Air Dispersion Modelling Report

Weir Canada Inc.

Surrey, British Columbia

GHD | 651 Colby Drive Waterloo Ontario N2V 1C2 Canada

11115558 | Report No 1 | August 3 2017

Executive Summary

GHD was retained by Weir Canada Inc. (Weir) to conduct an air dispersion modelling assessment of emissions for their new Industrial Plant located at 18933 34A Avenue, Surrey, BC (Facility). The dispersion modelling analysis considered emission sources related to the Facility and their impact on the surrounding environs. An air dispersion modelling plan was developed by GHD with input from the Greater Vancouver Regional District (Metro Vancouver, MV) pursuant to the Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008. The plan was approved by Metro Vancouver prior to commencing the assessment.

The Facility by Weir will be state-of-the-art and replaces their facility located in Richmond, BC that currently utilizes older manufacturing technologies. The Facility will continue to specialize in providing rubber and elastomer coatings of pipes, valves, specialized fabrications and pump components.

Emissions from the Facility includes: products of natural gas combustion from two boilers and two urethane curing ovens; particulate matter from a grit blast room dust collector, rubber buffing room and welding stations; and products from a paint booth, two urethane adhesive application booths and a rubber adhesive application booth.

The maximum predicted AERMOD concentrations were calculated based on the operating conditions where all sources are operating simultaneously at their individual maximum rates of production.

A maximum concentration for each significant contaminant emitted from the Facility was predicted by the AERMOD dispersion model based on the calculated emission rates and the output from the approved dispersion model; the results are presented in the Summary of Maximum Predicted Concentrations table. Estimated concentrations for select contaminants at receptors of interest are also provided in the Summary of Maximum Predicted Concentrations at Sensitive Receptors for Select Contaminants table.

The concentrations listed in the Summary of Maximum Predicted Concentrations table and Summary of Maximum Predicted Concentrations at Sensitive Receptors for Select Contaminants table was compared against the Metro Vancouver Objectives, and limits from the following jurisdictions: Alberta, Texas, Ontario and the European Union.

As the predicted total concentrations are below published limits, Weir's operation is not expected to have an adverse impact on either the surrounding environment or public health. Further, where background concentrations have been measured, they indicate that the maximum predicted emissions from the Facility, which occurs at the Facility's property boundary, are typically less than 50 percent of what is currently present.

Weir's operating processes are not expected to contribute odour to the surrounding environment. Since Weir acquired this operation, the company has not received an odour complaint.

Table of Contents

Table of Contents

Figure Index

Table Index

Appendix Index

1. Introduction and Facility Description

GHD was retained by Weir Canada Inc. (Weir) to conduct an air dispersion modelling assessment of emissions for their new Industrial Rebuilding Plant located at 18933 34A Avenue, Surrey, BC (Facility). The dispersion modelling analysis considered emission sources related to the Facility and their impact on the surrounding environs. An air dispersion modelling plan was developed by GHD with input from the Greater Vancouver Regional District (Metro Vancouver, MV) pursuant to the Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008. The plan was approved by Metro Vancouver prior to commencing the assessment.

The Facility by Weir will be state-of-the-art and replaces their facility located in Richmond, BC that currently utilizes older manufacturing technologies. The Facility will continue to specialize in providing rubber and elastomer coatings of pipes, valves, specialized fabrications and pump components.

Emissions from the Facility will include: products of natural gas combustion from two boilers and two urethane curing ovens; particulate matter from a grit blast room dust collector, rubber buffing room and welding stations; and products from a paint booth, two urethane adhesive application booths and a rubber adhesive application booth.

1.1 Purpose and Scope of the ADM Report

This Air Dispersion Modelling Report was prepared in support of an Air Permit Application for the Facility. The Facility will be located at 18933 34A Avenue, Surrey, BC. The location of the Facility is presented in Figure 1. The Facility location relative to the nearest intersection in Surrey and the location of the discharges from each of the sources are presented in Figure 2; the location of each of the sources is specified with the source reference number and description.

1.2 Description of Products and Raw Materials

The Facility's primary operations consist of providing rubber and elastomer coating of pipes, valves, specialized fabrications and pump components. The Facility receives parts for remanufacture; de-bond their existing coatings; apply new coatings; and ships them to the customer. Additionally, the Facility manufactures and coat parts for custom orders.

Additional information is provided in Appendix A.

1.3 Operating Schedule

The Facility generally operates 16 hours per day, up to six days per week, and up to 50 weeks per year.

2. Identification of Sources and Contaminants

This section provides an initial identification of all of the sources and contaminants emitted at the Facility.

There may be general ventilation from the Facility that only discharges uncontaminated air from the workspaces or air from the workspace that may include contaminants that come from commercial office supplies, building maintenance products or supplies and activities; these types of ventilation sources are considered to be negligible and were not identified as sources at the Facility.

General ventilation located in the process area that does not vent process emissions is also considered negligible.

2.1 Sources and Contaminants Identification Table

Table 1 identifies all contaminants released from the Facility. Table 1 also lists the concentration limits and jurisdiction for each of the contaminants.

Table 2 lists all the emission sources at the Facility. Table 2 also provides the parameters for each emission source used for dispersion modelling.

The expected contaminants emitted from each source are also identified in Table 2. Each of the identified sources has been assigned a source reference number.

The location of the discharges from each of the sources is presented in Figure 2 as identified by the source reference numbers.

3. Operating Conditions, Emissions Estimating, and Data Quality

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the Facility.

3.1 Description of Operating Conditions

The averaging time for the operating condition is based on the applicable averaging time for each contaminant. The contaminants typically have a 1-hour, 24-hour and/or annual averaging period. The operating condition used for this Facility that results in the maximum ground level concentration (GLC) is the scenario where all significant sources are operating simultaneously at their individual maximum rates of production. The individual maximum rates of production for each significant source of emissions correspond to the maximum emission rate during any hourly period. The individual maximum rates of production for each significant source of emissions are explicitly described in Appendix A.

3.2 Explanation of the Methods Used to Calculate Emission Rates

The emission rate for each contaminant emitted from a source was estimated and the methodology for the calculation is documented in Appendix A. A summary of the calculated emission rates are provided in Table 2.

4. Source Summary Table and Site Plan

4.1 Source Summary Table

For each source of significant contaminants the following parameters are referenced in Table 2 and are as follows:

- Contaminant
- Chemical Abstract Service (CAS) reference number
- Source reference number
- Source description
- Stack parameters (flow rate, exhaust temperature, diameter, height above grade, and height above roof)
- Maximum emission rate
- Averaging period
- Emission estimating technique
- Estimation of data quality
- Percentage of overall emission

4.2 Site Plan

The locations of the emission sources are presented in Figure 2; the location of each of the sources is specified with the source reference number and description. The location of the property-line is also indicated in Figure 2, with the end points of each section of the property-line clearly referenced in Universal Transverse Mercator (UTM) coordinate system. The location of each source is referenced to the UTM coordinates system under a column in Table 2.

The heights of the structures that are part of the Facility are labeled in Figure 2.

5. Dispersion Modelling

This section provides a description of how the dispersion modelling was conducted at the Facility to calculate the maximum GLC.

The dispersion modelling was conducted in accordance with the MOE publication "British Columbia Air Quality Dispersion Modelling Guideline" (BC AQDMG) dated November 2015.

The AERMOD modeling system was approved by Metro Vancouver to assess the Facility's maximum GLC. This system is made up of the AERMOD dispersion model, the AERMET meteorological pre-processor, the AERMAP terrain pre-processor, and the BPIP building downwash pre-processor. The following approved dispersion model and pre-processors were used in the assessment:

- AERMOD dispersion model (v. 15181)
- AERMET meteorological pre-processor (v. 15181)
- AERMAP surface pre-processor (v. 11103)
- BPIP building downwash pre-processor (v. 04274)

The Facility sources were modelled as point sources. A summary of the AERMOD source input parameters is provided in Appendix B.

The emission rates used in the dispersion model were calculated such that it is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant. These emission rates are further described in Appendix A.

For each air contaminant, the highest predicted concentration for each averaging period was determined and used to assess against the air quality limits as listed in Table 1. No meteorological outliers were removed as part of the assessment. Ambient background concentrations, where available, were included as part of the assessment.

5.1 Coordinate System

The Universal Transverse Mercator (UTM) coordinate system was used to specify source locations, model object sources, buildings and receptors. All coordinates were defined in the North American Datum of 1983 (NAD83).

Property line coordinates are provided in Figure 2.

5.2 Meteorology and Land Use Data

5.2.1 Surface Meteorological Data

Metro Vancouver provided surface wind speed, wind direction, atmospheric temperature and precipitation data for the T015 Surrey East monitoring station for the years 2010 to 2014. Data for the year 2015 was not provided by Metro Vancouver as it had not yet been reviewed. Precipitation data was not used for this assessment; deposition was not considered. AERMOD was used to calculate the maximum GLC for the Facility.

The Metro Vancouver dataset was examined for completeness. The data was found to contain the following monitoring flags mixed in with the recorded data: "NoData", "<Samp", "InVld" and "Down". Not all determined hours were found to be missing all data fields and the missing data were identified for interpolation (for periods of three hours or less) or backfilling with surrogate data. Data completion for the Metro Vancouver dataset was:

- Wind speed, 99.7 percent

- Wind direction, 99.7 percent
- Atmospheric temperature, 99.8 percent

Surrogate data to backfill missing data were from the following Environment Canada stations (in order of preference):

- Pitt Meadows Climate Station (WMO ID 71775)
- Vancouver International Airport (Climate ID 1108447)

Additional meteorological data from the above two stations were also applied to complete the meteorological dataset before processing through AERMET. The additional data were station pressure, humidity and cloud cover. As during the backfilling of the Surrey East dataset, data from the Pitt Meadows station was preferred. If Pitt Meadows was missing or incomplete, the Vancouver International AP data was used.

5.2.2 Stagnation Conditions

Wind speeds from the T015 Surrey East monitoring station for 2010 to 2014 was assessed for potential stagnation conditions. The assessment was performed for both the original data provided by Metro Vancouver and the backfilled dataset. The assessment indicated that of the 43,824 hours:

- The original Metro Vancouver dataset recorded 24 one-hour periods when the wind speed was below 0.28 metres per second (m/s).
- The backfilled dataset recorded 43 one-hour periods when the wind speed was below 0.28 m/s.
- The difference in the number of hourly period of low or no wind speeds that may result in stagnation effects was from backfilling missing wind speed values.

Wind speeds that would result in potential stagnation effects account for less than 0.01 percent of the 5 years of meteorological data. The effects from stagnation were not considered significant.

5.2.3 Upper Air Data

Upper air data was retrieved from the NOAA radiosonde database. As no radiosonde data within the vicinity of Vancouver was found, the nearest US coastal site was used for the upper air soundings. The upper air data used was from Quillayut, Washington for the years 2010 to 2014.

5.2.4 Land Use Parameterization

Land use surrounding the Facility was visually assessed using Google Earth imagery to determine surface roughness, albedo and Bowen ratio. The assessment was performed in 30 degree wind sectors and out to a distance of 1000 m from the Facility. The classification of the land use by sector was based on the dominant land use type in use (or intended use) and by seasons.

Figure 3 provides the dominant land use classifications by wind sector. A summary of the surface roughness, albedo and Bowen ratio land use parameters is provided in Table 3.

5.2.5 AERMET Processed Meteorological Data

The raw surface and upper air data was processed through AERMET with the land use classifications and the Surrey East meteorological station data. AERMET subsequently produced surface and profile meteorological files ready for use with the AERMOD model.

Figures 4 to 7 shows the seasonal wind directions and speeds at the Facility. The figures also show the surface wind speed distribution for each of the seasons.

5.3 Terrain

AERMOD captures the essential physics of dispersion in complex terrain though the use of a separate height scale factor for each receptor. The highest scale factor represents the terrain that would dominate flow in the vicinity of the receptor.

The height scale factor that is used by AERMOD is generated by the AERMAP terrain pre-processor. AERMAP utilizes terrain data, or Digital Elevation Model (DEM) data in conjunction with a layout of receptors and sources to height scale factors that can be directly used in AERMOD.

Terrain data was acquired from Natural Resources Canada's GeoGratis site. Data was downloaded in GeoTIFF format and converted into USGS DEM format. Overlaying the data onto Surrey shows that the local essential topological features are present in the model, including the elevation rises for White Rock (southwest) and Campbell Valley Regional Park (southeast), and watershed of the Nicomeki River (north).

A visual representation of the DEM data is provided in Figure 8.

5.4 Receptors

Receptors were chosen based on recommendations provided in the BC AQDMG. A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

- 50 m spacing within 500 m of the edge of the bounding box
- 250 m spacing from 500 m to 2000 m
- 500 m spacing from 2000 to 5000 m

A property line receptor grid with 20 m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed with the Facility's property line. All receptors were defined with a flagpole height of 1.5 m above grade. The total dimension of the receptor grid used was 10 km x 10 km.

A figure of the receptor grid is provided in Figure 9.

5.5 Building Downwash

The Facility buildings were entered into the model using the USEPA Building Profile Input Program (BPIP-PRIME). The inputs into this pre-processor include the co-ordinates and heights of the buildings and stacks. The BPIP program was executed to evaluate any building cavity downwash effects. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions. The on-site buildings and structures were modelled with their respective average roof heights.

The PRIME plume rise algorithms include vertical wind shear calculations (important for buoyant releases from short stacks [i.e., stacks at release heights within the recirculation zones of the buildings]). The PRIME algorithm also allows for the wind speed deficit factors to improve the accuracy of predicted concentrations within building wake zones that form in the lee of buildings.

The Facility consists of one building with dimensions of 128 m x 80 m x 9.6 mH. A small extension is attached along the north side of the building with dimensions of 18 m x 18 m x 6.8 mH. The building layout is provided in Figure 2.

5.6 Deposition

AERMOD has the ability to account for wet and dry deposition of substances that would reduce ground level concentrations at POIs. However, the deposition algorithm has not been implemented in this assessment and therefore, the predicted POI concentrations are considered to be more conservative.

5.7 Averaging Times

The shortest time scale that AERMOD predicts is a 1-hour average value. The limits used in this assessment include averaging periods for 1-hour, 8-hour, 24-hour, monthly (30-day), and annual.

5.8 Background Ambient Concentrations

Ambient air quality data was provided by Metro Vancouver from the Surrey East (station ID T015) and Langley (station ID T027) ambient monitoring stations for years 2013 to 2015. Data from both monitoring stations were used to calculated background concentrations at the Facility. Background concentrations for volatile organic compounds (VOCs) were acquired from Environment Canada's NAPS network for Surrey East (NAPS ID S100119; 2012-2013 data).

Air quality data provided from each station consisted of:

- Surrey East – NO_2, NOx, O_3, CO, PM-2.5
- Langley – NO_2, NOx, O_3, CO, SO_2, PM-10, PM-2.5

Background concentrations for nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3) and PM-2.5 was calculated based on data from both Surrey East and Langley. Background concentrations for sulphur dioxide (SO_2) and PM-10 was calculated from Langley only.

Background concentrations were established from the NAPS data for the following individual compounds: 1,2,4-trimethylbenzene, ethylbenzene and toluene. For total VOCs, the background concentration was calculated as follows:

- For each NAPS sampling period during 2012 to 2013, the concentrations for all compounds collected were summed into a single total VOC concentration for the period.
- The maximum of the summed concentrations from all the NAPS sampling periods was used as the total VOC background concentration.

For all compounds with a 1-hour averaging period and available background concentrations, the 98th percentile concentration was calculated. The exception to this method was SO_2, where the 99th percentile was calculated instead.

For all compounds with an 8-hour or 24-hour averaging period and available background concentrations, the 98th percentile rolling average was calculated. The exceptions to this method were the VOC compounds derived from the NAPS data, where the 100th percentile was calculated.

For compounds with an annual averaging period, the maximum annual average concentration was calculated.

The conversion of concentrations from parts-per-million (ppb) and parts-per-billion (ppb) to micrograms per cubic metres (µg/m^3) were calculated using the formulas:

$$\frac{\mu g}{m^3} = \frac{ppm \times MW}{24.45} \times 1000$$

and

$$\frac{\mu g}{m^3} = \frac{ppb \times MW}{24.45}$$

A summary of the calculated background concentrations, number of samples used and completeness of the provided data is provided in Table 4.

5.9 Air Contaminant Modelling

All air contaminants identified in Table 1 were modelled and their maximum predicted concentrations were compared against their listed limits. The following special considerations should be noted with respect to the models.

5.9.1 AERMOD Urban Dispersion Option (URBANOPT)

AERMOD can model the affects from thermal heat islands that result from heavily urbanized locales. These thermal islands increase atmospheric turbulence that is caused by heat rising due to urban activities, such as high population density or heavy urban development. The urban co-efficient option in AERMOD requires that one of the following two definitions be met:

- A minimum of 50 percent of the surrounding land within 3 kilometres of the facility be zoned for high-density urban use (mid- to high-density commercial, mid- to high-density residential, mid- to high-density industrial).

- The minimum average population density of the surrounding land within 3 kilometres of the facility is 750 persons per square kilometre.

As the land use surrounding the facility does not meet either these requirements, the urban dispersion option was not enabled.

5.9.2 Nitrogen Oxides

Nitrogen oxides (as nitrogen dioxide) were modelled with the Plume Volume Molar Ratio Method (PVMRM) to account for O_3 scavenging. The background ozone level was estimated using the maximum O_3 concentration from the Surrey East and Langley monitoring stations which was calculated at 67.6 ppb. This value was applied to the NO_2 model. As the PVMRM was being used, the BC AQDMG recommended values were applied: 0.90 was used for the NO_2:NOx equilibrium ratio, and 0.10 was used for the NO_2:NOx in-stack ratio.

A description of the PVMRM equations can be found in the EPA document "AERMOD Model Formulation and Evaluation", section 5.8 (https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod).

5.9.3 Particulate Matter Emissions

All particulate matter was assumed to be PM-10 or less. Processes at the Facility that generate PM emissions would typically have size diameters of 10 microns or smaller. PM emissions would be generated from natural gas combustion, rubber buffing (rubber fumes), welding (welding fumes), and adhesive and polymer applications. For conservatism, PM emissions were assumed to apply down to the 2.5 micron size category.

5.9.4 Annual Average AERMOD Model Runs

The AERMOD model was used to calculate the maximum annual average, off-site concentrations for compounds that have annual air quality criteria. As a screening approach, the applicable compound hourly average or daily average emission rates for each emission source were assumed to occur continuously throughout the year. This is extremely conservative since none of the emissions sources at the Facility operate continuously throughout the year, and in fact many of the sources only operate for a small fraction of the year. Using this screening approach, all of the compounds were found to be well below the annual air quality criteria, including background concentrations where applicable. Although the PM-2.5 annual average screening run was well below the annual air quality criteria, it was decided to conduct a refined annual average AERMOD run for PM-2.5 to obtain a lower and more realistic prediction of the annual average. The annual operating hours of the equipment at the Facility emitting PM-2.5 were used to estimate the annual average emission rate of PM-2.5 for each source and these emission rates were assumed to occur continuously throughout the year in the annual average AERMOD run for PM-2.5.

5.9.5 Unitary Dispersion Factors

Many of the compounds modelled were emitted from either a single source, or a group of sources with identical parameters and emission rates. Instead of modelling these compounds individually,

unitary emission rate sources were created for these sources or group of sources to have AERMOD predict a unitary dispersion factor (i.e., a dispersion factor based on 1 g/s emission rate. The dispersion factor could then be used to calculate the maximum predicted concentration using the following formula:

(Concentration)($\mu g/m^3$) = (Dispersion Factor)($\mu g/m^3$ per 1 g/s) x (Emission Rate)(g/s)

5.9.6 Predicted Concentration Values

The maximum predicted concentration from the dispersion models were used to assess against the limits in Table 1. No outlier values were removed from consideration. As the maximum concentration typically results from very rare meteorological conditions, this approach can be considered highly conservative as it represents the highest predicted concentration calculated within the model domain. This maximum predicted concentration should not be considered representative of a facility's typical impact on the general environment.

5.9.7 Deposition Considerations

Deposition resulting from Facility emissions is expected to have negligible impact on the surrounding water sources (aquifers and surface waters), fish habitats, and soil (including agriculture and other flora). The majority of the deposition would occur either on Facility property or within a short distance of the Facility in a similar manner as any predicted air contaminant concentrations.

Deposition occurs from the settling of air contaminants onto a surface, typically measured in grams per square metre per year ($g/m^2/yr$), where they may:

- Accumulate
- Be removed (either through re-entrainment into the atmosphere, or by washing away by rainfall)
- Decompose

The current Alberta dustfall objective is 53 mg/100 cm^2 (5.3 g/m^2 equivalent) for a 30-day average. The current Ontario dustfall criteria is 7 g/m^2 for a 30-day average.

Two PM deposition models were run with AERMOD using the PM fraction and a particle size diameter. Two models were assessed for sensitivity: 100% PM-10 from all sources (PM fraction = 1.0; size diameter = 10 microns), and 100% PM-2.5 from all sources (PM fraction = 1.0; size fraction = 2.5 microns). A 30-day deposition value, in grams per square metre (g/m^2), was calculated by AERMOD for these two model runs.

The maximum 30-day deposition was calculated to occur along the north property line of the Facility with deposition values of 0.00893 g/m^2 (PM-10) to 0.00891 g/m^2 (PM-2.5). Comparing against the Alberta and Ontario dustfall criteria, the predicted 30-day deposition values are over 1000 times lower and, therefore, insignificant. Furthermore, the predicted deposition values decrease significantly to one-tenth of the maximum predicted values within a distance of 250 m.

A selection of metal contaminants were screened to assess their impact on soil concentrations. The contaminants screened provide an indication of the Facility's deposition impact on the surrounding

environment. Soil concentration values from Schedule 7 Column III "Soil Relocation to Agricultural Land" of B.C. Reg. 375/96 were used for comparison against predicted deposition concentrations from the Facility. Soil concentrations from deposition were calculated based on an annual PM deposition rate, the Facility's metals emission rates and a soil mixing depth of 0.1 m. The estimated maximum soil metals concentrations were then compared against those listed in Schedule 7 Column II of B.C. Reg. 375/96, and determined to be well below the established limits in Schedule 7.

Table 7 provides a summary of the deposition modeling results. The results of the metals deposition modeling indicate that the soil concentrations are all less than 0.1% of the agricultural land soil standards. Based on these results, it is evident that there will be insignificant deposition of contaminants and negligible impacts on soil and water quality.

5.10 Dispersion Modelling Options

The options used in the AERMOD dispersion model are summarized in the table below.

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Specifies that regulatory default options will be used	No
BETA	Specifies the use of horizontal and capped sources	Yes
NO_2STACK	Specifies NO_2:NOx in-stack concentration ratio	Yes; NO_2 model only
NO_2EQUIL	Specifies NO_2:NOx equilibrium concentration ratio	Yes; NO_2 model only
OZONEFIL	Specifies the use of an hourly ozone file for NO_2 scavenging calculations	Yes; NO_2 model only
CONC	Specifies that concentration values will be calculated	Yes
DDPLETE	Specifies that dry deposition will be calculated	No
WDPLETE	Specifies that wet deposition will be calculated	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used	No, the model will use elevated terrain as detailed in the AERMAP output
NOSTD	Specifies that the non-default option of no stack-tip downwash will be used	No
AVERTIME	Time averaging periods calculated	1-hour, rolling 8-hour, rolling 24-hour, 30-day, annual
URBANOPT	Allows model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions	No
URBANROUGHNESS	Specifies the urban roughness length (m)	Not Applicable
FLAGPOLE	Specifies that receptor heights above local ground level are allowed on the receptors	Yes; 1.5 m

5.11 Dispersion Modelling Input and Output Files

Appendix B includes the input and output files from the AERMOD model in electronic form.

6. Dispersion Modelling Results and Conclusions

This section provides a summary of the results from the dispersion modelling.

6.1 Summary of Maximum Predicted Concentrations Table

A maximum concentration for each contaminant emitted from the Facility was calculated based on the emission rates listed in Table 2 and the background concentrations listed in Table 4. The output from the approved dispersion model is presented in Appendix B. The results are presented in Table 5. For each source of contaminants the following parameters are referenced:

- Contaminant name
- CAS number
- Total Facility emission rate
- Approved dispersion model used
- Maximum predicted concentration
- Background concentration
- Total predicted concentration
- Averaging period for the dispersion modelling
- Air quality limit
- Jurisdiction of limit
- Percent of limit for Facility only
- Percent of limit for Facility with background

6.2 Concentrations at Sensitive Receptors

Table 6 provides the estimated concentrations at the receptors of interest identified in Figure 1. Only air contaminants of particular concern to Metro Vancouver with respect to the Facility were assessed. The maximum concentrations for all sensitive receptors were assessed (with and without background concentrations considered) against the limits.

6.3 Deposition Considerations

Deposition from the Facility is expected to be insignificant. The maximum 30-day deposition was calculated to occur along the north property line of the Facility with deposition values of 0.00893 g/m^2 (PM-10) to 0.00891 g/m^2 (PM-2.5). Comparing against the Alberta and Ontario dustfall criteria, the predicted 30-day deposition values are over 1000 times lower and, therefore, insignificant. Furthermore, the predicted deposition values decrease significantly to one-tenth of the maximum predicted values within a distance of 250 m.

Soil contamination from metal releases from the Facility are also expected to be insignificant. Table 7 provides a summary of the metals assessed against published soil concentration values from Schedule 7 Column III "Soil Relocation to Agricultural Land" of B.C. Reg. 375/96.

6.4 Predicted Concentration Contours

Concentration contours for air contaminants with Metro Vancouver objectives are provided in Figures 10 to 22. These contours provide a visual indicator for where the maximum predicted concentrations occur, potential locations of concern, and how rapidly concentrations will decrease over distance. Generally, the maximum predicted concentrations will occur along the property line, and rapidly decreases once beyond the property line. The contour plots include background concentrations where available.

6.5 Facility Emissions vs. Ambient Background Concentrations

Predicted ground level concentrations from Facility emissions are well below concentrations measured at nearby ambient monitoring stations. Further, when comparing Facility emissions with the ambient background concentrations, the ambient concentrations are significantly higher than those predicted from the Facility. The predicted concentrations from the Facility that were used for the comparison represent a worst-case situation, with maximum and concurrent outputs from all Facility equipment. Concentrations along the property boundary will decrease quickly with distance from the property, even in the case of maximum impact and rare atmospheric conditions. Based on these comparisons, we conclude that the Facility will have a neglible impact on the local air shed.

6.6 Facility Emissions vs. Jurisdictional Limits

Predicted concentrations from the Facility, when compared against the Metro Vancouver Objectives, or other criteria from Alberta, Ontario and Texas, shows that they are well below the published jurisdictional limits (as presented in Table 1). Jurisdictional limits are typically established based on a given concentration level for an adverse affect on the surrounding environs, such as health, soiling, corrosion, vegetation damage, and/or visibility.

Certain hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) are established based on the lowest probability of developing chronic health issues.

6.7 Facility Emissions on Local Impacts and Health Effects

As stated above, the predicted concentrations from the Facility are well below measured ambient background concentrations and published jurisdictional limits. These limits are typically established based on a contaminant having an adverse effect on its surrounding environment or to human health. Based on the low predicted concentrations, emissions from the Facility are not expected to have any impact or heath effects on the surrounding environment and communities.

6.8 Odour Considerations

The manufacturing processes at the Facility may potentially generate a limited amount of on-site odour. Potential sources for these odours would typically be from batch curing ovens and

application booths. Given that Weir has never received an off-site odour complaint since acquiring this operation, with newer equipment and updated operating procedures the Facility is not expected to be a source of off-site odour.

6.9 Conclusions

This Air Dispersion Modelling Report was prepared to assess the emission sources related to the Weir Canada Inc. Industrial Plant, and was developed to support the air permit application submitted by Weir. The dispersion models were approved and developed with input from Metro Vancouver.

The emission rate estimates for each source of contaminants are documented in Table 2. All the emission rates listed in Table 2 correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates of production. Therefore these emission rate estimates listed in Table 2 are not likely to be an underestimate of the actual emission rates.

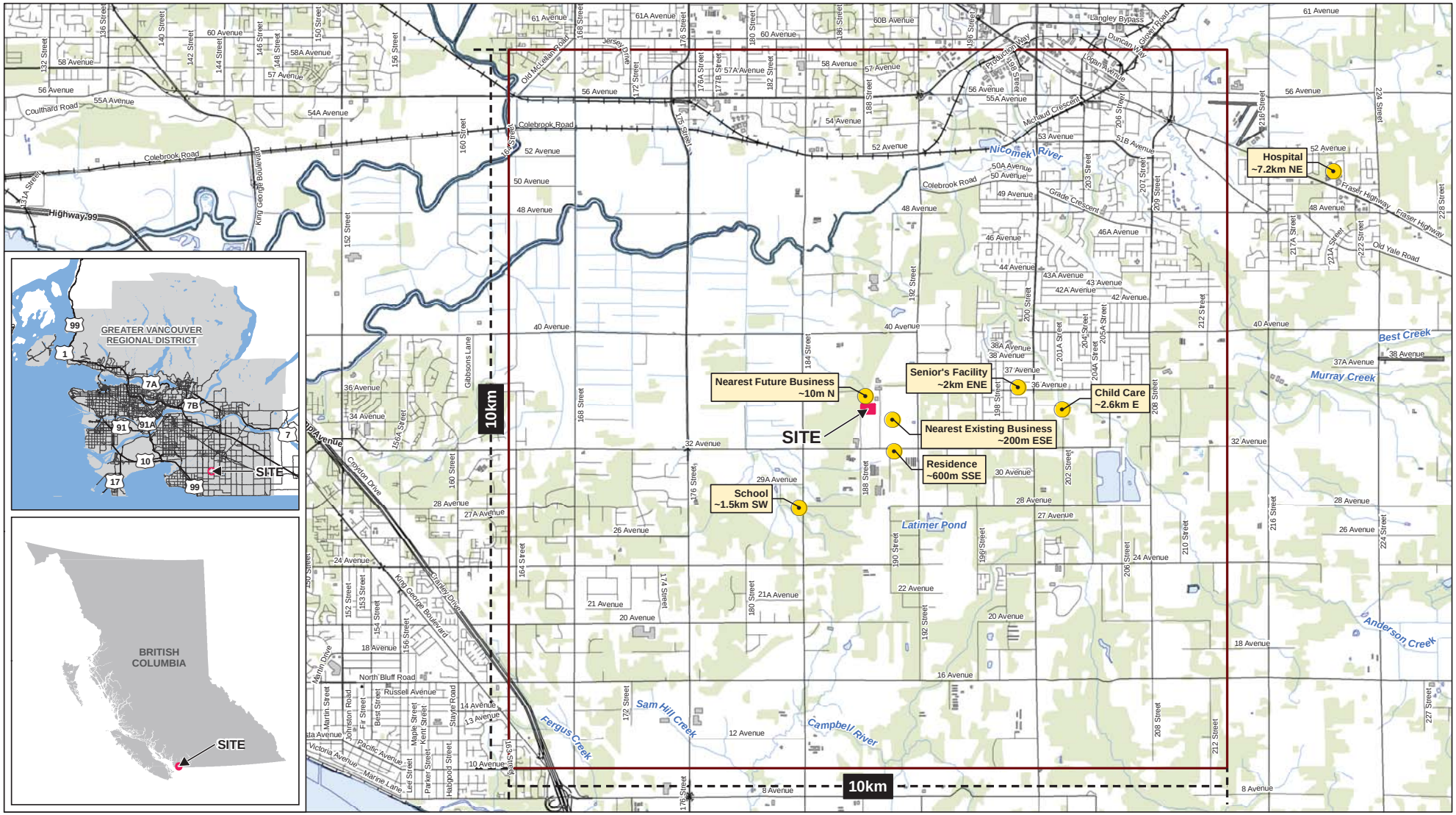
A concentration for each significant contaminant emitted from the Facility was calculated based on the calculated emission rates and the output from AERMOD model; the results are presented in Tables 5 and 6. Ambient background concentrations were included when available.

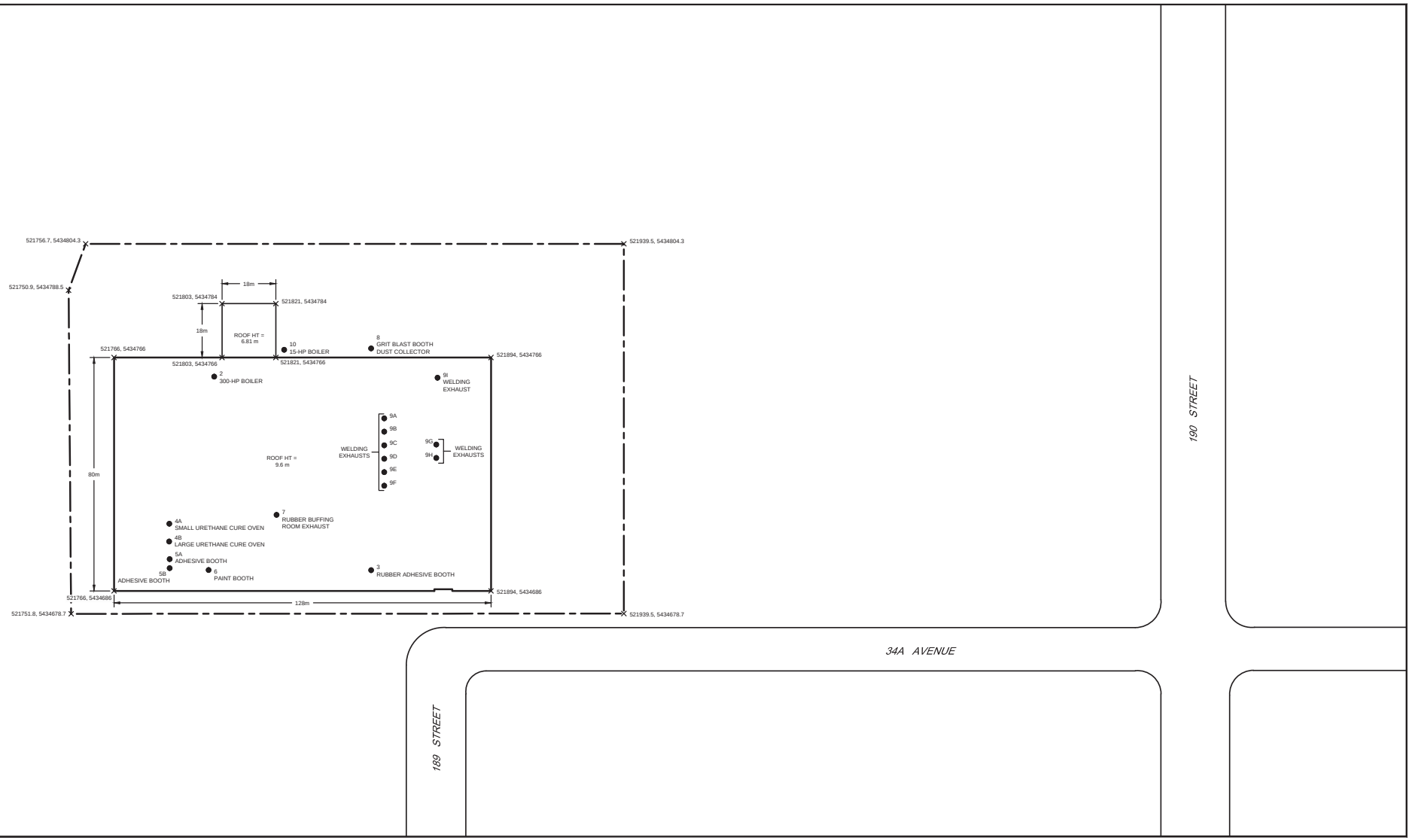
The total concentrations listed in Tables 5 and 6 were compared against published limits. Limits compared against included those from the Metro Vancouver Objectives and limits from the following jurisdictions: Alberta, Texas, Ontario and the European Union. Tables 5 and 6 show that the maximum predicted concentrations of air contaminants from the Facility (including background) are below the limits.

As the predicted total concentrations are below published limits, Weir's operation is not expected to have an adverse impact on either the surrounding environment or public health. Further, where background concentrations have been measured, they indicate that the maximum predicted emissions from the Facility, which occurs at the Facility's property boundary, are typically less than 50 percent of what is currently present.

Weir's operating processes are not expected to contribute odour to the surrounding environment. Since Weir acquired this operation, the company has not received an odour complaint.

This Air Dispersion Modelling Report demonstrates that the Facility will operate in compliance with the Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008.


Nearest Future Business ~10m N
Senior's Facility ~2km ENE
Child Care ~2.6km E
Nearest Existing Business ~200m ESE
Residence ~600m SSE
School ~1.5km SW
Hospital ~7.2km NE
SITE
10km
10km
GREATER VANCOUVER REGIONAL DISTRICT
BRITISH COLUMBIA
SITE
Nicomekl River
Latimer Pond
Best Creek
Murray Creek
Anderson Creek
Fergus Creek
Sam Hill Creek
Campbell River
Colebrook Road
Highway 99
Old Yale Road
Fraser Highway
Langley Bypass
Source: CanVec Edition 1.1 © Department of Natural Resources Canada, all rights reserved. National Road Network 2.0 GeoBase. ESRI Base Data, 2008.
0 500 1,000 1,500
Meters
Coordinate System: NAD 1983 UTM Zone 10N
Legend
18933 34A Ave, Surrey
Nearest Receptors
Modelling Domain (10km x 10km)
DRAFT
GHD
WEIR MINERALS
18933 34A AVE, SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN
11115558-00
Apr 13, 2017
MODELLING DOMAIN AND NEAREST SENSITIVE RECEPTORS
FIGURE 1
GIS File: Q:\GIS\PROJECTS\11115000s\11115558\Layouts\PRES001\11115558-00(PRES001)GIS-WA001.mxd



0 12.5 25 37.5m

Coordinate System: UTM, Nad 83

LEGEND

PROPERTY BOUNDARY

S-1 SOURCE LOCATION

WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

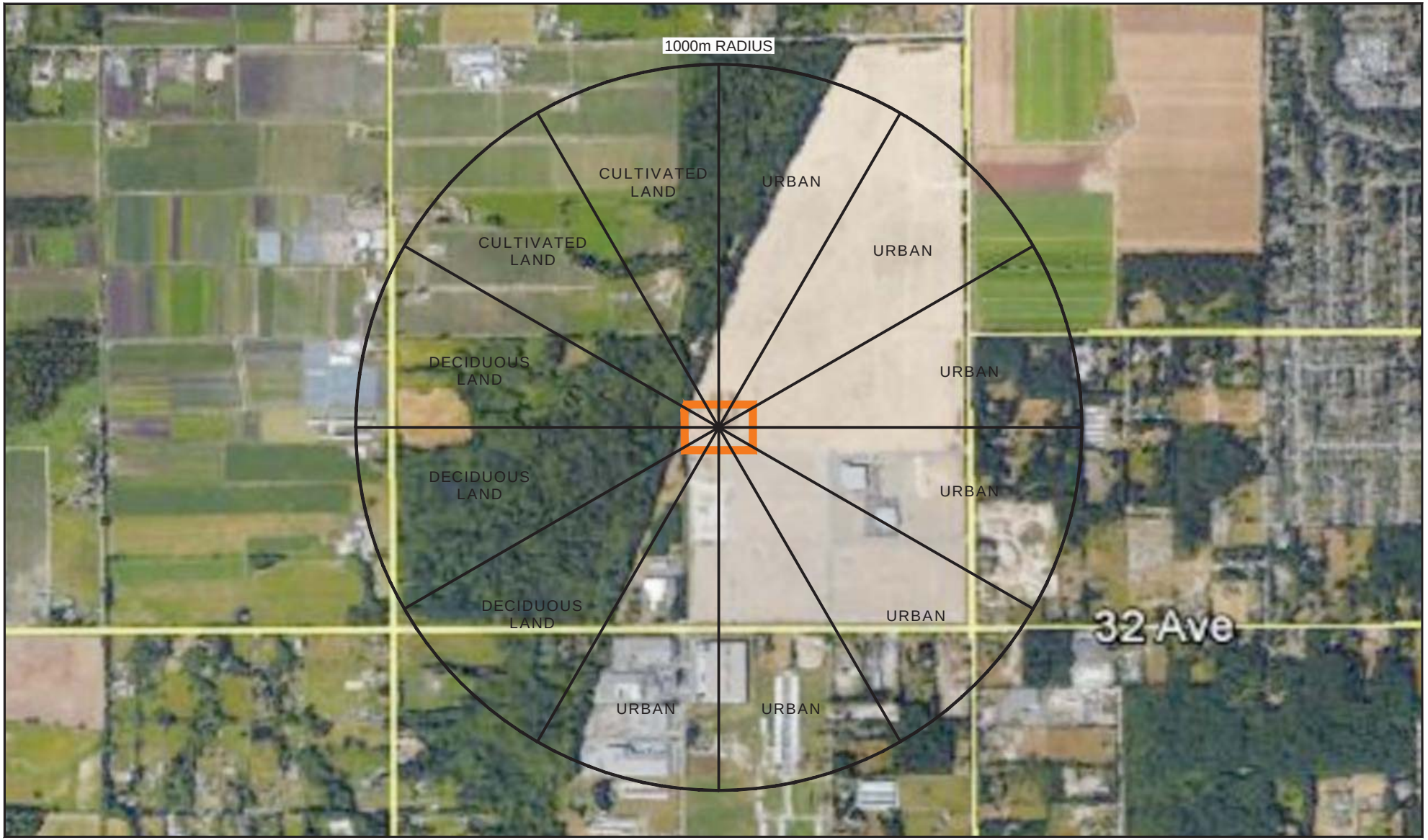
11115558-01

Apr 17, 2017

SITE LAYOUT AND SOURCE LOCATIONS

FIGURE 2

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA018.dwg



SOURCE: IMAGE © 2016 GOOGLE.

0 150 300 450m

Coordinate System:
UTM, Nad 83

WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

SITE BOUNDARY

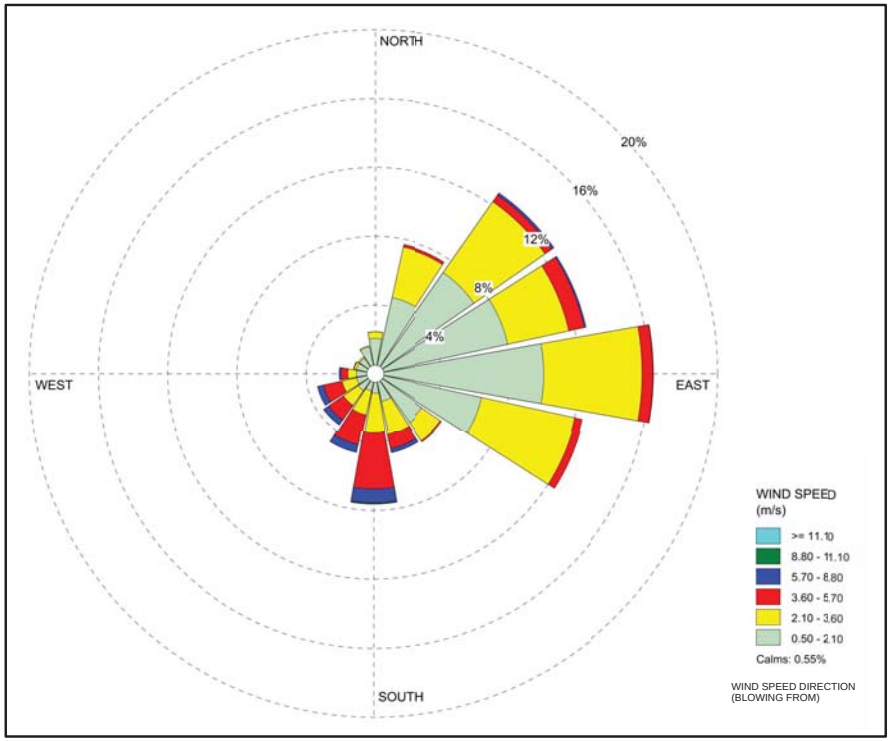
11115558-01

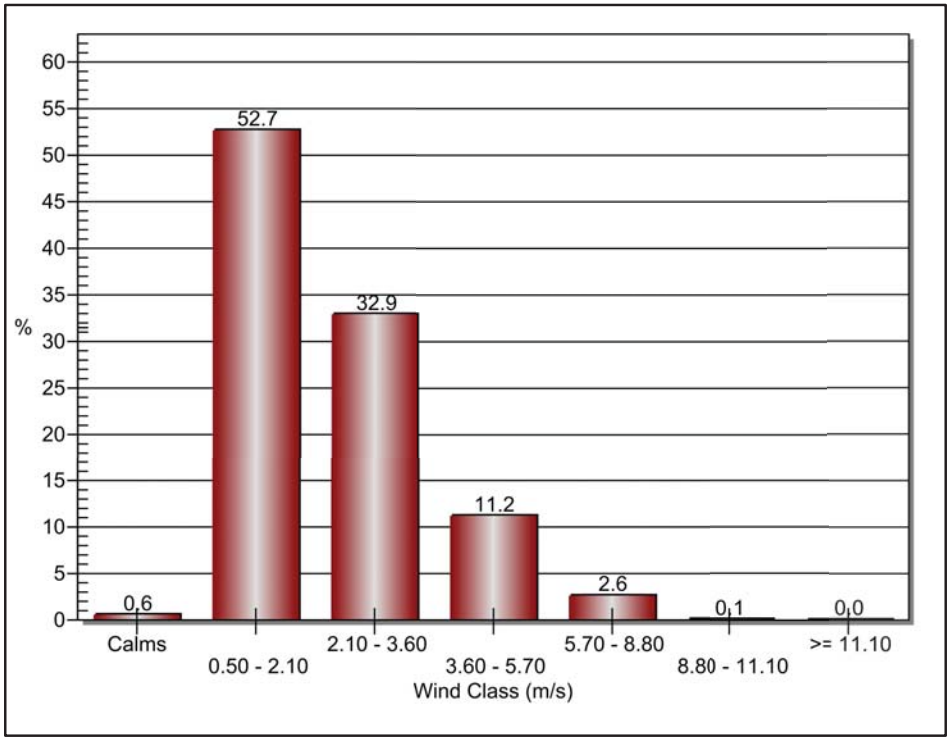
Apr 17, 2017

PLOT OF AERMET LAND USE SECTORS

FIGURE 3

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA003.DWG





SOURCE: T015 SURREY EAST MONITORING STATION (AERMET PROCESSED OUTPUT)

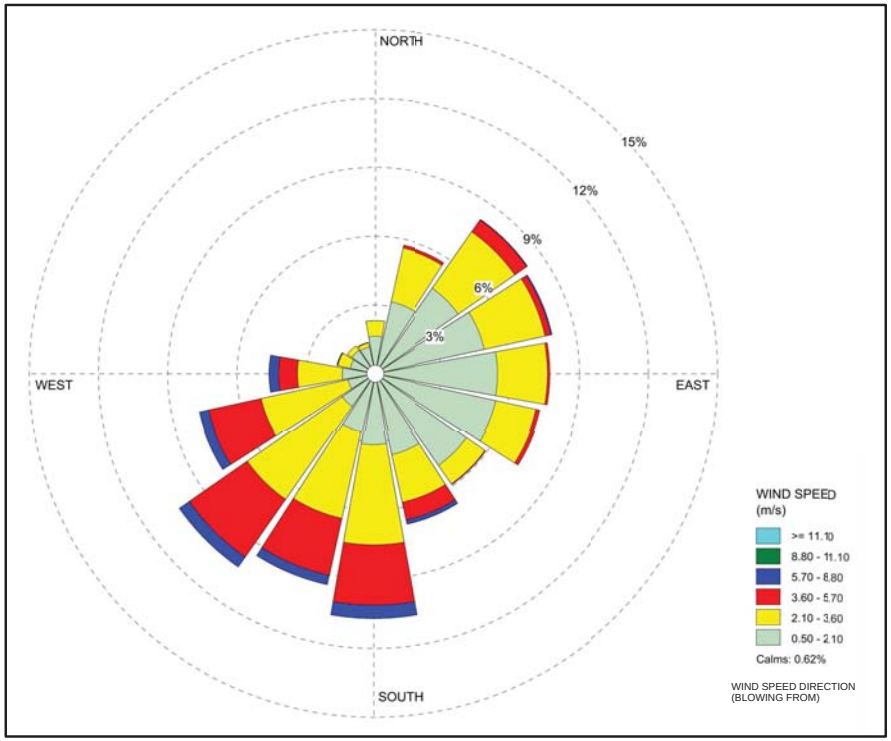
WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

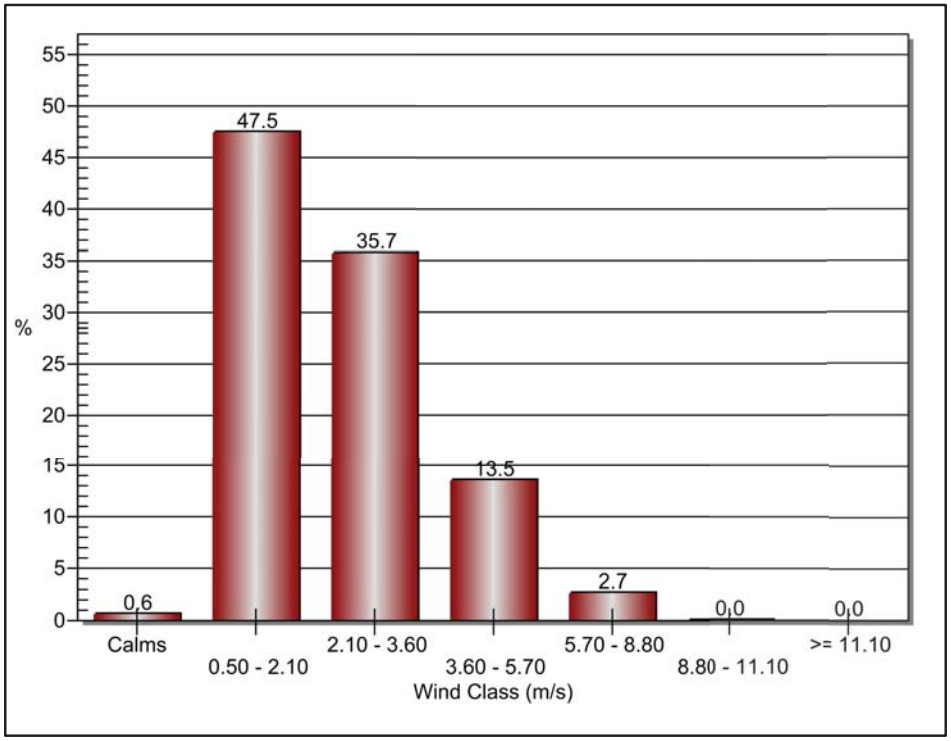
WIND ROSE AND WIND SPEED DISTRIBUTION
WINTER (DECEMBER-FEBRUARY)

11115558-01
May 15, 2017

FIGURE 4

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA004.DWG





SOURCE: T015 SURREY EAST MONITORING STATION (AERMET PROCESSED OUTPUT)

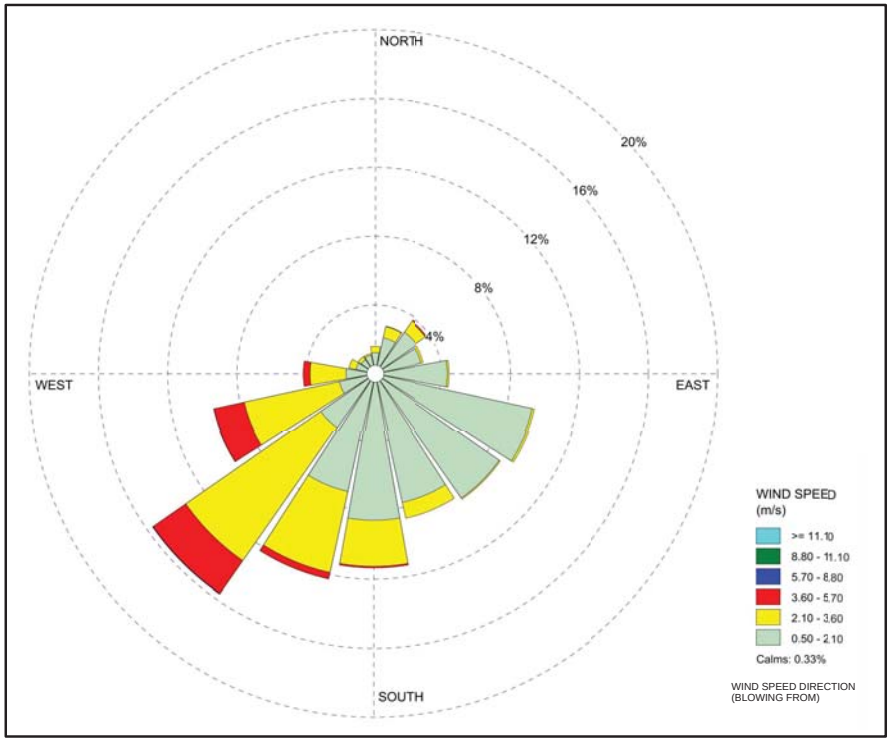
WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

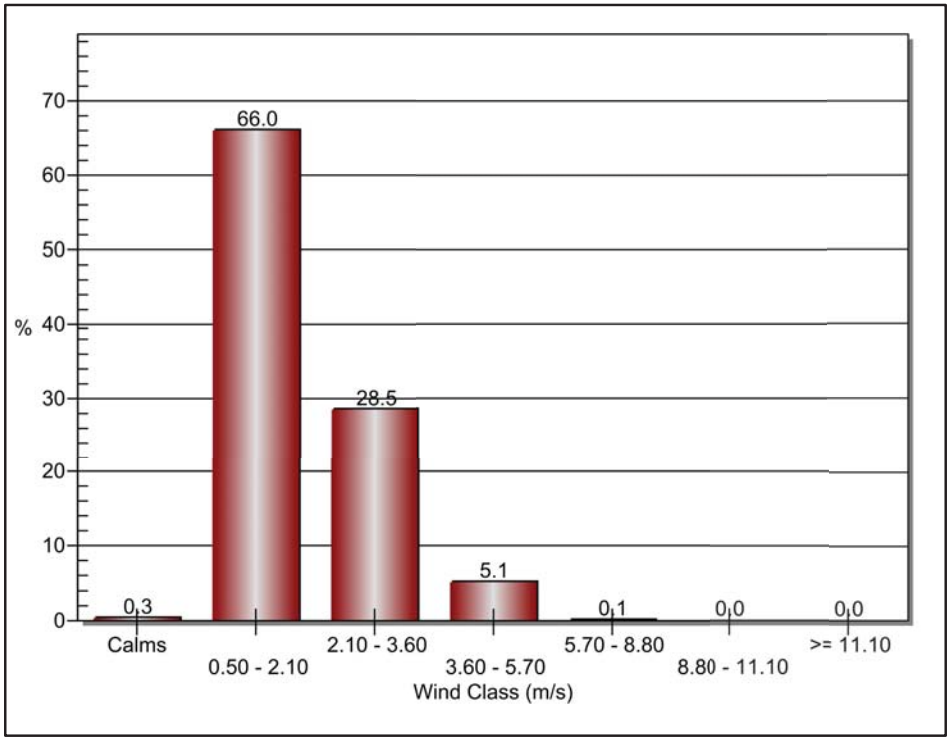
WIND ROSE AND WIND SPEED DISTRIBUTION
SPRING (MARCH-MAY)

11115558-01
May 15, 2017

FIGURE 5

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA005.DWG





SOURCE: T015 SURREY EAST MONITORING STATION (AERMET PROCESSED OUTPUT)

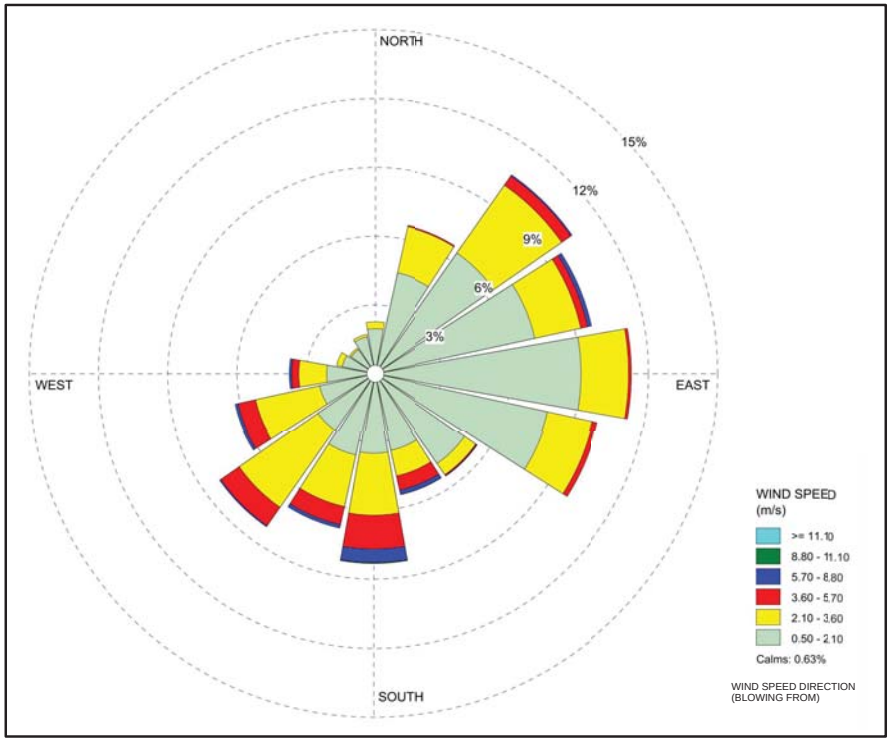
WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

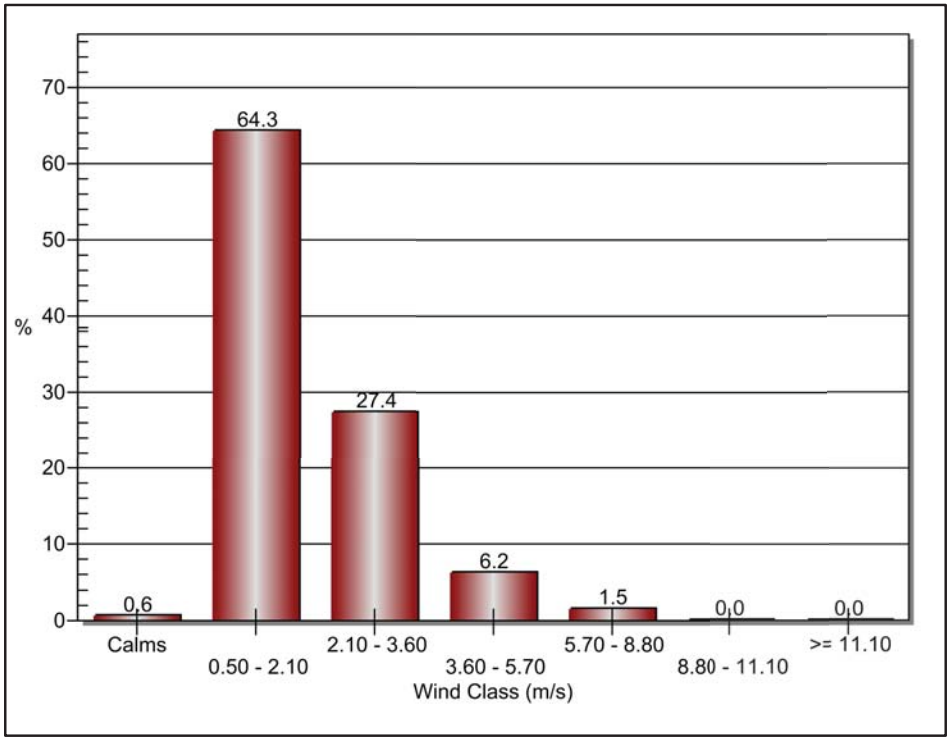
WIND ROSE AND WIND SPEED DISTRIBUTION
SUMMER (JUNE-AUGUST)

11115558-01
May 15, 2017

FIGURE 6

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA006.DWG





SOURCE: T015 SURREY EAST MONITORING STATION (AERMET PROCESSED OUTPUT)

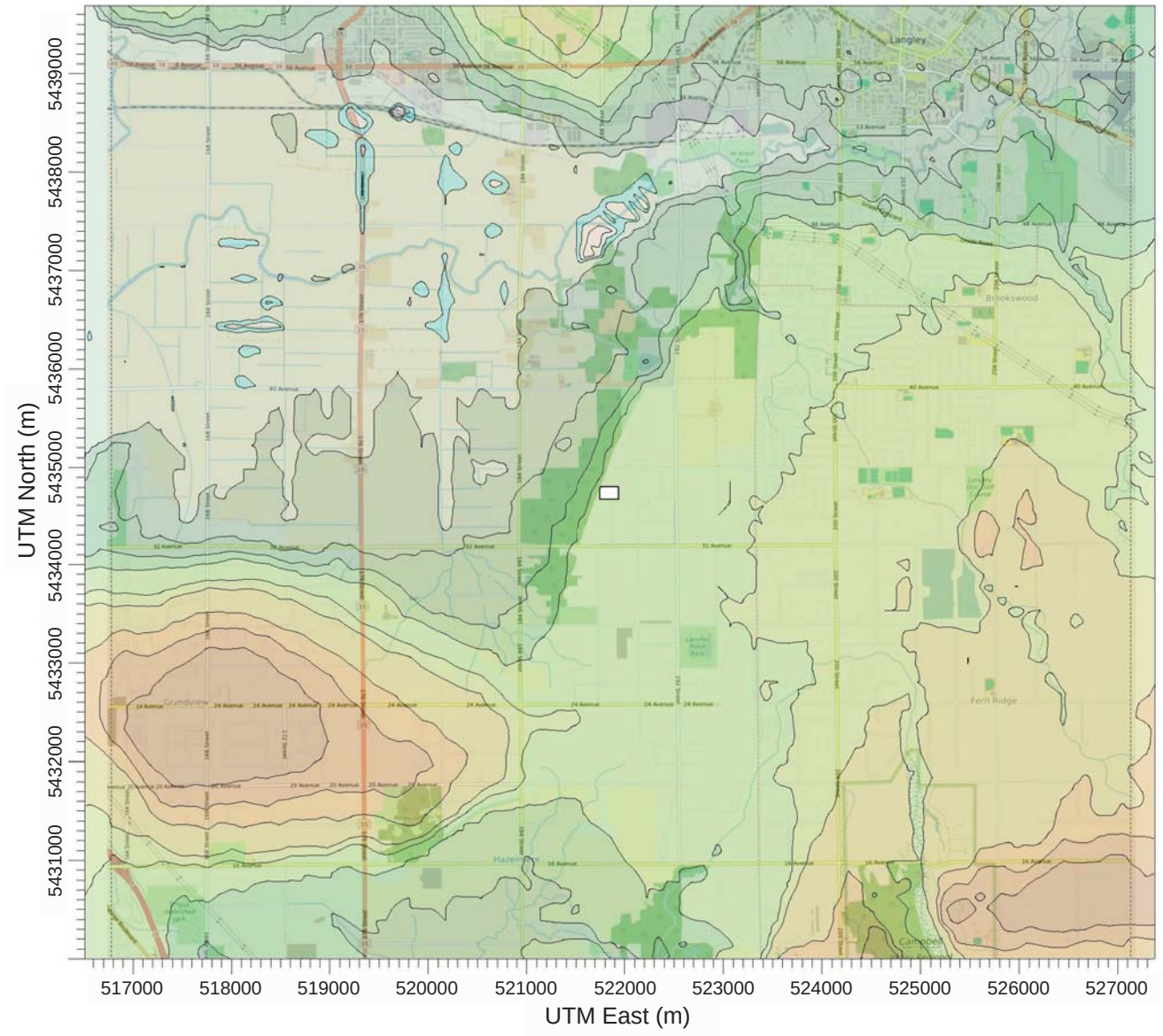
WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

WIND ROSE AND WIND SPEED DISTRIBUTION
AUTUMN (SEPTEMBER TO NOVEMBER)

11115558-01
May 15, 2017

FIGURE 7

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA007.DWG



WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

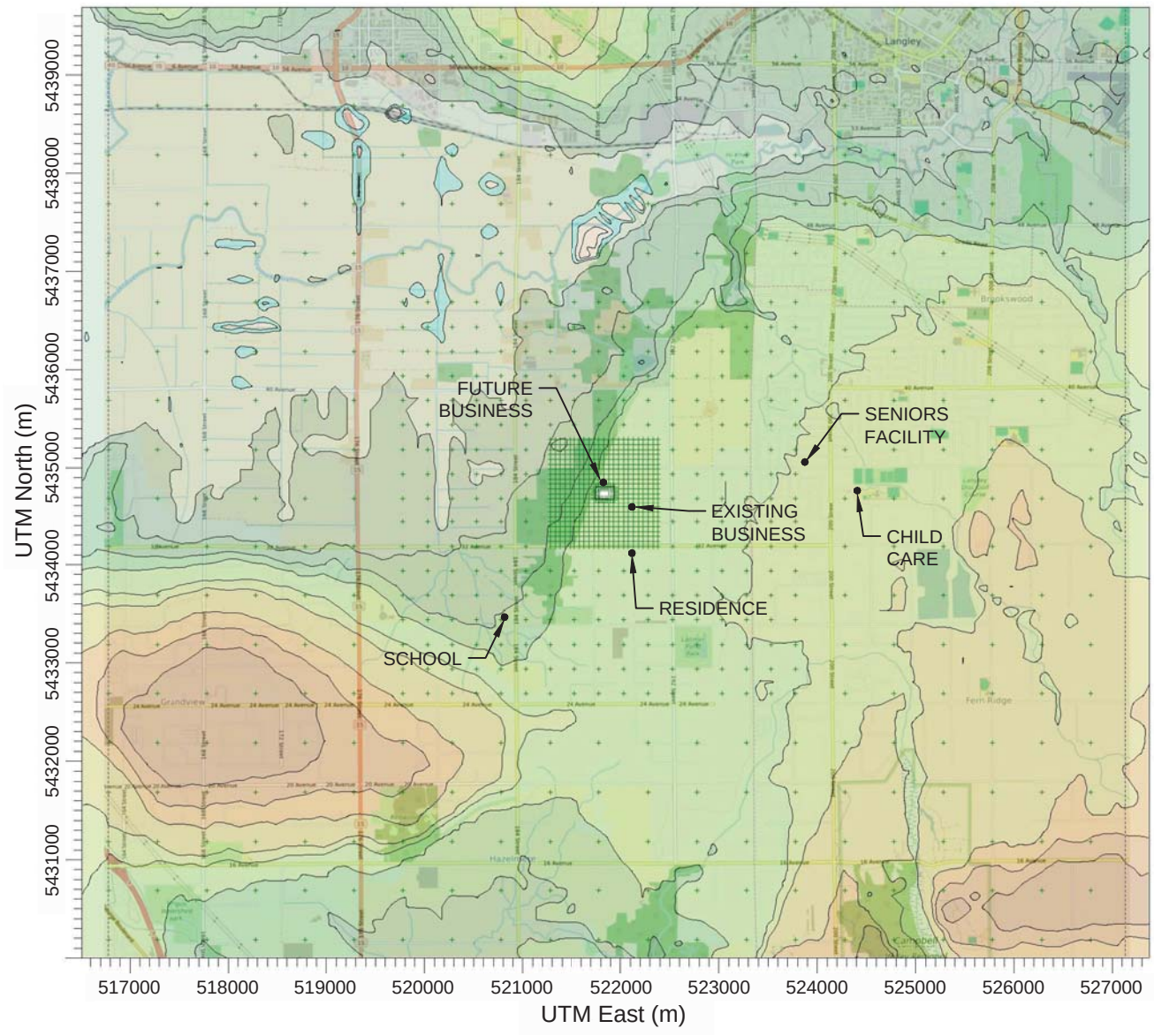
11115558-01

Feb 8, 2017

DIGITAL ELEVATION MODEL CONTOURS

FIGURE 8

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA008.DWG



WEIR MINERALS
SURREY, BRITISH COLUMBIA
AIR DISPERSION MODELLING PLAN

11115558-01

Apr 17, 2017

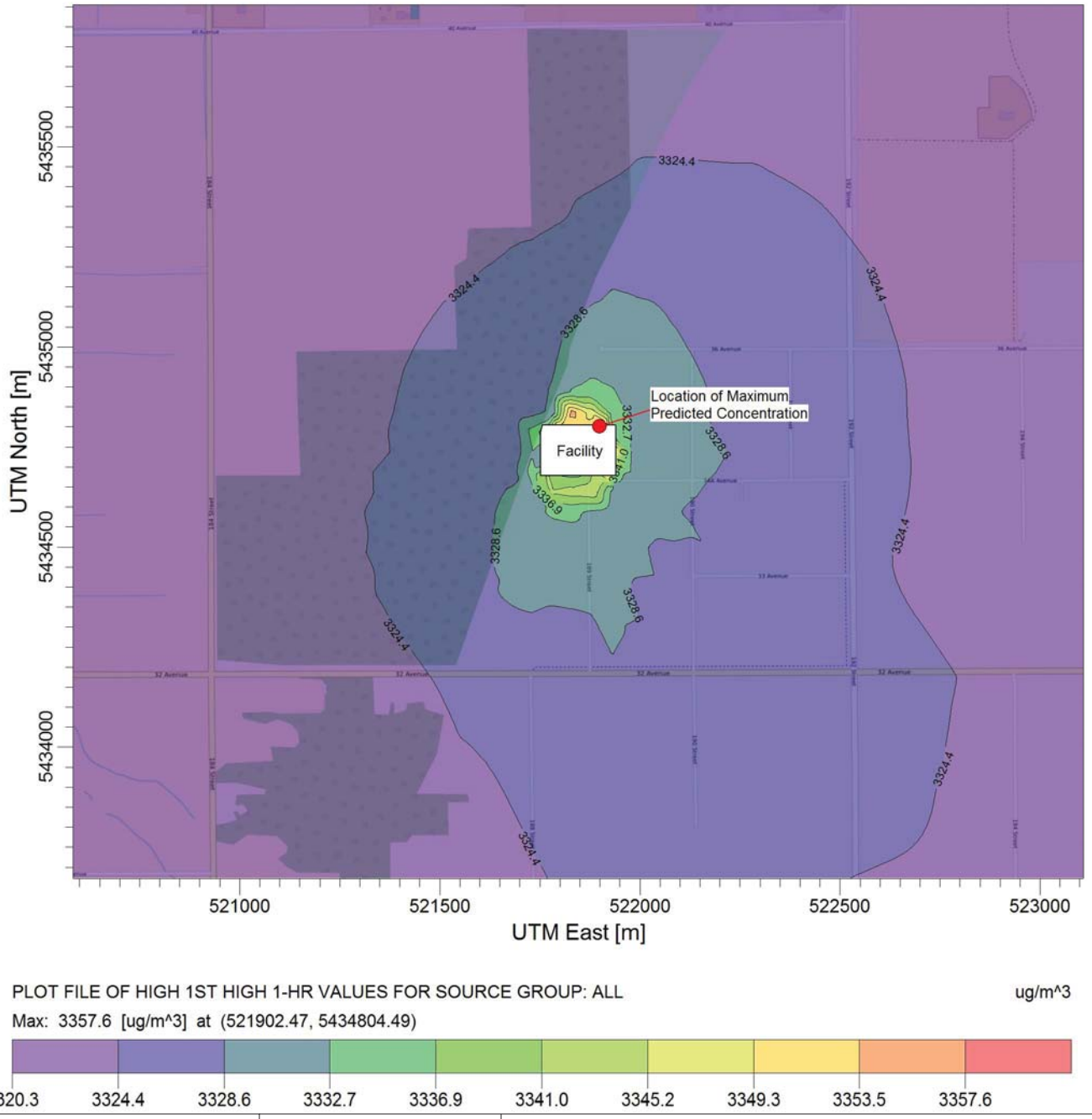
RECEPTOR GRID

FIGURE 9

CAD File: P:\drawings\11115000s\11115558\11115558-reports\11115558-01(001)\11115558-01(001)GN\11115558-01(001)GN-WA008.DWG

PROJECT TITLE:

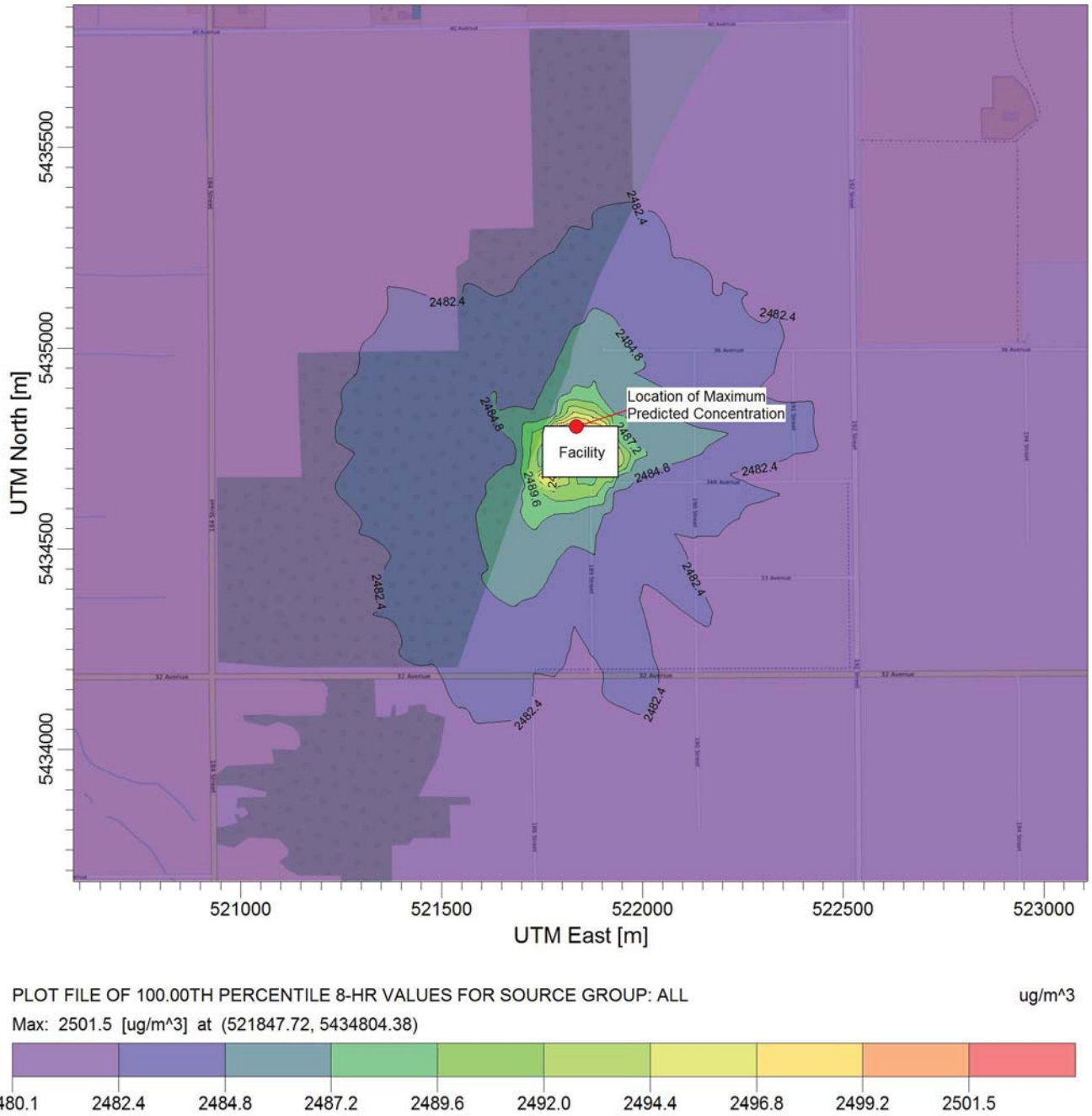
Figure 10
Maximum 1 Hour Carbon Monoxide Contours (with Background)



COMMENTS: Maximum concentration from Weir Minerals = 37.6 ug/m3	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:15,881 0 0.5 km	
	MAX: **3357.6 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 11
Maximum 8 Hour Carbon Monoxide Contours (with Background)



PLOT FILE OF 100.00TH PERCENTILE 8-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

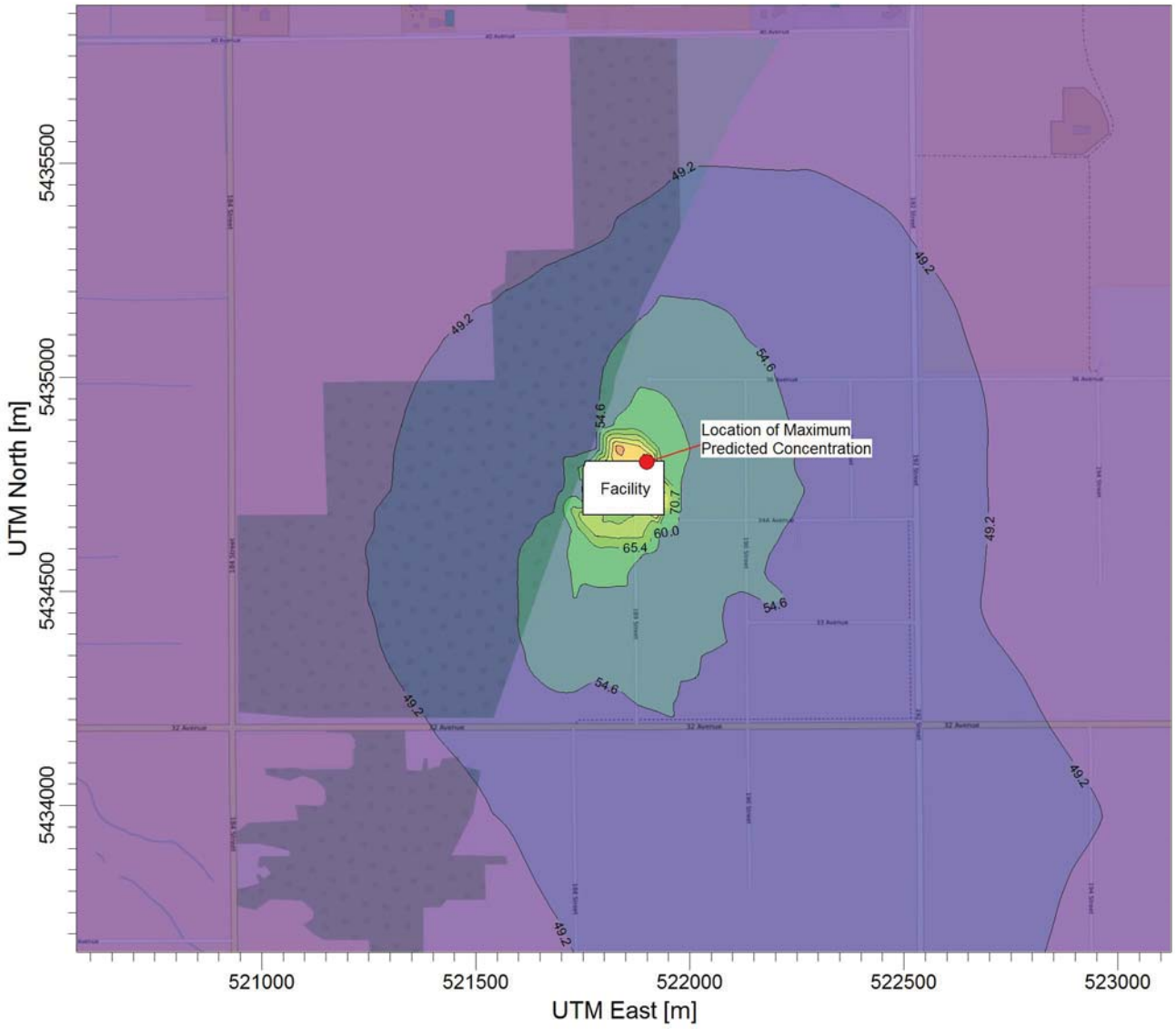
Max: 2501.5 [ug/m^3] at (521847.72, 5434804.38)

2480.1 2482.4 2484.8 2487.2 2489.6 2492.0 2494.4 2496.8 2499.2 2501.5

COMMENTS: Maximum Concentration from Weir Minerals = 21.5 ug/m3 8-hour rolling average concentration plot.	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:15,881 0 0.5 km	
	MAX: **2501.5 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 12
Maximum 1 Hour Nitrogen Dioxide Contours, 100% Conversion (with Background)



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

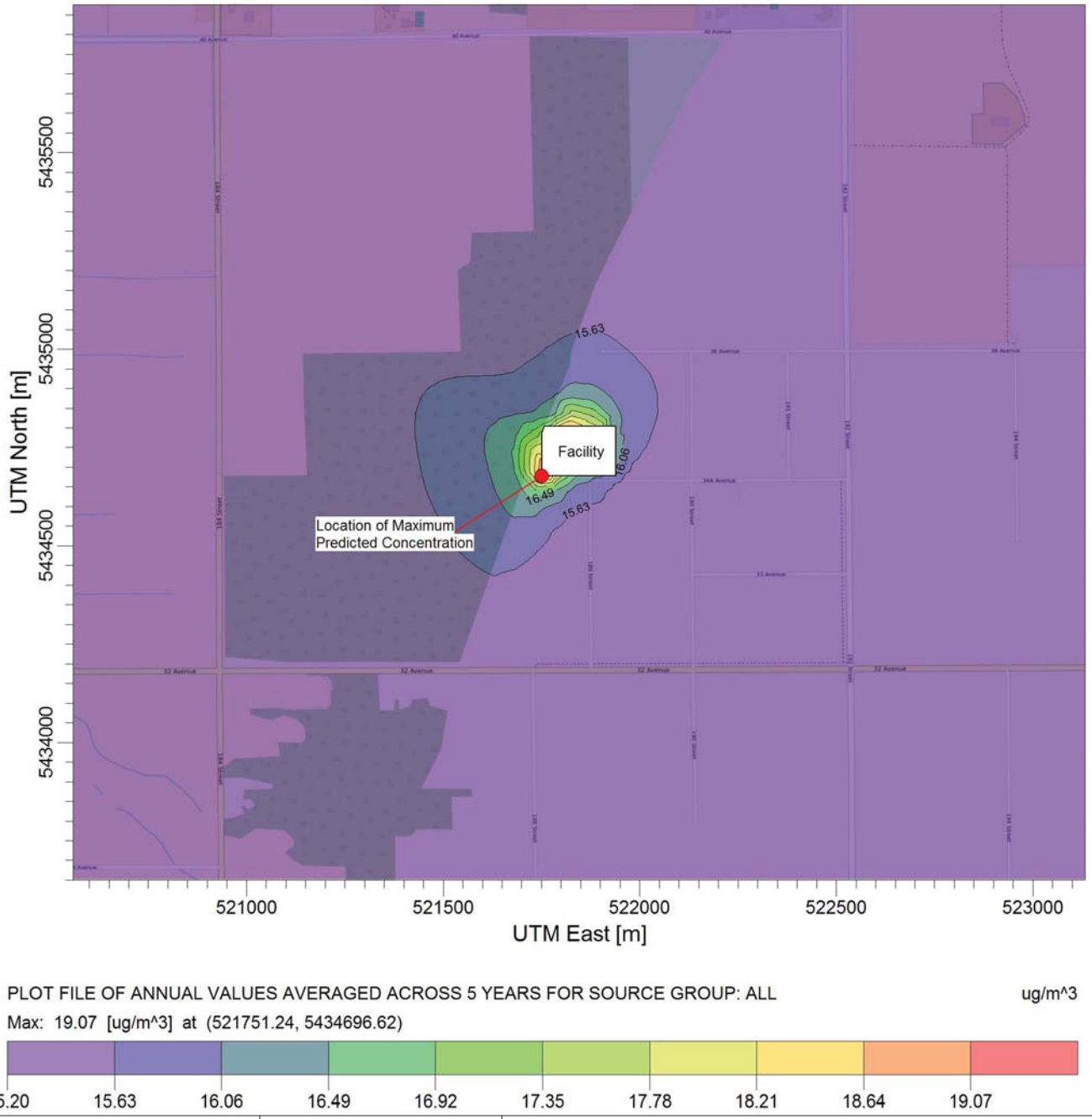
Max: 92.2 [ug/m^3] at (521902.47, 5434804.49)

43.9 49.2 54.6 60.0 65.4 70.7 76.1 81.5 86.8 92.2

COMMENTS: Maximum concentration from Weir Minerals = 48.7 ug/m3	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,088 0 0.5 km	
	MAX: **92.2 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

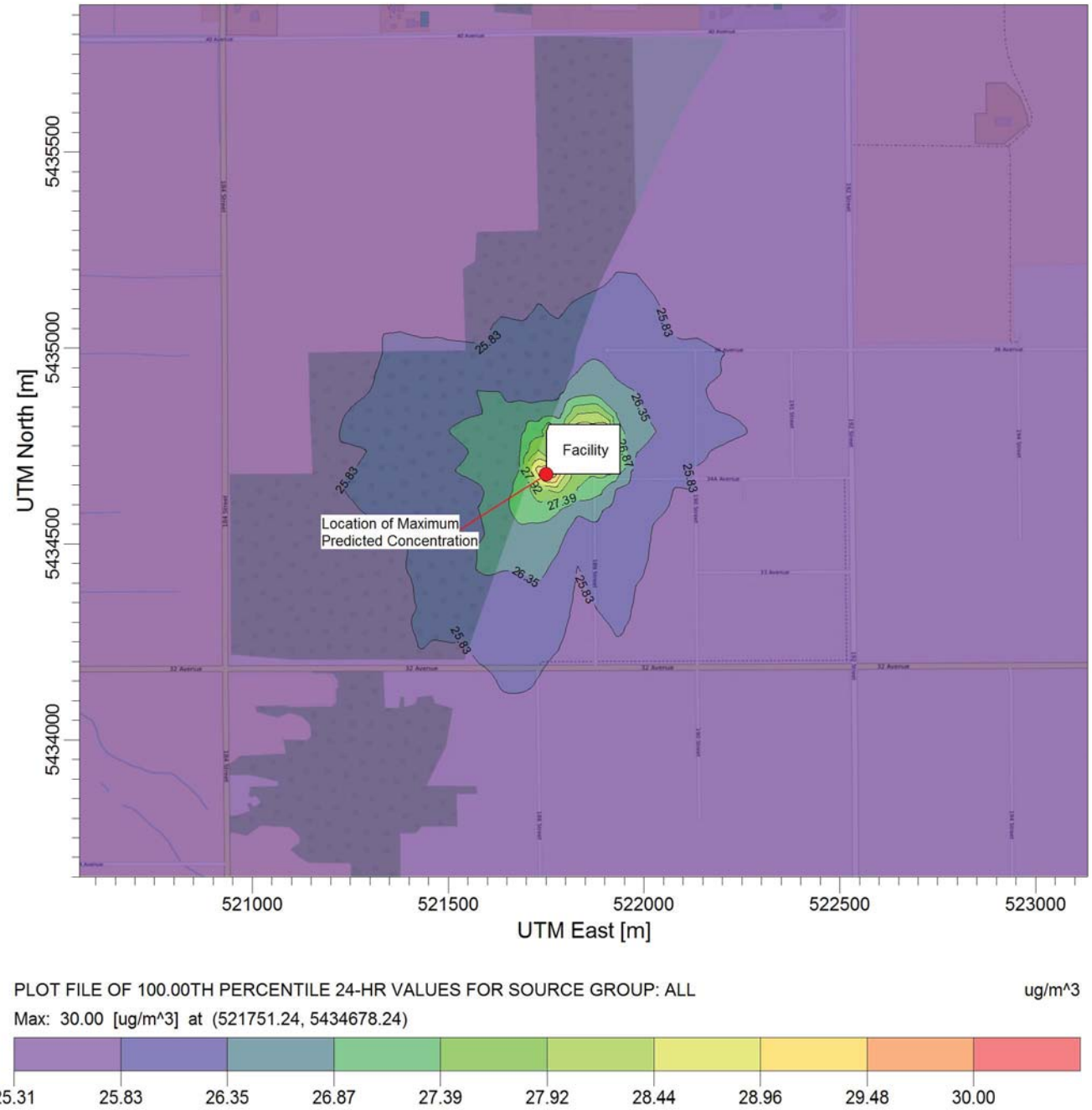
Figure 13
Maximum Annual Nitrogen Dioxide Contours, 100% Conversion (with Background)



COMMENTS: Maximum Concentration from Weir Minerals = 3.7 ug/m3	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,190 0 0.5 km	
	MAX: **19.07 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

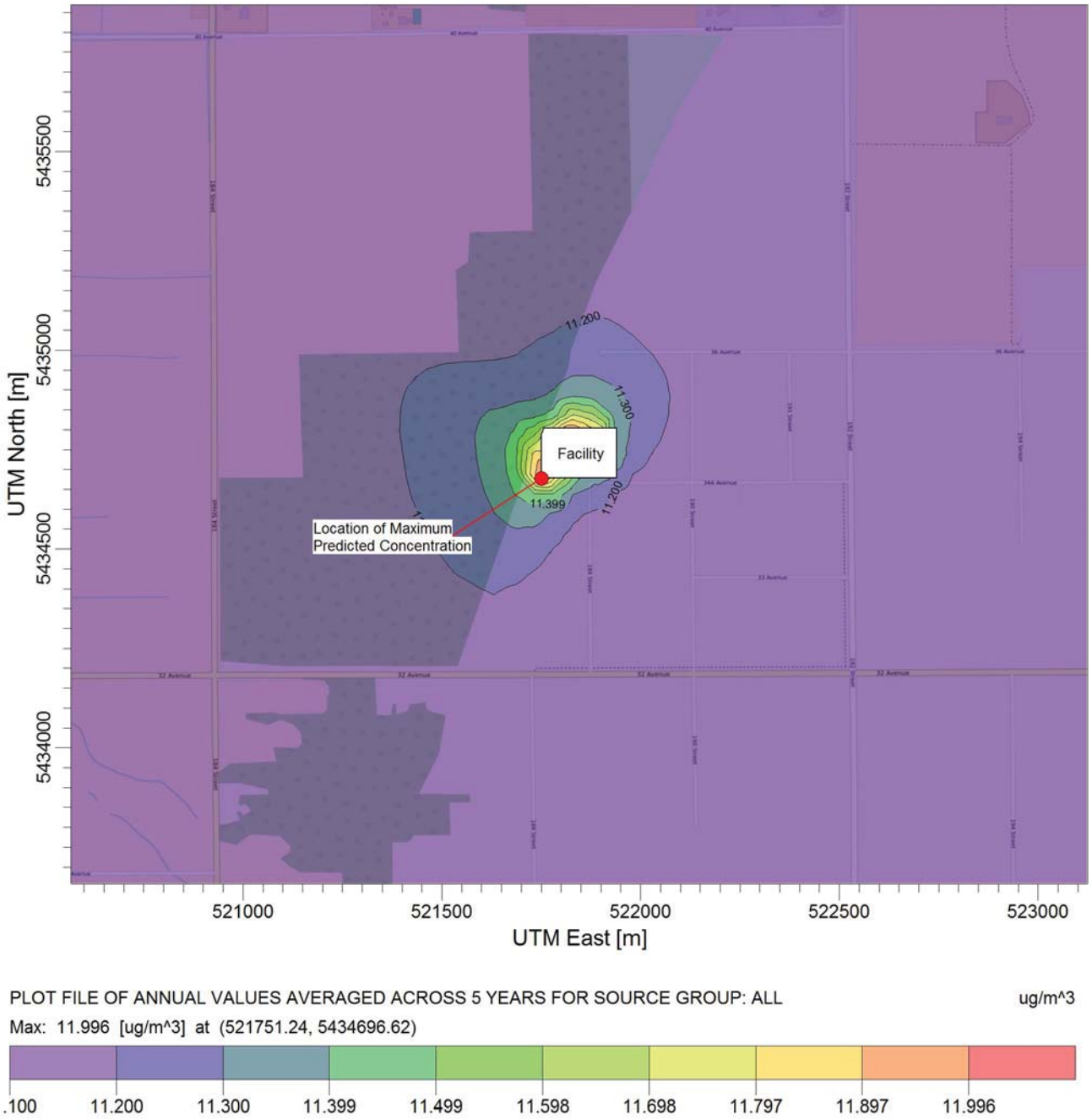
Figure 14
Maximum 24 Hour PM 10 Contours (with Background)



COMMENTS: Maximum Concentration from Weir Minerals = 4.7 ug/m3 24-hour rolling average concentration plot.	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,190 0 0.5 km	
	MAX: **30.00 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 15
Maximum Annual PM 10 Contours (with Background)



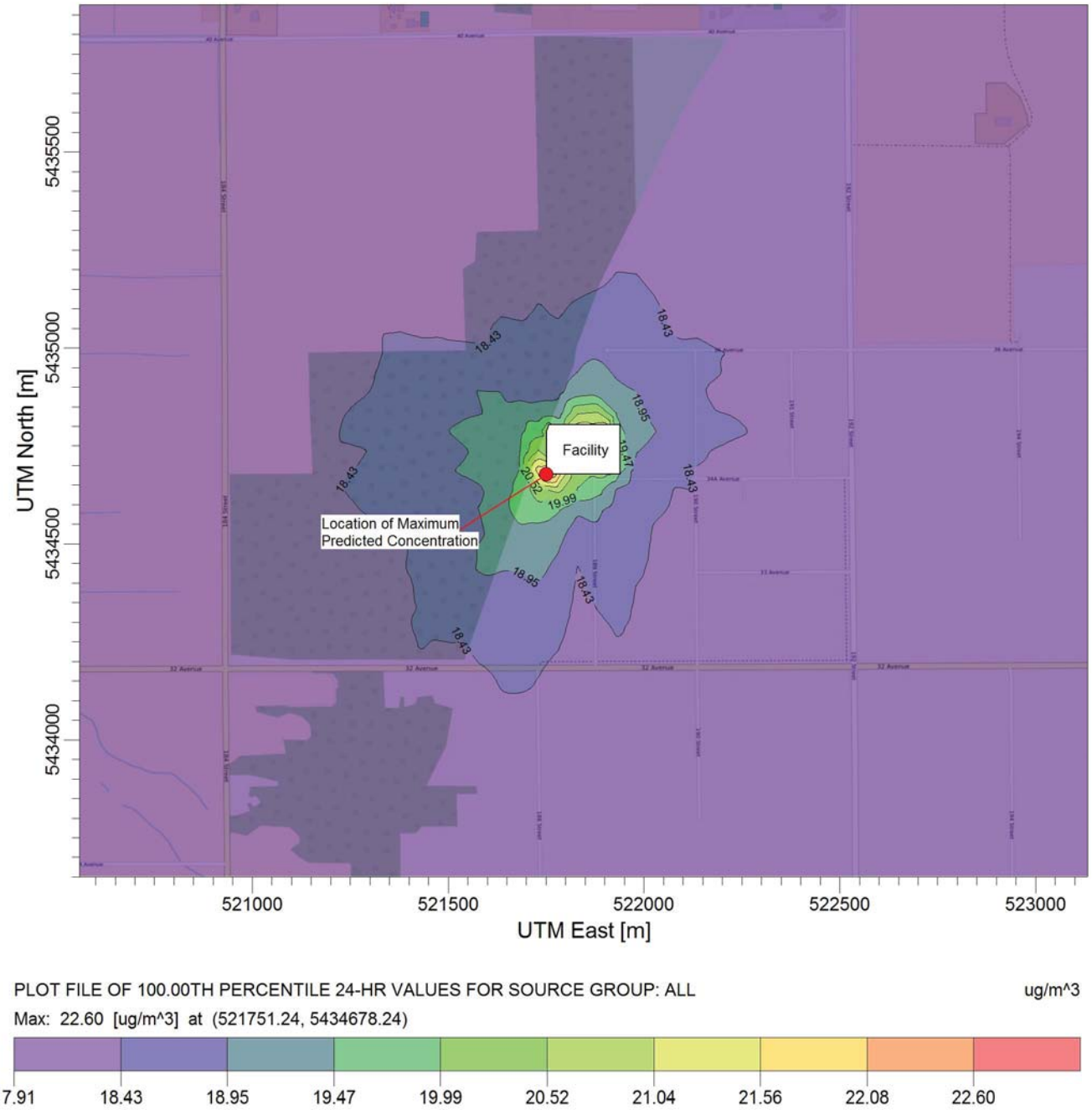
PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

Max: 11.996 [ug/m^3] at (521751.24, 5434696.62)

COMMENTS:	SOURCES:	COMPANY NAME:	
Maximum Concentration from Weir Minerals = 0.90 ug/m3	**20**	**Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,086 — 0 — 0.5 km	
	MAX: **11.996 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

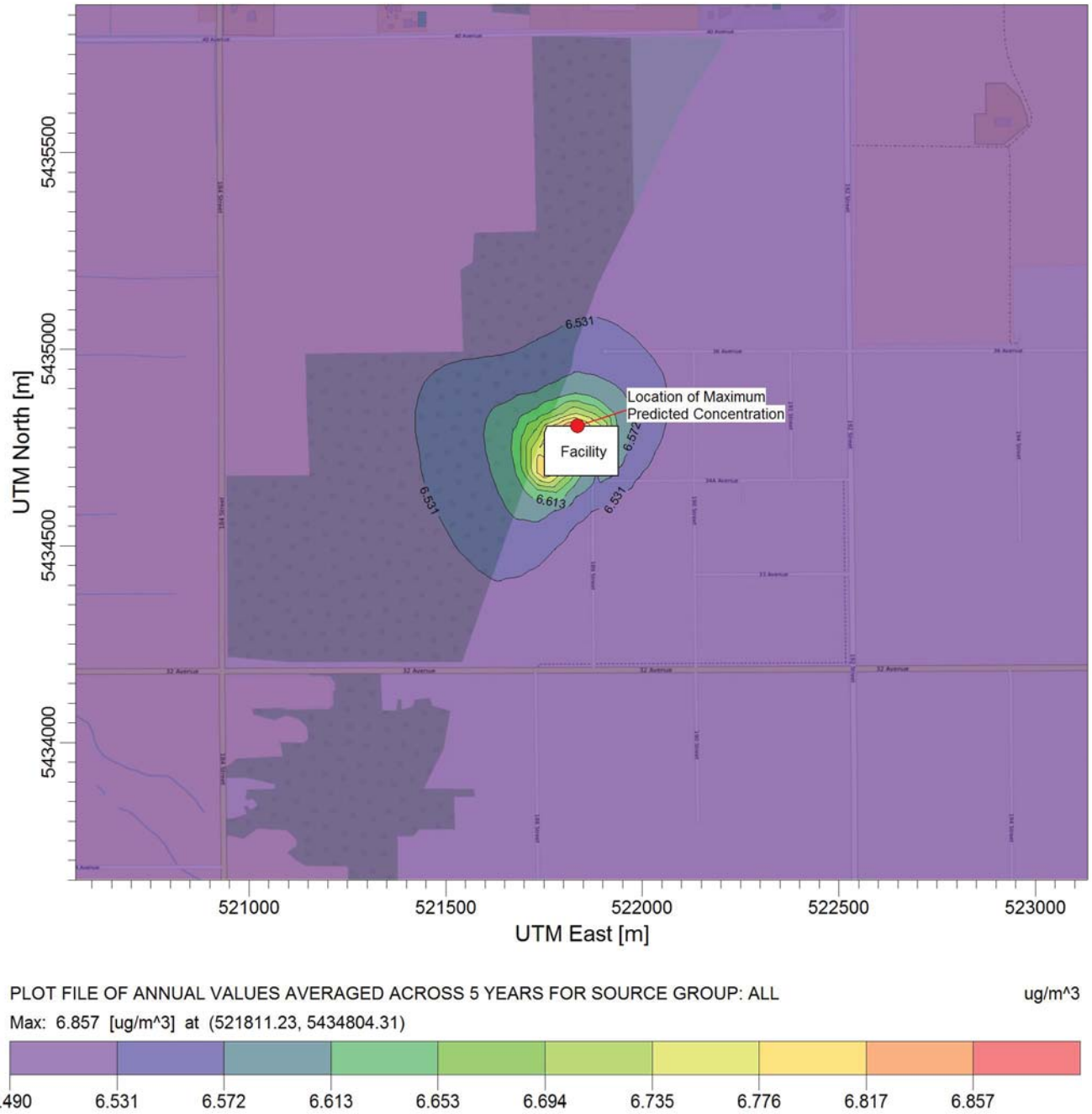
Figure 16
Maximum 24 Hour PM 2.5 Contours (with Background)



COMMENTS: Maximum Concentration from Weir Minerals = 4.7 ug/m3 24-hour rolling average concentration plot.	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,190 0 0.5 km	
	MAX: **22.60 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 17
Maximum Annual PM 2.5 Contours (with Background)



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

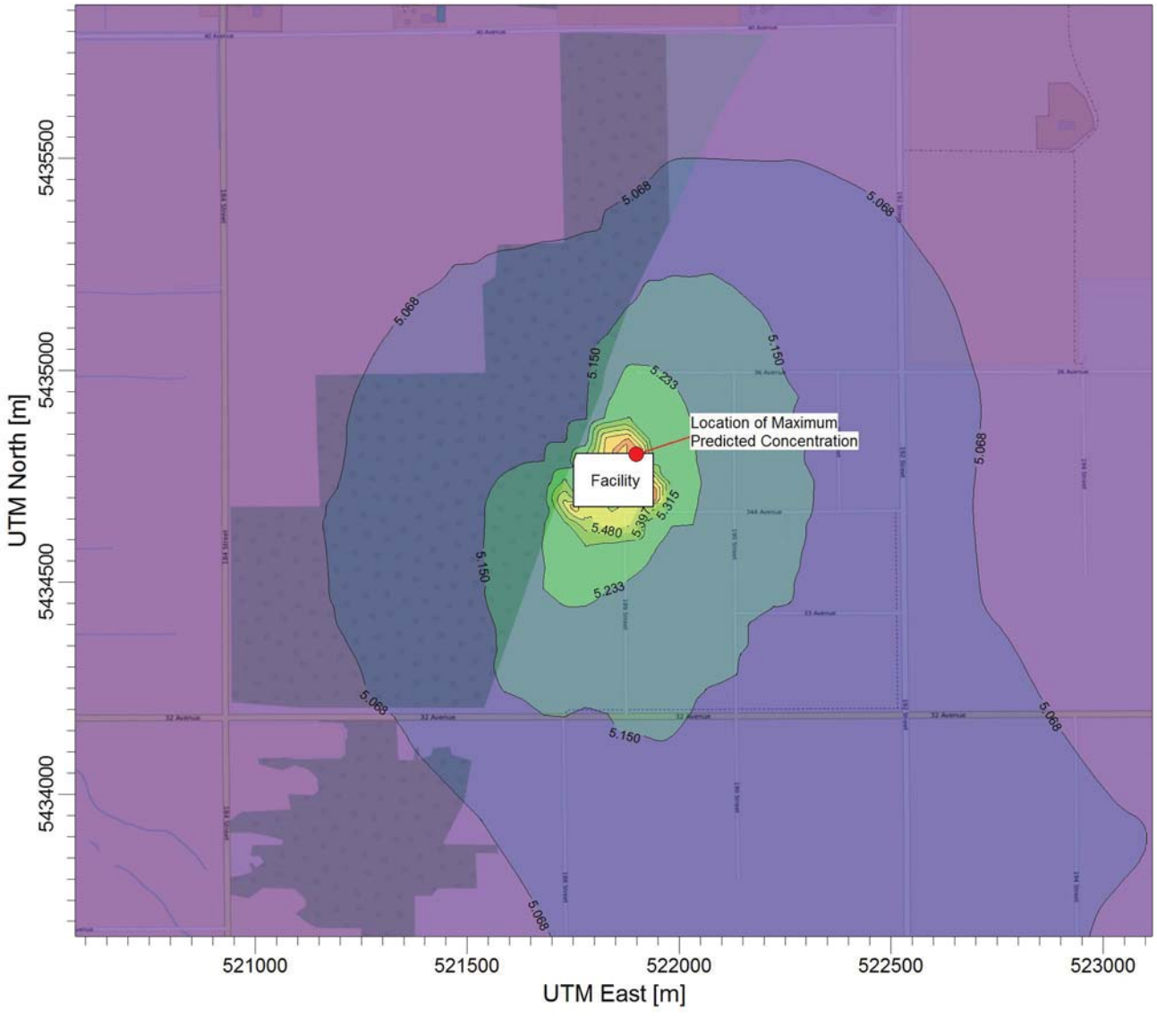
Max: 6.857 [ug/m^3] at (521811.23, 5434804.31)

6.490 6.531 6.572 6.613 6.653 6.694 6.735 6.776 6.817 6.857

COMMENTS: Maximum Concentration from Weir Minerals = 0.37 ug/m3	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,190 0 0.5 km	
	MAX: **6.857 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 18
Maximum 1 Hour Sulphur Dioxide Contours (with Background)



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

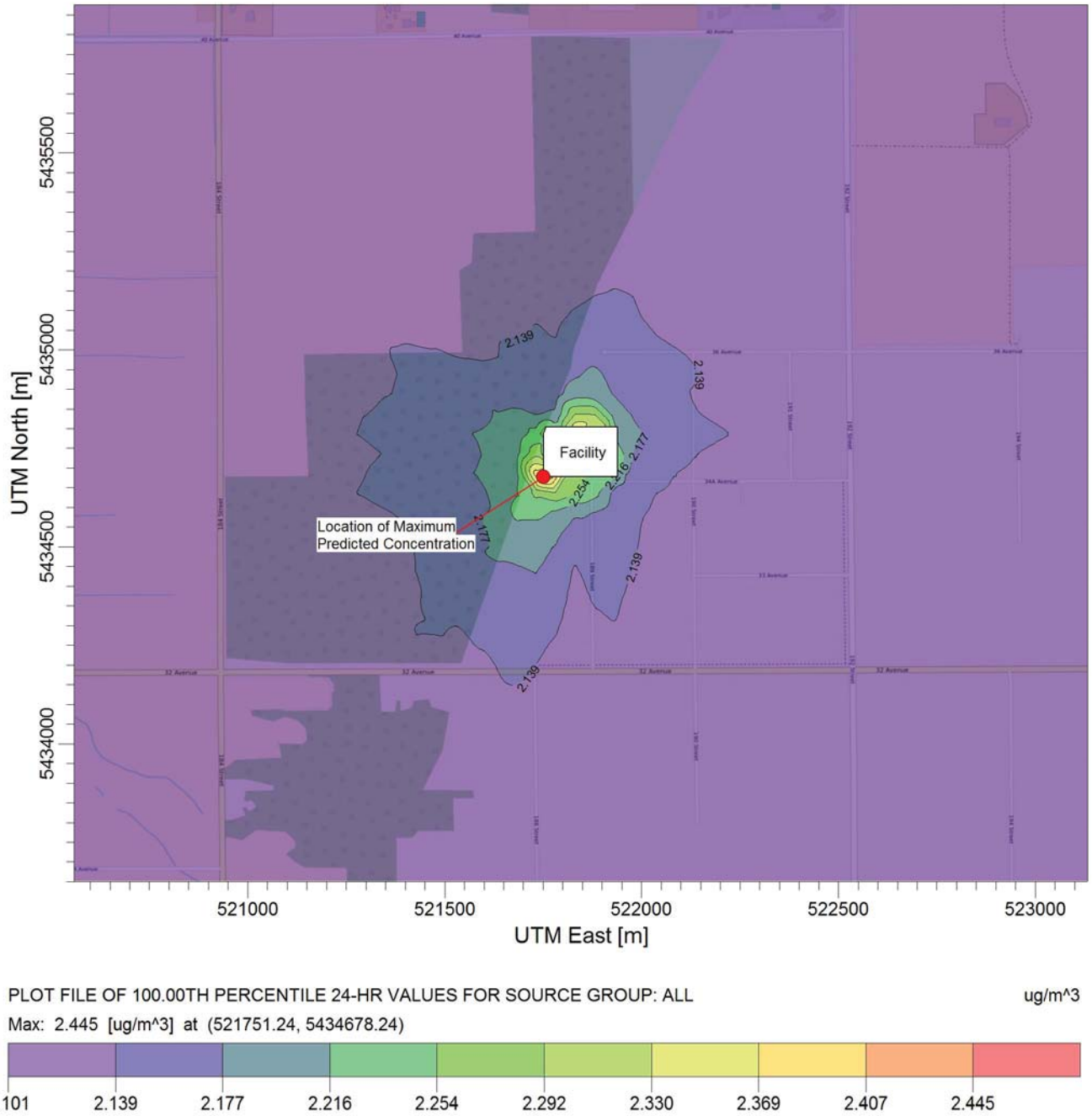
Max: 5.727 [ug/m^3] at (521902.47, 5434804.49)

4.986 5.068 5.150 5.233 5.315 5.397 5.480 5.562 5.644 5.727

COMMENTS: Maximum concentration from Weir Minerals = 0.75 ug/m3	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:15,985 0 0.5 km	
	MAX: **5.727 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

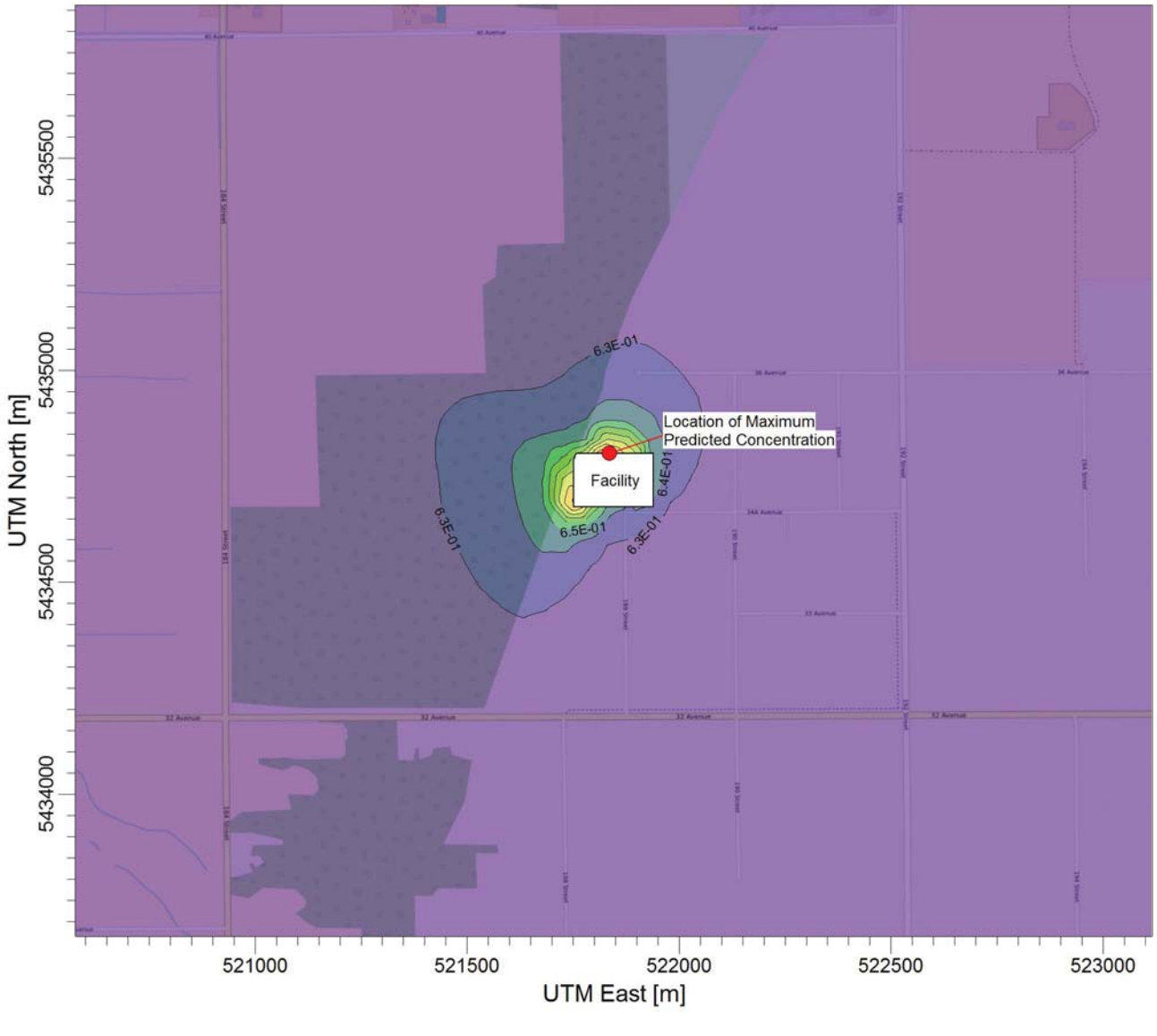
Figure 19
Maximum 24 Hour Sulphur Dioxide Contours (with Background)



COMMENTS: Maximum Concentration from Weir Minerals = 0.35 ug/m3 24-hour rolling average concentration plot.	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,190 0 0.5 km	
	MAX: **2.445 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 20
Maximum Annual Sulphur Dioxide Contours (with Background)



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

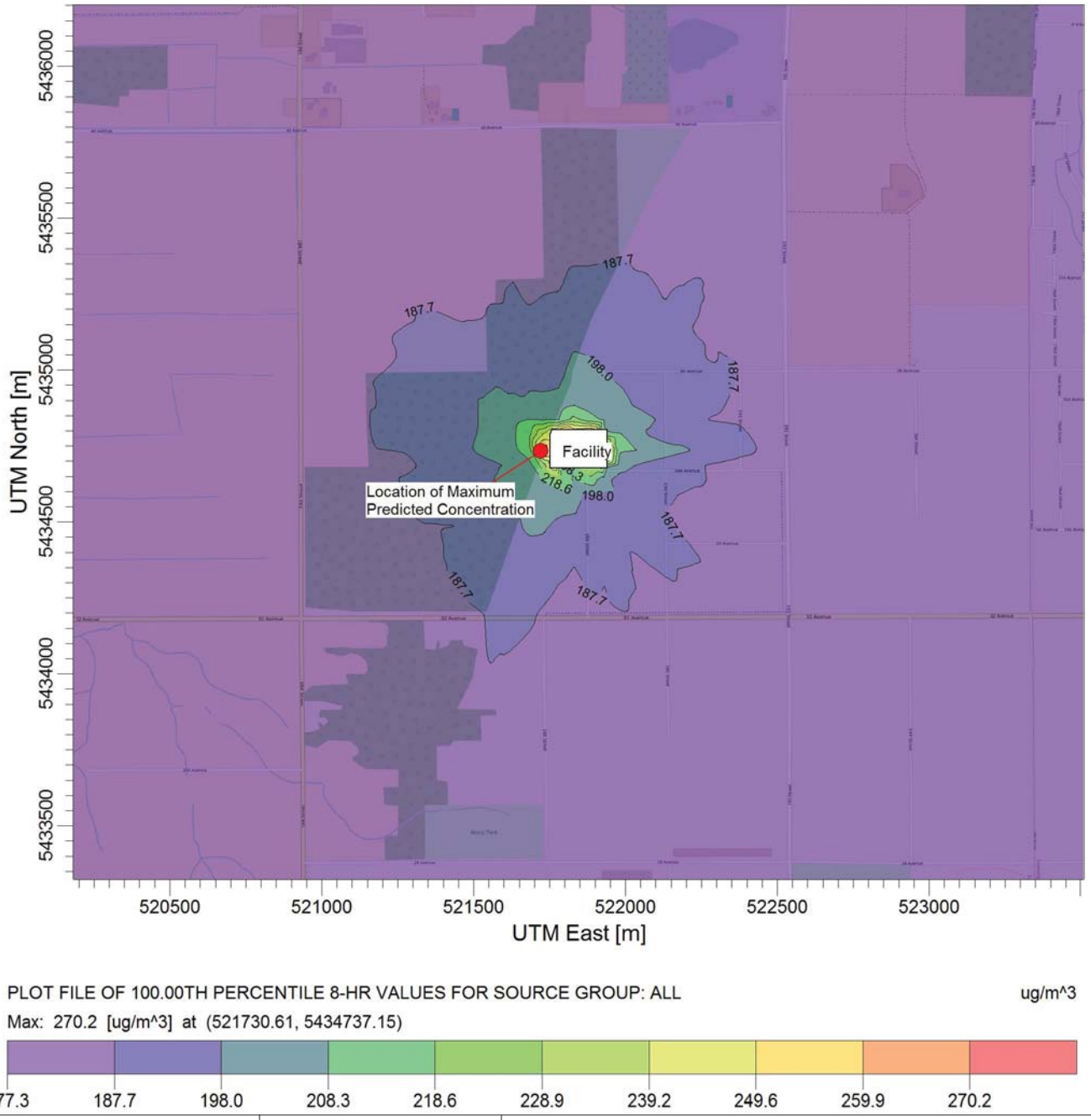
Max: 6.9E-01 [ug/m^3] at (521829.48, 5434804.35)

6.3E-01 6.3E-01 6.4E-01 6.5E-01 6.5E-01 6.6E-01 6.7E-01 6.8E-01 6.8E-01 6.9E-01

COMMENTS: Maximum Concentration from Weir Minerals = 0.06 ug/m3	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:15,981 0 0.5 km	
	MAX: **6.9E-01 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 21
Maximum 8 Hour Volatile Organic Compounds Contours (with Background)



PLOT FILE OF 100.00TH PERCENTILE 8-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

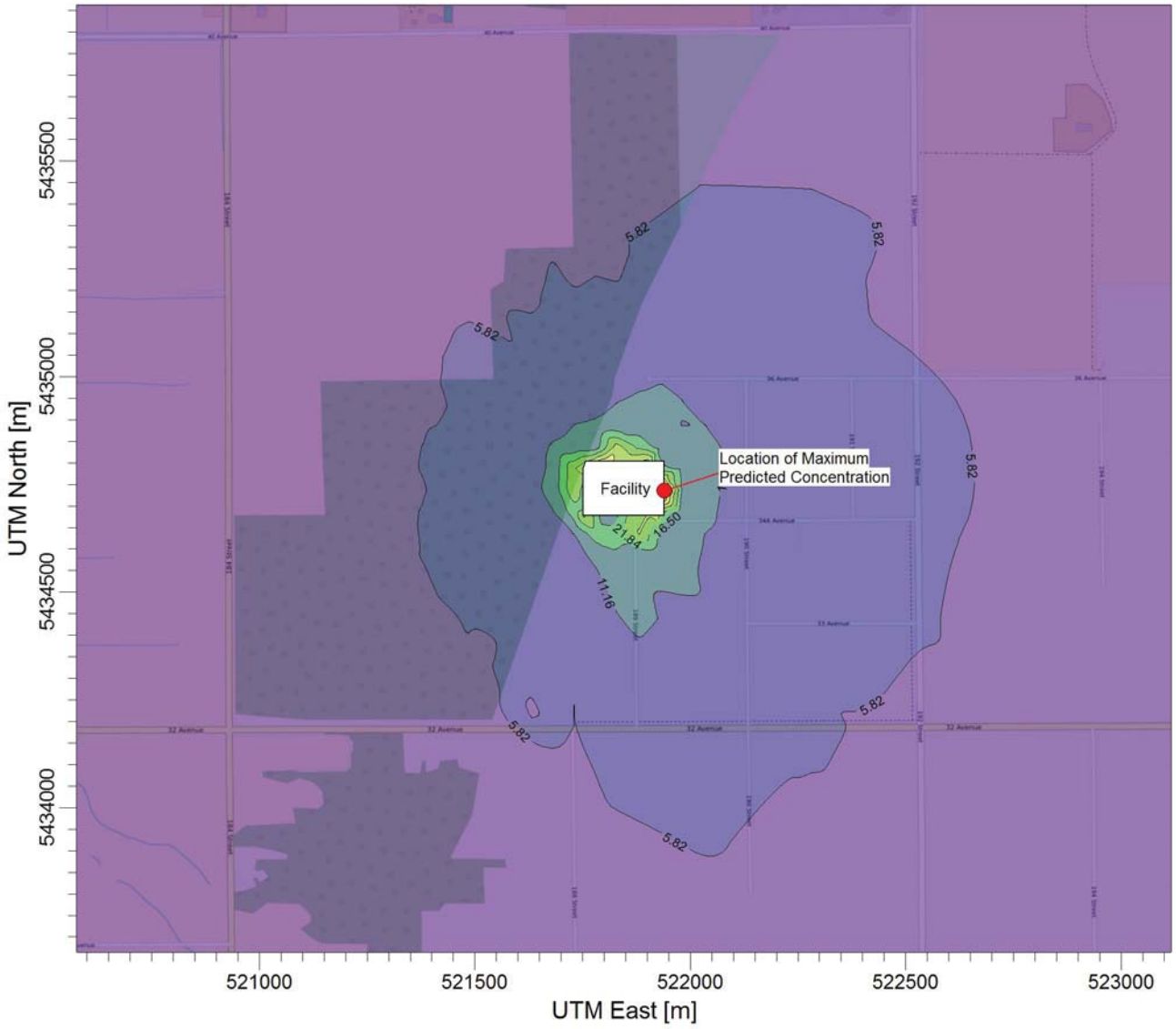
Max: 270.2 [ug/m^3] at (521730.61, 5434737.15)

177.3 187.7 198.0 208.3 218.6 228.9 239.2 249.6 259.9 270.2

COMMENTS: Maximum Concentration from Weir Minerals = 93.2 ug/m3 8-Hour rolling average concentration plot.	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:20,939 0 0.5 km	
	MAX: **270.2 ug/m^3**	DATE: **5/17/2017**	PROJECT NO.: **11115558**

PROJECT TITLE:

Figure 22
Maximum 1 Hour Hazardous Air Pollutant Contours (without Background)



COMMENTS:	SOURCES: **20**	COMPANY NAME: **Weir Minerals, Surrey, British Columbia**	
	RECEPTORS: **1175**	MODELER: **GHD**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:15,985 (0 — 0.5 km)	
	MAX: **48.52 ug/m^3**	DATE: **4/17/2017**	PROJECT NO.: **11115558**

Table 1

Air Contaminants and Averaging Periods
Weir Canada Inc.
Surrey, British Columbia

Air Contaminant	CAS No.	Metro Vancouver Objective ($\mu g/m^3$)	Averaging Period (hours)	Other Criteria ($\mu g/m^3$)	Averaging Period (hours)	Jurisdiction of Other Criteria
Carbon Monoxide	630-08-0	30000	1	--	--	--
		10000	8	--	--	--
Nitrogen Oxides (as Nitrogen Dioxde)	10102-44-0	200	1	--	--	--
		40	annual	--	--	--
Inhalable Particulate Matter (PM10)	NA	50	24	--	--	--
		20	annual	--	--	--
Fine Particulate Matter (PM2.5)	NA	25	24	--	--	--
		8	annual	--	--	--
Sulphur Dioxide	7446-09-5	196	1	--	--	--
		125	24	--	--	--
		30	annual	--	--	--
Volatile Organic Compounds	NA	--	--	300	8	EU
(2-methoxymethylethoxy)propanol	34590-94-8	--	--	3100	1	Texas
		--	--	1400	24	Ontario
1-(2-butoxy-1-methylethoxy)propan-2-ol	29911-28-2	--	--	1000	1	Texas
		--	--	11	24	Ontario
1,2,4-Trimethylbenzene	95-63-6	--	--	4400	1	Texas
		--	--	220	24	Ontario
1,3,5-Trimethylbenzene	108-67-8	--	--	4400	1	Texas
		--	--	220	24	Ontario
2-Butoxyethanol	111-76-2	--	--	2900	1	Texas
		--	--	2400	24	Ontario
2-Propanol, 1-methoxy-, acetate	108-65-6	--	--	2700	1	Texas
		--	--	5000	24	Ontario
3-Butoxypropan-2-ol	5131-66-8	--	--	730	1	Texas
		--	--	3300	24	Ontario
Acrylic Resin	NA	--	--	NA	NA	--
Aluminum	7429-90-5	--	--	50	1	Texas
		--	--	4.8	24	Ontario
Aluminum Oxide	1344-28-1	--	--	50	1	Texas
		--	--	120	24	Ontario
Barium Sulphate	7727-43-7	--	--	50	1	Texas
		--	--	5	annual	Texas
Bismuth (and compounds)	7440-69-9	--	--	50	1	Texas
		--	--	5	annual	Texas
Boron	11108-67-1	--	--	NA	NA	--
Butan-2-ol	78-92-2	--	--	3000	1	Texas
		--	--	496	24	Ontario
Carbon	7440-44-0	--	--	35	1	Texas
		--	--	3.5	annual	Texas
Carbon Black	1333-86-4	--	--	35	1	Texas
		--	--	10	24	Ontario
Cellulose	65996-61-4	--	--	NA	NA	--
Chlorinated Polymer	NA	--	--	NA	NA	--
Chromium (and compounds)	7440-47-3	--	--	1	1	Alberta
Copper	7440-50-8	--	--	10	1	Texas
		--	--	50	24	Ontario
Dipropylene Glycol Methyl Ether Acetate	88917-22-0	--	--	3100	1	Texas
		--	--	3104	24	Ontario
Epichlorohydrin	106-89-8	--	--	20	1	Texas
		--	--	1	24	Ontario
Ethyl Benzene	100-41-4	--	--	2000	1	Alberta
Ethyl Glycol Acetate	111-15-9	--	--	270	1	Texas
		--	--	540	24	Ontario

Table 1

Air Contaminants and Averaging Periods
Weir Canada Inc.
Surrey, British Columbia

Air Contaminant	CAS No.	Metro Vancouver Objective ($\mu g/m^3$)	Averaging Period (hours)	Other Criteria ($\mu g/m^3$)	Averaging Period (hours)	Jurisdiction of Other Criteria
Fluorides	7789-75-5	--	--	40	30-day	Alberta
Hexachlorocyclopentadiene	77-47-4	--	--	1	1	Texas
		--	--	2	24	Ontario
Hexamethylenetetramine	100-97-0	--	--	170	1	Texas
		--	--	8	24	Ontario
Iron	7439-89-6	--	--	4	24	Ontario
Iron Oxide	65996-74-9	--	--	25	24	Ontario
Isopropanol	67-63-0	--	--	7850	1	Alberta
Limestone	1317-65-3	--	--	24	24	Ontario
Lithium	554-13-2	--	--	2	1	Texas
		--	--	0.2	annual	Texas
Magnesium (and compounds)	7439-95-4	--	--	120	24	Ontario
Manganese (and compounds)	7439-96-5	--	--	2	1	Alberta
		--	--	0.2	annual	Alberta
Methyl Ethyl Ketone	78-93-3	--	--	18000	1	Texas
		--	--	1000	24	Ontario
Methyl Isobutyl Ketone	108-10-1	--	--	820	1	Texas
		--	--	1200	24	Ontario
Mineral Silicates	1332-58-7	--	--	20	1	Texas
		--	--	8	24	Ontario
Mineral Spirits	8052-41-3	--	--	3500	1	Texas
		--	--	350	annual	Texas
Molybdenum	7439-98-7	--	--	30	1	Texas
		--	--	120	24	Ontario
Neodecanoic Acid, Cobalt Salt	27253-31-2	--	--	0.2	1	Texas
		--	--	0.02	annual	Texas
Nickel	7440-02-0	--	--	6	1	Alberta
		--	--	0.05	annual	Alberta
N-Methyl-2-Pyrrolidone	872-50-4	--	--	400	1	Texas
Quartz	14808-60-7	--	--	14	1	Texas
		--	--	5	24	Ontario
Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	--	--	NA	NA	--
Resorcinol	108-46-3	--	--	450	1	Texas
		--	--	27	24	Ontario
Selenium	7782-49-2	--	--	2	1	Texas
		--	--	10	24	Ontario
Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	--	--	1000	1	Texas
		--	--	100	annual	Texas
Silica, amorphous, cryst.-free	112945-52-5	--	--	27	1	Texas
		--	--	0.12	24	Ontario
Silicates and Binders	1344-09-8	--	--	NA	NA	--
Silicon (and compounds)	7440-21-3	--	--	20	24	Ontario
Solvent Naphtha, Light Aromatic	64742-95-6	--	--	1250	1	Texas
		--	--	305	24	Ontario
Talc , not containing asbestiform fibres	14807-96-6	--	--	20	1	Texas
		--	--	2	24	Ontario
Titanium	12719-90-3	--	--	NA	NA	--
Titanium Dioxide	13463-67-7	--	--	50	1	Texas
		--	--	34	24	Ontario
Toluene	108-88-3	--	--	1880	1	Alberta
		--	--	400	24	Alberta
Xylene	1330-20-7	--	--	2300	1	Alberta
		--	--	700	24	Alberta
Zinc Oxide	1314-13-2	--	--	20	1	Texas
		--	--	2	annual	Texas
Zirconium (and compounds)	12004-83-0	--	--	NA	NA	--

Table 2

Summary of Sources and Emission Rates by Air Contaminant
Weir Canada Inc.
Surrey, British Columbia

Contaminant	CAS No.	Source ID	Source Description	UTM Coordinates		Stack Orientation	Stack Flow Rate		Stack Exit Temperature	Stack Inside Diameter	Stack Velocity	Stack Height Above Grade	Stack Height Above Roof	Roof Height	Maximum Emission Rate	Averaging Period	Emission Estimation Technique	% of Overall Emissions
				X	Y		(Am^3/s)	(Am^3/min)	(C)	(m)	(m/s)	(m)	(m)	(m)	(g/s)	(hours)		(%)
(2-methoxymethylethoxy)propanol	34590-94-8	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	1.65E-03	1	EE	100.0%
1-(2-butoxy-1-methylethoxy)propan-2-ol	29911-28-2	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	5.49E-04	1	EE	100.0%
1,2,4-Trimethylbenzene	95-63-6	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	3.17E-03	1	EE	50.0%
1,2,4-Trimethylbenzene	95-63-6	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	3.17E-03	1	EE	50.0%
1,3,5-Trimethylbenzene	108-67-8	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.06E-03	1	EE	50.0%
1,3,5-Trimethylbenzene	108-67-8	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.06E-03	1	EE	50.0%
2-Butoxyethanol	111-76-2	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	2.45E-03	1	EE	100.0%
2-Propanol, 1-methoxy-, acetate	108-65-6	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	1.86E-02	1	EE	42.9%
2-Propanol, 1-methoxy-, acetate	108-65-6	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.24E-02	1	EE	28.6%
2-Propanol, 1-methoxy-, acetate	108-65-6	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.24E-02	1	EE	28.6%
3-Butoxypropan-2-ol	5131-66-8	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	5.49E-04	1	EE	100.0%
Acrylic Resin	NA	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	3.63E-04	1	EE	100.0%
Aluminum	7429-90-5	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Aluminum Oxide	1344-28-1	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Barium Sulphate	7727-43-7	6	Pant Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	1.36E-04	1	EE	100.0%
Bismuth (and compounds)	7440-69-9	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	7.87E-09	1	EE	100.0%
Boron	11108-67-1	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Butan-2-ol	78-92-2	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	2.45E-03	1	EE	100.0%
Carbon	7440-44-0	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.43E-07	1	EE	100.0%
Carbon Black	1333-86-4	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.15E-06	1	EE	50.0%
Carbon Black	1333-86-4	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.15E-06	1	EE	50.0%
Carbon Monoxide	630-08-0	2	300 HP Boiler	521800.35	5434759.17	vertical, capped	1.9	113.6	227	0.56	7.72	12.04	2.44	9.60	2.90E-02	1	EE	35.9%
Carbon Monoxide	630-08-0	4a	Small Urethane Cure Oven	521785.1	5434709.22	vertical, capped	0.3	19.8	104	0.20	10.19	11.43	1.83	9.60	6.21E-03	1	EE	7.7%
Carbon Monoxide	630-08-0	4b	Large Urethane Cure Oven	521785.05	5434703.19	vertical, capped	0.5	28.3	104	0.20	14.55	11.43	1.83	9.60	1.04E-02	1	EE	12.8%
Carbon Monoxide	630-08-0	10	15 HP Boiler			vertical, capped	0.1	3.2	50	0.15	2.88	5.33	NA	NA	5.47E-04	1	EE	0.7%
Cellulose	65996-61-4	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	1.01E-07	1	EE	100.0%
Chlorinated Polymer	not hazardous	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.46E-05	1	EE	50.0%
Chlorinated Polymer	not hazardous	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.46E-05	1	EE	50.0%
Chromium (and compounds)	7440-47-3	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	9.49E-07	1	EE	100.0%
Copper	7440-50-8	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	2.02E-06	1	EE	100.0%
Dipropylene Glycol Methyl Ether Acetate	88917-22-0	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	3.10E-04	1	EE	42.9%
Dipropylene Glycol Methyl Ether Acetate	88917-22-0	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.07E-04	1	EE	28.6%
Dipropylene Glycol Methyl Ether Acetate	88917-22-0	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.07E-04	1	EE	28.6%
Epichlorohydrin	106-89-8	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.96E-04	1	EE	50.0%
Epichlorohydrin	106-89-8	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.96E-04	1	EE	50.0%
Ethyl Benzene	100-41-4	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.96E-03	1	EE	50.0%
Ethyl Benzene	100-41-4	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.96E-03	1	EE	50.0%
Fluorides	7789-75-5	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Glycol Ether Acetate	111-15-9	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	4.50E-02	1	EE	100.0%
Hazardous Air Pollutants (HAPs), total	NA	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	1.89E-02	1	EE	38.6%
Hazardous Air Pollutants (HAPs), total	NA	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	2.45E-03	1	EE	5.0%
Hazardous Air Pollutants (HAPs), total	NA	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.38E-02	1	EE	28.2%
Hazardous Air Pollutants (HAPs), total	NA	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.38E-02	1	EE	28.2%
Hexachlorocyclopentadiene	77-47-4	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.11E-05	1	EE	50.0%
Hexachlorocyclopentadiene	77-47-4	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.11E-05	1	EE	50.0%
Hexamethylenetetramine	100-97-0	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.37E-05	1	EE	50.0%
Hexamethylenetetramine	100-97-0	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.37E-05	1	EE	50.0%
Iron	7439-89-6	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.16E-05	1	EE	100.0%
Iron Oxides	65996-74-9	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	1.01E-08	1	EE	100.0%
Isopropanol	67-63-0	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	7.89E-03	1	EE	50.0%
Isopropanol	67-63-0	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	7.89E-03	1	EE	50.0%
Limestone	1317-65-3	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	5.04E-08	1	EE	100.0%
Lithium	554-13-2	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	7.87E-09	1	EE	100.0%
Magnesium (and compounds)	7439-95-4	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Manganese (and compounds)	7439-96-5	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	3.17E-06	1	EE	100.0%
Methyl Ethyl Ketone	78-93-3	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	3.02E-02	1	EE	42.9%
Methyl Ethyl Ketone	78-93-3	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.02E-02	1	EE	28.6%
Methyl Ethyl Ketone	78-93-3	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	2.02E-02	1	EE	28.6%
Methyl Isobutyl Ketone	108-10-1	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.37E-02	1	EE	50.0%
Methyl Isobutyl Ketone	108-10-1	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.37E-02	1	EE	50.0%
Mineral Silicates	1332-58-7	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	3.17E-06	1	EE	100.0%
Mineral Spirits	8052-41-3	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.28E-03	1	EE	50.0%
Mineral Spirits	8052-41-3	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.28E-03	1	EE	50.0%
Molybdenum	7439-98-7	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	3.89E-07	1	EE	100.0%
Neodecanoic Acid, Cobalt Salt	27253-31-2	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	9.72E-06	1	EE	100.0%
Nickel	7440-02-0	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	5.31E-07	1	EE	100.0%

Table 2

Summary of Sources and Emission Rates by Air Contaminant
Weir Canada Inc.
Surrey, British Columbia

Contaminant	CAS No.	Source ID	Source Description	UTM Coordinates		Stack Orientation	Stack Flow Rate		Stack Exit Temperature	Stack Inside Diameter	Stack Velocity	Stack Height Above Grade	Stack Height Above Roof	Roof Height	Maximum Emission Rate	Averaging Period	Emission Estimation Technique	% of Overall Emissions
				X	Y		(Am^3/s)	(Am^3/min)	(C)	(m)	(m/s)	(m)	(m)	(m)	(g/s)	(hours)		(%)
Nitrogen Oxides	10102-44-0	2	300 HP Boiler	521800.35	5434759.17	vertical, capped	1.9	113.6	227	0.56	7.72	12.04	2.44	9.60	5.42E-02	1	EE	57.3%
Nitrogen Oxides	10102-44-0	4a	Small Urethane Cure Oven	521785.1	5434709.22	vertical, capped	0.3	19.8	104	0.20	10.19	11.43	1.83	9.60	7.40E-03	1	EE	7.8%
Nitrogen Oxides	10102-44-0	4b	Large Urethane Cure Oven	521785.05	5434703.19	vertical, capped	0.5	28.3	104	0.20	14.55	11.43	1.83	9.60	1.23E-02	1	EE	13.0%
Nitrogen Oxides	10102-44-0	10	15 HP Boiler			vertical, capped	0.1	3.2	50	0.15	2.88	5.33	NA	NA	1.87E-03	1	EE	2.0%
N-Methyl-2-Pyrrolidone	872-50-4	6	Pant Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	1.65E-03	1	EE	100.0%
Particulate Matter	NA	7	Rubber Buffing Extraction Exhaust	521821.5	5434712.23	vertical	11.8	707.9	20	0.91	17.97	13.56	3.96	9.60	5.25E-04	24	EE	2.0%
Particulate Matter	NA	8	Grit Blast Booth Exhaust Dust Collector	521853.61	5434768.75	vertical	9.4	566.3	20	0.83 x 0.55	20.68	6.25	NA	NA	1.85E-03	24	EE	7.1%
Particulate Matter, total	NA	2	300 HP Boiler	521800.35	5434759.17	vertical, capped	1.9	113.6	227	0.56	7.72	12.04	2.44	9.60	1.16E-02	24	EE	44.3%
Particulate Matter, total	NA	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	5.63E-04	24	EE	2.1%
Particulate Matter, total	NA	4a	Small Urethane Cure Oven	521785.1	5434709.22	vertical, capped	0.3	19.8	104	0.20	10.19	11.43	1.83	9.60	5.62E-04	24	EE	2.1%
Particulate Matter, total	NA	4b	Large Urethane Cure Oven	521785.05	5434703.19	vertical, capped	0.5	28.3	104	0.20	14.55	11.43	1.83	9.60	9.37E-04	24	EE	3.6%
Particulate Matter, total	NA	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	6.52E-05	24	EE	0.2%
Particulate Matter, total	NA	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	6.52E-05	24	EE	0.2%
Particulate Matter, total	NA	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	4.23E-05	24	EE	0.2%
Particulate Matter, total	NA	10	15 HP Boiler			vertical, capped	0.1	3.2	50	0.15	2.88	5.33	NA	NA	7.81E-04	24	EE	3.0%
PM-2.5 (annualized emission rate)	NA	7	Rubber Buffing Extraction Exhaust	521821.5	5434712.23	vertical	11.8	707.9	20	0.91	17.97	13.56	3.96	9.60	1.35E-04	annual	EE	1.0%
PM-2.5 (annualized emission rate)	NA	8	Grit Blast Booth Exhaust Dust Collector	521853.61	5434768.75	horizontal	9.4	566.3	20	0.83 x 0.55	20.68	6.25	NA	NA	1.43E-03	annual	EE	10.4%
PM-2.5 (annualized emission rate)	NA	2	300 HP Boiler	521800.35	5434759.17	vertical, capped	1.9	113.6	227	0.56	7.72	12.04	2.44	9.60	1.98E-03	annual	EE	14.5%
PM-2.5 (annualized emission rate)	NA	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	6.04E-05	annual	EE	0.4%
PM-2.5 (annualized emission rate)	NA	4a	Small Urethane Cure Oven	521785.1	5434709.22	vertical, capped	0.3	19.8	104	0.20	10.19	11.43	1.83	9.60	9.63E-05	annual	EE	0.7%
PM-2.5 (annualized emission rate)	NA	4b	Large Urethane Cure Oven	521785.05	5434703.19	vertical, capped	0.5	28.3	104	0.20	14.55	11.43	1.83	9.60	1.60E-04	annual	EE	1.2%
PM-2.5 (annualized emission rate)	NA	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.20E-06	annual	EE	0.0%
PM-2.5 (annualized emission rate)	NA	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.20E-06	annual	EE	0.0%
PM-2.5 (annualized emission rate)	NA	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	1.45E-05	annual	EE	0.1%
PM-2.5 (annualized emission rate)	NA	10	15 HP Boiler			vertical, capped	0.1	3.2	50	0.15	2.88	5.33	NA	NA	6.13E-04	annual	EE	4.5%
Quartz	14808-60-7	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	1.78E-02	1	EE	42.9%
Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.19E-02	1	EE	28.6%
Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.19E-02	1	EE	28.6%
Resorcinol	108-46-3	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.37E-05	1	EE	50.0%
Resorcinol	108-46-3	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.37E-05	1	EE	50.0%
Selenium	7782-49-2	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.15E-06	1	EE	50.0%
Selenium	7782-49-2	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.15E-06	1	EE	50.0%
Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	7.56E-06	1	EE	42.9%
Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.04E-06	1	EE	28.6%
Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.04E-06	1	EE	28.6%
Silica, amorphous, cryst.-free	112945-52-5	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	6.86E-06	1	EE	50.0%
Silica, amorphous, cryst.-free	112945-52-5	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	6.86E-06	1	EE	50.0%
Silicates and Binders	1344-09-8	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	5.04E-08	1	EE	100.0%
Silicon (and compounds)	7440-21-3	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	1.02E-06	1	EE	100.0%
Solvent Naphtha, Light Aromatic	64742-95-6	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.22E-03	1	EE	50.0%
Solvent Naphtha, Light Aromatic	64742-95-6	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.22E-03	1	EE	50.0%
Sulphur Dioxide	7446-09-5	2	300 HP Boiler	521800.35	5434759.17	vertical, capped	1.9	113.6	227	0.56	7.72	12.04	2.44	9.60	9.07E-04	1	EE	3.6%
Sulphur Dioxide	7446-09-5	4a	Small Urethane Cure Oven	521785.1	5434709.22	vertical, capped	0.3	19.8	104	0.20	10.19	11.43	1.83	9.60	4.44E-05	1	EE	0.2%
Sulphur Dioxide	7446-09-5	4b	Large Urethane Cure Oven	521785.05	5434703.19	vertical, capped	0.5	28.3	104	0.20	14.55	11.43	1.83	9.60	7.40E-05	1	EE	0.3%
Sulphur Dioxide	7446-09-5	10	15 HP Boiler			vertical, capped	0.1	3.2	50	0.15	2.88	5.33	NA	NA	7.81E-05	1	EE	0.3%
Talc , not containing asbestiform fibres	14807-96-6	6	Pant Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	5.44E-05	1	EE	100.0%
Titanium	12719-90-3	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-07	1	EE	100.0%
Titanium Dioxide	13463-67-7	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.15E-06	1	EE	30.9%
Titanium Dioxide	13463-67-7	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	5.15E-06	1	EE	30.9%
Titanium Dioxides	13463-67-7	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	6.34E-06	1	EE	38.1%
Toluene	108-88-3	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	7.50E-03	1	EE	16.1%
Toluene	108-88-3	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.95E-02	1	EE	41.9%
Toluene	108-88-3	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.95E-02	1	EE	41.9%
Volatile Organic Compounds	NA	2	300 HP Boiler	521800.35	5434759.17	vertical, capped	1.9	113.6	227	0.56	7.72	12.04	2.44	9.60	5.54E-03	1	EE	2.3%
Volatile Organic Compounds	NA	4a	Small Urethane Cure Oven	521785.1	5434709.22	vertical, capped	0.3	19.8	104	0.20	10.19	11.43	1.83	9.60	8.14E-04	1	EE	0.3%
Volatile Organic Compounds	NA	4b	Large Urethane Cure Oven	521785.05	5434703.19	vertical, capped	0.5	28.3	104	0.20	14.55	11.43	1.83	9.60	1.36E-03	1	EE	0.6%
Volatile Organic Compounds (VOCs), total	NA	3	Rubber Adhesive Booth	521854.32	5434694.54	vertical	11.8	707.9	20	1.07	13.20	13.56	3.96	9.60	1.19E-01	1	EE	48.7%
Volatile Organic Compounds (VOCs), total	NA	6	Paint Booth	521798.44	5434693.5	vertical	18.9	1132.7	20	1.22	16.17	13.56	3.96	9.60	9.30E-03	1	EE	3.8%
Volatile Organic Compounds (VOCs), total	NA	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.83E-02	1	EE	19.7%
Volatile Organic Compounds (VOCs), total	NA	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	4.83E-02	1	EE	19.7%
Volatile Organic Compounds (VOCs), total	NA	10	15 HP Boiler			vertical, capped	0.1	3.2	50	0.15	2.88	5.33	NA	NA	3.12E-04	1	EE	0.1%
Xylene	1330-20-7	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.08E-02	1	EE	50.0%
Xylene	1330-20-7	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.08E-02	1	EE	50.0%
Zinc Oxide	1314-13-2	5a	Urethane Adhesive Booth	521785.24	5434697.22	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.03E-05	1	EE	50.0%
Zinc Oxide	1314-13-2	5b	Urethane Adhesive Booth	521785.23	5434694.14	vertical	3.8	226.5	20	0.69	10.22	13.56	3.96	9.60	1.03E-05	1	EE	50.0%
Zirconium (and compounds)	12004-83-0	9a to 9i	Nine (9) Welding Exhausts	various	various	gooseneck	0.4	25.5	20	0.20	13.10	10.52	0.91	9.60	3.94E-08	1	EE	100.0%

Table 3

AERMET Land Use Parameters by Wind Sectors
Weir Canada Inc.
Surrey, British Columbia

Wind Sector (degrees)	Dominant Land Use Type	Winter (Dec - Feb) [1]			Spring (Mar - May)			Summer (Jun - Aug)			Autumn (Sep - Nov)		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness (m)
0 - 210	Urban	0.18	2	1	0.14	1	1	0.16	2	1	0.18	2	1
210 - 300	Deciduous Land	0.12	1	0.8	0.12	0.7	1	0.12	0.3	1.3	0.12	1	0.8
300 - 360	Cultivated Land	0.18	0.7	0.05	0.14	0.3	0.03	0.2	0.5	0.2	0.18	0.7	0.05

Note:

(1) Land use parameters for Autumn were used to reflect the area around the facility during winter months.

Table 4

Background Concentrations
Weir Canada Inc.
Surrey, British Columbia

Air Contaminant	CAS No.	Background Concentration [1]			Monitoring Station	Years	Averaging Period (hours)	Percentile (nth)	Number of Samples	Completeness of Dataset (%)	Rolling Average (Y/N)
		(ppm)	(ppb)	(µg/m^3)							
Carbon Monoxide	630-08-0	2.90	--	3.32E+03	T015 Surrey East/ T027 Langley	2013-2015	1	98	25343 / 24445	96.4% / 92.7%	N
Carbon Monoxide	630-08-0	2.16	--	2.48E+03	T015 Surrey East/ T027 Langley	2013-2015	8	98	--	--	Y
Nitrogen Dioxide	10102-44-0	--	23.10	4.35E+01	T015 Surrey East/ T027 Langley	2013-2015	1	98	25470 / 25339	96.9% / 96.3%	N
Nitrogen Dioxide	10102-44-0	--	8.08	1.52E+01	T015 Surrey East/ T027 Langley	2013-2015	annual	NA	--	--	N
Inhalable Particulate Matter (PM10)	NA	--	--	2.53E+01	T027 Langley	2013-2015	24	98	-- / 24345	-- / 92.1%	Y
Inhalable Particulate Matter (PM10)	NA	--	--	1.11E+01	T027 Langley	2013-2015	annual	NA	--	--	N
Fine Particulate Matter (PM2.5)	NA	--	--	1.79E+01	T015 Surrey East/ T027 Langley	2013-2015	24	98	25127 / 24619	95.6% / 93.5%	Y
Fine Particulate Matter (PM2.5)	NA	--	--	6.49E+00	T015 Surrey East/ T027 Langley	2013-2015	annual	NA	--	--	N
Sulphur Dioxide	7446-09-5	--	1.90	4.98E+00	T027 Langley	2013-2015	1	99	-- / 25128	-- / 95.6%	N
Sulphur Dioxide	7446-09-5	--	0.80	2.10E+00	T027 Langley	2013-2015	24	98	--	--	Y
Sulphur Dioxide	7446-09-5	--	0.24	6.25E-01	T027 Langley	2013-2015	annual	NA	--	--	N
Ozone	10025-15-6	--	67.60	1.33E+02	T015 Surrey East/ T027 Langley	2013-2015	1	100	25056 / 25237	95.1% / 95.9%	N
Volatile Organic Compounds (VOCs)	NA	--	--	1.77E+02	EC NAPS S100119	2012-2013	24	100	117	96.2%	N
1,2,4-Trimethylbenzene	95-63-6	--	--	3.36E+00	EC NAPS S100119	2012-2013	1	100	--	--	N
1,2,4-Trimethylbenzene	95-63-6	--	--	1.35E+00	EC NAPS S100119	2012-2013	24	100	117	96.2%	N
Ethyl Benzene	100-41-4	--	--	4.37E+00	EC NAPS S100119	2012-2013	1	100	117 (2)	96.2%	N
Toluene	108-88-3	--	--	2.67E+01	EC NAPS S100119	2012-2013	1	100	--	--	N
Toluene	108-88-3	--	--	1.07E+01	EC NAPS S100119	2012-2013	24	100	117	96.2%	N

Notes:

(1) Equations for conversion of ppm/ppb to µg/m^3:
µg/m^3 = (ppm x MW) / 24.45 x 1000
µg/m^3 = (ppb x MW) / 24.45
(2) 24-hour sampling periods.

Table 5

Summary of Maximum Predicted Concentrations
Weir Minerals
Surrey, British Columbia

Air Contaminant	CAS No.	Facility Emission Rate (g/s)	Air Dispersion Model Used	Max. Predicted Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Conc. With Background Incl. (µg/m^3)	Averaging Period (hours)	Rolling Average (Y/N)	Limit (µg/m^3)	Jurisdiction	Percent of Limit	
											Facility Only	with Background (%)
Carbon Monoxide	630-08-0	8.07E-02	AERMOD	3.76E+01	3.32E+03	3.36E+03	1	N	30000	MV Obj	0.13%	11.21%
Carbon Monoxide	630-08-0	8.07E-02	AERMOD	2.15E+01	2.48E+03	2.50E+03	8	Y	10000	MV Obj	0.22%	24.97%
Nitrogen Oxides (as Nitrogen Dioxde), 100% Conversion	10102-44-0	9.45E-02	AERMOD	5.41E+01	4.35E+01	9.76E+01	1	N	200	MV Obj	27.05%	48.79%
Nitrogen Oxides (as Nitrogen Dioxde), 100% Conversion	10102-44-0	9.45E-02	AERMOD	4.30E+00	1.52E+01	1.95E+01	annual	N	40	MV Obj	10.75%	48.75%
Nitrogen Oxides (as Nitrogen Dioxde), PVMRM	10102-44-0	9.45E-02	AERMOD	4.87E+01	4.35E+01	9.22E+01	1	N	200	MV Obj	24.35%	46.08%
Nitrogen Oxides (as Nitrogen Dioxde), PVMRM	10102-44-0	9.45E-02	AERMOD	3.87E+00	1.52E+01	1.91E+01	annual	N	40	MV Obj	9.67%	47.67%
Inhalable Particulate Matter (PM10)	NA	2.54E-02	AERMOD	4.70E+00	2.53E+01	3.00E+01	24	Y	50	MV Obj	9.40%	60.10%
Inhalable Particulate Matter (PM10)	NA	2.54E-02	AERMOD	8.96E-01	1.11E+01	1.20E+01	annual	N	20	MV Obj	4.48%	60.10%
Fine Particulate Matter (PM2.5)	NA	2.54E-02	AERMOD	4.70E+00	1.79E+01	2.26E+01	24	Y	25	MV Obj	18.80%	90.43%
Fine Particulate Matter (PM2.5)	NA	2.54E-02	AERMOD	3.67E-01	6.49E+00	6.86E+00	annual	N	8	MV Obj	4.59%	85.78%
Sulphur Dioxide	7446-09-5	2.50E-02	AERMOD	7.47E-01	4.98E+00	5.73E+00	1	N	196	MV Obj	0.38%	2.92%
Sulphur Dioxide	7446-09-5	2.50E-02	AERMOD	3.45E-01	2.10E+00	2.44E+00	24	Y	125	MV Obj	0.28%	1.95%
Sulphur Dioxide	7446-09-5	2.50E-02	AERMOD	6.47E-02	6.25E-01	6.89E-01	annual	N	30	MV Obj	0.22%	2.30%
Volatile Organic Compounds (VOCs)	NA	2.45E-01	AERMOD	9.32E+01	1.77E+02	2.71E+02	8	Y	300	EU	31.07%	90.18%
Hazardous Air Pollutants (HAPs)	NA	4.90E-02	AERMOD	4.85E+01	--	4.85E+01	1	N	NA	--	NA	NA
(2-methoxymethylethoxy)propanol	34590-94-8	1.65E-03	AERMOD	9.27E-01	--	9.27E-01	1	N	3100	Texas	0.03%	0.03%
(2-methoxymethylethoxy)propanol	34590-94-8	1.65E-03	AERMOD	3.86E-01	--	3.86E-01	24	Y	1400	Ontario	0.03%	0.03%
1-(2-butoxy-1-methylethoxy)propan-2-ol	29911-28-2	5.49E-04	AERMOD	3.09E-01	--	3.09E-01	1	N	1000	Texas	0.03%	0.03%
1-(2-butoxy-1-methylethoxy)propan-2-ol	29911-28-2	5.49E-04	AERMOD	1.29E-01	--	1.29E-01	24	Y	11	Ontario	1.17%	1.17%
1,2,4-Trimethylbenzene	95-63-6	6.33E-03	AERMOD	8.11E+00	3.36E+00	1.15E+01	1	N	4400	Texas	0.18%	0.26%
1,2,4-Trimethylbenzene	95-63-6	6.33E-03	AERMOD	2.65E+00	1.35E+00	3.99E+00	24	Y	220	Ontario	1.20%	1.81%
1,3,5-Trimethylbenzene	108-67-8	2.11E-03	AERMOD	2.70E+00	--	2.70E+00	1	N	4400	Texas	0.06%	0.06%
1,3,5-Trimethylbenzene	108-67-8	2.11E-03	AERMOD	8.82E-01	--	8.82E-01	24	Y	220	Ontario	0.40%	0.40%
2-Butoxyethanol	111-76-2	2.45E-03	AERMOD	1.38E+00	--	1.38E+00	1	N	2900	Texas	0.05%	0.05%
2-Butoxyethanol	111-76-2	2.45E-03	AERMOD	5.75E-01	--	5.75E-01	24	Y	2400	Ontario	0.02%	0.02%
2-Propanol, 1-methoxy-, acetate	108-65-6	4.34E-02	AERMOD	4.43E+01	--	4.43E+01	1	N	2700	Texas	1.64%	1.64%
2-Propanol, 1-methoxy-, acetate	108-65-6	4.34E-02	AERMOD	1.11E+01	--	1.11E+01	24	Y	5000	Ontario	0.22%	0.22%
3-Butoxypropan-2-ol	5131-66-8	5.49E-04	AERMOD	3.09E-01	--	3.09E-01	1	N	730	Texas	0.04%	0.04%
3-Butoxypropan-2-ol	5131-66-8	5.49E-04	AERMOD	1.29E-01	--	1.29E-01	24	Y	3300	Ontario	0.00%	0.00%
Acrylic Resin	NA	3.35E-01	AERMOD	1.88E+02	--	1.88E+02	1	N	NA	--	NA	NA
Aluminum	7429-90-5	6.34E-07	AERMOD	5.17E-03	--	5.17E-03	1	N	50	Texas	0.01%	0.01%
Aluminum	7429-90-5	6.34E-07	AERMOD	8.66E-04	--	8.66E-04	24	Y	4.8	Ontario	0.02%	0.02%
Aluminum Oxide	1344-28-1	6.34E-07	AERMOD	5.17E-03	--	5.17E-03	1	N	50	Texas	0.01%	0.01%
Aluminum Oxide	1344-28-1	6.34E-07	AERMOD	8.66E-04	--	8.66E-04	24	Y	120	Ontario	0.00%	0.00%
Barium Sulphate	7727-43-7	1.36E-04	AERMOD	7.65E-02	--	7.65E-02	1	N	50	Texas	0.15%	0.15%
Barium Sulphate	7727-43-7	1.36E-04	AERMOD	4.32E-03	--	4.32E-03	annual	N	5	Texas	0.09%	0.09%
Bismuth (and compounds)	7440-69-9	7.87E-09	AERMOD	6.42E-05	--	6.42E-05	1	N	50	Texas	0.00%	0.00%
Bismuth (and compounds)	7440-69-9	7.87E-09	AERMOD	1.84E-06	--	1.84E-06	annual	N	5	Texas	0.00%	0.00%
Boron	11108-67-1	6.34E-07	AERMOD	5.17E-03	--	5.17E-03	1	N	NA	--	NA	NA
Butan-2-ol	78-92-2	2.45E-03	AERMOD	1.38E+00	--	1.38E+00	1	N	3000	Texas	0.05%	0.05%
Butan-2-ol	78-92-2	2.45E-03	AERMOD	5.75E-01	--	5.75E-01	24	Y	496	Ontario	0.12%	0.12%
Carbon	7440-44-0	6.43E-07	AERMOD	5.24E-03	--	5.24E-03	1	N	35	Texas	0.01%	0.01%
Carbon	7440-44-0	6.43E-07	AERMOD	1.50E-04	--	1.50E-04	annual	N	3.5	Texas	0.00%	0.00%
Carbon Black	1333-86-4	1.03E-05	AERMOD	1.32E-02	--	1.32E-02	1	N	35	Texas	0.04%	0.04%
Carbon Black	1333-86-4	1.03E-05	AERMOD	4.30E-03	--	4.30E-03	24	Y	10	Ontario	0.04%	0.04%
Cellulose	65996-61-4	1.01E-07	AERMOD	8.21E-04	--	8.21E-04	1	N	NA	--	NA	NA
Chlorinated Polymer	NA	3.35E-01	AERMOD	4.28E+02	--	4.28E+02	1	N	NA	--	NA	NA
Chromium (and compounds)	7440-47-3	9.49E-07	AERMOD	7.73E-03	--	7.73E-03	1	N	1	Alberta	0.77%	0.77%
Copper	7440-50-8	2.02E-06	AERMOD	1.65E-02	--	1.65E-02	1	N	10	Texas	0.16%	0.16%
Copper	7440-50-8	2.02E-06	AERMOD	2.76E-03	--	2.76E-03	24	Y	50	Ontario	0.01%	0.01%

Table 5

Summary of Maximum Predicted Concentrations
Weir Minerals
Surrey, British Columbia

Air Contaminant	CAS No.	Facility Emission Rate (g/s)	Air Dispersion Model Used	Max. Predicted Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Conc. With Background Incl. (µg/m^3)	Averaging Period (hours)	Rolling Average (Y/N)	Limit (µg/m^3)	Jurisdiction	Percent of Limit	
											Facility Only	with Background (%)
Dipropylene Glycol Methyl Ether Acetate	88917-22-0	7.23E-04	AERMOD	7.38E-01	--	7.38E-01	1	N	3100	Texas	0.02%	0.02%
Dipropylene Glycol Methyl Ether Acetate	88917-22-0	7.23E-04	AERMOD	1.86E-01	--	1.86E-01	24	Y	3104	Ontario	0.01%	0.01%
Epichlorohydrin	106-89-8	5.92E-04	AERMOD	7.57E-01	--	7.57E-01	1	N	20	Texas	3.79%	3.79%
Epichlorohydrin	106-89-8	5.92E-04	AERMOD	2.47E-01	--	2.47E-01	24	Y	1	Ontario	24.72%	24.72%
Ethyl Benzene	100-41-4	5.92E-03	AERMOD	7.57E+00	4.37E+00	1.19E+01	1	N	2000	Alberta	0.38%	0.60%
Ethyl Glycol Acetate	111-15-9	4.50E-02	AERMOD	4.09E+01	--	4.09E+01	1	N	270	Texas	15.17%	15.17%
Ethyl Glycol Acetate	111-15-9	4.50E-02	AERMOD	1.51E+01	--	1.51E+01	24	Y	540	Ontario	2.80%	2.80%
Fluorides	7789-75-5	6.34E-07	AERMOD	3.87E-04	--	3.87E-04	30-day	N	40	Alberta	0.00%	0.00%
Hexachlorocyclopentadiene	77-47-4	4.22E-05	AERMOD	5.40E-02	--	5.40E-02	1	N	1	Texas	5.40%	5.40%
Hexachlorocyclopentadiene	77-47-4	4.22E-05	AERMOD	1.76E-02	--	1.76E-02	24	Y	2	Ontario	0.88%	0.88%
Hexamethylenetetramine	100-97-0	2.74E-05	AERMOD	3.51E-02	--	3.51E-02	1	N	170	Texas	0.02%	0.02%
Hexamethylenetetramine	100-97-0	2.74E-05	AERMOD	1.15E-02	--	1.15E-02	24	Y	8	Ontario	0.14%	0.14%
Iron	7439-89-6	4.11E-05	AERMOD	5.61E-02	--	5.61E-02	24	Y	4	Ontario	1.40%	1.40%
Iron Oxide	65996-74-9	1.01E-08	AERMOD	1.38E-05	--	1.38E-05	24	Y	25	Ontario	0.00%	0.00%
Isopropanol	67-63-0	1.58E-02	AERMOD	2.02E+01	--	2.02E+01	1	N	7850	Alberta	0.26%	0.26%
Limestone	1317-65-3	5.04E-08	AERMOD	6.88E-05	--	6.88E-05	24	Y	24	Ontario	0.00%	0.00%
Lithium	554-13-2	7.87E-09	AERMOD	6.42E-05	--	6.42E-05	1	N	2	Texas	0.00%	0.00%
Lithium	554-13-2	7.87E-09	AERMOD	1.84E-06	--	1.84E-06	annual	N	0.2	Texas	0.00%	0.00%
Magnesium (and compounds)	7439-95-4	6.34E-07	AERMOD	8.66E-04	--	8.66E-04	24	Y	120	Ontario	0.00%	0.00%
Manganese (and compounds)	7439-96-5	3.17E-06	AERMOD	2.58E-02	--	2.58E-02	1	N	2	Alberta	1.29%	1.29%
Manganese (and compounds)	7439-96-5	3.17E-06	AERMOD	7.42E-04	--	7.42E-04	annual	N	0.2	Alberta	0.37%	0.37%
Methyl Ethyl Ketone	78-93-3	7.05E-02	AERMOD	7.20E+01	--	7.20E+01	1	N	18000	Texas	0.40%	0.40%
Methyl Ethyl Ketone	78-93-3	7.05E-02	AERMOD	1.81E+01	--	1.81E+01	24	Y	1000	Ontario	1.81%	1.81%
Methyl Isobutyl Ketone	108-10-1	2.74E-02	AERMOD	3.51E+01	--	3.51E+01	1	N	820	Texas	4.28%	4.28%
Methyl Isobutyl Ketone	108-10-1	2.74E-02	AERMOD	1.15E+01	--	1.15E+01	24	Y	1200	Ontario	0.96%	0.96%
Mineral Silicates	1332-58-7	3.17E-06	AERMOD	2.58E-02	--	2.58E-02	1	N	20	Texas	0.13%	0.13%
Mineral Silicates	1332-58-7	3.17E-06	AERMOD	4.33E-03	--	4.33E-03	24	Y	8	Ontario	0.05%	0.05%
Mineral Spirits	8052-41-3	1.06E-02	AERMOD	1.35E+01	--	1.35E+01	1	N	3500	Texas	0.39%	0.39%
Mineral Spirits	8052-41-3	1.06E-02	AERMOD	7.72E-01	--	7.72E-01	annual	N	350	Texas	0.22%	0.22%
Molybdenum	7439-98-7	3.89E-07	AERMOD	3.17E-03	--	3.17E-03	1	N	30	Texas	0.01%	0.01%
Molybdenum	7439-98-7	3.89E-07	AERMOD	5.31E-04	--	5.31E-04	24	Y	120	Ontario	0.00%	0.00%
Neodecanoic Acid, Cobalt Salt	27253-31-2	9.72E-06	AERMOD	5.47E-03	--	5.47E-03	1	N	0.2	Texas	2.73%	2.73%
Neodecanoic Acid, Cobalt Salt	27253-31-2	9.72E-06	AERMOD	3.09E-04	--	3.09E-04	annual	N	0.02	Texas	1.54%	1.54%
Nickel	7440-02-0	5.31E-07	AERMOD	4.33E-03	--	4.33E-03	1	N	6	Alberta	0.07%	0.07%
Nickel	7440-02-0	5.31E-07	AERMOD	1.24E-04	--	1.24E-04	annual	N	0.05	Alberta	0.25%	0.25%
N-Methyl-2-Pyrrolidone	872-50-4	1.65E-03	AERMOD	9.27E-01	--	9.27E-01	1	N	400	Texas	0.23%	0.23%
Quartz	14808-60-7	6.34E-07	AERMOD	5.17E-03	--	5.17E-03	1	N	14	Texas	0.04%	0.04%
Quartz	14808-60-7	6.34E-07	AERMOD	8.66E-04	--	8.66E-04	24	Y	5	Ontario	0.02%	0.02%
Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	4.16E-02	AERMOD	4.24E+01	--	4.24E+01	1	N	NA	--	NA	NA
Resorcinol	108-46-3	2.74E-05	AERMOD	3.51E-02	--	3.51E-02	1	N	450	Texas	0.01%	0.01%
Resorcinol	108-46-3	2.74E-05	AERMOD	1.15E-02	--	1.15E-02	24	Y	27	Ontario	0.04%	0.04%
Selenium	7782-49-2	1.03E-05	AERMOD	1.32E-02	--	1.32E-02	1	N	2	Texas	0.66%	0.66%
Selenium	7782-49-2	1.03E-05	AERMOD	4.30E-03	--	4.30E-03	24	Y	10	Ontario	0.04%	0.04%
Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	1.76E-05	AERMOD	1.80E-02	--	1.80E-02	1	N	1000	Texas	0.00%	0.00%
Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	1.76E-05	AERMOD	1.02E-03	--	1.02E-03	annual	N	100	Texas	0.00%	0.00%
Silica, amorphous, cryst.-free	112945-52-5	1.37E-05	AERMOD	1.76E-02	--	1.76E-02	1	N	27	Texas	0.07%	0.07%
Silica, amorphous, cryst.-free	112945-52-5	1.37E-05	AERMOD	5.73E-03	--	5.73E-03	24	Y	0.12	Ontario	4.78%	4.78%
Silicates and Binders	1344-09-8	5.04E-08	AERMOD	4.11E-04	--	4.11E-04	1	N	NA	--	NA	NA
Silicon (and compounds)	7440-21-3	1.02E-06	AERMOD	1.40E-03	--	1.40E-03	24	Y	20	Ontario	0.01%	0.01%
Solvent Naphtha, Light Aromatic	64742-95-6	8.44E-03	AERMOD	1.08E+01	--	1.08E+01	1	N	1250	Texas	0.86%	0.86%
Solvent Naphtha, Light Aromatic	64742-95-6	8.44E-03	AERMOD	3.53E+00	--	3.53E+00	24	Y	305	Ontario	1.16%	1.16%

Table 5

Summary of Maximum Predicted Concentrations
Weir Minerals
Surrey, British Columbia

Air Contaminant	CAS No.	Facility Emission Rate (g/s)	Air Dispersion Model Used	Max. Predicted Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Conc. With Background Incl. (µg/m^3)	Averaging Period (hours)	Rolling Average (Y/N)	Limit (µg/m^3)	Jurisdiction	Percent of Limit	
											Facility Only	with Background (%)
Talc , not containing asbestiform fibres	14807-96-6	5.44E-05	AERMOD	3.06E-02	--	3.06E-02	1	N	20	Texas	0.15%	0.15%
Talc , not containing asbestiform fibres	14807-96-6	5.44E-05	AERMOD	1.27E-02	--	1.27E-02	24	Y	2	Ontario	0.64%	0.64%
Titanium	12719-90-3	6.34E-07	AERMOD	5.17E-03	--	5.17E-03	1	N	NA	--	NA	NA
Titanium Dioxide	13463-67-7	1.66E-05	AERMOD	5.43E-02	--	5.43E-02	1	N	50	Texas	0.11%	0.11%
Titanium Dioxide	13463-67-7	1.66E-05	AERMOD	9.70E-03	--	9.70E-03	24	Y	34	Ontario	0.03%	0.03%
Toluene	108-88-3	4.66E-02	AERMOD	5.32E+01	2.67E+01	7.99E+01	1	N	1880	Alberta	2.83%	4.25%
Toluene	108-88-3	4.66E-02	AERMOD	1.65E+01	1.07E+01	2.72E+01	24	Y	400	Alberta	4.13%	6.81%
Xylene	1330-20-7	2.17E-02	AERMOD	2.78E+01	--	2.78E+01	1	N	2300	Alberta	1.21%	1.21%
Xylene	1330-20-7	2.17E-02	AERMOD	9.06E+00	--	9.06E+00	24	Y	700	Alberta	1.29%	1.29%
Zinc Oxide	1314-13-2	2.06E-05	AERMOD	2.63E-02	--	2.63E-02	1	N	20	Texas	0.13%	0.13%
Zinc Oxide	1314-13-2	2.06E-05	AERMOD	1.51E-03	--	1.51E-03	annual	N	2	Texas	0.08%	0.08%
Zirconium (and compounds)	12004-83-0	3.94E-08	AERMOD	3.21E-04	--	3.21E-04	1	N	NA	--	NA	NA

Table 6

Summary of Maximum Predicted Concentrations at Sensitive Receptors for Select Contaminants
Weir Minerals
Surrey, British Columbia

Air Contaminant	CAS No.	Facility Emission Rate (g/s)	Air Dispersion Model Used	Predicted Concentration at Sensitive Receptor (1)							Background Concentration ($\mu g/m^3$)	Total Conc. With Background Incl. ($\mu g/m^3$)	Averaging Period (hours)	Rolling Average (Y/N)	Limit ($\mu g/m^3$)	Jurisdiction	Max. Percent of Limit at Receptors	
				Future Business ($\mu g/m^3$)	Existing Business ($\mu g/m^3$)	Residence ($\mu g/m^3$)	School ($\mu g/m^3$)	Senior's Facility ($\mu g/m^3$)	Child Care ($\mu g/m^3$)	Overall Max. ($\mu g/m^3$)							Facility Only	with Background (%)
Carbon Monoxide	630-08-0	8.07E-02	AERMOD	**2.91E+01**	8.34E+00	6.52E+00	8.80E-01	9.41E-01	8.41E-01	2.91E+01	3.32E+03	**3.35E+03**	1	N	30000	MV Obj	**0.10%**	**11.18%**
Carbon Monoxide	630-08-0	8.07E-02	AERMOD	**1.45E+01**	2.87E+00	1.43E+00	6.48E-01	4.57E-01	2.24E-01	1.45E+01	2.48E+03	**2.49E+03**	8	Y	10000	MV Obj	**0.14%**	**24.90%**
Nitrogen Oxides (as Nitrogen Dioxde), 100% Conversion	10102-44-0	9.45E-02	AERMOD	**4.48E+01**	1.32E+01	1.04E+01	1.27E+00	1.35E+00	1.25E+00	4.48E+01	4.35E+01	**8.83E+01**	1	N	200	MV Obj	**22.39%**	**44.13%**
Nitrogen Oxides (as Nitrogen Dioxde), 100% Conversion	10102-44-0	9.45E-02	AERMOD	**2.35E+00**	1.27E-01	5.34E-02	4.59E-02	1.11E-02	7.81E-03	2.35E+00	1.52E+01	**1.75E+01**	annual	N	40	MV Obj	**5.86%**	**43.86%**
Nitrogen Oxides (as Nitrogen Dioxde), PVMRM	10102-44-0	9.45E-02	AERMOD	**4.03E+01**	1.19E+01	9.33E+00	1.14E+00	1.22E+00	1.12E+00	4.03E+01	4.35E+01	**8.38E+01**	1	N	200	MV Obj	**20.15%**	**41.89%**
Nitrogen Oxides (as Nitrogen Dioxde), PVMRM	10102-44-0	9.45E-02	AERMOD	**2.11E+00**	1.15E-01	4.81E-02	4.13E-02	9.95E-03	7.03E-03	2.11E+00	1.52E+01	**1.73E+01**	annual	N	40	MV Obj	**5.28%**	**43.28%**
Inhalable Particulate Matter (PM10)	NA	2.54E-02	AERMOD	**2.42E+00**	5.26E-01	2.73E-01	8.97E-02	4.75E-02	2.55E-02	2.42E+00	2.53E+01	**2.78E+01**	24	Y	50	MV Obj	**4.84%**	**55.54%**
Inhalable Particulate Matter (PM10)	NA	2.54E-02	AERMOD	**5.40E-01**	3.06E-02	1.27E-02	8.51E-03	2.35E-03	1.61E-03	5.40E-01	1.11E+01	**1.17E+01**	annual	N	20	MV Obj	**2.70%**	**58.32%**
Fine Particulate Matter (PM2.5)	NA	2.54E-02	AERMOD	**2.42E+00**	5.26E-01	2.73E-01	8.97E-02	4.75E-02	2.55E-02	2.42E+00	1.79E+01	**2.03E+01**	24	Y	25	MV Obj	**9.68%**	**81.31%**
Fine Particulate Matter (PM2.5)	NA	2.54E-02	AERMOD	**2.13E-01**	1.24E-02	5.21E-03	3.08E-03	8.90E-04	5.80E-04	2.13E-01	6.49E+00	**6.71E+00**	annual	N	8	MV Obj	**2.66%**	**83.84%**
Sulphur Dioxide	7446-09-5	2.50E-02	AERMOD	**6.25E-01**	2.06E-01	1.54E-01	1.71E-02	1.75E-02	1.80E-02	6.25E-01	4.98E+00	**5.60E+00**	1	N	196	MV Obj	**0.32%**	**2.86%**
Sulphur Dioxide	7446-09-5	2.50E-02	AERMOD	**1.89E-01**	3.56E-02	1.80E-02	5.87E-03	2.96E-03	1.58E-03	1.89E-01	2.10E+00	**2.29E+00**	24	Y	125	MV Obj	**0.15%**	**1.83%**
Sulphur Dioxide	7446-09-5	2.50E-02	AERMOD	**4.02E-02**	2.07E-03	8.70E-04	5.70E-04	1.60E-04	1.10E-04	4.02E-02	6.25E-01	**6.65E-01**	annual	N	30	MV Obj	**0.13%**	**2.22%**
Volatile Organic Compounds (VOCs)	NA	2.45E-01	AERMOD	**3.73E+01**	1.33E+01	5.82E+00	3.83E+00	2.32E+00	1.31E+00	3.73E+01	1.77E+02	**2.15E+02**	8	Y	300	EU	**12.43%**	**71.54%**
Hazardous Air Pollutants (HAPs)	NA	4.90E-02	AERMOD	**2.64E+01**	9.07E+00	6.04E+00	2.27E+00	2.35E+00	2.09E+00	2.64E+01	--	**2.64E+01**	1	N	NA	--	**NA**	**NA**

Notes:
(1) See Figures 1 and 9.

Table 7

Estimated Maximum Predicted Soil Concentrations for Metal Contaminants
Weir Minerals
Surrey, British Columbia

Air Contaminant	Facility-Wide Emission Rate (g/s)	AERMOD Predicted Deposition (g/m2/year)	Estimated Maximum Annual Cumulative Soil Concentration (g/m3/year) (2)	Typical Soil Density (g/cm3) (3)	Estimated Maximum Soil Contamination (ug/g)	Soil Contamination Limit (4) (ug/g)	Percent of Soil Contamination Limit (%)
Particulate Matter as PM-10	2.54E-02	4.51E-02	--	--	--	--	--
Zinc Oxide (5)	2.06E-05	3.66E-05 (1)	3.66E-04	1.33	2.75E-04	150	<0.1%
Nickel	5.31E-07	9.44E-07 (1)	9.44E-06	1.33	7.10E-06	150	<0.1%
Barium Sulphate (6)	5.35E-03	9.51E-03 (1)	9.51E-02	1.33	7.15E-02	400	<0.1%
Copper	2.02E-06	3.59E-06 (1)	3.59E-05	1.33	2.70E-05	90	<0.1%
Chromium (and compounds)	9.49E-07	1.69E-06 (1)	1.69E-05	1.33	1.27E-05	50	<0.1%
Molybdenum	3.89E-07	6.91E-07 (1)	6.91E-06	1.33	5.20E-06	5	<0.1%
Selenium	1.03E-05	1.83E-05 (1)	1.83E-04	1.33	1.37E-04	2	<0.1%
Fluorides	6.34E-07	1.13E-06 (1)	1.13E-05	1.33	8.47E-06	200	<0.1%

Notes:
(1) Estimated deposition of contaminant from PM predicted annual deposition value and the emission rate of the contaminant.
(2) Assuming the contaminant is mixed into a soil depth of 10 cm.
(3) Assuming typical silt loam soil (USDA).
(4) Environmental Management Act, Contaminanted Sites Regulation, Schedule 7, Column III "Soil Relocation to Agricultural Land" (B.C. Reg. 375/96).
(5) As zinc.
(6) As barium.

Appendices

Appendix A
Emission Rate Calculations

Appendix A Emission Rate Calculations

The emissions estimates for the Facility were based on established engineering calculation procedures, including emissions factors, mass balances and reference stack testing. The calculations for each source are detailed in the attached Tables A.1 through A.9.A description of the calculation methodology for each source is provided as follows.

Tables A.1 and A.2 – Natural Gas Combustion Equipment

A listing of the natural gas combustion equipment and the heating rating in in BTU/hr is provided in Table A.1. The emissions from natural gas combustion are based on USEPA AP-42 emissions factors and the heating ratings of the equipment. The emission factor calculations for natural gas combustion products are provided in Table A.2.

Table A.4 – Grit Blast Booth Dust Collector

The grit blast booth dust collector emissions are based on an estimated 5 kilograms per hour loading into the dust collector and a 99.8 percent removal efficiency. The particulate emissions from the grit blast booth dust collector are calculated in Table A.3.

Tables A.4, A.5 and A.8 – Urethane Adhesive Booths, Paint Booth and Rubber Adhesive Booth

The emission from the Urethane Adhesive Booths, Paint Booth and Rubber Adhesive Booth are calculated using a mass balance. The usage rates of urethane, paint and adhesive products per hour are multiplied by the average concentrations of ingredients in the product and an estimated fraction emitted to the atmosphere. Volatile compound ingredients are assumed to be emitted 100 percent to the atmosphere and lower percentages are applied to semi- and non-volatile ingredients.

Table A.6 – Rubber Buffing

The emissions from the rubber buffing process were calculated based on an experiment conducted by Weir to determine the fraction of rubber particles that are not recovered. Most of the rubber buffing particles are large and heavy and drop immediately to the floor. Weir measured the rubber part before and after buffing and collected all the rubber particles that dropped on the floor in the buffing area. The unaccounted particulate was determined to be approximately 5 percent of the total rubber that was removed. The rubber particulate emissions are captured by a ventilation system with a filter that is 90 percent efficient. Weir processes a maximum of 20 lb rubber removed per day. The rubber buffing calculations are summarized in Table A.6.

Table A.7 – Arc Welding

Arc welding emissions were estimated using the amount of weld wire and electrode products consumed per hour multiplied by USEPA AP-42 emissions factors for welding. The welding emissions are captured and filtered with an efficiency of 99 percent. The welding emissions are summarized in Table A.7.

Table A.1

List of Combustion Equipment
Weir Minerals
Surrey, British Columbia

Source ID	Description	Ratings (BTUs/hr)
2	300 HP Boiler	12,313,000
4a	Small Urethane Cure Oven	600,000
4b	Large Urethane Cure Oven	1,000,000
10	15 HP Boiler	620,000
	Total	**14,533,000**

Table A.2

Estimated Natural Gas Combustion Products Emissions
Weir Minerals
Surrey, British Columbia

Source ID	Compound	CAS No.	Heat Input Rating (BTU/hr)	USEPA AP-42 Emission Factor ($kg/10^6m^3$)	USEPA AP-42 Emission Factor Quality Rating [2]	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (g/s) [1]	Maximum Estimated Emission Rate (tonnes/yr)
2	Nitrogen Oxides	10102-44-0	12313000	--	--	28.6	5.42E-02 (3)	2.93E-01
	Carbon Monoxide	630-08-0		--	--	15.3	2.90E-02 (3)	1.56E-01
	Particulate Matter, total	n/a		--	--	6.1	1.16E-02 (3)	6.26E-02
	PM-2.5 (annualized emission rate)	n/a		--	--	--	1.98E-03 (3)	--
	Sulphur Dioxide	7446-09-5		--	--	0.5	9.07E-04 (3)	4.90E-03
	Volatile Organic Compounds	n/a		--	--	2.9	5.54E-03 (3)	2.99E-02
4a	Nitrogen Oxides	10102-44-0	600000	1600	B	22.4	7.40E-03	4.00E-02
	Carbon Monoxide	630-08-0		1344	B	18.8	6.21E-03	3.36E-02
	Particulate Matter, total	n/a		121.6	D	1.7	5.62E-04	3.04E-03
	PM-2.5 (annualized emission rate)	n/a		--	--	--	9.63E-05	--
	Sulphur Dioxide	7446-09-5		9.6	A	0.1	4.44E-05	2.40E-04
	Volatile Organic Compounds	n/a		176	B	2.5	8.14E-04	4.39E-03
4b	Nitrogen Oxides	10102-44-0	1000000	1600	B	26.1	1.23E-02	6.66E-02
	Carbon Monoxide	630-08-0		1344	B	21.9	1.04E-02	5.59E-02
	Particulate Matter, total	n/a		121.6	D	2.0	9.37E-04	5.06E-03
	PM-2.5 (annualized emission rate)	n/a		--	--	--	1.60E-04	--
	Sulphur Dioxide	7446-09-5		9.6	A	0.2	7.40E-05	4.00E-04
	Volatile Organic Compounds	n/a		176	B	2.9	1.36E-03	7.32E-03
10	Nitrogen Oxides	10102-44-0	620000	--	--	35.6	1.87E-03 (4)	4.64E-02
	Carbon Monoxide	630-08-0		--	--	10.4	5.47E-04 (4)	1.35E-02
	Particulate Matter, total	n/a		--	--	14.9	7.81E-04 (4)	1.93E-02
	PM-2.5 (annualized emission rate)	n/a		--	--	--	6.13E-04 (4)	--
	Sulphur Dioxide	7446-09-5		--	--	1.5	7.81E-05 (4)	1.93E-03
	Volatile Organic Compounds	n/a		--	--	5.9	3.12E-04 (4)	7.73E-03

Notes:

(1) Based on the BTU/hr ratings for the equipment, a natural gas heating value of 1020 BTU/ft^3, and USEPA AP-42 emission factors for natural gas combustion in uncontrolled small boilers (<100 MM BTU), unless otherwise noted.
(2) USEPA AP-42 data quality rating factor provided as bracketed letter, i.e. (B).
(3) Based on manufacturer provided emissions profile for boiler.

Table A.3

Estimated Particulate Emissions from Dust Collectors
Weir Minerals
Surrey, British Columbia

Source ID	Source Description	Compound	Cas No.	Flow Rate (cfm)	Dust Loading (g/ft^3)	Control Efficiency (%)	Outlet Concentration (mg/m^3)	Estimated Maximum Emission Rate	
								(tonnes/yr)	(g/s)
8	Grit Blast Booth Exhaust Dust Collector	Particulate Matter	n/a	20000	0.0042	99.8%	0.2	0.045	1.85E-03
		PM-2.5 (annualized emission rate)	n/a	--	--	--	--	--	1.43E-03

Note:

(1) Inlet dust loading based on 5 kg/hr of abrasives breakdown and surface contaminants.

Table A.4

Emissions from Urethane Adhesive Booths
Weir Minerals
Surrey, British Columbia

Source ID	Adhesive Name	Maximum Usage Rate (L/hr)	Specific Gravity (kg/L)	Hazardous Ingredient(s)	CAS No.	Weight Percent (%)	Estimated Fraction Emitted To Atmosphere (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr) [1]	Maximum Estimated Emission Rate (g/s) [1]
5a and 5b	Thixon OSN-2 EF	0.200	0.95	1,2,4-Trimethylbenzene	95-63-6	6%	100.00%	0.839	6.44E-03	3.17E-03
				1,3,5-Trimethylbenzene	108-67-8	2%	100.00%	0.280	2.15E-03	1.06E-03
				Carbon Black	1333-86-4	2%	0.65%	0.001	1.05E-05	5.15E-06
				Chlorinated Polymer	not hazardous	12%	0.65%	0.011	8.37E-05	4.12E-05
				Hexachlorocyclopentadiene	77-47-4	0.4%	10.00%	0.006	4.29E-05	2.11E-05
				Hexamethylenetetramine	100-97-0	3%	0.65%	0.003	2.09E-05	1.03E-05
				Methyl Ethyl Ketone	78-93-3	18%	100.00%	2.516	1.93E-02	9.50E-03
				Mineral Spirits	8052-41-3	2%	100.00%	0.280	2.15E-03	1.06E-03
				Resorcinol	108-46-3	3%	0.65%	0.003	2.09E-05	1.03E-05
				Selenium	7782-49-2	2%	0.65%	0.001	1.05E-05	5.15E-06
				Silica, amorphous, cryst.-free	112945-52-5	2%	0.65%	0.002	1.40E-05	6.86E-06
				Solvent Naptha, Light Aromatic	64742-95-6	8%	100.00%	1.118	8.59E-03	4.22E-03
				Toluene	108-88-3	37%	100.00%	5.172	3.97E-02	1.95E-02
				Xylene	1330-20-7	1%	100.00%	0.140	1.07E-03	5.28E-04
				Zinc Oxide	1314-13-2	2%	0.65%	0.002	1.40E-05	6.86E-06
5a and 5b	Thixon P-6-EF	0.200	0.95	1,2,4-Trimethylbenzene	95-63-6	3%	100.00%	0.419	3.22E-03	1.58E-03
				1,3,5-Trimethylbenzene	108-67-8	1%	100.00%	0.140	1.07E-03	5.28E-04
				Carbon Black	1333-86-4	0.4%	0.65%	0.000	2.79E-06	1.37E-06
				Chlorinated Polymer	not hazardous	13%	0.65%	0.012	9.07E-05	4.46E-05
				Epichlorohydrin	106-89-8	0.03%	100.00%	0.001	3.22E-05	3.96E-06
				Hexachlorocyclopentadiene	77-47-4	0.4%	10.00%	0.006	4.29E-05	2.11E-05
				Hexamethylenetetramine	100-97-0	4%	0.65%	0.004	2.79E-05	1.37E-05
				Methyl Ethyl Ketone	78-93-3	7%	100.00%	0.979	7.51E-03	3.69E-03
				Methyl Isobutyl Ketone	108-10-1	26%	100.00%	3.634	2.79E-02	1.37E-02
				Mineral Spirits	8052-41-3	10%	100.00%	1.398	1.07E-02	5.28E-03
				Resorcinol	108-46-3	4%	0.65%	0.004	2.79E-05	1.37E-05
				Solvent Naphtha, Light Aromatic	64742-95-6	3%	100.00%	0.419	3.22E-03	1.58E-03
				Titanium Dioxide	13463-67-7	1.5%	0.65%	0.001	1.05E-05	5.15E-06
				Toluene	108-88-3	23%	100.00%	3.215	2.47E-02	1.21E-02
				Zinc Oxide	1314-13-2	3%	0.65%	0.003	2.09E-05	1.03E-05
5a and 5b	Thixon 423	0.200	0.93	2-Propanol, 1-methoxy-, acetate	108-65-6	24%	100.00%	3.284	2.52E-02	1.24E-02
				Dipropylene Glycol Methyl Ether Acetate	88917-22-0	4%	10.00%	0.055	4.20E-04	2.07E-04
				Methyl Ethyl Ketone	78-93-3	39%	100.00%	5.337	4.10E-02	2.02E-02
				Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	23%	100.00%	3.147	2.42E-02	1.19E-02
				Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	1.5%	0.65%	0.001	1.02E-05	5.04E-06
				Toluene	108-88-3	7%	100.00%	0.958	7.36E-03	3.62E-03
5a and 5b	Chemlok 289	0.200	0.71	Epichlorohydrin	106-89-8	3%	100.00%	0.078	2.41E-03	2.96E-04
				Ethyl Benzene	100-41-4	7.5%	100.00%	0.784	6.02E-03	2.96E-03
				Isopropanol	67-63-0	20%	100.00%	2.089	1.60E-02	7.89E-03
				Methyl Ethyl Ketone	78-93-3	20%	100.00%	2.089	1.60E-02	7.89E-03
				Xylenes (o-, m-, p- isomers)	1330-20-7	28%	100.00%	2.873	2.21E-02	1.08E-02

Table A.4

Emissions from Urethane Adhesive Booths
Weir Minerals
Surrey, British Columbia

Source ID	Adhesive Name	Maximum Usage Rate (L/hr)	Specific Gravity (kg/L)	Hazardous Ingredient(s)	CAS No.	Weight Percent (%)	Estimated Fraction Emitted To Atmosphere (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr) [1]	Maximum Estimated Emission Rate (g/s) [1]
5a and 5b	Maximum Estimated Adhesive Booth Emissions	--	--	1,2,4-Trimethylbenzene	95-63-6	--	--	0.839	6.44E-03	3.17E-03
				1,3,5-Trimethylbenzene	108-67-8	--	--	0.280	2.15E-03	1.06E-03
				2-Propanol, 1-methoxy-, acetate	108-65-6	--	--	3.284	2.52E-02	1.24E-02
				Carbon Black	1333-86-4	--	--	0.001	1.05E-05	5.15E-06
				Chlorinated Polymer	not hazardous	--	--	0.012	9.07E-05	4.46E-05
				Dipropylene Glycol Methyl Ether Acetate	88917-22-0	--	--	0.055	4.20E-04	2.07E-04
				Epichlorohydrin	106-89-8	--	--	0.078	6.02E-04	2.96E-04
				Ethyl Benzene	100-41-4	--	--	0.784	6.02E-03	2.96E-03
				Hexachlorocyclopentadiene	77-47-4	--	--	0.006	4.29E-05	2.11E-05
				Hexamethylenetetramine	100-97-0	--	--	0.004	2.79E-05	1.37E-05
				Isopropanol	67-63-0	--	--	2.089	1.60E-02	7.89E-03
				Methyl Ethyl Ketone	78-93-3	--	--	5.337	4.10E-02	2.02E-02
				Methyl Isobutyl Ketone	108-10-1	--	--	3.634	2.79E-02	1.37E-02
				Mineral Spirits	8052-41-3	--	--	1.398	1.07E-02	5.28E-03
				Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	--	--	3.147	2.42E-02	1.19E-02
				Resorcinol	108-46-3	--	--	0.004	2.79E-05	1.37E-05
				Selenium	7782-49-2	--	--	0.001	1.05E-05	5.15E-06
				Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	--	--	0.001	1.02E-05	5.04E-06
				Silica, amorphous, cryst.-free	112945-52-5	--	--	0.002	1.40E-05	6.86E-06
				Solvent Naphtha, Light Aromatic	64742-95-6	--	--	1.118	8.59E-03	4.22E-03
				Titanium Dioxide	13463-67-7	--	--	0.001	1.05E-05	5.15E-06
				Toluene	108-88-3	--	--	5.172	3.97E-02	1.95E-02
				Xylene	1330-20-7	--	--	2.873	2.21E-02	1.08E-02
				Zinc Oxide	1314-13-2	--	--	0.003	2.09E-05	1.03E-05
				Particulate Matter, total	--	--	--	0.017	1.33E-04	6.52E-05
				PM-2.5 (annualized emission rate)	--	--	--	--	--	4.20E-06
				Volatile Organic Compounds (VOCs), total	--	--	--	12.781	1.31E-01	4.83E-02
				Hazardous Air Pollutants (HAPs), total	--	--	--	3.657	2.81E-02	1.38E-02

Notes:

(1) Emissions rates are per booth.
(2) Assumed fraction of emissions released to atmosphere for non-particulate emissions as follows: volatiles, 100%; semi-volatiles, 10%. Particulate emissions controlled with 99.35% efficient filters.

Table A.5

Estimated Emissions from Paint Booth
Weir Minerals
Surrey, British Columbia

Source ID	Paint Name	Maximum Usage Rate (L/hr)	Specific Gravity (kg/L)	Hazardous Ingredient(s)	CAS No.	Weight Percent (%)	Estimated Fraction Emitted To Atmosphere [1] (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr)	Maximum Estimated Emission Rate (g/s)
6	Aquacron WR Alkyd Gloss Ultradeep Base	1.750	1.01	2-Butoxyethanol	111-76-2	5%	10%	0.130	8.31.E-03	2.45E-03
				Butan-2-ol	78-92-2	5%	10%	0.130	8.31.E-03	2.45E-03
				Neodecanoic Acid, Cobalt Salt	27253-31-2	1%	0.33%	0.001	3.29.E-05	9.72E-06
6	Aquacron 870 LC	1.750	1.13	(2-methoxymethylethoxy)propanol	34590-94-8	3%	10%	0.087	5.58.E-03	1.65E-03
				1-(2-butoxy-1-methylethoxy)propan-2-ol	29911-28-2	1%	10%	0.029	1.86.E-03	5.49E-04
				3-Butoxypropan-2-ol	5131-66-8	1%	10%	0.029	1.86.E-03	5.49E-04
				Acrylic Resin	NA	20%	0.33%	0.019	1.23.E-03	3.63E-04
				Barium Sulphate	7727-43-7	8%	0.33%	0.007	4.60.E-04	1.36E-04
				N-Methyl-2-Pyrrolidone	872-50-4	3%	10%	0.087	5.58.E-03	1.65E-03
				Talc , not containing asbestiform fibres	14807-96-6	3%	0.33%	0.003	1.84.E-04	5.44E-05
6	**Maximum Estimated Adhesive Booth Emissions**	**--**	**--**	**(2-methoxymethylethoxy)propanol**	**34590-94-8**	**--**	**--**	**0.087**	**5.58.E-03**	**1.65E-03**
				1-(2-butoxy-1-methylethoxy)propan-2-ol	**29911-28-2**	**--**	**--**	**0.029**	**1.86.E-03**	**5.49E-04**
				2-Butoxyethanol	**111-76-2**	**--**	**--**	**0.130**	**8.31.E-03**	**2.45E-03**
				3-Butoxypropan-2-ol	**5131-66-8**	**--**	**--**	**0.029**	**1.86.E-03**	**5.49E-04**
				Acrylic Resin	**NA**	**--**	**--**	**0.019**	**1.23.E-03**	**3.63E-04**
				Barium Sulphate	**7727-43-7**	**--**	**--**	**0.007**	**4.60.E-04**	**1.36E-04**
				Butan-2-ol	**78-92-2**	**--**	**--**	**0.130**	**8.31.E-03**	**2.45E-03**
				Neodecanoic Acid, Cobalt Salt	**27253-31-2**	**--**	**--**	**0.001**	**3.29.E-05**	**9.72E-06**
				N-Methyl-2-Pyrrolidone	**872-50-4**	**--**	**--**	**0.087**	**5.58.E-03**	**1.65E-03**
				Talc , not containing asbestiform fibres	**14807-96-6**	**--**	**--**	**0.003**	**1.84.E-04**	**5.44E-05**
				Particulate Matter, total	**--**	**--**	**--**	**0.030**	**1.90E-03**	**5.63E-04**
				PM-2.5 (annualized emission rate)	**--**	**--**	**--**	**--**	**--**	**6.04E-05**
				Volatile Organic Compounds (VOCs), total	**--**	**--**	**--**	**0.493**	**3.15E-02**	**9.30E-03**
				Hazardous Air Pollutants (HAPs), total	**--**	**--**	**--**	**0.130**	**8.31E-03**	**2.45E-03**

Note:

(1) Assumed fraction of emissions released to atmosphere for non-particulate emissions as follows: volatiles, 100%; semi-volatiles, 10%. Particulate emissions controlled with 99.67% efficient filters.

Table A.6

Estimated Emissions from Rubber Buffing Extraction Exhaust
Weir Minerals
Surrey, British Columbia

Source ID	Air Contaminant	Estimated Rubber Loss To Atmosphere [1] (% of lb rubber removed)	Rubber Removed Per Day (lb rubber removed/day)	Outlet Concentration (mg/m^3)	Estimated Maximum Emission Rate [2]	
					(tonnes/yr)	(g/s)
7	Particulate Matter	5%	20	0.044	4.25E-03	5.25E-04
	PM-2.5 (annualized emission rate)	--	--	--	--	1.35E-04

Notes:

(1) Engineering Estimate.
(2) Assumes 100% of emissions exhaust through filtered side hoods with 90% efficiency.
Emission rate assumes maximum 12 hours buffing per day (upper estimate). Annual emissions based on 2250 operating hours per year.

Table A.7

Estimated Emissions from Arc Welding
Weir Minerals
Surrey, British Columbia

Source ID	Welding Material Name	Maximum Usage Rate (kg/hr)	Total Fume Emission Factor (g/kg electrode consumed)	Ingredients	CAS Number	Maximum Weight Percent (%)	Control Efficiency (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr) [1]	Maximum Estimated Emission Rate (g/s) [1]
9a to 9i	Ultracore Flux Cored Stainless Electrodes	0.03	10.00	Particulate Matter	NA	100.0%	99.0%	0.000	5.67E-06	5.25E-07
				Aluminum	7429-90-5	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Aluminum Oxide	1344-28-1	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Bismuth (and compounds)	7440-69-9	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Chromium (and compounds)	7440-47-3	29.0%	99.0%	0.000	2.47E-06	2.28E-07
				Fluorides	7789-75-5	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Iron	7439-89-6	63.8%	99.0%	0.000	5.43E-06	5.02E-07
				Lithium	554-13-2	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Manganese (and compounds)	7439-96-5	6.5%	99.0%	0.000	5.53E-07	5.12E-08
				Mineral Silicates	1332-58-7	5.0%	99.0%	0.000	4.25E-07	3.94E-08
				Molybdenum	7439-98-7	5.0%	99.0%	0.000	4.25E-07	3.94E-08
				Nickel (metal)	7440.02-0	15.0%	99.0%	0.000	1.28E-06	1.18E-07
				Quartz	14808-60-7	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Silicon (and compounds)	7440-21-3	1.0%	99.0%	0.000	8.50E-08	7.87E-09
				Titanium Dioxides	13463-67-7	10.0%	99.0%	0.000	8.50E-07	7.87E-08
				Zirconium (and compounds)	12004-83-0	5.0%	99.0%	0.000	4.25E-07	3.94E-08
	Fleetweld 5P+	0.01	25.60	Particulate Matter	NA	100.0%	99.0%	0.000	7.26E-06	6.72E-07
				Cellulose	65996-61-4	10.0%	99.0%	0.000	1.09E-06	1.01E-07
				Iron	7439-89-6	95.8%	99.0%	0.000	1.04E-05	9.66E-07
				Iron Oxides	65996-74-9	1.0%	99.0%	0.000	1.09E-07	1.01E-08
				Limestone	1317-65-3	5.0%	99.0%	0.000	5.44E-07	5.04E-08
				Manganese (and compounds)	7439-96-5	5.0%	99.0%	0.000	5.44E-07	5.04E-08
				Silicates and Binders	1344-09-8	5.0%	99.0%	0.000	5.44E-07	5.04E-08
				Silicon (and compounds)	7440-21-3	1.0%	99.0%	0.000	1.09E-07	1.01E-08
				Titanium Dioxides	13463-67-7	5.0%	99.0%	0.000	5.44E-07	5.04E-08
	Metalshield MC-6	0.03	15.10	Particulate Matter	NA	100.0%	99.0%	0.000	8.56E-06	7.93E-07
				Aluminum	7429-90-5	1.0%	99.0%	0.000	1.28E-07	1.19E-08
				Boron	11108-67-1	1.0%	99.0%	0.000	1.28E-07	1.19E-08
				Iron	7439-89-6	100.0%	99.0%	0.000	1.28E-05	1.19E-06
				Manganese (and compounds)	7439-96-5	5.0%	99.0%	0.000	6.42E-07	5.95E-08
				Silicon (and compounds)	7440-21-3	1.0%	99.0%	0.000	1.28E-07	1.19E-08
				Titanium (and compounds)	12719-90-3	1.0%	99.0%	0.000	1.28E-07	1.19E-08
	L-56	0.09	17.10	Particulate Matter	NA	100.0%	99.0%	0.001	2.91E-05	2.69E-06
				Copper	7440-50-8	50.0%	99.0%	0.001	2.18E-05	2.02E-06
				Iron	7439-89-6	99.0%	99.0%	0.001	4.32E-05	4.00E-06
				Manganese	7439-96-5	10.0%	99.0%	0.000	4.36E-06	4.04E-07
	Ultracore 712A80	1.42	12.20	Particulate Matter	NA	100.0%	99.0%	0.008	3.46E-04	3.20E-05
				Boron	11108-67-1	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Fluorides	7789-75-5	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Iron	7439-89-6	98.3%	99.0%	0.012	5.10E-04	4.72E-05
				Magnesium (and compounds)	7439-95-4	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Manganese (and compounds)	7439-96-5	5.0%	99.0%	0.001	2.59E-05	2.40E-06
				Mineral Silicates	1332-58-7	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Nickel (metal)	7440-02-0	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Quartz	14808-60-7	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Silicon (and compounds)	7440-21-3	1.0%	99.0%	0.000	5.19E-06	4.80E-07
				Titanium Dioxides	13463-67-7	10.0%	99.0%	0.001	5.19E-05	4.80E-06

Table A.7

Estimated Emissions from Arc Welding
Weir Minerals
Surrey, British Columbia

Source ID	Welding Material Name	Maximum Usage Rate (kg/hr)	Total Fume Emission Factor (g/kg electrode consumed)	Ingredients	CAS Number	Maximum Weight Percent (%)	Control Efficiency (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr) [1]	Maximum Estimated Emission Rate (g/s) [1]
	Outershield 71 Supreme	1.87	12.20	Particulate Matter	NA	100.0%	99.0%	0.011	4.57E-04	4.23E-05
				Aluminum	7429-90-5	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Aluminum Oxide	1344-28-1	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Boron	11108-67-1	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Fluorides	7789-75-5	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Iron	7439-89-6	97.2%	99.0%	0.016	6.66E-04	6.16E-05
				Magnesium (and compounds)	7439-95-4	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Manganese (and compounds)	7439-96-5	5.0%	99.0%	0.001	3.42E-05	3.17E-06
				Mineral Silicates	1332-58-7	5.0%	99.0%	0.001	3.42E-05	3.17E-06
				Quartz	14808-60-7	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Silicon (and compounds)	7440-21-3	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Titanium	12719-90-3	1.0%	99.0%	0.000	6.85E-06	6.34E-07
				Titanium Dioxides	13463-67-7	10.0%	99.0%	0.002	6.85E-05	6.34E-06
	GC001 Gouging Carbon Electrodes	0.003	81.60	Particulate Matter	NA	100.0%	99.0%	0.000	4.63E-06	4.28E-07
				Carbon	7440-44-0	100.0%	99.0%	0.000	6.94E-06	6.43E-07
				Copper	7440-50-8	5.0%	99.0%	0.000	3.47E-07	3.21E-08
	Techalloy 309-type Stainless Wires	0.06	24.10	Particulate Matter	NA	100.0%	99.0%	0.001	2.73E-05	2.53E-06
				Chromium	7440-47-3	25.0%	99.0%	0.000	1.02E-05	9.49E-07
				Iron	7439-89-6	62.0%	99.0%	0.001	2.54E-05	2.35E-06
				Manganese	7439-96-5	2.5%	99.0%	0.000	1.02E-06	9.49E-08
				Molybdenum	7439-98-7	3.0%	99.0%	0.000	1.23E-06	1.14E-07
				Nickel	7440-02-0	14.0%	99.0%	0.000	5.74E-06	5.31E-07
	Endotec 23DO	0.01	24.10	Particulate Matter	NA	100.0%	99.0%	0.000	3.42E-06	3.16E-07
				Carbon	7440-44-0	5.0%	99.0%	0.000	2.56E-07	2.37E-08
				Iron	7439-89-6	100.0%	99.0%	0.000	5.12E-06	4.74E-07
				Manganese	7439-96-5	1.0%	99.0%	0.000	5.12E-08	4.74E-09
				Nickel	7440-02-0	1.0%	99.0%	0.000	5.12E-08	4.74E-09
				Silicon	7440-21-3	5.0%	99.0%	0.000	2.56E-07	2.37E-08
	Gas Metal Arc Welding Solid Wire	1.42	5.20	Particulate Matter	NA	100.0%	99.0%	0.004	1.47E-04	1.36E-05
				Aluminum	7429-90-5	1.0%	99.0%	0.000	2.21E-06	2.05E-07
				Copper	7440-50-8	5.0%	99.0%	0.000	1.11E-05	1.02E-06
				Iron	7439-89-6	90.0%	99.0%	0.005	1.99E-04	1.84E-05
				Manganese	7439-96-5	10.0%	99.0%	0.001	2.21E-05	2.05E-06
				Molybdenum	231-107-2	1.9%	99.0%	0.000	4.20E-06	3.89E-07
				Silicon	231-130-8	5.0%	99.0%	0.000	1.11E-05	1.02E-06
				Titanium	7440-32-6	0.2%	99.0%	0.000	4.42E-07	4.09E-08
				Zirconium	7440-67-7	0.1%	99.0%	0.000	2.21E-07	2.05E-08

Table A.7

Estimated Emissions from Arc Welding
Weir Minerals
Surrey, British Columbia

Source ID	Welding Material Name	Maximum Usage Rate (kg/hr)	Total Fume Emission Factor (g/kg electrode consumed)	Ingredients	CAS Number	Maximum Weight Percent (%)	Control Efficiency (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr) [1]	Maximum Estimated Emission Rate (g/s) [1]
	Maximum Estimated Welding Emissions	--	--	**Aluminum**	7429-90-5	--	--	0.000	6.85E-06	6.34E-07
				Aluminum Oxide	1344-28-1	--	--	0.000	6.85E-06	6.34E-07
				Bismuth (and compounds)	7440-69-9	--	--	0.000	8.50E-08	7.87E-09
				Boron	11108-67-1	--	--	0.000	6.85E-06	6.34E-07
				Carbon	7440-44-0	--	--	0.000	6.94E-06	6.43E-07
				Cellulose	65996-61-4	--	--	0.000	1.09E-06	1.01E-07
				Chromium (and compounds)	7440-47-3	--	--	0.000	1.02E-05	9.49E-07
				Copper	7440-50-8	--	--	0.001	2.18E-05	2.02E-06
				Fluorides	7789-75-5	--	--	0.000	6.85E-06	6.34E-07
				Iron	7439-89-6	--	--	0.016	6.66E-04	6.16E-05
				Iron Oxides	65996-74-9	--	--	0.000	1.09E-07	1.01E-08
				Limestone	1317-65-3	--	--	0.000	5.44E-07	5.04E-08
				Lithium	554-13-2	--	--	0.000	8.50E-08	7.87E-09
				Magnesium (and compounds)	7439-95-4	--	--	0.000	6.85E-06	6.34E-07
				Manganese (and compounds)	7439-96-5	--	--	0.001	3.42E-05	3.17E-06
				Mineral Silicates	1332-58-7	--	--	0.001	3.42E-05	3.17E-06
				Molybdenum	7439-98-7	--	--	0.000	4.20E-06	3.89E-07
				Nickel	7440-02-0	--	--	0.000	5.74E-06	5.31E-07
				Quartz	14808-60-7	--	--	0.000	6.85E-06	6.34E-07
				Silicates and Binders	1344-09-8	--	--	0.000	5.44E-07	5.04E-08
				Silicon (and compounds)	7440-21-3	--	--	0.000	1.11E-05	1.02E-06
				Titanium	12719-90-3	--	--	0.000	6.85E-06	6.34E-07
				Titanium Dioxides	13463-67-7	--	--	0.002	6.85E-05	6.34E-06
				Zirconium (and compounds)	12004-83-0	--	--	0.000	4.25E-07	3.94E-08
				Particulate Matter, total	NA	--	--	0.011	4.57E-04	4.23E-05
				PM-2.5 (annualized emission rate)	NA	--	--	--	--	1.45E-05
				Volatile Organic Compounds (VOCs), total	--	--	--	0.000	0.00E+00	0.00E+00
				Hazardous Air Pollutants (HAPs), total	--	--	--	0.000	0.00E+00	0.00E+00

Notes:

NA - Not Applicable.
(1) Welding emissions represent total emissions for all nine welding stations.

Table A.8

Estimated Emissions from Rubber Adhesive Booth
Weir Minerals
Surrey, British Columbia

Source ID	Paint Name	Maximum Usage Rate (L/hr)	Specific Gravity (kg/L)	Hazardous Ingredient(s)	CAS No.	Weight Percent (%)	Estimated Fraction Emitted To Atmosphere [1] (%)	Outlet Concentration (mg/m^3)	Maximum Estimated Emission Rate (tonnes/yr)	Maximum Estimated Emission Rate (g/s)
3	Thixon 907	0.30	0.9	Glycol Ether Acetate	111-15-9	60%	100%	3.81	8.91.E-01	4.50E-02
				Methyl Ethyl Ketone	78-93-3	30%	100%	1.91	4.46.E-01	2.25E-02
				Toluene	108-88-3	10%	100%	0.64	1.49.E-01	7.50E-03
3	Thixon 423	0.30	0.93	2-Propanol, 1-methoxy-, acetate	108-65-6	24%	100%	1.58	3.68E-01	1.86E-02
				Dipropylene Glycol Methyl Ether Acetate	88917-22-0	4%	10%	0.03	6.14E-03	3.10E-04
				Methyl Ethyl Ketone	78-93-3	39%	100%	2.56	5.98E-01	3.02E-02
				Reaction Product of Epichlorohydrin & Bisphenol-A	25068-38-6	23%	100%	1.51	3.53E-01	1.78E-02
				Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	2530-83-8	1.5%	0.65%	0.0006	1.50E-04	7.56E-06
				Toluene	108-88-3	7%	100%	0.46	1.07E-01	5.43E-03
3	**Maximum Estimated Rubber Adhesive Emissions**	**--**	**--**	**2-Propanol, 1-methoxy-, acetate**	**108-65-6**	**--**	**--**	**1.58**	**3.68.E-01**	**1.86.E-02**
				Dipropylene Glycol Methyl Ether Acetate	**88917-22-0**	**--**	**--**	**0.03**	**6.14.E-03**	**3.10.E-04**
				Glycol Ether Acetate	**111-15-9**	**--**	**--**	**3.81**	**8.91.E-01**	**4.50.E-02**
				Methyl Ethyl Ketone	**78-93-3**	**--**	**--**	**2.56**	**5.98.E-01**	**3.02.E-02**
				Reaction Product of Epichlorohydrin & Bisphenol-A	**25068-38-6**	**--**	**--**	**1.51**	**3.53.E-01**	**1.78.E-02**
				Silane, Trimethoxy[3-(oxiranylmethoxy)propyl]-	**2530-83-8**	**--**	**--**	**0.00**	**1.50.E-04**	**7.56.E-06**
				Toluene	**108-88-3**	**--**	**--**	**0.64**	**1.49.E-01**	**7.50.E-03**
				Volatile Organic Compounds (VOCs), total	**--**	**--**	**--**	**10.12**	**2.37E+00**	**1.19E-01**
				Hazardous Air Pollutants (HAPs), total	**--**	**--**	**--**	**1.60**	**3.74E-01**	**1.89E-02**

Note:

(1) Assumed fraction of emissions released to atmosphere for non-particulate emissions as follows: volatiles, 100%; semi-volatiles, 10%. Particulate emissions controlled with 99.35% efficient filters.

Appendix B
Dispersion Modelling Files (Electronic)

Table B.1

AERMOD Input Parameters
Weir Minerals
Surrey, British Columbia

Source ID	Description	UTM Coordinates (1) X (m)	UTM Coordinates (1) Y (m)	Release Type	Release Height (m)	Gas Exit Temperature (K)	Gas Exit Velocity (m/s)	Inside Diameter (m)
2	300 HP Boiler	521800.35	5434759.17	Capped	12.04	500.15	7.715	0.559
3	Rubber Adhesive Booth	521854.32	5434694.54	Vertical	13.56	293.15	13.195	1.067
04A	Small Urethane Cure Oven	521785.10	5434709.22	Capped	11.43	377.15	10.207	0.203
04B	Large Urethane Cure Oven	521785.05	5434703.19	Capped	11.43	377.15	14.582	0.203
05A	Urethane Adhesive Booth	521785.24	5434697.22	Vertical	13.56	293.15	10.215	0.686
05B	Urethane Adhesive Booth	521785.23	5434694.14	Vertical	13.56	293.15	10.215	0.686
6	Pant Booth	521798.44	5434693.50	Vertical	13.56	293.15	16.175	1.219
7	Rubber Buffing Extraction Exhaust	521821.50	5434712.23	Vertical	13.56	293.15	17.983	0.914
8	Grit Blast Booth Exhaust Dust Collector	521853.61	5434768.75	Vertical	6.25	293.15	20.677	0.762
09A	Welding Exhaust	521858.07	5434745.00	Capped	10.52	293.15	13.124	0.203
09B	Welding Exhaust	521858.07	5434740.47	Capped	10.52	293.15	13.124	0.203
09C	Welding Exhaust	521858.07	5434735.85	Capped	10.52	293.15	13.124	0.203
09D	Welding Exhaust	521858.07	5434731.28	Capped	10.52	293.15	13.124	0.203
09E	Welding Exhaust	521858.07	5434726.74	Capped	10.52	293.15	13.124	0.203
09F	Welding Exhaust	521858.08	5434722.12	Capped	10.52	293.15	13.124	0.203
09G	Welding Exhaust	521875.76	5434736.10	Capped	10.52	293.15	13.124	0.203
09H	Welding Exhaust	521875.76	5434731.57	Capped	10.52	293.15	13.124	0.203
09I	Welding Exhaust	521876.17	5434758.78	Capped	10.52	293.15	13.124	0.203
10	10 HP Boiler (steam generator)	521824.13	5434768.64	Capped	5.33	323.15	2.88	0.15

Note:

(1) Coordinates in UTM NAD83, Zone 10.

www.ghd.com