University of Cincinnati

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I, Bradley S Knipper , hereby submit this original work as part of the requirements for the degree of Master of Science in Industrial Hygiene (Environmental Health).

It is entitled:

Examination of Silica Exposure from Fugitive Dust Emission for Phosphate Mining Facilities – an Investigation during Drought Conditions

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Examination of Silica Exposure from Fugitive Dust Emission for Phosphate Mining Facilities – an Investigation during Drought Conditions

A thesis submitted to the

Graduate School

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requirements for the degree of

MASTER OF SCIENCE

in the Department of Environmental Health

of the College of Medicine

by

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Abstract

Phosphate is a salt of phosphorous. Approximately 90 percent of phosphate mined in the United States is used to make phosphoric acid, which is used for the production of phosphate fertilizers. Phosphate rock has been mined in Florida since 1887. Fugitive dust is particulate matter that escapes or is released uncontrollably. Virtually all dust generated during mining operations can be classified as fugitive dust.

Phosphate mining in Florida generally occurs below the water table level, which serves as a natural control preventing much of the possible dust from being lofted into the air. A prolonged drought or other event which alters the hydrology of Polk County, Florida, a major region of phosphate mining, could lead to the drying of overburden and the phosphate matrix, and allow aerosolization.

Dust generation under dry (not usual) conditions, was modeled using Screen View, a software package by Lake Environmental for the US EPA's SCREEN3 screening tool. Three dust generation scenarios (high, medium, and low) were modeled under worst-case atmospheric stability conditions and wind speed for dust generation. Since one-third of the matrix is composed of quartz sand, exposure to respirable crystalline silica was considered. In this case, the OSHA PEL for crystalline silica, which can cause pulmonary fibrosis and lung cancer, is 0.83 mg/m^3. Areas where exposure guidelines might be exceeded were plotted.

Under the high and medium dust generation scenarios investigated, there is potential for over exposure to total dust, and respirable silica for workers. The potential for over exposure to respirable particulate matter also existed in the medium generation scenario. Suggestions are made to conduct further modeling in the future as well as to refine model assumptions.

Contents

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List of Tables

List of Figures

List of Equations

1 Purpose

The objective of this study is to anticipate exposure of workers to potential fugitive dust releases from a phosphate mining facility in Polk County, Florida using an Environmental Protection Agency (EPA) particulate dispersion model.

2 Background

2.1 Introduction

Phosphate is a salt of phosphorous. Approximately 90 percent of phosphate mined in the United States is used to make phosphoric acid [1]. Almost all of this is used for the production of phosphate fertilizers [1]. Phosphorous (P) is a highly reactive element and therefore is not found in its pure form in nature. It is required by every living plant and animal cell and as such is a critical resource. Phosphorous gives shape to DNA (deoxyribonucleic acid) as the sugar-phosphate backbone of the double helix. Phosphorous is also used in cells to produce energy, and enters the food chain at the primary production level through plants.

Phosphate rock has been mined in Florida since 1887. In 2010, seven mines in Florida represented 85% of domestic annual production [2]. 106 million metric tons of ore were mined at an estimated value of $1.98 billion [2].

Phosphate rock is mined using large excavation machines called draglines. After the over burden is removed and put in spoil piles, the matrix is mined. The matrix consists of approximately equal parts phosphate rock, clay, and sand. It is then dumped into pits where high-pressure water guns slurry the matrix for pumping to the beneficiation plant which, in some cases, is up to 10 miles away [1]. At the beneficiation plant, the phosphate is separated from the rest of the clay-sand matrix. The phosphate is captured and sent to a chemical processing plant while sand is sent back to the mine and clay is pumped to a settling pond. Phosphogypsum, a byproduct of the beneficiation process, is often stored in large stacks near the beneficiation plant.

In its elemental form, phosphorus is an upper and lower respiratory tract and gastrointestinal irritant. It can cause liver damage if ingested at high enough concentrations [3]. Elemental phosphorus can spontaneously ignite when exposed to moist air. Phosphate rock contains relatively high concentrations of naturally occurring radioactive materials from the uranium and thorium decay series, specifically 238 Uranium and 232 Thorium [4]. These radionuclides are removed during processing and bound in solid waste such as phosphogypsum [4].

The Environmental Protection Agency (EPA) has banned the use of phosphogypsum with an average concentration of 10 pCi/g of radium in drywall and other industrial uses. Phosphogypsum from northern Florida has 10 pCi/g radium on average while phosphogypsum from the central Florida region has on average 26pCi/g radium making it unusable [1]. As a result it is stored indefinitely in stacks near the beneficiation plant. While the stacks are uncapped, the phosphogypsum can be carried from the site by wind and water runoff. There are approximately 1 billion ton of phosphogypsum stored in 25 stacks across Florida. Twenty two of these stacks are located in central Florida. The industry produces 30 million tons of phosphogympsum a year.

Fugitive dust is any particulate matter that is unintentionally released from an operation. It is dust that affects ambient air quality. Virtually all dust generated during mining operations can be classified as fugitive dust. [5]

Dust and other inhaled particulates place stress on the respiratory tract. The size of the particle has a significant effect on its ability to penetrate into the respiratory system. The EPA has established its own air particulate rules for $PM_{2.5}$ and PM_{10}. For $PM_{2.5}$ the limit, known as the annual mean, is set at 15 μg/m^3 over three years and 35 μg/m^3 over 24 hours. $PM_{2.5}$ and PM_{10} were established for communities. The US EPA does not have a standard for components of $PM_{2.5}$ and PM_{10}.

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends that airborne concentrations of respirable particulate matter (RPM) be kept below 3 mg/m^3 total and 10 mg/m^3 for total dust (TD) until a Threshold Limit Value (TLV) can be established [3]. ACGIH has set the TLV for crystalline silica, which can cause pulmonary fibrosis and lung cancer, at 0.025 mg/m^3 [3]. ACGIH TLVs are for workers exposed during an eight hour period [6].

The Occupational Safety and Health Administration (OSHA) has a Permissible Exposure Limit (PEL) for respirable crystalline silica, which includes silica in sand, at 10 mg/m^3 divided by the percent respirable quartz + 2. The National Institute for Occupation Safety and Health (NIOSH) Recommended Exposure Limit (REL) for respirable crystalline silica is 0.05 mg/m^3. For silica, the immediately dangerous to life or health (IDLH) value is 50 mg/m^3.

The Florida Department of Environmental Protection operates the Florida Air Quality System (FLAQS), to monitor and allow mapping of ozone and $PM_{2.5}$ particulate levels recorded by the Florida Ambient Air Monitoring Network [7]. $PM_{2.5}$ data from these particle pollution monitoring stations is reported in $\mu g/m^3$. Polk County is home to three phosphate mines: South Fort Meade Mine (Mosaic Fertilizer LLC), Hookers Prairie Mine (Mosaic Fertilizer LLC), and Four Corners (Mosaic Phosphate Company).

Under normal conditions, fugitive dust emissions from the mining process are minimal. More than 98 percent of the phosphate rock mined in the United States is mined in areas where the ground moisture content is high enough to prevent particulate emissions during ore removal [8]. Fugitive dust emissions could become a concern in the event of significant drought or other effect that leads to a depressed water table. It is a scenario such as this that this thesis investigates.

2.2 The Screen View Software

The screening software Screen View ™ from Lake Environmental was used as a preliminary tool to model release of the fugitive dust from phosphate mines. Screen View ™ is a free screening software interface for the U.S. EPA's screening model SCREEN3. SCREEN3 is a single source Gaussian plume model which provides Maximum Ground-Level Concentrations (MGLC) for point, area, flare, and volume sources [9].

2.2.1 Inputs Required by the Screen View Software

The Screen View software requires the user to specify several input conditions in order to run the model. The required input is as follows:

- **Source Type:** Classification of the source as a point, flare, area, or volume.
- **Dispersion Coefficient:** If 50 percent or more of the 3 km area around the source can be classified as urban, then the urban dispersion coefficient is selected. Otherwise, the rural coefficient is selected [10].
- **Flagpole Receptor Height:** The height of the receptor above ground level in meters or feet. This is used to replicate receptors located on building roof tops, poles, or balconies.
- **Emission Rate:** The amount material emitted from the source. For an area source, it is in $g/s/m^2$ or $lb/hr/ft^2$.
- **Source Release Height:** The height above ground level that the source is released in meters or ft.
- **Larger Side Length of the Rectangular Area:** The length of the longer side of the rectangular area source in meters feet.
- **Smaller Side Length of the Rectangular Area:** The length of the shorter side of the rectangular area source in meters feet.
- **Search Through Range of Wind Directions:** Determines whether or not the software will look at a range of wind directions to find the maximum concentration of the emitted material. "Yes" is selected as default for most regulatory modeling. "No" should only be selected if the modeler is attempting to determine the concentration at a specific receptor. If this is the case, then the user will be able to enter a direction into the Wind Direction Relative to Long Dimension text box.
- **Wind Direction Relative to Long Dimension:** This is the direction the wind is blowing relative to the long dimension axis of the rectangular area. The value

entered is in degrees. This option is only available if the software is instructed not to search through a range of wind directions

2.2.2 Additional Options Available for Inclusion in the Model

Screen View has several options that can be selected to more closely tailor the model to the user's desired specifications. The options available are dependent upon the point source specified and include:

- **Terrain Options:** Simple or complex terrain. Simple terrain is flat, while complex terrain can include hills. An area source can only utilize simple terrain.
- **Distance:** The distance from the receptor to the source can be automated where it uses an array of 50 predetermined distances, or discrete where the source is a specified distance away ranging from 1 meter to 100,000 meters.
- **Meteorology:** Allows the user to specify full meteorology (all atmospheric stability classes and wind speeds), single stability class (one stability class and all wind speeds), or single stability class and wind speed. Using full meteorology, all atmospheric stability classes and wind speeds are assessed to determine the greatest MGLC. In the single stability class and wind speed option, the user specifies the stability class, and the 10-meter wind speed which is the wind speed 10 meters above the ground in meters per second. This value is selected from a range of a values determined by the chosen stability class.
- **Brode 2 Mixing Height:** An algorithm which calculates mixing based on the calculated plume height, the anemometer height wind speed, and the stability factor which is compared to the stability-dependent minimum mixing height [10].

- **Anemometer Height:** The height of the anemometer used to measure wind speed. It is used to adjust the wind speed to the stack height.

3 Experimental Design and Methodology

3.1 Hypothesis

Modeled fugitive dust emissions from phosphate mines can reach concentrations in excess of the OSHA PEL for respirable silica at a p value <0.05.

3.2 Atmospheric Conditions

All atmospheric stability conditions in this model are examined. Screen View also examines all possible wind speeds and selects the condition that generates the greatest MGLC. The direction of the wind was specified so that it was blowing directly towards each monitoring station.

3.3 Scenarios

This assessment focuses on the Hookers Prairie Mine. Hookers Prairie is a surface strip mining operation operated by Mosaic Fertilizer LLC. Located in Polk County, Florida, the mine has an ore body of approximately 2,225 hectares [11]. Geologically, the mine is a bone valley member, part of the Peace River formation and the Hawthorn group [12]. Bone valley is a region with unique phosphate deposits that has provided much of the United States' phosphate production. It is composed of sand-sized and larger phosphate grains in a matrix of quartz sand, silt and clay, [12]. The average overburden depths in this region of Florida are approximately 6.1 m or 20 ft and have an average density of 1.3 ton/cubic yard [5] [11]. The mine is assumed to be operating at a rate of

2.45 million tons per year [11]. An aerial photograph of the mine and the surrounding area, taken from Google Earth, can be seen in figure 1.

Figure 1: Aerial photography of Hooker's Prairie mine

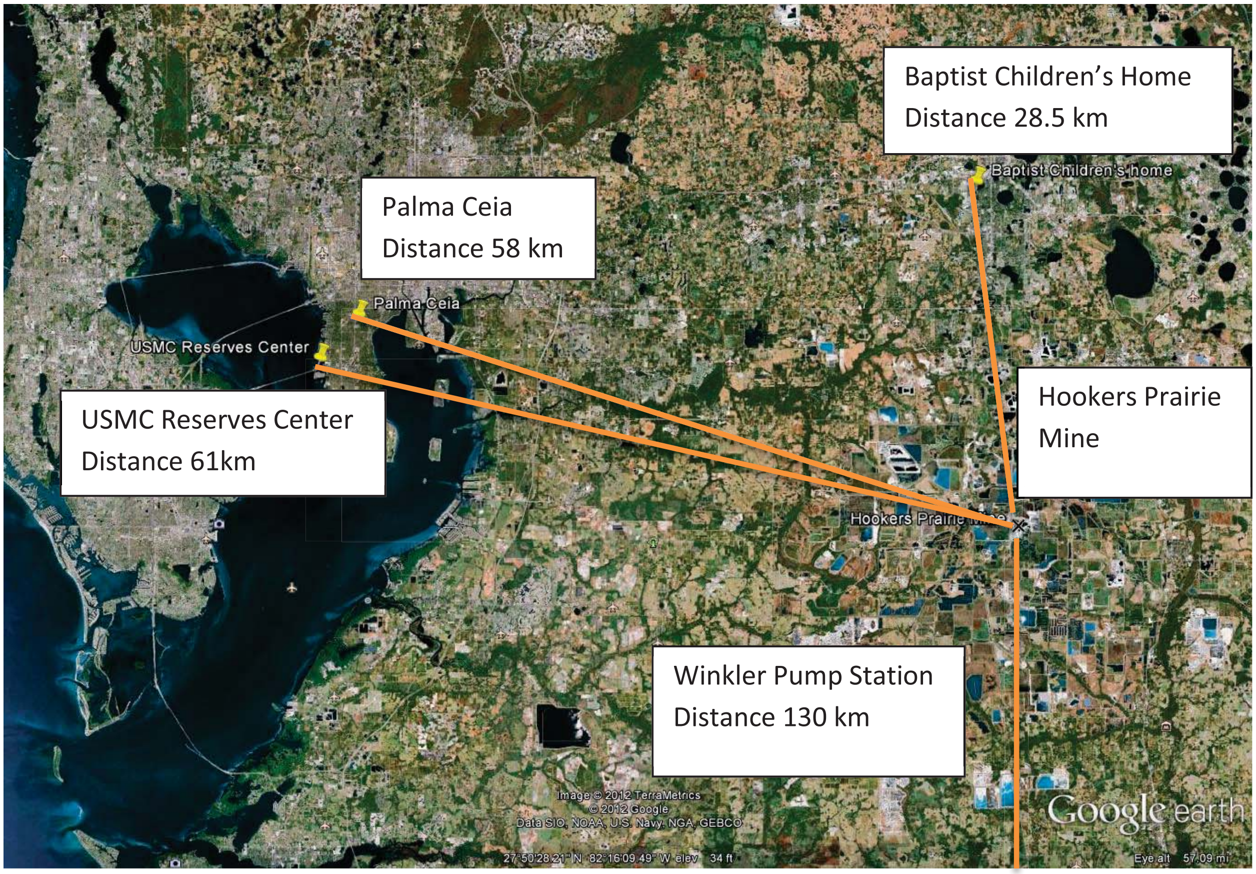

Figure 2: FLAQS particulate monitoring stations around the Hooker's Prairie mine

There are three Florida Air Quality System (FLAQS) particulate monitoring stations around the mine. The FLAQS monitors record PM 2.5 particles in μg/m^3. The closest of the three is at Baptist Children's Home, a distance of 28.5 km. The closest monitoring station up wind from the mine is Winkler Pump Station, 130 km to the South in Fort Myers.

3.4 Determining Model Parameters

For an area source, the algorithm used in the model was based on numerical integration and therefore it only allowed for the source to be represented by a rectangle. [10] Additionally, the software can only calculate simple terrain for an area source, so it was assumed that the mine floor was equal with the surrounding ground level. Based on a review of aerial photography from Google Earth, the decision was made to use the rural dispersion coefficient since a large portion of the surrounding 3 km appears to be fields. A receptor height of 10 meters was specified.

A review of the literature did not yield information on the amount of dust generated from phosphate mining in Florida since dust generation is not a problem under current climatic conditions. Requests for information for data on dust generation and size fractioning of the dust from Mosaic LLC, owner of the mine, were not answered [13]. Therefore data generated by PEDCo Environmental for fugitive dust generation from non-coal mining operations was selected.

The removal of overburden generally tends to be a significant source of fugitive dust in mining operations. [5] Its removal generates 0.048-0.10 pounds of dust per ton removed. Since the ore area has already been prepared, the overburden has already been removed and will not be taken into account in this model. Adapting from PEDCo data, the actual mining of ore is estimated to generate 0.0008-0.45 pounds of dust per ton of ore. Additional sources of fugitive dust can be found in table 1.

Table 1: Estimated Quantities of Fugitive Dust from Some Mining Operations - This table details the range of estimates of fugitive dust released in various mining operations for non-coal mining operations.

Operation	Quantity of Dust
Overburden Removal	0.048-0.10 lb./ton of overburden
Ore Removal	0.0008-0.45 lb./ton of Ore
Shovels/truck loading	Up to 0.1 lb./ton of ore
Haul Roads	0.8-2.2 lb./mile traveled

Haul roads have been shown to be a major fugitive dust source at surface mines with an emission rate of 0.8-2.2 lb/mile traveled. [5] In the case of phosphate mines, transportation of the ore is largely accomplished through slurry trench; therefore, dust generation is likely to be minimal and is not included in this model.

Since the mode of mining is strip mining via draglines, the point of generation of the dust is the dragline bucket. The size of most dragline buckets utilized ranges from 45-65 yd^3. [1] The exact size of the buckets utilized at the Hookers Prairie mine were unknown, so a bucket size of 65 yd^3 was chosen to avoid underestimation of fugitive dust generation. Since the bucket was assumed to be a cube, it results in a generation area of $14m^2$. The bucket was assumed to be generating dust constantly and located at the center of the mine. The movement of the bucket and the possibility of multiple draglines and shovels were not taken into account in this model application.

Three dust generation scenarios were investigated: high dust generation, medium dust generation, and low dust generation. Table 2 details the amount of dust generated in grams per second per square meter for each of the three generation scenarios.

Table 2: Dust Generation Scenarios - Three generation scenarios were modeled; high, medium, and low.

Generation Scenario	**Gram of dust per second per square meter ($g/s/m^2$)**
High	1.16
Medium	0.59
Low	0.002

3.5 Estimation of Total Dust

The output concentrations are in total dust (TD). Each scenario was evaluated to determine the concentrations at various distances and compared with exposure guidlines. A buffer was created as a .KLM file and input into Google Earth for analysis and display.

3.6 Estimation of Thoracic and Respirable Dust from Total Dust

The raw output from the model is for Total Dust. Since the model did not allow particle size consideration, adjustments to the data were made to estimate concentrations of respirable dust. This is a calculation applied to model output. A buffer was created as a .KLM file and input into Google Earth

A study by NIOSH on dust generated on haul roads at surface mines found that 14.5% (0.145) of airborne dust had a particle size less than 10 μm, and 3.5% (0.035) had a particle size less than 3.5 μm [14]. These values were used as a basis to estimate other dust exposure metrics, from total dust concentrations. Equation 1 shows an estimation of PM_{10}, which closely follows the size distribution of thoracic particulate matter.

Equation 1: Thoracic Particulate Matter (TPM)

$$TPM = TD\ x\ 0.145$$

Equation 2 details the estimation of $PM_{2.5}$, which closely follows the size distribution of respirable particulate matter from the available data.

Equation 2: Respirable Particulate Matter (RPM)

$$RPM = \ TD\ x\ 0.035$$

3.7 Estimate of Respirable Silica Dust from Total Dust

In this case, the agent of concern is silica. A survey of material safety data sheet information for quartz sand revealed silica concentrations ranging from 95-99.95%. The phosphate matrix is composed of approximately 1/3 quartz sand, so it was assumed that 1/3 of the generated dust was from quartz sand. The NIOSH study on haul road dust generation at surface mines found that 3.5 percent of dust generated was respirable. Using this data, an equation to estimate respirable silica dust was developed. Equation 3 details the estimate for respirable silica dust.

Equation 3: Respirable Silica

$$Respirable\ Silica = \frac{1}{3}\ TD\ x\ 0.035\ x\ 0.95$$

This value is compared with the TLV and REL.

To estimate a PEL for comparison, an analogy is made to granite, which is similar to the matrix as approximately one-third of the parent material is silica [15]. Of the respirable fraction in actual sampling of granite exposure, about 10 percent is silica [16]. This calculation can be seen in equation 4.

Equation 4: Calculation of a PEL

$$PEL\ mg\ \ m^3\ = \frac{10\ mg\ \ m^3}{2 + \%Respirable\ Quartz} = \frac{10\ mg\ \ m^3}{2 + 10} = 0.83\ mg\ \ m^3$$

After calculating the PEL, the hazard ratio for each point is calculated by dividing the concentration by the PEL [17]. Next, the 95% Upper Confidence Interval Limit ($UCL_{95\%}$) is determined by adding the Sampling and Analytical Error (SAE) of the method to the value [17]. The 95% Lower Confidence Limit ($LCL_{95\%}$) is calculated by subtracting the SAE [17]. This range is then examined to determine if the PEL has been exceeded.

If the $UCL_{95\%}$ is less than 1.0, then the investigator can be 95% confident that the PEL was not exceeded [17]. If the $LCL_{95\%}$ is greater than 1.0, then the investigator can be 95% confident that the PEL was exceeded [17]. If the $UCL_{95\%}$ was greater than 1.0, but the $LCL_{95\%}$ was less than 1.0, then the investigator cannot be 95% confident that the PEL was exceed [17].

4 Results

Results generated by the model can be found in table 3. Values were reported in μg/m^3.

Complete results from each model run can be found in Appendix I.

Table 3: Modeled Dust Concentrations: Total Dust Concentrations (TD) listed are in μg/m^3 at each of the three FLAQS monitoring stations. The values presented in this table are for total dust generated at Hookers Prairie Mine and do not include background PM 2.5 measured at Winkler Pump Station. The Maximum Ground Level Concentration (MGLC) is listed with the distance it is predicted to occur.

FLAQS Receptor	Screen View Worst Possible Atmospheric Stability Conditions		
	Dust Generation Scenario		
	Concentrations in μg/m^3		
	High	Medium	Low
Baptist Children's	110	60.0	1.9
Palma Ceia	0.00	0.0	0.0
USMC Reserve	0.0	0.0	0.0
MGLC (μg/m3)	20,000	10,000	345.4
Distance (m)	225	225	225

Calculated TPM, RPM, respirable silica, and PEL values for each scenario can be found in Appendix II.

Table 4: Farthest Distance Where Concentrations Exceed the TLV of total dust and respirable particulate matter for Each Scenario

Exposure Scenario	Farthest Distance (meters) TLV is Exceeded	
	Total Dust	RPM
High	800	225
Medium	200	-
Low	-	-

Table 5: Farthest Distance Where Concentrations Potentially Exceed the PEL, REL and TLV for respirable silica in Each Scenario

Exposure Scenario	Farthest Distance (meters) Limit Exceeded for Respirable SIlica							
	PEL (0.83 mg/m^3)				REL (0.05 mg/m^3)		TLV (0.025 mg/m^3)	
	Conc	LCL95%	UCL95%	Distance	Conc	Distance	Conc	Distance
High	0.638	0.51	1.03	200	0.057	1,600	0.026	2,600
Medium	-	-	-	-	0.054	900	0.025	1,600
Low	-	-	-	-	-	-	-	-

5 Discussion

According to the model, dust from the mine can reach surrounding communities, though at low concentrations. The largest Maximum Ground Level Concentrations (MGLC) was predicted to occur in the high generation scenario at 20,000 µg/m^3 or 20 mg/m^3. This level was predicted to occur at a distance of 225 m from the source of generation, not reaching surrounding communities.. If this were to occur, individuals who work outdoors eight hours a day have the potential to be over exposed to total dust, and very close to the respirable particulate matter (RPM) TLV at 2.9 mg/m^3, given these model assumptions.

It cannot be concluded with 95 percent confidence that the PEL has been exceeded. Under the model parameters used, the farthest distance that it cannot be concluded with 95 percent confidence that the PEL has not been exceeded is 200 meters in the high dust generation scenario. As expected, there is a significant difference between the distances at which the PEL, REL, and TLV are potentially exceeded. These results show the REL was exceeded at1,600 and the TLV was exceeded at 2,600 meters. Results were similar for the medium generation scenario at 900 for the REL and1,600 meters for the TLV. Of the exposure guidelines considered, the TLV is the most conservative.

As can be seen in figure 3, the region of potential over exposure to total dust under the high generation scenario encompasses much of the current production area of the Hookers Prairie Mine. Figure 4 highlights the region of potential over exposure to total dust in the medium dust generation scenario. This is much smaller and entirely in the mine. Workers would need to wear appropriate respiratory protection while working under these generation and atmospheric conditions should the model parameters be consistent with geological conditions. The model did not predict potential over exposure to total dust in the low dust generation scenario.

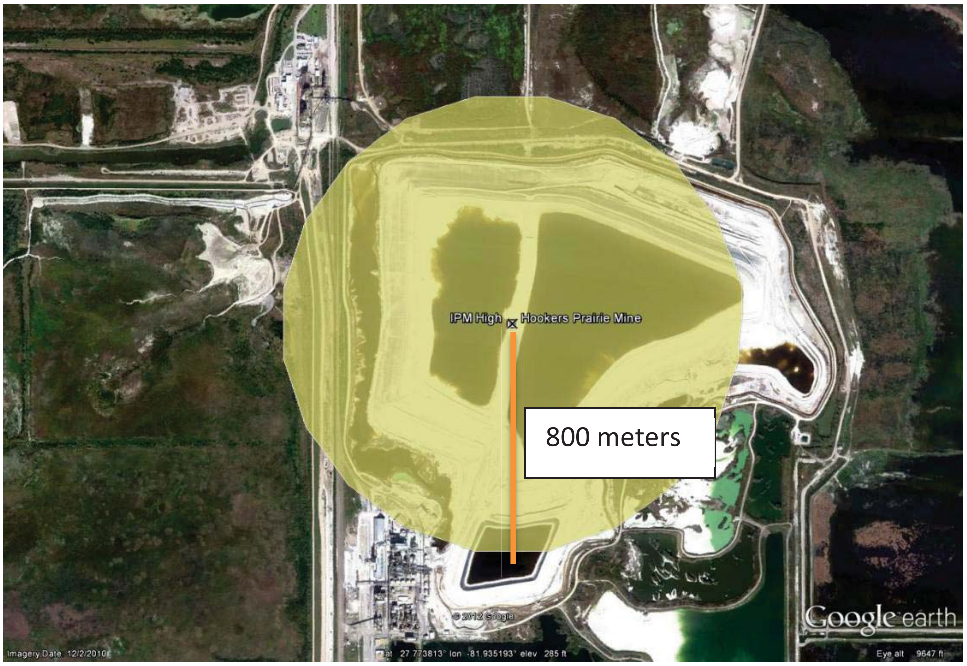

Figure 3: Region of potential over exposure to inhaled total dust under high dust generation scenario

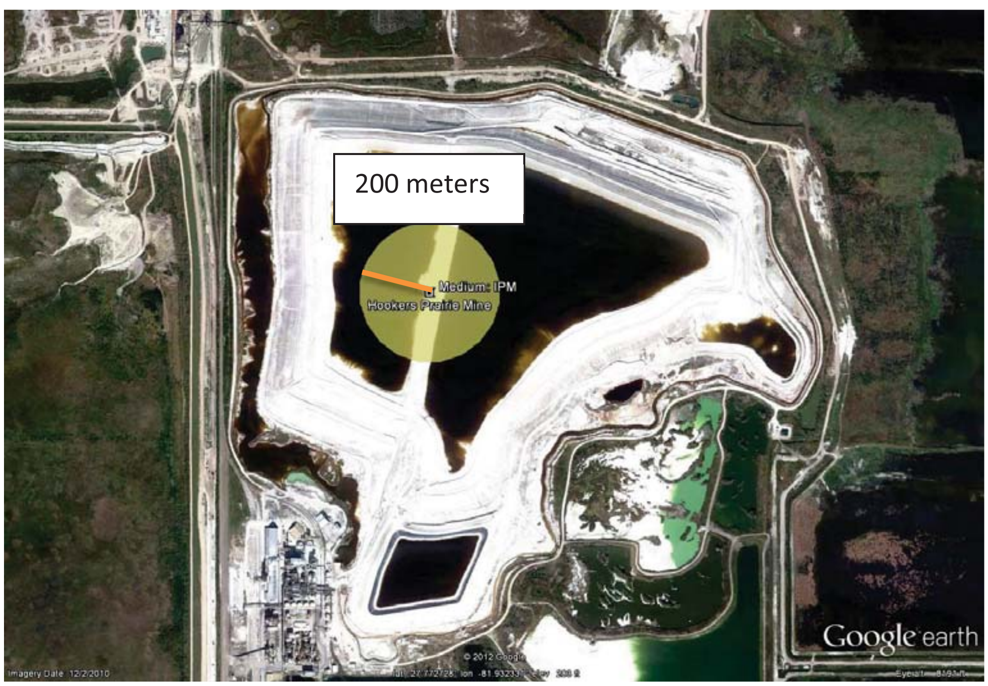

Figure 4: Region of potential over exposure to total dust under medium generation scenario

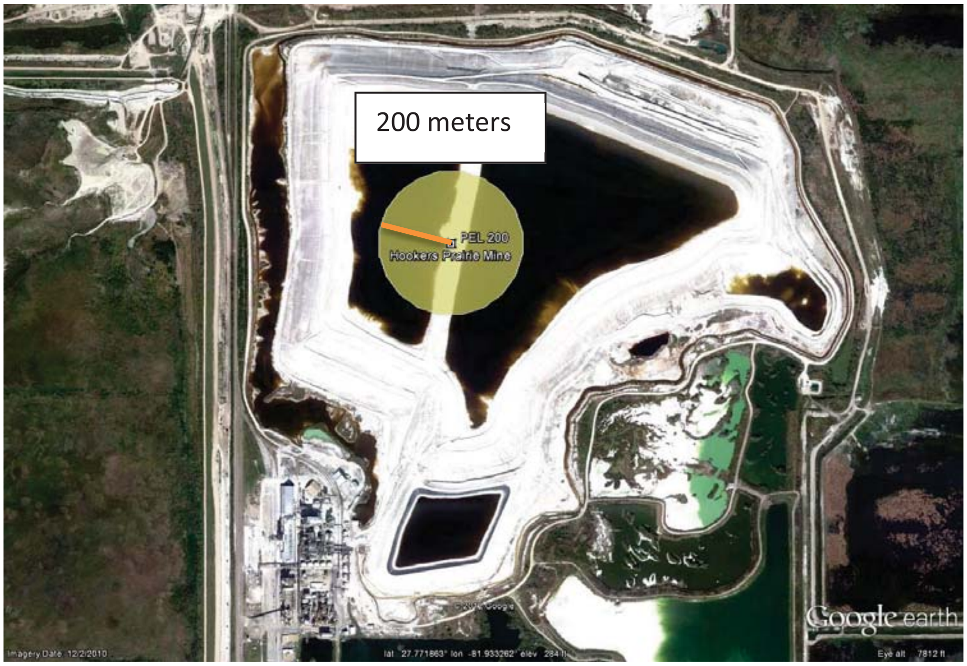

Figure 5: Region of potential over exposure to total dust in the high generation scenario

As can be seen in figure 5, the region of potential exposure to respirable silica does not extend beyond the active dig area in the high dust generation scenario. Workers at the mine would need to consider wearing respiratory protection to reduce their exposure to silica should the model parameters be consistent with geological conditions. It should be recognized that the adjustments made to total dust are crude and that they could vary if the particle size distribution was known.

It is important to recognize that Screen View examines a range of atmospheric conditions to determine the greatest MGLC. In all three scenarios, stability class 6, a stable atmosphere, was selected. Stability class 6 had a specified 10 meter wind speed range of 1-4 m/s. Less stable atmospheres or higher wind speeds are predicted to result in lower MGLCs, and therefore lower exposures. The model did not predict potential over exposure to respirable silica in the low dust generation scenario.

The situation presented here is a potential worst case using the currently active mining area and proposed environmental conditions. In the event that an expansion was to be added to Hookers Prairie mine or if a new mine were to open, overburden removal would have to be considered. Since overburden removal generates significant amounts of dust, the mass of fugitive dust generated would be far greater than predicted in this model.

If this situation was to be planned, models could be run in advance and an appropirate exposure plan developed. Exposures could be reduced through application of engineering controls such as water sprays, enclosed/ventilated cabs, and personal protective equipment if engineering controls were not sufficent.

5.1 Limitations

There are some clear limitations with this study. It is possible that the model specifications were inaccurate, especially on the amount of dust generated. From the generated results, it is clear that the usual condition is not a worst case. Better data on the dust generation rate will need to be acquired to produce a more accurate model. Research is needed to determine the particle size range of dust generated during phosphate mining

Screen View is a screening tool that can be used to determine if more in depth modeling should be considered. As a screening tool, it has limitations, e.g., it does not take into account any physical characteristics of the particulate in question, such as Stokes number or aerodynamic diameter. Further, Screen View does not allow the plane of generation to be placed below ground level, as is the case in the actual mine. This distance is approximately 6.1 m. Therefore, more particulate matter will be predicted to escape the mine than probably can occur, resulting in larger predicted concentrations at the monitor.

The monitors used in this study were a significant distance away from the point of generation. The greater the distance from the source to the monitor, the more difficult it becomes to attribute particulate measured at the monitor to the source unless the particulate is in some way identifiably unique to the source. In this case, there are two other mining facilities between Hookers Prairie and the Baptist Children's Home, which makes it impossible to identify fugitive dust specifically from Hookers Prairie or the other two facilities.

The FLAQS monitors used in this study only record $PM_{2.5}$. Therefore they are only useful for assessing exposure to this fraction at the monitoring site. The particulate is not analyzed to determine what it actually is. Combustion engines, fires, and other high energy activities generate $PM_{2.5}$ particles. If the scenario investigated in this thesis were to occur, identification and speciation of the collected particles would be necessary to better understand exposure.

Based on the actual, current situation on the ground, fugitive dust emissions from the mining process are not of concern since soil moisture content largely prohibits dust generation. However it is the duty of industrial hygienists to anticipate, recognize, evaluate, and control potential hazards. It is important to recognize that if hydrology of Polk County were to change, there could be the potential for worker and community. Modeling is one valuable tool to anticipate potential hazards.

6 Conclusions

A significant drought or change in the hydrology of Polk County, Florida that leads to a drop in the water table could have implications for public health and occupational health relating to the phosphate mining industry. In both the high and medium dust generation scenarios as presented here, the possibility of over exposure to total dust, RPM, and respirable silica would exist for outdoors workers, especially those working in Hookers Prairie mine. Exposure control might be required.

Managers and safety officials at mining facilities in Polk County, Hookers Prairie included, might examine their contingency plans to determine the potential effect of changes in local hydrology.

7 Need for Future Research

If this study were to be repeated, it is highly recommended to use particulate monitoring stations much closer to the mining site to evaluate particle size and obtain a more accurate estimation of particle generation rates. Data generated in this study may be used as a guide as to where to place monitoring locations. It is recommended field monitors be used instead of the FLAQS monitors as the particulate collected could then be analyzed for content, size and mass.

Data on the particle size range produced during phosphate mining was not found in the literature. Knowing the respirable size fraction of the dust as well as the percent of free airborne silica would allow the estimates presented to be greatly refined.

This study only included one dragline. The number in operation and the size of their bucket was unknown. This information would allow the construction of a more comprehensive and precise model.

In future studies, the use of a more sophisticated model such as AERMOD is recommended. The model selected should be able to take into account local terrain features and allow the plane of generation to be below surrounding ground level. It should also allow the user to enter the characteristics of the particles generated.

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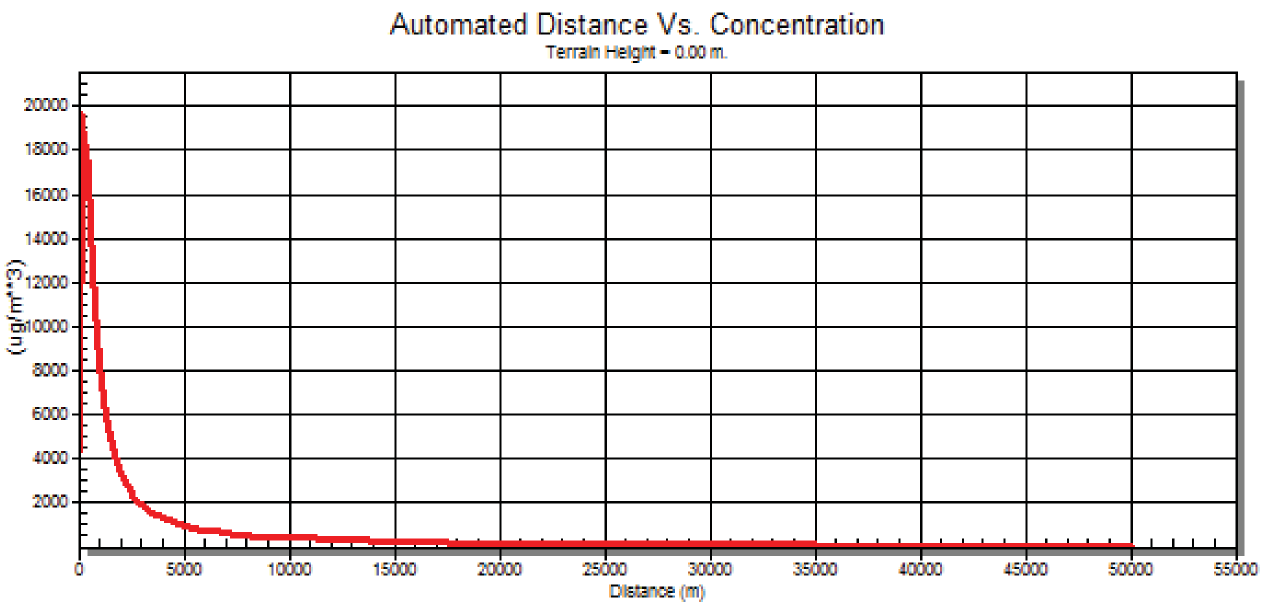
Appendix I: Screen View Output

1 Screen View Determines worst possible Atmospheric Stability Conditions for Highest MGLC

1.1 Children's Baptist Hospital:

Distance from Hookers Prairie – 28.5km

1.1.1 High Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                  =         AREA
    EMISSION RATE (G/(S-M**2))   =      1.16000
    SOURCE HEIGHT (M)            =       0.0000
    LENGTH OF LARGER SIDE (M)    =       3.7410
    LENGTH OF SMALLER SIDE (M)   =       3.7410
    RECEPTOR HEIGHT (M)          =      10.0000
    URBAN/RURAL OPTION           =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     352.4900


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***
```

```
 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	352.
100.	4294.	5	1.0	1.0	10000.0	0.00	352.
200.	0.1961E+05	5	1.0	1.0	10000.0	0.00	352.
300.	0.1810E+05	5	1.0	1.0	10000.0	0.00	352.
400.	0.1824E+05	6	1.0	1.0	10000.0	0.00	352.
500.	0.1681E+05	6	1.0	1.0	10000.0	0.00	352.
600.	0.1471E+05	6	1.0	1.0	10000.0	0.00	352.
700.	0.1269E+05	6	1.0	1.0	10000.0	0.00	352.
800.	0.1099E+05	6	1.0	1.0	10000.0	0.00	352.
900.	9591.	6	1.0	1.0	10000.0	0.00	352.
1000.	8435.	6	1.0	1.0	10000.0	0.00	352.
1100.	7495.	6	1.0	1.0	10000.0	0.00	352.
1200.	6710.	6	1.0	1.0	10000.0	0.00	352.
1300.	6048.	6	1.0	1.0	10000.0	0.00	352.
1400.	5484.	6	1.0	1.0	10000.0	0.00	352.
1500.	5000.	6	1.0	1.0	10000.0	0.00	352.
1600.	4582.	6	1.0	1.0	10000.0	0.00	352.
1700.	4217.	6	1.0	1.0	10000.0	0.00	352.
1800.	3897.	6	1.0	1.0	10000.0	0.00	352.
1900.	3615.	6	1.0	1.0	10000.0	0.00	352.
2000.	3364.	6	1.0	1.0	10000.0	0.00	352.
2100.	3151.	6	1.0	1.0	10000.0	0.00	352.
2200.	2960.	6	1.0	1.0	10000.0	0.00	352.
2300.	2788.	6	1.0	1.0	10000.0	0.00	352.
2400.	2632.	6	1.0	1.0	10000.0	0.00	352.
2500.	2490.	6	1.0	1.0	10000.0	0.00	352.
2600.	2361.	6	1.0	1.0	10000.0	0.00	352.
2700.	2242.	6	1.0	1.0	10000.0	0.00	352.
2800.	2134.	6	1.0	1.0	10000.0	0.00	352.
2900.	2033.	6	1.0	1.0	10000.0	0.00	352.
3000.	1941.	6	1.0	1.0	10000.0	0.00	352.
3500.	1587.	6	1.0	1.0	10000.0	0.00	352.
4000.	1331.	6	1.0	1.0	10000.0	0.00	352.
4500.	1140.	6	1.0	1.0	10000.0	0.00	352.
5000.	991.5	6	1.0	1.0	10000.0	0.00	352.
5500.	873.8	6	1.0	1.0	10000.0	0.00	352.
6000.	778.5	6	1.0	1.0	10000.0	0.00	352.
6500.	700.0	6	1.0	1.0	10000.0	0.00	352.
7000.	634.1	6	1.0	1.0	10000.0	0.00	352.
7500.	580.4	6	1.0	1.0	10000.0	0.00	352.
8000.	534.2	6	1.0	1.0	10000.0	0.00	352.

```
  8500.   494.2        6     1.0    1.0 10000.0    0.00    352.
  9000.   459.1        6     1.0    1.0 10000.0    0.00    352.
  9500.   428.3        6     1.0    1.0 10000.0    0.00    352.
 10000.   400.9        6     1.0    1.0 10000.0    0.00    352.
 15000.   237.9        6     1.0    1.0 10000.0    0.00    352.
 20000.   168.3        6     1.0    1.0 10000.0    0.00    352.
 25000.   128.8        6     1.0    1.0 10000.0    0.00    352.
 30000.   103.6        6     1.0    1.0 10000.0    0.00    352.
 40000.   74.51        6     1.0    1.0 10000.0    0.00    352.
 50000.   57.78        6     1.0    1.0 10000.0    0.00    352.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
   225.  0.2003E+05    5     1.0    1.0 10000.0    0.00    352.

*********************************
*** SCREEN DISCRETE DISTANCES ***
*********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

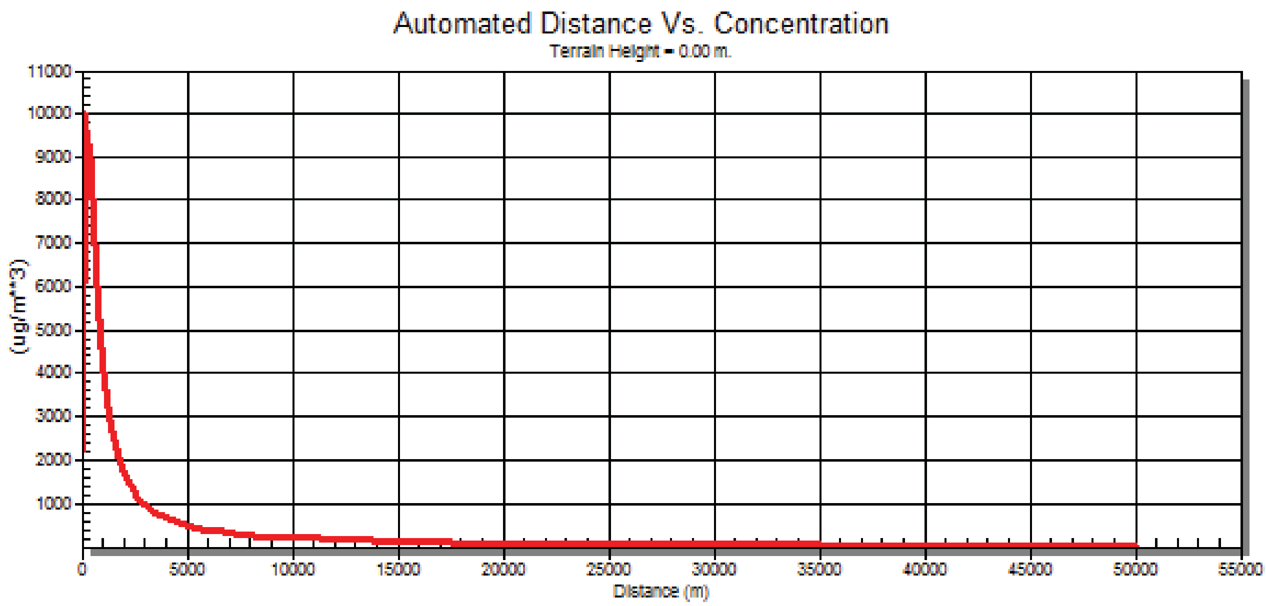
   DIST     CONC             U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
  28500.   110.1        6     1.0    1.0 10000.0    0.00    352.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC    DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
 --------------   -----------   -------   -------
 SIMPLE TERRAIN    0.2003E+05      225.        0.


***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

1.1.2 Medium Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                  =         AREA
    EMISSION RATE (G/(S-M**2))   =     0.590000
    SOURCE HEIGHT (M)            =       0.0000
    LENGTH OF LARGER SIDE (M)    =       3.7410
    LENGTH OF SMALLER SIDE (M)   =       3.7410
    RECEPTOR HEIGHT (M)          =      10.0000
    URBAN/RURAL OPTION           =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     352.4900


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	352.
100.	2184.	5	1.0	1.0	10000.0	0.00	352.
200.	9976.	5	1.0	1.0	10000.0	0.00	352.

300.	9207.	5	1.0	1.0	10000.0	0.00	352.
400.	9275.	6	1.0	1.0	10000.0	0.00	352.
500.	8549.	6	1.0	1.0	10000.0	0.00	352.
600.	7481.	6	1.0	1.0	10000.0	0.00	352.
700.	6455.	6	1.0	1.0	10000.0	0.00	352.
800.	5591.	6	1.0	1.0	10000.0	0.00	352.
900.	4878.	6	1.0	1.0	10000.0	0.00	352.
1000.	4290.	6	1.0	1.0	10000.0	0.00	352.
1100.	3812.	6	1.0	1.0	10000.0	0.00	352.
1200.	3413.	6	1.0	1.0	10000.0	0.00	352.
1300.	3076.	6	1.0	1.0	10000.0	0.00	352.
1400.	2789.	6	1.0	1.0	10000.0	0.00	352.
1500.	2543.	6	1.0	1.0	10000.0	0.00	352.
1600.	2330.	6	1.0	1.0	10000.0	0.00	352.
1700.	2145.	6	1.0	1.0	10000.0	0.00	352.
1800.	1982.	6	1.0	1.0	10000.0	0.00	352.
1900.	1838.	6	1.0	1.0	10000.0	0.00	352.
2000.	1711.	6	1.0	1.0	10000.0	0.00	352.
2100.	1603.	6	1.0	1.0	10000.0	0.00	352.
2200.	1506.	6	1.0	1.0	10000.0	0.00	352.
2300.	1418.	6	1.0	1.0	10000.0	0.00	352.
2400.	1339.	6	1.0	1.0	10000.0	0.00	352.
2500.	1267.	6	1.0	1.0	10000.0	0.00	352.
2600.	1201.	6	1.0	1.0	10000.0	0.00	352.
2700.	1141.	6	1.0	1.0	10000.0	0.00	352.
2800.	1085.	6	1.0	1.0	10000.0	0.00	352.
2900.	1034.	6	1.0	1.0	10000.0	0.00	352.
3000.	987.3	6	1.0	1.0	10000.0	0.00	352.
3500.	806.9	6	1.0	1.0	10000.0	0.00	352.
4000.	677.1	6	1.0	1.0	10000.0	0.00	352.
4500.	579.7	6	1.0	1.0	10000.0	0.00	352.
5000.	504.3	6	1.0	1.0	10000.0	0.00	352.
5500.	444.4	6	1.0	1.0	10000.0	0.00	352.
6000.	396.0	6	1.0	1.0	10000.0	0.00	352.
6500.	356.0	6	1.0	1.0	10000.0	0.00	352.
7000.	322.5	6	1.0	1.0	10000.0	0.00	352.
7500.	295.2	6	1.0	1.0	10000.0	0.00	352.
8000.	271.7	6	1.0	1.0	10000.0	0.00	352.
8500.	251.3	6	1.0	1.0	10000.0	0.00	352.
9000.	233.5	6	1.0	1.0	10000.0	0.00	352.
9500.	217.8	6	1.0	1.0	10000.0	0.00	352.
10000.	203.9	6	1.0	1.0	10000.0	0.00	352.
15000.	121.0	6	1.0	1.0	10000.0	0.00	352.
20000.	85.60	6	1.0	1.0	10000.0	0.00	352.
25000.	65.50	6	1.0	1.0	10000.0	0.00	352.
30000.	52.67	6	1.0	1.0	10000.0	0.00	352.
40000.	37.90	6	1.0	1.0	10000.0	0.00	352.
50000.	29.39	6	1.0	1.0	10000.0	0.00	352.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

225.	0.1019E+05	5	1.0	1.0	10000.0	0.00	352.

```
 **********************************
 *** SCREEN DISCRETE DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

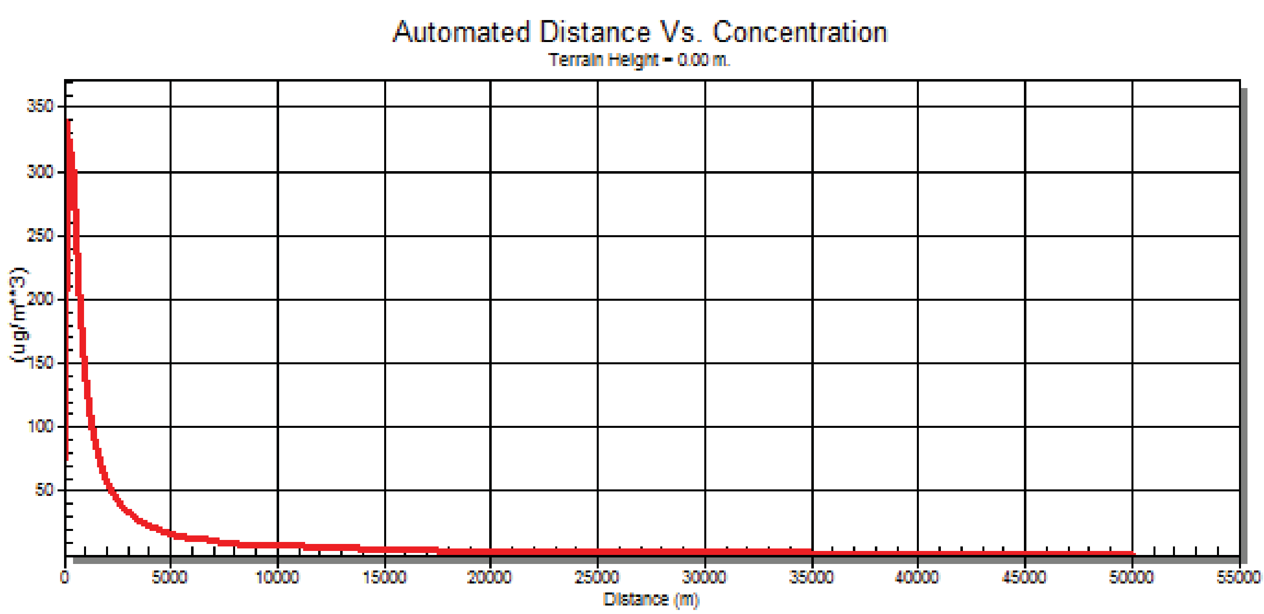
   DIST      CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)    (UG/M**3)   STAB   (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------   ----   -----  -----  ------  ------  -------
  28500.   55.99          6     1.0     1.0 10000.0    0.00    352.

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

  CALCULATION         MAX CONC     DIST TO    TERRAIN
   PROCEDURE         (UG/M**3)     MAX (M)     HT (M)
 --------------     -----------    -------    -------
 SIMPLE TERRAIN      0.1019E+05      225.          0.


 ***************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
 ***************************************************
```

1.1.3 Low Emission Rate



SIMPLE TERRAIN INPUTS:

```
    SOURCE TYPE                  =          AREA
    EMISSION RATE (G/(S-M**2))  =     0.200000E-01
    SOURCE HEIGHT (M)            =       0.0000
    LENGTH OF LARGER SIDE (M)    =       3.7410
    LENGTH OF SMALLER SIDE (M)   =       3.7410
    RECEPTOR HEIGHT (M)          =      10.0000
    URBAN/RURAL OPTION           =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     352.4900


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	352.
100.	74.03	5	1.0	1.0	10000.0	0.00	352.
200.	338.2	5	1.0	1.0	10000.0	0.00	352.
300.	312.1	5	1.0	1.0	10000.0	0.00	352.
400.	314.4	6	1.0	1.0	10000.0	0.00	352.
500.	289.8	6	1.0	1.0	10000.0	0.00	352.
600.	253.6	6	1.0	1.0	10000.0	0.00	352.
700.	218.8	6	1.0	1.0	10000.0	0.00	352.
800.	189.5	6	1.0	1.0	10000.0	0.00	352.
900.	165.4	6	1.0	1.0	10000.0	0.00	352.
1000.	145.4	6	1.0	1.0	10000.0	0.00	352.
1100.	129.2	6	1.0	1.0	10000.0	0.00	352.
1200.	115.7	6	1.0	1.0	10000.0	0.00	352.
1300.	104.3	6	1.0	1.0	10000.0	0.00	352.
1400.	94.56	6	1.0	1.0	10000.0	0.00	352.
1500.	86.21	6	1.0	1.0	10000.0	0.00	352.
1600.	78.99	6	1.0	1.0	10000.0	0.00	352.
1700.	72.70	6	1.0	1.0	10000.0	0.00	352.
1800.	67.19	6	1.0	1.0	10000.0	0.00	352.
1900.	62.32	6	1.0	1.0	10000.0	0.00	352.
2000.	58.00	6	1.0	1.0	10000.0	0.00	352.
2100.	54.34	6	1.0	1.0	10000.0	0.00	352.
2200.	51.04	6	1.0	1.0	10000.0	0.00	352.
2300.	48.07	6	1.0	1.0	10000.0	0.00	352.

2400.	45.38	6	1.0	1.0	10000.0	0.00	352.
2500.	42.94	6	1.0	1.0	10000.0	0.00	352.
2600.	40.70	6	1.0	1.0	10000.0	0.00	352.
2700.	38.66	6	1.0	1.0	10000.0	0.00	352.
2800.	36.79	6	1.0	1.0	10000.0	0.00	352.
2900.	35.06	6	1.0	1.0	10000.0	0.00	352.
3000.	33.47	6	1.0	1.0	10000.0	0.00	352.
3500.	27.35	6	1.0	1.0	10000.0	0.00	352.
4000.	22.95	6	1.0	1.0	10000.0	0.00	352.
4500.	19.65	6	1.0	1.0	10000.0	0.00	352.
5000.	17.09	6	1.0	1.0	10000.0	0.00	352.
5500.	15.07	6	1.0	1.0	10000.0	0.00	352.
6000.	13.42	6	1.0	1.0	10000.0	0.00	352.
6500.	12.07	6	1.0	1.0	10000.0	0.00	352.
7000.	10.93	6	1.0	1.0	10000.0	0.00	352.
7500.	10.01	6	1.0	1.0	10000.0	0.00	352.
8000.	9.211	6	1.0	1.0	10000.0	0.00	352.
8500.	8.520	6	1.0	1.0	10000.0	0.00	352.
9000.	7.916	6	1.0	1.0	10000.0	0.00	352.
9500.	7.384	6	1.0	1.0	10000.0	0.00	352.
10000.	6.913	6	1.0	1.0	10000.0	0.00	352.
15000.	4.102	6	1.0	1.0	10000.0	0.00	352.
20000.	2.902	6	1.0	1.0	10000.0	0.00	352.
25000.	2.220	6	1.0	1.0	10000.0	0.00	352.
30000.	1.785	6	1.0	1.0	10000.0	0.00	352.
40000.	1.285	6	1.0	1.0	10000.0	0.00	352.
50000.	0.9963	6	1.0	1.0	10000.0	0.00	352.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

225.	345.3	5	1.0	1.0	10000.0	0.00	352.

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
28500.	1.898	6	1.0	1.0	10000.0	0.00	352.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

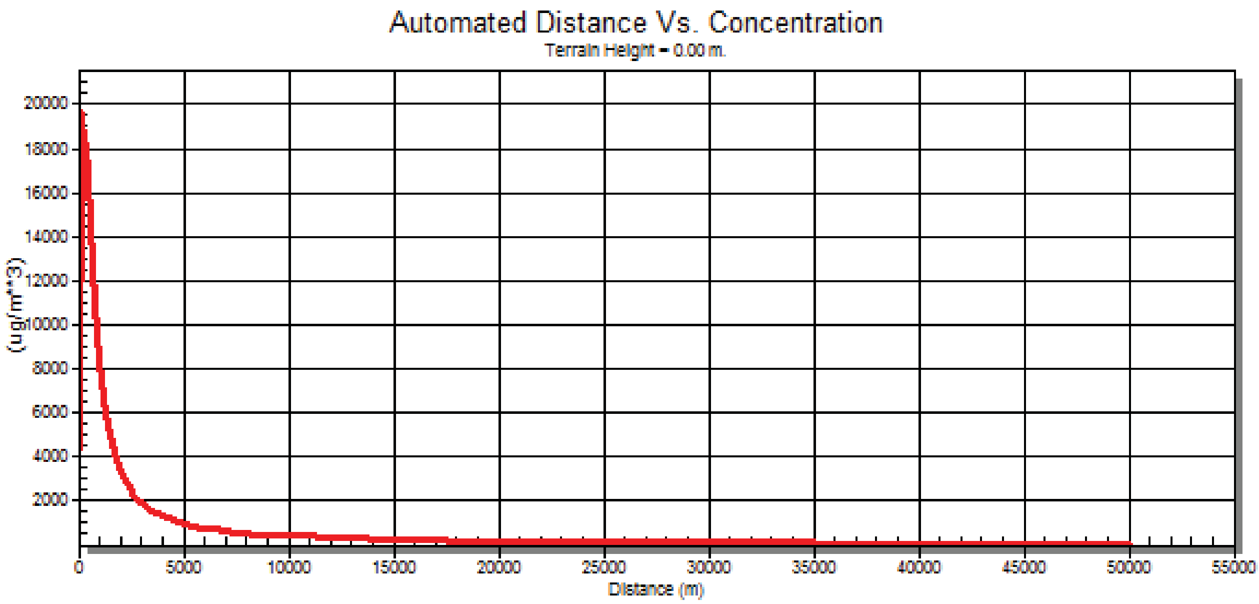
CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	345.3	225.	0.

```
***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

1.2 Palma Ceia:

Distance from Hookers Prairie – 58.7 km

1.2.1 High Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                  =        AREA
    EMISSION RATE (G/(S-M**2))   =     1.16000
    SOURCE HEIGHT (M)            =      0.0000
    LENGTH OF LARGER SIDE (M)    =      3.7410
    LENGTH OF SMALLER SIDE (M)   =      3.7410
    RECEPTOR HEIGHT (M)          =     10.0000
    URBAN/RURAL OPTION           =       RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     286.9200


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************
```

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	287.
100.	4295.	5	1.0	1.0	10000.0	0.00	287.
200.	0.1962E+05	5	1.0	1.0	10000.0	0.00	287.
300.	0.1810E+05	5	1.0	1.0	10000.0	0.00	287.
400.	0.1824E+05	6	1.0	1.0	10000.0	0.00	287.
500.	0.1680E+05	6	1.0	1.0	10000.0	0.00	287.
600.	0.1471E+05	6	1.0	1.0	10000.0	0.00	287.
700.	0.1269E+05	6	1.0	1.0	10000.0	0.00	287.
800.	0.1099E+05	6	1.0	1.0	10000.0	0.00	287.
900.	9591.	6	1.0	1.0	10000.0	0.00	287.
1000.	8434.	6	1.0	1.0	10000.0	0.00	287.
1100.	7495.	6	1.0	1.0	10000.0	0.00	287.
1200.	6710.	6	1.0	1.0	10000.0	0.00	287.
1300.	6048.	6	1.0	1.0	10000.0	0.00	287.
1400.	5484.	6	1.0	1.0	10000.0	0.00	287.
1500.	5000.	6	1.0	1.0	10000.0	0.00	287.
1600.	4581.	6	1.0	1.0	10000.0	0.00	287.
1700.	4217.	6	1.0	1.0	10000.0	0.00	287.
1800.	3897.	6	1.0	1.0	10000.0	0.00	287.
1900.	3614.	6	1.0	1.0	10000.0	0.00	287.
2000.	3364.	6	1.0	1.0	10000.0	0.00	287.
2100.	3152.	6	1.0	1.0	10000.0	0.00	287.
2200.	2960.	6	1.0	1.0	10000.0	0.00	287.
2300.	2788.	6	1.0	1.0	10000.0	0.00	287.
2400.	2632.	6	1.0	1.0	10000.0	0.00	287.
2500.	2490.	6	1.0	1.0	10000.0	0.00	287.
2600.	2361.	6	1.0	1.0	10000.0	0.00	287.
2700.	2242.	6	1.0	1.0	10000.0	0.00	287.
2800.	2134.	6	1.0	1.0	10000.0	0.00	287.
2900.	2034.	6	1.0	1.0	10000.0	0.00	287.
3000.	1941.	6	1.0	1.0	10000.0	0.00	287.
3500.	1587.	6	1.0	1.0	10000.0	0.00	287.
4000.	1331.	6	1.0	1.0	10000.0	0.00	287.
4500.	1139.	6	1.0	1.0	10000.0	0.00	287.
5000.	991.3	6	1.0	1.0	10000.0	0.00	287.
5500.	873.7	6	1.0	1.0	10000.0	0.00	287.
6000.	778.4	6	1.0	1.0	10000.0	0.00	287.
6500.	699.8	6	1.0	1.0	10000.0	0.00	287.
7000.	633.9	6	1.0	1.0	10000.0	0.00	287.
7500.	580.3	6	1.0	1.0	10000.0	0.00	287.
8000.	534.1	6	1.0	1.0	10000.0	0.00	287.
8500.	494.1	6	1.0	1.0	10000.0	0.00	287.
9000.	459.1	6	1.0	1.0	10000.0	0.00	287.
9500.	428.2	6	1.0	1.0	10000.0	0.00	287.
10000.	400.9	6	1.0	1.0	10000.0	0.00	287.
15000.	238.0	6	1.0	1.0	10000.0	0.00	287.

```
  20000.   168.4        6     1.0    1.0 10000.0    0.00    287.
  25000.   128.9        6     1.0    1.0 10000.0    0.00    287.
  30000.   103.7        6     1.0    1.0 10000.0    0.00    287.
  40000.   74.65        6     1.0    1.0 10000.0    0.00    287.
  50000.   57.89        6     1.0    1.0 10000.0    0.00    287.

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
    225.  0.2003E+05    5     1.0    1.0 10000.0    0.00    287.

 *********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

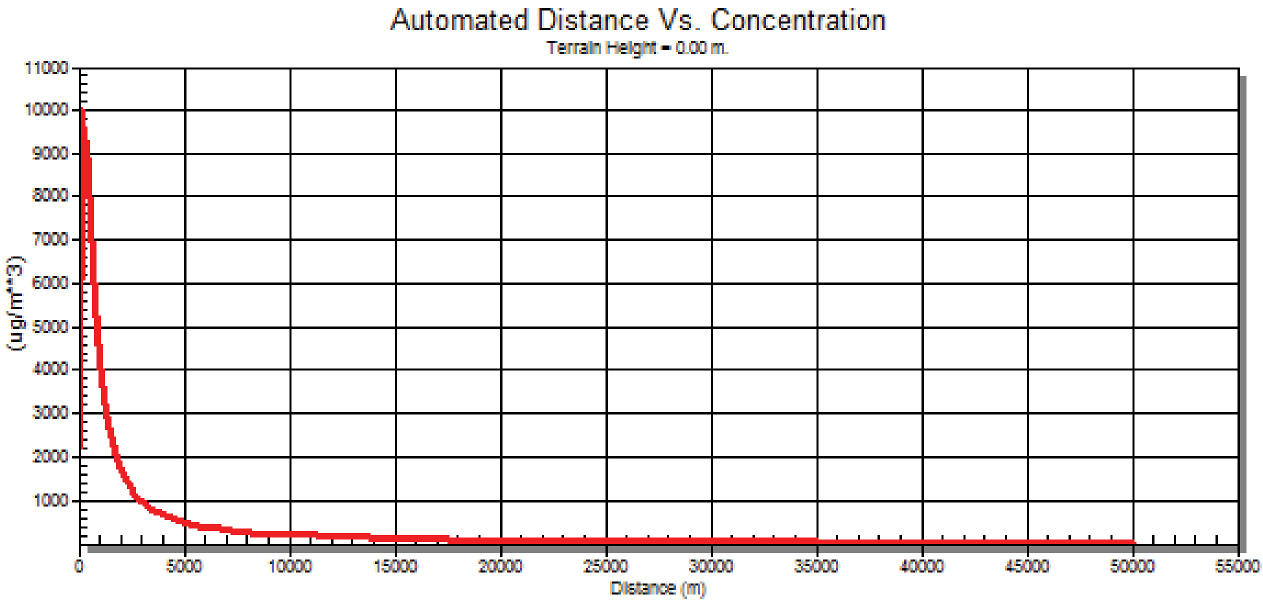
   DIST     CONC           U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
  58700.  -999.0        0     0.0    0.0     0.0    0.00      0.

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

  CALCULATION        MAX CONC    DIST TO   TERRAIN
   PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
 --------------    -----------   -------   -------
 SIMPLE TERRAIN     0.2003E+05      225.        0.


 ***************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
 ***************************************************
```

1.2.2 Medium Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                      =        AREA
    EMISSION RATE (G/(S-M**2))       =     0.590000
    SOURCE HEIGHT (M)                =       0.0000
    LENGTH OF LARGER SIDE (M)        =       3.7410
    LENGTH OF SMALLER SIDE (M)       =       3.7410
    RECEPTOR HEIGHT (M)              =      10.0000
    URBAN/RURAL OPTION               =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     286.9200


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

   DIST      CONC              U10M   USTK  MIX HT   PLUME   MAX DIR
    (M)    (UG/M**3)    STAB  (M/S)  (M/S)    (M)    HT  (M)   (DEG)
 -------  ----------    ----  -----  -----  ------   ------  -------
      1.    0.000        5     1.0    1.0 10000.0    0.00     287.
    100.    2184.        5     1.0    1.0 10000.0    0.00     287.
    200.    9978.        5     1.0    1.0 10000.0    0.00     287.
```

300.	9207.	5	1.0	1.0	10000.0	0.00	287.
400.	9276.	6	1.0	1.0	10000.0	0.00	287.
500.	8547.	6	1.0	1.0	10000.0	0.00	287.
600.	7481.	6	1.0	1.0	10000.0	0.00	287.
700.	6455.	6	1.0	1.0	10000.0	0.00	287.
800.	5591.	6	1.0	1.0	10000.0	0.00	287.
900.	4878.	6	1.0	1.0	10000.0	0.00	287.
1000.	4290.	6	1.0	1.0	10000.0	0.00	287.
1100.	3812.	6	1.0	1.0	10000.0	0.00	287.
1200.	3413.	6	1.0	1.0	10000.0	0.00	287.
1300.	3076.	6	1.0	1.0	10000.0	0.00	287.
1400.	2789.	6	1.0	1.0	10000.0	0.00	287.
1500.	2543.	6	1.0	1.0	10000.0	0.00	287.
1600.	2330.	6	1.0	1.0	10000.0	0.00	287.
1700.	2145.	6	1.0	1.0	10000.0	0.00	287.
1800.	1982.	6	1.0	1.0	10000.0	0.00	287.
1900.	1838.	6	1.0	1.0	10000.0	0.00	287.
2000.	1711.	6	1.0	1.0	10000.0	0.00	287.
2100.	1603.	6	1.0	1.0	10000.0	0.00	287.
2200.	1506.	6	1.0	1.0	10000.0	0.00	287.
2300.	1418.	6	1.0	1.0	10000.0	0.00	287.
2400.	1339.	6	1.0	1.0	10000.0	0.00	287.
2500.	1267.	6	1.0	1.0	10000.0	0.00	287.
2600.	1201.	6	1.0	1.0	10000.0	0.00	287.
2700.	1141.	6	1.0	1.0	10000.0	0.00	287.
2800.	1085.	6	1.0	1.0	10000.0	0.00	287.
2900.	1034.	6	1.0	1.0	10000.0	0.00	287.
3000.	987.3	6	1.0	1.0	10000.0	0.00	287.
3500.	807.0	6	1.0	1.0	10000.0	0.00	287.
4000.	677.0	6	1.0	1.0	10000.0	0.00	287.
4500.	579.6	6	1.0	1.0	10000.0	0.00	287.
5000.	504.2	6	1.0	1.0	10000.0	0.00	287.
5500.	444.4	6	1.0	1.0	10000.0	0.00	287.
6000.	395.9	6	1.0	1.0	10000.0	0.00	287.
6500.	355.9	6	1.0	1.0	10000.0	0.00	287.
7000.	322.4	6	1.0	1.0	10000.0	0.00	287.
7500.	295.2	6	1.0	1.0	10000.0	0.00	287.
8000.	271.7	6	1.0	1.0	10000.0	0.00	287.
8500.	251.3	6	1.0	1.0	10000.0	0.00	287.
9000.	233.5	6	1.0	1.0	10000.0	0.00	287.
9500.	217.8	6	1.0	1.0	10000.0	0.00	287.
10000.	203.9	6	1.0	1.0	10000.0	0.00	287.
15000.	121.0	6	1.0	1.0	10000.0	0.00	287.
20000.	85.66	6	1.0	1.0	10000.0	0.00	287.
25000.	65.54	6	1.0	1.0	10000.0	0.00	287.
30000.	52.73	6	1.0	1.0	10000.0	0.00	287.
40000.	37.97	6	1.0	1.0	10000.0	0.00	287.
50000.	29.44	6	1.0	1.0	10000.0	0.00	287.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

225.	0.1019E+05	5	1.0	1.0	10000.0	0.00	287.

```
 ********************************
 *** SCREEN DISCRETE DISTANCES ***
 ********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

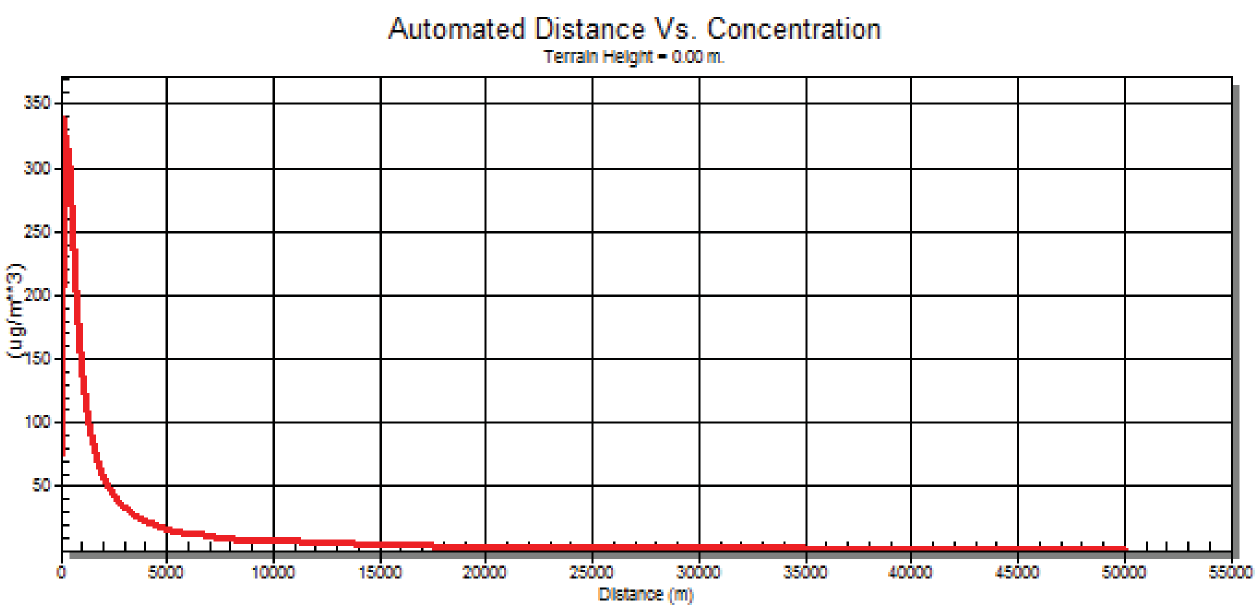
   DIST      CONC               U10M    USTK   MIX HT    PLUME   MAX DIR
    (M)    (UG/M**3)    STAB   (M/S)   (M/S)     (M)    HT  (M)   (DEG)
 -------  ----------    ----   -----   -----   ------   ------   -------
  58700.  -999.0          0      0.0     0.0      0.0     0.00        0.

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

  CALCULATION         MAX CONC     DIST TO    TERRAIN
   PROCEDURE         (UG/M**3)     MAX (M)     HT (M)
 --------------     -----------    -------    -------
 SIMPLE TERRAIN      0.1019E+05       225.         0.

 ***************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
 ***************************************************
```

1.2.3 Low Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                  =        AREA
    EMISSION RATE (G/(S-M**2))   =     0.200000E-01
    SOURCE HEIGHT (M)            =       0.0000
    LENGTH OF LARGER SIDE (M)    =       3.7410
```

LENGTH OF SMALLER SIDE (M) = 3.7410
RECEPTOR HEIGHT (M) = 10.0000
URBAN/RURAL OPTION = RURAL
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

ANGLE RELATIVE TO LONG AXIS = 286.9200

BUOY. FLUX = 0.000 M**4/S**3; MOM. FLUX = 0.000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	287.
100.	74.04	5	1.0	1.0	10000.0	0.00	287.
200.	338.2	5	1.0	1.0	10000.0	0.00	287.
300.	312.1	5	1.0	1.0	10000.0	0.00	287.
400.	314.4	6	1.0	1.0	10000.0	0.00	287.
500.	289.7	6	1.0	1.0	10000.0	0.00	287.
600.	253.6	6	1.0	1.0	10000.0	0.00	287.
700.	218.8	6	1.0	1.0	10000.0	0.00	287.
800.	189.5	6	1.0	1.0	10000.0	0.00	287.
900.	165.4	6	1.0	1.0	10000.0	0.00	287.
1000.	145.4	6	1.0	1.0	10000.0	0.00	287.
1100.	129.2	6	1.0	1.0	10000.0	0.00	287.
1200.	115.7	6	1.0	1.0	10000.0	0.00	287.
1300.	104.3	6	1.0	1.0	10000.0	0.00	287.
1400.	94.55	6	1.0	1.0	10000.0	0.00	287.
1500.	86.21	6	1.0	1.0	10000.0	0.00	287.
1600.	78.99	6	1.0	1.0	10000.0	0.00	287.
1700.	72.70	6	1.0	1.0	10000.0	0.00	287.
1800.	67.19	6	1.0	1.0	10000.0	0.00	287.
1900.	62.32	6	1.0	1.0	10000.0	0.00	287.
2000.	58.00	6	1.0	1.0	10000.0	0.00	287.
2100.	54.34	6	1.0	1.0	10000.0	0.00	287.
2200.	51.04	6	1.0	1.0	10000.0	0.00	287.
2300.	48.07	6	1.0	1.0	10000.0	0.00	287.
2400.	45.38	6	1.0	1.0	10000.0	0.00	287.
2500.	42.94	6	1.0	1.0	10000.0	0.00	287.
2600.	40.71	6	1.0	1.0	10000.0	0.00	287.
2700.	38.66	6	1.0	1.0	10000.0	0.00	287.

```
  2800.   36.79        6     1.0    1.0 10000.0    0.00    287.
  2900.   35.06        6     1.0    1.0 10000.0    0.00    287.
  3000.   33.47        6     1.0    1.0 10000.0    0.00    287.
  3500.   27.35        6     1.0    1.0 10000.0    0.00    287.
  4000.   22.95        6     1.0    1.0 10000.0    0.00    287.
  4500.   19.65        6     1.0    1.0 10000.0    0.00    287.
  5000.   17.09        6     1.0    1.0 10000.0    0.00    287.
  5500.   15.06        6     1.0    1.0 10000.0    0.00    287.
  6000.   13.42        6     1.0    1.0 10000.0    0.00    287.
  6500.   12.07        6     1.0    1.0 10000.0    0.00    287.
  7000.   10.93        6     1.0    1.0 10000.0    0.00    287.
  7500.   10.01        6     1.0    1.0 10000.0    0.00    287.
  8000.   9.209        6     1.0    1.0 10000.0    0.00    287.
  8500.   8.519        6     1.0    1.0 10000.0    0.00    287.
  9000.   7.915        6     1.0    1.0 10000.0    0.00    287.
  9500.   7.383        6     1.0    1.0 10000.0    0.00    287.
 10000.   6.911        6     1.0    1.0 10000.0    0.00    287.
 15000.   4.103        6     1.0    1.0 10000.0    0.00    287.
 20000.   2.904        6     1.0    1.0 10000.0    0.00    287.
 25000.   2.222        6     1.0    1.0 10000.0    0.00    287.
 30000.   1.787        6     1.0    1.0 10000.0    0.00    287.
 40000.   1.287        6     1.0    1.0 10000.0    0.00    287.
 50000.  0.9981        6     1.0    1.0 10000.0    0.00    287.

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
   225.   345.4        5     1.0    1.0 10000.0    0.00    287.

 *********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

   DIST     CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
  58700.  -999.0        0     0.0    0.0     0.0    0.00      0.

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

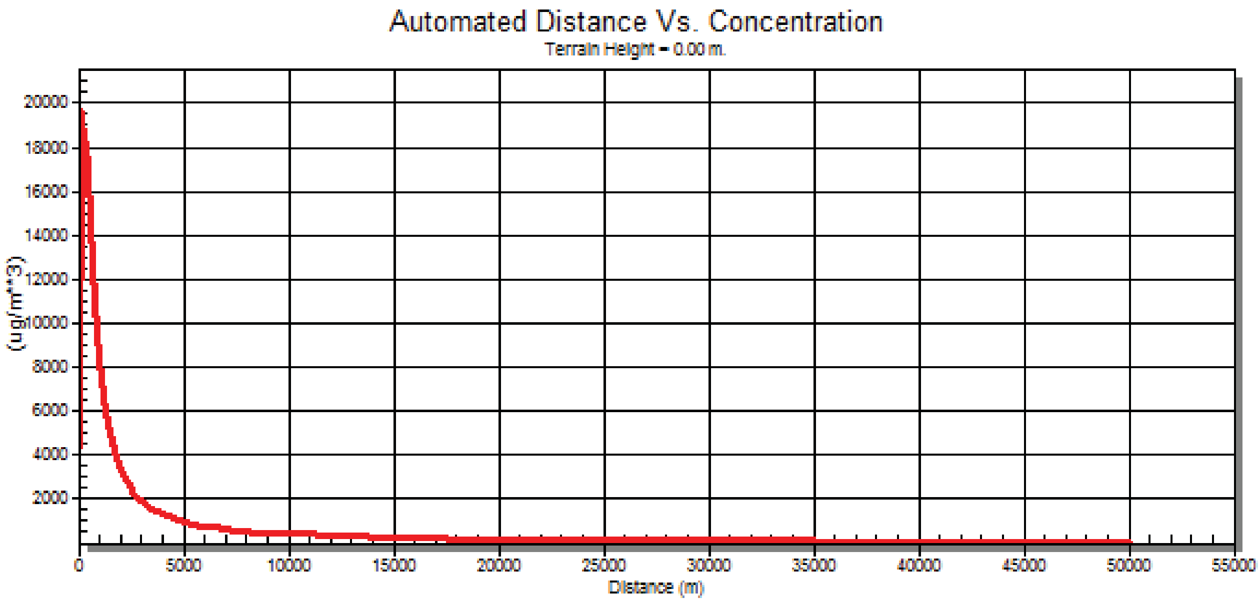
  CALCULATION         MAX CONC    DIST TO   TERRAIN
   PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
 --------------     -----------   -------   -------
 SIMPLE TERRAIN       345.4          225.        0.


 ***************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
 ***************************************************
```

1.3 USMC Reserve Center:

Distance from Hookers Prairie – 61.0 km

1.3.1 High Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                  =        AREA
    EMISSION RATE (G/(S-M**2))   =     1.16000
    SOURCE HEIGHT (M)            =      0.0000
    LENGTH OF LARGER SIDE (M)    =      3.7410
    LENGTH OF SMALLER SIDE (M)   =      3.7410
    RECEPTOR HEIGHT (M)          =     10.0000
    URBAN/RURAL OPTION           =       RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     282.9600


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

   DIST     CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
```

(M)	(UG/M**3)	STAB	(M/S)	(M/S)	(M)	HT (M)	(DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	283.
100.	4291.	5	1.0	1.0	10000.0	0.00	283.
200.	0.1962E+05	5	1.0	1.0	10000.0	0.00	283.
300.	0.1810E+05	5	1.0	1.0	10000.0	0.00	283.
400.	0.1824E+05	6	1.0	1.0	10000.0	0.00	283.
500.	0.1681E+05	6	1.0	1.0	10000.0	0.00	283.
600.	0.1471E+05	6	1.0	1.0	10000.0	0.00	283.
700.	0.1269E+05	6	1.0	1.0	10000.0	0.00	283.
800.	0.1099E+05	6	1.0	1.0	10000.0	0.00	283.
900.	9591.	6	1.0	1.0	10000.0	0.00	283.
1000.	8435.	6	1.0	1.0	10000.0	0.00	283.
1100.	7495.	6	1.0	1.0	10000.0	0.00	283.
1200.	6710.	6	1.0	1.0	10000.0	0.00	283.
1300.	6048.	6	1.0	1.0	10000.0	0.00	283.
1400.	5484.	6	1.0	1.0	10000.0	0.00	283.
1500.	5000.	6	1.0	1.0	10000.0	0.00	283.
1600.	4582.	6	1.0	1.0	10000.0	0.00	283.
1700.	4217.	6	1.0	1.0	10000.0	0.00	283.
1800.	3897.	6	1.0	1.0	10000.0	0.00	283.
1900.	3614.	6	1.0	1.0	10000.0	0.00	283.
2000.	3364.	6	1.0	1.0	10000.0	0.00	283.
2100.	3151.	6	1.0	1.0	10000.0	0.00	283.
2200.	2960.	6	1.0	1.0	10000.0	0.00	283.
2300.	2788.	6	1.0	1.0	10000.0	0.00	283.
2400.	2632.	6	1.0	1.0	10000.0	0.00	283.
2500.	2490.	6	1.0	1.0	10000.0	0.00	283.
2600.	2361.	6	1.0	1.0	10000.0	0.00	283.
2700.	2242.	6	1.0	1.0	10000.0	0.00	283.
2800.	2134.	6	1.0	1.0	10000.0	0.00	283.
2900.	2033.	6	1.0	1.0	10000.0	0.00	283.
3000.	1941.	6	1.0	1.0	10000.0	0.00	283.
3500.	1586.	6	1.0	1.0	10000.0	0.00	283.
4000.	1331.	6	1.0	1.0	10000.0	0.00	283.
4500.	1140.	6	1.0	1.0	10000.0	0.00	283.
5000.	991.4	6	1.0	1.0	10000.0	0.00	283.
5500.	873.7	6	1.0	1.0	10000.0	0.00	283.
6000.	778.4	6	1.0	1.0	10000.0	0.00	283.
6500.	699.9	6	1.0	1.0	10000.0	0.00	283.
7000.	634.4	6	1.0	1.0	10000.0	0.00	283.
7500.	580.4	6	1.0	1.0	10000.0	0.00	283.
8000.	534.2	6	1.0	1.0	10000.0	0.00	283.
8500.	494.1	6	1.0	1.0	10000.0	0.00	283.
9000.	459.1	6	1.0	1.0	10000.0	0.00	283.
9500.	428.3	6	1.0	1.0	10000.0	0.00	283.
10000.	400.9	6	1.0	1.0	10000.0	0.00	283.
15000.	237.7	6	1.0	1.0	10000.0	0.00	283.
20000.	168.4	6	1.0	1.0	10000.0	0.00	283.
25000.	128.9	6	1.0	1.0	10000.0	0.00	283.
30000.	103.5	6	1.0	1.0	10000.0	0.00	283.
40000.	74.59	6	1.0	1.0	10000.0	0.00	283.

```
  50000.    57.85         6      1.0     1.0 10000.0    0.00    283.

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND      1. M:
    225.  0.2003E+05     5      1.0     1.0 10000.0    0.00    283.

 *********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

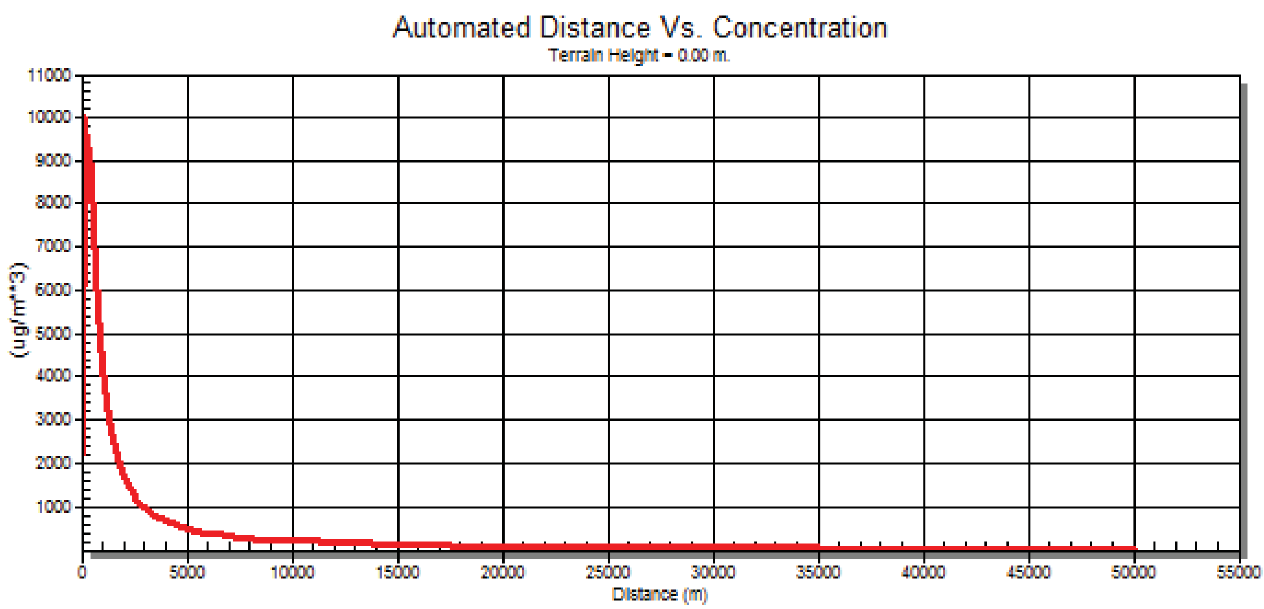
   DIST      CONC              U10M    USTK   MIX HT    PLUME   MAX DIR
    (M)    (UG/M**3)    STAB   (M/S)   (M/S)     (M)    HT  (M)   (DEG)
 -------  ----------    ----   -----   -----   ------   ------   -------
  61000.  -999.0          0      0.0     0.0      0.0    0.00       0.

      **************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      **************************************

  CALCULATION          MAX CONC     DIST TO    TERRAIN
   PROCEDURE          (UG/M**3)     MAX (M)     HT (M)
 --------------      -----------    -------    -------
 SIMPLE TERRAIN      0.2003E+05       225.          0.


 ***************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
 ***************************************************
```

1.3.2 Medium Emission Rate



```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                  =        AREA
    EMISSION RATE (G/(S-M**2))   =     0.590000
    SOURCE HEIGHT (M)            =       0.0000
    LENGTH OF LARGER SIDE (M)    =       3.7410
    LENGTH OF SMALLER SIDE (M)   =       3.7410
    RECEPTOR HEIGHT (M)          =      10.0000
    URBAN/RURAL OPTION           =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     282.9600


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	283.
100.	2182.	5	1.0	1.0	10000.0	0.00	283.
200.	9977.	5	1.0	1.0	10000.0	0.00	283.
300.	9207.	5	1.0	1.0	10000.0	0.00	283.
400.	9276.	6	1.0	1.0	10000.0	0.00	283.
500.	8548.	6	1.0	1.0	10000.0	0.00	283.
600.	7481.	6	1.0	1.0	10000.0	0.00	283.
700.	6455.	6	1.0	1.0	10000.0	0.00	283.
800.	5591.	6	1.0	1.0	10000.0	0.00	283.
900.	4878.	6	1.0	1.0	10000.0	0.00	283.
1000.	4290.	6	1.0	1.0	10000.0	0.00	283.
1100.	3812.	6	1.0	1.0	10000.0	0.00	283.
1200.	3413.	6	1.0	1.0	10000.0	0.00	283.
1300.	3076.	6	1.0	1.0	10000.0	0.00	283.
1400.	2789.	6	1.0	1.0	10000.0	0.00	283.
1500.	2543.	6	1.0	1.0	10000.0	0.00	283.
1600.	2330.	6	1.0	1.0	10000.0	0.00	283.
1700.	2145.	6	1.0	1.0	10000.0	0.00	283.
1800.	1982.	6	1.0	1.0	10000.0	0.00	283.
1900.	1838.	6	1.0	1.0	10000.0	0.00	283.
2000.	1711.	6	1.0	1.0	10000.0	0.00	283.
2100.	1603.	6	1.0	1.0	10000.0	0.00	283.
2200.	1506.	6	1.0	1.0	10000.0	0.00	283.

```
   2300.   1418.        6     1.0     1.0 10000.0    0.00    283.
   2400.   1339.        6     1.0     1.0 10000.0    0.00    283.
   2500.   1267.        6     1.0     1.0 10000.0    0.00    283.
   2600.   1201.        6     1.0     1.0 10000.0    0.00    283.
   2700.   1141.        6     1.0     1.0 10000.0    0.00    283.
   2800.   1085.        6     1.0     1.0 10000.0    0.00    283.
   2900.   1034.        6     1.0     1.0 10000.0    0.00    283.
   3000.   987.2        6     1.0     1.0 10000.0    0.00    283.
   3500.   806.9        6     1.0     1.0 10000.0    0.00    283.
   4000.   677.0        6     1.0     1.0 10000.0    0.00    283.
   4500.   579.6        6     1.0     1.0 10000.0    0.00    283.
   5000.   504.2        6     1.0     1.0 10000.0    0.00    283.
   5500.   444.4        6     1.0     1.0 10000.0    0.00    283.
   6000.   395.9        6     1.0     1.0 10000.0    0.00    283.
   6500.   356.0        6     1.0     1.0 10000.0    0.00    283.
   7000.   322.7        6     1.0     1.0 10000.0    0.00    283.
   7500.   295.2        6     1.0     1.0 10000.0    0.00    283.
   8000.   271.7        6     1.0     1.0 10000.0    0.00    283.
   8500.   251.3        6     1.0     1.0 10000.0    0.00    283.
   9000.   233.5        6     1.0     1.0 10000.0    0.00    283.
   9500.   217.8        6     1.0     1.0 10000.0    0.00    283.
  10000.   203.9        6     1.0     1.0 10000.0    0.00    283.
  15000.   120.9        6     1.0     1.0 10000.0    0.00    283.
  20000.   85.65        6     1.0     1.0 10000.0    0.00    283.
  25000.   65.54        6     1.0     1.0 10000.0    0.00    283.
  30000.   52.65        6     1.0     1.0 10000.0    0.00    283.
  40000.   37.94        6     1.0     1.0 10000.0    0.00    283.
  50000.   29.42        6     1.0     1.0 10000.0    0.00    283.

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
    225.  0.1019E+05    5     1.0     1.0 10000.0    0.00    283.

 *********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

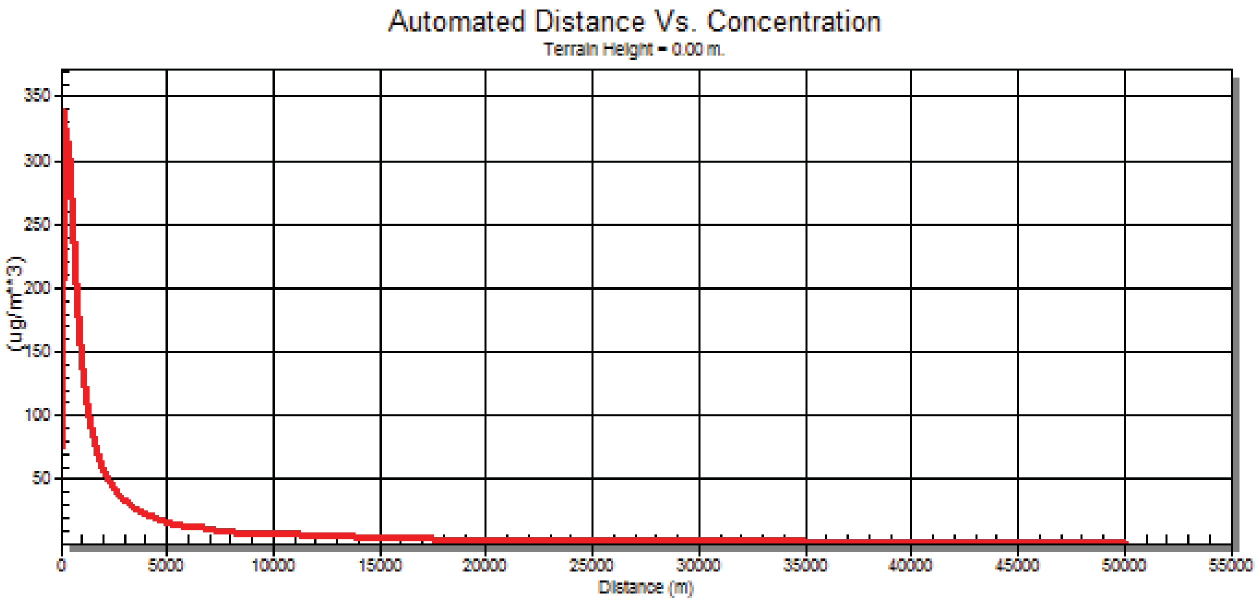
   DIST     CONC             U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
  61000.  -999.0        0     0.0    0.0     0.0    0.00      0.

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

  CALCULATION        MAX CONC    DIST TO   TERRAIN
   PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
 --------------    -----------   -------   -------
 SIMPLE TERRAIN     0.1019E+05      225.        0.
```

```
 ***************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
 ***************************************************
```

1.3.3 Low Emission Rate




```
SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                 =          AREA
    EMISSION RATE (G/(S-M**2))  =     0.200000E-01
    SOURCE HEIGHT (M)           =        0.0000
    LENGTH OF LARGER SIDE (M)   =        3.7410
    LENGTH OF SMALLER SIDE (M)  =        3.7410
    RECEPTOR HEIGHT (M)         =       10.0000
    URBAN/RURAL OPTION          =         RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    ANGLE RELATIVE TO LONG AXIS =     282.9600


 BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************
```

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	0.000	5	1.0	1.0	10000.0	0.00	283.
100.	73.98	5	1.0	1.0	10000.0	0.00	283.
200.	338.2	5	1.0	1.0	10000.0	0.00	283.
300.	312.1	5	1.0	1.0	10000.0	0.00	283.
400.	314.4	6	1.0	1.0	10000.0	0.00	283.
500.	289.8	6	1.0	1.0	10000.0	0.00	283.
600.	253.6	6	1.0	1.0	10000.0	0.00	283.
700.	218.8	6	1.0	1.0	10000.0	0.00	283.
800.	189.5	6	1.0	1.0	10000.0	0.00	283.
900.	165.4	6	1.0	1.0	10000.0	0.00	283.
1000.	145.4	6	1.0	1.0	10000.0	0.00	283.
1100.	129.2	6	1.0	1.0	10000.0	0.00	283.
1200.	115.7	6	1.0	1.0	10000.0	0.00	283.
1300.	104.3	6	1.0	1.0	10000.0	0.00	283.
1400.	94.55	6	1.0	1.0	10000.0	0.00	283.
1500.	86.21	6	1.0	1.0	10000.0	0.00	283.
1600.	78.99	6	1.0	1.0	10000.0	0.00	283.
1700.	72.71	6	1.0	1.0	10000.0	0.00	283.
1800.	67.19	6	1.0	1.0	10000.0	0.00	283.
1900.	62.32	6	1.0	1.0	10000.0	0.00	283.
2000.	58.00	6	1.0	1.0	10000.0	0.00	283.
2100.	54.33	6	1.0	1.0	10000.0	0.00	283.
2200.	51.04	6	1.0	1.0	10000.0	0.00	283.
2300.	48.07	6	1.0	1.0	10000.0	0.00	283.
2400.	45.38	6	1.0	1.0	10000.0	0.00	283.
2500.	42.94	6	1.0	1.0	10000.0	0.00	283.
2600.	40.70	6	1.0	1.0	10000.0	0.00	283.
2700.	38.66	6	1.0	1.0	10000.0	0.00	283.
2800.	36.79	6	1.0	1.0	10000.0	0.00	283.
2900.	35.06	6	1.0	1.0	10000.0	0.00	283.
3000.	33.47	6	1.0	1.0	10000.0	0.00	283.
3500.	27.35	6	1.0	1.0	10000.0	0.00	283.
4000.	22.95	6	1.0	1.0	10000.0	0.00	283.
4500.	19.65	6	1.0	1.0	10000.0	0.00	283.
5000.	17.09	6	1.0	1.0	10000.0	0.00	283.
5500.	15.06	6	1.0	1.0	10000.0	0.00	283.
6000.	13.42	6	1.0	1.0	10000.0	0.00	283.
6500.	12.07	6	1.0	1.0	10000.0	0.00	283.
7000.	10.94	6	1.0	1.0	10000.0	0.00	283.
7500.	10.01	6	1.0	1.0	10000.0	0.00	283.
8000.	9.210	6	1.0	1.0	10000.0	0.00	283.
8500.	8.519	6	1.0	1.0	10000.0	0.00	283.
9000.	7.916	6	1.0	1.0	10000.0	0.00	283.
9500.	7.384	6	1.0	1.0	10000.0	0.00	283.
10000.	6.912	6	1.0	1.0	10000.0	0.00	283.
15000.	4.099	6	1.0	1.0	10000.0	0.00	283.

```
 20000.   2.904        6     1.0    1.0 10000.0    0.00    283.
 25000.   2.222        6     1.0    1.0 10000.0    0.00    283.
 30000.   1.785        6     1.0    1.0 10000.0    0.00    283.
 40000.   1.286        6     1.0    1.0 10000.0    0.00    283.
 50000.  0.9974        6     1.0    1.0 10000.0    0.00    283.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
   225.   345.4        5     1.0    1.0 10000.0    0.00    283.

*********************************
*** SCREEN DISCRETE DISTANCES ***
*********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING
DISTANCES ***

  DIST     CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ----------  ----  -----  -----  ------  ------  -------
 61000.  -999.0        0     0.0    0.0     0.0    0.00      0.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC    DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN       345.4         225.        0.


***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
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Appendix II: Calculated TMP and RMP Silica Values for each Scenario

Monitor	Scenario	DIST (M)	IPM (μg/m³)	TPM (μg/m³)	RPM (μg/m³)	RPM Silica (μg/m³)	PEL Silica (μg/m3)	LCL95%	UCL95%
Children's	High	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
Children's	High	100	4294	622.63	150.29	47.59	1431.33	-0.08	0.44
Children's	High	200	1.96E+04	2843.45	686.35	217.34	6536.67	0.57	1.09
Children's	High	300	1.81E+04	2624.50	633.50	200.61	6033.33	0.50	1.02
Children's	High	400	1.82E+04	2644.80	638.40	202.16	6080.00	0.51	1.03
Children's	High	500	1.68E+04	2437.45	588.35	186.31	5603.33	0.45	0.97
Children's	High	600	1.47E+04	2132.95	514.85	163.04	4903.33	0.36	0.88
Children's	High	700	1.27E+04	1840.05	444.15	140.65	4230.00	0.28	0.80
Children's	High	800	1.10E+04	1593.55	384.65	121.81	3663.33	0.20	0.72
Children's	High	900	9591	1390.70	335.69	106.30	3197.00	0.14	0.66
Children's	High	1000	8435	1223.08	295.23	93.49	2811.67	0.10	0.62
Children's	High	1100	7495	1086.78	262.33	83.07	2498.33	0.06	0.58
Children's	High	1200	6710	972.95	234.85	74.37	2236.67	0.02	0.54
Children's	High	1300	6048	876.96	211.68	67.03	2016.00	0.00	0.52
Children's	High	1400	5484	795.18	191.94	60.78	1828.00	-0.03	0.49
Children's	High	1500	5000	725.00	175.00	55.42	1666.67	-0.05	0.47
Children's	High	1600	4582	664.39	160.37	50.78	1527.33	-0.07	0.45
Children's	High	1700	4217	611.47	147.60	46.74	1405.67	-0.08	0.44
Children's	High	1800	3897	565.07	136.40	43.19	1299.00	-0.10	0.42
Children's	High	1900	3615	524.18	126.53	40.07	1205.00	-0.11	0.41
Children's	High	2000	3364	487.78	117.74	37.28	1121.33	-0.12	0.40
Children's	High	2100	3151	456.90	110.29	34.92	1050.33	-0.13	0.39
Children's	High	2200	2960	429.20	103.60	32.81	986.67	-0.14	0.38
Children's	High	2300	2788	404.26	97.58	30.90	929.33	-0.14	0.38
Children's	High	2400	2632	381.64	92.12	29.17	877.33	-0.15	0.37
Children's	High	2500	2490	361.05	87.15	27.60	830.00	-0.16	0.37
Children's	High	2600	2361	342.35	82.64	26.17	787.00	-0.16	0.36
Children's	High	2700	2242	325.09	78.47	24.85	747.33	-0.17	0.35
Children's	High	2800	2134	309.43	74.69	23.65	711.33	-0.17	0.35
Children's	High	2900	2033	294.79	71.16	22.53	677.67	-0.17	0.35
Children's	High	3000	1941	281.45	67.94	21.51	647.00	-0.18	0.34
Children's	High	3500	1587	230.12	55.55	17.59	529.00	-0.19	0.33
Children's	High	4000	1331	193.00	46.59	14.75	443.67	-0.20	0.32
Children's	High	4500	1140	165.30	39.90	12.64	380.00	-0.21	0.31
Children's	High	5000	991.5	143.77	34.70	10.99	330.50	-0.22	0.30
Children's	High	5500	873.8	126.70	30.58	9.68	291.27	-0.22	0.30
Children's	High	6000	778.5	112.88	27.25	8.63	259.50	-0.23	0.29

Monitor	Scenario	DIST (M)	IPM (µg/m³)	TPM (µg/m³)	RPM (µg/m³)	RPM Silica (µg/m³)	PEL Silica (µg/m3)	LCL95%	UCL95%
Children's	High	6500	700	101.50	24.50	7.76	233.33	-0.23	0.29
Children's	High	7000	634.1	91.94	22.19	7.03	211.37	-0.23	0.29
Children's	High	7500	580.4	84.16	20.31	6.43	193.47	-0.24	0.28
Children's	High	8000	534.2	77.46	18.70	5.92	178.07	-0.24	0.28
Children's	High	8500	494.2	71.66	17.30	5.48	164.73	-0.24	0.28
Children's	High	9000	459.1	66.57	16.07	5.09	153.03	-0.24	0.28
Children's	High	9500	428.3	62.10	14.99	4.75	142.77	-0.24	0.28
Children's	High	10000	400.9	58.13	14.03	4.44	133.63	-0.24	0.28
Children's	High	15000	237.9	34.50	8.33	2.64	79.30	-0.25	0.27
Children's	High	20000	168.3	24.40	5.89	1.87	56.10	-0.25	0.27
Children's	High	25000	128.8	18.68	4.51	1.43	42.93	-0.25	0.27
Children's	High	28500	110.1	15.96	3.85	1.22	36.70	-0.26	0.26
Children's	High	30000	103.6	15.02	3.63	1.15	34.53	-0.26	0.26
Children's	High	40000	74.51	10.80	2.61	0.83	24.84	-0.26	0.26
Children's	High	50000	57.78	8.38	2.02	0.64	19.26	-0.26	0.26
Children's	Medium	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
Children's	Medium	100	2184	316.68	76.44	24.21	728.00	-0.17	0.35
Children's	Medium	200	9976	1446.52	349.16	110.57	3325.33	0.16	0.68
Children's	Medium	300	9207	1335.02	322.25	102.04	3069.00	0.13	0.65
Children's	Medium	400	9275	1344.88	324.63	102.80	3091.67	0.13	0.65
Children's	Medium	500	8549	1239.61	299.22	94.75	2849.67	0.10	0.62
Children's	Medium	600	7481	1084.75	261.84	82.91	2493.67	0.06	0.58
Children's	Medium	700	6455	935.98	225.93	71.54	2151.67	0.01	0.53
Children's	Medium	800	5591	810.70	195.69	61.97	1863.67	-0.02	0.50
Children's	Medium	900	4878	707.31	170.73	54.06	1626.00	-0.05	0.47
Children's	Medium	1000	4290	622.05	150.15	47.55	1430.00	-0.08	0.44
Children's	Medium	1100	3812	552.74	133.42	42.25	1270.67	-0.10	0.42
Children's	Medium	1200	3413	494.89	119.46	37.83	1137.67	-0.12	0.40
Children's	Medium	1300	3076	446.02	107.66	34.09	1025.33	-0.13	0.39
Children's	Medium	1400	2789	404.41	97.62	30.91	929.67	-0.14	0.38
Children's	Medium	1500	2543	368.74	89.01	28.18	847.67	-0.15	0.37
Children's	Medium	1600	2330	337.85	81.55	25.82	776.67	-0.16	0.36
Children's	Medium	1700	2145	311.03	75.08	23.77	715.00	-0.17	0.35
Children's	Medium	1800	1982	287.39	69.37	21.97	660.67	-0.18	0.34
Children's	Medium	1900	1838	266.51	64.33	20.37	612.67	-0.18	0.34
Children's	Medium	2000	1711	248.10	59.89	18.96	570.33	-0.19	0.33
Children's	Medium	2100	1603	232.44	56.11	17.77	534.33	-0.19	0.33
Children's	Medium	2200	1506	218.37	52.71	16.69	502.00	-0.20	0.32
Children's	Medium	2300	1418	205.61	49.63	15.72	472.67	-0.20	0.32

Monitor	Scenario	DIST (M)	IPM (µg/m^3)	TPM (µg/m^3)	RPM (µg/m^3)	RPM Silica (µg/m^3)	PEL Silica (µg/m3)	LCL95%	UCL95%
Children's	Medium	2400	1339	194.16	46.87	14.84	446.33	-0.20	0.32
Children's	Medium	2500	1267	183.72	44.35	14.04	422.33	-0.21	0.31
Children's	Medium	2600	1201	174.15	42.04	13.31	400.33	-0.21	0.31
Children's	Medium	2700	1141	165.45	39.94	12.65	380.33	-0.21	0.31
Children's	Medium	2800	1085	157.33	37.98	12.03	361.67	-0.21	0.31
Children's	Medium	2900	1034	149.93	36.19	11.46	344.67	-0.22	0.30
Children's	Medium	3000	987.3	143.16	34.56	10.94	329.10	-0.22	0.30
Children's	Medium	3500	806.9	117.00	28.24	8.94	268.97	-0.23	0.29
Children's	Medium	4000	677.1	98.18	23.70	7.50	225.70	-0.23	0.29
Children's	Medium	4500	579.7	84.06	20.29	6.43	193.23	-0.24	0.28
Children's	Medium	5000	504.3	73.12	17.65	5.59	168.10	-0.24	0.28
Children's	Medium	5500	444.4	64.44	15.55	4.93	148.13	-0.24	0.28
Children's	Medium	6000	396	57.42	13.86	4.39	132.00	-0.24	0.28
Children's	Medium	6500	356	51.62	12.46	3.95	118.67	-0.24	0.28
Children's	Medium	7000	322.5	46.76	11.29	3.57	107.50	-0.25	0.27
Children's	Medium	7500	295.2	42.80	10.33	3.27	98.40	-0.25	0.27
Children's	Medium	8000	271.7	39.40	9.51	3.01	90.57	-0.25	0.27
Children's	Medium	8500	251.3	36.44	8.80	2.79	83.77	-0.25	0.27
Children's	Medium	9000	233.5	33.86	8.17	2.59	77.83	-0.25	0.27
Children's	Medium	9500	217.8	31.58	7.62	2.41	72.60	-0.25	0.27
Children's	Medium	10000	203.9	29.57	7.14	2.26	67.97	-0.25	0.27
Children's	Medium	15000	121	17.55	4.24	1.34	40.33	-0.25	0.27
Children's	Medium	20000	85.6	12.41	3.00	0.95	28.53	-0.26	0.26
Children's	Medium	25000	65.5	9.50	2.29	0.73	21.83	-0.26	0.26
Children's	Medium	28500	55.99	8.12	1.96	0.62	18.66	-0.26	0.26
Children's	Medium	30000	52.67	7.64	1.84	0.58	17.56	-0.26	0.26
Children's	Medium	40000	37.9	5.50	1.33	0.42	12.63	-0.26	0.26
Children's	Medium	50000	29.39	4.26	1.03	0.33	9.80	-0.26	0.26
Children's	Low	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
Children's	Low	100	74.03	10.73	2.59	0.82	24.68	-0.26	0.26
Children's	Low	200	338.2	49.04	11.84	3.75	112.73	-0.25	0.27
Children's	Low	300	312.1	45.25	10.92	3.46	104.03	-0.25	0.27
Children's	Low	400	314.4	45.59	11.00	3.48	104.80	-0.25	0.27
Children's	Low	500	289.8	42.02	10.14	3.21	96.60	-0.25	0.27
Children's	Low	600	253.6	36.77	8.88	2.81	84.53	-0.25	0.27
Children's	Low	700	218.8	31.73	7.66	2.43	72.93	-0.25	0.27
Children's	Low	800	189.5	27.48	6.63	2.10	63.17	-0.25	0.27
Children's	Low	900	165.4	23.98	5.79	1.83	55.13	-0.25	0.27
Children's	Low	1000	145.4	21.08	5.09	1.61	48.47	-0.25	0.27

Monitor	Scenario	DIST (M)	IPM ($\mu g/m^3$)	TPM ($\mu g/m^3$)	RPM ($\mu g/m^3$)	RPM Silica ($\mu g/m^3$)	PEL Silica (µg/m3)	LCL95%	UCL95%
Children’s	Low	1100	129.2	18.73	4.52	1.43	43.07	-0.25	0.27
Children’s	Low	1200	115.7	16.78	4.05	1.28	38.57	-0.26	0.26
Children’s	Low	1300	104.3	15.12	3.65	1.16	34.77	-0.26	0.26
Children’s	Low	1400	94.56	13.71	3.31	1.05	31.52	-0.26	0.26
Children’s	Low	1500	86.21	12.50	3.02	0.96	28.74	-0.26	0.26
Children’s	Low	1600	78.99	11.45	2.76	0.88	26.33	-0.26	0.26
Children’s	Low	1700	72.7	10.54	2.54	0.81	24.23	-0.26	0.26
Children’s	Low	1800	67.19	9.74	2.35	0.74	22.40	-0.26	0.26
Children’s	Low	1900	62.32	9.04	2.18	0.69	20.77	-0.26	0.26
Children’s	Low	2000	58	8.41	2.03	0.64	19.33	-0.26	0.26
Children’s	Low	2100	54.34	7.88	1.90	0.60	18.11	-0.26	0.26
Children’s	Low	2200	51.04	7.40	1.79	0.57	17.01	-0.26	0.26
Children’s	Low	2300	48.07	6.97	1.68	0.53	16.02	-0.26	0.26
Children’s	Low	2400	45.38	6.58	1.59	0.50	15.13	-0.26	0.26
Children’s	Low	2500	42.94	6.23	1.50	0.48	14.31	-0.26	0.26
Children’s	Low	2600	40.7	5.90	1.42	0.45	13.57	-0.26	0.26
Children’s	Low	2700	38.66	5.61	1.35	0.43	12.89	-0.26	0.26
Children’s	Low	2800	36.79	5.33	1.29	0.41	12.26	-0.26	0.26
Children’s	Low	2900	35.06	5.08	1.23	0.39	11.69	-0.26	0.26
Children’s	Low	3000	33.47	4.85	1.17	0.37	11.16	-0.26	0.26
Children’s	Low	3500	27.35	3.97	0.96	0.30	9.12	-0.26	0.26
Children’s	Low	4000	22.95	3.33	0.80	0.25	7.65	-0.26	0.26
Children’s	Low	4500	19.65	2.85	0.69	0.22	6.55	-0.26	0.26
Children’s	Low	5000	17.09	2.48	0.60	0.19	5.70	-0.26	0.26
Children’s	Low	5500	15.07	2.19	0.53	0.17	5.02	-0.26	0.26
Children’s	Low	6000	13.42	1.95	0.47	0.15	4.47	-0.26	0.26
Children’s	Low	6500	12.07	1.75	0.42	0.13	4.02	-0.26	0.26
Children’s	Low	7000	10.93	1.58	0.38	0.12	3.64	-0.26	0.26
Children’s	Low	7500	10.01	1.45	0.35	0.11	3.34	-0.26	0.26
Children’s	Low	8000	9.211	1.34	0.32	0.10	3.07	-0.26	0.26
Children’s	Low	8500	8.52	1.24	0.30	0.09	2.84	-0.26	0.26
Children’s	Low	9000	7.916	1.15	0.28	0.09	2.64	-0.26	0.26
Children’s	Low	9500	7.384	1.07	0.26	0.08	2.46	-0.26	0.26
Children’s	Low	10000	6.913	1.00	0.24	0.08	2.30	-0.26	0.26
Children’s	Low	15000	4.102	0.59	0.14	0.05	1.37	-0.26	0.26
Children’s	Low	20000	2.902	0.42	0.10	0.03	0.97	-0.26	0.26
Children’s	Low	25000	2.22	0.32	0.08	0.02	0.74	-0.26	0.26
Children’s	Low	28500	1.898	0.28	0.07	0.02	0.63	-0.26	0.26
Children’s	Low	30000	1.785	0.26	0.06	0.02	0.60	-0.26	0.26

Monitor	Scenario	DIST (M)	IPM ($\mu g/m^3$)	TPM ($\mu g/m^3$)	RPM ($\mu g/m^3$)	RPM Silica ($\mu g/m^3$)	PEL Silica (µg/m3)	LCL95%	UCL95%
Children's	Low	40000	1.285	0.19	0.04	0.01	0.43	-0.26	0.26
Children's	Low	50000	0.9963	0.14	0.03	0.01	0.33	-0.26	0.26
Palma Ceia	High	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
Palma Ceia	High	100	4295	622.78	150.33	47.60	1431.67	-0.08	0.44
Palma Ceia	High	200	1.96E+04	2844.90	686.70	217.46	6540.00	0.57	1.09
Palma Ceia	High	300	1.81E+04	2624.50	633.50	200.61	6033.33	0.50	1.02
Palma Ceia	High	400	1.82E+04	2644.80	638.40	202.16	6080.00	0.51	1.03
Palma Ceia	High	500	1.68E+04	2436.00	588.00	186.20	5600.00	0.45	0.97
Palma Ceia	High	600	1.47E+04	2132.95	514.85	163.04	4903.33	0.36	0.88
Palma Ceia	High	700	1.27E+04	1840.05	444.15	140.65	4230.00	0.28	0.80
Palma Ceia	High	800	1.10E+04	1593.55	384.65	121.81	3663.33	0.20	0.72
Palma Ceia	High	900	9591	1390.70	335.69	106.30	3197.00	0.14	0.66
Palma Ceia	High	1000	8434	1222.93	295.19	93.48	2811.33	0.10	0.62
Palma Ceia	High	1100	7495	1086.78	262.33	83.07	2498.33	0.06	0.58
Palma Ceia	High	1200	6710	972.95	234.85	74.37	2236.67	0.02	0.54
Palma Ceia	High	1300	6048	876.96	211.68	67.03	2016.00	0.00	0.52
Palma Ceia	High	1400	5484	795.18	191.94	60.78	1828.00	-0.03	0.49
Palma Ceia	High	1500	5000	725.00	175.00	55.42	1666.67	-0.05	0.47
Palma Ceia	High	1600	4581	664.25	160.34	50.77	1527.00	-0.07	0.45
Palma Ceia	High	1700	4217	611.47	147.60	46.74	1405.67	-0.08	0.44
Palma Ceia	High	1800	3897	565.07	136.40	43.19	1299.00	-0.10	0.42
Palma Ceia	High	1900	3614	524.03	126.49	40.06	1204.67	-0.11	0.41
Palma Ceia	High	2000	3364	487.78	117.74	37.28	1121.33	-0.12	0.40
Palma Ceia	High	2100	3152	457.04	110.32	34.93	1050.67	-0.13	0.39
Palma Ceia	High	2200	2960	429.20	103.60	32.81	986.67	-0.14	0.38
Palma Ceia	High	2300	2788	404.26	97.58	30.90	929.33	-0.14	0.38
Palma Ceia	High	2400	2632	381.64	92.12	29.17	877.33	-0.15	0.37
Palma Ceia	High	2500	2490	361.05	87.15	27.60	830.00	-0.16	0.37
Palma Ceia	High	2600	2361	342.35	82.64	26.17	787.00	-0.16	0.36
Palma Ceia	High	2700	2242	325.09	78.47	24.85	747.33	-0.17	0.35
Palma Ceia	High	2800	2134	309.43	74.69	23.65	711.33	-0.17	0.35
Palma Ceia	High	2900	2034	294.93	71.19	22.54	678.00	-0.17	0.35
Palma Ceia	High	3000	1941	281.45	67.94	21.51	647.00	-0.18	0.34
Palma Ceia	High	3500	1587	230.12	55.55	17.59	529.00	-0.19	0.33
Palma Ceia	High	4000	1331	193.00	46.59	14.75	443.67	-0.20	0.32
Palma Ceia	High	4500	1139	165.16	39.87	12.62	379.67	-0.21	0.31
Palma Ceia	High	5000	991.3	143.74	34.70	10.99	330.43	-0.22	0.30
Palma Ceia	High	5500	873.7	126.69	30.58	9.68	291.23	-0.22	0.30
Palma Ceia	High	6000	778.4	112.87	27.24	8.63	259.47	-0.23	0.29

Monitor	Scenario	DIST (M)	IPM (µg/m³)	TPM (µg/m³)	RPM (µg/m³)	RPM Silica (µg/m³)	PEL Silica (µg/m3)	LCL95%	UCL95%
Palma Ceia	High	6500	699.8	101.47	24.49	7.76	233.27	-0.23	0.29
Palma Ceia	High	7000	633.9	91.92	22.19	7.03	211.30	-0.23	0.29
Palma Ceia	High	7500	580.3	84.14	20.31	6.43	193.43	-0.24	0.28
Palma Ceia	High	8000	534.1	77.44	18.69	5.92	178.03	-0.24	0.28
Palma Ceia	High	8500	494.1	71.64	17.29	5.48	164.70	-0.24	0.28
Palma Ceia	High	9000	459.1	66.57	16.07	5.09	153.03	-0.24	0.28
Palma Ceia	High	9500	428.2	62.09	14.99	4.75	142.73	-0.24	0.28
Palma Ceia	High	10000	400.9	58.13	14.03	4.44	133.63	-0.24	0.28
Palma Ceia	High	15000	238	34.51	8.33	2.64	79.33	-0.25	0.27
Palma Ceia	High	20000	168.4	24.42	5.89	1.87	56.13	-0.25	0.27
Palma Ceia	High	25000	128.9	18.69	4.51	1.43	42.97	-0.25	0.27
Palma Ceia	High	30000	103.7	15.04	3.63	1.15	34.57	-0.26	0.26
Palma Ceia	High	40000	74.65	10.82	2.61	0.83	24.88	-0.26	0.26
Palma Ceia	High	50000	57.89	8.39	2.03	0.64	19.30	-0.26	0.26
Palma Ceia	High	58700	-999	-144.86	-34.97	-11.07	-333.00	-0.30	0.22
Palma Ceia	Medium	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
Palma Ceia	Medium	100	2184	316.68	76.44	24.21	728.00	-0.17	0.35
Palma Ceia	Medium	200	9978	1446.81	349.23	110.59	3326.00	0.16	0.68
Palma Ceia	Medium	300	9207	1335.02	322.25	102.04	3069.00	0.13	0.65
Palma Ceia	Medium	400	9276	1345.02	324.66	102.81	3092.00	0.13	0.65
Palma Ceia	Medium	500	8547	1239.32	299.15	94.73	2849.00	0.10	0.62
Palma Ceia	Medium	600	7481	1084.75	261.84	82.91	2493.67	0.06	0.58
Palma Ceia	Medium	700	6455	935.98	225.93	71.54	2151.67	0.01	0.53
Palma Ceia	Medium	800	5591	810.70	195.69	61.97	1863.67	-0.02	0.50
Palma Ceia	Medium	900	4878	707.31	170.73	54.06	1626.00	-0.05	0.47
Palma Ceia	Medium	1000	4290	622.05	150.15	47.55	1430.00	-0.08	0.44
Palma Ceia	Medium	1100	3812	552.74	133.42	42.25	1270.67	-0.10	0.42
Palma Ceia	Medium	1200	3413	494.89	119.46	37.83	1137.67	-0.12	0.40
Palma Ceia	Medium	1300	3076	446.02	107.66	34.09	1025.33	-0.13	0.39
Palma Ceia	Medium	1400	2789	404.41	97.62	30.91	929.67	-0.14	0.38
Palma Ceia	Medium	1500	2543	368.74	89.01	28.18	847.67	-0.15	0.37
Palma Ceia	Medium	1600	2330	337.85	81.55	25.82	776.67	-0.16	0.36
Palma Ceia	Medium	1700	2145	311.03	75.08	23.77	715.00	-0.17	0.35
Palma Ceia	Medium	1800	1982	287.39	69.37	21.97	660.67	-0.18	0.34
Palma Ceia	Medium	1900	1838	266.51	64.33	20.37	612.67	-0.18	0.34
Palma Ceia	Medium	2000	1711	248.10	59.89	18.96	570.33	-0.19	0.33
Palma Ceia	Medium	2100	1603	232.44	56.11	17.77	534.33	-0.19	0.33
Palma Ceia	Medium	2200	1506	218.37	52.71	16.69	502.00	-0.20	0.32
Palma Ceia	Medium	2300	1418	205.61	49.63	15.72	472.67	-0.20	0.32

Monitor	Scenario	DIST (M)	IPM (µg/m^3)	TPM (µg/m^3)	RPM (µg/m^3)	RPM Silica (µg/m^3)	PEL Silica (µg/m3)	LCL95%	UCL95%
Palma Ceia	Medium	2400	1339	194.16	46.87	14.84	446.33	-0.20	0.32
Palma Ceia	Medium	2500	1267	183.72	44.35	14.04	422.33	-0.21	0.31
Palma Ceia	Medium	2600	1201	174.15	42.04	13.31	400.33	-0.21	0.31
Palma Ceia	Medium	2700	1141	165.45	39.94	12.65	380.33	-0.21	0.31
Palma Ceia	Medium	2800	1085	157.33	37.98	12.03	361.67	-0.21	0.31
Palma Ceia	Medium	2900	1034	149.93	36.19	11.46	344.67	-0.22	0.30
Palma Ceia	Medium	3000	987.3	143.16	34.56	10.94	329.10	-0.22	0.30
Palma Ceia	Medium	3500	807	117.02	28.25	8.94	269.00	-0.23	0.29
Palma Ceia	Medium	4000	677	98.17	23.70	7.50	225.67	-0.23	0.29
Palma Ceia	Medium	4500	579.6	84.04	20.29	6.42	193.20	-0.24	0.28
Palma Ceia	Medium	5000	504.2	73.11	17.65	5.59	168.07	-0.24	0.28
Palma Ceia	Medium	5500	444.4	64.44	15.55	4.93	148.13	-0.24	0.28
Palma Ceia	Medium	6000	395.9	57.41	13.86	4.39	131.97	-0.24	0.28
Palma Ceia	Medium	6500	355.9	51.61	12.46	3.94	118.63	-0.24	0.28
Palma Ceia	Medium	7000	322.4	46.75	11.28	3.57	107.47	-0.25	0.27
Palma Ceia	Medium	7500	295.2	42.80	10.33	3.27	98.40	-0.25	0.27
Palma Ceia	Medium	8000	271.7	39.40	9.51	3.01	90.57	-0.25	0.27
Palma Ceia	Medium	8500	251.3	36.44	8.80	2.79	83.77	-0.25	0.27
Palma Ceia	Medium	9000	233.5	33.86	8.17	2.59	77.83	-0.25	0.27
Palma Ceia	Medium	9500	217.8	31.58	7.62	2.41	72.60	-0.25	0.27
Palma Ceia	Medium	10000	203.9	29.57	7.14	2.26	67.97	-0.25	0.27
Palma Ceia	Medium	15000	121	17.55	4.24	1.34	40.33	-0.25	0.27
Palma Ceia	Medium	20000	85.66	12.42	3.00	0.95	28.55	-0.26	0.26
Palma Ceia	Medium	25000	65.54	9.50	2.29	0.73	21.85	-0.26	0.26
Palma Ceia	Medium	30000	52.73	7.65	1.85	0.58	17.58	-0.26	0.26
Palma Ceia	Medium	40000	37.97	5.51	1.33	0.42	12.66	-0.26	0.26
Palma Ceia	Medium	50000	29.44	4.27	1.03	0.33	9.81	-0.26	0.26
Palma Ceia	Medium	58700	-999	-144.86	-34.97	-11.07	-333.00	-0.30	0.22
Palma Ceia	Low	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
Palma Ceia	Low	100	74.04	10.74	2.59	0.82	24.68	-0.26	0.26
Palma Ceia	Low	200	338.2	49.04	11.84	3.75	112.73	-0.25	0.27
Palma Ceia	Low	300	312.1	45.25	10.92	3.46	104.03	-0.25	0.27
Palma Ceia	Low	400	314.4	45.59	11.00	3.48	104.80	-0.25	0.27
Palma Ceia	Low	500	289.7	42.01	10.14	3.21	96.57	-0.25	0.27
Palma Ceia	Low	600	253.6	36.77	8.88	2.81	84.53	-0.25	0.27
Palma Ceia	Low	700	218.8	31.73	7.66	2.43	72.93	-0.25	0.27
Palma Ceia	Low	800	189.5	27.48	6.63	2.10	63.17	-0.25	0.27
Palma Ceia	Low	900	165.4	23.98	5.79	1.83	55.13	-0.25	0.27
Palma Ceia	Low	1000	145.4	21.08	5.09	1.61	48.47	-0.25	0.27

Monitor	Scenario	DIST (M)	IPM (μg/m³)	TPM (μg/m³)	RPM (μg/m³)	RPM Silica (μg/m³)	PEL Silica (μg/m3)	LCL95%	UCL95%
Palma Ceia	Low	1100	129.2	18.73	4.52	1.43	43.07	-0.25	0.27
Palma Ceia	Low	1200	115.7	16.78	4.05	1.28	38.57	-0.26	0.26
Palma Ceia	Low	1300	104.3	15.12	3.65	1.16	34.77	-0.26	0.26
Palma Ceia	Low	1400	94.55	13.71	3.31	1.05	31.52	-0.26	0.26
Palma Ceia	Low	1500	86.21	12.50	3.02	0.96	28.74	-0.26	0.26
Palma Ceia	Low	1600	78.99	11.45	2.76	0.88	26.33	-0.26	0.26
Palma Ceia	Low	1700	72.7	10.54	2.54	0.81	24.23	-0.26	0.26
Palma Ceia	Low	1800	67.19	9.74	2.35	0.74	22.40	-0.26	0.26
Palma Ceia	Low	1900	62.32	9.04	2.18	0.69	20.77	-0.26	0.26
Palma Ceia	Low	2000	58	8.41	2.03	0.64	19.33	-0.26	0.26
Palma Ceia	Low	2100	54.34	7.88	1.90	0.60	18.11	-0.26	0.26
Palma Ceia	Low	2200	51.04	7.40	1.79	0.57	17.01	-0.26	0.26
Palma Ceia	Low	2300	48.07	6.97	1.68	0.53	16.02	-0.26	0.26
Palma Ceia	Low	2400	45.38	6.58	1.59	0.50	15.13	-0.26	0.26
Palma Ceia	Low	2500	42.94	6.23	1.50	0.48	14.31	-0.26	0.26
Palma Ceia	Low	2600	40.71	5.90	1.42	0.45	13.57	-0.26	0.26
Palma Ceia	Low	2700	38.66	5.61	1.35	0.43	12.89	-0.26	0.26
Palma Ceia	Low	2800	36.79	5.33	1.29	0.41	12.26	-0.26	0.26
Palma Ceia	Low	2900	35.06	5.08	1.23	0.39	11.69	-0.26	0.26
Palma Ceia	Low	3000	33.47	4.85	1.17	0.37	11.16	-0.26	0.26
Palma Ceia	Low	3500	27.35	3.97	0.96	0.30	9.12	-0.26	0.26
Palma Ceia	Low	4000	22.95	3.33	0.80	0.25	7.65	-0.26	0.26
Palma Ceia	Low	4500	19.65	2.85	0.69	0.22	6.55	-0.26	0.26
Palma Ceia	Low	5000	17.09	2.48	0.60	0.19	5.70	-0.26	0.26
Palma Ceia	Low	5500	15.06	2.18	0.53	0.17	5.02	-0.26	0.26
Palma Ceia	Low	6000	13.42	1.95	0.47	0.15	4.47	-0.26	0.26
Palma Ceia	Low	6500	12.07	1.75	0.42	0.13	4.02	-0.26	0.26
Palma Ceia	Low	7000	10.93	1.58	0.38	0.12	3.64	-0.26	0.26
Palma Ceia	Low	7500	10.01	1.45	0.35	0.11	3.34	-0.26	0.26
Palma Ceia	Low	8000	9.209	1.34	0.32	0.10	3.07	-0.26	0.26
Palma Ceia	Low	8500	8.519	1.24	0.30	0.09	2.84	-0.26	0.26
Palma Ceia	Low	9000	7.915	1.15	0.28	0.09	2.64	-0.26	0.26
Palma Ceia	Low	9500	7.383	1.07	0.26	0.08	2.46	-0.26	0.26
Palma Ceia	Low	10000	6.911	1.00	0.24	0.08	2.30	-0.26	0.26
Palma Ceia	Low	15000	4.103	0.59	0.14	0.05	1.37	-0.26	0.26
Palma Ceia	Low	20000	2.904	0.42	0.10	0.03	0.97	-0.26	0.26
Palma Ceia	Low	25000	2.222	0.32	0.08	0.02	0.74	-0.26	0.26
Palma Ceia	Low	30000	1.787	0.26	0.06	0.02	0.60	-0.26	0.26
Palma Ceia	Low	40000	1.287	0.19	0.05	0.01	0.43	-0.26	0.26

Monitor	Scenario	DIST (M)	IPM ($\mu g/m^3$)	TPM ($\mu g/m^3$)	RPM ($\mu g/m^3$)	RPM Silica ($\mu g/m^3$)	PEL Silica (µg/m3)	LCL95%	UCL95%
Palma Ceia	Low	50000	0.9981	0.14	0.03	0.01	0.33	-0.26	0.26
Palma Ceia	Low	58700	-999	-144.86	-34.97	-11.07	-333.00	-0.30	0.22
USMC	High	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
USMC	High	100	4291	622.20	150.19	47.56	1430.33	-0.08	0.44
USMC	High	200	1.96E+04	2844.90	686.70	217.46	6540.00	0.57	1.09
USMC	High	300	1.81E+04	2624.50	633.50	200.61	6033.33	0.50	1.02
USMC	High	400	1.82E+04	2644.80	638.40	202.16	6080.00	0.51	1.03
USMC	High	500	1.68E+04	2437.45	588.35	186.31	5603.33	0.45	0.97
USMC	High	600	1.47E+04	2132.95	514.85	163.04	4903.33	0.36	0.88
USMC	High	700	1.27E+04	1840.05	444.15	140.65	4230.00	0.28	0.80
USMC	High	800	1.10E+04	1593.55	384.65	121.81	3663.33	0.20	0.72
USMC	High	900	9591	1390.70	335.69	106.30	3197.00	0.14	0.66
USMC	High	1000	8435	1223.08	295.23	93.49	2811.67	0.10	0.62
USMC	High	1100	7495	1086.78	262.33	83.07	2498.33	0.06	0.58
USMC	High	1200	6710	972.95	234.85	74.37	2236.67	0.02	0.54
USMC	High	1300	6048	876.96	211.68	67.03	2016.00	0.00	0.52
USMC	High	1400	5484	795.18	191.94	60.78	1828.00	-0.03	0.49
USMC	High	1500	5000	725.00	175.00	55.42	1666.67	-0.05	0.47
USMC	High	1600	4582	664.39	160.37	50.78	1527.33	-0.07	0.45
USMC	High	1700	4217	611.47	147.60	46.74	1405.67	-0.08	0.44
USMC	High	1800	3897	565.07	136.40	43.19	1299.00	-0.10	0.42
USMC	High	1900	3614	524.03	126.49	40.06	1204.67	-0.11	0.41
USMC	High	2000	3364	487.78	117.74	37.28	1121.33	-0.12	0.40
USMC	High	2100	3151	456.90	110.29	34.92	1050.33	-0.13	0.39
USMC	High	2200	2960	429.20	103.60	32.81	986.67	-0.14	0.38
USMC	High	2300	2788	404.26	97.58	30.90	929.33	-0.14	0.38
USMC	High	2400	2632	381.64	92.12	29.17	877.33	-0.15	0.37
USMC	High	2500	2490	361.05	87.15	27.60	830.00	-0.16	0.37
USMC	High	2600	2361	342.35	82.64	26.17	787.00	-0.16	0.36
USMC	High	2700	2242	325.09	78.47	24.85	747.33	-0.17	0.35
USMC	High	2800	2134	309.43	74.69	23.65	711.33	-0.17	0.35
USMC	High	2900	2033	294.79	71.16	22.53	677.67	-0.17	0.35
USMC	High	3000	1941	281.45	67.94	21.51	647.00	-0.18	0.34
USMC	High	3500	1586	229.97	55.51	17.58	528.67	-0.19	0.33
USMC	High	4000	1331	193.00	46.59	14.75	443.67	-0.20	0.32
USMC	High	4500	1140	165.30	39.90	12.64	380.00	-0.21	0.31
USMC	High	5000	991.4	143.75	34.70	10.99	330.47	-0.22	0.30
USMC	High	5500	873.7	126.69	30.58	9.68	291.23	-0.22	0.30
USMC	High	6000	778.4	112.87	27.24	8.63	259.47	-0.23	0.29

Monitor	Scenario	DIST (M)	IPM (µg/m³)	TPM (µg/m³)	RPM (µg/m³)	RPM Silica (µg/m³)	PEL Silica (µg/m3)	LCL95%	UCL95%
USMC	High	6500	699.9	101.49	24.50	7.76	233.30	-0.23	0.29
USMC	High	7000	634.4	91.99	22.20	7.03	211.47	-0.23	0.29
USMC	High	7500	580.4	84.16	20.31	6.43	193.47	-0.24	0.28
USMC	High	8000	534.2	77.46	18.70	5.92	178.07	-0.24	0.28
USMC	High	8500	494.1	71.64	17.29	5.48	164.70	-0.24	0.28
USMC	High	9000	459.1	66.57	16.07	5.09	153.03	-0.24	0.28
USMC	High	9500	428.3	62.10	14.99	4.75	142.77	-0.24	0.28
USMC	High	10000	400.9	58.13	14.03	4.44	133.63	-0.24	0.28
USMC	High	15000	237.7	34.47	8.32	2.63	79.23	-0.25	0.27
USMC	High	20000	168.4	24.42	5.89	1.87	56.13	-0.25	0.27
USMC	High	25000	128.9	18.69	4.51	1.43	42.97	-0.25	0.27
USMC	High	30000	103.5	15.01	3.62	1.15	34.50	-0.26	0.26
USMC	High	40000	74.59	10.82	2.61	0.83	24.86	-0.26	0.26
USMC	High	50000	57.85	8.39	2.02	0.64	19.28	-0.26	0.26
USMC	High	61000	-999	-144.86	-34.97	-11.07	-333.00	-0.30	0.22
USMC	Medium	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
USMC	Medium	100	2182	316.39	76.37	24.18	727.33	-0.17	0.35
USMC	Medium	200	9977	1446.67	349.20	110.58	3325.67	0.16	0.68
USMC	Medium	300	9207	1335.02	322.25	102.04	3069.00	0.13	0.65
USMC	Medium	400	9276	1345.02	324.66	102.81	3092.00	0.13	0.65
USMC	Medium	500	8548	1239.46	299.18	94.74	2849.33	0.10	0.62
USMC	Medium	600	7481	1084.75	261.84	82.91	2493.67	0.06	0.58
USMC	Medium	700	6455	935.98	225.93	71.54	2151.67	0.01	0.53
USMC	Medium	800	5591	810.70	195.69	61.97	1863.67	-0.02	0.50
USMC	Medium	900	4878	707.31	170.73	54.06	1626.00	-0.05	0.47
USMC	Medium	1000	4290	622.05	150.15	47.55	1430.00	-0.08	0.44
USMC	Medium	1100	3812	552.74	133.42	42.25	1270.67	-0.10	0.42
USMC	Medium	1200	3413	494.89	119.46	37.83	1137.67	-0.12	0.40
USMC	Medium	1300	3076	446.02	107.66	34.09	1025.33	-0.13	0.39
USMC	Medium	1400	2789	404.41	97.62	30.91	929.67	-0.14	0.38
USMC	Medium	1500	2543	368.74	89.01	28.18	847.67	-0.15	0.37
USMC	Medium	1600	2330	337.85	81.55	25.82	776.67	-0.16	0.36
USMC	Medium	1700	2145	311.03	75.08	23.77	715.00	-0.17	0.35
USMC	Medium	1800	1982	287.39	69.37	21.97	660.67	-0.18	0.34
USMC	Medium	1900	1838	266.51	64.33	20.37	612.67	-0.18	0.34
USMC	Medium	2000	1711	248.10	59.89	18.96	570.33	-0.19	0.33
USMC	Medium	2100	1603	232.44	56.11	17.77	534.33	-0.19	0.33
USMC	Medium	2200	1506	218.37	52.71	16.69	502.00	-0.20	0.32
USMC	Medium	2300	1418	205.61	49.63	15.72	472.67	-0.20	0.32

Monitor	Scenario	DIST (M)	IPM (µg/m^3)	TPM (µg/m^3)	RPM (µg/m^3)	RPM Silica (µg/m^3)	PEL Silica (µg/m3)	LCL95%	UCL95%
USMC	Medium	2400	1339	194.16	46.87	14.84	446.33	-0.20	0.32
USMC	Medium	2500	1267	183.72	44.35	14.04	422.33	-0.21	0.31
USMC	Medium	2600	1201	174.15	42.04	13.31	400.33	-0.21	0.31
USMC	Medium	2700	1141	165.45	39.94	12.65	380.33	-0.21	0.31
USMC	Medium	2800	1085	157.33	37.98	12.03	361.67	-0.21	0.31
USMC	Medium	2900	1034	149.93	36.19	11.46	344.67	-0.22	0.30
USMC	Medium	3000	987.2	143.14	34.55	10.94	329.07	-0.22	0.30
USMC	Medium	3500	806.9	117.00	28.24	8.94	268.97	-0.23	0.29
USMC	Medium	4000	677	98.17	23.70	7.50	225.67	-0.23	0.29
USMC	Medium	4500	579.6	84.04	20.29	6.42	193.20	-0.24	0.28
USMC	Medium	5000	504.2	73.11	17.65	5.59	168.07	-0.24	0.28
USMC	Medium	5500	444.4	64.44	15.55	4.93	148.13	-0.24	0.28
USMC	Medium	6000	395.9	57.41	13.86	4.39	131.97	-0.24	0.28
USMC	Medium	6500	356	51.62	12.46	3.95	118.67	-0.24	0.28
USMC	Medium	7000	322.7	46.79	11.29	3.58	107.57	-0.25	0.27
USMC	Medium	7500	295.2	42.80	10.33	3.27	98.40	-0.25	0.27
USMC	Medium	8000	271.7	39.40	9.51	3.01	90.57	-0.25	0.27
USMC	Medium	8500	251.3	36.44	8.80	2.79	83.77	-0.25	0.27
USMC	Medium	9000	233.5	33.86	8.17	2.59	77.83	-0.25	0.27
USMC	Medium	9500	217.8	31.58	7.62	2.41	72.60	-0.25	0.27
USMC	Medium	10000	203.9	29.57	7.14	2.26	67.97	-0.25	0.27
USMC	Medium	15000	120.9	17.53	4.23	1.34	40.30	-0.25	0.27
USMC	Medium	20000	85.65	12.42	3.00	0.95	28.55	-0.26	0.26
USMC	Medium	25000	65.54	9.50	2.29	0.73	21.85	-0.26	0.26
USMC	Medium	30000	52.65	7.63	1.84	0.58	17.55	-0.26	0.26
USMC	Medium	40000	37.94	5.50	1.33	0.42	12.65	-0.26	0.26
USMC	Medium	50000	29.42	4.27	1.03	0.33	9.81	-0.26	0.26
USMC	Medium	61000	-999	-144.86	-34.97	-11.07	-333.00	-0.30	0.22
USMC	Low	1	0	0.00	0.00	0.00	0.00	-0.26	0.26
USMC	Low	100	73.98	10.73	2.59	0.82	24.66	-0.26	0.26
USMC	Low	200	338.2	49.04	11.84	3.75	112.73	-0.25	0.27
USMC	Low	300	312.1	45.25	10.92	3.46	104.03	-0.25	0.27
USMC	Low	400	314.4	45.59	11.00	3.48	104.80	-0.25	0.27
USMC	Low	500	289.8	42.02	10.14	3.21	96.60	-0.25	0.27
USMC	Low	600	253.6	36.77	8.88	2.81	84.53	-0.25	0.27
USMC	Low	700	218.8	31.73	7.66	2.43	72.93	-0.25	0.27
USMC	Low	800	189.5	27.48	6.63	2.10	63.17	-0.25	0.27
USMC	Low	900	165.4	23.98	5.79	1.83	55.13	-0.25	0.27
USMC	Low	1000	145.4	21.08	5.09	1.61	48.47	-0.25	0.27

Monitor	Scenario	DIST (M)	IPM (µg/m³)	TPM (µg/m³)	RPM (µg/m³)	RPM Silica (µg/m³)	PEL Silica (µg/m3)	LCL95%	UCL95%
USMC	Low	1100	129.2	18.73	4.52	1.43	43.07	-0.25	0.27
USMC	Low	1200	115.7	16.78	4.05	1.28	38.57	-0.26	0.26
USMC	Low	1300	104.3	15.12	3.65	1.16	34.77	-0.26	0.26
USMC	Low	1400	94.55	13.71	3.31	1.05	31.52	-0.26	0.26
USMC	Low	1500	86.21	12.50	3.02	0.96	28.74	-0.26	0.26
USMC	Low	1600	78.99	11.45	2.76	0.88	26.33	-0.26	0.26
USMC	Low	1700	72.71	10.54	2.54	0.81	24.24	-0.26	0.26
USMC	Low	1800	67.19	9.74	2.35	0.74	22.40	-0.26	0.26
USMC	Low	1900	62.32	9.04	2.18	0.69	20.77	-0.26	0.26
USMC	Low	2000	58	8.41	2.03	0.64	19.33	-0.26	0.26
USMC	Low	2100	54.33	7.88	1.90	0.60	18.11	-0.26	0.26
USMC	Low	2200	51.04	7.40	1.79	0.57	17.01	-0.26	0.26
USMC	Low	2300	48.07	6.97	1.68	0.53	16.02	-0.26	0.26
USMC	Low	2400	45.38	6.58	1.59	0.50	15.13	-0.26	0.26
USMC	Low	2500	42.94	6.23	1.50	0.48	14.31	-0.26	0.26
USMC	Low	2600	40.7	5.90	1.42	0.45	13.57	-0.26	0.26
USMC	Low	2700	38.66	5.61	1.35	0.43	12.89	-0.26	0.26
USMC	Low	2800	36.79	5.33	1.29	0.41	12.26	-0.26	0.26
USMC	Low	2900	35.06	5.08	1.23	0.39	11.69	-0.26	0.26
USMC	Low	3000	33.47	4.85	1.17	0.37	11.16	-0.26	0.26
USMC	Low	3500	27.35	3.97	0.96	0.30	9.12	-0.26	0.26
USMC	Low	4000	22.95	3.33	0.80	0.25	7.65	-0.26	0.26
USMC	Low	4500	19.65	2.85	0.69	0.22	6.55	-0.26	0.26
USMC	Low	5000	17.09	2.48	0.60	0.19	5.70	-0.26	0.26
USMC	Low	5500	15.06	2.18	0.53	0.17	5.02	-0.26	0.26
USMC	Low	6000	13.42	1.95	0.47	0.15	4.47	-0.26	0.26
USMC	Low	6500	12.07	1.75	0.42	0.13	4.02	-0.26	0.26
USMC	Low	7000	10.94	1.59	0.38	0.12	3.65	-0.26	0.26
USMC	Low	7500	10.01	1.45	0.35	0.11	3.34	-0.26	0.26
USMC	Low	8000	9.21	1.34	0.32	0.10	3.07	-0.26	0.26
USMC	Low	8500	8.519	1.24	0.30	0.09	2.84	-0.26	0.26
USMC	Low	9000	7.916	1.15	0.28	0.09	2.64	-0.26	0.26
USMC	Low	9500	7.384	1.07	0.26	0.08	2.46	-0.26	0.26
USMC	Low	10000	6.912	1.00	0.24	0.08	2.30	-0.26	0.26
USMC	Low	15000	4.099	0.59	0.14	0.05	1.37	-0.26	0.26
USMC	Low	20000	2.904	0.42	0.10	0.03	0.97	-0.26	0.26
USMC	Low	25000	2.222	0.32	0.08	0.02	0.74	-0.26	0.26
USMC	Low	30000	1.785	0.26	0.06	0.02	0.60	-0.26	0.26
USMC	Low	40000	1.286	0.19	0.05	0.01	0.43	-0.26	0.26

Monitor	Scenario	DIST (M)	IPM (µg/m^3)	TPM (µg/m^3)	RPM (µg/m^3)	RPM Silica (µg/m^3)	PEL Silica (µg/m3)	LCL95%	UCL95%
USMC	Low	50000	0.9974	0.14	0.03	0.01	0.33	-0.26	0.26
USMC	Low	61000	-999	-144.86	-34.97	-11.07	-333.00	-0.30	0.22

Appendix III: Florida Air Quality System Daily Particulate Average for June 2011

	Baptist Children's	Palma Ceia	USMC Reserve	Winker Pump Station
Date	Daily Avg. (µg/m^3)	Daily Avg. (µg/m^3)	Daily Avg. (µg/m^3)	Daily Avg. (µg/m^3)
1-Jun	9.1	*	11.7	6.1
2-Jun	4.8	5.7	6.3	9.9
3-Jun	5.1	7.1	7.1	7.6
4-Jun	6.3	8.8	8.6	6.7
5-Jun	10.7	11.8	11.7	9.5
6-Jun	16.7	17.3	15.2	17.6
7-Jun	12.4	14.3	14.4	16.1
8-Jun	11.8	14.4	14.8	15.7
9-Jun	10.9	14	14.1	14
10-Jun	8.2	12.3	11.3	10
11-Jun	9.9	12.4	11.1	8.9
12-Jun	9.1	11.7	10.2	8.3
13-Jun	12.3	12.1	12.1	8.6
14-Jun	*	14.5	13.5	10.5
15-Jun	*	*	16.9	15.2
16-Jun	*	15.8	17.5	16.8
17-Jun	*	14.5	13	16.1
18-Jun	*	10.7	10.5	5.5
19-Jun	*	7.3	7.4	5
20-Jun	*	10.6	9.3	6.1
21-Jun	10.9	12.1	12.8	8.4
22-Jun	10.5	13.1	12.9	7
23-Jun	3.1	5.9	6.7	5.1
24-Jun	4.8	6	7.2	8.9
25-Jun	6.8	7.6	7.4	9.7
26-Jun	7.9	7.4	7.4	8.7
27-Jun	11.6	11.9	11.3	8.7
28-Jun	12.6	13.9	12.8	6.5
29-Jun	5	5.7	5.8	5
30-Jun	5.2	5.6	5.7	7

* Denotes Missing Data