene	1hr	9th	1.8E-05	1.8E-05	2.5E-05
1	2-methylnaphthalene	24hr	max	6.2E-06	6.2E-06	8.2E-06
2	2-methylnaphthalene	24hr	max	6.6E-06	7.0E-06	8.3E-06
3	2-methylnaphthalene	24hr	max	6.8E-06	7.1E-06	8.5E-06
4	2-methylnaphthalene	24hr	max	7.1E-06	7.4E-06	8.8E-06
5	2-methylnaphthalene	24hr	max	7.4E-06	7.8E-06	9.6E-06
6	2-methylnaphthalene	24hr	max	7.5E-06	7.8E-06	9.8E-06
7	2-methylnaphthalene	24hr	max	7.2E-06	7.8E-06	9.1E-06
8	2-methylnaphthalene	24hr	max	7.5E-06	7.9E-06	1.0E-05
9	2-methylnaphthalene	24hr	max	7.1E-06	7.3E-06	9.2E-06
10	2-methylnaphthalene	24hr	max	5.7E-06	6.1E-06	8.6E-06
11	2-methylnaphthalene	24hr	max	8.8E-06	8.8E-06	1.1E-05
12	2-methylnaphthalene	24hr	max	8.0E-06	8.2E-06	1.0E-05
13	2-methylnaphthalene	24hr	max	9.4E-06	9.6E-06	1.2E-05
14	2-methylnaphthalene	24hr	max	1.1E-05	1.1E-05	1.1E-05
15	2-methylnaphthalene	24hr	max	7.5E-06	8.2E-06	1.2E-05
16	2-methylnaphthalene	24hr	max	7.6E-06	8.2E-06	1.2E-05
17	2-methylnaphthalene	24hr	max	7.6E-06	7.8E-06	1.1E-05
18	2-methylnaphthalene	24hr	max	7.6E-06	7.8E-06	1.1E-05
19	2-methylnaphthalene	24hr	max	7.5E-06	7.7E-06	1.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
20	2-methylnaphthalene	24hr	max	7.3E-06	7.7E-06	1.1E-05
21	2-methylnaphthalene	24hr	max	7.9E-06	8.2E-06	1.2E-05
22	2-methylnaphthalene	24hr	max	6.7E-06	6.9E-06	1.2E-05
23	2-methylnaphthalene	24hr	max	7.1E-06	7.3E-06	1.0E-05
24	2-methylnaphthalene	24hr	max	7.8E-06	8.4E-06	1.2E-05
25	2-methylnaphthalene	24hr	max	1.3E-05	1.4E-05	1.4E-05
26	2-methylnaphthalene	24hr	max	9.2E-06	9.4E-06	1.3E-05
27	2-methylnaphthalene	24hr	max	9.2E-06	1.0E-05	1.8E-05
28	2-methylnaphthalene	24hr	max	5.9E-06	6.0E-06	1.3E-05
29	2-methylnaphthalene	24hr	max	5.8E-06	6.1E-06	1.3E-05
30	2-methylnaphthalene	24hr	max	1.3E-05	1.3E-05	1.3E-05
31	2-methylnaphthalene	24hr	max	1.3E-05	1.3E-05	1.3E-05
32	2-methylnaphthalene	24hr	max	6.5E-06	6.8E-06	8.3E-06
33	2-methylnaphthalene	24hr	max	8.0E-06	8.1E-06	9.0E-06
34	2-methylnaphthalene	24hr	max	7.9E-06	8.1E-06	9.0E-06
35	2-methylnaphthalene	24hr	max	8.6E-06	8.6E-06	9.5E-06
36	2-methylnaphthalene	24hr	max	8.7E-06	8.8E-06	1.0E-05
37	2-methylnaphthalene	24hr	max	9.1E-06	9.1E-06	1.1E-05
38	2-methylnaphthalene	24hr	max	7.9E-06	8.1E-06	1.1E-05
39	2-methylnaphthalene	24hr	max	8.1E-06	8.2E-06	1.3E-05
40	2-methylnaphthalene	24hr	max	8.5E-06	8.5E-06	1.5E-05
41	2-methylnaphthalene	24hr	max	9.0E-06	9.1E-06	1.7E-05
42	2-methylnaphthalene	24hr	max	9.3E-06	9.3E-06	1.4E-05
43	2-methylnaphthalene	24hr	max	1.2E-05	1.2E-05	1.7E-05
44	2-methylnaphthalene	24hr	max	1.5E-05	1.5E-05	2.5E-05
45	2-methylnaphthalene	24hr	max	1.0E-05	1.0E-05	1.6E-05
46	2-methylnaphthalene	24hr	max	1.0E-05	1.0E-05	1.6E-05
47	2-methylnaphthalene	24hr	max	1.1E-05	1.1E-05	1.7E-05
48	2-methylnaphthalene	24hr	max	1.3E-05	1.3E-05	1.7E-05
49	2-methylnaphthalene	24hr	max	1.0E-05	1.0E-05	1.6E-05
50	2-methylnaphthalene	24hr	max	1.2E-05	1.2E-05	1.9E-05
51	2-methylnaphthalene	24hr	max	1.0E-05	1.0E-05	1.6E-05
52	2-methylnaphthalene	24hr	max	1.5E-05	1.5E-05	5.1E-05
53	2-methylnaphthalene	24hr	max	1.3E-05	1.3E-05	2.6E-05
54	2-methylnaphthalene	24hr	max	7.5E-06	7.7E-06	9.2E-06
55	2-methylnaphthalene	24hr	max	8.5E-06	8.8E-06	1.2E-05
56	2-methylnaphthalene	24hr	max	8.9E-06	9.3E-06	1.3E-05
57	2-methylnaphthalene	24hr	max	7.1E-06	7.5E-06	9.7E-06
58	2-methylnaphthalene	24hr	max	7.3E-06	7.4E-06	9.8E-06
59	2-methylnaphthalene	24hr	max	1.7E-05	1.7E-05	2.7E-05
60	2-methylnaphthalene	24hr	max	1.8E-05	1.8E-05	1.8E-05
61	2-methylnaphthalene	24hr	max	2.5E-05	2.5E-05	2.6E-05
62	2-methylnaphthalene	24hr	max	2.2E-05	2.2E-05	2.3E-05
63	2-methylnaphthalene	24hr	max	2.2E-05	2.2E-05	3.4E-05
64	2-methylnaphthalene	24hr	max	2.1E-05	2.1E-05	3.2E-05
65	2-methylnaphthalene	24hr	max	2.7E-05	2.7E-05	2.7E-05
66	2-methylnaphthalene	24hr	max	9.1E-06	9.2E-06	1.2E-05
67	2-methylnaphthalene	24hr	max	8.5E-06	8.5E-06	1.2E-05
68	2-methylnaphthalene	24hr	max	8.0E-06	8.1E-06	1.1E-05
69	2-methylnaphthalene	24hr	max	6.7E-06	6.7E-06	1.0E-05
70	2-methylnaphthalene	24hr	max	5.7E-06	5.7E-06	8.2E-06
71	2-methylnaphthalene	24hr	max	1.8E-05	1.8E-05	1.9E-05
72	2-methylnaphthalene	24hr	max	1.8E-05	1.8E-05	1.9E-05
73	2-methylnaphthalene	24hr	max	3.8E-05	3.8E-05	4.0E-05
74	2-methylnaphthalene	24hr	max	1.7E-05	1.7E-05	4.7E-05
75	2-methylnaphthalene	24hr	max	3.7E-04	3.7E-04	3.7E-04
76	2-methylnaphthalene	24hr	max	2.4E-05	2.4E-05	2.5E-05
77	2-methylnaphthalene	24hr	max	1.8E-05	1.8E-05	9.9E-05
78	2-methylnaphthalene	24hr	max	8.8E-06	8.8E-06	1.4E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
79	2-methylnaphthalene	24hr	max	7.4E-06	7.6E-06	1.2E-05
1	2-methylnaphthalene	annual	average	2.6E-07	2.8E-07	3.5E-07
2	2-methylnaphthalene	annual	average	5.0E-07	5.3E-07	6.6E-07
3	2-methylnaphthalene	annual	average	5.1E-07	5.4E-07	6.7E-07
4	2-methylnaphthalene	annual	average	5.4E-07	5.8E-07	7.3E-07
5	2-methylnaphthalene	annual	average	6.0E-07	6.7E-07	8.4E-07
6	2-methylnaphthalene	annual	average	6.1E-07	6.8E-07	8.6E-07
7	2-methylnaphthalene	annual	average	6.0E-07	6.6E-07	8.2E-07
8	2-methylnaphthalene	annual	average	6.3E-07	7.0E-07	8.8E-07
9	2-methylnaphthalene	annual	average	5.7E-07	6.2E-07	8.0E-07
10	2-methylnaphthalene	annual	average	7.6E-07	8.1E-07	1.1E-06
11	2-methylnaphthalene	annual	average	1.0E-06	1.1E-06	1.4E-06
12	2-methylnaphthalene	annual	average	9.0E-07	9.6E-07	1.3E-06
13	2-methylnaphthalene	annual	average	8.6E-07	9.1E-07	1.2E-06
14	2-methylnaphthalene	annual	average	1.3E-06	1.4E-06	1.8E-06
15	2-methylnaphthalene	annual	average	7.0E-07	8.6E-07	1.1E-06
16	2-methylnaphthalene	annual	average	7.0E-07	8.6E-07	1.1E-06
17	2-methylnaphthalene	annual	average	7.3E-07	8.9E-07	1.1E-06
18	2-methylnaphthalene	annual	average	7.6E-07	9.3E-07	1.2E-06
19	2-methylnaphthalene	annual	average	7.7E-07	9.4E-07	1.2E-06
20	2-methylnaphthalene	annual	average	8.0E-07	1.0E-06	1.3E-06
21	2-methylnaphthalene	annual	average	1.6E-06	1.7E-06	2.1E-06
22	2-methylnaphthalene	annual	average	1.1E-06	1.2E-06	1.5E-06
23	2-methylnaphthalene	annual	average	7.5E-07	8.4E-07	1.1E-06
24	2-methylnaphthalene	annual	average	5.6E-07	6.2E-07	7.6E-07
25	2-methylnaphthalene	annual	average	7.7E-07	1.1E-06	1.4E-06
26	2-methylnaphthalene	annual	average	8.5E-07	1.1E-06	1.5E-06
27	2-methylnaphthalene	annual	average	1.0E-06	1.5E-06	2.1E-06
28	2-methylnaphthalene	annual	average	8.7E-07	1.0E-06	1.4E-06
29	2-methylnaphthalene	annual	average	8.9E-07	1.0E-06	1.4E-06
30	2-methylnaphthalene	annual	average	6.7E-07	7.6E-07	9.8E-07
31	2-methylnaphthalene	annual	average	7.0E-07	8.1E-07	1.0E-06
32	2-methylnaphthalene	annual	average	2.8E-07	3.1E-07	3.9E-07
33	2-methylnaphthalene	annual	average	3.6E-07	4.0E-07	5.1E-07
34	2-methylnaphthalene	annual	average	3.8E-07	4.1E-07	5.2E-07
35	2-methylnaphthalene	annual	average	4.0E-07	4.4E-07	5.5E-07
36	2-methylnaphthalene	annual	average	4.4E-07	4.8E-07	5.9E-07
37	2-methylnaphthalene	annual	average	4.4E-07	4.8E-07	6.0E-07
38	2-methylnaphthalene	annual	average	9.6E-07	1.1E-06	1.5E-06
39	2-methylnaphthalene	annual	average	1.0E-06	1.1E-06	1.7E-06
40	2-methylnaphthalene	annual	average	1.0E-06	1.2E-06	1.8E-06
41	2-methylnaphthalene	annual	average	1.1E-06	1.2E-06	1.9E-06
42	2-methylnaphthalene	annual	average	1.1E-06	1.2E-06	1.9E-06
43	2-methylnaphthalene	annual	average	1.8E-06	1.9E-06	2.6E-06
44	2-methylnaphthalene	annual	average	2.3E-06	2.4E-06	3.1E-06
45	2-methylnaphthalene	annual	average	1.2E-06	1.3E-06	2.1E-06
46	2-methylnaphthalene	annual	average	1.3E-06	1.4E-06	2.2E-06
47	2-methylnaphthalene	annual	average	1.2E-06	1.3E-06	2.1E-06
48	2-methylnaphthalene	annual	average	2.0E-06	2.1E-06	2.9E-06
49	2-methylnaphthalene	annual	average	1.5E-06	1.6E-06	2.4E-06
50	2-methylnaphthalene	annual	average	1.4E-06	1.5E-06	2.3E-06
51	2-methylnaphthalene	annual	average	1.1E-06	1.2E-06	2.0E-06
52	2-methylnaphthalene	annual	average	1.6E-06	1.7E-06	4.9E-06
53	2-methylnaphthalene	annual	average	1.3E-06	1.4E-06	3.1E-06
54	2-methylnaphthalene	annual	average	4.4E-07	4.6E-07	5.6E-07
55	2-methylnaphthalene	annual	average	4.8E-07	5.2E-07	6.3E-07
56	2-methylnaphthalene	annual	average	5.1E-07	5.5E-07	6.8E-07
57	2-methylnaphthalene	annual	average	5.1E-07	5.5E-07	6.8E-07
58	2-methylnaphthalene	annual	average	3.7E-07	4.0E-07	4.8E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
59	2-methylnaphthalene	annual	average	1.7E-06	1.8E-06	5.0E-06
60	2-methylnaphthalene	annual	average	2.4E-06	2.4E-06	3.2E-06
61	2-methylnaphthalene	annual	average	2.7E-06	2.8E-06	3.7E-06
62	2-methylnaphthalene	annual	average	2.4E-06	2.4E-06	3.5E-06
63	2-methylnaphthalene	annual	average	2.3E-06	2.3E-06	3.7E-06
64	2-methylnaphthalene	annual	average	2.2E-06	2.3E-06	3.6E-06
65	2-methylnaphthalene	annual	average	3.9E-06	3.9E-06	4.9E-06
66	2-methylnaphthalene	annual	average	7.0E-07	7.5E-07	1.0E-06
67	2-methylnaphthalene	annual	average	8.4E-07	8.9E-07	1.2E-06
68	2-methylnaphthalene	annual	average	6.7E-07	7.1E-07	9.5E-07
69	2-methylnaphthalene	annual	average	6.6E-07	7.0E-07	9.4E-07
70	2-methylnaphthalene	annual	average	6.2E-07	6.6E-07	8.8E-07
71	2-methylnaphthalene	annual	average	1.2E-06	1.3E-06	1.7E-06
72	2-methylnaphthalene	annual	average	1.2E-06	1.3E-06	1.7E-06
73	2-methylnaphthalene	annual	average	7.8E-06	7.9E-06	8.9E-06
74	2-methylnaphthalene	annual	average	1.8E-06	1.8E-06	6.9E-06
75	2-methylnaphthalene	annual	average	5.8E-05	5.9E-05	5.9E-05
76	2-methylnaphthalene	annual	average	2.7E-06	2.7E-06	3.7E-06
77	2-methylnaphthalene	annual	average	1.9E-06	1.9E-06	5.2E-06
78	2-methylnaphthalene	annual	average	1.0E-06	1.2E-06	1.8E-06
79	2-methylnaphthalene	annual	average	1.2E-06	1.3E-06	1.6E-06
1	3-methylcholanthrene	1hr	max	5.6E-07	5.6E-07	5.7E-07
2	3-methylcholanthrene	1hr	max	4.4E-07	4.5E-07	5.1E-07
3	3-methylcholanthrene	1hr	max	4.4E-07	4.5E-07	5.0E-07
4	3-methylcholanthrene	1hr	max	4.6E-07	4.7E-07	5.4E-07
5	3-methylcholanthrene	1hr	max	4.9E-07	5.0E-07	5.6E-07
6	3-methylcholanthrene	1hr	max	4.9E-07	5.0E-07	5.6E-07
7	3-methylcholanthrene	1hr	max	6.0E-07	6.4E-07	6.6E-07
8	3-methylcholanthrene	1hr	max	4.9E-07	5.2E-07	5.6E-07
9	3-methylcholanthrene	1hr	max	4.3E-07	4.3E-07	4.4E-07
10	3-methylcholanthrene	1hr	max	5.0E-07	5.5E-07	6.0E-07
11	3-methylcholanthrene	1hr	max	7.2E-07	7.3E-07	7.9E-07
12	3-methylcholanthrene	1hr	max	5.3E-07	5.3E-07	5.7E-07
13	3-methylcholanthrene	1hr	max	5.2E-07	5.2E-07	5.6E-07
14	3-methylcholanthrene	1hr	max	1.4E-06	1.4E-06	1.5E-06
15	3-methylcholanthrene	1hr	max	5.3E-07	5.8E-07	6.0E-07
16	3-methylcholanthrene	1hr	max	5.3E-07	5.8E-07	5.9E-07
17	3-methylcholanthrene	1hr	max	5.1E-07	5.8E-07	5.9E-07
18	3-methylcholanthrene	1hr	max	5.0E-07	5.7E-07	5.8E-07
19	3-methylcholanthrene	1hr	max	5.0E-07	5.7E-07	5.9E-07
20	3-methylcholanthrene	1hr	max	4.9E-07	5.2E-07	5.3E-07
21	3-methylcholanthrene	1hr	max	1.4E-06	1.4E-06	1.4E-06
22	3-methylcholanthrene	1hr	max	7.1E-07	7.2E-07	7.4E-07
23	3-methylcholanthrene	1hr	max	5.6E-07	5.7E-07	5.9E-07
24	3-methylcholanthrene	1hr	max	4.3E-07	4.6E-07	5.1E-07
25	3-methylcholanthrene	1hr	max	1.3E-06	2.5E-06	2.5E-06
26	3-methylcholanthrene	1hr	max	9.8E-07	9.9E-07	1.0E-06
27	3-methylcholanthrene	1hr	max	1.1E-06	4.7E-06	4.7E-06
28	3-methylcholanthrene	1hr	max	5.5E-07	5.5E-07	5.7E-07
29	3-methylcholanthrene	1hr	max	5.6E-07	5.6E-07	5.9E-07
30	3-methylcholanthrene	1hr	max	1.2E-06	1.2E-06	1.2E-06
31	3-methylcholanthrene	1hr	max	1.0E-06	1.0E-06	1.1E-06
32	3-methylcholanthrene	1hr	max	5.9E-07	5.9E-07	5.9E-07
33	3-methylcholanthrene	1hr	max	6.5E-07	6.5E-07	7.0E-07
34	3-methylcholanthrene	1hr	max	6.1E-07	6.1E-07	6.1E-07
35	3-methylcholanthrene	1hr	max	6.8E-07	6.8E-07	6.9E-07
36	3-methylcholanthrene	1hr	max	6.7E-07	6.7E-07	6.9E-07
37	3-methylcholanthrene	1hr	max	6.7E-07	6.7E-07	7.0E-07
38	3-methylcholanthrene	1hr	max	8.7E-07	8.7E-07	1.0E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
39	3-methylcholanthrene	1hr	max	6.0E-07	6.0E-07	6.1E-07
40	3-methylcholanthrene	1hr	max	5.7E-07	5.7E-07	5.9E-07
41	3-methylcholanthrene	1hr	max	6.5E-07	6.7E-07	7.3E-07
42	3-methylcholanthrene	1hr	max	1.5E-06	1.5E-06	1.5E-06
43	3-methylcholanthrene	1hr	max	2.2E-06	2.3E-06	2.3E-06
44	3-methylcholanthrene	1hr	max	4.2E-06	4.2E-06	4.2E-06
45	3-methylcholanthrene	1hr	max	1.1E-06	1.1E-06	1.2E-06
46	3-methylcholanthrene	1hr	max	1.9E-06	1.9E-06	1.9E-06
47	3-methylcholanthrene	1hr	max	1.8E-06	1.8E-06	1.8E-06
48	3-methylcholanthrene	1hr	max	3.0E-06	3.0E-06	3.1E-06
49	3-methylcholanthrene	1hr	max	3.6E-06	3.7E-06	3.7E-06
50	3-methylcholanthrene	1hr	max	1.2E-06	1.2E-06	1.2E-06
51	3-methylcholanthrene	1hr	max	1.4E-06	1.4E-06	1.5E-06
52	3-methylcholanthrene	1hr	max	1.0E-06	1.0E-06	1.9E-06
53	3-methylcholanthrene	1hr	max	8.5E-07	8.5E-07	1.0E-06
54	3-methylcholanthrene	1hr	max	3.9E-07	4.5E-07	5.1E-07
55	3-methylcholanthrene	1hr	max	4.2E-07	4.4E-07	5.3E-07
56	3-methylcholanthrene	1hr	max	4.2E-07	4.9E-07	5.7E-07
57	3-methylcholanthrene	1hr	max	4.3E-07	5.0E-07	5.3E-07
58	3-methylcholanthrene	1hr	max	4.7E-07	4.9E-07	5.3E-07
59	3-methylcholanthrene	1hr	max	1.7E-06	1.7E-06	1.7E-06
60	3-methylcholanthrene	1hr	max	1.8E-06	1.8E-06	1.9E-06
61	3-methylcholanthrene	1hr	max	5.4E-06	5.4E-06	5.4E-06
62	3-methylcholanthrene	1hr	max	2.2E-06	2.2E-06	2.2E-06
63	3-methylcholanthrene	1hr	max	1.7E-06	1.7E-06	1.8E-06
64	3-methylcholanthrene	1hr	max	1.8E-06	1.8E-06	1.8E-06
65	3-methylcholanthrene	1hr	max	3.9E-06	3.9E-06	3.9E-06
66	3-methylcholanthrene	1hr	max	5.4E-07	5.4E-07	5.8E-07
67	3-methylcholanthrene	1hr	max	5.8E-07	5.8E-07	6.4E-07
68	3-methylcholanthrene	1hr	max	5.7E-07	5.7E-07	6.0E-07
69	3-methylcholanthrene	1hr	max	5.4E-07	5.4E-07	5.7E-07
70	3-methylcholanthrene	1hr	max	4.8E-07	4.8E-07	5.1E-07
71	3-methylcholanthrene	1hr	max	1.1E-06	1.1E-06	1.4E-06
72	3-methylcholanthrene	1hr	max	1.1E-06	1.1E-06	1.3E-06
73	3-methylcholanthrene	1hr	max	6.7E-06	6.7E-06	6.7E-06
74	3-methylcholanthrene	1hr	max	1.2E-06	1.2E-06	2.4E-06
75	3-methylcholanthrene	1hr	max	9.6E-05	9.6E-05	9.6E-05
76	3-methylcholanthrene	1hr	max	4.2E-06	4.2E-06	4.2E-06
77	3-methylcholanthrene	1hr	max	2.5E-06	2.5E-06	3.9E-06
78	3-methylcholanthrene	1hr	max	1.1E-06	1.1E-06	1.2E-06
79	3-methylcholanthrene	1hr	max	8.3E-07	8.3E-07	8.7E-07
1	3-methylcholanthrene	1hr	9th	2.8E-07	3.0E-07	3.5E-07
2	3-methylcholanthrene	1hr	9th	3.3E-07	3.5E-07	3.8E-07
3	3-methylcholanthrene	1hr	9th	3.4E-07	3.5E-07	4.0E-07
4	3-methylcholanthrene	1hr	9th	3.5E-07	3.6E-07	4.1E-07
5	3-methylcholanthrene	1hr	9th	3.9E-07	4.1E-07	4.2E-07
6	3-methylcholanthrene	1hr	9th	3.9E-07	4.1E-07	4.3E-07
7	3-methylcholanthrene	1hr	9th	4.0E-07	4.5E-07	4.8E-07
8	3-methylcholanthrene	1hr	9th	3.8E-07	4.2E-07	4.4E-07
9	3-methylcholanthrene	1hr	9th	3.5E-07	3.6E-07	4.0E-07
10	3-methylcholanthrene	1hr	9th	4.0E-07	4.2E-07	4.4E-07
11	3-methylcholanthrene	1hr	9th	5.0E-07	5.4E-07	5.5E-07
12	3-methylcholanthrene	1hr	9th	4.0E-07	4.1E-07	4.3E-07
13	3-methylcholanthrene	1hr	9th	3.9E-07	3.9E-07	4.2E-07
14	3-methylcholanthrene	1hr	9th	4.3E-07	4.4E-07	4.7E-07
15	3-methylcholanthrene	1hr	9th	3.8E-07	4.3E-07	5.0E-07
16	3-methylcholanthrene	1hr	9th	3.8E-07	4.1E-07	4.9E-07
17	3-methylcholanthrene	1hr	9th	4.0E-07	4.4E-07	4.9E-07
18	3-methylcholanthrene	1hr	9th	3.9E-07	4.3E-07	4.5E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
19	3-methylcholanthrene	1hr	9th	4.0E-07	4.3E-07	4.6E-07
20	3-methylcholanthrene	1hr	9th	4.0E-07	4.3E-07	4.5E-07
21	3-methylcholanthrene	1hr	9th	8.1E-07	8.3E-07	8.4E-07
22	3-methylcholanthrene	1hr	9th	6.1E-07	6.4E-07	6.6E-07
23	3-methylcholanthrene	1hr	9th	3.8E-07	4.0E-07	4.3E-07
24	3-methylcholanthrene	1hr	9th	3.6E-07	4.1E-07	4.6E-07
25	3-methylcholanthrene	1hr	9th	5.2E-07	1.2E-06	1.2E-06
26	3-methylcholanthrene	1hr	9th	5.1E-07	5.7E-07	5.9E-07
27	3-methylcholanthrene	1hr	9th	6.1E-07	2.0E-06	2.0E-06
28	3-methylcholanthrene	1hr	9th	4.1E-07	4.1E-07	4.7E-07
29	3-methylcholanthrene	1hr	9th	4.2E-07	4.2E-07	4.7E-07
30	3-methylcholanthrene	1hr	9th	5.9E-07	5.9E-07	6.9E-07
31	3-methylcholanthrene	1hr	9th	6.2E-07	6.3E-07	7.3E-07
32	3-methylcholanthrene	1hr	9th	3.4E-07	3.5E-07	4.1E-07
33	3-methylcholanthrene	1hr	9th	4.2E-07	4.3E-07	4.8E-07
34	3-methylcholanthrene	1hr	9th	4.2E-07	4.3E-07	4.9E-07
35	3-methylcholanthrene	1hr	9th	3.6E-07	3.8E-07	4.4E-07
36	3-methylcholanthrene	1hr	9th	3.7E-07	4.1E-07	4.7E-07
37	3-methylcholanthrene	1hr	9th	3.8E-07	4.4E-07	4.8E-07
38	3-methylcholanthrene	1hr	9th	4.3E-07	4.3E-07	4.5E-07
39	3-methylcholanthrene	1hr	9th	4.6E-07	4.6E-07	4.9E-07
40	3-methylcholanthrene	1hr	9th	4.7E-07	4.8E-07	5.2E-07
41	3-methylcholanthrene	1hr	9th	5.0E-07	5.0E-07	5.7E-07
42	3-methylcholanthrene	1hr	9th	6.5E-07	6.5E-07	6.8E-07
43	3-methylcholanthrene	1hr	9th	1.8E-06	1.8E-06	1.8E-06
44	3-methylcholanthrene	1hr	9th	2.9E-06	2.9E-06	2.9E-06
45	3-methylcholanthrene	1hr	9th	7.9E-07	8.0E-07	8.4E-07
46	3-methylcholanthrene	1hr	9th	1.3E-06	1.3E-06	1.3E-06
47	3-methylcholanthrene	1hr	9th	8.2E-07	8.3E-07	8.7E-07
48	3-methylcholanthrene	1hr	9th	2.3E-06	2.3E-06	2.3E-06
49	3-methylcholanthrene	1hr	9th	1.8E-06	1.8E-06	1.8E-06
50	3-methylcholanthrene	1hr	9th	7.5E-07	7.5E-07	7.8E-07
51	3-methylcholanthrene	1hr	9th	6.1E-07	6.1E-07	6.7E-07
52	3-methylcholanthrene	1hr	9th	7.7E-07	7.7E-07	1.2E-06
53	3-methylcholanthrene	1hr	9th	6.4E-07	6.4E-07	7.5E-07
54	3-methylcholanthrene	1hr	9th	3.2E-07	3.5E-07	3.8E-07
55	3-methylcholanthrene	1hr	9th	3.5E-07	3.9E-07	4.3E-07
56	3-methylcholanthrene	1hr	9th	3.6E-07	4.0E-07	4.4E-07
57	3-methylcholanthrene	1hr	9th	3.3E-07	3.8E-07	4.3E-07
58	3-methylcholanthrene	1hr	9th	3.3E-07	3.7E-07	4.3E-07
59	3-methylcholanthrene	1hr	9th	9.5E-07	9.5E-07	9.5E-07
60	3-methylcholanthrene	1hr	9th	1.2E-06	1.2E-06	1.2E-06
61	3-methylcholanthrene	1hr	9th	1.6E-06	1.6E-06	1.6E-06
62	3-methylcholanthrene	1hr	9th	1.2E-06	1.2E-06	1.2E-06
63	3-methylcholanthrene	1hr	9th	1.0E-06	1.0E-06	1.0E-06
64	3-methylcholanthrene	1hr	9th	9.8E-07	9.8E-07	1.0E-06
65	3-methylcholanthrene	1hr	9th	3.1E-06	3.1E-06	3.2E-06
66	3-methylcholanthrene	1hr	9th	3.4E-07	3.5E-07	3.9E-07
67	3-methylcholanthrene	1hr	9th	3.7E-07	3.8E-07	4.4E-07
68	3-methylcholanthrene	1hr	9th	3.5E-07	3.5E-07	3.9E-07
69	3-methylcholanthrene	1hr	9th	3.4E-07	3.4E-07	3.9E-07
70	3-methylcholanthrene	1hr	9th	3.3E-07	3.3E-07	3.6E-07
71	3-methylcholanthrene	1hr	9th	7.7E-07	7.7E-07	9.3E-07
72	3-methylcholanthrene	1hr	9th	7.6E-07	7.7E-07	9.0E-07
73	3-methylcholanthrene	1hr	9th	6.3E-06	6.3E-06	6.3E-06
74	3-methylcholanthrene	1hr	9th	9.1E-07	9.1E-07	1.2E-06
75	3-methylcholanthrene	1hr	9th	7.8E-05	7.8E-05	7.8E-05
76	3-methylcholanthrene	1hr	9th	1.5E-06	1.5E-06	1.5E-06
77	3-methylcholanthrene	1hr	9th	9.5E-07	9.5E-07	1.4E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
78	3-methylcholanthrene	1hr	9th	4.7E-07	4.7E-07	5.1E-07
79	3-methylcholanthrene	1hr	9th	6.9E-07	7.0E-07	7.1E-07
1	3-methylcholanthrene	24hr	max	1.4E-07	1.7E-07	2.0E-07
2	3-methylcholanthrene	24hr	max	1.5E-07	1.8E-07	2.1E-07
3	3-methylcholanthrene	24hr	max	1.6E-07	1.8E-07	2.1E-07
4	3-methylcholanthrene	24hr	max	1.6E-07	1.9E-07	2.2E-07
5	3-methylcholanthrene	24hr	max	1.7E-07	2.0E-07	2.2E-07
6	3-methylcholanthrene	24hr	max	1.7E-07	2.0E-07	2.2E-07
7	3-methylcholanthrene	24hr	max	1.7E-07	2.0E-07	2.3E-07
8	3-methylcholanthrene	24hr	max	1.7E-07	2.0E-07	2.2E-07
9	3-methylcholanthrene	24hr	max	1.7E-07	1.8E-07	2.1E-07
10	3-methylcholanthrene	24hr	max	1.5E-07	1.8E-07	2.1E-07
11	3-methylcholanthrene	24hr	max	2.3E-07	2.6E-07	3.0E-07
12	3-methylcholanthrene	24hr	max	1.7E-07	1.9E-07	2.2E-07
13	3-methylcholanthrene	24hr	max	1.7E-07	1.8E-07	2.1E-07
14	3-methylcholanthrene	24hr	max	2.1E-07	2.1E-07	2.3E-07
15	3-methylcholanthrene	24hr	max	2.1E-07	2.5E-07	2.9E-07
16	3-methylcholanthrene	24hr	max	2.1E-07	2.5E-07	3.0E-07
17	3-methylcholanthrene	24hr	max	2.0E-07	2.3E-07	2.7E-07
18	3-methylcholanthrene	24hr	max	1.9E-07	2.2E-07	2.6E-07
19	3-methylcholanthrene	24hr	max	1.9E-07	2.2E-07	2.6E-07
20	3-methylcholanthrene	24hr	max	1.9E-07	2.1E-07	2.4E-07
21	3-methylcholanthrene	24hr	max	4.5E-07	4.8E-07	5.0E-07
22	3-methylcholanthrene	24hr	max	2.3E-07	2.6E-07	2.8E-07
23	3-methylcholanthrene	24hr	max	1.7E-07	1.9E-07	2.1E-07
24	3-methylcholanthrene	24hr	max	1.9E-07	2.4E-07	2.9E-07
25	3-methylcholanthrene	24hr	max	2.6E-07	4.6E-07	4.7E-07
26	3-methylcholanthrene	24hr	max	2.3E-07	2.4E-07	2.8E-07
27	3-methylcholanthrene	24hr	max	2.4E-07	6.9E-07	6.9E-07
28	3-methylcholanthrene	24hr	max	1.7E-07	1.8E-07	2.1E-07
29	3-methylcholanthrene	24hr	max	1.7E-07	1.7E-07	2.1E-07
30	3-methylcholanthrene	24hr	max	3.0E-07	3.0E-07	3.6E-07
31	3-methylcholanthrene	24hr	max	3.0E-07	3.0E-07	3.7E-07
32	3-methylcholanthrene	24hr	max	1.6E-07	1.9E-07	2.2E-07
33	3-methylcholanthrene	24hr	max	2.0E-07	2.1E-07	2.5E-07
34	3-methylcholanthrene	24hr	max	2.0E-07	2.1E-07	2.3E-07
35	3-methylcholanthrene	24hr	max	1.9E-07	2.1E-07	2.4E-07
36	3-methylcholanthrene	24hr	max	1.9E-07	2.2E-07	2.5E-07
37	3-methylcholanthrene	24hr	max	1.9E-07	2.3E-07	2.6E-07
38	3-methylcholanthrene	24hr	max	1.7E-07	1.8E-07	2.1E-07
39	3-methylcholanthrene	24hr	max	1.8E-07	1.9E-07	2.2E-07
40	3-methylcholanthrene	24hr	max	1.9E-07	2.0E-07	2.4E-07
41	3-methylcholanthrene	24hr	max	2.1E-07	2.1E-07	2.5E-07
42	3-methylcholanthrene	24hr	max	2.5E-07	2.5E-07	2.8E-07
43	3-methylcholanthrene	24hr	max	8.3E-07	8.3E-07	8.4E-07
44	3-methylcholanthrene	24hr	max	9.4E-07	9.4E-07	1.0E-06
45	3-methylcholanthrene	24hr	max	2.4E-07	2.7E-07	3.2E-07
46	3-methylcholanthrene	24hr	max	2.7E-07	2.8E-07	3.2E-07
47	3-methylcholanthrene	24hr	max	2.5E-07	2.6E-07	3.4E-07
48	3-methylcholanthrene	24hr	max	9.2E-07	9.3E-07	9.8E-07
49	3-methylcholanthrene	24hr	max	4.4E-07	4.4E-07	4.9E-07
50	3-methylcholanthrene	24hr	max	3.4E-07	3.5E-07	4.3E-07
51	3-methylcholanthrene	24hr	max	2.7E-07	2.7E-07	3.3E-07
52	3-methylcholanthrene	24hr	max	3.5E-07	3.5E-07	5.6E-07
53	3-methylcholanthrene	24hr	max	3.0E-07	3.1E-07	4.4E-07
54	3-methylcholanthrene	24hr	max	1.6E-07	2.0E-07	2.3E-07
55	3-methylcholanthrene	24hr	max	1.8E-07	2.3E-07	2.7E-07
56	3-methylcholanthrene	24hr	max	1.9E-07	2.5E-07	3.0E-07
57	3-methylcholanthrene	24hr	max	1.7E-07	2.1E-07	2.4E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
58	3-methylcholanthrene	24hr	max	1.6E-07	2.0E-07	2.3E-07
59	3-methylcholanthrene	24hr	max	4.4E-07	4.4E-07	4.7E-07
60	3-methylcholanthrene	24hr	max	4.4E-07	4.4E-07	4.6E-07
61	3-methylcholanthrene	24hr	max	5.9E-07	5.9E-07	6.2E-07
62	3-methylcholanthrene	24hr	max	5.1E-07	5.2E-07	5.5E-07
63	3-methylcholanthrene	24hr	max	4.6E-07	4.7E-07	5.0E-07
64	3-methylcholanthrene	24hr	max	4.6E-07	4.6E-07	4.9E-07
65	3-methylcholanthrene	24hr	max	1.2E-06	1.2E-06	1.2E-06
66	3-methylcholanthrene	24hr	max	1.6E-07	1.7E-07	2.0E-07
67	3-methylcholanthrene	24hr	max	1.8E-07	1.8E-07	2.1E-07
68	3-methylcholanthrene	24hr	max	1.6E-07	1.7E-07	2.0E-07
69	3-methylcholanthrene	24hr	max	1.5E-07	1.5E-07	1.8E-07
70	3-methylcholanthrene	24hr	max	1.3E-07	1.4E-07	1.6E-07
71	3-methylcholanthrene	24hr	max	3.4E-07	3.4E-07	4.1E-07
72	3-methylcholanthrene	24hr	max	3.4E-07	3.4E-07	4.0E-07
73	3-methylcholanthrene	24hr	max	2.7E-06	2.7E-06	2.7E-06
74	3-methylcholanthrene	24hr	max	4.0E-07	4.0E-07	5.4E-07
75	3-methylcholanthrene	24hr	max	2.8E-05	2.8E-05	2.8E-05
76	3-methylcholanthrene	24hr	max	5.7E-07	5.8E-07	6.1E-07
77	3-methylcholanthrene	24hr	max	4.1E-07	4.1E-07	4.4E-07
78	3-methylcholanthrene	24hr	max	2.1E-07	2.1E-07	2.6E-07
79	3-methylcholanthrene	24hr	max	2.9E-07	3.0E-07	3.3E-07
1	3-methylcholanthrene	annual	average	6.7E-09	8.1E-09	9.2E-09
2	3-methylcholanthrene	annual	average	1.4E-08	1.6E-08	1.9E-08
3	3-methylcholanthrene	annual	average	1.4E-08	1.7E-08	1.9E-08
4	3-methylcholanthrene	annual	average	1.5E-08	1.8E-08	2.1E-08
5	3-methylcholanthrene	annual	average	1.6E-08	2.1E-08	2.4E-08
6	3-methylcholanthrene	annual	average	1.7E-08	2.2E-08	2.5E-08
7	3-methylcholanthrene	annual	average	1.6E-08	2.0E-08	2.3E-08
8	3-methylcholanthrene	annual	average	1.7E-08	2.2E-08	2.5E-08
9	3-methylcholanthrene	annual	average	1.8E-08	2.1E-08	2.4E-08
10	3-methylcholanthrene	annual	average	2.2E-08	2.6E-08	3.1E-08
11	3-methylcholanthrene	annual	average	3.1E-08	3.6E-08	4.3E-08
12	3-methylcholanthrene	annual	average	2.5E-08	2.9E-08	3.4E-08
13	3-methylcholanthrene	annual	average	2.4E-08	2.8E-08	3.2E-08
14	3-methylcholanthrene	annual	average	3.0E-08	3.7E-08	4.4E-08
15	3-methylcholanthrene	annual	average	1.7E-08	2.9E-08	3.3E-08
16	3-methylcholanthrene	annual	average	1.7E-08	2.9E-08	3.3E-08
17	3-methylcholanthrene	annual	average	1.8E-08	3.0E-08	3.4E-08
18	3-methylcholanthrene	annual	average	1.9E-08	3.2E-08	3.5E-08
19	3-methylcholanthrene	annual	average	1.9E-08	3.2E-08	3.6E-08
20	3-methylcholanthrene	annual	average	2.0E-08	3.4E-08	3.8E-08
21	3-methylcholanthrene	annual	average	7.7E-08	8.5E-08	9.0E-08
22	3-methylcholanthrene	annual	average	3.8E-08	4.6E-08	5.1E-08
23	3-methylcholanthrene	annual	average	2.0E-08	2.7E-08	3.1E-08
24	3-methylcholanthrene	annual	average	1.4E-08	1.8E-08	2.1E-08
25	3-methylcholanthrene	annual	average	1.8E-08	4.6E-08	5.0E-08
26	3-methylcholanthrene	annual	average	2.1E-08	4.2E-08	4.7E-08
27	3-methylcholanthrene	annual	average	2.6E-08	6.3E-08	7.0E-08
28	3-methylcholanthrene	annual	average	2.1E-08	3.2E-08	3.7E-08
29	3-methylcholanthrene	annual	average	2.1E-08	3.2E-08	3.8E-08
30	3-methylcholanthrene	annual	average	1.6E-08	2.3E-08	2.7E-08
31	3-methylcholanthrene	annual	average	1.7E-08	2.5E-08	2.9E-08
32	3-methylcholanthrene	annual	average	7.2E-09	9.3E-09	1.1E-08
33	3-methylcholanthrene	annual	average	9.1E-09	1.2E-08	1.4E-08
34	3-methylcholanthrene	annual	average	9.3E-09	1.2E-08	1.3E-08
35	3-methylcholanthrene	annual	average	9.6E-09	1.2E-08	1.4E-08
36	3-methylcholanthrene	annual	average	1.0E-08	1.3E-08	1.5E-08
37	3-methylcholanthrene	annual	average	1.1E-08	1.4E-08	1.6E-08

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
38	3-methylcholanthrene	annual	average	2.4E-08	3.3E-08	3.9E-08
39	3-methylcholanthrene	annual	average	2.6E-08	3.6E-08	4.3E-08
40	3-methylcholanthrene	annual	average	2.7E-08	3.8E-08	4.6E-08
41	3-methylcholanthrene	annual	average	2.8E-08	3.8E-08	4.6E-08
42	3-methylcholanthrene	annual	average	3.4E-08	4.2E-08	4.9E-08
43	3-methylcholanthrene	annual	average	8.4E-08	9.2E-08	1.0E-07
44	3-methylcholanthrene	annual	average	1.2E-07	1.3E-07	1.4E-07
45	3-methylcholanthrene	annual	average	4.1E-08	4.8E-08	5.7E-08
46	3-methylcholanthrene	annual	average	4.7E-08	5.5E-08	6.4E-08
47	3-methylcholanthrene	annual	average	4.0E-08	4.7E-08	5.6E-08
48	3-methylcholanthrene	annual	average	9.8E-08	1.1E-07	1.1E-07
49	3-methylcholanthrene	annual	average	6.2E-08	6.9E-08	7.8E-08
50	3-methylcholanthrene	annual	average	5.5E-08	6.3E-08	7.1E-08
51	3-methylcholanthrene	annual	average	3.3E-08	4.1E-08	4.9E-08
52	3-methylcholanthrene	annual	average	4.8E-08	5.3E-08	9.1E-08
53	3-methylcholanthrene	annual	average	3.7E-08	4.3E-08	6.2E-08
54	3-methylcholanthrene	annual	average	1.1E-08	1.4E-08	1.5E-08
55	3-methylcholanthrene	annual	average	1.2E-08	1.5E-08	1.7E-08
56	3-methylcholanthrene	annual	average	1.3E-08	1.6E-08	1.8E-08
57	3-methylcholanthrene	annual	average	1.3E-08	1.6E-08	1.9E-08
58	3-methylcholanthrene	annual	average	9.8E-09	1.2E-08	1.3E-08
59	3-methylcholanthrene	annual	average	5.5E-08	5.8E-08	8.5E-08
60	3-methylcholanthrene	annual	average	6.1E-08	6.3E-08	8.4E-08
61	3-methylcholanthrene	annual	average	8.4E-08	8.6E-08	1.0E-07
62	3-methylcholanthrene	annual	average	7.1E-08	7.3E-08	8.9E-08
63	3-methylcholanthrene	annual	average	6.5E-08	6.7E-08	8.8E-08
64	3-methylcholanthrene	annual	average	6.4E-08	6.7E-08	8.5E-08
65	3-methylcholanthrene	annual	average	1.8E-07	1.8E-07	2.0E-07
66	3-methylcholanthrene	annual	average	2.0E-08	2.3E-08	2.7E-08
67	3-methylcholanthrene	annual	average	2.3E-08	2.7E-08	3.1E-08
68	3-methylcholanthrene	annual	average	2.0E-08	2.3E-08	2.7E-08
69	3-methylcholanthrene	annual	average	2.0E-08	2.3E-08	2.6E-08
70	3-methylcholanthrene	annual	average	1.8E-08	2.1E-08	2.4E-08
71	3-methylcholanthrene	annual	average	3.3E-08	4.0E-08	4.8E-08
72	3-methylcholanthrene	annual	average	3.4E-08	4.1E-08	4.8E-08
73	3-methylcholanthrene	annual	average	4.8E-07	4.8E-07	4.9E-07
74	3-methylcholanthrene	annual	average	5.4E-08	5.8E-08	1.1E-07
75	3-methylcholanthrene	annual	average	4.2E-06	4.2E-06	4.2E-06
76	3-methylcholanthrene	annual	average	8.2E-08	8.4E-08	9.9E-08
77	3-methylcholanthrene	annual	average	5.5E-08	5.8E-08	8.9E-08
78	3-methylcholanthrene	annual	average	2.8E-08	3.7E-08	4.4E-08
79	3-methylcholanthrene	annual	average	5.1E-08	5.9E-08	6.3E-08
1	7,12-dimethylbenz(a)anthracene	1hr	max	2.7E-06	2.8E-06	3.2E-06
2	7,12-dimethylbenz(a)anthracene	1hr	max	3.3E-06	3.3E-06	3.4E-06
3	7,12-dimethylbenz(a)anthracene	1hr	max	3.9E-06	4.0E-06	4.1E-06
4	7,12-dimethylbenz(a)anthracene	1hr	max	3.3E-06	3.6E-06	3.9E-06
5	7,12-dimethylbenz(a)anthracene	1hr	max	3.1E-06	4.0E-06	4.3E-06
6	7,12-dimethylbenz(a)anthracene	1hr	max	3.2E-06	3.8E-06	4.1E-06
7	7,12-dimethylbenz(a)anthracene	1hr	max	5.0E-06	5.4E-06	5.6E-06
8	7,12-dimethylbenz(a)anthracene	1hr	max	4.0E-06	4.4E-06	4.6E-06
9	7,12-dimethylbenz(a)anthracene	1hr	max	3.8E-06	3.8E-06	3.8E-06
10	7,12-dimethylbenz(a)anthracene	1hr	max	3.7E-06	4.9E-06	5.1E-06
11	7,12-dimethylbenz(a)anthracene	1hr	max	6.3E-06	6.4E-06	6.9E-06
12	7,12-dimethylbenz(a)anthracene	1hr	max	4.7E-06	4.7E-06	5.1E-06
13	7,12-dimethylbenz(a)anthracene	1hr	max	4.6E-06	4.6E-06	5.0E-06
14	7,12-dimethylbenz(a)anthracene	1hr	max	1.3E-05	1.3E-05	1.3E-05
15	7,12-dimethylbenz(a)anthracene	1hr	max	3.3E-06	4.8E-06	4.9E-06
16	7,12-dimethylbenz(a)anthracene	1hr	max	3.1E-06	4.3E-06	4.6E-06
17	7,12-dimethylbenz(a)anthracene	1hr	max	3.3E-06	4.9E-06	5.0E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
18	7,12-dimethylbenz(a)anthracene	1hr	max	2.8E-06	4.5E-06	4.6E-06
19	7,12-dimethylbenz(a)anthracene	1hr	max	2.8E-06	5.0E-06	5.2E-06
20	7,12-dimethylbenz(a)anthracene	1hr	max	3.3E-06	3.7E-06	3.9E-06
21	7,12-dimethylbenz(a)anthracene	1hr	max	1.3E-05	1.3E-05	1.3E-05
22	7,12-dimethylbenz(a)anthracene	1hr	max	6.3E-06	6.3E-06	6.3E-06
23	7,12-dimethylbenz(a)anthracene	1hr	max	5.0E-06	5.1E-06	5.2E-06
24	7,12-dimethylbenz(a)anthracene	1hr	max	3.5E-06	3.7E-06	3.9E-06
25	7,12-dimethylbenz(a)anthracene	1hr	max	1.1E-05	2.2E-05	2.2E-05
26	7,12-dimethylbenz(a)anthracene	1hr	max	8.5E-06	8.6E-06	8.8E-06
27	7,12-dimethylbenz(a)anthracene	1hr	max	1.0E-05	4.2E-05	4.2E-05
28	7,12-dimethylbenz(a)anthracene	1hr	max	4.9E-06	4.9E-06	5.1E-06
29	7,12-dimethylbenz(a)anthracene	1hr	max	5.0E-06	5.0E-06	5.2E-06
30	7,12-dimethylbenz(a)anthracene	1hr	max	9.8E-06	9.8E-06	1.0E-05
31	7,12-dimethylbenz(a)anthracene	1hr	max	8.7E-06	8.7E-06	9.3E-06
32	7,12-dimethylbenz(a)anthracene	1hr	max	2.9E-06	3.6E-06	4.5E-06
33	7,12-dimethylbenz(a)anthracene	1hr	max	4.7E-06	4.8E-06	5.5E-06
34	7,12-dimethylbenz(a)anthracene	1hr	max	3.9E-06	4.1E-06	4.6E-06
35	7,12-dimethylbenz(a)anthracene	1hr	max	4.3E-06	4.5E-06	5.0E-06
36	7,12-dimethylbenz(a)anthracene	1hr	max	4.4E-06	4.6E-06	5.2E-06
37	7,12-dimethylbenz(a)anthracene	1hr	max	4.3E-06	4.5E-06	5.1E-06
38	7,12-dimethylbenz(a)anthracene	1hr	max	7.7E-06	7.7E-06	8.9E-06
39	7,12-dimethylbenz(a)anthracene	1hr	max	4.9E-06	5.0E-06	5.3E-06
40	7,12-dimethylbenz(a)anthracene	1hr	max	4.4E-06	4.5E-06	4.8E-06
41	7,12-dimethylbenz(a)anthracene	1hr	max	5.8E-06	5.8E-06	5.8E-06
42	7,12-dimethylbenz(a)anthracene	1hr	max	1.3E-05	1.3E-05	1.3E-05
43	7,12-dimethylbenz(a)anthracene	1hr	max	1.9E-05	1.9E-05	1.9E-05
44	7,12-dimethylbenz(a)anthracene	1hr	max	3.6E-05	3.6E-05	3.6E-05
45	7,12-dimethylbenz(a)anthracene	1hr	max	9.8E-06	9.8E-06	1.0E-05
46	7,12-dimethylbenz(a)anthracene	1hr	max	1.6E-05	1.6E-05	1.7E-05
47	7,12-dimethylbenz(a)anthracene	1hr	max	1.6E-05	1.6E-05	1.6E-05
48	7,12-dimethylbenz(a)anthracene	1hr	max	2.7E-05	2.7E-05	2.7E-05
49	7,12-dimethylbenz(a)anthracene	1hr	max	3.2E-05	3.2E-05	3.3E-05
50	7,12-dimethylbenz(a)anthracene	1hr	max	1.1E-05	1.1E-05	1.1E-05
51	7,12-dimethylbenz(a)anthracene	1hr	max	1.3E-05	1.3E-05	1.3E-05
52	7,12-dimethylbenz(a)anthracene	1hr	max	9.2E-06	9.2E-06	1.7E-05
53	7,12-dimethylbenz(a)anthracene	1hr	max	6.6E-06	6.6E-06	8.2E-06
54	7,12-dimethylbenz(a)anthracene	1hr	max	3.0E-06	3.4E-06	3.9E-06
55	7,12-dimethylbenz(a)anthracene	1hr	max	2.8E-06	3.2E-06	3.9E-06
56	7,12-dimethylbenz(a)anthracene	1hr	max	2.9E-06	3.5E-06	4.4E-06
57	7,12-dimethylbenz(a)anthracene	1hr	max	3.6E-06	3.7E-06	3.8E-06
58	7,12-dimethylbenz(a)anthracene	1hr	max	3.2E-06	3.5E-06	4.0E-06
59	7,12-dimethylbenz(a)anthracene	1hr	max	1.4E-05	1.4E-05	1.4E-05
60	7,12-dimethylbenz(a)anthracene	1hr	max	1.6E-05	1.6E-05	1.7E-05
61	7,12-dimethylbenz(a)anthracene	1hr	max	4.8E-05	4.8E-05	4.8E-05
62	7,12-dimethylbenz(a)anthracene	1hr	max	1.9E-05	1.9E-05	2.0E-05
63	7,12-dimethylbenz(a)anthracene	1hr	max	1.6E-05	1.6E-05	1.6E-05
64	7,12-dimethylbenz(a)anthracene	1hr	max	1.6E-05	1.6E-05	1.6E-05
65	7,12-dimethylbenz(a)anthracene	1hr	max	3.4E-05	3.4E-05	3.4E-05
66	7,12-dimethylbenz(a)anthracene	1hr	max	4.8E-06	4.8E-06	5.1E-06
67	7,12-dimethylbenz(a)anthracene	1hr	max	5.2E-06	5.2E-06	5.7E-06
68	7,12-dimethylbenz(a)anthracene	1hr	max	4.3E-06	4.3E-06	4.7E-06
69	7,12-dimethylbenz(a)anthracene	1hr	max	4.4E-06	4.4E-06	4.7E-06
70	7,12-dimethylbenz(a)anthracene	1hr	max	4.1E-06	4.1E-06	4.4E-06
71	7,12-dimethylbenz(a)anthracene	1hr	max	7.4E-06	7.5E-06	8.8E-06
72	7,12-dimethylbenz(a)anthracene	1hr	max	7.7E-06	7.7E-06	8.3E-06
73	7,12-dimethylbenz(a)anthracene	1hr	max	5.9E-05	5.9E-05	5.9E-05
74	7,12-dimethylbenz(a)anthracene	1hr	max	1.1E-05	1.1E-05	2.1E-05
75	7,12-dimethylbenz(a)anthracene	1hr	max	8.5E-04	8.5E-04	8.5E-04
76	7,12-dimethylbenz(a)anthracene	1hr	max	3.7E-05	3.7E-05	3.7E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
77	7,12-dimethylbenz(a)anthracene	1hr	max	2.3E-05	2.3E-05	3.5E-05
78	7,12-dimethylbenz(a)anthracene	1hr	max	1.0E-05	1.0E-05	1.1E-05
79	7,12-dimethylbenz(a)anthracene	1hr	max	7.4E-06	7.4E-06	7.7E-06
1	7,12-dimethylbenz(a)anthracene	1hr	9th	1.7E-06	1.8E-06	2.1E-06
2	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.4E-06	2.7E-06
3	7,12-dimethylbenz(a)anthracene	1hr	9th	2.1E-06	2.3E-06	2.6E-06
4	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.3E-06	2.5E-06
5	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.4E-06	2.7E-06
6	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.4E-06	2.7E-06
7	7,12-dimethylbenz(a)anthracene	1hr	9th	2.1E-06	2.5E-06	2.9E-06
8	7,12-dimethylbenz(a)anthracene	1hr	9th	2.1E-06	2.4E-06	2.7E-06
9	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.4E-06	2.7E-06
10	7,12-dimethylbenz(a)anthracene	1hr	9th	2.7E-06	2.8E-06	3.3E-06
11	7,12-dimethylbenz(a)anthracene	1hr	9th	3.7E-06	3.9E-06	4.1E-06
12	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.5E-06	3.0E-06
13	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.4E-06	2.9E-06
14	7,12-dimethylbenz(a)anthracene	1hr	9th	2.9E-06	3.0E-06	3.4E-06
15	7,12-dimethylbenz(a)anthracene	1hr	9th	2.3E-06	2.9E-06	3.2E-06
16	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.8E-06	3.1E-06
17	7,12-dimethylbenz(a)anthracene	1hr	9th	2.3E-06	2.7E-06	3.1E-06
18	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.9E-06	3.2E-06
19	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	3.2E-06	3.4E-06
20	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.9E-06	3.1E-06
21	7,12-dimethylbenz(a)anthracene	1hr	9th	7.1E-06	7.4E-06	7.4E-06
22	7,12-dimethylbenz(a)anthracene	1hr	9th	5.2E-06	5.3E-06	5.5E-06
23	7,12-dimethylbenz(a)anthracene	1hr	9th	2.5E-06	2.6E-06	3.0E-06
24	7,12-dimethylbenz(a)anthracene	1hr	9th	2.3E-06	2.6E-06	3.0E-06
25	7,12-dimethylbenz(a)anthracene	1hr	9th	3.1E-06	1.1E-05	1.1E-05
26	7,12-dimethylbenz(a)anthracene	1hr	9th	2.8E-06	4.6E-06	4.7E-06
27	7,12-dimethylbenz(a)anthracene	1hr	9th	3.4E-06	1.7E-05	1.8E-05
28	7,12-dimethylbenz(a)anthracene	1hr	9th	2.5E-06	2.7E-06	3.0E-06
29	7,12-dimethylbenz(a)anthracene	1hr	9th	2.5E-06	2.7E-06	3.0E-06
30	7,12-dimethylbenz(a)anthracene	1hr	9th	3.7E-06	4.0E-06	4.5E-06
31	7,12-dimethylbenz(a)anthracene	1hr	9th	3.8E-06	4.1E-06	4.7E-06
32	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.1E-06	2.5E-06
33	7,12-dimethylbenz(a)anthracene	1hr	9th	2.6E-06	2.6E-06	3.0E-06
34	7,12-dimethylbenz(a)anthracene	1hr	9th	2.7E-06	2.8E-06	3.1E-06
35	7,12-dimethylbenz(a)anthracene	1hr	9th	2.5E-06	2.6E-06	3.1E-06
36	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.6E-06	2.9E-06
37	7,12-dimethylbenz(a)anthracene	1hr	9th	2.4E-06	2.7E-06	3.0E-06
38	7,12-dimethylbenz(a)anthracene	1hr	9th	2.8E-06	2.8E-06	3.3E-06
39	7,12-dimethylbenz(a)anthracene	1hr	9th	2.9E-06	2.9E-06	3.3E-06
40	7,12-dimethylbenz(a)anthracene	1hr	9th	3.0E-06	3.0E-06	3.5E-06
41	7,12-dimethylbenz(a)anthracene	1hr	9th	3.2E-06	3.2E-06	3.7E-06
42	7,12-dimethylbenz(a)anthracene	1hr	9th	5.5E-06	5.5E-06	5.8E-06
43	7,12-dimethylbenz(a)anthracene	1hr	9th	1.6E-05	1.6E-05	1.6E-05
44	7,12-dimethylbenz(a)anthracene	1hr	9th	2.5E-05	2.5E-05	2.6E-05
45	7,12-dimethylbenz(a)anthracene	1hr	9th	7.0E-06	7.1E-06	7.2E-06
46	7,12-dimethylbenz(a)anthracene	1hr	9th	1.2E-05	1.2E-05	1.2E-05
47	7,12-dimethylbenz(a)anthracene	1hr	9th	7.2E-06	7.2E-06	7.7E-06
48	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-05	2.0E-05	2.1E-05
49	7,12-dimethylbenz(a)anthracene	1hr	9th	1.6E-05	1.6E-05	1.6E-05
50	7,12-dimethylbenz(a)anthracene	1hr	9th	6.5E-06	6.5E-06	6.6E-06
51	7,12-dimethylbenz(a)anthracene	1hr	9th	4.2E-06	4.2E-06	5.0E-06
52	7,12-dimethylbenz(a)anthracene	1hr	9th	5.6E-06	5.6E-06	1.1E-05
53	7,12-dimethylbenz(a)anthracene	1hr	9th	4.1E-06	4.1E-06	5.6E-06
54	7,12-dimethylbenz(a)anthracene	1hr	9th	1.8E-06	2.2E-06	2.6E-06
55	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.5E-06	2.8E-06
56	7,12-dimethylbenz(a)anthracene	1hr	9th	2.1E-06	2.6E-06	2.8E-06

Table 4E-1 Volatile Organic Compounds						
ReceptorID	**Chemical**	**Period**	**Stat**	**Baseline**	**Application**	**CEA**
57	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.6E-06	3.0E-06
58	7,12-dimethylbenz(a)anthracene	1hr	9th	1.8E-06	2.0E-06	2.4E-06
59	7,12-dimethylbenz(a)anthracene	1hr	9th	6.9E-06	6.9E-06	7.3E-06
60	7,12-dimethylbenz(a)anthracene	1hr	9th	1.0E-05	1.0E-05	1.1E-05
61	7,12-dimethylbenz(a)anthracene	1hr	9th	1.3E-05	1.3E-05	1.4E-05
62	7,12-dimethylbenz(a)anthracene	1hr	9th	9.7E-06	9.7E-06	1.0E-05
63	7,12-dimethylbenz(a)anthracene	1hr	9th	8.7E-06	8.8E-06	9.0E-06
64	7,12-dimethylbenz(a)anthracene	1hr	9th	8.5E-06	8.5E-06	8.9E-06
65	7,12-dimethylbenz(a)anthracene	1hr	9th	2.7E-05	2.7E-05	2.7E-05
66	7,12-dimethylbenz(a)anthracene	1hr	9th	2.1E-06	2.1E-06	2.5E-06
67	7,12-dimethylbenz(a)anthracene	1hr	9th	2.2E-06	2.2E-06	2.8E-06
68	7,12-dimethylbenz(a)anthracene	1hr	9th	2.3E-06	2.3E-06	2.7E-06
69	7,12-dimethylbenz(a)anthracene	1hr	9th	2.3E-06	2.4E-06	2.5E-06
70	7,12-dimethylbenz(a)anthracene	1hr	9th	2.0E-06	2.0E-06	2.3E-06
71	7,12-dimethylbenz(a)anthracene	1hr	9th	5.3E-06	5.3E-06	6.9E-06
72	7,12-dimethylbenz(a)anthracene	1hr	9th	5.1E-06	5.2E-06	6.9E-06
73	7,12-dimethylbenz(a)anthracene	1hr	9th	5.6E-05	5.6E-05	5.6E-05
74	7,12-dimethylbenz(a)anthracene	1hr	9th	6.7E-06	6.7E-06	9.0E-06
75	7,12-dimethylbenz(a)anthracene	1hr	9th	7.0E-04	7.0E-04	7.0E-04
76	7,12-dimethylbenz(a)anthracene	1hr	9th	1.3E-05	1.3E-05	1.3E-05
77	7,12-dimethylbenz(a)anthracene	1hr	9th	7.3E-06	7.3E-06	1.2E-05
78	7,12-dimethylbenz(a)anthracene	1hr	9th	3.8E-06	3.8E-06	4.0E-06
79	7,12-dimethylbenz(a)anthracene	1hr	9th	5.6E-06	5.8E-06	6.0E-06
1	7,12-dimethylbenz(a)anthracene	24hr	max	7.6E-07	1.0E-06	1.2E-06
2	7,12-dimethylbenz(a)anthracene	24hr	max	7.5E-07	9.7E-07	1.2E-06
3	7,12-dimethylbenz(a)anthracene	24hr	max	7.7E-07	9.8E-07	1.2E-06
4	7,12-dimethylbenz(a)anthracene	24hr	max	7.9E-07	1.0E-06	1.3E-06
5	7,12-dimethylbenz(a)anthracene	24hr	max	9.5E-07	1.0E-06	1.3E-06
6	7,12-dimethylbenz(a)anthracene	24hr	max	9.8E-07	1.1E-06	1.3E-06
7	7,12-dimethylbenz(a)anthracene	24hr	max	9.6E-07	1.2E-06	1.4E-06
8	7,12-dimethylbenz(a)anthracene	24hr	max	9.4E-07	1.1E-06	1.3E-06
9	7,12-dimethylbenz(a)anthracene	24hr	max	1.0E-06	1.0E-06	1.3E-06
10	7,12-dimethylbenz(a)anthracene	24hr	max	1.2E-06	1.3E-06	1.7E-06
11	7,12-dimethylbenz(a)anthracene	24hr	max	1.9E-06	2.2E-06	2.5E-06
12	7,12-dimethylbenz(a)anthracene	24hr	max	1.2E-06	1.3E-06	1.6E-06
13	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.3E-06	1.6E-06
14	7,12-dimethylbenz(a)anthracene	24hr	max	1.7E-06	1.7E-06	1.9E-06
15	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.5E-06	1.9E-06
16	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.5E-06	1.9E-06
17	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.3E-06	1.7E-06
18	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.3E-06	1.6E-06
19	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.3E-06	1.6E-06
20	7,12-dimethylbenz(a)anthracene	24hr	max	1.0E-06	1.5E-06	1.7E-06
21	7,12-dimethylbenz(a)anthracene	24hr	max	3.9E-06	4.2E-06	4.3E-06
22	7,12-dimethylbenz(a)anthracene	24hr	max	1.9E-06	2.1E-06	2.3E-06
23	7,12-dimethylbenz(a)anthracene	24hr	max	9.9E-07	1.1E-06	1.3E-06
24	7,12-dimethylbenz(a)anthracene	24hr	max	1.0E-06	1.5E-06	1.9E-06
25	7,12-dimethylbenz(a)anthracene	24hr	max	1.6E-06	4.0E-06	4.0E-06
26	7,12-dimethylbenz(a)anthracene	24hr	max	1.5E-06	1.5E-06	1.8E-06
27	7,12-dimethylbenz(a)anthracene	24hr	max	1.6E-06	6.0E-06	6.0E-06
28	7,12-dimethylbenz(a)anthracene	24hr	max	9.7E-07	1.1E-06	1.4E-06
29	7,12-dimethylbenz(a)anthracene	24hr	max	9.8E-07	1.2E-06	1.4E-06
30	7,12-dimethylbenz(a)anthracene	24hr	max	1.8E-06	1.8E-06	2.3E-06
31	7,12-dimethylbenz(a)anthracene	24hr	max	1.8E-06	1.8E-06	2.4E-06
32	7,12-dimethylbenz(a)anthracene	24hr	max	8.8E-07	1.1E-06	1.4E-06
33	7,12-dimethylbenz(a)anthracene	24hr	max	1.2E-06	1.3E-06	1.6E-06
34	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.2E-06	1.5E-06
35	7,12-dimethylbenz(a)anthracene	24hr	max	9.8E-07	1.2E-06	1.5E-06
36	7,12-dimethylbenz(a)anthracene	24hr	max	9.9E-07	1.3E-06	1.6E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
37	7,12-dimethylbenz(a)anthracene	24hr	max	9.9E-07	1.3E-06	1.6E-06
38	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.3E-06	1.6E-06
39	7,12-dimethylbenz(a)anthracene	24hr	max	1.2E-06	1.3E-06	1.7E-06
40	7,12-dimethylbenz(a)anthracene	24hr	max	1.3E-06	1.4E-06	1.8E-06
41	7,12-dimethylbenz(a)anthracene	24hr	max	1.4E-06	1.5E-06	1.8E-06
42	7,12-dimethylbenz(a)anthracene	24hr	max	1.8E-06	1.8E-06	2.3E-06
43	7,12-dimethylbenz(a)anthracene	24hr	max	7.3E-06	7.3E-06	7.4E-06
44	7,12-dimethylbenz(a)anthracene	24hr	max	8.2E-06	8.3E-06	9.0E-06
45	7,12-dimethylbenz(a)anthracene	24hr	max	1.9E-06	2.0E-06	2.6E-06
46	7,12-dimethylbenz(a)anthracene	24hr	max	2.3E-06	2.3E-06	2.8E-06
47	7,12-dimethylbenz(a)anthracene	24hr	max	2.0E-06	2.0E-06	2.7E-06
48	7,12-dimethylbenz(a)anthracene	24hr	max	8.1E-06	8.1E-06	8.6E-06
49	7,12-dimethylbenz(a)anthracene	24hr	max	3.7E-06	3.8E-06	4.2E-06
50	7,12-dimethylbenz(a)anthracene	24hr	max	2.7E-06	2.7E-06	3.4E-06
51	7,12-dimethylbenz(a)anthracene	24hr	max	2.0E-06	2.0E-06	2.5E-06
52	7,12-dimethylbenz(a)anthracene	24hr	max	2.2E-06	2.3E-06	4.1E-06
53	7,12-dimethylbenz(a)anthracene	24hr	max	1.9E-06	2.0E-06	3.1E-06
54	7,12-dimethylbenz(a)anthracene	24hr	max	8.6E-07	1.2E-06	1.5E-06
55	7,12-dimethylbenz(a)anthracene	24hr	max	9.6E-07	1.4E-06	1.8E-06
56	7,12-dimethylbenz(a)anthracene	24hr	max	1.0E-06	1.6E-06	2.0E-06
57	7,12-dimethylbenz(a)anthracene	24hr	max	9.2E-07	1.3E-06	1.6E-06
58	7,12-dimethylbenz(a)anthracene	24hr	max	8.4E-07	1.2E-06	1.5E-06
59	7,12-dimethylbenz(a)anthracene	24hr	max	3.7E-06	3.7E-06	3.9E-06
60	7,12-dimethylbenz(a)anthracene	24hr	max	3.6E-06	3.6E-06	3.8E-06
61	7,12-dimethylbenz(a)anthracene	24hr	max	4.7E-06	4.7E-06	4.9E-06
62	7,12-dimethylbenz(a)anthracene	24hr	max	3.9E-06	3.9E-06	4.1E-06
63	7,12-dimethylbenz(a)anthracene	24hr	max	3.5E-06	3.5E-06	3.7E-06
64	7,12-dimethylbenz(a)anthracene	24hr	max	3.5E-06	3.5E-06	3.7E-06
65	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-05	1.1E-05	1.1E-05
66	7,12-dimethylbenz(a)anthracene	24hr	max	1.1E-06	1.1E-06	1.4E-06
67	7,12-dimethylbenz(a)anthracene	24hr	max	1.2E-06	1.2E-06	1.5E-06
68	7,12-dimethylbenz(a)anthracene	24hr	max	1.2E-06	1.2E-06	1.3E-06
69	7,12-dimethylbenz(a)anthracene	24hr	max	9.5E-07	1.0E-06	1.2E-06
70	7,12-dimethylbenz(a)anthracene	24hr	max	7.8E-07	9.3E-07	1.1E-06
71	7,12-dimethylbenz(a)anthracene	24hr	max	1.9E-06	1.9E-06	2.8E-06
72	7,12-dimethylbenz(a)anthracene	24hr	max	1.9E-06	1.9E-06	2.8E-06
73	7,12-dimethylbenz(a)anthracene	24hr	max	2.4E-05	2.4E-05	2.4E-05
74	7,12-dimethylbenz(a)anthracene	24hr	max	2.7E-06	2.7E-06	4.2E-06
75	7,12-dimethylbenz(a)anthracene	24hr	max	2.5E-04	2.5E-04	2.5E-04
76	7,12-dimethylbenz(a)anthracene	24hr	max	4.4E-06	4.4E-06	4.6E-06
77	7,12-dimethylbenz(a)anthracene	24hr	max	2.8E-06	2.8E-06	3.1E-06
78	7,12-dimethylbenz(a)anthracene	24hr	max	1.5E-06	1.5E-06	2.0E-06
79	7,12-dimethylbenz(a)anthracene	24hr	max	2.4E-06	2.4E-06	2.8E-06
1	7,12-dimethylbenz(a)anthracene	annual	average	4.1E-08	5.3E-08	6.3E-08
2	7,12-dimethylbenz(a)anthracene	annual	average	8.6E-08	1.1E-07	1.3E-07
3	7,12-dimethylbenz(a)anthracene	annual	average	8.7E-08	1.1E-07	1.3E-07
4	7,12-dimethylbenz(a)anthracene	annual	average	9.1E-08	1.2E-07	1.4E-07
5	7,12-dimethylbenz(a)anthracene	annual	average	1.0E-07	1.4E-07	1.7E-07
6	7,12-dimethylbenz(a)anthracene	annual	average	1.0E-07	1.5E-07	1.7E-07
7	7,12-dimethylbenz(a)anthracene	annual	average	9.4E-08	1.3E-07	1.6E-07
8	7,12-dimethylbenz(a)anthracene	annual	average	1.0E-07	1.5E-07	1.8E-07
9	7,12-dimethylbenz(a)anthracene	annual	average	1.2E-07	1.5E-07	1.7E-07
10	7,12-dimethylbenz(a)anthracene	annual	average	1.5E-07	1.9E-07	2.3E-07
11	7,12-dimethylbenz(a)anthracene	annual	average	2.3E-07	2.7E-07	3.3E-07
12	7,12-dimethylbenz(a)anthracene	annual	average	1.8E-07	2.1E-07	2.6E-07
13	7,12-dimethylbenz(a)anthracene	annual	average	1.6E-07	2.0E-07	2.4E-07
14	7,12-dimethylbenz(a)anthracene	annual	average	2.1E-07	2.8E-07	3.3E-07
15	7,12-dimethylbenz(a)anthracene	annual	average	1.0E-07	2.1E-07	2.4E-07
16	7,12-dimethylbenz(a)anthracene	annual	average	1.0E-07	2.1E-07	2.4E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
17	7,12-dimethylbenz(a)anthracene	annual	average	1.1E-07	2.2E-07	2.5E-07
18	7,12-dimethylbenz(a)anthracene	annual	average	1.2E-07	2.3E-07	2.6E-07
19	7,12-dimethylbenz(a)anthracene	annual	average	1.2E-07	2.3E-07	2.7E-07
20	7,12-dimethylbenz(a)anthracene	annual	average	1.2E-07	2.5E-07	2.9E-07
21	7,12-dimethylbenz(a)anthracene	annual	average	6.4E-07	7.1E-07	7.5E-07
22	7,12-dimethylbenz(a)anthracene	annual	average	2.9E-07	3.6E-07	4.0E-07
23	7,12-dimethylbenz(a)anthracene	annual	average	1.3E-07	1.9E-07	2.3E-07
24	7,12-dimethylbenz(a)anthracene	annual	average	8.2E-08	1.2E-07	1.4E-07
25	7,12-dimethylbenz(a)anthracene	annual	average	9.9E-08	3.5E-07	3.8E-07
26	7,12-dimethylbenz(a)anthracene	annual	average	1.1E-07	3.1E-07	3.5E-07
27	7,12-dimethylbenz(a)anthracene	annual	average	1.5E-07	4.8E-07	5.4E-07
28	7,12-dimethylbenz(a)anthracene	annual	average	1.3E-07	2.3E-07	2.8E-07
29	7,12-dimethylbenz(a)anthracene	annual	average	1.4E-07	2.3E-07	2.8E-07
30	7,12-dimethylbenz(a)anthracene	annual	average	9.4E-08	1.6E-07	1.9E-07
31	7,12-dimethylbenz(a)anthracene	annual	average	9.8E-08	1.7E-07	2.0E-07
32	7,12-dimethylbenz(a)anthracene	annual	average	4.2E-08	6.1E-08	7.3E-08
33	7,12-dimethylbenz(a)anthracene	annual	average	5.6E-08	7.9E-08	9.5E-08
34	7,12-dimethylbenz(a)anthracene	annual	average	5.8E-08	7.9E-08	9.4E-08
35	7,12-dimethylbenz(a)anthracene	annual	average	5.6E-08	8.0E-08	9.6E-08
36	7,12-dimethylbenz(a)anthracene	annual	average	5.9E-08	8.6E-08	1.0E-07
37	7,12-dimethylbenz(a)anthracene	annual	average	6.0E-08	8.8E-08	1.0E-07
38	7,12-dimethylbenz(a)anthracene	annual	average	1.6E-07	2.4E-07	2.9E-07
39	7,12-dimethylbenz(a)anthracene	annual	average	1.6E-07	2.6E-07	3.2E-07
40	7,12-dimethylbenz(a)anthracene	annual	average	1.7E-07	2.8E-07	3.4E-07
41	7,12-dimethylbenz(a)anthracene	annual	average	1.8E-07	2.7E-07	3.4E-07
42	7,12-dimethylbenz(a)anthracene	annual	average	2.4E-07	3.2E-07	3.8E-07
43	7,12-dimethylbenz(a)anthracene	annual	average	6.9E-07	7.6E-07	8.3E-07
44	7,12-dimethylbenz(a)anthracene	annual	average	1.0E-06	1.1E-06	1.2E-06
45	7,12-dimethylbenz(a)anthracene	annual	average	3.0E-07	3.7E-07	4.5E-07
46	7,12-dimethylbenz(a)anthracene	annual	average	3.6E-07	4.3E-07	5.1E-07
47	7,12-dimethylbenz(a)anthracene	annual	average	2.9E-07	3.6E-07	4.4E-07
48	7,12-dimethylbenz(a)anthracene	annual	average	8.1E-07	8.8E-07	9.5E-07
49	7,12-dimethylbenz(a)anthracene	annual	average	4.9E-07	5.6E-07	6.3E-07
50	7,12-dimethylbenz(a)anthracene	annual	average	4.3E-07	5.0E-07	5.8E-07
51	7,12-dimethylbenz(a)anthracene	annual	average	2.3E-07	3.0E-07	3.8E-07
52	7,12-dimethylbenz(a)anthracene	annual	average	3.4E-07	3.9E-07	7.2E-07
53	7,12-dimethylbenz(a)anthracene	annual	average	2.6E-07	3.1E-07	4.8E-07
54	7,12-dimethylbenz(a)anthracene	annual	average	6.9E-08	8.8E-08	1.0E-07
55	7,12-dimethylbenz(a)anthracene	annual	average	7.1E-08	9.7E-08	1.1E-07
56	7,12-dimethylbenz(a)anthracene	annual	average	7.3E-08	1.1E-07	1.2E-07
57	7,12-dimethylbenz(a)anthracene	annual	average	7.8E-08	1.1E-07	1.2E-07
58	7,12-dimethylbenz(a)anthracene	annual	average	5.9E-08	7.4E-08	8.7E-08
59	7,12-dimethylbenz(a)anthracene	annual	average	4.1E-07	4.4E-07	6.8E-07
60	7,12-dimethylbenz(a)anthracene	annual	average	4.5E-07	4.7E-07	6.6E-07
61	7,12-dimethylbenz(a)anthracene	annual	average	6.4E-07	6.6E-07	7.9E-07
62	7,12-dimethylbenz(a)anthracene	annual	average	5.3E-07	5.5E-07	6.9E-07
63	7,12-dimethylbenz(a)anthracene	annual	average	4.7E-07	5.0E-07	6.8E-07
64	7,12-dimethylbenz(a)anthracene	annual	average	4.7E-07	5.0E-07	6.6E-07
65	7,12-dimethylbenz(a)anthracene	annual	average	1.5E-06	1.5E-06	1.7E-06
66	7,12-dimethylbenz(a)anthracene	annual	average	1.4E-07	1.6E-07	2.0E-07
67	7,12-dimethylbenz(a)anthracene	annual	average	1.6E-07	1.9E-07	2.3E-07
68	7,12-dimethylbenz(a)anthracene	annual	average	1.4E-07	1.6E-07	1.9E-07
69	7,12-dimethylbenz(a)anthracene	annual	average	1.3E-07	1.6E-07	1.9E-07
70	7,12-dimethylbenz(a)anthracene	annual	average	1.2E-07	1.4E-07	1.7E-07
71	7,12-dimethylbenz(a)anthracene	annual	average	2.1E-07	2.7E-07	3.4E-07
72	7,12-dimethylbenz(a)anthracene	annual	average	2.1E-07	2.8E-07	3.4E-07
73	7,12-dimethylbenz(a)anthracene	annual	average	4.1E-06	4.2E-06	4.3E-06
74	7,12-dimethylbenz(a)anthracene	annual	average	4.0E-07	4.4E-07	8.7E-07
75	7,12-dimethylbenz(a)anthracene	annual	average	3.8E-05	3.8E-05	3.8E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
76	7,12-dimethylbenz(a)anthracene	annual	average	6.2E-07	6.4E-07	7.8E-07
77	7,12-dimethylbenz(a)anthracene	annual	average	4.1E-07	4.3E-07	7.1E-07
78	7,12-dimethylbenz(a)anthracene	annual	average	2.0E-07	2.7E-07	3.3E-07
79	7,12-dimethylbenz(a)anthracene	annual	average	4.1E-07	4.8E-07	5.2E-07
1	acenaphthene	1hr	max	1.1E-04	1.1E-04	1.4E-04
2	acenaphthene	1hr	max	1.3E-04	1.3E-04	1.6E-04
3	acenaphthene	1hr	max	1.4E-04	1.4E-04	1.8E-04
4	acenaphthene	1hr	max	1.1E-04	1.1E-04	1.6E-04
5	acenaphthene	1hr	max	9.5E-05	9.5E-05	1.4E-04
6	acenaphthene	1hr	max	8.9E-05	8.9E-05	1.4E-04
7	acenaphthene	1hr	max	1.1E-04	1.1E-04	1.4E-04
8	acenaphthene	1hr	max	9.7E-05	9.7E-05	1.4E-04
9	acenaphthene	1hr	max	1.2E-04	1.2E-04	2.3E-04
10	acenaphthene	1hr	max	2.0E-04	2.0E-04	2.6E-04
11	acenaphthene	1hr	max	2.1E-04	2.1E-04	3.0E-04
12	acenaphthene	1hr	max	2.6E-04	2.6E-04	3.6E-04
13	acenaphthene	1hr	max	2.5E-04	2.5E-04	3.7E-04
14	acenaphthene	1hr	max	3.5E-04	3.5E-04	3.5E-04
15	acenaphthene	1hr	max	1.7E-04	1.7E-04	3.4E-04
16	acenaphthene	1hr	max	1.6E-04	1.6E-04	3.4E-04
17	acenaphthene	1hr	max	2.1E-04	2.1E-04	2.5E-04
18	acenaphthene	1hr	max	2.4E-04	2.4E-04	2.8E-04
19	acenaphthene	1hr	max	2.4E-04	2.4E-04	2.8E-04
20	acenaphthene	1hr	max	3.1E-04	3.1E-04	3.8E-04
21	acenaphthene	1hr	max	4.0E-04	4.0E-04	5.5E-04
22	acenaphthene	1hr	max	4.1E-04	4.1E-04	5.5E-04
23	acenaphthene	1hr	max	3.7E-04	3.7E-04	4.6E-04
24	acenaphthene	1hr	max	1.2E-04	1.2E-04	1.3E-04
25	acenaphthene	1hr	max	2.6E-04	2.6E-04	3.2E-04
26	acenaphthene	1hr	max	2.1E-04	2.1E-04	3.5E-04
27	acenaphthene	1hr	max	1.6E-04	1.6E-04	2.2E-04
28	acenaphthene	1hr	max	4.2E-04	4.2E-04	5.3E-04
29	acenaphthene	1hr	max	4.3E-04	4.3E-04	5.5E-04
30	acenaphthene	1hr	max	3.1E-04	3.1E-04	4.5E-04
31	acenaphthene	1hr	max	3.5E-04	3.5E-04	4.8E-04
32	acenaphthene	1hr	max	1.4E-04	1.4E-04	1.6E-04
33	acenaphthene	1hr	max	1.2E-04	1.2E-04	2.1E-04
34	acenaphthene	1hr	max	1.3E-04	1.3E-04	2.2E-04
35	acenaphthene	1hr	max	1.2E-04	1.2E-04	1.8E-04
36	acenaphthene	1hr	max	1.4E-04	1.4E-04	2.1E-04
37	acenaphthene	1hr	max	1.5E-04	1.5E-04	2.1E-04
38	acenaphthene	1hr	max	5.0E-04	5.0E-04	6.0E-04
39	acenaphthene	1hr	max	4.7E-04	4.7E-04	6.2E-04
40	acenaphthene	1hr	max	3.9E-04	3.9E-04	5.7E-04
41	acenaphthene	1hr	max	2.6E-04	2.6E-04	3.6E-04
42	acenaphthene	1hr	max	3.6E-04	3.6E-04	4.6E-04
43	acenaphthene	1hr	max	3.4E-04	3.4E-04	4.3E-04
44	acenaphthene	1hr	max	3.3E-04	3.3E-04	4.2E-04
45	acenaphthene	1hr	max	2.9E-04	2.9E-04	3.7E-04
46	acenaphthene	1hr	max	2.9E-04	2.9E-04	3.7E-04
47	acenaphthene	1hr	max	2.4E-04	2.4E-04	3.1E-04
48	acenaphthene	1hr	max	2.9E-04	2.9E-04	3.7E-04
49	acenaphthene	1hr	max	2.7E-04	2.7E-04	3.5E-04
50	acenaphthene	1hr	max	2.6E-04	2.6E-04	3.4E-04
51	acenaphthene	1hr	max	2.7E-04	2.7E-04	3.4E-04
52	acenaphthene	1hr	max	2.6E-04	2.6E-04	9.0E-04
53	acenaphthene	1hr	max	2.8E-04	2.8E-04	5.1E-04
54	acenaphthene	1hr	max	8.1E-05	8.1E-05	1.1E-04
55	acenaphthene	1hr	max	1.3E-04	1.3E-04	1.5E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
56	acenaphthene	1hr	max	1.2E-04	1.2E-04	1.4E-04
57	acenaphthene	1hr	max	1.4E-04	1.4E-04	1.6E-04
58	acenaphthene	1hr	max	7.5E-05	7.5E-05	9.5E-05
59	acenaphthene	1hr	max	2.9E-04	2.9E-04	5.5E-04
60	acenaphthene	1hr	max	6.5E-04	6.5E-04	9.4E-04
61	acenaphthene	1hr	max	5.9E-04	5.9E-04	1.0E-03
62	acenaphthene	1hr	max	4.9E-04	4.9E-04	9.3E-04
63	acenaphthene	1hr	max	4.1E-04	4.1E-04	8.5E-04
64	acenaphthene	1hr	max	4.1E-04	4.1E-04	8.7E-04
65	acenaphthene	1hr	max	4.5E-04	4.5E-04	9.9E-04
66	acenaphthene	1hr	max	1.8E-04	1.8E-04	2.7E-04
67	acenaphthene	1hr	max	2.4E-04	2.4E-04	3.7E-04
68	acenaphthene	1hr	max	1.8E-04	1.8E-04	2.9E-04
69	acenaphthene	1hr	max	1.9E-04	1.9E-04	2.9E-04
70	acenaphthene	1hr	max	1.8E-04	1.8E-04	2.6E-04
71	acenaphthene	1hr	max	2.7E-04	2.7E-04	4.5E-04
72	acenaphthene	1hr	max	2.8E-04	2.8E-04	4.6E-04
73	acenaphthene	1hr	max	4.4E-04	4.4E-04	9.9E-04
74	acenaphthene	1hr	max	3.6E-04	3.6E-04	1.2E-03
75	acenaphthene	1hr	max	1.4E-03	1.4E-03	1.6E-03
76	acenaphthene	1hr	max	5.8E-04	5.8E-04	1.0E-03
77	acenaphthene	1hr	max	3.2E-04	3.2E-04	4.1E-03
78	acenaphthene	1hr	max	3.7E-04	3.7E-04	4.8E-04
79	acenaphthene	1hr	max	4.2E-04	4.2E-04	5.6E-04
1	acenaphthene	1hr	9th	5.2E-05	5.2E-05	6.7E-05
2	acenaphthene	1hr	9th	5.7E-05	5.7E-05	8.7E-05
3	acenaphthene	1hr	9th	5.7E-05	5.7E-05	9.0E-05
4	acenaphthene	1hr	9th	6.1E-05	6.1E-05	8.5E-05
5	acenaphthene	1hr	9th	6.1E-05	6.1E-05	9.7E-05
6	acenaphthene	1hr	9th	5.8E-05	5.8E-05	9.8E-05
7	acenaphthene	1hr	9th	5.7E-05	5.7E-05	8.3E-05
8	acenaphthene	1hr	9th	6.2E-05	6.2E-05	9.6E-05
9	acenaphthene	1hr	9th	5.7E-05	5.7E-05	8.6E-05
10	acenaphthene	1hr	9th	6.4E-05	6.4E-05	1.0E-04
11	acenaphthene	1hr	9th	8.9E-05	8.9E-05	1.1E-04
12	acenaphthene	1hr	9th	7.1E-05	7.1E-05	1.2E-04
13	acenaphthene	1hr	9th	7.7E-05	7.7E-05	1.2E-04
14	acenaphthene	1hr	9th	1.7E-04	1.7E-04	1.7E-04
15	acenaphthene	1hr	9th	7.3E-05	7.3E-05	1.0E-04
16	acenaphthene	1hr	9th	6.9E-05	7.0E-05	1.0E-04
17	acenaphthene	1hr	9th	6.9E-05	6.9E-05	1.0E-04
18	acenaphthene	1hr	9th	6.2E-05	6.2E-05	1.0E-04
19	acenaphthene	1hr	9th	6.5E-05	6.5E-05	1.0E-04
20	acenaphthene	1hr	9th	7.7E-05	7.7E-05	1.1E-04
21	acenaphthene	1hr	9th	9.2E-05	9.2E-05	1.2E-04
22	acenaphthene	1hr	9th	7.7E-05	7.7E-05	1.2E-04
23	acenaphthene	1hr	9th	6.2E-05	6.2E-05	1.2E-04
24	acenaphthene	1hr	9th	6.0E-05	6.0E-05	8.9E-05
25	acenaphthene	1hr	9th	1.1E-04	1.1E-04	1.5E-04
26	acenaphthene	1hr	9th	1.1E-04	1.1E-04	1.3E-04
27	acenaphthene	1hr	9th	1.0E-04	1.0E-04	1.9E-04
28	acenaphthene	1hr	9th	8.0E-05	8.0E-05	1.3E-04
29	acenaphthene	1hr	9th	8.0E-05	8.0E-05	1.3E-04
30	acenaphthene	1hr	9th	1.2E-04	1.2E-04	1.5E-04
31	acenaphthene	1hr	9th	1.2E-04	1.2E-04	1.6E-04
32	acenaphthene	1hr	9th	5.9E-05	5.9E-05	7.8E-05
33	acenaphthene	1hr	9th	7.3E-05	7.3E-05	1.1E-04
34	acenaphthene	1hr	9th	7.3E-05	7.3E-05	9.6E-05
35	acenaphthene	1hr	9th	6.6E-05	6.6E-05	8.3E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
36	acenaphthene	1hr	9th	6.3E-05	6.3E-05	8.1E-05
37	acenaphthene	1hr	9th	6.1E-05	6.1E-05	8.4E-05
38	acenaphthene	1hr	9th	8.3E-05	8.3E-05	1.3E-04
39	acenaphthene	1hr	9th	8.4E-05	8.4E-05	1.3E-04
40	acenaphthene	1hr	9th	8.9E-05	8.9E-05	1.4E-04
41	acenaphthene	1hr	9th	9.9E-05	9.9E-05	1.6E-04
42	acenaphthene	1hr	9th	8.7E-05	8.7E-05	1.6E-04
43	acenaphthene	1hr	9th	9.1E-05	9.1E-05	1.7E-04
44	acenaphthene	1hr	9th	9.0E-05	9.0E-05	1.6E-04
45	acenaphthene	1hr	9th	9.0E-05	9.0E-05	1.7E-04
46	acenaphthene	1hr	9th	8.9E-05	8.9E-05	1.7E-04
47	acenaphthene	1hr	9th	9.6E-05	9.6E-05	1.6E-04
48	acenaphthene	1hr	9th	9.1E-05	9.1E-05	1.7E-04
49	acenaphthene	1hr	9th	9.1E-05	9.1E-05	1.6E-04
50	acenaphthene	1hr	9th	9.0E-05	9.0E-05	1.6E-04
51	acenaphthene	1hr	9th	8.9E-05	8.9E-05	1.7E-04
52	acenaphthene	1hr	9th	1.5E-04	1.5E-04	4.4E-04
53	acenaphthene	1hr	9th	1.2E-04	1.2E-04	2.4E-04
54	acenaphthene	1hr	9th	5.1E-05	5.1E-05	7.0E-05
55	acenaphthene	1hr	9th	5.1E-05	5.1E-05	7.9E-05
56	acenaphthene	1hr	9th	5.2E-05	5.2E-05	8.3E-05
57	acenaphthene	1hr	9th	4.7E-05	4.7E-05	7.8E-05
58	acenaphthene	1hr	9th	5.3E-05	5.3E-05	7.6E-05
59	acenaphthene	1hr	9th	1.9E-04	1.9E-04	2.6E-04
60	acenaphthene	1hr	9th	3.1E-04	3.1E-04	4.6E-04
61	acenaphthene	1hr	9th	3.2E-04	3.2E-04	4.0E-04
62	acenaphthene	1hr	9th	2.9E-04	2.9E-04	3.6E-04
63	acenaphthene	1hr	9th	2.6E-04	2.6E-04	3.5E-04
64	acenaphthene	1hr	9th	2.6E-04	2.6E-04	3.3E-04
65	acenaphthene	1hr	9th	3.0E-04	3.0E-04	3.8E-04
66	acenaphthene	1hr	9th	6.6E-05	6.6E-05	1.1E-04
67	acenaphthene	1hr	9th	6.9E-05	6.9E-05	1.1E-04
68	acenaphthene	1hr	9th	6.1E-05	6.1E-05	1.0E-04
69	acenaphthene	1hr	9th	5.9E-05	5.9E-05	1.1E-04
70	acenaphthene	1hr	9th	5.2E-05	5.2E-05	1.0E-04
71	acenaphthene	1hr	9th	1.4E-04	1.4E-04	2.3E-04
72	acenaphthene	1hr	9th	1.4E-04	1.4E-04	2.3E-04
73	acenaphthene	1hr	9th	3.0E-04	3.0E-04	3.9E-04
74	acenaphthene	1hr	9th	1.9E-04	1.9E-04	5.2E-04
75	acenaphthene	1hr	9th	9.4E-04	9.4E-04	1.1E-03
76	acenaphthene	1hr	9th	3.2E-04	3.2E-04	4.0E-04
77	acenaphthene	1hr	9th	2.0E-04	2.0E-04	1.8E-03
78	acenaphthene	1hr	9th	8.8E-05	8.8E-05	1.6E-04
79	acenaphthene	1hr	9th	8.5E-05	8.5E-05	1.3E-04
1	acenaphthene	24hr	max	1.7E-05	1.7E-05	2.7E-05
2	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.7E-05
3	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.8E-05
4	acenaphthene	24hr	max	2.3E-05	2.4E-05	3.8E-05
5	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.9E-05
6	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.9E-05
7	acenaphthene	24hr	max	2.2E-05	2.2E-05	3.5E-05
8	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.8E-05
9	acenaphthene	24hr	max	2.7E-05	2.7E-05	4.1E-05
10	acenaphthene	24hr	max	3.3E-05	3.3E-05	5.2E-05
11	acenaphthene	24hr	max	3.6E-05	3.6E-05	6.2E-05
12	acenaphthene	24hr	max	3.3E-05	3.3E-05	5.5E-05
13	acenaphthene	24hr	max	3.3E-05	3.3E-05	5.1E-05
14	acenaphthene	24hr	max	3.8E-05	3.8E-05	6.1E-05
15	acenaphthene	24hr	max	2.4E-05	2.4E-05	4.2E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
16	acenaphthene	24hr	max	2.4E-05	2.4E-05	4.2E-05
17	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.9E-05
18	acenaphthene	24hr	max	2.5E-05	2.5E-05	3.8E-05
19	acenaphthene	24hr	max	2.5E-05	2.5E-05	3.8E-05
20	acenaphthene	24hr	max	2.9E-05	2.9E-05	4.1E-05
21	acenaphthene	24hr	max	3.4E-05	3.4E-05	5.6E-05
22	acenaphthene	24hr	max	3.6E-05	3.6E-05	5.5E-05
23	acenaphthene	24hr	max	3.1E-05	3.1E-05	4.4E-05
24	acenaphthene	24hr	max	2.2E-05	2.2E-05	3.6E-05
25	acenaphthene	24hr	max	3.9E-05	3.9E-05	6.0E-05
26	acenaphthene	24hr	max	3.1E-05	3.1E-05	4.9E-05
27	acenaphthene	24hr	max	3.3E-05	3.3E-05	5.9E-05
28	acenaphthene	24hr	max	3.8E-05	3.9E-05	5.7E-05
29	acenaphthene	24hr	max	3.9E-05	3.9E-05	5.9E-05
30	acenaphthene	24hr	max	5.1E-05	5.1E-05	8.1E-05
31	acenaphthene	24hr	max	5.4E-05	5.4E-05	8.5E-05
32	acenaphthene	24hr	max	1.8E-05	1.8E-05	2.9E-05
33	acenaphthene	24hr	max	2.3E-05	2.3E-05	3.8E-05
34	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.7E-05
35	acenaphthene	24hr	max	2.3E-05	2.3E-05	3.3E-05
36	acenaphthene	24hr	max	2.4E-05	2.4E-05	3.4E-05
37	acenaphthene	24hr	max	2.3E-05	2.3E-05	3.5E-05
38	acenaphthene	24hr	max	4.6E-05	4.6E-05	7.1E-05
39	acenaphthene	24hr	max	4.6E-05	4.6E-05	7.2E-05
40	acenaphthene	24hr	max	4.8E-05	4.8E-05	8.2E-05
41	acenaphthene	24hr	max	5.1E-05	5.1E-05	9.3E-05
42	acenaphthene	24hr	max	4.2E-05	4.2E-05	8.9E-05
43	acenaphthene	24hr	max	4.6E-05	4.6E-05	9.5E-05
44	acenaphthene	24hr	max	4.5E-05	4.5E-05	9.3E-05
45	acenaphthene	24hr	max	4.9E-05	4.9E-05	9.8E-05
46	acenaphthene	24hr	max	4.9E-05	4.9E-05	9.7E-05
47	acenaphthene	24hr	max	4.9E-05	4.9E-05	9.3E-05
48	acenaphthene	24hr	max	4.7E-05	4.7E-05	9.3E-05
49	acenaphthene	24hr	max	4.8E-05	4.8E-05	9.3E-05
50	acenaphthene	24hr	max	4.5E-05	4.5E-05	8.7E-05
51	acenaphthene	24hr	max	4.2E-05	4.2E-05	8.6E-05
52	acenaphthene	24hr	max	6.1E-05	6.1E-05	2.2E-04
53	acenaphthene	24hr	max	6.2E-05	6.2E-05	1.5E-04
54	acenaphthene	24hr	max	2.1E-05	2.1E-05	3.2E-05
55	acenaphthene	24hr	max	2.0E-05	2.0E-05	3.4E-05
56	acenaphthene	24hr	max	1.9E-05	2.0E-05	3.8E-05
57	acenaphthene	24hr	max	2.1E-05	2.1E-05	3.3E-05
58	acenaphthene	24hr	max	1.9E-05	1.9E-05	2.9E-05
59	acenaphthene	24hr	max	6.9E-05	6.9E-05	1.0E-04
60	acenaphthene	24hr	max	9.9E-05	9.9E-05	1.6E-04
61	acenaphthene	24hr	max	1.1E-04	1.1E-04	1.9E-04
62	acenaphthene	24hr	max	1.0E-04	1.0E-04	1.7E-04
63	acenaphthene	24hr	max	8.8E-05	8.8E-05	1.5E-04
64	acenaphthene	24hr	max	9.1E-05	9.1E-05	1.5E-04
65	acenaphthene	24hr	max	1.1E-04	1.1E-04	1.8E-04
66	acenaphthene	24hr	max	3.3E-05	3.3E-05	5.0E-05
67	acenaphthene	24hr	max	3.0E-05	3.0E-05	5.3E-05
68	acenaphthene	24hr	max	2.8E-05	2.8E-05	5.0E-05
69	acenaphthene	24hr	max	2.3E-05	2.3E-05	4.7E-05
70	acenaphthene	24hr	max	2.0E-05	2.0E-05	4.0E-05
71	acenaphthene	24hr	max	6.6E-05	6.6E-05	1.1E-04
72	acenaphthene	24hr	max	6.4E-05	6.4E-05	1.1E-04
73	acenaphthene	24hr	max	1.1E-04	1.1E-04	1.8E-04
74	acenaphthene	24hr	max	7.1E-05	7.1E-05	1.4E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
75	acenaphthene	24hr	max	3.5E-04	3.5E-04	4.4E-04
76	acenaphthene	24hr	max	1.1E-04	1.1E-04	1.9E-04
77	acenaphthene	24hr	max	7.5E-05	7.5E-05	3.4E-04
78	acenaphthene	24hr	max	4.2E-05	4.2E-05	8.7E-05
79	acenaphthene	24hr	max	3.7E-05	3.7E-05	5.7E-05
1	acenaphthene	annual	average	1.2E-06	1.2E-06	1.7E-06
2	acenaphthene	annual	average	1.7E-06	1.8E-06	2.6E-06
3	acenaphthene	annual	average	1.8E-06	1.8E-06	2.7E-06
4	acenaphthene	annual	average	1.9E-06	1.9E-06	2.9E-06
5	acenaphthene	annual	average	2.1E-06	2.1E-06	3.2E-06
6	acenaphthene	annual	average	2.1E-06	2.1E-06	3.2E-06
7	acenaphthene	annual	average	2.0E-06	2.0E-06	3.0E-06
8	acenaphthene	annual	average	2.2E-06	2.2E-06	3.3E-06
9	acenaphthene	annual	average	2.1E-06	2.1E-06	3.2E-06
10	acenaphthene	annual	average	2.9E-06	2.9E-06	4.4E-06
11	acenaphthene	annual	average	3.8E-06	3.8E-06	5.4E-06
12	acenaphthene	annual	average	3.6E-06	3.6E-06	5.2E-06
13	acenaphthene	annual	average	3.4E-06	3.4E-06	5.0E-06
14	acenaphthene	annual	average	4.6E-06	4.6E-06	6.6E-06
15	acenaphthene	annual	average	2.6E-06	2.6E-06	3.9E-06
16	acenaphthene	annual	average	2.6E-06	2.6E-06	3.9E-06
17	acenaphthene	annual	average	2.7E-06	2.8E-06	4.1E-06
18	acenaphthene	annual	average	3.1E-06	3.2E-06	4.6E-06
19	acenaphthene	annual	average	3.0E-06	3.0E-06	4.5E-06
20	acenaphthene	annual	average	3.1E-06	3.1E-06	4.8E-06
21	acenaphthene	annual	average	4.5E-06	4.5E-06	6.2E-06
22	acenaphthene	annual	average	3.8E-06	3.8E-06	5.6E-06
23	acenaphthene	annual	average	2.7E-06	2.7E-06	4.2E-06
24	acenaphthene	annual	average	1.8E-06	1.8E-06	2.8E-06
25	acenaphthene	annual	average	2.6E-06	2.6E-06	4.2E-06
26	acenaphthene	annual	average	2.7E-06	2.8E-06	4.6E-06
27	acenaphthene	annual	average	3.8E-06	3.8E-06	6.5E-06
28	acenaphthene	annual	average	3.3E-06	3.4E-06	5.3E-06
29	acenaphthene	annual	average	3.4E-06	3.4E-06	5.5E-06
30	acenaphthene	annual	average	2.6E-06	2.7E-06	4.1E-06
31	acenaphthene	annual	average	2.8E-06	2.8E-06	4.3E-06
32	acenaphthene	annual	average	1.2E-06	1.2E-06	1.8E-06
33	acenaphthene	annual	average	1.6E-06	1.6E-06	2.4E-06
34	acenaphthene	annual	average	1.6E-06	1.6E-06	2.4E-06
35	acenaphthene	annual	average	1.7E-06	1.7E-06	2.5E-06
36	acenaphthene	annual	average	1.8E-06	1.8E-06	2.6E-06
37	acenaphthene	annual	average	1.7E-06	1.7E-06	2.5E-06
38	acenaphthene	annual	average	3.7E-06	3.7E-06	6.2E-06
39	acenaphthene	annual	average	3.8E-06	3.8E-06	6.5E-06
40	acenaphthene	annual	average	3.9E-06	3.9E-06	7.0E-06
41	acenaphthene	annual	average	4.0E-06	4.0E-06	7.5E-06
42	acenaphthene	annual	average	4.2E-06	4.2E-06	7.4E-06
43	acenaphthene	annual	average	4.4E-06	4.4E-06	7.8E-06
44	acenaphthene	annual	average	4.4E-06	4.4E-06	7.8E-06
45	acenaphthene	annual	average	4.3E-06	4.3E-06	8.0E-06
46	acenaphthene	annual	average	4.3E-06	4.3E-06	8.0E-06
47	acenaphthene	annual	average	4.3E-06	4.3E-06	8.2E-06
48	acenaphthene	annual	average	4.4E-06	4.4E-06	8.1E-06
49	acenaphthene	annual	average	4.3E-06	4.3E-06	8.1E-06
50	acenaphthene	annual	average	4.4E-06	4.4E-06	8.1E-06
51	acenaphthene	annual	average	4.2E-06	4.3E-06	7.7E-06
52	acenaphthene	annual	average	5.7E-06	5.7E-06	1.7E-05
53	acenaphthene	annual	average	5.0E-06	5.0E-06	1.2E-05
54	acenaphthene	annual	average	1.5E-06	1.5E-06	2.2E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
55	acenaphthene	annual	average	1.6E-06	1.6E-06	2.4E-06
56	acenaphthene	annual	average	1.7E-06	1.7E-06	2.5E-06
57	acenaphthene	annual	average	1.8E-06	1.8E-06	2.6E-06
58	acenaphthene	annual	average	1.3E-06	1.3E-06	1.9E-06
59	acenaphthene	annual	average	6.9E-06	6.9E-06	1.9E-05
60	acenaphthene	annual	average	9.8E-06	9.8E-06	1.5E-05
61	acenaphthene	annual	average	1.2E-05	1.2E-05	1.8E-05
62	acenaphthene	annual	average	1.0E-05	1.0E-05	1.6E-05
63	acenaphthene	annual	average	9.0E-06	9.0E-06	1.6E-05
64	acenaphthene	annual	average	9.2E-06	9.2E-06	1.6E-05
65	acenaphthene	annual	average	1.1E-05	1.1E-05	1.7E-05
66	acenaphthene	annual	average	2.7E-06	2.7E-06	4.2E-06
67	acenaphthene	annual	average	3.1E-06	3.1E-06	4.8E-06
68	acenaphthene	annual	average	2.5E-06	2.5E-06	3.9E-06
69	acenaphthene	annual	average	2.3E-06	2.3E-06	3.7E-06
70	acenaphthene	annual	average	2.1E-06	2.1E-06	3.5E-06
71	acenaphthene	annual	average	4.0E-06	4.0E-06	6.4E-06
72	acenaphthene	annual	average	4.0E-06	4.0E-06	6.4E-06
73	acenaphthene	annual	average	1.1E-05	1.1E-05	1.7E-05
74	acenaphthene	annual	average	6.9E-06	6.9E-06	2.5E-05
75	acenaphthene	annual	average	4.1E-05	4.1E-05	4.9E-05
76	acenaphthene	annual	average	1.2E-05	1.2E-05	1.8E-05
77	acenaphthene	annual	average	7.6E-06	7.6E-06	2.0E-05
78	acenaphthene	annual	average	4.1E-06	4.1E-06	7.1E-06
79	acenaphthene	annual	average	3.6E-06	3.6E-06	5.3E-06
1	acenaphthylene	1hr	max	2.3E-04	2.3E-04	2.8E-04
2	acenaphthylene	1hr	max	2.6E-04	2.6E-04	3.2E-04
3	acenaphthylene	1hr	max	2.8E-04	2.8E-04	3.5E-04
4	acenaphthylene	1hr	max	2.3E-04	2.3E-04	3.1E-04
5	acenaphthylene	1hr	max	2.0E-04	2.0E-04	2.7E-04
6	acenaphthylene	1hr	max	1.8E-04	1.9E-04	2.7E-04
7	acenaphthylene	1hr	max	2.2E-04	2.2E-04	2.8E-04
8	acenaphthylene	1hr	max	2.0E-04	2.0E-04	2.7E-04
9	acenaphthylene	1hr	max	2.5E-04	2.5E-04	4.4E-04
10	acenaphthylene	1hr	max	4.0E-04	4.0E-04	5.1E-04
11	acenaphthylene	1hr	max	4.3E-04	4.3E-04	5.8E-04
12	acenaphthylene	1hr	max	5.1E-04	5.1E-04	7.2E-04
13	acenaphthylene	1hr	max	5.1E-04	5.1E-04	7.3E-04
14	acenaphthylene	1hr	max	5.2E-04	5.2E-04	6.7E-04
15	acenaphthylene	1hr	max	3.4E-04	3.4E-04	6.7E-04
16	acenaphthylene	1hr	max	3.3E-04	3.3E-04	6.7E-04
17	acenaphthylene	1hr	max	4.2E-04	4.2E-04	5.0E-04
18	acenaphthylene	1hr	max	4.8E-04	4.8E-04	5.5E-04
19	acenaphthylene	1hr	max	4.8E-04	4.8E-04	5.5E-04
20	acenaphthylene	1hr	max	6.2E-04	6.2E-04	7.5E-04
21	acenaphthylene	1hr	max	8.1E-04	8.1E-04	1.1E-03
22	acenaphthylene	1hr	max	8.2E-04	8.2E-04	1.1E-03
23	acenaphthylene	1hr	max	7.7E-04	7.7E-04	9.2E-04
24	acenaphthylene	1hr	max	2.4E-04	2.4E-04	2.7E-04
25	acenaphthylene	1hr	max	5.3E-04	5.3E-04	6.5E-04
26	acenaphthylene	1hr	max	4.3E-04	4.3E-04	6.9E-04
27	acenaphthylene	1hr	max	3.3E-04	3.3E-04	4.5E-04
28	acenaphthylene	1hr	max	8.4E-04	8.4E-04	1.0E-03
29	acenaphthylene	1hr	max	8.6E-04	8.6E-04	1.1E-03
30	acenaphthylene	1hr	max	6.4E-04	6.4E-04	9.0E-04
31	acenaphthylene	1hr	max	7.0E-04	7.0E-04	9.6E-04
32	acenaphthylene	1hr	max	6.5E-04	6.5E-04	6.5E-04
33	acenaphthylene	1hr	max	2.5E-04	2.5E-04	4.3E-04
34	acenaphthylene	1hr	max	2.7E-04	2.7E-04	4.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
35	acenaphthylene	1hr	max	2.5E-04	2.5E-04	3.7E-04
36	acenaphthylene	1hr	max	2.8E-04	2.8E-04	4.3E-04
37	acenaphthylene	1hr	max	3.1E-04	3.1E-04	4.2E-04
38	acenaphthylene	1hr	max	1.0E-03	1.0E-03	1.2E-03
39	acenaphthylene	1hr	max	9.4E-04	9.4E-04	1.2E-03
40	acenaphthylene	1hr	max	7.8E-04	7.8E-04	1.1E-03
41	acenaphthylene	1hr	max	5.2E-04	5.2E-04	7.2E-04
42	acenaphthylene	1hr	max	7.3E-04	7.3E-04	9.2E-04
43	acenaphthylene	1hr	max	6.8E-04	6.8E-04	8.7E-04
44	acenaphthylene	1hr	max	6.6E-04	6.6E-04	8.5E-04
45	acenaphthylene	1hr	max	5.7E-04	5.7E-04	7.4E-04
46	acenaphthylene	1hr	max	5.8E-04	5.8E-04	7.5E-04
47	acenaphthylene	1hr	max	4.9E-04	4.9E-04	6.2E-04
48	acenaphthylene	1hr	max	5.8E-04	5.8E-04	7.4E-04
49	acenaphthylene	1hr	max	5.5E-04	5.5E-04	7.0E-04
50	acenaphthylene	1hr	max	5.4E-04	5.4E-04	6.8E-04
51	acenaphthylene	1hr	max	5.5E-04	5.5E-04	7.0E-04
52	acenaphthylene	1hr	max	5.3E-04	5.3E-04	1.0E-03
53	acenaphthylene	1hr	max	5.5E-04	5.5E-04	9.0E-04
54	acenaphthylene	1hr	max	1.7E-04	1.7E-04	2.2E-04
55	acenaphthylene	1hr	max	2.7E-04	2.7E-04	3.0E-04
56	acenaphthylene	1hr	max	2.6E-04	2.6E-04	2.9E-04
57	acenaphthylene	1hr	max	3.0E-04	3.0E-04	3.3E-04
58	acenaphthylene	1hr	max	1.7E-04	1.7E-04	2.0E-04
59	acenaphthylene	1hr	max	5.9E-04	5.9E-04	9.1E-04
60	acenaphthylene	1hr	max	1.3E-03	1.3E-03	1.9E-03
61	acenaphthylene	1hr	max	1.1E-03	1.1E-03	2.0E-03
62	acenaphthylene	1hr	max	9.4E-04	9.4E-04	1.9E-03
63	acenaphthylene	1hr	max	7.9E-04	7.9E-04	1.7E-03
64	acenaphthylene	1hr	max	7.9E-04	7.9E-04	1.7E-03
65	acenaphthylene	1hr	max	9.4E-04	9.4E-04	2.0E-03
66	acenaphthylene	1hr	max	3.5E-04	3.5E-04	5.4E-04
67	acenaphthylene	1hr	max	4.7E-04	4.7E-04	7.3E-04
68	acenaphthylene	1hr	max	3.7E-04	3.7E-04	5.7E-04
69	acenaphthylene	1hr	max	3.9E-04	3.9E-04	5.9E-04
70	acenaphthylene	1hr	max	3.6E-04	3.6E-04	5.3E-04
71	acenaphthylene	1hr	max	5.4E-04	5.4E-04	8.9E-04
72	acenaphthylene	1hr	max	5.5E-04	5.5E-04	9.0E-04
73	acenaphthylene	1hr	max	9.3E-04	9.3E-04	2.0E-03
74	acenaphthylene	1hr	max	7.4E-04	7.4E-04	1.2E-03
75	acenaphthylene	1hr	max	2.7E-03	2.7E-03	3.1E-03
76	acenaphthylene	1hr	max	1.1E-03	1.1E-03	2.0E-03
77	acenaphthylene	1hr	max	6.3E-04	6.3E-04	4.1E-03
78	acenaphthylene	1hr	max	7.7E-04	7.7E-04	9.8E-04
79	acenaphthylene	1hr	max	8.4E-04	8.4E-04	1.1E-03
1	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	1.5E-04
2	acenaphthylene	1hr	9th	1.2E-04	1.2E-04	1.7E-04
3	acenaphthylene	1hr	9th	1.2E-04	1.2E-04	1.8E-04
4	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	1.7E-04
5	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	1.9E-04
6	acenaphthylene	1hr	9th	1.2E-04	1.3E-04	1.8E-04
7	acenaphthylene	1hr	9th	1.2E-04	1.2E-04	1.7E-04
8	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	1.9E-04
9	acenaphthylene	1hr	9th	1.2E-04	1.2E-04	1.6E-04
10	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	2.0E-04
11	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.2E-04
12	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.3E-04
13	acenaphthylene	1hr	9th	1.4E-04	1.4E-04	2.2E-04
14	acenaphthylene	1hr	9th	2.1E-04	2.1E-04	2.3E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
15	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.0E-04
16	acenaphthylene	1hr	9th	1.4E-04	1.4E-04	2.0E-04
17	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.0E-04
18	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.0E-04
19	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	2.0E-04
20	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	2.3E-04
21	acenaphthylene	1hr	9th	3.3E-04	3.3E-04	3.5E-04
22	acenaphthylene	1hr	9th	2.3E-04	2.3E-04	2.8E-04
23	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.2E-04
24	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	1.8E-04
25	acenaphthylene	1hr	9th	2.3E-04	2.3E-04	3.0E-04
26	acenaphthylene	1hr	9th	2.2E-04	2.3E-04	3.0E-04
27	acenaphthylene	1hr	9th	2.2E-04	2.3E-04	2.8E-04
28	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	2.4E-04
29	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	2.3E-04
30	acenaphthylene	1hr	9th	2.7E-04	2.7E-04	3.3E-04
31	acenaphthylene	1hr	9th	2.6E-04	2.6E-04	3.4E-04
32	acenaphthylene	1hr	9th	1.4E-04	1.4E-04	1.7E-04
33	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	2.1E-04
34	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	2.0E-04
35	acenaphthylene	1hr	9th	1.6E-04	1.6E-04	1.8E-04
36	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	1.7E-04
37	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	1.7E-04
38	acenaphthylene	1hr	9th	1.8E-04	1.8E-04	2.4E-04
39	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	2.4E-04
40	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	2.8E-04
41	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	3.0E-04
42	acenaphthylene	1hr	9th	1.8E-04	1.8E-04	3.0E-04
43	acenaphthylene	1hr	9th	1.8E-04	1.8E-04	3.0E-04
44	acenaphthylene	1hr	9th	1.8E-04	1.8E-04	3.1E-04
45	acenaphthylene	1hr	9th	1.9E-04	1.9E-04	3.0E-04
46	acenaphthylene	1hr	9th	1.9E-04	1.9E-04	3.0E-04
47	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	3.0E-04
48	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	3.1E-04
49	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	3.1E-04
50	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	3.1E-04
51	acenaphthylene	1hr	9th	1.8E-04	1.8E-04	3.2E-04
52	acenaphthylene	1hr	9th	3.1E-04	3.1E-04	5.6E-04
53	acenaphthylene	1hr	9th	2.4E-04	2.4E-04	4.0E-04
54	acenaphthylene	1hr	9th	1.1E-04	1.1E-04	1.4E-04
55	acenaphthylene	1hr	9th	1.1E-04	1.1E-04	1.5E-04
56	acenaphthylene	1hr	9th	1.1E-04	1.1E-04	1.6E-04
57	acenaphthylene	1hr	9th	9.9E-05	1.0E-04	1.6E-04
58	acenaphthylene	1hr	9th	1.1E-04	1.1E-04	1.6E-04
59	acenaphthylene	1hr	9th	3.8E-04	3.8E-04	5.0E-04
60	acenaphthylene	1hr	9th	6.3E-04	6.3E-04	9.1E-04
61	acenaphthylene	1hr	9th	6.3E-04	6.3E-04	7.9E-04
62	acenaphthylene	1hr	9th	5.9E-04	5.9E-04	7.3E-04
63	acenaphthylene	1hr	9th	5.1E-04	5.1E-04	6.7E-04
64	acenaphthylene	1hr	9th	5.5E-04	5.5E-04	6.5E-04
65	acenaphthylene	1hr	9th	5.9E-04	5.9E-04	7.5E-04
66	acenaphthylene	1hr	9th	1.4E-04	1.4E-04	2.1E-04
67	acenaphthylene	1hr	9th	1.5E-04	1.5E-04	2.1E-04
68	acenaphthylene	1hr	9th	1.3E-04	1.3E-04	2.0E-04
69	acenaphthylene	1hr	9th	1.2E-04	1.2E-04	2.1E-04
70	acenaphthylene	1hr	9th	1.1E-04	1.1E-04	1.9E-04
71	acenaphthylene	1hr	9th	3.3E-04	3.3E-04	4.5E-04
72	acenaphthylene	1hr	9th	3.4E-04	3.4E-04	4.6E-04
73	acenaphthylene	1hr	9th	6.3E-04	6.3E-04	7.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
74	acenaphthylene	1hr	9th	3.6E-04	3.6E-04	5.9E-04
75	acenaphthylene	1hr	9th	1.9E-03	1.9E-03	2.1E-03
76	acenaphthylene	1hr	9th	6.3E-04	6.3E-04	7.9E-04
77	acenaphthylene	1hr	9th	3.9E-04	3.9E-04	1.8E-03
78	acenaphthylene	1hr	9th	2.0E-04	2.0E-04	3.1E-04
79	acenaphthylene	1hr	9th	2.7E-04	2.7E-04	3.1E-04
1	acenaphthylene	24hr	max	4.5E-05	4.5E-05	5.5E-05
2	acenaphthylene	24hr	max	5.4E-05	5.4E-05	7.8E-05
3	acenaphthylene	24hr	max	5.4E-05	5.5E-05	7.9E-05
4	acenaphthylene	24hr	max	5.4E-05	5.5E-05	8.0E-05
5	acenaphthylene	24hr	max	5.6E-05	5.7E-05	8.2E-05
6	acenaphthylene	24hr	max	5.6E-05	5.7E-05	8.2E-05
7	acenaphthylene	24hr	max	5.2E-05	5.3E-05	7.6E-05
8	acenaphthylene	24hr	max	5.6E-05	5.7E-05	8.1E-05
9	acenaphthylene	24hr	max	5.9E-05	6.0E-05	8.4E-05
10	acenaphthylene	24hr	max	6.9E-05	6.9E-05	1.0E-04
11	acenaphthylene	24hr	max	7.4E-05	7.5E-05	1.1E-04
12	acenaphthylene	24hr	max	6.3E-05	6.3E-05	9.8E-05
13	acenaphthylene	24hr	max	6.8E-05	6.8E-05	9.5E-05
14	acenaphthylene	24hr	max	6.6E-05	6.6E-05	1.1E-04
15	acenaphthylene	24hr	max	5.3E-05	5.3E-05	8.6E-05
16	acenaphthylene	24hr	max	5.2E-05	5.3E-05	8.7E-05
17	acenaphthylene	24hr	max	5.8E-05	5.9E-05	8.1E-05
18	acenaphthylene	24hr	max	5.8E-05	5.9E-05	8.2E-05
19	acenaphthylene	24hr	max	5.8E-05	5.8E-05	8.2E-05
20	acenaphthylene	24hr	max	6.3E-05	6.4E-05	8.7E-05
21	acenaphthylene	24hr	max	9.8E-05	9.8E-05	1.1E-04
22	acenaphthylene	24hr	max	1.4E-04	1.4E-04	1.5E-04
23	acenaphthylene	24hr	max	6.7E-05	6.7E-05	9.2E-05
24	acenaphthylene	24hr	max	4.9E-05	4.9E-05	7.0E-05
25	acenaphthylene	24hr	max	8.4E-05	8.4E-05	1.2E-04
26	acenaphthylene	24hr	max	6.6E-05	6.6E-05	1.0E-04
27	acenaphthylene	24hr	max	7.4E-05	7.5E-05	1.1E-04
28	acenaphthylene	24hr	max	8.1E-05	8.1E-05	1.1E-04
29	acenaphthylene	24hr	max	8.1E-05	8.2E-05	1.1E-04
30	acenaphthylene	24hr	max	1.1E-04	1.1E-04	1.6E-04
31	acenaphthylene	24hr	max	1.1E-04	1.1E-04	1.7E-04
32	acenaphthylene	24hr	max	6.0E-05	6.0E-05	6.1E-05
33	acenaphthylene	24hr	max	5.4E-05	5.4E-05	8.0E-05
34	acenaphthylene	24hr	max	5.7E-05	5.7E-05	7.7E-05
35	acenaphthylene	24hr	max	5.6E-05	5.6E-05	7.0E-05
36	acenaphthylene	24hr	max	6.1E-05	6.1E-05	7.0E-05
37	acenaphthylene	24hr	max	5.8E-05	5.8E-05	7.0E-05
38	acenaphthylene	24hr	max	9.2E-05	9.2E-05	1.3E-04
39	acenaphthylene	24hr	max	9.4E-05	9.4E-05	1.3E-04
40	acenaphthylene	24hr	max	9.7E-05	9.7E-05	1.5E-04
41	acenaphthylene	24hr	max	1.0E-04	1.0E-04	1.7E-04
42	acenaphthylene	24hr	max	8.5E-05	8.5E-05	1.5E-04
43	acenaphthylene	24hr	max	9.3E-05	9.3E-05	1.6E-04
44	acenaphthylene	24hr	max	1.0E-04	1.0E-04	1.7E-04
45	acenaphthylene	24hr	max	1.0E-04	1.0E-04	1.7E-04
46	acenaphthylene	24hr	max	1.0E-04	1.0E-04	1.7E-04
47	acenaphthylene	24hr	max	1.0E-04	1.0E-04	1.7E-04
48	acenaphthylene	24hr	max	9.8E-05	9.8E-05	1.6E-04
49	acenaphthylene	24hr	max	9.8E-05	9.8E-05	1.6E-04
50	acenaphthylene	24hr	max	9.1E-05	9.1E-05	1.5E-04
51	acenaphthylene	24hr	max	8.4E-05	8.4E-05	1.5E-04
52	acenaphthylene	24hr	max	1.2E-04	1.2E-04	3.2E-04
53	acenaphthylene	24hr	max	1.2E-04	1.2E-04	2.5E-04

Table 4E-1 Volatile Organic Compounds						
ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
54	acenaphthylene	24hr	max	4.8E-05	4.8E-05	6.8E-05
55	acenaphthylene	24hr	max	4.5E-05	4.6E-05	6.5E-05
56	acenaphthylene	24hr	max	4.5E-05	4.5E-05	7.1E-05
57	acenaphthylene	24hr	max	4.9E-05	4.9E-05	7.0E-05
58	acenaphthylene	24hr	max	4.3E-05	4.3E-05	5.9E-05
59	acenaphthylene	24hr	max	1.4E-04	1.4E-04	2.0E-04
60	acenaphthylene	24hr	max	2.0E-04	2.0E-04	3.2E-04
61	acenaphthylene	24hr	max	2.3E-04	2.3E-04	3.8E-04
62	acenaphthylene	24hr	max	2.0E-04	2.0E-04	3.4E-04
63	acenaphthylene	24hr	max	1.8E-04	1.8E-04	3.0E-04
64	acenaphthylene	24hr	max	1.8E-04	1.8E-04	3.1E-04
65	acenaphthylene	24hr	max	2.3E-04	2.3E-04	3.6E-04
66	acenaphthylene	24hr	max	6.5E-05	6.5E-05	9.3E-05
67	acenaphthylene	24hr	max	6.5E-05	6.5E-05	9.9E-05
68	acenaphthylene	24hr	max	5.8E-05	5.8E-05	9.1E-05
69	acenaphthylene	24hr	max	5.1E-05	5.1E-05	8.7E-05
70	acenaphthylene	24hr	max	4.4E-05	4.4E-05	7.6E-05
71	acenaphthylene	24hr	max	1.3E-04	1.3E-04	2.1E-04
72	acenaphthylene	24hr	max	1.3E-04	1.3E-04	2.1E-04
73	acenaphthylene	24hr	max	2.3E-04	2.3E-04	3.6E-04
74	acenaphthylene	24hr	max	1.4E-04	1.4E-04	2.1E-04
75	acenaphthylene	24hr	max	9.2E-04	9.2E-04	1.1E-03
76	acenaphthylene	24hr	max	2.2E-04	2.2E-04	3.7E-04
77	acenaphthylene	24hr	max	1.5E-04	1.5E-04	3.6E-04
78	acenaphthylene	24hr	max	9.0E-05	9.0E-05	1.5E-04
79	acenaphthylene	24hr	max	8.7E-05	8.7E-05	1.2E-04
1	acenaphthylene	annual	average	4.1E-06	4.1E-06	4.8E-06
2	acenaphthylene	annual	average	5.0E-06	5.0E-06	6.3E-06
3	acenaphthylene	annual	average	5.1E-06	5.2E-06	6.5E-06
4	acenaphthylene	annual	average	5.4E-06	5.5E-06	7.0E-06
5	acenaphthylene	annual	average	5.8E-06	5.9E-06	7.6E-06
6	acenaphthylene	annual	average	5.9E-06	6.0E-06	7.7E-06
7	acenaphthylene	annual	average	5.5E-06	5.6E-06	7.2E-06
8	acenaphthylene	annual	average	5.9E-06	6.0E-06	7.7E-06
9	acenaphthylene	annual	average	6.0E-06	6.1E-06	7.8E-06
10	acenaphthylene	annual	average	8.5E-06	8.5E-06	1.1E-05
11	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.3E-05
12	acenaphthylene	annual	average	1.0E-05	1.0E-05	1.3E-05
13	acenaphthylene	annual	average	9.4E-06	9.5E-06	1.2E-05
14	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.4E-05
15	acenaphthylene	annual	average	7.1E-06	7.3E-06	9.3E-06
16	acenaphthylene	annual	average	7.0E-06	7.2E-06	9.3E-06
17	acenaphthylene	annual	average	7.7E-06	7.9E-06	1.0E-05
18	acenaphthylene	annual	average	9.2E-06	9.4E-06	1.2E-05
19	acenaphthylene	annual	average	8.3E-06	8.6E-06	1.1E-05
20	acenaphthylene	annual	average	8.5E-06	8.8E-06	1.1E-05
21	acenaphthylene	annual	average	1.5E-05	1.5E-05	1.8E-05
22	acenaphthylene	annual	average	1.1E-05	1.2E-05	1.4E-05
23	acenaphthylene	annual	average	7.5E-06	7.6E-06	9.8E-06
24	acenaphthylene	annual	average	5.1E-06	5.2E-06	6.7E-06
25	acenaphthylene	annual	average	7.0E-06	7.5E-06	9.9E-06
26	acenaphthylene	annual	average	7.4E-06	7.8E-06	1.0E-05
27	acenaphthylene	annual	average	1.1E-05	1.2E-05	1.5E-05
28	acenaphthylene	annual	average	8.8E-06	9.0E-06	1.2E-05
29	acenaphthylene	annual	average	9.1E-06	9.3E-06	1.2E-05
30	acenaphthylene	annual	average	6.8E-06	6.9E-06	9.1E-06
31	acenaphthylene	annual	average	7.5E-06	7.6E-06	9.9E-06
32	acenaphthylene	annual	average	3.7E-06	3.7E-06	4.6E-06
33	acenaphthylene	annual	average	4.6E-06	4.6E-06	5.9E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
34	acenaphthylene	annual	average	4.2E-06	4.2E-06	5.5E-06
35	acenaphthylene	annual	average	5.4E-06	5.4E-06	6.6E-06
36	acenaphthylene	annual	average	5.6E-06	5.7E-06	6.9E-06
37	acenaphthylene	annual	average	5.4E-06	5.4E-06	6.6E-06
38	acenaphthylene	annual	average	9.7E-06	9.9E-06	1.3E-05
39	acenaphthylene	annual	average	1.0E-05	1.0E-05	1.4E-05
40	acenaphthylene	annual	average	9.9E-06	1.0E-05	1.4E-05
41	acenaphthylene	annual	average	9.6E-06	9.8E-06	1.5E-05
42	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.5E-05
43	acenaphthylene	annual	average	1.2E-05	1.2E-05	1.7E-05
44	acenaphthylene	annual	average	1.3E-05	1.3E-05	1.7E-05
45	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.6E-05
46	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.6E-05
47	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.6E-05
48	acenaphthylene	annual	average	1.2E-05	1.2E-05	1.7E-05
49	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.6E-05
50	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.6E-05
51	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.6E-05
52	acenaphthylene	annual	average	1.3E-05	1.3E-05	2.7E-05
53	acenaphthylene	annual	average	1.2E-05	1.2E-05	2.0E-05
54	acenaphthylene	annual	average	4.3E-06	4.4E-06	5.4E-06
55	acenaphthylene	annual	average	4.6E-06	4.6E-06	5.8E-06
56	acenaphthylene	annual	average	4.8E-06	4.8E-06	6.1E-06
57	acenaphthylene	annual	average	5.1E-06	5.2E-06	6.5E-06
58	acenaphthylene	annual	average	3.8E-06	3.9E-06	4.8E-06
59	acenaphthylene	annual	average	1.5E-05	1.5E-05	3.0E-05
60	acenaphthylene	annual	average	2.1E-05	2.1E-05	2.9E-05
61	acenaphthylene	annual	average	2.5E-05	2.5E-05	3.5E-05
62	acenaphthylene	annual	average	2.2E-05	2.2E-05	3.2E-05
63	acenaphthylene	annual	average	2.0E-05	2.0E-05	2.9E-05
64	acenaphthylene	annual	average	2.0E-05	2.0E-05	3.0E-05
65	acenaphthylene	annual	average	2.5E-05	2.5E-05	3.4E-05
66	acenaphthylene	annual	average	7.8E-06	7.8E-06	1.0E-05
67	acenaphthylene	annual	average	8.0E-06	8.0E-06	1.1E-05
68	acenaphthylene	annual	average	7.1E-06	7.1E-06	9.2E-06
69	acenaphthylene	annual	average	6.5E-06	6.5E-06	8.6E-06
70	acenaphthylene	annual	average	5.6E-06	5.7E-06	7.7E-06
71	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.4E-05
72	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.5E-05
73	acenaphthylene	annual	average	3.0E-05	3.0E-05	4.0E-05
74	acenaphthylene	annual	average	1.6E-05	1.6E-05	3.6E-05
75	acenaphthylene	annual	average	1.5E-04	1.5E-04	1.6E-04
76	acenaphthylene	annual	average	2.5E-05	2.5E-05	3.4E-05
77	acenaphthylene	annual	average	1.7E-05	1.7E-05	3.2E-05
78	acenaphthylene	annual	average	1.0E-05	1.0E-05	1.5E-05
79	acenaphthylene	annual	average	1.1E-05	1.1E-05	1.4E-05
1	acetaldehyde	1hr	max	4.4E-02	4.4E-02	4.5E-02
2	acetaldehyde	1hr	max	1.6E-02	1.6E-02	2.3E-02
3	acetaldehyde	1hr	max	1.6E-02	1.6E-02	2.3E-02
4	acetaldehyde	1hr	max	2.0E-02	2.0E-02	2.3E-02
5	acetaldehyde	1hr	max	2.0E-02	2.0E-02	2.4E-02
6	acetaldehyde	1hr	max	2.0E-02	2.0E-02	2.5E-02
7	acetaldehyde	1hr	max	1.9E-02	2.1E-02	2.7E-02
8	acetaldehyde	1hr	max	1.8E-02	1.9E-02	2.7E-02
9	acetaldehyde	1hr	max	2.3E-02	2.3E-02	2.4E-02
10	acetaldehyde	1hr	max	3.2E-02	3.3E-02	3.3E-02
11	acetaldehyde	1hr	max	2.7E-02	2.9E-02	3.5E-02
12	acetaldehyde	1hr	max	4.1E-02	4.1E-02	4.2E-02
13	acetaldehyde	1hr	max	2.4E-02	2.5E-02	3.2E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
14	acetaldehyde	1hr	max	4.5E-02	4.5E-02	4.8E-02
15	acetaldehyde	1hr	max	2.6E-02	2.6E-02	3.3E-02
16	acetaldehyde	1hr	max	2.2E-02	2.2E-02	3.3E-02
17	acetaldehyde	1hr	max	2.3E-02	2.3E-02	3.4E-02
18	acetaldehyde	1hr	max	4.3E-02	4.4E-02	4.7E-02
19	acetaldehyde	1hr	max	3.5E-02	3.5E-02	3.6E-02
20	acetaldehyde	1hr	max	2.8E-02	2.8E-02	3.0E-02
21	acetaldehyde	1hr	max	1.5E-01	1.5E-01	1.5E-01
22	acetaldehyde	1hr	max	9.7E-02	9.7E-02	9.7E-02
23	acetaldehyde	1hr	max	2.9E-02	2.9E-02	3.1E-02
24	acetaldehyde	1hr	max	1.5E-02	1.8E-02	3.1E-02
25	acetaldehyde	1hr	max	4.1E-02	8.1E-02	8.1E-02
26	acetaldehyde	1hr	max	7.6E-02	7.7E-02	7.7E-02
27	acetaldehyde	1hr	max	4.8E-02	1.3E-01	1.3E-01
28	acetaldehyde	1hr	max	2.2E-02	2.2E-02	3.4E-02
29	acetaldehyde	1hr	max	2.7E-02	2.7E-02	3.4E-02
30	acetaldehyde	1hr	max	3.8E-02	3.8E-02	5.1E-02
31	acetaldehyde	1hr	max	3.5E-02	3.5E-02	6.0E-02
32	acetaldehyde	1hr	max	1.2E-01	1.2E-01	1.2E-01
33	acetaldehyde	1hr	max	2.1E-02	2.1E-02	3.2E-02
34	acetaldehyde	1hr	max	2.0E-02	2.1E-02	3.0E-02
35	acetaldehyde	1hr	max	2.7E-02	2.7E-02	3.4E-02
36	acetaldehyde	1hr	max	2.3E-02	2.3E-02	3.7E-02
37	acetaldehyde	1hr	max	2.1E-02	2.2E-02	3.6E-02
38	acetaldehyde	1hr	max	3.2E-02	3.2E-02	4.5E-02
39	acetaldehyde	1hr	max	4.2E-02	4.2E-02	4.4E-02
40	acetaldehyde	1hr	max	4.5E-02	4.5E-02	5.0E-02
41	acetaldehyde	1hr	max	2.0E-02	2.2E-02	3.8E-02
42	acetaldehyde	1hr	max	4.1E-02	4.1E-02	5.0E-02
43	acetaldehyde	1hr	max	6.5E-02	6.7E-02	7.8E-02
44	acetaldehyde	1hr	max	1.2E-01	1.2E-01	1.2E-01
45	acetaldehyde	1hr	max	4.1E-02	4.1E-02	4.6E-02
46	acetaldehyde	1hr	max	5.3E-02	5.3E-02	5.8E-02
47	acetaldehyde	1hr	max	5.0E-02	5.0E-02	5.5E-02
48	acetaldehyde	1hr	max	8.6E-02	8.6E-02	1.0E-01
49	acetaldehyde	1hr	max	1.0E-01	1.0E-01	1.1E-01
50	acetaldehyde	1hr	max	4.2E-02	4.4E-02	5.1E-02
51	acetaldehyde	1hr	max	4.2E-02	4.2E-02	5.1E-02
52	acetaldehyde	1hr	max	3.3E-02	3.3E-02	6.2E-02
53	acetaldehyde	1hr	max	2.8E-02	2.8E-02	4.7E-02
54	acetaldehyde	1hr	max	1.8E-02	1.9E-02	3.1E-02
55	acetaldehyde	1hr	max	1.5E-02	1.7E-02	2.7E-02
56	acetaldehyde	1hr	max	1.6E-02	1.9E-02	3.0E-02
57	acetaldehyde	1hr	max	1.4E-02	1.7E-02	2.7E-02
58	acetaldehyde	1hr	max	1.6E-02	1.7E-02	2.8E-02
59	acetaldehyde	1hr	max	5.5E-02	5.5E-02	6.7E-02
60	acetaldehyde	1hr	max	5.7E-02	5.7E-02	9.1E-02
61	acetaldehyde	1hr	max	1.5E-01	1.5E-01	1.6E-01
62	acetaldehyde	1hr	max	6.3E-02	6.3E-02	6.5E-02
63	acetaldehyde	1hr	max	5.2E-02	5.2E-02	5.4E-02
64	acetaldehyde	1hr	max	5.4E-02	5.4E-02	5.5E-02
65	acetaldehyde	1hr	max	1.1E-01	1.1E-01	1.1E-01
66	acetaldehyde	1hr	max	2.0E-02	2.0E-02	2.4E-02
67	acetaldehyde	1hr	max	1.8E-02	1.8E-02	2.7E-02
68	acetaldehyde	1hr	max	2.3E-02	2.3E-02	2.4E-02
69	acetaldehyde	1hr	max	2.5E-02	2.5E-02	2.4E-02
70	acetaldehyde	1hr	max	1.6E-02	1.6E-02	2.2E-02
71	acetaldehyde	1hr	max	7.4E-02	7.5E-02	2.1E-01
72	acetaldehyde	1hr	max	9.7E-02	9.7E-02	2.4E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
73	acetaldehyde	1hr	max	1.9E-01	1.9E-01	1.9E-01
74	acetaldehyde	1hr	max	4.4E-02	4.4E-02	1.1E-01
75	acetaldehyde	1hr	max	2.7E+00	2.7E+00	2.7E+00
76	acetaldehyde	1hr	max	1.2E-01	1.2E-01	1.2E-01
77	acetaldehyde	1hr	max	7.2E-02	7.2E-02	1.3E-01
78	acetaldehyde	1hr	max	3.8E-02	3.8E-02	4.3E-02
79	acetaldehyde	1hr	max	8.9E-02	8.9E-02	8.9E-02
1	acetaldehyde	1hr	9th	2.2E-02	2.2E-02	2.3E-02
2	acetaldehyde	1hr	9th	1.2E-02	1.3E-02	1.8E-02
3	acetaldehyde	1hr	9th	1.3E-02	1.3E-02	1.8E-02
4	acetaldehyde	1hr	9th	1.4E-02	1.4E-02	1.8E-02
5	acetaldehyde	1hr	9th	1.5E-02	1.5E-02	2.0E-02
6	acetaldehyde	1hr	9th	1.5E-02	1.6E-02	2.0E-02
7	acetaldehyde	1hr	9th	1.5E-02	1.6E-02	2.2E-02
8	acetaldehyde	1hr	9th	1.5E-02	1.5E-02	2.0E-02
9	acetaldehyde	1hr	9th	1.6E-02	1.6E-02	1.8E-02
10	acetaldehyde	1hr	9th	2.0E-02	2.1E-02	2.3E-02
11	acetaldehyde	1hr	9th	2.3E-02	2.4E-02	3.0E-02
12	acetaldehyde	1hr	9th	1.8E-02	1.8E-02	2.4E-02
13	acetaldehyde	1hr	9th	1.7E-02	1.7E-02	2.2E-02
14	acetaldehyde	1hr	9th	2.0E-02	2.1E-02	2.6E-02
15	acetaldehyde	1hr	9th	1.7E-02	1.8E-02	2.4E-02
16	acetaldehyde	1hr	9th	1.7E-02	1.7E-02	2.4E-02
17	acetaldehyde	1hr	9th	1.9E-02	2.0E-02	2.3E-02
18	acetaldehyde	1hr	9th	2.5E-02	2.5E-02	2.8E-02
19	acetaldehyde	1hr	9th	2.1E-02	2.1E-02	2.7E-02
20	acetaldehyde	1hr	9th	1.6E-02	1.7E-02	2.6E-02
21	acetaldehyde	1hr	9th	6.6E-02	6.7E-02	6.8E-02
22	acetaldehyde	1hr	9th	3.5E-02	3.6E-02	4.4E-02
23	acetaldehyde	1hr	9th	2.0E-02	2.0E-02	2.6E-02
24	acetaldehyde	1hr	9th	1.4E-02	1.5E-02	2.4E-02
25	acetaldehyde	1hr	9th	1.9E-02	4.0E-02	4.6E-02
26	acetaldehyde	1hr	9th	1.9E-02	2.1E-02	3.1E-02
27	acetaldehyde	1hr	9th	2.2E-02	5.7E-02	6.0E-02
28	acetaldehyde	1hr	9th	1.7E-02	1.8E-02	2.4E-02
29	acetaldehyde	1hr	9th	1.8E-02	1.9E-02	2.4E-02
30	acetaldehyde	1hr	9th	2.2E-02	2.2E-02	4.2E-02
31	acetaldehyde	1hr	9th	2.5E-02	2.6E-02	4.4E-02
32	acetaldehyde	1hr	9th	2.1E-02	2.1E-02	2.7E-02
33	acetaldehyde	1hr	9th	1.5E-02	1.6E-02	2.9E-02
34	acetaldehyde	1hr	9th	1.5E-02	1.6E-02	2.2E-02
35	acetaldehyde	1hr	9th	1.5E-02	1.5E-02	2.5E-02
36	acetaldehyde	1hr	9th	1.6E-02	1.6E-02	2.5E-02
37	acetaldehyde	1hr	9th	1.5E-02	1.6E-02	2.7E-02
38	acetaldehyde	1hr	9th	1.8E-02	1.8E-02	2.7E-02
39	acetaldehyde	1hr	9th	2.7E-02	2.7E-02	3.2E-02
40	acetaldehyde	1hr	9th	1.9E-02	2.0E-02	2.8E-02
41	acetaldehyde	1hr	9th	1.7E-02	1.8E-02	2.4E-02
42	acetaldehyde	1hr	9th	2.2E-02	2.3E-02	3.0E-02
43	acetaldehyde	1hr	9th	5.2E-02	5.4E-02	5.5E-02
44	acetaldehyde	1hr	9th	8.1E-02	8.1E-02	8.4E-02
45	acetaldehyde	1hr	9th	2.4E-02	2.5E-02	3.1E-02
46	acetaldehyde	1hr	9th	3.7E-02	3.7E-02	4.1E-02
47	acetaldehyde	1hr	9th	2.6E-02	2.6E-02	3.2E-02
48	acetaldehyde	1hr	9th	6.6E-02	6.6E-02	7.0E-02
49	acetaldehyde	1hr	9th	5.2E-02	5.2E-02	5.2E-02
50	acetaldehyde	1hr	9th	2.3E-02	2.4E-02	3.4E-02
51	acetaldehyde	1hr	9th	2.1E-02	2.1E-02	2.9E-02
52	acetaldehyde	1hr	9th	2.5E-02	2.5E-02	5.3E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
53	acetaldehyde	1hr	9th	2.1E-02	2.1E-02	3.4E-02
54	acetaldehyde	1hr	9th	1.3E-02	1.4E-02	2.0E-02
55	acetaldehyde	1hr	9th	1.3E-02	1.4E-02	2.3E-02
56	acetaldehyde	1hr	9th	1.4E-02	1.4E-02	2.4E-02
57	acetaldehyde	1hr	9th	1.3E-02	1.4E-02	2.1E-02
58	acetaldehyde	1hr	9th	1.2E-02	1.4E-02	2.2E-02
59	acetaldehyde	1hr	9th	3.2E-02	3.2E-02	4.4E-02
60	acetaldehyde	1hr	9th	3.7E-02	3.7E-02	6.7E-02
61	acetaldehyde	1hr	9th	5.0E-02	5.0E-02	6.0E-02
62	acetaldehyde	1hr	9th	4.1E-02	4.1E-02	5.1E-02
63	acetaldehyde	1hr	9th	3.5E-02	3.5E-02	4.7E-02
64	acetaldehyde	1hr	9th	3.5E-02	3.5E-02	4.4E-02
65	acetaldehyde	1hr	9th	8.8E-02	8.8E-02	9.5E-02
66	acetaldehyde	1hr	9th	1.5E-02	1.5E-02	1.9E-02
67	acetaldehyde	1hr	9th	1.4E-02	1.4E-02	2.1E-02
68	acetaldehyde	1hr	9th	1.9E-02	1.9E-02	2.0E-02
69	acetaldehyde	1hr	9th	1.5E-02	1.5E-02	2.0E-02
70	acetaldehyde	1hr	9th	1.2E-02	1.2E-02	1.6E-02
71	acetaldehyde	1hr	9th	3.6E-02	3.7E-02	1.1E-01
72	acetaldehyde	1hr	9th	3.3E-02	3.3E-02	1.3E-01
73	acetaldehyde	1hr	9th	1.8E-01	1.8E-01	1.8E-01
74	acetaldehyde	1hr	9th	3.0E-02	3.0E-02	6.2E-02
75	acetaldehyde	1hr	9th	2.2E+00	2.2E+00	2.2E+00
76	acetaldehyde	1hr	9th	4.7E-02	4.7E-02	5.9E-02
77	acetaldehyde	1hr	9th	3.2E-02	3.2E-02	7.3E-02
78	acetaldehyde	1hr	9th	2.2E-02	2.2E-02	3.0E-02
79	acetaldehyde	1hr	9th	4.1E-02	4.1E-02	4.2E-02
1	acetaldehyde	24hr	max	9.7E-03	9.7E-03	1.2E-02
2	acetaldehyde	24hr	max	6.4E-03	7.1E-03	1.2E-02
3	acetaldehyde	24hr	max	6.5E-03	7.1E-03	1.2E-02
4	acetaldehyde	24hr	max	6.7E-03	7.4E-03	1.2E-02
5	acetaldehyde	24hr	max	7.2E-03	7.9E-03	1.2E-02
6	acetaldehyde	24hr	max	7.3E-03	8.1E-03	1.2E-02
7	acetaldehyde	24hr	max	7.6E-03	8.3E-03	1.3E-02
8	acetaldehyde	24hr	max	7.4E-03	8.2E-03	1.3E-02
9	acetaldehyde	24hr	max	7.3E-03	7.5E-03	1.0E-02
10	acetaldehyde	24hr	max	9.2E-03	9.9E-03	1.5E-02
11	acetaldehyde	24hr	max	1.2E-02	1.2E-02	1.8E-02
12	acetaldehyde	24hr	max	9.8E-03	9.8E-03	1.4E-02
13	acetaldehyde	24hr	max	8.8E-03	8.9E-03	1.3E-02
14	acetaldehyde	24hr	max	9.7E-03	9.8E-03	1.4E-02
15	acetaldehyde	24hr	max	1.1E-02	1.1E-02	1.5E-02
16	acetaldehyde	24hr	max	8.8E-03	9.6E-03	1.5E-02
17	acetaldehyde	24hr	max	8.9E-03	9.7E-03	1.4E-02
18	acetaldehyde	24hr	max	9.2E-03	9.8E-03	1.4E-02
19	acetaldehyde	24hr	max	8.3E-03	8.5E-03	1.3E-02
20	acetaldehyde	24hr	max	7.7E-03	8.2E-03	1.2E-02
21	acetaldehyde	24hr	max	2.8E-02	2.9E-02	3.3E-02
22	acetaldehyde	24hr	max	2.5E-02	2.5E-02	3.1E-02
23	acetaldehyde	24hr	max	1.1E-02	1.1E-02	1.4E-02
24	acetaldehyde	24hr	max	8.4E-03	9.8E-03	1.5E-02
25	acetaldehyde	24hr	max	9.9E-03	1.7E-02	2.0E-02
26	acetaldehyde	24hr	max	9.0E-03	9.4E-03	1.6E-02
27	acetaldehyde	24hr	max	1.0E-02	2.1E-02	2.2E-02
28	acetaldehyde	24hr	max	6.9E-03	7.0E-03	1.3E-02
29	acetaldehyde	24hr	max	7.7E-03	7.7E-03	1.3E-02
30	acetaldehyde	24hr	max	1.1E-02	1.1E-02	2.1E-02
31	acetaldehyde	24hr	max	1.1E-02	1.1E-02	2.2E-02
32	acetaldehyde	24hr	max	1.2E-02	1.2E-02	1.4E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
33	acetaldehyde	24hr	max	7.7E-03	7.9E-03	1.4E-02
34	acetaldehyde	24hr	max	7.3E-03	7.6E-03	1.2E-02
35	acetaldehyde	24hr	max	7.4E-03	8.1E-03	1.3E-02
36	acetaldehyde	24hr	max	7.7E-03	8.5E-03	1.3E-02
37	acetaldehyde	24hr	max	7.8E-03	8.9E-03	1.4E-02
38	acetaldehyde	24hr	max	9.0E-03	9.2E-03	1.4E-02
39	acetaldehyde	24hr	max	7.9E-03	8.0E-03	1.5E-02
40	acetaldehyde	24hr	max	8.1E-03	8.5E-03	1.6E-02
41	acetaldehyde	24hr	max	8.8E-03	9.0E-03	1.5E-02
42	acetaldehyde	24hr	max	9.9E-03	1.0E-02	1.6E-02
43	acetaldehyde	24hr	max	2.5E-02	2.5E-02	2.9E-02
44	acetaldehyde	24hr	max	2.8E-02	2.8E-02	3.5E-02
45	acetaldehyde	24hr	max	9.8E-03	1.0E-02	1.6E-02
46	acetaldehyde	24hr	max	1.1E-02	1.1E-02	1.6E-02
47	acetaldehyde	24hr	max	1.0E-02	1.0E-02	1.7E-02
48	acetaldehyde	24hr	max	2.9E-02	2.9E-02	3.3E-02
49	acetaldehyde	24hr	max	1.5E-02	1.5E-02	1.9E-02
50	acetaldehyde	24hr	max	1.3E-02	1.3E-02	1.9E-02
51	acetaldehyde	24hr	max	9.8E-03	1.0E-02	1.7E-02
52	acetaldehyde	24hr	max	1.3E-02	1.3E-02	2.8E-02
53	acetaldehyde	24hr	max	1.2E-02	1.2E-02	2.1E-02
54	acetaldehyde	24hr	max	7.9E-03	9.0E-03	1.3E-02
55	acetaldehyde	24hr	max	8.0E-03	9.5E-03	1.5E-02
56	acetaldehyde	24hr	max	8.4E-03	1.0E-02	1.6E-02
57	acetaldehyde	24hr	max	7.6E-03	8.6E-03	1.3E-02
58	acetaldehyde	24hr	max	7.2E-03	8.5E-03	1.3E-02
59	acetaldehyde	24hr	max	1.6E-02	1.6E-02	2.0E-02
60	acetaldehyde	24hr	max	1.6E-02	1.6E-02	3.3E-02
61	acetaldehyde	24hr	max	2.1E-02	2.1E-02	3.0E-02
62	acetaldehyde	24hr	max	1.9E-02	1.9E-02	2.3E-02
63	acetaldehyde	24hr	max	1.7E-02	1.7E-02	2.1E-02
64	acetaldehyde	24hr	max	1.7E-02	1.7E-02	2.0E-02
65	acetaldehyde	24hr	max	3.6E-02	3.6E-02	4.0E-02
66	acetaldehyde	24hr	max	8.9E-03	9.0E-03	1.2E-02
67	acetaldehyde	24hr	max	7.6E-03	7.8E-03	1.2E-02
68	acetaldehyde	24hr	max	7.7E-03	7.7E-03	1.1E-02
69	acetaldehyde	24hr	max	8.8E-03	8.8E-03	1.0E-02
70	acetaldehyde	24hr	max	5.8E-03	6.3E-03	9.2E-03
71	acetaldehyde	24hr	max	1.3E-02	1.3E-02	3.1E-02
72	acetaldehyde	24hr	max	1.3E-02	1.3E-02	2.8E-02
73	acetaldehyde	24hr	max	7.6E-02	7.6E-02	7.8E-02
74	acetaldehyde	24hr	max	1.5E-02	1.5E-02	2.8E-02
75	acetaldehyde	24hr	max	7.8E-01	7.8E-01	7.8E-01
76	acetaldehyde	24hr	max	2.1E-02	2.1E-02	3.0E-02
77	acetaldehyde	24hr	max	1.5E-02	1.5E-02	1.9E-02
78	acetaldehyde	24hr	max	1.2E-02	1.2E-02	1.5E-02
79	acetaldehyde	24hr	max	1.2E-02	1.3E-02	1.7E-02
1	acetaldehyde	annual	average	1.1E-03	1.2E-03	1.3E-03
2	acetaldehyde	annual	average	9.4E-04	1.0E-03	1.3E-03
3	acetaldehyde	annual	average	9.4E-04	1.0E-03	1.3E-03
4	acetaldehyde	annual	average	1.0E-03	1.1E-03	1.4E-03
5	acetaldehyde	annual	average	1.1E-03	1.3E-03	1.6E-03
6	acetaldehyde	annual	average	1.2E-03	1.3E-03	1.7E-03
7	acetaldehyde	annual	average	1.0E-03	1.2E-03	1.5E-03
8	acetaldehyde	annual	average	1.1E-03	1.3E-03	1.7E-03
9	acetaldehyde	annual	average	1.2E-03	1.3E-03	1.6E-03
10	acetaldehyde	annual	average	1.6E-03	1.7E-03	2.2E-03
11	acetaldehyde	annual	average	2.1E-03	2.3E-03	2.9E-03
12	acetaldehyde	annual	average	1.9E-03	2.0E-03	2.6E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
13	acetaldehyde	annual	average	1.8E-03	1.9E-03	2.4E-03
14	acetaldehyde	annual	average	1.9E-03	2.1E-03	2.8E-03
15	acetaldehyde	annual	average	1.2E-03	1.5E-03	2.0E-03
16	acetaldehyde	annual	average	1.2E-03	1.5E-03	2.0E-03
17	acetaldehyde	annual	average	1.3E-03	1.6E-03	2.1E-03
18	acetaldehyde	annual	average	1.6E-03	1.9E-03	2.5E-03
19	acetaldehyde	annual	average	1.4E-03	1.8E-03	2.3E-03
20	acetaldehyde	annual	average	1.4E-03	1.8E-03	2.4E-03
21	acetaldehyde	annual	average	3.9E-03	4.2E-03	4.8E-03
22	acetaldehyde	annual	average	2.4E-03	2.6E-03	3.2E-03
23	acetaldehyde	annual	average	1.4E-03	1.5E-03	2.1E-03
24	acetaldehyde	annual	average	9.0E-04	1.0E-03	1.4E-03
25	acetaldehyde	annual	average	1.1E-03	1.9E-03	2.6E-03
26	acetaldehyde	annual	average	1.2E-03	1.8E-03	2.6E-03
27	acetaldehyde	annual	average	1.9E-03	2.9E-03	4.1E-03
28	acetaldehyde	annual	average	1.4E-03	1.8E-03	2.5E-03
29	acetaldehyde	annual	average	1.5E-03	1.8E-03	2.5E-03
30	acetaldehyde	annual	average	1.1E-03	1.3E-03	1.8E-03
31	acetaldehyde	annual	average	1.2E-03	1.4E-03	2.0E-03
32	acetaldehyde	annual	average	7.9E-04	8.5E-04	1.1E-03
33	acetaldehyde	annual	average	7.2E-04	7.9E-04	1.1E-03
34	acetaldehyde	annual	average	6.3E-04	7.0E-04	9.5E-04
35	acetaldehyde	annual	average	9.0E-04	9.7E-04	1.2E-03
36	acetaldehyde	annual	average	9.5E-04	1.0E-03	1.3E-03
37	acetaldehyde	annual	average	9.2E-04	1.0E-03	1.3E-03
38	acetaldehyde	annual	average	1.6E-03	1.8E-03	2.6E-03
39	acetaldehyde	annual	average	1.6E-03	1.9E-03	2.8E-03
40	acetaldehyde	annual	average	1.7E-03	2.0E-03	3.0E-03
41	acetaldehyde	annual	average	1.5E-03	1.7E-03	2.9E-03
42	acetaldehyde	annual	average	1.9E-03	2.1E-03	3.1E-03
43	acetaldehyde	annual	average	3.3E-03	3.5E-03	4.5E-03
44	acetaldehyde	annual	average	4.4E-03	4.6E-03	5.6E-03
45	acetaldehyde	annual	average	2.0E-03	2.2E-03	3.3E-03
46	acetaldehyde	annual	average	2.2E-03	2.4E-03	3.5E-03
47	acetaldehyde	annual	average	1.9E-03	2.1E-03	3.2E-03
48	acetaldehyde	annual	average	3.6E-03	3.8E-03	4.8E-03
49	acetaldehyde	annual	average	2.6E-03	2.8E-03	3.8E-03
50	acetaldehyde	annual	average	2.4E-03	2.6E-03	3.7E-03
51	acetaldehyde	annual	average	1.8E-03	2.0E-03	3.0E-03
52	acetaldehyde	annual	average	2.1E-03	2.3E-03	5.1E-03
53	acetaldehyde	annual	average	1.7E-03	1.9E-03	3.7E-03
54	acetaldehyde	annual	average	7.8E-04	8.4E-04	1.1E-03
55	acetaldehyde	annual	average	8.2E-04	9.0E-04	1.2E-03
56	acetaldehyde	annual	average	8.4E-04	9.4E-04	1.3E-03
57	acetaldehyde	annual	average	9.1E-04	1.0E-03	1.3E-03
58	acetaldehyde	annual	average	7.0E-04	7.5E-04	9.7E-04
59	acetaldehyde	annual	average	2.3E-03	2.4E-03	4.7E-03
60	acetaldehyde	annual	average	2.5E-03	2.6E-03	5.2E-03
61	acetaldehyde	annual	average	3.1E-03	3.2E-03	5.1E-03
62	acetaldehyde	annual	average	2.8E-03	2.9E-03	4.8E-03
63	acetaldehyde	annual	average	2.6E-03	2.7E-03	5.3E-03
64	acetaldehyde	annual	average	2.6E-03	2.7E-03	5.0E-03
65	acetaldehyde	annual	average	5.9E-03	6.0E-03	7.8E-03
66	acetaldehyde	annual	average	1.5E-03	1.5E-03	2.0E-03
67	acetaldehyde	annual	average	1.5E-03	1.6E-03	2.1E-03
68	acetaldehyde	annual	average	1.4E-03	1.5E-03	1.9E-03
69	acetaldehyde	annual	average	1.3E-03	1.4E-03	1.8E-03
70	acetaldehyde	annual	average	1.1E-03	1.2E-03	1.5E-03
71	acetaldehyde	annual	average	2.1E-03	2.4E-03	3.7E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
72	acetaldehyde	annual	average	2.2E-03	2.4E-03	3.8E-03
73	acetaldehyde	annual	average	1.4E-02	1.4E-02	1.6E-02
74	acetaldehyde	annual	average	2.4E-03	2.5E-03	5.9E-03
75	acetaldehyde	annual	average	1.2E-01	1.2E-01	1.2E-01
76	acetaldehyde	annual	average	3.1E-03	3.1E-03	5.0E-03
77	acetaldehyde	annual	average	2.4E-03	2.4E-03	5.0E-03
78	acetaldehyde	annual	average	1.7E-03	1.9E-03	2.8E-03
79	acetaldehyde	annual	average	2.6E-03	2.8E-03	3.4E-03
1	acrolein	1hr	max	3.3E-02	3.3E-02	3.3E-02
2	acrolein	1hr	max	1.1E-02	1.1E-02	1.1E-02
3	acrolein	1hr	max	1.1E-02	1.1E-02	1.1E-02
4	acrolein	1hr	max	1.8E-02	1.8E-02	1.8E-02
5	acrolein	1hr	max	1.8E-02	1.8E-02	1.8E-02
6	acrolein	1hr	max	1.7E-02	1.7E-02	1.7E-02
7	acrolein	1hr	max	1.2E-02	1.2E-02	1.2E-02
8	acrolein	1hr	max	1.2E-02	1.2E-02	1.2E-02
9	acrolein	1hr	max	2.0E-02	2.0E-02	2.0E-02
10	acrolein	1hr	max	2.9E-02	2.9E-02	2.9E-02
11	acrolein	1hr	max	2.3E-02	2.3E-02	2.5E-02
12	acrolein	1hr	max	3.9E-02	3.9E-02	3.9E-02
13	acrolein	1hr	max	2.1E-02	2.1E-02	2.2E-02
14	acrolein	1hr	max	2.5E-02	2.6E-02	2.6E-02
15	acrolein	1hr	max	2.2E-02	2.2E-02	2.2E-02
16	acrolein	1hr	max	1.8E-02	1.8E-02	1.8E-02
17	acrolein	1hr	max	1.9E-02	1.9E-02	2.0E-02
18	acrolein	1hr	max	3.8E-02	3.8E-02	3.9E-02
19	acrolein	1hr	max	3.1E-02	3.1E-02	3.2E-02
20	acrolein	1hr	max	2.4E-02	2.4E-02	2.4E-02
21	acrolein	1hr	max	1.3E-01	1.3E-01	1.3E-01
22	acrolein	1hr	max	8.4E-02	8.4E-02	8.4E-02
23	acrolein	1hr	max	2.5E-02	2.5E-02	2.5E-02
24	acrolein	1hr	max	8.3E-03	8.3E-03	9.6E-03
25	acrolein	1hr	max	1.8E-02	4.1E-02	4.1E-02
26	acrolein	1hr	max	7.1E-02	7.2E-02	7.2E-02
27	acrolein	1hr	max	4.0E-02	5.9E-02	5.9E-02
28	acrolein	1hr	max	2.0E-02	2.0E-02	2.0E-02
29	acrolein	1hr	max	2.4E-02	2.4E-02	2.5E-02
30	acrolein	1hr	max	1.5E-02	1.5E-02	1.7E-02
31	acrolein	1hr	max	3.3E-02	3.3E-02	3.3E-02
32	acrolein	1hr	max	1.1E-01	1.1E-01	1.1E-01
33	acrolein	1hr	max	1.4E-02	1.4E-02	1.4E-02
34	acrolein	1hr	max	8.1E-03	8.1E-03	9.8E-03
35	acrolein	1hr	max	2.6E-02	2.6E-02	2.6E-02
36	acrolein	1hr	max	2.2E-02	2.2E-02	2.2E-02
37	acrolein	1hr	max	1.5E-02	1.6E-02	1.6E-02
38	acrolein	1hr	max	3.0E-02	3.0E-02	3.0E-02
39	acrolein	1hr	max	3.8E-02	3.8E-02	3.8E-02
40	acrolein	1hr	max	4.2E-02	4.2E-02	4.2E-02
41	acrolein	1hr	max	1.4E-02	1.4E-02	1.5E-02
42	acrolein	1hr	max	2.1E-02	2.1E-02	2.2E-02
43	acrolein	1hr	max	4.2E-02	4.2E-02	4.3E-02
44	acrolein	1hr	max	5.2E-02	5.2E-02	5.2E-02
45	acrolein	1hr	max	3.1E-02	3.1E-02	3.2E-02
46	acrolein	1hr	max	2.8E-02	2.8E-02	2.9E-02
47	acrolein	1hr	max	2.2E-02	2.2E-02	2.3E-02
48	acrolein	1hr	max	3.8E-02	3.8E-02	4.0E-02
49	acrolein	1hr	max	4.7E-02	4.7E-02	4.8E-02
50	acrolein	1hr	max	3.5E-02	3.6E-02	3.7E-02
51	acrolein	1hr	max	1.8E-02	1.8E-02	1.9E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
52	acrolein	1hr	max	1.3E-02	1.3E-02	2.6E-02
53	acrolein	1hr	max	1.1E-02	1.1E-02	1.4E-02
54	acrolein	1hr	max	1.5E-02	1.5E-02	1.5E-02
55	acrolein	1hr	max	1.2E-02	1.2E-02	1.2E-02
56	acrolein	1hr	max	1.2E-02	1.3E-02	1.4E-02
57	acrolein	1hr	max	9.7E-03	9.7E-03	9.7E-03
58	acrolein	1hr	max	6.6E-03	6.9E-03	8.9E-03
59	acrolein	1hr	max	2.2E-02	2.2E-02	2.2E-02
60	acrolein	1hr	max	2.3E-02	2.3E-02	2.5E-02
61	acrolein	1hr	max	6.7E-02	6.7E-02	6.9E-02
62	acrolein	1hr	max	2.7E-02	2.7E-02	2.8E-02
63	acrolein	1hr	max	2.2E-02	2.2E-02	2.2E-02
64	acrolein	1hr	max	2.2E-02	2.2E-02	2.3E-02
65	acrolein	1hr	max	4.9E-02	4.9E-02	4.9E-02
66	acrolein	1hr	max	1.6E-02	1.6E-02	1.7E-02
67	acrolein	1hr	max	1.1E-02	1.1E-02	1.1E-02
68	acrolein	1hr	max	1.9E-02	1.9E-02	1.9E-02
69	acrolein	1hr	max	1.7E-02	1.7E-02	1.7E-02
70	acrolein	1hr	max	1.0E-02	1.0E-02	1.0E-02
71	acrolein	1hr	max	6.1E-02	6.1E-02	6.1E-02
72	acrolein	1hr	max	9.0E-02	9.0E-02	9.0E-02
73	acrolein	1hr	max	8.2E-02	8.2E-02	8.3E-02
74	acrolein	1hr	max	1.7E-02	1.7E-02	3.2E-02
75	acrolein	1hr	max	1.2E+00	1.2E+00	1.2E+00
76	acrolein	1hr	max	5.2E-02	5.2E-02	5.2E-02
77	acrolein	1hr	max	3.2E-02	3.2E-02	5.0E-02
78	acrolein	1hr	max	2.8E-02	2.8E-02	2.9E-02
79	acrolein	1hr	max	8.0E-02	8.0E-02	8.0E-02
1	acrolein	1hr	9th	1.7E-02	1.7E-02	1.7E-02
2	acrolein	1hr	9th	7.5E-03	7.5E-03	7.7E-03
3	acrolein	1hr	9th	7.5E-03	7.6E-03	8.1E-03
4	acrolein	1hr	9th	1.0E-02	1.0E-02	1.0E-02
5	acrolein	1hr	9th	9.9E-03	9.9E-03	1.0E-02
6	acrolein	1hr	9th	1.0E-02	1.0E-02	1.0E-02
7	acrolein	1hr	9th	8.7E-03	8.7E-03	9.2E-03
8	acrolein	1hr	9th	9.8E-03	9.8E-03	9.7E-03
9	acrolein	1hr	9th	1.3E-02	1.3E-02	1.3E-02
10	acrolein	1hr	9th	1.8E-02	1.8E-02	1.8E-02
11	acrolein	1hr	9th	1.8E-02	1.8E-02	1.9E-02
12	acrolein	1hr	9th	1.2E-02	1.2E-02	1.2E-02
13	acrolein	1hr	9th	1.2E-02	1.2E-02	1.2E-02
14	acrolein	1hr	9th	1.5E-02	1.6E-02	1.6E-02
15	acrolein	1hr	9th	1.4E-02	1.4E-02	1.4E-02
16	acrolein	1hr	9th	1.4E-02	1.4E-02	1.4E-02
17	acrolein	1hr	9th	1.6E-02	1.7E-02	1.7E-02
18	acrolein	1hr	9th	2.2E-02	2.2E-02	2.2E-02
19	acrolein	1hr	9th	1.8E-02	1.8E-02	1.8E-02
20	acrolein	1hr	9th	1.4E-02	1.4E-02	1.4E-02
21	acrolein	1hr	9th	5.6E-02	5.6E-02	5.7E-02
22	acrolein	1hr	9th	3.1E-02	3.2E-02	3.2E-02
23	acrolein	1hr	9th	1.6E-02	1.6E-02	1.7E-02
24	acrolein	1hr	9th	7.2E-03	7.5E-03	8.3E-03
25	acrolein	1hr	9th	1.4E-02	2.0E-02	2.0E-02
26	acrolein	1hr	9th	1.3E-02	1.3E-02	1.3E-02
27	acrolein	1hr	9th	1.8E-02	2.7E-02	2.8E-02
28	acrolein	1hr	9th	1.3E-02	1.3E-02	1.4E-02
29	acrolein	1hr	9th	1.5E-02	1.5E-02	1.5E-02
30	acrolein	1hr	9th	1.1E-02	1.1E-02	1.2E-02
31	acrolein	1hr	9th	1.3E-02	1.3E-02	1.4E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
32	acrolein	1hr	9th	1.6E-02	1.7E-02	1.7E-02
33	acrolein	1hr	9th	9.8E-03	1.0E-02	1.1E-02
34	acrolein	1hr	9th	6.7E-03	6.9E-03	7.8E-03
35	acrolein	1hr	9th	9.2E-03	9.3E-03	1.0E-02
36	acrolein	1hr	9th	8.7E-03	8.9E-03	9.6E-03
37	acrolein	1hr	9th	7.9E-03	8.0E-03	8.7E-03
38	acrolein	1hr	9th	9.7E-03	1.0E-02	1.1E-02
39	acrolein	1hr	9th	2.4E-02	2.4E-02	2.4E-02
40	acrolein	1hr	9th	1.5E-02	1.5E-02	1.5E-02
41	acrolein	1hr	9th	7.6E-03	8.0E-03	8.5E-03
42	acrolein	1hr	9th	1.4E-02	1.4E-02	1.5E-02
43	acrolein	1hr	9th	2.4E-02	2.4E-02	2.5E-02
44	acrolein	1hr	9th	3.6E-02	3.6E-02	3.6E-02
45	acrolein	1hr	9th	1.2E-02	1.3E-02	1.3E-02
46	acrolein	1hr	9th	1.8E-02	1.8E-02	1.8E-02
47	acrolein	1hr	9th	1.3E-02	1.3E-02	1.3E-02
48	acrolein	1hr	9th	3.2E-02	3.2E-02	3.2E-02
49	acrolein	1hr	9th	2.3E-02	2.3E-02	2.3E-02
50	acrolein	1hr	9th	1.2E-02	1.2E-02	1.2E-02
51	acrolein	1hr	9th	9.7E-03	9.8E-03	1.1E-02
52	acrolein	1hr	9th	9.9E-03	9.9E-03	1.7E-02
53	acrolein	1hr	9th	8.7E-03	8.8E-03	1.1E-02
54	acrolein	1hr	9th	6.9E-03	7.0E-03	7.9E-03
55	acrolein	1hr	9th	8.0E-03	8.0E-03	9.5E-03
56	acrolein	1hr	9th	7.4E-03	7.8E-03	8.6E-03
57	acrolein	1hr	9th	7.8E-03	7.8E-03	8.1E-03
58	acrolein	1hr	9th	5.6E-03	5.9E-03	7.3E-03
59	acrolein	1hr	9th	1.2E-02	1.2E-02	1.4E-02
60	acrolein	1hr	9th	1.5E-02	1.5E-02	1.6E-02
61	acrolein	1hr	9th	1.9E-02	1.9E-02	2.0E-02
62	acrolein	1hr	9th	1.6E-02	1.6E-02	1.7E-02
63	acrolein	1hr	9th	1.3E-02	1.3E-02	1.4E-02
64	acrolein	1hr	9th	1.3E-02	1.3E-02	1.4E-02
65	acrolein	1hr	9th	3.9E-02	3.9E-02	4.1E-02
66	acrolein	1hr	9th	1.1E-02	1.1E-02	1.1E-02
67	acrolein	1hr	9th	7.8E-03	7.9E-03	8.5E-03
68	acrolein	1hr	9th	1.4E-02	1.4E-02	1.4E-02
69	acrolein	1hr	9th	1.2E-02	1.2E-02	1.2E-02
70	acrolein	1hr	9th	7.7E-03	7.7E-03	8.0E-03
71	acrolein	1hr	9th	2.4E-02	2.4E-02	3.1E-02
72	acrolein	1hr	9th	2.8E-02	2.8E-02	3.0E-02
73	acrolein	1hr	9th	7.8E-02	7.8E-02	7.8E-02
74	acrolein	1hr	9th	1.3E-02	1.3E-02	1.8E-02
75	acrolein	1hr	9th	9.7E-01	9.7E-01	9.7E-01
76	acrolein	1hr	9th	1.8E-02	1.8E-02	1.9E-02
77	acrolein	1hr	9th	1.2E-02	1.2E-02	2.3E-02
78	acrolein	1hr	9th	1.2E-02	1.2E-02	1.3E-02
79	acrolein	1hr	9th	3.5E-02	3.5E-02	3.6E-02
1	acrolein	24hr	max	3.9E-03	3.9E-03	4.4E-03
2	acrolein	24hr	max	3.8E-03	3.8E-03	3.9E-03
3	acrolein	24hr	max	3.9E-03	3.9E-03	4.0E-03
4	acrolein	24hr	max	5.2E-03	5.2E-03	5.2E-03
5	acrolein	24hr	max	4.6E-03	4.6E-03	4.6E-03
6	acrolein	24hr	max	4.6E-03	4.6E-03	4.6E-03
7	acrolein	24hr	max	4.2E-03	4.2E-03	4.8E-03
8	acrolein	24hr	max	4.3E-03	4.3E-03	4.6E-03
9	acrolein	24hr	max	5.8E-03	5.8E-03	5.8E-03
10	acrolein	24hr	max	5.9E-03	6.0E-03	7.0E-03
11	acrolein	24hr	max	7.6E-03	7.6E-03	8.6E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
12	acrolein	24hr	max	6.7E-03	6.7E-03	7.0E-03
13	acrolein	24hr	max	5.5E-03	5.6E-03	5.8E-03
14	acrolein	24hr	max	5.6E-03	5.9E-03	6.6E-03
15	acrolein	24hr	max	8.4E-03	8.4E-03	8.6E-03
16	acrolein	24hr	max	6.3E-03	6.3E-03	6.5E-03
17	acrolein	24hr	max	6.1E-03	6.1E-03	6.2E-03
18	acrolein	24hr	max	7.3E-03	7.5E-03	8.2E-03
19	acrolein	24hr	max	6.7E-03	6.7E-03	6.7E-03
20	acrolein	24hr	max	5.5E-03	5.5E-03	5.7E-03
21	acrolein	24hr	max	2.0E-02	2.0E-02	2.1E-02
22	acrolein	24hr	max	2.0E-02	2.0E-02	2.1E-02
23	acrolein	24hr	max	7.3E-03	7.4E-03	8.2E-03
24	acrolein	24hr	max	4.0E-03	4.6E-03	5.7E-03
25	acrolein	24hr	max	7.8E-03	9.6E-03	9.7E-03
26	acrolein	24hr	max	4.5E-03	5.3E-03	6.4E-03
27	acrolein	24hr	max	4.6E-03	1.0E-02	1.0E-02
28	acrolein	24hr	max	5.1E-03	5.1E-03	5.5E-03
29	acrolein	24hr	max	5.9E-03	5.9E-03	6.0E-03
30	acrolein	24hr	max	4.5E-03	4.5E-03	6.4E-03
31	acrolein	24hr	max	4.4E-03	4.4E-03	6.5E-03
32	acrolein	24hr	max	1.0E-02	1.0E-02	1.0E-02
33	acrolein	24hr	max	3.3E-03	3.4E-03	4.5E-03
34	acrolein	24hr	max	3.0E-03	3.2E-03	4.0E-03
35	acrolein	24hr	max	3.2E-03	3.5E-03	4.4E-03
36	acrolein	24hr	max	3.4E-03	3.8E-03	4.7E-03
37	acrolein	24hr	max	3.4E-03	3.9E-03	4.9E-03
38	acrolein	24hr	max	4.9E-03	4.9E-03	5.6E-03
39	acrolein	24hr	max	6.5E-03	6.5E-03	6.6E-03
40	acrolein	24hr	max	5.4E-03	5.4E-03	5.8E-03
41	acrolein	24hr	max	3.4E-03	3.6E-03	4.7E-03
42	acrolein	24hr	max	4.7E-03	5.2E-03	6.1E-03
43	acrolein	24hr	max	1.2E-02	1.2E-02	1.2E-02
44	acrolein	24hr	max	1.2E-02	1.2E-02	1.4E-02
45	acrolein	24hr	max	5.4E-03	5.4E-03	6.4E-03
46	acrolein	24hr	max	5.7E-03	5.7E-03	6.8E-03
47	acrolein	24hr	max	5.3E-03	5.3E-03	5.8E-03
48	acrolein	24hr	max	1.3E-02	1.3E-02	1.5E-02
49	acrolein	24hr	max	7.2E-03	7.2E-03	8.3E-03
50	acrolein	24hr	max	5.1E-03	5.5E-03	6.7E-03
51	acrolein	24hr	max	4.6E-03	4.7E-03	5.5E-03
52	acrolein	24hr	max	5.0E-03	5.0E-03	8.6E-03
53	acrolein	24hr	max	4.5E-03	4.5E-03	6.9E-03
54	acrolein	24hr	max	4.1E-03	4.6E-03	5.4E-03
55	acrolein	24hr	max	3.7E-03	4.4E-03	5.4E-03
56	acrolein	24hr	max	3.9E-03	4.6E-03	5.8E-03
57	acrolein	24hr	max	3.6E-03	4.1E-03	5.0E-03
58	acrolein	24hr	max	3.4E-03	4.0E-03	4.9E-03
59	acrolein	24hr	max	6.2E-03	6.2E-03	7.0E-03
60	acrolein	24hr	max	5.9E-03	5.9E-03	7.9E-03
61	acrolein	24hr	max	8.1E-03	8.1E-03	8.9E-03
62	acrolein	24hr	max	7.1E-03	7.1E-03	7.9E-03
63	acrolein	24hr	max	6.5E-03	6.5E-03	7.2E-03
64	acrolein	24hr	max	6.4E-03	6.4E-03	7.2E-03
65	acrolein	24hr	max	1.5E-02	1.5E-02	1.6E-02
66	acrolein	24hr	max	5.5E-03	5.5E-03	5.7E-03
67	acrolein	24hr	max	4.2E-03	4.2E-03	4.5E-03
68	acrolein	24hr	max	6.0E-03	6.0E-03	6.0E-03
69	acrolein	24hr	max	6.0E-03	6.0E-03	6.0E-03
70	acrolein	24hr	max	3.0E-03	3.2E-03	3.9E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
71	acrolein	24hr	max	6.4E-03	6.4E-03	8.3E-03
72	acrolein	24hr	max	7.3E-03	7.3E-03	8.1E-03
73	acrolein	24hr	max	3.4E-02	3.4E-02	3.4E-02
74	acrolein	24hr	max	5.9E-03	5.9E-03	8.8E-03
75	acrolein	24hr	max	3.4E-01	3.4E-01	3.4E-01
76	acrolein	24hr	max	7.9E-03	8.0E-03	8.8E-03
77	acrolein	24hr	max	5.7E-03	5.7E-03	6.8E-03
78	acrolein	24hr	max	6.3E-03	6.3E-03	6.8E-03
79	acrolein	24hr	max	8.8E-03	8.9E-03	9.5E-03
1	acrolein	annual	average	5.6E-04	5.7E-04	6.0E-04
2	acrolein	annual	average	5.6E-04	5.9E-04	6.4E-04
3	acrolein	annual	average	5.7E-04	6.0E-04	6.6E-04
4	acrolein	annual	average	6.0E-04	6.4E-04	7.1E-04
5	acrolein	annual	average	6.4E-04	7.0E-04	7.7E-04
6	acrolein	annual	average	6.5E-04	7.1E-04	7.9E-04
7	acrolein	annual	average	5.9E-04	6.5E-04	7.3E-04
8	acrolein	annual	average	6.4E-04	7.1E-04	7.9E-04
9	acrolein	annual	average	7.3E-04	7.7E-04	8.4E-04
10	acrolein	annual	average	1.0E-03	1.1E-03	1.2E-03
11	acrolein	annual	average	1.4E-03	1.4E-03	1.6E-03
12	acrolein	annual	average	1.2E-03	1.3E-03	1.4E-03
13	acrolein	annual	average	1.1E-03	1.2E-03	1.3E-03
14	acrolein	annual	average	1.2E-03	1.3E-03	1.4E-03
15	acrolein	annual	average	7.3E-04	8.8E-04	9.7E-04
16	acrolein	annual	average	7.1E-04	8.6E-04	9.6E-04
17	acrolein	annual	average	8.2E-04	9.7E-04	1.1E-03
18	acrolein	annual	average	1.0E-03	1.2E-03	1.3E-03
19	acrolein	annual	average	8.9E-04	1.1E-03	1.2E-03
20	acrolein	annual	average	8.9E-04	1.1E-03	1.2E-03
21	acrolein	annual	average	2.5E-03	2.6E-03	2.7E-03
22	acrolein	annual	average	1.5E-03	1.6E-03	1.7E-03
23	acrolein	annual	average	8.2E-04	9.0E-04	1.0E-03
24	acrolein	annual	average	5.4E-04	5.9E-04	6.6E-04
25	acrolein	annual	average	6.6E-04	1.0E-03	1.1E-03
26	acrolein	annual	average	7.0E-04	9.7E-04	1.1E-03
27	acrolein	annual	average	1.2E-03	1.6E-03	1.8E-03
28	acrolein	annual	average	8.7E-04	1.0E-03	1.1E-03
29	acrolein	annual	average	9.0E-04	1.0E-03	1.2E-03
30	acrolein	annual	average	5.6E-04	6.5E-04	7.6E-04
31	acrolein	annual	average	6.5E-04	7.5E-04	8.6E-04
32	acrolein	annual	average	4.3E-04	4.6E-04	5.0E-04
33	acrolein	annual	average	4.6E-04	5.0E-04	5.5E-04
34	acrolein	annual	average	3.7E-04	4.0E-04	4.5E-04
35	acrolein	annual	average	6.1E-04	6.5E-04	7.0E-04
36	acrolein	annual	average	6.5E-04	6.9E-04	7.4E-04
37	acrolein	annual	average	6.1E-04	6.5E-04	7.1E-04
38	acrolein	annual	average	9.2E-04	1.0E-03	1.2E-03
39	acrolein	annual	average	9.4E-04	1.1E-03	1.3E-03
40	acrolein	annual	average	9.0E-04	1.0E-03	1.2E-03
41	acrolein	annual	average	7.5E-04	8.7E-04	1.1E-03
42	acrolein	annual	average	1.1E-03	1.2E-03	1.4E-03
43	acrolein	annual	average	1.7E-03	1.8E-03	2.0E-03
44	acrolein	annual	average	2.2E-03	2.2E-03	2.5E-03
45	acrolein	annual	average	1.0E-03	1.1E-03	1.4E-03
46	acrolein	annual	average	1.1E-03	1.2E-03	1.5E-03
47	acrolein	annual	average	9.9E-04	1.1E-03	1.3E-03
48	acrolein	annual	average	1.8E-03	1.8E-03	2.1E-03
49	acrolein	annual	average	1.3E-03	1.4E-03	1.6E-03
50	acrolein	annual	average	1.2E-03	1.3E-03	1.6E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
51	acrolein	annual	average	1.0E-03	1.1E-03	1.3E-03
52	acrolein	annual	average	9.1E-04	9.7E-04	1.7E-03
53	acrolein	annual	average	7.8E-04	8.5E-04	1.3E-03
54	acrolein	annual	average	4.8E-04	5.0E-04	5.5E-04
55	acrolein	annual	average	5.0E-04	5.4E-04	5.9E-04
56	acrolein	annual	average	5.1E-04	5.5E-04	6.2E-04
57	acrolein	annual	average	5.7E-04	6.0E-04	6.7E-04
58	acrolein	annual	average	4.4E-04	4.6E-04	5.0E-04
59	acrolein	annual	average	9.8E-04	1.0E-03	1.6E-03
60	acrolein	annual	average	9.7E-04	1.0E-03	1.5E-03
61	acrolein	annual	average	1.2E-03	1.3E-03	1.6E-03
62	acrolein	annual	average	1.1E-03	1.1E-03	1.5E-03
63	acrolein	annual	average	1.0E-03	1.1E-03	1.6E-03
64	acrolein	annual	average	1.0E-03	1.0E-03	1.5E-03
65	acrolein	annual	average	2.4E-03	2.5E-03	2.8E-03
66	acrolein	annual	average	9.1E-04	9.5E-04	1.0E-03
67	acrolein	annual	average	8.5E-04	9.0E-04	1.0E-03
68	acrolein	annual	average	8.3E-04	8.6E-04	9.5E-04
69	acrolein	annual	average	7.4E-04	7.7E-04	8.5E-04
70	acrolein	annual	average	5.9E-04	6.2E-04	7.0E-04
71	acrolein	annual	average	1.1E-03	1.1E-03	1.4E-03
72	acrolein	annual	average	1.2E-03	1.3E-03	1.5E-03
73	acrolein	annual	average	6.1E-03	6.1E-03	6.5E-03
74	acrolein	annual	average	1.0E-03	1.1E-03	1.9E-03
75	acrolein	annual	average	5.3E-02	5.3E-02	5.3E-02
76	acrolein	annual	average	1.2E-03	1.2E-03	1.6E-03
77	acrolein	annual	average	9.6E-04	1.0E-03	1.6E-03
78	acrolein	annual	average	9.5E-04	1.1E-03	1.2E-03
79	acrolein	annual	average	1.6E-03	1.7E-03	1.8E-03
1	anthracene	1hr	max	3.6E-05	3.6E-05	6.4E-05
2	anthracene	1hr	max	4.0E-05	4.0E-05	5.8E-05
3	anthracene	1hr	max	4.3E-05	4.3E-05	6.0E-05
4	anthracene	1hr	max	3.5E-05	3.5E-05	6.0E-05
5	anthracene	1hr	max	3.3E-05	3.3E-05	6.6E-05
6	anthracene	1hr	max	3.4E-05	3.4E-05	6.7E-05
7	anthracene	1hr	max	3.5E-05	3.5E-05	6.2E-05
8	anthracene	1hr	max	3.8E-05	3.8E-05	6.5E-05
9	anthracene	1hr	max	3.8E-05	3.8E-05	7.9E-05
10	anthracene	1hr	max	6.1E-05	6.1E-05	8.9E-05
11	anthracene	1hr	max	9.6E-05	9.6E-05	1.1E-04
12	anthracene	1hr	max	8.2E-05	8.2E-05	1.2E-04
13	anthracene	1hr	max	7.9E-05	7.9E-05	1.1E-04
14	anthracene	1hr	max	3.5E-04	3.5E-04	3.5E-04
15	anthracene	1hr	max	5.2E-05	5.3E-05	1.1E-04
16	anthracene	1hr	max	5.0E-05	5.0E-05	1.1E-04
17	anthracene	1hr	max	6.4E-05	6.4E-05	8.1E-05
18	anthracene	1hr	max	7.3E-05	7.3E-05	8.6E-05
19	anthracene	1hr	max	7.2E-05	7.2E-05	8.7E-05
20	anthracene	1hr	max	9.4E-05	9.4E-05	1.2E-04
21	anthracene	1hr	max	1.2E-04	1.2E-04	1.8E-04
22	anthracene	1hr	max	1.2E-04	1.2E-04	1.8E-04
23	anthracene	1hr	max	1.2E-04	1.2E-04	1.5E-04
24	anthracene	1hr	max	3.7E-05	3.7E-05	6.2E-05
25	anthracene	1hr	max	7.8E-05	7.8E-05	1.0E-04
26	anthracene	1hr	max	6.7E-05	6.7E-05	1.1E-04
27	anthracene	1hr	max	4.9E-05	4.9E-05	2.2E-04
28	anthracene	1hr	max	1.3E-04	1.3E-04	1.8E-04
29	anthracene	1hr	max	1.3E-04	1.3E-04	1.8E-04
30	anthracene	1hr	max	9.8E-05	9.8E-05	1.4E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
31	anthracene	1hr	max	1.1E-04	1.1E-04	1.5E-04
32	anthracene	1hr	max	9.1E-05	9.1E-05	9.1E-05
33	anthracene	1hr	max	4.0E-05	4.0E-05	6.4E-05
34	anthracene	1hr	max	4.5E-05	4.5E-05	6.8E-05
35	anthracene	1hr	max	3.9E-05	3.9E-05	6.1E-05
36	anthracene	1hr	max	4.4E-05	4.4E-05	6.7E-05
37	anthracene	1hr	max	4.7E-05	4.7E-05	7.0E-05
38	anthracene	1hr	max	1.5E-04	1.5E-04	1.8E-04
39	anthracene	1hr	max	1.4E-04	1.4E-04	1.9E-04
40	anthracene	1hr	max	1.2E-04	1.2E-04	1.7E-04
41	anthracene	1hr	max	8.2E-05	8.2E-05	1.3E-04
42	anthracene	1hr	max	1.1E-04	1.1E-04	1.7E-04
43	anthracene	1hr	max	1.0E-04	1.0E-04	1.7E-04
44	anthracene	1hr	max	1.0E-04	1.0E-04	1.5E-04
45	anthracene	1hr	max	8.8E-05	8.8E-05	1.4E-04
46	anthracene	1hr	max	8.9E-05	8.9E-05	1.3E-04
47	anthracene	1hr	max	7.4E-05	7.4E-05	1.2E-04
48	anthracene	1hr	max	8.8E-05	8.8E-05	1.3E-04
49	anthracene	1hr	max	8.4E-05	8.4E-05	1.2E-04
50	anthracene	1hr	max	8.2E-05	8.2E-05	1.2E-04
51	anthracene	1hr	max	8.4E-05	8.4E-05	1.2E-04
52	anthracene	1hr	max	8.0E-05	8.0E-05	8.4E-04
53	anthracene	1hr	max	8.6E-05	8.6E-05	3.8E-04
54	anthracene	1hr	max	2.7E-05	2.7E-05	4.0E-05
55	anthracene	1hr	max	4.1E-05	4.1E-05	6.5E-05
56	anthracene	1hr	max	3.9E-05	3.9E-05	8.4E-05
57	anthracene	1hr	max	4.6E-05	4.6E-05	5.2E-05
58	anthracene	1hr	max	2.5E-05	2.5E-05	5.3E-05
59	anthracene	1hr	max	9.7E-05	9.7E-05	5.4E-04
60	anthracene	1hr	max	2.0E-04	2.0E-04	2.9E-04
61	anthracene	1hr	max	2.2E-04	2.2E-04	3.1E-04
62	anthracene	1hr	max	1.9E-04	1.9E-04	2.8E-04
63	anthracene	1hr	max	1.5E-04	1.5E-04	4.4E-04
64	anthracene	1hr	max	1.6E-04	1.6E-04	2.9E-04
65	anthracene	1hr	max	1.6E-04	1.6E-04	3.0E-04
66	anthracene	1hr	max	5.6E-05	5.6E-05	8.5E-05
67	anthracene	1hr	max	7.5E-05	7.5E-05	1.1E-04
68	anthracene	1hr	max	5.6E-05	5.6E-05	9.4E-05
69	anthracene	1hr	max	6.0E-05	6.0E-05	9.2E-05
70	anthracene	1hr	max	5.6E-05	5.6E-05	8.2E-05
71	anthracene	1hr	max	8.5E-05	8.5E-05	1.4E-04
72	anthracene	1hr	max	8.6E-05	8.6E-05	1.5E-04
73	anthracene	1hr	max	1.6E-04	1.6E-04	3.0E-04
74	anthracene	1hr	max	1.1E-04	1.1E-04	1.2E-03
75	anthracene	1hr	max	4.2E-04	4.2E-04	4.8E-04
76	anthracene	1hr	max	2.2E-04	2.2E-04	3.1E-04
77	anthracene	1hr	max	9.9E-05	9.9E-05	4.1E-03
78	anthracene	1hr	max	1.2E-04	1.2E-04	1.6E-04
79	anthracene	1hr	max	1.3E-04	1.3E-04	1.9E-04
1	anthracene	1hr	9th	2.0E-05	2.0E-05	3.3E-05
2	anthracene	1hr	9th	2.1E-05	2.1E-05	4.1E-05
3	anthracene	1hr	9th	2.2E-05	2.2E-05	4.2E-05
4	anthracene	1hr	9th	2.1E-05	2.1E-05	4.4E-05
5	anthracene	1hr	9th	2.3E-05	2.3E-05	4.9E-05
6	anthracene	1hr	9th	2.5E-05	2.5E-05	4.8E-05
7	anthracene	1hr	9th	2.0E-05	2.0E-05	4.0E-05
8	anthracene	1hr	9th	2.3E-05	2.3E-05	4.7E-05
9	anthracene	1hr	9th	2.1E-05	2.1E-05	4.4E-05
10	anthracene	1hr	9th	3.4E-05	3.4E-05	5.6E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
11	anthracene	1hr	9th	6.8E-05	6.8E-05	8.7E-05
12	anthracene	1hr	9th	3.6E-05	3.6E-05	6.4E-05
13	anthracene	1hr	9th	4.2E-05	4.2E-05	6.1E-05
14	anthracene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	anthracene	1hr	9th	3.0E-05	3.0E-05	4.9E-05
16	anthracene	1hr	9th	2.9E-05	2.9E-05	4.8E-05
17	anthracene	1hr	9th	3.0E-05	3.0E-05	4.7E-05
18	anthracene	1hr	9th	3.0E-05	3.0E-05	4.7E-05
19	anthracene	1hr	9th	2.8E-05	2.8E-05	4.6E-05
20	anthracene	1hr	9th	2.7E-05	2.7E-05	5.5E-05
21	anthracene	1hr	9th	5.4E-05	5.4E-05	8.1E-05
22	anthracene	1hr	9th	4.1E-05	4.1E-05	7.2E-05
23	anthracene	1hr	9th	3.1E-05	3.1E-05	6.6E-05
24	anthracene	1hr	9th	1.9E-05	1.9E-05	4.2E-05
25	anthracene	1hr	9th	3.8E-05	3.8E-05	8.2E-05
26	anthracene	1hr	9th	3.7E-05	3.7E-05	9.1E-05
27	anthracene	1hr	9th	3.3E-05	3.3E-05	1.6E-04
28	anthracene	1hr	9th	3.3E-05	3.3E-05	7.0E-05
29	anthracene	1hr	9th	3.5E-05	3.5E-05	7.4E-05
30	anthracene	1hr	9th	4.2E-05	4.2E-05	6.9E-05
31	anthracene	1hr	9th	4.3E-05	4.3E-05	7.3E-05
32	anthracene	1hr	9th	2.1E-05	2.1E-05	3.3E-05
33	anthracene	1hr	9th	2.6E-05	2.6E-05	4.4E-05
34	anthracene	1hr	9th	2.6E-05	2.6E-05	3.7E-05
35	anthracene	1hr	9th	2.3E-05	2.3E-05	4.4E-05
36	anthracene	1hr	9th	2.2E-05	2.3E-05	4.8E-05
37	anthracene	1hr	9th	2.2E-05	2.2E-05	4.7E-05
38	anthracene	1hr	9th	3.7E-05	3.7E-05	8.7E-05
39	anthracene	1hr	9th	3.5E-05	3.5E-05	8.6E-05
40	anthracene	1hr	9th	3.4E-05	3.4E-05	9.7E-05
41	anthracene	1hr	9th	3.5E-05	3.5E-05	1.1E-04
42	anthracene	1hr	9th	3.4E-05	3.4E-05	8.7E-05
43	anthracene	1hr	9th	3.1E-05	3.1E-05	8.5E-05
44	anthracene	1hr	9th	3.1E-05	3.1E-05	8.6E-05
45	anthracene	1hr	9th	3.1E-05	3.1E-05	8.8E-05
46	anthracene	1hr	9th	3.2E-05	3.2E-05	8.8E-05
47	anthracene	1hr	9th	3.2E-05	3.2E-05	8.7E-05
48	anthracene	1hr	9th	3.3E-05	3.3E-05	8.5E-05
49	anthracene	1hr	9th	3.3E-05	3.3E-05	8.6E-05
50	anthracene	1hr	9th	3.5E-05	3.5E-05	8.9E-05
51	anthracene	1hr	9th	3.5E-05	3.5E-05	8.6E-05
52	anthracene	1hr	9th	5.2E-05	5.2E-05	4.0E-04
53	anthracene	1hr	9th	4.3E-05	4.3E-05	1.9E-04
54	anthracene	1hr	9th	1.8E-05	1.8E-05	3.4E-05
55	anthracene	1hr	9th	1.9E-05	1.9E-05	3.9E-05
56	anthracene	1hr	9th	1.9E-05	1.9E-05	4.2E-05
57	anthracene	1hr	9th	1.9E-05	1.9E-05	3.7E-05
58	anthracene	1hr	9th	1.8E-05	1.8E-05	3.1E-05
59	anthracene	1hr	9th	6.3E-05	6.3E-05	2.2E-04
60	anthracene	1hr	9th	9.7E-05	9.7E-05	1.8E-04
61	anthracene	1hr	9th	1.1E-04	1.1E-04	1.5E-04
62	anthracene	1hr	9th	9.1E-05	9.1E-05	1.8E-04
63	anthracene	1hr	9th	8.4E-05	8.4E-05	2.7E-04
64	anthracene	1hr	9th	8.7E-05	8.7E-05	2.5E-04
65	anthracene	1hr	9th	9.7E-05	9.7E-05	1.8E-04
66	anthracene	1hr	9th	3.0E-05	3.0E-05	5.2E-05
67	anthracene	1hr	9th	3.1E-05	3.1E-05	5.5E-05
68	anthracene	1hr	9th	2.3E-05	2.3E-05	4.6E-05
69	anthracene	1hr	9th	2.2E-05	2.2E-05	4.3E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
70	anthracene	1hr	9th	1.9E-05	1.9E-05	4.2E-05
71	anthracene	1hr	9th	5.6E-05	5.6E-05	9.5E-05
72	anthracene	1hr	9th	5.9E-05	5.9E-05	9.6E-05
73	anthracene	1hr	9th	9.7E-05	9.7E-05	1.9E-04
74	anthracene	1hr	9th	6.3E-05	6.3E-05	4.7E-04
75	anthracene	1hr	9th	3.0E-04	3.0E-04	3.3E-04
76	anthracene	1hr	9th	1.1E-04	1.1E-04	1.6E-04
77	anthracene	1hr	9th	6.3E-05	6.3E-05	1.8E-03
78	anthracene	1hr	9th	3.5E-05	3.5E-05	8.4E-05
79	anthracene	1hr	9th	5.0E-05	5.0E-05	7.6E-05
1	anthracene	24hr	max	6.6E-06	6.6E-06	1.5E-05
2	anthracene	24hr	max	9.1E-06	9.2E-06	1.6E-05
3	anthracene	24hr	max	9.2E-06	9.2E-06	1.7E-05
4	anthracene	24hr	max	9.2E-06	9.2E-06	1.7E-05
5	anthracene	24hr	max	9.5E-06	9.5E-06	2.1E-05
6	anthracene	24hr	max	9.5E-06	9.6E-06	2.2E-05
7	anthracene	24hr	max	8.8E-06	8.8E-06	1.8E-05
8	anthracene	24hr	max	9.5E-06	9.5E-06	2.2E-05
9	anthracene	24hr	max	1.1E-05	1.1E-05	1.8E-05
10	anthracene	24hr	max	1.4E-05	1.4E-05	2.9E-05
11	anthracene	24hr	max	2.7E-05	2.7E-05	3.7E-05
12	anthracene	24hr	max	1.5E-05	1.5E-05	3.1E-05
13	anthracene	24hr	max	1.8E-05	1.8E-05	2.9E-05
14	anthracene	24hr	max	3.7E-05	3.7E-05	3.7E-05
15	anthracene	24hr	max	1.3E-05	1.3E-05	2.3E-05
16	anthracene	24hr	max	1.1E-05	1.1E-05	2.3E-05
17	anthracene	24hr	max	1.2E-05	1.2E-05	2.3E-05
18	anthracene	24hr	max	1.2E-05	1.2E-05	2.1E-05
19	anthracene	24hr	max	1.1E-05	1.1E-05	2.1E-05
20	anthracene	24hr	max	1.0E-05	1.0E-05	2.2E-05
21	anthracene	24hr	max	1.7E-05	1.7E-05	2.8E-05
22	anthracene	24hr	max	2.0E-05	2.0E-05	2.7E-05
23	anthracene	24hr	max	1.4E-05	1.4E-05	3.0E-05
24	anthracene	24hr	max	8.1E-06	8.1E-06	2.3E-05
25	anthracene	24hr	max	1.4E-05	1.4E-05	3.2E-05
26	anthracene	24hr	max	1.2E-05	1.2E-05	3.2E-05
27	anthracene	24hr	max	1.3E-05	1.3E-05	4.8E-05
28	anthracene	24hr	max	1.3E-05	1.3E-05	3.5E-05
29	anthracene	24hr	max	1.3E-05	1.3E-05	3.6E-05
30	anthracene	24hr	max	1.9E-05	1.9E-05	3.5E-05
31	anthracene	24hr	max	2.0E-05	2.0E-05	3.7E-05
32	anthracene	24hr	max	8.8E-06	8.8E-06	1.5E-05
33	anthracene	24hr	max	1.0E-05	1.0E-05	1.7E-05
34	anthracene	24hr	max	9.7E-06	9.7E-06	1.6E-05
35	anthracene	24hr	max	8.3E-06	8.3E-06	1.6E-05
36	anthracene	24hr	max	8.2E-06	8.2E-06	1.8E-05
37	anthracene	24hr	max	7.9E-06	8.0E-06	2.0E-05
38	anthracene	24hr	max	1.6E-05	1.6E-05	3.5E-05
39	anthracene	24hr	max	1.6E-05	1.6E-05	3.8E-05
40	anthracene	24hr	max	1.7E-05	1.7E-05	4.4E-05
41	anthracene	24hr	max	1.8E-05	1.8E-05	5.0E-05
42	anthracene	24hr	max	1.6E-05	1.6E-05	5.0E-05
43	anthracene	24hr	max	1.7E-05	1.7E-05	5.3E-05
44	anthracene	24hr	max	1.7E-05	1.7E-05	5.2E-05
45	anthracene	24hr	max	1.8E-05	1.8E-05	5.3E-05
46	anthracene	24hr	max	1.9E-05	1.9E-05	5.3E-05
47	anthracene	24hr	max	1.9E-05	1.9E-05	4.8E-05
48	anthracene	24hr	max	1.8E-05	1.8E-05	5.0E-05
49	anthracene	24hr	max	1.8E-05	1.8E-05	5.0E-05

Table 4E-1 Volatile Organic Compounds						
ReceptorID	**Chemical**	**Period**	**Stat**	**Baseline**	**Application**	**CEA**
50	anthracene	24hr	max	1.7E-05	1.7E-05	4.5E-05
51	anthracene	24hr	max	1.6E-05	1.6E-05	4.7E-05
52	anthracene	24hr	max	2.2E-05	2.2E-05	1.7E-04
53	anthracene	24hr	max	2.2E-05	2.2E-05	9.3E-05
54	anthracene	24hr	max	7.8E-06	7.8E-06	1.7E-05
55	anthracene	24hr	max	7.4E-06	7.4E-06	2.2E-05
56	anthracene	24hr	max	7.4E-06	7.5E-06	2.5E-05
57	anthracene	24hr	max	8.1E-06	8.1E-06	1.8E-05
58	anthracene	24hr	max	6.8E-06	6.8E-06	1.9E-05
59	anthracene	24hr	max	2.6E-05	2.6E-05	8.7E-05
60	anthracene	24hr	max	3.7E-05	3.7E-05	5.5E-05
61	anthracene	24hr	max	4.1E-05	4.1E-05	6.4E-05
62	anthracene	24hr	max	3.7E-05	3.7E-05	7.0E-05
63	anthracene	24hr	max	3.1E-05	3.1E-05	1.1E-04
64	anthracene	24hr	max	3.2E-05	3.2E-05	9.9E-05
65	anthracene	24hr	max	4.1E-05	4.1E-05	6.2E-05
66	anthracene	24hr	max	1.8E-05	1.8E-05	2.8E-05
67	anthracene	24hr	max	1.3E-05	1.3E-05	2.8E-05
68	anthracene	24hr	max	1.3E-05	1.3E-05	2.7E-05
69	anthracene	24hr	max	8.9E-06	8.9E-06	2.4E-05
70	anthracene	24hr	max	7.9E-06	7.9E-06	1.9E-05
71	anthracene	24hr	max	2.6E-05	2.6E-05	5.2E-05
72	anthracene	24hr	max	2.5E-05	2.5E-05	5.1E-05
73	anthracene	24hr	max	4.1E-05	4.1E-05	6.2E-05
74	anthracene	24hr	max	2.6E-05	2.6E-05	1.4E-04
75	anthracene	24hr	max	1.3E-04	1.3E-04	1.5E-04
76	anthracene	24hr	max	4.0E-05	4.0E-05	6.4E-05
77	anthracene	24hr	max	2.8E-05	2.8E-05	3.3E-04
78	anthracene	24hr	max	1.6E-05	1.6E-05	4.9E-05
79	anthracene	24hr	max	1.7E-05	1.7E-05	3.3E-05
1	anthracene	annual	average	6.5E-07	6.6E-07	9.6E-07
2	anthracene	annual	average	8.9E-07	8.9E-07	1.4E-06
3	anthracene	annual	average	9.1E-07	9.2E-07	1.5E-06
4	anthracene	annual	average	9.8E-07	9.8E-07	1.6E-06
5	anthracene	annual	average	1.1E-06	1.1E-06	1.8E-06
6	anthracene	annual	average	1.1E-06	1.1E-06	1.8E-06
7	anthracene	annual	average	1.0E-06	1.0E-06	1.7E-06
8	anthracene	annual	average	1.1E-06	1.1E-06	1.9E-06
9	anthracene	annual	average	1.1E-06	1.1E-06	1.8E-06
10	anthracene	annual	average	1.7E-06	1.7E-06	2.7E-06
11	anthracene	annual	average	2.3E-06	2.3E-06	3.5E-06
12	anthracene	annual	average	2.1E-06	2.1E-06	3.3E-06
13	anthracene	annual	average	2.0E-06	2.0E-06	3.1E-06
14	anthracene	annual	average	3.0E-06	3.0E-06	4.5E-06
15	anthracene	annual	average	1.3E-06	1.3E-06	2.2E-06
16	anthracene	annual	average	1.3E-06	1.3E-06	2.2E-06
17	anthracene	annual	average	1.4E-06	1.5E-06	2.3E-06
18	anthracene	annual	average	1.7E-06	1.7E-06	2.7E-06
19	anthracene	annual	average	1.6E-06	1.6E-06	2.6E-06
20	anthracene	annual	average	1.6E-06	1.7E-06	2.8E-06
21	anthracene	annual	average	2.7E-06	2.7E-06	3.9E-06
22	anthracene	annual	average	2.2E-06	2.2E-06	3.5E-06
23	anthracene	annual	average	1.5E-06	1.5E-06	2.5E-06
24	anthracene	annual	average	9.1E-07	9.2E-07	1.5E-06
25	anthracene	annual	average	1.2E-06	1.2E-06	2.4E-06
26	anthracene	annual	average	1.3E-06	1.3E-06	2.7E-06
27	anthracene	annual	average	1.8E-06	1.9E-06	4.0E-06
28	anthracene	annual	average	1.8E-06	1.8E-06	3.2E-06
29	anthracene	annual	average	1.8E-06	1.8E-06	3.3E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
30	anthracene	annual	average	1.2E-06	1.2E-06	2.1E-06
31	anthracene	annual	average	1.3E-06	1.3E-06	2.2E-06
32	anthracene	annual	average	6.0E-07	6.0E-07	9.6E-07
33	anthracene	annual	average	7.6E-07	7.7E-07	1.3E-06
34	anthracene	annual	average	7.1E-07	7.1E-07	1.2E-06
35	anthracene	annual	average	8.8E-07	8.8E-07	1.4E-06
36	anthracene	annual	average	9.2E-07	9.2E-07	1.4E-06
37	anthracene	annual	average	8.8E-07	8.8E-07	1.4E-06
38	anthracene	annual	average	1.9E-06	1.9E-06	3.7E-06
39	anthracene	annual	average	1.9E-06	1.9E-06	3.9E-06
40	anthracene	annual	average	1.8E-06	1.9E-06	4.2E-06
41	anthracene	annual	average	1.8E-06	1.8E-06	4.5E-06
42	anthracene	annual	average	2.1E-06	2.1E-06	4.5E-06
43	anthracene	annual	average	2.2E-06	2.2E-06	4.8E-06
44	anthracene	annual	average	2.2E-06	2.2E-06	4.8E-06
45	anthracene	annual	average	2.0E-06	2.0E-06	4.9E-06
46	anthracene	annual	average	2.1E-06	2.1E-06	4.9E-06
47	anthracene	annual	average	2.0E-06	2.0E-06	5.0E-06
48	anthracene	annual	average	2.1E-06	2.1E-06	5.0E-06
49	anthracene	annual	average	2.1E-06	2.1E-06	5.0E-06
50	anthracene	annual	average	2.1E-06	2.1E-06	5.0E-06
51	anthracene	annual	average	2.1E-06	2.1E-06	4.7E-06
52	anthracene	annual	average	2.4E-06	2.4E-06	1.3E-05
53	anthracene	annual	average	2.1E-06	2.1E-06	7.8E-06
54	anthracene	annual	average	7.5E-07	7.5E-07	1.2E-06
55	anthracene	annual	average	7.9E-07	8.0E-07	1.3E-06
56	anthracene	annual	average	8.2E-07	8.3E-07	1.4E-06
57	anthracene	annual	average	8.9E-07	9.0E-07	1.4E-06
58	anthracene	annual	average	6.5E-07	6.5E-07	1.0E-06
59	anthracene	annual	average	2.8E-06	2.8E-06	1.3E-05
60	anthracene	annual	average	3.8E-06	3.8E-06	7.1E-06
61	anthracene	annual	average	4.4E-06	4.4E-06	8.3E-06
62	anthracene	annual	average	3.9E-06	3.9E-06	8.1E-06
63	anthracene	annual	average	3.5E-06	3.5E-06	8.6E-06
64	anthracene	annual	average	3.5E-06	3.5E-06	8.4E-06
65	anthracene	annual	average	4.3E-06	4.3E-06	8.3E-06
66	anthracene	annual	average	1.5E-06	1.5E-06	2.5E-06
67	anthracene	annual	average	1.7E-06	1.7E-06	2.9E-06
68	anthracene	annual	average	1.3E-06	1.3E-06	2.3E-06
69	anthracene	annual	average	1.2E-06	1.2E-06	2.2E-06
70	anthracene	annual	average	1.1E-06	1.1E-06	2.0E-06
71	anthracene	annual	average	1.8E-06	1.8E-06	3.5E-06
72	anthracene	annual	average	1.9E-06	1.9E-06	3.6E-06
73	anthracene	annual	average	4.7E-06	4.7E-06	8.9E-06
74	anthracene	annual	average	2.9E-06	2.9E-06	1.9E-05
75	anthracene	annual	average	1.8E-05	1.8E-05	2.1E-05
76	anthracene	annual	average	4.3E-06	4.3E-06	8.3E-06
77	anthracene	annual	average	3.0E-06	3.0E-06	1.4E-05
78	anthracene	annual	average	2.0E-06	2.0E-06	4.2E-06
79	anthracene	annual	average	2.1E-06	2.1E-06	3.3E-06
1	benzaldehyde	1hr	max	1.1E-02	1.2E-02	1.2E-02
2	benzaldehyde	1hr	max	6.7E-03	6.9E-03	7.7E-03
3	benzaldehyde	1hr	max	6.8E-03	7.1E-03	7.6E-03
4	benzaldehyde	1hr	max	6.9E-03	7.1E-03	8.2E-03
5	benzaldehyde	1hr	max	7.4E-03	7.5E-03	8.5E-03
6	benzaldehyde	1hr	max	7.4E-03	7.6E-03	8.5E-03
7	benzaldehyde	1hr	max	9.4E-03	1.0E-02	1.0E-02
8	benzaldehyde	1hr	max	7.4E-03	8.2E-03	8.5E-03
9	benzaldehyde	1hr	max	6.4E-03	6.4E-03	6.6E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
10	benzaldehyde	1hr	max	7.5E-03	8.4E-03	9.1E-03
11	benzaldehyde	1hr	max	1.1E-02	1.1E-02	1.2E-02
12	benzaldehyde	1hr	max	8.5E-03	8.5E-03	9.2E-03
13	benzaldehyde	1hr	max	8.0E-03	8.0E-03	8.6E-03
14	benzaldehyde	1hr	max	2.2E-02	2.2E-02	2.4E-02
15	benzaldehyde	1hr	max	8.0E-03	8.8E-03	9.0E-03
16	benzaldehyde	1hr	max	8.0E-03	8.7E-03	8.9E-03
17	benzaldehyde	1hr	max	7.7E-03	8.7E-03	8.9E-03
18	benzaldehyde	1hr	max	7.6E-03	8.6E-03	8.8E-03
19	benzaldehyde	1hr	max	7.6E-03	8.7E-03	9.0E-03
20	benzaldehyde	1hr	max	7.4E-03	7.8E-03	8.0E-03
21	benzaldehyde	1hr	max	2.1E-02	2.1E-02	2.1E-02
22	benzaldehyde	1hr	max	1.1E-02	1.1E-02	1.2E-02
23	benzaldehyde	1hr	max	8.5E-03	8.6E-03	8.9E-03
24	benzaldehyde	1hr	max	6.8E-03	7.1E-03	7.8E-03
25	benzaldehyde	1hr	max	2.1E-02	3.7E-02	3.7E-02
26	benzaldehyde	1hr	max	1.5E-02	1.5E-02	1.5E-02
27	benzaldehyde	1hr	max	1.8E-02	7.1E-02	7.1E-02
28	benzaldehyde	1hr	max	8.5E-03	8.5E-03	8.9E-03
29	benzaldehyde	1hr	max	8.6E-03	8.6E-03	9.0E-03
30	benzaldehyde	1hr	max	1.8E-02	1.8E-02	1.9E-02
31	benzaldehyde	1hr	max	1.6E-02	1.6E-02	1.7E-02
32	benzaldehyde	1hr	max	8.8E-03	8.8E-03	8.9E-03
33	benzaldehyde	1hr	max	9.8E-03	9.8E-03	1.1E-02
34	benzaldehyde	1hr	max	9.2E-03	9.2E-03	9.3E-03
35	benzaldehyde	1hr	max	1.0E-02	1.0E-02	1.1E-02
36	benzaldehyde	1hr	max	1.0E-02	1.0E-02	1.0E-02
37	benzaldehyde	1hr	max	1.0E-02	1.0E-02	1.1E-02
38	benzaldehyde	1hr	max	1.3E-02	1.3E-02	1.5E-02
39	benzaldehyde	1hr	max	9.0E-03	9.0E-03	9.3E-03
40	benzaldehyde	1hr	max	8.6E-03	8.6E-03	8.9E-03
41	benzaldehyde	1hr	max	1.0E-02	1.0E-02	1.1E-02
42	benzaldehyde	1hr	max	2.2E-02	2.2E-02	2.2E-02
43	benzaldehyde	1hr	max	3.3E-02	3.5E-02	3.5E-02
44	benzaldehyde	1hr	max	6.3E-02	6.3E-02	6.3E-02
45	benzaldehyde	1hr	max	1.7E-02	1.7E-02	1.8E-02
46	benzaldehyde	1hr	max	2.8E-02	2.8E-02	2.9E-02
47	benzaldehyde	1hr	max	2.6E-02	2.7E-02	2.7E-02
48	benzaldehyde	1hr	max	4.6E-02	4.6E-02	4.7E-02
49	benzaldehyde	1hr	max	5.5E-02	5.5E-02	5.6E-02
50	benzaldehyde	1hr	max	1.9E-02	1.9E-02	1.9E-02
51	benzaldehyde	1hr	max	2.2E-02	2.2E-02	2.3E-02
52	benzaldehyde	1hr	max	1.6E-02	1.6E-02	2.9E-02
53	benzaldehyde	1hr	max	1.3E-02	1.3E-02	1.5E-02
54	benzaldehyde	1hr	max	6.0E-03	6.9E-03	7.7E-03
55	benzaldehyde	1hr	max	6.4E-03	6.7E-03	8.0E-03
56	benzaldehyde	1hr	max	6.4E-03	7.4E-03	8.6E-03
57	benzaldehyde	1hr	max	6.8E-03	7.6E-03	8.0E-03
58	benzaldehyde	1hr	max	7.2E-03	7.4E-03	8.0E-03
59	benzaldehyde	1hr	max	2.6E-02	2.6E-02	2.6E-02
60	benzaldehyde	1hr	max	2.8E-02	2.8E-02	2.9E-02
61	benzaldehyde	1hr	max	8.2E-02	8.2E-02	8.3E-02
62	benzaldehyde	1hr	max	3.3E-02	3.3E-02	3.4E-02
63	benzaldehyde	1hr	max	2.6E-02	2.6E-02	2.7E-02
64	benzaldehyde	1hr	max	2.7E-02	2.7E-02	2.7E-02
65	benzaldehyde	1hr	max	5.9E-02	5.9E-02	6.0E-02
66	benzaldehyde	1hr	max	8.3E-03	8.3E-03	8.9E-03
67	benzaldehyde	1hr	max	8.9E-03	8.9E-03	9.8E-03
68	benzaldehyde	1hr	max	8.7E-03	8.7E-03	9.1E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
69	benzaldehyde	1hr	max	8.3E-03	8.3E-03	8.8E-03
70	benzaldehyde	1hr	max	7.3E-03	7.3E-03	7.8E-03
71	benzaldehyde	1hr	max	1.7E-02	1.7E-02	2.1E-02
72	benzaldehyde	1hr	max	1.7E-02	1.7E-02	2.0E-02
73	benzaldehyde	1hr	max	1.0E-01	1.0E-01	1.0E-01
74	benzaldehyde	1hr	max	1.9E-02	1.9E-02	3.6E-02
75	benzaldehyde	1hr	max	1.5E+00	1.5E+00	1.5E+00
76	benzaldehyde	1hr	max	6.3E-02	6.3E-02	6.4E-02
77	benzaldehyde	1hr	max	3.9E-02	3.9E-02	5.9E-02
78	benzaldehyde	1hr	max	1.8E-02	1.8E-02	1.9E-02
79	benzaldehyde	1hr	max	1.3E-02	1.3E-02	1.3E-02
1	benzaldehyde	1hr	9th	5.7E-03	5.7E-03	6.0E-03
2	benzaldehyde	1hr	9th	5.0E-03	5.3E-03	5.7E-03
3	benzaldehyde	1hr	9th	5.2E-03	5.3E-03	6.0E-03
4	benzaldehyde	1hr	9th	5.4E-03	5.5E-03	6.3E-03
5	benzaldehyde	1hr	9th	5.8E-03	6.2E-03	6.4E-03
6	benzaldehyde	1hr	9th	5.9E-03	6.3E-03	6.6E-03
7	benzaldehyde	1hr	9th	6.1E-03	6.8E-03	7.2E-03
8	benzaldehyde	1hr	9th	5.8E-03	6.4E-03	6.7E-03
9	benzaldehyde	1hr	9th	5.3E-03	5.4E-03	6.0E-03
10	benzaldehyde	1hr	9th	6.0E-03	6.4E-03	6.8E-03
11	benzaldehyde	1hr	9th	7.5E-03	8.1E-03	8.3E-03
12	benzaldehyde	1hr	9th	6.0E-03	6.1E-03	6.4E-03
13	benzaldehyde	1hr	9th	5.9E-03	6.0E-03	6.4E-03
14	benzaldehyde	1hr	9th	6.5E-03	6.6E-03	7.0E-03
15	benzaldehyde	1hr	9th	5.8E-03	6.5E-03	7.5E-03
16	benzaldehyde	1hr	9th	5.8E-03	6.2E-03	7.5E-03
17	benzaldehyde	1hr	9th	6.0E-03	6.7E-03	7.4E-03
18	benzaldehyde	1hr	9th	5.9E-03	6.5E-03	6.8E-03
19	benzaldehyde	1hr	9th	6.0E-03	6.6E-03	6.9E-03
20	benzaldehyde	1hr	9th	6.0E-03	6.5E-03	6.8E-03
21	benzaldehyde	1hr	9th	1.2E-02	1.3E-02	1.3E-02
22	benzaldehyde	1hr	9th	9.3E-03	9.6E-03	1.0E-02
23	benzaldehyde	1hr	9th	5.9E-03	6.1E-03	6.6E-03
24	benzaldehyde	1hr	9th	5.4E-03	6.2E-03	7.0E-03
25	benzaldehyde	1hr	9th	7.9E-03	1.9E-02	1.9E-02
26	benzaldehyde	1hr	9th	7.7E-03	8.6E-03	8.9E-03
27	benzaldehyde	1hr	9th	9.3E-03	3.0E-02	3.0E-02
28	benzaldehyde	1hr	9th	6.2E-03	6.3E-03	7.1E-03
29	benzaldehyde	1hr	9th	6.3E-03	6.4E-03	7.2E-03
30	benzaldehyde	1hr	9th	9.1E-03	9.1E-03	1.0E-02
31	benzaldehyde	1hr	9th	9.5E-03	9.6E-03	1.1E-02
32	benzaldehyde	1hr	9th	5.2E-03	5.4E-03	6.2E-03
33	benzaldehyde	1hr	9th	6.4E-03	6.5E-03	7.3E-03
34	benzaldehyde	1hr	9th	6.4E-03	6.6E-03	7.5E-03
35	benzaldehyde	1hr	9th	5.6E-03	5.8E-03	6.7E-03
36	benzaldehyde	1hr	9th	5.6E-03	6.3E-03	7.1E-03
37	benzaldehyde	1hr	9th	5.7E-03	6.7E-03	7.4E-03
38	benzaldehyde	1hr	9th	6.5E-03	6.5E-03	7.0E-03
39	benzaldehyde	1hr	9th	7.0E-03	7.0E-03	7.5E-03
40	benzaldehyde	1hr	9th	7.1E-03	7.3E-03	7.9E-03
41	benzaldehyde	1hr	9th	7.5E-03	7.6E-03	8.8E-03
42	benzaldehyde	1hr	9th	9.8E-03	9.8E-03	1.0E-02
43	benzaldehyde	1hr	9th	2.8E-02	2.8E-02	2.8E-02
44	benzaldehyde	1hr	9th	4.3E-02	4.3E-02	4.4E-02
45	benzaldehyde	1hr	9th	1.2E-02	1.2E-02	1.3E-02
46	benzaldehyde	1hr	9th	2.0E-02	2.0E-02	2.0E-02
47	benzaldehyde	1hr	9th	1.2E-02	1.3E-02	1.3E-02
48	benzaldehyde	1hr	9th	3.4E-02	3.5E-02	3.5E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
49	benzaldehyde	1hr	9th	2.7E-02	2.7E-02	2.7E-02
50	benzaldehyde	1hr	9th	1.1E-02	1.1E-02	1.2E-02
51	benzaldehyde	1hr	9th	9.4E-03	9.4E-03	1.0E-02
52	benzaldehyde	1hr	9th	1.2E-02	1.2E-02	1.9E-02
53	benzaldehyde	1hr	9th	9.8E-03	9.8E-03	1.1E-02
54	benzaldehyde	1hr	9th	4.8E-03	5.3E-03	5.8E-03
55	benzaldehyde	1hr	9th	5.3E-03	6.0E-03	6.5E-03
56	benzaldehyde	1hr	9th	5.4E-03	6.1E-03	6.7E-03
57	benzaldehyde	1hr	9th	5.1E-03	5.8E-03	6.5E-03
58	benzaldehyde	1hr	9th	5.1E-03	5.7E-03	6.5E-03
59	benzaldehyde	1hr	9th	1.4E-02	1.4E-02	1.5E-02
60	benzaldehyde	1hr	9th	1.8E-02	1.8E-02	1.9E-02
61	benzaldehyde	1hr	9th	2.4E-02	2.4E-02	2.4E-02
62	benzaldehyde	1hr	9th	1.8E-02	1.8E-02	1.8E-02
63	benzaldehyde	1hr	9th	1.5E-02	1.5E-02	1.6E-02
64	benzaldehyde	1hr	9th	1.5E-02	1.5E-02	1.6E-02
65	benzaldehyde	1hr	9th	4.6E-02	4.7E-02	4.8E-02
66	benzaldehyde	1hr	9th	5.2E-03	5.3E-03	6.0E-03
67	benzaldehyde	1hr	9th	5.7E-03	5.8E-03	6.7E-03
68	benzaldehyde	1hr	9th	5.3E-03	5.3E-03	6.0E-03
69	benzaldehyde	1hr	9th	5.2E-03	5.2E-03	5.9E-03
70	benzaldehyde	1hr	9th	5.0E-03	5.0E-03	5.4E-03
71	benzaldehyde	1hr	9th	1.2E-02	1.2E-02	1.4E-02
72	benzaldehyde	1hr	9th	1.2E-02	1.2E-02	1.4E-02
73	benzaldehyde	1hr	9th	9.5E-02	9.5E-02	9.5E-02
74	benzaldehyde	1hr	9th	1.4E-02	1.4E-02	1.8E-02
75	benzaldehyde	1hr	9th	1.2E+00	1.2E+00	1.2E+00
76	benzaldehyde	1hr	9th	2.2E-02	2.2E-02	2.3E-02
77	benzaldehyde	1hr	9th	1.5E-02	1.5E-02	2.1E-02
78	benzaldehyde	1hr	9th	7.1E-03	7.1E-03	7.7E-03
79	benzaldehyde	1hr	9th	1.0E-02	1.1E-02	1.1E-02
1	benzaldehyde	24hr	max	2.4E-03	2.8E-03	3.2E-03
2	benzaldehyde	24hr	max	2.4E-03	2.7E-03	3.2E-03
3	benzaldehyde	24hr	max	2.4E-03	2.8E-03	3.2E-03
4	benzaldehyde	24hr	max	2.5E-03	2.8E-03	3.3E-03
5	benzaldehyde	24hr	max	2.6E-03	3.0E-03	3.4E-03
6	benzaldehyde	24hr	max	2.6E-03	3.0E-03	3.4E-03
7	benzaldehyde	24hr	max	2.5E-03	3.0E-03	3.4E-03
8	benzaldehyde	24hr	max	2.6E-03	3.0E-03	3.5E-03
9	benzaldehyde	24hr	max	2.6E-03	2.7E-03	3.1E-03
10	benzaldehyde	24hr	max	2.3E-03	2.7E-03	3.2E-03
11	benzaldehyde	24hr	max	3.4E-03	4.0E-03	4.5E-03
12	benzaldehyde	24hr	max	2.6E-03	2.9E-03	3.3E-03
13	benzaldehyde	24hr	max	2.5E-03	2.7E-03	3.2E-03
14	benzaldehyde	24hr	max	3.1E-03	3.2E-03	3.5E-03
15	benzaldehyde	24hr	max	3.1E-03	3.7E-03	4.5E-03
16	benzaldehyde	24hr	max	3.1E-03	3.7E-03	4.5E-03
17	benzaldehyde	24hr	max	3.0E-03	3.5E-03	4.1E-03
18	benzaldehyde	24hr	max	3.0E-03	3.3E-03	3.9E-03
19	benzaldehyde	24hr	max	3.0E-03	3.3E-03	3.9E-03
20	benzaldehyde	24hr	max	2.9E-03	3.2E-03	3.7E-03
21	benzaldehyde	24hr	max	6.9E-03	7.3E-03	7.5E-03
22	benzaldehyde	24hr	max	3.6E-03	3.9E-03	4.2E-03
23	benzaldehyde	24hr	max	2.6E-03	2.9E-03	3.3E-03
24	benzaldehyde	24hr	max	2.9E-03	3.7E-03	4.4E-03
25	benzaldehyde	24hr	max	4.0E-03	7.0E-03	7.1E-03
26	benzaldehyde	24hr	max	3.4E-03	3.7E-03	4.2E-03
27	benzaldehyde	24hr	max	3.7E-03	1.0E-02	1.0E-02
28	benzaldehyde	24hr	max	2.6E-03	2.7E-03	3.2E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
29	benzaldehyde	24hr	max	2.5E-03	2.6E-03	3.2E-03
30	benzaldehyde	24hr	max	4.6E-03	4.6E-03	5.6E-03
31	benzaldehyde	24hr	max	4.6E-03	4.6E-03	5.6E-03
32	benzaldehyde	24hr	max	2.5E-03	2.8E-03	3.4E-03
33	benzaldehyde	24hr	max	3.1E-03	3.2E-03	3.8E-03
34	benzaldehyde	24hr	max	3.0E-03	3.1E-03	3.6E-03
35	benzaldehyde	24hr	max	2.8E-03	3.2E-03	3.6E-03
36	benzaldehyde	24hr	max	2.9E-03	3.3E-03	3.8E-03
37	benzaldehyde	24hr	max	2.9E-03	3.5E-03	4.0E-03
38	benzaldehyde	24hr	max	2.6E-03	2.8E-03	3.2E-03
39	benzaldehyde	24hr	max	2.7E-03	2.9E-03	3.4E-03
40	benzaldehyde	24hr	max	3.0E-03	3.1E-03	3.6E-03
41	benzaldehyde	24hr	max	3.2E-03	3.2E-03	3.8E-03
42	benzaldehyde	24hr	max	3.7E-03	3.7E-03	4.2E-03
43	benzaldehyde	24hr	max	1.3E-02	1.3E-02	1.3E-02
44	benzaldehyde	24hr	max	1.4E-02	1.4E-02	1.5E-02
45	benzaldehyde	24hr	max	3.7E-03	4.0E-03	4.9E-03
46	benzaldehyde	24hr	max	4.1E-03	4.2E-03	4.9E-03
47	benzaldehyde	24hr	max	3.9E-03	4.0E-03	5.1E-03
48	benzaldehyde	24hr	max	1.4E-02	1.4E-02	1.5E-02
49	benzaldehyde	24hr	max	6.6E-03	6.6E-03	7.4E-03
50	benzaldehyde	24hr	max	5.2E-03	5.3E-03	6.5E-03
51	benzaldehyde	24hr	max	4.1E-03	4.1E-03	4.9E-03
52	benzaldehyde	24hr	max	5.3E-03	5.3E-03	8.5E-03
53	benzaldehyde	24hr	max	4.6E-03	4.7E-03	6.7E-03
54	benzaldehyde	24hr	max	2.4E-03	3.0E-03	3.5E-03
55	benzaldehyde	24hr	max	2.7E-03	3.5E-03	4.2E-03
56	benzaldehyde	24hr	max	2.9E-03	3.8E-03	4.5E-03
57	benzaldehyde	24hr	max	2.6E-03	3.2E-03	3.7E-03
58	benzaldehyde	24hr	max	2.4E-03	3.0E-03	3.5E-03
59	benzaldehyde	24hr	max	6.6E-03	6.7E-03	7.1E-03
60	benzaldehyde	24hr	max	7.0E-03	7.0E-03	7.3E-03
61	benzaldehyde	24hr	max	8.9E-03	9.0E-03	9.5E-03
62	benzaldehyde	24hr	max	7.8E-03	7.9E-03	8.4E-03
63	benzaldehyde	24hr	max	7.1E-03	7.1E-03	7.6E-03
64	benzaldehyde	24hr	max	7.0E-03	7.1E-03	7.5E-03
65	benzaldehyde	24hr	max	1.9E-02	1.9E-02	1.9E-02
66	benzaldehyde	24hr	max	2.4E-03	2.6E-03	3.0E-03
67	benzaldehyde	24hr	max	2.7E-03	2.7E-03	3.2E-03
68	benzaldehyde	24hr	max	2.5E-03	2.5E-03	3.0E-03
69	benzaldehyde	24hr	max	2.3E-03	2.4E-03	2.8E-03
70	benzaldehyde	24hr	max	1.9E-03	2.2E-03	2.5E-03
71	benzaldehyde	24hr	max	5.3E-03	5.3E-03	6.2E-03
72	benzaldehyde	24hr	max	5.3E-03	5.3E-03	6.0E-03
73	benzaldehyde	24hr	max	4.1E-02	4.1E-02	4.1E-02
74	benzaldehyde	24hr	max	6.1E-03	6.2E-03	8.2E-03
75	benzaldehyde	24hr	max	4.2E-01	4.2E-01	4.2E-01
76	benzaldehyde	24hr	max	8.8E-03	8.8E-03	9.4E-03
77	benzaldehyde	24hr	max	6.2E-03	6.3E-03	6.7E-03
78	benzaldehyde	24hr	max	3.2E-03	3.2E-03	4.0E-03
79	benzaldehyde	24hr	max	4.4E-03	4.5E-03	5.1E-03
1	benzaldehyde	annual	average	2.1E-04	2.4E-04	2.5E-04
2	benzaldehyde	annual	average	2.2E-04	2.6E-04	2.9E-04
3	benzaldehyde	annual	average	2.2E-04	2.6E-04	2.9E-04
4	benzaldehyde	annual	average	2.3E-04	2.8E-04	3.2E-04
5	benzaldehyde	annual	average	2.7E-04	3.4E-04	3.9E-04
6	benzaldehyde	annual	average	2.8E-04	3.5E-04	4.0E-04
7	benzaldehyde	annual	average	2.5E-04	3.2E-04	3.6E-04
8	benzaldehyde	annual	average	2.8E-04	3.6E-04	4.0E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
9	benzaldehyde	annual	average	2.7E-04	3.2E-04	3.6E-04
10	benzaldehyde	annual	average	3.4E-04	4.0E-04	4.7E-04
11	benzaldehyde	annual	average	4.7E-04	5.5E-04	6.5E-04
12	benzaldehyde	annual	average	3.8E-04	4.5E-04	5.2E-04
13	benzaldehyde	annual	average	3.6E-04	4.2E-04	4.9E-04
14	benzaldehyde	annual	average	4.5E-04	5.6E-04	6.6E-04
15	benzaldehyde	annual	average	2.6E-04	4.5E-04	5.0E-04
16	benzaldehyde	annual	average	2.6E-04	4.4E-04	5.0E-04
17	benzaldehyde	annual	average	2.8E-04	4.6E-04	5.1E-04
18	benzaldehyde	annual	average	2.9E-04	4.8E-04	5.4E-04
19	benzaldehyde	annual	average	2.9E-04	4.9E-04	5.5E-04
20	benzaldehyde	annual	average	3.0E-04	5.2E-04	5.9E-04
21	benzaldehyde	annual	average	1.2E-03	1.3E-03	1.4E-03
22	benzaldehyde	annual	average	5.8E-04	7.0E-04	7.7E-04
23	benzaldehyde	annual	average	3.1E-04	4.1E-04	4.8E-04
24	benzaldehyde	annual	average	2.2E-04	2.8E-04	3.2E-04
25	benzaldehyde	annual	average	2.7E-04	7.0E-04	7.6E-04
26	benzaldehyde	annual	average	3.2E-04	6.4E-04	7.2E-04
27	benzaldehyde	annual	average	4.0E-04	9.6E-04	1.1E-03
28	benzaldehyde	annual	average	3.2E-04	4.9E-04	5.7E-04
29	benzaldehyde	annual	average	3.3E-04	5.0E-04	5.7E-04
30	benzaldehyde	annual	average	2.7E-04	3.8E-04	4.3E-04
31	benzaldehyde	annual	average	2.8E-04	4.0E-04	4.6E-04
32	benzaldehyde	annual	average	1.5E-04	1.9E-04	2.1E-04
33	benzaldehyde	annual	average	1.4E-04	1.8E-04	2.1E-04
34	benzaldehyde	annual	average	1.5E-04	1.8E-04	2.1E-04
35	benzaldehyde	annual	average	1.5E-04	1.9E-04	2.2E-04
36	benzaldehyde	annual	average	1.6E-04	2.1E-04	2.4E-04
37	benzaldehyde	annual	average	1.7E-04	2.1E-04	2.4E-04
38	benzaldehyde	annual	average	3.7E-04	5.0E-04	5.9E-04
39	benzaldehyde	annual	average	3.9E-04	5.5E-04	6.5E-04
40	benzaldehyde	annual	average	4.3E-04	6.0E-04	7.1E-04
41	benzaldehyde	annual	average	4.3E-04	5.8E-04	7.0E-04
42	benzaldehyde	annual	average	5.1E-04	6.4E-04	7.5E-04
43	benzaldehyde	annual	average	1.3E-03	1.4E-03	1.5E-03
44	benzaldehyde	annual	average	1.9E-03	2.0E-03	2.1E-03
45	benzaldehyde	annual	average	6.2E-04	7.3E-04	8.6E-04
46	benzaldehyde	annual	average	7.2E-04	8.3E-04	9.7E-04
47	benzaldehyde	annual	average	6.0E-04	7.1E-04	8.5E-04
48	benzaldehyde	annual	average	1.5E-03	1.6E-03	1.7E-03
49	benzaldehyde	annual	average	9.3E-04	1.0E-03	1.2E-03
50	benzaldehyde	annual	average	8.3E-04	9.5E-04	1.1E-03
51	benzaldehyde	annual	average	5.0E-04	6.2E-04	7.4E-04
52	benzaldehyde	annual	average	7.4E-04	8.2E-04	1.4E-03
53	benzaldehyde	annual	average	5.6E-04	6.5E-04	9.4E-04
54	benzaldehyde	annual	average	1.8E-04	2.1E-04	2.4E-04
55	benzaldehyde	annual	average	1.9E-04	2.3E-04	2.6E-04
56	benzaldehyde	annual	average	2.0E-04	2.5E-04	2.8E-04
57	benzaldehyde	annual	average	2.0E-04	2.5E-04	2.8E-04
58	benzaldehyde	annual	average	1.5E-04	1.8E-04	2.0E-04
59	benzaldehyde	annual	average	8.3E-04	8.9E-04	1.3E-03
60	benzaldehyde	annual	average	9.8E-04	1.0E-03	1.3E-03
61	benzaldehyde	annual	average	1.3E-03	1.3E-03	1.6E-03
62	benzaldehyde	annual	average	1.1E-03	1.2E-03	1.4E-03
63	benzaldehyde	annual	average	1.0E-03	1.1E-03	1.4E-03
64	benzaldehyde	annual	average	1.0E-03	1.1E-03	1.3E-03
65	benzaldehyde	annual	average	2.8E-03	2.8E-03	3.0E-03
66	benzaldehyde	annual	average	3.1E-04	3.5E-04	4.1E-04
67	benzaldehyde	annual	average	3.5E-04	4.1E-04	4.8E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
68	benzaldehyde	annual	average	3.1E-04	3.5E-04	4.1E-04
69	benzaldehyde	annual	average	3.1E-04	3.5E-04	4.0E-04
70	benzaldehyde	annual	average	2.8E-04	3.2E-04	3.6E-04
71	benzaldehyde	annual	average	6.0E-04	7.1E-04	8.2E-04
72	benzaldehyde	annual	average	6.0E-04	7.1E-04	8.2E-04
73	benzaldehyde	annual	average	7.2E-03	7.3E-03	7.5E-03
74	benzaldehyde	annual	average	8.3E-04	8.9E-04	1.6E-03
75	benzaldehyde	annual	average	6.4E-02	6.5E-02	6.5E-02
76	benzaldehyde	annual	average	1.3E-03	1.3E-03	1.5E-03
77	benzaldehyde	annual	average	8.6E-04	9.0E-04	1.4E-03
78	benzaldehyde	annual	average	4.3E-04	5.6E-04	6.6E-04
79	benzaldehyde	annual	average	7.8E-04	9.0E-04	9.6E-04
1	benzene	1hr	max	1.9E+00	1.9E+00	1.9E+00
2	benzene	1hr	max	2.5E+00	2.5E+00	2.7E+00
3	benzene	1hr	max	2.7E+00	2.8E+00	2.9E+00
4	benzene	1hr	max	3.2E+00	3.2E+00	3.3E+00
5	benzene	1hr	max	2.8E+00	2.8E+00	4.3E+00
6	benzene	1hr	max	2.5E+00	2.5E+00	4.9E+00
7	benzene	1hr	max	3.0E+00	3.0E+00	3.2E+00
8	benzene	1hr	max	2.6E+00	2.6E+00	5.3E+00
9	benzene	1hr	max	3.5E+00	3.5E+00	4.6E+00
10	benzene	1hr	max	2.6E+00	2.6E+00	3.6E+00
11	benzene	1hr	max	2.9E+00	2.9E+00	4.3E+00
12	benzene	1hr	max	4.1E+00	4.1E+00	6.2E+00
13	benzene	1hr	max	4.3E+00	4.3E+00	5.8E+00
14	benzene	1hr	max	3.6E+00	3.6E+00	4.8E+00
15	benzene	1hr	max	7.2E+00	7.2E+00	8.7E+00
16	benzene	1hr	max	6.5E+00	6.5E+00	7.9E+00
17	benzene	1hr	max	4.6E+00	4.6E+00	5.7E+00
18	benzene	1hr	max	5.2E+00	5.2E+00	5.2E+00
19	benzene	1hr	max	4.7E+00	4.7E+00	6.1E+00
20	benzene	1hr	max	4.1E+00	4.1E+00	4.5E+00
21	benzene	1hr	max	5.6E+00	5.6E+00	6.0E+00
22	benzene	1hr	max	5.8E+00	5.8E+00	6.4E+00
23	benzene	1hr	max	5.9E+00	5.9E+00	6.5E+00
24	benzene	1hr	max	4.6E+00	4.6E+00	4.6E+00
25	benzene	1hr	max	7.4E+00	7.4E+00	7.8E+00
26	benzene	1hr	max	6.1E+00	6.1E+00	1.1E+01
27	benzene	1hr	max	1.3E+01	1.3E+01	1.3E+01
28	benzene	1hr	max	4.7E+00	4.7E+00	5.0E+00
29	benzene	1hr	max	5.1E+00	5.1E+00	5.1E+00
30	benzene	1hr	max	5.1E+00	5.1E+00	7.2E+00
31	benzene	1hr	max	5.0E+00	5.0E+00	7.9E+00
32	benzene	1hr	max	1.5E+00	1.5E+00	2.4E+00
33	benzene	1hr	max	1.6E+00	1.6E+00	3.5E+00
34	benzene	1hr	max	1.5E+00	1.5E+00	3.8E+00
35	benzene	1hr	max	4.6E+00	4.6E+00	5.6E+00
36	benzene	1hr	max	4.7E+00	4.7E+00	5.5E+00
37	benzene	1hr	max	5.0E+00	5.0E+00	5.4E+00
38	benzene	1hr	max	7.1E+00	7.1E+00	7.1E+00
39	benzene	1hr	max	9.0E+00	9.0E+00	9.0E+00
40	benzene	1hr	max	6.7E+00	6.7E+00	8.4E+00
41	benzene	1hr	max	1.5E+01	1.5E+01	1.7E+01
42	benzene	1hr	max	8.7E+00	8.7E+00	8.7E+00
43	benzene	1hr	max	7.2E+00	7.2E+00	9.0E+00
44	benzene	1hr	max	7.3E+00	7.3E+00	7.3E+00
45	benzene	1hr	max	5.9E+00	5.9E+00	8.0E+00
46	benzene	1hr	max	5.9E+00	5.9E+00	8.0E+00
47	benzene	1hr	max	5.2E+00	5.2E+00	9.7E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
48	benzene	1hr	max	6.1E+00	6.1E+00	8.1E+00
49	benzene	1hr	max	5.8E+00	5.8E+00	7.9E+00
50	benzene	1hr	max	6.6E+00	6.6E+00	6.6E+00
51	benzene	1hr	max	8.2E+00	8.2E+00	8.2E+00
52	benzene	1hr	max	6.1E+00	6.1E+00	6.3E+00
53	benzene	1hr	max	7.5E+00	7.5E+00	1.0E+01
54	benzene	1hr	max	4.4E+00	4.4E+00	4.6E+00
55	benzene	1hr	max	4.4E+00	4.4E+00	4.4E+00
56	benzene	1hr	max	4.2E+00	4.2E+00	4.2E+00
57	benzene	1hr	max	4.5E+00	4.5E+00	4.6E+00
58	benzene	1hr	max	3.1E+00	3.1E+00	3.2E+00
59	benzene	1hr	max	8.3E+00	8.3E+00	1.1E+01
60	benzene	1hr	max	2.4E+01	2.4E+01	2.6E+01
61	benzene	1hr	max	1.3E+01	1.3E+01	1.3E+01
62	benzene	1hr	max	7.8E+00	7.8E+00	9.7E+00
63	benzene	1hr	max	8.1E+00	8.1E+00	9.7E+00
64	benzene	1hr	max	8.6E+00	8.6E+00	1.0E+01
65	benzene	1hr	max	1.2E+01	1.2E+01	1.7E+01
66	benzene	1hr	max	3.1E+00	3.1E+00	3.5E+00
67	benzene	1hr	max	3.4E+00	3.4E+00	7.0E+00
68	benzene	1hr	max	5.1E+00	5.1E+00	5.7E+00
69	benzene	1hr	max	5.4E+00	5.4E+00	6.0E+00
70	benzene	1hr	max	4.6E+00	4.6E+00	4.9E+00
71	benzene	1hr	max	5.9E+00	5.9E+00	9.4E+00
72	benzene	1hr	max	5.7E+00	5.7E+00	9.1E+00
73	benzene	1hr	max	1.2E+01	1.2E+01	1.8E+01
74	benzene	1hr	max	7.1E+00	7.1E+00	9.7E+00
75	benzene	1hr	max	4.1E+01	4.1E+01	4.3E+01
76	benzene	1hr	max	1.3E+01	1.3E+01	1.3E+01
77	benzene	1hr	max	9.7E+00	9.7E+00	9.8E+00
78	benzene	1hr	max	9.7E+00	9.7E+00	9.7E+00
79	benzene	1hr	max	4.8E+00	4.8E+00	5.2E+00
1	benzene	1hr	9th	3.5E-01	3.5E-01	4.8E-01
2	benzene	1hr	9th	5.7E-01	5.7E-01	1.0E+00
3	benzene	1hr	9th	6.1E-01	6.1E-01	1.0E+00
4	benzene	1hr	9th	7.0E-01	7.0E-01	9.5E-01
5	benzene	1hr	9th	7.4E-01	7.4E-01	1.3E+00
6	benzene	1hr	9th	1.0E+00	1.0E+00	1.3E+00
7	benzene	1hr	9th	1.3E+00	1.3E+00	1.5E+00
8	benzene	1hr	9th	9.8E-01	9.8E-01	1.5E+00
9	benzene	1hr	9th	3.4E-01	3.4E-01	8.1E-01
10	benzene	1hr	9th	4.9E-01	4.9E-01	5.3E-01
11	benzene	1hr	9th	4.1E-01	4.1E-01	5.0E-01
12	benzene	1hr	9th	5.3E-01	5.3E-01	7.7E-01
13	benzene	1hr	9th	7.6E-01	7.6E-01	7.9E-01
14	benzene	1hr	9th	8.1E-01	8.1E-01	9.6E-01
15	benzene	1hr	9th	7.4E-01	7.4E-01	1.2E+00
16	benzene	1hr	9th	6.7E-01	6.7E-01	1.2E+00
17	benzene	1hr	9th	9.9E-01	9.9E-01	1.1E+00
18	benzene	1hr	9th	1.1E+00	1.1E+00	1.4E+00
19	benzene	1hr	9th	1.0E+00	1.0E+00	1.5E+00
20	benzene	1hr	9th	9.6E-01	9.6E-01	1.7E+00
21	benzene	1hr	9th	1.1E+00	1.1E+00	1.2E+00
22	benzene	1hr	9th	8.8E-01	8.8E-01	1.3E+00
23	benzene	1hr	9th	7.9E-01	8.0E-01	8.3E-01
24	benzene	1hr	9th	9.2E-01	9.2E-01	1.3E+00
25	benzene	1hr	9th	9.5E-01	9.5E-01	1.5E+00
26	benzene	1hr	9th	1.1E+00	1.1E+00	1.4E+00
27	benzene	1hr	9th	1.2E+00	1.2E+00	1.9E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
28	benzene	1hr	9th	1.1E+00	1.1E+00	2.4E+00
29	benzene	1hr	9th	1.3E+00	1.3E+00	2.5E+00
30	benzene	1hr	9th	1.6E+00	1.6E+00	2.1E+00
31	benzene	1hr	9th	1.6E+00	1.6E+00	2.2E+00
32	benzene	1hr	9th	2.3E-01	2.3E-01	2.7E-01
33	benzene	1hr	9th	7.2E-01	7.2E-01	7.4E-01
34	benzene	1hr	9th	5.1E-01	5.1E-01	5.1E-01
35	benzene	1hr	9th	4.0E-01	4.0E-01	4.5E-01
36	benzene	1hr	9th	4.4E-01	4.4E-01	5.3E-01
37	benzene	1hr	9th	4.0E-01	4.0E-01	5.8E-01
38	benzene	1hr	9th	1.0E+00	1.0E+00	1.2E+00
39	benzene	1hr	9th	9.4E-01	9.4E-01	1.3E+00
40	benzene	1hr	9th	1.2E+00	1.2E+00	1.5E+00
41	benzene	1hr	9th	1.4E+00	1.4E+00	1.7E+00
42	benzene	1hr	9th	1.2E+00	1.2E+00	1.5E+00
43	benzene	1hr	9th	1.2E+00	1.2E+00	1.6E+00
44	benzene	1hr	9th	1.2E+00	1.2E+00	1.6E+00
45	benzene	1hr	9th	1.3E+00	1.3E+00	1.8E+00
46	benzene	1hr	9th	1.2E+00	1.2E+00	1.9E+00
47	benzene	1hr	9th	1.1E+00	1.1E+00	1.8E+00
48	benzene	1hr	9th	1.2E+00	1.2E+00	1.9E+00
49	benzene	1hr	9th	1.2E+00	1.2E+00	1.9E+00
50	benzene	1hr	9th	1.1E+00	1.1E+00	2.0E+00
51	benzene	1hr	9th	8.7E-01	8.7E-01	1.5E+00
52	benzene	1hr	9th	2.6E+00	2.6E+00	3.0E+00
53	benzene	1hr	9th	2.0E+00	2.0E+00	2.4E+00
54	benzene	1hr	9th	8.4E-01	8.4E-01	8.8E-01
55	benzene	1hr	9th	6.2E-01	6.2E-01	1.4E+00
56	benzene	1hr	9th	8.9E-01	8.9E-01	1.1E+00
57	benzene	1hr	9th	8.2E-01	8.2E-01	1.3E+00
58	benzene	1hr	9th	8.2E-01	8.2E-01	8.3E-01
59	benzene	1hr	9th	2.9E+00	2.9E+00	3.6E+00
60	benzene	1hr	9th	3.5E+00	3.5E+00	5.5E+00
61	benzene	1hr	9th	3.7E+00	3.7E+00	6.7E+00
62	benzene	1hr	9th	4.2E+00	4.2E+00	5.6E+00
63	benzene	1hr	9th	2.8E+00	2.8E+00	4.4E+00
64	benzene	1hr	9th	3.1E+00	3.1E+00	4.5E+00
65	benzene	1hr	9th	5.6E+00	5.6E+00	5.8E+00
66	benzene	1hr	9th	5.2E-01	5.2E-01	7.9E-01
67	benzene	1hr	9th	7.0E-01	7.0E-01	9.1E-01
68	benzene	1hr	9th	4.4E-01	4.4E-01	1.1E+00
69	benzene	1hr	9th	4.2E-01	4.2E-01	9.1E-01
70	benzene	1hr	9th	6.9E-01	6.9E-01	1.1E+00
71	benzene	1hr	9th	2.3E+00	2.3E+00	3.4E+00
72	benzene	1hr	9th	2.2E+00	2.2E+00	2.8E+00
73	benzene	1hr	9th	5.0E+00	5.0E+00	5.7E+00
74	benzene	1hr	9th	3.3E+00	3.3E+00	3.4E+00
75	benzene	1hr	9th	1.1E+01	1.1E+01	1.3E+01
76	benzene	1hr	9th	3.8E+00	3.8E+00	6.3E+00
77	benzene	1hr	9th	3.4E+00	3.4E+00	4.3E+00
78	benzene	1hr	9th	1.1E+00	1.1E+00	1.2E+00
79	benzene	1hr	9th	7.5E-01	7.5E-01	1.6E+00
1	benzene	24hr	max	1.0E-01	1.0E-01	1.2E-01
2	benzene	24hr	max	1.5E-01	1.5E-01	1.5E-01
3	benzene	24hr	max	1.5E-01	1.5E-01	1.7E-01
4	benzene	24hr	max	2.0E-01	2.0E-01	2.2E-01
5	benzene	24hr	max	1.6E-01	1.6E-01	3.3E-01
6	benzene	24hr	max	1.5E-01	1.5E-01	3.7E-01
7	benzene	24hr	max	3.0E-01	3.0E-01	3.3E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
8	benzene	24hr	max	1.5E-01	1.5E-01	4.1E-01
9	benzene	24hr	max	1.5E-01	1.5E-01	2.1E-01
10	benzene	24hr	max	1.8E-01	1.8E-01	2.5E-01
11	benzene	24hr	max	1.9E-01	1.9E-01	2.8E-01
12	benzene	24hr	max	2.3E-01	2.3E-01	3.5E-01
13	benzene	24hr	max	2.3E-01	2.3E-01	3.2E-01
14	benzene	24hr	max	2.2E-01	2.2E-01	3.0E-01
15	benzene	24hr	max	3.8E-01	3.8E-01	4.7E-01
16	benzene	24hr	max	3.5E-01	3.5E-01	4.3E-01
17	benzene	24hr	max	2.6E-01	2.6E-01	3.3E-01
18	benzene	24hr	max	2.8E-01	2.8E-01	2.8E-01
19	benzene	24hr	max	2.5E-01	2.5E-01	3.4E-01
20	benzene	24hr	max	2.3E-01	2.3E-01	2.6E-01
21	benzene	24hr	max	2.8E-01	2.8E-01	3.3E-01
22	benzene	24hr	max	3.0E-01	3.0E-01	3.4E-01
23	benzene	24hr	max	2.8E-01	2.8E-01	3.1E-01
24	benzene	24hr	max	4.2E-01	4.2E-01	4.8E-01
25	benzene	24hr	max	5.0E-01	5.0E-01	6.2E-01
26	benzene	24hr	max	5.6E-01	5.6E-01	6.5E-01
27	benzene	24hr	max	6.7E-01	6.7E-01	7.0E-01
28	benzene	24hr	max	2.7E-01	2.7E-01	3.2E-01
29	benzene	24hr	max	2.8E-01	2.8E-01	3.3E-01
30	benzene	24hr	max	5.1E-01	5.1E-01	7.4E-01
31	benzene	24hr	max	5.1E-01	5.1E-01	7.5E-01
32	benzene	24hr	max	9.0E-02	9.1E-02	1.4E-01
33	benzene	24hr	max	1.3E-01	1.3E-01	2.0E-01
34	benzene	24hr	max	1.0E-01	1.0E-01	2.1E-01
35	benzene	24hr	max	2.3E-01	2.3E-01	2.8E-01
36	benzene	24hr	max	2.3E-01	2.3E-01	2.7E-01
37	benzene	24hr	max	2.4E-01	2.4E-01	2.6E-01
38	benzene	24hr	max	4.2E-01	4.2E-01	6.0E-01
39	benzene	24hr	max	4.5E-01	4.5E-01	4.5E-01
40	benzene	24hr	max	3.6E-01	3.6E-01	4.8E-01
41	benzene	24hr	max	7.5E-01	7.5E-01	8.5E-01
42	benzene	24hr	max	4.4E-01	4.4E-01	4.4E-01
43	benzene	24hr	max	3.7E-01	3.7E-01	4.7E-01
44	benzene	24hr	max	3.8E-01	3.8E-01	3.9E-01
45	benzene	24hr	max	3.1E-01	3.1E-01	4.3E-01
46	benzene	24hr	max	3.2E-01	3.2E-01	4.3E-01
47	benzene	24hr	max	2.8E-01	2.8E-01	4.9E-01
48	benzene	24hr	max	3.3E-01	3.3E-01	4.3E-01
49	benzene	24hr	max	3.1E-01	3.1E-01	4.2E-01
50	benzene	24hr	max	3.5E-01	3.5E-01	3.6E-01
51	benzene	24hr	max	4.2E-01	4.2E-01	4.2E-01
52	benzene	24hr	max	5.6E-01	5.6E-01	6.0E-01
53	benzene	24hr	max	5.8E-01	5.8E-01	7.6E-01
54	benzene	24hr	max	2.6E-01	2.6E-01	2.9E-01
55	benzene	24hr	max	3.1E-01	3.1E-01	3.3E-01
56	benzene	24hr	max	2.7E-01	2.7E-01	3.3E-01
57	benzene	24hr	max	4.0E-01	4.0E-01	4.2E-01
58	benzene	24hr	max	1.8E-01	1.8E-01	1.8E-01
59	benzene	24hr	max	6.1E-01	6.1E-01	7.8E-01
60	benzene	24hr	max	1.5E+00	1.5E+00	1.6E+00
61	benzene	24hr	max	1.2E+00	1.2E+00	1.2E+00
62	benzene	24hr	max	9.7E-01	9.7E-01	1.0E+00
63	benzene	24hr	max	7.3E-01	7.3E-01	7.9E-01
64	benzene	24hr	max	7.2E-01	7.2E-01	7.9E-01
65	benzene	24hr	max	7.9E-01	7.9E-01	9.1E-01
66	benzene	24hr	max	1.7E-01	1.7E-01	2.1E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
67	benzene	24hr	max	1.8E-01	1.8E-01	3.6E-01
68	benzene	24hr	max	2.4E-01	2.4E-01	2.7E-01
69	benzene	24hr	max	2.5E-01	2.5E-01	2.8E-01
70	benzene	24hr	max	2.2E-01	2.2E-01	2.4E-01
71	benzene	24hr	max	4.8E-01	4.8E-01	8.5E-01
72	benzene	24hr	max	4.7E-01	4.7E-01	8.1E-01
73	benzene	24hr	max	7.9E-01	7.9E-01	9.3E-01
74	benzene	24hr	max	5.5E-01	5.5E-01	7.4E-01
75	benzene	24hr	max	4.4E+00	4.4E+00	4.7E+00
76	benzene	24hr	max	1.3E+00	1.3E+00	1.4E+00
77	benzene	24hr	max	5.9E-01	5.9E-01	6.4E-01
78	benzene	24hr	max	4.8E-01	4.8E-01	4.9E-01
79	benzene	24hr	max	2.5E-01	2.5E-01	2.9E-01
1	benzene	annual	average	8.1E-03	8.2E-03	9.2E-03
2	benzene	annual	average	7.3E-03	7.3E-03	9.6E-03
3	benzene	annual	average	7.3E-03	7.4E-03	9.7E-03
4	benzene	annual	average	7.7E-03	7.8E-03	1.0E-02
5	benzene	annual	average	8.8E-03	8.9E-03	1.2E-02
6	benzene	annual	average	9.1E-03	9.2E-03	1.2E-02
7	benzene	annual	average	8.8E-03	8.9E-03	1.2E-02
8	benzene	annual	average	9.2E-03	9.3E-03	1.3E-02
9	benzene	annual	average	7.7E-03	7.7E-03	1.1E-02
10	benzene	annual	average	9.6E-03	9.7E-03	1.2E-02
11	benzene	annual	average	1.1E-02	1.2E-02	1.5E-02
12	benzene	annual	average	1.1E-02	1.1E-02	1.4E-02
13	benzene	annual	average	1.1E-02	1.1E-02	1.4E-02
14	benzene	annual	average	1.2E-02	1.2E-02	1.6E-02
15	benzene	annual	average	1.1E-02	1.1E-02	1.4E-02
16	benzene	annual	average	1.0E-02	1.1E-02	1.4E-02
17	benzene	annual	average	1.1E-02	1.1E-02	1.5E-02
18	benzene	annual	average	1.2E-02	1.2E-02	1.6E-02
19	benzene	annual	average	1.2E-02	1.2E-02	1.6E-02
20	benzene	annual	average	1.2E-02	1.2E-02	1.6E-02
21	benzene	annual	average	1.6E-02	1.6E-02	2.0E-02
22	benzene	annual	average	1.3E-02	1.4E-02	1.7E-02
23	benzene	annual	average	1.0E-02	1.1E-02	1.4E-02
24	benzene	annual	average	8.4E-03	8.4E-03	1.1E-02
25	benzene	annual	average	1.1E-02	1.2E-02	1.6E-02
26	benzene	annual	average	1.3E-02	1.4E-02	1.8E-02
27	benzene	annual	average	1.8E-02	1.9E-02	2.3E-02
28	benzene	annual	average	1.3E-02	1.3E-02	1.8E-02
29	benzene	annual	average	1.3E-02	1.4E-02	1.8E-02
30	benzene	annual	average	1.3E-02	1.4E-02	1.8E-02
31	benzene	annual	average	1.4E-02	1.4E-02	1.9E-02
32	benzene	annual	average	5.6E-03	5.7E-03	7.1E-03
33	benzene	annual	average	6.3E-03	6.3E-03	8.2E-03
34	benzene	annual	average	6.0E-03	6.1E-03	7.9E-03
35	benzene	annual	average	6.9E-03	6.9E-03	8.7E-03
36	benzene	annual	average	7.3E-03	7.3E-03	9.0E-03
37	benzene	annual	average	6.9E-03	6.9E-03	8.6E-03
38	benzene	annual	average	1.4E-02	1.5E-02	1.9E-02
39	benzene	annual	average	1.5E-02	1.5E-02	2.0E-02
40	benzene	annual	average	1.6E-02	1.6E-02	2.2E-02
41	benzene	annual	average	1.9E-02	1.9E-02	2.5E-02
42	benzene	annual	average	1.6E-02	1.6E-02	2.2E-02
43	benzene	annual	average	1.8E-02	1.9E-02	2.5E-02
44	benzene	annual	average	1.9E-02	1.9E-02	2.5E-02
45	benzene	annual	average	1.8E-02	1.8E-02	2.4E-02
46	benzene	annual	average	1.8E-02	1.8E-02	2.4E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
47	benzene	annual	average	1.8E-02	1.8E-02	2.5E-02
48	benzene	annual	average	1.9E-02	1.9E-02	2.6E-02
49	benzene	annual	average	1.8E-02	1.8E-02	2.5E-02
50	benzene	annual	average	1.8E-02	1.8E-02	2.4E-02
51	benzene	annual	average	1.6E-02	1.6E-02	2.3E-02
52	benzene	annual	average	2.6E-02	2.6E-02	3.5E-02
53	benzene	annual	average	2.3E-02	2.3E-02	3.1E-02
54	benzene	annual	average	7.4E-03	7.4E-03	9.3E-03
55	benzene	annual	average	7.7E-03	7.8E-03	9.8E-03
56	benzene	annual	average	7.4E-03	7.5E-03	9.6E-03
57	benzene	annual	average	8.5E-03	8.6E-03	1.1E-02
58	benzene	annual	average	6.4E-03	6.4E-03	7.7E-03
59	benzene	annual	average	3.2E-02	3.2E-02	4.2E-02
60	benzene	annual	average	5.3E-02	5.3E-02	6.7E-02
61	benzene	annual	average	5.7E-02	5.7E-02	7.3E-02
62	benzene	annual	average	5.0E-02	5.0E-02	6.3E-02
63	benzene	annual	average	4.3E-02	4.3E-02	5.5E-02
64	benzene	annual	average	4.5E-02	4.5E-02	5.7E-02
65	benzene	annual	average	5.4E-02	5.4E-02	6.8E-02
66	benzene	annual	average	9.5E-03	9.6E-03	1.2E-02
67	benzene	annual	average	1.0E-02	1.1E-02	1.4E-02
68	benzene	annual	average	9.3E-03	9.4E-03	1.3E-02
69	benzene	annual	average	8.6E-03	8.7E-03	1.2E-02
70	benzene	annual	average	8.1E-03	8.2E-03	1.1E-02
71	benzene	annual	average	2.1E-02	2.1E-02	2.7E-02
72	benzene	annual	average	2.1E-02	2.1E-02	2.7E-02
73	benzene	annual	average	6.0E-02	6.0E-02	7.5E-02
74	benzene	annual	average	3.2E-02	3.2E-02	4.2E-02
75	benzene	annual	average	2.7E-01	2.7E-01	2.9E-01
76	benzene	annual	average	5.7E-02	5.7E-02	7.2E-02
77	benzene	annual	average	3.6E-02	3.6E-02	4.7E-02
78	benzene	annual	average	1.6E-02	1.6E-02	2.1E-02
79	benzene	annual	average	1.3E-02	1.3E-02	1.7E-02
1	benzo(a)anthracene	1hr	max	1.4E-05	1.4E-05	5.7E-05
2	benzo(a)anthracene	1hr	max	1.5E-05	1.5E-05	3.7E-05
3	benzo(a)anthracene	1hr	max	1.5E-05	1.5E-05	3.9E-05
4	benzo(a)anthracene	1hr	max	1.6E-05	1.6E-05	4.0E-05
5	benzo(a)anthracene	1hr	max	2.6E-05	2.6E-05	5.2E-05
6	benzo(a)anthracene	1hr	max	3.0E-05	3.0E-05	5.4E-05
7	benzo(a)anthracene	1hr	max	2.1E-05	2.1E-05	5.1E-05
8	benzo(a)anthracene	1hr	max	3.3E-05	3.3E-05	5.5E-05
9	benzo(a)anthracene	1hr	max	2.1E-05	2.1E-05	4.6E-05
10	benzo(a)anthracene	1hr	max	4.5E-05	4.5E-05	5.9E-05
11	benzo(a)anthracene	1hr	max	9.6E-05	9.6E-05	9.6E-05
12	benzo(a)anthracene	1hr	max	6.2E-05	6.2E-05	6.8E-05
13	benzo(a)anthracene	1hr	max	4.6E-05	4.6E-05	6.2E-05
14	benzo(a)anthracene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	benzo(a)anthracene	1hr	max	2.9E-05	2.9E-05	5.6E-05
16	benzo(a)anthracene	1hr	max	2.7E-05	2.8E-05	5.7E-05
17	benzo(a)anthracene	1hr	max	3.3E-05	3.3E-05	4.5E-05
18	benzo(a)anthracene	1hr	max	2.9E-05	2.9E-05	5.0E-05
19	benzo(a)anthracene	1hr	max	3.1E-05	3.1E-05	5.2E-05
20	benzo(a)anthracene	1hr	max	3.3E-05	3.3E-05	5.5E-05
21	benzo(a)anthracene	1hr	max	1.0E-04	1.0E-04	1.1E-04
22	benzo(a)anthracene	1hr	max	8.4E-05	8.4E-05	1.0E-04
23	benzo(a)anthracene	1hr	max	5.6E-05	5.6E-05	8.3E-05
24	benzo(a)anthracene	1hr	max	1.3E-05	1.4E-05	5.7E-05
25	benzo(a)anthracene	1hr	max	2.4E-05	2.4E-05	9.9E-05
26	benzo(a)anthracene	1hr	max	2.0E-05	2.0E-05	1.1E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
27	benzo(a)anthracene	1hr	max	1.9E-05	1.9E-05	2.2E-04
28	benzo(a)anthracene	1hr	max	3.8E-05	3.8E-05	9.9E-05
29	benzo(a)anthracene	1hr	max	4.8E-05	4.8E-05	1.1E-04
30	benzo(a)anthracene	1hr	max	2.8E-05	2.8E-05	7.7E-05
31	benzo(a)anthracene	1hr	max	3.0E-05	3.0E-05	8.6E-05
32	benzo(a)anthracene	1hr	max	1.5E-05	1.5E-05	4.0E-05
33	benzo(a)anthracene	1hr	max	2.0E-05	2.0E-05	4.3E-05
34	benzo(a)anthracene	1hr	max	2.0E-05	2.0E-05	3.8E-05
35	benzo(a)anthracene	1hr	max	1.7E-05	1.7E-05	6.0E-05
36	benzo(a)anthracene	1hr	max	1.7E-05	1.7E-05	5.8E-05
37	benzo(a)anthracene	1hr	max	1.6E-05	1.6E-05	6.2E-05
38	benzo(a)anthracene	1hr	max	5.0E-05	5.0E-05	1.4E-04
39	benzo(a)anthracene	1hr	max	3.7E-05	3.7E-05	1.3E-04
40	benzo(a)anthracene	1hr	max	3.2E-05	3.2E-05	1.3E-04
41	benzo(a)anthracene	1hr	max	2.5E-05	2.5E-05	1.3E-04
42	benzo(a)anthracene	1hr	max	4.3E-05	4.3E-05	1.7E-04
43	benzo(a)anthracene	1hr	max	2.9E-05	2.9E-05	1.6E-04
44	benzo(a)anthracene	1hr	max	3.1E-05	3.1E-05	1.5E-04
45	benzo(a)anthracene	1hr	max	2.7E-05	2.7E-05	1.3E-04
46	benzo(a)anthracene	1hr	max	2.8E-05	2.8E-05	1.3E-04
47	benzo(a)anthracene	1hr	max	2.8E-05	2.8E-05	1.1E-04
48	benzo(a)anthracene	1hr	max	3.2E-05	3.2E-05	1.2E-04
49	benzo(a)anthracene	1hr	max	3.1E-05	3.1E-05	1.2E-04
50	benzo(a)anthracene	1hr	max	4.2E-05	4.2E-05	1.1E-04
51	benzo(a)anthracene	1hr	max	4.3E-05	4.3E-05	1.2E-04
52	benzo(a)anthracene	1hr	max	3.2E-05	3.2E-05	8.2E-04
53	benzo(a)anthracene	1hr	max	2.8E-05	2.8E-05	3.8E-04
54	benzo(a)anthracene	1hr	max	1.3E-05	1.3E-05	3.3E-05
55	benzo(a)anthracene	1hr	max	1.3E-05	1.3E-05	6.0E-05
56	benzo(a)anthracene	1hr	max	1.2E-05	1.2E-05	7.7E-05
57	benzo(a)anthracene	1hr	max	1.6E-05	1.6E-05	4.7E-05
58	benzo(a)anthracene	1hr	max	1.1E-05	1.1E-05	4.8E-05
59	benzo(a)anthracene	1hr	max	3.4E-05	3.4E-05	5.3E-04
60	benzo(a)anthracene	1hr	max	6.0E-05	6.0E-05	2.6E-04
61	benzo(a)anthracene	1hr	max	1.0E-04	1.0E-04	2.3E-04
62	benzo(a)anthracene	1hr	max	9.1E-05	9.1E-05	2.7E-04
63	benzo(a)anthracene	1hr	max	7.2E-05	7.2E-05	4.4E-04
64	benzo(a)anthracene	1hr	max	7.5E-05	7.5E-05	2.9E-04
65	benzo(a)anthracene	1hr	max	9.0E-05	9.0E-05	2.5E-04
66	benzo(a)anthracene	1hr	max	3.1E-05	3.1E-05	5.6E-05
67	benzo(a)anthracene	1hr	max	5.1E-05	5.1E-05	5.7E-05
68	benzo(a)anthracene	1hr	max	2.6E-05	2.6E-05	4.6E-05
69	benzo(a)anthracene	1hr	max	2.3E-05	2.3E-05	4.5E-05
70	benzo(a)anthracene	1hr	max	2.2E-05	2.2E-05	4.0E-05
71	benzo(a)anthracene	1hr	max	4.2E-05	4.2E-05	1.1E-04
72	benzo(a)anthracene	1hr	max	4.2E-05	4.2E-05	1.1E-04
73	benzo(a)anthracene	1hr	max	8.8E-05	8.8E-05	2.8E-04
74	benzo(a)anthracene	1hr	max	3.9E-05	3.9E-05	1.2E-03
75	benzo(a)anthracene	1hr	max	1.6E-04	1.6E-04	1.7E-04
76	benzo(a)anthracene	1hr	max	1.0E-04	1.0E-04	2.4E-04
77	benzo(a)anthracene	1hr	max	5.2E-05	5.2E-05	4.1E-03
78	benzo(a)anthracene	1hr	max	4.8E-05	4.8E-05	1.6E-04
79	benzo(a)anthracene	1hr	max	6.7E-05	6.7E-05	9.9E-05
1	benzo(a)anthracene	1hr	9th	6.9E-06	6.9E-06	2.7E-05
2	benzo(a)anthracene	1hr	9th	1.0E-05	1.0E-05	2.7E-05
3	benzo(a)anthracene	1hr	9th	1.1E-05	1.1E-05	2.9E-05
4	benzo(a)anthracene	1hr	9th	1.2E-05	1.2E-05	3.2E-05
5	benzo(a)anthracene	1hr	9th	1.4E-05	1.4E-05	3.9E-05
6	benzo(a)anthracene	1hr	9th	1.4E-05	1.4E-05	4.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
7	benzo(a)anthracene	1hr	9th	1.2E-05	1.2E-05	3.3E-05
8	benzo(a)anthracene	1hr	9th	1.3E-05	1.4E-05	4.1E-05
9	benzo(a)anthracene	1hr	9th	1.3E-05	1.3E-05	3.4E-05
10	benzo(a)anthracene	1hr	9th	3.0E-05	3.0E-05	4.7E-05
11	benzo(a)anthracene	1hr	9th	6.5E-05	6.5E-05	7.8E-05
12	benzo(a)anthracene	1hr	9th	3.3E-05	3.3E-05	5.2E-05
13	benzo(a)anthracene	1hr	9th	3.5E-05	3.5E-05	5.0E-05
14	benzo(a)anthracene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	benzo(a)anthracene	1hr	9th	1.6E-05	1.6E-05	3.8E-05
16	benzo(a)anthracene	1hr	9th	1.6E-05	1.6E-05	3.7E-05
17	benzo(a)anthracene	1hr	9th	2.0E-05	2.0E-05	4.0E-05
18	benzo(a)anthracene	1hr	9th	1.9E-05	1.9E-05	4.1E-05
19	benzo(a)anthracene	1hr	9th	1.8E-05	1.8E-05	4.2E-05
20	benzo(a)anthracene	1hr	9th	2.0E-05	2.0E-05	4.7E-05
21	benzo(a)anthracene	1hr	9th	3.7E-05	3.7E-05	6.4E-05
22	benzo(a)anthracene	1hr	9th	3.7E-05	3.7E-05	6.3E-05
23	benzo(a)anthracene	1hr	9th	2.7E-05	2.7E-05	5.2E-05
24	benzo(a)anthracene	1hr	9th	9.5E-06	9.6E-06	3.2E-05
25	benzo(a)anthracene	1hr	9th	1.4E-05	1.5E-05	7.4E-05
26	benzo(a)anthracene	1hr	9th	1.3E-05	1.3E-05	8.7E-05
27	benzo(a)anthracene	1hr	9th	1.3E-05	1.3E-05	1.5E-04
28	benzo(a)anthracene	1hr	9th	2.5E-05	2.5E-05	6.1E-05
29	benzo(a)anthracene	1hr	9th	2.8E-05	2.8E-05	6.1E-05
30	benzo(a)anthracene	1hr	9th	1.8E-05	1.8E-05	4.6E-05
31	benzo(a)anthracene	1hr	9th	2.0E-05	2.0E-05	5.2E-05
32	benzo(a)anthracene	1hr	9th	8.6E-06	8.7E-06	2.5E-05
33	benzo(a)anthracene	1hr	9th	1.0E-05	1.0E-05	2.8E-05
34	benzo(a)anthracene	1hr	9th	1.0E-05	1.0E-05	2.7E-05
35	benzo(a)anthracene	1hr	9th	9.4E-06	9.5E-06	3.0E-05
36	benzo(a)anthracene	1hr	9th	1.0E-05	1.0E-05	3.1E-05
37	benzo(a)anthracene	1hr	9th	9.8E-06	9.9E-06	3.3E-05
38	benzo(a)anthracene	1hr	9th	2.9E-05	2.9E-05	7.2E-05
39	benzo(a)anthracene	1hr	9th	2.7E-05	2.7E-05	7.5E-05
40	benzo(a)anthracene	1hr	9th	2.2E-05	2.2E-05	9.2E-05
41	benzo(a)anthracene	1hr	9th	1.8E-05	1.8E-05	9.2E-05
42	benzo(a)anthracene	1hr	9th	2.5E-05	2.5E-05	6.9E-05
43	benzo(a)anthracene	1hr	9th	2.3E-05	2.3E-05	7.1E-05
44	benzo(a)anthracene	1hr	9th	2.1E-05	2.1E-05	7.3E-05
45	benzo(a)anthracene	1hr	9th	1.9E-05	1.9E-05	7.5E-05
46	benzo(a)anthracene	1hr	9th	2.0E-05	2.0E-05	7.4E-05
47	benzo(a)anthracene	1hr	9th	1.9E-05	1.9E-05	7.5E-05
48	benzo(a)anthracene	1hr	9th	2.1E-05	2.1E-05	7.3E-05
49	benzo(a)anthracene	1hr	9th	2.0E-05	2.0E-05	7.5E-05
50	benzo(a)anthracene	1hr	9th	2.3E-05	2.3E-05	7.9E-05
51	benzo(a)anthracene	1hr	9th	2.5E-05	2.5E-05	6.8E-05
52	benzo(a)anthracene	1hr	9th	1.9E-05	1.9E-05	3.8E-04
53	benzo(a)anthracene	1hr	9th	1.8E-05	1.8E-05	1.7E-04
54	benzo(a)anthracene	1hr	9th	7.6E-06	7.6E-06	2.3E-05
55	benzo(a)anthracene	1hr	9th	8.8E-06	8.9E-06	2.9E-05
56	benzo(a)anthracene	1hr	9th	8.6E-06	8.6E-06	3.2E-05
57	benzo(a)anthracene	1hr	9th	9.4E-06	9.5E-06	2.6E-05
58	benzo(a)anthracene	1hr	9th	8.1E-06	8.2E-06	2.2E-05
59	benzo(a)anthracene	1hr	9th	2.6E-05	2.6E-05	2.2E-04
60	benzo(a)anthracene	1hr	9th	3.4E-05	3.4E-05	1.0E-04
61	benzo(a)anthracene	1hr	9th	4.3E-05	4.3E-05	1.4E-04
62	benzo(a)anthracene	1hr	9th	3.3E-05	3.3E-05	1.7E-04
63	benzo(a)anthracene	1hr	9th	3.0E-05	3.0E-05	2.7E-04
64	benzo(a)anthracene	1hr	9th	3.1E-05	3.1E-05	2.5E-04
65	benzo(a)anthracene	1hr	9th	4.0E-05	4.0E-05	1.7E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
66	benzo(a)anthracene	1hr	9th	2.0E-05	2.0E-05	3.9E-05
67	benzo(a)anthracene	1hr	9th	2.5E-05	2.5E-05	4.3E-05
68	benzo(a)anthracene	1hr	9th	1.6E-05	1.6E-05	3.2E-05
69	benzo(a)anthracene	1hr	9th	1.2E-05	1.2E-05	3.2E-05
70	benzo(a)anthracene	1hr	9th	9.6E-06	9.7E-06	3.0E-05
71	benzo(a)anthracene	1hr	9th	2.4E-05	2.4E-05	8.2E-05
72	benzo(a)anthracene	1hr	9th	2.5E-05	2.5E-05	8.2E-05
73	benzo(a)anthracene	1hr	9th	4.0E-05	4.0E-05	1.8E-04
74	benzo(a)anthracene	1hr	9th	2.5E-05	2.5E-05	4.6E-04
75	benzo(a)anthracene	1hr	9th	1.3E-04	1.3E-04	1.4E-04
76	benzo(a)anthracene	1hr	9th	4.1E-05	4.1E-05	1.4E-04
77	benzo(a)anthracene	1hr	9th	2.7E-05	2.7E-05	1.8E-03
78	benzo(a)anthracene	1hr	9th	2.6E-05	2.6E-05	6.7E-05
79	benzo(a)anthracene	1hr	9th	2.9E-05	2.9E-05	6.0E-05
1	benzo(a)anthracene	24hr	max	3.4E-06	3.4E-06	1.0E-05
2	benzo(a)anthracene	24hr	max	4.4E-06	4.4E-06	1.1E-05
3	benzo(a)anthracene	24hr	max	4.5E-06	4.6E-06	1.1E-05
4	benzo(a)anthracene	24hr	max	4.9E-06	4.9E-06	1.4E-05
5	benzo(a)anthracene	24hr	max	4.8E-06	4.8E-06	1.7E-05
6	benzo(a)anthracene	24hr	max	5.0E-06	5.0E-06	1.8E-05
7	benzo(a)anthracene	24hr	max	4.8E-06	4.8E-06	1.3E-05
8	benzo(a)anthracene	24hr	max	5.9E-06	5.9E-06	1.9E-05
9	benzo(a)anthracene	24hr	max	5.4E-06	5.4E-06	1.6E-05
10	benzo(a)anthracene	24hr	max	1.2E-05	1.2E-05	2.0E-05
11	benzo(a)anthracene	24hr	max	2.5E-05	2.5E-05	3.0E-05
12	benzo(a)anthracene	24hr	max	1.0E-05	1.0E-05	2.3E-05
13	benzo(a)anthracene	24hr	max	1.2E-05	1.2E-05	2.1E-05
14	benzo(a)anthracene	24hr	max	3.5E-05	3.5E-05	3.6E-05
15	benzo(a)anthracene	24hr	max	7.2E-06	7.2E-06	1.7E-05
16	benzo(a)anthracene	24hr	max	7.1E-06	7.1E-06	1.7E-05
17	benzo(a)anthracene	24hr	max	7.9E-06	7.9E-06	1.7E-05
18	benzo(a)anthracene	24hr	max	8.6E-06	8.6E-06	1.8E-05
19	benzo(a)anthracene	24hr	max	8.1E-06	8.1E-06	1.8E-05
20	benzo(a)anthracene	24hr	max	7.5E-06	7.5E-06	1.9E-05
21	benzo(a)anthracene	24hr	max	1.5E-05	1.5E-05	2.4E-05
22	benzo(a)anthracene	24hr	max	1.6E-05	1.6E-05	2.3E-05
23	benzo(a)anthracene	24hr	max	1.1E-05	1.1E-05	2.3E-05
24	benzo(a)anthracene	24hr	max	3.8E-06	3.8E-06	1.7E-05
25	benzo(a)anthracene	24hr	max	5.7E-06	5.7E-06	3.0E-05
26	benzo(a)anthracene	24hr	max	5.2E-06	5.3E-06	3.1E-05
27	benzo(a)anthracene	24hr	max	5.7E-06	5.7E-06	4.7E-05
28	benzo(a)anthracene	24hr	max	6.9E-06	6.9E-06	3.0E-05
29	benzo(a)anthracene	24hr	max	7.3E-06	7.3E-06	3.1E-05
30	benzo(a)anthracene	24hr	max	8.2E-06	8.2E-06	2.0E-05
31	benzo(a)anthracene	24hr	max	8.5E-06	8.5E-06	2.1E-05
32	benzo(a)anthracene	24hr	max	4.1E-06	4.1E-06	9.4E-06
33	benzo(a)anthracene	24hr	max	5.7E-06	5.7E-06	1.1E-05
34	benzo(a)anthracene	24hr	max	5.3E-06	5.3E-06	1.1E-05
35	benzo(a)anthracene	24hr	max	4.4E-06	4.4E-06	1.0E-05
36	benzo(a)anthracene	24hr	max	4.3E-06	4.3E-06	1.2E-05
37	benzo(a)anthracene	24hr	max	4.2E-06	4.2E-06	1.4E-05
38	benzo(a)anthracene	24hr	max	1.1E-05	1.1E-05	2.9E-05
39	benzo(a)anthracene	24hr	max	9.5E-06	9.6E-06	3.3E-05
40	benzo(a)anthracene	24hr	max	6.9E-06	6.9E-06	3.9E-05
41	benzo(a)anthracene	24hr	max	7.7E-06	7.7E-06	4.4E-05
42	benzo(a)anthracene	24hr	max	8.2E-06	8.2E-06	3.8E-05
43	benzo(a)anthracene	24hr	max	8.1E-06	8.1E-06	3.9E-05
44	benzo(a)anthracene	24hr	max	8.7E-06	8.7E-06	3.9E-05
45	benzo(a)anthracene	24hr	max	8.1E-06	8.1E-06	3.8E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
46	benzo(a)anthracene	24hr	max	8.1E-06	8.1E-06	3.8E-05
47	benzo(a)anthracene	24hr	max	8.2E-06	8.2E-06	3.2E-05
48	benzo(a)anthracene	24hr	max	8.2E-06	8.2E-06	3.6E-05
49	benzo(a)anthracene	24hr	max	8.1E-06	8.1E-06	3.5E-05
50	benzo(a)anthracene	24hr	max	7.8E-06	7.8E-06	3.2E-05
51	benzo(a)anthracene	24hr	max	7.8E-06	7.8E-06	3.4E-05
52	benzo(a)anthracene	24hr	max	9.8E-06	9.8E-06	1.6E-04
53	benzo(a)anthracene	24hr	max	9.4E-06	9.4E-06	7.3E-05
54	benzo(a)anthracene	24hr	max	3.4E-06	3.5E-06	1.3E-05
55	benzo(a)anthracene	24hr	max	3.5E-06	3.6E-06	1.7E-05
56	benzo(a)anthracene	24hr	max	3.7E-06	3.8E-06	2.0E-05
57	benzo(a)anthracene	24hr	max	3.6E-06	3.7E-06	1.3E-05
58	benzo(a)anthracene	24hr	max	3.2E-06	3.3E-06	1.4E-05
59	benzo(a)anthracene	24hr	max	1.1E-05	1.1E-05	8.7E-05
60	benzo(a)anthracene	24hr	max	1.6E-05	1.6E-05	4.5E-05
61	benzo(a)anthracene	24hr	max	1.7E-05	1.7E-05	6.1E-05
62	benzo(a)anthracene	24hr	max	1.5E-05	1.5E-05	6.8E-05
63	benzo(a)anthracene	24hr	max	1.3E-05	1.3E-05	1.0E-04
64	benzo(a)anthracene	24hr	max	1.3E-05	1.3E-05	9.8E-05
65	benzo(a)anthracene	24hr	max	1.7E-05	1.7E-05	4.0E-05
66	benzo(a)anthracene	24hr	max	1.2E-05	1.2E-05	2.1E-05
67	benzo(a)anthracene	24hr	max	7.4E-06	7.5E-06	1.9E-05
68	benzo(a)anthracene	24hr	max	7.9E-06	7.9E-06	1.9E-05
69	benzo(a)anthracene	24hr	max	4.5E-06	4.6E-06	1.6E-05
70	benzo(a)anthracene	24hr	max	4.7E-06	4.7E-06	1.2E-05
71	benzo(a)anthracene	24hr	max	1.3E-05	1.3E-05	3.1E-05
72	benzo(a)anthracene	24hr	max	1.2E-05	1.2E-05	3.1E-05
73	benzo(a)anthracene	24hr	max	1.8E-05	1.8E-05	3.7E-05
74	benzo(a)anthracene	24hr	max	1.2E-05	1.2E-05	1.4E-04
75	benzo(a)anthracene	24hr	max	5.7E-05	5.7E-05	6.4E-05
76	benzo(a)anthracene	24hr	max	1.7E-05	1.7E-05	6.2E-05
77	benzo(a)anthracene	24hr	max	1.2E-05	1.2E-05	3.3E-04
78	benzo(a)anthracene	24hr	max	9.1E-06	9.1E-06	4.0E-05
79	benzo(a)anthracene	24hr	max	1.4E-05	1.4E-05	2.6E-05
1	benzo(a)anthracene	annual	average	2.2E-07	2.2E-07	4.7E-07
2	benzo(a)anthracene	annual	average	3.9E-07	4.0E-07	8.2E-07
3	benzo(a)anthracene	annual	average	4.1E-07	4.1E-07	8.5E-07
4	benzo(a)anthracene	annual	average	4.4E-07	4.5E-07	9.3E-07
5	benzo(a)anthracene	annual	average	5.1E-07	5.2E-07	1.1E-06
6	benzo(a)anthracene	annual	average	5.2E-07	5.3E-07	1.1E-06
7	benzo(a)anthracene	annual	average	4.6E-07	4.7E-07	9.9E-07
8	benzo(a)anthracene	annual	average	5.3E-07	5.4E-07	1.2E-06
9	benzo(a)anthracene	annual	average	5.1E-07	5.2E-07	1.1E-06
10	benzo(a)anthracene	annual	average	8.2E-07	8.2E-07	1.7E-06
11	benzo(a)anthracene	annual	average	1.3E-06	1.3E-06	2.3E-06
12	benzo(a)anthracene	annual	average	1.1E-06	1.1E-06	2.1E-06
13	benzo(a)anthracene	annual	average	1.0E-06	1.1E-06	2.0E-06
14	benzo(a)anthracene	annual	average	2.1E-06	2.1E-06	3.3E-06
15	benzo(a)anthracene	annual	average	6.1E-07	6.3E-07	1.3E-06
16	benzo(a)anthracene	annual	average	6.1E-07	6.3E-07	1.3E-06
17	benzo(a)anthracene	annual	average	6.7E-07	6.9E-07	1.4E-06
18	benzo(a)anthracene	annual	average	7.5E-07	7.7E-07	1.6E-06
19	benzo(a)anthracene	annual	average	7.4E-07	7.6E-07	1.6E-06
20	benzo(a)anthracene	annual	average	7.9E-07	8.2E-07	1.7E-06
21	benzo(a)anthracene	annual	average	1.2E-06	1.2E-06	2.3E-06
22	benzo(a)anthracene	annual	average	1.1E-06	1.1E-06	2.2E-06
23	benzo(a)anthracene	annual	average	7.8E-07	7.9E-07	1.7E-06
24	benzo(a)anthracene	annual	average	4.1E-07	4.1E-07	9.0E-07
25	benzo(a)anthracene	annual	average	5.1E-07	5.7E-07	1.5E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
26	benzo(a)anthracene	annual	average	5.8E-07	6.2E-07	1.8E-06
27	benzo(a)anthracene	annual	average	7.2E-07	7.9E-07	2.6E-06
28	benzo(a)anthracene	annual	average	9.0E-07	9.2E-07	2.1E-06
29	benzo(a)anthracene	annual	average	9.4E-07	9.6E-07	2.2E-06
30	benzo(a)anthracene	annual	average	4.9E-07	5.0E-07	1.2E-06
31	benzo(a)anthracene	annual	average	5.1E-07	5.3E-07	1.3E-06
32	benzo(a)anthracene	annual	average	2.2E-07	2.3E-07	5.1E-07
33	benzo(a)anthracene	annual	average	2.9E-07	3.0E-07	6.9E-07
34	benzo(a)anthracene	annual	average	2.9E-07	3.0E-07	6.7E-07
35	benzo(a)anthracene	annual	average	3.1E-07	3.2E-07	6.9E-07
36	benzo(a)anthracene	annual	average	3.3E-07	3.4E-07	7.3E-07
37	benzo(a)anthracene	annual	average	3.2E-07	3.3E-07	7.3E-07
38	benzo(a)anthracene	annual	average	9.3E-07	9.5E-07	2.5E-06
39	benzo(a)anthracene	annual	average	9.1E-07	9.3E-07	2.7E-06
40	benzo(a)anthracene	annual	average	8.9E-07	9.0E-07	3.0E-06
41	benzo(a)anthracene	annual	average	8.4E-07	8.6E-07	3.2E-06
42	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	3.1E-06
43	benzo(a)anthracene	annual	average	1.1E-06	1.1E-06	3.4E-06
44	benzo(a)anthracene	annual	average	1.2E-06	1.2E-06	3.5E-06
45	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	3.6E-06
46	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	3.6E-06
47	benzo(a)anthracene	annual	average	9.8E-07	1.0E-06	3.7E-06
48	benzo(a)anthracene	annual	average	1.1E-06	1.1E-06	3.6E-06
49	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	3.6E-06
50	benzo(a)anthracene	annual	average	1.1E-06	1.1E-06	3.7E-06
51	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	3.4E-06
52	benzo(a)anthracene	annual	average	1.1E-06	1.1E-06	1.1E-05
53	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	6.3E-06
54	benzo(a)anthracene	annual	average	3.2E-07	3.2E-07	6.6E-07
55	benzo(a)anthracene	annual	average	3.4E-07	3.4E-07	7.4E-07
56	benzo(a)anthracene	annual	average	3.6E-07	3.6E-07	8.0E-07
57	benzo(a)anthracene	annual	average	3.8E-07	3.9E-07	8.0E-07
58	benzo(a)anthracene	annual	average	2.7E-07	2.7E-07	5.7E-07
59	benzo(a)anthracene	annual	average	1.4E-06	1.4E-06	1.1E-05
60	benzo(a)anthracene	annual	average	1.8E-06	1.8E-06	4.4E-06
61	benzo(a)anthracene	annual	average	2.0E-06	2.0E-06	5.1E-06
62	benzo(a)anthracene	annual	average	1.8E-06	1.8E-06	5.3E-06
63	benzo(a)anthracene	annual	average	1.6E-06	1.7E-06	6.1E-06
64	benzo(a)anthracene	annual	average	1.6E-06	1.6E-06	5.8E-06
65	benzo(a)anthracene	annual	average	2.1E-06	2.1E-06	5.3E-06
66	benzo(a)anthracene	annual	average	7.4E-07	7.5E-07	1.6E-06
67	benzo(a)anthracene	annual	average	9.6E-07	9.7E-07	2.0E-06
68	benzo(a)anthracene	annual	average	6.4E-07	6.4E-07	1.4E-06
69	benzo(a)anthracene	annual	average	6.0E-07	6.0E-07	1.4E-06
70	benzo(a)anthracene	annual	average	5.5E-07	5.5E-07	1.3E-06
71	benzo(a)anthracene	annual	average	7.7E-07	7.8E-07	2.2E-06
72	benzo(a)anthracene	annual	average	7.7E-07	7.8E-07	2.2E-06
73	benzo(a)anthracene	annual	average	2.6E-06	2.6E-06	6.0E-06
74	benzo(a)anthracene	annual	average	1.4E-06	1.4E-06	1.7E-05
75	benzo(a)anthracene	annual	average	1.1E-05	1.1E-05	1.2E-05
76	benzo(a)anthracene	annual	average	1.9E-06	1.9E-06	5.1E-06
77	benzo(a)anthracene	annual	average	1.4E-06	1.4E-06	1.2E-05
78	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	3.0E-06
79	benzo(a)anthracene	annual	average	1.0E-06	1.0E-06	2.0E-06
1	benzo(a)pyrene	1hr	max	1.2E-05	1.2E-05	5.4E-05
2	benzo(a)pyrene	1hr	max	1.1E-05	1.1E-05	3.5E-05
3	benzo(a)pyrene	1hr	max	1.3E-05	1.3E-05	3.7E-05
4	benzo(a)pyrene	1hr	max	1.5E-05	1.5E-05	3.7E-05
5	benzo(a)pyrene	1hr	max	2.5E-05	2.5E-05	4.9E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
6	benzo(a)pyrene	1hr	max	2.9E-05	2.9E-05	5.1E-05
7	benzo(a)pyrene	1hr	max	2.1E-05	2.1E-05	5.0E-05
8	benzo(a)pyrene	1hr	max	3.2E-05	3.2E-05	5.2E-05
9	benzo(a)pyrene	1hr	max	2.0E-05	2.0E-05	4.5E-05
10	benzo(a)pyrene	1hr	max	4.5E-05	4.5E-05	5.7E-05
11	benzo(a)pyrene	1hr	max	9.5E-05	9.5E-05	9.6E-05
12	benzo(a)pyrene	1hr	max	6.2E-05	6.2E-05	6.6E-05
13	benzo(a)pyrene	1hr	max	4.5E-05	4.5E-05	6.1E-05
14	benzo(a)pyrene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	benzo(a)pyrene	1hr	max	2.9E-05	2.9E-05	5.4E-05
16	benzo(a)pyrene	1hr	max	2.7E-05	2.7E-05	5.4E-05
17	benzo(a)pyrene	1hr	max	3.2E-05	3.2E-05	4.3E-05
18	benzo(a)pyrene	1hr	max	2.8E-05	2.8E-05	4.7E-05
19	benzo(a)pyrene	1hr	max	3.1E-05	3.1E-05	4.8E-05
20	benzo(a)pyrene	1hr	max	3.3E-05	3.3E-05	5.4E-05
21	benzo(a)pyrene	1hr	max	1.0E-04	1.0E-04	1.1E-04
22	benzo(a)pyrene	1hr	max	8.3E-05	8.3E-05	9.8E-05
23	benzo(a)pyrene	1hr	max	5.6E-05	5.6E-05	8.1E-05
24	benzo(a)pyrene	1hr	max	1.0E-05	1.0E-05	5.5E-05
25	benzo(a)pyrene	1hr	max	1.5E-05	1.5E-05	9.9E-05
26	benzo(a)pyrene	1hr	max	1.4E-05	1.4E-05	1.1E-04
27	benzo(a)pyrene	1hr	max	1.5E-05	1.5E-05	2.1E-04
28	benzo(a)pyrene	1hr	max	3.8E-05	3.8E-05	9.8E-05
29	benzo(a)pyrene	1hr	max	4.7E-05	4.7E-05	1.1E-04
30	benzo(a)pyrene	1hr	max	2.3E-05	2.3E-05	7.6E-05
31	benzo(a)pyrene	1hr	max	2.4E-05	2.4E-05	8.5E-05
32	benzo(a)pyrene	1hr	max	1.2E-05	1.2E-05	3.6E-05
33	benzo(a)pyrene	1hr	max	1.7E-05	1.7E-05	4.3E-05
34	benzo(a)pyrene	1hr	max	1.6E-05	1.6E-05	3.8E-05
35	benzo(a)pyrene	1hr	max	1.4E-05	1.4E-05	5.9E-05
36	benzo(a)pyrene	1hr	max	1.2E-05	1.2E-05	5.7E-05
37	benzo(a)pyrene	1hr	max	1.2E-05	1.2E-05	6.0E-05
38	benzo(a)pyrene	1hr	max	5.0E-05	5.0E-05	1.3E-04
39	benzo(a)pyrene	1hr	max	3.3E-05	3.3E-05	1.3E-04
40	benzo(a)pyrene	1hr	max	2.4E-05	2.4E-05	1.3E-04
41	benzo(a)pyrene	1hr	max	2.0E-05	2.0E-05	1.3E-04
42	benzo(a)pyrene	1hr	max	4.2E-05	4.2E-05	1.6E-04
43	benzo(a)pyrene	1hr	max	2.9E-05	2.9E-05	1.6E-04
44	benzo(a)pyrene	1hr	max	3.0E-05	3.0E-05	1.5E-04
45	benzo(a)pyrene	1hr	max	2.6E-05	2.6E-05	1.3E-04
46	benzo(a)pyrene	1hr	max	2.7E-05	2.7E-05	1.3E-04
47	benzo(a)pyrene	1hr	max	2.8E-05	2.8E-05	1.1E-04
48	benzo(a)pyrene	1hr	max	3.0E-05	3.0E-05	1.2E-04
49	benzo(a)pyrene	1hr	max	2.9E-05	2.9E-05	1.2E-04
50	benzo(a)pyrene	1hr	max	4.2E-05	4.2E-05	1.1E-04
51	benzo(a)pyrene	1hr	max	4.2E-05	4.2E-05	1.2E-04
52	benzo(a)pyrene	1hr	max	2.7E-05	2.7E-05	8.1E-04
53	benzo(a)pyrene	1hr	max	2.4E-05	2.4E-05	3.8E-04
54	benzo(a)pyrene	1hr	max	1.2E-05	1.2E-05	3.2E-05
55	benzo(a)pyrene	1hr	max	1.2E-05	1.2E-05	5.8E-05
56	benzo(a)pyrene	1hr	max	1.1E-05	1.1E-05	7.5E-05
57	benzo(a)pyrene	1hr	max	1.6E-05	1.6E-05	4.6E-05
58	benzo(a)pyrene	1hr	max	1.0E-05	1.0E-05	4.6E-05
59	benzo(a)pyrene	1hr	max	2.3E-05	2.3E-05	5.3E-04
60	benzo(a)pyrene	1hr	max	4.2E-05	4.2E-05	2.6E-04
61	benzo(a)pyrene	1hr	max	8.0E-05	8.0E-05	2.2E-04
62	benzo(a)pyrene	1hr	max	7.1E-05	7.1E-05	2.7E-04
63	benzo(a)pyrene	1hr	max	5.5E-05	5.5E-05	4.4E-04
64	benzo(a)pyrene	1hr	max	5.7E-05	5.7E-05	2.8E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
65	benzo(a)pyrene	1hr	max	7.4E-05	7.4E-05	2.4E-04
66	benzo(a)pyrene	1hr	max	3.0E-05	3.0E-05	5.5E-05
67	benzo(a)pyrene	1hr	max	5.1E-05	5.1E-05	5.5E-05
68	benzo(a)pyrene	1hr	max	2.6E-05	2.6E-05	4.1E-05
69	benzo(a)pyrene	1hr	max	2.3E-05	2.3E-05	4.0E-05
70	benzo(a)pyrene	1hr	max	2.1E-05	2.1E-05	3.8E-05
71	benzo(a)pyrene	1hr	max	3.8E-05	3.8E-05	1.1E-04
72	benzo(a)pyrene	1hr	max	3.7E-05	3.7E-05	1.1E-04
73	benzo(a)pyrene	1hr	max	7.3E-05	7.3E-05	2.8E-04
74	benzo(a)pyrene	1hr	max	3.3E-05	3.3E-05	1.2E-03
75	benzo(a)pyrene	1hr	max	1.1E-04	1.1E-04	1.2E-04
76	benzo(a)pyrene	1hr	max	7.9E-05	7.9E-05	2.4E-04
77	benzo(a)pyrene	1hr	max	4.4E-05	4.4E-05	4.1E-03
78	benzo(a)pyrene	1hr	max	4.8E-05	4.8E-05	1.5E-04
79	benzo(a)pyrene	1hr	max	6.6E-05	6.6E-05	9.7E-05
1	benzo(a)pyrene	1hr	9th	5.7E-06	5.7E-06	2.7E-05
2	benzo(a)pyrene	1hr	9th	9.1E-06	9.1E-06	2.4E-05
3	benzo(a)pyrene	1hr	9th	9.6E-06	9.6E-06	2.6E-05
4	benzo(a)pyrene	1hr	9th	1.0E-05	1.0E-05	3.0E-05
5	benzo(a)pyrene	1hr	9th	1.2E-05	1.2E-05	3.7E-05
6	benzo(a)pyrene	1hr	9th	1.3E-05	1.3E-05	3.7E-05
7	benzo(a)pyrene	1hr	9th	9.9E-06	1.0E-05	3.2E-05
8	benzo(a)pyrene	1hr	9th	1.2E-05	1.2E-05	3.9E-05
9	benzo(a)pyrene	1hr	9th	1.3E-05	1.3E-05	3.3E-05
10	benzo(a)pyrene	1hr	9th	2.9E-05	2.9E-05	4.6E-05
11	benzo(a)pyrene	1hr	9th	6.4E-05	6.4E-05	7.6E-05
12	benzo(a)pyrene	1hr	9th	3.2E-05	3.2E-05	5.2E-05
13	benzo(a)pyrene	1hr	9th	3.3E-05	3.3E-05	4.8E-05
14	benzo(a)pyrene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	benzo(a)pyrene	1hr	9th	1.5E-05	1.6E-05	3.7E-05
16	benzo(a)pyrene	1hr	9th	1.5E-05	1.5E-05	3.6E-05
17	benzo(a)pyrene	1hr	9th	2.0E-05	2.0E-05	3.9E-05
18	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	4.1E-05
19	benzo(a)pyrene	1hr	9th	1.7E-05	1.7E-05	4.1E-05
20	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	4.5E-05
21	benzo(a)pyrene	1hr	9th	3.6E-05	3.6E-05	6.1E-05
22	benzo(a)pyrene	1hr	9th	3.7E-05	3.7E-05	6.1E-05
23	benzo(a)pyrene	1hr	9th	2.6E-05	2.6E-05	4.8E-05
24	benzo(a)pyrene	1hr	9th	7.6E-06	7.6E-06	3.0E-05
25	benzo(a)pyrene	1hr	9th	9.6E-06	9.6E-06	7.3E-05
26	benzo(a)pyrene	1hr	9th	9.5E-06	9.5E-06	8.4E-05
27	benzo(a)pyrene	1hr	9th	1.0E-05	1.0E-05	1.5E-04
28	benzo(a)pyrene	1hr	9th	2.4E-05	2.4E-05	5.7E-05
29	benzo(a)pyrene	1hr	9th	2.7E-05	2.7E-05	5.6E-05
30	benzo(a)pyrene	1hr	9th	1.5E-05	1.5E-05	4.4E-05
31	benzo(a)pyrene	1hr	9th	1.6E-05	1.6E-05	5.1E-05
32	benzo(a)pyrene	1hr	9th	6.1E-06	6.1E-06	2.3E-05
33	benzo(a)pyrene	1hr	9th	8.7E-06	8.7E-06	2.6E-05
34	benzo(a)pyrene	1hr	9th	7.8E-06	7.8E-06	2.6E-05
35	benzo(a)pyrene	1hr	9th	6.9E-06	7.0E-06	2.8E-05
36	benzo(a)pyrene	1hr	9th	7.0E-06	7.0E-06	3.1E-05
37	benzo(a)pyrene	1hr	9th	6.8E-06	6.8E-06	3.2E-05
38	benzo(a)pyrene	1hr	9th	2.9E-05	2.9E-05	6.9E-05
39	benzo(a)pyrene	1hr	9th	2.6E-05	2.6E-05	7.4E-05
40	benzo(a)pyrene	1hr	9th	2.0E-05	2.0E-05	9.0E-05
41	benzo(a)pyrene	1hr	9th	1.5E-05	1.5E-05	8.9E-05
42	benzo(a)pyrene	1hr	9th	2.5E-05	2.5E-05	6.6E-05
43	benzo(a)pyrene	1hr	9th	2.1E-05	2.1E-05	6.7E-05
44	benzo(a)pyrene	1hr	9th	2.1E-05	2.1E-05	7.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
45	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	7.1E-05
46	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	7.1E-05
47	benzo(a)pyrene	1hr	9th	1.8E-05	1.8E-05	7.1E-05
48	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	7.2E-05
49	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	7.4E-05
50	benzo(a)pyrene	1hr	9th	2.2E-05	2.2E-05	7.4E-05
51	benzo(a)pyrene	1hr	9th	2.4E-05	2.4E-05	6.5E-05
52	benzo(a)pyrene	1hr	9th	1.4E-05	1.4E-05	3.8E-04
53	benzo(a)pyrene	1hr	9th	1.2E-05	1.2E-05	1.7E-04
54	benzo(a)pyrene	1hr	9th	6.2E-06	6.2E-06	2.2E-05
55	benzo(a)pyrene	1hr	9th	6.5E-06	6.5E-06	2.7E-05
56	benzo(a)pyrene	1hr	9th	6.6E-06	6.6E-06	3.0E-05
57	benzo(a)pyrene	1hr	9th	7.5E-06	7.5E-06	2.5E-05
58	benzo(a)pyrene	1hr	9th	6.4E-06	6.4E-06	2.0E-05
59	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	2.2E-04
60	benzo(a)pyrene	1hr	9th	2.5E-05	2.5E-05	1.0E-04
61	benzo(a)pyrene	1hr	9th	3.1E-05	3.1E-05	1.4E-04
62	benzo(a)pyrene	1hr	9th	2.4E-05	2.4E-05	1.7E-04
63	benzo(a)pyrene	1hr	9th	2.2E-05	2.2E-05	2.7E-04
64	benzo(a)pyrene	1hr	9th	2.2E-05	2.2E-05	2.5E-04
65	benzo(a)pyrene	1hr	9th	2.8E-05	2.8E-05	1.7E-04
66	benzo(a)pyrene	1hr	9th	1.8E-05	1.8E-05	3.7E-05
67	benzo(a)pyrene	1hr	9th	2.4E-05	2.4E-05	4.1E-05
68	benzo(a)pyrene	1hr	9th	1.4E-05	1.4E-05	3.0E-05
69	benzo(a)pyrene	1hr	9th	1.0E-05	1.0E-05	3.0E-05
70	benzo(a)pyrene	1hr	9th	8.2E-06	8.2E-06	2.9E-05
71	benzo(a)pyrene	1hr	9th	2.1E-05	2.1E-05	8.0E-05
72	benzo(a)pyrene	1hr	9th	2.0E-05	2.0E-05	8.0E-05
73	benzo(a)pyrene	1hr	9th	2.8E-05	2.8E-05	1.8E-04
74	benzo(a)pyrene	1hr	9th	1.9E-05	1.9E-05	4.6E-04
75	benzo(a)pyrene	1hr	9th	6.4E-05	6.4E-05	7.0E-05
76	benzo(a)pyrene	1hr	9th	3.1E-05	3.1E-05	1.4E-04
77	benzo(a)pyrene	1hr	9th	2.1E-05	2.1E-05	1.8E-03
78	benzo(a)pyrene	1hr	9th	2.5E-05	2.5E-05	6.4E-05
79	benzo(a)pyrene	1hr	9th	2.7E-05	2.7E-05	5.4E-05
1	benzo(a)pyrene	24hr	max	2.7E-06	2.7E-06	9.2E-06
2	benzo(a)pyrene	24hr	max	3.7E-06	3.7E-06	1.0E-05
3	benzo(a)pyrene	24hr	max	3.8E-06	3.8E-06	1.1E-05
4	benzo(a)pyrene	24hr	max	4.3E-06	4.3E-06	1.3E-05
5	benzo(a)pyrene	24hr	max	4.5E-06	4.5E-06	1.6E-05
6	benzo(a)pyrene	24hr	max	4.7E-06	4.7E-06	1.7E-05
7	benzo(a)pyrene	24hr	max	4.5E-06	4.5E-06	1.2E-05
8	benzo(a)pyrene	24hr	max	5.6E-06	5.6E-06	1.7E-05
9	benzo(a)pyrene	24hr	max	4.2E-06	4.2E-06	1.6E-05
10	benzo(a)pyrene	24hr	max	1.2E-05	1.2E-05	1.9E-05
11	benzo(a)pyrene	24hr	max	2.4E-05	2.4E-05	2.9E-05
12	benzo(a)pyrene	24hr	max	9.6E-06	9.6E-06	2.1E-05
13	benzo(a)pyrene	24hr	max	1.1E-05	1.1E-05	2.0E-05
14	benzo(a)pyrene	24hr	max	3.5E-05	3.5E-05	3.5E-05
15	benzo(a)pyrene	24hr	max	6.6E-06	6.6E-06	1.6E-05
16	benzo(a)pyrene	24hr	max	6.7E-06	6.7E-06	1.6E-05
17	benzo(a)pyrene	24hr	max	7.3E-06	7.3E-06	1.7E-05
18	benzo(a)pyrene	24hr	max	8.0E-06	8.0E-06	1.8E-05
19	benzo(a)pyrene	24hr	max	7.6E-06	7.6E-06	1.8E-05
20	benzo(a)pyrene	24hr	max	7.1E-06	7.1E-06	1.8E-05
21	benzo(a)pyrene	24hr	max	1.5E-05	1.5E-05	2.3E-05
22	benzo(a)pyrene	24hr	max	1.6E-05	1.6E-05	2.2E-05
23	benzo(a)pyrene	24hr	max	1.1E-05	1.1E-05	2.1E-05
24	benzo(a)pyrene	24hr	max	3.4E-06	3.4E-06	1.6E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
25	benzo(a)pyrene	24hr	max	3.8E-06	3.8E-06	2.9E-05
26	benzo(a)pyrene	24hr	max	3.7E-06	3.7E-06	3.0E-05
27	benzo(a)pyrene	24hr	max	4.1E-06	4.1E-06	4.6E-05
28	benzo(a)pyrene	24hr	max	6.8E-06	6.8E-06	2.8E-05
29	benzo(a)pyrene	24hr	max	7.2E-06	7.2E-06	3.0E-05
30	benzo(a)pyrene	24hr	max	6.6E-06	6.6E-06	1.6E-05
31	benzo(a)pyrene	24hr	max	6.8E-06	6.8E-06	1.7E-05
32	benzo(a)pyrene	24hr	max	3.2E-06	3.3E-06	7.6E-06
33	benzo(a)pyrene	24hr	max	4.6E-06	4.6E-06	1.0E-05
34	benzo(a)pyrene	24hr	max	4.2E-06	4.3E-06	1.0E-05
35	benzo(a)pyrene	24hr	max	3.5E-06	3.5E-06	8.3E-06
36	benzo(a)pyrene	24hr	max	3.3E-06	3.4E-06	1.0E-05
37	benzo(a)pyrene	24hr	max	3.3E-06	3.3E-06	1.2E-05
38	benzo(a)pyrene	24hr	max	1.1E-05	1.1E-05	2.8E-05
39	benzo(a)pyrene	24hr	max	9.2E-06	9.2E-06	3.2E-05
40	benzo(a)pyrene	24hr	max	6.3E-06	6.3E-06	3.7E-05
41	benzo(a)pyrene	24hr	max	5.7E-06	5.7E-06	4.2E-05
42	benzo(a)pyrene	24hr	max	7.8E-06	7.8E-06	3.6E-05
43	benzo(a)pyrene	24hr	max	7.4E-06	7.4E-06	3.5E-05
44	benzo(a)pyrene	24hr	max	7.3E-06	7.4E-06	3.5E-05
45	benzo(a)pyrene	24hr	max	6.8E-06	6.8E-06	3.4E-05
46	benzo(a)pyrene	24hr	max	6.9E-06	6.9E-06	3.4E-05
47	benzo(a)pyrene	24hr	max	6.1E-06	6.1E-06	2.9E-05
48	benzo(a)pyrene	24hr	max	6.7E-06	6.8E-06	3.2E-05
49	benzo(a)pyrene	24hr	max	6.5E-06	6.5E-06	3.1E-05
50	benzo(a)pyrene	24hr	max	6.6E-06	6.6E-06	2.9E-05
51	benzo(a)pyrene	24hr	max	7.3E-06	7.3E-06	3.1E-05
52	benzo(a)pyrene	24hr	max	7.0E-06	7.0E-06	1.6E-04
53	benzo(a)pyrene	24hr	max	6.5E-06	6.5E-06	6.8E-05
54	benzo(a)pyrene	24hr	max	3.2E-06	3.2E-06	1.1E-05
55	benzo(a)pyrene	24hr	max	3.0E-06	3.0E-06	1.6E-05
56	benzo(a)pyrene	24hr	max	2.9E-06	2.9E-06	1.8E-05
57	benzo(a)pyrene	24hr	max	3.4E-06	3.4E-06	1.2E-05
58	benzo(a)pyrene	24hr	max	2.8E-06	2.8E-06	1.3E-05
59	benzo(a)pyrene	24hr	max	8.1E-06	8.1E-06	8.6E-05
60	benzo(a)pyrene	24hr	max	1.2E-05	1.2E-05	4.4E-05
61	benzo(a)pyrene	24hr	max	1.2E-05	1.2E-05	6.0E-05
62	benzo(a)pyrene	24hr	max	1.1E-05	1.1E-05	6.7E-05
63	benzo(a)pyrene	24hr	max	9.0E-06	9.0E-06	1.0E-04
64	benzo(a)pyrene	24hr	max	9.4E-06	9.4E-06	9.7E-05
65	benzo(a)pyrene	24hr	max	1.2E-05	1.2E-05	3.9E-05
66	benzo(a)pyrene	24hr	max	1.1E-05	1.1E-05	1.9E-05
67	benzo(a)pyrene	24hr	max	7.2E-06	7.2E-06	1.7E-05
68	benzo(a)pyrene	24hr	max	6.6E-06	6.6E-06	1.7E-05
69	benzo(a)pyrene	24hr	max	4.1E-06	4.1E-06	1.5E-05
70	benzo(a)pyrene	24hr	max	4.3E-06	4.3E-06	1.1E-05
71	benzo(a)pyrene	24hr	max	9.6E-06	9.6E-06	2.5E-05
72	benzo(a)pyrene	24hr	max	9.4E-06	9.4E-06	2.5E-05
73	benzo(a)pyrene	24hr	max	1.2E-05	1.2E-05	3.6E-05
74	benzo(a)pyrene	24hr	max	8.3E-06	8.3E-06	1.4E-04
75	benzo(a)pyrene	24hr	max	3.3E-05	3.3E-05	3.6E-05
76	benzo(a)pyrene	24hr	max	1.2E-05	1.2E-05	6.1E-05
77	benzo(a)pyrene	24hr	max	8.7E-06	8.7E-06	3.3E-04
78	benzo(a)pyrene	24hr	max	8.9E-06	8.9E-06	3.9E-05
79	benzo(a)pyrene	24hr	max	1.4E-05	1.4E-05	2.4E-05
1	benzo(a)pyrene	annual	average	1.6E-07	1.6E-07	3.8E-07
2	benzo(a)pyrene	annual	average	3.0E-07	3.1E-07	6.8E-07
3	benzo(a)pyrene	annual	average	3.1E-07	3.2E-07	7.1E-07
4	benzo(a)pyrene	annual	average	3.4E-07	3.5E-07	7.8E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
5	benzo(a)pyrene	annual	average	4.0E-07	4.1E-07	9.3E-07
6	benzo(a)pyrene	annual	average	4.1E-07	4.2E-07	9.6E-07
7	benzo(a)pyrene	annual	average	3.6E-07	3.7E-07	8.4E-07
8	benzo(a)pyrene	annual	average	4.3E-07	4.3E-07	9.9E-07
9	benzo(a)pyrene	annual	average	4.0E-07	4.0E-07	9.5E-07
10	benzo(a)pyrene	annual	average	6.7E-07	6.7E-07	1.5E-06
11	benzo(a)pyrene	annual	average	1.1E-06	1.1E-06	2.1E-06
12	benzo(a)pyrene	annual	average	9.5E-07	9.6E-07	1.9E-06
13	benzo(a)pyrene	annual	average	8.8E-07	8.8E-07	1.8E-06
14	benzo(a)pyrene	annual	average	1.9E-06	1.9E-06	3.1E-06
15	benzo(a)pyrene	annual	average	4.9E-07	5.0E-07	1.1E-06
16	benzo(a)pyrene	annual	average	4.8E-07	4.9E-07	1.1E-06
17	benzo(a)pyrene	annual	average	5.4E-07	5.5E-07	1.2E-06
18	benzo(a)pyrene	annual	average	5.9E-07	6.0E-07	1.3E-06
19	benzo(a)pyrene	annual	average	5.9E-07	6.0E-07	1.3E-06
20	benzo(a)pyrene	annual	average	6.4E-07	6.5E-07	1.5E-06
21	benzo(a)pyrene	annual	average	9.7E-07	9.7E-07	2.0E-06
22	benzo(a)pyrene	annual	average	9.1E-07	9.2E-07	1.9E-06
23	benzo(a)pyrene	annual	average	6.4E-07	6.5E-07	1.5E-06
24	benzo(a)pyrene	annual	average	3.1E-07	3.2E-07	7.5E-07
25	benzo(a)pyrene	annual	average	3.8E-07	4.1E-07	1.3E-06
26	benzo(a)pyrene	annual	average	4.4E-07	4.6E-07	1.5E-06
27	benzo(a)pyrene	annual	average	5.2E-07	5.6E-07	2.3E-06
28	benzo(a)pyrene	annual	average	7.4E-07	7.5E-07	1.8E-06
29	benzo(a)pyrene	annual	average	7.8E-07	7.9E-07	1.9E-06
30	benzo(a)pyrene	annual	average	3.5E-07	3.6E-07	1.0E-06
31	benzo(a)pyrene	annual	average	3.7E-07	3.8E-07	1.1E-06
32	benzo(a)pyrene	annual	average	1.6E-07	1.6E-07	4.2E-07
33	benzo(a)pyrene	annual	average	2.1E-07	2.1E-07	5.6E-07
34	benzo(a)pyrene	annual	average	2.1E-07	2.2E-07	5.5E-07
35	benzo(a)pyrene	annual	average	2.2E-07	2.3E-07	5.6E-07
36	benzo(a)pyrene	annual	average	2.4E-07	2.4E-07	6.0E-07
37	benzo(a)pyrene	annual	average	2.3E-07	2.4E-07	6.0E-07
38	benzo(a)pyrene	annual	average	7.5E-07	7.6E-07	2.2E-06
39	benzo(a)pyrene	annual	average	7.2E-07	7.3E-07	2.4E-06
40	benzo(a)pyrene	annual	average	6.9E-07	7.0E-07	2.7E-06
41	benzo(a)pyrene	annual	average	6.4E-07	6.5E-07	2.9E-06
42	benzo(a)pyrene	annual	average	8.2E-07	8.3E-07	2.8E-06
43	benzo(a)pyrene	annual	average	8.3E-07	8.4E-07	3.0E-06
44	benzo(a)pyrene	annual	average	8.5E-07	8.6E-07	3.1E-06
45	benzo(a)pyrene	annual	average	7.7E-07	7.8E-07	3.2E-06
46	benzo(a)pyrene	annual	average	7.8E-07	7.8E-07	3.2E-06
47	benzo(a)pyrene	annual	average	7.6E-07	7.6E-07	3.3E-06
48	benzo(a)pyrene	annual	average	8.1E-07	8.2E-07	3.2E-06
49	benzo(a)pyrene	annual	average	7.8E-07	7.9E-07	3.2E-06
50	benzo(a)pyrene	annual	average	8.1E-07	8.2E-07	3.3E-06
51	benzo(a)pyrene	annual	average	8.2E-07	8.2E-07	3.0E-06
52	benzo(a)pyrene	annual	average	8.3E-07	8.3E-07	1.0E-05
53	benzo(a)pyrene	annual	average	7.5E-07	7.5E-07	5.9E-06
54	benzo(a)pyrene	annual	average	2.4E-07	2.4E-07	5.4E-07
55	benzo(a)pyrene	annual	average	2.6E-07	2.6E-07	6.1E-07
56	benzo(a)pyrene	annual	average	2.7E-07	2.7E-07	6.7E-07
57	benzo(a)pyrene	annual	average	2.9E-07	2.9E-07	6.6E-07
58	benzo(a)pyrene	annual	average	2.0E-07	2.0E-07	4.7E-07
59	benzo(a)pyrene	annual	average	1.0E-06	1.0E-06	1.1E-05
60	benzo(a)pyrene	annual	average	1.4E-06	1.4E-06	3.6E-06
61	benzo(a)pyrene	annual	average	1.4E-06	1.4E-06	4.2E-06
62	benzo(a)pyrene	annual	average	1.3E-06	1.3E-06	4.5E-06
63	benzo(a)pyrene	annual	average	1.2E-06	1.2E-06	5.3E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
64	benzo(a)pyrene	annual	average	1.2E-06	1.2E-06	5.1E-06
65	benzo(a)pyrene	annual	average	1.4E-06	1.4E-06	4.4E-06
66	benzo(a)pyrene	annual	average	6.0E-07	6.1E-07	1.4E-06
67	benzo(a)pyrene	annual	average	8.1E-07	8.2E-07	1.8E-06
68	benzo(a)pyrene	annual	average	5.0E-07	5.1E-07	1.2E-06
69	benzo(a)pyrene	annual	average	4.7E-07	4.7E-07	1.2E-06
70	benzo(a)pyrene	annual	average	4.4E-07	4.4E-07	1.1E-06
71	benzo(a)pyrene	annual	average	5.6E-07	5.7E-07	1.8E-06
72	benzo(a)pyrene	annual	average	5.6E-07	5.6E-07	1.8E-06
73	benzo(a)pyrene	annual	average	1.7E-06	1.7E-06	4.9E-06
74	benzo(a)pyrene	annual	average	1.0E-06	1.0E-06	1.7E-05
75	benzo(a)pyrene	annual	average	5.2E-06	5.2E-06	6.3E-06
76	benzo(a)pyrene	annual	average	1.4E-06	1.4E-06	4.2E-06
77	benzo(a)pyrene	annual	average	1.0E-06	1.0E-06	1.1E-05
78	benzo(a)pyrene	annual	average	8.1E-07	8.2E-07	2.6E-06
79	benzo(a)pyrene	annual	average	8.3E-07	8.3E-07	1.8E-06
1	benzo(b)fluoranthene	1hr	max	3.0E-05	3.0E-05	6.0E-05
2	benzo(b)fluoranthene	1hr	max	3.2E-05	3.2E-05	5.1E-05
3	benzo(b)fluoranthene	1hr	max	3.4E-05	3.4E-05	5.3E-05
4	benzo(b)fluoranthene	1hr	max	2.9E-05	2.9E-05	5.3E-05
5	benzo(b)fluoranthene	1hr	max	2.7E-05	2.8E-05	5.9E-05
6	benzo(b)fluoranthene	1hr	max	2.9E-05	2.9E-05	6.0E-05
7	benzo(b)fluoranthene	1hr	max	2.8E-05	2.9E-05	5.7E-05
8	benzo(b)fluoranthene	1hr	max	3.2E-05	3.2E-05	6.0E-05
9	benzo(b)fluoranthene	1hr	max	3.0E-05	3.0E-05	6.5E-05
10	benzo(b)fluoranthene	1hr	max	4.8E-05	4.8E-05	7.3E-05
11	benzo(b)fluoranthene	1hr	max	9.5E-05	9.5E-05	1.1E-04
12	benzo(b)fluoranthene	1hr	max	6.6E-05	6.6E-05	9.6E-05
13	benzo(b)fluoranthene	1hr	max	6.3E-05	6.3E-05	9.2E-05
14	benzo(b)fluoranthene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	benzo(b)fluoranthene	1hr	max	4.2E-05	4.2E-05	8.5E-05
16	benzo(b)fluoranthene	1hr	max	3.9E-05	3.9E-05	8.6E-05
17	benzo(b)fluoranthene	1hr	max	5.1E-05	5.1E-05	6.3E-05
18	benzo(b)fluoranthene	1hr	max	5.8E-05	5.8E-05	6.9E-05
19	benzo(b)fluoranthene	1hr	max	5.8E-05	5.8E-05	7.0E-05
20	benzo(b)fluoranthene	1hr	max	7.5E-05	7.5E-05	9.8E-05
21	benzo(b)fluoranthene	1hr	max	1.0E-04	1.0E-04	1.5E-04
22	benzo(b)fluoranthene	1hr	max	9.8E-05	9.8E-05	1.5E-04
23	benzo(b)fluoranthene	1hr	max	8.9E-05	8.9E-05	1.2E-04
24	benzo(b)fluoranthene	1hr	max	3.0E-05	3.0E-05	5.8E-05
25	benzo(b)fluoranthene	1hr	max	6.3E-05	6.3E-05	9.9E-05
26	benzo(b)fluoranthene	1hr	max	5.4E-05	5.4E-05	1.1E-04
27	benzo(b)fluoranthene	1hr	max	3.9E-05	3.9E-05	2.1E-04
28	benzo(b)fluoranthene	1hr	max	1.0E-04	1.0E-04	1.5E-04
29	benzo(b)fluoranthene	1hr	max	1.0E-04	1.0E-04	1.5E-04
30	benzo(b)fluoranthene	1hr	max	7.9E-05	7.9E-05	1.1E-04
31	benzo(b)fluoranthene	1hr	max	8.7E-05	8.7E-05	1.2E-04
32	benzo(b)fluoranthene	1hr	max	2.4E-05	2.4E-05	4.5E-05
33	benzo(b)fluoranthene	1hr	max	3.4E-05	3.4E-05	5.1E-05
34	benzo(b)fluoranthene	1hr	max	3.7E-05	3.7E-05	5.4E-05
35	benzo(b)fluoranthene	1hr	max	3.1E-05	3.1E-05	5.9E-05
36	benzo(b)fluoranthene	1hr	max	3.5E-05	3.5E-05	5.7E-05
37	benzo(b)fluoranthene	1hr	max	3.7E-05	3.7E-05	6.6E-05
38	benzo(b)fluoranthene	1hr	max	1.2E-04	1.2E-04	1.4E-04
39	benzo(b)fluoranthene	1hr	max	1.1E-04	1.1E-04	1.5E-04
40	benzo(b)fluoranthene	1hr	max	9.6E-05	9.6E-05	1.4E-04
41	benzo(b)fluoranthene	1hr	max	6.6E-05	6.6E-05	1.3E-04
42	benzo(b)fluoranthene	1hr	max	8.9E-05	8.9E-05	1.7E-04
43	benzo(b)fluoranthene	1hr	max	8.3E-05	8.3E-05	1.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
44	benzo(b)fluoranthene	1hr	max	8.1E-05	8.1E-05	1.5E-04
45	benzo(b)fluoranthene	1hr	max	7.0E-05	7.0E-05	1.3E-04
46	benzo(b)fluoranthene	1hr	max	7.1E-05	7.1E-05	1.3E-04
47	benzo(b)fluoranthene	1hr	max	5.9E-05	5.9E-05	1.1E-04
48	benzo(b)fluoranthene	1hr	max	7.1E-05	7.1E-05	1.2E-04
49	benzo(b)fluoranthene	1hr	max	6.7E-05	6.7E-05	1.2E-04
50	benzo(b)fluoranthene	1hr	max	6.6E-05	6.6E-05	1.1E-04
51	benzo(b)fluoranthene	1hr	max	6.7E-05	6.7E-05	1.2E-04
52	benzo(b)fluoranthene	1hr	max	6.4E-05	6.4E-05	8.3E-04
53	benzo(b)fluoranthene	1hr	max	6.9E-05	6.9E-05	3.8E-04
54	benzo(b)fluoranthene	1hr	max	2.3E-05	2.3E-05	3.5E-05
55	benzo(b)fluoranthene	1hr	max	3.3E-05	3.3E-05	6.1E-05
56	benzo(b)fluoranthene	1hr	max	3.1E-05	3.1E-05	7.9E-05
57	benzo(b)fluoranthene	1hr	max	3.7E-05	3.7E-05	4.7E-05
58	benzo(b)fluoranthene	1hr	max	2.1E-05	2.1E-05	5.0E-05
59	benzo(b)fluoranthene	1hr	max	7.9E-05	7.9E-05	5.4E-04
60	benzo(b)fluoranthene	1hr	max	1.6E-04	1.6E-04	2.6E-04
61	benzo(b)fluoranthene	1hr	max	1.9E-04	1.9E-04	2.5E-04
62	benzo(b)fluoranthene	1hr	max	1.6E-04	1.6E-04	2.7E-04
63	benzo(b)fluoranthene	1hr	max	1.3E-04	1.3E-04	4.4E-04
64	benzo(b)fluoranthene	1hr	max	1.3E-04	1.3E-04	2.9E-04
65	benzo(b)fluoranthene	1hr	max	1.4E-04	1.4E-04	2.4E-04
66	benzo(b)fluoranthene	1hr	max	4.5E-05	4.5E-05	6.8E-05
67	benzo(b)fluoranthene	1hr	max	6.0E-05	6.0E-05	9.1E-05
68	benzo(b)fluoranthene	1hr	max	4.5E-05	4.5E-05	7.7E-05
69	benzo(b)fluoranthene	1hr	max	4.8E-05	4.8E-05	7.4E-05
70	benzo(b)fluoranthene	1hr	max	4.5E-05	4.5E-05	6.5E-05
71	benzo(b)fluoranthene	1hr	max	6.8E-05	6.8E-05	1.1E-04
72	benzo(b)fluoranthene	1hr	max	6.9E-05	6.9E-05	1.1E-04
73	benzo(b)fluoranthene	1hr	max	1.4E-04	1.4E-04	2.8E-04
74	benzo(b)fluoranthene	1hr	max	9.0E-05	9.0E-05	1.2E-03
75	benzo(b)fluoranthene	1hr	max	3.4E-04	3.4E-04	3.9E-04
76	benzo(b)fluoranthene	1hr	max	1.9E-04	1.9E-04	2.5E-04
77	benzo(b)fluoranthene	1hr	max	8.2E-05	8.2E-05	4.1E-03
78	benzo(b)fluoranthene	1hr	max	9.1E-05	9.1E-05	1.6E-04
79	benzo(b)fluoranthene	1hr	max	1.0E-04	1.0E-04	1.5E-04
1	benzo(b)fluoranthene	1hr	9th	1.5E-05	1.5E-05	3.0E-05
2	benzo(b)fluoranthene	1hr	9th	1.7E-05	1.7E-05	3.6E-05
3	benzo(b)fluoranthene	1hr	9th	1.9E-05	1.9E-05	3.8E-05
4	benzo(b)fluoranthene	1hr	9th	1.7E-05	1.7E-05	3.9E-05
5	benzo(b)fluoranthene	1hr	9th	2.0E-05	2.0E-05	4.3E-05
6	benzo(b)fluoranthene	1hr	9th	2.1E-05	2.1E-05	4.4E-05
7	benzo(b)fluoranthene	1hr	9th	1.7E-05	1.7E-05	3.7E-05
8	benzo(b)fluoranthene	1hr	9th	1.9E-05	1.9E-05	4.4E-05
9	benzo(b)fluoranthene	1hr	9th	1.8E-05	1.8E-05	4.1E-05
10	benzo(b)fluoranthene	1hr	9th	3.2E-05	3.2E-05	5.4E-05
11	benzo(b)fluoranthene	1hr	9th	6.6E-05	6.6E-05	8.3E-05
12	benzo(b)fluoranthene	1hr	9th	3.5E-05	3.5E-05	5.9E-05
13	benzo(b)fluoranthene	1hr	9th	3.9E-05	3.9E-05	5.7E-05
14	benzo(b)fluoranthene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	benzo(b)fluoranthene	1hr	9th	2.5E-05	2.5E-05	4.3E-05
16	benzo(b)fluoranthene	1hr	9th	2.5E-05	2.5E-05	4.3E-05
17	benzo(b)fluoranthene	1hr	9th	2.5E-05	2.5E-05	4.2E-05
18	benzo(b)fluoranthene	1hr	9th	2.7E-05	2.7E-05	4.4E-05
19	benzo(b)fluoranthene	1hr	9th	2.3E-05	2.3E-05	4.5E-05
20	benzo(b)fluoranthene	1hr	9th	2.2E-05	2.2E-05	5.2E-05
21	benzo(b)fluoranthene	1hr	9th	3.7E-05	3.7E-05	6.7E-05
22	benzo(b)fluoranthene	1hr	9th	3.9E-05	3.9E-05	6.9E-05
23	benzo(b)fluoranthene	1hr	9th	2.8E-05	2.8E-05	6.0E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
24	benzo(b)fluoranthene	1hr	9th	1.6E-05	1.6E-05	3.6E-05
25	benzo(b)fluoranthene	1hr	9th	3.2E-05	3.2E-05	7.7E-05
26	benzo(b)fluoranthene	1hr	9th	2.9E-05	2.9E-05	8.9E-05
27	benzo(b)fluoranthene	1hr	9th	2.7E-05	2.7E-05	1.6E-04
28	benzo(b)fluoranthene	1hr	9th	2.9E-05	2.9E-05	6.5E-05
29	benzo(b)fluoranthene	1hr	9th	3.0E-05	3.0E-05	6.9E-05
30	benzo(b)fluoranthene	1hr	9th	3.5E-05	3.5E-05	6.1E-05
31	benzo(b)fluoranthene	1hr	9th	3.7E-05	3.7E-05	6.3E-05
32	benzo(b)fluoranthene	1hr	9th	1.6E-05	1.6E-05	2.8E-05
33	benzo(b)fluoranthene	1hr	9th	2.3E-05	2.3E-05	4.0E-05
34	benzo(b)fluoranthene	1hr	9th	2.3E-05	2.3E-05	3.5E-05
35	benzo(b)fluoranthene	1hr	9th	1.9E-05	1.9E-05	4.1E-05
36	benzo(b)fluoranthene	1hr	9th	1.8E-05	1.8E-05	4.1E-05
37	benzo(b)fluoranthene	1hr	9th	1.9E-05	1.9E-05	3.9E-05
38	benzo(b)fluoranthene	1hr	9th	3.5E-05	3.5E-05	8.4E-05
39	benzo(b)fluoranthene	1hr	9th	3.1E-05	3.1E-05	8.0E-05
40	benzo(b)fluoranthene	1hr	9th	2.8E-05	2.8E-05	9.4E-05
41	benzo(b)fluoranthene	1hr	9th	3.1E-05	3.1E-05	1.0E-04
42	benzo(b)fluoranthene	1hr	9th	3.0E-05	3.0E-05	8.0E-05
43	benzo(b)fluoranthene	1hr	9th	2.7E-05	2.7E-05	8.3E-05
44	benzo(b)fluoranthene	1hr	9th	2.6E-05	2.6E-05	7.9E-05
45	benzo(b)fluoranthene	1hr	9th	2.6E-05	2.6E-05	8.0E-05
46	benzo(b)fluoranthene	1hr	9th	2.5E-05	2.5E-05	7.9E-05
47	benzo(b)fluoranthene	1hr	9th	2.7E-05	2.7E-05	8.0E-05
48	benzo(b)fluoranthene	1hr	9th	2.8E-05	2.8E-05	7.9E-05
49	benzo(b)fluoranthene	1hr	9th	2.8E-05	2.8E-05	8.0E-05
50	benzo(b)fluoranthene	1hr	9th	2.9E-05	2.9E-05	8.3E-05
51	benzo(b)fluoranthene	1hr	9th	2.9E-05	2.9E-05	8.1E-05
52	benzo(b)fluoranthene	1hr	9th	4.3E-05	4.3E-05	3.9E-04
53	benzo(b)fluoranthene	1hr	9th	3.6E-05	3.6E-05	1.9E-04
54	benzo(b)fluoranthene	1hr	9th	1.4E-05	1.4E-05	2.9E-05
55	benzo(b)fluoranthene	1hr	9th	1.6E-05	1.6E-05	3.5E-05
56	benzo(b)fluoranthene	1hr	9th	1.5E-05	1.5E-05	3.6E-05
57	benzo(b)fluoranthene	1hr	9th	1.6E-05	1.6E-05	3.2E-05
58	benzo(b)fluoranthene	1hr	9th	1.5E-05	1.5E-05	2.7E-05
59	benzo(b)fluoranthene	1hr	9th	5.3E-05	5.3E-05	2.2E-04
60	benzo(b)fluoranthene	1hr	9th	7.8E-05	7.8E-05	1.5E-04
61	benzo(b)fluoranthene	1hr	9th	8.9E-05	8.9E-05	1.5E-04
62	benzo(b)fluoranthene	1hr	9th	7.2E-05	7.2E-05	1.7E-04
63	benzo(b)fluoranthene	1hr	9th	6.7E-05	6.7E-05	2.7E-04
64	benzo(b)fluoranthene	1hr	9th	7.1E-05	7.1E-05	2.5E-04
65	benzo(b)fluoranthene	1hr	9th	8.3E-05	8.3E-05	1.7E-04
66	benzo(b)fluoranthene	1hr	9th	2.9E-05	2.9E-05	4.7E-05
67	benzo(b)fluoranthene	1hr	9th	2.7E-05	2.7E-05	5.0E-05
68	benzo(b)fluoranthene	1hr	9th	1.9E-05	1.9E-05	4.0E-05
69	benzo(b)fluoranthene	1hr	9th	1.8E-05	1.8E-05	3.8E-05
70	benzo(b)fluoranthene	1hr	9th	1.6E-05	1.6E-05	3.6E-05
71	benzo(b)fluoranthene	1hr	9th	4.8E-05	4.8E-05	9.1E-05
72	benzo(b)fluoranthene	1hr	9th	4.8E-05	4.8E-05	9.2E-05
73	benzo(b)fluoranthene	1hr	9th	8.4E-05	8.4E-05	1.9E-04
74	benzo(b)fluoranthene	1hr	9th	5.2E-05	5.2E-05	4.6E-04
75	benzo(b)fluoranthene	1hr	9th	2.5E-04	2.5E-04	2.7E-04
76	benzo(b)fluoranthene	1hr	9th	8.8E-05	8.8E-05	1.5E-04
77	benzo(b)fluoranthene	1hr	9th	5.2E-05	5.2E-05	1.8E-03
78	benzo(b)fluoranthene	1hr	9th	3.0E-05	3.0E-05	7.7E-05
79	benzo(b)fluoranthene	1hr	9th	3.5E-05	3.5E-05	6.7E-05
1	benzo(b)fluoranthene	24hr	max	5.1E-06	5.1E-06	1.3E-05
2	benzo(b)fluoranthene	24hr	max	7.4E-06	7.4E-06	1.3E-05
3	benzo(b)fluoranthene	24hr	max	7.5E-06	7.5E-06	1.4E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
4	benzo(b)fluoranthene	24hr	max	7.5E-06	7.5E-06	1.5E-05
5	benzo(b)fluoranthene	24hr	max	7.6E-06	7.7E-06	1.9E-05
6	benzo(b)fluoranthene	24hr	max	7.6E-06	7.7E-06	2.0E-05
7	benzo(b)fluoranthene	24hr	max	7.1E-06	7.2E-06	1.5E-05
8	benzo(b)fluoranthene	24hr	max	7.6E-06	7.6E-06	2.0E-05
9	benzo(b)fluoranthene	24hr	max	9.0E-06	9.0E-06	1.7E-05
10	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	2.5E-05
11	benzo(b)fluoranthene	24hr	max	2.6E-05	2.6E-05	3.3E-05
12	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	2.8E-05
13	benzo(b)fluoranthene	24hr	max	1.6E-05	1.6E-05	2.5E-05
14	benzo(b)fluoranthene	24hr	max	3.6E-05	3.6E-05	3.6E-05
15	benzo(b)fluoranthene	24hr	max	7.7E-06	7.7E-06	2.0E-05
16	benzo(b)fluoranthene	24hr	max	7.7E-06	7.8E-06	2.0E-05
17	benzo(b)fluoranthene	24hr	max	8.4E-06	8.4E-06	1.9E-05
18	benzo(b)fluoranthene	24hr	max	8.8E-06	8.8E-06	1.9E-05
19	benzo(b)fluoranthene	24hr	max	8.3E-06	8.4E-06	1.9E-05
20	benzo(b)fluoranthene	24hr	max	8.3E-06	8.3E-06	1.9E-05
21	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	2.6E-05
22	benzo(b)fluoranthene	24hr	max	1.6E-05	1.6E-05	2.6E-05
23	benzo(b)fluoranthene	24hr	max	1.1E-05	1.1E-05	2.5E-05
24	benzo(b)fluoranthene	24hr	max	6.6E-06	6.7E-06	2.0E-05
25	benzo(b)fluoranthene	24hr	max	1.2E-05	1.2E-05	3.0E-05
26	benzo(b)fluoranthene	24hr	max	9.8E-06	9.8E-06	3.1E-05
27	benzo(b)fluoranthene	24hr	max	1.0E-05	1.0E-05	4.7E-05
28	benzo(b)fluoranthene	24hr	max	9.9E-06	9.9E-06	3.3E-05
29	benzo(b)fluoranthene	24hr	max	1.0E-05	1.0E-05	3.4E-05
30	benzo(b)fluoranthene	24hr	max	1.6E-05	1.6E-05	2.9E-05
31	benzo(b)fluoranthene	24hr	max	1.6E-05	1.6E-05	3.1E-05
32	benzo(b)fluoranthene	24hr	max	6.1E-06	6.1E-06	1.2E-05
33	benzo(b)fluoranthene	24hr	max	8.8E-06	8.8E-06	1.4E-05
34	benzo(b)fluoranthene	24hr	max	8.3E-06	8.3E-06	1.3E-05
35	benzo(b)fluoranthene	24hr	max	6.9E-06	6.9E-06	1.4E-05
36	benzo(b)fluoranthene	24hr	max	6.7E-06	6.7E-06	1.5E-05
37	benzo(b)fluoranthene	24hr	max	6.5E-06	6.5E-06	1.7E-05
38	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	3.2E-05
39	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	3.6E-05
40	benzo(b)fluoranthene	24hr	max	1.4E-05	1.4E-05	4.2E-05
41	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.8E-05
42	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	4.5E-05
43	benzo(b)fluoranthene	24hr	max	1.4E-05	1.4E-05	4.8E-05
44	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.7E-05
45	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.8E-05
46	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.7E-05
47	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.2E-05
48	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.5E-05
49	benzo(b)fluoranthene	24hr	max	1.5E-05	1.5E-05	4.4E-05
50	benzo(b)fluoranthene	24hr	max	1.4E-05	1.4E-05	4.1E-05
51	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	4.2E-05
52	benzo(b)fluoranthene	24hr	max	1.9E-05	1.9E-05	1.6E-04
53	benzo(b)fluoranthene	24hr	max	1.9E-05	1.9E-05	8.6E-05
54	benzo(b)fluoranthene	24hr	max	6.3E-06	6.4E-06	1.5E-05
55	benzo(b)fluoranthene	24hr	max	6.1E-06	6.1E-06	1.9E-05
56	benzo(b)fluoranthene	24hr	max	6.0E-06	6.0E-06	2.2E-05
57	benzo(b)fluoranthene	24hr	max	6.6E-06	6.7E-06	1.6E-05
58	benzo(b)fluoranthene	24hr	max	5.4E-06	5.5E-06	1.6E-05
59	benzo(b)fluoranthene	24hr	max	2.1E-05	2.1E-05	8.6E-05
60	benzo(b)fluoranthene	24hr	max	3.1E-05	3.1E-05	4.9E-05
61	benzo(b)fluoranthene	24hr	max	3.4E-05	3.4E-05	6.1E-05
62	benzo(b)fluoranthene	24hr	max	3.1E-05	3.1E-05	6.9E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
63	benzo(b)fluoranthene	24hr	max	2.6E-05	2.6E-05	1.1E-04
64	benzo(b)fluoranthene	24hr	max	2.7E-05	2.7E-05	9.7E-05
65	benzo(b)fluoranthene	24hr	max	3.4E-05	3.4E-05	5.0E-05
66	benzo(b)fluoranthene	24hr	max	1.6E-05	1.6E-05	2.5E-05
67	benzo(b)fluoranthene	24hr	max	1.1E-05	1.1E-05	2.5E-05
68	benzo(b)fluoranthene	24hr	max	1.1E-05	1.1E-05	2.4E-05
69	benzo(b)fluoranthene	24hr	max	7.4E-06	7.4E-06	2.1E-05
70	benzo(b)fluoranthene	24hr	max	6.7E-06	6.7E-06	1.7E-05
71	benzo(b)fluoranthene	24hr	max	2.2E-05	2.2E-05	4.4E-05
72	benzo(b)fluoranthene	24hr	max	2.1E-05	2.1E-05	4.3E-05
73	benzo(b)fluoranthene	24hr	max	3.4E-05	3.4E-05	5.1E-05
74	benzo(b)fluoranthene	24hr	max	2.2E-05	2.2E-05	1.4E-04
75	benzo(b)fluoranthene	24hr	max	1.0E-04	1.0E-04	1.2E-04
76	benzo(b)fluoranthene	24hr	max	3.4E-05	3.4E-05	6.2E-05
77	benzo(b)fluoranthene	24hr	max	2.3E-05	2.3E-05	3.3E-04
78	benzo(b)fluoranthene	24hr	max	1.3E-05	1.3E-05	4.4E-05
79	benzo(b)fluoranthene	24hr	max	1.4E-05	1.4E-05	2.8E-05
1	benzo(b)fluoranthene	annual	average	3.1E-07	3.1E-07	5.8E-07
2	benzo(b)fluoranthene	annual	average	5.5E-07	5.5E-07	1.0E-06
3	benzo(b)fluoranthene	annual	average	5.7E-07	5.7E-07	1.1E-06
4	benzo(b)fluoranthene	annual	average	6.1E-07	6.2E-07	1.1E-06
5	benzo(b)fluoranthene	annual	average	7.0E-07	7.0E-07	1.3E-06
6	benzo(b)fluoranthene	annual	average	7.1E-07	7.2E-07	1.4E-06
7	benzo(b)fluoranthene	annual	average	6.5E-07	6.6E-07	1.2E-06
8	benzo(b)fluoranthene	annual	average	7.3E-07	7.4E-07	1.4E-06
9	benzo(b)fluoranthene	annual	average	6.7E-07	6.8E-07	1.3E-06
10	benzo(b)fluoranthene	annual	average	1.0E-06	1.0E-06	2.0E-06
11	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	2.6E-06
12	benzo(b)fluoranthene	annual	average	1.3E-06	1.4E-06	2.4E-06
13	benzo(b)fluoranthene	annual	average	1.3E-06	1.3E-06	2.3E-06
14	benzo(b)fluoranthene	annual	average	2.3E-06	2.3E-06	3.7E-06
15	benzo(b)fluoranthene	annual	average	8.5E-07	8.6E-07	1.6E-06
16	benzo(b)fluoranthene	annual	average	8.5E-07	8.7E-07	1.6E-06
17	benzo(b)fluoranthene	annual	average	9.2E-07	9.3E-07	1.7E-06
18	benzo(b)fluoranthene	annual	average	1.0E-06	1.0E-06	1.9E-06
19	benzo(b)fluoranthene	annual	average	1.0E-06	1.0E-06	1.9E-06
20	benzo(b)fluoranthene	annual	average	1.1E-06	1.1E-06	2.1E-06
21	benzo(b)fluoranthene	annual	average	1.4E-06	1.5E-06	2.6E-06
22	benzo(b)fluoranthene	annual	average	1.3E-06	1.4E-06	2.5E-06
23	benzo(b)fluoranthene	annual	average	1.0E-06	1.0E-06	1.9E-06
24	benzo(b)fluoranthene	annual	average	5.9E-07	5.9E-07	1.1E-06
25	benzo(b)fluoranthene	annual	average	7.9E-07	8.3E-07	1.8E-06
26	benzo(b)fluoranthene	annual	average	8.7E-07	9.0E-07	2.1E-06
27	benzo(b)fluoranthene	annual	average	1.1E-06	1.1E-06	3.0E-06
28	benzo(b)fluoranthene	annual	average	1.2E-06	1.2E-06	2.5E-06
29	benzo(b)fluoranthene	annual	average	1.2E-06	1.3E-06	2.5E-06
30	benzo(b)fluoranthene	annual	average	8.0E-07	8.1E-07	1.6E-06
31	benzo(b)fluoranthene	annual	average	8.4E-07	8.5E-07	1.7E-06
32	benzo(b)fluoranthene	annual	average	3.3E-07	3.3E-07	6.4E-07
33	benzo(b)fluoranthene	annual	average	4.5E-07	4.5E-07	8.9E-07
34	benzo(b)fluoranthene	annual	average	4.6E-07	4.7E-07	8.9E-07
35	benzo(b)fluoranthene	annual	average	4.6E-07	4.7E-07	8.8E-07
36	benzo(b)fluoranthene	annual	average	4.8E-07	4.9E-07	9.2E-07
37	benzo(b)fluoranthene	annual	average	4.7E-07	4.8E-07	9.1E-07
38	benzo(b)fluoranthene	annual	average	1.3E-06	1.3E-06	2.9E-06
39	benzo(b)fluoranthene	annual	average	1.3E-06	1.3E-06	3.1E-06
40	benzo(b)fluoranthene	annual	average	1.3E-06	1.3E-06	3.5E-06
41	benzo(b)fluoranthene	annual	average	1.3E-06	1.3E-06	3.8E-06
42	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	3.6E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
43	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	3.9E-06
44	benzo(b)fluoranthene	annual	average	1.5E-06	1.6E-06	4.0E-06
45	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	4.1E-06
46	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	4.1E-06
47	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	4.2E-06
48	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	4.2E-06
49	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	4.2E-06
50	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	4.2E-06
51	benzo(b)fluoranthene	annual	average	1.5E-06	1.5E-06	3.9E-06
52	benzo(b)fluoranthene	annual	average	1.9E-06	1.9E-06	1.2E-05
53	benzo(b)fluoranthene	annual	average	1.6E-06	1.6E-06	7.0E-06
54	benzo(b)fluoranthene	annual	average	4.5E-07	4.6E-07	8.3E-07
55	benzo(b)fluoranthene	annual	average	4.9E-07	4.9E-07	9.2E-07
56	benzo(b)fluoranthene	annual	average	5.2E-07	5.2E-07	1.0E-06
57	benzo(b)fluoranthene	annual	average	5.4E-07	5.5E-07	1.0E-06
58	benzo(b)fluoranthene	annual	average	3.8E-07	3.8E-07	7.1E-07
59	benzo(b)fluoranthene	annual	average	2.3E-06	2.3E-06	1.3E-05
60	benzo(b)fluoranthene	annual	average	3.2E-06	3.2E-06	6.0E-06
61	benzo(b)fluoranthene	annual	average	3.7E-06	3.7E-06	7.1E-06
62	benzo(b)fluoranthene	annual	average	3.2E-06	3.2E-06	7.0E-06
63	benzo(b)fluoranthene	annual	average	2.9E-06	2.9E-06	7.5E-06
64	benzo(b)fluoranthene	annual	average	2.9E-06	2.9E-06	7.3E-06
65	benzo(b)fluoranthene	annual	average	3.5E-06	3.5E-06	7.1E-06
66	benzo(b)fluoranthene	annual	average	9.5E-07	9.5E-07	1.8E-06
67	benzo(b)fluoranthene	annual	average	1.2E-06	1.2E-06	2.3E-06
68	benzo(b)fluoranthene	annual	average	8.3E-07	8.3E-07	1.7E-06
69	benzo(b)fluoranthene	annual	average	7.9E-07	7.9E-07	1.6E-06
70	benzo(b)fluoranthene	annual	average	7.4E-07	7.5E-07	1.6E-06
71	benzo(b)fluoranthene	annual	average	1.2E-06	1.2E-06	2.7E-06
72	benzo(b)fluoranthene	annual	average	1.2E-06	1.2E-06	2.7E-06
73	benzo(b)fluoranthene	annual	average	3.8E-06	3.8E-06	7.6E-06
74	benzo(b)fluoranthene	annual	average	2.3E-06	2.3E-06	1.8E-05
75	benzo(b)fluoranthene	annual	average	1.4E-05	1.4E-05	1.7E-05
76	benzo(b)fluoranthene	annual	average	3.6E-06	3.6E-06	7.1E-06
77	benzo(b)fluoranthene	annual	average	2.5E-06	2.5E-06	1.3E-05
78	benzo(b)fluoranthene	annual	average	1.4E-06	1.4E-06	3.5E-06
79	benzo(b)fluoranthene	annual	average	1.3E-06	1.3E-06	2.3E-06
1	benzo(e)pyrene	1hr	max	5.1E-07	5.1E-07	6.1E-07
2	benzo(e)pyrene	1hr	max	5.5E-07	5.5E-07	6.7E-07
3	benzo(e)pyrene	1hr	max	5.9E-07	5.9E-07	7.4E-07
4	benzo(e)pyrene	1hr	max	5.0E-07	5.0E-07	6.6E-07
5	benzo(e)pyrene	1hr	max	4.0E-07	4.0E-07	5.3E-07
6	benzo(e)pyrene	1hr	max	4.0E-07	4.0E-07	5.3E-07
7	benzo(e)pyrene	1hr	max	4.7E-07	4.7E-07	5.6E-07
8	benzo(e)pyrene	1hr	max	4.4E-07	4.4E-07	5.4E-07
9	benzo(e)pyrene	1hr	max	5.2E-07	5.2E-07	9.0E-07
10	benzo(e)pyrene	1hr	max	8.3E-07	8.3E-07	1.1E-06
11	benzo(e)pyrene	1hr	max	8.9E-07	8.9E-07	1.2E-06
12	benzo(e)pyrene	1hr	max	1.0E-06	1.0E-06	1.4E-06
13	benzo(e)pyrene	1hr	max	1.0E-06	1.0E-06	1.5E-06
14	benzo(e)pyrene	1hr	max	9.9E-07	9.9E-07	1.3E-06
15	benzo(e)pyrene	1hr	max	7.4E-07	7.4E-07	1.3E-06
16	benzo(e)pyrene	1hr	max	7.0E-07	7.0E-07	1.3E-06
17	benzo(e)pyrene	1hr	max	8.9E-07	8.9E-07	1.0E-06
18	benzo(e)pyrene	1hr	max	1.0E-06	1.0E-06	1.1E-06
19	benzo(e)pyrene	1hr	max	9.9E-07	9.9E-07	1.2E-06
20	benzo(e)pyrene	1hr	max	1.3E-06	1.3E-06	1.5E-06
21	benzo(e)pyrene	1hr	max	1.6E-06	1.6E-06	2.2E-06
22	benzo(e)pyrene	1hr	max	1.6E-06	1.6E-06	2.1E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
23	benzo(e)pyrene	1hr	max	1.5E-06	1.5E-06	1.8E-06
24	benzo(e)pyrene	1hr	max	5.2E-07	5.2E-07	6.0E-07
25	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.3E-06
26	benzo(e)pyrene	1hr	max	8.3E-07	8.3E-07	1.4E-06
27	benzo(e)pyrene	1hr	max	6.7E-07	6.7E-07	9.1E-07
28	benzo(e)pyrene	1hr	max	1.7E-06	1.7E-06	2.1E-06
29	benzo(e)pyrene	1hr	max	1.7E-06	1.7E-06	2.1E-06
30	benzo(e)pyrene	1hr	max	1.3E-06	1.3E-06	1.9E-06
31	benzo(e)pyrene	1hr	max	1.5E-06	1.5E-06	2.0E-06
32	benzo(e)pyrene	1hr	max	4.5E-07	4.5E-07	7.0E-07
33	benzo(e)pyrene	1hr	max	6.1E-07	6.1E-07	9.3E-07
34	benzo(e)pyrene	1hr	max	6.3E-07	6.3E-07	9.8E-07
35	benzo(e)pyrene	1hr	max	5.6E-07	5.6E-07	7.8E-07
36	benzo(e)pyrene	1hr	max	5.8E-07	5.8E-07	8.7E-07
37	benzo(e)pyrene	1hr	max	6.3E-07	6.3E-07	8.7E-07
38	benzo(e)pyrene	1hr	max	2.0E-06	2.0E-06	2.4E-06
39	benzo(e)pyrene	1hr	max	1.9E-06	1.9E-06	2.5E-06
40	benzo(e)pyrene	1hr	max	1.6E-06	1.6E-06	2.3E-06
41	benzo(e)pyrene	1hr	max	1.0E-06	1.0E-06	1.4E-06
42	benzo(e)pyrene	1hr	max	1.4E-06	1.4E-06	1.8E-06
43	benzo(e)pyrene	1hr	max	1.3E-06	1.3E-06	1.7E-06
44	benzo(e)pyrene	1hr	max	1.3E-06	1.3E-06	1.7E-06
45	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.5E-06
46	benzo(e)pyrene	1hr	max	1.2E-06	1.2E-06	1.5E-06
47	benzo(e)pyrene	1hr	max	9.5E-07	9.5E-07	1.2E-06
48	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.5E-06
49	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.4E-06
50	benzo(e)pyrene	1hr	max	1.0E-06	1.0E-06	1.3E-06
51	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.4E-06
52	benzo(e)pyrene	1hr	max	1.2E-06	1.2E-06	1.5E-06
53	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.7E-06
54	benzo(e)pyrene	1hr	max	4.1E-07	4.1E-07	5.1E-07
55	benzo(e)pyrene	1hr	max	5.8E-07	5.8E-07	6.5E-07
56	benzo(e)pyrene	1hr	max	5.5E-07	5.5E-07	6.2E-07
57	benzo(e)pyrene	1hr	max	6.3E-07	6.3E-07	7.0E-07
58	benzo(e)pyrene	1hr	max	4.7E-07	4.7E-07	5.5E-07
59	benzo(e)pyrene	1hr	max	1.3E-06	1.3E-06	1.9E-06
60	benzo(e)pyrene	1hr	max	2.7E-06	2.7E-06	3.9E-06
61	benzo(e)pyrene	1hr	max	2.2E-06	2.2E-06	4.1E-06
62	benzo(e)pyrene	1hr	max	1.8E-06	1.8E-06	3.7E-06
63	benzo(e)pyrene	1hr	max	1.5E-06	1.5E-06	3.4E-06
64	benzo(e)pyrene	1hr	max	1.5E-06	1.5E-06	3.5E-06
65	benzo(e)pyrene	1hr	max	2.1E-06	2.1E-06	3.9E-06
66	benzo(e)pyrene	1hr	max	7.0E-07	7.0E-07	1.1E-06
67	benzo(e)pyrene	1hr	max	9.3E-07	9.3E-07	1.5E-06
68	benzo(e)pyrene	1hr	max	8.0E-07	8.0E-07	1.2E-06
69	benzo(e)pyrene	1hr	max	8.3E-07	8.3E-07	1.2E-06
70	benzo(e)pyrene	1hr	max	7.4E-07	7.4E-07	1.1E-06
71	benzo(e)pyrene	1hr	max	1.1E-06	1.1E-06	1.8E-06
72	benzo(e)pyrene	1hr	max	1.2E-06	1.2E-06	1.9E-06
73	benzo(e)pyrene	1hr	max	2.1E-06	2.1E-06	3.9E-06
74	benzo(e)pyrene	1hr	max	1.6E-06	1.6E-06	2.0E-06
75	benzo(e)pyrene	1hr	max	5.3E-06	5.3E-06	6.1E-06
76	benzo(e)pyrene	1hr	max	2.2E-06	2.2E-06	4.0E-06
77	benzo(e)pyrene	1hr	max	1.4E-06	1.4E-06	5.6E-06
78	benzo(e)pyrene	1hr	max	1.5E-06	1.5E-06	1.9E-06
79	benzo(e)pyrene	1hr	max	1.7E-06	1.7E-06	2.2E-06
1	benzo(e)pyrene	1hr	9th	3.0E-07	3.0E-07	3.3E-07
2	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.0E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
3	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	3.9E-07
4	benzo(e)pyrene	1hr	9th	2.9E-07	2.9E-07	3.9E-07
5	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	3.9E-07
6	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.0E-07
7	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	3.7E-07
8	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.0E-07
9	benzo(e)pyrene	1hr	9th	2.5E-07	2.5E-07	3.4E-07
10	benzo(e)pyrene	1hr	9th	2.7E-07	2.7E-07	3.9E-07
11	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.4E-07
12	benzo(e)pyrene	1hr	9th	3.3E-07	3.3E-07	4.3E-07
13	benzo(e)pyrene	1hr	9th	3.4E-07	3.4E-07	4.4E-07
14	benzo(e)pyrene	1hr	9th	3.3E-07	3.3E-07	4.6E-07
15	benzo(e)pyrene	1hr	9th	3.3E-07	3.3E-07	4.1E-07
16	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	4.2E-07
17	benzo(e)pyrene	1hr	9th	3.3E-07	3.3E-07	4.3E-07
18	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	4.4E-07
19	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	4.2E-07
20	benzo(e)pyrene	1hr	9th	3.4E-07	3.4E-07	4.9E-07
21	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	4.3E-07
22	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.3E-07
23	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	4.4E-07
24	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	3.7E-07
25	benzo(e)pyrene	1hr	9th	5.5E-07	5.5E-07	7.0E-07
26	benzo(e)pyrene	1hr	9th	4.4E-07	4.4E-07	5.8E-07
27	benzo(e)pyrene	1hr	9th	4.8E-07	4.8E-07	5.8E-07
28	benzo(e)pyrene	1hr	9th	3.7E-07	3.7E-07	4.8E-07
29	benzo(e)pyrene	1hr	9th	3.6E-07	3.6E-07	4.8E-07
30	benzo(e)pyrene	1hr	9th	6.8E-07	6.8E-07	8.6E-07
31	benzo(e)pyrene	1hr	9th	6.9E-07	6.9E-07	9.0E-07
32	benzo(e)pyrene	1hr	9th	3.2E-07	3.2E-07	3.7E-07
33	benzo(e)pyrene	1hr	9th	4.0E-07	4.0E-07	4.9E-07
34	benzo(e)pyrene	1hr	9th	4.2E-07	4.2E-07	4.7E-07
35	benzo(e)pyrene	1hr	9th	4.2E-07	4.2E-07	4.9E-07
36	benzo(e)pyrene	1hr	9th	4.1E-07	4.1E-07	4.9E-07
37	benzo(e)pyrene	1hr	9th	4.0E-07	4.0E-07	4.6E-07
38	benzo(e)pyrene	1hr	9th	3.7E-07	3.7E-07	4.8E-07
39	benzo(e)pyrene	1hr	9th	3.9E-07	3.9E-07	4.9E-07
40	benzo(e)pyrene	1hr	9th	4.1E-07	4.1E-07	5.8E-07
41	benzo(e)pyrene	1hr	9th	4.5E-07	4.5E-07	6.3E-07
42	benzo(e)pyrene	1hr	9th	4.3E-07	4.3E-07	6.1E-07
43	benzo(e)pyrene	1hr	9th	4.3E-07	4.3E-07	6.1E-07
44	benzo(e)pyrene	1hr	9th	4.4E-07	4.4E-07	6.1E-07
45	benzo(e)pyrene	1hr	9th	4.6E-07	4.6E-07	6.6E-07
46	benzo(e)pyrene	1hr	9th	4.5E-07	4.5E-07	6.5E-07
47	benzo(e)pyrene	1hr	9th	4.7E-07	4.7E-07	6.7E-07
48	benzo(e)pyrene	1hr	9th	4.6E-07	4.6E-07	6.5E-07
49	benzo(e)pyrene	1hr	9th	4.7E-07	4.7E-07	6.5E-07
50	benzo(e)pyrene	1hr	9th	4.8E-07	4.8E-07	6.4E-07
51	benzo(e)pyrene	1hr	9th	4.3E-07	4.3E-07	6.3E-07
52	benzo(e)pyrene	1hr	9th	6.9E-07	6.9E-07	9.7E-07
53	benzo(e)pyrene	1hr	9th	6.0E-07	6.0E-07	7.9E-07
54	benzo(e)pyrene	1hr	9th	2.8E-07	2.8E-07	3.2E-07
55	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	3.7E-07
56	benzo(e)pyrene	1hr	9th	3.0E-07	3.0E-07	3.8E-07
57	benzo(e)pyrene	1hr	9th	2.7E-07	2.7E-07	3.2E-07
58	benzo(e)pyrene	1hr	9th	2.7E-07	2.7E-07	3.7E-07
59	benzo(e)pyrene	1hr	9th	8.0E-07	8.0E-07	9.9E-07
60	benzo(e)pyrene	1hr	9th	1.3E-06	1.3E-06	1.8E-06
61	benzo(e)pyrene	1hr	9th	1.3E-06	1.3E-06	1.6E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
62	benzo(e)pyrene	1hr	9th	1.2E-06	1.2E-06	1.5E-06
63	benzo(e)pyrene	1hr	9th	1.1E-06	1.1E-06	1.3E-06
64	benzo(e)pyrene	1hr	9th	1.1E-06	1.1E-06	1.3E-06
65	benzo(e)pyrene	1hr	9th	1.3E-06	1.3E-06	1.5E-06
66	benzo(e)pyrene	1hr	9th	3.3E-07	3.3E-07	4.6E-07
67	benzo(e)pyrene	1hr	9th	3.5E-07	3.5E-07	4.8E-07
68	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.8E-07
69	benzo(e)pyrene	1hr	9th	2.9E-07	2.9E-07	4.6E-07
70	benzo(e)pyrene	1hr	9th	2.5E-07	2.5E-07	4.1E-07
71	benzo(e)pyrene	1hr	9th	7.9E-07	7.9E-07	1.0E-06
72	benzo(e)pyrene	1hr	9th	7.7E-07	7.7E-07	9.5E-07
73	benzo(e)pyrene	1hr	9th	1.3E-06	1.3E-06	1.5E-06
74	benzo(e)pyrene	1hr	9th	8.3E-07	8.3E-07	1.1E-06
75	benzo(e)pyrene	1hr	9th	3.7E-06	3.7E-06	4.2E-06
76	benzo(e)pyrene	1hr	9th	1.3E-06	1.3E-06	1.6E-06
77	benzo(e)pyrene	1hr	9th	8.5E-07	8.5E-07	2.4E-06
78	benzo(e)pyrene	1hr	9th	4.2E-07	4.2E-07	5.9E-07
79	benzo(e)pyrene	1hr	9th	3.1E-07	3.1E-07	4.4E-07
1	benzo(e)pyrene	24hr	max	1.1E-07	1.1E-07	1.2E-07
2	benzo(e)pyrene	24hr	max	1.3E-07	1.3E-07	1.8E-07
3	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.8E-07
4	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
5	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
6	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
7	benzo(e)pyrene	24hr	max	1.3E-07	1.3E-07	1.8E-07
8	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
9	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
10	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	2.0E-07
11	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	2.1E-07
12	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	2.0E-07
13	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.0E-07
14	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.2E-07
15	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
16	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
17	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	1.9E-07
18	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.0E-07
19	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.0E-07
20	benzo(e)pyrene	24hr	max	1.6E-07	1.6E-07	2.1E-07
21	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.2E-07
22	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.2E-07
23	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.0E-07
24	benzo(e)pyrene	24hr	max	1.2E-07	1.2E-07	1.7E-07
25	benzo(e)pyrene	24hr	max	2.0E-07	2.0E-07	2.7E-07
26	benzo(e)pyrene	24hr	max	1.8E-07	1.8E-07	2.3E-07
27	benzo(e)pyrene	24hr	max	1.9E-07	1.9E-07	2.4E-07
28	benzo(e)pyrene	24hr	max	1.7E-07	1.7E-07	2.4E-07
29	benzo(e)pyrene	24hr	max	1.7E-07	1.7E-07	2.4E-07
30	benzo(e)pyrene	24hr	max	2.5E-07	2.5E-07	3.6E-07
31	benzo(e)pyrene	24hr	max	2.7E-07	2.7E-07	3.7E-07
32	benzo(e)pyrene	24hr	max	1.2E-07	1.2E-07	1.5E-07
33	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	1.9E-07
34	benzo(e)pyrene	24hr	max	1.6E-07	1.6E-07	1.9E-07
35	benzo(e)pyrene	24hr	max	1.6E-07	1.6E-07	1.7E-07
36	benzo(e)pyrene	24hr	max	1.6E-07	1.6E-07	1.8E-07
37	benzo(e)pyrene	24hr	max	1.6E-07	1.6E-07	1.7E-07
38	benzo(e)pyrene	24hr	max	1.8E-07	1.8E-07	2.7E-07
39	benzo(e)pyrene	24hr	max	1.8E-07	1.8E-07	2.6E-07
40	benzo(e)pyrene	24hr	max	1.9E-07	1.9E-07	3.0E-07
41	benzo(e)pyrene	24hr	max	2.3E-07	2.3E-07	3.4E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
42	benzo(e)pyrene	24hr	max	1.9E-07	1.9E-07	3.0E-07
43	benzo(e)pyrene	24hr	max	2.0E-07	2.0E-07	3.2E-07
44	benzo(e)pyrene	24hr	max	2.0E-07	2.0E-07	3.1E-07
45	benzo(e)pyrene	24hr	max	2.1E-07	2.1E-07	3.3E-07
46	benzo(e)pyrene	24hr	max	2.1E-07	2.1E-07	3.3E-07
47	benzo(e)pyrene	24hr	max	2.1E-07	2.1E-07	3.2E-07
48	benzo(e)pyrene	24hr	max	2.1E-07	2.1E-07	3.2E-07
49	benzo(e)pyrene	24hr	max	2.1E-07	2.1E-07	3.2E-07
50	benzo(e)pyrene	24hr	max	2.2E-07	2.2E-07	3.1E-07
51	benzo(e)pyrene	24hr	max	2.1E-07	2.1E-07	2.9E-07
52	benzo(e)pyrene	24hr	max	2.8E-07	2.8E-07	5.8E-07
53	benzo(e)pyrene	24hr	max	2.7E-07	2.7E-07	4.8E-07
54	benzo(e)pyrene	24hr	max	1.2E-07	1.2E-07	1.6E-07
55	benzo(e)pyrene	24hr	max	1.2E-07	1.2E-07	1.6E-07
56	benzo(e)pyrene	24hr	max	1.3E-07	1.3E-07	1.6E-07
57	benzo(e)pyrene	24hr	max	1.3E-07	1.3E-07	1.7E-07
58	benzo(e)pyrene	24hr	max	1.2E-07	1.2E-07	1.4E-07
59	benzo(e)pyrene	24hr	max	3.6E-07	3.6E-07	4.4E-07
60	benzo(e)pyrene	24hr	max	4.9E-07	4.9E-07	7.2E-07
61	benzo(e)pyrene	24hr	max	4.9E-07	4.9E-07	8.0E-07
62	benzo(e)pyrene	24hr	max	4.4E-07	4.4E-07	7.1E-07
63	benzo(e)pyrene	24hr	max	4.0E-07	4.0E-07	6.4E-07
64	benzo(e)pyrene	24hr	max	4.0E-07	4.0E-07	6.5E-07
65	benzo(e)pyrene	24hr	max	4.7E-07	4.7E-07	7.3E-07
66	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.0E-07
67	benzo(e)pyrene	24hr	max	1.6E-07	1.6E-07	2.2E-07
68	benzo(e)pyrene	24hr	max	1.4E-07	1.4E-07	2.0E-07
69	benzo(e)pyrene	24hr	max	1.3E-07	1.3E-07	2.0E-07
70	benzo(e)pyrene	24hr	max	1.2E-07	1.2E-07	1.8E-07
71	benzo(e)pyrene	24hr	max	3.1E-07	3.1E-07	4.7E-07
72	benzo(e)pyrene	24hr	max	3.1E-07	3.1E-07	4.6E-07
73	benzo(e)pyrene	24hr	max	4.6E-07	4.6E-07	7.3E-07
74	benzo(e)pyrene	24hr	max	3.5E-07	3.5E-07	4.4E-07
75	benzo(e)pyrene	24hr	max	1.4E-06	1.4E-06	1.7E-06
76	benzo(e)pyrene	24hr	max	4.9E-07	4.9E-07	7.9E-07
77	benzo(e)pyrene	24hr	max	3.6E-07	3.6E-07	5.1E-07
78	benzo(e)pyrene	24hr	max	1.8E-07	1.8E-07	2.9E-07
79	benzo(e)pyrene	24hr	max	1.5E-07	1.5E-07	2.2E-07
1	benzo(e)pyrene	annual	average	4.3E-09	4.3E-09	5.7E-09
2	benzo(e)pyrene	annual	average	7.6E-09	7.6E-09	1.0E-08
3	benzo(e)pyrene	annual	average	7.7E-09	7.7E-09	1.0E-08
4	benzo(e)pyrene	annual	average	8.2E-09	8.2E-09	1.1E-08
5	benzo(e)pyrene	annual	average	9.1E-09	9.1E-09	1.2E-08
6	benzo(e)pyrene	annual	average	9.2E-09	9.2E-09	1.3E-08
7	benzo(e)pyrene	annual	average	9.1E-09	9.1E-09	1.2E-08
8	benzo(e)pyrene	annual	average	9.4E-09	9.4E-09	1.3E-08
9	benzo(e)pyrene	annual	average	8.1E-09	8.1E-09	1.1E-08
10	benzo(e)pyrene	annual	average	1.0E-08	1.0E-08	1.4E-08
11	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.6E-08
12	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.6E-08
13	benzo(e)pyrene	annual	average	1.1E-08	1.1E-08	1.6E-08
14	benzo(e)pyrene	annual	average	1.5E-08	1.5E-08	2.0E-08
15	benzo(e)pyrene	annual	average	1.1E-08	1.1E-08	1.5E-08
16	benzo(e)pyrene	annual	average	1.1E-08	1.1E-08	1.5E-08
17	benzo(e)pyrene	annual	average	1.1E-08	1.1E-08	1.6E-08
18	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.6E-08
19	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.7E-08
20	benzo(e)pyrene	annual	average	1.3E-08	1.3E-08	1.8E-08
21	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.7E-08

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
22	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.7E-08
23	benzo(e)pyrene	annual	average	1.1E-08	1.1E-08	1.5E-08
24	benzo(e)pyrene	annual	average	8.7E-09	8.7E-09	1.2E-08
25	benzo(e)pyrene	annual	average	1.3E-08	1.3E-08	1.8E-08
26	benzo(e)pyrene	annual	average	1.4E-08	1.4E-08	1.9E-08
27	benzo(e)pyrene	annual	average	1.7E-08	1.7E-08	2.5E-08
28	benzo(e)pyrene	annual	average	1.4E-08	1.4E-08	1.9E-08
29	benzo(e)pyrene	annual	average	1.4E-08	1.4E-08	2.0E-08
30	benzo(e)pyrene	annual	average	1.3E-08	1.3E-08	1.7E-08
31	benzo(e)pyrene	annual	average	1.3E-08	1.3E-08	1.8E-08
32	benzo(e)pyrene	annual	average	4.7E-09	4.7E-09	6.5E-09
33	benzo(e)pyrene	annual	average	6.6E-09	6.6E-09	9.2E-09
34	benzo(e)pyrene	annual	average	7.0E-09	7.0E-09	9.6E-09
35	benzo(e)pyrene	annual	average	6.8E-09	6.8E-09	9.1E-09
36	benzo(e)pyrene	annual	average	7.1E-09	7.1E-09	9.6E-09
37	benzo(e)pyrene	annual	average	7.1E-09	7.1E-09	9.5E-09
38	benzo(e)pyrene	annual	average	1.6E-08	1.6E-08	2.3E-08
39	benzo(e)pyrene	annual	average	1.7E-08	1.7E-08	2.4E-08
40	benzo(e)pyrene	annual	average	1.8E-08	1.8E-08	2.6E-08
41	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.8E-08
42	benzo(e)pyrene	annual	average	1.8E-08	1.8E-08	2.6E-08
43	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.7E-08
44	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.7E-08
45	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.9E-08
46	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.8E-08
47	benzo(e)pyrene	annual	average	2.0E-08	2.0E-08	2.9E-08
48	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.8E-08
49	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.9E-08
50	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.9E-08
51	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.7E-08
52	benzo(e)pyrene	annual	average	3.0E-08	3.0E-08	5.2E-08
53	benzo(e)pyrene	annual	average	2.5E-08	2.5E-08	4.0E-08
54	benzo(e)pyrene	annual	average	6.7E-09	6.7E-09	8.8E-09
55	benzo(e)pyrene	annual	average	7.3E-09	7.3E-09	9.7E-09
56	benzo(e)pyrene	annual	average	7.8E-09	7.8E-09	1.0E-08
57	benzo(e)pyrene	annual	average	7.9E-09	7.9E-09	1.0E-08
58	benzo(e)pyrene	annual	average	5.6E-09	5.6E-09	7.5E-09
59	benzo(e)pyrene	annual	average	3.4E-08	3.4E-08	5.8E-08
60	benzo(e)pyrene	annual	average	5.1E-08	5.1E-08	6.7E-08
61	benzo(e)pyrene	annual	average	6.0E-08	6.0E-08	7.8E-08
62	benzo(e)pyrene	annual	average	5.2E-08	5.2E-08	7.0E-08
63	benzo(e)pyrene	annual	average	4.7E-08	4.7E-08	6.6E-08
64	benzo(e)pyrene	annual	average	4.7E-08	4.7E-08	6.5E-08
65	benzo(e)pyrene	annual	average	5.4E-08	5.4E-08	7.2E-08
66	benzo(e)pyrene	annual	average	1.0E-08	1.0E-08	1.4E-08
67	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.7E-08
68	benzo(e)pyrene	annual	average	9.7E-09	9.7E-09	1.4E-08
69	benzo(e)pyrene	annual	average	9.6E-09	9.6E-09	1.4E-08
70	benzo(e)pyrene	annual	average	9.3E-09	9.3E-09	1.3E-08
71	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.7E-08
72	benzo(e)pyrene	annual	average	1.9E-08	1.9E-08	2.7E-08
73	benzo(e)pyrene	annual	average	5.4E-08	5.4E-08	7.2E-08
74	benzo(e)pyrene	annual	average	3.5E-08	3.5E-08	6.6E-08
75	benzo(e)pyrene	annual	average	1.6E-07	1.6E-07	1.9E-07
76	benzo(e)pyrene	annual	average	5.8E-08	5.8E-08	7.7E-08
77	benzo(e)pyrene	annual	average	3.8E-08	3.8E-08	6.3E-08
78	benzo(e)pyrene	annual	average	1.7E-08	1.7E-08	2.5E-08
79	benzo(e)pyrene	annual	average	1.2E-08	1.2E-08	1.7E-08
1	benzo(ghi)perylene	1hr	max	1.1E-05	1.1E-05	5.4E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
2	benzo(ghi)perylene	1hr	max	1.1E-05	1.1E-05	3.4E-05
3	benzo(ghi)perylene	1hr	max	1.3E-05	1.3E-05	3.6E-05
4	benzo(ghi)perylene	1hr	max	1.5E-05	1.5E-05	3.6E-05
5	benzo(ghi)perylene	1hr	max	2.6E-05	2.6E-05	4.9E-05
6	benzo(ghi)perylene	1hr	max	2.9E-05	2.9E-05	5.0E-05
7	benzo(ghi)perylene	1hr	max	2.1E-05	2.1E-05	4.9E-05
8	benzo(ghi)perylene	1hr	max	3.2E-05	3.2E-05	5.1E-05
9	benzo(ghi)perylene	1hr	max	2.1E-05	2.1E-05	4.4E-05
10	benzo(ghi)perylene	1hr	max	4.5E-05	4.5E-05	5.7E-05
11	benzo(ghi)perylene	1hr	max	9.5E-05	9.5E-05	9.6E-05
12	benzo(ghi)perylene	1hr	max	6.2E-05	6.2E-05	6.5E-05
13	benzo(ghi)perylene	1hr	max	4.5E-05	4.5E-05	6.1E-05
14	benzo(ghi)perylene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	benzo(ghi)perylene	1hr	max	2.9E-05	2.9E-05	5.4E-05
16	benzo(ghi)perylene	1hr	max	2.7E-05	2.7E-05	5.4E-05
17	benzo(ghi)perylene	1hr	max	3.2E-05	3.2E-05	4.2E-05
18	benzo(ghi)perylene	1hr	max	2.8E-05	2.8E-05	4.6E-05
19	benzo(ghi)perylene	1hr	max	3.1E-05	3.1E-05	4.7E-05
20	benzo(ghi)perylene	1hr	max	3.3E-05	3.3E-05	5.4E-05
21	benzo(ghi)perylene	1hr	max	1.0E-04	1.0E-04	1.1E-04
22	benzo(ghi)perylene	1hr	max	8.3E-05	8.3E-05	9.8E-05
23	benzo(ghi)perylene	1hr	max	5.6E-05	5.6E-05	8.1E-05
24	benzo(ghi)perylene	1hr	max	1.0E-05	1.0E-05	5.4E-05
25	benzo(ghi)perylene	1hr	max	1.4E-05	1.4E-05	9.9E-05
26	benzo(ghi)perylene	1hr	max	1.4E-05	1.4E-05	1.1E-04
27	benzo(ghi)perylene	1hr	max	1.5E-05	1.5E-05	2.1E-04
28	benzo(ghi)perylene	1hr	max	3.8E-05	3.8E-05	9.7E-05
29	benzo(ghi)perylene	1hr	max	4.7E-05	4.7E-05	1.1E-04
30	benzo(ghi)perylene	1hr	max	2.2E-05	2.2E-05	7.6E-05
31	benzo(ghi)perylene	1hr	max	2.3E-05	2.3E-05	8.5E-05
32	benzo(ghi)perylene	1hr	max	1.1E-05	1.1E-05	3.5E-05
33	benzo(ghi)perylene	1hr	max	1.6E-05	1.6E-05	4.3E-05
34	benzo(ghi)perylene	1hr	max	1.4E-05	1.4E-05	3.8E-05
35	benzo(ghi)perylene	1hr	max	1.3E-05	1.3E-05	5.9E-05
36	benzo(ghi)perylene	1hr	max	1.1E-05	1.1E-05	5.7E-05
37	benzo(ghi)perylene	1hr	max	1.1E-05	1.1E-05	5.9E-05
38	benzo(ghi)perylene	1hr	max	5.0E-05	5.0E-05	1.3E-04
39	benzo(ghi)perylene	1hr	max	3.3E-05	3.3E-05	1.3E-04
40	benzo(ghi)perylene	1hr	max	2.4E-05	2.4E-05	1.3E-04
41	benzo(ghi)perylene	1hr	max	1.8E-05	1.8E-05	1.3E-04
42	benzo(ghi)perylene	1hr	max	4.2E-05	4.2E-05	1.6E-04
43	benzo(ghi)perylene	1hr	max	2.9E-05	2.9E-05	1.6E-04
44	benzo(ghi)perylene	1hr	max	3.0E-05	3.0E-05	1.5E-04
45	benzo(ghi)perylene	1hr	max	2.6E-05	2.6E-05	1.3E-04
46	benzo(ghi)perylene	1hr	max	2.7E-05	2.7E-05	1.3E-04
47	benzo(ghi)perylene	1hr	max	2.8E-05	2.8E-05	1.1E-04
48	benzo(ghi)perylene	1hr	max	3.1E-05	3.1E-05	1.2E-04
49	benzo(ghi)perylene	1hr	max	3.0E-05	3.0E-05	1.2E-04
50	benzo(ghi)perylene	1hr	max	4.2E-05	4.2E-05	1.1E-04
51	benzo(ghi)perylene	1hr	max	4.2E-05	4.2E-05	1.2E-04
52	benzo(ghi)perylene	1hr	max	2.4E-05	2.4E-05	8.1E-04
53	benzo(ghi)perylene	1hr	max	2.2E-05	2.2E-05	3.7E-04
54	benzo(ghi)perylene	1hr	max	1.2E-05	1.2E-05	3.2E-05
55	benzo(ghi)perylene	1hr	max	1.2E-05	1.2E-05	5.7E-05
56	benzo(ghi)perylene	1hr	max	1.1E-05	1.1E-05	7.4E-05
57	benzo(ghi)perylene	1hr	max	1.6E-05	1.6E-05	4.5E-05
58	benzo(ghi)perylene	1hr	max	1.0E-05	1.0E-05	4.6E-05
59	benzo(ghi)perylene	1hr	max	2.1E-05	2.1E-05	5.3E-04
60	benzo(ghi)perylene	1hr	max	3.2E-05	3.2E-05	2.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
61	benzo(ghi)perylene	1hr	max	6.7E-05	6.7E-05	2.2E-04
62	benzo(ghi)perylene	1hr	max	6.0E-05	6.0E-05	2.7E-04
63	benzo(ghi)perylene	1hr	max	4.6E-05	4.6E-05	4.4E-04
64	benzo(ghi)perylene	1hr	max	4.9E-05	4.9E-05	2.8E-04
65	benzo(ghi)perylene	1hr	max	6.6E-05	6.6E-05	2.4E-04
66	benzo(ghi)perylene	1hr	max	3.0E-05	3.0E-05	5.5E-05
67	benzo(ghi)perylene	1hr	max	5.1E-05	5.1E-05	5.5E-05
68	benzo(ghi)perylene	1hr	max	2.6E-05	2.6E-05	3.9E-05
69	benzo(ghi)perylene	1hr	max	2.3E-05	2.3E-05	3.9E-05
70	benzo(ghi)perylene	1hr	max	2.1E-05	2.1E-05	3.8E-05
71	benzo(ghi)perylene	1hr	max	3.6E-05	3.6E-05	1.1E-04
72	benzo(ghi)perylene	1hr	max	3.5E-05	3.5E-05	1.1E-04
73	benzo(ghi)perylene	1hr	max	6.5E-05	6.5E-05	2.8E-04
74	benzo(ghi)perylene	1hr	max	3.0E-05	3.0E-05	1.2E-03
75	benzo(ghi)perylene	1hr	max	9.8E-05	9.8E-05	9.9E-05
76	benzo(ghi)perylene	1hr	max	6.7E-05	6.7E-05	2.4E-04
77	benzo(ghi)perylene	1hr	max	4.0E-05	4.0E-05	4.1E-03
78	benzo(ghi)perylene	1hr	max	4.8E-05	4.8E-05	1.5E-04
79	benzo(ghi)perylene	1hr	max	6.6E-05	6.6E-05	9.7E-05
1	benzo(ghi)perylene	1hr	9th	5.0E-06	5.0E-06	2.7E-05
2	benzo(ghi)perylene	1hr	9th	8.6E-06	8.7E-06	2.3E-05
3	benzo(ghi)perylene	1hr	9th	9.2E-06	9.2E-06	2.4E-05
4	benzo(ghi)perylene	1hr	9th	1.0E-05	1.0E-05	2.9E-05
5	benzo(ghi)perylene	1hr	9th	1.2E-05	1.2E-05	3.5E-05
6	benzo(ghi)perylene	1hr	9th	1.3E-05	1.3E-05	3.6E-05
7	benzo(ghi)perylene	1hr	9th	9.9E-06	9.9E-06	3.1E-05
8	benzo(ghi)perylene	1hr	9th	1.2E-05	1.2E-05	3.8E-05
9	benzo(ghi)perylene	1hr	9th	1.3E-05	1.3E-05	3.2E-05
10	benzo(ghi)perylene	1hr	9th	2.9E-05	2.9E-05	4.6E-05
11	benzo(ghi)perylene	1hr	9th	6.4E-05	6.4E-05	7.5E-05
12	benzo(ghi)perylene	1hr	9th	3.2E-05	3.2E-05	5.1E-05
13	benzo(ghi)perylene	1hr	9th	3.2E-05	3.2E-05	4.8E-05
14	benzo(ghi)perylene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	benzo(ghi)perylene	1hr	9th	1.6E-05	1.6E-05	3.7E-05
16	benzo(ghi)perylene	1hr	9th	1.5E-05	1.5E-05	3.6E-05
17	benzo(ghi)perylene	1hr	9th	2.0E-05	2.0E-05	3.9E-05
18	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	4.1E-05
19	benzo(ghi)perylene	1hr	9th	1.7E-05	1.7E-05	4.1E-05
20	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	4.5E-05
21	benzo(ghi)perylene	1hr	9th	3.6E-05	3.6E-05	6.1E-05
22	benzo(ghi)perylene	1hr	9th	3.7E-05	3.7E-05	6.1E-05
23	benzo(ghi)perylene	1hr	9th	2.6E-05	2.6E-05	4.8E-05
24	benzo(ghi)perylene	1hr	9th	7.8E-06	7.8E-06	3.0E-05
25	benzo(ghi)perylene	1hr	9th	7.6E-06	7.8E-06	7.3E-05
26	benzo(ghi)perylene	1hr	9th	8.9E-06	8.9E-06	8.3E-05
27	benzo(ghi)perylene	1hr	9th	9.5E-06	9.5E-06	1.5E-04
28	benzo(ghi)perylene	1hr	9th	2.4E-05	2.4E-05	5.6E-05
29	benzo(ghi)perylene	1hr	9th	2.7E-05	2.7E-05	5.6E-05
30	benzo(ghi)perylene	1hr	9th	1.3E-05	1.3E-05	4.4E-05
31	benzo(ghi)perylene	1hr	9th	1.3E-05	1.3E-05	5.1E-05
32	benzo(ghi)perylene	1hr	9th	5.6E-06	5.6E-06	2.3E-05
33	benzo(ghi)perylene	1hr	9th	7.7E-06	7.7E-06	2.6E-05
34	benzo(ghi)perylene	1hr	9th	7.3E-06	7.3E-06	2.6E-05
35	benzo(ghi)perylene	1hr	9th	6.5E-06	6.5E-06	2.7E-05
36	benzo(ghi)perylene	1hr	9th	6.5E-06	6.6E-06	3.1E-05
37	benzo(ghi)perylene	1hr	9th	6.1E-06	6.1E-06	3.2E-05
38	benzo(ghi)perylene	1hr	9th	2.9E-05	2.9E-05	6.7E-05
39	benzo(ghi)perylene	1hr	9th	2.6E-05	2.6E-05	7.3E-05
40	benzo(ghi)perylene	1hr	9th	2.0E-05	2.0E-05	9.0E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
41	benzo(ghi)perylene	1hr	9th	1.4E-05	1.4E-05	8.8E-05
42	benzo(ghi)perylene	1hr	9th	2.5E-05	2.5E-05	6.5E-05
43	benzo(ghi)perylene	1hr	9th	2.1E-05	2.1E-05	6.6E-05
44	benzo(ghi)perylene	1hr	9th	2.1E-05	2.1E-05	6.8E-05
45	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	6.9E-05
46	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	6.9E-05
47	benzo(ghi)perylene	1hr	9th	1.8E-05	1.8E-05	7.1E-05
48	benzo(ghi)perylene	1hr	9th	2.0E-05	2.0E-05	7.1E-05
49	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	7.3E-05
50	benzo(ghi)perylene	1hr	9th	2.2E-05	2.2E-05	7.1E-05
51	benzo(ghi)perylene	1hr	9th	2.4E-05	2.4E-05	6.5E-05
52	benzo(ghi)perylene	1hr	9th	1.3E-05	1.3E-05	3.8E-04
53	benzo(ghi)perylene	1hr	9th	1.2E-05	1.2E-05	1.6E-04
54	benzo(ghi)perylene	1hr	9th	6.1E-06	6.2E-06	2.2E-05
55	benzo(ghi)perylene	1hr	9th	5.8E-06	5.8E-06	2.6E-05
56	benzo(ghi)perylene	1hr	9th	6.1E-06	6.1E-06	3.0E-05
57	benzo(ghi)perylene	1hr	9th	7.6E-06	7.6E-06	2.5E-05
58	benzo(ghi)perylene	1hr	9th	5.4E-06	5.5E-06	1.9E-05
59	benzo(ghi)perylene	1hr	9th	1.5E-05	1.5E-05	2.2E-04
60	benzo(ghi)perylene	1hr	9th	2.1E-05	2.1E-05	1.0E-04
61	benzo(ghi)perylene	1hr	9th	2.6E-05	2.6E-05	1.4E-04
62	benzo(ghi)perylene	1hr	9th	2.3E-05	2.3E-05	1.7E-04
63	benzo(ghi)perylene	1hr	9th	2.1E-05	2.1E-05	2.7E-04
64	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	2.5E-04
65	benzo(ghi)perylene	1hr	9th	2.4E-05	2.4E-05	1.7E-04
66	benzo(ghi)perylene	1hr	9th	1.8E-05	1.8E-05	3.6E-05
67	benzo(ghi)perylene	1hr	9th	2.4E-05	2.4E-05	4.1E-05
68	benzo(ghi)perylene	1hr	9th	1.4E-05	1.4E-05	3.0E-05
69	benzo(ghi)perylene	1hr	9th	1.0E-05	1.0E-05	2.9E-05
70	benzo(ghi)perylene	1hr	9th	7.6E-06	7.6E-06	2.9E-05
71	benzo(ghi)perylene	1hr	9th	1.9E-05	1.9E-05	7.9E-05
72	benzo(ghi)perylene	1hr	9th	1.8E-05	1.8E-05	8.0E-05
73	benzo(ghi)perylene	1hr	9th	2.4E-05	2.4E-05	1.8E-04
74	benzo(ghi)perylene	1hr	9th	1.5E-05	1.5E-05	4.6E-04
75	benzo(ghi)perylene	1hr	9th	6.6E-05	6.6E-05	7.2E-05
76	benzo(ghi)perylene	1hr	9th	2.5E-05	2.5E-05	1.4E-04
77	benzo(ghi)perylene	1hr	9th	1.7E-05	1.7E-05	1.8E-03
78	benzo(ghi)perylene	1hr	9th	2.5E-05	2.5E-05	6.3E-05
79	benzo(ghi)perylene	1hr	9th	2.7E-05	2.7E-05	5.4E-05
1	benzo(ghi)perylene	24hr	max	2.5E-06	2.5E-06	8.8E-06
2	benzo(ghi)perylene	24hr	max	3.5E-06	3.5E-06	1.0E-05
3	benzo(ghi)perylene	24hr	max	3.6E-06	3.6E-06	1.0E-05
4	benzo(ghi)perylene	24hr	max	4.1E-06	4.1E-06	1.3E-05
5	benzo(ghi)perylene	24hr	max	4.5E-06	4.5E-06	1.6E-05
6	benzo(ghi)perylene	24hr	max	4.8E-06	4.8E-06	1.7E-05
7	benzo(ghi)perylene	24hr	max	4.6E-06	4.6E-06	1.2E-05
8	benzo(ghi)perylene	24hr	max	5.7E-06	5.7E-06	1.7E-05
9	benzo(ghi)perylene	24hr	max	4.1E-06	4.1E-06	1.5E-05
10	benzo(ghi)perylene	24hr	max	1.2E-05	1.2E-05	1.9E-05
11	benzo(ghi)perylene	24hr	max	2.4E-05	2.4E-05	2.9E-05
12	benzo(ghi)perylene	24hr	max	9.3E-06	9.3E-06	2.0E-05
13	benzo(ghi)perylene	24hr	max	1.0E-05	1.0E-05	2.0E-05
14	benzo(ghi)perylene	24hr	max	3.5E-05	3.5E-05	3.5E-05
15	benzo(ghi)perylene	24hr	max	6.7E-06	6.7E-06	1.6E-05
16	benzo(ghi)perylene	24hr	max	6.7E-06	6.7E-06	1.6E-05
17	benzo(ghi)perylene	24hr	max	7.4E-06	7.4E-06	1.7E-05
18	benzo(ghi)perylene	24hr	max	8.1E-06	8.1E-06	1.8E-05
19	benzo(ghi)perylene	24hr	max	7.7E-06	7.7E-06	1.8E-05
20	benzo(ghi)perylene	24hr	max	7.1E-06	7.1E-06	1.8E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
21	benzo(ghi)perylene	24hr	max	1.5E-05	1.5E-05	2.2E-05
22	benzo(ghi)perylene	24hr	max	1.6E-05	1.6E-05	2.2E-05
23	benzo(ghi)perylene	24hr	max	1.1E-05	1.1E-05	2.1E-05
24	benzo(ghi)perylene	24hr	max	3.5E-06	3.5E-06	1.5E-05
25	benzo(ghi)perylene	24hr	max	3.4E-06	3.4E-06	2.9E-05
26	benzo(ghi)perylene	24hr	max	3.6E-06	3.6E-06	3.0E-05
27	benzo(ghi)perylene	24hr	max	3.4E-06	3.4E-06	4.6E-05
28	benzo(ghi)perylene	24hr	max	6.8E-06	6.8E-06	2.8E-05
29	benzo(ghi)perylene	24hr	max	7.2E-06	7.2E-06	2.9E-05
30	benzo(ghi)perylene	24hr	max	5.9E-06	5.9E-06	1.5E-05
31	benzo(ghi)perylene	24hr	max	6.1E-06	6.1E-06	1.5E-05
32	benzo(ghi)perylene	24hr	max	3.0E-06	3.0E-06	7.1E-06
33	benzo(ghi)perylene	24hr	max	4.2E-06	4.2E-06	1.0E-05
34	benzo(ghi)perylene	24hr	max	3.9E-06	3.9E-06	1.0E-05
35	benzo(ghi)perylene	24hr	max	3.2E-06	3.2E-06	7.7E-06
36	benzo(ghi)perylene	24hr	max	3.1E-06	3.1E-06	9.4E-06
37	benzo(ghi)perylene	24hr	max	3.0E-06	3.0E-06	1.1E-05
38	benzo(ghi)perylene	24hr	max	1.1E-05	1.1E-05	2.7E-05
39	benzo(ghi)perylene	24hr	max	9.2E-06	9.2E-06	3.1E-05
40	benzo(ghi)perylene	24hr	max	6.3E-06	6.3E-06	3.6E-05
41	benzo(ghi)perylene	24hr	max	5.6E-06	5.6E-06	4.2E-05
42	benzo(ghi)perylene	24hr	max	7.9E-06	7.9E-06	3.6E-05
43	benzo(ghi)perylene	24hr	max	7.4E-06	7.4E-06	3.4E-05
44	benzo(ghi)perylene	24hr	max	7.3E-06	7.3E-06	3.3E-05
45	benzo(ghi)perylene	24hr	max	6.7E-06	6.7E-06	3.3E-05
46	benzo(ghi)perylene	24hr	max	6.8E-06	6.8E-06	3.2E-05
47	benzo(ghi)perylene	24hr	max	6.0E-06	6.0E-06	2.7E-05
48	benzo(ghi)perylene	24hr	max	6.7E-06	6.7E-06	3.0E-05
49	benzo(ghi)perylene	24hr	max	6.5E-06	6.5E-06	3.0E-05
50	benzo(ghi)perylene	24hr	max	6.5E-06	6.6E-06	2.8E-05
51	benzo(ghi)perylene	24hr	max	7.3E-06	7.3E-06	2.9E-05
52	benzo(ghi)perylene	24hr	max	5.9E-06	5.9E-06	1.6E-04
53	benzo(ghi)perylene	24hr	max	5.8E-06	5.9E-06	6.6E-05
54	benzo(ghi)perylene	24hr	max	3.2E-06	3.2E-06	1.1E-05
55	benzo(ghi)perylene	24hr	max	3.1E-06	3.1E-06	1.5E-05
56	benzo(ghi)perylene	24hr	max	2.9E-06	3.0E-06	1.8E-05
57	benzo(ghi)perylene	24hr	max	3.4E-06	3.4E-06	1.2E-05
58	benzo(ghi)perylene	24hr	max	2.8E-06	2.8E-06	1.3E-05
59	benzo(ghi)perylene	24hr	max	6.7E-06	6.7E-06	8.6E-05
60	benzo(ghi)perylene	24hr	max	9.8E-06	9.8E-06	4.3E-05
61	benzo(ghi)perylene	24hr	max	9.3E-06	9.3E-06	6.0E-05
62	benzo(ghi)perylene	24hr	max	8.4E-06	8.4E-06	6.7E-05
63	benzo(ghi)perylene	24hr	max	7.2E-06	7.2E-06	1.0E-04
64	benzo(ghi)perylene	24hr	max	7.4E-06	7.4E-06	9.7E-05
65	benzo(ghi)perylene	24hr	max	9.8E-06	9.8E-06	3.9E-05
66	benzo(ghi)perylene	24hr	max	1.1E-05	1.1E-05	1.8E-05
67	benzo(ghi)perylene	24hr	max	7.3E-06	7.3E-06	1.7E-05
68	benzo(ghi)perylene	24hr	max	6.1E-06	6.2E-06	1.6E-05
69	benzo(ghi)perylene	24hr	max	4.1E-06	4.1E-06	1.4E-05
70	benzo(ghi)perylene	24hr	max	4.3E-06	4.3E-06	1.1E-05
71	benzo(ghi)perylene	24hr	max	8.2E-06	8.2E-06	2.5E-05
72	benzo(ghi)perylene	24hr	max	8.1E-06	8.1E-06	2.3E-05
73	benzo(ghi)perylene	24hr	max	1.0E-05	1.0E-05	3.7E-05
74	benzo(ghi)perylene	24hr	max	6.9E-06	6.9E-06	1.4E-04
75	benzo(ghi)perylene	24hr	max	3.0E-05	3.0E-05	3.4E-05
76	benzo(ghi)perylene	24hr	max	9.2E-06	9.2E-06	6.1E-05
77	benzo(ghi)perylene	24hr	max	7.4E-06	7.4E-06	3.3E-04
78	benzo(ghi)perylene	24hr	max	9.0E-06	9.0E-06	3.8E-05
79	benzo(ghi)perylene	24hr	max	1.4E-05	1.4E-05	2.4E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
1	benzo(ghi)perylene	annual	average	1.6E-07	1.6E-07	3.7E-07
2	benzo(ghi)perylene	annual	average	2.9E-07	3.0E-07	6.6E-07
3	benzo(ghi)perylene	annual	average	3.0E-07	3.1E-07	6.8E-07
4	benzo(ghi)perylene	annual	average	3.3E-07	3.4E-07	7.6E-07
5	benzo(ghi)perylene	annual	average	3.9E-07	3.9E-07	9.0E-07
6	benzo(ghi)perylene	annual	average	4.0E-07	4.1E-07	9.3E-07
7	benzo(ghi)perylene	annual	average	3.5E-07	3.5E-07	8.0E-07
8	benzo(ghi)perylene	annual	average	4.1E-07	4.2E-07	9.5E-07
9	benzo(ghi)perylene	annual	average	3.9E-07	4.0E-07	9.3E-07
10	benzo(ghi)perylene	annual	average	6.7E-07	6.7E-07	1.5E-06
11	benzo(ghi)perylene	annual	average	1.1E-06	1.1E-06	2.1E-06
12	benzo(ghi)perylene	annual	average	9.5E-07	9.5E-07	1.8E-06
13	benzo(ghi)perylene	annual	average	8.7E-07	8.8E-07	1.8E-06
14	benzo(ghi)perylene	annual	average	1.9E-06	1.9E-06	3.0E-06
15	benzo(ghi)perylene	annual	average	4.7E-07	4.8E-07	1.1E-06
16	benzo(ghi)perylene	annual	average	4.7E-07	4.8E-07	1.1E-06
17	benzo(ghi)perylene	annual	average	5.2E-07	5.3E-07	1.2E-06
18	benzo(ghi)perylene	annual	average	5.8E-07	6.0E-07	1.3E-06
19	benzo(ghi)perylene	annual	average	5.8E-07	5.9E-07	1.3E-06
20	benzo(ghi)perylene	annual	average	6.2E-07	6.4E-07	1.4E-06
21	benzo(ghi)perylene	annual	average	9.9E-07	9.9E-07	2.0E-06
22	benzo(ghi)perylene	annual	average	9.1E-07	9.2E-07	1.9E-06
23	benzo(ghi)perylene	annual	average	6.3E-07	6.4E-07	1.4E-06
24	benzo(ghi)perylene	annual	average	3.0E-07	3.0E-07	7.2E-07
25	benzo(ghi)perylene	annual	average	3.6E-07	3.9E-07	1.3E-06
26	benzo(ghi)perylene	annual	average	4.1E-07	4.3E-07	1.4E-06
27	benzo(ghi)perylene	annual	average	5.0E-07	5.4E-07	2.2E-06
28	benzo(ghi)perylene	annual	average	7.2E-07	7.3E-07	1.8E-06
29	benzo(ghi)perylene	annual	average	7.5E-07	7.6E-07	1.9E-06
30	benzo(ghi)perylene	annual	average	3.2E-07	3.3E-07	9.6E-07
31	benzo(ghi)perylene	annual	average	3.4E-07	3.5E-07	1.0E-06
32	benzo(ghi)perylene	annual	average	1.5E-07	1.6E-07	4.0E-07
33	benzo(ghi)perylene	annual	average	2.0E-07	2.0E-07	5.4E-07
34	benzo(ghi)perylene	annual	average	2.0E-07	2.0E-07	5.2E-07
35	benzo(ghi)perylene	annual	average	2.2E-07	2.2E-07	5.4E-07
36	benzo(ghi)perylene	annual	average	2.3E-07	2.4E-07	5.8E-07
37	benzo(ghi)perylene	annual	average	2.3E-07	2.3E-07	5.8E-07
38	benzo(ghi)perylene	annual	average	7.2E-07	7.2E-07	2.1E-06
39	benzo(ghi)perylene	annual	average	6.9E-07	7.0E-07	2.3E-06
40	benzo(ghi)perylene	annual	average	6.5E-07	6.6E-07	2.6E-06
41	benzo(ghi)perylene	annual	average	5.8E-07	5.9E-07	2.8E-06
42	benzo(ghi)perylene	annual	average	7.8E-07	7.9E-07	2.7E-06
43	benzo(ghi)perylene	annual	average	7.9E-07	8.0E-07	3.0E-06
44	benzo(ghi)perylene	annual	average	8.2E-07	8.2E-07	3.0E-06
45	benzo(ghi)perylene	annual	average	7.2E-07	7.3E-07	3.1E-06
46	benzo(ghi)perylene	annual	average	7.3E-07	7.3E-07	3.1E-06
47	benzo(ghi)perylene	annual	average	7.0E-07	7.1E-07	3.2E-06
48	benzo(ghi)perylene	annual	average	7.7E-07	7.7E-07	3.1E-06
49	benzo(ghi)perylene	annual	average	7.3E-07	7.4E-07	3.1E-06
50	benzo(ghi)perylene	annual	average	7.7E-07	7.7E-07	3.2E-06
51	benzo(ghi)perylene	annual	average	7.7E-07	7.8E-07	3.0E-06
52	benzo(ghi)perylene	annual	average	7.3E-07	7.3E-07	1.0E-05
53	benzo(ghi)perylene	annual	average	6.6E-07	6.7E-07	5.7E-06
54	benzo(ghi)perylene	annual	average	2.3E-07	2.3E-07	5.2E-07
55	benzo(ghi)perylene	annual	average	2.5E-07	2.5E-07	5.9E-07
56	benzo(ghi)perylene	annual	average	2.6E-07	2.6E-07	6.4E-07
57	benzo(ghi)perylene	annual	average	2.8E-07	2.8E-07	6.4E-07
58	benzo(ghi)perylene	annual	average	1.9E-07	2.0E-07	4.5E-07
59	benzo(ghi)perylene	annual	average	9.1E-07	9.1E-07	1.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
60	benzo(ghi)perylene	annual	average	1.2E-06	1.2E-06	3.3E-06
61	benzo(ghi)perylene	annual	average	1.1E-06	1.1E-06	3.8E-06
62	benzo(ghi)perylene	annual	average	1.1E-06	1.1E-06	4.2E-06
63	benzo(ghi)perylene	annual	average	1.0E-06	1.0E-06	5.1E-06
64	benzo(ghi)perylene	annual	average	1.0E-06	1.0E-06	4.8E-06
65	benzo(ghi)perylene	annual	average	1.2E-06	1.2E-06	4.1E-06
66	benzo(ghi)perylene	annual	average	5.9E-07	6.0E-07	1.3E-06
67	benzo(ghi)perylene	annual	average	7.9E-07	8.0E-07	1.7E-06
68	benzo(ghi)perylene	annual	average	4.9E-07	4.9E-07	1.2E-06
69	benzo(ghi)perylene	annual	average	4.6E-07	4.6E-07	1.2E-06
70	benzo(ghi)perylene	annual	average	4.2E-07	4.2E-07	1.1E-06
71	benzo(ghi)perylene	annual	average	5.2E-07	5.3E-07	1.7E-06
72	benzo(ghi)perylene	annual	average	5.2E-07	5.3E-07	1.8E-06
73	benzo(ghi)perylene	annual	average	1.5E-06	1.5E-06	4.6E-06
74	benzo(ghi)perylene	annual	average	8.8E-07	8.8E-07	1.6E-05
75	benzo(ghi)perylene	annual	average	4.9E-06	4.9E-06	5.8E-06
76	benzo(ghi)perylene	annual	average	1.1E-06	1.1E-06	3.9E-06
77	benzo(ghi)perylene	annual	average	9.0E-07	9.0E-07	1.1E-05
78	benzo(ghi)perylene	annual	average	7.7E-07	7.8E-07	2.6E-06
79	benzo(ghi)perylene	annual	average	8.2E-07	8.3E-07	1.7E-06
1	benzo(k)fluoranthene	1hr	max	1.1E-05	1.1E-05	5.4E-05
2	benzo(k)fluoranthene	1hr	max	1.1E-05	1.1E-05	3.5E-05
3	benzo(k)fluoranthene	1hr	max	1.3E-05	1.3E-05	3.7E-05
4	benzo(k)fluoranthene	1hr	max	1.5E-05	1.5E-05	3.7E-05
5	benzo(k)fluoranthene	1hr	max	2.5E-05	2.5E-05	4.9E-05
6	benzo(k)fluoranthene	1hr	max	2.9E-05	2.9E-05	5.1E-05
7	benzo(k)fluoranthene	1hr	max	2.0E-05	2.0E-05	4.9E-05
8	benzo(k)fluoranthene	1hr	max	3.2E-05	3.2E-05	5.1E-05
9	benzo(k)fluoranthene	1hr	max	2.1E-05	2.1E-05	4.4E-05
10	benzo(k)fluoranthene	1hr	max	4.5E-05	4.5E-05	5.7E-05
11	benzo(k)fluoranthene	1hr	max	9.5E-05	9.5E-05	9.6E-05
12	benzo(k)fluoranthene	1hr	max	6.2E-05	6.2E-05	6.6E-05
13	benzo(k)fluoranthene	1hr	max	4.5E-05	4.5E-05	6.1E-05
14	benzo(k)fluoranthene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	benzo(k)fluoranthene	1hr	max	2.9E-05	2.9E-05	5.4E-05
16	benzo(k)fluoranthene	1hr	max	2.7E-05	2.7E-05	5.4E-05
17	benzo(k)fluoranthene	1hr	max	3.2E-05	3.2E-05	4.2E-05
18	benzo(k)fluoranthene	1hr	max	2.8E-05	2.8E-05	4.7E-05
19	benzo(k)fluoranthene	1hr	max	3.1E-05	3.1E-05	4.8E-05
20	benzo(k)fluoranthene	1hr	max	3.2E-05	3.2E-05	5.4E-05
21	benzo(k)fluoranthene	1hr	max	1.0E-04	1.0E-04	1.1E-04
22	benzo(k)fluoranthene	1hr	max	8.3E-05	8.3E-05	9.8E-05
23	benzo(k)fluoranthene	1hr	max	5.6E-05	5.6E-05	8.1E-05
24	benzo(k)fluoranthene	1hr	max	1.0E-05	1.0E-05	5.4E-05
25	benzo(k)fluoranthene	1hr	max	1.5E-05	1.5E-05	9.9E-05
26	benzo(k)fluoranthene	1hr	max	1.4E-05	1.4E-05	1.1E-04
27	benzo(k)fluoranthene	1hr	max	1.5E-05	1.5E-05	2.1E-04
28	benzo(k)fluoranthene	1hr	max	3.8E-05	3.8E-05	9.7E-05
29	benzo(k)fluoranthene	1hr	max	4.7E-05	4.7E-05	1.1E-04
30	benzo(k)fluoranthene	1hr	max	2.3E-05	2.3E-05	7.6E-05
31	benzo(k)fluoranthene	1hr	max	2.4E-05	2.4E-05	8.5E-05
32	benzo(k)fluoranthene	1hr	max	1.2E-05	1.2E-05	3.6E-05
33	benzo(k)fluoranthene	1hr	max	1.7E-05	1.7E-05	4.3E-05
34	benzo(k)fluoranthene	1hr	max	1.6E-05	1.6E-05	3.8E-05
35	benzo(k)fluoranthene	1hr	max	1.4E-05	1.4E-05	5.9E-05
36	benzo(k)fluoranthene	1hr	max	1.2E-05	1.2E-05	5.7E-05
37	benzo(k)fluoranthene	1hr	max	1.2E-05	1.2E-05	6.0E-05
38	benzo(k)fluoranthene	1hr	max	5.0E-05	5.0E-05	1.3E-04
39	benzo(k)fluoranthene	1hr	max	3.3E-05	3.3E-05	1.3E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
40	benzo(k)fluoranthene	1hr	max	2.4E-05	2.4E-05	1.3E-04
41	benzo(k)fluoranthene	1hr	max	2.0E-05	2.0E-05	1.3E-04
42	benzo(k)fluoranthene	1hr	max	4.2E-05	4.2E-05	1.6E-04
43	benzo(k)fluoranthene	1hr	max	2.9E-05	2.9E-05	1.6E-04
44	benzo(k)fluoranthene	1hr	max	3.0E-05	3.0E-05	1.5E-04
45	benzo(k)fluoranthene	1hr	max	2.6E-05	2.6E-05	1.3E-04
46	benzo(k)fluoranthene	1hr	max	2.7E-05	2.7E-05	1.3E-04
47	benzo(k)fluoranthene	1hr	max	2.8E-05	2.8E-05	1.1E-04
48	benzo(k)fluoranthene	1hr	max	3.0E-05	3.0E-05	1.2E-04
49	benzo(k)fluoranthene	1hr	max	3.0E-05	3.0E-05	1.1E-04
50	benzo(k)fluoranthene	1hr	max	4.2E-05	4.2E-05	1.1E-04
51	benzo(k)fluoranthene	1hr	max	4.2E-05	4.2E-05	1.2E-04
52	benzo(k)fluoranthene	1hr	max	2.7E-05	2.7E-05	8.1E-04
53	benzo(k)fluoranthene	1hr	max	2.4E-05	2.4E-05	3.7E-04
54	benzo(k)fluoranthene	1hr	max	1.2E-05	1.2E-05	3.2E-05
55	benzo(k)fluoranthene	1hr	max	1.2E-05	1.2E-05	5.7E-05
56	benzo(k)fluoranthene	1hr	max	1.1E-05	1.1E-05	7.4E-05
57	benzo(k)fluoranthene	1hr	max	1.6E-05	1.6E-05	4.6E-05
58	benzo(k)fluoranthene	1hr	max	1.0E-05	1.0E-05	4.6E-05
59	benzo(k)fluoranthene	1hr	max	2.2E-05	2.2E-05	5.3E-04
60	benzo(k)fluoranthene	1hr	max	4.1E-05	4.1E-05	2.6E-04
61	benzo(k)fluoranthene	1hr	max	7.9E-05	7.9E-05	2.2E-04
62	benzo(k)fluoranthene	1hr	max	7.1E-05	7.1E-05	2.7E-04
63	benzo(k)fluoranthene	1hr	max	5.5E-05	5.5E-05	4.4E-04
64	benzo(k)fluoranthene	1hr	max	5.7E-05	5.7E-05	2.8E-04
65	benzo(k)fluoranthene	1hr	max	7.4E-05	7.4E-05	2.4E-04
66	benzo(k)fluoranthene	1hr	max	3.0E-05	3.0E-05	5.5E-05
67	benzo(k)fluoranthene	1hr	max	5.1E-05	5.1E-05	5.5E-05
68	benzo(k)fluoranthene	1hr	max	2.6E-05	2.6E-05	4.0E-05
69	benzo(k)fluoranthene	1hr	max	2.3E-05	2.3E-05	4.0E-05
70	benzo(k)fluoranthene	1hr	max	2.1E-05	2.1E-05	3.8E-05
71	benzo(k)fluoranthene	1hr	max	3.8E-05	3.8E-05	1.1E-04
72	benzo(k)fluoranthene	1hr	max	3.7E-05	3.7E-05	1.1E-04
73	benzo(k)fluoranthene	1hr	max	7.3E-05	7.3E-05	2.8E-04
74	benzo(k)fluoranthene	1hr	max	3.3E-05	3.3E-05	1.2E-03
75	benzo(k)fluoranthene	1hr	max	1.1E-04	1.1E-04	1.1E-04
76	benzo(k)fluoranthene	1hr	max	7.9E-05	7.9E-05	2.3E-04
77	benzo(k)fluoranthene	1hr	max	4.4E-05	4.4E-05	4.1E-03
78	benzo(k)fluoranthene	1hr	max	4.8E-05	4.8E-05	1.5E-04
79	benzo(k)fluoranthene	1hr	max	6.6E-05	6.6E-05	9.7E-05
1	benzo(k)fluoranthene	1hr	9th	5.6E-06	5.6E-06	2.6E-05
2	benzo(k)fluoranthene	1hr	9th	9.1E-06	9.1E-06	2.4E-05
3	benzo(k)fluoranthene	1hr	9th	9.6E-06	9.6E-06	2.5E-05
4	benzo(k)fluoranthene	1hr	9th	1.0E-05	1.0E-05	3.0E-05
5	benzo(k)fluoranthene	1hr	9th	1.2E-05	1.2E-05	3.6E-05
6	benzo(k)fluoranthene	1hr	9th	1.3E-05	1.3E-05	3.7E-05
7	benzo(k)fluoranthene	1hr	9th	9.8E-06	9.9E-06	3.1E-05
8	benzo(k)fluoranthene	1hr	9th	1.2E-05	1.2E-05	3.8E-05
9	benzo(k)fluoranthene	1hr	9th	1.3E-05	1.3E-05	3.3E-05
10	benzo(k)fluoranthene	1hr	9th	2.9E-05	2.9E-05	4.6E-05
11	benzo(k)fluoranthene	1hr	9th	6.4E-05	6.4E-05	7.5E-05
12	benzo(k)fluoranthene	1hr	9th	3.2E-05	3.2E-05	5.2E-05
13	benzo(k)fluoranthene	1hr	9th	3.2E-05	3.2E-05	4.8E-05
14	benzo(k)fluoranthene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	benzo(k)fluoranthene	1hr	9th	1.5E-05	1.5E-05	3.7E-05
16	benzo(k)fluoranthene	1hr	9th	1.5E-05	1.5E-05	3.6E-05
17	benzo(k)fluoranthene	1hr	9th	2.0E-05	2.0E-05	3.9E-05
18	benzo(k)fluoranthene	1hr	9th	1.9E-05	1.9E-05	4.0E-05
19	benzo(k)fluoranthene	1hr	9th	1.7E-05	1.7E-05	4.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
20	benzo(k)fluoranthene	1hr	9th	1.9E-05	1.9E-05	4.5E-05
21	benzo(k)fluoranthene	1hr	9th	3.6E-05	3.6E-05	6.0E-05
22	benzo(k)fluoranthene	1hr	9th	3.7E-05	3.7E-05	6.0E-05
23	benzo(k)fluoranthene	1hr	9th	2.6E-05	2.6E-05	4.8E-05
24	benzo(k)fluoranthene	1hr	9th	7.6E-06	7.6E-06	3.0E-05
25	benzo(k)fluoranthene	1hr	9th	9.5E-06	9.5E-06	7.3E-05
26	benzo(k)fluoranthene	1hr	9th	9.4E-06	9.4E-06	8.4E-05
27	benzo(k)fluoranthene	1hr	9th	1.0E-05	1.0E-05	1.5E-04
28	benzo(k)fluoranthene	1hr	9th	2.4E-05	2.4E-05	5.7E-05
29	benzo(k)fluoranthene	1hr	9th	2.7E-05	2.7E-05	5.6E-05
30	benzo(k)fluoranthene	1hr	9th	1.5E-05	1.5E-05	4.4E-05
31	benzo(k)fluoranthene	1hr	9th	1.5E-05	1.5E-05	5.1E-05
32	benzo(k)fluoranthene	1hr	9th	6.0E-06	6.0E-06	2.3E-05
33	benzo(k)fluoranthene	1hr	9th	8.6E-06	8.6E-06	2.6E-05
34	benzo(k)fluoranthene	1hr	9th	7.7E-06	7.7E-06	2.6E-05
35	benzo(k)fluoranthene	1hr	9th	6.9E-06	7.0E-06	2.8E-05
36	benzo(k)fluoranthene	1hr	9th	6.9E-06	7.0E-06	3.1E-05
37	benzo(k)fluoranthene	1hr	9th	6.7E-06	6.8E-06	3.2E-05
38	benzo(k)fluoranthene	1hr	9th	2.9E-05	2.9E-05	6.9E-05
39	benzo(k)fluoranthene	1hr	9th	2.6E-05	2.6E-05	7.4E-05
40	benzo(k)fluoranthene	1hr	9th	2.0E-05	2.0E-05	9.0E-05
41	benzo(k)fluoranthene	1hr	9th	1.4E-05	1.4E-05	8.9E-05
42	benzo(k)fluoranthene	1hr	9th	2.5E-05	2.5E-05	6.5E-05
43	benzo(k)fluoranthene	1hr	9th	2.1E-05	2.1E-05	6.6E-05
44	benzo(k)fluoranthene	1hr	9th	2.0E-05	2.0E-05	7.0E-05
45	benzo(k)fluoranthene	1hr	9th	1.8E-05	1.8E-05	7.1E-05
46	benzo(k)fluoranthene	1hr	9th	1.9E-05	1.9E-05	7.0E-05
47	benzo(k)fluoranthene	1hr	9th	1.8E-05	1.8E-05	7.1E-05
48	benzo(k)fluoranthene	1hr	9th	2.0E-05	2.0E-05	7.1E-05
49	benzo(k)fluoranthene	1hr	9th	1.9E-05	1.9E-05	7.3E-05
50	benzo(k)fluoranthene	1hr	9th	2.2E-05	2.2E-05	7.4E-05
51	benzo(k)fluoranthene	1hr	9th	2.4E-05	2.4E-05	6.5E-05
52	benzo(k)fluoranthene	1hr	9th	1.4E-05	1.4E-05	3.8E-04
53	benzo(k)fluoranthene	1hr	9th	1.2E-05	1.2E-05	1.6E-04
54	benzo(k)fluoranthene	1hr	9th	6.2E-06	6.2E-06	2.2E-05
55	benzo(k)fluoranthene	1hr	9th	6.4E-06	6.4E-06	2.7E-05
56	benzo(k)fluoranthene	1hr	9th	6.5E-06	6.5E-06	3.0E-05
57	benzo(k)fluoranthene	1hr	9th	7.5E-06	7.5E-06	2.4E-05
58	benzo(k)fluoranthene	1hr	9th	6.3E-06	6.3E-06	2.0E-05
59	benzo(k)fluoranthene	1hr	9th	1.9E-05	1.9E-05	2.2E-04
60	benzo(k)fluoranthene	1hr	9th	2.5E-05	2.5E-05	1.0E-04
61	benzo(k)fluoranthene	1hr	9th	3.1E-05	3.1E-05	1.4E-04
62	benzo(k)fluoranthene	1hr	9th	2.4E-05	2.4E-05	1.7E-04
63	benzo(k)fluoranthene	1hr	9th	2.2E-05	2.2E-05	2.7E-04
64	benzo(k)fluoranthene	1hr	9th	2.2E-05	2.2E-05	2.5E-04
65	benzo(k)fluoranthene	1hr	9th	2.8E-05	2.8E-05	1.7E-04
66	benzo(k)fluoranthene	1hr	9th	1.8E-05	1.8E-05	3.7E-05
67	benzo(k)fluoranthene	1hr	9th	2.4E-05	2.4E-05	4.1E-05
68	benzo(k)fluoranthene	1hr	9th	1.4E-05	1.4E-05	3.0E-05
69	benzo(k)fluoranthene	1hr	9th	1.0E-05	1.0E-05	2.9E-05
70	benzo(k)fluoranthene	1hr	9th	8.1E-06	8.1E-06	2.9E-05
71	benzo(k)fluoranthene	1hr	9th	2.1E-05	2.1E-05	8.0E-05
72	benzo(k)fluoranthene	1hr	9th	2.0E-05	2.0E-05	8.0E-05
73	benzo(k)fluoranthene	1hr	9th	2.9E-05	2.9E-05	1.8E-04
74	benzo(k)fluoranthene	1hr	9th	1.9E-05	1.9E-05	4.6E-04
75	benzo(k)fluoranthene	1hr	9th	8.4E-05	8.4E-05	8.9E-05
76	benzo(k)fluoranthene	1hr	9th	3.0E-05	3.0E-05	1.4E-04
77	benzo(k)fluoranthene	1hr	9th	2.1E-05	2.1E-05	1.8E-03
78	benzo(k)fluoranthene	1hr	9th	2.5E-05	2.5E-05	6.4E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
79	benzo(k)fluoranthene	1hr	9th	2.7E-05	2.7E-05	5.4E-05
1	benzo(k)fluoranthene	24hr	max	2.6E-06	2.7E-06	9.0E-06
2	benzo(k)fluoranthene	24hr	max	3.6E-06	3.6E-06	1.0E-05
3	benzo(k)fluoranthene	24hr	max	3.8E-06	3.8E-06	1.1E-05
4	benzo(k)fluoranthene	24hr	max	4.2E-06	4.2E-06	1.3E-05
5	benzo(k)fluoranthene	24hr	max	4.4E-06	4.4E-06	1.6E-05
6	benzo(k)fluoranthene	24hr	max	4.7E-06	4.7E-06	1.7E-05
7	benzo(k)fluoranthene	24hr	max	4.5E-06	4.5E-06	1.2E-05
8	benzo(k)fluoranthene	24hr	max	5.5E-06	5.5E-06	1.7E-05
9	benzo(k)fluoranthene	24hr	max	4.2E-06	4.2E-06	1.6E-05
10	benzo(k)fluoranthene	24hr	max	1.2E-05	1.2E-05	1.9E-05
11	benzo(k)fluoranthene	24hr	max	2.4E-05	2.4E-05	2.9E-05
12	benzo(k)fluoranthene	24hr	max	9.5E-06	9.5E-06	2.1E-05
13	benzo(k)fluoranthene	24hr	max	1.1E-05	1.1E-05	2.0E-05
14	benzo(k)fluoranthene	24hr	max	3.5E-05	3.5E-05	3.5E-05
15	benzo(k)fluoranthene	24hr	max	6.6E-06	6.6E-06	1.6E-05
16	benzo(k)fluoranthene	24hr	max	6.6E-06	6.6E-06	1.6E-05
17	benzo(k)fluoranthene	24hr	max	7.3E-06	7.3E-06	1.7E-05
18	benzo(k)fluoranthene	24hr	max	7.9E-06	8.0E-06	1.7E-05
19	benzo(k)fluoranthene	24hr	max	7.6E-06	7.6E-06	1.7E-05
20	benzo(k)fluoranthene	24hr	max	7.0E-06	7.1E-06	1.8E-05
21	benzo(k)fluoranthene	24hr	max	1.5E-05	1.5E-05	2.3E-05
22	benzo(k)fluoranthene	24hr	max	1.6E-05	1.6E-05	2.2E-05
23	benzo(k)fluoranthene	24hr	max	1.1E-05	1.1E-05	2.1E-05
24	benzo(k)fluoranthene	24hr	max	3.4E-06	3.4E-06	1.6E-05
25	benzo(k)fluoranthene	24hr	max	3.8E-06	3.8E-06	2.9E-05
26	benzo(k)fluoranthene	24hr	max	3.7E-06	3.7E-06	3.0E-05
27	benzo(k)fluoranthene	24hr	max	4.1E-06	4.1E-06	4.6E-05
28	benzo(k)fluoranthene	24hr	max	6.7E-06	6.7E-06	2.8E-05
29	benzo(k)fluoranthene	24hr	max	7.2E-06	7.2E-06	2.9E-05
30	benzo(k)fluoranthene	24hr	max	6.5E-06	6.5E-06	1.5E-05
31	benzo(k)fluoranthene	24hr	max	6.8E-06	6.8E-06	1.6E-05
32	benzo(k)fluoranthene	24hr	max	3.2E-06	3.2E-06	7.3E-06
33	benzo(k)fluoranthene	24hr	max	4.6E-06	4.6E-06	1.0E-05
34	benzo(k)fluoranthene	24hr	max	4.2E-06	4.3E-06	1.0E-05
35	benzo(k)fluoranthene	24hr	max	3.5E-06	3.5E-06	8.1E-06
36	benzo(k)fluoranthene	24hr	max	3.3E-06	3.4E-06	9.8E-06
37	benzo(k)fluoranthene	24hr	max	3.2E-06	3.3E-06	1.2E-05
38	benzo(k)fluoranthene	24hr	max	1.1E-05	1.1E-05	2.8E-05
39	benzo(k)fluoranthene	24hr	max	9.2E-06	9.2E-06	3.1E-05
40	benzo(k)fluoranthene	24hr	max	6.3E-06	6.3E-06	3.7E-05
41	benzo(k)fluoranthene	24hr	max	5.7E-06	5.7E-06	4.2E-05
42	benzo(k)fluoranthene	24hr	max	7.8E-06	7.8E-06	3.6E-05
43	benzo(k)fluoranthene	24hr	max	7.4E-06	7.4E-06	3.5E-05
44	benzo(k)fluoranthene	24hr	max	7.4E-06	7.4E-06	3.5E-05
45	benzo(k)fluoranthene	24hr	max	6.7E-06	6.7E-06	3.4E-05
46	benzo(k)fluoranthene	24hr	max	6.9E-06	6.9E-06	3.4E-05
47	benzo(k)fluoranthene	24hr	max	6.0E-06	6.0E-06	2.9E-05
48	benzo(k)fluoranthene	24hr	max	6.7E-06	6.7E-06	3.2E-05
49	benzo(k)fluoranthene	24hr	max	6.5E-06	6.5E-06	3.1E-05
50	benzo(k)fluoranthene	24hr	max	6.5E-06	6.5E-06	2.9E-05
51	benzo(k)fluoranthene	24hr	max	7.3E-06	7.3E-06	3.0E-05
52	benzo(k)fluoranthene	24hr	max	7.0E-06	7.0E-06	1.6E-04
53	benzo(k)fluoranthene	24hr	max	6.4E-06	6.4E-06	6.8E-05
54	benzo(k)fluoranthene	24hr	max	3.1E-06	3.1E-06	1.1E-05
55	benzo(k)fluoranthene	24hr	max	3.0E-06	3.0E-06	1.6E-05
56	benzo(k)fluoranthene	24hr	max	2.9E-06	2.9E-06	1.8E-05
57	benzo(k)fluoranthene	24hr	max	3.3E-06	3.3E-06	1.2E-05
58	benzo(k)fluoranthene	24hr	max	2.7E-06	2.8E-06	1.3E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
59	benzo(k)fluoranthene	24hr	max	8.0E-06	8.0E-06	8.6E-05
60	benzo(k)fluoranthene	24hr	max	1.2E-05	1.2E-05	4.4E-05
61	benzo(k)fluoranthene	24hr	max	1.2E-05	1.2E-05	6.0E-05
62	benzo(k)fluoranthene	24hr	max	1.1E-05	1.1E-05	6.7E-05
63	benzo(k)fluoranthene	24hr	max	8.9E-06	8.9E-06	1.0E-04
64	benzo(k)fluoranthene	24hr	max	9.3E-06	9.3E-06	9.7E-05
65	benzo(k)fluoranthene	24hr	max	1.2E-05	1.2E-05	3.9E-05
66	benzo(k)fluoranthene	24hr	max	1.1E-05	1.1E-05	1.8E-05
67	benzo(k)fluoranthene	24hr	max	7.2E-06	7.2E-06	1.7E-05
68	benzo(k)fluoranthene	24hr	max	6.6E-06	6.6E-06	1.7E-05
69	benzo(k)fluoranthene	24hr	max	4.0E-06	4.1E-06	1.4E-05
70	benzo(k)fluoranthene	24hr	max	4.3E-06	4.3E-06	1.1E-05
71	benzo(k)fluoranthene	24hr	max	9.5E-06	9.5E-06	2.5E-05
72	benzo(k)fluoranthene	24hr	max	9.3E-06	9.3E-06	2.4E-05
73	benzo(k)fluoranthene	24hr	max	1.2E-05	1.2E-05	3.7E-05
74	benzo(k)fluoranthene	24hr	max	8.1E-06	8.1E-06	1.4E-04
75	benzo(k)fluoranthene	24hr	max	3.4E-05	3.4E-05	4.0E-05
76	benzo(k)fluoranthene	24hr	max	1.2E-05	1.2E-05	6.1E-05
77	benzo(k)fluoranthene	24hr	max	8.7E-06	8.7E-06	3.3E-04
78	benzo(k)fluoranthene	24hr	max	8.9E-06	8.9E-06	3.8E-05
79	benzo(k)fluoranthene	24hr	max	1.4E-05	1.4E-05	2.4E-05
1	benzo(k)fluoranthene	annual	average	1.5E-07	1.5E-07	3.7E-07
2	benzo(k)fluoranthene	annual	average	3.0E-07	3.0E-07	6.7E-07
3	benzo(k)fluoranthene	annual	average	3.1E-07	3.1E-07	6.9E-07
4	benzo(k)fluoranthene	annual	average	3.4E-07	3.4E-07	7.7E-07
5	benzo(k)fluoranthene	annual	average	3.9E-07	4.0E-07	9.1E-07
6	benzo(k)fluoranthene	annual	average	4.1E-07	4.1E-07	9.4E-07
7	benzo(k)fluoranthene	annual	average	3.6E-07	3.6E-07	8.2E-07
8	benzo(k)fluoranthene	annual	average	4.2E-07	4.2E-07	9.7E-07
9	benzo(k)fluoranthene	annual	average	3.9E-07	4.0E-07	9.3E-07
10	benzo(k)fluoranthene	annual	average	6.6E-07	6.6E-07	1.5E-06
11	benzo(k)fluoranthene	annual	average	1.1E-06	1.1E-06	2.0E-06
12	benzo(k)fluoranthene	annual	average	9.4E-07	9.4E-07	1.8E-06
13	benzo(k)fluoranthene	annual	average	8.7E-07	8.7E-07	1.8E-06
14	benzo(k)fluoranthene	annual	average	1.9E-06	1.9E-06	3.0E-06
15	benzo(k)fluoranthene	annual	average	4.8E-07	4.9E-07	1.1E-06
16	benzo(k)fluoranthene	annual	average	4.8E-07	4.9E-07	1.1E-06
17	benzo(k)fluoranthene	annual	average	5.3E-07	5.4E-07	1.2E-06
18	benzo(k)fluoranthene	annual	average	5.8E-07	5.9E-07	1.3E-06
19	benzo(k)fluoranthene	annual	average	5.8E-07	6.0E-07	1.3E-06
20	benzo(k)fluoranthene	annual	average	6.3E-07	6.5E-07	1.5E-06
21	benzo(k)fluoranthene	annual	average	9.6E-07	9.7E-07	1.9E-06
22	benzo(k)fluoranthene	annual	average	9.0E-07	9.1E-07	1.9E-06
23	benzo(k)fluoranthene	annual	average	6.3E-07	6.4E-07	1.4E-06
24	benzo(k)fluoranthene	annual	average	3.1E-07	3.1E-07	7.3E-07
25	benzo(k)fluoranthene	annual	average	3.8E-07	4.1E-07	1.3E-06
26	benzo(k)fluoranthene	annual	average	4.3E-07	4.6E-07	1.5E-06
27	benzo(k)fluoranthene	annual	average	5.1E-07	5.6E-07	2.2E-06
28	benzo(k)fluoranthene	annual	average	7.3E-07	7.5E-07	1.8E-06
29	benzo(k)fluoranthene	annual	average	7.7E-07	7.8E-07	1.9E-06
30	benzo(k)fluoranthene	annual	average	3.5E-07	3.6E-07	9.9E-07
31	benzo(k)fluoranthene	annual	average	3.6E-07	3.7E-07	1.0E-06
32	benzo(k)fluoranthene	annual	average	1.5E-07	1.6E-07	4.0E-07
33	benzo(k)fluoranthene	annual	average	2.0E-07	2.1E-07	5.5E-07
34	benzo(k)fluoranthene	annual	average	2.1E-07	2.1E-07	5.4E-07
35	benzo(k)fluoranthene	annual	average	2.2E-07	2.2E-07	5.5E-07
36	benzo(k)fluoranthene	annual	average	2.3E-07	2.3E-07	5.8E-07
37	benzo(k)fluoranthene	annual	average	2.3E-07	2.3E-07	5.8E-07
38	benzo(k)fluoranthene	annual	average	7.4E-07	7.5E-07	2.2E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
39	benzo(k)fluoranthene	annual	average	7.1E-07	7.2E-07	2.3E-06
40	benzo(k)fluoranthene	annual	average	6.8E-07	6.9E-07	2.6E-06
41	benzo(k)fluoranthene	annual	average	6.3E-07	6.4E-07	2.8E-06
42	benzo(k)fluoranthene	annual	average	8.1E-07	8.2E-07	2.7E-06
43	benzo(k)fluoranthene	annual	average	8.3E-07	8.4E-07	3.0E-06
44	benzo(k)fluoranthene	annual	average	8.7E-07	8.8E-07	3.0E-06
45	benzo(k)fluoranthene	annual	average	7.6E-07	7.7E-07	3.2E-06
46	benzo(k)fluoranthene	annual	average	7.7E-07	7.8E-07	3.1E-06
47	benzo(k)fluoranthene	annual	average	7.5E-07	7.6E-07	3.2E-06
48	benzo(k)fluoranthene	annual	average	8.2E-07	8.3E-07	3.2E-06
49	benzo(k)fluoranthene	annual	average	7.8E-07	7.9E-07	3.2E-06
50	benzo(k)fluoranthene	annual	average	8.1E-07	8.2E-07	3.3E-06
51	benzo(k)fluoranthene	annual	average	8.1E-07	8.2E-07	3.0E-06
52	benzo(k)fluoranthene	annual	average	8.2E-07	8.2E-07	1.0E-05
53	benzo(k)fluoranthene	annual	average	7.3E-07	7.4E-07	5.8E-06
54	benzo(k)fluoranthene	annual	average	2.3E-07	2.4E-07	5.3E-07
55	benzo(k)fluoranthene	annual	average	2.5E-07	2.5E-07	6.0E-07
56	benzo(k)fluoranthene	annual	average	2.6E-07	2.7E-07	6.5E-07
57	benzo(k)fluoranthene	annual	average	2.8E-07	2.9E-07	6.4E-07
58	benzo(k)fluoranthene	annual	average	1.9E-07	2.0E-07	4.6E-07
59	benzo(k)fluoranthene	annual	average	1.0E-06	1.0E-06	1.1E-05
60	benzo(k)fluoranthene	annual	average	1.3E-06	1.3E-06	3.5E-06
61	benzo(k)fluoranthene	annual	average	1.4E-06	1.4E-06	4.1E-06
62	benzo(k)fluoranthene	annual	average	1.3E-06	1.3E-06	4.4E-06
63	benzo(k)fluoranthene	annual	average	1.2E-06	1.2E-06	5.2E-06
64	benzo(k)fluoranthene	annual	average	1.2E-06	1.2E-06	5.0E-06
65	benzo(k)fluoranthene	annual	average	1.5E-06	1.5E-06	4.4E-06
66	benzo(k)fluoranthene	annual	average	5.9E-07	6.0E-07	1.3E-06
67	benzo(k)fluoranthene	annual	average	8.0E-07	8.1E-07	1.7E-06
68	benzo(k)fluoranthene	annual	average	4.9E-07	5.0E-07	1.2E-06
69	benzo(k)fluoranthene	annual	average	4.6E-07	4.6E-07	1.2E-06
70	benzo(k)fluoranthene	annual	average	4.3E-07	4.3E-07	1.1E-06
71	benzo(k)fluoranthene	annual	average	5.6E-07	5.6E-07	1.8E-06
72	benzo(k)fluoranthene	annual	average	5.5E-07	5.6E-07	1.8E-06
73	benzo(k)fluoranthene	annual	average	1.8E-06	1.8E-06	4.9E-06
74	benzo(k)fluoranthene	annual	average	9.9E-07	9.9E-07	1.6E-05
75	benzo(k)fluoranthene	annual	average	6.6E-06	6.6E-06	7.6E-06
76	benzo(k)fluoranthene	annual	average	1.4E-06	1.4E-06	4.1E-06
77	benzo(k)fluoranthene	annual	average	1.0E-06	1.0E-06	1.1E-05
78	benzo(k)fluoranthene	annual	average	8.0E-07	8.1E-07	2.6E-06
79	benzo(k)fluoranthene	annual	average	8.2E-07	8.3E-07	1.7E-06
1	chrysene	1hr	max	2.6E-05	2.6E-05	6.1E-05
2	chrysene	1hr	max	2.7E-05	2.7E-05	4.9E-05
3	chrysene	1hr	max	2.9E-05	2.9E-05	5.1E-05
4	chrysene	1hr	max	2.6E-05	2.6E-05	5.1E-05
5	chrysene	1hr	max	2.6E-05	2.6E-05	5.7E-05
6	chrysene	1hr	max	3.0E-05	3.0E-05	5.9E-05
7	chrysene	1hr	max	2.5E-05	2.5E-05	5.7E-05
8	chrysene	1hr	max	3.3E-05	3.3E-05	6.0E-05
9	chrysene	1hr	max	2.7E-05	2.7E-05	5.8E-05
10	chrysene	1hr	max	4.5E-05	4.5E-05	6.6E-05
11	chrysene	1hr	max	9.6E-05	9.6E-05	1.0E-04
12	chrysene	1hr	max	6.2E-05	6.2E-05	8.3E-05
13	chrysene	1hr	max	5.4E-05	5.4E-05	7.9E-05
14	chrysene	1hr	max	3.5E-04	3.5E-04	3.5E-04
15	chrysene	1hr	max	3.5E-05	3.5E-05	7.3E-05
16	chrysene	1hr	max	3.3E-05	3.4E-05	7.4E-05
17	chrysene	1hr	max	4.3E-05	4.3E-05	5.5E-05
18	chrysene	1hr	max	4.9E-05	4.9E-05	5.9E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
19	chrysene	1hr	max	4.9E-05	4.9E-05	6.0E-05
20	chrysene	1hr	max	6.3E-05	6.3E-05	8.4E-05
21	chrysene	1hr	max	1.0E-04	1.0E-04	1.3E-04
22	chrysene	1hr	max	8.4E-05	8.4E-05	1.3E-04
23	chrysene	1hr	max	7.6E-05	7.6E-05	1.1E-04
24	chrysene	1hr	max	2.6E-05	2.6E-05	5.9E-05
25	chrysene	1hr	max	5.4E-05	5.4E-05	1.0E-04
26	chrysene	1hr	max	4.6E-05	4.6E-05	1.1E-04
27	chrysene	1hr	max	3.5E-05	3.5E-05	2.2E-04
28	chrysene	1hr	max	8.6E-05	8.6E-05	1.3E-04
29	chrysene	1hr	max	8.8E-05	8.8E-05	1.3E-04
30	chrysene	1hr	max	6.7E-05	6.7E-05	9.6E-05
31	chrysene	1hr	max	7.4E-05	7.4E-05	1.0E-04
32	chrysene	1hr	max	2.1E-05	2.1E-05	4.5E-05
33	chrysene	1hr	max	3.0E-05	3.0E-05	4.4E-05
34	chrysene	1hr	max	3.3E-05	3.3E-05	4.6E-05
35	chrysene	1hr	max	2.8E-05	2.8E-05	6.0E-05
36	chrysene	1hr	max	2.9E-05	2.9E-05	5.8E-05
37	chrysene	1hr	max	3.2E-05	3.2E-05	6.6E-05
38	chrysene	1hr	max	1.0E-04	1.0E-04	1.4E-04
39	chrysene	1hr	max	9.7E-05	9.7E-05	1.3E-04
40	chrysene	1hr	max	8.1E-05	8.1E-05	1.3E-04
41	chrysene	1hr	max	5.7E-05	5.7E-05	1.3E-04
42	chrysene	1hr	max	7.6E-05	7.6E-05	1.7E-04
43	chrysene	1hr	max	7.0E-05	7.0E-05	1.6E-04
44	chrysene	1hr	max	6.9E-05	6.9E-05	1.5E-04
45	chrysene	1hr	max	5.9E-05	5.9E-05	1.3E-04
46	chrysene	1hr	max	6.0E-05	6.0E-05	1.3E-04
47	chrysene	1hr	max	5.1E-05	5.1E-05	1.1E-04
48	chrysene	1hr	max	6.0E-05	6.0E-05	1.2E-04
49	chrysene	1hr	max	5.7E-05	5.7E-05	1.2E-04
50	chrysene	1hr	max	5.6E-05	5.6E-05	1.1E-04
51	chrysene	1hr	max	5.7E-05	5.7E-05	1.2E-04
52	chrysene	1hr	max	5.5E-05	5.5E-05	8.3E-04
53	chrysene	1hr	max	5.8E-05	5.8E-05	3.8E-04
54	chrysene	1hr	max	2.0E-05	2.0E-05	3.5E-05
55	chrysene	1hr	max	2.8E-05	2.8E-05	6.2E-05
56	chrysene	1hr	max	2.7E-05	2.7E-05	8.0E-05
57	chrysene	1hr	max	3.2E-05	3.2E-05	4.8E-05
58	chrysene	1hr	max	1.8E-05	1.8E-05	5.1E-05
59	chrysene	1hr	max	6.9E-05	6.9E-05	5.4E-04
60	chrysene	1hr	max	1.4E-04	1.4E-04	2.6E-04
61	chrysene	1hr	max	1.7E-04	1.7E-04	2.3E-04
62	chrysene	1hr	max	1.4E-04	1.4E-04	2.7E-04
63	chrysene	1hr	max	1.2E-04	1.2E-04	4.4E-04
64	chrysene	1hr	max	1.2E-04	1.2E-04	2.9E-04
65	chrysene	1hr	max	1.3E-04	1.3E-04	2.5E-04
66	chrysene	1hr	max	3.9E-05	3.9E-05	5.9E-05
67	chrysene	1hr	max	5.2E-05	5.2E-05	7.8E-05
68	chrysene	1hr	max	3.8E-05	3.8E-05	6.7E-05
69	chrysene	1hr	max	4.1E-05	4.1E-05	6.3E-05
70	chrysene	1hr	max	3.8E-05	3.8E-05	5.6E-05
71	chrysene	1hr	max	6.1E-05	6.1E-05	1.1E-04
72	chrysene	1hr	max	6.2E-05	6.2E-05	1.1E-04
73	chrysene	1hr	max	1.3E-04	1.3E-04	2.8E-04
74	chrysene	1hr	max	7.6E-05	7.6E-05	1.2E-03
75	chrysene	1hr	max	2.9E-04	2.9E-04	3.3E-04
76	chrysene	1hr	max	1.7E-04	1.7E-04	2.4E-04
77	chrysene	1hr	max	7.3E-05	7.3E-05	4.1E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
78	chrysene	1hr	max	7.7E-05	7.7E-05	1.6E-04
79	chrysene	1hr	max	8.5E-05	8.5E-05	1.3E-04
1	chrysene	1hr	9th	1.3E-05	1.3E-05	3.1E-05
2	chrysene	1hr	9th	1.5E-05	1.5E-05	3.5E-05
3	chrysene	1hr	9th	1.6E-05	1.6E-05	3.6E-05
4	chrysene	1hr	9th	1.6E-05	1.6E-05	3.8E-05
5	chrysene	1hr	9th	2.0E-05	2.0E-05	4.2E-05
6	chrysene	1hr	9th	2.0E-05	2.0E-05	4.4E-05
7	chrysene	1hr	9th	1.5E-05	1.5E-05	3.6E-05
8	chrysene	1hr	9th	1.8E-05	1.8E-05	4.4E-05
9	chrysene	1hr	9th	1.7E-05	1.7E-05	3.9E-05
10	chrysene	1hr	9th	3.2E-05	3.2E-05	5.2E-05
11	chrysene	1hr	9th	6.7E-05	6.7E-05	8.2E-05
12	chrysene	1hr	9th	3.5E-05	3.5E-05	5.9E-05
13	chrysene	1hr	9th	3.9E-05	3.9E-05	5.6E-05
14	chrysene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	chrysene	1hr	9th	2.4E-05	2.4E-05	4.1E-05
16	chrysene	1hr	9th	2.4E-05	2.4E-05	4.1E-05
17	chrysene	1hr	9th	2.5E-05	2.5E-05	4.3E-05
18	chrysene	1hr	9th	2.4E-05	2.4E-05	4.4E-05
19	chrysene	1hr	9th	2.2E-05	2.2E-05	4.5E-05
20	chrysene	1hr	9th	2.2E-05	2.2E-05	5.2E-05
21	chrysene	1hr	9th	3.8E-05	3.8E-05	6.6E-05
22	chrysene	1hr	9th	4.0E-05	4.0E-05	6.8E-05
23	chrysene	1hr	9th	2.7E-05	2.7E-05	5.9E-05
24	chrysene	1hr	9th	1.4E-05	1.4E-05	3.5E-05
25	chrysene	1hr	9th	2.8E-05	2.8E-05	7.5E-05
26	chrysene	1hr	9th	2.5E-05	2.5E-05	8.9E-05
27	chrysene	1hr	9th	2.4E-05	2.4E-05	1.6E-04
28	chrysene	1hr	9th	2.8E-05	2.8E-05	6.4E-05
29	chrysene	1hr	9th	3.0E-05	3.0E-05	6.8E-05
30	chrysene	1hr	9th	3.1E-05	3.1E-05	5.6E-05
31	chrysene	1hr	9th	3.3E-05	3.3E-05	6.1E-05
32	chrysene	1hr	9th	1.6E-05	1.6E-05	2.8E-05
33	chrysene	1hr	9th	2.0E-05	2.0E-05	3.8E-05
34	chrysene	1hr	9th	2.0E-05	2.0E-05	3.2E-05
35	chrysene	1hr	9th	1.7E-05	1.7E-05	3.8E-05
36	chrysene	1hr	9th	1.7E-05	1.7E-05	3.8E-05
37	chrysene	1hr	9th	1.8E-05	1.8E-05	3.7E-05
38	chrysene	1hr	9th	3.5E-05	3.5E-05	8.4E-05
39	chrysene	1hr	9th	3.0E-05	3.0E-05	7.9E-05
40	chrysene	1hr	9th	2.5E-05	2.5E-05	9.4E-05
41	chrysene	1hr	9th	2.8E-05	2.8E-05	9.8E-05
42	chrysene	1hr	9th	2.7E-05	2.7E-05	7.7E-05
43	chrysene	1hr	9th	2.5E-05	2.5E-05	8.3E-05
44	chrysene	1hr	9th	2.5E-05	2.5E-05	7.6E-05
45	chrysene	1hr	9th	2.3E-05	2.3E-05	7.8E-05
46	chrysene	1hr	9th	2.4E-05	2.4E-05	7.7E-05
47	chrysene	1hr	9th	2.4E-05	2.4E-05	8.1E-05
48	chrysene	1hr	9th	2.5E-05	2.5E-05	7.7E-05
49	chrysene	1hr	9th	2.5E-05	2.5E-05	7.7E-05
50	chrysene	1hr	9th	2.7E-05	2.7E-05	8.5E-05
51	chrysene	1hr	9th	2.8E-05	2.8E-05	8.1E-05
52	chrysene	1hr	9th	3.8E-05	3.8E-05	3.9E-04
53	chrysene	1hr	9th	3.2E-05	3.2E-05	1.8E-04
54	chrysene	1hr	9th	1.3E-05	1.3E-05	2.9E-05
55	chrysene	1hr	9th	1.4E-05	1.4E-05	3.3E-05
56	chrysene	1hr	9th	1.4E-05	1.4E-05	3.6E-05
57	chrysene	1hr	9th	1.5E-05	1.5E-05	3.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
58	chrysene	1hr	9th	1.3E-05	1.4E-05	2.6E-05
59	chrysene	1hr	9th	4.8E-05	4.8E-05	2.2E-04
60	chrysene	1hr	9th	6.7E-05	6.7E-05	1.3E-04
61	chrysene	1hr	9th	8.0E-05	8.0E-05	1.5E-04
62	chrysene	1hr	9th	6.3E-05	6.3E-05	1.7E-04
63	chrysene	1hr	9th	5.8E-05	5.8E-05	2.7E-04
64	chrysene	1hr	9th	6.0E-05	6.0E-05	2.5E-04
65	chrysene	1hr	9th	7.0E-05	7.0E-05	1.8E-04
66	chrysene	1hr	9th	2.6E-05	2.6E-05	4.6E-05
67	chrysene	1hr	9th	2.7E-05	2.7E-05	4.7E-05
68	chrysene	1hr	9th	1.9E-05	1.9E-05	3.9E-05
69	chrysene	1hr	9th	1.7E-05	1.7E-05	3.9E-05
70	chrysene	1hr	9th	1.5E-05	1.5E-05	3.5E-05
71	chrysene	1hr	9th	4.2E-05	4.2E-05	9.0E-05
72	chrysene	1hr	9th	4.1E-05	4.1E-05	9.3E-05
73	chrysene	1hr	9th	7.2E-05	7.2E-05	1.9E-04
74	chrysene	1hr	9th	4.7E-05	4.7E-05	4.6E-04
75	chrysene	1hr	9th	2.1E-04	2.1E-04	2.3E-04
76	chrysene	1hr	9th	7.6E-05	7.6E-05	1.5E-04
77	chrysene	1hr	9th	4.7E-05	4.7E-05	1.8E-03
78	chrysene	1hr	9th	3.0E-05	3.0E-05	7.8E-05
79	chrysene	1hr	9th	3.2E-05	3.2E-05	6.7E-05
1	chrysene	24hr	max	4.8E-06	4.9E-06	1.3E-05
2	chrysene	24hr	max	6.8E-06	6.8E-06	1.3E-05
3	chrysene	24hr	max	6.9E-06	6.9E-06	1.3E-05
4	chrysene	24hr	max	6.8E-06	6.9E-06	1.5E-05
5	chrysene	24hr	max	7.0E-06	7.1E-06	1.9E-05
6	chrysene	24hr	max	7.0E-06	7.1E-06	2.0E-05
7	chrysene	24hr	max	6.5E-06	6.6E-06	1.5E-05
8	chrysene	24hr	max	7.0E-06	7.0E-06	2.0E-05
9	chrysene	24hr	max	8.4E-06	8.4E-06	1.7E-05
10	chrysene	24hr	max	1.3E-05	1.3E-05	2.4E-05
11	chrysene	24hr	max	2.6E-05	2.6E-05	3.2E-05
12	chrysene	24hr	max	1.3E-05	1.3E-05	2.7E-05
13	chrysene	24hr	max	1.5E-05	1.5E-05	2.5E-05
14	chrysene	24hr	max	3.6E-05	3.6E-05	3.6E-05
15	chrysene	24hr	max	7.6E-06	7.6E-06	2.0E-05
16	chrysene	24hr	max	7.7E-06	7.7E-06	2.0E-05
17	chrysene	24hr	max	8.5E-06	8.5E-06	1.9E-05
18	chrysene	24hr	max	9.0E-06	9.0E-06	1.9E-05
19	chrysene	24hr	max	8.4E-06	8.5E-06	1.9E-05
20	chrysene	24hr	max	7.9E-06	7.9E-06	1.9E-05
21	chrysene	24hr	max	1.5E-05	1.5E-05	2.6E-05
22	chrysene	24hr	max	1.6E-05	1.6E-05	2.5E-05
23	chrysene	24hr	max	1.1E-05	1.1E-05	2.5E-05
24	chrysene	24hr	max	5.9E-06	5.9E-06	2.0E-05
25	chrysene	24hr	max	1.0E-05	1.0E-05	3.1E-05
26	chrysene	24hr	max	8.8E-06	8.8E-06	3.1E-05
27	chrysene	24hr	max	9.3E-06	9.4E-06	4.7E-05
28	chrysene	24hr	max	8.7E-06	8.7E-06	3.3E-05
29	chrysene	24hr	max	8.8E-06	8.8E-06	3.4E-05
30	chrysene	24hr	max	1.4E-05	1.4E-05	2.8E-05
31	chrysene	24hr	max	1.5E-05	1.5E-05	3.0E-05
32	chrysene	24hr	max	5.8E-06	5.8E-06	1.2E-05
33	chrysene	24hr	max	8.2E-06	8.2E-06	1.4E-05
34	chrysene	24hr	max	7.7E-06	7.7E-06	1.3E-05
35	chrysene	24hr	max	6.5E-06	6.5E-06	1.3E-05
36	chrysene	24hr	max	6.3E-06	6.3E-06	1.5E-05
37	chrysene	24hr	max	6.1E-06	6.2E-06	1.7E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
38	chrysene	24hr	max	1.1E-05	1.2E-05	3.2E-05
39	chrysene	24hr	max	1.1E-05	1.1E-05	3.6E-05
40	chrysene	24hr	max	1.2E-05	1.2E-05	4.2E-05
41	chrysene	24hr	max	1.4E-05	1.4E-05	4.7E-05
42	chrysene	24hr	max	1.2E-05	1.2E-05	4.4E-05
43	chrysene	24hr	max	1.3E-05	1.3E-05	4.6E-05
44	chrysene	24hr	max	1.3E-05	1.3E-05	4.6E-05
45	chrysene	24hr	max	1.4E-05	1.4E-05	4.6E-05
46	chrysene	24hr	max	1.4E-05	1.4E-05	4.6E-05
47	chrysene	24hr	max	1.4E-05	1.4E-05	4.1E-05
48	chrysene	24hr	max	1.3E-05	1.3E-05	4.4E-05
49	chrysene	24hr	max	1.3E-05	1.3E-05	4.3E-05
50	chrysene	24hr	max	1.3E-05	1.3E-05	3.9E-05
51	chrysene	24hr	max	1.2E-05	1.2E-05	4.1E-05
52	chrysene	24hr	max	1.7E-05	1.7E-05	1.6E-04
53	chrysene	24hr	max	1.7E-05	1.7E-05	8.4E-05
54	chrysene	24hr	max	5.7E-06	5.7E-06	1.5E-05
55	chrysene	24hr	max	5.5E-06	5.5E-06	2.0E-05
56	chrysene	24hr	max	5.4E-06	5.5E-06	2.3E-05
57	chrysene	24hr	max	6.0E-06	6.1E-06	1.6E-05
58	chrysene	24hr	max	4.9E-06	4.9E-06	1.6E-05
59	chrysene	24hr	max	1.9E-05	1.9E-05	8.7E-05
60	chrysene	24hr	max	2.8E-05	2.8E-05	4.9E-05
61	chrysene	24hr	max	3.0E-05	3.0E-05	6.2E-05
62	chrysene	24hr	max	2.7E-05	2.7E-05	6.9E-05
63	chrysene	24hr	max	2.3E-05	2.3E-05	1.1E-04
64	chrysene	24hr	max	2.4E-05	2.4E-05	9.8E-05
65	chrysene	24hr	max	3.1E-05	3.1E-05	4.5E-05
66	chrysene	24hr	max	1.5E-05	1.5E-05	2.5E-05
67	chrysene	24hr	max	1.1E-05	1.1E-05	2.4E-05
68	chrysene	24hr	max	1.1E-05	1.1E-05	2.4E-05
69	chrysene	24hr	max	6.8E-06	6.8E-06	2.1E-05
70	chrysene	24hr	max	6.1E-06	6.1E-06	1.6E-05
71	chrysene	24hr	max	2.0E-05	2.0E-05	4.3E-05
72	chrysene	24hr	max	1.9E-05	1.9E-05	4.2E-05
73	chrysene	24hr	max	3.1E-05	3.1E-05	4.5E-05
74	chrysene	24hr	max	2.0E-05	2.0E-05	1.4E-04
75	chrysene	24hr	max	9.1E-05	9.1E-05	1.1E-04
76	chrysene	24hr	max	3.0E-05	3.0E-05	6.3E-05
77	chrysene	24hr	max	2.1E-05	2.1E-05	3.3E-04
78	chrysene	24hr	max	1.2E-05	1.2E-05	4.2E-05
79	chrysene	24hr	max	1.4E-05	1.4E-05	2.8E-05
1	chrysene	annual	average	3.1E-07	3.1E-07	6.0E-07
2	chrysene	annual	average	5.4E-07	5.4E-07	1.0E-06
3	chrysene	annual	average	5.6E-07	5.6E-07	1.1E-06
4	chrysene	annual	average	6.0E-07	6.0E-07	1.2E-06
5	chrysene	annual	average	6.8E-07	6.9E-07	1.3E-06
6	chrysene	annual	average	7.0E-07	7.0E-07	1.4E-06
7	chrysene	annual	average	6.3E-07	6.4E-07	1.2E-06
8	chrysene	annual	average	7.1E-07	7.2E-07	1.4E-06
9	chrysene	annual	average	6.7E-07	6.7E-07	1.3E-06
10	chrysene	annual	average	1.0E-06	1.0E-06	2.0E-06
11	chrysene	annual	average	1.5E-06	1.5E-06	2.6E-06
12	chrysene	annual	average	1.4E-06	1.4E-06	2.4E-06
13	chrysene	annual	average	1.3E-06	1.3E-06	2.4E-06
14	chrysene	annual	average	2.3E-06	2.3E-06	3.7E-06
15	chrysene	annual	average	8.3E-07	8.4E-07	1.6E-06
16	chrysene	annual	average	8.3E-07	8.4E-07	1.6E-06
17	chrysene	annual	average	8.9E-07	9.1E-07	1.7E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
18	chrysene	annual	average	9.9E-07	1.0E-06	1.9E-06
19	chrysene	annual	average	9.8E-07	9.9E-07	1.9E-06
20	chrysene	annual	average	1.0E-06	1.1E-06	2.1E-06
21	chrysene	annual	average	1.5E-06	1.5E-06	2.6E-06
22	chrysene	annual	average	1.3E-06	1.4E-06	2.5E-06
23	chrysene	annual	average	9.8E-07	9.9E-07	2.0E-06
24	chrysene	annual	average	5.7E-07	5.7E-07	1.1E-06
25	chrysene	annual	average	7.6E-07	8.0E-07	1.9E-06
26	chrysene	annual	average	8.4E-07	8.7E-07	2.1E-06
27	chrysene	annual	average	1.1E-06	1.1E-06	3.1E-06
28	chrysene	annual	average	1.2E-06	1.2E-06	2.5E-06
29	chrysene	annual	average	1.2E-06	1.2E-06	2.6E-06
30	chrysene	annual	average	7.5E-07	7.6E-07	1.6E-06
31	chrysene	annual	average	7.9E-07	8.0E-07	1.7E-06
32	chrysene	annual	average	3.2E-07	3.2E-07	6.5E-07
33	chrysene	annual	average	4.3E-07	4.4E-07	8.9E-07
34	chrysene	annual	average	4.4E-07	4.4E-07	8.9E-07
35	chrysene	annual	average	4.6E-07	4.6E-07	8.9E-07
36	chrysene	annual	average	4.8E-07	4.8E-07	9.4E-07
37	chrysene	annual	average	4.7E-07	4.7E-07	9.3E-07
38	chrysene	annual	average	1.3E-06	1.3E-06	2.9E-06
39	chrysene	annual	average	1.2E-06	1.3E-06	3.2E-06
40	chrysene	annual	average	1.2E-06	1.3E-06	3.5E-06
41	chrysene	annual	average	1.2E-06	1.3E-06	3.8E-06
42	chrysene	annual	average	1.4E-06	1.4E-06	3.6E-06
43	chrysene	annual	average	1.5E-06	1.5E-06	4.0E-06
44	chrysene	annual	average	1.5E-06	1.5E-06	4.0E-06
45	chrysene	annual	average	1.4E-06	1.4E-06	4.1E-06
46	chrysene	annual	average	1.4E-06	1.4E-06	4.1E-06
47	chrysene	annual	average	1.4E-06	1.4E-06	4.3E-06
48	chrysene	annual	average	1.5E-06	1.5E-06	4.2E-06
49	chrysene	annual	average	1.4E-06	1.4E-06	4.2E-06
50	chrysene	annual	average	1.4E-06	1.5E-06	4.2E-06
51	chrysene	annual	average	1.4E-06	1.4E-06	3.9E-06
52	chrysene	annual	average	1.8E-06	1.8E-06	1.2E-05
53	chrysene	annual	average	1.5E-06	1.6E-06	7.1E-06
54	chrysene	annual	average	4.4E-07	4.5E-07	8.4E-07
55	chrysene	annual	average	4.8E-07	4.8E-07	9.3E-07
56	chrysene	annual	average	5.0E-07	5.1E-07	1.0E-06
57	chrysene	annual	average	5.3E-07	5.3E-07	1.0E-06
58	chrysene	annual	average	3.8E-07	3.8E-07	7.2E-07
59	chrysene	annual	average	2.1E-06	2.1E-06	1.3E-05
60	chrysene	annual	average	2.9E-06	2.9E-06	5.9E-06
61	chrysene	annual	average	3.3E-06	3.3E-06	6.9E-06
62	chrysene	annual	average	2.9E-06	2.9E-06	6.9E-06
63	chrysene	annual	average	2.7E-06	2.7E-06	7.5E-06
64	chrysene	annual	average	2.7E-06	2.7E-06	7.3E-06
65	chrysene	annual	average	3.2E-06	3.2E-06	7.0E-06
66	chrysene	annual	average	9.4E-07	9.5E-07	1.9E-06
67	chrysene	annual	average	1.2E-06	1.2E-06	2.3E-06
68	chrysene	annual	average	8.3E-07	8.3E-07	1.7E-06
69	chrysene	annual	average	7.9E-07	7.9E-07	1.7E-06
70	chrysene	annual	average	7.3E-07	7.4E-07	1.6E-06
71	chrysene	annual	average	1.2E-06	1.2E-06	2.8E-06
72	chrysene	annual	average	1.1E-06	1.2E-06	2.8E-06
73	chrysene	annual	average	3.5E-06	3.5E-06	7.5E-06
74	chrysene	annual	average	2.1E-06	2.1E-06	1.8E-05
75	chrysene	annual	average	1.3E-05	1.3E-05	1.5E-05
76	chrysene	annual	average	3.3E-06	3.3E-06	6.8E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
77	chrysene	annual	average	2.3E-06	2.3E-06	1.3E-05
78	chrysene	annual	average	1.4E-06	1.4E-06	3.5E-06
79	chrysene	annual	average	1.2E-06	1.3E-06	2.4E-06
1	dibenz(ah)anthracene	1hr	max	1.3E-05	1.3E-05	5.6E-05
2	dibenz(ah)anthracene	1hr	max	1.4E-05	1.4E-05	3.7E-05
3	dibenz(ah)anthracene	1hr	max	1.5E-05	1.5E-05	3.9E-05
4	dibenz(ah)anthracene	1hr	max	1.5E-05	1.5E-05	3.9E-05
5	dibenz(ah)anthracene	1hr	max	2.5E-05	2.5E-05	5.2E-05
6	dibenz(ah)anthracene	1hr	max	2.9E-05	2.9E-05	5.3E-05
7	dibenz(ah)anthracene	1hr	max	2.0E-05	2.0E-05	5.0E-05
8	dibenz(ah)anthracene	1hr	max	3.2E-05	3.2E-05	5.4E-05
9	dibenz(ah)anthracene	1hr	max	2.0E-05	2.0E-05	4.6E-05
10	dibenz(ah)anthracene	1hr	max	4.5E-05	4.5E-05	5.9E-05
11	dibenz(ah)anthracene	1hr	max	9.5E-05	9.5E-05	9.6E-05
12	dibenz(ah)anthracene	1hr	max	6.2E-05	6.2E-05	6.7E-05
13	dibenz(ah)anthracene	1hr	max	4.5E-05	4.6E-05	6.1E-05
14	dibenz(ah)anthracene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	dibenz(ah)anthracene	1hr	max	2.9E-05	2.9E-05	5.6E-05
16	dibenz(ah)anthracene	1hr	max	2.7E-05	2.7E-05	5.6E-05
17	dibenz(ah)anthracene	1hr	max	3.2E-05	3.2E-05	4.5E-05
18	dibenz(ah)anthracene	1hr	max	2.8E-05	2.8E-05	5.0E-05
19	dibenz(ah)anthracene	1hr	max	3.1E-05	3.1E-05	5.1E-05
20	dibenz(ah)anthracene	1hr	max	3.3E-05	3.3E-05	5.5E-05
21	dibenz(ah)anthracene	1hr	max	1.0E-04	1.0E-04	1.1E-04
22	dibenz(ah)anthracene	1hr	max	8.3E-05	8.3E-05	1.0E-04
23	dibenz(ah)anthracene	1hr	max	5.6E-05	5.6E-05	8.2E-05
24	dibenz(ah)anthracene	1hr	max	1.3E-05	1.3E-05	5.6E-05
25	dibenz(ah)anthracene	1hr	max	2.3E-05	2.3E-05	9.9E-05
26	dibenz(ah)anthracene	1hr	max	2.1E-05	2.1E-05	1.1E-04
27	dibenz(ah)anthracene	1hr	max	1.9E-05	1.9E-05	2.2E-04
28	dibenz(ah)anthracene	1hr	max	3.8E-05	3.8E-05	9.9E-05
29	dibenz(ah)anthracene	1hr	max	4.7E-05	4.7E-05	1.1E-04
30	dibenz(ah)anthracene	1hr	max	2.8E-05	2.8E-05	7.7E-05
31	dibenz(ah)anthracene	1hr	max	3.0E-05	3.0E-05	8.6E-05
32	dibenz(ah)anthracene	1hr	max	1.5E-05	1.5E-05	3.9E-05
33	dibenz(ah)anthracene	1hr	max	2.0E-05	2.0E-05	4.3E-05
34	dibenz(ah)anthracene	1hr	max	1.9E-05	1.9E-05	3.8E-05
35	dibenz(ah)anthracene	1hr	max	1.7E-05	1.7E-05	6.0E-05
36	dibenz(ah)anthracene	1hr	max	1.6E-05	1.6E-05	5.8E-05
37	dibenz(ah)anthracene	1hr	max	1.5E-05	1.5E-05	6.2E-05
38	dibenz(ah)anthracene	1hr	max	5.0E-05	5.0E-05	1.4E-04
39	dibenz(ah)anthracene	1hr	max	3.8E-05	3.8E-05	1.3E-04
40	dibenz(ah)anthracene	1hr	max	3.2E-05	3.2E-05	1.3E-04
41	dibenz(ah)anthracene	1hr	max	2.5E-05	2.5E-05	1.3E-04
42	dibenz(ah)anthracene	1hr	max	4.2E-05	4.2E-05	1.7E-04
43	dibenz(ah)anthracene	1hr	max	2.9E-05	2.9E-05	1.6E-04
44	dibenz(ah)anthracene	1hr	max	3.0E-05	3.0E-05	1.5E-04
45	dibenz(ah)anthracene	1hr	max	2.6E-05	2.6E-05	1.3E-04
46	dibenz(ah)anthracene	1hr	max	2.7E-05	2.7E-05	1.3E-04
47	dibenz(ah)anthracene	1hr	max	2.7E-05	2.7E-05	1.1E-04
48	dibenz(ah)anthracene	1hr	max	3.0E-05	3.0E-05	1.2E-04
49	dibenz(ah)anthracene	1hr	max	2.9E-05	2.9E-05	1.2E-04
50	dibenz(ah)anthracene	1hr	max	4.2E-05	4.2E-05	1.1E-04
51	dibenz(ah)anthracene	1hr	max	4.1E-05	4.1E-05	1.2E-04
52	dibenz(ah)anthracene	1hr	max	3.2E-05	3.2E-05	8.2E-04
53	dibenz(ah)anthracene	1hr	max	2.8E-05	2.8E-05	3.8E-04
54	dibenz(ah)anthracene	1hr	max	1.2E-05	1.2E-05	3.3E-05
55	dibenz(ah)anthracene	1hr	max	1.2E-05	1.2E-05	5.9E-05
56	dibenz(ah)anthracene	1hr	max	1.2E-05	1.2E-05	7.7E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
57	dibenz(ah)anthracene	1hr	max	1.6E-05	1.6E-05	4.6E-05
58	dibenz(ah)anthracene	1hr	max	1.0E-05	1.0E-05	4.8E-05
59	dibenz(ah)anthracene	1hr	max	3.4E-05	3.4E-05	5.3E-04
60	dibenz(ah)anthracene	1hr	max	6.0E-05	6.0E-05	2.6E-04
61	dibenz(ah)anthracene	1hr	max	1.0E-04	1.0E-04	2.3E-04
62	dibenz(ah)anthracene	1hr	max	9.1E-05	9.1E-05	2.7E-04
63	dibenz(ah)anthracene	1hr	max	7.2E-05	7.2E-05	4.4E-04
64	dibenz(ah)anthracene	1hr	max	7.4E-05	7.4E-05	2.9E-04
65	dibenz(ah)anthracene	1hr	max	8.9E-05	8.9E-05	2.4E-04
66	dibenz(ah)anthracene	1hr	max	3.0E-05	3.1E-05	5.6E-05
67	dibenz(ah)anthracene	1hr	max	5.1E-05	5.1E-05	5.6E-05
68	dibenz(ah)anthracene	1hr	max	2.6E-05	2.6E-05	4.6E-05
69	dibenz(ah)anthracene	1hr	max	2.3E-05	2.3E-05	4.5E-05
70	dibenz(ah)anthracene	1hr	max	2.1E-05	2.1E-05	3.9E-05
71	dibenz(ah)anthracene	1hr	max	4.2E-05	4.2E-05	1.1E-04
72	dibenz(ah)anthracene	1hr	max	4.1E-05	4.1E-05	1.1E-04
73	dibenz(ah)anthracene	1hr	max	8.7E-05	8.7E-05	2.8E-04
74	dibenz(ah)anthracene	1hr	max	3.8E-05	3.8E-05	1.2E-03
75	dibenz(ah)anthracene	1hr	max	1.4E-04	1.4E-04	1.5E-04
76	dibenz(ah)anthracene	1hr	max	1.0E-04	1.0E-04	2.4E-04
77	dibenz(ah)anthracene	1hr	max	5.2E-05	5.2E-05	4.1E-03
78	dibenz(ah)anthracene	1hr	max	4.8E-05	4.8E-05	1.6E-04
79	dibenz(ah)anthracene	1hr	max	6.6E-05	6.6E-05	9.8E-05
1	dibenz(ah)anthracene	1hr	9th	6.7E-06	6.7E-06	2.7E-05
2	dibenz(ah)anthracene	1hr	9th	9.9E-06	1.0E-05	2.7E-05
3	dibenz(ah)anthracene	1hr	9th	1.1E-05	1.1E-05	2.8E-05
4	dibenz(ah)anthracene	1hr	9th	1.1E-05	1.1E-05	3.2E-05
5	dibenz(ah)anthracene	1hr	9th	1.3E-05	1.3E-05	3.9E-05
6	dibenz(ah)anthracene	1hr	9th	1.4E-05	1.4E-05	4.1E-05
7	dibenz(ah)anthracene	1hr	9th	1.2E-05	1.2E-05	3.3E-05
8	dibenz(ah)anthracene	1hr	9th	1.3E-05	1.3E-05	4.1E-05
9	dibenz(ah)anthracene	1hr	9th	1.3E-05	1.3E-05	3.4E-05
10	dibenz(ah)anthracene	1hr	9th	3.0E-05	3.0E-05	4.7E-05
11	dibenz(ah)anthracene	1hr	9th	6.5E-05	6.5E-05	7.7E-05
12	dibenz(ah)anthracene	1hr	9th	3.2E-05	3.2E-05	5.2E-05
13	dibenz(ah)anthracene	1hr	9th	3.4E-05	3.4E-05	5.0E-05
14	dibenz(ah)anthracene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	dibenz(ah)anthracene	1hr	9th	1.5E-05	1.5E-05	3.7E-05
16	dibenz(ah)anthracene	1hr	9th	1.5E-05	1.5E-05	3.7E-05
17	dibenz(ah)anthracene	1hr	9th	1.9E-05	1.9E-05	4.0E-05
18	dibenz(ah)anthracene	1hr	9th	1.9E-05	1.9E-05	4.1E-05
19	dibenz(ah)anthracene	1hr	9th	1.8E-05	1.8E-05	4.2E-05
20	dibenz(ah)anthracene	1hr	9th	2.0E-05	2.0E-05	4.6E-05
21	dibenz(ah)anthracene	1hr	9th	3.7E-05	3.7E-05	6.4E-05
22	dibenz(ah)anthracene	1hr	9th	3.7E-05	3.7E-05	6.3E-05
23	dibenz(ah)anthracene	1hr	9th	2.6E-05	2.6E-05	5.2E-05
24	dibenz(ah)anthracene	1hr	9th	8.9E-06	8.9E-06	3.2E-05
25	dibenz(ah)anthracene	1hr	9th	1.4E-05	1.4E-05	7.3E-05
26	dibenz(ah)anthracene	1hr	9th	1.3E-05	1.3E-05	8.7E-05
27	dibenz(ah)anthracene	1hr	9th	1.3E-05	1.3E-05	1.5E-04
28	dibenz(ah)anthracene	1hr	9th	2.4E-05	2.4E-05	6.1E-05
29	dibenz(ah)anthracene	1hr	9th	2.7E-05	2.7E-05	6.0E-05
30	dibenz(ah)anthracene	1hr	9th	1.8E-05	1.8E-05	4.6E-05
31	dibenz(ah)anthracene	1hr	9th	2.0E-05	2.0E-05	5.1E-05
32	dibenz(ah)anthracene	1hr	9th	8.1E-06	8.1E-06	2.4E-05
33	dibenz(ah)anthracene	1hr	9th	1.0E-05	1.0E-05	2.7E-05
34	dibenz(ah)anthracene	1hr	9th	1.0E-05	1.0E-05	2.7E-05
35	dibenz(ah)anthracene	1hr	9th	9.2E-06	9.2E-06	2.9E-05
36	dibenz(ah)anthracene	1hr	9th	1.0E-05	1.0E-05	3.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
37	dibenz(ah)anthracene	1hr	9th	9.5E-06	9.5E-06	3.2E-05
38	dibenz(ah)anthracene	1hr	9th	2.9E-05	2.9E-05	7.2E-05
39	dibenz(ah)anthracene	1hr	9th	2.6E-05	2.6E-05	7.5E-05
40	dibenz(ah)anthracene	1hr	9th	2.2E-05	2.2E-05	9.1E-05
41	dibenz(ah)anthracene	1hr	9th	1.8E-05	1.8E-05	9.1E-05
42	dibenz(ah)anthracene	1hr	9th	2.5E-05	2.5E-05	6.9E-05
43	dibenz(ah)anthracene	1hr	9th	2.2E-05	2.2E-05	7.1E-05
44	dibenz(ah)anthracene	1hr	9th	2.1E-05	2.1E-05	7.3E-05
45	dibenz(ah)anthracene	1hr	9th	1.9E-05	1.9E-05	7.4E-05
46	dibenz(ah)anthracene	1hr	9th	2.0E-05	2.0E-05	7.3E-05
47	dibenz(ah)anthracene	1hr	9th	1.9E-05	1.9E-05	7.4E-05
48	dibenz(ah)anthracene	1hr	9th	2.0E-05	2.0E-05	7.3E-05
49	dibenz(ah)anthracene	1hr	9th	2.0E-05	2.0E-05	7.5E-05
50	dibenz(ah)anthracene	1hr	9th	2.2E-05	2.2E-05	7.9E-05
51	dibenz(ah)anthracene	1hr	9th	2.4E-05	2.4E-05	6.7E-05
52	dibenz(ah)anthracene	1hr	9th	1.9E-05	1.9E-05	3.8E-04
53	dibenz(ah)anthracene	1hr	9th	1.7E-05	1.7E-05	1.7E-04
54	dibenz(ah)anthracene	1hr	9th	7.4E-06	7.4E-06	2.3E-05
55	dibenz(ah)anthracene	1hr	9th	8.7E-06	8.7E-06	2.9E-05
56	dibenz(ah)anthracene	1hr	9th	8.5E-06	8.6E-06	3.2E-05
57	dibenz(ah)anthracene	1hr	9th	8.9E-06	8.9E-06	2.6E-05
58	dibenz(ah)anthracene	1hr	9th	8.0E-06	8.0E-06	2.2E-05
59	dibenz(ah)anthracene	1hr	9th	2.5E-05	2.5E-05	2.2E-04
60	dibenz(ah)anthracene	1hr	9th	3.4E-05	3.4E-05	1.0E-04
61	dibenz(ah)anthracene	1hr	9th	4.3E-05	4.3E-05	1.4E-04
62	dibenz(ah)anthracene	1hr	9th	3.2E-05	3.2E-05	1.7E-04
63	dibenz(ah)anthracene	1hr	9th	3.0E-05	3.0E-05	2.7E-04
64	dibenz(ah)anthracene	1hr	9th	3.0E-05	3.0E-05	2.5E-04
65	dibenz(ah)anthracene	1hr	9th	3.9E-05	3.9E-05	1.7E-04
66	dibenz(ah)anthracene	1hr	9th	1.9E-05	1.9E-05	3.9E-05
67	dibenz(ah)anthracene	1hr	9th	2.5E-05	2.5E-05	4.2E-05
68	dibenz(ah)anthracene	1hr	9th	1.6E-05	1.6E-05	3.1E-05
69	dibenz(ah)anthracene	1hr	9th	1.2E-05	1.2E-05	3.2E-05
70	dibenz(ah)anthracene	1hr	9th	9.4E-06	9.4E-06	3.0E-05
71	dibenz(ah)anthracene	1hr	9th	2.5E-05	2.5E-05	8.1E-05
72	dibenz(ah)anthracene	1hr	9th	2.5E-05	2.5E-05	8.1E-05
73	dibenz(ah)anthracene	1hr	9th	3.9E-05	3.9E-05	1.8E-04
74	dibenz(ah)anthracene	1hr	9th	2.4E-05	2.4E-05	4.6E-04
75	dibenz(ah)anthracene	1hr	9th	9.1E-05	9.1E-05	1.0E-04
76	dibenz(ah)anthracene	1hr	9th	4.1E-05	4.1E-05	1.4E-04
77	dibenz(ah)anthracene	1hr	9th	2.7E-05	2.7E-05	1.8E-03
78	dibenz(ah)anthracene	1hr	9th	2.6E-05	2.6E-05	6.7E-05
79	dibenz(ah)anthracene	1hr	9th	2.8E-05	2.8E-05	5.8E-05
1	dibenz(ah)anthracene	24hr	max	3.2E-06	3.2E-06	1.0E-05
2	dibenz(ah)anthracene	24hr	max	4.2E-06	4.2E-06	1.1E-05
3	dibenz(ah)anthracene	24hr	max	4.3E-06	4.3E-06	1.1E-05
4	dibenz(ah)anthracene	24hr	max	4.7E-06	4.7E-06	1.4E-05
5	dibenz(ah)anthracene	24hr	max	4.5E-06	4.5E-06	1.7E-05
6	dibenz(ah)anthracene	24hr	max	4.6E-06	4.6E-06	1.8E-05
7	dibenz(ah)anthracene	24hr	max	4.4E-06	4.4E-06	1.3E-05
8	dibenz(ah)anthracene	24hr	max	5.4E-06	5.5E-06	1.8E-05
9	dibenz(ah)anthracene	24hr	max	5.2E-06	5.2E-06	1.6E-05
10	dibenz(ah)anthracene	24hr	max	1.2E-05	1.2E-05	2.0E-05
11	dibenz(ah)anthracene	24hr	max	2.5E-05	2.5E-05	3.0E-05
12	dibenz(ah)anthracene	24hr	max	1.0E-05	1.0E-05	2.3E-05
13	dibenz(ah)anthracene	24hr	max	1.2E-05	1.2E-05	2.1E-05
14	dibenz(ah)anthracene	24hr	max	3.5E-05	3.5E-05	3.5E-05
15	dibenz(ah)anthracene	24hr	max	6.7E-06	6.7E-06	1.7E-05
16	dibenz(ah)anthracene	24hr	max	6.7E-06	6.8E-06	1.7E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
17	dibenz(ah)anthracene	24hr	max	7.4E-06	7.4E-06	1.7E-05
18	dibenz(ah)anthracene	24hr	max	7.9E-06	7.9E-06	1.8E-05
19	dibenz(ah)anthracene	24hr	max	7.6E-06	7.6E-06	1.8E-05
20	dibenz(ah)anthracene	24hr	max	7.1E-06	7.1E-06	1.9E-05
21	dibenz(ah)anthracene	24hr	max	1.5E-05	1.5E-05	2.4E-05
22	dibenz(ah)anthracene	24hr	max	1.6E-05	1.6E-05	2.3E-05
23	dibenz(ah)anthracene	24hr	max	1.1E-05	1.1E-05	2.2E-05
24	dibenz(ah)anthracene	24hr	max	3.4E-06	3.5E-06	1.7E-05
25	dibenz(ah)anthracene	24hr	max	5.5E-06	5.5E-06	3.0E-05
26	dibenz(ah)anthracene	24hr	max	5.1E-06	5.1E-06	3.1E-05
27	dibenz(ah)anthracene	24hr	max	5.5E-06	5.5E-06	4.6E-05
28	dibenz(ah)anthracene	24hr	max	6.8E-06	6.8E-06	3.0E-05
29	dibenz(ah)anthracene	24hr	max	7.3E-06	7.3E-06	3.1E-05
30	dibenz(ah)anthracene	24hr	max	8.0E-06	8.0E-06	1.9E-05
31	dibenz(ah)anthracene	24hr	max	8.2E-06	8.2E-06	2.1E-05
32	dibenz(ah)anthracene	24hr	max	3.9E-06	3.9E-06	9.1E-06
33	dibenz(ah)anthracene	24hr	max	5.5E-06	5.5E-06	1.1E-05
34	dibenz(ah)anthracene	24hr	max	5.1E-06	5.1E-06	1.1E-05
35	dibenz(ah)anthracene	24hr	max	4.2E-06	4.2E-06	9.7E-06
36	dibenz(ah)anthracene	24hr	max	4.1E-06	4.1E-06	1.1E-05
37	dibenz(ah)anthracene	24hr	max	4.0E-06	4.0E-06	1.3E-05
38	dibenz(ah)anthracene	24hr	max	1.1E-05	1.1E-05	2.9E-05
39	dibenz(ah)anthracene	24hr	max	9.3E-06	9.3E-06	3.3E-05
40	dibenz(ah)anthracene	24hr	max	6.8E-06	6.8E-06	3.8E-05
41	dibenz(ah)anthracene	24hr	max	7.7E-06	7.7E-06	4.4E-05
42	dibenz(ah)anthracene	24hr	max	7.9E-06	7.9E-06	3.8E-05
43	dibenz(ah)anthracene	24hr	max	7.6E-06	7.6E-06	3.8E-05
44	dibenz(ah)anthracene	24hr	max	7.9E-06	7.9E-06	3.8E-05
45	dibenz(ah)anthracene	24hr	max	7.9E-06	7.9E-06	3.8E-05
46	dibenz(ah)anthracene	24hr	max	7.8E-06	7.8E-06	3.7E-05
47	dibenz(ah)anthracene	24hr	max	8.0E-06	8.0E-06	3.2E-05
48	dibenz(ah)anthracene	24hr	max	7.9E-06	7.9E-06	3.5E-05
49	dibenz(ah)anthracene	24hr	max	7.8E-06	7.8E-06	3.5E-05
50	dibenz(ah)anthracene	24hr	max	7.6E-06	7.6E-06	3.2E-05
51	dibenz(ah)anthracene	24hr	max	7.6E-06	7.6E-06	3.4E-05
52	dibenz(ah)anthracene	24hr	max	9.7E-06	9.7E-06	1.6E-04
53	dibenz(ah)anthracene	24hr	max	9.3E-06	9.3E-06	7.3E-05
54	dibenz(ah)anthracene	24hr	max	3.1E-06	3.2E-06	1.2E-05
55	dibenz(ah)anthracene	24hr	max	3.3E-06	3.3E-06	1.7E-05
56	dibenz(ah)anthracene	24hr	max	3.4E-06	3.5E-06	2.0E-05
57	dibenz(ah)anthracene	24hr	max	3.4E-06	3.4E-06	1.3E-05
58	dibenz(ah)anthracene	24hr	max	3.0E-06	3.0E-06	1.4E-05
59	dibenz(ah)anthracene	24hr	max	1.1E-05	1.1E-05	8.7E-05
60	dibenz(ah)anthracene	24hr	max	1.6E-05	1.6E-05	4.5E-05
61	dibenz(ah)anthracene	24hr	max	1.7E-05	1.7E-05	6.1E-05
62	dibenz(ah)anthracene	24hr	max	1.5E-05	1.5E-05	6.8E-05
63	dibenz(ah)anthracene	24hr	max	1.3E-05	1.3E-05	1.0E-04
64	dibenz(ah)anthracene	24hr	max	1.3E-05	1.3E-05	9.8E-05
65	dibenz(ah)anthracene	24hr	max	1.7E-05	1.7E-05	3.9E-05
66	dibenz(ah)anthracene	24hr	max	1.2E-05	1.2E-05	2.0E-05
67	dibenz(ah)anthracene	24hr	max	7.3E-06	7.3E-06	1.9E-05
68	dibenz(ah)anthracene	24hr	max	7.7E-06	7.7E-06	1.9E-05
69	dibenz(ah)anthracene	24hr	max	4.1E-06	4.2E-06	1.6E-05
70	dibenz(ah)anthracene	24hr	max	4.4E-06	4.4E-06	1.2E-05
71	dibenz(ah)anthracene	24hr	max	1.2E-05	1.2E-05	3.1E-05
72	dibenz(ah)anthracene	24hr	max	1.2E-05	1.2E-05	3.0E-05
73	dibenz(ah)anthracene	24hr	max	1.7E-05	1.7E-05	3.7E-05
74	dibenz(ah)anthracene	24hr	max	1.1E-05	1.1E-05	1.4E-04
75	dibenz(ah)anthracene	24hr	max	4.5E-05	4.5E-05	5.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
76	dibenz(ah)anthracene	24hr	max	1.7E-05	1.7E-05	6.2E-05
77	dibenz(ah)anthracene	24hr	max	1.2E-05	1.2E-05	3.3E-04
78	dibenz(ah)anthracene	24hr	max	8.9E-06	8.9E-06	4.0E-05
79	dibenz(ah)anthracene	24hr	max	1.4E-05	1.4E-05	2.5E-05
1	dibenz(ah)anthracene	annual	average	1.7E-07	1.7E-07	4.2E-07
2	dibenz(ah)anthracene	annual	average	3.4E-07	3.4E-07	7.6E-07
3	dibenz(ah)anthracene	annual	average	3.5E-07	3.6E-07	7.9E-07
4	dibenz(ah)anthracene	annual	average	3.8E-07	3.9E-07	8.7E-07
5	dibenz(ah)anthracene	annual	average	4.5E-07	4.5E-07	1.0E-06
6	dibenz(ah)anthracene	annual	average	4.6E-07	4.7E-07	1.1E-06
7	dibenz(ah)anthracene	annual	average	4.1E-07	4.1E-07	9.3E-07
8	dibenz(ah)anthracene	annual	average	4.8E-07	4.8E-07	1.1E-06
9	dibenz(ah)anthracene	annual	average	4.4E-07	4.4E-07	1.0E-06
10	dibenz(ah)anthracene	annual	average	7.1E-07	7.2E-07	1.6E-06
11	dibenz(ah)anthracene	annual	average	1.1E-06	1.1E-06	2.2E-06
12	dibenz(ah)anthracene	annual	average	1.0E-06	1.0E-06	2.0E-06
13	dibenz(ah)anthracene	annual	average	9.3E-07	9.4E-07	1.9E-06
14	dibenz(ah)anthracene	annual	average	1.9E-06	2.0E-06	3.2E-06
15	dibenz(ah)anthracene	annual	average	5.4E-07	5.5E-07	1.2E-06
16	dibenz(ah)anthracene	annual	average	5.4E-07	5.5E-07	1.2E-06
17	dibenz(ah)anthracene	annual	average	5.9E-07	6.0E-07	1.3E-06
18	dibenz(ah)anthracene	annual	average	6.4E-07	6.5E-07	1.4E-06
19	dibenz(ah)anthracene	annual	average	6.5E-07	6.6E-07	1.5E-06
20	dibenz(ah)anthracene	annual	average	7.0E-07	7.2E-07	1.6E-06
21	dibenz(ah)anthracene	annual	average	9.9E-07	9.9E-07	2.1E-06
22	dibenz(ah)anthracene	annual	average	9.5E-07	9.6E-07	2.0E-06
23	dibenz(ah)anthracene	annual	average	7.0E-07	7.0E-07	1.6E-06
24	dibenz(ah)anthracene	annual	average	3.6E-07	3.6E-07	8.5E-07
25	dibenz(ah)anthracene	annual	average	4.5E-07	4.8E-07	1.5E-06
26	dibenz(ah)anthracene	annual	average	5.2E-07	5.3E-07	1.7E-06
27	dibenz(ah)anthracene	annual	average	6.1E-07	6.5E-07	2.5E-06
28	dibenz(ah)anthracene	annual	average	8.2E-07	8.3E-07	2.0E-06
29	dibenz(ah)anthracene	annual	average	8.5E-07	8.6E-07	2.1E-06
30	dibenz(ah)anthracene	annual	average	4.4E-07	4.4E-07	1.2E-06
31	dibenz(ah)anthracene	annual	average	4.6E-07	4.6E-07	1.2E-06
32	dibenz(ah)anthracene	annual	average	1.8E-07	1.8E-07	4.7E-07
33	dibenz(ah)anthracene	annual	average	2.5E-07	2.5E-07	6.4E-07
34	dibenz(ah)anthracene	annual	average	2.6E-07	2.6E-07	6.4E-07
35	dibenz(ah)anthracene	annual	average	2.5E-07	2.5E-07	6.2E-07
36	dibenz(ah)anthracene	annual	average	2.6E-07	2.7E-07	6.6E-07
37	dibenz(ah)anthracene	annual	average	2.6E-07	2.6E-07	6.6E-07
38	dibenz(ah)anthracene	annual	average	8.4E-07	8.5E-07	2.4E-06
39	dibenz(ah)anthracene	annual	average	8.2E-07	8.3E-07	2.6E-06
40	dibenz(ah)anthracene	annual	average	8.1E-07	8.1E-07	2.9E-06
41	dibenz(ah)anthracene	annual	average	7.8E-07	7.9E-07	3.1E-06
42	dibenz(ah)anthracene	annual	average	9.3E-07	9.4E-07	3.0E-06
43	dibenz(ah)anthracene	annual	average	9.5E-07	9.6E-07	3.3E-06
44	dibenz(ah)anthracene	annual	average	9.8E-07	9.8E-07	3.3E-06
45	dibenz(ah)anthracene	annual	average	9.1E-07	9.1E-07	3.5E-06
46	dibenz(ah)anthracene	annual	average	9.1E-07	9.2E-07	3.4E-06
47	dibenz(ah)anthracene	annual	average	9.0E-07	9.1E-07	3.6E-06
48	dibenz(ah)anthracene	annual	average	9.5E-07	9.5E-07	3.5E-06
49	dibenz(ah)anthracene	annual	average	9.2E-07	9.3E-07	3.5E-06
50	dibenz(ah)anthracene	annual	average	9.5E-07	9.5E-07	3.6E-06
51	dibenz(ah)anthracene	annual	average	9.4E-07	9.5E-07	3.3E-06
52	dibenz(ah)anthracene	annual	average	1.1E-06	1.1E-06	1.1E-05
53	dibenz(ah)anthracene	annual	average	9.5E-07	9.5E-07	6.2E-06
54	dibenz(ah)anthracene	annual	average	2.7E-07	2.7E-07	6.1E-07
55	dibenz(ah)anthracene	annual	average	2.9E-07	2.9E-07	6.9E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
56	dibenz(ah)anthracene	annual	average	3.1E-07	3.1E-07	7.5E-07
57	dibenz(ah)anthracene	annual	average	3.3E-07	3.3E-07	7.4E-07
58	dibenz(ah)anthracene	annual	average	2.3E-07	2.3E-07	5.2E-07
59	dibenz(ah)anthracene	annual	average	1.3E-06	1.3E-06	1.1E-05
60	dibenz(ah)anthracene	annual	average	1.8E-06	1.8E-06	4.3E-06
61	dibenz(ah)anthracene	annual	average	1.9E-06	1.9E-06	5.0E-06
62	dibenz(ah)anthracene	annual	average	1.7E-06	1.7E-06	5.2E-06
63	dibenz(ah)anthracene	annual	average	1.6E-06	1.6E-06	6.0E-06
64	dibenz(ah)anthracene	annual	average	1.6E-06	1.6E-06	5.8E-06
65	dibenz(ah)anthracene	annual	average	1.9E-06	1.9E-06	5.2E-06
66	dibenz(ah)anthracene	annual	average	6.5E-07	6.5E-07	1.5E-06
67	dibenz(ah)anthracene	annual	average	8.8E-07	8.9E-07	1.9E-06
68	dibenz(ah)anthracene	annual	average	5.6E-07	5.6E-07	1.3E-06
69	dibenz(ah)anthracene	annual	average	5.3E-07	5.3E-07	1.3E-06
70	dibenz(ah)anthracene	annual	average	5.0E-07	5.0E-07	1.3E-06
71	dibenz(ah)anthracene	annual	average	6.8E-07	6.8E-07	2.1E-06
72	dibenz(ah)anthracene	annual	average	6.6E-07	6.7E-07	2.1E-06
73	dibenz(ah)anthracene	annual	average	2.1E-06	2.1E-06	5.6E-06
74	dibenz(ah)anthracene	annual	average	1.3E-06	1.3E-06	1.7E-05
75	dibenz(ah)anthracene	annual	average	6.9E-06	6.9E-06	8.4E-06
76	dibenz(ah)anthracene	annual	average	1.9E-06	1.9E-06	5.0E-06
77	dibenz(ah)anthracene	annual	average	1.4E-06	1.4E-06	1.2E-05
78	dibenz(ah)anthracene	annual	average	9.2E-07	9.3E-07	2.9E-06
79	dibenz(ah)anthracene	annual	average	8.7E-07	8.8E-07	1.9E-06
1	dichlorobenzene	1hr	max	3.7E-04	3.7E-04	3.8E-04
2	dichlorobenzene	1hr	max	2.9E-04	3.0E-04	3.4E-04
3	dichlorobenzene	1hr	max	2.9E-04	3.0E-04	3.4E-04
4	dichlorobenzene	1hr	max	3.0E-04	3.1E-04	3.6E-04
5	dichlorobenzene	1hr	max	3.3E-04	3.3E-04	3.7E-04
6	dichlorobenzene	1hr	max	3.3E-04	3.3E-04	3.7E-04
7	dichlorobenzene	1hr	max	4.0E-04	4.3E-04	4.4E-04
8	dichlorobenzene	1hr	max	3.3E-04	3.5E-04	3.7E-04
9	dichlorobenzene	1hr	max	2.8E-04	2.8E-04	2.9E-04
10	dichlorobenzene	1hr	max	3.3E-04	3.7E-04	4.0E-04
11	dichlorobenzene	1hr	max	4.8E-04	4.8E-04	5.3E-04
12	dichlorobenzene	1hr	max	3.5E-04	3.5E-04	3.8E-04
13	dichlorobenzene	1hr	max	3.5E-04	3.5E-04	3.8E-04
14	dichlorobenzene	1hr	max	9.6E-04	9.6E-04	1.0E-03
15	dichlorobenzene	1hr	max	3.5E-04	3.9E-04	4.0E-04
16	dichlorobenzene	1hr	max	3.5E-04	3.8E-04	3.9E-04
17	dichlorobenzene	1hr	max	3.4E-04	3.8E-04	3.9E-04
18	dichlorobenzene	1hr	max	3.3E-04	3.8E-04	3.9E-04
19	dichlorobenzene	1hr	max	3.3E-04	3.8E-04	3.9E-04
20	dichlorobenzene	1hr	max	3.2E-04	3.4E-04	3.5E-04
21	dichlorobenzene	1hr	max	9.4E-04	9.4E-04	9.5E-04
22	dichlorobenzene	1hr	max	4.7E-04	4.8E-04	4.9E-04
23	dichlorobenzene	1hr	max	3.7E-04	3.8E-04	3.9E-04
24	dichlorobenzene	1hr	max	2.9E-04	3.1E-04	3.4E-04
25	dichlorobenzene	1hr	max	8.7E-04	1.6E-03	1.6E-03
26	dichlorobenzene	1hr	max	6.5E-04	6.6E-04	6.7E-04
27	dichlorobenzene	1hr	max	7.6E-04	3.2E-03	3.2E-03
28	dichlorobenzene	1hr	max	3.7E-04	3.7E-04	3.8E-04
29	dichlorobenzene	1hr	max	3.7E-04	3.7E-04	3.9E-04
30	dichlorobenzene	1hr	max	7.8E-04	7.8E-04	8.2E-04
31	dichlorobenzene	1hr	max	7.0E-04	7.0E-04	7.4E-04
32	dichlorobenzene	1hr	max	3.9E-04	3.9E-04	3.9E-04
33	dichlorobenzene	1hr	max	4.3E-04	4.3E-04	4.7E-04
34	dichlorobenzene	1hr	max	4.0E-04	4.0E-04	4.1E-04
35	dichlorobenzene	1hr	max	4.5E-04	4.5E-04	4.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
36	dichlorobenzene	1hr	max	4.4E-04	4.5E-04	4.6E-04
37	dichlorobenzene	1hr	max	4.5E-04	4.5E-04	4.7E-04
38	dichlorobenzene	1hr	max	5.8E-04	5.8E-04	6.7E-04
39	dichlorobenzene	1hr	max	4.0E-04	4.0E-04	4.1E-04
40	dichlorobenzene	1hr	max	3.8E-04	3.8E-04	3.9E-04
41	dichlorobenzene	1hr	max	4.3E-04	4.5E-04	4.8E-04
42	dichlorobenzene	1hr	max	9.8E-04	9.8E-04	9.8E-04
43	dichlorobenzene	1hr	max	1.5E-03	1.5E-03	1.6E-03
44	dichlorobenzene	1hr	max	2.8E-03	2.8E-03	2.8E-03
45	dichlorobenzene	1hr	max	7.6E-04	7.6E-04	8.0E-04
46	dichlorobenzene	1hr	max	1.3E-03	1.3E-03	1.3E-03
47	dichlorobenzene	1hr	max	1.2E-03	1.2E-03	1.2E-03
48	dichlorobenzene	1hr	max	2.0E-03	2.0E-03	2.1E-03
49	dichlorobenzene	1hr	max	2.4E-03	2.4E-03	2.5E-03
50	dichlorobenzene	1hr	max	8.0E-04	8.0E-04	8.3E-04
51	dichlorobenzene	1hr	max	9.6E-04	9.6E-04	1.0E-03
52	dichlorobenzene	1hr	max	6.9E-04	6.9E-04	1.3E-03
53	dichlorobenzene	1hr	max	5.7E-04	5.7E-04	6.8E-04
54	dichlorobenzene	1hr	max	2.6E-04	3.0E-04	3.4E-04
55	dichlorobenzene	1hr	max	2.8E-04	3.0E-04	3.5E-04
56	dichlorobenzene	1hr	max	2.8E-04	3.3E-04	3.8E-04
57	dichlorobenzene	1hr	max	2.9E-04	3.3E-04	3.5E-04
58	dichlorobenzene	1hr	max	3.1E-04	3.3E-04	3.5E-04
59	dichlorobenzene	1hr	max	1.1E-03	1.1E-03	1.1E-03
60	dichlorobenzene	1hr	max	1.2E-03	1.2E-03	1.3E-03
61	dichlorobenzene	1hr	max	3.6E-03	3.6E-03	3.6E-03
62	dichlorobenzene	1hr	max	1.5E-03	1.5E-03	1.5E-03
63	dichlorobenzene	1hr	max	1.2E-03	1.2E-03	1.2E-03
64	dichlorobenzene	1hr	max	1.2E-03	1.2E-03	1.2E-03
65	dichlorobenzene	1hr	max	2.6E-03	2.6E-03	2.6E-03
66	dichlorobenzene	1hr	max	3.6E-04	3.6E-04	3.8E-04
67	dichlorobenzene	1hr	max	3.9E-04	3.9E-04	4.3E-04
68	dichlorobenzene	1hr	max	3.8E-04	3.8E-04	4.0E-04
69	dichlorobenzene	1hr	max	3.6E-04	3.6E-04	3.8E-04
70	dichlorobenzene	1hr	max	3.2E-04	3.2E-04	3.4E-04
71	dichlorobenzene	1hr	max	7.6E-04	7.6E-04	9.0E-04
72	dichlorobenzene	1hr	max	7.4E-04	7.4E-04	8.8E-04
73	dichlorobenzene	1hr	max	4.5E-03	4.5E-03	4.5E-03
74	dichlorobenzene	1hr	max	8.2E-04	8.2E-04	1.6E-03
75	dichlorobenzene	1hr	max	6.4E-02	6.4E-02	6.4E-02
76	dichlorobenzene	1hr	max	2.8E-03	2.8E-03	2.8E-03
77	dichlorobenzene	1hr	max	1.7E-03	1.7E-03	2.6E-03
78	dichlorobenzene	1hr	max	7.6E-04	7.6E-04	8.2E-04
79	dichlorobenzene	1hr	max	5.5E-04	5.6E-04	5.8E-04
1	dichlorobenzene	1hr	9th	1.9E-04	2.0E-04	2.3E-04
2	dichlorobenzene	1hr	9th	2.2E-04	2.3E-04	2.5E-04
3	dichlorobenzene	1hr	9th	2.3E-04	2.3E-04	2.6E-04
4	dichlorobenzene	1hr	9th	2.3E-04	2.4E-04	2.8E-04
5	dichlorobenzene	1hr	9th	2.6E-04	2.7E-04	2.8E-04
6	dichlorobenzene	1hr	9th	2.6E-04	2.7E-04	2.9E-04
7	dichlorobenzene	1hr	9th	2.7E-04	3.0E-04	3.2E-04
8	dichlorobenzene	1hr	9th	2.6E-04	2.8E-04	2.9E-04
9	dichlorobenzene	1hr	9th	2.3E-04	2.4E-04	2.6E-04
10	dichlorobenzene	1hr	9th	2.7E-04	2.8E-04	3.0E-04
11	dichlorobenzene	1hr	9th	3.3E-04	3.6E-04	3.7E-04
12	dichlorobenzene	1hr	9th	2.7E-04	2.7E-04	2.8E-04
13	dichlorobenzene	1hr	9th	2.6E-04	2.6E-04	2.8E-04
14	dichlorobenzene	1hr	9th	2.9E-04	2.9E-04	3.1E-04
15	dichlorobenzene	1hr	9th	2.6E-04	2.8E-04	3.3E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
16	dichlorobenzene	1hr	9th	2.5E-04	2.7E-04	3.3E-04
17	dichlorobenzene	1hr	9th	2.6E-04	3.0E-04	3.3E-04
18	dichlorobenzene	1hr	9th	2.6E-04	2.9E-04	3.0E-04
19	dichlorobenzene	1hr	9th	2.6E-04	2.9E-04	3.0E-04
20	dichlorobenzene	1hr	9th	2.6E-04	2.8E-04	3.0E-04
21	dichlorobenzene	1hr	9th	5.4E-04	5.6E-04	5.6E-04
22	dichlorobenzene	1hr	9th	4.1E-04	4.2E-04	4.4E-04
23	dichlorobenzene	1hr	9th	2.5E-04	2.7E-04	2.9E-04
24	dichlorobenzene	1hr	9th	2.4E-04	2.7E-04	3.1E-04
25	dichlorobenzene	1hr	9th	3.5E-04	8.2E-04	8.2E-04
26	dichlorobenzene	1hr	9th	3.4E-04	3.8E-04	3.9E-04
27	dichlorobenzene	1hr	9th	4.1E-04	1.3E-03	1.3E-03
28	dichlorobenzene	1hr	9th	2.7E-04	2.8E-04	3.1E-04
29	dichlorobenzene	1hr	9th	2.8E-04	2.8E-04	3.1E-04
30	dichlorobenzene	1hr	9th	3.9E-04	3.9E-04	4.6E-04
31	dichlorobenzene	1hr	9th	4.2E-04	4.2E-04	4.8E-04
32	dichlorobenzene	1hr	9th	2.3E-04	2.4E-04	2.7E-04
33	dichlorobenzene	1hr	9th	2.8E-04	2.8E-04	3.2E-04
34	dichlorobenzene	1hr	9th	2.8E-04	2.9E-04	3.3E-04
35	dichlorobenzene	1hr	9th	2.4E-04	2.6E-04	2.9E-04
36	dichlorobenzene	1hr	9th	2.5E-04	2.8E-04	3.1E-04
37	dichlorobenzene	1hr	9th	2.5E-04	2.9E-04	3.2E-04
38	dichlorobenzene	1hr	9th	2.8E-04	2.9E-04	3.0E-04
39	dichlorobenzene	1hr	9th	3.1E-04	3.1E-04	3.3E-04
40	dichlorobenzene	1hr	9th	3.1E-04	3.2E-04	3.5E-04
41	dichlorobenzene	1hr	9th	3.3E-04	3.3E-04	3.8E-04
42	dichlorobenzene	1hr	9th	4.3E-04	4.3E-04	4.5E-04
43	dichlorobenzene	1hr	9th	1.2E-03	1.2E-03	1.2E-03
44	dichlorobenzene	1hr	9th	1.9E-03	1.9E-03	2.0E-03
45	dichlorobenzene	1hr	9th	5.3E-04	5.3E-04	5.6E-04
46	dichlorobenzene	1hr	9th	8.9E-04	8.9E-04	9.0E-04
47	dichlorobenzene	1hr	9th	5.5E-04	5.5E-04	5.8E-04
48	dichlorobenzene	1hr	9th	1.5E-03	1.5E-03	1.6E-03
49	dichlorobenzene	1hr	9th	1.2E-03	1.2E-03	1.2E-03
50	dichlorobenzene	1hr	9th	5.0E-04	5.0E-04	5.2E-04
51	dichlorobenzene	1hr	9th	4.1E-04	4.1E-04	4.5E-04
52	dichlorobenzene	1hr	9th	5.1E-04	5.1E-04	8.2E-04
53	dichlorobenzene	1hr	9th	4.3E-04	4.3E-04	5.0E-04
54	dichlorobenzene	1hr	9th	2.1E-04	2.3E-04	2.5E-04
55	dichlorobenzene	1hr	9th	2.3E-04	2.6E-04	2.9E-04
56	dichlorobenzene	1hr	9th	2.4E-04	2.7E-04	2.9E-04
57	dichlorobenzene	1hr	9th	2.2E-04	2.5E-04	2.8E-04
58	dichlorobenzene	1hr	9th	2.2E-04	2.5E-04	2.8E-04
59	dichlorobenzene	1hr	9th	6.3E-04	6.3E-04	6.4E-04
60	dichlorobenzene	1hr	9th	8.1E-04	8.1E-04	8.2E-04
61	dichlorobenzene	1hr	9th	1.0E-03	1.0E-03	1.0E-03
62	dichlorobenzene	1hr	9th	7.8E-04	7.8E-04	8.1E-04
63	dichlorobenzene	1hr	9th	6.7E-04	6.7E-04	6.9E-04
64	dichlorobenzene	1hr	9th	6.5E-04	6.5E-04	6.7E-04
65	dichlorobenzene	1hr	9th	2.0E-03	2.1E-03	2.1E-03
66	dichlorobenzene	1hr	9th	2.3E-04	2.3E-04	2.6E-04
67	dichlorobenzene	1hr	9th	2.5E-04	2.5E-04	2.9E-04
68	dichlorobenzene	1hr	9th	2.3E-04	2.3E-04	2.6E-04
69	dichlorobenzene	1hr	9th	2.3E-04	2.3E-04	2.6E-04
70	dichlorobenzene	1hr	9th	2.2E-04	2.2E-04	2.4E-04
71	dichlorobenzene	1hr	9th	5.1E-04	5.1E-04	6.2E-04
72	dichlorobenzene	1hr	9th	5.1E-04	5.1E-04	6.0E-04
73	dichlorobenzene	1hr	9th	4.2E-03	4.2E-03	4.2E-03
74	dichlorobenzene	1hr	9th	6.1E-04	6.1E-04	8.0E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
75	dichlorobenzene	1hr	9th	5.2E-02	5.2E-02	5.2E-02
76	dichlorobenzene	1hr	9th	9.7E-04	9.7E-04	1.0E-03
77	dichlorobenzene	1hr	9th	6.3E-04	6.3E-04	9.3E-04
78	dichlorobenzene	1hr	9th	3.1E-04	3.1E-04	3.4E-04
79	dichlorobenzene	1hr	9th	4.6E-04	4.7E-04	4.7E-04
1	dichlorobenzene	24hr	max	9.5E-05	1.1E-04	1.3E-04
2	dichlorobenzene	24hr	max	1.0E-04	1.2E-04	1.4E-04
3	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
4	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
5	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.5E-04
6	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.5E-04
7	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.5E-04
8	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.5E-04
9	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
10	dichlorobenzene	24hr	max	1.0E-04	1.2E-04	1.4E-04
11	dichlorobenzene	24hr	max	1.5E-04	1.8E-04	2.0E-04
12	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.5E-04
13	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
14	dichlorobenzene	24hr	max	1.4E-04	1.4E-04	1.5E-04
15	dichlorobenzene	24hr	max	1.4E-04	1.6E-04	2.0E-04
16	dichlorobenzene	24hr	max	1.4E-04	1.6E-04	2.0E-04
17	dichlorobenzene	24hr	max	1.3E-04	1.5E-04	1.8E-04
18	dichlorobenzene	24hr	max	1.3E-04	1.4E-04	1.7E-04
19	dichlorobenzene	24hr	max	1.3E-04	1.4E-04	1.7E-04
20	dichlorobenzene	24hr	max	1.3E-04	1.4E-04	1.6E-04
21	dichlorobenzene	24hr	max	3.0E-04	3.2E-04	3.3E-04
22	dichlorobenzene	24hr	max	1.6E-04	1.7E-04	1.8E-04
23	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.4E-04
24	dichlorobenzene	24hr	max	1.3E-04	1.6E-04	1.9E-04
25	dichlorobenzene	24hr	max	1.7E-04	3.1E-04	3.1E-04
26	dichlorobenzene	24hr	max	1.5E-04	1.6E-04	1.9E-04
27	dichlorobenzene	24hr	max	1.6E-04	4.6E-04	4.6E-04
28	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
29	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
30	dichlorobenzene	24hr	max	2.0E-04	2.0E-04	2.4E-04
31	dichlorobenzene	24hr	max	2.0E-04	2.0E-04	2.4E-04
32	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.5E-04
33	dichlorobenzene	24hr	max	1.3E-04	1.4E-04	1.7E-04
34	dichlorobenzene	24hr	max	1.3E-04	1.4E-04	1.6E-04
35	dichlorobenzene	24hr	max	1.2E-04	1.4E-04	1.6E-04
36	dichlorobenzene	24hr	max	1.3E-04	1.5E-04	1.7E-04
37	dichlorobenzene	24hr	max	1.3E-04	1.5E-04	1.8E-04
38	dichlorobenzene	24hr	max	1.1E-04	1.2E-04	1.4E-04
39	dichlorobenzene	24hr	max	1.2E-04	1.3E-04	1.5E-04
40	dichlorobenzene	24hr	max	1.3E-04	1.4E-04	1.6E-04
41	dichlorobenzene	24hr	max	1.4E-04	1.4E-04	1.7E-04
42	dichlorobenzene	24hr	max	1.6E-04	1.6E-04	1.9E-04
43	dichlorobenzene	24hr	max	5.5E-04	5.5E-04	5.6E-04
44	dichlorobenzene	24hr	max	6.2E-04	6.3E-04	6.8E-04
45	dichlorobenzene	24hr	max	1.6E-04	1.8E-04	2.1E-04
46	dichlorobenzene	24hr	max	1.8E-04	1.9E-04	2.1E-04
47	dichlorobenzene	24hr	max	1.7E-04	1.7E-04	2.2E-04
48	dichlorobenzene	24hr	max	6.2E-04	6.2E-04	6.5E-04
49	dichlorobenzene	24hr	max	2.9E-04	2.9E-04	3.3E-04
50	dichlorobenzene	24hr	max	2.3E-04	2.3E-04	2.8E-04
51	dichlorobenzene	24hr	max	1.8E-04	1.8E-04	2.2E-04
52	dichlorobenzene	24hr	max	2.3E-04	2.3E-04	3.7E-04
53	dichlorobenzene	24hr	max	2.0E-04	2.0E-04	2.9E-04
54	dichlorobenzene	24hr	max	1.1E-04	1.3E-04	1.5E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
55	dichlorobenzene	24hr	max	1.2E-04	1.6E-04	1.8E-04
56	dichlorobenzene	24hr	max	1.3E-04	1.7E-04	2.0E-04
57	dichlorobenzene	24hr	max	1.1E-04	1.4E-04	1.6E-04
58	dichlorobenzene	24hr	max	1.0E-04	1.3E-04	1.6E-04
59	dichlorobenzene	24hr	max	2.9E-04	2.9E-04	3.1E-04
60	dichlorobenzene	24hr	max	3.0E-04	3.0E-04	3.1E-04
61	dichlorobenzene	24hr	max	3.9E-04	3.9E-04	4.2E-04
62	dichlorobenzene	24hr	max	3.4E-04	3.4E-04	3.7E-04
63	dichlorobenzene	24hr	max	3.1E-04	3.1E-04	3.3E-04
64	dichlorobenzene	24hr	max	3.1E-04	3.1E-04	3.3E-04
65	dichlorobenzene	24hr	max	8.1E-04	8.1E-04	8.3E-04
66	dichlorobenzene	24hr	max	1.1E-04	1.1E-04	1.3E-04
67	dichlorobenzene	24hr	max	1.2E-04	1.2E-04	1.4E-04
68	dichlorobenzene	24hr	max	1.1E-04	1.1E-04	1.3E-04
69	dichlorobenzene	24hr	max	1.0E-04	1.0E-04	1.2E-04
70	dichlorobenzene	24hr	max	8.5E-05	9.4E-05	1.1E-04
71	dichlorobenzene	24hr	max	2.3E-04	2.3E-04	2.7E-04
72	dichlorobenzene	24hr	max	2.3E-04	2.3E-04	2.6E-04
73	dichlorobenzene	24hr	max	1.8E-03	1.8E-03	1.8E-03
74	dichlorobenzene	24hr	max	2.7E-04	2.7E-04	3.6E-04
75	dichlorobenzene	24hr	max	1.8E-02	1.8E-02	1.8E-02
76	dichlorobenzene	24hr	max	3.8E-04	3.9E-04	4.1E-04
77	dichlorobenzene	24hr	max	2.7E-04	2.7E-04	2.9E-04
78	dichlorobenzene	24hr	max	1.4E-04	1.4E-04	1.7E-04
79	dichlorobenzene	24hr	max	1.9E-04	2.0E-04	2.2E-04
1	dichlorobenzene	annual	average	4.4E-06	5.4E-06	6.1E-06
2	dichlorobenzene	annual	average	9.3E-06	1.1E-05	1.2E-05
3	dichlorobenzene	annual	average	9.4E-06	1.1E-05	1.3E-05
4	dichlorobenzene	annual	average	9.9E-06	1.2E-05	1.4E-05
5	dichlorobenzene	annual	average	1.1E-05	1.4E-05	1.6E-05
6	dichlorobenzene	annual	average	1.1E-05	1.4E-05	1.6E-05
7	dichlorobenzene	annual	average	1.1E-05	1.4E-05	1.5E-05
8	dichlorobenzene	annual	average	1.1E-05	1.5E-05	1.7E-05
9	dichlorobenzene	annual	average	1.2E-05	1.4E-05	1.6E-05
10	dichlorobenzene	annual	average	1.5E-05	1.7E-05	2.1E-05
11	dichlorobenzene	annual	average	2.1E-05	2.4E-05	2.9E-05
12	dichlorobenzene	annual	average	1.7E-05	2.0E-05	2.3E-05
13	dichlorobenzene	annual	average	1.6E-05	1.9E-05	2.2E-05
14	dichlorobenzene	annual	average	2.0E-05	2.5E-05	2.9E-05
15	dichlorobenzene	annual	average	1.2E-05	2.0E-05	2.2E-05
16	dichlorobenzene	annual	average	1.2E-05	2.0E-05	2.2E-05
17	dichlorobenzene	annual	average	1.2E-05	2.0E-05	2.3E-05
18	dichlorobenzene	annual	average	1.3E-05	2.1E-05	2.4E-05
19	dichlorobenzene	annual	average	1.3E-05	2.1E-05	2.4E-05
20	dichlorobenzene	annual	average	1.3E-05	2.3E-05	2.6E-05
21	dichlorobenzene	annual	average	5.1E-05	5.7E-05	6.0E-05
22	dichlorobenzene	annual	average	2.6E-05	3.1E-05	3.4E-05
23	dichlorobenzene	annual	average	1.3E-05	1.8E-05	2.1E-05
24	dichlorobenzene	annual	average	9.4E-06	1.2E-05	1.4E-05
25	dichlorobenzene	annual	average	1.2E-05	3.1E-05	3.3E-05
26	dichlorobenzene	annual	average	1.4E-05	2.8E-05	3.1E-05
27	dichlorobenzene	annual	average	1.7E-05	4.2E-05	4.7E-05
28	dichlorobenzene	annual	average	1.4E-05	2.1E-05	2.5E-05
29	dichlorobenzene	annual	average	1.4E-05	2.2E-05	2.5E-05
30	dichlorobenzene	annual	average	1.1E-05	1.5E-05	1.8E-05
31	dichlorobenzene	annual	average	1.1E-05	1.7E-05	1.9E-05
32	dichlorobenzene	annual	average	4.8E-06	6.2E-06	7.1E-06
33	dichlorobenzene	annual	average	6.1E-06	7.8E-06	9.1E-06
34	dichlorobenzene	annual	average	6.2E-06	7.8E-06	9.0E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
35	dichlorobenzene	annual	average	6.4E-06	8.2E-06	9.4E-06
36	dichlorobenzene	annual	average	6.9E-06	8.9E-06	1.0E-05
37	dichlorobenzene	annual	average	7.0E-06	9.1E-06	1.0E-05
38	dichlorobenzene	annual	average	1.6E-05	2.2E-05	2.6E-05
39	dichlorobenzene	annual	average	1.7E-05	2.4E-05	2.8E-05
40	dichlorobenzene	annual	average	1.8E-05	2.6E-05	3.0E-05
41	dichlorobenzene	annual	average	1.9E-05	2.5E-05	3.1E-05
42	dichlorobenzene	annual	average	2.3E-05	2.8E-05	3.3E-05
43	dichlorobenzene	annual	average	5.6E-05	6.1E-05	6.7E-05
44	dichlorobenzene	annual	average	8.2E-05	8.8E-05	9.3E-05
45	dichlorobenzene	annual	average	2.7E-05	3.2E-05	3.8E-05
46	dichlorobenzene	annual	average	3.2E-05	3.7E-05	4.2E-05
47	dichlorobenzene	annual	average	2.6E-05	3.1E-05	3.7E-05
48	dichlorobenzene	annual	average	6.5E-05	7.0E-05	7.6E-05
49	dichlorobenzene	annual	average	4.1E-05	4.6E-05	5.2E-05
50	dichlorobenzene	annual	average	3.7E-05	4.2E-05	4.8E-05
51	dichlorobenzene	annual	average	2.2E-05	2.7E-05	3.3E-05
52	dichlorobenzene	annual	average	3.2E-05	3.6E-05	6.1E-05
53	dichlorobenzene	annual	average	2.5E-05	2.8E-05	4.1E-05
54	dichlorobenzene	annual	average	7.7E-06	9.1E-06	1.0E-05
55	dichlorobenzene	annual	average	8.1E-06	1.0E-05	1.1E-05
56	dichlorobenzene	annual	average	8.5E-06	1.1E-05	1.2E-05
57	dichlorobenzene	annual	average	8.8E-06	1.1E-05	1.2E-05
58	dichlorobenzene	annual	average	6.5E-06	7.7E-06	8.7E-06
59	dichlorobenzene	annual	average	3.6E-05	3.9E-05	5.7E-05
60	dichlorobenzene	annual	average	4.1E-05	4.2E-05	5.6E-05
61	dichlorobenzene	annual	average	5.6E-05	5.7E-05	6.7E-05
62	dichlorobenzene	annual	average	4.7E-05	4.9E-05	5.9E-05
63	dichlorobenzene	annual	average	4.3E-05	4.5E-05	5.9E-05
64	dichlorobenzene	annual	average	4.3E-05	4.4E-05	5.7E-05
65	dichlorobenzene	annual	average	1.2E-04	1.2E-04	1.3E-04
66	dichlorobenzene	annual	average	1.3E-05	1.6E-05	1.8E-05
67	dichlorobenzene	annual	average	1.5E-05	1.8E-05	2.1E-05
68	dichlorobenzene	annual	average	1.4E-05	1.6E-05	1.8E-05
69	dichlorobenzene	annual	average	1.3E-05	1.5E-05	1.7E-05
70	dichlorobenzene	annual	average	1.2E-05	1.4E-05	1.6E-05
71	dichlorobenzene	annual	average	2.2E-05	2.7E-05	3.2E-05
72	dichlorobenzene	annual	average	2.2E-05	2.7E-05	3.2E-05
73	dichlorobenzene	annual	average	3.2E-04	3.2E-04	3.3E-04
74	dichlorobenzene	annual	average	3.6E-05	3.9E-05	7.1E-05
75	dichlorobenzene	annual	average	2.8E-03	2.8E-03	2.8E-03
76	dichlorobenzene	annual	average	5.4E-05	5.6E-05	6.6E-05
77	dichlorobenzene	annual	average	3.7E-05	3.9E-05	5.9E-05
78	dichlorobenzene	annual	average	1.9E-05	2.4E-05	2.9E-05
79	dichlorobenzene	annual	average	3.4E-05	3.9E-05	4.2E-05
1	ethylbenzene	1hr	max	5.8E+00	5.8E+00	6.0E+00
2	ethylbenzene	1hr	max	7.9E+00	7.9E+00	8.4E+00
3	ethylbenzene	1hr	max	8.5E+00	8.5E+00	8.9E+00
4	ethylbenzene	1hr	max	9.8E+00	9.8E+00	1.0E+01
5	ethylbenzene	1hr	max	8.7E+00	8.7E+00	1.4E+01
6	ethylbenzene	1hr	max	7.8E+00	7.8E+00	1.6E+01
7	ethylbenzene	1hr	max	9.4E+00	9.4E+00	9.9E+00
8	ethylbenzene	1hr	max	8.2E+00	8.2E+00	1.7E+01
9	ethylbenzene	1hr	max	1.1E+01	1.1E+01	1.5E+01
10	ethylbenzene	1hr	max	7.9E+00	7.9E+00	1.1E+01
11	ethylbenzene	1hr	max	9.1E+00	9.1E+00	1.3E+01
12	ethylbenzene	1hr	max	1.3E+01	1.3E+01	1.9E+01
13	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.8E+01
14	ethylbenzene	1hr	max	1.1E+01	1.1E+01	1.5E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
15	ethylbenzene	1hr	max	2.2E+01	2.2E+01	2.7E+01
16	ethylbenzene	1hr	max	2.0E+01	2.0E+01	2.4E+01
17	ethylbenzene	1hr	max	1.5E+01	1.5E+01	1.8E+01
18	ethylbenzene	1hr	max	1.6E+01	1.6E+01	1.6E+01
19	ethylbenzene	1hr	max	1.5E+01	1.5E+01	1.9E+01
20	ethylbenzene	1hr	max	1.3E+01	1.3E+01	1.4E+01
21	ethylbenzene	1hr	max	1.8E+01	1.8E+01	1.9E+01
22	ethylbenzene	1hr	max	1.8E+01	1.8E+01	2.0E+01
23	ethylbenzene	1hr	max	1.8E+01	1.8E+01	2.0E+01
24	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.4E+01
25	ethylbenzene	1hr	max	2.3E+01	2.3E+01	2.4E+01
26	ethylbenzene	1hr	max	1.9E+01	1.9E+01	3.5E+01
27	ethylbenzene	1hr	max	3.9E+01	3.9E+01	3.9E+01
28	ethylbenzene	1hr	max	1.5E+01	1.5E+01	1.6E+01
29	ethylbenzene	1hr	max	1.6E+01	1.6E+01	1.6E+01
30	ethylbenzene	1hr	max	1.6E+01	1.6E+01	2.2E+01
31	ethylbenzene	1hr	max	1.5E+01	1.5E+01	2.4E+01
32	ethylbenzene	1hr	max	4.6E+00	4.6E+00	7.3E+00
33	ethylbenzene	1hr	max	5.0E+00	5.0E+00	1.1E+01
34	ethylbenzene	1hr	max	4.7E+00	4.7E+00	1.2E+01
35	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.7E+01
36	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.7E+01
37	ethylbenzene	1hr	max	1.5E+01	1.5E+01	1.7E+01
38	ethylbenzene	1hr	max	2.2E+01	2.2E+01	2.2E+01
39	ethylbenzene	1hr	max	2.8E+01	2.8E+01	2.8E+01
40	ethylbenzene	1hr	max	2.1E+01	2.1E+01	2.5E+01
41	ethylbenzene	1hr	max	4.7E+01	4.7E+01	5.2E+01
42	ethylbenzene	1hr	max	2.7E+01	2.7E+01	2.7E+01
43	ethylbenzene	1hr	max	2.2E+01	2.2E+01	2.8E+01
44	ethylbenzene	1hr	max	2.3E+01	2.3E+01	2.3E+01
45	ethylbenzene	1hr	max	1.8E+01	1.8E+01	2.5E+01
46	ethylbenzene	1hr	max	1.8E+01	1.8E+01	2.5E+01
47	ethylbenzene	1hr	max	1.6E+01	1.6E+01	3.0E+01
48	ethylbenzene	1hr	max	1.9E+01	1.9E+01	2.5E+01
49	ethylbenzene	1hr	max	1.8E+01	1.8E+01	2.4E+01
50	ethylbenzene	1hr	max	2.0E+01	2.0E+01	2.0E+01
51	ethylbenzene	1hr	max	2.6E+01	2.6E+01	2.6E+01
52	ethylbenzene	1hr	max	1.9E+01	1.9E+01	1.9E+01
53	ethylbenzene	1hr	max	2.3E+01	2.3E+01	3.1E+01
54	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.5E+01
55	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.4E+01
56	ethylbenzene	1hr	max	1.3E+01	1.3E+01	1.3E+01
57	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.4E+01
58	ethylbenzene	1hr	max	1.0E+01	1.0E+01	1.0E+01
59	ethylbenzene	1hr	max	2.5E+01	2.5E+01	3.3E+01
60	ethylbenzene	1hr	max	7.6E+01	7.6E+01	7.9E+01
61	ethylbenzene	1hr	max	4.2E+01	4.2E+01	4.2E+01
62	ethylbenzene	1hr	max	2.4E+01	2.4E+01	3.0E+01
63	ethylbenzene	1hr	max	2.5E+01	2.5E+01	3.0E+01
64	ethylbenzene	1hr	max	2.7E+01	2.7E+01	3.1E+01
65	ethylbenzene	1hr	max	3.6E+01	3.6E+01	5.4E+01
66	ethylbenzene	1hr	max	9.7E+00	9.7E+00	1.1E+01
67	ethylbenzene	1hr	max	1.1E+01	1.1E+01	2.2E+01
68	ethylbenzene	1hr	max	1.6E+01	1.6E+01	1.7E+01
69	ethylbenzene	1hr	max	1.7E+01	1.7E+01	1.9E+01
70	ethylbenzene	1hr	max	1.4E+01	1.4E+01	1.5E+01
71	ethylbenzene	1hr	max	1.9E+01	1.9E+01	2.9E+01
72	ethylbenzene	1hr	max	1.8E+01	1.8E+01	2.9E+01
73	ethylbenzene	1hr	max	3.7E+01	3.7E+01	5.5E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
74	ethylbenzene	1hr	max	2.2E+01	2.2E+01	3.0E+01
75	ethylbenzene	1hr	max	1.3E+02	1.3E+02	1.4E+02
76	ethylbenzene	1hr	max	4.2E+01	4.2E+01	4.2E+01
77	ethylbenzene	1hr	max	3.0E+01	3.0E+01	3.0E+01
78	ethylbenzene	1hr	max	3.0E+01	3.0E+01	3.0E+01
79	ethylbenzene	1hr	max	1.5E+01	1.5E+01	1.6E+01
1	ethylbenzene	1hr	9th	8.9E-01	8.9E-01	1.5E+00
2	ethylbenzene	1hr	9th	1.7E+00	1.7E+00	3.2E+00
3	ethylbenzene	1hr	9th	1.9E+00	1.9E+00	3.1E+00
4	ethylbenzene	1hr	9th	2.1E+00	2.1E+00	3.0E+00
5	ethylbenzene	1hr	9th	2.2E+00	2.2E+00	4.2E+00
6	ethylbenzene	1hr	9th	3.2E+00	3.2E+00	4.2E+00
7	ethylbenzene	1hr	9th	4.1E+00	4.1E+00	4.7E+00
8	ethylbenzene	1hr	9th	3.0E+00	3.0E+00	4.8E+00
9	ethylbenzene	1hr	9th	1.1E+00	1.1E+00	2.5E+00
10	ethylbenzene	1hr	9th	1.6E+00	1.6E+00	1.6E+00
11	ethylbenzene	1hr	9th	1.2E+00	1.2E+00	1.5E+00
12	ethylbenzene	1hr	9th	1.5E+00	1.5E+00	2.3E+00
13	ethylbenzene	1hr	9th	2.2E+00	2.2E+00	2.5E+00
14	ethylbenzene	1hr	9th	2.5E+00	2.5E+00	3.0E+00
15	ethylbenzene	1hr	9th	2.4E+00	2.4E+00	3.7E+00
16	ethylbenzene	1hr	9th	2.2E+00	2.2E+00	3.7E+00
17	ethylbenzene	1hr	9th	3.0E+00	3.0E+00	3.5E+00
18	ethylbenzene	1hr	9th	3.3E+00	3.3E+00	4.3E+00
19	ethylbenzene	1hr	9th	3.2E+00	3.2E+00	4.8E+00
20	ethylbenzene	1hr	9th	2.9E+00	2.9E+00	5.1E+00
21	ethylbenzene	1hr	9th	3.2E+00	3.2E+00	3.6E+00
22	ethylbenzene	1hr	9th	2.7E+00	2.7E+00	4.1E+00
23	ethylbenzene	1hr	9th	2.2E+00	2.2E+00	2.5E+00
24	ethylbenzene	1hr	9th	2.8E+00	2.8E+00	4.0E+00
25	ethylbenzene	1hr	9th	2.9E+00	2.9E+00	4.4E+00
26	ethylbenzene	1hr	9th	3.4E+00	3.4E+00	4.3E+00
27	ethylbenzene	1hr	9th	3.7E+00	3.7E+00	5.9E+00
28	ethylbenzene	1hr	9th	3.5E+00	3.5E+00	7.2E+00
29	ethylbenzene	1hr	9th	4.1E+00	4.1E+00	7.9E+00
30	ethylbenzene	1hr	9th	4.9E+00	4.9E+00	6.5E+00
31	ethylbenzene	1hr	9th	5.2E+00	5.2E+00	6.9E+00
32	ethylbenzene	1hr	9th	5.5E-01	5.5E-01	7.0E-01
33	ethylbenzene	1hr	9th	2.3E+00	2.3E+00	2.3E+00
34	ethylbenzene	1hr	9th	1.6E+00	1.6E+00	1.6E+00
35	ethylbenzene	1hr	9th	1.2E+00	1.2E+00	1.4E+00
36	ethylbenzene	1hr	9th	1.4E+00	1.4E+00	1.7E+00
37	ethylbenzene	1hr	9th	1.2E+00	1.2E+00	1.8E+00
38	ethylbenzene	1hr	9th	3.0E+00	3.0E+00	3.6E+00
39	ethylbenzene	1hr	9th	3.0E+00	3.0E+00	4.2E+00
40	ethylbenzene	1hr	9th	3.8E+00	3.8E+00	4.7E+00
41	ethylbenzene	1hr	9th	4.5E+00	4.5E+00	5.5E+00
42	ethylbenzene	1hr	9th	3.8E+00	3.8E+00	4.6E+00
43	ethylbenzene	1hr	9th	3.8E+00	3.8E+00	5.1E+00
44	ethylbenzene	1hr	9th	3.6E+00	3.6E+00	5.0E+00
45	ethylbenzene	1hr	9th	4.0E+00	4.0E+00	5.8E+00
46	ethylbenzene	1hr	9th	3.7E+00	3.7E+00	5.9E+00
47	ethylbenzene	1hr	9th	3.5E+00	3.5E+00	5.6E+00
48	ethylbenzene	1hr	9th	3.7E+00	3.7E+00	6.0E+00
49	ethylbenzene	1hr	9th	3.9E+00	3.9E+00	5.9E+00
50	ethylbenzene	1hr	9th	3.5E+00	3.5E+00	6.1E+00
51	ethylbenzene	1hr	9th	2.6E+00	2.6E+00	4.7E+00
52	ethylbenzene	1hr	9th	8.0E+00	8.0E+00	9.1E+00
53	ethylbenzene	1hr	9th	6.3E+00	6.3E+00	7.5E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
54	ethylbenzene	1hr	9th	2.5E+00	2.5E+00	2.7E+00
55	ethylbenzene	1hr	9th	1.9E+00	1.9E+00	4.3E+00
56	ethylbenzene	1hr	9th	2.8E+00	2.8E+00	3.4E+00
57	ethylbenzene	1hr	9th	2.6E+00	2.6E+00	4.2E+00
58	ethylbenzene	1hr	9th	2.5E+00	2.5E+00	2.6E+00
59	ethylbenzene	1hr	9th	9.0E+00	9.0E+00	1.1E+01
60	ethylbenzene	1hr	9th	1.1E+01	1.1E+01	1.6E+01
61	ethylbenzene	1hr	9th	1.2E+01	1.2E+01	2.0E+01
62	ethylbenzene	1hr	9th	1.2E+01	1.2E+01	1.7E+01
63	ethylbenzene	1hr	9th	8.4E+00	8.4E+00	1.4E+01
64	ethylbenzene	1hr	9th	9.6E+00	9.6E+00	1.4E+01
65	ethylbenzene	1hr	9th	1.7E+01	1.7E+01	1.8E+01
66	ethylbenzene	1hr	9th	1.6E+00	1.6E+00	2.3E+00
67	ethylbenzene	1hr	9th	2.2E+00	2.2E+00	2.9E+00
68	ethylbenzene	1hr	9th	1.4E+00	1.4E+00	3.5E+00
69	ethylbenzene	1hr	9th	1.3E+00	1.3E+00	2.8E+00
70	ethylbenzene	1hr	9th	2.2E+00	2.2E+00	3.6E+00
71	ethylbenzene	1hr	9th	7.4E+00	7.4E+00	1.1E+01
72	ethylbenzene	1hr	9th	6.8E+00	6.8E+00	8.7E+00
73	ethylbenzene	1hr	9th	1.6E+01	1.6E+01	1.8E+01
74	ethylbenzene	1hr	9th	1.0E+01	1.0E+01	1.0E+01
75	ethylbenzene	1hr	9th	3.4E+01	3.4E+01	3.8E+01
76	ethylbenzene	1hr	9th	1.2E+01	1.2E+01	2.0E+01
77	ethylbenzene	1hr	9th	1.0E+01	1.0E+01	1.3E+01
78	ethylbenzene	1hr	9th	3.5E+00	3.5E+00	3.7E+00
79	ethylbenzene	1hr	9th	2.3E+00	2.3E+00	4.9E+00
1	ethylbenzene	24th	max	3.0E-01	3.0E-01	3.3E-01
2	ethylbenzene	24th	max	4.4E-01	4.4E-01	4.5E-01
3	ethylbenzene	24th	max	4.3E-01	4.3E-01	4.9E-01
4	ethylbenzene	24th	max	5.9E-01	5.9E-01	6.4E-01
5	ethylbenzene	24th	max	4.5E-01	4.5E-01	1.0E+00
6	ethylbenzene	24th	max	4.2E-01	4.2E-01	1.1E+00
7	ethylbenzene	24th	max	9.1E-01	9.1E-01	9.7E-01
8	ethylbenzene	24th	max	4.2E-01	4.2E-01	1.3E+00
9	ethylbenzene	24th	max	4.7E-01	4.7E-01	6.5E-01
10	ethylbenzene	24th	max	5.0E-01	5.0E-01	7.2E-01
11	ethylbenzene	24th	max	5.5E-01	5.5E-01	8.1E-01
12	ethylbenzene	24th	max	6.8E-01	6.8E-01	1.0E+00
13	ethylbenzene	24th	max	6.9E-01	6.9E-01	9.7E-01
14	ethylbenzene	24th	max	6.4E-01	6.4E-01	8.9E-01
15	ethylbenzene	24th	max	1.1E+00	1.1E+00	1.4E+00
16	ethylbenzene	24th	max	1.0E+00	1.0E+00	1.3E+00
17	ethylbenzene	24th	max	7.7E-01	7.7E-01	9.8E-01
18	ethylbenzene	24th	max	8.4E-01	8.4E-01	8.6E-01
19	ethylbenzene	24th	max	7.5E-01	7.5E-01	9.9E-01
20	ethylbenzene	24th	max	6.9E-01	6.9E-01	7.7E-01
21	ethylbenzene	24th	max	8.7E-01	8.7E-01	1.0E+00
22	ethylbenzene	24th	max	8.9E-01	8.9E-01	1.0E+00
23	ethylbenzene	24th	max	8.6E-01	8.6E-01	9.4E-01
24	ethylbenzene	24th	max	1.3E+00	1.3E+00	1.5E+00
25	ethylbenzene	24th	max	1.5E+00	1.5E+00	1.8E+00
26	ethylbenzene	24th	max	1.7E+00	1.7E+00	1.9E+00
27	ethylbenzene	24th	max	2.0E+00	2.0E+00	2.1E+00
28	ethylbenzene	24th	max	7.9E-01	7.9E-01	9.4E-01
29	ethylbenzene	24th	max	8.5E-01	8.5E-01	9.8E-01
30	ethylbenzene	24th	max	1.5E+00	1.5E+00	2.2E+00
31	ethylbenzene	24th	max	1.5E+00	1.5E+00	2.2E+00
32	ethylbenzene	24th	max	2.5E-01	2.5E-01	4.0E-01
33	ethylbenzene	24th	max	3.9E-01	3.9E-01	5.8E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
34	ethylbenzene	24th	max	2.8E-01	2.8E-01	6.2E-01
35	ethylbenzene	24th	max	6.7E-01	6.7E-01	8.3E-01
36	ethylbenzene	24th	max	6.7E-01	6.7E-01	8.0E-01
37	ethylbenzene	24th	max	7.1E-01	7.1E-01	7.9E-01
38	ethylbenzene	24th	max	1.3E+00	1.3E+00	1.8E+00
39	ethylbenzene	24th	max	1.4E+00	1.4E+00	1.4E+00
40	ethylbenzene	24th	max	1.1E+00	1.1E+00	1.4E+00
41	ethylbenzene	24th	max	2.3E+00	2.3E+00	2.6E+00
42	ethylbenzene	24th	max	1.3E+00	1.3E+00	1.3E+00
43	ethylbenzene	24th	max	1.1E+00	1.1E+00	1.4E+00
44	ethylbenzene	24th	max	1.1E+00	1.1E+00	1.1E+00
45	ethylbenzene	24th	max	9.1E-01	9.1E-01	1.3E+00
46	ethylbenzene	24th	max	9.2E-01	9.2E-01	1.3E+00
47	ethylbenzene	24th	max	8.2E-01	8.2E-01	1.5E+00
48	ethylbenzene	24th	max	9.4E-01	9.4E-01	1.3E+00
49	ethylbenzene	24th	max	9.0E-01	9.0E-01	1.2E+00
50	ethylbenzene	24th	max	1.0E+00	1.0E+00	1.0E+00
51	ethylbenzene	24th	max	1.2E+00	1.2E+00	1.3E+00
52	ethylbenzene	24th	max	1.6E+00	1.6E+00	1.7E+00
53	ethylbenzene	24th	max	1.7E+00	1.7E+00	2.2E+00
54	ethylbenzene	24th	max	7.8E-01	7.8E-01	8.7E-01
55	ethylbenzene	24th	max	9.5E-01	9.5E-01	1.0E+00
56	ethylbenzene	24th	max	8.3E-01	8.3E-01	9.9E-01
57	ethylbenzene	24th	max	1.2E+00	1.2E+00	1.3E+00
58	ethylbenzene	24th	max	5.6E-01	5.6E-01	5.6E-01
59	ethylbenzene	24th	max	1.8E+00	1.8E+00	2.3E+00
60	ethylbenzene	24th	max	4.3E+00	4.3E+00	4.6E+00
61	ethylbenzene	24th	max	3.5E+00	3.5E+00	3.6E+00
62	ethylbenzene	24th	max	3.0E+00	3.0E+00	3.1E+00
63	ethylbenzene	24th	max	2.0E+00	2.0E+00	2.2E+00
64	ethylbenzene	24th	max	2.1E+00	2.1E+00	2.2E+00
65	ethylbenzene	24th	max	2.4E+00	2.4E+00	2.7E+00
66	ethylbenzene	24th	max	5.0E-01	5.0E-01	6.0E-01
67	ethylbenzene	24th	max	5.5E-01	5.5E-01	1.1E+00
68	ethylbenzene	24th	max	7.2E-01	7.2E-01	7.9E-01
69	ethylbenzene	24th	max	7.6E-01	7.6E-01	8.5E-01
70	ethylbenzene	24th	max	6.7E-01	6.7E-01	7.2E-01
71	ethylbenzene	24th	max	1.4E+00	1.4E+00	2.5E+00
72	ethylbenzene	24th	max	1.4E+00	1.4E+00	2.4E+00
73	ethylbenzene	24th	max	2.4E+00	2.4E+00	2.7E+00
74	ethylbenzene	24th	max	1.6E+00	1.6E+00	2.1E+00
75	ethylbenzene	24th	max	1.3E+01	1.3E+01	1.4E+01
76	ethylbenzene	24th	max	4.2E+00	4.2E+00	4.2E+00
77	ethylbenzene	24th	max	1.7E+00	1.7E+00	1.9E+00
78	ethylbenzene	24th	max	1.4E+00	1.4E+00	1.5E+00
79	ethylbenzene	24th	max	7.6E-01	7.6E-01	8.8E-01
1	ethylbenzene	annual	average	9.2E-03	9.2E-03	1.2E-02
2	ethylbenzene	annual	average	1.5E-02	1.5E-02	2.1E-02
3	ethylbenzene	annual	average	1.5E-02	1.5E-02	2.2E-02
4	ethylbenzene	annual	average	1.6E-02	1.6E-02	2.3E-02
5	ethylbenzene	annual	average	1.7E-02	1.7E-02	2.6E-02
6	ethylbenzene	annual	average	1.8E-02	1.8E-02	2.7E-02
7	ethylbenzene	annual	average	1.9E-02	1.9E-02	2.7E-02
8	ethylbenzene	annual	average	1.9E-02	1.9E-02	2.8E-02
9	ethylbenzene	annual	average	1.5E-02	1.5E-02	2.3E-02
10	ethylbenzene	annual	average	1.7E-02	1.7E-02	2.5E-02
11	ethylbenzene	annual	average	2.0E-02	2.0E-02	2.8E-02
12	ethylbenzene	annual	average	1.9E-02	1.9E-02	2.8E-02
13	ethylbenzene	annual	average	2.1E-02	2.1E-02	2.9E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
14	ethylbenzene	annual	average	2.3E-02	2.3E-02	3.4E-02
15	ethylbenzene	annual	average	2.3E-02	2.3E-02	3.2E-02
16	ethylbenzene	annual	average	2.3E-02	2.3E-02	3.2E-02
17	ethylbenzene	annual	average	2.4E-02	2.4E-02	3.3E-02
18	ethylbenzene	annual	average	2.4E-02	2.4E-02	3.3E-02
19	ethylbenzene	annual	average	2.5E-02	2.5E-02	3.5E-02
20	ethylbenzene	annual	average	2.5E-02	2.5E-02	3.7E-02
21	ethylbenzene	annual	average	2.4E-02	2.4E-02	3.3E-02
22	ethylbenzene	annual	average	2.4E-02	2.4E-02	3.3E-02
23	ethylbenzene	annual	average	2.1E-02	2.1E-02	3.0E-02
24	ethylbenzene	annual	average	1.9E-02	1.9E-02	2.6E-02
25	ethylbenzene	annual	average	2.6E-02	2.6E-02	3.7E-02
26	ethylbenzene	annual	average	3.1E-02	3.1E-02	4.2E-02
27	ethylbenzene	annual	average	4.0E-02	4.0E-02	5.2E-02
28	ethylbenzene	annual	average	2.8E-02	2.8E-02	4.1E-02
29	ethylbenzene	annual	average	2.9E-02	2.9E-02	4.1E-02
30	ethylbenzene	annual	average	3.1E-02	3.1E-02	4.5E-02
31	ethylbenzene	annual	average	3.3E-02	3.3E-02	4.6E-02
32	ethylbenzene	annual	average	8.3E-03	8.3E-03	1.2E-02
33	ethylbenzene	annual	average	1.3E-02	1.3E-02	1.8E-02
34	ethylbenzene	annual	average	1.3E-02	1.3E-02	1.8E-02
35	ethylbenzene	annual	average	1.3E-02	1.3E-02	1.8E-02
36	ethylbenzene	annual	average	1.4E-02	1.4E-02	1.9E-02
37	ethylbenzene	annual	average	1.3E-02	1.3E-02	1.8E-02
38	ethylbenzene	annual	average	3.2E-02	3.2E-02	4.6E-02
39	ethylbenzene	annual	average	3.4E-02	3.4E-02	4.8E-02
40	ethylbenzene	annual	average	3.5E-02	3.5E-02	5.1E-02
41	ethylbenzene	annual	average	4.7E-02	4.7E-02	6.3E-02
42	ethylbenzene	annual	average	3.6E-02	3.6E-02	5.1E-02
43	ethylbenzene	annual	average	3.9E-02	3.9E-02	5.7E-02
44	ethylbenzene	annual	average	3.9E-02	3.9E-02	5.6E-02
45	ethylbenzene	annual	average	4.1E-02	4.1E-02	5.9E-02
46	ethylbenzene	annual	average	4.1E-02	4.1E-02	5.9E-02
47	ethylbenzene	annual	average	4.3E-02	4.3E-02	6.2E-02
48	ethylbenzene	annual	average	4.1E-02	4.1E-02	6.0E-02
49	ethylbenzene	annual	average	4.2E-02	4.2E-02	6.0E-02
50	ethylbenzene	annual	average	4.0E-02	4.0E-02	5.8E-02
51	ethylbenzene	annual	average	3.7E-02	3.7E-02	5.4E-02
52	ethylbenzene	annual	average	6.7E-02	6.7E-02	9.0E-02
53	ethylbenzene	annual	average	5.9E-02	5.9E-02	8.0E-02
54	ethylbenzene	annual	average	1.7E-02	1.7E-02	2.2E-02
55	ethylbenzene	annual	average	1.7E-02	1.7E-02	2.3E-02
56	ethylbenzene	annual	average	1.6E-02	1.6E-02	2.2E-02
57	ethylbenzene	annual	average	1.9E-02	1.9E-02	2.5E-02
58	ethylbenzene	annual	average	1.4E-02	1.4E-02	1.8E-02
59	ethylbenzene	annual	average	8.4E-02	8.4E-02	1.1E-01
60	ethylbenzene	annual	average	1.4E-01	1.4E-01	1.8E-01
61	ethylbenzene	annual	average	1.5E-01	1.5E-01	1.9E-01
62	ethylbenzene	annual	average	1.3E-01	1.3E-01	1.7E-01
63	ethylbenzene	annual	average	1.1E-01	1.1E-01	1.4E-01
64	ethylbenzene	annual	average	1.2E-01	1.2E-01	1.5E-01
65	ethylbenzene	annual	average	1.3E-01	1.3E-01	1.7E-01
66	ethylbenzene	annual	average	1.8E-02	1.8E-02	2.6E-02
67	ethylbenzene	annual	average	2.2E-02	2.2E-02	3.2E-02
68	ethylbenzene	annual	average	1.9E-02	1.9E-02	2.8E-02
69	ethylbenzene	annual	average	1.8E-02	1.8E-02	2.6E-02
70	ethylbenzene	annual	average	1.8E-02	1.8E-02	2.7E-02
71	ethylbenzene	annual	average	4.4E-02	4.4E-02	6.1E-02
72	ethylbenzene	annual	average	4.2E-02	4.2E-02	5.9E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
73	ethylbenzene	annual	average	1.3E-01	1.3E-01	1.7E-01
74	ethylbenzene	annual	average	8.2E-02	8.2E-02	1.1E-01
75	ethylbenzene	annual	average	4.5E-01	4.5E-01	5.1E-01
76	ethylbenzene	annual	average	1.5E-01	1.5E-01	1.9E-01
77	ethylbenzene	annual	average	9.4E-02	9.4E-02	1.2E-01
78	ethylbenzene	annual	average	3.5E-02	3.5E-02	4.9E-02
79	ethylbenzene	annual	average	2.4E-02	2.4E-02	3.2E-02
1	fluoranthene	1hr	max	8.4E-05	8.4E-05	1.0E-04
2	fluoranthene	1hr	max	9.3E-05	9.3E-05	1.2E-04
3	fluoranthene	1hr	max	1.0E-04	1.0E-04	1.3E-04
4	fluoranthene	1hr	max	8.3E-05	8.3E-05	1.1E-04
5	fluoranthene	1hr	max	7.2E-05	7.3E-05	1.1E-04
6	fluoranthene	1hr	max	6.9E-05	7.0E-05	1.1E-04
7	fluoranthene	1hr	max	8.2E-05	8.3E-05	1.0E-04
8	fluoranthene	1hr	max	7.3E-05	7.3E-05	1.1E-04
9	fluoranthene	1hr	max	8.9E-05	8.9E-05	1.7E-04
10	fluoranthene	1hr	max	1.4E-04	1.4E-04	1.9E-04
11	fluoranthene	1hr	max	1.6E-04	1.6E-04	2.2E-04
12	fluoranthene	1hr	max	1.9E-04	1.9E-04	2.7E-04
13	fluoranthene	1hr	max	1.9E-04	1.9E-04	2.7E-04
14	fluoranthene	1hr	max	3.5E-04	3.5E-04	3.5E-04
15	fluoranthene	1hr	max	1.2E-04	1.2E-04	2.5E-04
16	fluoranthene	1hr	max	1.2E-04	1.2E-04	2.5E-04
17	fluoranthene	1hr	max	1.5E-04	1.5E-04	1.8E-04
18	fluoranthene	1hr	max	1.7E-04	1.7E-04	2.0E-04
19	fluoranthene	1hr	max	1.7E-04	1.7E-04	2.0E-04
20	fluoranthene	1hr	max	2.2E-04	2.2E-04	2.8E-04
21	fluoranthene	1hr	max	2.9E-04	2.9E-04	4.1E-04
22	fluoranthene	1hr	max	3.0E-04	3.0E-04	4.0E-04
23	fluoranthene	1hr	max	2.7E-04	2.7E-04	3.4E-04
24	fluoranthene	1hr	max	8.7E-05	8.7E-05	1.0E-04
25	fluoranthene	1hr	max	1.9E-04	1.9E-04	2.5E-04
26	fluoranthene	1hr	max	1.5E-04	1.5E-04	2.6E-04
27	fluoranthene	1hr	max	1.2E-04	1.2E-04	2.3E-04
28	fluoranthene	1hr	max	3.0E-04	3.0E-04	3.9E-04
29	fluoranthene	1hr	max	3.1E-04	3.1E-04	4.0E-04
30	fluoranthene	1hr	max	2.4E-04	2.4E-04	3.4E-04
31	fluoranthene	1hr	max	2.6E-04	2.6E-04	3.6E-04
32	fluoranthene	1hr	max	7.0E-05	7.0E-05	1.2E-04
33	fluoranthene	1hr	max	8.9E-05	8.9E-05	1.5E-04
34	fluoranthene	1hr	max	1.0E-04	1.0E-04	1.6E-04
35	fluoranthene	1hr	max	9.1E-05	9.1E-05	1.3E-04
36	fluoranthene	1hr	max	1.0E-04	1.0E-04	1.6E-04
37	fluoranthene	1hr	max	1.1E-04	1.1E-04	1.6E-04
38	fluoranthene	1hr	max	3.7E-04	3.7E-04	4.4E-04
39	fluoranthene	1hr	max	3.4E-04	3.4E-04	4.5E-04
40	fluoranthene	1hr	max	2.8E-04	2.8E-04	4.1E-04
41	fluoranthene	1hr	max	1.9E-04	1.9E-04	2.6E-04
42	fluoranthene	1hr	max	2.7E-04	2.7E-04	3.4E-04
43	fluoranthene	1hr	max	2.5E-04	2.5E-04	3.2E-04
44	fluoranthene	1hr	max	2.4E-04	2.4E-04	3.1E-04
45	fluoranthene	1hr	max	2.1E-04	2.1E-04	2.7E-04
46	fluoranthene	1hr	max	2.2E-04	2.2E-04	2.7E-04
47	fluoranthene	1hr	max	1.8E-04	1.8E-04	2.3E-04
48	fluoranthene	1hr	max	2.1E-04	2.1E-04	2.7E-04
49	fluoranthene	1hr	max	2.0E-04	2.0E-04	2.6E-04
50	fluoranthene	1hr	max	2.0E-04	2.0E-04	2.5E-04
51	fluoranthene	1hr	max	2.1E-04	2.1E-04	2.6E-04
52	fluoranthene	1hr	max	2.0E-04	2.0E-04	8.9E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
53	fluoranthene	1hr	max	2.0E-04	2.0E-04	4.0E-04
54	fluoranthene	1hr	max	6.2E-05	6.2E-05	8.7E-05
55	fluoranthene	1hr	max	9.7E-05	9.7E-05	1.1E-04
56	fluoranthene	1hr	max	9.1E-05	9.1E-05	1.1E-04
57	fluoranthene	1hr	max	1.1E-04	1.1E-04	1.2E-04
58	fluoranthene	1hr	max	5.8E-05	5.8E-05	7.7E-05
59	fluoranthene	1hr	max	2.2E-04	2.2E-04	5.5E-04
60	fluoranthene	1hr	max	4.9E-04	4.9E-04	6.9E-04
61	fluoranthene	1hr	max	4.6E-04	4.6E-04	7.4E-04
62	fluoranthene	1hr	max	3.8E-04	3.8E-04	6.8E-04
63	fluoranthene	1hr	max	3.2E-04	3.2E-04	6.1E-04
64	fluoranthene	1hr	max	3.2E-04	3.2E-04	6.3E-04
65	fluoranthene	1hr	max	3.5E-04	3.5E-04	7.2E-04
66	fluoranthene	1hr	max	1.3E-04	1.3E-04	2.0E-04
67	fluoranthene	1hr	max	1.8E-04	1.8E-04	2.7E-04
68	fluoranthene	1hr	max	1.3E-04	1.3E-04	2.1E-04
69	fluoranthene	1hr	max	1.4E-04	1.4E-04	2.2E-04
70	fluoranthene	1hr	max	1.3E-04	1.3E-04	2.0E-04
71	fluoranthene	1hr	max	2.0E-04	2.0E-04	3.4E-04
72	fluoranthene	1hr	max	2.0E-04	2.0E-04	3.4E-04
73	fluoranthene	1hr	max	3.4E-04	3.4E-04	7.2E-04
74	fluoranthene	1hr	max	2.7E-04	2.7E-04	1.2E-03
75	fluoranthene	1hr	max	9.7E-04	9.7E-04	1.2E-03
76	fluoranthene	1hr	max	4.5E-04	4.5E-04	7.4E-04
77	fluoranthene	1hr	max	2.3E-04	2.3E-04	4.2E-03
78	fluoranthene	1hr	max	2.8E-04	2.8E-04	3.5E-04
79	fluoranthene	1hr	max	3.0E-04	3.0E-04	4.1E-04
1	fluoranthene	1hr	9th	4.1E-05	4.1E-05	5.4E-05
2	fluoranthene	1hr	9th	4.6E-05	4.6E-05	7.2E-05
3	fluoranthene	1hr	9th	4.4E-05	4.4E-05	7.6E-05
4	fluoranthene	1hr	9th	4.6E-05	4.7E-05	7.2E-05
5	fluoranthene	1hr	9th	4.6E-05	4.6E-05	8.2E-05
6	fluoranthene	1hr	9th	4.5E-05	4.6E-05	8.3E-05
7	fluoranthene	1hr	9th	4.3E-05	4.4E-05	6.6E-05
8	fluoranthene	1hr	9th	4.7E-05	4.7E-05	7.9E-05
9	fluoranthene	1hr	9th	4.4E-05	4.4E-05	7.1E-05
10	fluoranthene	1hr	9th	5.2E-05	5.2E-05	9.1E-05
11	fluoranthene	1hr	9th	7.7E-05	7.7E-05	9.6E-05
12	fluoranthene	1hr	9th	5.8E-05	5.8E-05	9.2E-05
13	fluoranthene	1hr	9th	6.1E-05	6.1E-05	9.7E-05
14	fluoranthene	1hr	9th	1.6E-04	1.6E-04	1.6E-04
15	fluoranthene	1hr	9th	5.5E-05	5.5E-05	7.8E-05
16	fluoranthene	1hr	9th	5.3E-05	5.4E-05	7.9E-05
17	fluoranthene	1hr	9th	5.2E-05	5.3E-05	8.3E-05
18	fluoranthene	1hr	9th	4.8E-05	4.8E-05	8.7E-05
19	fluoranthene	1hr	9th	5.1E-05	5.1E-05	8.7E-05
20	fluoranthene	1hr	9th	5.8E-05	5.9E-05	9.0E-05
21	fluoranthene	1hr	9th	6.2E-05	6.2E-05	1.0E-04
22	fluoranthene	1hr	9th	5.7E-05	5.7E-05	9.9E-05
23	fluoranthene	1hr	9th	5.2E-05	5.2E-05	9.8E-05
24	fluoranthene	1hr	9th	4.4E-05	4.4E-05	7.1E-05
25	fluoranthene	1hr	9th	8.6E-05	8.6E-05	1.2E-04
26	fluoranthene	1hr	9th	8.1E-05	8.1E-05	1.1E-04
27	fluoranthene	1hr	9th	7.6E-05	7.6E-05	1.7E-04
28	fluoranthene	1hr	9th	5.9E-05	5.9E-05	1.1E-04
29	fluoranthene	1hr	9th	6.0E-05	6.0E-05	1.1E-04
30	fluoranthene	1hr	9th	9.0E-05	9.0E-05	1.2E-04
31	fluoranthene	1hr	9th	9.2E-05	9.2E-05	1.3E-04
32	fluoranthene	1hr	9th	4.5E-05	4.5E-05	6.1E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
33	fluoranthene	1hr	9th	5.6E-05	5.6E-05	8.3E-05
34	fluoranthene	1hr	9th	5.6E-05	5.6E-05	7.2E-05
35	fluoranthene	1hr	9th	5.2E-05	5.2E-05	6.6E-05
36	fluoranthene	1hr	9th	5.0E-05	5.0E-05	7.1E-05
37	fluoranthene	1hr	9th	4.9E-05	4.9E-05	7.2E-05
38	fluoranthene	1hr	9th	6.1E-05	6.1E-05	1.1E-04
39	fluoranthene	1hr	9th	6.6E-05	6.6E-05	1.2E-04
40	fluoranthene	1hr	9th	6.9E-05	6.9E-05	1.4E-04
41	fluoranthene	1hr	9th	7.7E-05	7.7E-05	1.4E-04
42	fluoranthene	1hr	9th	6.7E-05	6.7E-05	1.3E-04
43	fluoranthene	1hr	9th	6.9E-05	6.9E-05	1.4E-04
44	fluoranthene	1hr	9th	7.1E-05	7.1E-05	1.4E-04
45	fluoranthene	1hr	9th	7.0E-05	7.0E-05	1.4E-04
46	fluoranthene	1hr	9th	7.1E-05	7.1E-05	1.4E-04
47	fluoranthene	1hr	9th	7.4E-05	7.4E-05	1.3E-04
48	fluoranthene	1hr	9th	7.1E-05	7.1E-05	1.3E-04
49	fluoranthene	1hr	9th	7.2E-05	7.2E-05	1.3E-04
50	fluoranthene	1hr	9th	7.2E-05	7.2E-05	1.3E-04
51	fluoranthene	1hr	9th	6.9E-05	6.9E-05	1.3E-04
52	fluoranthene	1hr	9th	1.1E-04	1.1E-04	4.3E-04
53	fluoranthene	1hr	9th	9.5E-05	9.5E-05	2.3E-04
54	fluoranthene	1hr	9th	4.2E-05	4.2E-05	5.6E-05
55	fluoranthene	1hr	9th	4.1E-05	4.2E-05	7.0E-05
56	fluoranthene	1hr	9th	4.0E-05	4.1E-05	7.7E-05
57	fluoranthene	1hr	9th	3.7E-05	3.8E-05	6.2E-05
58	fluoranthene	1hr	9th	4.1E-05	4.1E-05	6.3E-05
59	fluoranthene	1hr	9th	1.4E-04	1.4E-04	2.5E-04
60	fluoranthene	1hr	9th	2.3E-04	2.3E-04	3.5E-04
61	fluoranthene	1hr	9th	2.4E-04	2.4E-04	2.9E-04
62	fluoranthene	1hr	9th	2.2E-04	2.2E-04	2.7E-04
63	fluoranthene	1hr	9th	1.9E-04	1.9E-04	3.3E-04
64	fluoranthene	1hr	9th	2.0E-04	2.0E-04	2.9E-04
65	fluoranthene	1hr	9th	2.3E-04	2.3E-04	2.7E-04
66	fluoranthene	1hr	9th	5.4E-05	5.4E-05	8.9E-05
67	fluoranthene	1hr	9th	5.4E-05	5.4E-05	9.4E-05
68	fluoranthene	1hr	9th	4.8E-05	4.8E-05	8.1E-05
69	fluoranthene	1hr	9th	4.7E-05	4.7E-05	8.0E-05
70	fluoranthene	1hr	9th	4.1E-05	4.1E-05	7.6E-05
71	fluoranthene	1hr	9th	1.1E-04	1.1E-04	1.7E-04
72	fluoranthene	1hr	9th	1.1E-04	1.1E-04	1.7E-04
73	fluoranthene	1hr	9th	2.4E-04	2.4E-04	2.9E-04
74	fluoranthene	1hr	9th	1.4E-04	1.4E-04	5.1E-04
75	fluoranthene	1hr	9th	8.3E-04	8.3E-04	8.9E-04
76	fluoranthene	1hr	9th	2.3E-04	2.3E-04	2.9E-04
77	fluoranthene	1hr	9th	1.5E-04	1.5E-04	1.8E-03
78	fluoranthene	1hr	9th	6.7E-05	6.7E-05	1.4E-04
79	fluoranthene	1hr	9th	5.9E-05	5.9E-05	1.0E-04
1	fluoranthene	24hr	max	1.3E-05	1.3E-05	2.4E-05
2	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.2E-05
3	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.2E-05
4	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.2E-05
5	fluoranthene	24hr	max	1.9E-05	2.0E-05	3.2E-05
6	fluoranthene	24hr	max	1.9E-05	2.0E-05	3.2E-05
7	fluoranthene	24hr	max	1.8E-05	1.8E-05	3.0E-05
8	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.2E-05
9	fluoranthene	24hr	max	2.1E-05	2.2E-05	3.4E-05
10	fluoranthene	24hr	max	2.6E-05	2.6E-05	4.4E-05
11	fluoranthene	24hr	max	3.1E-05	3.1E-05	5.4E-05
12	fluoranthene	24hr	max	2.7E-05	2.7E-05	4.8E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
13	fluoranthene	24hr	max	2.9E-05	2.9E-05	4.4E-05
14	fluoranthene	24hr	max	3.7E-05	3.7E-05	5.1E-05
15	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.6E-05
16	fluoranthene	24hr	max	1.9E-05	2.0E-05	3.6E-05
17	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.4E-05
18	fluoranthene	24hr	max	2.0E-05	2.0E-05	3.3E-05
19	fluoranthene	24hr	max	2.0E-05	2.1E-05	3.3E-05
20	fluoranthene	24hr	max	2.2E-05	2.2E-05	3.4E-05
21	fluoranthene	24hr	max	2.6E-05	2.6E-05	4.4E-05
22	fluoranthene	24hr	max	2.6E-05	2.6E-05	4.3E-05
23	fluoranthene	24hr	max	2.3E-05	2.3E-05	3.7E-05
24	fluoranthene	24hr	max	1.8E-05	1.8E-05	3.4E-05
25	fluoranthene	24hr	max	3.1E-05	3.1E-05	4.9E-05
26	fluoranthene	24hr	max	2.5E-05	2.5E-05	4.0E-05
27	fluoranthene	24hr	max	2.6E-05	2.6E-05	5.6E-05
28	fluoranthene	24hr	max	2.8E-05	2.8E-05	4.7E-05
29	fluoranthene	24hr	max	2.9E-05	2.9E-05	4.8E-05
30	fluoranthene	24hr	max	4.0E-05	4.0E-05	6.8E-05
31	fluoranthene	24hr	max	4.2E-05	4.2E-05	7.2E-05
32	fluoranthene	24hr	max	1.4E-05	1.4E-05	2.7E-05
33	fluoranthene	24hr	max	2.0E-05	2.0E-05	3.3E-05
34	fluoranthene	24hr	max	1.9E-05	1.9E-05	3.2E-05
35	fluoranthene	24hr	max	1.7E-05	1.7E-05	2.9E-05
36	fluoranthene	24hr	max	1.8E-05	1.8E-05	3.1E-05
37	fluoranthene	24hr	max	1.7E-05	1.7E-05	3.2E-05
38	fluoranthene	24hr	max	3.5E-05	3.5E-05	5.7E-05
39	fluoranthene	24hr	max	3.5E-05	3.5E-05	6.0E-05
40	fluoranthene	24hr	max	3.6E-05	3.6E-05	6.9E-05
41	fluoranthene	24hr	max	4.0E-05	4.0E-05	7.7E-05
42	fluoranthene	24hr	max	3.3E-05	3.3E-05	7.7E-05
43	fluoranthene	24hr	max	3.7E-05	3.7E-05	8.3E-05
44	fluoranthene	24hr	max	4.2E-05	4.2E-05	8.7E-05
45	fluoranthene	24hr	max	3.9E-05	3.9E-05	8.4E-05
46	fluoranthene	24hr	max	3.9E-05	3.9E-05	8.3E-05
47	fluoranthene	24hr	max	3.9E-05	3.9E-05	7.9E-05
48	fluoranthene	24hr	max	4.0E-05	4.0E-05	8.2E-05
49	fluoranthene	24hr	max	3.9E-05	3.9E-05	8.0E-05
50	fluoranthene	24hr	max	3.7E-05	3.7E-05	7.5E-05
51	fluoranthene	24hr	max	3.4E-05	3.4E-05	7.4E-05
52	fluoranthene	24hr	max	4.8E-05	4.8E-05	2.1E-04
53	fluoranthene	24hr	max	4.8E-05	4.8E-05	1.3E-04
54	fluoranthene	24hr	max	1.7E-05	1.7E-05	2.7E-05
55	fluoranthene	24hr	max	1.6E-05	1.6E-05	3.3E-05
56	fluoranthene	24hr	max	1.6E-05	1.6E-05	3.6E-05
57	fluoranthene	24hr	max	1.7E-05	1.7E-05	2.8E-05
58	fluoranthene	24hr	max	1.5E-05	1.5E-05	2.7E-05
59	fluoranthene	24hr	max	5.6E-05	5.6E-05	8.9E-05
60	fluoranthene	24hr	max	7.7E-05	7.7E-05	1.2E-04
61	fluoranthene	24hr	max	8.9E-05	8.9E-05	1.4E-04
62	fluoranthene	24hr	max	7.9E-05	7.9E-05	1.3E-04
63	fluoranthene	24hr	max	6.9E-05	6.9E-05	1.2E-04
64	fluoranthene	24hr	max	7.0E-05	7.0E-05	1.2E-04
65	fluoranthene	24hr	max	8.9E-05	8.9E-05	1.4E-04
66	fluoranthene	24hr	max	2.8E-05	2.8E-05	4.4E-05
67	fluoranthene	24hr	max	2.5E-05	2.5E-05	4.6E-05
68	fluoranthene	24hr	max	2.4E-05	2.4E-05	4.3E-05
69	fluoranthene	24hr	max	1.9E-05	1.9E-05	4.0E-05
70	fluoranthene	24hr	max	1.7E-05	1.7E-05	3.4E-05
71	fluoranthene	24hr	max	5.2E-05	5.2E-05	9.9E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
72	fluoranthene	24hr	max	5.1E-05	5.1E-05	9.6E-05
73	fluoranthene	24hr	max	9.1E-05	9.1E-05	1.4E-04
74	fluoranthene	24hr	max	5.7E-05	5.7E-05	1.5E-04
75	fluoranthene	24hr	max	3.9E-04	3.9E-04	4.5E-04
76	fluoranthene	24hr	max	8.7E-05	8.7E-05	1.4E-04
77	fluoranthene	24hr	max	5.9E-05	5.9E-05	3.4E-04
78	fluoranthene	24hr	max	3.3E-05	3.3E-05	7.5E-05
79	fluoranthene	24hr	max	2.7E-05	2.7E-05	4.4E-05
1	fluoranthene	annual	average	8.2E-07	8.3E-07	1.3E-06
2	fluoranthene	annual	average	1.3E-06	1.3E-06	2.1E-06
3	fluoranthene	annual	average	1.3E-06	1.4E-06	2.2E-06
4	fluoranthene	annual	average	1.4E-06	1.5E-06	2.4E-06
5	fluoranthene	annual	average	1.6E-06	1.6E-06	2.7E-06
6	fluoranthene	annual	average	1.6E-06	1.7E-06	2.8E-06
7	fluoranthene	annual	average	1.5E-06	1.6E-06	2.5E-06
8	fluoranthene	annual	average	1.7E-06	1.7E-06	2.8E-06
9	fluoranthene	annual	average	1.6E-06	1.6E-06	2.7E-06
10	fluoranthene	annual	average	2.2E-06	2.2E-06	3.7E-06
11	fluoranthene	annual	average	2.9E-06	2.9E-06	4.6E-06
12	fluoranthene	annual	average	2.7E-06	2.7E-06	4.3E-06
13	fluoranthene	annual	average	2.6E-06	2.6E-06	4.2E-06
14	fluoranthene	annual	average	3.8E-06	3.9E-06	5.9E-06
15	fluoranthene	annual	average	1.9E-06	2.0E-06	3.3E-06
16	fluoranthene	annual	average	1.9E-06	2.0E-06	3.3E-06
17	fluoranthene	annual	average	2.1E-06	2.2E-06	3.5E-06
18	fluoranthene	annual	average	2.3E-06	2.4E-06	3.8E-06
19	fluoranthene	annual	average	2.2E-06	2.4E-06	3.8E-06
20	fluoranthene	annual	average	2.3E-06	2.5E-06	4.1E-06
21	fluoranthene	annual	average	3.5E-06	3.6E-06	5.3E-06
22	fluoranthene	annual	average	2.9E-06	3.0E-06	4.7E-06
23	fluoranthene	annual	average	2.1E-06	2.2E-06	3.6E-06
24	fluoranthene	annual	average	1.4E-06	1.4E-06	2.4E-06
25	fluoranthene	annual	average	1.9E-06	2.2E-06	3.9E-06
26	fluoranthene	annual	average	2.1E-06	2.3E-06	4.2E-06
27	fluoranthene	annual	average	2.7E-06	3.1E-06	6.0E-06
28	fluoranthene	annual	average	2.6E-06	2.7E-06	4.7E-06
29	fluoranthene	annual	average	2.6E-06	2.7E-06	4.8E-06
30	fluoranthene	annual	average	2.0E-06	2.1E-06	3.5E-06
31	fluoranthene	annual	average	2.1E-06	2.2E-06	3.7E-06
32	fluoranthene	annual	average	8.4E-07	8.6E-07	1.4E-06
33	fluoranthene	annual	average	1.1E-06	1.2E-06	1.9E-06
34	fluoranthene	annual	average	1.2E-06	1.2E-06	1.9E-06
35	fluoranthene	annual	average	1.2E-06	1.2E-06	1.9E-06
36	fluoranthene	annual	average	1.2E-06	1.3E-06	2.0E-06
37	fluoranthene	annual	average	1.2E-06	1.2E-06	2.0E-06
38	fluoranthene	annual	average	2.9E-06	3.0E-06	5.4E-06
39	fluoranthene	annual	average	2.9E-06	3.0E-06	5.8E-06
40	fluoranthene	annual	average	3.0E-06	3.1E-06	6.3E-06
41	fluoranthene	annual	average	3.2E-06	3.3E-06	6.8E-06
42	fluoranthene	annual	average	3.3E-06	3.4E-06	6.5E-06
43	fluoranthene	annual	average	3.9E-06	4.0E-06	7.4E-06
44	fluoranthene	annual	average	4.3E-06	4.4E-06	7.8E-06
45	fluoranthene	annual	average	3.5E-06	3.6E-06	7.3E-06
46	fluoranthene	annual	average	3.6E-06	3.7E-06	7.3E-06
47	fluoranthene	annual	average	3.5E-06	3.6E-06	7.5E-06
48	fluoranthene	annual	average	4.1E-06	4.1E-06	7.8E-06
49	fluoranthene	annual	average	3.7E-06	3.8E-06	7.5E-06
50	fluoranthene	annual	average	3.7E-06	3.8E-06	7.5E-06
51	fluoranthene	annual	average	3.4E-06	3.5E-06	6.9E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
52	fluoranthene	annual	average	4.8E-06	4.8E-06	1.7E-05
53	fluoranthene	annual	average	4.1E-06	4.2E-06	1.1E-05
54	fluoranthene	annual	average	1.1E-06	1.1E-06	1.8E-06
55	fluoranthene	annual	average	1.2E-06	1.2E-06	2.0E-06
56	fluoranthene	annual	average	1.2E-06	1.3E-06	2.1E-06
57	fluoranthene	annual	average	1.3E-06	1.3E-06	2.1E-06
58	fluoranthene	annual	average	9.4E-07	9.6E-07	1.5E-06
59	fluoranthene	annual	average	5.7E-06	5.8E-06	1.8E-05
60	fluoranthene	annual	average	8.0E-06	8.1E-06	1.3E-05
61	fluoranthene	annual	average	9.6E-06	9.7E-06	1.5E-05
62	fluoranthene	annual	average	8.4E-06	8.4E-06	1.4E-05
63	fluoranthene	annual	average	7.4E-06	7.5E-06	1.4E-05
64	fluoranthene	annual	average	7.5E-06	7.5E-06	1.4E-05
65	fluoranthene	annual	average	9.9E-06	9.9E-06	1.6E-05
66	fluoranthene	annual	average	2.1E-06	2.1E-06	3.5E-06
67	fluoranthene	annual	average	2.5E-06	2.5E-06	4.2E-06
68	fluoranthene	annual	average	1.9E-06	1.9E-06	3.3E-06
69	fluoranthene	annual	average	1.8E-06	1.9E-06	3.2E-06
70	fluoranthene	annual	average	1.7E-06	1.7E-06	3.0E-06
71	fluoranthene	annual	average	3.1E-06	3.1E-06	5.7E-06
72	fluoranthene	annual	average	3.1E-06	3.1E-06	5.7E-06
73	fluoranthene	annual	average	1.3E-05	1.3E-05	1.9E-05
74	fluoranthene	annual	average	5.7E-06	5.8E-06	2.4E-05
75	fluoranthene	annual	average	6.9E-05	6.9E-05	7.5E-05
76	fluoranthene	annual	average	9.4E-06	9.5E-06	1.5E-05
77	fluoranthene	annual	average	6.3E-06	6.3E-06	1.9E-05
78	fluoranthene	annual	average	3.2E-06	3.3E-06	6.2E-06
79	fluoranthene	annual	average	2.9E-06	2.9E-06	4.6E-06
1	fluorene	1hr	max	3.1E-04	3.1E-04	3.8E-04
2	fluorene	1hr	max	3.5E-04	3.5E-04	4.3E-04
3	fluorene	1hr	max	3.7E-04	3.7E-04	4.8E-04
4	fluorene	1hr	max	3.1E-04	3.1E-04	4.2E-04
5	fluorene	1hr	max	2.6E-04	2.6E-04	3.6E-04
6	fluorene	1hr	max	2.4E-04	2.4E-04	3.6E-04
7	fluorene	1hr	max	2.9E-04	2.9E-04	3.8E-04
8	fluorene	1hr	max	2.6E-04	2.6E-04	3.7E-04
9	fluorene	1hr	max	3.3E-04	3.3E-04	6.0E-04
10	fluorene	1hr	max	5.3E-04	5.3E-04	6.9E-04
11	fluorene	1hr	max	5.8E-04	5.8E-04	7.9E-04
12	fluorene	1hr	max	6.9E-04	6.9E-04	9.8E-04
13	fluorene	1hr	max	6.8E-04	6.8E-04	9.9E-04
14	fluorene	1hr	max	6.8E-04	6.8E-04	8.9E-04
15	fluorene	1hr	max	4.6E-04	4.6E-04	9.2E-04
16	fluorene	1hr	max	4.4E-04	4.4E-04	9.2E-04
17	fluorene	1hr	max	5.7E-04	5.7E-04	6.8E-04
18	fluorene	1hr	max	6.5E-04	6.5E-04	7.5E-04
19	fluorene	1hr	max	6.5E-04	6.5E-04	7.6E-04
20	fluorene	1hr	max	8.5E-04	8.5E-04	1.0E-03
21	fluorene	1hr	max	1.1E-03	1.1E-03	1.5E-03
22	fluorene	1hr	max	1.1E-03	1.1E-03	1.5E-03
23	fluorene	1hr	max	1.0E-03	1.0E-03	1.2E-03
24	fluorene	1hr	max	3.1E-04	3.1E-04	3.6E-04
25	fluorene	1hr	max	7.0E-04	7.0E-04	8.8E-04
26	fluorene	1hr	max	5.7E-04	5.7E-04	9.5E-04
27	fluorene	1hr	max	4.4E-04	4.4E-04	6.1E-04
28	fluorene	1hr	max	1.2E-03	1.2E-03	1.4E-03
29	fluorene	1hr	max	1.2E-03	1.2E-03	1.5E-03
30	fluorene	1hr	max	8.5E-04	8.5E-04	1.2E-03
31	fluorene	1hr	max	9.5E-04	9.5E-04	1.3E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
32	fluorene	1hr	max	3.8E-04	3.8E-04	4.3E-04
33	fluorene	1hr	max	3.1E-04	3.1E-04	5.8E-04
34	fluorene	1hr	max	3.4E-04	3.4E-04	6.1E-04
35	fluorene	1hr	max	3.4E-04	3.4E-04	5.0E-04
36	fluorene	1hr	max	3.9E-04	3.9E-04	5.8E-04
37	fluorene	1hr	max	4.2E-04	4.2E-04	5.8E-04
38	fluorene	1hr	max	1.4E-03	1.4E-03	1.6E-03
39	fluorene	1hr	max	1.3E-03	1.3E-03	1.7E-03
40	fluorene	1hr	max	1.1E-03	1.1E-03	1.5E-03
41	fluorene	1hr	max	7.1E-04	7.1E-04	9.8E-04
42	fluorene	1hr	max	9.8E-04	9.8E-04	1.3E-03
43	fluorene	1hr	max	9.2E-04	9.2E-04	1.2E-03
44	fluorene	1hr	max	8.9E-04	8.9E-04	1.1E-03
45	fluorene	1hr	max	7.8E-04	7.8E-04	1.0E-03
46	fluorene	1hr	max	7.9E-04	7.9E-04	1.0E-03
47	fluorene	1hr	max	6.5E-04	6.5E-04	8.4E-04
48	fluorene	1hr	max	7.8E-04	7.8E-04	1.0E-03
49	fluorene	1hr	max	7.5E-04	7.5E-04	9.5E-04
50	fluorene	1hr	max	7.2E-04	7.2E-04	9.1E-04
51	fluorene	1hr	max	7.3E-04	7.3E-04	9.3E-04
52	fluorene	1hr	max	7.1E-04	7.1E-04	1.1E-03
53	fluorene	1hr	max	7.5E-04	7.5E-04	1.2E-03
54	fluorene	1hr	max	2.2E-04	2.2E-04	2.9E-04
55	fluorene	1hr	max	3.5E-04	3.5E-04	4.0E-04
56	fluorene	1hr	max	3.3E-04	3.3E-04	3.8E-04
57	fluorene	1hr	max	3.9E-04	3.9E-04	4.4E-04
58	fluorene	1hr	max	2.0E-04	2.0E-04	2.6E-04
59	fluorene	1hr	max	7.8E-04	7.8E-04	1.2E-03
60	fluorene	1hr	max	1.8E-03	1.8E-03	2.6E-03
61	fluorene	1hr	max	1.5E-03	1.5E-03	2.8E-03
62	fluorene	1hr	max	1.2E-03	1.2E-03	2.5E-03
63	fluorene	1hr	max	1.0E-03	1.0E-03	2.3E-03
64	fluorene	1hr	max	1.0E-03	1.0E-03	2.4E-03
65	fluorene	1hr	max	1.2E-03	1.2E-03	2.7E-03
66	fluorene	1hr	max	4.8E-04	4.8E-04	7.3E-04
67	fluorene	1hr	max	6.4E-04	6.4E-04	9.9E-04
68	fluorene	1hr	max	4.9E-04	4.9E-04	7.6E-04
69	fluorene	1hr	max	5.2E-04	5.2E-04	7.9E-04
70	fluorene	1hr	max	4.9E-04	4.9E-04	7.2E-04
71	fluorene	1hr	max	7.4E-04	7.4E-04	1.2E-03
72	fluorene	1hr	max	7.5E-04	7.5E-04	1.2E-03
73	fluorene	1hr	max	1.2E-03	1.2E-03	2.7E-03
74	fluorene	1hr	max	9.9E-04	9.9E-04	1.3E-03
75	fluorene	1hr	max	3.6E-03	3.6E-03	4.2E-03
76	fluorene	1hr	max	1.5E-03	1.5E-03	2.8E-03
77	fluorene	1hr	max	8.6E-04	8.6E-04	4.2E-03
78	fluorene	1hr	max	1.0E-03	1.0E-03	1.3E-03
79	fluorene	1hr	max	1.1E-03	1.1E-03	1.5E-03
1	fluorene	1hr	9th	1.4E-04	1.4E-04	1.7E-04
2	fluorene	1hr	9th	1.4E-04	1.4E-04	2.1E-04
3	fluorene	1hr	9th	1.5E-04	1.5E-04	2.3E-04
4	fluorene	1hr	9th	1.7E-04	1.7E-04	2.2E-04
5	fluorene	1hr	9th	1.7E-04	1.7E-04	2.3E-04
6	fluorene	1hr	9th	1.6E-04	1.6E-04	2.3E-04
7	fluorene	1hr	9th	1.5E-04	1.5E-04	2.2E-04
8	fluorene	1hr	9th	1.6E-04	1.6E-04	2.3E-04
9	fluorene	1hr	9th	1.5E-04	1.5E-04	2.1E-04
10	fluorene	1hr	9th	1.6E-04	1.6E-04	2.3E-04
11	fluorene	1hr	9th	1.8E-04	1.8E-04	2.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
12	fluorene	1hr	9th	1.7E-04	1.7E-04	2.8E-04
13	fluorene	1hr	9th	1.8E-04	1.8E-04	2.9E-04
14	fluorene	1hr	9th	2.1E-04	2.1E-04	2.9E-04
15	fluorene	1hr	9th	1.9E-04	2.0E-04	2.4E-04
16	fluorene	1hr	9th	1.8E-04	1.9E-04	2.4E-04
17	fluorene	1hr	9th	1.9E-04	1.9E-04	2.4E-04
18	fluorene	1hr	9th	1.6E-04	1.6E-04	2.6E-04
19	fluorene	1hr	9th	1.8E-04	1.8E-04	2.7E-04
20	fluorene	1hr	9th	2.0E-04	2.0E-04	2.9E-04
21	fluorene	1hr	9th	2.3E-04	2.3E-04	3.1E-04
22	fluorene	1hr	9th	2.0E-04	2.0E-04	2.7E-04
23	fluorene	1hr	9th	1.7E-04	1.7E-04	2.6E-04
24	fluorene	1hr	9th	1.6E-04	1.6E-04	2.4E-04
25	fluorene	1hr	9th	3.0E-04	3.0E-04	4.1E-04
26	fluorene	1hr	9th	3.0E-04	3.0E-04	3.7E-04
27	fluorene	1hr	9th	2.8E-04	2.8E-04	3.8E-04
28	fluorene	1hr	9th	2.2E-04	2.2E-04	3.1E-04
29	fluorene	1hr	9th	2.2E-04	2.2E-04	3.1E-04
30	fluorene	1hr	9th	3.3E-04	3.3E-04	4.1E-04
31	fluorene	1hr	9th	3.0E-04	3.0E-04	4.3E-04
32	fluorene	1hr	9th	1.6E-04	1.6E-04	2.0E-04
33	fluorene	1hr	9th	1.9E-04	1.9E-04	2.7E-04
34	fluorene	1hr	9th	2.0E-04	2.0E-04	2.5E-04
35	fluorene	1hr	9th	1.8E-04	1.8E-04	2.2E-04
36	fluorene	1hr	9th	1.7E-04	1.7E-04	2.2E-04
37	fluorene	1hr	9th	1.7E-04	1.7E-04	2.2E-04
38	fluorene	1hr	9th	2.2E-04	2.2E-04	3.2E-04
39	fluorene	1hr	9th	2.1E-04	2.1E-04	3.2E-04
40	fluorene	1hr	9th	2.4E-04	2.4E-04	3.7E-04
41	fluorene	1hr	9th	2.7E-04	2.7E-04	4.0E-04
42	fluorene	1hr	9th	2.4E-04	2.4E-04	3.9E-04
43	fluorene	1hr	9th	2.4E-04	2.4E-04	4.1E-04
44	fluorene	1hr	9th	2.4E-04	2.4E-04	4.1E-04
45	fluorene	1hr	9th	2.4E-04	2.4E-04	4.0E-04
46	fluorene	1hr	9th	2.4E-04	2.4E-04	4.0E-04
47	fluorene	1hr	9th	2.6E-04	2.6E-04	4.0E-04
48	fluorene	1hr	9th	2.5E-04	2.5E-04	4.1E-04
49	fluorene	1hr	9th	2.5E-04	2.5E-04	4.0E-04
50	fluorene	1hr	9th	2.4E-04	2.4E-04	4.1E-04
51	fluorene	1hr	9th	2.4E-04	2.4E-04	4.3E-04
52	fluorene	1hr	9th	3.9E-04	3.9E-04	6.3E-04
53	fluorene	1hr	9th	3.1E-04	3.1E-04	5.2E-04
54	fluorene	1hr	9th	1.4E-04	1.4E-04	1.8E-04
55	fluorene	1hr	9th	1.4E-04	1.4E-04	2.1E-04
56	fluorene	1hr	9th	1.4E-04	1.4E-04	2.1E-04
57	fluorene	1hr	9th	1.2E-04	1.2E-04	2.1E-04
58	fluorene	1hr	9th	1.4E-04	1.4E-04	2.0E-04
59	fluorene	1hr	9th	4.9E-04	4.9E-04	5.8E-04
60	fluorene	1hr	9th	8.5E-04	8.5E-04	1.3E-03
61	fluorene	1hr	9th	8.7E-04	8.7E-04	1.1E-03
62	fluorene	1hr	9th	7.8E-04	7.8E-04	9.8E-04
63	fluorene	1hr	9th	6.8E-04	6.8E-04	9.1E-04
64	fluorene	1hr	9th	7.0E-04	7.0E-04	8.9E-04
65	fluorene	1hr	9th	8.1E-04	8.1E-04	1.0E-03
66	fluorene	1hr	9th	1.6E-04	1.6E-04	2.6E-04
67	fluorene	1hr	9th	1.9E-04	1.9E-04	2.9E-04
68	fluorene	1hr	9th	1.6E-04	1.6E-04	2.7E-04
69	fluorene	1hr	9th	1.6E-04	1.6E-04	2.7E-04
70	fluorene	1hr	9th	1.4E-04	1.4E-04	2.6E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
71	fluorene	1hr	9th	3.9E-04	3.9E-04	6.2E-04
72	fluorene	1hr	9th	3.8E-04	3.8E-04	6.0E-04
73	fluorene	1hr	9th	8.1E-04	8.1E-04	1.0E-03
74	fluorene	1hr	9th	5.0E-04	5.0E-04	6.9E-04
75	fluorene	1hr	9th	2.5E-03	2.5E-03	2.9E-03
76	fluorene	1hr	9th	8.6E-04	8.6E-04	1.1E-03
77	fluorene	1hr	9th	5.2E-04	5.2E-04	1.8E-03
78	fluorene	1hr	9th	2.4E-04	2.4E-04	3.9E-04
79	fluorene	1hr	9th	2.3E-04	2.3E-04	2.9E-04
1	fluorene	24hr	max	4.7E-05	4.7E-05	6.1E-05
2	fluorene	24hr	max	6.2E-05	6.2E-05	9.5E-05
3	fluorene	24hr	max	6.2E-05	6.2E-05	9.5E-05
4	fluorene	24hr	max	6.1E-05	6.1E-05	9.6E-05
5	fluorene	24hr	max	6.3E-05	6.3E-05	9.8E-05
6	fluorene	24hr	max	6.3E-05	6.3E-05	9.8E-05
7	fluorene	24hr	max	5.8E-05	5.9E-05	9.1E-05
8	fluorene	24hr	max	6.2E-05	6.2E-05	9.7E-05
9	fluorene	24hr	max	6.8E-05	6.8E-05	1.0E-04
10	fluorene	24hr	max	8.3E-05	8.3E-05	1.2E-04
11	fluorene	24hr	max	8.3E-05	8.3E-05	1.3E-04
12	fluorene	24hr	max	8.1E-05	8.1E-05	1.3E-04
13	fluorene	24hr	max	7.5E-05	7.5E-05	1.2E-04
14	fluorene	24hr	max	8.4E-05	8.4E-05	1.4E-04
15	fluorene	24hr	max	6.3E-05	6.3E-05	1.1E-04
16	fluorene	24hr	max	6.3E-05	6.3E-05	1.1E-04
17	fluorene	24hr	max	6.3E-05	6.3E-05	1.0E-04
18	fluorene	24hr	max	6.6E-05	6.6E-05	9.8E-05
19	fluorene	24hr	max	6.7E-05	6.7E-05	9.9E-05
20	fluorene	24hr	max	7.9E-05	7.9E-05	1.1E-04
21	fluorene	24hr	max	9.3E-05	9.3E-05	1.4E-04
22	fluorene	24hr	max	9.8E-05	9.8E-05	1.4E-04
23	fluorene	24hr	max	8.3E-05	8.3E-05	1.1E-04
24	fluorene	24hr	max	5.9E-05	5.9E-05	8.2E-05
25	fluorene	24hr	max	1.0E-04	1.0E-04	1.5E-04
26	fluorene	24hr	max	8.1E-05	8.1E-05	1.3E-04
27	fluorene	24hr	max	8.7E-05	8.8E-05	1.4E-04
28	fluorene	24hr	max	1.0E-04	1.0E-04	1.4E-04
29	fluorene	24hr	max	1.1E-04	1.1E-04	1.5E-04
30	fluorene	24hr	max	1.3E-04	1.3E-04	2.0E-04
31	fluorene	24hr	max	1.4E-04	1.4E-04	2.1E-04
32	fluorene	24hr	max	4.9E-05	4.9E-05	7.2E-05
33	fluorene	24hr	max	6.2E-05	6.2E-05	9.8E-05
34	fluorene	24hr	max	6.6E-05	6.6E-05	9.4E-05
35	fluorene	24hr	max	6.2E-05	6.2E-05	8.1E-05
36	fluorene	24hr	max	6.5E-05	6.5E-05	8.1E-05
37	fluorene	24hr	max	6.2E-05	6.2E-05	8.1E-05
38	fluorene	24hr	max	1.2E-04	1.2E-04	1.7E-04
39	fluorene	24hr	max	1.2E-04	1.2E-04	1.7E-04
40	fluorene	24hr	max	1.3E-04	1.3E-04	1.9E-04
41	fluorene	24hr	max	1.3E-04	1.3E-04	2.2E-04
42	fluorene	24hr	max	1.1E-04	1.1E-04	1.9E-04
43	fluorene	24hr	max	1.2E-04	1.2E-04	2.1E-04
44	fluorene	24hr	max	1.2E-04	1.2E-04	2.0E-04
45	fluorene	24hr	max	1.3E-04	1.3E-04	2.2E-04
46	fluorene	24hr	max	1.3E-04	1.3E-04	2.1E-04
47	fluorene	24hr	max	1.3E-04	1.3E-04	2.1E-04
48	fluorene	24hr	max	1.2E-04	1.2E-04	2.1E-04
49	fluorene	24hr	max	1.2E-04	1.2E-04	2.1E-04
50	fluorene	24hr	max	1.2E-04	1.2E-04	2.0E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
51	fluorene	24hr	max	1.1E-04	1.1E-04	1.9E-04
52	fluorene	24hr	max	1.6E-04	1.6E-04	3.8E-04
53	fluorene	24hr	max	1.6E-04	1.6E-04	3.1E-04
54	fluorene	24hr	max	5.6E-05	5.6E-05	8.4E-05
55	fluorene	24hr	max	5.3E-05	5.3E-05	8.0E-05
56	fluorene	24hr	max	5.1E-05	5.1E-05	7.8E-05
57	fluorene	24hr	max	5.6E-05	5.6E-05	8.6E-05
58	fluorene	24hr	max	5.0E-05	5.0E-05	7.4E-05
59	fluorene	24hr	max	1.8E-04	1.8E-04	2.7E-04
60	fluorene	24hr	max	2.6E-04	2.6E-04	4.2E-04
61	fluorene	24hr	max	3.0E-04	3.0E-04	5.1E-04
62	fluorene	24hr	max	2.7E-04	2.7E-04	4.6E-04
63	fluorene	24hr	max	2.3E-04	2.3E-04	4.0E-04
64	fluorene	24hr	max	2.4E-04	2.4E-04	4.1E-04
65	fluorene	24hr	max	3.0E-04	3.0E-04	4.8E-04
66	fluorene	24hr	max	7.3E-05	7.3E-05	1.1E-04
67	fluorene	24hr	max	7.5E-05	7.5E-05	1.2E-04
68	fluorene	24hr	max	6.8E-05	6.8E-05	1.1E-04
69	fluorene	24hr	max	6.0E-05	6.0E-05	1.1E-04
70	fluorene	24hr	max	5.2E-05	5.2E-05	9.4E-05
71	fluorene	24hr	max	1.7E-04	1.7E-04	2.9E-04
72	fluorene	24hr	max	1.6E-04	1.6E-04	2.8E-04
73	fluorene	24hr	max	3.0E-04	3.0E-04	4.8E-04
74	fluorene	24hr	max	1.9E-04	1.9E-04	2.8E-04
75	fluorene	24hr	max	9.5E-04	9.5E-04	1.2E-03
76	fluorene	24hr	max	2.9E-04	2.9E-04	5.0E-04
77	fluorene	24hr	max	2.0E-04	2.0E-04	3.7E-04
78	fluorene	24hr	max	1.1E-04	1.1E-04	1.9E-04
79	fluorene	24hr	max	1.0E-04	1.0E-04	1.5E-04
1	fluorene	annual	average	3.3E-06	3.3E-06	4.3E-06
2	fluorene	annual	average	4.4E-06	4.5E-06	6.2E-06
3	fluorene	annual	average	4.6E-06	4.6E-06	6.4E-06
4	fluorene	annual	average	4.8E-06	4.9E-06	6.8E-06
5	fluorene	annual	average	5.2E-06	5.3E-06	7.5E-06
6	fluorene	annual	average	5.3E-06	5.3E-06	7.6E-06
7	fluorene	annual	average	5.0E-06	5.0E-06	7.2E-06
8	fluorene	annual	average	5.4E-06	5.4E-06	7.7E-06
9	fluorene	annual	average	5.2E-06	5.2E-06	7.5E-06
10	fluorene	annual	average	7.1E-06	7.1E-06	1.0E-05
11	fluorene	annual	average	8.8E-06	8.8E-06	1.2E-05
12	fluorene	annual	average	8.5E-06	8.5E-06	1.2E-05
13	fluorene	annual	average	8.1E-06	8.1E-06	1.1E-05
14	fluorene	annual	average	9.7E-06	9.7E-06	1.4E-05
15	fluorene	annual	average	6.4E-06	6.5E-06	9.2E-06
16	fluorene	annual	average	6.4E-06	6.4E-06	9.2E-06
17	fluorene	annual	average	6.9E-06	6.9E-06	9.8E-06
18	fluorene	annual	average	7.9E-06	8.0E-06	1.1E-05
19	fluorene	annual	average	7.5E-06	7.5E-06	1.1E-05
20	fluorene	annual	average	7.7E-06	7.7E-06	1.1E-05
21	fluorene	annual	average	1.1E-05	1.1E-05	1.5E-05
22	fluorene	annual	average	9.2E-06	9.2E-06	1.3E-05
23	fluorene	annual	average	6.7E-06	6.7E-06	9.6E-06
24	fluorene	annual	average	4.7E-06	4.7E-06	6.7E-06
25	fluorene	annual	average	6.6E-06	6.7E-06	1.0E-05
26	fluorene	annual	average	7.0E-06	7.1E-06	1.1E-05
27	fluorene	annual	average	9.8E-06	9.9E-06	1.5E-05
28	fluorene	annual	average	8.2E-06	8.2E-06	1.2E-05
29	fluorene	annual	average	8.4E-06	8.4E-06	1.2E-05
30	fluorene	annual	average	6.9E-06	6.9E-06	1.0E-05

Table 4E-1 Volatile Organic Compounds						
ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
31	fluorene	annual	average	7.4E-06	7.4E-06	1.1E-05
32	fluorene	annual	average	3.2E-06	3.2E-06	4.4E-06
33	fluorene	annual	average	4.2E-06	4.2E-06	6.0E-06
34	fluorene	annual	average	4.0E-06	4.0E-06	5.8E-06
35	fluorene	annual	average	4.6E-06	4.6E-06	6.2E-06
36	fluorene	annual	average	4.7E-06	4.7E-06	6.4E-06
37	fluorene	annual	average	4.5E-06	4.5E-06	6.2E-06
38	fluorene	annual	average	9.3E-06	9.3E-06	1.4E-05
39	fluorene	annual	average	9.5E-06	9.6E-06	1.5E-05
40	fluorene	annual	average	9.8E-06	9.8E-06	1.5E-05
41	fluorene	annual	average	1.0E-05	1.0E-05	1.6E-05
42	fluorene	annual	average	1.1E-05	1.1E-05	1.6E-05
43	fluorene	annual	average	1.1E-05	1.1E-05	1.7E-05
44	fluorene	annual	average	1.1E-05	1.1E-05	1.7E-05
45	fluorene	annual	average	1.1E-05	1.1E-05	1.7E-05
46	fluorene	annual	average	1.1E-05	1.1E-05	1.7E-05
47	fluorene	annual	average	1.1E-05	1.1E-05	1.8E-05
48	fluorene	annual	average	1.1E-05	1.1E-05	1.8E-05
49	fluorene	annual	average	1.1E-05	1.1E-05	1.8E-05
50	fluorene	annual	average	1.1E-05	1.1E-05	1.8E-05
51	fluorene	annual	average	1.1E-05	1.1E-05	1.7E-05
52	fluorene	annual	average	1.5E-05	1.5E-05	3.1E-05
53	fluorene	annual	average	1.3E-05	1.3E-05	2.3E-05
54	fluorene	annual	average	3.8E-06	3.8E-06	5.3E-06
55	fluorene	annual	average	4.1E-06	4.1E-06	5.7E-06
56	fluorene	annual	average	4.2E-06	4.3E-06	6.0E-06
57	fluorene	annual	average	4.5E-06	4.5E-06	6.3E-06
58	fluorene	annual	average	3.3E-06	3.3E-06	4.6E-06
59	fluorene	annual	average	1.8E-05	1.8E-05	3.5E-05
60	fluorene	annual	average	2.5E-05	2.5E-05	3.7E-05
61	fluorene	annual	average	3.1E-05	3.1E-05	4.4E-05
62	fluorene	annual	average	2.7E-05	2.7E-05	3.9E-05
63	fluorene	annual	average	2.3E-05	2.3E-05	3.6E-05
64	fluorene	annual	average	2.4E-05	2.4E-05	3.6E-05
65	fluorene	annual	average	2.8E-05	2.8E-05	4.1E-05
66	fluorene	annual	average	6.8E-06	6.8E-06	9.6E-06
67	fluorene	annual	average	7.3E-06	7.4E-06	1.1E-05
68	fluorene	annual	average	6.2E-06	6.2E-06	9.0E-06
69	fluorene	annual	average	5.9E-06	5.9E-06	8.6E-06
70	fluorene	annual	average	5.3E-06	5.3E-06	8.0E-06
71	fluorene	annual	average	1.0E-05	1.0E-05	1.5E-05
72	fluorene	annual	average	1.0E-05	1.0E-05	1.6E-05
73	fluorene	annual	average	2.9E-05	2.9E-05	4.2E-05
74	fluorene	annual	average	1.8E-05	1.8E-05	4.1E-05
75	fluorene	annual	average	1.1E-04	1.1E-04	1.3E-04
76	fluorene	annual	average	3.0E-05	3.0E-05	4.3E-05
77	fluorene	annual	average	2.0E-05	2.0E-05	3.8E-05
78	fluorene	annual	average	1.0E-05	1.0E-05	1.6E-05
79	fluorene	annual	average	8.8E-06	8.8E-06	1.2E-05
1	formaldehyde	1hr	max	2.6E-01	2.6E-01	4.3E-06
2	formaldehyde	1hr	max	2.2E-01	2.2E-01	6.2E-06
3	formaldehyde	1hr	max	2.1E-01	2.2E-01	6.4E-06
4	formaldehyde	1hr	max	2.3E-01	2.3E-01	6.8E-06
5	formaldehyde	1hr	max	2.3E-01	2.4E-01	7.5E-06
6	formaldehyde	1hr	max	2.3E-01	2.4E-01	7.6E-06
7	formaldehyde	1hr	max	2.4E-01	2.6E-01	7.2E-06
8	formaldehyde	1hr	max	2.3E-01	2.4E-01	7.7E-06
9	formaldehyde	1hr	max	2.0E-01	2.0E-01	7.5E-06
10	formaldehyde	1hr	max	2.6E-01	2.7E-01	1.0E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
11	formaldehyde	1hr	max	3.1E-01	3.4E-01	1.2E-05
12	formaldehyde	1hr	max	3.0E-01	3.1E-01	1.2E-05
13	formaldehyde	1hr	max	2.5E-01	2.6E-01	1.1E-05
14	formaldehyde	1hr	max	5.6E-01	5.6E-01	1.4E-05
15	formaldehyde	1hr	max	2.3E-01	2.4E-01	9.2E-06
16	formaldehyde	1hr	max	2.2E-01	2.4E-01	9.2E-06
17	formaldehyde	1hr	max	2.4E-01	2.6E-01	9.8E-06
18	formaldehyde	1hr	max	3.4E-01	3.5E-01	1.1E-05
19	formaldehyde	1hr	max	2.7E-01	2.7E-01	1.1E-05
20	formaldehyde	1hr	max	2.4E-01	2.4E-01	1.1E-05
21	formaldehyde	1hr	max	1.3E+00	1.3E+00	1.5E-05
22	formaldehyde	1hr	max	8.0E-01	8.0E-01	1.3E-05
23	formaldehyde	1hr	max	3.1E-01	3.1E-01	9.6E-06
24	formaldehyde	1hr	max	1.9E-01	2.3E-01	6.7E-06
25	formaldehyde	1hr	max	5.2E-01	1.0E+00	1.0E-05
26	formaldehyde	1hr	max	5.6E-01	5.7E-01	1.1E-05
27	formaldehyde	1hr	max	4.4E-01	1.8E+00	1.5E-05
28	formaldehyde	1hr	max	2.3E-01	2.6E-01	1.2E-05
29	formaldehyde	1hr	max	2.3E-01	2.7E-01	1.2E-05
30	formaldehyde	1hr	max	4.9E-01	4.9E-01	1.0E-05
31	formaldehyde	1hr	max	4.4E-01	4.4E-01	1.1E-05
32	formaldehyde	1hr	max	8.4E-01	8.4E-01	4.4E-06
33	formaldehyde	1hr	max	2.8E-01	2.8E-01	6.0E-06
34	formaldehyde	1hr	max	2.8E-01	2.8E-01	5.8E-06
35	formaldehyde	1hr	max	3.1E-01	3.1E-01	6.2E-06
36	formaldehyde	1hr	max	2.9E-01	3.0E-01	6.4E-06
37	formaldehyde	1hr	max	2.8E-01	2.9E-01	6.2E-06
38	formaldehyde	1hr	max	3.4E-01	3.4E-01	1.4E-05
39	formaldehyde	1hr	max	3.2E-01	3.2E-01	1.5E-05
40	formaldehyde	1hr	max	3.3E-01	3.3E-01	1.5E-05
41	formaldehyde	1hr	max	2.7E-01	2.9E-01	1.6E-05
42	formaldehyde	1hr	max	5.5E-01	5.5E-01	1.6E-05
43	formaldehyde	1hr	max	8.6E-01	9.0E-01	1.7E-05
44	formaldehyde	1hr	max	1.6E+00	1.6E+00	1.7E-05
45	formaldehyde	1hr	max	4.4E-01	4.4E-01	1.7E-05
46	formaldehyde	1hr	max	7.2E-01	7.2E-01	1.7E-05
47	formaldehyde	1hr	max	6.7E-01	6.7E-01	1.8E-05
48	formaldehyde	1hr	max	1.1E+00	1.2E+00	1.8E-05
49	formaldehyde	1hr	max	1.4E+00	1.4E+00	1.8E-05
50	formaldehyde	1hr	max	4.6E-01	4.6E-01	1.8E-05
51	formaldehyde	1hr	max	5.5E-01	5.5E-01	1.7E-05
52	formaldehyde	1hr	max	4.5E-01	4.5E-01	3.1E-05
53	formaldehyde	1hr	max	3.8E-01	3.8E-01	2.3E-05
54	formaldehyde	1hr	max	2.2E-01	2.4E-01	5.3E-06
55	formaldehyde	1hr	max	2.0E-01	2.2E-01	5.7E-06
56	formaldehyde	1hr	max	2.0E-01	2.5E-01	6.0E-06
57	formaldehyde	1hr	max	1.9E-01	2.3E-01	6.3E-06
58	formaldehyde	1hr	max	2.1E-01	2.2E-01	4.6E-06
59	formaldehyde	1hr	max	7.3E-01	7.3E-01	3.5E-05
60	formaldehyde	1hr	max	7.6E-01	7.6E-01	3.7E-05
61	formaldehyde	1hr	max	2.1E+00	2.1E+00	4.4E-05
62	formaldehyde	1hr	max	8.4E-01	8.4E-01	3.9E-05
63	formaldehyde	1hr	max	7.0E-01	7.0E-01	3.6E-05
64	formaldehyde	1hr	max	7.1E-01	7.1E-01	3.6E-05
65	formaldehyde	1hr	max	1.5E+00	1.5E+00	4.1E-05
66	formaldehyde	1hr	max	2.6E-01	2.6E-01	9.6E-06
67	formaldehyde	1hr	max	2.4E-01	2.4E-01	1.1E-05
68	formaldehyde	1hr	max	2.7E-01	2.7E-01	9.0E-06
69	formaldehyde	1hr	max	2.5E-01	2.5E-01	8.6E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
70	formaldehyde	1hr	max	2.1E-01	2.1E-01	8.0E-06
71	formaldehyde	1hr	max	6.3E-01	6.4E-01	1.5E-05
72	formaldehyde	1hr	max	7.1E-01	7.1E-01	1.6E-05
73	formaldehyde	1hr	max	2.5E+00	2.5E+00	4.2E-05
74	formaldehyde	1hr	max	6.0E-01	6.0E-01	4.1E-05
75	formaldehyde	1hr	max	3.6E+01	3.6E+01	1.3E-04
76	formaldehyde	1hr	max	1.6E+00	1.6E+00	4.3E-05
77	formaldehyde	1hr	max	9.6E-01	9.6E-01	3.8E-05
78	formaldehyde	1hr	max	4.8E-01	4.8E-01	1.6E-05
79	formaldehyde	1hr	max	7.0E-01	7.0E-01	1.2E-05
1	formaldehyde	1hr	9th	1.7E-01	1.8E-01	2.5E-01
2	formaldehyde	1hr	9th	1.5E-01	1.6E-01	2.4E-01
3	formaldehyde	1hr	9th	1.6E-01	1.7E-01	2.5E-01
4	formaldehyde	1hr	9th	1.6E-01	1.8E-01	2.5E-01
5	formaldehyde	1hr	9th	1.8E-01	1.9E-01	2.6E-01
6	formaldehyde	1hr	9th	1.8E-01	1.9E-01	2.6E-01
7	formaldehyde	1hr	9th	1.9E-01	2.0E-01	3.0E-01
8	formaldehyde	1hr	9th	1.9E-01	2.0E-01	2.7E-01
9	formaldehyde	1hr	9th	1.7E-01	1.8E-01	2.6E-01
10	formaldehyde	1hr	9th	2.0E-01	2.1E-01	2.8E-01
11	formaldehyde	1hr	9th	2.4E-01	2.4E-01	3.5E-01
12	formaldehyde	1hr	9th	2.2E-01	2.2E-01	3.1E-01
13	formaldehyde	1hr	9th	2.0E-01	2.1E-01	3.0E-01
14	formaldehyde	1hr	9th	2.5E-01	2.6E-01	3.6E-01
15	formaldehyde	1hr	9th	1.9E-01	2.1E-01	3.2E-01
16	formaldehyde	1hr	9th	1.9E-01	2.0E-01	3.2E-01
17	formaldehyde	1hr	9th	1.9E-01	2.2E-01	3.1E-01
18	formaldehyde	1hr	9th	2.0E-01	2.1E-01	3.4E-01
19	formaldehyde	1hr	9th	2.0E-01	2.1E-01	3.3E-01
20	formaldehyde	1hr	9th	2.0E-01	2.0E-01	3.2E-01
21	formaldehyde	1hr	9th	5.5E-01	5.7E-01	6.1E-01
22	formaldehyde	1hr	9th	3.1E-01	3.3E-01	4.0E-01
23	formaldehyde	1hr	9th	2.2E-01	2.2E-01	3.2E-01
24	formaldehyde	1hr	9th	1.8E-01	1.9E-01	3.3E-01
25	formaldehyde	1hr	9th	2.4E-01	4.9E-01	6.0E-01
26	formaldehyde	1hr	9th	2.4E-01	2.7E-01	4.3E-01
27	formaldehyde	1hr	9th	2.8E-01	7.5E-01	7.9E-01
28	formaldehyde	1hr	9th	1.9E-01	1.9E-01	3.3E-01
29	formaldehyde	1hr	9th	2.0E-01	2.0E-01	3.3E-01
30	formaldehyde	1hr	9th	3.0E-01	3.0E-01	5.7E-01
31	formaldehyde	1hr	9th	3.0E-01	3.0E-01	5.9E-01
32	formaldehyde	1hr	9th	1.9E-01	2.2E-01	3.5E-01
33	formaldehyde	1hr	9th	2.0E-01	2.0E-01	3.9E-01
34	formaldehyde	1hr	9th	2.1E-01	2.1E-01	3.0E-01
35	formaldehyde	1hr	9th	1.9E-01	2.0E-01	3.2E-01
36	formaldehyde	1hr	9th	1.9E-01	2.0E-01	3.4E-01
37	formaldehyde	1hr	9th	1.9E-01	2.0E-01	3.7E-01
38	formaldehyde	1hr	9th	2.1E-01	2.2E-01	3.8E-01
39	formaldehyde	1hr	9th	2.3E-01	2.3E-01	3.9E-01
40	formaldehyde	1hr	9th	2.3E-01	2.4E-01	3.7E-01
41	formaldehyde	1hr	9th	2.3E-01	2.4E-01	3.8E-01
42	formaldehyde	1hr	9th	2.7E-01	2.7E-01	4.2E-01
43	formaldehyde	1hr	9th	6.9E-01	7.1E-01	7.6E-01
44	formaldehyde	1hr	9th	1.1E+00	1.1E+00	1.2E+00
45	formaldehyde	1hr	9th	3.2E-01	3.2E-01	4.5E-01
46	formaldehyde	1hr	9th	5.0E-01	5.0E-01	5.5E-01
47	formaldehyde	1hr	9th	3.6E-01	3.6E-01	4.5E-01
48	formaldehyde	1hr	9th	8.7E-01	8.7E-01	9.4E-01
49	formaldehyde	1hr	9th	6.9E-01	6.9E-01	7.0E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
50	formaldehyde	1hr	9th	3.1E-01	3.1E-01	4.5E-01
51	formaldehyde	1hr	9th	2.9E-01	2.9E-01	4.3E-01
52	formaldehyde	1hr	9th	3.5E-01	3.5E-01	1.0E+00
53	formaldehyde	1hr	9th	2.9E-01	2.9E-01	5.6E-01
54	formaldehyde	1hr	9th	1.5E-01	1.6E-01	2.7E-01
55	formaldehyde	1hr	9th	1.7E-01	1.8E-01	3.1E-01
56	formaldehyde	1hr	9th	1.7E-01	1.9E-01	3.4E-01
57	formaldehyde	1hr	9th	1.6E-01	1.8E-01	2.9E-01
58	formaldehyde	1hr	9th	1.6E-01	1.8E-01	3.1E-01
59	formaldehyde	1hr	9th	4.3E-01	4.3E-01	7.2E-01
60	formaldehyde	1hr	9th	5.0E-01	5.0E-01	9.0E-01
61	formaldehyde	1hr	9th	6.5E-01	6.5E-01	8.1E-01
62	formaldehyde	1hr	9th	5.6E-01	5.6E-01	7.0E-01
63	formaldehyde	1hr	9th	4.7E-01	4.7E-01	7.1E-01
64	formaldehyde	1hr	9th	4.7E-01	4.7E-01	6.9E-01
65	formaldehyde	1hr	9th	1.2E+00	1.2E+00	1.3E+00
66	formaldehyde	1hr	9th	1.8E-01	1.8E-01	2.7E-01
67	formaldehyde	1hr	9th	1.9E-01	1.9E-01	2.9E-01
68	formaldehyde	1hr	9th	2.0E-01	2.0E-01	2.7E-01
69	formaldehyde	1hr	9th	1.9E-01	1.9E-01	2.6E-01
70	formaldehyde	1hr	9th	1.7E-01	1.7E-01	2.3E-01
71	formaldehyde	1hr	9th	4.1E-01	4.1E-01	1.4E+00
72	formaldehyde	1hr	9th	3.5E-01	3.5E-01	1.7E+00
73	formaldehyde	1hr	9th	2.4E+00	2.4E+00	2.4E+00
74	formaldehyde	1hr	9th	4.0E-01	4.0E-01	1.2E+00
75	formaldehyde	1hr	9th	2.9E+01	2.9E+01	2.9E+01
76	formaldehyde	1hr	9th	6.3E-01	6.3E-01	8.0E-01
77	formaldehyde	1hr	9th	4.3E-01	4.3E-01	2.5E+00
78	formaldehyde	1hr	9th	2.5E-01	2.5E-01	3.9E-01
79	formaldehyde	1hr	9th	3.7E-01	3.7E-01	4.0E-01
1	formaldehyde	24hr	max	8.3E-02	9.4E-02	1.5E-01
2	formaldehyde	24hr	max	8.2E-02	9.2E-02	1.5E-01
3	formaldehyde	24hr	max	8.4E-02	9.3E-02	1.6E-01
4	formaldehyde	24hr	max	8.7E-02	9.6E-02	1.6E-01
5	formaldehyde	24hr	max	9.2E-02	1.0E-01	1.7E-01
6	formaldehyde	24hr	max	9.3E-02	1.0E-01	1.7E-01
7	formaldehyde	24hr	max	9.4E-02	1.0E-01	1.7E-01
8	formaldehyde	24hr	max	9.2E-02	1.0E-01	1.7E-01
9	formaldehyde	24hr	max	9.3E-02	9.7E-02	1.4E-01
10	formaldehyde	24hr	max	1.0E-01	1.1E-01	1.9E-01
11	formaldehyde	24hr	max	1.3E-01	1.4E-01	2.2E-01
12	formaldehyde	24hr	max	1.2E-01	1.3E-01	1.9E-01
13	formaldehyde	24hr	max	1.2E-01	1.2E-01	1.8E-01
14	formaldehyde	24hr	max	1.1E-01	1.2E-01	1.8E-01
15	formaldehyde	24hr	max	1.1E-01	1.3E-01	2.1E-01
16	formaldehyde	24hr	max	1.1E-01	1.2E-01	2.1E-01
17	formaldehyde	24hr	max	1.1E-01	1.2E-01	2.0E-01
18	formaldehyde	24hr	max	1.0E-01	1.1E-01	1.8E-01
19	formaldehyde	24hr	max	1.0E-01	1.1E-01	1.8E-01
20	formaldehyde	24hr	max	1.0E-01	1.1E-01	1.7E-01
21	formaldehyde	24hr	max	2.9E-01	3.0E-01	3.6E-01
22	formaldehyde	24hr	max	2.2E-01	2.3E-01	3.1E-01
23	formaldehyde	24hr	max	1.1E-01	1.1E-01	1.8E-01
24	formaldehyde	24hr	max	1.1E-01	1.3E-01	2.1E-01
25	formaldehyde	24hr	max	1.2E-01	2.1E-01	2.7E-01
26	formaldehyde	24hr	max	1.2E-01	1.3E-01	2.2E-01
27	formaldehyde	24hr	max	1.3E-01	2.8E-01	2.9E-01
28	formaldehyde	24hr	max	8.9E-02	9.2E-02	1.7E-01
29	formaldehyde	24hr	max	8.9E-02	9.1E-02	1.7E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
30	formaldehyde	24hr	max	1.4E-01	1.5E-01	2.9E-01
31	formaldehyde	24hr	max	1.4E-01	1.5E-01	3.0E-01
32	formaldehyde	24hr	max	9.3E-02	9.7E-02	1.9E-01
33	formaldehyde	24hr	max	1.0E-01	1.1E-01	1.8E-01
34	formaldehyde	24hr	max	9.8E-02	1.0E-01	1.6E-01
35	formaldehyde	24hr	max	9.6E-02	1.1E-01	1.7E-01
36	formaldehyde	24hr	max	1.0E-01	1.1E-01	1.8E-01
37	formaldehyde	24hr	max	1.0E-01	1.2E-01	1.9E-01
38	formaldehyde	24hr	max	1.0E-01	1.1E-01	2.0E-01
39	formaldehyde	24hr	max	9.6E-02	1.0E-01	2.1E-01
40	formaldehyde	24hr	max	1.1E-01	1.1E-01	2.3E-01
41	formaldehyde	24hr	max	1.2E-01	1.2E-01	2.2E-01
42	formaldehyde	24hr	max	1.3E-01	1.3E-01	2.2E-01
43	formaldehyde	24hr	max	3.3E-01	3.3E-01	4.0E-01
44	formaldehyde	24hr	max	3.8E-01	3.8E-01	5.0E-01
45	formaldehyde	24hr	max	1.3E-01	1.3E-01	2.4E-01
46	formaldehyde	24hr	max	1.4E-01	1.5E-01	2.4E-01
47	formaldehyde	24hr	max	1.3E-01	1.4E-01	2.4E-01
48	formaldehyde	24hr	max	3.7E-01	3.7E-01	4.5E-01
49	formaldehyde	24hr	max	1.9E-01	1.9E-01	2.6E-01
50	formaldehyde	24hr	max	1.7E-01	1.7E-01	2.8E-01
51	formaldehyde	24hr	max	1.3E-01	1.3E-01	2.4E-01
52	formaldehyde	24hr	max	1.8E-01	1.8E-01	5.1E-01
53	formaldehyde	24hr	max	1.6E-01	1.6E-01	3.1E-01
54	formaldehyde	24hr	max	9.5E-02	1.1E-01	1.7E-01
55	formaldehyde	24hr	max	1.0E-01	1.2E-01	2.0E-01
56	formaldehyde	24hr	max	1.1E-01	1.3E-01	2.2E-01
57	formaldehyde	24hr	max	9.4E-02	1.1E-01	1.8E-01
58	formaldehyde	24hr	max	9.0E-02	1.1E-01	1.8E-01
59	formaldehyde	24hr	max	2.2E-01	2.2E-01	2.8E-01
60	formaldehyde	24hr	max	2.0E-01	2.0E-01	4.4E-01
61	formaldehyde	24hr	max	2.9E-01	2.9E-01	4.0E-01
62	formaldehyde	24hr	max	2.5E-01	2.5E-01	3.1E-01
63	formaldehyde	24hr	max	2.3E-01	2.3E-01	3.1E-01
64	formaldehyde	24hr	max	2.3E-01	2.3E-01	2.9E-01
65	formaldehyde	24hr	max	4.8E-01	4.8E-01	5.3E-01
66	formaldehyde	24hr	max	1.1E-01	1.1E-01	1.7E-01
67	formaldehyde	24hr	max	1.0E-01	1.0E-01	1.7E-01
68	formaldehyde	24hr	max	1.0E-01	1.0E-01	1.6E-01
69	formaldehyde	24hr	max	9.0E-02	9.0E-02	1.4E-01
70	formaldehyde	24hr	max	7.4E-02	8.0E-02	1.2E-01
71	formaldehyde	24hr	max	1.7E-01	1.7E-01	4.3E-01
72	formaldehyde	24hr	max	1.6E-01	1.6E-01	3.9E-01
73	formaldehyde	24hr	max	1.0E+00	1.0E+00	1.0E+00
74	formaldehyde	24hr	max	2.0E-01	2.1E-01	5.1E-01
75	formaldehyde	24hr	max	1.0E+01	1.0E+01	1.0E+01
76	formaldehyde	24hr	max	2.8E-01	2.8E-01	4.0E-01
77	formaldehyde	24hr	max	2.0E-01	2.0E-01	5.6E-01
78	formaldehyde	24hr	max	1.3E-01	1.3E-01	2.2E-01
79	formaldehyde	24hr	max	1.5E-01	1.5E-01	2.0E-01
1	formaldehyde	annual	average	7.7E-03	8.2E-03	1.1E-02
2	formaldehyde	annual	average	1.0E-02	1.1E-02	1.5E-02
3	formaldehyde	annual	average	1.0E-02	1.1E-02	1.6E-02
4	formaldehyde	annual	average	1.1E-02	1.2E-02	1.7E-02
5	formaldehyde	annual	average	1.2E-02	1.4E-02	1.9E-02
6	formaldehyde	annual	average	1.2E-02	1.4E-02	2.0E-02
7	formaldehyde	annual	average	1.1E-02	1.3E-02	1.8E-02
8	formaldehyde	annual	average	1.2E-02	1.4E-02	2.0E-02
9	formaldehyde	annual	average	1.3E-02	1.4E-02	1.9E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
10	formaldehyde	annual	average	1.7E-02	1.9E-02	2.6E-02
11	formaldehyde	annual	average	2.3E-02	2.5E-02	3.4E-02
12	formaldehyde	annual	average	2.0E-02	2.2E-02	3.0E-02
13	formaldehyde	annual	average	1.9E-02	2.1E-02	2.9E-02
14	formaldehyde	annual	average	2.3E-02	2.5E-02	3.6E-02
15	formaldehyde	annual	average	1.3E-02	1.8E-02	2.5E-02
16	formaldehyde	annual	average	1.3E-02	1.7E-02	2.4E-02
17	formaldehyde	annual	average	1.4E-02	1.9E-02	2.6E-02
18	formaldehyde	annual	average	1.6E-02	2.1E-02	2.9E-02
19	formaldehyde	annual	average	1.5E-02	2.0E-02	2.8E-02
20	formaldehyde	annual	average	1.6E-02	2.1E-02	3.0E-02
21	formaldehyde	annual	average	4.4E-02	4.7E-02	5.6E-02
22	formaldehyde	annual	average	2.6E-02	2.9E-02	3.8E-02
23	formaldehyde	annual	average	1.5E-02	1.7E-02	2.5E-02
24	formaldehyde	annual	average	1.0E-02	1.1E-02	1.7E-02
25	formaldehyde	annual	average	1.3E-02	2.3E-02	3.3E-02
26	formaldehyde	annual	average	1.4E-02	2.2E-02	3.4E-02
27	formaldehyde	annual	average	2.0E-02	3.4E-02	5.2E-02
28	formaldehyde	annual	average	1.6E-02	2.0E-02	3.1E-02
29	formaldehyde	annual	average	1.7E-02	2.1E-02	3.1E-02
30	formaldehyde	annual	average	1.1E-02	1.4E-02	2.2E-02
31	formaldehyde	annual	average	1.2E-02	1.5E-02	2.4E-02
32	formaldehyde	annual	average	6.7E-03	7.4E-03	1.1E-02
33	formaldehyde	annual	average	7.5E-03	8.4E-03	1.3E-02
34	formaldehyde	annual	average	6.8E-03	7.7E-03	1.1E-02
35	formaldehyde	annual	average	8.8E-03	9.8E-03	1.4E-02
36	formaldehyde	annual	average	9.4E-03	1.1E-02	1.5E-02
37	formaldehyde	annual	average	9.2E-03	1.0E-02	1.5E-02
38	formaldehyde	annual	average	1.8E-02	2.1E-02	3.3E-02
39	formaldehyde	annual	average	1.8E-02	2.2E-02	3.6E-02
40	formaldehyde	annual	average	1.9E-02	2.3E-02	3.8E-02
41	formaldehyde	annual	average	1.8E-02	2.1E-02	3.8E-02
42	formaldehyde	annual	average	2.2E-02	2.5E-02	4.0E-02
43	formaldehyde	annual	average	4.1E-02	4.4E-02	5.9E-02
44	formaldehyde	annual	average	5.6E-02	5.8E-02	7.4E-02
45	formaldehyde	annual	average	2.4E-02	2.7E-02	4.3E-02
46	formaldehyde	annual	average	2.7E-02	2.9E-02	4.6E-02
47	formaldehyde	annual	average	2.3E-02	2.6E-02	4.3E-02
48	formaldehyde	annual	average	4.5E-02	4.8E-02	6.5E-02
49	formaldehyde	annual	average	3.2E-02	3.4E-02	5.1E-02
50	formaldehyde	annual	average	3.0E-02	3.3E-02	4.9E-02
51	formaldehyde	annual	average	2.1E-02	2.4E-02	4.0E-02
52	formaldehyde	annual	average	2.7E-02	2.9E-02	7.7E-02
53	formaldehyde	annual	average	2.2E-02	2.4E-02	5.3E-02
54	formaldehyde	annual	average	8.4E-03	9.2E-03	1.3E-02
55	formaldehyde	annual	average	8.9E-03	1.0E-02	1.4E-02
56	formaldehyde	annual	average	9.2E-03	1.1E-02	1.5E-02
57	formaldehyde	annual	average	9.8E-03	1.1E-02	1.6E-02
58	formaldehyde	annual	average	7.5E-03	8.1E-03	1.1E-02
59	formaldehyde	annual	average	3.1E-02	3.2E-02	7.2E-02
60	formaldehyde	annual	average	3.2E-02	3.3E-02	6.9E-02
61	formaldehyde	annual	average	4.1E-02	4.2E-02	7.0E-02
62	formaldehyde	annual	average	3.6E-02	3.6E-02	6.6E-02
63	formaldehyde	annual	average	3.3E-02	3.4E-02	7.3E-02
64	formaldehyde	annual	average	3.3E-02	3.4E-02	6.8E-02
65	formaldehyde	annual	average	7.7E-02	7.8E-02	1.1E-01
66	formaldehyde	annual	average	1.6E-02	1.7E-02	2.4E-02
67	formaldehyde	annual	average	1.7E-02	1.8E-02	2.6E-02
68	formaldehyde	annual	average	1.5E-02	1.6E-02	2.3E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
69	formaldehyde	annual	average	1.5E-02	1.6E-02	2.2E-02
70	formaldehyde	annual	average	1.3E-02	1.4E-02	1.9E-02
71	formaldehyde	annual	average	2.1E-02	2.4E-02	4.4E-02
72	formaldehyde	annual	average	2.2E-02	2.5E-02	4.5E-02
73	formaldehyde	annual	average	1.9E-01	1.9E-01	2.2E-01
74	formaldehyde	annual	average	3.1E-02	3.2E-02	9.3E-02
75	formaldehyde	annual	average	1.6E+00	1.6E+00	1.6E+00
76	formaldehyde	annual	average	4.0E-02	4.1E-02	6.9E-02
77	formaldehyde	annual	average	3.0E-02	3.1E-02	7.6E-02
78	formaldehyde	annual	average	1.9E-02	2.3E-02	3.6E-02
79	formaldehyde	annual	average	3.0E-02	3.3E-02	4.1E-02
1	hexane	1hr	max	1.1E+02	1.1E+02	1.2E+02
2	hexane	1hr	max	1.5E+02	1.5E+02	1.6E+02
3	hexane	1hr	max	1.6E+02	1.6E+02	1.7E+02
4	hexane	1hr	max	1.9E+02	1.9E+02	1.9E+02
5	hexane	1hr	max	1.7E+02	1.7E+02	2.6E+02
6	hexane	1hr	max	1.5E+02	1.5E+02	3.0E+02
7	hexane	1hr	max	1.8E+02	1.8E+02	1.9E+02
8	hexane	1hr	max	1.5E+02	1.5E+02	3.2E+02
9	hexane	1hr	max	2.1E+02	2.1E+02	2.8E+02
10	hexane	1hr	max	1.6E+02	1.6E+02	2.2E+02
11	hexane	1hr	max	1.8E+02	1.8E+02	2.6E+02
12	hexane	1hr	max	2.5E+02	2.5E+02	3.8E+02
13	hexane	1hr	max	2.7E+02	2.7E+02	3.6E+02
14	hexane	1hr	max	2.2E+02	2.2E+02	2.9E+02
15	hexane	1hr	max	4.2E+02	4.2E+02	5.1E+02
16	hexane	1hr	max	3.8E+02	3.8E+02	4.7E+02
17	hexane	1hr	max	2.8E+02	2.8E+02	3.4E+02
18	hexane	1hr	max	3.2E+02	3.2E+02	3.2E+02
19	hexane	1hr	max	2.8E+02	2.8E+02	3.7E+02
20	hexane	1hr	max	2.5E+02	2.5E+02	2.7E+02
21	hexane	1hr	max	3.4E+02	3.4E+02	3.6E+02
22	hexane	1hr	max	3.5E+02	3.5E+02	3.8E+02
23	hexane	1hr	max	3.5E+02	3.5E+02	3.9E+02
24	hexane	1hr	max	2.6E+02	2.6E+02	2.6E+02
25	hexane	1hr	max	4.3E+02	4.3E+02	4.5E+02
26	hexane	1hr	max	3.7E+02	3.7E+02	6.7E+02
27	hexane	1hr	max	7.3E+02	7.3E+02	7.3E+02
28	hexane	1hr	max	2.8E+02	2.8E+02	3.0E+02
29	hexane	1hr	max	3.0E+02	3.0E+02	3.0E+02
30	hexane	1hr	max	3.0E+02	3.0E+02	4.2E+02
31	hexane	1hr	max	2.9E+02	2.9E+02	4.7E+02
32	hexane	1hr	max	9.1E+01	9.1E+01	1.4E+02
33	hexane	1hr	max	9.6E+01	9.6E+01	2.1E+02
34	hexane	1hr	max	9.3E+01	9.3E+01	2.3E+02
35	hexane	1hr	max	2.7E+02	2.7E+02	3.3E+02
36	hexane	1hr	max	2.7E+02	2.7E+02	3.2E+02
37	hexane	1hr	max	3.0E+02	3.0E+02	3.2E+02
38	hexane	1hr	max	4.1E+02	4.1E+02	4.1E+02
39	hexane	1hr	max	5.3E+02	5.3E+02	5.3E+02
40	hexane	1hr	max	3.9E+02	3.9E+02	4.7E+02
41	hexane	1hr	max	8.8E+02	8.8E+02	9.8E+02
42	hexane	1hr	max	5.1E+02	5.1E+02	5.1E+02
43	hexane	1hr	max	4.2E+02	4.2E+02	5.3E+02
44	hexane	1hr	max	4.2E+02	4.2E+02	4.2E+02
45	hexane	1hr	max	3.4E+02	3.4E+02	4.7E+02
46	hexane	1hr	max	3.4E+02	3.4E+02	4.7E+02
47	hexane	1hr	max	3.0E+02	3.0E+02	5.8E+02
48	hexane	1hr	max	3.5E+02	3.5E+02	4.8E+02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
49	hexane	1hr	max	3.3E+02	3.3E+02	4.6E+02
50	hexane	1hr	max	3.8E+02	3.8E+02	3.8E+02
51	hexane	1hr	max	4.8E+02	4.8E+02	4.8E+02
52	hexane	1hr	max	3.5E+02	3.5E+02	3.6E+02
53	hexane	1hr	max	4.2E+02	4.2E+02	5.8E+02
54	hexane	1hr	max	2.7E+02	2.7E+02	2.8E+02
55	hexane	1hr	max	2.6E+02	2.6E+02	2.6E+02
56	hexane	1hr	max	2.6E+02	2.6E+02	2.6E+02
57	hexane	1hr	max	2.7E+02	2.7E+02	2.7E+02
58	hexane	1hr	max	1.9E+02	1.9E+02	1.9E+02
59	hexane	1hr	max	4.8E+02	4.8E+02	6.2E+02
60	hexane	1hr	max	1.4E+03	1.4E+03	1.5E+03
61	hexane	1hr	max	7.9E+02	7.9E+02	8.0E+02
62	hexane	1hr	max	4.7E+02	4.7E+02	5.8E+02
63	hexane	1hr	max	4.7E+02	4.7E+02	5.8E+02
64	hexane	1hr	max	5.1E+02	5.1E+02	6.0E+02
65	hexane	1hr	max	7.0E+02	7.0E+02	1.0E+03
66	hexane	1hr	max	1.9E+02	1.9E+02	2.1E+02
67	hexane	1hr	max	2.1E+02	2.1E+02	4.3E+02
68	hexane	1hr	max	3.0E+02	3.0E+02	3.4E+02
69	hexane	1hr	max	3.2E+02	3.2E+02	3.6E+02
70	hexane	1hr	max	2.8E+02	2.8E+02	2.9E+02
71	hexane	1hr	max	3.6E+02	3.6E+02	5.7E+02
72	hexane	1hr	max	3.5E+02	3.5E+02	5.6E+02
73	hexane	1hr	max	7.0E+02	7.0E+02	1.0E+03
74	hexane	1hr	max	4.1E+02	4.1E+02	5.7E+02
75	hexane	1hr	max	2.5E+03	2.5E+03	2.6E+03
76	hexane	1hr	max	8.1E+02	8.1E+02	8.1E+02
77	hexane	1hr	max	5.7E+02	5.7E+02	5.8E+02
78	hexane	1hr	max	5.7E+02	5.7E+02	5.7E+02
79	hexane	1hr	max	2.9E+02	2.9E+02	3.2E+02
1	hexane	1hr	9th	1.7E+01	1.7E+01	3.0E+01
2	hexane	1hr	9th	3.7E+01	3.7E+01	6.6E+01
3	hexane	1hr	9th	3.8E+01	3.8E+01	6.0E+01
4	hexane	1hr	9th	4.0E+01	4.0E+01	5.8E+01
5	hexane	1hr	9th	4.0E+01	4.0E+01	8.1E+01
6	hexane	1hr	9th	6.0E+01	6.0E+01	7.9E+01
7	hexane	1hr	9th	7.7E+01	7.7E+01	8.8E+01
8	hexane	1hr	9th	5.8E+01	5.8E+01	9.2E+01
9	hexane	1hr	9th	2.1E+01	2.1E+01	4.9E+01
10	hexane	1hr	9th	3.0E+01	3.0E+01	3.2E+01
11	hexane	1hr	9th	2.4E+01	2.4E+01	3.0E+01
12	hexane	1hr	9th	3.0E+01	3.0E+01	4.4E+01
13	hexane	1hr	9th	4.0E+01	4.0E+01	4.8E+01
14	hexane	1hr	9th	4.9E+01	4.9E+01	5.8E+01
15	hexane	1hr	9th	4.5E+01	4.5E+01	7.0E+01
16	hexane	1hr	9th	4.1E+01	4.1E+01	7.0E+01
17	hexane	1hr	9th	5.8E+01	5.8E+01	6.8E+01
18	hexane	1hr	9th	6.4E+01	6.4E+01	8.4E+01
19	hexane	1hr	9th	6.3E+01	6.3E+01	9.1E+01
20	hexane	1hr	9th	5.6E+01	5.6E+01	9.8E+01
21	hexane	1hr	9th	6.0E+01	6.0E+01	6.7E+01
22	hexane	1hr	9th	5.1E+01	5.1E+01	7.8E+01
23	hexane	1hr	9th	3.9E+01	3.9E+01	4.7E+01
24	hexane	1hr	9th	5.4E+01	5.4E+01	7.6E+01
25	hexane	1hr	9th	5.5E+01	5.5E+01	8.6E+01
26	hexane	1hr	9th	6.6E+01	6.6E+01	8.3E+01
27	hexane	1hr	9th	7.2E+01	7.2E+01	1.1E+02
28	hexane	1hr	9th	6.7E+01	6.7E+01	1.4E+02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
29	hexane	1hr	9th	7.8E+01	7.8E+01	1.5E+02
30	hexane	1hr	9th	9.1E+01	9.1E+01	1.3E+02
31	hexane	1hr	9th	9.7E+01	9.7E+01	1.3E+02
32	hexane	1hr	9th	1.1E+01	1.1E+01	1.4E+01
33	hexane	1hr	9th	4.6E+01	4.6E+01	4.7E+01
34	hexane	1hr	9th	3.1E+01	3.1E+01	3.1E+01
35	hexane	1hr	9th	2.5E+01	2.5E+01	2.9E+01
36	hexane	1hr	9th	2.7E+01	2.7E+01	3.3E+01
37	hexane	1hr	9th	2.4E+01	2.4E+01	3.5E+01
38	hexane	1hr	9th	5.4E+01	5.4E+01	7.1E+01
39	hexane	1hr	9th	5.8E+01	5.8E+01	8.1E+01
40	hexane	1hr	9th	7.2E+01	7.2E+01	9.0E+01
41	hexane	1hr	9th	8.9E+01	8.9E+01	1.1E+02
42	hexane	1hr	9th	7.4E+01	7.4E+01	8.9E+01
43	hexane	1hr	9th	7.5E+01	7.5E+01	9.8E+01
44	hexane	1hr	9th	7.1E+01	7.1E+01	9.7E+01
45	hexane	1hr	9th	7.7E+01	7.7E+01	1.1E+02
46	hexane	1hr	9th	7.2E+01	7.2E+01	1.2E+02
47	hexane	1hr	9th	6.7E+01	6.7E+01	1.1E+02
48	hexane	1hr	9th	7.2E+01	7.2E+01	1.2E+02
49	hexane	1hr	9th	7.5E+01	7.5E+01	1.2E+02
50	hexane	1hr	9th	6.8E+01	6.8E+01	1.2E+02
51	hexane	1hr	9th	5.1E+01	5.1E+01	9.1E+01
52	hexane	1hr	9th	1.5E+02	1.5E+02	1.8E+02
53	hexane	1hr	9th	1.2E+02	1.2E+02	1.4E+02
54	hexane	1hr	9th	4.6E+01	4.6E+01	5.2E+01
55	hexane	1hr	9th	3.7E+01	3.7E+01	8.2E+01
56	hexane	1hr	9th	5.4E+01	5.4E+01	6.7E+01
57	hexane	1hr	9th	5.0E+01	5.0E+01	8.1E+01
58	hexane	1hr	9th	4.8E+01	4.8E+01	5.0E+01
59	hexane	1hr	9th	1.7E+02	1.7E+02	2.1E+02
60	hexane	1hr	9th	2.1E+02	2.1E+02	3.1E+02
61	hexane	1hr	9th	2.3E+02	2.3E+02	3.9E+02
62	hexane	1hr	9th	2.4E+02	2.4E+02	3.3E+02
63	hexane	1hr	9th	1.7E+02	1.7E+02	2.7E+02
64	hexane	1hr	9th	1.9E+02	1.9E+02	2.8E+02
65	hexane	1hr	9th	3.4E+02	3.4E+02	3.4E+02
66	hexane	1hr	9th	3.1E+01	3.1E+01	4.5E+01
67	hexane	1hr	9th	4.3E+01	4.3E+01	5.5E+01
68	hexane	1hr	9th	2.7E+01	2.7E+01	6.7E+01
69	hexane	1hr	9th	2.4E+01	2.4E+01	5.5E+01
70	hexane	1hr	9th	4.2E+01	4.2E+01	7.0E+01
71	hexane	1hr	9th	1.5E+02	1.5E+02	2.0E+02
72	hexane	1hr	9th	1.3E+02	1.3E+02	1.7E+02
73	hexane	1hr	9th	2.9E+02	2.9E+02	3.4E+02
74	hexane	1hr	9th	2.0E+02	2.0E+02	2.0E+02
75	hexane	1hr	9th	6.5E+02	6.5E+02	7.7E+02
76	hexane	1hr	9th	2.3E+02	2.3E+02	3.9E+02
77	hexane	1hr	9th	2.0E+02	2.0E+02	2.5E+02
78	hexane	1hr	9th	6.7E+01	6.7E+01	7.0E+01
79	hexane	1hr	9th	4.4E+01	4.4E+01	9.4E+01
1	hexane	24hr	max	6.0E+00	6.0E+00	6.5E+00
2	hexane	24hr	max	8.4E+00	8.5E+00	8.6E+00
3	hexane	24hr	max	8.3E+00	8.4E+00	9.4E+00
4	hexane	24hr	max	1.1E+01	1.1E+01	1.2E+01
5	hexane	24hr	max	8.6E+00	8.7E+00	1.9E+01
6	hexane	24hr	max	8.1E+00	8.2E+00	2.2E+01
7	hexane	24hr	max	1.7E+01	1.8E+01	1.9E+01
8	hexane	24hr	max	8.1E+00	8.1E+00	2.5E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
9	hexane	24hr	max	9.0E+00	9.0E+00	1.2E+01
10	hexane	24hr	max	1.0E+01	1.0E+01	1.4E+01
11	hexane	24hr	max	1.1E+01	1.1E+01	1.6E+01
12	hexane	24hr	max	1.3E+01	1.3E+01	2.0E+01
13	hexane	24hr	max	1.4E+01	1.4E+01	1.9E+01
14	hexane	24hr	max	1.3E+01	1.3E+01	1.7E+01
15	hexane	24hr	max	2.2E+01	2.2E+01	2.7E+01
16	hexane	24hr	max	2.0E+01	2.0E+01	2.5E+01
17	hexane	24hr	max	1.5E+01	1.5E+01	1.9E+01
18	hexane	24hr	max	1.6E+01	1.6E+01	1.6E+01
19	hexane	24hr	max	1.4E+01	1.4E+01	1.9E+01
20	hexane	24hr	max	1.3E+01	1.3E+01	1.5E+01
21	hexane	24hr	max	1.7E+01	1.7E+01	1.9E+01
22	hexane	24hr	max	1.7E+01	1.7E+01	2.0E+01
23	hexane	24hr	max	1.6E+01	1.6E+01	1.8E+01
24	hexane	24hr	max	2.4E+01	2.4E+01	2.8E+01
25	hexane	24hr	max	2.8E+01	2.8E+01	3.5E+01
26	hexane	24hr	max	3.2E+01	3.2E+01	3.7E+01
27	hexane	24hr	max	3.7E+01	3.7E+01	4.0E+01
28	hexane	24hr	max	1.5E+01	1.5E+01	1.8E+01
29	hexane	24hr	max	1.6E+01	1.6E+01	1.9E+01
30	hexane	24hr	max	2.9E+01	2.9E+01	4.2E+01
31	hexane	24hr	max	2.9E+01	2.9E+01	4.3E+01
32	hexane	24hr	max	5.1E+00	5.1E+00	7.9E+00
33	hexane	24hr	max	7.5E+00	7.5E+00	1.1E+01
34	hexane	24hr	max	5.7E+00	5.7E+00	1.2E+01
35	hexane	24hr	max	1.3E+01	1.3E+01	1.6E+01
36	hexane	24hr	max	1.3E+01	1.3E+01	1.5E+01
37	hexane	24hr	max	1.4E+01	1.4E+01	1.5E+01
38	hexane	24hr	max	2.5E+01	2.5E+01	3.6E+01
39	hexane	24hr	max	2.6E+01	2.6E+01	2.6E+01
40	hexane	24hr	max	2.0E+01	2.0E+01	2.5E+01
41	hexane	24hr	max	4.2E+01	4.2E+01	4.8E+01
42	hexane	24hr	max	2.5E+01	2.5E+01	2.5E+01
43	hexane	24hr	max	2.1E+01	2.1E+01	2.7E+01
44	hexane	24hr	max	2.1E+01	2.1E+01	2.2E+01
45	hexane	24hr	max	1.7E+01	1.7E+01	2.4E+01
46	hexane	24hr	max	1.7E+01	1.7E+01	2.4E+01
47	hexane	24hr	max	1.5E+01	1.5E+01	2.8E+01
48	hexane	24hr	max	1.8E+01	1.8E+01	2.4E+01
49	hexane	24hr	max	1.7E+01	1.7E+01	2.4E+01
50	hexane	24hr	max	1.9E+01	1.9E+01	2.0E+01
51	hexane	24hr	max	2.4E+01	2.4E+01	2.4E+01
52	hexane	24hr	max	3.0E+01	3.0E+01	3.3E+01
53	hexane	24hr	max	3.3E+01	3.3E+01	4.3E+01
54	hexane	24hr	max	1.5E+01	1.5E+01	1.7E+01
55	hexane	24hr	max	1.8E+01	1.8E+01	2.0E+01
56	hexane	24hr	max	1.6E+01	1.6E+01	1.9E+01
57	hexane	24hr	max	2.3E+01	2.3E+01	2.5E+01
58	hexane	24hr	max	1.1E+01	1.1E+01	1.1E+01
59	hexane	24hr	max	3.4E+01	3.4E+01	4.3E+01
60	hexane	24hr	max	8.0E+01	8.0E+01	8.5E+01
61	hexane	24hr	max	6.7E+01	6.7E+01	6.9E+01
62	hexane	24hr	max	5.7E+01	5.7E+01	5.8E+01
63	hexane	24hr	max	3.6E+01	3.6E+01	3.9E+01
64	hexane	24hr	max	3.9E+01	3.9E+01	4.1E+01
65	hexane	24hr	max	4.6E+01	4.6E+01	5.2E+01
66	hexane	24hr	max	9.7E+00	9.7E+00	1.2E+01
67	hexane	24hr	max	1.1E+01	1.1E+01	2.1E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
68	hexane	24hr	max	1.4E+01	1.4E+01	1.5E+01
69	hexane	24hr	max	1.5E+01	1.5E+01	1.6E+01
70	hexane	24hr	max	1.3E+01	1.3E+01	1.4E+01
71	hexane	24hr	max	2.8E+01	2.8E+01	5.0E+01
72	hexane	24hr	max	2.7E+01	2.7E+01	4.7E+01
73	hexane	24hr	max	4.6E+01	4.6E+01	5.3E+01
74	hexane	24hr	max	3.0E+01	3.0E+01	4.1E+01
75	hexane	24hr	max	2.6E+02	2.6E+02	2.7E+02
76	hexane	24hr	max	8.0E+01	8.0E+01	8.1E+01
77	hexane	24hr	max	3.3E+01	3.3E+01	3.6E+01
78	hexane	24hr	max	2.7E+01	2.7E+01	2.7E+01
79	hexane	24hr	max	1.5E+01	1.5E+01	1.7E+01
1	hexane	annual	average	1.6E-01	1.6E-01	2.2E-01
2	hexane	annual	average	3.0E-01	3.0E-01	4.3E-01
3	hexane	annual	average	3.1E-01	3.1E-01	4.4E-01
4	hexane	annual	average	3.1E-01	3.2E-01	4.6E-01
5	hexane	annual	average	3.4E-01	3.5E-01	5.2E-01
6	hexane	annual	average	3.5E-01	3.6E-01	5.3E-01
7	hexane	annual	average	3.8E-01	3.8E-01	5.4E-01
8	hexane	annual	average	3.7E-01	3.7E-01	5.6E-01
9	hexane	annual	average	3.0E-01	3.1E-01	4.7E-01
10	hexane	annual	average	3.5E-01	3.6E-01	5.1E-01
11	hexane	annual	average	4.1E-01	4.1E-01	5.8E-01
12	hexane	annual	average	4.0E-01	4.0E-01	5.7E-01
13	hexane	annual	average	4.2E-01	4.2E-01	5.9E-01
14	hexane	annual	average	4.6E-01	4.7E-01	6.9E-01
15	hexane	annual	average	4.7E-01	4.8E-01	6.4E-01
16	hexane	annual	average	4.6E-01	4.7E-01	6.4E-01
17	hexane	annual	average	4.7E-01	4.8E-01	6.6E-01
18	hexane	annual	average	4.8E-01	4.9E-01	6.8E-01
19	hexane	annual	average	4.9E-01	5.1E-01	7.1E-01
20	hexane	annual	average	5.0E-01	5.2E-01	7.4E-01
21	hexane	annual	average	5.4E-01	5.5E-01	7.3E-01
22	hexane	annual	average	4.9E-01	5.0E-01	6.8E-01
23	hexane	annual	average	4.3E-01	4.4E-01	6.0E-01
24	hexane	annual	average	3.8E-01	3.8E-01	5.1E-01
25	hexane	annual	average	5.1E-01	5.4E-01	7.6E-01
26	hexane	annual	average	6.2E-01	6.4E-01	8.5E-01
27	hexane	annual	average	7.9E-01	8.3E-01	1.1E+00
28	hexane	annual	average	5.6E-01	5.8E-01	8.3E-01
29	hexane	annual	average	5.8E-01	5.9E-01	8.3E-01
30	hexane	annual	average	6.1E-01	6.2E-01	8.8E-01
31	hexane	annual	average	6.4E-01	6.5E-01	9.2E-01
32	hexane	annual	average	1.6E-01	1.6E-01	2.4E-01
33	hexane	annual	average	2.6E-01	2.7E-01	3.7E-01
34	hexane	annual	average	2.7E-01	2.7E-01	3.7E-01
35	hexane	annual	average	2.6E-01	2.7E-01	3.6E-01
36	hexane	annual	average	2.8E-01	2.9E-01	3.8E-01
37	hexane	annual	average	2.6E-01	2.7E-01	3.6E-01
38	hexane	annual	average	6.4E-01	6.5E-01	9.1E-01
39	hexane	annual	average	6.8E-01	6.9E-01	9.5E-01
40	hexane	annual	average	7.0E-01	7.2E-01	1.0E+00
41	hexane	annual	average	9.3E-01	9.4E-01	1.3E+00
42	hexane	annual	average	7.3E-01	7.4E-01	1.0E+00
43	hexane	annual	average	8.4E-01	8.5E-01	1.2E+00
44	hexane	annual	average	8.7E-01	8.8E-01	1.2E+00
45	hexane	annual	average	8.4E-01	8.4E-01	1.2E+00
46	hexane	annual	average	8.4E-01	8.5E-01	1.2E+00
47	hexane	annual	average	8.7E-01	8.7E-01	1.2E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
48	hexane	annual	average	8.9E-01	9.0E-01	1.3E+00
49	hexane	annual	average	8.6E-01	8.7E-01	1.2E+00
50	hexane	annual	average	8.3E-01	8.4E-01	1.2E+00
51	hexane	annual	average	7.5E-01	7.6E-01	1.1E+00
52	hexane	annual	average	1.3E+00	1.3E+00	1.8E+00
53	hexane	annual	average	1.2E+00	1.2E+00	1.6E+00
54	hexane	annual	average	3.3E-01	3.3E-01	4.4E-01
55	hexane	annual	average	3.5E-01	3.5E-01	4.6E-01
56	hexane	annual	average	3.3E-01	3.3E-01	4.5E-01
57	hexane	annual	average	3.8E-01	3.8E-01	5.0E-01
58	hexane	annual	average	2.8E-01	2.8E-01	3.5E-01
59	hexane	annual	average	1.7E+00	1.7E+00	2.2E+00
60	hexane	annual	average	2.7E+00	2.7E+00	3.5E+00
61	hexane	annual	average	2.9E+00	2.9E+00	3.8E+00
62	hexane	annual	average	2.5E+00	2.5E+00	3.3E+00
63	hexane	annual	average	2.2E+00	2.2E+00	2.8E+00
64	hexane	annual	average	2.2E+00	2.3E+00	2.9E+00
65	hexane	annual	average	2.7E+00	2.7E+00	3.5E+00
66	hexane	annual	average	3.7E-01	3.8E-01	5.3E-01
67	hexane	annual	average	4.5E-01	4.5E-01	6.4E-01
68	hexane	annual	average	3.8E-01	3.9E-01	5.6E-01
69	hexane	annual	average	3.6E-01	3.7E-01	5.3E-01
70	hexane	annual	average	3.6E-01	3.6E-01	5.5E-01
71	hexane	annual	average	8.7E-01	8.8E-01	1.2E+00
72	hexane	annual	average	8.3E-01	8.4E-01	1.2E+00
73	hexane	annual	average	3.0E+00	3.0E+00	3.8E+00
74	hexane	annual	average	1.6E+00	1.6E+00	2.1E+00
75	hexane	annual	average	1.2E+01	1.2E+01	1.4E+01
76	hexane	annual	average	2.9E+00	2.9E+00	3.8E+00
77	hexane	annual	average	1.8E+00	1.8E+00	2.4E+00
78	hexane	annual	average	7.1E-01	7.1E-01	9.9E-01
79	hexane	annual	average	5.0E-01	5.1E-01	6.8E-01
1	Indeno(1,2,3cd)pyrene	1hr	max	1.3E-05	1.3E-05	5.6E-05
2	Indeno(1,2,3cd)pyrene	1hr	max	1.2E-05	1.2E-05	3.6E-05
3	Indeno(1,2,3cd)pyrene	1hr	max	1.3E-05	1.3E-05	3.8E-05
4	Indeno(1,2,3cd)pyrene	1hr	max	1.5E-05	1.5E-05	3.8E-05
5	Indeno(1,2,3cd)pyrene	1hr	max	2.6E-05	2.6E-05	5.1E-05
6	Indeno(1,2,3cd)pyrene	1hr	max	3.0E-05	3.0E-05	5.3E-05
7	Indeno(1,2,3cd)pyrene	1hr	max	2.1E-05	2.1E-05	5.0E-05
8	Indeno(1,2,3cd)pyrene	1hr	max	3.2E-05	3.3E-05	5.3E-05
9	Indeno(1,2,3cd)pyrene	1hr	max	2.1E-05	2.1E-05	4.6E-05
10	Indeno(1,2,3cd)pyrene	1hr	max	4.5E-05	4.5E-05	5.9E-05
11	Indeno(1,2,3cd)pyrene	1hr	max	9.5E-05	9.5E-05	9.6E-05
12	Indeno(1,2,3cd)pyrene	1hr	max	6.2E-05	6.2E-05	6.7E-05
13	Indeno(1,2,3cd)pyrene	1hr	max	4.6E-05	4.6E-05	6.2E-05
14	Indeno(1,2,3cd)pyrene	1hr	max	3.4E-04	3.4E-04	3.5E-04
15	Indeno(1,2,3cd)pyrene	1hr	max	2.9E-05	2.9E-05	5.6E-05
16	Indeno(1,2,3cd)pyrene	1hr	max	2.7E-05	2.7E-05	5.6E-05
17	Indeno(1,2,3cd)pyrene	1hr	max	3.2E-05	3.2E-05	4.4E-05
18	Indeno(1,2,3cd)pyrene	1hr	max	2.8E-05	2.8E-05	4.9E-05
19	Indeno(1,2,3cd)pyrene	1hr	max	3.1E-05	3.1E-05	5.0E-05
20	Indeno(1,2,3cd)pyrene	1hr	max	3.3E-05	3.3E-05	5.5E-05
21	Indeno(1,2,3cd)pyrene	1hr	max	1.0E-04	1.0E-04	1.1E-04
22	Indeno(1,2,3cd)pyrene	1hr	max	8.3E-05	8.4E-05	1.0E-04
23	Indeno(1,2,3cd)pyrene	1hr	max	5.6E-05	5.6E-05	8.2E-05
24	Indeno(1,2,3cd)pyrene	1hr	max	1.1E-05	1.1E-05	5.6E-05
25	Indeno(1,2,3cd)pyrene	1hr	max	1.6E-05	1.6E-05	9.9E-05
26	Indeno(1,2,3cd)pyrene	1hr	max	1.5E-05	1.5E-05	1.1E-04
27	Indeno(1,2,3cd)pyrene	1hr	max	1.6E-05	1.6E-05	2.2E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
28	Indeno(1,2,3cd)pyrene	1hr	max	3.8E-05	3.8E-05	9.9E-05
29	Indeno(1,2,3cd)pyrene	1hr	max	4.7E-05	4.7E-05	1.1E-04
30	Indeno(1,2,3cd)pyrene	1hr	max	2.5E-05	2.5E-05	7.7E-05
31	Indeno(1,2,3cd)pyrene	1hr	max	2.6E-05	2.6E-05	8.6E-05
32	Indeno(1,2,3cd)pyrene	1hr	max	1.4E-05	1.4E-05	3.8E-05
33	Indeno(1,2,3cd)pyrene	1hr	max	1.8E-05	1.8E-05	4.3E-05
34	Indeno(1,2,3cd)pyrene	1hr	max	1.7E-05	1.8E-05	3.8E-05
35	Indeno(1,2,3cd)pyrene	1hr	max	1.5E-05	1.5E-05	6.0E-05
36	Indeno(1,2,3cd)pyrene	1hr	max	1.4E-05	1.4E-05	5.8E-05
37	Indeno(1,2,3cd)pyrene	1hr	max	1.3E-05	1.3E-05	6.1E-05
38	Indeno(1,2,3cd)pyrene	1hr	max	5.0E-05	5.0E-05	1.4E-04
39	Indeno(1,2,3cd)pyrene	1hr	max	3.3E-05	3.3E-05	1.3E-04
40	Indeno(1,2,3cd)pyrene	1hr	max	2.4E-05	2.4E-05	1.3E-04
41	Indeno(1,2,3cd)pyrene	1hr	max	2.1E-05	2.1E-05	1.3E-04
42	Indeno(1,2,3cd)pyrene	1hr	max	4.2E-05	4.2E-05	1.7E-04
43	Indeno(1,2,3cd)pyrene	1hr	max	2.9E-05	2.9E-05	1.6E-04
44	Indeno(1,2,3cd)pyrene	1hr	max	3.0E-05	3.0E-05	1.5E-04
45	Indeno(1,2,3cd)pyrene	1hr	max	2.6E-05	2.6E-05	1.3E-04
46	Indeno(1,2,3cd)pyrene	1hr	max	2.7E-05	2.7E-05	1.3E-04
47	Indeno(1,2,3cd)pyrene	1hr	max	2.8E-05	2.8E-05	1.1E-04
48	Indeno(1,2,3cd)pyrene	1hr	max	3.1E-05	3.1E-05	1.2E-04
49	Indeno(1,2,3cd)pyrene	1hr	max	3.0E-05	3.0E-05	1.2E-04
50	Indeno(1,2,3cd)pyrene	1hr	max	4.2E-05	4.2E-05	1.1E-04
51	Indeno(1,2,3cd)pyrene	1hr	max	4.2E-05	4.2E-05	1.2E-04
52	Indeno(1,2,3cd)pyrene	1hr	max	2.9E-05	2.9E-05	8.2E-04
53	Indeno(1,2,3cd)pyrene	1hr	max	2.6E-05	2.6E-05	3.8E-04
54	Indeno(1,2,3cd)pyrene	1hr	max	1.2E-05	1.2E-05	3.3E-05
55	Indeno(1,2,3cd)pyrene	1hr	max	1.2E-05	1.2E-05	5.9E-05
56	Indeno(1,2,3cd)pyrene	1hr	max	1.1E-05	1.1E-05	7.6E-05
57	Indeno(1,2,3cd)pyrene	1hr	max	1.6E-05	1.6E-05	4.6E-05
58	Indeno(1,2,3cd)pyrene	1hr	max	1.0E-05	1.0E-05	4.8E-05
59	Indeno(1,2,3cd)pyrene	1hr	max	2.6E-05	2.6E-05	5.3E-04
60	Indeno(1,2,3cd)pyrene	1hr	max	4.9E-05	4.9E-05	2.6E-04
61	Indeno(1,2,3cd)pyrene	1hr	max	8.9E-05	8.9E-05	2.3E-04
62	Indeno(1,2,3cd)pyrene	1hr	max	7.9E-05	7.9E-05	2.7E-04
63	Indeno(1,2,3cd)pyrene	1hr	max	6.2E-05	6.2E-05	4.4E-04
64	Indeno(1,2,3cd)pyrene	1hr	max	6.4E-05	6.4E-05	2.9E-04
65	Indeno(1,2,3cd)pyrene	1hr	max	8.0E-05	8.0E-05	2.5E-04
66	Indeno(1,2,3cd)pyrene	1hr	max	3.1E-05	3.1E-05	5.6E-05
67	Indeno(1,2,3cd)pyrene	1hr	max	5.1E-05	5.1E-05	5.6E-05
68	Indeno(1,2,3cd)pyrene	1hr	max	2.6E-05	2.6E-05	4.3E-05
69	Indeno(1,2,3cd)pyrene	1hr	max	2.3E-05	2.3E-05	4.2E-05
70	Indeno(1,2,3cd)pyrene	1hr	max	2.1E-05	2.1E-05	3.9E-05
71	Indeno(1,2,3cd)pyrene	1hr	max	4.0E-05	4.0E-05	1.1E-04
72	Indeno(1,2,3cd)pyrene	1hr	max	3.9E-05	3.9E-05	1.1E-04
73	Indeno(1,2,3cd)pyrene	1hr	max	7.8E-05	7.8E-05	2.8E-04
74	Indeno(1,2,3cd)pyrene	1hr	max	3.5E-05	3.5E-05	1.2E-03
75	Indeno(1,2,3cd)pyrene	1hr	max	1.3E-04	1.3E-04	1.3E-04
76	Indeno(1,2,3cd)pyrene	1hr	max	8.9E-05	8.9E-05	2.4E-04
77	Indeno(1,2,3cd)pyrene	1hr	max	4.7E-05	4.7E-05	4.1E-03
78	Indeno(1,2,3cd)pyrene	1hr	max	4.8E-05	4.8E-05	1.6E-04
79	Indeno(1,2,3cd)pyrene	1hr	max	6.6E-05	6.6E-05	9.8E-05
1	Indeno(1,2,3cd)pyrene	1hr	9th	6.2E-06	6.3E-06	2.7E-05
2	Indeno(1,2,3cd)pyrene	1hr	9th	9.5E-06	9.5E-06	2.5E-05
3	Indeno(1,2,3cd)pyrene	1hr	9th	1.0E-05	1.0E-05	2.7E-05
4	Indeno(1,2,3cd)pyrene	1hr	9th	1.1E-05	1.1E-05	3.1E-05
5	Indeno(1,2,3cd)pyrene	1hr	9th	1.3E-05	1.3E-05	3.9E-05
6	Indeno(1,2,3cd)pyrene	1hr	9th	1.3E-05	1.3E-05	3.9E-05
7	Indeno(1,2,3cd)pyrene	1hr	9th	1.1E-05	1.1E-05	3.2E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
8	Indeno(1,2,3cd)pyrene	1hr	9th	1.2E-05	1.2E-05	4.0E-05
9	Indeno(1,2,3cd)pyrene	1hr	9th	1.3E-05	1.3E-05	3.4E-05
10	Indeno(1,2,3cd)pyrene	1hr	9th	3.0E-05	3.0E-05	4.7E-05
11	Indeno(1,2,3cd)pyrene	1hr	9th	6.5E-05	6.5E-05	7.7E-05
12	Indeno(1,2,3cd)pyrene	1hr	9th	3.3E-05	3.3E-05	5.2E-05
13	Indeno(1,2,3cd)pyrene	1hr	9th	3.4E-05	3.4E-05	4.9E-05
14	Indeno(1,2,3cd)pyrene	1hr	9th	1.4E-04	1.4E-04	1.4E-04
15	Indeno(1,2,3cd)pyrene	1hr	9th	1.6E-05	1.6E-05	3.7E-05
16	Indeno(1,2,3cd)pyrene	1hr	9th	1.5E-05	1.5E-05	3.7E-05
17	Indeno(1,2,3cd)pyrene	1hr	9th	2.0E-05	2.0E-05	4.0E-05
18	Indeno(1,2,3cd)pyrene	1hr	9th	1.9E-05	1.9E-05	4.1E-05
19	Indeno(1,2,3cd)pyrene	1hr	9th	1.7E-05	1.7E-05	4.2E-05
20	Indeno(1,2,3cd)pyrene	1hr	9th	1.9E-05	1.9E-05	4.6E-05
21	Indeno(1,2,3cd)pyrene	1hr	9th	3.7E-05	3.7E-05	6.2E-05
22	Indeno(1,2,3cd)pyrene	1hr	9th	3.7E-05	3.7E-05	6.2E-05
23	Indeno(1,2,3cd)pyrene	1hr	9th	2.6E-05	2.6E-05	4.9E-05
24	Indeno(1,2,3cd)pyrene	1hr	9th	8.2E-06	8.2E-06	3.1E-05
25	Indeno(1,2,3cd)pyrene	1hr	9th	1.1E-05	1.1E-05	7.4E-05
26	Indeno(1,2,3cd)pyrene	1hr	9th	1.1E-05	1.1E-05	8.6E-05
27	Indeno(1,2,3cd)pyrene	1hr	9th	1.1E-05	1.1E-05	1.5E-04
28	Indeno(1,2,3cd)pyrene	1hr	9th	2.4E-05	2.4E-05	5.8E-05
29	Indeno(1,2,3cd)pyrene	1hr	9th	2.7E-05	2.7E-05	5.8E-05
30	Indeno(1,2,3cd)pyrene	1hr	9th	1.7E-05	1.7E-05	4.6E-05
31	Indeno(1,2,3cd)pyrene	1hr	9th	1.8E-05	1.8E-05	5.2E-05
32	Indeno(1,2,3cd)pyrene	1hr	9th	7.6E-06	7.6E-06	2.3E-05
33	Indeno(1,2,3cd)pyrene	1hr	9th	9.3E-06	9.3E-06	2.7E-05
34	Indeno(1,2,3cd)pyrene	1hr	9th	9.0E-06	9.0E-06	2.7E-05
35	Indeno(1,2,3cd)pyrene	1hr	9th	8.0E-06	8.0E-06	2.9E-05
36	Indeno(1,2,3cd)pyrene	1hr	9th	7.9E-06	7.9E-06	3.1E-05
37	Indeno(1,2,3cd)pyrene	1hr	9th	8.2E-06	8.2E-06	3.2E-05
38	Indeno(1,2,3cd)pyrene	1hr	9th	2.9E-05	2.9E-05	7.1E-05
39	Indeno(1,2,3cd)pyrene	1hr	9th	2.6E-05	2.6E-05	7.5E-05
40	Indeno(1,2,3cd)pyrene	1hr	9th	2.0E-05	2.0E-05	9.1E-05
41	Indeno(1,2,3cd)pyrene	1hr	9th	1.5E-05	1.5E-05	9.1E-05
42	Indeno(1,2,3cd)pyrene	1hr	9th	2.5E-05	2.5E-05	6.8E-05
43	Indeno(1,2,3cd)pyrene	1hr	9th	2.1E-05	2.1E-05	6.8E-05
44	Indeno(1,2,3cd)pyrene	1hr	9th	2.1E-05	2.1E-05	7.2E-05
45	Indeno(1,2,3cd)pyrene	1hr	9th	1.9E-05	1.9E-05	7.4E-05
46	Indeno(1,2,3cd)pyrene	1hr	9th	1.9E-05	1.9E-05	7.3E-05
47	Indeno(1,2,3cd)pyrene	1hr	9th	1.8E-05	1.8E-05	7.3E-05
48	Indeno(1,2,3cd)pyrene	1hr	9th	2.0E-05	2.0E-05	7.3E-05
49	Indeno(1,2,3cd)pyrene	1hr	9th	1.9E-05	1.9E-05	7.5E-05
50	Indeno(1,2,3cd)pyrene	1hr	9th	2.2E-05	2.2E-05	7.8E-05
51	Indeno(1,2,3cd)pyrene	1hr	9th	2.4E-05	2.4E-05	6.6E-05
52	Indeno(1,2,3cd)pyrene	1hr	9th	1.6E-05	1.6E-05	3.8E-04
53	Indeno(1,2,3cd)pyrene	1hr	9th	1.5E-05	1.5E-05	1.7E-04
54	Indeno(1,2,3cd)pyrene	1hr	9th	7.1E-06	7.1E-06	2.3E-05
55	Indeno(1,2,3cd)pyrene	1hr	9th	7.5E-06	7.5E-06	2.8E-05
56	Indeno(1,2,3cd)pyrene	1hr	9th	7.6E-06	7.6E-06	3.1E-05
57	Indeno(1,2,3cd)pyrene	1hr	9th	8.5E-06	8.5E-06	2.5E-05
58	Indeno(1,2,3cd)pyrene	1hr	9th	6.9E-06	6.9E-06	2.1E-05
59	Indeno(1,2,3cd)pyrene	1hr	9th	2.2E-05	2.2E-05	2.2E-04
60	Indeno(1,2,3cd)pyrene	1hr	9th	2.8E-05	2.8E-05	1.0E-04
61	Indeno(1,2,3cd)pyrene	1hr	9th	3.5E-05	3.5E-05	1.4E-04
62	Indeno(1,2,3cd)pyrene	1hr	9th	2.7E-05	2.7E-05	1.7E-04
63	Indeno(1,2,3cd)pyrene	1hr	9th	2.5E-05	2.5E-05	2.7E-04
64	Indeno(1,2,3cd)pyrene	1hr	9th	2.5E-05	2.5E-05	2.5E-04
65	Indeno(1,2,3cd)pyrene	1hr	9th	3.3E-05	3.3E-05	1.7E-04
66	Indeno(1,2,3cd)pyrene	1hr	9th	1.9E-05	1.9E-05	3.9E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
67	Indeno(1,2,3cd)pyrene	1hr	9th	2.5E-05	2.5E-05	4.2E-05
68	Indeno(1,2,3cd)pyrene	1hr	9th	1.5E-05	1.5E-05	3.1E-05
69	Indeno(1,2,3cd)pyrene	1hr	9th	1.1E-05	1.2E-05	3.1E-05
70	Indeno(1,2,3cd)pyrene	1hr	9th	9.3E-06	9.4E-06	3.0E-05
71	Indeno(1,2,3cd)pyrene	1hr	9th	2.3E-05	2.3E-05	8.1E-05
72	Indeno(1,2,3cd)pyrene	1hr	9th	2.2E-05	2.2E-05	8.1E-05
73	Indeno(1,2,3cd)pyrene	1hr	9th	3.4E-05	3.4E-05	1.8E-04
74	Indeno(1,2,3cd)pyrene	1hr	9th	2.2E-05	2.2E-05	4.6E-04
75	Indeno(1,2,3cd)pyrene	1hr	9th	8.6E-05	8.6E-05	9.1E-05
76	Indeno(1,2,3cd)pyrene	1hr	9th	3.4E-05	3.4E-05	1.4E-04
77	Indeno(1,2,3cd)pyrene	1hr	9th	2.4E-05	2.4E-05	1.8E-03
78	Indeno(1,2,3cd)pyrene	1hr	9th	2.5E-05	2.5E-05	6.5E-05
79	Indeno(1,2,3cd)pyrene	1hr	9th	2.7E-05	2.7E-05	5.6E-05
1	Indeno(1,2,3cd)pyrene	24hr	max	3.0E-06	3.1E-06	9.9E-06
2	Indeno(1,2,3cd)pyrene	24hr	max	4.0E-06	4.0E-06	1.1E-05
3	Indeno(1,2,3cd)pyrene	24hr	max	4.2E-06	4.2E-06	1.1E-05
4	Indeno(1,2,3cd)pyrene	24hr	max	4.6E-06	4.6E-06	1.3E-05
5	Indeno(1,2,3cd)pyrene	24hr	max	4.6E-06	4.6E-06	1.7E-05
6	Indeno(1,2,3cd)pyrene	24hr	max	4.8E-06	4.8E-06	1.8E-05
7	Indeno(1,2,3cd)pyrene	24hr	max	4.7E-06	4.7E-06	1.3E-05
8	Indeno(1,2,3cd)pyrene	24hr	max	5.7E-06	5.7E-06	1.8E-05
9	Indeno(1,2,3cd)pyrene	24hr	max	4.7E-06	4.7E-06	1.6E-05
10	Indeno(1,2,3cd)pyrene	24hr	max	1.2E-05	1.2E-05	2.0E-05
11	Indeno(1,2,3cd)pyrene	24hr	max	2.5E-05	2.5E-05	3.0E-05
12	Indeno(1,2,3cd)pyrene	24hr	max	9.9E-06	9.9E-06	2.2E-05
13	Indeno(1,2,3cd)pyrene	24hr	max	1.2E-05	1.2E-05	2.1E-05
14	Indeno(1,2,3cd)pyrene	24hr	max	3.5E-05	3.5E-05	3.6E-05
15	Indeno(1,2,3cd)pyrene	24hr	max	6.8E-06	6.8E-06	1.7E-05
16	Indeno(1,2,3cd)pyrene	24hr	max	6.9E-06	6.9E-06	1.7E-05
17	Indeno(1,2,3cd)pyrene	24hr	max	7.5E-06	7.5E-06	1.7E-05
18	Indeno(1,2,3cd)pyrene	24hr	max	8.2E-06	8.2E-06	1.8E-05
19	Indeno(1,2,3cd)pyrene	24hr	max	7.8E-06	7.8E-06	1.8E-05
20	Indeno(1,2,3cd)pyrene	24hr	max	7.3E-06	7.3E-06	1.9E-05
21	Indeno(1,2,3cd)pyrene	24hr	max	1.5E-05	1.5E-05	2.3E-05
22	Indeno(1,2,3cd)pyrene	24hr	max	1.6E-05	1.6E-05	2.3E-05
23	Indeno(1,2,3cd)pyrene	24hr	max	1.1E-05	1.1E-05	2.2E-05
24	Indeno(1,2,3cd)pyrene	24hr	max	3.6E-06	3.6E-06	1.7E-05
25	Indeno(1,2,3cd)pyrene	24hr	max	4.6E-06	4.6E-06	3.0E-05
26	Indeno(1,2,3cd)pyrene	24hr	max	4.4E-06	4.4E-06	3.1E-05
27	Indeno(1,2,3cd)pyrene	24hr	max	4.8E-06	4.8E-06	4.6E-05
28	Indeno(1,2,3cd)pyrene	24hr	max	6.8E-06	6.8E-06	2.9E-05
29	Indeno(1,2,3cd)pyrene	24hr	max	7.3E-06	7.3E-06	3.0E-05
30	Indeno(1,2,3cd)pyrene	24hr	max	7.4E-06	7.4E-06	1.8E-05
31	Indeno(1,2,3cd)pyrene	24hr	max	7.6E-06	7.6E-06	1.9E-05
32	Indeno(1,2,3cd)pyrene	24hr	max	3.7E-06	3.7E-06	8.7E-06
33	Indeno(1,2,3cd)pyrene	24hr	max	5.1E-06	5.1E-06	1.1E-05
34	Indeno(1,2,3cd)pyrene	24hr	max	4.8E-06	4.8E-06	1.1E-05
35	Indeno(1,2,3cd)pyrene	24hr	max	3.9E-06	4.0E-06	9.2E-06
36	Indeno(1,2,3cd)pyrene	24hr	max	3.8E-06	3.9E-06	1.1E-05
37	Indeno(1,2,3cd)pyrene	24hr	max	3.7E-06	3.8E-06	1.3E-05
38	Indeno(1,2,3cd)pyrene	24hr	max	1.1E-05	1.1E-05	2.9E-05
39	Indeno(1,2,3cd)pyrene	24hr	max	9.4E-06	9.4E-06	3.2E-05
40	Indeno(1,2,3cd)pyrene	24hr	max	6.5E-06	6.5E-06	3.8E-05
41	Indeno(1,2,3cd)pyrene	24hr	max	6.4E-06	6.4E-06	4.3E-05
42	Indeno(1,2,3cd)pyrene	24hr	max	7.9E-06	7.9E-06	3.7E-05
43	Indeno(1,2,3cd)pyrene	24hr	max	7.7E-06	7.7E-06	3.7E-05
44	Indeno(1,2,3cd)pyrene	24hr	max	7.7E-06	7.7E-06	3.6E-05
45	Indeno(1,2,3cd)pyrene	24hr	max	7.1E-06	7.1E-06	3.6E-05
46	Indeno(1,2,3cd)pyrene	24hr	max	7.2E-06	7.2E-06	3.6E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
47	Indeno(1,2,3cd)pyrene	24hr	max	6.8E-06	6.8E-06	3.0E-05
48	Indeno(1,2,3cd)pyrene	24hr	max	7.1E-06	7.1E-06	3.4E-05
49	Indeno(1,2,3cd)pyrene	24hr	max	6.8E-06	6.8E-06	3.3E-05
50	Indeno(1,2,3cd)pyrene	24hr	max	6.9E-06	6.9E-06	3.0E-05
51	Indeno(1,2,3cd)pyrene	24hr	max	7.6E-06	7.6E-06	3.2E-05
52	Indeno(1,2,3cd)pyrene	24hr	max	8.2E-06	8.2E-06	1.6E-04
53	Indeno(1,2,3cd)pyrene	24hr	max	7.7E-06	7.7E-06	7.0E-05
54	Indeno(1,2,3cd)pyrene	24hr	max	3.3E-06	3.3E-06	1.2E-05
55	Indeno(1,2,3cd)pyrene	24hr	max	3.1E-06	3.2E-06	1.7E-05
56	Indeno(1,2,3cd)pyrene	24hr	max	3.3E-06	3.3E-06	1.9E-05
57	Indeno(1,2,3cd)pyrene	24hr	max	3.5E-06	3.5E-06	1.3E-05
58	Indeno(1,2,3cd)pyrene	24hr	max	2.9E-06	2.9E-06	1.4E-05
59	Indeno(1,2,3cd)pyrene	24hr	max	9.5E-06	9.5E-06	8.7E-05
60	Indeno(1,2,3cd)pyrene	24hr	max	1.4E-05	1.4E-05	4.5E-05
61	Indeno(1,2,3cd)pyrene	24hr	max	1.4E-05	1.4E-05	6.1E-05
62	Indeno(1,2,3cd)pyrene	24hr	max	1.3E-05	1.3E-05	6.8E-05
63	Indeno(1,2,3cd)pyrene	24hr	max	1.1E-05	1.1E-05	1.0E-04
64	Indeno(1,2,3cd)pyrene	24hr	max	1.1E-05	1.1E-05	9.8E-05
65	Indeno(1,2,3cd)pyrene	24hr	max	1.4E-05	1.4E-05	4.0E-05
66	Indeno(1,2,3cd)pyrene	24hr	max	1.2E-05	1.2E-05	2.0E-05
67	Indeno(1,2,3cd)pyrene	24hr	max	7.3E-06	7.3E-06	1.8E-05
68	Indeno(1,2,3cd)pyrene	24hr	max	7.3E-06	7.3E-06	1.8E-05
69	Indeno(1,2,3cd)pyrene	24hr	max	4.3E-06	4.3E-06	1.5E-05
70	Indeno(1,2,3cd)pyrene	24hr	max	4.5E-06	4.5E-06	1.2E-05
71	Indeno(1,2,3cd)pyrene	24hr	max	1.1E-05	1.1E-05	2.8E-05
72	Indeno(1,2,3cd)pyrene	24hr	max	1.1E-05	1.1E-05	2.8E-05
73	Indeno(1,2,3cd)pyrene	24hr	max	1.5E-05	1.5E-05	3.7E-05
74	Indeno(1,2,3cd)pyrene	24hr	max	9.7E-06	9.7E-06	1.4E-04
75	Indeno(1,2,3cd)pyrene	24hr	max	4.0E-05	4.0E-05	4.4E-05
76	Indeno(1,2,3cd)pyrene	24hr	max	1.4E-05	1.4E-05	6.2E-05
77	Indeno(1,2,3cd)pyrene	24hr	max	1.0E-05	1.0E-05	3.3E-04
78	Indeno(1,2,3cd)pyrene	24hr	max	9.0E-06	9.0E-06	4.0E-05
79	Indeno(1,2,3cd)pyrene	24hr	max	1.4E-05	1.4E-05	2.5E-05
1	Indeno(1,2,3cd)pyrene	annual	average	1.8E-07	1.9E-07	4.2E-07
2	Indeno(1,2,3cd)pyrene	annual	average	3.5E-07	3.5E-07	7.5E-07
3	Indeno(1,2,3cd)pyrene	annual	average	3.6E-07	3.6E-07	7.8E-07
4	Indeno(1,2,3cd)pyrene	annual	average	3.9E-07	3.9E-07	8.6E-07
5	Indeno(1,2,3cd)pyrene	annual	average	4.5E-07	4.6E-07	1.0E-06
6	Indeno(1,2,3cd)pyrene	annual	average	4.6E-07	4.7E-07	1.1E-06
7	Indeno(1,2,3cd)pyrene	annual	average	4.1E-07	4.2E-07	9.2E-07
8	Indeno(1,2,3cd)pyrene	annual	average	4.8E-07	4.8E-07	1.1E-06
9	Indeno(1,2,3cd)pyrene	annual	average	4.5E-07	4.6E-07	1.0E-06
10	Indeno(1,2,3cd)pyrene	annual	average	7.4E-07	7.4E-07	1.6E-06
11	Indeno(1,2,3cd)pyrene	annual	average	1.2E-06	1.2E-06	2.2E-06
12	Indeno(1,2,3cd)pyrene	annual	average	1.0E-06	1.0E-06	2.0E-06
13	Indeno(1,2,3cd)pyrene	annual	average	9.6E-07	9.6E-07	1.9E-06
14	Indeno(1,2,3cd)pyrene	annual	average	2.0E-06	2.0E-06	3.2E-06
15	Indeno(1,2,3cd)pyrene	annual	average	5.4E-07	5.6E-07	1.2E-06
16	Indeno(1,2,3cd)pyrene	annual	average	5.4E-07	5.6E-07	1.2E-06
17	Indeno(1,2,3cd)pyrene	annual	average	6.0E-07	6.1E-07	1.3E-06
18	Indeno(1,2,3cd)pyrene	annual	average	6.6E-07	6.8E-07	1.4E-06
19	Indeno(1,2,3cd)pyrene	annual	average	6.6E-07	6.7E-07	1.5E-06
20	Indeno(1,2,3cd)pyrene	annual	average	7.1E-07	7.3E-07	1.6E-06
21	Indeno(1,2,3cd)pyrene	annual	average	1.1E-06	1.1E-06	2.1E-06
22	Indeno(1,2,3cd)pyrene	annual	average	9.9E-07	1.0E-06	2.0E-06
23	Indeno(1,2,3cd)pyrene	annual	average	7.0E-07	7.1E-07	1.6E-06
24	Indeno(1,2,3cd)pyrene	annual	average	3.6E-07	3.6E-07	8.3E-07
25	Indeno(1,2,3cd)pyrene	annual	average	4.5E-07	4.8E-07	1.4E-06
26	Indeno(1,2,3cd)pyrene	annual	average	5.1E-07	5.3E-07	1.6E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
27	Indeno(1,2,3cd)pyrene	annual	average	6.2E-07	6.7E-07	2.5E-06
28	Indeno(1,2,3cd)pyrene	annual	average	8.2E-07	8.3E-07	2.0E-06
29	Indeno(1,2,3cd)pyrene	annual	average	8.5E-07	8.7E-07	2.1E-06
30	Indeno(1,2,3cd)pyrene	annual	average	4.2E-07	4.2E-07	1.1E-06
31	Indeno(1,2,3cd)pyrene	annual	average	4.4E-07	4.5E-07	1.2E-06
32	Indeno(1,2,3cd)pyrene	annual	average	1.9E-07	1.9E-07	4.6E-07
33	Indeno(1,2,3cd)pyrene	annual	average	2.5E-07	2.5E-07	6.3E-07
34	Indeno(1,2,3cd)pyrene	annual	average	2.5E-07	2.5E-07	6.2E-07
35	Indeno(1,2,3cd)pyrene	annual	average	2.6E-07	2.7E-07	6.3E-07
36	Indeno(1,2,3cd)pyrene	annual	average	2.8E-07	2.8E-07	6.6E-07
37	Indeno(1,2,3cd)pyrene	annual	average	2.7E-07	2.8E-07	6.7E-07
38	Indeno(1,2,3cd)pyrene	annual	average	8.3E-07	8.4E-07	2.4E-06
39	Indeno(1,2,3cd)pyrene	annual	average	8.1E-07	8.2E-07	2.6E-06
40	Indeno(1,2,3cd)pyrene	annual	average	7.8E-07	8.0E-07	2.9E-06
41	Indeno(1,2,3cd)pyrene	annual	average	7.3E-07	7.4E-07	3.1E-06
42	Indeno(1,2,3cd)pyrene	annual	average	9.2E-07	9.3E-07	3.0E-06
43	Indeno(1,2,3cd)pyrene	annual	average	9.5E-07	9.6E-07	3.2E-06
44	Indeno(1,2,3cd)pyrene	annual	average	9.8E-07	9.9E-07	3.3E-06
45	Indeno(1,2,3cd)pyrene	annual	average	8.8E-07	8.8E-07	3.4E-06
46	Indeno(1,2,3cd)pyrene	annual	average	8.8E-07	8.9E-07	3.4E-06
47	Indeno(1,2,3cd)pyrene	annual	average	8.6E-07	8.7E-07	3.5E-06
48	Indeno(1,2,3cd)pyrene	annual	average	9.4E-07	9.4E-07	3.4E-06
49	Indeno(1,2,3cd)pyrene	annual	average	9.0E-07	9.0E-07	3.4E-06
50	Indeno(1,2,3cd)pyrene	annual	average	9.2E-07	9.3E-07	3.5E-06
51	Indeno(1,2,3cd)pyrene	annual	average	9.2E-07	9.3E-07	3.2E-06
52	Indeno(1,2,3cd)pyrene	annual	average	9.8E-07	9.8E-07	1.1E-05
53	Indeno(1,2,3cd)pyrene	annual	average	8.7E-07	8.8E-07	6.1E-06
54	Indeno(1,2,3cd)pyrene	annual	average	2.8E-07	2.8E-07	6.0E-07
55	Indeno(1,2,3cd)pyrene	annual	average	2.9E-07	3.0E-07	6.8E-07
56	Indeno(1,2,3cd)pyrene	annual	average	3.1E-07	3.2E-07	7.4E-07
57	Indeno(1,2,3cd)pyrene	annual	average	3.3E-07	3.3E-07	7.3E-07
58	Indeno(1,2,3cd)pyrene	annual	average	2.3E-07	2.3E-07	5.2E-07
59	Indeno(1,2,3cd)pyrene	annual	average	1.2E-06	1.2E-06	1.1E-05
60	Indeno(1,2,3cd)pyrene	annual	average	1.6E-06	1.6E-06	4.1E-06
61	Indeno(1,2,3cd)pyrene	annual	average	1.6E-06	1.6E-06	4.6E-06
62	Indeno(1,2,3cd)pyrene	annual	average	1.5E-06	1.5E-06	4.9E-06
63	Indeno(1,2,3cd)pyrene	annual	average	1.4E-06	1.4E-06	5.8E-06
64	Indeno(1,2,3cd)pyrene	annual	average	1.4E-06	1.4E-06	5.5E-06
65	Indeno(1,2,3cd)pyrene	annual	average	1.7E-06	1.7E-06	4.9E-06
66	Indeno(1,2,3cd)pyrene	annual	average	6.7E-07	6.7E-07	1.5E-06
67	Indeno(1,2,3cd)pyrene	annual	average	8.9E-07	8.9E-07	1.9E-06
68	Indeno(1,2,3cd)pyrene	annual	average	5.7E-07	5.7E-07	1.3E-06
69	Indeno(1,2,3cd)pyrene	annual	average	5.3E-07	5.3E-07	1.3E-06
70	Indeno(1,2,3cd)pyrene	annual	average	4.9E-07	4.9E-07	1.2E-06
71	Indeno(1,2,3cd)pyrene	annual	average	6.6E-07	6.7E-07	2.1E-06
72	Indeno(1,2,3cd)pyrene	annual	average	6.5E-07	6.6E-07	2.1E-06
73	Indeno(1,2,3cd)pyrene	annual	average	2.0E-06	2.0E-06	5.4E-06
74	Indeno(1,2,3cd)pyrene	annual	average	1.2E-06	1.2E-06	1.7E-05
75	Indeno(1,2,3cd)pyrene	annual	average	7.3E-06	7.3E-06	8.6E-06
76	Indeno(1,2,3cd)pyrene	annual	average	1.6E-06	1.6E-06	4.6E-06
77	Indeno(1,2,3cd)pyrene	annual	average	1.2E-06	1.2E-06	1.2E-05
78	Indeno(1,2,3cd)pyrene	annual	average	9.0E-07	9.1E-07	2.8E-06
79	Indeno(1,2,3cd)pyrene	annual	average	9.1E-07	9.2E-07	1.9E-06
1	naphthalene	1hr	max	2.2E+00	2.2E+00	2.3E+00
2	naphthalene	1hr	max	2.9E+00	2.9E+00	3.2E+00
3	naphthalene	1hr	max	3.1E+00	3.1E+00	3.3E+00
4	naphthalene	1hr	max	3.6E+00	3.6E+00	3.8E+00
5	naphthalene	1hr	max	3.2E+00	3.2E+00	5.0E+00
6	naphthalene	1hr	max	2.9E+00	2.9E+00	5.7E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
7	naphthalene	1hr	max	3.5E+00	3.5E+00	3.7E+00
8	naphthalene	1hr	max	3.0E+00	3.0E+00	6.2E+00
9	naphthalene	1hr	max	4.0E+00	4.0E+00	5.3E+00
10	naphthalene	1hr	max	3.2E+00	3.2E+00	4.4E+00
11	naphthalene	1hr	max	4.0E+00	4.0E+00	5.5E+00
12	naphthalene	1hr	max	5.3E+00	5.3E+00	7.7E+00
13	naphthalene	1hr	max	5.6E+00	5.6E+00	7.3E+00
14	naphthalene	1hr	max	4.5E+00	4.5E+00	5.9E+00
15	naphthalene	1hr	max	8.2E+00	8.2E+00	9.8E+00
16	naphthalene	1hr	max	7.3E+00	7.3E+00	8.9E+00
17	naphthalene	1hr	max	5.3E+00	5.3E+00	6.6E+00
18	naphthalene	1hr	max	6.1E+00	6.1E+00	6.1E+00
19	naphthalene	1hr	max	5.4E+00	5.4E+00	7.0E+00
20	naphthalene	1hr	max	4.8E+00	4.8E+00	5.1E+00
21	naphthalene	1hr	max	6.4E+00	6.4E+00	7.0E+00
22	naphthalene	1hr	max	6.7E+00	6.7E+00	7.4E+00
23	naphthalene	1hr	max	6.8E+00	6.8E+00	7.4E+00
24	naphthalene	1hr	max	5.1E+00	5.1E+00	5.1E+00
25	naphthalene	1hr	max	8.3E+00	8.3E+00	8.8E+00
26	naphthalene	1hr	max	6.9E+00	6.9E+00	1.3E+01
27	naphthalene	1hr	max	1.4E+01	1.4E+01	1.4E+01
28	naphthalene	1hr	max	5.3E+00	5.3E+00	5.9E+00
29	naphthalene	1hr	max	5.8E+00	5.8E+00	5.8E+00
30	naphthalene	1hr	max	5.9E+00	5.9E+00	8.2E+00
31	naphthalene	1hr	max	5.9E+00	5.9E+00	9.3E+00
32	naphthalene	1hr	max	1.8E+00	1.8E+00	2.8E+00
33	naphthalene	1hr	max	1.8E+00	1.8E+00	4.3E+00
34	naphthalene	1hr	max	1.8E+00	1.8E+00	4.4E+00
35	naphthalene	1hr	max	5.3E+00	5.3E+00	6.4E+00
36	naphthalene	1hr	max	5.3E+00	5.3E+00	6.2E+00
37	naphthalene	1hr	max	5.7E+00	5.7E+00	6.1E+00
38	naphthalene	1hr	max	7.9E+00	7.9E+00	7.9E+00
39	naphthalene	1hr	max	1.0E+01	1.0E+01	1.0E+01
40	naphthalene	1hr	max	7.6E+00	7.6E+00	9.1E+00
41	naphthalene	1hr	max	1.7E+01	1.7E+01	1.9E+01
42	naphthalene	1hr	max	9.9E+00	9.9E+00	9.9E+00
43	naphthalene	1hr	max	8.1E+00	8.1E+00	1.0E+01
44	naphthalene	1hr	max	8.2E+00	8.2E+00	8.2E+00
45	naphthalene	1hr	max	6.5E+00	6.5E+00	9.0E+00
46	naphthalene	1hr	max	6.6E+00	6.6E+00	9.1E+00
47	naphthalene	1hr	max	5.8E+00	5.8E+00	1.1E+01
48	naphthalene	1hr	max	6.8E+00	6.8E+00	9.1E+00
49	naphthalene	1hr	max	6.4E+00	6.4E+00	8.9E+00
50	naphthalene	1hr	max	7.4E+00	7.4E+00	7.4E+00
51	naphthalene	1hr	max	9.4E+00	9.4E+00	9.4E+00
52	naphthalene	1hr	max	6.7E+00	6.7E+00	6.9E+00
53	naphthalene	1hr	max	8.6E+00	8.6E+00	1.2E+01
54	naphthalene	1hr	max	5.3E+00	5.3E+00	5.4E+00
55	naphthalene	1hr	max	5.1E+00	5.1E+00	5.1E+00
56	naphthalene	1hr	max	4.9E+00	4.9E+00	4.9E+00
57	naphthalene	1hr	max	5.2E+00	5.2E+00	5.2E+00
58	naphthalene	1hr	max	3.8E+00	3.8E+00	3.8E+00
59	naphthalene	1hr	max	9.9E+00	9.9E+00	1.3E+01
60	naphthalene	1hr	max	2.8E+01	2.8E+01	2.9E+01
61	naphthalene	1hr	max	1.5E+01	1.5E+01	1.5E+01
62	naphthalene	1hr	max	9.3E+00	9.3E+00	1.1E+01
63	naphthalene	1hr	max	9.3E+00	9.3E+00	1.1E+01
64	naphthalene	1hr	max	9.9E+00	9.9E+00	1.2E+01
65	naphthalene	1hr	max	1.4E+01	1.4E+01	2.0E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
66	naphthalene	1hr	max	3.7E+00	3.7E+00	4.1E+00
67	naphthalene	1hr	max	4.3E+00	4.3E+00	8.5E+00
68	naphthalene	1hr	max	6.0E+00	6.0E+00	6.6E+00
69	naphthalene	1hr	max	6.3E+00	6.3E+00	7.0E+00
70	naphthalene	1hr	max	5.4E+00	5.4E+00	5.8E+00
71	naphthalene	1hr	max	7.0E+00	7.0E+00	1.1E+01
72	naphthalene	1hr	max	6.8E+00	6.8E+00	1.1E+01
73	naphthalene	1hr	max	1.4E+01	1.4E+01	2.0E+01
74	naphthalene	1hr	max	8.3E+00	8.3E+00	1.1E+01
75	naphthalene	1hr	max	4.7E+01	4.7E+01	5.0E+01
76	naphthalene	1hr	max	1.5E+01	1.5E+01	1.5E+01
77	naphthalene	1hr	max	1.1E+01	1.1E+01	1.1E+01
78	naphthalene	1hr	max	1.1E+01	1.1E+01	1.1E+01
79	naphthalene	1hr	max	5.6E+00	5.6E+00	6.1E+00
1	naphthalene	1hr	9th	3.5E-01	3.5E-01	5.7E-01
2	naphthalene	1hr	9th	6.3E-01	6.3E-01	1.3E+00
3	naphthalene	1hr	9th	7.7E-01	7.7E-01	1.1E+00
4	naphthalene	1hr	9th	8.1E-01	8.1E-01	1.1E+00
5	naphthalene	1hr	9th	7.9E-01	7.9E-01	1.5E+00
6	naphthalene	1hr	9th	1.2E+00	1.2E+00	1.5E+00
7	naphthalene	1hr	9th	1.5E+00	1.5E+00	1.7E+00
8	naphthalene	1hr	9th	1.2E+00	1.2E+00	1.7E+00
9	naphthalene	1hr	9th	4.2E-01	4.2E-01	9.2E-01
10	naphthalene	1hr	9th	5.7E-01	5.7E-01	6.5E-01
11	naphthalene	1hr	9th	4.5E-01	4.5E-01	5.7E-01
12	naphthalene	1hr	9th	5.8E-01	5.8E-01	8.4E-01
13	naphthalene	1hr	9th	8.0E-01	8.0E-01	9.1E-01
14	naphthalene	1hr	9th	9.2E-01	9.2E-01	1.1E+00
15	naphthalene	1hr	9th	8.7E-01	8.7E-01	1.4E+00
16	naphthalene	1hr	9th	7.9E-01	7.9E-01	1.4E+00
17	naphthalene	1hr	9th	1.1E+00	1.1E+00	1.4E+00
18	naphthalene	1hr	9th	1.3E+00	1.3E+00	1.6E+00
19	naphthalene	1hr	9th	1.3E+00	1.3E+00	1.8E+00
20	naphthalene	1hr	9th	1.1E+00	1.1E+00	1.9E+00
21	naphthalene	1hr	9th	1.2E+00	1.2E+00	1.3E+00
22	naphthalene	1hr	9th	9.9E-01	9.9E-01	1.5E+00
23	naphthalene	1hr	9th	7.8E-01	7.8E-01	9.2E-01
24	naphthalene	1hr	9th	1.1E+00	1.1E+00	1.6E+00
25	naphthalene	1hr	9th	1.1E+00	1.1E+00	1.7E+00
26	naphthalene	1hr	9th	1.4E+00	1.4E+00	1.6E+00
27	naphthalene	1hr	9th	1.4E+00	1.4E+00	2.2E+00
28	naphthalene	1hr	9th	1.3E+00	1.3E+00	2.7E+00
29	naphthalene	1hr	9th	1.5E+00	1.5E+00	2.9E+00
30	naphthalene	1hr	9th	1.9E+00	1.9E+00	2.4E+00
31	naphthalene	1hr	9th	1.9E+00	1.9E+00	2.7E+00
32	naphthalene	1hr	9th	2.1E-01	2.1E-01	3.1E-01
33	naphthalene	1hr	9th	9.4E-01	9.4E-01	9.6E-01
34	naphthalene	1hr	9th	6.3E-01	6.3E-01	6.3E-01
35	naphthalene	1hr	9th	4.7E-01	4.7E-01	5.7E-01
36	naphthalene	1hr	9th	5.1E-01	5.1E-01	6.6E-01
37	naphthalene	1hr	9th	4.8E-01	4.8E-01	6.7E-01
38	naphthalene	1hr	9th	1.0E+00	1.0E+00	1.4E+00
39	naphthalene	1hr	9th	1.2E+00	1.2E+00	1.6E+00
40	naphthalene	1hr	9th	1.6E+00	1.6E+00	2.0E+00
41	naphthalene	1hr	9th	1.9E+00	1.9E+00	2.2E+00
42	naphthalene	1hr	9th	1.6E+00	1.6E+00	1.9E+00
43	naphthalene	1hr	9th	1.6E+00	1.6E+00	1.9E+00
44	naphthalene	1hr	9th	1.5E+00	1.5E+00	1.8E+00
45	naphthalene	1hr	9th	1.6E+00	1.6E+00	2.4E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
46	naphthalene	1hr	9th	1.7E+00	1.7E+00	2.5E+00
47	naphthalene	1hr	9th	1.5E+00	1.5E+00	2.4E+00
48	naphthalene	1hr	9th	1.6E+00	1.6E+00	2.4E+00
49	naphthalene	1hr	9th	1.5E+00	1.5E+00	2.5E+00
50	naphthalene	1hr	9th	1.4E+00	1.4E+00	2.2E+00
51	naphthalene	1hr	9th	1.3E+00	1.3E+00	1.8E+00
52	naphthalene	1hr	9th	3.0E+00	3.0E+00	3.5E+00
53	naphthalene	1hr	9th	2.4E+00	2.4E+00	2.7E+00
54	naphthalene	1hr	9th	9.0E-01	9.0E-01	1.1E+00
55	naphthalene	1hr	9th	7.2E-01	7.2E-01	1.6E+00
56	naphthalene	1hr	9th	1.0E+00	1.0E+00	1.3E+00
57	naphthalene	1hr	9th	9.4E-01	9.4E-01	1.5E+00
58	naphthalene	1hr	9th	9.3E-01	9.3E-01	9.6E-01
59	naphthalene	1hr	9th	3.5E+00	3.5E+00	4.2E+00
60	naphthalene	1hr	9th	4.2E+00	4.2E+00	6.2E+00
61	naphthalene	1hr	9th	4.4E+00	4.4E+00	7.9E+00
62	naphthalene	1hr	9th	5.0E+00	5.0E+00	6.4E+00
63	naphthalene	1hr	9th	3.5E+00	3.5E+00	5.3E+00
64	naphthalene	1hr	9th	4.1E+00	4.1E+00	5.3E+00
65	naphthalene	1hr	9th	6.4E+00	6.4E+00	6.5E+00
66	naphthalene	1hr	9th	6.1E-01	6.1E-01	8.7E-01
67	naphthalene	1hr	9th	8.2E-01	8.2E-01	1.1E+00
68	naphthalene	1hr	9th	5.2E-01	5.2E-01	1.3E+00
69	naphthalene	1hr	9th	5.4E-01	5.4E-01	1.1E+00
70	naphthalene	1hr	9th	7.9E-01	7.9E-01	1.4E+00
71	naphthalene	1hr	9th	2.8E+00	2.8E+00	3.9E+00
72	naphthalene	1hr	9th	2.6E+00	2.6E+00	3.3E+00
73	naphthalene	1hr	9th	5.7E+00	5.7E+00	6.5E+00
74	naphthalene	1hr	9th	3.7E+00	3.7E+00	4.1E+00
75	naphthalene	1hr	9th	1.2E+01	1.2E+01	1.4E+01
76	naphthalene	1hr	9th	4.5E+00	4.5E+00	7.9E+00
77	naphthalene	1hr	9th	3.9E+00	3.9E+00	4.8E+00
78	naphthalene	1hr	9th	1.3E+00	1.3E+00	1.3E+00
79	naphthalene	1hr	9th	8.5E-01	8.5E-01	1.8E+00
1	naphthalene	24hr	max	1.2E-01	1.2E-01	1.3E-01
2	naphthalene	24hr	max	1.6E-01	1.6E-01	1.6E-01
3	naphthalene	24hr	max	1.6E-01	1.6E-01	1.8E-01
4	naphthalene	24hr	max	2.2E-01	2.2E-01	2.4E-01
5	naphthalene	24hr	max	1.6E-01	1.6E-01	3.7E-01
6	naphthalene	24hr	max	1.6E-01	1.6E-01	4.2E-01
7	naphthalene	24hr	max	3.4E-01	3.4E-01	3.6E-01
8	naphthalene	24hr	max	1.5E-01	1.5E-01	4.7E-01
9	naphthalene	24hr	max	1.7E-01	1.7E-01	2.4E-01
10	naphthalene	24hr	max	2.0E-01	2.0E-01	2.8E-01
11	naphthalene	24hr	max	2.3E-01	2.3E-01	3.3E-01
12	naphthalene	24hr	max	2.8E-01	2.8E-01	4.1E-01
13	naphthalene	24hr	max	2.8E-01	2.8E-01	3.9E-01
14	naphthalene	24hr	max	2.5E-01	2.5E-01	3.5E-01
15	naphthalene	24hr	max	4.2E-01	4.2E-01	5.1E-01
16	naphthalene	24hr	max	3.8E-01	3.8E-01	4.7E-01
17	naphthalene	24hr	max	2.8E-01	2.8E-01	3.6E-01
18	naphthalene	24hr	max	3.1E-01	3.1E-01	3.1E-01
19	naphthalene	24hr	max	2.7E-01	2.7E-01	3.6E-01
20	naphthalene	24hr	max	2.5E-01	2.5E-01	2.8E-01
21	naphthalene	24hr	max	3.2E-01	3.2E-01	3.7E-01
22	naphthalene	24hr	max	3.3E-01	3.3E-01	3.8E-01
23	naphthalene	24hr	max	3.1E-01	3.1E-01	3.4E-01
24	naphthalene	24hr	max	4.8E-01	4.8E-01	5.4E-01
25	naphthalene	24hr	max	5.4E-01	5.4E-01	6.7E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
26	naphthalene	24hr	max	6.1E-01	6.1E-01	7.1E-01
27	naphthalene	24hr	max	7.1E-01	7.1E-01	7.7E-01
28	naphthalene	24hr	max	3.0E-01	3.0E-01	3.7E-01
29	naphthalene	24hr	max	3.1E-01	3.1E-01	3.9E-01
30	naphthalene	24hr	max	5.6E-01	5.6E-01	8.2E-01
31	naphthalene	24hr	max	5.8E-01	5.8E-01	8.5E-01
32	naphthalene	24hr	max	1.0E-01	1.0E-01	1.5E-01
33	naphthalene	24hr	max	1.5E-01	1.5E-01	2.3E-01
34	naphthalene	24hr	max	1.1E-01	1.1E-01	2.3E-01
35	naphthalene	24hr	max	2.5E-01	2.5E-01	3.1E-01
36	naphthalene	24hr	max	2.5E-01	2.5E-01	3.0E-01
37	naphthalene	24hr	max	2.6E-01	2.6E-01	2.9E-01
38	naphthalene	24hr	max	4.9E-01	4.9E-01	7.0E-01
39	naphthalene	24hr	max	4.9E-01	4.9E-01	5.0E-01
40	naphthalene	24hr	max	3.9E-01	3.9E-01	5.0E-01
41	naphthalene	24hr	max	8.2E-01	8.2E-01	9.3E-01
42	naphthalene	24hr	max	4.8E-01	4.8E-01	4.8E-01
43	naphthalene	24hr	max	4.0E-01	4.0E-01	5.1E-01
44	naphthalene	24hr	max	4.0E-01	4.0E-01	4.2E-01
45	naphthalene	24hr	max	3.3E-01	3.3E-01	4.6E-01
46	naphthalene	24hr	max	3.3E-01	3.3E-01	4.6E-01
47	naphthalene	24hr	max	3.0E-01	3.0E-01	5.4E-01
48	naphthalene	24hr	max	3.4E-01	3.4E-01	4.6E-01
49	naphthalene	24hr	max	3.3E-01	3.3E-01	4.5E-01
50	naphthalene	24hr	max	3.7E-01	3.7E-01	3.9E-01
51	naphthalene	24hr	max	4.5E-01	4.5E-01	4.6E-01
52	naphthalene	24hr	max	5.9E-01	5.9E-01	6.6E-01
53	naphthalene	24hr	max	6.5E-01	6.5E-01	8.8E-01
54	naphthalene	24hr	max	3.0E-01	3.0E-01	3.3E-01
55	naphthalene	24hr	max	3.6E-01	3.6E-01	3.8E-01
56	naphthalene	24hr	max	3.2E-01	3.2E-01	3.8E-01
57	naphthalene	24hr	max	4.6E-01	4.6E-01	4.8E-01
58	naphthalene	24hr	max	2.2E-01	2.2E-01	2.2E-01
59	naphthalene	24hr	max	6.8E-01	6.8E-01	8.6E-01
60	naphthalene	24hr	max	1.6E+00	1.6E+00	1.7E+00
61	naphthalene	24hr	max	1.3E+00	1.3E+00	1.4E+00
62	naphthalene	24hr	max	1.1E+00	1.1E+00	1.2E+00
63	naphthalene	24hr	max	7.2E-01	7.2E-01	7.8E-01
64	naphthalene	24hr	max	7.7E-01	7.7E-01	7.9E-01
65	naphthalene	24hr	max	9.2E-01	9.2E-01	1.0E+00
66	naphthalene	24hr	max	1.9E-01	1.9E-01	2.3E-01
67	naphthalene	24hr	max	2.1E-01	2.1E-01	4.2E-01
68	naphthalene	24hr	max	2.7E-01	2.7E-01	3.0E-01
69	naphthalene	24hr	max	2.9E-01	2.9E-01	3.2E-01
70	naphthalene	24hr	max	2.5E-01	2.5E-01	2.7E-01
71	naphthalene	24hr	max	5.6E-01	5.6E-01	9.9E-01
72	naphthalene	24hr	max	5.5E-01	5.5E-01	9.4E-01
73	naphthalene	24hr	max	9.0E-01	9.0E-01	1.0E+00
74	naphthalene	24hr	max	6.0E-01	6.0E-01	8.0E-01
75	naphthalene	24hr	max	4.8E+00	4.8E+00	5.2E+00
76	naphthalene	24hr	max	1.6E+00	1.6E+00	1.6E+00
77	naphthalene	24hr	max	6.3E-01	6.3E-01	6.8E-01
78	naphthalene	24hr	max	5.2E-01	5.2E-01	5.3E-01
79	naphthalene	24hr	max	2.8E-01	2.8E-01	3.2E-01
1	naphthalene	annual	average	3.3E-03	3.3E-03	4.4E-03
2	naphthalene	annual	average	5.7E-03	5.7E-03	8.2E-03
3	naphthalene	annual	average	5.8E-03	5.8E-03	8.4E-03
4	naphthalene	annual	average	5.9E-03	5.9E-03	8.8E-03
5	naphthalene	annual	average	6.6E-03	6.6E-03	1.0E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
6	naphthalene	annual	average	6.7E-03	6.7E-03	1.0E-02
7	naphthalene	annual	average	7.2E-03	7.2E-03	1.0E-02
8	naphthalene	annual	average	7.0E-03	7.0E-03	1.1E-02
9	naphthalene	annual	average	5.7E-03	5.7E-03	9.0E-03
10	naphthalene	annual	average	6.7E-03	6.8E-03	9.9E-03
11	naphthalene	annual	average	7.9E-03	7.9E-03	1.1E-02
12	naphthalene	annual	average	7.7E-03	7.8E-03	1.1E-02
13	naphthalene	annual	average	8.2E-03	8.2E-03	1.2E-02
14	naphthalene	annual	average	9.4E-03	9.4E-03	1.4E-02
15	naphthalene	annual	average	8.9E-03	8.9E-03	1.2E-02
16	naphthalene	annual	average	8.7E-03	8.8E-03	1.2E-02
17	naphthalene	annual	average	9.0E-03	9.1E-03	1.3E-02
18	naphthalene	annual	average	9.2E-03	9.2E-03	1.3E-02
19	naphthalene	annual	average	9.5E-03	9.5E-03	1.4E-02
20	naphthalene	annual	average	9.7E-03	9.7E-03	1.4E-02
21	naphthalene	annual	average	9.5E-03	9.5E-03	1.3E-02
22	naphthalene	annual	average	9.3E-03	9.3E-03	1.3E-02
23	naphthalene	annual	average	8.2E-03	8.2E-03	1.2E-02
24	naphthalene	annual	average	7.2E-03	7.2E-03	9.9E-03
25	naphthalene	annual	average	9.7E-03	9.8E-03	1.4E-02
26	naphthalene	annual	average	1.2E-02	1.2E-02	1.6E-02
27	naphthalene	annual	average	1.5E-02	1.5E-02	2.0E-02
28	naphthalene	annual	average	1.1E-02	1.1E-02	1.6E-02
29	naphthalene	annual	average	1.1E-02	1.1E-02	1.6E-02
30	naphthalene	annual	average	1.2E-02	1.2E-02	1.7E-02
31	naphthalene	annual	average	1.2E-02	1.2E-02	1.8E-02
32	naphthalene	annual	average	3.1E-03	3.1E-03	4.7E-03
33	naphthalene	annual	average	5.1E-03	5.1E-03	7.1E-03
34	naphthalene	annual	average	5.1E-03	5.1E-03	7.1E-03
35	naphthalene	annual	average	5.0E-03	5.0E-03	6.9E-03
36	naphthalene	annual	average	5.4E-03	5.4E-03	7.2E-03
37	naphthalene	annual	average	5.0E-03	5.0E-03	6.9E-03
38	naphthalene	annual	average	1.2E-02	1.2E-02	1.8E-02
39	naphthalene	annual	average	1.3E-02	1.3E-02	1.9E-02
40	naphthalene	annual	average	1.3E-02	1.3E-02	2.0E-02
41	naphthalene	annual	average	1.8E-02	1.8E-02	2.5E-02
42	naphthalene	annual	average	1.4E-02	1.4E-02	2.0E-02
43	naphthalene	annual	average	1.5E-02	1.5E-02	2.3E-02
44	naphthalene	annual	average	1.5E-02	1.5E-02	2.2E-02
45	naphthalene	annual	average	1.6E-02	1.6E-02	2.4E-02
46	naphthalene	annual	average	1.6E-02	1.6E-02	2.4E-02
47	naphthalene	annual	average	1.6E-02	1.6E-02	2.5E-02
48	naphthalene	annual	average	1.6E-02	1.6E-02	2.4E-02
49	naphthalene	annual	average	1.6E-02	1.6E-02	2.4E-02
50	naphthalene	annual	average	1.5E-02	1.5E-02	2.3E-02
51	naphthalene	annual	average	1.4E-02	1.4E-02	2.2E-02
52	naphthalene	annual	average	2.5E-02	2.5E-02	3.9E-02
53	naphthalene	annual	average	2.2E-02	2.2E-02	3.3E-02
54	naphthalene	annual	average	6.3E-03	6.3E-03	8.4E-03
55	naphthalene	annual	average	6.6E-03	6.6E-03	8.9E-03
56	naphthalene	annual	average	6.2E-03	6.2E-03	8.6E-03
57	naphthalene	annual	average	7.2E-03	7.2E-03	9.6E-03
58	naphthalene	annual	average	5.4E-03	5.4E-03	6.8E-03
59	naphthalene	annual	average	3.2E-02	3.2E-02	4.7E-02
60	naphthalene	annual	average	5.2E-02	5.2E-02	6.8E-02
61	naphthalene	annual	average	5.7E-02	5.7E-02	7.4E-02
62	naphthalene	annual	average	4.8E-02	4.8E-02	6.4E-02
63	naphthalene	annual	average	4.2E-02	4.2E-02	5.6E-02
64	naphthalene	annual	average	4.3E-02	4.3E-02	5.7E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
65	naphthalene	annual	average	5.1E-02	5.1E-02	6.7E-02
66	naphthalene	annual	average	7.1E-03	7.1E-03	1.0E-02
67	naphthalene	annual	average	8.6E-03	8.6E-03	1.3E-02
68	naphthalene	annual	average	7.3E-03	7.3E-03	1.1E-02
69	naphthalene	annual	average	6.8E-03	6.8E-03	1.0E-02
70	naphthalene	annual	average	6.8E-03	6.8E-03	1.1E-02
71	naphthalene	annual	average	1.7E-02	1.7E-02	2.4E-02
72	naphthalene	annual	average	1.6E-02	1.6E-02	2.3E-02
73	naphthalene	annual	average	5.1E-02	5.1E-02	6.7E-02
74	naphthalene	annual	average	3.1E-02	3.1E-02	4.9E-02
75	naphthalene	annual	average	1.7E-01	1.7E-01	1.9E-01
76	naphthalene	annual	average	5.6E-02	5.6E-02	7.3E-02
77	naphthalene	annual	average	3.5E-02	3.5E-02	5.1E-02
78	naphthalene	annual	average	1.3E-02	1.3E-02	2.0E-02
79	naphthalene	annual	average	9.1E-03	9.2E-03	1.3E-02
1	pentane	1hr	max	5.6E+01	5.6E+01	5.8E+01
2	pentane	1hr	max	7.6E+01	7.6E+01	8.2E+01
3	pentane	1hr	max	8.1E+01	8.1E+01	8.5E+01
4	pentane	1hr	max	9.4E+01	9.4E+01	9.8E+01
5	pentane	1hr	max	8.4E+01	8.4E+01	1.3E+02
6	pentane	1hr	max	7.6E+01	7.6E+01	1.5E+02
7	pentane	1hr	max	9.2E+01	9.2E+01	9.6E+01
8	pentane	1hr	max	7.7E+01	7.7E+01	1.6E+02
9	pentane	1hr	max	1.1E+02	1.1E+02	1.4E+02
10	pentane	1hr	max	7.8E+01	7.8E+01	1.1E+02
11	pentane	1hr	max	9.2E+01	9.2E+01	1.3E+02
12	pentane	1hr	max	1.3E+02	1.3E+02	1.9E+02
13	pentane	1hr	max	1.3E+02	1.3E+02	1.8E+02
14	pentane	1hr	max	1.1E+02	1.1E+02	1.5E+02
15	pentane	1hr	max	2.1E+02	2.1E+02	2.6E+02
16	pentane	1hr	max	1.9E+02	1.9E+02	2.3E+02
17	pentane	1hr	max	1.4E+02	1.4E+02	1.7E+02
18	pentane	1hr	max	1.6E+02	1.6E+02	1.6E+02
19	pentane	1hr	max	1.4E+02	1.4E+02	1.8E+02
20	pentane	1hr	max	1.2E+02	1.2E+02	1.3E+02
21	pentane	1hr	max	1.7E+02	1.7E+02	1.8E+02
22	pentane	1hr	max	1.8E+02	1.8E+02	1.9E+02
23	pentane	1hr	max	1.8E+02	1.8E+02	1.9E+02
24	pentane	1hr	max	1.3E+02	1.3E+02	1.3E+02
25	pentane	1hr	max	2.1E+02	2.1E+02	2.3E+02
26	pentane	1hr	max	1.8E+02	1.8E+02	3.4E+02
27	pentane	1hr	max	3.6E+02	3.6E+02	3.7E+02
28	pentane	1hr	max	1.4E+02	1.4E+02	1.5E+02
29	pentane	1hr	max	1.5E+02	1.5E+02	1.5E+02
30	pentane	1hr	max	1.5E+02	1.5E+02	2.1E+02
31	pentane	1hr	max	1.4E+02	1.4E+02	2.3E+02
32	pentane	1hr	max	4.6E+01	4.6E+01	7.2E+01
33	pentane	1hr	max	4.8E+01	4.8E+01	1.1E+02
34	pentane	1hr	max	4.7E+01	4.7E+01	1.2E+02
35	pentane	1hr	max	1.4E+02	1.4E+02	1.6E+02
36	pentane	1hr	max	1.3E+02	1.3E+02	1.6E+02
37	pentane	1hr	max	1.5E+02	1.5E+02	1.6E+02
38	pentane	1hr	max	2.0E+02	2.0E+02	2.0E+02
39	pentane	1hr	max	2.7E+02	2.7E+02	2.7E+02
40	pentane	1hr	max	2.0E+02	2.0E+02	2.4E+02
41	pentane	1hr	max	4.4E+02	4.4E+02	4.9E+02
42	pentane	1hr	max	2.6E+02	2.6E+02	2.6E+02
43	pentane	1hr	max	2.1E+02	2.1E+02	2.7E+02
44	pentane	1hr	max	2.1E+02	2.1E+02	2.1E+02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
45	pentane	1hr	max	1.7E+02	1.7E+02	2.3E+02
46	pentane	1hr	max	1.7E+02	1.7E+02	2.4E+02
47	pentane	1hr	max	1.5E+02	1.5E+02	2.9E+02
48	pentane	1hr	max	1.7E+02	1.7E+02	2.4E+02
49	pentane	1hr	max	1.7E+02	1.7E+02	2.3E+02
50	pentane	1hr	max	1.9E+02	1.9E+02	1.9E+02
51	pentane	1hr	max	2.4E+02	2.4E+02	2.4E+02
52	pentane	1hr	max	1.7E+02	1.7E+02	1.8E+02
53	pentane	1hr	max	2.1E+02	2.1E+02	2.9E+02
54	pentane	1hr	max	1.4E+02	1.4E+02	1.4E+02
55	pentane	1hr	max	1.3E+02	1.3E+02	1.3E+02
56	pentane	1hr	max	1.3E+02	1.3E+02	1.3E+02
57	pentane	1hr	max	1.3E+02	1.3E+02	1.3E+02
58	pentane	1hr	max	9.7E+01	9.7E+01	9.7E+01
59	pentane	1hr	max	2.4E+02	2.4E+02	3.1E+02
60	pentane	1hr	max	7.2E+02	7.2E+02	7.5E+02
61	pentane	1hr	max	4.0E+02	4.0E+02	4.0E+02
62	pentane	1hr	max	2.3E+02	2.3E+02	2.9E+02
63	pentane	1hr	max	2.4E+02	2.4E+02	2.9E+02
64	pentane	1hr	max	2.5E+02	2.5E+02	3.0E+02
65	pentane	1hr	max	3.5E+02	3.5E+02	5.1E+02
66	pentane	1hr	max	9.3E+01	9.3E+01	1.0E+02
67	pentane	1hr	max	1.0E+02	1.0E+02	2.2E+02
68	pentane	1hr	max	1.5E+02	1.5E+02	1.7E+02
69	pentane	1hr	max	1.6E+02	1.6E+02	1.8E+02
70	pentane	1hr	max	1.4E+02	1.4E+02	1.5E+02
71	pentane	1hr	max	1.8E+02	1.8E+02	2.9E+02
72	pentane	1hr	max	1.8E+02	1.8E+02	2.8E+02
73	pentane	1hr	max	3.5E+02	3.5E+02	5.2E+02
74	pentane	1hr	max	2.1E+02	2.1E+02	2.8E+02
75	pentane	1hr	max	1.2E+03	1.2E+03	1.3E+03
76	pentane	1hr	max	4.0E+02	4.0E+02	4.0E+02
77	pentane	1hr	max	2.9E+02	2.9E+02	2.9E+02
78	pentane	1hr	max	2.9E+02	2.9E+02	2.9E+02
79	pentane	1hr	max	1.5E+02	1.5E+02	1.6E+02
1	pentane	1hr	9th	8.7E+00	8.7E+00	1.5E+01
2	pentane	1hr	9th	1.9E+01	1.9E+01	3.3E+01
3	pentane	1hr	9th	1.9E+01	1.9E+01	3.0E+01
4	pentane	1hr	9th	2.0E+01	2.0E+01	2.9E+01
5	pentane	1hr	9th	2.0E+01	2.0E+01	4.0E+01
6	pentane	1hr	9th	3.0E+01	3.0E+01	4.0E+01
7	pentane	1hr	9th	3.9E+01	3.9E+01	4.4E+01
8	pentane	1hr	9th	2.9E+01	2.9E+01	4.6E+01
9	pentane	1hr	9th	1.1E+01	1.1E+01	2.5E+01
10	pentane	1hr	9th	1.5E+01	1.5E+01	1.6E+01
11	pentane	1hr	9th	1.2E+01	1.2E+01	1.5E+01
12	pentane	1hr	9th	1.5E+01	1.5E+01	2.3E+01
13	pentane	1hr	9th	2.0E+01	2.0E+01	2.4E+01
14	pentane	1hr	9th	2.5E+01	2.5E+01	2.9E+01
15	pentane	1hr	9th	2.3E+01	2.3E+01	3.5E+01
16	pentane	1hr	9th	2.1E+01	2.1E+01	3.5E+01
17	pentane	1hr	9th	2.9E+01	2.9E+01	3.4E+01
18	pentane	1hr	9th	3.2E+01	3.2E+01	4.2E+01
19	pentane	1hr	9th	3.2E+01	3.2E+01	4.6E+01
20	pentane	1hr	9th	2.8E+01	2.8E+01	4.9E+01
21	pentane	1hr	9th	3.0E+01	3.0E+01	3.4E+01
22	pentane	1hr	9th	2.6E+01	2.6E+01	3.9E+01
23	pentane	1hr	9th	2.0E+01	2.0E+01	2.4E+01
24	pentane	1hr	9th	2.7E+01	2.7E+01	3.8E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
25	pentane	1hr	9th	2.8E+01	2.8E+01	4.3E+01
26	pentane	1hr	9th	3.3E+01	3.3E+01	4.2E+01
27	pentane	1hr	9th	3.6E+01	3.6E+01	5.7E+01
28	pentane	1hr	9th	3.4E+01	3.4E+01	7.0E+01
29	pentane	1hr	9th	3.9E+01	3.9E+01	7.5E+01
30	pentane	1hr	9th	4.6E+01	4.6E+01	6.3E+01
31	pentane	1hr	9th	4.9E+01	4.9E+01	6.7E+01
32	pentane	1hr	9th	5.8E+00	5.8E+00	7.3E+00
33	pentane	1hr	9th	2.3E+01	2.3E+01	2.3E+01
34	pentane	1hr	9th	1.5E+01	1.5E+01	1.6E+01
35	pentane	1hr	9th	1.2E+01	1.2E+01	1.4E+01
36	pentane	1hr	9th	1.3E+01	1.3E+01	1.7E+01
37	pentane	1hr	9th	1.2E+01	1.2E+01	1.8E+01
38	pentane	1hr	9th	2.8E+01	2.8E+01	3.5E+01
39	pentane	1hr	9th	2.9E+01	2.9E+01	4.1E+01
40	pentane	1hr	9th	3.6E+01	3.6E+01	4.5E+01
41	pentane	1hr	9th	4.5E+01	4.5E+01	5.5E+01
42	pentane	1hr	9th	3.7E+01	3.7E+01	4.5E+01
43	pentane	1hr	9th	3.7E+01	3.7E+01	4.9E+01
44	pentane	1hr	9th	3.6E+01	3.6E+01	4.9E+01
45	pentane	1hr	9th	3.9E+01	3.9E+01	5.8E+01
46	pentane	1hr	9th	3.6E+01	3.6E+01	5.9E+01
47	pentane	1hr	9th	3.4E+01	3.4E+01	5.6E+01
48	pentane	1hr	9th	3.6E+01	3.6E+01	5.9E+01
49	pentane	1hr	9th	3.8E+01	3.8E+01	5.9E+01
50	pentane	1hr	9th	3.4E+01	3.4E+01	5.9E+01
51	pentane	1hr	9th	2.6E+01	2.6E+01	4.5E+01
52	pentane	1hr	9th	7.5E+01	7.5E+01	8.9E+01
53	pentane	1hr	9th	6.1E+01	6.1E+01	7.2E+01
54	pentane	1hr	9th	2.3E+01	2.3E+01	2.6E+01
55	pentane	1hr	9th	1.8E+01	1.8E+01	4.1E+01
56	pentane	1hr	9th	2.7E+01	2.7E+01	3.3E+01
57	pentane	1hr	9th	2.5E+01	2.5E+01	4.1E+01
58	pentane	1hr	9th	2.4E+01	2.4E+01	2.5E+01
59	pentane	1hr	9th	8.7E+01	8.7E+01	1.1E+02
60	pentane	1hr	9th	1.0E+02	1.0E+02	1.6E+02
61	pentane	1hr	9th	1.1E+02	1.1E+02	2.0E+02
62	pentane	1hr	9th	1.2E+02	1.2E+02	1.7E+02
63	pentane	1hr	9th	8.4E+01	8.4E+01	1.4E+02
64	pentane	1hr	9th	9.6E+01	9.6E+01	1.4E+02
65	pentane	1hr	9th	1.7E+02	1.7E+02	1.7E+02
66	pentane	1hr	9th	1.6E+01	1.6E+01	2.3E+01
67	pentane	1hr	9th	2.2E+01	2.2E+01	2.8E+01
68	pentane	1hr	9th	1.3E+01	1.3E+01	3.4E+01
69	pentane	1hr	9th	1.2E+01	1.2E+01	2.7E+01
70	pentane	1hr	9th	2.1E+01	2.1E+01	3.5E+01
71	pentane	1hr	9th	7.3E+01	7.3E+01	1.0E+02
72	pentane	1hr	9th	6.8E+01	6.8E+01	8.4E+01
73	pentane	1hr	9th	1.5E+02	1.5E+02	1.7E+02
74	pentane	1hr	9th	9.8E+01	9.8E+01	1.0E+02
75	pentane	1hr	9th	3.3E+02	3.3E+02	3.9E+02
76	pentane	1hr	9th	1.1E+02	1.1E+02	2.0E+02
77	pentane	1hr	9th	1.0E+02	1.0E+02	1.3E+02
78	pentane	1hr	9th	3.4E+01	3.4E+01	3.5E+01
79	pentane	1hr	9th	2.2E+01	2.2E+01	4.7E+01
1	pentane	24hr	max	3.0E+00	3.0E+00	3.3E+00
2	pentane	24hr	max	4.3E+00	4.3E+00	4.4E+00
3	pentane	24hr	max	4.2E+00	4.3E+00	4.8E+00
4	pentane	24hr	max	5.7E+00	5.7E+00	6.3E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
5	pentane	24hr	max	4.4E+00	4.4E+00	9.8E+00
6	pentane	24hr	max	4.1E+00	4.2E+00	1.1E+01
7	pentane	24hr	max	8.9E+00	8.9E+00	9.5E+00
8	pentane	24hr	max	4.1E+00	4.2E+00	1.2E+01
9	pentane	24hr	max	4.5E+00	4.5E+00	6.3E+00
10	pentane	24hr	max	5.1E+00	5.1E+00	7.3E+00
11	pentane	24hr	max	5.6E+00	5.6E+00	8.1E+00
12	pentane	24hr	max	6.8E+00	6.8E+00	1.0E+01
13	pentane	24hr	max	6.9E+00	6.9E+00	9.6E+00
14	pentane	24hr	max	6.4E+00	6.4E+00	8.8E+00
15	pentane	24hr	max	1.1E+01	1.1E+01	1.4E+01
16	pentane	24hr	max	1.0E+01	1.0E+01	1.2E+01
17	pentane	24hr	max	7.5E+00	7.6E+00	9.6E+00
18	pentane	24hr	max	8.2E+00	8.2E+00	8.4E+00
19	pentane	24hr	max	7.3E+00	7.3E+00	9.8E+00
20	pentane	24hr	max	6.7E+00	6.7E+00	7.6E+00
21	pentane	24hr	max	8.4E+00	8.4E+00	9.9E+00
22	pentane	24hr	max	8.6E+00	8.6E+00	1.0E+01
23	pentane	24hr	max	8.3E+00	8.3E+00	9.0E+00
24	pentane	24hr	max	1.2E+01	1.2E+01	1.4E+01
25	pentane	24hr	max	1.4E+01	1.4E+01	1.8E+01
26	pentane	24hr	max	1.6E+01	1.6E+01	1.9E+01
27	pentane	24hr	max	1.9E+01	1.9E+01	2.0E+01
28	pentane	24hr	max	7.5E+00	7.6E+00	9.4E+00
29	pentane	24hr	max	8.1E+00	8.1E+00	9.8E+00
30	pentane	24hr	max	1.5E+01	1.5E+01	2.1E+01
31	pentane	24hr	max	1.5E+01	1.5E+01	2.2E+01
32	pentane	24hr	max	2.6E+00	2.7E+00	4.1E+00
33	pentane	24hr	max	3.8E+00	3.8E+00	5.8E+00
34	pentane	24hr	max	2.9E+00	2.9E+00	6.2E+00
35	pentane	24hr	max	6.5E+00	6.6E+00	8.1E+00
36	pentane	24hr	max	6.5E+00	6.5E+00	7.8E+00
37	pentane	24hr	max	7.0E+00	7.0E+00	7.8E+00
38	pentane	24hr	max	1.3E+01	1.3E+01	1.8E+01
39	pentane	24hr	max	1.3E+01	1.3E+01	1.3E+01
40	pentane	24hr	max	1.0E+01	1.0E+01	1.3E+01
41	pentane	24hr	max	2.1E+01	2.1E+01	2.4E+01
42	pentane	24hr	max	1.2E+01	1.2E+01	1.3E+01
43	pentane	24hr	max	1.0E+01	1.0E+01	1.3E+01
44	pentane	24hr	max	1.1E+01	1.1E+01	1.1E+01
45	pentane	24hr	max	8.7E+00	8.7E+00	1.2E+01
46	pentane	24hr	max	8.7E+00	8.8E+00	1.2E+01
47	pentane	24hr	max	7.8E+00	7.8E+00	1.4E+01
48	pentane	24hr	max	9.2E+00	9.2E+00	1.2E+01
49	pentane	24hr	max	8.7E+00	8.7E+00	1.2E+01
50	pentane	24hr	max	9.6E+00	9.6E+00	1.0E+01
51	pentane	24hr	max	1.2E+01	1.2E+01	1.2E+01
52	pentane	24hr	max	1.5E+01	1.5E+01	1.7E+01
53	pentane	24hr	max	1.6E+01	1.6E+01	2.2E+01
54	pentane	24hr	max	7.6E+00	7.6E+00	8.5E+00
55	pentane	24hr	max	9.3E+00	9.3E+00	9.9E+00
56	pentane	24hr	max	8.1E+00	8.1E+00	9.7E+00
57	pentane	24hr	max	1.2E+01	1.2E+01	1.2E+01
58	pentane	24hr	max	5.4E+00	5.4E+00	5.4E+00
59	pentane	24hr	max	1.7E+01	1.7E+01	2.2E+01
60	pentane	24hr	max	4.0E+01	4.0E+01	4.3E+01
61	pentane	24hr	max	3.4E+01	3.4E+01	3.5E+01
62	pentane	24hr	max	2.9E+01	2.9E+01	2.9E+01
63	pentane	24hr	max	1.8E+01	1.8E+01	2.0E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
64	pentane	24hr	max	2.0E+01	2.0E+01	2.0E+01
65	pentane	24hr	max	2.3E+01	2.3E+01	2.6E+01
66	pentane	24hr	max	4.9E+00	4.9E+00	6.0E+00
67	pentane	24hr	max	5.4E+00	5.5E+00	1.1E+01
68	pentane	24hr	max	7.0E+00	7.1E+00	7.8E+00
69	pentane	24hr	max	7.4E+00	7.5E+00	8.3E+00
70	pentane	24hr	max	6.6E+00	6.6E+00	7.1E+00
71	pentane	24hr	max	1.4E+01	1.4E+01	2.5E+01
72	pentane	24hr	max	1.4E+01	1.4E+01	2.4E+01
73	pentane	24hr	max	2.4E+01	2.4E+01	2.7E+01
74	pentane	24hr	max	1.5E+01	1.5E+01	2.1E+01
75	pentane	24hr	max	1.3E+02	1.3E+02	1.4E+02
76	pentane	24hr	max	4.0E+01	4.0E+01	4.1E+01
77	pentane	24hr	max	1.7E+01	1.7E+01	1.8E+01
78	pentane	24hr	max	1.4E+01	1.4E+01	1.4E+01
79	pentane	24hr	max	7.3E+00	7.3E+00	8.5E+00
1	pentane	annual	average	8.8E-02	9.0E-02	1.2E-01
2	pentane	annual	average	1.6E-01	1.7E-01	2.3E-01
3	pentane	annual	average	1.7E-01	1.7E-01	2.4E-01
4	pentane	annual	average	1.7E-01	1.8E-01	2.5E-01
5	pentane	annual	average	1.9E-01	1.9E-01	2.8E-01
6	pentane	annual	average	1.9E-01	2.0E-01	2.9E-01
7	pentane	annual	average	2.0E-01	2.1E-01	2.9E-01
8	pentane	annual	average	2.0E-01	2.1E-01	3.0E-01
9	pentane	annual	average	1.7E-01	1.7E-01	2.6E-01
10	pentane	annual	average	2.0E-01	2.0E-01	2.8E-01
11	pentane	annual	average	2.3E-01	2.4E-01	3.3E-01
12	pentane	annual	average	2.2E-01	2.3E-01	3.2E-01
13	pentane	annual	average	2.3E-01	2.4E-01	3.3E-01
14	pentane	annual	average	2.6E-01	2.7E-01	3.9E-01
15	pentane	annual	average	2.5E-01	2.7E-01	3.5E-01
16	pentane	annual	average	2.4E-01	2.6E-01	3.5E-01
17	pentane	annual	average	2.5E-01	2.7E-01	3.6E-01
18	pentane	annual	average	2.6E-01	2.8E-01	3.7E-01
19	pentane	annual	average	2.6E-01	2.8E-01	3.9E-01
20	pentane	annual	average	2.7E-01	2.9E-01	4.1E-01
21	pentane	annual	average	3.4E-01	3.6E-01	4.5E-01
22	pentane	annual	average	2.8E-01	2.9E-01	3.9E-01
23	pentane	annual	average	2.3E-01	2.4E-01	3.3E-01
24	pentane	annual	average	2.0E-01	2.1E-01	2.8E-01
25	pentane	annual	average	2.7E-01	3.1E-01	4.3E-01
26	pentane	annual	average	3.3E-01	3.6E-01	4.7E-01
27	pentane	annual	average	4.2E-01	4.7E-01	6.0E-01
28	pentane	annual	average	3.0E-01	3.2E-01	4.5E-01
29	pentane	annual	average	3.1E-01	3.3E-01	4.5E-01
30	pentane	annual	average	3.2E-01	3.3E-01	4.6E-01
31	pentane	annual	average	3.4E-01	3.5E-01	4.8E-01
32	pentane	annual	average	8.7E-02	9.0E-02	1.3E-01
33	pentane	annual	average	1.4E-01	1.4E-01	2.0E-01
34	pentane	annual	average	1.4E-01	1.5E-01	2.0E-01
35	pentane	annual	average	1.4E-01	1.4E-01	1.9E-01
36	pentane	annual	average	1.5E-01	1.6E-01	2.0E-01
37	pentane	annual	average	1.4E-01	1.5E-01	1.9E-01
38	pentane	annual	average	3.4E-01	3.6E-01	4.9E-01
39	pentane	annual	average	3.6E-01	3.8E-01	5.2E-01
40	pentane	annual	average	3.8E-01	3.9E-01	5.5E-01
41	pentane	annual	average	4.9E-01	5.1E-01	6.7E-01
42	pentane	annual	average	4.0E-01	4.1E-01	5.6E-01
43	pentane	annual	average	5.0E-01	5.1E-01	6.9E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
44	pentane	annual	average	5.5E-01	5.7E-01	7.4E-01
45	pentane	annual	average	4.6E-01	4.7E-01	6.5E-01
46	pentane	annual	average	4.6E-01	4.8E-01	6.6E-01
47	pentane	annual	average	4.7E-01	4.8E-01	6.8E-01
48	pentane	annual	average	5.4E-01	5.5E-01	7.4E-01
49	pentane	annual	average	4.9E-01	5.0E-01	6.9E-01
50	pentane	annual	average	4.7E-01	4.8E-01	6.6E-01
51	pentane	annual	average	4.1E-01	4.2E-01	5.9E-01
52	pentane	annual	average	7.1E-01	7.2E-01	9.9E-01
53	pentane	annual	average	6.2E-01	6.2E-01	8.5E-01
54	pentane	annual	average	1.8E-01	1.8E-01	2.3E-01
55	pentane	annual	average	1.9E-01	1.9E-01	2.5E-01
56	pentane	annual	average	1.7E-01	1.8E-01	2.4E-01
57	pentane	annual	average	2.0E-01	2.1E-01	2.7E-01
58	pentane	annual	average	1.5E-01	1.5E-01	1.9E-01
59	pentane	annual	average	8.8E-01	8.8E-01	1.2E+00
60	pentane	annual	average	1.4E+00	1.4E+00	1.8E+00
61	pentane	annual	average	1.6E+00	1.6E+00	2.0E+00
62	pentane	annual	average	1.3E+00	1.3E+00	1.7E+00
63	pentane	annual	average	1.1E+00	1.2E+00	1.5E+00
64	pentane	annual	average	1.2E+00	1.2E+00	1.5E+00
65	pentane	annual	average	1.5E+00	1.5E+00	1.9E+00
66	pentane	annual	average	2.1E-01	2.1E-01	2.9E-01
67	pentane	annual	average	2.5E-01	2.5E-01	3.5E-01
68	pentane	annual	average	2.1E-01	2.2E-01	3.1E-01
69	pentane	annual	average	2.0E-01	2.0E-01	2.9E-01
70	pentane	annual	average	2.0E-01	2.0E-01	3.0E-01
71	pentane	annual	average	4.7E-01	4.8E-01	6.5E-01
72	pentane	annual	average	4.5E-01	4.6E-01	6.3E-01
73	pentane	annual	average	2.0E+00	2.0E+00	2.4E+00
74	pentane	annual	average	8.6E-01	8.6E-01	1.2E+00
75	pentane	annual	average	1.0E+01	1.0E+01	1.1E+01
76	pentane	annual	average	1.5E+00	1.5E+00	2.0E+00
77	pentane	annual	average	9.7E-01	9.7E-01	1.3E+00
78	pentane	annual	average	3.8E-01	3.9E-01	5.3E-01
79	pentane	annual	average	3.0E-01	3.1E-01	4.0E-01
1	perylene	1hr	max	2.5E-07	2.5E-07	2.6E-07
2	perylene	1hr	max	1.6E-07	1.6E-07	2.0E-07
3	perylene	1hr	max	1.6E-07	1.6E-07	2.0E-07
4	perylene	1hr	max	1.6E-07	1.6E-07	2.1E-07
5	perylene	1hr	max	1.7E-07	1.7E-07	2.1E-07
6	perylene	1hr	max	1.8E-07	1.8E-07	2.1E-07
7	perylene	1hr	max	1.8E-07	1.8E-07	2.1E-07
8	perylene	1hr	max	1.8E-07	1.8E-07	2.1E-07
9	perylene	1hr	max	1.4E-07	1.4E-07	1.7E-07
10	perylene	1hr	max	1.9E-07	1.9E-07	2.1E-07
11	perylene	1hr	max	2.1E-07	2.1E-07	2.4E-07
12	perylene	1hr	max	2.1E-07	2.1E-07	2.3E-07
13	perylene	1hr	max	2.0E-07	2.0E-07	2.4E-07
14	perylene	1hr	max	4.8E-07	4.8E-07	4.9E-07
15	perylene	1hr	max	2.2E-07	2.2E-07	2.5E-07
16	perylene	1hr	max	2.2E-07	2.2E-07	2.5E-07
17	perylene	1hr	max	2.3E-07	2.3E-07	2.6E-07
18	perylene	1hr	max	2.2E-07	2.2E-07	2.4E-07
19	perylene	1hr	max	2.2E-07	2.2E-07	2.3E-07
20	perylene	1hr	max	2.0E-07	2.0E-07	2.4E-07
21	perylene	1hr	max	2.2E-07	2.2E-07	3.2E-07
22	perylene	1hr	max	2.2E-07	2.2E-07	3.1E-07
23	perylene	1hr	max	2.2E-07	2.2E-07	2.8E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
24	perylene	1hr	max	1.7E-07	1.7E-07	2.0E-07
25	perylene	1hr	max	3.0E-07	3.0E-07	3.2E-07
26	perylene	1hr	max	2.8E-07	2.8E-07	3.2E-07
27	perylene	1hr	max	3.1E-07	3.1E-07	4.0E-07
28	perylene	1hr	max	2.3E-07	2.3E-07	3.0E-07
29	perylene	1hr	max	2.3E-07	2.3E-07	3.1E-07
30	perylene	1hr	max	4.5E-07	4.5E-07	4.6E-07
31	perylene	1hr	max	4.5E-07	4.5E-07	4.6E-07
32	perylene	1hr	max	2.7E-07	2.7E-07	2.7E-07
33	perylene	1hr	max	3.2E-07	3.2E-07	3.3E-07
34	perylene	1hr	max	3.0E-07	3.0E-07	3.0E-07
35	perylene	1hr	max	3.2E-07	3.2E-07	3.2E-07
36	perylene	1hr	max	3.1E-07	3.1E-07	3.2E-07
37	perylene	1hr	max	3.1E-07	3.1E-07	3.2E-07
38	perylene	1hr	max	2.5E-07	2.5E-07	3.0E-07
39	perylene	1hr	max	2.4E-07	2.4E-07	3.2E-07
40	perylene	1hr	max	2.7E-07	2.7E-07	3.0E-07
41	perylene	1hr	max	2.5E-07	2.5E-07	2.8E-07
42	perylene	1hr	max	3.0E-07	3.0E-07	3.1E-07
43	perylene	1hr	max	3.2E-07	3.2E-07	3.3E-07
44	perylene	1hr	max	3.2E-07	3.2E-07	3.3E-07
45	perylene	1hr	max	3.2E-07	3.2E-07	3.4E-07
46	perylene	1hr	max	3.2E-07	3.2E-07	3.4E-07
47	perylene	1hr	max	3.2E-07	3.2E-07	3.6E-07
48	perylene	1hr	max	3.2E-07	3.2E-07	3.4E-07
49	perylene	1hr	max	3.2E-07	3.2E-07	3.4E-07
50	perylene	1hr	max	3.3E-07	3.3E-07	3.6E-07
51	perylene	1hr	max	3.2E-07	3.2E-07	3.3E-07
52	perylene	1hr	max	3.9E-07	3.9E-07	1.2E-06
53	perylene	1hr	max	3.8E-07	3.8E-07	5.5E-07
54	perylene	1hr	max	1.7E-07	1.7E-07	1.9E-07
55	perylene	1hr	max	1.9E-07	1.9E-07	2.1E-07
56	perylene	1hr	max	1.9E-07	1.9E-07	2.2E-07
57	perylene	1hr	max	1.6E-07	1.6E-07	1.9E-07
58	perylene	1hr	max	2.2E-07	2.2E-07	2.5E-07
59	perylene	1hr	max	5.2E-07	5.2E-07	7.4E-07
60	perylene	1hr	max	7.1E-07	7.1E-07	7.2E-07
61	perylene	1hr	max	6.3E-07	6.3E-07	6.8E-07
62	perylene	1hr	max	5.4E-07	5.4E-07	5.8E-07
63	perylene	1hr	max	5.0E-07	5.0E-07	6.0E-07
64	perylene	1hr	max	4.3E-07	4.3E-07	4.7E-07
65	perylene	1hr	max	6.4E-07	6.4E-07	6.9E-07
66	perylene	1hr	max	2.5E-07	2.5E-07	2.5E-07
67	perylene	1hr	max	2.1E-07	2.1E-07	2.3E-07
68	perylene	1hr	max	2.5E-07	2.5E-07	2.7E-07
69	perylene	1hr	max	2.1E-07	2.1E-07	2.5E-07
70	perylene	1hr	max	1.9E-07	1.9E-07	2.2E-07
71	perylene	1hr	max	5.1E-07	5.1E-07	5.6E-07
72	perylene	1hr	max	5.0E-07	5.0E-07	6.2E-07
73	perylene	1hr	max	6.4E-07	6.4E-07	6.9E-07
74	perylene	1hr	max	4.7E-07	4.7E-07	1.6E-06
75	perylene	1hr	max	7.6E-07	7.6E-07	8.3E-07
76	perylene	1hr	max	6.2E-07	6.2E-07	6.7E-07
77	perylene	1hr	max	4.8E-07	4.8E-07	5.6E-06
78	perylene	1hr	max	2.9E-07	2.9E-07	3.0E-07
79	perylene	1hr	max	2.3E-07	2.3E-07	3.2E-07
1	perylene	1hr	9th	1.2E-07	1.2E-07	1.4E-07
2	perylene	1hr	9th	1.3E-07	1.3E-07	1.5E-07
3	perylene	1hr	9th	1.3E-07	1.3E-07	1.5E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
4	perylene	1hr	9th	1.3E-07	1.3E-07	1.6E-07
5	perylene	1hr	9th	1.4E-07	1.4E-07	1.6E-07
6	perylene	1hr	9th	1.4E-07	1.4E-07	1.6E-07
7	perylene	1hr	9th	1.4E-07	1.4E-07	1.6E-07
8	perylene	1hr	9th	1.4E-07	1.4E-07	1.7E-07
9	perylene	1hr	9th	1.1E-07	1.1E-07	1.4E-07
10	perylene	1hr	9th	1.4E-07	1.4E-07	1.5E-07
11	perylene	1hr	9th	1.6E-07	1.6E-07	1.7E-07
12	perylene	1hr	9th	1.6E-07	1.6E-07	1.9E-07
13	perylene	1hr	9th	1.7E-07	1.7E-07	1.9E-07
14	perylene	1hr	9th	2.0E-07	2.0E-07	2.1E-07
15	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
16	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
17	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
18	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
19	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
20	perylene	1hr	9th	1.6E-07	1.6E-07	1.8E-07
21	perylene	1hr	9th	1.6E-07	1.6E-07	1.8E-07
22	perylene	1hr	9th	1.6E-07	1.6E-07	1.8E-07
23	perylene	1hr	9th	1.5E-07	1.5E-07	1.8E-07
24	perylene	1hr	9th	1.5E-07	1.5E-07	1.6E-07
25	perylene	1hr	9th	2.4E-07	2.4E-07	2.7E-07
26	perylene	1hr	9th	1.9E-07	1.9E-07	2.2E-07
27	perylene	1hr	9th	2.4E-07	2.4E-07	2.8E-07
28	perylene	1hr	9th	1.7E-07	1.7E-07	1.8E-07
29	perylene	1hr	9th	1.7E-07	1.7E-07	1.9E-07
30	perylene	1hr	9th	2.6E-07	2.6E-07	2.9E-07
31	perylene	1hr	9th	2.8E-07	2.8E-07	3.0E-07
32	perylene	1hr	9th	1.4E-07	1.4E-07	1.7E-07
33	perylene	1hr	9th	1.9E-07	1.9E-07	2.0E-07
34	perylene	1hr	9th	1.7E-07	1.7E-07	2.0E-07
35	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
36	perylene	1hr	9th	1.8E-07	1.8E-07	1.8E-07
37	perylene	1hr	9th	1.7E-07	1.7E-07	1.9E-07
38	perylene	1hr	9th	1.7E-07	1.7E-07	2.0E-07
39	perylene	1hr	9th	1.8E-07	1.8E-07	2.0E-07
40	perylene	1hr	9th	2.0E-07	2.0E-07	2.2E-07
41	perylene	1hr	9th	2.0E-07	2.0E-07	2.1E-07
42	perylene	1hr	9th	1.8E-07	1.8E-07	2.2E-07
43	perylene	1hr	9th	1.8E-07	1.8E-07	2.2E-07
44	perylene	1hr	9th	1.8E-07	1.8E-07	2.2E-07
45	perylene	1hr	9th	1.8E-07	1.8E-07	2.3E-07
46	perylene	1hr	9th	1.8E-07	1.8E-07	2.3E-07
47	perylene	1hr	9th	1.8E-07	1.8E-07	2.5E-07
48	perylene	1hr	9th	1.8E-07	1.8E-07	2.4E-07
49	perylene	1hr	9th	1.8E-07	1.8E-07	2.4E-07
50	perylene	1hr	9th	1.9E-07	1.9E-07	2.5E-07
51	perylene	1hr	9th	1.8E-07	1.8E-07	2.2E-07
52	perylene	1hr	9th	3.0E-07	3.0E-07	6.2E-07
53	perylene	1hr	9th	2.5E-07	2.5E-07	3.5E-07
54	perylene	1hr	9th	1.3E-07	1.3E-07	1.5E-07
55	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
56	perylene	1hr	9th	1.6E-07	1.6E-07	1.7E-07
57	perylene	1hr	9th	1.4E-07	1.4E-07	1.6E-07
58	perylene	1hr	9th	1.4E-07	1.4E-07	1.5E-07
59	perylene	1hr	9th	3.0E-07	3.0E-07	3.7E-07
60	perylene	1hr	9th	4.1E-07	4.1E-07	4.2E-07
61	perylene	1hr	9th	4.1E-07	4.1E-07	4.6E-07
62	perylene	1hr	9th	3.9E-07	3.9E-07	4.1E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
63	perylene	1hr	9th	3.9E-07	3.9E-07	4.6E-07
64	perylene	1hr	9th	3.7E-07	3.7E-07	4.1E-07
65	perylene	1hr	9th	4.0E-07	4.0E-07	4.4E-07
66	perylene	1hr	9th	1.5E-07	1.5E-07	1.7E-07
67	perylene	1hr	9th	1.5E-07	1.5E-07	1.9E-07
68	perylene	1hr	9th	1.4E-07	1.4E-07	1.7E-07
69	perylene	1hr	9th	1.4E-07	1.4E-07	1.7E-07
70	perylene	1hr	9th	1.3E-07	1.3E-07	1.5E-07
71	perylene	1hr	9th	3.5E-07	3.5E-07	4.0E-07
72	perylene	1hr	9th	3.4E-07	3.4E-07	3.9E-07
73	perylene	1hr	9th	4.1E-07	4.1E-07	4.5E-07
74	perylene	1hr	9th	3.2E-07	3.2E-07	6.9E-07
75	perylene	1hr	9th	5.8E-07	5.8E-07	6.6E-07
76	perylene	1hr	9th	4.1E-07	4.1E-07	4.6E-07
77	perylene	1hr	9th	3.3E-07	3.3E-07	2.4E-06
78	perylene	1hr	9th	1.9E-07	1.9E-07	2.1E-07
79	perylene	1hr	9th	1.5E-07	1.5E-07	1.8E-07
1	perylene	24hr	max	6.0E-08	6.0E-08	6.7E-08
2	perylene	24hr	max	6.3E-08	6.3E-08	7.9E-08
3	perylene	24hr	max	6.4E-08	6.4E-08	8.0E-08
4	perylene	24hr	max	6.7E-08	6.7E-08	8.3E-08
5	perylene	24hr	max	7.1E-08	7.1E-08	8.6E-08
6	perylene	24hr	max	7.1E-08	7.1E-08	8.7E-08
7	perylene	24hr	max	6.8E-08	6.8E-08	8.4E-08
8	perylene	24hr	max	7.1E-08	7.1E-08	8.6E-08
9	perylene	24hr	max	6.6E-08	6.6E-08	7.9E-08
10	perylene	24hr	max	4.9E-08	4.9E-08	6.7E-08
11	perylene	24hr	max	5.5E-08	5.5E-08	7.3E-08
12	perylene	24hr	max	6.8E-08	6.8E-08	8.5E-08
13	perylene	24hr	max	7.6E-08	7.6E-08	9.5E-08
14	perylene	24hr	max	7.3E-08	7.3E-08	7.7E-08
15	perylene	24hr	max	7.2E-08	7.2E-08	9.2E-08
16	perylene	24hr	max	7.2E-08	7.2E-08	9.2E-08
17	perylene	24hr	max	7.4E-08	7.4E-08	8.8E-08
18	perylene	24hr	max	7.4E-08	7.4E-08	8.5E-08
19	perylene	24hr	max	7.4E-08	7.4E-08	8.5E-08
20	perylene	24hr	max	7.4E-08	7.4E-08	8.4E-08
21	perylene	24hr	max	6.0E-08	6.0E-08	7.5E-08
22	perylene	24hr	max	6.1E-08	6.1E-08	7.6E-08
23	perylene	24hr	max	6.9E-08	6.9E-08	8.2E-08
24	perylene	24hr	max	7.8E-08	7.8E-08	9.0E-08
25	perylene	24hr	max	1.3E-07	1.3E-07	1.5E-07
26	perylene	24hr	max	9.4E-08	9.4E-08	1.1E-07
27	perylene	24hr	max	9.1E-08	9.1E-08	1.3E-07
28	perylene	24hr	max	6.3E-08	6.3E-08	8.4E-08
29	perylene	24hr	max	6.2E-08	6.2E-08	8.5E-08
30	perylene	24hr	max	1.2E-07	1.2E-07	1.3E-07
31	perylene	24hr	max	1.3E-07	1.3E-07	1.4E-07
32	perylene	24hr	max	5.9E-08	5.9E-08	7.7E-08
33	perylene	24hr	max	7.0E-08	7.0E-08	8.7E-08
34	perylene	24hr	max	7.6E-08	7.6E-08	8.6E-08
35	perylene	24hr	max	8.3E-08	8.3E-08	8.7E-08
36	perylene	24hr	max	8.5E-08	8.5E-08	9.0E-08
37	perylene	24hr	max	8.6E-08	8.6E-08	9.1E-08
38	perylene	24hr	max	7.4E-08	7.4E-08	8.6E-08
39	perylene	24hr	max	7.5E-08	7.5E-08	9.5E-08
40	perylene	24hr	max	7.8E-08	7.8E-08	1.1E-07
41	perylene	24hr	max	8.2E-08	8.2E-08	1.2E-07
42	perylene	24hr	max	8.2E-08	8.2E-08	1.1E-07

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
43	perylene	24hr	max	8.6E-08	8.6E-08	1.2E-07
44	perylene	24hr	max	8.6E-08	8.6E-08	1.2E-07
45	perylene	24hr	max	9.1E-08	9.1E-08	1.3E-07
46	perylene	24hr	max	9.1E-08	9.1E-08	1.3E-07
47	perylene	24hr	max	9.6E-08	9.6E-08	1.3E-07
48	perylene	24hr	max	9.2E-08	9.2E-08	1.3E-07
49	perylene	24hr	max	9.3E-08	9.3E-08	1.3E-07
50	perylene	24hr	max	9.3E-08	9.3E-08	1.4E-07
51	perylene	24hr	max	9.0E-08	9.0E-08	1.3E-07
52	perylene	24hr	max	1.5E-07	1.5E-07	2.8E-07
53	perylene	24hr	max	1.2E-07	1.2E-07	1.8E-07
54	perylene	24hr	max	7.3E-08	7.3E-08	8.1E-08
55	perylene	24hr	max	8.2E-08	8.2E-08	9.0E-08
56	perylene	24hr	max	8.6E-08	8.6E-08	9.5E-08
57	perylene	24hr	max	7.1E-08	7.1E-08	8.2E-08
58	perylene	24hr	max	6.8E-08	6.8E-08	7.4E-08
59	perylene	24hr	max	1.6E-07	1.6E-07	1.8E-07
60	perylene	24hr	max	1.7E-07	1.7E-07	2.0E-07
61	perylene	24hr	max	2.2E-07	2.2E-07	2.5E-07
62	perylene	24hr	max	2.0E-07	2.0E-07	2.2E-07
63	perylene	24hr	max	2.0E-07	2.0E-07	2.2E-07
64	perylene	24hr	max	1.9E-07	1.9E-07	2.1E-07
65	perylene	24hr	max	2.1E-07	2.1E-07	2.3E-07
66	perylene	24hr	max	7.3E-08	7.3E-08	9.2E-08
67	perylene	24hr	max	7.6E-08	7.6E-08	1.0E-07
68	perylene	24hr	max	7.1E-08	7.1E-08	9.4E-08
69	perylene	24hr	max	6.4E-08	6.4E-08	8.8E-08
70	perylene	24hr	max	5.4E-08	5.4E-08	7.3E-08
71	perylene	24hr	max	1.8E-07	1.8E-07	2.0E-07
72	perylene	24hr	max	1.8E-07	1.8E-07	2.0E-07
73	perylene	24hr	max	2.1E-07	2.1E-07	2.3E-07
74	perylene	24hr	max	1.6E-07	1.6E-07	2.1E-07
75	perylene	24hr	max	3.0E-07	3.0E-07	3.3E-07
76	perylene	24hr	max	2.2E-07	2.2E-07	2.4E-07
77	perylene	24hr	max	1.7E-07	1.7E-07	4.6E-07
78	perylene	24hr	max	8.0E-08	8.0E-08	1.0E-07
79	perylene	24hr	max	6.4E-08	6.4E-08	7.8E-08
1	perylene	annual	average	2.2E-09	2.2E-09	2.8E-09
2	perylene	annual	average	4.1E-09	4.1E-09	5.2E-09
3	perylene	annual	average	4.1E-09	4.1E-09	5.3E-09
4	perylene	annual	average	4.4E-09	4.4E-09	5.6E-09
5	perylene	annual	average	4.9E-09	4.9E-09	6.3E-09
6	perylene	annual	average	5.0E-09	5.0E-09	6.5E-09
7	perylene	annual	average	5.0E-09	5.0E-09	6.3E-09
8	perylene	annual	average	5.1E-09	5.1E-09	6.6E-09
9	perylene	annual	average	4.3E-09	4.3E-09	5.7E-09
10	perylene	annual	average	5.4E-09	5.4E-09	7.4E-09
11	perylene	annual	average	6.5E-09	6.5E-09	8.8E-09
12	perylene	annual	average	6.3E-09	6.3E-09	8.5E-09
13	perylene	annual	average	6.1E-09	6.1E-09	8.3E-09
14	perylene	annual	average	8.3E-09	8.3E-09	1.1E-08
15	perylene	annual	average	5.9E-09	5.9E-09	7.7E-09
16	perylene	annual	average	5.9E-09	5.9E-09	7.7E-09
17	perylene	annual	average	6.1E-09	6.1E-09	7.9E-09
18	perylene	annual	average	6.3E-09	6.3E-09	8.3E-09
19	perylene	annual	average	6.4E-09	6.4E-09	8.4E-09
20	perylene	annual	average	6.7E-09	6.7E-09	8.9E-09
21	perylene	annual	average	6.6E-09	6.6E-09	9.0E-09
22	perylene	annual	average	6.5E-09	6.5E-09	8.9E-09

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
23	perylene	annual	average	5.7E-09	5.7E-09	7.7E-09
24	perylene	annual	average	4.8E-09	4.8E-09	6.1E-09
25	perylene	annual	average	6.8E-09	6.8E-09	9.3E-09
26	perylene	annual	average	7.5E-09	7.5E-09	1.0E-08
27	perylene	annual	average	9.1E-09	9.1E-09	1.4E-08
28	perylene	annual	average	7.1E-09	7.1E-09	9.9E-09
29	perylene	annual	average	7.3E-09	7.3E-09	1.0E-08
30	perylene	annual	average	6.0E-09	6.0E-09	7.9E-09
31	perylene	annual	average	6.3E-09	6.3E-09	8.4E-09
32	perylene	annual	average	2.4E-09	2.4E-09	3.2E-09
33	perylene	annual	average	3.2E-09	3.2E-09	4.2E-09
34	perylene	annual	average	3.3E-09	3.3E-09	4.3E-09
35	perylene	annual	average	3.4E-09	3.4E-09	4.4E-09
36	perylene	annual	average	3.7E-09	3.7E-09	4.8E-09
37	perylene	annual	average	3.8E-09	3.8E-09	4.8E-09
38	perylene	annual	average	7.9E-09	7.9E-09	1.1E-08
39	perylene	annual	average	8.3E-09	8.3E-09	1.2E-08
40	perylene	annual	average	8.9E-09	8.9E-09	1.3E-08
41	perylene	annual	average	9.3E-09	9.3E-09	1.4E-08
42	perylene	annual	average	8.5E-09	8.5E-09	1.3E-08
43	perylene	annual	average	8.8E-09	8.8E-09	1.4E-08
44	perylene	annual	average	8.8E-09	8.8E-09	1.4E-08
45	perylene	annual	average	9.0E-09	9.0E-09	1.4E-08
46	perylene	annual	average	9.0E-09	9.0E-09	1.4E-08
47	perylene	annual	average	9.2E-09	9.2E-09	1.4E-08
48	perylene	annual	average	9.0E-09	9.0E-09	1.4E-08
49	perylene	annual	average	9.0E-09	9.1E-09	1.4E-08
50	perylene	annual	average	9.2E-09	9.2E-09	1.4E-08
51	perylene	annual	average	8.8E-09	8.8E-09	1.4E-08
52	perylene	annual	average	1.4E-08	1.4E-08	3.0E-08
53	perylene	annual	average	1.1E-08	1.1E-08	2.1E-08
54	perylene	annual	average	3.7E-09	3.7E-09	4.6E-09
55	perylene	annual	average	4.0E-09	4.0E-09	5.1E-09
56	perylene	annual	average	4.3E-09	4.3E-09	5.5E-09
57	perylene	annual	average	4.3E-09	4.3E-09	5.5E-09
58	perylene	annual	average	3.1E-09	3.1E-09	3.9E-09
59	perylene	annual	average	1.5E-08	1.5E-08	3.1E-08
60	perylene	annual	average	2.1E-08	2.1E-08	2.9E-08
61	perylene	annual	average	2.3E-08	2.3E-08	3.1E-08
62	perylene	annual	average	2.1E-08	2.1E-08	2.9E-08
63	perylene	annual	average	2.0E-08	2.0E-08	3.0E-08
64	perylene	annual	average	1.9E-08	1.9E-08	2.9E-08
65	perylene	annual	average	2.1E-08	2.1E-08	2.9E-08
66	perylene	annual	average	5.2E-09	5.2E-09	7.1E-09
67	perylene	annual	average	6.2E-09	6.2E-09	8.4E-09
68	perylene	annual	average	5.1E-09	5.1E-09	6.8E-09
69	perylene	annual	average	5.0E-09	5.0E-09	6.8E-09
70	perylene	annual	average	4.8E-09	4.8E-09	6.5E-09
71	perylene	annual	average	9.9E-09	9.9E-09	1.4E-08
72	perylene	annual	average	9.8E-09	9.8E-09	1.4E-08
73	perylene	annual	average	2.1E-08	2.1E-08	2.9E-08
74	perylene	annual	average	1.5E-08	1.5E-08	4.0E-08
75	perylene	annual	average	4.0E-08	4.0E-08	4.5E-08
76	perylene	annual	average	2.3E-08	2.3E-08	3.0E-08
77	perylene	annual	average	1.6E-08	1.6E-08	3.3E-08
78	perylene	annual	average	8.4E-09	8.4E-09	1.3E-08
79	perylene	annual	average	6.3E-09	6.3E-09	8.6E-09
1	phenanthrene	1hr	max	9.1E-04	9.1E-04	1.1E-03
2	phenanthrene	1hr	max	1.0E-03	1.0E-03	1.3E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
3	phenanthrene	1hr	max	1.1E-03	1.1E-03	1.4E-03
4	phenanthrene	1hr	max	9.1E-04	9.1E-04	1.2E-03
5	phenanthrene	1hr	max	7.5E-04	7.6E-04	1.1E-03
6	phenanthrene	1hr	max	7.0E-04	7.0E-04	1.1E-03
7	phenanthrene	1hr	max	8.5E-04	8.5E-04	1.1E-03
8	phenanthrene	1hr	max	7.8E-04	7.8E-04	1.1E-03
9	phenanthrene	1hr	max	9.9E-04	9.9E-04	1.7E-03
10	phenanthrene	1hr	max	1.6E-03	1.6E-03	2.0E-03
11	phenanthrene	1hr	max	1.7E-03	1.7E-03	2.3E-03
12	phenanthrene	1hr	max	2.0E-03	2.0E-03	2.9E-03
13	phenanthrene	1hr	max	2.0E-03	2.0E-03	2.9E-03
14	phenanthrene	1hr	max	2.0E-03	2.0E-03	2.6E-03
15	phenanthrene	1hr	max	1.4E-03	1.4E-03	2.7E-03
16	phenanthrene	1hr	max	1.3E-03	1.3E-03	2.7E-03
17	phenanthrene	1hr	max	1.7E-03	1.7E-03	2.0E-03
18	phenanthrene	1hr	max	1.9E-03	1.9E-03	2.2E-03
19	phenanthrene	1hr	max	1.9E-03	1.9E-03	2.2E-03
20	phenanthrene	1hr	max	2.5E-03	2.5E-03	3.0E-03
21	phenanthrene	1hr	max	3.2E-03	3.2E-03	4.3E-03
22	phenanthrene	1hr	max	3.3E-03	3.3E-03	4.2E-03
23	phenanthrene	1hr	max	3.0E-03	3.0E-03	3.5E-03
24	phenanthrene	1hr	max	9.3E-04	9.3E-04	1.1E-03
25	phenanthrene	1hr	max	2.1E-03	2.1E-03	2.6E-03
26	phenanthrene	1hr	max	1.7E-03	1.7E-03	2.8E-03
27	phenanthrene	1hr	max	1.3E-03	1.3E-03	1.8E-03
28	phenanthrene	1hr	max	3.4E-03	3.4E-03	4.1E-03
29	phenanthrene	1hr	max	3.5E-03	3.5E-03	4.2E-03
30	phenanthrene	1hr	max	2.5E-03	2.5E-03	3.6E-03
31	phenanthrene	1hr	max	2.8E-03	2.8E-03	3.9E-03
32	phenanthrene	1hr	max	7.8E-04	7.8E-04	1.3E-03
33	phenanthrene	1hr	max	9.2E-04	9.2E-04	1.7E-03
34	phenanthrene	1hr	max	1.0E-03	1.0E-03	1.8E-03
35	phenanthrene	1hr	max	1.0E-03	1.0E-03	1.5E-03
36	phenanthrene	1hr	max	1.1E-03	1.1E-03	1.7E-03
37	phenanthrene	1hr	max	1.2E-03	1.2E-03	1.7E-03
38	phenanthrene	1hr	max	4.0E-03	4.0E-03	4.8E-03
39	phenanthrene	1hr	max	3.8E-03	3.8E-03	5.0E-03
40	phenanthrene	1hr	max	3.2E-03	3.2E-03	4.6E-03
41	phenanthrene	1hr	max	2.1E-03	2.1E-03	2.9E-03
42	phenanthrene	1hr	max	2.9E-03	2.9E-03	3.7E-03
43	phenanthrene	1hr	max	2.7E-03	2.7E-03	3.5E-03
44	phenanthrene	1hr	max	2.6E-03	2.6E-03	3.4E-03
45	phenanthrene	1hr	max	2.3E-03	2.3E-03	3.0E-03
46	phenanthrene	1hr	max	2.3E-03	2.3E-03	3.0E-03
47	phenanthrene	1hr	max	1.9E-03	1.9E-03	2.5E-03
48	phenanthrene	1hr	max	2.3E-03	2.3E-03	3.0E-03
49	phenanthrene	1hr	max	2.2E-03	2.2E-03	2.8E-03
50	phenanthrene	1hr	max	2.1E-03	2.1E-03	2.7E-03
51	phenanthrene	1hr	max	2.2E-03	2.2E-03	2.8E-03
52	phenanthrene	1hr	max	2.1E-03	2.1E-03	2.8E-03
53	phenanthrene	1hr	max	2.2E-03	2.2E-03	3.4E-03
54	phenanthrene	1hr	max	6.5E-04	6.5E-04	8.9E-04
55	phenanthrene	1hr	max	1.0E-03	1.0E-03	1.2E-03
56	phenanthrene	1hr	max	9.9E-04	9.9E-04	1.1E-03
57	phenanthrene	1hr	max	1.2E-03	1.2E-03	1.3E-03
58	phenanthrene	1hr	max	6.2E-04	6.3E-04	8.1E-04
59	phenanthrene	1hr	max	2.3E-03	2.3E-03	3.6E-03
60	phenanthrene	1hr	max	5.3E-03	5.3E-03	7.6E-03
61	phenanthrene	1hr	max	4.4E-03	4.4E-03	8.2E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
62	phenanthrene	1hr	max	3.6E-03	3.6E-03	7.5E-03
63	phenanthrene	1hr	max	3.0E-03	3.0E-03	6.8E-03
64	phenanthrene	1hr	max	3.0E-03	3.0E-03	7.0E-03
65	phenanthrene	1hr	max	3.6E-03	3.6E-03	7.9E-03
66	phenanthrene	1hr	max	1.4E-03	1.4E-03	2.1E-03
67	phenanthrene	1hr	max	1.9E-03	1.9E-03	2.9E-03
68	phenanthrene	1hr	max	1.5E-03	1.5E-03	2.3E-03
69	phenanthrene	1hr	max	1.6E-03	1.6E-03	2.3E-03
70	phenanthrene	1hr	max	1.4E-03	1.4E-03	2.1E-03
71	phenanthrene	1hr	max	2.2E-03	2.2E-03	3.7E-03
72	phenanthrene	1hr	max	2.2E-03	2.2E-03	3.7E-03
73	phenanthrene	1hr	max	3.6E-03	3.6E-03	7.9E-03
74	phenanthrene	1hr	max	2.9E-03	2.9E-03	3.8E-03
75	phenanthrene	1hr	max	1.1E-02	1.1E-02	1.2E-02
76	phenanthrene	1hr	max	4.3E-03	4.3E-03	8.1E-03
77	phenanthrene	1hr	max	2.6E-03	2.6E-03	4.3E-03
78	phenanthrene	1hr	max	3.0E-03	3.0E-03	3.8E-03
79	phenanthrene	1hr	max	3.4E-03	3.4E-03	4.3E-03
1	phenanthrene	1hr	9th	4.1E-04	4.1E-04	4.9E-04
2	phenanthrene	1hr	9th	4.3E-04	4.3E-04	6.4E-04
3	phenanthrene	1hr	9th	4.4E-04	4.4E-04	6.8E-04
4	phenanthrene	1hr	9th	4.9E-04	4.9E-04	6.2E-04
5	phenanthrene	1hr	9th	4.7E-04	4.7E-04	6.9E-04
6	phenanthrene	1hr	9th	4.7E-04	4.7E-04	6.7E-04
7	phenanthrene	1hr	9th	4.6E-04	4.6E-04	6.3E-04
8	phenanthrene	1hr	9th	4.9E-04	4.9E-04	6.6E-04
9	phenanthrene	1hr	9th	4.3E-04	4.3E-04	5.9E-04
10	phenanthrene	1hr	9th	4.4E-04	4.4E-04	6.7E-04
11	phenanthrene	1hr	9th	4.8E-04	4.8E-04	7.6E-04
12	phenanthrene	1hr	9th	5.0E-04	5.0E-04	8.0E-04
13	phenanthrene	1hr	9th	5.4E-04	5.4E-04	8.1E-04
14	phenanthrene	1hr	9th	5.2E-04	5.2E-04	8.1E-04
15	phenanthrene	1hr	9th	5.8E-04	5.8E-04	7.2E-04
16	phenanthrene	1hr	9th	5.5E-04	5.5E-04	7.1E-04
17	phenanthrene	1hr	9th	5.4E-04	5.4E-04	7.1E-04
18	phenanthrene	1hr	9th	4.8E-04	4.8E-04	7.8E-04
19	phenanthrene	1hr	9th	5.2E-04	5.2E-04	7.9E-04
20	phenanthrene	1hr	9th	5.9E-04	6.0E-04	8.3E-04
21	phenanthrene	1hr	9th	5.7E-04	5.7E-04	7.6E-04
22	phenanthrene	1hr	9th	5.3E-04	5.3E-04	7.1E-04
23	phenanthrene	1hr	9th	4.8E-04	4.8E-04	7.3E-04
24	phenanthrene	1hr	9th	4.9E-04	4.9E-04	7.1E-04
25	phenanthrene	1hr	9th	9.0E-04	9.0E-04	1.2E-03
26	phenanthrene	1hr	9th	8.7E-04	8.7E-04	1.1E-03
27	phenanthrene	1hr	9th	8.4E-04	8.4E-04	1.1E-03
28	phenanthrene	1hr	9th	6.4E-04	6.4E-04	8.8E-04
29	phenanthrene	1hr	9th	6.5E-04	6.5E-04	8.6E-04
30	phenanthrene	1hr	9th	1.0E-03	1.0E-03	1.2E-03
31	phenanthrene	1hr	9th	9.4E-04	9.4E-04	1.3E-03
32	phenanthrene	1hr	9th	4.3E-04	4.3E-04	5.8E-04
33	phenanthrene	1hr	9th	5.8E-04	5.8E-04	8.0E-04
34	phenanthrene	1hr	9th	5.9E-04	5.9E-04	7.4E-04
35	phenanthrene	1hr	9th	5.5E-04	5.5E-04	6.3E-04
36	phenanthrene	1hr	9th	5.3E-04	5.3E-04	6.5E-04
37	phenanthrene	1hr	9th	5.1E-04	5.1E-04	6.8E-04
38	phenanthrene	1hr	9th	6.5E-04	6.5E-04	9.2E-04
39	phenanthrene	1hr	9th	6.2E-04	6.2E-04	9.3E-04
40	phenanthrene	1hr	9th	7.1E-04	7.1E-04	1.0E-03
41	phenanthrene	1hr	9th	8.1E-04	8.1E-04	1.2E-03

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
42	phenanthrene	1hr	9th	7.1E-04	7.1E-04	1.1E-03
43	phenanthrene	1hr	9th	7.1E-04	7.1E-04	1.2E-03
44	phenanthrene	1hr	9th	7.3E-04	7.3E-04	1.2E-03
45	phenanthrene	1hr	9th	7.1E-04	7.1E-04	1.2E-03
46	phenanthrene	1hr	9th	7.2E-04	7.2E-04	1.2E-03
47	phenanthrene	1hr	9th	7.7E-04	7.7E-04	1.2E-03
48	phenanthrene	1hr	9th	7.4E-04	7.4E-04	1.2E-03
49	phenanthrene	1hr	9th	7.5E-04	7.5E-04	1.2E-03
50	phenanthrene	1hr	9th	7.3E-04	7.3E-04	1.2E-03
51	phenanthrene	1hr	9th	7.0E-04	7.0E-04	1.2E-03
52	phenanthrene	1hr	9th	1.2E-03	1.2E-03	1.7E-03
53	phenanthrene	1hr	9th	9.3E-04	9.3E-04	1.4E-03
54	phenanthrene	1hr	9th	4.2E-04	4.2E-04	5.6E-04
55	phenanthrene	1hr	9th	4.1E-04	4.1E-04	6.1E-04
56	phenanthrene	1hr	9th	4.2E-04	4.2E-04	6.3E-04
57	phenanthrene	1hr	9th	3.8E-04	3.8E-04	6.2E-04
58	phenanthrene	1hr	9th	4.2E-04	4.2E-04	6.1E-04
59	phenanthrene	1hr	9th	1.5E-03	1.5E-03	1.7E-03
60	phenanthrene	1hr	9th	2.5E-03	2.5E-03	3.7E-03
61	phenanthrene	1hr	9th	2.6E-03	2.6E-03	3.2E-03
62	phenanthrene	1hr	9th	2.3E-03	2.3E-03	2.9E-03
63	phenanthrene	1hr	9th	2.0E-03	2.0E-03	2.7E-03
64	phenanthrene	1hr	9th	2.1E-03	2.1E-03	2.6E-03
65	phenanthrene	1hr	9th	2.4E-03	2.4E-03	3.0E-03
66	phenanthrene	1hr	9th	4.9E-04	4.9E-04	7.6E-04
67	phenanthrene	1hr	9th	5.6E-04	5.6E-04	8.2E-04
68	phenanthrene	1hr	9th	4.9E-04	4.9E-04	7.9E-04
69	phenanthrene	1hr	9th	4.7E-04	4.7E-04	7.7E-04
70	phenanthrene	1hr	9th	4.1E-04	4.1E-04	7.2E-04
71	phenanthrene	1hr	9th	1.2E-03	1.2E-03	1.8E-03
72	phenanthrene	1hr	9th	1.2E-03	1.2E-03	1.8E-03
73	phenanthrene	1hr	9th	2.4E-03	2.4E-03	3.0E-03
74	phenanthrene	1hr	9th	1.5E-03	1.5E-03	1.8E-03
75	phenanthrene	1hr	9th	7.4E-03	7.4E-03	8.4E-03
76	phenanthrene	1hr	9th	2.6E-03	2.6E-03	3.2E-03
77	phenanthrene	1hr	9th	1.5E-03	1.5E-03	2.4E-03
78	phenanthrene	1hr	9th	6.8E-04	6.8E-04	1.1E-03
79	phenanthrene	1hr	9th	5.5E-04	5.5E-04	7.3E-04
1	phenanthrene	24hr	max	1.4E-04	1.4E-04	1.7E-04
2	phenanthrene	24hr	max	1.8E-04	1.9E-04	2.8E-04
3	phenanthrene	24hr	max	1.9E-04	1.9E-04	2.9E-04
4	phenanthrene	24hr	max	1.8E-04	1.8E-04	2.9E-04
5	phenanthrene	24hr	max	1.9E-04	1.9E-04	2.9E-04
6	phenanthrene	24hr	max	1.9E-04	1.9E-04	2.9E-04
7	phenanthrene	24hr	max	1.8E-04	1.8E-04	2.8E-04
8	phenanthrene	24hr	max	1.9E-04	1.9E-04	2.9E-04
9	phenanthrene	24hr	max	2.0E-04	2.0E-04	2.9E-04
10	phenanthrene	24hr	max	2.4E-04	2.4E-04	3.5E-04
11	phenanthrene	24hr	max	2.4E-04	2.4E-04	3.6E-04
12	phenanthrene	24hr	max	2.3E-04	2.3E-04	3.6E-04
13	phenanthrene	24hr	max	2.1E-04	2.1E-04	3.4E-04
14	phenanthrene	24hr	max	2.5E-04	2.5E-04	3.8E-04
15	phenanthrene	24hr	max	1.8E-04	1.9E-04	3.3E-04
16	phenanthrene	24hr	max	1.9E-04	1.9E-04	3.3E-04
17	phenanthrene	24hr	max	1.8E-04	1.8E-04	3.0E-04
18	phenanthrene	24hr	max	2.0E-04	2.0E-04	2.9E-04
19	phenanthrene	24hr	max	2.0E-04	2.0E-04	3.0E-04
20	phenanthrene	24hr	max	2.3E-04	2.3E-04	3.2E-04
21	phenanthrene	24hr	max	2.7E-04	2.7E-04	4.1E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
22	phenanthrene	24hr	max	2.7E-04	2.7E-04	4.0E-04
23	phenanthrene	24hr	max	2.4E-04	2.4E-04	3.3E-04
24	phenanthrene	24hr	max	1.8E-04	1.8E-04	2.5E-04
25	phenanthrene	24hr	max	3.1E-04	3.1E-04	4.6E-04
26	phenanthrene	24hr	max	2.4E-04	2.4E-04	3.9E-04
27	phenanthrene	24hr	max	2.6E-04	2.7E-04	4.0E-04
28	phenanthrene	24hr	max	3.0E-04	3.0E-04	4.1E-04
29	phenanthrene	24hr	max	3.1E-04	3.1E-04	4.2E-04
30	phenanthrene	24hr	max	4.0E-04	4.0E-04	6.1E-04
31	phenanthrene	24hr	max	4.2E-04	4.2E-04	6.4E-04
32	phenanthrene	24hr	max	1.5E-04	1.5E-04	2.2E-04
33	phenanthrene	24hr	max	1.9E-04	1.9E-04	3.0E-04
34	phenanthrene	24hr	max	2.1E-04	2.1E-04	2.9E-04
35	phenanthrene	24hr	max	1.9E-04	1.9E-04	2.4E-04
36	phenanthrene	24hr	max	2.0E-04	2.0E-04	2.4E-04
37	phenanthrene	24hr	max	1.9E-04	1.9E-04	2.3E-04
38	phenanthrene	24hr	max	3.5E-04	3.5E-04	4.9E-04
39	phenanthrene	24hr	max	3.5E-04	3.5E-04	5.0E-04
40	phenanthrene	24hr	max	3.7E-04	3.7E-04	5.2E-04
41	phenanthrene	24hr	max	3.9E-04	3.9E-04	6.0E-04
42	phenanthrene	24hr	max	3.2E-04	3.2E-04	5.2E-04
43	phenanthrene	24hr	max	3.5E-04	3.5E-04	5.6E-04
44	phenanthrene	24hr	max	3.5E-04	3.5E-04	5.6E-04
45	phenanthrene	24hr	max	3.8E-04	3.8E-04	5.9E-04
46	phenanthrene	24hr	max	3.7E-04	3.7E-04	5.8E-04
47	phenanthrene	24hr	max	3.8E-04	3.8E-04	5.8E-04
48	phenanthrene	24hr	max	3.7E-04	3.7E-04	5.7E-04
49	phenanthrene	24hr	max	3.7E-04	3.7E-04	5.8E-04
50	phenanthrene	24hr	max	3.5E-04	3.5E-04	5.5E-04
51	phenanthrene	24hr	max	3.2E-04	3.2E-04	5.2E-04
52	phenanthrene	24hr	max	4.7E-04	4.7E-04	9.1E-04
53	phenanthrene	24hr	max	4.8E-04	4.8E-04	8.2E-04
54	phenanthrene	24hr	max	1.7E-04	1.7E-04	2.5E-04
55	phenanthrene	24hr	max	1.6E-04	1.6E-04	2.4E-04
56	phenanthrene	24hr	max	1.6E-04	1.6E-04	2.4E-04
57	phenanthrene	24hr	max	1.7E-04	1.7E-04	2.6E-04
58	phenanthrene	24hr	max	1.5E-04	1.5E-04	2.2E-04
59	phenanthrene	24hr	max	5.4E-04	5.4E-04	7.9E-04
60	phenanthrene	24hr	max	7.8E-04	7.8E-04	1.3E-03
61	phenanthrene	24hr	max	8.9E-04	8.9E-04	1.5E-03
62	phenanthrene	24hr	max	7.9E-04	7.9E-04	1.3E-03
63	phenanthrene	24hr	max	6.9E-04	6.9E-04	1.2E-03
64	phenanthrene	24hr	max	7.0E-04	7.0E-04	1.2E-03
65	phenanthrene	24hr	max	8.7E-04	8.7E-04	1.4E-03
66	phenanthrene	24hr	max	2.0E-04	2.0E-04	3.0E-04
67	phenanthrene	24hr	max	2.2E-04	2.2E-04	3.4E-04
68	phenanthrene	24hr	max	2.0E-04	2.0E-04	3.1E-04
69	phenanthrene	24hr	max	1.8E-04	1.8E-04	3.0E-04
70	phenanthrene	24hr	max	1.6E-04	1.6E-04	2.7E-04
71	phenanthrene	24hr	max	4.9E-04	4.9E-04	8.5E-04
72	phenanthrene	24hr	max	4.8E-04	4.8E-04	8.3E-04
73	phenanthrene	24hr	max	8.8E-04	8.8E-04	1.4E-03
74	phenanthrene	24hr	max	5.5E-04	5.5E-04	8.4E-04
75	phenanthrene	24hr	max	3.0E-03	3.0E-03	3.8E-03
76	phenanthrene	24hr	max	8.7E-04	8.7E-04	1.5E-03
77	phenanthrene	24hr	max	5.7E-04	5.7E-04	8.9E-04
78	phenanthrene	24hr	max	3.1E-04	3.1E-04	5.1E-04
79	phenanthrene	24hr	max	2.8E-04	2.8E-04	4.1E-04
1	phenanthrene	annual	average	7.0E-06	7.1E-06	9.9E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
2	phenanthrene	annual	average	1.1E-05	1.1E-05	1.6E-05
3	phenanthrene	annual	average	1.1E-05	1.1E-05	1.7E-05
4	phenanthrene	annual	average	1.2E-05	1.2E-05	1.8E-05
5	phenanthrene	annual	average	1.3E-05	1.3E-05	2.0E-05
6	phenanthrene	annual	average	1.3E-05	1.3E-05	2.0E-05
7	phenanthrene	annual	average	1.3E-05	1.3E-05	1.9E-05
8	phenanthrene	annual	average	1.3E-05	1.4E-05	2.0E-05
9	phenanthrene	annual	average	1.2E-05	1.2E-05	1.9E-05
10	phenanthrene	annual	average	1.6E-05	1.6E-05	2.4E-05
11	phenanthrene	annual	average	1.9E-05	1.9E-05	2.8E-05
12	phenanthrene	annual	average	1.9E-05	1.9E-05	2.7E-05
13	phenanthrene	annual	average	1.8E-05	1.8E-05	2.7E-05
14	phenanthrene	annual	average	2.1E-05	2.2E-05	3.2E-05
15	phenanthrene	annual	average	1.6E-05	1.6E-05	2.4E-05
16	phenanthrene	annual	average	1.6E-05	1.6E-05	2.4E-05
17	phenanthrene	annual	average	1.7E-05	1.7E-05	2.5E-05
18	phenanthrene	annual	average	1.8E-05	1.9E-05	2.7E-05
19	phenanthrene	annual	average	1.8E-05	1.8E-05	2.7E-05
20	phenanthrene	annual	average	1.9E-05	1.9E-05	2.9E-05
21	phenanthrene	annual	average	2.3E-05	2.3E-05	3.3E-05
22	phenanthrene	annual	average	2.0E-05	2.0E-05	3.0E-05
23	phenanthrene	annual	average	1.6E-05	1.6E-05	2.4E-05
24	phenanthrene	annual	average	1.2E-05	1.2E-05	1.8E-05
25	phenanthrene	annual	average	1.7E-05	1.8E-05	2.8E-05
26	phenanthrene	annual	average	1.9E-05	1.9E-05	3.0E-05
27	phenanthrene	annual	average	2.5E-05	2.5E-05	4.0E-05
28	phenanthrene	annual	average	2.0E-05	2.1E-05	3.1E-05
29	phenanthrene	annual	average	2.1E-05	2.1E-05	3.2E-05
30	phenanthrene	annual	average	1.9E-05	1.9E-05	2.8E-05
31	phenanthrene	annual	average	2.0E-05	2.0E-05	2.9E-05
32	phenanthrene	annual	average	7.4E-06	7.5E-06	1.1E-05
33	phenanthrene	annual	average	1.0E-05	1.0E-05	1.6E-05
34	phenanthrene	annual	average	1.1E-05	1.1E-05	1.6E-05
35	phenanthrene	annual	average	1.1E-05	1.1E-05	1.5E-05
36	phenanthrene	annual	average	1.1E-05	1.1E-05	1.6E-05
37	phenanthrene	annual	average	1.1E-05	1.1E-05	1.5E-05
38	phenanthrene	annual	average	2.4E-05	2.4E-05	3.6E-05
39	phenanthrene	annual	average	2.5E-05	2.5E-05	3.8E-05
40	phenanthrene	annual	average	2.6E-05	2.6E-05	4.1E-05
41	phenanthrene	annual	average	2.8E-05	2.9E-05	4.5E-05
42	phenanthrene	annual	average	2.7E-05	2.8E-05	4.2E-05
43	phenanthrene	annual	average	3.0E-05	3.0E-05	4.6E-05
44	phenanthrene	annual	average	3.1E-05	3.1E-05	4.7E-05
45	phenanthrene	annual	average	3.0E-05	3.0E-05	4.6E-05
46	phenanthrene	annual	average	3.0E-05	3.0E-05	4.6E-05
47	phenanthrene	annual	average	3.0E-05	3.0E-05	4.7E-05
48	phenanthrene	annual	average	3.1E-05	3.1E-05	4.8E-05
49	phenanthrene	annual	average	3.0E-05	3.0E-05	4.7E-05
50	phenanthrene	annual	average	3.0E-05	3.0E-05	4.7E-05
51	phenanthrene	annual	average	2.8E-05	2.8E-05	4.4E-05
52	phenanthrene	annual	average	4.4E-05	4.4E-05	7.7E-05
53	phenanthrene	annual	average	3.8E-05	3.8E-05	6.2E-05
54	phenanthrene	annual	average	9.4E-06	9.5E-06	1.4E-05
55	phenanthrene	annual	average	1.0E-05	1.0E-05	1.5E-05
56	phenanthrene	annual	average	1.1E-05	1.1E-05	1.6E-05
57	phenanthrene	annual	average	1.1E-05	1.1E-05	1.6E-05
58	phenanthrene	annual	average	8.1E-06	8.1E-06	1.2E-05
59	phenanthrene	annual	average	5.2E-05	5.2E-05	8.7E-05
60	phenanthrene	annual	average	7.6E-05	7.6E-05	1.1E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
61	phenanthrene	annual	average	9.3E-05	9.3E-05	1.3E-04
62	phenanthrene	annual	average	8.0E-05	8.0E-05	1.1E-04
63	phenanthrene	annual	average	7.0E-05	7.0E-05	1.1E-04
64	phenanthrene	annual	average	7.1E-05	7.2E-05	1.1E-04
65	phenanthrene	annual	average	8.7E-05	8.7E-05	1.2E-04
66	phenanthrene	annual	average	1.6E-05	1.6E-05	2.4E-05
67	phenanthrene	annual	average	1.8E-05	1.8E-05	2.7E-05
68	phenanthrene	annual	average	1.5E-05	1.5E-05	2.3E-05
69	phenanthrene	annual	average	1.5E-05	1.5E-05	2.2E-05
70	phenanthrene	annual	average	1.4E-05	1.4E-05	2.1E-05
71	phenanthrene	annual	average	2.8E-05	2.8E-05	4.3E-05
72	phenanthrene	annual	average	2.7E-05	2.8E-05	4.3E-05
73	phenanthrene	annual	average	9.4E-05	9.4E-05	1.3E-04
74	phenanthrene	annual	average	5.3E-05	5.3E-05	9.5E-05
75	phenanthrene	annual	average	4.1E-04	4.1E-04	4.6E-04
76	phenanthrene	annual	average	9.1E-05	9.1E-05	1.3E-04
77	phenanthrene	annual	average	5.9E-05	5.9E-05	9.6E-05
78	phenanthrene	annual	average	2.6E-05	2.7E-05	4.1E-05
79	phenanthrene	annual	average	2.0E-05	2.0E-05	2.9E-05
1	pyrene	1hr	max	6.7E-05	6.7E-05	8.1E-05
2	pyrene	1hr	max	7.4E-05	7.4E-05	9.2E-05
3	pyrene	1hr	max	7.9E-05	7.9E-05	1.0E-04
4	pyrene	1hr	max	6.6E-05	6.6E-05	9.1E-05
5	pyrene	1hr	max	5.8E-05	5.8E-05	9.4E-05
6	pyrene	1hr	max	5.6E-05	5.6E-05	9.5E-05
7	pyrene	1hr	max	6.5E-05	6.6E-05	8.3E-05
8	pyrene	1hr	max	5.9E-05	5.9E-05	9.3E-05
9	pyrene	1hr	max	7.1E-05	7.1E-05	1.4E-04
10	pyrene	1hr	max	1.1E-04	1.1E-04	1.6E-04
11	pyrene	1hr	max	1.2E-04	1.2E-04	1.8E-04
12	pyrene	1hr	max	1.5E-04	1.5E-04	2.1E-04
13	pyrene	1hr	max	1.5E-04	1.5E-04	2.1E-04
14	pyrene	1hr	max	3.5E-04	3.5E-04	3.5E-04
15	pyrene	1hr	max	9.8E-05	9.8E-05	2.0E-04
16	pyrene	1hr	max	9.3E-05	9.3E-05	2.0E-04
17	pyrene	1hr	max	1.2E-04	1.2E-04	1.5E-04
18	pyrene	1hr	max	1.4E-04	1.4E-04	1.6E-04
19	pyrene	1hr	max	1.4E-04	1.4E-04	1.6E-04
20	pyrene	1hr	max	1.8E-04	1.8E-04	2.2E-04
21	pyrene	1hr	max	2.3E-04	2.3E-04	3.3E-04
22	pyrene	1hr	max	2.3E-04	2.3E-04	3.2E-04
23	pyrene	1hr	max	2.1E-04	2.1E-04	2.7E-04
24	pyrene	1hr	max	6.9E-05	7.0E-05	8.0E-05
25	pyrene	1hr	max	1.5E-04	1.5E-04	1.9E-04
26	pyrene	1hr	max	1.2E-04	1.2E-04	2.0E-04
27	pyrene	1hr	max	9.4E-05	9.4E-05	2.2E-04
28	pyrene	1hr	max	2.4E-04	2.4E-04	3.1E-04
29	pyrene	1hr	max	2.5E-04	2.5E-04	3.2E-04
30	pyrene	1hr	max	1.8E-04	1.8E-04	2.6E-04
31	pyrene	1hr	max	2.0E-04	2.0E-04	2.8E-04
32	pyrene	1hr	max	1.1E-04	1.1E-04	1.1E-04
33	pyrene	1hr	max	7.3E-05	7.3E-05	1.2E-04
34	pyrene	1hr	max	8.0E-05	8.0E-05	1.3E-04
35	pyrene	1hr	max	7.2E-05	7.2E-05	1.1E-04
36	pyrene	1hr	max	8.2E-05	8.2E-05	1.2E-04
37	pyrene	1hr	max	8.8E-05	8.8E-05	1.2E-04
38	pyrene	1hr	max	2.9E-04	2.9E-04	3.4E-04
39	pyrene	1hr	max	2.7E-04	2.7E-04	3.5E-04
40	pyrene	1hr	max	2.2E-04	2.2E-04	3.2E-04

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
41	pyrene	1hr	max	1.5E-04	1.5E-04	2.1E-04
42	pyrene	1hr	max	2.1E-04	2.1E-04	2.7E-04
43	pyrene	1hr	max	2.0E-04	2.0E-04	2.5E-04
44	pyrene	1hr	max	1.9E-04	1.9E-04	2.5E-04
45	pyrene	1hr	max	1.7E-04	1.7E-04	2.1E-04
46	pyrene	1hr	max	1.7E-04	1.7E-04	2.2E-04
47	pyrene	1hr	max	1.4E-04	1.4E-04	1.8E-04
48	pyrene	1hr	max	1.7E-04	1.7E-04	2.1E-04
49	pyrene	1hr	max	1.6E-04	1.6E-04	2.0E-04
50	pyrene	1hr	max	1.6E-04	1.6E-04	2.0E-04
51	pyrene	1hr	max	1.6E-04	1.6E-04	2.0E-04
52	pyrene	1hr	max	1.5E-04	1.5E-04	8.7E-04
53	pyrene	1hr	max	1.6E-04	1.6E-04	3.8E-04
54	pyrene	1hr	max	4.9E-05	4.9E-05	6.9E-05
55	pyrene	1hr	max	7.7E-05	7.7E-05	8.7E-05
56	pyrene	1hr	max	7.3E-05	7.3E-05	9.2E-05
57	pyrene	1hr	max	8.6E-05	8.6E-05	9.6E-05
58	pyrene	1hr	max	4.7E-05	4.8E-05	6.0E-05
59	pyrene	1hr	max	1.7E-04	1.7E-04	5.4E-04
60	pyrene	1hr	max	3.8E-04	3.8E-04	5.4E-04
61	pyrene	1hr	max	3.7E-04	3.7E-04	5.8E-04
62	pyrene	1hr	max	3.1E-04	3.1E-04	5.3E-04
63	pyrene	1hr	max	2.6E-04	2.6E-04	4.8E-04
64	pyrene	1hr	max	2.6E-04	2.6E-04	5.0E-04
65	pyrene	1hr	max	2.7E-04	2.7E-04	5.7E-04
66	pyrene	1hr	max	1.0E-04	1.0E-04	1.6E-04
67	pyrene	1hr	max	1.4E-04	1.4E-04	2.1E-04
68	pyrene	1hr	max	1.1E-04	1.1E-04	1.7E-04
69	pyrene	1hr	max	1.1E-04	1.1E-04	1.7E-04
70	pyrene	1hr	max	1.1E-04	1.1E-04	1.5E-04
71	pyrene	1hr	max	1.6E-04	1.6E-04	2.6E-04
72	pyrene	1hr	max	1.6E-04	1.6E-04	2.7E-04
73	pyrene	1hr	max	2.7E-04	2.7E-04	5.7E-04
74	pyrene	1hr	max	2.1E-04	2.1E-04	1.2E-03
75	pyrene	1hr	max	7.7E-04	7.7E-04	9.1E-04
76	pyrene	1hr	max	3.7E-04	3.7E-04	5.8E-04
77	pyrene	1hr	max	1.8E-04	1.8E-04	4.1E-03
78	pyrene	1hr	max	2.2E-04	2.2E-04	2.8E-04
79	pyrene	1hr	max	2.4E-04	2.4E-04	3.3E-04
1	pyrene	1hr	9th	3.3E-05	3.3E-05	4.6E-05
2	pyrene	1hr	9th	3.7E-05	3.7E-05	6.2E-05
3	pyrene	1hr	9th	3.7E-05	3.7E-05	6.1E-05
4	pyrene	1hr	9th	3.7E-05	3.8E-05	6.2E-05
5	pyrene	1hr	9th	3.8E-05	3.8E-05	6.8E-05
6	pyrene	1hr	9th	3.7E-05	3.7E-05	6.8E-05
7	pyrene	1hr	9th	3.5E-05	3.6E-05	5.5E-05
8	pyrene	1hr	9th	3.8E-05	3.9E-05	6.5E-05
9	pyrene	1hr	9th	3.5E-05	3.5E-05	6.1E-05
10	pyrene	1hr	9th	4.6E-05	4.6E-05	7.9E-05
11	pyrene	1hr	9th	7.5E-05	7.5E-05	9.0E-05
12	pyrene	1hr	9th	4.9E-05	4.9E-05	8.0E-05
13	pyrene	1hr	9th	5.5E-05	5.5E-05	8.4E-05
14	pyrene	1hr	9th	1.5E-04	1.5E-04	1.6E-04
15	pyrene	1hr	9th	4.4E-05	4.4E-05	6.5E-05
16	pyrene	1hr	9th	4.3E-05	4.3E-05	6.5E-05
17	pyrene	1hr	9th	4.3E-05	4.3E-05	6.7E-05
18	pyrene	1hr	9th	3.9E-05	3.9E-05	7.3E-05
19	pyrene	1hr	9th	4.1E-05	4.1E-05	7.2E-05
20	pyrene	1hr	9th	4.7E-05	4.7E-05	7.7E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
21	pyrene	1hr	9th	6.9E-05	6.9E-05	1.0E-04
22	pyrene	1hr	9th	6.1E-05	6.1E-05	8.9E-05
23	pyrene	1hr	9th	4.6E-05	4.6E-05	8.2E-05
24	pyrene	1hr	9th	3.6E-05	3.6E-05	6.0E-05
25	pyrene	1hr	9th	6.9E-05	6.9E-05	1.0E-04
26	pyrene	1hr	9th	6.8E-05	6.8E-05	1.0E-04
27	pyrene	1hr	9th	6.0E-05	6.1E-05	1.6E-04
28	pyrene	1hr	9th	4.7E-05	4.7E-05	9.4E-05
29	pyrene	1hr	9th	4.8E-05	4.9E-05	9.6E-05
30	pyrene	1hr	9th	7.5E-05	7.5E-05	1.0E-04
31	pyrene	1hr	9th	7.4E-05	7.4E-05	1.1E-04
32	pyrene	1hr	9th	3.9E-05	3.9E-05	5.4E-05
33	pyrene	1hr	9th	4.7E-05	4.7E-05	6.7E-05
34	pyrene	1hr	9th	4.7E-05	4.7E-05	5.9E-05
35	pyrene	1hr	9th	4.5E-05	4.5E-05	5.8E-05
36	pyrene	1hr	9th	4.0E-05	4.0E-05	5.9E-05
37	pyrene	1hr	9th	4.0E-05	4.0E-05	5.8E-05
38	pyrene	1hr	9th	5.3E-05	5.3E-05	9.4E-05
39	pyrene	1hr	9th	5.5E-05	5.5E-05	1.0E-04
40	pyrene	1hr	9th	5.6E-05	5.6E-05	1.2E-04
41	pyrene	1hr	9th	6.2E-05	6.2E-05	1.2E-04
42	pyrene	1hr	9th	5.4E-05	5.4E-05	1.2E-04
43	pyrene	1hr	9th	5.5E-05	5.5E-05	1.2E-04
44	pyrene	1hr	9th	5.6E-05	5.6E-05	1.2E-04
45	pyrene	1hr	9th	5.6E-05	5.6E-05	1.2E-04
46	pyrene	1hr	9th	5.7E-05	5.7E-05	1.2E-04
47	pyrene	1hr	9th	5.8E-05	5.8E-05	1.1E-04
48	pyrene	1hr	9th	5.7E-05	5.7E-05	1.1E-04
49	pyrene	1hr	9th	5.7E-05	5.7E-05	1.1E-04
50	pyrene	1hr	9th	5.7E-05	5.7E-05	1.1E-04
51	pyrene	1hr	9th	5.4E-05	5.4E-05	1.1E-04
52	pyrene	1hr	9th	9.1E-05	9.1E-05	4.1E-04
53	pyrene	1hr	9th	7.6E-05	7.6E-05	2.0E-04
54	pyrene	1hr	9th	3.3E-05	3.3E-05	4.7E-05
55	pyrene	1hr	9th	3.3E-05	3.4E-05	5.7E-05
56	pyrene	1hr	9th	3.3E-05	3.3E-05	6.1E-05
57	pyrene	1hr	9th	3.0E-05	3.0E-05	5.2E-05
58	pyrene	1hr	9th	3.3E-05	3.3E-05	4.9E-05
59	pyrene	1hr	9th	1.1E-04	1.1E-04	2.4E-04
60	pyrene	1hr	9th	1.8E-04	1.8E-04	2.8E-04
61	pyrene	1hr	9th	1.9E-04	1.9E-04	2.4E-04
62	pyrene	1hr	9th	1.7E-04	1.7E-04	2.3E-04
63	pyrene	1hr	9th	1.5E-04	1.5E-04	3.0E-04
64	pyrene	1hr	9th	1.6E-04	1.6E-04	2.6E-04
65	pyrene	1hr	9th	1.8E-04	1.8E-04	2.4E-04
66	pyrene	1hr	9th	4.5E-05	4.5E-05	7.6E-05
67	pyrene	1hr	9th	4.5E-05	4.5E-05	7.5E-05
68	pyrene	1hr	9th	3.9E-05	3.9E-05	6.8E-05
69	pyrene	1hr	9th	3.8E-05	3.8E-05	6.4E-05
70	pyrene	1hr	9th	3.3E-05	3.3E-05	6.2E-05
71	pyrene	1hr	9th	9.1E-05	9.1E-05	1.3E-04
72	pyrene	1hr	9th	9.2E-05	9.2E-05	1.3E-04
73	pyrene	1hr	9th	1.9E-04	1.9E-04	2.5E-04
74	pyrene	1hr	9th	1.1E-04	1.1E-04	4.9E-04
75	pyrene	1hr	9th	6.1E-04	6.1E-04	6.5E-04
76	pyrene	1hr	9th	1.9E-04	1.9E-04	2.3E-04
77	pyrene	1hr	9th	1.1E-04	1.1E-04	1.8E-03
78	pyrene	1hr	9th	5.6E-05	5.6E-05	1.1E-04
79	pyrene	1hr	9th	6.2E-05	6.2E-05	9.3E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
1	pyrene	24hr	max	1.1E-05	1.1E-05	2.1E-05
2	pyrene	24hr	max	1.6E-05	1.6E-05	2.6E-05
3	pyrene	24hr	max	1.6E-05	1.6E-05	2.6E-05
4	pyrene	24hr	max	1.6E-05	1.6E-05	2.6E-05
5	pyrene	24hr	max	1.6E-05	1.7E-05	2.7E-05
6	pyrene	24hr	max	1.6E-05	1.7E-05	2.7E-05
7	pyrene	24hr	max	1.5E-05	1.5E-05	2.4E-05
8	pyrene	24hr	max	1.6E-05	1.6E-05	2.7E-05
9	pyrene	24hr	max	1.8E-05	1.8E-05	2.8E-05
10	pyrene	24hr	max	2.2E-05	2.2E-05	3.9E-05
11	pyrene	24hr	max	2.9E-05	2.9E-05	4.8E-05
12	pyrene	24hr	max	2.2E-05	2.2E-05	4.1E-05
13	pyrene	24hr	max	2.5E-05	2.5E-05	3.8E-05
14	pyrene	24hr	max	3.8E-05	3.8E-05	4.4E-05
15	pyrene	24hr	max	1.6E-05	1.6E-05	3.1E-05
16	pyrene	24hr	max	1.6E-05	1.6E-05	3.1E-05
17	pyrene	24hr	max	1.6E-05	1.6E-05	3.0E-05
18	pyrene	24hr	max	1.7E-05	1.7E-05	2.9E-05
19	pyrene	24hr	max	1.7E-05	1.7E-05	2.9E-05
20	pyrene	24hr	max	1.8E-05	1.8E-05	2.9E-05
21	pyrene	24hr	max	2.1E-05	2.2E-05	3.6E-05
22	pyrene	24hr	max	2.7E-05	2.7E-05	3.6E-05
23	pyrene	24hr	max	1.9E-05	1.9E-05	3.6E-05
24	pyrene	24hr	max	1.4E-05	1.5E-05	2.9E-05
25	pyrene	24hr	max	2.5E-05	2.5E-05	3.9E-05
26	pyrene	24hr	max	2.0E-05	2.0E-05	3.6E-05
27	pyrene	24hr	max	2.1E-05	2.2E-05	5.0E-05
28	pyrene	24hr	max	2.3E-05	2.3E-05	4.2E-05
29	pyrene	24hr	max	2.3E-05	2.3E-05	4.3E-05
30	pyrene	24hr	max	3.3E-05	3.3E-05	5.5E-05
31	pyrene	24hr	max	3.4E-05	3.4E-05	5.8E-05
32	pyrene	24hr	max	1.2E-05	1.2E-05	2.2E-05
33	pyrene	24hr	max	1.7E-05	1.7E-05	2.7E-05
34	pyrene	24hr	max	1.6E-05	1.6E-05	2.6E-05
35	pyrene	24hr	max	1.5E-05	1.5E-05	2.4E-05
36	pyrene	24hr	max	1.6E-05	1.6E-05	2.6E-05
37	pyrene	24hr	max	1.5E-05	1.5E-05	2.7E-05
38	pyrene	24hr	max	2.8E-05	2.8E-05	4.9E-05
39	pyrene	24hr	max	2.8E-05	2.8E-05	5.1E-05
40	pyrene	24hr	max	2.9E-05	2.9E-05	5.8E-05
41	pyrene	24hr	max	3.2E-05	3.2E-05	6.5E-05
42	pyrene	24hr	max	2.7E-05	2.7E-05	6.6E-05
43	pyrene	24hr	max	2.9E-05	2.9E-05	7.0E-05
44	pyrene	24hr	max	3.3E-05	3.3E-05	7.3E-05
45	pyrene	24hr	max	3.1E-05	3.1E-05	7.2E-05
46	pyrene	24hr	max	3.1E-05	3.1E-05	7.1E-05
47	pyrene	24hr	max	3.2E-05	3.2E-05	6.6E-05
48	pyrene	24hr	max	3.1E-05	3.1E-05	6.9E-05
49	pyrene	24hr	max	3.1E-05	3.1E-05	6.8E-05
50	pyrene	24hr	max	2.9E-05	2.9E-05	6.3E-05
51	pyrene	24hr	max	2.7E-05	2.7E-05	6.3E-05
52	pyrene	24hr	max	3.8E-05	3.8E-05	1.9E-04
53	pyrene	24hr	max	3.9E-05	3.9E-05	1.2E-04
54	pyrene	24hr	max	1.4E-05	1.4E-05	2.3E-05
55	pyrene	24hr	max	1.3E-05	1.3E-05	2.8E-05
56	pyrene	24hr	max	1.3E-05	1.3E-05	3.2E-05
57	pyrene	24hr	max	1.4E-05	1.4E-05	2.4E-05
58	pyrene	24hr	max	1.2E-05	1.2E-05	2.4E-05
59	pyrene	24hr	max	4.5E-05	4.5E-05	8.7E-05

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
60	pyrene	24hr	max	6.2E-05	6.2E-05	9.6E-05
61	pyrene	24hr	max	7.1E-05	7.1E-05	1.1E-04
62	pyrene	24hr	max	6.4E-05	6.4E-05	1.0E-04
63	pyrene	24hr	max	5.5E-05	5.5E-05	1.1E-04
64	pyrene	24hr	max	5.6E-05	5.6E-05	1.0E-04
65	pyrene	24hr	max	7.1E-05	7.1E-05	1.1E-04
66	pyrene	24hr	max	2.5E-05	2.5E-05	3.8E-05
67	pyrene	24hr	max	2.1E-05	2.1E-05	3.9E-05
68	pyrene	24hr	max	2.0E-05	2.0E-05	3.7E-05
69	pyrene	24hr	max	1.6E-05	1.6E-05	3.4E-05
70	pyrene	24hr	max	1.4E-05	1.4E-05	2.8E-05
71	pyrene	24hr	max	4.3E-05	4.3E-05	7.8E-05
72	pyrene	24hr	max	4.2E-05	4.2E-05	7.7E-05
73	pyrene	24hr	max	7.3E-05	7.3E-05	1.1E-04
74	pyrene	24hr	max	4.5E-05	4.5E-05	1.4E-04
75	pyrene	24hr	max	2.9E-04	2.9E-04	3.4E-04
76	pyrene	24hr	max	7.0E-05	7.0E-05	1.1E-04
77	pyrene	24hr	max	4.7E-05	4.7E-05	3.3E-04
78	pyrene	24hr	max	2.7E-05	2.7E-05	6.4E-05
79	pyrene	24hr	max	2.3E-05	2.3E-05	3.9E-05
1	pyrene	annual	average	9.2E-07	9.3E-07	1.3E-06
2	pyrene	annual	average	1.3E-06	1.3E-06	2.0E-06
3	pyrene	annual	average	1.3E-06	1.4E-06	2.0E-06
4	pyrene	annual	average	1.4E-06	1.4E-06	2.2E-06
5	pyrene	annual	average	1.6E-06	1.6E-06	2.5E-06
6	pyrene	annual	average	1.6E-06	1.6E-06	2.5E-06
7	pyrene	annual	average	1.5E-06	1.5E-06	2.3E-06
8	pyrene	annual	average	1.6E-06	1.6E-06	2.6E-06
9	pyrene	annual	average	1.6E-06	1.6E-06	2.5E-06
10	pyrene	annual	average	2.3E-06	2.3E-06	3.5E-06
11	pyrene	annual	average	3.0E-06	3.1E-06	4.5E-06
12	pyrene	annual	average	2.8E-06	2.8E-06	4.2E-06
13	pyrene	annual	average	2.6E-06	2.7E-06	4.0E-06
14	pyrene	annual	average	3.8E-06	3.8E-06	5.5E-06
15	pyrene	annual	average	1.9E-06	2.0E-06	3.0E-06
16	pyrene	annual	average	1.9E-06	2.0E-06	3.0E-06
17	pyrene	annual	average	2.1E-06	2.1E-06	3.2E-06
18	pyrene	annual	average	2.4E-06	2.4E-06	3.6E-06
19	pyrene	annual	average	2.2E-06	2.3E-06	3.5E-06
20	pyrene	annual	average	2.3E-06	2.4E-06	3.7E-06
21	pyrene	annual	average	3.8E-06	3.8E-06	5.3E-06
22	pyrene	annual	average	3.0E-06	3.1E-06	4.5E-06
23	pyrene	annual	average	2.1E-06	2.1E-06	3.4E-06
24	pyrene	annual	average	1.4E-06	1.4E-06	2.1E-06
25	pyrene	annual	average	1.8E-06	2.0E-06	3.4E-06
26	pyrene	annual	average	2.0E-06	2.1E-06	3.7E-06
27	pyrene	annual	average	2.7E-06	3.0E-06	5.3E-06
28	pyrene	annual	average	2.5E-06	2.6E-06	4.2E-06
29	pyrene	annual	average	2.6E-06	2.6E-06	4.3E-06
30	pyrene	annual	average	1.8E-06	1.9E-06	3.0E-06
31	pyrene	annual	average	2.0E-06	2.0E-06	3.2E-06
32	pyrene	annual	average	8.8E-07	8.9E-07	1.3E-06
33	pyrene	annual	average	1.1E-06	1.2E-06	1.8E-06
34	pyrene	annual	average	1.1E-06	1.1E-06	1.7E-06
35	pyrene	annual	average	1.3E-06	1.3E-06	1.9E-06
36	pyrene	annual	average	1.3E-06	1.3E-06	2.0E-06
37	pyrene	annual	average	1.3E-06	1.3E-06	1.9E-06
38	pyrene	annual	average	2.7E-06	2.8E-06	4.9E-06
39	pyrene	annual	average	2.8E-06	2.9E-06	5.2E-06

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
40	pyrene	annual	average	2.8E-06	2.9E-06	5.5E-06
41	pyrene	annual	average	2.8E-06	2.9E-06	5.9E-06
42	pyrene	annual	average	3.1E-06	3.2E-06	5.8E-06
43	pyrene	annual	average	3.5E-06	3.5E-06	6.5E-06
44	pyrene	annual	average	3.7E-06	3.8E-06	6.7E-06
45	pyrene	annual	average	3.2E-06	3.2E-06	6.4E-06
46	pyrene	annual	average	3.2E-06	3.3E-06	6.4E-06
47	pyrene	annual	average	3.1E-06	3.2E-06	6.5E-06
48	pyrene	annual	average	3.5E-06	3.6E-06	6.8E-06
49	pyrene	annual	average	3.3E-06	3.3E-06	6.6E-06
50	pyrene	annual	average	3.3E-06	3.3E-06	6.6E-06
51	pyrene	annual	average	3.1E-06	3.2E-06	6.1E-06
52	pyrene	annual	average	4.0E-06	4.0E-06	1.5E-05
53	pyrene	annual	average	3.5E-06	3.5E-06	9.7E-06
54	pyrene	annual	average	1.1E-06	1.1E-06	1.6E-06
55	pyrene	annual	average	1.2E-06	1.2E-06	1.8E-06
56	pyrene	annual	average	1.2E-06	1.3E-06	1.9E-06
57	pyrene	annual	average	1.3E-06	1.3E-06	2.0E-06
58	pyrene	annual	average	9.6E-07	9.7E-07	1.4E-06
59	pyrene	annual	average	4.7E-06	4.7E-06	1.6E-05
60	pyrene	annual	average	6.6E-06	6.6E-06	1.1E-05
61	pyrene	annual	average	7.8E-06	7.8E-06	1.3E-05
62	pyrene	annual	average	6.8E-06	6.8E-06	1.2E-05
63	pyrene	annual	average	6.1E-06	6.1E-06	1.2E-05
64	pyrene	annual	average	6.1E-06	6.1E-06	1.2E-05
65	pyrene	annual	average	7.8E-06	7.8E-06	1.3E-05
66	pyrene	annual	average	2.1E-06	2.1E-06	3.3E-06
67	pyrene	annual	average	2.4E-06	2.4E-06	3.8E-06
68	pyrene	annual	average	1.9E-06	1.9E-06	3.0E-06
69	pyrene	annual	average	1.8E-06	1.8E-06	2.9E-06
70	pyrene	annual	average	1.6E-06	1.6E-06	2.7E-06
71	pyrene	annual	average	2.9E-06	2.9E-06	4.9E-06
72	pyrene	annual	average	2.9E-06	3.0E-06	4.9E-06
73	pyrene	annual	average	9.7E-06	9.7E-06	1.5E-05
74	pyrene	annual	average	4.7E-06	4.8E-06	2.2E-05
75	pyrene	annual	average	4.9E-05	4.9E-05	5.4E-05
76	pyrene	annual	average	7.6E-06	7.6E-06	1.2E-05
77	pyrene	annual	average	5.1E-06	5.2E-06	1.7E-05
78	pyrene	annual	average	3.0E-06	3.0E-06	5.6E-06
79	pyrene	annual	average	2.9E-06	3.0E-06	4.4E-06
1	toluene	1hr	max	5.8E+00	5.8E+00	6.0E+00
2	toluene	1hr	max	7.9E+00	7.9E+00	8.5E+00
3	toluene	1hr	max	8.5E+00	8.5E+00	8.9E+00
4	toluene	1hr	max	9.9E+00	9.9E+00	1.0E+01
5	toluene	1hr	max	8.8E+00	8.8E+00	1.4E+01
6	toluene	1hr	max	7.9E+00	7.9E+00	1.6E+01
7	toluene	1hr	max	9.5E+00	9.5E+00	9.9E+00
8	toluene	1hr	max	8.2E+00	8.2E+00	1.7E+01
9	toluene	1hr	max	1.1E+01	1.1E+01	1.5E+01
10	toluene	1hr	max	7.9E+00	7.9E+00	1.1E+01
11	toluene	1hr	max	9.1E+00	9.1E+00	1.3E+01
12	toluene	1hr	max	1.3E+01	1.3E+01	1.9E+01
13	toluene	1hr	max	1.4E+01	1.4E+01	1.8E+01
14	toluene	1hr	max	1.1E+01	1.1E+01	1.5E+01
15	toluene	1hr	max	2.2E+01	2.2E+01	2.7E+01
16	toluene	1hr	max	2.0E+01	2.0E+01	2.5E+01
17	toluene	1hr	max	1.5E+01	1.5E+01	1.8E+01
18	toluene	1hr	max	1.6E+01	1.6E+01	1.6E+01
19	toluene	1hr	max	1.5E+01	1.5E+01	1.9E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
20	toluene	1hr	max	1.3E+01	1.3E+01	1.4E+01
21	toluene	1hr	max	1.8E+01	1.8E+01	1.9E+01
22	toluene	1hr	max	1.8E+01	1.8E+01	2.0E+01
23	toluene	1hr	max	1.9E+01	1.9E+01	2.0E+01
24	toluene	1hr	max	1.4E+01	1.4E+01	1.4E+01
25	toluene	1hr	max	2.3E+01	2.3E+01	2.4E+01
26	toluene	1hr	max	1.9E+01	1.9E+01	3.5E+01
27	toluene	1hr	max	3.9E+01	3.9E+01	3.9E+01
28	toluene	1hr	max	1.5E+01	1.5E+01	1.6E+01
29	toluene	1hr	max	1.6E+01	1.6E+01	1.6E+01
30	toluene	1hr	max	1.6E+01	1.6E+01	2.2E+01
31	toluene	1hr	max	1.5E+01	1.5E+01	2.4E+01
32	toluene	1hr	max	4.6E+00	4.6E+00	7.4E+00
33	toluene	1hr	max	5.0E+00	5.0E+00	1.1E+01
34	toluene	1hr	max	4.7E+00	4.7E+00	1.2E+01
35	toluene	1hr	max	1.4E+01	1.4E+01	1.7E+01
36	toluene	1hr	max	1.4E+01	1.4E+01	1.7E+01
37	toluene	1hr	max	1.5E+01	1.5E+01	1.7E+01
38	toluene	1hr	max	2.2E+01	2.2E+01	2.2E+01
39	toluene	1hr	max	2.8E+01	2.8E+01	2.8E+01
40	toluene	1hr	max	2.1E+01	2.1E+01	2.5E+01
41	toluene	1hr	max	4.7E+01	4.7E+01	5.2E+01
42	toluene	1hr	max	2.7E+01	2.7E+01	2.7E+01
43	toluene	1hr	max	2.2E+01	2.2E+01	2.8E+01
44	toluene	1hr	max	2.3E+01	2.3E+01	2.3E+01
45	toluene	1hr	max	1.8E+01	1.8E+01	2.5E+01
46	toluene	1hr	max	1.8E+01	1.8E+01	2.5E+01
47	toluene	1hr	max	1.6E+01	1.6E+01	3.0E+01
48	toluene	1hr	max	1.9E+01	1.9E+01	2.5E+01
49	toluene	1hr	max	1.8E+01	1.8E+01	2.4E+01
50	toluene	1hr	max	2.0E+01	2.0E+01	2.0E+01
51	toluene	1hr	max	2.6E+01	2.6E+01	2.6E+01
52	toluene	1hr	max	1.9E+01	1.9E+01	1.9E+01
53	toluene	1hr	max	2.3E+01	2.3E+01	3.1E+01
54	toluene	1hr	max	1.4E+01	1.4E+01	1.5E+01
55	toluene	1hr	max	1.4E+01	1.4E+01	1.4E+01
56	toluene	1hr	max	1.3E+01	1.3E+01	1.3E+01
57	toluene	1hr	max	1.4E+01	1.4E+01	1.4E+01
58	toluene	1hr	max	1.0E+01	1.0E+01	1.0E+01
59	toluene	1hr	max	2.6E+01	2.6E+01	3.3E+01
60	toluene	1hr	max	7.6E+01	7.6E+01	7.9E+01
61	toluene	1hr	max	4.2E+01	4.2E+01	4.2E+01
62	toluene	1hr	max	2.4E+01	2.4E+01	3.0E+01
63	toluene	1hr	max	2.5E+01	2.5E+01	3.0E+01
64	toluene	1hr	max	2.7E+01	2.7E+01	3.1E+01
65	toluene	1hr	max	3.6E+01	3.6E+01	5.4E+01
66	toluene	1hr	max	9.7E+00	9.7E+00	1.1E+01
67	toluene	1hr	max	1.1E+01	1.1E+01	2.2E+01
68	toluene	1hr	max	1.6E+01	1.6E+01	1.8E+01
69	toluene	1hr	max	1.7E+01	1.7E+01	1.9E+01
70	toluene	1hr	max	1.4E+01	1.4E+01	1.5E+01
71	toluene	1hr	max	1.9E+01	1.9E+01	3.0E+01
72	toluene	1hr	max	1.8E+01	1.8E+01	2.9E+01
73	toluene	1hr	max	3.7E+01	3.7E+01	5.5E+01
74	toluene	1hr	max	2.2E+01	2.2E+01	3.0E+01
75	toluene	1hr	max	1.3E+02	1.3E+02	1.4E+02
76	toluene	1hr	max	4.2E+01	4.2E+01	4.2E+01
77	toluene	1hr	max	3.0E+01	3.0E+01	3.1E+01
78	toluene	1hr	max	3.0E+01	3.0E+01	3.0E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
79	toluene	1hr	max	1.5E+01	1.5E+01	1.7E+01
1	toluene	1hr	9th	9.1E-01	9.1E-01	1.5E+00
2	toluene	1hr	9th	1.7E+00	1.7E+00	3.2E+00
3	toluene	1hr	9th	1.9E+00	1.9E+00	3.1E+00
4	toluene	1hr	9th	2.1E+00	2.1E+00	3.0E+00
5	toluene	1hr	9th	2.2E+00	2.2E+00	4.2E+00
6	toluene	1hr	9th	3.3E+00	3.3E+00	4.2E+00
7	toluene	1hr	9th	4.1E+00	4.1E+00	4.7E+00
8	toluene	1hr	9th	3.1E+00	3.1E+00	4.8E+00
9	toluene	1hr	9th	1.1E+00	1.1E+00	2.5E+00
10	toluene	1hr	9th	1.6E+00	1.6E+00	1.7E+00
11	toluene	1hr	9th	1.2E+00	1.2E+00	1.5E+00
12	toluene	1hr	9th	1.6E+00	1.6E+00	2.4E+00
13	toluene	1hr	9th	2.2E+00	2.2E+00	2.5E+00
14	toluene	1hr	9th	2.5E+00	2.5E+00	3.0E+00
15	toluene	1hr	9th	2.4E+00	2.4E+00	3.7E+00
16	toluene	1hr	9th	2.2E+00	2.2E+00	3.7E+00
17	toluene	1hr	9th	3.0E+00	3.0E+00	3.5E+00
18	toluene	1hr	9th	3.3E+00	3.3E+00	4.4E+00
19	toluene	1hr	9th	3.2E+00	3.2E+00	4.8E+00
20	toluene	1hr	9th	2.9E+00	2.9E+00	5.2E+00
21	toluene	1hr	9th	3.2E+00	3.2E+00	3.6E+00
22	toluene	1hr	9th	2.7E+00	2.7E+00	4.1E+00
23	toluene	1hr	9th	2.2E+00	2.2E+00	2.5E+00
24	toluene	1hr	9th	2.8E+00	2.9E+00	4.0E+00
25	toluene	1hr	9th	2.9E+00	2.9E+00	4.5E+00
26	toluene	1hr	9th	3.4E+00	3.4E+00	4.3E+00
27	toluene	1hr	9th	3.7E+00	3.7E+00	5.9E+00
28	toluene	1hr	9th	3.5E+00	3.5E+00	7.3E+00
29	toluene	1hr	9th	4.1E+00	4.1E+00	7.9E+00
30	toluene	1hr	9th	4.9E+00	4.9E+00	6.5E+00
31	toluene	1hr	9th	5.2E+00	5.2E+00	6.9E+00
32	toluene	1hr	9th	5.6E-01	5.6E-01	7.2E-01
33	toluene	1hr	9th	2.3E+00	2.3E+00	2.4E+00
34	toluene	1hr	9th	1.6E+00	1.6E+00	1.6E+00
35	toluene	1hr	9th	1.2E+00	1.2E+00	1.4E+00
36	toluene	1hr	9th	1.4E+00	1.4E+00	1.7E+00
37	toluene	1hr	9th	1.2E+00	1.2E+00	1.8E+00
38	toluene	1hr	9th	3.0E+00	3.0E+00	3.7E+00
39	toluene	1hr	9th	3.0E+00	3.0E+00	4.2E+00
40	toluene	1hr	9th	3.8E+00	3.8E+00	4.7E+00
41	toluene	1hr	9th	4.5E+00	4.5E+00	5.5E+00
42	toluene	1hr	9th	3.8E+00	3.8E+00	4.7E+00
43	toluene	1hr	9th	3.8E+00	3.8E+00	5.2E+00
44	toluene	1hr	9th	3.7E+00	3.7E+00	5.1E+00
45	toluene	1hr	9th	4.0E+00	4.0E+00	5.8E+00
46	toluene	1hr	9th	3.7E+00	3.7E+00	6.0E+00
47	toluene	1hr	9th	3.5E+00	3.5E+00	5.7E+00
48	toluene	1hr	9th	3.7E+00	3.7E+00	6.0E+00
49	toluene	1hr	9th	3.9E+00	3.9E+00	5.9E+00
50	toluene	1hr	9th	3.5E+00	3.5E+00	6.1E+00
51	toluene	1hr	9th	2.7E+00	2.7E+00	4.7E+00
52	toluene	1hr	9th	8.0E+00	8.0E+00	9.2E+00
53	toluene	1hr	9th	6.3E+00	6.3E+00	7.5E+00
54	toluene	1hr	9th	2.5E+00	2.5E+00	2.7E+00
55	toluene	1hr	9th	1.9E+00	1.9E+00	4.3E+00
56	toluene	1hr	9th	2.8E+00	2.8E+00	3.5E+00
57	toluene	1hr	9th	2.6E+00	2.6E+00	4.2E+00
58	toluene	1hr	9th	2.5E+00	2.5E+00	2.6E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
59	toluene	1hr	9th	9.0E+00	9.0E+00	1.1E+01
60	toluene	1hr	9th	1.1E+01	1.1E+01	1.6E+01
61	toluene	1hr	9th	1.2E+01	1.2E+01	2.0E+01
62	toluene	1hr	9th	1.3E+01	1.3E+01	1.7E+01
63	toluene	1hr	9th	8.5E+00	8.5E+00	1.4E+01
64	toluene	1hr	9th	9.6E+00	9.6E+00	1.4E+01
65	toluene	1hr	9th	1.8E+01	1.8E+01	1.8E+01
66	toluene	1hr	9th	1.6E+00	1.6E+00	2.4E+00
67	toluene	1hr	9th	2.2E+00	2.2E+00	2.9E+00
68	toluene	1hr	9th	1.4E+00	1.4E+00	3.5E+00
69	toluene	1hr	9th	1.3E+00	1.3E+00	2.8E+00
70	toluene	1hr	9th	2.2E+00	2.2E+00	3.6E+00
71	toluene	1hr	9th	7.4E+00	7.4E+00	1.1E+01
72	toluene	1hr	9th	6.8E+00	6.8E+00	8.8E+00
73	toluene	1hr	9th	1.6E+01	1.6E+01	1.8E+01
74	toluene	1hr	9th	1.0E+01	1.0E+01	1.1E+01
75	toluene	1hr	9th	3.4E+01	3.4E+01	4.0E+01
76	toluene	1hr	9th	1.2E+01	1.2E+01	2.0E+01
77	toluene	1hr	9th	1.0E+01	1.0E+01	1.3E+01
78	toluene	1hr	9th	3.5E+00	3.5E+00	3.7E+00
79	toluene	1hr	9th	2.3E+00	2.3E+00	5.0E+00
1	toluene	24hr	max	3.1E-01	3.1E-01	3.4E-01
2	toluene	24hr	max	4.5E-01	4.5E-01	4.6E-01
3	toluene	24hr	max	4.4E-01	4.5E-01	5.1E-01
4	toluene	24hr	max	6.0E-01	6.0E-01	6.6E-01
5	toluene	24hr	max	4.7E-01	4.7E-01	1.0E+00
6	toluene	24hr	max	4.4E-01	4.4E-01	1.2E+00
7	toluene	24hr	max	9.2E-01	9.2E-01	9.9E-01
8	toluene	24hr	max	4.3E-01	4.3E-01	1.3E+00
9	toluene	24hr	max	4.7E-01	4.7E-01	6.6E-01
10	toluene	24hr	max	5.2E-01	5.2E-01	7.5E-01
11	toluene	24hr	max	5.6E-01	5.6E-01	8.4E-01
12	toluene	24hr	max	7.0E-01	7.0E-01	1.1E+00
13	toluene	24hr	max	7.0E-01	7.0E-01	9.9E-01
14	toluene	24hr	max	6.5E-01	6.5E-01	9.2E-01
15	toluene	24hr	max	1.2E+00	1.2E+00	1.4E+00
16	toluene	24hr	max	1.1E+00	1.1E+00	1.3E+00
17	toluene	24hr	max	7.8E-01	7.8E-01	1.0E+00
18	toluene	24hr	max	8.5E-01	8.5E-01	8.7E-01
19	toluene	24hr	max	7.6E-01	7.6E-01	1.0E+00
20	toluene	24hr	max	7.0E-01	7.0E-01	7.8E-01
21	toluene	24hr	max	8.7E-01	8.7E-01	1.0E+00
22	toluene	24hr	max	9.0E-01	9.0E-01	1.0E+00
23	toluene	24hr	max	8.6E-01	8.6E-01	9.4E-01
24	toluene	24hr	max	1.3E+00	1.3E+00	1.5E+00
25	toluene	24hr	max	1.5E+00	1.5E+00	1.9E+00
26	toluene	24hr	max	1.7E+00	1.7E+00	2.0E+00
27	toluene	24hr	max	2.0E+00	2.0E+00	2.2E+00
28	toluene	24hr	max	7.9E-01	7.9E-01	9.6E-01
29	toluene	24hr	max	8.5E-01	8.6E-01	1.0E+00
30	toluene	24hr	max	1.5E+00	1.5E+00	2.2E+00
31	toluene	24hr	max	1.5E+00	1.5E+00	2.3E+00
32	toluene	24hr	max	2.6E-01	2.6E-01	4.1E-01
33	toluene	24hr	max	4.0E-01	4.0E-01	5.9E-01
34	toluene	24hr	max	2.9E-01	2.9E-01	6.3E-01
35	toluene	24hr	max	6.8E-01	6.8E-01	8.4E-01
36	toluene	24hr	max	6.8E-01	6.8E-01	8.2E-01
37	toluene	24hr	max	7.2E-01	7.2E-01	8.0E-01
38	toluene	24hr	max	1.3E+00	1.3E+00	1.9E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
39	toluene	24hr	max	1.4E+00	1.4E+00	1.4E+00
40	toluene	24hr	max	1.1E+00	1.1E+00	1.4E+00
41	toluene	24hr	max	2.3E+00	2.3E+00	2.6E+00
42	toluene	24hr	max	1.3E+00	1.3E+00	1.3E+00
43	toluene	24hr	max	1.1E+00	1.1E+00	1.4E+00
44	toluene	24hr	max	1.1E+00	1.1E+00	1.2E+00
45	toluene	24hr	max	9.2E-01	9.2E-01	1.3E+00
46	toluene	24hr	max	9.3E-01	9.3E-01	1.3E+00
47	toluene	24hr	max	8.3E-01	8.3E-01	1.5E+00
48	toluene	24hr	max	9.6E-01	9.6E-01	1.3E+00
49	toluene	24hr	max	9.1E-01	9.1E-01	1.3E+00
50	toluene	24hr	max	1.0E+00	1.0E+00	1.1E+00
51	toluene	24hr	max	1.3E+00	1.3E+00	1.3E+00
52	toluene	24hr	max	1.7E+00	1.7E+00	1.8E+00
53	toluene	24hr	max	1.7E+00	1.7E+00	2.4E+00
54	toluene	24hr	max	7.9E-01	7.9E-01	8.8E-01
55	toluene	24hr	max	9.6E-01	9.6E-01	1.0E+00
56	toluene	24hr	max	8.3E-01	8.3E-01	1.0E+00
57	toluene	24hr	max	1.2E+00	1.2E+00	1.3E+00
58	toluene	24hr	max	5.6E-01	5.6E-01	5.6E-01
59	toluene	24hr	max	1.8E+00	1.8E+00	2.3E+00
60	toluene	24hr	max	4.4E+00	4.4E+00	4.6E+00
61	toluene	24hr	max	3.5E+00	3.5E+00	3.6E+00
62	toluene	24hr	max	3.0E+00	3.0E+00	3.1E+00
63	toluene	24hr	max	2.0E+00	2.0E+00	2.2E+00
64	toluene	24hr	max	2.1E+00	2.1E+00	2.2E+00
65	toluene	24hr	max	2.4E+00	2.4E+00	2.7E+00
66	toluene	24hr	max	5.1E-01	5.1E-01	6.2E-01
67	toluene	24hr	max	5.6E-01	5.6E-01	1.1E+00
68	toluene	24hr	max	7.3E-01	7.3E-01	8.1E-01
69	toluene	24hr	max	7.7E-01	7.7E-01	8.6E-01
70	toluene	24hr	max	6.8E-01	6.8E-01	7.3E-01
71	toluene	24hr	max	1.4E+00	1.4E+00	2.6E+00
72	toluene	24hr	max	1.4E+00	1.4E+00	2.5E+00
73	toluene	24hr	max	2.4E+00	2.4E+00	2.8E+00
74	toluene	24hr	max	1.6E+00	1.6E+00	2.2E+00
75	toluene	24hr	max	1.3E+01	1.3E+01	1.4E+01
76	toluene	24hr	max	4.2E+00	4.2E+00	4.3E+00
77	toluene	24hr	max	1.7E+00	1.7E+00	1.9E+00
78	toluene	24hr	max	1.4E+00	1.4E+00	1.5E+00
79	toluene	24hr	max	7.6E-01	7.6E-01	8.9E-01
1	toluene	annual	average	1.8E-02	1.8E-02	2.1E-02
2	toluene	annual	average	1.7E-02	1.7E-02	2.4E-02
3	toluene	annual	average	1.7E-02	1.7E-02	2.4E-02
4	toluene	annual	average	1.8E-02	1.8E-02	2.6E-02
5	toluene	annual	average	2.1E-02	2.1E-02	3.1E-02
6	toluene	annual	average	2.1E-02	2.2E-02	3.2E-02
7	toluene	annual	average	2.1E-02	2.2E-02	3.0E-02
8	toluene	annual	average	2.2E-02	2.2E-02	3.3E-02
9	toluene	annual	average	1.7E-02	1.7E-02	2.6E-02
10	toluene	annual	average	2.0E-02	2.0E-02	2.9E-02
11	toluene	annual	average	2.4E-02	2.4E-02	3.4E-02
12	toluene	annual	average	2.3E-02	2.3E-02	3.3E-02
13	toluene	annual	average	2.4E-02	2.4E-02	3.4E-02
14	toluene	annual	average	2.8E-02	2.8E-02	4.2E-02
15	toluene	annual	average	2.6E-02	2.6E-02	3.6E-02
16	toluene	annual	average	2.5E-02	2.6E-02	3.5E-02
17	toluene	annual	average	2.6E-02	2.6E-02	3.7E-02
18	toluene	annual	average	2.7E-02	2.7E-02	3.8E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
19	toluene	annual	average	2.7E-02	2.8E-02	4.0E-02
20	toluene	annual	average	2.8E-02	2.9E-02	4.2E-02
21	toluene	annual	average	3.1E-02	3.1E-02	4.2E-02
22	toluene	annual	average	2.8E-02	2.8E-02	4.0E-02
23	toluene	annual	average	2.5E-02	2.5E-02	3.5E-02
24	toluene	annual	average	2.0E-02	2.1E-02	2.8E-02
25	toluene	annual	average	2.8E-02	2.9E-02	4.2E-02
26	toluene	annual	average	3.4E-02	3.4E-02	4.7E-02
27	toluene	annual	average	4.3E-02	4.5E-02	6.0E-02
28	toluene	annual	average	3.1E-02	3.2E-02	4.7E-02
29	toluene	annual	average	3.2E-02	3.3E-02	4.7E-02
30	toluene	annual	average	3.5E-02	3.5E-02	5.0E-02
31	toluene	annual	average	3.6E-02	3.6E-02	5.1E-02
32	toluene	annual	average	1.2E-02	1.2E-02	1.7E-02
33	toluene	annual	average	1.4E-02	1.5E-02	2.0E-02
34	toluene	annual	average	1.4E-02	1.5E-02	2.0E-02
35	toluene	annual	average	1.5E-02	1.5E-02	2.0E-02
36	toluene	annual	average	1.6E-02	1.6E-02	2.1E-02
37	toluene	annual	average	1.5E-02	1.5E-02	2.0E-02
38	toluene	annual	average	3.5E-02	3.6E-02	5.2E-02
39	toluene	annual	average	3.7E-02	3.7E-02	5.4E-02
40	toluene	annual	average	3.9E-02	4.0E-02	5.9E-02
41	toluene	annual	average	5.0E-02	5.1E-02	7.1E-02
42	toluene	annual	average	4.0E-02	4.0E-02	5.8E-02
43	toluene	annual	average	4.5E-02	4.5E-02	6.8E-02
44	toluene	annual	average	4.6E-02	4.7E-02	6.8E-02
45	toluene	annual	average	4.5E-02	4.5E-02	6.8E-02
46	toluene	annual	average	4.5E-02	4.5E-02	6.8E-02
47	toluene	annual	average	4.6E-02	4.7E-02	7.1E-02
48	toluene	annual	average	4.7E-02	4.7E-02	7.1E-02
49	toluene	annual	average	4.6E-02	4.6E-02	7.0E-02
50	toluene	annual	average	4.4E-02	4.5E-02	6.8E-02
51	toluene	annual	average	4.1E-02	4.1E-02	6.3E-02
52	toluene	annual	average	7.1E-02	7.1E-02	1.1E-01
53	toluene	annual	average	6.2E-02	6.2E-02	9.4E-02
54	toluene	annual	average	1.8E-02	1.8E-02	2.4E-02
55	toluene	annual	average	1.9E-02	1.9E-02	2.6E-02
56	toluene	annual	average	1.8E-02	1.8E-02	2.5E-02
57	toluene	annual	average	2.1E-02	2.1E-02	2.8E-02
58	toluene	annual	average	1.5E-02	1.5E-02	1.9E-02
59	toluene	annual	average	8.8E-02	8.9E-02	1.3E-01
60	toluene	annual	average	1.5E-01	1.5E-01	1.9E-01
61	toluene	annual	average	1.6E-01	1.6E-01	2.1E-01
62	toluene	annual	average	1.4E-01	1.4E-01	1.8E-01
63	toluene	annual	average	1.2E-01	1.2E-01	1.6E-01
64	toluene	annual	average	1.2E-01	1.2E-01	1.6E-01
65	toluene	annual	average	1.5E-01	1.5E-01	1.9E-01
66	toluene	annual	average	2.1E-02	2.1E-02	3.0E-02
67	toluene	annual	average	2.5E-02	2.5E-02	3.7E-02
68	toluene	annual	average	2.1E-02	2.1E-02	3.2E-02
69	toluene	annual	average	2.0E-02	2.0E-02	3.0E-02
70	toluene	annual	average	2.0E-02	2.0E-02	3.1E-02
71	toluene	annual	average	5.4E-02	5.4E-02	7.4E-02
72	toluene	annual	average	5.1E-02	5.1E-02	7.1E-02
73	toluene	annual	average	1.6E-01	1.6E-01	2.0E-01
74	toluene	annual	average	8.7E-02	8.7E-02	1.4E-01
75	toluene	annual	average	6.6E-01	6.6E-01	7.2E-01
76	toluene	annual	average	1.6E-01	1.6E-01	2.1E-01
77	toluene	annual	average	9.9E-02	1.0E-01	1.5E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
78	toluene	annual	average	3.8E-02	3.9E-02	5.6E-02
79	toluene	annual	average	2.8E-02	2.8E-02	3.9E-02
1	xylenes	1hr	max	5.8E+00	5.8E+00	6.0E+00
2	xylenes	1hr	max	7.9E+00	7.9E+00	8.4E+00
3	xylenes	1hr	max	8.5E+00	8.5E+00	8.9E+00
4	xylenes	1hr	max	9.9E+00	9.9E+00	1.0E+01
5	xylenes	1hr	max	8.7E+00	8.7E+00	1.4E+01
6	xylenes	1hr	max	7.8E+00	7.8E+00	1.6E+01
7	xylenes	1hr	max	9.4E+00	9.4E+00	9.9E+00
8	xylenes	1hr	max	8.2E+00	8.2E+00	1.7E+01
9	xylenes	1hr	max	1.1E+01	1.1E+01	1.5E+01
10	xylenes	1hr	max	7.9E+00	7.9E+00	1.1E+01
11	xylenes	1hr	max	9.1E+00	9.1E+00	1.3E+01
12	xylenes	1hr	max	1.3E+01	1.3E+01	1.9E+01
13	xylenes	1hr	max	1.4E+01	1.4E+01	1.8E+01
14	xylenes	1hr	max	1.1E+01	1.1E+01	1.5E+01
15	xylenes	1hr	max	2.2E+01	2.2E+01	2.7E+01
16	xylenes	1hr	max	2.0E+01	2.0E+01	2.4E+01
17	xylenes	1hr	max	1.5E+01	1.5E+01	1.8E+01
18	xylenes	1hr	max	1.6E+01	1.6E+01	1.6E+01
19	xylenes	1hr	max	1.5E+01	1.5E+01	1.9E+01
20	xylenes	1hr	max	1.3E+01	1.3E+01	1.4E+01
21	xylenes	1hr	max	1.8E+01	1.8E+01	1.9E+01
22	xylenes	1hr	max	1.8E+01	1.8E+01	2.0E+01
23	xylenes	1hr	max	1.8E+01	1.8E+01	2.0E+01
24	xylenes	1hr	max	1.4E+01	1.4E+01	1.4E+01
25	xylenes	1hr	max	2.3E+01	2.3E+01	2.4E+01
26	xylenes	1hr	max	1.9E+01	1.9E+01	3.5E+01
27	xylenes	1hr	max	3.9E+01	3.9E+01	3.9E+01
28	xylenes	1hr	max	1.5E+01	1.5E+01	1.6E+01
29	xylenes	1hr	max	1.6E+01	1.6E+01	1.6E+01
30	xylenes	1hr	max	1.6E+01	1.6E+01	2.2E+01
31	xylenes	1hr	max	1.5E+01	1.5E+01	2.4E+01
32	xylenes	1hr	max	4.6E+00	4.6E+00	7.3E+00
33	xylenes	1hr	max	5.0E+00	5.0E+00	1.1E+01
34	xylenes	1hr	max	4.7E+00	4.7E+00	1.2E+01
35	xylenes	1hr	max	1.4E+01	1.4E+01	1.7E+01
36	xylenes	1hr	max	1.4E+01	1.4E+01	1.7E+01
37	xylenes	1hr	max	1.5E+01	1.5E+01	1.7E+01
38	xylenes	1hr	max	2.2E+01	2.2E+01	2.2E+01
39	xylenes	1hr	max	2.8E+01	2.8E+01	2.8E+01
40	xylenes	1hr	max	2.1E+01	2.1E+01	2.5E+01
41	xylenes	1hr	max	4.7E+01	4.7E+01	5.2E+01
42	xylenes	1hr	max	2.7E+01	2.7E+01	2.7E+01
43	xylenes	1hr	max	2.2E+01	2.2E+01	2.8E+01
44	xylenes	1hr	max	2.3E+01	2.3E+01	2.3E+01
45	xylenes	1hr	max	1.8E+01	1.8E+01	2.5E+01
46	xylenes	1hr	max	1.8E+01	1.8E+01	2.5E+01
47	xylenes	1hr	max	1.6E+01	1.6E+01	3.0E+01
48	xylenes	1hr	max	1.9E+01	1.9E+01	2.5E+01
49	xylenes	1hr	max	1.8E+01	1.8E+01	2.4E+01
50	xylenes	1hr	max	2.0E+01	2.0E+01	2.0E+01
51	xylenes	1hr	max	2.6E+01	2.6E+01	2.6E+01
52	xylenes	1hr	max	1.9E+01	1.9E+01	1.9E+01
53	xylenes	1hr	max	2.3E+01	2.3E+01	3.1E+01
54	xylenes	1hr	max	1.4E+01	1.4E+01	1.5E+01
55	xylenes	1hr	max	1.4E+01	1.4E+01	1.4E+01
56	xylenes	1hr	max	1.3E+01	1.3E+01	1.3E+01
57	xylenes	1hr	max	1.4E+01	1.4E+01	1.4E+01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
58	xylenes	1hr	max	1.0E+01	1.0E+01	1.0E+01
59	xylenes	1hr	max	2.6E+01	2.6E+01	3.3E+01
60	xylenes	1hr	max	7.6E+01	7.6E+01	7.9E+01
61	xylenes	1hr	max	4.2E+01	4.2E+01	4.2E+01
62	xylenes	1hr	max	2.4E+01	2.4E+01	3.0E+01
63	xylenes	1hr	max	2.5E+01	2.5E+01	3.0E+01
64	xylenes	1hr	max	2.7E+01	2.7E+01	3.1E+01
65	xylenes	1hr	max	3.6E+01	3.6E+01	5.4E+01
66	xylenes	1hr	max	9.7E+00	9.7E+00	1.1E+01
67	xylenes	1hr	max	1.1E+01	1.1E+01	2.2E+01
68	xylenes	1hr	max	1.6E+01	1.6E+01	1.7E+01
69	xylenes	1hr	max	1.7E+01	1.7E+01	1.9E+01
70	xylenes	1hr	max	1.4E+01	1.4E+01	1.5E+01
71	xylenes	1hr	max	1.9E+01	1.9E+01	2.9E+01
72	xylenes	1hr	max	1.8E+01	1.8E+01	2.9E+01
73	xylenes	1hr	max	3.7E+01	3.7E+01	5.5E+01
74	xylenes	1hr	max	2.2E+01	2.2E+01	3.0E+01
75	xylenes	1hr	max	1.3E+02	1.3E+02	1.4E+02
76	xylenes	1hr	max	4.2E+01	4.2E+01	4.2E+01
77	xylenes	1hr	max	3.0E+01	3.0E+01	3.1E+01
78	xylenes	1hr	max	3.0E+01	3.0E+01	3.0E+01
79	xylenes	1hr	max	1.5E+01	1.5E+01	1.6E+01
1	xylenes	1hr	9th	9.0E-01	9.0E-01	1.5E+00
2	xylenes	1hr	9th	1.7E+00	1.7E+00	3.2E+00
3	xylenes	1hr	9th	1.9E+00	1.9E+00	3.1E+00
4	xylenes	1hr	9th	2.1E+00	2.1E+00	3.0E+00
5	xylenes	1hr	9th	2.2E+00	2.2E+00	4.2E+00
6	xylenes	1hr	9th	3.3E+00	3.3E+00	4.2E+00
7	xylenes	1hr	9th	4.1E+00	4.1E+00	4.7E+00
8	xylenes	1hr	9th	3.0E+00	3.0E+00	4.8E+00
9	xylenes	1hr	9th	1.1E+00	1.1E+00	2.5E+00
10	xylenes	1hr	9th	1.6E+00	1.6E+00	1.6E+00
11	xylenes	1hr	9th	1.2E+00	1.2E+00	1.5E+00
12	xylenes	1hr	9th	1.5E+00	1.5E+00	2.4E+00
13	xylenes	1hr	9th	2.2E+00	2.2E+00	2.5E+00
14	xylenes	1hr	9th	2.5E+00	2.5E+00	3.0E+00
15	xylenes	1hr	9th	2.4E+00	2.4E+00	3.7E+00
16	xylenes	1hr	9th	2.2E+00	2.2E+00	3.7E+00
17	xylenes	1hr	9th	3.0E+00	3.0E+00	3.5E+00
18	xylenes	1hr	9th	3.3E+00	3.3E+00	4.3E+00
19	xylenes	1hr	9th	3.2E+00	3.2E+00	4.8E+00
20	xylenes	1hr	9th	2.9E+00	2.9E+00	5.1E+00
21	xylenes	1hr	9th	3.2E+00	3.2E+00	3.6E+00
22	xylenes	1hr	9th	2.7E+00	2.7E+00	4.1E+00
23	xylenes	1hr	9th	2.2E+00	2.2E+00	2.5E+00
24	xylenes	1hr	9th	2.8E+00	2.8E+00	4.0E+00
25	xylenes	1hr	9th	2.9E+00	2.9E+00	4.4E+00
26	xylenes	1hr	9th	3.4E+00	3.4E+00	4.3E+00
27	xylenes	1hr	9th	3.7E+00	3.7E+00	5.9E+00
28	xylenes	1hr	9th	3.5E+00	3.5E+00	7.2E+00
29	xylenes	1hr	9th	4.1E+00	4.1E+00	7.9E+00
30	xylenes	1hr	9th	4.9E+00	4.9E+00	6.5E+00
31	xylenes	1hr	9th	5.2E+00	5.2E+00	6.9E+00
32	xylenes	1hr	9th	5.5E-01	5.5E-01	7.1E-01
33	xylenes	1hr	9th	2.3E+00	2.3E+00	2.4E+00
34	xylenes	1hr	9th	1.6E+00	1.6E+00	1.6E+00
35	xylenes	1hr	9th	1.2E+00	1.2E+00	1.4E+00
36	xylenes	1hr	9th	1.4E+00	1.4E+00	1.7E+00
37	xylenes	1hr	9th	1.2E+00	1.2E+00	1.8E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
38	xylenes	1hr	9th	3.0E+00	3.0E+00	3.6E+00
39	xylenes	1hr	9th	3.0E+00	3.0E+00	4.2E+00
40	xylenes	1hr	9th	3.8E+00	3.8E+00	4.7E+00
41	xylenes	1hr	9th	4.5E+00	4.5E+00	5.5E+00
42	xylenes	1hr	9th	3.8E+00	3.8E+00	4.6E+00
43	xylenes	1hr	9th	3.8E+00	3.8E+00	5.1E+00
44	xylenes	1hr	9th	3.7E+00	3.7E+00	5.0E+00
45	xylenes	1hr	9th	4.0E+00	4.0E+00	5.8E+00
46	xylenes	1hr	9th	3.7E+00	3.7E+00	5.9E+00
47	xylenes	1hr	9th	3.5E+00	3.5E+00	5.6E+00
48	xylenes	1hr	9th	3.7E+00	3.7E+00	6.0E+00
49	xylenes	1hr	9th	3.9E+00	3.9E+00	5.9E+00
50	xylenes	1hr	9th	3.5E+00	3.5E+00	6.1E+00
51	xylenes	1hr	9th	2.6E+00	2.6E+00	4.7E+00
52	xylenes	1hr	9th	8.0E+00	8.0E+00	9.1E+00
53	xylenes	1hr	9th	6.3E+00	6.3E+00	7.5E+00
54	xylenes	1hr	9th	2.5E+00	2.5E+00	2.7E+00
55	xylenes	1hr	9th	1.9E+00	1.9E+00	4.3E+00
56	xylenes	1hr	9th	2.8E+00	2.8E+00	3.4E+00
57	xylenes	1hr	9th	2.6E+00	2.6E+00	4.2E+00
58	xylenes	1hr	9th	2.5E+00	2.5E+00	2.6E+00
59	xylenes	1hr	9th	9.0E+00	9.0E+00	1.1E+01
60	xylenes	1hr	9th	1.1E+01	1.1E+01	1.6E+01
61	xylenes	1hr	9th	1.2E+01	1.2E+01	2.0E+01
62	xylenes	1hr	9th	1.2E+01	1.2E+01	1.7E+01
63	xylenes	1hr	9th	8.5E+00	8.5E+00	1.4E+01
64	xylenes	1hr	9th	9.6E+00	9.6E+00	1.4E+01
65	xylenes	1hr	9th	1.8E+01	1.8E+01	1.8E+01
66	xylenes	1hr	9th	1.6E+00	1.6E+00	2.3E+00
67	xylenes	1hr	9th	2.2E+00	2.2E+00	2.9E+00
68	xylenes	1hr	9th	1.4E+00	1.4E+00	3.5E+00
69	xylenes	1hr	9th	1.3E+00	1.3E+00	2.8E+00
70	xylenes	1hr	9th	2.2E+00	2.2E+00	3.6E+00
71	xylenes	1hr	9th	7.4E+00	7.4E+00	1.1E+01
72	xylenes	1hr	9th	6.8E+00	6.8E+00	8.7E+00
73	xylenes	1hr	9th	1.6E+01	1.6E+01	1.8E+01
74	xylenes	1hr	9th	1.0E+01	1.0E+01	1.0E+01
75	xylenes	1hr	9th	3.4E+01	3.4E+01	3.9E+01
76	xylenes	1hr	9th	1.2E+01	1.2E+01	2.0E+01
77	xylenes	1hr	9th	1.0E+01	1.0E+01	1.3E+01
78	xylenes	1hr	9th	3.5E+00	3.5E+00	3.7E+00
79	xylenes	1hr	9th	2.3E+00	2.3E+00	4.9E+00
1	xylenes	24hr	max	3.0E-01	3.0E-01	3.3E-01
2	xylenes	24hr	max	4.4E-01	4.4E-01	4.5E-01
3	xylenes	24hr	max	4.4E-01	4.4E-01	4.9E-01
4	xylenes	24hr	max	5.9E-01	5.9E-01	6.4E-01
5	xylenes	24hr	max	4.6E-01	4.6E-01	1.0E+00
6	xylenes	24hr	max	4.3E-01	4.3E-01	1.1E+00
7	xylenes	24hr	max	9.1E-01	9.1E-01	9.8E-01
8	xylenes	24hr	max	4.2E-01	4.2E-01	1.3E+00
9	xylenes	24hr	max	4.7E-01	4.7E-01	6.5E-01
10	xylenes	24hr	max	5.0E-01	5.0E-01	7.2E-01
11	xylenes	24hr	max	5.5E-01	5.5E-01	8.1E-01
12	xylenes	24hr	max	6.8E-01	6.8E-01	1.0E+00
13	xylenes	24hr	max	6.9E-01	6.9E-01	9.7E-01
14	xylenes	24hr	max	6.4E-01	6.4E-01	8.9E-01
15	xylenes	24hr	max	1.1E+00	1.1E+00	1.4E+00
16	xylenes	24hr	max	1.0E+00	1.0E+00	1.3E+00
17	xylenes	24hr	max	7.7E-01	7.7E-01	9.8E-01

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
18	xylenes	24hr	max	8.5E-01	8.5E-01	8.6E-01
19	xylenes	24hr	max	7.5E-01	7.5E-01	1.0E+00
20	xylenes	24hr	max	6.9E-01	6.9E-01	7.7E-01
21	xylenes	24hr	max	8.7E-01	8.7E-01	1.0E+00
22	xylenes	24hr	max	8.9E-01	8.9E-01	1.0E+00
23	xylenes	24hr	max	8.6E-01	8.6E-01	9.4E-01
24	xylenes	24hr	max	1.3E+00	1.3E+00	1.5E+00
25	xylenes	24hr	max	1.5E+00	1.5E+00	1.8E+00
26	xylenes	24hr	max	1.7E+00	1.7E+00	1.9E+00
27	xylenes	24hr	max	2.0E+00	2.0E+00	2.1E+00
28	xylenes	24hr	max	7.9E-01	7.9E-01	9.4E-01
29	xylenes	24hr	max	8.5E-01	8.5E-01	9.8E-01
30	xylenes	24hr	max	1.5E+00	1.5E+00	2.2E+00
31	xylenes	24hr	max	1.5E+00	1.5E+00	2.2E+00
32	xylenes	24hr	max	2.6E-01	2.6E-01	4.0E-01
33	xylenes	24hr	max	3.9E-01	3.9E-01	5.8E-01
34	xylenes	24hr	max	2.8E-01	2.8E-01	6.2E-01
35	xylenes	24hr	max	6.7E-01	6.7E-01	8.3E-01
36	xylenes	24hr	max	6.7E-01	6.7E-01	8.1E-01
37	xylenes	24hr	max	7.2E-01	7.2E-01	7.9E-01
38	xylenes	24hr	max	1.3E+00	1.3E+00	1.8E+00
39	xylenes	24hr	max	1.4E+00	1.4E+00	1.4E+00
40	xylenes	24hr	max	1.1E+00	1.1E+00	1.4E+00
41	xylenes	24hr	max	2.3E+00	2.3E+00	2.6E+00
42	xylenes	24hr	max	1.3E+00	1.3E+00	1.3E+00
43	xylenes	24hr	max	1.1E+00	1.1E+00	1.4E+00
44	xylenes	24hr	max	1.1E+00	1.1E+00	1.1E+00
45	xylenes	24hr	max	9.1E-01	9.2E-01	1.3E+00
46	xylenes	24hr	max	9.2E-01	9.2E-01	1.3E+00
47	xylenes	24hr	max	8.2E-01	8.2E-01	1.5E+00
48	xylenes	24hr	max	9.5E-01	9.5E-01	1.3E+00
49	xylenes	24hr	max	9.1E-01	9.1E-01	1.2E+00
50	xylenes	24hr	max	1.0E+00	1.0E+00	1.0E+00
51	xylenes	24hr	max	1.2E+00	1.2E+00	1.3E+00
52	xylenes	24hr	max	1.6E+00	1.6E+00	1.8E+00
53	xylenes	24hr	max	1.7E+00	1.7E+00	2.2E+00
54	xylenes	24hr	max	7.9E-01	7.9E-01	8.7E-01
55	xylenes	24hr	max	9.5E-01	9.5E-01	1.0E+00
56	xylenes	24hr	max	8.3E-01	8.3E-01	9.9E-01
57	xylenes	24hr	max	1.2E+00	1.2E+00	1.3E+00
58	xylenes	24hr	max	5.6E-01	5.6E-01	5.6E-01
59	xylenes	24hr	max	1.8E+00	1.8E+00	2.3E+00
60	xylenes	24hr	max	4.3E+00	4.3E+00	4.6E+00
61	xylenes	24hr	max	3.5E+00	3.5E+00	3.6E+00
62	xylenes	24hr	max	3.0E+00	3.0E+00	3.1E+00
63	xylenes	24hr	max	2.0E+00	2.0E+00	2.2E+00
64	xylenes	24hr	max	2.1E+00	2.1E+00	2.2E+00
65	xylenes	24hr	max	2.4E+00	2.4E+00	2.7E+00
66	xylenes	24hr	max	5.0E-01	5.0E-01	6.0E-01
67	xylenes	24hr	max	5.5E-01	5.5E-01	1.1E+00
68	xylenes	24hr	max	7.2E-01	7.2E-01	8.0E-01
69	xylenes	24hr	max	7.6E-01	7.6E-01	8.5E-01
70	xylenes	24hr	max	6.7E-01	6.7E-01	7.2E-01
71	xylenes	24hr	max	1.4E+00	1.4E+00	2.5E+00
72	xylenes	24hr	max	1.4E+00	1.4E+00	2.4E+00
73	xylenes	24hr	max	2.4E+00	2.4E+00	2.8E+00
74	xylenes	24hr	max	1.6E+00	1.6E+00	2.1E+00
75	xylenes	24hr	max	1.3E+01	1.3E+01	1.4E+01
76	xylenes	24hr	max	4.2E+00	4.2E+00	4.2E+00

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
77	xylenes	24hr	max	1.7E+00	1.7E+00	1.9E+00
78	xylenes	24hr	max	1.4E+00	1.4E+00	1.5E+00
79	xylenes	24hr	max	7.6E-01	7.6E-01	8.8E-01
1	xylenes	annual	average	1.3E-02	1.3E-02	1.6E-02
2	xylenes	annual	average	1.5E-02	1.6E-02	2.2E-02
3	xylenes	annual	average	1.6E-02	1.6E-02	2.2E-02
4	xylenes	annual	average	1.6E-02	1.6E-02	2.4E-02
5	xylenes	annual	average	1.9E-02	1.9E-02	2.7E-02
6	xylenes	annual	average	1.9E-02	1.9E-02	2.8E-02
7	xylenes	annual	average	2.0E-02	2.0E-02	2.8E-02
8	xylenes	annual	average	2.0E-02	2.0E-02	2.9E-02
9	xylenes	annual	average	1.5E-02	1.5E-02	2.4E-02
10	xylenes	annual	average	1.8E-02	1.8E-02	2.5E-02
11	xylenes	annual	average	2.0E-02	2.0E-02	2.9E-02
12	xylenes	annual	average	2.0E-02	2.0E-02	2.8E-02
13	xylenes	annual	average	2.1E-02	2.1E-02	3.0E-02
14	xylenes	annual	average	2.3E-02	2.3E-02	3.5E-02
15	xylenes	annual	average	2.4E-02	2.4E-02	3.3E-02
16	xylenes	annual	average	2.3E-02	2.4E-02	3.2E-02
17	xylenes	annual	average	2.4E-02	2.4E-02	3.3E-02
18	xylenes	annual	average	2.5E-02	2.5E-02	3.4E-02
19	xylenes	annual	average	2.5E-02	2.6E-02	3.6E-02
20	xylenes	annual	average	2.6E-02	2.6E-02	3.8E-02
21	xylenes	annual	average	2.6E-02	2.6E-02	3.5E-02
22	xylenes	annual	average	2.5E-02	2.5E-02	3.4E-02
23	xylenes	annual	average	2.2E-02	2.2E-02	3.1E-02
24	xylenes	annual	average	1.9E-02	1.9E-02	2.6E-02
25	xylenes	annual	average	2.6E-02	2.6E-02	3.8E-02
26	xylenes	annual	average	3.2E-02	3.2E-02	4.3E-02
27	xylenes	annual	average	4.1E-02	4.2E-02	5.4E-02
28	xylenes	annual	average	2.9E-02	2.9E-02	4.2E-02
29	xylenes	annual	average	3.0E-02	3.0E-02	4.2E-02
30	xylenes	annual	average	3.2E-02	3.3E-02	4.6E-02
31	xylenes	annual	average	3.4E-02	3.4E-02	4.8E-02
32	xylenes	annual	average	1.0E-02	1.0E-02	1.4E-02
33	xylenes	annual	average	1.3E-02	1.3E-02	1.9E-02
34	xylenes	annual	average	1.4E-02	1.4E-02	1.9E-02
35	xylenes	annual	average	1.4E-02	1.4E-02	1.8E-02
36	xylenes	annual	average	1.4E-02	1.4E-02	1.9E-02
37	xylenes	annual	average	1.3E-02	1.4E-02	1.8E-02
38	xylenes	annual	average	3.3E-02	3.3E-02	4.6E-02
39	xylenes	annual	average	3.5E-02	3.5E-02	4.8E-02
40	xylenes	annual	average	3.6E-02	3.7E-02	5.2E-02
41	xylenes	annual	average	4.8E-02	4.8E-02	6.4E-02
42	xylenes	annual	average	3.7E-02	3.7E-02	5.2E-02
43	xylenes	annual	average	4.1E-02	4.1E-02	5.9E-02
44	xylenes	annual	average	4.1E-02	4.1E-02	5.8E-02
45	xylenes	annual	average	4.2E-02	4.2E-02	6.0E-02
46	xylenes	annual	average	4.2E-02	4.2E-02	6.0E-02
47	xylenes	annual	average	4.4E-02	4.4E-02	6.3E-02
48	xylenes	annual	average	4.3E-02	4.3E-02	6.2E-02
49	xylenes	annual	average	4.3E-02	4.3E-02	6.1E-02
50	xylenes	annual	average	4.1E-02	4.1E-02	5.9E-02
51	xylenes	annual	average	3.8E-02	3.8E-02	5.5E-02
52	xylenes	annual	average	6.8E-02	6.8E-02	9.2E-02
53	xylenes	annual	average	6.0E-02	6.0E-02	8.1E-02
54	xylenes	annual	average	1.7E-02	1.7E-02	2.2E-02
55	xylenes	annual	average	1.8E-02	1.8E-02	2.4E-02
56	xylenes	annual	average	1.7E-02	1.7E-02	2.3E-02

Table 4E-1 Volatile Organic Compounds

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
57	xylenes	annual	average	1.9E-02	1.9E-02	2.6E-02
58	xylenes	annual	average	1.4E-02	1.4E-02	1.8E-02
59	xylenes	annual	average	8.5E-02	8.5E-02	1.1E-01
60	xylenes	annual	average	1.4E-01	1.4E-01	1.8E-01
61	xylenes	annual	average	1.5E-01	1.5E-01	2.0E-01
62	xylenes	annual	average	1.3E-01	1.3E-01	1.7E-01
63	xylenes	annual	average	1.1E-01	1.1E-01	1.5E-01
64	xylenes	annual	average	1.2E-01	1.2E-01	1.5E-01
65	xylenes	annual	average	1.4E-01	1.4E-01	1.8E-01
66	xylenes	annual	average	1.9E-02	1.9E-02	2.7E-02
67	xylenes	annual	average	2.2E-02	2.3E-02	3.2E-02
68	xylenes	annual	average	1.9E-02	1.9E-02	2.8E-02
69	xylenes	annual	average	1.8E-02	1.8E-02	2.7E-02
70	xylenes	annual	average	1.8E-02	1.8E-02	2.8E-02
71	xylenes	annual	average	4.8E-02	4.8E-02	6.6E-02
72	xylenes	annual	average	4.6E-02	4.6E-02	6.3E-02
73	xylenes	annual	average	1.4E-01	1.4E-01	1.8E-01
74	xylenes	annual	average	8.3E-02	8.3E-02	1.1E-01
75	xylenes	annual	average	5.3E-01	5.3E-01	5.9E-01
76	xylenes	annual	average	1.5E-01	1.5E-01	1.9E-01
77	xylenes	annual	average	9.5E-02	9.6E-02	1.2E-01
78	xylenes	annual	average	3.6E-02	3.6E-02	5.0E-02
79	xylenes	annual	average	2.5E-02	2.5E-02	3.3E-02

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R01	SO2	1h	max	26.71	26.709	26.86
R02	SO2	1h	max	15.17	15.296	16.78
R03	SO2	1h	max	15.10	15.211	17.30
R04	SO2	1h	max	16.20	16.229	18.85
R05	SO2	1h	max	29.47	29.512	33.24
R06	SO2	1h	max	34.43	34.483	37.35
R07	SO2	1h	max	18.01	18.132	21.54
R08	SO2	1h	max	36.59	36.657	38.00
R09	SO2	1h	max	20.46	20.463	21.21
R10	SO2	1h	max	25.44	25.443	26.73
R11	SO2	1h	max	59.43	59.43	61.68
R12	SO2	1h	max	22.06	22.348	25.01
R13	SO2	1h	max	20.55	20.901	23.31
R14	SO2	1h	max	78.40	78.402	79.10
R15	SO2	1h	max	19.35	19.541	19.89
R16	SO2	1h	max	19.26	19.37	19.94
R17	SO2	1h	max	19.84	20.031	21.07
R18	SO2	1h	max	19.10	19.24	19.96
R19	SO2	1h	max	18.50	18.539	19.34
R20	SO2	1h	max	28.89	28.886	30.07
R21	SO2	1h	max	30.68	30.693	30.80
R22	SO2	1h	max	35.78	35.783	35.81
R23	SO2	1h	max	63.18	63.236	64.34
R24	SO2	1h	max	16.15	16.461	17.43
R25	SO2	1h	max	34.15	34.152	34.50
R26	SO2	1h	max	23.90	23.897	25.66
R27	SO2	1h	max	31.28	45.504	45.51
R28	SO2	1h	max	21.19	21.829	23.92
R29	SO2	1h	max	21.45	21.871	25.79
R30	SO2	1h	max	37.52	37.52	37.62
R31	SO2	1h	max	37.82	37.817	37.92
R32	SO2	1h	max	28.41	28.406	28.45
R33	SO2	1h	max	36.86	36.863	36.91
R34	SO2	1h	max	34.38	34.384	34.48
R35	SO2	1h	max	30.27	30.269	30.74
R36	SO2	1h	max	29.46	29.466	29.97
R37	SO2	1h	max	29.70	29.74	30.40
R38	SO2	1h	max	21.57	21.571	35.16
R39	SO2	1h	max	25.05	25.048	35.34
R40	SO2	1h	max	28.24	28.241	38.19
R41	SO2	1h	max	24.06	24.055	37.22
R42	SO2	1h	max	25.54	25.561	37.94
R43	SO2	1h	max	24.93	24.927	33.80
R44	SO2	1h	max	25.37	25.368	31.86
R45	SO2	1h	max	26.83	26.832	30.52
R46	SO2	1h	max	26.83	26.83	30.48
R47	SO2	1h	max	28.43	28.428	33.57
R48	SO2	1h	max	27.35	27.346	31.15
R49	SO2	1h	max	27.65	27.647	31.91
R50	SO2	1h	max	28.63	28.634	33.78
R51	SO2	1h	max	26.32	26.324	30.97
R52	SO2	1h	max	39.80	39.803	238.17
R53	SO2	1h	max	35.87	35.872	55.27
R54	SO2	1h	max	17.22	17.441	18.06
R55	SO2	1h	max	19.31	19.657	20.37
R56	SO2	1h	max	20.43	20.84	21.54
R57	SO2	1h	max	14.05	14.772	16.28
R58	SO2	1h	max	19.18	19.311	20.23
R59	SO2	1h	max	49.05	49.045	54.67
R60	SO2	1h	max	65.37	65.373	65.64
R61	SO2	1h	max	71.52	71.524	71.99
R62	SO2	1h	max	53.73	53.756	55.49
R63	SO2	1h	max	56.00	55.999	56.42
R64	SO2	1h	max	45.83	45.825	46.11
R65	SO2	1h	max	69.05	69.052	69.59
R66	SO2	1h	max	17.10	17.11	19.94
R67	SO2	1h	max	20.48	20.475	22.10
R68	SO2	1h	max	19.21	19.214	21.41

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R69	SO2	1h	max	17.69	17.69	18.85
R70	SO2	1h	max	17.61	17.607	19.12
R71	SO2	1h	max	66.28	66.28	66.52
R72	SO2	1h	max	64.23	64.232	64.47
R73	SO2	1h	max	81.40	81.4	81.89
R74	SO2	1h	max	43.01	43.011	62.37
R75	SO2	1h	max	60.57	60.568	60.69
R76	SO2	1h	max	65.84	65.84	66.30
R77	SO2	1h	max	50.68	50.681	152.50
R78	SO2	1h	max	27.19	27.21	37.54
R79	SO2	1h	max	30.61	30.609	30.64
R01	SO2	1h	9th	11.421	11.424	12.361
R02	SO2	1h	9th	11.568	11.752	12.634
R03	SO2	1h	9th	11.927	12.063	13.392
R04	SO2	1h	9th	14.229	14.423	14.591
R05	SO2	1h	9th	16.267	16.338	18.174
R06	SO2	1h	9th	16.679	16.934	18.499
R07	SO2	1h	9th	14.391	14.745	15.834
R08	SO2	1h	9th	16.84	16.846	18.111
R09	SO2	1h	9th	17.208	17.208	18.12
R10	SO2	1h	9th	20.883	21.327	22.461
R11	SO2	1h	9th	41.461	41.476	42.332
R12	SO2	1h	9th	18.259	18.489	20.18
R13	SO2	1h	9th	16.325	16.326	18.769
R14	SO2	1h	9th	28.07	28.074	28.343
R15	SO2	1h	9th	16.268	16.717	16.974
R16	SO2	1h	9th	16.254	16.63	16.895
R17	SO2	1h	9th	15.916	16.001	16.627
R18	SO2	1h	9th	15.333	15.473	15.66
R19	SO2	1h	9th	16.22	16.285	16.442
R20	SO2	1h	9th	15.309	15.671	16.237
R21	SO2	1h	9th	20.779	20.782	21.851
R22	SO2	1h	9th	20.274	20.37	21.126
R23	SO2	1h	9th	22.458	22.462	22.718
R24	SO2	1h	9th	14.022	14.339	15.158
R25	SO2	1h	9th	23.799	23.799	25.31
R26	SO2	1h	9th	20.129	20.129	20.983
R27	SO2	1h	9th	25.402	26.767	28.62
R28	SO2	1h	9th	16.393	16.476	17.65
R29	SO2	1h	9th	16.81	16.925	18.056
R30	SO2	1h	9th	26.279	26.279	26.396
R31	SO2	1h	9th	28.35	28.35	28.563
R32	SO2	1h	9th	12.327	12.574	12.786
R33	SO2	1h	9th	15.254	15.317	15.644
R34	SO2	1h	9th	16.33	16.349	16.67
R35	SO2	1h	9th	16.258	16.258	16.41
R36	SO2	1h	9th	15.794	15.802	16.57
R37	SO2	1h	9th	16.097	16.1	16.835
R38	SO2	1h	9th	16.862	16.862	19.481
R39	SO2	1h	9th	18.589	18.59	20.25
R40	SO2	1h	9th	20.424	20.424	22.704
R41	SO2	1h	9th	19.785	19.785	23.803
R42	SO2	1h	9th	17.081	17.081	20.251
R43	SO2	1h	9th	18.028	18.029	22.815
R44	SO2	1h	9th	17.952	18.007	22.746
R45	SO2	1h	9th	18.83	18.831	24.371
R46	SO2	1h	9th	18.714	18.714	24.321
R47	SO2	1h	9th	18.778	18.778	26.539
R48	SO2	1h	9th	18.574	18.574	24.995
R49	SO2	1h	9th	18.443	18.443	25.087
R50	SO2	1h	9th	19.35	19.35	25.973
R51	SO2	1h	9th	18.678	18.678	23.776
R52	SO2	1h	9th	28.992	28.992	109.32
R53	SO2	1h	9th	23.892	23.892	40.006
R54	SO2	1h	9th	12.924	13.025	13.686
R55	SO2	1h	9th	14.914	15.378	16.691
R56	SO2	1h	9th	15.208	15.624	17.076
R57	SO2	1h	9th	12.934	13.086	13.487

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R58	SO2	1h	9th	13.685	13.689	15.28
R59	SO2	1h	9th	36.335	36.335	37.303
R60	SO2	1h	9th	49.245	49.245	49.514
R61	SO2	1h	9th	43.91	43.91	44.447
R62	SO2	1h	9th	40.042	40.042	41.029
R63	SO2	1h	9th	42.388	42.388	42.64
R64	SO2	1h	9th	39.439	39.439	39.701
R65	SO2	1h	9th	44.323	44.323	44.397
R66	SO2	1h	9th	14.249	14.249	15.937
R67	SO2	1h	9th	14.568	14.901	16.434
R68	SO2	1h	9th	13.765	13.846	15.314
R69	SO2	1h	9th	12.903	12.977	14.894
R70	SO2	1h	9th	12.557	12.559	14.41
R71	SO2	1h	9th	36.846	36.846	39.516
R72	SO2	1h	9th	36.656	36.656	38.874
R73	SO2	1h	9th	46.646	46.712	47.846
R74	SO2	1h	9th	32.593	32.593	41.78
R75	SO2	1h	9th	51.63	51.63	51.889
R76	SO2	1h	9th	42.802	42.831	43.402
R77	SO2	1h	9th	33.115	33.115	77.974
R78	SO2	1h	9th	17.445	17.445	20.961
R79	SO2	1h	9th	17.876	17.876	19.431
R01	SO2	24h	max	4.2453	4.4467	5.1212
R02	SO2	24h	max	5.6632	5.8753	6.6695
R03	SO2	24h	max	5.8578	6.0578	6.8781
R04	SO2	24h	max	6.0742	6.2723	7.0754
R05	SO2	24h	max	6.3175	6.5472	7.2747
R06	SO2	24h	max	6.4825	6.6152	7.3233
R07	SO2	24h	max	5.861	6.0791	6.8496
R08	SO2	24h	max	7.2958	7.4335	8.3354
R09	SO2	24h	max	6.7122	6.8121	8.3402
R10	SO2	24h	max	8.9312	9.0005	10.431
R11	SO2	24h	max	15.427	15.712	17.076
R12	SO2	24h	max	9.5831	9.8784	10.498
R13	SO2	24h	max	8.1816	8.449	9.4778
R14	SO2	24h	max	10.721	10.721	11.262
R15	SO2	24h	max	6.3701	6.7874	7.4763
R16	SO2	24h	max	6.4059	6.7707	7.4138
R17	SO2	24h	max	6.6682	6.7549	7.2601
R18	SO2	24h	max	6.8417	6.9846	7.4401
R19	SO2	24h	max	6.885	7.0486	7.4795
R20	SO2	24h	max	6.9276	7.1994	7.5912
R21	SO2	24h	max	9.5201	9.5242	9.6513
R22	SO2	24h	max	10.775	10.779	10.963
R23	SO2	24h	max	8.1428	8.1463	9.3415
R24	SO2	24h	max	5.9283	6.2502	7.5054
R25	SO2	24h	max	11.555	11.874	12.531
R26	SO2	24h	max	7.669	7.7909	8.9677
R27	SO2	24h	max	9.0937	9.7118	11.001
R28	SO2	24h	max	6.1246	6.1961	7.4145
R29	SO2	24h	max	6.2428	6.2783	7.6317
R30	SO2	24h	max	9.1174	9.2341	10.311
R31	SO2	24h	max	9.8975	9.9682	10.74
R32	SO2	24h	max	4.5815	4.759	5.5087
R33	SO2	24h	max	5.414	5.4832	6.2788
R34	SO2	24h	max	5.3179	5.345	5.9107
R35	SO2	24h	max	6.0103	6.0106	6.0782
R36	SO2	24h	max	6.3383	6.3445	6.4829
R37	SO2	24h	max	6.5358	6.5486	6.905
R38	SO2	24h	max	5.65	5.6928	8.4639
R39	SO2	24h	max	6.1773	6.2127	9.5302
R40	SO2	24h	max	7.0947	7.1168	10.907
R41	SO2	24h	max	7.9687	8.0129	12.199
R42	SO2	24h	max	8.1126	8.1145	10.579
R43	SO2	24h	max	8.6869	8.6878	11.444
R44	SO2	24h	max	8.878	8.8788	11.48
R45	SO2	24h	max	9.184	9.1845	12.351
R46	SO2	24h	max	9.2038	9.2042	12.369

Table 4E-2 Criteria Air Contaminants						
ReceptorID	**Chemical**	**Period**	**Stat**	**Baseline**	**Application**	**CEA**
R47	SO2	24h	max	9.7375	9.7377	14.064
R48	SO2	24h	max	9.469	9.4693	13.065
R49	SO2	24h	max	9.5507	9.551	13.393
R50	SO2	24h	max	10.523	10.523	15.005
R51	SO2	24h	max	9.6458	9.6465	12.652
R52	SO2	24h	max	13.253	13.273	27.407
R53	SO2	24h	max	12.438	12.461	20.658
R54	SO2	24h	max	5.4707	5.6082	5.9312
R55	SO2	24h	max	6.2139	6.401	7.2838
R56	SO2	24h	max	6.5861	6.8218	7.9554
R57	SO2	24h	max	5.3951	5.6415	6.3128
R58	SO2	24h	max	5.7464	5.8275	6.2153
R59	SO2	24h	max	19.202	19.202	19.459
R60	SO2	24h	max	16.476	16.476	16.701
R61	SO2	24h	max	21.796	21.811	22.147
R62	SO2	24h	max	18.991	19.006	19.337
R63	SO2	24h	max	18.964	18.979	19.325
R64	SO2	24h	max	17.823	17.839	18.176
R65	SO2	24h	max	18.206	18.221	18.593
R66	SO2	24h	max	7.3259	7.4134	8.4199
R67	SO2	24h	max	7.6207	7.8697	9.1316
R68	SO2	24h	max	7.3756	7.4152	8.7173
R69	SO2	24h	max	6.9418	6.9519	8.2137
R70	SO2	24h	max	5.9032	5.9047	6.6956
R71	SO2	24h	max	17.594	17.598	18.302
R72	SO2	24h	max	17.386	17.391	18.106
R73	SO2	24h	max	18.718	18.732	19.112
R74	SO2	24h	max	14.719	14.737	15.522
R75	SO2	24h	max	23.869	23.872	24.232
R76	SO2	24h	max	21.355	21.369	21.704
R77	SO2	24h	max	14.201	14.218	17.616
R78	SO2	24h	max	7.7763	7.7794	10.754
R79	SO2	24h	max	10.296	10.3	10.688
R01	SO2	annual	average	0.26	0.26708	0.30149
R02	SO2	annual	average	0.54	0.55477	0.63569
R03	SO2	annual	average	0.54	0.56503	0.65006
R04	SO2	annual	average	0.58	0.60857	0.70497
R05	SO2	annual	average	0.67	0.71083	0.8267
R06	SO2	annual	average	0.69	0.72897	0.84794
R07	SO2	annual	average	0.62	0.65896	0.76152
R08	SO2	annual	average	0.69	0.736	0.85786
R09	SO2	annual	average	0.71	0.7384	0.85899
R10	SO2	annual	average	1.10	1.1294	1.356
R11	SO2	annual	average	1.86	1.9031	2.2236
R12	SO2	annual	average	1.34	1.3706	1.5855
R13	SO2	annual	average	1.20	1.2366	1.4366
R14	SO2	annual	average	1.68	1.7404	2.0219
R15	SO2	annual	average	0.70	0.80737	0.9185
R16	SO2	annual	average	0.69	0.79951	0.90975
R17	SO2	annual	average	0.74	0.84301	0.9621
R18	SO2	annual	average	0.77	0.88063	1.0052
R19	SO2	annual	average	0.77	0.88896	1.0141
R20	SO2	annual	average	0.81	0.9397	1.0775
R21	SO2	annual	average	1.02	1.0857	1.2798
R22	SO2	annual	average	0.99	1.0506	1.2398
R23	SO2	annual	average	0.91	0.96688	1.1529
R24	SO2	annual	average	0.54	0.57674	0.66198
R25	SO2	annual	average	0.71	0.96049	1.091
R26	SO2	annual	average	0.82	1.0118	1.1666
R27	SO2	annual	average	1.04	1.3761	1.6169
R28	SO2	annual	average	0.86	0.95396	1.1246
R29	SO2	annual	average	0.88	0.9782	1.1576
R30	SO2	annual	average	0.61	0.66845	0.77432
R31	SO2	annual	average	0.64	0.70614	0.81875
R32	SO2	annual	average	0.26	0.27598	0.31783
R33	SO2	annual	average	0.32	0.3381	0.39425
R34	SO2	annual	average	0.33	0.34897	0.4018
R35	SO2	annual	average	0.35	0.37174	0.42449

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R36	SO2	annual	average	0.38	0.4063	0.46383
R37	SO2	annual	average	0.39	0.41557	0.47456
R38	SO2	annual	average	0.97	1.0428	1.2622
R39	SO2	annual	average	1.03	1.1244	1.3715
R40	SO2	annual	average	1.11	1.2102	1.4974
R41	SO2	annual	average	1.14	1.221	1.5445
R42	SO2	annual	average	1.04	1.1098	1.4161
R43	SO2	annual	average	1.09	1.1536	1.5003
R44	SO2	annual	average	1.10	1.1656	1.5112
R45	SO2	annual	average	1.12	1.1773	1.5548
R46	SO2	annual	average	1.12	1.1772	1.5516
R47	SO2	annual	average	1.15	1.2137	1.6038
R48	SO2	annual	average	1.14	1.2005	1.5737
R49	SO2	annual	average	1.14	1.198	1.5766
R50	SO2	annual	average	1.18	1.2441	1.6268
R51	SO2	annual	average	1.11	1.178	1.5214
R52	SO2	annual	average	2.27	2.3115	4.5878
R53	SO2	annual	average	1.59	1.6336	2.8014
R54	SO2	annual	average	0.42	0.44082	0.50071
R55	SO2	annual	average	0.46	0.48086	0.54932
R56	SO2	annual	average	0.49	0.51478	0.58893
R57	SO2	annual	average	0.50	0.5226	0.59737
R58	SO2	annual	average	0.36	0.37287	0.42291
R59	SO2	annual	average	2.24	2.2651	3.3076
R60	SO2	annual	average	2.07	2.088	2.7063
R61	SO2	annual	average	2.33	2.3482	2.7759
R62	SO2	annual	average	2.10	2.1146	2.5789
R63	SO2	annual	average	2.13	2.1492	2.7691
R64	SO2	annual	average	2.03	2.0524	2.6094
R65	SO2	annual	average	2.51	2.5254	2.9578
R66	SO2	annual	average	0.90	0.92228	1.0818
R67	SO2	annual	average	1.14	1.1742	1.3569
R68	SO2	annual	average	0.88	0.90722	1.0513
R69	SO2	annual	average	0.86	0.88213	1.0185
R70	SO2	annual	average	0.77	0.78457	0.90383
R71	SO2	annual	average	1.10	1.1583	1.3858
R72	SO2	annual	average	1.10	1.1639	1.3881
R73	SO2	annual	average	2.75	2.766	3.2193
R74	SO2	annual	average	2.21	2.2356	3.8808
R75	SO2	annual	average	4.65	4.6606	4.8282
R76	SO2	annual	average	2.29	2.3099	2.7432
R77	SO2	annual	average	1.87	1.8897	2.9258
R78	SO2	annual	average	1.03	1.0981	1.3819
R79	SO2	annual	average	0.94	1.0015	1.1595
R01	NO2	1h	max	59.41	59.412	59.412
R02	NO2	1h	max	27.71	28.503	34.082
R03	NO2	1h	max	26.44	27.452	33.584
R04	NO2	1h	max	22.72	23.471	30.771
R05	NO2	1h	max	26.46	30.722	33.401
R06	NO2	1h	max	27.23	29.554	32.232
R07	NO2	1h	max	30.16	35.317	38.245
R08	NO2	1h	max	28.80	30.373	33.073
R09	NO2	1h	max	27.66	28.874	32.009
R10	NO2	1h	max	52.23	52.23	52.23
R11	NO2	1h	max	42.65	44.063	44.3
R12	NO2	1h	max	38.27	38.269	39.589
R13	NO2	1h	max	38.31	38.307	39.677
R14	NO2	1h	max	41.73	43.273	48.652
R15	NO2	1h	max	62.48	62.476	62.476
R16	NO2	1h	max	47.06	47.225	47.256
R17	NO2	1h	max	66.43	66.43	66.43
R18	NO2	1h	max	90.88	90.881	90.883
R19	NO2	1h	max	100.55	100.56	100.57
R20	NO2	1h	max	75.41	75.413	75.413
R21	NO2	1h	max	75.19	77.566	77.75
R22	NO2	1h	max	52.98	54.52	54.521
R23	NO2	1h	max	49.63	49.632	50.585
R24	NO2	1h	max	33.07	34.193	37.762

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R25	NO2	1h	max	50.48	62.531	62.56
R26	NO2	1h	max	33.45	38.322	39.606
R27	NO2	1h	max	33.54	77.536	77.537
R28	NO2	1h	max	49.38	49.384	51.25
R29	NO2	1h	max	49.51	49.508	51.472
R30	NO2	1h	max	56.65	56.652	58.024
R31	NO2	1h	max	59.30	59.295	59.296
R32	NO2	1h	max	48.33	48.48	48.591
R33	NO2	1h	max	35.43	35.453	43.034
R34	NO2	1h	max	36.45	36.476	45.787
R35	NO2	1h	max	40.07	40.086	40.104
R36	NO2	1h	max	93.46	93.461	93.463
R37	NO2	1h	max	48.31	48.309	48.604
R38	NO2	1h	max	52.30	52.366	52.949
R39	NO2	1h	max	67.55	67.553	67.627
R40	NO2	1h	max	63.37	63.372	63.372
R41	NO2	1h	max	38.67	38.667	49.375
R42	NO2	1h	max	48.26	48.258	49.974
R43	NO2	1h	max	47.62	47.615	49.609
R44	NO2	1h	max	46.30	46.295	49.348
R45	NO2	1h	max	40.55	40.552	48.878
R46	NO2	1h	max	41.22	41.224	48.917
R47	NO2	1h	max	39.29	39.291	48.49
R48	NO2	1h	max	40.80	40.797	48.646
R49	NO2	1h	max	39.02	39.021	48.503
R50	NO2	1h	max	38.54	38.542	48.254
R51	NO2	1h	max	39.28	39.281	48.533
R52	NO2	1h	max	42.12	42.116	65.35
R53	NO2	1h	max	38.30	38.302	55.724
R54	NO2	1h	max	25.57	25.751	28.013
R55	NO2	1h	max	35.76	35.83	38.524
R56	NO2	1h	max	35.62	35.701	38.879
R57	NO2	1h	max	38.46	39.392	42.212
R58	NO2	1h	max	31.60	31.607	31.623
R59	NO2	1h	max	67.22	67.217	69.599
R60	NO2	1h	max	63.33	63.325	64.484
R61	NO2	1h	max	78.45	78.448	79.47
R62	NO2	1h	max	76.60	76.601	77.569
R63	NO2	1h	max	66.15	66.15	70.112
R64	NO2	1h	max	69.06	69.058	75.317
R65	NO2	1h	max	78.74	78.736	79.775
R66	NO2	1h	max	36.77	36.766	37.971
R67	NO2	1h	max	37.47	37.472	38.979
R68	NO2	1h	max	35.66	35.657	36.744
R69	NO2	1h	max	25.82	25.822	35.535
R70	NO2	1h	max	22.15	22.147	26.609
R71	NO2	1h	max	56.51	56.509	61.35
R72	NO2	1h	max	56.48	56.483	61.824
R73	NO2	1h	max	78.90	78.898	79.933
R74	NO2	1h	max	67.53	67.528	69.586
R75	NO2	1h	max	96.18	96.176	96.188
R76	NO2	1h	max	78.38	78.379	79.396
R77	NO2	1h	max	69.36	69.362	77.287
R78	NO2	1h	max	51.22	51.244	51.773
R79	NO2	1h	max	65.42	65.575	65.788
R01	NO2	1h	9th	37.34	37.341	37.341
R02	NO2	1h	9th	16.89	18.463	21.871
R03	NO2	1h	9th	17.17	18.498	21.528
R04	NO2	1h	9th	17.51	18.82	22.103
R05	NO2	1h	9th	18.75	20.434	24.185
R06	NO2	1h	9th	19.33	20.793	24.52
R07	NO2	1h	9th	18.95	21.174	23.514
R08	NO2	1h	9th	21.53	22.445	26.033
R09	NO2	1h	9th	15.95	17.444	19.605
R10	NO2	1h	9th	29.97	32.161	32.327
R11	NO2	1h	9th	31.82	33.07	33.724
R12	NO2	1h	9th	25.36	25.355	27.251
R13	NO2	1h	9th	26.06	28.159	28.698

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R14	NO2	1h	9th	28.16	28.558	29.464
R15	NO2	1h	9th	34.63	36.427	37.161
R16	NO2	1h	9th	29.96	29.961	29.961
R17	NO2	1h	9th	44.61	44.61	44.64
R18	NO2	1h	9th	71.19	71.194	71.194
R19	NO2	1h	9th	62.46	62.534	63.214
R20	NO2	1h	9th	46.38	46.378	46.378
R21	NO2	1h	9th	49.64	50.649	51.439
R22	NO2	1h	9th	40.53	42.01	42.527
R23	NO2	1h	9th	33.92	33.924	36.393
R24	NO2	1h	9th	16.77	18.252	21.969
R25	NO2	1h	9th	26.00	43.422	44.394
R26	NO2	1h	9th	21.41	27.084	28.418
R27	NO2	1h	9th	24.38	56.954	57.536
R28	NO2	1h	9th	27.87	28.13	29.014
R29	NO2	1h	9th	27.12	28.404	28.745
R30	NO2	1h	9th	35.17	35.168	40.008
R31	NO2	1h	9th	39.69	39.694	47.06
R32	NO2	1h	9th	21.65	23.514	26.61
R33	NO2	1h	9th	21.58	21.877	27.847
R34	NO2	1h	9th	20.58	20.889	25.107
R35	NO2	1h	9th	22.35	22.363	23.315
R36	NO2	1h	9th	35.84	35.839	36.526
R37	NO2	1h	9th	25.75	25.749	28.246
R38	NO2	1h	9th	30.11	30.108	32.048
R39	NO2	1h	9th	27.35	27.345	31.641
R40	NO2	1h	9th	31.97	31.97	34.662
R41	NO2	1h	9th	28.62	28.617	32.443
R42	NO2	1h	9th	30.82	30.819	35.768
R43	NO2	1h	9th	27.46	28.091	32.509
R44	NO2	1h	9th	27.02	27.028	32.947
R45	NO2	1h	9th	25.95	25.946	31.943
R46	NO2	1h	9th	27.17	27.174	32.165
R47	NO2	1h	9th	26.20	26.195	33.102
R48	NO2	1h	9th	25.78	25.781	32.73
R49	NO2	1h	9th	26.85	26.846	31.923
R50	NO2	1h	9th	27.34	27.337	34.928
R51	NO2	1h	9th	28.45	28.652	34.056
R52	NO2	1h	9th	32.25	32.25	53.421
R53	NO2	1h	9th	30.93	30.931	40.515
R54	NO2	1h	9th	16.84	17.609	20.062
R55	NO2	1h	9th	16.03	17.938	22.76
R56	NO2	1h	9th	16.74	20.071	24.916
R57	NO2	1h	9th	15.27	18.382	20.526
R58	NO2	1h	9th	17.79	18.844	21.492
R59	NO2	1h	9th	40.11	40.11	44.128
R60	NO2	1h	9th	52.32	52.317	56.782
R61	NO2	1h	9th	52.94	52.94	55.426
R62	NO2	1h	9th	50.68	50.692	52.338
R63	NO2	1h	9th	47.47	47.467	52.265
R64	NO2	1h	9th	47.08	47.079	50.883
R65	NO2	1h	9th	48.30	48.301	50.64
R66	NO2	1h	9th	22.83	23.578	24.238
R67	NO2	1h	9th	20.12	20.217	24.895
R68	NO2	1h	9th	20.61	20.933	23.6
R69	NO2	1h	9th	19.07	19.797	22.516
R70	NO2	1h	9th	13.94	14.974	17.673
R71	NO2	1h	9th	40.24	40.244	48.798
R72	NO2	1h	9th	39.07	39.071	48.622
R73	NO2	1h	9th	48.56	48.559	52.073
R74	NO2	1h	9th	37.53	37.53	52.807
R75	NO2	1h	9th	80.46	80.461	81.091
R76	NO2	1h	9th	52.77	52.77	55.375
R77	NO2	1h	9th	38.79	38.791	57.387
R78	NO2	1h	9th	33.63	33.627	37.054
R79	NO2	1h	9th	48.40	48.404	48.555
R01	NO2	24h	max	10.252	10.258	11.756
R02	NO2	24h	max	8.9477	10.145	12.419

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R03	NO2	24h	max	9.0674	10.197	12.544
R04	NO2	24h	max	9.4046	10.524	12.941
R05	NO2	24h	max	10.26	11.558	13.981
R06	NO2	24h	max	10.874	12.203	14.633
R07	NO2	24h	max	9.1724	11.109	13.302
R08	NO2	24h	max	11.486	12.943	15.32
R09	NO2	24h	max	10.862	11.426	13.924
R10	NO2	24h	max	12.95	12.983	15.275
R11	NO2	24h	max	14.263	15.558	17.291
R12	NO2	24h	max	10.774	11.768	12.117
R13	NO2	24h	max	11.2	13.001	13.739
R14	NO2	24h	max	11.688	13.369	17.162
R15	NO2	24h	max	16.105	16.106	16.107
R16	NO2	24h	max	12.764	13.826	15.006
R17	NO2	24h	max	15.371	15.377	15.509
R18	NO2	24h	max	25.367	25.885	26.357
R19	NO2	24h	max	16.934	16.934	18.003
R20	NO2	24h	max	18.921	18.921	18.921
R21	NO2	24h	max	19.774	21.212	21.213
R22	NO2	24h	max	19.74	20.054	20.801
R23	NO2	24h	max	14.552	14.689	16.154
R24	NO2	24h	max	7.8027	10.079	12.823
R25	NO2	24h	max	10.884	18.543	19.079
R26	NO2	24h	max	9.363	10.975	12.733
R27	NO2	24h	max	12.708	21.005	21.272
R28	NO2	24h	max	12.279	12.407	14.762
R29	NO2	24h	max	12.338	12.401	14.784
R30	NO2	24h	max	15.328	15.439	19.517
R31	NO2	24h	max	15.474	15.577	19.801
R32	NO2	24h	max	7.1566	8.2624	10.405
R33	NO2	24h	max	7.9763	8.3596	11.499
R34	NO2	24h	max	7.352	7.7294	10.356
R35	NO2	24h	max	6.8029	7.8802	10.3
R36	NO2	24h	max	14.32	14.32	14.32
R37	NO2	24h	max	8.4591	8.8197	11.28
R38	NO2	24h	max	13.485	13.665	15.273
R39	NO2	24h	max	12.302	12.302	15.532
R40	NO2	24h	max	14.309	14.309	15.126
R41	NO2	24h	max	12.359	12.391	15.231
R42	NO2	24h	max	12.118	12.122	15.246
R43	NO2	24h	max	12.707	12.708	15.05
R44	NO2	24h	max	14.046	14.047	16.17
R45	NO2	24h	max	12.405	12.405	15.171
R46	NO2	24h	max	12.388	12.388	15.123
R47	NO2	24h	max	12.644	12.644	15.847
R48	NO2	24h	max	12.456	12.456	15.299
R49	NO2	24h	max	12.504	12.504	15.438
R50	NO2	24h	max	13.009	13.009	16.344
R51	NO2	24h	max	12.32	12.321	14.874
R52	NO2	24h	max	15.013	15.08	34.173
R53	NO2	24h	max	13.533	13.612	23.676
R54	NO2	24h	max	7.724	9.2382	11.167
R55	NO2	24h	max	7.621	10.015	12.496
R56	NO2	24h	max	7.5963	10.383	13.157
R57	NO2	24h	max	7.7498	9.2261	11.333
R58	NO2	24h	max	6.782	8.6501	10.646
R59	NO2	24h	max	19.748	19.863	22.223
R60	NO2	24h	max	25.96	25.96	28.612
R61	NO2	24h	max	28.229	28.229	31.935
R62	NO2	24h	max	24.827	24.827	28.951
R63	NO2	24h	max	24.716	24.716	28.472
R64	NO2	24h	max	24.189	24.189	28.197
R65	NO2	24h	max	22.883	22.917	25.534
R66	NO2	24h	max	8.9216	9.3571	10.482
R67	NO2	24h	max	8.9269	9.3261	10.506
R68	NO2	24h	max	8.4639	10.027	11.311
R69	NO2	24h	max	7.8008	9.4579	10.733
R70	NO2	24h	max	6.7845	7.6545	8.7325

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R71	NO2	24h	max	18.622	18.638	25.283
R72	NO2	24h	max	18.081	18.108	24.959
R73	NO2	24h	max	26.493	26.527	28.963
R74	NO2	24h	max	19.345	19.345	23.969
R75	NO2	24h	max	46.491	46.491	48.119
R76	NO2	24h	max	27.738	27.738	31.476
R77	NO2	24h	max	18.339	18.393	20.529
R78	NO2	24h	max	17.741	17.758	18.812
R79	NO2	24h	max	19.661	20.055	21.448
R01	NO2	annual	average	2.2302	2.29	2.3754
R02	NO2	annual	average	1.1921	1.29	1.4766
R03	NO2	annual	average	1.1342	1.24	1.43
R04	NO2	annual	average	1.3006	1.44	1.6325
R05	NO2	annual	average	1.7311	1.93	2.1515
R06	NO2	annual	average	1.8149	2.03	2.2504
R07	NO2	annual	average	1.4062	1.61	1.8044
R08	NO2	annual	average	1.7533	1.98	2.2063
R09	NO2	annual	average	1.3686	1.51	1.7414
R10	NO2	annual	average	2.1589	2.33	2.6754
R11	NO2	annual	average	2.9312	3.13	3.5755
R12	NO2	annual	average	2.588	2.76	3.0946
R13	NO2	annual	average	2.3517	2.51	2.8427
R14	NO2	annual	average	2.7189	3.02	3.4301
R15	NO2	annual	average	1.744	2.31	2.5433
R16	NO2	annual	average	1.7011	2.27	2.4956
R17	NO2	annual	average	2.1157	2.69	2.9252
R18	NO2	annual	average	2.8806	3.48	3.7219
R19	NO2	annual	average	2.3449	2.95	3.2052
R20	NO2	annual	average	2.6287	3.30	3.5724
R21	NO2	annual	average	3.7485	4.06	4.3824
R22	NO2	annual	average	2.9166	3.23	3.5472
R23	NO2	annual	average	1.976	2.28	2.5733
R24	NO2	annual	average	1.191	1.36	1.5381
R25	NO2	annual	average	1.4547	2.60	2.8456
R26	NO2	annual	average	1.4434	2.42	2.7196
R27	NO2	annual	average	2.1189	3.57	3.9959
R28	NO2	annual	average	2.193	2.70	3.0184
R29	NO2	annual	average	2.2491	2.75	3.0753
R30	NO2	annual	average	1.6674	1.97	2.1989
R31	NO2	annual	average	1.9223	2.26	2.5062
R32	NO2	annual	average	1.2557	1.34	1.4466
R33	NO2	annual	average	1.0613	1.17	1.3084
R34	NO2	annual	average	0.86973	0.97	1.1027
R35	NO2	annual	average	1.338	1.45	1.5788
R36	NO2	annual	average	2.1528	2.28	2.417
R37	NO2	annual	average	1.7323	1.87	2.0036
R38	NO2	annual	average	2.1933	2.59	2.9687
R39	NO2	annual	average	2.1967	2.68	3.0919
R40	NO2	annual	average	2.2391	2.75	3.2087
R41	NO2	annual	average	1.9588	2.39	2.8945
R42	NO2	annual	average	2.4321	2.79	3.2587
R43	NO2	annual	average	2.6012	2.92	3.4373
R44	NO2	annual	average	2.6482	2.96	3.4759
R45	NO2	annual	average	2.3034	2.62	3.1712
R46	NO2	annual	average	2.3425	2.66	3.2041
R47	NO2	annual	average	2.2588	2.57	3.1302
R48	NO2	annual	average	2.4639	2.77	3.3134
R49	NO2	annual	average	2.3639	2.67	3.2219
R50	NO2	annual	average	2.4231	2.74	3.2898
R51	NO2	annual	average	2.3846	2.71	3.228
R52	NO2	annual	average	3.0206	3.23	5.1395
R53	NO2	annual	average	2.3928	2.64	3.728
R54	NO2	annual	average	1.0027	1.09	1.2315
R55	NO2	annual	average	1.032	1.15	1.3069
R56	NO2	annual	average	1.0836	1.23	1.3935
R57	NO2	annual	average	1.1332	1.26	1.4232
R58	NO2	annual	average	1.0033	1.07	1.1961
R59	NO2	annual	average	2.9658	3.11	4.6805

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R60	NO2	annual	average	3.6295	3.72	4.9975
R61	NO2	annual	average	3.6217	3.70	4.684
R62	NO2	annual	average	3.4237	3.51	4.5696
R63	NO2	annual	average	3.3859	3.48	4.786
R64	NO2	annual	average	3.3541	3.45	4.6487
R65	NO2	annual	average	4.2418	4.32	5.3277
R66	NO2	annual	average	2.1	2.22	2.5267
R67	NO2	annual	average	1.991	2.15	2.4738
R68	NO2	annual	average	1.7296	1.84	2.1337
R69	NO2	annual	average	1.5466	1.65	1.9406
R70	NO2	annual	average	1.2835	1.38	1.654
R71	NO2	annual	average	3.0982	3.40	3.8299
R72	NO2	annual	average	3.1589	3.48	3.8973
R73	NO2	annual	average	5.8521	5.93	6.9349
R74	NO2	annual	average	3.1699	3.32	5.8848
R75	NO2	annual	average	14.051	14.09	14.71
R76	NO2	annual	average	3.5867	3.66	4.6632
R77	NO2	annual	average	3.0261	3.14	4.7947
R78	NO2	annual	average	2.2731	2.64	3.0866
R79	NO2	annual	average	2.7149	3.05	3.3233
R01	TPM	1h	max	53.43	53.516	53.58
R02	TPM	1h	max	7.57	7.6806	8.59
R03	TPM	1h	max	7.63	7.7197	8.69
R04	TPM	1h	max	7.72	7.8325	8.80
R05	TPM	1h	max	11.73	11.733	11.92
R06	TPM	1h	max	13.19	13.187	13.19
R07	TPM	1h	max	7.61	7.8924	8.71
R08	TPM	1h	max	9.41	9.429	9.61
R09	TPM	1h	max	6.48	6.4775	8.02
R10	TPM	1h	max	9.26	9.6564	10.58
R11	TPM	1h	max	10.47	10.941	11.97
R12	TPM	1h	max	12.12	12.516	13.64
R13	TPM	1h	max	12.44	12.695	13.86
R14	TPM	1h	max	10.58	11.128	12.23
R15	TPM	1h	max	8.69	8.6963	10.22
R16	TPM	1h	max	8.72	8.725	10.28
R17	TPM	1h	max	8.39	8.3921	9.79
R18	TPM	1h	max	8.22	8.4867	9.64
R19	TPM	1h	max	8.30	8.6014	9.86
R20	TPM	1h	max	8.71	8.7785	10.22
R21	TPM	1h	max	29.81	29.806	29.87
R22	TPM	1h	max	14.94	14.943	14.94
R23	TPM	1h	max	8.21	8.2127	9.27
R24	TPM	1h	max	7.19	7.2039	8.55
R25	TPM	1h	max	10.78	11.542	11.78
R26	TPM	1h	max	10.16	10.268	11.26
R27	TPM	1h	max	9.55	19.916	19.93
R28	TPM	1h	max	8.91	8.9502	9.85
R29	TPM	1h	max	9.04	9.2858	10.15
R30	TPM	1h	max	11.37	11.37	13.14
R31	TPM	1h	max	12.27	12.27	13.76
R32	TPM	1h	max	7.17	7.3121	8.10
R33	TPM	1h	max	9.02	9.0186	9.80
R34	TPM	1h	max	8.18	8.2145	9.55
R35	TPM	1h	max	8.14	8.2539	9.45
R36	TPM	1h	max	7.94	8.0445	9.33
R37	TPM	1h	max	7.96	8.0047	9.26
R38	TPM	1h	max	12.48	12.92	14.08
R39	TPM	1h	max	12.52	12.757	13.92
R40	TPM	1h	max	12.90	13.013	14.15
R41	TPM	1h	max	13.22	13.24	14.88
R42	TPM	1h	max	31.52	31.519	31.52
R43	TPM	1h	max	45.00	45.081	45.25
R44	TPM	1h	max	89.13	89.128	89.57
R45	TPM	1h	max	22.17	22.174	22.58
R46	TPM	1h	max	39.12	39.117	39.18
R47	TPM	1h	max	37.08	37.122	37.57
R48	TPM	1h	max	64.59	64.639	65.04

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R49	TPM	1h	max	77.71	77.735	78.30
R50	TPM	1h	max	21.30	21.303	21.91
R51	TPM	1h	max	15.81	15.831	17.98
R52	TPM	1h	max	22.48	22.479	26.33
R53	TPM	1h	max	20.74	20.736	25.43
R54	TPM	1h	max	6.30	6.4225	8.12
R55	TPM	1h	max	7.21	7.2161	8.18
R56	TPM	1h	max	7.34	7.3869	8.79
R57	TPM	1h	max	7.52	7.6235	8.33
R58	TPM	1h	max	6.41	6.4617	7.77
R59	TPM	1h	max	29.62	29.618	33.08
R60	TPM	1h	max	18.28	18.279	21.13
R61	TPM	1h	max	35.53	35.531	39.45
R62	TPM	1h	max	30.92	30.922	34.61
R63	TPM	1h	max	23.73	23.73	27.05
R64	TPM	1h	max	25.39	25.394	28.74
R65	TPM	1h	max	131.41	131.44	132.22
R66	TPM	1h	max	12.14	12.291	13.55
R67	TPM	1h	max	12.73	12.848	14.22
R68	TPM	1h	max	11.30	11.391	12.85
R69	TPM	1h	max	10.14	10.258	12.35
R70	TPM	1h	max	12.07	12.11	14.22
R71	TPM	1h	max	15.68	15.825	16.45
R72	TPM	1h	max	12.72	12.719	13.98
R73	TPM	1h	max	224.69	224.69	224.76
R74	TPM	1h	max	28.87	28.874	32.24
R75	TPM	1h	max	124.49	124.49	124.49
R76	TPM	1h	max	35.73	35.733	39.62
R77	TPM	1h	max	30.35	30.351	34.02
R78	TPM	1h	max	14.26	14.323	15.36
R79	TPM	1h	max	17.41	17.415	17.75
R01	TPM	1h	9th	25.25	25.301	25.354
R02	TPM	1h	9th	4.77	4.851	6.2311
R03	TPM	1h	9th	4.79	4.8497	6.2077
R04	TPM	1h	9th	4.99	5.057	6.3516
R05	TPM	1h	9th	8.16	8.2728	8.6062
R06	TPM	1h	9th	10.59	10.616	10.637
R07	TPM	1h	9th	5.83	5.9476	7.4728
R08	TPM	1h	9th	7.56	7.6351	7.998
R09	TPM	1h	9th	5.33	5.3314	6.0477
R10	TPM	1h	9th	6.50	6.7877	8.3035
R11	TPM	1h	9th	7.53	8.1885	9.379
R12	TPM	1h	9th	8.35	8.9639	10.058
R13	TPM	1h	9th	8.58	8.9835	10.678
R14	TPM	1h	9th	7.37	7.8926	9.2879
R15	TPM	1h	9th	6.26	6.3039	7.7749
R16	TPM	1h	9th	6.20	6.3276	7.778
R17	TPM	1h	9th	6.11	6.2178	7.9338
R18	TPM	1h	9th	6.34	6.4891	8.0649
R19	TPM	1h	9th	6.34	6.5962	7.9167
R20	TPM	1h	9th	6.10	6.12	7.7701
R21	TPM	1h	9th	16.99	17.146	17.541
R22	TPM	1h	9th	11.81	11.819	12.314
R23	TPM	1h	9th	5.81	5.9289	7.1245
R24	TPM	1h	9th	5.74	5.9891	7.2417
R25	TPM	1h	9th	6.66	8.0955	8.866
R26	TPM	1h	9th	6.38	6.6381	8.0845
R27	TPM	1h	9th	7.81	9.5362	10.392
R28	TPM	1h	9th	7.40	7.6288	8.4696
R29	TPM	1h	9th	7.51	7.6372	8.8911
R30	TPM	1h	9th	6.92	7.0289	9.1864
R31	TPM	1h	9th	7.01	7.0078	9.0634
R32	TPM	1h	9th	4.50	4.655	5.4444
R33	TPM	1h	9th	5.07	5.1703	6.0655
R34	TPM	1h	9th	5.40	5.4016	6.3325
R35	TPM	1h	9th	5.28	5.435	6.6084
R36	TPM	1h	9th	5.54	5.6947	6.7922
R37	TPM	1h	9th	5.57	5.7834	6.8562

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R38	TPM	1h	9th	8.47	8.9827	10.441
R39	TPM	1h	9th	8.71	8.9501	10.512
R40	TPM	1h	9th	9.39	9.5048	11.478
R41	TPM	1h	9th	11.12	11.224	13.079
R42	TPM	1h	9th	13.42	13.415	14.202
R43	TPM	1h	9th	39.23	39.226	39.458
R44	TPM	1h	9th	61.21	61.21	61.857
R45	TPM	1h	9th	15.64	15.691	17.422
R46	TPM	1h	9th	27.00	27.005	27.77
R47	TPM	1h	9th	17.28	17.31	19.648
R48	TPM	1h	9th	49.54	50.644	50.914
R49	TPM	1h	9th	37.35	37.375	37.53
R50	TPM	1h	9th	15.86	15.918	16.734
R51	TPM	1h	9th	13.70	13.839	15.348
R52	TPM	1h	9th	16.14	16.136	18.907
R53	TPM	1h	9th	15.27	15.403	19.207
R54	TPM	1h	9th	5.08	5.1565	6.2874
R55	TPM	1h	9th	5.28	5.702	7.1631
R56	TPM	1h	9th	5.73	5.7778	7.3317
R57	TPM	1h	9th	5.68	5.8744	7.2448
R58	TPM	1h	9th	4.72	5.2397	6.3687
R59	TPM	1h	9th	18.76	18.831	22.789
R60	TPM	1h	9th	14.33	14.334	17.072
R61	TPM	1h	9th	17.38	17.448	21.599
R62	TPM	1h	9th	17.98	18.103	22.581
R63	TPM	1h	9th	16.45	16.621	19.469
R64	TPM	1h	9th	16.63	16.626	20.286
R65	TPM	1h	9th	99.48	99.486	101.38
R66	TPM	1h	9th	8.47	8.8947	10.129
R67	TPM	1h	9th	9.37	10.034	11.289
R68	TPM	1h	9th	8.82	9.1674	10.634
R69	TPM	1h	9th	9.24	9.378	10.929
R70	TPM	1h	9th	9.42	9.7974	11.695
R71	TPM	1h	9th	9.87	9.8717	11.115
R72	TPM	1h	9th	9.20	9.1976	10.878
R73	TPM	1h	9th	211.87	211.87	211.95
R74	TPM	1h	9th	18.27	18.274	22.553
R75	TPM	1h	9th	93.83	93.827	94.522
R76	TPM	1h	9th	17.17	17.255	21.528
R77	TPM	1h	9th	17.93	17.99	20.457
R78	TPM	1h	9th	10.67	10.887	12.935
R79	TPM	1h	9th	13.98	14.055	14.11
R01	TPM	24hr	max	10.076	10.08	10.122
R02	TPM	24hr	max	3.1708	3.4247	4.3235
R03	TPM	24hr	max	3.1793	3.4237	4.3254
R04	TPM	24hr	max	3.3209	3.5697	4.504
R05	TPM	24hr	max	3.5833	3.7864	4.7611
R06	TPM	24hr	max	3.9217	4.1023	4.8005
R07	TPM	24hr	max	3.6593	4.0217	5.0455
R08	TPM	24hr	max	3.6194	3.8861	4.8858
R09	TPM	24hr	max	2.7499	2.8921	3.6834
R10	TPM	24hr	max	3.9247	4.4328	5.4829
R11	TPM	24hr	max	5.2198	5.7259	6.8069
R12	TPM	24hr	max	5.3934	5.8432	7.0764
R13	TPM	24hr	max	5.5894	6.0257	7.3186
R14	TPM	24hr	max	4.8736	5.324	6.4994
R15	TPM	24hr	max	4.0286	4.4175	5.5563
R16	TPM	24hr	max	4.0328	4.4167	5.5518
R17	TPM	24hr	max	3.9709	4.308	5.418
R18	TPM	24hr	max	3.9146	4.2168	5.3015
R19	TPM	24hr	max	3.9141	4.2088	5.2881
R20	TPM	24hr	max	3.8794	4.1266	5.1933
R21	TPM	24hr	max	9.1093	9.2332	9.4049
R22	TPM	24hr	max	4.8458	5.3533	6.2252
R23	TPM	24hr	max	3.4347	3.755	4.6396
R24	TPM	24hr	max	3.848	4.358	5.4715
R25	TPM	24hr	max	4.055	4.1549	5.147
R26	TPM	24hr	max	4.1958	4.3543	5.4292

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R27	TPM	24hr	max	4.2511	4.4746	5.5248
R28	TPM	24hr	max	4.1922	4.6097	5.5821
R29	TPM	24hr	max	4.2982	4.7286	5.7292
R30	TPM	24hr	max	4.1931	4.2545	5.3637
R31	TPM	24hr	max	4.2012	4.2177	5.3566
R32	TPM	24hr	max	2.9634	3.1318	3.9128
R33	TPM	24hr	max	3.2502	3.3414	4.1406
R34	TPM	24hr	max	3.4369	3.5374	4.3165
R35	TPM	24hr	max	3.4801	3.6628	4.513
R36	TPM	24hr	max	3.594	3.8168	4.7259
R37	TPM	24hr	max	3.6253	3.8944	4.8412
R38	TPM	24hr	max	5.9386	6.3319	7.7151
R39	TPM	24hr	max	6.0937	6.4621	7.9155
R40	TPM	24hr	max	6.5901	6.8767	8.4578
R41	TPM	24hr	max	7.2609	7.4816	9.1304
R42	TPM	24hr	max	7.6336	7.9025	9.6786
R43	TPM	24hr	max	17.619	17.636	17.724
R44	TPM	24hr	max	17.584	17.588	18.381
R45	TPM	24hr	max	8.4757	8.6982	10.732
R46	TPM	24hr	max	8.4867	8.7107	10.742
R47	TPM	24hr	max	8.8442	9.057	11.169
R48	TPM	24hr	max	19.239	19.242	19.7
R49	TPM	24hr	max	8.7575	8.85	10.923
R50	TPM	24hr	max	10.625	10.852	12.951
R51	TPM	24hr	max	8.3854	8.6344	10.627
R52	TPM	24hr	max	10.122	10.272	13.14
R53	TPM	24hr	max	9.5577	9.719	12.384
R54	TPM	24hr	max	3.5439	4.0122	5.0049
R55	TPM	24hr	max	3.7122	4.2205	5.2834
R56	TPM	24hr	max	3.8037	4.3235	5.4256
R57	TPM	24hr	max	3.6544	4.1259	5.1584
R58	TPM	24hr	max	3.4767	3.9223	4.8864
R59	TPM	24hr	max	12.133	12.262	14.334
R60	TPM	24hr	max	8.6413	8.7619	10.264
R61	TPM	24hr	max	12.037	12.154	14.157
R62	TPM	24hr	max	11.584	11.705	13.647
R63	TPM	24hr	max	10.905	11.032	12.842
R64	TPM	24hr	max	10.946	11.072	12.915
R65	TPM	24hr	max	36.569	36.57	37.141
R66	TPM	24hr	max	5.2318	5.6588	6.9125
R67	TPM	24hr	max	6.2058	6.6014	8.0235
R68	TPM	24hr	max	5.3797	5.7825	7.0597
R69	TPM	24hr	max	5.6719	6.0325	7.3462
R70	TPM	24hr	max	5.8155	6.1178	7.4392
R71	TPM	24hr	max	4.4866	4.5436	5.7766
R72	TPM	24hr	max	4.4619	4.5223	5.7283
R73	TPM	24hr	max	88.342	88.36	88.688
R74	TPM	24hr	max	11.387	11.523	13.536
R75	TPM	24hr	max	32.257	32.257	32.257
R76	TPM	24hr	max	11.967	12.084	14.079
R77	TPM	24hr	max	11.319	11.45	13.415
R78	TPM	24hr	max	7.2695	7.5614	9.2628
R79	TPM	24hr	max	5.427	5.4646	5.8141
R01	TPM	24hr	8th	2.2008	2.2548	2.3026
R02	TPM	24hr	8th	1.6913	1.8468	2.1657
R03	TPM	24hr	8th	1.6878	1.8444	2.1126
R04	TPM	24hr	8th	1.7022	1.8671	2.2115
R05	TPM	24hr	8th	2.2891	2.432	2.8433
R06	TPM	24hr	8th	2.4948	2.5767	3.0305
R07	TPM	24hr	8th	1.8225	2.0051	2.2733
R08	TPM	24hr	8th	2.4465	2.5423	3.0678
R09	TPM	24hr	8th	1.6217	1.7251	2.0347
R10	TPM	24hr	8th	1.7861	1.8168	2.2512
R11	TPM	24hr	8th	2.0424	2.0537	2.4336
R12	TPM	24hr	8th	1.7233	1.7953	2.2621
R13	TPM	24hr	8th	1.6997	1.7593	2.2114
R14	TPM	24hr	8th	2.0005	2.0128	2.5612
R15	TPM	24hr	8th	1.8035	2.0293	2.3054

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R16	TPM	24hr	8th	1.7895	2.0195	2.3191
R17	TPM	24hr	8th	1.832	2.0574	2.4304
R18	TPM	24hr	8th	2.1305	2.3232	2.7152
R19	TPM	24hr	8th	2.0673	2.3093	2.7394
R20	TPM	24hr	8th	2.1061	2.2195	2.8221
R21	TPM	24hr	8th	4.6896	4.7855	5.0123
R22	TPM	24hr	8th	3.4431	3.4888	3.8762
R23	TPM	24hr	8th	2.1691	2.4011	2.7577
R24	TPM	24hr	8th	1.5634	1.6465	1.9604
R25	TPM	24hr	8th	2.0649	2.4207	2.7949
R26	TPM	24hr	8th	2.2377	2.4467	2.9623
R27	TPM	24hr	8th	2.5843	3.0296	3.5061
R28	TPM	24hr	8th	2.1891	2.4731	2.9506
R29	TPM	24hr	8th	2.1974	2.476	2.9551
R30	TPM	24hr	8th	2.0188	2.0934	2.4915
R31	TPM	24hr	8th	1.983	2.1313	2.5248
R32	TPM	24hr	8th	1.1017	1.238	1.4025
R33	TPM	24hr	8th	1.0926	1.285	1.4669
R34	TPM	24hr	8th	1.1908	1.3524	1.4967
R35	TPM	24hr	8th	1.1674	1.2138	1.432
R36	TPM	24hr	8th	1.2237	1.277	1.4652
R37	TPM	24hr	8th	1.2813	1.3375	1.579
R38	TPM	24hr	8th	2.3108	2.3438	3.1387
R39	TPM	24hr	8th	2.4577	2.4972	3.387
R40	TPM	24hr	8th	2.7429	2.7781	3.6871
R41	TPM	24hr	8th	2.7977	2.7977	3.7157
R42	TPM	24hr	8th	3.0287	3.0394	3.6822
R43	TPM	24hr	8th	8.5128	8.5753	9.5704
R44	TPM	24hr	8th	12.245	12.245	12.773
R45	TPM	24hr	8th	3.8512	3.8529	4.2013
R46	TPM	24hr	8th	4.5074	4.6911	5.1429
R47	TPM	24hr	8th	3.4182	3.4228	3.919
R48	TPM	24hr	8th	7.195	7.195	7.5785
R49	TPM	24hr	8th	5.8764	5.8764	6.2127
R50	TPM	24hr	8th	4.4687	4.4689	5.1545
R51	TPM	24hr	8th	3.1254	3.1371	3.6955
R52	TPM	24hr	8th	3.2378	3.2392	4.9089
R53	TPM	24hr	8th	3.1157	3.116	4.0104
R54	TPM	24hr	8th	1.4573	1.5183	1.7925
R55	TPM	24hr	8th	1.4494	1.4742	1.7768
R56	TPM	24hr	8th	1.4638	1.5541	1.8277
R57	TPM	24hr	8th	1.5554	1.5557	1.843
R58	TPM	24hr	8th	1.3472	1.3845	1.6949
R59	TPM	24hr	8th	3.6885	3.6911	4.5205
R60	TPM	24hr	8th	5.0832	5.0832	5.9454
R61	TPM	24hr	8th	4.6929	4.7103	5.7317
R62	TPM	24hr	8th	4.6193	4.6193	5.5402
R63	TPM	24hr	8th	4.6691	4.6691	5.3067
R64	TPM	24hr	8th	4.6149	4.6149	5.2933
R65	TPM	24hr	8th	24.064	24.201	25.301
R66	TPM	24hr	8th	1.6787	1.7181	2.1776
R67	TPM	24hr	8th	1.7893	1.8034	2.2096
R68	TPM	24hr	8th	1.6668	1.6845	2.0741
R69	TPM	24hr	8th	1.7214	1.7216	2.136
R70	TPM	24hr	8th	1.5406	1.5434	1.9134
R71	TPM	24hr	8th	2.8636	2.9593	3.4729
R72	TPM	24hr	8th	2.8563	2.9483	3.4614
R73	TPM	24hr	8th	46.256	46.342	47.368
R74	TPM	24hr	8th	3.8347	3.8913	4.9023
R75	TPM	24hr	8th	20.923	20.923	21.807
R76	TPM	24hr	8th	4.7978	4.8143	5.767
R77	TPM	24hr	8th	4.2277	4.2344	4.9475
R78	TPM	24hr	8th	2.5561	2.6168	3.2577
R79	TPM	24hr	8th	4.2676	4.4225	4.7536
R01	TPM	annual	average	0.67036	0.68	0.70515
R02	TPM	annual	average	0.30692	0.32349	0.3722
R03	TPM	annual	average	0.26363	0.28107	0.3306
R04	TPM	annual	average	0.35623	0.37692	0.42856

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R05	TPM	annual	average	0.58869	0.61706	0.67322
R06	TPM	annual	average	0.63966	0.66953	0.72652
R07	TPM	annual	average	0.36968	0.39794	0.45054
R08	TPM	annual	average	0.58326	0.61526	0.67286
R09	TPM	annual	average	0.26945	0.29104	0.35051
R10	TPM	annual	average	0.33063	0.35908	0.43529
R11	TPM	annual	average	0.4007	0.43397	0.52107
R12	TPM	annual	average	0.36696	0.39672	0.47704
R13	TPM	annual	average	0.35758	0.38607	0.46584
R14	TPM	annual	average	0.42679	0.47147	0.56087
R15	TPM	annual	average	0.28578	0.35271	0.41257
R16	TPM	annual	average	0.2854	0.35173	0.41175
R17	TPM	annual	average	0.29965	0.36703	0.42949
R18	TPM	annual	average	0.32308	0.3943	0.45976
R19	TPM	annual	average	0.3263	0.39942	0.466
R20	TPM	annual	average	0.33733	0.41522	0.48593
R21	TPM	annual	average	1.5532	1.6005	1.6775
R22	TPM	annual	average	0.71894	0.76473	0.84071
R23	TPM	annual	average	0.43639	0.47784	0.54812
R24	TPM	annual	average	0.23591	0.26146	0.30903
R25	TPM	annual	average	0.27893	0.41519	0.47503
R26	TPM	annual	average	0.30978	0.41991	0.49145
R27	TPM	annual	average	0.39481	0.57197	0.6683
R28	TPM	annual	average	0.36306	0.42629	0.5065
R29	TPM	annual	average	0.37352	0.4366	0.51834
R30	TPM	annual	average	0.38233	0.42279	0.47697
R31	TPM	annual	average	0.35611	0.40087	0.45716
R32	TPM	annual	average	0.34196	0.35534	0.38239
R33	TPM	annual	average	0.1656	0.18235	0.21599
R34	TPM	annual	average	0.17696	0.19314	0.22753
R35	TPM	annual	average	0.1933	0.21087	0.24492
R36	TPM	annual	average	0.1972	0.2167	0.25242
R37	TPM	annual	average	0.20964	0.22964	0.26558
R38	TPM	annual	average	0.40487	0.4586	0.55311
R39	TPM	annual	average	0.42031	0.48157	0.58195
R40	TPM	annual	average	0.49339	0.55676	0.66541
R41	TPM	annual	average	0.45301	0.50737	0.62503
R42	TPM	annual	average	0.59755	0.64564	0.75804
R43	TPM	annual	average	1.659	1.7055	1.8254
R44	TPM	annual	average	2.5124	2.5583	2.6783
R45	TPM	annual	average	0.72575	0.77061	0.89688
R46	TPM	annual	average	0.86971	0.91458	1.0403
R47	TPM	annual	average	0.696	0.73938	0.86942
R48	TPM	annual	average	1.9421	1.9867	2.1125
R49	TPM	annual	average	1.1683	1.2125	1.3396
R50	TPM	annual	average	1.0187	1.0638	1.1911
R51	TPM	annual	average	0.5599	0.60593	0.72555
R52	TPM	annual	average	0.64081	0.6717	1.0099
R53	TPM	annual	average	0.54567	0.58045	0.7958
R54	TPM	annual	average	0.20433	0.2189	0.25868
R55	TPM	annual	average	0.21034	0.22913	0.27048
R56	TPM	annual	average	0.21711	0.23934	0.2822
R57	TPM	annual	average	0.22396	0.24407	0.28858
R58	TPM	annual	average	0.18777	0.1997	0.23421
R59	TPM	annual	average	0.69791	0.72047	0.96751
R60	TPM	annual	average	0.96807	0.98355	1.1848
R61	TPM	annual	average	0.9297	0.94339	1.1246
R62	TPM	annual	average	0.91127	0.92595	1.1107
R63	TPM	annual	average	0.85936	0.87595	1.0835
R64	TPM	annual	average	0.87799	0.89384	1.0906
R65	TPM	annual	average	4.3318	4.3459	4.5288
R66	TPM	annual	average	0.32083	0.34427	0.41792
R67	TPM	annual	average	0.35722	0.38468	0.46536
R68	TPM	annual	average	0.31822	0.33973	0.41306
R69	TPM	annual	average	0.3158	0.336	0.40956
R70	TPM	annual	average	0.29885	0.31716	0.38795
R71	TPM	annual	average	0.84602	0.88766	0.97295
R72	TPM	annual	average	0.80264	0.84553	0.93058

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R73	TPM	annual	average	14.289	14.304	14.49
R74	TPM	annual	average	0.72038	0.74341	1.0994
R75	TPM	annual	average	5.8849	5.8944	6.0599
R76	TPM	annual	average	0.92643	0.94023	1.1222
R77	TPM	annual	average	0.76783	0.78712	1.0472
R78	TPM	annual	average	0.48333	0.53255	0.64072
R79	TPM	annual	average	1.0067	1.0535	1.1257
R01	CO	1hr	max	611.51	611.97	612.43
R02	CO	1hr	max	53.913	56.59	60.437
R03	CO	1hr	max	53.244	56.03	59.715
R04	CO	1hr	max	51.892	52.72	55.192
R05	CO	1hr	max	80.528	81.78	83.533
R06	CO	1hr	max	90.35	91.64	94.938
R07	CO	1hr	max	79.818	79.82	87.646
R08	CO	1hr	max	99.34	101.44	101.98
R09	CO	1hr	max	33.864	34.92	41.255
R10	CO	1hr	max	62.295	63.46	65.264
R11	CO	1hr	max	78.411	79.32	81.845
R12	CO	1hr	max	67.998	68.27	74.244
R13	CO	1hr	max	64.902	65.05	77.625
R14	CO	1hr	max	109.99	109.99	121.78
R15	CO	1hr	max	257.39	257.39	257.84
R16	CO	1hr	max	213.83	214.36	216.71
R17	CO	1hr	max	342.89	342.89	343.47
R18	CO	1hr	max	309.04	309.15	311.2
R19	CO	1hr	max	289.94	289.99	290.34
R20	CO	1hr	max	176.66	176.93	177.59
R21	CO	1hr	max	115.23	115.23	129.91
R22	CO	1hr	max	135.74	138.66	138.74
R23	CO	1hr	max	214.31	215.83	217.49
R24	CO	1hr	max	62.179	62.19	66.03
R25	CO	1hr	max	115.06	115.06	126.44
R26	CO	1hr	max	80.367	80.84	84.892
R27	CO	1hr	max	56.107	157.98	158.1
R28	CO	1hr	max	96.072	96.07	99.082
R29	CO	1hr	max	96.347	97.06	103.32
R30	CO	1hr	max	121.13	121.13	137.91
R31	CO	1hr	max	122.39	122.39	138.49
R32	CO	1hr	max	51.487	51.49	51.487
R33	CO	1hr	max	40.045	40.06	48.26
R34	CO	1hr	max	41.635	41.66	49.601
R35	CO	1hr	max	41.059	41.58	47.445
R36	CO	1hr	max	41.125	41.75	47.814
R37	CO	1hr	max	40.662	41.16	48.948
R38	CO	1hr	max	112.18	112.18	129.49
R39	CO	1hr	max	104.62	104.62	127.03
R40	CO	1hr	max	94.392	94.39	122.99
R41	CO	1hr	max	64.979	64.98	88.338
R42	CO	1hr	max	96.275	96.28	110.88
R43	CO	1hr	max	94.777	94.78	107.89
R44	CO	1hr	max	94.235	94.24	107.02
R45	CO	1hr	max	82.091	82.09	95.787
R46	CO	1hr	max	84.061	84.06	97.497
R47	CO	1hr	max	73.79	73.79	85.25
R48	CO	1hr	max	83.913	83.91	94.733
R49	CO	1hr	max	80.757	80.76	92.152
R50	CO	1hr	max	83.45	83.45	93.508
R51	CO	1hr	max	84.969	84.97	96.449
R52	CO	1hr	max	70.037	70.04	194.71
R53	CO	1hr	max	58.366	58.37	88.049
R54	CO	1hr	max	42.694	42.82	45.788
R55	CO	1hr	max	49.092	49.14	52.565
R56	CO	1hr	max	50.071	50.09	55.218
R57	CO	1hr	max	59.08	59.68	63.465
R58	CO	1hr	max	31.069	32.06	35.603
R59	CO	1hr	max	95.443	95.44	112.85
R60	CO	1hr	max	194.71	194.71	209.97
R61	CO	1hr	max	164.06	164.06	173.57

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R62	CO	1hr	max	140.87	140.87	150.03
R63	CO	1hr	max	122.44	122.44	130.35
R64	CO	1hr	max	123.62	123.62	131.85
R65	CO	1hr	max	144.23	144.23	159.48
R66	CO	1hr	max	53.378	53.38	65.015
R67	CO	1hr	max	59.817	59.82	76.05
R68	CO	1hr	max	50.775	50.78	62.569
R69	CO	1hr	max	53.555	53.56	64.807
R70	CO	1hr	max	48.61	48.61	58.623
R71	CO	1hr	max	176.85	177.91	184.39
R72	CO	1hr	max	124.08	124.10	124.11
R73	CO	1hr	max	149.24	149.24	163.36
R74	CO	1hr	max	96.026	96.03	126.98
R75	CO	1hr	max	3009.7	3009.70	3009.7
R76	CO	1hr	max	161.6	161.60	171.08
R77	CO	1hr	max	154.19	154.19	194.48
R78	CO	1hr	max	107.46	107.46	123.22
R79	CO	1hr	max	169.8	170.85	171.33
R01	CO	1hr	9th	284.98	285.02	285.14
R02	CO	1hr	9th	31.125	31.968	36.29
R03	CO	1hr	9th	29.152	29.697	33.13
R04	CO	1hr	9th	34.561	34.833	38.07
R05	CO	1hr	9th	49.806	50.239	55.92
R06	CO	1hr	9th	57.712	57.769	60.11
R07	CO	1hr	9th	55.37	57.058	58.65
R08	CO	1hr	9th	72.444	72.572	73.30
R09	CO	1hr	9th	27.251	27.28	31.06
R10	CO	1hr	9th	38.383	40.999	41.22
R11	CO	1hr	9th	41.033	42.666	43.10
R12	CO	1hr	9th	26.931	28.682	32.57
R13	CO	1hr	9th	27.964	28.579	32.81
R14	CO	1hr	9th	43.735	45.971	46.52
R15	CO	1hr	9th	143.36	143.36	144.14
R16	CO	1hr	9th	91.399	91.433	91.54
R17	CO	1hr	9th	142.38	143.24	143.35
R18	CO	1hr	9th	159.27	160.37	162.68
R19	CO	1hr	9th	147.1	147.11	148.33
R20	CO	1hr	9th	99.946	99.946	100.01
R21	CO	1hr	9th	93.497	95.67	97.23
R22	CO	1hr	9th	94.679	96.151	96.29
R23	CO	1hr	9th	119.67	122.01	122.64
R24	CO	1hr	9th	42.518	42.524	43.57
R25	CO	1hr	9th	36.921	49.438	54.35
R26	CO	1hr	9th	41.415	45.666	47.02
R27	CO	1hr	9th	34.15	67.762	69.57
R28	CO	1hr	9th	62.706	62.98	63.53
R29	CO	1hr	9th	63.551	63.551	63.64
R30	CO	1hr	9th	44.861	45.955	52.44
R31	CO	1hr	9th	46.278	46.278	54.16
R32	CO	1hr	9th	32.03	32.04	32.99
R33	CO	1hr	9th	25.196	25.196	33.84
R34	CO	1hr	9th	27.876	27.882	33.49
R35	CO	1hr	9th	28.466	28.466	33.53
R36	CO	1hr	9th	27.541	27.907	31.68
R37	CO	1hr	9th	27.496	27.62	32.40
R38	CO	1hr	9th	32.259	32.274	38.10
R39	CO	1hr	9th	39.021	39.889	45.70
R40	CO	1hr	9th	43.766	43.766	48.64
R41	CO	1hr	9th	35.188	35.188	43.14
R42	CO	1hr	9th	34.864	34.864	41.33
R43	CO	1hr	9th	36.658	37.565	45.26
R44	CO	1hr	9th	39.198	39.701	48.52
R45	CO	1hr	9th	36.363	36.363	44.48
R46	CO	1hr	9th	39.373	39.373	47.01
R47	CO	1hr	9th	36.376	36.376	46.87
R48	CO	1hr	9th	38.713	38.713	45.77
R49	CO	1hr	9th	36.358	36.644	45.54
R50	CO	1hr	9th	40.42	40.626	46.47

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R51	CO	1hr	9th	35.339	35.339	43.85
R52	CO	1hr	9th	48.892	48.892	98.20
R53	CO	1hr	9th	42.015	42.015	58.10
R54	CO	1hr	9th	23.251	23.625	28.08
R55	CO	1hr	9th	30.331	30.794	33.90
R56	CO	1hr	9th	34.957	34.964	36.28
R57	CO	1hr	9th	29.211	31.739	32.63
R58	CO	1hr	9th	21.394	22.053	26.21
R59	CO	1hr	9th	65.59	65.59	72.03
R60	CO	1hr	9th	118.69	118.69	124.45
R61	CO	1hr	9th	96.313	96.313	106.29
R62	CO	1hr	9th	77.144	77.144	89.34
R63	CO	1hr	9th	73.528	73.528	84.18
R64	CO	1hr	9th	80.374	80.374	89.94
R65	CO	1hr	9th	97.131	97.13	104.36
R66	CO	1hr	9th	26.051	26.448	31.24
R67	CO	1hr	9th	25.617	26.86	31.75
R68	CO	1hr	9th	32.119	32.21	36.12
R69	CO	1hr	9th	31.033	31.033	32.80
R70	CO	1hr	9th	23.184	23.184	26.82
R71	CO	1hr	9th	95.016	96.265	108.83
R72	CO	1hr	9th	91.3	92.328	100.06
R73	CO	1hr	9th	110.79	110.79	128.53
R74	CO	1hr	9th	60.026	60.026	81.10
R75	CO	1hr	9th	1778.2	1778.2	1782.70
R76	CO	1hr	9th	92.288	92.288	100.38
R77	CO	1hr	9th	69.928	69.929	92.88
R78	CO	1hr	9th	41.11	41.113	47.32
R79	CO	1hr	9th	119.01	122.32	122.96
R01	CO	8h	max	282.07	282.11	282.23
R02	CO	8h	max	19.348	20.406	23.943
R03	CO	8h	max	20.385	21.344	23.926
R04	CO	8h	max	24.517	25.546	27.532
R05	CO	8h	max	35.146	36.317	38.498
R06	CO	8h	max	37.6	38.802	41.013
R07	CO	8h	max	43.296	44.32	47.351
R08	CO	8h	max	38.182	39.614	41.79
R09	CO	8h	max	21.836	23.736	25.434
R10	CO	8h	max	25.796	26.337	30.16
R11	CO	8h	max	30.012	32.385	34.153
R12	CO	8h	max	22.264	22.338	26.918
R13	CO	8h	max	22.695	24.521	28.412
R14	CO	8h	max	29.343	32.45	33.793
R15	CO	8h	max	66.547	66.582	67.411
R16	CO	8h	max	51.371	51.604	53.51
R17	CO	8h	max	125.38	125.38	125.98
R18	CO	8h	max	93.45	93.45	94.236
R19	CO	8h	max	113.72	113.79	114.41
R20	CO	8h	max	51.339	51.339	53.187
R21	CO	8h	max	47.351	50.401	51.444
R22	CO	8h	max	59.563	62.459	63.466
R23	CO	8h	max	69.722	70.799	71.337
R24	CO	8h	max	24.435	25.858	29.322
R25	CO	8h	max	32.277	36.549	37.899
R26	CO	8h	max	28.096	31.642	32.641
R27	CO	8h	max	27.254	42.422	42.677
R28	CO	8h	max	39.725	40.247	43.752
R29	CO	8h	max	34.666	34.666	34.716
R30	CO	8h	max	32.749	32.749	45.869
R31	CO	8h	max	33.091	33.301	47.08
R32	CO	8h	max	24.814	24.857	25.143
R33	CO	8h	max	24.365	24.638	32.559
R34	CO	8h	max	22.492	22.801	28.539
R35	CO	8h	max	24.575	24.575	26.324
R36	CO	8h	max	23.893	23.897	25.722
R37	CO	8h	max	23.992	24.014	25.878
R38	CO	8h	max	27.238	27.238	35.134
R39	CO	8h	max	33.436	33.612	36.334

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R40	CO	8h	max	30.265	30.265	40.339
R41	CO	8h	max	30.195	30.195	39.96
R42	CO	8h	max	28.571	28.571	36.684
R43	CO	8h	max	29.862	29.862	39.668
R44	CO	8h	max	32.717	32.717	39.931
R45	CO	8h	max	30.969	30.969	39.499
R46	CO	8h	max	30.905	30.905	39.39
R47	CO	8h	max	31.651	31.651	42.638
R48	CO	8h	max	30.997	30.997	40.14
R49	CO	8h	max	31.185	31.185	40.84
R50	CO	8h	max	31.389	31.389	41.693
R51	CO	8h	max	30.376	30.376	37.954
R52	CO	8h	max	37.712	37.712	55.448
R53	CO	8h	max	34.895	34.895	50.516
R54	CO	8h	max	18.463	19.319	22.295
R55	CO	8h	max	23.299	23.302	25.269
R56	CO	8h	max	21.57	21.571	25.986
R57	CO	8h	max	20.894	22.186	26.535
R58	CO	8h	max	20.19	20.784	23.507
R59	CO	8h	max	39.706	39.805	50.029
R60	CO	8h	max	70.896	70.911	79.682
R61	CO	8h	max	64.773	65.01	77.505
R62	CO	8h	max	57.908	58.15	70.064
R63	CO	8h	max	55.572	55.572	63.637
R64	CO	8h	max	55.53	55.53	63.653
R65	CO	8h	max	61.753	61.98	77.62
R66	CO	8h	max	22.218	22.367	28.317
R67	CO	8h	max	22.519	22.546	29.518
R68	CO	8h	max	22.066	22.155	28.759
R69	CO	8h	max	25.769	25.769	26.284
R70	CO	8h	max	16.128	16.817	20.977
R71	CO	8h	max	70.808	71.675	73.809
R72	CO	8h	max	70.243	71.128	73.234
R73	CO	8h	max	85.824	85.824	86.665
R74	CO	8h	max	40.532	40.532	64.202
R75	CO	8h	max	1070.1	1070.1	1075.4
R76	CO	8h	max	63.471	63.709	76.641
R77	CO	8h	max	45.135	45.38	51.395
R78	CO	8h	max	36.982	36.985	41.033
R79	CO	8h	max	53.453	55.973	56.935
R01	CO	annual	average	7.3297	7.3762	7.4764
R02	CO	annual	average	1.7057	1.787	1.9755
R03	CO	annual	average	1.5775	1.6638	1.8604
R04	CO	annual	average	1.9741	2.0796	2.2978
R05	CO	annual	average	3.0049	3.1562	3.4124
R06	CO	annual	average	3.2381	3.3984	3.6606
R07	CO	annual	average	2.2602	2.4118	2.6515
R08	CO	annual	average	3.1235	3.2961	3.5652
R09	CO	annual	average	1.8493	1.9567	2.2025
R10	CO	annual	average	2.6159	2.752	3.1284
R11	CO	annual	average	3.2866	3.4535	3.9292
R12	CO	annual	average	2.8677	3.0115	3.4096
R13	CO	annual	average	2.6768	2.813	3.1985
R14	CO	annual	average	3.4481	3.6892	4.1886
R15	CO	annual	average	2.5413	2.9389	3.2413
R16	CO	annual	average	2.3059	2.6984	3.0018
R17	CO	annual	average	2.7951	3.192	3.5087
R18	CO	annual	average	3.0291	3.4479	3.7822
R19	CO	annual	average	3.0841	3.5176	3.8589
R20	CO	annual	average	2.9811	3.4581	3.8259
R21	CO	annual	average	5.1487	5.409	5.8183
R22	CO	annual	average	4.3387	4.5889	4.9901
R23	CO	annual	average	3.4393	3.6613	4.0207
R24	CO	annual	average	1.721	1.8546	2.0746
R25	CO	annual	average	1.7485	2.6577	3.0107
R26	CO	annual	average	1.961	2.6718	3.0883
R27	CO	annual	average	2.7279	3.9339	4.532
R28	CO	annual	average	3.1544	3.5229	3.9524

Table 4E-2 Criteria Air Contaminants

ReceptorID	Chemical	Period	Stat	Baseline	Application	CEA
R29	CO	annual	average	3.2344	3.6007	4.0419
R30	CO	annual	average	3.0721	3.3068	3.6306
R31	CO	annual	average	2.7341	2.9965	3.3386
R32	CO	annual	average	3.2874	3.3566	3.48
R33	CO	annual	average	1.1197	1.2058	1.3826
R34	CO	annual	average	1.1303	1.2086	1.3813
R35	CO	annual	average	1.3604	1.4481	1.61
R36	CO	annual	average	1.3461	1.4449	1.6146
R37	CO	annual	average	1.487	1.5904	1.7596
R38	CO	annual	average	2.6051	2.8981	3.4277
R39	CO	annual	average	2.7921	3.1424	3.7256
R40	CO	annual	average	3.4439	3.8166	4.4751
R41	CO	annual	average	2.6042	2.92	3.6632
R42	CO	annual	average	2.9906	3.2559	3.9365
R43	CO	annual	average	3.5175	3.7734	4.5186
R44	CO	annual	average	3.8252	4.0777	4.8225
R45	CO	annual	average	2.9737	3.2202	4.0188
R46	CO	annual	average	3.0525	3.299	4.0926
R47	CO	annual	average	2.9301	3.1677	3.993
R48	CO	annual	average	3.5073	3.7519	4.5448
R49	CO	annual	average	3.1601	3.4028	4.2052
R50	CO	annual	average	3.1724	3.4212	4.2265
R51	CO	annual	average	2.9301	3.1838	3.9243
R52	CO	annual	average	3.7993	3.9722	7.1336
R53	CO	annual	average	3.0337	3.2245	4.9693
R54	CO	annual	average	1.2644	1.3346	1.4916
R55	CO	annual	average	1.4107	1.5079	1.6863
R56	CO	annual	average	1.4964	1.6146	1.8077
R57	CO	annual	average	1.4848	1.5871	1.7789
R58	CO	annual	average	1.2159	1.2735	1.405
R59	CO	annual	average	4.094	4.2137	6.3271
R60	CO	annual	average	7.4045	7.4811	9.1735
R61	CO	annual	average	6.6845	6.7536	8.1217
R62	CO	annual	average	7.0448	7.1195	8.5261
R63	CO	annual	average	6.6944	6.7804	8.4583
R64	CO	annual	average	7.0305	7.1117	8.6609
R65	CO	annual	average	8.8625	8.9354	10.311
R66	CO	annual	average	2.3314	2.4369	2.7601
R67	CO	annual	average	2.3719	2.5045	2.8885
R68	CO	annual	average	2.1795	2.2762	2.5764
R69	CO	annual	average	2.0568	2.149	2.4421
R70	CO	annual	average	1.7329	1.8176	2.0918
R71	CO	annual	average	7.7362	7.9734	8.5832
R72	CO	annual	average	7.2717	7.5173	8.1183
R73	CO	annual	average	12.547	12.621	14.032
R74	CO	annual	average	4.4776	4.6007	7.9735
R75	CO	annual	average	85.94	85.987	87.244
R76	CO	annual	average	6.6762	6.7459	8.1214
R77	CO	annual	average	5.1541	5.2545	7.4919
R78	CO	annual	average	2.7936	3.0654	3.7096
R79	CO	annual	average	4.6969	4.9525	5.3226