Appendix A3
Health Risk Assessment

Contents

1.0 Introduction 1
2.0 Emission Estimation Approach 3
2.1 Emissions Used for Cancer Risk 4
2.2 Emissions Used for Non-Cancer Hazard Indices 5
2.3 TAC Speciation 6
3.0 Air Dispersion Modeling 11
3.1 Model Selection 11
3.2 Receptors 11
4.0 Health Risk Assessment Approach 23
4.1 Toxicity Assessment 23
4.2 Exposure Assessment 26
4.3 Risk Characterization 27
4.3.1 Estimation of Individual Cancer Risk 27
4.3.2 Population Cancer Burden 31
4.3.3 Non-Cancer Chronic and Acute HI 31
5.0 Significance Criteria 32
6.0 Predicted Incremental Health Impacts 32
6.1 Unmitigated Project Relative to the CEQA Baseline 32
6.1.1 Individual Cancer Risk 35
6.1.2 Population Cancer Burden 36
6.1.3 Chronic and Acute Hazard Indices 36
6.2 Unmitigated Project Relative to the NEPA Baseline 37
6.2.1 Individual Cancer Risk 39
6.2.2 Population Cancer Burden 40
6.2.3 Chronic and Acute Hazard Indices 41
6.3 Mitigated Project Relative to the CEQA Baseline 41
6.3.1 Individual Cancer Risk 44
6.3.2 Population Cancer Burden 45
6.3.3 Chronic and Acute Hazard Indices 46
6.4 Mitigated Project Relative to the NEPA Baseline 46
6.4.1 Individual Cancer Risk 48
6.4.2 Population Cancer Burden 49
6.4.3 Chronic and Acute Hazard Indices 50
6.5 No Project Alternative Relative to the CEQA Baseline 50
6.5.1 Individual Cancer Risk 53

6.5.2 Population Cancer Burden 55
6.5.3 Chronic and Acute Hazard Indices 55
6.6 No Federal Action Alternative Relative to the CEQA Baseline 55
6.6.1 Individual Cancer Risk 58
6.6.2 Population Cancer Burden 59
6.6.3 Chronic and Acute Hazard Indices 60
7.0 Source Contributions 60
8.0 Risk Uncertainty 60
References 63

List of Tables

Table A3-1. Speciation Profiles for PM_{10} 7
Table A3-2. Speciation Profiles for TOG 9
Table A3-4. Toxicity Values Used In the HRA 25
Table A3-5. Cancer Risk Exposure Assumptions by Receptor Type 30
Table A3-6. Maximum Health Impacts Estimated for Construction and Operation of the Unmitigated Project Relative to the CEQA Baseline and Floating Future Baseline 33
Table A3-7. Maximum Health Impacts Estimated for Construction and Operation of the Unmitigated Project Relative to the NEPA Baseline 37
Table A3-8. Maximum Health Impacts Estimated for Construction and Operation of the Mitigated Project Relative to the CEQA Baseline and Floating Future Baseline 42
Table A3-9. Maximum Health Impacts Estimated for Construction and Operation of the Mitigated Project Relative to the NEPA Baseline 46
Table A3-10. Maximum Health Impacts Estimated for Operation of the No Project Alternative Relative to the CEQA Baseline and Floating Future Baseline 51
Table A3-11. Maximum Health Impacts Estimated for Construction and Operation of the No Federal Action Alternative Relative to the CEQA Baseline and Floating Future Baseline 56
Table A3-12. ource Contributions to Cancer Risk at the Maximum Increment Receptors for the Mitigated Project Relative to the NEPA Baseline 60

List of Figures

Figure A3-1. HRA Modeled Receptor Locations (Far Field) 12
Figure A3-2. HRA Modeled Receptor Locations (Near Field) 13
Figure A3-3. HRA Modeled Sensitive Receptors 14
Figure A3-4. Locations of Maximum CEQA Health Impacts Estimated for Construction and Operation of Unmitigated Project 34
Figure A3-5. Isopleth of Residential 30-yr Cancer Risk - Unmitigated Project Minus Floating Future Baseline Increment 36
Figure A3-6. Locations of Maximum NEPA Health Impacts Estimated for Construction and Operation of Unmitigated Project 38
Figure A3-7. Isopleth of Residential 30-yr Cancer Risk - Unmitigated Project Minus NEPA Increment 40
Figure A3-8. Locations of Maximum CEQA Health Impacts Estimated for Construction and Operation of Mitigated Project 43
Figure A3-9. Isopleth of Residential 30-yr Cancer Risk - Mitigated Project Minus Floating Future Baseline Increment 45
Figure A3-10. Locations of Maximum NEPA Health Impacts Estimated for Construction and Operation of Mitigated Project 47
Figure A3-11. Isopleth of Residential 30-yr Cancer Risk - Mitigated Project Minus NEPA Increment 49
Figure A3-12. Locations of Maximum CEQA Health Impacts Estimated for Operation of No Project Alternative 52
Figure A3-13. Isopleth of Residential 30-yr Cancer Risk - No Project Minus Floating Future Baseline Increment 54
Figure A3-14. Locations of Maximum CEQA Health Impacts Estimated for Construction and Operation of No Federal Action Alternative 57
Figure A3-15. Isopleth of Residential 30-yr Cancer Risk - No Federal Action Alternative Minus Floating Future Baseline Increment 59

1.0 Introduction

This appendix describes the methods and results of a health risk assessment (HRA) that evaluates potential public health effects from toxic air contaminant (TAC) emissions that would be generated during construction and operation of the Berths 121-131 Container Terminal Redevelopment Project at the West Basin Intermodal Container Transfer Facility (WBICTF). TACs are compounds that are known or suspected to cause adverse health effects after short-term (acute) or long-term (cancer and chronic non-cancer) exposure.

The following scenarios were analyzed:

- **Proposed Project:** this scenario represents activity associated with construction of the wharf at Berths 126-129 and the WBICTF rail yard improvements, as well as future operational activities. Future regulations that affect various emission sources are taken into account, which are described in more detail in Appendix A1 Air Emissions.
- **Mitigated Proposed Project:** this scenario represents activity associated with the Proposed Project after application of mitigation measures proposed in the EIR/EIS for construction and operation. Future regulations that affect various emission sources and additional proposed mitigations are taken into account.
- **Alternative 1 No Project:** this scenario represents activity associated with operation at projected activity levels in the future, assuming that no project elements are constructed, and that the berths and railyard at the Berths 121-131 terminal continue to operate. Future regulations that affect various emission sources are taken into account.
- **Alternative 2 No Federal Action:** this scenario represents activity associated with construction of the WBICTF rail yard improvements only, and future terminal operations. Future regulations that affect various emission sources are taken into account.
- **Alternative 2 Mitigated No Federal Action:** this scenario represents activity associated with the No Federal Action after application of mitigation measures proposed in the EIR/EIS for construction and operation.

Health risk values associated with the scenarios described above and evaluated under CEQA were analyzed relative to the following two baseline scenarios:

- **Baseline:** sometimes referred to as "CEQA baseline", this baseline scenario represents recorded actual activity and throughput of terminal operations in 2019. Emission factors reflect age of the equipment, vessel and truck fleet as well as local, federal and state regulations in place in 2019.
- **Floating Future Baseline:** this baseline scenario assumes 2019 activity levels, but the emission factors vary by year throughout the long exposure periods (30 years for individual cancer risks for residential and sensitive receptors, 70 years for population cancer burden, and 25 years for occupational cancer risks) to account for future beneficial effects of existing air quality regulations. However, effects of future regulations on the various emission sources and normal turn-over of equipment are taken into account. That is, mass emissions of individual future years would typically decrease over time due to regulatory effects.

A third baseline is evaluated against the Proposed Project (unmitigated and mitigated) scenarios for health risk calculations under NEPA:

- **NEPA Baseline:** Unlike the CEQA baseline, which is defined by conditions at a point in time, the NEPA baseline is dynamic and it includes increases in operations for each study year (2028, 2036, 2050, 2055, and 2062) which are projected to occur absent a federal permit. The NEPA baseline, for purposes of this Draft EIS/EIR, is the same as the No Federal Action Alternative (Alternative 2); hence Alternative 2 annual emissions are used to represent the NEPA baseline for health risk calculations. The No Federal Action Alternative includes only backlands improvements to the intermodal railyard at WBCT that could be implemented in the absence of a USACE permit. More details on the definition of the NEPA baseline can be found in section 3.2.1.3 of Chapter 3.

Details of the baseline, Proposed Project and Alternatives are provided in Chapter 2 of the EIR/EIS and Appendix A1.

The HRA was prepared as a Tier 1 risk assessment in accordance with OEHHA's *Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2015) and the South Coast Air Quality Management District's (SCAQMD) *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act* (SCAQMD, 2020). The HRA includes an evaluation of four different types of health effects: individual incremental excess lifetime cancer risk, population cancer burden, chronic non-cancer hazard index (HI), and acute non-cancer HI.

- Individual incremental excess lifetime cancer risk (referred to hereafter simply as "individual cancer risk") is the additional chance for a person to contract cancer after long-term exposure to Project emissions (30 years for a resident[1], and 25 years for an off-site worker).
- Population cancer burden is the expected number of additional cancer cases in the population exposed to a cancer risk level of 1 in a million or greater from the Project based on 70-year residential cancer risk estimates.
- The chronic HI is a ratio of annual average concentrations of TACs in the air to established chronic reference exposure levels (RELs). A chronic HI below or equal to 1.0 indicates that adverse non-cancer health effects from long-term exposure are not expected.
- The acute HI is a ratio of maximum 1-hour average concentrations of TACs in the air to established acute RELs. An acute HI below or equal to 1.0 indicates that adverse non-cancer health effects from infrequent short-term exposure are not expected.

The OEHHA HRA guidelines also provide a methodology for determining an 8-hour chronic HI, which evaluates repeated 8-hour exposures over a significant fraction of a lifetime when the Project emits only a portion of the day (OEHHA, 2015). This health risk evaluation is applicable primarily to off-site workers with work schedules that align with the emitting facility's operational schedule. Because the Berths 121-131 terminal operates 24 hours per day, the average 8-hour concentrations to which off-site workers would be exposed would roughly approximate the annual concentrations used to calculate

[1] Other sensitive receptor types (e.g. schools, child cares, elder cares, hospitals and recreational areas, etc.) are expected to have lower exposures than a resident, and were conservatively evaluated under the 30-year resident exposure scenario in this analysis.

the chronic HI. Moreover, the toxicity factors for the 8-hour chronic HI are less stringent and apply to fewer TACs than the toxicity factors for the chronic HI. As a result, the 8-hour chronic hazard indices associated with the proposed Project and alternatives would be less than the chronic HIs. Therefore, this HRA does not quantify 8-hour chronic hazard indices, and instead uses chronic hazard indices as a conservative health value for off-site workers.

The EPA dispersion model AERMOD, version 24142 (USEPA, 2024a), was used to predict maximum ambient pollutant concentrations outside the Project site. The HRA was conducted in accordance with the guideline from OEHHA (OEHHA 2015) and SCAQMD (SCAQMD, 2020) based on output from the AERMOD dispersion model. There are multi-pathway chemicals as defined by OEHHA (2015) emitted from the Project. The Hotspots Analysis and Reporting Program (HARP2) Risk Assessment Standalone Tool (RAST), version 22118 (CARB, 2022), was used to perform the health risk calculations for the non-inhalation pathways for the multi-pathway chemicals.

The HRA was developed using a five-step process to estimate incremental health impact results: (1) quantify construction emissions and operational emissions for baselines, Proposed Project and Alternatives; (2) identify ground-level receptor locations that may be affected by emissions, including a regular receptor grid as well as specific discrete sensitive receptor locations nearby such as schools, hospitals, elder care facilities, child care centers, and recreational areas; (3) perform dispersion modeling analyses to estimate ambient TAC concentrations at each receptor location; (4) characterize the potential health impacts at each receptor location; and (5) evaluate incremental health impacts by comparing potential health impacts posed by the Project and Alternative scenarios relative to the baseline scenarios. The following sections provide additional details on the methods used to complete the HRA.

2.0 Emission Estimation Approach

The following construction emission sources were included in the HRA:

- Off-road construction equipment: exhaust emissions from diesel-fueled land-based equipment and marine-based equipment (dredging and pile driving equipment);
- On-road construction vehicles (haul trucks, delivery trucks): Heavy duty diesel trucks. Truck emissions include engine exhaust, tire wear, brake wear, and road dust;
- New cranes delivery ship exhaust emissions include hoteling and maneuvering within harbor and
- Harbor craft: exhaust emissions from assist tugboats (used to position dredging barges and scows) and dive boats.
- Worker vehicles: Gasoline worker vehicle emission sources include engine exhaust, tire wear, brake wear, and road dust.
- For mitigated alternatives, the installation of electrical chargers in 2035: emission sources associated with the construction activities required for the installation of electrical chargers to facilitate future all-electric cargo-handling equipment, which have been modeled with the 2036 operational year emissions of the cargo-handling equipment.

In accordance with SCAQMD guidance (SCAQMD, 2005), only onsite construction emission sources were evaluated for health risk impacts. Onsite emission sources included diesel engine exhaust from land and marine heavy construction equipment, haul trucks traveling and idling onsite, new crane delivery cargo ship auxiliary engines and boilers while hoteling at berth, harbor craft used in dredging and pile driving, and fugitive dust.

The following operational emission sources were included in the HRA:

- Container ships transiting between the SCAQMD overwater boundary and the terminal (about 40 nautical miles), maneuvering within harbor, anchoring while waiting for an available berth, and hoteling while at berth. Ship exhaust emission sources include propulsion engines, auxiliary engines, and boilers.
- Tugboats used to assist ships while arriving and departing the Port. Tugboat activity is assumed to take place within the harbor, during vessel maneuvering, (i.e., within the limits of Angel's gate). Tugboat emission sources include propulsion and auxiliary engines.
- Locomotives performing switching activities at the on-dock rail yard; and line-haul locomotives moving and idling at the on-dock rail yard, and line-haul transit to and from the yard through the part of the Alameda corridor within the modeling domain. Locomotive emission sources include engine exhaust.
- Cargo handling equipment working both on-terminal grounds and handling Berths 121-131-related containers at the on-dock rail yard. Cargo handling equipment emission sources include engine exhaust.
- Trucks idling at the in-gate, out-gate, and on-terminal; driving on-terminal; and driving off-terminal along the primary truck routes. Truck emission sources include engine exhaust, tire wear, brake wear, and road dust.
- Worker vehicles driving both on- and off-terminal. Worker vehicle emission sources include engine exhaust, tire wear, brake wear, and road dust.

2.1 Emissions Used for Cancer Risk

To estimate cancer risk impacts for the construction and operation of the Proposed Project and Alternatives, annual volatile organic compound (VOC) and particulate matter less than 10 micron (PM_{10}) emissions associated with terminal operation were estimated for each year of several long-term exposure periods. The cancer risk exposure periods were 30 years for residents and other sensitive receptors, 25 years for occupational receptors, and 70 years for population cancer burden analysis. The initial year of each Project and Alternatives scenarios' exposure period was assumed to be 2026. For example, the 30-year residential exposure period for the Proposed Project scenario was assumed to occur during the years 2026-2055. Construction was assumed for the purposes of this analysis to be 2026 and 2027, which was reasonable at the time analysis commenced; this assumption is conservative because if construction were to occur later, emissions would be less because of the likely phase-in of cleaner equipment. The CEQA Baseline and Floating Future Baseline scenarios start with analysis year 2019.

Annual VOC and PM_{10} emissions for analysis years 2026, 2027, 2028, 2036, 2050, 2055, and 2062 were estimated using the methodology and assumptions described in Appendix A1. The emissions for the interim years were estimated via linear interpolation using the emissions of each modeled analysis year. The emissions account for the projected future growth in container throughput, and the future reduction in emission factors for most

equipment in response to existing regulations. Annual emissions for analysis years of 2026, 2027, 2028, 2036, 2050, 2055, and 2062 were modeled in AERMOD to estimate criteria pollutant concentrations, and concentrations for the interim years were estimated via linear interpolation using the concentrations of each modeled analysis year. In the case of the 70-year cancer burden calculation, the extent of this analysis assumes exposure beyond 2062, which represents the horizon year for this EIS/EIR when No Project Alternative and No Federal Action Alternative (NEPA Baseline) would reach full terminal throughput capacity, and therefore is a conservative estimate of the Project impacts. Emissions were assumed to remain constant after 2062 until 2095 which is the end of the exposure period. To better apprise the public and decision makers of the Proposed Project's environmental impacts, the predicted cancer risks for the Project scenarios were compared to the following two variations of the baseline: 2019 Baseline (or the CEQA Baseline) and the Floating Future Baseline. To estimate cancer effect for the CEQA Baseline, annual emissions of VOC and PM_{10} were modeled using 2019 activity levels and 2019 emission factors for the entire exposure period (i.e., 2019-2049 for cancer risks and 2019-2089 for cancer burden). To estimate cancer risks for the Floating Future Baseline, the modeled annual emissions of VOC and PM_{10} in analysis years 2019, 2026, 2027, 2028, 2036 were used, and the emissions for the interim years were estimated via linear interpolation using the emissions of each modeled analysis year until 2049. The Floating Future Baseline cancer risks are typically lower than the CEQA Baseline cancer risks because emission factors for port-related equipment generally decline over time in response to existing air quality regulations and assumptions regarding equipment fleet turnover. This declining trend in future emission factors is accounted for in the Floating Future Baseline but not the CEQA Baseline. As a result, the Project cancer risk increments relative to the Floating Future Baseline are generally greater than the increments relative to the Baseline. Increments relative to the Floating Future Baseline (as well as the CEQA Baseline) were used to determine significance of impacts.

The use of both the 2019 Baseline and Floating Future Baseline for cancer risk helps to resolve the complication of evaluating the terminal during a fixed point in time (2019 baseline conditions) for a health impact that is based on decades-long exposure periods. This complication does not exist for the chronic and acute hazard indices because they are based on modeled TAC concentrations of one year and one hour within the baseline period, respectively, and do not involve changes across time. Therefore, the Floating Future Baseline was used only for cancer risk evaluation under CEQA.

2.2 Emissions Used for Non-Cancer Hazard Indices

To estimate chronic and acute non-cancer hazard indices for proposed Project, alternatives, and NEPA baseline, annual and peak hour construction emissions of VOC and PM_{10} were calculated for each year of construction, 2026 and 2027; and for the operational analysis years 2026, 2027, 2028, 2036, 2050, 2055, and 2062. The emissions for analysis years were estimated using the methodology and assumptions described in Appendix A1, and the emissions for the interim years were estimated via linear interpolation using the emissions of each modeled analysis year. Because prior Port projects have shown that the chronic and acute HIs are unlikely to exceed the significance thresholds, a conservative screening approach was used where each AERMOD source was modeled with its maximum emissions even if the emissions would not occur at the same time as other sources.

To estimate chronic and acute non-cancer hazard indices for the CEQA Baseline, annual and peak hour emissions of VOC and PM_{10} were calculated using 2019 activity levels and 2019 emission factors. As explained in the previous section, calculation of a Floating Future Baseline was not necessary for the evaluation of chronic and acute hazard indices because the annual and peak hour averaging periods fit within the 2019 baseline period.

Appendix A1 of this EIR/EIS documents the overall emission calculation methodology and assumptions for the Project and baseline scenarios.

2.3 TAC Speciation

Diesel internal combustion (IC) engines represent the biggest source of TAC emissions associated with terminal operation. Diesel IC engine sources include container ship propulsion and auxiliary engines, tugboats, locomotives, diesel cargo handling equipment (CHE), and diesel trucks. For the determination of cancer risk and chronic hazard indices, OEHHA and CARB use diesel particulate matter (DPM) from IC engines as a surrogate for total diesel exhaust (CARB, 2025). The cancer and chronic non-cancer toxicity values for DPM established by OEHHA and CARB were used in the cancer risk and chronic non-cancer hazard evaluation to account for the individual TACs contained in total diesel IC engine exhaust. Therefore, diesel IC engine exhaust was not speciated into its chemical components for the determination of cancer risk and chronic non-cancer hazard indices.

Sources other than diesel IC engines include container ship boilers, liquefied petroleum gas (LPG)-fueled CHE, liquefied natural gas (LNG) trucks, gasoline-fueled worker vehicles, and vehicle tire and brake wear. For these sources, VOC and PM_{10} emissions were speciated into their individual TAC components for the determination of cancer risk and chronic hazard indices. The speciation profiles used in the HRA were developed by CARB (2025). Table A3-1 presents the speciation profiles that were used to convert PM_{10} emissions into individual TACs for all emission sources. Table A3-2 presents the speciation profiles that were used to convert total organic gas (TOG) emissions into individual TACs for all emission sources. Prior to speciation, VOC emissions were converted to TOG using factors provided by CARB (2025).

OEHHA and CARB have not established acute toxicity factors for DPM. Therefore, peak hour VOC and PM_{10} emissions from all sources, including diesel IC engines, were speciated into their individual TAC components for the determination of acute hazard indices.

Table A3-1. Speciation Profiles for PM_{10}

Toxic Air Contaminant [b]	HARP2 TAC ID	Speciation Profile and TAC Weight Fraction [a]									
		Profile 9901: Diesel [c]	Profile 6299: Off-Road Diesel Vehicle Exhaust [d]	Profile 7212: Heavy Duty Diesel Trucks - Cruise [d]	Profile 7501: Heavy Duty Diesel Trucks - Idle [d]	Profile 123: Gas IC Engines	Profile 4251: Marine Vessels MGO [d]	Profile 112: Fuel Combustion Distillate	Profile 400: Gasoline Vehicles	Profile 473: Brake Wear	Profile 472: Tire Wear
Arsenic	7440382	0	0.000002	0.000005	0	0	0	0.00542	0	0.00001	0
Cadmium	7440439	0	0.000022	0.000005	0	0	0	0.0005	0	0	0
Chlorine	7782505	0	0.000048	0.000148	0.000443	0.07	0	0	0.07	0.0015	0.0078
Cobalt	1216	0	0.000004	0.000001	0	0.0005					
Copper	7440508	0	0.000139	0.000268	0.000162	0.0005	0	0	0.0005	0.0115	0.00049
DieselExhPM	9901	1	0	0	0	0	0	0	0	0	0
Hexavalent Chromium [e]	18540299	0	0.0000084	0.00002255	0.00001675	0.000025	0	0.000271	0.000025	0.00006	0.0000015
Trivalent Chromium [e]	16065831	0	0.0001596	0.00042845	0.00031825	0.000475	0	0.00515	0.000475	0.00114	0.0000285
Lead	7439921	0	0.000009	0.000004	0.000006	0	0	0.0055	0	0.00005	0.00016
Manganese	7439965	0	0.000042	0.000054	0.000007	0.0005	0	0	0.0005	0.0017	0.0001
Mercury	7439976	0	0.000007	0.000001	0.000001	0	0	0	0	0	0
Nickel	7440020	0	0.000008	0.000059	0.000141	0.0005	0	0.0005	0.0005	0.00066	0.00005
Selenium	7782492	0	0.000007	0.000054	0.000015	0	0	0.0005	0	0.00002	0.00002
Sulfates	9960	0	0.100739	0.248118	0.012152	0.45	0.08	0.25	0.45	0.0334	0.0025
Vanadium	7440622	0	0.000001	0.000005	0.000003	0	0	0	0	0.00066	0
Applicable sources:		All diesel IC engines - CHE, harbor craft, loco-motives, diesel	CHE, harbor craft with aux or main engine, diesel rail onsite and offsite, diesel truck onsite	Diesel trucks offsite and onsite running (ACUTE ONLY)	Diesel truck idling (ACUTE ONLY)	LNG trucks, CHE (CANCER/ CHRONIC /ACUTE)	Harbor craft, ship main and auxiliary engines (ACUTE ONLY)	Ship boilers (CANCER/CH RONIC /ACUTE)	Gasoline auto-mobiles, construction onroad light-duty equipments (CANCER/CH	Break ware (CANCER/CH RONIC /ACUTE)	Tire ware (CANCER/CH RONIC /ACUTE)

Toxic Air Contaminant [b]	HARP2 TAC ID	Speciation Profile and TAC Weight Fraction [a]									
		Profile 9901: Diesel [c]	Profile 6299: Off-Road Diesel Vehicle Exhaust [d]	Profile 7212: Heavy Duty Diesel Trucks - Cruise [d]	Profile 7501: Heavy Duty Diesel Trucks - Idle [d]	Profile 123: Gas IC Engines	Profile 4251: Marine Vessels MGO [d]	Profile 112: Fuel Combustion Distillate	Profile 400: Gasoline Vehicles	Profile 473: Brake Wear	Profile 472: Tire Wear
		trucks, ship main and auxiliary engines, construction onroad heavy-duty equipments (CANCER/ CHRONIC)	(ACUTE ONLY)						RONIC /ACUTE)		

Notes:

[a] Source for speciation profiles except Profile 9901: CARB 2025. See note c for Profile 9901.

[b] Only TACs that have toxicity values from the CARB Consolidated Health Value Table (CARB 2025) are shown in the table.

[c] Profile 9901 represents diesel particulate matter (DPM) emissions from diesel internal combustion engines. This profile was used for the determination of cancer risk and the chronic hazard index because the health values for DPM are representative of diesel IC engine exhaust as a whole (CARB 2025).
[d] Profiles 6299, 7212, 7501 and 7223 are associated with diesel IC engines and therefore were only used for the determination of the acute HI.

[e] Hexavalent chromium is assumed to be 5 percent of total chromium, according to CARB's AB2588 Technical Support Document (CARB 1989), page 57. Trivalent chromium is assumed to be 95 percent of total chromium for acute effects.

Table A3-2. Speciation Profiles for TOG

Toxic Air Contaminant [b]	HARP2 TAC ID	Speciation Profile and TAC Weight Fraction [a]			
		Profile 818: Diesel IC Engines [c,d]	Profile 504: Boilers [d]	Profile 2303: Automobiles [d]	Profile 719: Natural Gas IC Engines [d]
Acetaldehyde	75070	0.0735	0	0.009	0.0003
Acrolein	107028	0	0	0.000014	0
Benzene	71432	0.02	0.0216	0.0389	0.0011
1,3-Butadiene	106990	0.0019	0	0.0024	0
Chlorobenzene	108907	0	0.0005	0	0
Ethyl benzene	100414	0.0031	0.0007	0.0112	0.0001
Formaldehyde	50000	0.1471	0.001	0.0215	0.0081
Hexane	110543	0.0016	0.0159	0.0078	0.0002
Methanol	67561	0.0003	0	0.0002	0
Methyl tert-butyl ether	1634044	0	0	0.0047	0
Methyl ethyl ketone	78933	0.0148	0	0.0015	0
Naphthalene	91203	0.0009	0.0007	0.0037	0
Propylene	115071	0.026	0.0456	0.022	0.0169
Styrene	100425	0.0006		0.0022	
Toluene	108883	0.0147	0.0215	0.0475	0.0004
Trimethylbenzenes	25551137	0	0.0068	0	0
1,2,3-trimethylbenzene	52738	0.0012	0	0.00728718	0.0001
1,2,4-trimethylbenzene	95636	0.0053	0	0.03159537	0.0001
1,3,5-trimethylbenzene	108678	0.0019	0	0.00674134	0.0002
Xylenes [e]	1330207	0.0105	0.011	0.051	0.0004
Applicable sources:		CHE, harbor craft, loco-motives, diesel trucks, ship main and auxiliary engines, construction offroad equipment, construction onroad heavy-duty equipment (ACUTE ONLY)	Ship boilers (CANCER/CHRONIC /ACUTE)	Gasoline auto-mobiles, construction onroad light-duty equipment (CANCER/CHRONIC /ACUTE)	LNG trucks, CHE (CANCER/CHRONIC /ACUTE)

Notes:

[a] Source for speciation profiles: CARB, 2025.

[b] Only TACs that have toxicity values from the CARB Consolidated Health Value Table (CARB 2025) are shown in the table.

[c] Profile 818 is associated with diesel IC engines and therefore was only used for the determination of the acute HI. For the determination of cancer risk and the chronic HI, DPM emissions were used without speciation because CARB provides toxicity factors for DPM as a whole (CARB 2025).

[d] VOC emissions were converted to TOG by dividing by the following VOC/TOG ratios: 0.8794 for Profile 818; 0.946 for Profile 504; 0.6853 for Profile 2303; and 0.0931 for Profile 719 (CARB 2025).

[e] For a conservative estimate, the weight fractions of all species, including xylenes (mixed), o-xylene, m-xylene, and p-xylene, if available, were summed to determine the total weight fraction of xylenes.

3.0 Air Dispersion Modeling

3.1 Model Selection

The air dispersion modeling was performed using the USEPA AERMOD dispersion model, version 24142 (USEPA, 2024a), based on the *Guideline on Air Quality Models* (USEPA, 2024b). The emission source parameters, meteorological data, model options, and temporal distribution assumptions used in the HRA are the same as described in Appendix A2. Sources were grouped into source groups in AERMOD based on those with common speciation profiles. All sources were modeled with actual TAC emission rates.

3.2 Receptors

The HRA modeled TAC concentrations and health effects at 3,618 locations (receptors) throughout the project area, including the locations of potentially exposed residents, offsite workers, and other sensitive receptors of the local population. Sensitive receptor groups include residents, children, the elderly, and the acutely and chronically ill. The locations of sensitive receptor groups include residencies, schools, child care centers, elder care facilities, and hospitals. For health risk assessment purposes, Los Angeles Harbor Department (LAHD) also treats recreational areas, such as parks, marinas, and public waterfront areas, as sensitive receptor locations (LAHD, 2017). For the purposes of this health risk assessment, sensitive receptors were identified and included in the model but, for simplification, sensitive receptors were all conservatively evaluated as residents. This assumption is conservative and overestimates cancer risk for non-residential sensitive receptors. Health impacts for all sensitive receptor types are therefore presented as receptor category “resident/sensitive” using residential exposure assumptions.

Cartesian coordinate receptor grids were used to provide adequate spatial coverage surrounding the Project area to assess ground-level pollution concentrations, identify the extent of impacts, and identify maximum impact locations. AERMOD modeling was conducted with a 22-by-22 kilometer (km) coarse grid, with receptors placed 1,000 meters (m) apart, centered over the Project site. Embedded within this receptor grid was a 9 km-by-12 km grid of receptors, placed 500 m apart. An inner grid of receptors, placed 250 m apart, covered an area of 7.5 km by 10.5 km. Receptors with 25-m resolution were also placed on residential parcels within 500 m of the Berths 121-131 facility as well as within 100 m of all modeled roadways.

In addition to the gridded receptor sets, previously identified sensitive receptors near the Berths 121-131 facility were also included. These receptors included residencies, schools, daycares, hospitals, recreational facilities, parks, and convalescent homes. Receptors were also located at 20-m spacing along the Berths 121-131 facility fence line.

Figures A3-1 and A3-2 show the full set of receptor points modeled in the HRA. The far field view shows the full extent of on-land receptors modeled, and the near field shows a closer view of the terminal with more densely spaced receptors in areas near sources. Figure A3-3 shows only the sensitive receptors modeled in the HRA; the figure is paired with Table A3-3, which provides descriptions and addresses of the sensitive receptors. Again, these receptors were included in the model, but for simplification, were conservatively evaluated as residents.

Figure A3-1. HRA Modeled Receptor Locations (Far Field)

Figure A3-2. HRA Modeled Receptor Locations (Near Field)

Figure A3-3. HRA Modeled Sensitive Receptors

Legend

Table A3-3. Sensitive Receptor Descriptions [a]

No.	Receptor Description	Street Address	City, State, Zip	Category
1	7th Street Elementary School	1570 W. 7th St	San Pedro, CA 90731	School
2	15th Street Elementary School	1527 Mesa St	San Pedro, CA 90731	School
3	Academy of the Two Hearts School	1540 S. Walker Ave	San Pedro, CA 90731	School
4	Angel's Gate High School	3607 S. Gaffey St	San Pedro, CA 90731	School
5	Apostolic Faith Center/Apostolic Faith Academy	1530 E Robidoux St	Wilmington, CA 90744	School
6	Artesia Well Preparatory Academy	1235 Pacific Ave	Long Beach, CA 90813	School
7	Avalon High School	1425 N Avalon Blvd	Wilmington, CA 90744	School
8	Bandini Street Elementary School	425 N. Bandini St	San Pedro, CA 90731	School
9	Barton Hill Elementary School	423 N. Pacific Ave	San Pedro, CA 90731	School
10	Bethune Mary School	2101 San Gabriel Ave	Long Beach, CA 90810	School
11	Birney Elementary School	710 W. Spring St	Long Beach, CA 90806	School
12	Broad Avenue Elementary School	24815 Broad Ave	Wilmington, CA 90744	School
13	Burnett Elementary	565 East Hill St.	Long Beach, CA 90806	School
14	Cabrillo Avenue Elementary School	732 S. Cabrillo Ave	San Pedro, CA 90731	School
15	Cambodian Christian	2474 Pacific Ave	Long Beach, CA 90806	School
16	Cesar Chavez Elementary	730 West Third St.	Long Beach, CA 90802	School
17	Christ Lutheran Elementary School	28850 S. Western Ave	Rancho Palos Verdes, CA 90275	School
18	Colegio New City	1637 Long Beach Blvd	Long Beach, CA 90813	School
19	Crestwood Street Elementary School	1946 W. Crestwood St	Rancho Palos Verdes, CA 90275	School
20	Daniel Webster Elementary School and Head Start	1755 W 32nd Way	Long Beach, CA 90810	School
21	Edison Elementary	625 Maine Ave.	Long Beach, CA 90802	School
22	Elizabeth Hudson Elementary School and Development Center Daycare	2335 Webster Ave	Long Beach, CA 90810	School
23	First Baptist Christian School	1360 Broad Ave	Wilmington, CA 90744	School
24	First Baptist Church School	1000 Pine Ave	Long Beach, CA 90813	School
25	First Lutheran Day Care, Preschool and Elementary School	946 Linden Ave	Long Beach, CA 90813	School
26	Fries Ave. Elementary School	1301 N Fries Ave	Wilmington, CA 90744	School
27	Wilmington Skills Center	217 Island Ave	Wilmington, CA 90744	School
28	George de la Torre Jr. Elementary School	500 Island Ave	Wilmington, CA 90744	School
29	George Washington Middle School	1450 Cedar Ave	Long Beach, CA 90813	School
30	Gulf Avenue Elementary School	828 W. L St	Wilmington, CA 90744	School
31	Harbor City Elementary School	1508 254th St	Harbor City, CA 90710	School
32	Harbor Occupational Center	740 N. Pacific Ave.	San Pedro, CA 90731	School
33	Harry Bridges Span School	1235 Broad Ave	Wilmington, CA 90744	School
34	Hawaiian Avenue Elementary School	540 Hawaiian Ave	Wilmington, CA 90744	School
35	Holy Family Preschool and Elementary School	1122 E Robidoux St	Wilmington, CA 90744	School

No.	Receptor Description	Street Address	City, State, Zip	Category
36	Holy Innocents Elementary School	2500 Pacific Ave	Long Beach, CA 90806	School
37	Holy Trinity Elementary School	1226 W. Santa Cruz St	San Pedro, CA 90732	School
38	International Elementary	700 Locust Ave	Long Beach, CA 90813	School
39	J F Cooper High School	2210 N. Taper Ave	San Pedro, CA 90731	School
40	Jackie Robinson Academy	2750 Pine Ave	Long Beach, CA 90806	School
41	James Garfield Elementary School / LBUSD Child Development Center	2240 Baltic Ave	Long Beach, CA 90810	School
42	John Muir Elementary School	3038 Delta Ave	Long Beach, CA 90810	School
43	Juan Rodriguez Cabrillo High School	2001 Santa Fe Ave	Long Beach, CA 90810	School
44	Lafayette Elementary School	2445 Chestnut Ave	Long Beach, CA 90806	School
45	Learn4Life Wilmington Assurance Learning Academy	707 W C St	Wilmington, CA 90744	School
46	Leland Street Elementary School	2120 S. Leland St	San Pedro, CA 90731	School
47	Long Beach Montessori School	525 E. 7th St	Long Beach, CA 90813	School
48	Mary Star of the Sea Elementary School	717 S. Cabrillo Ave	San Pedro, CA 90731	School
49	Mary Star of the Sea High School	810 W. 8th St	San Pedro, CA 90731	School
50	Normont Elementary School	1001 253rd St	Harbor City, CA 90710	School
51	Normont Terrace Childrens Center	25028 Petroleum Ave	Harbor City, CA 90710	School
52	Oakwood Academy	2951 Long Beach Blvd	Long Beach, CA 90806	School
53	Pacific Harbor Christian School	1530 N. Wilmington Blvd	Wilmington, CA 90744	School
54	Park Western Place Elementary School	1214 Park Western Place	San Pedro, CA 90732	School
55	Phineas Banning Senior High School	1527 Lakme Ave	Wilmington, CA 90744	School
56	Polytechnic High School	1600Atlantic Ave.	Long Beach, CA 90813	School
57	Port of Los Angeles High School	250 W 5th St	San Pedro, CA 90731	School
58	Pt. Fermin Elementary School	3333 Kerckhoff Ave	San Pedro, CA 90731	School
59	R H Dana Middle School	1501 S. Cabrillo	San Pedro, CA 90731	School
60	Regency High School	490 W. 14th Street	Long Beach, CA 90813	School
61	Reid Continuation High School	2153 W Hill St	Long Beach, CA 90810	School
62	Renaissance High School for the Arts	235 East Eighth St.	Long Beach, CA 90813	School
63	Rolling Hills Preparatory School	1 Rolling Hills Prep Way	San Pedro, CA 90732	School
64	Roosevelt Elementary	1574 Linden Ave.	Long Beach, CA 90813	School
64b	Rudecinda Sepulveda Dodson Middle School	28014 S Montereina Dr.	Rancho Palos Verdes, CA 90275	School
65	Saint Anthony Preschool / Elementary	855 East Fifth St.	Long Beach, CA 90802	School
66	Saints Peter & Paul School	706 Bay View Ave	Wilmington, CA 90744	School
66b	San Pedro Adult Learning Center	950 W Santa Cruz St.	San Pedro, CA 90731	School
67	San Pedro High School	1001 W. 15th St	San Pedro, CA 90731	School
68	San Pedro High School Olguin Campus	3210 S Alma St	San Pedro, CA 90731	School
69	San Pedro MST Center	2201 Barrywood Ave	San Pedro, CA 90731	School
70	Savannah Academy	2152 W Hill St	Long Beach, CA 90810	School
71	Select Community Day School	5869 Atlantic Ave.	Long Beach, CA 90802	School

No.	Receptor Description	Street Address	City, State, Zip	Category
72	St. Anthony High School/Constellation Community Charter Middle	620 Olive Ave.	Long Beach, CA 90802	School
73	St. Lucy School	2320 Cota Ave	Long Beach, CA 90810	School
74	Stevenson Elementary; Stevenson Child Development Centers/Preschool	515 Lime Ave.	Long Beach, CA 90802	School
75	Taper Avenue Elementary School	1824 N. Taper Ave	San Pedro, CA 90731	School
76	The New City School	1230 Pine Ave	Long Beach, CA 90813	School
77	Trinity Luthern School	1450 W. 7th St	San Pedro, CA 90731	School
78	True Social Justice Academy	630 Magnolia Ave	Long Beach, CA 90802	School
79	Vermont Christian School	931 Frigate Ave	Wilmington, CA 90744	School
80	White Point Elementary School	1410 Silvius Ave	San Pedro, CA 90731	School
81	Willenberg Special Education	308 S. Weymouth Ave.	San Pedro, CA 90731	School
82	William J. Johnston Community Day School	2210 N Taper Ave	San Pedro, CA 90731	School
83	William Logan Stephens Middle School	1830 W Columbia St	Long Beach, CA 90810	School
84	Wilmington Middle School	1700 Gulf Ave	Wilmington, CA 90744	School
85	Wilmington Park Elementary School/Mahar House	1140 Mahar Ave	Wilmington, CA 90744	School
86	8th Street Early Head Start	820 Long Beach Blvd	Long Beach, CA 90813	Child Care
87	12th Street Head Start	1212 Long Beach Blvd	Long Beach, CA 90806	Child Care
88	A Love 4 Learning Academy	306 Elm Ave	Long Beach, CA 90802	Child Care
89	ABC 123 Long Beach Learning Center	909 Pine Ave	Long Beach, CA 90813	Child Care
90	Agu Family Child Care	4400 Boyar Ave	Long Beach, CA 90807	Child Care
91	Armstrong Academy	1682 Anaheim St	Harbor City, CA 90710	Child Care
92	Aspiranet Foster Family Agency	1043 Pine Ave	Long Beach, CA 90813	Child Care
93	Atlantic Headstart	1862 Atlantic Ave	Long Beach, CA 90806	Child Care
94	Babineaux Family Child Care	2881 Delta Ave	Long Beach, CA 90810	Child Care
95	Bances and Luque Family Child Care	650 W Santa Cruz St	San Pedro, CA 90731	Child Care
96	Benford Family Child Care	530 E 8th St	Long Beach, CA 90813	Child Care
97	Bobo Family Daycare	3532 Delta Ave	Long Beach, CA 90810	Child Care
98	Briggs Family Child Care	Golden Ave	Long Beach, CA 90806	Child Care
99	Brighter Days Montessori	1903 W. Summerland St	San Pedro, CA 90732	Child Care
100	Brown Family Child Care	1831 W Jeanette Pl	Long Beach, CA 90810	Child Care
101	Cabrillo Child Development Center	2205 San Gabriel Ave	Long Beach, CA 90810	Child Care
102	Cabrillo Early Education Center	741 W. 8th St	San Pedro, CA 90731	Child Care
103	Carmen's Cry Baby Care	1509 S. Palos Verdes St	San Pedro, CA 90731	Child Care
104	Carol Daycare	2842 Easy Ave	Long Beach, CA 90810	Child Care
105	Casian Family Child Care	3256 Fashion Ave	Long Beach, CA 90810	Child Care
106	Ceja Family Child Care	2030 W Spring St	Long Beach, CA 90810	Child Care
107	Century Villages at Cabrillo Homeless Housing Community	2001 River Ave	Long Beach, CA 90810	Child Care
108	Child Care Center at St Mary Medical Center	930 Elm Ave	Long Beach, CA 90813	Child Care
109	Childtime Learning Center	1 World Trade Ctr # 199	Long Beach, CA 90813	Child Care

Appendix A3

No.	Receptor Description	Street Address	City, State, Zip	Category
110	City of Long Beach Multi-Service Center; The Play House	1301 W 12th St	Long Beach, CA 90813	Child Care
111	Comprehensive Child Development	2565 Pacific Ave.	Long Beach, CA 90806	Child Care
112	Costa Family Child Care	2085 Easy Ave	Long Beach, CA 90810	Child Care
113	CPDC Child Development Center	769 W 3rd St	San Pedro, CA 90731	Child Care
114	Dahlquist Preschool	1420 W. 7th St	San Pedro, CA 90731	Child Care
115	Davis Family Child Care	957 W 12th St	San Pedro, CA 90731	Child Care
116	Day Star Early Learning Center	631 W. 6th St	San Pedro, CA 90731	Child Care
117	Delgado Family Child Care	3383 Adriatic Ave	Long Beach, CA 90810	Child Care
118	Duran, Ramona Family Day Care	2935 Baltic Ave	Long Beach, CA 90810	Child Care
119	Edison Child Development Center	640 W 7th St	Long Beach, CA 90813	Child Care
120	Elm Street Head Start	1425 & 1429 Elm Ave	Long Beach, CA 90806	Child Care
121	Fords Family Day Care	2726 San Francisco Ave	Long Beach, CA 90806	Child Care
122	Franklin Day Care Center	2333 Fashion Ave	Carson, CA 90810	Child Care
123	Gallegos Family Child Care	2024 Adriatic Ave	Long Beach, CA 90810	Child Care
124	Garcia Family Child Care	2145 Wardlow Rd	Long Beach, CA 90810	Child Care
125	Garfield Head Start	2240 Baltic Ave	Long Beach, CA 90810	Child Care
126	Garibay Family Child Care	2172 Lime Ave	Long Beach, CA 90806	Child Care
127	Gomez Family Child Care	1156 Ronan Ave	Wilmington, CA 90744	Child Care
128	Good Shepherd Preschool and Infant Center	1350 W 25th St	San Pedro, CA 90732	Child Care
129	Grace Lutheran Preschool	245 W Wardlow Rd	Long Beach, CA 90807	Child Care
130	Happy Tots Montessori School & Infant Center	1518 Pacific Coast Hwy	Harbor City, CA 90710	Child Care
131	Harbor Area YWCA	437 W 9th St	San Pedro, CA 90731	Child Care
132	Harbor Day Preschool	580 W 6th St	San Pedro, CA 90731	Child Care
133	Harbor Hills Early Education Center	1874 Palos Verdes Dr N	Lomita, CA 90717	Child Care
134	Hawaiian Ave Early Education Center	501 Hawaiian Ave	Wilmington, CA 90744	Child Care
135	Heritage Tree Daycare	572 W 19th St	San Pedro, CA 90731	Child Care
136	Hernandez Family Child Care	2200 Golden Ave	Long Beach, CA 90806	Child Care
137	Hernandez Family Child Care	5322 Elm Ave	Long Beach, CA 90805	Child Care
138	Herrera Family Child Care	737 W Hill St	Long Beach, CA 90806	Child Care
139	Jardin De Ninos Home Child Care	1319 W Lowen St	Wilmington, CA 90744	Child Care
140	Job Corps Head Start – Daycare and Nursery	1903 Santa Fe Ave	Long Beach, CA 90810	Child Care
141	Jones Family Child Care	2275 Baltic Ave	Long Beach, CA 90810	Child Care
142	Just Like Home	1346 W 27th St	San Pedro, CA 90731	Child Care
143	Kelly's Care	943 N Washington Pl	Long Beach, CA 90813	Child Care
144	Kelly's Kids Daycare Center	855 W Willow St	Long Beach, CA 90806	Child Care
145	Kidazzle Preschool	1921 N Gaffey St	San Pedro, CA 90731	Child Care
146	Kim Family Child Care	2035 Linden Ave	Long Beach, CA 90806	Child Care
147	Lara Family Day Care	1303 W 253rd St	Harbor City, CA 90710	Child Care
148	Lil Cowpoke Preschool	445 N Avalon Blvd	Wilmington, CA 90744	Child Care

Appendix A3

No.	Receptor Description	Street Address	City, State, Zip	Category
149	Lisas Home Daycare	326 W 33rd St	San Pedro, CA 90731	Child Care
150	Long Beach Blvd Head Start	2236 Long Beach Blvd	Long Beach, CA 90806	Child Care
151	Long Beach Center for Child Development	622 E. Hill St	Long Beach, CA 90806	Child Care
152	Long Beach Child Development Center	2222 Olive Ave	Long Beach, CA 90806	Child Care
153	Long Beach Day Nursery – West Branch	1548 Chestnut Ave	Long Beach, CA 90813	Child Care
154	Look Who’s Learning Pre-School	1491 W O’Farrell St	San Pedro, CA 90732	Child Care
155	Lopez Family Child Care	3500 Fashion Ave	Long Beach, CA 90810	Child Care
156	Loves Family Child Care	527 Daisy Ave	Long Beach, CA 90802	Child Care
157	Loving Day Care	1303 253rd St	Harbor City, CA 90710	Child Care
158	Lucy’s Baby Care	940 Maine Ave	Long Beach, CA 90813	Child Care
159	Merry Go Round Nursery School	446 W 8th St	San Pedro, CA 90731	Child Care
160	Mills Family Daycare	1061 W 17th St	San Pedro, CA 90731	Child Care
161	Montessori On Elm Preschool + Kindergarten	930 Elm Ave	Long Beach, CA 90813	Child Care
162	Morales & Medina Family Childcare	526 W 2nd St	San Pedro, CA 90731	Child Care
163	Morales & Medina Family Childcare	526 W 2nd St	San Pedro, CA 90731	Child Care
164	Muir Child Development Center	3105 Easy Ave	Long Beach, CA 90810	Child Care
165	Munchkin Center	1348 N Marine Ave	Wilmington, CA 90744	Child Care
166	My First School	25405 Normandie Ave	Harbor City, CA 90710	Child Care
167	N 2 Lil Folkz	1624 Chestnut Ave	Long Beach, CA 90813	Child Care
168	Nero-Morrison Family Child Care	3500 Gale Ave	Long Beach, CA 90810	Child Care
169	New Harbor Vista Child Development Center	909 W D St	Wilmington, CA 90744	Child Care
170	Nursery Rhymes Day Care	1410 W. Ofarrell St	San Pedro, CA 90732	Child Care
171	Oakwood Children’s Center	2650 Pacific Ave	Long Beach, CA 90806	Child Care
172	Old King Cole Day Care	3300 Oregon Ave	Long Beach, CA 90806	Child Care
173	P.A.L. Family Day Care	1980 Daisy Ave	Long Beach, CA 90806	Child Care
174	Pacific Head Start	2179 Pacific Ave	Long Beach, CA 90806	Child Care
175	Pandas Child Care WeeCare	938 McFarland Ave	Wilmington, CA 90744	Child Care
176	Park Western Place Children’s Center	1220 Park Western Pl	San Pedro, CA 90732	Child Care
177	Patterson Family Child Care	2133 Canal Ave	Long Beach, CA 90810	Child Care
178	Pine Head Start	927 Pine Ave	Long Beach, CA 90813	Child Care
179	Pines Christian Preschool	1516 W Anaheim St	Harbor City, CA 90710	Child Care
180	Poole Family Child Care	2002 Lime Ave	Long Beach, CA 90806	Child Care
181	Real Family Child Care	444 W 9th St	San Pedro, CA 90731	Child Care
182	Reece Family Day Care	911 King Ave	Wilmington, CA 90744	Child Care
183	Rise and Shine WeeCare	388 W 15th St	San Pedro, CA 90731	Child Care
184	Robin’s Nest Day Care	645 W. 14th St	San Pedro, CA 90731	Child Care
185	Ruiz Family Daycare	2670 Daisy Ave	Long Beach, CA 90806	Child Care
186	San Pedro – Wilmington Early Education Center	920 W. 36th St	San Pedro, CA 90731	Child Care
187	San Pedro Child Care	926 W Elberon Ave	San Pedro, CA 90731	Child Care

Appendix A3

No.	Receptor Description	Street Address	City, State, Zip	Category
188	Sanchez Family Child Care	1443 Deepwater Ave	Wilmington, CA 90744	Child Care
189	Sanders Teeny Tiny Preschool	3211 Santa Fe Ave	Long Beach, CA 90810	Child Care
190	Sandford Family Child Care	215 E Burnett St	Long Beach, CA 90806	Child Care
191	Sar Family Child Care	2171 Pasadena Ave	Long Beach, CA 90806	Child Care
192	Small World Learning Center	1749 N Avalon Blvd	Wilmington, CA 90744	Child Care
193	Smart & Manageable	2054 Myrtle Ave	Long Beach, CA 90806	Child Care
194	Smith Family Daycare	787 W Elberon Ave	San Pedro, CA 90731	Child Care
195	Tender Child Care	211 E 29th St	Long Beach, CA 90806	Child Care
196	The Mama's and Papa's Daycare	864 S Herbert Ave	San Pedro, CA 90731	Child Care
197	Third Street - CPDC Child Development Center	769 W 3rd St	San Pedro, CA 90731	Child Care
198	Toberman Child Care Center	131 N. Grand Ave	San Pedro, CA 90731	Child Care
199	Un Mundo De Amigos Preschool	1480 Long Beach Blvd	Long Beach, CA 90813	Child Care
200	VOA/Cesar Chavez Head Start	1269 N. Avalon St	Wilmington, CA 90744	Child Care
201	Volunteers of America-Parent Child Center	1135 257th St	Harbor City, CA 90710	Child Care
202	West Anaheim Child Care Center	440 W. Anaheim St	Long Beach, CA 90813	Child Care
203	Wilmington Park Children’s Center	1419 E Young St	Wilmington, CA 90744	Child Care
204	World Tots LA Day Care Center	100 W. 5th St	San Pedro, CA 90731	Child Care
205	YMCA GLB Fairfield 3rd Street Preschool	607 E. 3rd St	Long Beach, CA 90802	Child Care
206	YMCA Play & Learn Preschool	2179 Pacific Ave	Long Beach, CA 90806	Child Care
207	Young Horizons Child Development Center	501 Atlantic Ave	Long Beach, CA 90802	Child Care
208	Young Horizons Child Development Center	1840 Pacific Ave	Long Beach, CA 90806	Child Care
209	Young Horizons Child Development Center	2418 Pacific Ave	Long Beach, CA 90806	Child Care
210	Young Horizons/El Jardin de la Felicidad	507 Pacific Ave	Long Beach, CA 90813	Child Care
211	Yvette’s Daycare	815 W. Opp St	Wilmington, CA 90744	Child Care
212	Zarate Family Child Care	2496 Oregon Ave	Long Beach, CA 90806	Child Care
213	Akin’s Post Acute Rehab Hospital; Atlantic Memorial Healthcare Center	2750 Atlantic Ave	Long Beach, CA 90806	Elder Care
214	Am’s Residential Facility-2	3627 Delta Ave	Long Beach, CA 90810	Elder Care
215	American AAA Health Care Center	629 N Avalon Blvd	Wilmington, CA 90744	Elder Care
216	American Gold Star Manor Healthcare	3021 Gold Star Dr	Long Beach, CA 90810	Elder Care
217	Anew Direction Adult Living	2300 S Pacific Ave	San Pedro, CA 90731	Elder Care
218	Aquarius Home	1765 Aquarius St	Long Beach, CA 90810	Elder Care
219	Bay Breeze Care	1653 Santa Fe Ave	Long Beach, CA 90813	Elder Care
220	Burnett Home Care	1740 W Burnett St	Long Beach, CA 90810	Elder Care
221	Cameron Home	W Cameron St	Long Beach, CA 90810	Elder Care
222	Caruthers Royale Care	2204 Lime Ave	Long Beach, CA 90806	Elder Care
223	Crow Flora Boarding & Care Homes	624 W. 9th St	San Pedro, CA 90731	Elder Care
224	Deluxe Guest Home	3260 Pine Ave	Long Beach, CA 90807	Elder Care
225	Deluxe Guest Home II	3266 Pine Ave	Long Beach, CA 90806	Elder Care
226	The Garden	2485 Cedar Ave	Long Beach, CA 90806	Elder Care

No.	Receptor Description	Street Address	City, State, Zip	Category
227	Grandma's House	1218 W D St	Wilmington, CA 90744	Elder Care
228	Harbor Terrace Retirement Community	435 W 8th St	San Pedro, CA 90731	Elder Care
229	Harbor View Rehabilitation Center	490 W. 14th Street	Long Beach, CA 90813	Elder Care
230	Hayes Home	2470 Hayes Ave	Long Beach, CA 90810	Elder Care
231	Healthview – Pine Villa Assisted Living	117 E 8th St	Long Beach, CA 90813	Elder Care
232	Heritage Board & Care #2	1509 E 4th St	Long Beach, CA 90802	Elder Care
233	Hillcrest Care Center	3401 Cedar Ave	Long Beach, CA 90807	Elder Care
234	Little Sisters of the Poor	2100 S. Western Ave.	San Pedro, CA 90732	Elder Care
235	Loram Manor	1925 Gemini St	Long Beach, CA 90810	Elder Care
236	Los Palos Convalescent Hospital	1430 W 6th St	San Pedro, CA 90731	Elder Care
237	Olive Tree Home	1035 Olive St	Long Beach, CA 90813	Elder Care
238	Pacific Care Nursing Center	3355 Pacific Place	Long Beach, CA 90806	Elder Care
239	Padua House	940 Atlantic Ave	Long Beach, CA 90813	Elder Care
240	Pioneer Homes Of California	2041 W Carolyn Pl	Long Beach, CA 90810	Elder Care
241	Reliable Residential Care	1840 Aquarius St	Long Beach, CA 90810	Elder Care
242	Right At Home	2245 Elm Ave	Long Beach, CA 90806	Elder Care
243	RMR Residential Care Facility, LLC	2900 De Forest Ave	Long Beach, CA 90806	Elder Care
244	Royal Care Skilled Nursing Center	2725 Pacific Avenue	Long Beach, CA 90806	Elder Care
245	Santa Fe Convalescent Hospital	3294 Santa Fe Ave	Long Beach, CA 90810	Elder Care
246	Seacrest Convalescent Hospital	1416 W 6th St	San Pedro, CA 90731	Elder Care
247	Serra Project Long Beach	1043 Elm Ave	Long Beach, CA 90813	Elder Care
248	Villa Maria Care Center	723 E 9th St	Long Beach, CA 90813	Elder Care
249	Wilmington Gardens	1311 W Anaheim St	Wilmington, CA 90744	Elder Care
250	Earl & Lorraine Miller Children's Hospital; Long Beach Memorial Medical Center and Hospital	2801 Atlantic Ave	Long Beach, CA 90806	Hospital
251	Kaiser Permanente Foundation Hospital	25825 S. Vermont Ave	Harbor City, CA 90710	Hospital
252	Kaiser Permanente South Bay Medical Center	25825 S Vermont Ave	Harbor City, CA 90710	Hospital
253	Little Company of Mary San Pedro Hospital	1300 W. 7th St	San Pedro, CA 90732	Hospital
254	Long Beach Doctors Hospital	1725 Pacific Ave	Long Beach, CA 90813	Hospital
255	Pacific Hospital of Long Beach (Hospital and Convalescent/Nursing Home)	2776 Pacific Ave	Long Beach, CA 90806	Hospital
256	St Mary Medical Center (Hospital and Convalescent/Nursing Home)	1050 Linden Ave	Long Beach, CA 90813	Hospital
257	Tom Redgate Memorial Hospital	1775 Chestnut Ave	Long Beach, CA 90813	Hospital
258	Torrance Memorial Medical Center	3330 Lomita Blvd	Torrance, CA 90505	Hospital
259	22nd Street Park	140 W 22nd St	San Pedro, CA 90731	Recreational
260	22nd Street Park	140 W 22nd St	Long Beach, CA 90810	Recreational
261	Admiral Kidd Park	2125 Santa Fe Ave	San Pedro, CA 90731	Recreational
262	AltaSea	2451 Signal St	Los Angeles, CA 90731	Recreational
263	Battleship USS Iowa	250 Harbor Blvd	Wilmington, CA 90744	Recreational
264	Beacon Light Mission	525 Broad Ave	San Pedro, CA 90731	Recreational

Appendix A3

No.	Receptor Description	Street Address	City, State, Zip	Category
265	Cabrillo Beach	720 Stephen M. White Dr.	San Pedro, CA 90731	Recreational
266	Cabrillo Beach & Cabrillo Aquarium	3720 Stephen M. White Drive	San Pedro, CA 90731	Recreational
267	Cabrillo Beach Youth Waterfront Sports Center	3000 Shoshonean Rd	San Pedro, CA 90731	Recreational
268	California Yacht Marina – Wilmington	718 Peninsula Rd Berth 202 #36	Wilmington, CA 90744	Recreational
269	Cesar Chavez Park	401 Golden Ave	Long Beach, CA 90802	Recreational
270	Coastal Comprehensive Treatment Center	117 E Harry Bridges Blvd	Wilmington, CA 90744	Recreational
271	Field of Dreams	501 Westmont Drive	San Pedro, CA 90731	Recreational
272	Gaffey Street Community Gardens	1400 N Gaffey Street	San Pedro, CA 90731	Recreational
273	Harbor Community Teen Center	612 W E St	Wilmington, CA 90744	Recreational
274	Harbor Japanese Community Cultural Center	1766 Seabright Ave	Long Beach, CA 90813	Recreational
275	Hudson Park	2335 Webster Ave	Long Beach, CA 90810	Recreational
276	Hudson Park Community Garden	2335 Webster Ave	Long Beach, CA 90810	Recreational
277	Joan Milke Flores Park	3601 S Gaffey St	San Pedro, CA 90731	Recreational
278	Khemara Buddhikaram Cambodian Buddhist Temple	2100 W Willow Street	Long Beach, CA 90810	Recreational
279	Knoll Hill Baseball Fields	766 Eastview Little League Drive	San Pedro, CA 90731	Recreational
280	Los Angeles World Cruise Center	100 Swinford St	San Pedro, CA 90731	Recreational
281	Pramuan Simsriwatna Place of Worship	2015 W Hill Street	Long Beach, CA 90810	Recreational
282	San Pedro Plaza Park	7000 S Beacon Street	San Pedro, CA 90731	Recreational
283	San Pedro Plaza Park	7000 S Beacon Street	San Pedro, CA 90731	Recreational
284	San Pedro Plaza Park	7000 S Beacon Street	San Pedro, CA 90731	Recreational
285	Silverado Park Community Center	1545 W 31st Street	Long Beach, CA 90810	Recreational
286	USC Boathouse	400 Yacht St	Wilmington, CA 90744	Recreational
287	Wilmington Recreation Center	325 N Neptune Ave	Wilmington, CA 90744	Recreational
288	Wilmington Urgent Care and Family Clinic	714 N Avalon Blvd	Wilmington, CA 90744	Recreational
289	Wilmington Waterfront Park	S. C Street	Wilmington, CA 90744	Recreational
290	Wilmington Waterfront Park	S. C Street	Wilmington, CA 90744	Recreational
291	Wilmington Waterfront Park	S. C Street	Wilmington, CA 90744	Recreational
292	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
293	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
294	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
295	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
296	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
297	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
298	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
299	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
300	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
301	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
302	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational

No.	Receptor Description	Street Address	City, State, Zip	Category
303	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
304	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
305	Wilmington Waterfront Promenade	S. C Street	Wilmington, CA 90744	Recreational
306	Banning's Landing Community Center	100 E Water St	Wilmington, CA 90744	Child Care/ Recreational
307	Banning's Landing Community Center	100 E Water St	Wilmington, CA 90744	Child Care/ Recreational
308	Banning's Landing Community Center	100 E Water St	Wilmington, CA 90744	Child Care/ Recreational
309	Banning's Landing Community Center	100 E Water St	Wilmington, CA 90744	Child Care/ Recreational

Maximally exposed individual (MEI) locations were selected from the modeled receptor grids for two different receptor types: residential/sensitive and occupational (i.e., the off-site workers). The selection methodology for the MEI locations was:

- The residential MEI was selected from all receptors in residential or residentially-zoned areas that are not located within modeled roadways or railways. Marinas where live-aboards may be present were treated as valid residential receptors. The residential receptor set also included all sensitive receptors, including modeled schools, child care centers, elder care facilities, hospitals, and recreational areas such as parks, marinas, and public waterfront areas. These sensitive receptors were treated conservatively with resident exposure.
- The occupational MEI was selected from all receptors on or outside the China Shipping terminal boundary that are not located on water or within modeled roadways or railways.

4.0 Health Risk Assessment Approach

The HRA was performed based on the TAC unit concentrations, following methods recommended by OEHHA (OEHHA 2015) and SCAQMD (SCAQMD, 2024) with the help of HARP2 RAST, version 22118 (CARB, 2022). Values for individual cancer risk, chronic HI, and acute HI at each modeled receptor for the Project and baseline scenarios were calculated. For each calculated health risk estimate, the HRA determined a Project increment by subtracting the baseline health risk estimate from the Project health risk estimate at each modeled receptor. For each quantitatively evaluated receptor type (i.e. residential/sensitive, occupational), the modeled receptor with the highest increment was selected for reporting and comparison to the appropriate significance threshold.

4.1 Toxicity Assessment

The toxicity assessment (also referred to as the dose-response assessment) examines the potential for a constituent to cause adverse health effects in exposed individuals. Toxicity values that were used to estimate the likelihood of adverse effects from the TACs listed in Section 2.3 were identified in this component of the HRA process.

Cancer potency factors established by CARB (CARB, 2025) were used to evaluate the probability that a person will contract excess lifetime cancer risk from the continuous

exposures of carcinogenic TACs over the evaluated exposure period using the risk assessment methodology defined in OEHHA (2015).

To assess the potential for non-cancer health effects resulting from chronic and acute inhalation exposure, OEHHA has established chronic and acute RELs (CARB, 2025). An REL 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. The chronic HI is the sum of the chemical-specific chronic hazard quotients (HQs) affecting a particular target organ. The acute HI is the sum of the chemical-specific acute HQs affecting a particular target organ. An HQ is a chemical's predicted concentration divided by its REL. A separate HI is calculated for each target organ affected by the TACs because not all TACs affect the same target organ. A HI below 1.0 for all affected target organs indicates that adverse non-cancer health effects are not expected.

Table A3-4 presents the toxicity factors used to assess health risks in this study.

Table A3-4. Toxicity Values Used In the HRA

Toxic Air Contaminant	CASRN	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Chronic Inhalation REL ($\mu g/m^3$)	Target Organ for Chronic Exposure[b]	Acute Inhalation REL ($\mu g/m^3$)	Target Organ for Acute Exposure[b]	Multipath Chemicals[c]
Acetaldehyde	75-07-0	0.01	140	I	470	D,I	No
Acrolein	107-02-8	--	0.35	I	2.5	D,I	No
Arsenic[a]	7440-38-2	12	0.015	B,C,G,I,J	0.2	B,C,G	Yes
Benzene	71-43-2	0.1	3	E	27	C,E,F	No
1,3-Butadiene	106-99-0	0.6	2	C	660	C	No
Cadmium[a]	7440-43-9	15	0.02	I,M	--	--	Yes
Chlorine	7782-50-5	--	0.2	I	210	D,I	No
Chlorobenzene	108-90-7	--	1,000	A,C,M	--	--	No
Cobalt	7440-48-4	27	--	--	--	--	No
Copper	7440-50-8	--	--	--	100	I	No
DieselExhPM	9901	1.1	5	I	--	--	No
Ethyl benzene	100-41-4	0.0087	2,000	A,C,L,M	--	--	No
Formaldehyde	50-00-0	0.021	9	I	55	D	No
Hexane	110-54-3	--	7,000	G	--	--	No
Hexavalent Chromium[a]	18540-29-9	510	0.2	E,I	--	--	Yes
Isoprene	78-79-5	0.019	--	--	--	--	No
Lead[a]	7439-92-1	0.042	--	--	--	--	Yes
Manganese	7439-96-5	--	0.09	G	--	--	No
Methanol	67-56-1	--	4,000	C	28,000	G	No
Methyl ethyl ketone	78-93-3	--	--	--	13,000	D,I	No
Methyl tert-butyl ether	1634-04-4	0.0018	8,000	A,D,M	--	--	No
Mercury[a]	7439-97-6	--	0.03	C,G,M	0.6	C,G	Yes
Naphthalene	91-20-3	0.12	9	I	--	--	No
Nickel[a]	7440-02-0	0.91	0.014	C,E,I	0.2	F	Yes
Propylene	115-07-1	--	3,000	I	--	--	No
Selenium	7782-49-2	--	20	A,B,G	--	--	No
Styrene	100-42-5	--	900	G	21,000	C,D,I	No
Sulfates	9-96-0	--	--	--	120	I	No
Toluene	108-88-3	--	420	C,G,I	5,000	C,D,G,I	No
Trivalent Chromium	16065-83-1	--	0.06	I	0.48	I	No
1,2,3-trimethylbenzene	526-73-8	--	4	G	2,400	G	No
1,2,4-trimethylbenzene	95-63-6	--	4	G	2,400	G	No

Toxic Air Contaminant	CASRN	Inhalation Cancer Potency Factor (mg/kg-d)$^{-1}$	Chronic Inhalation REL (μg/m^3)	Target Organ for Chronic Exposure[b]	Acute Inhalation REL (μg/m^3)	Target Organ for Acute Exposure[b]	Multipath Chemicals[c]
1,3,5-trimethylbenzene	108-67-8	--	4	G	2,400	G	No
Vanadium	7440-62-2	--	--	--	30	D,I	No
Xylenes	1330-20-7	--	700	D,G,I	22,000	D,G,I	No

Notes:

[a] Arsenic, cadmium, hexavalent chromium, lead, mercury, and nickel, were also evaluated for non-inhalation exposure pathways. For arsenic, the cancer risk oral slope factor is 1.5 (mg/kg/day)$^{-1}$, and the non-cancer chronic oral REL is 0.0000035 mg/kg/day. For cadmium, the non-cancer chronic oral REL is 0.0005 mg/kg/day. For hexavalent chromium, the cancer risk oral slope factor is 0.5 (mg/kg/day)$^{-1}$, and the non-cancer chronic oral REL is 0.02 mg/kg/day. For lead, the cancer risk oral slope factor is 0.0085 (mg/kg/day)$^{-1}$. For mercury, the noncancer chronic oral REL is 0.00016 mg/kg/day. For nickel, the non-cancer chronic oral REL is 0.011 mg/kg/day.

[b] Key to non-cancer acute and chronic exposure target organs:

[c] Based on the multipath chemicals recommended by OEHHA (2015) for evaluation of health impacts through the non-inhalation pathways.

-- = not available

A = Alimentary Tract

B = Cardiovascular System

C = Reproductive/Developmental System

CASRN = Chemical Abstract Services Registry Number

D = Eye

E = Hematologic System

F = Immune System

G = Nervous System

I = Respiratory System

J = Skin

K = Bone

L = Endocrine System

M = Kidney

Source: CARB, 2025. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. January.

4.2 Exposure Assessment

Potentially Exposed Populations: As discussed in Section 1, this analysis conservatively evaluated following receptor population, which is expected to yield the highest impacts:

- All sensitive receptors as residents, and
- Off-site workers

The residential exposure assumptions were more conservative than those for other sensitive receptor types (i.e., schools, child care centers, hospitals, elder cares, and recreational areas) as residential uses have the longest exposure time, exposure duration and highest exposure frequency. A conservative approach of considering all sensitive receptors as residential receptors was used in this HRA.

Exposure Pathways and Assumptions: When there are multi-pathway chemicals identified in the TACs to evaluate in the HRA, OEHHA Hot Spots Guidance (OEHHA 2015) requires the evaluation of both inhalation and non-inhalation exposure pathways, the latter is also referred to as a multi-pathway analysis, for selected multi-pathway chemicals and land use designations in the area being evaluated. Arsenic, cadmium,

hexavalent chromium, lead, nickel and selenium that need to be evaluated in this HRA are considered multi-pathway chemicals as defined by OEHHA (2015). Consistent with the recommendations of the OEHHA (OEHHA 2015) and SCAQMD (2020) for conducting a multi-pathway analysis, in addition to the inhalation, several non-inhalation exposure pathways were also evaluated in the HRA, including dermal contact with soil, soil ingestion, home-grown produce ingestion, and mother's milk ingestion (the latter two pathways were only evaluated for the residential exposure scenario).

The exposure parameters used to estimate excess lifetime cancer risks for the inhalation pathway for residents and workers were obtained using risk assessment guidelines from OEHHA (2015) and SCAQMD (2020), and are presented in Table A3-5. Ramboll conducted the multi-pathway analysis using the HARP2 RAST software (CARB 2022), which incorporates the OEHHA 2015 guidelines using exposure assumptions under the OEHHA derived method in RAST software.

Calculation of Intake: The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, was calculated as follows:

$$IF_{inh} = \frac{DBR * ET * EF * ED * FAH * CF}{AT}$$

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
ET	=	Exposure Time (hours/24 hours)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
FAH	=	Fraction of Time at Home
CF	=	Conversion Factor, 0.001 (m^3/L)

The chemical intake or dose was estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in OEHHA Hot Spots guidance (OEHHA 2015).

4.3 Risk Characterization

4.3.1 Estimation of Individual Cancer Risk

Excess lifetime cancer risks were estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to

potential carcinogens. The estimated risk was expressed as a unitless probability. The cancer risk attributed to a chemical was calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF_i \times ASF$$

Where:

$Risk_{inh}$ = Cancer Risk for the Inhalation Pathway; (unitless)

Ci = Annual Average Air Concentration for Chemicali ($\mu g/m^3$)

CF = Conversion Factor (mg/µg)

IF_{inh} = Intake Factor for Inhalation (m^3/kg-day)

CPF_i = Cancer Potency Factor for $Chemical_i$

(mg chemical/kg body weight-day)$^{-1}$

ASF = Age Sensitivity Factor (unitless)

According to OEHHA (2015), the estimated excess lifetime cancer risks for a resident were adjusted using the age sensitivity factors (ASFs) recommended in the Cal/EPA OEHHA Technical Support Document (TSD) (Cal/EPA 2009). This approach accounted for an “anticipated special sensitivity to carcinogens” of infants and children. Cancer risk estimates were weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age (labeled by OEHHA as “3rd trimester” and “0 < 2”), and by a factor of three for exposures that occur from two years through 15 years of age (“2 < 16”). No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) was applied to ages 16 and older.

Because the proposed Project, No Federal Action alternative (or the NEPA Baseline), No Project alternative, and Floating Future Baseline scenarios have emissions that change over time in the HRA, it was necessary to subdivide the exposure durations listed in Table A3-5 into smaller time periods (sub-periods) and calculate risks and hazards separately for each sub-period. These sub-periods correspond to the years when the modeled receptor’s age falls within the ranges defined by the age sensitivity factors and daily breathing rates (3rd trimester, $0 < 2$, $2 < 16$, and ≥ 16).

For each receptor type, the most conservative (highest) exposure scenario was evaluated to estimate cancer risk results. For example, the calculation of a 30-year residential cancer risk assumes that the exposed person is in the 3rd trimester before birth at the beginning of the 30-year exposure period because the childhood age sensitivity factor (ASF) used in the cancer risk calculation is the highest for age groups 3rd trimester and $0<2$. Moreover, the calculated cancer risk is increased even further during childhood years by using higher breathing rates per body weight than adults.

For each sub-period, the average annual operational or baseline emissions that would occur during that sub-period were used. The cancer risk results for each sub-period were

then summed to obtain the total cancer risk for the entire exposure duration. For example, the 30-year residential cancer risk was determined for each of four sub-periods. The first sub-period represents a receptor age of 3rd Trimester, assumes an exposure duration of 0.25 years, and uses proposed Project emissions in 2026. The second sub-period represents a receptor age of 0 < 2, assumes an exposure duration of 2 years, and uses proposed Project emissions averaged over the time period April 2026 - March 2028. The third sub-period represents a receptor age of 2 < 16, assumes an exposure duration of 14 years, and uses proposed Project emissions averaged over the time period April 2028-March 2042. The fourth sub-period represents a receptor age of 16 < 30, assumes an exposure duration of 14 years, and uses proposed Project emissions averaged over the time period April 2042 - March 2056. The cancer risks calculated for these four sub-periods were then summed to obtain the total cancer risks for the entire exposure duration of 30 years[2].

Based on land use information and SCAQMD's recommendation, residential and sensitive receptors were evaluated for inhalation, soil ingestion, dermal contact, mother's milk ingestion, and homegrown garden ingestion pathways; occupational receptors were evaluated for inhalation, soil ingestion, and dermal contact pathways. The evaluation of the non-inhalation pathways were conducted with the help of OEHHA developed HRA software HARP2 RAST (CARB, 2022). Assumptions of the OEHHA derived method were used to evaluate the cancer risks for the non-inhalation pathways. In accordance with SCAQMD's recommendation (SCAQMD, 2024), a deposition settling velocity of 0.02 meters per second was assumed in HARP2 RAST.

[2] In accordance with OEHHA's Hot Spots Guidance (OEHHA 2015), the exposure during the 3rd trimester before birth is also included in the cancer risk evaluation for a resident. Therefore, the total exposure duration for evaluating individual cancer risk for a resident is 30.25 years.

Table A3-5. Cancer Risk Exposure Assumptions by Receptor Type

Receptor Type [a]	Scenario [b]	Age Group	Exposure Frequency [c]	Exposure Time [c]	Exposure Duration [c]	Daily Breathing Rate [c] (L/kg-day)	Fraction of Time at Home (FAH) [d] (unitless)	ASF [e] (unit-less)	MAF [f] (unit-less)	Approach for Multi-Pathway Analysis [g]
Resident - Individual Cancer Risk (30 years)	Construction Scenario	3rd Trimester	350	24	0.25	361	1	10	1	Derived OEHHA Method
		0-2 years	350	24	1.75	1090	1	10		
	Operation Scenario	3rd Trimester	350	24	0.25	361	1	10		
		0-2 years	350	24	2	1090	1	10		
		2-16 years	350	24	14	572	1	3		
		16-30 years	350	24	14	261	0.73	1		
Resident - Population Cancer Burden (70 years)	Construction Scenario	3rd Trimester	350	24	0.25	361	1	10		
		0-2 years	350	24	1.75	1091	1	10		
	Operation Scenario	3rd Trimester	350	24	0.25	361	1	10		
		0-2 years	350	24	2	1091	1	10		
		2-16 years	350	24	14	572	1	3		
		16-70 years	350	24	54	233	0.73	1		
Commercial /Industrial Workers	Construction Scenario	Adults	250	8	2	230	--	1	see note f	
Commercial /Industrial Workers	Operation Scenario	Adults	250	8	25	230	--	1		

Notes:

[a] LAHD conservatively evaluated other sensitive receptors (i.e. schools, hospitals, elder care, child care and recreational areas) using the 30-year residential exposure assumptions from OEHHA (2015).

[b] The Unmitigated Project and Mitigated Project were evaluated for both construction and operation scenarios; the No Action and the Baseline were only evaluated for the operation scenario.

[c] The exposure assumptions for residential and commercial/industrial receptors were obtained from OEHHA (2015), CARB (2015), and SCAQMD (2020). In accordance with the recommendation from CARB's Risk Management Policy (RMP) (CARB 2015) and the SCAQMD (2020) for residential receptors, this analysis uses the 95th percentile of the breathing rates for children from the 3rd trimester through age 2, and 80th percentile breathing rates for all other age groups for the residents.

[d] Fraction of time spent at home is conservatively assumed to be 1 (i.e., 24 hours/day) for age groups from the third trimester to less than 16 years old. Based on the OEHHA 2015 Guidance, the age group 16 to 30 years old is estimated to be at school or work for 6.5 hours of the day. Therefore, the fraction of time spent at home is assumed to be 0.73 (17.5 hours/24 hours per day) for this age group.

[e] The age sensitivity factors (ASF) are as recommended in the 2015 OEHHA Hot Spots Guidance (OEHHA 2015) for each age group.

[f] The residents were assumed to be exposed to the construction and operational emissions continuously, therefore no adjustment is needed in the calculation of exposure point concentrations for the residents. For the commercial workers, the construction emissions are from 7 AM to 7 PM in 2026 and 2027, In accordance with OEHHA's recommendation (OEHHA 2015), a modeling adjustment factor (MAF) of 2 (24 hours/12 hours) was applied to the annual average concentrations used in the evaluation for the workers to account for an construction emission schedule of 12 hours/day for these two sources.

[g] The "OEHHA Derived Method" is recommended by the SCAQMD (2020) for evaluating the multi-pathway exposures. For cancer risk, it uses high end (95th percentile) exposure parameters for the top two dominant exposure pathways (one of which is nearly always inhalation), and average point exposure parameters for the remaining pathways.

Sources:

California Air Resources Board (CARB). 2015. Risk Management Guidance for Stationary Sources of Air Toxics. July 23.

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

SCAQMD, 2020. *AB 2588 and Rule 1402 Supplemental Guidelines (Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act).* October.

4.3.2 Population Cancer Burden

Population cancer burden is defined by OEHHA as an estimate of the number of cancer cases expected from a 70-year exposure to emissions (OEHHA, 2015). Whereas individual cancer risk represents the probability of a single exposed person to develop cancer, population cancer burden estimates the number of individuals that would be expected to contract cancer by multiplying the individual incremental excess lifetime cancer risk by the population exposed to that level of incremental risk, calculated at the census tract or block level.

The individual cancer risk is calculated assuming a 70-year exposure period assuming that the exposed person is in the 3rd trimester before birth at the beginning of the exposure period based on OEHHA's recommendation (OEHHA 2015). The exposed population is defined as the number of persons within a facility's zone of impact, which is defined by the LAHD and SCAQMD as the area within the Project's one in a million cancer risk isopleth. Population cancer burden was calculated using census block population data contained in HARP2, which are based on the 2020 U.S. Census.

4.3.3 Non-Cancer Chronic and Acute HI

Chronic HI

The potential for exposure to result in adverse chronic non-cancer effects for the inhalation pathway is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the non-cancer chronic reference exposure level (cREL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed an HQ. To evaluate the potential for adverse chronic non-cancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI.

$$HQ_i = C_i / cREL_i$$

$$HI = \sum HQ_i$$

Where:

HQ_i	=	Chronic hazard quotient for chemical_i
HI	=	Hazard index
C_i	=	Annual average concentration of chemical_i ($\mu g/m^3$)
$cREL_i$	=	Chronic reference exposure level for chemical_i ($\mu g/m^3$)

As discussed in Section 4.4.1, based on land use information and SCAQMD's recommendation, residential and sensitive receptors were also evaluated for soil ingestion, dermal contact, mother's milk ingestion, and homegrown garden ingestion pathways; occupational receptors were also evaluated for soil ingestion and dermal contact pathways. The evaluation of the non-inhalation pathways were conducted with the help of OEHHA developed HRA software HARP2 RAST (CARB, 2022).

Assumptions of the OEHHA derived method were used to evaluate the chronic non-cancer hazard indices for the non-inhalation pathways. In accordance with SCAQMD's recommendation (SCAQMD, 2024), a deposition settling velocity of 0.02 meters per second was assumed in HARP2 RAST.

Acute HI

The potential for exposure to result in adverse acute effects is evaluated by comparing the estimated one-hour maximum air concentration of chemical to the acute reference exposure level (aREL) for each chemical evaluated in this analysis at each receptor location. When calculated for a single chemical, the comparison yields an HQ. To evaluate the potential for adverse acute health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI. All receptors were evaluated for inhalation exposure pathway only for the acute HI.

$$HQ_i = C_i / aREL_i$$

$$HI = \sum HQ_i$$

Where:

HQ_i	=	Acute hazard quotient for chemical_i
HI	=	Hazard index
C_i	=	One-hour maximum concentration of chemical_i (μg/m^3)
$aREL_i$	=	Acute reference exposure level for chemical_i (μg/m^3)

5.0 Significance Criteria

The SCAQMD significance threshold for individual cancer risk (project increment) is 10 in a million. Based on this threshold, the proposed Project would produce less than significant cancer risk impacts if the maximum cancer risk due to the Project is less than 10 in 1 million (10×10^{-6}) relative to both the Baseline and the Floating Future Baseline. The air quality significance threshold for cancer burden is 0.5 excess cancer cases in areas with Project-attributable individual cancer risk above one in a million (1×10^{-6}) (SCAQMD, 2023). In addition, the SCAQMD significance threshold is 1.0 for chronic and acute non-cancer hazard indices; the proposed Project would produce less than significant non-cancer impacts if the chronic and acute hazard indices are less than 1.0 (SCAQMD, 2023).

6.0 Predicted Incremental Health Impacts

6.1 Unmitigated Project Relative to the CEQA Baseline

Table A3-6 presents the maximum predicted health impacts of the unmitigated Project relative to the CEQA Baseline and Floating Future Baseline. The table includes estimates of individual cancer risk, chronic non-cancer HI, and acute non-cancer HI at the

maximally exposed residential/sensitive and occupational receptors. Results are presented for the unmitigated Project (before subtracting baseline), CEQA Baseline, unmitigated Project Minus CEQA Baseline increment, Floating Future Baseline, and the unmitigated Project Minus Floating Future Baseline increment (the latter two categories are applicable only to cancer risk). The table also presents the population cancer burden increments for the unmitigated Project relative to the CEQA Baseline and Floating Future Baseline.

Figure A3-4 shows the locations of the maximum predicted individual cancer risk, chronic HI, and acute HI increments for the unmitigated Project relative to the CEQA Baseline and Floating Future Baseline.

Table A3-6. Maximum Health Impacts Estimated for Construction and Operation of the Unmitigated Project Relative to the CEQA Baseline and Floating Future Baseline

Health Impact	Receptor Type	Unmitigated Project[a,b,c]	CEQA Baseline[b,c]	Unmitigated Project Minus CEQA Baseline[b,c,d]	Floating Future Baseline[b,c]	Unmitigated Project Minus Floating Future Baseline[b,c,d]	Significance Threshold	Threshold Exceeded ?[e]
Individual Cancer Risk[f]	Residential/ Sensitive	25×10^{-6}	41×10^{-6}	<0	33×10^{-6}	2.3	10×10^{-6} 10 in a million	No
		25 in a million	41 in a million	<0 in a million	33 in a million	2 in a million		
	Occupational	7.8×10^{-6}	6.3×10^{-6}	2.6×10^{-6}	3.4×10^{-6}	4.4×10^{-6}		No
		8 in a million	6 in a million	3 in a million	3 in a million	4 in a million		
Chronic Hazard Index	Residential/ Sensitive	0.14	0.092	0.062	n/a[h]	n/a[h]	1	No
	Occupational	0.34	0.12	0.22	n/a[h]	n/a[h]		No
Acute Hazard Index	Residential/ Sensitive	0.14	n/a[g]	<1[g]	n/a[h]	n/a[h]	1	No
	Occupational	0.33	n/a[g]	<1[g]	n/a[h]	n/a[h]		No
Population Cancer Burden			**Unmitigated Project Minus CEQA Baseline**		**Unmitigated Project Minus Floating Future Baseline**		0.5	No
			0.0053		0.12			

Notes:

[a]The "Unmitigated Project" column represents the maximum Unmitigated Project health values prior to subtracting the CEQA Baseline or Floating Future Baseline.

[b]The maximum health values for the "Unmitigated Project", "CEQA Baseline", and "Unmitigated Project Minus CEQA Baseline" shown in the table may not occur at the same receptor location. Therefore, the maximum health values for the "Unmitigated Project" and "CEQA Baseline" may not necessarily subtract to equal the maximum health value for the "Unmitigated Project Minus CEQA Baseline". The same is true for the "Unmitigated Project", "Floating Future Baseline", and "Unmitigated Project Minus Floating Future Baseline" maximum health values. The example given in the text provides more explanation on the determination of maximum health values.

[c]Each positive result shown in the table for cancer risk, chronic HI, and acute HI represents the receptor location with the maximum modeled health value. The health values at all other modeled receptors would be less than the values in the table.

[d]A CEQA Baseline increment or a Floating Future Baseline increment less than zero means that the Unmitigated Project health values would be less than the CEQA Baseline or the Floating Future Baseline health values at all modeled receptors.

[e]The significance thresholds apply only to the two Project increments: "Unmitigated Project Minus CEQA Baseline" and, for cancer risk and cancer burden, "Unmitigated Project Minus Floating Future Baseline".

[f]Values displayed for individual cancer risk have been rounded to the nearest integer.

[g]The CEQA Baseline and CEQA Baseline increment for acute HI were not calculated. The increment would be below the threshold because the absolute acute HIs for the Unmitigated Project are all below the threshold.

[h]Floating Future Baseline health values are not applicable to chronic and acute hazard indices, as explained in Section 2.1.

Figure A3-4. Locations of Maximum CEQA Health Impacts Estimated for Construction and Operation of Unmitigated Project

It is worth noting that the maximum health impacts for the Unmitigated Project (before subtracting Baselines), CEQA Baselines, and Project increments (Unmitigated Project minus CEQA Baseline and Unmitigated Project minus Floating Future Baseline) in Table A3-6 do not always occur at the same receptor location. This means that the displayed maximum Unmitigated Project increments are not necessarily equal to the displayed

maximum Unmitigated Project impacts minus the displayed maximum Baseline impacts. An increment was calculated at each modeled receptors, and the receptor with the highest increment is presented in the table.

The health impacts and the incremental health impacts relative to the CEQA Baseline and Floating Future Baseline for the Unmitigated Project are summarized and discussed in Sections 6.1.1 through 6.1.3 for each evaluated health endpoint.

6.1.1 Individual Cancer Risk

All individual cancer risk impacts listed in Table A3-6 are predicted to be less than significant. The maximum individual cancer risk increments for the Unmitigated Project relative to the Floating Future Baseline at the maximally exposed residential/sensitive receptor and the occupational receptor are predicted to be 2 in a million and 4 in a million, respectively, and both are lower than the significance threshold. The residential/sensitive MEI receptor for cancer risk is located in the vicinity of Hawaiian Avenue and West C Street in Wilmington. The occupational MEI receptor is situated immediately adjacent to the southern boundary of the Project site, near the West Basin.

Figure A3-5 shows individual cancer risk contours of the Unmitigated Project minus Floating Future Baseline, assuming residential (30-year) exposure parameters. Incremental risks relative to the Floating Future Baseline would always be greater than those relative to the CEQA Baseline, so only the increments relative to the Floating Future Baseline are shown in the figure.

Figure A3-5. Isopleth of Residential 30-yr Cancer Risk - Unmitigated Project Minus Floating Future Baseline Increment

6.1.2 Population Cancer Burden

The cancer burden increments for the unmitigated Project are predicted to be less than the significance threshold relative to both the CEQA Baseline and Floating Future Baseline.

6.1.3 Chronic and Acute Hazard Indices

The maximum chronic and acute HI increments are predicted to be less than the significance threshold for all receptor types.

6.2 Unmitigated Project Relative to the NEPA Baseline

Table A3-7 presents the maximum predicted health impacts of the Unmitigated Project relative to the NEPA Baseline. The table includes estimates of individual cancer risk, chronic non-cancer HI, and acute non-cancer HI at the maximally exposed residential/sensitive and occupational receptors. Results are presented for the Unmitigated Project (before subtracting baseline), NEPA Baseline, and Unmitigated Project Minus NEPA Baseline increment. The table also presents the population cancer burden increments for the Unmitigated Project relative to the NEPA Baseline.

Figure A3-6 shows the locations of the maximum predicted individual cancer risk, chronic HI, and acute HI increments for the Unmitigated Project relative to the NEPA Baseline.

Table A3-7. Maximum Health Impacts Estimated for Construction and Operation of the Unmitigated Project Relative to the NEPA Baseline

Health Impact	Receptor Type	Unmitigated Project[a,b,c]	NEPA Baseline - No Federal Action[b,c]	Unmitigated Project Minus NEPA Baseline[b,c]	Significance Threshold	Threshold Exceeded?[d]
Individual Cancer Risk[e]	Residential/Sensitive	25×10^{-6}	19×10^{-6}	6.6×10^{-6}	10×10^{-6} 10 in a million	No
		25 in a million	19 in a million	7 in a million		
	Occupational	7.8×10^{-6}	4.3×10^{-6}	3.5×10^{-6}		No
		8 in a million	4 in a million	4 in a million		
Chronic Hazard Index	Residential/Sensitive	0.14	0.13	0.022	1	No
	Occupational	0.34	0.27	0.15		No
Acute Hazard Index	Residential/Sensitive	0.14	0.12	0.028	1	No
	Occupational	0.33	0.25	0.080		No
Population Cancer Burden			**Unmitigated Project Minus NEPA Baseline**		0.5	No
			0.14			

Notes:
[a]The “Unmitigated Project” column represents the maximum Mitigated Project health values prior to subtracting the NEPA Baseline.
[b]Each positive result shown in the table for cancer risk, chronic HI, and acute HI represents the receptor location with the maximum modeled health value. The health values at all other modeled receptors would be less than the values in the table.
[c]The maximum health values for the “Unmitigated Project”, “NEPA Baseline”, and “Unmitigated Project Minus NEPA Baseline” shown in the table may not occur at the same receptor location. Therefore, the maximum health values for the “Unmitigated Project” and “NEPA Baseline” may not necessarily subtract to equal the maximum health value for the “Unmitigated Project Minus NEPA Baseline”. The example given in the text provides more explanation on the determination of maximum health values.
[d]The significance thresholds apply only to the Project increment: “Unmitigated Project Minus NEPA Baseline”, for cancer risk and cancer burden.
[e]Values displayed for individual cancer risk have been rounded to the nearest integer.

Figure A3-6. Locations of Maximum NEPA Health Impacts Estimated for Construction and Operation of Unmitigated Project

The health impacts and the incremental health impacts relative to the NEPA Baseline and for the Unmitigated Project are summarized and discussed in Sections 6.2.1 through 6.2.3 for each evaluated health endpoint.

6.2.1 Individual Cancer Risk

All individual cancer risk impacts listed in Table A3-7 are predicted to be less than significant. In relation to the NEPA Baseline, the individual cancer risk at the maximally exposed residential/sensitive receptor and the occupational receptor are predicted to 7 in a million and 4 in a million, respectively, and both are lower than the significance threshold. The residential/sensitive MEI receptor for cancer risk is located at the Wilmington Waterfront Promenade, near South Avalon Boulevard and West Water Street. The occupational MEI receptor is situated immediately adjacent to the southern boundary of the Project site, near the West Basin.

Figure A3-7 shows individual cancer risk contours of the unmitigated Proposed Project Minus NEPA Baseline, assuming residential (30-year) exposure parameters. The location of the residential receptor with the highest individual cancer risk increment of 7 in a million is also shown in the figure.

Figure A3-7. Isopleth of Residential 30-yr Cancer Risk - Unmitigated Project Minus NEPA Increment

6.2.2 Population Cancer Burden

The cancer burden increments for the unmitigated Project are predicted to be less than the significance threshold relative to the NEPA Baseline.

6.2.3 Chronic and Acute Hazard Indices

The maximum chronic and acute hazard index increments are predicted to be less than the significance threshold for all receptor types.

6.3 Mitigated Project Relative to the CEQA Baseline

Table A3-8 presents the maximum predicted health impacts of the Mitigated Project relative to the CEQA Baseline and Floating Future Baseline. The table includes estimates of individual cancer risk, chronic non-cancer HI, and acute non-cancer HI at the maximally exposed residential/sensitive and occupational receptors. Results are presented for the Mitigated Project (before subtracting baseline), CEQA Baseline, Mitigated Project Minus CEQA Baseline increment, Floating Future Baseline, and the Mitigated Project Minus Floating Future Baseline increment (the latter two categories are applicable only to cancer risk). The table also presents the population cancer burden increments for the Mitigated Project relative to the CEQA Baseline and Floating Future Baseline.

Figure A3-8 shows the locations of the maximum predicted individual cancer risk, chronic HI, and acute HI increments for the Mitigated Project relative to the CEQA Baseline and Floating Future Baseline.

Table A3-8. Maximum Health Impacts Estimated for Construction and Operation of the Mitigated Project Relative to the CEQA Baseline and Floating Future Baseline

Health Impact	Receptor Type	Mitigated Project[a,b,c]	CEQA Baseline[b,c]	Mitigated Project Minus CEQA Baseline[b,c,d]	Floating Future Baseline[b,c]	Mitigated Project Minus Floating Future Baseline[b,c,d]	Significance Threshold	Threshold Exceeded?[e]
Individual Cancer Risk[f]	Residential/ Sensitive	25×10^{-6}	41×10^{-6}	<0	33×10^{-6}	1.9	10×10^{-6} 10 in a million	No
		25 in a million	41 in a million	<0 in a million	33 in a million	2 in a million		
	Occupational	5.4×10^{-6}	6.3×10^{-6}	1.9×10^{-6}	3.4×10^{-6}	3.3×10^{-6}		No
		5 in a million	6 in a million	2 in a million	3 in a million	3 in a million		
Chronic Hazard Index	Residential/ Sensitive	0.14	0.092	0.055	n/a[g]	n/a[g]	1	No
	Occupational	0.13	0.12	0.066	n/a[g]	n/a[g]		No
Acute Hazard Index	Residential/ Sensitive	0.077	n/a[h]	<1[h]	n/a[g]	n/a[g]	1	No
	Occupational	0.15	n/a[h]	<1[h]	n/a[g]	n/a[g]		No
Population Cancer Burden			**Mitigated Project Minus CEQA Baseline**		**Mitigated Project Minus Floating Future Baseline**		0.5	No
			<0		0.0033			

Notes:

[a]The "Mitigated Project" column represents the maximum Mitigated Project health values prior to subtracting baseline.

[b]Each positive result shown in the table for cancer risk, chronic HI, and acute HI represents the receptor location with the maximum modeled health value. The health values at all other modeled receptors would be less than the values in the table.

[c]The maximum health values for the "Mitigated Project", "CEQA Baseline", and "Mitigated Project Minus CEQA Baseline" shown in the table may not occur at the same receptor location. Therefore, the maximum health values for the "Mitigated Project" and "CEQA Baseline" may not necessarily subtract to equal the maximum health value for the "Mitigated Project Minus CEQA Baseline". The same is true for the "Mitigated Project", "Floating Future Baseline", and "Mitigated Project Minus Floating Future Baseline" maximum health values. The example given in the text provides more explanation on the determination of maximum health values.

[d]A CEQA Baseline increment or a Floating Future Baseline increment less than zero means that the Mitigated Project health values would be less than the CEQA baseline or Floating Future Baseline health values at all modeled receptors.

[e]The significance thresholds apply only to the two Project increments: "Mitigated Project Minus CEQA Baseline" and, for cancer risk and cancer burden, "Mitigated Project Minus Floating Future Baseline".

[f]Values displayed for individual cancer risk have been rounded to the nearest integer.

[g]Floating Future Baseline health values are not applicable to chronic and acute hazard indices, as explained in Section 2.1.

[h] The CEQA Baseline and CEQA Baseline increments for acute HI were not calculated. The increment would be below the threshold because the absolute acute HIs for the Mitigated Project are all below the threshold, and there are no values for CEQA Baseline absolute risk.

Figure A3-8. Locations of Maximum CEQA Health Impacts Estimated for Construction and Operation of Mitigated Project

It is worth noting that the maximum health values for the Mitigated Project (before subtracting Baseline), Baselines, and Project increments (Mitigated Project Minus CEQA Baseline and Mitigated Project Minus Floating Future Baseline) in Table A3-8 do not always occur at the same receptor location. This means that the displayed Mitigated Project increments are not necessarily equal to the displayed Mitigated Project results minus the displayed Baseline results, although all displayed values are correct. Instead, an increment must be calculated at each of the hundreds of modeled receptors, and the receptor with the highest increment is presented in the table.

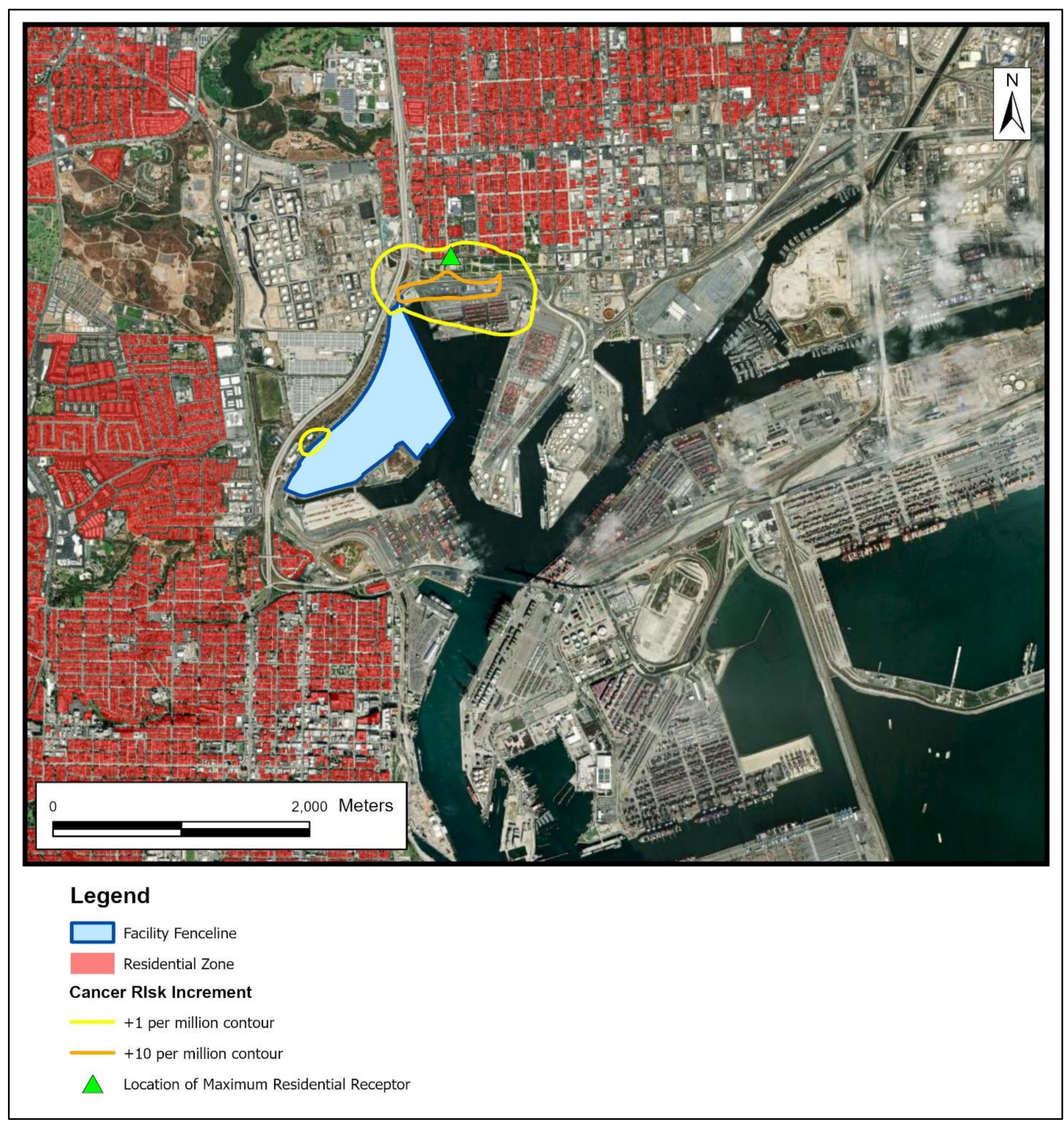
The health impacts and the incremental health impacts relative to the CEQA Baseline and Floating Future Baseline for the Mitigated Project are summarized and discussed in Sections 6.3.1 through 6.3.3 for each evaluated health endpoint.

6.3.1 Individual Cancer Risk

All individual cancer risk impacts listed in Table A3-8 are predicted to be less than significant. The maximum individual cancer risk increments for the Mitigated Project relative to the Floating Future Baseline at the maximally exposed residential/sensitive receptor and the occupational receptor are predicted to be 2 in a million and 3 in a million, respectively, and both are lower than the significance threshold. The residential/sensitive MEI receptor for cancer risk is located in the vicinity of Hawaiian Avenue and West C Street in Wilmington. The occupational MEI receptor is situated immediately adjacent to the northern boundary of the Project site, between the John South Gibson Boulevard and the West Basin.

Figure A3-9 shows individual cancer risk contours of the Mitigated Project Minus Floating Future Baseline, assuming residential (30-year) exposure parameters. Incremental risks relative to the Floating Future Baseline would always be greater than those relative to the CEQA Baseline, so only the increments relative to the Floating Future Baseline are shown in the figure.

Figure A3-9. Isopleth of Residential 30-yr Cancer Risk - Mitigated Project Minus Floating Future Baseline Increment



6.3.2 Population Cancer Burden

The cancer burden increments for the Mitigated Project are predicted to be less than the significance threshold relative to both the CEQA Baseline and Floating Future Baseline.

6.3.3 Chronic and Acute Hazard Indices

The maximum chronic and acute HI increments are predicted to be less than the significance threshold for all receptor types.

6.4 Mitigated Project Relative to the NEPA Baseline

Table A3-9 presents the maximum predicted health impacts of the Mitigated Project relative to the NEPA Baseline. The table includes estimates of individual cancer risk, chronic non-cancer HI, and acute non-cancer HI at the maximally exposed residential/sensitive and occupational receptors. Results are presented for the Mitigated Project (before subtracting baseline), NEPA Baseline, and Mitigated Project Minus NEPA Baseline increment. The table also presents the population cancer burden increments for the Mitigated Project relative to the NEPA Baseline.

Figure A3-10 show the locations of the maximum predicted individual cancer risk, chronic HI, and acute HI increments for the Mitigated Project relative to the NEPA Baseline.

Table A3-9. Maximum Health Impacts Estimated for Construction and Operation of the Mitigated Project Relative to the NEPA Baseline

Health Impact	Receptor Type	Mitigated Project[a,b,c]	NEPA Baseline - No Federal Action[b,c]	Mitigated Project Minus NEPA Baseline[b,c,d]	Significance Threshold	Threshold Exceeded?[e]
Individual Cancer Risk[f]	Residential/Sensitive	25×10^{-6}	19×10^{-6}	6.2×10^{-6}	10×10^{-6} 10 in a million	No
		25 in a million	19 in a million	6 in a million		
	Occupational	5.4×10^{-6}	4.3×10^{-6}	1.8×10^{-6}		No
		5 in a million	4 in a million	2 in a million		
Chronic Hazard Index	Residential/Sensitive	0.14	0.13	0.015	1	No
	Occupational	0.13	0.27	0.022		No
Acute Hazard Index	Residential/Sensitive	0.077	0.12	<0	1	No
	Occupational	0.15	0.25	<0		No
Population Cancer Burden			**Mitigated Project Minus NEPA Baseline**		0.5	No
			0.011			

Notes:

[a]The "Mitigated Project" column represents the maximum Mitigated Project health values prior to subtracting baseline.

[b] Each positive result shown in the table for cancer risk, chronic HI, and acute HI represents the receptor location with the maximum modeled health value. The health values at all other modeled receptors would be less than the values in the table.

[c]The maximum health values for the "Mitigated Project", "NEPA Baseline", and "Mitigated Project Minus NEPA Baseline" shown in the table may not occur at the same receptor location. Therefore, the maximum health values for the "Mitigated Project" and "NEPA Baseline" may not necessarily subtract to equal the maximum health value for the "Mitigated Project Minus NEPA Baseline". The example given in the text provides more explanation on the determination of maximum health values.

[d]A NEPA increment less than zero means that the Mitigated Project health values would be less than the NEPA baseline health values at all modeled receptors.

[e]The significance thresholds apply only to the Project increments: "Mitigated Project Minus NEPA Baseline", for cancer risk and cancer burden.

[f]Values displayed for individual cancer risk have been rounded to the nearest integer.

Figure A3-10. Locations of Maximum NEPA Health Impacts Estimated for Construction and Operation of Mitigated Project

The health impacts and the incremental health impacts relative to the NEPA Baseline for the Mitigated Project are summarized and discussed in Sections 6.4.1 through 6.4.3 for each evaluated health endpoint.

6.4.1 Individual Cancer Risk

All individual cancer risk impacts listed in Table A3-9 are predicted to be less than significant. In relation to the NEPA Baseline, the individual cancer risk at the maximally exposed residential/sensitive receptor and the occupational receptor are predicted to 6 in a million and 2 in a million, respectively, and both are lower than the significance threshold. The residential/sensitive MEI receptor for cancer risk is located at the Wilmington Waterfront Promenade, near South Avalon Boulevard and West Water Street. The occupational MEI receptor is situated immediately adjacent to the northern boundary of the Project site, between the John South Gibson Boulevard and the West Basin.

Figure A3-11 shows individual cancer risk contours of the Mitigated Project Minus NEPA Baseline, assuming residential (30-year) exposure parameters. The location of the residential/sensitive receptor with the highest individual cancer risk increment of 6 in a million is also shown in the figure.

Figure A3-11. Isopleth of Residential 30-yr Cancer Risk - Mitigated Project Minus NEPA Increment

6.4.2 Population Cancer Burden

The cancer burden increments for the Mitigated Project are predicted to be less than the significance threshold relative to the NEPA Baseline.

6.4.3 Chronic and Acute Hazard Indices

The maximum chronic and acute hazard index increments are predicted to be less than the significance threshold for all receptor types.

6.5 No Project Alternative Relative to the CEQA Baseline

Table A3-10 presents the maximum predicted health impacts of the No Project Alternative relative to the Baseline and Floating Future Baseline. The table includes estimates of individual cancer risk, chronic non-cancer HI, and acute non-cancer HI at the maximally exposed residential/sensitive and occupational receptors. Results are presented for the No Project Alternative (before subtracting baseline), CEQA Baseline, No Project Alternative Minus CEQA Baseline increment, Floating Future Baseline, and the No Project Alternative Minus Floating Future Baseline increment (the latter two categories are applicable only to cancer risk). The table also presents the population cancer burden increments for the No Project Alternative relative to the CEQA Baseline and Floating Future Baseline.

Figure A3-12 shows the locations of the maximum predicted individual cancer risk, chronic HI, and acute HI increments for the No Project Alternative relative to the CEQA Baseline and Floating Future Baseline.

Table A3-10. Maximum Health Impacts Estimated for Operation of the No Project Alternative Relative to the CEQA Baseline and Floating Future Baseline

Health Impact	Receptor Type	No Project Alternative[a,b,c]	CEQA Baseline[b,c]	No Project Alternative Minus CEQA Baseline[b,c,d]	Floating Future Baseline[b,c]	No Project Alternative Minus Floating Future Baseline[b,c,d]	Significance Threshold	Threshold Exceeded?[e]
Individual Cancer Risk[f]	Residential/ Sensitive	19×10^{-6}	41×10^{-6}	<0	33×10^{-6}	<0	10×10^{-6} 10 in a million	No
		19 in a million	41 in a million	<0 in a million	33 in a million	<0 in a million		
	Occupational	4.3×10^{-6}	6.3×10^{-6}	<0	3.4×10^{-6}	1.2×10^{-6}		No
		4 in a million	6 in a million	<0 in a million	3 in a million	1 in a million		
Chronic Hazard Index	Residential/ Sensitive	0.13	0.092	0.043	n/a[g]	n/a[g]	1	No
	Occupational	0.19	0.12	0.070	n/a[g]	n/a[g]		No
Acute Hazard Index	Residential/ Sensitive	0.12	n/a[h]	<1[h]	n/a[g]	n/a[g]	1	No
	Occupational	0.26	n/a[h]	<1[h]	n/a[g]	n/a[g]		No
Population Cancer Burden			**No Project Alternative Minus CEQA Baseline**		**No Project Alternative Minus Floating Future Baseline**		0.5	No
			<0		<0			

Notes:

[a]The "No Project Alternative" column represents the maximum No Project Alternative health values prior to subtracting baseline.

[b]Each positive result shown in the table for cancer risk, chronic HI, and acute HI represents the receptor location with the maximum modeled health value. The health values at all other modeled receptors would be less than the values in the table.

[c]The maximum health values for the "No Project Alternative", "CEQA Baseline", and "No Project Alternative Minus CEQA Baseline" shown in the table may not occur at the same receptor location. Therefore, the maximum health values for the "No Project Alternative" and "CEQA Baseline" may not necessarily subtract to equal the maximum health value for the "No Project Alternative Minus CEQA Baseline". The same is true for the "No Project Alternative", "Floating Future Baseline", and "No Project Alternative Minus Floating Future Baseline" maximum health values. The example given in the text provides more explanation on the determination of maximum health values.

[d]A CEQA Baseline increment or a Floating Future Baseline increment less than zero means that the No Project health values would be less than the CEQA Baseline or the Floating Future Baseline health values at all modeled receptors.

[e]The significance thresholds apply only to the two Project increments: "No Project Alternative Minus CEQA Baseline" and, for cancer risk and cancer burden, "No Project Alternative Minus Floating Future Baseline".

[f]Values displayed for individual cancer risk have been rounded to the nearest integer.

[g]Floating Future Baseline health values are not applicable to chronic and acute hazard indices, as explained in Section 2.1.

[h]The CEQA Baseline and CEQA Baseline increments for acute HI were not calculated. They would be below the threshold because the absolute acute HIs for the No Project Alternative are all below the threshold, and there are no values for CEQA Baseline absolute risk.

Figure A3-12. Locations of Maximum CEQA Health Impacts Estimated for Operation of No Project Alternative

It is worth noting that the maximum health values for the No Project Alternative (before subtracting Baseline), Baselines, and Project increments (No Project Alternative Minus CEQA Baseline and No Project Alternative Minus Floating Future Baseline) in Table A3-10 do not always occur at the same receptor location. This means that the displayed No Project Alternative increments are not necessarily equal to the displayed No Project Alternative results minus the displayed Baseline results, although all displayed values are

correct. Instead, an increment must be calculated at each of the hundreds of modeled receptors, and the receptor with the highest increment is presented in the table.

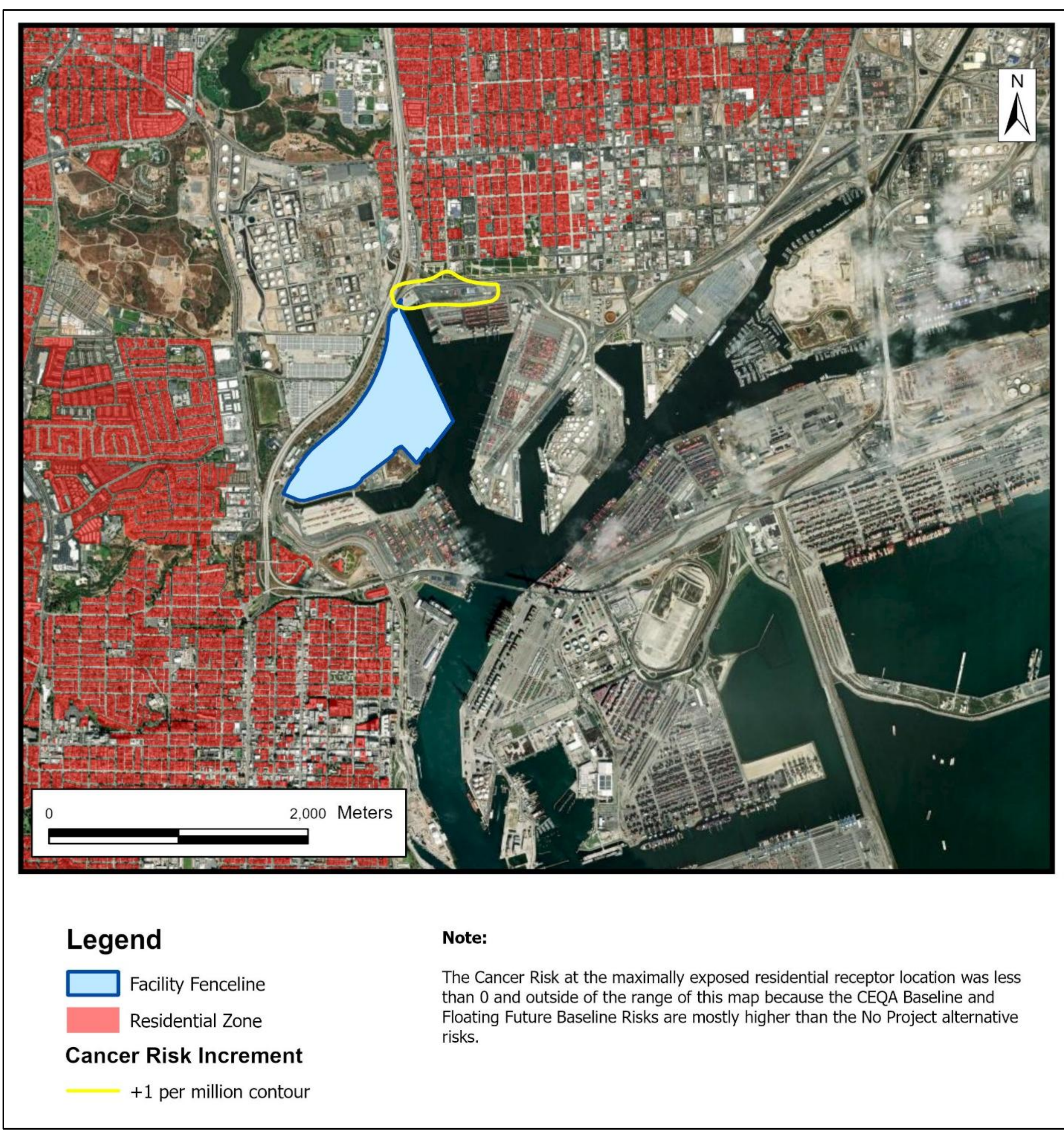
The health impacts and the incremental health impacts relative to the CEQA Baseline and Floating Future Baseline for the No Project Alternative are summarized and discussed in Sections 6.5.1 through 6.5.3 for each evaluated health endpoint.

6.5.1 Individual Cancer Risk

All individual cancer risk impacts listed in Table A3-10 are predicted to be less than significant. The maximum individual cancer risk increments for the No Project Alternative relative to the Floating Future Baseline at the maximally exposed residential/sensitive receptor and the occupational receptor are predicted to be less than zero and 1 in a million, respectively, and both are lower than the significance threshold. The occupational MEI receptor is situated immediately adjacent to the northern boundary of the Project site, between the John South Gibson Boulevard and the West Basin.

Figure A3-13 shows individual cancer risk contours of the No Project Alternative Minus Floating Future Baseline, assuming residential (30-year) exposure parameters. Incremental risks relative to the Floating Future Baseline would always be greater than those relative to the CEQA Baseline, so only the increments relative to the Floating Future Baseline are shown in the figure.

Figure A3-13. Isopleth of Residential 30-yr Cancer Risk - No Project Minus Floating Future Baseline Increment



Legend

Facility Fenceline

Residential Zone

Cancer Risk Increment

+1 per million contour

Note:

The Cancer Risk at the maximally exposed residential receptor location was less than 0 and outside of the range of this map because the CEQA Baseline and Floating Future Baseline Risks are mostly higher than the No Project alternative risks.

6.5.2 Population Cancer Burden

The cancer burden increments for the No Project Alternative are predicted to be less than the significance threshold relative to both the CEQA Baseline and Floating Future Baseline.

6.5.3 Chronic and Acute Hazard Indices

The maximum chronic and acute HI increments are predicted to be less than the significance threshold for all receptor types.

6.6 No Federal Action Alternative Relative to the CEQA Baseline

Table A3-11 presents the maximum predicted health impacts of the No Federal Action Alternative relative to the Baseline and Floating Future Baseline. The table includes estimates of individual cancer risk, chronic non-cancer HI, and acute non-cancer HI at the maximally exposed residential/sensitive and occupational receptors. Results are presented for the No Federal Action Alternative (before subtracting baseline), CEQA Baseline, No Federal Action Alternative Minus CEQA Baseline increment, Floating Future Baseline, and the No Federal Action Alternative Minus Floating Future Baseline increment (the latter two categories are applicable only to cancer risk). The table also presents the population cancer burden increments for the No Federal Action Alternative relative to the CEQA Baseline and Floating Future Baseline.

Figure A3-14 shows the locations of the maximum predicted individual cancer risk, chronic HI, and acute HI increments for the No Federal Action Alternative relative to the CEQA Baseline and Floating Future Baseline.

Table A3-11. Maximum Health Impacts Estimated for Construction and Operation of the No Federal Action Alternative Relative to the CEQA Baseline and Floating Future Baseline

Health Impact	Receptor Type	No Federal Action Alternative [a,b,c]	CEQA Baseline [b,c]	No Federal Action Alternative Minus CEQA Baseline [b,c,d]	Floating Future Baseline [b,c]	No Federal Action Alternative Minus Floating Future Baseline [b,c,d]	Significance Threshold	Threshold Exceeded ?[e]
Individual Cancer Risk[f]	Residential/ Sensitive	19×10^{-6}	41×10^{-6}	<0	33×10^{-6}	<0	10×10^{-6} 10 in a million	No
		19 in a million	41 in a million	<0 in a million	33 in a million	<0 in a million		
	Occupational	4.3×10^{-6}	6.3×10^{-6}	0.10×10^{-6}	3.4×10^{-6}	1.1×10^{-6}		No
		4 in a million	6 in a million	0 in a million	3 in a million	1 in a million		
Chronic Hazard Index	Residential/ Sensitive	0.13	0.092	0.042	n/a[g]	n/a[g]	1	No
	Occupational	0.27	0.12	0.069	n/a[g]	n/a[g]		No
Acute Hazard Index	Residential/ Sensitive	0.12	n/a[h]	<1[h]	n/a[g]	n/a[g]	1	No
	Occupational	0.25	n/a[h]	<1[h]	n/a[g]	n/a[g]		No
Population Cancer Burden			**No Federal Action Alternative Minus CEQA Baseline**		**No Federal Action Alternative Minus Floating Future Baseline**		0.5	No
			<0		<0			

Notes:

[a]The "No Federal Action Alternative" column represents the maximum No Federal Action Alternative health values prior to subtracting baseline.

[b]Each positive result shown in the table for cancer risk, chronic HI, and acute HI represents the receptor location with the maximum modeled health value. The health values at all other modeled receptors would be less than the values in the table.

[c]The maximum health values for the "No Federal Action Alternative", "CEQA Baseline", and "No Federal Action Alternative Minus CEQA Baseline" shown in the table may not occur at the same receptor location. Therefore, the maximum health values for the "No Federal Action Alternative" and "CEQA Baseline" may not necessarily subtract to equal the maximum health value for the "No Federal Action Alternative Minus CEQA Baseline". The same is true for the "No Federal Action Alternative", "Floating Future Baseline", and "No Federal Action Alternative Minus Floating Future Baseline" maximum health values. The example given in the text provides more explanation on the determination of maximum health values.

[d]A CEQA Baseline increment or a Floating Future Baseline increment less than zero means that the No Federal Action health values would be less than the CEQA baseline or the Floating Future Baseline health values at all modeled receptors.

[e]The significance thresholds apply only to the two Project increments: "No Federal Action Alternative Minus CEQA Baseline" and, for cancer risk and cancer burden, "No Federal Action Alternative Minus Floating Future Baseline".

[f]Values displayed for individual cancer risk have been rounded to the nearest integer.

[g]Floating Future Baseline health values are not applicable to chronic and acute hazard indices, as explained in Section 2.1.

[h]The CEQA Baseline and CEQA Baseline increments for acute HI were not calculated. The increment would be below the threshold because the absolute acute HIs for the No Federal Action Alternative are all below the threshold, and there are no values for CEQA Baseline absolute risk.

Figure A3-14. Locations of Maximum CEQA Health Impacts Estimated for Construction and Operation of No Federal Action Alternative

It is worth noting that the maximum health values for the No Federal Action Alternative (before subtracting Baseline), Baselines, and Project increments (No Federal Action Alternative Minus CEQA Baseline and No Federal Action Alternative Minus Floating Future Baseline) in Table A3-11 do not always occur at the same receptor location. This means that the displayed No Federal Action Alternative increments are not necessarily equal to the displayed No Federal Action Alternative results minus the displayed Baseline results, although all displayed values are correct. Instead, an increment must be calculated at each of the hundreds of modeled receptors, and the receptor with the highest increment is presented in the table.

The health impacts and the incremental health impacts relative to the CEQA Baseline and Floating Future Baseline for the No Federal Action Alternative are summarized and discussed in Sections 6.6.1 through 6.6.3 for each evaluated health endpoint.

6.6.1 Individual Cancer Risk

The maximum individual cancer risk increments for the No Federal Action Alternative relative to the Floating Future Baseline at the maximally exposed residential/sensitive receptor and the occupational receptor are predicted to be less than zero and 1 in a million, respectively, and both are lower than the significance threshold. The occupational MEI receptor is situated immediately adjacent to the northern boundary of the Project site, between the John South Gibson Boulevard and the West Basin. All other health impacts listed in Table A3-11 are predicted to be less than significant.

Figure A3-15 shows individual cancer risk contours of the No Federal Action Alternative Minus Floating Future Baseline, assuming residential (30-year) exposure parameters. Incremental risks relative to the Floating Future Baseline would always be greater than those relative to the CEQA Baseline, so only the increments relative to the Floating Future Baseline are shown in the figure.

Figure A3-15. Isopleth of Residential 30-yr Cancer Risk - No Federal Action Alternative Minus Floating Future Baseline Increment

6.6.2 Population Cancer Burden

The cancer burden increments for the No Federal Action Alternative are predicted to be less than the significance threshold relative to both the CEQA Baseline and Floating Future Baseline.

6.6.3 Chronic and Acute Hazard Indices

The maximum chronic and acute HI increments are predicted to be less than the significance threshold for all receptor types.

7.0 Source Contributions

Table A3-12 shows the emission source contributions to cancer risk for the Mitigated Project at the residential/sensitive and occupational receptor locations with the highest predicted cancer risk increments relative to the NEPA Baseline. Positive contributions reflect increasing emissions over time, while negative contributions reflect decreasing emissions over time. Emissions are modeled in ‘source groups’ according to their common modeling characteristics: fuel type (speciation), operation schedule (temporal), relative location in the modeling domain (spatial). The highest source contributor to the cancer risk is from diesel-fueled sources such as line haul, switchers, cargo handling equipment, trucks and dredging equipment (used during construction). These would contribute to 99 percent or higher of the total incremental risk.

Table A3-12. ource Contributions to Cancer Risk at the Maximum Increment Receptors for the Mitigated Project Relative to the NEPA Baseline

Source Category	Residential Receptor		Occupational Receptor	
	Incremental Risk	% Total Incremental Risk	Incremental Risk	% Total Incremental Risk
Rail Offsite Operations	5.4	87.8%	0.022	1.2%
Rail On Dock Operations	0.74	12.1%	1.77	97.0%
Trucks Offsite Driving	0.11	1.8%	0.20	10.8%
Ocean Going Vessels	0.049	0.8%	0.07	4.0%
Trucks Onsite Driving/Idling	0.0093	0.2%	0.0050	0.3%
Construction Onsite Equipment	0.0013	0.2%	0.0015	0.1%
Worker Vehicles Offsite	0.00034	0.0%	0.00055	0.0%
Worker Vehicles Onsite Driving	0.000034	0.0%	0.000029	0.0%
Harbor Craft	-0.010	-0.2%	0.00011	0.0%
Total	**6.2**	**100%**	**1.8**	**100%**

Note: numbers may not add up due to rounding.

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 to each other and to significance criteria. Consistent with agency guidelines and standard approaches to regulatory risk assessment, this risk assessment used health-protective (conservative) assumptions to provide a margin of safety with respect to human health. OEHHA has provided a discussion of risk uncertainty, which is reiterated here (OEHHA 2015):

OEHHA has striven to use the best science available in developing these risk assessment guidelines. However, 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 overestimate or underestimate risk, include: 1) extrapolation of toxicity data in animals to humans, 2) uncertainty in the estimation of emissions, 3) uncertainty in the air dispersion models, and 4) uncertainty in the exposure estimates. In addition to uncertainty, there is a natural range or variability in measured parameters defining the exposure scenario. Scientific studies with representative sampling and large enough sample sizes can characterize this variability. In the specific context of a Hot Spots risk assessment, the source of variability with the greatest quantitative impact is variation among the human population in such properties as height, weight, food consumption, breathing rates, and susceptibility to chemical toxicants. OEHHA captures at least some of the variability in exposure by developing data driven distributions of intake rates, where feasible, in the TSD for Exposure Assessment (OEHHA, 2012).

Interactive effects of exposure to more than one carcinogen or toxicant are addressed in the risk assessment with default assumptions of additivity. Cancer risks from all carcinogens addressed in the HRA are added. Similarly, non-cancer hazard quotients for substances impacting the same target organ/system are added to determine the hazard index (HI). Although such effects of multiple chemicals are assumed to be additive by default, several examples of 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. In most cases, cancer potency values have been estimated only for the single most affected tumor site. This represents a source of uncertainty in the cancer risk assessment. Adjustment for tumors at multiple sites induced by some carcinogens may result in a higher potency. Some recent assessments of carcinogens include such adjustments. Other uncertainties arise 1) in the assumptions underlying the dose-response model used, and 2) in extrapolating from large experimental doses, where other toxic effects may compromise the assessment of carcinogenic potential, to usually much smaller environmental doses.

When occupational epidemiological data are used to generate a carcinogenic potency or a health protective level for a non-carcinogen, less uncertainty is involved in the extrapolation from workplace exposures to environmental exposures. When using human data, no interspecies extrapolation is necessary, eliminating a significant source of uncertainty. However, children are a subpopulation whose hematological, nervous, endocrine, and immune systems, for example, are still developing and who may be more sensitive to the effects of toxicants on their developing systems. The worker population and risk estimates based on occupational epidemiological data are more uncertain for children than adults. Current risk assessment guidelines include procedures designed to address the possibly greater sensitivity of infants and children, but there are only a few

compounds for which these effects have actually been measured experimentally. In most cases, the adjustment relies on default assumptions which may either underestimate or overestimate the true risks faced by infants and children exposed to toxic substances or carcinogens.

Risk estimates generated by an HRA should not be interpreted as the expected rates of disease in the exposed population but rather as estimates of potential for disease, based on current knowledge and a number of assumptions.

In the Hot Spots program, cancer risk is often expressed as the maximum number of new cases of cancer projected to occur in a population of one million people due to exposure to the cancer-causing substance over a 30-year residential period. However, there is uncertainty associated with the cancer risk estimate. An individual's risk of contracting cancer from exposure to facility emissions may be less or more than the risk calculated in the risk assessment. An individual's risk not only depends on the individual's exposure to a specific chemical but also on his or her genetic background, health, diet, lifestyle choices and other environmental and workplace exposures. OEHHA uses health-protective exposure assumptions to avoid underestimating risk. For example, the risk estimate for airborne exposure to chemical emissions uses the health protective assumption that the individual has a high breathing rate and exposure began early in life when cancer risk is highest.

A Reference Exposure Level (REL) is the concentration level at or below which no adverse non-cancer health effects are anticipated for the specified exposure duration. RELs are based on the most sensitive, relevant, adverse health effect reported in the medical and toxicological literature. RELs are designed to protect the most sensitive individuals in the population by the inclusion of factors that account for uncertainties as well as individual differences in human susceptibility to chemical exposures. The factors used in the calculation of RELs are meant to err on the side of public health protection in order to avoid underestimation of non-cancer hazards. Exceeding the REL does not automatically indicate an adverse health impact. However, increasing concentrations above the REL value increases the likelihood that the health effect will occur.

Risk assessments under the Hot Spots program are often used to compare one source with another and to prioritize concerns. Consistent approaches to risk assessment are necessary to fulfill this function.

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