APPENDIX C

AIR QUALITY MODELING AND HEALT RISK ASSESSMENT REPORT

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California Steel Industry,
Fontana, CA Facility
District Facility ID 46268

Air Quality Modeling and Health Risk Assessment Report

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1.0 EXECUTIVE SUMMARY

California Steel Industry (CSI) is submitting an application to the San Bernardino County Land Use Services Planning for proposed improvements on an approximately 535,000 square-foot portion ("Development Area") of the 430-acre property located at 1 California Steel Way (APN 0231-121-04-0000, 0231-121-05-0000) in the unincorporated Fontana area of San Bernardino County, at the northwest corner of San Bernardino and Cherry Avenues

The proposed project includes a new galvanizing line (#3 CGL), a push pull pickle line (PPPL), the installation of new combustion units (including a new furnace serving #3 CGL), new process and storage tanks, a new emergency generator.

The new galvanizing line will be constructed within the existing Plate Mill building that most recently contained the No.2 Pipe Mill. The equipment associated with the Pipe Mill will be removed and the existing building will be used to house the #3 CGL.

The Project will allow Applicant to increase the existing facility's current production of galvanized and galvalume sheet products. This will replace lost manufacturing capacity in the country due to the impending closure of USS-UPI steel facility in Pittsburg, California by the end of 2024, and optimize product mix to meet market demand.

The HRA has been performed per South Coast Air Quality Management District and OEHHA guidelines, and the results of the HRA are presented in this report. Results of the HRA show that cancer risk due to toxic air emissions from the proposed project are below 1 per million, the chronic and acute hazard indices are below one, and the cancer burden is below 0.5. The project therefore meets District Rule 1401 requirements and may proceed.

1.1 Facility Information

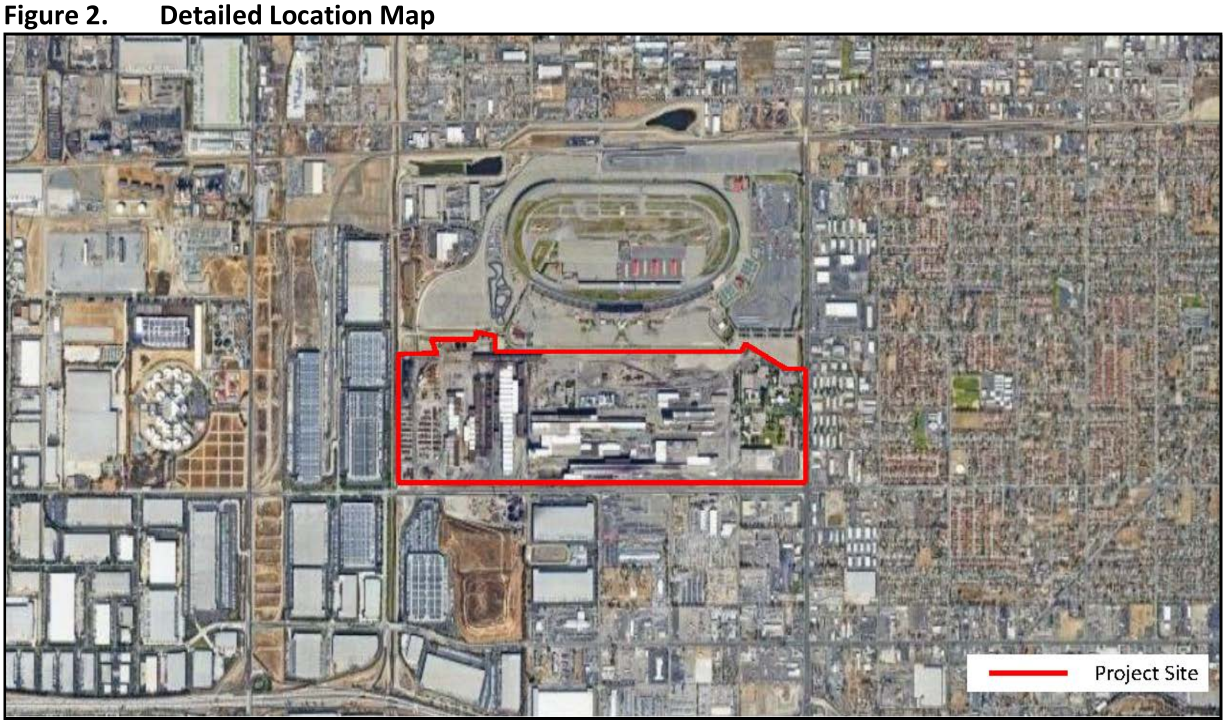
CSI owns and operates a steel rolling mill that produces hot rolled, cold rolled, and galvanized steel products.

California Steel Industry – Fontana (Facility ID: 46268)
14000 San Bernardino Ave,
Fontana, CA 92335

Maps showing the location of the facility are provided as Figure 1 and Figure 2, below

Figure 1. General Location Map

Figure 2. Detailed Location Map



2.0 Modeling Approach

2.1 Methodology

The HRA evaluated maximum potential emissions from the following sources:

- Natural gas-fired heaters
- Scrubbers
- Emergency standby engine
- Thermal oxidizer controlling the Coating Line
- Ammonia storage tank

Modeling was performed following SCAQMD and OEHHA guidance. All sources were assumed to emit 24 hours per day, 7 days per week.

Risks for the entire project that are less than the following regulatory thresholds are not considered to be significant and, therefore, acceptable:

- Cancer risk equal to or less than 10 in one million
- Chronic hazard index equal to or less than 1
- Acute hazard index equal to or less than 1
- Cancer burden equal to or less than 0.5

The cancer risk and hazard index metrics are generally applied to the maximally exposed individual (MEI). There are separate MEIs for residential exposure (i.e., residential areas) and for worker exposure (i.e., offsite work places).

2.2 Dispersion and Health Risk Assessment Models

This health risk assessment was performed following the SCAQMD and Office of Environmental Health Hazard Assessment (OEHHA) guidelines[1]. As recommended by these guidelines, the California Air Resources Board (CARB) Hotspots Analysis and Reporting Program Version 2 (HARP) was used to perform a refined health risk assessment for the project's emission sources. The AMS/EPA Regulatory Model (AERMOD, v 22112) was used as the air dispersion model for this analysis. HARP includes AERMOD but also allows model runs to be performed with AERMOD

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[1] South Coast Air Quality Management District, RISK ASSESSMENT PROCEDURES for Rules 1401, 1401.1 and 212, Version 8.1, September 1, 2017.

South Coast AQMD Modeling Guidance for AERMOD (http://www.aqmd.gov/home/air-quality/meteorological-data/modeling-guidance).

California Office of Environmental Health Hazard Assessment (OEHHA) 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015.

outside of HARP. For this project, AERMOD was run outside of HARP, and the results were imported into HARP to complete the risk analysis.

2.3 Project Sources

As described above, the HRA considered emissions from proposed new natural gas-fired heaters, scrubbers, a diesel-fired emergency standby engine, a Chem Treat and Coating Line controlled by a thermal oxidizer, and an ammonia storage tank. Table 1 below provides details on how the sources were treated in the modeling. Specific source parameters used in AERMOD are provided in Appendix A. A diagram showing the locations of modeled sources is provided in Appendix B.

Table 1. Source IDs and Modeling Methodology

Source	Source ID	Description
Natural gas-fired heaters	HEATERS	The natural gas heaters and afterburner vent to a common stack. The stack was modeled as a point source.
Scrubbers	CLEAN, PPPL	The cleaning section exhaust (CLEAN) and the push-pull pickle line exhaust are each sent to a scrubber and vent through stacks. Each source was modeled as a point source.
Emergency standby engine	ENG	The emergency standby diesel engine was modeled as a point source. Source parameters were assumed to be the default parameters from Appendix D of Santa Barbara County APCD Modeling Guidelines for Health Risk Assessments[2]
Thermal oxidizer controlling the Chem Treat and Coating Line	CHEMCOAT	The coating line emissions vent to a thermal oxidizer located within the CGL building. The chem treat process also vents within the same building. The emissions from both sources were combined and modeled as a volume source released at approximately 120 feet above ground level through building vents.
Ammonia storage tank	AMTNK	The ammonia tank was modeled as a volume source with parameters based on the tank dimensions.

2.4 Terrain Characterization

AERMOD requires that each source in the analysis be categorized as being in either a rural or an urban setting. As per South Coast AQMD policy[3] the county of San Bernardino was classified as urban. Therefore, AERMOD was run using the urban option. The population density also followed South Coast AQMD policy, and a population of 2,035,210 (San Bernardino County) was utilized.

[2] https://www.ourair.org/wp-content/uploads/apcd-15i.pdf

[3] South Coast AQMD Modeling Guidance for AERMOD (accessed July 13, 2023)

Source and receptors were modeled with consideration of terrain elevations. The AERMOD terrain processor (AERMAP) was used to calculate terrain elevations for each source and receptor from the U.S. Geological Survey (USGS) National Elevation Dataset (NED) at 10 m resolution.

2.5 Building Downwash

When point sources are located near or on buildings or structures, the dispersion of the plume can be influenced. The wake produced on the lee side of the structure can cause the plume to be pulled toward the ground near the structure resulting in higher concentrations. This is called building downwash. Stack heights that minimize downwash effects are designated good engineering practice (GEP) stack heights.

The effects of building downwash have been examined in this modeling analysis. AERMOD uses the EPA-approved Building Profile Input Program with Plume Rise Model Enhancements (BPIP-PRIME) to provide input for the downwash analysis. This program calculates the GEP formula stack heights and direction-specific building dimensions for input to the dispersion calculations. BPIP-PRIME requires the input of building coordinates and heights, and stack coordinates; structures judged to have downwash potential were included. A diagram showing the building downwash structures that were considered in the modeling is included in Attachment B.

2.6 Meteorological Data

The AERMOD-ready meteorological data sets for years 2011-2016 for the District's Fontana meteorological station in Central San Bernardino Valley were used for the analysis. These data sets were made available by the South Coast AQMD and downloaded from the South Coast AQMD AERMOD Meteorological Files webpage[4]. The meteorological data was processed using AERMET version 18081, the AERMOD meteorological data preprocessor. The Fontana meteorological station is located <2 km north of the facility and was deemed to be the most representative station due to its proximity, similar elevation, and similar terrain. A windrose showing a graphical distribution of wind speed and wind direction for the time period modeled is included as Figure D-1 of the Appendices.

2.7 Model Options

AERMOD was run with the regulatory default modeling options.

2.8 Receptors

Health effect indices such as cancer risk, chronic hazard index, and acute hazard index were calculated for a variety of receptor locations. Receptors of primary interest are typically those at residential locations, at sensitive population locations, and at offsite worker locations. However, in order to get a more complete picture of the patterns of exposure, concentrations and risk are also calculated at regularly spaced grid points throughout the modeling domain.

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[4] AERMOD Table 1 (aqmd.gov) (accessed September 13, 2023).

The receptors used to analyze project impacts include:

- 25-m spaced receptors along the facility boundary and out to 500 m from the project sources;
- 50-m spaced receptors beyond 500 m out to 1,000 m from the project sources;
- 100-m spaced receptors beyond 1,000 m out to 1,500 m from the project sources;
- 250-m spaced receptors beyond 1,500 m out to 2,000 m from the project sources.

In addition to the receptors described above, onsite receptors were added to locations where CSI leases part of their property to other businesses. These onsite leased areas are located in the northwest, west, and northeast portions of their property. A total of 102 onsite receptors were used in the project analysis; receptor spacing for the onsite receptors was 25 meters. Sensitive receptor locations (schools, hospitals, nursing homes, and day care facilities) were obtained via an internet search and the Google Maps database. The sensitive receptors used in the project analysis are listed in Table E-1 of the Appendices.

Receptor heights were set to the elevation as described above in Section 2.4, to capture ground level concentrations. The network is composed of Cartesian (X,Y) receptors with Universal Transverse Mercator (UTM) coordinates. The modeling was conducted using the North American Datum of 1983 (NAD83).

Figure F-1 of the Appendices shows the model representation of the receptors. A total of 6,380 receptors were included in the analysis.

3.0 Risk Characterization

The air dispersion modeling is used to estimate normalized ground level concentrations based on an emission rate of one gram per second for each emission source (χ/Q or Chi over Q). Since ambient concentration is directly related to emission rate, the χ/Q is then multiplied in HARP by the emission rate for each substance from each source to obtain a ground-level concentration (GLC) resulting from each substance. Potential pathways of exposure to potential offsite receptors by each substance are identified (e.g., inhalation, dermal) and the appropriate algorithms are then used together with the χ/Q to estimate the concentration in air, soil, water, vegetation, and animals. The potential exposure levels to receptors are then estimated for each substance. HARP analyzes this data to calculate cancer risk and non-cancer risks. Default risk analysis methods were used, and default values for all pathways were used with the exception of the dermal pathway, which assumed a “warm” climate per SCAQMD guidance. Per OEHHA and SCAQMD guidance for HARP modeling, a deposition velocity of 0.02 m/s was assumed for the non-inhalation pathways.

The exposure pathways chosen for this analysis were inhalation, homegrown produce, dermal absorption, soil ingestion, and mother’s milk for residential exposure and inhalation, dermal absorption, and soil ingestion for worker pathways. Pathways of fish ingestion, dairy milk ingestion, drinking water consumption, and meat ingestion were not used as the facility does not impact a local fishable body of water, grazing land, dairy, or water reservoir.

3.1 Carcinogens

The cancer health impacts are characterized as a cancer risk that represents the chances per million people of developing cancer. The cancer risk from each substance is added together to arrive at a total cancer risk. HARP calculates cancer risk based on annual average concentrations. Assumed exposure durations are provided in the table below.

Table 2. Exposure Duration Assumptions for Cancer Risk

Risk type	Exposure Duration
Residential cancer risk	24 hr/day, 350 day/yr, 30 years
Cancer burden	24 hr/day, 350 day/yr, 70 years
Worker cancer risk	8 hr/day, 250 day/yr, 25 years

3.2 Non-Carcinogens

The non-cancer health impacts are characterized by a hazard index (HI). When more than one chemical is considered, it is assumed that the effects are additive provided the associated chemicals are expected to have an adverse impact on the same target organ system (respiratory system, liver, etc.). Thus, chemical-specific hazard indices are summed to arrive at a hazard index for each target organ. For any organ system, a total hazard index exceeding 1.0 indicates a potential health effect. Although the assumption of additivity of exposure to multiple chemicals ignores possible antagonistic or synergistic interactions, this approach has been accepted by regulatory agencies as generally conservative.

4.0 Health Risk Results

4.1 Cancer, Chronic, and Acute Risk

SCAQMD Rule 1401 states that a permit to construct will be denied if cancer risk will exceed 10 in one million or the chronic or acute hazard index will exceed 1. The predicted increase in health risks at maximally exposed receptors resulting from the project are summarized in Table 3 below. As shown, the highest calculated risks are below Rule 1401 limits and project risk impacts are acceptable.

Table 3. Summary of Results at Maximally Exposed Offsite Receptors

Location	Risk/HI Value	Receptor Number	Easting (X) (m)	Northing (Y) (m)
Cancer Risk (Per Million)				
Maximum residential cancer risk (per million)	0.153	5203	455300.0	3772050.0
Maximum worker cancer risk (per million)	0.065	248	453623.4	3771571.7
Maximum sensitive receptor cancer risk (per	0.097	6312	455250.0	3773000.0
Chronic Hazard Index				
Maximum residential chronic risk (hazard index)	0.011	4694	455350.0	3771450.0

Location	Risk/HI Value	Receptor Number	Easting (X) (m)	Northing (Y) (m)
Maximum worker chronic risk (hazard index)	0.060	2405	454150.0	3770825.0
Maximum sensitive receptor chronic risk (hazard	0.007	5809	455600.0	3771200.0
Acute Hazard Index				
Point of maximum impact (PMI)	0.028	6350	453113.9	3771479.7

The maximum cancer risk at a residential receptor was 0.153 per million, at a receptor located approximately 600 meters northeast of the facility. The maximum cancer risk at a worker receptor was 0.065 per million, at a fenceline receptor on the northern plant boundary. The maximum cancer risk at a sensitive receptor was 0.097 per million, at Redwood Elementary School located about 1500 meters north-northeast of the facility boundary. At the MEIR most of the risk was due to PAHs (41.8%), DPM (31.8%), and hexavalent chromium (14.6%). The three largest contributors to risk were the chem treat and coating line thermal oxidizer, the emergency standby engine, and the CGL heaters, each contributing about 30% of the risk. At the MEIW most of the risk was due to DPM emissions from the emergency standby engine (63.1%) followed by the CGL heaters (14.1%) and the cleaning section scrubber stack (12.2%). At the maximum sensitive receptor, the distribution of risk was similar to the MEIR.

The maximum chronic risks at the highest residential receptor, highest worker receptor, and highest sensitive receptor were very low (hazard index <0.1). The maximum chronic risk at a residential receptor was a hazard index of 0.011, at a receptor located approximately 500 meters east of the facility. The maximum chronic risk at a worker receptor was a hazard index of 0.060, at a receptor south of the facility across San Bernardino Avenue. The maximum chronic risk at a sensitive receptor was a hazard index of 0.008, at Live Oak Elementary School located about 700 meters east of CSI. At each of these receptors, hydrochloric acid from the PPPL scrubber was the primary source of risk (>90%).

The acute risk at the point of maximum impact (PMI) was 0.028, at a receptor within plant boundaries on leased property, north of the new galvanizing line building. Risk was driven almost entirely be ammonia emissions from the ammonia tank.

Complete breakdowns of cancer, chronic, and acute risk by substance and by source at the maximum receptors are provided in Appendix G and Appendix H. Figures showing the locations of the maximum impacted receptors and contour maps showing the residential and worker cancer risks are provided in Appendix I and Appendix J.

4.2 Cancer Burden

SCAQMD Rule 1401 states that a permit to construct will be denied if cancer burden[5] will exceed 0.5, and defines cancer burden as “the estimated increase in the occurrence of cancer cases in a population subject to a MICR of greater than or equal to one in one million (1.0 x 10-6) resulting from exposure to toxic air contaminants.” Since the highest residential and worker cancer risk are below one per million, cancer burden does not need to be evaluated and no further analysis is necessary.

5.0 CONCLUSION

This HRA shows that the CGL No. 3 project at CSI will meet AQMD Rule 1401 requirements as proposed by the permit application. Residential and worker cancer risk is below 10 in one million and chronic and acute risk will not exceed a hazard index of 1.0. Cancer burden will not exceed 0.5.

[5] Per SCAQMD Rule 1401, *cancer burden* is defined as “the estimated increase in the occurrence of cancer cases in a population subject to a MICR of greater than or equal to one in one million (1.0 x 10^{-6}) resulting from exposure to toxic air contaminants.”

APPENDIX A. SOURCE PARAMETERS

Table A-1. Project Point Source Parameters

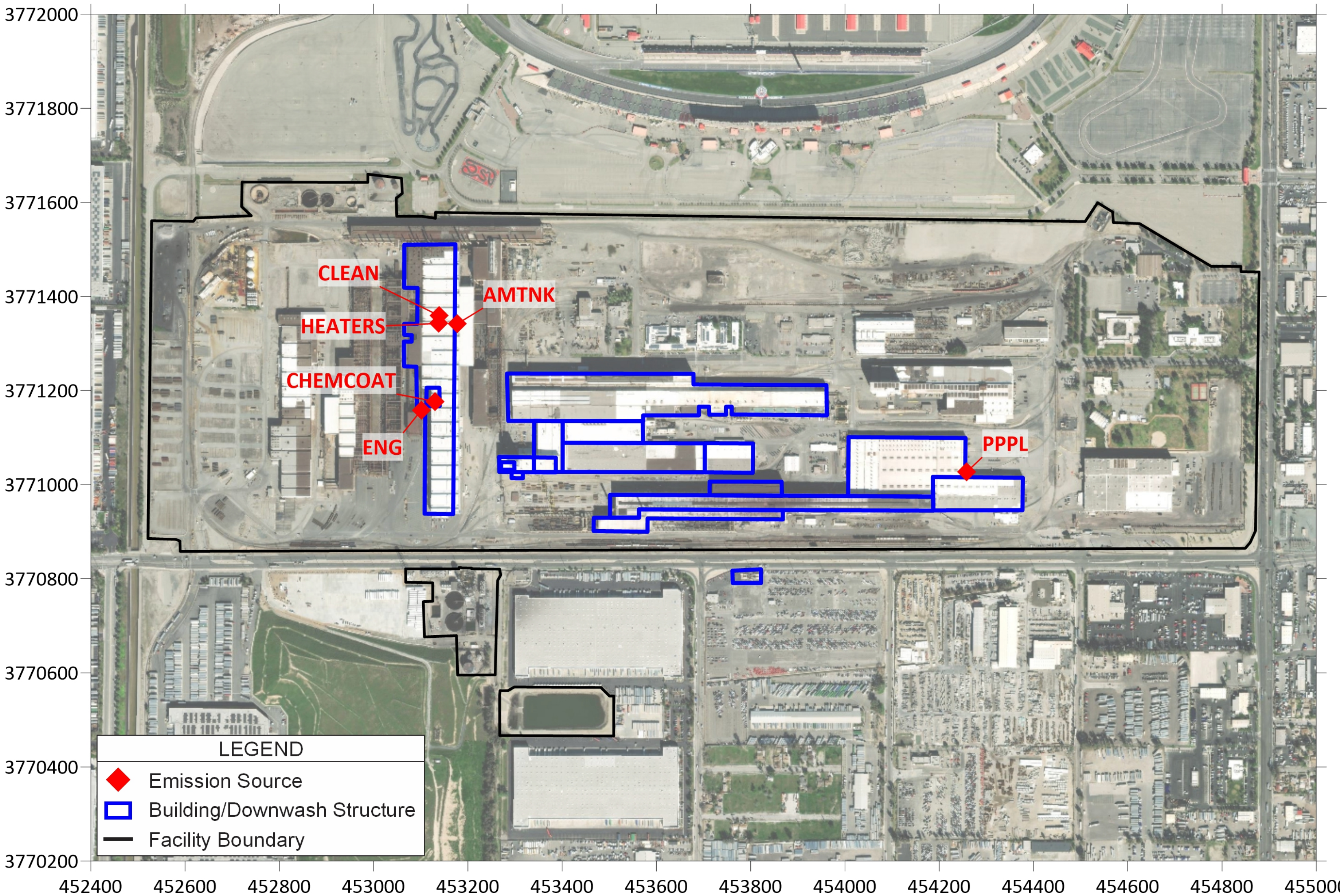
Source Description	Stack ID	Stack Height		Stack Gas Exit Temperature		Stack Gas Exit Velocity		Stack Gas Exit Flow Rate		Stack Diameter		UTM Coordinates (NAD83)		Base Elevation	Stack Release Type
		(ft)	(m)	(°F)	(K)	(ft/s)	(m/s)	(ft³/m)	(m³/s)	(ft)	(m)	East (m)	North (m)	(m)	
Cleaning Section Scrubber Stack	CLEAN	135.0	41.1	125.0	324.8	42.4	12.9	8000	3.78	2.0	0.61	453138.95	3771359.29	329.37	Vertical
Emergency Standby Engine	ENG	10.1	3.1	886.0	747.6	216.1	65.9	3788	1.79	0.6	0.19	453101.15	3771158.5	328.31	Vertical
CGL Heaters	HEATERS	135.0	42.7	500.0	533.2	28.1	8.6	40000	18.88	5.5	1.68	453138.36	3771342.75	329.28	Vertical
PPPL Scrubber	PPPL	70.0	21.3	125.0	324.8	56.8	17.3	24100	11.37	3.0	0.91	454258.1	3771026.8	329.26	Vertical

Table A-2. Project Volume Source Parameters

Source Description	Model ID	Release Height		Init. Horizontal Dimension		Init. Vertical Dimension		UTM Coordinates Easting/ Northing		Base Elevation
		(ft)	(m)	(ft)	(m)	(ft)	(m)	(m)	(m)	(m)
Chem Treat and Coating Line Thermal Oxidizer	CHEMCOAT	122	37.19	24.76	7.55	86.05	26.23	453130.09	3771176.81	328.48
Ammonia Tank	AMTNK	14.3	4.36	2.8	0.84	13.0	3.97	453177.93	3771342.16	329.41

APPENDIX B. SOURCE AND DOWNWASH STRUCTURES LOCATIONS

Figure B-1. Source and Downwash Structures Locations



APPENDIX C. EMISSION RATES

Table C-1. Emission Rates by Substance

CAS Number	Substance Name	Annual Average Emission Rate		Maximum 1-Hr Emission Rate	
		lb/yr	g/s	lb/hr	g/s
7664-41-7	Ammonia	3.06E+02	4.41E-03	2.84E+00	3.58E-01
75-07-0	Acetaldehyde	2.72E+00	3.91E-05	3.11E-04	3.92E-05
107-02-8	Acrolein	2.23E+00	3.21E-05	2.55E-04	3.21E-05
71-43-2	Benzene	5.08E+00	7.31E-05	5.80E-04	7.31E-05
100-41-4	Ethylbenzene	6.05E+00	8.70E-05	6.91E-04	8.70E-05
50-00-0	Formaldehyde	1.08E+01	1.55E-04	1.23E-03	1.55E-04
91-20-3	Naphthalene	2.48E-01	3.56E-06	2.83E-05	3.56E-06
110-54-3	n-Hexane	4.03E+00	5.79E-05	4.60E-04	5.80E-05
1151	PAH's (including naphthalene)	3.30E-01	4.75E-06	3.77E-05	4.75E-06
115-07-1	Propylene	4.65E+02	6.68E-03	5.31E-02	6.69E-03
108-88-3	Toluene	2.32E+01	3.34E-04	2.65E-03	3.34E-04
1330-20-7	Xylenes	1.73E+01	2.48E-04	1.97E-03	2.48E-04
18540-29-9	Cr+6	5.37E-03	7.72E-08	6.13E-07	7.72E-08
7440-38-2	Arsenic	1.80E-02	2.59E-07	2.06E-06	2.60E-07
7440-41-7	Beryllium	1.80E-02	2.59E-07	2.06E-06	2.60E-07
7440-43-9	Cadmium	1.80E-02	2.59E-07	2.06E-06	2.60E-07
7440-47-3	Chromium	1.80E+00	2.59E-05	2.06E-04	2.59E-05
7440-50-8	Copper	5.41E+00	7.78E-05	6.17E-04	7.78E-05
7439-92-1	Lead	1.80E-02	2.59E-07	2.06E-06	2.60E-07
7439-96-5	Manganese	2.97E+01	4.28E-04	3.39E-03	4.28E-04
7439-97-6	Mercury	1.80E-02	2.59E-07	2.06E-06	2.60E-07
7440-02-0	Nickel	1.80E+00	2.59E-05	2.06E-04	2.59E-05
7782-49-2	Selenium	1.80E-02	2.59E-07	2.06E-06	2.60E-07
9901	Diesel PM	8.73E+00	1.26E-04	4.37E-02	5.50E-03
7647-01-0	HCL	7.30E+03	1.05E-01	8.33E-01	1.05E-01

Table C-2. Emission Rates by Source

Source ID	Source Description	Substance Name	CAS Number	Annual Average Emission Rate		Maximum 1-Hr Emission Rate	
				lb/yr	g/s	lb/hr	g/s
AMTNK	Ammonia Tank	Ammonia	7664-41-7	6.42E+00	9.23E-05	2.81E+00	3.54E-01
CHEMCOAT	Chem Treat and Coating Line Thermal Oxidizer	Acetaldehyde	75-07-0	3.59E-01	5.16E-06	4.10E-05	5.17E-06
		Acrolein	107-02-8	2.25E-01	3.24E-06	2.57E-05	3.24E-06
		Benzene	71-43-2	6.67E-01	9.60E-06	7.62E-05	9.60E-06
		Ethyl benzene	100-41-4	7.93E-01	1.14E-05	9.05E-05	1.14E-05
		Formaldehyde	50-00-0	1.42E+00	2.04E-05	1.62E-04	2.04E-05
		Naphthalene	91-20-3	2.50E-02	3.60E-07	2.86E-06	3.60E-07
		Hexane	110-54-3	5.26E-01	7.56E-06	6.00E-05	7.56E-06
		PAHs, total	1151	3.34E-02	4.80E-07	3.81E-06	4.80E-07
		Propylene	115-07-1	6.10E+01	8.77E-04	6.96E-03	8.77E-04
		Toluene	108-88-3	3.05E+00	4.39E-05	3.49E-04	4.39E-05
		Xylenes (mixed)	1330-20-7	2.27E+00	3.26E-05	2.59E-04	3.26E-05
		Chromium, hexavalent (& compounds)	18540-29-9	5.37E-03	7.72E-08	6.13E-07	7.72E-08
CLEAN	Cleaning Section Scrubber Stack	Arsenic	7440-38-2	1.80E-02	2.59E-07	2.06E-06	2.60E-07
		Beryllium	7440-41-7	1.80E-02	2.59E-07	2.06E-06	2.60E-07
		Cadmium	7440-43-9	1.80E-02	2.59E-07	2.06E-06	2.60E-07
		Chromium	7440-47-3	1.80E+00	2.59E-05	2.06E-04	2.59E-05
		Copper	7440-50-8	5.41E+00	7.78E-05	6.17E-04	7.78E-05
		Lead	7439-92-1	1.80E-02	2.59E-07	2.06E-06	2.60E-07
		Manganese	7439-96-5	2.97E+01	4.28E-04	3.39E-03	4.28E-04
		Mercury	7439-97-6	1.80E-02	2.59E-07	2.06E-06	2.60E-07
		Nickel	7440-02-0	1.80E+00	2.59E-05	2.06E-04	2.59E-05
		Selenium	7782-49-2	1.80E-02	2.59E-07	2.06E-06	2.60E-07
ENG	Emergency Standby Engine	Diesel PM	9901	8.73E+00	1.26E-04	4.37E-02	5.50E-03

Source ID	Source Description	Substance Name	CAS Number	Annual Average Emission Rate		Maximum 1-Hr Emission Rate	
				lb/yr	g/s	lb/hr	g/s
HEATERS	CGL Heaters	Acetaldehyde	75-07-0	2.36E+00	3.40E-05	2.70E-04	3.40E-05
		Acrolein	107-02-8	2.00E+00	2.88E-05	2.29E-04	2.89E-05
		Ammonia	7664-41-7	3.00E+02	4.31E-03	3.42E-02	4.31E-03
		Benzene	71-43-2	4.42E+00	6.35E-05	5.04E-04	6.35E-05
		Ethyl benzene	100-41-4	5.25E+00	7.56E-05	6.00E-04	7.56E-05
		Formaldehyde	50-00-0	9.37E+00	1.35E-04	1.07E-03	1.35E-04
		Naphthalene	91-20-3	2.23E-01	3.20E-06	2.54E-05	3.20E-06
		Hexane	110-54-3	3.50E+00	5.04E-05	4.00E-04	5.04E-05
		PAHs, total	1151	2.97E-01	4.27E-06	3.39E-05	4.27E-06
		Propylene	115-07-1	4.04E+02	5.81E-03	4.61E-02	5.81E-03
		Toluene	108-88-3	2.02E+01	2.90E-04	2.30E-03	2.90E-04
		Xylenes (mixed)	1330-20-7	1.50E+01	2.16E-04	1.71E-03	2.15E-04
PPPL	PPPL Scrubber	Hydrochloric acid	7647-01-0	7.30E+03	1.05E-01	8.33E-01	1.05E-01

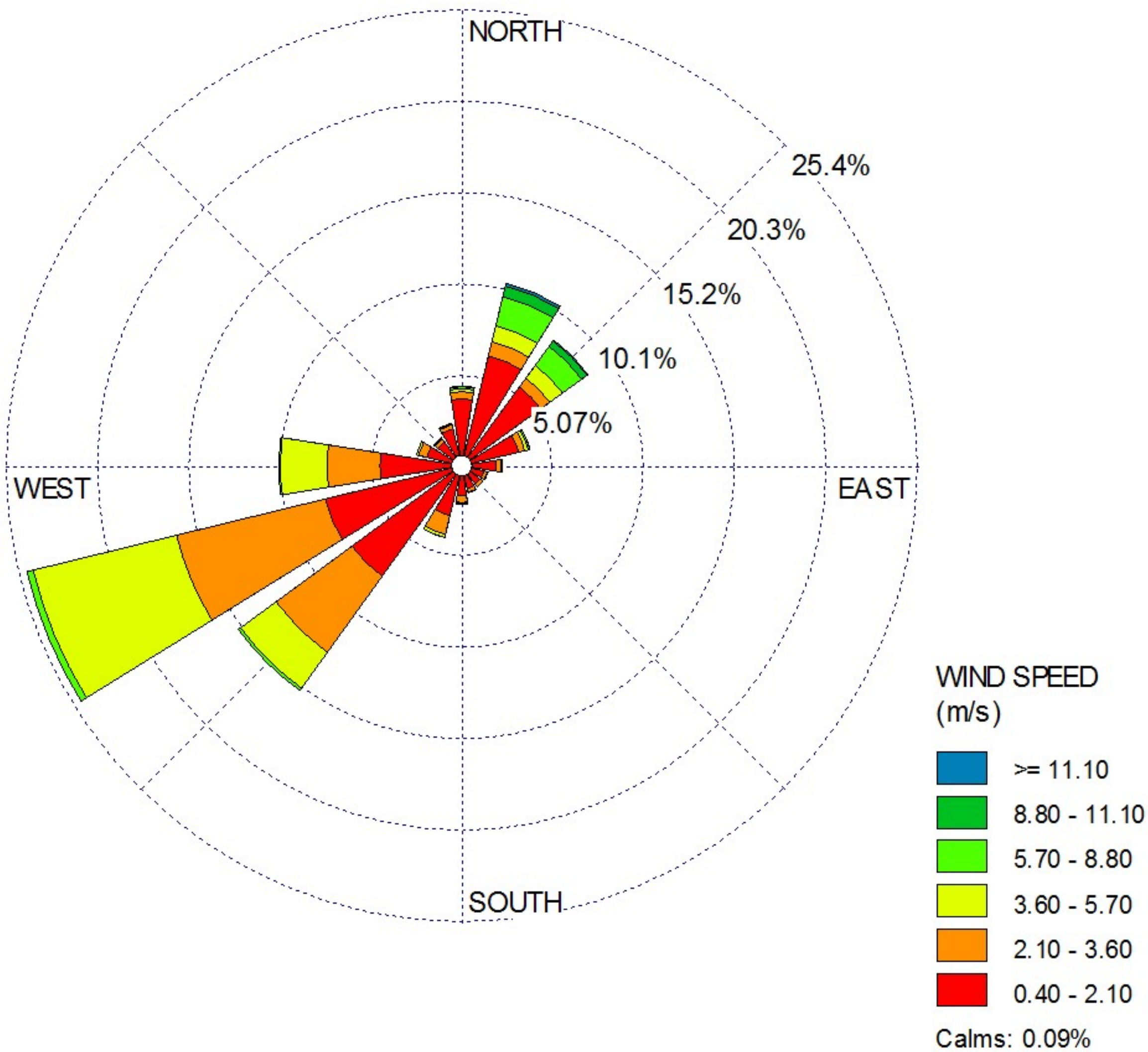
APPENDIX D. WINDROSE

Figure D-1. Windrose

Station No. 3102

Fontana, CA

Period: 2011 - 2013, 2015 - 2016



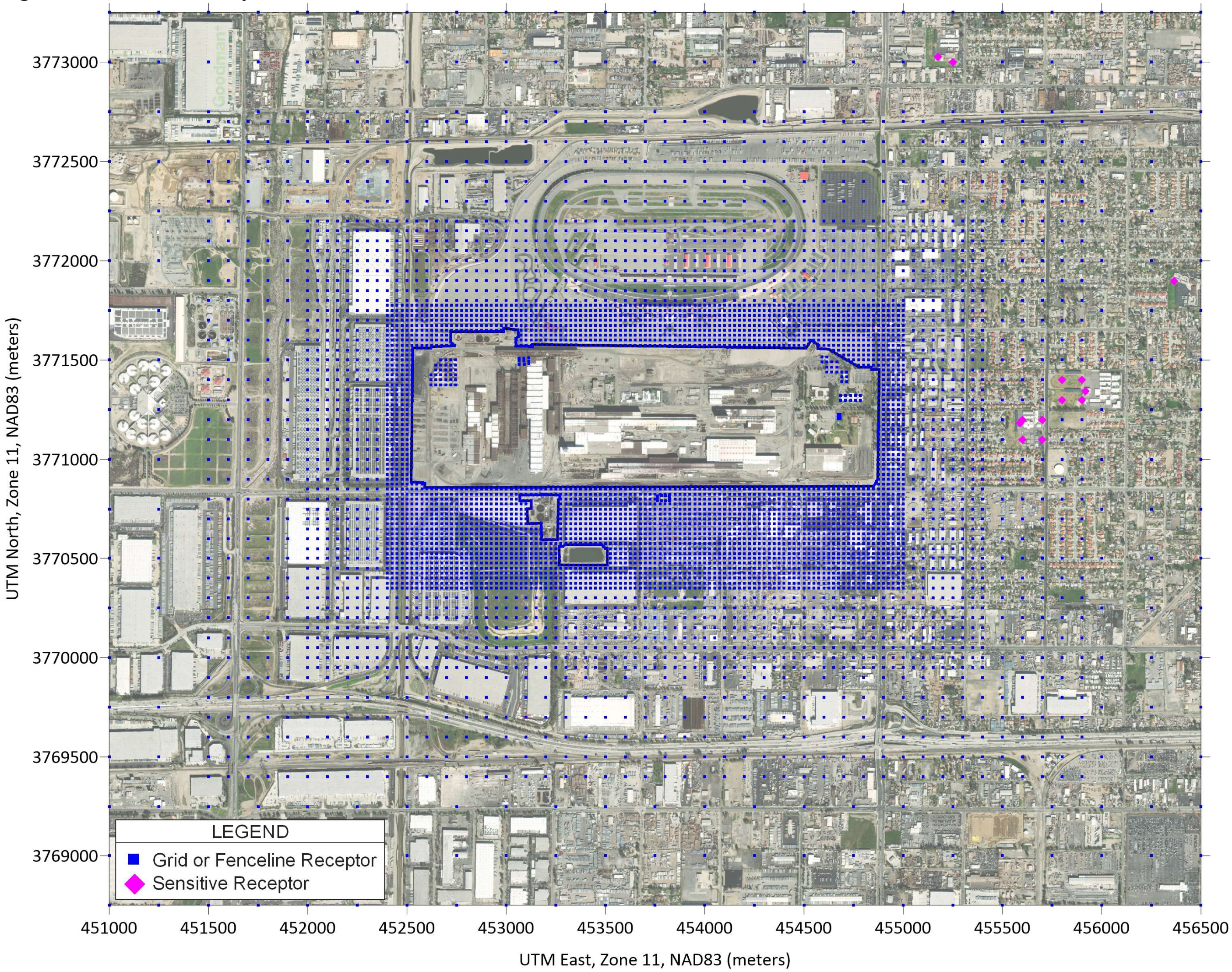
APPENDIX E. SENSITIVE RECEPTORS

Table E-1. Description and Location of Sensitive Receptors

Rec. #	UTM Coordinates (NAD83)		Sensitive Receptor Description	Address
	Easting (m)	Northing (m)		
5835	455600	3771100	Live Oak Elementary School	9522 Live Oak Ave, Fontana, CA 92335
5836	455700	3771100	Live Oak Elementary School	9522 Live Oak Ave, Fontana, CA 92335
5845	455600	3771200	Live Oak Elementary School	9522 Live Oak Ave, Fontana, CA 92335
5846	455700	3771200	Live Oak Elementary School	9522 Live Oak Ave, Fontana, CA 92335
5857	455800	3771300	Sequoia Middle School	9452 Hemlock Ave, Fontana, CA 92335
5858	455900	3771300	Sequoia Middle School	9452 Hemlock Ave, Fontana, CA 92335
5867	455800	3771400	Sequoia Middle School	9452 Hemlock Ave, Fontana, CA 92335
5868	455900	3771400	Sequoia Middle School	9452 Hemlock Ave, Fontana, CA 92335
6348	455250	3773000	Redwood Elementary School	8570 Redwood Ave, Fontana, CA 92335
6377	455589	3771183	Live Oak Elementary School	9522 Live Oak Ave, Fontana, CA 92335
6378	455920	3771345	Sequoia Middle School	9452 Hemlock Ave, Fontana, CA 92335
6379	456365	3771898	Beech Avenue Elementary School	9206 Beech Ave, Fontana, CA 92335
6381	455175	3773027	Redwood Elementary School	8570 Redwood Ave, Fontana, CA 92335

APPENDIX F. RECEPTOR GRID DIAGRAMS

Figure F-1. HRA Receptor Locations



APPENDIX G. RISK CONTRIBUTION BY SUBSTANCE

Table G-1. Cancer Risk by Substance at MEIR, MEIW, and Maximum Sensitive Receptors

Pollutant	CAS Number	MEIR		MEIW		Maximum Sensitive Receptor	
		Total risk	Fraction	Total risk	Fraction	Total risk	Fraction
PAHs, total	1151	6.4E-08	41.8%	9.9E-09	15.3%	4.5E-08	46.7%
Diesel PM	9901	4.9E-08	31.8%	4.1E-08	63.1%	2.6E-08	26.7%
Chromium, hexavalent (& compounds)	18540-29-9	2.2E-08	14.6%	5.1E-09	7.8%	1.3E-08	13.6%
Arsenic	7440-38-2	8.7E-09	5.7%	2.5E-09	3.9%	6.2E-09	6.3%
Nickel	7440-02-0	6.1E-09	4.0%	4.3E-09	6.6%	4.3E-09	4.4%
Cadmium	7440-43-9	1.0E-09	0.7%	7.0E-10	1.1%	7.1E-10	0.7%
Benzene	71-43-2	9.5E-10	0.6%	6.0E-10	0.9%	6.6E-10	0.7%
Beryllium	7440-41-7	5.6E-10	0.4%	3.9E-10	0.6%	4.0E-10	0.4%
Formaldehyde	50-00-0	4.2E-10	0.3%	2.7E-10	0.4%	3.0E-10	0.3%
Ethyl benzene	100-41-4	9.8E-11	0.1%	6.2E-11	0.1%	6.9E-11	0.1%
Naphthalene	91-20-3	5.3E-11	0.0%	3.5E-11	0.1%	3.7E-11	0.0%
Acetaldehyde	75-07-0	5.1E-11	0.0%	3.2E-11	0.0%	3.6E-11	0.0%
Lead	7439-92-1	3.4E-11	0.0%	1.1E-11	0.0%	2.4E-11	0.0%
Total		**1.5E-07**	**100.0%**	**6.5E-08**	**100.0%**	**9.7E-08**	**100.0%**

Table G-2. Chronic Risk by Substance at MEIR, MEIW, and Maximum Sensitive Receptors[6]

Pollutant	CAS Number	MEIR		MEIW		Maximum Sensitive Receptor	
		Total risk	Fraction	Total risk	Fraction	Total risk	Fraction
Hydrochloric acid	7647-01-0	1.0E-02	91.3%	5.9E-02	99.0%	6.7E-03	90.8%
Nickel	7440-02-0	4.9E-04	4.4%	4.4E-04	0.7%	3.4E-04	4.6%
Arsenic	7440-38-2	4.5E-04	4.0%	1.2E-04	0.2%	3.1E-04	4.2%
Acrolein	107-02-8	1.2E-05	0.1%	1.1E-05	0.0%	8.3E-06	0.1%
Diesel PM	9901	1.0E-05	0.1%	1.7E-05	0.0%	6.4E-06	0.1%
Beryllium	7440-41-7	9.8E-06	0.1%	8.9E-06	0.0%	6.9E-06	0.1%
Cadmium	7440-43-9	3.4E-06	0.0%	3.1E-06	0.0%	2.4E-06	0.0%
Formaldehyde	50-00-0	2.3E-06	0.0%	2.3E-06	0.0%	1.7E-06	0.0%
Ammonia	7664-41-7	2.3E-06	0.0%	2.2E-06	0.0%	1.6E-06	0.0%
Propylene	115-07-1	3.0E-07	0.0%	3.0E-07	0.0%	2.1E-07	0.0%
Chromium, hexavalent (& compounds)	18540-29-9	1.5E-07	0.0%	1.9E-07	0.0%	1.0E-07	0.0%
Naphthalene	91-20-3	5.1E-08	0.0%	4.8E-08	0.0%	3.6E-08	0.0%
Xylenes (mixed)	1330-20-7	4.8E-08	0.0%	4.7E-08	0.0%	3.4E-08	0.0%
Acetaldehyde	75-07-0	3.8E-08	0.0%	3.7E-08	0.0%	2.7E-08	0.0%
Total		**1.1E-02**	**100.0%**	**6.0E-02**	**100.0%**	**7.4E-03**	**100.0%**

[6] To calculate maximum chronic risk, HARP determines risk from all chemicals for all pathways, and the pathway with the highest total is considered the maximum. If a chemical contributes risk to one or more pathways but does not affect the pathway with the highest risk, it is not listed in this table. For this project, the pathway with the highest chronic risk at the PMI, MEIR, MEIW, and maximum sensitive receptor was the respiratory system.

Table G-3. Acute Risk by Substance at PMI[7]

Pollutant	CAS Number	PMI	
		Hazard Index	Fraction
Ammonia	7664-41-7	2.7E-02	97.4%
Hydrochloric acid	7647-01-0	4.0E-04	1.4%
Acrolein	107-02-8	2.7E-04	1.0%
Formaldehyde	50-00-0	6.2E-05	0.2%
Acetaldehyde	75-07-0	1.8E-06	0.0%
Toluene	108-88-3	1.5E-06	0.0%
Xylenes (mixed)	1330-20-7	2.5E-07	0.0%
Total		**2.8E-02**	**100.0%**

[7] To calculate maximum acute risk, HARP determines risk from all chemicals for all pathways, and the pathway with the highest total is considered the maximum. If a chemical contributes risk to one or more pathways but does not affect the pathway with the highest risk, it is not listed in this table. For this project, the pathway with the highest acute risk at the PMI was the eyes.

APPENDIX H. RISK CONTRIBUTION BY SOURCE

Table H-1. Cancer Risk by Source at MEIR, MEIW, and Maximum Sensitive Receptors

Source Description	Source ID	MEIR		MEIW		Maximum Sensitive Receptor	
		Total risk	Fraction	Total risk	Fraction	Total risk	Fraction
Emergency Standby Engine	ENG	4.9E-08	31.8%	4.1E-08	63.1%	2.6E-08	26.7%
CGL Heaters	HEATERS	4.8E-08	31.5%	9.1E-09	14.1%	3.6E-08	37.3%
Chem Treat and Coating Line Thermal Oxidizer	CHEMCOAT	4.0E-08	26.0%	6.8E-09	10.6%	2.3E-08	24.1%
Cleaning Section Scrubber Stack	CLEAN	1.6E-08	10.7%	7.9E-09	12.2%	1.2E-08	11.9%
Ammonia Tank	AMTNK	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
PPPL Scrubber	PPPL	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Total		**1.5E-07**	**100.0%**	**6.5E-08**	**100.0%**	**9.7E-08**	**100.0%**

Table H-2. Chronic Risk by Source at MEIR, MEIW, and Maximum Sensitive Receptors

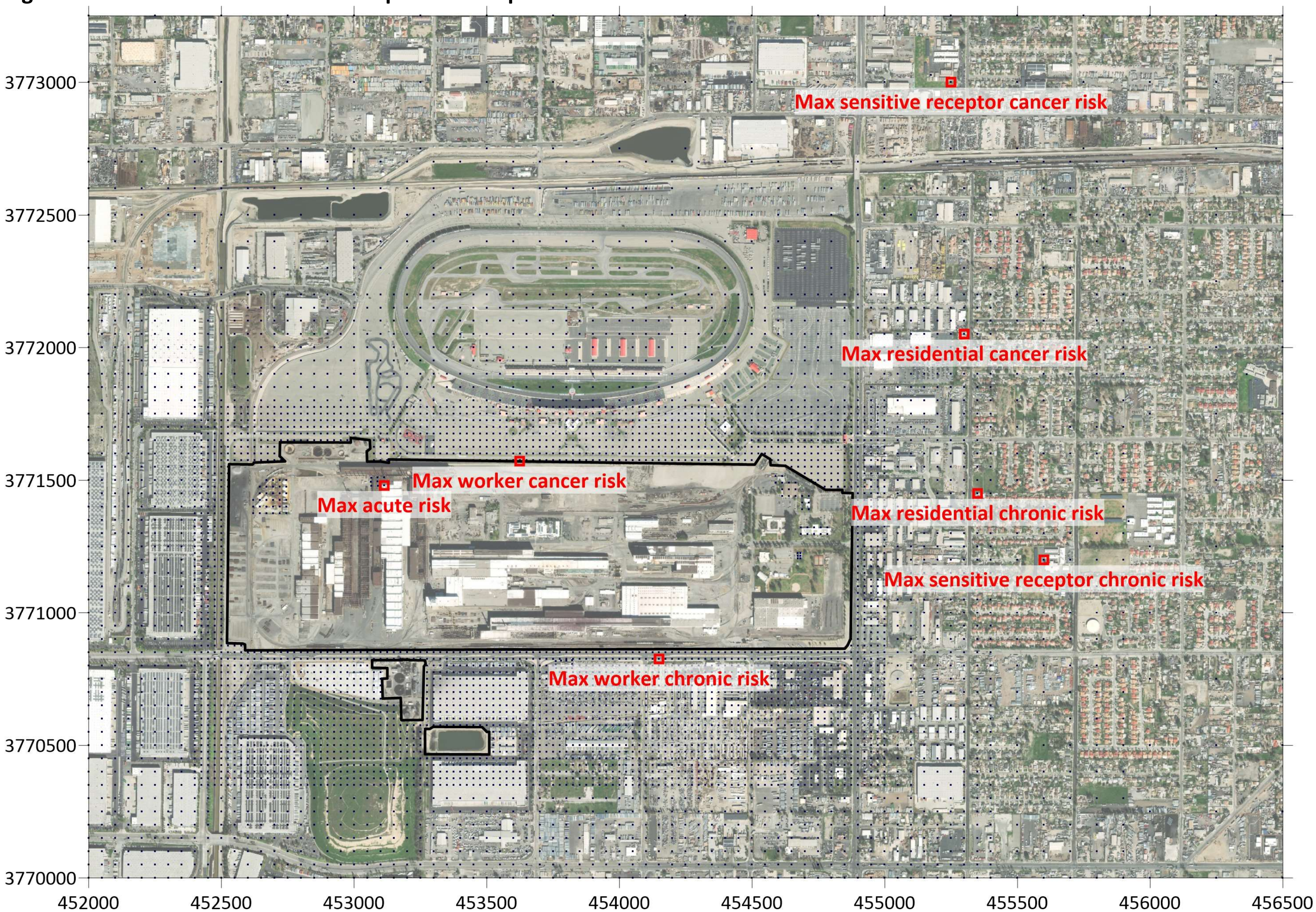
Source Description	Source ID	MEIR		MEIW		Maximum Sensitive Receptor	
		Total risk	Fraction	Total risk	Fraction	Total risk	Fraction
PPPL Scrubber	PPPL	1.0E-02	91.3%	5.9E-02	99.0%	6.7E-03	90.8%
Cleaning Section Scrubber Stack	CLEAN	9.5E-04	8.4%	5.7E-04	1.0%	6.7E-04	9.0%
CGL Heaters	HEATERS	1.2E-05	0.1%	9.7E-06	0.0%	8.5E-06	0.1%
Emergency Standby Engine	ENG	1.0E-05	0.1%	1.7E-05	0.0%	6.4E-06	0.1%
Chem Treat and Coating Line Thermal Oxidizer	CHEMCOAT	4.7E-06	0.0%	6.0E-06	0.0%	3.3E-06	0.0%
Ammonia Tank	AMTNK	2.0E-07	0.0%	4.4E-07	0.0%	1.4E-07	0.0%
Total		**1.1E-02**	**100.0%**	**6.0E-02**	**100.0%**	**7.4E-03**	**100.0%**

Table H-3. Acute Risk by Source at PMI

Source Description	Source ID	PMI	
		Total risk	Fraction
Ammonia Tank	AMTNK	2.7E-02	97.3%
PPPL Scrubber	PPPL	4.0E-04	1.4%
CGL Heaters	HEATERS	3.1E-04	1.1%
Chem Treat and Coating Line Thermal Oxidizer	CHEMCOAT	5.7E-05	0.2%
Cleaning Section Scrubber Stack	CLEAN	0.0E+00	0.0%
Emergency Standby Engine	ENG	0.0E+00	0.0%
Total		**2.8E-02**	**100.0%**

APPENDIX I. LOCATION OF MAXIMUM IMPACTED RECEPTORS

Figure I-1. Location of Maximum Impacted Receptors



APPENDIX J. CONTOUR MAPS

Figure J-1. Contours of Residential Cancer Risk and Zone of Impact, per Million Exposed

Figure J-2. Contours of Worker Cancer Risk and Zone of Impact, per Million Exposed

APPENDIX K. ELECTRONIC FILES

Provided via SharePoint.