

**AIR TOXICS “HOT SPOTS” PROGRAM (AB2588)
HEALTH RISK ASSESSMENT REPORT**

**GRAYSON POWER PLANT
CITY OF GLENDALE,
GLENDALE WATER & POWER
SCAQMD FACILITY ID: 800327**

FOR SUBMITTAL TO:

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LIST OF ACRONYMS

AB2588	Air Toxics “Hot Spots” Information and Assessment Act
AERMOD	American Meteorological Society Regulatory Model
AER	Annual Emission Report
ATIR	Air Toxics Inventory Report
BPIPPRIME	Building Profile Input Program PRIME
CARB	California Air Resources Board
CAS	Chemical Abstract System
CPF	Cancer Potency Factor
GIS	Geographic Information System
GLC	Ground Level Concentrations
HARP	Hot Spots Analysis and Reporting Program
HI	Hazard Index
HRA	Health Risk Assessment
MEIR	Maximum Exposed Individual Resident
MEIW	Maximum Exposed Individual Worker
MICR	Maximum Individual Cancer Risk
OEHHA	Office of Environmental Health Hazard Assessment
PM	Particulate Matter
PMI	Point of Maximum Impact
REL	Reference Exposure Level
SCAQMD	South Coast Air Quality Management District
TAC	Toxic Air Contaminants
USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
ZOI	Zone of Impact

LIST OF DEFINITIONS

Acute Health Impacts: Health effects that occur over a relatively short period of time. The term is used to describe brief exposures and effects that appear promptly after exposure (usually less than 24 hours).

Cancer Burden: the estimated increase in the occurrence of cancer cases in a population subject to maximum exposure of one in one-million or greater.

Cancer Health Impacts: An exposure to a carcinogenic substance that causes an increase in the likelihood of cancer in the exposed individual.

Chronic Health Impacts: Adverse non-cancer effects that develop and persist over time after long-term exposure to a substance (typically months or years).

8-Hour Chronic Impacts: Chronic health impacts after exposure for 8 hours on a daily basis.

SECTION 1.0

EXECUTIVE SUMMARY

1.1 Project Overview

Glendale Water & Power (GWP) is submitting this Air Toxics Hotspots Program Health Risk Assessment Report (HRA) for the Grayson Power Plant in response to the South Coast Air Quality Management District (SCAQMD) notification letter dated March 22, 2018. This HRA report is prepared based on an Air Toxics Inventory Report (ATIR) for calendar year 2015, which was reviewed and approved by SCAQMD. Additionally, This HRA report has been prepared in accordance with SCAQMD Supplemental Guidelines for Preparing Risk Assessment and Risk Reduction Plan for the Air Toxics “Hot Spots” Information and Assessment Act (AB2588), dated November 4, 2016, with assistance from Montrose Air Quality Services (MAQS).

1.2 Facility and Emissions Information

The Grayson Power Plant is located at 800 Air Way in Glendale and operates under SCAQMD Facility ID 800327. The facility has been providing electrical power to the City of Glendale since 1941. The facility operates two steam turbines (Units 1 and 2), three boilers (Units 3, 4, and 5), and four gas turbines (Units 8A, 8B, 8C, and 9) as the power generating equipment. The boilers and gas turbines are the primary emission sources at the facility. In 2015, Units 3, 4, and 5 combusted landfill gas from the nearby Scholl Canyon Landfill. GWP has discontinued the combustion of landfill gas at Grayson Power Plant in 2018. Other potential emissions sources include a diesel-fired emergency engine, spray coating and abrasive blasting operations, storage tanks, fuel dispensing operations, and cooling towers. Based on the 2015 ATIR, only the boilers, gas turbines, emergency engine, and the gas turbines ammonia injection lines were identified as AB2588 Toxic Air Contaminant (TAC) sources.

The combustion sources at Grayson Power Plant emit a variety of TACs that have been identified by OEHA to have health impacts and that can enter the human body through multiple pathways. For this HRA, there are twenty-two (22) chemicals which have been identified by OEHA to potentially cause cancer to exposed individuals. Additionally, there are twenty-three (23) chemicals with non-cancer chronic health impacts, ten (10) chemicals with non-cancer 8-hour chronic health impacts, and fourteen (14) chemicals with non-cancer acute health impacts. TACs can contribute to non-cancer chronic and acute health impacts by affecting human target organ systems, including the respiratory system, reproductive system, and others. Section 4.2 of this report contains a list of TACs from Grayson sources. Section 5.1 contains a list of pathways through which each TAC can enter the human body.

1.3 Health Risk Air Dispersion Modeling

This HRA was prepared in accordance with SCAQMD Supplemental Guidelines for Preparing Risk Assessment and Risk Reduction Plan for the Air Toxics “Hot Spots” Information and Assessment Act, dated November 4, 2016 and Office of Environmental Health Hazard Assessment (OEHHA) Guideline dated February 2015.

Two software programs, AERMOD (Version 18081) and HARP2 were used to estimate and analyze the TAC emissions impact to the community surrounding the facility. AERMOD is an air dispersion model used to estimate the ground level TAC concentrations beyond the facility fence line. The Hotspot Analysis and Reporting Program (HARP2) software estimates cancer and non-cancer health impacts for individual receptors using AERMOD ground level concentration data.

1.4 Cancer (Carcinogenic) Risk

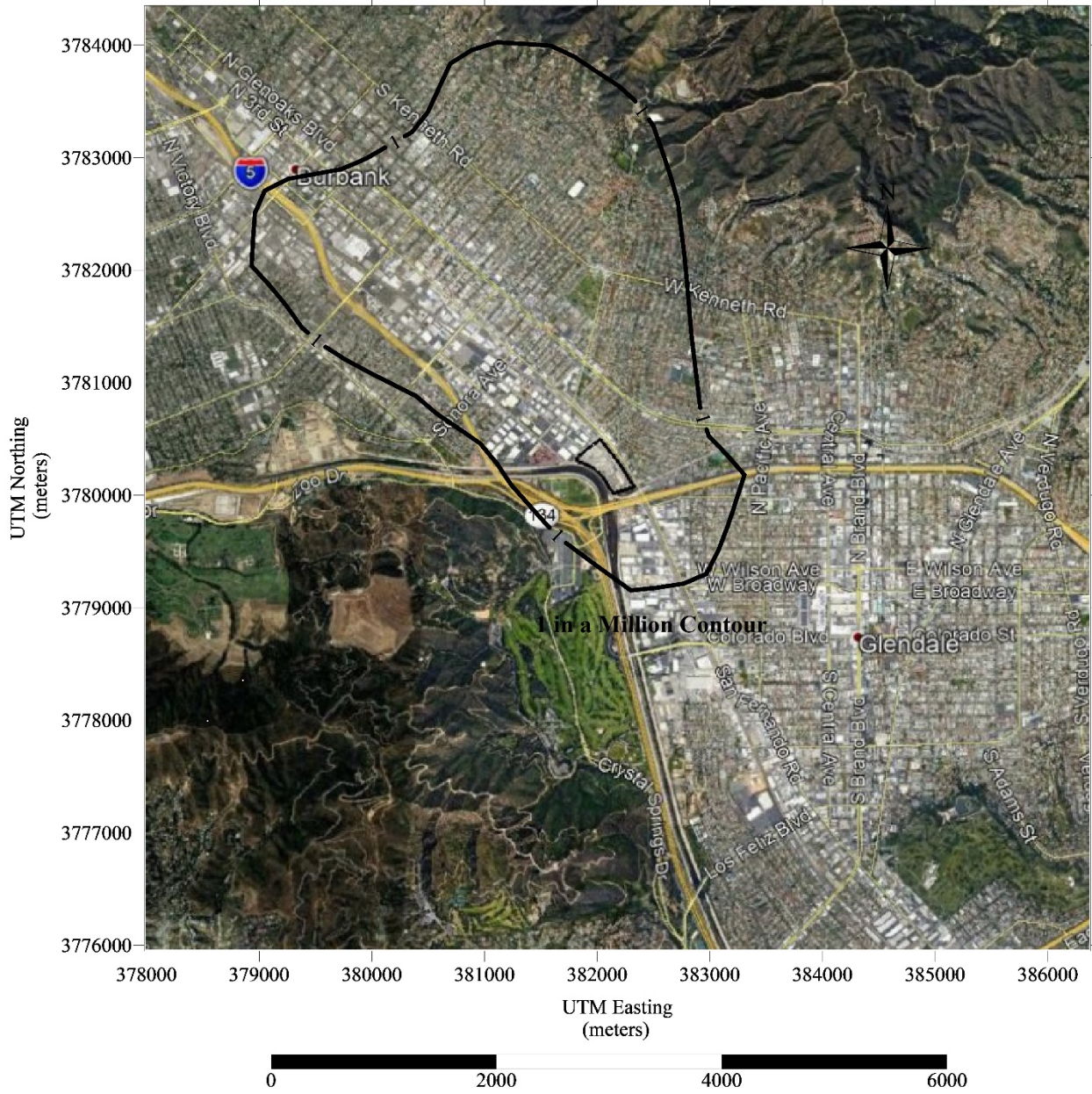
Table 1-1 shows the cancer risk that was estimated using AERMOD and HARP2 based upon the assumption that the calendar year 2015 operating profile of Grayson would continue indefinitely. Cancer risk is shown for specific receptor points, including point of maximum impact (PMI), the maximum exposed individual resident (MEIR), and maximum exposed worker (MEIW) locations. Assumed emissions of hexavalent chromium contributes approximately 57% of the cancer risk attributed to the facility. Emission rates of hexavalent chromium reflects CATEF default factors for tests of similar landfill operations in early 1990s. Nickel, cadmium, and arsenic contribute approximately 28% of the assumed cancer risk. These pollutants are attributed to landfill gas combustion in the boilers that occurred in 2015, but the use of landfill gas in these units was discontinued in 2018. Detailed cancer risk data for each pollutant is provided in Section 5.2 and Appendix C of this report.

**TABLE 1-1
MAXIMUM CANCER RISK**

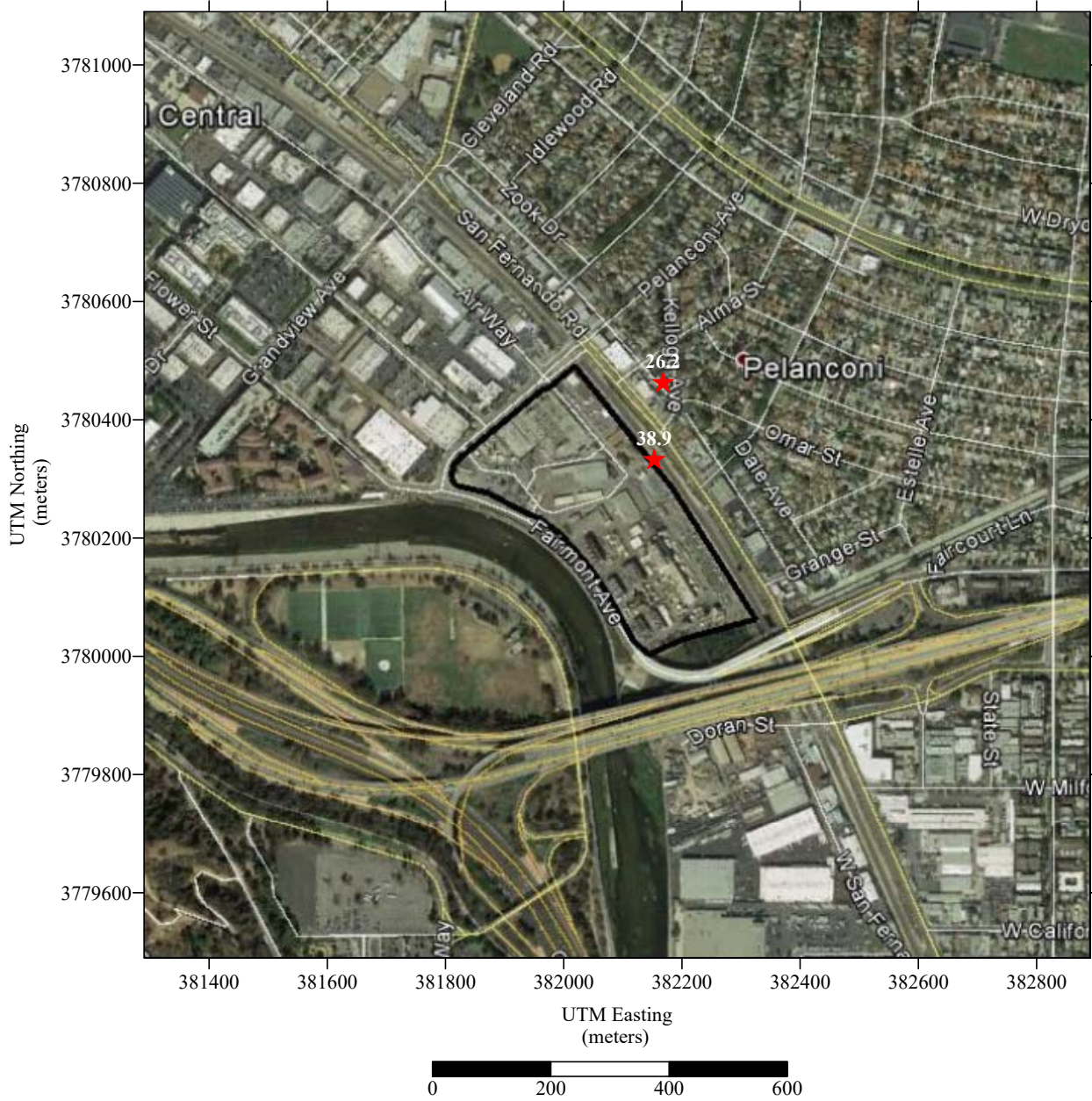
Type of Receptor	Cancer Risk (in one million)	Receptor ID#	UTM Coordinates
PMI	38.9	83	382153.1 E, 3780332.1 N
MEIR	26.2	27	382167.5 E, 3780462.1 N
MEIW	1.76	1403	382160 E, 3780420 N

As shown in Table 1-1, the point of maximum impact (PMI) for cancer risk is located along the eastern facility fence line with a cancer risk of 38.9 in one-million. The MEIR is located in the residential area to the northeast of the facility with a cancer risk of 26.2 in one-million. The MEIW is located in the industrial complex to the northeast of the facility with a cancer risk of 1.76 in one-million. Figures 1-1 through 1-3 includes isopleth maps showing the cancer risk at MEIR and MEIW.

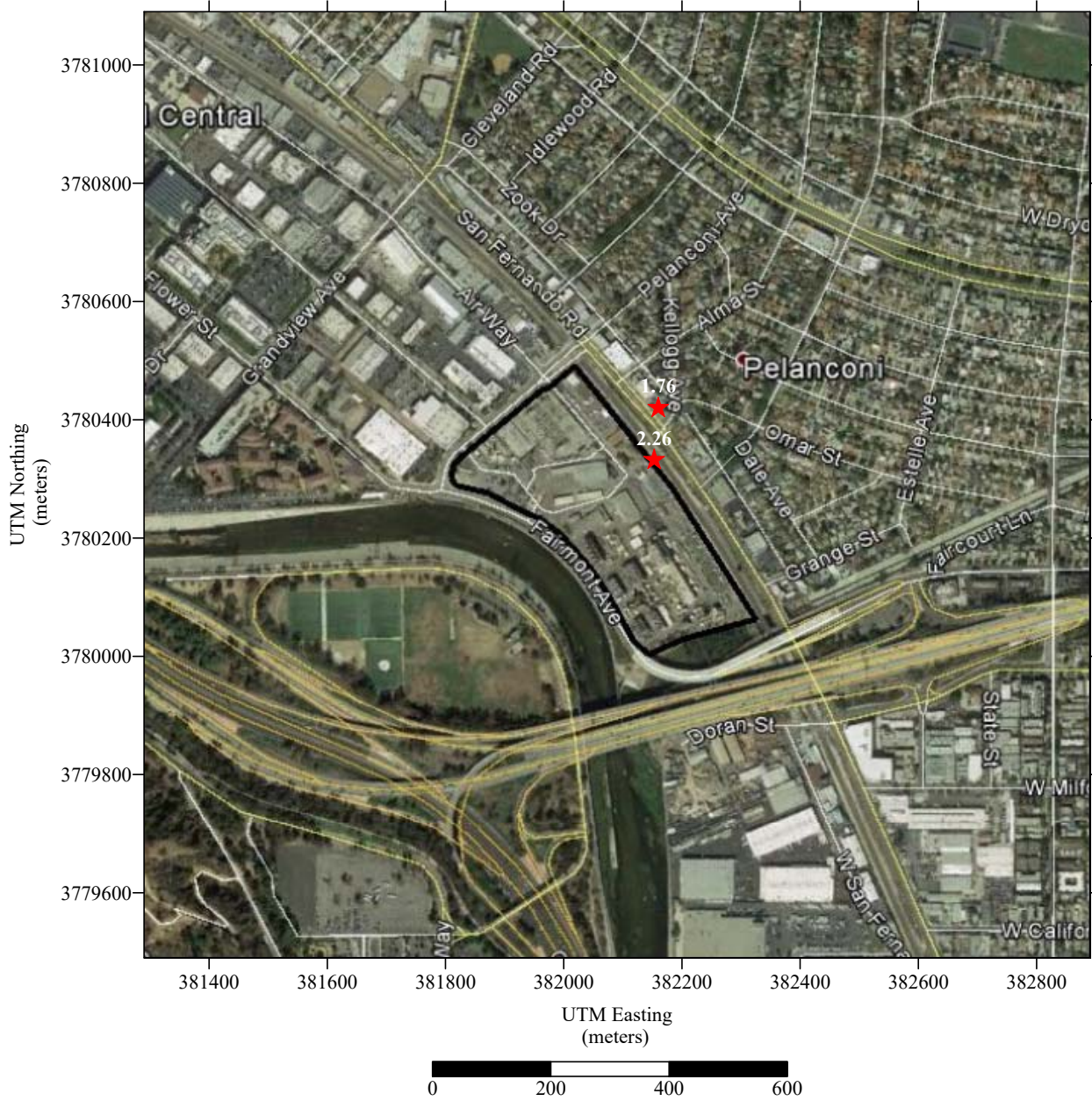
**FIGURE 1-1
MAP OF CANCER RISK BASED ON 30-YEAR EXPOSURE
(CANCER RISK CONTOUR OF 1 IN 1 MILLION)**



**FIGURE 1-2
MAP OF MAXIMUM INCREASE IN CANCER RISK FOR RESIDENTIAL
RECEPTORS BASED ON 30-YEAR EXPOSURE**



**FIGURE 1-3
MAP OF MAXIMUM INCREASE IN CANCER RISK FOR
WORKER RECEPTORS BASED ON 25-YEAR EXPOSURE**



In addition to private homes, there are schools and day care facilities surrounding the facility with a cancer risk of more than ten in one-million. Table 1-2 identifies information for these facilities. Cancer risk at school locations was calculated based upon a 30-year lifetime exposure, rather than the typical tenure of a student at the school location.

**TABLE 1-2
LIST OF SCHOOLS OR DAY CARE FACILITIES
AT CANCER RISK EXPOSURE OF ONE IN ONE-MILLION OR MORE**

Facility Name	Address	Facility UTM (m)
Balboa Elementary School	1844 Bel Air Drive, Glendale, CA 91201	381441E 3782764N
Mark Keppel Elementary School	730 Glenwood Road, Glendale, CA 91202	382729E 3781204N
Eleanor J. Toll Middle School	700 Glenwood Road, Glendale, CA 91202	382893E 3781140N
Scholars Armenia School and Art Center	1021 Grandview Ave., Glendale, CA 91201	381780E 3780988N
Grandview Children's Center	1130 Ruberta Avenue, Glendale, CA 91201	381519E 3781667N
Thomas Jefferson Elementary School	1540 5 TH Street, Glendale, CA 91201	381396E 3781734N
Gohar Daycare	1336 Highland Avenue, Glendale, CA 91202	382672E 3781445N
Milky Way Child Care & Preschool	1325 Idlewood Road, Glendale, CA 91202	382244E 3781478N
Joaquin Miller Elementary School	720 E. Providence Ave., Burbank, CA 91501	380423E 3783185N
Benjamin Franklin Elementary School	1610 Lake Street, Glendale, CA 91201	380495E 3780894N

1.5 Non-Cancer Chronic Hazard Index

Table 1-3 shows the chronic hazard indices for the PMI, MEIR, and MEIW. Assumed total emissions of arsenic, dioxins and furans compound, and nickel contribute approximately 98% of the non-cancer chronic hazard index (HIC) attributed to the facility. The primary target organ impacted by chronic exposure is the respiratory system.

**TABLE 1-3
MAXIMUM CHRONIC HAZARD INDEX**

Type of Receptor	HIC	Receptor ID#	UTM Coordinates
PMI	0.721	83	382153 E, 3780332 N
MEIR	0.491	27	382167.5 E, 3780462.1 N
MEIW	0.444	1403	382160 E, 3780420 N

1.6 Non-Cancer 8-hour Chronic Hazard Index

Assumed emissions of manganese contribute approximately 98% of the non-cancer 8-hour chronic hazard index (HIC-8) attributed to the facility. The primary target organ impacted by 8-hour chronic exposure is the central nervous system. The PMI for HIC-8 is 0.127, which is located at receptor #83 with UTM coordinates of 382153 E and 3780332 N.

1.7 Non-Cancer Acute Hazard Index

Table 1-4 shows the acute indices for the PMI, MEIR, and MEIW. Assumed emissions of nickel contribute approximately 99% of the non-cancer acute hazard index (HIA) attributed to the facility. The primary target organ impacted by acute exposure is the immune system.

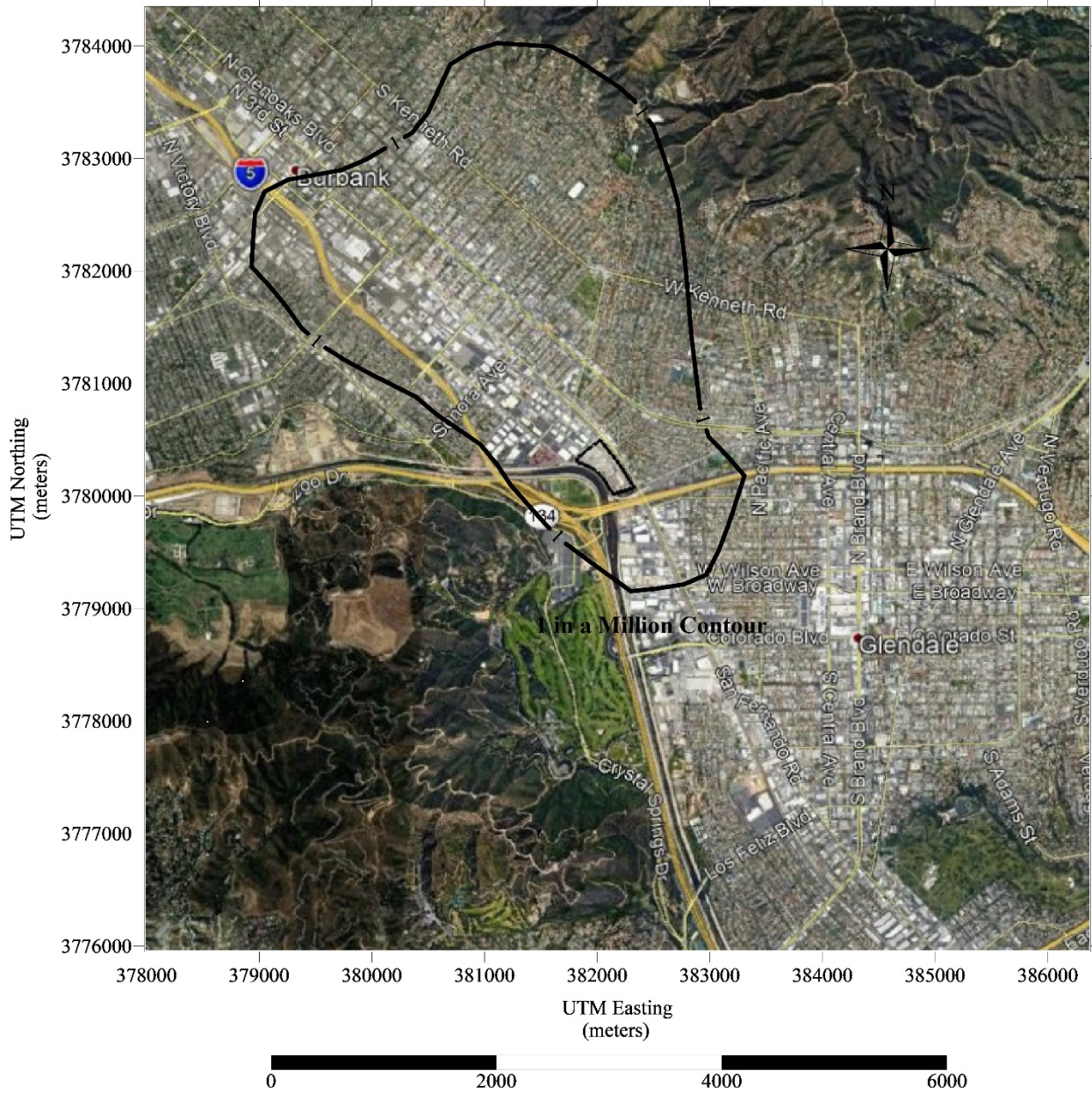
**TABLE 1-4
MAXIMUM ACUTE HAZARD INDEX**

Type of Receptor	HIA	Receptor ID#	UTM Coordinates
PMI	0.80	95	382275.4 E, 3780140.7 N
MEIR	0.46	20	382241 E, 3780369 N
MEIW	0.50	1259	382220 E, 3780340 N

1.8 Cancer Burden

Since the cancer risk is greater than one in one-million, the cancer burden is analyzed using a 70-year exposure period. The number of people exposed to a cancer risk of one in one-million or greater is estimated to be 74,608 based on 2010 US Census Data. The cancer burden was calculated to be 0.116. Figure 1-4 shows a map with a risk contour of more than 1 in one-million based on a 70-year lifetime exposure.

**FIGURE 1-4
MAP OF CANCER RISK BASED ON 70-YEAR EXPOSURE**



1.9 Revision to 2015 ATIR

The risk assessment contained in this report is based on the emissions reported in the approved ATIR, except on the following emissions:

- Instead of using default emission factors, the result of a source test which was conducted in November 2018 and approved by SCAQMD source testing department, was used to calculate the chlorinated dioxins and furans compound emissions from the landfill gas combustion in the boilers.
- The initial ATIR reflects an incorrect higher default emission factor and a double-counting of ammonia emissions. Therefore, the ammonia emissions were revised by using more accurate default emission factors and historical source test data.

1.10 Conclusion.

The health risk assessment for the Grayson Power Plant HRA that is based upon 2015 reported emissions results in a MICR of more than twenty-five in one-million, a non-cancer total HIA of less than 1.0, and a non-cancer total HIC of less than 1.0. Pursuant to Rule 1402, the facility is required to do the following:

- Submit a risk reduction plan;
- Distribute public notification materials; and
- Participate in a District-approved public meeting.

The City of Glendale will comply with Rule 1402 and Air Toxics “Hot Spots” (AB2588) Program requirements. In fact, the actions already taken in 2018 to cease landfill gas combustion serves as the basis for the pending risk reduction plan. At this point only natural gas fuel is being combusted in Grayson Power Plant’s gas-fired equipment units. Without landfill gas combustion, the cancer risk of the plant is expected to be less than ten in one-million; the non-cancer acute and chronic hazard indices are expected to be less than one. Additionally, the City of Glendale has submitted permit applications to SCAQMD to replace all existing boilers and three combined-cycle gas turbines with two new combined-cycle gas turbines and two new simple-cycle gas turbines. Although the proposed repower project has not yet been approved by the Glendale City Council, it will be appropriately reflected as an alternative operating scenario in the risk reduction plan.

SECTION 2.0

INTRODUCTION

2.1 Project Summary

In July 2017, Glendale Water & Power (GWP) submitted an Air Toxic Inventory Report (ATIR) for calendar year 2015. This ATIR has been reviewed and approved by SCAQMD. Subsequently, GWP received a notification letter dated March 22, 2018 to prepare and submit a Health Risk Assessment (HRA) based on the approved 2015 ATIR. This HRA report has been prepared with assistance from Montrose Air Quality Services (MAQS) in accordance with SCAQMD Supplemental Guidelines for Preparing Risk Assessment and Risk Reduction Plan for the Air Toxics “Hot Spots” Information and Assessment Act, dated November 4, 2016 and OEHHA Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, dated February 2015.

2.2 Facility Information

The GWP facility, Grayson Power Plant, is located at 800 Air Way in the City of Glendale. The SCAQMD Facility ID is 800327. Grayson Power Plant is located in an industrial area of the City of Glendale, northeast of the Interstate 5 and Highway 134 interchange. The facility is bounded to the south by Verdugo Wash and Highway 134, to the west by the Los Angeles River and Interstate 5, to the north by commercial properties, and to the east of a mixture of residential and commercial properties. The approximate latitude and longitude coordinates of the facility are 34°19'19" N and 118°16'42" W. Facility diagrams and area map are included in Appendix A.

2.3 Technical Project Contacts

For the purposes of this submittal, MAQS will be the primary contact for technical issues related to air quality.

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SECTION 3.0

HAZARD IDENTIFICATION

In 2015, Grayson Power Plant emitted a variety of chemical compounds that have been identified as Toxic Air Contaminants (TAC) in Appendix A of the SCAQMD *Air Toxics Hot Spots Program Guidance Manual*. Each chemical was evaluated for its potential cancer risk, non-cancer acute health hazard, and non-cancer chronic health hazard. This evaluation also includes the exposures routes (pathways) through which a person's health can be impacted.

Cancer risk was assessed using inhalation and oral slope factors in the units of increased occurrences per milligram dosage per kilogram of body weight per day. Non-cancer chronic impacts were assessed using inhalation and oral reference exposure level (REL), expressed as an HI for specific target organs. Non-cancer acute impacts were assessed using an inhalation REL to estimate health hazard impacts for each specific target organ. Table 3-1 shows the list of these substances along with associated dose-response reference exposure values for both oral and inhalation pathways.

**TABLE 3-1
DOSE-RESPONSE VALUES OF EMITTED TAC**

Pollutants	CAS	Cancer Risk Factor		Chronic			Acute
		Inhalation Cancer Potency Factor (mg/kg-d) ⁻¹	Oral Slope Factor (mg/kg-d) ⁻¹	Inhalation REL (ug/m ³)	8-Hour Inhalation REL (ug/m ³)	Oral REL (mg/kg-d)	Inhalation REL (ug/m ³)
Acetaldehyde	75070	1.0E-02		1.4E+02	3.0E+02		4.7E+02
Acrolein	107028			3.5E-01	7.0E-01		2.5E+00
Ammonia	7664417			2.0E+02			3.2E+03
Arsenic	7440382	1.2E+01	1.5E+00	1.5E-02	1.5E-02	3.5E-06	2.0E-01
Benzene	71432	1.0E-01		3.0E+00	3.0E+00		2.7E+01
Beryllium	7440417	8.4E+00		7.0E-03		2.0E-03	
Butadiene, 1,3-	106990	6.0E-01		2.0E+00	9.0E+00		6.6E+02
Cadmium	7440439	1.5E+01		2.0E-02		5.0E-04	
Copper	7440508						1.0E+02
Chromium, hexavalent	18540299	5.1E+02	5.0E-01	2.0E-01		2.0E-02	
Diesel Particulate Matter	9901	1.1E+00		5.0E+00			
Dioxins and dibenzofurans	1080						
1-8OctaCDD	3268879	3.9E+01	3.9E+01	1.3E-01		3.3E-05	
Ethyl Benzene	100414	8.7E-3		2.0E+03			
Formaldehyde	50000	2.1E-02		9.0E+00	9.0E+00		5.5E+01

Pollutants	CAS	Cancer Risk Factor		Chronic			Acute
		Inhalation Cancer Potency Factor (mg/kg-d) ⁻¹	Oral Slope Factor (mg/kg-d) ⁻¹	Inhalation REL (ug/m ³)	8-Hour Inhalation REL (ug/m ³)	Oral REL (mg/kg-d)	Inhalation REL (ug/m ³)
Hexane, n-	110543			7.0E+03			
Hydrochloric Acid	7647010			9.0E+00			2.1E+03
Lead	7439921	4.2E-02	8.5E-03				
Manganese	7439965			9.0E-02	1.7E-01		
Mercury	7439976			3.0E-02	1.6E-04		6.0E-01
Nickel	7440020	9.1E-01		1.4E-02	6.0E-02	1.1E-02	2.0E-01
PAHs-w/o individual components	1151						
Acenaphthene	83329						
Acenaphthylene	208968						
Anthracene	120127						
B[a]anthracene	56553	3.9E-01	1.2E+00				
B[a]P	50328	3.9E+00	1.2E+01				
B[b]fluoranthene	205992	3.9E-01	1.2E+00				
B[g,h,i]perylene	191242						
B[k]fluoranthene	207089	3.9E-01	1.2E+00				
Chrysene	218019	3.9E-02	1.2E-01				
D[a,h]anthracene	53703	4.1E+00	4.1E+00				
Fluoranthene	206440						
Fluorene	86737						
In[1,2,3-cd]pyr	193395	3.9E-01	1.2E+00				
Naphthalene	91203	1.2E-01		9.0E+00			
Phenanthrene	85018						
Pyrene	129000						
Propylene Oxide	75569	1.3E-02		3.0E+01			3.1E+03
Selenium	7782492			2.0E+01	5.0E-03		
Toluene	108883			3.0E+02			3.7E+04
Xylenes	1330207			7.0E+02			2.2E+04

Many of the toxic compounds in Table 3-1 may also harm people's health via non-inhalation routes of exposure. Those routes can include soil ingestion, dermal, oral (which includes meat, milk, eggs, vegetables, and water consumption), and mother's milk. Table 3-2 reflects compounds subject to multipathway exposure routes.

**TABLE 3-2
MULTIPATHWAY POLLUTANTS AND THEIR PATHWAYS**

Pollutant	Inhalation	Soil Ingestion	Dermal	Oral	Mother's Milk
Arsenic	X	X	X	X	
Beryllium	X	X	X	X	
Cadmium	X	X	X	X	
Chromium (VI)	X	X	X	X	
Lead	X	X	X	X	X
Mercury	X	X	X	X	
Nickel	X	X	X	X	
Selenium	X	X	X	X	
PCBs	X	X	X	X	X
Dioxins and Furans	X	X	X	X	X
PAHs	X	X	X	X	X

For this HRA, there are twenty-two (22) chemicals which have been identified by OEHHA to potentially cause cancer to exposed individuals. Additionally, there are twenty-three (23) chemicals with non-cancer chronic health impacts, ten (10) chemicals with non-cancer 8-hour chronic health impacts, and fourteen (14) chemicals with non-cancer acute health impacts. TACs can contribute to non-cancer chronic and acute health impacts by affecting human target organ systems, including the respiratory system, reproductive system, and others. Table 3-3 shows the target organs potentially affected by each TAC attributed to Grayson Power Plant emissions.

**TABLE 3-3
TARGET ORGANS OF NON-CANCER RISK CHEMICALS**

Pollutants	Target Organs												
	AT	BO	CV	DV	EN	EY	HE	IM	KI	CN	RE	RP	SK
Acetaldehyde						A					AC		
Acrolein													
Ammonia						A							
Arsenic			AC	AC						AC	C		C
Benzene				AC			AC	A		C			
Beryllium	C							C			C	C	
Butadiene, 1,3-											C		
Cadmium									C		C		
Copper											A		
Chromium, hexavalent							C						
Diesel Particulate Matter											C		

Pollutants	Target Organs												
	AT	BO	CV	DV	EN	EY	HE	IM	KI	CN	RE	RP	SK
Dioxins and dibenzofurans													
1-8OctaCDD	C			C	C		C				C	C	
Ethyl Benzene	C		C	C					C				
Formaldehyde						A					C		
Hexane, n-													
Hydrochloric Acid													
Lead													
Manganese										C			
Mercury									C	AC			
Nickel	C						C	A			AC		
PAHs-w/o individual components													
Acenaphthene													
Acenaphthylene													
Anthracene													
B[a]anthracene													
B[a]P													
B[b]fluoranthene													
B[g,h,i]perylene													
B[k]fluoranthene													
Chrysene													
D[a,h]anthracene													
Fluoranthene													
Fluorene													
In[1,2,3-cd]pyr													
Naphthalene											C		
Phenanthrene													
Pyrene													
Propylene Oxide						A					AC	A	
Selenium	C		C							C			
Toluene				AC		A				AC	AC	A	
Xylenes						A				C	AC		

Notes: A = Acute Toxicity, C = Chronic Toxicity, AC = Acute and Chronic Toxicity, AT = Alimentary Tract, BO = Bone, CN = Central Nervous System, CV = Cardiovascular System, DV = Developmental, EN = Endocrine, EY = Eye, HE = Hematologic, IM = Immunological System, KI = Kidneys, RE = Respiratory System, RP = Reproductive System, SK = Skin.

SECTION 4.0

EXPOSURE ASSESSMENT

4.1 Facility Description

Glendale Water and Power (GWP) of City of Glendale owns and operates Grayson Power Plant located at 800 Air Way in Glendale, CA. Its SCAQMD facility ID is 800327. The facility's power generating equipment consists of two steam turbines, three dual-fuel boilers, and four gas turbines. As reported in the 2015 ATIR, the boilers and gas turbines are the primary emission sources at the facility. A diesel-fired emergency engine was also operated in 2015 and emitted TACs.

4.1.1 Boilers

There are three boilers (Boilers 3, 4, and 5) currently operating at Grayson Power Plant. Boiler 3 is rated at 260 MMBtu/hr.; Boiler 4 is rated at 492 MMBtu/hr.; and Boiler 5 is rated at 527.25 MMBtu/hr. Each boiler utilizes natural gas and landfill gas as its primary fuel; and fuel oil no.6 as a backup fuel limited by any fuel curtailment events. Table 4-1 shows the estimated fuel consumption and operating hour of each boiler in 2015.

**TABLE 4-1
BOILERS 2015 OPERATING PROFILE**

Unit	Fuel Type	Fuel Consumption MMCF	Fuel Consumption MMBTU*	Operating Hours
Boiler 3	Natural Gas	81.123	84,043	1,260
	Landfill Gas	322.427	102,209	
Boiler 4	Natural Gas	172.402	178,608	1,881
	Landfill Gas	649.937	206,030	
Boiler 5	Natural Gas	692.641	717,576	5,259
	Landfill Gas	1,564.606	495,980	

*Fuel in MMBTU is estimated using higher heating values of 317 MMBTU/MMCF for landfill gas and 1036 MMBTU/MMCF for natural gas.

TAC emissions from the boilers were calculated based upon the 2015 operating year fuel consumption, SCAQMD default emission factors, the results of an ammonia slip test that was conducted in 2015, the results of dioxins and furans compound source test that was conducted in 2018, and 2010 landfill gas analysis for Arsenic.

4.1.2 Combined Cycle Gas Turbines

There are three combined cycle gas turbines (Turbines 8A, 8B, and 8C) currently operating at Grayson Power Plant. As combined cycle units, gas turbines 8A, 8B, and 8C operate in conjunction with steam turbines or boilers that recover and use the waste heat from the gas

turbines to generate additional power. Gas turbine 8A works with Boiler 8A to generate power at a capacity of 30MW; Gas turbines 8B and 8C operate with one common Boiler 8BC to generate power at a capacity of 60MW. The Unit 8 boilers operate as heat recovery units to produce steam without combusting additional fuel. Each of gas turbines 8A, 8B, and 8C is rated at 350 MMBtu/hr. and is equipped with air pollution control systems consisting of selective catalytic reduction (SCR) and oxidation catalysts. Only natural gas is combusted in these devices. Table 4-2 shows the fuel consumption and operating hours of each gas turbine in 2015.

**TABLE 4-2
COMBINED CYCLE TURBINES 2015 OPERATING PROFILE**

Unit	Fuel Type	Fuel Consumption MMCF	Fuel Consumption MMBTU*	Operating Hours
Turbine 8A	Natural Gas	228.106	236,318	902
Turbine 8BC	Natural Gas	101.876**	105,544**	211**

*Fuel in MMBTU is estimated using higher heating values of 1036 MMBTU/MMCF for natural gas.

**This is total combined quantity of Turbine 8B and 8C.

TAC emissions from gas turbines were calculated based on the fuel consumption, SCAQMD default emission factors, and the results of ammonia slip tests that were conducted in 2015.

4.1.3 Simple Cycle Gas Turbines

Unit 9 currently operates as a simple cycle gas turbine, which means the turbine is the only unit connected to the generator. Similar to the other gas turbines, Unit 9 is also equipped with an air pollution control system consisting of SCR and oxidation catalyst. Unit 9 is rated at 470 MMBtu/hr., and utilizes only natural gas as its fuel. Unit 9 was operated for 609 hours in 2015 and its natural gas consumption was 168.405 MMCF. TAC emissions from Unit 9 were calculated based on the fuel consumption, SCAQMD default emission factors, and the result of an ammonia slip test conducted in 2015.

4.1.4 Emergency Diesel Internal Combustion Engine

There is one diesel-fired internal combustion engine driving a standby generator installed at the facility. The engine is a Cummins model NTA-855-G2 and is rated at 486 bhp. The facility operated the engine for 18.2 hours in 2015 using ultra-low sulfur diesel fuel. TAC emissions from the engine were calculated based on the fuel consumption, SCAQMD default emission factors, and manufacturer emission data.

4.2 Emission Inventory

This HRA report is based on emission information in an ATIR, which was reviewed and approved by SCAQMD. During the preparation of the HRA, it was discovered the ATIR contains several errors and use of incorrect default emission factors. Therefore, the emission

inventory for this HRA was revised to reflect more accurate emissions from Grayson Power Plant.

4.2.1 Source Test of Chlorinated Dioxins and Furans Emissions from Landfill Gas Combustion in the Boiler

In the ATIR, default emission factors were used to estimate chlorinated dioxins and furans emissions from landfill gas combustion in the boilers. In November 2018, GWP conducted source test to measure chlorinated dioxins and furans emissions from one of the boilers. The source test only detected one species of chlorinated dioxins and furans compound, which emission is significantly lower than the default emission factor.

4.2.2 Revised Ammonia Emissions

The initial ATIR reflects an incorrect higher default emission factor and a double-counting of ammonia emissions. Therefore, the ammonia emissions were revised based on the ammonia slip source test for one boiler and gas turbines. The default ammonia emission factor for unit without Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR) were selected accordingly.

4.2.3 Diesel Particulate Matter

The approved ATIR does not include diesel particulate matter (PM) emissions from the emergency diesel-fired internal combustion engine. Diesel PM was identified as a TAC by the California Air Resource Board (CARB) in 1998; therefore, Diesel PM was added in this HRA.

Diesel PM emissions were calculated based on an emission factor of 0.30 grams per horsepower-hour as referenced in manufacturer emission data specifications. The 18.2 annual operating hours that were used to calculate emissions were derived from facility operator logs. Based on these factors, diesel PM emissions from the emergency engine are estimated to be approximately 5.6 pounds for the entire 2015 calendar year.

Tables 4-3 and 4-4 show the annual emissions and maximum hourly emissions for each emission source operating at the facility. Table 4-5 shows the facility wide annual and maximum hourly emissions for the 2015 calendar year. Detailed emission inventory data by TAC and emission source is contained in Appendix C.

**TABLE 4-3
ANNUAL EMISSIONS BY EACH EMISSION SOURCE**

Toxic Air Contaminants	CAS	Boiler 3 (LFG)	Boiler 3 (NG)	Boiler 4 (LFG)	Boiler 4 (NG)	Boiler 5 (LFG)	Boiler 5 (NG)	Turb. 8A	Turb. 8B	Turb. 8C	Turb. 9	Diesel ICE
Acetaldehyde	75070	0.0E+00	7.3E-02	0.0E+00	1.6E-01	0.0E+00	6.2E-01	9.3E+00	2.1E+00	2.1E+00	6.9E+00	3.1E-01
Acrolein	107028	0.0E+00	6.5E-02	0.0E+00	1.4E-01	0.0E+00	5.5E-01	1.5E+00	3.3E-01	3.3E-01	1.1E+00	1.3E-02
Ammonia	7664417	7.6E+02	2.6E+02	1.5E+03	5.5E+02	3.7E+03	4.9E+03	5.5E+01	1.6E+01	1.6E+01	8.2E+02	3.1E-01
Arsenic	7440382	2.3E-01	0.0E+00	4.6E-01	0.0E+00	1.1E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.2E-04
Benzene	71432	0.0E+00	1.4E-01	0.0E+00	2.9E-01	0.0E+00	1.2E+00	2.8E+00	6.2E-01	6.2E-01	2.1E+00	7.3E-02
Beryllium	7440417	3.5E-01	0.0E+00	7.1E-01	0.0E+00	1.7E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Butadiene, 1,3-	106990	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-01	2.2E-02	2.2E-02	7.4E-02	8.5E-02
Cadmium	7440439	2.2E+00	0.0E+00	4.4E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.8E-04
Copper	7440508	3.6E+00	0.0E+00	7.2E+00	0.0E+00	1.7E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-03
Chromium, hex.	18540299	2.3E-01	0.0E+00	4.6E-01	0.0E+00	1.1E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-05
Diesel PM	9901	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E+00
Dioxins and dibenzofurans	1080											
1-8OctaCDD	3268879	1.7E-07	0.0E+00	3.5E-07	0.0E+00	8.3E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Ethyl Benzene	100414	0.0E+00	1.6E-01	0.0E+00	3.4E-01	0.0E+00	1.4E+00	7.4E+00	1.7E+00	1.7E+00	5.5E+00	4.2E-03
Formaldehyde	50000	4.3E+01	2.9E-01	8.7E+01	6.2E-01	2.1E+02	2.5E+00	1.7E+02	3.7E+01	3.7E+01	1.2E+02	6.7E-01
Hexane, n-	110543	0.0E+00	1.1E-01	0.0E+00	2.2E-01	0.0E+00	9.0E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-02
Hydrochloric Acid	7647010	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-02
Lead	7439921	2.2E+00	0.0E+00	4.5E+00	0.0E+00	1.1E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E-03
Manganese	7439965	1.2E+02	0.0E+00	2.5E+02	0.0E+00	5.9E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-03
Mercury	7439976	2.5E-02	0.0E+00	5.1E-02	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.8E-04
Nickel	7440020	3.7E+01	0.0E+00	7.5E+01	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-03
PAHs-w/o individual components	1151	0.0E+00	8.1E-03	0.0E+00	1.7E-02	0.0E+00	6.9E-02	2.1E-01	4.7E-02	4.7E-02	1.5E-01	1.4E-02
Acenaphthene	83329	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Acenaphthylene	208968	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Anthracene	120127	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[a]anthracene	56553	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[a]P	50328	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[b]fluoranthene	205992	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[g,h,i]perylene	191242	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[k]fluoranthene	207089	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Chrysene	218019	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
D[a,h]anthracene	53703	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoranthene	206440	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluorene	86737	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
In[1,2,3-cd]pyr	193395	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Naphthalene	91203	8.4E+01	2.4E-02	1.7E+02	5.2E-02	4.1E+02	2.1E-01	3.0E-01	6.8E-02	6.8E-02	2.2E-01	7.7E-03
Phenanthrene	85018	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Toxic Air Contaminants	CAS	Boiler 3 (LFG)	Boiler 3 (NG)	Boiler 4 (LFG)	Boiler 4 (NG)	Boiler 5 (LFG)	Boiler 5 (NG)	Turb. 8A	Turb. 8B	Turb. 8C	Turb. 9	Diesel ICE
Pyrene	129000	1.4E-01	0.0E+00	2.7E-01	0.0E+00	6.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Propylene Oxide	75569	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.8E+00	1.5E+00	1.5E+00	5.0E+00	0.0E+00
Selenium	7782492	1.6E-01	0.0E+00	3.3E-01	0.0E+00	7.9E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.6E-04
Toluene	108883	0.0E+00	6.3E-01	0.0E+00	1.3E+00	0.0E+00	5.4E+00	3.0E+01	6.8E+00	6.8E+00	2.2E+01	4.1E-02
Xylenes	1330207	0.0E+00	4.7E-01	0.0E+00	1.0E+00	0.0E+00	4.0E+00	1.5E+01	3.3E+00	3.3E+00	1.1E+01	1.7E-02

**TABLE 4-4
HOURLY EMISSIONS BY EACH EMISSION SOURCE**

Toxic Air Contaminants	CAS	Boiler 3 (LFG)	Boiler 3 (NG)	Boiler 4 (LFG)	Boiler 4 (NG)	Boiler 5 (LFG)	Boiler 5 (NG)	Turb. 8A	Turb. 8B	Turb. 8C	Turb. 9	Diesel ICE
Acetaldehyde	75070	0.0E+00	1.0E-05	0.0E+00	2.2E-05	0.0E+00	8.9E-05	1.3E-03	3.0E-04	3.0E-04	9.8E-04	4.4E-05
Acrolein	107028	0.0E+00	9.3E-06	0.0E+00	2.0E-05	0.0E+00	7.9E-05	2.1E-04	4.8E-05	4.8E-05	1.6E-04	1.9E-06
Ammonia	7664417	1.1E-01	3.7E-02	2.2E-01	7.9E-02	5.3E-01	6.9E-01	7.8E-03	2.3E-03	2.3E-03	1.2E-01	1.6E-04
Arsenic	7440382	3.3E-05	0.0E+00	6.6E-05	0.0E+00	1.6E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.9E-08
Benzene	71432	0.0E+00	2.0E-05	0.0E+00	4.2E-05	0.0E+00	1.7E-04	4.0E-04	8.9E-05	8.9E-05	2.9E-04	1.0E-05
Beryllium	7440417	5.1E-05	0.0E+00	1.0E-04	0.0E+00	2.5E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Butadiene, 1,3-	106990	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-05	3.2E-06	3.2E-06	1.1E-05	1.2E-05
Cadmium	7440439	3.1E-04	0.0E+00	6.2E-04	0.0E+00	1.5E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.4E-08
Copper	7440508	5.1E-04	0.0E+00	1.0E-03	0.0E+00	2.5E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-07
Chromium, hex.	18540299	3.3E-05	0.0E+00	6.6E-05	0.0E+00	1.6E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-09
Diesel PM	9901	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-02
Dioxins and dibenzofurans	1080											
1-8OctaCDD	3268879	2.5E-11	0.0E+00	5.0E-11	0.0E+00	1.2E-10	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Ethyl Benzene	100414	0.0E+00	2.3E-05	0.0E+00	4.9E-05	0.0E+00	2.0E-04	1.1E-03	2.4E-04	2.4E-04	7.9E-04	6.1E-07
Formaldehyde	50000	6.2E-03	4.2E-05	1.2E-02	8.9E-05	3.0E-02	3.6E-04	2.4E-02	5.3E-03	5.3E-03	1.7E-02	9.6E-05
Hexane, n-	110543	0.0E+00	1.5E-05	0.0E+00	3.2E-05	0.0E+00	1.3E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-06
Hydrochloric Acid	7647010	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-05
Lead	7439921	3.2E-04	0.0E+00	6.4E-04	0.0E+00	1.5E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.6E-07
Manganese	7439965	1.7E-02	0.0E+00	3.5E-02	0.0E+00	8.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-07
Mercury	7439976	3.6E-06	0.0E+00	7.3E-06	0.0E+00	1.8E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-07
Nickel	7440020	5.3E-03	0.0E+00	1.1E-02	0.0E+00	2.6E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-07
PAHs-w/o individual components	1151	0.0E+00	1.2E-06	0.0E+00	2.5E-06	0.0E+00	9.9E-06	3.0E-05	6.7E-06	6.7E-06	2.2E-05	2.0E-06
Acenaphthene	83329	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Acenaphthylene	208968	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Anthracene	120127	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[a]anthracene	56553	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[a]P	50328	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[b]fluoranthene	205992	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
B[g,h,i]perylene	191242	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Toxic Air Contaminants	CAS	Boiler 3 (LFG)	Boiler 3 (NG)	Boiler 4 (LFG)	Boiler 4 (NG)	Boiler 5 (LFG)	Boiler 5 (NG)	Turb. 8A	Turb. 8B	Turb. 8C	Turb. 9	Diesel ICE
B[k]fluoranthen	207089	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Chrysene	218019	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
D[a,h]anthracen	53703	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoranthene	206440	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluorene	86737	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
In[1,2,3-cd]pyr	193395	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Naphthalene	91203	1.2E-02	3.5E-06	2.4E-02	7.4E-06	5.8E-02	3.0E-05	4.3E-05	9.7E-06	9.7E-06	3.2E-05	1.1E-06
Phenanthrene	85018	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Pyrene	129000	1.9E-05	0.0E+00	3.9E-05	0.0E+00	9.4E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Propylene Oxide	75569	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.7E-04	2.2E-04	2.2E-04	7.1E-04	0.0E+00
Selenium	7782492	2.3E-05	0.0E+00	4.7E-05	0.0E+00	1.1E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-07
Toluene	108883	0.0E+00	9.1E-05	0.0E+00	1.9E-04	0.0E+00	7.7E-04	4.3E-03	9.7E-04	9.7E-04	3.2E-03	5.9E-06
Xylenes	1330207	0.0E+00	6.7E-05	0.0E+00	1.4E-04	0.0E+00	5.7E-04	2.1E-03	4.8E-04	4.8E-04	1.6E-03	2.4E-06

**TABLE 4-5
FACILITY WIDE EMISSIONS**

Toxic Air Contaminants	CAS	Annual Emissions, lbs./year	Maximum Hourly Emissions, lbs./hr.
Acetaldehyde	75070	2.1E+01	3.1E-03
Acrolein	107028	4.0E+00	5.8E-04
Ammonia	7664417	1.3E+04	1.8E+00
Arsenic	7440382	1.8E+00	2.6E-04
Benzene	71432	7.8E+00	1.1E-03
Beryllium	7440417	2.8E+00	4.0E-04
Butadiene, 1,3-	106990	3.0E-01	4.3E-05
Cadmium	7440439	1.7E+01	2.4E-03
Copper	7440508	2.8E+01	4.0E-03
Chromium, hex.	18540299	1.8E+00	2.6E-04
Diesel PM	9901	5.6E+00	5.5E-02
Dioxins and dibenzofurans	1080		
1-8OctaCDD	3268879	1.4E-06	1.9E-10
Ethyl Benzene	100414	1.8E+01	2.6E-03
Formaldehyde	50000	7.0E+02	1.0E-01
Hexane, n-	110543	1.2E+00	1.8E-04
Hydrochloric Acid	7647010	7.3E-02	1.0E-05
Lead	7439921	1.7E+01	2.5E-03
Manganese	7439965	9.6E+02	1.4E-01
Mercury	7439976	2.0E-01	2.9E-05
Nickel	7440020	2.9E+02	4.2E-02
PAHs-w/o individual components	1151	5.7E-01	8.1E-05
Acenaphthene	83329	1.1E+00	1.5E-04
Acenaphthylene	208968	1.1E+00	1.5E-04
Anthracene	120127	1.1E+00	1.5E-04
B[a]anthracene	56553	1.1E+00	1.5E-04
B[a]P	50328	1.1E+00	1.5E-04
B[b]fluoranthene	205992	1.1E+00	1.5E-04
B[g,h,i]perylene	191242	1.1E+00	1.5E-04
B[k]fluoranthene	207089	1.1E+00	1.5E-04
Chrysene	218019	1.1E+00	1.5E-04
D[a,h]anthracen	53703	1.1E+00	1.5E-04
Fluoranthene	206440	1.1E+00	1.5E-04
Fluorene	86737	1.1E+00	1.5E-04
In[1,2,3-cd]pyr	193395	1.1E+00	1.5E-04
Naphthalene	91203	6.6E+02	9.4E-02
Phenanthrene	85018	1.1E+00	1.5E-04
Pyrene	129000	1.1E+00	1.5E-04
Propylene Oxide	75569	1.5E+01	2.1E-03
Selenium	7782492	1.3E+00	1.8E-04
Toluene	108883	7.4E+01	1.1E-02
Xylenes	1330207	3.8E+01	5.4E-03

4.3 Air Dispersion Modeling

The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Dispersion Model (AERMOD), Version 18081 was used to estimate off-site ambient concentrations of pollutants. AERMOD is a Gaussian plume dispersion model which is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. The AERMOD dispersion model estimated the ground level TAC concentration resulting from the emission sources. A normalized emission rate of one gram per second (unit emission factor) was used to model each emission source. Table 4-6 summarizes the selected model options and parameters for this model.

**TABLE 4-6
AERMOD MODEL OPTIONS AND PARAMETERS**

Description	Specification
AERMOD Version:	18081
Coordinate System Type:	Universal Transverse Mercator (UTM)
UTM Zone:	11
Datum:	WGS84 – World Geodetic System 1984
Hemisphere:	Northern
Regulatory Default Option:	Yes
Urban or Rural Model Option:	Urban
Flat or Complex terrain Option:	Complex
Include Building Downwash:	Yes
Meteorology Option:	SCAQMD Burbank Meteorological Data
Receptor Grid:	500 square kilometers

4.3.1 Model Input Defaults/Options

The AERMOD model was run with regulatory default options as recommended in the EPA Guideline on Air Quality Models (EPA, 2016). The following supporting pre-processing programs for AERMOD will also be used:

- BPIP-Prime (*Version 04274*)
- AERMAP (*Version 18081*)

The technical options selected for the AERMOD model include receptor elevations and controlling hill heights obtained from the AERMAP output. The AERMOD model predicts ground-level concentrations of any generic pollutant without chemical transformations. Since exhaust from the boilers, gas turbines, and emergency engine would be vented to dedicated vertical stacks, all of these sources were categorized and modeled as point sources. Table 4-7 identifies all the emission sources included in the modeling analysis.

**TABLE 4-7
EMISSION SOURCES PARAMETERS**

Model ID	Source Description	Stack Height (ft)	Stack Diameter (ft)	Stack Temperature (°F)	Stack Velocity (ft/sec)
S0001	D1-Unit 4 Boiler (NG)	89.0	8.00	595	51.3470
S0002	D2-Unit 3 Boiler (NG)	72.0	5.94	327	60.6447
S0003	D3-Unit 5 Boiler (NG)	89.0	7.92	220.9	51.2306
S0004	D4 – Unit 8A (NG)	100.0	10.97	408	63.7340
S0005	D5, D6 – Unit 8BC (NG)	100.0	17.42	413.5	57.8054
S0006	D58 – Unit 9 (NG)	85.0	10.00	790.5	132.9065
S0007	D12-Emergency ICE	11.0	0.67	900.00	121.46
S0028	Unit 8A – Ammonia Injection Line	100.0	10.97	408	63.7340
S0029	Unit 8BC – Ammonia Injection Line	100.0	17.42	413.5	57.8054
S0030	Unit 9 – Ammonia Injection Line	85.0	10.00	790.5	132.9065
S0031	D1-Unit 4 Boiler (LG)	89.0	8.00	280.9999	20.8148
S0032	D2-Unit 3 Boiler (LG)	72.0	5.94	311.0000	46.9382
S0033	D3-Unit 5 Boiler (LG)	89.0	7.92	235.2000	55.0661

The point source parameters used for the analysis are in accordance with the parameters in the ATIR that GWP submitted to SCAQMD. A facility diagram showing the location of facility emission sources is included in Appendix A. Additionally, detailed information for each of the emission sources is provided in Appendix B.

4.3.2 Topography and Meteorology

Topography

The facility is located 1.7 miles northwest of downtown Glendale, California along the Los Angeles River. The nearest complex terrain (i.e., terrain exceeding stack height) in relation to the proposed project is located in the Santa Monica Mountains, approximately 2.5 miles to the west-southwest and the Verdugo Mountains, approximately 4.2 miles to the north and

northwest. Area elevations surrounding the Project site are either similar or higher, so the dispersion modeling analysis includes detailed terrain data.

Meteorology

Meteorological data collected at the SCAQMD Burbank meteorological monitoring station was used to model ambient air quality impacts. The meteorological data used for this analysis has been compiled by SCAQMD using AERMET (*Version 14134*) and include the period from January 1, 2012, through December 31, 2016.

According to EPA's Guideline on Air Quality Models (EPA, 2016), representativeness of meteorological data used in dispersion modeling depends on (1) the proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected.

The monitoring site is located approximately 2.5 miles northwest of the existing Grayson Power Plant. There are no complex terrain features between the monitoring site and the existing power plant. The local historical prevailing wind direction is predominantly northwesterly winds and is consistent with local terrain considerations. A wind rose for the Burbank Airport meteorological monitoring station is presented in Figure 4-1.

FIGURE 4-1
WINDROSE OF BURBANK METEOROLOGICAL DATA (2012-2016)

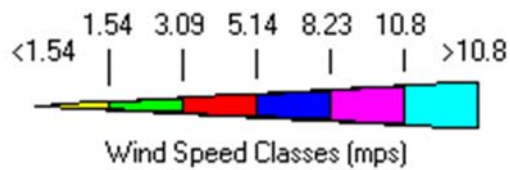
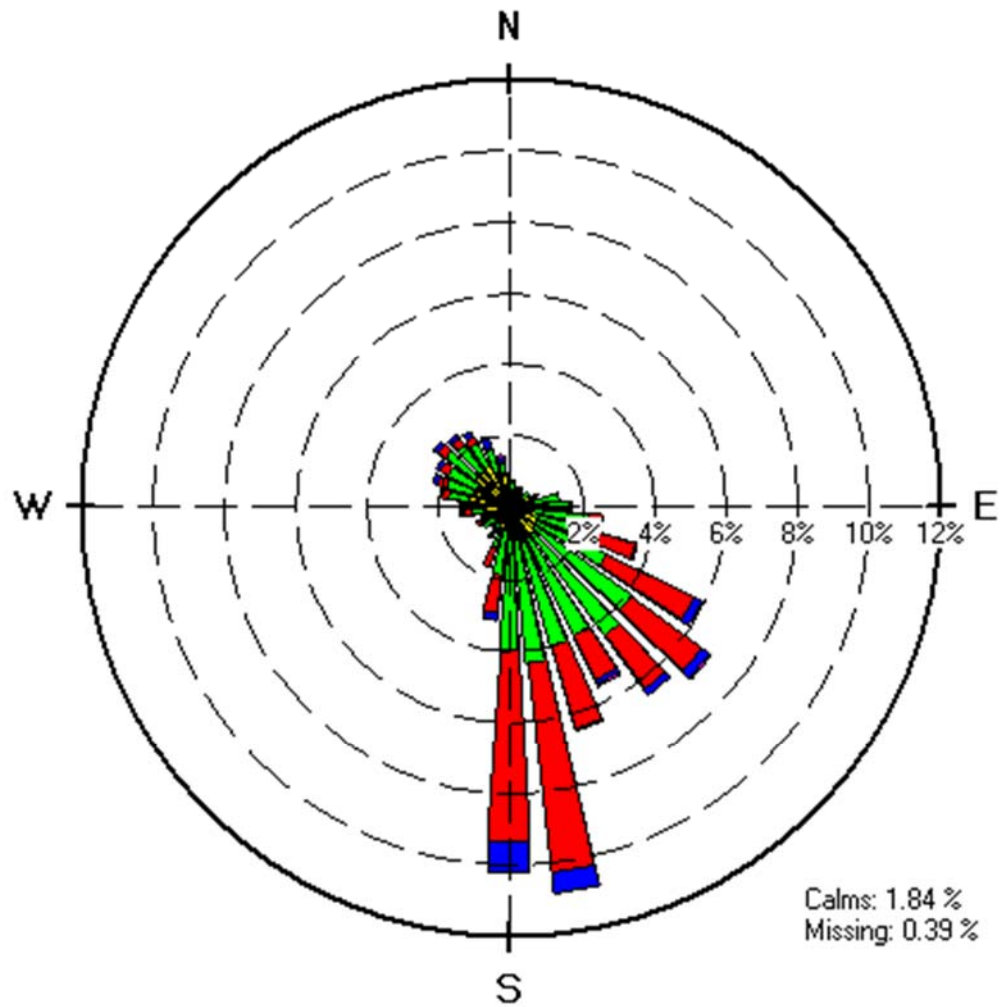


Figure 3
2012-16 Windrose

Burbank Station No. 23152
 Burbank, CA
 Year: 2012-16

Note: Diagram of the frequency of occurrence of each wind direction.

Met File Type: AERMET SFC
 File: K BUR_v9.SFC

The land uses surrounding the meteorological monitoring site and the existing Grayson Power Plant are similar and have been categorized as industrial and medium density residential. Therefore, the monitoring station is considered representative of the Project site. For this dispersion modeling analysis, five years of monitored data, 2012 – 2016, was obtained from SCAQMD.

4.3.3 Receptor Network

The base modeling receptor grid for the AERMOD model includes receptors that are placed at the ambient air boundary as well as Cartesian-grid receptors that are placed beyond the facility boundary. The facility property boundary was used as the ambient air boundary. Property boundary receptors were placed at 20-meter intervals. The cartesian receptor grid covers approximately 500 square kilometers with 50-meter spacing between receptors from the facility boundary to 500 meters, 100-meter spacing from 500 meters to 1,000 meters, 250-meter spacing from 1,000 meters to 5,000 meters, 500-meter spacing from 2,000 meters to 10,000 meters, 1,000-meter spacing from 10,000 meters to 20,000 meters. Discrete receptors, with 20-meter spacing, were established for nearby sensitive and off-site worker receptor locations. No flagpole receptors were included in the model.

A total of 9,901 receptors are included in the model. Table 4-8 summarizes the identification of these receptors.

**TABLE 4-8
RECEPTOR GRID SPACING**

Receptor No.	Receptor Type	Number of Receptors	Spacing (meters)
1 – 54	Discrete	54	20
55-136	Fenceline (Boundary)	82	50
137-9,901	Grid	9,753	50 from 0 to 500 meters 100 from 500 to 1,000 meters 250 from 1,000 to 5,000 meters 500 from 2,000 to 10,000 meters 1,000 from 10,000 to 20,000 meters

AERMAP (*Version 18081*) was used to calculate the receptor elevations and the controlling hill heights. Terrain files for the area were from the National Elevation Dataset (NED) 1 Arc Second found at <http://landfire.cr.usgs.gov>. The AERMAP domain is large enough to encompass the 10 percent slope factor required for calculating the controlling hill height.

4.3.4 Building Wake Downwash and Good Engineering Practice

AERMOD can account for building downwash and cavity zone effects. Evaluation of building downwash on adjacent stack sources is deemed necessary, since most (if not all) of the stack

source heights may be below Good Engineering Practice (GEP) heights. The formula for GEP height estimation is:

$$H_s = H_b + 1.50L_b$$

where: H_s = GEP stack height

H_b = building height

L_b = the lesser building dimension of the height, length, or width

The effects of aerodynamic downwash due to buildings and other structures is accounted for by using wind direction-specific building parameters calculated by the USEPA-approved Building Parameter Input Program Prime (BPIP-Prime (*Version 04274*)) and the algorithms included in the AERMOD air dispersion model. Based on examination of plot plans for the relationship of sources to the location of facility structures, the locations and dimensions of emission sources and facility structures were input to the BPIP-Prime software package, which calculates the direction-specific building dimensions for input into the AERMOD model. A downwash analysis was performed for each point source. Project buildings dimensions were input into the dispersion model to assess the potential for downwash effects on emissions from nearby point sources. A building downwash analysis, using the latest version of BPIP-Prime, was conducted and incorporated into the modeling analysis to account for potential effluent downwash due to the tanks and buildings. Output from BPIP-Prime was then incorporated into the AERMOD modeling input files.

4.3.5 Ground Level Concentrations

The AERMOD output files calculates ground level concentrations (GLCs) at each receptor. These average annual, maximum one-hour, or maximum 8-hour GLCs will be used to determine the cancer and non-cancer risk exposure of each receptor in the HRA. Table 4-9 summarizes the annual average, maximum one-hour, and average 8-hour concentrations at the PMI, MEIR, and MEIW.

**TABLE 4-9
GROUND LEVEL CONCENTRATIONS**

Type of Receptor	Average Annual (ug/m ³)	Max. 1-hour (ug/m ³)	Average 8-hour (ug/m ³)*
PMI	47.69	391.7	200.30
MEIR	18.43	215.4	77.41
MEIW	23.58	266.1	99.04

*8-hour concentration is estimated using average annual concentration with adjustment factor of 4.2.

SECTION 5.0

RISK CHARACTERIZATION

In accordance with the applicable guideline, all AB2588 risk assessments prepared for the SCAQMD must use the most recent version of Hotspots Analysis and Reporting Program (HARP2; Version 2.1.1). HARP2 utilizes the air dispersion modeling plot files generated by AERMOD to predict ground level concentrations of each TAC at each receptor location. HARP2 then assigns health risk values to each TAC, such as cancer potency (“CP”) for carcinogens and reference exposure levels (“RELs”) for compounds that may cause chronic or acute health conditions.

The following HARP files were submitted to SCAQMD in electronic format along with this report:

1. AERMOD input file
2. AERMOD output file
3. HARP input file
4. HARP output file

5.1 Exposure Pathways

As discussed in Section 3, TACs can impact human health through multiple pathways, such as inhalation, dermal, soil ingestion, vegetables ingestion, meat and dairy products ingestion, and mother’s milk. For this HRA, inhalation is the primary exposure pathway for all TAC emissions from the modeled emission sources. While most TACs analyzed in this HRA impact human health through inhalation only, there are some TACs are capable of harming human health through multiple pathways.

In accordance with SCAQMD guideline, the HARP modeling options summarized in Table 5-1 were utilized to analyze health risk:

**TABLE 5-1
HARP2 MODEL OPTIONS**

Description	Specification
Analysis Type:	Cancer, 8-hour Chronic, Chronic, and Acute Risk
Receptor Type:	Residential, sensitive, and worker
Exposure Duration:	30 years for residential and sensitive receptors 25 years for off-site workers
Analysis Option:	OEHHA derived method, except RMP using the derived method for residential cancer risk

Description	Specification
Pathways to Evaluate:	Inhalation, soil ingestion, dermal, home grown produce for resident and sensitive receptors; Inhalation, soil ingestion, and dermal for off-site worker receptors.
Deposition Velocity:	0.02 m/s
Multi-Pathway Exposure Assumption:	HARP2 defaults except 'warm' climate for dermal pathway

5.2 HRA Result

Table 5-2 summarizes the results of the health risk assessment, which include the location (UTM coordinates) and description for the point of maximum impact (PMI), maximum exposed individual resident (MEIR), and maximum exposed individual worker (MEIW) for cancer risk and non-cancer (chronic, 8-hour chronic, and acute) risk.

**TABLE 5-2
SUMMARY OF HRA RESULTS**

Exposure Parameters	Result	Receptor ID#	Location (UTME, UTMN)
Cancer Risk – PMI	38.9 x 10 ⁻⁶	83	382153.1, 37803321.1
Cancer Risk – MEIR	26.2 x 10 ⁻⁶	27	382167.5, 3780462.1
Cancer Risk - MEIW	1.76 x 10 ⁻⁶	1403	382160, 3780420
Cancer Burden	0.116	NA	NA
Chronic HI – MEIR	0.491	27	382167.5, 3780462.1
Chronic HI - MEIW	0.444	1403	382160, 3780420
8-hour Chronic HI - PMI	0.127	83	382153.1, 37803321.1
Acute HI – PMI	0.86	95	382275, 3780141
Acute HI - MEIR	0.46	20	382241, 3780369
Acute HI – MEIW	0.50	1259	382220, 3780340

Appendix C contains detailed results of multipathway cancer risks and non-cancer (chronic and acute) risks at the PMI, MEIR, MEIW, and any sensitive receptors. The results are grouped based on the contributions by substance and emission source.

Appendix C also contains isopleth maps showing the locations of the PMI, MEIR, MEIW, and sensitive receptors for the cancer and non-cancer (chronic and acute risks). The maps also include the cancer risk contours for 1, 10, and 25 in one-million.

5.2.1 Cancer Risk

As shown in Table 5-2, the cancer risks at PMI, MEIR, and MEIW are 38.9, 26.2, and 1.76 in one-million, respectively. Hexavalent chromium account for approximately 57% of cancer risk, while nickel and cadmium account for approximately 10% each of cancer risk and arsenic accounts for approximately 8% of cancer risk. These substances are assumed to have been emitted from the landfill gas combustion in the boilers, which contributes 85% of the overall cancer risks. Section 6.0 of this report discusses assessment uncertainties related to the quantification of dioxin and furan emissions from landfill gas combustion sources.

5.2.2 Non-Cancer Chronic HI

The non-cancer chronic hazard index (HIC) at MEIR and MEIW are 0.491 and 0.444 respectively. Nickel contributes approximately 63% of the overall HIC, while arsenic accounts for approximately 32% of the overall HIC. The primary target organ impacted from chronic exposure is the respiratory system.

5.2.3 Non-Cancer 8-Hour Chronic HI

The non-cancer 8-hour chronic hazard index (HIC-8) at PMI is 0.127. Manganese is the primary contributor at 98% to the HIC-8. The primary target organ impacted from 8-hour chronic exposure is the central nervous system.

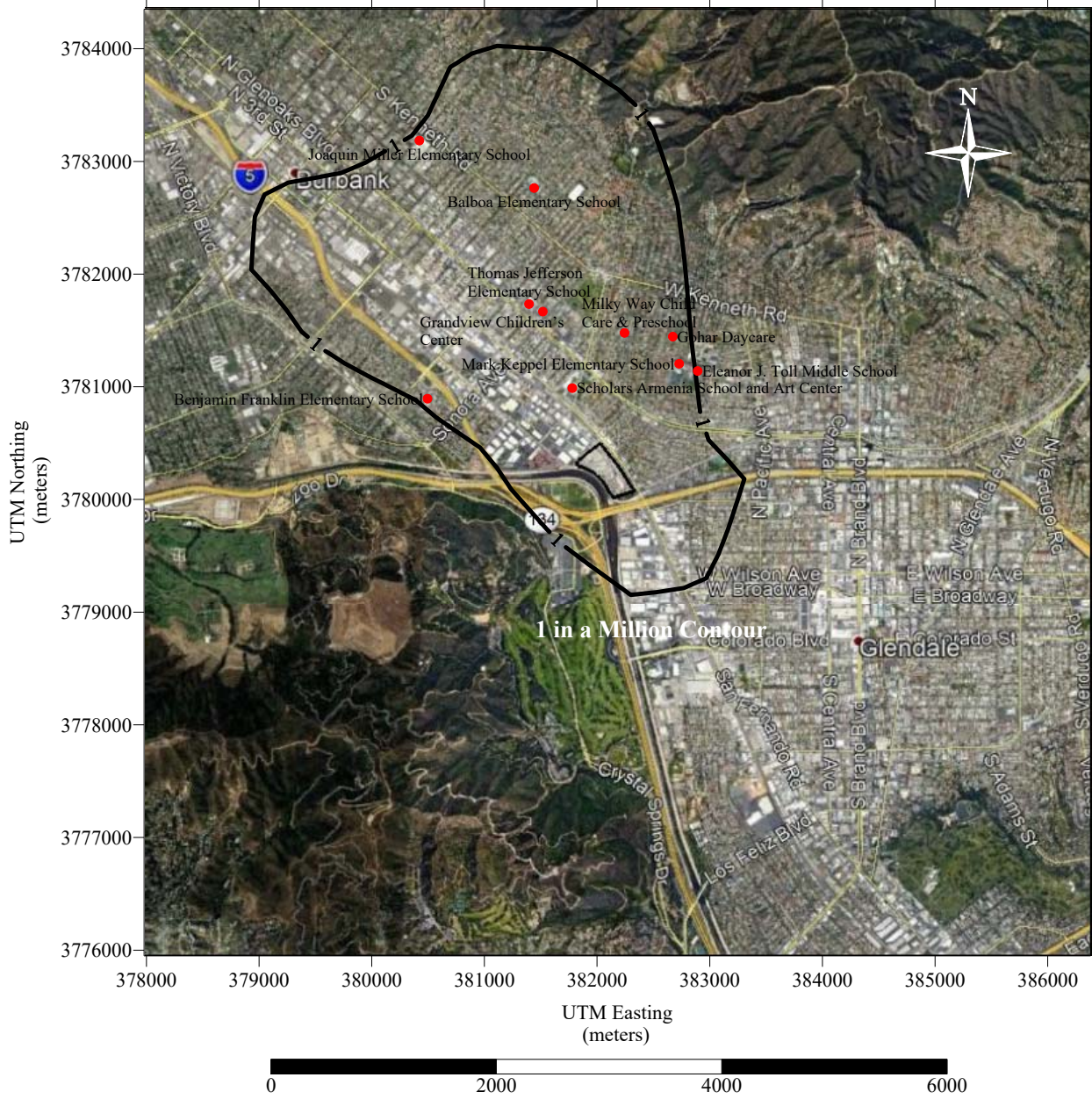
5.2.4 Acute HI

The non-cancer acute hazard index (HIA) at PMI, MEIR, and MEIW are 0.86, 0.46, and 0.50 respectively. Nickel contributes 99% of the overall HIA. The primary target organ impacted from acute exposure is the immune system.

5.2.5 Schools and Day Care Facilities

In addition to residential homes, there are schools, day care facilities, and hospitals identified within the impact area of this HRA. The type of facilities located within an exposure area with a cancer risk of one in one-million or greater are identified. Sensitive receptors, which include schools, daycares, or hospitals, are identified within the impact area of this HRA. Table 5-3 shows the cancer risks, HIC, and HIA at these nearest receptors to these facilities. Figure 5-1 shows the location of the schools and day care facilities.

**FIGURE 5-1
MAP OF SCHOOL AND DAY CARE FACILITIES
WITH CANCER RISK OF ONE IN ONE-MILLION OR MORE**



**TABLE 5-3
ESTIMATED HRA RESULTS FOR SCHOOL AND DAY CARE FACILITIES
WITH CANCER RISK OF ONE IN ONE-MILLION OR MORE**

Receptor Description	Estimated Distance School to Facility (meters)	Closest Receptor No.	Cancer Risk (in a million)
Balboa Elementary School	2,726	354	1.82
Mark Keppel Elementary School	1,211	242	1.07
Scholars Armenia School and Art Center	934	485	4.64
Grandview Children's Center	1,661	404	2.29
Thomas Jefferson Elementary School	1,772	420	2.07
Gohar Daycare	1,407	223	1.72
Milky Way Child Care & Preschool	1,346	227	3.15
Benjamin Franklin Elementary School	1,830	592	1.21
Joaquin Miller Elementary School	3,510	1229	1.20
Eleanor J. Toll Middle School	1,244	242	1.07

5.2.6 Cancer Burden

Because the cancer risk at MEIR is above one in a million, cancer burden is calculated based on affected residential population within the zone of impact (ZOI), which is the area with a cancer risk of one in one-million or greater, based on seventy years exposure. The maximum distance from the facility to the edge of 70-year ZOI is approximately 4,028.4 meters. The overall population within the ZOI is approximately 74,608 people. Using HARP census tract receptors, overall cancer burden for this HRA is 0.116. Table 5-4 summarizes the cancer burden of this HRA.

**TABLE 5-4
CANCER BURDEN**

Cancer Risk	Population	Cancer Burden
10 in a million or greater	373	0.0056
1 in a million or greater	74,608	0.116

SECTION 6.0

REFERENCES

1. Office of Environmental Health Hazard Assessment (OEHHA), Air Toxics Hot Spots Program – Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments, February 2015.
<https://oehha.ca.gov/media/downloads/crn/2015guidancemanual.pdf>
2. California Air Resource Board (CARB), Hotspots Analysis and Reporting Program (HARP), Version 18159 (ADMRT); Version 2.1.1 (EIM)
<https://www.arb.ca.gov/toxics/harp/harp.htm>
3. South Coast Air Quality Management District (SCAQMD), AB2588 & Rule 1402 Supplemental Guidelines: Supplemental Guideline for Preparing Risk Assessments and Risk Reduction Plan for the Air Toxics “Hot Spots” Information and Assessment Act, dated November 4, 2016
<http://www.aqmd.gov/docs/default-source/planning/risk-assessment/ab2588-supplemental-guidelines.pdf?sfvrsn=9>
4. Google Earth
<https://www.google.com/earth/>

APPENDIX A

FACILITY MAPS AND DIAGRAMS

**GLENDALE CITY, GLENDALE WATER & POWER
800 AIR WAY, GLENDALE, CA 91201**

AREA MAP

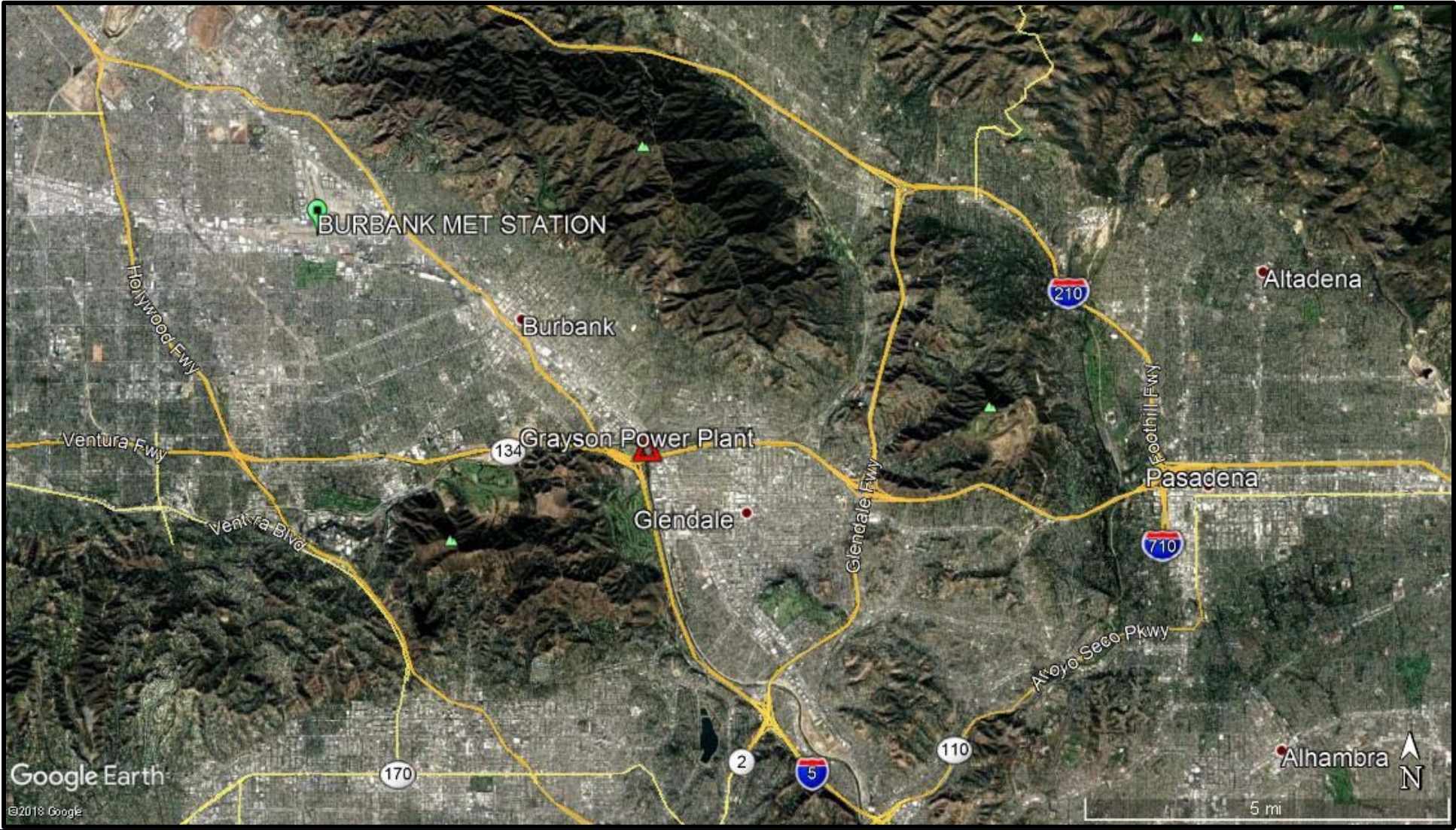


Image courtesy of Google ©2018 (www.google.com)

**GLENDALE CITY, GLENDALE WATER & POWER
800 AIR WAY, GLENDALE, CA 91201**

SITE MAP

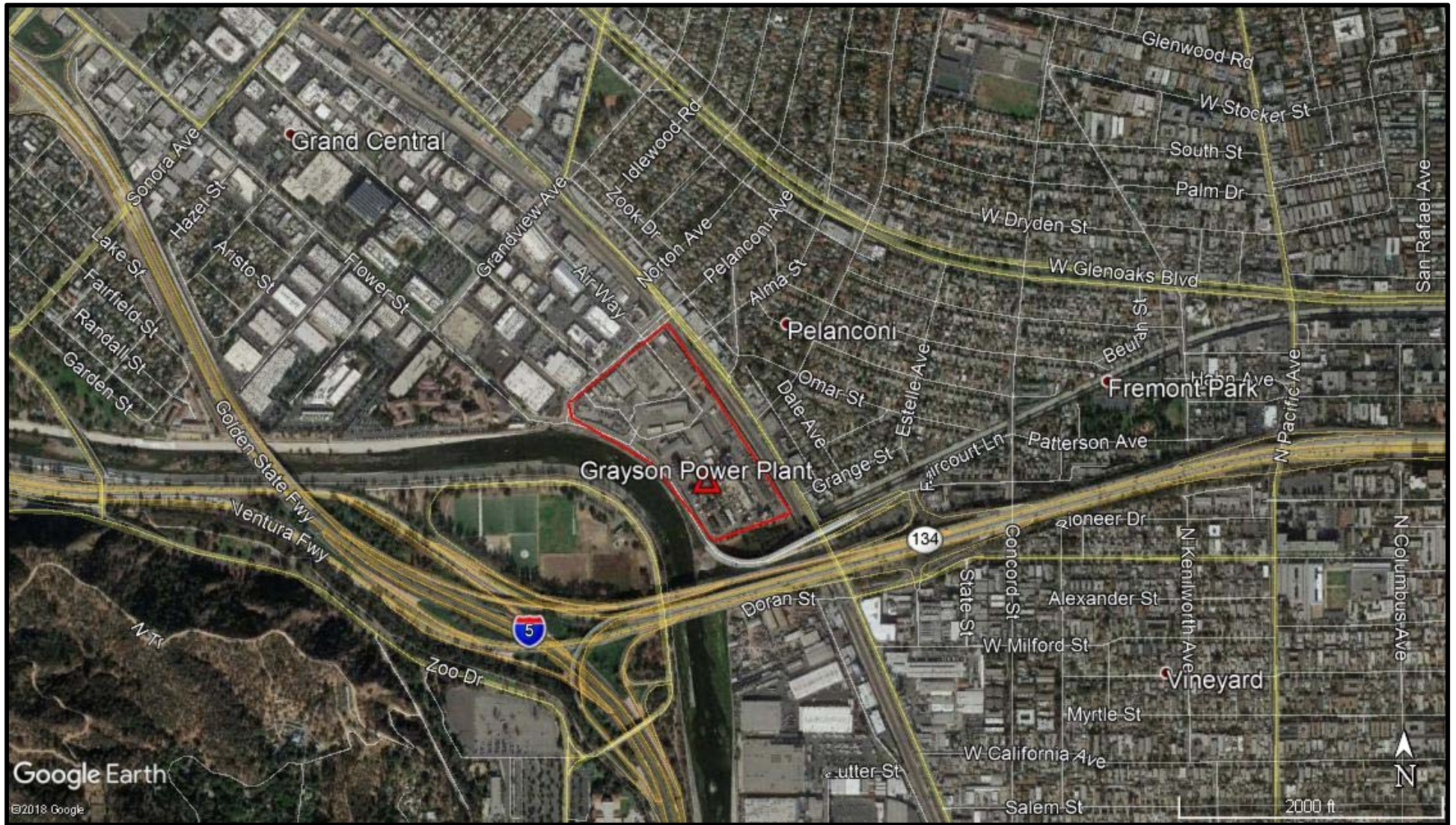


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**GLENDALE CITY, GLENDALE WATER & POWER
800 AIR WAY, GLENDALE, CA 91201**

FACILITY MAP



SOURCE DESCRIPTION	
S0001	D1-Unit 4 Boiler (NG)
S0002	D2-Unit 3 Boiler (NG)
S0003	D3-Unit 5 Boiler (NG)
S0004	C51- SCR (Connected to D4 and C52) / Gas Turbine 8A
S0005	C53- SCR (Connected to D5, D6 and C54) / Gas Turbine 8BC
S0006	C61- SCR (connected to C60) / Gas Turbine 9
S0007	D12-Emergency ICE
S0028	Unit 8A-Ammonia Injection Line
S0029	Unit 8BC-Ammonia Injection Line
S0030	Unit 9-Ammonia Injection Line
S0031	D1-Unit 4 Boiler (LG)
S0032	D2-Unit 3 Boiler (LG)
S0033	D3-Unit 5 Boiler (LG)

APPENDIX B

EMISSION RATE AND SOURCE INFORMATION

DIESEL PM EMISSION RATE CALCULATION

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

DIESEL PM EMISSION FROM EMERGENCY ENGINE (S0007)

Diesel PM Emission Factor (g/bhp-hr)	Engine Rating (bhp)	2015 Operating Hours	2015 Emission (lbs/year)
0.3	465	18.2	5.6

Note:

Diesel PM emission factor is based on the manufacturer literature.

EMISSION SOURCE PARAMETERS

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

SOURCE PARAMETERS - POINT SOURCES/STACKS

Source ID No.	Stack Name	UTM Easting	UTM Northing	Stack Height (m)	Stack Diameter (m)	Stack Temp. (K)	Stack Flow Rate (ACFM)	Stack Exit Velocity (m/s)	Elevation (m)
S0001	D1-Unit 4 Boiler (NG)	382173	3780131	27.13	2.44	585.93	158,151	15.651	142.0385
S0002	D2-Unit 3 Boiler (NG)	382164	3780156	21.95	1.81	437.04	100,773	18.485	142.0385
S0003	D3-Unit 5 Boiler (NG)	382142	3780169	27.13	2.41	378.09	154,547	15.615	142.0385
S0004	D4 – Unit 8A (NG)	382135.8	3780085.6	30.48	3.34	482.04	361,522	19.426	142.0385
S0005	D5, D6 – Unit 8BC (NG)	382122	3780092	30.48	5.31	485.09	807,953	17.619	142.0385
S0006	D58 – Unit 9 (NG)	382238.2	3780061.8	25.91	3.05	694.54	616,089	40.51	142.0385
S0007	D12-Emergency ICE	382120	3780234	3.35	0.20	755.37	2,570	37.021	142.0385
S0028	Unit 8A-NH3 Injection Line	382135.8	3780085.6	30.48	3.34	482.04	361,522	19.426	142.0385
S0029	Unit 8BC-NH3 Injection Line	382122	3780092	30.48	5.31	485.09	807,953	17.619	142.0385
S0030	Unit 9-NH3 Injection Line	382238.2	3780061.8	25.91	3.05	694.54	616,089	40.51	142.0385
S0031	D1-Unit 4 Boiler (LG)	382173	3780131	27.13	2.44	411.48	64,096	6.344	142.0385
S0032	D2-Unit 3 Boiler (LG)	382164	3780156	21.95	1.81	428.15	77,993	14.307	142.0385
S0033	D3-Unit 5 Boiler (LG)	382142	3780169	27.13	2.41	386.04	166,142	16.784	142.0385

EMISSION RATE BY SOURCE

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

EMISSION RATE BY SUBSTANCE AND SOURCE

Source	Source Name	Compounds	CAS	1-Hour Maximum (lbs/hr)	1-Hour Maximum (g/s)	Annual Average (lbs/yr)	Annual Average (g/s)
S0001	D1 - Unit 4 Boiler (NG)	Acetaldehyde	75070	2.22E-05	2.80E-06	1.55E-01	1.95E-02
S0001	D1 - Unit 4 Boiler (NG)	Acrolein	107028	1.97E-05	2.49E-06	1.38E-01	1.74E-02
S0001	D1 - Unit 4 Boiler (NG)	Benzene	71432	4.19E-05	5.28E-06	2.93E-01	3.69E-02
S0001	D1 - Unit 4 Boiler (NG)	Ethyl Benzene	100414	4.93E-05	6.22E-06	3.45E-01	4.34E-02
S0001	D1 - Unit 4 Boiler (NG)	Formaldehyde	50000	8.88E-05	1.12E-05	6.21E-01	7.82E-02
S0001	D1 - Unit 4 Boiler (NG)	Hexane	110543	3.21E-05	4.04E-06	2.24E-01	2.82E-02
S0001	D1 - Unit 4 Boiler (NG)	Naphthalene	91203	7.40E-06	9.32E-07	5.17E-02	6.52E-03
S0001	D1 - Unit 4 Boiler (NG)	NH3	7664417	7.89E-02	9.95E-03	5.52E+02	6.95E+01
S0001	D1 - Unit 4 Boiler (NG)	PAHs-w/o	1151	2.47E-06	3.11E-07	1.72E-02	2.17E-03
S0001	D1 - Unit 4 Boiler (NG)	Toluene	108883	1.92E-04	2.42E-05	1.34E+00	1.69E-01
S0001	D1 - Unit 4 Boiler (NG)	Xylenes	1330207	1.43E-04	1.80E-05	1.00E+00	1.26E-01
S0002	D2 - Unit 3 Boiler (NG)	Acetaldehyde	75070	1.04E-05	1.32E-06	7.30E-02	9.20E-03
S0002	D2 - Unit 3 Boiler (NG)	Acrolein	107028	9.29E-06	1.17E-06	6.49E-02	8.18E-03
S0002	D2 - Unit 3 Boiler (NG)	Benzene	71432	1.97E-05	2.49E-06	1.38E-01	1.74E-02
S0002	D2 - Unit 3 Boiler (NG)	Ethyl Benzene	100414	2.32E-05	2.92E-06	1.62E-01	2.04E-02
S0002	D2 - Unit 3 Boiler (NG)	Formaldehyde	50000	4.18E-05	5.26E-06	2.92E-01	3.68E-02
S0002	D2 - Unit 3 Boiler (NG)	Hexane	110543	1.51E-05	1.90E-06	1.05E-01	1.33E-02
S0002	D2 - Unit 3 Boiler (NG)	Naphthalene	91203	3.48E-06	4.39E-07	2.43E-02	3.07E-03
S0002	D2 - Unit 3 Boiler (NG)	NH3	7664417	3.71E-02	4.68E-03	2.60E+02	3.27E+01
S0002	D2 - Unit 3 Boiler (NG)	PAHs-w/o	1151	1.16E-06	1.46E-07	8.11E-03	1.02E-03
S0002	D2 - Unit 3 Boiler (NG)	Toluene	108883	9.05E-05	1.14E-05	6.33E-01	7.97E-02
S0002	D2 - Unit 3 Boiler (NG)	Xylenes	1330207	6.73E-05	8.48E-06	4.70E-01	5.93E-02
S0003	D3 - Unit 5 Boiler (NG)	Acetaldehyde	75070	8.92E-05	1.12E-05	6.23E-01	7.85E-02
S0003	D3 - Unit 5 Boiler (NG)	Acrolein	107028	7.93E-05	9.99E-06	5.54E-01	6.98E-02
S0003	D3 - Unit 5 Boiler (NG)	Benzene	71432	1.68E-04	2.12E-05	1.18E+00	1.48E-01
S0003	D3 - Unit 5 Boiler (NG)	Ethyl Benzene	100414	1.98E-04	2.50E-05	1.39E+00	1.75E-01
S0003	D3 - Unit 5 Boiler (NG)	Formaldehyde	50000	3.57E-04	4.50E-05	2.49E+00	3.14E-01
S0003	D3 - Unit 5 Boiler (NG)	Hexane	110543	1.29E-04	1.62E-05	9.00E-01	1.13E-01
S0003	D3 - Unit 5 Boiler (NG)	Naphthalene	91203	2.97E-05	3.75E-06	2.08E-01	2.62E-02
S0003	D3 - Unit 5 Boiler (NG)	NH3	7664417	6.95E-01	8.76E-02	4.86E+03	6.12E+02
S0003	D3 - Unit 5 Boiler (NG)	PAHs-w/o	1151	9.91E-06	1.25E-06	6.93E-02	8.73E-03
S0003	D3 - Unit 5 Boiler (NG)	Toluene	108883	7.73E-04	9.74E-05	5.40E+00	6.81E-01
S0003	D3 - Unit 5 Boiler (NG)	Xylenes	1330207	5.75E-04	7.24E-05	4.02E+00	5.06E-01
S0004	Gas Turbine 8A	1,3-Butadiene	106990	1.43E-05	1.81E-06	1.00E-01	1.26E-02
S0004	Gas Turbine 8A	Acetaldehyde	75070	1.33E-03	1.68E-04	9.31E+00	1.17E+00
S0004	Gas Turbine 8A	Acrolein	107028	2.13E-04	2.69E-05	1.49E+00	1.88E-01
S0004	Gas Turbine 8A	Benzene	71432	3.98E-04	5.02E-05	2.78E+00	3.51E-01
S0004	Gas Turbine 8A	Ethyl Benzene	100414	1.06E-03	1.34E-04	7.44E+00	9.37E-01
S0004	Gas Turbine 8A	Formaldehyde	50000	2.36E-02	2.98E-03	1.65E+02	2.08E+01
S0004	Gas Turbine 8A	Naphthalene	91203	4.34E-05	5.47E-06	3.03E-01	3.82E-02
S0004	Gas Turbine 8A	NH3	7664417	7.83E-03	9.87E-04	5.47E+01	6.90E+00
S0004	Gas Turbine 8A	PAHs-w/o	1151	3.00E-05	3.78E-06	2.09E-01	2.64E-02
S0004	Gas Turbine 8A	Propylene Oxide	75569	9.66E-04	1.22E-04	6.75E+00	8.51E-01
S0004	Gas Turbine 8A	Toluene	108883	4.34E-03	5.47E-04	3.03E+01	3.82E+00
S0004	Gas Turbine 8A	Xylenes	1330207	2.13E-03	2.69E-04	1.49E+01	1.88E+00
S0005	Gas Turbine 8B	1,3-Butadiene	106990	3.20E-06	4.03E-07	2.24E-02	2.82E-03
S0005	Gas Turbine 8C	1,3-Butadiene	106990	3.20E-06	4.03E-07	2.24E-02	2.82E-03
S0005	Gas Turbine 8B	Acetaldehyde	75070	2.97E-04	3.75E-05	2.08E+00	2.62E-01
S0005	Gas Turbine 8C	Acetaldehyde	75070	2.97E-04	3.75E-05	2.08E+00	2.62E-01
S0005	Gas Turbine 8B	Acrolein	107028	4.76E-05	6.00E-06	3.33E-01	4.19E-02
S0005	Gas Turbine 8C	Acrolein	107028	4.76E-05	6.00E-06	3.33E-01	4.19E-02
S0005	Gas Turbine 8B	Benzene	71432	8.89E-05	1.12E-05	6.21E-01	7.83E-02
S0005	Gas Turbine 8C	Benzene	71432	8.89E-05	1.12E-05	6.21E-01	7.83E-02
S0005	Gas Turbine 8B	Ethyl Benzene	100414	2.38E-04	2.99E-05	1.66E+00	2.09E-01
S0005	Gas Turbine 8C	Ethyl Benzene	100414	2.38E-04	2.99E-05	1.66E+00	2.09E-01
S0005	Gas Turbine 8B	Formaldehyde	50000	5.28E-03	6.65E-04	3.69E+01	4.65E+00
S0005	Gas Turbine 8C	Formaldehyde	50000	5.28E-03	6.65E-04	3.69E+01	4.65E+00
S0005	Gas Turbine 8B	Naphthalene	91203	9.69E-06	1.22E-06	6.78E-02	8.54E-03

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EMISSION RATE BY SUBSTANCE AND SOURCE

Source	Source Name	Compounds	CAS	1-Hour Maximum (lbs/hr)	1-Hour Maximum (g/s)	Annual Average (lbs/yr)	Annual Average (g/s)
S0005	Gas Turbine 8C	Naphthalene	91203	9.69E-06	1.22E-06	6.78E-02	8.54E-03
S0005	Gas Turbine 8B	NH3	7664417	2.33E-03	2.94E-04	1.63E+01	2.05E+00
S0005	Gas Turbine 8C	NH3	7664417	2.33E-03	2.94E-04	1.63E+01	2.05E+00
S0005	Gas Turbine 8B	PAHs-w/o	1151	6.69E-06	8.43E-07	4.68E-02	5.89E-03
S0005	Gas Turbine 8C	PAHs-w/o	1151	6.69E-06	8.43E-07	4.68E-02	5.89E-03
S0005	Gas Turbine 8B	Propylene Oxide	75569	2.16E-04	2.72E-05	1.51E+00	1.90E-01
S0005	Gas Turbine 8C	Propylene Oxide	75569	2.16E-04	2.72E-05	1.51E+00	1.90E-01
S0005	Gas Turbine 8B	Toluene	108883	9.69E-04	1.22E-04	6.78E+00	8.54E-01
S0005	Gas Turbine 8C	Toluene	108883	9.69E-04	1.22E-04	6.78E+00	8.54E-01
S0005	Gas Turbine 8B	Xylenes	1330207	4.76E-04	6.00E-05	3.33E+00	4.19E-01
S0005	Gas Turbine 8C	Xylenes	1330207	4.76E-04	6.00E-05	3.33E+00	4.19E-01
S0006	Gas Turbine 9	1,3-Butadiene	106990	1.06E-05	1.33E-06	7.39E-02	9.32E-03
S0006	Gas Turbine 9	Acetaldehyde	75070	9.83E-04	1.24E-04	6.87E+00	8.66E-01
S0006	Gas Turbine 9	Acrolein	107028	1.57E-04	1.98E-05	1.10E+00	1.39E-01
S0006	Gas Turbine 9	Benzene	71432	2.94E-04	3.70E-05	2.05E+00	2.59E-01
S0006	Gas Turbine 9	Ethyl Benzene	100414	7.86E-04	9.90E-05	5.49E+00	6.92E-01
S0006	Gas Turbine 9	Formaldehyde	50000	1.74E-02	2.20E-03	1.22E+02	1.54E+01
S0006	Gas Turbine 9	Naphthalene	91203	3.20E-05	4.04E-06	2.24E-01	2.82E-02
S0006	Gas Turbine 9	NH3	7664417	1.17E-01	1.48E-02	8.18E+02	1.03E+02
S0006	Gas Turbine 9	PAHs-w/o	1151	2.21E-05	2.79E-06	1.55E-01	1.95E-02
S0006	Gas Turbine 9	Propylene Oxide	75569	7.13E-04	8.99E-05	4.98E+00	6.28E-01
S0006	Gas Turbine 9	Toluene	108883	3.20E-03	4.04E-04	2.24E+01	2.82E+00
S0006	Gas Turbine 9	Xylenes	1330207	1.57E-03	1.98E-04	1.10E+01	1.39E+00
S0007	D12 - Emergency ICE	1,3-Butadiene	106990	1.21E-05	1.53E-06	8.47E-02	1.07E-02
S0007	D12 - Emergency ICE	Acetaldehyde	75070	4.37E-05	5.50E-06	3.05E-01	3.85E-02
S0007	D12 - Emergency ICE	Acrolein	107028	1.89E-06	2.38E-07	1.32E-02	1.66E-03
S0007	D12 - Emergency ICE	Arsenic	7440382	8.92E-08	1.12E-08	6.24E-04	7.86E-05
S0007	D12 - Emergency ICE	Benzene	71432	1.04E-05	1.31E-06	7.26E-02	9.15E-03
S0007	D12 - Emergency ICE	Cadmium	7440439	8.37E-08	1.05E-08	5.85E-04	7.37E-05
S0007	D12 - Emergency ICE	Copper	7440508	2.29E-07	2.88E-08	1.60E-03	2.01E-04
S0007	D12 - Emergency ICE	Cr(VI)	18540299	5.58E-09	7.03E-10	3.90E-05	4.91E-06
S0007	D12 - Emergency ICE	Diesel PM	9901	5.49E-02	6.92E-03	5.60E+00	7.05E-01
S0007	D12 - Emergency ICE	Ethyl Benzene	100414	6.08E-07	7.66E-08	4.25E-03	5.35E-04
S0007	D12 - Emergency ICE	Formaldehyde	50000	9.63E-05	1.21E-05	6.73E-01	8.48E-02
S0007	D12 - Emergency ICE	HCl	7647010	1.04E-05	1.31E-06	7.26E-02	9.15E-03
S0007	D12 - Emergency ICE	Hexane	110543	1.50E-06	1.89E-07	1.05E-02	1.32E-03
S0007	D12 - Emergency ICE	Lead	7439921	4.63E-07	5.83E-08	3.24E-03	4.08E-04
S0007	D12 - Emergency ICE	Manganese	7439965	1.73E-07	2.18E-08	1.21E-03	1.52E-04
S0007	D12 - Emergency ICE	Mercury	7439976	1.12E-07	1.41E-08	7.80E-04	9.82E-05
S0007	D12 - Emergency ICE	Naphthalene	91203	1.10E-06	1.38E-07	7.68E-03	9.68E-04
S0007	D12 - Emergency ICE	NH3	7664417	4.46E-05	5.62E-06	3.12E-01	3.93E-02
S0007	D12 - Emergency ICE	Nickel	7440020	2.18E-07	2.74E-08	1.52E-03	1.92E-04
S0007	D12 - Emergency ICE	PAHs-w/o	1151	2.02E-06	2.54E-07	1.41E-02	1.78E-03
S0007	D12 - Emergency ICE	Selenium	7782492	1.23E-07	1.55E-08	8.58E-04	1.08E-04
S0007	D12 - Emergency ICE	Toluene	108883	5.88E-06	7.41E-07	4.11E-02	5.18E-03
S0007	D12 - Emergency ICE	Xylenes	1330207	2.36E-06	2.98E-07	1.65E-02	2.08E-03
S0031	D1 - Unit 4 Boiler (LG)	1-8 OctaCDD	3268879	4.96E-11	6.25E-12	3.46E-07	4.37E-08
S0031	D1 - Unit 4 Boiler (LG)	Acenaphthene	83329	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Acenaphthylene	208968	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Anthracene	120127	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Arsenic	7440382	6.58E-05	8.29E-06	4.60E-01	5.79E-02
S0031	D1 - Unit 4 Boiler (LG)	B[a]anthracene	56553	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	B[a]P	50328	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	B[b]fluoranthene	205992	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	B[g,h,i]perylene	191242	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	B[k]fluoranthene	207089	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Beryllium	7440417	1.02E-04	1.29E-05	7.15E-01	9.01E-02
S0031	D1 - Unit 4 Boiler (LG)	Cadmium	7440439	6.23E-04	7.85E-05	4.35E+00	5.49E-01

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Source	Source Name	Compounds	CAS	1-Hour Maximum (lbs/hr)	1-Hour Maximum (g/s)	Annual Average (lbs/yr)	Annual Average (g/s)
S0031	D1 - Unit 4 Boiler (LG)	Chrysene	218019	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Copper	7440508	1.03E-03	1.30E-04	7.21E+00	9.09E-01
S0031	D1 - Unit 4 Boiler (LG)	Cr(VI)	18540299	6.64E-05	8.37E-06	4.64E-01	5.85E-02
S0031	D1 - Unit 4 Boiler (LG)	D[a,h]anthracen	53703	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Fluoranthene	206440	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Fluorene	86737	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Formaldehyde	50000	1.25E-02	1.57E-03	8.71E+01	1.10E+01
S0031	D1 - Unit 4 Boiler (LG)	In[1,2,3-cd]pyr	193395	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Lead	7439921	6.37E-04	8.03E-05	4.45E+00	5.61E-01
S0031	D1 - Unit 4 Boiler (LG)	Manganese	7439965	3.52E-02	4.44E-03	2.46E+02	3.10E+01
S0031	D1 - Unit 4 Boiler (LG)	Mercury	7439976	7.31E-06	9.21E-07	5.11E-02	6.44E-03
S0031	D1 - Unit 4 Boiler (LG)	Naphthalene	91203	2.41E-02	3.03E-03	1.68E+02	2.12E+01
S0031	D1 - Unit 4 Boiler (LG)	NH3	7664417	2.19E-01	2.75E-02	1.53E+03	1.92E+02
S0031	D1 - Unit 4 Boiler (LG)	Nickel	7440020	1.07E-02	1.35E-03	7.47E+01	9.42E+00
S0031	D1 - Unit 4 Boiler (LG)	Phenanthrene	85018	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Pyrene	129000	3.90E-05	4.91E-06	2.72E-01	3.43E-02
S0031	D1 - Unit 4 Boiler (LG)	Selenium	7782492	4.72E-05	5.95E-06	3.30E-01	4.16E-02
S0032	D2 - Unit 3 Boiler (LG)	1-8 OctaCDD	3268879	2.46E-11	3.10E-12	1.72E-07	2.17E-08
S0032	D2 - Unit 3 Boiler (LG)	Acenaphthene	83329	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Acenaphthylene	208968	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Anthracene	120127	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Arsenic	7440382	3.26E-05	4.11E-06	2.28E-01	2.87E-02
S0032	D2 - Unit 3 Boiler (LG)	B[a]anthracene	56553	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	B[a]P	50328	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	B[b]fluoranthen	205992	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	B[g,h,i]perylene	191242	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	B[k]fluoranthen	207089	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Beryllium	7440417	5.07E-05	6.39E-06	3.55E-01	4.47E-02
S0032	D2 - Unit 3 Boiler (LG)	Cadmium	7440439	3.09E-04	3.89E-05	2.16E+00	2.72E-01
S0032	D2 - Unit 3 Boiler (LG)	Chrysene	218019	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Copper	7440508	5.12E-04	6.45E-05	3.58E+00	4.51E-01
S0032	D2 - Unit 3 Boiler (LG)	Cr(VI)	18540299	3.29E-05	4.15E-06	2.30E-01	2.90E-02
S0032	D2 - Unit 3 Boiler (LG)	D[a,h]anthracen	53703	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Fluoranthene	206440	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Fluorene	86737	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Formaldehyde	50000	6.18E-03	7.79E-04	4.32E+01	5.44E+00
S0032	D2 - Unit 3 Boiler (LG)	In[1,2,3-cd]pyr	193395	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Lead	7439921	3.16E-04	3.98E-05	2.21E+00	2.78E-01
S0032	D2 - Unit 3 Boiler (LG)	Manganese	7439965	1.75E-02	2.20E-03	1.22E+02	1.54E+01
S0032	D2 - Unit 3 Boiler (LG)	Mercury	7439976	3.63E-06	4.57E-07	2.53E-02	3.19E-03
S0032	D2 - Unit 3 Boiler (LG)	Naphthalene	91203	1.19E-02	1.51E-03	8.35E+01	1.05E+01
S0032	D2 - Unit 3 Boiler (LG)	NH3	7664417	1.08E-01	1.37E-02	7.58E+02	9.55E+01
S0032	D2 - Unit 3 Boiler (LG)	Nickel	7440020	5.31E-03	6.68E-04	3.71E+01	4.67E+00
S0032	D2 - Unit 3 Boiler (LG)	Phenanthrene	85018	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Pyrene	129000	1.93E-05	2.44E-06	1.35E-01	1.70E-02
S0032	D2 - Unit 3 Boiler (LG)	Selenium	7782492	2.34E-05	2.95E-06	1.64E-01	2.06E-02
S0033	D3 - Unit 5 Boiler (LG)	1-8 OctaCDD	3268879	1.19E-10	1.50E-11	8.34E-07	1.05E-07
S0033	D3 - Unit 5 Boiler (LG)	Acenaphthene	83329	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Acenaphthylene	208968	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Anthracene	120127	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Arsenic	7440382	1.58E-04	2.00E-05	1.11E+00	1.39E-01
S0033	D3 - Unit 5 Boiler (LG)	B[a]anthracene	56553	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	B[a]P	50328	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	B[b]fluoranthen	205992	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	B[g,h,i]perylene	191242	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	B[k]fluoranthen	207089	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Beryllium	7440417	2.46E-04	3.10E-05	1.72E+00	2.17E-01
S0033	D3 - Unit 5 Boiler (LG)	Cadmium	7440439	1.50E-03	1.89E-04	1.05E+01	1.32E+00

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

EMISSION RATE BY SUBSTANCE AND SOURCE

Source	Source Name	Compounds	CAS	1-Hour Maximum (lbs/hr)	1-Hour Maximum (g/s)	Annual Average (lbs/yr)	Annual Average (g/s)
S0033	D3 - Unit 5 Boiler (LG)	Chrysene	218019	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Copper	7440508	2.49E-03	3.13E-04	1.74E+01	2.19E+00
S0033	D3 - Unit 5 Boiler (LG)	Cr(VI)	18540299	1.60E-04	2.01E-05	1.12E+00	1.41E-01
S0033	D3 - Unit 5 Boiler (LG)	D[a,h]anthracen	53703	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Fluoranthene	206440	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Fluorene	86737	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Formaldehyde	50000	3.00E-02	3.78E-03	2.10E+02	2.64E+01
S0033	D3 - Unit 5 Boiler (LG)	In[1,2,3-cd]pyr	193395	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Lead	7439921	1.53E-03	1.93E-04	1.07E+01	1.35E+00
S0033	D3 - Unit 5 Boiler (LG)	Manganese	7439965	8.48E-02	1.07E-02	5.93E+02	7.47E+01
S0033	D3 - Unit 5 Boiler (LG)	Mercury	7439976	1.76E-05	2.22E-06	1.23E-01	1.55E-02
S0033	D3 - Unit 5 Boiler (LG)	Naphthalene	91203	5.80E-02	7.31E-03	4.05E+02	5.11E+01
S0033	D3 - Unit 5 Boiler (LG)	NH3	7664417	5.26E-01	6.63E-02	3.68E+03	4.63E+02
S0033	D3 - Unit 5 Boiler (LG)	Nickel	7440020	2.57E-02	3.24E-03	1.80E+02	2.27E+01
S0033	D3 - Unit 5 Boiler (LG)	Phenanthrene	85018	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Pyrene	129000	9.38E-05	1.18E-05	6.56E-01	8.26E-02
S0033	D3 - Unit 5 Boiler (LG)	Selenium	7782492	1.14E-04	1.43E-05	7.95E-01	1.00E-01

Note:

There are no emissions from Sources S0028, S0029, and S0030. The 2015 ATIR contains duplicate ammonia emissions in Sources S0028, S0029, and S0030. These emissions have been accounted in Sources S0004, S0005, and S0006.

EMISSION RATE BY SUBSTANCE

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

EMISSION RATE BY SUBSTANCE

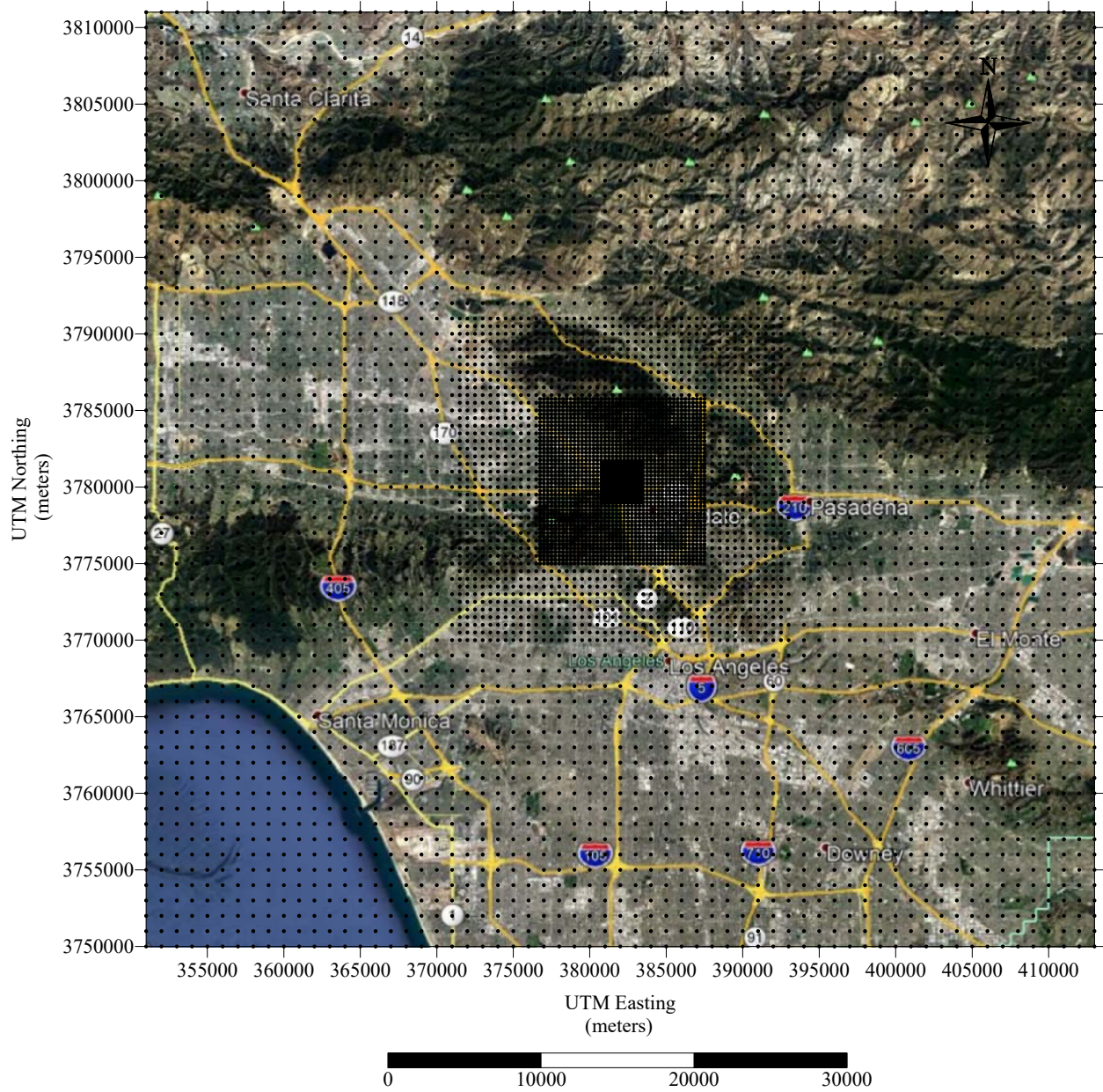
Compounds	CAS	1-Hour Maximum (lbs/hr)	1-Hour Maximum (g/s)	Annual Average (lbs/yr)	Annual Average (g/s)
1,3-Butadiene	106990	4.34E-05	5.47E-06	3.04E-01	3.82E-02
1-8 OctaCDD	3268879	1.94E-10	2.44E-11	1.35E-06	1.94E-10
Acenaphthene	83329	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Acenaphthylene	208968	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Acetaldehyde	75070	3.08E-03	3.87E-04	2.15E+01	3.08E-03
Acrolein	107028	5.76E-04	7.26E-05	4.02E+00	5.76E-04
Anthracene	120127	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Arsenic	7440382	2.57E-04	3.24E-05	1.80E+00	2.57E-04
B[a]anthracene	56553	1.52E-04	1.92E-05	1.06E+00	1.52E-04
B[a]P	50328	1.52E-04	1.92E-05	1.06E+00	1.52E-04
B[b]fluoranthene	205992	1.52E-04	1.92E-05	1.06E+00	1.52E-04
B[g,h,i]perylene	191242	1.52E-04	1.92E-05	1.06E+00	1.52E-04
B[k]fluoranthene	207089	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Benzene	71432	1.11E-03	1.40E-04	7.76E+00	1.11E-03
Beryllium	7440417	3.99E-04	5.03E-05	2.79E+00	3.99E-04
Cadmium	7440439	2.43E-03	3.06E-04	1.70E+01	2.43E-03
Chrysene	218019	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Copper	7440508	4.03E-03	5.08E-04	2.82E+01	4.03E-03
Cr(VI)	18540299	2.59E-04	3.27E-05	1.81E+00	2.59E-04
D[a,h]anthracene	53703	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Diesel PM	9901	5.49E-02	6.92E-03	5.60E+00	5.49E-02
Ethyl Benzene	100414	2.60E-03	3.27E-04	1.81E+01	2.60E-03
Fluoranthene	206440	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Fluorene	86737	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Formaldehyde	50000	1.01E-01	1.27E-02	7.05E+02	1.01E-01
HCl	7647010	1.04E-05	1.31E-06	7.26E-02	1.04E-05
Hexane	110543	1.77E-04	2.24E-05	1.24E+00	1.77E-04
In[1,2,3-cd]pyr	193395	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Lead	7439921	2.49E-03	3.13E-04	1.74E+01	2.49E-03
Manganese	7439965	1.38E-01	1.73E-02	9.62E+02	1.38E-01
Mercury	7439976	2.86E-05	3.61E-06	2.00E-01	2.86E-05
Naphthalene	91203	9.42E-02	1.19E-02	6.58E+02	9.42E-02
NH3	7664417	1.79E+00	2.26E-01	1.25E+04	1.79E+00
Nickel	7440020	4.17E-02	5.26E-03	2.92E+02	4.17E-02
PAHs-w/o	1151	8.10E-05	1.02E-05	5.66E-01	8.10E-05
Phenanthrene	85018	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Propylene Oxide	75569	2.11E-03	2.66E-04	1.48E+01	2.11E-03
Pyrene	129000	1.52E-04	1.92E-05	1.06E+00	1.52E-04
Selenium	7782492	1.85E-04	2.33E-05	1.29E+00	1.85E-04
Toluene	108883	1.05E-02	1.33E-03	7.37E+01	1.05E-02
Xylenes	1330207	5.44E-03	6.86E-04	3.80E+01	5.44E-03

APPENDIX C

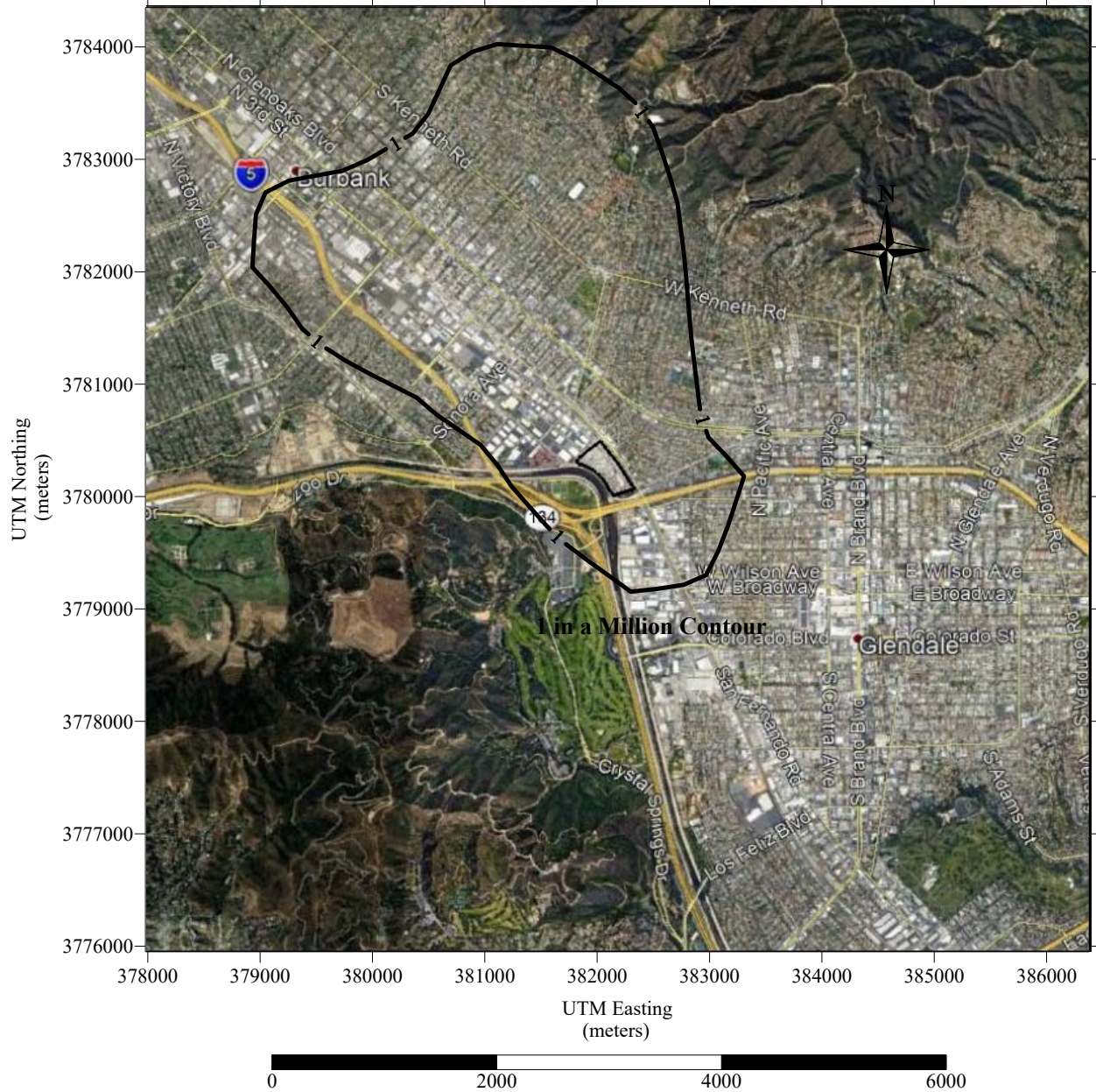
HRA RESULTS

**MAPS SHOWING HRA RESULTS
AT PMI, MEIR, AND MEIW**

RECEPTOR GRID AREA MAP



**MAP SHOWING ZONE OF IMPACT OF
CANCER RISK OF 1 IN 1 MILLION OR GREATER (30 YEAR EXPOSURE)
(THE CANCER CONTOUR RISK VALUES SHOWN ON THE MAP IS BASED ON 1 IN 1 MILLION)**

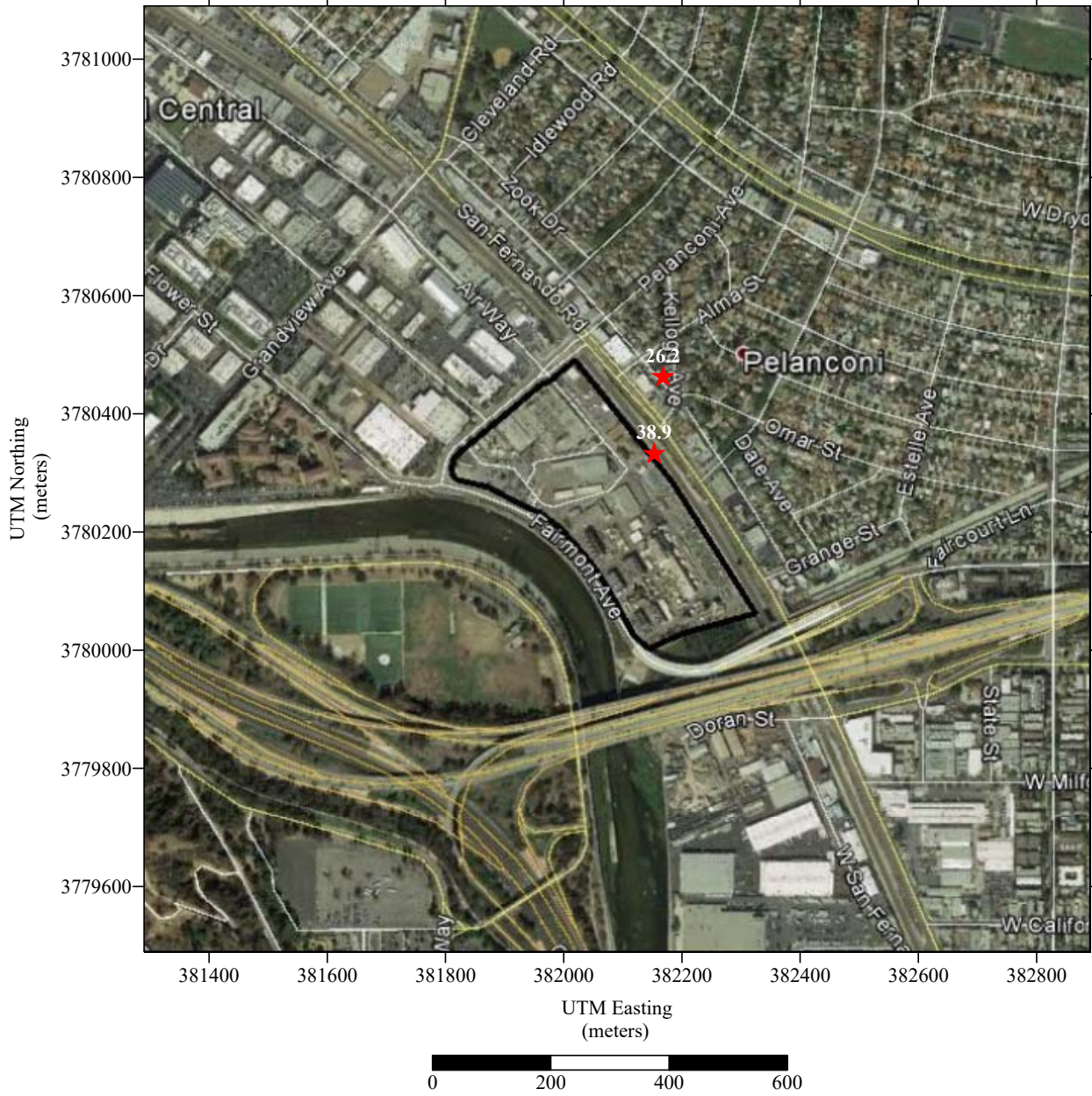


**MAP SHOWING ZONE OF IMPACT OF
CANCER RISK OF 1 IN 1 MILLION OR GREATER (70 YEAR EXPOSURE)
(THE CANCER CONTOUR RISK VALUES SHOWN ON THE MAP IS BASED ON 1 IN 1 MILLION)**



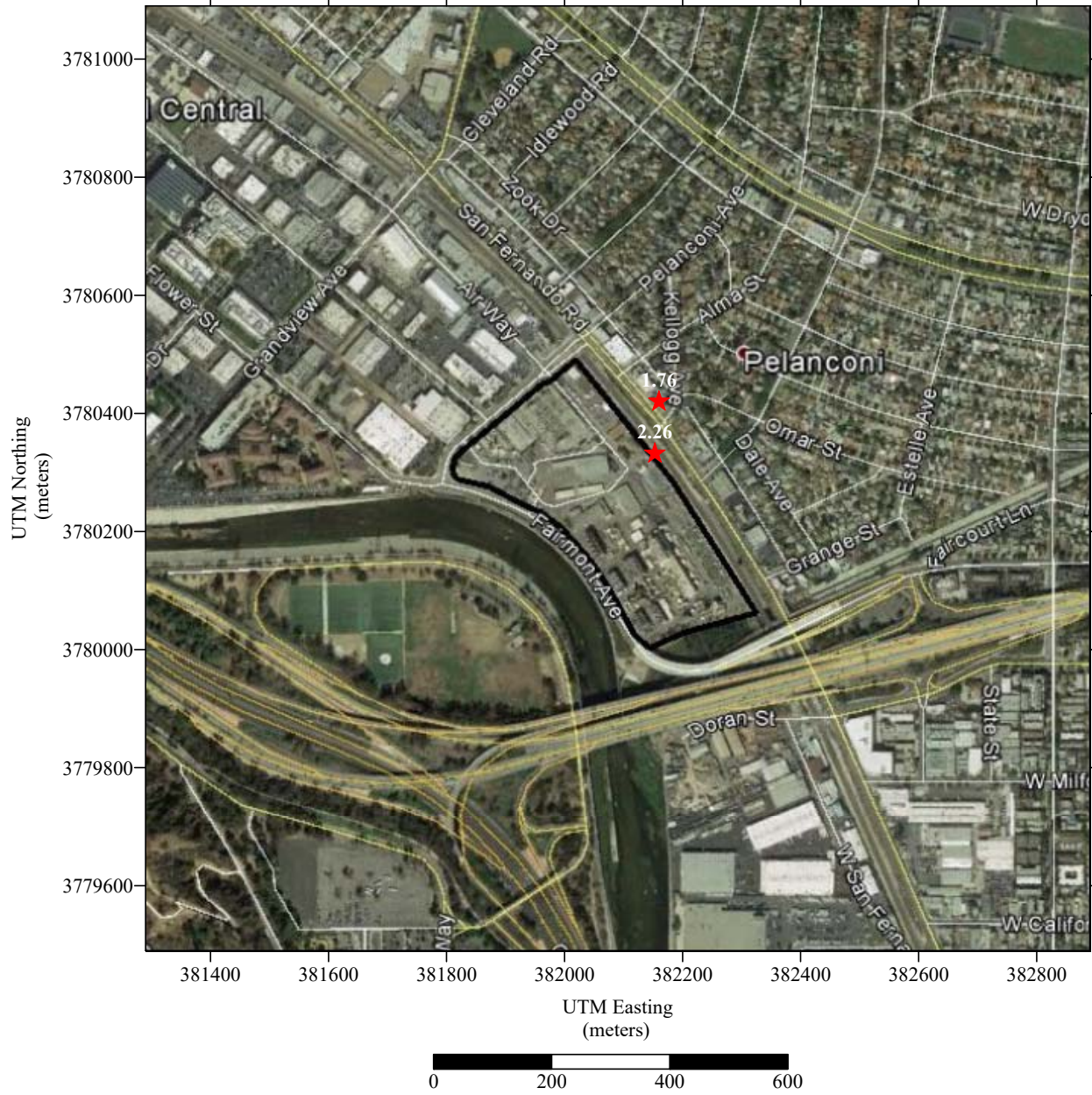
MAP OF PMI AND MEIR CANCER RISK - 30 YEAR EXPOSURE

(THE CANCER RISK VALUES SHOWN ON THE MAP IS BASED ON 1 IN 1 MILLION)

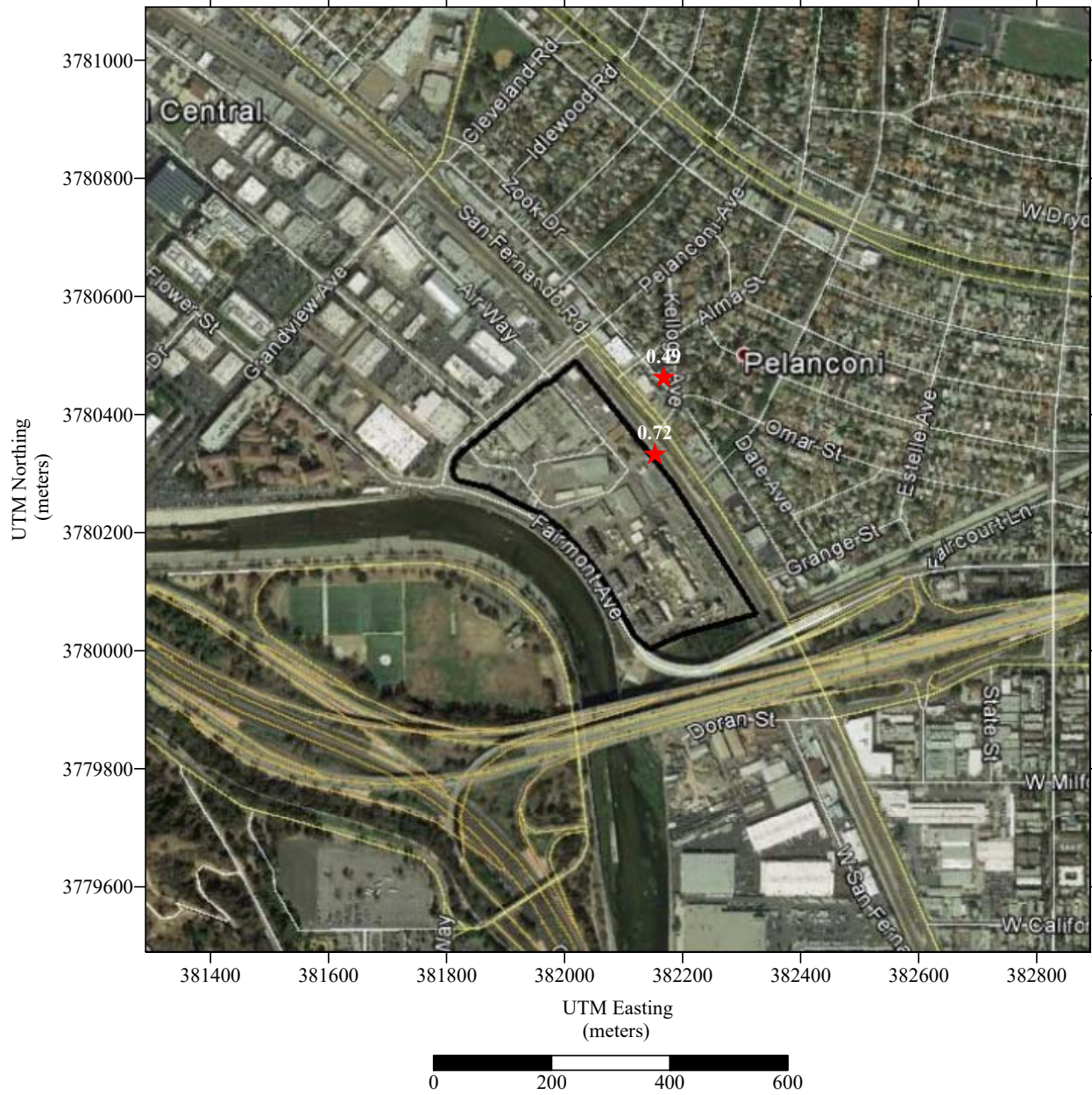


MAP OF PMI AND MEIW CANCER RISK - 25 YEAR EXPOSURE

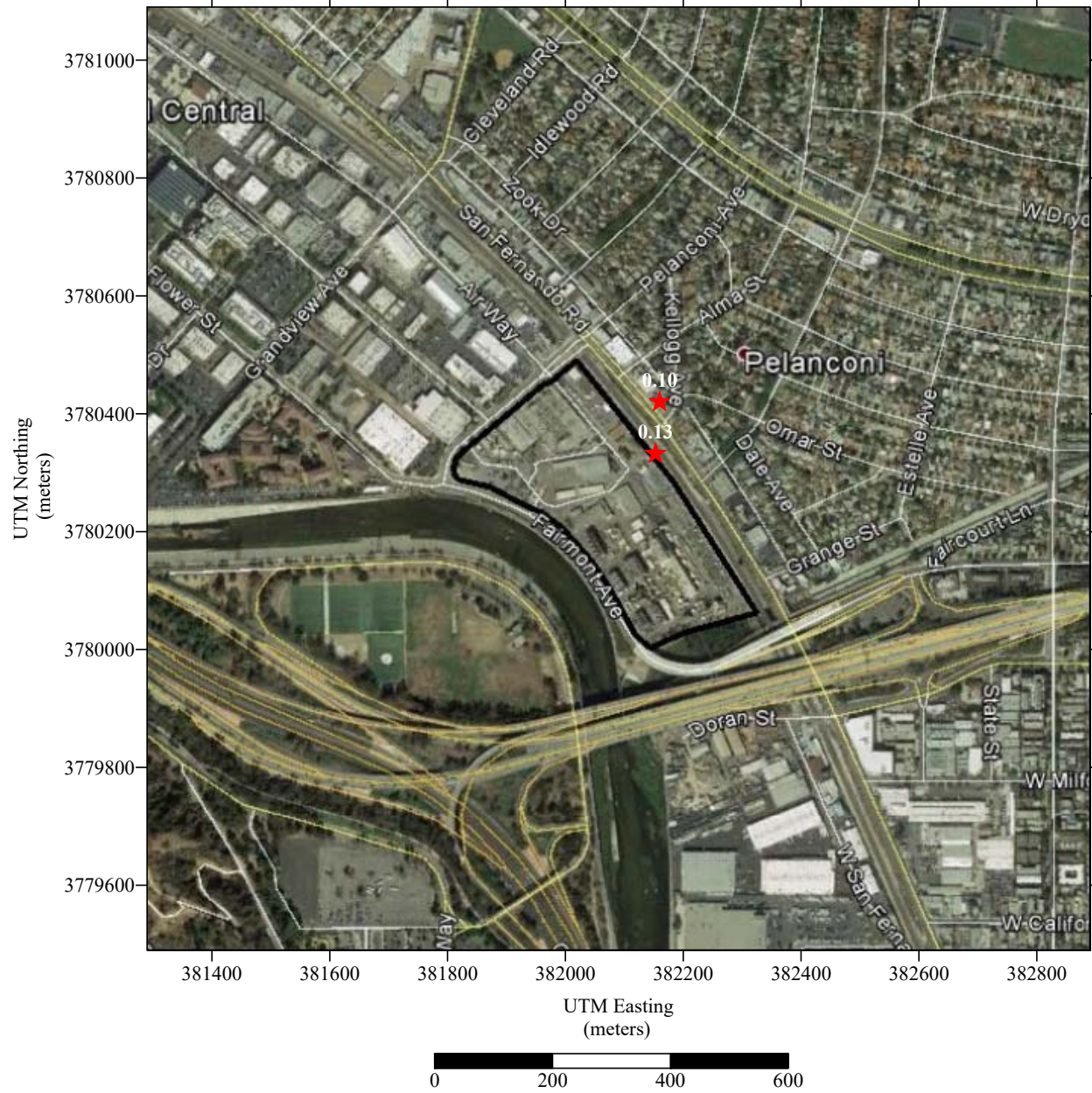
(THE CANCER RISK VALUES SHOWN ON THE MAP IS BASED ON 1 IN 1 MILLION)



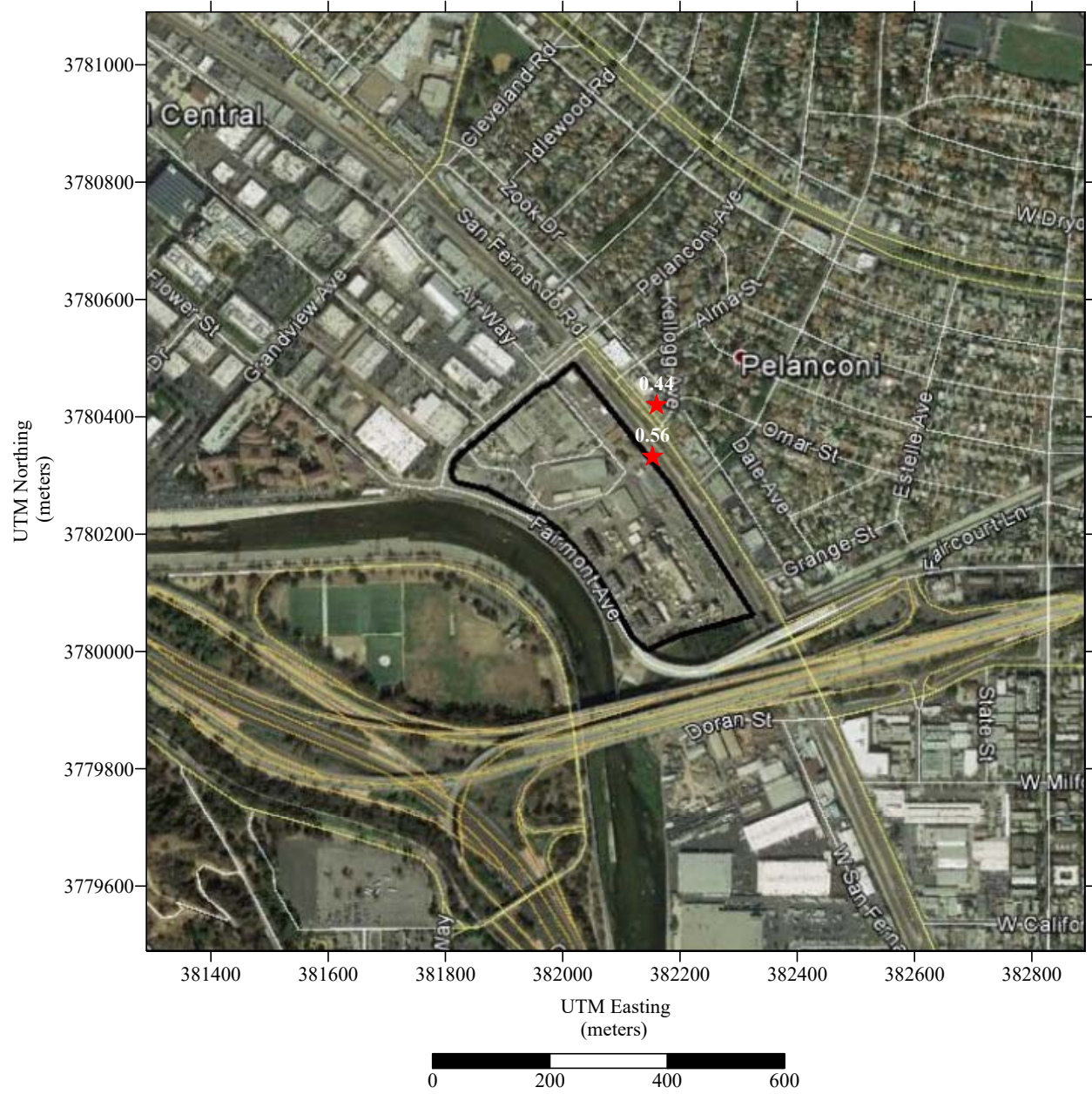
MAP OF PMI AND MEIR CHRONIC HAZARD INDEX
(THE CHRONIC HAZARD INDEX VALUES SHOWN ON THE MAP)



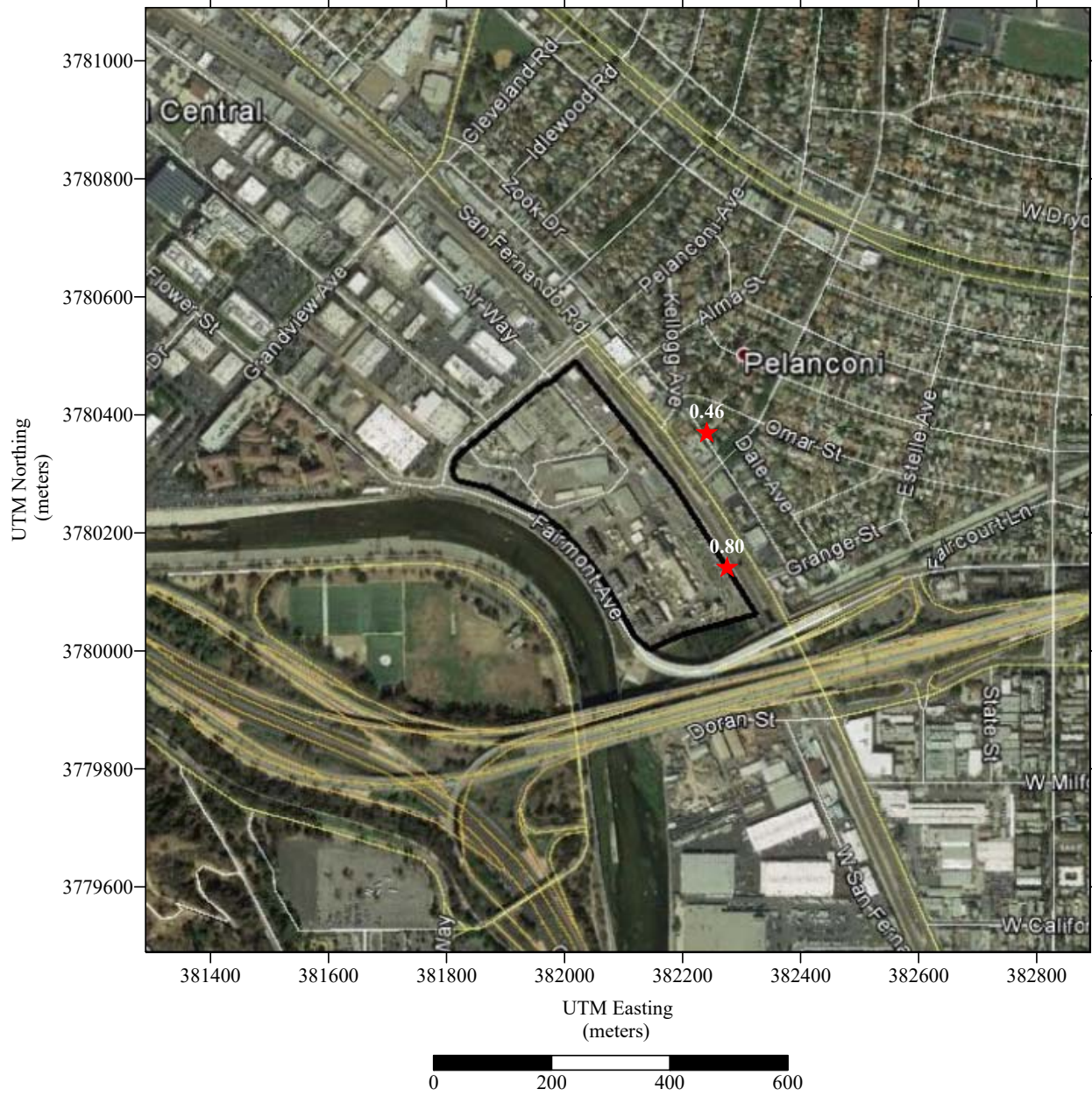
**MAP OF PMI AND MEIW 8-HOUR CHRONIC HAZARD INDEX
(THE CHRONIC 8-HOUR HAZARD INDEX VALUES SHOWN ON THE MAP)**



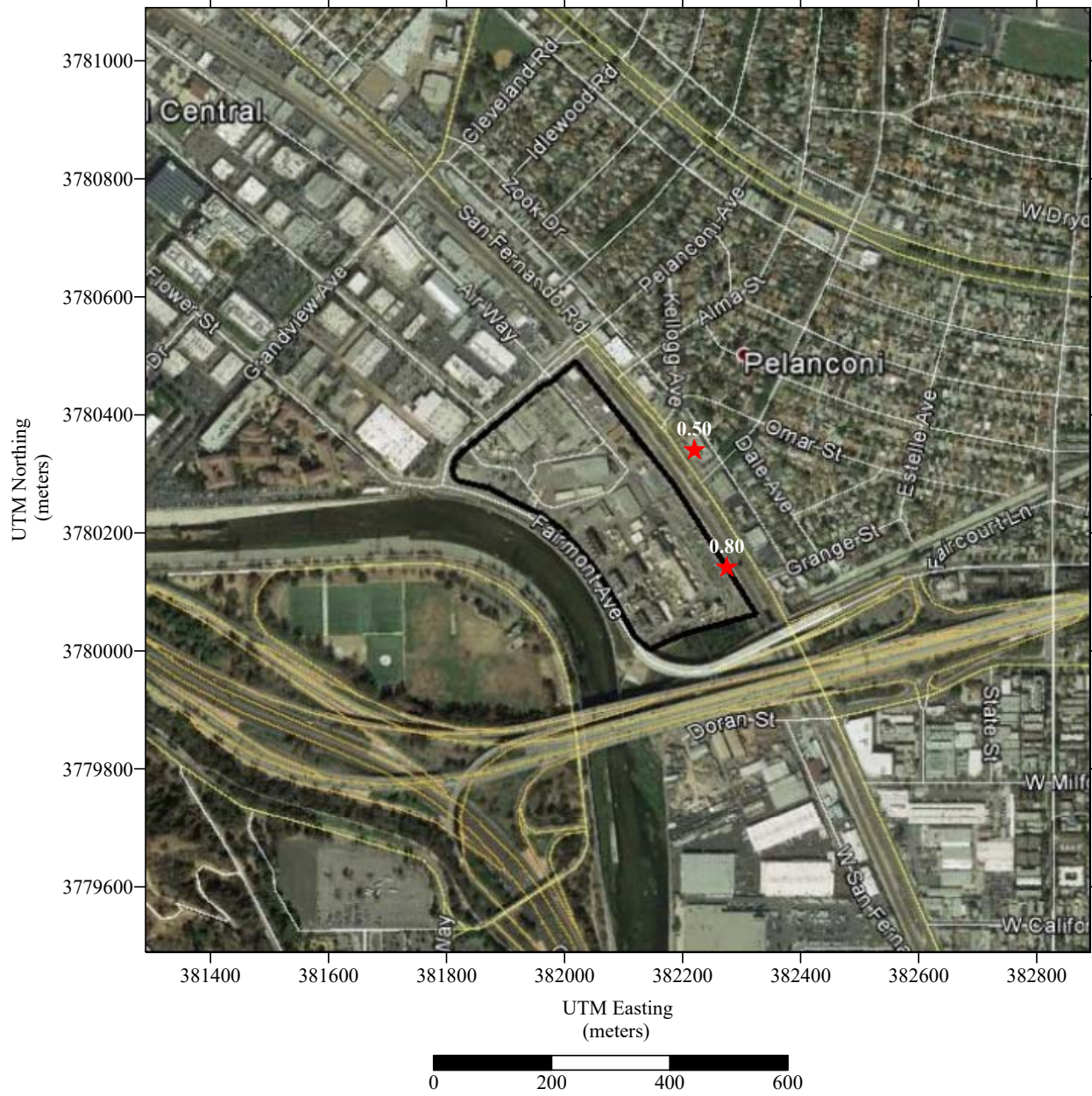
MAP OF PMI AND MEIW CHRONIC HAZARD INDEX
(THE CHRONIC HAZARD INDEX VALUES SHOWN ON THE MAP)



MAP OF PMI AND MEIR ACUTE HAZARD INDEX
(THE ACUTE HAZARD INDEX VALUES SHOWN ON THE MAP)



MAP OF PMI AND MEIW ACUTE HAZARD INDEX
(THE ACUTE HAZARD INDEX VALUES SHOWN ON THE MAP)



**HRA RESULTS AT PMI, MEIR, AND MEIW
BY EMISSION SOURCE**

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

CANCER RISK BY EMISSION SOURCES

SOURCE ID NO.	SOURCE DESCRIPTION	PMI (REC #83)	MEIR (REC #27)	MEIW (REC #1403)
S0001	D1-Unit 4 Boiler (NG)	4.28E-09	4.38E-09	1.17E-10
S0002	D2-Unit 3 Boiler (NG)	2.20E-08	1.13E-08	3.58E-10
S0003	D3-Unit 5 Boiler (NG)	8.00E-08	6.36E-08	1.85E-09
S0004	D4 – Unit 8A (NG)	6.23E-08	7.06E-08	2.45E-09
S0005	D5, D6 – Unit 8BC (NG)	1.68E-08	2.07E-08	7.03E-10
S0006	D58 – Unit 9 (NG)	2.39E-08	2.90E-08	9.64E-10
S0007	D12-Emergency ICE	1.76E-06	7.68E-07	7.68E-08
S0028	Unit 8A-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0029	Unit 8BC-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0030	Unit 9-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0031	D1-Unit 4 Boiler (LG)	6.33E-06	4.76E-06	3.10E-07
S0032	D2-Unit 3 Boiler (LG)	1.40E-05	6.69E-06	4.83E-07
S0033	D3-Unit 5 Boiler (LG)	1.67E-05	1.37E-05	8.85E-07

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

NON-CANCER CHRONIC RISK BY EMISSION SOURCES

SOURCE ID NO.	SOURCE DESCRIPTION	PMI (REC #83) (RESPIRATORY SYSTEM)	MEIR (REC #27) (RESPIRATORY SYSTEM)	MEIW (REC #1403) (RESPIRATORY SYSTEM)
S0001	D1-Unit 4 Boiler (NG)	1.27E-05	1.30E-05	1.35E-05
S0002	D2-Unit 3 Boiler (NG)	6.54E-05	3.35E-05	4.13E-05
S0003	D3-Unit 5 Boiler (NG)	4.80E-04	3.81E-04	4.31E-04
S0004	D4 – Unit 8A (NG)	9.35E-05	1.06E-04	1.07E-04
S0005	D5, D6 – Unit 8BC (NG)	2.54E-05	3.13E-05	3.08E-05
S0006	D58 – Unit 9 (NG)	4.39E-05	5.34E-05	5.16E-05
S0007	D12-Emergency ICE	1.72E-03	7.51E-04	5.25E-04
S0028	Unit 8A-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0029	Unit 8BC-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0030	Unit 9-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0031	D1-Unit 4 Boiler (LG)	1.23E-01	9.25E-02	8.18E-02
S0032	D2-Unit 3 Boiler (LG)	2.72E-01	1.30E-01	1.28E-01
S0033	D3-Unit 5 Boiler (LG)	3.24E-01	2.67E-01	2.34E-01

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

NON-CANCER ACUTE RISK BY EMISSION SOURCES

SOURCE ID NO.	SOURCE DESCRIPTION	PMI (REC #95) (IMMUNE SYSTEM)	MEIR (REC #20) (IMMUNE SYSTEM)	MEIW (REC #1259) (IMMUNE SYSTEM)
S0001	D1-Unit 4 Boiler (NG)	1.84E-04	2.96E-05	2.85E-05
S0002	D2-Unit 3 Boiler (NG)	5.37E-05	4.54E-05	5.23E-05
S0003	D3-Unit 5 Boiler (NG)	4.16E-04	5.56E-04	5.92E-04
S0004	D4 – Unit 8A (NG)	8.95E-05	1.30E-04	1.26E-04
S0005	D5, D6 – Unit 8BC (NG)	1.85E-05	2.36E-05	2.38E-05
S0006	D58 – Unit 9 (NG)	3.34E-05	6.35E-05	6.38E-05
S0007	D12-Emergency ICE	3.05E-05	6.73E-05	7.84E-05
S0028	Unit 8A-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0029	Unit 8BC-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0030	Unit 9-NH3 Injection Line	0.00E+00	0.00E+00	0.00E+00
S0031	D1-Unit 4 Boiler (LG)	5.21E-01	1.09E-01	1.20E-01
S0032	D2-Unit 3 Boiler (LG)	1.01E-01	8.88E-02	1.02E-01
S0033	D3-Unit 5 Boiler (LG)	1.81E-01	2.60E-01	2.77E-01

**HRA RESULTS AT PMI, MEIR, AND MEIW
BY SUBSTANCE**

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

CANCER RISK BY SUBSTANCE

TAC	CAS	PMI (REC #83)	MEIR (REC #27)	MEIW (REC #1403)
1,3-Butadiene	106990	1.20E-08	5.44E-09	6.12E-10
1-8OctaCDD	3268879	2.01E-11	1.37E-11	3.89E-13
Acenaphthene	83329	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	208968	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75070	1.23E-09	8.72E-10	8.28E-11
Acrolein	107028	0.00E+00	0.00E+00	0.00E+00
Anthracene	120127	0.00E+00	0.00E+00	0.00E+00
Arsenic	7440382	3.12E-06	2.12E-06	9.51E-08
B[a]anthracene	56553	1.42E-07	9.68E-08	2.67E-09
B[a]P	50328	1.42E-06	9.68E-07	2.67E-08
B[b]fluoranthene	205992	1.42E-07	9.68E-08	2.67E-09
B[g,h,i]perylene	191242	0.00E+00	0.00E+00	0.00E+00
B[k]fluoranthene	207089	1.42E-07	9.68E-08	2.67E-09
Benzene	71432	4.86E-09	3.64E-09	3.41E-10
Beryllium	7440417	3.48E-07	2.37E-07	2.28E-08
Cadmium	7440439	3.78E-06	2.58E-06	2.48E-07
Chrysene	218019	1.42E-08	9.68E-09	2.67E-10
Copper	7440508	0.00E+00	0.00E+00	0.00E+00
Cr(VI)	18540299	2.19E-05	1.49E-05	9.19E-07
D[a,h]anthracene	53703	5.16E-07	3.52E-07	1.05E-08
DieselExhPM	9901	1.42E-06	6.20E-07	7.10E-08
Ethyl Benzene	100414	4.97E-10	4.91E-10	4.25E-11
Fluoranthene	206440	0.00E+00	0.00E+00	0.00E+00
Fluorene	86737	0.00E+00	0.00E+00	0.00E+00
Formaldehyde	50000	1.26E-07	9.24E-08	8.67E-09
HCl	7647010	0.00E+00	0.00E+00	0.00E+00
Hexane	110543	0.00E+00	0.00E+00	0.00E+00
In[1,2,3-cd]pyr	193395	1.42E-07	9.68E-08	2.67E-09
Lead	7439921	1.24E-07	8.43E-08	4.14E-09
Manganese	7439965	0.00E+00	0.00E+00	0.00E+00
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91203	1.17E-06	7.97E-07	7.67E-08
NH3	7664417	0.00E+00	0.00E+00	0.00E+00
Nickel	7440020	3.94E-06	2.68E-06	2.58E-07
PAHs-w/o	1151	4.81E-07	3.04E-07	8.62E-09
Phenanthrene	85018	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75569	3.93E-10	4.60E-10	3.81E-11
Pyrene	129000	0.00E+00	0.00E+00	0.00E+00
Selenium	7782492	0.00E+00	0.00E+00	0.00E+00
Toluene	108883	0.00E+00	0.00E+00	0.00E+00
Xylenes	1330207	0.00E+00	0.00E+00	0.00E+00

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

NON-CANCER CHRONIC RISK BY SUBSTANCE

TAC	CAS	PMI (REC #83) (RESPIRATORY SYSTEM)	MEIR (REC #27) (RESPIRATORY SYSTEM)	MEIW (REC #1403) (RESPIRATORY SYSTEM)
1,3-Butadiene	106990	0.00E+00	0.00E+00	0.00E+00
1-8OctaCDD	3268879	6.91E-08	4.71E-08	1.19E-09
Acenaphthene	83329	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	208968	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75070	1.29E-06	9.21E-07	1.05E-06
Acrolein	107028	7.96E-05	6.73E-05	7.32E-05
Anthracene	120127	0.00E+00	0.00E+00	0.00E+00
Arsenic	7440382	2.32E-01	1.58E-01	5.89E-02
B[a]anthracene	56553	0.00E+00	0.00E+00	0.00E+00
B[a]P	50328	0.00E+00	0.00E+00	0.00E+00
B[b]fluoranthene	205992	0.00E+00	0.00E+00	0.00E+00
B[g,h,i]perylene	191242	0.00E+00	0.00E+00	0.00E+00
B[k]fluoranthene	207089	0.00E+00	0.00E+00	0.00E+00
Benzene	71432	0.00E+00	0.00E+00	0.00E+00
Beryllium	7440417	8.74E-03	5.95E-03	6.89E-03
Cadmium	7440439	1.86E-02	1.27E-02	1.47E-02
Chrysene	218019	0.00E+00	0.00E+00	0.00E+00
Copper	7440508	0.00E+00	0.00E+00	0.00E+00
Cr(VI)	18540299	1.99E-04	1.35E-04	1.57E-04
D[a,h]anthracene	53703	0.00E+00	0.00E+00	0.00E+00
DieselExhPM	9901	3.82E-04	1.67E-04	2.29E-04
Ethyl Benzene	100414	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	206440	0.00E+00	0.00E+00	0.00E+00
Fluorene	86737	0.00E+00	0.00E+00	0.00E+00
Formaldehyde	50000	9.82E-04	7.22E-04	8.16E-04
HCl	7647010	2.75E-06	1.20E-06	1.65E-06
Hexane	110543	0.00E+00	0.00E+00	0.00E+00
In[1,2,3-cd]pyr	193395	0.00E+00	0.00E+00	0.00E+00
Lead	7439921	0.00E+00	0.00E+00	0.00E+00
Manganese	7439965	0.00E+00	0.00E+00	0.00E+00
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91203	1.60E-03	1.09E-03	1.26E-03
NH3	7664417	1.18E-03	8.51E-04	9.73E-04
Nickel	7440020	4.57E-01	3.11E-01	3.60E-01
PAHs-w/o	1151	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	85018	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75569	1.49E-06	1.74E-06	1.74E-06
Pyrene	129000	0.00E+00	0.00E+00	0.00E+00
Selenium	7782492	0.00E+00	0.00E+00	0.00E+00
Toluene	108883	1.15E-06	1.13E-06	1.18E-06
Xylenes	1330207	2.89E-07	2.72E-07	2.87E-07

**GLENDALE CITY, GLENDALE WATER & POWER (FID 162556)
800 AIR WAY, GLENDALE, CA 91201**

NON-CANCER ACUTE RISK BY SUBSTANCE

TAC	CAS	PMI (REC #95) (IMMUNE SYSTEM)	MEIR (REC #20) (IMMUNE SYSTEM)	MEIW (REC #1259) (IMMUNE SYSTEM)
1,3-Butadiene	106990	0.00E+00	0.00E+00	0.00E+00
1-8OctaCDD	3268879	0.00E+00	0.00E+00	0.00E+00
Acenaphthene	83329	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	208968	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	75070	0.00E+00	0.00E+00	0.00E+00
Acrolein	107028	0.00E+00	0.00E+00	0.00E+00
Anthracene	120127	0.00E+00	0.00E+00	0.00E+00
Arsenic	7440382	0.00E+00	0.00E+00	0.00E+00
B[a]anthracene	56553	0.00E+00	0.00E+00	0.00E+00
B[a]P	50328	0.00E+00	0.00E+00	0.00E+00
B[b]fluoranthen	205992	0.00E+00	0.00E+00	0.00E+00
B[g,h,i]perylene	191242	0.00E+00	0.00E+00	0.00E+00
B[k]fluoranthen	207089	0.00E+00	0.00E+00	0.00E+00
Benzene	71432	2.93E-05	3.29E-05	3.55E-05
Beryllium	7440417	0.00E+00	0.00E+00	0.00E+00
Cadmium	7440439	0.00E+00	0.00E+00	0.00E+00
Chrysene	218019	0.00E+00	0.00E+00	0.00E+00
Copper	7440508	0.00E+00	0.00E+00	0.00E+00
Cr(VI)	18540299	0.00E+00	0.00E+00	0.00E+00
D[a,h]anthracen	53703	0.00E+00	0.00E+00	0.00E+00
DieselExhPM	9901	0.00E+00	0.00E+00	0.00E+00
Ethyl Benzene	100414	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	206440	0.00E+00	0.00E+00	0.00E+00
Fluorene	86737	0.00E+00	0.00E+00	0.00E+00
Formaldehyde	50000	0.00E+00	0.00E+00	0.00E+00
HCl	7647010	0.00E+00	0.00E+00	0.00E+00
Hexane	110543	0.00E+00	0.00E+00	0.00E+00
In[1,2,3-cd]pyr	193395	0.00E+00	0.00E+00	0.00E+00
Lead	7439921	0.00E+00	0.00E+00	0.00E+00
Manganese	7439965	0.00E+00	0.00E+00	0.00E+00
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91203	0.00E+00	0.00E+00	0.00E+00
NH3	7664417	0.00E+00	0.00E+00	0.00E+00
Nickel	7440020	8.04E-01	4.58E-01	4.99E-01
PAHs-w/o	1151	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	85018	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	75569	0.00E+00	0.00E+00	0.00E+00
Pyrene	129000	0.00E+00	0.00E+00	0.00E+00
Selenium	7782492	0.00E+00	0.00E+00	0.00E+00
Toluene	108883	0.00E+00	0.00E+00	0.00E+00
Xylenes	1330207	0.00E+00	0.00E+00	0.00E+00

APPENDIX D

COMPUTER FILES (AERMOD & HARP2)