Appendix C3
Health Risk Assessment for the Southern California Intermodal Gateway (SCIG)

Appendix C3
Health Risk Assessment for the Southern California Intermodal Gateway (SCIG)

1.0 Introduction

This document describes the methods and results of a health risk assessment (HRA) that evaluates potential public health effects from toxic air contaminant (TAC) emissions generated by the construction and operation of the Port of Los Angeles SCIG Project (Project or proposed Project). TACs are compounds that are known or suspected to cause adverse health effects after short-term (acute) or long-term (chronic) exposure.

The HRA evaluated health effects associated with the following alternatives:

- Project, with and without mitigation (Project and Mitigated Project)
- No Project
- Reduced Project, with and without mitigation (Reduced Project and Mitigated Reduced Project)

The HRA analyzed Project emissions and potential human exposure to emissions during the 70-year period from 2013 to 2082; the Baseline is based on the 70-year period from 2010-2079.

This HRA was prepared in accordance with the *Health Risk Assessment Protocol for Port of Los Angeles Terminal Improvement Projects* (Protocol) (Port of Los Angeles, 2008). The Protocol is a living document, developed by the Port in consultation with the South Coast Air Quality Management District (SCAQMD), California Air Resources Board (CARB), and Office of Environmental Health Hazard Assessment (OEHHA). In general, the Protocol follows the methodology for preparing Tier 1 risk assessments described in *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2003), *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588)* (SCAQMD, 2005), *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions* (SCAQMD, 2002), and *ARB Health Risk Assessment Guidance for Rail Yard and Intermodal Facilities* (CARB, 2006a). Prior to development of the HRA, a project-specific Protocol was prepared based on methods in the above-cited documents and reviewed by the SCAQMD prior to implementation (POLA, 2008).

The HRA process requires the completion of four general steps to estimate health impact results: (1) quantify Project-generated emissions; (2) identify ground-level receptor locations that may be affected by the emissions (including both a regular grid of receptors and any additional sensitive receptor locations such as schools, hospitals, convalescent homes, and/or daycare centers); (3) perform dispersion modeling analyses to estimate ambient TAC concentrations at each receptor location; and (4) use established methods to estimate potential health effects at each receptor location. The following sections describe in detail the methods used to complete each step of the HRA.

2.0 Development of Emission Scenarios Used in the HRA

2.1 Emission Sources

The following emission sources were included in the health risk assessment:

Locomotives break-down and build activities and idling within the SCIG facility, and off-site train travel between the SCIG facility and the Alameda Corridor, as far north as the intersection of the Alameda Corridor with CA-91. The northern boundary of the emission source domain for off-site train transit was set at CA-91 to be consistent with the truck source domain, described below.

Locomotive emissions in the Baseline only included minor switching activity associated with locomotives calling on certain existing business facilities. Locomotives were otherwise not included in the Baseline as the SCIG facility did not exist in the Baseline year.

Trucks traveling along designated truck routes to and from the SCIG facility, including the following major roadway segments:

- On-site driving and idling
- Pacific Coast Highway (PCH) from the facility to the Terminal Island (TI) Freeway Interchange
- TI Freeway to East I Street and Anaheim Street
- Anaheim Street to Alameda Street
- Alameda Street to Harry Bridges Boulevard
- Harry Bridges Boulevard to West Basin Terminals
- Anaheim Street to the I-710
- I-710 to Port of Long Beach Terminals
- TI Freeway to Terminal Island Terminals

On-site truck emissions include trucks waiting at the SCIG facility in-gate, driving from the in-gate to the on-site loading tracks, and driving and idling on-site to drop off and pick up their loads.

Refueling trucks visiting the SCIG facility were modeled as exiting the facility and using the PCH to the I-110 and I-710 freeways, and then north on these freeways to the interchanges with the I-405.

Drayage trucks of businesses at the alternate sites conducting trips between the Port terminals and their facilities exit the facilities at either the TI Freeway or the Sepulveda Boulevard driveway at the north end of the SCIG facility. Trucks exiting at the Sepulveda Boulevard driveway primarily travel west on Sepulveda to Alameda Street and south on Alameda Street to various Port of Los Angeles and Port of Long Beach terminal destinations. Trucks exiting at the TI Freeway driveway travel south on the TI Freeway to various Port of Los Angeles and Port of Long Beach terminals. In addition to the drayage trucks traveling to and from the Ports, vendor trucks visit certain business sites. These trucks travel on Sepulveda Boulevard to Alameda Street or the I-110 and then north to destinations throughout the South Coast area (for alternate business sites at the Sepulveda driveway), or north on the TI Freeway to the PCH and east or west to the I-110 or I-710 and then north to destinations throughout the South Coast area (for alternate business sites at the TI Freeway driveways). Vendor trucks visiting the sites were tracked as far as the intersection of Alameda Street, the I-110 or the I-710 with the I-405 freeway. Beyond the intersection of these roadways with the I-405, the destinations of these trucks were unknown and a sensitivity analysis indicated that their contributions to the total risk from all Project sources at the maximum occupational and residential receptors were minimal.

In the analysis for the Reduced Project Alternative, the remaining cargo not handled by the SCIG facility would be handled at other railyards such as the UP ICTF. This assumption is based on the projections of regional intermodal demand and the market share of that demand handled by both Class I railroads described in Chapter 1 that will occur independently of the Reduced Project Alternative, thus they are not included in this analysis. In the No Project Alternative, all drayage trucks are modeled as traveling to the Hobart Yard following the truck routes described in Section 3.10.

In the Baseline analysis, drayage trucks traveling between the BNSF Hobart Yard and the Port terminals as well as those between the existing business sites and the Port terminals were modeled. Hobart trucks mainly utilize the I-710 or the I-100 with connection to I-710 via the Gardena Freeway, although some trucks travel along the Terminal Island Freeway and pass by the Project site and others travel along Alameda Street. Trucks from existing business sites primarily exit at the PCH driveways and Sepulveda driveways, and use a variety of major roadways to travel to and from the site and the Port terminals, including:

- On-site driving and idling
- PCH from the site to the Terminal Island (TI) Freeway Interchange
- TI Freeway to Terminal Island
- PCH from the site to the I-710
- I-710 to Port of Long Beach Terminals
- PCH to Alameda Street
- Alameda Street to Harry Bridges Boulevard
- Harry Bridges Boulevard to West Basin Terminals
- Sepulveda Boulevard to the TI Freeway
- TI Freeway to Terminal Island Terminals
- TI Freeway to PCH
- PCH to the I-710
- I-710 to Port of Long Beach Terminals

The Baseline vendor trucks calling on existing business facilities were modeled as traveling east and west on the PCH to the I-710 and I-110 respectively, and north on these freeways to the interchanges with the I-405.

A sensitivity analysis was performed to examine potential impacts from trucks traveling on roadways farther from the facility than the links described above. The sensitivity analysis showed that each roadway segment at these distances contributes no greater than

0.2 percent to the total risks from all Project sources at the maximum residential and occupational receptors. Therefore, these roadway segments were not included in the emission source domain for truck travel.

Rail Yard and Cargo-Handling Equipment at the SCIG facility and alternate business sites, including yard tractors, rail wheel change-out machines, forklifts, top picks and other equipment types.

These equipment types were also modeled in the Baseline for facilities that make use of these equipment types.

Light-Duty Gasoline Vehicles, including service trucks on-site and employee commute vehicles for the SCIG facility and alternate business sites.

Construction Equipment, including off-road diesel equipment, on-road delivery and haul trucks, rail delivery, and general cargo ship delivery. In accordance with SCAQMD guidance, only onsite construction emissions were included in the HRA.

Construction equipment was not modeled for the Baseline and No Project Alternative because those scenarios would have no construction activities.

2.2 TAC Emission Calculation Approach

The determination of health risks in this HRA required the calculation of 70-year average, 40-year average, maximum annual, and maximum 1-hour emission rates. The 70-year-average emission rates were used to determine individual lifetime cancer risks for residents, recreational receptors, and sensitive receptors. Cancer risks for workers were calculated based on TAC emissions calculated over a 40-year period, and cancer risks to student receptors were evaluated based on peak annual emissions evaluated over a 6 year period.

Maximum annual emission rates during project construction and operation were conservatively used to determine chronic non-cancer effects, given that the chronic exposure period for non-cancer effects is assumed to be approximately 12% of a 70-year lifetime, or 8 or more years (OEHHA, 2002). Maximum 1-hour emission rates were used to determine the acute hazard index because the acute exposure period is 1 hour for most TACs.

The extended period of analysis (up to 70 years for cancer risk) required predictions of the future operational characteristics of the proposed emission sources. Two of the more important factors that would affect future emissions from Project sources and that were integrated into the analysis are:

- Reductions in emissions due to (a) the incidental phase-in of cleaner vehicles or equipment due to normal fleet turnover; (b) the future phase-in of cleaner fuels as required by existing regulations or agreements; and (c) the future phase-in of cleaner engines as required by existing regulations or agreements
- Increased vehicle and equipment activity levels due to anticipated increases in container throughput.

Based on the future trends in these factors, this HRA developed annualized 70-year TAC emission rates for each emission source category by using the methods described in Sections 2.3, 2.4, and 2.5. The approaches for estimating maximum annual and 1-hour emissions are described in Sections 2.6 and 2.7, respectively.

The year-by-year particulate matter (PM) and volatile organic compound (VOC) emission calculations by source are attached to this Appendix.

2.3 CEQA Baseline

Both a primary and a secondary methodology were used to develop the CEQA baseline 70-year average TAC emissions. The primary approach is referred to as the floating baseline, and the secondary approach is referred to as the CEQA existing condition baseline (2010). Under both methodologies, the activity levels were held constant for all emissions sources at the baseline (2010) level. Significance determinations regarding the health risk assessment results were based on the CEQA incremental impacts between the floating baseline and the impacts of a given alternative.

Floating Baseline

The floating baseline used for analysis of the Project's health risk impacts incorporate the effects of reduced emissions that would result from planned future air quality regulations, but assumes that activities of existing businesses remain at baseline levels. This approach is consistent with the methodology developed by the Port for previous project HRAs (LAHD 2007, LAHD 2008) and with the recent *Pfeiffer v. City of Sunnyvale City Council, 200 Cal.App.4th 1522* (*Pfeiffer*) decision regarding CEQA baseline analyses.

Emission rates were linearly interpolated between analysis years (2010, 2013, 2014, 2015, 2016, 2023, 2035, 2046, and 2066), and were held constant after the analysis surpassed the extent of existing regulations. After emissions had been determined for the CEQA floating baseline 70-year period, a single 70-year average emissions rate was determined for use in the CEQA floating baseline cancer risk determination.

CEQA Baseline

The emissions factors were also held constant at the values for the CEQA baseline period, i.e., the year 2010. The resulting annual emissions were used to represent the 70-year average emissions for the CEQA baseline risk calculations. This approach is consistent with the *Sunnyvale* decision (14 Cal. Code Regs. Section 15125: *Sunnyvale West Neighborhood Association v. City of Sunnyvale City Council*, 190 Cal.App.4th 1351, discussed in detail in Chapter 3.2) regarding the CEQA baseline analyses.

2.4 Emission Factor Trends

The following methods were used in this HRA to develop the 70-year trends in annual emission factors for unmitigated emissions.

1. **Trucks**. Due to the promulgation of future USEPA and CARB emission standards, the San Pedro Bay Ports Clean Truck Program (CTP), coupled with normal truck fleet turnover, unmitigated emission factors for trucks will decrease with time. The emission factors also assume the use of CARB ULSD (maximum 15ppm sulfur) starting September 1, 2006, in accordance with existing California Diesel Fuel Regulations (CARB, 2004b). Composite truck emission factors were developed using the EMFAC2011 emission factor model (CARB, 2011a). Emission factors were calculated for several analysis years between 2010 and 2066. Actual inventory data for on-road trucks that serviced the San Pedro Bay ports container terminals were used to develop the truck fleet age distribution used in EMFAC2011 for the Baseline analysis (Starcrest, 2011). Inventory projections developed for the San Pedro Bay Port CAAP were used to develop fleet age distributions for future years. This approach accounts for a small percentage of older trucks being retired each year and

replaced with newer, cleaner trucks through normal fleet turnover, and the accelerated turnover effects of the Ports' CTP and the CARB drayage truck rule and in-use truck and bus rule. Given a lack of information on how emission factors would change beyond the year 2046, emission factors after the year 2046 were held constant at 2046 levels.

2. **Locomotives.** Locomotive future-year emission factors were developed considering the 1998 and 2005 CARB MOUs and the fleet average requirements and forecasting developed as part of the MOU analyses. The 2005 CARB railyard MOU was used to determine 2016 opening year locomotive fleet mixes, which require a Tier 2 linehaul locomotive average standard. Forecasts of the linehaul locomotive fleet mix from the 2005 CARB Railyard MOU were used as a basis for projecting the fleet mix to future years until 2019, after which the projections were matched with those of the USEPA nationwide locomotive emission standard implementation schedule (USEPA, 1998). In general, locomotive emission factors decline in future years as older locomotives gradually are replaced with newer locomotives meeting the USEPA tiered emission standards. The emission factors also assume the use of ULSD with 15 ppm sulfur, which is nationally required for locomotives by the opening year of the SCIG facility. Emission factors after the year 2046 were held constant at 2046 levels.

3. **Rail Yard and Cargo-Handling Equipment.** Emission factors for rail yard equipment, including the emergency generator and TRU's, and cargo-handling equipment were calculated to year 2046 using methodology from the CARB OFFROAD2007 Emissions Model (CARB, 2007a) and CHE calculator (CARB, 2007b). For cargo-handling equipment, this methodology accounts for the tiered implementation of future engine standards from existing CARB and USEPA rules, coupled with an assumed equipment-fleet turnover rate. To estimate future year emission factors for cargo-handling equipment of alternate business sites, the models were run using the actual Baseline equipment population at the existing business sites in 2010. With each future analysis year, the equipment population was allowed to age in the models until it would reach its useful lifetime, at which point it would be assumed to be replaced by new equipment meeting current emission standards. The new replacement equipment would then age in a similar manner. As a result, emission factors for cargo-handling equipment tend to gradually increase with time as equipment ages, followed by a sharp reduction in emission factors upon replacement with new equipment. The emission factors also assume the use of CARB ULSD fuel (maximum 15ppm sulfur), for the purposes of the risk assessment), in accordance with California Diesel Fuel Regulations (CARB, 2004b). Emission factors after the year 2046 were held constant at 2046 levels. For the emergency generator, the generator was assumed to meet EPA Tier 4 emissions levels for all analysis years. The TRU's were modeled using the OFFROAD2007 model and considering the CARB air toxics control measure (ACTM) for TRU's.

4. **Light-Duty Gasoline Vehicles**. Emissions factors for light-duty gasoline vehicles, including light-duty gasoline service trucks operating at the SCIG facility and light-duty gasoline automobiles used for employee commutes at the SCIG facility and alternate business facilities were developed using the EMFAC2011 model. Vehicles were assumed to meet the default South Coast Air Basin fleet mixes by vehicle type, and the EMFAC2011 model was used to calculate emission factors for each analysis year, considering normal fleet turnover.

5. **Construction Equipment**. Emissions from diesel-powered construction equipment were calculated using emission factors derived from OFFROAD2007. Using South Coast Air Basin fleet information, the OFFROAD model was run for each of the

construction years from 2013 through 2015. Emission factors were calculated based on each type of equipment and horsepower rating of the equipment.

2.5 Activity Level Trends

The second parameter needed to develop source category emission rates is the annual source activity levels expected each year over the 70-year period. Examples of activity levels include the container throughput at the SCIG facility, the subsequent required number of train and truck trips, on-site equipment usage, truck vehicle miles traveled (VMT), and truck travel speeds.

For the floating baseline and CEQA baseline scenarios, existing business activity levels in 2010 were held constant over the entire 70-year period.

2.6 70-Year and 40-Year Average Emission Rates

For diesel internal combustion engines (ICEs), which represent the majority of emission sources associated with SCIG, DPM is the only pollutant needed for the cancer risk analysis (which uses 70-year-average emission rates for residential, recreational, and sensitive receptor risks and the 40-year average emission rates for worker risk). The cancer slope factor established by OEHHA for the assessment of DPM cancer risk includes consideration of the individual toxic species that could be adsorbed onto DPM particles.

For all other source types (tire and brake wear and alternative-fueled engines) speciating combustion emissions into individual TAC components was necessary. Speciation profiles based on those developed by the CARB were used in this study (CARB, 2011b). Table C3-2-1 presents the speciation profiles that were used to convert total organic gas (TOG) and particulate matter (PM) combustion emissions into individual TAC emissions.

Table C3-2-1. Speciation Profiles for Diesel and Alternative Fuel Combustion Sources.[a]

Pollutant	CAS Number	Weight Percent					
		PM_{10} Profile Diesel No. 425[b]	PM_{10} Profile LNG No. 123[b]	PM_{10} Profile Propane No. 123[b]	TOG Profile Diesel[c,d,e] No. 818	TOG Profile LNG[c,d,f] No. 719	TOG Profile Propane[c,d,f] No. 719
Acetaldehyde	75070	--	--	--	7.35	0.03	0.03
Acetone	67641	--	--	--	7.51	0.0	0.0
Acetylene	74862	--	--	--	4.25	0.32	0.32
Alkene Ketone		--	--	--	1.75	0.0	0.0
Benzaldehyde	100527	--	--	--	0.70	0.0	0.0
Benzene	71432	--	--	--	2.00	0.11	0.11
Bromine	7726956	--	0.05	0.05	--	0.0	0.0
1,3-Butadiene	106990	--	--	--	0.19	--	--
N-Butane	106978	--	--	--	0.10	1.00	1.00
1-Butene	106989	--	--	--	0.67	0.01	0.01
cis-2-Butene	590181	--	--	--	0.094	0.02	0.02
trans-2-Butene	624646	--	--	--	0.20	0.13	0.13
Butyraldehyde	123728	--	--	--	1.87	0.02	0.02
C10 Aromatics		--	--	--	0.079	0.0	0.0
C10 Dialkyl benzenes		--	--	--	--	0.01	0.01
C10 Internal alkenes		--	--	--	--	0.02	0.02
C5 Aldehyde		--	--	--	0.11	--	--
C6 Aldehydes		--	--	--	3.80	--	--
C9 Aromatics		--	--	--	0.50	0.01	0.01

Pollutant	CAS Number	Weight Percent					
		PM_{10} Profile Diesel No. 425[b]	PM_{10} Profile LNG No. 123[b]	PM_{10} Profile Propane No. 123[b]	TOG Profile Diesel[c,d,e] No. 818	TOG Profile LNG[c,d,f] No. 719	TOG Profile Propane[c,d,f] No. 719
C9 Internal alkenes		--	--	--	--	0.04	0.04
Calcium	7440702	--	0.55	0.55	--	--	--
Carbon Elemental	7440440	--	20.0	20.0	--	--	--
Chlorine	7782505	--	7.0	7.0	--	--	--
Chromium	7440473	--	0.05	0.05	--	--	--
Cobalt	7440484	--	0.05	0.05	--	--	--
Copper	7440508	--	0.05	0.05	--	--	--
Cyclohexane	110827	--	--	--	0.026	0.01	0.01
Cyclohexanone	108941	--	--	--	0.11	--	--
Cyclopentane	287923	--	--	--	0.012	0.02	0.02
N-Decane	124185	--	--	--	0.53	0.01	0.01
1,2-Diethylbenzene (Ortho)	135013	--	--	--	0.086	--	--
2,3-Dimethyl-1-butene	563780	--	--	--	0.028	--	--
3,3-Dimethyl-1-butene	558372	--	--	--	2.82	--	--
2,2-Dimethylbutane	75832	--	--	--	0.061	0.01	0.01
2,3-Dimethylhexane	584941	--	--	--	0.011	--	--
2,4-Dimethylhexane	589435	--	--	--	0.036	--	--
2,3-Dimethylpentane	565593	--	--	--	0.073	--	--
2,4-Dimethylpentane	108087	--	--	--	0.019	0.01	0.01
DPM	9901	100.00	--	--	--	--	--
Ethane	74840	--	--	--	0.57	13.99	13.99
Ethanol	64175	--	--	--	0.009	--	--
Ethylbenzene	100414	--	--	--	0.31	0.01	0.01
Ethylene	74851	--	--	--	14.38	0.63	0.63
Ethylhexane		--	--	--	0.061	--	--
Formaldehyde	50000	--	--	--	14.71	0.81	0.81
N-Heptane	142825	--	--	--	0.068	0.02	0.02
1-Heptene	592767	--	--	--	--	0.01	0.01
N-Hexane	110543	--	--	--	0.16	0.02	0.02
Hexavalent chromium[g]	18540299	--	0.0025	0.0025	--	--	--
Indan	496117	--	--	--	0.19	--	--
Iron	7439896	--	0.05	0.05	--	--	--
Isobutane	75285	--	--	--	1.22	0.43	0.43
Isobutylene	115117	--	--	--	0.92	0.02	0.02
Isomers Of Butene		--	--	--	--	0.26	0.26
Isomers Of Butylbenzene		--	--	--	0.13	--	--
Isomers Of Decane		--	--	--	--	0.02	0.02
Isomers Of Diethylbenzene		--	--	--	0.14	--	--
Isomers Of Heptane		--	--	--	--	0.04	0.04
Isomers Of Hexane		--	--	--	--	0.02	0.02
Isomers Of Nonane		--	--	--	--	0.01	0.01
Isomers Of Octane		--	--	--	--	0.02	0.02
Isomers Of Pentane		--	--	--	--	0.13	0.13
Isomers Of Xylene	1330207	--	--	--	--	0.02	0.02
Isopentane	78784	--	--	--	0.60	--	--
Isopropylbenzene (Cumene)	98828	--	--	--	0.015	--	--
Manganese	7439965	--	0.05	0.05	--	--	--
Methane	74828	--	--	--	4.08	76.64	76.64
Methyl Alcohol	67561	--	--	--	0.030	--	--
Methyl Ethyl Ketone (MEK) (2-Butanone)	78933	--	--	--	1.48	--	--

Pollutant	CAS Number	Weight Percent					
		PM_{10} Profile Diesel No. 425[b]	PM_{10} Profile LNG No. 123[b]	PM_{10} Profile Propane No. 123[b]	TOG Profile Diesel[c,d,e] No. 818	TOG Profile LNG[c,d,f] No. 719	TOG Profile Propane[c,d,f] No. 719
Methyl N-Butyl Ketone	591786	--	--	--	0.90	--	--
2-Methyl-1-Pentene	763291	--	--	--	--	0.02	0.02
2-Methyl-2-Butene	513359	--	--	--	--	0.01	0.01
1-Methyl-2-Ethylbenzene	611143	--	--	--	0.14	0.01	0.01
1-Methyl-3-Ethylbenzene	620144	--	--	--	0.25	0.01	0.01
Methylcyclohexane	108872	--	--	--	0.068	0.02	0.02
Methylcyclopentane	96377	--	--	--	0.15	0.04	0.04
2-Methylheptane	592278	--	--	--	0.057	--	--
3-Methylheptane	589811	--	--	--	--	0.02	0.02
2-Methylhexane	591764	--	--	--	0.12	--	--
3-Methylhexane	589344	--	--	--	0.35	0.01	0.01
2-Methylpentane	107835	--	--	--	0.39	--	--
3-Methylpentane	96140	--	--	--	0.12	0.02	0.02
(1-Methylpropyl)Benzene	135988	--	--	--	0.051	--	--
(2-Methylpropyl)Benzene	538932	--	--	--	0.13	--	--
B-Methylstyrene	637503	--	--	--	0.047	0.0	0.0
Naphthalene	91203	--	--	--	0.085	--	--
Nickel	7440020	--	0.05	0.05	--	--	--
Nitrates	14797558	--	0.55	0.55	--	--	--
N-Nonane	111842	--	--	--	0.23	0.01	0.01
1-Nonene	124118	--	--	--	--	0.01	0.01
N-Octane	111659	--	--	--	0.14	0.02	0.02
1-Octene	111660	--	--	--	--	0.01	0.01
Other		--	25.95	25.95	--	--	--
N-Pentane	109660	--	--	--	0.18	0.13	0.13
1-Pentene	109671	--	--	--	0.32	0.01	0.01
Cis-2-Pentene	627203	--	--	--	0.030	--	--
Trans-2-Pentene	646048	--	--	--	0.040	0.01	0.01
Potassium	7440097	--	0.55	0.55	--	--	--
1,2-Propadiene	463490	--	--	--	0.47	--	--
Propane	74986	--	--	--	0.19	2.91	2.91
Propionaldehyde	123386	--	--	--	0.97	--	--
N-Propylbenzene	103651	--	--	--	0.12	--	--
Propylene	115071	--	--	--	2.60	1.69	1.69
Styrene	100425	--	--	--	0.058	--	--
Sulfates	9960	--	45.0	45.0	--	--	--
T-Butylbenzene	98066	--	--	--	0.006	--	--
Toluene	108883	--	--	--	1.47	0.04	0.04
1,2,3-Trimethylbenzene	526738	--	--	--	0.12	0.01	0.01
1,2,4-Trimethylbenzene	95636	--	--	--	0.53	0.01	0.01
1,3,5-Trimethylbenzene	108678	--	--	--	0.19	0.02	0.02
2,2,4-Trimethylpentane	540841	--	--	--	0.30	--	--
2,3,4-Trimethylpentane	565753	--	--	--	0.015	--	--
N-Undecane	1120214	--	--	--	0.26	--	--
Unidentified		--	--	--	13.86	--	--
M-Xylene	108383	--	--	--	0.61	0.01	0.01
O-Xylene	95476	--	--	--	0.34	0.01	0.01
P-Xylene	106423	--	--	--	0.10	--	--
Zinc	7440666	--	0.05	0.05	--	--	--
Applicable Emissions		Locomotives,	Locomotives	Locomotives,	Cargo handling	Cargo	Cargo

Pollutant	CAS Number	Weight Percent					
		PM_{10} Profile Diesel No. 425[b]	PM_{10} Profile LNG No. 123[b]	PM_{10} Profile Propane No. 123[b]	TOG Profile Diesel[c,d,e] No. 818	TOG Profile LNG[c,d,f] No. 719	TOG Profile Propane[c,d,f] No. 719
Sources:		switchers, cargo handling equipment, emergency generator, trucks – diesel fuel.	switchers, cargo handling equipment, emergency generator, trucks – diesel fuel.	switchers, cargo handling equipment, emergency generator, trucks – diesel fuel.	equipment and hostlers	handling equipment and hostlers	handling equipment and hostlers

Notes:

a) Other speciation profiles used in the HRA but not shown in this table are PM_{10} Profile No. 472 (Truck Tire Wear) and PM_{10} Profile No. 473 (Truck Brake Wear).
b) CARB 2011b
c) CARB 2011b
d) TOG – total organic gas.
e) For Profile No. 818, TOG is 87.85 percent VOC.
f) For Profile No. 719, TOG is 9.14 percent VOC.
g) Hexavalent chromium is assumed to be 5 percent of total chromium, in accordance with the CARB AB2588 Technical Support Document (SCAQMD, 2005), page 57.

Source:

California Environmental Protection Agency Air Resources Board (CARB). 2011b. Speciation Profiles Used in ARB Modeling.

For each emission source category, PM and TOG emissions were calculated for specific analysis years (2010, 2013, 2014, 2015, 2016, 2023, 2035, 2046, and 2066 for the floating baseline; 2010 for the CEQA baseline; 2013-2015 for construction; and 2016, 2023, 2035, 2046, and 2066 for each Project alternative) by multiplying the source activity level by the emission factors for that particular year. The resulting annual emission rates for each pollutant were then averaged to produce the 70-year average PM and TOG emission rates, to be used for the residential, recreational, and sensitive receptor risk calculations, and the 40-year average PM and TOG emission rates, to be used for the worker receptor risk calculations. Maximum annual emissions, described in Section 2.6 below, were used for the student risk calculations. For the 70- and 40-year average emissions, it was assumed that emissions change linearly between analysis years and remain at the 2046 emission rate until the end of the period, where the 70-year period runs from 2013 through 2082 and the 40-year period runs from 2013 through 2052 for the Project alternatives, and where the 70-year period runs from 2010 through 2079 and the 40-year period runs from 2010 through 2049 for the floating baseline. The only exception is that the CEQA baseline 70-year average emission rate and 40-year average emission rate are simply the 2010 emission rate. Tables C3-2-2 through C3-2-8 present the 70-year average, 40-year average, maximum annual, and maximum hourly TAC emission rates used in this HRA for the Floating Baseline, Unmitigated Project, Mitigated Project, No Project Alternative, Unmitigated Reduced Project Alternative, Mitigated Reduced Project Alternative, and CEQA Baseline, respectively.

Table C3-2-2. Toxic Air Contaminant Emissions by Source - Floating Baseline.

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]		40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]				Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	Hexavalent Chromium	DPM	Chlorine	Cobalt	DPM	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Hobart Trucks	1.8E+03	8.2E-02	1.9E+03	8.3E+00	0.0E+00	2.8E+03	9.5E-01	1.0E-01	2.0E-01	1.3E-04	6.6E-03
Existing Business CHE	4.6E+02	0.0E+00	6.8E+02	6.6E+01	4.7E-01	2.0E+03	4.7E-01	7.9E-02	1.9E-01	1.5E-04	1.3E-01
Existing Business Offsite Gasoline Vehicles	0.0E+00	2.4E-02	0.0E+00	5.6E+00	3.1E-02	0.0E+00	3.1E-01	1.6E-03	9.0E-03	1.1E-04	1.0E-02
Existing Business Offsite Trucks	5.7E+02	5.0E-02	6.6E+02	4.3E+01	2.7E-01	2.5E+03	7.8E-01	1.2E-01	2.5E-01	2.5E-04	8.3E-02
Existing Business Onsite Gasoline Vehicles	0.0E+00	6.4E-04	0.0E+00	8.2E-01	5.7E-03	0.0E+00	1.1E-02	2.6E-04	1.4E-03	3.7E-06	1.8E-03
Existing Business Onsite Locomotives	1.3E+01	0.0E+00	1.3E+01	0.0E+00	0.0E+00	1.3E+01	0.0E+00	1.4E-03	2.8E-03	8.7E-08	8.0E-05
Existing Business Onsite Trucks	1.1E+02	3.4E-03	1.4E+02	5.1E+00	3.5E-02	8.8E+02	6.8E-02	1.4E-01	2.9E-01	2.5E-05	1.4E-02
Total - All Sources	**3.0E+03**	**1.6E-01**	**3.4E+03**	**1.3E+02**	**8.2E-01**	**8.1E+03**	**2.6E+00**	**4.5E-01**	**9.4E-01**	**6.7E-04**	**2.5E-01**

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.

c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.

d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine, cobalt, and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.

e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

Table C3-2-3. Toxic Air Contaminant Emissions by Source - Unmitigated Project.

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]		40-Year-Average Emissions (lb/yr)[b,c]		Maximum Annual Emissions (lb/yr)[c,d]						Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	Hexavalent Chromium	DPM	Hexavalent Chromium	Chlorine	Cobalt	DPM	Formaldehyde	Manganese	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Emergency Generator	7.8E+00	0.0E+00	7.6E+00	0.0E+00	0.0E+00	0.0E+00	8.2E+00	8.3E+00	0.0E+00	0.0E+00	2.1E-02	4.2E-02	7.8E-07	7.2E-04
Hostler	0.0E+00	9.5E-04	0.0E+00	7.9E-04	3.3E+00	2.3E-02	0.0E+00	3.1E+02	2.3E-02	2.3E-02	1.5E-03	4.1E-02	3.0E-06	2.7E-03
Onsite Refueling Trucks	7.4E-01	5.6E-06	6.3E-01	4.8E-06	6.8E-04	0.0E+00	8.8E-01	9.0E+00	2.0E-04	2.0E-04	5.2E-04	1.0E-03	1.1E-08	1.8E-06
SCIG CHE/TRU	5.1E+00	0.0E+00	4.8E+00	0.0E+00	0.0E+00	0.0E+00	7.6E+00	6.8E+00	0.0E+00	0.0E+00	6.6E-03	1.3E-02	2.8E-07	2.6E-04
SCIG Construction	1.8E+02	1.1E-05	3.1E+02	1.9E-05	3.2E-02	3.9E-06	7.8E+03	4.4E+03	1.2E-02	1.2E-02	1.3E+00	2.7E+00	8.9E-05	8.0E-02
SCIG Offsite Gasoline Vehicles	0.0E+00	8.2E-03	0.0E+00	6.8E-03	1.2E+00	5.2E-03	0.0E+00	1.1E+00	2.8E-01	2.8E-01	2.3E-05	1.3E-04	1.3E-05	5.5E-04
SCIG Offsite Locomotives	2.4E+02	0.0E+00	2.7E+02	0.0E+00	0.0E+00	0.0E+00	4.2E+02	1.3E+02	0.0E+00	0.0E+00	7.5E-03	1.5E-02	9.2E-07	8.4E-04
SCIG Offsite Trucks	1.2E+03	6.1E-02	9.8E+02	5.1E-02	7.4E+00	0.0E+00	1.4E+03	1.0E+03	2.1E+00	2.1E+00	6.6E-02	1.3E-01	1.1E-04	3.4E-03
SCIG Onsite Gasoline Vehicles	0.0E+00	1.2E-03	0.0E+00	1.1E-03	2.7E+00	1.9E-02	0.0E+00	2.3E+00	2.9E-02	2.9E-02	4.7E-05	2.7E-04	2.6E-06	2.0E-03
SCIG Onsite Locomotives	1.5E+02	0.0E+00	1.6E+02	0.0E+00	0.0E+00	0.0E+00	2.5E+02	8.9E+01	0.0E+00	0.0E+00	5.1E-03	1.0E-02	5.5E-07	5.1E-04
SCIG Onsite Trucks	6.1E+02	2.5E-02	5.0E+02	2.1E-02	3.1E+00	0.0E+00	7.5E+02	2.3E+03	8.9E-01	8.9E-01	1.5E-01	3.0E-01	4.7E-05	1.8E-03
Alternate Business Location CHE	2.3E+02	6.7E-03	3.5E+02	6.8E-03	1.8E+01	1.3E-01	9.1E+02	1.7E+02	1.3E-01	1.3E-01	2.0E-02	4.7E-02	3.7E-05	3.4E-02
Alternate Business Location Construction	6.5E+00	0.0E+00	1.1E+01	0.0E+00	0.0E+00	0.0E+00	4.5E+02	2.1E+02	0.0E+00	0.0E+00	5.8E-02	1.2E-01	4.6E-06	4.2E-03
Alternate Business Location Offsite Gasoline Vehicles	0.0E+00	7.4E-03	0.0E+00	7.4E-03	2.5E+00	1.1E-02	0.0E+00	8.1E+00	5.8E-01	5.8E-01	3.8E-04	2.1E-03	6.1E-05	2.6E-03
Alternate Business Location Offsite Trucks	2.7E+02	2.1E-02	2.9E+02	2.1E-02	3.4E+01	2.1E-01	1.3E+03	4.8E+02	1.6E+00	1.6E+00	6.9E-02	1.4E-01	2.2E-04	6.1E-02

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]		40-Year-Average Emissions (lb/yr)[b,c]		Maximum Annual Emissions (lb/yr)[c,d]						Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	Hexavalent Chromium	DPM	Hexavalent Chromium	Chlorine	Cobalt	DPM	Formaldehyde	Manganese	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Alternate Business Location Onsite Gasoline Vehicles	0.0E+00	1.8E-04	0.0E+00	1.8E-04	1.6E-01	1.1E-03	0.0E+00	6.7E-01	4.6E-03	4.6E-03	3.4E-05	1.9E-04	6.9E-07	2.9E-04
Alternate Business Location Onsite Locomotives	2.0E+00	0.0E+00	2.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E+00	1.1E+00	0.0E+00	0.0E+00	1.4E-04	2.9E-04	9.0E-09	8.3E-06
Alternate Business Location Onsite Trucks	5.1E+01	1.6E-03	5.8E+01	1.6E-03	6.5E-01	3.6E-03	1.6E+02	3.3E+02	4.5E-02	4.5E-02	5.1E-02	1.0E-01	6.8E-06	1.8E-03
Total - All Sources	**2.9E+03**	**1.3E-01**	**3.0E+03**	**1.2E-01**	**7.4E+01**	**4.0E-01**	**1.3E+04**	**9.5E+03**	**5.7E+00**	**5.7E+00**	**1.8E+00**	**3.6E+00**	**6.1E-04**	**2.0E-01**

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.

c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.

d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine, cobalt, formaldehyde, manganese, and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.

e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

Table C3-2-4. Toxic Air Contaminant Emissions by Source - Mitigated Project.

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]	40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]						Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	DPM	Chlorine	Cobalt	DPM	Formaldehyde	Manganese	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Emergency Generator	7.8E+00	7.6E+00	0.0E+00	0.0E+00	8.2E+00	8.3E+00	0.0E+00	0.0E+00	2.1E-02	4.2E-02	7.8E-07	7.2E-04
Hostler	0.0E+00	0.0E+00	3.3E+00	2.3E-02	0.0E+00	3.1E+02	2.3E-02	2.3E-02	1.5E-03	4.1E-02	3.0E-06	2.7E-03
Onsite Refueling Trucks	7.4E-01	6.3E-01	6.8E-04	0.0E+00	8.8E-01	9.0E+00	2.0E-04	7.7E-05	5.2E-04	1.0E-03	1.1E-08	1.8E-06
SCIG CHE/TRU	5.1E+00	4.8E+00	0.0E+00	0.0E+00	7.6E+00	6.8E+00	0.0E+00	0.0E+00	6.6E-03	1.3E-02	2.8E-07	2.6E-04
SCIG Construction	6.0E+01	1.0E+02	3.2E-02	3.9E-06	2.6E+03	3.3E+03	1.2E-02	4.6E-03	1.1E+00	2.1E+00	3.6E-05	3.2E-02
SCIG Offsite Gasoline Vehicles	0.0E+00	0.0E+00	1.2E+00	5.2E-03	0.0E+00	1.1E+00	2.8E-01	1.1E-01	2.3E-05	1.3E-04	1.3E-05	5.5E-04
SCIG Offsite Locomotives	2.4E+02	2.7E+02	0.0E+00	0.0E+00	4.2E+02	1.3E+02	0.0E+00	0.0E+00	7.5E-03	1.5E-02	9.2E-07	8.4E-04
SCIG Offsite Trucks	2.0E+02	1.9E+02	9.2E+01	6.1E-01	3.5E+02	3.7E+02	2.8E+00	1.4E+00	2.1E-02	4.7E-02	1.9E-04	7.2E-02
SCIG Onsite Gasoline Vehicles	0.0E+00	0.0E+00	2.7E+00	1.9E-02	0.0E+00	2.3E+00	2.9E-02	2.3E-02	4.7E-05	2.7E-04	2.6E-06	2.0E-03
SCIG Onsite Locomotives	1.5E+02	1.6E+02	0.0E+00	0.0E+00	2.5E+02	8.9E+01	0.0E+00	0.0E+00	5.1E-03	1.0E-02	5.5E-07	5.1E-04
SCIG Onsite Trucks	1.0E+02	9.6E+01	4.8E+01	3.2E-01	1.6E+02	6.9E+02	1.2E+00	6.7E-01	3.8E-02	9.0E-02	8.7E-05	3.8E-02
Alternate Business Location CHE	2.3E+02	3.5E+02	1.8E+01	1.3E-01	9.1E+02	1.7E+02	1.3E-01	1.3E-01	2.0E-02	4.7E-02	3.7E-05	3.4E-02
Alternate Business Location Construction	4.6E+00	8.1E+00	0.0E+00	0.0E+00	3.2E+02	1.8E+02	0.0E+00	0.0E+00	4.3E-02	8.6E-02	5.6E-06	5.1E-03
Alternate Business Location Offsite Gasoline Vehicles	0.0E+00	0.0E+00	2.5E+00	1.1E-02	0.0E+00	8.1E+00	5.8E-01	2.3E-01	3.8E-04	2.1E-03	6.1E-05	2.6E-03

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]	40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]						Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	DPM	Chlorine	Cobalt	DPM	Formaldehyde	Manganese	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Alternate Business Location Offsite Trucks	2.7E+02	2.9E+02	3.4E+01	2.1E-01	1.3E+03	4.8E+02	1.6E+00	7.5E-01	6.9E-02	1.4E-01	2.2E-04	6.1E-02
Alternate Business Location Onsite Gasoline Vehicles	0.0E+00	0.0E+00	1.6E-01	1.1E-03	0.0E+00	6.7E-01	4.6E-03	2.5E-03	3.4E-05	1.9E-04	6.9E-07	2.9E-04
Alternate Business Location Onsite Locomotives	2.0E+00	2.0E+00	0.0E+00	0.0E+00	1.9E+00	1.1E+00	0.0E+00	0.0E+00	1.4E-04	2.9E-04	9.0E-09	8.3E-06
Alternate Business Location Onsite Trucks	5.1E+01	5.8E+01	6.5E-01	3.6E-03	1.6E+02	3.3E+02	4.5E-02	2.0E-02	5.1E-02	1.0E-01	6.8E-06	1.8E-03
Total - All Sources	**1.3E+03**	**1.5E+03**	**2.0E+02**	**1.3E+00**	**6.4E+03**	**6.1E+03**	**6.7E+00**	**3.4E+00**	**1.4E+00**	**2.8E+00**	**6.7E-04**	**2.5E-01**

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.

c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.

d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine, cobalt, formaldehyde, manganese, and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.

e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

Table C3-2-5. Toxic Air Contaminant Emissions by Source - No Project Alternative.

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]		40-Year-Average Emissions (lb/yr)[b,c]		Maximum Annual Emissions (lb/yr)[c,d]				Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	**Hexavalent Chromium**	**DPM**	**Hexavalent Chromium**	**Chlorine**	**DPM**	**Manganese**	**Nickel**	**Acetaldehyde**	**Formaldehyde**	**Nickel**	**Sulfates**
Hobart Trucks	4.8E+03	2.4E-01	4.1E+03	2.0E-01	2.9E+01	5.9E+03	8.3E+00	3.2E+00	2.3E-01	4.5E-01	4.4E-04	1.4E-02
Business CHE	4.5E+02	0.0E+00	6.4E+02	0.0E+00	7.3E+01	2.0E+03	5.2E-01	5.2E-01	7.7E-02	1.9E-01	1.6E-04	1.5E-01
Business Offsite Gasoline Vehicles	0.0E+00	2.8E-02	0.0E+00	2.8E-02	3.8E+00	0.0E+00	8.5E-01	3.4E-01	6.5E-04	3.7E-03	1.1E-04	4.9E-03
Business Offsite Trucks	5.8E+02	5.6E-02	6.1E+02	5.6E-02	3.3E+01	1.5E+03	1.7E+00	7.7E-01	1.0E-01	2.1E-01	2.5E-04	6.0E-02
Business Onsite Gasoline Vehicles	0.0E+00	7.5E-04	0.0E+00	7.4E-04	6.7E-01	0.0E+00	2.0E-02	1.1E-02	1.7E-04	9.4E-04	3.7E-06	1.4E-03
Business Onsite Locomotives	1.5E+01	0.0E+00	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	1.7E-03	3.3E-03	1.0E-07	9.5E-05
Business Onsite Trucks	9.7E+01	3.8E-03	1.1E+02	3.8E-03	1.9E+00	4.3E+02	1.1E-01	4.9E-02	1.2E-01	2.4E-01	1.8E-05	5.1E-03
Total - All Sources	**6.0E+03**	**3.2E-01**	**5.5E+03**	**2.9E-01**	**1.4E+02**	**9.9E+03**	**1.1E+01**	**4.9E+00**	**5.3E-01**	**1.1E+00**	**9.9E-04**	**2.3E-01**

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.

c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.

d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine, manganese, and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.

e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

Table C3-2-6. Toxic Air Contaminant Emissions by Source - Unmitigated Reduced Project Alternative.

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]		40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]			Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	Hexavalent Chromium	DPM	Chlorine	DPM	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Emergency Generator	7.8E+00	0.0E+00	7.6E+00	0.0E+00	8.2E+00	0.0E+00	2.1E-02	4.2E-02	7.8E-07	7.2E-04
Hostler	0.0E+00	6.5E-04	0.0E+00	2.2E+00	0.0E+00	1.5E-02	1.0E-03	2.7E-02	2.0E-06	1.8E-03
Onsite Refueling Trucks	5.7E-01	4.3E-06	5.0E-01	5.1E-04	6.6E-01	5.8E-05	3.9E-04	7.8E-04	8.1E-09	1.4E-06
SCIG CHE/TRU	5.1E+00	0.0E+00	4.8E+00	0.0E+00	7.6E+00	0.0E+00	6.6E-03	1.3E-02	1.1E-08	1.0E-05
SCIG Construction	1.8E+02	1.1E-05	3.1E+02	3.2E-02	7.8E+03	4.6E-03	1.3E+00	2.7E+00	8.9E-05	8.0E-02
SCIG Offsite Gasoline Vehicles	0.0E+00	5.6E-03	0.0E+00	8.3E-01	0.0E+00	7.6E-02	1.5E-05	8.7E-05	8.8E-06	3.7E-04
SCIG Offsite Locomotives	2.0E+02	0.0E+00	2.3E+02	0.0E+00	4.2E+02	0.0E+00	7.4E-03	1.5E-02	9.2E-07	8.4E-04
SCIG Offsite Trucks	8.1E+02	4.2E-02	7.0E+02	4.9E+00	9.6E+02	5.6E-01	4.5E-02	8.9E-02	7.5E-05	2.3E-03
SCIG Onsite Gasoline Vehicles	0.0E+00	1.1E-03	0.0E+00	2.6E+00	0.0E+00	2.1E-02	4.5E-05	2.5E-04	2.4E-06	1.9E-03
SCIG Onsite Locomotives	1.3E+02	0.0E+00	1.5E+02	0.0E+00	2.5E+02	0.0E+00	5.1E-03	1.0E-02	5.5E-07	5.1E-04
SCIG Onsite Trucks	4.2E+02	1.7E-02	3.6E+02	2.0E+00	5.0E+02	2.3E-01	9.9E-02	2.0E-01	3.1E-05	1.2E-03
Alternate Business Location CHE	2.3E+02	6.7E-03	3.5E+02	1.8E+01	9.1E+02	1.3E-01	2.0E-02	4.7E-02	3.7E-05	3.4E-02
Alternate Business Location Construction	6.5E+00	0.0E+00	1.1E+01	0.0E+00	4.5E+02	0.0E+00	5.8E-02	1.2E-01	4.6E-06	4.2E-03
Alternate Business Location Offsite Gasoline Vehicles	0.0E+00	7.4E-03	0.0E+00	2.5E+00	0.0E+00	2.3E-01	3.8E-04	2.1E-03	6.1E-05	2.6E-03
Alternate Business Location Offsite Trucks	2.7E+02	2.1E-02	2.9E+02	3.4E+01	1.3E+03	7.5E-01	6.9E-02	1.4E-01	2.2E-04	6.1E-02
Alternate Business Location Onsite Gasoline Vehicles	0.0E+00	1.8E-04	0.0E+00	1.6E-01	0.0E+00	2.5E-03	3.4E-05	1.9E-04	6.9E-07	2.9E-04

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]		40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]			Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	Hexavalent Chromium	DPM	Chlorine	DPM	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Alternate Business Location Onsite Locomotives	2.0E+00	0.0E+00	2.0E+00	0.0E+00	1.9E+00	0.0E+00	1.4E-04	2.9E-04	9.0E-09	8.3E-06
Alternate Business Location Onsite Trucks	5.1E+01	1.6E-03	5.8E+01	6.5E-01	1.6E+02	2.0E-02	4.0E-02	8.0E-02	5.8E-06	1.6E-03
Total - All Sources	**2.3E+03**	**1.0E-01**	**2.5E+03**	**6.8E+01**	**1.3E+04**	**2.0E+00**	**1.7E+00**	**3.5E+00**	**5.5E-04**	**1.9E-01**

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.

c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.

d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.

e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

Table C3-2-7. Toxic Air Contaminant Emissions by Source - Mitigated Reduced Project Alternative.

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]				40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]						Maximum 1-Hour Emissions (lb/hr)[e]			
	Formaldehyde	DPM	Cobalt	Hexavalent Chromium	DPM	Chlorine	Cobalt	DPM	Formaldehyde	Manganese	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Emergency Generator	7.9E+00	7.8E+00	0.0E+00	0.0E+00	7.6E+00	0.0E+00	0.0E+00	8.2E+00	8.3E+00	0.0E+00	0.0E+00	2.1E-02	4.2E-02	7.8E-07	7.2E-04
Hostler	1.8E+02	0.0E+00	1.3E-02	6.5E-04	0.0E+00	2.2E+00	1.5E-02	0.0E+00	2.1E+02	1.5E-02	1.5E-02	1.0E-03	2.7E-02	2.0E-06	1.8E-03
Onsite Refueling Trucks	5.7E+00	5.7E-01	0.0E+00	4.3E-06	5.0E-01	5.1E-04	0.0E+00	6.6E-01	6.8E+00	1.5E-04	5.8E-05	3.9E-04	7.8E-04	8.1E-09	1.4E-06
SCIG CHE/TRU	6.3E+00	5.1E+00	0.0E+00	0.0E+00	4.8E+00	0.0E+00	0.0E+00	7.6E+00	6.8E+00	0.0E+00	0.0E+00	6.6E-03	1.3E-02	2.8E-07	2.6E-04
SCIG Construction	7.0E+01	6.0E+01	0.0E+00	1.1E-05	1.0E+02	3.2E-02	3.9E-06	2.6E+03	3.3E+03	1.2E-02	4.6E-03	1.1E+00	2.1E+00	3.6E-05	3.2E-02
SCIG Offsite Gasoline Vehicles	6.3E-01	0.0E+00	2.8E-03	5.6E-03	0.0E+00	8.3E-01	3.5E-03	0.0E+00	7.5E-01	1.9E-01	7.6E-02	1.5E-05	8.7E-05	8.8E-06	3.7E-04
SCIG Offsite Locomotives	6.1E+01	2.0E+02	0.0E+00	0.0E+00	2.3E+02	0.0E+00	0.0E+00	4.2E+02	1.3E+02	0.0E+00	0.0E+00	7.4E-03	1.5E-02	9.2E-07	8.4E-04
SCIG Offsite Trucks	1.1E+02	1.5E+02	3.3E-01	5.8E-02	1.5E+02	6.2E+01	4.0E-01	3.5E+02	3.5E+02	1.8E+00	9.7E-01	2.1E-02	4.5E-02	1.3E-04	4.8E-02
SCIG Onsite Gasoline Vehicles	1.6E+00	0.0E+00	1.8E-02	1.1E-03	0.0E+00	2.6E+00	1.9E-02	0.0E+00	2.2E+00	2.5E-02	2.1E-02	4.5E-05	2.5E-04	2.4E-06	1.9E-03
SCIG Onsite Locomotives	4.4E+01	1.3E+02	0.0E+00	0.0E+00	1.5E+02	0.0E+00	0.0E+00	2.5E+02	8.8E+01	0.0E+00	0.0E+00	5.1E-03	1.0E-02	5.5E-07	5.1E-04
SCIG Onsite Trucks	2.4E+02	7.4E+01	1.7E-01	2.6E-02	7.5E+01	3.2E+01	2.1E-01	1.6E+02	6.5E+02	8.1E-01	4.5E-01	3.8E-02	8.5E-02	5.8E-05	2.5E-02
Alternate Business Location CHE	1.1E+02	2.3E+02	1.3E-01	6.7E-03	3.5E+02	1.8E+01	1.3E-01	9.1E+02	1.7E+02	1.3E-01	1.3E-01	2.0E-02	4.7E-02	3.7E-05	3.4E-02
Alternate Business Location Construction	2.5E+00	4.6E+00	0.0E+00	0.0E+00	8.1E+00	0.0E+00	0.0E+00	3.2E+02	1.8E+02	0.0E+00	0.0E+00	4.3E-02	8.6E-02	5.6E-06	5.1E-03
Alternate Business Location Offsite Gasoline Vehicles	1.0E+00	0.0E+00	3.6E-03	7.4E-03	0.0E+00	2.5E+00	1.1E-02	0.0E+00	8.1E+00	5.8E-01	2.3E-01	3.8E-04	2.1E-03	6.1E-05	2.6E-03
Alternate Business Location Offsite Trucks	1.7E+02	2.7E+02	4.7E-02	2.1E-02	2.9E+02	3.4E+01	2.1E-01	1.3E+03	4.8E+02	1.6E+00	7.5E-01	6.9E-02	1.4E-01	2.2E-04	6.1E-02
Alternate Business Location Onsite Gasoline Vehicles	3.0E-01	0.0E+00	1.1E-03	1.8E-04	0.0E+00	1.6E-01	1.1E-03	0.0E+00	6.7E-01	4.6E-03	2.5E-03	3.4E-05	1.9E-04	6.9E-07	2.9E-04
Alternate Business Location Onsite Locomotives	1.2E+00	2.0E+00	0.0E+00	0.0E+00	2.0E+00	0.0E+00	0.0E+00	1.9E+00	1.1E+00	0.0E+00	0.0E+00	1.4E-04	2.9E-04	9.0E-09	8.3E-06
Alternate Business Location Onsite Trucks	2.9E+02	5.1E+01	3.3E-03	1.6E-03	5.8E+01	6.5E-01	3.6E-03	1.6E+02	3.3E+02	4.5E-02	2.0E-02	5.1E-02	1.0E-01	6.8E-06	1.8E-03
Total - All Sources	**1.3E+03**	**1.2E+03**	**7.2E-01**	**1.3E-01**	**1.4E+03**	**1.5E+02**	**1.0E+00**	**6.4E+03**	**5.9E+03**	**5.2E+00**	**2.7E+00**	**1.4E+00**	**2.8E+00**	**5.7E-04**	**2.2E-01**

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.
c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.
d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine, cobalt, formaldehyde, manganese, and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.
e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

Table C3-2-8. Toxic Air Contaminant Emissions by Source - CEQA Baseline (2010).

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]	40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]				Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	DPM	Chlorine	Cobalt	DPM	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Hobart Trucks	2.8E+03	2.8E+03	8.3E+00	0.0E+00	2.8E+03	9.4E-01	7.6E-02	1.5E-01	1.3E-04	6.6E-03
Existing Business CHE	1.8E+03	1.8E+03	6.6E+01	4.7E-01	1.8E+03	4.7E-01	5.4E-02	1.1E-01	1.5E-04	1.3E-01
Existing Business Offsite Gasoline Vehicles	0.0E+00	0.0E+00	5.4E+00	3.0E-02	0.0E+00	2.9E-01	1.6E-03	8.8E-03	9.7E-05	1.0E-02
Existing Business Offsite Trucks	2.4E+03	2.4E+03	4.1E+01	2.6E-01	2.4E+03	7.3E-01	1.0E-01	2.1E-01	2.4E-04	8.0E-02
Existing Business Onsite Gasoline Vehicles	0.0E+00	0.0E+00	8.2E-01	5.7E-03	0.0E+00	1.1E-02	2.6E-04	1.4E-03	3.7E-06	1.8E-03
Existing Business Onsite Locomotives	1.3E+01	1.3E+01	0.0E+00	0.0E+00	1.3E+01	0.0E+00	1.4E-03	2.8E-03	8.7E-08	8.0E-05
Existing Business Onsite Trucks	8.8E+02	8.8E+02	5.1E+00	3.5E-02	8.8E+02	6.8E-02	1.4E-01	2.9E-01	2.5E-05	1.4E-02

Emission Source[a]	70-Year-Average Emissions (lb/yr)[b,c]	40-Year-Average Emissions (lb/yr)[b,c]	Maximum Annual Emissions (lb/yr)[c,d]				Maximum 1-Hour Emissions (lb/hr)[e]			
	DPM	DPM	Chlorine	Cobalt	DPM	Nickel	Acetaldehyde	Formaldehyde	Nickel	Sulfates
Total - All Sources	7.9E+03	7.9E+03	1.3E+02	8.1E-01	7.9E+03	2.5E+00	3.8E-01	7.7E-01	6.4E-04	2.5E-01

Notes:

a) This HRA evaluated emissions of all toxic air contaminants (TACs) listed in Table C3-5-1. However, for brevity, only those TACs contributing at least 2 percent to the estimated health endpoint results are presented in this table.

b) Seventy-year-average emissions were used to determine individual residential, recreational, and sensitive receptor lifetime cancer risk. Forty-year-average emissions were used to determine individual worker lifetime cancer risk.

c) Maximum annual emissions were used to determine noncancer chronic hazard indexes and were used to determine individual student lifetime cancer risk, as a conservative estimate of 6-year-average emissions.

d) For maximum annual emissions, only nondiesel Internal Combustion Engine (ICE) emissions (i.e., alternative fueled engines, tire wear, and brake wear) are shown for chlorine, cobalt, and nickel. Diesel ICE emissions are modeled only with DPM emissions. For 70-year average and 40-year average emissions, only DPM emissions were modeled in the HRA.

e) Maximum 1-hour emissions were used to determine noncancer acute hazard indices.

2.7 Maximum Year Emission Rates

Similar to the cancer risk analysis, the chronic hazard index developed to assess non-cancer health effects from diesel ICEs requires only DPM emissions data. Analogous to the DPM unit risk factor, the reference exposure level (REL) established by OEHHA for the assessment of DPM for chronic non-cancer effects includes consideration of the individual toxic species that may be adsorbed onto the DPM particles.

For all other source types (tire and brake wear and alternative-fueled engines), it was necessary to speciate combustion emissions into individual TAC components using the TOG and PM speciation profiles shown in Table C3-2-1.

For the Project alternatives, maximum year emissions were selected from the Project construction years (2013-2015) and analysis years (2016, 2023, 2035, 2046, and 2066). For floating baseline conditions, maximum year emissions were selected from the floating baseline analysis years (2010, 2013, 2014, 2015, 2016, 2023, 2035, 2046, and 2066). For CEQA baseline conditions, 2010 emissions were used in the HRA. To ensure the capture of maximum impacts, the highest annual emissions from each type of source were conservatively modeled together in the HRA, even if the emissions would occur in different analysis years for different source groupings.

Tables C3-2-2 through C3-2-8 present the maximum annual TAC emission rates used in this HRA for the Floating Baseline, Unmitigated Project, Mitigated Project, No Project Alternative, Unmitigated Reduced Project Alternative, Mitigated Reduced Project Alternative, and CEQA Baseline, respectively.

2.8 Maximum 1-Hour Emission Rates

For the acute hazard index analysis, which is based on maximum 1-hour emission rates, speciating combustion emissions into individual TAC components was necessary for all source types including diesel ICE because OEHHA has not developed an acute REL for DPM. Therefore, combustion emissions were speciated into individual TAC components using the TOG and PM speciation profiles shown in Table C3-2-1.

For the Project alternatives, maximum 1-hour emissions were calculated assuming theoretical worst-case hourly activity levels for each source category from the construction years (2013-2015) and analysis years (2016, 2023, 2035, 2046, 2066). For floating baseline conditions, maximum 1-hour emissions were selected from the floating baseline analysis years (2010, 2013, 2014, 2015, 2016, 2023, 2035, 2046, and 2066). For CEQA baseline conditions, maximum 1-hour emissions from 2010 were used in the HRA. To ensure that the health effect calculations included an assessment of maximum impacts, the highest 1-hour emissions from each type of source were conservatively modeled together in the HRA, even if the emissions would occur in different analysis years for different source groupings. .

For SCIG facility equipment, maximum 1-hour emissions for TRUs and the on-site emergency generator assumed activity for the entire 1-hour duration. For other on-site equipment, maximum 1-hour emissions were derived from the average daily emissions. For SCIG yard hostlers and gasoline vehicles (service trucks), these were assumed to operate for the entire 1-hour duration. Maximum 1-hour emissions for SCIG locomotives were derived from the detailed locomotive movement emissions, which track every step in the entry, breakdown, build and departure of trains. The movements were analyzed to determine the series of movements representing the maximum 1-hour emissions from all movements.

For SCIG trucks maximum 1-hour emissions were derived from the peak daily emissions. The derivation of peak daily emissions for trucks and terminal equipment is discussed in Section 3.2 of the EIR under Impact AQ-3. Peak daily emissions were estimated using a peaking factor representative of port-wide activities in the Port's 2004 Baseline transportation study.

For construction equipment, maximum 1-hour emissions were estimated by first calculating daily emissions from individual construction elements (for example, PCH grade separation, site construction, lead and storage track construction). Maximum daily emissions then were determined by summing emissions from overlapping construction activities as indicated in the proposed construction schedule (Table 2-2) of the EIR. Maximum 1-hour emissions were derived from the peak daily emissions assuming uniform distribution of emissions over a 10-hour workday.

For activities at the alternate business sites, maximum 1-hour emissions from on-site cargo-handling equipment assumed that the equipment were operational for the entire 1-hour duration. For trucks of the alternate business sites, maximum 1-hour emissions were derived from the peak daily emissions which are discussed in Section 3.2 of the EIR under Impact AQ-3. Peak daily emissions were derived using the Port peaking factor described above.

Tables C3-2-2 through C3-2-8 present the maximum 1-hour speciated emissions by source for the Floating Baseline, Unmitigated Project, Mitigated Project, No Project Alternative, Unmitigated Reduced Project Alternative, Mitigated Reduced Project Alternative, and CEQA Baseline, respectively.

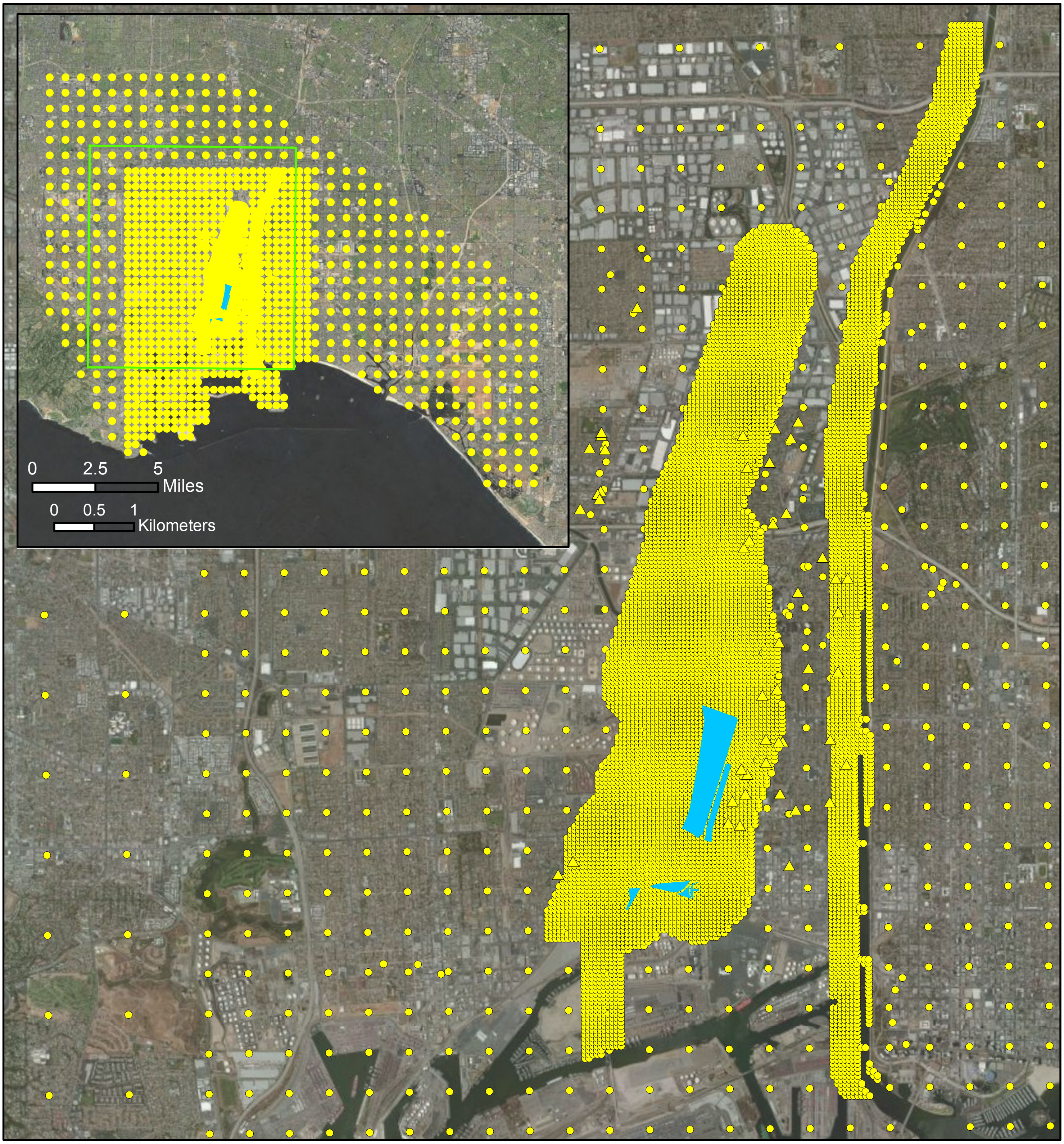
3.0 Receptor Locations Used in the HRA

This HRA analyzes the health effects associated with TAC emissions from Project-related sources at a variety of locations (receptors) throughout the project area, including at the locations of potential exposure of residents, offsite workers, recreational users, students, and sensitive members of the public. The analysis utilized a fine grid of 8,603 receptor points spaced every 50 meters (m) apart over the area that extended 250 m outward from the facility boundaries of the Project, businesses at the alternate sites, and ICTF. This fine grid also covered the 250 m buffer around highway I-710 between West Ocean Blvd and CA-91. A medium grid of 691 receptor points spaced every 500 m apart extended roughly 4 kilometers (km) to the east and west, 1 km to the north, and 5.5 km to the south of the fine grid. A coarse grid of 366 receptor points spaced every 1,000 m apart extended up to approximately 16 km from the medium grid. In addition, TAC concentrations were modeled at 37 discrete sensitive receptor locations of special concern, such as schools, day care centers, convalescent homes, and hospitals within a 1-mile radius of the Site boundary and within a 1-mile radius of the proposed ICTF project boundary. Based on input from agencies and project stakeholders, an additional 47 sensitive receptors were included in the analysis using natural neighbor interpolation methodology to calculate cancer risk and chronic and acute hazard indices for these locations.

Figure C3.3-1 presents the coarse, medium, and fine receptor grids used in the AERMOD modeling analysis discussed in Section 4.0. Figure C3.3-2 shows the locations of the sensitive receptors included in the analysis, and Table C3-3-1 provides a list of all sensitive receptors cross-referenced by the number used to identify their location in Figure C3.3-2.

Table C3-3-1. Sensitive Receptor Locations.

Label	Name	Address	City	State	Zip	Type
1	A & P Guest Home	1703 East Albreda Street	Carson	CA	90745	Interpolated
2	Acosta Family Home II	1811 Abila Street	Carson	CA	90745	Interpolated
3	Admiral Kidd Park			CA		Interpolated
4	Agu Family Child Care	2468 Easy Ave. #246	Long Beach	CA	90807	Interpolated
5	American Gold Star Manor Healthcare	3021 North Gold Star Drive	Long Beach	CA	90810	Interpolated
6	Am's Residential Facility 3	2605 East Washington St.	Long Beach	CA	90810	Interpolated
7	Am's Residential Facility-2	3627 Delta Avenue	Long Beach	CA	90810	Interpolated
8	Anderson Park	19101 Wilmington Ave.	Carson	CA	90746	Modeled
9	Angels Hangout/Saldana Family Child Care	1714 E Abri Street	Carson	CA	90810	Modeled
10	Apostolic Faith Center/Apostolic Faith Academy	1530 E Robidoux Street	Wilmington	CA	90744	Interpolated
11	Aquarius Home	1765 Aquarius Street, W.	Long Beach	CA	90810	Interpolated
12	Babineaux Family Child Care	2885 Fashion Avenue	Long Beach	CA	90810	Interpolated
13	Bay Breeze Care	1653 Santa Fe Ave	Long Beach	CA	90813	Interpolated
14	Bethune School Recreational Facilities			CA		Modeled
15	Bethune School/Program for the Homeless	2101 San Gabriel Ave.	Long Beach	CA	90810	Modeled
16	Bobo Family Daycare	3532 Delta Avenue	Long Beach	CA	90810	Modeled
17	Brown Family Child Care	1831 W. Jeanette Pl.	Long Beach	CA	90810	Interpolated
18	Burnett home Care - Aged People Care	1740 West Burnett St.	Long Beach	CA	90810	Modeled
19	Cabrillo Center Expansion		Long Beach	CA	90802	Interpolated
20	Cabrillo Child Development Center - Child Care	2205 San Gabriel Avenue	Long Beach	CA	90810	Interpolated
21	Cabrillo High Recreational Facilities			CA		Interpolated
22	Cabrillo High School	2001 Santa Fe Avenue	Long Beach	CA	90810	Modeled
23	Cameron Home	2225 W. Cameron Street	Long Beach	CA	90810	Interpolated
24	Carol Daycare	2842 Easy Avenue	Long Beach	CA	90810	Modeled
25	Casian Family Child Care	3256 Fashion Ave.	Long Beach	CA	90810	Interpolated
26	Cecilia Olivas	2556 E. Jackson St.	Carson	CA	90810	Interpolated
27	Ceja Family Child Care	2030 W. Spring St	Long Beach	CA	90810	Modeled
28	Century Villages at	2001 River Avenue	Long Beach	CA	90802	Modeled



Legend

- Interpolated Sensitive Receptor Location
- Receptor Location
- Site

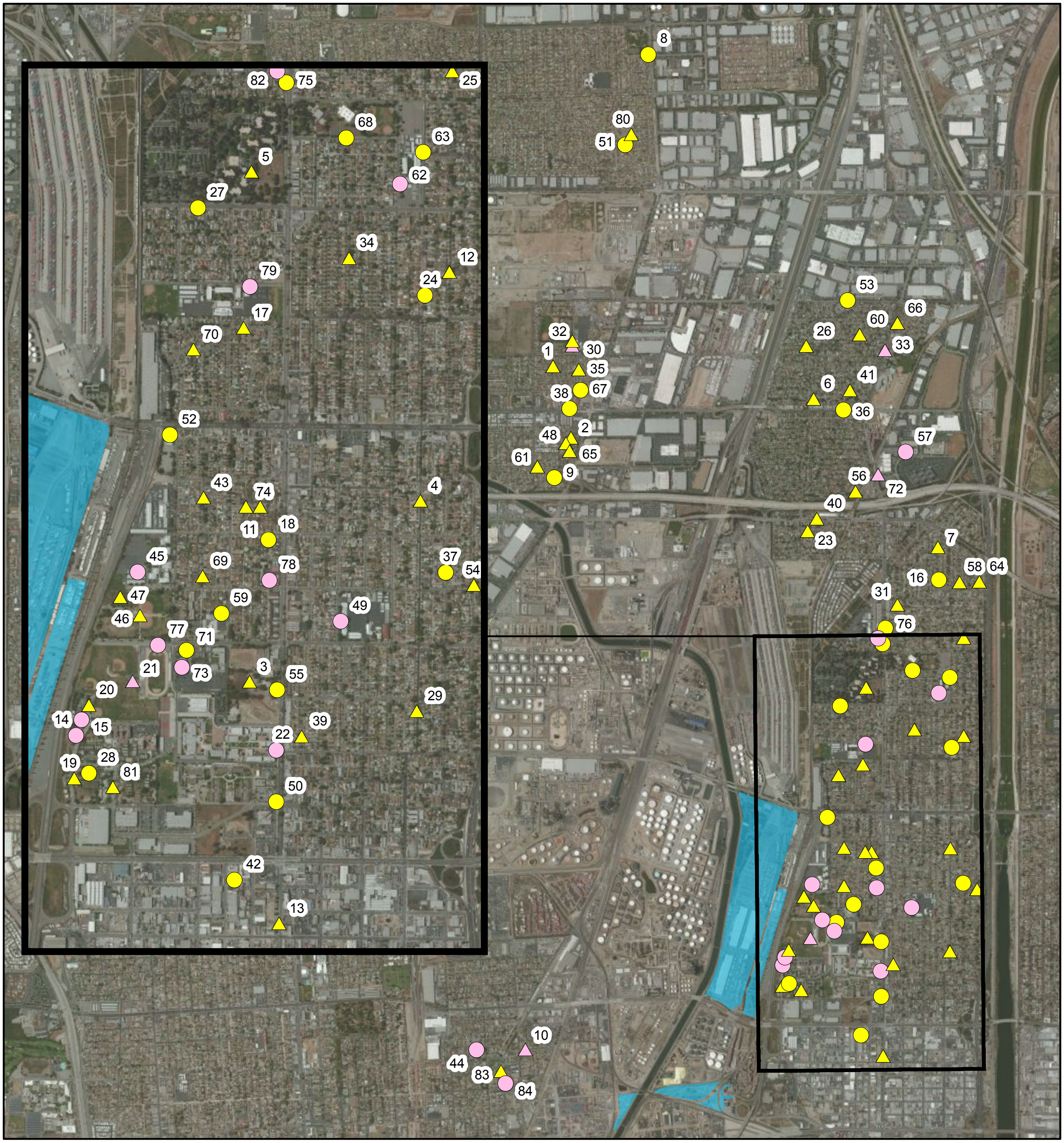
N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.3-1
Coarse, Medium, and Fine Receptor Grids

ENVIRON



Legend

- Modeled Non-School Sensitive Receptor
- Interpolated Non-School Sensitive Receptor
- Modeled School Sensitive Receptor
- Interpolated School Sensitive Receptor
- Site

N

0 0.25 0.5 Miles

0 0.25 0.5 Kilometers

Note: Sensitive receptor labels correspond to those shown in Table C-3-1.

Figure C3.3-2
Sensitive Receptor Locations

ENVIRON

Label	Name	Address	City	State	Zip	Type
	Cabrillo Homeless Housing Community					
29	Costa Family Child Care	2085 Easy Ave.	Long Beach	CA	90810	Interpolated
30	Del Amo Elementary School	21228 Water Street	Carson	CA	90745	Interpolated
31	Delgado Family Child Care	3383 Adriatic Avenue	Long Beach	CA	90810	Interpolated
32	Dolphin Park	21205 S. Water St.	Carson	CA	90745	Interpolated
33	Dominguez Elementary School	21250 Santa Fe Avenue	Carson	CA	90810	Interpolated
34	Duran, Ramona Family Day Care	2935 Baltic Ave.	Long Beach	CA	90810	Interpolated
35	Fernandez Guest Home	21413 Water St.	Carson	CA	90745	Interpolated
36	First Baptist Preschool and Daycare	2679 E. Carson Street	Long Beach	CA	90810	Modeled
37	Franklin Day Care Center	2333 Fashion Avenue	Long Beach	CA	90810	Modeled
38	Friendship Children	1717 E. Carson St.	Carson	CA	90745	Modeled
39	Gallegos Family Child Care	2024 Adriatic Ave.	Long Beach	CA	90810	Interpolated
40	Garcia Family Child Care	2145 W Wardlow Rd.	Long Beach	CA	90810	Interpolated
41	Good Beginnings Head Start	21503 Prospect Ave.	Long Beach	CA	90810	Interpolated
42	Harbor Japanese Community Cultural Center	1766 Seabright Ave	Long Beach	CA	90813	Modeled
43	Hayes Home	2470 Hayes Ave.	Long Beach	CA	90810	Interpolated
44	Holy Family School and Pre-School	1122 E Robidoux St	Wilmington	CA	90744	Modeled
45	Hudson K-8 School	2335 Webster Ave.	Long Beach	CA	90810	Modeled
46	Hudson Park			CA		Interpolated
47	Hudson Park Community Garden			CA		Interpolated
48	Jackson Family Child Care	21836 Water St.	Carson	CA	90745	Interpolated
49	James Garfield Elementary School/Child Development Center and Head Start	2240 Baltic Ave.	Long Beach	CA	90810	Modeled
50	Job Corp Head Start - Daycare and Nursery	1903 Santa Fe Ave.	Long Beach	CA	90810	Modeled
51	Just Being Cute (It Takes A Village Family Day Care)	1813 E Calstock Street	Carson	CA	90746	Modeled
52	Khemara Buddhikaram Cambodian Buddhist Temple	2100 W Willow St	Long Beach	CA	90810	Modeled
53	Lakeshore Kids & Company 2695 E Dominguez St	2695 E Dominguez St	Carson	CA	90895	Modeled

Label	Name	Address	City	State	Zip	Type
54	Lara Family Day Care	2300 Gale Ave.	Long Beach	CA	90810	Interpolated
55	LBUSD Child Development Center/Westside Neighborhood Clinic	2125 Santa Fe Ave.	Long Beach	CA	90810	Modeled
56	Little Greenwood Daycare	22114 S Carlerik Ave	Carson	CA	90810	Interpolated
57	Long Beach Unified School District: Gifted & Talented Education	1515 Hughes Way	Long Beach	CA	90810	Modeled
58	Lopez Family Child Care	3500 Fashion Ave	Long Beach	CA	90805	Interpolated
59	Loram Manor	1925 Gemini Street	Long Beach	CA	90810	Modeled
60	Martin-Luna Family Child Care	2716 East Van Buren Street	Long Beach	CA	90810	Interpolated
61	Merced's Family Home	1606 E. 220th St.	Carson	CA	90745	Interpolated
62	Muir Academy	3038 Delta Ave.	Long Beach	CA	90810	Modeled
63	Muir Child Development Center	3105 Easy Avenue	Long Beach	CA	90810	Modeled
64	Nero-Morrison Family Child Care	3500 Gale Ave.	Long Beach	CA	90810	Interpolated
65	Nevarez Family Child Care	1805 E 219th St.	Carson	CA	90745	Interpolated
66	New Life Homes	21139 Adriatic Avenue, S.	Long Beach	CA	90810	Interpolated
67	Pablo Residential Care Home	1802 E. 215th Pl.	Carson	CA	90745	Modeled
68	Park Silverado Community Center	1545 W. 31st Street	Long Beach	CA	90810	Modeled
69	Patterson Family Child Care	2326 Hayes Avenue	Long Beach	CA	90810	Interpolated
70	Pioneer Homes Of California	2041 W. Carolyn Place	Long Beach	CA	90810	Interpolated
71	Pramuan Simsriwatna Place of Worship	2015 West Hill St.	Long Beach	CA	90810	Modeled
72	Rancho Dominguez Preparatory	4110 Santa Fe Ave.	Long Beach	CA	90810	Interpolated
73	Reid Continuation High School	2153 West Hill St.	Long Beach	CA	90810	Modeled
74	Reliable Residential Care	1840 W. Aquarius Street	Long Beach	CA	90810	Interpolated
75	Sanders Teeny Tiny Preschool	3211 Santa Fe Avenue	Long Beach	CA	90810	Modeled
76	Santa Fe Convalescent Hospital	3294 Santa Fe Avenue	Long Beach	CA	90810	Modeled
77	Savannah Academy	2152 Hill St.	Long Beach	CA	90810	Modeled
78	St. Lucy Church and School	2320 Cota Avenue	Long Beach	CA	90810	Modeled
79	Stephens Middle School	1830 West Columbia St.	Long Beach	CA	90810	Modeled
80	Stevens Adult Home	1857 Abbottson	Carson	CA	90746	Interpolated
81	VA Long Beach Clinic and Veteran's Support Services	2001 River Ave, Building 28	Long Beach	CA	90810	Interpolated

Label	Name	Address	City	State	Zip	Type
82	Webster Elementary School and Head Start	1755 West 32nd Way	Long Beach	CA	90810	Modeled
83	Wilmington Park Children's Center (Early Education Center)	1419 East Young Street	Wilmington	CA	90744	Interpolated
84	Wilmington Park Elementary School/Mahar House	1140 Mahar Ave	Wilmington	CA	90744	Modeled

AERMAP, version 09040, was used to calculate source elevations, receptor elevations and the controlling hill height for each receptor.

Maximally exposed individual (MEI) locations were selected from the modeled receptor grids for five different receptor types: residential, occupational, sensitive, student, and recreational. The selection methodology for the MEI locations was:

- The residential MEI was selected from all receptors in residential or residentially-zoned areas that did not fall on roads.
- The occupational MEI was selected from all receptors outside Port of Los Angeles property (and outside of alternate business sites) that did not fall on roads.
- The sensitive MEI was selected from all identified schools, day care centers, convalescent homes, hospitals, and other identified sensitive receptors in the surrounding area.
- The student MEI was selected from all identified schools in the surrounding area.
- The recreational MEI was selected from all receptors not over water and outside Port of Los Angeles property that did not fall on roads, but including receptors located within the Wilmington and San Pedro Waterfront recreational areas.

4.0 Dispersion Model Selection and Inputs

The air dispersion modeling for the HRA was performed using the USEPA AERMOD dispersion model, version 09292, based on the *Guideline on Air Quality Models* (USEPA, 2005). The AERMOD model is a steady-state, multiple-source, Gaussian dispersion model designed for use with emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources. The AERMOD model requires hourly meteorological data consisting of wind vector, wind speed, temperature, stability class, and mixing height. The AERMOD model allows input of multiple sources and source groupings, eliminating the need for multiple model runs. The selection of the AERMOD model is well suited based on (1) the general acceptance by the modeling community and regulatory agencies of its ability to provide reasonable results for large industrial complexes with multiple emission sources, (2) a consideration of the availability of annual sets of hourly meteorological data for use by AERMOD, and (3) the ability of the model to handle the various physical characteristics of project emission sources, including, “point,” “area,” and “volume” source types. AERMOD is a USEPA-approved dispersion model; the SCAQMD approves of its use for mobile source analyses, and CARB’s *Health Risk Assessment Guidance for Rail Yard and Intermodal Facilities* (CARB, 2006a) recommends its use.

4.1 Emission Source Representation

The AERMOD modeling analysis evaluated Project-related construction and operational emission sources, including construction equipment, rail yard equipment, locomotives, and on-road vehicles. The HRA simulated the Project-related emission sources, taking into consideration physical characteristics and operational locations of the sources. Emissions from the movement of locomotives on rail lines, and vehicles on roadways are line-source emissions that were simulated and modeled as a series of separated volume sources. Mobile source operations confined within specific geographic locations, such as the construction equipment, were modeled as a collection of volume sources covering the area. Volume source emissions were simulated by AERMOD as being released and mixed vertically and horizontally within a volume of air prior to being dispersed downwind. The onsite cargo handling equipment emissions were modeled as area sources covering specific geographic locations. Finally, stationary emissions from the emergency generator and rail idling were modeled as point (stack) sources with upward plume velocity and buoyancy.

The operational characteristics of each source type in terms of area of operation and vertical stack height or source height determined the release parameters of each volume or point source. A total of six types of emission sources were simulated in AERMOD. The specific methodology for defining the sources is discussed below.

1. **Construction trucks and equipment.** The areas of SCIG and alternate business site construction were overlaid with square boxes of various sizes to achieve complete coverage of the surface areas where the construction equipment and truck sources operate. Each of the boxes represents the base of a volume source. The emissions were assumed to be spread uniformly over the entire area represented by the volume sources. Emissions, therefore, were assigned to each volume source in proportion to the base area of the source divided by the total area of all sources. Emissions from construction trucks and equipment were assigned a release height of 15 feet, which is the approximate average height of the exhaust port plus a nominal amount of plume rise.
2. **Cargo handling equipment.** The SCIG rail yard and footprints of the alternate business sites were covered with polygon area sources to achieve complete coverage of the surface areas where the cargo handling equipment sources operate. The emissions were assumed to be spread uniformly over each area source. Emissions from cargo handling equipment were assigned a release height of 15 feet, which is the approximate average height of the exhaust port plus a nominal amount of plume rise.
3. **Roadways and railways.** Truck and gasoline vehicle movements on roadways and train movements on rail lines were modeled as a series of separated volume sources, as recommended for the simulation of line sources in the AERMOD User's Guide (USEPA, 2004). Roadways were divided into links that have uniform average speeds and widths. Average roadway speeds by roadway link were directly output from the traffic modeling described in Section 3.10. The rail line was assumed to have a width of 9.05 meters where there is only a single track and the combined track width plus 3.05 meters where there are multiple tracks, with uniform emissions per mile of off-site locomotive travel over the entire segment from the SCIG rail yard to I-405. Therefore, the source characteristics for each volume source along a given link are identical except for the centerpoint locations. Total link emissions were divided

equally among the number of sources in a given link. Truck idling at the gate was modeled using discrete volume sources.

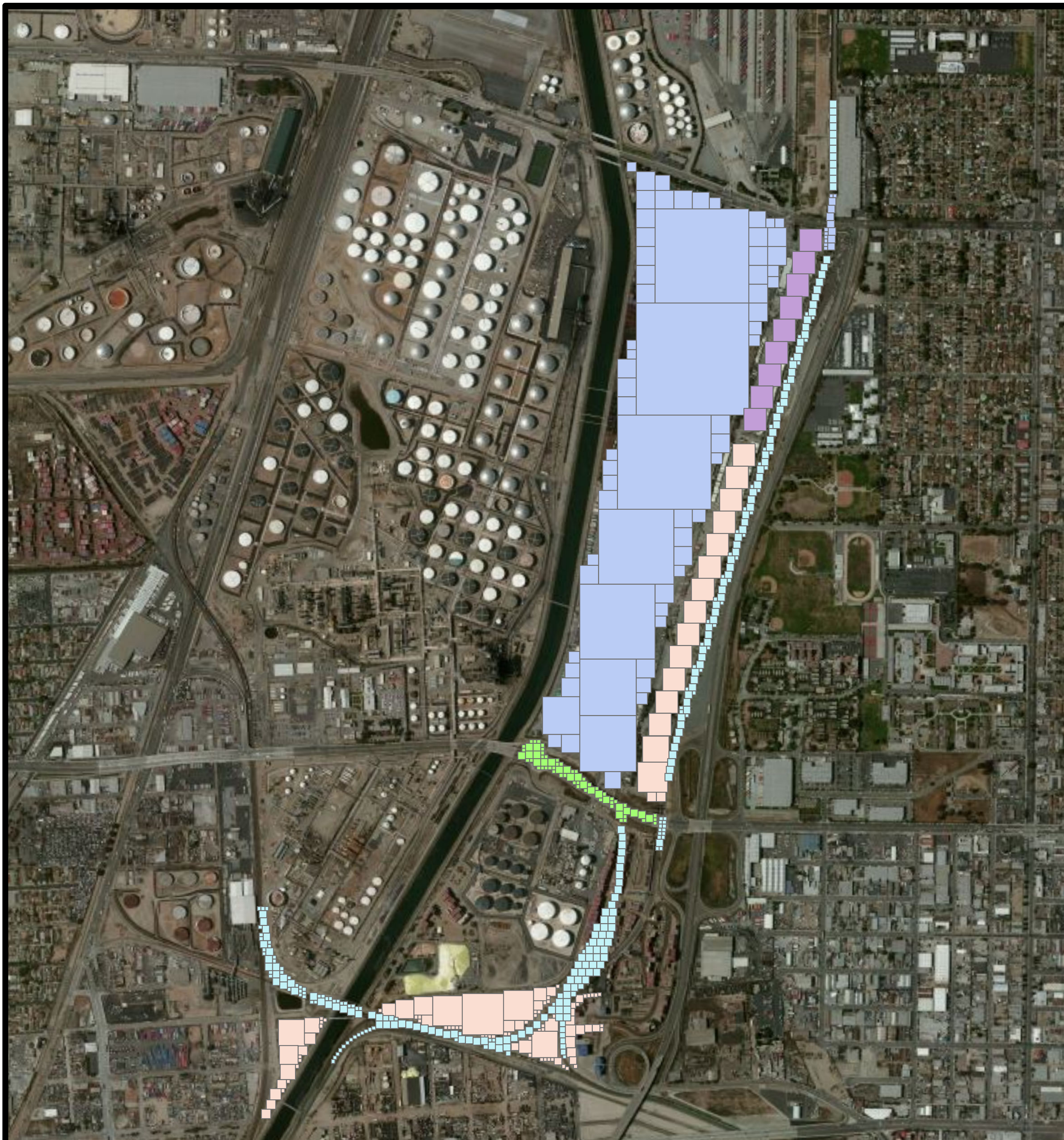
Emissions from trucks were assigned a release height of 15 feet, which is the approximate average height of the exhaust port plus a nominal amount of plume rise, and emissions from gasoline vehicles were assigned a release height of 2 feet. The width of the volume sources for roadways was set equal to the width of the roadway.

Based on the methodology in the Roseville Rail Yard Study, the volume source heights for locomotives in transit were set to between 16 – 20 feet for daytime conditions and 28 – 177 feet for nighttime conditions (CARB, 2004c). Following the same methodology, the volume source height for switcher locomotives was 36 feet for daytime conditions and 51 feet for nighttime conditions. The width of the volume sources for rail lines was set equal to the number of tracks times 3.05 meters per track, except if the rail line had only a single track, in which an additional 3 m was added on each side.

4. **Emergency Generator.** SCIG's emergency generator was modeled as a single point source, with a release height of 3.7 feet, an exit velocity of 10,755 feet per minute, an exit temperature of 879 degrees Fahrenheit, and a stack diameter of 23 feet, based on the Generac Model SD 600 specifications.

The HRA positioned the emission sources by using the Universal Transverse Mercator (UTM) coordinate system (NAD-83) referenced to topographic data obtained from the United States Geological Survey (USGS).

Table C3-4-1 lists the source release parameters used in the AERMOD model. Figures C3.4-1, C3.4-2, and C3.4-3 show the sizes and locations of the emission sources over a base map of the Project vicinity during construction, onsite operation, and offsite operation.



Legend

- PCH Grade
- Lead Track and Dominguez
- Relocated Tenants
- SCIG site and North Lead Track Overpass
- SCE Tower Relocation

N

0 500 1,000 Feet

0 75 150 Meters

Notes
1. Area sources are modeled for fugitive dust emissions during construction
2. Volume sources are modeled for off-road equipment exhaust emissions during construction

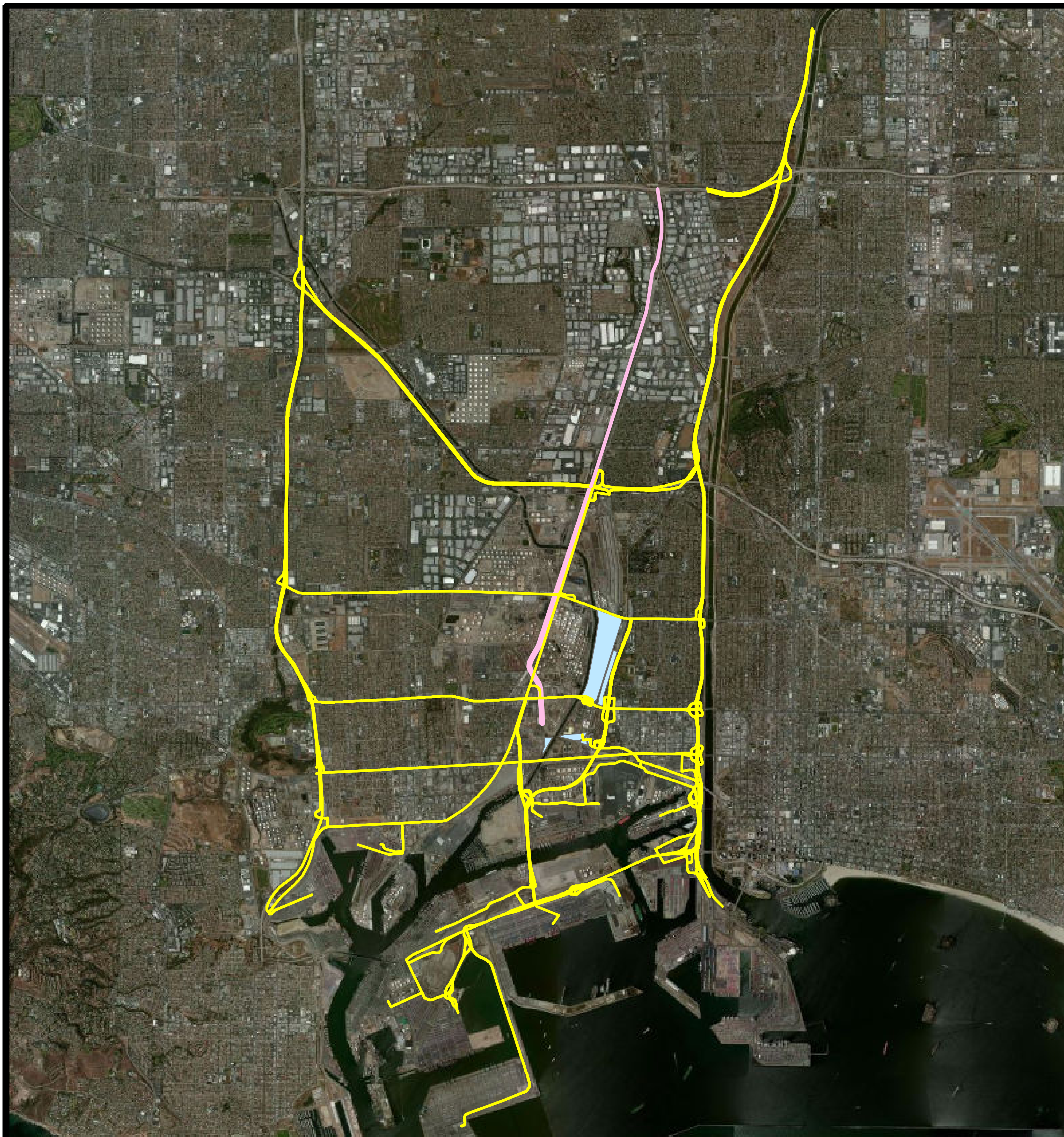
Figure C3.4-1
Source Representation in AERMOD
Construction Sources

ENVIRON

<u>Notes</u>
1. Point sources are modeled for emergency generator and locomotive idling emissions.
2. Area sources are modeled for cargo handling equipment and gasoline vehicle emissions.
3. Volume sources are modeled for locomotive movement and truck emissions.

Figure C3.4-2
Source Representation in AERMOD
Onsite Operational Sources

ENVIRON



Legend

Project Site

Alameda Corridor

Offsite Truck

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Notes

1. Volume sources are modeled for SCIG locomotive emissions on Alameda Corridor and offsite truck traffic between SCIG project site and Port terminals.

Figure C3.4-3
Source Representation in AERMOD
Offsite Operational Sources

ENVIRON

Table C3-4-1. AERMOD Source Release Parameters for the HRA.

Source Type	Source Description	AERMOD Source Type	Release Height (feet)	Source Width (m)	Line Source Spacing (m)	Exit Velocity (fpm)	Exit Temp. (°F)	Stack Diam. (feet)
Construction of SCIG and Alternate Business Sites	Construction Equipment and Trucks	Volume	15 [a]	Various [b]	—	—	—	—
Cargo Handling Equipment	Wheel Change Out Machines	Area	15[a]	—	—	—	—	—
	Yard Hostler	Area	15[a]	—	—	—	—	—
Locomotives	Line Haul Movement	Volume	Various[c]	Various[e]	50	—	—	—
	Line Haul Idling	Point	15	—	—	684[f]	209[f]	2[f]
	Switcher Movement	Volume	Various[d]	Various[e]	50	—	—	—
	Switcher Idling	Point	15	—	—	3,062[f]	191[f]	0.9[f]
Trucks	Trucks driving between terminals and SCIG or alternate business sites	Volume	15[a]	Various[g]	—	—	—	—
Gasoline Vehicles	Service Truck and Employee Vehicle	Volume	2[h]	Various[g]	50	—	—	—
Emergency Generator	Generac, Model SD600	Point	3.7[i]	—	—	10775[i]	879[i]	0.23[i]

Notes:

a) Consistent with the past POLA EIRs.
b) It was assumed that construction activities can occur anywhere onsite. Various size of volume sources were used to cover the construction area of SCIG and businesses at alternate sites.
c) The volume source height for Line Haul locomotives ranges from 16 - 280 feet for daytime and 28 – 177 feet for nighttime conditions, respectively. These heights were derived based on the methodology in the Roseville Railyard Study (CARB, 2004c).
d) The volume source height for switcher locomotives was 36 feet for daytime and 51 feet for nighttime conditions, respectively. These heights were derived based on the methodology in the Roseville Railyard Study (CARB, 2004c).
e) The width of locomotive volume sources depends on the width of the proposed track lines.
f) Source parameters provided by Southwest Research Institute, Steve Fritz, Personal Communication, November 2006.
g) The width of trucks and gasoline vehicles depends on the width of the traveled roadways.
h) Release height based on CARB Risk Reduction Plan (CARB, 2000) and recommendations from ARB staff.
i) Stack Parameters are based on a 600 kW generator, consistent with parameters used under the MOU, which are different from those listed on the manufacturer's website. The use of the stack parameters listed on the manufacturer's website would not alter the results presented for the following two reasons:
   1. The change to the modeled dispersion factors is de minimis. ENVIRON modeled the emergency generator using the manufacturer's parameters and compared the dispersion factors to those corresponding to the source parameters shown above. The differences are de minimis.
   2. The emergency generator is a small source of emissions. As shown in the source contribution tables in Appendices C2 and C3, it contributes 0.1% or less to the criteria pollutant concentrations at the point of maximum impact, less than 1% to the cancer risk and chronic HI at the MEI, and less than 5% to the acute HI at the MEI.

Abbreviations:

fpm feet per minute
m meter
°F degrees Fahrenheit

4.2 Meteorological Data

The dominant terrain features/water bodies that may influence wind patterns in this part of the Los Angeles Basin include the Pacific Ocean to the west, the hills of the Palos Verdes Peninsula to the west/southwest and the San Pedro Bay and shipping channels to the south of the study area. Although the area in the immediate vicinity of the Ports of Los Angeles (POLA or the Port) and Long Beach (POLB) is generally flat, these terrain features/water bodies may result in significant variations in wind patterns over relatively short distances (POLA/POLB, 2010).

POLA and POLB currently are operating monitoring programs that include the collection of meteorological data from several locations within port boundaries (POLA, 2004). The data sets contain 8,760 hourly observations of wind speed, wind direction, temperature, atmospheric stability, and mixing height recorded at each of the monitoring stations in the network. The meteorological data stations to the west of the Palos Verdes Hills and within approximately 5 kilometers of the San Pedro Bay generally exhibit predominant winds from the northwest and from the south or southeast. The consistency of the predominant winds among these stations indicates that the Palo Verdes Hills are channeling the winds from the northwest and that the San Pedro Bay and shipping channels influence the winds from the south and southeast (POLA/POLB, 2010).

Because all of the Long Beach area stations indicate the same general wind patterns (i.e., predominant winds from the northwest and south/southeast), and due to data quality issues identified for most other stations in this area, the Saints Peter and Paul Elementary School (SPPS) meteorological station in Wilmington, about 2.5 miles southwest of the project site, and the Terminal Island Treatment Plant (TITP) meteorological station, about 4 miles southwest of the project site, were selected as representative meteorological stations for the on-Port emissions and out-of-Port truck emissions on major freeways and locomotive emissions on the Alameda Corridor in the northern part of Long Beach. The Berth 47 (B47) station is located at the southern tip of the Port of Los Angeles, where the winds appear to be heavily influenced by the San Pedro Bay and predominant winds are from the southwest. The B47 station is characterized by higher wind speeds and less variation in wind direction than patterns further inland (POLA/POLB, 2010).

To account for the unique wind patterns in the project area, the modeling domain for this analysis was split into inner, middle and outer harbor regions. The inner harbor zone is north of the East Basin Channel, Cerritos Channel, and Vincent Thomas Bridge, and bounded by Interstate 110 on west, Interstate 710 on the east, and an approximate east-west line created by Interstate 405 and 223rd Street in the northern part of Long Beach on the north. The middle harbor zone is the majority of Terminal Island and San Pedro. The outer harbor zone is the terminals on the southern end of Terminal Island and inside breakwater. Emission sources located in the inner harbor region, which includes construction sources and most operational sources, were modeled with the SPPS meteorological data. Emission sources located in the middle harbor region, which includes truck traffic between the project site and the terminals, were modeled with the TITP meteorological data. Emission sources located in the outer harbor region, which includes truck traffic near the breakwater, were not included based on the results of a sensitivity analysis that showed that sources in the outer harbor region contributed less than 0.6% of the risk from DPM at the MEIR. As a result, the B47 meteorological data was not used in the analysis. The modeling results were then summed at each common receptor point.

The meteorological data were processed using the USEPA's approved AERMET (version 06341) meteorological data preprocessor for the AERMOD dispersion model. AERMET uses three steps to preprocess and combine the surface and upper-air soundings to output the data in a format which is compatible with the AERMOD model. The first step extracts the data and performs a brief quality assurance check of the data. The second step merges the meteorological data sets. The third step outputs the data in AERMOD-compatible format while also incorporating surface characteristics surrounding the collection or application site.

The output from the AERMET model consists of two separate files: the surface conditions file and a vertical profile dataset. AERMOD utilizes these two files in the dispersion modeling algorithm to predict pollutant concentrations resulting from a source's emissions.

4.3 Model Options

Technical options selected for the AERMOD model used regulatory defaults. Use of these options follows the USEPA modeling guidance (USEPA, 2005).

The following temporal distribution of emissions was modeled for peak 1-hour, peak 8-hour, peak 24-hour, and annual average concentrations:

Construction (SCIG)	100% of emissions 8am – 6pm
Offsite Trucks and Gasoline Vehicles (SCIG), Locomotives (SCIG), Cargo Handling Equipment (SCIG), Emergency Generator (SCIG), Onsite Gasoline Vehicles (SCIG)	Uniform distribution of emissions 24 hr/day
Offsite Gasoline Vehicles (Alternate Business Sites), Offsite Trucks (California Cartage and Fastlane)	100% of emissions 6am – 6pm
Offsite Trucks (All Alternate Business Sites Other Than California Cartage and Fastlane)	100% of emissions 8am – 4pm
Construction (Alternate Business Sites)	100% of emissions 9am – 5pm
Onsite Sources (Alternate Business Sites)	Variable by Business Operation Schedule

These emission distributions are based on the floating and CEQA baseline and Project operation schedules of SCIG and the affected businesses.

5.0 Calculation of Health Risks

An HRA spanning years 2013-2082 was conducted pursuant to a project-specific Protocol developed by the Port of Los Angeles and reviewed by SCAQMD (POLA, 2008). The period 2013-2082 is the 70-year exposure period with the greatest combined DPM emissions from the Project construction and operation. Seventy-year average TAC concentrations were used to estimate cancer risk to residential receptors, sensitive receptors, and recreational receptor populations (see following). In addition, the HRA evaluated the cancer risk from project emissions to workers based on average emissions calculated over a 40-year period (years 2013 to 2052) and evaluated the cancer risk to students based on peak annual emissions for an exposure duration of 6 years. The HRA was performed in a manner consistent with methodologies specified in:

- *Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003)*
- *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis (South Coast Air Quality Management District [SCAQMD], 2003),*

- *Air Resources Board Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (Air Resources Board [ARB], 2003)*
- *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588) (SCAQMD, 2005),*
- *Health Risk Assessment Protocol for Port of Los Angeles Terminal Improvement Projects (Los Angeles Harbor Department [Port of Los Angeles],* 2008).

In addition to cancer risk and non-cancer hazard, the HRA considered cancer burden, which is the estimated number of cancer cases for a population exposed over a 70-year period to project emissions (OEHHA, 2003; SCAQMD, 2011). Because the Project would generate DPM during construction and operation, the HRA also discusses and evaluates the effects of PM on mortality and morbidity.

Chronic and acute non-cancer effects were evaluated by calculating a hazard index (HI). The chronic non-cancer HI is a ratio of the maximum annual average concentration of a TAC to a chronic reference exposure level (REL). Similarly, an acute non-cancer HI is the ratio of the maximum hourly concentration of a TAC to an acute REL.

5.1 Toxicity Factors

The inhalation unit risk factor is the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to a TAC at a concentration of 1 $\mu g/m^3$ in air (US Environmental Protection Agency [USEPA], 2009). The inhalation unit risk factor is used to calculate a potential inhalation cancer risk using risk algorithms defined in OEHHA (2003).

The likelihood for non-cancer effects was evaluated by developing HIs, which, as noted above, represent the ratio of the modeled concentration of each TAC to the REL. RELs are developed by OEHHA (2012) and each is an estimate of the continuous inhalation exposure concentration to which the human population (including sensitive subgroups) may be exposed without appreciable risk of experiencing adverse non-cancer effects. A chronic non-cancer HI below 1.0, or an acute HI below 1.0 indicates that adverse non-cancer health effects from long-term or short-term exposure, respectively, are not expected.

Table C3-5-1 presents the cancer, chronic non-cancer, and acute non-cancer toxicity factors used to assess health risks in this study. As noted in the TAC Emission Calculation Approach (section 2.2), the TACs listed in this table were identified from the speciation of all non-DPM sources (e.g., tire and brake wear and alternate-fueled engines), as well as the speciation of DPM for the assessment of acute health effects.

Table C3-5-1. Toxicity Factors Used in the HRA.

Pollutant	CAS Number	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$ [a]	Chronic Inhalation REL $(\mu g/m^3)$ [b]	Target Organ for Chronic Exposure [b]	Acute Inhalation REL $(\mu g/m^3)$ [b,c]	Target Organ for Acute Exposure [b]
Acetaldehyde	75070	0.01	140	I	470	D,I
Acrolein (2-propenal)	107028	--	0.35	I	2.5	D,I
Ammonia	7664417	--	200	I	3200	D,I
Arsenic	7440382	12	0.015	B,C,G,I,J	0.2	B,C,G
Benzene[c]	71432	0.1	60	C,E,G	1300	C,H
1,3-butadiene	106990	0.6	20	H	--	--
Cadmium	7440439	15	0.02	I,M	--	--
Chlorine	7782505	--	0.2	I	210	D, I
Cobalt[d]	7440484	31.5	0.006	I	--	--
Copper	7440508	--	--	--	100	I
DPM[e]	9901	1.1	5	I	--	--
Ethylbenzene	100414	0.0087	2000	A,L,M	--	--
Formaldehyde	50000	0.021	9	I	55	D
N-hexane	110543	--	7000	G	--	--
Hexavalent chromium	18540299	510	0.2	I	--	--
Lead	7439921	0.042	--	--	--	--
Manganese	7439965	--	0.09	G	--	--
Mercury	7439976	--	0.03	G	0.6	G
Methyl alcohol	67561	--	4000	C	28000	G
Methyl ethyl ketone (mek) (2-butanone)[f]	78933	--	5000	C	13000	D,I
Naphthalene	91203	0.12	9	I	--	--
Nickel	7440020	0.91	0.014	E,I	0.2	F
Propylene	115071	--	3000	I	--	--
Selenium	7782492	--	20	A,B,G	--	--
Styrene	100425	--	900	G	21000	C,D,H,I
Sulfates	9960	--	--	--	120	I
Toluene	108883	--	300	C,G,I	37000	G,I
Vanadium (fume or dust)	7440622	--	--	--	30	D, I
Isomers of xylene	1330207	--	700	D,G,I	22000	D,G,I
M-xylene	108383	--	700	D,G,I	22000	D,G,I
O-xylene	95476	--	700	D,G,I	22000	D,G,I
P-xylene	106423	--	700	D,G,I	22000	D,G,I

Notes:

a) CARB 2012
b) OEHHA 2012
c) The acute exposure period is 1 hour for all compounds except benzene (6 hours). All acute effects are modeled using 1-hour averaging periods.
d) Toxicity factors and the target organ for chronic exposure were selected from USEPA (2012) and USEPA (2008), respectively, since they were not available from CARB (2012) or OEHHA (2012). The inhalation cancer potency factor was calculated from the inhalation unit risk.

e) For diesel ICEs and diesel trucks, only DPM emissions were evaluated for cancer risk and chronic hazard indices, because DPM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions. For all other emission sources (external combustion boilers, alternative fuel engines, tire and brake wear), emissions of the 30 other toxic air contaminants were evaluated for cancer risk and chronic hazard indices. For the acute hazard indices, DPM was not evaluated; rather, emissions of the 30 other toxic air contaminants were evaluated for all emission sources (including diesel ICEs).
f) The chronic inhalation REL and the target organ for chronic exposure were selected from USEPA (2012) and USEPA IRIS (2003), respectively, since they were not available from CARB (2012) or OEHHA (2012).

Key to noncancer acute and chronic exposure target organs:

A. Alimentary Tract
B. Cardiovascular System
C. Developmental System
D. Eye
E. Hematologic System
F. Immune System
G. Nervous System
H. Reproductive System
I. Respiratory System
J. Skin
K. Bone
L. Endocrine System
M. Kidney

Source: OEHHA 2012

5.2 Health Effects of Particulate Matter

Particulate matter small enough to be inhaled and retained by the lungs is a public health concern. These respirable particles (particulate matter less than about 10 micrometers in diameter [PM_{10}] and particulate matter less than 2.5 micrometers in diameter [$PM_{2.5}$]) can accumulate in the respiratory system or penetrate into the vascular system, causing or aggravating diseases such as asthma, bronchitis, lung disease, and cardiovascular disease. Children, the elderly, and the ill are believed to be especially vulnerable to adverse health effects of PM_{10} and $PM_{2.5}$.

PM in ambient air is a complex mixture that varies in size and chemical composition, as well as varying spatially and temporally. PM is generated from a number of sources such as the combustion of petroleum-based fuels, forest fires, and re-suspension of soil. At the present time, the PM released from combustion of diesel fuel, diesel exhaust particulate matter (DPM), can't be reliably distinguished from other sources of PM. The CARB and OEHHA consider DPM and PM to have equivalent toxicity.

Numerous studies have been published over the past 15 years that have established a strong correlation between the inhalation of ambient PM and an increased incidence of premature mortality from heart and/or lung diseases (Pope et al., 1995, 2002; 2004; Jerrett et al. 2005; Krewski et al., 2001; Gauderman et al., 2007). Asthma onset and the exacerbation of existing disease have also been linked to PM exposure (Pandya et al., 2002; Jerrett et al., 2008; Clark et al., 2010). Studies such as these provide the basis for PM air quality standards promulgated by SCAQMD, CARB, EPA, and the World Health Organization.

5.2.1 Quantifying Mortality and Morbidity

The Port has previously included analyses of PM-related mortality in the TraPac, China Shipping, and San Pedro Waterfront EIRs. The latter two documents utilized a methodology published by CARB (2006b), which was primarily developed for large geographic areas such as air basins or the entire state. In CARB (2008), the agency noted that the methods for applying calculations of mortality to a project-level scale were not fully developed, and that such applications should include explicit statements regarding the uncertainties and limitations. Notwithstanding these uncertainties, the Port has received requests from individuals, environmental groups, the SCAQMD, OEHHA, and the CARB to include separate quantitative assessments of project-related PM-attributable mortality as well as morbidity in their CEQA analyses. In response to these requests POLA developed a methodology to calculate mortality and morbidity from project emissions. A complete description of the methodology, including supporting equations and references, is available in POLA (2011).

In brief, the Port has committed to quantifying mortality and morbidity from PM exposure if dispersion modeling of ambient air quality concentrations for operation of the project (Project minus CEQA baseline) results in the identification of a significant impact for 24-hour concentrations of $PM_{2.5}$ (Impact AQ-4 in POLA CEQA documents).

No CEQA significance thresholds have been identified for premature mortality or morbidity by any state or local regulatory agency. As specified in POLA (2011), POLA has determined that mortality and morbidity will be calculated when the incremental operational emissions would result in off-site 24-hour $PM_{2.5}$ concentrations that exceed the SCAQMD significance criterion of 2.5 $\mu g/m^3$. The geographic area of analysis for the mortality and morbidity calculations is all census blocks partially or fully within the 2.5 $\mu g/m^3$ $PM_{2.5}$ peak daily concentration isopleths for the Project minus Baseline. This approach is consistent with the significant impact threshold identified by the SCAQMD for $PM_{2.5}$. Project-specific estimates of the exposed population will be developed based on the residential population within these census blocks.

Mortality will be calculated using the relative risk factor of a 10% increase in premature deaths per year (mortality rate) per 10 $\mu g/m^3$ increase in $PM_{2.5}$ concentration (CARB, 2008). Morbidity calculations will follow the general methodology and available concentration-response data described by CARB (2002, 2006b) and provided in POLA (2011). Morbidity endpoints that are calculated on an annual basis will be based on project-specific incremental annual $PM_{2.5}$ concentrations (e.g., project minus Baseline). Morbidity endpoints that require estimates of daily impacts will be based on daily average $PM_{2.5}$ concentrations.

The specific health effect endpoints that will be evaluated include:

- Hospital admissions for chronic obstructive pulmonary disease
- Hospital admissions for pneumonia
- Hospital admissions for cardiovascular disease
- Acute bronchitis
- Hospital admissions for asthma
- Emergency Room visits for asthma
- Asthma attacks
- Lower respiratory symptoms
- Work loss days
- Minor restricted activity days

To address mortality and morbidity over the multiple years of a project's lease, the annual incidence for each endpoint will be summed to provide an estimate of the aggregate effects attributable to a project's incremental PM emissions.

Since the adoption of the POLA/POLB methodology for evaluating morbidity and mortality, CARB has updated their approach to estimating premature death associated with exposure to fine particulate matter (CARB, 2010). In the updated methodology, CARB relies on the current methods outlined by USEPA (2010) in *Quantitative Health Risk Assessment for Particulate Matter*, from which CARB integrated several key factors. Three key elements of this updated approach include: a) limiting the evaluation to cardiovascular disease-related mortality, b) adoption of an annual average $PM_{2.5}$ threshold concentration of 5.8 μg/m^3 ("CARB $PM_{2.5}$ threshold") for quantifying mortality, and c) revision of the coefficient used to relate mortality to changes in $PM_{2.5}$ concentrations.

5.3 Cancer Burden

The Office of Environmental Health Hazard Assessment defines cancer burden as "an estimate of the number of cancer cases expected from a 70-year exposure …" to current estimated emissions (OEHHA, 2003). Whereas cancer risk represents the probability of an individual developing cancer, cancer burden estimates the number of individuals that would be expected to contract cancer by multiplying the cancer risk by the exposed population . The exposed population is defined as the number of persons within a facility's zone of impact, which is defined by the Port as the area within the facility's one in a million cancer risk isopleth. Consistent with this definition, cancer burden is calculated only if a project alternative is associated with cancer risks of one in a million or above.

5.4 Exposure Scenarios for Individual Lifetime Cancer Risk

For the cancer risk evaluation, the frequency and duration of exposure to TACs are assumed to be directly proportional to the risk. Therefore, this HRA used specific exposure assumptions for each receptor type, as described below.

1. **Residential and Sensitive Receptors.** Cancer risks for residential and sensitive receptors were estimated using the breathing rates described in the *CARB Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (October 2003)* (CARB, 2004a). The HRA determined residential and sensitive receptor cancer risks by using a breathing rate of 302 liters per kilogram day (corresponding to an 80th percentile value) and an exposure duration of 24 hours per day, 350 days per year over 70 years. For supplemental information, residential cancer risks also were calculated using a 65th percentile ("average") breathing rate of 271 L/kg-day and a 95th percentile ("high-end") breathing rate of 393 L/kg-day.
2. **Occupational impacts**. Workers generally do not spend as much time within the region of a project as do residents. The SCAQMD, therefore, allows an exposure adjustment for workers (SCAQMD, 2005). Lifetime occupational exposure is based on a worker presence of 8 hours per day, 245 days per year for 40 years (as recommended by OEHHA [2003]). The breathing rate for workers is equal to 447 L/kg-day, which equates to 149 L/kg-day over an 8-hour workday (OEHHA, 2003).
3. **Student impacts**. The policy of the SCAQMD is to evaluate student cancer risk based upon a full 70 years of exposure. However, students actually spend a far more limited portion of their lives at a given school than 70 years. Accordingly, student exposures were calculated based on a student presence of 6 hours per day, 180 days per year for 6 years. The breathing rate of children is equal to 581 L/kg-day (OEHHA, 2003).

4. **Recreational user impacts**. Exposures for recreational users were estimated based on an exposure frequency of 2 hours per day, 350 days per year, and an exposure duration of 70 years. The breathing rate of a person engaged in recreational activities is assumed to be a "heavy-activity" rate equal to 1,097 L/kg-day, which was obtained from the USEPA *Exposure Factors Handbook* (USEPA, 1997).

Table C3-5-2 summarizes the primary exposure assumptions used to calculate individual lifetime cancer risk by receptor type.

Table C3-5-2. Exposure Assumptions for Individual Lifetime Cancer Risk.

Receptor Type	Exposure Frequency		Exposure Duration	Breathing Rate
	Hours/Day	Days/Year	(Years)	(L/kg-day)
Residential	24	350	70	302
Occupational	8	245	40	447
Sensitive	24	350	70	302
Student	6	180	6	581
Recreational	2	350	70	1,097

Notes:

a) The residential breathing rate of 302 L/kg BW-day represents the 80th percentile breathing rate. For informational purposes, residential cancer risks were also calculated for a 95th percentile ("high end") breathing rate of 393 L/kg BW-day (OEHHA, 2003).

b) The occupational exposure frequency of 245 days/year represents 5 days/week, **49** weeks/year. The occupational breathing rate of 447 L/kg BW-day equates to 149 L/kg BW-day over an 8-hour work day (OEHHA, 2003).

c) The student breathing rate of 581 L/kg BW-day represents the high end child breathing rate (OEHHA, 2003).

d) The recreational breathing rate of 1,097 L/kg BW-day represents a "heavy activity" breathing rate, which is derived from a breathing rate of 3.2 m3/hr (and assuming a 70-kg adult) as reported in the USEPA *Exposure Factors Handbook* (USEPA, 1997). This recreational breathing rate is conservative because it assumes that an individual could sustain the maximum hourly breathing rate for 2 consecutive hours.

6.0 Significance Criteria for Project Health Risks

The Port has adopted the significance threshold of 10 in a million as being an acceptable level of risk for receptors. Based on this threshold, a project would produce less than significant cancer risk impacts if the maximum incremental cancer risk due to the project is less than 10 in 1 million (10×10^{-6}).

The Port has also adopted the recently-established air quality significance threshold for cancer burden of 0.5 excess cancer cases in areas with project-attributable cancer risk above one in a million (1×10^{-6}) (SCAQMD, 2011).

For chronic and acute non-cancer exposures, maximum predicted annual and 1-hour TAC concentrations are compared with the RELs developed by OEHHA to yield HIs. Hazard indexes above 1.0 indicate there is a potential for unacceptable non-cancer health effects, and represent CEQA significance criteria for non-cancer effects.

For the determination of significance from a CEQA standpoint, this HRA determined the incremental change in health effects due to the Project by estimating the net change in impacts between each Project and floating baseline conditions. These incremental health effects values were compared to the significance thresholds described above.

7.0 Predicted Health Impacts

7.1 Unmitigated Project Health Impacts

Table C3-7-1 presents a summary of the maximum health impacts that would occur for each receptor type with construction and operation of the Unmitigated Project. The table also shows the maximum health impacts from the floating baseline and the floating baseline increment (Unmitigated Project minus floating baseline), as well as the CEQA baseline and the CEQA baseline increment (Unmitigated Project minus CEQA baseline). Because the results in Table C3-7-1 represent the maximum impacts predicted for each receptor type, the impacts at all other receptors would be less than these values.

Table C3-7-1. Maximum Health Impacts Associated with the Unmitigated Project.

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Project	CEQA Baseline	CEQA Increment	Floating Baseline	Floating Increment	
Cancer Risk	Residential	31 x 10^{-6} (31 in a million)	68 x 10^{-6} (68 in a million)	1.2 x 10^{-6} (1.2 in a million)	34 x 10^{-6} (34 in a million)	**20 x 10^{-6} (20 in a million)**	10 x 10^{-6} (10 in a million)
	Occupational	24 x 10^{-6} (24 in a million)	51 x 10^{-6} (51 in a million)	9.4 x 10^{-6} (9.4 in a million)	21 x 10^{-6} (21 in a million)	**13 x 10^{-6} (13 in a million)**	
	Sensitive	30 x 10^{-6} (30 in a million)	45 x 10^{-6} (45 in a million)	0.5 x 10^{-6} (0.5 in a million)	20 x 10^{-6} (20 in a million)	**16 x 10^{-6} (16 in a million)**	
	Student	2.2 x 10^{-6} (2.2 in a million)	0.9 x 10^{-6} (0.9 in a million)	1.3 x 10^{-6} (1.3 in a million)	0.3 x 10^{-6} (0.3 in a million)	1.9 x 10^{-6} (1.9 in a million)	
	Recreational	39 x 10^{-6} (39 in a million)	78 x 10^{-6} (78 in a million)	9.5 x 10^{-6} (9.5 in a million)	22 x 10^{-6} (22 in a million)	**27 x 10^{-6} (27 in a million)**	
Chronic Hazard Index	Residential	0.08	0.06	0.03	0.06	0.02	1.0
	Occupational	0.4	0.2	0.3	0.2	0.3	
	Sensitive	0.09	0.06	0.04	0.07	0.04	
	Student	0.09	0.06	0.03	0.07	0.03	
	Recreational	0.4	0.2	0.3	0.2	0.3	
Acute Hazard Index	Residential	0.2	0.10	0.08	0.1	0.08	1.0
	Occupational	0.5	0.3	0.3	0.3	0.3	
	Sensitive	0.2	0.10	0.1	0.1	0.10	
	Student	0.2	0.09	0.1	0.1	0.09	
	Recreational	0.5	0.3	0.3	0.3	0.3	

Notes:

a) Exceedances of the significance thresholds are in **bold**. The significance thresholds apply to the floating increments only.

b) The maximum increments might not occur at the same receptor locations as the maximum impacts. This means that the increments cannot necessarily be determined by subtracting the floating baseline impact from the project impact. Rather, the subtraction must be done at each receptor, for all modeled receptors, and the maximum result selected.

c) The floating increment represents Project minus floating baseline.

d) When the maximum increment for a receptor type is negative, the maximum increment displayed is the increment at the maximum project receptor location.

e) Data represent the receptor locations with the maximum impacts or increments. The impacts or increments at all other modeled receptors would be less than these values for each receptor type.

f) The cancer risk values reported in this table for the residential receptor are based on the 80th percentile breathing rate. The risks associated with the 65th percentile (average) breathing rate will be less than these values. The risks associated with the 95th percentile (high end) breathing rate are 41 x 10^{-6} for the Project impact, 44 x 10-6 for the floating baseline impact, and 26 x 10-6 for the floating increment.

The values in Table C3-7-1 show that the floating baseline incremental cancer risk for the residential MEI is 20 in a million (20×10^{-6}). This risk value is in exceedance of the significance threshold of 10 in a million. Incremental risks for the occupational, sensitive, and recreational MEIs, calculated with a floating baseline, also exceed the CEQA significance threshold.

The location identified for the MEI residential receptor is in the Westside neighborhood of Long Beach, approximately 226 meters to the southeast of the site and alternate business sites. The cancer risk increment would also exceed the significance threshold at other residential locations in that neighborhood.

The MEI occupational receptor is located approximately 15 meters southeast of the site and alternative business sites, while the MEI recreational receptor is located approximately 65 meters southeast of the site. The MEI sensitive receptor is located at the Cabrillo Center Expansion.

The maximum chronic hazard index increments, calculated for a floating baseline, are predicted to be less than the CEQA significance threshold of 1.0 at all receptors.

The maximum acute hazard index increments, calculated for a floating baseline, are predicted to be less than the CEQA significance threshold of 1.0 at all receptors.

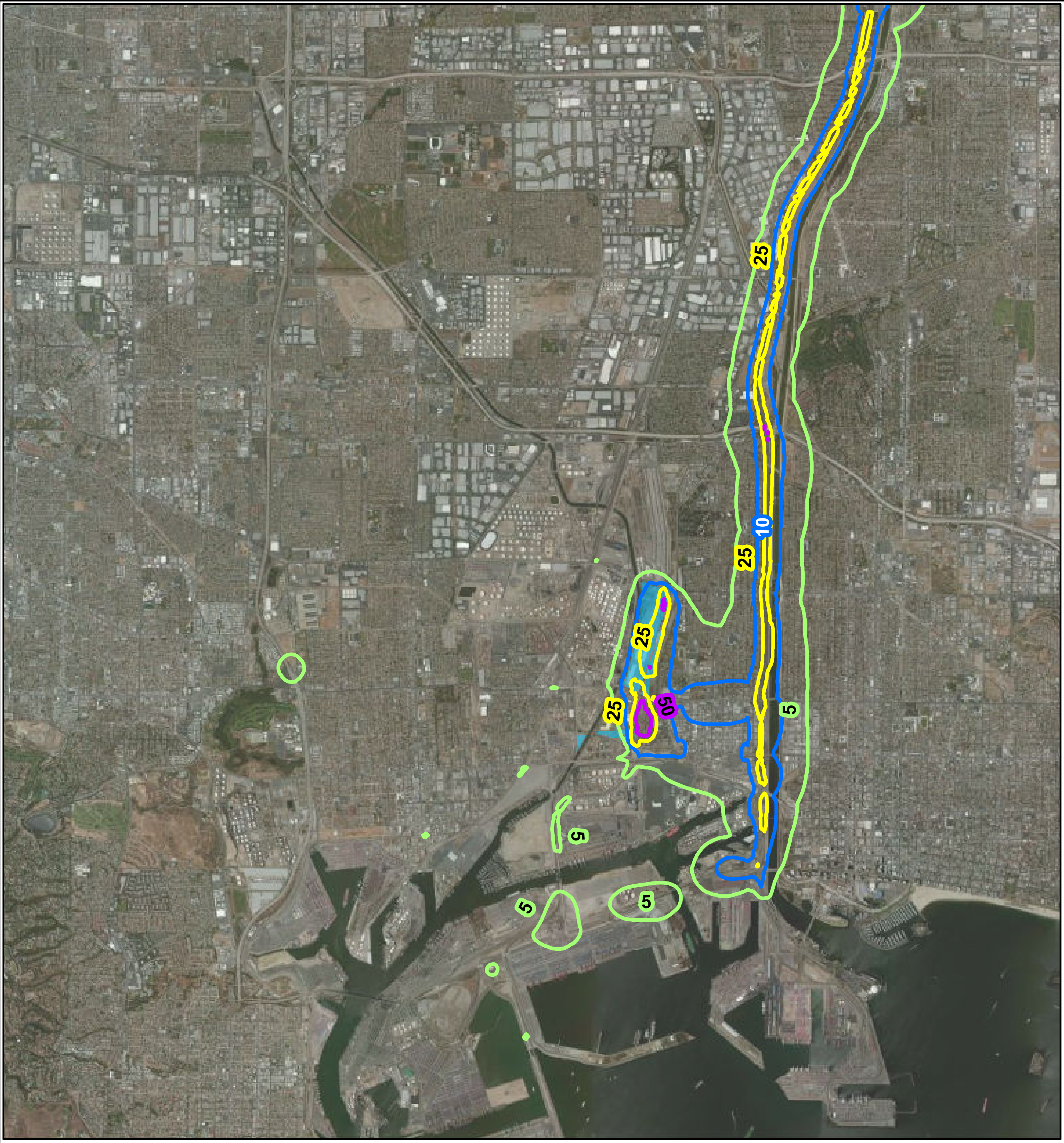
To illustrate the geographical extent of the potential health risk impacts associated with the Project, a series of cancer risk isopleths (risk contours) for residential receptors has been prepared. The isopleths show individual lifetime cancer risks overlaid on a map of the surrounding community. These cancer risk isopleths were calculated based on the exposure assumptions shown in Table C3-5-2, i.e., that individuals are exposed by inhalation via an 80th percentile breathing rate 24 hours per day, 350 days per year, for 70 years. Figure C3.7-1 shows the floating baseline residential individual lifetime cancer risk (per million). For reference, Figure C3.7-2 shows the CEQA baseline residential individual lifetime cancer risk (per million).

Figures C3.7-3, C3.7-4, and C3.7-5 show the maximum receptor locations for the floating baseline for cancer risk, chronic HI, and acute HI, respectively. The residential, occupational, and recreational MEIs are not necessarily located directly on existing homes, workplaces, or recreational facilities; rather, they are located in areas that contain these land use types.

Figures C3.7-6 and C3.7-7 show the residential cancer risk isopleths associated with the Unmitigated Project and Unmitigated Project minus floating baseline, respectively.

Figures C3.7-8, C3.7-9, and C3.7-10 show the maximally exposed receptor locations for the Unmitigated Project for cancer risk, chronic HI, and acute HI, respectively. The residential, occupational, and recreational MEIs are not necessarily located directly on existing homes, workplaces, or recreational facilities; rather, they are located in areas that contain these land use types.

Table C3-7-2 presents the contributions from each emission source to the maximum health effects values for the Unmitigated Project. At the maximum residential receptor, the greatest contributor to the cancer risk is SCIG offsite and onsite trucks. The proximity of the receptor to the on- and off-ramps of Highway 1 (the Pacific Coast Highway) is the dominant contributor to these health risk values. By contrast, the greatest contributor to the chronic hazard index at the maximum residential receptor is a combination of emissions from SCIG construction, SCIG offsite trucks, and SCIG onsite trucks. The greatest contributor to the acute hazard index at the maximum residential



Legend

- 5
- 10
- 25
- 50
- Site

N

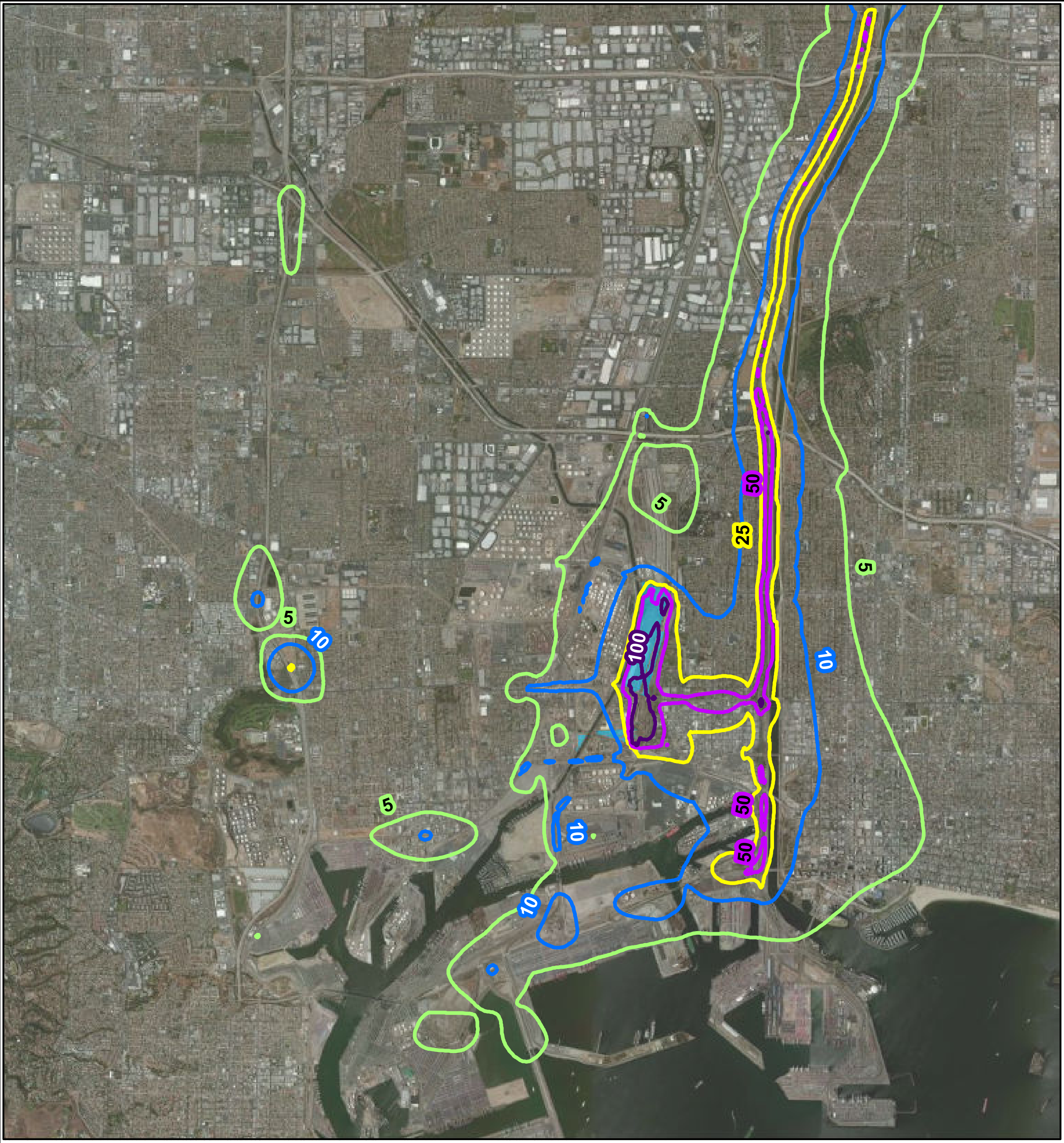
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-1
Floating Baseline

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



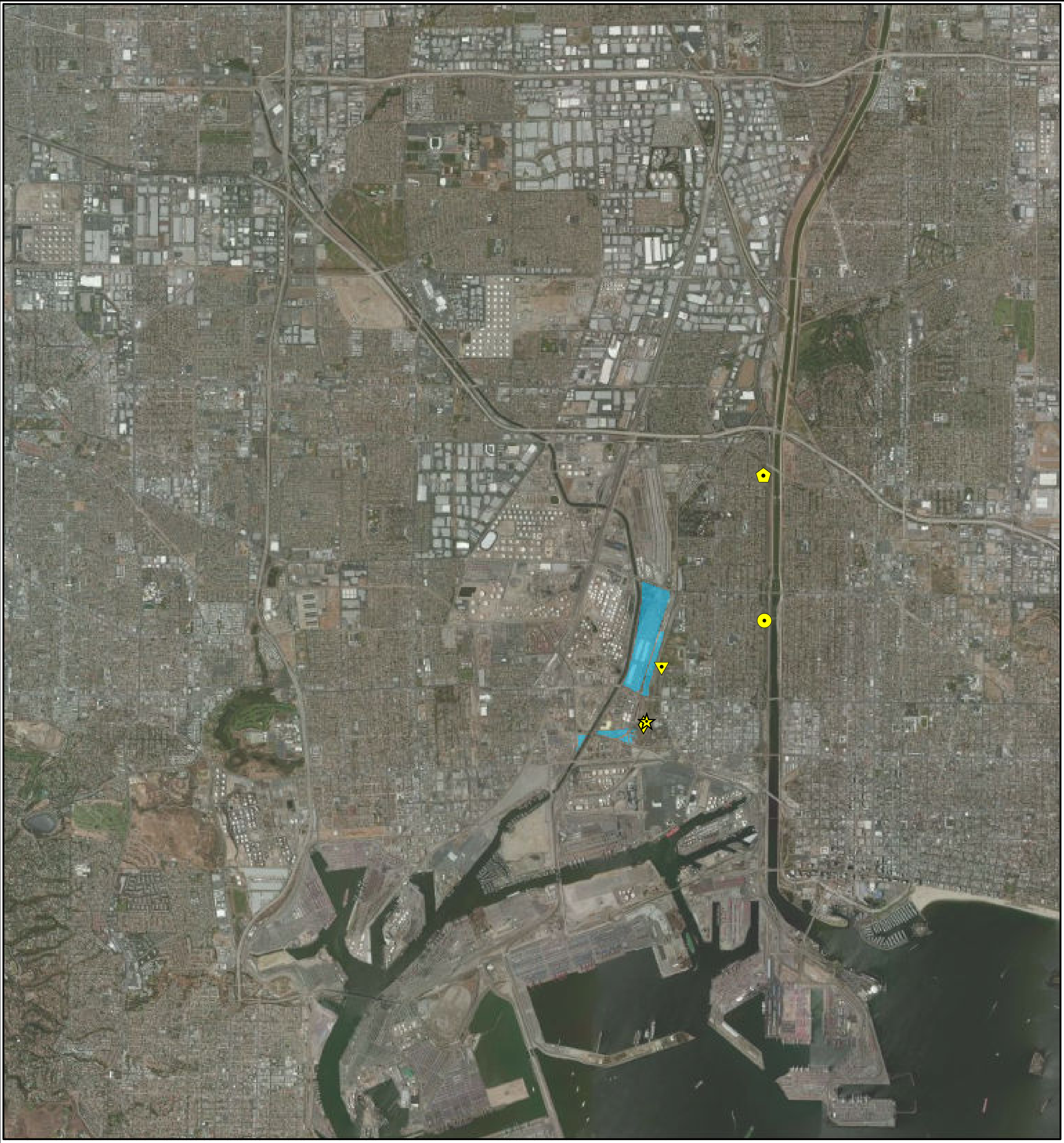
Legend
5
10
25
50
100
Site

N
0 0.5 1 Miles
0 0.5 1 Kilometers

Figure C3.7-2
NOP CEQA Baseline

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



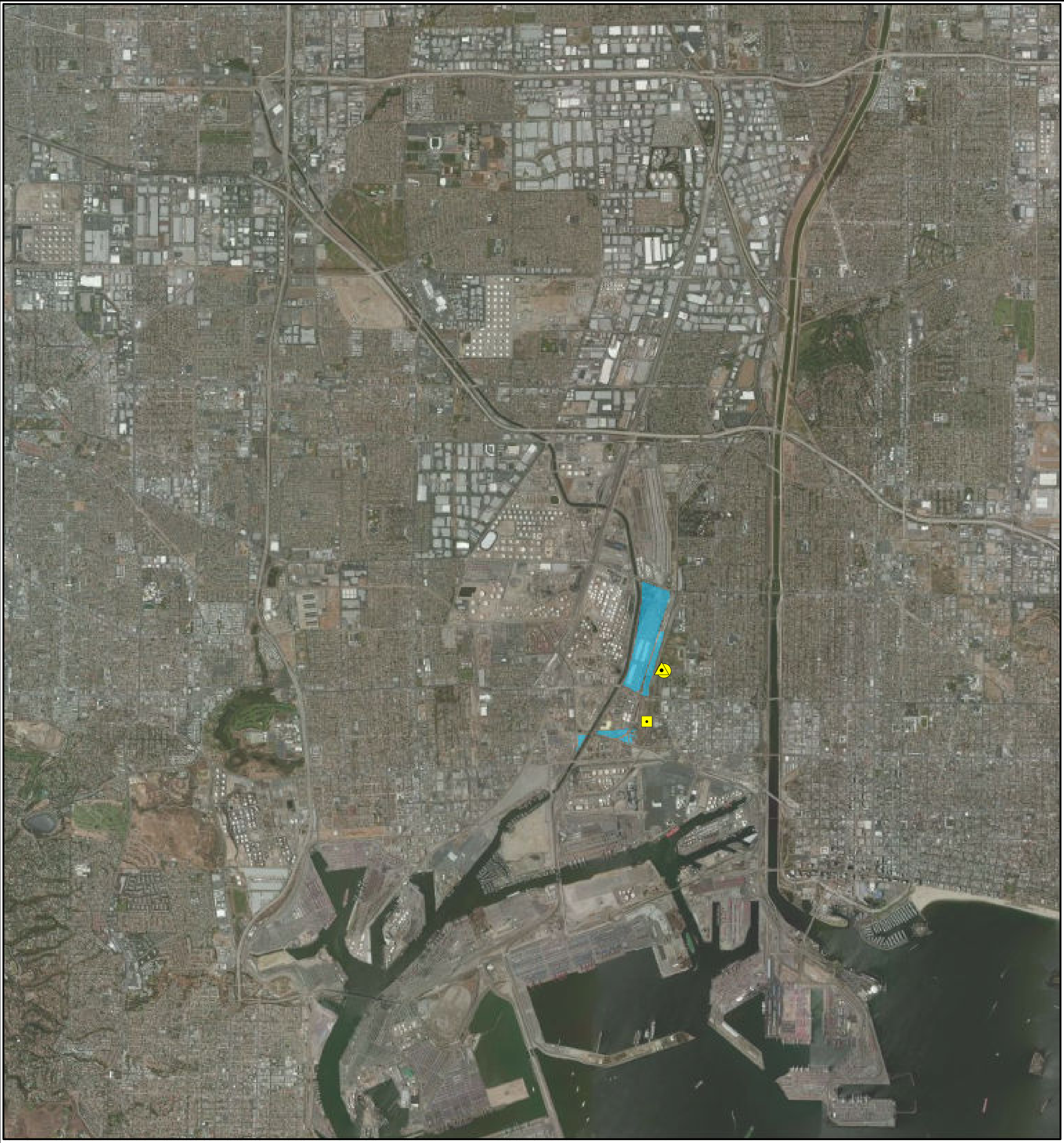
Legend

- Residential MEI - Floating Baseline
- Occupational MEI - Floating Baseline
- Recreational MEI - Floating Baseline
- Sensitive MEI - Floating Baseline
- Student MEI - Floating Baseline
- Site

Figure C3.7-3
Floating Baseline

Maximum Exposed Individual for Cancer Risk

ENVIRON



Legend

- Residential MEI - Floating Baseline
- Occupational and Recreational MEI - Floating Baseline
- Sensitive and Student MEI - Floating Baseline
- Site

N

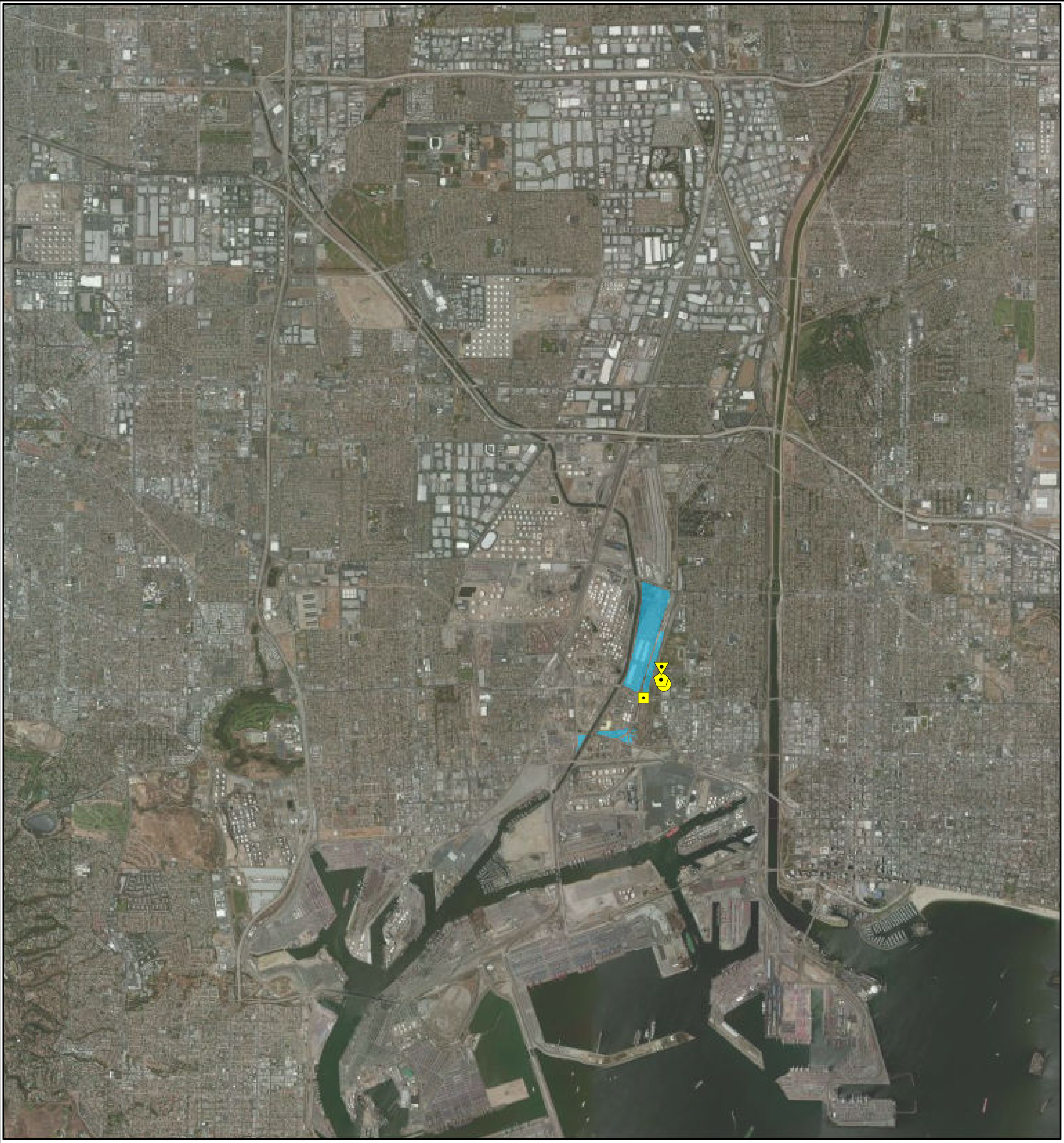
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-4
Floating Baseline

Maximum Exposed Individual for Chronic HI

ENVIRON



Legend

- Residential MEI - Floating Baseline
- Occupational and Recreational MEI - Floating Baseline
- Sensitive MEI - Floating Baseline
- Student MEI - Floating Baseline
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-5
Floating Baseline

Maximum Exposed Individual for Acute HI

ENVIRON

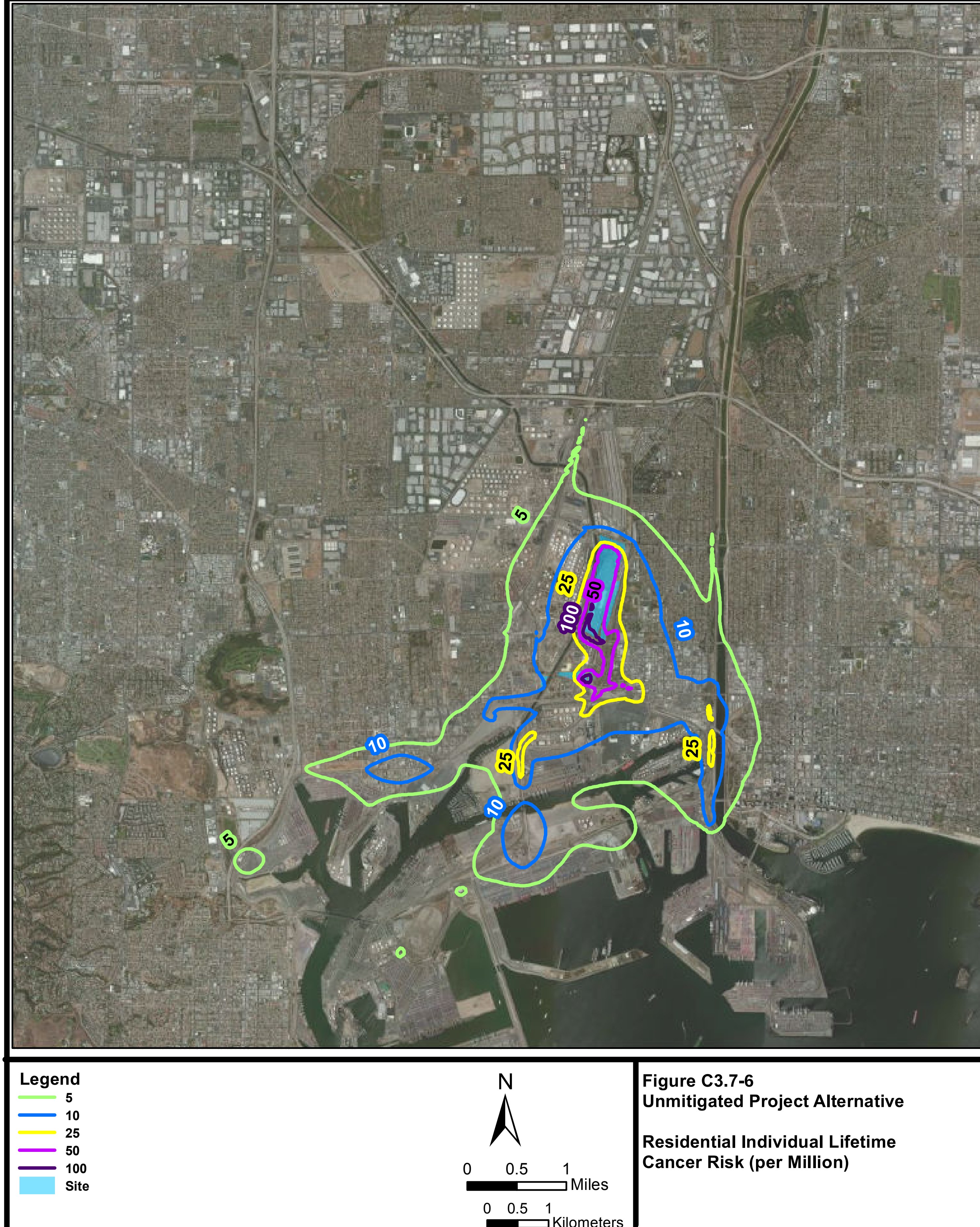
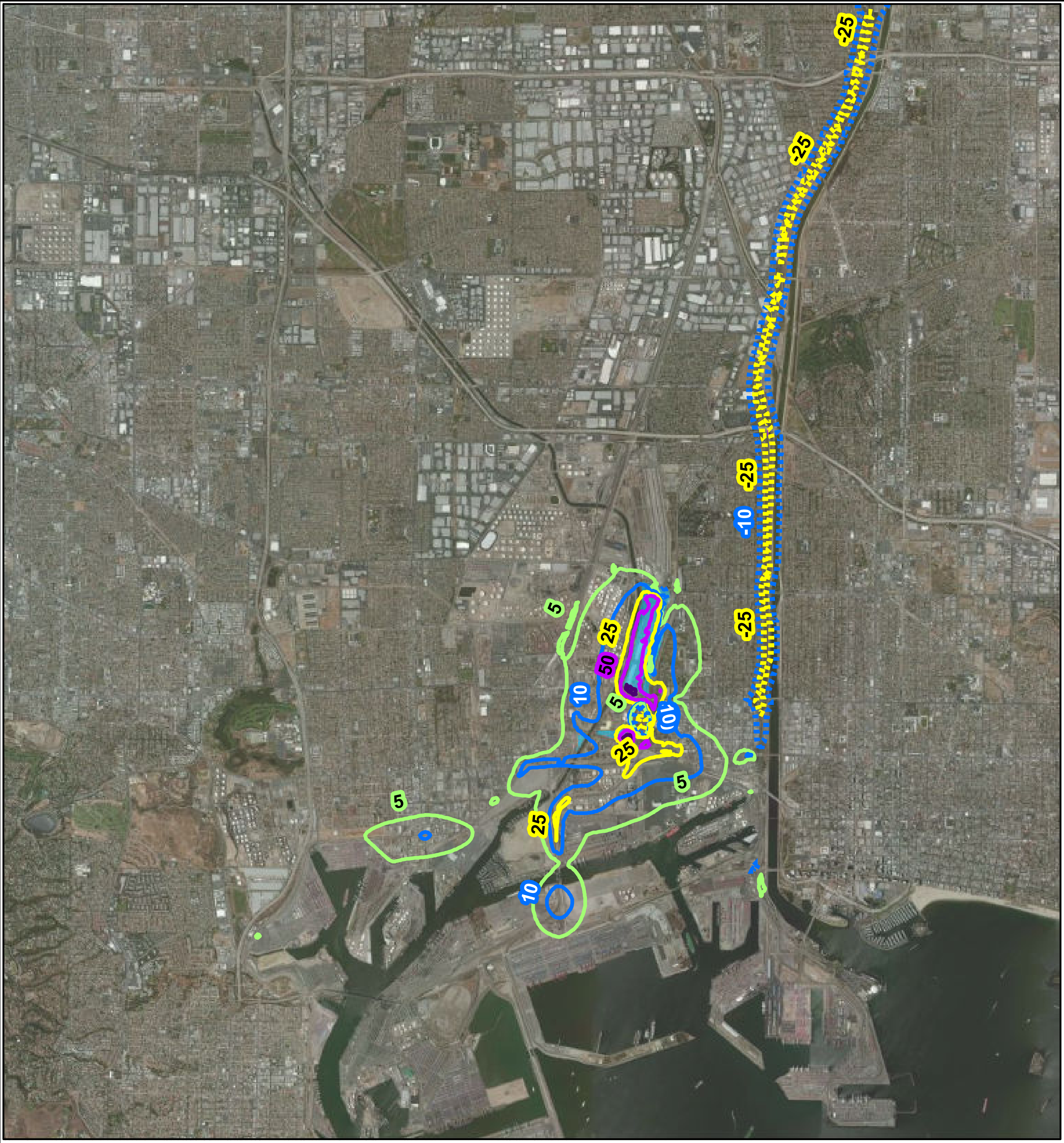


Figure C3.7-6
Unmitigated Project Alternative

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- -10
- -25
- -50
- 5
- 10
- 25
- 50
- 100
- Site

N

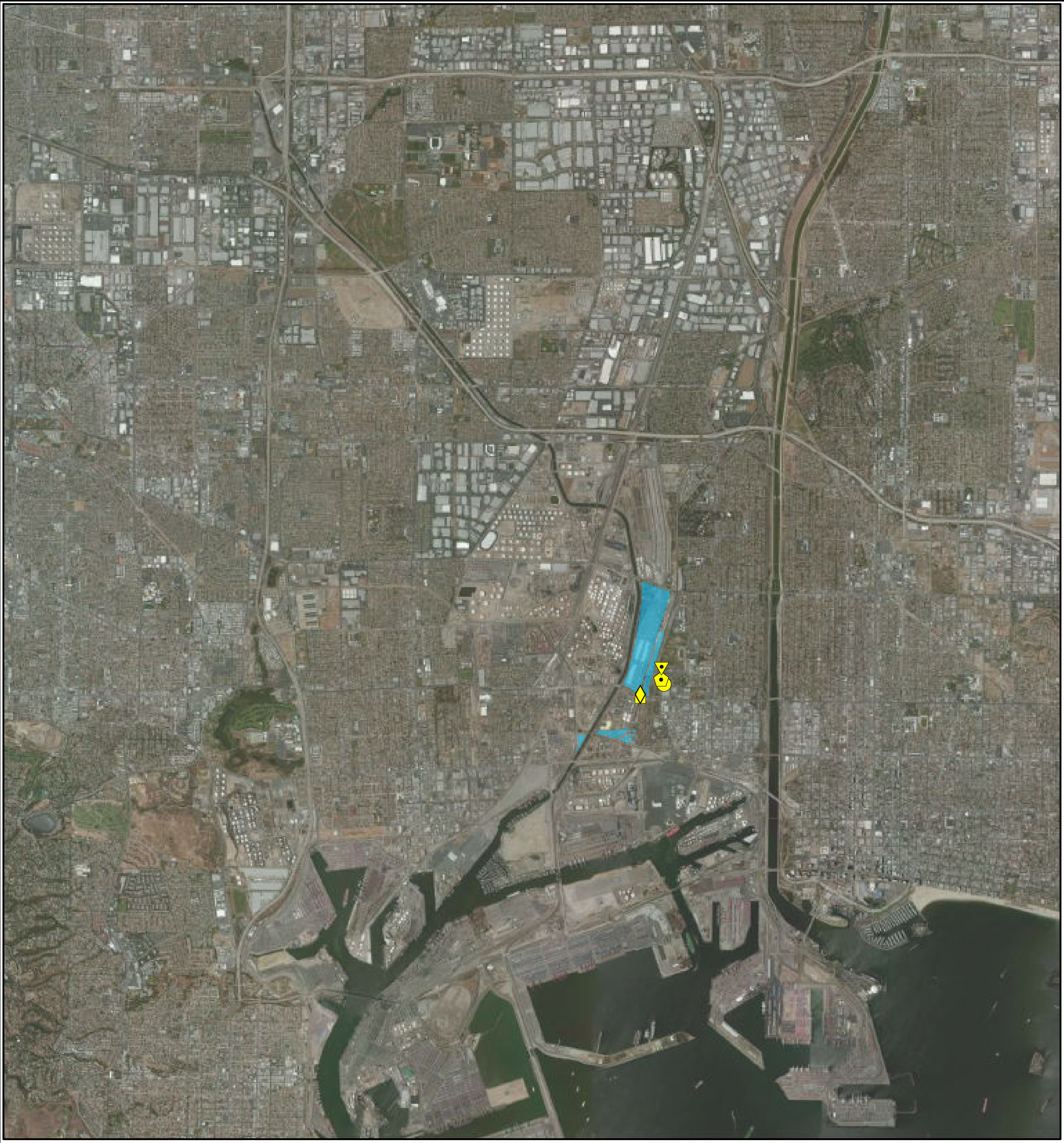
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-7
Unmitigated Project Alternative minus Floating Baseline

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- Residential MEI - Unmitigated Project[1]
- Occupational and Recreational MEI - Unmitigated Project[2]
- Sensitive MEI - Unmitigated Project[3]
- Student MEI - Unmitigated Project[4]
- Occupational MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

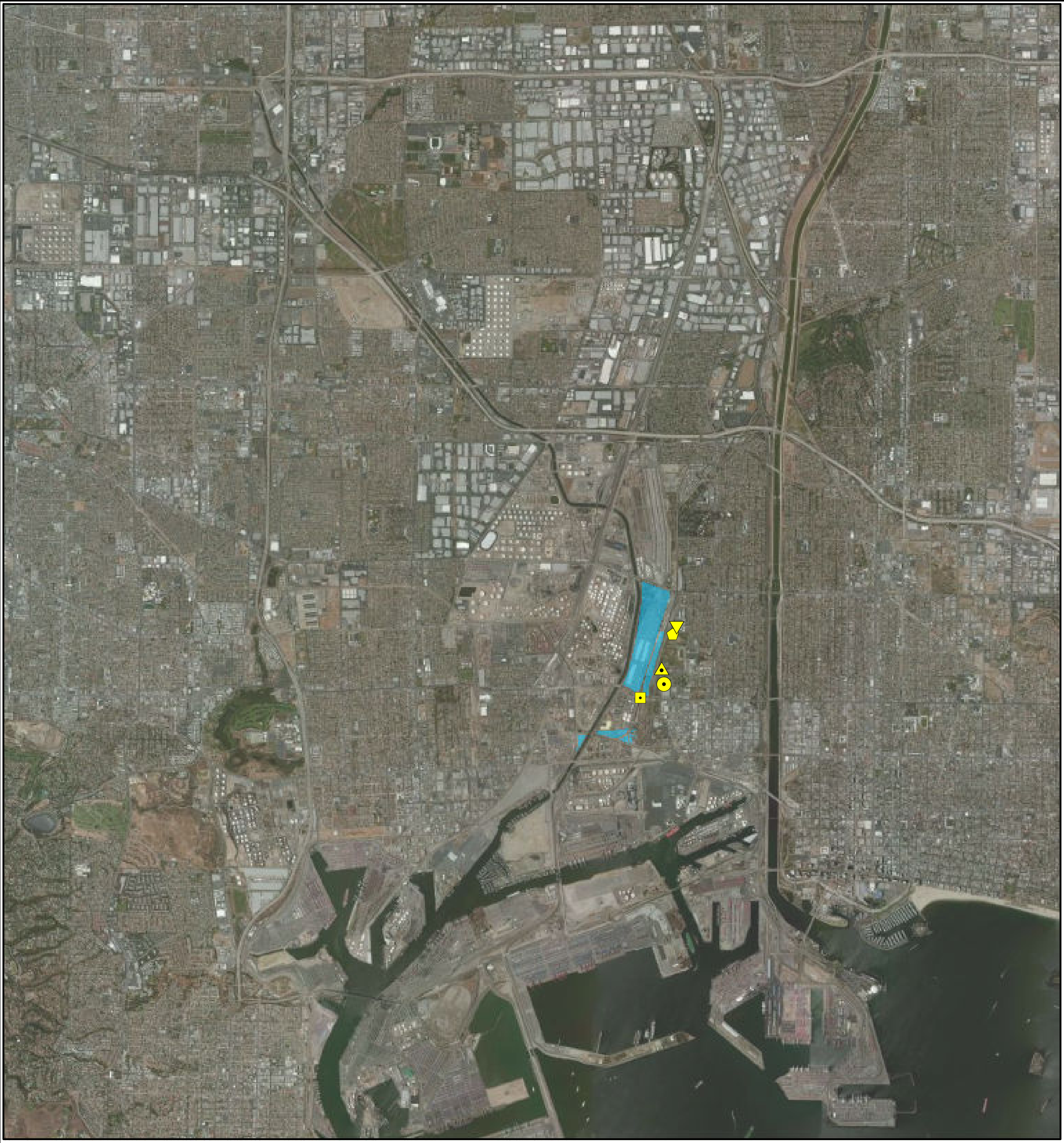
Note:

1. Also location of the Residential Floating Increment value in Table C3-7-1.
2. Also location of the Recreational Floating Increment value in Table C3-7-1.
3. Also location of the Sensitive Floating Increment value in Table C3-7-1.
4. Also location of the Student Floating Increment value in Table C3-7-1.

Figure C3.7-8
Unmitigated Project Alternative

Maximum Exposed Individual for Cancer Risk

ENVIRON



Legend

- Residential MEI - Unmitigated Project[1]
- Occupational and Recreational MEI - Unmitigated Project[2]
- Sensitive and Student MEI - Unmitigated Project
- Sensitive MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

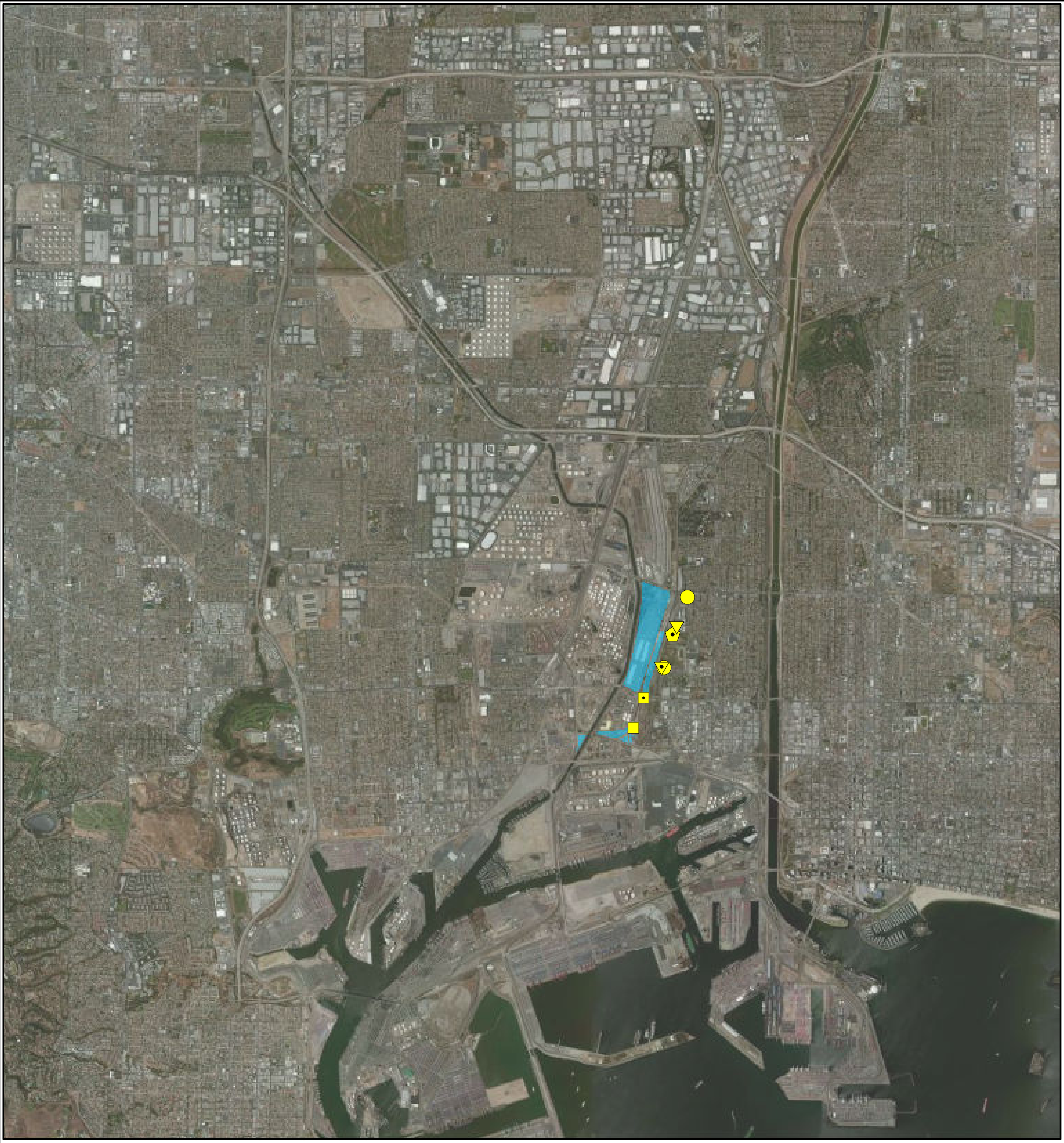
0 0.5 1 Kilometers

Note:
1. Also location of the Residential Floating Increment value in Table C3-7-1.
2. Also location of the Occupational and Recreational Floating Increment values in Table C3-7-1.

Figure C3.7-9
Unmitigated Project Alternative

Maximum Exposed Individual for Chronic HI

ENVIRON



Legend

- Residential MEI - Unmitigated Project
- Occupational and Recreational MEI - Unmitigated Project
- Sensitive MEI - Unmitigated Project[1]
- Student MEI - Unmitigated Project
- Residential MEI - Floating Increment
- Occupational and Recreational MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Note:
1. Also location of the Sensitive Floating Increment value in Table C3-7-1.

Figure C3.7-10
Unmitigated Project Alternative

Maximum Exposed Individual for Acute HI

ENVIRON

receptor is construction emissions from SCIG and alternate business sites. SCIG locomotives contribute between approximately 1-5% of each health effect endpoint at the maximum residential receptor.

Table C3-7-2. Source Contributions at the Residential and Occupational MEIs for the Unmitigated Project.

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
SCIG Offsite Trucks	48.5%	21.1%	1.2%	53.9%	17.3%	1.4%
SCIG Onsite Trucks	36.5%	14.7%	6.8%	22.7%	9.2%	2.9%
SCIG Onsite Locomotives	4.0%	1.6%	0.6%	2.9%	0.7%	0.4%
Alternate Business Location CHE	2.7%	8.2%	3.1%	1.9%	0.7%	13.8%
SCIG Construction	2.7%	31.0%	50.9%	15.0%	62.7%	45.1%
Hostler	1.2%	9.5%	3.7%	0.2%	0.8%	1.3%
Alternate Business Location Offsite Trucks	1.2%	7.2%	2.5%	1.1%	6.5%	1.7%
SCIG Offsite Locomotives	1.1%	0.5%	<0.1%	0.4%	0.1%	<0.1%
Alternate Business Location Onsite Trucks	0.9%	1.0%	4.3%	0.4%	<0.1%	28.4%
SCIG CHE/TRU	0.4%	0.2%	1.0%	0.2%	<0.1%	0.3%
Onsite Refueling Trucks	0.2%	<0.1%	<0.1%	0.8%	0.6%	<0.1%
Alternate Business Location Onsite Locomotives	0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Alternate Business Location Construction	0.1%	2.3%	21.5%	<0.1%	0.3%	3.8%
SCIG Onsite Gasoline Vehicles	0.1%	1.9%	0.2%	<0.1%	0.3%	<0.1%
Emergency Generator	<0.1%	<0.1%	4.0%	<0.1%	<0.1%	0.3%
SCIG Offsite Gasoline Vehicles	<0.1%	0.4%	<0.1%	0.1%	0.5%	<0.1%
Alternate Business Location Offsite Gasoline Vehicles	<0.1%	0.2%	0.3%	<0.1%	0.3%	0.2%
Alternate Business Location Onsite Gasoline Vehicles	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	0.2%

At the maximum occupational receptor, the greatest contributors to the cancer risk are SCIG offsite and onsite trucks. The greatest contributor to the chronic hazard index is SCIG construction and SCIG onsite and offsite trucks. The greatest contributors to the acute hazard index are SCIG construction and alternate business location onsite trucks and cargo handling equipment (CHE). SCIG locomotives contribute 3.4% to cancer risk, less than 1% to the chronic hazard index, and 0.4% to the acute hazard index at the maximum occupational receptor.

Table C3-7-3 presents the contributions from each TAC to the maximum health effects values for the Unmitigated Project. Because DPM is a surrogate for all diesel ICE emissions for cancer risk calculations, DPM is the maximum contributor (over 96 percent) to these health risk values at the residential and occupational receptor. DPM contributes over 86 percent of the chronic hazard index at the occupational receptor while DPM and chlorine together contribute over 81 percent of the chronic hazard index at the residential receptor. The table shows that the greatest acute hazard index contributor is formaldehyde at both the maximum residential and occupational receptors.

Table C3-7-3. TAC Contributions at the Residential and Occupational MEIs for the Unmitigated Project.

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
DPM	96.3%	67.3%	0.0%	97.6%	86.1%	0.0%
Hexavalent Chromium	2.2%	<0.1%	0.0%	2.0%	<0.1%	0.0%
Formaldehyde	0.7%	6.0%	88.7%	0.1%	0.5%	88.7%
Benzene	0.5%	0.1%	0.5%	<0.1%	<0.1%	0.5%
Cobalt	0.3%	2.6%	0.0%	<0.1%	0.6%	0.0%
Nickel	<0.1%	7.0%	2.7%	<0.1%	5.1%	2.5%
1,3-Butadiene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Acetaldehyde	<0.1%	<0.1%	5.0%	<0.1%	<0.1%	5.1%
Arsenic	<0.1%	<0.1%	0.2%	<0.1%	<0.1%	0.2%
Ethylbenzene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Naphthalene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Lead	<0.1%	0.0%	0.0%	<0.1%	0.0%	0.0%
Cadmium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Acrolein (2-Propenal)	0.0%	<0.1%	0.1%	0.0%	<0.1%	0.1%
Ammonia	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Antimony	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calcium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Elemental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Organic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbonate Ion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chlorine	0.0%	14.3%	0.1%	0.0%	5.5%	<0.1%
Chromium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Copper	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Iron	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Isomers Of Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Manganese	0.0%	2.5%	0.0%	0.0%	1.9%	0.0%
Mercury	0.0%	0.0%	0.4%	0.0%	0.0%	0.5%
Methyl Alcohol	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Ethyl Ketone (Mek) (2-Butanone)	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
M-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
N-Hexane	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
Nitrates	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
O-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Phosphorous	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Potassium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
Propylene	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
P-Xylene	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Selenium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Styrene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Sulfates	0.0%	0.0%	2.2%	0.0%	0.0%	2.2%
Toluene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unknown Pm	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Vanadium	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Vanadium (Fume Or Dust)	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Zinc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes:

"a) The chemical contributions for the chronic and acute hazard indices include all chemicals regardless of the target organs they affect.

b) For diesel internal combustion engines, only DPM emissions were evaluated for cancer risk and chronic hazard indices, because DPM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions. For all other emissions (alternative fuel engines, tire and brake wear), emissions of the 47 other toxic air contaminants were evaluated for cancer and chronic hazard indices. For the acute hazard indices, DPM was not evaluated; rather, emissions of the 47 other toxic air contaminants were evaluated for all emission sources (including diesel internal combustion engines)."

Because residential cancer risks attributable to the Project were estimated to exceed 1 x 10^{-6} (one in a million), cancer burden was calculated as per the Port's policy. As shown in Attachment C3-1, the cancer burden of the population in the area of impact (14,451 individuals) is 0.045, well below the significance threshold of 0.5.

7.1.1 $PM_{2.5}$ Effects

As described in Chapter 3-2 (Impact AQ-4), the results of ambient air dispersion modeling indicated that operation of the Unmitigated Project (project minus baseline) would result in off-site 24-hour $PM_{2.5}$ concentrations that exceed the SCAQMD significance threshold of 2.5 µg/m^3. Because of this exceedance, incremental $PM_{2.5}$ concentrations from the project's operations meet the Port's criteria for calculating mortality and morbidity attributable to PM (POLA, 2011), and are discussed here as further elaboration of a $PM_{2.5}$ significance finding identified in Chapter 3-2. This discussion does not identify a new impact, but provides additional information on the potential impact of $PM_{2.5}$ levels identified in AQ-4.

In accordance with the Port's methodology, census blocks lying partially or completely within the project increment 24-hour $PM_{2.5}$ µg/m^3 concentration isopleth were identified (see Figure C3.7-31). As clearly shown in that figure, all census blocks within the project increment were found to be located in industrialized areas, and aerial images did not show any residential structures. On the ground observations established that these census blocks are used solely for industrial purposes i.e., that there is no residential use. Because no residential populations inhabit the impacted census blocks, the project increment is not expected to have an impact on PM-attributable morbidity or mortality. No calculations of mortality and morbidity were completed.

7.2 Mitigated Project Health Impacts

This HRA evaluated the effect on health risks resulting from the implementation of the air quality mitigation measures identified in Section 3.2 of the EIR. A summary of the mitigation measures quantified in this HRA for project construction and operation is as follows:

MM AQ-1: The Mitigated Project assumes that the Port guidelines for reducing emissions from construction equipment operating at the Port are followed; it is otherwise equivalent to the Unmitigated Project.

MM AQ-2: This mitigation measure assumes fleet modernization for onroad trucks per the Port guidelines for reducing emissions from construction activities operating at the Port.

watering of the site and use of other measures (discussed in Section 3.2.4.3) to ensure Project compliance with SCAQMD Rule 403.

MM AQ-8: This mitigation measure would require drayage trucks calling on the SCIG facility to meet an emission reduction in diesel particulate matter emissions (DPM) of 95% by mass relative to the federal 2007 on-road heavy-duty diesel engine emission standard (“low-emission” trucks). These trucks were modeled as liquefied natural gas (LNG) diesel pilot ignition heavy-duty drayage trucks in the mitigated Project HRA, but any technology meeting the emissions standard of a 95% reduction in DPM emissions relative to the MY2007 on-road truck standard is applicable in this mitigation measure.

MM AQ-9: This mitigation measure would require the business to review, in terms of feasibility, any Port-identified or other new emissions-reduction technology, and report to the Port. Such technology feasibility reviews shall take place at the time of the Port’s consideration of any lease amendment or facility modification for the Project site. If the technology is determined by the Port to be feasible in terms of cost, technical and operational feasibility, the business shall work with the Port to implement such technology.

Potential technologies that may further reduce emission and/or result in cost-savings benefits for the business may be identified through future work on the CAAP. Over the course of the lease, the business and the Port shall work together to identify potential new technology. Such technology shall be studied for feasibility, in terms of cost, technical and operational feasibility.

MM AQ-10: This mitigation would require that if any kind of technology becomes available and is shown to be as good or as better in terms of emissions reduction performance than an existing measure, the technology could replace the existing measure pending approval by the Port. The technology’s emissions reductions must be verifiable through USEPA, CARB, or other reputable certification and/or demonstration studies to the Port’s satisfaction.

Table C3-7-4 presents a summary of the maximum health impacts that would occur for each receptor type with construction and operation of the Mitigated Project. The table also shows the maximum health impacts from the floating baseline and the floating increment (Mitigated Project minus floating baseline), as well as the CEQA Baseline and CEQA increment (Mitigated Project minus CEQA baseline). Table C3-7-4 shows that the incremental floating baseline risk and non-cancer hazards for the Mitigated Project are below levels of significance under CEQA. Because the results in Table C3-7-4 represent the maximum impacts predicted for each receptor type, the impacts at all other receptors would be less than these values.

The mitigation measure would reduce Project maximum cancer risks by about 17 to 88 percent, depending on the receptor location. Chronic hazard indexes would be reduced by about 4 to 16 percent. Acute hazard indices would be reduced by about 14 to 21 percent.

Table C3-7-4. Maximum Health Impacts Associated with the Mitigated Project.

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Project	CEQA Baseline	CEQA Increment	Floating Baseline	Floating Increment	
Cancer Risk	Residential	9.8 x 10^{-6} (9.8 in a million)	68 x 10^{-6} (68 in a million)	-28 x 10^{-6} (-28 in a million)	34 x 10^{-6} (34 in a million)	0.2 x 10^{-6} (0.2 in a million)	10 x 10^{-6} (10 in a million)
	Occupational	20 x 10^{-6} (20 in a million)	51 x 10^{-6} (51 in a million)	7 x 10^{-6} (7 in a million)	21 x 10^{-6} (21 in a million)	9.5 x 10^{-6} (9.5 in a million)	
	Sensitive	9.7 x 10^{-6} (9.7 in a million)	45 x 10^{-6} (45 in a million)	-32 x 10^{-6} (-32 in a million)	20 x 10^{-6} (20 in a million)	-3.5 x 10^{-6} (-3.5 in a million)	
	Student	0.9 x 10^{-6} (0.9 in a million)	0.9 x 10^{-6} (0.9 in a million)	0.1 x 10^{-6} (0.1 in a million)	0.3 x 10^{-6} (0.3 in a million)	0.6 x 10^{-6} (0.6 in a million)	
	Recreational	4.5 x 10^{-6} (4.5 in a million)	78 x 10^{-6} (78 in a million)	6.3 x 10^{-6} (6.3 in a million)	22 x 10^{-6} (22 in a million)	7.3 x 10^{-6} (7.3 in a million)	
Chronic Hazard Index	Residential	0.09	0.06	0.04	0.06	0.03	1.0
	Occupational	0.4	0.2	0.2	0.2	0.2	
	Sensitive	0.09	0.06	0.03	0.07	0.03	
	Student	0.09	0.06	0.03	0.07	0.02	
	Recreational	0.4	0.2	0.2	0.2	0.2	
Acute Hazard Index	Residential	0.1	0.1	0.06	0.1	0.06	1.0
	Occupational	0.5	0.3	0.2	0.3	0.2	
	Sensitive	0.1	0.10	0.07	0.1	0.06	
	Student	0.1	0.09	0.07	0.1	0.06	
	Recreational	0.5	0.3	0.2	0.3	0.2	

Notes

a) Exceedances of the significance thresholds are in bold. The significance thresholds apply to the floating increments only.

b) The maximum increments might not occur at the same receptor locations as the maximum impacts. This means that the increments cannot necessarily be determined by subtracting the floating baseline impact from the project impact. Rather, the subtraction must be done at each receptor, for all modeled receptors, and the maximum result selected.

c) The floating increment represents Project minus floating baseline.

d) When the maximum increment for a receptor type is negative, the maximum increment displayed is the increment at the maximum project receptor location.e Data represent the receptor locations with the maximum impacts or increments. The impacts or increments at all other modeled receptors would be less than these values for each receptor type. The recreational cancer risk floating increment presented above does not include receptor locations on confirmed private property not accessible to the public.

f) The cancer risk values reported in this table for the residential receptor are based on the 80th percentile breathing rate. The risks associated with the 65th percentile (average) breathing rate will be less than these values. The risks associated with the 95th percentile (high end) breathing rate are 62 x 10-6 for the Project impact, 740 x 10-6 for the floating baseline impact, and -209 x 10-6 for the floating increment.

g) The Mitigated Project assumes that the Port guidelines for reducing emissions from construction equipment operating at the Port are followed and includes the use of LNG trucks for port activities; it is otherwise equivalent to the Unmitigated Project.

The data in Table C3-7-4 show that the floating cancer risk increment at the location of the Mitigated Project MEI is predicted to be 0.2 in a million (0.2×10^{-6}), at a residential receptor. This risk value, as well as the risk value at all residential receptors, is below the significance threshold of 10 in a million. The floating cancer risk increments are below the CEQA significance threshold at all receptors, including occupational, sensitive, student, and recreational.

The maximum floating chronic hazard index increments are predicted to be less than the CEQA significance threshold of 1.0 at all receptors.

The maximum floating acute hazard index increments are predicted to be less than the CEQA significance threshold of 1.0 at each receptor type.

Figures C3.7-11 and C3.7-12 show the isopleths associated with the Mitigated Project and Mitigated Project minus floating baseline residential individual lifetime cancer risk (per million), respectively.

Figures C3.7-13, C3.7-14, and C3.7-15 show the maximum receptor locations for the Mitigated Project for cancer risk, chronic HI, and acute HI, respectively. It should be noted that the residential, occupational, and recreational MEIs are not necessarily located directly on existing homes, workplaces, or recreational facilities; rather, they are located in areas that contain these land use types.

Table C3-7-5 presents the contributions from each emission source to the maximum health effects impacts for the Mitigated Project. At the maximum residential receptor, the greatest contributors to cancer risk are SCIG offsite locomotives. The greatest contributors to the chronic hazard index are SCIG onsite and offsite trucks. The greatest contributor to the acute hazard index is construction at SCIG and alternate business sites. SCIG locomotives contribute approximately 2% to the chronic hazard index and less than 1% to the acute hazard index at the maximum residential receptor.

Table C3-7-5. Source Contributions at the Residential and Occupational MEIs for the Mitigated Project.

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
SCIG Offsite Locomotives	79.0%	0.4%	<0.1%	0.6%	0.1%	<0.1%
Alternate Business Location Offsite Trucks	5.2%	6.5%	3.0%	2.8%	7.9%	2.1%
SCIG Onsite Trucks	4.6%	26.3%	3.4%	0.8%	21.6%	1.5%
SCIG Onsite Locomotives	4.4%	1.5%	0.7%	5.0%	0.9%	0.4%
SCIG Offsite Trucks	4.1%	35.4%	1.1%	5.2%	39.1%	1.4%
Alternate Business Location CHE	1.1%	7.3%	3.7%	76.0%	0.8%	16.5%
SCIG Construction	0.4%	8.8%	46.1%	0.4%	26.1%	38.4%
Emergency Generator	0.3%	<0.1%	4.8%	<0.1%	<0.1%	0.3%
Alternate Business Location Onsite Trucks	0.2%	0.9%	5.1%	8.8%	0.1%	34.0%
Hostler	0.2%	8.5%	4.4%	<0.1%	1.0%	1.6%
SCIG Offsite Gasoline Vehicles	0.1%	0.3%	<0.1%	<0.1%	0.6%	<0.1%

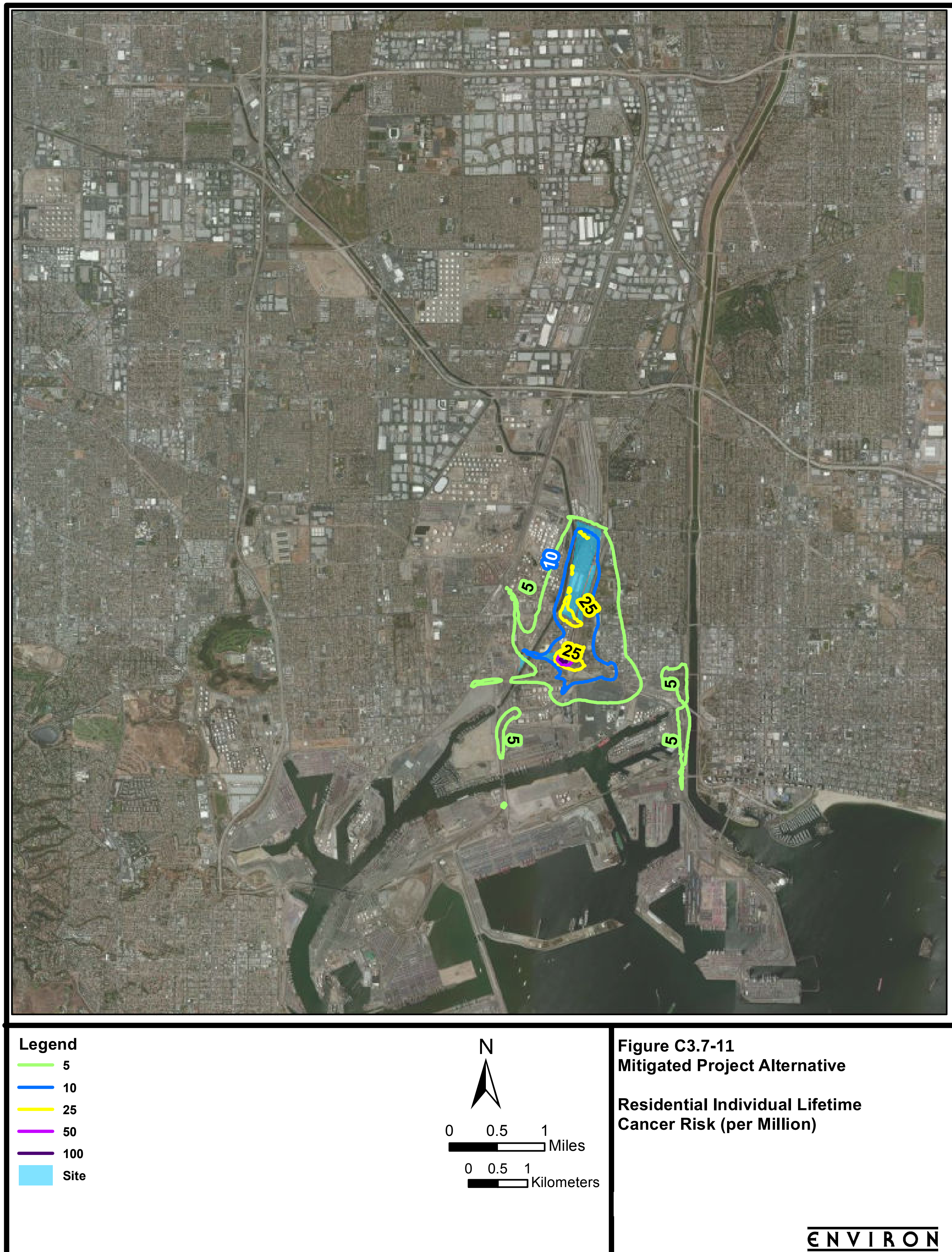
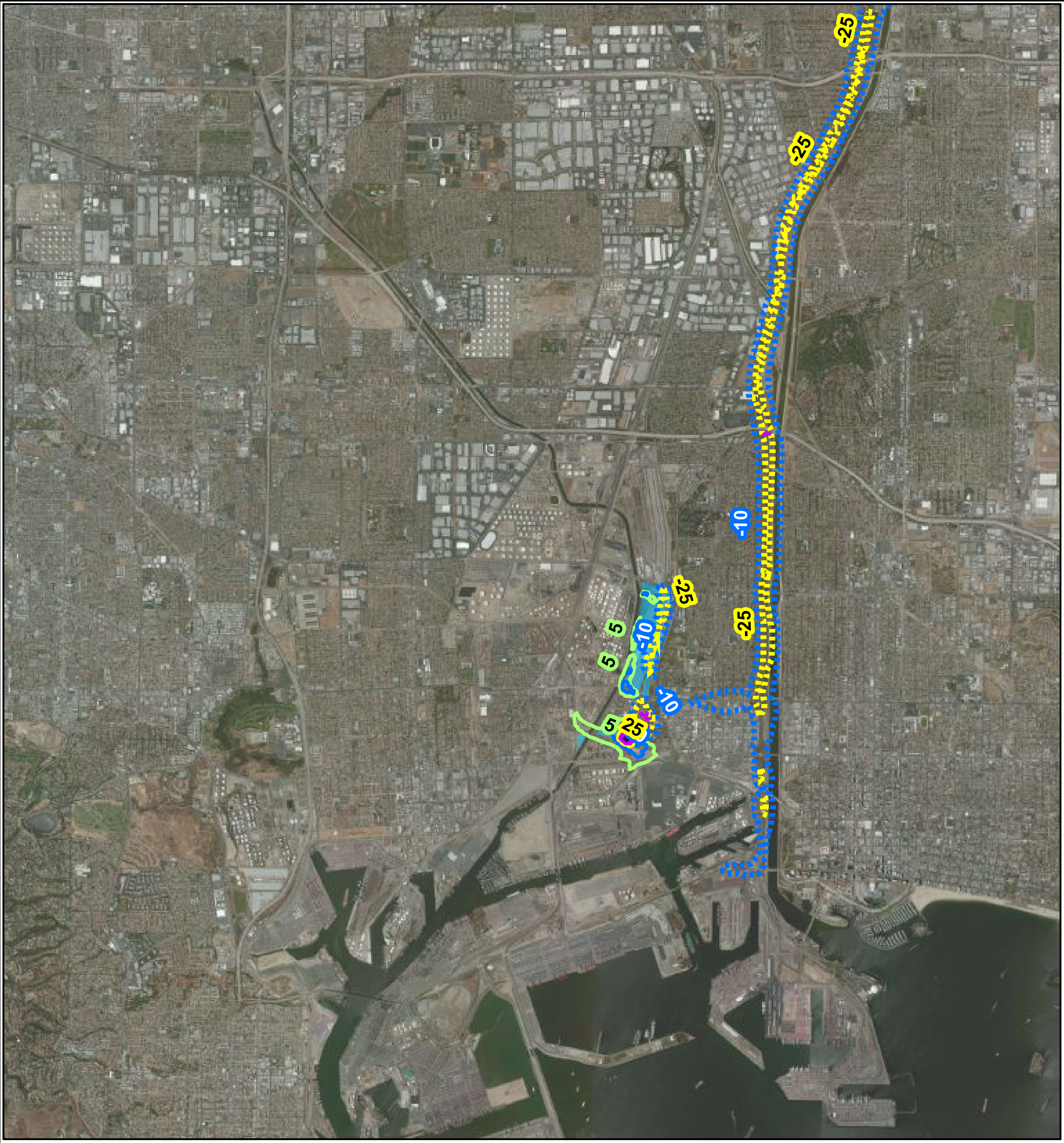


Figure C3.7-11
Mitigated Project Alternative

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- -10
- -25
- -50
- 5
- 10
- 25
- 50
- 100
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-12
Mitigated Project Alternative minus Floating Baseline

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON

Legend
- Residential MEI - Mitigated Project
- Occupational MEI - Mitigated Project
- Recreational MEI - Mitigated Project
- Sensitive MEI - Mitigated Project[1]
- Student MEI - Mitigated Project[2]
- Residential MEI - Floating Increment
- Occupational MEI - Floating Increment
- Recreational MEI - Floating Increment
- Site

Note:
1. Also location of the Sensitive Floating Increment value in Table C3-7-4.
2. Also location of the Student Floating Increment value in Table C3-7-4.

N

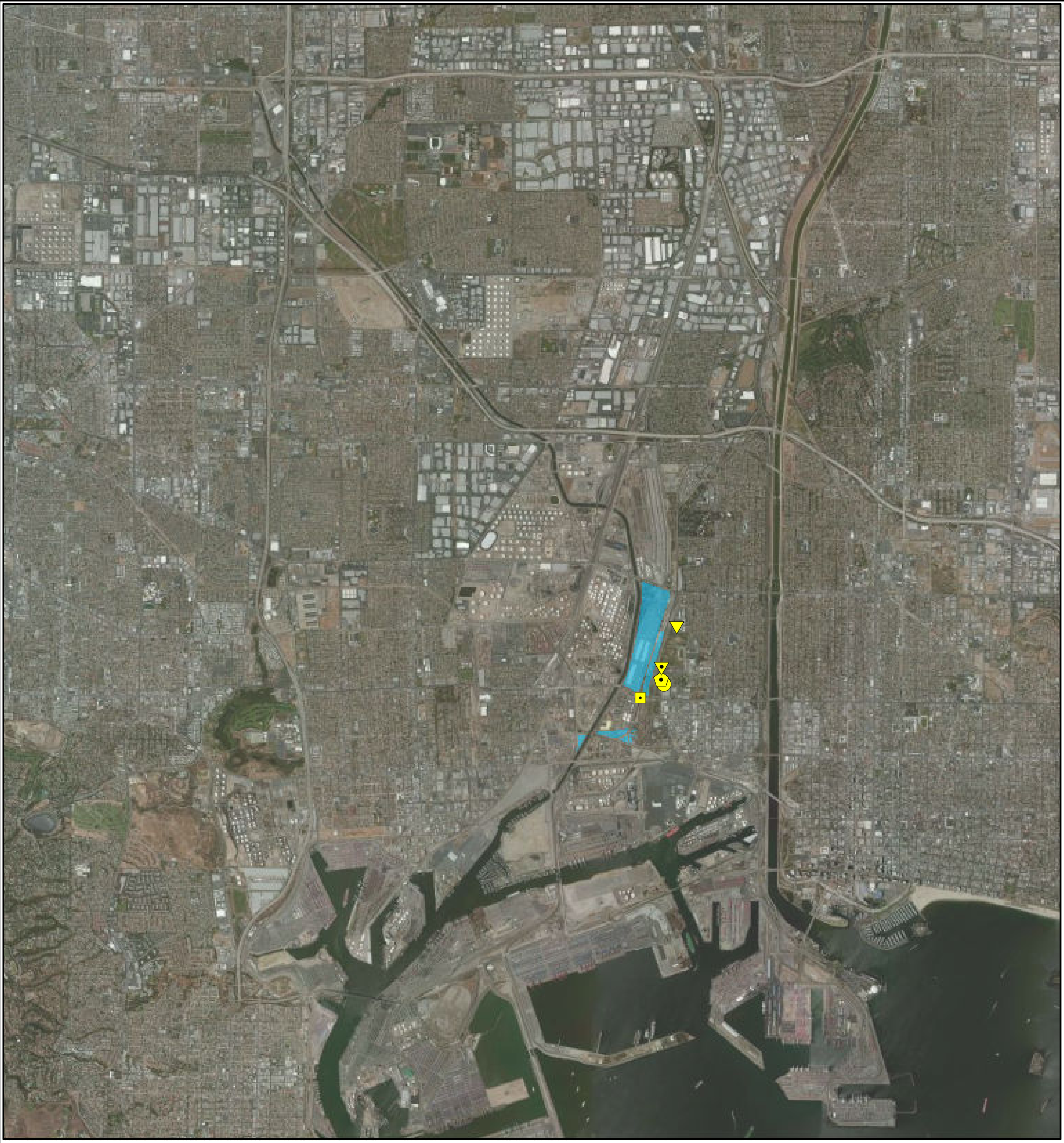
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-13
Mitigated Project Alternative

Maximum Exposed Individual for Cancer Risk

ENVIRON



Legend

- Residential MEI - Mitigated Project[1]
- Occupational and Recreational MEI - Mitigated Project[2]
- Sensitive MEI - Mitigated Project[3]
- Student MEI - Mitigated Project
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

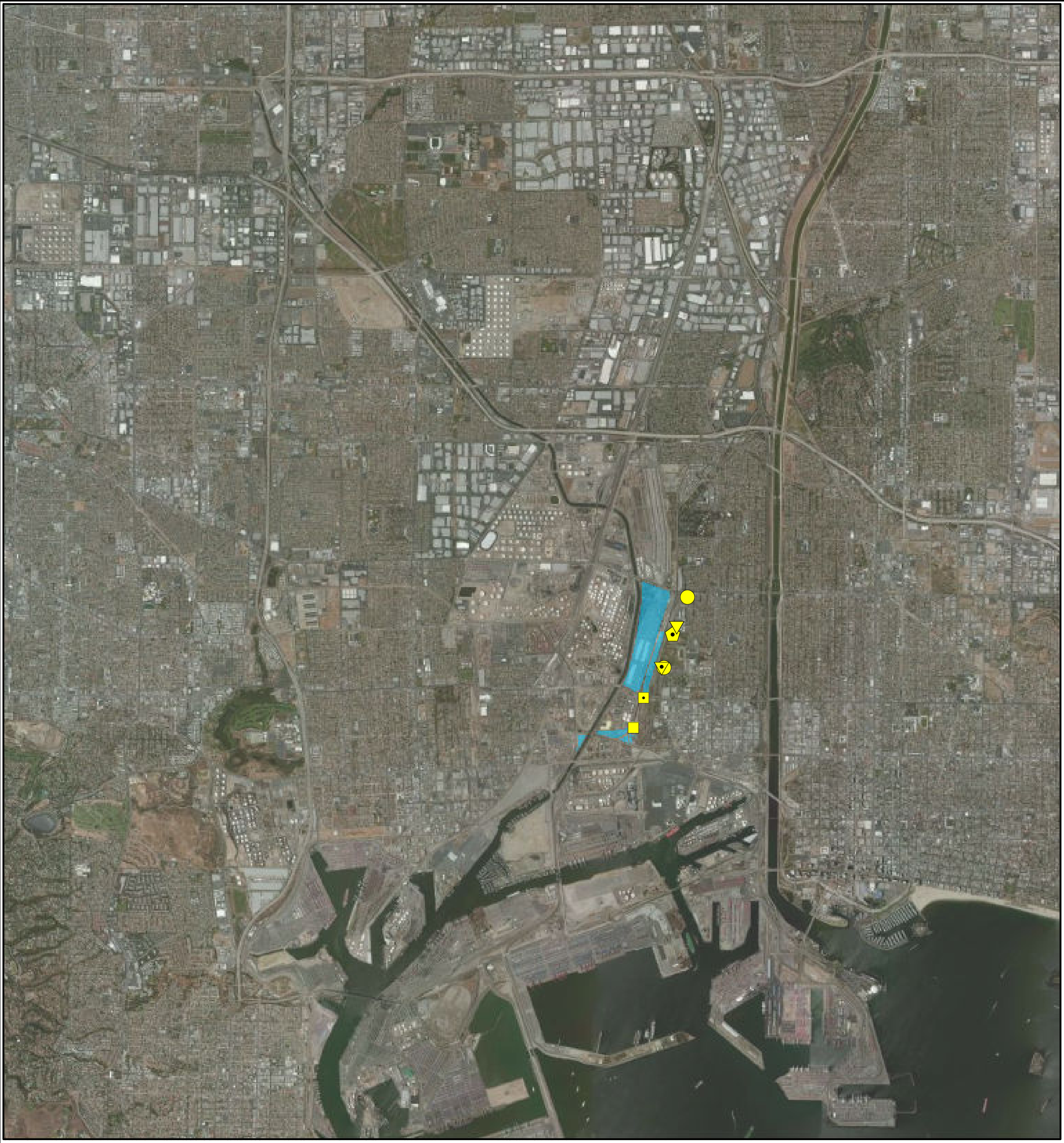
Note:

1. Also location of the Residential Floating Increment value in Table C3-7-4.
2. Also location of the Occupational and Recreational Floating Increment values in Table C3-7-4.
3. Also location of the Sensitive Floating Increment value in Table C3-7-4.

Figure C3.7-14
Mitigated Project Alternative

Maximum Exposed Individual for Chronic HI

ENVIRON



Legend

- Residential MEI - Mitigated Project
- Occupational and Recreational MEI - Mitigated Project
- Sensitive MEI - Mitigated Project[1]
- Student MEI - Mitigated Project
- Residential MEI - Floating Increment
- Occupational and Recreational MEI - Floating Increment
- Student MEI - Floating Increment
- Site

Note:
1. Also location of the Sensitive Floating Increment value in Table C3-7-4.

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-15
Mitigated Project Alternative

Maximum Exposed Individual for Acute HI

ENVIRON

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
SCIG CHE/TRU	0.1%	0.1%	1.2%	<0.1%	<0.1%	0.4%
Onsite Refueling Trucks	<0.1%	<0.1%	<0.1%	<0.1%	0.7%	<0.1%
Alternate Business Location Onsite Locomotives	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Alternate Business Location Offsite Gasoline Vehicles	<0.1%	0.2%	0.4%	<0.1%	0.4%	0.2%
SCIG Onsite Gasoline Vehicles	<0.1%	1.7%	0.2%	<0.1%	0.4%	<0.1%
Alternate Business Location Construction	<0.1%	2.0%	25.7%	0.1%	0.3%	2.8%
Alternate Business Location Onsite Gasoline Vehicles	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	0.3%

At the maximum occupational receptor, the greatest contributors to cancer risk are CHE emissions at alternate business sites. The greatest contributors to the chronic hazard index are SCIG onsite and offsite trucks and SCIG construction emissions. The greatest contributors to the acute hazard index are SCIG construction, and alternate business location onsite trucks and CHE emissions. SCIG locomotives contribute between less than 1% and approximately 6% by health effect at the maximum occupational receptor.

Table C3-7-6 presents the contributions from each TAC to the maximum health effects values for the Mitigated Project. Despite the use of alternative fuels in trucks, DPM remains the primary contributor to cancer risk at both the maximum residential and occupational receptors (greater than 97 percent). The greatest chronic hazard index contributors are chlorine and DPM at both the maximum occupational receptor and the maximum residential receptor. The greatest acute hazard index contributor is formaldehyde.

Table C3-7-6. TAC Contributions at the Residential and Occupational MEIs for the Mitigated Project.

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
DPM	97.5%	23.4%	0.0%	98.4%	37.3%	0.0%
Hexavalent Chromium	1.6%	<0.1%	0.0%	1.1%	<0.1%	0.0%
Cobalt	0.5%	10.4%	0.0%	0.4%	8.7%	0.0%
Formaldehyde	0.2%	6.4%	87.7%	<0.1%	1.5%	88.1%
Benzene	0.1%	0.1%	0.5%	<0.1%	<0.1%	0.5%
Nickel	<0.1%	9.7%	3.3%	<0.1%	9.5%	2.9%
1,3-Butadiene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Arsenic	<0.1%	<0.1%	0.2%	<0.1%	<0.1%	0.2%
Acetaldehyde	<0.1%	<0.1%	4.8%	<0.1%	<0.1%	5.0%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
Ethylbenzene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Naphthalene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Lead	<0.1%	0.0%	0.0%	<0.1%	0.0%	0.0%
Cadmium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chlorine	0.0%	46.9%	0.2%	0.0%	39.9%	0.2%
Manganese	0.0%	2.8%	0.0%	0.0%	2.9%	0.0%
Acrolein (2-Propenal)	0.0%	<0.1%	0.1%	0.0%	<0.1%	0.2%
Propylene	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
Toluene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Isomers Of Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
M-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
O-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
N-Hexane	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
Ammonia	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Styrene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Alcohol	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Ethyl Ketone (Mek) (2-Butanone)	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Mercury	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
Sulfates	0.0%	0.0%	2.8%	0.0%	0.0%	2.5%
Copper	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Vanadium	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Vanadium (Fume Or Dust)	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
P-Xylene	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Antimony	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calcium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Elemental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Organic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbonate Ion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chromium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Iron	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Nitrates	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Phosphorous	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Potassium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Selenium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unknown Pm	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Zinc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes:

"a) The chemical contributions for the chronic and acute hazard indices include all chemicals regardless of the target organs they affect.

b) For diesel internal combustion engines, only DPM emissions were evaluated for cancer risk and chronic hazard indices, because DPM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions. For all other emissions (alternative fuel engines, tire and brake wear), emissions of the 47 other toxic air contaminants were evaluated for cancer and chronic hazard indices. For the acute hazard indices, DPM was not evaluated; rather, emissions of the 47 other toxic air contaminants were evaluated for all emission sources (including diesel internal combustion engines)."

Cancer risks for the Mitigated Project exceed 1 x 10^{-6} (one in a million) for a population of 1,404 in the vicinity of the facility. The cancer burden for this population is 0.0014, which is below the significance threshold of 0.5 (see Attachment C3-2).

7.2.1 $PM_{2.5}$ Effects

While the Mitigated Project will reduce $PM_{2.5}$ concentrations relative to the Unmitigated Project, 24-hour $PM_{2.5}$ emissions for the Mitigated Project increment (Mitigated Project minus CEQA baseline) would still exceed the 24-hour $PM_{2.5}$ SCAQMD threshold of 2.5 $\mu g/m^3$. Because of this exceedance, incremental operational $PM_{2.5}$ concentrations meet the Port's criteria for calculating mortality and morbidity attributable to PM.

The area impacted by PM emissions from the Mitigated Project increment (shown in Figure C3.7-32) is similar to that of the Unmitigated Project increment, although the impacted area is smaller in geographic extent (consistent with the reduced emissions). No residential populations inhabit the census blocks that are within the zone of $PM_{2.5}$ exceedance; all of the census blocks are within the footprint of the facility or its businesses. Consequently, the Mitigated Project increment is not expected to have an impact on PM-attributable morbidity or mortality. As a result, no calculations of morbidity and/or mortality were completed.

7.3 No Project Alternative Health Impacts

The No Project Alternative assumes that the Project is not built. It accounts for growth for the existing businesses and trucks associated with the project going to the BNSF Hobart Yard instead (Hobart trucks).

Table C3-7-7 presents a summary of the maximum health impacts that would occur for each receptor type under the No Project Alternative. The table also shows the maximum health impacts from the floating baseline and floating increment (No Project minus floating baseline), as well as the CEQA baseline and CEQA increment (No Project minus CEQA baseline). Because the results in Table C3-7-7 represent the maximum impacts predicted for each receptor type, the impacts at all other receptors would be less than these values.

Table C3-7-7. Maximum Health Impacts Associated with the No Project Alternative.

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Project	CEQA Baseline	CEQA Increment	Floating Baseline	Floating Increment	
Cancer Risk	Residential	71 x 10^{-6} (71 in a million)	68 x 10^{-6} (68 in a million)	28 x 10^{-6} (28 in a million)	34 x 10^{-6} (34 in a million)	**37 x 10^{-6} (37 in a million)**	10 x 10^{-6} (10 in a million)
	Occupational	22 x 10^{-6} (22 in a million)	51 x 10^{-6} (51 in a million)	4.9 x 10^{-6} (4.9 in a million)	21 x 10^{-6} (21 in a million)	7.4 x 10^{-6} (7.4 in a million)	
	Sensitive	42 x 10^{-6} (42 in a million)	45 x 10^{-6} (45 in a million)	6.1 x 10^{-6} (6.1 in a million)	20 x 10^{-6} (20 in a million)	**22 x 10^{-6} (22 in a million)**	
	Student	0.9 x 10^{-6} (0.9 in a million)	0.9 x 10^{-6} (0.9 in a million)	0.1 x 10^{-6} (0.1 in a million)	0.3 x 10^{-6} (0.3 in a million)	0.6 x 10^{-6} (0.6 in a million)	
	Recreational	27 x 10^{-6} (27 in a million)	78 x 10^{-6} (78 in a million)	11 x 10^{-6} (11 in a million)	22 x 10^{-6} (22 in a million)	**15 x 10^{-6} (15 in a million)**	
Chronic Hazard Index	Residential	0.08	0.06	0.04	0.06	0.04	1.0
	Occupational	0.2	0.2	0.05	0.2	0.05	
	Sensitive	0.07	0.06	0.02	0.07	0.02	
	Student	0.07	0.06	0.01	0.07	0.01	
	Recreational	0.2	0.2	0.05	0.2	0.05	
Acute Hazard Index	Residential	0.1	0.1	0.01	0.1	0.01	1.0
	Occupational	0.3	0.3	0.02	0.3	0.02	
	Sensitive	0.11	0.10	0.009	0.1	0.006	
	Student	0.10	0.09	0.007	0.1	0.003	
	Recreational	0.3	0.3	0.02	0.3	0.02	

Notes:

a Exceedances of the significance thresholds are in **bold**. The significance thresholds apply to the floating increments only.

b The maximum increments might not occur at the same receptor locations as the maximum impacts. This means that the increments cannot necessarily be determined by subtracting the floating baseline impact from the project impact. Rather, the subtraction must be done at each receptor, for all modeled receptors, and the maximum result selected.

c The floating increment represents Project minus floating baseline.

d When the maximum increment for a receptor type is negative, the maximum increment displayed is the increment at the maximum project receptor location.

e Data represent the receptor locations with the maximum impacts or increments. The impacts or increments at all other modeled receptors would be less than these values for each receptor type.

f The No Project Alternative assumes that the Project is not built. It accounts for approximately 10% business growth and significant growth in trips to Hobart Yard, equivalent to the growth in cargo throughput forecasted for the ports.

The data in Table C3-7-7 show that the CEQA cancer risk increment at the location of the No Project Alternative MEI is predicted to be 37 in a million (37 x 10^{-6}), at a residential receptor. This risk value exceeds the significance threshold of 10 in a million. The floating increments also exceed the CEQA significance threshold at sensitive and recreational receptors.

The areas of impact associated with the No Project Alternative that exceed the significance threshold lie along the Long Beach Freeway (Interstate-710).

The maximum floating chronic hazard index increments are predicted to be less than the CEQA significance of 1.0 at all receptors.

The maximum floating acute hazard index increments are predicted to be less than the CEQA significance threshold of 1.0 at each receptor type.

Figures C3.7-16 and C3.7-17 show the isopleths associated with the No Project Alternative and No Project minus floating baseline residential individual lifetime cancer risk (per million), respectively.

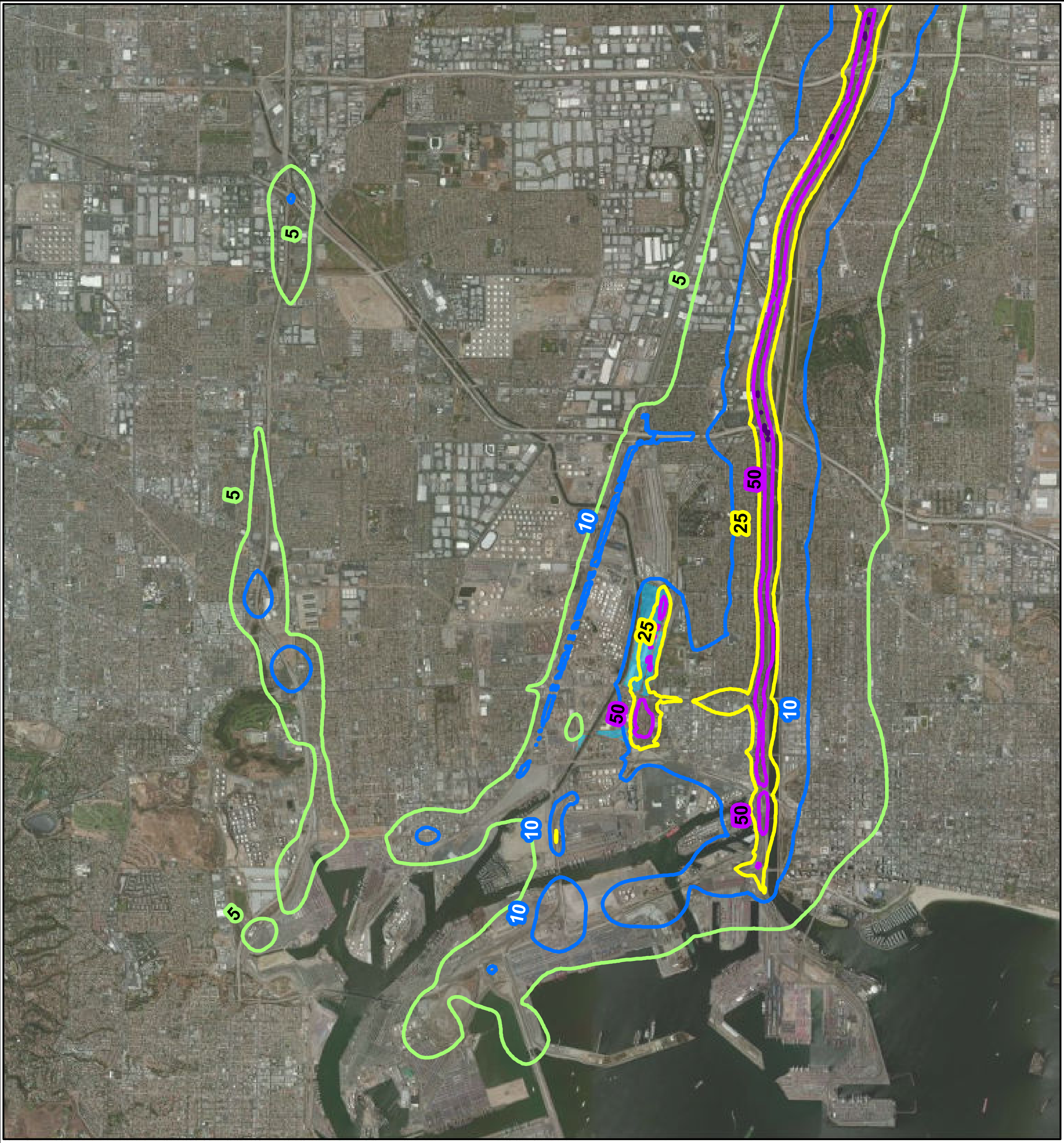
Figures C3.7-18, C3.7-19, and C3.7-20 show the maximum receptor locations for the No Project Alternative for cancer risk, chronic HI, and acute HI, respectively. It should be noted that the residential, occupational, and recreational MEIs are not necessarily located directly on existing homes, workplaces, or recreational facilities; rather, they are located in areas that contain these land use types.

Table C3-7-8 presents the contributions from each emission source to the maximum health effects impacts for the No Project Alternative. At the maximum residential receptor, the greatest contributors to cancer risk are Hobart trucks. The greatest contributors to the chronic hazard index are also Hobart trucks. The greatest contributors to the acute hazard index are Hobart trucks, existing business onsite and offsite trucks, and existing business CHE emissions. Existing business onsite locomotives contribute 2.5% to the acute hazard index and less than 0.5% to the cancer risk and chronic hazard index at the maximum residential receptor.

Table C3-7-8. Source Contributions at the Residential and Occupational MEIs for the No Project Alternative.

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
Hobart Trucks	91.6%	99.7%	42.8%	99.9%	99.8%	83.8%
Existing Business Offsite Trucks	7.6%	0.1%	16.8%	<0.1%	<0.1%	2.9%
Existing Business Onsite Locomotives	0.3%	<0.1%	2.5%	<0.1%	<0.1%	0.6%
Existing Business CHE	0.3%	0.1%	19.7%	<0.1%	<0.1%	7.4%
Existing Business Offsite Gasoline Vehicles	0.1%	<0.1%	3.6%	<0.1%	<0.1%	0.6%
Existing Business Onsite Trucks	<0.1%	<0.1%	13.9%	<0.1%	<0.1%	4.6%
Existing Business Onsite Gasoline Vehicles	<0.1%	<0.1%	0.7%	<0.1%	<0.1%	0.2%

At the maximum occupational receptor, the greatest contributor to cancer risk is Hobart trucks, as the receptor is located along Interstate-710. The greatest contributor to the chronic hazard index is also Hobart truck emissions. The greatest contributors to the



Legend

(green line)	5
(blue line)	10
(yellow line)	25
(magenta line)	50
(dark purple line)	100
(light blue fill)	Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-16
No Project Alternative

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON

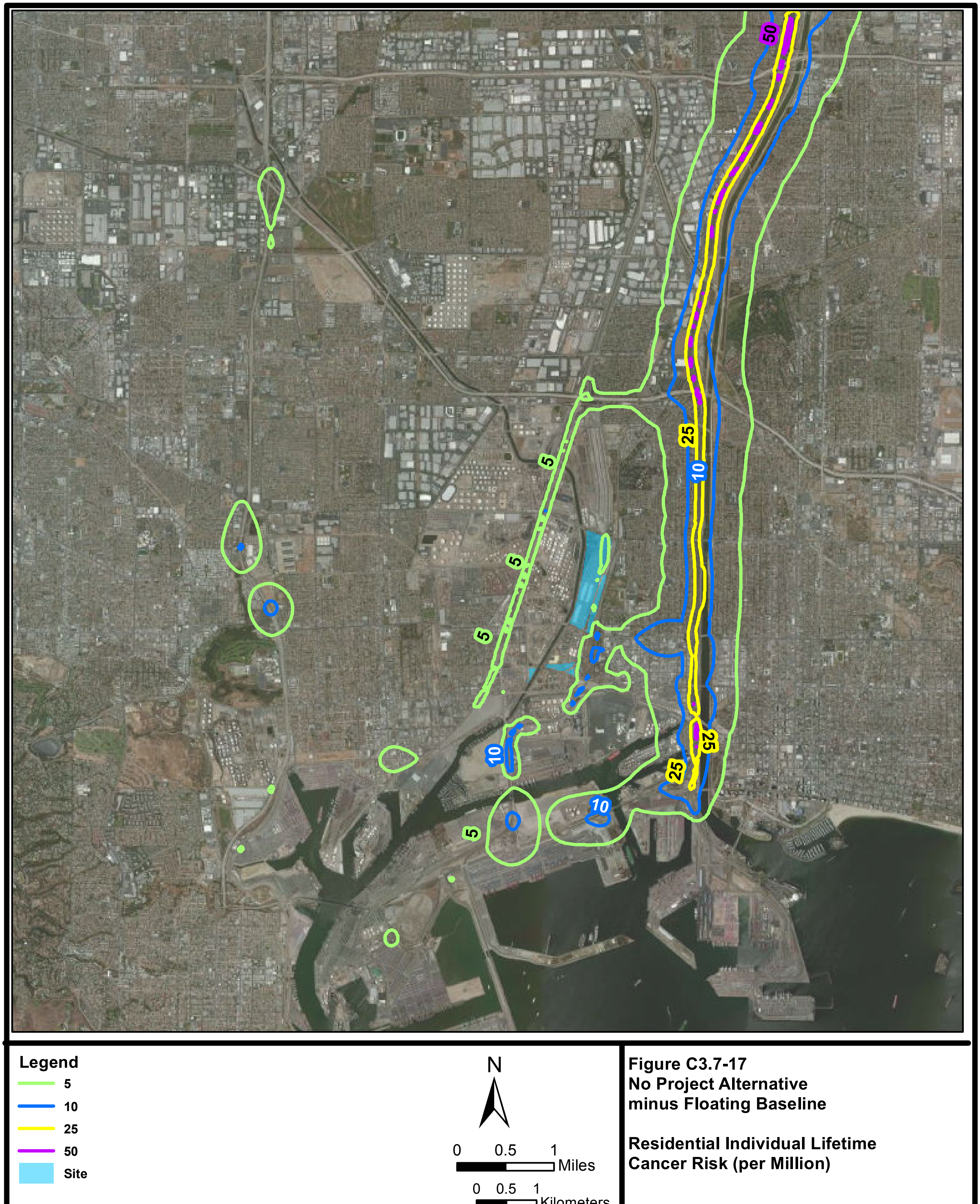
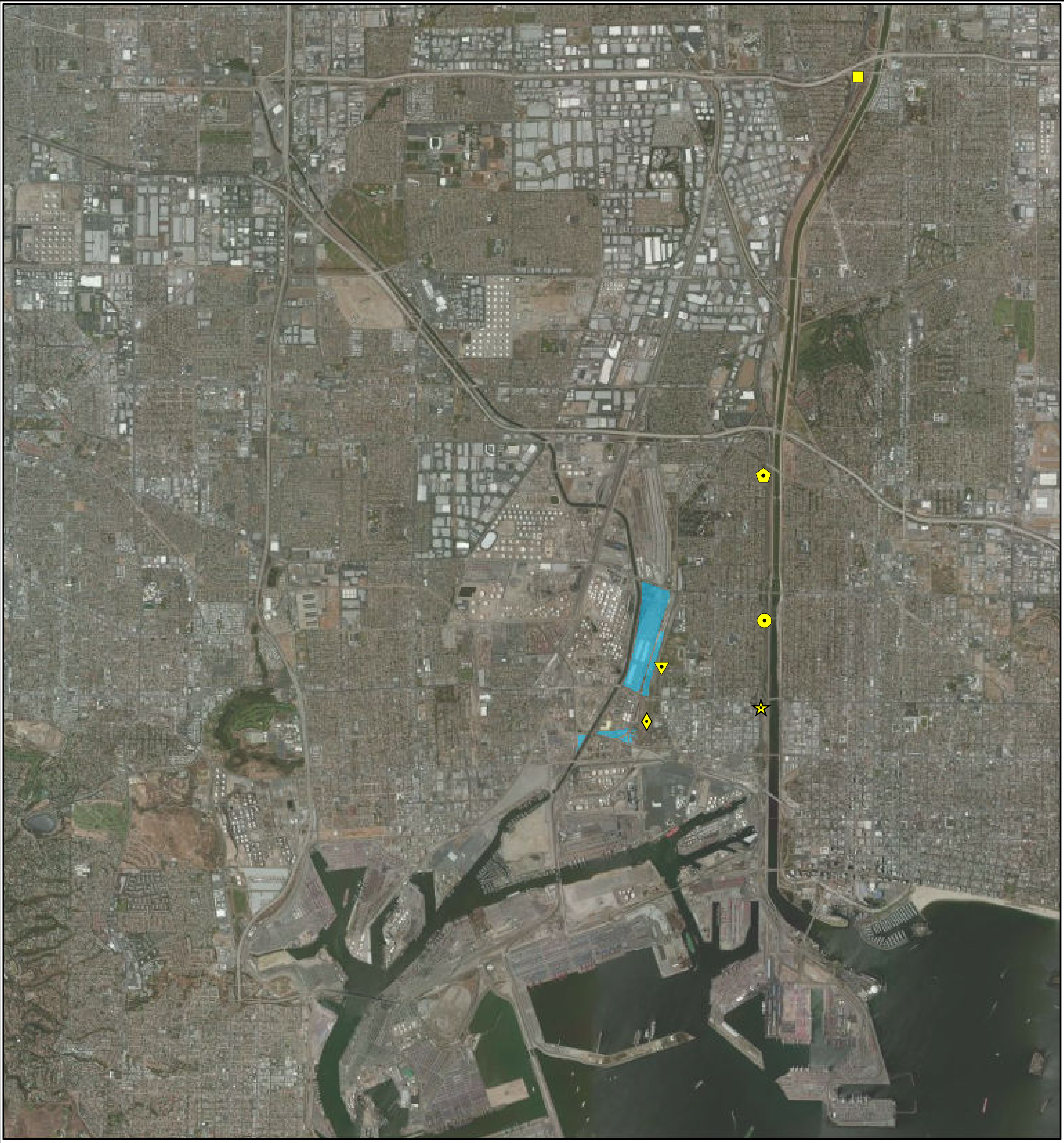


Figure C3.7-17
No Project Alternative minus Floating Baseline

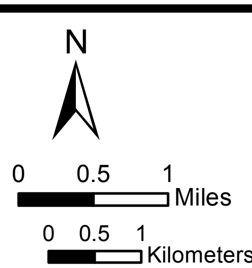
Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- Residential MEI - No Project[1]
- Occupational MEI - No Project
- Recreational MEI - No Project
- Sensitive MEI - No Project[2]
- Student MEI - No Project[3]
- Occupational and Recreational MEI - Floating Increment
- Site



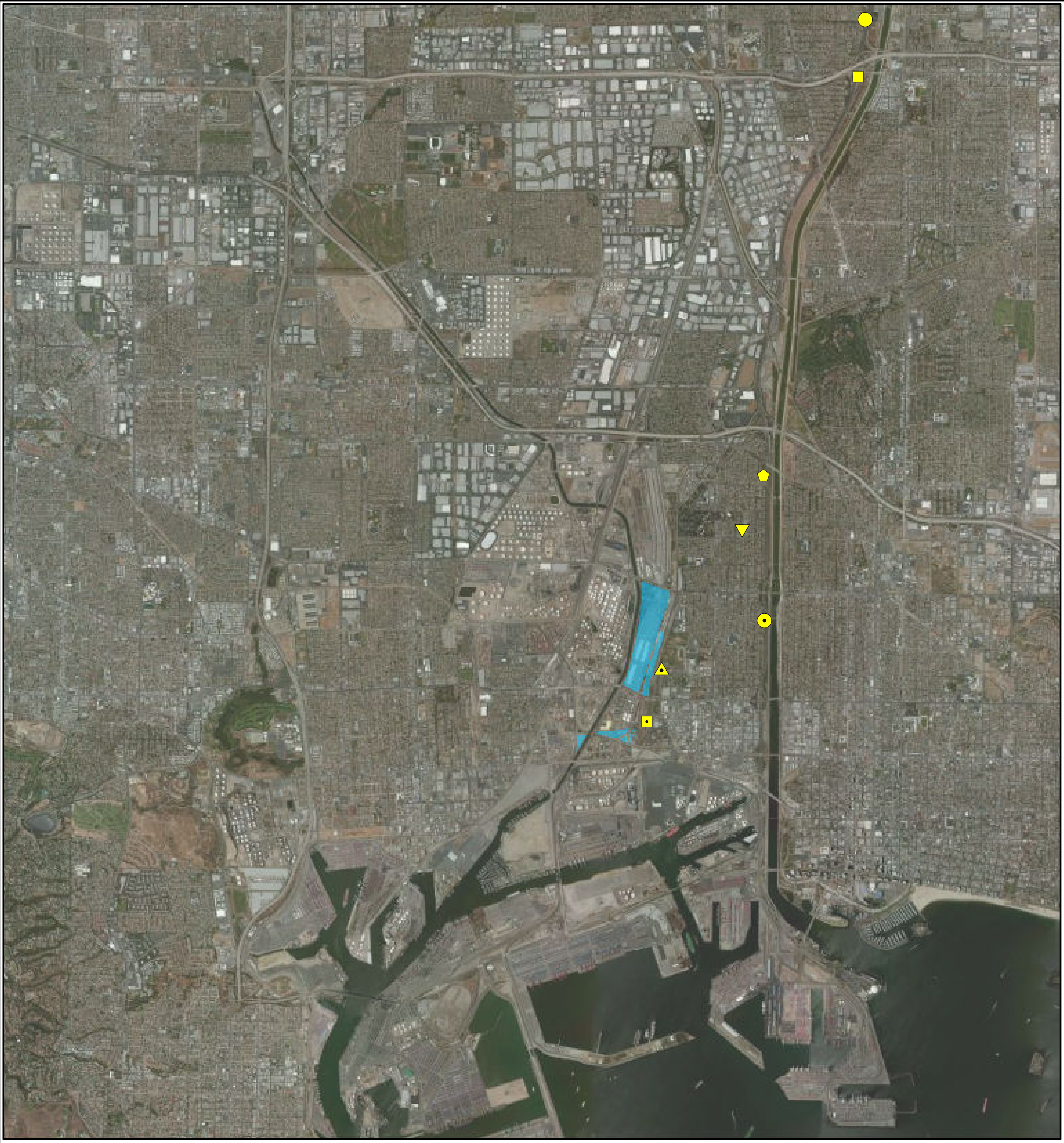
Note:

1. Also location of the Residential Floating Increment value in Table C3-7-7.
2. Also location of the Sensitive Floating Increment value in Table C3-7-7.
3. Also location of the Student Floating Increment value in Table C3-7-7.

Figure C3.7-18
No Project Alternative

Maximum Exposed Individual for Cancer Risk

ENVIRON



Legend

- Residential MEI - No Project
- Occupational and Recreational MEI - No Project
- Sensitive and Student MEI - No Project
- Residential MEI - Floating Increment
- Occupational and Recreational MEI - Floating Increment
- Sensitive MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

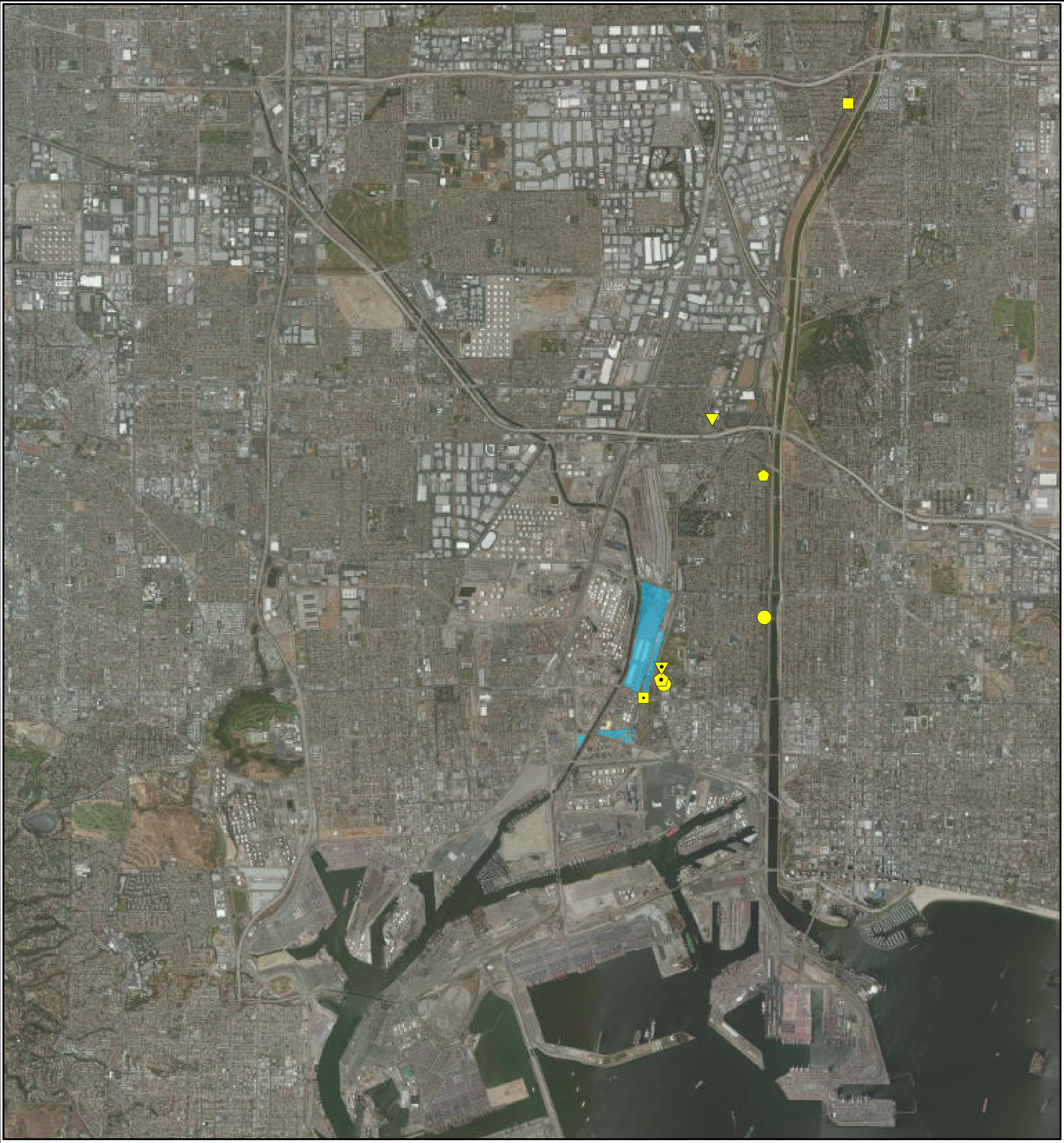
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-19
No Project Alternative

Maximum Exposed Individual for Chronic HI

ENVIRON



Legend

- Residential MEI - No Project
- Occupational and Recreational MEI - No Project
- Sensitive MEI - No Project
- Student MEI - No Project
- Residential MEI - Floating Increment
- Occupational and Recreational MEI - Floating Increment
- Sensitive MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-20
No Project Alternative

Maximum Exposed Individual for Acute HI

ENVIRON

acute hazard index are Hobart trucks and existing business CHE emissions. Existing business locomotives contribute less than 1% to the acute hazard index and less than 0.1% to the cancer risk and chronic hazard index at the maximum occupational receptor.

Table C3-7-9 presents the contributions from each TAC to the maximum health effects values for the No Project Alternative. DPM remains the primary contributor to cancer risk (greater than 97 percent) at both the maximum residential and occupational receptors. The greatest chronic hazard index contributors at the maximum residential and occupational receptors are DPM, nickel, chlorine, and manganese. The greatest acute hazard index contributor is formaldehyde, followed by nickel.

Table C3-7-9. TAC Contributions at the Residential and Occupational MEIs for the No Project Alternative.

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
DPM	97.4%	71.6%	0.0%	97.7%	70.6%	0.0%
Hexavalent Chromium	2.5%	<0.1%	0.0%	2.3%	<0.1%	0.0%
Nickel	<0.1%	14.0%	17.8%	<0.1%	14.4%	21.2%
Cobalt	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Arsenic	<0.1%	0.2%	0.4%	<0.1%	0.2%	0.5%
1,3-Butadiene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Benzene	<0.1%	<0.1%	0.4%	<0.1%	<0.1%	0.4%
Formaldehyde	<0.1%	<0.1%	69.6%	<0.1%	<0.1%	69.2%
Lead	<0.1%	0.0%	0.0%	<0.1%	0.0%	0.0%
Ethylbenzene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Naphthalene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Acetaldehyde	<0.1%	<0.1%	3.9%	<0.1%	<0.1%	4.0%
Cadmium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chlorine	0.0%	8.6%	0.5%	0.0%	8.9%	0.3%
Manganese	0.0%	5.5%	0.0%	0.0%	5.7%	0.0%
Acrolein (2-Propenal)	0.0%	<0.1%	0.8%	0.0%	<0.1%	0.2%
Ammonia	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Toluene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Propylene	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
M-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
O-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Isomers Of Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
N-Hexane	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
Styrene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Alcohol	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Ethyl Ketone (Mek) (2-Butanone)	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Mercury	0.0%	0.0%	0.4%	0.0%	0.0%	0.4%
Sulfates	0.0%	0.0%	5.5%	0.0%	0.0%	3.0%
Copper	0.0%	0.0%	0.5%	0.0%	0.0%	0.7%
Vanadium	0.0%	0.0%	<0.1%	0.0%	0.0%	0.1%
Vanadium (Fume	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
Or Dust)						
P-Xylene	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Antimony	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calcium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Elemental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Organic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbonate Ion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chromium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Iron	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Nitrates	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Phosphorous	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Potassium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Selenium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unknown Pm	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Zinc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

As per the policy of POLA, cancer burden calculations were not completed for the No Project Alternative.

7.3.1 $PM_{2.5}$ Effects

The results of ambient air dispersion modeling indicated that operation of the No Project (project minus CEQA baseline) would not result in off-site 24-hour $PM_{2.5}$ concentrations that exceed the SCAQMD significance threshold of 2.5 µg/m^3. As a result, incremental operational $PM_{2.5}$ concentrations for the No Project do not meet the Port's criteria for calculating mortality and morbidity attributable to PM (POLA, 2011), and no calculations of mortality or morbidity were made.

7.4 Unmitigated Reduced Project Alternative Health Impacts

The Unmitigated Reduced Project Alternative is based on assumptions of reduced throughput.

Table C3-7-10 presents a summary of the maximum health impacts that would occur for each receptor type with construction and operation of the Unmitigated Reduced Project Alternative. The table also shows the maximum health impacts from the floating baseline and the floating increment (Reduced Project minus floating baseline), as well as the CEQA baseline and CEQA increment (Reduced Project minus CEQA baseline). Because the results in Table C3-7-10 represent the maximum impacts predicted for each receptor type, the impacts at all other receptors would be less than these values.

Table C3-7-10. Maximum Health Impacts Associated with the Unmitigated Reduced Project Alternative.

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Project	CEQA Baseline	CEQA Increment	Floating Baseline	Floating Increment	
Cancer Risk	Residential	23 x 10^{-6} (23 in a million)	68 x 10^{-6} (68 in a million)	-15 x 10^{-6} (-15 in a million)	34 x 10^{-6} (34 in a million)	**11 x 10^{-6} (11 in a million)**	10 x 10^{-6} (10 in a million)
	Occupational	22 x 10^{-6} (22 in a million)	51 x 10^{-6} (51 in a million)	8.5 x 10^{-6} (8.5 in a million)	21 x 10^{-6} (21 in a million)	**11 x 10^{-6} (11 in a million)**	
	Sensitive	22 x 10^{-6} (22 in a million)	45 x 10^{-6} (45 in a million)	-24 x 10^{-6} (-24 in a million)	20 x 10^{-6} (20 in a million)	8.5 x 10^{-6} (8.5 in a million)	
	Student	2.1 x 10^{-6} (2.1 in a million)	0.9 x 10^{-6} (0.9 in a million)	1.1 x 10^{-6} (1.1 in a million)	0.3 x 10^{-6} (0.3 in a million)	1.7 x 10^{-6} (1.7 in a million)	
	Recreational	29 x 10^{-6} (29 in a million)	78 x 10^{-6} (78 in a million)	6.7 x 10^{-6} (6.7 in a million)	22 x 10^{-6} (22 in a million)	**16 x 10^{-6} (16 in a million)**	
Chronic Hazard Index	Residential	0.07	0.06	0.02	0.06	0.02	1.0
	Occupational	0.4	0.2	0.3	0.2	0.3	
	Sensitive	0.08	0.06	0.03	0.07	0.03	
	Student	0.08	0.06	0.03	0.07	0.02	
	Recreational	0.4	0.2	0.3	0.2	0.3	
Acute Hazard Index	Residential	0.2	0.1	0.08	0.1	0.07	1.0
	Occupational	0.5	0.3	0.3	0.3	0.3	
	Sensitive	0.2	0.10	0.10	0.1	0.09	
	Student	0.2	0.09	0.09	0.1	0.08	
	Recreational	0.5	0.3	0.3	0.3	0.3	

Notes:

a) Exceedances of the significance thresholds are in bold. The significance thresholds apply to the floating increments only.

b) The maximum increments might not occur at the same receptor locations as the maximum impacts. This means that the increments cannot necessarily be determined by subtracting the floating baseline impact from the project impact. Rather, the subtraction must be done at each receptor, for all modeled receptors, and the maximum result selected.

c) The floating increment represents Project minus floating baseline.

d) When the maximum increment for a receptor type is negative, the maximum increment displayed is the increment at the maximum project receptor location.

e) Data represent the receptor locations with the maximum impacts or increments. The impacts or increments at all other modeled receptors would be less than these values for each receptor type.

f) The Unmitigated Reduced Project scenario is based on a reduced throughput assumption.

The data in Table C3-7-10 show that the floating baseline cancer risk increment at the location of the Unmitigated Reduced Project Alternative MEI is predicted to be 11 in a million (11 x 10^{-6}), at a residential receptor. This risk value exceeds the significance threshold of 10 in a million. The floating baseline incremental risks are also in exceedance of the CEQA significance threshold for occupational and recreational MEIs.

The location identified for the residential MEI receptor is approximately 226 meters to the southeast of the site and alternate business sites. The occupational MEI receptor is located approximately 25 meters south of Fastlane, while the recreational MEI receptor is located approximately 65 meters southeast of the site.

The maximum floating chronic hazard index increments are predicted to be less than the CEQA significance of 1.0 at all receptors.

The maximum floating acute hazard index increments are predicted to be less than the CEQA significance threshold of 1.0 at each receptor type.

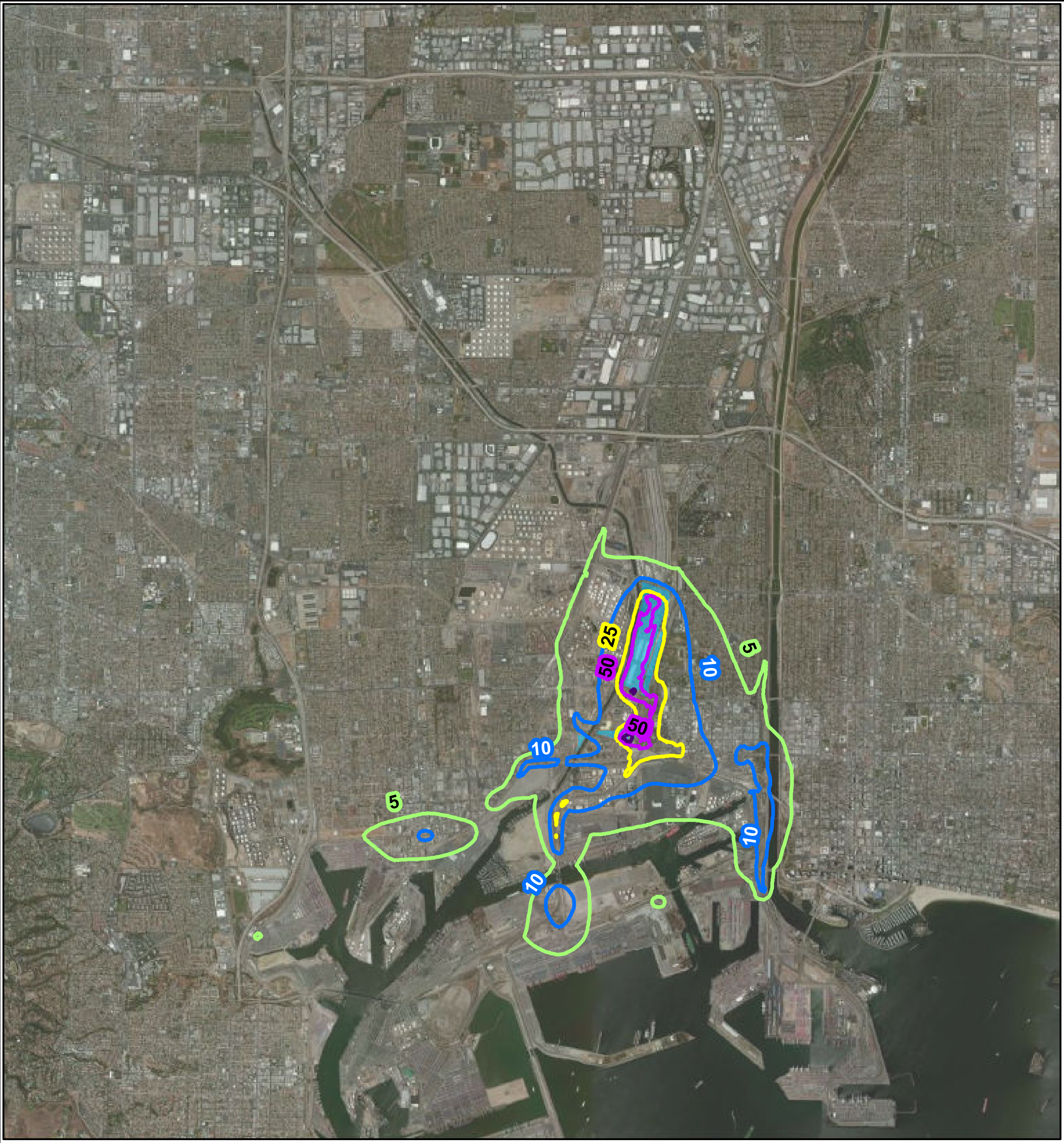
Figures C3.7-21 and C3.7-22 show the isopleths associated with the Unmitigated Reduced Project Alternative and Unmitigated Reduced Project minus floating baseline residential individual lifetime cancer risk (per million), respectively.

Figures C3.7-23, C3.7-24, and C3.7-25 show the maximum receptor locations for the Unmitigated Reduced Project Alternative for cancer risk, chronic HI, and acute HI, respectively. It should be noted that the residential, occupational, and recreational MEIs are not necessarily located directly on existing homes, workplaces, or recreational facilities; rather, they are located in areas that contain these land use types.

Table C3-7-11 presents the contributions from each emission source to the maximum health effects impacts for the Unmitigated Reduced Project Alternative. At the maximum residential receptor, the greatest contributors to cancer risk are SCIG offsite and onsite trucks. The greatest contributors to the chronic hazard index are SCIG construction and SCIG onsite trucks. The greatest contributor to the acute hazard index is SCIG construction, followed by construction at alternate business locations. SCIG locomotives contribute between approximately 1-6% by health effect at the maximum residential receptor.

Table C3-7-11. Source Contributions at the Residential and Occupational MEIs for the Unmitigated Reduced Project Alternative.

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
SCIG Offsite Trucks	46.2%	3.5%	0.8%	14.2%	12.7%	1.0%
SCIG Onsite Trucks	34.7%	14.9%	4.8%	2.1%	6.8%	2.0%
SCIG Onsite Locomotives	4.9%	3.7%	0.6%	4.0%	0.8%	0.4%
Alternate Business Location CHE	3.7%	1.0%	3.3%	67.3%	0.7%	14.1%
SCIG Construction	3.7%	61.2%	53.8%	1.2%	69.1%	46.3%
Alternate Business Location Offsite Trucks	1.6%	5.0%	2.6%	2.5%	7.2%	1.8%
Alternate Business Location Onsite Trucks	1.3%	0.1%	3.0%	7.8%	<0.1%	28.4%
SCIG Offsite Locomotives	1.2%	1.2%	<0.1%	0.5%	0.1%	<0.1%



Legend
- 5
- 10
- 25
- 50
- 100
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-21
Unmitigated Reduced Project Alternative

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON

Legend

- -10
- -25
- -50
- 5
- 10
- 25
- 50
- 100
- Site

N

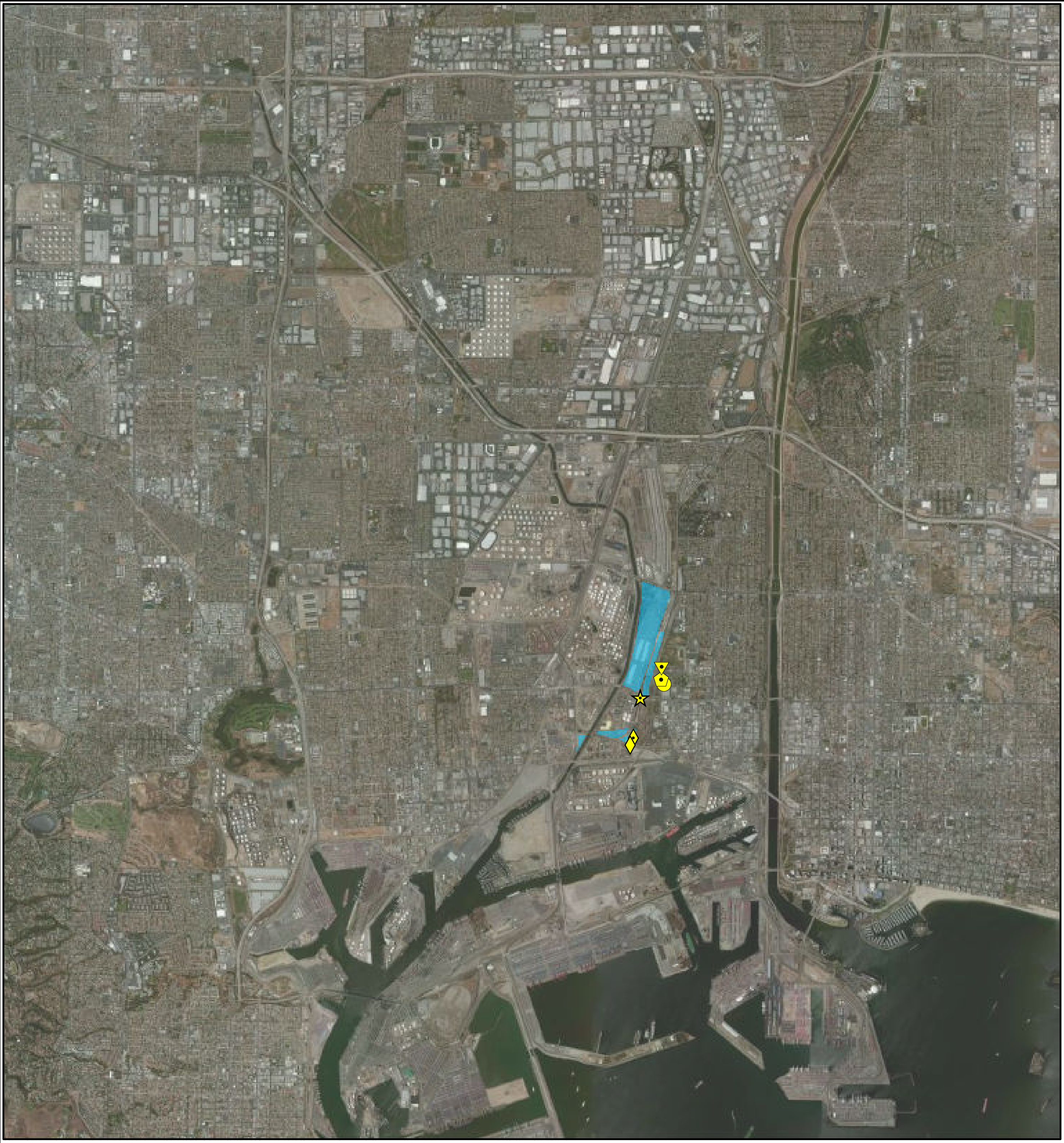
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-22
Unmitigated Reduced Project Alternative minus Floating Baseline

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- Residential MEI - Reduced Project[1]
- Occupational MEI - Reduced Project
- Recreational MEI - Reduced Project[2]
- Sensitive MEI - Reduced Project[3]
- Student MEI - Reduced Project[4]
- Occupational MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

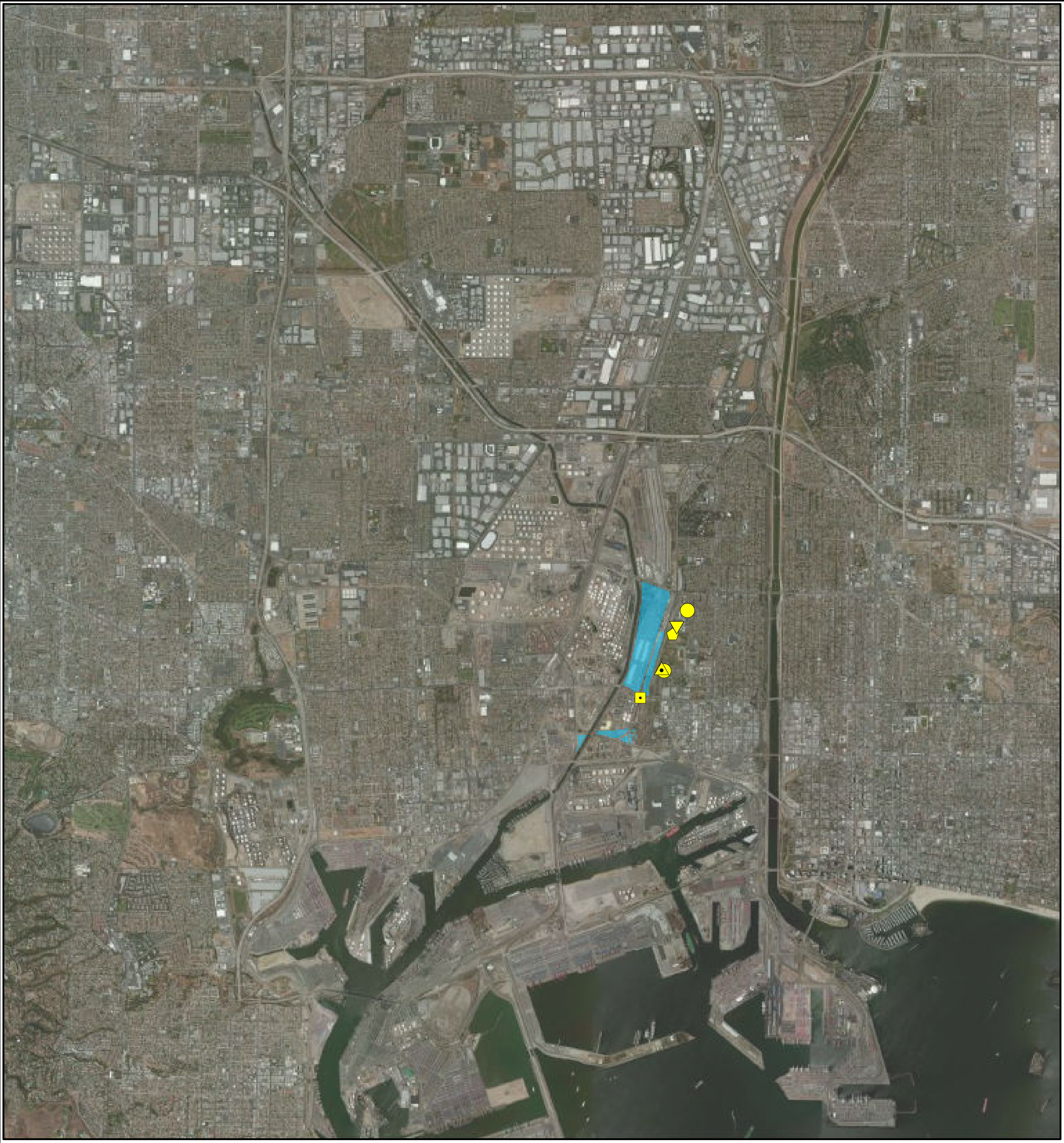
Note:

1. Also location of the Residential Floating Increment value in Table C3-7-10.
2. Also location of the Recreational Floating Increment value in Table C3-7-10.
3. Also location of the Sensitive Floating Increment value in Table C3-7-10.
4. Also location of the Student Floating Increment value in Table C3-7-10.

Figure C3.7-23
Unmitigated Reduced Project Alternative

Maximum Exposed Individual for Cancer Risk

ENVIRON



Legend

- Residential MEI - Reduced Project
- Occupational and Recreational MEI - Reduced Project[1]
- Sensitive and Student MEI - Reduced Project
- Residential MEI - Floating Increment
- Sensitive MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

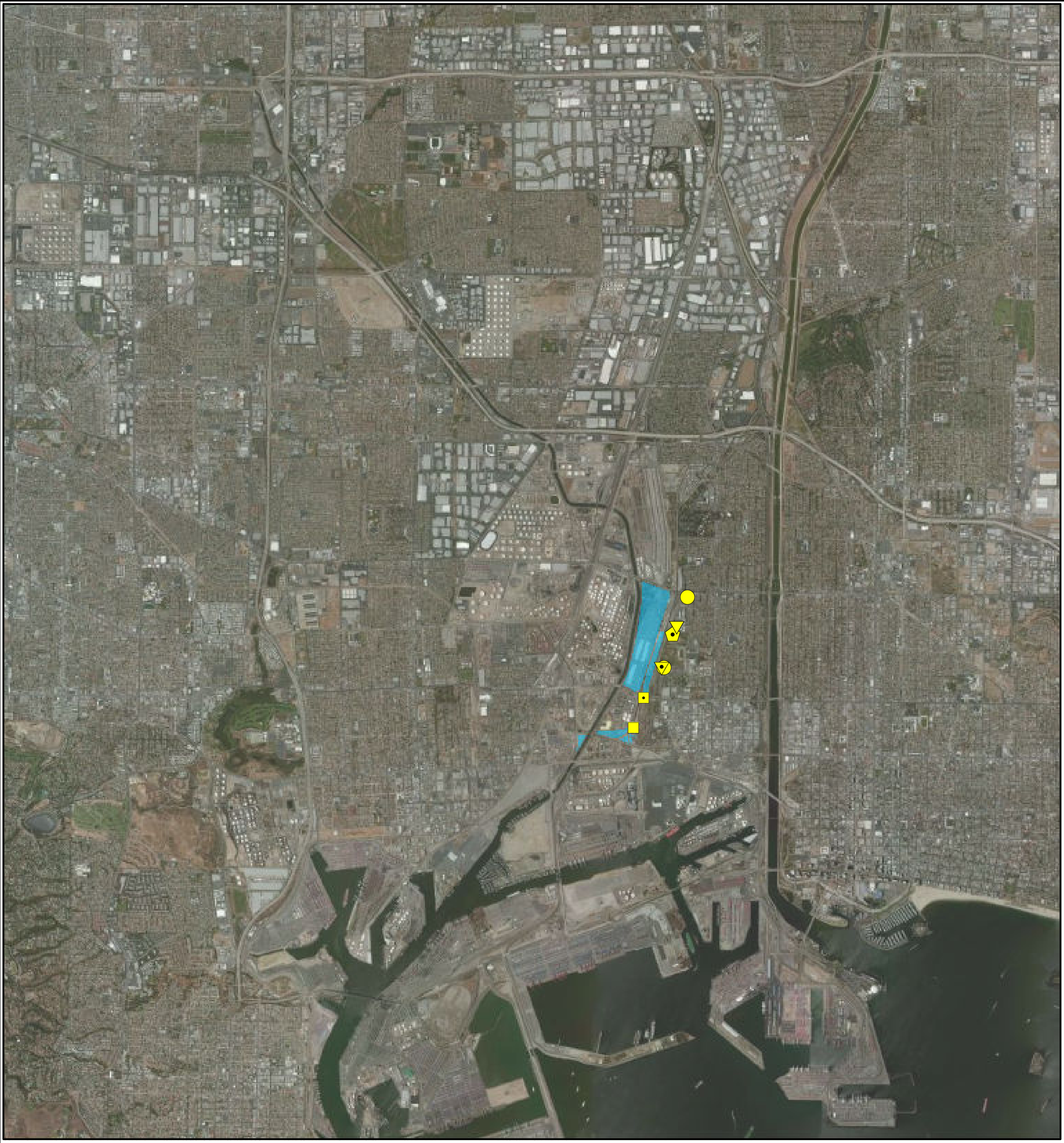
0 0.5 1 Kilometers

Note:
1. Also location of the Occupational and Recreational Floating Increment values in Table C3-7-10.

Figure C3.7-24
Unmitigated Reduced Project Alternative

Maximum Exposed Individual for Chronic HI

ENVIRON



Legend

- Residential MEI - Reduced Project
- Occupational and Recreational MEI - Reduced Project
- Sensitive MEI - Reduced Project[1]
- Student MEI - Reduced Project
- Residential MEI - Floating Increment
- Occupational and Recreational MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Note:
1. Also location of the Sensitive Floating Increment value in Table C3-7-10.

Figure C3.7-25
Unmitigated Reduced Project Alternative

Maximum Exposed Individual for Acute HI

ENVIRON

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
Hostler	1.1%	1.9%	2.6%	<0.1%	0.6%	0.9%
SCIG CHE/TRU	0.6%	0.3%	1.0%	<0.1%	<0.1%	0.3%
Alternate Business Location Onsite Locomotives	0.2%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Onsite Refueling Trucks	0.2%	<0.1%	<0.1%	<0.1%	0.5%	<0.1%
Alternate Business Location Construction	0.2%	3.1%	22.7%	0.3%	0.3%	3.9%
SCIG Onsite Gasoline Vehicles	0.2%	3.1%	0.2%	<0.1%	0.3%	<0.1%
Emergency Generator	0.1%	0.4%	4.2%	<0.1%	<0.1%	0.3%
SCIG Offsite Gasoline Vehicles	<0.1%	0.2%	<0.1%	<0.1%	0.3%	<0.1%
Alternate Business Location Offsite Gasoline Vehicles	<0.1%	0.2%	0.3%	<0.1%	0.4%	0.2%
Alternate Business Location Onsite Gasoline Vehicles	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	0.2%

At the maximum occupational receptor, the greatest contributors to cancer risk are CHE emissions from alternate business sites, as well as SCIG offsite trucks and alternate business onsite trucks. The greatest contributors to the chronic hazard index are SCIG construction and SCIG offsite trucks. The greatest contributors to the acute hazard index are SCIG construction, alternate business location onsite trucks and CHE emissions. SCIG locomotives contribute approximately 5% to cancer risk, 1% to the chronic hazard index, and less than 1% to the acute hazard index at the maximum occupational receptor.

Table C3-7-12 presents the contributions from each TAC to the maximum health effects values for the Unmitigated Reduced Project Alternative. DPM remains the primary contributor to cancer risk at both the maximum residential and occupational receptor (greater than 96 percent and 99 percent, respectively). At the residential and occupational receptors, the greatest chronic hazard index contributors are DPM, chlorine, and nickel.. The greatest acute hazard index contributor is formaldehyde.

Table C3-7-12. TAC Contributions at the Residential and Occupational MEIs for the Unmitigated Reduced Project Alternative.

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
DPM	96.3%	86.1%	0.0%	99.3%	88.2%	0.0%
Hexavalent Chromium	2.2%	<0.1%	0.0%	0.6%	<0.1%	0.0%
Formaldehyde	0.6%	1.2%	88.6%	<0.1%	0.4%	88.7%
Benzene	0.4%	<0.1%	0.5%	<0.1%	<0.1%	0.5%
Cobalt	0.3%	1.2%	0.0%	<0.1%	0.7%	0.0%
Nickel	<0.1%	3.4%	2.6%	<0.1%	4.0%	2.4%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
1,3-Butadiene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Acetaldehyde	<0.1%	<0.1%	5.0%	<0.1%	<0.1%	5.1%
Arsenic	<0.1%	<0.1%	0.2%	<0.1%	<0.1%	0.2%
Ethylbenzene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Naphthalene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Lead	<0.1%	0.0%	0.0%	<0.1%	0.0%	0.0%
Cadmium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Acrolein (2-Propenal)	0.0%	<0.1%	0.1%	0.0%	<0.1%	0.1%
Ammonia	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Antimony	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calcium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Elemental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Organic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbonate Ion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chlorine	0.0%	6.6%	0.1%	0.0%	5.0%	<0.1%
Chromium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Copper	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Iron	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Isomers Of Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Manganese	0.0%	1.2%	0.0%	0.0%	1.5%	0.0%
Mercury	0.0%	0.0%	0.4%	0.0%	0.0%	0.5%
Methyl Alcohol	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Ethyl Ketone (Mek) (2-Butanone)	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
M-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
N-Hexane	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
Nitrates	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
O-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Phosphorous	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Potassium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Propylene	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
P-Xylene	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Selenium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Styrene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Sulfates	0.0%	0.0%	2.3%	0.0%	0.0%	2.2%
Toluene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unknown Pm	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Vanadium	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Vanadium	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
(Fume Or Dust)						
Zinc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes:

"a) The chemical contributions for the chronic and acute hazard indices include all chemicals regardless of the target organs they affect.

b) For diesel internal combustion engines, only DPM emissions were evaluated for cancer risk and chronic hazard indices, because DPM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions. For all other emissions (alternative fuel engines, tire and brake wear), emissions of the 47 other toxic air contaminants were evaluated for cancer and chronic hazard indices. For the acute hazard indices, DPM was not evaluated; rather, emissions of the 47 other toxic air contaminants were evaluated for all emission sources (including diesel internal combustion engines)."

Residential cancer risks attributable to the Unmitigated Reduced Project were estimated to exceed 1×10^{-6} (one in a million), and cancer burden was calculated consistent with the Port's policy. As shown in Attachment C3-3, the cancer burden of the population in the area of impact (6,963 individuals) is 0.018, which is below the significance threshold of 0.5.

7.4.1 $PM_{2.5}$ Effects

The Unmitigated Reduced Project Alternative will reduce $PM_{2.5}$ concentrations relative to the Unmitigated Project, but is still predicted to yield incremental operational 24-hour $PM_{2.5}$ emissions that will exceed the SCAQMD 24-hour $PM_{2.5}$ threshold of 2.5 $\mu g/m^3$. Because of this exceedance, incremental operational $PM_{2.5}$ concentrations meet the Port's criteria for calculating mortality and morbidity attributable to PM.

The area impacted by PM emissions from the Unmitigated Reduced Project Alternative is defined as those census blocks lying partially or completely within the project increment peak 24-hour $PM_{2.5}$ $\mu g/m^3$ concentration isopleth (shown in Figure C3.7-33).

The area with exceedances of the 24-hour $PM_{2.5}$ threshold of 2.5 $\mu g/m^3$ lies entirely within the footprint of the SCIG facility or alternate business sites. No residential populations inhabit the census blocks of interest, and because of this, the Unmitigated Reduced Project Alternative is not expected to have an impact on PM-attributable morbidity or mortality. No calculations of mortality and morbidity were completed.

7.5 Mitigated Reduced Project Alternative Health Impacts

The Mitigated Reduced Project Alternative assumes the same mitigation measures for the Project scenario as described in Section 7.2; it is otherwise equivalent to the Unmitigated Reduced Project Alternative.

Table C3-7-13 presents a summary of the maximum health impacts that would occur for each receptor type with construction and operation of the Mitigated Reduced Project Alternative. The table also shows the maximum health impacts from the baseline and the floating increment (Mitigated Reduced Project minus floating baseline), as well as the CEQA baseline and NOP CEQA increment (Mitigated Reduced Project minus CEQA baseline). Because the results in Table C3-7-13 represent the maximum impacts predicted for each receptor type, the impacts at all other receptors would be less than these values.

Table C3-7-13. Maximum Health Impacts Associated with the Mitigated Reduced Project Alternative.

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Project	CEQA Baseline	CEQA Increment	Floating Baseline	Floating Increment	
Cancer Risk	Residential	7.9 x 10^{-6} (7.9 in a million)	68 x 10^{-6} (68 in a million)	-30 x 10^{-6} (-30 in a million)	34 x 10^{-6} (34 in a million)	-3.5 x 10^{-6} (-3.5 in a million)	10 x 10^{-6} (10 in a million)
	Occupational	20 x 10^{-6} (20 in a million)	51 x 10^{-6} (51 in a million)	7.2 x 10^{-6} (7.2 in a million)	21 x 10^{-6} (21 in a million)	9.7 x 10^{-6} (9.7 in a million)	
	Sensitive	7.9 x 10^{-6} (7.9 in a million)	45 x 10^{-6} (45 in a million)	-34 x 10^{-6} (-34 in a million)	20 x 10^{-6} (20 in a million)	-5.3 x 10^{-6} (-5.3 in a million)	
	Student	0.9 x 10^{-6} (0.9 in a million)	0.9 x 10^{-6} (0.9 in a million)	0.1 x 10^{-6} (0.1 in a million)	0.3 x 10^{-6} (0.3 in a million)	0.6 x 10^{-6} (0.6 in a million)	
	Recreational	9.5 x 10^{-6} (9.5 in a million)	78 x 10^{-6} (78 in a million)	4.1 x 10^{-6} (4.1 in a million)	22 x 10^{-6} (22 in a million)	6.9 x 10^{-6} (6.9 in a million)	
Chronic Hazard Index	Residential	0.07	0.06	0.02	0.06	0.01	1.0
	Occupational	0.3	0.2	0.2	0.2	0.1	
	Sensitive	0.07	0.06	0.01	0.07	0.01	
	Student	0.07	0.06	0.01	0.07	0.01	
	Recreational	0.3	0.2	0.2	0.2	0.1	
Acute Hazard Index	Residential	0.1	0.1	0.06	0.1	0.05	1.0
	Occupational	0.5	0.3	0.2	0.3	0.2	
	Sensitive	0.1	0.10	0.07	0.1	0.06	
	Student	0.1	0.09	0.06	0.1	0.06	
	Recreational	0.5	0.3	0.2	0.3	0.2	

Notes:

a) Exceedances of the significance thresholds are in **bold**. The significance thresholds apply to the floating increments only.
b) The maximum increments might not occur at the same receptor locations as the maximum impacts. This means that the increments cannot necessarily be determined by subtracting the floating baseline impact from the project impact. Rather, the subtraction must be done at each receptor, for all modeled receptors, and the maximum result selected.
c) The floating increment represents Project minus floating baseline.
d) When the maximum increment for a receptor type is negative, the maximum increment displayed is the increment at the maximum project receptor location.
e) Data represent the receptor locations with the maximum impacts or increments. The impacts or increments at all other modeled receptors would be less than these values for each receptor type.
f) The Mitigated Reduced Project Alternative assumes that the Port guidelines for reducing emissions from construction equipment operating at the Port are followed and LNG trucks are used; it is otherwise equivalent to the Unmitigated Reduced Project Alternative.

The data in Table C3-7-13 show that the floating baseline cancer risk increment at the location of the Mitigated Reduced Project Alternative MEI is predicted to be -3.5 in a million (negative 3.5 x 10^{-6}), at a residential receptor. This risk value, as well as the risk value at all residential receptors, is below the significance threshold of 10 in a million. The floating baseline CEQA increments are below the CEQA significance threshold at all receptors, including occupational, sensitive, student, and recreational.

The maximum floating chronic hazard index increments are predicted to be less than the CEQA significance of 1.0 at all receptors.

The maximum floating acute hazard index increments are predicted to be less than the CEQA significance threshold of 1.0 at each receptor type.

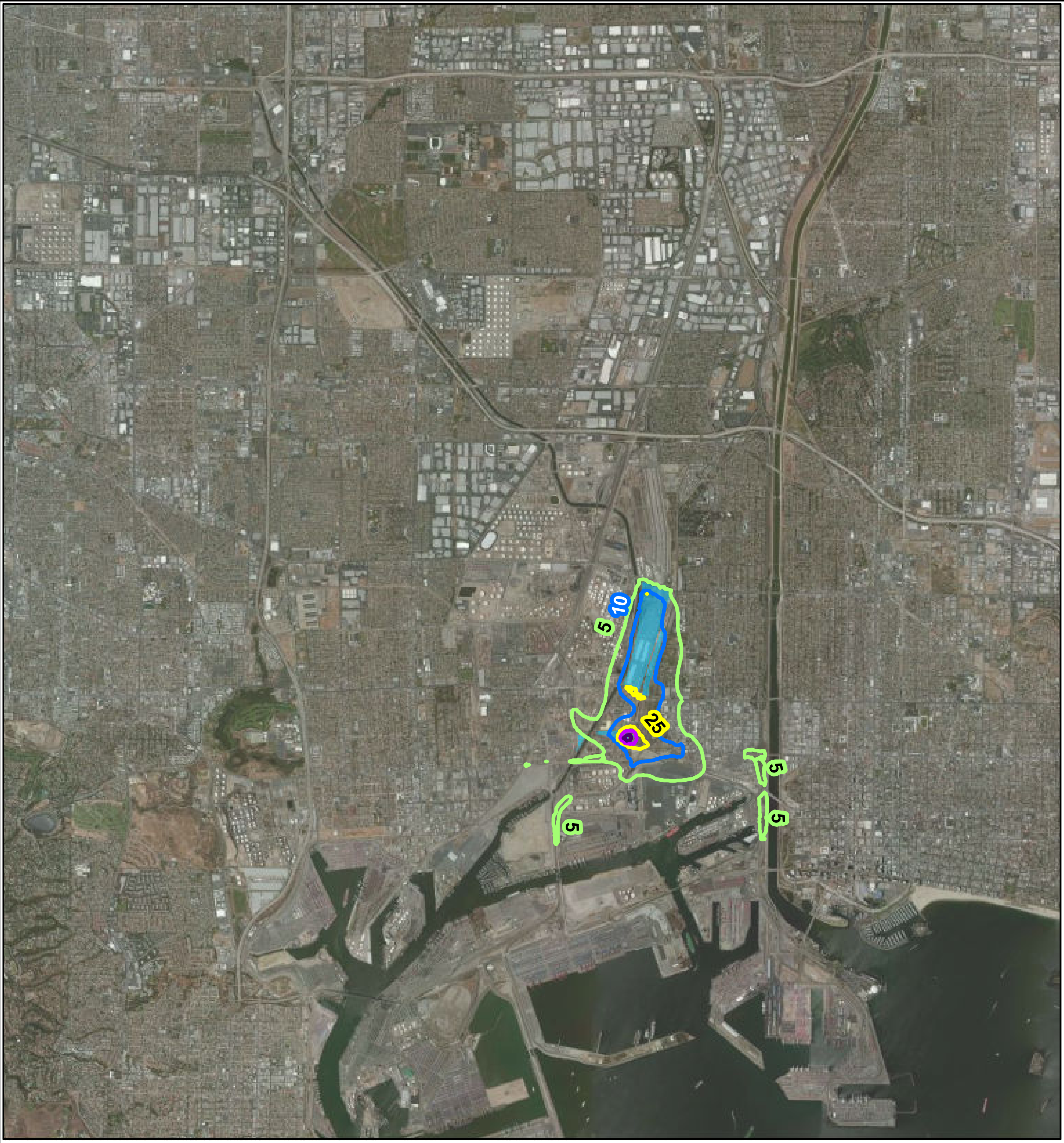
Figures C3.7-26 and C3.7-27 show the isopleths associated with the Mitigated Reduced Project and Mitigated Reduced Project minus floating baseline residential individual lifetime cancer risk (per million), respectively.

Figures C3.7-28, C3.7-29, and C3.7-30 show the maximum receptor locations for the Mitigated Reduced Project for cancer risk, chronic HI, and acute HI, respectively. It should be noted that the residential, occupational, and recreational MEIs are not necessarily located directly on existing homes, workplaces, or recreational facilities; rather, they are located in areas that contain these land use types.

Table C3-7-14 presents the contributions from each emission source to the maximum health effects impacts for the Mitigated Reduced Project Alternative. At the maximum residential receptor, the greatest contributors to cancer risk are SCIG offsite and onsite trucks, as well as SCIG onsite locomotives and alternate business location CHE emissions. The greatest contributors to the chronic hazard index are SCIG offsite and onsite trucks, SCIG construction, alternate business location CHE and offsite trucks. The greatest contributors to the acute hazard index are construction at SCIG and alternate business sites. SCIG locomotives contribute approximately 18% to the cancer risk at the maximum residential receptor; locomotives also contribute less than 3% to the chronic hazard index and less than 1% to the acute hazard index.

Table C3-7-14. Source Contributions at the Residential and Occupational MEIs for the Mitigated Reduced Project Alternative.

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
SCIG Offsite Trucks	29.7%	31.5%	0.9%	6.9%	33.6%	1.1%
SCIG Onsite Trucks	21.9%	23.3%	3.0%	1.0%	18.6%	1.3%
SCIG Onsite Locomotives	14.3%	1.9%	0.7%	4.4%	1.1%	0.4%
Alternate Business Location CHE	10.8%	9.3%	3.8%	74.8%	1.0%	16.7%
Alternate Business Location Offsite Trucks	4.8%	8.3%	3.0%	2.8%	9.8%	2.1%
Alternate Business Location Onsite Trucks	3.7%	1.1%	5.3%	8.7%	0.1%	34.3%
SCIG Offsite Locomotives	3.5%	0.5%	<0.1%	0.5%	0.2%	<0.1%



Legend
- 5
- 10
- 25
- 50
- 100
- Site

N

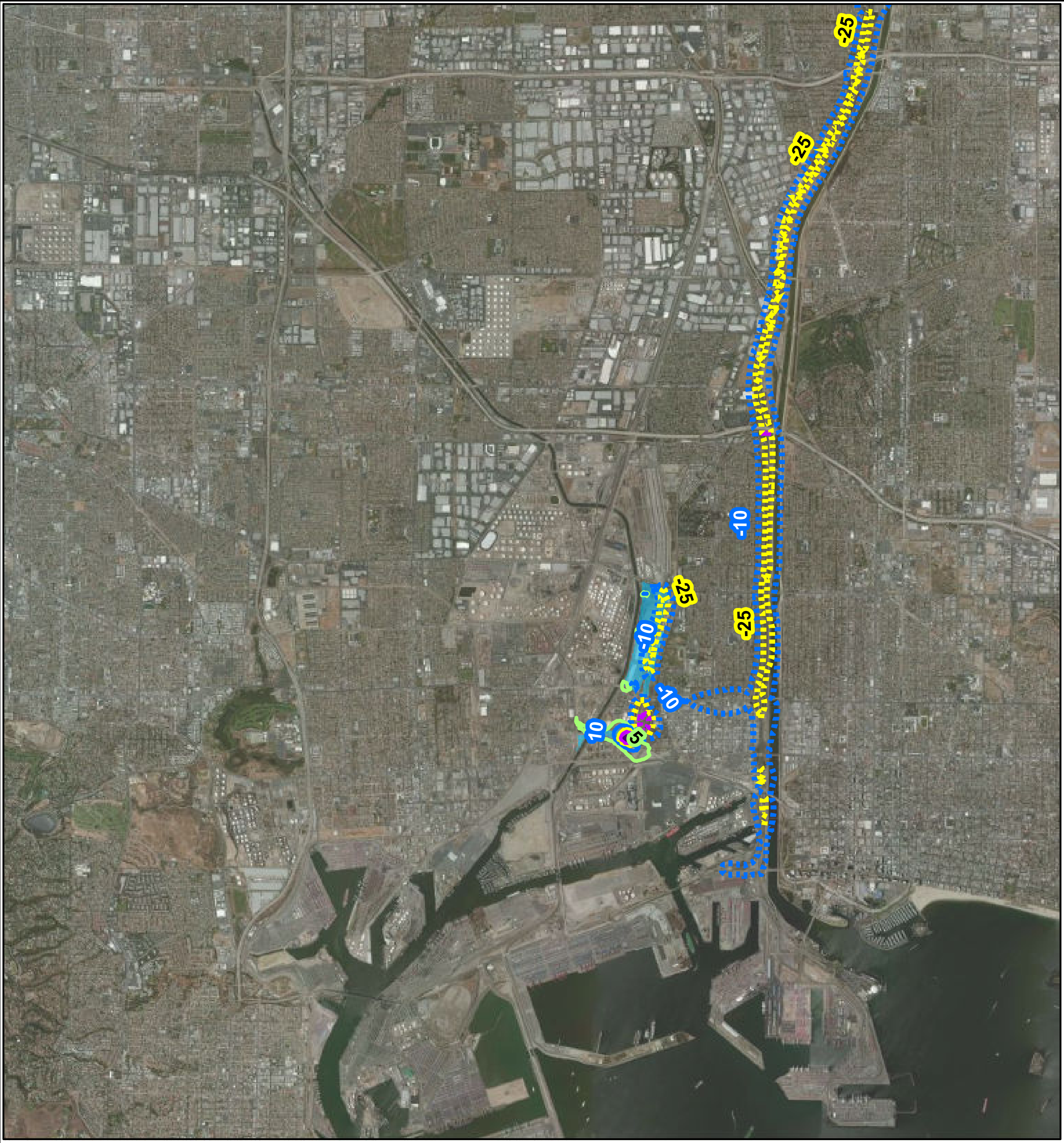
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-26
Mitigated Reduced Project Alternative

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- -10
- -25
- -50
- 5
- 10
- 25
- 50
- 100
- Site

N

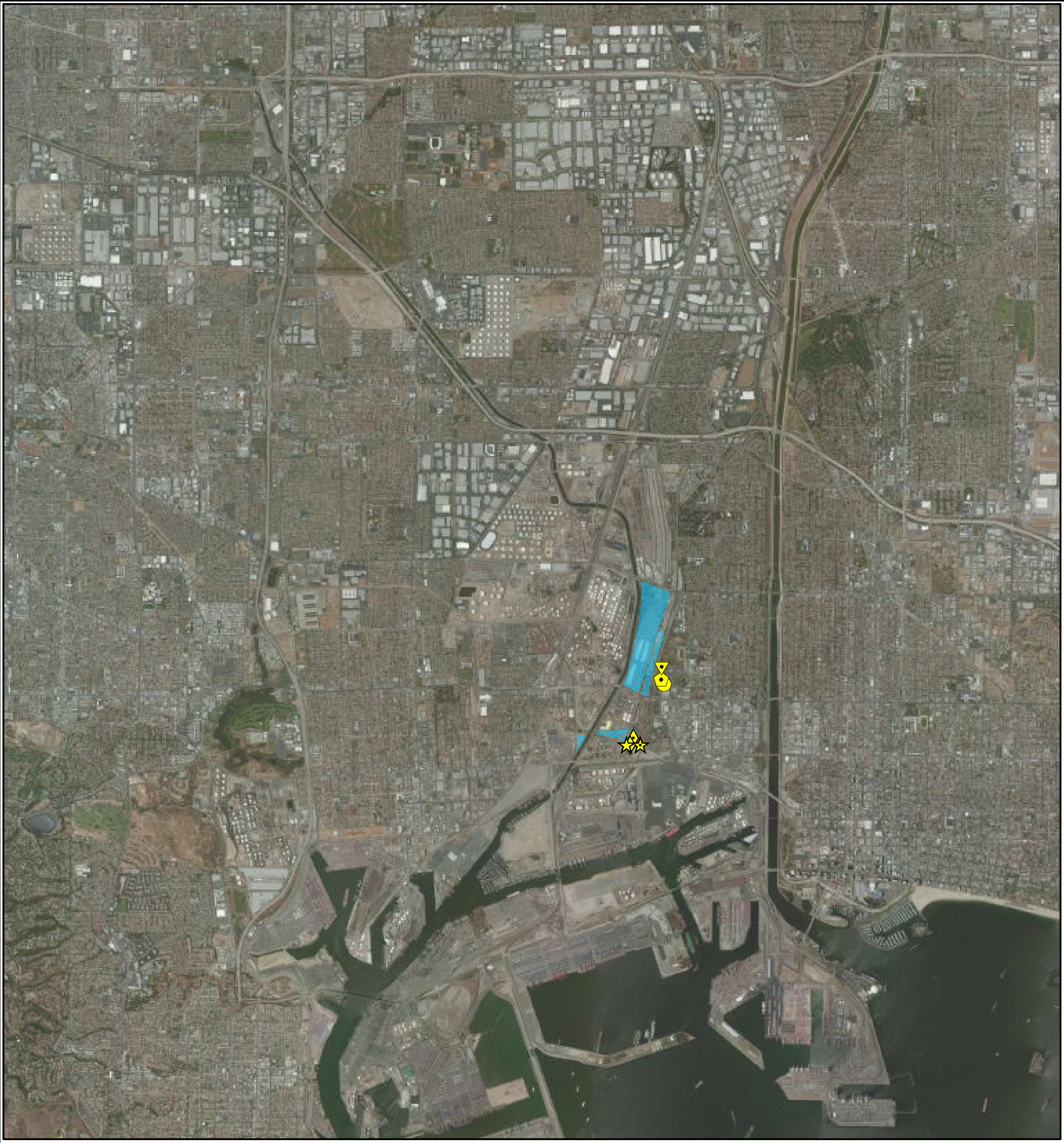
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-27
Mitigated Reduced Project Alternative minus Floating Baseline

Residential Individual Lifetime Cancer Risk (per Million)

ENVIRON



Legend

- Residential MEI - Mitigated Reduced Project[1]
- Occupational MEI - Mitigated Reduced Project
- Recreational MEI - Mitigated Reduced Project
- Sensitive MEI - Mitigated Reduced Project[2]
- Student MEI - Mitigated Reduced Project[3]
- Occupational MEI - Floating Increment
- Recreational MEI - Floating Increment
- Site

Note:
1. Also location of the Residential Floating Increment value in Table C3-7-13.
2. Also location of the Sensitive Floating Increment value in Table C3-7-13.
3. Also location of the Student Floating Increment value in Table C3-7-13.

N

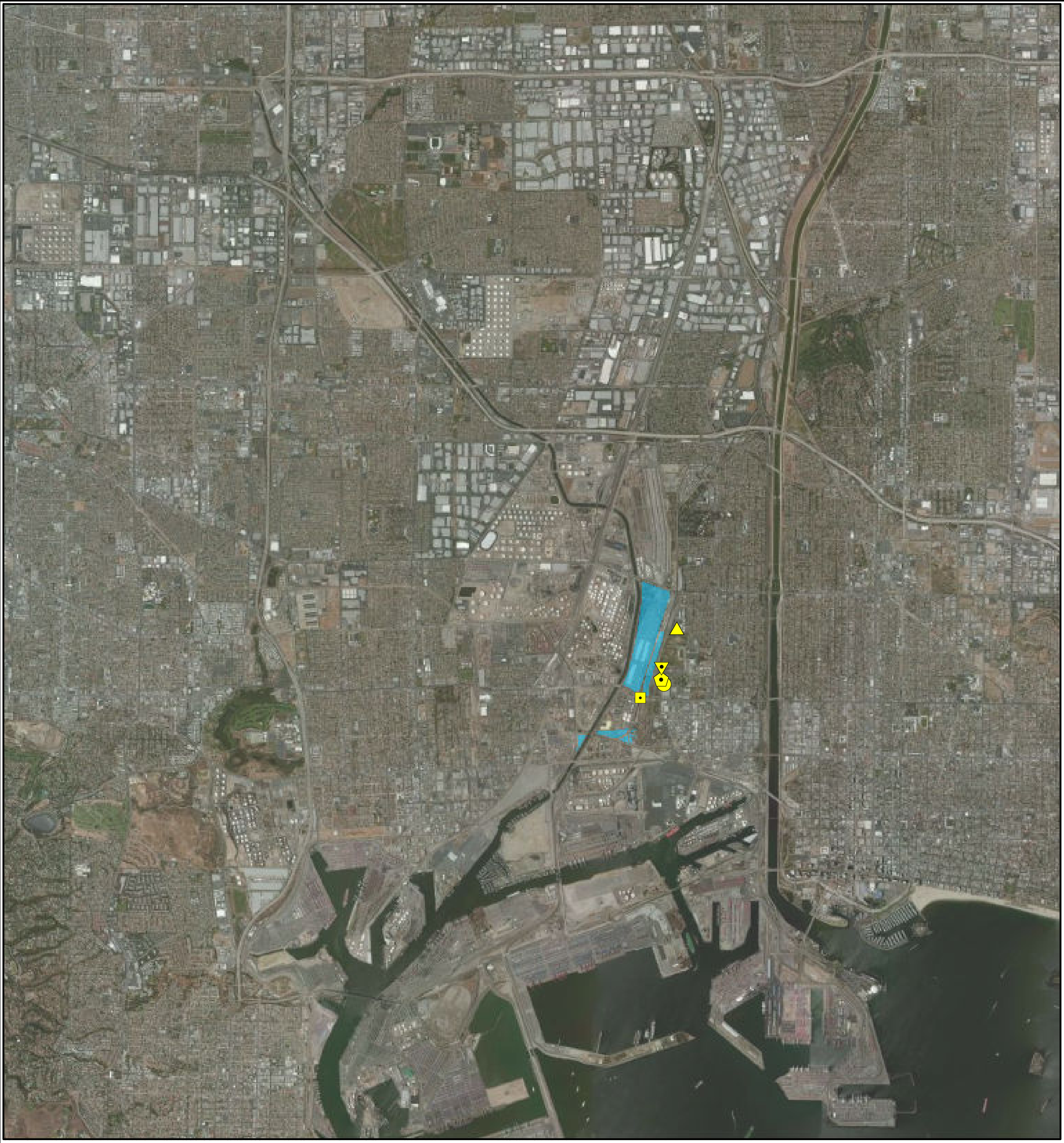
0 0.5 1 Miles

0 0.5 1 Kilometers

Figure C3.7-28
Mitigated Reduced Project Alternative

Maximum Exposed Individual for Cancer Risk

ENVIRON



Legend

- Residential MEI - Mitigated Reduced Project[1]
- Occupational and Recreational MEI - Mitigated Reduced Project[2]
- Sensitive MEI - Mitigated Reduced Project
- Student MEI - Mitigated Reduced Project
- Sensitive and Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

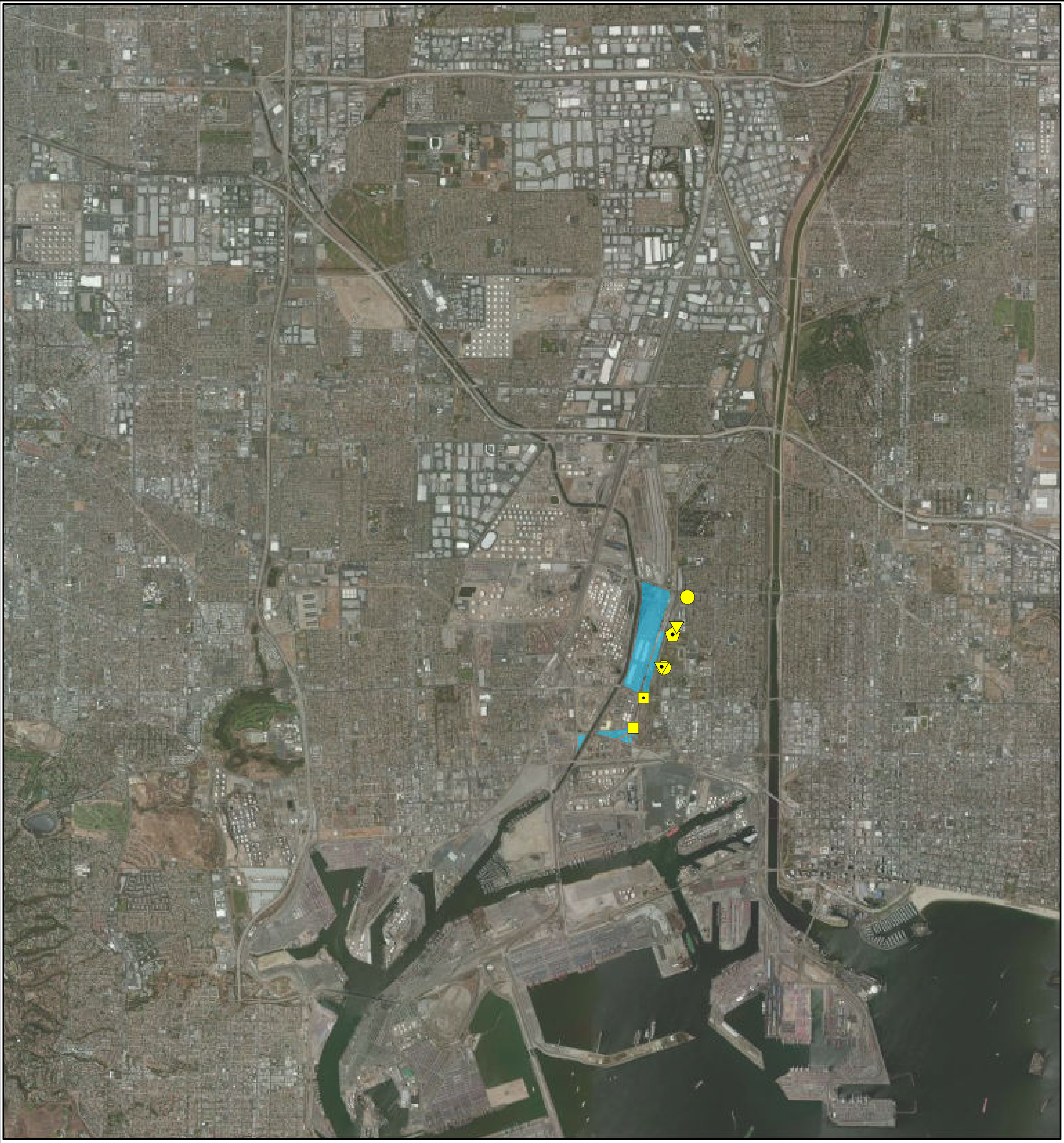
0 0.5 1 Kilometers

Note:
1. Also location of the Residential Floating Increment value in Table C3-7-13.
2. Also location of the Occupational and Recreational Floating Increment values in Table C3-7-13.

Figure C3.7-29
Mitigated Reduced Project Alternative

Maximum Exposed Individual for Chronic HI

ENVIRON



Legend

- Residential MEI - Mitigated Reduced Project
- Occupational and Recreational MEI - Mitigated Reduced Project
- Sensitive MEI - Mitigated Reduced Project[1]
- Student MEI - Mitigated Reduced Project
- Residential MEI - Floating Increment
- Occupational and Recreational MEI - Floating Increment
- Student MEI - Floating Increment
- Site

N

0 0.5 1 Miles

0 0.5 1 Kilometers

Note:
1. Also location of the Sensitive Floating Increment value in Table C3-7-13.

Figure C3.7-30
Mitigated Reduced Project Alternative

Maximum Exposed Individual for Acute HI

ENVIRON

Legend

24-Hour PM2.5 Concentration = 2.5 µg/m3	
0	*Census Block Population: 0*
1 - 50	*Census Block Population: 1 - 50*
51 - 100	*Census Block Population: 51 - 100*
101 - 150	*Census Block Population: 101 - 150*
151 - 200	*Census Block Population: 151 - 200*
201 - 271	*Census Block Population: 201 - 271*
Site	

N

0 0.2 0.4 Miles

0 0.2 0.4 Kilometers

Figure C3.7-31
Unmitigated Project Alternative minus Floating Baseline

Morbidity and Mortality Analysis

ENVIRON

Legend

- 24-Hour $PM_{2.5}$ Concentration = 2.5 µg/m3
- 0 *Census Block Population: 0*
- 1 - 50 *Census Block Population: 1 - 50*
- 51 - 100 *Census Block Population: 51 - 100*
- 101 - 150 *Census Block Population: 101 - 150*
- 151 - 200 *Census Block Population: 151 - 200*
- 201 - 271 *Census Block Population: 201 - 271*
- Site

N

0 0.2 0.4 Miles

0 0.2 0.4 Kilometers

Figure C3.7-32
Mitigated Project Alternative minus Floating Baseline

Morbidity and Mortality Analysis

ENVIRON

Legend

- 24-Hour $PM_{2.5}$ Concentration = 2.5 μg/m3
- 0 *Census Block Population: 0*
- 1 - 50 *Census Block Population: 1 - 50*
- 51 - 100 *Census Block Population: 51 - 100*
- 101 - 150 *Census Block Population: 101 - 150*
- 151 - 200 *Census Block Population: 151 - 200*
- 201 - 271 *Census Block Population: 201 - 271*
- Site

N

0 0.2 0.4 Miles

0 0.2 0.4 Kilometers

Figure C3.7-33
Unmitigated Reduced Project Alternative minus Floating Baseline

Morbidity and Mortality Analysis

ENVIRON

Emission Source	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index	Acute Hazard Index	Cancer Risk	Chronic Hazard Index	Acute Hazard Index
SCIG Construction	3.5%	11.3%	47.2%	0.4%	32.4%	38.8%
Hostler	3.3%	7.3%	3.0%	<0.1%	0.8%	1.0%
SCIG CHE/TRU	1.8%	0.2%	1.2%	<0.1%	<0.1%	0.4%
Alternate Business Location Onsite Locomotives	0.6%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Onsite Refueling Trucks	0.6%	<0.1%	<0.1%	<0.1%	0.6%	<0.1%
Alternate Business Location Construction	0.5%	2.5%	26.3%	0.1%	0.4%	2.8%
SCIG Onsite Gasoline Vehicles	0.5%	2.2%	0.2%	<0.1%	0.4%	<0.1%
Emergency Generator	0.4%	<0.1%	4.9%	<0.1%	<0.1%	0.4%
SCIG Offsite Gasoline Vehicles	0.2%	0.3%	<0.1%	<0.1%	0.5%	<0.1%
Alternate Business Location Offsite Gasoline Vehicles	<0.1%	0.3%	0.4%	<0.1%	0.5%	0.2%
Alternate Business Location Onsite Gasoline Vehicles	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	0.3%

At the maximum occupational receptor, the greatest contributor to cancer risk is alternate business location CHE emissions. The greatest contributors to the chronic hazard index are SCIG construction and SCIG onsite and offsite trucks. The greatest contributors to the acute hazard index are SCIG construction, alternate business location onsite trucks and CHE. SCIG locomotives contribute approximately 5% to the cancer risk at the maximum occupational receptor; SCIG locomotives also contribute over 1% to the chronic hazard index and less than 1% to the acute hazard index.

Table C3-7-15 presents the contributions from each TAC to the maximum health effects values for the Mitigated Reduced Project Alternative. DPM remains the primary contributor to cancer risk at both the maximum residential and occupational receptor (greater than 83 percent and 97 percent, respectively). The greatest chronic hazard index contributors are DPM and chlorine at the maximum residential receptor and at the maximum occupational receptor. The greatest acute hazard index contributor is formaldehyde at both the maximum residential and occupational receptors.

Table C3-7-15. TAC Contributions at the Residential and Occupational MEIs for the Mitigated Reduced Project Alternative.

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
DPM	83.6%	29.9%	0.0%	97.9%	46.0%	0.0%
Hexavalent Chromium	8.6%	<0.1%	0.0%	1.4%	<0.1%	0.0%
Cobalt	3.7%	9.6%	0.0%	0.5%	7.4%	0.0%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
Formaldehyde	2.2%	5.6%	88.1%	<0.1%	1.3%	88.4%
Benzene	1.5%	0.1%	0.5%	<0.1%	<0.1%	0.5%
Nickel	0.2%	8.8%	3.0%	<0.1%	8.3%	2.7%
1,3-Butadiene	0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Acetaldehyde	<0.1%	<0.1%	4.9%	<0.1%	<0.1%	5.1%
Arsenic	<0.1%	<0.1%	0.2%	<0.1%	<0.1%	0.2%
Ethylbenzene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Naphthalene	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	0.0%
Lead	<0.1%	0.0%	0.0%	<0.1%	0.0%	0.0%
Cadmium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Acrolein (2-Propenal)	0.0%	<0.1%	0.1%	0.0%	<0.1%	0.2%
Ammonia	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Antimony	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calcium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Elemental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbon Organic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Carbonate Ion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chlorine	0.0%	43.2%	0.2%	0.0%	34.3%	0.1%
Chromium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Copper	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Iron	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Isomers Of Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Manganese	0.0%	2.5%	0.0%	0.0%	2.5%	0.0%
Mercury	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
Methyl Alcohol	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Methyl Ethyl Ketone (Mek) (2-Butanone)	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
M-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
N-Hexane	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
Nitrates	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
O-Xylene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Phosphorous	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Potassium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Propylene	0.0%	<0.1%	0.0%	0.0%	<0.1%	0.0%
P-Xylene	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Selenium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Styrene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Sulfates	0.0%	0.0%	2.6%	0.0%	0.0%	2.3%
Toluene	0.0%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Pollutant	Maximum Residential Receptor			Maximum Occupational Receptor		
	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]	Cancer Risk	Chronic Hazard Index[a]	Acute Hazard Index[a]
Unknown Pm	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Vanadium	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Vanadium (Fume Or Dust)	0.0%	0.0%	<0.1%	0.0%	0.0%	<0.1%
Zinc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes:

"a) The chemical contributions for the chronic and acute hazard indices include all chemicals regardless of the target organs they affect.

b) For diesel internal combustion engines, only DPM emissions were evaluated for cancer risk and chronic hazard indices, because DPM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions. For all other emissions (alternative fuel engines, tire and brake wear), emissions of the 47 other toxic air contaminants were evaluated for cancer and chronic hazard indices. For the acute hazard indices, DPM was not evaluated; rather, emissions of the 47 other toxic air contaminants were evaluated for all emission sources (including diesel internal combustion engines)."

7.5.1 $PM_{2.5}$ Effects

The Mitigated Reduced Project Alternative will reduce operational 24-hour $PM_{2.5}$ concentrations relative to the Unmitigated Reduced Project Alternative, but will still result in incremental (Mitigated Reduced Project minus CEQA baseline) operational 24-hour $PM_{2.5}$ concentrations predicted to exceed the SCAQMD 24-hour $PM_{2.5}$ threshold of 2.5 $\mu g/m^3$. Accordingly, operational $PM_{2.5}$ concentrations for the Mitigated Reduced Project Alternative increment meet the Port's criteria for calculating mortality and morbidity attributable to PM (POLA, 2011).

The area impacted by PM emissions from the Mitigated Reduced Project Alternative increment (Figure C3.7-34) is quite similar to that of the Unmitigated Reduced Project Alternative increment, although the impacted area is smaller in geographic extent (consistent with the reduced emissions). Census blocks lying partially or completely within the project increment peak 24-hour $PM_{2.5}$ $\mu g/m^3$ concentration isopleths represent the area identified for analysis of PM-attributable mortality and morbidity. However, no residential populations inhabit the census blocks of interest, and because of this, the Mitigated Reduced Project Alternative is not expected to have an impact on PM-attributable morbidity or mortality, and no calculations of mortality and morbidity were completed.

8.0 Risk Uncertainty

Health risk assessments such as the one presented in this Appendix are not intended to provide estimates of the absolute health risk or expected incidence of disease in a population, but instead, are conducted to allow comparisons of the potential health impacts of different alternatives. Consistent with agency guidelines and standard approaches to regulatory risk assessment, this risk assessment used health-protective (conservative) assumptions selected by regulatory agencies to "err on the side of health protection in order to avoid underestimation of risk to the public" (OEHHA, 2003). As an example of the conservative assumptions used in this risk assessment, residential receptors are considered to be exposed to TACs while individuals are present at the same

Legend

- 24-Hour $PM_{2.5}$ Concentration = 2.5 µg/m3
- 0 *Census Block Population: 0*
- 1 - 50 *Census Block Population: 1 - 50*
- 51 - 100 *Census Block Population: 51 - 100*
- 101 - 150 *Census Block Population: 101 - 150*
- 151 - 200 *Census Block Population: 151 - 200*
- 201 - 271 *Census Block Population: 201 - 271*
- Site

N

0 0.2 0.4 Miles

0 0.2 0.4 Kilometers

Figure C3.7-34
Mitigated Reduced Project Alternative minus Floating Baseline

Morbidity and Mortality Analysis

ENVIRON

outdoor location for 365 days per year for 70 years, breathing continuously at a rate that is at the 80th percentile of breathing rates for the population.

OEHHA has provided a discussion of risk uncertainty, which is reiterated here (OEHHA, 2003).

> *There is a great deal of uncertainty associated with the process of risk assessment. 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 either 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. Uncertainty may be defined as what is not known and may be reduced with further scientific studies. In addition to uncertainty, there is a natural range or variability in the human population in such properties as height, weight, and susceptibility to chemical toxicants. Scientific studies with representative individuals and large enough sample size can characterize this variability.*
>
> *Interactive effects of exposure to more than one carcinogen or toxicant are also not necessarily quantified in the HRA. Cancer risks from all emitted carcinogens are typically added, and hazard quotients for substances impacting the same target organ system are added to determine the hazard index (HI). Many examples of additivity and synergism (interactive effects greater than additive) are known. For substances that act synergistically, the HRA could underestimate the risks. Some substances may have antagonistic effects (lessen the toxic effects produced by another substance). For substances that act antagonistically, the HRA could overestimate the risks.*
>
> *Other sources of uncertainty, which may underestimate or overestimate risk, can be found in exposure estimates where little or no data are available (e.g., soil half-life and dermal penetration of some substances from a soil matrix).*
>
> *The differences among species and within human populations usually cannot be easily quantified and incorporated into risk assessments. Factors including metabolism, target site sensitivity, diet, immunological responses, and genetics may influence the response to toxicants. The human population is much more diverse both genetically and culturally (e.g., lifestyle, diet) than inbred experimental animals. The intraspecies variability among humans is expected to be much greater than in laboratory animals. Adjustment for tumors at multiple sites induced by some carcinogens could result in a higher potency. Other uncertainties arise 1) in the assumptions underlying the dose-response model used, and 2) in extrapolating from large experimental doses, where, for example, other toxic effects may compromise the assessment of carcinogenic potential, to usually much smaller environmental doses. Also, only single tumor sites induced by a substance are usually considered. When epidemiological data are used to generate a carcinogenic potency, less uncertainty is involved in the extrapolation*

from workplace exposures to environmental exposures. However, children, a subpopulation whose hematological, nervous, endocrine, and immune systems, for example, are still developing and who may be more sensitive to the effects of carcinogens on their developing systems, are not included in the worker population and risk estimates based on occupational epidemiological data are more uncertain for children than adults. Finally, the quantification of each uncertainty applied in the estimate of cancer potency is itself uncertain.

Thus, 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 risk, based on current knowledge and a number of assumptions. Additionally, the uncertainty factors integrated within the estimates of non-cancer RELs are meant to err on the side of public health protection in order to avoid underestimation of risk. Risk assessment is best used as a ruler to compare one source with another and to prioritize concerns. Consistent approaches to risk assessment are necessary to fulfill this function.

9.0 References

California Air Resources Board (CARB). 2012. California Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. May 3.

________2011a. *EMFAC2011 Motor Vehicles Software.* EMFAC2011 released in September 2011. Available at http://www.arb.ca.gov/msei/modeling.htm. Last accessed June 2012.

________2011b. "PM and Organic Gas Speciation Profiles." Available online at: http://www.arb.ca.gov/ei/speciate/dnldopt.htm. March 9.

________2010. Estimate of Premature Deaths Associated with Fine Particle Pollution ($PM_{2.5}$) in California Using a U.S. Environmental Protection Agency Methodology. Website: http://www.arb.ca.gov/research/health/pm-mort/pm-report_2010.pdf. August 31.

________2008. Methodology for Estimating Premature Deaths Associated with Long-term Exposure to Fine Airborne Particulate Matter in California. October 24, 2008. California Air Resources Board. California Environmental Protection Agency.

________2007a. *OFFROAD 2007 Program*. December. Website: http://www.arb.ca.gov/msei/offroad/offroad.htm

________2007b. Cargo Handling Equipment Calculator Version 09132007.

________2006a. *ARB Health Risk Assessment Guidance for Rail Yard and Intermodal Facilities.* September.

________2006b. *Emission Reduction Plan for Ports and International Goods Movement*. January 30. Website: www.arb.ca.gov/planning/gmerp/gmerp.htm.

________2004a. *Recommended Interim Risk Management Policy*. Web site: http://www.arb.ca.gov/toxics/harp/rmpolicyfaq.htm.

________2004b. *The California Diesel Fuel Regulations*. Title 13, California Code of Regulations, Sections 2281-2285; Title 17, California Code of Regulations, Section 93114. August 14.

________2004c. *Roseville Rail Yard Study.* Stationary Source Division. October 14.

________2002. Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates. Prepared by CARB and OEHHA. May 3.Clark, N. A., P. A. Demers, C. J. Karr, M. Koehoorn, C. Lencar, L. Tamburic, and M. Brauer. 2010. "Effect of Early Life Exposure to Air Pollution on Development of Childhood Asthma." Environmental Health Perspectives. Vol. 118, No. 2. pp. 284-290.

________2000. *Risk Reduction Plan to Reduce Particular Matter Emissions from Diesel-Fueled Engines and Vehicles.* Stationary Source Division and Mobile Source Control Division. October. Web site: http://www.arb.ca.gov/diesel/documents/rrpfinal.pdf

Gauderman, W. J., H. Vora, R. McConnell, K. Berhane, F. Gilliland, D. Thomas, F. Lurmann, E. Avol, N. Kunzli, M. Jerrett, and J. Peters. 2007. Effect of exposure to traffic on lung development from 10 to18 years of age: a cohort study. Lancet. 369. pp. 571-577.

Jerrett, M., R.T. Burnett, R. Ma, C.A. Pope III, D. Krewski, K.B. Newbold, G. Thurston, Y. Shi, N. Finkelstein, E.E. Calle, and M.J. Thun. 2005. Spatial analysis of air pollution and mortality in Los Angeles. Epidemiology 16 (6):727-36.

Jerrett, M., K. Shankardass, K. Berhane, W. J. Gauderman, N. Künzli, E. Avol, F. Gilliland, F. Lurmann, J. N. Molitor, J. T. Molitor, D. C. Thomas, J. Peters, and R. McConnell. 2008. Traffic-Related Air Pollution and Asthma Onset in Children: A Prospective Cohort Study with Individual Exposure Measurement. Environmental Health Perspectives. Vol. 116, No. 10. pp. 1433-1438.

Krewski, D., R. Burnett, M.S. Goldberg, K. Koover, J. Siemiatycki, M. Jerrett, et al. 2001. Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality. Research Report of the Health Effects Institute.

Los Angeles Harbor Department (LAHD). 2008. Berths 97-109 [China Shipping] Container Terminal Project Final Environmental Impact Statement/Environmental Impact Report. December. Available at http://www.portoflosangeles.org/EIR/ChinaShipping/FEIR/feir_china_shipping.asp.

________2007. Berths 136-147 [TraPac] Container Terminal Project Final Environmental Impact Statement/Environmental Impact Report. December. Available at http://www.portoflosangeles.org/EIR/TraPac/FEIR/feir_trapac.asp.

Office of Environmental Health Hazard Assessment (OEHHA). 2012. All OEHHA Acute, 8-hour and Chronic Reference Exposure Levels (chRELs). February. http://oehha.ca.gov/air/allrels.html

________2003. Air Toxics Hot Spots Program Risk Assessment Guidelines. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* August.

________2002. Air Toxics Hot Spots ProgramRisk Assessment Guidelines Part III. Technical Support Document for the Determination of Non-cancer Chronic Reference Exposure Levels. Air Toxicology and Epidemiology Section Office of Environmental Health Hazard Assessment,California Environmental Protection Agency. February 2000.

Pandya, R. J., G. Solomon, A. Kinner, and J. R. Balmes. 2002. Diesel Exhaust and Asthma: Hypotheses and Molecular Mechanisms of Action. Environmental Health Perspectives. Vol. 110, Supplement 1. pp. 104-112.

Pope, C.A., R. T. Burnett, G. D. Thurston, M. J. Thun, E. E. Calle, D. Krewski, and J. J. Godleski. 2004. Cardiovascular Mortality and Long-Term Exposure to Particulate Air Pollution: Epidemiological Evidence of General Pathophysiological Pathways of Disease. Circulation. 109: 71-77.

Pope, C.A., R.T. Burnett, M.J. Thun, E.E. Calle, D. Krewski, K. Ito, and G. Thurston. 2002. Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Air Pollution. JAMA. 287: 1123-1141.Pope, C.A., M.J. Thun, M.M. Namboodiri, D.W. Dockery, J.S. Evans, F.E. Speizer, and C.W. Health. 1995. Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults. American Journal of Respiratory and Critical Care Medicine. 151: 669-674.

Port of Los Angeles (POLA), 2011. *Methodology for Addressing Mortality and Morbidity in Port of Los Angeles CEQA Documents*. July 22, 2011.

_______.2008. *Draft Protocol for Emissions Estimation, Dispersion Modeling and Human Health Risk Assessment for the Southern California Intermodal Gateway*. October 31.

________2004. *Final Air Quality Monitoring Work Plan for the Port of Los Angeles*.

________2010. *Final 2010 San Pedro Bay Ports Clean Air Action Plan Update*. Attachment I to Appendix B - Sphere of Influence Bay-Wide Sphere of Influence Analysis for Surface Meteorological Stations Near the Ports. Web site: http://www.cleanairactionplan.org/civica/filebank/blobdload.asp?BlobID=2439.

South Coast Air Quality Management District(SCAQMD). 2011. SCAQMD Air Quality Significance Thresholds. http://www.aqmd.gov/ceqa/handbook/signthres.pdf

________2005. Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588). July.

________2003. Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis. August 2003.

________2002. *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions.*

Starcrest, 2011. Port of Los Angeles Inventory of Air Emissions 2010.

United States Environmental Protection Agency (USEPA). 2012. Regional Screening Levels. May.

________2010. Quantitative Health Risk Assessment for Particulate Matter – Final Report. http://www.epa.gov/ttnnaaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf

________2009. Vocabulary Catalog List Detail - Integrated Risk Information System (IRIS) Glossary. March. Available at http://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&glossaryName=IRIS%20Glossary.

________2008. Provisional Peer Reviewed Toxicity Values for Cobalt. August 25.

________2005. USEPA AERMOD Dispersion Model, version 09292, based on the *Guideline on Air Quality Models* (40 CFR, Appendix W; November).

________2004. *User's Guide for the AMS/EPA Regulatory Model – AERMOD.* Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. EPA-454/B-03/001.

________2003. USEPA Integrated Risk Information System (IRIS). Methyl ethyl ketone. September 26.

________1998. Locomotive Emission Standards. Regulatory Support Document. Office of Mobile Sources. April.

________1997. *Exposure Factors Handbook*. August.

Attachment C3: Cancer Burden Tables

Table C3-1. HRA Cancer Burden Estimate - Unmitigated Project Alternative

BLOCKID10 [a]	Total Population [b]	Maximum Incremental Risk Within the Block	Cancer Burden (population x risk)
060372941201007	302	1.35E-06	4.09E-04
060372941203003	111	2.96E-06	3.29E-04
060372941203004	155	2.77E-06	4.30E-04
060372941203007	95	2.59E-06	2.46E-04
060372941203011	41	2.13E-06	8.72E-05
060372941203012	162	2.21E-06	3.58E-04
060372946101004	124	9.84E-07	1.22E-04
060372946102008	228	8.61E-07	1.96E-04
060372946102011	136	1.32E-06	1.80E-04
060372946201001	201	2.77E-06	5.58E-04
060372946201002	169	2.87E-06	4.85E-04
060372946201004	139	2.86E-06	3.98E-04
060372946201008	60	2.53E-06	1.52E-04
060372946201009	82	2.61E-06	2.14E-04
060372946201010	65	2.68E-06	1.74E-04
060372946201012	72	2.93E-06	2.11E-04
060372946201013	256	3.11E-06	7.96E-04
060372946201019	179	2.97E-06	5.31E-04
060372946202000	41	1.66E-06	6.81E-05
060372946202004	203	1.50E-06	3.06E-04
060372946202005	200	2.11E-06	4.22E-04
060372946202008	110	2.00E-06	2.20E-04
060372946203007	310	1.99E-06	6.17E-04
060372947011002	130	3.56E-06	4.63E-04
060372947011003	133	2.96E-06	3.94E-04
060372947011006	50	4.30E-06	2.15E-04
060372947011010	71	6.86E-06	4.87E-04
060372947012007	1	2.72E-06	2.72E-06
060372947012009	60	3.10E-06	1.86E-04
060372947013004	79	1.79E-06	1.42E-04
060372947013011	82	1.49E-06	1.22E-04
060372948201003	227	1.23E-06	2.80E-04
060372948301001	128	8.72E-07	1.12E-04
060372948301002	280	8.08E-07	2.26E-04
060372948302003	93	1.15E-06	1.07E-04
060372948302009	132	1.47E-06	1.94E-04
060372951032011	245	4.58E-07	1.12E-04
060372963001000	182	5.14E-07	9.36E-05
060375433051037	1282	1.27E-06	1.63E-03
060375440021013	167	9.05E-07	1.51E-04

Table C3-1. HRA Cancer Burden Estimate - Unmitigated Project Alternative (continued)

060375440022003	124	1.02E-06	1.26E-04
060375440022006	26	8.68E-07	2.26E-05
060375440022013	119	1.08E-06	1.28E-04
060375723012020	197	1.54E-06	3.03E-04
060375725001002	654	1.50E-06	9.80E-04
060375725001003	128	1.10E-06	1.41E-04
060375725002000	748	1.56E-06	1.16E-03
060375726003001	125	1.32E-06	1.65E-04
060375726003002	661	5.58E-06	3.69E-03
060375726003004	138	1.04E-06	1.44E-04
060375726003006	115	1.41E-06	1.62E-04
060375726003007	152	1.58E-06	2.41E-04
060375726004001	138	2.27E-06	3.14E-04
060375726004002	138	2.59E-06	3.57E-04
060375726004003	71	2.78E-06	1.97E-04
060375726004004	146	3.28E-06	4.79E-04
060375726004005	178	1.71E-06	3.04E-04
060375726004006	34	2.65E-06	9.02E-05
060375727003002	75	2.29E-06	1.72E-04
060375727003003	161	2.98E-06	4.81E-04
060375727003004	114	3.71E-06	4.23E-04
060375727003005	118	4.43E-06	5.22E-04
060375727003006	169	5.79E-06	9.78E-04
060375727003007	135	4.64E-06	6.26E-04
060375727003008	242	3.68E-06	8.90E-04
060375727004002	170	4.20E-06	7.14E-04
060375727004003	238	6.69E-06	1.59E-03
060375727004004	254	7.05E-06	1.79E-03
060375728001000	4	1.24E-05	4.98E-05
060375728001010	210	1.06E-05	2.23E-03
060375728001014	63	2.00E-05	1.26E-03
060375728001015	556	1.28E-05	7.14E-03
060375728001016	6	1.16E-05	6.94E-05
060375729003006	97	2.55E-06	2.47E-04
060375729003008	101	1.34E-06	1.35E-04
060375755001007	1	1.02E-06	1.02E-06
060375755001012	8	-1.09E-06	-8.76E-06
060375755001013	7	2.06E-06	1.44E-05
060375755001014	6	-2.24E-06	-1.35E-05
060375755001023	8	1.01E-05	8.12E-05
060375755001024	2	1.06E-05	2.11E-05
060375755001026	6	9.89E-06	5.93E-05
060375758011010	155	9.51E-07	1.47E-04
060375759014007	286	1.11E-06	3.17E-04
060375759022002	101	1.16E-06	1.17E-04
060375760012010	138	9.93E-07	1.37E-04
060375760012073	24	1.06E-06	2.54E-05

Table C3-1. HRA Cancer Burden Estimate - Unmitigated project Alternative (continued)

060379800141047	8	1.32E-04	1.06E-03
060379800141052	7	5.78E-06	4.05E-05
060379800141053	18	5.54E-06	9.96E-05
060379800141056	7	3.37E-06	2.36E-05
060379800141089	6	3.71E-05	2.23E-04
060379800141131	33	5.84E-06	1.93E-04
060379800141143	1	5.41E-06	5.41E-06
060379800141155	20	1.52E-05	3.03E-04
060379800141178	139	4.10E-06	5.69E-04
060379800311002	3	2.61E-06	7.82E-06
060379800311009	8	5.36E-06	4.28E-05
060379800311051	14	5.17E-07	7.24E-06
060379800331004	6	3.51E-06	2.11E-05
060379800331027	8	3.17E-06	2.54E-05
060379800331029	2	6.47E-06	1.29E-05
060379800331043	41	6.27E-06	2.57E-04
Total	**14,451**		**4.45E-02**

[a] The BLOCKID10 is a combination of the two-digit state, three-digit county, six-digit census tract, one-digit block group, and four-digit block codes. For example, the BLOCKID10, 060372941201007, is made up of the following codes: state (06), county (037), census tract (29412), block group (0), and block (1007).

[b] U.S. Census Bureau. 2010

Table C3-2. HRA Cancer Burden Estimate - Mitigated Project Alternative

BLOCKID10 [a]	Total Population [b]	Maximum Incremental Risk Within the Block	Cancer Burden (population x risk)
060375433051037	1282	1.02E-06	1.30E-03
060375728001014	63	-1.63E-06	-1.03E-04
060379800141047	8	1.45E-05	1.16E-04
060379800141052	7	1.51E-06	1.05E-05
060379800141053	18	1.29E-06	2.32E-05
060379800141089	6	3.03E-06	1.82E-05
060379800141155	20	1.79E-06	3.58E-05
060379800331043	41	1.10E-07	4.53E-06
Total	**1,404**		**0.0014**

[a] The BLOCKID10 is a combination of the two-digit state, three-digit county, six-digit census tract, one-digit block group, and four-digit block codes. For example, the BLOCKID10, 060372941201007, is made up of the following codes: state (06), county (037), census tract (29412), block group (0), and block (1007).

[b] U.S. Census Bureau. 2010

Table C3-3. HRA Cancer Burden Estimate - Reduced Project Alternative

BLOCKID10 [a]	Total Population [b]	Maximum Incremental Risk Within the Block	Cancer Burden (population x risk)
060372941203003	111	1.72E-06	1.91E-04
060372941203004	155	1.58E-06	2.44E-04
060372941203007	95	1.41E-06	1.34E-04
060372941203011	41	9.55E-07	3.92E-05
060372941203012	162	1.22E-06	1.98E-04
060372946102011	136	6.25E-07	8.50E-05
060372946201001	201	1.47E-06	2.95E-04
060372946201002	169	1.52E-06	2.56E-04
060372946201004	139	1.52E-06	2.11E-04
060372946201008	60	1.36E-06	8.14E-05
060372946201009	82	1.41E-06	1.15E-04
060372946201010	65	1.46E-06	9.50E-05
060372946201012	72	1.56E-06	1.12E-04
060372946201013	256	1.68E-06	4.31E-04
060372946201019	179	1.64E-06	2.93E-04
060372946202005	200	9.97E-07	1.99E-04
060372946202008	110	1.03E-06	1.13E-04
060372946203007	310	1.05E-06	3.25E-04
060372947011002	130	2.02E-06	2.62E-04
060372947011003	133	1.67E-06	2.22E-04
060372947011006	50	2.60E-06	1.30E-04
060372947011010	71	3.99E-06	2.83E-04
060372947012007	1	1.93E-06	1.93E-06
060372947012009	60	1.95E-06	1.17E-04
060372947013004	79	1.17E-06	9.27E-05
060372948302009	132	6.98E-07	9.21E-05
060375726003002	661	3.09E-06	2.04E-03
060375726004002	138	1.06E-06	1.46E-04
060375726004003	71	1.32E-06	9.37E-05
060375726004004	146	1.56E-06	2.28E-04
060375726004006	34	1.05E-06	3.57E-05
060375727003003	161	1.17E-06	1.88E-04
060375727003004	114	1.61E-06	1.84E-04
060375727003005	118	1.92E-06	2.26E-04
060375727003006	169	2.63E-06	4.45E-04
060375727003007	135	2.05E-06	2.77E-04
060375727003008	242	1.50E-06	3.62E-04
060375727004002	170	1.76E-06	3.00E-04
060375727004003	238	3.17E-06	7.55E-04
060375727004004	254	3.39E-06	8.62E-04
060375728001000	4	5.72E-06	2.29E-05

Table C3-3. HRA Cancer Burden Estimate - Reduced Project Alternative (continued)

060375728001010	210	5.31E-06	1.12E-03
060375728001014	63	1.14E-05	7.20E-04
060375728001015	556	6.20E-06	3.45E-03
060375728001016	6	5.54E-06	3.33E-05
060375755001023	8	5.00E-06	4.00E-05
060375755001024	2	5.31E-06	1.06E-05
060375755001026	6	4.74E-06	2.84E-05
060379800141047	8	8.72E-05	6.98E-04
060379800141052	7	3.77E-06	2.64E-05
060379800141053	18	3.55E-06	6.39E-05
060379800141056	7	1.77E-06	1.24E-05
060379800141089	6	2.35E-05	1.41E-04
060379800141131	33	3.36E-06	1.11E-04
060379800141143	1	3.23E-06	3.23E-06
060379800141155	20	9.85E-06	1.97E-04
060379800141178	139	2.19E-06	3.04E-04
060379800311002	3	1.15E-06	3.45E-06
060379800311009	8	2.99E-06	2.39E-05
060379800331004	6	-7.27E-08	-4.36E-07
060379800331029	2	1.64E-06	3.28E-06
060379800331043	41	3.51E-06	1.44E-04
Total	**6,963**		**0.018**

[a] The BLOCKID10 is a combination of the two-digit state, three-digit county, six-digit census tract, one-digit block group, and four-digit block codes. For example, the BLOCKID10, 060372941201007, is made up of the following codes: state (06), county (037), census tract (29412), block group (0), and block (1007).

[b] U.S. Census Bureau. 2010

Table C3-4. HRA Cancer Burden Estimate - Mitigated Reduced Project Alternative

BLOCKID10 [a]	Total Population [b]	Maximum Incremental Risk Within the Block	Cancer Burden (population x risk)
060379800141047	8	7.62E-06	6.10E-05
060379800141052	7	8.17E-07	5.72E-06
060379800331043	41	-4.10E-07	-1.68E-05
Total	**56**		**4.99E-05**

[a] The BLOCKID10 is a combination of the two-digit state, three-digit county, six-digit census tract, one-digit block group, and four-digit block codes. For example, the BLOCKID10, 060372941201007, is made up of the following codes: state (06), county (037), census tract (29412), block group (0), and block (1007).

[b] U.S. Census Bureau. 2010