Louisiana Pacific Canada Ltd. – Swan Valley OSB Plant Human Health Risk Assessment

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EXECUTIVE SUMMARY

Louisiana-Pacific Canada (LP) owns and operates the Swan Valley Oriented Strand Board (OSB) Plant (the Project). The Project is located 5 km east of Minitonas, Manitoba on Provincial Highway 10. Minitonas is approximately 300 km northwest of Brandon, Manitoba's second largest city. LP Swan Valley Oriented Strand Board (OSB) currently operates three Regenerative Thermal Oxidizers (RTOs) for the control of volatile organic compounds (VOCs) from the press and dryer exhaust gas streams. Since the installation of the state-of-the-art single pass dryers and wood-fired energy system in 2004, LP has frequently and openly discussed the eventual decommissioning of the RTOs. As such, LP submitted on November 18, 2008 a request to Manitoba Conservation to amend emission limits from its Swan Valley OSB operation. To facilitate decommissioning of RTOs, changes to emission limits and associated licence conditions in the Environment Act Licence 1900S4 are required.

This report entitled "*Louisiana Pacific Canada Ltd. – Swan Valley OSB Plant Human Health Risk Assessment*" has been prepared to evaluate the potential human health related impacts associated with the removal of RTOs from the Project. This Human Health Risk Assessment (HHRA) will evaluate the potential for adverse health effects to local populations exposed to air emissions from the Project. Furthermore, this report was prepared to satisfy Manitoba's Clean Environment Commission's (CEC) request for a proper stand-alone risk assessment report that includes a description and rationale of applicable pathways, a rationale for the selection of health standards used and a fully referenced report that can be peer-reviewed.

Risk Assessment Framework

The purpose of an HHRA is to evaluate the potential for adverse health outcomes from both short-term (acute) exposures and long-term (chronic) exposures resulting from environmental releases to air, land, and water. The potential health risks of Project-related emissions were considered in the HHRA. This technical study focuses on the quantification of potential risk of adverse health effects from direct inhalation of airborne chemical emissions from the Project to human receptors.

All chemicals (from anthropogenic and natural sources) have the potential to cause environmental effects. However, the level of environmental effect (*i.e.*, risk) depends on the receptor (person or wildlife) being exposed, the route of exposure, and the hazard (inherent toxicity) of the chemical. As illustrated in the diagram above, if all three components are present (*i.e.,* where the three circles intersect), the possibility of a risk exists. If one or more of these three components is missing, then there would be no risk. For example, a receptor could be exposed to a chemical, but if that chemical is essentially hazardless (low toxicity) and present at only very low levels, then no unacceptable risk would be expected. Alternatively, an extremely hazardous chemical may be present, but if there is no way for a receptor to be exposed (*i.e.*, no route of exposure), then that receptor is not at risk for contact with the chemical.

The HHRA was conducted according to widely accepted risk assessment methodologies and guidance published and endorsed by regulatory agencies, including Health Canada, Canadian Council of Ministers of the Environment and the United States Environmental Protection Agency. The risk assessment framework used in the technical study follows the standard paradigm: problem formulation, exposure assessment, toxicity assessment, and risk characterization.

Project Assessment Scenarios

Three assessment scenarios were evaluated as part of this HHRA. Each case is intended to represent the contribution of chemicals of potential concern (COPC) to ambient air from background conditions, operational conditions or a combination of background and operational conditions (i.e., cumulative), respectively. The three scenarios used in this HHRA are:

- Baseline Case – this only includes background air concentrations from ambient air monitoring stations around the Project site;
- Project Case – this only includes air concentrations from the proposed Project without any other source contribution; and,
- Cumulative Case – this includes background air concentrations of COPC (i.e., Baseline Case) and the predicted increases in chemical concentrations from the operation of the Project (i.e. Project Case).

Each case scenario at each of the 43 receptor locations was assessed for inhalation health risks.

Exposure Pathways

Potential changes in air quality for each of the chemicals of potential concern (COPC) were assessed by air modeling engineers using the emissions data and air dispersion modeling. Total air concentrations for the Project Case scenario include estimates for 1-hour, 24-hour and annual averaging periods. For the inhalation pathway, COPC were modeled without deposition or plume depletion to consider worst-case maximum ground level concentrations. Air concentrations were reported for each receptor location. These air concentrations were used to evaluate the health risks to receptors from direct inhalation of the COPC emitted from the Project.

In addition to the inhalation pathway assessment, the HHRA also considers chemical exposure to receptors from various exposure pathways (i.e. ingestion). To identify the COPC that are considered in the multi-pathway exposure assessment, the physical-chemical properties of each of the COPC were compared to accepted national and international criteria for the classification of persistent and bio-accumulative substances.

Based on persistence and bioaccumulation screening, COPC from the Project are not considered persistent or bio-accumulative in the environment; consequently no secondary exposure pathways exist for COPC from the Project and the inhalation pathway is considered the only pathway of concern.

People Evaluated in Risk Assessment

The Project site is located 5 km from Minitonas, Manitoba. In order to ascertain the potential risk to humans, discrete receptor locations were selected by the air quality team within a 5 km area around the Project site. Key receptor locations were selected along various receptor grids, starting at the center of the plant.

A total of 66 receptor locations were selected as key receptor locations. From this total, a number of receptors overlap in the same vicinity, therefore for HHRA purposes a subset of 43 receptors were selected for evaluation in the HHRA. Note, only potential risks to the public were evaluated in the HHRA; therefore potential risks to on-site workers associated with facility emissions are not assessed.

Methods of Risk Evaluation

It is important that conservative assumptions are made about the potential human receptors types. The potential health effects associated with non-carcinogenic contaminants are assessed differently than those for carcinogenic contaminants. Non-carcinogenic contaminants

are generally considered to act through a threshold mechanism where it is assumed that there is a dose (or concentration) that does not produce any adverse effect. As the dose or concentration increases to the point where the body can no longer process or excrete the chemical, an adverse effect may occur. This point is termed the threshold and is different for every chemical.

For contaminants for which the critical effect is assumed to have no threshold (i.e., carcinogens), it is assumed that there is some probability of harm to human health at any level of exposure. There is a dose-response relationship that converts estimated daily intakes averaged over a lifetime of exposure directly to an incremental risk of an individual developing cancer.

For inhalation exposure, concentration ratios (CR) are used to evaluate acute and chronic non-carcinogenic health risks from direct exposure to chemicals in air with a benchmark CR set to 1.0. If the CR is less than 1.0, the air concentration does not exceed the regulatory exposure limit and adverse health effects are not expected. However, a CR greater than 1.0 does not necessarily imply that action is required to mitigate unacceptable risks; rather, an exceedance is an indication that the data and assumptions used to estimate the risks should be more closely examined.

For non-threshold carcinogenic chemicals, potential risks are expressed as incremental lifetime cancer risks (ILCRs) and lifetime cancer risks (LCRs), which represents the risk of an individual within a given population developing cancer over his or her lifetime (increased risk, in the case of the ILCR). For this assessment, ILCRs consider the increase in risk over and above the probability of developing cancer due to background exposures while LCRs represent total lifetime cancer risks.

Regulatory agencies such as Health Canada and the United States Environmental Protection Agency (US EPA) have assumed that any level of long-term exposure to a carcinogenic compound is associated with some “hypothetical cancer risk”. As a result, regulatory agencies have typically employed acceptable ILCR levels (*i.e.*, incremental cancer risks over and above background cancer incidence) between 1-in-100,000 and 1-in-1,000,000. ILCRs generally consider risks related to a particular Project (i.e. Project alone) in that the cancer risks are expressed on an incremental or additional basis as compared to cancer risks related to all sources.

Manitoba follows Canadian Council of Ministers of the Environment (CCME) and the federal (i.e., Health Canada) approach therefore an ILCR benchmark of 1-in-100,000 or 1E-05 will be used to predict risk from the Project Case. Any ILCR estimate less than 1E-05 indicates that

predicted exposures are considered acceptable. Conversely, an ILCR greater than 1-in-100,000 (i.e. 1E-05) signifies that the incremental lifetime cancer risk exceeds the regulatory benchmark. This suggests that the potential for an elevated level of risk may be present for the COPC in question; further investigation may be needed to confirm the identified risk.

Results – Human Health Risks from Inhalation Exposure

Predicted 1-hour, 24-hour or annual air concentrations for all COPC under the Baseline Case scenario do not exceed the recommend non-carcinogenic benchmark of 1.0; therefore, no adverse health risk is expected from potential exposure to baseline concentrations of COPC.

For both the Project and Cumulative Case predicted 1-hour, 24-hour or annual air concentrations for all COPC do not exceed the recommend benchmark of 1.0, except for 24-hour acrolein at the maximum ground level concentration (max GLC). Conversely, for COPC at each of the 43 individual receptor locations (e.g., residences, school), no health risks were predicted for the Project Case or Cumulative Case.

Max GLC of acrolein was predicted at the southwest fenceline of the Project property (0.83 $\mu g/m^3$) resulted in a CR greater than 1.0, for both the Project and Cumulative Cases. However, this needs to be considered in context as it relates to the maximum 24-hour acrolein at the individual receptor level, how it relates to typical background concentrations observed in other areas of Canada, and understand the toxicological basis for this risk prediction. The maximum 24-hour concentration of acrolein predicted at each of the 43 receptor locations was modeled to be at receptor location 40, a residence. At this location, the 24-hour modeled acrolein concentration was 0.232 $\mu g/m^3$, which results in a CR below of 0.58 well below the benchmark value of 1.0.

In lieu of measured ambient acrolein data from the Site, 24-hour acrolein concentrations close to the Project were considered to be similar to those measured in other areas of Canada. From a toxicological point of view, studies have shown that acrolein (in air) acts primarily as an eye and upper respiratory tract irritant in humans. Exposure to concentrations as low as 140 $\mu g/m^3$ for five minutes may elicit subjective complaints of irritation, with increasing concentrations leading to more intense eye, nose and respiratory symptoms. In a study by Darley et al., (1960) that exposed 36 healthy volunteers for five minutes to 140 $\mu g/m^3$, mild eye irritation was observed.

In a clinical study by Weber-Tschopp et al. (1977), which provides one of the most comprehensive descriptions of health risks of acrolein in humans following short-term exposures, three experiments were performed using male and female student volunteers. These involved:

- Continuous exposure at constantly increasing acrolein concentrations;
- Short exposures to successively increasing acrolein concentrations; and
- A single hour of exposure to a constant concentration.

The investigators concluded that the average threshold of health-related environmental effects for acrolein is between 210 µg/m^3 (eye irritation) and 700 µg/m^3 (throat irritation and decreased respiration rate), with nasal irritation at 350 µg/m^3.

The lowest concentration at which mild eye irritation has been observed in humans (i.e.,140 µg/m^3) is more than 100-times higher than the maximum modeled 24-hour air concentration of acrolein (0.83 µg/m^3). Furthermore, for there to be an actual risk at the max GLC, a receptor would have to be present at the same location at the same time the maximum predicated air concentration is observed; therefore the likelihood of this occurring is very small. As such, it is unlikely that concentrations of acrolein would result in a substantive health risk.

Results of the carcinogenic assessment indicate that none of the ILCR values predicted for the carcinogenic COPC under the Project Case scenario exceeded the recommend regulatory acceptable cancer risk level of 1-in-100,000 (i.e., 1E-05); therefore no adverse carcinogenic effects are expected from the Project Case.

Conclusions

The purpose of this HHRA was to evaluate the potential risk to human receptors exposed to Project-related COPC under three assessment scenarios. In all cases, except for 24-hour acrolein at the maximum ground level concentration, risk estimates for all receptors exposed to COPC were below the acceptable inhalation non-carcinogenic benchmark of 1.0 and carcinogenic benchmark of 1-in-100,000.

The concentration ratio predicted for the maximum 24-hour concentrations of acrolein is higher than 1 for the Project Case and Cumulative Case; however, the lowest concentration at which mild eye irritation has been observed in humans (i.e., 140 µg/m^3) is more than 100-times higher than the maximum modeled 24-hour air concentration of acrolein (0.83 µg/m^3). Therefore, it is unlikely that the concentrations of acrolein would result in an appreciative health risk. Furthermore, for there to be a risk at the max GLC, a receptor would have to be present at the same location at the same time the maximum predicated air concentration is observed; therefore the likelihood of this occurring is very small.

Overall, no adverse health risks are predicted for human receptors in the surrounding area from the Project.

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ACRONYMS

$\mu g/m^3$	Microgram per cubic meter
AENV	Alberta Environment
ATSDR	Agency for Toxic Substances and Disease Registry
CAC	Criteria Air Contaminant
CalEPA	California Environmental Protection Agency
CEC	Clean Environment Commission
COPC	Chemicals of Potential Concern
CR	Concentration Ratio
DL	Detection Limit
EPCs	Exposure Point Concentrations
HHRA	Human Health Risk Assessment
ILCR	Incremental Lifetime Cancer Risk
IRIS	Integrated Risk Information System
K_{ow}	Octanol-Water Partition Coefficient
LCR	Lifetime Cancer Risk
LOAEL	Lowest Observable Adverse Effect Level
LP	Lousiana Pacific-Canada
MOE	Ministry of the Environment
MRL	Minimal Risk Levels
NOAEL	No Observed Adverse Effects Level
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
REL	Reference Exposure Level
RfC	Reference Concentration
RIVM	Netherlands National Institute of Public Health and the Environment
$t_{1/2}$	Soil Half-life
TC	Tolerable Concentration
TCA	Tolerable Concentration in Air
TPM	Total Particulate Matter
TRVs	Toxicity Reference Values
UCLM	Upper Confidence Limit on the Mean
UR	Unit Risk
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WHO	World Health Organization

1 INTRODUCTION

Louisiana-Pacific Canada (LP) owns and operates the Swan Valley Oriented Strand Board (OSB) Plant (the Project). The Project is located 5 km east of Minitonas, Manitoba on Provincial Highway 10. Minitonas is approximately 300 km northwest of Brandon, Manitoba's second largest city. The Project itself is located in the "Rural Municipality of Minitonas", which is just north of Duck Mountain Provincial Park, and south of Porcupine Provincial Park. Louisiana Pacific is one of the biggest employers in the area, employing directly and indirectly approximately 450 people (Manitoba, 2010).

Up until January 7, 2009, LP Swan Valley OSB operated three Regenerative Thermal Oxidizers (RTOs) for the control of volatile organic compounds (VOCs) from the press and dryer exhaust gas streams. Since the installation of the state-of-the-art single pass dryers and wood-fired energy system in 2004, LP has frequently and openly discussed the eventual decommissioning of the RTOs. As such, LP submitted on November 18, 2008 a request to Manitoba Conservation to amend emission limits from its Swan Valley OSB operation. To facilitate decommissioning of RTOs, changes to emission limits and associated licence conditions in the Environment Act Licence 1900S4 are required.

1.1 Purpose of the Report

This report entitled "*Louisiana Pacific Canada Ltd. – Swan Valley OSB Plant Human Health Risk Assessment*" has been prepared to evaluate the potential human health related impacts associated with the removal of RTOs from the Project. This Human Health Risk Assessment (HHRA) will evaluate the potential for adverse health effects to local populations exposed to air emissions from the Project.

Furthermore, this report was prepared to satisfy Manitoba's Clean Environment Commission's (CEC) request for a proper stand-alone risk assessment report that includes a description and rationale of applicable pathways, a rationale for the selection of health standards used and a fully referenced report that can be peer-reviewed.

2 RISK ASSESSMENT FRAMEWORK

All chemicals (from both anthropogenic and natural sources) have the potential to cause environmental effects. However, the level of environmental effect (i.e., risk) depends on the receptor (i.e., person) being exposed, the route and duration of exposure, and the hazard (i.e., inherent toxicity) of the chemical. As illustrated in the diagram to the right, if all three components are present (i.e., where the three circles intersect), the possibility of a risk exists. If one or more of these three components is missing, then there would be no risk. For example, a receptor could be exposed to a chemical, but if that chemical is essentially hazardless (low toxicity) and present at only very low levels, then no unacceptable risk would be expected. Alternatively, an extremely hazardous chemical may be present, but if there is no way for a receptor to be exposed (i.e., no route of exposure), then that receptor is not at risk for contact with the chemical.

The current HHRA was conducted according to widely accepted risk assessment methodologies and guidance published and endorsed by regulatory agencies, including Health Canada, Canadian Council of Ministers of the Environment (CCME) and the United States Environmental Protection Agency. The risk assessment framework used in this risk assessment follows a standard paradigm that progressed from a qualitative initial Problem Formulation step, through Exposure and Toxicity Assessments, and concludes with a quantitative Risk Characterization. The risk assessment framework is depicted in Figure 2-1.

2.1 Problem Formulation

The problem formulation stage is an information gathering and interpretation stage that focuses the study on the primary areas of concern for the Project. Problem formulation defines the nature and scope of the risk assessment, permits practical boundaries to be placed on the overall scope of work, and ensures that the risk assessment is directed at the key areas and issues of concern related to the Project emissions. The gathered data provide information regarding the characteristics of the study area, possible exposure pathways, potential human receptors, chemicals of potential concern (COPC) and any other specific areas or issues of concern to be addressed.

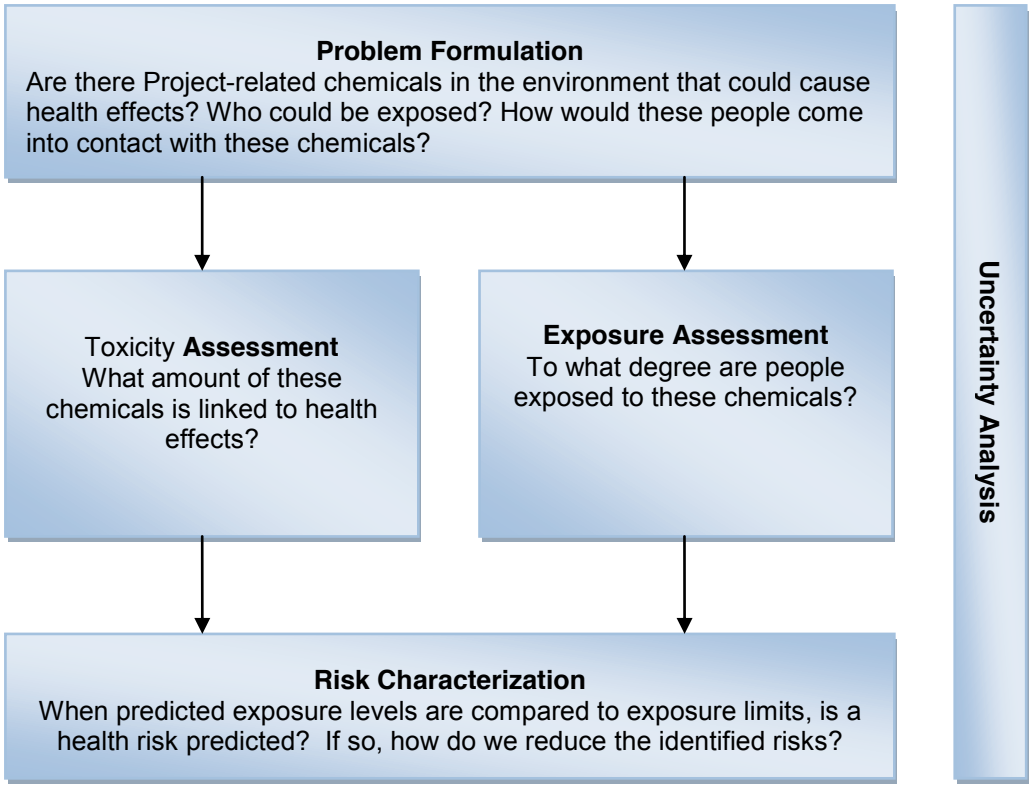


Figure 2-1. Risk Assessment Framework

The key tasks requiring evaluation within the problem formulation step include:

- Characterization of the Project and the study area, including land use;
- Identification of COPC (i.e., the hazards) associated with Project-related emissions;
- Identification of the potentially affected environmental media;
- Receptor identification and characterization; and,
- Identification of exposure pathways and routes.

2.2 Exposure Assessment

Receptors can come into contact with chemicals in their environment in a variety of ways depending on their daily activities and land use patterns. The means by which receptors contact a chemical in an environmental medium is referred to as an exposure pathway. The means by which a chemical enters the body from the environmental medium is referred to as an exposure route. The exposure assessment incorporates information about Project-related

chemical emissions, receptor characteristics, and the exposure pathways identified during the problem formulation phase of the risk assessment.

Generally, receptors can be exposed to chemicals in the environment by: directly inhaling them, coming into direct dermal contact with them, and ingesting them along with food.

The exposure assessment predicts the rate of exposure (i.e., the quantity and rate at which a chemical is received) of the selected receptors to the COPC via the various exposure scenarios and pathways identified in the problem formulation step. The rate of exposure to chemicals from many pathways is usually expressed as the amount of chemical taken in per body weight per unit time (e.g., microgram (µg) chemical/kilogram (kg) body weight/day).

The magnitude of the exposure of receptors to chemicals in the environment depends on the interaction of a number of variables, including the:

- concentration of chemicals in various environmental media;
- physical-chemical characteristics of the COPC, which affect their environmental fate and transport and determine such factors as efficiency of absorption into the body;
- influence of site-specific environmental characteristics, such as geology, soil type, topography, hydrology, hydrogeology, local meteorology, and climatology on a chemical's behaviour within environmental media; and,
- Physiological and behavioural characteristics of the receptors (e.g., respiration rate, soils/dusts intake, time spent at various activities and in different areas).

2.3 Toxicity Assessment

The toxicity assessment involves the selection of toxicity reference values (TRVs), also referred to as exposure limits, for COPC. Toxicity is the potential for a chemical to produce any type of damage, permanent or temporary, to the structure or functioning of any part of the receptor's body. The toxicity of a chemical depends on the amount of chemical taken into the body (referred to as the "dose") and the duration of exposure (i.e., the length of time the receptor is exposed to the chemical). For each COPC, there is a specific dose and duration of exposure necessary to produce a toxic environmental effect in a given receptor. This is referred to as the "dose-response relationship" of a chemical. The toxic potency of a chemical (i.e., its ability to produce any type of damage to the structure or function of any part of the body), is dependent on the inherent properties of the chemical itself (i.e., its ability to cause a biochemical or

physiological response at the site of action), as well as the ability of the chemical to reach the site of action. This dose-response principle is central to the risk assessment methodology.

2.4 Risk Characterization

The risk characterization step integrates the exposure and hazard assessments to provide a conservative estimate of health risk for the receptors assessed in the various exposure scenarios. Potential risks were characterized through a comparison of the estimated or predicted exposures from all pathways (from the exposure assessment) with the identified exposure limits (from the toxicity assessment) for COPC.

If the results of the risk assessment indicate the potential for adverse health risks related to Project emissions, this may lead to the requirement for the development of site-specific, facility-specific or study area-specific risk management options and/or criteria.

2.5 Uncertainty Analysis

Uncertainties are inherent in every aspect of the risk assessment process. Generally, these technical boundaries are addressed by incorporating conservative assumptions in the analysis. As a result, risk assessments tend to overstate the actual risk. Although many factors are considered in preparation of a risk analysis, analysis results are generally only sensitive to very few of these factors. The uncertainty analysis is included to demonstrate that assumptions used are conservative, or that the analysis result is not sensitive to the key assumptions.

A risk assessment containing a high degree of confidence is based on the following factors:

- Conditions where the nature and scope of the risk assessment is defined with a high level of certainty based on data and physical observations and
- An acceptable and reasonable level of conservatism in assumptions that will ensure that risks are overstated and an appreciation of the bounds and limitations of the HHRA conclusions.

The exposure assessment performed as part of this study was based on:

- Available data to describe existing air conditions;
- Sound conservative assumptions for certain parameters, as required; and
- Well understood and generally accepted methods for risk prediction.

Throughout the entire risk assessment, the use of the term conservatism is meant to convey a preference for erring on the side of overstating, as opposed to understating, risk under conditions of uncertainty. For example, analytical values or approaches were selected that would result in an overestimation of exposure or potential risk to humans and the environment, as opposed to understating the risk.

3 PROBLEM FORMULATION

Problem formulation is the first step in the risk assessment process. Information is gathered on the proposed Project and its potential interactions with the environment to provide focus for the subsequent phases of the risk assessment. Key factors that were evaluated include:

- Site characterization;
- Identification of COPC;
- Receptor identification and characterization - identification of receptors, which includes those persons with the greatest probability of exposure to chemicals and/or those that have the greatest sensitivity to these chemicals; and,
- Identification of exposure pathways and routes.

The outcome of these tasks forms the basis of the approach taken in the HHRA. The following subsections describe the methodological details and outcomes of problem formulation, specific to identification of the chemicals, assessment area, receptors and pathways

3.1 Site Characterization

The Project is located 5 km east of Minitonas, Manitoba on Provincial Highway 10. Minitonas is approximately 300 km northwest of Brandon, Manitoba's second largest city. The Project itself is located in the "Rural Municipality of Minitonas", which is just north of Duck Mountain Provincial Park, and south of Porcupine Provincial Park. Louisiana Pacific is one of the biggest employers in the area, employing approximately 450 people (Manitoba, 2010). The closest residential receptor to the site is located approximately 1.3 km from the Project to the west.

3.2 Chemicals of Potential Concern

Selection of the chemicals of potential concern (COPC) to be evaluated is a critical step in any risk assessment. It is standard practice in HHRA to limit the number of chemicals evaluated to those representing the greatest potential to affect health. It is preferable to comprehensively evaluate a smaller number of chemicals that represent the greatest potential concern, than it is to conduct a less detailed risk assessment on a larger number of chemicals that are of lesser potential concern. The COPC selection process is designed such that if no unacceptable health

risks are predicted for the chemicals evaluated, then health risks would not be expected for any of the chemicals not included in the evaluation (i.e., those that are present at lower environmental concentrations, emitted at lower rates, or possessing a lower toxic potency). A number of screening methods can be used to narrow a list of chemicals for further analysis, these include:

- Relative toxic potency determinations using emission rates and exposure limits;
- Bioaccumulative and persistent in the environment based on log K_{ow} and soil half-life values, respectively;
- Identifying chemicals viewed as a concern by regulatory authorities for the industry in question; and,
- Identifying chemicals perceived as a concern by the public.

Based on the available information and consultation with the air modeling engineers for the Project, 13 COPC could potentially be emitted from the Project.

3.2.1 Inhalation Pathway Assessment

Potential changes in air quality for each of the COPC listed in Table 3-1 were assessed by air modeling engineers using the emissions data and air dispersion modeling. Total air concentrations for the Project Case scenario include estimates for 1-hour, 24-hour and annual averaging periods. For the inhalation pathway, COPC were modeled without deposition or plume depletion to consider worst-case maximum ground level concentrations. Air concentrations were reported for each receptor location. These air concentrations were used to evaluate the health risks to receptors from direct inhalation of the COPC emitted from the Project.

Table 3-1. Inhalation COPC

Inhalation COPC	• NO_2 • TPM • PM10 • PM2.5 • Acetaldehyde • Acrolein • Benzene • Formaldehyde • Phenol • HCN • MDI • Methanol • Propionaldehyde

3.2.2 Screening of Chemicals for a Multi-Pathway Assessment

In addition to the inhalation pathway assessment, HHRA also considers chemical exposure to receptors from various exposure pathways (i.e. ingestion and dermal contact) in a multi-pathway assessment. Not all COPC presented in Table 3-1 are considered relevant to the multi-pathway assessment, due to the physical-chemical properties of the COPC. Specifically not all COPC released from the Project will persist or accumulate in the environment enough for a receptor to be exposed. To identify the COPC that are considered in the multi-pathway exposure assessment, the physical-chemical properties of each of the COPC in Table 3-1 were compared to accepted national and international criteria for the classification of persistent and bio-accumulative substances (EC, 2006; Rodan *et al.,* 1999).

The characterization of persistence and bio-accumulation is provided in detail within Environment Canada's Existing Substances Program and the Health Canada and Environment Canada's Domestic Substances List Categorization, under the *Canadian Environmental Protection Act* (CEPA, 1999).

Persistence refers to the length of time a chemical resides in the environment and is measured by its half-life. This is the time required for the quantity of a chemical to diminish or degrade to half of its original amount within a particular environment or medium. For the purposes of this HHRA, a chemical was considered persistent if its half-life in soil was greater than or equal to (≥) six months (182 days).

Bio-accumulation is a general term used to describe the process by which chemicals are accumulated in an organism directly from exposure to water, soil, or through consumption of food containing the substances. A chemical's potential to bio-accumulate is related to its octanol-water partition coefficient (K_{ow}). The K_{ow} refers to the ratio of distribution of a substance in octanol compared to that in water. For the purposes of this HHRA, a chemical was considered bio-accumulative if its Log K_{ow} was greater than or equal to five; therefore, all COPC retained for full multi-pathway assessment would have:

- A half-life in soil greater than or equal to six months; and/or
- An octanol-water partition coefficient (Log K_{ow}) greater than or equal to five (5).

The rationale behind this exercise is that if a chemical released to the air does not meet either of these criteria, only a limited opportunity exists for human exposure via secondary exposure pathways (i.e., those other than inhalation), as the potential for that chemical to persist and/or accumulate in the environment is negligible. However, if a chemical meets one or both of these criteria, sufficient opportunity could be present for human exposure. The screening completed on the COPC to evaluate persistence and bio-accumulation is provided in Table 3-2.

Table 3-2. Persistence and Bioaccumulation Screening

COPC	Selected Log K_{ow}	Reference	Selected Soil Half-Life ($t_{1/2}$)	Reference	Carried forward to multi-pathway assessment?
NO_2	Not analyzed for persistence and bioaccumulation [a]				
TPM					
PM10					
PM2.5					
Acetaldehyde	-0.22	US EPA (2005)	2.29E+00	Mackay et al. (2000)	NO
Acrolein	-0.01	US EPA (2005)	2.29E+00	Mackay et al. (2000)	NO
Benzene	2.1	US EPA (2005)	2.29E+01	Mackay et al. (2000)	NO
Formaldehyde	0.35	US EPA (2005)	2.29E+00	Mackay et al. (2000)	NO
Phenol	1.5	US EPA (2005)	7.08E+00	Mackay et al. (2000)	NO
HCN	-0.25	NIH (2010)	3.00E+01	EpiSuite 4.0 (2009)	NO
MDI	5.22	EpiSuite 4.0 (2009) [b]	7.50E+01	EpiSuite 4.0 (2009)	NO
Methanol	0.77	Mackay et al. (2000)	2.29E+00	Mackay et al. (2000)	NO
Propionaldehyde	0.59	Mackay et al. (2000)	2.29E+00	Mackay et al. (2000)	NO

[a] Criteria air components are not persistent or bioaccumulative in the environment
[b] EpiSuite (Kowwin) estimate is questionable according to EpiSuite (2010) as isocyanates hydrolyze; therefore not carried forward

Based on the screening presented in Table 3-2, COPC from the Project are not considered persistent or bioaccumulative in the environment; consequently no secondary exposure pathways exist for COPC from the Project and the inhalation pathway is considered the only pathway of concern.

3.3 People Evaluated in Risk Assessment

The Project site is located 5 km from Minitonas, Manitoba. In order to ascertain the potential risk to humans, discrete receptor locations were selected by the air quality team within a 5 kilometre area around the Project site. Key receptor locations were selected along the following receptor grids, starting at the center of the plant:

- A fine grid 4 km square with receptors every 100 metres,
- A medium grid 10 km square with receptors every 500 metres, and
- A course grid 22 km square with receptors every 1000 metres.

A total of 66 receptor locations were selected as key receptor locations (Figure 3-1) based on the above selection criteria. From this total, a number of receptors overlap in the same vicinity, therefore for HHRA purposes a subset of 43 receptors were selected for evaluation in the HHRA (Table 3-3). Note, only potential risks to the public were evaluated in the HHRA; therefore

potential risks to on-site workers (i.e., Receptor #1) associated with facility emissions are not assessed.

Table 3-3 HHRA Receptor Locations

Receptor	Name	UTM Easting (m)	UT Northing (m)
2	School	360128.0	5773040.0
4	Minitonas Town Office	360062.0	5772460.0
8	Senior's Manor	360177.0	5772750.0
9	Private Residence	364117.0	5773840.0
10	Private Residence	363774.0	5772640.0
11	Private Residence	366607.0	5772230.0
12	Private Residence	367028.0	5772000.0
13	Private Residence	368254.0	5772120.0
14	Private Residence	365226.0	5771180.0
15	Private Residence	363745.0	5772410.0
16	Private Residence	362122.0	5772960.0
17	Private Residence	362439.0	5773920.0
18	Private Residence	362155.0	5774200.0
19	Private Residence	362292.0	5775750.0
20	Private Residence	363745.0	5776590.0
21	Private Residence	370045.0	5773040.0
22	Private Residence	369069.0	5772180.0
23	Private Residence	368692.0	5773030.0
24	Private Residence	368300.0	5773720.0
25	Private Residence	367025.0	5772810.0
26	Private Residence	362052.0	5769160.0
27	Private Residence	361572.0	5772510.0
29	Private Residence	361324.0	5772480.0
31	Private Residence	365522.0	5775500.0
32	Private Residence	365046.0	5775440.0
33	Private Residence	366612.0	5775370.0
34	Private Residence	366971.0	5775600.0
35	Private Residence	367018.0	5776580.0
36	Private Residence	368487.0	5776380.0
37	Private Residence	368167.0	5775470.0
38	Private Residence	369005.0	5774930.0
39	Private Residence	365322.0	5771220.0
40	Private Residence	361935.0	5770850.0
42	Private Residence	360685.0	5774400.0

Receptor	Name	UTM Easting (m)	UT Northing (m)
43	Private Residence	360539.0	5773630.0
45	Private Residence	360423.0	5773360.0
48	Private Residence	360488.0	5773260.0
53	Private Residence	361170.0	5773010.0
59	Private Residence	360868.0	5772510.0
63	Private Residence	360440.0	5771940.0
64	Private Residence	360461.0	5771050.0
65	@Air Monitoring Station #1	365738.0	5775280.0
66	@Air Monitoring Station #2	362302.0	5773040.0

3.4 Project Assessment Scenarios

Three assessment scenarios were evaluated as part of this HHRA. Each case is intended to represent the contribution of COPC to ambient air from background conditions, operational conditions or a combination of background and operational conditions (i.e., cumulative), respectively. The three scenarios used in this HHRA are:

- Baseline Case – this only includes background air concentrations from ambient air monitoring stations around the Project site;
- Project Case – this only includes air concentrations from the proposed Project without any other source contribution; and,
- Cumulative Case – this includes background air concentrations of COPC (i.e., Baseline Case) and the predicted increases in chemical concentrations from the operation of the Project (i.e. Project Case).

Each case scenario at each of the 43 receptor locations was assessed for inhalation health risks.

3.5 Exposure Pathways

Human receptors may come into contact with chemicals present in the environment in different ways, depending on lifestyle and local resource utilization. Paths that chemicals may travel to reach environmental media such as air, soil, water and food and subsequently can lead to human exposure are termed exposure pathways.

An exposure pathway must exist from the point of chemical emission (e.g. release of chemical into air from Project) to the point of contact with humans in order for human exposure to take

place. To adequately determine the relevant exposure pathways, all appropriate affected environmental media must be examined. For this HHRA, based on the persistence and bioaccumulation screening of COPC emitted from the Project, only exposure from air will be considered.

How a chemical travels from environmental media into systemic circulation is called an exposure route. There are three major exposure routes, which include: inhalation, ingestion and dermal absorption.

In this HHRA, people were assumed to be exposed to chemicals present in Project emissions via the inhalation pathway only.

4 EXPOSURE ASSESSMENT

The exposure assessment incorporates information about Project-related chemical emissions, activities and land use in the area, receptor characteristics, and the exposure pathways identified during the problem formulation phase of the HHRA. Given the nature of the Project and that the primary source of COPC to the environment will be via emissions to the atmosphere from the stack of the Project, the primary route of exposure for people will be inhalation.

For the inhalation exposure assessment, 43 receptor locations were evaluated. Specific rates of exposure were not calculated; rather, human exposures were conservatively assumed to be equal to ambient air concentrations (measured or modeled) of these substances (in $\mu g/m^3$). The inhalation assessment evaluates health risks from acute and chronic exposures (*via* direct air inhalation only) for all of the COPC at each of the 43 receptor locations.

Figure 4-1. Key Receptor locations within 5000 metres of LP Minitonas.

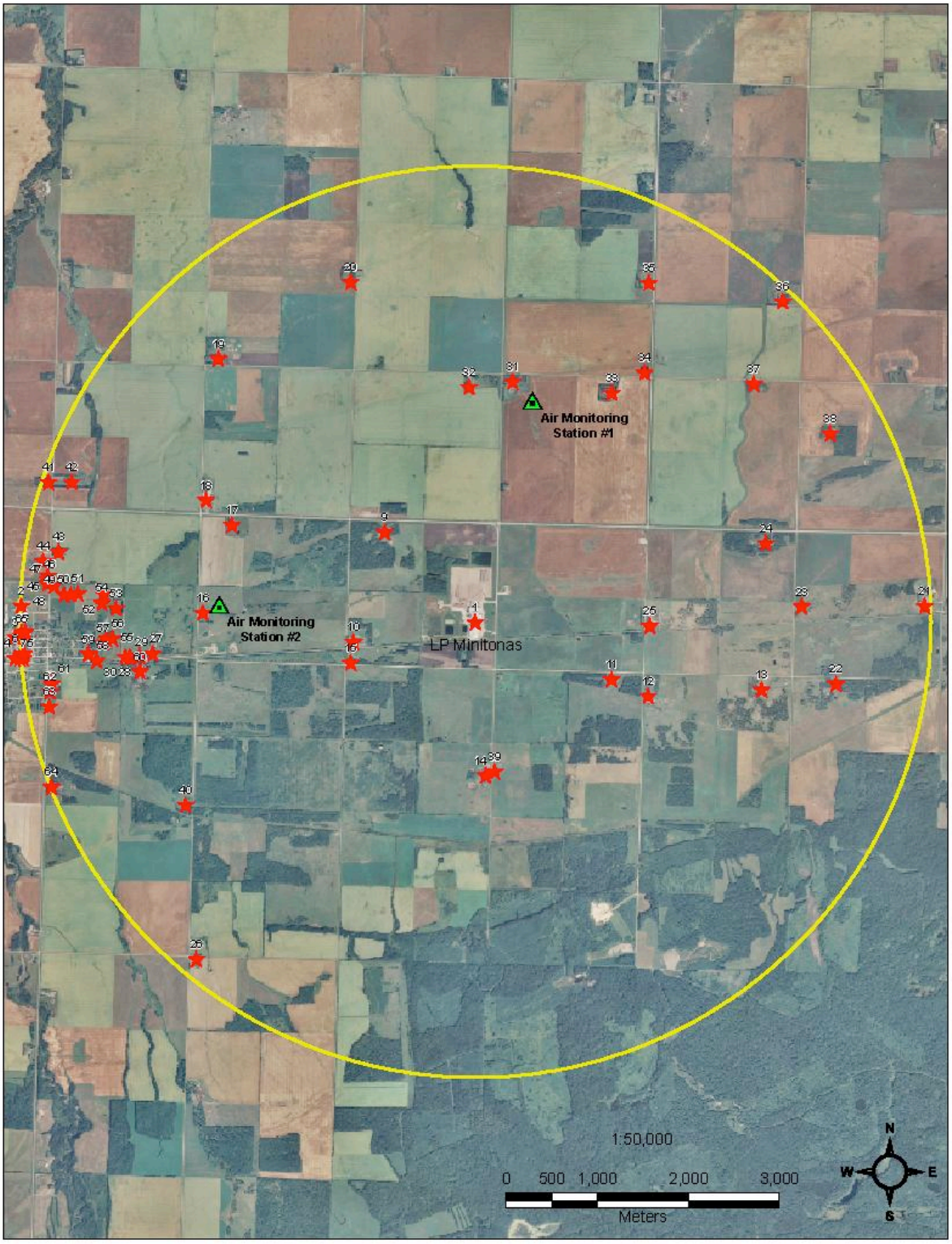


Figure 4-2 presents a conceptual model for human exposure to Project emissions from the inhalation pathway.

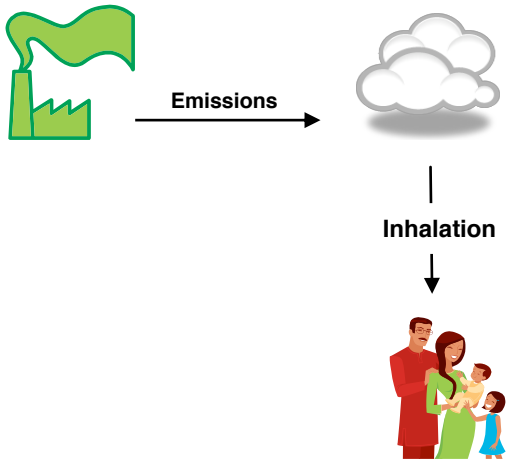


Figure 4-2. Inhalation Exposure Pathway

4.1 Chemical Characterization

The second major component required to quantify potential human exposures to COPC is the characterization of Exposure Point Concentrations (EPCs) in various environmental media. As previously discussed, potential human health risks related only to inhalation (for each COPC) were estimated at each of the 43 receptor locations around the Project (**Appendix A**).

4.1.1 Exposure Point Concentrations

When emitted from the stack of the Facility, COPC will mix with the surrounding air, or fall to the ground over time. These processes are referred to as dispersion and deposition, respectively. Note, given that this HHRA only considers the inhalation pathway, as determined in Section 3.5, deposition is not considered. The COPC concentration in ambient air is directly inhaled by the receptor.

Baseline air concentrations were established using ambient air monitoring data and are considered representative of the entire study area. Changes in the COPC concentrations in ambient air caused by Project-related emissions were obtained directly from the air dispersion modeling results. The air modeling was conducted using Industrial Source Complex 3 Plume Rise Model Enhancements (ISC3-PRIME) steady-state Gaussian plume dispersion modeling. The assessment area for air dispersion modeling covered a grid around the Site of 22km by 22km. For a full description of the methodology used for modeling of Project emissions, please see the air modeling session of the LP submission.

4.1.2 Existing Environmental Conditions

A comprehensive ambient air quality monitoring network has been in place in the vicinity of the Project site since 1995. COPC measured currently include PM10, formaldehyde, total VOCs, benzene, MDI, phenol and hydrogen cyanide. Ambient air quality monitoring station #1 (LP1) is located approximately 1.5 km NE of the Project site and ambient air quality monitoring station #2 (LP2) is located approximately 2 km west of the Project site (Figure 3-1).

With the exception of PM10, formaldehyde, and hydrogen cyanide (HCN), all COPC monitored were below respective detection limits. For this HHRA, to be conservative, for those COPC measured below the detection limit (DL), baseline air concentrations were set equivalent to the DL. Note for MDI, in 5 years of quarterly measurements, concentrations above the DL were measured twice; however, given that 98% of the measurements (N=126) in this 5-year period were below the DL, the baseline concentration for MDI was set to the DL. For Phenol, although all quarterly measurements were below DL, multiple detection limits were used; therefore in order to be conservative, the highest DL (i.e.,7.40 µg/m^3) was selected as the 24-hour baseline concentration.

For PM10, background concentrations were calculated based on continuous PM10 measurements at both ambient air monitoring stations for the five (5) year period from March 1, 2004 through February 28, 2009. For this HHRA, to be conservative, measurements from the both LP1 and LP2 were combined (N=40) and a 95UCLM (i.e., upper confidence limit on the mean) was calculated using US EPA ProUCL software (US EPA, 2010). For both 1-hour and 24-hour averaging periods a 95UCLM was calculated and used to represent 1-hour and 24-hour baseline PM10 concentrations.

For formaldehyde, background concentrations were calculated based on measured one (1) hour concentrations at the two monitoring sites for the five (5) year monitoring period from May 15, 2004 through May 13, 2009. Only ambient formaldehyde concentrations uninfluenced by plant emissions were considered in the background calculations using the following procedures:

- LP1 – background includes only measurements when winds were blowing from the monitoring station towards the plant within a 90° quadrant centered on NNE winds during the sampling hour (e.g. winds from the NNW, N, NNE, NE and ENE)
- LP2 – background includes only measurements when winds were blowing from the monitoring station towards the plant within a 90° quadrant centered on W winds during the sampling hour (e.g. winds from the SW, WSW, W, WNW, NW)

Based on this analysis, average background 1-hr formaldehyde concentrations were calculated to be 1.65 µg/m^3.

For HCN, 24-hour quarterly sampling has been collected since April 2001 at each ambient air monitoring station. For the purposes of this HHRA only the last 5 years of data have been assessed. Measurements from the both LP1 and LP2 were combined (N=42) and a 95UCLM was calculated using US EPA ProUCL software (US EPA, 2010), which was used to represent the 24-hour baseline HCN concentration.

In instances where 1-hour and annual baseline air concentrations were not available (i.e., benzene, HCN, MDI, and Phenol), US EPA (1992) guidance was used to calculate each respective 1-hour and annual concentration from the measured 24-hour concentration. Similarly, US EPA (1992) was used to calculate 24-hour and annual formaldehyde baseline air concentrations.

For the remaining COPC (i.e., NO_2, $PM_{2.5}$, TPM, Acetaldehyde, Acrolein, Methanol and Propionaldehyde), no background data exists; therefore these COPC were not be assessed in the Baseline Case.

Table 4-1. Baseline Air Concentrations

COPC	1-hour	24-hour	Annual
NO_2	--	--	--
PM2.5	--	--	--
PM10 [d]	13.6	13.6	13.6
TPM	--	--	--
Acetaldehyde	--	--	--
Acrolein	--	--	--
Benzene [a]	7.50	**3.00**	0.600
Formaldehyde [b]	1.65	0.660	0.130
HCN [c]	1.60	0.640	0.130
MDI [a]	0.50	**0.200**	0.0400
Methanol	--	--	--
Phenol [a]	18.5	**7.40**	1.48
Propionaldehyde	--	--	--

[a] detection limit used to estimate 1-hour and annual concentrations
[b] 1-hour concentration used to estimate 24-hour and annual concentrations
[c] 24-hour concentration is calculated 95UCLM; 24-hour concentration used to estimate 1-hour and annual concentrations
[d] 1-hour and 24-hour concentrations are calculated 95UCLM; annual concentration is set equal to 24-hour concentration
Bold font – detection limit
"--" – not measured

5 TOXICITY ASSESSMENT

All chemicals (anthropogenic and natural) have the potential to cause toxicological effects in people who are exposed to them; however, it is the chemical concentration, the route of exposure, the duration of exposure, and the inherent toxicity of the chemical that determines the level of effect and subsequent potential for unacceptable risk to the exposed receptor. In this stage of the risk assessment, literature on the toxic potential of each COPC was reviewed and toxicity reference values (TRVs) were selected for use in the HHRA. For the purpose of this assessment, TRVs are defined as doses of chemicals (generally derived from animal laboratory studies or based on results of actual human exposure) or regulatory benchmarks (e.g., also health-based but often policy derived) that receptors can be exposed to without the development of unacceptable health effects.

Two basic and quite different chemical categories are commonly recognized by regulatory agencies and applied when estimating toxicological criteria for humans (FDA 1982; US EPA 1989). These are the threshold approach, typically used to evaluate non-carcinogens, and the non-threshold approach (or the mathematical model-unit risk estimation approach), typically used for carcinogenic compounds.

For chemicals that follow a threshold dose-response, a benchmark or threshold level must be exceeded in order for toxicity to occur, and lowest observable adverse effect level (LOAEL) and no-observable adverse effect level (NOAEL), can be determined. The addition of uncertainty factors (or safety factors) to LOAELs or NOAELs results in the derivation of a TRV that is expected to be “safe” to sensitive subjects following exposure for a prescribed period of time. Uncertainty factors are generally 10-fold factors used to account for a number of extrapolations that may be required to derive a TRV (e.g., to account for individual sensitivity towards a chemical, extrapolations that need to be made when applying animal toxicity data to human TRVs; US EPA 1993; 2002).

For chemicals that follow non-threshold dose-responses, a specific dose where toxic effects manifest themselves cannot be identified. Such is the case for carcinogenic chemicals. Regulatory agencies such as Health Canada and the United States Environmental Protection Agency (US EPA) assume that any level of long-term exposure to carcinogenic chemicals is associated with some “hypothetical cancer risk”. As a result, regulatory agencies have typically employed acceptable incremental lifetime cancer risk (ILCR) levels.

The terminology used to define threshold and non-threshold TRVs differs according to the source and type of exposure and often varies between regulatory jurisdictions. For the

assessment, generic nomenclature has been developed, with the following terms and descriptions commonly used:

- **Reference Concentration (RfC)**: an RfC can be defined as the acceptable level of an airborne chemical for which the primary route of exposure is inhalation (i.e., inhalation NOAEL or LOAEL with uncertainty factors applied). It is expressed as a concentration of the chemical in air (i.e., µg/m^3) and applies only to threshold chemicals.
- **Benchmark (Inhalation)**: Similar to reference concentrations, regulatory benchmarks are also health-based but often policy derived exposure limits. For this assessment only health-based benchmarks were used (with the exception of those used for total particulate matter). Benchmarks are acceptable levels of airborne chemicals and are generally expressed as a concentration of chemical in air (i.e., µg/m^3) and apply only to threshold chemicals.
- **Unit Risk**: The US EPA defines a unit risk value as "…the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/L in water, or 1 µg/m^3 in air…". A unit risk value of 3.0 x 10-5 per µg/m^3 would mean that under an upper worst-case estimate, three excess cancer cases are expected to develop per one hundred thousand (100,000) people, if exposed every day for a lifetime to 1 µg of the chemical per m^3 of air.

The toxicity of a chemical often depends on whether or not exposure has been acute (short-term) or chronic (long-term) and TRVs need to be differentiated accordingly.

- **Acute:** The amount or dose of a chemical that can be tolerated without evidence of adverse health outcomes on a short-term basis. These limits are routinely applied to conditions in which exposures extend from minutes through several hours or several days only (ATSDR, 2006). For this HHRA, risks will be evaluated based upon 1- or 24-hour exposure periods.
- **Chronic:** The amount of a chemical that is expected to be without health outcomes, even when exposure occurs continuously or regularly over extended periods, possibly lasting for periods of at least a year, and possibly extending over an entire lifetime (ATSDR, 2006).

5.1 Selection of Toxicity Reference Values

The toxicity reference values used in this risk assessment may be divided into two categories: those for acute, or short-term exposures and chronic, or long-term exposures. TRVs selected for use in this HHRA were obtained from regulatory agencies including:

- Manitoba Conservation;
- Alberta Environment (AENV);
- Ontario Ministry of the Environment (MOE);
- Health Canada;
- US EPA Integrated Risk Information System (IRIS);

- Agency for Toxic Substances and Disease Registry (ATSDR);
- World Health Organization (WHO);
- Netherlands National Institute of Public Health and the Environment (RIVM); and,
- California Environmental Protection Agency (CalEPA).

To maintain a systematic, defensible, and logical approach to selection of TRVs, a selection hierarchy was adopted with Manitoba Conservation being the main source of TRVs. In instances where Manitoba Conservation does not have a published value, Health Canada (2004a) provides a recommended hierarchy for selection of TRVs.

For acute exposures, concentrations of COPC were compared to health-based benchmarks established by the following regulatory agencies, in order of preference:

- Manitoba Conservation – The Project is located in Manitoba and is subject to Provincial jurisdiction; hence criteria published by Manitoba will be the primary source of acute inhalation TRVs.
- Ontario Ministry of the Environment (MOE) – The MOE represents another Canadian Provincial jurisdiction that has the most complete listing of acute screening criteria for air pollutants.
- Alberta Environment (AENV) – The AENV represents another Canadian Provincial jurisdiction that has a listing of acute screening criteria for air pollutants.
- Agency for Toxic Substances and Disease Registry (ATSDR) – The ATSDR is a recognized source agency recommended by Health Canada.
- World Health Organization (WHO) – WHO is a recognized source agency recommended by Health Canada.
- California Environmental Protection Agency (CalEPA) – CalEPA is a recognized source agency recommended by Health Canada.

For chronic exposures, concentrations of COPC were compared to health-based benchmarks established by the following regulatory agencies, in order of preference:

- Manitoba Conservation – The Project is located in Manitoba and is subject to Provincial jurisdiction; hence criteria published by Manitoba will be the primary source of chronic inhalation TRVs, when available.
- Health Canada – In the absence of published Manitoba chronic TRVs, Health Canada will be used as a reference as Manitoba is subject to federal jurisdiction. Health Canada is the Federal regulatory agency responsible for the development of TRVs.
- US EPA Integrated Risk Information System (IRIS) – Where Health Canada does not have published criteria, the US EPA IRIS provides the best source of extensively peer-reviewed TRVs, published by another North American jurisdiction.
- World Health Organization (WHO) – WHO is a recognized source agency recommended by Health Canada.

- Netherlands National Institute of Public Health and the Environment (RIVM) – RIVM is a recognized source agency recommended by Health Canada.
- Agency for Toxic Substances and Disease Registry (ATSDR) – The ATSDR is a recognized source agency recommended by Health Canada.
- California Environmental Protection Agency (CalEPA) – CalEPA is a recognized source agency recommended by Health Canada.

Inhalation TRVs for each CAC and COPC (where available), as well as key critical health outcome and regulatory source for each TRV, are provided in Table 5-1. Refer to the toxicological profiles provided in **Appendix C** for a discussion of the relevant background information supporting the selected TRVs.

Table 5-1. Summary of TRVs and Inhalation Benchmarks Selected

COPC	Duration	Value	Critical Effect	Reference Type	Source
Nitrogen Dioxide (NO_2)	1-Hour	400	Respiratory Irritation	Benchmark	MB, 2005
	24-Hour	200	Respiratory Irritation	Benchmark	MB, 2005
	Annual Average	100	Respiratory Irritation	Benchmark	MB, 2005
$PM_{2.5}$	1-Hour	80	Health-Based	Benchmark	AENV, 2009
	24-Hour	30	Health-Based	Benchmark	MB, 2005
	Annual Average	10	Health-Based	Benchmark	WHO, 2005
PM_{10}	1-Hour	NV			
	24-Hour	50	Health-Based	Benchmark	MB, 2005
	Annual Average	20	Health-Based	Benchmark	WHO, 2005
TPM	1-Hour	NV			
	24-Hour	120	Health-Based	Benchmark	MB, 2005
	Annual Average	70	Effects-Based	Benchmark	MB, 2005
Acetaldehyde	1-Hour	90	Health-Based	Benchmark	AENV, 2009
	24-Hour	500	Health-Based	Benchmark	MOE, 2008
	Annual Average	390	Non-neoplastic lesions in rat nasal olfactory epithelium	TC	HC, 2004b
	Carcinogenic Annual Average	5.80E-07	Increased incidence of nasal adenocarcinomas and squamous cell carcinomas	UR	HC, 2004b
Acrolein	1-Hour	4.5	Health-Based	Benchmark	MOE, 2009
	24-Hour	0.4	Health-Based	Benchmark	MOE, 2009
	Annual Average	0.4	Increase in disarrangement, necrosis, thickening, desquamation and hyperplasia in nasal	TC	HC, 2004b

COPC	Duration	Value	Critical Effect	Reference Type	Source
			respiratory epithelium of rats		
Benzene	1-Hour	30	Health-Based	Benchmark	AENV, 2009
	24-Hour	30	Reduces lymphocyte proliferation following mitogen stimulation	Benchmark	ATSDR, 2008
	Annual Average	30	Decreased lymphocyte count	RfC	US EPA, 2003
	Carcinogenic Annual Average	3.30E-06	Myelogenous leukaemia, Lymphomas; oral cavity squamous cell carcinomas	UR	HC, 2009
Formaldehyde	1-Hour	60	Health-Based	Benchmark	MB, 2005
	24-Hour	65	Health-Based	Benchmark	MOE, 2008
	Annual Average	10	Nasal	MRL	ATSDR, 1999
	Carcinogenic Annual Average	2.0E-10	Nasal squamous tumours	UR	HC, 2004b
HCN	1-Hour	40	Health Effects Not Specified	Benchmark	MB, 2005
	24-Hour	8	Health-Based	Benchmark	MOE, 2008
	Annual Average	3	Health Effects Not Specified	Benchmark	MB, 2005
MDI	1-Hour	3	Health Effects Not Specified	Benchmark	MB, 2005
	24-Hour	0.7	Health-Based	Benchmark	MOE, 2008
	Annual Average	0.5	Health Effects Not Specified	Benchmark	MB, 2005
Methanol	1-Hour	2600	Health-Based	Benchmark	AENV, 2009
	24-Hour	4000	Health-Based	Benchmark	MOE, 2008
	Annual Average	4000	Developmental Effects	REL	CalEPA, 2008
Phenol	1-Hour	63	Health Effects Not Specified	Benchmark	MB, 2005
	24-Hour	30	Health-Based	Benchmark	MOE, 2005
	Annual Average	20	Health-Based	TCA	RIVM, 2001
Propionaldehyde	1-Hour	NV			
	24-Hour	NV			
	Annual Average	8	Atrophy of olfactory epithelium	RfC	US EPA, 2008

Units – non-carcinogenic: $\mu g/m^3$, carcinogenic $(\mu g/m^3)^{-1}$
NV – No Value, MRL – Minimum Risk Level, REL – Reference Exposure Level, RfC – Reference Concentration, TC – Tolerable Concentration, TCA – Tolerable Concentration in Air, UR – Unit Risk

5.2 Bioavailability

Bioavailability of a contaminant can be defined as the total dose, administered by any route, which makes it to systemic circulation in an unchanged form. The bioavailability will vary depending on the pathway of exposure (i.e., ingestion, inhalation, or dermal contact), the form of the contaminant (e.g., dissolved in water versus adsorbed to fine soil), and the physiological

characteristics of the receptor at the time of exposure (e.g., absorption may be higher if the receptor is malnourished, or has a specific nutritional requirement, such as toddlers).

The process of a contaminant entering the body can be described in two steps – contact with an outer boundary (exposure or intake), followed by actual entry into the bloodstream (uptake). Intake is typically defined as the process by which a contaminant crosses the outer surface of a receptor without passing an absorption barrier (such as through ingestion, inhalation, or dermal contact), while uptake is the process by which a contaminant crosses an absorption barrier (such as the lining of the gastrointestinal tract, the outer layer of skin, or the lining of the lungs) into the receptor.

For this risk assessment, the inhalation bioavailability factor was conservatively set to 1.0, meaning each COPC is 100% bioavailable via the inhalation route of exposure.

6 RISK CHARACTERIZATION

Risk characterization is the final step in a risk assessment. The purpose of the risk characterization is to combine the results from the exposure assessment (Section 4) and the information of the toxicity assessment (Section 5) to estimate the potential risks to human health from the COPC evaluated. This section briefly summarizes the general approach to the risk characterization for non-carcinogenic and carcinogenic COPC, respectively.

6.1 Approach

Risk characterization is essentially a comparison of the predicted human intake of a COPC to the TRV for that COPC. Evaluation of potential acute (short-term) and potential chronic (long-term) risks are completed in separate assessments. Potential inhalation acute health risks are evaluated using short-term intakes, based on 1-hour and 24-hour air concentrations, and compared with acute TRVs; while, chronic risk is assessed using chronic TRVs. Therefore risk estimates were separated as follows:

- Acute inhalation (1-hr and 24-hr durations),
- Chronic inhalation (annual average durations).

The potential health effects associated with non-carcinogenic contaminants are assessed differently than those for carcinogenic contaminants. Non-carcinogenic contaminants are generally considered to act through a threshold mechanism where it is assumed that there is a dose (or concentration) that does not produce any adverse effect. As the dose or concentration

increases to the point where the body can no longer process or excrete the chemical, an adverse effect may occur. This point is termed the threshold and is different for every chemical.

For contaminants for which the critical effect is assumed to have no threshold (i.e., carcinogens), it is assumed that there is some probability of harm to human health at any level of exposure. There is a dose-response relationship that converts estimated daily intakes averaged over a lifetime of exposure directly to an incremental risk of an individual developing cancer.

6.1.1 Non-carcinogens

Concentration ratios (CR) are used to evaluate acute and chronic non-carcinogenic health risks from direct exposure to chemicals in air. CR values are calculated by dividing the predicted air concentration (1-hour, 24-hour, or annual average) by the appropriate exposure limit (i.e., ambient air quality guideline or reference concentration) as follows:

$$CR = \frac{[Air]}{Exposure\ Limit}$$

Where:

CR	=	the exposure-duration specific concentration ratio (unitless)
[Air]	=	the predicted air concentration (µg/m^3) for a specific exposure duration (i.e., 1-hour, 24-hour, or annual average)
Exposure Limit	=	the exposure-duration specific exposure limit (µg/m^3)

If the CR is less than 1.0, the air concentration does not exceed the regulatory exposure limit and adverse health effects are not expected. However, a CR greater than 1.0 does not necessarily imply that action is required to mitigate unacceptable risks; rather, an exceedance is an indication that the data and assumptions used to estimate the risks should be more closely examined.

6.1.2 Carcinogens

For non-threshold carcinogenic chemicals, potential risks are expressed as incremental lifetime cancer risks (ILCRs) and lifetime cancer risks (LCRs), which represents the risk of an individual within a given population developing cancer over his or her lifetime (increased risk, in the case of the ILCR). For this assessment, ILCRs consider the increase in risk over and above the

probability of developing cancer due to background exposures while LCRs represent total lifetime cancer risks.

ILCR and LCR estimates were used to evaluate the increased cancer risk resulting from a lifetime of exposure to non-threshold genotoxic carcinogenic chemicals. ILCR estimates provide the incremental lifetime cancer risk resulting from emissions from the Project (i.e., Project Case), while LCR estimates provide the overall background lifetime cancer risk associated with typical concentrations of the COPC within the study area (i.e., Baseline Case and Cumulative Case).

ILCR estimates from direct air inhalation were calculated as follows:

$$\boldsymbol{ILCR = [Air]_{project\ alone}\ x\ UR}$$

Where:

ILCR	=	the incremental (or additional) lifetime cancer risk (unitless)
$[AIR]_{project\ alone}$	=	the predicted annual average ground-level air concentration ($\mu g/m^3$) from only Project emissions
UR	=	the COPC-specific unit risk $(\mu g/m^3)^{-1}$

LCR estimates from direct air inhalation were calculated as follows:

$$\boldsymbol{LCR = [Air]_{all\ sources}\ x\ UR}$$

Where:

LCR	=	the lifetime cancer risk (unitless)
$[AIR]_{all\ sources}$	=	the predicted annual average ground-level air concentration ($\mu g/m^3$) from all sources, including the Project (Cumulative Case Only)
UR	=	the COPC-specific unit risk $(\mu g/m^3)^{-1}$

As stated, non-threshold chemicals that can alter genetic material (*i.e.*, genotoxic) are capable of producing cancer. Regulatory agencies such as Health Canada and the US EPA have therefore assumed that any level of long-term exposure to a carcinogenic compound is associated with some "hypothetical cancer risk". As a result, regulatory agencies have typically employed acceptable ILCR levels (*i.e.*, incremental cancer risks over and above background cancer incidence) between 1-in-100,000 and 1-in-1,000,000. ILCRs generally consider risks related to a particular Project (i.e. Project alone) in that the cancer risks are expressed on an incremental or additional basis as compared to cancer risks related to all sources.

This HHRA is being conducted in the province of Manitoba; Manitoba does not specify an ILCR benchmark. In lieu of a specific provincial benchmark, because Manitoba is subject to federal jurisdiction the Health Canada ILCR benchmark of 1-in-100,000 or 1E-05 will be used to predict risk from the Project Case. Any ILCR estimate less than 1E-05 indicates that predicted exposures are considered acceptable. Conversely, an ILCR greater than 1-in-100,000 (i.e. 1E-05) signifies that the incremental lifetime cancer risk exceeds the regulatory benchmark. This suggests that the potential for an elevated level of risk may be present for the COPC in question; further investigation may be needed to confirm the identified risk.

In the case of LCR estimates, there are no accepted regulatory benchmarks by which to evaluate an acceptable level of lifetime cancer risk. Unlike ILCRs, LCRs include the consideration of cancer risks from all sources. As such, LCRs are expressed on a total or all sources basis. Since regulators have not recommended an acceptable benchmark LCR for exposure to carcinogens associated with background or baseline conditions, interpretation of the significance of the LCR values is difficult. The only comparison one could make would be to the typical observed cancer incidence in the Canadian population. Each year, approximately 145,000 Canadians are diagnosed with cancer. Based on current cancer incidence and mortality rates, the lifetime probability of developing cancer is 38% for women and 44% for men or 40% overall (Canadian Cancer Society, 2007). In other words, if the Project's air emissions were to increase the Canadian cancer incidence rate from 0.40000 to 0.40001, then Health Canada would consider the facility to pose an unacceptable risk to the population

6.2 Results - Non-carcinogenic Risk Estimates

As discussed in Section 6.1.1, the CR represents the relationship between the magnitude of exposure to the contaminant in air relative to a regulatory exposure limit. The CR indicates the probability of occurrence of adverse health effects. The benchmark CR value for inhaled exposures is 1.0. If the CR is greater than 1.0, then there may be potential for adverse health effects and further assessment or monitoring would be required. Conversely, a CR of less than

1.0 indicates that the intake of the contaminant from inhalation exposure does not exceed the tolerable intake and no adverse health effects are expected.

6.2.1 Baseline Case

Predicted 1-hour, 24-hour or annual air concentrations for all COPC under the Baseline Case scenario do not exceed the recommend benchmark of 1.0; therefore, no adverse health risk is expected from potential exposure to baseline concentrations of COPC.

Baseline Case results are presented in Table 6-1 below.

Table 6-1. Concentration Ratios at Baseline Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NO_X	--	--	--
$PM_{2.5}$	--	--	--
PM_{10}	--	2.71E-01	6.78E-01
TPM	--	--	--
VOCs			
Acetaldehyde	--	--	--
Acrolein	--	--	--
Benzene	2.50E-01	1.00E-01	2.00E-02
Formaldehyde	2.75E-02	1.02E-02	1.32E-02
HCN	4.01E-02	8.01E-02	4.27E-02
MDI	1.67E-01	2.86E-01	8.00E-02
Methanol	--	--	--
Phenol	2.94E-01	2.47E-01	7.40E-02
Propionaldehyde	--	--	--

Notes: "--" no CR calculated

6.2.2 Project Case – Maximum Ground Level Concentration

Predicted 1-hour, 24-hour or annual air concentrations for all COPC under the Project Case scenario do not exceed the recommend benchmark of 1.0, except for 24-hour Acrolein (Table 6-3) at the maximum ground level concentration (max GLC). The max GLC for each COPC is shown in Table 6-2. For COPC at each of the 43 individual receptor locations, no health risks were predicted for the Project Case (**Appendix B**).

Table 6-2. Maximum Ground Level Concentration

COPC	Max GLC		
	1-hour	24-hour	Annual
Criteria Air Contaminants			
NO_2	147.783	64.478	8.536
$PM_{2.5}$	--	22.26	--
PM_{10}	--	32.29	--
TPM	--	39.679	6.638
VOCs			
Acetaldehyde	9.77	2.81	0.15
Acrolein	2.7	0.83	0.03
Benzene	2.058	0.592	0.036
Formaldehyde	56.802	15.429	1.261
HCN	3.873	--	0.045
MDI	1.895	--	0.088
Methanol	63.57	18.66	2.25
Phenol	38.546	--	--
Propionaldehyde	2.41	0.74	0.03

Units: $\mu g/m^3$
Notes: "--" no Max GLC calculated

Table 6-3. Concentration Ratios at Maximum Ground Level Concentration – Project Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NO_2	3.69E-01	3.22E-01	8.54E-02
$PM_{2.5}$	--	7.42E-01	--
PM_{10}	--	6.46E-01	--
TPM	--	3.31E-01	9.48E-02
VOCs			
Acetaldehyde	1.09E-01	5.62E-03	3.85E-04
Acrolein	6.00E-01	**2.08E+00**	7.50E-02
Benzene	6.86E-02	1.97E-02	1.20E-03
Formaldehyde	9.47E-01	2.37E-01	1.26E-01
HCN	9.68E-02	--	1.50E-02
MDI	6.32E-01	--	1.76E-01
Methanol	2.45E-02	4.67E-03	5.63E-04
Phenol	6.12E-01	--	--

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Propionaldehyde	--	--	3.75E-03

Notes: "--" no CR calculated

At the max GLC concentration (0.83 µg/m^3) at the southwest fenceline of the Project property, acrolein exceeded the benchmark CR (2.08). Frequency analysis (Table 6-4) shows that although an exceedence was predicted at the max GLC, at the 98th percentile, 24-hour air concentrations acrolein drop to 0.063 µg/m^3 and at the 50th percentile drop to 0 µg/m^3, which are below the 24-hour exposure limit of 0.4 µg/m^3 (MOE, 2009).

Table 6-4. Frequency Analysis of 24-hour Acrolein

Percentile	24-hour
99.9	0.688
99	0.513
98	0.063
95	0.082
90	0.048
50	0.000

Nevertheless, at the max GLC acrolein was predicted to be higher than 1.0, therefore it is important to put this risk in context as it relates to the maximum 24-hour acrolein at the individual receptor level, how it relates to typical background concentrations observed in other areas of Canada, and understand the toxicological basis for this risk prediction. The maximum 24-hour concentration of acrolein measured at each of the 43 receptor locations evaluated was found at receptor location 40, a residence. At this location, the 24-hour acrolein concentration measured was 0.232 µg/m^3, which corresponds to a CR below the benchmark CR (0.58).

In lieu of measured ambient acrolein data from the Site, 24-hour acrolein concentrations close to the Project were considered to be similar to those measured in other areas of Canada (Table 6-5). Small amounts of acrolein can be formed and enter the air when trees, tobacco, other plants, gasoline, or oil are burned, although it is known to break down fairly rapidly in air (ATSDR, 2007).

Table 6-5. Ambient Concentrations of Acrolein at Ten Environment Canada Monitoring Stations

Location	2001		2002		2003		2004		2005		2006	
	Ave. Ann.	Max. 24 h	Ave. Ann.	Max. 24 h	Ave. Ann.	Max. 24 h	Ave. Ann.	Max. 24 h	Ave. Ann.	Max. 24 h	Ave. Ann.	Max. 24 h
Saint John, Forest Hills, NB	0.01	0.11	0.05	0.26	N/A	N/A	0.02	0.22	0.04	0.37	0.02	0.2
Saint John, Champlain Heights, NB	N/A	N/A	N/A	N/A	N/A	N/A	0.03	0.12	N/A	N/A	N/A	N/A
Vancouver, Rocky Pt, BC	0.09	0.42	N/A	N/A	0.02	0.1	0.03	0.11	N/A	N/A	0.01	0.08
Montreal, Pte. Aux Trembles, QC	0.18	0.52	0.16	0.67	0.12	0.86	0.07	0.29	0.06	0.3	0.05	0.28
Montreal, Ontario St, QC	0.22	1.2	0.19	0.7	0.1	0.69	0.08	0.48	0.12	1.1	0.07	0.24
Ottawa, Slater St, ON	0.21	0.53	N/A	N/A	0.1	0.42	0.09	0.55	N/A	N/A	N/A	N/A
Windsor, College/ Prince, ON	0.11	0.4	0.1	0.69	0.13	0.31	0.05	0.13	0.08	0.08	0.04	0.12
Toronto, Perth/Ruskin, ON	0.11	0.21	0.12	0.29	0.13	0.26	0.09	0.35	0.19	1.17	0.02	0.06
Simcoe, ON	0.1	1	0.05	0.26	0.03	0.11	0.01	0.04	N/A	N/A	0.01	0.08
Winnipeg, Ellen St, MB	0.16	2.59	0.08	0.34	0.05	0.33	0.05	0.27	0.06	0.37	0.04	0.12

Source: Jacques Whitford, 2008
Notes:
Ann. Avg. is the annual average ground-level concentration for the year.
24 h Max. is the maximum 24 h ground-level concentration observed in the year.
N/A indicates data for that chemical, for that period, is not available.

From a toxicological point of view, studies have shown that acrolein (in air) acts primarily as an eye and upper respiratory tract irritant in humans (WHO, 2002). Exposure to concentrations as low as 140 µg/m^3 for five minutes may elicit subjective complaints of irritation, with increasing concentrations leading to more intense eye, nose and respiratory symptoms. In a study that exposed 36 healthy volunteers for five minutes to 140 µg/m^3, mild eye irritation was observed (Darley et al. 1960).

The current MOE (2009) 24-hour standard of 0.4 µg/m^3 used in this assessment, is derived from a chronic study by Dorman et al. (2008) where a no observed adverse effect level (NOAEL) of 458 µg/m^3 was established for olfactory epithelial pathology in rats. From this a human equivalent concentration (HEC) of 11 µg/m^3 was calculated to which a cumulative uncertainty factor of 30 was applied to derive a 24-hour exposure limit of 0.4 µg/m^3. The uncertainty factor applied to this NOAEL is broken down to an uncertainty factor of 3 for interspecies extrapolation

and an uncertainty factor of 10 for intraspecies variability, which protects for potential sensitivities in the human population.

In a clinical study by Weber-Tschopp et al. (1977), which provides one of the most comprehensive descriptions of health risks of acrolein in humans following short-term exposures, three experiments were performed using male and female student volunteers. These involved:

- Continuous exposure at constantly increasing acrolein concentrations;
- Short exposures to successively increasing acrolein concentrations; and
- A single hour of exposure to a constant concentration.

The investigators concluded that the average threshold of health-related environmental effects for acrolein is between 210 µg/m^3 (eye irritation) and 700 µg/m^3 (throat irritation and decreased respiration rate), with nasal irritation at 350 µg/m^3.

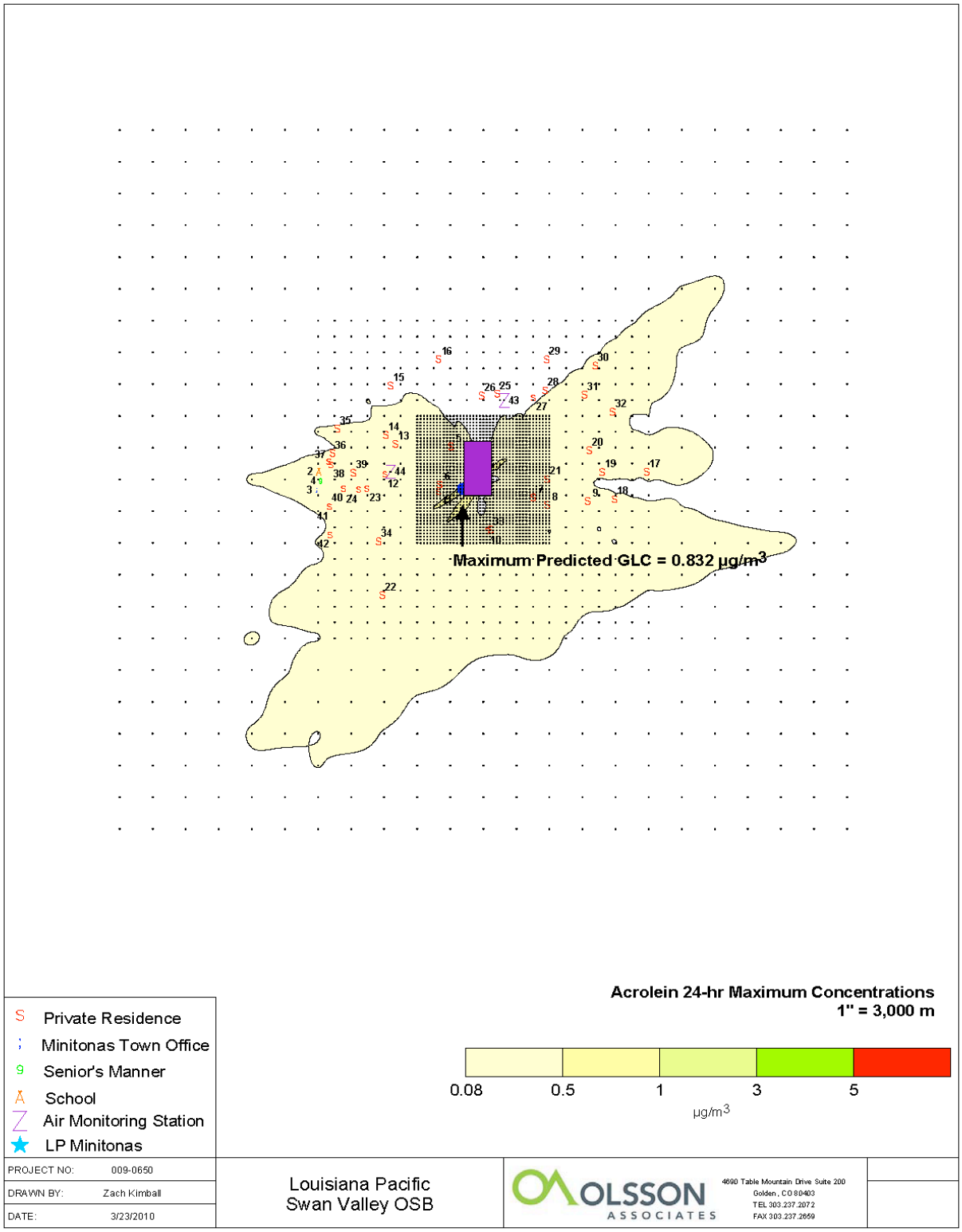
As shown in Table 6-6, the lowest concentration at which mild eye irritation has been observed in humans (i.e.,140 µg/m^3) is more than 100-times higher than the maximum modeled 24-hour air concentration of acrolein (0.83 µg/m^3). Furthermore, for there to be an actual risk at the max GLC, a receptor would have to be present at the same location at the same time the maximum predicated air concentration is observed; given that the location of the max GLC is on the southwest fenceline of the Project property it is highly unlikely a receptor would be present (Figure 6-1). Therefore the likelihood of this exposure occurring is very small and thus unlikely that concentrations of acrolein would result in an appreciative health risk to the surrounding population.

Table 6-6. Observed Responses in Humans to Short-Term Exposure to Acrolein

Air concentration [a] [µg/m^3]	**Acute Health Endpoints**	**Reference**
140[b] to 210	Mild eye irritation	Darley et al. (1960); Weber Tschopp et al. (1977)
230[c]	Lacrimation and irritation of the eyes, nose and throat	Fassett (1962)
350	Nasal irritation	Weber-Tschopp et al. (1977)
700	Decreased respiratory rate and throat irritation	Weber-Tschopp et al. (1977)
350,000[b]	Lethality	Prentiss (1937)

NOTES:
[a] On an acute basis, the toxicity of acrolein is determined to a greater extent by the exposure concentration than by duration. As such, the air concentrations were not duration-adjusted. Unless stated otherwise, the air concentrations are based on 1-hour exposure duration.
[b] Air concentration based on 5-minute exposure duration.
[c] Air concentration based on 10-minute exposure duration.

Figure 6-1. 24-hour Acrolein Isoconcentration Map



6.2.3 Cumulative Case – Maximum Ground Level Concentration

Predicted 1-hour, 24-hour or annual air concentrations for all COPC under the Cumulative Case scenario do not exceed the recommend benchmark of 1.0, except for 24-hour acrolein (Table 6-7) at the maximum ground level concentration. For COPC at each of the 43 individual receptor locations, no health risks were predicted for the Cumulative Case (**Appendix B**).

In the cumulative case, 24-hour acrolein is equivalent to the CR predicted for the Project Case, as no Baseline Case CR was predicted for acrolein. Therefore, as discussed above in Section 6.2.2, acrolein is not predicted to result in adverse health risk to human receptors at the max GLC or at any of the individual receptor locations.

Table 6-7. Concentration Ratios at Maximum Ground Level Concentration – Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NO_2 [a]	3.69E-01	3.22E-01	8.54E-02
$PM_{2.5}$ [a]	--	7.42E-01	--
PM_{10} [b]	--	9.17E-01	6.78E-01
TPM [a]	--	3.31E-01	9.48E-02
VOCs			
Acetaldehyde [a]	1.09E-01	5.62E-03	3.85E-04
Acrolein [a]	6.00E-01	**2.08E+00**	7.50E-02
Benzene	3.19E-01	1.20E-01	2.12E-02
Formaldehyde	9.74E-01	2.48E-01	1.39E-01
HCN [c]	1.37E-01	8.01E-02	5.77E-02
MDI [c]	7.98E-01	2.86E-01	2.56E-01
Methanol [a]	2.45E-02	4.67E-03	5.63E-04
Phenol [d]	9.05E-01	2.47E-01	7.40E-02
Propionaldehyde [a]	--	--	3.75E-03

Notes: "--" no CR calculated
[a] CRs listed are equivalent to respective Project Cases; no Baseline Case CRs calculated
[b] Annual CR is equivalent to Annual Baseline Case; No Annual Project Case CR calculated
[c] 24-hour CR is equivalent to 24-hour Baseline Case; No 24-hour Project Case CR calculated
[d] 24-hour and Annual CR are equivalent to respective Baseline Cases; No 24-hour and Annual Project Case CRs calculated

6.3 Results - Carcinogenic Risk Estimates

This section addresses the risks of adverse health effects from long-term (chronic) inhalation exposure to carcinogenic COPC under the Baseline Case and Project Case. Carcinogenic health risks, expressed as ILCRs, assume that individuals would be continuously exposed to the predicted annual average air concentration over the course of a lifetime.

Results of the carcinogenic inhalation risk characterization are presented in **Appendix B** by scenario and receptor, for all COPC. The maximum predicted ILCRs/LCRs are presented in Table 6-8.

Table 6-8. LCR and ILCR Risk Estimates – Baseline and Project Case

COPC	Baseline Case LCR	Project Case ILCR
Criteria Air Contaminants		
NO_X	--	--
$PM_{2.5}$	--	--
PM_{10}	--	--
TPM	--	--
VOCs		
Acetaldehyde [a]	NC	8.70E-08
Acrolein	--	--
Benzene	1.98E-06	1.19E-07
Formaldehyde	2.64E-11	2.52E-10
HCN	--	--
MDI	--	--
Methanol	--	--
Phenol	--	--
Propionaldehyde	--	--

Notes: "--" no ILCR/LCR calculated, not a carcinogenic COPC
NC – Not calculated, no baseline annual acetaldehyde concentration measured
[a] Cumulative LCR listed is equivalent to Project Case; No Background Case LCR calculated

Results of the assessment indicate that none of the ILCR values predicted for the carcinogenic COPC under the Project Case scenario exceeded the recommend regulatory acceptable cancer risk level of 1-in-100,000 (i.e., 1E-05). LCR values were calculated for the other cases for information purposes; however, as previously discussed, there are currently no regulatory benchmarks for LCR values. Note, an LCR for the Cumulative Case was not calculated, because ILCR values are not cumulative.

7 UNCERTAINTY ANALYSIS

In the risk assessment process, a number of conservative assumptions are required to quantitatively evaluate the risks to human health from exposure to the Project. These assumptions inherently add an element of uncertainty to the risk assessment. As a result, risk assessments tend to overstate the actual level of risk. Although many factors are considered in preparation of a risk analysis, analysis results are generally only sensitive to very few of these factors. The uncertainty analysis is included to demonstrate that assumptions used are conservative, or that the analysis result is not sensitive to the key assumptions. The following sections outline the assumptions/uncertainties used in this risk assessment.

7.1 Uncertainties in Exposure Assessment

7.1.1 Estimation of Air Concentrations

Conservative assumptions were used in the development of the air model. Maximum predicted acute (i.e., 1-h and 24-h) and chronic (i.e., annual) ground-level air concentrations at each receptor location were used to evaluate all acute inhalation risk estimates.

In reality, the frequency with which the maximum concentration would occur at any one receptor location is relatively low for most COPC. To be exposed, a receptor would have to be present at the same location at the same time the maximum predicated air concentration is observed; therefore the likelihood of this occurring is very small. Nevertheless, to err on the side of caution the inhalation assessment was carried out at maximum air concentrations.

7.1.2 Background Air Concentrations and Detection Limits

The HHRA conservatively used the method detection limits for those COPC whose concentrations were not detected in air. The detection limit represents the lowest laboratory measureable concentration of a chemical in a media sample. It is likely that actual concentrations are lower than the assessed detection limit or not present at all. As a result the use of detection limits is assumed to conservatively overestimate exposure.

7.2 Uncertainties in Toxicological Information

There is limited toxicological information on the effects associated with low-level chemical exposures to humans. Most information available is based on epidemiological studies of occupationally exposed workers. These are usually based on an 8hr/day or 40hr/week, higher level exposure regimes and do not apply well to low-level, chronic exposures. Additionally

reference doses and cancer potency estimates for many chemicals are based on laboratory dose-response estimates in animals. The use of animals requires certain assumptions be made, which introduces further uncertainty. Assumptions include:

- The toxicological effect in animals also occurs in humans;
- The short-term exposures used in animal studies can be extrapolated to chronic or long term human exposures;
- The toxicokinetic and toxicodynamic processes that occur in animals also occur in humans;
- The uptake of the compound from the test vehicle (the medium within which the test compound is delivered to the animals, e.g. water, food) will be representative of the uptake of the chemical from real-world environmental media (e.g. soil, water, air); and
- The assumption that extrapolation from high-dose laboratory studies and low-dose environmental studies accurately reflects the shape of the dose response curve at the low dose-response range.

To account for these and other related uncertainties, regulatory agencies such as Health Canada and the US EPA adopt conservative assumptions to account for uncertainties. The use of Uncertainty Factors accounts for uncertainties by lowering the reference dose of the concentration ratio calculation well below the level where no effects were seen in animals. Uncertainty Factors are applied by factors of 10 to account for uncertainties such as, interspecies differences (e.g. physiology), individual variation (e.g. unusually sensitive individuals), limitations in toxicological information, and extrapolation from acute exposures to chronic exposures. Depending on the degree of uncertainty, typical factors will range from 100 to 10,000, with some being lower than 10 (in the case where solid human data is available). The incorporation of these factors results in risk estimates that are extremely conservative and ensure that limited exposures above reference does concentrations will not result in adverse human health effects.

7.2.1 Sensitive Populations

A susceptible or sensitive population will exhibit a different or enhanced response to a COPC than will most persons exposed to the same level of the contaminant in the environment. Reasons may be genetic makeup, age (e.g. children or seniors), health and nutritional status, behaviour and exposure to other toxic substances (e.g. cigarette smoke). The non-carcinogenic TRVs used in this risk assessment are estimates of a continuous exposure to the human population, including sensitive subgroups that are to be without appreciable risk of adverse non-cancer effects during a lifetime. Toxicity doses and cancer slope factors used in the assessment have accounted for sensitive populations by applying uncertainty factors (see Section 7.2 above).

7.3 Uncertainties in Risk Characterization

7.3.1 Chemical interactions

The risk assessment of contaminants is complicated by the reality that most toxicological studies are on single chemicals but exposures are rarely to single chemicals. Exposures generally involve more than one contaminant. Although chemicals in the environment are most often present in some sort of mixture, guidelines for the protection of human health are almost exclusively based on exposure to single chemicals. The lack of approaches to evaluate biological effects of chemical mixtures and the use of single-compound toxicity data makes their use highly speculative.

Chemicals in a mixture may interact in four general ways to elicit a response:

- Non-interacting – chemicals have no effect in combination with each other; the toxicity of the mixture is the same as the toxicity of the most toxic component of the mixture
- Additive – chemicals have similar targets and modes of action but do not interact, the hazard for exposure to the mixture is simply the sum of hazards for the individual chemicals
- Synergistic – there is a positive interaction among the chemicals such that the response is greater than would be expected if the chemicals acted independently
- Antagonistic – there is a negative interaction among chemicals such that the response is less than would be expected if the chemicals acted independently

For human health exposures, quantitative information on interactions among chemicals in mixtures is rarely available. In the absence of information on the mixture, risk is sometimes based on the addition of the risks of the individual mixture components, unless there is information indicating that the interaction is other than additive in nature. However, this practice is only appropriate if the COPC in question have similar modes of action and similar toxic endpoints in the human body. There is uncertainty associated with any of the above approaches in that risk may be overestimated or underestimated.

In this risk assessment, the COPC-specific CRs, ILCRs and LCRs for a receptor have been characterized for single COPC only.

8 CONCLUSIONS

The purpose of this HHRA was to evaluate the potential risk to human receptors exposed to Project-related COPC under three assessment scenarios. In all cases, except for 24-hour acrolein at the maximum ground level concentration, risk estimates for all receptors exposed to COPC were below the acceptable inhalation benchmark of 1.0 and carcinogenic benchmark of 1-in-100,000.

The concentration ratio predicted for the maximum 24-hour concentrations of acrolein is higher than 1 for the Project Case; however, the lowest concentration at which mild eye irritation has been observed in humans (i.e., 140 µg/m^3) is more than 100-times higher than the maximum modeled 24-hour air concentration of acrolein (0.83 µg/m^3). Therefore, it is unlikely that the concentrations of acrolein would result in a appreciative health risk. Furthermore, for there to be a risk at the max GLC, a receptor would have to be present at the same location at the same time the maximum predicated air concentration is observed; therefore the likelihood of this occurring is very small.

Overall, no adverse health risks are predicted for human receptors in the surrounding area from the Project.

9 CLOSURE

This report has been prepared for the sole benefit of the Tetres Consultants and Louisiana Pacific and may not be used by any other person or entity without the expressed written consent of Stantec Consulting Ltd. (Stantec) and Louisiana Pacific.

Any use, which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions are based on conditions encountered by Stantec at the time the work was performed based on available data.

This screening was undertaken exclusively for the purpose outlined herein and was limited to those chemicals, exposure pathways, receptors, and related uncertainties specifically referenced in this report. This work was specific to conditions and land use considerations described herein. The report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations.

This document describes only the applicable risks associated with the identified environmental hazards, and is not intended to imply a risk-free site. Should any conditions at the site be observed or discovered that differ from those at the sample locations, or should the land use surrounding the identified hazards change significantly, we request that we be notified immediately to reassess the conclusions provided herein.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this quantitative risk assessment, we request that we be notified immediately to reassess the conclusions provided herein.

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APPENDIX A

Inhalation Exposure Point Concentrations

Table A.1. Exposure Point Concentrations - Baseline - Baseline Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NO_X	--	--	--
$PM_{2.5}$	--	--	--
PM_{10}	1.36E+01	1.36E+01	1.36E+01
TPM	--	--	--
VOCs			
Acetaldehyde	--	--	--
Acrolein	--	--	--
Benzene	7.50E+00	3.00E+00	6.00E-01
Formaldehyde	1.65E+00	6.60E-01	1.32E-01
HCN	1.60E+00	6.41E-01	1.28E-01
MDI	5.00E-01	2.00E-01	4.00E-02
Methanol	--	--	--
Phenol	1.85E+01	7.40E+00	1.48E+00
Propionaldehyde			

Receptor #	
Receptor Name	Baseline
Case	Baseline

Table A.2. Exposure Point Concentrations - MaxGLC - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NO_X	1.48E+02	6.45E+01	8.54E+00
$PM_{2.5}$	--	2.23E+01	--
PM_{10}	--	3.23E+01	--
TPM	--	3.97E+01	6.64E+00
VOCs			
Acetaldehyde	9.77E+00	2.81E+00	1.50E-01
Acrolein	2.70E+00	8.30E-01	3.00E-02
Benzene	2.06E+00	5.92E-01	3.60E-02
Formaldehyde	5.68E+01	1.54E+01	1.26E+00
HCN	3.87E+00	--	4.50E-02
MDI	1.90E+00	--	8.80E-02
Methanol	6.36E+01	1.87E+01	2.25E+00
Phenol	3.85E+01	--	--
Propionaldehyde	2.41E+00	7.40E-01	3.00E-02

Receptor #	
Receptor Name	MaxGLC
Case	Project

Table A.3. Exposure Point Concentrations - MaxGLC - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NO_X	1.48E+02	6.45E+01	8.54E+00
$PM_{2.5}$	--	2.23E+01	--
PM_{10}	1.36E+01	4.59E+01	1.36E+01
TPM	--	3.97E+01	6.64E+00
VOCs			
Acetaldehyde	9.77E+00	2.81E+00	1.50E-01
Acrolein	2.70E+00	8.30E-01	3.00E-02
Benzene	9.56E+00	3.59E+00	6.36E-01
Formaldehyde	5.85E+01	1.61E+01	1.39E+00
HCN	5.48E+00	6.41E-01	1.73E-01
MDI	2.40E+00	2.00E-01	1.28E-01
Methanol	6.36E+01	1.87E+01	2.25E+00
Phenol	5.70E+01	7.40E+00	1.48E+00
Propionaldehyde	2.41E+00	7.40E-01	3.00E-02

Receptor #	
Receptor Name	MaxGLC
Case	Cumulative

Table A.4. Exposure Point Concentrations - School - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.88E+01	5.52E+00	3.40E-01
PM2.5	9.95E+00	2.99E+00	1.84E-01
PM10	1.54E+01	3.78E+00	2.48E-01
TPM	1.89E+01	4.55E+00	3.00E-01
VOCs			
Acetaldehyde	1.32E+00	3.93E-01	2.14E-02
Acrolein	3.85E-01	1.13E-01	5.82E-03
Benzene	2.77E-01	8.27E-02	4.57E-03
Formaldehyde	7.24E+00	2.18E+00	1.28E-01
HCN	5.52E-01	1.62E-01	8.36E-03
MDI	3.17E-01	4.70E-02	3.53E-03
Methanol	9.41E+00	2.11E+00	1.40E-01
Phenol	6.33E+00	9.63E-01	7.18E-02
Propionaldehyde	3.44E-01	1.01E-01	5.20E-03

Receptor #	2
Receptor Name	School
Case	Project

Table A.5. Exposure Point Concentrations - Minitonas Town Office - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.41E+01	4.50E+00	3.04E-01
PM2.5	1.32E+01	2.33E+00	1.64E-01
PM10	1.77E+01	3.01E+00	2.23E-01
TPM	2.17E+01	3.65E+00	2.70E-01
VOCs			
Acetaldehyde	1.76E+00	3.06E-01	1.93E-02
Acrolein	5.25E-01	8.88E-02	5.26E-03
Benzene	3.68E-01	6.47E-02	4.11E-03
Formaldehyde	9.43E+00	1.68E+00	1.15E-01
HCN	7.52E-01	1.27E-01	7.55E-03
MDI	2.71E-01	3.30E-02	3.12E-03
Methanol	9.76E+00	1.61E+00	1.24E-01
Phenol	6.17E+00	7.53E-01	6.43E-02
Propionaldehyde	4.69E-01	7.93E-02	4.70E-03

Receptor #	4
Receptor Name	Minitonas Town Office
Case	Project

Table A.6. Exposure Point Concentrations - Senior's Manor - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.96E+01	5.00E+00	3.26E-01
PM2.5	1.12E+01	2.77E+00	1.75E-01
PM10	1.73E+01	3.53E+00	2.40E-01
TPM	2.13E+01	4.22E+00	2.92E-01
VOCs			
Acetaldehyde	1.06E+00	3.49E-01	2.02E-02
Acrolein	2.94E-01	9.81E-02	5.44E-03
Benzene	2.27E-01	7.35E-02	4.31E-03
Formaldehyde	7.11E+00	1.99E+00	1.21E-01
HCN	4.22E-01	1.41E-01	7.81E-03
MDI	3.27E-01	4.68E-02	3.44E-03
Methanol	1.00E+01	2.03E+00	1.34E-01
Phenol	7.46E+00	9.05E-01	7.20E-02
Propionaldehyde	2.63E-01	8.76E-02	4.86E-03

Receptor #	8
Receptor Name	Senior's Manor
Case	Project

Table A.7. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.43E+01	9.10E+00	2.93E-01
PM2.5	2.12E+01	5.53E+00	1.77E-01
PM10	2.64E+01	7.16E+00	2.70E-01
TPM	3.13E+01	8.62E+00	3.45E-01
VOCs			
Acetaldehyde	2.76E+00	6.96E-01	2.17E-02
Acrolein	7.68E-01	1.93E-01	5.92E-03
Benzene	5.73E-01	1.46E-01	4.55E-03
Formaldehyde	1.59E+01	4.05E+00	1.30E-01
HCN	1.10E+00	2.77E-01	8.50E-03
MDI	3.93E-01	1.03E-01	3.44E-03
Methanol	1.66E+01	4.27E+00	1.38E-01
Phenol	1.52E+01	2.06E+00	1.10E-01
Propionaldehyde	6.86E-01	1.72E-01	5.29E-03

Receptor #	9
Receptor Name	Private Residence
Case	Project

Table A.8. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.85E+01	1.35E+01	6.34E-01
PM2.5	2.21E+01	6.90E+00	3.45E-01
PM10	2.75E+01	9.17E+00	5.44E-01
TPM	3.32E+01	1.10E+01	6.90E-01
VOCs			
Acetaldehyde	3.11E+00	8.11E-01	3.58E-02
Acrolein	9.18E-01	2.23E-01	9.06E-03
Benzene	6.49E-01	1.73E-01	7.73E-03
Formaldehyde	1.68E+01	4.75E+00	2.32E-01
HCN	1.32E+00	3.21E-01	1.30E-02
MDI	4.95E-01	1.36E-01	7.95E-03
Methanol	1.63E+01	5.06E+00	2.78E-01
Phenol	1.59E+01	2.58E+00	2.09E-01
Propionaldehyde	8.20E-01	1.99E-01	8.09E-03

Receptor #	10
Receptor Name	Private Residence
Case	Project

Table A.9. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	6.22E+01	8.41E+00	7.16E-01
PM2.5	2.48E+01	4.65E+00	3.86E-01
PM10	4.05E+01	6.69E+00	5.79E-01
TPM	4.96E+01	7.76E+00	7.09E-01
VOCs			
Acetaldehyde	2.81E+00	3.54E-01	3.52E-02
Acrolein	8.26E-01	8.89E-02	8.06E-03
Benzene	5.87E-01	7.72E-02	7.72E-03
Formaldehyde	1.54E+01	2.70E+00	2.46E-01
HCN	1.18E+00	1.28E-01	1.16E-02
MDI	9.64E-01	1.68E-01	1.03E-02
Methanol	2.44E+01	4.57E+00	3.29E-01
Phenol	1.65E+01	2.29E+00	2.08E-01
Propionaldehyde	7.37E-01	7.94E-02	7.20E-03

Receptor #	11
Receptor Name	Private Residence
Case	Project

Table A.10. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	5.02E+01	7.33E+00	6.13E-01
PM2.5	2.55E+01	3.65E+00	3.28E-01
PM10	3.86E+01	5.15E+00	4.73E-01
TPM	4.60E+01	6.20E+00	5.75E-01
VOCs			
Acetaldehyde	2.86E+00	3.53E-01	3.24E-02
Acrolein	8.43E-01	8.75E-02	7.92E-03
Benzene	6.00E-01	7.76E-02	7.04E-03
Formaldehyde	1.54E+01	2.32E+00	2.14E-01
HCN	1.21E+00	1.26E-01	1.14E-02
MDI	8.46E-01	1.02E-01	7.97E-03
Methanol	2.35E+01	2.90E+00	2.69E-01
Phenol	1.66E+01	1.90E+00	1.59E-01
Propionaldehyde	7.52E-01	7.82E-02	7.07E-03

Receptor #	12
Receptor Name	Private Residence
Case	Project

Table A.11. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.31E+01	9.85E+00	5.10E-01
PM2.5	1.86E+01	4.80E+00	2.71E-01
PM10	2.93E+01	6.54E+00	3.80E-01
TPM	3.58E+01	7.84E+00	4.61E-01
VOCs			
Acetaldehyde	1.59E+00	5.13E-01	2.82E-02
Acrolein	4.50E-01	1.35E-01	7.16E-03
Benzene	3.34E-01	1.12E-01	6.09E-03
Formaldehyde	1.08E+01	3.15E+00	1.80E-01
HCN	6.45E-01	1.95E-01	1.03E-02
MDI	6.56E-01	9.63E-02	6.10E-03
Methanol	1.79E+01	3.60E+00	2.16E-01
Phenol	1.34E+01	1.86E+00	1.23E-01
Propionaldehyde	4.02E-01	1.21E-01	6.40E-03

Receptor #	13
Receptor Name	Private Residence
Case	Project

Table A.12. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.84E+01	9.90E+00	5.04E-01
PM2.5	1.85E+01	4.66E+00	2.39E-01
PM10	3.77E+01	6.98E+00	3.71E-01
TPM	5.38E+01	8.53E+00	4.61E-01
VOCs			
Acetaldehyde	1.95E+00	4.36E-01	2.18E-02
Acrolein	5.24E-01	1.06E-01	5.22E-03
Benzene	4.16E-01	9.68E-02	4.86E-03
Formaldehyde	1.20E+01	2.88E+00	1.48E-01
HCN	7.53E-01	1.53E-01	7.53E-03
MDI	5.18E-01	1.17E-01	5.74E-03
Methanol	1.49E+01	3.71E+00	1.90E-01
Phenol	2.43E+01	2.36E+00	1.34E-01
Propionaldehyde	4.68E-01	9.50E-02	4.66E-03

Receptor #	14
Receptor Name	Private Residence
Case	Project

Table A.13. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.19E+01	1.19E+01	5.83E-01
PM2.5	2.17E+01	5.92E+00	3.05E-01
PM10	2.69E+01	8.20E+00	4.67E-01
TPM	3.21E+01	1.01E+01	5.90E-01
VOCs			
Acetaldehyde	2.91E+00	7.07E-01	3.35E-02
Acrolein	8.33E-01	1.97E-01	8.86E-03
Benzene	6.07E-01	1.51E-01	7.21E-03
Formaldehyde	1.63E+01	4.08E+00	2.07E-01
HCN	1.19E+00	2.83E-01	1.27E-02
MDI	4.84E-01	1.09E-01	6.25E-03
Methanol	1.70E+01	4.23E+00	2.34E-01
Phenol	1.32E+01	2.32E+00	1.67E-01
Propionaldehyde	7.44E-01	1.76E-01	7.91E-03

Receptor #	15
Receptor Name	Private Residence
Case	Project

Table A.14. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.41E+01	9.34E+00	5.37E-01
PM2.5	1.35E+01	4.93E+00	2.93E-01
PM10	1.74E+01	6.49E+00	4.10E-01
TPM	2.20E+01	7.81E+00	4.99E-01
VOCs			
Acetaldehyde	1.80E+00	5.96E-01	3.21E-02
Acrolein	5.18E-01	1.66E-01	8.40E-03
Benzene	3.77E-01	1.27E-01	6.89E-03
Formaldehyde	9.98E+00	3.46E+00	2.00E-01
HCN	7.43E-01	2.38E-01	1.21E-02
MDI	4.19E-01	8.64E-02	6.28E-03
Methanol	1.10E+01	3.62E+00	2.31E-01
Phenol	9.15E+00	1.76E+00	1.29E-01
Propionaldehyde	4.63E-01	1.48E-01	7.50E-03

Receptor #	16
Receptor Name	Private Residence
Case	Project

Table A.15. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.26E+01	6.61E+00	4.40E-01
PM2.5	1.33E+01	3.48E+00	2.44E-01
PM10	1.90E+01	4.45E+00	3.37E-01
TPM	2.38E+01	5.37E+00	4.13E-01
VOCs			
Acetaldehyde	1.74E+00	4.55E-01	2.92E-02
Acrolein	5.12E-01	1.32E-01	8.01E-03
Benzene	3.64E-01	9.61E-02	6.20E-03
Formaldehyde	9.93E+00	2.52E+00	1.73E-01
HCN	7.34E-01	1.89E-01	1.15E-02
MDI	3.25E-01	5.47E-02	4.57E-03
Methanol	1.03E+01	2.42E+00	1.85E-01
Phenol	1.08E+01	1.12E+00	1.07E-01
Propionaldehyde	4.57E-01	1.18E-01	7.15E-03

Receptor #	17
Receptor Name	Private Residence
Case	Project

Table A.16. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.95E+01	4.28E+00	3.61E-01
PM2.5	1.18E+01	2.44E+00	2.02E-01
PM10	1.67E+01	3.09E+00	2.75E-01
TPM	2.09E+01	3.73E+00	3.37E-01
VOCs			
Acetaldehyde	1.52E+00	3.03E-01	2.45E-02
Acrolein	4.32E-01	8.41E-02	6.75E-03
Benzene	3.16E-01	6.36E-02	5.19E-03
Formaldehyde	8.84E+00	1.77E+00	1.44E-01
HCN	6.19E-01	1.21E-01	9.69E-03
MDI	3.32E-01	4.62E-02	3.75E-03
Methanol	9.25E+00	1.89E+00	1.53E-01
Phenol	7.02E+00	8.60E-01	8.47E-02
Propionaldehyde	3.86E-01	7.51E-02	6.03E-03

Receptor #	18
Receptor Name	Private Residence
Case	Project

Table A.17. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.42E+01	3.10E+00	1.12E-01
PM2.5	8.25E+00	1.75E+00	6.38E-02
PM10	1.20E+01	2.21E+00	8.92E-02
TPM	1.49E+01	2.65E+00	1.11E-01
VOCs			
Acetaldehyde	1.09E+00	2.31E-01	7.94E-03
Acrolein	3.16E-01	6.64E-02	2.21E-03
Benzene	2.26E-01	4.86E-02	1.67E-03
Formaldehyde	6.09E+00	1.29E+00	4.62E-02
HCN	4.53E-01	9.52E-02	3.17E-03
MDI	1.82E-01	2.72E-02	1.14E-03
Methanol	6.59E+00	1.26E+00	4.80E-02
Phenol	4.16E+00	5.49E-01	2.86E-02
Propionaldehyde	2.82E-01	5.93E-02	1.97E-03

Receptor #	19
Receptor Name	Private Residence
Case	Project

Table A.18. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.48E+01	1.36E+00	7.55E-02
PM2.5	8.26E+00	7.96E-01	4.21E-02
PM10	1.10E+01	1.07E+00	6.30E-02
TPM	1.41E+01	1.34E+00	7.80E-02
VOCs			
Acetaldehyde	1.15E+00	9.58E-02	4.21E-03
Acrolein	3.37E-01	2.76E-02	1.03E-03
Benzene	2.39E-01	2.02E-02	9.10E-04
Formaldehyde	6.19E+00	5.51E-01	2.80E-02
HCN	4.82E-01	3.96E-02	1.48E-03
MDI	3.88E-01	2.24E-02	1.04E-03
Methanol	9.71E+00	7.28E-01	3.51E-02
Phenol	7.37E+00	4.28E-01	2.42E-02
Propionaldehyde	3.01E-01	2.46E-02	9.20E-04

Receptor #	20
Receptor Name	Private Residence
Case	Project

Table A.19. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.52E+01	4.61E+00	5.27E-01
PM2.5	1.40E+01	2.57E+00	2.89E-01
PM10	1.96E+01	3.41E+00	3.95E-01
TPM	2.40E+01	4.08E+00	4.76E-01
VOCs			
Acetaldehyde	1.49E+00	2.92E-01	3.17E-02
Acrolein	4.31E-01	7.77E-02	8.25E-03
Benzene	3.13E-01	6.23E-02	6.78E-03
Formaldehyde	9.33E+00	1.78E+00	1.97E-01
HCN	6.18E-01	1.12E-01	1.19E-02
MDI	4.22E-01	5.32E-02	6.24E-03
Methanol	1.17E+01	2.01E+00	2.29E-01
Phenol	7.99E+00	9.97E-01	1.21E-01
Propionaldehyde	3.85E-01	6.94E-02	7.37E-03

Receptor #	21
Receptor Name	Private Residence
Case	Project

Table A.20. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.27E+01	6.59E+00	4.66E-01
PM2.5	2.13E+01	3.17E+00	2.47E-01
PM10	3.21E+01	4.23E+00	3.37E-01
TPM	3.96E+01	5.09E+00	4.06E-01
VOCs			
Acetaldehyde	1.87E+00	3.72E-01	2.71E-02
Acrolein	4.85E-01	1.04E-01	7.14E-03
Benzene	4.05E-01	8.01E-02	5.83E-03
Formaldehyde	1.30E+01	2.15E+00	1.67E-01
HCN	6.97E-01	1.49E-01	1.03E-02
MDI	6.26E-01	5.57E-02	5.12E-03
Methanol	1.84E+01	2.27E+00	1.91E-01
Phenol	1.49E+01	1.12E+00	1.01E-01
Propionaldehyde	4.33E-01	9.27E-02	6.38E-03

Receptor #	22
Receptor Name	Private Residence
Case	Project

Table A.21. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.38E+01	4.85E+00	6.41E-01
PM2.5	1.32E+01	2.75E+00	3.55E-01
PM10	1.86E+01	3.76E+00	4.99E-01
TPM	2.28E+01	4.51E+00	6.04E-01
VOCs			
Acetaldehyde	1.73E+00	2.88E-01	3.65E-02
Acrolein	4.95E-01	7.54E-02	9.12E-03
Benzene	3.64E-01	6.19E-02	7.87E-03
Formaldehyde	9.68E+00	1.85E+00	2.37E-01
HCN	7.10E-01	1.08E-01	1.31E-02
MDI	4.66E-01	6.48E-02	8.40E-03
Methanol	1.24E+01	2.26E+00	2.90E-01
Phenol	9.44E+00	1.21E+00	1.64E-01
Propionaldehyde	4.42E-01	6.73E-02	8.15E-03

Receptor #	23
Receptor Name	Private Residence
Case	Project

Table A.22. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.24E+01	7.06E+00	9.63E-01
PM2.5	1.40E+01	3.41E+00	5.08E-01
PM10	2.22E+01	4.42E+00	7.07E-01
TPM	2.72E+01	5.34E+00	8.57E-01
VOCs			
Acetaldehyde	1.71E+00	4.30E-01	5.43E-02
Acrolein	4.85E-01	1.24E-01	1.41E-02
Benzene	3.62E-01	9.18E-02	1.17E-02
Formaldehyde	9.71E+00	2.38E+00	3.40E-01
HCN	6.95E-01	1.78E-01	2.03E-02
MDI	3.97E-01	6.77E-02	1.10E-02
Methanol	1.14E+01	2.30E+00	3.98E-01
Phenol	8.52E+00	1.25E+00	2.20E-01
Propionaldehyde	4.33E-01	1.11E-01	1.26E-02

Receptor #	24
Receptor Name	Private Residence
Case	Project

Table A.23. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.20E+01	6.53E+00	7.60E-01
PM2.5	1.80E+01	3.56E+00	4.46E-01
PM10	2.62E+01	5.47E+00	6.78E-01
TPM	3.00E+01	6.61E+00	8.29E-01
VOCs			
Acetaldehyde	1.80E+00	4.10E-01	3.81E-02
Acrolein	5.08E-01	1.16E-01	8.01E-03
Benzene	3.80E-01	8.73E-02	8.34E-03
Formaldehyde	1.11E+01	2.33E+00	2.84E-01
HCN	7.28E-01	1.66E-01	1.16E-02
MDI	8.51E-01	1.38E-01	1.33E-02
Methanol	2.16E+01	3.77E+00	4.04E-01
Phenol	1.37E+01	2.47E+00	2.62E-01
Propionaldehyde	4.53E-01	1.03E-01	7.15E-03

Receptor #	25
Receptor Name	Private Residence
Case	Project

Table A.24. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.99E+01	1.06E+01	5.35E-01
PM2.5	2.65E+01	5.53E+00	2.82E-01
PM10	3.38E+01	7.17E+00	3.78E-01
TPM	4.06E+01	8.60E+00	4.56E-01
VOCs			
Acetaldehyde	3.38E+00	6.76E-01	3.27E-02
Acrolein	9.60E-01	1.90E-01	8.90E-03
Benzene	7.13E-01	1.44E-01	6.99E-03
Formaldehyde	1.91E+01	3.87E+00	1.94E-01
HCN	1.38E+00	2.72E-01	1.28E-02
MDI	5.52E-01	9.30E-02	5.32E-03
Methanol	1.95E+01	4.00E+00	2.11E-01
Phenol	9.80E+00	1.79E+00	1.04E-01
Propionaldehyde	8.57E-01	1.69E-01	7.95E-03

Receptor #	26
Receptor Name	Private Residence
Case	Project

Table A.25. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.99E+01	6.97E+00	4.20E-01
PM2.5	1.63E+01	3.65E+00	2.27E-01
PM10	2.17E+01	4.76E+00	3.13E-01
TPM	2.67E+01	5.76E+00	3.81E-01
VOCs			
Acetaldehyde	2.31E+00	4.66E-01	2.61E-02
Acrolein	6.86E-01	1.33E-01	7.01E-03
Benzene	4.82E-01	9.86E-02	5.56E-03
Formaldehyde	1.23E+01	2.61E+00	1.57E-01
HCN	9.83E-01	1.91E-01	1.01E-02
MDI	3.43E-01	5.61E-02	4.48E-03
Methanol	1.26E+01	2.57E+00	1.74E-01
Phenol	8.18E+00	1.24E+00	9.43E-02
Propionaldehyde	6.12E-01	1.19E-01	6.26E-03

Receptor #	27
Receptor Name	Private Residence
Case	Project

Table A.26. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.96E+01	6.45E+00	3.88E-01
PM2.5	1.61E+01	3.39E+00	2.10E-01
PM10	2.05E+01	4.41E+00	2.88E-01
TPM	2.52E+01	5.34E+00	3.51E-01
VOCs			
Acetaldehyde	2.27E+00	4.35E-01	2.43E-02
Acrolein	6.75E-01	1.24E-01	6.55E-03
Benzene	4.76E-01	9.20E-02	5.17E-03
Formaldehyde	1.22E+01	2.43E+00	1.45E-01
HCN	9.67E-01	1.78E-01	9.41E-03
MDI	3.14E-01	5.21E-02	4.08E-03
Methanol	1.18E+01	2.40E+00	1.60E-01
Phenol	7.76E+00	1.14E+00	8.61E-02
Propionaldehyde	6.03E-01	1.11E-01	5.85E-03

Receptor #	29
Receptor Name	Private Residence
Case	Project

Table A.27. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.89E+01	3.55E+00	1.54E-01
PM2.5	1.27E+01	1.68E+00	7.83E-02
PM10	2.18E+01	2.28E+00	1.31E-01
TPM	2.67E+01	2.75E+00	1.65E-01
VOCs			
Acetaldehyde	1.08E+00	1.87E-01	5.90E-03
Acrolein	3.11E-01	5.09E-02	1.15E-03
Benzene	2.27E-01	4.06E-02	1.34E-03
Formaldehyde	6.09E+00	1.11E+00	4.67E-02
HCN	4.46E-01	7.31E-02	1.66E-03
MDI	4.77E-01	3.56E-02	2.36E-03
Methanol	1.20E+01	1.21E+00	6.91E-02
Phenol	9.01E+00	6.45E-01	5.61E-02
Propionaldehyde	2.78E-01	4.54E-02	1.02E-03

Receptor #	31
Receptor Name	Private Residence
Case	Project

Table A.28. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.39E+01	2.99E+00	1.07E-01
PM2.5	1.29E+01	1.43E+00	5.82E-02
PM10	1.60E+01	1.96E+00	9.95E-02
TPM	1.95E+01	2.35E+00	1.27E-01
VOCs			
Acetaldehyde	1.72E+00	1.49E-01	4.68E-03
Acrolein	4.99E-01	3.90E-02	9.50E-04
Benzene	3.62E-01	3.26E-02	1.04E-03
Formaldehyde	9.49E+00	9.21E-01	3.61E-02
HCN	7.16E-01	5.61E-02	1.38E-03
MDI	3.87E-01	2.89E-02	1.74E-03
Methanol	9.69E+00	1.07E+00	5.19E-02
Phenol	8.73E+00	5.83E-01	4.53E-02
Propionaldehyde	4.46E-01	3.48E-02	8.50E-04

Receptor #	32
Receptor Name	Private Residence
Case	Project

Table A.29. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.92E+01	3.37E+00	2.33E-01
PM2.5	1.30E+01	1.78E+00	1.13E-01
PM10	1.89E+01	2.26E+00	1.78E-01
TPM	2.30E+01	2.71E+00	2.24E-01
VOCs			
Acetaldehyde	1.75E+00	2.27E-01	1.09E-02
Acrolein	5.15E-01	6.48E-02	2.69E-03
Benzene	3.65E-01	4.80E-02	2.40E-03
Formaldehyde	9.42E+00	1.27E+00	7.20E-02
HCN	7.38E-01	9.30E-02	3.87E-03
MDI	3.35E-01	3.22E-02	2.61E-03
Methanol	1.00E+01	1.26E+00	8.89E-02
Phenol	8.73E+00	6.78E-01	6.75E-02
Propionaldehyde	4.60E-01	5.79E-02	2.40E-03

Receptor #	33
Receptor Name	Private Residence
Case	Project

Table A.30. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.07E+01	3.72E+00	3.00E-01
PM2.5	1.28E+01	1.91E+00	1.43E-01
PM10	1.77E+01	2.53E+00	2.15E-01
TPM	2.14E+01	3.05E+00	2.67E-01
VOCs			
Acetaldehyde	1.44E+00	2.32E-01	1.43E-02
Acrolein	4.22E-01	6.47E-02	3.63E-03
Benzene	3.01E-01	4.94E-02	3.13E-03
Formaldehyde	8.23E+00	1.33E+00	9.10E-02
HCN	6.04E-01	9.29E-02	5.23E-03
MDI	3.09E-01	3.24E-02	3.06E-03
Methanol	9.60E+00	1.38E+00	1.09E-01
Phenol	8.41E+00	6.69E-01	7.38E-02
Propionaldehyde	3.76E-01	5.78E-02	3.24E-03

Receptor #	34
Receptor Name	Private Residence
Case	Project

Table A.31. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.29E+01	1.99E+00	1.48E-01
PM2.5	1.21E+01	1.06E+00	7.48E-02
PM10	1.54E+01	1.33E+00	1.13E-01
TPM	1.85E+01	1.60E+00	1.40E-01
VOCs			
Acetaldehyde	1.56E+00	1.39E-01	7.62E-03
Acrolein	4.47E-01	4.03E-02	1.93E-03
Benzene	3.30E-01	2.94E-02	1.66E-03
Formaldehyde	8.77E+00	7.69E-01	4.89E-02
HCN	6.41E-01	5.78E-02	2.78E-03
MDI	2.27E-01	1.63E-02	1.66E-03
Methanol	8.68E+00	7.41E-01	5.86E-02
Phenol	5.66E+00	5.19E-01	3.97E-02
Propionaldehyde	3.99E-01	3.60E-02	1.73E-03

Receptor #	35
Receptor Name	Private Residence
Case	Project

Table A.32. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.46E+01	5.76E+00	4.92E-01
PM2.5	1.12E+01	3.00E+00	2.47E-01
PM10	1.49E+01	3.76E+00	3.43E-01
TPM	1.87E+01	4.52E+00	4.19E-01
VOCs			
Acetaldehyde	1.53E+00	4.09E-01	2.78E-02
Acrolein	4.42E-01	1.21E-01	7.49E-03
Benzene	3.19E-01	8.59E-02	5.98E-03
Formaldehyde	8.42E+00	2.20E+00	1.67E-01
HCN	6.34E-01	1.73E-01	1.08E-02
MDI	2.78E-01	5.75E-02	4.72E-03
Methanol	8.45E+00	2.02E+00	1.84E-01
Phenol	6.50E+00	1.08E+00	1.02E-01
Propionaldehyde	3.95E-01	1.08E-01	6.69E-03

Receptor #	36
Receptor Name	Private Residence
Case	Project

Table A.33. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.54E+01	1.16E+01	8.43E-01
PM2.5	1.44E+01	5.38E+00	4.19E-01
PM10	1.78E+01	7.42E+00	5.76E-01
TPM	2.13E+01	8.83E+00	7.00E-01
VOCs			
Acetaldehyde	1.98E+00	6.09E-01	4.73E-02
Acrolein	5.80E-01	1.74E-01	1.28E-02
Benzene	4.14E-01	1.28E-01	1.02E-02
Formaldehyde	1.08E+01	3.41E+00	2.82E-01
HCN	8.31E-01	2.50E-01	1.84E-02
MDI	2.88E-01	1.19E-01	7.84E-03
Methanol	1.01E+01	4.12E+00	3.09E-01
Phenol	7.04E+00	2.06E+00	1.66E-01
Propionaldehyde	5.18E-01	1.56E-01	1.14E-02

Receptor #	37
Receptor Name	Private Residence
Case	Project

Table A.34. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.33E+01	6.58E+00	9.90E-01
PM2.5	1.31E+01	3.65E+00	5.16E-01
PM10	1.62E+01	4.62E+00	6.94E-01
TPM	1.94E+01	5.51E+00	8.37E-01
VOCs			
Acetaldehyde	1.80E+00	4.67E-01	5.93E-02
Acrolein	5.28E-01	1.32E-01	1.61E-02
Benzene	3.77E-01	9.84E-02	1.27E-02
Formaldehyde	9.81E+00	2.64E+00	3.53E-01
HCN	7.56E-01	1.90E-01	2.31E-02
MDI	2.73E-01	6.01E-02	9.84E-03
Methanol	9.16E+00	2.67E+00	3.88E-01
Phenol	8.19E+00	1.14E+00	1.95E-01
Propionaldehyde	4.71E-01	1.18E-01	1.44E-02

Receptor #	38
Receptor Name	Private Residence
Case	Project

Table A.35. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.67E+01	8.99E+00	4.78E-01
PM2.5	1.72E+01	3.94E+00	2.29E-01
PM10	3.90E+01	5.96E+00	3.58E-01
TPM	5.33E+01	7.26E+00	4.45E-01
VOCs			
Acetaldehyde	2.04E+00	3.89E-01	2.06E-02
Acrolein	5.55E-01	1.03E-01	4.84E-03
Benzene	4.32E-01	8.41E-02	4.58E-03
Formaldehyde	1.20E+01	2.38E+00	1.41E-01
HCN	7.97E-01	1.48E-01	6.98E-03
MDI	5.34E-01	9.60E-02	5.65E-03
Methanol	1.41E+01	3.07E+00	1.84E-01
Phenol	1.91E+01	1.98E+00	1.31E-01
Propionaldehyde	4.96E-01	9.16E-02	4.32E-03

Receptor #	39
Receptor Name	Private Residence
Case	Project

Table A.36. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	5.63E+01	1.10E+01	5.17E-01
PM2.5	2.98E+01	5.93E+00	2.73E-01
PM10	4.02E+01	7.36E+00	3.60E-01
TPM	4.99E+01	8.81E+00	4.37E-01
VOCs			
Acetaldehyde	3.98E+00	7.97E-01	3.40E-02
Acrolein	1.16E+00	2.32E-01	9.61E-03
Benzene	8.39E-01	1.67E-01	7.22E-03
Formaldehyde	2.19E+01	4.35E+00	1.94E-01
HCN	1.66E+00	3.33E-01	1.38E-02
MDI	5.26E-01	8.24E-02	4.46E-03
Methanol	2.06E+01	4.10E+00	1.96E-01
Phenol	1.23E+01	1.69E+00	9.85E-02
Propionaldehyde	1.04E+00	2.07E-01	8.58E-03

Receptor #	40
Receptor Name	Private Residence
Case	Project

Table A.37. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.73E+01	4.45E+00	3.18E-01
PM2.5	1.01E+01	2.43E+00	1.74E-01
PM10	1.48E+01	3.07E+00	2.34E-01
TPM	1.87E+01	3.68E+00	2.85E-01
VOCs			
Acetaldehyde	1.40E+00	3.18E-01	2.14E-02
Acrolein	4.03E-01	9.14E-02	5.95E-03
Benzene	2.89E-01	6.70E-02	4.53E-03
Formaldehyde	7.72E+00	1.77E+00	1.24E-01
HCN	5.77E-01	1.31E-01	8.54E-03
MDI	2.84E-01	3.71E-02	3.08E-03
Methanol	7.77E+00	1.73E+00	1.30E-01
Phenol	6.68E+00	8.40E-01	6.86E-02
Propionaldehyde	3.60E-01	8.16E-02	5.31E-03

Receptor #	42
Receptor Name	Private Residence
Case	Project

Table A.38. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.78E+01	3.51E+00	3.82E-01
PM2.5	9.43E+00	1.86E+00	2.09E-01
PM10	1.40E+01	2.42E+00	2.81E-01
TPM	1.75E+01	2.92E+00	3.42E-01
VOCs			
Acetaldehyde	1.30E+00	2.30E-01	2.51E-02
Acrolein	3.78E-01	6.51E-02	6.91E-03
Benzene	2.70E-01	4.88E-02	5.33E-03
Formaldehyde	7.14E+00	1.30E+00	1.47E-01
HCN	5.41E-01	9.34E-02	9.92E-03
MDI	2.52E-01	3.54E-02	3.85E-03
Methanol	7.74E+00	1.37E+00	1.57E-01
Phenol	5.89E+00	9.13E-01	8.23E-02
Propionaldehyde	3.37E-01	5.81E-02	6.17E-03

Receptor #	43
Receptor Name	Private Residence
Case	Project

Table A.39. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.08E+01	4.90E+00	3.78E-01
PM2.5	1.20E+01	2.61E+00	2.06E-01
PM10	1.62E+01	3.30E+00	2.78E-01
TPM	1.98E+01	3.97E+00	3.37E-01
VOCs			
Acetaldehyde	1.54E+00	3.46E-01	2.43E-02
Acrolein	4.34E-01	1.00E-01	6.63E-03
Benzene	3.24E-01	7.29E-02	5.16E-03
Formaldehyde	8.84E+00	1.90E+00	1.44E-01
HCN	6.22E-01	1.44E-01	9.51E-03
MDI	2.93E-01	3.87E-02	3.89E-03
Methanol	9.01E+00	1.81E+00	1.56E-01
Phenol	6.69E+00	1.14E+00	8.11E-02
Propionaldehyde	3.87E-01	8.97E-02	5.92E-03

Receptor #	45
Receptor Name	Private Residence
Case	Project

Table A.40. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.85E+01	5.34E+00	3.79E-01
PM2.5	1.13E+01	2.86E+00	2.06E-01
PM10	1.50E+01	3.62E+00	2.79E-01
TPM	1.83E+01	4.35E+00	3.38E-01
VOCs			
Acetaldehyde	1.40E+00	3.79E-01	2.42E-02
Acrolein	4.00E-01	1.10E-01	6.57E-03
Benzene	2.93E-01	7.97E-02	5.15E-03
Formaldehyde	8.25E+00	2.09E+00	1.44E-01
HCN	5.73E-01	1.57E-01	9.43E-03
MDI	3.03E-01	4.16E-02	3.96E-03
Methanol	8.87E+00	2.01E+00	1.57E-01
Phenol	5.97E+00	1.05E+00	8.12E-02
Propionaldehyde	3.57E-01	9.79E-02	5.87E-03

Receptor #	48
Receptor Name	Private Residence
Case	Project

Table A.41. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.05E+01	6.90E+00	4.12E-01
PM2.5	1.15E+01	3.65E+00	2.24E-01
PM10	1.57E+01	4.75E+00	3.06E-01
TPM	1.96E+01	5.72E+00	3.72E-01
VOCs			
Acetaldehyde	1.58E+00	4.55E-01	2.54E-02
Acrolein	4.62E-01	1.30E-01	6.80E-03
Benzene	3.31E-01	9.62E-02	5.43E-03
Formaldehyde	8.62E+00	2.59E+00	1.54E-01
HCN	6.62E-01	1.86E-01	9.76E-03
MDI	3.45E-01	6.04E-02	4.50E-03
Methanol	9.64E+00	2.64E+00	1.73E-01
Phenol	7.30E+00	1.24E+00	9.19E-02
Propionaldehyde	4.12E-01	1.16E-01	6.07E-03

Receptor #	53
Receptor Name	Private Residence
Case	Project

Table A.42. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.62E+01	5.45E+00	3.51E-01
PM2.5	1.42E+01	2.81E+00	1.90E-01
PM10	1.94E+01	3.65E+00	2.60E-01
TPM	2.38E+01	4.44E+00	3.16E-01
VOCs			
Acetaldehyde	1.96E+00	3.65E-01	2.20E-02
Acrolein	5.86E-01	1.06E-01	5.94E-03
Benzene	4.11E-01	7.72E-02	4.68E-03
Formaldehyde	1.04E+01	2.02E+00	1.32E-01
HCN	8.40E-01	1.51E-01	8.53E-03
MDI	3.00E-01	4.04E-02	3.69E-03
Methanol	1.07E+01	1.94E+00	1.45E-01
Phenol	6.85E+00	9.40E-01	7.71E-02
Propionaldehyde	5.24E-01	9.42E-02	5.30E-03

Receptor #	59
Receptor Name	Private Residence
Case	Project

Table A.43. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.44E+01	4.38E+00	3.04E-01
PM2.5	1.37E+01	2.39E+00	1.63E-01
PM10	1.83E+01	3.00E+00	2.21E-01
TPM	2.23E+01	3.58E+00	2.68E-01
VOCs			
Acetaldehyde	1.78E+00	3.13E-01	1.94E-02
Acrolein	5.08E-01	9.00E-02	5.32E-03
Benzene	3.75E-01	6.59E-02	4.12E-03
Formaldehyde	1.01E+01	1.74E+00	1.14E-01
HCN	7.28E-01	1.29E-01	7.64E-03
MDI	2.90E-01	3.65E-02	3.00E-03
Methanol	1.00E+01	1.70E+00	1.22E-01
Phenol	7.80E+00	7.20E-01	6.42E-02
Propionaldehyde	4.53E-01	8.04E-02	4.75E-03

Receptor #	63
Receptor Name	Private Residence
Case	Project

Table A.44. Exposure Point Concentrations - Private Residence - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.42E+01	4.40E+00	2.71E-01
PM2.5	2.02E+01	2.33E+00	1.43E-01
PM10	2.61E+01	2.96E+00	1.91E-01
TPM	3.16E+01	3.55E+00	2.32E-01
VOCs			
Acetaldehyde	2.60E+00	3.05E-01	1.75E-02
Acrolein	7.32E-01	8.80E-02	4.88E-03
Benzene	5.44E-01	6.43E-02	3.71E-03
Formaldehyde	1.48E+01	1.69E+00	1.01E-01
HCN	1.05E+00	1.26E-01	7.00E-03
MDI	4.06E-01	3.44E-02	2.45E-03
Methanol	1.51E+01	1.64E+00	1.04E-01
Phenol	9.12E+00	7.16E-01	5.35E-02
Propionaldehyde	6.53E-01	7.85E-02	4.36E-03

Receptor #	64
Receptor Name	Private Residence
Case	Project

Table A.45. Exposure Point Concentrations - @Air Monitoring Station #1 - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.10E+01	5.01E+00	1.67E-01
PM2.5	1.33E+01	2.31E+00	8.49E-02
PM10	2.07E+01	3.19E+00	1.40E-01
TPM	2.54E+01	3.83E+00	1.76E-01
VOCs			
Acetaldehyde	1.32E+00	2.37E-01	7.07E-03
Acrolein	3.74E-01	6.19E-02	1.53E-03
Benzene	2.81E-01	5.21E-02	1.58E-03
Formaldehyde	8.07E+00	1.47E+00	5.21E-02
HCN	5.37E-01	8.91E-02	2.21E-03
MDI	4.98E-01	4.63E-02	2.36E-03
Methanol	1.25E+01	1.70E+00	7.24E-02
Phenol	9.50E+00	8.80E-01	5.78E-02
Propionaldehyde	3.34E-01	5.53E-02	1.36E-03

Receptor #	65
Receptor Name	@Air Monitoring Station #1
Case	Project

Table A.46. Exposure Point Concentrations - @Air Monitoring Station #2 - Project Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.63E+01	9.02E+00	5.70E-01
PM2.5	1.42E+01	4.53E+00	3.13E-01
PM10	1.79E+01	6.02E+00	4.39E-01
TPM	2.15E+01	7.30E+00	5.34E-01
VOCs			
Acetaldehyde	1.89E+00	5.50E-01	3.44E-02
Acrolein	5.49E-01	1.55E-01	8.97E-03
Benzene	3.98E-01	1.18E-01	7.36E-03
Formaldehyde	1.04E+01	3.15E+00	2.14E-01
HCN	7.88E-01	2.22E-01	1.29E-02
MDI	4.33E-01	7.45E-02	6.76E-03
Methanol	1.09E+01	3.21E+00	2.48E-01
Phenol	9.43E+00	1.64E+00	1.39E-01
Propionaldehyde	4.91E-01	1.38E-01	8.01E-03

Receptor #	66
Receptor Name	@Air Monitoring Station #2
Case	Project

Table A.47. Exposure Point Concentrations - School - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.88E+01	5.52E+00	3.40E-01
PM2.5	9.95E+00	2.99E+00	1.84E-01
PM10	2.90E+01	1.73E+01	1.38E+01
TPM	1.89E+01	4.55E+00	3.00E-01
VOCs			
Acetaldehyde	1.32E+00	3.93E-01	2.14E-02
Acrolein	3.85E-01	1.13E-01	5.82E-03
Benzene	7.78E+00	3.08E+00	6.05E-01
Formaldehyde	8.89E+00	2.84E+00	2.60E-01
HCN	2.15E+00	8.03E-01	1.37E-01
MDI	8.17E-01	2.47E-01	4.35E-02
Methanol	9.41E+00	2.11E+00	1.40E-01
Phenol	2.48E+01	8.36E+00	1.55E+00
Propionaldehyde	3.44E-01	1.01E-01	5.20E-03

Receptor #	2
Receptor Name	School
Case	Cumulative

Table A.48. Exposure Point Concentrations - Minitonas Town Office - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.41E+01	4.50E+00	3.04E-01
PM2.5	1.32E+01	2.33E+00	1.64E-01
PM10	3.13E+01	1.66E+01	1.38E+01
TPM	2.17E+01	3.65E+00	2.70E-01
VOCs			
Acetaldehyde	1.76E+00	3.06E-01	1.93E-02
Acrolein	5.25E-01	8.88E-02	5.26E-03
Benzene	7.87E+00	3.06E+00	6.04E-01
Formaldehyde	1.11E+01	2.34E+00	2.47E-01
HCN	2.35E+00	7.68E-01	1.36E-01
MDI	7.71E-01	2.33E-01	4.31E-02
Methanol	9.76E+00	1.61E+00	1.24E-01
Phenol	2.47E+01	8.15E+00	1.54E+00
Propionaldehyde	4.69E-01	7.93E-02	4.70E-03

Receptor #	4
Receptor Name	Minitonas Town Office
Case	Cumulative

Table A.49. Exposure Point Concentrations - Senior's Manor - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.96E+01	5.00E+00	3.26E-01
PM2.5	1.12E+01	2.77E+00	1.75E-01
PM10	3.09E+01	1.71E+01	1.38E+01
TPM	2.13E+01	4.22E+00	2.92E-01
VOCs			
Acetaldehyde	1.06E+00	3.49E-01	2.02E-02
Acrolein	2.94E-01	9.81E-02	5.44E-03
Benzene	7.73E+00	3.07E+00	6.04E-01
Formaldehyde	8.76E+00	2.65E+00	2.53E-01
HCN	2.02E+00	7.82E-01	1.36E-01
MDI	8.27E-01	2.47E-01	4.34E-02
Methanol	1.00E+01	2.03E+00	1.34E-01
Phenol	2.60E+01	8.31E+00	1.55E+00
Propionaldehyde	2.63E-01	8.76E-02	4.86E-03

Receptor #	8
Receptor Name	Senior's Manor
Case	Cumulative

Table A.50. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.43E+01	9.10E+00	2.93E-01
PM2.5	2.12E+01	5.53E+00	1.77E-01
PM10	4.00E+01	2.07E+01	1.38E+01
TPM	3.13E+01	8.62E+00	3.45E-01
VOCs			
Acetaldehyde	2.76E+00	6.96E-01	2.17E-02
Acrolein	7.68E-01	1.93E-01	5.92E-03
Benzene	8.07E+00	3.15E+00	6.05E-01
Formaldehyde	1.75E+01	4.71E+00	2.62E-01
HCN	2.70E+00	9.18E-01	1.37E-01
MDI	8.93E-01	3.03E-01	4.34E-02
Methanol	1.66E+01	4.27E+00	1.38E-01
Phenol	3.37E+01	9.46E+00	1.59E+00
Propionaldehyde	6.86E-01	1.72E-01	5.29E-03

Receptor #	9
Receptor Name	Private Residence
Case	Cumulative

Table A.51. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.85E+01	1.35E+01	6.34E-01
PM2.5	2.21E+01	6.90E+00	3.45E-01
PM10	4.11E+01	2.27E+01	1.41E+01
TPM	3.32E+01	1.10E+01	6.90E-01
VOCs			
Acetaldehyde	3.11E+00	8.11E-01	3.58E-02
Acrolein	9.18E-01	2.23E-01	9.06E-03
Benzene	8.15E+00	3.17E+00	6.08E-01
Formaldehyde	1.84E+01	5.41E+00	3.64E-01
HCN	2.92E+00	9.62E-01	1.41E-01
MDI	9.95E-01	3.36E-01	4.80E-02
Methanol	1.63E+01	5.06E+00	2.78E-01
Phenol	3.44E+01	9.98E+00	1.69E+00
Propionaldehyde	8.20E-01	1.99E-01	8.09E-03

Receptor #	10
Receptor Name	Private Residence
Case	Cumulative

Table A.52. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	6.22E+01	8.41E+00	7.16E-01
PM2.5	2.48E+01	4.65E+00	3.86E-01
PM10	5.41E+01	2.02E+01	1.41E+01
TPM	4.96E+01	7.76E+00	7.09E-01
VOCs			
Acetaldehyde	2.81E+00	3.54E-01	3.52E-02
Acrolein	8.26E-01	8.89E-02	8.06E-03
Benzene	8.09E+00	3.08E+00	6.08E-01
Formaldehyde	1.70E+01	3.36E+00	3.78E-01
HCN	2.79E+00	7.69E-01	1.40E-01
MDI	1.46E+00	3.68E-01	5.03E-02
Methanol	2.44E+01	4.57E+00	3.29E-01
Phenol	3.50E+01	9.69E+00	1.69E+00
Propionaldehyde	7.37E-01	7.94E-02	7.20E-03

Receptor #	11
Receptor Name	Private Residence
Case	Cumulative

Table A.53. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	5.02E+01	7.33E+00	6.13E-01
PM2.5	2.55E+01	3.65E+00	3.28E-01
PM10	5.22E+01	1.87E+01	1.40E+01
TPM	4.60E+01	6.20E+00	5.75E-01
VOCs			
Acetaldehyde	2.86E+00	3.53E-01	3.24E-02
Acrolein	8.43E-01	8.75E-02	7.92E-03
Benzene	8.10E+00	3.08E+00	6.07E-01
Formaldehyde	1.71E+01	2.98E+00	3.46E-01
HCN	2.81E+00	7.67E-01	1.40E-01
MDI	1.35E+00	3.02E-01	4.80E-02
Methanol	2.35E+01	2.90E+00	2.69E-01
Phenol	3.51E+01	9.30E+00	1.64E+00
Propionaldehyde	7.52E-01	7.82E-02	7.07E-03

Receptor #	12
Receptor Name	Private Residence
Case	Cumulative

Table A.54. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.31E+01	9.85E+00	5.10E-01
PM2.5	1.86E+01	4.80E+00	2.71E-01
PM10	4.29E+01	2.01E+01	1.39E+01
TPM	3.58E+01	7.84E+00	4.61E-01
VOCs			
Acetaldehyde	1.59E+00	5.13E-01	2.82E-02
Acrolein	4.50E-01	1.35E-01	7.16E-03
Benzene	7.83E+00	3.11E+00	6.06E-01
Formaldehyde	1.25E+01	3.81E+00	3.12E-01
HCN	2.25E+00	8.36E-01	1.39E-01
MDI	1.16E+00	2.96E-01	4.61E-02
Methanol	1.79E+01	3.60E+00	2.16E-01
Phenol	3.19E+01	9.26E+00	1.60E+00
Propionaldehyde	4.02E-01	1.21E-01	6.40E-03

Receptor #	13
Receptor Name	Private Residence
Case	Cumulative

Table A.55. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.84E+01	9.90E+00	5.04E-01
PM2.5	1.85E+01	4.66E+00	2.39E-01
PM10	5.13E+01	2.05E+01	1.39E+01
TPM	5.38E+01	8.53E+00	4.61E-01
VOCs			
Acetaldehyde	1.95E+00	4.36E-01	2.18E-02
Acrolein	5.24E-01	1.06E-01	5.22E-03
Benzene	7.92E+00	3.10E+00	6.05E-01
Formaldehyde	1.37E+01	3.54E+00	2.80E-01
HCN	2.36E+00	7.94E-01	1.36E-01
MDI	1.02E+00	3.17E-01	4.57E-02
Methanol	1.49E+01	3.71E+00	1.90E-01
Phenol	4.28E+01	9.76E+00	1.61E+00
Propionaldehyde	4.68E-01	9.50E-02	4.66E-03

Receptor #	14
Receptor Name	Private Residence
Case	Cumulative

Table A.56. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.19E+01	1.19E+01	5.83E-01
PM2.5	2.17E+01	5.92E+00	3.05E-01
PM10	4.05E+01	2.18E+01	1.40E+01
TPM	3.21E+01	1.01E+01	5.90E-01
VOCs			
Acetaldehyde	2.91E+00	7.07E-01	3.35E-02
Acrolein	8.33E-01	1.97E-01	8.86E-03
Benzene	8.11E+00	3.15E+00	6.07E-01
Formaldehyde	1.79E+01	4.74E+00	3.39E-01
HCN	2.80E+00	9.24E-01	1.41E-01
MDI	9.84E-01	3.09E-01	4.63E-02
Methanol	1.70E+01	4.23E+00	2.34E-01
Phenol	3.17E+01	9.72E+00	1.65E+00
Propionaldehyde	7.44E-01	1.76E-01	7.91E-03

Receptor #	15
Receptor Name	Private Residence
Case	Cumulative

Table A.57. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.41E+01	9.34E+00	5.37E-01
PM2.5	1.35E+01	4.93E+00	2.93E-01
PM10	3.10E+01	2.00E+01	1.40E+01
TPM	2.20E+01	7.81E+00	4.99E-01
VOCs			
Acetaldehyde	1.80E+00	5.96E-01	3.21E-02
Acrolein	5.18E-01	1.66E-01	8.40E-03
Benzene	7.88E+00	3.13E+00	6.07E-01
Formaldehyde	1.16E+01	4.12E+00	3.32E-01
HCN	2.35E+00	8.79E-01	1.40E-01
MDI	9.19E-01	2.86E-01	4.63E-02
Methanol	1.10E+01	3.62E+00	2.31E-01
Phenol	2.76E+01	9.16E+00	1.61E+00
Propionaldehyde	4.63E-01	1.48E-01	7.50E-03

Receptor #	16
Receptor Name	Private Residence
Case	Cumulative

Table A.58. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.26E+01	6.61E+00	4.40E-01
PM2.5	1.33E+01	3.48E+00	2.44E-01
PM10	3.26E+01	1.80E+01	1.39E+01
TPM	2.38E+01	5.37E+00	4.13E-01
VOCs			
Acetaldehyde	1.74E+00	4.55E-01	2.92E-02
Acrolein	5.12E-01	1.32E-01	8.01E-03
Benzene	7.86E+00	3.10E+00	6.06E-01
Formaldehyde	1.16E+01	3.18E+00	3.05E-01
HCN	2.34E+00	8.30E-01	1.40E-01
MDI	8.25E-01	2.55E-01	4.46E-02
Methanol	1.03E+01	2.42E+00	1.85E-01
Phenol	2.93E+01	8.52E+00	1.59E+00
Propionaldehyde	4.57E-01	1.18E-01	7.15E-03

Receptor #	17
Receptor Name	Private Residence
Case	Cumulative

Table A.59. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.95E+01	4.28E+00	3.61E-01
PM2.5	1.18E+01	2.44E+00	2.02E-01
PM10	3.03E+01	1.67E+01	1.38E+01
TPM	2.09E+01	3.73E+00	3.37E-01
VOCs			
Acetaldehyde	1.52E+00	3.03E-01	2.45E-02
Acrolein	4.32E-01	8.41E-02	6.75E-03
Benzene	7.82E+00	3.06E+00	6.05E-01
Formaldehyde	1.05E+01	2.43E+00	2.76E-01
HCN	2.22E+00	7.62E-01	1.38E-01
MDI	8.32E-01	2.46E-01	4.38E-02
Methanol	9.25E+00	1.89E+00	1.53E-01
Phenol	2.55E+01	8.26E+00	1.56E+00
Propionaldehyde	3.86E-01	7.51E-02	6.03E-03

Receptor #	18
Receptor Name	Private Residence
Case	Cumulative

Table A.60. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.42E+01	3.10E+00	1.12E-01
PM2.5	8.25E+00	1.75E+00	6.38E-02
PM10	2.56E+01	1.58E+01	1.36E+01
TPM	1.49E+01	2.65E+00	1.11E-01
VOCs			
Acetaldehyde	1.09E+00	2.31E-01	7.94E-03
Acrolein	3.16E-01	6.64E-02	2.21E-03
Benzene	7.73E+00	3.05E+00	6.02E-01
Formaldehyde	7.74E+00	1.95E+00	1.78E-01
HCN	2.06E+00	7.36E-01	1.31E-01
MDI	6.82E-01	2.27E-01	4.11E-02
Methanol	6.59E+00	1.26E+00	4.80E-02
Phenol	2.27E+01	7.95E+00	1.51E+00
Propionaldehyde	2.82E-01	5.93E-02	1.97E-03

Receptor #	19
Receptor Name	Private Residence
Case	Cumulative

Table A.61. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.48E+01	1.36E+00	7.55E-02
PM2.5	8.26E+00	7.96E-01	4.21E-02
PM10	2.45E+01	1.46E+01	1.36E+01
TPM	1.41E+01	1.34E+00	7.80E-02
VOCs			
Acetaldehyde	1.15E+00	9.58E-02	4.21E-03
Acrolein	3.37E-01	2.76E-02	1.03E-03
Benzene	7.74E+00	3.02E+00	6.01E-01
Formaldehyde	7.84E+00	1.21E+00	1.60E-01
HCN	2.08E+00	6.81E-01	1.30E-01
MDI	8.88E-01	2.22E-01	4.10E-02
Methanol	9.71E+00	7.28E-01	3.51E-02
Phenol	2.59E+01	7.83E+00	1.50E+00
Propionaldehyde	3.01E-01	2.46E-02	9.20E-04

Receptor #	20
Receptor Name	Private Residence
Case	Cumulative

Table A.62. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.52E+01	4.61E+00	5.27E-01
PM2.5	1.40E+01	2.57E+00	2.89E-01
PM10	3.32E+01	1.70E+01	1.40E+01
TPM	2.40E+01	4.08E+00	4.76E-01
VOCs			
Acetaldehyde	1.49E+00	2.92E-01	3.17E-02
Acrolein	4.31E-01	7.77E-02	8.25E-03
Benzene	7.81E+00	3.06E+00	6.07E-01
Formaldehyde	1.10E+01	2.44E+00	3.29E-01
HCN	2.22E+00	7.53E-01	1.40E-01
MDI	9.22E-01	2.53E-01	4.62E-02
Methanol	1.17E+01	2.01E+00	2.29E-01
Phenol	2.65E+01	8.40E+00	1.60E+00
Propionaldehyde	3.85E-01	6.94E-02	7.37E-03

Receptor #	21
Receptor Name	Private Residence
Case	Cumulative

Table A.63. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.27E+01	6.59E+00	4.66E-01
PM2.5	2.13E+01	3.17E+00	2.47E-01
PM10	4.56E+01	1.78E+01	1.39E+01
TPM	3.96E+01	5.09E+00	4.06E-01
VOCs			
Acetaldehyde	1.87E+00	3.72E-01	2.71E-02
Acrolein	4.85E-01	1.04E-01	7.14E-03
Benzene	7.91E+00	3.08E+00	6.06E-01
Formaldehyde	1.46E+01	2.81E+00	2.99E-01
HCN	2.30E+00	7.90E-01	1.38E-01
MDI	1.13E+00	2.56E-01	4.51E-02
Methanol	1.84E+01	2.27E+00	1.91E-01
Phenol	3.34E+01	8.52E+00	1.58E+00
Propionaldehyde	4.33E-01	9.27E-02	6.38E-03

Receptor #	22
Receptor Name	Private Residence
Case	Cumulative

Table A.64. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.38E+01	4.85E+00	6.41E-01
PM2.5	1.32E+01	2.75E+00	3.55E-01
PM10	3.22E+01	1.73E+01	1.41E+01
TPM	2.28E+01	4.51E+00	6.04E-01
VOCs			
Acetaldehyde	1.73E+00	2.88E-01	3.65E-02
Acrolein	4.95E-01	7.54E-02	9.12E-03
Benzene	7.86E+00	3.06E+00	6.08E-01
Formaldehyde	1.13E+01	2.51E+00	3.69E-01
HCN	2.31E+00	7.49E-01	1.41E-01
MDI	9.66E-01	2.65E-01	4.84E-02
Methanol	1.24E+01	2.26E+00	2.90E-01
Phenol	2.79E+01	8.61E+00	1.64E+00
Propionaldehyde	4.42E-01	6.73E-02	8.15E-03

Receptor #	23
Receptor Name	Private Residence
Case	Cumulative

Table A.65. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.24E+01	7.06E+00	9.63E-01
PM2.5	1.40E+01	3.41E+00	5.08E-01
PM10	3.57E+01	1.80E+01	1.43E+01
TPM	2.72E+01	5.34E+00	8.57E-01
VOCs			
Acetaldehyde	1.71E+00	4.30E-01	5.43E-02
Acrolein	4.85E-01	1.24E-01	1.41E-02
Benzene	7.86E+00	3.09E+00	6.12E-01
Formaldehyde	1.14E+01	3.04E+00	4.72E-01
HCN	2.30E+00	8.19E-01	1.48E-01
MDI	8.97E-01	2.68E-01	5.10E-02
Methanol	1.14E+01	2.30E+00	3.98E-01
Phenol	2.70E+01	8.65E+00	1.70E+00
Propionaldehyde	4.33E-01	1.11E-01	1.26E-02

Receptor #	24
Receptor Name	Private Residence
Case	Cumulative

Table A.66. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.20E+01	6.53E+00	7.60E-01
PM2.5	1.80E+01	3.56E+00	4.46E-01
PM10	3.98E+01	1.90E+01	1.42E+01
TPM	3.00E+01	6.61E+00	8.29E-01
VOCs			
Acetaldehyde	1.80E+00	4.10E-01	3.81E-02
Acrolein	5.08E-01	1.16E-01	8.01E-03
Benzene	7.88E+00	3.09E+00	6.08E-01
Formaldehyde	1.27E+01	2.99E+00	4.16E-01
HCN	2.33E+00	8.07E-01	1.40E-01
MDI	1.35E+00	3.38E-01	5.33E-02
Methanol	2.16E+01	3.77E+00	4.04E-01
Phenol	3.22E+01	9.87E+00	1.74E+00
Propionaldehyde	4.53E-01	1.03E-01	7.15E-03

Receptor #	25
Receptor Name	Private Residence
Case	Cumulative

Table A.67. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.99E+01	1.06E+01	5.35E-01
PM2.5	2.65E+01	5.53E+00	2.82E-01
PM10	4.74E+01	2.07E+01	1.39E+01
TPM	4.06E+01	8.60E+00	4.56E-01
VOCs			
Acetaldehyde	3.38E+00	6.76E-01	3.27E-02
Acrolein	9.60E-01	1.90E-01	8.90E-03
Benzene	8.21E+00	3.14E+00	6.07E-01
Formaldehyde	2.08E+01	4.53E+00	3.26E-01
HCN	2.98E+00	9.13E-01	1.41E-01
MDI	1.05E+00	2.93E-01	4.53E-02
Methanol	1.95E+01	4.00E+00	2.11E-01
Phenol	2.83E+01	9.19E+00	1.58E+00
Propionaldehyde	8.57E-01	1.69E-01	7.95E-03

Receptor #	26
Receptor Name	Private Residence
Case	Cumulative

Table A.68. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.99E+01	6.97E+00	4.20E-01
PM2.5	1.63E+01	3.65E+00	2.27E-01
PM10	3.53E+01	1.83E+01	1.39E+01
TPM	2.67E+01	5.76E+00	3.81E-01
VOCs			
Acetaldehyde	2.31E+00	4.66E-01	2.61E-02
Acrolein	6.86E-01	1.33E-01	7.01E-03
Benzene	7.98E+00	3.10E+00	6.06E-01
Formaldehyde	1.40E+01	3.27E+00	2.89E-01
HCN	2.59E+00	8.32E-01	1.38E-01
MDI	8.43E-01	2.56E-01	4.45E-02
Methanol	1.26E+01	2.57E+00	1.74E-01
Phenol	2.67E+01	8.64E+00	1.57E+00
Propionaldehyde	6.12E-01	1.19E-01	6.26E-03

Receptor #	27
Receptor Name	Private Residence
Case	Cumulative

Table A.69. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.96E+01	6.45E+00	3.88E-01
PM2.5	1.61E+01	3.39E+00	2.10E-01
PM10	3.41E+01	1.80E+01	1.38E+01
TPM	2.52E+01	5.34E+00	3.51E-01
VOCs			
Acetaldehyde	2.27E+00	4.35E-01	2.43E-02
Acrolein	6.75E-01	1.24E-01	6.55E-03
Benzene	7.98E+00	3.09E+00	6.05E-01
Formaldehyde	1.38E+01	3.09E+00	2.77E-01
HCN	2.57E+00	8.19E-01	1.38E-01
MDI	8.14E-01	2.52E-01	4.41E-02
Methanol	1.18E+01	2.40E+00	1.60E-01
Phenol	2.63E+01	8.54E+00	1.57E+00
Propionaldehyde	6.03E-01	1.11E-01	5.85E-03

Receptor #	29
Receptor Name	Private Residence
Case	Cumulative

Table A.70. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.89E+01	3.55E+00	1.54E-01
PM2.5	1.27E+01	1.68E+00	7.83E-02
PM10	3.53E+01	1.58E+01	1.37E+01
TPM	2.67E+01	2.75E+00	1.65E-01
VOCs			
Acetaldehyde	1.08E+00	1.87E-01	5.90E-03
Acrolein	3.11E-01	5.09E-02	1.15E-03
Benzene	7.73E+00	3.04E+00	6.01E-01
Formaldehyde	7.74E+00	1.77E+00	1.79E-01
HCN	2.05E+00	7.14E-01	1.30E-01
MDI	9.77E-01	2.36E-01	4.24E-02
Methanol	1.20E+01	1.21E+00	6.91E-02
Phenol	2.75E+01	8.05E+00	1.54E+00
Propionaldehyde	2.78E-01	4.54E-02	1.02E-03

Receptor #	31
Receptor Name	Private Residence
Case	Cumulative

Table A.71. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.39E+01	2.99E+00	1.07E-01
PM2.5	1.29E+01	1.43E+00	5.82E-02
PM10	2.96E+01	1.55E+01	1.37E+01
TPM	1.95E+01	2.35E+00	1.27E-01
VOCs			
Acetaldehyde	1.72E+00	1.49E-01	4.68E-03
Acrolein	4.99E-01	3.90E-02	9.50E-04
Benzene	7.86E+00	3.03E+00	6.01E-01
Formaldehyde	1.11E+01	1.58E+00	1.68E-01
HCN	2.32E+00	6.97E-01	1.30E-01
MDI	8.87E-01	2.29E-01	4.17E-02
Methanol	9.69E+00	1.07E+00	5.19E-02
Phenol	2.72E+01	7.98E+00	1.53E+00
Propionaldehyde	4.46E-01	3.48E-02	8.50E-04

Receptor #	32
Receptor Name	Private Residence
Case	Cumulative

Table A.72. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.92E+01	3.37E+00	2.33E-01
PM2.5	1.30E+01	1.78E+00	1.13E-01
PM10	3.25E+01	1.58E+01	1.37E+01
TPM	2.30E+01	2.71E+00	2.24E-01
VOCs			
Acetaldehyde	1.75E+00	2.27E-01	1.09E-02
Acrolein	5.15E-01	6.48E-02	2.69E-03
Benzene	7.87E+00	3.05E+00	6.02E-01
Formaldehyde	1.11E+01	1.93E+00	2.04E-01
HCN	2.34E+00	7.34E-01	1.32E-01
MDI	8.35E-01	2.32E-01	4.26E-02
Methanol	1.00E+01	1.26E+00	8.89E-02
Phenol	2.72E+01	8.08E+00	1.55E+00
Propionaldehyde	4.60E-01	5.79E-02	2.40E-03

Receptor #	33
Receptor Name	Private Residence
Case	Cumulative

Table A.73. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.07E+01	3.72E+00	3.00E-01
PM2.5	1.28E+01	1.91E+00	1.43E-01
PM10	3.13E+01	1.61E+01	1.38E+01
TPM	2.14E+01	3.05E+00	2.67E-01
VOCs			
Acetaldehyde	1.44E+00	2.32E-01	1.43E-02
Acrolein	4.22E-01	6.47E-02	3.63E-03
Benzene	7.80E+00	3.05E+00	6.03E-01
Formaldehyde	9.88E+00	1.99E+00	2.23E-01
HCN	2.21E+00	7.34E-01	1.33E-01
MDI	8.09E-01	2.32E-01	4.31E-02
Methanol	9.60E+00	1.38E+00	1.09E-01
Phenol	2.69E+01	8.07E+00	1.55E+00
Propionaldehyde	3.76E-01	5.78E-02	3.24E-03

Receptor #	34
Receptor Name	Private Residence
Case	Cumulative

Table A.74. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.29E+01	1.99E+00	1.48E-01
PM2.5	1.21E+01	1.06E+00	7.48E-02
PM10	2.90E+01	1.49E+01	1.37E+01
TPM	1.85E+01	1.60E+00	1.40E-01
VOCs			
Acetaldehyde	1.56E+00	1.39E-01	7.62E-03
Acrolein	4.47E-01	4.03E-02	1.93E-03
Benzene	7.83E+00	3.03E+00	6.02E-01
Formaldehyde	1.04E+01	1.43E+00	1.81E-01
HCN	2.24E+00	6.99E-01	1.31E-01
MDI	7.27E-01	2.16E-01	4.17E-02
Methanol	8.68E+00	7.41E-01	5.86E-02
Phenol	2.42E+01	7.92E+00	1.52E+00
Propionaldehyde	3.99E-01	3.60E-02	1.73E-03

Receptor #	35
Receptor Name	Private Residence
Case	Cumulative

Table A.75. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.46E+01	5.76E+00	4.92E-01
PM2.5	1.12E+01	3.00E+00	2.47E-01
PM10	2.85E+01	1.73E+01	1.39E+01
TPM	1.87E+01	4.52E+00	4.19E-01
VOCs			
Acetaldehyde	1.53E+00	4.09E-01	2.78E-02
Acrolein	4.42E-01	1.21E-01	7.49E-03
Benzene	7.82E+00	3.09E+00	6.06E-01
Formaldehyde	1.01E+01	2.86E+00	2.99E-01
HCN	2.24E+00	8.14E-01	1.39E-01
MDI	7.78E-01	2.58E-01	4.47E-02
Methanol	8.45E+00	2.02E+00	1.84E-01
Phenol	2.50E+01	8.48E+00	1.58E+00
Propionaldehyde	3.95E-01	1.08E-01	6.69E-03

Receptor #	36
Receptor Name	Private Residence
Case	Cumulative

Table A.76. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.54E+01	1.16E+01	8.43E-01
PM2.5	1.44E+01	5.38E+00	4.19E-01
PM10	3.13E+01	2.10E+01	1.41E+01
TPM	2.13E+01	8.83E+00	7.00E-01
VOCs			
Acetaldehyde	1.98E+00	6.09E-01	4.73E-02
Acrolein	5.80E-01	1.74E-01	1.28E-02
Benzene	7.91E+00	3.13E+00	6.10E-01
Formaldehyde	1.25E+01	4.07E+00	4.14E-01
HCN	2.43E+00	8.91E-01	1.47E-01
MDI	7.88E-01	3.19E-01	4.78E-02
Methanol	1.01E+01	4.12E+00	3.09E-01
Phenol	2.55E+01	9.46E+00	1.65E+00
Propionaldehyde	5.18E-01	1.56E-01	1.14E-02

Receptor #	37
Receptor Name	Private Residence
Case	Cumulative

Table A.77. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.33E+01	6.58E+00	9.90E-01
PM2.5	1.31E+01	3.65E+00	5.16E-01
PM10	2.98E+01	1.82E+01	1.43E+01
TPM	1.94E+01	5.51E+00	8.37E-01
VOCs			
Acetaldehyde	1.80E+00	4.67E-01	5.93E-02
Acrolein	5.28E-01	1.32E-01	1.61E-02
Benzene	7.88E+00	3.10E+00	6.13E-01
Formaldehyde	1.15E+01	3.30E+00	4.85E-01
HCN	2.36E+00	8.31E-01	1.51E-01
MDI	7.73E-01	2.60E-01	4.98E-02
Methanol	9.16E+00	2.67E+00	3.88E-01
Phenol	2.67E+01	8.54E+00	1.68E+00
Propionaldehyde	4.71E-01	1.18E-01	1.44E-02

Receptor #	38
Receptor Name	Private Residence
Case	Cumulative

Table A.78. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	4.67E+01	8.99E+00	4.78E-01
PM2.5	1.72E+01	3.94E+00	2.29E-01
PM10	5.26E+01	1.95E+01	1.39E+01
TPM	5.33E+01	7.26E+00	4.45E-01
VOCs			
Acetaldehyde	2.04E+00	3.89E-01	2.06E-02
Acrolein	5.55E-01	1.03E-01	4.84E-03
Benzene	7.93E+00	3.08E+00	6.05E-01
Formaldehyde	1.37E+01	3.04E+00	2.73E-01
HCN	2.40E+00	7.89E-01	1.35E-01
MDI	1.03E+00	2.96E-01	4.57E-02
Methanol	1.41E+01	3.07E+00	1.84E-01
Phenol	3.76E+01	9.38E+00	1.61E+00
Propionaldehyde	4.96E-01	9.16E-02	4.32E-03

Receptor #	39
Receptor Name	Private Residence
Case	Cumulative

Table A.79. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	5.63E+01	1.10E+01	5.17E-01
PM2.5	2.98E+01	5.93E+00	2.73E-01
PM10	5.38E+01	2.09E+01	1.39E+01
TPM	4.99E+01	8.81E+00	4.37E-01
VOCs			
Acetaldehyde	3.98E+00	7.97E-01	3.40E-02
Acrolein	1.16E+00	2.32E-01	9.61E-03
Benzene	8.34E+00	3.17E+00	6.07E-01
Formaldehyde	2.36E+01	5.01E+00	3.26E-01
HCN	3.27E+00	9.74E-01	1.42E-01
MDI	1.03E+00	2.82E-01	4.45E-02
Methanol	2.06E+01	4.10E+00	1.96E-01
Phenol	3.08E+01	9.09E+00	1.58E+00
Propionaldehyde	1.04E+00	2.07E-01	8.58E-03

Receptor #	40
Receptor Name	Private Residence
Case	Cumulative

Table A.80. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.73E+01	4.45E+00	3.18E-01
PM2.5	1.01E+01	2.43E+00	1.74E-01
PM10	2.84E+01	1.66E+01	1.38E+01
TPM	1.87E+01	3.68E+00	2.85E-01
VOCs			
Acetaldehyde	1.40E+00	3.18E-01	2.14E-02
Acrolein	4.03E-01	9.14E-02	5.95E-03
Benzene	7.79E+00	3.07E+00	6.05E-01
Formaldehyde	9.37E+00	2.43E+00	2.56E-01
HCN	2.18E+00	7.72E-01	1.37E-01
MDI	7.84E-01	2.37E-01	4.31E-02
Methanol	7.77E+00	1.73E+00	1.30E-01
Phenol	2.52E+01	8.24E+00	1.55E+00
Propionaldehyde	3.60E-01	8.16E-02	5.31E-03

Receptor #	42
Receptor Name	Private Residence
Case	Cumulative

Table A.81. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.78E+01	3.51E+00	3.82E-01
PM2.5	9.43E+00	1.86E+00	2.09E-01
PM10	2.76E+01	1.60E+01	1.38E+01
TPM	1.75E+01	2.92E+00	3.42E-01
VOCs			
Acetaldehyde	1.30E+00	2.30E-01	2.51E-02
Acrolein	3.78E-01	6.51E-02	6.91E-03
Benzene	7.77E+00	3.05E+00	6.05E-01
Formaldehyde	8.79E+00	1.96E+00	2.79E-01
HCN	2.14E+00	7.34E-01	1.38E-01
MDI	7.52E-01	2.35E-01	4.39E-02
Methanol	7.74E+00	1.37E+00	1.57E-01
Phenol	2.44E+01	8.31E+00	1.56E+00
Propionaldehyde	3.37E-01	5.81E-02	6.17E-03

Receptor #	43
Receptor Name	Private Residence
Case	Cumulative

Table A.82. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.08E+01	4.90E+00	3.78E-01
PM2.5	1.20E+01	2.61E+00	2.06E-01
PM10	2.97E+01	1.69E+01	1.38E+01
TPM	1.98E+01	3.97E+00	3.37E-01
VOCs			
Acetaldehyde	1.54E+00	3.46E-01	2.43E-02
Acrolein	4.34E-01	1.00E-01	6.63E-03
Benzene	7.82E+00	3.07E+00	6.05E-01
Formaldehyde	1.05E+01	2.56E+00	2.76E-01
HCN	2.22E+00	7.85E-01	1.38E-01
MDI	7.93E-01	2.39E-01	4.39E-02
Methanol	9.01E+00	1.81E+00	1.56E-01
Phenol	2.52E+01	8.54E+00	1.56E+00
Propionaldehyde	3.87E-01	8.97E-02	5.92E-03

Receptor #	45
Receptor Name	Private Residence
Case	Cumulative

Table A.83. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	1.85E+01	5.34E+00	3.79E-01
PM2.5	1.13E+01	2.86E+00	2.06E-01
PM10	2.86E+01	1.72E+01	1.38E+01
TPM	1.83E+01	4.35E+00	3.38E-01
VOCs			
Acetaldehyde	1.40E+00	3.79E-01	2.42E-02
Acrolein	4.00E-01	1.10E-01	6.57E-03
Benzene	7.79E+00	3.08E+00	6.05E-01
Formaldehyde	9.90E+00	2.75E+00	2.76E-01
HCN	2.18E+00	7.98E-01	1.38E-01
MDI	8.03E-01	2.42E-01	4.40E-02
Methanol	8.87E+00	2.01E+00	1.57E-01
Phenol	2.45E+01	8.45E+00	1.56E+00
Propionaldehyde	3.57E-01	9.79E-02	5.87E-03

Receptor #	48
Receptor Name	Private Residence
Case	Cumulative

Table A.84. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.05E+01	6.90E+00	4.12E-01
PM2.5	1.15E+01	3.65E+00	2.24E-01
PM10	2.93E+01	1.83E+01	1.39E+01
TPM	1.96E+01	5.72E+00	3.72E-01
VOCs			
Acetaldehyde	1.58E+00	4.55E-01	2.54E-02
Acrolein	4.62E-01	1.30E-01	6.80E-03
Benzene	7.83E+00	3.10E+00	6.05E-01
Formaldehyde	1.03E+01	3.25E+00	2.86E-01
HCN	2.26E+00	8.27E-01	1.38E-01
MDI	8.45E-01	2.60E-01	4.45E-02
Methanol	9.64E+00	2.64E+00	1.73E-01
Phenol	2.58E+01	8.64E+00	1.57E+00
Propionaldehyde	4.12E-01	1.16E-01	6.07E-03

Receptor #	53
Receptor Name	Private Residence
Case	Cumulative

Table A.85. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.62E+01	5.45E+00	3.51E-01
PM2.5	1.42E+01	2.81E+00	1.90E-01
PM10	3.30E+01	1.72E+01	1.38E+01
TPM	2.38E+01	4.44E+00	3.16E-01
VOCs			
Acetaldehyde	1.96E+00	3.65E-01	2.20E-02
Acrolein	5.86E-01	1.06E-01	5.94E-03
Benzene	7.91E+00	3.08E+00	6.05E-01
Formaldehyde	1.20E+01	2.68E+00	2.64E-01
HCN	2.44E+00	7.92E-01	1.37E-01
MDI	8.00E-01	2.40E-01	4.37E-02
Methanol	1.07E+01	1.94E+00	1.45E-01
Phenol	2.54E+01	8.34E+00	1.56E+00
Propionaldehyde	5.24E-01	9.42E-02	5.30E-03

Receptor #	59
Receptor Name	Private Residence
Case	Cumulative

Table A.86. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.44E+01	4.38E+00	3.04E-01
PM2.5	1.37E+01	2.39E+00	1.63E-01
PM10	3.18E+01	1.66E+01	1.38E+01
TPM	2.23E+01	3.58E+00	2.68E-01
VOCs			
Acetaldehyde	1.78E+00	3.13E-01	1.94E-02
Acrolein	5.08E-01	9.00E-02	5.32E-03
Benzene	7.87E+00	3.07E+00	6.04E-01
Formaldehyde	1.17E+01	2.40E+00	2.46E-01
HCN	2.33E+00	7.70E-01	1.36E-01
MDI	7.90E-01	2.36E-01	4.30E-02
Methanol	1.00E+01	1.70E+00	1.22E-01
Phenol	2.63E+01	8.12E+00	1.54E+00
Propionaldehyde	4.53E-01	8.04E-02	4.75E-03

Receptor #	63
Receptor Name	Private Residence
Case	Cumulative

Table A.87. Exposure Point Concentrations - Private Residence - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.42E+01	4.40E+00	2.71E-01
PM2.5	2.02E+01	2.33E+00	1.43E-01
PM10	3.97E+01	1.65E+01	1.38E+01
TPM	3.16E+01	3.55E+00	2.32E-01
VOCs			
Acetaldehyde	2.60E+00	3.05E-01	1.75E-02
Acrolein	7.32E-01	8.80E-02	4.88E-03
Benzene	8.04E+00	3.06E+00	6.04E-01
Formaldehyde	1.65E+01	2.35E+00	2.33E-01
HCN	2.65E+00	7.67E-01	1.35E-01
MDI	9.06E-01	2.34E-01	4.25E-02
Methanol	1.51E+01	1.64E+00	1.04E-01
Phenol	2.76E+01	8.12E+00	1.53E+00
Propionaldehyde	6.53E-01	7.85E-02	4.36E-03

Receptor #	64
Receptor Name	Private Residence
Case	Cumulative

Table A.88. Exposure Point Concentrations - @Air Monitoring Station #1 - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	3.10E+01	5.01E+00	1.67E-01
PM2.5	1.33E+01	2.31E+00	8.49E-02
PM10	3.42E+01	1.67E+01	1.37E+01
TPM	2.54E+01	3.83E+00	1.76E-01
VOCs			
Acetaldehyde	1.32E+00	2.37E-01	7.07E-03
Acrolein	3.74E-01	6.19E-02	1.53E-03
Benzene	7.78E+00	3.05E+00	6.02E-01
Formaldehyde	9.72E+00	2.13E+00	1.84E-01
HCN	2.14E+00	7.30E-01	1.30E-01
MDI	9.98E-01	2.46E-01	4.24E-02
Methanol	1.25E+01	1.70E+00	7.24E-02
Phenol	2.80E+01	8.28E+00	1.54E+00
Propionaldehyde	3.34E-01	5.53E-02	1.36E-03

Receptor #	65
Receptor Name	@Air Monitoring Station #1
Case	Cumulative

Table A.89. Exposure Point Concentrations - @Air Monitoring Station #2 - Cumulative Case

	Exposure Point Concentration (EPC)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NOX	2.63E+01	9.02E+00	5.70E-01
PM2.5	1.42E+01	4.53E+00	3.13E-01
PM10	3.15E+01	1.96E+01	1.40E+01
TPM	2.15E+01	7.30E+00	5.34E-01
VOCs			
Acetaldehyde	1.89E+00	5.50E-01	3.44E-02
Acrolein	5.49E-01	1.55E-01	8.97E-03
Benzene	7.90E+00	3.12E+00	6.07E-01
Formaldehyde	1.21E+01	3.81E+00	3.46E-01
HCN	2.39E+00	8.63E-01	1.41E-01
MDI	9.33E-01	2.75E-01	4.68E-02
Methanol	1.09E+01	3.21E+00	2.48E-01
Phenol	2.79E+01	9.04E+00	1.62E+00
Propionaldehyde	4.91E-01	1.38E-01	8.01E-03

Receptor #	66
Receptor Name	@Air Monitoring Station #2
Case	Cumulative

APPENDIX B

Inhalation Results – Concentration Ratios

Table B.1. Concentration Ratios - Baseline - Baseline Case

	Concentration Ratio (CR)			
COPC	**1-Hour**	**24-Hour**	**Annual**	**Lifetime Cancer Risk**
Criteria Air Contaminants				
NO_X	--	--	--	--
$PM_{2.5}$	--	--	--	--
PM_{10}	--	2.71E-01	6.78E-01	--
TPM	--	--	--	--
VOCs				
Acetaldehyde	--	--	--	--
Acrolein	--	--	--	--
Benzene	2.50E-01	1.00E-01	2.00E-02	1.98E-06
Formaldehyde	2.75E-02	1.02E-02	1.32E-02	2.64E-11
HCN	4.01E-02	8.01E-02	4.27E-02	--
MDI	1.67E-01	2.86E-01	8.00E-02	--
Methanol	--	--	--	--
Phenol	2.94E-01	2.47E-01	7.40E-02	--
Propionaldehyde	--	--	--	--

Health-Based Assessment	
Receptor #	
Receptor Name	Baseline
Case	Baseline

Table B.2. Concentration Ratios - Max GLC - Project Case

	Concentration Ratio (CR)			
COPC	**1-Hour**	**24-Hour**	**Annual**	**Lifetime Cancer Risk**
Criteria Air Contaminants				
NO_2	3.69E-01	3.22E-01	8.54E-02	--
$PM_{2.5}$	--	7.42E-01	--	--
PM_{10}	--	6.46E-01	--	--
TPM	--	3.31E-01	9.48E-02	--
VOCs				
Acetaldehyde	1.09E-01	5.62E-03	3.85E-04	8.70E-08
Acrolein	6.00E-01	2.08E+00	7.50E-02	--
Benzene	6.86E-02	1.97E-02	1.20E-03	1.19E-07
Formaldehyde	9.47E-01	2.37E-01	1.26E-01	2.52E-10
HCN	9.68E-02	--	1.50E-02	--
MDI	6.32E-01	--	1.76E-01	--
Methanol	2.45E-02	4.67E-03	5.63E-04	--
Phenol	6.12E-01	--	--	--
Propionaldehyde	--	--	3.75E-03	--

Health-Based Assessment	
Receptor #	
Receptor Name	Max GLC
Case	Project

Table B.3. Concentration Ratios - Max GLC - Cumulative Case

	Concentration Ratio (CR)		
COPC	**1-Hour**	**24-Hour**	**Annual**
Criteria Air Contaminants			
NO_2	3.69E-01	3.22E-01	8.54E-02
$PM_{2.5}$	--	7.42E-01	--
PM_{10}	--	9.17E-01	6.78E-01
TPM	--	3.31E-01	9.48E-02
VOCs			
Acetaldehyde	1.09E-01	5.62E-03	3.85E-04
Acrolein	6.00E-01	2.08E+00	7.50E-02
Benzene	3.19E-01	1.20E-01	2.12E-02
Formaldehyde	9.74E-01	2.48E-01	1.39E-01
HCN	1.37E-01	8.01E-02	5.77E-02
MDI	7.98E-01	2.86E-01	2.56E-01
Methanol	2.45E-02	4.67E-03	5.63E-04
Phenol	9.05E-01	2.47E-01	7.40E-02
Propionaldehyde	--	--	3.75E-03

Health-Based Assessment	
Receptor #	
Receptor Name	Max GLC
Case	Cumulative

Table B.4. Concentration Ratios - School - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	4.71E-02	2.76E-02	3.40E-03	--
PM2.5	1.24E-01	9.96E-02	1.84E-02	--
PM10	--	7.56E-02	1.24E-02	--
TPM	--	3.79E-02	4.29E-03	--
VOCs				
Acetaldehyde	1.47E-02	7.85E-04	5.50E-05	1.24E-08
Acrolein	8.56E-02	2.83E-01	1.46E-02	--
Benzene	9.24E-03	2.76E-03	1.52E-04	1.51E-08
Formaldehyde	1.21E-01	3.35E-02	1.28E-02	2.55E-11
HCN	1.38E-02	2.03E-02	2.79E-03	--
MDI	1.06E-01	6.71E-02	7.06E-03	--
Methanol	3.62E-03	5.28E-04	3.49E-05	--
Phenol	1.00E-01	3.21E-02	3.59E-03	--
Propionaldehyde	--	--	6.50E-04	--

Health-Based Assessment	
Receptor #	2
Receptor Name	School
Case	Project

Table B.5. Concentration Ratios - Minitonas Town Office - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.01E-02	2.25E-02	3.04E-03	--
PM2.5	1.65E-01	7.78E-02	1.64E-02	--
PM10	--	6.02E-02	1.11E-02	--
TPM	--	3.04E-02	3.86E-03	--
VOCs				
Acetaldehyde	1.95E-02	6.12E-04	4.95E-05	1.12E-08
Acrolein	1.17E-01	2.22E-01	1.32E-02	--
Benzene	1.23E-02	2.16E-03	1.37E-04	1.36E-08
Formaldehyde	1.57E-01	2.59E-02	1.15E-02	2.29E-11
HCN	1.88E-02	1.59E-02	2.52E-03	--
MDI	9.04E-02	4.72E-02	6.24E-03	--
Methanol	3.76E-03	4.02E-04	3.11E-05	--
Phenol	9.79E-02	2.51E-02	3.21E-03	--
Propionaldehyde	--	--	5.88E-04	--

Health-Based Assessment	
Receptor #	4
Receptor Name	Minitonas Town Office
Case	Project

Table B.6. Concentration Ratios - Senior's Manor - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	4.91E-02	2.50E-02	3.26E-03	--
PM2.5	1.40E-01	9.22E-02	1.75E-02	--
PM10	--	7.06E-02	1.20E-02	--
TPM	--	3.52E-02	4.17E-03	--
VOCs				
Acetaldehyde	1.18E-02	6.97E-04	5.17E-05	1.17E-08
Acrolein	6.54E-02	2.45E-01	1.36E-02	--
Benzene	7.57E-03	2.45E-03	1.44E-04	1.42E-08
Formaldehyde	1.19E-01	3.06E-02	1.21E-02	2.42E-11
HCN	1.06E-02	1.76E-02	2.60E-03	--
MDI	1.09E-01	6.68E-02	6.88E-03	--
Methanol	3.85E-03	5.08E-04	3.35E-05	--
Phenol	1.18E-01	3.02E-02	3.60E-03	--
Propionaldehyde	--	--	6.08E-04	--

Health-Based Assessment	
Receptor #	8
Receptor Name	Senior's Manor
Case	Project

Table B.7. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	8.56E-02	4.55E-02	2.93E-03	--
PM2.5	2.66E-01	1.84E-01	1.77E-02	--
PM10	--	1.43E-01	1.35E-02	--
TPM	--	7.19E-02	4.93E-03	--
VOCs				
Acetaldehyde	3.06E-02	1.39E-03	5.55E-05	1.26E-08
Acrolein	1.71E-01	4.82E-01	1.48E-02	--
Benzene	1.91E-02	4.86E-03	1.52E-04	1.50E-08
Formaldehyde	2.65E-01	6.23E-02	1.30E-02	2.59E-11
HCN	2.75E-02	3.46E-02	2.83E-03	--
MDI	1.31E-01	1.47E-01	6.88E-03	--
Methanol	6.38E-03	1.07E-03	3.46E-05	--
Phenol	2.41E-01	6.86E-02	5.52E-03	--
Propionaldehyde	--	--	6.61E-04	--

Health-Based Assessment	
Receptor #	9
Receptor Name	Private Residence
Case	Project

Table B.8. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	9.62E-02	6.73E-02	6.34E-03	--
PM2.5	2.76E-01	2.30E-01	3.45E-02	--
PM10	--	1.83E-01	2.72E-02	--
TPM	--	9.20E-02	9.86E-03	--
VOCs				
Acetaldehyde	3.46E-02	1.62E-03	9.19E-05	2.08E-08
Acrolein	2.04E-01	5.58E-01	2.27E-02	--
Benzene	2.16E-02	5.78E-03	2.58E-04	2.55E-08
Formaldehyde	2.80E-01	7.31E-02	2.32E-02	4.64E-11
HCN	3.29E-02	4.01E-02	4.34E-03	--
MDI	1.65E-01	1.94E-01	1.59E-02	--
Methanol	6.26E-03	1.27E-03	6.96E-05	--
Phenol	2.52E-01	8.60E-02	1.04E-02	--
Propionaldehyde	--	--	1.01E-03	--

Health-Based Assessment	
Receptor #	10
Receptor Name	Private Residence
Case	Project

Table B.9. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.56E-01	4.21E-02	7.16E-03	--
PM2.5	3.10E-01	1.55E-01	3.86E-02	--
PM10	--	1.34E-01	2.89E-02	--
TPM	--	6.47E-02	1.01E-02	--
VOCs				
Acetaldehyde	3.13E-02	7.09E-04	9.02E-05	2.04E-08
Acrolein	1.83E-01	2.22E-01	2.02E-02	--
Benzene	1.96E-02	2.57E-03	2.57E-04	2.55E-08
Formaldehyde	2.57E-01	4.15E-02	2.46E-02	4.92E-11
HCN	2.96E-02	1.60E-02	3.88E-03	--
MDI	3.21E-01	2.39E-01	2.06E-02	--
Methanol	9.37E-03	1.14E-03	8.21E-05	--
Phenol	2.62E-01	7.62E-02	1.04E-02	--
Propionaldehyde	--	--	9.00E-04	--

Health-Based Assessment	
Receptor #	11
Receptor Name	Private Residence
Case	Project

Table B.10. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.26E-01	3.66E-02	6.13E-03	--
PM2.5	3.19E-01	1.22E-01	3.28E-02	--
PM10	--	1.03E-01	2.37E-02	--
TPM	--	5.17E-02	8.22E-03	--
VOCs				
Acetaldehyde	3.18E-02	7.07E-04	8.30E-05	1.88E-08
Acrolein	1.87E-01	2.19E-01	1.98E-02	--
Benzene	2.00E-02	2.59E-03	2.35E-04	2.32E-08
Formaldehyde	2.57E-01	3.56E-02	2.14E-02	4.28E-11
HCN	3.02E-02	1.57E-02	3.80E-03	--
MDI	2.82E-01	1.45E-01	1.59E-02	--
Methanol	9.02E-03	7.24E-04	6.73E-05	--
Phenol	2.63E-01	6.32E-02	7.97E-03	--
Propionaldehyde	--	--	8.84E-04	--

Health-Based Assessment	
Receptor #	12
Receptor Name	Private Residence
Case	Project

Table B.11. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	8.29E-02	4.92E-02	5.10E-03	--
PM2.5	2.33E-01	1.60E-01	2.71E-02	--
PM10	--	1.31E-01	1.90E-02	--
TPM	--	6.54E-02	6.59E-03	--
VOCs				
Acetaldehyde	1.77E-02	1.03E-03	7.22E-05	1.63E-08
Acrolein	1.00E-01	3.39E-01	1.79E-02	--
Benzene	1.11E-02	3.72E-03	2.03E-04	2.01E-08
Formaldehyde	1.80E-01	4.84E-02	1.80E-02	3.59E-11
HCN	1.61E-02	2.44E-02	3.44E-03	--
MDI	2.19E-01	1.38E-01	1.22E-02	--
Methanol	6.90E-03	9.00E-04	5.39E-05	--
Phenol	2.13E-01	6.21E-02	6.15E-03	--
Propionaldehyde	--	--	8.00E-04	--

Health-Based Assessment	
Receptor #	13
Receptor Name	Private Residence
Case	Project

Table B.12. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.21E-01	4.95E-02	5.04E-03	--
PM2.5	2.32E-01	1.55E-01	2.39E-02	--
PM10	--	1.40E-01	1.86E-02	--
TPM	--	7.11E-02	6.59E-03	--
VOCs				
Acetaldehyde	2.17E-02	8.72E-04	5.60E-05	1.27E-08
Acrolein	1.17E-01	2.66E-01	1.31E-02	--
Benzene	1.39E-02	3.23E-03	1.62E-04	1.60E-08
Formaldehyde	2.01E-01	4.43E-02	1.48E-02	2.96E-11
HCN	1.88E-02	1.92E-02	2.51E-03	--
MDI	1.73E-01	1.67E-01	1.15E-02	--
Methanol	5.73E-03	9.27E-04	4.74E-05	--
Phenol	3.86E-01	7.87E-02	6.69E-03	--
Propionaldehyde	--	--	5.83E-04	--

Health-Based Assessment	
Receptor #	14
Receptor Name	Private Residence
Case	Project

Table B.13. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.05E-01	5.93E-02	5.83E-03	--
PM2.5	2.71E-01	1.97E-01	3.05E-02	--
PM10	--	1.64E-01	2.34E-02	--
TPM	--	8.39E-02	8.44E-03	--
VOCs				
Acetaldehyde	3.23E-02	1.41E-03	8.59E-05	1.94E-08
Acrolein	1.85E-01	4.93E-01	2.22E-02	--
Benzene	2.02E-02	5.04E-03	2.40E-04	2.38E-08
Formaldehyde	2.71E-01	6.28E-02	2.07E-02	4.14E-11
HCN	2.98E-02	3.54E-02	4.24E-03	--
MDI	1.61E-01	1.55E-01	1.25E-02	--
Methanol	6.56E-03	1.06E-03	5.86E-05	--
Phenol	2.10E-01	7.74E-02	8.36E-03	--
Propionaldehyde	--	--	9.89E-04	--

Health-Based Assessment	
Receptor #	15
Receptor Name	Private Residence
Case	Project

Table B.14. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.03E-02	4.67E-02	5.37E-03	--
PM2.5	1.69E-01	1.64E-01	2.93E-02	--
PM10	--	1.30E-01	2.05E-02	--
TPM	--	6.51E-02	7.13E-03	--
VOCs				
Acetaldehyde	2.00E-02	1.19E-03	8.24E-05	1.86E-08
Acrolein	1.15E-01	4.14E-01	2.10E-02	--
Benzene	1.26E-02	4.23E-03	2.30E-04	2.27E-08
Formaldehyde	1.66E-01	5.32E-02	2.00E-02	3.99E-11
HCN	1.86E-02	2.97E-02	4.02E-03	--
MDI	1.40E-01	1.23E-01	1.26E-02	--
Methanol	4.24E-03	9.05E-04	5.78E-05	--
Phenol	1.45E-01	5.87E-02	6.45E-03	--
Propionaldehyde	--	--	9.38E-04	--

Health-Based Assessment	
Receptor #	16
Receptor Name	Private Residence
Case	Project

Table B.15. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.66E-02	3.30E-02	4.40E-03	--
PM2.5	1.67E-01	1.16E-01	2.44E-02	--
PM10	--	8.90E-02	1.68E-02	--
TPM	--	4.47E-02	5.90E-03	--
VOCs				
Acetaldehyde	1.93E-02	9.11E-04	7.49E-05	1.70E-08
Acrolein	1.14E-01	3.29E-01	2.00E-02	--
Benzene	1.21E-02	3.20E-03	2.07E-04	2.05E-08
Formaldehyde	1.66E-01	3.87E-02	1.73E-02	3.45E-11
HCN	1.84E-02	2.36E-02	3.83E-03	--
MDI	1.08E-01	7.81E-02	9.14E-03	--
Methanol	3.95E-03	6.06E-04	4.62E-05	--
Phenol	1.71E-01	3.75E-02	5.33E-03	--
Propionaldehyde	--	--	8.94E-04	--

Health-Based Assessment	
Receptor #	17
Receptor Name	Private Residence
Case	Project

Table B.16. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	4.87E-02	2.14E-02	3.61E-03	--
PM2.5	1.47E-01	8.14E-02	2.02E-02	--
PM10	--	6.18E-02	1.38E-02	--
TPM	--	3.11E-02	4.81E-03	--
VOCs				
Acetaldehyde	1.69E-02	6.06E-04	6.29E-05	1.42E-08
Acrolein	9.60E-02	2.10E-01	1.69E-02	--
Benzene	1.05E-02	2.12E-03	1.73E-04	1.71E-08
Formaldehyde	1.47E-01	2.72E-02	1.44E-02	2.88E-11
HCN	1.55E-02	1.51E-02	3.23E-03	--
MDI	1.11E-01	6.60E-02	7.50E-03	--
Methanol	3.56E-03	4.72E-04	3.83E-05	--
Phenol	1.12E-01	2.87E-02	4.24E-03	--
Propionaldehyde	--	--	7.54E-04	--

Health-Based Assessment	
Receptor #	18
Receptor Name	Private Residence
Case	Project

Table B.17. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	3.56E-02	1.55E-02	1.12E-03	--
PM2.5	1.03E-01	5.84E-02	6.38E-03	--
PM10	--	4.41E-02	4.46E-03	--
TPM	--	2.21E-02	1.58E-03	--
VOCs				
Acetaldehyde	1.22E-02	4.63E-04	2.04E-05	4.61E-09
Acrolein	7.03E-02	1.66E-01	5.53E-03	--
Benzene	7.55E-03	1.62E-03	5.57E-05	5.51E-09
Formaldehyde	1.01E-01	1.98E-02	4.62E-03	9.23E-12
HCN	1.13E-02	1.19E-02	1.06E-03	--
MDI	6.08E-02	3.88E-02	2.28E-03	--
Methanol	2.53E-03	3.16E-04	1.20E-05	--
Phenol	6.60E-02	1.83E-02	1.43E-03	--
Propionaldehyde	--	--	2.46E-04	--

Health-Based Assessment	
Receptor #	19
Receptor Name	Private Residence
Case	Project

Table B.18. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	3.71E-02	6.78E-03	7.55E-04	--
PM2.5	1.03E-01	2.65E-02	4.21E-03	--
PM10	--	2.14E-02	3.15E-03	--
TPM	--	1.12E-02	1.11E-03	--
VOCs				
Acetaldehyde	1.27E-02	1.92E-04	1.08E-05	2.44E-09
Acrolein	7.48E-02	6.90E-02	2.58E-03	--
Benzene	7.98E-03	6.72E-04	3.03E-05	3.00E-09
Formaldehyde	1.03E-01	8.48E-03	2.80E-03	5.60E-12
HCN	1.21E-02	4.95E-03	4.93E-04	--
MDI	1.29E-01	3.20E-02	2.08E-03	--
Methanol	3.73E-03	1.82E-04	8.77E-06	--
Phenol	1.17E-01	1.43E-02	1.21E-03	--
Propionaldehyde	--	--	1.15E-04	--

Health-Based Assessment	
Receptor #	20
Receptor Name	Private Residence
Case	Project

Table B.19. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.30E-02	2.31E-02	5.27E-03	--
PM2.5	1.75E-01	8.57E-02	2.89E-02	--
PM10	--	6.82E-02	1.97E-02	--
TPM	--	3.40E-02	6.79E-03	--
VOCs				
Acetaldehyde	1.65E-02	5.85E-04	8.12E-05	1.84E-08
Acrolein	9.58E-02	1.94E-01	2.06E-02	--
Benzene	1.04E-02	2.08E-03	2.26E-04	2.24E-08
Formaldehyde	1.56E-01	2.74E-02	1.97E-02	3.93E-11
HCN	1.55E-02	1.40E-02	3.95E-03	--
MDI	1.41E-01	7.59E-02	1.25E-02	--
Methanol	4.51E-03	5.04E-04	5.72E-05	--
Phenol	1.27E-01	3.32E-02	6.04E-03	--
Propionaldehyde	--	--	9.21E-04	--

Health-Based Assessment	
Receptor #	21
Receptor Name	Private Residence
Case	Project

Table B.20. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.07E-01	3.29E-02	4.66E-03	--
PM2.5	2.66E-01	1.06E-01	2.47E-02	--
PM10	--	8.45E-02	1.68E-02	--
TPM	--	4.25E-02	5.80E-03	--
VOCs				
Acetaldehyde	2.08E-02	7.44E-04	6.95E-05	1.57E-08
Acrolein	1.08E-01	2.59E-01	1.79E-02	--
Benzene	1.35E-02	2.67E-03	1.94E-04	1.92E-08
Formaldehyde	2.16E-01	3.30E-02	1.67E-02	3.33E-11
HCN	1.74E-02	1.86E-02	3.42E-03	--
MDI	2.09E-01	7.95E-02	1.02E-02	--
Methanol	7.06E-03	5.68E-04	4.78E-05	--
Phenol	2.36E-01	3.74E-02	5.04E-03	--
Propionaldehyde	--	--	7.98E-04	--

Health-Based Assessment	
Receptor #	22
Receptor Name	Private Residence
Case	Project

Table B.21. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.96E-02	2.42E-02	6.41E-03	--
PM2.5	1.66E-01	9.17E-02	3.55E-02	--
PM10	--	7.53E-02	2.49E-02	--
TPM	--	3.76E-02	8.62E-03	--
VOCs				
Acetaldehyde	1.92E-02	5.77E-04	9.36E-05	2.12E-08
Acrolein	1.10E-01	1.88E-01	2.28E-02	--
Benzene	1.21E-02	2.06E-03	2.62E-04	2.60E-08
Formaldehyde	1.61E-01	2.85E-02	2.37E-02	4.73E-11
HCN	1.78E-02	1.35E-02	4.38E-03	--
MDI	1.55E-01	9.26E-02	1.68E-02	--
Methanol	4.78E-03	5.65E-04	7.26E-05	--
Phenol	1.50E-01	4.04E-02	8.19E-03	--
Propionaldehyde	--	--	1.02E-03	--

Health-Based Assessment	
Receptor #	23
Receptor Name	Private Residence
Case	Project

Table B.22. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	8.10E-02	3.53E-02	9.63E-03	--
PM2.5	1.75E-01	1.14E-01	5.08E-02	--
PM10	--	8.85E-02	3.54E-02	--
TPM	--	4.45E-02	1.22E-02	--
VOCs				
Acetaldehyde	1.90E-02	8.60E-04	1.39E-04	3.15E-08
Acrolein	1.08E-01	3.10E-01	3.52E-02	--
Benzene	1.21E-02	3.06E-03	3.91E-04	3.87E-08
Formaldehyde	1.62E-01	3.66E-02	3.40E-02	6.79E-11
HCN	1.74E-02	2.23E-02	6.75E-03	--
MDI	1.32E-01	9.68E-02	2.19E-02	--
Methanol	4.38E-03	5.74E-04	9.95E-05	--
Phenol	1.35E-01	4.16E-02	1.10E-02	--
Propionaldehyde	--	--	1.57E-03	--

Health-Based Assessment	
Receptor #	24
Receptor Name	Private Residence
Case	Project

Table B.23. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.99E-02	3.27E-02	7.60E-03	--
PM2.5	2.26E-01	1.19E-01	4.46E-02	--
PM10	--	1.09E-01	3.39E-02	--
TPM	--	5.50E-02	1.18E-02	--
VOCs				
Acetaldehyde	2.00E-02	8.20E-04	9.76E-05	2.21E-08
Acrolein	1.13E-01	2.89E-01	2.00E-02	--
Benzene	1.27E-02	2.91E-03	2.78E-04	2.75E-08
Formaldehyde	1.85E-01	3.59E-02	2.84E-02	5.68E-11
HCN	1.82E-02	2.08E-02	3.86E-03	--
MDI	2.84E-01	1.98E-01	2.67E-02	--
Methanol	8.29E-03	9.43E-04	1.01E-04	--
Phenol	2.18E-01	8.23E-02	1.31E-02	--
Propionaldehyde	--	--	8.94E-04	--

Health-Based Assessment	
Receptor #	25
Receptor Name	Private Residence
Case	Project

Table B.24. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.25E-01	5.30E-02	5.35E-03	--
PM2.5	3.31E-01	1.84E-01	2.82E-02	--
PM10	--	1.43E-01	1.89E-02	--
TPM	--	7.16E-02	6.51E-03	--
VOCs				
Acetaldehyde	3.76E-02	1.35E-03	8.39E-05	1.90E-08
Acrolein	2.13E-01	4.74E-01	2.23E-02	--
Benzene	2.38E-02	4.79E-03	2.33E-04	2.31E-08
Formaldehyde	3.19E-01	5.96E-02	1.94E-02	3.88E-11
HCN	3.44E-02	3.40E-02	4.26E-03	--
MDI	1.84E-01	1.33E-01	1.06E-02	--
Methanol	7.51E-03	9.99E-04	5.28E-05	--
Phenol	1.56E-01	5.98E-02	5.18E-03	--
Propionaldehyde	--	--	9.94E-04	--

Health-Based Assessment	
Receptor #	26
Receptor Name	Private Residence
Case	Project

Table B.25. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.47E-02	3.49E-02	4.20E-03	--
PM2.5	2.04E-01	1.22E-01	2.27E-02	--
PM10	--	9.51E-02	1.56E-02	--
TPM	--	4.80E-02	5.45E-03	--
VOCs				
Acetaldehyde	2.56E-02	9.32E-04	6.68E-05	1.51E-08
Acrolein	1.52E-01	3.33E-01	1.75E-02	--
Benzene	1.61E-02	3.29E-03	1.85E-04	1.83E-08
Formaldehyde	2.05E-01	4.02E-02	1.57E-02	3.14E-11
HCN	2.46E-02	2.39E-02	3.36E-03	--
MDI	1.14E-01	8.01E-02	8.96E-03	--
Methanol	4.84E-03	6.44E-04	4.34E-05	--
Phenol	1.30E-01	4.13E-02	4.71E-03	--
Propionaldehyde	--	--	7.83E-04	--

Health-Based Assessment	
Receptor #	27
Receptor Name	Private Residence
Case	Project

Table B.26. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.40E-02	3.23E-02	3.88E-03	--
PM2.5	2.02E-01	1.13E-01	2.10E-02	--
PM10	--	8.82E-02	1.44E-02	--
TPM	--	4.45E-02	5.01E-03	--
VOCs				
Acetaldehyde	2.53E-02	8.69E-04	6.22E-05	1.41E-08
Acrolein	1.50E-01	3.11E-01	1.64E-02	--
Benzene	1.59E-02	3.07E-03	1.72E-04	1.71E-08
Formaldehyde	2.03E-01	3.74E-02	1.45E-02	2.91E-11
HCN	2.42E-02	2.23E-02	3.14E-03	--
MDI	1.05E-01	7.45E-02	8.16E-03	--
Methanol	4.52E-03	6.00E-04	4.00E-05	--
Phenol	1.23E-01	3.81E-02	4.30E-03	--
Propionaldehyde	--	--	7.31E-04	--

Health-Based Assessment	
Receptor #	29
Receptor Name	Private Residence
Case	Project

Table B.27. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.22E-02	1.77E-02	1.54E-03	--
PM2.5	1.58E-01	5.62E-02	7.83E-03	--
PM10	--	4.56E-02	6.54E-03	--
TPM	--	2.29E-02	2.35E-03	--
VOCs				
Acetaldehyde	1.20E-02	3.75E-04	1.51E-05	3.42E-09
Acrolein	6.92E-02	1.27E-01	2.88E-03	--
Benzene	7.58E-03	1.35E-03	4.47E-05	4.42E-09
Formaldehyde	1.02E-01	1.71E-02	4.67E-03	9.34E-12
HCN	1.12E-02	9.14E-03	5.53E-04	--
MDI	1.59E-01	5.08E-02	4.72E-03	--
Methanol	4.61E-03	3.04E-04	1.73E-05	--
Phenol	1.43E-01	2.15E-02	2.80E-03	--
Propionaldehyde	--	--	1.28E-04	--

Health-Based Assessment	
Receptor #	31
Receptor Name	Private Residence
Case	Project

Table B.28. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.98E-02	1.50E-02	1.07E-03	--
PM2.5	1.61E-01	4.76E-02	5.82E-03	--
PM10	--	3.91E-02	4.98E-03	--
TPM	--	1.96E-02	1.82E-03	--
VOCs				
Acetaldehyde	1.92E-02	2.98E-04	1.20E-05	2.71E-09
Acrolein	1.11E-01	9.76E-02	2.38E-03	--
Benzene	1.21E-02	1.09E-03	3.47E-05	3.43E-09
Formaldehyde	1.58E-01	1.42E-02	3.61E-03	7.23E-12
HCN	1.79E-02	7.02E-03	4.60E-04	--
MDI	1.29E-01	4.13E-02	3.48E-03	--
Methanol	3.73E-03	2.67E-04	1.30E-05	--
Phenol	1.39E-01	1.94E-02	2.27E-03	--
Propionaldehyde	--	--	1.06E-04	--

Health-Based Assessment	
Receptor #	32
Receptor Name	Private Residence
Case	Project

Table B.29. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.30E-02	1.68E-02	2.33E-03	--
PM2.5	1.62E-01	5.93E-02	1.13E-02	--
PM10	--	4.53E-02	8.91E-03	--
TPM	--	2.26E-02	3.20E-03	--
VOCs				
Acetaldehyde	1.94E-02	4.54E-04	2.79E-05	6.32E-09
Acrolein	1.14E-01	1.62E-01	6.73E-03	--
Benzene	1.22E-02	1.60E-03	8.00E-05	7.92E-09
Formaldehyde	1.57E-01	1.96E-02	7.20E-03	1.44E-11
HCN	1.84E-02	1.16E-02	1.29E-03	--
MDI	1.12E-01	4.60E-02	5.22E-03	--
Methanol	3.85E-03	3.16E-04	2.22E-05	--
Phenol	1.39E-01	2.26E-02	3.37E-03	--
Propionaldehyde	--	--	3.00E-04	--

Health-Based Assessment	
Receptor #	33
Receptor Name	Private Residence
Case	Project

Table B.30. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.67E-02	1.86E-02	3.00E-03	--
PM2.5	1.60E-01	6.38E-02	1.43E-02	--
PM10	--	5.05E-02	1.08E-02	--
TPM	--	2.54E-02	3.82E-03	--
VOCs				
Acetaldehyde	1.60E-02	4.63E-04	3.65E-05	8.27E-09
Acrolein	9.37E-02	1.62E-01	9.08E-03	--
Benzene	1.00E-02	1.65E-03	1.04E-04	1.03E-08
Formaldehyde	1.37E-01	2.05E-02	9.10E-03	1.82E-11
HCN	1.51E-02	1.16E-02	1.74E-03	--
MDI	1.03E-01	4.63E-02	6.12E-03	--
Methanol	3.69E-03	3.45E-04	2.71E-05	--
Phenol	1.33E-01	2.23E-02	3.69E-03	--
Propionaldehyde	--	--	4.05E-04	--

Health-Based Assessment	
Receptor #	34
Receptor Name	Private Residence
Case	Project

Table B.31. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.72E-02	9.94E-03	1.48E-03	--
PM2.5	1.52E-01	3.53E-02	7.48E-03	--
PM10	--	2.66E-02	5.63E-03	--
TPM	--	1.33E-02	2.00E-03	--
VOCs				
Acetaldehyde	1.74E-02	2.79E-04	1.95E-05	4.42E-09
Acrolein	9.94E-02	1.01E-01	4.83E-03	--
Benzene	1.10E-02	9.79E-04	5.53E-05	5.48E-09
Formaldehyde	1.46E-01	1.18E-02	4.89E-03	9.78E-12
HCN	1.60E-02	7.23E-03	9.27E-04	--
MDI	7.56E-02	2.33E-02	3.32E-03	--
Methanol	3.34E-03	1.85E-04	1.47E-05	--
Phenol	8.98E-02	1.73E-02	1.98E-03	--
Propionaldehyde	--	--	2.16E-04	--

Health-Based Assessment	
Receptor #	35
Receptor Name	Private Residence
Case	Project

Table B.32. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.14E-02	2.88E-02	4.92E-03	--
PM2.5	1.40E-01	9.99E-02	2.47E-02	--
PM10	--	7.52E-02	1.72E-02	--
TPM	--	3.77E-02	5.98E-03	--
VOCs				
Acetaldehyde	1.70E-02	8.19E-04	7.12E-05	1.61E-08
Acrolein	9.83E-02	3.02E-01	1.87E-02	--
Benzene	1.06E-02	2.86E-03	1.99E-04	1.97E-08
Formaldehyde	1.40E-01	3.39E-02	1.67E-02	3.34E-11
HCN	1.58E-02	2.16E-02	3.59E-03	--
MDI	9.26E-02	8.22E-02	9.44E-03	--
Methanol	3.25E-03	5.06E-04	4.60E-05	--
Phenol	1.03E-01	3.60E-02	5.10E-03	--
Propionaldehyde	--	--	8.36E-04	--

Health-Based Assessment	
Receptor #	36
Receptor Name	Private Residence
Case	Project

Table B.33. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.35E-02	5.79E-02	8.43E-03	--
PM2.5	1.80E-01	1.79E-01	4.19E-02	--
PM10	--	1.48E-01	2.88E-02	--
TPM	--	7.36E-02	1.00E-02	--
VOCs				
Acetaldehyde	2.20E-02	1.22E-03	1.21E-04	2.74E-08
Acrolein	1.29E-01	4.36E-01	3.21E-02	--
Benzene	1.38E-02	4.28E-03	3.40E-04	3.36E-08
Formaldehyde	1.80E-01	5.24E-02	2.82E-02	5.64E-11
HCN	2.08E-02	3.12E-02	6.14E-03	--
MDI	9.61E-02	1.70E-01	1.57E-02	--
Methanol	3.90E-03	1.03E-03	7.72E-05	--
Phenol	1.12E-01	6.87E-02	8.30E-03	--
Propionaldehyde	--	--	1.43E-03	--

Health-Based Assessment	
Receptor #	37
Receptor Name	Private Residence
Case	Project

Table B.34. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.83E-02	3.29E-02	9.90E-03	--
PM2.5	1.64E-01	1.22E-01	5.16E-02	--
PM10	--	9.23E-02	3.47E-02	--
TPM	--	4.59E-02	1.20E-02	--
VOCs				
Acetaldehyde	2.00E-02	9.34E-04	1.52E-04	3.44E-08
Acrolein	1.17E-01	3.31E-01	4.02E-02	--
Benzene	1.26E-02	3.28E-03	4.23E-04	4.19E-08
Formaldehyde	1.63E-01	4.07E-02	3.53E-02	7.07E-11
HCN	1.89E-02	2.37E-02	7.69E-03	--
MDI	9.08E-02	8.58E-02	1.97E-02	--
Methanol	3.52E-03	6.67E-04	9.69E-05	--
Phenol	1.30E-01	3.78E-02	9.75E-03	--
Propionaldehyde	--	--	1.79E-03	--

Health-Based Assessment	
Receptor #	38
Receptor Name	Private Residence
Case	Project

Table B.35. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.17E-01	4.49E-02	4.78E-03	--
PM2.5	2.15E-01	1.31E-01	2.29E-02	--
PM10	--	1.19E-01	1.79E-02	--
TPM	--	6.05E-02	6.36E-03	--
VOCs				
Acetaldehyde	2.26E-02	7.78E-04	5.27E-05	1.19E-08
Acrolein	1.23E-01	2.57E-01	1.21E-02	--
Benzene	1.44E-02	2.80E-03	1.53E-04	1.51E-08
Formaldehyde	2.01E-01	3.67E-02	1.41E-02	2.83E-11
HCN	1.99E-02	1.84E-02	2.33E-03	--
MDI	1.78E-01	1.37E-01	1.13E-02	--
Methanol	5.42E-03	7.68E-04	4.60E-05	--
Phenol	3.03E-01	6.60E-02	6.54E-03	--
Propionaldehyde	--	--	5.40E-04	--

Health-Based Assessment	
Receptor #	39
Receptor Name	Private Residence
Case	Project

Table B.36. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	1.41E-01	5.51E-02	5.17E-03	--
PM2.5	3.73E-01	1.98E-01	2.73E-02	--
PM10	--	1.47E-01	1.80E-02	--
TPM	--	7.34E-02	6.24E-03	--
VOCs				
Acetaldehyde	4.43E-02	1.59E-03	8.73E-05	1.97E-08
Acrolein	2.58E-01	5.81E-01	2.40E-02	--
Benzene	2.80E-02	5.58E-03	2.41E-04	2.38E-08
Formaldehyde	3.65E-01	6.69E-02	1.94E-02	3.87E-11
HCN	4.16E-02	4.16E-02	4.60E-03	--
MDI	1.75E-01	1.18E-01	8.92E-03	--
Methanol	7.91E-03	1.03E-03	4.90E-05	--
Phenol	1.95E-01	5.62E-02	4.93E-03	--
Propionaldehyde	--	--	1.07E-03	--

Health-Based Assessment	
Receptor #	40
Receptor Name	Private Residence
Case	Project

Table B.37. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	4.32E-02	2.23E-02	3.18E-03	--
PM2.5	1.26E-01	8.11E-02	1.74E-02	--
PM10	--	6.14E-02	1.17E-02	--
TPM	--	3.07E-02	4.07E-03	--
VOCs				
Acetaldehyde	1.55E-02	6.37E-04	5.49E-05	1.24E-08
Acrolein	8.96E-02	2.28E-01	1.49E-02	--
Benzene	9.64E-03	2.23E-03	1.51E-04	1.49E-08
Formaldehyde	1.29E-01	2.73E-02	1.24E-02	2.48E-11
HCN	1.44E-02	1.64E-02	2.85E-03	--
MDI	9.48E-02	5.30E-02	6.16E-03	--
Methanol	2.99E-03	4.33E-04	3.24E-05	--
Phenol	1.06E-01	2.80E-02	3.43E-03	--
Propionaldehyde	--	--	6.64E-04	--

Health-Based Assessment	
Receptor #	42
Receptor Name	Private Residence
Case	Project

Table B.38. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	4.44E-02	1.76E-02	3.82E-03	--
PM2.5	1.18E-01	6.19E-02	2.09E-02	--
PM10	--	4.83E-02	1.41E-02	--
TPM	--	2.44E-02	4.89E-03	--
VOCs				
Acetaldehyde	1.44E-02	4.60E-04	6.44E-05	1.46E-08
Acrolein	8.40E-02	1.63E-01	1.73E-02	--
Benzene	9.00E-03	1.63E-03	1.78E-04	1.76E-08
Formaldehyde	1.19E-01	2.01E-02	1.47E-02	2.95E-11
HCN	1.35E-02	1.17E-02	3.31E-03	--
MDI	8.41E-02	5.06E-02	7.70E-03	--
Methanol	2.98E-03	3.44E-04	3.93E-05	--
Phenol	9.35E-02	3.04E-02	4.12E-03	--
Propionaldehyde	--	--	7.71E-04	--

Health-Based Assessment	
Receptor #	43
Receptor Name	Private Residence
Case	Project

Table B.39. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.19E-02	2.45E-02	3.78E-03	--
PM2.5	1.51E-01	8.70E-02	2.06E-02	--
PM10	--	6.60E-02	1.39E-02	--
TPM	--	3.31E-02	4.81E-03	--
VOCs				
Acetaldehyde	1.71E-02	6.92E-04	6.23E-05	1.41E-08
Acrolein	9.63E-02	2.51E-01	1.66E-02	--
Benzene	1.08E-02	2.43E-03	1.72E-04	1.70E-08
Formaldehyde	1.47E-01	2.93E-02	1.44E-02	2.88E-11
HCN	1.55E-02	1.80E-02	3.17E-03	--
MDI	9.77E-02	5.53E-02	7.78E-03	--
Methanol	3.46E-03	4.54E-04	3.89E-05	--
Phenol	1.06E-01	3.79E-02	4.05E-03	--
Propionaldehyde	--	--	7.40E-04	--

Health-Based Assessment	
Receptor #	45
Receptor Name	Private Residence
Case	Project

Table B.40. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	4.61E-02	2.67E-02	3.79E-03	--
PM2.5	1.41E-01	9.55E-02	2.06E-02	--
PM10	--	7.24E-02	1.39E-02	--
TPM	--	3.63E-02	4.83E-03	--
VOCs				
Acetaldehyde	1.55E-02	7.57E-04	6.20E-05	1.40E-08
Acrolein	8.89E-02	2.74E-01	1.64E-02	--
Benzene	9.76E-03	2.66E-03	1.72E-04	1.70E-08
Formaldehyde	1.37E-01	3.21E-02	1.44E-02	2.88E-11
HCN	1.43E-02	1.96E-02	3.14E-03	--
MDI	1.01E-01	5.94E-02	7.92E-03	--
Methanol	3.41E-03	5.01E-04	3.92E-05	--
Phenol	9.48E-02	3.50E-02	4.06E-03	--
Propionaldehyde	--	--	7.34E-04	--

Health-Based Assessment	
Receptor #	48
Receptor Name	Private Residence
Case	Project

Table B.41. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	5.12E-02	3.45E-02	4.12E-03	--
PM2.5	1.44E-01	1.22E-01	2.24E-02	--
PM10	--	9.50E-02	1.53E-02	--
TPM	--	4.77E-02	5.31E-03	--
VOCs				
Acetaldehyde	1.76E-02	9.09E-04	6.52E-05	1.47E-08
Acrolein	1.03E-01	3.24E-01	1.70E-02	--
Benzene	1.10E-02	3.21E-03	1.81E-04	1.79E-08
Formaldehyde	1.44E-01	3.98E-02	1.54E-02	3.08E-11
HCN	1.65E-02	2.32E-02	3.25E-03	--
MDI	1.15E-01	8.63E-02	9.00E-03	--
Methanol	3.71E-03	6.59E-04	4.31E-05	--
Phenol	1.16E-01	4.14E-02	4.60E-03	--
Propionaldehyde	--	--	7.59E-04	--

Health-Based Assessment	
Receptor #	53
Receptor Name	Private Residence
Case	Project

Table B.42. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.55E-02	2.72E-02	3.51E-03	--
PM2.5	1.77E-01	9.36E-02	1.90E-02	--
PM10	--	7.31E-02	1.30E-02	--
TPM	--	3.70E-02	4.51E-03	--
VOCs				
Acetaldehyde	2.18E-02	7.30E-04	5.64E-05	1.27E-08
Acrolein	1.30E-01	2.64E-01	1.49E-02	--
Benzene	1.37E-02	2.57E-03	1.56E-04	1.54E-08
Formaldehyde	1.73E-01	3.10E-02	1.32E-02	2.63E-11
HCN	2.10E-02	1.89E-02	2.84E-03	--
MDI	1.00E-01	5.78E-02	7.38E-03	--
Methanol	4.10E-03	4.85E-04	3.62E-05	--
Phenol	1.09E-01	3.13E-02	3.86E-03	--
Propionaldehyde	--	--	6.63E-04	--

Health-Based Assessment	
Receptor #	59
Receptor Name	Private Residence
Case	Project

Table B.43. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.09E-02	2.19E-02	3.04E-03	--
PM2.5	1.72E-01	7.97E-02	1.63E-02	--
PM10	--	6.00E-02	1.10E-02	--
TPM	--	2.99E-02	3.83E-03	--
VOCs				
Acetaldehyde	1.98E-02	6.27E-04	4.97E-05	1.12E-08
Acrolein	1.13E-01	2.25E-01	1.33E-02	--
Benzene	1.25E-02	2.20E-03	1.37E-04	1.36E-08
Formaldehyde	1.68E-01	2.68E-02	1.14E-02	2.28E-11
HCN	1.82E-02	1.61E-02	2.55E-03	--
MDI	9.66E-02	5.21E-02	6.00E-03	--
Methanol	3.85E-03	4.26E-04	3.05E-05	--
Phenol	1.24E-01	2.40E-02	3.21E-03	--
Propionaldehyde	--	--	5.94E-04	--

Health-Based Assessment	
Receptor #	63
Receptor Name	Private Residence
Case	Project

Table B.44. Concentration Ratios - Private Residence - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	8.56E-02	2.20E-02	2.71E-03	--
PM2.5	2.52E-01	7.78E-02	1.43E-02	--
PM10	--	5.91E-02	9.56E-03	--
TPM	--	2.96E-02	3.32E-03	--
VOCs				
Acetaldehyde	2.89E-02	6.10E-04	4.48E-05	1.01E-08
Acrolein	1.63E-01	2.20E-01	1.22E-02	--
Benzene	1.81E-02	2.14E-03	1.24E-04	1.22E-08
Formaldehyde	2.47E-01	2.60E-02	1.01E-02	2.01E-11
HCN	2.62E-02	1.58E-02	2.33E-03	--
MDI	1.35E-01	4.92E-02	4.90E-03	--
Methanol	5.81E-03	4.09E-04	2.60E-05	--
Phenol	1.45E-01	2.39E-02	2.67E-03	--
Propionaldehyde	--	--	5.45E-04	--

Health-Based Assessment	
Receptor #	64
Receptor Name	Private Residence
Case	Project

Table B.45. Concentration Ratios - Air Monitoring Station #1 - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	7.75E-02	2.50E-02	1.67E-03	--
PM2.5	1.67E-01	7.70E-02	8.49E-03	--
PM10	--	6.38E-02	6.98E-03	--
TPM	--	3.20E-02	2.52E-03	--
VOCs				
Acetaldehyde	1.47E-02	4.74E-04	1.81E-05	4.10E-09
Acrolein	8.31E-02	1.55E-01	3.83E-03	--
Benzene	9.36E-03	1.74E-03	5.27E-05	5.21E-09
Formaldehyde	1.34E-01	2.26E-02	5.21E-03	1.04E-11
HCN	1.34E-02	1.11E-02	7.37E-04	--
MDI	1.66E-01	6.62E-02	4.72E-03	--
Methanol	4.80E-03	4.26E-04	1.81E-05	--
Phenol	1.51E-01	2.93E-02	2.89E-03	--
Propionaldehyde	--	--	1.70E-04	--

Health-Based Assessment	
Receptor #	65
Receptor Name	Air Monitoring Station #1
Case	Project

Table B.46. Concentration Ratios - Air Monitoring Station #2 - Project Case

COPC	Concentration Ratio (CR)			Incremental Lifetime Cancer Risk
	1-Hour	24-Hour	Annual	
Criteria Air Contaminants				
NOX	6.58E-02	4.51E-02	5.70E-03	--
PM2.5	1.78E-01	1.51E-01	3.13E-02	--
PM10	--	1.20E-01	2.19E-02	--
TPM	--	6.09E-02	7.63E-03	--
VOCs				
Acetaldehyde	2.10E-02	1.10E-03	8.82E-05	1.99E-08
Acrolein	1.22E-01	3.87E-01	2.24E-02	--
Benzene	1.33E-02	3.92E-03	2.45E-04	2.43E-08
Formaldehyde	1.74E-01	4.84E-02	2.14E-02	4.28E-11
HCN	1.97E-02	2.78E-02	4.30E-03	--
MDI	1.44E-01	1.06E-01	1.35E-02	--
Methanol	4.17E-03	8.03E-04	6.20E-05	--
Phenol	1.50E-01	5.47E-02	6.93E-03	--
Propionaldehyde	--	--	1.00E-03	--

Health-Based Assessment	
Receptor #	66
Receptor Name	Air Monitoring Station #2
Case	Project

Table B.47. Concentration Ratios - School - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	4.71E-02	2.76E-02	3.40E-03
PM2.5	1.24E-01	9.96E-02	1.84E-02
PM10	--	3.47E-01	6.90E-01
TPM	--	3.79E-02	4.29E-03
VOCs			
Acetaldehyde	1.47E-02	7.85E-04	5.50E-05
Acrolein	8.56E-02	2.83E-01	1.46E-02
Benzene	2.59E-01	1.03E-01	2.02E-02
Formaldehyde	1.48E-01	4.36E-02	2.60E-02
HCN	5.39E-02	1.00E-01	4.55E-02
MDI	2.72E-01	3.53E-01	8.71E-02
Methanol	3.62E-03	5.28E-04	3.49E-05
Phenol	3.94E-01	2.79E-01	7.76E-02
Propionaldehyde	--	--	6.50E-04

Health-Based Assessment	
Receptor #	2
Receptor Name	School
Case	Cumulative

Table B.48. Concentration Ratios - Minitonas Town Office - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.01E-02	2.25E-02	3.04E-03
PM2.5	1.65E-01	7.78E-02	1.64E-02
PM10	--	3.31E-01	6.89E-01
TPM	--	3.04E-02	3.86E-03
VOCs			
Acetaldehyde	1.95E-02	6.12E-04	4.95E-05
Acrolein	1.17E-01	2.22E-01	1.32E-02
Benzene	2.62E-01	1.02E-01	2.01E-02
Formaldehyde	1.85E-01	3.61E-02	2.47E-02
HCN	5.89E-02	9.60E-02	4.53E-02
MDI	2.57E-01	3.33E-01	8.62E-02
Methanol	3.76E-03	4.02E-04	3.11E-05
Phenol	3.92E-01	2.72E-01	7.72E-02
Propionaldehyde	--	--	5.88E-04

Health-Based Assessment	
Receptor #	4
Receptor Name	Minitonas Town Office
Case	Cumulative

Table B.49. Concentration Ratios - Senior's Manor - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	4.91E-02	2.50E-02	3.26E-03
PM2.5	1.40E-01	9.22E-02	1.75E-02
PM10	--	3.42E-01	6.90E-01
TPM	--	3.52E-02	4.17E-03
VOCs			
Acetaldehyde	1.18E-02	6.97E-04	5.17E-05
Acrolein	6.54E-02	2.45E-01	1.36E-02
Benzene	2.58E-01	1.02E-01	2.01E-02
Formaldehyde	1.46E-01	4.07E-02	2.53E-02
HCN	5.06E-02	9.77E-02	4.53E-02
MDI	2.76E-01	3.53E-01	8.69E-02
Methanol	3.85E-03	5.08E-04	3.35E-05
Phenol	4.12E-01	2.77E-01	7.76E-02
Propionaldehyde	--	--	6.08E-04

Health-Based Assessment	
Receptor #	8
Receptor Name	Senior's Manor
Case	Cumulative

Table B.50. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	8.56E-02	4.55E-02	2.93E-03
PM2.5	2.66E-01	1.84E-01	1.77E-02
PM10	--	4.14E-01	6.91E-01
TPM	--	7.19E-02	4.93E-03
VOCs			
Acetaldehyde	3.06E-02	1.39E-03	5.55E-05
Acrolein	1.71E-01	4.82E-01	1.48E-02
Benzene	2.69E-01	1.05E-01	2.02E-02
Formaldehyde	2.92E-01	7.25E-02	2.62E-02
HCN	6.76E-02	1.15E-01	4.56E-02
MDI	2.98E-01	4.32E-01	8.69E-02
Methanol	6.38E-03	1.07E-03	3.46E-05
Phenol	5.35E-01	3.15E-01	7.95E-02
Propionaldehyde	--	--	6.61E-04

Health-Based Assessment	
Receptor #	9
Receptor Name	Private Residence
Case	Cumulative

Table B.51. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	9.62E-02	6.73E-02	6.34E-03
PM2.5	2.76E-01	2.30E-01	3.45E-02
PM10	--	4.55E-01	7.05E-01
TPM	--	9.20E-02	9.86E-03
VOCs			
Acetaldehyde	3.46E-02	1.62E-03	9.19E-05
Acrolein	2.04E-01	5.58E-01	2.27E-02
Benzene	2.72E-01	1.06E-01	2.03E-02
Formaldehyde	3.07E-01	8.33E-02	3.64E-02
HCN	7.29E-02	1.20E-01	4.71E-02
MDI	3.32E-01	4.80E-01	9.59E-02
Methanol	6.26E-03	1.27E-03	6.96E-05
Phenol	5.46E-01	3.33E-01	8.44E-02
Propionaldehyde	--	--	1.01E-03

Health-Based Assessment	
Receptor #	10
Receptor Name	Private Residence
Case	Cumulative

Table B.52. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.56E-01	4.21E-02	7.16E-03
PM2.5	3.10E-01	1.55E-01	3.86E-02
PM10	--	4.05E-01	7.07E-01
TPM	--	6.47E-02	1.01E-02
VOCs			
Acetaldehyde	3.13E-02	7.09E-04	9.02E-05
Acrolein	1.83E-01	2.22E-01	2.02E-02
Benzene	2.70E-01	1.03E-01	2.03E-02
Formaldehyde	2.84E-01	5.16E-02	3.78E-02
HCN	6.96E-02	9.61E-02	4.66E-02
MDI	4.88E-01	5.25E-01	1.01E-01
Methanol	9.37E-03	1.14E-03	8.21E-05
Phenol	5.56E-01	3.23E-01	8.44E-02
Propionaldehyde	--	--	9.00E-04

Health-Based Assessment	
Receptor #	11
Receptor Name	Private Residence
Case	Cumulative

Table B.53. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.26E-01	3.66E-02	6.13E-03
PM2.5	3.19E-01	1.22E-01	3.28E-02
PM10	--	3.74E-01	7.02E-01
TPM	--	5.17E-02	8.22E-03
VOCs			
Acetaldehyde	3.18E-02	7.07E-04	8.30E-05
Acrolein	1.87E-01	2.19E-01	1.98E-02
Benzene	2.70E-01	1.03E-01	2.02E-02
Formaldehyde	2.84E-01	4.58E-02	3.46E-02
HCN	7.03E-02	9.58E-02	4.65E-02
MDI	4.49E-01	4.31E-01	9.59E-02
Methanol	9.02E-03	7.24E-04	6.73E-05
Phenol	5.56E-01	3.10E-01	8.20E-02
Propionaldehyde	--	--	8.84E-04

Health-Based Assessment	
Receptor #	12
Receptor Name	Private Residence
Case	Cumulative

Table B.54. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	8.29E-02	4.92E-02	5.10E-03
PM2.5	2.33E-01	1.60E-01	2.71E-02
PM10	--	4.02E-01	6.97E-01
TPM	--	6.54E-02	6.59E-03
VOCs			
Acetaldehyde	1.77E-02	1.03E-03	7.22E-05
Acrolein	1.00E-01	3.39E-01	1.79E-02
Benzene	2.61E-01	1.04E-01	2.02E-02
Formaldehyde	2.08E-01	5.86E-02	3.12E-02
HCN	5.62E-02	1.04E-01	4.62E-02
MDI	3.85E-01	4.23E-01	9.22E-02
Methanol	6.90E-03	9.00E-04	5.39E-05
Phenol	5.07E-01	3.09E-01	8.02E-02
Propionaldehyde	--	--	8.00E-04

Health-Based Assessment	
Receptor #	13
Receptor Name	Private Residence
Case	Cumulative

Table B.55. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.21E-01	4.95E-02	5.04E-03
PM2.5	2.32E-01	1.55E-01	2.39E-02
PM10	--	4.11E-01	6.97E-01
TPM	--	7.11E-02	6.59E-03
VOCs			
Acetaldehyde	2.17E-02	8.72E-04	5.60E-05
Acrolein	1.17E-01	2.66E-01	1.31E-02
Benzene	2.64E-01	1.03E-01	2.02E-02
Formaldehyde	2.28E-01	5.44E-02	2.80E-02
HCN	5.89E-02	9.93E-02	4.52E-02
MDI	3.39E-01	4.53E-01	9.15E-02
Methanol	5.73E-03	9.27E-04	4.74E-05
Phenol	6.79E-01	3.25E-01	8.07E-02
Propionaldehyde	--	--	5.83E-04

Health-Based Assessment	
Receptor #	14
Receptor Name	Private Residence
Case	Cumulative

Table B.56. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.05E-01	5.93E-02	5.83E-03
PM2.5	2.71E-01	1.97E-01	3.05E-02
PM10	--	4.35E-01	7.01E-01
TPM	--	8.39E-02	8.44E-03
VOCs			
Acetaldehyde	3.23E-02	1.41E-03	8.59E-05
Acrolein	1.85E-01	4.93E-01	2.22E-02
Benzene	2.70E-01	1.05E-01	2.02E-02
Formaldehyde	2.99E-01	7.30E-02	3.39E-02
HCN	6.99E-02	1.16E-01	4.70E-02
MDI	3.28E-01	4.41E-01	9.25E-02
Methanol	6.56E-03	1.06E-03	5.86E-05
Phenol	5.04E-01	3.24E-01	8.24E-02
Propionaldehyde	--	--	9.89E-04

Health-Based Assessment	
Receptor #	15
Receptor Name	Private Residence
Case	Cumulative

Table B.57. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.03E-02	4.67E-02	5.37E-03
PM2.5	1.69E-01	1.64E-01	2.93E-02
PM10	--	4.01E-01	6.98E-01
TPM	--	6.51E-02	7.13E-03
VOCs			
Acetaldehyde	2.00E-02	1.19E-03	8.24E-05
Acrolein	1.15E-01	4.14E-01	2.10E-02
Benzene	2.63E-01	1.04E-01	2.02E-02
Formaldehyde	1.94E-01	6.33E-02	3.32E-02
HCN	5.86E-02	1.10E-01	4.68E-02
MDI	3.06E-01	4.09E-01	9.26E-02
Methanol	4.24E-03	9.05E-04	5.78E-05
Phenol	4.39E-01	3.05E-01	8.04E-02
Propionaldehyde	--	--	9.38E-04

Health-Based Assessment	
Receptor #	16
Receptor Name	Private Residence
Case	Cumulative

Table B.58. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.66E-02	3.30E-02	4.40E-03
PM2.5	1.67E-01	1.16E-01	2.44E-02
PM10	--	3.60E-01	6.95E-01
TPM	--	4.47E-02	5.90E-03
VOCs			
Acetaldehyde	1.93E-02	9.11E-04	7.49E-05
Acrolein	1.14E-01	3.29E-01	2.00E-02
Benzene	2.62E-01	1.03E-01	2.02E-02
Formaldehyde	1.93E-01	4.89E-02	3.05E-02
HCN	5.84E-02	1.04E-01	4.66E-02
MDI	2.75E-01	3.64E-01	8.91E-02
Methanol	3.95E-03	6.06E-04	4.62E-05
Phenol	4.65E-01	2.84E-01	7.93E-02
Propionaldehyde	--	--	8.94E-04

Health-Based Assessment	
Receptor #	17
Receptor Name	Private Residence
Case	Cumulative

Table B.59. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	4.87E-02	2.14E-02	3.61E-03
PM2.5	1.47E-01	8.14E-02	2.02E-02
PM10	--	3.33E-01	6.92E-01
TPM	--	3.11E-02	4.81E-03
VOCs			
Acetaldehyde	1.69E-02	6.06E-04	6.29E-05
Acrolein	9.60E-02	2.10E-01	1.69E-02
Benzene	2.61E-01	1.02E-01	2.02E-02
Formaldehyde	1.75E-01	3.74E-02	2.76E-02
HCN	5.55E-02	9.52E-02	4.60E-02
MDI	2.77E-01	3.52E-01	8.75E-02
Methanol	3.56E-03	4.72E-04	3.83E-05
Phenol	4.05E-01	2.75E-01	7.82E-02
Propionaldehyde	--	--	7.54E-04

Health-Based Assessment	
Receptor #	18
Receptor Name	Private Residence
Case	Cumulative

Table B.60. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	3.56E-02	1.55E-02	1.12E-03
PM2.5	1.03E-01	5.84E-02	6.38E-03
PM10	--	3.15E-01	6.82E-01
TPM	--	2.21E-02	1.58E-03
VOCs			
Acetaldehyde	1.22E-02	4.63E-04	2.04E-05
Acrolein	7.03E-02	1.66E-01	5.53E-03
Benzene	2.58E-01	1.02E-01	2.01E-02
Formaldehyde	1.29E-01	3.00E-02	1.78E-02
HCN	5.14E-02	9.20E-02	4.38E-02
MDI	2.27E-01	3.25E-01	8.23E-02
Methanol	2.53E-03	3.16E-04	1.20E-05
Phenol	3.60E-01	2.65E-01	7.54E-02
Propionaldehyde	--	--	2.46E-04

Health-Based Assessment	
Receptor #	19
Receptor Name	Private Residence
Case	Cumulative

Table B.61. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	3.71E-02	6.78E-03	7.55E-04
PM2.5	1.03E-01	2.65E-02	4.21E-03
PM10	--	2.93E-01	6.81E-01
TPM	--	1.12E-02	1.11E-03
VOCs			
Acetaldehyde	1.27E-02	1.92E-04	1.08E-05
Acrolein	7.48E-02	6.90E-02	2.58E-03
Benzene	2.58E-01	1.01E-01	2.00E-02
Formaldehyde	1.31E-01	1.86E-02	1.60E-02
HCN	5.21E-02	8.51E-02	4.32E-02
MDI	2.96E-01	3.18E-01	8.21E-02
Methanol	3.73E-03	1.82E-04	8.77E-06
Phenol	4.11E-01	2.61E-01	7.52E-02
Propionaldehyde	--	--	1.15E-04

Health-Based Assessment	
Receptor #	20
Receptor Name	Private Residence
Case	Cumulative

Table B.62. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.30E-02	2.31E-02	5.27E-03
PM2.5	1.75E-01	8.57E-02	2.89E-02
PM10	--	3.39E-01	6.98E-01
TPM	--	3.40E-02	6.79E-03
VOCs			
Acetaldehyde	1.65E-02	5.85E-04	8.12E-05
Acrolein	9.58E-02	1.94E-01	2.06E-02
Benzene	2.60E-01	1.02E-01	2.02E-02
Formaldehyde	1.83E-01	3.75E-02	3.29E-02
HCN	5.55E-02	9.41E-02	4.67E-02
MDI	3.07E-01	3.62E-01	9.25E-02
Methanol	4.51E-03	5.04E-04	5.72E-05
Phenol	4.20E-01	2.80E-01	8.00E-02
Propionaldehyde	--	--	9.21E-04

Health-Based Assessment	
Receptor #	21
Receptor Name	Private Residence
Case	Cumulative

Table B.63. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.07E-01	3.29E-02	4.66E-03
PM2.5	2.66E-01	1.06E-01	2.47E-02
PM10	--	3.56E-01	6.95E-01
TPM	--	4.25E-02	5.80E-03
VOCs			
Acetaldehyde	2.08E-02	7.44E-04	6.95E-05
Acrolein	1.08E-01	2.59E-01	1.79E-02
Benzene	2.64E-01	1.03E-01	2.02E-02
Formaldehyde	2.44E-01	4.32E-02	2.99E-02
HCN	5.75E-02	9.88E-02	4.62E-02
MDI	3.75E-01	3.65E-01	9.02E-02
Methanol	7.06E-03	5.68E-04	4.78E-05
Phenol	5.30E-01	2.84E-01	7.90E-02
Propionaldehyde	--	--	7.98E-04

Health-Based Assessment	
Receptor #	22
Receptor Name	Private Residence
Case	Cumulative

Table B.64. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.96E-02	2.42E-02	6.41E-03
PM2.5	1.66E-01	9.17E-02	3.55E-02
PM10	--	3.46E-01	7.03E-01
TPM	--	3.76E-02	8.62E-03
VOCs			
Acetaldehyde	1.92E-02	5.77E-04	9.36E-05
Acrolein	1.10E-01	1.88E-01	2.28E-02
Benzene	2.62E-01	1.02E-01	2.03E-02
Formaldehyde	1.89E-01	3.87E-02	3.69E-02
HCN	5.78E-02	9.37E-02	4.71E-02
MDI	3.22E-01	3.78E-01	9.68E-02
Methanol	4.78E-03	5.65E-04	7.26E-05
Phenol	4.43E-01	2.87E-01	8.22E-02
Propionaldehyde	--	--	1.02E-03

Health-Based Assessment	
Receptor #	23
Receptor Name	Private Residence
Case	Cumulative

Table B.65. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	8.10E-02	3.53E-02	9.63E-03
PM2.5	1.75E-01	1.14E-01	5.08E-02
PM10	--	3.60E-01	7.13E-01
TPM	--	4.45E-02	1.22E-02
VOCs			
Acetaldehyde	1.90E-02	8.60E-04	1.39E-04
Acrolein	1.08E-01	3.10E-01	3.52E-02
Benzene	2.62E-01	1.03E-01	2.04E-02
Formaldehyde	1.89E-01	4.68E-02	4.72E-02
HCN	5.74E-02	1.02E-01	4.95E-02
MDI	2.99E-01	3.82E-01	1.02E-01
Methanol	4.38E-03	5.74E-04	9.95E-05
Phenol	4.29E-01	2.88E-01	8.50E-02
Propionaldehyde	--	--	1.57E-03

Health-Based Assessment	
Receptor #	24
Receptor Name	Private Residence
Case	Cumulative

Table B.66. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.99E-02	3.27E-02	7.60E-03
PM2.5	2.26E-01	1.19E-01	4.46E-02
PM10	--	3.81E-01	7.12E-01
TPM	--	5.50E-02	1.18E-02
VOCs			
Acetaldehyde	2.00E-02	8.20E-04	9.76E-05
Acrolein	1.13E-01	2.89E-01	2.00E-02
Benzene	2.63E-01	1.03E-01	2.03E-02
Formaldehyde	2.12E-01	4.60E-02	4.16E-02
HCN	5.83E-02	1.01E-01	4.66E-02
MDI	4.50E-01	4.83E-01	1.07E-01
Methanol	8.29E-03	9.43E-04	1.01E-04
Phenol	5.11E-01	3.29E-01	8.71E-02
Propionaldehyde	--	--	8.94E-04

Health-Based Assessment	
Receptor #	25
Receptor Name	Private Residence
Case	Cumulative

Table B.67. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.25E-01	5.30E-02	5.35E-03
PM2.5	3.31E-01	1.84E-01	2.82E-02
PM10	--	4.15E-01	6.97E-01
TPM	--	7.16E-02	6.51E-03
VOCs			
Acetaldehyde	3.76E-02	1.35E-03	8.39E-05
Acrolein	2.13E-01	4.74E-01	2.23E-02
Benzene	2.74E-01	1.05E-01	2.02E-02
Formaldehyde	3.46E-01	6.98E-02	3.26E-02
HCN	7.45E-02	1.14E-01	4.70E-02
MDI	3.51E-01	4.19E-01	9.06E-02
Methanol	7.51E-03	9.99E-04	5.28E-05
Phenol	4.49E-01	3.06E-01	7.92E-02
Propionaldehyde	--	--	9.94E-04

Health-Based Assessment	
Receptor #	26
Receptor Name	Private Residence
Case	Cumulative

Table B.68. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.47E-02	3.49E-02	4.20E-03
PM2.5	2.04E-01	1.22E-01	2.27E-02
PM10	--	3.66E-01	6.94E-01
TPM	--	4.80E-02	5.45E-03
VOCs			
Acetaldehyde	2.56E-02	9.32E-04	6.68E-05
Acrolein	1.52E-01	3.33E-01	1.75E-02
Benzene	2.66E-01	1.03E-01	2.02E-02
Formaldehyde	2.33E-01	5.03E-02	2.89E-02
HCN	6.46E-02	1.04E-01	4.61E-02
MDI	2.81E-01	3.66E-01	8.90E-02
Methanol	4.84E-03	6.44E-04	4.34E-05
Phenol	4.24E-01	2.88E-01	7.87E-02
Propionaldehyde	--	--	7.83E-04

Health-Based Assessment	
Receptor #	27
Receptor Name	Private Residence
Case	Cumulative

Table B.69. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.40E-02	3.23E-02	3.88E-03
PM2.5	2.02E-01	1.13E-01	2.10E-02
PM10	--	3.59E-01	6.92E-01
TPM	--	4.45E-02	5.01E-03
VOCs			
Acetaldehyde	2.53E-02	8.69E-04	6.22E-05
Acrolein	1.50E-01	3.11E-01	1.64E-02
Benzene	2.66E-01	1.03E-01	2.02E-02
Formaldehyde	2.30E-01	4.76E-02	2.77E-02
HCN	6.43E-02	1.02E-01	4.59E-02
MDI	2.71E-01	3.60E-01	8.82E-02
Methanol	4.52E-03	6.00E-04	4.00E-05
Phenol	4.17E-01	2.85E-01	7.83E-02
Propionaldehyde	--	--	7.31E-04

Health-Based Assessment	
Receptor #	29
Receptor Name	Private Residence
Case	Cumulative

Table B.70. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.22E-02	1.77E-02	1.54E-03
PM2.5	1.58E-01	5.62E-02	7.83E-03
PM10	--	3.17E-01	6.85E-01
TPM	--	2.29E-02	2.35E-03
VOCs			
Acetaldehyde	1.20E-02	3.75E-04	1.51E-05
Acrolein	6.92E-02	1.27E-01	2.88E-03
Benzene	2.58E-01	1.01E-01	2.00E-02
Formaldehyde	1.29E-01	2.73E-02	1.79E-02
HCN	5.12E-02	8.93E-02	4.33E-02
MDI	3.26E-01	3.37E-01	8.47E-02
Methanol	4.61E-03	3.04E-04	1.73E-05
Phenol	4.37E-01	2.68E-01	7.68E-02
Propionaldehyde	--	--	1.28E-04

Health-Based Assessment	
Receptor #	31
Receptor Name	Private Residence
Case	Cumulative

Table B.71. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.98E-02	1.50E-02	1.07E-03
PM2.5	1.61E-01	4.76E-02	5.82E-03
PM10	--	3.10E-01	6.83E-01
TPM	--	1.96E-02	1.82E-03
VOCs			
Acetaldehyde	1.92E-02	2.98E-04	1.20E-05
Acrolein	1.11E-01	9.76E-02	2.38E-03
Benzene	2.62E-01	1.01E-01	2.00E-02
Formaldehyde	1.86E-01	2.43E-02	1.68E-02
HCN	5.80E-02	8.71E-02	4.32E-02
MDI	2.96E-01	3.27E-01	8.35E-02
Methanol	3.73E-03	2.67E-04	1.30E-05
Phenol	4.32E-01	2.66E-01	7.63E-02
Propionaldehyde	--	--	1.06E-04

Health-Based Assessment	
Receptor #	32
Receptor Name	Private Residence
Case	Cumulative

Table B.72. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.30E-02	1.68E-02	2.33E-03
PM2.5	1.62E-01	5.93E-02	1.13E-02
PM10	--	3.16E-01	6.87E-01
TPM	--	2.26E-02	3.20E-03
VOCs			
Acetaldehyde	1.94E-02	4.54E-04	2.79E-05
Acrolein	1.14E-01	1.62E-01	6.73E-03
Benzene	2.62E-01	1.02E-01	2.01E-02
Formaldehyde	1.85E-01	2.97E-02	2.04E-02
HCN	5.85E-02	9.18E-02	4.40E-02
MDI	2.78E-01	3.32E-01	8.52E-02
Methanol	3.85E-03	3.16E-04	2.22E-05
Phenol	4.32E-01	2.69E-01	7.74E-02
Propionaldehyde	--	--	3.00E-04

Health-Based Assessment	
Receptor #	33
Receptor Name	Private Residence
Case	Cumulative

Table B.73. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.67E-02	1.86E-02	3.00E-03
PM2.5	1.60E-01	6.38E-02	1.43E-02
PM10	--	3.22E-01	6.89E-01
TPM	--	2.54E-02	3.82E-03
VOCs			
Acetaldehyde	1.60E-02	4.63E-04	3.65E-05
Acrolein	9.37E-02	1.62E-01	9.08E-03
Benzene	2.60E-01	1.02E-01	2.01E-02
Formaldehyde	1.65E-01	3.07E-02	2.23E-02
HCN	5.52E-02	9.17E-02	4.45E-02
MDI	2.70E-01	3.32E-01	8.61E-02
Methanol	3.69E-03	3.45E-04	2.71E-05
Phenol	4.27E-01	2.69E-01	7.77E-02
Propionaldehyde	--	--	4.05E-04

Health-Based Assessment	
Receptor #	34
Receptor Name	Private Residence
Case	Cumulative

Table B.74. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.72E-02	9.94E-03	1.48E-03
PM2.5	1.52E-01	3.53E-02	7.48E-03
PM10	--	2.98E-01	6.84E-01
TPM	--	1.33E-02	2.00E-03
VOCs			
Acetaldehyde	1.74E-02	2.79E-04	1.95E-05
Acrolein	9.94E-02	1.01E-01	4.83E-03
Benzene	2.61E-01	1.01E-01	2.01E-02
Formaldehyde	1.74E-01	2.20E-02	1.81E-02
HCN	5.61E-02	8.74E-02	4.37E-02
MDI	2.42E-01	3.09E-01	8.33E-02
Methanol	3.34E-03	1.85E-04	1.47E-05
Phenol	3.83E-01	2.64E-01	7.60E-02
Propionaldehyde	--	--	2.16E-04

Health-Based Assessment	
Receptor #	35
Receptor Name	Private Residence
Case	Cumulative

Table B.75. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.14E-02	2.88E-02	4.92E-03
PM2.5	1.40E-01	9.99E-02	2.47E-02
PM10	--	3.46E-01	6.95E-01
TPM	--	3.77E-02	5.98E-03
VOCs			
Acetaldehyde	1.70E-02	8.19E-04	7.12E-05
Acrolein	9.83E-02	3.02E-01	1.87E-02
Benzene	2.61E-01	1.03E-01	2.02E-02
Formaldehyde	1.68E-01	4.40E-02	2.99E-02
HCN	5.59E-02	1.02E-01	4.63E-02
MDI	2.59E-01	3.68E-01	8.94E-02
Methanol	3.25E-03	5.06E-04	4.60E-05
Phenol	3.97E-01	2.83E-01	7.91E-02
Propionaldehyde	--	--	8.36E-04

Health-Based Assessment	
Receptor #	36
Receptor Name	Private Residence
Case	Cumulative

Table B.76. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.35E-02	5.79E-02	8.43E-03
PM2.5	1.80E-01	1.79E-01	4.19E-02
PM10	--	4.20E-01	7.07E-01
TPM	--	7.36E-02	1.00E-02
VOCs			
Acetaldehyde	2.20E-02	1.22E-03	1.21E-04
Acrolein	1.29E-01	4.36E-01	3.21E-02
Benzene	2.64E-01	1.04E-01	2.03E-02
Formaldehyde	2.08E-01	6.25E-02	4.14E-02
HCN	6.08E-02	1.11E-01	4.89E-02
MDI	2.63E-01	4.56E-01	9.57E-02
Methanol	3.90E-03	1.03E-03	7.72E-05
Phenol	4.05E-01	3.15E-01	8.23E-02
Propionaldehyde	--	--	1.43E-03

Health-Based Assessment	
Receptor #	37
Receptor Name	Private Residence
Case	Cumulative

Table B.77. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.83E-02	3.29E-02	9.90E-03
PM2.5	1.64E-01	1.22E-01	5.16E-02
PM10	--	3.64E-01	7.13E-01
TPM	--	4.59E-02	1.20E-02
VOCs			
Acetaldehyde	2.00E-02	9.34E-04	1.52E-04
Acrolein	1.17E-01	3.31E-01	4.02E-02
Benzene	2.63E-01	1.03E-01	2.04E-02
Formaldehyde	1.91E-01	5.08E-02	4.85E-02
HCN	5.90E-02	1.04E-01	5.04E-02
MDI	2.58E-01	3.72E-01	9.97E-02
Methanol	3.52E-03	6.67E-04	9.69E-05
Phenol	4.24E-01	2.85E-01	8.38E-02
Propionaldehyde	--	--	1.79E-03

Health-Based Assessment	
Receptor #	38
Receptor Name	Private Residence
Case	Cumulative

Table B.78. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.17E-01	4.49E-02	4.78E-03
PM2.5	2.15E-01	1.31E-01	2.29E-02
PM10	--	3.90E-01	6.96E-01
TPM	--	6.05E-02	6.36E-03
VOCs			
Acetaldehyde	2.26E-02	7.78E-04	5.27E-05
Acrolein	1.23E-01	2.57E-01	1.21E-02
Benzene	2.64E-01	1.03E-01	2.02E-02
Formaldehyde	2.28E-01	4.68E-02	2.73E-02
HCN	6.00E-02	9.86E-02	4.51E-02
MDI	3.45E-01	4.23E-01	9.13E-02
Methanol	5.42E-03	7.68E-04	4.60E-05
Phenol	5.96E-01	3.13E-01	8.05E-02
Propionaldehyde	--	--	5.40E-04

Health-Based Assessment	
Receptor #	39
Receptor Name	Private Residence
Case	Cumulative

Table B.79. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	1.41E-01	5.51E-02	5.17E-03
PM2.5	3.73E-01	1.98E-01	2.73E-02
PM10	--	4.18E-01	6.96E-01
TPM	--	7.34E-02	6.24E-03
VOCs			
Acetaldehyde	4.43E-02	1.59E-03	8.73E-05
Acrolein	2.58E-01	5.81E-01	2.40E-02
Benzene	2.78E-01	1.06E-01	2.02E-02
Formaldehyde	3.93E-01	7.71E-02	3.26E-02
HCN	8.17E-02	1.22E-01	4.73E-02
MDI	3.42E-01	4.03E-01	8.89E-02
Methanol	7.91E-03	1.03E-03	4.90E-05
Phenol	4.89E-01	3.03E-01	7.89E-02
Propionaldehyde	--	--	1.07E-03

Health-Based Assessment	
Receptor #	40
Receptor Name	Private Residence
Case	Cumulative

Table B.80. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	4.32E-02	2.23E-02	3.18E-03
PM2.5	1.26E-01	8.11E-02	1.74E-02
PM10	--	3.33E-01	6.90E-01
TPM	--	3.07E-02	4.07E-03
VOCs			
Acetaldehyde	1.55E-02	6.37E-04	5.49E-05
Acrolein	8.96E-02	2.28E-01	1.49E-02
Benzene	2.60E-01	1.02E-01	2.02E-02
Formaldehyde	1.56E-01	3.74E-02	2.56E-02
HCN	5.45E-02	9.65E-02	4.56E-02
MDI	2.61E-01	3.39E-01	8.62E-02
Methanol	2.99E-03	4.33E-04	3.24E-05
Phenol	4.00E-01	2.75E-01	7.74E-02
Propionaldehyde	--	--	6.64E-04

Health-Based Assessment	
Receptor #	42
Receptor Name	Private Residence
Case	Cumulative

Table B.81. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	4.44E-02	1.76E-02	3.82E-03
PM2.5	1.18E-01	6.19E-02	2.09E-02
PM10	--	3.20E-01	6.92E-01
TPM	--	2.44E-02	4.89E-03
VOCs			
Acetaldehyde	1.44E-02	4.60E-04	6.44E-05
Acrolein	8.40E-02	1.63E-01	1.73E-02
Benzene	2.59E-01	1.02E-01	2.02E-02
Formaldehyde	1.46E-01	3.02E-02	2.79E-02
HCN	5.36E-02	9.18E-02	4.60E-02
MDI	2.51E-01	3.36E-01	8.77E-02
Methanol	2.98E-03	3.44E-04	3.93E-05
Phenol	3.87E-01	2.77E-01	7.81E-02
Propionaldehyde	--	--	7.71E-04

Health-Based Assessment	
Receptor #	43
Receptor Name	Private Residence
Case	Cumulative

Table B.82. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.19E-02	2.45E-02	3.78E-03
PM2.5	1.51E-01	8.70E-02	2.06E-02
PM10	--	3.37E-01	6.92E-01
TPM	--	3.31E-02	4.81E-03
VOCs			
Acetaldehyde	1.71E-02	6.92E-04	6.23E-05
Acrolein	9.63E-02	2.51E-01	1.66E-02
Benzene	2.61E-01	1.02E-01	2.02E-02
Formaldehyde	1.75E-01	3.94E-02	2.76E-02
HCN	5.56E-02	9.81E-02	4.59E-02
MDI	2.64E-01	3.41E-01	8.78E-02
Methanol	3.46E-03	4.54E-04	3.89E-05
Phenol	4.00E-01	2.85E-01	7.81E-02
Propionaldehyde	--	--	7.40E-04

Health-Based Assessment	
Receptor #	45
Receptor Name	Private Residence
Case	Cumulative

Table B.83. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	4.61E-02	2.67E-02	3.79E-03
PM2.5	1.41E-01	9.55E-02	2.06E-02
PM10	--	3.44E-01	6.92E-01
TPM	--	3.63E-02	4.83E-03
VOCs			
Acetaldehyde	1.55E-02	7.57E-04	6.20E-05
Acrolein	8.89E-02	2.74E-01	1.64E-02
Benzene	2.60E-01	1.03E-01	2.02E-02
Formaldehyde	1.65E-01	4.23E-02	2.76E-02
HCN	5.44E-02	9.98E-02	4.59E-02
MDI	2.68E-01	3.45E-01	8.79E-02
Methanol	3.41E-03	5.01E-04	3.92E-05
Phenol	3.88E-01	2.82E-01	7.81E-02
Propionaldehyde	--	--	7.34E-04

Health-Based Assessment	
Receptor #	48
Receptor Name	Private Residence
Case	Cumulative

Table B.84. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	5.12E-02	3.45E-02	4.12E-03
PM2.5	1.44E-01	1.22E-01	2.24E-02
PM10	--	3.66E-01	6.93E-01
TPM	--	4.77E-02	5.31E-03
VOCs			
Acetaldehyde	1.76E-02	9.09E-04	6.52E-05
Acrolein	1.03E-01	3.24E-01	1.70E-02
Benzene	2.61E-01	1.03E-01	2.02E-02
Formaldehyde	1.71E-01	5.00E-02	2.86E-02
HCN	5.66E-02	1.03E-01	4.60E-02
MDI	2.82E-01	3.72E-01	8.90E-02
Methanol	3.71E-03	6.59E-04	4.31E-05
Phenol	4.10E-01	2.88E-01	7.86E-02
Propionaldehyde	--	--	7.59E-04

Health-Based Assessment	
Receptor #	53
Receptor Name	Private Residence
Case	Cumulative

Table B.85. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.55E-02	2.72E-02	3.51E-03
PM2.5	1.77E-01	9.36E-02	1.90E-02
PM10	--	3.44E-01	6.91E-01
TPM	--	3.70E-02	4.51E-03
VOCs			
Acetaldehyde	2.18E-02	7.30E-04	5.64E-05
Acrolein	1.30E-01	2.64E-01	1.49E-02
Benzene	2.64E-01	1.03E-01	2.02E-02
Formaldehyde	2.00E-01	4.12E-02	2.64E-02
HCN	6.11E-02	9.90E-02	4.56E-02
MDI	2.67E-01	3.43E-01	8.74E-02
Methanol	4.10E-03	4.85E-04	3.62E-05
Phenol	4.02E-01	2.78E-01	7.79E-02
Propionaldehyde	--	--	6.63E-04

Health-Based Assessment	
Receptor #	59
Receptor Name	Private Residence
Case	Cumulative

Table B.86. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.09E-02	2.19E-02	3.04E-03
PM2.5	1.72E-01	7.97E-02	1.63E-02
PM10	--	3.31E-01	6.89E-01
TPM	--	2.99E-02	3.83E-03
VOCs			
Acetaldehyde	1.98E-02	6.27E-04	4.97E-05
Acrolein	1.13E-01	2.25E-01	1.33E-02
Benzene	2.62E-01	1.02E-01	2.01E-02
Formaldehyde	1.95E-01	3.70E-02	2.46E-02
HCN	5.83E-02	9.63E-02	4.53E-02
MDI	2.63E-01	3.38E-01	8.60E-02
Methanol	3.85E-03	4.26E-04	3.05E-05
Phenol	4.17E-01	2.71E-01	7.72E-02
Propionaldehyde	--	--	5.94E-04

Health-Based Assessment	
Receptor #	63
Receptor Name	Private Residence
Case	Cumulative

Table B.87. Concentration Ratios - Private Residence - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	8.56E-02	2.20E-02	2.71E-03
PM2.5	2.52E-01	7.78E-02	1.43E-02
PM10	--	3.30E-01	6.88E-01
TPM	--	2.96E-02	3.32E-03
VOCs			
Acetaldehyde	2.89E-02	6.10E-04	4.48E-05
Acrolein	1.63E-01	2.20E-01	1.22E-02
Benzene	2.68E-01	1.02E-01	2.01E-02
Formaldehyde	2.75E-01	3.61E-02	2.33E-02
HCN	6.63E-02	9.59E-02	4.51E-02
MDI	3.02E-01	3.35E-01	8.49E-02
Methanol	5.81E-03	4.09E-04	2.60E-05
Phenol	4.38E-01	2.71E-01	7.67E-02
Propionaldehyde	--	--	5.45E-04

Health-Based Assessment	
Receptor #	64
Receptor Name	Private Residence
Case	Cumulative

Table B.88. Concentration Ratios - Air Monitoring Station #1 - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	7.75E-02	2.50E-02	1.67E-03
PM2.5	1.67E-01	7.70E-02	8.49E-03
PM10	--	3.35E-01	6.85E-01
TPM	--	3.20E-02	2.52E-03
VOCs			
Acetaldehyde	1.47E-02	4.74E-04	1.81E-05
Acrolein	8.31E-02	1.55E-01	3.83E-03
Benzene	2.59E-01	1.02E-01	2.01E-02
Formaldehyde	1.62E-01	3.27E-02	1.84E-02
HCN	5.35E-02	9.13E-02	4.35E-02
MDI	3.33E-01	3.52E-01	8.47E-02
Methanol	4.80E-03	4.26E-04	1.81E-05
Phenol	4.45E-01	2.76E-01	7.69E-02
Propionaldehyde	--	--	1.70E-04

Health-Based Assessment	
Receptor #	65
Receptor Name	Air Monitoring Station #1
Case	Cumulative

Table B.89. Concentration Ratios - Air Monitoring Station #2 - Cumulative Case

COPC	Concentration Ratio (CR)		
	1-Hour	24-Hour	Annual
Criteria Air Contaminants			
NOX	6.58E-02	4.51E-02	5.70E-03
PM2.5	1.78E-01	1.51E-01	3.13E-02
PM10	--	3.92E-01	7.00E-01
TPM	--	6.09E-02	7.63E-03
VOCs			
Acetaldehyde	2.10E-02	1.10E-03	8.82E-05
Acrolein	1.22E-01	3.87E-01	2.24E-02
Benzene	2.63E-01	1.04E-01	2.02E-02
Formaldehyde	2.01E-01	5.85E-02	3.46E-02
HCN	5.98E-02	1.08E-01	4.70E-02
MDI	3.11E-01	3.92E-01	9.35E-02
Methanol	4.17E-03	8.03E-04	6.20E-05
Phenol	4.43E-01	3.01E-01	8.09E-02
Propionaldehyde	--	--	1.00E-03

Health-Based Assessment	
Receptor #	66
Receptor Name	Air Monitoring Station #2
Case	Cumulative

APPENDIX C

Toxicological Profiles

All chemicals (anthropogenic and natural) have the potential to cause toxicological effects in people who are exposed to them; however, it is the chemical concentration, the route of exposure, the duration of exposure, and the inherent toxicity of the chemical that determines the level of effect and subsequent potential for unacceptable risk to the exposed receptor. In the toxicity assessment stage of the risk assessment, literature on the toxic potential of each COPC was reviewed and toxicity reference values (TRVs) were selected for use in the HHRA. For the purpose of this assessment, TRVs are defined as doses of chemicals (generally derived from animal laboratory studies or based on results of actual human exposure) or regulatory benchmarks (e.g., also health-based but often policy derived) that receptors can be exposed to without the development of unacceptable health effects.

Two basic and quite different chemical categories are commonly recognized by regulatory agencies and applied when estimating toxicological criteria for humans. These are the threshold approach, typically used to evaluate non-carcinogens, and the non-threshold approach (or the mathematical model-unit risk estimation approach), typically used for carcinogenic compounds.

For chemicals that follow a threshold dose-response, a benchmark or threshold level must be exceeded in order for toxicity to occur, and lowest observable adverse effect level (LOAEL) and no-observable adverse effect level (NOAEL), can be determined. The addition of uncertainty factors (or safety factors) to LOAELs or NOAELs results in the derivation of a TRV that is expected to be “safe” to sensitive subjects following exposure for a prescribed period of time. Uncertainty factors are generally 10-fold factors used to account for a number of extrapolations that may be required to derive a TRV (e.g., to account for individual sensitivity towards a chemical, extrapolations that need to be made when applying animal toxicity data to human).

For chemicals that follow non-threshold dose-responses, a specific dose where toxic effects manifest themselves cannot be identified. Such is the case for carcinogenic chemicals. Regulatory agencies such as Health Canada and the US EPA assume that any level of long-term exposure to carcinogenic chemicals is associated with some “hypothetical cancer risk”. As a result, regulatory agencies have typically employed acceptable incremental lifetime cancer risk (ILCR) levels.

The terminology used to define threshold and non-threshold TRVs differs according to the source and type of exposure and often varies between regulatory jurisdictions. For the assessment, generic nomenclature has been developed, with the following terms and descriptions commonly used:

- **Reference Concentration (RfC)**: an RfC can be defined as (i.e., inhalation NOAEL or LOAEL with uncertainty factors applied) the acceptable level of an airborne chemical for which the primary route of exposure is inhalation. It is expressed as a

concentration of the chemical in air (i.e., µg/m^3) and applies only to threshold chemicals.

- **Benchmark (Inhalation)**: Similar to reference concentrations, regulatory benchmarks are also health-based but often policy derived exposure limits. For this assessment only health-based benchmarks were used (with the exception of those used for total particulate matter). Benchmarks are acceptable levels of airborne chemicals and are generally expressed as a concentration of chemical in air (i.e., µg/m^3) and apply only to threshold chemicals.
- **Unit Risk**: The US EPA defines a unit risk value as "…the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/L in water, or 1 µg/m^3 in air…". A unit risk value of 3.0 x 10-5 per µg/m^3 would mean that under an upper worst-case estimate, three excess cancer cases are expected to develop per one hundred thousand (100,000) people, if exposed every day for a lifetime to 1 µg of the chemical per m^3 of air.

The toxicity of a chemical often depends on whether or not exposure has been acute (short-term) or chronic (long-term) and TRVs need to be differentiated accordingly.

- **Acute:** The amount or dose of a chemical that can be tolerated without evidence of adverse health outcomes on a short-term basis. These limits are routinely applied to conditions in which exposures extend from minutes through several hours or several days only. For this HHRA, risks will be evaluated based upon 1- or 24-hour exposure periods.
- **Chronic:** The amount of a chemical that is expected to be without health outcomes, even when exposure occurs continuously or regularly over extended periods, possibly lasting for periods of at least a year, and possibly extending over an entire lifetime.

Selection of Toxicity Reference Values

The toxicity reference values used in this risk assessment may be divided into two categories: those for acute, or short-term exposures and chronic, or long-term exposures. TRVs selected for use in this HHRA were obtained from regulatory agencies including:

- Manitoba Conservation;
- Alberta Environment (AENV);
- Ontario Ministry of the Environment (MOE);
- Health Canada;
- US EPA Integrated Risk Information System (IRIS);
- Agency for Toxic Substances and Disease Registry (ATSDR);
- World Health Organization (WHO);
- Netherlands National Institute of Public Health and the Environment (RIVM); and,
- California Environmental Protection Agency (CalEPA).

To maintain a systematic, defensible, and logical approach to selection of TRVs, a selection hierarchy was adopted with Manitoba Conservation being the main source of TRVs. In

instances where Manitoba Conservation does not have a published value, Health Canada provides a recommended hierarchy for selection of TRVs.

For acute exposures, concentrations of COPC were compared to health-based benchmarks established by the following regulatory agencies, in order of preference:

- Manitoba Conservation – The Project is located in Manitoba and is subject to Provincial jurisdiction; hence criteria published by Manitoba will be the primary source of acute inhalation TRVs.
- Ontario Ministry of the Environment (MOE) – The MOE represents another Canadian Provincial jurisdiction that has the most complete listing of acute screening criteria for air pollutants.
- Alberta Environment (AENV) – The AENV represents another Canadian Provincial jurisdiction that has a listing of acute screening criteria for air pollutants.
- Agency for Toxic Substances and Disease Registry (ATSDR) – The ATSDR is a recognized source agency recommended by Health Canada.
- World Health Organization (WHO) – WHO is a recognized source agency recommended by Health Canada.
- California Environmental Protection Agency (CalEPA) – CalEPA is a recognized source agency recommended by Health Canada.

For chronic exposures, concentrations of COPC were compared to health-based benchmarks established by the following regulatory agencies, in order of preference:

- Manitoba Conservation – The Project is located in Manitoba and is subject to Provincial jurisdiction; hence criteria published by Manitoba will be the primary source of chronic inhalation TRVs, when available.
- Health Canada – In the absence of published Manitoba chronic TRVs, Health Canada will be used as a reference as Manitoba is subject to federal jurisdiction. Health Canada is the Federal regulatory agency responsible for the development of TRVs.
- US EPA Integrated Risk Information System (IRIS) – Where Health Canada does not have published criteria, the US EPA IRIS provides the best source of extensively peer-reviewed TRVs, published by another North American jurisdiction.
- World Health Organization (WHO) – WHO is a recognized source agency recommended by Health Canada.
- Netherlands National Institute of Public Health and the Environment (RIVM) – RIVM is a recognized source agency recommended by Health Canada.
- Agency for Toxic Substances and Disease Registry (ATSDR) – The ATSDR is a recognized source agency recommended by Health Canada.
- California Environmental Protection Agency (CalEPA) – CalEPA is a recognized source agency recommended by Health Canada.

Inhalation TRVs for each CAC and COPC (where available), as well as key critical health outcome and regulatory source for each TRV are provided in the following appendix.

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1 ACETALDEHYDE

Acetaldehyde is ubiquitous in the environment and may be formed in the body from the breakdown of ethanol; however, it is mainly used as an intermediate in the synthesis of other chemicals (US EPA, 2000). Acetaldehyde is also used in the production of perfumes, polyester resins, and basic dyes (US EPA, 2000).

Acetaldehyde is used as a chemical intermediate in the production of acetic acid and a number of other chemicals (US EPA, 1994). To a lesser extent, it is used as a fragrance, deodorizer, and flavouring agent in food (Environment Canada, 2000). Anthropogenic sources include combustion from motor vehicles, furnaces, power plants, waste incinerators, cigarettes, and cooking of certain types of food. Emissions also result from industrial manufacturing of products with residual acetaldehyde. These sources include chemical manufacturing plants, pulp and paper mills, tire rubber plants, and petroleum refining and coal processing plants (Environment Canada 2000). The secondary formation of acetaldehyde from photochemical reactions with organic compounds and pollutants in the atmosphere is a major source that often exceeds primary emissions (Environment Canada, 2000). Acetaldehyde is also a degradation product of sewage and biological wastes. Biomass combustion is a major natural source of acetaldehyde. Acetaldehyde is a metabolic intermediate in human metabolism, plant respiration, and alcohol fermentation. Humans are exposed to acetaldehyde primarily through the inhalation of ambient and indoor sources (Environment Canada 2000), but also via ingestion since acetaldehyde occurs naturally in certain foods (e.g., coffee, fruit, breads).

Since acetaldehyde is a major metabolite of ethanol many adverse health effects from ethanol are attributed to acetaldehyde. Acute (short-term exposure) health effects of acetaldehyde include irritation of the eyes and respiratory tract, and altered respiratory function. Prolonged or chronic dermal exposure can cause burns and dermatitis. Chronic inhalation exposure has been shown to cause adverse effects on the respiratory tracts of animals (US EPA, 2000).

1.1 Assessment of Carcinogenicity

The International Agency for Research on Cancer (IARC, 2006), classifies acetaldehyde as Group 2B, “possibly carcinogenic to humans.” The US EPA (1991) classifies acetaldehyde as Group B2, a probable human carcinogen via inhalation, based on limited evidence in humans, and sufficient evidence in animals, as shown via increased incidence of nasal tumours in rats and laryngeal tumours in hamsters.

For this assessment, acetaldehyde is being evaluated as a carcinogen.

1.2 Susceptible Populations

Populations with increased susceptibility to exposure to acetaldehyde were not identified.

1.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, is outlined below.

1.3.1 Oral Exposure

1.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, acetaldehyde is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

1.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, acetaldehyde is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

1.3.2 Inhalation Exposure

1.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 1-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	--	--	**90**	--	--	470	90	AENV, 2009
24-hour	--	**500**	--	--	--	--	500	MOE, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

The 1-hour exposure limit selected for this risk assessment was selected from Alberta Environment (AENV, 2009) Ambient Air Quality Objectives and Guidelines. No further information regarding the derivation of this value is available.

The 24-hour exposure limit used in this risk assessment was selected from the Ontario Ministry of the Environment (MOE, 2008). A 24-hour AAQC benchmark of 500 µg/m^3 was derived by MOE (2008) based on tissue damage observed during a rat inhalation study (Appleman et al. 1986). This 4 week inhalation study exposed groups of 10 male rats to different levels of acetaldehyde (0, 150 or 500ppm) 6 h/day, 5 d/week, with or without interruption. No toxic effect was observed in rats interruptedly or uninterruptedly exposed to 150 ppm acetaldehyde during the 4 weeks. This was translated to a NOAEL of 270,000 µg/m^3. An adjusted NOAEL of 49,000 µg/m^3 was calculated after adjusting the study NOAEL of 270,000 µg/m^3 for continuous

exposure (6/24 hours, 5/7 days). A cumulative uncertainty factor of 100 was applied for human variability (10) and interspecies variability (10).

Chronic Inhalation Toxicity Reference Values

Table 1-2. Chronic Inhalation Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	--	**390**	9	--	--	--	140	390	HC, 2004
Carcinogenic	--	**5.8E-07**	2.20E-06	--	--	--	2.70E-06	5.8E-07	HC, 2004

Notes: units: $\mu g/m^3$; carcinogen $(\mu g/m^3)^{-1}$; bold – value selected; "--" – not value

Health Canada (2004) established a tolerable inhalation concentration (TC) of 390 $\mu g/m^3$ based two short-term rat inhalation studies (Appleman et al. 1982; 1986). Although the two reference studies were only four weeks in duration, they establish a concentration-response for lesions that is pathologically consistent with the effects seen in longer-term studies. The studies exposed Wistar rats (10/sex/group) to different levels of acetaldehyde (ranging from 0-5000ppm, or 0 to 9100 mg/m^3). No compound related effects (i.e., degeneration of olfactory epithelium) were observed at 150ppm (273,000 $\mu g/m^3$) and this was set as the study NOAEL. An uncertainty factor of 100 was applied to determine the TC (10 for sensitive human populations 10 for subchronic to chronic extrapolation, and 10 for interspecies extrapolation using dosimetric adjustments). HC used the 95% lower confidence limit of a benchmark concentration associated with a 5% increase in non-neoplastic lesions in nasal olfactory epithelium to derive a TC of 390 $\mu g/m^3$.

1.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

Health Canada (2004) estimated the carcinogenic potency of acetaldehyde with a tumorigenic concentration (TC05) of 86,000 $\mu g/m^3$. This concentration was derived from a Woutersen et al. (1986) study that also showed increased incidence of the aforementioned carcinomas in male rats exposed to acetaldehyde for up to 28 months. The study exposed male and female Wistar rats to 750, 1500 or 3000 ppm (1350, 2700 or 5400 mg/m^3) acetaldehyde for 6 hours per day, 5 days/week for up to 28 weeks. The LOAEL (for non-neoplastic histopathological effects in the upper respiratory tract, was 750 ppm. The TC_{05} was calculated using a multistage model, with adjustment for intermittent to continuous exposure (6/24 hours, 5/7 days). However, the highest exposure concentration group was not included in the derivation because of high mortality. The inhalation unit risk value, calculated by dividing the TC05 into 0.05, is 5.8×10^{-7} $(\mu g/m^3)^{-1}$. For this assessment the Health Canada (2004) inhalation toxicity reference value was selected.

1.4 Bioavailability

In this risk assessment, acetaldehyde is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that acetaldehyde is completely absorbed (i.e. absorption factor is 1).

1.5 Conclusion

The following tables present acetaldehyde TRVs selected for use in this risk assessment.

Table 1-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
Acetaldehyde	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 1-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Acetaldehyde	1-Hour	90	Health-Based	Benchmark	AENV, 2009
	24-Hour	500	Health-Based	Benchmark	MOE, 2008
	Annual Average	390	Non-neoplastic lesions in rat nasal olfactory epithelium	TC	HC, 2004
	Carcinogenic Annual Average	5.8×10^{-7}	Increased incidence of nasal adenocarcinomas (combined)	UR	HC, 2004

[a] Units: Non-carcinogenic COPC ($\mu g/m^3$) , Carcinogenic COPC ($\mu g/m^3$) $^{-1}$, UR (unit risk), TC (tolerable concentration)

1.6 References

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Last reviewed: April 2010 (RJ)

2 ACROLEIN

The majority of acrolein produced in the United States is used in the industrial production of acrylic acid (ATSDR, 2007). Acrolein is also used as a biocide in a variety of contexts: it is used an algicide and herbicide in drainage ditches and irrigation waters, a biocide in process water systems, a slimicide in the paper industry, and a biocide in oil wells and liquid petroleum fuels (ATSDR, 2007). It serves as an ingredient in many manufacturing processes, including those for perfumes, leather, colloidal forms of metals, methionine, glutaraldehyde, allyl alcohol, pyridines, and tetrahydrobenzaldehyde (ATSDR, 2007).

2.1 Assessment of Carcinogenicity

According to the International Agency for Research on Cancer (IARC, 1997), acrolein is designated a member of Group 3, "not classifiable as to its carcinogenicity to humans." The US EPA (2003) states that the carcinogenicity of acrolein cannot be evaluated because "data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure" (US EPA, 2003). Health Canada (2000) has also commented that not enough data are available to assess whether acrolein can induce tumours or interact with DNA. Given this guidance, carcinogenic effects of acrolein have not been evaluated in this risk assessment.

2.2 Susceptible Populations

Acrolein is a strong respiratory irritant (ATSDR, 2007), and those whose respiratory functions are compromised or who suffer from allergic conditions would therefore be more susceptible to acrolein toxicity than other members of the general population (ATSDR, 2007).

2.3 Selection of Toxicity Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, is outlined below.

2.3.1 Oral Exposure

2.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, acrolein is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

2.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, acrolein is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

2.3.2 Inhalation Exposure

2.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 2-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**--**	**4.5**	**--**	--	--	2.5	4.5	MOE, 2009
24-hour	**--**	**0.4**	--	**7**	--	--	0.4	MOE, 2009

Notes: units: µg/m^3; bold – value selected; "--" – not value

The MOE (2009) 1-hour standard of 4.5 µg/m^3, selected for use in this assessment, is derived from a LOAEL identified by Darley et al. (1960), where potential for irritation of the eye, mucous membranes and respiratory tract from acute exposure to acrolein. To derive their ambient air quality standard, the Darley et al (1960) LOAEL of 137 µg/m^3 was divided by an uncertainty factor of 30 (3 for extrapolation from LOAEL to NOAEL and 10 to account of intraspecies variability).

The current MOE (2009) 24-hour standard of 0.4 µg/m^3, selected for use in this assessment, is derived from a chronic study by Dorman et al. (2008) where a NOAEL of 458 µg/m^3 was established for olfactory epithelial pathology in rats. From this a human equivalent concentration (HEC) of 11 µg/m^3 was calculated to which a cumulative uncertainty factor of 30 was applied to derive a 24-hour exposure limit of 0.4 µg/m^3. The uncertainty factor applied to this NOAEL is broken down to an uncertainty factor of 3 for interspecies extrapolation and an uncertainty factor of 10 for intraspecies variability, which protects for potential sensitivities in the human population.

Chronic Inhalation Toxicity Reference Values

Table 2-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic		0.4	0.02	--	--	--	35	0.4	HC,2004

Notes: units: µg/m^3; bold – value selected; "--" – not value

The chronic toxicity reference value adopted for use in this risk assessment is 0.4 µg/m^3 from Health Canada (HC, 2004). Health Canada derived a tolerable concentration of 0.4 µg/m^3 from

a LOEAL of 0.57 µg/m^3 by Cassee et al (1996) based histopathological changes in the nasal respiratory/transitional epithelium in rats.

2.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

Given the inadequacy of the data set, as far as carcinogenic effects of acrolein are concerned, no cancer inhalation toxicity reference values have been selected for use in the risk assessment.

2.4 Bioavailability

In this risk assessment, acrolein is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that acrolein is completely absorbed (i.e., absorption factor is 1).

2.5 Conclusion

The following tables present the TRV and bioavailability summaries for acrolein.

Table 2-3. Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
Acrolein	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 2-4. Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Acrolein	1-Hour	4.5	Health-Based	Benchmark	MOE, 2009
	24-Hour	0.4	Health-Based	Benchmark	MOE, 2009
	Annual Average	0.4	Increase in disarrangement, necrosis, thickening, desquamation and hyperplasia in nasal respiratory epithelium of rats	TC	HC, 2004

[a] Units: µg/m^3; TC – Tolerable Concentration

2.6 References

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3 BENZENE

Benzene is a colourless liquid with a sweet odour. It is highly flammable, evaporates into air very quickly, and dissolves into water slightly. Benzene is commonly found in the environment and enters the environment mainly through industrial processes, such as burning coal and oil, motor vehicle exhaust, evaporation from gas service stations and in the manufacturing of rubbers, lubricants, dyes, detergents and pesticides (ATSDR, 2007). Natural emissions are discharged from volcanic gases, forest fires and present in crude oil and gasoline (ATSDR, 2007).

The health effects of benzene depend on the route, dose, and duration of exposure. Acute inhalation of high levels of benzene can lead to drowsiness, dizziness, rapid heart rate, headache, tremors, confusion, unconsciousness, and at very high levels, death (ATSDR, 2007). Ingestion of high levels of benzene can lead to vomiting, stomach irritation, dizziness, sleepiness, convulsions, rapid heart rate, and possible death (ATSDR, 2007).

Chronic effects of benzene exposure can harm the bone marrow and cause a decrease in red blood cells, leading to anemia. It can also cause excessive bleeding, and disturb immune function, increasing susceptibility to infection (ATSDR, 2007). In some women, chronic exposure to benzene has lead to irregular menstrual periods and a decrease in ovary size; however this evidence is inconclusive (ATSDR, 2007). Benzene's effects on fertility in men are unknown (ATSDR, 2007).

3.1 Assessment of Carcinogenicity

Benzene is a known human carcinogen (Category A, US EPA, 2003) and is listed as a Group 1 carcinogen by IARC (2006). Health Canada (1996; CEPA, 1993) has also classified benzene as carcinogenic to humans (Group I).

For this assessment, benzene is being assessed for both non-carcinogenic and carcinogenic endpoints.

3.2 Susceptible Populations

Individuals expressing certain genetic polymorphisms, such as mutations in alleles responsible for the enzymes NQ01 and CYP2E1, may be at greater risk of benzene poisoning than those not expressing these polymorphisms (ATSDR, 2007). Also at risk for increased benzene toxicity include individuals with reduced bone marrow function or decreased levels of certain blood factors, and individuals who consume alcohol (ATSDR, 2007). No definitive human data

were discovered on the effects of gender, or age at exposure, on rate or extent of benzene metabolism, although theories have been advanced on these subjects (ATSDR, 2007).

3.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, are outlined below.

3.3.1 Oral Exposure

3.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, benzene is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

3.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, benzene is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

3.3.2 Inhalation Exposure

3.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 3-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**--**	--	**30**	--	--	1300	30	AENV, 2009
24-hour	**--**	--	--	**30**	--	--	30	ATSDR, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

AENV (2009) has selected a 1-hour inhalation benchmark of 30 µg/m^3 for formaldehyde. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

The 24-hour exposure limit used in this risk assessment was selected from the ATSDR. ATSDR (2008) derived an acute MRL for benzene of 30 µg/m^3 based on an acute toxicity study in mice (Rozen et al. 1984). Rozen et al. (1984) exposed male C57BL/6J mice (7–8/group) for 6 hours/day for 6 consecutive days to concentrations of 3.26 x 10^4, 9.9 x 10^4, 3.2 x 20^5, 9.6 x 10^5 µg/m^3. Erythrocyte counts were depressed in C57BL/6 mice only at 100 and 301 ppm. The 10.2

ppm exposure level resulted in significant depression of femoral lipopolysaccharide-induced B-colony-forming ability in the absence of a significant depression of total numbers of B cells. At 31 ppm, splenic phytohemagglutinin-induced blastogenesis was significantly depressed without a concomitant significant depression in numbers of T-lymphocytes. Peripheral lymphocyte counts were depressed at all exposure levels. Based on these results ATSDR (2008) derived an LOAEL of 3.26×10^4. The LOAEL was adjusted to a continuous exposure (LOAEL x 6/24) and a cumulative uncertainty factor of 300 (10 for use of a LOAEL, 3 for the extrapolation from animals to humans, and 10 to protect sensitive individuals) was applied. Based on the adjustments, ATSDR (2008) derived an acute inhalation MRL of 30 $\mu g/m^3$.

Chronic Inhalation Toxicity Reference Values

Table 3-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	**--**	--	**30**	9.8	--	--	60	30	US EPA, 2003
Carcinogenic	**--**	**3.30E-06**	7.80E-06	--	--	6.00E-06	2.90E-05	3.30E-06	HC, 2009

Notes: units: $\mu g/m^3$; carcinogen $(\mu g/m^3)^{-1}$; bold – value selected; "--" – not value

The US EPA (2003) IRIS database derived a chronic inhalation RfC of 30 $\mu g/m^3$ for benzene based on a decreased lymphocyte count observed during a human occupational inhalation study (Rothman et al., 1996). Rothman et al. (1996) conducted a cross-sectional study of 44 workers exposed to a range of benzene concentrations and 44 age and gender-matched unexposed controls, all from Shanghai, China. Benzene exposure was monitored by organic vapor passive dosimetry badges worn by each worker for a full workshift on 5 days within a 1-2 week period prior to collection of blood samples. The percentage of erythrocytes in whole blood was chosen as the critical effect. The continuous linear model and the US EPA's Benchmark Dose Modeling Software were used to calculate the unadjusted BMCL of 23,000 $\mu g/m^3$. An adjusted BMCL was calculated by correcting for continuous exposure (5/7 days) and the occupational inhalation rate (10/20 m^3/day). A safety factor of 300 (3 for effect level extrapolation 10 for intraspecies variability, 3 for sub-chronic to chronic extrapolation, and 3 for database deficiencies) was applied to the adjusted BMCL of 8,200 $\mu g/m^3$. The US EPA RfC of 30 $\mu g/m^3$ was adopted as the chronic inhalation exposure limit for non-carcinogenic effects for the current assessment

3.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

A TC_{05} of 15,000 µg/m^3 was developed by Health Canada (CEPA 1993; Health Canada, 1996) and corresponds to the inhalation UR of 3.3 x 10^{-6} (µg/m^3)$^{-1}$ (Health Canada, 2004). This value was derived from three epidemiological studies of humans following occupational exposure (Bond et al., 1986; Wong, 1987a, b; Rinsky et al., 1987). In each study workers with occupational exposure to sources of benzene were followed and evaluated by researchers for varying time periods. The results of each study indicated a statistically significant increase in the incidence of leukemia following occupational exposure to benzene. From these results Health Canada (2004) derived a UR of 3.3 x 10^{-6} (µg/m^3)$^{-1}$; this value was selected for use in the current risk assessment.

3.4 Bioavailability

In this risk assessment, benzene is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that benzene is completely absorbed (i.e. absorption factor is 1).

3.5 Conclusion

The following tables present benzene TRVs selected for use in this risk assessment.

Table 3-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
Benzene	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 3-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Benzene	1-Hour	30	Health-Based	Benchmark	AENV, 2009
	24-Hour	30	Reduces lymphocyte proliferation following mitogen stimulation	Benchmark	ATSDR, 2008
	Annual Average	30	Decreased lymphocyte count	RfC	US EPA, 2003

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
	Carcinogenic Annual Average	3.30E-06	Myelogenous leukaemia, Lymphomas; oral cavity squamous cell carcinomas	UR	HC, 2009

[a] Units: Non-carcinogenic COPC (µg/m^3) , Carcinogenic COPC (µg/m^3) $^{-1}$; RfC – reference concentration; UR – Unit Risk

3.6 References

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4 FORMALDEHYDE

At room temperature, formaldehyde is a colourless, highly reactive, highly flammable gas with a pungent, irritating odour (Environment Canada/Health Canada, 2001). It polymerizes easily in air and water to form a variety of other compounds (Environment Canada/Health Canada, 2001). Because of its reactivity, formaldehyde is one of the most widely-used organic chemicals in the world (ATSDR, 1999). It is used as a preservative in a variety of consumer goods, and as an intermediate in a large number of chemical syntheses (ATSDR, 1999). It has also been used as a disinfectant, as a biocide, and in the manufacture of fertilizers (ATSDR, 1999).

The effects of formaldehyde on human health vary by dose. At low doses, formaldehyde acts as an irritant, affecting the eyes, nose, throat and skin. People with asthma may be more susceptible to irritation from inhalation (ATSDR 1999). Ingestion of large doses of formaldehyde can lead to vomiting, severe pain, coma, and possible death (ATSDR 1999).

4.1 Assessment of Carcinogenicity

The International Agency for Research on Cancer (IARC, 2006), classifies formaldehyde as Group 1, “carcinogenic to humans.” The US EPA (1991) classifies formaldehyde as Group B1, a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals. Environment Canada/Health Canada (2001) notes, however, that formaldehyde appears to be carcinogenic only at concentrations high enough to produce cytotoxicity, a non-carcinogenic effect, for which the cellular proliferative response is itself carcinogenic.

For this risk assessment, formaldehyde is considered a carcinogen.

4.2 Susceptible Populations

The ATSDR (1999) indicates that two segments of the general population are potentially susceptible to toxic effects of formaldehyde, although the data are not always consistent: those suffering from asthma, and those with dermal sensitization to formaldehyde.

4.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, is outlined below.

4.3.1 Oral Exposure

4.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, formaldehyde is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral toxicological reference value has not been selected.

4.3.1.2 Cancer Toxicity Reference Values

In this risk assessment, formaldehyde is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral toxicological reference value has not been selected.

4.3.2 Inhalation Exposure

4.3.2.1 Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 4-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**60**	--	65	--	--	55	60	MB, 2005
24-hour	**--**	**65**	--	49	--	--	65	MOE, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

Manitoba Conservation (MB, 2005) has selected a 1-hour inhalation benchmark of 60 µg/m^3 for formaldehyde. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

MOE (2008) derived a 24-hour AAQC benchmark of 65 µg/m^3 for formaldehyde. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

4.3.2.2 Chronic Inhalation Toxicity Reference Values

Table 4-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	**--**	--	**--**	**10**	--	--	9	10	ATSDR, 1999
Carcinogenic	**--**	**2.0E-10**	1.30E-05	--	--	--	--	2.0E-10	HC, 2004

Notes: units: µg/m^3; carcinogen (µg/m^3)$^{-1}$; bold – value selected; "--" – not value

The chronic inhalation toxicity reference value used in this risk assessment is 10 $\mu g/m^3$ selected from the ATSDR (1999). The ATSDR derived a minimum risk level (MRL) of 0.008 ppm based on a study by Holmstrom et al. (1989) where effects were seen in the nasal mucosa in persons occupationally exposed. A total uncertainty of 30 was applied to derive this MRL.

4.3.2.3 Carcinogenic Inhalation Toxicity Reference Values

Health Canada (HC, 2004) has derived an inhalation unit risk based upon the incidence of nasal squamous tumours in rats exposed for up to 24 months (Monticello et al., 1996) and a biologically based, two-stage clonal growth model (CIIT, 1999). According to ITER (2010), "The two-stage model describes a low-dose, linear carcinogenic response for humans exposed to levels of formaldehyde of less than or equal to 0.1 ppm (0.12 mg/m^3), where cytotoxicity and sustained cellular regenerative proliferation do not appear to play a role in tumour induction. Indeed, the effect of formaldehyde upon regenerative cellular proliferation did not have a significant impact upon the predicted carcinogenic risks at exposures between 0.001 and 0.1 ppm (0.0012 and 0.12 mg/m^3). Based upon the two-stage clonal growth model, the predicted additional risks of upper respiratory tract cancer for non-smokers, associated with an 80-year continuous exposure to levels of formaldehyde between 0.001 and 0.1 ppm (1.2 and 120 $\mu g/m^3$), range from 2.3 E-10 to 2.7 E-8, respectively". For this risk assessment, to remain conservative, the higher end of the range was used, 2.0E-10 $(\mu g/m^3)^{-1}$ (i.e., at 1 $\mu g/m^3$ exposure).

4.4 Bioavailability

In this risk assessment, formaldehyde is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that formaldehyde is completely absorbed (i.e. absorption factor is 1).

4.5 Conclusion

The TRVs used in this HHRA are tabulated below.

Table 4-3 Formaldehyde Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value (mg/kg/day)	Critical Effect	Reference Type	Source
Formaldehyde	Non-carcinogenic TRV	NE			
	Carcinogenic Slope	NE			

COPC	Toxicity Reference Value	Value (mg/kg/day)	Critical Effect	Reference Type	Source
	Factor				

NE – Not Evaluated

Table 4-4 Formaldehyde Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Formaldehyde	1-Hour	60	Health-Based	Benchmark	MB, 2005
	24-Hour	65	Health-Based	Benchmark	MOE, 2008
	Annual Average	10	Nasal	MRL	ATSDR, 1999
	Carcinogenic Annual Average	2.0E-10	Nasal squamous tumours	UR	HC, 2004

[a] Units: Non-carcinogenic COPC (µg/m^3) , Carcinogenic COPC (µg/m^3) $^{-1}$; MRL – minimum risk level; UR – Unit Risk

4.6 References

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5 HYDROGEN CYANIDE

Cyanide is usually joined with other chemicals to form compounds such as hydrogen cyanide (HCN). Cyanide is produced by certain bacteria, fungi and algae and is found in a number of foods and plants. Hydrogen cyanide is a colourless gas that has a faint, bitter, almond odour. Cyanide and HCN are used in industry for electroplating, metallurgy, the manufacture of plastics and even some mining processes (ATSDR, 2006).

5.1 Assessment of Carcinogenicity

No studies have shown that cyanide is carcinogenic in humans or animals; US EPA has determined that cyanide is not classifiable as a human carcinogen (ATSDR, 2006).

5.2 Susceptible Populations

Populations with increased susceptibility to exposure to HCN specifically were not identified.

5.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, are outlined below.

5.3.1 Oral Exposure

5.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, HCN is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

5.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, HCN is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

5.3.2 Inhalation Exposure

5.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 5-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**40**	--	--	--	--	340	40	MB, 2005

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
24-hour	--	**8**	--	--	--	--	8	MOE, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

Manitoba Conservation (MB, 2005) has selected a 1-hour inhalation benchmark of 40 µg/m^3 for HCN. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

The Ontario Ministry of Environment (MOE, 2005; 2008) has derived a 24-hour inhalation benchmark of 8 µg/m^3 for HCN based on CNS and thyroid effects. The principal study used is to derive this benchmark is an occupation exposure study by El Ghawabi et al (1975). To derive a 24-hour benchmark, the MOE used the LOAEL (6.4 ppm) from this study and converted it to an equivalent inhalation-weighted average concentration using US EPA methodology (US EPA, 2002). Next, the resulting value was adjusted for number of days of exposure during a work week (5) and divided by an uncertainty factor of 300 (i.e., 10 for interspecies differences, 10 for use of a LOAEL instead of a NOAEL, and 3 for the use of a subchronic study). This value was selected for use in the risk assessment.

Chronic Inhalation Toxicity Reference Values

Table 5-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	**3**	--	3	--	25	--	9	3	MB, 2005

Notes: units: µg/m^3; carcinogen (µg/m^3)$^{-1}$; bold – value selected; "--" – not value

Manitoba Conservation (MB, 2005) has selected a chronic inhalation benchmark of 3 µg/m^3 for HCN. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

5.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

HCN is not classified as a carcinogenic substance; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

5.4 Bioavailability

In this risk assessment, HCN is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards

to the inhalation pathway, it has been conservatively assumed that HCN is completely absorbed (i.e. absorption factor is 1).

5.5 Conclusion

The following tables present HCN TRVs selected for use in this risk assessment.

Table 5-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
HCN	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 5-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
HCN	1-Hour	40	Health Effects Not Specified	Benchmark	MB, 2005
	24-Hour	8	Health-Based	Benchmark	MOE, 2008
	Annual Average	3	Health Effects Not Specified	Benchmark	MB, 2005

[a] Units: $\mu g/m^3$

5.6 References

ATSDR (Agency for Toxic Substances and Disease Registry), 2006. Toxicological Profile for Cyanide. U.S. Department of Health and Human Services. Public Health Service.

El Ghawabi, S.H., Gaafar, M.A., El-Saharti, A.A., Ahmed, S.H., Malash, K.K., and Fares, R. 1975. Chronic cyanide exposure: a clinical, radioisotope, and laboratory study. Br J Indus Med **32**:215-219.

MB (Manitoba Conservation), 2005. Manitoba Ambient Air Quality Criteria.

US EPA. 2002. Integrated Risk Information System On-line. United States Environmental Protection Agency (US EPA). URL: www.epa.gov/iris/subst/0060.htm

MOE (Ontario Ministry of Environment) 2005. Ontario Air Standards for Hydrogen Cyanide. Standards Development Branch. June 2005.

MOE (Ontario Ministry of the Environment). 2008. Summary of O.Reg. 419/05 Standards and Point of Impingement Guidelines & Ambient Air Quality Criteria (AAQCs). Standards Development Branch. Ontario Ministry of the Environment.

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6 METHLENEDIPHENYL DIISOCYANATE

Isocyanates are the raw materials of polyurethane products. The most widely used isocyanates are diisocyanates, including methylenediphenyl diisocyanate (MDI). MDI forms the basic raw material for a number of polyurethane foams for bedding, cushions, carpet padding and underlay. MDI is also used in rigid foam used primarily for insulation (OSHA, 2010; NIOSH, 2009; International Isocyanate Institute, 2010).

6.1 Assessment of Carcinogenicity

There is inadequate evidence in humans to classify MDI as a carcinogen; however there is limited animal data to support carcinogenicity (HSDB, 2001). For this assessment, MDI has been evaluated as a non-carcinogen.

6.2 Susceptible Populations

Populations with increased susceptibility to exposure to MDI were not identified.

6.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, are outlined below.

6.3.1 Oral Exposure

6.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, MDI is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

6.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, MDI is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

6.3.2 Inhalation Exposure

6.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 6-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**3**	--	0.51	--	--	--	3	MB, 2005
24-hour	--	**0.7**	--	--	--	--	0.7	MOE, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

Manitoba Conservation (MB, 2005) has selected a 1-hour inhalation benchmark of 3 µg/m^3 for MDI. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

The Ontario Ministry of Environment (MOE, 2008) has selected a 24-hour inhalation benchmark of 0.7 µg/m^3 for MDI. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

Chronic Inhalation Toxicity Reference Values

Table 6-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	**0.5**	--	0.6	--	--	--	0.7	0.5	MB, 2005

Notes: units: µg/m^3; carcinogen (µg/m^3)$^{-1}$; bold – value selected; "--" – not value

Manitoba Conservation (MB, 2005) has selected a chronic inhalation benchmark of 0.5 µg/m^3 for MDI. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

6.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

MDI is not classified as a carcinogenic substance; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

6.4 Bioavailability

In this risk assessment, MDI is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that MDI is completely absorbed (i.e. absorption factor is 1).

6.5 Conclusion

The following tables present MDI TRVs selected for use in this risk assessment.

Table 6-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
MDI	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 6-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
MDI	1-Hour	3	Health Effects Not Specified	Benchmark	MB, 2005
	24-Hour	0.7	Health-Based	Benchmark	MOE, 2008
	Annual Average	0.5	Health Effects Not Specified	Benchmark	MB, 2005

[a] Units: $\mu g/m^3$

6.6 References

HSDB (Hazardous Substances Data Bank), 2001. METHYLENEBIS(4-PHENYLISOCYANATE) CASRN: 101-68-8. National Library of Medicine. National Institutes of Health. Available online: http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~4qpNfU:1

International Isocyanate Institute, 2010. Available online: http://www.diisocyanates.org/

MB (Manitoba Conservation), 2005. Manitoba Ambient Air Quality Criteria.

MOE (Ontario Ministry of the Environment). 2008. Summary of O.Reg. 419/05 Standards and Point of Impingement Guidelines & Ambient Air Quality Criteria (AAQCs). Standards Development Branch. Ontario Ministry of the Environment.

NIOSH (National Institute for Occupational Safety and Health), 2009. Safety and Health Topic: Isocyanates. Available online: http://www.cdc.gov/niosh/topics/isocyanates/

OSHA (Occupational Safety & Health Administration), 2010. Safety and Health Topics: Isocyanates. Available online: http://www.osha.gov/SLTC/isocyanates/index.html

7 METHANOL

Methanol is a colourless liquid with a pungent odour. Methanol is also known as methyl alcohol, wood alcohol or wood spirits. It is a toxic alcohol that is used industrially as a solvent, a pesticide and as an alternative fuel source. Methanol does occur naturally in humans, with the primary source coming from foods such as fruits and vegetables, fruit juices, and in diet soft drinks that contain aspartame (NIOSH, 2008).

7.1 Assessment of Carcinogenicity

Methanol is not suspected to be carcinogenic (NIOSH, 2008); there for this assessment it is considered a non-carcinogen.

7.2 Susceptible Populations

Persons with existing skin, kidney, liver or eye disorders may be at increased risk when exposed to methanol. Folate-deficient individuals are also known to be at greater risk when exposed to low concentrations of methanol (HSDB, 2005).

7.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, are outlined below.

7.3.1 Oral Exposure

7.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, methanol is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

7.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, methanol is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

7.3.2 Inhalation Exposure

7.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 7-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	--	--	**2600**	--	--	28000	2600	AENV, 2009
24-hour	--	**4000**	--	--	--	--	4000	MOE, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

AENV (2009) has selected a 1-hour inhalation benchmark of 2600 µg/m^3 for methanol. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

MOE (2008) has selected a 24-hour inhalation benchmark of 4000 µg/m^3 for methanol. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

Chronic Inhalation Toxicity Reference Values

Table 7-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	--	--	--	--	--	--	4000	4000	CalEPA, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

The chronic inhalation toxicity reference value used in this risk assessment is 4000 µg/m^3 selected from CalEPA (2008). The CalEPA (2008) reference exposure level (REL) is based on a study by Rogers et al (1993) where an increased development effects (i.e., incidence of abnormal cervical ribs, cleft palate and exencephaly) were seen in mice. A cumulative uncertainty factor of 30 was applied to the NOAEL of 1000 ppm to account for interspecies variability (3) and intraspecies variability (10).

7.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

Methanol is not classified as a carcinogenic substance; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

7.4 Bioavailability

In this risk assessment, methanol is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that methanol is completely absorbed (i.e. absorption factor is 1).

7.5 Conclusion

The following tables present methanol TRVs selected for use in this risk assessment.

Table 7-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
Methanol	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 7-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Methanol	1-Hour	2600	Health-Based	Benchmark	AENV. 2009
	24-Hour	4000	Health-Based	Benchmark	MOE, 2008
	Annual Average	4000	Developmental Effects	REL	CalEPA, 2008

[a] Units: $\mu g/m^3$; REL – reference exposure level

7.6 References

AENV (Alberta Environment), 2009. Alberta Ambient Air Quality Objectives and Guidelines. Available online: http://environment.gov.ab.ca/info/library/5726.pdf

CalEPA (California Environmental Protection Agency) 2008. Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary. Office of Environmental Health Hazard Assessment.

HSDB (Hazardous Substances Data Bank), 2005. METHANOL CASRN: 123-38-6. National Library of Medicine. National Institutes of Health. Available online: http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~Yzo0VR:1

MOE (Ontario Ministry of the Environment). 2008. Summary of O.Reg. 419/05 Standards and Point of Impingement Guidelines & Ambient Air Quality Criteria (AAQCs). Standards Development Branch. Ontario Ministry of the Environment.

NIOSH (National Institute for Occupational Safety and Health), 2008. The Emergency Response Safety and Health Database. Methanol. Available online: http://www.cdc.gov/niosh/ershdb/EmergencyResponseCard_29750029.html

Rogers JM, Mole ML, Chernoff N, Barbee BD, Turner CI, Logsdon TR, and Kavlock JV. 1993. The developmental toxicity of inhaled methanol in the CD-1 mouse, with quantitative dose-response modeling for estimation of benchmark doses. Teratology 47:175-188.

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8 NITROGEN OXIDES (NO_X) AND NITROGEN DIOXIDE (NO_2)

Nitrogen oxides (NO_x) are mixtures of gases composed of nitrogen and oxygen. Different nitrogen oxides have different physical properties. Major sources of NO_x in the air are the exhaust of motor vehicles, the burning of coal, oil and natural gas, and processes such as arc welding, electroplating and dynamite blasting (ATSDR, 2002). Nitrogen oxides are also produced commercially. They can be used in the production of nitric acid, lacquers, dyes, rocket fuels, and explosives (ATSDR, 2002).

NOx causes a wide variety of health and environmental impacts because of various compounds and derivatives in the family of nitrogen oxides, including nitrogen dioxide (NO_2), nitric acid, nitrous oxide, nitrates, and nitric oxide. Low concentrations of NO_x in the air can irritate the eyes, nose, throat and lungs as well as causing shortness of breath, fluid build-up in the lungs (after 1 or 2 days of exposure), tiredness and nausea (ATSDR, 2002). Inhalation of high doses of NO_x can cause burning, spasms and swelling of the throat and upper respiratory tract, reduced oxygenation of body tissues, cause a build-up of fluid in the lungs and result in possible death (ATSDR, 2002).

Dermal contact with NO_x (gas or liquid) can cause severe burns (ATSDR, 2002).

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are still unclear, but continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.

Ambient air quality guidelines/objectives are generally specific to nitrogen dioxide (NO_2).

8.1 Assessment of Carcinogenicity

Nitrogen oxides are not classified as carcinogenic.

8.2 Susceptible Populations

Two general groups in the population may be more susceptible to the effects of NO_2 exposure than other individuals: persons with pre-existing respiratory disease and children 5 to 12 years old (US EPA, 2008). Individuals in these groups appear to be affected by lower levels of NO_2 than individuals in the rest of the population. Asthmatics are considered to be one of the groups most responsive to NO_2 exposure (US EPA, 2008). Patients with chronic obstructive pulmonary disease (COPD) constitute another subpopulation that is potentially susceptible to NO_2 exposure, as are immunocompromised individuals (e.g., individuals suffering from the human immunodeficiency virus and cancer patients being treated with chemotherapy) (US EPA, 2008).

8.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, is outlined below.

8.3.1 Oral Exposure

8.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, NO_2 is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

8.3.1.2 Cancer Toxicity Reference Values

Nitrogen dioxide is not classified as a carcinogenic substance; therefore, a carcinogenic oral TRV has not been selected.

8.3.2 Inhalation Exposure

8.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 8-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**400**	400	--	--	--	470	400	MB, 2005
24-hour	**200**	200	200	--	--	200	400	MB, 2005

Notes: units: µg/m^3; bold – value selected; "--" – not value

1-hour and 24-hour exposure limits used in this risk assessment were selected from Manitoba Conservation (MB, 2005). Health Canada's National Ambient Air Quality Objectives (Health Canada, 2006) also provide maximum acceptable 1-hour and 24-hour levels of NO_2 of 400 and 200 µg/m^3, respectively, which are equivalent to those criteria established by Manitoba Conservation. These values are based on respiratory irritation with no additional information regarding benchmark derivation provided.

Chronic Inhalation Toxicity Reference Values

Table 8-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	**100**	--	--	--	--	40	--	100	MB, 2005

Notes: units: µg/m^3; bold – value selected; "--" – not value

Manitoba Conservation's chronic Ambient Air Quality Criteria of 100 µg/m^3 was selected for use in this risk assessment. No further information regarding the derivation of this value is available.

8.3.2.2 Cancer Inhalation Toxicity Reference Values

Nitrogen dioxide is not classified as a carcinogenic substance; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

8.4 Bioavailability

In this risk assessment, NO_2 is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that $NO_2$is completely absorbed (i.e., absorption factor is 1).

8.5 Conclusion

The following tables present NO_2 TRVs selected for use in this risk assessment.

Table 8-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value (mg/kg/day)	Critical Effect	Reference Type	Source
Nitrogen Oxides	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE- Not Evaluated

Table 8-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Nitrogen Oxides	1-Hour	400	Respiratory Irritation	Benchmark	MB, 2005
	24-Hour	200	Respiratory Irritation	Benchmark	MB, 2005
	Annual Average	100	Respiratory Irritation	Benchmark	MB, 2005

[a] Units: $\mu g/m^3$

8.6 References

ATSDR (Agency for Toxic Substances and Disease Registry). 2002. ToxFAQs for Nitrogen Oxides. April 2002.

Health Canada. 2006. Regulations Related To Health And Air Quality. Health Canada. Available at: http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/reg_e.html.

MB (Manitoba Conservation), 2005. Manitoba Ambient Air Quality Criteria.

US EPA (United States Environmental Protection Agency). 2008. Risk and Exposure Assessment to Support the Review of the National Ambient Air Quality Standards for Nitrogen Dioxide: Assessment of Scientific and Technical Information. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. August, 2008. EPA-452/R-95-005. Available on-line at: http://www.epa.gov/ttn/naaqs/standards/nox/data/20081121_NO2_REA_final.pdf

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9 PARTICULATE MATTER (TPM, PM2.5 AND PM10)

Particulate matter (PM) consists of minute solid or liquid particles that remain suspended in air and can be inhaled into the respiratory system. Particles are not defined on the basis of their chemical composition, and may include a broad range of chemical species. Particles in the atmosphere have been characterized according to size mainly because of the different health effects from particles of different diameters. The smaller the particle size, the farther the particle can penetrate the lungs. Particulate matter in the atmosphere, as described in the current assessment, is composed of three groups: Total particulate matter (TPM), inhalable coarse particles (PM_{10} and $PM_{2.5-10}$) and fine or respirable particles ($PM_{2.5}$). It is important to recognize that TPM contains all particles smaller than 44 microns; PM_{10} contains all particles with a mean aerodynamic diameter of less than 10 microns; and $PM_{2.5}$ contains particles smaller than 2.5 microns as well as ultrafine PM of less than 0.1 micron (US EPA, 2004).

Particulate matter can cause serious health problems when fine particles get deep into the lungs. Health effects include increased respiratory symptoms (irritation of airways, coughing , difficulty breathing), decreased lung function, aggravated asthma, chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease (US EPA, 2008).

9.1 Assessment of Carcinogenicity

The US EPA and Health Canada have not classified particulate matter (PM) with respect to carcinogenicity. Relatively few studies are available that examine the effects of long term or chronic exposure on health end points. Available studies indicate that long term exposures (16 to 20 years) were associated with increases in mortality, respiratory disease symptoms, decrements in lung function and, possibly, with lung cancer (Health Canada, 1998). However, the effects on mortality cannot be ascribed with certainty to a true chronic effect, since they could equally be the result of cumulative effects of daily variations in PM. Moreover, the association with lung cancer was weak by comparison with other lifestyle factors such as smoking (Health Canada, 1998). Accordingly, particulate matter has been assessed as a non-carcinogen in this risk assessment.

9.2 Susceptible Populations

Epidemiological studies indicate that the elderly, children, and people with chronic lung disease, influenza, or asthma, are especially sensitive to the effects of particulate matter (Health Canada, 1998).

9.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, is outlined below.

9.3.1 Oral Exposure

9.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, particulate matter is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

9.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, particulate matter is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

9.3.2 Inhalation Exposure

9.3.2.1 Non-Carcinogenic Toxicity Reference Values

Table 9-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

COPC	Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
TPM	1-hour	**--**	--	--	--	--	--	NV	--
	24-hour	**120**	100	--	--	--	--	120	MB, 2005
PM_{10}	1-hour	**--**	--	--	--	--	--	NV	--
	24-hour	**50**	50	--	--	50	--	50	MB, 2005
$PM_{2.5}$	1-hour	**--**	--	**80**	--	--	--	80	AENV, 2009
	24-hour	**30**	30	30	--	25	--	30	MB, 2005

Notes: units: $\mu g/m^3$; bold – value selected; "--" – not value; NV – no value

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Epidemiological studies have indicated that there is little evidence that the dose-response curve for PM includes a threshold (Health Canada, 1998). The lack of a threshold at low concentrations suggests that it would be difficult to identify a level at which no adverse effects would be expected to occur as a result of exposure to particulate matter. Although 1-hour exposure limits have not been specified by all government agencies, 24-hour exposure limits for

all manner of particulate matter have been specified and selected for use in this risk assessment.

Total Particulate Matter

No 1-hour TRV was indentified for total particulate matter.

Manitoba Conservation (MB, 2005) has adopted Health Canada's National Ambient Air Quality Objectives provide a maximum acceptable annual level of total particulate matter of 120 $\mu g/m^3$ as a 24-hour benchmark. It is a level that is based on the critical effect of respiratory irritation and is also reflective of technological, economic and societal information. Furthermore, it represents the air quality management goal for the protection of the general public and the environment of Canada (Health Canada, 2006). No further information regarding the derivation of this value is available.

PM_{10}

No 1-hour TRV was indentified for PM_{10}.

Manitoba Conservation (MB, 2005) has set a 24-hour benchmark of 50 $\mu g/m^3$ for PM_{10}. No further information regarding the derivation of this value is available.

$PM_{2.5}$

AENV (2009) derived there 1-hour benchmark of 80 $\mu g/m^3$ for $PM_{2.5}$ from the Canada Wide Standard (CCME, 2006). No further information regarding the derivation of this value is available.

Manitoba Conservation (MB, 2005) has adopted the Canada Wide Standard (CCME, 2006) for 24-hour $PM_{2.5}$ of 30 $\mu g/m^3$. This Canada-Wide Standard is based on 98th percentile ambient measurements conducted annually and averaged over 3 years. No further information regarding the derivation of this value is available.

Chronic Inhalation Toxicity Reference Values

Table 9-2. Chronic Toxicity Reference Values

COPC	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
TPM	**70**	--	--	--	--	--	--	70	MB, 2005
PM_{10}	**--**	--	--	--	--	**20**	--	20	WHO, 2005
$PM_{2.5}$	**--**	--	--	--	--	**10**	--	10	WHO, 2005

Notes: units: $\mu g/m^3$; bold – value selected; "--" – not value

Total Particulate Matter

Manitoba Conservation (MB, 2005) has selected a value of 70 $\mu g/m^3$ for TPM. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

PM_{10} and $PM_{2.5}$

WHO (2005) identifies annual air quality guidelines for PM10 and PM2.5 of 20 and 10 $\mu g/m^3$, respectively. Both values represent the lowest levels at which total cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to $PM_{2.5}$ exposure.

9.3.2.2 Cancer Inhalation Toxicity Reference Values

In this risk assessment, particulate matter is not being evaluated as a carcinogen; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

9.4 Bioavailability

In this risk assessment, particulate matter is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that particulate matter is completely absorbed (i.e. absorption factor is 1).

9.5 Conclusion

The following tables present Particulate Matter (TPM, $PM_{2.5}$, and PM_{10}) TRVs selected for use in this risk assessment.

Table 9-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value (mg/kg/day)	Critical Effect	Reference Type	Source
Particulate Matter (TPM, PM_{10}, and $PM_{2.5}$)	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE- Not Evaluated

Table 9-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
TPM	1-Hour	NV			
	24-Hour	120	Health-Based	Benchmark	MB, 2005
	Annual Average	70	Effects-Based	Benchmark	MB, 2005
PM_{10}	1-Hour	NV			
	24-Hour	50	Health-Based	Benchmark	MB, 2005
	Annual Average	20	Health-Based	Benchmark	WHO, 2005
$PM_{2.5}$	1-Hour	80	Health-Based	Benchmark	AENV, 2009
	24-Hour	30	Health-Based	Benchmark	MB, 2005
	Annual Average	10	Health-Based	Benchmark	WHO, 2005

[a] Units: Non-carcinogenic COPC ($\mu g/m^3$) , NV – No Value

9.6 References

Alberta Environment. 2009. Alberta Ambient Air Quality Objectives and Guidelines. Available at http://environment.gov.ab.ca/info/library/5726.pdf.

CCME (Canadian Council of Ministers of the Environment). 2006. Canada-Wide Standards for Particulate Matter (PM) and Ozone. Canadian Council of Ministers of the Environment, Quebec City.

Health Canada. 2006. Regulations Related To Health And Air Quality. Health Canada. Available at: http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/reg_e.html.

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10 PHENOL

Phenol is a natural substance that also can be manufactured. Phenol is a colourless solid when pure and in commercial form is a liquid with a distinct odour that is sweet and tarty. In industry, phenol is used in the manufacturing of nylon and other synthetic fibers and is used primarily in the production of phenolic resins. Non-industrial uses of phenol include the use as a slimicide, as a disinfectant and antiseptic and it is used in mouthwash and sore throat lozenges (ATSDR, 2008).

10.1 Assessment of Carcinogenicity

Both IARC (International Agency for Research on Cancer) and the US EPA classify phenol as non-carcinogenic to humans (ATSDR, 2008).

10.2 Susceptible Populations

Certain individuals in a population maybe more sensitive to phenol toxicity then others; these include: those with low activities of phenol sulfotransferase and glucuronyltransferase, neonates maybe more susceptible to dermally-applied phenol because of increased skin permeability and a proportionally greater surface area. In addition, individuals with sensitive skin or pulmonary incapacity maybe more sensitive to phenol because it is a known vesicant (ATSDR, 2008).

10.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, are outlined below.

10.3.1 Oral Exposure

10.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, Phenol is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

10.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, Phenol is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

10.3.2 Inhalation Exposure

10.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 10-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	**63**	--	100	--	--	5800	63	MB, 2005
24-hour	--	**30**	--	--	--	--	30	MOE, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

Manitoba Conservation (MB, 2005) has selected a 1-hour inhalation benchmark of 63 µg/m^3 for phenol. No further information regarding the derivation of this value is available. This value was selected for use in the risk assessment.

The Ontario Ministry of Environment (MOE, 2005; 2008) has derived a 24-hour inhalation benchmark of 30 µg/m^3 for HCN based CNS and hepatic effects. The principal study used to derive this 24-hour benchmark is a 90-day subchronic inhalation study by Sandage (1961). In this study, a NOAEL of 5 ppm was determined when no effects of cardiovascular, respiratory, haematological, hepatic and renal systems were seen as a result of inhalation exposure. To this NOAEL an uncertainty factor of 600 was applied to account of interspecies variability (10), intraspecies variability (10), use of a subchronic vs. chronic study (3) and an uncertainty factor of 2 to account of deficiencies in the scientific literature in respect to phenol inhalation toxicity. This value was selected for use in the risk assessment.

Chronic Inhalation Toxicity Reference Values

Table 10-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	--	--	--	--	**20**	--	200	20	RIVM, 2001

Notes: units: µg/m^3; carcinogen (µg/m^3)$^{-1}$; bold – value selected; "--" – not value

The chronic inhalation benchmark used in this risk assessment is selected from the RIVM (2001) provisional tolerable concentration in air (TCA) of 20 µg/m^3. Similar to derivation of the 24-hour benchmark, RIVM used the Sandage (1961) NOEAL of 5 ppm to derive a TCA. An uncertainty factor of 1000 was applied to the NOAEL to account for inter- and inter-species variability (100) and 10 for a subchronic vs. chronic study. RIVM (2001) considers this TCA

provisional because of deficiencies in the scientific literature in respect to phenol inhalation toxicity.

10.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

Phenol is not classified as a carcinogenic substance; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

10.4 Bioavailability

In this risk assessment, phenol is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that phenol is completely absorbed (i.e. absorption factor is 1).

10.5 Conclusion

The following tables present Phenol TRVs selected for use in this risk assessment.

Table 10-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
Phenol	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 10-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
Phenol	1-Hour	63	Health Effects Not Specified	Benchmark	MB, 2005
	24-Hour	30	Health-Based	Benchmark	MOE, 2005
	Annual Average	20	Health-Based	TCA	RIVM, 2001

[a] Units: $\mu g/m^3$; TCA – tolerable concentration in air

10.6 References

ATSDR (Agency for Toxic Substances and Disease Registry), 2008. Toxicological Profile for Phenol. U.S. Department of Health and Human Services. Public Health Service.

MB (Manitoba Conservation), 2005. Manitoba Ambient Air Quality Criteria.

MOE (Ontario Ministry of Environment) 2005. Ontario Air Standards for Phenol. Standards Development Branch. June 2005.

MOE (Ontario Ministry of the Environment). 2008. Summary of O.Reg. 419/05 Standards and Point of Impingement Guidelines & Ambient Air Quality Criteria (AAQCs). Standards Development Branch. Ontario Ministry of the Environment.

RIVM (National Institute of Public Health and the Environment), 2001. Re-evaluation of human-toxicological maximum permissible risk levels. RIVM report no. 711701025, National Institute of Public Health and the Environment, Bilthoven, The Netherlands, March 2001, p 128-131. Available online: http://www.rivm.nl/bibliotheek/rapporten/711701025.pdf.

Sandage, C. 1961. Tolerance criteria for continuous inhalation exposure to toxic material. I. Effects on animals of 90-day exposure to phenol, CCl_4 and a mixture of indole, skatole, H_2S and methyl mercaptan. Wright Patterson Air Force Base, OH. U.S. Air Force systems command, Aeronautical Systems Division, ASD technical report 61-519(I).

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11 PROPIONALDEHYDE

Propionaldehyde or propanal, is a colourless liquid with a pungent odour (ICSC, 1993). Propionaldehyde is used in manufacturing trimethylolethane for use in alkyd resin system and in some cases it is also oxidized to propionic acid and reduced to propyl alcohol. It is sometimes found in medicinal and agricultural chemical preparations. Propionaldehyde can also be used in the manufacture of polyvinyl and other plastics and the synthesis of rubber chemicals (HSDB, 2009).

11.1 Assessment of Carcinogenicity

No evidence of propionaldehyde carcinogenicity has been identified.

11.2 Susceptible Populations

Populations with increased susceptibility to exposure to propionaldehyde specifically were not identified.

11.3 Selection of Toxicity Reference Values

Numerous sources were consulted in order to obtain toxicological and benchmark values for COPC. A summary of the reviewed studies, and the rationale for the selection of the TRVs used in the HHRA, are outlined below.

11.3.1 Oral Exposure

11.3.1.1 Non-Carcinogenic Toxicity Reference Values

In this risk assessment, propionaldehyde is only being evaluated through the inhalation pathway; therefore, a non-carcinogenic oral TRV has not been selected.

11.3.1.2 Carcinogenic Toxicity Reference Values

In this risk assessment, propionaldehyde is only being evaluated through the inhalation pathway; therefore, a carcinogenic oral TRV has not been selected.

11.3.2 Inhalation Exposure

11.3.2.1 Non-Carcinogenic Toxicity Reference Values

Acute Inhalation Toxicity Reference Values (1-hour, 24-hour)

Table 11-1. 1-hour and 24-hour Toxicity Reference Values by Jurisdiction

Averaging Time	MB	MOE	AENV	ATSDR	WHO	CalEPA	Value Selected	Reference
1-hour	--	--	--	--	--	--	NV	--
24-hour	--	--	--	--	--	--	NV	--

Notes: "--" – not value; NV – no value

No 1-hour or 24-hour inhalation toxicity reference values were identified for propionaldehyde.

Chronic Inhalation Toxicity Reference Values

Table 11-2. Chronic Toxicity Reference Values by Jurisdiction

Averaging Time	MB	Health Canada	US EPA	ATSDR	RIVM	WHO	CalEPA	Value Selected	Reference
Chronic	--	--	**8**	--	--	--	--	8	US EPA, 2008

Notes: units: µg/m^3; bold – value selected; "--" – not value

The chronic inhalation toxicity reference value used in this risk assessment is 8 µg/m^3 selected from the US EPA (2008) IRIS database. The US EPA (2008) RfC for propionaldehyde is derived from a benchmark concentration (BMC) analysis of a subchronic inhalation study by Union Carbide (1993) which showed atrophy of olfactory epithelium in male rats. A total uncertainty of 1000 was applied to derive the RfC of 0.008 mg/m3 (10 for intraspecies variability, 10 for a subchronic study, 3 for extrapolations from animals to humans and a final 3 for deficiency in the scientific literature).

11.3.2.2 Carcinogenic Inhalation Toxicity Reference Values

Propionaldehyde is not classified as a carcinogenic substance; therefore, a carcinogenic inhalation toxicological reference value has not been selected.

11.4 Bioavailability

In this risk assessment, propionaldehyde is only being evaluated through the inhalation pathway; as a result, oral and dermal bioavailability/absorption factors have not been determined. With regards to the inhalation pathway, it has been conservatively assumed that propionaldehyde is completely absorbed (i.e. absorption factor is 1).

11.5 Conclusion

The following tables present propionaldehyde TRVs selected for use in this risk assessment.

Table 11-3 Oral TRVs used in the HHRA

COPC	Toxicity Reference Value	Value [a]	Critical Effect	Reference Type	Source
HCN	Non-carcinogenic TRV	NE			
	Carcinogenic Slope Factor	NE			

NE – Not Evaluated

Table 11-4 Inhalation TRVs used in the HHRA

COPC	Duration	Value [a]	Critical Effect	Reference Type	Agency
HCN	1-Hour	NV			
	24-Hour	NV			
	Annual Average	8	Atrophy of olfactory epithelium	RfC	US EPA, 2008

[a] NV – No Value; Units: $\mu g/m^3$; RfC – reference concentration

11.6 References

HSDB (Hazardous Substances Data Bank), 2009. PROPIONALDEHYDE CASRN: 123-38-6. National Library of Medicine. National Institutes of Health. Available online: http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~qgNNwG:1

ICSC (International Chemical Safety Cards), 1993. Available online: http://actrav.itcilo.org/actrav-english/telearn/osh/ic/123386.htm

Union Carbide. 1993. Propionaldehyde: combined repeated-exposure and reproductive/developmental toxicity study in rats with cover letter dated 041493. Submitted under TSCA Section 8D; EPA Document No. 86-930000198; NTIS No. OTS0538178.

U.S. EPA. 2008. Toxicological Review of Propionaldehyde in Support of Summary Information on the Integrated Risk Information System (IRIS), National Center for Environmental Assessment, Washington, DC. NCEA-S-2693. Available at http://www.epa.gov/ncea/iris/toxreviews/1011-tr.pdf

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APPENDIX D

Ambient Air Concentrations

Table D.1 - Ambient Air Concentrations - Average PM10

LPC Swan Valley PM10 Conc.		LP1	LP2
Q1 - 2004 (Mar.-May)	Monthly 24 hr - Ave.	8.18	8.46
	Quarterly 24 hr - Ave.	9.83	10.13
	Quarterly 1 hr - Ave.	9.96	10.25
Q2 - 2004 (June-Aug.)	Monthly 24 hr - Ave.	10.48	11.28
	Quarterly 24 hr - Ave.	12.24	13.43
	Quarterly 1 hr - Ave.	12.35	13.49
Q3 - 2004 (Sept. - Dec.)	Monthly 24 hr - Ave.	17.49	16.26
	Quarterly 24 hr - Ave.	18.75	17.65
	Quarterly 1 hr - Ave.	18.88	17.61
Q4 - 2004 (Jan. - Mar.)	Monthly 24 hr - Ave.	8.83	7.78
	Quarterly 24 hr - Ave.	8.80	8.30
	Quarterly 1 hr - Ave.	8.80	8.31
(Mar. 2004 - Feb. 2005)	**Annual 24 hr - Ave.**	12.41	12.38
	Annual 1 hr - Ave.	12.50	12.42
Q1 - 2005 (Mar.-May)	Monthly 24 hr - Ave.	9.03	10.03
	Quarterly 24 hr - Ave.	11.49	12.47
	Quarterly 1 hr - Ave.	11.51	12.42
Q2 - 2005 (June-Aug.)	Monthly 24 hr - Ave.	10.32	11.47
	Quarterly 24 hr - Ave.	14.61	15.84
	Quarterly 1 hr - Ave.	14.76	16.16
Q3 - 2005 (Sept. - Dec.)	Monthly 24 hr - Ave.	14.38	16.72
	Quarterly 24 hr - Ave.	12.28	13.48
	Quarterly 1 hr - Ave.	12.35	13.43
Q4 - 2005 (Jan. - Mar.)	Monthly 24 hr - Ave.	6.93	7.40
	Quarterly 24 hr - Ave.	7.32	7.95
	Quarterly 1 hr - Ave.	7.32	7.91
(Mar. 2005 - Feb. 2006)	**Annual 24 hr - Ave.**	11.42	12.43
	Annual 1 hr - Ave.	11.48	12.48
Q1 - 2006 (Mar.-May)	Monthly 24 hr - Ave.	8.52	9.06
	Quarterly 24 hr - Ave.	11.18	12.14
	Quarterly 1 hr - Ave.	11.16	11.72
Q2 - 2006 (June-Aug.)	Monthly 24 hr - Ave.	19.07	21.48
	Quarterly 24 hr - Ave.	20.00	23.14
	Quarterly 1 hr - Ave.	20.02	23.15
Q3 - 2006 (Sept. - Dec.)	Monthly 24 hr - Ave.	16.24	15.45
	Quarterly 24 hr - Ave.	11.48	12.29
	Quarterly 1 hr - Ave.	11.48	12.31
Q4 - 2006 (Jan. - Mar.)	Monthly 24 hr - Ave.	6.75	7.19
	Quarterly 24 hr - Ave.	7.39	7.64
	Quarterly 1 hr - Ave.	7.35	7.61
(Mar. 2006 - Feb. 2007)	**Annual 24 hr - Ave.**	12.51	13.80
	Annual 1 hr - Ave.	12.50	13.70
Q1 - 2007 (Mar.-May)	Monthly 24 hr - Ave.	9.36	10.59
	Quarterly 24 hr - Ave.	10.57	11.84
	Quarterly 1 hr - Ave.	10.58	11.85
Q2 - 2007 (June-Aug.)	Monthly 24 hr - Ave.	10.62	11.85
	Quarterly 24 hr - Ave.	14.63	17.42
	Quarterly 1 hr - Ave.	14.15	17.43
Q3 - 2007 (Sept. - Dec.)	Monthly 24 hr - Ave.	13.55	14.95
	Quarterly 24 hr - Ave.	12.12	13.72
	Quarterly 1 hr - Ave.	12.07	13.74
Q4 - 2007 (Jan. - Mar.)	Monthly 24 hr - Ave.	8.42	10.31
	Quarterly 24 hr - Ave.	8.89	10.06
	Quarterly 1 hr - Ave.	8.88	10.07
(Mar. 2007 - Feb. 2008)	**Annual 24 hr - Ave.**	11.55	13.26
	Annual 1 hr - Ave.	11.42	13.27
Q1 - 2008 (Mar.-May)	Monthly 24 hr - Ave.	9.10	11.25
	Quarterly 24 hr - Ave.	12.31	13.27
	Quarterly 1 hr - Ave.	12.32	13.27
Q2 - 2008 (June-Aug.)	Monthly 24 hr - Ave.	11.79	14.35
	Quarterly 24 hr - Ave.	16.86	17.54
	Quarterly 1 hr - Ave.	17.34	17.56
Q3 - 2008 (Sept. - Dec.)	Monthly 24 hr - Ave.	16.05	17.57
	Quarterly 24 hr - Ave.	12.84	14.78
	Quarterly 1 hr - Ave.	12.87	14.78
Q4 - 2008 (Jan. - Mar.)	Monthly 24 hr - Ave.	8.78	8.99
	Quarterly 24 hr - Ave.	8.23	7.86
	Quarterly 1 hr - Ave.	8.24	7.89
(Mar. 2008 - Feb. 2009)	**Annual 24 hr - Ave.**	12.56	13.36
	Annual 1 hr - Ave.	12.69	13.38
(Mar. 2004 - Feb. 2009)	**5 year 24 hr - Ave.**	12.09	13.05
(Mar. 2004 - Feb. 2009)	**5 year 1 hr - Ave.**	12.12	13.05

Table D.2 - Ambient Air Concentrations -Monthly PM10

Month	Monthly Average PM_{10} Concentration (ug/m^3)		Manitoba 24-hr Guideline	US EPA 24-hr Standard
	LP1	LP2		
	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
Sep-02	18.6	18.1	50	150
Oct-02	8.8	8.8	50	150
Nov-02	10.5	11.1	50	150
Dec-02	7.9	8.4	50	150
Jan-03	8.3	8.4	50	150
Feb-03	8.2	8.4	50	150
Mar-03	10.7	10.4	50	150
Apr-03	10.3	11.3	50	150
May-03	21.5	22.6	50	150
Jun-03	17.6	19.9	50	150
Jul-03	14.6	21.4	50	150
Aug-03	31.6	35.9	50	150
Sep-03	14.7	18.3	50	150
Oct-03	19.8	21.4	50	150
Nov-03	11.8	13.5	50	150
Dec-03	8.2	9.8	50	150
Jan-04	8	8.6	50	150
Feb-04	9.5	9.5	50	150
Mar-04	8.2	8.5	50	150
Apr-04	10.9	11.2	50	150
May-04	10.5	10.7	50	150
Jun-04	10.5	11.3	50	150
Jul-04	14.9	16.1	50	150
Aug-04	11.4	12.9	50	150
Sep-04	17.5	16.3	50	150
Oct-04	23.6	18.2	50	150
Nov-04	15.7	18.3	50	150
Dec-04	8.8	7.7	50	150
Jan-05	8.8	7.7	50	150
Feb-05	8.8	9.4	50	150
Mar-05	9	10	50	150
Apr-05	11.3	12.2	50	150
May-05	14.2	14.6	50	150
Jun-05	10.3	11.2	50	150
Jul-05	16.4	17.2	50	150
Aug-05	16.6	18.6	50	150
Sep-05	14.4	16.7	50	150
Oct-05	15.6	14.6	50	150
Nov-05	6.9	9.1	50	150
Dec-05	6.9	7.4	50	150
Jan-06	6.8	7.3	50	150
Feb-06	8.2	9.2	50	150
Mar-06	8.5	8.8	50	150
Apr-06	13.9	15.6	50	150
May-06	11	12.1	50	150
Jun-06	19.1	21.5	50	150
Jul-06	21.8	27.6	50	150
Aug-06	18.8	20.2	50	150
Sep-06	16.2	15.4	50	150
Oct-06	9.4	11.5	50	150
Nov-06	8.9	9.9	50	150
Dec-06	6.7	7.2	50	150
Jan-07	7.1	7.1	50	150
Feb-07	8.3	8.6	50	150
Mar-07	9.4	10.6	50	150
Apr-07	9.2	10.7	50	150
May-07	13.1	14.2	50	150
Jun-07	10.6	11.9	50	150
Jul-07	18.6	23.1	50	150
Aug-07		17.3	50	150
Sep-07	13.6	14.9	50	150
Oct-07	14.3	15.4	50	150
Nov-07	8.6	10.8	50	150
Dec-07	8.4	10.3	50	150
Jan-08	8.9	9.9	50	150
Feb-08	9.3	10	50	150
Mar-08	9.1	11.2	50	150
Apr-08	10.9	12.4	50	150
May-08	16.9	16.2	50	150
Jun-08	11.8	14.3	50	150
Jul-08	16.4	16.5	50	150
Aug-08	22.4	21.8	50	150
Sep-08	16	17.6	50	150
Oct-08	14	17.4	50	150
Nov-08	8.4	9.4	50	150
Dec-08	8.8	9	50	150
Jan-09	8.7	7.5	50	150
Feb-09	7.2	7.1	50	150

Table D.3 - Ambient Air Concentrations - Formaldehyde

	LP1				Wind Direction (16 point compass)			LP2				Wind Direction (16 point compass)			Manitoba 1-hr Guideline (ug/m3)
Date	Start Time	Concentration[a] µg/m³	Concentration[a] ppb	Detection Limit (µg/m³)	Previous Hour	Sample Hour	Following Hour	Date	Start Time	Concentration[a] µg/m³	Concentration[a] ppb	Detection Limit µg/m³	Previous Hour	Sample Hour	Following Hour	
2-Mar-01	21:45	0.57	0.45	0.43	ENE	E	E	2-Mar-01	23:30	0.44	0.34	0.44	ENE	E	E	60
8-Mar-01	15:18	0.57	0.45	0.43	SW	SSW	SSW	8-Mar-01	16:06	0.58	0.46	0.43	SW	SSW	SSW	60
14-Mar-01	20:28	0.85	0.67	0.42	WSW	NE	ESE	14-Mar-01	9:16	0.58	0.45	0.43	WSW	NE	ESE	60
20-Mar-01	16:05	0.58	0.46	0.44	WSW	W	W	20-Mar-01	16:32	0.6	0.47	0.45	WSW	W	W	60
26-Mar-01	15:17	0.56	0.44	0.42	WNW	W	W	26-Mar-01	17:05	0.57	0.45	0.43	WNW	W	W	60
1-Apr-01	13:37	LTDL	LTDL	0.37	N	N	NNE	1-Apr-01	14:56	LTDL	LTDL	0.44	N	N	NNE	60
7-Apr-01	15:03	LTDL	LTDL	0.43	NE	NE	NNE	7-Apr-01	15:48	LTDL	LTDL	0.44	NE	NE	NNE	60
13-Apr-01	13:55	LTDL	LTDL	0.37	NE	E	ENE	13-Apr-01	15:33	13.43	10.57	0.5	NE	E	ENE	60
19-Apr-01	11:34	LTDL	LTDL	0.37	NE	ENE	E	19-Apr-01	14:17	11.22	8.83	0.47	NE	ENE	E	60
25-Apr-01	16:18	1.74	1.37	0.37	W	W	WNW	25-Apr-01	12:05	10.19	8.02	0.51	W	W	WNW	60
1-May-01	16:18	2.37	1.87	0.37	N	E	E	1-May-01	17:07	2.38	1.87	0.51	N	E	E	60
7-May-01	14:25	1.77	1.39	0.38	W	W	WNW	7-May-01	14:50	2.51	1.98	0.5	W	W	WNW	60
13-May-01	13:15	4.68	3.68	0.37	SE	ESE	ESE	13-May-01	15:00	4.1	3.23	0.51	SE	ESE	ESE	60
19-May-01	13:53	1.23	0.97	0.37	SW	SW	SW	19-May-01	15:16	1.85	1.45	0.5	SW	SW	SW	60
25-May-01	16:03	2.45	1.93	0.37	NNE	NE	E	25-May-01	16:46	2.67	2.1	0.5	NNE	NE	E	60
31-May-01	15:10	1.85	1.45	0.37	WSW	WSW	WSW	31-May-01	16:40	1.84	1.45	0.5	WSW	WSW	WSW	60
6-Jun-01	21:55	3.6	2.83	0.4	E	ENE	ENE	6-Jun-01	23:40	9.9	7.79	0.52	ENE	E	NE	60
12-Jun-01	14:43	1	0.78	0.43	NE	ENE	ENE	12-Jun-01	15:27	1.23	0.97	0.53	NE	ENE	ENE	60
18-Jun-01	20:50	LTDL	LTDL	0.43	WSW	NNW	NW	18-Jun-01	21:25	LTDL	LTDL	0.52	WSW	NNW	NW	60
24-Jun-01	14:02	17.06	13.43	0.43	E	E	E	24-Jun-01	13:35	31.17	24.53	0.53	E	E	E	60
30-Jun-01	20:13	0.68	0.53	0.51	ESE	SSE	SSW	30-Jun-01	20:43	LTDL	LTDL	0.52	SSE	SSW	SSE	60
6-Jul-01	14:57	1.43	1.13	0.43	WSW	WSW	WSW	6-Jul-01	15:32	1.59	1.25	0.53	WSW	WSW	WSW	60
12-Jul-01	16:43	2.83	2.23	0.42	WNW	WNW	W	12-Jul-01	17:17	2.79	2.2	0.52	WNW	WNW	W	60
18-Jul-01	15:00	3.71	2.92	0.43	W	W	WSW	18-Jul-01	17:10	2.27	1.78	0.52	WSW	W	WSW	60
24-Jul-01	20:35	1.7	1.34	0.43	E	E	ESE	24-Jul-01	21:59	2.09	1.65	0.52	E	ESE	E	60
30-Jul-01	20:57	1.57	1.24	0.43	WSW	SW	SW	30-Jul-01	21:23	1.83	1.44	0.39	WSW	SW	SW	60
5-Aug-01	14:33	3	2.36	0.43	WSW	WSW	WSW	5-Aug-01	15:54	1.84	1.45	0.39	WSW	WSW	SW	60
11-Aug-01	22:30	1.68	1.32	0.42	SSW	SSW	SSW	12-Aug-01	0:15	1.17	0.92	0.39	SSW	SW	SW	60
17-Aug-01	14:20	1.83	1.44	0.42	NE	NNE	NE	17-Aug-01	16:15	1.83	1.44	0.39	NE	NE	NE	60
23-Aug-01	14:45	1.57	1.24	0.43	S	SSE	S	23-Aug-01	15:07	1.04	0.82	0.39	S	SSE	S	60
29-Aug-01	16:08	3.01	2.37	0.43	WNW	NW	NW	29-Aug-01	16:43	2.23	1.75	0.39	NW	NW	WNW	60
4-Sep-01	14:20	5.56	4.37	0.46	NW	NW	NNW	4-Sep-01	16:50	5.26	4.14	0.4	NNE	ENE	E	60
10-Sep-01	21:30	3.34	2.63	0.46	SSW	SW	SSW	10-Sep-01	23:15	2.93	2.3	0.4	SSW	SSW	SW	60
16-Sep-01	15:04	5.4	4.25	0.46	WSW	NNE	NE	16-Sep-01	15:45	6.14	4.83	0.41	NNE	NE	NE	60
22-Sep-01	20:18	2.12	1.67	0.45	ENE	S	SSW	22-Sep-01	20:58	1.99	1.57	0.4	S	SSW	SSW	60
30-Sep-01	21:40	9.55	7.51	0.46	SW	SW	SW	30-Sep-01	23:35	6.65	5.24	0.41	SW	SW	SW	60
4-Oct-01	17:30	LTDL	LTDL	0.46	NW	NW	NW	4-Oct-01	15:05	LTDL	LTDL	0.4	NW	NNW	NW	60
10-Oct-01	15:28	LTDL	LTDL	0.46	NW	WNW	WNW	10-Oct-01	16:14	LTDL	LTDL	0.41	WNW	WNW	W	60
16-Oct-01	15:44	LTDL	LTDL	0.46	S	SSE	SSE	16-Oct-01	16:23	LTDL	LTDL	0.4	S	SSE	SSE	60
22-Oct-01	14:00	0.62	0.48	0.46	E	ENE	ENE	22-Oct-01	16:15	LTDL	LTDL	0.41	ENE	ENE	NE	60
28-Oct-01	14:11	LTDL	LTDL	0.46	W	WNW	WNW	28-Oct-01	14:40	LTDL	LTDL	0.4	WNW	WNW	W	60
3-Nov-01	14:41	LTDL	LTDL	0.5	WSW	WSW	WSW	3-Nov-01	15:19	LTDL	LTDL	0.49	WSW	WSW	WSW	60
9-Nov-01	14:30	LTDL	LTDL	0.51	W	W	WSW	9-Nov-01	15:05	0.82	0.64	0.49	W	WSW	SW	60
15-Nov-01	14:35	LTDL	LTDL	0.51	NE	ENE	E	15-Nov-01	16:15	LTDL	LTDL	0.49	ENE	E	E	60
21-Nov-01	13:15	LTDL	LTDL	0.51	E	ENE	ENE	21-Nov-01	13:35	LTDL	LTDL	0.49	ENE	ENE	ENE	60
27-Nov-01	16:00	0.83	0.65	0.5	ENE	E	E	27-Nov-01	16:30	1.27	1	0.48	ENE	E	E	60
3-Dec-01	13:35	LTDL	LTDL	0.51	ESE	ESE	ESE	3-Dec-01	14:00	LTDL	LTDL	0.57	ESE	ESE	ESE	60
9-Dec-01	13:50	LTDL	LTDL	0.52	WSW	WSW	WSW	9-Dec-01	15:20	LTDL	LTDL	0.55	WSW	WSW	W	60
15-Dec-01	10:50	LTDL	LTDL	0.51	WSW	WSW	WSW	15-Dec-01	11:15	0.73	0.57	0.55	WSW	WSW	WSW	60
21-Dec-01	14:50	LTDL	LTDL	0.51	NE	NE	NNE	21-Dec-01	15:15	0.56	0.44	0.56	NE	NE	NNE	60
27-Dec-01	11:30	1.19	0.94	0.51	NNW	NE	NE	27-Dec-01	11:15	2	1.57	0.54	NNW	NE	NE	60
2-Jan-02	14:00	LTDL	LTDL	0.51	SSW	SSE	ESE	2-Jan-02	15:55	LTDL	LTDL	0.54	ESE	ESE	ESE	60
8-Jan-02	14:50	LTDL	LTDL	0.51	SW	SW	SW	8-Jan-02	16:40	LTDL	LTDL	0.55	SW	SW	WSW	60
14-Jan-02	15:55	LTDL	LTDL	0.51	NNE	NNE	NNE	14-Jan-02	16:20	LTDL	LTDL	0.56	NNE	NNE	NNE	60
20-Jan-02	14:40	LTDL	LTDL	0.52	NNE	NNE	NNE	20-Jan-02	15:00	LTDL	LTDL	0.55	NNE	NNE	NNE	60
26-Jan-02	16:10	LTDL	LTDL	0.51	WSW	SW	WSW	26-Jan-02	17:35	LTDL	LTDL	0.54	WSW	WSW	SW	60
1-Feb-02	15:45	LTDL	LTDL	0.5	WSW	WSW	WSW	1-Feb-02	17:15	LTDL	LTDL	0.53	WSW	WSW	S	60
7-Feb-02	13:45	LTDL	LTDL	0.52	ENE	ENE	ENE	7-Feb-02	14:15	LTDL	LTDL	0.57	ENE	ENE	ENE	60
13-Feb-02	16:15	LTDL	LTDL	0.54	WSW	WSW	WSW	13-Feb-02	16:35	LTDL	LTDL	0.58	WSW	WSW	WSW	60
19-Feb-02	15:20	LTDL	LTDL	0.51	N/A	N/A	N/A	19-Feb-02	14:45	0.72	0.56	0.54	N/A	N/A	N/A	60
25-Feb-02	16:20	LTDL	LTDL	0.52	WNW	WSW	WSW	25-Feb-02	17:50	LTDL	LTDL	0.44	WSW	WSW	WSW	60
3-Mar-02	10:35	LTDL	LTDL	0.52	WSW	WSW	WSW	3-Mar-02	11:45	LTDL	LTDL	0.46	WSW	WSW	WSW	60
9-Mar-02	11:10	LTDL	LTDL	0.52	SW	SW	SW	9-Mar-02	11:35	LTDL	LTDL	0.44	SW	SW	WSW	60
15-Mar-02	15:20	LTDL	LTDL	0.53	W	WSW	WSW	15-Mar-02	14:50	LTDL	LTDL	0.45	W	WSW	WSW	60
21-Mar-02	15:40	LTDL	LTDL	0.52	WSW	WSW	WSW	21-Mar-02	17:16	LTDL	LTDL	0.43	WSW	WSW	WSW	60
27-Mar-02	13:20	LTDL	LTDL	0.56	ENE	E	E	27-Mar-02	13:40	LTDL	LTDL	0.47	E	E	W	60
2-Apr-02	16:15	LTDL	LTDL	0.56	NNE	NNE	NNE	2-Apr-02	16:42	LTDL	LTDL	0.45	NNE	NNE	NNE	60
8-Apr-02	14:25	LTDL	LTDL	0.53	WSW	WSW	WSW	8-Apr-02	16:20	LTDL	LTDL	0.45	WSW	WSW	WSW	60
14-Apr-02	14:45	LTDL	LTDL	0.54	E	E	E	14-Apr-02	16:25	LTDL	LTDL	0.46	E	E	E	60
20-Apr-02	11:05	LTDL	LTDL	0.54	NNW	WNW	WNW	20-Apr-02	11:30	LTDL	LTDL	0.45	NNW	WNW	WNW	60
26-Apr-02	13:50	LTDL	LTDL	0.52	WSW	WSW	WSW	26-Apr-02	14:15	LTDL	LTDL	0.47	WSW	WSW	WSW	60
2-May-02	15:10	LTDL	LTDL	0.53	SE	SE	SE	2-May-02	17:05	LTDL	LTDL	0.45	SE	SE	SE	60
8-May-02	15:10	LTDL	LTDL	0.53	NE	NNE	NE	8-May-02	17:00	9.98	7.86	0.45	NE	NE	NE	60
14-May-02	16:55	LTDL	LTDL	0.56	N	NNE	NNE	14-May-02	17:10	2.02	1.59	0.55	N	NNE	NNE	60
20-May-02	14:15	LTDL	LTDL	0.54	S	S	S	20-May-02	14:35	0.71	0.56	0.53	S	S	SSW	60
27-May-02	8:30	LTDL	LTDL	0.55	W	WNW	WNW	27-May-02	8:55	LTDL	LTDL	0.5	WNW	WNW	WNW	60
1-Jun-02	15:30	LTDL	LTDL	0.55	N/A	N/A	N/A	1-Jun-02	16:00	LTDL	LTDL	0.5	N/A	N/A	N/A	60
7-Jun-02	8:30	LTDL	LTDL	0.55	N/A	N/A	N/A	7-Jun-02	8:50	LTDL	LTDL	0.52	N/A	N/A	N/A	60
13-Jun-02	14:15	1.83	1.44	0.55	NNW	W	WNW	13-Jun-02	14:40	2.33	1.84	0.54	W	WNW	W	60
19-Jun-02	16:35	LTDL	LTDL	0.55	NNE	NNE	NNE	19-Jun-02	16:45	LTDL	LTDL	0.5	NNE	NNE	NNE	60
25-Jun-02	10:25	LTDL	LTDL	0.55	W	W	SW	25-Jun-02	10:55	LTDL	LTDL	0.54	W	SW	W	60
1-Jul-02	10:50	1.47	1.16	0.55	WSW	WSW	WSW	1-Jul-02	11:15	1.52	1.2	0.51	WSW	WSW	WSW	60
7-Jul-02	10:10	2.55	2.01	0.55	E	ENE	W	7-Jul-02	11:30	1.41	1.11	0.47	ENE	W	W	60
13-Jul-02	16:00	4.44	3.49	0.55	N	NNE	ENE	13-Jul-02	15:37	4.54	3.58	0.5	N	NNE	ENE	60
19-Jul-02	15:20	1.84	1.45	0.55	NNE	NNE	NNE	19-Jul-02	17:15	1.68	1.32	0.5	NNE	NNE	NE	60
25-Jul-02	16:15	1.78	1.4	0.59	WSW	WSW	WSW	25-Jul-02	16:45	2.35	1.85	0.5	WSW	WSW	WSW	60
31-Jul-02	15:35	2.18	1.71	0.59	WSW	WSW	WSW	31-Jul-02	17:00	2.19	1.72	0.5	WSW	WSW	WSW	60
6-Aug-02	15:45	2.2	1.73	0.55	SSE	S	SE	6-Aug-02	17:05	3.18	2.5	0.5	S	SE	ESE	60
12-Aug-02	12:35	1.28	1.01	0.55	NW	NW	NW	12-Aug-02	13:00	1.21	0.95	0.52	NW	NW	NW	60
18-Aug-02	11:15	3.83	3.01	0.52	WSW	WSW	WSW	18-Aug-02	12:30	1.51	1.19	0.65	WSW	WSW	WSW	60
24-Aug-02	13:35	2.61	2.06	0.52	WSW	WSW	WSW	24-Aug-02	14:55	3.84	3.02	0.64	WSW	WSW	W	60
30-Aug-02	14:45	2.62	2.06	0.52	SE	SE	SE	30-Aug-02	16:15	1.69	1.33	0.64	SE	SE	ESE	60
5-Sep-02	15:30	0.52	0.41	0.52	ENE	E	E	5-Sep-02	17:10	LTDL	LTDL	0.64	E	E	E	60
11-Sep-02	15:55	0.7	0.55	0.52	WSW	SW	SW	11-Sep-02	17:15	1.52	1.19	0.65	SW	SW	ENE	60
17-Sep-02	16:10	0.89	0.7	0.53	NE	NE	ENE	17-Sep-02	17:20	0.87	0.69	0.66	NE	ENE	NE	60
23-Sep-02	14:35	LTDL	LTDL	0.52	W	WSW	WSW	23-Sep-02	16:10	0.64	0.5	0.64	WSW	WSW	W	60
29-Sep-02	15:10	0.89	0.7	0.53	SW	W	W	29-Sep-02	16:50	0.87	0.68	0.65	W	SW	SW	60
5-Oct-02	14:15	LTDL	LTDL	0.52	W	W	W	5-Oct-02	15:35	0.85	0.67	0.64	W	WNW	N	60
11-Oct-02	14:05	LTDL	LTDL	0.52	WNW	WNW	NW	11-Oct-02	15:20	LTDL	LTDL	0.64	WNW	NW	NW	60
17-Oct-02	15:25	LTDL	LTDL	0.52	E	E	ESE	17-Oct-02	17:02	LTDL	LTDL	0.65	ESE	SE	SSE	60
23-Oct-02	14:40	LTDL	LTDL	0.51	WSW	WSW	WSW	23-Oct-02	15:30	LTDL	LTDL	0.63	WSW	WSW	WSW	60
29-Oct-02	14:16	LTDL	LTDL	0.55	WSW	WSW	WSW	29-Oct-02	14:25	LTDL	LTDL	0.64	WSW	WSW	WSW	60
4-Nov-02	16:45	LTDL	LTDL	0.52	S	SE	SE	4-Nov-02	17:00	LTDL	LTDL	0.65	S	SE	SE	60
10-Nov-02	13:11	1.92	1.51	0.52	SW	WSW	W	10-Nov-02	15:47	LTDL	LTDL	0.65	WSW	WSW	WSW	60
16-Nov-02	15:27	1.39	1.09	0.52	W	W	NW	16-Nov-02	17:14	LTDL	LTDL	0.64	NW	N	NW	60
22-Nov-02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22-Nov-02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60
28-Nov-02	16:30	2.98	2.35	0.5	WSW	W	W	28-Nov-02	16:45	1.26	0.99	0.63	W	W	W	60
4-Dec-02	15:30	0.59	0.47	0.45	WSW	WSW	WSW	4-Dec-02	16:15	0.67	0.53	0.5	WSW	WSW	WSW	60
10-Dec-02	15:22	0.81	0.64	0.49	WSW	W	W	10-Dec-02	16:17	0.66	0.52	0.49	W	W	WSW	60
16-Dec-02	14:28	0.61	0.48	0.45	S	SSE	SE	16-Dec-02	14:35	1.42	1.12	0.53	SSE	SE	SE	60
22-Dec-02	11:10	4.03	3.17	0.45	NNE	N	N	22-Dec-02	13:05	LTDL	LTDL	0.5	N	W	SSW	60
28-Dec-02	14:55	1.12	0.88	0.48	W	WNW	SSW	28-Dec-02	17:00	0.66	0.52	0.49	SSW	NW	N	60
3-Jan-03	15:40	1.45	1.14	0.48	NNE	ENE	ESE	3-Jan-03	16:30	2.13	1.68	0.49	NNE	ENE	ESE	60
9-Jan-03	14:23	1.04	0.82	0.45	NW	NW	NW	9-Jan-03	14:50	0.48	0.38	0.48	NW	NW	NW	60
15-Jan-03	14:56	0.74	0.58	0.44	SW	SW	SW	15-Jan-03	15:07	1.03	0.81	0.51	SW	SW	SW	60
21-Jan-03	16:20	0.79	0.62	0.47	N	NE	NE	21-Jan-03	16:40	4.03	3.17	0.5	NE	NE	E	60
27-Jan-03	15:50	1.45	1.14	0.48	WNW	WNW	NW	27-Jan-03	16:40	0.69	0.54	0.51	WNW	NW	N	60
2-Feb-03	14:05	0.64	0.5	0.48	WSW	WSW	WSW	2-Feb-03	14:20	0.55	0.43	0.55	WSW	WSW	WSW	60
8-Feb-03	11:13	0.61	0.48	0.46	WSW	WSW	SW	8-Feb-03	11:20	0.73	0.57	0.44	WSW	WSW	SW	60
14-Feb-03	15:43	0.43	0.34	0.43	NW	NNW	WNW	14-Feb-03	16:35	0.57	0.45	0.43	NNW	WNW	WSW	60
20-Feb-03	16:27	LTDL	LTDL	0.43	N	NNE	NE	20-Feb-03	17:20	0.87	0.68	0.43	NNE	NE	NE	60
26-Feb-03	16:20	0.49	0.39	0.49	W	WSW	SSW	26-Feb-03	16:25	0.44	0.35	0.44	W	WSW	SSW	60
4-Mar-03	17:20	LTDL	LTDL	0.43	WSW	WSW	WSW	4-Mar-03	17:24	LTDL	LTDL	0.46	WSW	WSW	WSW	60
10-Mar-03	15:29	LTDL	LTDL	0.46	WSW	SW	SW	10-Mar-03	16:15	LTDL	LTDL	0.44	SW	SW	WSW	60
16-Mar-03	16:10	0.73	0.57	0.44	ENE	ENE	E	16-Mar-03	17:00	1.61	1.27	0.44	ENE	E	E	60
22-Mar-03	14:15	3.01	2.37	0.45	WSW	WSW	WSW	22-Mar-03	15:20	2.66	2.09	0.44	WSW	WSW	WSW	60
28-Mar-03	14:35	LTDL	LTDL	0.44	NNE	NE	NE	28-Mar-03	15:45	LTDL	LTDL	0.44	NE	NE	NE	60
3-Apr-03	15:03	3.59	2.82	0.43	ENE	ENE	E	3-Apr-03	14:55	4.02	3.17	0.43	ENE	ENE	E	60
9-Apr-03	14:47	1.41	1.11	0.47	WNW	W	W	9-Apr-03	16:35	1.49	1.17	0.45	W	W	NW	60
15-Apr-03	14:25	1.38	1.09	0.46	E	E	E	15-Apr-03	14:20	1.7	1.34	0.46	E	E	E	60
21-Apr-03	13:25	2.74	2.16	0.43	ENE	ENE	ENE	21-Apr-03	14:25	2.64	2.08	0.47	ENE	ENE	E	60
27-Apr-03	15:30	1.37	1.08	0.46	NNE	NE	NE	27-Apr-03	16:15	1.58	1.25	0.43	NE	NE	NE	60
3-May-03	15:36	2.79	2.2	0.44	E	SSW	WSW	3-May-03	16:25	2.8	2.2	0.44	E	SSW	WSW	60
9-May-03	14:05	1.08	0.85	0.46	NNE	NNE	NNE	9-May-03	14:25	1.09	0.86	0.47	NNE	NNE	NNE	60
15-May-03	15:05	3.69	2.9	0.48	S	SSW	S	15-May-03	15:20	3.27	2.58	0.47	S	SSW	S	60
21-May-03	16:30	2.8	2.2	0.47	NW	NNE	ENE	21-May-03	17:10	3.16	2.49	0.45	NNE	ENE	ESE	60
27-May-03	16:03	2.49	1.96	0.47	NW	NW	WNW	27-May-03	16:52	2.57	2.02	0.45	NW	WNW	NW	60
2-Jun-03	17:05	3.06	2.41	0.48	SE	SE	SE	2-Jun-03	17:23	5.3	4.17	0.47	SE	SE	SE	60
8-Jun-03	13:11	2.15	1.7	0.5	ESE	SE	SE	8-Jun-03	13:30	2.27	1.79	0.45	ESE	SE	SE	60
14-Jun-03	15:30	5.3	4.17	0.47	WSW	S	SSW	14-Jun-03	16:22	6.23	4.91	0.46	S	SSW	S	60
20-Jun-03	16:44	31.74	24.98	0.48	SSW	S	SSE	20-Jun-03	17:40	6.91	5.44	0.47	S	SSE	SSE	60
26-Jun-03	14:31	3.28	2.58	0.47	W	NNW	W	26-Jun-03	14:50	5.08	4	0.45	W	NNW	W	60
2-Jul-03	11:15	1.72	1.35	0.47	N	N	WNW	2-Jul-03	11:45	34.98	27.53	0.45	N	WNW	SSW	60
8-Jul-03	15:48	LTDL	LTDL	0.46	ESE	ESE	SE	8-Jul-03	16:40	1.04	0.82	0.45	ESE	SE	SE	60
14-Jul-03	14:05	1.39	1.1	0.46	NW	N	E	14-Jul-03	14:25	21	16.53	0.45	NW	N	E	60
20-Jul-03	14:10	1.55	1.22	0.46	NNW	N	N	20-Jul-03	14:30	1.2	0.94	0.45	NNW	N	N	60
26-Jul-03	13:50	2.02	1.59	0.47	W	NW	NW	26-Jul-03	15:05	1.95	1.54	0.45	NW	NW	NNW	60
1-Aug-03	16:05	8.83	6.95	0.46	N	NNE	NNE	1-Aug-03	16:45	4.9	3.85	0.46	NNE	NNE	NE	60
7-Aug-03	11:45	2.78	2.19	0.46	ENE	NNE	NNE	7-Aug-03	14:20	4.83	3.8	0.47	NNE	ESE	SE	60
13-Aug-03	11:25	1.71	1.34	0.47	E	ENE	ENE	13-Aug-03	13:45	6.12	4.81	0.47	NNE	SSW	SW	60
19-Aug-03	14:25	6.5	5.11	0.56	NE	E	ENE	19-Aug-03	15:05	3.99	3.14	0.57	E	ENE	E	60
25-Aug-03	16:02	3.22	2.54	0.54	WNW	W	WNW	25-Aug-03	16:45	1.94	1.53	0.53	W	WNW	W	60
31-Aug-03	15:20	2.67	2.1	0.53	ENE	NE	NE	31-Aug-03	16:30	1.89	1.49	0.52	NE	NE	E	60
6-Sep-03	13:35	3.21	2.53	0.54	E	E	E	6-Sep-03	14:55	4.42	3.48	0.51	E	E	E	60
12-Sep-03	16:10	2.16	1.7	0.54	SW	SW	SW	12-Sep-03	17:18	4.1	3.22	0.51	SW	SW	W	60
17-Sep-03	14:05	2.3	1.81	0.53	N	N	N	17-Sep-03	14:25	2.67	2.1	0.5	N	N	N	60
24-Sep-03	15:55	2.99	2.36	0.53	NW	NW	WNW	24-Sep-03	16:40	2.7	2.12	0.51	NW	WNW	W	60
30-Sep-03	15:59	2.62	2.06	0.52	NNE	NNE	NE	30-Sep-03	16:21	2.17	1.71	0.5	NNE	NNE	NE	60
6-Oct-03	13:40	3.4	2.68	0.54	WSW	WSW	WSW	6-Oct-03	13:56	1.9	1.49	0.52	WSW	WSW	WSW	60
12-Oct-03	15:55	0.54	0.42	0.54	N	NE	E	12-Oct-03	16:30	3.27	2.57	0.52	N	NE	E	60
18-Oct-03	15:15	3.19	2.51	0.53	E	E	E	18-Oct-03	16:00	3.2	2.52	0.51	E	E	E	60
24-Oct-03	13:15	0.89	0.7	0.54	N	NNE	NNE	24-Oct-03	14:35	1.02	0.81	0.51	NNE	NNE	NNE	60
30-Oct-03	14:35	LTDL	LTDL	0.53	N	N	N	30-Oct-03	14:54	0.84	0.66	0.5	N	N	N	60

	LP1				Wind Direction (16 point compass)			LP2				Wind Direction (16 point compass)			Manitoba 1-hr Guideline (ug/m3)
Date	Start Time	Concentration[a] µg/m³	Concentration[a] ppb	Detection Limit (µg/m³)	Previous Hour	Sample Hour	Following Hour	Date	Start Time	Concentration[a] µg/m³	Concentration[a] ppb	Detection Limit µg/m³	Previous Hour	Sample Hour	Following Hour	
6-Nov-03	15:30	LTDL	LTDL	0.53	NW	NNW	NNW	6-Nov-03	16:00	0.85	0.67	0.51	NNW	NNW	NW	60
11-Nov-03	16:07	0.89	0.7	0.53	SW	SW	SW	11-Nov-03	16:50	0.86	0.67	0.51	SW	SW	WSW	60
17-Nov-03	15:10	1.86	1.47	0.56	ENE	NNW	W	17-Nov-03	15:28	2.67	2.1	0.53	ENE	NNW	W	60
23-Nov-03	11:45	1.04	0.82	0.45	W	NW	WNW	23-Nov-03	14:30	0.61	0.48	0.46	WNW	W	WSW	60
29-Nov-03	16:00	2.92	2.3	0.46	WSW	SW	WSW	29-Nov-03	16:46	LTDL	LTDL	0.47	SW	WSW	WSW	60
5-Dec-03	16:10	LTDL	LTDL	0.45	NE	NW	S	5-Dec-03	17:00	0.46	0.36	0.46	NW	S	E	60
11-Dec-03	14:00	1.5	1.18	0.45	W	WNW	NW	11-Dec-03	15:10	0.46	0.36	0.46	WNW	NW	WNW	60
17-Dec-03	15:28	LTDL	LTDL	0.48	SW	SW	WSW	17-Dec-03	15:48	0.75	0.59	0.45	SW	WSW	WSW	60
23-Dec-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	23-Dec-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60
29-Dec-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29-Dec-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60
4-Jan-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4-Jan-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60
10-Jan-04	13:45	0.62	0.49	0.46	NNE	NNE	NNE	10-Jan-04	15:10	0.64	0.5	0.48	NNE	NNE	ENE	60
18-Jan-04	15:02	LTDL	LTDL	0.46	ENE	S	NE	18-Jan-04	15:30	0.47	0.37	0.47	ENE	S	NE	60
22-Jan-04	15:55	LTDL	LTDL	0.44	E	E	E	22-Jan-04	16:45	LTDL	LTDL	0.46	E	E	E	60
28-Jan-04	14:28	LTDL	LTDL	0.43	WSW	W	WSW	28-Jan-04	14:24	1.23	0.97	0.46	WSW	W	WSW	60
3-Feb-04	14:40	3.86	3.04	0.46	SW	WSW	WSW	3-Feb-04	15:50	4.5	3.54	0.48	WSW	WSW	WSW	60
9-Feb-04	14:05	1.79	1.41	0.45	SSW	E	SE	9-Feb-04	15:00	4.6	3.62	0.46	E	SE	SW	60
15-Feb-04	14:05	5.25	4.13	0.45	NNW	W	SW	15-Feb-04	14:28	7.55	5.94	0.46	NNW	W	SW	60
21-Feb-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	21-Feb-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60
27-Feb-04	16:07	1.94	1.52	0.34	ENE	ENE	NE	27-Feb-04	14:51	2.03	1.6	0.34	E	ENE	ENE	60
4-Mar-04	15:30	7.84	6.17	0.34	ENE	ENE	ENE	4-Mar-04	15:50	8.22	6.47	0.33	ENE	ENE	ENE	60
9-Mar-04	15:25	5.98	4.71	0.35	W	W	W	9-Mar-04	15:30	5.86	4.61	0.33	W	W	WSW	60
16-Mar-04	13:58	7.37	5.8	0.35	WNW	WNW	WNW	16-Mar-04	14:19	7.54	5.93	0.33	WNW	WNW	WNW	60
22-Mar-04	16:40	8.27	6.51	0.34	NE	NE	ENE	22-Mar-04	16:55	6.27	4.93	0.32	NE	ENE	NE	60
28-Mar-04	15:55	5.71	4.49	0.34	WNW	W	WNW	28-Mar-04	16:30	7.22	5.68	0.33	W	WNW	WNW	60
3-Apr-04	15:50	5.99	4.71	0.34	WNW	NNW	NE	3-Apr-04	16:20	4.97	3.91	0.32	NNW	NE	NNW	60
8-Apr-04	12:20	2.25	1.77	0.34	NNE	NNE	NNE	8-Apr-04	13:27	2.39	1.88	0.33	NNE	NNE	NNE	60
15-Apr-04	15:14	3.07	2.42	0.34	E	E	E	15-Apr-04	13:55	2.41	1.9	0.33	ESE	E	E	60
21-Apr-04	15:25	2.16	1.7	0.34	NNE	NNE	NE	21-Apr-04	15:45	1.76	1.39	0.33	NE	ENE	ENE	60
27-Apr-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27-Apr-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60
3-May-04	13:55	0.68	0.54	0.34	NNW	NNW	NNW	3-May-04	14:22	0.55	0.43	0.33	NNW	NNW	NNW	60
9-May-04	13:45	0.69	0.54	0.34	W	W	W	9-May-04	14:20	0.77	0.6	0.33	W	W	W	60
15-May-04	16:10	1.48	1.16	0.34	WNW	WNW	WNW	15-May-04	16:30	0.54	0.43	0.33	WNW	WNW	WNW	60
21-May-04	17:00	0.56	0.44	0.34	E	E	ENE	21-May-04	17:30	0.54	0.42	0.32	E	ENE	ENE	60
27-May-04	13:40	0.57	0.45	0.34	E	SE	SW	27-May-04	15:00	0.66	0.52	0.33	SW	W	WNW	60
2-Jun-04	13:20	1.24	0.98	0.37	NNE	ENE	ENE	2-Jun-04	13:55	1.43	1.12	0.36	ENE	ENE	NW	60
8-Jun-04	15:50	1.62	1.28	0.37	ENE	ENE	ENE	8-Jun-04	16:45	1.53	1.21	0.35	ENE	ENE	NE	60
15-Jun-04	16:00	0.87	0.69	0.37	N	N	NNE	15-Jun-04	16:45	0.59	0.47	0.36	N	NNE	NNE	60
20-Jun-04	15:42	1.75	1.38	0.38	WNW	NW	NNW	20-Jun-04	15:55	0.84	0.66	0.36	WNW	NW	NNW	60
25-Jun-04	8:46	1.24	0.97	0.37	NNW	N	NNE	25-Jun-04	9:20	0.7	0.55	0.35	NNW	N	NNE	60
2-Jul-04	15:40	0.88	0.69	0.38	ESE	ESE	ESE	2-Jul-04	16:30	1.68	1.32	0.36	ESE	ESE	ESE	60
8-Jul-04	16:00	1.25	0.98	0.38	SSE	SE	ESE	8-Jul-04	16:50	0.48	0.37	0.36	SE	ESE	E	60
14-Jul-04	8:14	2.31	1.82	0.36	WSW	WSW	WSW	14-Jul-04	8:40	N/A	N/A	0.36	WSW	WSW	WSW	60
20-Jul-04	14:45	N/A	N/A	0.38	ENE	WSW	SW	20-Jul-04	14:08	N/A	N/A	0.36	E	ENE	WSW	60
26-Jul-04	15:40	6.18	4.87	0.38	SSW	SW	SW	26-Jul-04	16:30	5.07	3.99	0.36	SSW	SW	SW	60
1-Aug-04	15:50	4.12	3.24	0.37	WSW	SW	WSW	1-Aug-04	16:40	4.16	3.27	0.36	SW	WSW	WNW	60
7-Aug-04	13:30	12.38	9.74	0.38	W	WNW	NNW	7-Aug-04	13:54	N/A	N/A	0.36	WNW	NNW	S	60
13-Aug-04	10:32	2.6	2.04	0.37	W	WNW	W	13-Aug-04	10:41	3.67	2.88	0.35	W	WNW	W	60
19-Aug-04	14:30	1.25	0.98	0.37	N	NNW	N	19-Aug-04	15:00	2.02	1.59	0.36	NNW	N	N	60
25-Aug-04	8:20	1	0.79	0.37	SSE	SE	ESE	25-Aug-04	8:45	1.9	1.5	0.36	SE	ESE	ESE	60
31-Aug-04	14:00	3.13	2.47	0.43	SSW	NNE	ESE	31-Aug-04	14:15	2.24	1.77	0.45	SSW	NNE	ESE	60
7-Sep-04	10:30	0.85	0.67	0.42	WNW	NW	W	7-Sep-04	11:42	1.5	1.18	0.45	W	WSW	WSW	60
12-Sep-04	13:40	1.45	1.14	0.43	E	E	ENE	12-Sep-04	14:30	2.12	1.67	0.46	E	E	ENE	60
18-Sep-04	10:12	1.3	1.02	0.43	E	E	E	18-Sep-04	10:24	1.21	0.95	0.45	E	E	E	60
24-Sep-04	13:30	1.73	1.36	0.43	WSW	W	W	24-Sep-04	13:47	1.51	1.19	0.45	W	W	W	60
30-Sep-04	15:03	1.59	1.25	43	W	WSW	WSW	30-Sep-04	16:15	1.06	0.83	0.45	WSW	WSW	W	60
6-Oct-04	11:47	5.62	4.42	0.43	N	SSW	SW	6-Oct-04	12:18	3.21	2.52	0.46	N	SSW	SW	60
12-Oct-04	14:36	3.3	2.6	0.43	N	N	NNE	12-Oct-04	15:00	4.53	3.57	0.45	N	N	NNE	60
18-Oct-04	13:30	1.71	1.35	0.43	ESE	ESE	ESE	18-Oct-04	14:20	1.61	1.26	0.44	ESE	ESE	E	60
24-Oct-04	12:55	2.44	1.92	0.43	WNW	WNW	WNW	24-Oct-04	14:10	2.06	1.62	0.44	WNW	WNW	W	60
30-Oct-04	14:53	1.88	1.48	0.43	NNE	ENE	E	30-Oct-04	15:26	1.66	1.3	0.45	NNE	ENE	E	60
5-Nov-04	16:55	4.63	3.65	0.43	WSW	WSW	WSW	5-Nov-04	17:15	4.24	3.34	0.45	WSW	WSW	WSW	60
11-Nov-04	10:50	0.85	0.67	0.42	WSW	WSW	WSW	11-Nov-04	11:45	1.22	0.96	0.46	WSW	WSW	W	60
17-Nov-04	15:15	0.86	0.67	0.43	WSW	WSW	WSW	17-Nov-04	15:25	1.38	1.08	0.34	WSW	WSW	WSW	60
23-Nov-04	11:25	1.42	1.12	0.43	WNW	WNW	NW	23-Nov-04	14:46	0.76	0.6	0.46	WNW	NW	NW	60
29-Nov-04	14:12	1	0.79	0.43	WSW	WSW	W	29-Nov-04	15:20	1.06	0.83	0.45	WSW	W	NE	60
5-Dec-04	13:25	0.78	0.62	0.39	E	E	E	5-Dec-04	14:25	1.59	1.25	0.48	E	E	E	60
11-Dec-04	14:25	1.35	1.06	0.4	WSW	ENE	WSW	11-Dec-04	14:44	2.22	1.75	0.48	ENE	WSW	NW	60
18-Dec-04	15:00	1.16	0.91	0.39	NNE	NW	NNW	18-Dec-04	15:40	1.21	0.95	0.45	NW	NNW	WSW	60
23-Dec-04	13:40	1.55	1.22	0.39	WSW	WSW	WSW	23-Dec-04	14:17	1.39	1.09	0.42	WSW	WSW	WSW	60
29-Dec-04	14:10	1.44	1.13	0.39	W	NNE	S	29-Dec-04	14:28	1.07	0.85	0.46	W	NNE	S	60
4-Jan-05	--	--	--	--	--	--	--	4-Jan-05	--	--	--	--	--	--	--	60
10-Jan-05	15:50	3.04	2.39	0.4	NNW	W	WSW	10-Jan-05	16:35	4.66	3.67	0.47	W	WSW	WSW	60
16-Jan-05	16:15	1.55	1.22	0.39	WSW	SW	WSW	16-Jan-05	17:00	1.66	1.31	0.45	SW	WSW	WNW	60
22-Jan-05	15:45	2.21	1.74	0.39	E	SE	E	22-Jan-05	16:10	2.13	1.68	0.46	E	SE	E	60
28-Jan-05	14:55	1.71	1.34	0.39	NNE	NNE	NNE	28-Jan-05	15:20	1.69	1.33	0.46	NNE	NNE	NNE	60
3-Feb-05	10:05	4.17	3.28	0.39	ENE	E	E	3-Feb-05	10:00	4.26	3.35	0.46	ENE	E	E	60
9-Feb-05	16:00	0.79	0.62	0.4	WSW	WSW	SW	9-Feb-05	16:50	1.23	0.97	0.46	WSW	SW	WSW	60
15-Feb-05	14:05	0.79	0.62	0.4	WSW	WSW	WSW	15-Feb-05	14:45	1.86	1.47	0.47	WSW	WSW	WSW	60
21-Feb-05	14:35	1.31	1.03	0.39	N	NNE	NE	21-Feb-05	14:40	0.75	0.59	0.45	N	NNE	NE	60
27-Feb-05	15:55	0.92	0.72	0.39	NW	WNW	W	27-Feb-05	16:40	1.08	0.85	0.46	WNW	W	WSW	60
9-Mar-05	10:50	1.15	0.91	0.43	WSW	SW	SW	9-Mar-05	10:49	2.04	1.6	0.51	WSW	SW	SW	60
11-Mar-05	10:55	0.86	0.68	0.43	NE	NE	NE	11-Mar-05	11:20	1.34	1.06	0.5	NE	NE	NE	60
17-Mar-05	14:20	2.62	2.06	0.41	N	ENE	ESE	17-Mar-05	14:35	2.32	1.83	0.5	ENE	ESE	ESE	60
23-Mar-05	16:20	0.69	0.55	0.42	N	N	NNE	23-Mar-05	17:00	0.83	0.65	0.5	N	NNE	NNE	60
29-Mar-05	15:55	1	0.78	0.43	WNW	WSW	SSW	29-Mar-05	17:00	1.2	0.94	0.51	WSW	SSW	W	60
4-Apr-05	15:35	2.38	1.87	0.45	ENE	ENE	ENE	4-Apr-05	15:30	2.02	1.59	0.51	ENE	ENE	ENE	60
10-Apr-05	14:30	5.08	4	0.42	SSE	S	SSW	10-Apr-05	16:20	1.52	1.19	0.51	SSW	S	SSE	60
15-Apr-05	10:25	1.83	1.44	0.42	--	--	--	15-Apr-05	10:00	2.21	1.74	0.51	--	--	--	60
22-Apr-05	15:50	1.52	1.2	0.41	NE	ESE	ESE	22-Apr-05	16:40	1.67	1.32	0.5	ESE	ESE	E	60
28-Apr-05	14:55	1.18	0.93	0.44	WNW	WNW	WNW	28-Apr-05	15:10	2.52	1.98	0.54	WNW	WNW	WNW	60
4-May-05	14:55	3.19	2.51	0.46	WSW	SW	WSW	4-May-05	15:10	3.04	2.39	0.51	WSW	SW	WSW	60
10-May-05	15:45	1.38	1.08	0.41	NNE	NE	NE	10-May-05	16:35	1.64	1.29	0.49	NE	NE	NE	60
16-May-05	16:05	2.82	2.22	0.42	ESE	ESE	ESE	16-May-05	16:55	2.74	2.16	0.51	ESE	ESE	ESE	60
23-May-05	16:05	4.28	3.37	0.4	ENE	SE	WSW	23-May-05	16:35	3.69	2.91	0.4	SE	WSW	SW	60
28-May-05	10:50	1.85	1.46	0.4	NNE	NNE	NNE	28-May-05	11:10	1.91	1.5	0.41	NNE	NNE	NNE	60
3-Jun-05	--	--	--	--	--	--	--	3-Jun-05	--	--	--	--	--	--	--	60
9-Jun-05	14:00	1.45	1.14	0.48	SSW	S	SSW	9-Jun-05	14:00	0.87	0.68	0.37	SSW	S	SSW	60
15-Jun-05	14:35	0.94	0.74	0.47	SE	SSE	S	15-Jun-05	14:50	2.36	1.86	0.47	SE	SSE	S	60
21-Jun-05	13:45	2.79	2.2	0.47	ESE	ESE	ESE	21-Jun-05	14:05	3.61	2.84	0.47	ESE	ESE	ESE	60
27-Jun-05	15:55	2.98	2.34	0.47	NE	NE	NE	27-Jun-05	16:40	3.31	2.61	0.47	NE	NE	E	60
3-Jul-05	16:15	4.1	3.23	0.47	--	--	--	3-Jul-05	17:00	2.1	1.65	0.37	--	--	--	60
9-Jul-05	13:30	2.22	1.75	0.48	--	--	--	9-Jul-05	14:40	2.89	2.28	0.48	--	--	--	60
15-Jul-05	13:25	2.5	1.97	0.47	W	WSW	WSW	15-Jul-05	14:40	2.22	1.75	0.48	WSW	WSW	WSW	60
21-Jul-05	14:15	2.48	1.95	0.47	WSW	WSW	WSW	21-Jul-01	14:30	2.08	1.64	0.37	WSW	E	ENE	60
27-Jul-05	13:55	1.24	0.97	0.46	NW	WNW	WNW	27-Jul-05	13:30	1.73	1.36	0.47	WNW	NW	WNW	60
2-Aug-05	13:50	3.15	2.48	0.47	SW	SW	SW	2-Aug-05	14:55	2.13	1.67	0.49	SW	SW	WSW	60
8-Aug-05	15:00	2.08	1.64	0.48	NW	WNW	WNW	8-Aug-05	15:20	1.88	1.48	0.47	NW	WNW	WNW	60
15-Aug-05	15:15	1.24	0.98	0.46	W	WNW	WNW	15-Aug-05	12:00	1.56	1.22	0.47	W	W	WNW	60
20-Aug-05	9:25	1.7	1.34	0.46	W	WNW	NW	20-Aug-05	9:05	1.4	1.1	0.47	W	WNW	NW	60
25-Aug-05	19:14	37.6	29.6	0.53	SSW	S	SSW	25-Aug-05	14:40	9.81	7.72	0.47	S	S	SSW	60
1-Sep-05	14:35	1.15	0.91	0.58	NNE	NNE	NNE	1-Sep-05	14:50	0.53	0.41	0.53	NNE	NNE	NNE	60
7-Sep-05	16:00	1.51	1.19	0.5	WSW	W	WSW	7-Sep-05	16:40	1.22	0.96	0.52	W	WSW	SSE	60
13-Sep-05	16:30	0.67	0.53	0.51	WNW	W	WNW	13-Sep-05	17:30	< 0.52	< 0.41	0.52	W	WNW	W	60
19-Sep-05	14:20	2.79	2.19	0.52	SSW	SW	SSW	19-Sep-05	14:40	1.47	1.16	0.55	SW	SSW	S	60
25-Sep-05	13:23	1.34	1.06	0.5	WSW	SW	SW	25-Sep-05	14:33	1.05	0.83	0.53	SW	SW	WSW	60
1-Oct-05	15:50	0.85	0.67	0.51	ENE	E	E	1-Oct-05	16:40	< 0.53	< 0.42	0.53	E	E	ENE	60
7-Oct-05	15:50	< 0.50	< 0.40	0.5	SE	S	SE	7-Oct-05	16:40	1.23	0.97	0.53	S	SE	SSW	60
13-Oct-05	14:28	0.67	0.53	0.5	SE	NNW	S	13-Oct-05	14:48	0.7	0.55	0.53	NNW	S	SSW	60
19-Oct-05	14:27	< 0.50	< 0.39	0.5	NE	ENE	ENE	19-Oct-05	14:43	< 0.52	< 0.41	0.52	ENE	ENE	ENE	60
25-Oct-05	15:35	0.67	0.53	0.5	NNE	NE	NE	25-Oct-05	16:00	< 0.52	< 0.41	0.52	NNE	NE	NE	60
1-Nov-05	16:30	0.67	0.53	0.5	SW	SW	SSW	1-Nov-05	17:15	< 0.53	< 0.42	0.53	SW	SSW	SSW	60
6-Nov-05	13:05	< 0.50	< 0.40	0.5	W	WNW	NNW	6-Nov-05	14:15	1.24	0.98	0.53	WNW	NNW	N	60
12-Nov-05	14:05	0.69	0.55	0.52	SW	SW	W	12-Nov-05	14:25	0.71	0.56	0.53	SW	SW	W	60
18-Nov-05	15:10	< 0.51	< 0.40	0.51	SW	SW	WSW	18-Nov-05	16:00	< 0.54	< 0.42	0.54	SW	WSW	WSW	60
24-Nov-05	16:50	< 0.50	< 0.39	0.5	E	E	E	24-Nov-05	17:30	< 0.51	< 0.40	0.51	E	E	E	60
30-Nov-05	13:10	< 0.57	< 0.45	0.57	W	W	W	30-Nov-05	13:30	< 0.53	< 0.41	0.53	W	W	W	60
6-Dec-05	14:25	1.08	0.85	0.54	NNW	NNW	N	6-Dec-05	14:18	0.52	0.41	0.52	NNW	NNW	N	60
12-Dec-05	10:38	1.64	1.29	0.55	ENE	ENE	ENE	12-Dec-05	10:42	1.26	0.99	0.54	ENE	ENE	ENE	60
12/15/505	13:45	0.73	0.58	0.55	NNE	NNE	NNE	15-Dec-05	14:05	0.54	0.42	0.54	NNE	NNE	NNE	60
22-Dec-05	14:15	2.98	2.35	0.56	ENE	S	WSW	22-Dec-05	14:15	1.42	1.12	0.53	ENE	S	WSW	60
30-Dec-05	13:25	1.49	1.17	0.56	W	W	WSW	30-Dec-05	14:40	1.05	0.83	0.53	WSW	W	W	60
5-Jan-06	14:25	0.91	0.72	0.55	SW	SW	WSW	5-Jan-06	15:10	0.52	0.41	0.52	SW	WSW	WSW	60
11-Jan-06	15:00	0.56	0.44	0.56	ENE	NE	NE	11-Jan-06	15:40	1.26	0.99	0.54	NE	NE	ENE	60
17-Jan-06	15:00	0.74	0.58	0.55	WSW	SW	WSW	17-Jan-06	15:05	0.71	0.56	0.53	WSW	SW	WSW	60
23-Jan-06	15:35	0.56	0.44	0.56	NW	NW	WNW	23-Jan-06	15:00	0.55	0.44	0.55	WNW	NW	NW	60
29-Jan-06	15:15	0.74	0.58	0.55	ENE	ENE	ENE	29-Jan-06	15:50	0.52	0.41	0.52	ENE	ENE	NE	60
4-Feb-06	15:30	0.73	0.58	0.55	WNW	WSW	NE	4-Feb-06	16:55	0.52	0.41	0.52	NE	W	SW	60
10-Feb-06	14:30	0.5	0.4	0.5	N	N	N	10-Feb-06	14:50	1.2	0.95	0.52	N	N	N	60
16-Feb-06	15:20	0.72	0.56	0.54	W	WSW	WSW	16-Feb-06	15:20	0.68	0.53	0.51	W	WSW	WSW	60
22-Feb-06	15:40	0.55	0.44	0.55	WNW	NW	NW	22-Feb-06	16:25	0.53	0.42	0.53	WSW	WSW	WSW	60
28-Feb-06	10:50	0.55	0.44	0.55	ESE	ESE	ESE	28-Feb-06	11:40	0.44	0.34	0.44	ESE	ESE	ESE	60
6-Mar-06	16:25	1	0.79	0.5	N	NNE	NE	6-Mar-06	15:10	0.39	0.3	0.39	N	N	NNE	60
13-Mar-06	14:25	1.5	1.18	0.5	NW	W	W	13-Mar-06	14:45	0.96	0.75	0.41	W	W	W	60
18-Mar-06	15:45	0.66	0.52	0.5	ESE	ESE	E	18-Mar-06	16:30	0.38	0.3	0.38	ESE	ESE	E	60
23-Mar-06	15:45	2.64	2.08	0.5	WSW	SW	SSW	23-Mar-06	16:00	1.01	0.8	0.38	WSW	SW	SSW	60
30-Mar-06	8:10	1.35	1.06	0.51	NE	NNE	NNE	30-Mar-06	8:30	0.78	0.61	0.39	NE	NNE	NNE	60
5-Apr-06	15:12	0.85	0.67	0.51	NE	ENE	NE	5-Apr-06	16:27	0.4	0.32	0.4	ENE	NE	ENE	60
11-Apr-06	16:20	0.51	0.4	0.51	WSW	WSW	WSW	11-Apr-06	17:45	0.91	0.72	0.39	WSW	WSW	WSW	60
17-Apr-06	16:05	0.68	0.54	0.51	NE	NNE	NNE	17-Apr-06	16:55	0.52	0.41	0.39	NNE	NNE	NNE	60
23-Apr-06	13:15	0.52	0.41	0.52	N	WNW	NNW	23-Apr-06	13:30	0.38	0.3	0.38	N	WNW	NNW	60
29-Apr-06	13:30	0.67	0.53	0.51	ESE	ESE	SE	29-Apr-06	13:43	0.39	0.3	0.39	ESE	SE	SE	60
5-May-06	15:46	0.67	0.53	0.51	ENE	ENE	E	5-May-06	16:10	0.39	0.31	0.39	ENE	ENE	E	60
10-May-06	14:17	0.5	0.39	0.5	NNE	NNE	NNE	10-May-06	14:00	0.9	0.71	0.39	NNE	NNE	NNE	60
17-May-06	13:51	0.69	0.55	0.52	NE	NE	ENE	17-May-06	14:13	0.52	0.41	0.39	NE	NE	ENE	60
23-May-06	13:55	0.42	0.33	0.42	E	E	ESE	23-May-06	14:12	0.4	0.32	0.4	E	E	ESE	60
29-May-06	16:00	0.42	0.33	0.42	WSW	WSW	WSW	29-May-06	16:45	0.4	0.31	0.4	WSW	WSW	SW	60
4-Jun-06	16:00	1.66	1.3	0.5	E	ESE	SE	4-Jun-06	16:45	1.54	1.21	0.51	ESE	SE	SE	60
10-Jun-06	14:04	1.31	1.03	0.49	SE	SE	SE	10-Jun-06	15:18	1.16	0.91	0.5	SE	SE	SE	60
16-Jun-06	14:06	2	1.57	0.5	ESE	SW	SW	16-Jun-06	15:20	4.11	3.24	0.54	SW	SW	SW	60
22-Jun-06	14:02	1.5	1.18	0.5	ESE	SSW	SW	22-Jun-06	14:30	1.84	1.45	0.5	ESE	SSW	SW	60
28-Jun-06	16:20	2.3	1.81	0.49	SW	WSW	WSW	28-Jun-06	17:10	3.24	2.55	0.51	WSW	WSW	SW	60
4-Jul-06	14:33	1.49	1.18	0.5	WSW	ENE	NE	4-Jul-06	14:55	1.99	1.56	0.5	WSW	ENE	NE	60
10-Jul-06	14:50	1.99	1.56	0.5	ESE	ESE	SE	10-Jul-06	14:52	2.19	1.72	0.5	ESE	ESE	SE	60
16-Jul-06	16:00	1.65	1.3	0.5	SW	WSW	WSW	16-Jul-06	16:50	1.33	1.05	0.5	WSW	WSW	W	60

	LP1				Wind Direction (16 point compass)		
Date	Start Time	Concentration[a] µg/m³	Concentration[a] ppb	Detection Limit (µg/m³)	Previous Hour	Sample Hour	Following Hour
22-Jul-06	15:55	2.65	2.08	0.5	W	W	WNW
27-Jul-06	14:55	2.05	1.61	0.51	WNW	NW	NW
3-Aug-06	14:18	1.31	1.03	0.49	W	W	NW
9-Aug-06	16:00	1.98	1.56	0.49	ESE	ESE	ESE
16-Aug-06	16:20	1.98	1.56	0.49	NE	WSW	W
21-Aug-06	13:52	0.98	0.77	0.49	NNE	NE	ENE
26-Aug-06	15:40	1.15	0.91	0.49	W	W	WNW
2-Sep-06	15:30	1.97	1.55	0.49	W	SW	WSW
8-Sep-06	16:30	0.98	0.77	0.49	E	E	ESE
14-Sep-06	15:20	0.98	0.77	0.49	ENE	NE	NE
20-Sep-06	14:52	1.82	1.43	0.5	SW	SW	SW
26-Sep-06	8:30	1.16	0.91	0.5	NNE	NNW	W
3-Oct-06	14:35	1.14	0.9	0.49	NW	NNW	NW
8-Oct-06	13:48	0.65	0.51	0.49	NW	NW	NNW
14-Oct-06	13:55	3.3	2.6	0.49	W	W	W
20-Oct-06	-	-	-	-	-	-	-
26-Oct-06	14:38	1.54	1.21	0.51	WSW	SW	SW
1-Nov-06	15:20	2.78	2.19	0.49	WNW	WNW	WNW
7-Nov-06	15:53	1.84	1.45	0.5	E	ENE	E
13-Nov-06	15:06	3.01	2.37	0.5	ESE	E	E
19-Nov-06	14:50	1.95	1.53	0.49	WNW	W	WSW
25-Nov-06	14:25	7.21	5.68	0.5	SW	SW	SW
1-Dec-06	15:00	0.96	0.75	0.48	N	N	N
7-Dec-06	11:00	2.13	1.68	0.46	WSW	W	WSW
13-Dec-06	15:03	2.98	2.35	0.47	SW	SW	SW
19-Dec-06	14:48	0.31	0.25	0.47	WSW	WSW	WSW
25-Dec-06	-	-	-	-	-	-	-
31-Dec-06	-	-	-	-	-	-	-
4-Jan-07	15:52	2.44	1.92	0.49	WNW	W	W
12-Jan-07	14:35	1.82	1.43	0.46	SSE	ESE	SW
18-Jan-07	15:22	0.76	0.6	0.46	WSW	WSW	WSW
24-Jan-07	15:40	1.53	1.2	0.46	ENE	ENE	NE
30-Jan-07	15:50	2.24	1.77	0.45	WSW	NW	NW
5-Feb-07	15:05	0.47	0.37	0.47	ESE	E	NNE
11-Feb-07	14:33	0.43	0.34	0.43	N	N	NNE
17-Feb-07	16:55	0.46	0.36	0.46	NE	NE	ENE
23-Feb-07	15:53	1.1	0.87	0.47	E	E	E
1-Mar-07	14:55	0.45	0.36	0.45	ENE	NE	NE
7-Mar-07	15:27	1.36	1.07	0.45	W	W	W
13-Mar-07	15:45	1.07	0.84	0.46	SW	WSW	WSW
19-Mar-07	15:50	0.46	0.36	0.46	NE	NNE	N
25-Mar-07	14:00	0.47	0.37	0.47	SW	WSW	WSW
31-Mar-07	15:47	0.44	0.35	0.44	WNW	NW	WNW
6-Apr-07	15:00	0.44	0.34	0.44	N	NNE	NNE
12-Apr-07	9:30	0.46	0.36	0.46	WSW	WSW	WSW
18-Apr-07	16:04	0.48	0.38	0.48	ESE	ESE	E
24-Apr-07	14:25	0.45	0.35	0.45	ENE	ENE	ENE
30-Apr-07	15:50	0.45	0.36	0.45	N	N	NNW
6-May-07	15:50	0.46	0.36	0.46	ENE	NE	NNE
12-May-07	13:40	1.41	1.11	0.47	SSW	SSW	SW
18-May-07	14:27	1.6	1.26	0.44	ENE	NE	NE
24-May-07	16:00	2.5	1.97	0.44	NNE	NNE	NNE
30-May-07	15:50	1.14	0.9	0.43	NE	NE	NE
5-Jun-07	14:42	1.97	1.55	0.45	NNW	ENE	E
11-Jun-07	13:59	1.68	1.32	0.46	ESE	ESE	E
17-Jun-07	16:40	1.52	1.2	0.46	E	ENE	E
23-Jun-07	15:20	1.52	1.2	0.46	SE	WSW	W
29-Jun-07	15:05	2.25	1.77	0.45	ESE	ESE	ESE
5-Jul-07	14:48	1.22	0.96	0.46	NNW	NNW	WNW
11-Jul-07	16:00	0.45	0.35	0.45	N	N	N
17-Jul-07	15:40	3.31	2.6	0.45	W	NE	ESE
23-Jul-07	14:36	1.81	1.43	0.45	SW	SW	WSW
29-Jul-07	15:45	2.12	1.67	0.45	E	E	E
4-Aug-07	15:45	1.36	1.07	0.45	SSW	SW	SW
10-Aug-07	16:15	1.2	0.94	0.45	E	E	NNE
16-Aug-07	15:28	0.45	0.35	0.45	NNW	NW	NNW
22-Aug-07	13:54	0.45	0.36	0.45	W	WSW	WSW
28-Aug-07	15:40	0.75	0.59	0.45	NNW	WNW	WNW
3-Sep-07	15:55	0.45	0.36	0.45	ESE	ESE	ESE
9-Sep-07	13:56	3.07	2.42	0.46	W	N	WNW
15-Sep-07	10:40	0.45	0.35	0.45	WSW	WSW	WSW
21-Sep-07	11:37	1.83	1.44	0.46	WSW	W	WNW
27-Sep-07	12:33	2.13	1.67	0.46	W	W	WNW
3-Oct-07	16:50	2.18	1.71	0.47	W	WNW	W
9-Oct-07	16:10	1.2	0.95	0.45	NNE	NNE	NNE
15-Oct-07	15:40	3.3	2.6	0.45	ENE	SW	SSW
23-Oct-07	14:30	1.67	1.31	0.46	NW	NW	NW
27-Oct-07	14:00	0.44	0.35	0.44	WSW	WSW	WSW
2-Nov-07	13:38	1.34	1.06	0.45	WNW	WNW	WNW
8-Nov-07	14:09	0.9	0.71	0.45	ESE	E	ESE
14-Nov-07	14:56	0.45	0.35	0.45	WNW	W	W
20-Nov-07	14:46	0.44	0.35	0.44	N	N	NNE
26-Nov-07	14:40	2.64	2.08	0.44	W	W	W
2-Dec-07	15:06	0.43	0.33	0.43	-	-	NNE
8-Dec-07	14:45	0.42	0.33	0.42	WSW	WSW	WSW
14-Dec-07	14:18	0.43	0.33	0.43	WSW	WSW	WSW
20-Dec-07	13:38	1.12	0.88	0.42	W	SSE	SW
26-Dec-07	12:55	1.1	0.87	0.41	WNW	WNW	SW
1-Jan-08	12:05	0.82	0.65	0.41	WSW	SW	WSW
7-Jan-08	14:01	0.69	0.54	0.41	WSW	SW	SW
13-Jan-08	13:40	2.78	2.19	0.42	WNW	WNW	WSW
19-Jan-08	14:30	0.4	0.32	0.4	WSW	WSW	W
25-Jan-08	14:55	0.43	0.34	0.43	SSE	ESE	SE
31-Jan-08	14:09	0.42	0.33	0.42	WNW	WSW	SW
6-Feb-08	14:38	1.35	1.06	0.45	WSW	SW	SW
12-Feb-08	14:56	2.38	1.88	0.42	N	WNW	WNW
18-Feb-08	14:25	0.42	0.33	0.42	SW	SW	SW
24-Feb-08	-	-	-	-	-	-	-
2-Mar-08	14:10	0.42	0.33	0.42	W	WNW	WNW
7-Mar-08	16:15	0.43	0.34	0.43	SW	SW	SW
13-Mar-08	15:55	0.43	0.34	0.43	NNE	NNE	NNE
19-Mar-08	14:10	1.29	1.01	0.43	N	N	NNE
25-Mar-08	15:18	0.42	0.33	0.42	ENE	NE	NNE
31-Mar-08	15:40	0.42	0.33	0.42	W	NW	WNW
6-Apr-08	11:00	0.42	0.33	0.42	NE	NW	WNW
12-Apr-08	13:35	0.43	0.34	0.43	WNW	W	W
18-Apr-08	13:47	0.43	0.34	0.43	N	N	NNE
24-Apr-08	16:00	0.42	0.33	0.42	NNE	NNE	NE
30-Apr-08	16:10	0.42	0.33	0.42	E	E	E
30-May-08	14:25	8.22	6.47	0.47	S	SSW	NNE
5-Jun-08	14:00	5.32	4.19	0.48	ESE	ESE	SE
11-Jun-08	16:10	2.65	2.09	0.47	ESE	E	E
17-Jun-08	16:00	3.29	2.59	0.47	SE	E	NW
23-Jun-08	15:12	2.96	2.33	0.47	SW	SW	SW
29-Jun-08	13:48	3.73	2.94	0.47	WSW	WSW	WSW
5-Jul-08	16:00	3.19	2.51	0.48	WSW	W	W
11-Jul-08	16:00	1.27	1	0.47	NNW	W	W
17-Jul-08	14:10	1.4	1.1	0.47	WSW	WSW	WSW
23-Jul-08	15:00	1.57	1.23	0.47	ESE	SE	SSE
29-Jul-08	16:00	1.41	1.11	0.47	NW	WNW	WNW
5-Aug-08	13:51	2.03	1.6	0.47	WNW	WNW	NW
10-Aug-08	14:04	2.86	2.25	0.48	ESE	ESE	SE
16-Aug-08	14:17	1.77	1.39	0.48	WSW	WSW	WSW
22-Aug-08	16:45	0.62	0.49	0.47	NNW	NW	NW
28-Aug-08	16:00	1.26	0.99	0.47	W	W	W
3-Sep-08	14:30	1.49	1.17	0.5	W	WSW	WSW
9-Sep-08	13:45	1.44	1.13	0.48	WSW	E	E
15-Sep-08	16:25	1.94	1.52	0.48	WSW	WSW	WSW
21-Sep-08	16:15	2.09	1.65	0.48	ESE	ESE	E
28-Sep-08	16:15	0.96	0.76	0.48	WNW	WNW	WNW
3-Oct-08	14:05	4.32	3.4	0.48	ENE	E	E
9-Oct-08	16:00	0.63	0.49	0.47	WNW	NW	NW
15-Oct-08	16:00	0.64	0.5	0.48	W	WSW	WSW
21-Oct-08	14:06	1.66	1.31	0.5	SSW	SSW	S
27-Oct-08	14:24	0.79	0.62	0.48	WSW	WSW	WSW
2-Nov-08	16:00	0.49	0.38	0.49	ENE	NE	ENE
8-Nov-08	16:50	0.47	0.37	0.47	ESE	SSE	S
14-Nov-08	13:45	0.49	0.39	0.49	NW	NW	WNW
20-Nov-08	14:50	0.46	0.36	0.46	WSW	WSW	WSW
26-Nov-08	20:30	0.48	0.38	0.48	WSW	WSW	W
2-Dec-08	16:00	< 0.45	LTDL	0.45	WNW	W	WNW
8-Dec-08	14:48	< 0.45	LTDL	0.45	NNW	NNE	ESE
7-Jan-09	14:25	< 0.47	LTDL	0.47	SW	SW	SW
13-Jan-09	16:00	< 0.45	LTDL	0.45	NNE	NE	ESE
18-Feb-09	13:55	< 0.45	LTDL	0.45	NNE	ENE	SSW
24-Feb-09	-	< 0.46	LTDL	0.46	-	-	-
2-Mar-09	16:10	0.79	0.62	0.48	E	SE	S
8-Mar-09	15:45	0.48	0.38	0.48	SW	WSW	WSW
14-Mar-09	14:11	0.96	0.76	0.48	ENE	ENE	ENE
20-Mar-09	-	-	-	-	-	-	-
26-Mar-09	21:55	0.64	0.50	0.48	W	SSW	S
3-Apr-09	17:30	0.48	0.38	0.48	N	N	N
7-Apr-09	9:08	4.19	3.29	0.48	WSW	WSW	WSW
13-Apr-09	13:49	2.91	2.29	0.48	WNW	WNW	NW
19-Apr-09	16:00	2.89	2.27	0.48	W	WSW	WSW
25-Apr-09	15:40	0.48	0.38	0.48	WNW	WNW	N
1-May-09	13:55	0.48	0.38	0.48	WNW	NW	NW
7-May-09	14:20	0.48	0.38	0.48	NNE	NE	NE
13-May-09	16:00	20.91	16.45	0.49	NNW	NNW	NNW

	LP2				Wind Direction (16 point compass)		
Date	Start Time	Concentration[a] µg/m³	Concentration[a] ppb	Detection Limit µg/m³	Previous Hour	Sample Hour	Following Hour
22-Jul-06	16:45	2.85	2.25	0.5	W	WNW	W
27-Jul-06	15:12	1.85	1.46	0.5	WNW	NW	NW
3-Aug-06	15:27	1.42	1.12	0.53	W	NW	WNW
9-Aug-06	15:05	2.33	1.84	0.5	E	ESE	ESE
6-Aug-06	17:05	2.31	1.82	0.5	WSW	W	SW
21-Aug-06	15:05	1.22	0.96	0.52	NE	ENE	E
26-Aug-06	16:10	1.23	0.97	0.53	W	W	WNW
2-Sep-06	16:15	1.59	1.25	0.43	SW	WSW	WSW
8-Sep-06	17:00	0.76	0.6	0.46	E	ESE	ESE
14-Sep-06	15:20	1.08	0.85	0.46	ENE	NE	NE
20-Sep-06	15:19	2.78	2.19	0.46	SW	SW	SW
26-Sep-06	9:05	1.3	1.03	0.43	NNW	W	WNW
3-Oct-06	14:15	0.77	0.61	0.46	NW	NW	NNW
8-Oct-06	15:10	0.62	0.49	0.46	NW	NNW	NNW
14-Oct-06	15:12	0.81	0.63	0.48	W	W	W
20-Oct-06	-	-	-	-	-	-	-
26-Oct-06	14:45	1.33	1.05	0.44	WSW	SW	SW
1-Nov-06	15:25	3.27	2.57	0.47	WNW	WNW	WNW
7-Nov-06	15:50	1.74	1.37	0.48	E	ENE	E
13-Nov-06	15:18	2.22	1.75	0.48	ESE	E	E
19-Nov-06	15:40	4.4	3.46	0.45	W	WSW	SSW
25-Nov-06	15:37	12.8	10.07	0.48	SW	WSW	WSW
1-Dec-06	16:02	3.41	2.68	0.46	N	N	N
7-Dec-06	11:45	2.95	2.32	0.47	W	WSW	SW
13-Dec-06	15:30	2.47	1.94	0.39	SW	SW	SW
19-Dec-06	15:11	0.5	0.4	0.5	WSW	WSW	WSW
25-Dec-06	-	-	-	-	-	-	-
31-Dec-06	-	-	-	-	-	-	-
4-Jan-07	16:12	0.31	0.25	0.47	WNW	W	W
12-Jan-07	14:50	0.46	0.36	0.46	SSE	ESE	SW
18-Jan-07	15:23	3.7	2.91	0.46	WSW	WSW	WSW
24-Jan-07	16:30	2.62	2.06	0.44	ENE	ENE	NE
30-Jan-07	16:40	0.46	0.36	0.46	NW	NW	N
5-Feb-07	15:04	0.46	0.36	0.46	ESE	E	NNE
11-Feb-07	15:02	0.64	0.5	0.48	N	N	NNE
17-Feb-07	15:25	0.3	0.24	0.45	NNE	NE	NE
23-Feb-07	16:40	0.61	0.48	0.46	E	E	E
1-Mar-07	15:00	0.95	0.74	0.47	ENE	NE	NE
7-Mar-07	15:35	1.02	0.81	0.51	W	W	NW
13-Mar-07	16:35	0.47	0.37	0.47	WSW	WSW	WSW
19-Mar-07	16:40	0.46	0.37	0.46	NNE	N	ENE
25-Mar-07	15:12	1.6	1.26	0.48	WSW	WSW	WSW
31-Mar-07	17:00	0.47	0.37	0.47	NW	WNW	SW
6-Apr-07	16:12	0.48	0.38	0.48	NNE	NNE	NNE
12-Apr-07	10:50	0.47	0.37	0.47	WSW	WSW	WSW
18-Apr-07	16:19	0.47	0.37	0.47	ESE	ESE	E
24-Apr-07	14:37	0.49	0.38	0.49	ENE	ENE	ENE
30-Apr-07	16:40	0.47	0.37	0.47	N	NNW	NNW
6-May-07	16:40	1.42	1.12	0.47	NE	NNE	N
12-May-07	14:50	1.3	1.02	0.49	SSW	SW	SSW
18-May-07	14:34	0.47	0.37	0.47	NE	NE	ENE
24-May-07	16:50	1.57	1.24	0.47	NNE	NNE	NNE
30-May-07	16:40	1.72	1.35	0.47	NE	NE	NE
5-Jun-07	14:58	1.21	0.95	0.52	NNW	ENE	E
11-Jun-07	15:20	2.41	1.89	0.52	ESE	E	E
17-Jun-07	17:20	1.38	1.08	0.52	E	ENE	E
23-Jun-07	16:10	1.38	1.08	0.52	WSW	W	SW
29-Jun-07	15:15	1.37	1.08	0.51	ESE	ESE	ESE
5-Jul-07	15:10	4.26	3.35	0.51	NNW	NNW	WNW
11-Jul-07	16:50	0.51	0.4	0.51	N	N	N
17-Jul-07	16:30	2.22	1.75	0.51	W	NE	ESE
23-Jul-07	14:55	2.76	2.17	0.52	SW	SW	WSW
29-Jul-07	16:35	1.54	1.21	0.51	E	E	ESE
4-Aug-07	16:30	0.69	0.54	0.52	SSW	SW	SW
10-Aug-07	17:00	1.88	1.48	0.51	E	NNE	NNE
16-Aug-07	15:44	0.51	0.41	0.51	NW	NNW	NNW
22-Aug-07	14:07	0.52	0.41	0.52	W	WSW	WSW
28-Aug-07	16:30	0.51	0.4	0.51	NNW	WNW	WNW
3-Sep-07	16:45	0.69	0.55	0.52	ESE	ESE	ESE
9-Sep-07	14:14	0.54	0.42	0.54	W	N	WNW
15-Sep-07	10:55	0.52	0.41	0.52	WSW	WSW	WSW
21-Sep-07	11:55	1.84	1.44	0.55	WSW	W	WNW
27-Sep-07	13:02	0.59	0.46	0.59	W	W	WNW
3-Oct-07	17:10	1.97	1.55	0.54	W	WNW	W
9-Oct-07	16:40	2.08	1.63	0.52	NNE	NNE	NNE
15-Oct-07	16:30	2.25	1.77	0.52	ENE	SW	SSW
23-Oct-07	15:00	0.52	0.41	0.52	NW	NW	NW
27-Oct-07	14:30	1.56	1.23	0.52	WSW	WSW	WSW
2-Nov-07	13:48	0.53	0.42	0.53	WNW	WNW	WNW
8-Nov-07	14:30	1.91	1.51	0.52	ESE	E	ESE
14-Nov-07	15:26	0.52	0.41	0.52	WNW	W	W
20-Nov-07	15:00	0.53	0.42	0.53	N	N	NNE
26-Nov-07	14:52	2.07	1.63	0.52	W	W	W
2-Dec-07	15:48	0.53	0.42	0.53	-	NNE	ENE
8-Dec-07	14:05	0.52	0.41	0.52	WSW	WSW	WSW
14-Dec-07	14:25	2.27	1.79	0.52	WSW	WSW	WSW
20-Dec-07	13:46	4.66	3.67	0.56	W	SSE	SW
26-Dec-07	13:20	0.53	0.41	0.53	WNW	WNW	SW
1-Jan-08	12:35	0.7	0.55	0.52	WSW	SW	WSW
7-Jan-08	14:05	0.54	0.42	0.54	WSW	SW	SW
13-Jan-08	13:46	0.7	0.55	0.52	WNW	WNW	WSW
19-Jan-08	14:50	0.51	0.4	0.51	WSW	WSW	W
25-Jan-08	14:25	0.71	0.56	0.53	SSE	ESE	SE
31-Jan-08	14:20	3.02	2.38	0.53	WNW	WSW	SW
6-Feb-08	14:46	1.62	1.28	0.54	WSW	SW	SW
12-Feb-08	15:26	1.94	1.52	0.53	N	WNW	WNW
18-Feb-08	13:30	0.54	0.42	0.54	SW	SW	SW
24-Feb-08	-	-	-	-	-	-	-
2-Mar-08	14:21	0.47	0.37	0.47	W	WNW	WNW
7-Mar-08	16:55	1.58	1.24	0.47	SW	SW	WNW
13-Mar-08	16:45	0.48	0.37	0.48	NNE	NNE	NNE
19-Mar-08	14:25	0.47	0.37	0.47	N	N	NNE
25-Mar-08	15:33	0.47	0.37	0.47	NE	NNE	NNE
31-Mar-08	16:30	0.77	0.61	0.46	W	NW	WNW
6-Apr-08	11:30	1.56	1.23	0.47	NE	NW	WNW
12-Apr-08	14:41	1.85	1.46	0.46	W	W	W
18-Apr-08	14:04	0.47	0.37	0.47	N	N	NNE
24-Apr-08	16:50	0.47	0.37	0.47	NNE	NE	NNE
30-Apr-08	17:00	0.47	0.37	0.47	E	E	ENE
30-May-08	14:38	4.2	3.3	0.47	SSW	NNE	NE
5-Jun-08	14:14	3.34	2.63	0.46	ESE	ESE	SE
11-Jun-08	16:38	2.42	1.91	0.45	E	E	ENE
17-Jun-08	16:51	2.88	2.27	0.45	E	NW	NNE
23-Jun-08	14:08	2.12	1.67	0.45	SSW	SW	SW
29-Jun-08	14:06	5.27	4.15	0.45	WSW	WSW	WSW
5-Jul-08	16:15	7.26	5.71	0.46	WSW	W	W
11-Jul-08	16:50	1.07	0.84	0.46	W	W	W
17-Jul-08	14:16	1.47	1.16	0.49	WSW	WSW	WSW
23-Jul-08	15:15	1.22	0.96	0.46	ESE	SE	SSE
29-Jul-08	16:45	3.05	2.4	0.46	WNW	WNW	NNW
5-Aug-08	14:05	2.26	1.78	0.45	WNW	WNW	NW
10-Aug-08	14:14	2.11	1.66	0.45	ESE	ESE	SE
16-Aug-08	14:31	2.03	1.6	0.47	WSW	WSW	WSW
22-Aug-08	16:00	0.49	0.38	0.49	NNW	NNW	NW
28-Aug-08	16:50	1.29	1.01	0.48	W	W	WSW
3-Sep-08	14:45	0.84	0.66	0.51	WSW	WSW	SW
9-Sep-08	14:04	1.71	1.34	0.51	WSW	E	ENE
15-Sep-08	17:10	1.65	1.3	0.5	WSW	WSW	SW
21-Sep-08	17:05	1.98	1.56	0.49	ESE	E	E
28-Sep-08	17:05	0.82	0.65	0.49	WNW	WNW	WNW
3-Oct-08	14:17	2.83	2.23	0.53	ENE	E	E
9-Oct-08	16:50	0.66	0.52	0.5	NW	NW	W
15-Oct-08	16:45	0.65	0.51	0.49	WSW	WSW	SW
21-Oct-08	14:15	0.86	0.68	0.52	SSW	SSW	S
27-Oct-08	14:44	0.81	0.63	0.48	WSW	WSW	WSW
2-Nov-08	16:45	0.5	0.39	0.5	NE	ENE	E
8-Nov-08	17:40	0.49	0.39	0.49	SSE	S	S
14-Nov-08	14:03	0.49	0.39	0.49	NW	NW	WNW
20-Nov-08	15:02	0.48	0.38	0.48	WSW	WSW	WSW
26-Nov-08	21:20	0.49	0.39	0.49	WSW	W	W
2-Dec-08	16:50	< 0.46	LTDL	0.46	W	WNW	NW
8-Dec-08	14:41	< 0.46	LTDL	0.46	NNW	NNE	ESE
7-Jan-09	14:45	< 0.48	LTDL	0.48	SW	SW	SW
13-Jan-09	16:45	1.52	1.2	0.46	NE	ESE	SSE
18-Feb-09	14:12	< 0.47	LTDL	0.47	NNE	ENE	SSW
24-Feb-09	-	< 0.46	LTDL	0.46	-	-	-
2-Mar-09	16:50	1.53	1.20	0.51	SE	S	SE
8-Mar-09	16:15	1.88	1.48	0.51	SW	WSW	WSW
14-Mar-09	14:20	0.52	0.41	0.52	ENE	ENE	ENE
20-Mar-09	-	-	-	-	-	-	-
26-Mar-09	22:30	0.51	0.40	0.51	W	SSW	S
3-Apr-09	18:20	0.51	0.40	0.51	N	N	NNE
7-Apr-09	9:18	22.69	17.85	0.52	WSW	WSW	WSW
13-Apr-09	15:10	1.03	0.81	0.51	WNW	NW	ENE
19-Apr-09	18:00	2.54	2.00	0.51	WSW	WSW	SW
25-Apr-09	16:30	0.51	0.40	0.51	WNW	WNW	NNE
1-May-09	15:10	0.51	0.40	0.51	NW	NW	NW
7-May-09	15:35	0.51	0.41	0.51	NE	NE	NNE
13-May-09	16:50	1.03	0.81	0.52	NNW	NNW	NNW

Manitoba 1-hr Guideline (ug/m3)
60

Table D.4 - Ambient Air Concentrations - Benzene

Date	LP1		LP2		Detection Limit		Predominant Wind Direction
	mg/m^3	ppb	mg/m^3	ppb	mg/m^3	ppb	
2-Mar-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
8-Mar-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
14-Mar-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-Mar-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
26-Mar-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
1-Apr-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
7-Apr-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Apr-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
19-Apr-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Apr-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
1-May-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
7-May-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
13-May-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
19-May-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
25-May-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
31-May-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
6-Jun-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
12-Jun-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
18-Jun-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
24-Jun-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
30-Jun-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNW/N
6-Jul-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
12-Jul-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
18-Jul-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
24-Jul-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
30-Jul-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
5-Aug-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
11-Aug-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
17-Aug-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
23-Aug-01	0.009	3.1	< 0.003	LTDL	0.003	1	SSE/S
29-Aug-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
4-Sep-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
10-Sep-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSW/SW
16-Sep-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
22-Sep-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
28-Sep-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
4-Oct-01	0.01	3	< 0.003	LTDL	0.003	1	WNW/NW
10-Oct-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
16-Oct-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
22-Oct-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
28-Oct-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
3-Nov-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
9-Nov-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
15-Nov-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NONE
21-Nov-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE
27-Nov-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE
3-Dec-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
9-Dec-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
15-Dec-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
21-Dec-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
27-Dec-01	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
2-Jan-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Jan-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
14-Jan-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
20-Jan-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
26-Jan-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
1-Feb-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
7-Feb-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
13-Feb-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
19-Feb-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
25-Feb-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
3-Mar-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
9-Mar-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
15-Mar-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
21-Mar-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
27-Mar-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
2-Apr-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
8-Apr-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
14-Apr-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-Apr-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Apr-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
2-May-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-May-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
14-May-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-May-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSE/S
27-May-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
1-Jun-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/A
7-Jun-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/A
13-Jun-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/A
20-Jun-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Jun-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
1-Jul-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
7-Jul-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Jul-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
19-Jul-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Jul-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
31-Jul-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
6-Aug-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Aug-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
18-Aug-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
24-Aug-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
30-Aug-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
5-Sep-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
11-Sep-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
17-Sep-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
23-Sep-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
29-Sep-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
5-Oct-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Oct-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
17-Oct-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Oct-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
29-Oct-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
4-Nov-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
10-Nov-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
16-Nov-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
22-Nov-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
28-Nov-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
4-Dec-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
10-Dec-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
16-Dec-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
22-Dec-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
28-Dec-02	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
3-Jan-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
9-Jan-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
15-Jan-03	N/A	N/A	N/A	N/A	N/A	N/A	SW
21-Jan-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
27-Jan-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
2-Feb-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Feb-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
14-Feb-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-Feb-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
26-Feb-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
4-Mar-03	< 0.003	LTDL[(a)]	< 0.003	LTDL	0.003	1	SW/WSW
10-Mar-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
16-Mar-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
24-Mar-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
28-Mar-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
3-Apr-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE
9-Apr-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
15-Apr-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
21-Apr-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
27-Apr-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
3-May-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
9-May-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
15-May-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	S/SSW
21-May-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
27-May-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
2-Jun-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Jun-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
14-Jun-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-Jun-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Jun-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
2-Jul-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
8-Jul-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
14-Jul-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-Jul-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Jul-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
1-Aug-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
7-Aug-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Aug-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
19-Aug-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Aug-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
31-Aug-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
6-Sep-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Sep-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
17-Sep-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
24-Sep-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSW/SW
30-Sep-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
6-Oct-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Oct-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Oct-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24-Oct-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
30-Oct-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None

Date	LP1		LP2		Detection Limit		Predominant Wind Direction
	mg/m^3	ppb	mg/m^3	ppb	mg/m^3	ppb	
6-Nov-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
11-Nov-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
17-Nov-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
23-Nov-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
29-Nov-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
5-Dec-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
11-Dec-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
17-Dec-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
22-Dec-03	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
29-Dec-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Jan-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-Jan-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
16-Jan-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
22-Jan-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
28-Jan-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
3-Feb-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
9-Feb-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
15-Feb-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
21-Feb-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A
27-Feb-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
4-Mar-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
9-Mar-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
16-Mar-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
22-Mar-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
29-Mar-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
3-Apr-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Apr-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE
15-Apr-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
21-Apr-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSW/SW
27-Apr-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3-May-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
9-May-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
15-May-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
21-May-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
27-May-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
2-Jun-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Jun-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
15-Jun-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
20-Jun-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Jun-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
2-Jul-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Jul-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
14-Jul-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
20-Jul-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Jul-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
1-Aug-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
7-Aug-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Aug-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
19-Aug-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
25-Aug-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
31-Aug-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
7-Sep-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Sep-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Sep-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
24-Sep-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
30-Sep-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
6-Oct-04	<0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
12-Oct-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Oct-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
24-Oct-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
30-Oct-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
5-Nov-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
11-Nov-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
17-Nov-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
23-Nov-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
29-Nov-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
5-Dec-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E
11-Dec-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Dec-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
23-Dec-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
29-Dec-04	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
4-Jan-05	<0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
10-Jan-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
16-Jan-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
22-Jan-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
28-Jan-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
3-Feb-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
9-Feb-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
15-Feb-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
21-Feb-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
27-Feb-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
5-Mar-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
11-Mar-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
17-Mar-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Mar-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
29-Mar-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
4-Apr-05	<0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
10-Apr-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
14-Apr-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
22-Apr-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
28-Apr-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
4-May-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
10-May-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
16-May-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE
23-May-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
28-May-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE
3-Jun-05	--	--	--	--	--	--	--
9-Jun-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
15-Jun-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
21-Jun-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
27-Jun-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
3-Jul-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	--
9-Jul-05	<0.003	LTDL	< 0.003	LTDL	0.003	1	--
15-Jul-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
20-Jul-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
27-Jul-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
02-Aug-05	--	--	--	--	--	--	None
08-Aug-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
15-Aug-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
20-Aug-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Aug-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None[(f)]
01-Sep-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE[(a)]
07-Sep-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Sep-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
19-Sep-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSWSW
25-Sep-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
01-Oct-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE
07-Oct-05	<0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
13-Oct-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
19-Oct-05	< 0.003	LTDL	--	--	0.003	1	None
25-Oct-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
01-Nov-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
06-Nov-05	--	--	--	--	--	--	None
12-Nov-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
18-Nov-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
24-Nov-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSW/SW
30-Nov-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
06-Dec-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNW/N
12-Dec-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
15-Dec-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE
22-Dec-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
30-Dec-05	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
05-Jan-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
11-Jan-06	<0.003	LTDL	< 0.003	LTDL	0.003	1	NE
17-Jan-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
23-Jan-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
29-Jan-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
04-Feb-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
10-Feb-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N
16-Feb-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
22-Feb-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
28-Feb-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE
06-Mar-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Mar-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Mar-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
23-Mar-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
30-Mar-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
05-Apr-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
11-Apr-06	<0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
17-Apr-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Apr-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
29-Apr-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
05-May-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
10-May-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
17-May-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-May-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
29-May-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
04-Jun-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
10-Jun-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
16-Jun-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SSW/SW
22-Jun-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
28-Jun-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
04-Jul-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
10-Jul-06	<0.003	LTDL	< 0.003	LTDL	0.003	1	None
16-Jul-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W

Date	LP1		LP2		Detection Limit		Predominant Wind Direction
	mg/m^3	ppb	mg/m^3	ppb	mg/m^3	ppb	
22-Jul-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
27-Jul-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
03-Aug-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
09-Aug-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
16-Aug-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
21-Aug-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Aug-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
02-Sep-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
08-Sep-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
14-Sep-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE
20-Sep-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
26-Sep-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
03-Oct-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
08-Oct-06	<0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
14-Oct-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
20-Oct-06	-	-	-	-	-	-	WSW/W
26-Oct-06	< 0.003	LTDL	0.003	1	0.003	1	SW/WSW
01-Nov-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W
07-Nov-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE/E
13-Nov-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E
19-Nov-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Nov-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
01-Dec-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N
07-Dec-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
13-Dec-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
19-Dec-06	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
25-Dec-06	-	-	-	-	-	-	-
31-Dec-06	-	-	-	-	-	-	-
04-Jan-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
12-Jan-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
18-Jan-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
24-Jan-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
30-Jan-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
05-Feb-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
11-Feb-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
17-Feb-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Feb-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
01-Mar-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE
07-Mar-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Mar-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
19-Mar-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Mar-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
31-Mar-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
06-Apr-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Apr-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
18-Apr-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
24-Apr-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
30-Apr-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
06-May-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-May-07	-	-	-	-	-	-	S/SSW
18-May-07	-	-	-	-	-	-	ENE
24-May-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
30-May-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
05-Jun-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
11-Jun-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
17-Jun-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
23-Jun-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
29-Jun-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
05-Jul-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
11-Jul-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Jul-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Jul-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
29-Jul-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
04-Aug-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
10-Aug-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
16-Aug-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
22-Aug-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
28-Aug-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
03-Sep-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
09-Sep-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
15-Sep-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
22-Sep-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
27-Sep-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
03-Oct-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
09-Oct-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
15-Oct-07	-	-	-	-	-	-	-
23-Oct-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
27-Oct-07	< 0.003	LTDL	0.8	1.2	0.003	1	WSW/W
02-Nov-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
08-Nov-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
14-Nov-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
20-Nov-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
26-Nov-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
02-Dec-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
08-Dec-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
14-Dec-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
20-Dec-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Dec-07	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
01-Jan-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
07-Jan-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
13-Jan-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
19-Jan-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
25-Jan-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
31-Jan-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
06-Feb-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
12-Feb-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Feb-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
24-Feb-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
02-Mar-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
07-Mar-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
13-Mar-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE
19-Mar-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
25-Mar-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE/NE
31-Mar-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
06-Apr-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
12-Apr-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Apr-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
24-Apr-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NE/ENE
30-Apr-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E
30-May-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
05-Jun-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ESE/SE
11-Jun-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E/ESE
17-Jun-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Jun-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
29-Jun-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
05-Jul-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
11-Jul-08	< 0.003	LTDL	-	-	0.003	1	None
17-Jul-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
23-Jul-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
29-Jul-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
05-Aug-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
10-Aug-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
16-Aug-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
22-Aug-08	-	-	< 0.003	LTDL	0.003	1	None
28-Aug-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
03-Sep-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
09-Sep-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
15-Sep-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
21-Sep-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	E
28-Sep-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
03-Oct-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
09-Oct-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	W/WNW
15-Oct-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
21-Oct-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
27-Oct-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
02-Nov-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
08-Nov-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
14-Nov-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
20-Nov-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
26-Nov-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
02-Dec-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WNW/NW
08-Dec-08	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
07-Jan-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
13-Jan-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
18-Feb-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW/WSW
24-Feb-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNE
2-Mar-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
8-Mar-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW
14-Mar-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	ENE
20-Mar-09	na	na	na	na	na	na	na
26-Mar-09	< 0.003	LTDL	0.0036	1.1	0.003	1	None
3-Apr-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
7-Apr-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	WSW/W
13-Apr-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
19-Apr-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	SW
25-Apr-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
1-May-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None
7-May-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N
13-May-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	NNW/N
20-May-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	N/NNE
25-May-09	0.003	1.0	< 0.003	LTDL	0.003	1	None
31-May-09	< 0.003	LTDL	< 0.003	LTDL	0.003	1	None

Table D.5 - Ambient Air Concentrations -MDI

Date	LP1 Concentration µg/m³	LP1 Concentration ppb	LP1 Detection Limit (µg/m³)	LP2 Concentration µg/m³	LP2 Concentration ppb	LP2 Detection Limit (µg/m³)	Predominant Wind Direction	Manitoba 1-hr Guideline (ug/m3)
9-Apr-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
9-Apr-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
9 to 10 Apr-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
25-Jul-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E	3
25-Jul-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	ENE	3
25 to 26 July-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
29-Oct-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SE	3
29-Oct-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
29 to 30 Oct-01	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
18-Feb-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NONE	3
18 to 19 Feb-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E/ENE	3
19-Feb-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	No Data	3
8-May-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NE/ENE	3
8 to 9 May-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
9-May-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
14-Aug-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
14 to 15 Aug-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
15-Aug-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
20-Nov-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
20 to 21 Nov-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
21-Nov-02	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
4-Feb-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW/W	3
4 to 5 Feb-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW/W	3
5-Feb-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
6-May-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E/ESE	3
6 to 7 May-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E/ESE	3
7-May-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E/ESE	3
14-Aug-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	N/A	3
14 to 15 Aug-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
15-Aug-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
18-Nov-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW/W	3
18 to 19 Nov-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	W	3
19-Nov-03	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
18-Feb-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
18 to 19 Feb-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
19-Feb-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
31-May-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NE/ENE	3
31 May-04 to 1 Jun-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
1-Jun-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNE/NE	3
26-Aug-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	N/NNE	3
26 to 27-Aug-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SSW/SW	3
27-Aug-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW	3
28 to 29 Nov-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
29-Nov-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
29-Nov-04	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
18-Feb-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
18 to 19 Feb-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E	3
19-Feb-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW	3
19-May-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
19 to 20 May-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
20-May-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
24-Aug-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	ESE	3
24 to 25 Aug-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
25-Aug-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SSW	3
27-Nov-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
27 to 28 Nov-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
28-Nov-05	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
23 to 24 Feb-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
24-Feb-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
24-Feb-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
18-May-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E	3
18 to 19 May-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW/W	3
19-May-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
15-Aug-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNE	3
15 to 16 Aug-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNE	3
16-Aug-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNE	3
28-Nov-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	N	3
28 to 29 Nov-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNW	3
29-Nov-06	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNW	3
27-Feb-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	N-NNE	3
27 to 28 Feb-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
28-Feb-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E	3
28-May-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	ESE/SE	3
28 to 29 May-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E/ESE	3
29-May-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	NNE/NE	3
6-Sep-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	ENE/NE	3
6 to 7 Sep-07	LTDL	LTDL	0.2	0.63	0.06	0.2	NNE/NE	3
7-Sep-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
29-Nov-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
29 to 30 Nov-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
30-Nov-07	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WSW	3
28 to 29 Feb-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WNW	3
29-Feb-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	WNW/NW	3
29-Feb-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
22-May-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E	3
22-May-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E/ENE	3
23-May-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	E	3
21-Aug-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
21-Aug-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
22-Aug-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
25-Nov-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3
25-Nov-08	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW	3
26-Nov-08	LTDL	LTDL	0.2	0.6	0.5	0.2	None	3
26-Feb-09	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SSW/SW	3
26-Feb-09	LTDL	LTDL	0.2	LTDL	LTDL	0.2	SW/WSW	3
27-Feb-09	LTDL	LTDL	0.2	LTDL	LTDL	0.2	None	3

Table D.6 - Ambient Air Concentrations - Phenol

Date	LP1 Concentration ug/m^3	LP1 Concentration ppb	LP1 Detection Limit (µg/m^3)	LP2 Concentration µg/m^3	LP2 Concentration ppb	LP2 Detection Limit (µg/m^3)	Predominant Wind Direction	Manitoba 1-hr Guideline (ug/m3)
9 to 10 Apr-01	LTDL	LTDL	7.7	LTDL	LTDL	6.9	None	63
25 to 26 July-01	LTDL	LTDL	7.7	LTDL	LTDL	6.9	ENE/E	63
29 to 30 Oct-01	LTDL	LTDL	7.7	LTDL	LTDL	6.9	NONE	63
18 to 19 Feb-02	LTDL	LTDL	6.7	LTDL	LTDL	6.2	E/ENE	63
08 to 09 May-02	LTDL	LTDL	8.1	LTDL	LTDL	7.7	None	63
14 to 15 Aug-02	LTDL	LTDL	6.3	LTDL	LTDL	7.3	None	63
20 to 21 Nov-02	LTDL	LTDL	7.1	LTDL	LTDL	6.8	None	63
4 to 5 Feb-03	LTDL	LTDL	7.6	LTDL	LTDL	7	WSW/W	63
6 to 7 May-03	11.7	3.01	6.5	LTDL	LTDL	7.3	E/ESE	63
14 to 15 Aug-03	LTDL	LTDL	7.2	LTDL	LTDL	6.8	SW/WSW	63
18 to 19 Nov-03	LTDL	LTDL	6.5	LTDL	LTDL	6.9	WSW/W	63
18 to 19 Feb-04	LTDL	LTDL	6.6	LTDL	LTDL	6.2	None	63
31-May to 1-Jun 04	LTDL	LTDL	6.7	LTDL	LTDL	6.5	NE/ENE	63
26 to 27 Aug-04	LTDL	LTDL	6.8	LTDL	LTDL	6.8	SSW/SW	63
28 to 29 Nov-04	LTDL	LTDL	6.7	LTDL	LTDL	7	WSW	63
18 to 19 Feb-05	LTDL	LTDL	6.7	LTDL	LTDL	7.1	None	63
19 to 20 May-05	LTDL	LTDL	6.4	LTDL	LTDL	7	None	63
24 to 25 Aug-05	LTDL	LTDL	6.4	LTDL	LTDL	7.3	None	63
27 to 28 Nov-05	LTDL	LTDL	6.6	LTDL	LTDL	7.3	SW/WSW	63
23 to 24 Feb-06	LTDL	LTDL	6.8	LTDL	LTDL	6.4	None	63
18 to 19 May-06	LTDL	LTDL	6.7	LTDL	LTDL	7.1	None	63
15 to 16 Aug-06	LTDL	LTDL	6.6	LTDL	LTDL	6.9	NNE	63
28 to 29 Nov-06	LTDL	LTDL	6.2	LTDL	LTDL	7.4	N-NNW	63
27 to 28 Feb-07	LTDL	LTDL	6.9	LTDL	LTDL	7.1	None	63
28 to 29 May-07	LTDL	LTDL	7	LTDL	LTDL	6.9	None	63
6 to 7 Sep-07	LTDL	LTDL	6.5	LTDL	LTDL	6.8	None	63
29 to 30 Nov-07	LTDL	LTDL	6.5	LTDL	LTDL	7.2	WSW	63
28 to 29 Feb-08	LTDL	LTDL	7	LTDL	LTDL	6.6	WNW/NW	63
22 to 23 May-08	LTDL	LTDL	7	LTDL	LTDL	6.8	E	63
21 to 22 aug-08	LTDL	LTDL	6.7	LTDL	LTDL	7.1	None	63
25 to 26 Nov-08	LTDL	LTDL	6.8	LTDL	LTDL	7.3	None	63
26 to 27 Feb-09	LTDL	LTDL	7.1	LTDL	LTDL	6.9	SW/WSW	63

Table D.7 - Ambient Air Concentrations - Hydrogen Cyanide

	LP1						LP2						
	HCN (µg/sample)			Sample Air Volumes			HCN (µg/sample)			Sample Air Volumes			
Date	Exposed Sample	Control Blank	Collected Amount	(m^3)	HCN Concentration (µg/m^3)	Predominant Wind Direction	Exposed Sample	Control Blank	Collected Amount	(m^3)	HCN Concentration (µg/m^3)	Predominant Wind Direction	Manitoba 1-hr Guideline (ug/m3)
9 to 10 Apr-01	0.2	0.2	0	0.081	0	None	0.2	0.2	0	0.089	0	None	40
25 to 26 Jul-01	0.1	0.2	0	0.072	0	ENE/E	0.2	0.1	0.1	0.089	1.1	ENE/E	40
29 to 30 Oct-01	0.1	0.2	0	0.089	0	NONE	0.2	0.1	0.1	0.086	1.2	NONE	40
18 to 19 Feb-02	0.2	0.2	0	0.081	0	E/ENE	0.1	0.2	0	0.086	0	E/ENE	40
08 to 09 May-02	LTDL	0.1	0	0.081	0	None	0.1	0.1	0	0.078	0	None	40
14 to 15 Aug-02	LTDL	LTDL	0	0.088	0	None	LTDL	0.1	0	0.081	0	None	40
20 to 21 Nov-02	0.2	0.1	0.1	0.085	1.2	None	0.1	0.1	0	0.074	0	None	40
4 to 5 Feb-03	LTDL	LTDL	0	0.088	0	WSW/W	LTDL	LTDL	0	0.083	0	WSW/W	40
6 to 7 May-03	0.2	LTDL	0.2	0.082	2.4	E/ESE	LTDL	0.2	0	0.076	0	E/ESE	40
14 to 15 Aug-03	0.1	0.1	0	0.082	0	SW/WSW	0.1	0.1	0	0.075	0	SW/WSW	40
18 to 19 Nov-03	0	0.2	0	0.076	0	WSW/W	0.2	0.2	0	0.078	0	WSW/W	40
18 to 19 Feb-04	0.2	0.2	0	0.082	0	None	0.2	LTDL	0.2	0.075	2.7	None	40
31-May-04 to 1-Jun 04	0.1	0.1	0	0.081	0	NE/NNE	0.1	0.1	0	0.082	0	NE/NNE	40
26 to 27 Aug-04	0.2	0.1	0.1	0.081	1.2	SSW/SW	0.2	LTDL	0.2	0.082	2.4	SSW/SW	40
28 to 29 Nov-04	0.2	0.2	0	0.076	0	WSW	0.2	0.3	0	0.076	0	WSW	40
18 to 19 Feb-05	0.2	0.2	0	0.076	0	None	0.2	0.3	0	0.076	0	None	40
19 to 20 May-05	0.2	0.2	0	0.085	0	None	0.2	0.3	0	0.086	0	None	40
24 to 25 Aug-05	< 0.1	< 0.1	< 0.1	0.081	0	None	< 0.1	< 0.1	< 0.1	0.072	0	None	40
27 to 28 Nov-05	0.1	0.1	0.1	0.09	0	SW/WSW	0.1	0.1	0.1	0.078	0	SW/WSW	40
23 to 24 Feb-06	< 0.1	< 0.1	< 0.1	0.082	< 1.2	None	< 0.1	< 0.1	< 0.1	0.088	< 1.1	None	40
18 to 19 May-06	< 0.1	< 0.1	< 0.1	0.085	< 1.2	None	< 0.1	< 0.1	< 0.1	0.086	< 1.2	None	40
15 to 16 Aug-06	0.2	0.3	< 0.1	0.083	< 1.2	NNE	0.2	0.3	< 0.1	0.086	< 1.2	NNE	40
28 to 29 Nov-06	< 0.1	< 0.1	< 0.1	0.088	< 1.1	N-NNW	< 0.1	< 0.1	< 0.1	0.081	< 1.2	N-NNW	40
27 to 28 Feb-07	< 0.1	< 0.1	< 0.1	0.072	< 1.2	None	< 0.1	< 0.1	< 0.1	0.069	< 1.2	None	40
28 to 29 May-07	< 0.1	< 0.1	< 0.1	0.077	< 1.2	None	< 0.1	< 0.1	< 0.1	0.072	< 1.2	None	40
6 to 7 Sep-07	< 0.1	< 0.1	< 0.1	0.081	< 1.2	None	< 0.1	< 0.1	< 0.1	0.082	< 1.2	None	40
29 to 30 Nov-07	< 0.02	0.47	< 0.02	0.086	< 0.2	WSW	< 0.02	< 0.02	< 0.02	0.082	< 0.2	WSW	40
28 to 29 Feb-08	0.24	0.34	< 0.02	0.082	< 0.2	WNW/NW	< 0.02	0.3	< 0.02	0.085	< 0.2	WNW/NW	40
22 to 23 May-08	< 0.02	< 0.02	< 0.02	0.088	< 0.2	E	0.16	< 0.02	0.16	0.078	2.06	E	40
21 to 22 Aug-08	< 0.02	< 0.02	< 0.02	0.084	< 0.2	None	< 0.02	< 0.02	< 0.02	0.081	< 0.2	None	40
25 to 26 Nov-08	< 0.02	< 0.02	< 0.02	0.084	< 0.2	None	< 0.02	< 0.02	< 0.02	0.081	< 0.2	None	40
26 to 27 Feb-09	< 0.02	< 0.02	< 0.02	0.084	< 0.2	SW/WSW	< 0.02	< 0.02	< 0.02	0.081	< 0.2	SW/WSW	40