AB2588 REVISED HEALTH RISK ASSESSMENT FOR THE PEBBLY BEACH GENERATING STATION (SCAQMD ID: 4477)

Prepared for:

Southern California Edison

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November 2019

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Prepared for:
Southern California Edison
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This document has been prepared by SLR International Corporation (SLR). The material and data in this report were prepared under the supervision and direction of the undersigned.

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DEFINITIONS

Cancer Risk: The theoretical probability of developing cancer as a result of lifetime exposure to carcinogenic substances. Cancer risk is calculated by summing the potential cancer risks due to both inhalation and non-inhalation routes of exposure.

Hazard Quotient (HQ): The estimated ground level concentration of a non-carcinogenic substance divided by the reference exposure level for the substance and a particular endpoint.

Reference Exposure Level (REL): The REL is an exposure level at or below which no non-cancer adverse health effect is anticipated to occur in a human population, including sensitive subpopulations, exposed for a specific duration. One-hour acute RELs are designed to be protective for infrequent one-hour maximum exposures. Eight-hour RELs are designed to be protective for repeated 8-hour exposures. Chronic RELs are designed to be protective for continuous long-term exposures. RELs are used to evaluate toxicity endpoints other than cancer.

Non-Cancer Chronic Health Impacts: Health impacts for long-term exposure to non-carcinogenic substances. Non-cancer chronic health impacts are calculated as a chronic hazard index, which is the sum of individual chronic HQs for each substance affecting a particular toxicological endpoint.

Non-Cancer 8-Hour Chronic Health Impacts: Health impacts for repeated 8-hour exposures to non-carcinogenic substances. Non-cancer 8-hour chronic health impacts are calculated as an 8-hour chronic hazard index, which is the sum of individual 8-hour chronic HQs for each substance affecting a particular toxicological endpoint.

Acute Health Impacts: Health impacts for short-term, peak one-hour exposures to non-carcinogenic substances. Acute health impacts are calculated as an acute hazard index, which is the sum of individual acute HQs for each substance affecting a particular toxicological endpoint.

ACRONYMS

AB2588	Air Toxics “Hot Spots” Information and Assessment Act of 1987
ARB	California Air Resources Board
ADMRT	Air Dispersion Modeling and Risk Assessment Tool
ATIR	Air Toxics Inventory Report
BPIPPRM	Building Profile Input Program
CAS	Chemical Abstract Service
CAPCOA	California Air Pollution Control Officers Association
EIM	Emissions Inventory Module
EPA	United States Environmental Protection Agency
GEP	Good Engineering Practice
HARP	Hot Spots Analysis and Reporting Program
HI	Hazard Index
HRA	Health Risk Assessment
HQ	Hazard Quotient
km	Kilometer
(χ/Q)	Relative Concentration
lb/hr	Pound Per Hour
lb/yr	Pound Per Year
m	Meter
MEIR	Maximum Exposed Individual Resident
MEIW	Maximum Exposed Individual Worker
mg	Milligrams
Mgal	1,000 Gallons
MICR	Maximum Individual Cancer Risk
MMIF	Mesoscale Model Interface Program
µg/m3	Microgram Per Cubic Meter
NED	National Elevation Dataset
NAD83	North American Datum 1983
OEHHA	California Office of Environmental Health Hazard Assessment
PBGS	Pebbly Beach Generating Station
PM	Particulate Matter
PMI	Point of Maximum Impact
REL	Reference Exposure Level

RMP	Risk Management Policy
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCICo	Santa Catalina Island Company
SCR	Selective Catalytic Reduction
SLR	SLR International Corporation
TAC	Toxic Air Contaminant
UTM	Universal Transverse Mercator
WRF	Weather Research and Forecasting Model
ZOI	Zone of Impact

South Coast Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • www.aqmd.gov

HEALTH RISK ASSESSMENT SUMMARY FORM

(Required in Executive Summary of HRA)

Facility Name : Southern California Edison, Pebbly Beach Generating Station
Facility Address: 1 Pebbly Beach Road
Avalon, CA 90704
Type of Business: Electric Power Generation
SCAQMD ID No.: 4477

A. Cancer Risk

(One in a million means one chance in a million of getting cancer from being constantly exposed to a certain level of a chemical over a period of time)

1. Inventory Reporting Year : 2015
2. Maximum Cancer Risk to Receptors : *(Offsite and residence = 30-year exposure, worker = 25-year exposure)*
   a. Offsite N/A in a million Location: N/A
   b. Residence 11.8 in a million Location: 377910 E, 3689157 N (UTM Zone 11, NAD83, meters)
   c. Worker 5.7 in a million Location: 378042 E, 3689107 N
3. Substances Accounting for 90% of Cancer Risk: Diesel Particulate Matter
   Processes Accounting for 90% of Cancer Risk: Electric Power Generation
4. Cancer Burden for a 70-yr exposure: *(Cancer Burden = [cancer risk] x [# of people exposed to specific cancer risk])*
   a. Cancer Burden 0.05
   b. Number of people exposed to >1 per million cancer risk for a 70-yr exposure 3,728
   c. Maximum distance to edge of 70-year, 1 x 10^{-6} cancer risk isopleth (meters) N/A (see HRA report Section 4.3.6)

B. Hazard Indices

[Long Term Effects (chronic) and Short Term Effects (acute)]
(non-carcinogenic impacts are estimated by comparing calculated concentration to identified Reference Exposure Levels, and expressing this comparison in terms of a "Hazard Index")

1. Maximum Chronic Hazard Indices:
   a. Residence HI: 3.2E-03 Location: 377910 E, 3689157 N toxicological endpoint: Respiratory
   b. Worker HI : 1.9E-02 Location: 378042 E, 3689107 N toxicological endpoint: Respiratory
2. Substances Accounting for 90% of Chronic Hazard Index: Diesel Particulate Matter
3. Maximum 8-hour Chronic Hazard Index:
   8-Hour Chronic HI: 3.7E-05 Location: 378113 E, 3688903 N toxicological endpoint: Hematological
4. Substances Accounting for 90% of 8-hour Chronic Hazard Index: Benzene
5. Maximum Acute Hazard Index:
   PMI: 4.4E-01 Location: 378045 E, 3688972 N toxicological endpoint: Immune
6. Substances Accounting for 90% of Acute Hazard Index: Benzene

C. Public Notification and Risk Reduction

1. Public Notification Required? X Yes ____ No
   a. If 'Yes', estimated population exposed to risks > 10 in a million for a 30-year exposure, or an HI >1
   Approximately 35
2. Risk Reduction Required? ____ Yes X No

EXECUTIVE SUMMARY

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB2588) requires facilities that may cause a significant increase in public health risks due to the emissions of toxic air contaminants (TAC) from their operations, to assess those impacts in a health risk assessment (HRA). Southern California Edison's (SCE) Pebbly Beach Generating Station (PBGS) is required to prepare a HRA [South Coast Air Quality Management District (SCAQMD) 2019a]. This HRA was prepared using emissions data provided in the revised Air Toxics Inventory Report (ATIR) submitted to the SCAQMD on January 3, 2019 (Yorke 2019). The SCAQMD approved the ATIR on January 23, 2019 (SCAQMD 2019a). The ATIR was updated to respond to SCAQMD comments received on August 21, 2019 to align the ATIR with this HRA (SLR 2019a).

There was one multi-pathway non-carcinogenic TAC emitted by facility sources reported in the ATIR. As such, the HRA is a multi-pathway based risk analysis performed using the Hot Spots Analysis Reporting Program (HARP) (Version 19044[1]) developed by the California Air Resources Board (ARB) for conducting health risk assessments in California under the Air Toxics Hot Spots Program. The HARP modeling system is a comprehensive health risk assessment tool that contains air emissions, dispersion, and risk analysis modules. The methods used to assess potential human health risks are consistent with those prepared by the California Office of Environmental Health Hazard Assessment (OEHHA) Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments [OEHHA Guidelines (OEHHA 2015)], which describes algorithms, exposure methods, and cancer and non-cancer health values needed to perform a HRA under the AB2588 program. The OEHHA Guidelines are generally considered the best available reference for conducting human health risk assessments in California. The HRA also followed the ARB and California Air Pollution Control Officers Association (CAPCOA) Risk Management Guidance for Stationary Sources of Air Toxics [RMP, Risk Management Policy (CAPCOA 2015)] and SCAQMD's supplemental guidance for preparing risk assessments (SCAQMD 2018).

The HRA contains three quantitative determinations: emissions estimation, air dispersion analysis, and health risk characterization. Emissions of TACs from the facility, as reported in the ATIR, were estimated using approved source test reports for the primary electric generating units, SCAQMD default emission factors, default methodologies, and safety data sheets for fugitive sources, as appropriate. Exposure calculations were performed using air dispersion modeling analyses to predict ground-level air concentrations by emission source. Results of the dispersion modeling exposure predictions were applied to emissions estimates and, along with the respective cancer potency factors and chronic and acute non-cancer reference exposure levels for each TAC, used to perform a health risk characterization that quantified theoretical individual health risks associated with predicted levels of exposure.

Summaries of the predicted risks due to emissions from the PBGS are provided in this Executive Summary. The predicted cancer risks and non-cancer chronic hazard indices are almost exclusively

[1] The HARP Air Dispersion Modeling and Risk Tool (ADMRT) was updated to Version 19121 on May 1, 2019. According to the release notes with Version 19121, there were no changes to the risk calculations in the May 1, 2019 update.

attributed to emissions of diesel particulate matter (PM). The maximum acute hazard index (HI) is primarily due to benzene emissions from the portable gasoline-fired welder.

Facility Information

SCE operates the PBGS facility (SCAQMD ID: 4477) at 1 Pebbly Beach Road, Avalon, California. The facility is bounded by Pebbly Beach Road to the west, neighboring businesses to the north, the Pacific Ocean to the east, and rocky terrain to the south. Figure E-1 shows the location of the PBGS while Figure E-2 shows a detailed map of the facility, including the facility boundary and emissions sources.

Facility Operations and Emitted Substances

The PBGS is the primary producer of electric power for Santa Catalina Island. Electricity is generated using six diesel-fired internal combustion engines. A diesel-fired emergency generator, 23 liquefied petroleum gas-fired micro turbines, and two diesel fuel storage tanks also are present. A portable gasoline-fired welder and abrasive blasting equipment are operated at the facility. The primary TAC emitted by the PBGS is diesel PM from the six main generating units.

The HRA was prepared using TAC emissions as reported in the approved ATIR (Yorke 2019, SLR 2019a). Table E-1 presents the facility-wide maximum 1-hour [pounds/hour (lb/hr)] and annual [pounds/year (lb/yr)] emission rates. There was one non-cancer chronic multi-pathway TAC (nickel) emitted by the portable gasoline-fired welder. Source-by-source modeled emission rates are presented in Appendix A.

For diesel-fired Unit 15, the annual diesel PM emissions (751 lb/yr) used in the HRA are lower than what was submitted in the approved ATIR (1,138 lb/yr). This revision is due to two factors, which SCE discovered after the ATIR was submitted. First, the hourly emission rate from the 2015 source test (0.28 lb/hr) mistakenly included both the front-half and back-half PM catch. Per SCAQMD Rule 1470(g)(1)(A)(i)(I), diesel PM shall be measured only by the probe catch and filter catch, and shall not include PM captured in the impinge catch or solvent catch (i.e. front-half only). This methodology was also previously discussed with Mr. Edward Lee during the SCAQMD comment period on the ATIR.

Making the adjustment for front-half only [8.2 milligrams(mg)/11.8 mg = 0.695], the new PM emission rate for Unit 15 is 0.195 lb/hr. Secondly, the fuel rate used to calculate emissions in the ATIR (2.98 gallons/minute) was an average for the 2015 calendar year. However, since the PM emission rate above is specific to conditions during the source test, the fuel rate measured during the test (3.14 gallons/minute) is a more accurate value to use. Making this adjustment results in a corrected emission factor of 1.035 lb PM/1,000 gallons (Mgal), and with Unit 15 combusting 725.59 Mgal/yr in 2015, this yields an annual emission rate of 751 lb diesel PM/year. These corrections to Unit 15's diesel PM emissions were incorporated into the HARP Emissions Inventory Module (SLR 2019a).

Figure E-1 Facility Location

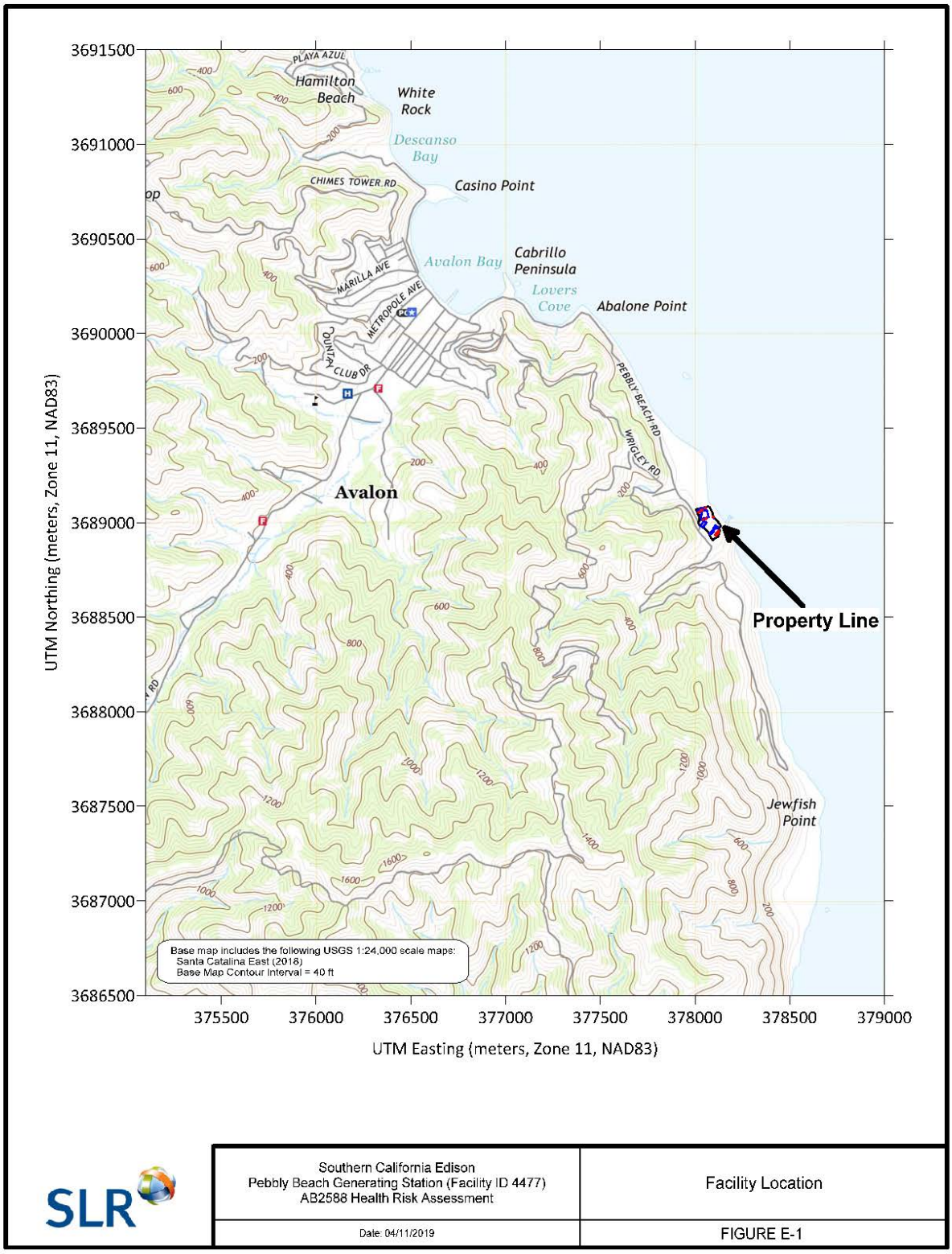


Figure E-2 Facility Detail Map

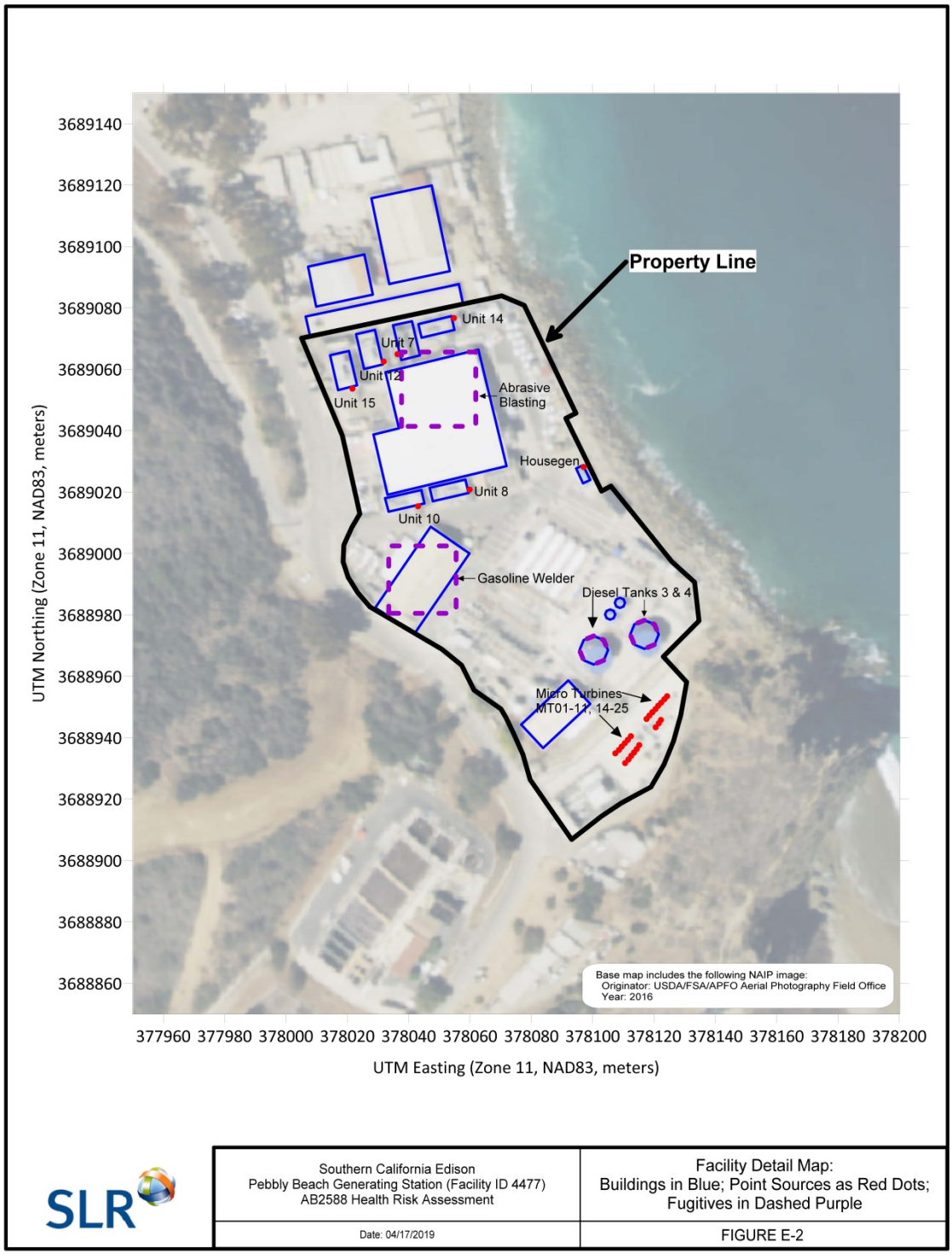


Table E-1 Facility-Wide TAC Emission Rates

TAC Name	TAC ID Used in HARP	Maximum Hourly Emission Rate (lb/hr)	Annual Average Emission Rate (lb/yr)
Crystalline Silica, Respirable	1175	4.21E-08	3.69E-04
Diesel PM [1]	9901	1.47E+00	2.91E+03
Formaldehyde	50000	6.38E-03	1.61E-01
Methanol	67561	1.39E-03	1.54E-02
Benzene	71432	6.85E-03	7.54E-02
Acetaldehyde	75070	1.49E-03	1.64E-02
Methyl Ethyl Ketone	78933	1.20E-04	1.32E-03
Naphthalene	91203	2.59E-04	2.85E-03
o-Xylene	95476	3.09E-03	3.40E-02
1,2,4-Trimethylbenzene	95636	2.62E-03	9.95E-01
Ethyl Benzene	100414	2.99E-03	4.26E-02
Styrene	100425	2.59E-04	2.85E-03
1,3-Butadiene	106990	1.65E-03	1.82E-02
Acrolein	107028	3.59E-04	3.95E-03
m-Xylene	108383	8.87E-03	9.76E-02
Toluene	108883	1.36E-02	2.02E-01
n-Hexane	110543	2.61E-03	2.87E-02
Xylenes (mixed)	1330207	3.20E-05	2.81E-01
Aluminum Oxide (fibrous)	1344281	1.05E-05	9.19E-02
Methyl Tertiary-Butyl Ether	1634044	3.71E-03	4.08E-02
Manganese	7439965	5.85E-06	6.44E-05
Nickel	7440020	5.85E-06	6.44E-05
Copper	7440508	5.85E-06	6.44E-05
Ammonia	7664417	6.38E-01	1.30E+03
Chlorine	7782505	8.19E-04	9.02E-03

[1] See discussion above regarding a correction to Unit 15's diesel PM emission rate.

Dispersion Modeling and Exposure Assessment

The United States Environmental Protection Agency (EPA)-approved AERMOD modeling system was used to determine how and where the plumes disperse in the atmosphere, and what the estimated ground-level concentrations are within the surrounding area. EPA and SCAQMD regulatory default options were used in the AERMOD modeling. AERMOD's non-default urban option was not used because the land use within a 3-kilometer (km) radius of the facility (including the over-water areas northeast and east of the PBGS) is generally undeveloped. This determination was made based on a qualitative analysis of aerial imagery following EPA procedures [40 C.F.R. 51, Appendix W, § 7.2.1.1(b)(i)]. Other dispersion modeling methods followed EPA procedures and guidance as well as the SCAQMD's AERMOD modeling guidelines (SCAQMD 2019b). The main components of the dispersion modeling are:

- Meteorological data to estimate the dispersive nature of the atmosphere. SLR International Corporation (SLR) worked with SCAQMD to prepare the meteorological dataset that is needed to determine the extent of public exposure to emissions from the facility (SLR 2019b).
- Ground-level receptors within the surrounding community where individuals could be exposed to facility emissions. Receptors must be identified in areas that are currently developed, as well as areas that are zoned for future development based on currently approved zoning designations. SLR utilized receptor sets that were generated for the most recent approved AB2588 HRA (AECOM 2011), which were reviewed against recent aerial photographs and currently approved Los Angeles County zoning maps. The receptor sets used in the HRA included portions of the greater Avalon area, Pebbly Village [Santa Catalina Island Company (SCICo) employee housing area near the PBGS facility], nearby businesses along Pebbly Beach Road, and industrial facilities south of the PBGS facility and within the Avalon business district. For acute exposures (one-hour), receptors were placed along the PBGS property line as well as in areas where the public could be exposed over short-term periods. Receptors also were placed along the mainland shoreline to estimate risks on the mainland, consistent with the most recent approved AB2588 HRA.
- Source release characteristics (i.e., stack parameters and fugitive source parameters) were input to the AERMOD model. Turbulence generated by facility structures were used in AERMOD to account for building downwash of point sources.

Dose-Response Assessment

Carcinogenic risks, and chronic non-cancer and acute health risks, were assessed using the TAC emission rates and dispersion modeling results and numerical values of toxicity provided by OEHHA. Table E-2 defines the health effect of each TAC emitted by the PBGS sources. Table E-3, Table E-4, and Table E-5 provide the target organ systems by TAC for non-cancer chronic, non-cancer 8-hour chronic, and acute health effects, respectively.

Table E-2 Health Effects of Each Modeled TAC

TAC	Carcinogen	Non-Cancer Chronic	Non-Cancer 8-Hour Chronic	Acute
Diesel PM	X	X		
Ammonia		X		X
Crystalline Silica, Respirable		X		
Aluminum Oxide (fibrous) [1]				
Benzene	X	X	X	X
1,2,4-Trimethylbenzene [1]				
Ethyl Benzene	X	X		
Toluene		X		X
n-Hexane		X		

Table E-2 Health Effects of Each Modeled TAC

TAC	Carcinogen	Non-Cancer Chronic	Non-Cancer 8-Hour Chronic	Acute
Xylenes (mixed)		X		X
Formaldehyde	X	X	X	X
Methanol		X		X
Acetaldehyde	X	X	X	X
Methyl Ethyl Ketone				X
Naphthalene	X	X		
o-Xylene		X		X
Styrene		X		X
1,3-Butadiene	X	X	X	X
Acrolein		X	X	X
m-Xylene		X		X
Methyl Tertiary-Butyl Ether	X	X		
Manganese		X	X	
Nickel	X	X	X	X
Copper				X
Chlorine		X		X

[1] There are no health values in the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, Table 1. Reference: CARB, September 19, 2019 (https://www.arb.ca.gov/toxics/healthval/healthval.htm).

Table E-3 Non-Cancer Chronic Target Organs by TAC

TAC	CNS	KIDNEY	GILV	REPRO/ DEVEL	RESP	EYE	ENDO	BLOOD
Diesel PM					X			
Ammonia					X			
Crystalline Silica, Respirable					X			
Benzene								X
Ethyl Benzene		X	X	X			X	
Toluene	X			X	X			
n-Hexane	X							
Xylenes (mixed)	X				X	X		

Table E-3 Non-Cancer Chronic Target Organs by TAC

TAC	CNS	KIDNEY	GILV	REPRO/ DEVEL	RESP	EYE	ENDO	BLOOD
Formaldehyde					X			
Methanol				X				
Acetaldehyde					X			
Naphthalene					X			
o-Xylene	X				X	X		
Styrene	X							
1,3-Butadiene				X				
Acrolein					X			
m-Xylene	X				X	X		
Methyl Tertiary-Butyl Ether		X	X			X		
Manganese	X							
Nickel				X	X			
Chlorine					X			

Reference: CARB, September 19, 2019 (https://www.arb.ca.gov/toxics/healthval/healthval.htm) and as provided by HARP output files.

Table E-4 Non-Cancer 8-Hour Chronic Target Organs by TAC

TAC	CNS	IMMUN	REPRO/ DEVEL	RESP	BLOOD
Benzene					X
Formaldehyde				X	
Acetaldehyde				X	
1,3-Butadiene			X		
Acrolein				X	
Manganese	X				
Nickel		X		X	

Reference: CARB, September 19, 2019 (https://www.arb.ca.gov/toxics/healthval/healthval.htm) and as provided by HARP output files.

Table E-5 Acute Target Organs by TAC

TAC	CNS	IMMUN	REPRO/ DEVEL	RESP	EYE	BLOOD
Ammonia				X	X	
Benzene		X	X			X
Toluene	X		X	X	X	
Xylenes (mixed)	X			X	X	
Formaldehyde					X	
Methanol	X					
Acetaldehyde				X	X	
Methyl Ethyl Ketone				X	X	
o-Xylene	X			X	X	
Styrene			X	X	X	
1,3-Butadiene			X			
Acrolein				X	X	
m-Xylene	X			X	X	
Nickel		X				
Copper				X		
Chlorine				X	X	

Reference: CARB, September 19, 2019 (https://www.arb.ca.gov/toxics/healthval/healthval.htm) and as provided by HARP output files.

Summary of Results

Cancer risk estimates are expressed in units of increased cancer occurrences per million individuals due to PBGS emissions. Non-cancer health hazard impacts are expressed as a health hazard index (HI) value for a specific target organ (toxicological endpoint). A brief discussion of the HRA results is provided below.

Predicted Cancer Risks

The maximum exposed individual resident (MEIR) cancer risk is predicted to occur at the SCICo employee housing area approximately 125 meters (m) northwest of the PBGS northwest property line corner. The cancer risk at the MEIR is 11.8 per million and reflects a 30-year lifetime exposure in accordance with the RMP (CAPCOA 2015). The maximum exposed individual worker (MEIW) cancer risk is predicted to occur at an industrial facility directly north of the PBGS. The cancer risk at the MEIW is 5.7 per million and reflects a 25-year lifetime exposure. The maximum sensitive receptor cancer risk is predicted to occur at the Preschool Learning for Avalon Youth facility in the City of Avalon approximately

2,100 m west-northwest of the PBGS. The maximum sensitive receptor cancer risk is 2.8 per million and reflects a 30-year lifetime exposure. The maximum predicted cancer risk at the mainland is less than 1 per million.

Table E-6 presents a summary of predicted cancer risks. Figure E-3 provides a map showing the locations of the MEIR, MEIW, and maximum sensitive receptor cancer risks along with the increase in lifetime cancer risk due to facility emissions by receptor area modeled in the HRA. Due to non-contiguous receptor grids and different exposure assumptions used in the receptor sets, a single isopleth plot is not presented.

Table E-6 Summary of Predicted Cancer Risks

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Cancer Risk (Per Million)
MEIR	377910	3689157	11.8
MEIW	378042	3689107	5.7
Max. Sensitive Receptor	375964	3689230	2.8

[1] Universe Transverse Mercator (UTM) Zone 11, North American Datum 1983 (NAD83).

The maximum individual cancer risk (MICR), which is the higher value of the MEIR or MEIW, of 11.8 per million does not exceed the SCAQMD Rule 1402 Action Level[2]. Most of the locations in the greater Avalon area where predicted cancer risks meet or exceed the SCAQMD Rule 1402 Notification Risk Level[3] are in steep uninhabited terrain south and east of the greater Avalon area. The only potential actual receptor locations in this area with risks that meet or exceed the Notification Risk Level are near the Inn on Mount Ada (see Figure E-3). A portion of the SCICo employee housing area is also predicted to meet or exceed the Notification Risk Level. Based on information received from the Inn and SCICo during preparation of the previous AB2588 HRA (AECOM 2011), housing for residential use at these locations is restricted to employees only.

There were no multi-pathway carcinogenic TACs emitted by facility sources reported in the ATIR; therefore, the predicted cancer risks were only associated with the inhalation pathway. The predicted cancer risks are almost exclusively attributed to emissions of diesel PM. Table E-7 provides a breakdown by TAC for the predicted cancer risks at the MEIR and MEIW.

[2] The SCAQMD cancer risk Action Level is 25 per million [Rule 1402(c)(2)].
[3] The SCAQMD cancer risk Notification Risk Level is 10 per million [Rule 1402(c)(12)].

Figure E-3 Locations of Maximum Cancer Risks and Increase in Lifetime Cancer Risk by Receptor Area

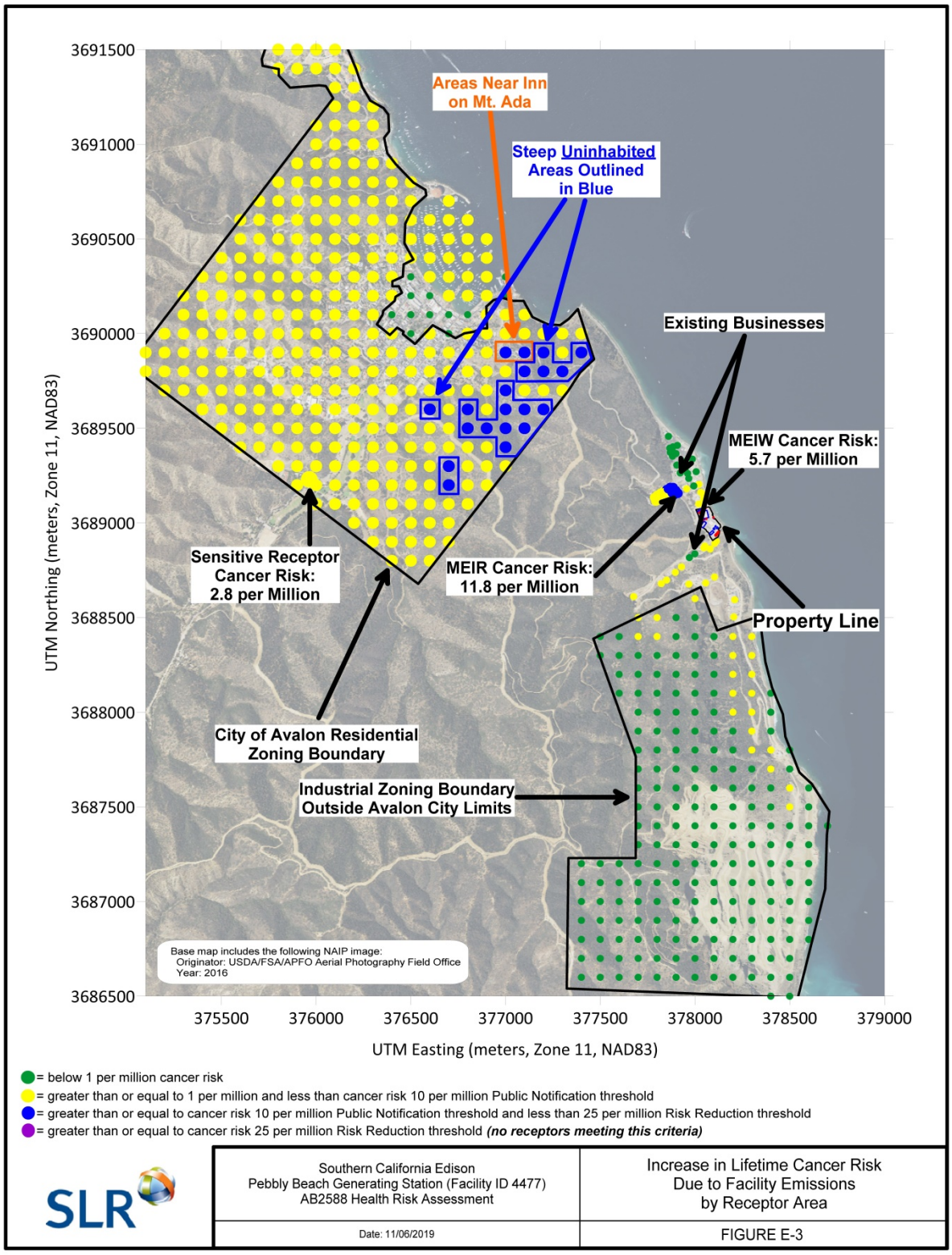


Table E-7 MEIR and MEIW Cancer Risks by TAC

TAC	MEIR (Per Million)	MEIW (Per Million)
Diesel PM	11.8	5.7
Benzene	2.5E-03	4.5E-04
Ethyl Benzene	1.0E-04	1.9E-05
Formaldehyde	5.0E-04	8.8E-05
Acetaldehyde	5.4E-05	9.8E-06
Naphthalene	1.1E-04	2.1E-05
1,3-Butadiene	3.6E-03	6.5E-04
Methyl Tertiary-Butyl Ether	2.4E-05	4.4E-06
Nickel	1.9E-05	3.5E-06
Total Risk	**11.8**	**5.7**

Predicted Non-Cancer Chronic Risks

The MEIR non-cancer chronic HI is predicted to occur at the SCICo employee housing area approximately 125 m northwest of the PBGS northwest property line corner. The non-cancer chronic HI at the MEIR is 0.003. The MEIW non-cancer chronic HI is predicted to occur at an industrial facility directly north of the PBGS. The non-cancer chronic HI at the MEIW is 0.019. The maximum sensitive receptor non-cancer chronic HI is predicted to occur at the Preschool Learning for Avalon Youth facility in the City of Avalon approximately 2,100 m west-northwest of the PBGS. The maximum sensitive receptor non-cancer chronic HI is less than 0.001. All non-cancer chronic risks are below the SCAQMD Rule 1402 Notification and Risk Action Levels of 1.0 and 3.0, respectively.

Table E-8 presents a summary of predicted non-cancer chronic hazard indices. Figure E-4 provides a map showing the locations of the MEIR, MEIW, and maximum sensitive receptor non-cancer chronic hazard indices.

There was one non-cancer chronic multi-pathway TAC (nickel) emitted by the portable gasoline-fired welder. The SCAQMD mandatory pathways described in Table 8 of SCAQMD (2018) and the required settings for the non-inhalation pathways were used. The non-inhalation homegrown produce pathway used the “households that garden” fractions in HARP for residential and sensitive receptor risks. The predicted non-cancer chronic hazard indices are almost exclusively attributed to emissions of diesel PM. Table E-9 provides a breakdown by target organ for the predicted non-cancer chronic hazard indices at the MEIR and MEIW.

Table E-8 Summary of Predicted Non-Cancer Chronic Hazard Indices

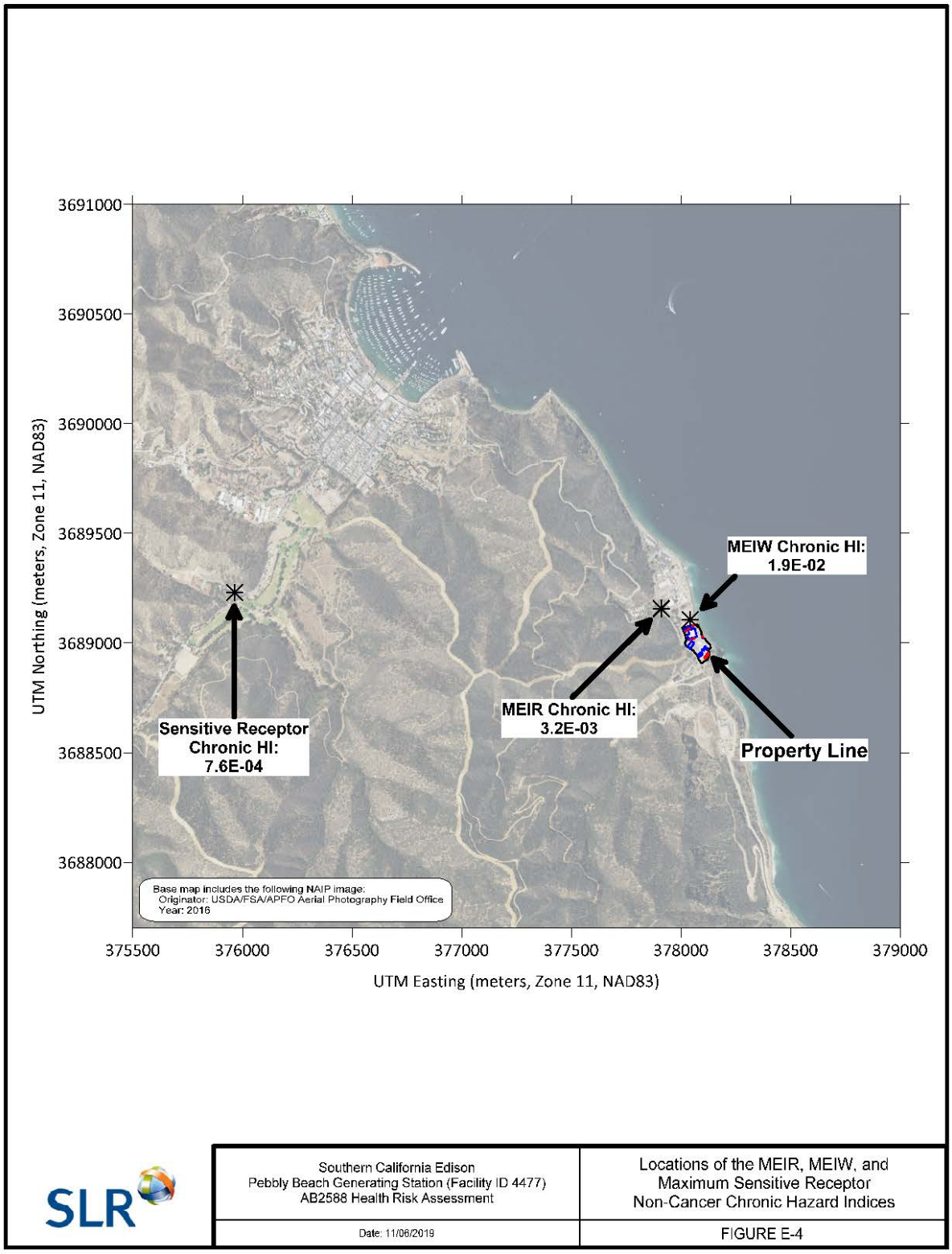
Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Hazard Index (Unitless)
MEIR	377910	3689157	3.2E-03
MEIW	378042	3689107	1.9E-02
Max Sensitive Receptor	375964	3689230	7.6E-04

[1] UTM Zone 11, NAD83.

Table E-9 MEIR and MEIW Non-Cancer Chronic Hazard Indices by Target Organ

Target Organ	MEIR (Unitless)	MEIW (Unitless)
Central Nervous System	7.7E-07	1.6E-06
Kidneys	1.1E-08	2.4E-08
Gastrointestinal Tract & Liver or Alimentary Tract	1.1E-08	2.4E-08
Reproductive System & Developmental	4.8E-06	1.0E-05
Respiratory System	3.2E-03	1.9E-02
Eyes	1.6E-07	3.2E-07
Endocrine System	8.9E-09	1.9E-08
Hematological System	1.5E-05	3.2E-05
Maximum Risk	**3.2E-03**	**1.9E-02**

Figure E-4 Locations of Maximum Non-Cancer Chronic Hazard Indices



Predicted Non-Cancer 8-Hour Chronic Risks

The MEIR non-cancer 8-hour chronic HI is predicted to occur at the SCICo employee housing area approximately 125 m northwest of the PBGS northwest property line corner. The non-cancer 8-hour chronic HI at the MEIR is less than 0.001. The MEIW non-cancer chronic HI is predicted to occur at an industrial facility directly south of the PBGS. The non-cancer 8-hour chronic HI at the MEIW is less than 0.001. The maximum sensitive receptor non-cancer 8-hour chronic HI is predicted to occur at the Preschool Learning for Avalon Youth facility in the City of Avalon approximately 2,100 m west-northwest of the PBGS. The maximum sensitive receptor non-cancer chronic HI is less than 0.001. All non-cancer 8-hour chronic risks are below the SCAQMD Rule 1402 Notification and Risk Action Levels of 1.0 and 3.0, respectively.

Table E-10 presents a summary of predicted non-cancer 8-hour chronic hazard indices. The predicted non-cancer 8-hour chronic hazard indices are exclusively attributed to emissions of benzene. Table E-11 provides a breakdown by target organ for the predicted non-cancer 8-hour chronic hazard indices at the MEIR and MEIW.

Table E-10 Summary of Predicted Non-Cancer 8-Hour Chronic Hazard Indices

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Hazard Index (Unitless)
MEIR	377910	3689157	1.2E-05
MEIW	378113	3688903	3.7E-05
Max Sensitive Receptor	376370	3689724	5.6E-07

[1] UTM Zone 11, NAD83.

Table E-11 MEIR and MEIW Non-Cancer 8-Hour Chronic Hazard Indices by Target Organ

Target Organ	MEIR (Unitless)	MEIW (Unitless)
Central Nervous System	1.8E-07	5.6E-07
Immune System	5.2E-07	1.6E-06
Reproductive System & Developmental	9.9E-07	3.0E-06
Respiratory System	7.2E-06	2.2E-05
Hematological System	1.2E-05	3.7E-05
Maximum Risk	**1.2E-05**	**3.7E-05**

Predicted Acute Risks

The point of maximum impact (PMI) acute HI is predicted to occur on the western property line of the PBGS. The acute HI at the PMI is 0.44. The MEIR acute HI is predicted to occur at the SCICo employee housing area approximately 150 m northwest of the PBGS northwest property line corner. The acute HI at the MEIR is 0.12. The MEIW acute HI is predicted to occur at an industrial facility directly south of the PBGS. The acute HI at the MEIW is 0.16. The maximum sensitive receptor acute HI is predicted to occur at the Catalina Kid Ventures Child Care facility in the City of Avalon approximately 1,850 m northwest of the PBGS. The maximum sensitive receptor acute HI is 0.02. All acute risks are below the SCAQMD Rule 1402 Notification and Risk Action Levels of 1.0 and 3.0, respectively.

Table E-12 presents a summary of predicted acute hazard indices. Figure E-5 provides a map showing the locations of the PMI, MEIR, MEIW, and maximum sensitive receptor acute hazard indices.

Table E-12 Summary of Predicted Acute Hazard Indices

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Hazard Index (Unitless)
PMI	378045	3688972	4.4E-01
MEIR	377880	3689160	1.2E-01
MEIW	378113	3688903	1.6E-01
Max. Sensitive Receptor	376370	3689724	2.0E-02

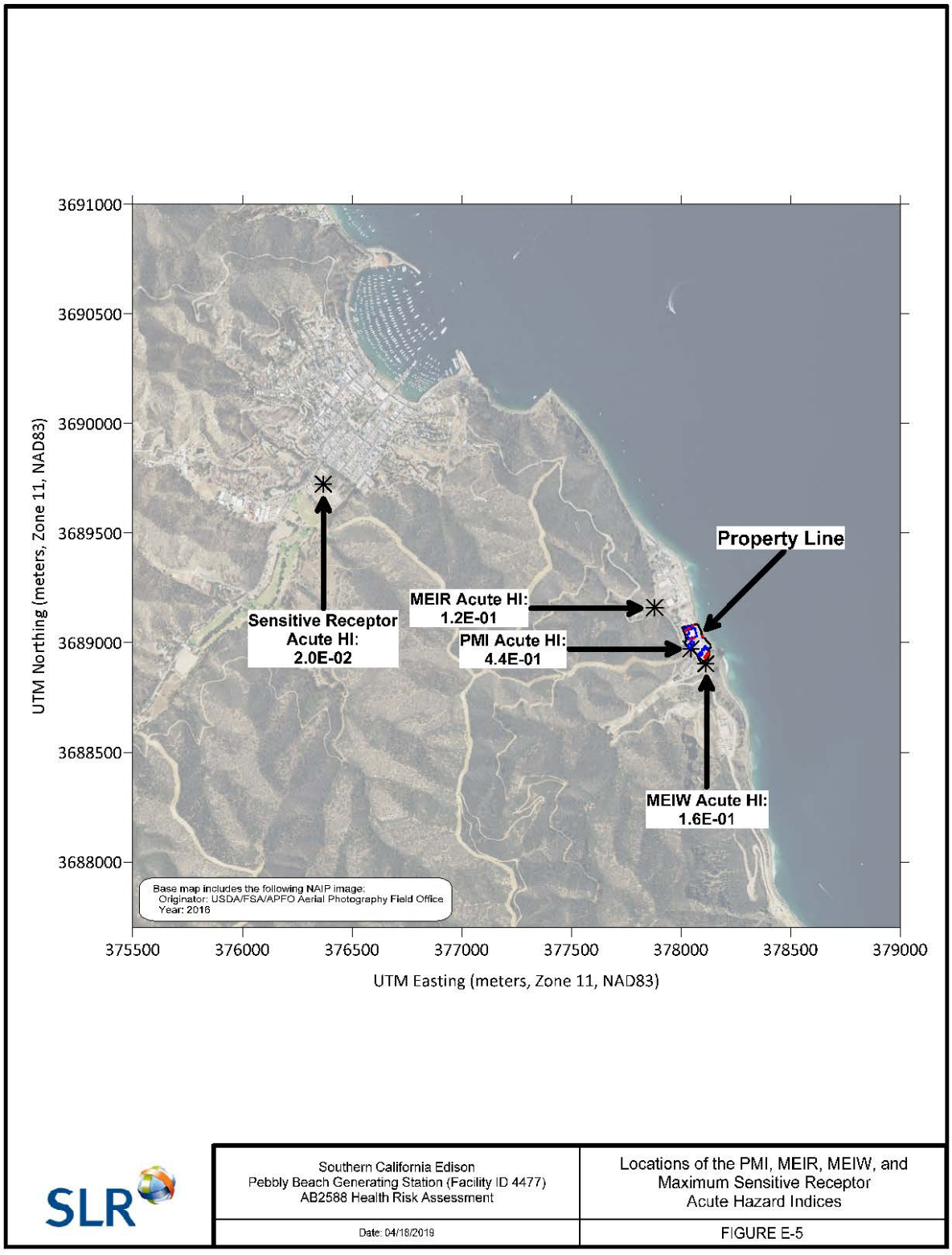
[1] UTM Zone 11, NAD83.

Table E-13 provides a breakdown by target organ for the predicted acute hazard indices at the PMI, MEIR, and MEIW. All acute HIs are 90 percent due to benzene and 10 percent due to nickel.

Table E-13 PMI, MEIR, and MEIW Acute Hazard Indices by Target Organ

Target Organ	PMI (Unitless)	MEIR (Unitless)	MEIW (Unitless)
Central Nervous System	1.5E-03	4.2E-04	5.6E-04
Immune System	4.4E-01	1.2E-01	1.6E-01
Reproductive System & Developmental	3.9E-01	1.1E-01	1.5E-01
Respiratory System	2.4E-01	6.9E-02	9.1E-02
Eyes	4.1E-01	1.2E-01	1.6E-01
Hematological System	3.9E-01	1.1E-01	1.5E-01
Maximum Risk	**4.4E-01**	**1.2E-01**	**1.6E-01**

Figure E-5 Locations of Maximum Acute Hazard Indices



Zone of Impact

Consistent with the previous AB2588 HRA (AECOM 2011), the cancer risk zone of impact (ZOI) isopleth of 1 per million is not provided. The ZOI for non-cancer chronic and acute hazard indices is the area subject to a HI of 0.5 or greater. None of the hazard indices exceed the ZOI isopleth threshold of 0.5, and therefore, quantification of the extent of the non-cancer hazard index ZOI isopleths is not required.

Population Cancer Burden

Population cancer burden is the population-weighted number of excess cancer cases based on the population of residential and off-site worker individuals within the ZOI. Since the cancer risk ZOI is assumed to encompass the most densely populated portions of Catalina Island, which are concentrated in the City of Avalon, the population of the City of Avalon was used to calculate the cancer burden. According to OEHHA (2015), the cancer burden is calculated by multiplying the cancer risk at a census block centroid by the number of people who live in the census block and adding up the estimated number of potential cancer cases across the ZOI. The result of this calculation is an estimate of the number of potential cancer cases within the population that was exposed to the emissions over a 70 year lifetime exposure duration.

A conservative estimate of cancer burden was made by multiplying the entire population of the City of Avalon by the predicted cancer risk at the MEIR assuming a 70-year lifetime exposure duration. The 70-year cancer risk at the location of the MEIR is a MICR of 13.3 per million. According to 2010 census data, the City of Avalon's population is 3,728. The resulting cancer burden is 0.05 and is below the SCAQMD Rule 1402 Action Level of 0.5.

1. INTRODUCTION

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB2588) requires facilities that may cause a significant increase in public health risks due to the emissions of toxic air contaminants (TAC) from their operations, to assess those impacts in a health risk assessment (HRA). Southern California Edison's (SCE) Pebbly Beach Generating Station (PBGS) is required to prepare a HRA [South Coast Air Quality Management District (SCAQMD) 2019a].

SCE retained SLR International Corporation (SLR) to prepare the HRA required by SCAQMD (2019a). This HRA was prepared using emissions data provided in the revised Air Toxics Inventory Report (ATIR) submitted to the SCAQMD on January 3, 2019 (Yorke 2019). The SCAQMD approved the ATIR on January 23, 2019 (SCAQMD 2019a). The ATIR was updated to respond to SCAQMD comments received on August 21, 2019 to align the ATIR with this HRA (SLR 2019a).

Chapter 2 contains the hazard identification for TACs emitted from the facility. Chapter 3 presents the methods used to quantify the exposure to the community from emitted TACs. Chapter 4 provides the risk characterization and HRA results. Chapter 5 provides a list of references. Other supporting information is provided in appendices.

2. HAZARD IDENTIFICATION

The ATIR indicates that 25 TACs are emitted from the facility, of which nine TACs contribute to cancer risk, 21 contribute to non-cancer chronic health effects, seven contribute to non-cancer 8-hour chronic health effects, and 16 contribute to acute health effects. A complete list of all TACs emitted from the PBGS, along with the chemical abstract service (CAS) numbers and health effects, are provided in Table 2-1. The potential human health risks associated with these TACs were evaluated in the HRA.

There was one non-cancer chronic multi-pathway TAC (nickel) reported in the ATIR; therefore, the non-inhalation along with the inhalation pathways were evaluated. Cancer risk is assessed using inhalation potency factors to estimate the theoretical risk, expressed in units of increased occurrences per million individuals. Non-cancer chronic risks are assessed using inhalation reference exposure levels (RELs) to estimate long-term non-cancer chronic and non-cancer 8-hour chronic health hazard impacts, expressed as the chronic hazard index (HI) for each specified target organ. Acute impacts are assessed using inhalation RELs to estimate short-term health hazard impacts, expressed as the acute HI, for each specified target organ.

A presentation of the emissions inventory is provided in Section 3.2.

Table 2-1 Health Effects of Each Modeled TAC

TAC	CAS Number/ TAC ID	Carcinogen	Non-Cancer Chronic	Non-Cancer 8-Hour Chronic	Acute
Diesel PM	9901	X	X		
Ammonia	7664-41-7		X		X
Crystalline Silica, Respirable	1175		X		
Aluminum Oxide (fibrous) [1]	1344-28-1				
Benzene	71-43-2	X	X	X	X
1,2,4-Trimethylbenzene [1]	95-63-6				
Ethyl Benzene	100-41-4	X	X		
Toluene	108-88-3		X		X
n-Hexane	110-54-3		X		
Xylenes (mixed)	1330-20-7		X		X
Formaldehyde	50-00-0	X	X	X	X
Methanol	67-56-1		X		X
Acetaldehyde	75-07-0	X	X	X	X
Methyl Ethyl Ketone	78-93-3				X
Naphthalene	91-20-3	X	X		
o-Xylene	95-47-6		X		X

Table 2-1 Health Effects of Each Modeled TAC

TAC	CAS Number/ TAC ID	Carcinogen	Non-Cancer Chronic	Non-Cancer 8-Hour Chronic	Acute
Styrene	100-42-5		X		X
1,3-Butadiene	106-99-0	X	X	X	X
Acrolein	107-02-8		X	X	X
m-Xylene	108-38-3		X		X
Methyl Tertiary-Butyl Ether	1634-04-4	X	X		
Manganese	7439-96-5		X	X	
Nickel	7440-02-0	X	X	X	X
Copper	7440-50-8				X
Chlorine	7782-50-5		X		X

[1] There are no health values in the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, Table 1.
Reference: CARB, September 19, 2019 (https://www.arb.ca.gov/toxics/healthval/healthval.htm).

3. EXPOSURE ASSESSMENT

The exposure assessment estimates the potential exposure by using an air quality dispersion model to determine how and where the emissions disperse in the atmosphere, and what the estimated maximum ground level concentrations are within the surrounding community. Details regarding the exposure assessment methodology are presented in this chapter.

3.1 FACILITY DESCRIPTION

SCE operates the PBGS facility (SCAQMD ID: 4477) at 1 Pebbly Beach Road, Avalon, California. The facility is bounded by Pebbly Beach Road to the west, neighboring businesses directly to the north and south, the Pacific Ocean to the east, and primarily rocky terrain immediately to the south. The terrain immediately west of Pebbly Beach Road, as well as extending to the northwest and south of the PBGS, is complex in nature with vegetated and rocky terrain features. Figure 3-1 shows a facility plot plan including the facility boundary, emissions source locations, and structure heights. There was one non-cancer chronic multi-pathway TAC (nickel) reported in the ATIR; therefore, the non-inhalation along with the inhalation pathways were evaluated.

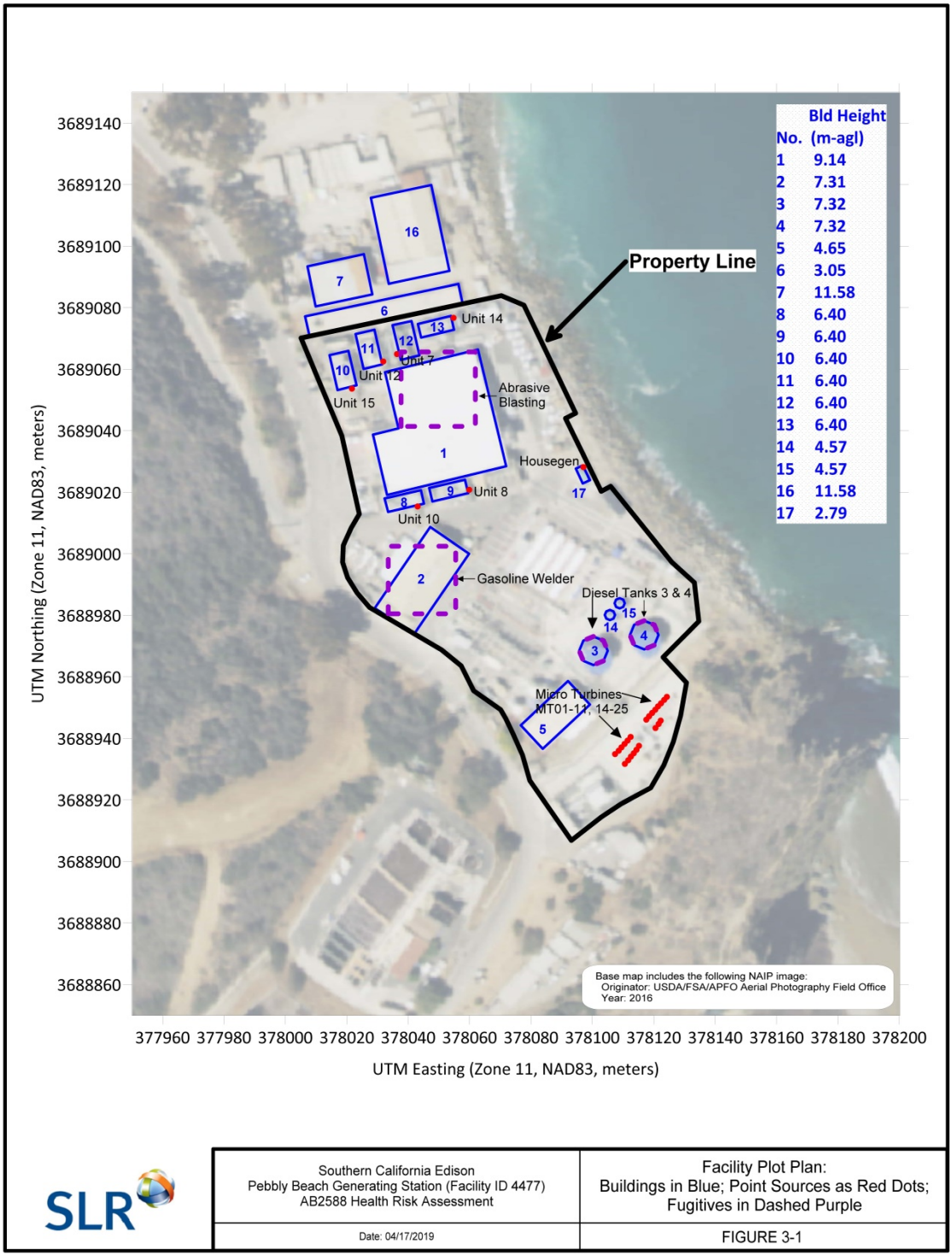
3.2 EMISSIONS INVENTORY

The PBGS is the primary producer of electric power for Santa Catalina Island. Electricity is generated using six diesel-fired internal combustion engines. A diesel-fired emergency generator, 23 liquefied petroleum gas-fired micro turbines, and two diesel fuel storage tanks also are present. A portable gasoline-fired welder and abrasive blasting equipment are operated at the facility. Table 3-1 provides a listing of the sources modeled in the HRA. The device numbers and source descriptions were provided in the Hot Spots Analysis and Reporting Program (HARP) Emissions Inventory Module (EIM) submitted with the ATIR. SLR assigned the stack names/model IDs used in the dispersion modeling described in Chapter 3.3 and risk characterization described in Chapter 4.

The information provided in this Section was obtained from the HARP EIM submitted with the ATIR with the exception of the release parameters for the fugitive abrasive blasting, portable gasoline-fired welder, and diesel storage tank sources (see Section 3.3.3). Each source's Universal Transverse Mercator (UTM) coordinates, base elevation, source release height, release parameters, operating schedules, and TAC emission rates are provided in Appendix A.

The six main generating units have selective catalytic reduction (SCR) and oxidation catalyst control devices installed that are used to control nitrogen oxides and carbon monoxide emissions, respectively. As stated in the ATIR (Yorke 2019), diesel PM emissions from the six main generating units were obtained from source tests. Ammonia slip from the SCRs was reported in the ATIR and was included in the HRA. No post-combustion particulate controls are installed on the six main generating units.

Figure 3-1 Facility Plot Plan



Southern California Edison Pebbly Beach Generating Station (Facility ID 4477) AB2588 Health Risk Assessment	Facility Plot Plan: Buildings in Blue; Point Sources as Red Dots; Fugitives in Dashed Purple
Date: 04/17/2019	FIGURE 3-1

Table 3-1 Modeled Source Descriptions

Device No.	Stack Name/ Model ID	Source Description
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15
11	Housegen	Diesel ICE, Emergency, 399 bhp
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines
12	Abrsblst	Abrasive Blasting
35	Gasweldr	Gasoline Welder, 23 bhp
27	DSLTANK3	Diesel Storage Tank No. T3
28	DSLTANK4	Diesel Storage Tank No. T4

Emissions of TACs from the diesel-fired emergency generator engine, abrasive blasting, portable gasoline-fired welder, and diesel storage tanks were estimated using SCAQMD default emission factors, default methodologies, and safety data sheets for fugitive sources, as appropriate and described in Yorke (2019).

For diesel-fired Unit 15, the annual diesel PM emissions (751 lb/yr) used in the HRA are lower than what was submitted in the approved ATIR (1,138 lb/yr). This revision is due to two factors, which SCE discovered after the ATIR was submitted. First, the hourly emission rate from the 2015 source test (0.28 lb/hr) mistakenly included both the front-half and back-half PM catch. Per SCAQMD Rule 1470(g)(1)(A)(i)(I), diesel PM shall be measured only by the probe catch and filter catch, and shall not include PM captured in the impinge catch or solvent catch (i.e., front-half only). This methodology was also previously discussed with Mr. Edward Lee during the SCAQMD comment period on the ATIR.

Making the adjustment for front-half only [8.2 milligrams(mg)/11.8 mg = 0.695], the new PM emission rate for Unit 15 is 0.195 lb/hr. Secondly, the fuel rate used to calculate emissions in the ATIR (2.98 gallons/minute) was an average for the 2015 calendar year. However, since the PM emission rate above is specific to conditions during the source test, the fuel rate measured during the test (3.14 gallons/minute) is a more accurate value to use. Making this adjustment results in a corrected emission factor of 1.035 lb PM/1,000 gallons (Mgal), and with Unit 15 combusting 725.59 Mgal/yr in 2015, this yields an annual emission rate of 751 lb diesel PM/year. These corrections to Unit 15's diesel PM emissions were incorporated into the HARP EIM (SLR 2019a).

Table 3-2 provides the facility total emissions by TAC used in the HRA.

Table 3-2 Facility Total Emissions by TAC

TAC Name	TAC ID Used in HARP	1-Hour Maximum (lb/hr)	1-Hour Maximum (g/s)	Annual Average (lb/yr)	Annual Average (g/s)
Diesel PM [1]	9901	1.47E+00	1.85E-01	2.91E+03	4.18E-02
Ammonia	7664417	6.38E-01	8.04E-02	1.30E+03	1.87E-02
Crystalline Silica, Respirable	1175	4.21E-08	5.31E-09	3.69E-04	5.31E-09
Aluminum Oxide (fibrous)	1344281	1.05E-05	1.32E-06	9.19E-02	1.32E-06
Benzene	71432	6.85E-03	8.64E-04	7.54E-02	1.09E-06
1,2,4-Trimethylbenzene	95636	2.62E-03	3.30E-04	9.95E-01	1.43E-05
Ethyl Benzene	100414	2.99E-03	3.77E-04	4.26E-02	6.12E-07
Toluene	108883	1.36E-02	1.71E-03	2.02E-01	2.91E-06
n-Hexane	110543	2.61E-03	3.29E-04	2.87E-02	4.13E-07
Xylenes (mixed)	1330207	3.20E-05	4.04E-06	2.81E-01	4.04E-06
Formaldehyde	50000	6.38E-03	8.03E-04	1.61E-01	2.32E-06
Methanol	67561	1.39E-03	1.76E-04	1.54E-02	2.21E-07
Acetaldehyde	75070	1.49E-03	1.88E-04	1.64E-02	2.37E-07
Methyl Ethyl Ketone	78933	1.20E-04	1.51E-05	1.32E-03	1.89E-08
Naphthalene	91203	2.59E-04	3.26E-05	2.85E-03	4.10E-08
o-Xylene	95476	3.09E-03	3.89E-04	3.40E-02	4.89E-07
Styrene	100425	2.59E-04	3.26E-05	2.85E-03	4.10E-08
1,3-Butadiene	106990	1.65E-03	2.08E-04	1.82E-02	2.62E-07
Acrolein	107028	3.59E-04	4.52E-05	3.95E-03	5.68E-08
m-Xylene	108383	8.87E-03	1.12E-03	9.76E-02	1.40E-06
Methyl Tertiary-Butyl Ether	1634044	3.71E-03	4.67E-04	4.08E-02	5.87E-07
Manganese	7439965	5.85E-06	7.38E-07	6.44E-05	9.27E-10
Nickel	7440020	5.85E-06	7.38E-07	6.44E-05	9.27E-10
Copper	7440508	5.85E-06	7.38E-07	6.44E-05	9.27E-10
Chlorine	7782505	8.19E-04	1.03E-04	9.02E-03	1.30E-07

[1] See discussion above regarding Unit 15's diesel PM emission rate corrections.

3.3 AIR DISPERSION MODELING

3.3.1 MODEL SELECTION

Selection of the appropriate dispersion model for use in the analysis was based on the available meteorological input data, the physical characteristics of the sources that are to be simulated, the land use designation in the vicinity of the facility, the complexity of the nearby terrain, and applicable California Office of Environmental Health Hazard Assessment (OEHHA), SCAQMD, and EPA guidance to be followed for an AB2588 HRA.

SLR used the EPA-approved AERMOD modeling system to meet the dispersion modeling requirements for the HRA. AERMOD is recommended for use in modeling single and multi-source facilities, and can account for plume downwash, stack tip downwash, and point, area, and volume sources (EPA 2018a and 2017).

Version numbers of the AERMOD model and processors that were used include:

- AERMAP Version 18081;
- AERMET Version 18081[4]; and
- AERMOD Version 18081[5].

The AERMINUTE and AERSURFACE meteorological pre-processors were not used for this application since the AERMET inputs were prepared by the Mesoscale Model Interface Program (MMIF) program (see Section 3.3.5).

3.3.2 MODEL INPUT OPTIONS

The EPA and SCAQMD regulatory default dispersion options specified in SCAQMD (2018) were used in the HRA. AERMOD's non-default urban option was not used because the land use within a 3-kilometer (km) radius of the facility (including the over-water areas northeast and east of the PBGS) is generally undeveloped. This determination was made based on a qualitative analysis of aerial imagery following EPA procedures [40 C.F.R. 51, Appendix W, § 7.2.1.1(b)(i)]. Other dispersion modeling methods followed EPA procedures and guidance as well as the SCAQMD's AERMOD modeling guidelines (SCAQMD 2019b).

3.3.3 MODELED RELEASE PARAMETERS

The modeled stack parameters for point sources were obtained from the HARP EIM. The two diesel fuel storage tanks were modeled as circular area sources with the breathing losses released from the tank rooflines rather than as point sources with low exit velocity at ambient temperature as stated in the ATIR. The diameter of each circular area source was set to the diameter of each tank.

Emissions from the abrasive blasting operation were modeled as a volume source centered on the northern half of the main production building where the abrasive blaster is located rather than the garage building stated in the ATIR. Emissions from the portable gasoline-fired welder were modeled as a volume source centered on the garage building as stated in the ATIR. Modeling the welder and abrasive blasting as volume sources is consistent with SCAQMD guidance received during preparation of the previous AB2588 HRA (AECOM 2011) regarding modeling fugitive sources within a building.

The release parameters for each source are provided in Appendix A. The release parameters were updated in the EIM submitted to the SCAQMD on September 11, 2019 to reflect the data used in this HRA (SLR 2019a). The location of each modeled source is shown in Figure 3-1.

[4] AERMET was updated to Version 19191 on August 21, 2019. SLR confirmed that there were no changes to the resulting AERMOD-ready meteorological data files due to the Version 19191 update.
[5] AERMOD was updated to Version 19191 on August 21, 2019. SLR confirmed that there were no changes to the resulting AERMOD predicted air concentrations due to the Version 19191 update.

3.3.4 PLUME DOWNWASH

The effects of plume downwash were included for the facility point sources. Direction-specific building dimensions were calculated using the current version of the EPA approved Building Profile Input Program (BPIPPRM Version 04274). PBGS on-structure dimensions were digitized from aerial photographs and plot plans provided in the ATIR. Three off-site structures just north of the PBGS were included in the downwash analysis, which included the additional building requested by SCAQMD in their ATIR comments.

Heights for all structures above the base (above ground level) elevation were obtained from the original HARP EIM with the exception of the two diesel fuel storage tanks. The heights of these tank structures were corrected to be 24 feet above the base elevation in the HRA modeling. In addition, the structure associated with the emergency generator engine was included in the downwash analysis. All structure base elevations were obtained from the original HARP EIM with the exception of the emergency generator engine structure which was estimated from Google Earth. The structure information described herein was updated in the EIM submitted to the SCAQMD on September 11, 2019 to reflect the data used in this HRA (SLR 2019a).

In addition to calculating direction specific building dimensions, the BPIPPRM program also calculates the Good Engineering Practice (GEP) stack height. The PBGS stack heights were checked to verify that there are within the GEP stack height limit.

A simplified plot plan of the PBGS facility showing the locations of all structures and emission sources is provided in Figure 3-1.

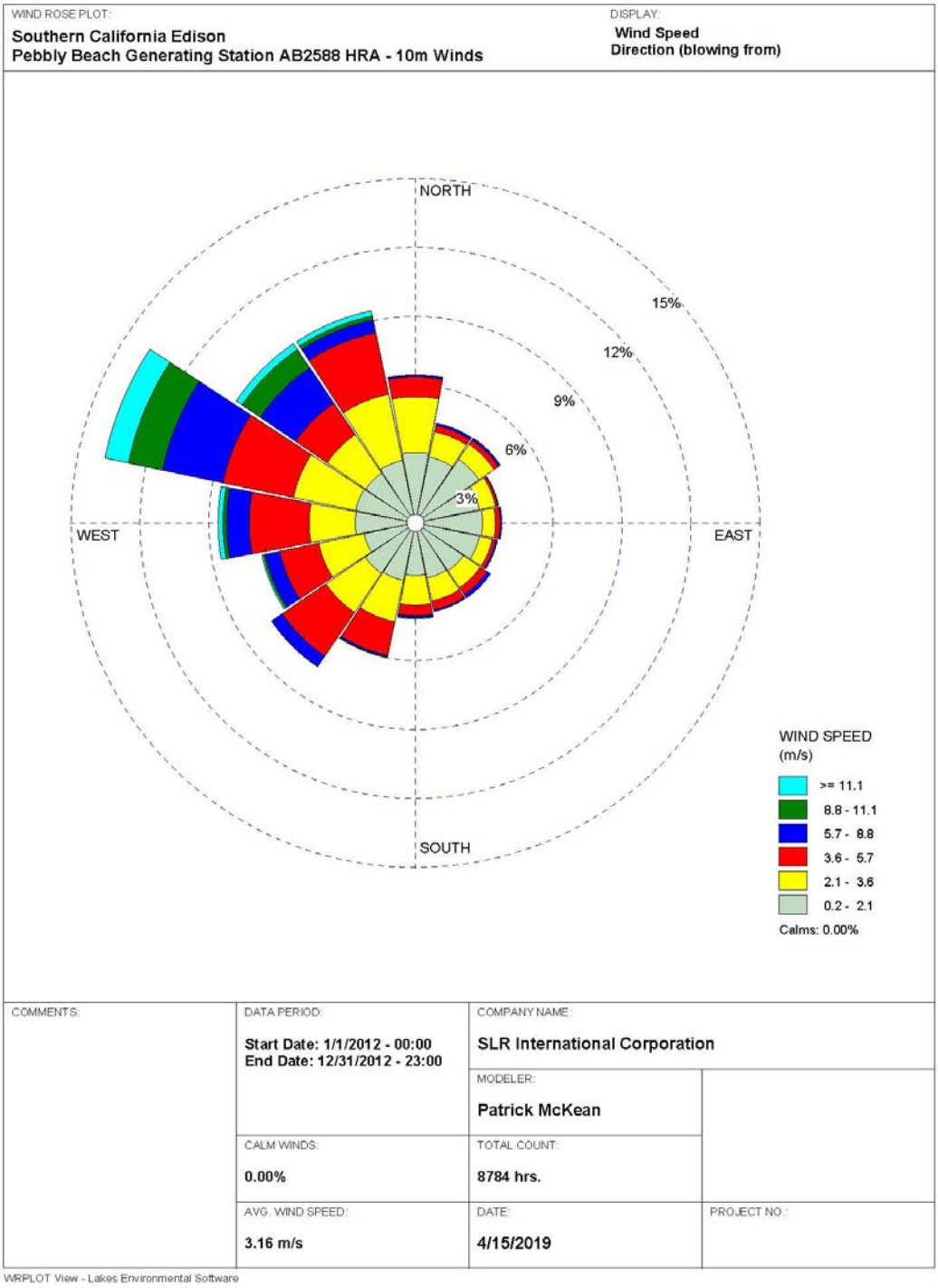
3.3.5 METEOROLOGICAL DATA

Site-specific meteorological observations that are considered suitable for regulatory dispersion modeling are not available for the PBGS area. The nearest National Weather Service observing station is located at the Avalon Airport, which is several kilometers inland in complex terrain with very little coastal influence. The wind and temperature data at the airport are not considered representative of the Pebbly Beach area and were therefore not used.

Since there are no site-specific meteorological observations in the PBGS area, the SCAQMD provided one calendar year (2012) of prognostic data from the Weather Research and Forecasting (WRF) model that is approved for the PBGS project area (SCAQMD 2019c). The WRF output was processed by SCAQMD using the MMIF program, in consultation with SLR, in a manner which allowed SLR to run the AERMET processor to prepare the meteorological data for input to AERMOD (SLR 2019b). Appendix B provides details regarding the MMIF and AERMET processing used for the HRA.

Figure 3-2 provides a 10-meter (m) wind rose for the 2012 meteorological data set.

Figure 3-2 10-Meter Wind Rose



3.3.6 PROPERTY BOUNDARY

The PBGS property boundary was digitized using aerial imagery and plot plans provided in the ATIR. The property boundary was used to define the receptor network described in Section 3.3.6. The property boundary was updated in the EIM submitted to the SCAQMD on September 11, 2019 to reflect the boundary used in this HRA (SLR 2019a).

The PBGS property boundary is shown in Figure 3-1.

3.3.7 MODELED RECEPTORS

Receptor grids have been developed to estimate the risks for potentially exposed portions of the community. Residential, off-site worker, and sensitive receptor areas require different exposure assumptions for cancer risk in the HRA; therefore, several receptor sets were generated in the following areas:

- Existing and potential residential areas within the populated portion of the City of Avalon residential zoning area. Residential receptors were included in Avalon Harbor. Receptors were placed at 100-m spacing within the residential zoning area.
- Existing and potential off-site worker areas along Pebbly Beach Road, the Avalon business district, and industrial facilities south of the PBGS. Existing businesses were placed at their approximate locations based on aerial photographs. Receptors located in the Avalon business district and a quarry area south of the PBGS were placed at 100-m spacing.
- Existing residential locations at Pebbly Village [Santa Catalina Island Company (SCICo) employee housing area]. Receptors were placed at 20-m spacing within this area using aerial photographs.
- Sensitive receptor locations consisted of schools including preschools and daycare centers; health facilities such as hospitals; retirement and nursing homes; long term care hospitals; and hospices. Sensitive receptor locations were identified from internet searches and the street addresses were converted to UTM Zone 11, North American Datum 1983 (NAD83) coordinates for input to AERMAP. Table 3-3 presents the sensitive receptors that were included in the HRA.
- Receptors placed along the mainland of the Southern California coastline at 1-km spacing, consistent with the previous AB2588 HRA (AECOM 2011).
- Receptors along the property line and a Cartesian grid of receptors that includes off-property receptor locations for use in the acute HI calculations for potential short-term exposure locations. Property line receptors were placed at 20-m spacing. The Cartesian grid consisted of nested receptors placed at resolutions following guidance found SCAQMD (2018):
    - 25-m resolution extending to approximately 100 m from the property boundary;
    - 100-m resolution extending to approximately 1 km from the property boundary;
    - 250-m resolution extending to approximately 2.5 km from the property boundary; and
    - 500-m resolution extending to approximately 5 km from the property boundary.

Table 3-3 Sensitive Receptor Locations

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)
Avalon K-12 School	376052	3689595
Preschool Learning for Avalon Youth	375964	3689230
Catalina Island Marine Institute	373890	3693544
Catalina Island Medical Center	376165	3689682
Catalina Kid Ventures Child Care	376370	3689724

[1] Coordinates are in UTM Zone 11, NAD83.

The receptor locations were generated in UTM Zone 11, NAD83 coordinates. Receptor elevations and scale heights were obtained using the AERMAP terrain processor. The digital elevation dataset provided as input to AERMAP was National Elevation Dataset (NED) data at 1/3 arc second resolution, which is equivalent to approximately 10 m in the project area. Receptor elevations obtained from AERMAP were reviewed against 7.5-minute topographic maps.

The SCAQMD supplemental AB2588 risk assessment guidelines (SCAQMD 2018) require that receptors be placed to identify the distance to the Zone of Impact (ZOI). Because this distance for predicted cancer risk is expected to extend beyond the populated areas of Catalina Island and include many receptors over the ocean where long-term exposure to emissions from the PBGS is not likely, the SCAQMD agreed during preparation of the previous AB2588 HRA (AECOM 2011) that chronic risk receptors only need to be placed within the populated portions, or areas of potential future development, of Catalina Island. The Cartesian grid used for the acute HI encompassed the entire 5-km receptor domain including over-water locations.

The SCAQMD requires that actual receptor locations and areas where potential public exposure could occur be included in the HRA. Potential exposure areas must include areas that are zoned for future development. To identify all existing and potential residential and off-site worker receptor locations, SLR reviewed the receptor sets used in the previous AB2588 HRA against currently approved zoning maps for the City of Avalon and land use maps from the County of Los Angeles.

Locations within the modeling domain where the public would not experience long-term (chronic) exposure to PBGS emissions consist of the following:

- Areas zoned as Open Space/Conservation because these areas are protected and cannot be developed for residential or commercial uses;
- Steep and rugged terrain areas zoned as commercial or residential between the PGBS and populated portion of the City of Avalon based on prior agreement with SCAQMD; and

- More distant areas beyond the receptor locations described in this Section because these areas are outside the area of maximum impact.

A map showing the zoning and land use for Catalina Island is provided in Appendix C.

The previously approved AB2588 HRA receptor sets described in this Section are adequate for evaluating potential public exposure to PBGS emissions, with the exception of sensitive receptors. Sensitive receptor locations were updated as described above.

Figure 3-3 and Figure 3-4 show the City of Avalon zoning and County of Los Angeles land use maps, respectively, overlaid with the modeled residential, off-site worker, and sensitive receptor locations. Figure 3-5 shows all modeled receptor locations including the Cartesian grid receptors used for the acute HI analysis.

3.3.8 AVERAGING PERIODS OUTPUT BY AERMOD AND CONCENTRATION CALCULATIONS

AERMOD was run using unit emission rates (i.e., 1 gram per second) for each source. To assess maximum 1-hour and annual concentrations associated with the unit emission rates [relative concentration (χ/Q)], AERMOD was run using the 1-hour and PERIOD averaging periods and 1 year of meteorological data.

The HARP software combines the χ/Q values for each source and averaging period with the maximum 1-hour and annual average emission rates for each TAC. The resulting maximum 1-hour and annual average concentrations for each TAC are used to estimate risks described in Chapter 4 and are contained in the HARP output files provided on electronic media contained in Appendix D.

Figure 3-3 Residential, Worker, and Sensitive Receptors Overlaid on City of Avalon Zoning Map

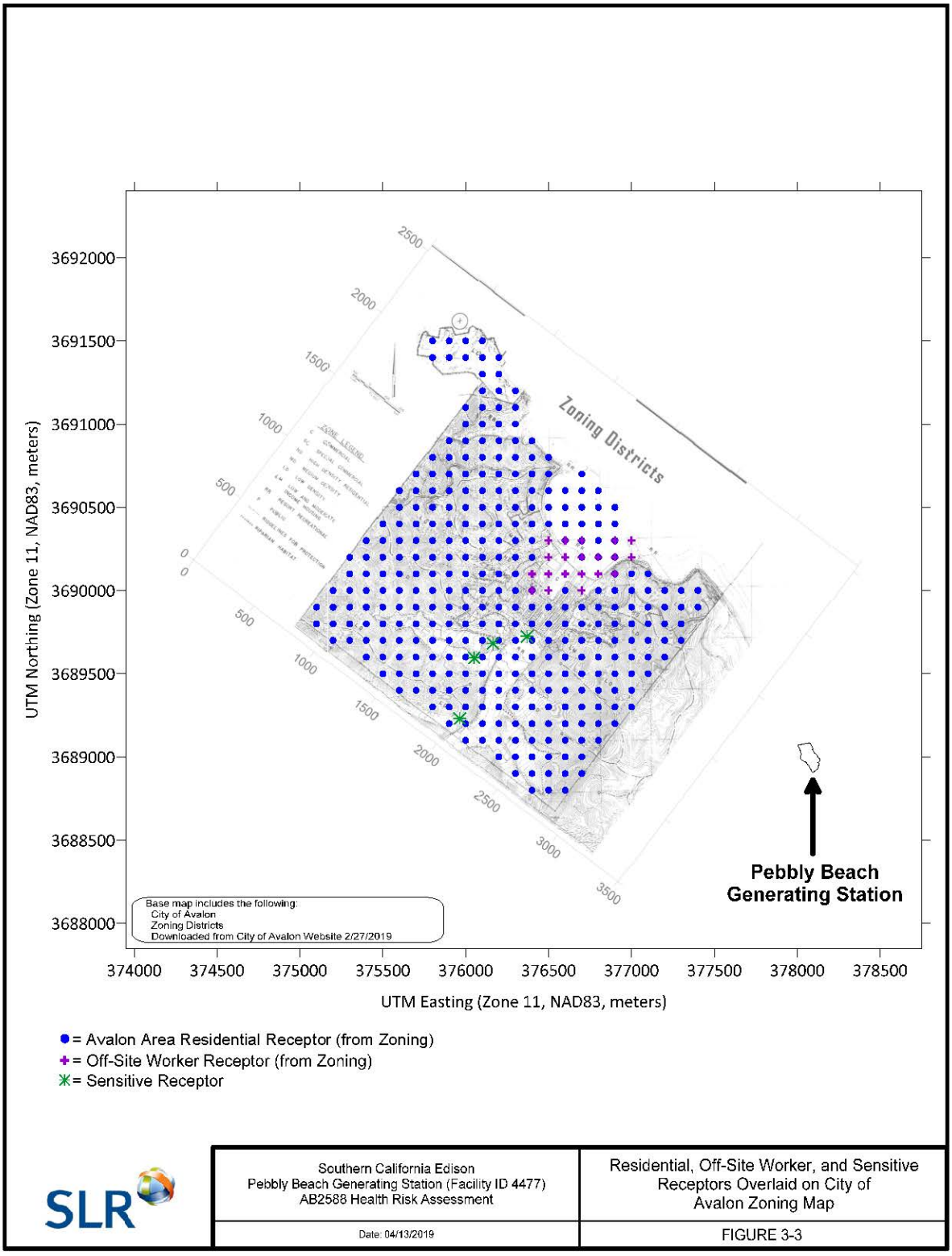


Figure 3-4 Residential, Worker, and Sensitive Receptors Overlaid on Los Angeles County Land Use Map

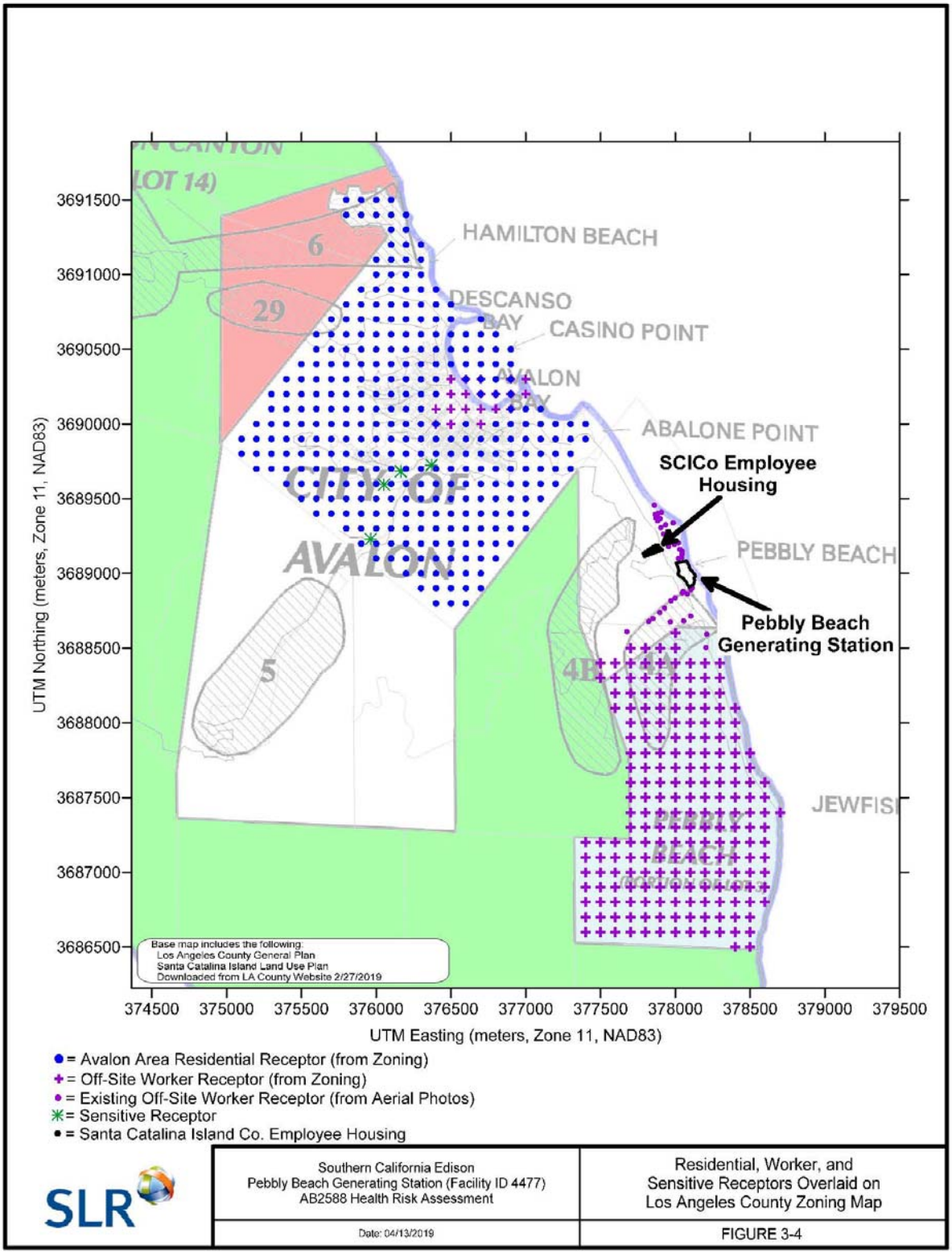
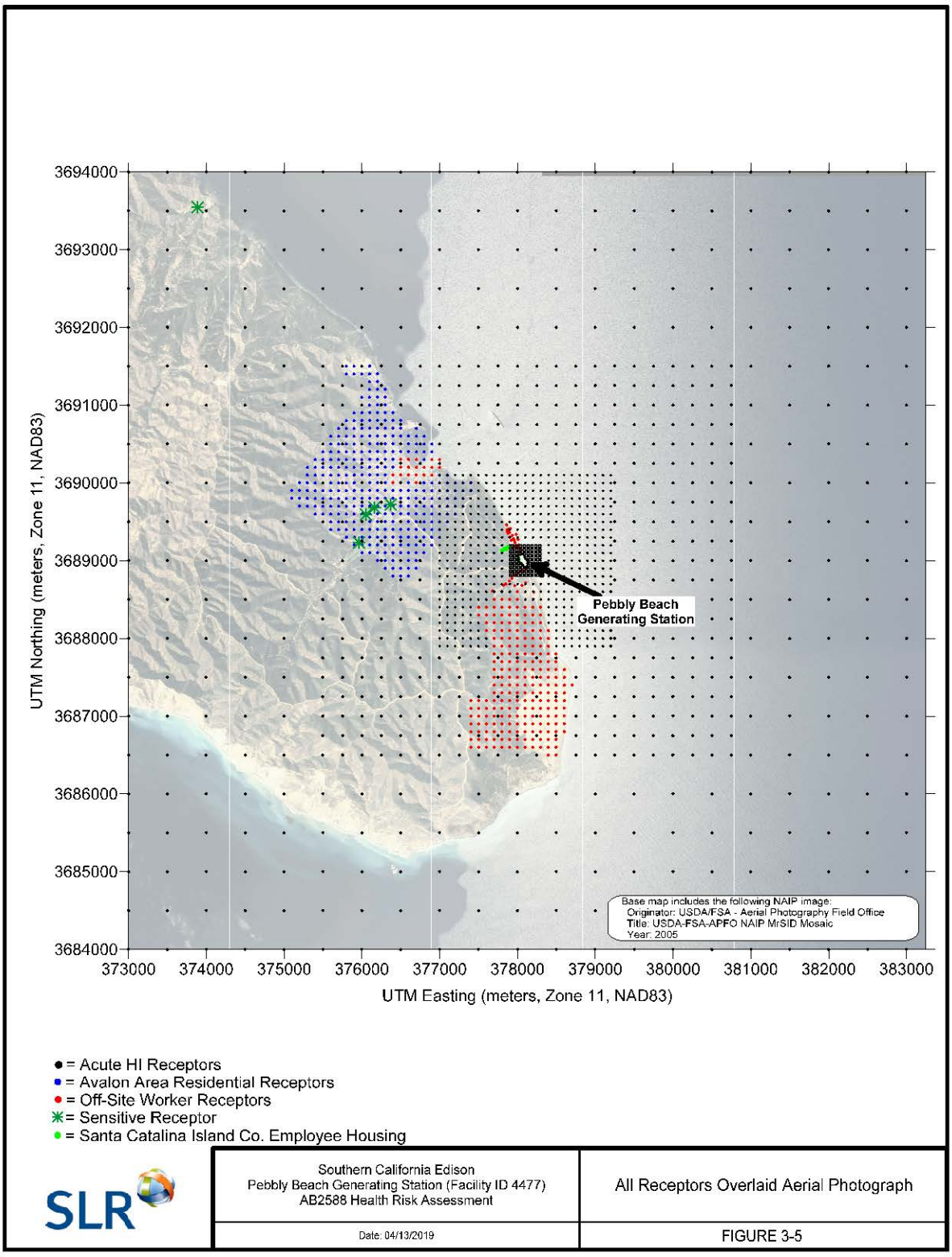


Figure 3-5 All Receptors Overlaid Aerial Photograph



4. RISK CHARACTERIZATION AND RESULTS

The HRA evaluated cancer risks, and non-cancer chronic and acute health hazard indices for residential, off-site worker, and sensitive receptor locations, and identified the locations of maximum potential impacts and excess population cancer burden. Risks were evaluated using the dispersion modeling and TAC emissions described in Chapter 3, and the California Air Resources Board (ARB) HARP Air Dispersion Modeling and Risk Assessment Tool (ADMRT, Version 19044[6]). The ADMRT incorporates the current OEHHA Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments [OEHHA Guidelines (OEHHA 2015)], which describes the algorithms, exposure methods, and cancer and non-cancer health values needed to perform a HRA under the AB2588 program. The OEHHA Guidelines are generally considered the best available reference for conducting human health risk assessments in California. The HRA also followed the ARB and California Air Pollution Control Officers Association (CAPCOA) Risk Management Guidance for Stationary Sources of Air Toxics [RMP, Risk Management Policy (CAPCOA 2015)] and SCAQMD's supplemental guidance for preparing risk assessments (SCAQMD 2018).

Receptor grids were developed to estimate the risks for potentially exposed portions of the community. Residential, off-site worker, and sensitive receptor areas require different exposure assumptions for predicting risks in the HRA; therefore, several receptor sets were generated. To determine the maximum exposed individual resident (MEIR) and maximum exposed individual worker (MEIW) for cancer risk, non-cancer chronic HI, non-cancer 8-hour chronic HI, and acute HI, the maximum impacts were reported for actual and potential zoning locations defined by the applicable receptor sets described in Section 3.3.6. The Cartesian grid described in Section 3.3.6 was used to identify the point of maximum impact (PMI) for the acute HI only. The maximum cancer risk, non-cancer chronic HI, non-cancer 8-hour chronic HI, and acute HI for sensitive receptors shown in Table 3-3 were also reported. The exposure assumptions and risk characterization methods are discussed in Section 4.2 below.

4.1 ADMRT PROCEDURES

AERMOD maximum 1-hour and annual average PLOTFILES for each source were imported into the ADMRT. The maximum lb/hr and annual lb/yr TAC emissions for each source (see Table A-4 in Appendix A) were formatted into a single comma-delimited *.CSV file for input the ADMRT. The ADMRT was then used to combine the dispersion modeling results (χ/Q values for each source via the AERMOD PLOTFILES) and TAC emission rates for each source (via the *.CSV file) to calculate the ground level concentrations in micrograms per cubic meter ($\mu g/m^3$) for each source and each TAC for use in the risk calculations.

[6] The HARP Air Dispersion Modeling and Risk Tool (ADMRT) was updated to Version 19121 on May 1, 2019. According to the release notes with Version 19121, there were no changes to the risk calculations in the May 1, 2019 update.

4.2 EXPOSURE ASSUMPTIONS AND RISK CHARACTERIZATION METHODS

The ADMRT performs the necessary risk calculations following the OEHHA Guidelines (OEHHA 2015) and RMP (CAPCOA 2015). These guidelines recommend that the risk analysis methods described below be employed.

4.2.1 RESIDENTIAL AND SENSITIVE RECEPTOR CANCER RISK

Residential and sensitive receptor cancer risks were calculated in the ADMRT using the "RMP Using Derived Method"[7] risk analysis option for a 30-year exposure duration. The fraction of time at home for age bins less than 16 years was not invoked for the inhalation pathway because there are schools in the area that could experience a cancer risk of 1 per million or greater due to PBGS emissions (see Section 4.3.1).

4.2.2 OFF-SITE WORKER CANCER RISK

Off-site worker cancer risks were calculated in the ADMRT using the "OEHHA Derived Method"[3] risk analysis option over a 25-year exposure duration. The PBGS facility operates 24 hours per day and 7 days per week; therefore, the Worker Adjustment Factor was not used for off-site worker cancer risk calculations. The 8-hour breathing rate was set to Moderate Intensity (Recommended) in the ADMRT.

4.2.3 CANCER BURDEN

Population cancer burden is the population-weighted number of excess cancer cases based on the population of residential and off-site worker individuals within the ZOI. Since the cancer risk ZOI is assumed to encompass the most densely populated portions of Catalina Island, which are concentrated in the City of Avalon, the population of the City of Avalon was used to calculate the cancer burden. According to OEHHA (2015), the cancer burden is calculated by multiplying the cancer risk at a census block centroid by the number of people who live in the census block and adding up the estimated number of potential cancer cases across the ZOI. The result of this calculation is an estimate of the number of potential cancer cases within the population that was exposed to the emissions over a 70 year lifetime exposure duration.

A conservative estimate of cancer burden was made by multiplying the entire population of the City of Avalon by the predicted cancer risk at the MEIR assuming a 70-year lifetime exposure duration. According to 2010 census data, the City of Avalon's population is 3,728 which was used in the cancer burden calculation.

[7] While none of the emitted TACs are multi-pathway carcinogens, SLR used the SCAQMD mandatory pathways described in Table 8 of SCAQMD (2018) and the required settings for the non-inhalation pathways. There were no cancer risks associated with the non-inhalation pathways.

4.2.4 CHRONIC NON-CANCER RISK

Residential, off-site worker, and sensitive receptor chronic non-cancer risks were calculated in the ADMRT using the "OEHHA Derived Method" risk analysis option. As shown in Table 3-2, nickel is emitted from the PBGS facility; nickel is a multi-pathway chronic non-cancer TAC. SLR therefore used the SCAQMD mandatory pathways described in Table 8 of SCAQMD (2018) and the required settings for the non-inhalation pathways. The non-inhalation homegrown produce pathway used the "households that garden" fractions in the ADMRT for residential and sensitive receptor risks.

Benzene, formaldehyde, acetaldehyde, 1,3-butadiene, acrolein, manganese, and nickel are emitted from the PBGS facility; these TACs have 8-hour chronic inhalation reference exposure levels. Non-cancer 8-hour chronic risks were calculated in the ADMRT using the "OEHHA Derived Method" risk analysis option for these TACs.

4.2.5 ACUTE RISK

Point of maximum impact, residential, off-site worker, and sensitive receptor acute risks were calculated in the ADMRT using the default inhalation exposure assumptions.

4.3 HEALTH RISK ASSESSMENT RESULTS

Cancer risk estimates are expressed in units of increased cancer occurrences per million individuals. Non-cancer health hazard impacts are expressed as a health HI value for a specific target organ (toxicological endpoint). Electronic media with dispersion and ADMRT modeling files is included with this report. Appendix D contains a readme file for the electronic media contents. The required SCAQMD AB2588 Air Toxics Document Certification form is provided in Appendix E.

4.3.1 PREDICTED CANCER RISKS

The maximum exposed individual resident (MEIR) cancer risk is predicted to occur at the SCICo employee housing area approximately 125 meters (m) northwest of the PBGS northwest property line corner. The cancer risk at the MEIR is 11.8 per million and reflects a 30-year lifetime exposure in accordance with the RMP (CAPCOA 2015). The maximum exposed individual worker (MEIW) cancer risk is predicted to occur at an industrial facility directly north of the PBGS. The cancer risk at the MEIW is 5.7 per million and reflects a 25-year lifetime exposure. The maximum sensitive receptor cancer risk is predicted to occur at the Preschool Learning for Avalon Youth facility in the City of Avalon approximately 2,100 m west-northwest of the PBGS. The maximum sensitive receptor cancer risk is 2.8 per million and reflects a 30-year lifetime exposure. The maximum predicted cancer risk at the mainland is less than 1 per million.

Table 4-1 presents a summary of predicted cancer risks. Figure 4-1 provides a map showing the locations of the MEIR, MEIW, and maximum sensitive receptor cancer risks along with the increase in lifetime cancer risk due to facility emissions by receptor area modeled in the HRA. Due to non-contiguous receptor grids and different exposure assumptions used in the receptor sets, a single isopleth plot is not presented.

Table 4-1 Summary of Predicted Cancer Risks

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Cancer Risk (Per Million)
MEIR	377910	3689157	11.8
MEIW	378042	3689107	5.7
Max. Sensitive Receptor	375964	3689230	2.8

[1] UTM Zone 11, NAD83.

The maximum individual cancer risk (MICR), which is the higher value of the MEIR or MEIW, of 11.8 per million does not exceed the SCAQMD Rule 1402 Action Level[8]. Most of the locations in the greater Avalon area where predicted cancer risks meet or exceed the SCAQMD Rule 1402 Notification Risk Level[9] are in steep uninhabited terrain south and east of the greater Avalon area. The only potential actual receptor locations in this area with risks that meet or exceed the Notification Risk Level are near the Inn on Mount Ada (see Figure 4-1). A portion of the SCICo employee housing area is also predicted to meet or exceed the Notification Risk Level. Based on information received from the Inn and SCICo during preparation of the previous AB2588 HRA (AECOM 2011), housing for residential use at these locations is restricted to employees only.

There are no multi-pathway carcinogenic TACs emitted by facility sources reported in the revised ATIR; therefore, the predicted cancer risks were only associated with the inhalation pathway. The predicted cancer risks are almost exclusively attributed to emissions of diesel PM. Table 4-2 provides a breakdown by TAC for the predicted cancer risks at the MEIR and MEIW. Table 4-3 and Table 4-4 provide a breakdown by source for the predicted cancer risks at the MEIR and MEIW, respectively.

4.3.2 PREDICTED NON-CANCER CHRONIC RISKS

The MEIR non-cancer chronic HI is predicted to occur at the SCICo employee housing area approximately 125 m northwest of the PBGS northwest property line corner. The non-cancer chronic HI at the MEIR is 0.003. The MEIW non-cancer chronic HI is predicted to occur at an industrial facility directly north of the PBGS. The non-cancer chronic HI at the MEIW is 0.019. The maximum sensitive receptor non-cancer chronic HI is predicted to occur at the Preschool Learning for Avalon Youth facility in the City of Avalon approximately 2,100 m west-northwest of the PBGS. The maximum sensitive receptor non-cancer chronic HI is less than 0.001. All non-cancer chronic risks are below the SCAQMD Rule 1402 Notification and Risk Action Levels of 1.0 and 3.0, respectively.

[8] The SCAQMD cancer risk Action Level is 25 per million [Rule 1402(c)(2)].
[9] The SCAQMD cancer risk Notification Risk Level is 10 per million [Rule 1402(c)(12)].

Figure 4-1 Locations of Maximum Cancer Risks and Increase in Lifetime Cancer Risk by Receptor Area

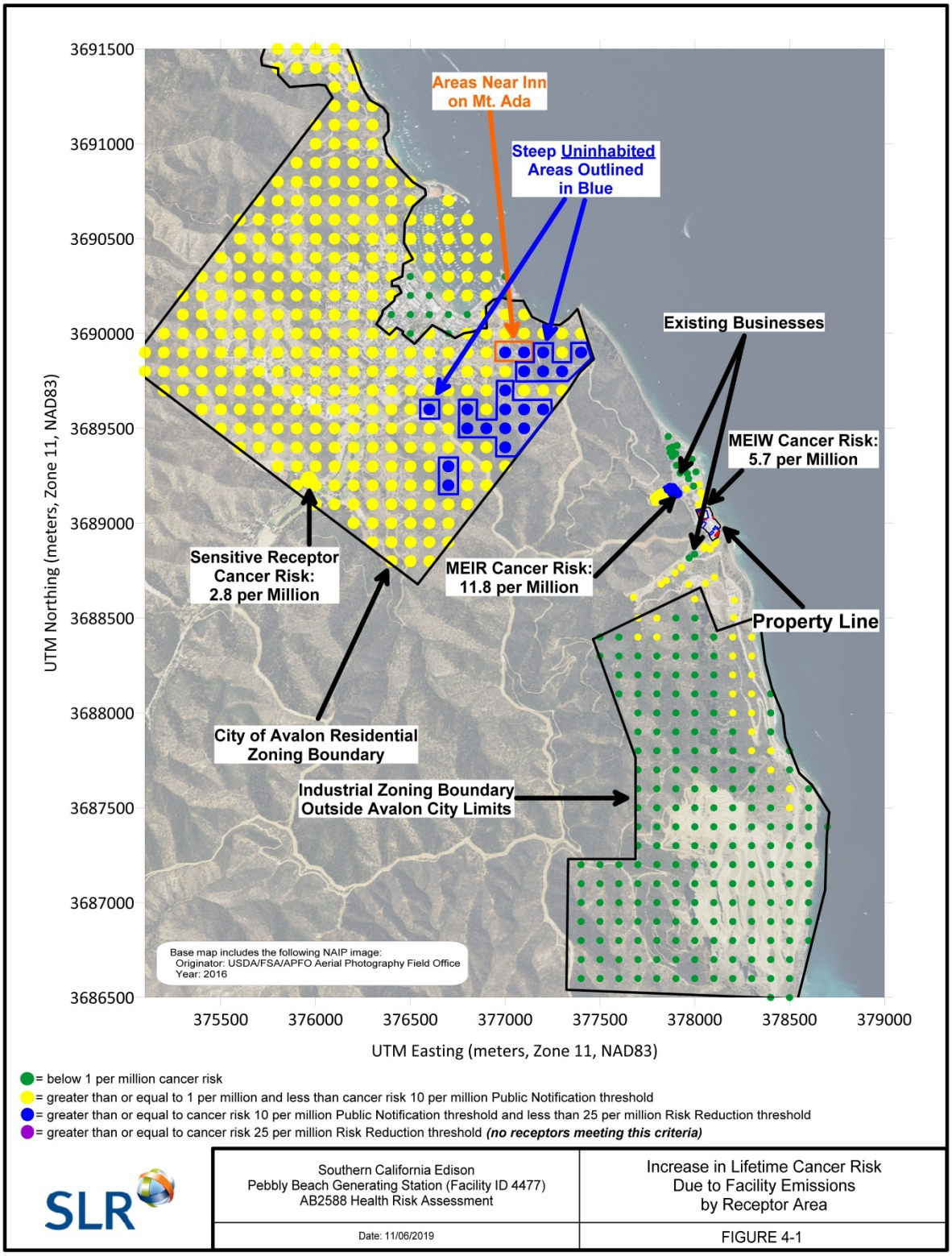


Table 4-2 MEIR and MEIW Cancer Risk by TAC

TAC	MEIR (Per Million)	MEIW (Per Million)
Diesel PM	11.8	5.7
Benzene	2.5E-03	4.5E-04
Ethyl Benzene	1.0E-04	1.9E-05
Formaldehyde	5.0E-04	8.8E-05
Acetaldehyde	5.4E-05	9.8E-06
Naphthalene	1.1E-04	2.1E-05
1,3-Butadiene	3.6E-03	6.5E-04
Methyl Tertiary-Butyl Ether	2.4E-05	4.4E-06
Nickel	1.9E-05	3.5E-06
Total Risk	**11.8**	**5.7**

Table 4-3 MEIR Cancer Risk by Source

Device No.	Stack Name/ Model ID	Source Description	Cancer Risk (Per Million)	Percent of Total Cancer Risk
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	0.7	5.8%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	0.4	3.5%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	4.0	33.9%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	1.0	8.1%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	5.0	42.5%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	0.7	5.7%
11	Housegen	Diesel ICE, Emergency, 399 bhp	3.9E-02	0.3%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	2.1E-05	<0.01%
12	Abrsblst	Abrasive Blasting	0.0	0.0%
35	Gasweldr	Gasoline Welder, 23 bhp	6.9E-03	0.06%
27	DSLTANK3	Diesel Storage Tank No. T3	4.7E-06	<0.01%
28	DSLTANK4	Diesel Storage Tank No. T4	5.1E-06	<0.01%

Table 4-4 MEIW Cancer Risk by Source

Device No.	Stack Name/ Model ID	Source Description	Cancer Risk (Per Million)	Percent of Total Cancer Risk
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	0.9	16.5%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	0.1	1.5%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	1.0	16.6%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	1.1	18.9%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	1.5	26.8%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	1.1	19.5%
11	Housegen	Diesel ICE, Emergency, 399 bhp	5.6E-03	0.1%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	2.1E-06	<0.01%
12	Abrsblst	Abrasive Blasting	0.0	0.0%
35	Gasweldr	Gasoline Welder, 23 bhp	1.2E-03	<0.03%
27	DSLTANK3	Diesel Storage Tank No. T3	6.8E-07	<0.01%
28	DSLTANK4	Diesel Storage Tank No. T4	7.1E-07	<0.01%

Table 4-5 presents a summary of predicted non-cancer chronic hazard indices. Figure 4-2 provides a map showing the locations of the MEIR, MEIW, and maximum sensitive receptor non-cancer chronic hazard indices.

There was one non-cancer chronic multi-pathway TAC (nickel) emitted by the portable gasoline-fired welder. The SCAQMD mandatory pathways described in Table 8 of SCAQMD (2018) and the required settings for the non-inhalation pathways were used. The non-inhalation homegrown produce pathway used the "households that garden" fractions in the ADMRT for residential and sensitive receptor risks.

The predicted non-cancer chronic hazard indices are almost exclusively attributed to emissions of diesel PM. Table 4-6 provides a breakdown by target organ for the predicted non-cancer chronic hazard indices at the MEIR and MEIW. Table 4-7 provides a breakdown by TAC for the predicted non-cancer chronic hazard indices at the MEIR and MEIW. Table 4-8 and Table 4-9 provide a breakdown by source for the predicted non-cancer chronic hazard indices at the MEIR and MEIW, respectively.

Table 4-5 Summary of Predicted Non-Cancer Chronic Hazard Indices

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Hazard Index (Unitless)
MEIR	377910	3689157	3.2E-03
MEIW	378042	3689107	1.9E-02
Max Sensitive Receptor	375964	3689230	7.6E-04

[1] UTM Zone 11, NAD83.

Figure 4-2 Locations of Maximum Non-Cancer Chronic Hazard Indices

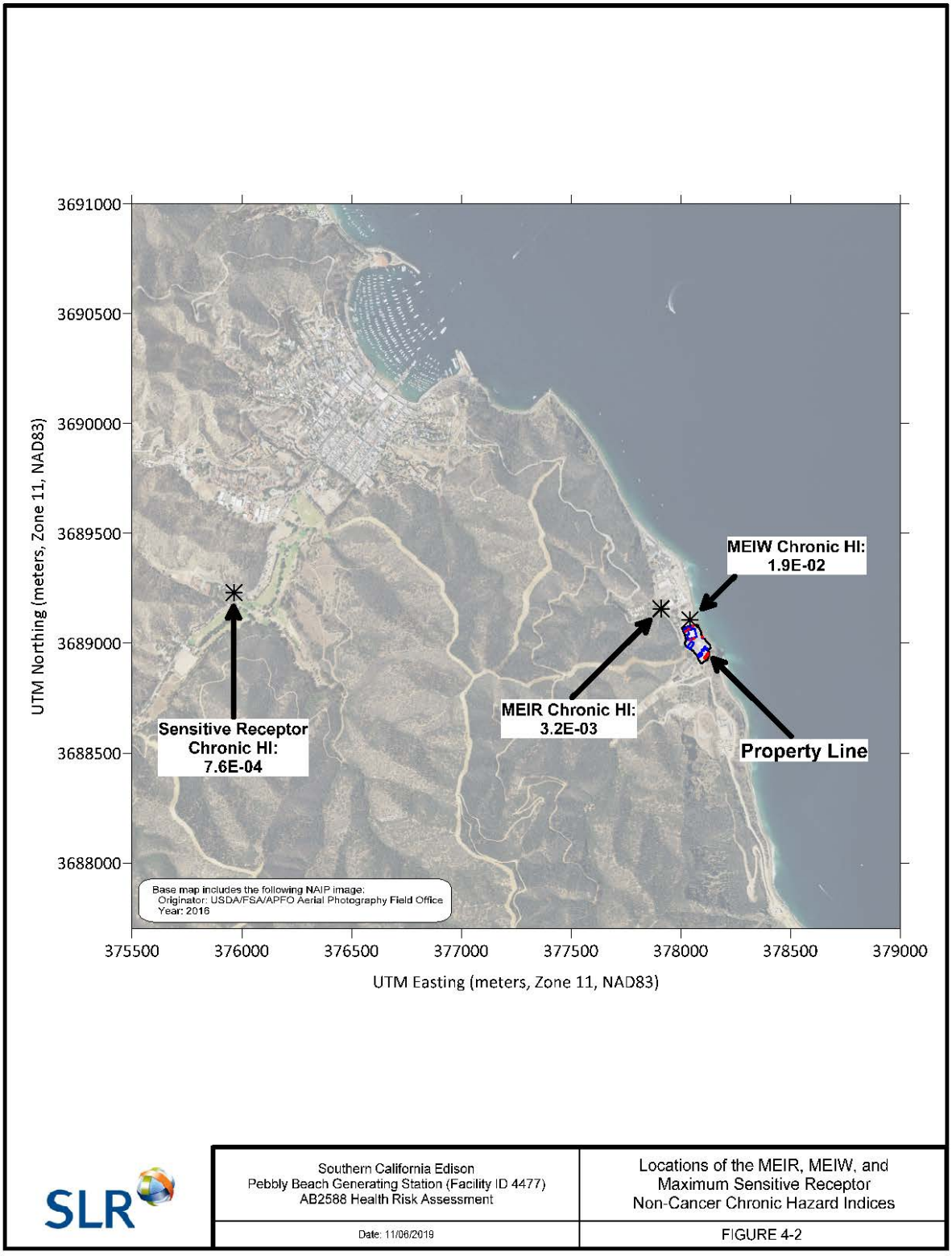


Table 4-6 MEIR and MEIW Non-Cancer Chronic Hazard Indices by Target Organ

Target Organ	MEIR (Unitless)	MEIW (Unitless)
Central Nervous System	7.7E-07	1.6E-06
Kidneys	1.1E-08	2.4E-08
Gastrointestinal Tract & Liver or Alimentary Tract	1.1E-08	2.4E-08
Reproductive System & Developmental	4.8E-06	1.0E-05
Respiratory System	3.2E-03	1.9E-02
Eyes	1.6E-07	3.2E-07
Endocrine System	8.9E-09	1.9E-08
Hematological System	1.5E-05	3.2E-05
Maximum Risk	**3.2E-03**	**1.9E-02**

Table 4-7 MEIR and MEIW Non-Cancer Chronic Hazard Indices by TAC

TAC	MEIR (Unitless)	MEIW (Unitless)
Diesel PM	3.2E-03	1.9E-02
Ammonia	3.0E-05	2.6E-04
Crystalline Silica, Respirable	8.0E-08	2.7E-07
Benzene	0.0E+00	0.0E+00
Ethyl Benzene	0.0E+00	0.0E+00
Toluene	2.6E-07	5.6E-07
n-Hexane	0.0E+00	0.0E+00
Xylenes (mixed)	6.9E-08	1.2E-07
Formaldehyde	3.9E-06	8.3E-06
Methanol	0.0E+00	0.0E+00
Acetaldehyde	5.7E-08	1.2E-07
Naphthalene	1.5E-07	3.4E-07
o-Xylene	2.4E-08	5.2E-08
Styrene	0.0E+00	0.0E+00
1,3-Butadiene	0.0E+00	0.0E+00

Table 4-7 MEIR and MEIW Non-Cancer Chronic Hazard Indices by TAC

TAC	MEIR (Unitless)	MEIW (Unitless)
Acrolein	5.5E-06	1.2E-05
m-Xylene	6.8E-08	1.5E-07
Methyl Tertiary-Butyl Ether	0.0E+00	0.0E+00
Manganese	0.0E+00	0.0E+00
Nickel	2.2E-06	4.9E-06
Chlorine	2.2E-05	4.8E-05
Total Risk	**3.2E-03**	**1.9E-02**

Table 4-8 MEIR Non-Cancer Chronic Hazard Index by Source

Device No.	Stack Name/ Model ID	Source Description	Hazard Index (Unitless)	Percent of Total Hazard Index
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	1.9E-04	5.8%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	1.1E-04	3.5%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	1.1E-03	33.6%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	2.7E-04	8.2%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	1.3E-03	41.8%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	1.8E-04	5.6%
11	Housegen	Diesel ICE, Emergency, 399 bhp	1.0E-05	0.3%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	1.7E-07	0.01%
12	Abrsblst	Abrasive Blasting	8.0E-08	<0.01%
35	Gasweldr	Gasoline Welder, 23 bhp	3.4E-05	1.0%
27	DSLTANK3	Diesel Storage Tank No. T3	4.1E-08	<0.01%
28	DSLTANK4	Diesel Storage Tank No. T4	4.4E-08	<0.01%

Table 4-9 MEIW Non-Cancer Chronic Hazard Index by Source

Device No.	Stack Name/ Model ID	Source Description	Hazard Index (Unitless)	Percent of Total Hazard Index
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	3.1E-03	16.5%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	2.9E-04	1.5%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	3.1E-03	16.5%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	3.6E-03	19.2%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	5.0E-03	26.4%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	3.7E-03	19.4%
11	Housegen	Diesel ICE, Emergency, 399 bhp	1.8E-05	0.1%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	2.0E-07	<0.01%
12	Abrsblst	Abrasive Blasting	2.7E-07	<0.01%
35	Gasweldr	Gasoline Welder, 23 bhp	7.4E-05	0.4%
27	DSLTANK3	Diesel Storage Tank No. T3	7.1E-08	<0.01%
28	DSLTANK4	Diesel Storage Tank No. T4	7.5E-08	<0.01%

4.3.3 PREDICTED NON-CANCER 8-HOUR CHRONIC RISKS

The MEIR non-cancer 8-hour chronic HI is predicted to occur at the SCICo employee housing area approximately 125 m northwest of the PBGS northwest property line corner. The non-cancer 8-hour chronic HI at the MEIR is less than 0.001. The MEIW non-cancer chronic HI is predicted to occur at an industrial facility directly south of the PBGS. The non-cancer 8-hour chronic HI at the MEIW is less than 0.001. The maximum sensitive receptor non-cancer 8-hour chronic HI is predicted to occur at the Preschool Learning for Avalon Youth facility in the City of Avalon approximately 2,100 m west-northwest of the PBGS. The maximum sensitive receptor non-cancer chronic HI is less than 0.001. All non-cancer 8-hour chronic risks are below the SCAQMD Rule 1402 Notification and Risk Action Levels of 1.0 and 3.0, respectively.

Table 4-10 presents a summary of predicted non-cancer 8-hour chronic hazard indices. The predicted non-cancer 8-hour chronic hazard indices are exclusively attributed to emissions of benzene from the portable gasoline-fired welder. Table 4-11 provides a breakdown by target organ for the predicted non-cancer 8-hour chronic hazard indices at the MEIR and MEIW.

Table 4-10 Summary of Predicted Non-Cancer 8-Hour Chronic Hazard Indices

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Hazard Index (Unitless)
MEIR	377910	3689157	1.2E-05
MEIW	378113	3688903	3.7E-05
Max Sensitive Receptor	376370	3689724	5.6E-07

[1] UTM Zone 11, NAD83.

Table 4-11 MEIR and MEIW Non-Cancer 8-Hour Chronic Hazard Indices by Target Organ

Target Organ	MEIR (Unitless)	MEIW (Unitless)
Central Nervous System	1.8E-07	5.6E-07
Immune System	5.2E-07	1.6E-06
Reproductive System & Developmental	9.9E-07	3.0E-06
Respiratory System	7.2E-06	2.2E-05
Hematological System	1.2E-05	3.7E-05
Maximum Risk	**1.2E-05**	**3.7E-05**

4.3.4 PREDICTED ACUTE RISKS

The point of maximum impact (PMI) acute HI is predicted to occur on the western property line of the PBGS. The acute HI at the PMI is 0.44. The MEIR acute HI is predicted to occur at the SCICo employee housing area approximately 150 m northwest of the PBGS northwest property line corner. The acute HI at the MEIR is 0.12. The MEIW acute HI is predicted to occur at an industrial facility directly south of the PBGS. The acute HI at the MEIW is 0.16. The maximum sensitive receptor acute HI is predicted to occur at the Catalina Kid Ventures Child Care facility in the City of Avalon approximately 1,850 m northwest of the PBGS. The maximum sensitive receptor acute HI is 0.02. All acute risks are below the SCAQMD Rule 1402 Notification and Risk Action Levels of 1.0 and 3.0, respectively.

Table 4-12 presents a summary of predicted acute hazard indices. Figure 4-3 provides a map showing the locations of the PMI, MEIR, MEIW, and maximum sensitive receptor acute hazard indices.

Table 4-12 Summary of Predicted Acute Hazard Indices

Receptor	UTM Easting [1] (m)	UTM Northing [1] (m)	Hazard Index (Unitless)
PMI	378045	3688972	4.4E-01
MEIR	377880	3689160	1.2E-01
MEIW	378113	3688903	1.6E-01
Max Sensitive Receptor	376370	3689724	2.0E-02

[1] UTM Zone 11, NAD83.

Table 4-13 provides a breakdown by target organ for the predicted acute hazard indices at the PMI, MEIR, and MEIW. All acute HIs are 90 percent due to benzene and 10 percent due to nickel. Table 4-14 provides a breakdown by TAC for the predicted acute hazard indices at the PMI, MEIR, and MEIW. Table 4-15, Table 4-16, and Table 4-17 provide a breakdown by source for the predicted acute hazard indices at the PMI, MEIR, and MEIW, respectively.

4.3.5 ZONE OF IMPACT

Consistent with the previous AB2588 HRA (AECOM 2011), the cancer risk ZOI isopleth of 1 per million is not provided. The ZOI for non-cancer chronic and acute hazard indices is the area subject to a HI of 0.5 or greater. None of the hazard indices exceed the ZOI isopleth threshold of 0.5, and therefore, quantification of the extent of the non-cancer hazard index ZOI isopleths is not required.

4.3.6 POPULATION CANCER BURDEN

As described in Section 4.2.3, a conservative estimate of cancer burden was made by multiplying the entire population of the City of Avalon by the predicted cancer risk at the MEIR assuming a 70-year lifetime exposure duration. The 70 year cancer risk at the location of the MEIR is a MICR of 13.3 per million. According to 2010 census data, the City of Avalon's population is 3,728. The resulting cancer burden is 0.05 and is below the SCAQMD Rule 1402 Action Level of 0.5.

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Figure 4-3 Locations of Maximum Acute Hazard Indices

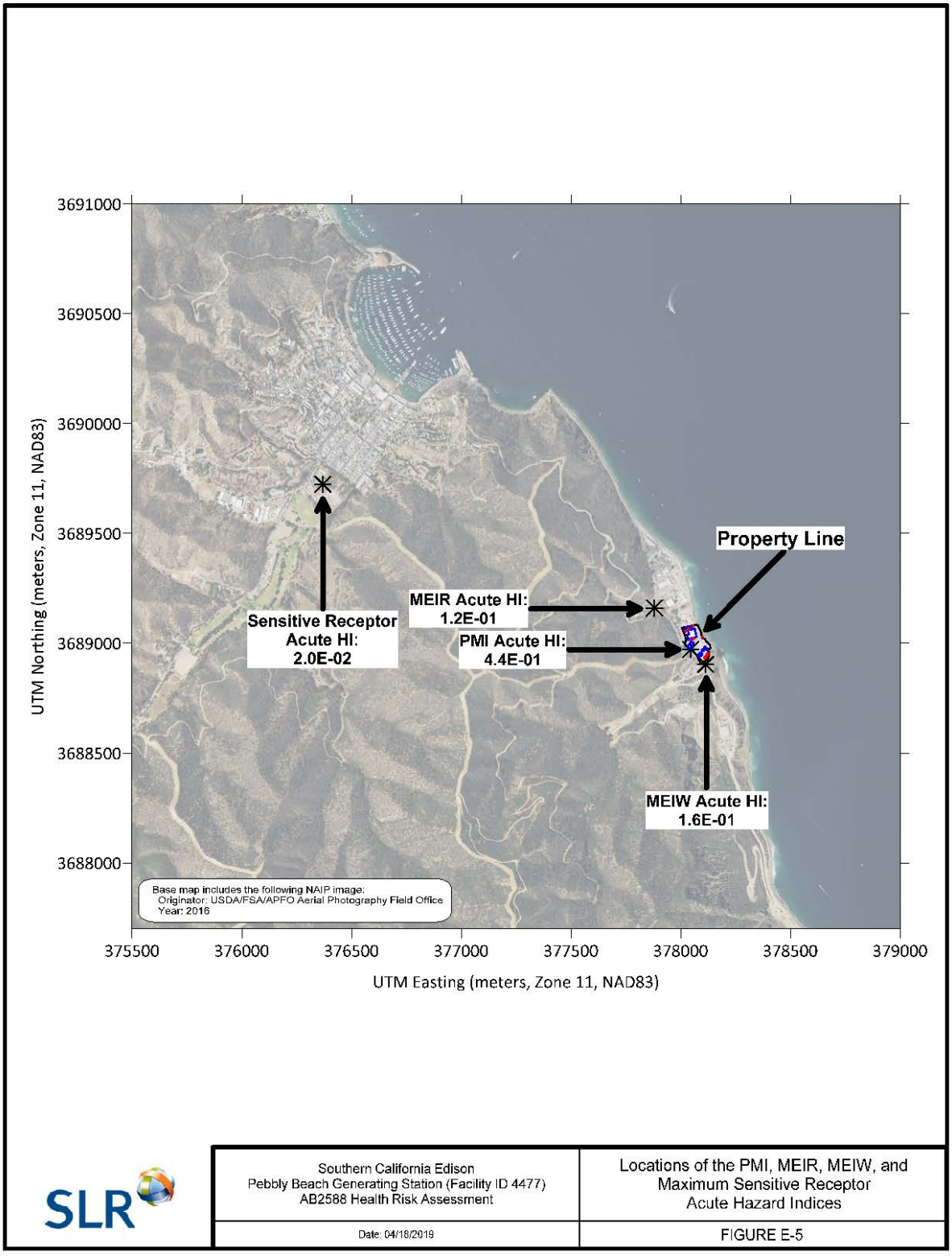

Table 4-13 PMI, MEIR, and MEIW Acute Hazard Indices by Target Organ

Target Organ	PMI (Unitless)	MEIR (Unitless)	MEIW (Unitless)
Central Nervous System	1.5E-03	4.2E-04	5.6E-04
Immune System	4.4E-01	1.2E-01	1.6E-01
Reproductive System & Developmental	3.9E-01	1.1E-01	1.5E-01
Respiratory System	2.4E-01	6.9E-02	9.1E-02
Eyes	4.1E-01	1.2E-01	1.6E-01
Hematological System	3.9E-01	1.1E-01	1.5E-01
Maximum Risk	**4.4E-01**	**1.2E-01**	**1.6E-01**

Table 4-14 PMI, MEIR, and MEIW Acute Hazard Indices by TAC

TAC	PMI (Unitless)	MEIR (Unitless)	MEIW (Unitless)
Ammonia	0.0E+00	0.0E+00	0.0E+00
Benzene	3.9E-01	1.1E-01	1.5E-01
Toluene	0.0E+00	0.0E+00	0.0E+00
Xylenes (mixed)	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	0.0E+00	0.0E+00	0.0E+00
Methanol	0.0E+00	0.0E+00	0.0E+00
Acetaldehyde	0.0E+00	0.0E+00	0.0E+00
Methyl Ethyl Ketone	0.0E+00	0.0E+00	0.0E+00
o-Xylene	0.0E+00	0.0E+00	0.0E+00
Styrene	0.0E+00	0.0E+00	0.0E+00
1,3-Butadiene	0.0E+00	0.0E+00	0.0E+00
Acrolein	0.0E+00	0.0E+00	0.0E+00
m-Xylene	0.0E+00	0.0E+00	0.0E+00
Nickel	4.5E-02	1.3E-02	1.7E-02
Copper	0.0E+00	0.0E+00	0.0E+00
Chlorine	0.0E+00	0.0E+00	0.0E+00
Total Risk	**4.4E-01**	**1.2E-01**	**1.6E-01**

Table 4-15 PMI Acute Hazard Index by Source

Device No.	Stack Name/ Model ID	Source Description	Hazard Index (Unitless)	Percent of Total Hazard Index
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	0.0E+00	0.0%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	0.0E+00	0.0%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	0.0E+00	0.0%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	0.0E+00	0.0%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	0.0E+00	0.0%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	0.0E+00	0.0%
11	Housegen	Diesel ICE, Emergency, 399 bhp	0.0E+00	0.0%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	0.0E+00	0.0%
12	Abrsblst	Abrasive Blasting	0.0E+00	0.0%
35	Gasweldr	Gasoline Welder, 23 bhp	4.4E-01	100.0%
27	DSLTANK3	Diesel Storage Tank No. T3	0.0E+00	0.0%
28	DSLTANK4	Diesel Storage Tank No. T4	0.0E+00	0.0%

Table 4-16 MEIR Acute Hazard Index by Source

Device No.	Stack Name/ Model ID	Source Description	Hazard Index (Unitless)	Percent of Total Hazard Index
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	0.0E+00	0.0%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	0.0E+00	0.0%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	0.0E+00	0.0%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	0.0E+00	0.0%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	0.0E+00	0.0%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	0.0E+00	0.0%
11	Housegen	Diesel ICE, Emergency, 399 bhp	0.0E+00	0.0%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	0.0E+00	0.0%
12	Abrsblst	Abrasive Blasting	0.0E+00	0.0%
35	Gasweldr	Gasoline Welder, 23 bhp	1.2E-01	100.0%
27	DSLTANK3	Diesel Storage Tank No. T3	0.0E+00	0.0%
28	DSLTANK4	Diesel Storage Tank No. T4	0.0E+00	0.0%

Table 4-17 MEIW Acute Hazard Index by Source

Device No.	Stack Name/ Model ID	Source Description	Hazard Index (Unitless)	Percent of Total Hazard Index
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	0.0E+00	0.0%
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	0.0E+00	0.0%
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	0.0E+00	0.0%
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	0.0E+00	0.0%
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	0.0E+00	0.0%
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	0.0E+00	0.0%
11	Housegen	Diesel ICE, Emergency, 399 bhp	0.0E+00	0.0%
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbines	0.0E+00	0.0%
12	Abrsblst	Abrasive Blasting	0.0E+00	0.0%
35	Gasweldr	Gasoline Welder, 23 bhp	1.6E-01	100.0%
27	DSLTANK3	Diesel Storage Tank No. T3	0.0E+00	0.0%
28	DSLTANK4	Diesel Storage Tank No. T4	0.0E+00	0.0%

4.4 UNCERTAINTY IN THE ANALYSIS

The results shown in this report are based on a number of assumptions required to be used by the regulatory agency. Each step in the entire risk assessment process is fraught with uncertainty, requiring a large number of assumptions to be made. Because all facilities are required to make assumptions according to the same guidelines, these results are at best useful as a yardstick for comparing relative risk from one facility to another. Because of the great deal of uncertainty in many important assumptions, the results shown are not accurate for predicting actual risk in absolute numbers and should not be used as such. The OEHHA Guidelines (OEHHA 2015) caution any users of these results as follows:

"...The uncertainty arises from lack of data in many areas necessitating the use of assumptions. The assumptions used in these guidelines are designed to err on the side of health protection in order to avoid underestimation of risk to the public. Sources of uncertainty, which may overestimate or underestimate risk, include: 1) extrapolation of toxicity data in animals to humans, 2) uncertainty in the estimation of emissions, 3) uncertainty in the air dispersion models, and 4) uncertainty in the exposure estimates. In addition to uncertainty, there is a natural range or variability in measured parameters defining the exposure scenario." (OEHHA 2015, Section 1.6, page 1-5)

"…An individual's risk of contracting cancer from exposure to facility emissions may be less or more than the risk calculated in the risk assessment. An individual's risk not only depends on the individual's exposure to a specific chemical but also on his or her genetic background, health, diet, lifestyle choices and other environmental and workplace exposures. OEHHA uses health-protective exposure

assumptions to avoid underestimating risk. For example, the risk estimate for airborne exposure to chemical emissions uses the health-protective assumption that the individual has a high breathing rate and exposure began early in life when cancer risk is highest." (OEHHA 2015, Section 1.6, page 1-6)

"…Risk estimates generated by an HRA should not be interpreted as the expected rates of disease in the exposed population but rather as estimates of potential for disease, based on current knowledge and a number of assumptions." (OEHHA 2015, Section 1.6, page 1-6)

"…Risk assessments under the Hot Spots program are often used to compare one source with another and to prioritize concerns. Consistent approaches to risk assessment are necessary to fulfill this function." (OEHHA 2015, Section 1.6, page 1-7)

5. REFERENCES

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APPENDIX A

SOURCE RELEASE PARAMETER AND EMISSIONS TABLES

Table A-1: Stack Parameters
SCE Pebbly Beach Generation Station Revised AB2588 HRA / 1 Pebbly Beach Road, Avalon, CA / AQMD ID: 4477

Point Source Stack Parameters										
Device No.	Stack Name/ Model ID	Source Description	UTM Easting [1] (m)	UTM Northing [1] (m)	Stack Base Elevation (m)	Stack Height (m)	Stack Diameter (m)	Exhaust Temp (K)	Exhaust Flow Rate (acfm)	Exhaust Velocity (m/s)
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	378036.4	3689064.9	6.23	11.20	0.60	612.6	11233	18.75
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	378059.9	3689020.8	6.61	9.70	0.60	619.8	14390	24.02
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	378043.1	3689015.4	6.66	9.68	0.60	605.4	12192	20.35
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	378031.9	3689062.5	6.08	11.20	0.60	608.7	12887	21.51
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	378054.8	3689076.7	6.12	9.88	0.60	646.5	15427	25.75
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	378021.7	3689053.7	6.18	11.23	0.80	657.0	21227	19.93
11	Housegen	Diesel ICE, Emergency, 399 bhp	378097.1	3689028.2	5.56	2.89	0.10	533.2	820	49.25
101	MT01	Micro Turbine No.1	378117.6	3688946.1	10.67	2.55	0.21	572.8	1703	23.20
102	MT02	Micro Turbine No.2	378118.5	3688947.2	10.67	2.55	0.21	572.8	1703	23.20
103	MT03	Micro Turbine No.3	378119.5	3688948.3	10.67	2.55	0.21	572.8	1703	23.20
104	MT04	Micro Turbine No.4	378120.5	3688949.3	10.67	2.55	0.21	572.8	1703	23.20
105	MT05	Micro Turbine No.5	378121.4	3688950.4	10.67	2.55	0.21	572.8	1703	23.20
106	MT06	Micro Turbine No.6	378122.4	3688951.4	10.67	2.55	0.21	572.8	1703	23.20
107	MT07	Micro Turbine No.7	378123.4	3688952.5	10.67	2.55	0.21	572.8	1703	23.20
108	MT08	Micro Turbine No.8	378124.3	3688953.5	10.67	2.55	0.21	572.8	1703	23.20
109	MT09	Micro Turbine No.9	378120.6	3688943.4	10.67	2.55	0.21	572.8	1703	23.20
110	MT10	Micro Turbine No.10	378121.6	3688944.7	10.67	2.55	0.21	572.8	1703	23.20
111	MT11	Micro Turbine No.11	378122.3	3688945.8	10.67	2.55	0.21	572.8	1703	23.20
114	MT14	Micro Turbine No.14	378107.4	3688934.9	10.67	2.55	0.21	572.8	1703	23.20
115	MT15	Micro Turbine No.15	378108.6	3688936.0	10.67	2.55	0.21	572.8	1703	23.20
116	MT16	Micro Turbine No.16	378109.5	3688937.1	10.67	2.55	0.21	572.8	1703	23.20
117	MT17	Micro Turbine No.17	378110.5	3688938.2	10.67	2.55	0.21	572.8	1703	23.20
118	MT18	Micro Turbine No.18	378111.5	3688939.3	10.67	2.55	0.21	572.8	1703	23.20
119	MT19	Micro Turbine No.19	378112.5	3688940.5	10.67	2.55	0.21	572.8	1703	23.20
120	MT20	Micro Turbine No.20	378110.6	3688931.7	10.67	2.55	0.21	572.8	1703	23.20
121	MT21	Micro Turbine No.21	378111.7	3688932.9	10.67	2.55	0.21	572.8	1703	23.20
122	MT22	Micro Turbine No.22	378112.6	3688934.1	10.67	2.55	0.21	572.8	1703	23.20
123	MT23	Micro Turbine No.23	378113.5	3688935.2	10.67	2.55	0.21	572.8	1703	23.20
124	MT24	Micro Turbine No.24	378114.4	3688936.3	10.67	2.55	0.21	572.8	1703	23.20
125	MT25	Micro Turbine No.25	378115.2	3688937.6	10.67	2.55	0.21	572.8	1703	23.20

[1] Universe Transverse Mercator (UTM) Zone 11, North American Datum 1983

Table A-2: Fugitive Release Parameters
SCE Pebbly Beach Generation Station Revised AB2588 HRA / 1 Pebbly Beach Road, Avalon, CA / AQMD ID: 4477

Volume Source Release Parameters								
Device No.	Source Name/ Model ID	Source Description	UTM Easting [1] (m)	UTM Northing [1] (m)	Source Base Elevation (m)	Release Height (m)	SYINIT (m)	SZINIT (m)
12	Abrsblst	Abrasive Blasting	378049.8	3689053.5	6.43	4.57	5.62	4.25
35	Gasweldr	Gasoline Welder, 23 bhp	378044.5	3688991.5	6.73	3.37	5.13	3.13

Circular Area Source Release Parameters									
Device No.	Source Name/ Model ID	Source Description	UTM Easting [1] (m)	UTM Northing [1] (m)	Source Base Elevation (m)	Release Height (m)	Radius (m)	No. of Vertices	SZINIT (m)
27	DSLTANK3	Diesel Storage Tank No. T3	378100.4	3688968.5	9.88	7.32	4.57	8	0.00
28	DSLTANK4	Diesel Storage Tank No. T4	378116.9	3688973.5	7.58	7.32	4.57	8	0.00

[1] Universe Transverse Mercator (UTM) Zone 11, North American Datum 1983

Table A-3: Source Operating Hours
SCE Pebbly Beach Generation Station Revised AB2588 HRA / 1 Pebbly Beach Road, Avalon, CA / AQMD ID: 4477

Device No.	Source Name/ Model ID	Source Description	Operating Hours/Day	Operating Hours/Year	Operating Days/Week	Operating Days/Year
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	24	8760	7	365
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	24	8760	7	365
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	24	8760	7	365
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	24	8760	7	365
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	24	8760	7	365
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	24	8760	7	365
11	Housegen	Diesel ICE, Emergency, 399 bhp	24	8760	7	365
101-111 114-125	MT01-MT11 MT14-MT25	Micro Turbine Nos.1-11, 14-25	24	8760	7	365
12	Abrsblst	Abrasive Blasting	24	8760	7	365
35	Gasweldr	Gasoline Welder, 23 bhp	24	8760	7	365
27	DSLTANK3	Diesel Storage Tank No. T3	24	8760	7	365
28	DSLTANK4	Diesel Storage Tank No. T4	24	8760	7	365

Table A-4: TAC Emission Rates by Substance and Source
SCE Pebbly Beach Generation Station Revised AB2588 HRA / 1 Pebbly Beach Road, Avalon, CA / AQMD ID: 4477

Device No.	Source Name/ Model ID	Source Description	CAS/ HARP ID Number	Substance Name	1-Hour Maximum (lb/hr)	1-Hour Maximum (g/s)	Annual Average (lb/yr)	Annual Average (g/s)
1	Unit7	Diesel ICE, 1500 bhp, Unit No.7	9901	Diesel PM	7.47E-02	9.41E-03	2.04E+02	2.94E-03
			7664417	Ammonia	5.58E-02	7.03E-03	1.53E+02	2.20E-03
3	Unit8	Diesel ICE, 2150 bhp, Unit No.8	9901	Diesel PM	2.20E-01	2.78E-02	7.06E+01	1.01E-03
			7664417	Ammonia	8.08E-02	1.02E-02	2.59E+01	3.72E-04
5	Unit10	Diesel ICE, 1575 bhp, Unit No.10	9901	Diesel PM	2.96E-01	3.73E-02	6.20E+02	8.91E-03
			7664417	Ammonia	1.41E-01	1.77E-02	2.95E+02	4.24E-03
7	Unit12	Diesel ICE, 2200 bhp, Unit No.12	9901	Diesel PM	1.05E-01	1.32E-02	3.06E+02	4.40E-03
			7664417	Ammonia	1.28E-01	1.61E-02	3.73E+02	5.37E-03
9	Unit14	Diesel ICE, 1950 bhp, Unit No.14	9901	Diesel PM	3.38E-01	4.25E-02	9.53E+02	1.37E-02
			7664417	Ammonia	2.64E-02	3.33E-03	7.47E+01	1.07E-03
11	Housegen	Diesel ICE, Emergency, 399 bhp	9901	Diesel PM	1.32E-01	1.66E-02	8.58E-01	1.23E-05
			7664417	Ammonia	5.57E-02	7.02E-03	3.62E-01	5.21E-06
12	Abrsblst	Abrasive Blasting	1175	Crystalline Silica, Respirable	4.21E-08	5.31E-09	3.69E-04	5.31E-09
			1344281	Aluminum Oxide (fibrous)	1.05E-05	1.32E-06	9.19E-02	1.32E-06
15	Unit15	Diesel ICE, 3900 bhp, Unit No.15	9901	***Diesel PM (See Table Note 1)***	***3.00E-01***	***3.78E-02***	7.51E+02	1.08E-02
			7664417	Ammonia	1.51E-01	1.90E-02	3.77E+02	5.43E-03
27	DSLTANK3	Diesel Storage Tank No. T3	71432	Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			95636	1,2,4-Trimethylbenzene	5.52E-05	6.96E-06	4.84E-01	6.96E-06
			100414	Ethyl Benzene	5.52E-07	6.96E-08	4.84E-03	6.96E-08
			108883	Toluene	1.66E-06	2.09E-07	1.45E-02	2.09E-07
			110543	n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			1330207	Xylenes (mixed)	1.60E-05	2.02E-06	1.40E-01	2.02E-06
28	DSLTANK4	Diesel Storage Tank No. T4	71432	Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			95636	1,2,4-Trimethylbenzene	5.52E-05	6.96E-06	4.84E-01	6.96E-06
			100414	Ethyl Benzene	5.52E-07	6.96E-08	4.84E-03	6.96E-08
			108883	Toluene	1.66E-06	2.09E-07	1.45E-02	2.09E-07
			110543	n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			1330207	Xylenes (mixed)	1.60E-05	2.02E-06	1.40E-01	2.02E-06
35	Gasweldr	Gasoline Welder, 23 bhp	50000	Formaldehyde	6.22E-03	7.83E-04	6.84E-02	9.84E-07
			67561	Methanol	1.39E-03	1.76E-04	1.54E-02	2.21E-07
			71432	Benzene	6.85E-03	8.64E-04	7.54E-02	1.09E-06
			75070	Acetaldehyde	1.49E-03	1.88E-04	1.64E-02	2.37E-07
			78933	Methyl Ethyl Ketone	1.20E-04	1.51E-05	1.32E-03	1.89E-08
			91203	Naphthalene	2.59E-04	3.26E-05	2.85E-03	4.10E-08
			95476	o-Xylene	3.09E-03	3.89E-04	3.40E-02	4.89E-07
			95636	1,2,4-Trimethylbenzene	2.51E-03	3.16E-04	2.76E-02	3.97E-07
			100414	Ethyl Benzene	2.99E-03	3.77E-04	3.29E-02	4.73E-07
			100425	Styrene	2.59E-04	3.26E-05	2.85E-03	4.10E-08
			106990	1,3-Butadiene	1.65E-03	2.08E-04	1.82E-02	2.62E-07
			107028	Acrolein	3.59E-04	4.52E-05	3.95E-03	5.68E-08
			108383	m-Xylene	8.87E-03	1.12E-03	9.76E-02	1.40E-06
			108883	Toluene	1.35E-02	1.70E-03	1.49E-01	2.14E-06
			110543	n-Hexane	2.61E-03	3.29E-04	2.87E-02	4.13E-07
			1634044	Methyl tertiary-Butyl Ether	3.71E-03	4.67E-04	4.08E-02	5.87E-07
			7439965	Manganese	5.85E-06	7.38E-07	6.44E-05	9.27E-10
			7440020	Nickel	5.85E-06	7.38E-07	6.44E-05	9.27E-10
			7440508	Copper	5.85E-06	7.38E-07	6.44E-05	9.27E-10
			7782505	Chlorine	8.19E-04	1.03E-04	9.02E-03	1.30E-07
101	MT01	Micro Turbine No.1	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08

(1) The correct 1-hour maximum diesel PM emission rate is 0.30 lb/hr as shown in this table. The lb/hr diesel PM emission rate entered in HARP was 0.195 lb/hr, which was the basis for the lb/yr emission calculation (see Section 3.2 for discussion). While the lb/hr diesel PM emission rate for Unit 15 is not correct in HARP, the lb/hr diesel PM emissions are NOT used by HARP for any risk calculations (see OEHHA 2015, Appendix D, Section D-2.3).

Table A-4: TAC Emission Rates by Substance and Source
SCE Pebbly Beach Generation Station Revised AB2588 HRA / 1 Pebbly Beach Road, Avalon, CA / AQMD ID: 4477

Device No.	Source Name/ Model ID	Source Description	CAS/ HARP ID Number	Substance Name	1-Hour Maximum (lb/hr)	1-Hour Maximum (g/s)	Annual Average (lb/yr)	Annual Average (g/s)
102	MT02	Micro Turbine No.2	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
103	MT03	Micro Turbine No.3	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
104	MT04	Micro Turbine No.4	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
105	MT05	Micro Turbine No.5	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
106	MT06	Micro Turbine No.6	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
107	MT07	Micro Turbine No.7	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
108	MT08	Micro Turbine No.8	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
109	MT09	Micro Turbine No.9	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
110	MT10	Micro Turbine No.10	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
111	MT11	Micro Turbine No.11	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
114	MT14	Micro Turbine No.14	50000	Formaldehyde	6.60E-06	8.31E-07	4.04E-03	5.81E-08
			108883	Toluene	1.74E-06	2.19E-07	1.07E-03	1.53E-08
115	MT15	Micro Turbine No.15	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
116	MT16	Micro Turbine No.16	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
117	MT17	Micro Turbine No.17	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
118	MT18	Micro Turbine No.18	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
119	MT19	Micro Turbine No.19	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
120	MT20	Micro Turbine No.20	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
121	MT21	Micro Turbine No.21	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
122	MT22	Micro Turbine No.22	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
123	MT23	Micro Turbine No.23	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
124	MT24	Micro Turbine No.24	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08
125	MT25	Micro Turbine No.25	50000	Formaldehyde	6.91E-06	8.71E-07	4.04E-03	5.81E-08
			108883	Toluene	1.82E-06	2.29E-07	1.07E-03	1.53E-08

APPENDIX B

DETAILS REGARDING MMIF AND AERMET PROCESSING

Patrick McKean

From: Marc Carreras Sospedra <msospedra@aqmd.gov>
Sent: February 20, 2019 10:40 AM
To: Patrick McKean
Cc: Victoria Moaveni; Edward Lee; Melissa Sheffer; Casey Scott (Casey.Scott@sce.com); Andrew Michael Lembeck-Edens; Jason Reed; Sang-Mi Lee
Subject: RE: SCAQMD Facility ID No. 4477 - request for additional info re: 2012 met data
Attachments: PBGS_MMIF.zip

Hi Patrick,

Thanks for the thorough description.
Please, find attached the output files from MMIF using your input file. Let me know if you have any other questions.

Sincerely,

Marc

Marc Carreras Sospedra, Ph.D.
Air Quality Specialist
Planning, Rule Development, Area Source Division
South Coast Air Quality Management District
Phone: (909)-396-2852
www.aqmd.gov

From: Patrick McKean [mailto:pmckean@slrconsulting.com]
Sent: Tuesday, February 19, 2019 7:56 PM
To: Marc Carreras Sospedra <msospedra@aqmd.gov>
Cc: Victoria Moaveni <vmoaveni@aqmd.gov>; Edward Lee <ELee@aqmd.gov>; Melissa Sheffer <msheffer@aqmd.gov>; Casey Scott (Casey.Scott@sce.com) <Casey.Scott@sce.com>; Andrew Michael Lembeck-Edens <andrew.lembeckedens@sce.com>; Jason Reed <jreed@slrconsulting.com>
Subject: RE: SCAQMD Facility ID No. 4477 - request for additional info re: 2012 met data

Hi Marc – per our discussion on 2/15/2019, attached is a modified MMIF input file that contains the changes we discussed for the SCE Pebbly Beach Generating Station (PBGS) updated AB2588 HRA. The basis for each change to the KEYWORDs listed below are provided following the requested change. The purpose of the changes is to better align the MMIF processing with 40 C.F.R. Appendix W and the MMIF Guidance (attached). Once I receive the updated MMIF output from you, I'll run AERMET so we can evaluate the resulting AERMOD-ready met files against the WRF pass-through option that you ran previously.

Since I don't have the WRF output, I'm not able to test whether my requested changes will execute properly, so it may take some trial and error if I did not input the KEYWORD changes correctly. I followed the MMIF User's Manual (also attached) in preparing the MMIF input file.

MMIF input file - MMIF_SCE_PBGS_AERMET_version.inp:

1. Change the values of LAYERS to be "MID 25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, and 5000". See bullet 4. below.
    - Basis: MMIF Guidance, Section 3.2.3 for an AERMOD application.

2. Change the value of AER_MIXHT to "AERMET" to allow AERMET to calculate mixing heights rather than passing through WRF-generated mixing heights.
    - Basis: 40 C.F.R. Appendix W, Section 8.4.5.1(b). For a regulatory modeling application, the WRF output should be processed to generate AERMET inputs and the data subsequently processed through AERMET for input to AERMOD. Selecting "AERMET" in the AER_MIXHT keyword will allow for this.
3. With the above change to AER_MIXHT, I have added the required FSL_INTERVAL keyword with a default value of "12" to generate the customary 0Z and 12Z soundings for use in AERMET.
    - Basis: 40 C.F.R. Appendix W, Section 8.4.5.1(b). A sounding file is required to run AERMET.
4. Change the value of AER_LAYERS to "1 10" to allow MMIF to extract data from the WRF output up to 300 m ASL for AERMET to create a multi-level profile file (see bullet 1. above). If after running MMIF you receive an error regarding duplicate ONSITE heights, see page 56 of the MMIF User's Manual for how to adjust the 1st value in the AER_LAYERS keyword.
    - Basis: This change is consistent with the MM5-derived 2002 data set that has been previously approved for PBGS, which included a multi-level profile file.
5. Change the values of OUTPUT (repeatable keyword) to "AERMET" and include the following data files to be written for processing with AERMET:
    - BAT – creates batch file needed to run AERMET.
    - USEFUL – creates the AERMOD ME keyword inputs and provides the PROFBASE.
    - ONSITE – creates a text file for use in the ONSITE pathway in the AERMET Stage 1 input file. The text file will include the surface and upper level met data.
    - FSL – creates a text file formatted to mimic NOAA/ESRL FSL-formatted upper air data for use in the UPPERAIR pathway in the AERMET Stage 1 input file.
    - AERSFC – creates a text file that mimics AERSURACE output needed for the AERMET Stage 3 input file.
    - Basis: The above outputs are required to generate the inputs needed to run AERMET.

I believe that the OUTPUT files described above will allow me to run AERMET. The files should be small enough to send to me via e-mail. Note that when I run AERMET, I will invoke the Adj_u* keyword in the AERMET Stage 3 input file, per the MMIF User's Manual, Section 1.1.

Please let me know if you have any questions regarding the attached MMIF input file or the bases for the changes described above. Thank you for your help and willingness to re-run MMIF for this project.

From: Victoria Moaveni [mailto:vmoaveni@aqmd.gov]
Sent: January 30, 2019 2:49 PM
To: Patrick McKean
Cc: Edward Lee; Melissa Sheffer; Casey Scott (Casey.Scott@sce.com); Joy Brooks; Marc Carreras Sospedra
Subject: RE: SCAQMD Facility ID No. 4477 - request for additional info re: 2012 met data

Patrick,

Please see the response to your requests below:

- *Was MMIF used to generate AERMET inputs or was it run to directly generate AERMOD-ready SFC and PFL meteorological files?*

  MMIF was used to generate directly AERMOD-ready SFC and PFL files.

- *If MMIF generated the AERMET inputs and AERMET was used to prepare the AERMOD-ready meteorological files, please provide the AERMET Stage 1/2/3 input files.*

  AERMET was not used.

- *A map of the area showing the grid cells available from the WRF simulation.*

A map showing the grid cell (in red) used for the met data is attached.

- *The MMIF input file.*

The MMIF input file is attached.

If you have any additional questions regarding the processing of the 2012 dataset, please feel free to contact Marc Carreras Sospedra at (909) 396-2852.

Thanks, Victoria

Victoria Moaveni
SCAQMD
Phone: (909) 396-2455
Fax: (909) 396-3810
*email: **vmoaveni@aqmd.gov***

From: Patrick McKean [mailto:pmckean@slrconsulting.com]
Sent: Wednesday, January 30, 2019 8:50 AM
To: Victoria Moaveni <vmoaveni@aqmd.gov>
Cc: Edward Lee <ELee@aqmd.gov>; Melissa Sheffer <msheffer@aqmd.gov>; Casey Scott (Casey.Scott@sce.com) <Casey.Scott@sce.com>; Joy Brooks <joy.s.brooks@sce.com>
Subject: SCAQMD Facility ID No. 4477 - request for additional info re: 2012 met data

Hi Victoria – I'm assisting SCE with preparing for the health risk assessment required by letter from the SCAQMD dated January 23, 2019 (attached). Edward Lee provided SCE via e-mail the AERMOD-ready meteorological files prepared by SCAQMD from the WRF prognostic meteorological model for calendar year 2012.

On behalf of SCE, I have the following requests for additional information related to the processing of the 2012 dataset:

- Was MMIF used to generate AERMET inputs or was it run to directly generate AERMOD-ready SFC and PFL meteorological files?
- If MMIF generated the AERMET inputs and AERMET was used to prepare the AERMOD-ready meteorological files, please provide the AERMET Stage 1/2/3 input files.
- A map of the area showing the grid cells available from the WRF simulation.
- The MMIF input file.

Please let me know if you have any questions regarding these requests. Thank you.

SLR

Patrick McKean, CCM

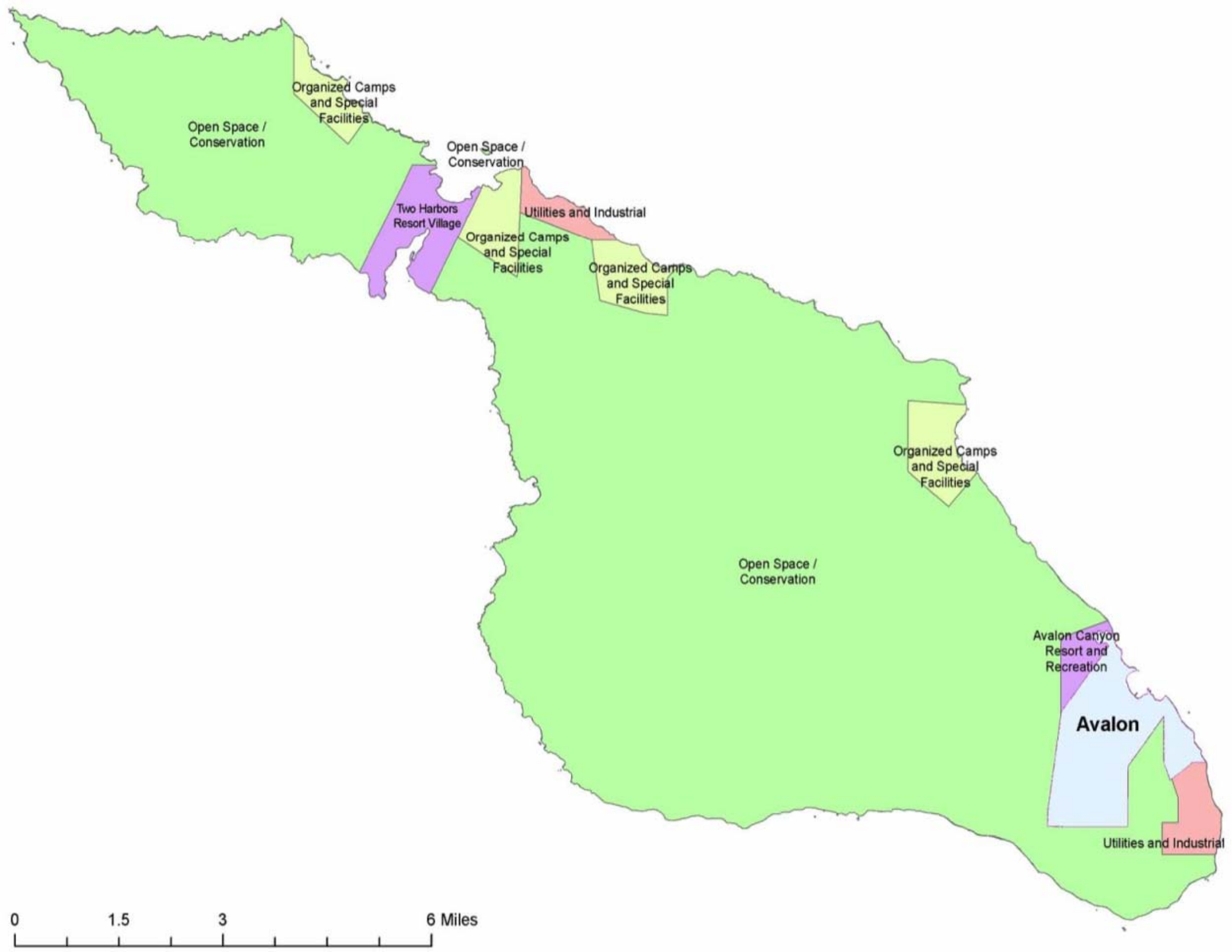
Senior Scientist

d 970-999-3972
c 970-219-6601
o 970-494-0805
e pmckean@slrconsulting.com

SLR International Corporation
1612 Specht Point Road, Suite 119, Fort Collins, CO, 80525

APPENDIX C

CATALINA ISLAND ZONING AND LAND USE MAP


Organized Camps and Special Facilities
Open Space / Conservation
Open Space / Conservation
Two Harbors Resort Village
Utilities and Industrial
Organized Camps and Special Facilities
Organized Camps and Special Facilities
Organized Camps and Special Facilities
Open Space / Conservation
Avalon Canyon Resort and Recreation
Avalon
Utilities and Industrial
0
1.5
3
6 Miles

APPENDIX D

ELECTRONIC MEDIA README FILE FOR DISPERSION AND ADMRT MODELING FILES

AB2588 Revised Health Risk Assessment for the Pebbly Beach Generating Station
SCAQMD ID: 4477
November 2019

This USB flash drive contains electronic model input/output files, and associated inputs and processing data, used in the AB2588 health risk assessment (HRA) for Southern California Edison's (SCE) Pebbly Beach Generating Station.

The individual file contents for each directory are described below:

Executables

General Description

This folder contains AERMOD model and processor PC executables. There are subfolders for each model/processor.

AERMAP

General Description

This folder contains input/output files for all AERMAP runs. The first level subfolder (e.g., 25m, 100m, Avalon_Industrial_Zoning_Area, etc.) indicates the receptor grid that was processed. The file names reflect the receptor grid that was run and are described below. NED terrain elevation data are included in this folder.

File Name	File Contents
*.inp	AERMAP input file
*.out	AERMAP output file
*.rou	Receptor elevations and height scales extracted by AERMAP
*.tif	NED terrain data file

BPIPPRM

General Description

This folder contains BPIPPRM input and output files.

File Name	File Contents
*.inp	BPIP input file
*.out	BPIP output file
*.sum	BPIP summary output file

Emissions

General Description

Modeled toxic air contaminant (TAC) emission rates are provided in Appendix A. Any differences in emission rates between the approved ATIR (Yorke 2019) and those used in the HRA are documented in the HRA report and Appendix A. This folder contains the emissions file used as input to the HARP ADMRT.

File Name	File Contents
*.csv	Emissions file imported to the ADMRT

AERMET

General Description

This folder contains input/output files for the AERMET run. Note that the AERMET input and data files were generated by MMIF by the SCAQMD. Files not listed below are output files for the different AERMET stages.

File Name	File Contents
*.txt	AERSURACE, onsite, and upper air input data files extracted by MMIF
*.in#	AERMET input file where # = 1, 2, and 3 for Stages 1, 2, and 3 processing
*.err	AERMET output error file
*.rpt	AERMET output report file
*.pfl	AERMET output profile file
*.sfc	AERMET output surface file

AERMOD

General Description

This folder contains input/output files for the AERMOD model runs. The first level subfolder (e.g., Avalon_Residential, Cartesian_Grid, etc.) indicates the receptor grid that was run. All file names are identical for each subfolder and are described below.

File Name	File Contents
*.inp	AERMOD input file
*.out	AERMOD output file
*.plt	AERMOD PLOTFILE. File names indicate the source group and averaging period

HARP

General Description

This folder contains the HARP ADMRT model runs. The first level subfolder (e.g., AVALON_RESIDENTIAL, CARTESIAN_GRID_ACUTE_ONLY, etc.) indicates the receptor group that was run. The second level subfolders contain the various files that were generated by the ADMRT. Summary result text files were output from the ADMRT in each subfolder and are described below.

File Name	File Contents
*.txt	Point of Maximum Impact (PMI) and project summary report files

APPENDIX E

AB2588 AIR TOXICS DOCUMENT CERTIFICATION & APPLICATION FORM

South Coast Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • www.aqmd.gov

AB2588 AIR TOXICS DOCUMENT CERTIFICATION & APPLICATION FORM

Please check the appropriate boxes for purpose of submittal:

AIR TOXICS INVENTORY REPORT (ATIR) — INVENTORY YEAR _____

- [ ] FIRST YEAR'S ATIR
- [ ] UPDATE ATIR

HEALTH RISK ASSESSMENT (HRA) — INVENTORY YEAR 2015

- [ ] INITIAL HRA
- [X] REVISED HRA

Facility name
Pebbly Beach Generating Station

Company name
Southern California Edison

Facility address
1 Pebbly Beach Road
Avalon, CA 90704

Mailing address
2244 Walnut Grove Avenue
Rosemead, CA 91770

SCAQMD Facility ID#
4477

Facility SIC #
4911

Contact Person (Company Official)
Ernest A. Diaz

Telephone (Contact Person)
310-882-3456

Preparer (if different from above)

Name: Patrick McKean
Company: SLR International Corporation

Title: Senior Scientist
Telephone: 970-999-3972

I SWEAR UNDER PENALTY OF PERJURY THAT THE DATA SUBMITTED WITH THIS DOCUMENT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, AND CONFORM WITH THE INFORMATION REQUESTED BY THE SCAQMD. I FURTHER ACKNOWLEDGE THAT FAILURE TO SUBMIT THE REQUIRED INFORMATION OR KNOWINGLY SUPPLY FALSE INFORMATION IS SUBJECT TO CIVIL PENALTIES PURSUANT TO THE CALIFORNIA HEALTH AND SAFETY CODE SECTIONS 44381(a) AND 44381(b).

Signature Of Responsible Company Official

Date 4/18/19

Name Of Responsible Company Official (please print)
Ronald P. Hite

Title
Catalina Production Manager