Appendix D Air Quality Impact Analysis and Health Risk Assessment Technical Report

AIR QUALITY IMPACT ANALYSIS

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1. EXECUTIVE SUMMARY

Trinity Consultants has completed an Air Quality Impact Analysis (AQIA), pursuant to the California Environmental Quality Act (CEQA), for the continuance of the Signal Hill Petroleum, Inc. (SHP) existing oil and gas operations at seven existing "Oil Operation Sites" and "Drill Sites" located throughout the City of Signal Hill, California. SHP is a privately owned, California-based energy company that sustainably explores, develops, and produces oil and gas resources in urban areas throughout the state. SHP currently operates the seven existing oil and gas extraction and processing sites (herein referred to as CUP Sites) under one consolidated Conditional Use Permit (CUP) (Record No. 97-03).

At this time, SHP is seeking the continuance of their existing oil and gas operations at the seven (7) CUP Sites (i.e., CUP 97-03) for twenty (20) years beyond its current term which ends in 2023 (the "Project"). In addition to the continuance of SHP's existing oil and gas operations, which would include the drilling of new wells (up to 46 new wells), and the redrilling of existing wells (up to 26 total) on an as needed basis consistent with existing operations, SHP is also proposing to install redundancy and efficiency modifications to the existing natural gas system located at CUP Site #2. Lastly, new well cellars (up to 20 total) may also be constructed at the CUP Sites on an as needed basis.

The Project's continued operations, as well as construction and operation of the gas system modifications at CUP Site #2, would have the potential to generate the following criteria pollutant emissions: reactive organic gases (ROG), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and suspended particulate matter (PM_{10} and $PM_{2.5}$). Project operations would continue to generate air pollutant emissions from mobile sources (diesel consumption from equipment/truck vehicle activity), energy sources (electricity and natural gas usage), operational sources (gas plant operations emissions and drilling and redrilling activities), and area sources (fugitive emissions from pipeline connections). Project construction and operational activities would also generate greenhouse gas (GHG) emissions. Criteria and GHG emissions were estimated using appropriate emission factors from the California Emissions Estimator Model (CalEEMod) version 2020.4.0 (California Air Pollution Control Officers Association (CAPCOA, 2021), which is the most current version of the model approved for use by the South Coast Air Quality Management District (South Coast AQMD), and emission factors from annual emissions data reported to South Coast AQMD through the Annual Emissions Reporting (AER) portal.

Table 6-6 presents the Project's construction emissions estimates and provides substantial evidence to support a *less than significant* air quality impact on the South Coast Air Basin under CEQA. **Table 6-7** presents the Project's operations emissions estimates and provides substantial evidence to support a *less than significant* air quality impact on the South Coast Air Basin under CEQA. Based on the foregoing conclusions, the Project is considered to have *less than significant* air quality impacts on the South Coast Air Basin under CEQA.

This AQIA has the following findings with respect to air quality and GHG, which address the specific impact statements within the CEQA Guidelines Appendix G Environmental Checklist Form (California Code of Regulations, Title 14):

Air Quality

CEQA Guidelines Appendix G Environmental Checklist – Criteria a): The Project would not conflict with or obstruct implementation of any applicable air quality plan (see Section 6.2.1).

The Project would be required to comply with regional air quality rules promulgated by the South Coast AQMD and participate in reducing air pollutant emissions. Specifically, air quality impacts from proposed projects

within City of Signal Hill are controlled through policies and provisions of the City of Signal Hill General Plan, South Coast AQMD's Final 2016 Air Quality Management Plan (AQMP), South Coast AQMD's final 2022 AQMP, and Southern California Association of Government's (SCAG's) 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (SCAG, 2020). In order to demonstrate that a proposed Project would not cause further air quality degradation in either the South Coast AQMD's plan to improve air quality within the air basin, or the federal requirements to meet certain air quality compliance goals, each project should also demonstrate consistency with the South Coast AQMD's adopted Air Quality Attainment Plans (AQAP) for O_3 and PM_{10}. The South Coast AQMD is required to submit a "Rate of Progress" document to the California Air Resources Board (CARB) that demonstrates past and planned progress toward reaching attainment for all criteria pollutants. The California Clean Air Act (CCAA) requires air pollution control districts with severe or extreme air quality problems to provide for a 5% reduction in non-attainment emissions per year. The AQAP prepared for the South Coast Air Basin by the South Coast AQMD complies with this requirement. CARB reviews, approves or amends the document and forwards the plan to the U.S. Environmental Protection Agency (U.S. EPA) for final review and approval within the State Implementation Plan (SIP).

As the continuance of existing operations represented by the proposed Project, and any future growth that may or may not result, is already included in the City of Signal Hill General Plan and the AQAP, conclusions may be drawn from the following criteria:

1. That, by definition, the proposed emissions from the Project are below the South Coast AQMD's established emissions impact thresholds;
2. That the primary source of emissions from the Project will be existing oil and gas drilling and handling operations and motor vehicles that are licensed through the State of California and whose emissions are already incorporated into CARB's South Coast Air Basin's Emissions Inventory.

Based on these factors, the proposed Project is consistent with the AQAP. Therefore, the Project would not obstruct implementation of applicable South Coast AQMD air quality plans and therefore be less than significant.

CEQA Guidelines Appendix G Environmental Checklist – Criteria b): The Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state AAQS (see Section 6.2.2).

Table 6-2, Table 6-6, and **Table 6-7** present the daily emissions for each criteria pollutant associated with both the existing operations, as well as the Project emissions, and the associated significance criteria established by South Coast AQMD. As required by CEQA, the level of significance is determined by the net change (or increment) between pre-project environmental conditions (baseline) and post-project (future) environmental conditions. CEQA does not require an analysis of a proposed Project's existing (or historical) operations. Instead, CEQA requires an analysis of how the proposed Project will incrementally change the existing environmental conditions. Nonetheless, for disclosure purposes, both existing as well as future Project emissions have been disclosed within this AQIA. The baseline emissions, as well as both Project construction and Project operational emissions are below the South Coast AQMD significance thresholds for all criteria pollutants. Therefore, potential impacts would be less than significant.

If a project will comply with the requirements in a previously approved plan or mitigation program, including but not limited to an air quality attainment or maintenance plan that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area in which the project is located, then the project's incremental contribution to a cumulative effect is not cumulatively considerable (CEQA Guidelines §15064(h)(3)). The impact analysis for a project's potential to exceed or contribute to exceedance

of an ambient air quality standard (AAQS) involves modeling emissions to predict the concentration of pollutant(s) at the property line.

As shown in **Table 6-8** and **Table 6-9**, criteria pollutant emission increases associated with the Project do not exceed applicable thresholds. Therefore, Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state AAQS, and therefore potential impacts would be less than significant.

CEQA Guidelines Appendix G Environmental Checklist – Criteria c): The Project would not expose sensitive receptors to substantial pollutant concentrations (see Section 6.2.3).

The Project's health risk assessment was conducted as described in Section 5.2.4 and estimates cancer risk and non-cancer chronic and acute hazards from toxic air contaminants (TACs) to nearby worker, resident, and/or sensitive receptor locations. **Table 6-11**, **Table 6-12,** and **Table 6-13** present health risk assessment results for the Project and compares them to applicable thresholds. Health risk is determined based on the change in conditions associated with the implementation of the Project. Nonetheless, as was done for the criteria pollutants as described above, for disclosure purposes both existing as well as future Project health risk affects have been quantified and are disclosed within this AQIA. As demonstrated by the tables, the Project's potential health risk impact was determined to be less than significant.

CEQA Guidelines Appendix G Environmental Checklist – Criteria d): The Project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people (see Section 6.2.4).

Baseline conditions include similar sources to the Project sources that could cause odor. The CUP Sites include operations subject to South Coast AQMD Rule 1148.1, which requires SHP to maintain an Odor Mitigation Plan that includes monitoring and mitigation requirements if there is a violation of South Coast AQMD Rule 402 or there are three confirmed odor events in six months. In addition, South Coast AQMD has additional regulations that require facilities not to present a nuisance to the adjacent areas. Odor complaints are addressed under the South Coast AQMD nuisance rule (Rule 402). The Project would continue to comply with South Coast AQMD rules and regulations. Therefore, Project impacts related to odor are less than significant.

Greenhouse Gas (GHG)

CEQA Guidelines Appendix G Environmental Checklist – Criteria a): The Project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment (see Section 6.2.5).

SHP is subject to U.S. EPA's Greenhouse Gas Reporting Program (GHGRP) and California's Mandatory Reporting of Greenhouse Gas Emissions (MRR) for GHG reporting. As a result, SHP has submitted its GHG emissions data to both U.S. EPA and CARB in the required reporting years and maintains a plan for accurately capturing and recording this data. As required by CARB, SHP has and would continue to have its GHG emissions data reports verified each year by a CARB-accredited verification body. In 2020, SHP emitted a verified 41,756 metric tons (MT) of carbon dioxide equivalent (CO_2e) from its oil and gas production activities, which includes the usage of natural gas and other fuels from stationary source operations (please note these emissions do include indirect emissions associated with electricity use). Given these reported GHG emissions do not include GHG emissions from mobile sources (e.g., trucks or passenger vehicles), those were estimated and reported in **Table 3-12**.

GHG emissions have been quantified for the Project, primarily for disclosure purposes. **Table 6-10** in Section 6.1.3.7 includes the GHG emissions from mobile sources and indirect electricity for the Project. As shown in **Table 6-10**, the proposed Project will increase SHP's GHG emissions by approximately 1,197.6 MT CO_2e/year, most of which is due to indirect electricity consumption, and therefore is subject to Cap and Trade requirements.

Although the Project would generate approximately 1,197.6 MT CO_2e/year GHGs from electricity use and combustion of gasoline/diesel fuels, each of these is regulated near the top of the supply-chain. As such, each citizen of California (including SHP) has and will continue to have no choice but to purchase electricity and fuels produced in a way that is acceptable to the California market. Thus, Project GHG emissions will be consistent with the relevant plan (i.e., AB 32 Scoping Plan). The Project would meet its fair share of the cost to mitigate the cumulative impact of global climate change because SHP is purchasing energy from the California market. Thus, the Project would have a less than significant impact on applicable GHG reduction plans.

Nonetheless, GHG emissions impacts from implementing the Project were calculated at the Project-specific level for construction and operations as explained further in Section 6.2.5. Impact analysis for the Project follows the approach certified by South Coast AQMD in the Final Negative Declaration for the Phillips 66 Los Angeles Refinery Carson Plant – Crude Oil Storage Capacity Project on December 12, 2014 (South Coast AQMD, 2014), which takes into account the cumulative nature of the energy industry and recognizes that consumers of electricity and diesel fuel are in effect regulated by higher level emissions restrictions on the producers of these energy sources. Thus, the proposed Project would have a less than significant GHG impact, with no mitigation measures would be required.

CEQA Guidelines Appendix G Environmental Checklist – Criteria b): The Project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. Potential conflicts with applicable air quality plans have been analyzed and ruled out (see Section 6.2.5).

Project emissions of GHGs are presented in **Table 6-10** below. South Coast AQMD guidance on impact analysis and threshold determination for GHGs were used to evaluate significance of Project GHG emissions. The Project would emit GHGs from fuel burned in engines, and from electricity consumption. Transportation fuel suppliers and importers are required to report emissions under the Cap-and-Trade which is designed to reduce GHG emissions as needed to achieve emissions reductions described in related planning documents which primarily consists of the Assembly Bill (AB) 32 Scoping Plan. Thus, the emissions reductions will occur at a level in the supply chain above the Project which will have no choice but to use fuels with GHG intensities that are consistent with the current Scoping Plan.

In summary, GHG emissions from the Project are less than the South Coast AQMD GHG screening criteria. In addition, each Project source would emit GHGs in amounts consistent with the AB 32 Scoping Plan. Therefore, the Project's potential impact related to GHG emissions is less than significant.

2. INTRODUCTION

2.1 Purpose

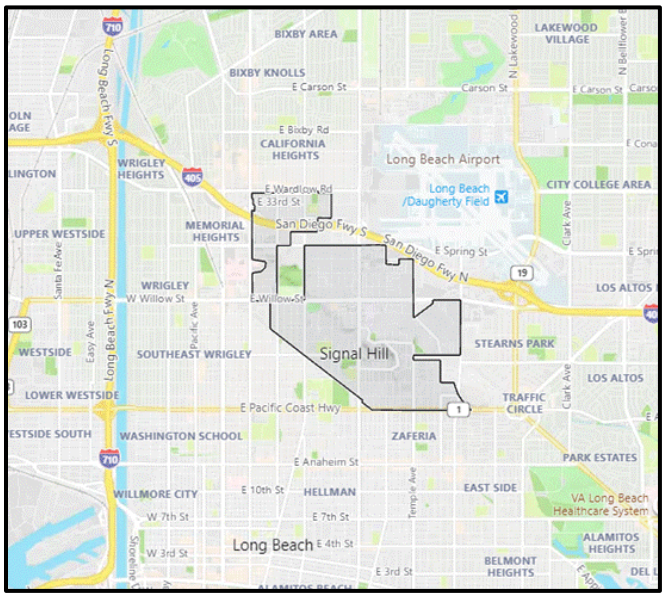
This AQIA was prepared pursuant to the South Coast AQMD CEQA Air Quality Handbook (South Coast AQMD, 1993, Revision: 2022a), other guidance resources posted on its webpage[1], and the California Environmental Quality Act (CEQA) Statute and Guidelines (CEQA 2022). This AQIA addresses City of Signal Hill's scoping direction as the CEQA Lead Agency for this technical report.

2.2 Existing Operations

Signal Hill Petroleum, Inc. (SHP) is a privately owned, California-based energy company that sustainably explores, develops, and produces oil and gas resources in urban areas throughout the state. SHP currently operates seven existing "Oil Operation Sites" and "Drill Sites", as defined in the City of Signal Hill – Municipal Code, located throughout the City of Signal Hill (City) under one consolidated Conditional Use Permit (CUP) (Record No. 97-03). CUP 97-03 was first approved by the City in 1998, and SHP has operated the CUP Sites for the current 23-year aggregate term in compliance with the existing CUP conditions of approval, the City's Municipal Code, and the regulatory requirements of other regulatory agencies as applicable. Additionally, the seven sites that comprise CUP 97-03 (collectively referred to herein as the "CUP Sites") have undergone previous CEQA reviews, resulting in two Mitigated Negative Declarations (MNDs) certified by the City in 1997 and 2002 respectively, and a Categorical Exemption (CatEx) in 2012. Additionally, the South Coast Air Quality Management District ("South Coast AQMD") approved a Subsequent Mitigated Negative Declaration (SMND) in 2015 for proposed changes to the natural gas processing facilities at CUP Site #2.

Figure 2-1 depicts the regional location and **Figure 2-2** depicts an aerial view of the Project location.

Figure 2-1. Regional Location



[1] South Coast AQMD CEQA guidance documents are located here: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook

Figure 2-2. Project Location

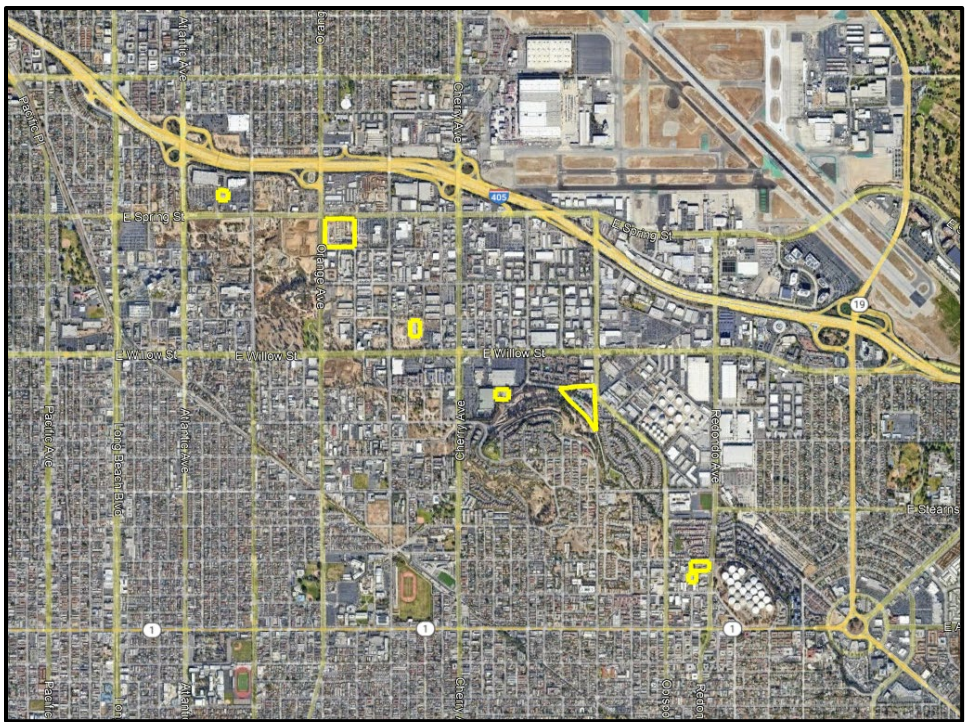
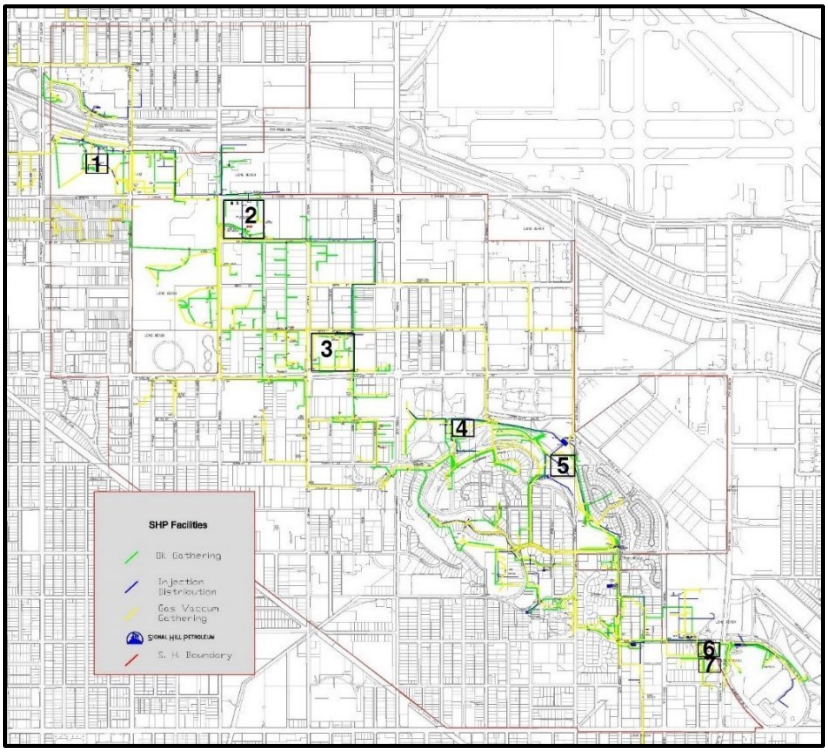


Figure 2-3 depicts the Project's location of the seven SHP CUP drill sites.

Figure 2-3. Project Site Plan



2.3 Proposed Project

SHP is now seeking the continuance of their existing oil and gas operations covered under CUP 97-03 for twenty (20) years beyond its current term which ends in 2023 (the "Project"). As part of the Project, SHP is also proposing to install redundancy and efficiency modifications to the existing natural gas system located at CUP Site #2. Other than the proposed redundancy and efficiency modifications to the existing gas system at CUP Site #2, the Project would include no substantial changes to SHP's existing operations, previously evaluated under the 1997, 2002, and 2012 CEQA reviews and City approvals. SHP would continue to operate the existing oil and gas facilities in the same manner and with the same equipment as they have historically, and SHP is not seeking any amendments or modifications to the CUP that would expand the activities authorized under the CUP's existing terms.

SHP would also continue to drill new wells and redrilling/rework existing wells at the CUP Sites on an as needed basis. Additionally, although SHP would continue drilling/redrilling operations within the existing well cellars at each CUP Site, at times a new ancillary well cellar may need to be created. However, both drilling/redrilling and new well cellar construction has occurred historically at the CUP Sites, and the Project does not propose any significant changes or increases in these onsite activities. Furthermore, the CUP Sites would continue to operate in accordance with the City's Municipal Oil and Gas Code, existing conditions of approval and mitigation measures, and in continue compliance with existing county, state and federal requirements, including Geologic Energy Management Division (CalGEM) and South Coast AQMD regulations.

Under the proposed Project, the existing facility boundaries would not change or expand, and all operations (existing and proposed) would continue to occur within the existing permitted CUP footprint(s) and consistent with current and historical norms. Specifically, SHP would continue the following general operations at their seven (7) CUP Sites:

- Well servicing and maintenance;
- Drilling and redrilling operations;
- Oil processing, storage and transfer;
- Natural gas and natural gas liquids processing, storage, and transfer;
- Produced water separation and injection facilities; and
- Electrical production from a natural gas turbine powered generator.

The Project would also not modify the existing production levels or methods, hours of operation, materials to be extracted, processed and sold, the number or type of onsite equipment (mobile equipment, drilling rigs, etc.), or the number of onsite employees.

Although cyclical fluctuations are a natural aspect of the oil and gas industry, the Project is a continuation of existing operations, and as such there are no proposed changes to the level of future drilling that would occur. While new wells would continue to be drilled and existing wells redrilled on an as needed basis, these activities would not occur outside the existing CUP boundaries/facilities, and the drilling/redrilling activity levels assumed throughout for the proposed 20-year extension of the existing operations under CUP 97-03 is forecasted to be consistent with historical operations. Specifically, wells would continue to be drilled/redrilled during the life of the CUP to replace lost production capacity, and therefore the total quantity of oil, natural gas, and water produced by extraction operations would not change or increase above existing levels. Continued drilling/redrilling would also not require the installation of additional ancillary equipment, as SHP's existing storage, transmission, and processing facilities located within the seven CUP Sites have sufficient capacity to continue to serve extraction operations throughout the proposed 20-year continuance of the existing operations under CUP 97-03.

Existing operations currently occurring at the CUP Sites per CUP 97-03 are the "baseline" against which the proposed Project's potential impacts to air quality have been analyzed to determine whether the Project will result in a potentially significant environmental impact under CEQA. CEQA does not require an analysis of a proposed Project's existing (i.e., baseline or historical) operations. Instead, CEQA requires an analysis of how the proposed Project will incrementally change the existing environmental conditions. Nonetheless, in certain instances, baseline emissions and related health effects have been quantified within this AQIA for disclosure purposes.

Additionally, although drilling and redrilling operations have and would continue to occur at the same activity levels, because new well drilling and re-drilling/reworking would require a discretionary CalGEM permit, these existing activities are treated as "new" and therefore considered a part of the proposed Project. Additionally, installation of new well cellars as well as the construction and operation of the proposed gas system modifications at CUP Site #2 are also new emissions sources evaluated as part of the proposed Project.

2.3.1 Natural Gas Processing Facility Modification

As part of the Project, SHP is proposing to modify its current natural gas processing system at CUP Site #2 by adding a back-up low temperature separation unit ("LTS") and a back-up membrane unit for the removal of inert gas. SHP will also connect to a new gas sales meter and pipeline provided by the SoCal Gas Company ("SCG"). The SCG sales outlet will be in addition to and provide back-up to the current Long Beach Energy gas sales outlet. A booster compressor will be added to provide the line pressure required to move gas into the SCG system. Finally, SHP will add a "CEB" technology clean burning combustion unit to handle waste gas streams that currently are recycled through the facility. The proposed modifications at CUP Site #2 will give SHP operational flexibility and back-up capacity for its critical gas processing equipment.

The proposed LTS unit will be sized to process 2,000 thousand standard cubic feet ("MCF") of natural gas per day (MCF/day), and the membrane unit sized to process 1,500 MCF/day. Both pieces of equipment will be sized at lower process rates than the current equipment, which will ensure operational efficiency. The current LTS capacity is 4,000 MCF/day and the membrane unit is 2,500/day. Ultimately, the addition of the backup LTS and membrane units to facilitate the SCG connection will allow for improved operational efficiency and flexibility for the entire natural gas processing system at CUP Site #2; however, it would not require installation of additional equipment at other CUP Sites or facilitate an increase in the total quantity of natural gas extracted under CUP 97-03.

The booster compressor and CEB burner will be installed in Phase 1 following approval of the Project. The LTS and membrane units will be installed in Phase 2, estimated to occur sometime in 2024. The construction process and timing will be virtually identical for the two Phases. Specifically, each Phase will span approximately 12 weeks. The construction process will start with excavations for underground process piping, electrical conduits, and control cable conduits as well as reinforced concrete foundations for each piece of equipment. Process piping and electrical conduits in and around the actual equipment packages will be located aboveground. The LTS and membrane units will come with certain piping and controls already installed and mounted on an independent steel skid unit. The skid units will be installed on the foundations and secured per the foundation plans.

Other than the installation and operation of the redundancy and efficiency modifications to the existing natural gas system, no changes to the existing natural gas processing facilities or structures at CUP Site #2 are proposed as part of this Project.

2.3.2 Drilling / Redrilling and Well Cellar Construction

In accordance with the existing CUP 97-03, as well as applicable City and CalGEM requirements, SHP has and would continue to drill new wells and redrill existing wells (both production and injection wells) at the seven CUP Sites on an as needed basis. As with current operations, these activities would continue to occur entirely within the existing CUP boundaries. For the purposes of this CEQA assessment, all future drilling and redrilling proposed to occur during the 20-year continuance of the Project operations under CUP 97-03, and the resulting air emissions and health risk effects, has been included as part of the proposed Project impact analysis.

As discussed above, SHP's oil and gas production has been, and will continue to be, cyclical and dependent upon market demands, economic cycles, and other factors beyond SHP's control (e.g., geological studies, production capacity of wells drilled, availability of required materials and services, etc.). As such, SHP's drilling/redrilling activities for both production and injection wells have and will continue to vary from year to year.

Although cyclical fluctuations are a natural aspect of the oil and gas industry, the Project is a continuation of existing operations, and as such the level of future drilling for the proposed 20-year continuance of the Project operations under CUP 97-03 is forecasted to be consistent with historical operations. Specifically, wells would continue to be drilled/redrilled during the life of the CUP to replace lost production capacity, and therefore the total quantity of oil, natural gas, and water produced by extraction operations would not change or increase above existing levels. Continued drilling/redrilling would also not require the installation of additional ancillary equipment, as SHP's existing storage, transmission, and processing facilities located within the seven CUP sites have sufficient capacity to continue to serve extraction operations throughout the proposed 20-year extension of the CUP.

Table 2-1 below summarizes SHP's forecasted future drilling/redrilling and new well cellar activity that could occur at each individual CUP Site during the life of the Project. Project air emissions have been estimate based on the total allowable drilling, redrilling and new well cellars over the proposed 20-year life of the CUP, specifically no more than 46 new wells, no more than 26 redrills of existing wells, and no more than 20 new well cellars. While the cumulative criteria pollutant emissions are based on this maximum activity levels across all CUP Sites, the health risk associated with the Project are based on the maximum level of future drilling/redrilling and new well cellar construction activity levels that could be potentially allowed at each individual CUP Site, as detailed in **Table 2-1** below. These maximum limits were developed based on the physical and operational constraints of each CUP Site.

Table 2-1. Maximum Future Drilling/Redrilling Activity at Each CUP Site

CUP Site	Drilling (new wells)	Redrilling (existing wells)	New Well Cellars
CUP Site #1	10	10	10
CUP Site #2	10	15	5
CUP Site #3	15	10	5
CUP Site #4	15	10	5
CUP Site #5	15	12	5
CUP Site #6	2	2	2
CUP Site #7	2	1	2
Total Maximum for all CUP Sites (over the 20-Year permit term)	**46**	**28**	**20**

Note: The individual CUP Site numbers shown above do not equal the cumulative maximum activity levels across all CUP Sites (e.g., adding new well capabilities for each site above equals 69 total new wells, not 46). This is intended to allow for flexibility with the implementation of the CUP at each site while also maintaining the maximum activity limits across all the CUP Sites over the proposed 20-year CUP term. For example, if SHP were to construct 10 new well cellars at CUP Site #1, they would only be allowed to construct no more than 10 additional well cellars across the remainder of their CUP Sites.

Generally, SHP would continue drilling/redrilling operations within the existing well cellars at each CUP Site; however, consistent with past operations, at times a new ancillary well cellar may need to be created. As with SHP's current protocols, new well cellars are created by excavating a shallow hole (approximately 6-feet wide, 6-feet long, and 5-feet deep) using a backhoe type excavator. Once excavation is complete, a pre-cast concrete box or a large diameter galvanized round steel pipe is placed into the excavation hole to secure the new well cellar.

To construct a new well cellar, at most the backhoe would have to operate at the given CUP Site for no more than 4 hours to excavate the necessary depression. The pre-cast concrete box would then be transported to the appropriate CUP Site via delivery truck. As such, well cellar construction can generally be completed within a single day, using SHP's existing equipment and onsite employees. SHP anticipates that no more than 20 new well cellars would be constructed over the proposed 20-year continued term of CUP 97-03.

3. ENVIRONMENTAL SETTING

Protection of public health is maintained through the attainment and maintenance of ambient air quality standards (AAQS) for various atmospheric compounds and the enforcement of emissions limits for individual stationary sources. The Federal Clean Air Act requires that the U.S. Environmental Protection Agency (U.S. EPA) establish National AAQS (NAAQS) to protect the health, safety, and welfare of the public. NAAQS have been established for ozone (O_3), CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$, and lead (Pb). California has also adopted AAQS (CAAQS) for these "criteria" air pollutants. CAAQS are more stringent than the corresponding NAAQS and include standards for hydrogen sulfide (H_2S), vinyl chloride (chloroethene), and visibility reducing particles. The U.S. Clean Air Act Amendments of 1977 required each state to identify areas that were in non-attainment of the NAAQS and to develop State Implementation Plans (SIP's) containing strategies to bring these non-attainment areas into compliance. NAAQS and CAAQS designation/classification for Los Angeles County are presented in Section 3.1 below.

Responsibility for regulation of air quality in California lies with the California Air Resources Board (CARB) and the 35 local air districts with oversight responsibility held by the U.S. EPA. CARB is responsible for regulating mobile source emissions, establishing CAAQS, conducting research, managing regulation development, and providing oversight and coordination of the activities of the 35 air districts. The air districts are primarily responsible for regulating stationary source emissions and monitoring ambient pollutant concentrations. CARB also determines whether air basins, or portions thereof, are "unclassified," in "attainment" or in "non-attainment" for the NAAQS and CAAQS relying on statewide air quality monitoring data.

3.1 Meteorological Conditions

The South Coast AQMD's jurisdiction consists of a four-county region which includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, the Riverside County portion of the Salton Sea Air Basin, and the non-Palo Verde, Riverside County portion of the Mojave Desert Air Basin. The South Coast AQMD region is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. SHP CUP sites are located within the Los Angeles County portion of the Basin.

The climate in the South Coast Air Basin (Basin) is generally characterized by sparse winter rainfall and hot summers tempered by cool ocean breezes. A temperature inversion, a warm layer of air that traps the cool marine air layer underneath it and prevents vertical mixing, is the prime factor that allows contaminants to accumulate in the Basin. The mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds. The climate of the area is not unique, but the high concentration of mobile and stationary sources in the western portion of the Basin, in addition to the mountains, which surround the perimeter of the Basin, contribute to air quality challenges in the region.

3.2 Temperature and Rainfall

Local winds are the result of temperature differences between the relatively stable ocean air and the uneven heating and cooling that takes place in the Basin due to a wide variation in topography. Temperature also has a major effect on vertical mixing height and affects chemical and photochemical reaction times. The annual average temperature across the Basin is 75°F. The coastal areas show little variation in temperature on a year-round basis due to the moderating effect of the marine influence. On average, August is the warmest month while January is the coolest month. Most of the annual rainfall in the Basin falls between November and April. Annual average rainfall varies from nine (9) inches in Riverside to fourteen (14) inches in downtown Los Angeles.

Meteorological data for various monitoring stations is maintained by the Western Regional Climate Center. Meteorological data for the Project site is expected to be similar to the data recorded at Long Beach Daugherty Field which is located one to two miles north/northeast of the Project site(s). This data is provided in **Table 3-1**. Over the 67-year period from 1949 through 2016 (the most recent data available), the average annual precipitation was 12.01 inches.

Table 3-1. Weather Data

Period of Record Monthly Climate Summary for the Period 01/01/1949 to 06/09/2016													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Maximum Temp (F)	67.1	67.2	68.4	71.7	73.5	76.9	82.2	83.9	82.3	77.9	72.2	67.0	74.2
Avg. Minimum Temp (F)	45.6	47.3	49.7	52.4	56.8	60.3	63.7	64.9	62.9	57.9	50.5	45.3	54.8
Average Total Precipitation (in.)	2.63	2.90	1.83	0.70	0.20	0.06	0.02	0.06	0.19	0.42	1.21	1.8	12.01
Average Snowfall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0
Percent of possible observations for period of record: Max. Temp.: 100% Min. Temp.: 100% Precipitation: 100% Snowfall: 90% Snow Depth: 90.4%													
Source: Western Regional Climate Center													

3.3 Wind Flow Patterns

Wind flow patterns play an important role in the transport of air pollutants in the Basin. The winds flow from offshore and blow eastward during the daytime hours. In summer, the sea breeze starts in mid-morning, peaks at 10-15 miles per hour, and subsides after sundown. There is a calm period until about midnight. At that time, the land breeze begins from the northwest, typically becoming calm again about sunrise. In winter, the same general wind flow patterns exist, except that summer wind speeds average slightly higher than winter wind speeds. This pattern of low wind speeds is a major factor that allows the pollutants to accumulate in the Basin. The normal wind patterns in the Basin are interrupted by the unstable air accompanying the passing storms during the winter, and infrequent strong northeasterly Santa Ana wind flows from the mountains and deserts north of the Basin.

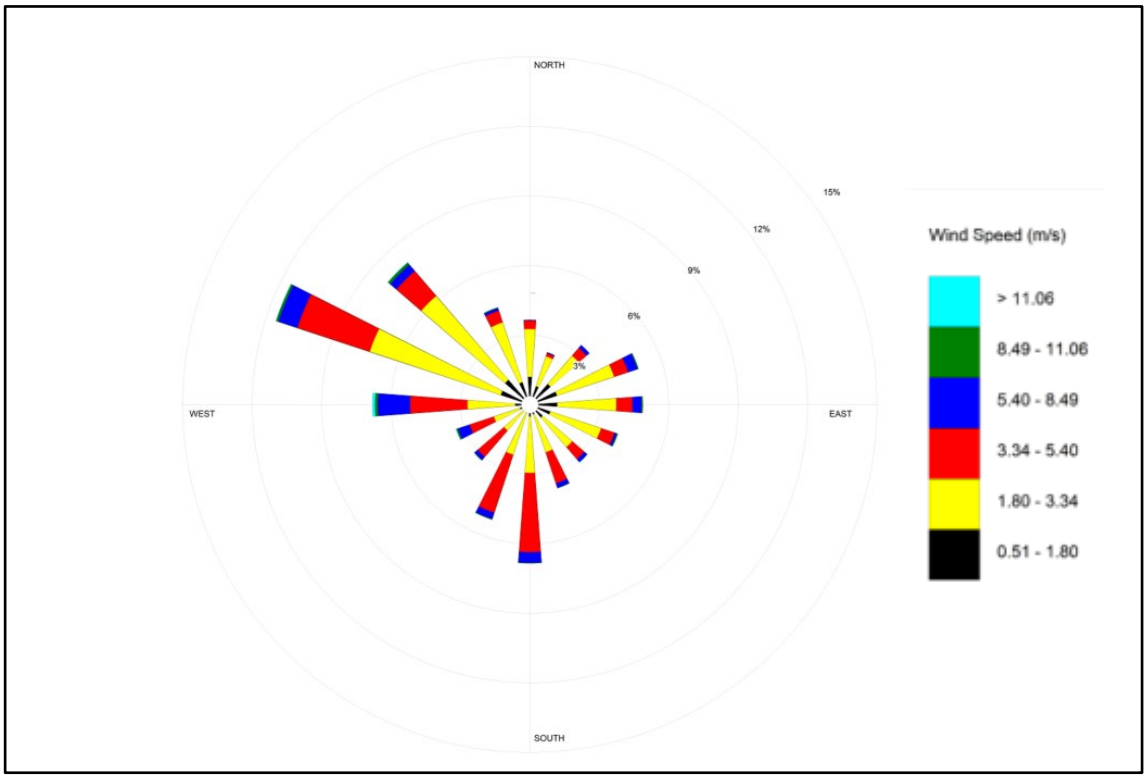
Wind speed data collected by the National Oceanic and Atmospheric Administration (NOAA) at the Long Beach Airport station (approximately 1 mile from City of Signal Hill) is shown in **Table 3-2**. The average monthly wind speed varies throughout the year. The windiest month of the year in Long Beach is June, with an average hourly wind speed of 6.3 miles per hour in 2021. The calmest month of the year in Signal Hill is November, with an average hourly wind speed of 3.7 miles per hour.

Table 3-2. Long Beach 2021 Wind Data

Month	2021 Wind Speeds (mph)	
	Average	Maximum
January	4.1	32
February	5.0	30
March	5.6	30
April	5.9	25

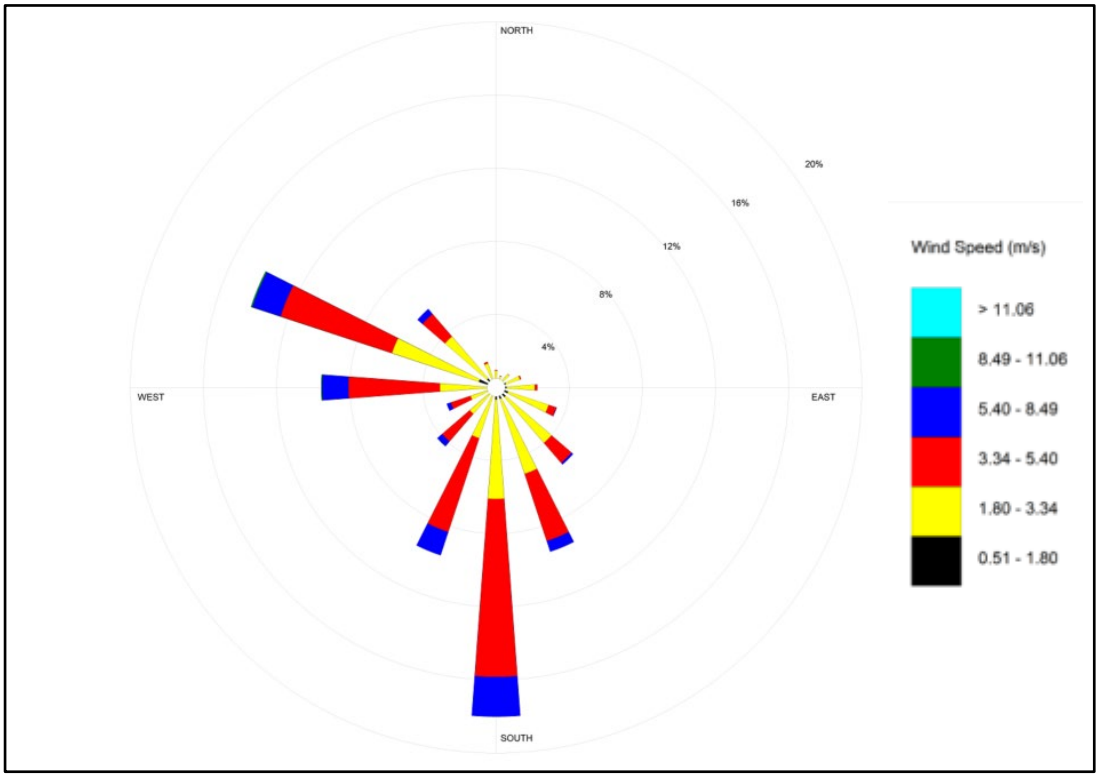
Month	2021 Wind Speeds (mph)	
	Average	Maximum
May	6.2	21
June	6.3	21
July	5.9	17
August	5.7	18
September	5.4	23
October	4.7	33
November	3.7	20
December	4.2	29
Annual	5.2	33

Figure 3-1. Average November Windrose in Long Beach 1961-1990



Source: Western Regional Climate Center

Figure 3-2. Average June Windrose in Long Beach 1961-1990



Source: Western Regional Climate Center

3.4 Criteria Pollutants

The Project area is located within Los Angeles County in the South Coast Air Basin. The Los Angeles County is included among the four counties that comprise the South Coast AQMD. The South Coast AQMD acts as the regulatory agency for air pollution control in the area and is the local agency empowered to regulate air pollutant emissions for the Project area. **Table 3-3** summarizes the applicable NAAQS and CAAQS.

Table 3-3. Federal & California Air Quality Standards

Pollutant	Averaging Time	NAAQS	CAAQS
		Concentration	
O_3	8-hour	0.070 ppm (137 µg/m^3)[a]	0.070 ppm (137 µg/m^3)
	1-hour		0.09 ppm (180 µg/m^3)
CO	8-hour	9 ppm (10 µg/m^3)	9 ppm (10 µg/m^3)
	1-hour	35 ppm (40 µg/m^3)	20 ppm (23 µg/m^3)
NO_2	Annual Arithmetic Mean	53 ppb (100 µg/m^3)	0.030 ppm (57 µg/m^3)
	1-Hour	100 ppb (188 µg/m^3)	0.18 ppm (339 µg/m^3)
SO_2	3-Hour	0.5 ppm (1,300 µg/m^3)	
	24 Hour	No Federal Standard	0.04 ppm (105 µg/m^3)
	1-Hour	75 ppb (196 µg/m^3)	0.25 ppm (655 µg/m^3)

Pollutant	Averaging Time	NAAQS	CAAQS
		Concentration	
Particulate Matter (PM_{10})	Annual Arithmetic Mean		20 µg/m^3
	24-Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	12 µg/m^3
	24-Hour	35 µg/m^3	
Sulfates	24-Hour		25 µg/m^3
Pb[d]	Rolling Three-Month Average	0.15 µg/m^3	
	Calendar Quarter	1.5 µg/m^3	
	30 Day Average		1.5 µg/m^3
H_2S	1-Hour		0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24-Hour		0.010 ppm (26 µg/m^3)
Visibility Reducing particles	8 Hour (1000 to 1800 PST)		[b]
ppm = parts per million ppb = parts per billion		mg/m^3 = milligrams per cubic meter	µg/m^3 = micrograms per cubic meter

Source: CARB 2016
a. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm
b. Extinction coefficient of 0.23 per kilometer - visibility of ten miles or more due to particles when relative humidity is less than 70 %.

Under the provisions of the U.S. Clean Air Act, the Los Angeles County of the South Coast AQMD has been classified as nonattainment (extreme, moderate, serious), nonattainment, attainment, maintenance, partial nonattainment, unclassified or no federal standard under the established NAAQS and CAAQS for various criteria pollutants. **Table 3-4** provides the South Coast AQMD's designation and classification based on the various criteria pollutants under both NAAQS and CAAQS.

Table 3-4. Basin NAAQS and CAAQS Attainment Status

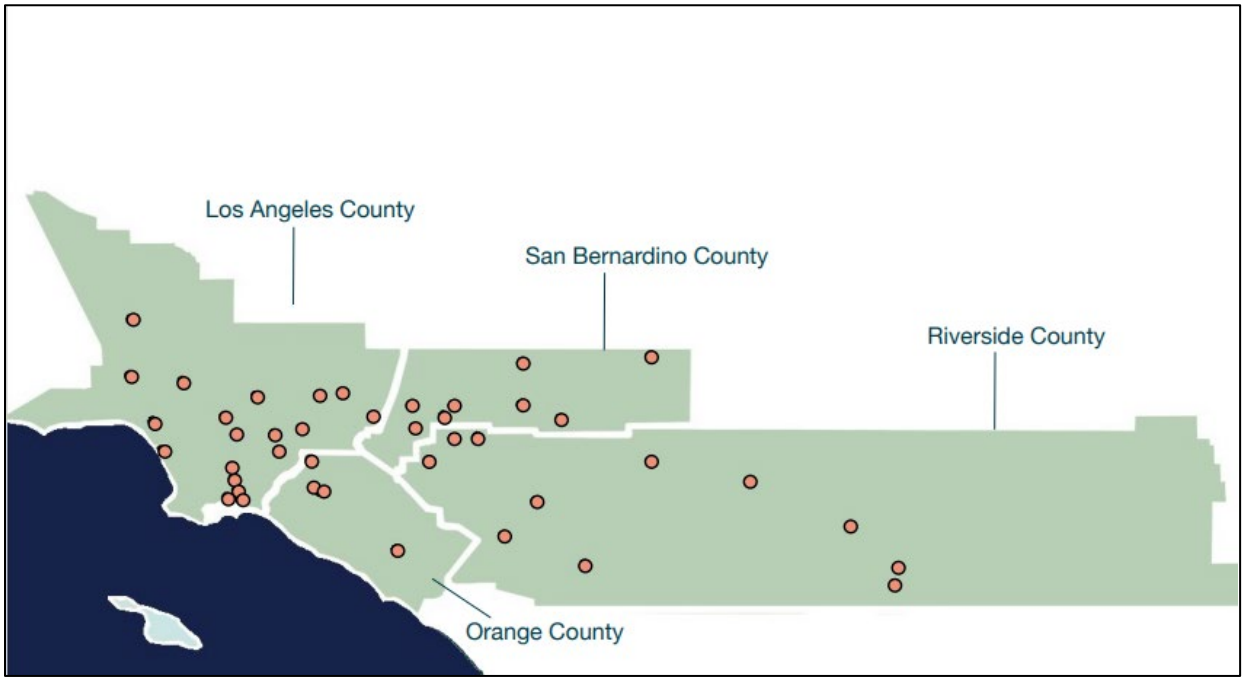
NAAQS[a]	
8-Hour Ozone (2015)	Extreme - Nonattainment
8-Hour Ozone (2008)	Extreme - Nonattainment
8-Hour Ozone (1997)	Extreme - Nonattainment
1-Hour Ozone (1979)	Extreme - Nonattainment
$PM_{2.5}$ (2012)	Serious - Nonattainment
$PM_{2.5}$ (2006)	Serious - Nonattainment
$PM_{2.5}$ (1997)	Moderate - Nonattainment
PM_{10} (1987)	Serious - Maintenance
SO_2 (2010)	Attainment
SO_2 (1971)	Attainment
Lead (2008)	Nonattainment
Lead (1978)	Attainment
CO (1971)	Serious - Maintenance
NO_2 (1971)	Maintenance

CAAQS[b]	
Ozone	Nonattainment
$PM_{2.5}$	Nonattainment
PM_{10}	Nonattainment
CO	Attainment
NO_2	Partial Nonattainment (CA 60 Near-road Portion of San Bernardino, Riverside and Los Angeles Counties)
SO_2	Attainment
Sulfates	Attainment
H_2S	Unclassified
Lead[c]	Attainment

Source:
a. U.S. EPA, 2020
b. CARB, 2019b
c. Only Los Angeles County portion of SCAB is in nonattainment for lead.

The South Coast AQMD, along with CARB, operates an air quality monitoring network that provides information on average concentrations of those pollutants for which Federal or State agencies have established NAAQS and CAAQS, respectively. The monitoring stations in the South Los Angeles County Coastal are depicted in **Figure 3-3**.

Figure 3-3. South Coast AQMD Monitoring Network



Source: South Coast AQMD 2020

3.5 Regional Air Quality

Air quality in the Basin is monitored by the South Coast AQMD, which operates a network of 38 permanent air monitoring stations and four (4) single-pollutant source impact lead air monitoring sites throughout the South Coast AQMD jurisdiction (South Coast AQMD 2020). For the purposes of background data and this air quality analysis, this analysis relied on data collected in the last three years for the CARB monitoring stations that are located in the closest proximity to the project site. **Table 3-5** provides the background concentrations

for O_3, particulate matter of 10 microns (PM_{10}), particulate matter of less than 2.5 microns ($PM_{2.5}$), CO, NO_2, SO_2, and Pb. Information is provided for monitoring stations South Coastal Los Angeles County 1, 2, 3 & 4 (station #072, 077, 033 & 039). A summary of 2018 (baseline year) through 2020 air quality data (the latest data available) from South Coast AQMD's monitoring stations is presented in **Table 3-5** below.

Table 3-5. Existing Ambient Air Quality Monitoring Station in Project Area

Pollutant and Monitoring Station Location	Maximum Concentration			Days Exceeding Standard		
	2019	2020	2021	2019	2020	2021
O_3 – 1-hour CAAQS (0.09 ppm)						
Long Beach – Signal Hill	*	0.105	0.086	*	4	0
Long Beach – 2425 Webster Street	0.075	*	*	0	*	*
Compton – 700 North Bullis Road	0.100	0.152	0.085	1	3	0
O_3 – 8-hour CAAQS (0.07 ppm)						
Long Beach – Signal Hill	*	0.083	0.065	*	4	0
Long Beach – 2425 Webster Street	0.065	*	*	0	*	*
Compton – 700 North Bullis Road	0.079	0.115	0.077	1	4	1
O_3 – 8-hour NAAQS (0.070 ppm)						
Long Beach – Signal Hill	*	0.083	0.064	*	4	0
Long Beach – 2425 Webster Street	0.064	*	*	0	*	*
Compton – 700 North Bullis Road	0.079	0.115	0.076	1	4	1
PM_{10} – 24-hour CAAQS (50 µg/m^3)						
South Long Beach	73.8	68.7	49.7	2	3	0
Long Beach – 2425 Webster Street	155.4	61.4	*	4	3	*
PM_{10} – 24-hour NAAQS (150 µg/m^3)						
South Long Beach	72.7	68.3	48.7	0	0	0
Long Beach – 2425 Webster Street	155.8	61.6	*	1	0	*
$PM_{2.5}$ - 24-hour NAAQS (35 µg/m^3)						
South Long Beach	30.6	63.7	42.9	0	10	4
North Long Beach	28.0	66.0	41.2	0	4	1
Long Beach – Route 710 Near Road	36.7	65.7	84.6	1	12	7
CO - 8-Hour CAAQS & NAAQS (9.0 ppm)						
No data collected	--	--	--	--	--	--
NO_2 - 1-Hour CAAQS (0.18 ppm)						
Long Beach – Signal Hill	*	0.075	0.059	*	0	0
Long Beach – 2425 Webster Street	0.071	*	*	0	*	*
Long Beach – Route 710 Near Road	0.097	0.100	0.091	0	0	0
NO_2 - 1-Hour NAAQS (0.10 ppm)						
Long Beach – Signal Hill	*	0.075	0.059	*	0	0
Long Beach – 2425 Webster Street	0.072	*	*	0	*	*
Long Beach – Route 710 Near Road	0.098	0.100	0.092	0	0	0
SO_2 – 24-hour Concentration - CAAQS (0.04 ppm) & NAAQS (0.14 ppm)						
No data collected	--	--	--	--	--	--
Pb - Maximum 30-Day Concentration CAAQS (1500 ng/m^3)						
Los Angeles – North Main Street	20.5	8.6	*	*	*	*

Source: CARB 2022a
Notes: ppm= parts per million
* There was insufficient (or no) data available to determine the value.

The following is a description of criteria air pollutants, typical sources and health effects and the recently documented pollutant levels in the Project vicinity.

3.5.1 Ozone (O_3)

The most severe air quality problem the Los Angeles County is high concentrations of O_3. High levels of O_3 cause eye irritation and can impair respiratory functions. High levels of O_3 can also affect plants and materials. Grapes, lettuce, spinach and many types of garden flowers and shrubs are particularly vulnerable to O_3 damage. O_3 is not emitted directly into the atmosphere but is a secondary pollutant produced through photochemical reactions involving hydrocarbons and nitrogen oxides (NOx). Significant O_3 generation requires about one to three hours in a stable atmosphere with strong sunlight. For this reason, the months of April through October comprise the "ozone season." O_3 is a regional pollutant because O_3 precursors are transported and diffused by wind concurrently with the reaction process. The data contained in **Table 3-5** shows that the Signal Hill area exceeded the 1-hour average ambient O_3 CAAQS and the 8-hour average ambient O_3 NAAQS and CAAQS during 2019 through 2021.

3.5.2 Suspended Particulate Matter (PM_{10} and $PM_{2.5}$)

Both State and Federal particulate standards now apply to particulates under 10 microns (PM_{10}) rather than to total suspended particulate (TSP), which includes particulates up to 30 microns in diameter. Continuing studies have shown that the smaller-diameter fraction of TSP represents the greatest health hazard posed by the pollutant; therefore, U.S. EPA has recently established NAAQS for $PM_{2.5}$. The Project area is classified as nonattainment for both PM_{10} and particulates under 2.5 microns ($PM_{2.5}$) for CAAQS.

Particulate matter consists of particles in the atmosphere resulting from many kinds of dust and fume-producing industrial and agricultural operations, from combustion, and from atmospheric photochemical reactions. Natural activities also increase the level of particulates in the atmosphere; wind-raised dust and ocean spray are two sources of naturally occurring particulates. The largest sources of PM_{10} and $PM_{2.5}$ in Los Angeles County are vehicle movement over paved and unpaved roads, demolition and construction activities, and unplanned fires. PM_{10} and $PM_{2.5}$ are considered regional pollutants with elevated levels typically occurring over a wide geographic area. Concentrations tend to be highest in the winter, during periods of high atmospheric stability and low wind speed. In the respiratory tract, very small particles of certain substances may produce injury by themselves or may contain absorbed gases that are injurious. Particulates of aerosol size suspended in the air can both scatter and absorb sunlight, producing haze and reducing visibility. They can also cause a wide range of damage to materials.

Table 3-5 shows that PM_{10} levels regularly exceeded the CAAQS at all the monitoring stations during 2019 and 2020, and the NAAQS was exceeded once at one monitoring station in 2019. On the other hand, as indicated in **Table 3-5**, the $PM_{2.5}$ NAAQS was exceeded during the 2019 through 2021 period. Similar levels can be expected to occur in the vicinity of the Project site.

3.5.3 Carbon Monoxide (CO)

Ambient CO concentrations normally correspond closely to the spatial and temporal distributions of vehicular traffic. Relatively high concentrations of CO would be expected along heavily traveled roads and near busy intersections. Wind speed and atmospheric mixing also influence CO concentrations; however, under inversion conditions, CO concentrations may be more uniformly distributed over a broad area.

Internal combustion engines, principally in vehicles, produce CO due to incomplete fuel combustion. Various industrial processes also produce CO emissions through incomplete combustion. Gasoline-powered motor vehicles are typically the major source of this contaminant. CO does not irritate the respiratory tract but passes

through the lungs directly into the blood stream, and by interfering with the transfer of fresh oxygen to the blood, deprives sensitive tissues of oxygen, thereby aggravate cardiovascular disease, causing fatigue, headaches, and dizziness. CO is not known to have adverse effects on vegetation, visibility, or materials.

None of the CARB monitoring stations reported CO data, as shown in **Table 3-5**.

3.5.4 Nitrogen Dioxide (NO_2) and Hydrocarbons

Los Angeles County has been designated as an attainment area for the NAAQS for NO_2. NO_2 is the "whiskey brown" colored gas readily visible during periods of heavy air pollution. Mobile sources and oil and gas production account for nearly all of the County's NOx emissions, most of which is emitted as NO_2. Combustion in motor vehicle engines, power plants, refineries and other industrial operations are the primary sources in the region. Railroads and aircraft are other potentially significant sources of combustion air contaminants. Oxides of nitrogen are direct participants in photochemical smog reactions. The emitted compound, nitric oxide, combines with oxygen in the atmosphere in the presence of hydrocarbons and sunlight to form NO_2 and O_3. NO_2, the most significant of these pollutants, can color the atmosphere at concentrations as low as 0.5 ppm on days of 10-mile visibility. NOx is an important air pollutant in the region because it is a primary receptor of ultraviolet light, which initiates the reactions producing photochemical smog. It also reacts in the air to form nitrate particulates.

Motor vehicles are the major source of reactive hydrocarbons in the basin. Other sources include evaporation of organic solvents and petroleum production and refining operations. Certain hydrocarbons can damage plants by inhibiting growth and by causing flowers and leaves to fall. Levels of hydrocarbons currently measured in urban areas are not known to cause adverse effects in humans. However, certain members of this contaminant group are important components in the reactions, which produce photochemical oxidants.

Table 3-5 shows that the Federal and State NO_2 standards have not been exceeded at South Los Angeles County monitoring stations over the three-year period. Please note that the hydrocarbons were not monitored.

3.5.5 Sulfur Dioxide (SO_2)

Los Angeles County has been designated as an attainment area for the NAAQS for SO_2. SO_2 is the primary combustion product of sulfur, or sulfur containing fuels. Fuel combustion is the major source of this pollutant, while chemical plants, sulfur recovery plants, and metal processing facilities are minor contributors. Gaseous fuels (natural gas, propane, etc.) typically have lower percentages of sulfur containing compounds than liquid fuels such as diesel or crude oil. SO_2 levels are generally higher in the winter months. Decreasing levels of SO_2 in the atmosphere reflect the use of natural gas in power plants and boilers.

At high concentrations, SO_2 irritates the upper respiratory tract. At lower concentrations, when respirated in combination with particulates, SO_2 can result in greater harm by injuring lung tissues. Sulfur oxides (SOx), in combination with moisture and oxygen, results in the formation of sulfuric acid, which can yellow the leaves of plants, dissolve marble, and oxidize iron and steel. SOx can also react to produce sulfates that reduce visibility and sunlight.

Table 3-5 shows no data has been reported over the three-year period in any of the monitoring stations.

3.5.6 Lead (Pb) and Suspended Sulfate

Ambient Pb levels have dropped dramatically due to the increase in the percentage of motor vehicles that run exclusively on unleaded fuel. Ambient Pb levels in Los Angeles County are well below the ambient standard and are expected to continue to decline; the data reported in **Table 3-5** only shows the highest concentration

as the number of days exceeding standards are not reported. Suspended sulfate levels have stabilized to the point where no excesses of the State standard are expected in any given year.

3.6 Toxic Air Contaminants

Health and Safety Code (HSC) Section 39655 defines a TAC as an air pollutant which may cause or contribute to an increase in mortality, an increase in serious illness, or which may pose a present or potential hazard to human health. U.S. EPA defines hazardous air pollutants (HAPs) as those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Under California's TAC programs (AB 1807, HSC Section 39650 et seq. and AB 2588, HSC Section 39650 *et seq*), CARB, with the participation of the local air pollution control districts, evaluates and develops any needed control measures for air toxics to limit exposure to TACs to the maximum extent feasible.

Office of Environmental Health Hazard Assessment (OEHHA) has determined that long-term exposure to diesel particulate matter (DPM) poses the highest cancer risk of any TAC it has evaluated. Short-term exposure to diesel exhaust can also have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, DPM made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Short-term exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks.

The City of Signal Hill and SHP's CUP Sites are located closest to the North Long Beach and North Los Angeles monitoring stations.[2] **Table 3-6** presents a summary of the most current available TAC data from the North Long Beach station (ARB# 70072), located at 3648 N. Long Beach Blvd., Long Beach, CA 90807 (approximately 4.5 miles northwest of the facility), and the Los Angeles – North Main Street station (ARB# 70087), located at 1630 North Main St., Los Angeles, CA 90012 (approximately 23 miles northwest of the facility). These monitoring stations are the closest to the CUP Sites that report all the applicable TACs and show the best available representative pollutant concentrations.

Table 3-6. Ambient Air Quality TACs –Most Recent Maximum Concentration[1]

	Peak 24-hour Concentration			
Pollutant	ARB# 70072	Year	ARB# 70087	Year
VOCs	ppbv		ppbv	
Acetaldehyde	1.8	2013	2.6	2019
Acetone	8.3	2013	14	2019
Acetonitrile	0.8	2013	0.4	2019
Acrolein	1.1	2013	1.8	2019
Benzene	0.82	2013	0.58	2019
1,3-Butadiene	0.29	2013	0.11	2019
Carbon Disulfide	0.05	2006	2.9	2006
Carbon Tetrachloride	0.09	2013	0.08	2019
Chlorobenzene	0.05	1994	0.1	1994
Chloroform	0.05	2013	0.3	2019
meta-Dichlorobenzene	0.1	1994	0.1	1994
ortho-Dichlorobenzene	0.15	2007	0.15	2007

[2] Monitoring for TACs is limited compared to monitoring for criteria pollutants because toxic pollutant impacts are typically more localized than criteria pollutant impacts. CARB conducts air monitoring for a number of TACs every 12 days at approximately 20 sites throughout California.

	Peak 24-hour Concentration			
para-Dichlorobenzene	0.15	2007	0.15	2007
Dichlorodifluoromethane	--	--	--	--
cis-1,3-Dichloropropene	0.05	2013	0.05	2019
trans-1,3-Dichloropropene	0.05	2013	0.05	2019
Ethyl Benzene	0.3	2013	0.3	2019
Ethylene Dibromide	0.005	1994	0.005	1994
Ethylene Dichloride	0.1	1992	0.1	1992
Formaldehyde	3.8	2013	7.3	2019
Methyl Bromide	0.05	2013	0.015	2019
Methyl Chloroform	0.005	2013	0.005	2019
Methyl Ethyl Ketone	0.3	2013	0.5	2019
Methyl tertiary-Butyl Ether	0.15	2004	0.15	2004
Methylene Chloride	2.6	2013	3.5	2019
Perchloroethylene	0.06	2013	0.04	2019
Styrene	0.1	2013	0.3	2019
Toluene	1.7	2013	6.2	2019
Trichloroethylene	0.08	2013	0.03	2019
Trichlorofluoromethane	--	--	--	--
Trichlorotrifluoroethane	--	--	0.01	2019
meta-Xylene	2.2	1994	6.7	1994
meta/para-Xylene	1.1	2013	0.9	2019
ortho-Xylene	0.4	2013	0.3	2019
para-Xylene	0.9	1994	2.4	1994
Polycyclic Aromatic Hydrocarbons	**ng/m³**	**Year**	**ng/m³**	**Year**
Benzo(a)pyrene-10	0.61	2004	0.40	2004
Benzo(b)fluoranthene-10	0.51	2004	0.41	2004
Benzo(g,h,i)perylene-10	1.7	2004	1.1	2004
Benzo(k)fluoranthene-10	0.19	2004	0.15	2004
Dibenz(a,h)anthracene-10	0.18	2004	0.025	2004
Indeno(1,2,3-cd)pyrene-10	0.64	2004	0.46	2004
Metals	**ng/m³**	**Year**	**ng/m³**	**Year**
Aluminum	1700	2003	2400	2003
Antimony	12	2013	17	2019
Arsenic	0.75	2013	0.87	2019
Barium	56	2003	95	2003
Beryllium	0.3	2013	0.152	2019
Bromine	9	2003	9	2003
Cadmium	0.75	2013	0.65	2019
Calcium	2300	2003	2800	2003
Chlorine	3900	1990	4200	1990
Chromium	9	2013	19	2019
Cobalt	0.75	2013	1.9	2019
Copper	46	2013	95	2019
Hexavalent Chromium	0.07	2013	0.11	2019
Iron	1400	2013	2690	2019
Lead	9.1	2013	20.5	2019
Manganese	30	2013	46.9	2019
Mercury	1.5	2003	4	2003
Molybdenum	5.4	2013	6.9	2019

	Peak 24-hour Concentration			
Nickel	5	2013	7	2019
Phosphorus	35	2003	32	2003
Potassium	890	2003	890	2003
Platinum	0.15	2013	0.105	2014
Rubidium	4	2003	5	2003
Selenium	0.75	2013	1.65	2019
Silicon	5600	2003	7500	2003
Strontium	14	2013	25	2019
Sulfur	2,300	2013	1600	2013
Tin	5.4	2013	15.4	2019
Titanium	87	2013	125	2019
Uranium	1.5	2003	1.5	2003
Vanadium	12	2013	4.3	2019
Yttrium	2	2003	3	2003
Zinc	90	2013	147	2019
Zirconium	4.3	2013	10.6	2019

[1] There are no air quality standards for TACs.
Source: CARB, 2013.[3] Annual Toxics Summaries by Monitoring Site, North Long Beach.
Notes: ppbv = parts per billion by volume. ng/m^3 = nanograms per cubic meter. -- = no data available in the last 6 years.

The selection of these monitoring stations was based on the proximity of the monitoring station to the proposed Project location, land-use of the area, and representativeness and availability of the data.

3.6.1 MATES IV and V

The Multiple Air Toxics Exposure Study (MATES) IV and MATES V report the monitored and modeled concentrations of air toxics and estimated the carcinogenic risks from ambient levels of air toxics. Chronic non-cancer health impacts were also estimated from the monitoring data, and MATES V includes an exploratory analysis of chronic non-cancer health impacts (e.g., cardiovascular, respiratory, neurological health outcomes, etc.). The chronic non-cancer health impacts, typically expressed as a hazard index, is an indicator of whether non-cancer health effects can occur due to long-term exposure to TACs. A hazard index that is less than or equal to one indicates that chronic non-cancer health effects are not likely to occur over a lifetime of exposure. Annual average concentrations were used to estimate a lifetime risk from exposure to these levels, consistent with guidelines established by the OEHHA of the California Environmental Protection Agency (CalEPA). Given the generally decreasing air pollution levels in the region, ambient concentrations of some pollutants can sometimes be lower than what air quality monitoring instruments can detect. Therefore, statistical techniques are required to calculate average concentrations and provide an estimate of actual levels. Modern statistical techniques were used to analyze the MATES V data and to provide the MATES V study's comprehensive comparison of pollutant trends. MATES II, MATES III, and MATES IV measurements were also re-analyzed as part of MATES V using these same techniques.

In addition to new measurements and updated modeling results, several other key updates were implemented in MATES V. First, MATES V estimates cancer risks by taking into account multiple exposure pathways, including both inhalation and non-inhalation pathways, which includes soil exposure. Exposure from non-inhalation pathways results from substances that deposit on the ground in particulate form and contribute to risk through the ingestion of soil or homegrown crops, or through dermal absorption. Utilizing this multiple

[3] https://www.arb.ca.gov/adam/toxics/toxics.html

exposure pathways approach is consistent with how cancer risks are estimated under South Coast AQMD's programs such as permitting, Air Toxics Hot Spots (AB2588), and CEQA compliance. Second, along with cancer risk estimates, MATES V also includes information on the chronic non-cancer health impacts from inhalation and non-inhalation pathways.

Air toxics monitoring data collected at 10 fixed site monitoring locations shows that the levels of air toxics in the Basin continue to decline, including the Long Beach site (located less than a mile away from SHP). **Figure 3-4** and **Figure 3-5** illustrate the following key findings from MATES V, which include:

- MATES V found a 40% decrease in risk since MATES IV and an 84% decrease since MATES II. The estimated population wide population-weighted cancer risk calculated from the modeling data (as opposed to fixed site monitoring data) similarly found a 54% decrease since MATES IV.
- MATES V determined that diesel PM is the largest contributor to overall air toxics cancer risk. However, monitoring data showed that the average levels of diesel PM in MATES V are 53% lower at the 10 fixed site monitoring locations as compared to MATES IV and 86% lower as compared to MATES II.
- The main sources of cancer risk in the Basin are neither lead nor arsenic, as shown in **Figure 3-4**. Most monitoring sites indicated that concentrations of lead and arsenic also continued an overall downward trend in MATES V as compared to MATES IV.

Figure 3-4. Average MATES V Cancer Risk

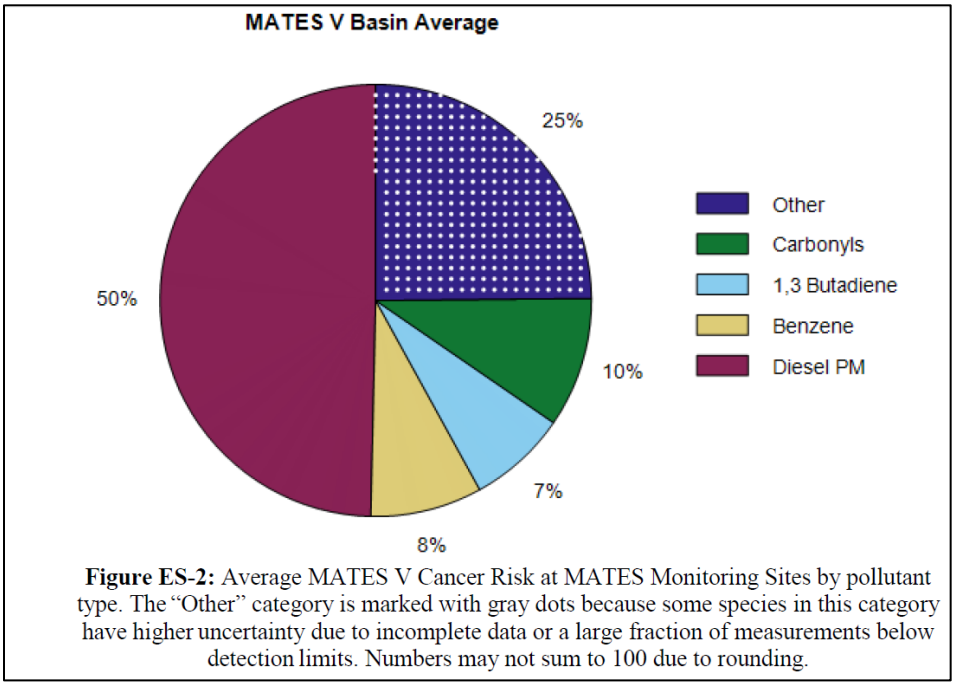


Figure ES-2: Average MATES V Cancer Risk at MATES Monitoring Sites by pollutant type. The "Other" category is marked with gray dots because some species in this category have higher uncertainty due to incomplete data or a large fraction of measurements below detection limits. Numbers may not sum to 100 due to rounding.

Figure 3-5. Trend in Average Cancer Risk by Monitoring Station

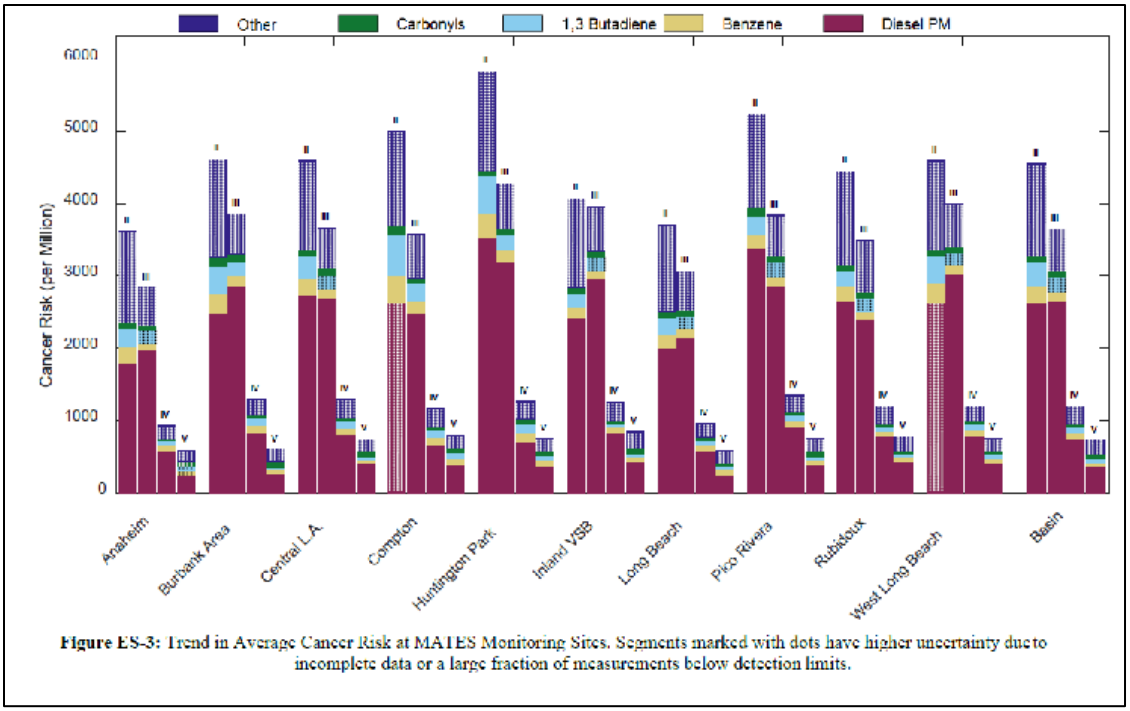


Figure ES-3: Trend in Average Cancer Risk at MATES Monitoring Sites. Segments marked with dots have higher uncertainty due to incomplete data or a large fraction of measurements below detection limits.

3.7 Greenhouse Gases

GHGs are a set of compounds whose presence in the atmosphere is associated with the differential absorption of incoming solar radiation and outgoing radiation from the surface of the earth. GHGs, such as carbon dioxide, methane, nitrous oxide, and certain synthetic chemicals, trap some of the Earth's outgoing energy, thus retaining heat in the atmosphere. This heat trapping causes changes in the radiative balance of the Earth - the balance between energy received from the sun and emitted from Earth - that alter climate and weather patterns at global and regional scales (U.S. EPA, 2020c). More specifically, GHGs strongly absorb the long-wave radiation emitted by the earth and hence are capable of warming the atmosphere. Regulated GHGs in California are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF_3). Other GHGs, such as water vapor, are not regulated.

In order to attempt to quantify the impact of specific GHGs, each gas is assigned a global warming potential (GWP). Individual GHG compounds have varying GWPs and atmospheric lifetimes. The GWP of a GHG is a measure of how much a given mass of a GHG is estimated to contribute to global warming, relative to CO_2, which is assigned a GWP of 1.0.

The GWP is used to determine the carbon dioxide equivalent (CO_2e) mass of each GHG. The calculation of the CO_2e is the accepted methodology for comparing GHG emissions since it normalizes various GHG emissions to a consistent reference gas, CO_2. For example, CH_4's GWP of 25 indicates that the global warming effect of CH_4 is 25 times greater than that of CO_2 on a unit mass basis. CO_2e is the mass emissions of an individual GHG multiplied by its GWP.

The physical properties and sources of GHGs are described in **Table 3-7**.

Table 3-7. GWPs, Properties, and Sources of GHGs

Constituent	GWP	Description and Physical Properties	Sources
CO_2	1	CO_2 is an odorless, colorless, naturally occurring GHG.	CO_2 is emitted from natural and anthropogenic (human) sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic out gassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
CH_4	25	CH_4 is an organic, colorless, naturally occurring, flammable gas. Its atmospheric concentration is less than CO_2 and its lifetime in the atmosphere is brief (10-12 years) compared to other GHGs.	CH_4 has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of CH_4. Other anthropogenic sources include fossil-fuel and biomass combustion, as well as landfilling and wastewater treatment.
N_2O	298	N_2O, commonly referred to as "laughing gas," is a colorless, nonflammable GHG. It is a powerful oxidizer and breaks down readily in the atmosphere.	Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, e.g., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars.
HFCs	92 - 14,900	HFCs are synthetic man-made chemicals that form one of the GHGs with the highest GWP	HFCs are man-made for applications such as automobile air conditioners and refrigerants.
PFCs	6,288 - 17,700	PFCs are colorless, non-flammable, dense gasses that have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years.	The two main sources of PFCs are primary aluminum production and semiconductor manufacture.
SF_6	22,800	SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas.	SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Constituent	GWP	Description and Physical Properties	Sources
NF_3	17,200	NF_3 is an inorganic, colorless, odorless, nonflammable gas.	NF_3 is used primarily in the plasma etching of silicon wafers

Source: CARB, 2016c.

There is growing concern about GHG emissions and their adverse impacts on the world's climate and environment. These concerns relate to the change in the average weather of the earth that may be measured by changes in wind patterns, storms, precipitation, and temperature.

Throughout history, climate has been changing due to forces unrelated to human activity, including solar energy input variation, volcanic activity, and changing concentrations of key atmospheric constituents such as CH_4 and CO_2. These climate changes resulted in ice ages and warm interglacial periods, accompanied by large differences in snow and ice cover and associated changes in ecological systems.

Large-scale combustion of fossil fuels (i.e., coal, oil, and natural gas) by humans beginning in the 19th century resulted in significant increases in emissions of CO_2. The resulting increase in atmospheric levels of CO_2 has been recorded in long-term records at monitoring stations such as Mauna Loa, Hawaii, where measured background ambient CO_2 levels have increased from 285 parts per million (ppm) in 1877 (Stanhill, 1984) to the current level of 410 ppm (NOAA, 2018). Simultaneously, average surface temperatures have been increasing at many locations around the world. Multiple lines of evidence confirm that human activities are the primary cause of the global warming of the past 50 years. Natural factors, such as variations in the sun's output, volcanic activity, the Earth's orbit, the carbon cycle, and others, also affect Earth's radiative balance. However, beginning in the late 1700s, the net global effect of human activities has been a continual increase in GHG concentrations (IPCC, 2013; U.S. Global Change Research Program, 2014).

3.7.1 GHG Emissions Inventory

Emissions inventories identify and quantify the primary human-generated sources and sinks of GHGs. This section summarizes information on global, national, and state GHG emissions inventories.

- **Global Emissions.** Worldwide emissions of GHGs in 2004 totaled 27 billion metric tons (MT) of CO_2e per year (UNFCCC, 2007). Global estimates are based on country inventories developed as part of the programs of the United Nations Framework Convention on Climate Change (UNFCCC).
- **United States Emissions.** In 2008, the United States emitted approximately seven (7) billion MT of CO_2e, or approximately 25 tons per year (tpy), per person. Of the six (6) major sectors - electric power industry, transportation, industry, agriculture, commercial, and residential - the electric power industry and transportation sectors combined account for approximately 62% of the GHG emissions; the majority of the electric power industry and all of the transportation emissions are generated from direct fossil fuel combustion. Between 1990 and 2006, total United States GHG emissions rose approximately 14.7% (UNFCCC, 2007).
- **State of California Emissions.** According to CARB emission inventory estimates, California emitted approximately 474 million metric tons (MMT) of CO2e emissions in 2008 (CARB, 2017b). This large number is due primarily to the sheer size of California compared to other states. By contrast, California has the fourth-lowest per-capita CO_2e emission rate from fossil fuel combustion in the country due to the success of its energy efficiency, renewable energy programs, and environmental commitments that have lowered the state's GHG emissions rate of growth by more than half (California Energy Commission (CEC), 2007). GHG emissions from the transportation and electricity

sectors are approximately 36% and 22% of California's emission inventory, respectively. The industrial sector contributes approximately 18%. The remaining sources of GHG emissions are high GWP gases at 7%, residential and commercial activities at 9%, agriculture at 6%, and recycling and waste at 2%.

CARB is responsible for developing the California GHG Emission Inventory. This inventory estimates the volume of GHGs emitted to and removed from the atmosphere by human activities within California and supports the AB 32 Climate Change Program. CARB's current GHG emission inventory covers the years 1990 through 2019, and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, and agricultural land area). SHP CUP Extension Project emissions inventory is included in the development of the California GHG Emission Inventory.

CARB staff has projected statewide unregulated GHG emissions for 2020, which represent the emissions that would be expected to occur in the absence of any GHG reduction actions, at 596 million metric tons (MMT) of CO_2e. GHG emissions from the transportation and electricity sectors as a whole are expected to increase but remain at approximately 36% and 22% of total CO2e emissions, respectively (CARB, 2017b).

3.7.2 Global Climate Change

"Global climate change" refers to change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms, lasting for decades or longer. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred by some scientists and policy makers to "global warming" because it helps convey the notion that in addition to rising temperatures, other changes in global climate may occur. Climate change may result from the following influences:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system (e.g., changes in ocean circulation); and/or
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, and desertification).

As determined from worldwide meteorological measurements between 1990 and 2005, the primary observed effect of global climate change has been a rise in the average global tropospheric temperature of 0.36 degree Fahrenheit (°F) per decade. Climate change modeling shows that further warming could occur, which could induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of California could include higher sea levels, drier or wetter weather, changes in ocean salinity, changes in wind patterns or more energetic aspects of extreme weather (e.g., droughts, heavy precipitation, heat waves, extreme cold, and increased intensity of tropical cyclones). Specific effects from climate change in California may include a decline in the Sierra Nevada snowpack, erosion of California's coastline, and seawater intrusion in the Sacramento-San Joaquin River Delta.

Human activities, including fossil fuel combustion and land use changes, release carbon dioxide (CO_2) and other compounds cumulatively termed GHGs. GHGs are effective at trapping radiation that would otherwise escape the atmosphere. This trapped radiation warms the atmosphere, the oceans, and the earth's surface (USGCRP, 2014). Many scientists believe "most of the warming observed over the last 50 years is attributable to human activities" (IPCC, 2017). The increased amount of CO_2 and other GHGs in the atmosphere is the alleged primary result of human-induced warming.

GHGs are present in the atmosphere naturally, released by natural sources, or formed from secondary reactions taking place in the atmosphere. They include CO_2, methane (CH_4), nitrous oxide (N_2O), and O_3. In the last 200 years, substantial quantities of GHGs have been released into the atmosphere, primarily from fossil fuel combustion. These human-induced emissions are increasing GHG concentrations in the atmosphere, therefore enhancing the natural greenhouse effect. The GHGs resulting from human activity are believed to be causing global climate change. While human-made GHGs include CO_2, CH_4, and N_2O, some (like chlorofluorocarbons [CFCs]) are completely new to the atmosphere. GHGs vary considerably in terms of Global Warming Potential (GWP), the comparative ability of each GHG to trap heat in the atmosphere. The GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time that the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of "CO_2 equivalents" (CO_2e).

Natural sources of CO_2 include the respiration (breathing) of humans and animals and evaporation from the oceans. Together, these natural sources release approximately 150 billion metric tons of CO_2 each year, far outweighing the 7 billion metric tons of GHG emissions from fossil fuel burning, waste incineration, deforestation, cement manufacturing, and other human activity. Nevertheless, natural GHG removal processes such as photosynthesis cannot keep pace with the additional output of CO_2 from human activities. Consequently, GHGs are building up in the atmosphere (Enviropedia, 2019).

Methane is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources of CH_4 production include wetlands, termites, and oceans. Human activity accounts for the majority of the approximately 500 million metric tons of CH_4 emitted annually. These anthropogenic sources include the mining and burning of fossil fuels; digestive processes in ruminant livestock such as cattle; rice cultivation; and the decomposition of waste in landfills. The major removal process for atmospheric CH_4, the chemical breakdown in the atmosphere, cannot keep pace with source emissions; therefore, CH_4 concentrations in the atmosphere are rising.

Worldwide emissions of GHGs in 2008 were 30.1 billion metric tons of CO_2e and have increased considerably since that time (United Nations, 2011). It is important to note that the global emissions inventory data are not all from the same year and may vary depending on the source of the data (U.S. EPA, 2019). Emissions from the top five emitting countries and the European Union accounted for approximately 70% of total global GHG emissions in 2014. The United States was the number two producer of GHG emissions behind China. The primary GHG emitted by human activities was CO_2, representing approximately 76% of total global GHG emissions (U.S. EPA, 2022).

In 2020, the United States emitted approximately 5,222 million metric tons of CO_2e when accounting for sequestration from the land sector. Of the six major sectors nationwide (electric power industry, transportation, industry, agriculture, commercial, and residential), the electric power industry and transportation sectors combined account for approximately 52% of the GHG emissions; the majority of the electrical power industry and all of the transportation emissions are generated from direct fossil fuel combustion. Between 1990 and 2017, total United States GHG emissions rose approximately 7.3% (U.S. EPA, 2022).

Worldwide, energy-related CO_2 emissions are expected to increase at an average rate of 0.6% annually between 2018 and 2050, compared with the average growth rate of 1.8% per year from 1990 to 2018. Much of the increase in these emissions is expected to occur in the developing world where emerging economies, such as China and India, fuel economic development with fossil fuel energy. Developing countries' emissions

are expected to grow above the world average at a rate of approximately 1% annually between 2018 and 2050 and surpass emissions of industrialized countries by 2025 (U.S. EIA, 2019).

CARB is responsible for developing and maintaining the California GHG emissions inventory. This inventory estimates the amount of GHGs emitted into and removed from the atmosphere by human activities within the state of California and supports the Assembly Bill (AB) 32 Climate Change Program. CARB's current GHG emission inventory covers the years 2000 through 2019 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, and agricultural lands).

In 2019, emissions from statewide emitting activities were 418 million metric tons of CO_2 equivalent (MMT CO_2e), which is 6 MMT CO_2e lower than 2017 levels. 2019 emissions have decreased by 15% since peak levels in 2004 and are 12 MMT CO_2e below the 1990 emissions level and the State's 2020 GHG limit. Per capita GHG emissions in California have dropped from a 2001 peak of 14.1 tonnes per person to 10.7 tonnes per person in 2019, a 24% decrease (CARB 2021a).

CARB estimates that transportation was the source of approximately 41% of California's GHG emissions in 2019, followed by electricity generation at 9%. Other sources of GHG emissions were industrial sources at 24%, residential plus commercial activities at 6%, and agriculture at 7% (CARB 2021a).

3.7.3 Effects of Global Climate Change

Changes in the global climate are assessed using historical records of temperature changes that have occurred in the past. Climate change scientists use this temperature data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from past climate changes in rate and magnitude.

The Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. In its Fifth Assessment Report, the IPCC predicted that the global mean temperature change from 1990 to 2100 could range from 1.1 degree Celsius (°C) to 6.4 °C (8 to 10.4 °Fahrenheit) (IPCC, 2013). Global average temperatures and sea levels are expected to rise under all scenarios (IPCC, 2014). The IPCC concluded that global climate change was largely the result of human activity, mainly the burning of fossil fuels. However, the scientific literature is not consistent regarding many of the aspects of climate change, the actual temperature changes during the 20th century, and contributions from human versus non-human activities.

Effects from global climate change may arise from temperature increases, climate sensitive diseases, extreme weather events, and degradation of air quality. There may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells. Those living in warmer climates are likely to experience more stress and heat-related problems. Heat-related problems include heat rash and heat stroke, drought, etc. In addition, climate-sensitive diseases may increase, such as those spread by mosquitoes and other disease-carrying insects. Such diseases include malaria, dengue fever, yellow fever, and encephalitis. Extreme events such as flooding and hurricanes can displace people and agriculture. Global warming may also contribute to air quality problems from increased frequency of smog and particulate air pollution.

According to the 2006 California Climate Action Team (CAT) Report, several climate change effects can be expected in California over the course of the next century (CalEPA, 2006). These are based on trends established by the IPCC and are summarized below.

- A diminishing Sierra snowpack declining by 70% to 90%, threatening the state's water supply.

- A rise in sea levels, resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California's coast have risen about seven inches. If emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Sea level rises of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. (Note: This condition would not affect the Proposed Project area, as it is a significant distance away from coastal areas.)
- An increase in temperature and extreme weather events. Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in California. More heat waves can exacerbate chronic disease or heat-related illness.
- Increased risk of large wildfires if rain increases as temperatures rise. Wildfires in the grasslands and chaparral ecosystems of southern California are estimated to increase by approximately 30% toward the end of the 21st century because more winter rain will stimulate the growth of more plant fuel available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90% more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- Increasing temperatures from 8 to 10.4 °F under the higher emission scenarios, leading to a 25% to 35% increase in the number of days that ozone pollution levels are exceeded in most urban areas (see below).
- Increased vulnerability of forests due to forest fires, pest infestation, and increased temperatures.
- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75 to 85% more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range. This increase in air quality problems could result in an increase in asthma and other health-related problems.
- A decrease in the health and productivity of California's forests. Climate change can cause an increase in wildfires, an enhanced insect population, and establishment of non-native species.
- Increased electricity demand, particularly in the hot summer months.
- Increased ground-level ozone formation due to higher reaction rates of ozone precursors.

3.7.4 Global Climate Change Regulatory Issues

In 1988, the United Nations established the Intergovernmental Panel on Climate Change to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United Nations Framework Convention on Climate Change established an agreement with the goal of controlling GHG emissions, including methane. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The plan consists of more than 50 voluntary programs. Additionally, the Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol stipulates that the production and consumption of compounds that deplete O_3 in the stratosphere (chlorofluorocarbons [CFCs], halons, carbon tetrachloride, and methyl chloroform) were phased out by 2000 (methyl chloroform was phased out by 2005).

On September 27, 2006, Assembly Bill 32 (AB32), the California Global Warming Solutions Act of 2006 (the Act) was enacted by the State of California. The legislature stated, "Global warming poses a serious threat to

the economic well-being, public health, natural resources, and the environment of California." The Act caps California's GHG emissions at 1990 levels by 2020. The Act defines GHG emissions as all of the following gases: carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. This agreement represents the first enforceable statewide program in the U.S. to cap all GHG emissions from major industries that includes penalties for non-compliance. While acknowledging that national and international actions will be necessary to fully address the issue of global warming, AB32 lays out a program to inventory and reduce GHG emissions in California and from power generation facilities located outside the state that serve California residents and businesses.

AB32 charges CARB with responsibility to monitor and regulate sources of GHG emissions in order to reduce those emissions. CARB has adopted a list of discrete early action measures that can be implemented to reduce GHG emissions. CARB has defined the 1990 baseline emissions for California and has adopted that baseline as the 2020 statewide emissions cap. CARB is conducting rulemaking for reducing GHG emissions to achieve the emissions cap by 2020. In designing emission reduction measures, CARB must aim to minimize costs, maximize benefits, improve and modernize California's energy infrastructure, maintain electric system reliability, maximize additional environmental and economic co-benefits for California, and complement the state's efforts to improve air quality.

Subsequent legislation by the California legislature has included Senate Bill (SB) 32, which expanded upon AB32 to reduce GHG emissions to 40% below the 1990 levels by 2030; AB197 which increased the legislative oversight of the CARB by adding two legislatively appointed non-voting members to the CARB Board and provided additional protection to disadvantaged communities; SB350, which increased California's renewable energy electricity procurement goal and SB100, which established a landmark policy requiring renewable energy and zero-carbon resources to supply 100 percent of electrical retail sales to end use customers and 100 percent of electricity procured to serve state agencies by 2045.

Global warming and climate change have received substantial public attention for more than 20 years. For example, the United States Global Change Research Program was established by the Global Change Research Act of 1990 to enhance the understanding of natural and human-induced changes in the Earth's global environmental system, to monitor, understand, and predict global change, and to provide a sound scientific basis for national and international decision-making. Even so, the analytical tools have not been developed to determine the effect on worldwide global warming from a particular increase in GHG emissions, or the resulting effects on climate change in a particular locale. The scientific tools needed to evaluate the impacts that a specific project may have on the environment are even farther in the future.

3.7.4.1 CARB's Scoping Plan Updates

CABR's 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan) evaluated four development scenarios and their potential for reducing GHGs. The summary below provides an overview of the alternatives designed and considered for the energy and industrial sectors in this update. Full details of each scenario considered can be found in the Draft 2022 Scoping Plan Update (CARB, 2022)"

- Scoping Plan Scenario (modeling scenario Alternative 3 from the Draft): carbon neutrality by 2045, deploy a broad portfolio of existing and emerging fossil fuel alternatives and clean technologies, and align with statutes, Executive Orders, Board direction, and direction from the governor.
- Alternative 1: carbon neutrality by 2035, nearly complete phaseout of all combustion, limited reliance on carbon capture and sequestration and engineered carbon removal, and restricted applications for biomass-derived fuels.
- Alternative 2: carbon neutrality by 2035 and aggressive deployment of a full suite of technology and energy options, including engineered carbon removal.

- Alternative 4: carbon neutrality by 2045, deployment of a broad portfolio of existing and emerging fossil fuel alternatives, slower deployment and adoption rates than the Scoping Plan Scenario, and a higher reliance on CO2 removal.

As noted in the 2022 Scoping Plan, the four scenarios evaluated shared many similarities, and each embodied the following characteristics:

- Drastic reduction in fossil fuel dependence, with some remaining in-state demand for fossil fuels for aviation, marine, and locomotion applications, and for fossil gas for buildings and industry.
- Ambitious deployment of efficient non-combustion technologies such as zero emission vehicles and heat pumps.
- Rapid growth in the production and distribution of clean energy such as zero carbon electricity and hydrogen.
- Progressive phasedown of fossil fuel production and distribution activities as part of the transition to clean energy.
- Remaining emissions of fugitive short-lived climate pollutants (SLCPs) such as refrigerants and fugitive methane.
- Strong consumer adoption of clean technology and fuel options.
- Removal of remaining CO2 emissions to achieve carbon neutrality.
- Some reliance on carbon capture and sequestration (CCS).

While the four scenarios had a lot in common, CARB notes that they also had some differences:

- Year in which carbon neutrality is achieved (2035 or 2045).
- Rate of deployment of clean technology and production and distribution of zero carbon energy.
- Remaining amount of demand for fossil energy in the year carbon neutrality is achieved.
- Constraints on technology and fuels deployed in certain sectors.
- Consumer adoption rates of clean technologies and fuels.
- Degree of reliance on CO2 removal.
- Degree of reliance on CCS.

Table 3-8 presents the actions included in the adopted scoping plan scenario in CARB's 2022 Scoping Plan.

Table 3-8. Actions for the Scoping Plan Scenario: AB 32 GHG Inventory Sectors

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
GHG Emissions Reductions Relative to the SB 32 Target (while the SB 32 GHG emissions reduction target is not an Action that is analyzed independently, it is included in this table for reference)	40% below 1990 levels by 2030	SB 32: Reduce statewide GHG emissions. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Smart Growth / Vehicle Miles Traveled (VMT)	VMT per capita reduced 25% below 2019 levels by 2030, and 30% below 2019 levels by 2045	SB 375: Reduce demand for fossil transportation fuels and GHGs, and improve air quality. In response to Board direction and EJ Advisory Committee recommendations.
Light-duty Vehicle (LDV) Zero Emission Vehicles (ZEVs)	100% of LDV sales are ZEV by 2035	EO N-79-20: Reduce demand for fossil transportation fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory. 2035 target aligns with the EJ Advisory Committee recommendation.
Truck ZEVs	100% of medium-duty (MDV)/HDV sales are ZEV by 2040 (AB 74 University of California Institute of Transportation Studies [ITS] report)	EO N-79-20: Reduce demand for fossil transportation fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Aviation	20% of aviation fuel demand is met by electricity (batteries) or hydrogen (fuel cells) in 2045. Sustainable aviation fuel meets most or the rest of the aviation fuel demand that has not already transitioned to hydrogen or batteries.	Reduce demand for petroleum aviation fuel and reduce GHGs. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory. In response to Governor Newsom's July 2022 letter to CARB Chair Liane Randolph.
Ocean-going Vessels (OGV)	2020 OGV At-Berth regulation fully implemented, with most OGVs utilizing shore power by 2027. 25% of OGVs utilize hydrogen fuel cell electric technology by 2045.	Reduce demand for petroleum fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Port Operations	100% of cargo handling equipment is zero-emission by 2037. 100% of drayage trucks are zero emission by 2035.	Executive Order N-79-20: Reduce demand for petroleum fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Freight and Passenger Rail	100% of passenger and other locomotive sales are ZEV by 2030. 100% of line haul locomotive sales are ZEV by 2035. Line haul and passenger rail rely primarily on hydrogen fuel cell technology, and others primarily utilize electricity.	Reduce demand for petroleum fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Oil and Gas Extraction	Reduce oil and gas extraction operations in line with petroleum demand by 2045.	Reduce GHGs and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Petroleum Refining	CCS on majority of operations by 2030, beginning in 2028. Production reduced in line with petroleum demand.	Reduce GHGs and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Electricity Generation	Sector GHG target of 38 million metric tons of carbon dioxide equivalent (MMTCO2e) in 2030 and 30 MMTCO2e in 2035. Retail sales load coverage. 20 gigawatts (GW) of offshore wind by 2045. Meet increased demand for electrification without new fossil gas-fired resources.	SB 350 and SB 100: Reduce GHGs and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory. In response to Governor Newsom's July 2022 letter, Board direction, and EJ Advisory Committee recommendation.

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
New Residential and Commercial Buildings	All electric appliances beginning 2026 (residential) and 2029 (commercial), contributing to 6 million heat pumps installed statewide by 2030.	Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory. In response to Governor Newsom's July 2022 letter.
Existing Residential Buildings	80% of appliance sales are electric by 2030 and 100% of appliance sales are electric by 2035. Appliances are replaced at end of life such that by 2030 there are 3 million all-electric and electric-ready homes—and by 2035, 7 million homes—as well as contributing to 6 million heat pumps installed statewide by 2030.	Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory. In response to Governor Newsom's July 2022 letter.
Existing Commercial Buildings	80% of appliance sales are electric by 2030, and 100% of appliance sales are electric by 2045. Appliances are replaced at end of life, contributing to 6 million heat pumps installed statewide by 2030.	Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory. In response to Governor Newsom's July 2022 letter.
Food Products	7.5% of energy demand electrified directly and/or indirectly by 2030; 75% by 2045.	Reduce demand for fossil gas and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Construction Equipment	25% of energy demand electrified by 2030 and 75% electrified by 2045.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Chemicals and Allied Products; Pulp and Paper	Electrify 0% of boilers by 2030 and 100% of boilers by 2045. Hydrogen for 25% of process heat by 2035 and 100% by 2045. Electrify 100% of other energy demand by 2045.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Stone, Clay, Glass, and Cement	CCS on 40% of operations by 2035 and on all facilities by 2045. Process emissions reduced through alternative materials and CCS.	SB 596: Reduce demand for fossil energy, process emissions, and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Other Industrial Manufacturing	0% energy demand electrified by 2030 and 50% by 2045.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Combined Heat and Power	Facilities retire by 2040.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Agriculture Energy Use	25% energy demand electrified by 2030 and 75% by 2045.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions.
Low Carbon Fuels for Transportation	Biomass supply is used to produce conventional and advanced biofuels, as well as hydrogen.	Reduce demand for petroleum fuel and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Low Carbon Fuels for Buildings and Industry	In 2030s biomethane (or RNG) blended in pipeline. Renewable hydrogen blended in fossil gas pipeline at 7% energy (~20% by volume), ramping up between 2030 and 2040. In 2030s, dedicated hydrogen pipelines constructed to serve certain industrial clusters.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory.
Non-combustion Methane Emissions	Increase landfill and dairy digester methane capture. Some alternative manure management deployed for smaller dairies. Moderate adoption of enteric strategies by 2030. Divert 75% of organic waste from landfills by 2025. Oil and gas fugitive methane emissions reduced 50% by 2030 and further reductions as infrastructure components retire in line with reduced fossil gas demand.	SB 1383: Reduce short-lived climate pollutants.
High GWP Potential Emissions	Low GWP refrigerants introduced as building electrification increases, mitigating HFC emissions.	SB 1383: Reduce short-lived climate pollutants.

Source: CARB, 2022.

3.7.4.2 Southern California Association of Governments (SCAG) GHG Reduction Strategies

SCAG prepared a Draft Technical Methodology to Estimate Greenhouse Gas Emissions for Connect SoCal (2024-2050 Regional Transportation Plan/Sustainable Communities Strategy [RTP/SCS]). On March 22, 2018, the CARB Board adopted the following per capita GHG emissions reduction targets from 2005 levels for the SCAG region effective October 1, 2018:

- 2020 Target: -8%
- 2035 Target: -19%

These per capita GHG targets apply to both Connect SoCal 2020 and Connect SoCal 2024. The previous RTP/SCS, Connect SoCal 2020, was estimated by SCAG's model to achieve GHG emission reductions relative to 2005 levels of 8 percent in 2020, and 19 percent in 2035, thereby meeting the GHG reduction targets set

for the SCAG region. **Table 3-9** summarizes the top GHG reduction strategies in the SCAG area which includes the City of Signal Hill where the proposed Project is located.

Table 3-9. SCAG Top GHG Reduction Strategies

GHG Reduction Strategy	Description
1. Housing	► Increase the total number of units in a project. ► Increase the dwelling units per acre (over the program requirements). ► Include mixed use development.
2. Parking	► Reduce below standard Institute of Transportation. Engineers parking rates. ► Unbundle housing and parking costs.
3. New Transit Service	► Include a vehicle purchase to capture GHG reduction.
4. Active Transportation Infrastructure	► Add new bike lanes. ► Add new pedestrian paths. ► Include a bike share station.
5. Transit Subsidies	► Provide deeper subsidies to increase GHG reduction.
6. Other Sustainable Transportation Infrastructure	► Include traffic calming measures such as: curb extensions, marked crosswalks, on-street parking, etc.

Source: SCAG, 2023

3.7.4.3 GHG CEQA Evaluation and CA Supreme Court Ruling

The California Supreme Court's most recent CEQA decision on the Newhall Ranch development case, Center for Biological v. California Department of Fish and Wildlife (November 30, 2015, Case No. 217763), determined that the project's Environmental Impact Report (EIR) did not substantiate the conclusion that the GHG cumulative impacts would be less than significant. The EIR determined that the Newhall Ranch development project would reduce GHG emissions by 31 percent from business as usual (BAU). This reduction was compared to California's target of reducing GHG emissions statewide by 29 percent from business as usual. The Court determined that "the EIR's deficiency stems from taking a quantitative comparison method developed by the Scoping Plan as a measure of the GHG reduction effort required by the state as a whole, and attempting to use that method, without adjustments, for a purpose very different from its original design." In the Court's final ruling it offered suggestions that were deemed appropriate use of the BAU methodology:

1. Lead agencies can use the comparison to BAU methodology if they determine what reduction a particular project must achieve in order to comply with statewide goals,
2. Project design features that comply with regulations to reduce emissions may demonstrate that those components of emissions are less that significant, and
3. Lead agencies could also demonstrate compliance with locally adopted climate plans or could apply specific numerical thresholds developed by some local agencies.

The City of Signal Hill, the Lead CEQA agency for this Project, has not developed specific thresholds for GHGs. As discussed in Section 4.2, the South Coast AQMD, a CEQA Responsible Agency for this Project, has developed thresholds to determine significance of a proposed project – 10,000 metric tons of CO_2e, an established Best Performance Standards threshold. Additionally, the South Coast AQMD AQMP includes best performance standards which will also be considered as part of this Project's impact evaluation (**Table 3-10**). Therefore, the GHG analysis for this Project follows the suggestions from the Court's ruling on the Newhall Ranch development project in order to determine significance through use of specific numerical thresholds.

Table 3-10. AQMP Best Performance Standards

Control Measure	Description
Stationary Source NOx Measures	
L-CMB-02: Reduction from boilers and process heaters (Permitted)	This control measure applies to facilities with boilers and process heaters with a rated heat input of greater than or equal to 2 million BTU/hr. This control measure aims to reduce NOx emissions by replacing or retrofitting boilers and process heaters with zero and low NOx emission technology.
L-CMB-03: NOx emission reduction from permitted non-emergency internal combustion engines	This control measure applies to facilities with non-emergency internal combustion engines rated over 50 brake horsepower (bhp). This control measure aims to transition older, engines to newer technologies with low NOx emissions.
L-CMB-04: Emissions Reductions from emergency standby engines (permitted)	This control measure applies to facilities with emergency standby internal combustion engines rated over 50 bhp. This control measure aims to encourage the transition to newer technologies with low NOx emissions.
L-CMB-05: NOx emission reductions from large turbines	This control measure applies to facilities with stationary gas turbines. This control measure aims to reduce NOx emissions from turbines by encouraging facilities to replace older turbines near the end of their lifetime with fuel cells or electrification.
L-CMB-07: Emission Reductions from Petroleum Refineries	This control measure applies to refineries with large heaters and boilers. This control measure aims to reduce NOx emissions by 20 percent by implementing next-generation ultra-low NOx burners and transitioning to zero emission technology.
Stationary Source VOC Measures	
FUG-01: Improved leak detection and repair	This control measure applies to facilities with processes and storage equipment with fugitive VOC leaks. This control measure aims to reduce emissions of VOCs from fugitive leaks by implementing advanced leak detection technologies such as optical gas imaging devices, open path detection devices, and gas sensors for early detection of VOC leaks.
FUG-02: Emission reductions from industrial cooling towers	This control applies to facilities with industrial cooling towers. This control measure includes reviewing cooling tower emissions, cost of monitoring equipment, and control requirements to determine if additional monitoring is required to reduce VOC emissions.
Emission Growth Management Measures	
EGM-01: Emission reductions from new development and redevelopment	This control measure applies to new development or redevelopment industrial projects. This control measure aims to identify emission reduction opportunities and to mitigate and reduce emissions.

Control Measure	Description
On-Road and Off-Road Mobile Sources	
MOB-05: Accelerated retirement of older light-duty and medium duty vehicles	This control measure applies to facilities using gasoline and diesel-powered vehicles with up to 8,500 lbs. gross vehicle weight rating (GVWR). This control measure aims to achieve emission reductions by retiring up to 2,000 light and medium duty vehicles annually and replace with cleaner conventionally powered vehicles or plug-in hybrid electric vehicles.
MOB-06: Accelerated retirement of older on-road heavy duty vehicles	This control measure applies to facilities using heavy-duty vehicles with a GVWR greater than 8,500 lbs. This control measure aims to reduce emissions from high polluting vehicles by replacement through an incentive program.
MOB-09: Further emission reductions from passenger locomotives	This control measure applies to facilities using passenger locomotives and aims to promote replacement or upgrade to Tier 4 or cleaner locomotives.
MOB-13: Fugitive emissions from tanker vessels	This control measure applies to ocean going petroleum tankers that transport crude oil, refined petroleum, and unfinished petroleum products. This control measure aims to quantify and control fugitive VOC emissions from tanker vessels that undergo pressure and temperature variations resulting in increased emissions.
MOB-14: Rule 2202 – on-road motor vehicle mitigation options	This control measure applies to large facilities with 250 or more employees. This control measure aims to mitigate the number of commuter trips on site and provide incentives for telecommuting when possible.
MOB-15: Zero emission infrastructure for mobile source.	This control measure applies to facilities with mobile sources of emissions and aims to develop a plan to accelerate the deployment of zero emission infrastructure by coordinating with stakeholders and address information gaps in planning and development.

Los Angeles County is in the process of adopting the 2045 Climate Action Plan (CAP), an update to the 2020 Community Climate Action Plan (CCAP) as local, state, and international leaders have identified new targets for emissions reductions. The 2045 CAP identifies strategies, measures, and actions to mitigate emissions from community activities. Although not specifically applicable to the City of Signal Hill, this Los Angeles County CAP (**Table 3-11**) as well as South Coast AQMD's most recent AQMP provide a robust list of best performance standards for reducing GHGs, which have and would continue to apply to SHP's operations conducted under CUP 97-03.

Table 3-11. County of Los Angeles 2045 Climate Action Plan (2022)

Measure	Description	Applicability/Conformance
Strategy 1: Decarbonize the Energy Supply		
MEASURE ES-1: Develop a Sunset Strategy for all Oil and Gas Operations.	Develop a sunset strategy for all oil and gas operations that prioritizes disproportionately affected communities and develop a strategy for carbon removal. The goal of Measure ES-1 is to reduce oil and gas operations by 40 percent by 2030, 60 percent by 2035, and 80 percent by 2045 (compared to 2015 baseline levels).	Applies. The proposed Project is for the extension of CUP operations for up to 20 years (2043) and GHG reductions in mobile sources and fugitives have been and could continue to be implemented as part of the Project. For these reasons, the Project will not directly conflict with this measure.

Measure	Description	Applicability/Conformance
MEASURE ES-2: Procure Zero-Carbon Electricity.	Supplying the County's power demand with zero-carbon electricity is critical to achieving significant GHG emissions reductions. The Clean Power Alliance (CPA) is a nonprofit and community choice energy provider that currently serves 32 communities across Southern California.	N/A
MEASURE ES-3: Increase Renewable Energy Production.	Expand local solar power generation on existing and new development and for LA County projects. The goal of Measure ES3 is to increase on-site solar electricity production for existing and new multifamily residential buildings, existing commercial buildings, and municipal buildings. The measure aims to install rooftop solar photovoltaic (PV) on 5 percent of existing residential and commercial buildings by 2030, 10 percent by 2035, and 20 percent by 2045; install rooftop solar PV on 80 percent of new multifamily residential buildings by 2030, 85 percent by 2035, and 95 percent by 2045; install rooftop solar PV on 40 percent of new commercial buildings by 2030, 50 percent by 2035, and 70 percent by 2045; and install 20,000 kilowatts (kW) of rooftop solar PV at county facilities.	N/A
MEASURE ES-4: Increase Energy Resilience.	Expand energy storage and microgrids throughout the community and for LA County operations. The goal of Measure ES-4 is to achieve community electricity storage capacity equal to the communitywide 24-hour average usage by 2035/2045.	N/A
MEASURE ES-5: Establish GHG Requirements for New Development.	Develop requirements to ensure that new development is consistent with the 2045 CAP milestone targets for 2030 and 2035 and long-term aspirational goal for 2045. This includes a project review consistency checklist for new development to demonstrate consistency with the 2045 CAP. LA County will assess the feasibility of developing a GHG offsets/credit program to create a pathway toward achieving the aspirational 2045 goal of carbon neutrality.	Applies. The Project has been designed to be consistent with the goals and policies of the 2045 CAP to the extent feasible (also see Section 6.2.5 below).
Strategy 2: Increase Density and Diversity of Destinations with an Emphasis Land Uses Near Transit		

Measure	Description	Applicability/Conformance
MEASURE T-1: Increase Density near High-Quality Transit Areas.	Increase housing opportunities that are affordable and near transit, to reduce VMT.	N/A
MEASURE T-2: Develop Land Use Plans Addressing Jobs-Housing Balance and Increase Mix Use.	Increasing density and the mix of land uses can help reduce single-occupancy trips, the number of trips, and trip lengths.	N/A
Strategy 3: Reduce Single-Occupancy Vehicle Trips		
MEASURE T-3: Expand Bicycle and Pedestrian Network to Service Residential, Employment and Recreational Trips.	Travel options that serve a variety of land uses and trip purposes can help shift some trips away from single-occupancy vehicles.	N/A
MEASURE T-4: Broaden Options for Transit, Active Transportation and Alternative Modes of Transportation.	Transit service, micro mobility services (such as bike-share, scooter-share, and drone deliveries), and access to these transportation options can help reduce VMT.	N/A
MEASURE T-5: Limit and Remove Parking Minimums.	Parking strategies such as parking maximums, unbundling parking, or market price parking can help reduce VMT.	N/A
Strategy 4: Institutionalize Low-Carbon Transportation		
MEASURE T-6: Increase ZEV Market Share and Reduce Gasoline and Diesel Fuel Sales.	Increase the County's zero emission vehicle (ZEV) market share and vehicle penetration to the maximum extent feasible. Set targets for reducing total gasoline and diesel vehicle fuel sales.	N/A
MEASURE T-7: Electrify LA County Fleet Vehicles.	Electrify the LA County bus, shuttle, and light-duty vehicle fleet and shuttles.	N/A
MEASURE T-8: Accelerate Freight Decarbonization.	Incentivize and implement freight decarbonization technologies, specifically focusing on charging infrastructure.	N/A
MEASURE T-9: Expand Use of Zero-Emission Technologies for Off-Road Vehicles and Equipment.	Prohibit the use of gas- and diesel-powered small (≤25 horsepower) off-road equipment and increase the use of zero-emission and near-zero-emission construction, agriculture, and manufacturing equipment.	Applies. SHP has one electric drill and will continue to upgrade its off-road fleet to the latest low emission technologies as they become available on the market.
Strategy 5: Decarbonize Buildings		

Measure	Description	Applicability/Conformance
MEASURE E-1: Transition Existing Buildings to All-Electric.	As the carbon intensity of grid-supplied electricity decreases, decarbonization must be combined with building electrification, shifting more load toward cleaner sources. This measure aims to electrify existing buildings. Biomethane is another preferred alternative to fossil natural gas; however, the existing opportunities for widespread use of biomethane are limited.	N/A
MEASURE E-2: Standardize All-Electric New Development.	This measure aims to electrify all new buildings.	N/A
MEASURE E-3: Other Decarbonization Actions.	Reduce the life-cycle carbon intensity of building materials and phase out the use of high-GWP refrigerants.	N/A
Strategy 6: Improve Energy Efficiency of Existing Buildings		
MEASURE E-4: Improve Energy Efficiency of Existing Buildings.	Retrofit existing building stock to reduce overall County energy use.	N/A
Strategy 7: Conserve Water		
MEASURE E-5: Increase Use of Recycled Water and Gray Water Systems.	Increasing the use of alternative water sources (e.g., recycled water, gray water, indirect potable reuse) reduces the demand for water sources with higher energy and carbon intensities (e.g., imported water, groundwater).	N/A
MEASURE E-6: Reduce Indoor and Outdoor Water Consumption.	Reducing indoor and outdoor water consumption is essential as the state experiences longer and more severe droughts. Not only will water conservation improve regional resiliency, but it will also reduce GHG emissions through the reduction of energy consumption associated with processing, treatment, and the conveyance of water and wastewater.	N/A
Strategy 8: Minimize Waste and Recover Energy and Materials from the Waste Stream		

Measure	Description	Applicability/Conformance
MEASURE W-1: Institutionalize Sustainable Waste Systems and Practices.	Undertake actions that result in sustainable waste systems countywide. Responsible and sustainable waste practices are learned behaviors, which the LA County can facilitate through outreach, education, and mandates. Increase diversion of recyclable materials and organics from landfills through ordinances, service improvements, education and outreach, and promotion of product stewardship and markets for material reuse. An increased diversion rate indirectly reduces the demand for virgin materials, which reduces the life-cycle carbon intensity of any resulting products. Through action taken at the LA County level, waste-conscious habits and thoughtful consumption can become the default.	N/A
MEASURE W-2: Increase Organic Waste Diversion.	Provide services for diverting yard waste, food scraps, and compostable paper from landfills to beneficial uses, including compost, food rescue, and energy production.	N/A
Strategy 9: Conserve Forests and Working Lands		
MEASURE A-1: Conserve Agricultural and Working Lands, Forest Lands and Wildlands.	Preserve, conserve, and restore agricultural lands, working lands, rangelands, forest lands, wetlands, and other wildlands in unincorporated Los Angeles County.	N/A
Strategy 10: Sequester Carbon and Implement Sustainable Agriculture		
MEASURE A-2: Support Regenerative Agriculture.	Promote agricultural practices that sequester carbon and restore soil quality, biodiversity, ecosystems health, and water quality.	N/A
MEASURE A-3: Expand Unincorporated Los Angeles County's Tree Canopy and Green Spaces.	Create an Urban Forest Management Plan to plant trees, increase the unincorporated County's tree canopy cover, add green space, and convert impervious surfaces.	N/A

3.7.5 SHP's Historical GHG Emissions Inventory

The monthly totals of SHP's CUP Sites GHG emissions are recorded on an annual GHG worksheet which is uploaded into CARB's electronic GHG Reporting Tool (Cal e-GGRT) along with the rest of SHP's operations facility wide. SHP CUP Sites use a continuous emissions monitoring systems (CEMS) on the turbine exhaust to quantify and report CO_2 emissions. The turbine provides 75-80% of total operational energy, with the rest supplied by Southern California Edison (SCE). A continuous gas sample is extracted from the stack and analyzed in a temperature controlled CEMS shelter. The CEMS is controlled by a programmable logic controller. The CEMS utilizes an electronic data acquisition system to monitor record and report emission data. All measurements are done on a continuous real-time basis. The CEMS monitors stack NOx emission

concentrations, CO concentrations, ammonia slip, and stack gas volumetric flow rate. Emissions data are read and recorded at one-minute intervals.

Per CARB's mandatory GHG reporting requirement, direct GHG emissions of CO_2, CH_4, and N_2O are required to be reported annually. SHP's historical GHG emission are reported through CARB's Mandatory Reporting of Greenhouse Gas Emissions (MRR) program. Note that these emissions represent all of SHP's operations within the Signal Hill/Long Beach area, and not just the seven CUP Sites applicable to the Project. In 2020, Ashworth Leininger Group verified all of SHP's facilities direct GHG emissions at 41,756 MT CO_2e from production activities. Ashworth Leininger Group conducted detailed data checks that focused on the largest and most uncertain estimates of emissions, product data, and fuel and electricity transactions. These GHG verifications are performed for and submitted to CARB as part of the mandatory GHG reporting requirement.

Since mobile GHG emissions are not included in the GHG emissions reported to CARB through the MRR, these emissions have been quantified for baseline mobile sources and provided in **Table 3-12** below.

Table 3-12. SHP Baseline Mobile GHG Emissions (Metric Tons CO_2e)

Source	CO_2	CH_4	N_2O	CO_2e
Employee Truck Trips (LDT2)	13.81	0.000	0.002	14.46
Heavy Duty Trucks (T7 Single)	3.35	0.000	0.001	3.5
Total	**17.15**	**0.00**	**0.003**	**17.97**
*0.000 could represent < 0.000.				

Note the baseline GHG emissions presented above are for disclosure purposes. For the Project, and to determine potential impacts, one-time construction GHG emissions associated with the Project (e.g., installation of facilities, new well cellars, etc.) and ongoing operational GHG emissions associated with the proposed Project uses (e.g., new drilling/redrilling, area, energy, and mobile sources, etc.) are evaluated in this AQIA to determine the potential significance of the Project's GHG impacts.

4. REGULATORY SETTING

AAQS in California are the responsibility of, and have been established by, both the U.S. EPA and CARB. These standards have been set at concentrations that provide margins of safety for the protection of public health and welfare. Federal and state air quality standards are presented above in **Table 3-3**. The South Coast AQMD has established levels of episodic criteria and has indicated measures that must be initiated to immediately reduce contaminant emissions when these levels are reached or exceeded. The federal, state, and local air quality regulations are described in further detail in the following sections.

4.1 Federal

4.1.1 Clean Air Act

The U.S. EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside of state waters (Outer Continental Shelf). U.S. EPA is responsible for implementing the CAA, which is the comprehensive federal law that regulates air emissions from stationary and mobile sources.

The CAA is designed to attain compliance with the NAAQS adopted by the U.S. EPA (42 United States Code (U.S.C.) § 7409). U.S. EPA has adopted NAAQS for ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$. (40 CFR Part 50.) For planning purposes, U.S EPA has divided the country into separate "air quality control regions" (42 U.S.C. § 7407; 40 CFR Part 81). U.S. EPA must determine whether each air quality region is in "attainment" or "nonattainment" of the NAAQS for each criteria pollutant (42 U.S.C. § 7407(d)(4); 42 U.S.C. § 7501(2)). Once a region is designated as in nonattainment, the CAA requires states to prepare a "state implementation plan" (SIP) (42 U.S.C. § 7410). Each SIP must provide for: (1) "implementation of all reasonably available control measures as expeditiously as practicable," and (2) the attainment of the NAAQS. U.S. EPA must review and approve each proposed SIP (42 U.S.C. § 7410(a)(1)).

The South Coast Air Basin is an air quality control region under the CAA. The South Coast AQMD is responsible for preparing the Basin's AQMP (Health and Safety Code § 40408). The AQMP serves as the SIP under the CAA (Health and Safety Code § 40460). The AQMP sets forth a variety of general "control measures" designed to attain and maintain the NAAQS within the Basin (Health and Safety Code § 40913).

The CAA is organized into seven main sections:

- Title I – Air Pollution Prevention and Control
  - Part A – Air Quality and Emission Limitations
  - Part B – Ozone Protection
  - Part C – Prevention of Significant Deterioration (PSD) of Air Quality
  - Part D – Plan Requirements for Nonattainment Areas
- Title II – Emission Standards for Moving Sources
  - Part A – Motor Vehicle Emission and Fuel Standards
  - Part B – Aircraft Emission Standards
  - Part C – Clean Fuel Vehicles
- Title III – General Provisions
- Title IV – Noise Pollution

- Title IV-A – Acid Deposition Control
- Title V – Permits
- Title VI – Stratospheric Ozone Protection

Title I Part C of the CAA is Prevention of Significant Deterioration (PSD), which applies to new major sources or major modifications at existing sources for pollutants where the area that the source is located in is in attainment or unclassifiable with the NAAQS. It requires installation of the "Best Available Control Technology" (BACT), an air quality analysis, an additional impacts analysis, and public involvement. PSD review will not be required for the proposed Project, because it does not constitute a new major source or major modification to an existing source (physical change to existing equipment). Title III of the CAA regulates TACs and is applicable to the proposed Project as analyzed in Chapter 4. Title V of the CAA establishes a federal permit program. The Title V program is implemented by the South Coast AQMD for areas within its jurisdiction via South Coast AQMD Regulation XXX – Title V Permits. Title V permits incorporate all federally enforceable requirements as well as state and local requirements.

SHP's CUP Sites have and would continue to operate pursuant to its South Coast AQMD air permits, which imposes all applicable CAA requirements on the oil and gas operations conducted under CUP 97-03.

4.1.2 Greenhouse Gas Reporting Program (GHGRP)

U.S. EPA's GHGRP, codified at 40 CFR Part 98, requires GHG data reporting from large GHG emission sources, fuel and industrial gas suppliers, and carbon dioxide injection sites in the United States. In general, the GHGRP applies to facilities that emit 25,000 MT CO_2e or more per year in the United States and requires such facilities to submit GHG emission reports on an annual basis. U.S. EPA electronically verifies data submitted and publishes the data.

SHP is subject to the GHGRP and has a history of compliance with the program. SHP would continue to be subject to applicable provisions of U. S. EPA's GHGRP throughout the proposed 20-year extended term of CUP 97-03/the Project.

4.2 State

4.2.1 CAAQS

The California Clean Air Act sets forth a state regulatory program that is parallel to the federal CAA program. The California CAA is designed to attain compliance with the CAAQS within specified "air quality basins" (Health and Safety Code § 39606). CARB has adopted CAAQS for all pollutants for which the federal government has NAAQS, and has also established standards for sulfates, visibility, H_2S, and vinyl chloride. California standards are generally more stringent than the NAAQS. Federal and state air quality standards are presented in **Table 3-3**.

For the most part, CARB's air quality basins have the same boundaries as U.S. EPA's air quality control regions. Like U.S. EPA under the Federal CAA, CARB must determine whether each air quality basin is attainment or nonattainment of the CAAQS for each criteria pollutant (Health and Safety Code § 39608). An "attainment plan" must be prepared for each nonattainment region (Health and Safety Code § 40911). Like federal SIPs, attainment plans must demonstrate how nonattainment basins will achieve and maintain the CAAQS (Health and Safety Code § 40913). Within each region/basin, the same document generally serves as both the SIP and the attainment plan (Health and Safety Code § 41650(a)). These plans are variously referred to as "air quality management plans", "air quality maintenance plans", "attainment plans", or "non-attainment plans". CARB must review and approve each attainment plan (Health and Safety Code § 40911).

The South Coast Air Basin is an air quality basin under the California CAA. The South Coast AQMD's AQMP serves as the attainment plan under the California Act for the Basin (Health and Safety Code § 40460). The AQMP sets forth a variety of general "control measures" designed to attain and maintain the CAAQS within the Basin (Health and Safety Code § 40913). Thus, the AQMP serves the same purpose under the California CAA and the parallel CAA – it provides a blueprint for attaining compliance with both the NAAQS and the CAAQS. CARB, which became part of the CalEPA in 1991, is responsible for ensuring implementation of the California CAA and federal CAA, and for regulating emissions.

4.2.2 AB 617 Community Air Protection Program

On July 26, 2017, Governor Brown approved Assembly Bill No. 617 ("AB 617"). AB 617 added and amended various sections of the California Health and Safety Code. The intent of AB 617 is to develop a collaborative relationship between CARB and local air districts to facilitate community participation, provide a science-based foundation supporting the identification of communities with high cumulative exposure burdens, accelerate the development and use of advanced air monitoring methods and equipment, and support the use of new mobile and stationary source technology. To achieve those goals, AB 617 requires six significant measures: (1) Annual Reporting; (2) Best Available Retrofit Control Technology ("BARCT"); (3) a Statewide Clearinghouse of BARCT; (4) Community Air Monitoring; (5) Community Emissions Reduction Programs; and (6) Increased Penalties.

The AB 617 Program's focus is to reduce exposure in communities most impacted by air pollution. A central component of the program is the selection of specific communities in which the Community Air Monitoring and Community Emissions Reductions Programs take place. These communities are selected based on community exposure to air pollution. In 2018, the community of Wilmington, Carson, and West Long Beach was nominated by South Coast AQMD and selected by CARB as an AB 617 Community. CUP Site #1 is within this community and therefore subject to the community programs. Further discussion is provided in Section 6.2.1.1.1.

4.2.3 AB 1807 and AB 2728

California also has established a state air toxics program, California Toxic Air Contaminants Program (Tanner Bill) (AB 1807), which was modified by the Revised Tanner Bill (AB 2728). This program sets forth provisions to implement the national program for control of HAPs.

SHP's CUP Sites are subject to the requirements of the California state air toxics program.

4.2.4 AB 2588

The Air Toxic "Hot Spots" Information and Assessment Act (AB 2588), as amended by Senate Bill (SB) 1731, requires operators of certain stationary sources to inventory air toxic emissions from their operations and, if directed to do so by the local air district, prepare a health risk assessment (HRA) to determine the potential health impacts of such emissions. If the health impacts are determined to be "significant" (greater than 10 per one million exposures or non-cancer hazard index greater than 1.0), each facility operator must, upon approval of the HRA, provide public notification to affected individuals.

SHP's CUP Sites are subject to the requirements of AB 2588.

4.2.5 Proposition 65

Proposition 65, officially named the "Safe Drinking Water and Toxic Enforcement Act of 1986," became law in California in 1986. The Proposition was intended to protect California citizens and the State's drinking water

sources from chemicals known to cause cancer, birth defects, or other reproductive harm, and to inform citizens about exposure to such chemicals. Under the statute, the state must maintain and update a list of such chemicals. Additionally, a person doing business cannot expose an individual to such a chemical without first giving a clear and reasonable warning. The warning can be provided in various ways, such as by labeling a consumer product, posting signs at the workplace, or distributing or publishing notices.

SHP is subject to the requirements of Proposition 65.

4.2.6 AB 32: MRR and Cap-and-Trade

The California Global Warming Solutions Act of 2006 (AB 32), requires a sharp reduction of GHG emissions in California in preparation to transition the State to a sustainable, low-carbon future. Pursuant to AB 32, CARB has adopted various programs and regulations with the goal of achieving maximum GHG emission reductions considering technological feasibility and cost-effectiveness.

MMR, introduced in Section 3.7 above, is one program that CARB developed and adopted under AB 32. The MRR (codified at Title 17, CCR, sections 95100-95157) incorporates certain requirements promulgated by U.S. EPA's GHGRP and is applicable to electricity generators, industrial facilities, fuel suppliers, and electricity importers. In general, the MRR applies to facilities that emit 10,000 MT CO_2e or more per year in California and requires such facilities to submit GHG emission reports on an annual basis. The MRR also requires the independent verification of GHG emissions data reports by a CARB-accredited verification body. CARB then publishes the publicly available data. SHP's CUP Sites are subject to the GHG MRR and has a history of compliance with the program.

Another program that CARB developed and adopted under AB 32 is the California Cap-and-Trade Program, which applies to electricity generators, distributors of transportation, natural gas, and other fuels, and large industrial facilities emitting 25,000 MT CO_2e or more annually in California. Facilities subject to Cap-and-Trade are considered "covered entities," and are required to register with the Cap-and-Trade Program, report and verify GHG emissions pursuant to the MRR, submit valid compliance instruments to fulfill the compliance obligation, and retain applicable records. Cap-and-Trade establishes a limit, or cap, on GHG emissions from covered entities. The cap commenced in 2013 and declines over time, achieving GHG emission reductions over time in alignment with AB 32. The cap is used to allocate emission credits, which are distributed to covered facilities. A facility's credits give them permission to release a certain quantity of emissions. Facilities with more credits than they need can sell them as offsets.

SHP participates in Cap-and-Trade as a result of its total stationary source emissions from CUP Site #2, specifically the power turbine, as previously described above in Section 3.7.5. The turbine at CUP Site #2 uses a gas stream produced from SHP's oil and gas extraction and processing operations, and converts it into electricity, which is used to offset electric consumption from SHP operations. As discussed in Section 3.7.5 above, the turbine provides approximately 75-80% of total energy needed for SHP's broader oil and gas operations. While Cap-and-Trade offsets can be seen as enabling major industrial facilities to buy the right to emit more, in this case SHP's turbine operations are reducing electricity usage from offsite sources. Additionally, SHP's gas turbine operates using natural gas byproducts; SHP could potentially be generating more direct and indirect GHG emissions if SHP were to purchase electricity (rather than produce it at the CUP Site #2 gas turbine) and flare the byproduct gas stream onsite (that is currently being used to power the CUP Site #2 gas turbine).

4.3 Regional

The South Coast AQMD has regulatory authority over stationary sources and air pollution control equipment, and limited authority over mobile sources for areas within its jurisdiction. The South Coast AQMD is responsible for air quality planning in the Basin and the development of the AQMP. The AQMP establishes the strategies that will be used to achieve compliance with CAAQS in all areas within the South Coast AQMD's jurisdiction.

The South Coast AQMD rules and regulations which are applicable to the SHP CUP sites, include but are not limited to the following:

- Rule 203 – Permit to Operate
- Rule 212 – Standards for Approving Permits
- Rule 218 – Continuous Emissions Monitoring
- Rule 222 – Filing Requirements for Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II
- Rule 301 – Permitting and Associated fees
- Rule 401 – Visible Emissions
- Rule 402 – Nuisance
- Rule 403 – Fugitive Dust
- Rule 404 – Particulate Emissions
- Rule 407 – Liquid and Gaseous Air Contaminants
- Rule 409 – Combustion Contaminants
- Rule 431.2 – Sulfur Content of Liquid Fuels
- Rule 463 – Organic Liquid Storage
- Rule 464 – Wastewater Separators
- Rule 1134 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities
- Rule 1148.1 – Oil and Gas Production Wells
- Rule 1148.2 – Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers
- Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil
- Rule 1173 – Control of Volatile Organic Compound leaks and Releases from Components at Petroleum Facilities and Chemical Plants
- Rule 1176 – VOC Emissions from Wastewater Systems
- Regulation XIII – NSR, including key rule (Rule 1303 – Requirements)
- Rule 1401 – New Source Review of Toxic Air Contaminants
- Rule 1402 – Control of Toxic Air Contaminants from Existing Sources
- Title 16 – Oil and Gas Code
- Regulation XX – CUP Site 2 is RECLAIM including key rules (Rule 2005 – NSR for RECLAIM Pollutants)
- Regulation XXX – Title V Permits (SHP has no Title V permits)

4.3.1 Rule 203

Rule 203 applies to facilities, including SHP's CUP Sites, that operate any equipment that may cause air contaminant emissions. This rule requires that the facility obtains a written permit to operate from the Executive Officer.

4.3.2 Rule 212

Rule 212 applies to facilities, including SHP's CUP Sites, that require a Permit to Operate (PTO). This rule sets the standards for approving permits to operate to ensure the facility eliminates, reduces, or controls air contaminant emissions.

4.3.3 Rule 218

Rule 218 applies to all facilities, including SHP's CUP Sites, that have emissions sources that require continuous emissions monitoring systems (CEMS). This rule sets the applicability and monitoring requirements of CEMS as well as application and approval requirements.

4.3.4 Rule 222

Rule 222 applies to facilities, including SHP's CUP Sites, not requiring a written permit pursuant to Regulation II for specific emission sources.

4.3.5 Rule 301

Rule 301 provides authority for the South Coast AQMD to adopt a fee schedule for the issuance of permits to cover the cost of evaluation, planning, inspection, and monitoring related to that activity.

4.3.6 Rule 401

Rule 401 applies to facilities, including SHP's CUP Sites, that have visible emissions. This rule requires that the facility will not discharge into the atmosphere from any single source of emission whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour that darker or of high opacity.

4.3.7 Rule 402

Rule 402 applies to facilities, including SHP's CUP Sites, that emit air contaminates. This rule requires that the facility will not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to the public.

4.3.8 Rule 403

Rule 403, Fugitive Dust, applies to any activity or man-made condition capable of generating fugitive dust, which includes SHP's CUP Sites. The purpose of this Rule is to reduce the amount of particulate matter entrained in ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce or mitigate fugitive dust emissions.

SHP follows South Coast AQMD's protocols for dust control. CUP Sites #2, #4, #5, #6 and #7 are all paved. CUP Site #1 has a stabilized gravel surface that controls dust. CUP Site #3 is partially covered with gravel. Further, CUP Site #3 is sprayed by a mobile water truck as needed whenever there are heavy equipment operations (e.g., well servicing, drilling etc.) and light vehicle traffic on CUP Site #3 is speed controlled to minimize dust.

4.3.9 Rule 404

Rule 404 applies to facilities, including SHP's CUP Sites, that emit particulate matter. This rule aims to ensure there is not an excess of particulate matter emissions.

4.3.10 Rule 407

Rule 407 applies to facilities, including SHP's CUP Sites, which operate equipment that may discharge liquid and gaseous air contaminants. This rule sets specific standards for carbon monoxide and sulfur compounds emissions into the atmosphere.

4.3.11 Rule 409

Rule 409 applies to facilities, including SHP's CUP Sites, that generate contaminants from combustion processes. The rule sets requirements for the discharge limits of combustion contaminants from the burning of fuel.

4.3.12 Rule 431.2

Rule 431.2 applies to facilities, including SHP's CUP Sites, that supply fuel. The aim of this rule is to limit the sulfur content in liquid fuels to reduce both the formation of sulfur oxides and particulates during combustion.

4.3.13 Rule 463

Rule 463 applies to facilities, such as SHP's CUP Sites, with any above-ground stationary storage tank with a capacity of 75,000 liters or greater used for organic liquids. This rule aims to reduce emissions of volatile organic compounds (VOCs) from any above-ground storage tank (AST).

4.3.14 Rule 464

Rule 464 applies to facilities, including SHP's CUP Sites, which utilize wastewater equipment that separates petroleum-derived compounds from wastewater. This rule sets specific requirements for the operation, maintenance, and handling of the wastewater separator equipment.

4.3.15 Rule 1134

Rule 1134 applies to facilities, including SHP's CUP Site 2, which operate stationary gas turbines of 0.3 megawatt or larger.

4.3.16 Rule 1148.1

Rule 1148.1 applies to facilities, including SHP's CUP Sites, such as onshore oil producing wells, well cellars, and produced gas handling operation and maintenance activities where petroleum and processed gas are produced, gathered, separate, processed, and stored. This rule aims to reduce emissions of VOCs, TACs, and TOCs from the operation and maintenance of the facility to ultimately prevent public disturbance and public health effects.

4.3.17 Rule 1148.2

Rule 1148.2 applies to any operator, including SHP's CUP Sites, of an onshore oil and gas or injection well located in the South Coast AQMD that is conducting drilling, well completion, rework, or acidizing. The purpose of this rule is to gather air quality-related information on oil and gas and injection wells for drilling, well completion, rework, and acidizing.

4.3.18 Rule 1166

Rule 1166 applies to facilities, including SHP's CUP Sites, that have VOC leakage from storage and transfer operations, accidental spillage, or other deposition. This rule sets requirements to control the emission of VOCs from excavating, grading, handling, and treating VOC contaminated soil.

4.3.19 Rule 1173

Rule 1173 applies to components at facilities, including SHP's CUP Sites, such as refineries, chemical plants, lubricating oil and grease re-refiners, marine terminals, oil and gas production fields, natural gas processing

plants and pipeline transfer stations. This rule aims to control VOC leaks from components such as valves, pumps, and compressors, as well as atmospheric process pressure relief devices (PRDs).

4.3.20 Rule 1176

Rule 1176 applies to facilities, including SHP's CUP Sites, with wastewater systems and associated control equipment located at petroleum refineries, on-shore oil production fields, off-shore oil production platforms, chemical plants, and industrial facilities. This rule aims to limit VOC emissions from wastewater systems.

4.3.21 Rule 1401

Rule 1401 applies to facilities, including SHP's CUP Sites, with new, relocated, or modified equipment that emit TACs. This rule establishes allowable health risks for permit units that require new permits. Rule 1401 applies to SHP's permit units based on the maximum potential to emit.

4.3.22 Rule 1402

Rule 1402 applies to facilities, including SHP's CUP sites, which are subject to the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588), and facilities with emissions that exceed significant or action risk levels. This rule reduces the health risk associated with emissions of TACs from existing sources by specifying limits for the Maximum Individual Cancer Risk (MICR), cancer burden, and non-cancer acute and chronic Hazard Index (HI) and requiring facilities to implement risk reduction plans to achieve these risk limits, as required by the Hot Spots Act and this rule. Rule 1402 requires preparation of an HRA to demonstrate compliance with specified limits.

4.3.23 Regulation XX

Regulation XX – RECLAIM is a market incentive program designed to allow facilities flexibility in achieving emission reduction requirements for Oxides of Nitrogen (NOx), and Oxides of Sulfur (SOx) under the AQMP such as add-on controls, equipment modifications, or purchase of excess emission reductions. SHP's CUP Site #2 is a RECLAIM facility.

4.3.24 Regulation XXX

Regulation XXX – Title V Permit system is the air pollution control permit system required to implement the federal Operating Permit Program as required by Title V of the federal Clean Air Act. This regulation defines permit application, issuance, and compliance requirements. SHP's CUP Sites have no Title V permits.

4.4 Local

4.4.1 Oil and Gas Code (Title 16)

The City of Signal Hill has adopted Title 16 of the City's Municipal Code (Oil and Gas Code), which regulates oil and gas drilling production facilities and related operations (processing, storage transport, etc.) in the City of Signal Hill and sets out the standards for development over and around active and abandoned oil wells within the City limits. The City's Oil and Gas Code is intended to supplement applicable CalGEM (formerly the California Department of Conservation, Division of Oil, Gas & Geothermal Resources [DOGGR]) regulations.

4.5 SHP Regulatory Compliance History with South Coast AQMD

SHP actively monitors all of its sites through pressure monitors, methane monitors, CEMS and other tools (as described in more detail in Section 5.3.1) as part of its compliance activities with South Coast AQMD's rules

and regulations and most of the emissions violations are remedied within 24-hours. While SHP monitors and manages 45 different facility locations with South Coast AQMD, only seven of the 45 facility locations are part of City of Signal Hill's CUP which is the focus of this CEQA air impact technical evaluation. Additionally, only five of the CUP sites have air permits with South Coast AQMD.

Since 1985, three of the seven CUP Sites have received 23 notices of violations (NOVs) for equipment and clerical errors. All the CUP Site NOVs have been addressed and those facilities are now in compliance. CUP Site #2 has received 18 NOVs since 1985. CUP Site#5 has received four NOVs. CUP Site #6 has received one NOV. A handful of the more recent NOVs are in the process of being completed and closed within South Coast AQMD's hearing board. As noted above, of the NOVs issued by South Coast AQMD for activities occurring at the seven CUP Sites over the past three decades, the majority were for clerical or administrative issues, and those associated with potential fugitive leaks were all remedy within 24-hours of detection. Further, none of the NOVs received for the CUP Sites were related to historical drilling, redrilling, or well reworking/maintenance activities.

5. AIR QUALITY AND GHG ANALYSIS METHODS

5.1 Current Operations

This section describes the existing operations and the analysis methods applicable for all seven CUP Sites. As discussed in the Project Description (see Section 2.3 above), the Project is primarily the continuance of SHP's existing consolidated oil and gas operations at the seven CUP Sites covered under CUP 97-03 for the proposed 20-year CUP 97-03 extension term. SHP would continue to operate the existing oil and gas facilities in the same manner and with the same equipment/personnel as they have historically, consistent with current and historical norms. The existing facility boundaries would not change or expand, and all operations (existing and proposed) would continue to occur within the existing permitted CUP footprint(s). Specifically, SHP would continue the following general operations at their seven CUP Sites:

- Well servicing and maintenance;
- Drilling and redrilling operations;
- Oil processing, storage and transfer;
- Natural gas and natural gas liquids processing, storage and transfer;
- Produced water separation, and injection facilities; and
- Electrical production from a natural gas turbine powered generator.

The Project would also not modify the existing production levels or methods, hours of operation, materials to be extracted, processed, and sold, the number or type of onsite equipment (mobile equipment, drilling rigs, etc.), or the number of onsite employees (12 to 14 existing employees per day would continue to work at the CUP Sites).

Table 5-1 below summarizes the various existing emissions sources specific to each individual CUP Site, as well as mobile sources, which currently services all of the CUP Sites and are not specific to one site/location.

Table 5-1. Existing Emission Sources for CUP Sites

CUP Site #	Fugitive Emissions	Tank Emissions	Stationary Sources	Mobile Sources
CUP Site #1	one existing well cellar, three active well heads, 1 idle well head	None	None	None
CUP Site #2	one well cellar, four active well heads, 4 idle well heads	three crude oil tanks, two water tanks, two surge tanks, two free water knockout tanks, two natural gas liquid vessels	one gas membrane, one low temperature gas separation (LTS) unit, one Wemco, one turbine engine with selective catalytic reduction (SCR), various combustion equipment on an as-needed basis	None
CUP Site #3	one well cellar, four active well heads, 3 idle well heads	None	None	None
CUP Site #4	one well cellar, eight active well heads, no idle well heads	None	None	None

CUP Site #	Fugitive Emissions	Tank Emissions	Stationary Sources	Mobile Sources
CUP Site #5	one well cellar, one active well head, 5 idle well heads	four crude oil tanks, four water tanks, three free water knock outs, two diesel storage tanks	various combustion equipment on an as needed basis	None
CUP Site #6	two active well heads, no idle well heads	None	None	None
CUP Site #7	one well cellar, one active well head, no idle well heads	None	None	None
All CUP Sites	--	--	--	on-road vehicles, off-road equipment, etc.

Table 5-2 describes the calculation methods used for each type of emissions source. Project emissions estimates can be found in Appendix B.

Table 5-2. Operations Estimation Method by Emission Source

Emission Source	Estimation Method	Source
Fugitive	Fugitive emissions from the well components for all CUP Sites were calculated based on the component counts provided by Montrose for SHP and the weighted average emission factor for each component type. Emission factors per component type were pulled from SHP's annual emissions reporting (AER) to South Coast AQMD through the AER portal. Since the emission factors components reported in the AER portal varied depending on the process and the component service type (e.g., gas service, light liquid service, etc.), a weighted average of each emission factor by the number of components in that process was used. For components with different service types, the gas service weighted average emission factor was used as a conservative estimate. Existing well cellar emissions and active well head emissions were primarily calculated based on the default emission factor as reported in the AER. VOC emissions from well cellars were calculated using the default AER reported emission rate with a 0.5 adjustment factor. South Coast AQMD Rule 1148.1 stringently restricts the storage of organic liquids in the well cellars to less than 24 hours. Because of the requirements of Rule 1148.1, assuming that the well cellars are wet and have organic liquids 50% of the time, 0.5 is an appropriate adjustment to the default AER emission factor.	SHP AER reporting to South Coast AQMD, 2022.
Tank	Emissions from the tanks, vessels, turbine, and combustion equipment were calculated based on the average reported emissions from the AER portal from 2013 through 2021.	SHP AER reporting to South Coast AQMD, 2022.
Stationary	Turbine NOx emissions were provided separately by SHP for 2010 through 2021 and are based on continuous emissions monitoring systems (CEMS) data. All other emissions were calculated based on the average reported emissions from the AER portal from 2013 through 2021.	SHP CEMS data. SHP AER reporting to South Coast AQMD, 2022.

Emission Source	Estimation Method	Source
Mobile	Emissions from existing mobile sources were estimated using the vehicle activity and travel distance data described in the Transportation Memorandum (Sespe, 2022) prepared for the Project. The transportation data is generally representative of the complete roundtrips, or "tours," that a single vehicle would make on a given operational day. Specifically, the average roundtrip distances (miles) represent the full distance that each vehicle would travel in a given day, moving from SHP's main office and between the individual CUP Sites. For existing conditions, there is an estimated 26 round trips per day made by various light-duty vehicles and trucks. The emissions from these existing mobile source activities were estimated by vehicle type using latest EMFAC2021 emission rates (CARB 2022). An average of LDT1 (light duty truck) and LDT2 emission factors was used to represent employee trip emissions, and T7 Single Other Class 8 emission factors were used to represent general heavy duty truck trip activities.	EMFAC 2021, CARB 2022

5.2 Proposed Project

5.2.1 Short-Term Construction Emissions

5.2.1.1 New Well Cellar Construction

As discussed in Section 2.3 above, SHP would generally continue drilling/redrilling operations within the existing well cellars at each CUP Site; however, consistent with past operations, at times a new ancillary well cellar may need to be created. As described above, no more than 20 new well cellars would be constructed over the 20-year extension of the Project, specifically the extension of CUP 97-03. Additionally, no more well cellars would be constructed at any single CUP Site beyond the individual totals presented in **Table 2-1** above.

New well cellars are created by excavating a shallow hole using a back-hoe type excavator for no more than 4 hours. While SHP anticipates that most likely only one or two well cellars would be constructed in a single year, to assess the most conservative scenario, this analysis assumed a maximum of seven well cellars would be constructed in the first year of Project operations across all seven sites for the purpose of criteria pollutant evaluation. Additionally, for the purposes of estimated Project health risks, it was assumed this rate of well cellar construction (i.e., no more than 7 total per year) would continue at each CUP Site, until the final total described in **Table 2-1** are fully constructed at each CUP Site (for example, full build-out of up to 10 new well cellars at CUP Site #1 is estimated to occur after two operational years). Emissions for the well cellar construction were calculated using the CalEEMod default horsepower, load factors, and emission factors for backhoes from the CalEEMod 2020.4.0 User Guide, Appendix D, Table 3.3 and 3.4. Analysis details for estimating construction emissions associated with new well cellar construction are located in Appendix B.

5.2.1.2 CUP Site #2 Modifications

As discussed above, SHP is proposing to modify its current natural gas processing system at CUP Site #2 by adding a backup low temperature separation ("LTS") unit and a backup membrane unit. **Table 5-3** below provides the list of construction equipment and total operating hours to be used for the construction of the new LTS system.

Table 5-3. Construction Equipment Activity Summary

Equipment	Onsite Engine Activity	
	Total Operating Engine Hours	Average Engine Hours/Day
Backhoe	40	8
Dump Truck	32	4
Water Truck	40	2
Crane	104	8
Welder	144	2
Concrete/Pavement Saw	16	2
Ready-Mix Concrete (RMC) Truck	64	2

Emissions for gas system modification/LTS unit construction were calculated using default horsepower, load factors, and emission factors from the CalEEMod 2020.4.0 User Guide, Appendix D, Table 3.3 and Table 3.4 for the applicable construction equipment summarized in **Table 5-3** above. Analysis details for estimating construction of the new gas system modification/LTS construction are located in Appendix B.

5.2.2 Long-Term Operations Emissions

5.2.2.1 New Well Drilling, Redrilling, Well Heads, & Wells Cellars

As discussed in Section 2.3 above, consistent with existing operations, the proposed Project would allow for the continued construction of new well cellars at the CUP Sites and/or new well drilling at each CUP Site, both of which would continue to be conducted on an as-needed basis. SHP currently owns two drilling rigs, one with a Tier 4 diesel engine with electric components (i.e., SHP Drill Rig #5) and one fully electric rig (i.e., SHP Drill Rig #6). Emissions from new well drilling and redrilling was calculated for the diesel drilling rig using CARB's off-road diesel engine Tier 4 standards, the horsepower of the rig, and total hours per year of usage as provided by SHP. Further, while SHP anticipates that most likely only one or two new wells would be drilled and/or existing wells redrilled in a given year, however to assess the most conservative emissions scenario, this analysis assumed a maximum of five (5) new wells would be drilled, and six (6) existing wells would be redrilled annually starting in the first year of Project. Additionally, for the purposes of conservatively overestimated Project health risks over the entire 20-year permit term, it was assumed the final total maximum new wells were drilled, existing wells were redrilled and well cellars constructed at each site would be no more than the maximums presented in **Table 2-1**, even though taken together this is cumulative activity level would be more than what would be allowed by the CUP. This approach leads to a potential worst-case estimate of fugitive emissions, and therefore potential worst-case health risk effects, as discussed further below. For example, the health risk assessment conservatively modeled the potential impacts from the cumulative construction of 34 well cellars across all CUP Sites (see **Table 2-1**), even though no more than 20 new well cellars total would be allowed under the Project.

Fugitive emissions from new well heads and cellars were calculated from the standard emissions factors applied in SHP's AER reporting to South Coast AQMD. VOC emissions from well cellars were calculated using the default AER reported emission rate with a 0.5 adjustment factor. South Coast AQMD Rule 1148.1 stringently restricts the storage of organic liquids in the well cellars to less than 24 hours. Because of Rule 1148.1, the analysis assumes that the well cellars would be "wet" and have exposed organic liquids only 50% of the time, which is a conservative assumption considering the cleanup requirements under Rule 1148.1. Therefore, the 0.5 adjustment has been applied to the AER emission factor to quantify emissions resulting from well cellars. Additionally, as discussed above, for the purposes of estimated Project health risks, it was assumed this rate of well cellar construction would continue (i.e., up to seven new well cellars per year across

all CUP sites), until the final total of well cellars specified in **Table 2-1** are fully constructed at each CUP Site (for example, full build-out of up to 10 new well cellars at CUP Site #1 is estimated to occur after two operational years). As was done for drilling and redrilling, conservatively the health risk assessment assumed the number of well cellars to be constructed at each CUP Site matches the estimates reported in **Table 2-1**, even though taken together this would result in greater cumulative activity across all sites than the total new well cellars allowed under the Project. This approach ensures that the potential health risk effects of the Project are conservatively overestimated at each CUP Site, and therefore results represent a conservative overestimation at affected receptors. Fugitive emissions from new well cellars were calculated using these conservative assumptions. The health risk analysis also assumes a final total maximum of 69 new well heads for fugitive emissions at all the CUP Sites, even though a maximum of 46 new well heads would be allowed under the Project (redrills would not require new well heads). Analysis details, including the highly conservative assumptions used for estimating emissions associated with the new well drilling, redrilling and new well cellars can be found in Appendix B.

5.2.2.2 CUP Site #2 Modification

Once the gas system modifications are fully operational, ongoing fugitive emissions from the new LTS system were calculated based on the component counts for the existing LTS system provided by Montrose through SHP and the weighted average emission factor for each component type. Emission factors per component type were pulled from SHP's annual emissions reporting to South Coast AQMD through the Annual Emissions Reporting (AER) portal. Since the emission factors components reported in the AER portal varied depending on the process and the component service type (e.g., gas service, light liquid service, etc.), a weighted average of each emission factor by the number of components in that process was used. For components with different service types, the gas service weighted average emission factor was used as a conservative estimate. Analysis details for estimating emissions associated with the operation of the gas system/LTS unit can be found in Appendix B.

5.2.3 Greenhouse Gases

5.2.3.1 Baseline Emissions

As previously discussed, SHP is subject to U.S. EPA's GHGRP and California's MRR for GHG reporting. As a result, SHP submits its GHG emissions data to both U.S. EPA and CARB in the required reporting years and maintains a plan for accurately capturing and recording this data. As required by CARB, SHP verifies its GHG emissions data reports each year by a CARB-accredited verification body. The annually reported and verified GHG emissions include the usage of natural gas and other fuels from stationary source operations but does not include other GHG emissions from mobile sources (e.g., trucks or passenger vehicles) or electricity usage.

Mobile source GHG emissions were quantified for SHP's existing truck activities. **Table 5-4** below summarizes the vehicle trips from existing operations. EMFAC2021 GHG emission factors for CO_2, CH_4, and N_2O were used to quantify the GHG emissions (CARB 2021a). An average of LDT1 (light duty truck) and LDT2 emission factors was used to represent employee trip emissions, and T7 Single Other Class 8 emission factors were used to represent general heavy duty truck trip activity. CO_2, CH_4, and N_2O emissions were converted to total CO_2e emissions using the global warming potentials (GWPs) as listed in CARB's MRR.

Table 5-4. Existing Mobile Emission Sources for CUP Sites

Activity/Operation	Average Trips/Day	Average Travel Distance (miles)
Operations Surveillance	2	7
Plant Operations (CUP Sites #2 and #5)	2	5
Surface Equipment Maintenance & Repairs	6	7
Downhole Well Servicing/Repairs	2	6.5
Misc. Maintenance & Site Visitors	2	7
Drilling/Redrilling Operations - Employees & Contractors	8	5
General Heavy-Duty Truck Activity	4	5

As discussed above, mobile source GHG emissions associated with SHP's existing operations have been quantified within this AQIA for disclosure purposes.

5.2.3.2 Short-Term Emissions

GHG emissions were quantified for on-road vehicles and off-road construction equipment for the construction of new well cellars and the CUP Site #2 modifications as mentioned above. Emissions for the well cellar construction were calculated using the CalEEMod default horsepower, load factors, and emission factors for backhoes as presented in the CalEEMod 2020.4.0 User Guide, Appendix D, Table 3.3 and 3.4. Total on-road vehicle trips and vehicle types were provided by SHP and are summarized in **Table 5-5** below, and GHG emissions were estimated using the same activity level assumptions described in Section 5.2.1.1 above (i.e., maximum seven new well cellars constructed at the CUP Sites each year, until up to twenty new cellars have been constructed). Short-term GHG emissions have been quantified in Section 6.1.3.7 below. EMFAC2021 GHG emission factors for CO_2, CH_4, and N_2O were used to quantify the GHG emissions from on-road vehicles. All CO_2, CH_4, and N_2O emissions were converted to total CO_2e emissions using the global warming potentials (GWPs) as listed in CARB's MRR.

Table 5-5. Project Construction Mobile Emission Sources for CUP Sites

Activity/Operation	Average Trips/Day	Average Travel Distance (miles)
Gas System Modification - Contractor/Gear Trucks	6	3
Gas System Modification - Heavy-Duty Trucks (Equipment/Deliveries)	2	5
Gas System Modification - Ready-Mix Concrete (RMC) Trucks	2	10
Well Cellar Construction - Employee/Contractor	2	3
Well Cellar Construction - Equipment Delivery	1	5

5.2.3.3 Long-Term Emissions

GHG emissions were estimated for the proposed Project for the operations year with the highest level of GHG emissions to be reasonably conservative. New Project elements and operations which could potentially generate GHG emissions include components such as those associated with new well heads, and indirect GHG emissions from electricity consumed.

New well heads from the Project could potentially contribute to GHG emissions through fugitive leaks. These potential GHG emissions would be reported annually through CARB's MRR as part of SHP's facility wide emissions. Future GHG emissions from new well heads were estimated per MRR § 95153(o) and default emission factors from MRR Appendix A. Note that GHG fugitives from up to 46 new well heads, which is the maximum number of new well heads to be installed at the site, were accounted for in the analysis.

Drilling of new wells would have long-term GHG emissions due to additional quantities of electricity consumed by SHP's all-electric Drill Rig#6, or diesel combustion if Drill Rig #5 is utilized. Additionally, once new wells are operational, the use of new pumpjacks would also consume electricity over the long-term. In addition to short-term construction GHG emissions, as well as the fugitive GHG emissions from the wellheads themselves (see discussion above), long-term GHG emissions resulting from the Project's additional electricity consumption by the pumpjacks and use of the all-electric Drill Rig #6 are also therefore quantified and compared to the applicable South Coast AQMD's thresholds. Note, the additional electricity consumption and related indirect GHG emissions from up to 46 new pumpjacks was accounted for within the GHG analysis.

5.2.4 Toxic Air Contaminants

South Coast AQMD recommends that projects with heavy duty truck activities and stationary sources with air toxics emissions evaluate potential health risk impacts. Because SHP's existing oil and gas activities within the existing CUP Sites meets both these criteria and is an existing source of TACs in a location near existing residential areas, both existing and proposed Project potential TAC impacts have been evaluated.

An HRA produces estimates of health risks for people who are exposed to various amounts of toxic substances. An HRA combines results of various studies on the health effects of various animal and human exposures to toxic air pollutants, and the results of studies that estimate the level of human exposure at various distances from the pollutant sources.

For disclosure purposes, an HRA was performed to determine the current health risk associated with the existing CUP Site's operations, and another HRA was performed to determine if new sources of TACs associated with the proposed Project (e.g., the gas system modifications at CUP Site #2, new well cellar construction, new well drilling, redrilling, etc.) would result in a potential net increase in TAC emissions that would be potentially significant at worker, resident, and/or sensitive receptor locations (e.g., schools and hospitals) surrounding the CUP Sites. The potential cumulative health risk effects of both existing (i.e., baseline) and proposed future Project were also estimated. See Section 6.2.3.1 for the Project HRA results. The HRA is comprised of two (2) components: air dispersion modeling of the affected mobile and stationary sources, followed by health risk evaluation based on the proposed Project's potential short (acute) and long-term (cancer and non-cancer) air quality impacts.

The most recent version of U.S. EPA's AMS/EPA Regulatory Model - AERMOD (AERMOD v21112) was used to predict the dispersion of emissions from the current operations and from the proposed Project. The analysis employed all of the regulatory default AERMOD model keyword parameters, including elevated terrain options. Receptor grids were placed around the seven CUP Sites based on South Coast AQMD's recommended receptor grid spacing. As such, a total of 8447 discrete off-site receptors were analyzed.

South Coast AQMD-provided, AERMET UStar processed meteorological datasets for the Long Beach Airport monitoring station, calendar years 2012 through 2016, was input into AERMOD (South Coast AQMD, 2022). This represents the most recent dataset available at the time the modeling was conducted. Urban dispersion parameters were used because the CUP Sites and the majority of the land surrounding the operations is developed and considered "urban" under the Auer land use classification method (Auer, 1978).

To predict potential health risks to the local population attributable to TAC emissions resulting from the existing operations, as well as the proposed Project, ambient air concentrations were predicted using dispersion modeling to arrive at a conservative estimate of increased individual carcinogenic risk that might occur as a result of continuous exposure over a 30-year lifetime for operational exposure or over the construction timeline for construction exposure. The model conservatively assumes that the LTS construction occurs over a 4-month timeline, and all new well cellar construction will occur at a maximum of 7 well cellars per year would be

constructed at each site until the maximum of total new well cellars described in **Table 2-1** is achieved at each CUP Site).

Additionally, to create the most conservative health risk assessment scenario, the maximum activity assumption was assigned to each CUP site as summarized in **Table 2-1**; this approach estimates more activity evaluated in the HRA than will actually occur to ensure that the most conservative health risk impact is accounted for. The activity modeled at each CUP Site for the health risk assessment is presented above in **Table 2-1**. The CUP extension would only allow the following: 1) six redrills per year until the CUP maximum is achieved; 2) five new well drills per year until the CUP maximum is achieved is achieved; and, 3) no more than seven new well cellars constructed at each site until the CUP maximum is achieved or the maximum as described in **Table 2-1**. Although this overestimation of Project emissions represents more total drilling, redrilling, and well cellar construction than would be cumulatively allowed by the proposed Project, this ensures that the maximum potential health risk impacts are determined at each individual CUP Site. Utilizing all these potential emissions sources and overly conservative activity assumptions outlined in **Table 2-1**, the model conservatively overestimates a 30-year lifetime for operational exposure at each CUP Site at the nearby receptors, even though the Project operations would be less, and the permit would renew operations for no more than 20 additional years under CUP 97-03. Similarly, these conservative assumptions and predicted concentrations were used to calculate non-cancer chronic and acute hazard indices (HIs), which are the ratio of expected exposure to acceptable exposure. TAC emissions from the existing operations and for the proposed Project were quantified and evaluated.

Plot files generated by AERMOD were uploaded to the Air Dispersion Modeling and Risk Assessment Tool (ADMRT) program, version 22118, in the Hotspots Analysis and Reporting Program Version 2 (HARP 2) (CARB 2022). ADMRT post-processing was used to assess the potential for excess cancer risk and chronic and acute non-cancer effects using the most recent health effects data from the CalEPA's Office of Environmental Health Hazard Assessment (OEHHA). HARP2 site parameters were set for the mandatory minimum pathways of inhalation, soil ingestion, dermal, mother's milk, and homegrown produce. Risk reports were generated using the derived OEHHA analysis method for carcinogenic risk and non-carcinogenic chronic and acute risk. The default exposure durations of 30 years for residential and sensitive receptors and 25 years for worker receptors was used. Selected parameters are included in the HARP2 output files. Total cancer risk was predicted for each receptor. A hazard index was computed for chronic and acute non-cancer health effects for each receptor.

Health risk is determined using the Hotspots Analysis and Reporting Program (HARP2) software distributed by the CARB; HARP2 requires peak 1-hour emission rates and annual-averaged emission rates for all pollutants for each modeling source (CARB 2015). Assumptions used to calculate the emission rates for the proposed Project are outlined below.

For existing CUP Site operations, HAP emissions were estimated based on average emissions reported by SHP in the AER portal for calendar years 2017 through 2021. Diesel particulate matter (DPM) emissions from employee trucks and heavy-duty trucks were estimated using EMFAC2021 emission factors (CARB 2021a). DPM emissions from drilling/redrilling were calculated using CARB's Tier 4 standard emission factors for PM_{10}. Note that all PM_{10} emitted from diesel equipment is assumed to be DPM.

For the proposed Project activities (i.e., operation of the gas system modifications at CUP Site #2, new well cellars, and new well heads), TAC emissions were estimated using the emission factors from SHP's AER reporting to South Coast AQMD. DPM emissions associated with the construction equipment were estimated using CalEEMod default emission factors, and emissions from truck activity was estimated using EMFAC2021 emission. DPM emissions from new drilling and redrilling were calculated using CARB's Tier 4 standard emission factors for PM_{10}. All PM_{10} emitted from diesel equipment is assumed to be DPM.

5.2.5 Potential Impact on Sensitive Receptors

Sensitive receptors are defined as locations where young children, chronically ill individuals, the elderly, or people who are more sensitive than the general population reside, such as schools, hospitals, nursing homes, and daycare centers. CUP Site #1 is surrounded by retail with some residences to the west. CUP Sites #2 and #3 are surrounded by commercial and industrial uses. CUP Site #4 is surrounded by commercial land uses with residences further south. CUP Site #5 is surrounded by residential and retail land uses. CUP Site #6 is surrounded by residential neighborhoods to the north and various commercial land uses to the south, east, and west. CUP Site #7 is surrounded by various commercial uses. Note that many of the properties/land uses adjacent to the CUP Sites are either owned by SHP and leased out to various residential, commercial, or industrial tenants, or were previously owned by SHP and sold for redevelopment. The closest residence to a CUP Site is located 0.01 miles to the east of CUP Site #5. **Table 5-6** summarizes the closest residence within the vicinity of each CUP Site. Additionally, **Figure 5-1** shows the location of the nearest medical centers to the CUP sites and **Figure 5-2** shows the location of the nearest schools to the CUP sites.

Table 5-6. Nearest Residents by CUP Site

CUP Site #	Distance to Nearest[1] Residence (miles)
1	0.17
2	0.26
3	0.13
4	0.10
5	0.01
6	0.02
7	0.06

1. Distance from the nearest residence boundary to a CUP Site boundary.

Figure 5-1. Medical Centers with 1-Mile Radius of Each CUP Site

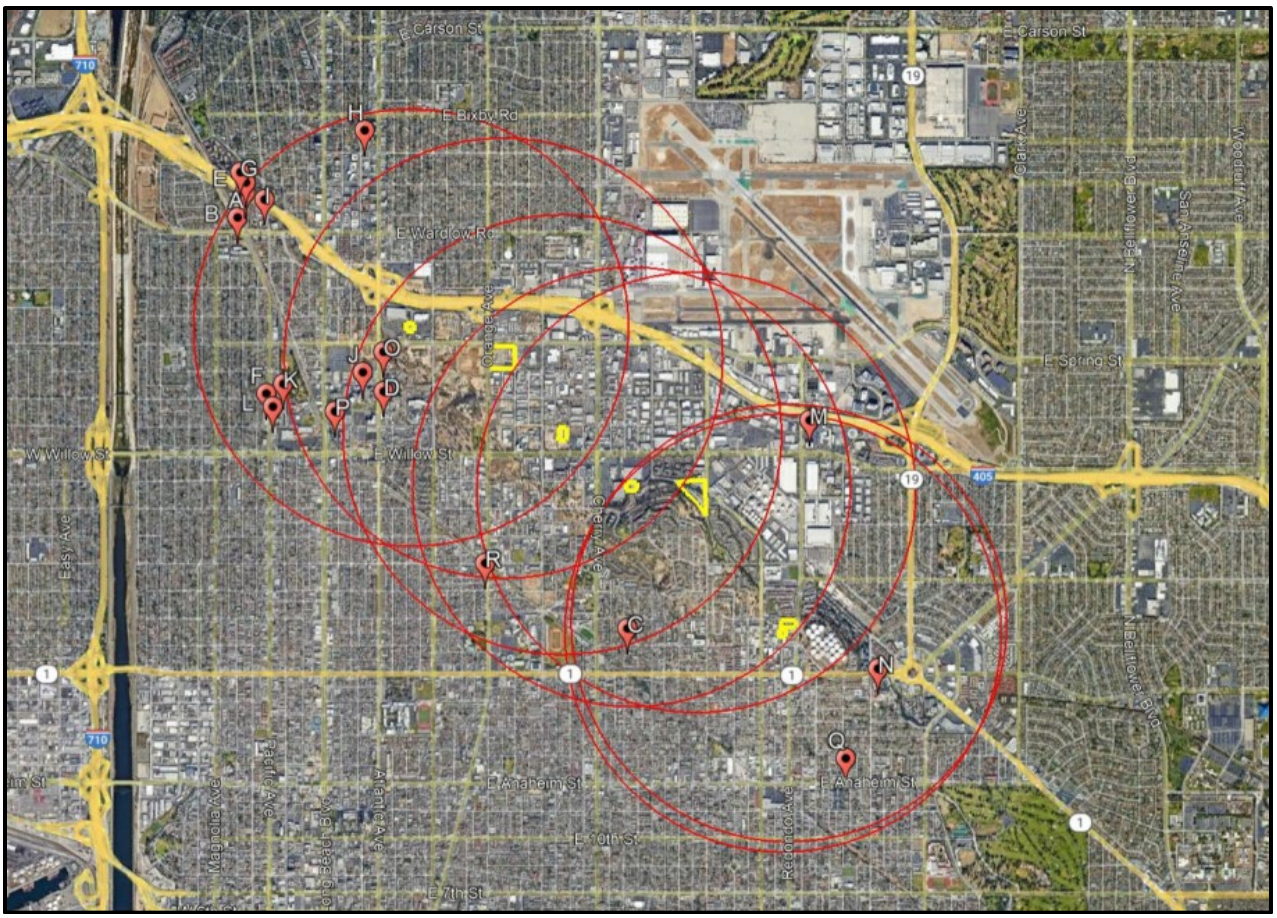
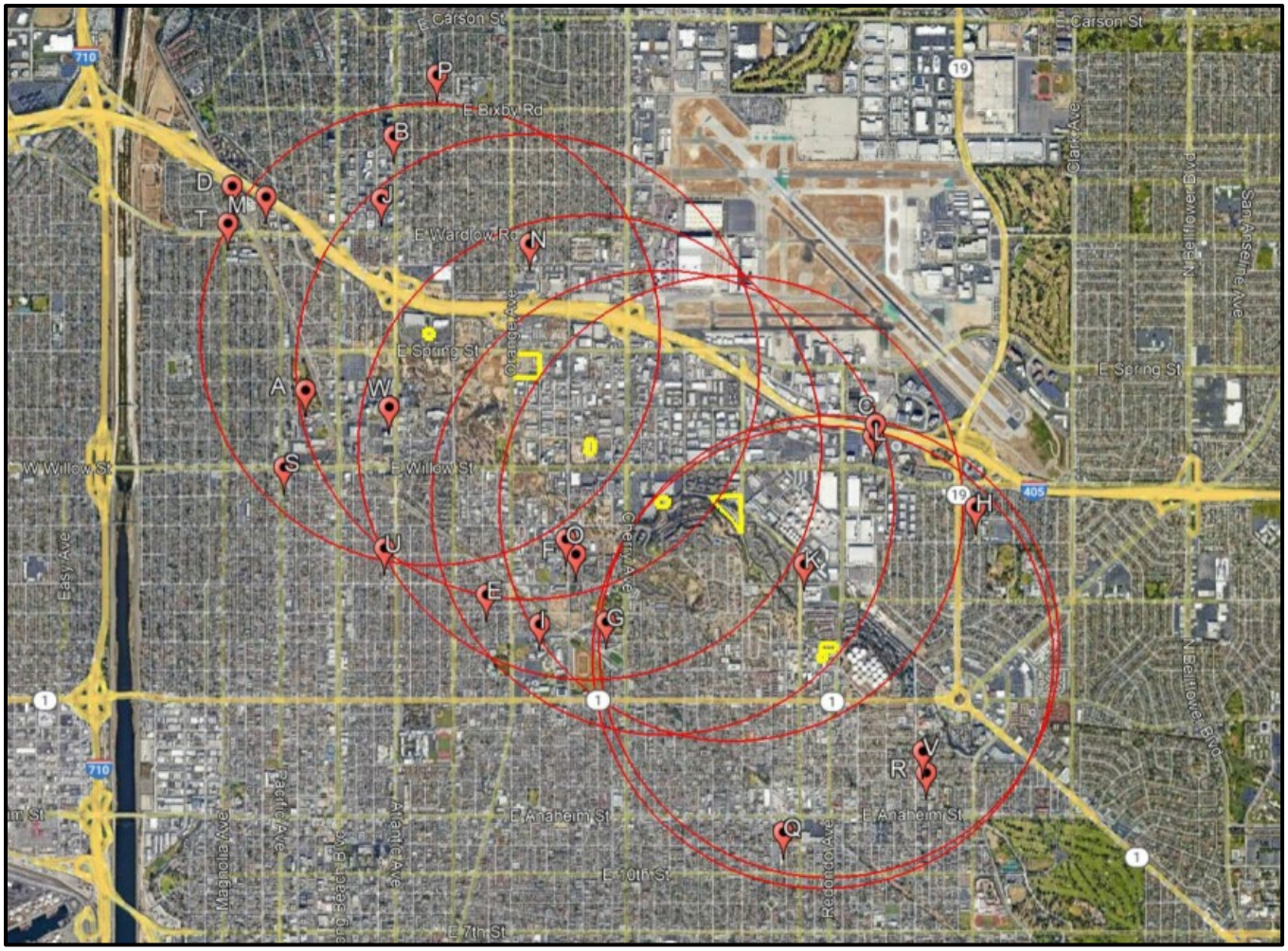


Figure 5-2. Schools with 1-Mile Radius of Each CUP Site



5.3 Project Design Features and Best Management Practices

As the estimated construction and operational emissions from the proposed Project would be less than significant, no Project-specific mitigation measures would be required. However, to ensure that Project is in compliance with all applicable South Coast AQMD rules and regulations, and to ensure emissions continue to be further reduced to the extent feasible, SHP will continue to implement and comply with a number of measures that are either recommended as a "good operating practice" for environmental stewardship, or measures that are required by regulation. Some of the listed measures are regulatory requirements or construction requirements that would result in further emission reductions through their inclusion in Project construction and long-term design. Additionally, some of the following measures are from South Coast AQMD's 2016 and 2022 AQMP Mitigation Monitoring and Reporting Program and are presented as "other recommended measures" for the proposed Project.

5.3.1 Vapor Recovery System & Greenhouse Gas Control Measures

SHP will continue to maintain their existing vapor recovery system, which ensures that fugitive emissions, including GHG's, are reduced to the extent feasible. The vapor recovery system consists of specially designed pipelines that that provide casing vapor recovery for SHP's wells and outlying tank farms that operate within the seven CUP Sites, by collecting the produced gas as well as fugitive emissions by vacuum. The captured

vapor is then transferred to CUP Site #2 where it is then dehydrated and processed, and either consumed in the gas turbine or sold to third-party customers in the same manner as SHP's extracted oil and gas. Continue implementation and maintenance of the vapor recovery at each of the CUP Sites through the proposed 20-year continued term of CUP 97-03 will ensure that GHG's such as carbon dioxide and methane are contained within the vacuum sealed closed system, and not released into the atmosphere as fugitive emissions. Specifically, the following vapor recovery systems/protocols will continue to be implemented at the CUP Sites:

- **Oxygen Sensors/Monitoring:** Because the vapor recovery system operates under a controlled vacuum, the presence of oxygen within the system is not beneficial and can indicate a mechanical problem or leak. Therefore, SHP has installed numerous oxygen sensors throughout the vapor recovery system infrastructure which are monitored 24/7 so that potential problems can be quickly identified and remedied. The sensors are tested and calibrated regularly (generally once a week) to ensure the system is functioning properly. Additionally, if an anomaly is detected, SHP will temporarily shut down operations, sometimes across their entire field, until operations personnel can confirm there are no leaks or pipe failures. In addition to the automatic sensors, operations staff have access to hand-held sensors that are periodically used to spot check portions of the vapor recovery infrastructure.
  - In addition to the automatic sensors, the vapor recovery is visually inspected a minimum of once daily by SHP operations personnel. Additionally, vacuum pressure readings are monitored at 17 different locations throughout the CUP Sites a minimum of four times daily.
- **Leak & Mechanical Integrity Testing**: In addition to continuous monitoring, the vapor recovery system is leak tested a minimum of once per quarter to ensure system integrity. Specifically, the leak tests are conducted by a third-party pursuant to the requirements of South Coast AQMD Rule 1173 Leak Detection and Repair (LDAR Program). The LDAR program is in compliance with EPA Method 21 and uses a hand-held vapor analyzer with visual enhancement using the FLIR cameras. In addition to the quarterly tests, SHP field crew performs monthly internal FLIR inspections of the vapor recovery system to confirm there are no fugitive leaks, including potential GHG's.
  - Because the vapor recovery pipelines are equipped with extensive safeguards, such as the oxygen leak detectors, and is inspected regularly, the system is considered exempt from additional pipeline testing requirements outlined under CCR Title 8, Section 6533 (Pipe Lines, Fittings, and Valves) and CCR Section 1774.1(f) (Pipeline Inspection and Testing). Nonetheless, SHP's operations personnel has and would continue to conduct periodic mechanical integrity tests on segments of the SHVR Pipeline System to further confirm its safe operation.
- **Misc. Protections/Fugitive Controls**: In addition to the measures summarized above, a minimum of three times a week SHP's vacuum truck crews extract any condensate that may have collected in low spots found throughout the vapor recovery system. Additionally, if field monitors report any unusual decreases in vacuum pressure, SHP's operations personnel are dispatched more frequently to ensure any condensates are properly contained. By collecting condensate quickly, SHP ensures that potential fugitive emissions due to off gassing is limited.

  Additionally, CARB's Oil and Gas Methane Rule requires LDAR and equipment registration.

  Lastly, SHP's vapor recovery system is covered by an underground damage prevention program (Dig Alert) and maintained under a CalARP/RMP/PSM plan, which necessitates detailed and prescriptive requirements for monitoring and maintaining mechanical integrity of all plant equipment beyond those required by CalGEM.

5.3.2 All-Electric vs. Diesel Drill Rig Activity

SHP currently uses two rigs for their drilling and redrilling operations, depending on the depth to be drilled. The lighter-duty drilling rig is SHP's Rig #5. This rig has a 2008 Cameron/Hubbard C-500 draw-works and mast powered by a 450 horsepower (hp) U.S. Environmental Protection Agency (USEPA) Tier 4 clean burn engine. The remainder of Rig #5's equipment is electrically powered. Rig #5 is typically used for shallower wells (7,000-feet below ground surface [bgs] or less) and redrills on smaller well sites. SHP's Rig #6 is a heavier-duty drilling rig with a 1,000 hp electrically powered draw-works motor. All of Rig #6's equipment is electrically powered (i.e., no fuel consumed during drilling/redrilling operations). For electric power, SHP's drilling rigs are designed to plug directly into SHP's private electrical distribution system and do not require electricity service from outside utility providers.

The following **Table 5-7** summarizes SHP's historical drilling/redrilling activity at the CUP Sites between 2009 and 2019, showing instances where the partially diesel-powered Rig #5 was utilized compared to when the all-electric-powered Rig #6 was used. Note that SHP did not purchase Rig #6 until 2012.

Table 5-7. Summary of Drill Rig Activity (Rig #5 [Diesel] vs. Rig #6 [All-Electric])

Year	Total Number of New Wells Drilled / Existing Wells Redrilled	Total Drills/Redrills – Rig #5 vs. Rig #6	
		Rig #5 (Diesel)	Rig #6 (All-Electric)
2009	2	2	0
2010	3	3	0
2011	4	4	0
2012	6	5	1
2013	3	0	3
2014	3	0	3
2015	0	0	0
2016	0	0	0
2017	0	0	0
2018	0	0	0
2019	1	0	1
2020	0	0	0
2021	0	0	0

As shown in **Table 5-7** above, since purchasing the all-electric Rig #6 in 2012, SHP has exclusively utilized this rig for all drilling and redrilling activities within the CUP Site boundaries. SHP intends to continue to only utilize Rig #6 for all future drilling and redrilling activities at the CUP Sites for the entirety of the 20-year CUP renewal term; however, conservatively for the purposes of the air quality and greenhouse gas (GHG) analysis, and to provide SHP with some operational flexibility, it is assumed that SHP will utilize Rig #5 approximately 10% of the time and Rig #6 approximately 90% of the time throughout the 20-year CUP permit term. In addition to air quality/GHG analysis, this assumption will also become a Condition of Approval within the renewed CUP 97-03, and will be overseen and enforced by the City (i.e., SHP will track the use of Rig #5 vs. Rig #6 to ensure that Rig #5 is used no more than 10% of the time on a cumulative annual basis). This measure will also become part of the Mitigation, Monitoring and Reporting Program (MMRP).

5.3.3 South Coast AQMD AQMP

The Project would comply with South Coast AQMD's 2022 AQMP[4], and all applicable station and mobile source control measures (see 2022 AQMD, Appendix IV-A). pumps, aerial lifts, material hoist, air compressors, forklifts, excavator, wheel loader, and soil compactors.

5.3.4 Recommended Measures to Reduce Fugitive Dust and Equipment Exhaust

In addition, the following measures would be required for construction activities to comply with South Coast AQMD Rule 403 which aims to reduce the amount of particulate matter entrained in the ambient air due to fugitive dust. These measures would be adhered to during construction of the gas system modification at CUP Site #2, as well as construction of new well cellars at the other CUP Sites:

- Limit and remove the accumulation of mud and/or dirt from adjacent public roadways at the end of each workday (Use of dry rotary brushes is prohibited except when preceded or accompanied by sufficient wetting to limit visible dust emissions and use of blowers is expressly forbidden).
- Stabilize the surface of storage piles following the addition or removal of materials using water or chemical stabilizer/suppressants.
- Remove visible track-out from the site at the end of each workday.
- Cease grading or other activities that cause excessive (greater than 20% opacity) dust formation during periods of high winds (greater than 20 mph over a one-hour period).
- Maintain all construction equipment as recommended by manufacturer manuals.
- Shut down equipment when not in use for extended periods.
- Construction equipment shall operate no longer than eight (8) cumulative hours per day.
- Use electric equipment for construction whenever possible in lieu of diesel or gasoline powered equipment.
- Curtail use of high-emitting construction equipment during periods of high or excessive ambient pollutant concentrations.
- All construction vehicles shall be equipped with proper emissions control equipment and kept in good and proper running order to substantially reduce NOx emissions.
- On-Road and Off-Road diesel equipment shall use diesel particulate filters if permitted under manufacturer's guidelines.
- On-Road and Off-Road diesel equipment shall use cooled exhaust gas recirculation (EGR) if permitted under manufacturer's guidelines.
- All construction workers shall be encouraged to shuttle (car-pool) to retail establishments or to remain on-site during lunch breaks.
- All construction activities within the project area shall be discontinued during the first stage smog alerts.
- Construction and grading activities shall not be allowed during first stage O_3 alerts. First stage O_3 alerts are declared when the O_3 level exceeds 0.20 ppm (1-hour average).

[4] The South Coast AQMD 2022 AQMP update was approved on December 2, 2022.

5.3.5 Other Measures to Reduce Potential Project Impacts

The following measures further reduce the potential for long-term emissions from the Project. These measures are required as a matter of regulatory compliance, and therefore SHP has and would continue to comply with them as needed:

- The Project design shall comply with applicable standards set forth in Title 24 of the Uniform Building Code to minimize total consumption of energy.
- Applicants shall be required to comply with applicable mitigation measures in the South Coast AQMD's 2016 AQMP and all applicable South Coast AQMD rules and regulations.
- The developer shall comply with the provisions of South Coast AQMD Rule 1113 - Architectural Coatings, during the construction of all buildings and facilities. Application of architectural coatings shall be completed in a manner that poses the least emissions impacts whenever such application is deemed proficient.
- The applicant shall comply with the provisions of South Coast AQMD Rule 1108 during the construction and pavement of all roads and parking areas within the project area. Specifically, the applicant shall not use any cutback asphalt containing more than 0.5 percent by volume organic compounds which evaporate at 260°C (500°F) or lower as determined by ASTM Method D402 (AASHTO T78) or other test method as approved by the Executive Officer.

6. AIR QUALITY AND GHG IMPACT ANALYSIS

6.1 Air Quality and Greenhouse Gas Significance Criteria

6.1.1 CEQA Guidelines

According to the CEQA 2019 Guidelines Appendix G Environmental Checklist Questions, a Project could have a potentially significant effect related to air quality if a project would:

- III-a) Conflict with or obstructs implementation of the applicable air quality plan;
- III-b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is designated non-attainment under a NAAQS and CAAQS (including emissions which exceed quantitative thresholds for O_3 precursors);
- III-c) Expose sensitive receptors to substantial pollutant concentrations; or
- III-d) Results in other emissions (such as those leading to odor) adversely affecting a substantial number of people.

Additionally, a Project could have a potentially significant effect related to GHGs if a project would:

- VIII-a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- VIII-b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

6.1.2 South Coast AQMD Thresholds of Significance

The City of Signal Hill, as the CEQA Lead Agency, applies the South Coast AQMD's thresholds of significance for air quality given it is responsible for managing this resource area for the region. The South Coast AQMD significance thresholds are designed to implement the general criteria for air quality emissions as required in the CEQA Guidelines, Appendix G, Paragraph III (Title 14 of the California Code of Regulations §15064.7) and CEQA (California Public Resources Code Sections 21000 et. al). South Coast AQMD's specific CEQA air quality thresholds for criteria air pollutants, TACs, and GHGs are presented in **Table 6-1**.

Table 6-1. South Coast AQMD Air Quality Thresholds of Significance

Mass Daily Thresholds[a]		
Pollutant	**Construction[b]**	**Operation[c]**
NOx	100 pounds per day (lbs/day)	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SOx	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Toxic Air Contaminants (TACs), Odor, and GHG Thresholds		
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)	

Mass Daily Thresholds[a]		
Pollutant	**Construction[b]**	**Operation[c]**
Odor	Project creates an odor nuisance pursuant to South Coast AQMD Rule 402	
GHG	10,000 MT per year CO_2e for industrial facilities	
AAQS for Criteria Pollutants[d]		
NO_2 1-hour average annual arithmetic mean	South Coast AQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.18 ppm (state) 0.03 ppm (state) and 0.0534 ppm (federal)	
PM_{10} 24-hour average annual average	10.4 $\mu g/m^3$ (construction) & 2.5 $\mu g/m^3$ (operation) 1.0 $\mu g/m^3$	
$PM_{2.5}$ 24-hour average	10.4 $\mu g/m^3$ (construction) & 2.5 $\mu g/m^3$ (operation)	
SO_2 1-hour average 24-hour average	0.25 ppm (state) & 0.075 ppm (federal – 99th percentile) 0.04 ppm (state)	
Sulfate 24-hour average	25 $\mu g/m^3$ (state)	
CO 1-hour average 8-hour average	South Coast AQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 20 ppm (state) and 35 ppm (federal) 9.0 ppm (state/federal)	
Lead 30-day average Rolling 3-month average	1.5 $\mu g/m^3$ (state) 0.15 $\mu g/m^3$ (federal)	

a. Source: South Coast AQMD CEQA Handbook (South Coast AQMD, 1993), Revision: March 2019.
b. Construction thresholds apply to South Coast Air Basin and Coachella Valley (Salton Sea and Mojave Desert Air Basins).
c. For Coachella Valley, the mass daily thresholds for operation are the same as the construction thresholds.
d. Ambient air quality thresholds for criteria pollutants based on South Coast AQMD Rule 1303, Table A-2 unless otherwise stated.
e. Ambient air quality threshold based on South Coast AQMD Rule 403.

KEY: lbs/day = pounds per day; lb/hr = pounds per hour; ppm = parts per million; MT/yr CO2eq = metric tons per year of CO2 equivalents; $\mu g/m^3$ = microgram per cubic meter; ng/m^3 = nanogram per cubic meter; ≥ = greater than or equal to; > = greater than

6.1.2.1 Thresholds for Ambient Air Quality Impacts

CEQA Guidelines – Appendix G (Environmental Checklist) states that a project that would "violate any air quality standard or contribute substantially to an existing or projected air quality violation" would be considered to create significant impacts on air quality. Therefore, an AQIA should determine whether the emissions from a project would cause or contribute significantly to violations of the NAAQS or CAAQS (presented above in **Table 6-1**) when added to existing ambient concentrations.

It is South Coast AQMD's responsibility to ensure that the NAAQS and CAAQS are achieved and maintained in its geographical jurisdiction, the South Coast Air Basin. A pollutant's attainment status in a given sub-region within the Basin dictates the significance determination for potential increases in ambient air pollution. If the sub-region is in attainment for a specific criteria pollutant, a project's net contributions plus the measured background concentration of that pollutant cannot exceed the applicable CAAQS (or NAAQS). In sub-regions

that are in nonattainment for a specific criteria pollutant, a project's emissions increase cannot exceed the applicable South Coast AQMD air quality significance threshold.

The screening-level localized significance thresholds (LSTs) are the quantities of project-related emissions at which localized concentrations (ppm or $\mu g/m^3$) could exceed the relevant AAQS for criteria air pollutants for which the South Coast Air Basin is designated in nonattainment. The screening-level LSTs are based on the proposed project site size and distance to the nearest sensitive receptor. Additionally, the screening-level LSTs are based on the California AAQS, which are the most stringent AAQS, established to provide a margin of safety in the protection of the public health and welfare.

6.1.2.2 Thresholds for Hazardous Air Pollutants

Rule 1402 applies to facilities that are subject to the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588), and facilities with emissions that exceed significant or action risk levels. This rule reduces the health risk associated with emissions of TACs from existing sources by specifying limits for the MICR, cancer burden, and non-cancer acute and chronic HI, and requiring facilities to implement risk reduction plans to achieve these risk limits, as required by the Hot Spots Act and this rule. Rule 1402 requires preparation of an HRA to demonstrate compliance with specified limits.

In 1992, the California legislature added a risk reduction component called, the Facility Air Contaminant Risk Audit and Reduction Plan (or also known as SB 1731), which required South Coast AQMD Board of Directors to establish action risk levels and significant risk levels. **Table 6-1** above presents the thresholds of significance used when evaluating TACs.

6.1.2.3 Cumulative Impacts Threshold of Significance

A project impact that is individually limited may nonetheless contribute to a larger cumulative impact. A "cumulative impact" is defined as two or more impacts from related past, current, or probable future projects which, when considered together, are considerable.

A CEQA impact analysis must discuss cumulative impacts if a project impact makes a "cumulatively considerable" contribution to the larger cumulative impact. A project impact is "cumulatively considerable" if the impact is significant when viewed together with similar impacts from related projects. If a project's incremental contribution to a cumulative impact is not cumulatively considerable, however, the CEQA impact analysis need only briefly describe the basis for its conclusions.

A lead agency may find that a project's contribution to a cumulative impact is not cumulatively considerable if the project will comply with the requirements of a plan, regulation, or mitigation program and the plan or program (1) is adopted by an agency with jurisdiction over the affected resources, and (2) sets forth specific requirements that will avoid or substantially lessen the cumulative impact within the relevant geographic area.

The relevant geographic area for analysis of cumulative criteria pollutant air quality impacts herein is the South Coast Air Basin. The Basin is a designated air quality control region under the Federal CAA and a designated air quality basin under the California CAA. Compliance with both Acts is measured based on criteria pollutant concentrations throughout the Basin.

In lieu of a list of specific projects, the analysis of cumulative air quality impacts herein uses the summary of projections and conditions set forth in the 2022 AQMP and the Final Program Environmental Impact Report (EIR) for the 2022 AQMP prepared and certified by the South Coast AQMD.

The AQMP is an approved plan and mitigation program within the meaning of CEQA Guidelines Section 15064(h)(3). The AQMP was adopted by the South Coast AQMD through a public process, and the South Coast AQMD has jurisdiction over air quality throughout the Basin. The California Legislature has delegated to the South Coast AQMD the State's primary responsibility under the Act for achieving and maintaining the NAAQS within the Basin (HSC Code Sections 40001 and 40412). The AQMP, approved by the U.S. EPA and CARB under the federal and state CAAs, respectively, sets forth control measures designed to attain the NAAQS and CAAQS (HSC Section 40913). The South Coast AQMD implements the AQMP control measures through regulations known as "rules" and a permitting scheme (HSC Sections 40440, 40506, and 42300). The South Coast AQMD has established thresholds for individual projects and if the project emissions are below established thresholds, then the project is viewed as in compliance with the AQMP, and the project's cumulative impacts are found to be less than cumulatively considerable.

6.1.3 Proposed Project Analysis Results

South Coast AQMD has set significance levels for criteria pollutants as shown in **Table 6-1**. As further discussed in Section 6.1.2 above, these thresholds are designed to implement the general criteria for air quality emissions. South Coast AQMD has established separate thresholds for construction (short-term) and operational (long-term) emissions.

6.1.3.1 Baseline Criteria Pollutant Emissions

As discussed previously, CEQA does not require an analysis of a proposed Project's existing (i.e., baseline or historical) operations. Instead, CEQA requires an analysis of how the proposed Project will incrementally change the existing environmental conditions. Nonetheless, baseline emissions and related health effects have been quantified within this AQIA for disclosure purposes. Specifically, baseline emissions for the CUP Sites current operations were calculated as described in Section 5.1 for the following:

- Well servicing and maintenance;
- Oil processing, storage and transfer;
- Natural gas and natural gas liquids processing, storage and transfer;
- Produced water separation, and injection facilities; and
- Electrical production from a natural gas turbine powered generator.

Baseline emissions were calculated per the methods discussed previously in Section 5.1. **Table 6-2** presents the criteria emissions for SHP's current operations compared to the operational (long-term) emissions thresholds.

Table 6-2. Current Operations Emissions

Emissions Source	Pollutant (pounds/day)					
	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Category						
CUP Site #1	2.30	NA	NA	NA	NA	NA
CUP Site #2	15.64	24.55	15.06	1.03	8.42	NA
CUP Site #3	4.40	NA	NA	NA	NA	NA
CUP Site #4	5.00	NA	NA	NA	NA	NA
CUP Site #5	10.71	NA	NA	NA	NA	NA
CUP Site #6	0.07	NA	NA	NA	NA	NA

Emissions Source	Pollutant (pounds/day)					
	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
CUP Site #7	0.19	NA	NA	NA	NA	NA
Mobile Sources	0.04	0.18	0.21	0.00	0.03	0.03
Daily Emissions	**38.35**	**24.73**	**15.28**	**1.03**	**8.45**	**0.03**
South Coast AQMD Significance Threshold	55	55	550	150	150	55
Threshold Exceeded for a Single Year?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Source: Trinity Consultants 2023 Note: 0.00 could represent < 0.00						

6.1.3.2 Baseline Health Risk Assessment

Baseline health risks were calculated per the methods discussed previously in Section 5.1. The results of the baseline HRA analysis are presented below in **Table 6-3** through **Table 6-5**. All existing operations are below South Coast AQMD's health risk thresholds.

Table 6-3. Baseline Cancer Health Risk Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	4.42 in a million	0.74 in a million
Threshold	10 in a million	10 in a million
Exceeds Threshold?	**No**	**No**
Source: Trinity Consultants 2023		

Table 6-4. Baseline Non-Cancer Chronic Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	0.02	0.02
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**
Source: Trinity Consultants 2023		

Table 6-5. Baseline Non-Cancer Acute Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	0.01	0.01
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**
Source: Trinity Consultants 2023		

6.1.3.3 Proposed Project Construction Emissions

Emissions for the proposed Project were calculated for construction and operation emissions as described in Section 5.2.1. Short-term emissions were calculated for construction of the new LTS system and seven new well cellars (the maximum new well cellars that would be constructed in one year across all CUP Sites). **Table 6-6** presents the Project's short-term emissions in comparison with the construction emission thresholds.

Table 6-6. Short-Term Construction Project Emissions

Emissions Source	Pollutant (pounds/day)					
	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Category						
LTS Construction	0.16	1.35	1.04	0.004	0.05	0.05
Well Cellar Construction	0.08	0.78	1.12	0.002	0.04	0.04
Daily Emissions	**0.24**	**2.13**	**2.16**	**0.006**	**0.09**	**0.08**
South Coast AQMD Significance Threshold	55	55	550	150	150	55
Threshold Exceeded for a Single Year?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Source: Trinity Consultants 2023 Note: 0.00 could represent < 0.00						

As shown above, the estimated short-term construction-related emissions would not exceed South Coast AQMD significance threshold levels during any given year and would therefore be *less than significant*.

6.1.3.4 Proposed Project Operations Emissions

The proposed Project is expected to have longer-term air quality emissions from operations of the new gas system modification/LTS system at CUP Site #2, future drilling/redrilling throughout the 20-year Project continuance under CUP 97-03, fugitives from 46 new well heads, as well as fugitives from 20 new well cellars constructed. Emissions calculated as described in Section 5.2.2 are shown in **Table 6-7** compared to the applicable operational emission thresholds.

Table 6-7. Project Operational Emissions

Emissions Source	Pollutant (pounds/day)					
	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Category						
LTS Fugitive Emissions	1.71	0.00	0.00	0.00	0.00	0.00
Redrilling	0.14	1.59	2.75	0.00	0.02	0.02
Drilling	0.12	1.32	2.29	0.00	0.01	0.01
New Well Cellars (fugitives)	1.75	0.00	0.00	0.00	0.00	0.00
New Well Heads (fugitives)	0.09	0.00	0.00	0.00	0.00	0.00
Total	**3.81**	**2.91**	**5.04**	**0.00**	**0.03**	**0.03**
South Coast AQMD Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Source: Trinity Consultants 2023 Note: 0.00 could represent < 0.00						

As shown in **Table 6-7**, operation-related emissions, calculated as described in Section 5.2.2 (see Appendix B), would be less than the South Coast AQMD significant threshold levels. Therefore, the proposed Project would have a *less than significant impact* during Project operations.

6.1.3.5 Potential Impacts from Carbon Monoxide

Ambient CO concentrations normally correspond closely to the spatial and temporal distributions of vehicular traffic. Relatively high concentrations of CO would be expected along heavily traveled roads and near busy intersections. CO concentrations are also influenced by wind speed and atmospheric mixing. CO concentrations may be more uniformly distributed when inversion conditions are prevalent in the valley. Under certain meteorological conditions, CO concentrations along a congested roadway or intersection may reach unhealthful levels for sensitive receptors (e.g., children, the elderly, hospital patients, etc.). This localized impact can result in elevated levels of CO, or "hotspots" even though concentrations at the closest air quality monitoring station may be below NAAQS and CAAQS.

The localized Project impacts depend on whether ambient CO levels in the Project vicinity would be above or below NAAQS. If ambient levels are below the standards, a project is considered to have significant impacts if a project's emissions would exceed of one or more of these standards. If ambient levels already exceed a state standard, a project's emissions are considered significant if they would increase one-hour CO concentrations by 10 ppm or more or eight-hour CO concentrations by 0.45 ppm or more. Typical criteria by which CO "Hot Spot" modeling should be considered include:

1. A traffic study for the project indicates that the Level of Service (LOS) on one or more streets or at one or more intersections in the project vicinity would be reduced to LOS E or F; or
2. A traffic study indicates that the project would substantially worsen an already existing LOS F on one or more streets or at one or more intersections in the project vicinity.

SHP's existing CUP Sites are already developed industrial oil and gas operations in an existing built out urban environment. Further, the Project includes a gas line upgrade improvement along with continued operations consistent with baseline conditions and thus there would be no substantial expansion of existing operations. While additional vehicles would have to travel to and from CUP Site #2 to facilitate construction of the proposed gas system modifications, these additional vehicle trips would be minimal (see **Table 5-3** above) and temporary/short-term in nature (i.e., construction is expected to last no more than 6 months). Once the gas system modifications are complete, existing employees and associated vehicles would be sufficient to operate the new equipment. For these reasons, SHP's CUP sites are not anticipated to permanently change or increase operational traffic to within the immediate vicinity of the CUP Sites, or within the City of Signal Hill more broadly. Therefore, CO "Hotspot" Modeling was not conducted for this Project and no concentrated excessive CO emissions are expected to be generated once temporary construction activities at CUP Site #2 are completed.

6.1.3.6 Impacts to Ambient Air Quality

The screening-level localized significance thresholds (LSTs) are the amount of project-related emissions at which localized concentrations (ppm or $\mu g/m^3$) could exceed the AAQS for criteria air pollutants for which the South Coast Air Basin is designated nonattainment. The screening-level LSTs are based on the proposed Project site size and distance to the nearest sensitive receptor. Additionally, the screening-level LSTs are based on the California AAQS, which are the most stringent AAQS, established to provide a margin of safety in the protection of public health and welfare.

Table 6-8 shows the maximum daily construction emissions (pounds per day) generated during onsite construction activities associated with the Project (i.e., simultaneous construction of the gas system modification at CUP Site #2, and new well cellars) compared with the South Coast AQMD's screening-level construction LSTs. The Project is in South Coast AQMD Source Receptor Area #4 (South Coast LA County); therefore, Source Receptor Area #4 allowable emissions are used in comparison with the Project emissions. As shown in **Table 6-8**, maximum daily construction emissions associated with the Project would not exceed

the South Coast AQMD screening-level construction LSTs. The analysis presented in this section is conservative since the South Coast AQMD LSTs apply to on-site emissions only. Please note that the construction area at CUP Sites #1, #3, #4, #5, #6, and #7, which is the area for new well cellar construction, are each less than 1 acre, and the construction area for CUP Site #2, which is the area for new well cellar construction and new gas system modification/LTS unit construction, is less than 1 acre. The threshold levels in South Coast AQMD's screening-level construction LSTs are for 1-acre areas. Thus, the LST thresholds are presented for Project areas of 1 acre in **Table 6-8**.

Table 6-8. Proposed Project Maximum Daily Onsite Localized Construction Emissions

Emissions Source	Pollutant (pounds/day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emission	**2.13**	**2.16**	**0.09**	**0.08**
LST for 1 Acres at 25 ft	57	585	4	3
Threshold Exceeded for a Single Year?	**NO**	**NO**	**NO**	**NO**
Source: Trinity Consultants 2023				

Table 6-9 shows the maximum daily operational emissions (pounds per day) generated during operational activities associated with the Project (new gas system modification/LTS system operations, redrilling existing wells/drilling new wells, new well head and new well cellar fugitive emissions) compared with the South Coast AQMD's screening-level operational LSTs. The Project is in South Coast AQMD Source Receptor Area #4. As shown in **Table 6-9**, the maximum daily operational emissions would not exceed the South Coast AQMD screening-level LSTs. As noted above, the operational area at CUP Sites #1, #3, #4, #5, #6, and #7, which is the area for new well cellar and well head fugitives, are each less than 1 acre, and the operational area for CUP Site #2, which is the area for new well cellar and well head fugitives and the new LTS system, is less than 1 acre. The threshold levels in South Coast AQMD's screening-level operational LSTs are for 1-acre areas. Thus, the LST thresholds are presented for Project areas of 1 acre in **Table 6-9**.

Table 6-9. Proposed Project Maximum Daily Onsite Localized Operations Emissions

Emissions Source	Pollutant (pounds/day)			
	NOx	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emission	**2.91**	**5.04**	**0.03**	**0.03**
LST for 1 Acres at 25 ft	57	585	1	1
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
Source: Trinity Consultants 2023				

Because the Project's estimated NOx, CO, PM_{10}, and $PM_{2.5}$ are below the South Coast AQMD's screening-level LSTs, the Project's contribution to potential violations of AAQS would be *less-than-significant*.

6.1.3.7 Potential Impacts from Greenhouse Gas Emissions

Construction of new well cellars and the proposed gas system modifications/LTS unit at CUP Site #2 modification, electricity consumed by Drill Rig #6 and operation of new pumpjacks, as well as diesel consumed within Drill Rig #5, would have long-term GHG emissions. **Table 6-10** presents construction GHG emissions and indirect emissions for the annual electricity anticipated for drilling and redrilling using Rig #6, as well as new pumpjacks associated within new wells operating throughout the life of the Project for informational purposes. GHGs from fuel used from Drill Rig#5 generator was also estimated. As discussed in Section 5.3.2, the diesel Drill Rig #5 is only utilized approximately 10% of the time during drilling/redrilling, while GHG

emissions due to increase electricity consumed by Drill Rig #6, which would continue to be utilized for 90% of future drilling/redrilling operations, was included in the Project GHG emissions in **Table 6-10**.

Potential GHG emissions from Project operations from well heads would be tied to system leaks. As discussed above, SHP has a state-of-the-art leak detection system in place. Any detected leaks are repaired within 24 hours per SHP protocols and CalGEM requirements. Although fugitive GHG emissions from the leaks are expected to be minimal, the GHG emissions were calculated based on CARB's MRR § 95153(o) and default emission factors from Appendix A of the MRR[5].

Table 6-10. Project GHG Emissions

Source	Emissions (MT/year)[1]			
	CO2	CH4	N2O	CO2e
Construction Emissions				
LTS Construction Equipment	16.08	4.70E-03	0.000	16.20
LTS On-Road Equipment	6.68	2.57E-06	0.001	6.99
Well Cellar Construction Equipment	0.48	1.55E-04	0.000	0.48
Well Cellar On-Road Equipment	0.07	5.95E-08	0.000	0.07
Total Construction Emissions	**23.31**	**0.005**	**0.0011**	**23.75**
Operational Emissions				
Annual Electricity Usage[2]	1,016	0.10	0.012	1,022
Redrilling	81.19	0.03	--	81.84
New Drilling	67.66	0.02	--	68.20
New Well Head Fugitives[3]	0.00	0.09	--	2.26
Total Operations Emissions	**1,165**	**0.23**	**0.012**	**1,174**
Total Project GHG Emissions				**1,197.6**

NOTES:
1. GHG emissions were estimated for the proposed Project for the operations year with the highest level of GHG emissions to be reasonably conservative. Specifically, annual GHG emissions shown above assumed full Project build-out (i.e., 46 new well heads, pumpjacks, etc.). Given new wells will be added incrementally and there is the potential to abandon existing wells during the CUP period, the emissions above represent a conservative overestimation of the Project's maximum annual GHG emissions.
2. Emission factors are year 2022 for SCE published in CalEEMod version 2022.1 User Guide Appendix G, Default Data Tables.
3. Subject to CARB MRR and Cap and Trade requirements.
Note: 0.000 could represent < 0.000

[5] Fugitive GHG emissions from well heads were calculated using the following conservative assumptions: 1) one week duration per leak, although SHP procedures includes repairing leaks within 24 hours, and 2) 100% of fugitive emissions are conservatively assumed to be CH_4, which has a higher global warming potential (GWP) than CO_2, although facilities are required to use a gas sample for GHG reporting.

6.2 Analysis of Air Quality and GHG CEQA Environmental Checklist Questions

6.2.1 AQ-1: Conflict or Obstruction of Air Quality Plan

CEQA Guidelines Air Quality Environmental Checklist Question III-a) – Would the Project conflict with or obstruct implementation of the applicable air quality plan?

Applicable South Coast AQMD Significance Criteria: presented in ***Table 6-1****.*

6.2.1.1 Consistency with the Air Quality Attainment Plan

Air quality impacts from proposed projects within City of Signal Hill are controlled through policies and provisions of the City of Signal Hill General Plan (City of Signal Hill, 2022), South Coast AQMD's Final 2016 AQMP (South Coast AQMD, 2017), South Coast AQMD's final 2022 AQMP (South Coast AQMD 2022b) and Southern California Association of Government's (SCAG's) 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (SCAG, 2020). In order to demonstrate that a proposed Project would not cause further air quality degradation in either the South Coast AQMD's plan to improve air quality within the air basin, or the federal requirements to meet certain air quality compliance goals, each project should also demonstrate consistency with the South Coast AQMD's adopted Air Quality Attainment Plans (AQAP) for O_3 and PM_{10}. The South Coast AQMD is required to submit a "Rate of Progress" document to CARB that demonstrates past and planned progress toward reaching attainment for all criteria pollutants. The California Clean Air Act (CCAA) requires air pollution control districts with severe or extreme air quality problems to provide for a 5% reduction in non-attainment emissions per year. The AQAP prepared for the South Coast Air Basin by the South Coast AQMD complies with this requirement. CARB reviews, approves or amends the document and forwards the plan to the U.S. EPA for final review and approval within the SIP.

Air pollution sources associated with stationary sources are regulated through the permitting authority of the South Coast AQMD under Regulation II, List and Criteria Identifying Information Required of Applicants Seeking a Permit to Construct from the South Coast AQMD and related rules (Rule 201 through Rule 223). Owners of any new or modified equipment that emits, reduces, or controls air contaminants, except those specifically exempted by the South Coast AQMD, are required to apply for an Authority to Construct and Permit to Operate (South Coast AQMD Rule 201). Through this permitting mechanism which include compliance with applicable rules and regulations, the South Coast AQMD would ensure that all stationary sources within the project area would be subject to the standards of the South Coast AQMD to ensure that new developments do not result in net increases in stationary sources of criteria air pollutants.

State CEQA Guidelines and the Federal Clean Air Act (Sections 176 and 316) contain specific references on the need to evaluate consistencies between a proposed project and the applicable AQAP for the project site. To accomplish this, CARB has developed a three-step approach to determine project conformity with the applicable AQAP:

1. *Determination that an AQAP is being implemented in the area where the project is being proposed*. The South Coast AQMD has implemented the current, modified AQAP as approved by CARB.
2. *The proposed project must be consistent with the growth assumptions of the applicable AQAP*. The Project land use type is an existing oil and gas operation, and continuation of these existing operations was anticipated in the current growth assumptions. Therefore, growth assumptions in the City of Signal Hill General Plan will not need to be modified with the approval of the proposed Project.

3. *The project must contain in its design all reasonably available and feasible air quality control measures*. The proposed Project incorporates various policy and rule-required project design features that will reduce related emissions.

The CCAA and AQAP identify transportation control measures as methods to further reduce emissions from mobile sources. Strategies identified to reduce vehicular emissions such as reductions in vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, and traffic congestion, can be implemented as control measures under the CCAA in order to reduce vehicular emissions as well.

As the continuance of existing operations represented by the proposed Project, and any future growth that may or may not result, is already included in the City of Signal Hill General Plan and the AQAP, conclusions may be drawn from the following criteria:

1. That, by definition, the proposed emissions from the Project are below the South Coast AQMD's established emissions impact thresholds;
2. That the primary source of emissions from the Project will be existing oil and gas drilling and handling operations and motor vehicles that are licensed through the State of California and whose emissions are already incorporated into CARB's South Coast Air Basin's Emissions Inventory.

Based on these factors, the proposed CUP Extension Project is *consistent with the AQAP*. Therefore, the Project would not obstruct implementation of applicable South Coast AQMD air quality plans and therefore be less than significant.

6.2.1.1.1 AB 617 Community Emissions Reduction Plan

As discussed in Section 4.2.2, AB 617 establishes a framework for development of Community Emissions Reduction Plans (CERP) in disadvantaged communities. A CERP for the Wilmington, Carson, and West Long Beach area that includes CUP Site #1 was prepared by the Community Steering Committee under the direction of the South Coast AQMD. The CERP lists actions prioritized by the Steering Committee that would reduce emissions and/or exposures within the Community. Oil drilling and production is identified in the CERP as a local air quality concern priority.

At the state-level, AB 617 requires six (6) measures listed below and followed by detailed discussion of applicability to the Project and how the Project would comply with each:

1. Annual Reporting;
2. Best Available Retrofit Control Technology ("BARCT");
3. Statewide Clearinghouse of BARCT;
4. Community Air Monitoring;
5. Community Emissions Reduction Programs; and
6. Increased Penalties.

Annual Reporting Requirements

AB 617 requires CARB and local air districts to establish an annual reporting system for certain classes of stationary sources through the Criteria Pollutants and Toxic Emissions Reporting (CTR) Regulation (Health and Safety Code, § 39607.1(b)(1)). Stationary sources subject to the annual reporting requirements include: (1) facilities required to report GHG emissions to CARB because they generate more than 25,000 $MTCO_2e$ annually; (2) facilities authorized to emit 250 tons or more of any nonattainment pollutant or its precursors;

and (3) facilities that receive an elevated prioritization score based on cancer or noncancer health impacts. (*Id.* at § 39607.1(a)(2).)

Since SHP reports GHG emissions for all SHP operations under one MRR CARB ID, SHP operations all together meet the CTR definition of a stationary source. SHP reports criteria pollutant and toxic emissions to South Coast AQMD through the AER Portal, and South Coast AQMD submits the emissions data to CARB. Therefore, the proposed Project will be subject to the CTR annual reporting requirements, and SHP will report emissions associated with the proposed Project through the AER portal to South Coast AQMD.

BARCT Requirements

AB 617 requires local air districts within nonattainment areas to develop an expedited BARCT schedule for all industrial sources subject to the state's cap-and-trade mechanism. (Health and Safety Code, § 40920.6(c). The Project is subject to cap-and-trade; therefore, the Project is subject to AB 617's BARCT requirements. South Coast AQMD was tasked with identifying rules that apply to facilities subject to cap-and-trade and determining if the rules meet BARCT requirements. South Coast AQMD was then required to develop a BARCT implementation schedule to amend those rules to meet the BARCT requirements. Once the rules have been amended, if SHP is subject to those rules, SHP will comply with the new BARCT requirements as part of their air permits.

Community Air Monitoring

On September 27, 2018, CARB adopted the Community Air Protection Blueprint, and selected the Wilmington, Carson, and West Long Beach for both community air monitoring and community emissions reduction.

AB 617 required the South Coast AQMD to deploy its community air monitoring system no later than July 1, 2019. (Health and Safety Code, § 42705.5(c).) The South Coast AQMD instituted its AB 617 Air Monitoring Plan for the Wilmington, Carson, and West Long Beach Community ("CAMP") in April 2019. As part of the community air monitoring system, the South Coast AQMD may require certain classes of stationary sources to deploy fence-line or other real time emissions monitoring systems. Stationary sources subject to real-time monitoring include: (1) facilities required to report GHG emissions to CARB because they generate more than 25,000 $MTCO_2e$ annually; (2) facilities authorized to emit 250 tons or more of any nonattainment pollutant or its precursors; and (3) facilities that receive an elevated prioritization score based on cancer or noncancer health impacts. (*Id.* at § 39607.1(a)(2).)

As previously discussed, SHP's full operations meet the definition of a stationary source under the CTR. However, only CUP Site #1 falls within the Wilmington, Carson, and West Long Beach community. CUP Site #1 does not meet the definition of a stationary source under the CTR because it will have less than 25,000 MT CO_2e and 250-tons of criteria pollutant emissions annually and would not have an elevated prioritization score.

Community Emissions Reduction Program

As discussed above, the Project would be consistent with applicable control measures in the CERP.

6.2.2 AQ-2: Cumulative Impacts

CEQA Guidelines Air Quality Environmental Checklist Question III-b) – Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state AAQS?

Applicable South Coast AQMD Significance Criteria: presented in ***Table 6-1****.*

By its very nature, air pollution has a cumulative impact. South Coast AQMD's nonattainment status is a result of past and present development within the South Coast Air Basin. Furthermore, attainment of AAQS can be jeopardized by increasing emissions-generating activities in the region. No single project would be sufficient in size, by itself, to result in nonattainment of the regional air quality standards. Instead, a project's emissions may be individually limited, but cumulatively considerable when taken in combination with past, present, and future development within the South Coast Air Basin. When assessing whether there is a new significant cumulative effect, the Lead Agency shall consider whether the incremental effects of the project are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects [CCR §15064(h)(1)]. Per CEQA Guidelines §15064(h)(3) a Lead Agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program, including, but not limited to an air quality attainment or maintenance plan that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area in which the project is located. The South Coast AQMD has established thresholds for individual projects and if the project emissions are below established thresholds, then the project is viewed as in compliance with the AQMP, and the project's cumulative impacts are found to be less than cumulatively considerable.

As discussed in Section 6.1.3 and shown in **Table 6-2** through **Table 6-7** above, the Project's estimated emissions are below established South Coast AQMD thresholds. Further, the cumulative baseline plus proposed Project emissions combined are below applicable South Coast AQMD's daily emissions thresholds. Please see Section 6.2.3 below for a summary of cumulative health risks.

For these reasons, the Project's potential impacts would not be cumulatively considerable, and the potential cumulative impact would be less than significant.

6.2.3 AQ-3: Sensitive Receptors

CEQA Guidelines Air Quality Environmental Checklist Question III-c) – Would the Project expose receptors to substantial pollutant concentrations?

Applicable South Coast AQMD Significance Criteria: presented in ***Table 6-1****.*

6.2.3.1 Predicted Project-Related Health Risk Impacts

South Coast AQMD has set the level of significance for carcinogenic risk at ten in one million, which is understood as the possibility of causing ten additional cancer cases in a population of one million people. The level of significance for chronic and acute non-cancer risk is a hazard index of 1.0. All residential and sensitive receptors were modeled with a 30-year exposure duration for future Project operation, as well as the cumulative health effects of existing/baseline activities plus future Project activities, and all business receptors were modeled with a 25-year exposure for baseline and Project operation. As discussed in Section 5.2.4 above,

Project operation included the most conservative operations profile with each CUP Site as described in **Table 2-1** above, even though when taken together this results in higher cumulative emissions when compared to the emissions associated with maximum activity across all CUP Sites of no more than 46 new wells drilled and operating, 28 existing wells redrilled, and all 20 new well cellars installed and in use throughout the entire 20-year duration of the permitted operations. While this cumulatively assumes more drilling, redrilling and well cellar construction than is requested for the CUP Extension Project, the health risk at each CUP Site is conservatively overestimated to ensure that worst case impacts are determined. Even with the incorporation of these conservative activity/design assumptions, the Project's health risk results were below the South Coast AQMD threshold for potential cancer risk impacts, and non-cancer potential chronic and acute impacts.

The carcinogenic risk and the health hazard index (HI) for chronic non-cancer and acute risk at the maximum exposed individual resident (MEIR) and maximum exposed individual work (MEIR) do not exceed the significance levels of ten in one million (10×10^{-6}) and 1.0, respectively for the proposed Project. The MEIRs and MEIWs for the current operations are identified by receptor location and risk and are provided in **Table 6-11** presents the cancer health risks for construction and operations as well as the total combined risk. **Table 6-12** presents the non-cancer chronic health risks for construction and operations as well as the total combined risk. **Table 6-13** presents the non-cancer acute health risks for construction and operations as well as the total combined risk. Note, the determined non-cancer chronic and acute health risks were below the applicable South Coast AQMD thresholds, in all areas within and outside of the CUP Boundaries. The electronic AERMOD and HARP2 output files are provided in Appendix C.

Table 6-11. Project Cancer Health Risk Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Construction	0.2693 in a million	0.005 in a million
Operational	1.4452in a million	0.036 in a million
Total	**1.7145 in a million**	**0.041 in a million**
Threshold	10 in a million	10 in a million
Exceeds Threshold?	**No**	**No**
Source: Trinity Consultants 2023		

Table 6-12. Project Non-Cancer Chronic Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Construction	0.00032	0.002
Operational	0.00183	0.001
Total	**0.00215**	**0.003**
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**
Source: Trinity Consultants 2023 Note: 0.000 could represent < 0.00 0		

Table 6-13. Project Non-Cancer Acute Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Construction	0.000	0.000
Operational	0.001	0.002

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Total	**0.001**	**0.002**
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**
Source: Trinity Consultants 2023 Note: 0.000 could represent < 0.000		

As shown above in **Table 6-11**, **Table 6-12** and **Table 6-13**, even when applying the overly conservative analysis approach summarized above, the maximum predicted residential cancer risk for Project operations is 1.71 in a million for resident exposure and 0.04 in a million for worker exposure, and both are below the applicable South Coast AQMD cancer risk threshold of greater than 10 in a million. Similarly, the maximum chronic non-cancer hazard index for Project operations is 0.002 for resident exposure and 0.003 for worker exposure, and both are well below the applicable HI threshold of 1.0. Lastly, the maximum acute non-cancer hazard index for the Project operations is 0.001 for resident exposure and 0.002 for worker exposure, and both are well below the applicable HI threshold of 1.0. Even when applying the overly conservative analysis approach, the Project results (i.e., the combined proposed Project construction and proposed Project operations MEIRs and MEIWs) remained below the significance threshold for cancer and chronic and acute non-cancer risk; for these reasons the proposed Project would not have an adverse health effect to any of the surrounding communities.

In summary, the potential health risk attributable to the proposed Project is determined to be *less than significant* based on the following conclusions:

1. Potential carcinogenic risk from the proposed Project is below the significance level of ten in a million at each of the modeled receptors; and
2. The hazard index for the potential chronic non-cancer risk from the proposed Project is below the significance level of 1.0 at each of the modeled receptors.
3. The hazard index for the potential acute non-cancer risk from the proposed Project is below the significance level of 1.0 at each of the modeled receptors.

Therefore, potential risk to the population attributable to emissions of TACs from the proposed Project would be less than significant.

Furthermore, though not attributable to the Project, the results of the baseline HRA, presented above in Section 6.1.3.2, demonstrate that both the standalone baseline operations, as well as cumulative baseline plus future Project emissions, are less than the applicable health risk significance thresholds. The proposed Project HRA, as presented in **Table 6-11**, **Table 6-12** and **Table 6-13**, demonstrate that the Project effects (i.e., the incremental [net]) future potential increase in health risk attributable to the proposed Project would remain less than the applicable health risk significance thresholds. Sensitive receptors as identified in **Figure 5-1** and **Figure 5-2** are included in the residential receptor analysis. The maximum residential cancer risk and non-cancer chronic and acute impacts for both the existing operations, the proposed Project, and the cumulative Project, are less than the South Coast AQMD maximum residential cancer risk threshold and non-cancer chronic and acute hazard indexes (**Table 6-1**); therefore, the impacts to sensitive receptors would also be less than the established significance thresholds, and the proposed Project would have less than impacts on sensitive receptors.

6.2.3.2 Predicted Cumulative Health Risk Impacts

Baseline plus Project health risks are combined and presented in **Table 6-14** through **Table 6-16**; these results show that cumulative health risks are also below applicable South Coast AQMD risk thresholds.

Table 6-14. Cumulative Cancer Health Risk Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	4.42 in a million	0.74 in a million
Project	1.7145in a million	0.041 in a million
Total*	**6.1345 in a million**	**0.781 in a million**
Threshold	10 in a million	10 in a million
Exceeds Threshold?	**No**	**No**

Source: Trinity Consultants 2023
*The maximum exposed individual resident and worker for baseline and Project scenarios may not be at the same location. Although the maximum exposed individuals are different for the baseline and Project, by comparing the combined total of the maximum baseline plus Project to the applicable threshold, this represents a conservative overestimation of individual health risk exposure.

Table 6-15. Cumulative Non-Cancer Chronic Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	0.02	0.02
Project	0.00215	0.003
Total*	**0.022**	**0.023**
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**

Source: Trinity Consultants 2023
Note: 0.000 could represent < 0.000
*The maximum exposed individual resident and worker for baseline and Project scenarios may not be at the same location. Although the maximum exposed individuals are different for the baseline and Project, by comparing the combined total of the maximum baseline plus Project to the applicable threshold, this represents a conservative overestimation of individual health risk exposure.

Table 6-16. Cumulative Non-Cancer Acute Impacts Predicted by HARP2

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	0.01	0.01
Project	0.001	0.002
Total	**0.011**	**0.012**
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**

Source: Trinity Consultants 2023
Note: 0.00 could represent < 0.00
*The maximum exposed individual resident and worker for baseline and Project scenarios may not be at the same location. Although the maximum exposed individuals are different for the baseline and Project, by comparing the combined total of the maximum baseline plus Project to the applicable threshold, this represents a conservative overestimation of individual health risk exposure.

6.2.4 AQ-4: Other Emissions

CEQA Guidelines Air Quality Environmental Checklist Question III-d) – Would the Project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Applicable South Coast AQMD Significance Criteria: presented in ***Table 6-1****.*

The intensity of an odor source's operations and its proximity to sensitive receptors influences the potential significance of odor emissions. Substantial odor-generating operations include wastewater treatment facilities, composting facilities, agricultural operations, and heavy industrial operations. Potential sources of operational odors generated by the Project would include new wells and the new gas system modification/LTS unit system, both of which would have vapor recovery that is routed to the turbine at CUP Site #2 and are subject to South Coast AQMD Rule 1148.1 and 1173 requirements. As part of compliance with Rule 1148.1, SHP is required to maintain an Odor Mitigation Plan that includes monitoring and mitigation requirements if there is a violation of South Coast AQMD Rule 402 or if there have been three confirmed odor events within six months. SHP has not met either condition triggering an Odor Mitigation Plan. Given SHP has not had a history of adverse odor releases and that South Coast AQMD Rule 1148.1 requires an Odor Mitigation Plan if there are odor events, these potential new odor sources are anticipated to therefore generate minimal odors. In addition, South Coast AQMD Rule 402 acts to prevent occurrences of odor nuisances. Therefore, potential operational-source odor impacts would be considered less than significant.

6.2.5 GHG-1: GHG Emissions Analysis

CEQA Guidelines GHG Environmental Checklist Question VIII-a) – Would the proposed Project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Applicable South Coast AQMD Significance Criteria: presented in ***Table 6-1****.*

CEQA Guidelines GHG Environmental Checklist Question VIII-b) – Would the proposed Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

Applicable South Coast AQMD Significance Criteria: presented in ***Table 6-1***

As discussed in Section 4.1.2, SHP is subject to U.S. EPA's GHGRP and California's MRR for GHG reporting. As a result, SHP has submitted its GHG emissions data to both U.S. EPA and CARB in the required reporting years and maintains a plan for accurately capturing and recording this data. As required by CARB, SHP has and will continue to have its GHG emissions data reports verified each year by a CARB-accredited verification body. In 2020, SHP emitted a verified 41,756 MT CO_2e from its oil and gas production activities, which includes the usage of natural gas and other fuels from stationary source operations. Additionally, since mobile (e.g., trucks or passenger vehicles) GHG emissions are not included in the GHG emissions reported to CARB through the MRR, these emissions have been quantified for baseline mobile sources and presented in **Table 3-12** in Section 3.7.5. Note, these baseline emissions have been presented for disclosure purposes.

For new Project GHG emissions sources describe previously in Section 6.1.3.7, emissions have been quantified for the Project for informational purposes. **Table 6-10** in Section 6.1.3.7 includes the GHG emissions from mobile sources and indirect electricity (non-Cap-and-Trade emissions) for the Project. As shown in **Table 6-10**, the proposed Project will increase SHP's annual GHG emissions by approximately 1,197.6 MT CO_2e/year. Note that the majority of this increase (i.e., 1,022 MT CO_2e/year) is due to indirect GHG emissions resulting

from additional electricity consumed within the new LTS system and pumpjacks for new wells, all of which would be captured under Cap-and-Trade.

Further, for context, South Coast AQMD does have a GHG project level threshold of significance which they apply to major industrial CEQA projects for which they are the CEQA lead agency. This is quantified at 10,000 MT per year. By comparison, **Table 6-10** shows the proposed Project's operations emissions would be 1,174 MT per year of CO_2e and construction emissions would be 23.75 MT per year of CO_2e for a combined total of 1,197.6 MT per year of CO_2e. These Project related emissions are substantially lower than South Coast AQMD's annual industrial GHG emissions threshold for CEQA.

Further, SHP already participates in Cap-and-Trade for its existing gas turbine at CUP Site #2 and will continue to participate in Cap-and-Trade as part of the proposed Project.

The following section details how the proposed CUP extension Project is consistent with the applicable state and regional GHG emission reduction plans and programs.

6.2.5.1.1 State and Local Efforts to Reduce GHGs and Combat Global Warming

For the last two decades, as part of its efforts to reduce local air pollution, South Coast AQMD has promoted a number of programs to combat climate change. For instance, South Coast AQMD has promoted energy conservation, low-carbon fuel technologies (natural gas vehicles; electric-hybrids, hydraulic-hybrids, and battery-electric vehicles), renewable energy, vehicle miles traveled (VMT) reduction programs, and market incentive programs. South Coast AQMD adopted the Air Quality-Related Energy Policy, which integrates air quality, energy, and climate change issues in a coordinated and consolidated manner.

- Promote zero and near-zero emission technologies through ultra clean energy strategies, to meet air quality, energy security, and climate change objectives.
- Promote zero and near-zero emission technologies in both stationary and mobile applications to the extent feasible.
- Promote diversification of electricity generation technologies to provide reliable, feasible, affordable, sustainable, and zero or near-zero emission electricity supply for the Basin in partnership with local power producers.
- Promote demand side management programs to manage energy demand growth. Such programs include, but are not limited to, energy conservation, energy efficiency and load-shifting measures.
- Promote in-Basin distributed electricity generation, with emphasis on distributed renewable electricity generation, to reduce reliance on energy imports or central power plants, and to minimize the air quality, climate and cross-media environmental impacts of traditional power generation.
- Incorporate energy efficiency and conservation as an emissions reductions strategy for stationary and mobile sources through AQMD's planning, rule-making, advocacy, and CEQA commenting activities
- Promote electricity storage technology to improve the supply reliability, availability, and increased generation technology choices.

Additional reductions would be achieved through the regulatory process of the air district and CARB as required changes to diesel engines are implemented which would affect the product delivery trucks and limits on idling. The strategies currently being implemented by CARB may help in reducing the Project's GHG emissions and are summarized in **Table 6-17** below.

Table 6-17. Select CARB GHG Emission Reduction Strategies

Strategy	Description of Strategy
Vehicle Climate Change Standards	AB 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by CARB in Sept. 2004.
Diesel Anti-Idling	In July 2004, CARB adopted a measure to limit diesel-fueled retail motor vehicle idling.
Other Light-Duty Vehicle Technology	New standards would be adopted to phase in beginning in the 2017 model year.
Alternative Fuels: Biodiesel Blends	CARB would develop regulations to require the use of 1% to 4% Biodiesel displacement of California diesel fuel.
Alternative Fuels: Ethanol	Increased use of ethanol fuel.
Heavy-Duty Vehicle Emission Reduction Measures	Increased efficiency in the design of heavy-duty vehicles and an educational program for the heavy-duty vehicle sector.

Not all of these measures are currently appropriate or applicable to the proposed Project. While future legislation could further reduce the Project's GHG footprint, the analysis of this is speculative and in accordance with CEQA Guidelines Section 15145, will not be further evaluated in this AQIA. CEQA Guidelines Section 15130 notes that sometimes the only feasible mitigation for cumulative impacts may involve the adoption of ordinances or regulations rather than the imposition of conditions on a project-by-project basis. Global climate change is this type of issue. The causes and effects may not be just regional or statewide, they may also be worldwide. Given the uncertainties in identifying, let alone quantifying the impact of any single project on global warming and climate change, and the efforts made to reduce emissions of GHGs from the Project through design, in accordance with CEQA Section 15130, any further feasible emissions reductions would be accomplished through CARB regulations adopted pursuant to AB32.

The analysis of GHG emissions is a different analysis than for criteria pollutants for the following reasons. For criteria pollutant, significance thresholds are based on daily emissions because attainment or non-attainment is primarily based on daily exceedances of applicable AAQS. Further, several AAQS are based on relatively short-term exposure effects to human health (one-hour and eight-hour standards), whereas the half-life of CO_2 is approximately 100 years, and as such the effects of GHGs occur over a longer timeframe than a single day. GHG emissions are typically considered to be cumulative impacts because they contribute to global climate change (versus local impacts). However, each project resulting in an emissions increase would contribute to the cumulative impact that emissions occurring planet-wide have on global climate change. Thus, determination of whether the Project contribution is cumulatively considerable is required to evaluate this impact.

There are many requirements for sources to reduce GHG emissions and most originate from the AB32 Scoping Plan and associated programs administrated by CARB. The Scoping Plan is the State's blueprint for how GHG reductions will be achieved. Local jurisdictions may have requirements as well, but the overall effort is centralized with CARB. Therefore, this impact evaluates whether the Project may conflict with the Scoping Plan (see Section 3.7.4). The South Coast AQMD Interim GHG Significance Threshold takes a tiered approach whereby Projects can screen-out by one of the following five methods: exemption from CEQA, GHG emissions already analyzed in GHG budgets from in approved regional plans, having emissions less than the 10,000 $MTCO_2e$/yr screening level, meeting best performance standards, or purchase GHG emissions offsets by funding projects or buying them outright. Projects with incremental increases less than this threshold screen out of further analysis and are not cumulatively considerable.

In the decade after South Coast AQMD adopted the Interim GHG Significance Threshold, several new laws and executive orders were adopted that require additional reductions in years after 2020. For instance, Senate Bill 32 (Lara, 2016) requires that GHG emissions be 40% less than 1990 levels by 2030. More drastic still, Senate Bill 100 (de Leon, 2018) which was signed by the Governor recently requires 100% zero-carbon electricity by 2045. On the day SB 100 was signed into law, the Governor also signed Executive Order B-55-18 which commits California to total, economy-wide carbon neutrality by 2045. Clearly, the 2008 Guidance may be somewhat inadequate in producing a meaningful comparison by today's standards which propose a grand vision that, if achieved, would fundamentally change how business is conducted and citizens live in the State. Thus, as discussed in the most recent updates to the Scoping Plan, objectives of the Scoping Plan affect entire sectors of the economy and it no longer makes sense to evaluate GHG emissions on a project-level.

For these reasons, Project GHG emissions levels presented in **Table 6-10** are primarily for disclosure purposes because impact analysis for the Project follows the approach certified by South Coast AQMD in the Final Negative Declaration for the Phillips 66 Los Angeles Refinery Carson Plant – Crude Oil Storage Capacity Project on December 12, 2014 (South Coast AQMD, 2014). The approach used by South Coast AQMD to assess GHG impacts from that project recognizes that consumers of electricity and transportation fuels are, in effect, regulated by requiring providers and importers of electricity and fuel to participate in the GHG Cap-and-Trade Program and other Programs (e.g., low carbon fuel standard, renewable portfolio standard, etc.). Each such sector-wide program exists within the framework of AB 32 and its descendant laws the purpose of which is to achieve GHG emissions reductions consistent with the AB 32 Scoping Plan.

In summary, the Project would generate GHGs from electricity use and combustion of gasoline/diesel fuels, each of which is regulated near the top of the supply-chain. As such, each citizen of California (including the operator of the Project) will have no choice but to purchase electricity and fuels produced in a way that is acceptable to the California market. Thus, Project GHG emissions will be consistent with the relevant plan (i.e., AB 32 Scoping Plan). The Project would meet its fair share of the cost to mitigate the cumulative impact of global climate change because SHP is purchasing energy from the California market. Thus, the Project would have a less than significant impact on applicable GHG reduction plans.

Nonetheless, GHG emissions impacts from implementing the Project were calculated at the Project-specific level for construction and operations as explained in the previous paragraphs. Impact analysis for the Project follows the approach certified by South Coast AQMD in the Final Negative Declaration for the Phillips 66 Los Angeles Refinery Carson Plant – Crude Oil Storage Capacity Project on December 12, 2014 (South Coast AQMD, 2014). In summary, this approach takes into account the cumulative nature of the energy industry and recognizes that consumers of electricity and diesel fuel are in effect regulated by higher level emissions restrictions on the producers of these energy sources. Therefore, the Project's contribution to cumulative global climate change impacts would *not be cumulatively considerable*.

7. CONCLUSIONS

The Project would have short-term air quality emissions due to construction activities as well as vehicular emissions associated with temporary construction activities occurring at CUP Site #2. Emissions from both of these construction sources *were found to be less than significant*.

The Project would result in long-term air quality emissions due to ongoing operational and related mobile source emissions. These impacts *were found to be less than significant*.

The Project, in conjunction with other past, present, and foreseeable future projects, would result in cumulative short-term and long-term effects to air quality. The Project's incremental contribution to these impacts are below thresholds of significance and would not be considered cumulatively considerable. Therefore, the Project's contribution to cumulative impacts *were found to be less than significant*.

The Project, in conjunction with other past, present, and foreseeable future projects, would result in cumulative long-term impacts to global climate change. The Project's incremental contribution to these impacts will be less than the established GHG threshold of significance for industrial facilities and is considered *less than significant*.

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APPENDIX A. EXISTING AIR QUALITY MONITORING DATA

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Ozone Averages

at Compton-700 North Bullis Road

iADAM

	2019		2020		2021	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National 2015 Std (0.070 ppm):						
First High:	Oct 6	0.079	Sep 6	0.115	Oct 3	0.076
Second High:	Sep 21	0.065	Oct 4	0.085	Oct 2	0.067
Third High:	Oct 5	0.065	Oct 15	0.081	Aug 26	0.062
Fourth High:	Oct 12	0.064	Oct 2	0.072	Sep 5	0.062
California Std (0.070 ppm):						
First High:	Oct 6	0.079	Sep 6	0.115	Oct 3	0.077
Second High:	Sep 21	0.066	Oct 4	0.086	Oct 2	0.067
Third High:	Oct 5	0.066	Oct 15	0.082	Aug 26	0.063
Fourth High:	Oct 12	0.065	Oct 2	0.072	Sep 5	0.062
National 2015 Std (0.070 ppm):						
# Days Above the Standard:		1		4		1
Nat'l Standard Design Value:		0.064		0.064		0.066
National Year Coverage:		97		99		97
California Std (0.070 ppm):						
# Days Above the Standard:		1		4		1
California Designation Value:		0.073		0.072		0.072
Expected Peak Day Concentration:		0.073		0.073		0.075
California Year Coverage:		95		96		94

Notes:

Eight-hour ozone averages and related statistics are available at Compton-700 North Bullis Road between 2008 and 2021. Some years in this range may not be represented.

All averages expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

State and national statistics may differ for the following reasons:

National 8-hour averages are truncated to three decimal places; State 8-hour averages are rounded to three decimal places.

State criteria for ensuring that data are sufficiently complete for calculating 8-hour averages are more stringent than the national criteria.

Daily maximum 8-hour averages associated with the National 0.070 ppm standard exclude those 8-hour averages that have first hours between midnight and 6:00 am, Pacific Standard Time.

Daily maximum 8-hour averages associated with the National 0.070 ppm standard include only those 8-hour averages from days that have sufficient data for the day to be considered valid.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Ozone Averages

at Long Beach-2425 Webster Street

iADAM

	2019		2020		2021	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National 2015 Std (0.070 ppm):						
First High:	Oct 6	0.064		*		*
Second High:	Mar 31	0.063		*		*
Third High:	Mar 17	0.056		*		*
Fourth High:	Oct 5	0.055		*		*
California Std (0.070 ppm):						
First High:	Oct 6	0.065		*		*
Second High:	Mar 31	0.064		*		*
Third High:	Mar 17	0.057		*		*
Fourth High:	Oct 5	0.056		*		*
National 2015 Std (0.070 ppm):						
# Days Above the Standard:		0		*		*
Nat'l Standard Design Value:		0.056		*		*
National Year Coverage:		95		*		*
California Std (0.070 ppm):						
# Days Above the Standard:		0		*		*
California Designation Value:		0.064		*		*
Expected Peak Day Concentration:		0.064		*		*
California Year Coverage:		94		*		*

Notes:

Eight-hour ozone averages and related statistics are available at Long Beach-2425 Webster Street between 2010 and 2019. Some years in this range may not be represented.

All averages expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

State and national statistics may differ for the following reasons:

National 8-hour averages are truncated to three decimal places; State 8-hour averages are rounded to three decimal places.

State criteria for ensuring that data are sufficiently complete for calculating 8-hour averages are more stringent than the national criteria.

Daily maximum 8-hour averages associated with the National 0.070 ppm standard exclude those 8-hour averages that have first hours between midnight and 6:00 am, Pacific Standard Time.

Daily maximum 8-hour averages associated with the National 0.070 ppm standard include only those 8-hour averages from days that have sufficient data for the day to be considered valid.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Ozone Averages

at Long Beach-Signal Hill

iADAM

	2019		2020		2021	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National 2015 Std (0.070 ppm):						
First High:		*	Oct 2	0.083	Oct 2	0.064
Second High:		*	Oct 15	0.078	Mar 28	0.062
Third High:		*	Oct 4	0.073	Apr 18	0.061
Fourth High:		*	Sep 6	0.071	Sep 4	0.060
California Std (0.070 ppm):						
First High:		*	Oct 2	0.083	Oct 2	0.065
Second High:		*	Oct 15	0.079	Mar 28	0.063
Third High:		*	Oct 4	0.073	Apr 18	0.061
Fourth High:		*	Sep 6	0.072	Sep 4	0.061
National 2015 Std (0.070 ppm):						
# Days Above the Standard:		*		4		0
Nat'l Standard Design Value:		*		*		*
National Year Coverage:		*		100		99
California Std (0.070 ppm):						
# Days Above the Standard:		*		4		0
California Designation Value:		*		0.083		0.083
Expected Peak Day Concentration:		*		*		*
California Year Coverage:		*		99		95

Notes:

Eight-hour ozone averages and related statistics are available at Long Beach-Signal Hill between 2020 and 2021. Some years in this range may not be represented.

All averages expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

State and national statistics may differ for the following reasons:

National 8-hour averages are truncated to three decimal places; State 8-hour averages are rounded to three decimal places.

State criteria for ensuring that data are sufficiently complete for calculating 8-hour averages are more stringent than the national criteria.

Daily maximum 8-hour averages associated with the National 0.070 ppm standard exclude those 8-hour averages that have first hours between midnight and 6:00 am, Pacific Standard Time.

Daily maximum 8-hour averages associated with the National 0.070 ppm standard include only those 8-hour averages from days that have sufficient data for the day to be considered valid.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum Hourly Ozone Measurements

at Compton-700 North Bullis Road

iADAM

	2019		2020		2021	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Oct 6	0.100	Sep 6	*0.152*	Oct 3	0.085
Second High:	Jun 10	0.085	Oct 4	0.110	Sep 9	0.084
Third High:	Oct 12	0.081	Sep 16	0.102	Aug 26	0.080
Fourth High:	Oct 5	0.077	Oct 15	0.090	Sep 4	0.080
California:						
# Days Above the Standard:		1		3		0
California Designation Value:		0.09		0.09		0.09
Expected Peak Day Concentration:		0.086		0.089		0.091
National:						
# Days Above the Standard:		*0*		*1*		*0*
3-Year Estimated Expected Number of Exceedance Days:		*0.0*		*0.3*		*0.3*
1-Year Estimated Expected Number of Exceedance Days:		*0.0*		*1.0*		*0.0*
Nat'l Standard Design Value:		*0.087*		*0.100*		*0.100*
Year Coverage:		97		97		96

Notes:

Hourly ozone measurements and related statistics are available at Compton-700 North Bullis Road between 2008 and 2021. Some years in this range may not be represented.

All concentrations expressed in parts per million.

The national 1-hour ozone standard was revoked in June 2005. Statistics related to the national 1-hour ozone standard are shown in or .

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum Hourly Ozone Measurements

at Long Beach-2425 Webster Street

iADAM

	2019		2020		2021	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Oct 6	0.075		*		*
Second High:	Mar 31	0.074		*		*
Third High:	Sep 21	0.070		*		*
Fourth High:	Oct 5	0.066		*		*
California:						
# Days Above the Standard:		0		*		*
California Designation Value:		0.08		*		*
Expected Peak Day Concentration:		0.077		*		*
National:						
# Days Above the Standard:		*0*		*		*
3-Year Estimated Expected Number of Exceedance Days:		*0.0*		*		*
1-Year Estimated Expected Number of Exceedance Days:		*0.0*		*		*
Nat'l Standard Design Value:		*0.075*		*		*
Year Coverage:		93		*		*

Notes:

Hourly ozone measurements and related statistics are available at Long Beach-2425 Webster Street between 2010 and 2019. Some years in this range may not be represented.

All concentrations expressed in parts per million.

The national 1-hour ozone standard was revoked in June 2005. Statistics related to the national 1-hour ozone standard are shown in or .

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum Hourly Ozone Measurements

at Long Beach-Signal Hill

	2019		2020		2021	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:		*	Oct 2	0.105	Sep 4	0.086
Second High:		*	Sep 5	0.099	Sep 5	0.075
Third High:		*	Aug 18	0.096	Oct 2	0.075
Fourth High:		*	Oct 15	0.095	Oct 3	0.070
California:						
# Days Above the Standard:		*		4		0
California Designation Value:		*		0.11		0.11
Expected Peak Day Concentration:		*		*		*
National:						
# Days Above the Standard:		*		*0*		*0*
3-Year Estimated Expected Number of Exceedance Days:		*		*		*
1-Year Estimated Expected Number of Exceedance Days:		*		*0.0*		*0.0*
Nat'l Standard Design Value:		*		*0.099*		*0.096*
Year Coverage:		*		99		97

Notes:

Hourly ozone measurements and related statistics are available at Long Beach-Signal Hill between 2020 and 2021. Some years in this range may not be represented.

All concentrations expressed in parts per million.

The national 1-hour ozone standard was revoked in June 2005. Statistics related to the national 1-hour ozone standard are shown in or .

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

at Long Beach-Route 710 Near Road

iADAM

	2019		2020		2021	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Nov 7	36.7	Sep 15	65.7	Jan 1	84.6
Second High:	Jan 28	34.7	Sep 14	60.8	Nov 20	48.4
Third High:	Jan 11	30.9	Sep 12	48.7	Dec 1	42.9
Fourth High:	Nov 12	30.7	Sep 13	47.6	Dec 20	40.8
California:						
First High:	Dec 9	45.4	Sep 15	74.1	Jan 1	103.2
Second High:	Nov 24	38.6	Sep 14	64.6	Nov 20	48.4
Third High:	Jan 28	37.4	Sep 12	55.4	Dec 20	43.1
Fourth High:	Nov 7	36.7	Jul 5	54.4	Dec 1	42.9
National:						
Estimated # Days > 24-Hour Std:		1.0		12.0		7.0
Measured # Days > 24-Hour Std:		1		12		7
24-Hour Standard Design Value:		33		35		34
24-Hour Standard 98th Percentile:		26.4		41.7		34.8
2006 Annual Std Design Value:		12.4		12.7		12.6
2013 Annual Std Design Value:		12.4		12.7		12.6
Annual Average:		10.9		13.8		13.0
California:						
Annual Std Designation Value:		13		14		14
Annual Average:		11.0		13.8		13.0
Year Coverage:		100		100		100

Notes:

Daily PM2.5 averages and related statistics are available at Long Beach-Route 710 Near Road between 2015 and 2021. Some years in this range may not be represented.

All averages expressed in micrograms per cubic meter.

An exceedance of a standard is not necessarily related to a violation of the standard.

State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

at North Long Beach

iADAM

	2019		2020		2021	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Jan 28	28.0	Sep 15	66.0	Jan 1	41.2
Second High:	Jan 29	24.5	Oct 27	48.3	Dec 6	33.6
Third High:	Jan 4	22.2	Sep 12	45.7	Nov 6	31.2
Fourth High:	Jan 5	20.7	Jul 5	38.3	Nov 30	30.5
California:						
First High:	Jan 28	28.0	Sep 15	66.0	Jan 1	41.2
Second High:	Jan 29	24.5	Oct 27	48.3	Dec 6	33.6
Third High:	Jan 4	22.2	Sep 12	45.7	Nov 6	31.2
Fourth High:	Jan 5	20.7	Jul 5	38.3	Nov 30	30.5
National:						
Estimated # Days > 24-Hour Std:		0.0		12.0		3.1
Measured # Days > 24-Hour Std:		0		4		1
24-Hour Standard Design Value:		29		33		33
24-Hour Standard 98th Percentile:		20.7		45.7		31.2
2006 Annual Std Design Value:		10.5		11.1		10.9
2013 Annual Std Design Value:		10.5		11.1		10.9
Annual Average:		9.2		12.4		10.9
California:						
Annual Std Designation Value:		*		12		12
Annual Average:		*		12.5		10.9
Year Coverage:		90		100		97

Notes:

Daily PM2.5 averages and related statistics are available at North Long Beach between 1999 and 2021. Some years in this range may not be represented.

All averages expressed in micrograms per cubic meter.

An exceedance of a standard is not necessarily related to a violation of the standard.

State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

at South Long Beach

iADAM

	2019		2020		2021	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Nov 7	30.6	Sep 15	63.7	Nov 20	42.9
Second High:	Nov 12	30.5	Sep 14	59.3	Jan 1	42.8
Third High:	Nov 13	30.3	Oct 27	49.8	Dec 2	42.1
Fourth High:	Jan 28	29.2	Sep 12	49.5	Dec 1	39.4
California:						
First High:	Nov 7	31.2	Sep 15	72.6	Jan 1	51.3
Second High:	Nov 12	30.5	Sep 14	66.5	Nov 20	46.3
Third High:	Nov 13	30.4	Oct 27	61.8	Dec 2	42.1
Fourth High:	Jan 28	30.0	Sep 12	55.9	Dec 1	39.4
National:						
Estimated # Days > 24-Hour Std:		0.0		10.0		4.0
Measured # Days > 24-Hour Std:		0		10		4
24-Hour Standard Design Value:		29		32		32
24-Hour Standard 98th Percentile:		23.2		39.0		32.8
2006 Annual Std Design Value:		10.7		11.0		11.0
2013 Annual Std Design Value:		10.7		11.0		11.0
Annual Average:		9.2		12.2		11.4
California:						
Annual Std Designation Value:		11		12		14
Annual Average:		10.6		12.1		13.8
Year Coverage:		100		100		100

Notes:

Daily PM2.5 averages and related statistics are available at South Long Beach between 2003 and 2021. Some years in this range may not be represented.

All averages expressed in micrograms per cubic meter.

An exceedance of a standard is not necessarily related to a violation of the standard.

State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily 24-Hour PM10 Averages

at Long Beach-2425 Webster Street

iADAM

	2019		2020		2021	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Apr 9	155.8	Feb 3	61.6		*
Second High:	Oct 30	74.3	Jan 28	54.3		*
Third High:	Oct 24	63.9	Feb 27	53.0		*
Fourth High:	May 21	52.4	Jan 4	43.4		*
California:						
First High:	Apr 9	155.4	Feb 3	61.4		*
Second High:	Oct 30	74.1	Jan 28	54.1		*
Third High:	Oct 24	63.7	Feb 27	52.8		*
Fourth High:	May 21	52.2	Jan 4	43.2		*
National:						
Estimated # Days > 24-Hour Std:		6.1		*		*
Measured # Days > 24-Hour Std:		1		0		0
3-Yr Avg Est # Days > 24-Hr Std:		2.0		*		*
Annual Average:		*29.7*		*31.8*		*
3-Year Average:		*32*		*31*		*
California:						
Estimated # Days > 24-Hour Std:		24.4		*		*
Measured # Days > 24-Hour Std:		4		3		0
Annual Average:		29.5		*		*
3-Year Maximum Annual Average:		33		33		*
Year Coverage:		96		33		*

Notes:

Daily PM10 averages and related statistics are available at Long Beach-2425 Webster Street between 2014 and 2020. Some years in this range may not be represented.

All averages expressed in micrograms per cubic meter.

The national annual average PM10 standard was revoked in December 2006 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics* .

An exceedance of a standard is not necessarily related to a violation of the standard.

All values listed above represent midnight-to-midnight 24-hour averages and may be related to an exceptional event.

State and national statistics may differ for the following reasons:

- State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.
- State statistics for 1998 and later are based on local conditions (except for sites in the South Coast Air Basin, where State statistics for 2002 and later are based on local conditions). National statistics are based on standard conditions.
- State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

Measurements are usually collected every six days. Measured days counts the days that a measurement was greater than the level of the standard; Estimated days mathematically estimates how many days concentrations would have been greater than the level of the standard had each day been monitored.

3-Year statistics represent the listed year and the 2 years before the listed year.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily 24-Hour PM10 Averages

at South Long Beach

iADAM

	2019		2020		2021	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Apr 9	72.7	Sep 12	68.3	Jan 16	48.7
Second High:	Oct 30	63.4	Nov 5	59.7	Oct 13	44.6
Third High:	Oct 24	42.9	Dec 23	51.7	Dec 6	42.3
Fourth High:	Oct 12	38.6	Dec 5	45.5	Nov 6	38.8
California:						
First High:	Apr 9	73.8	Sep 12	68.7	Jan 16	49.7
Second High:	Oct 30	65.0	Nov 5	59.9	Oct 13	45.6
Third High:	Oct 24	42.5	Dec 23	53.4	Dec 6	43.8
Fourth High:	Oct 12	38.9	Dec 5	47.5	Nov 6	40.0
National:						
Estimated # Days > 24-Hour Std:		0.0		*		0.0
Measured # Days > 24-Hour Std:		0		0		0
3-Yr Avg Est # Days > 24-Hr Std:		*		*		*
Annual Average:		*21.5*		*26.9*		*23.2*
3-Year Average:		*20*		*24*		*24*
California:						
Estimated # Days > 24-Hour Std:		12.2		*		0.0
Measured # Days > 24-Hour Std:		2		3		0
Annual Average:		21.8		*		23.6
3-Year Maximum Annual Average:		25		25		24
Year Coverage:		100		93		100

Notes:

Daily PM10 averages and related statistics are available at South Long Beach between 2003 and 2021. Some years in this range may not be represented.

All averages expressed in micrograms per cubic meter.

The national annual average PM10 standard was revoked in December 2006 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics* .

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- State statistics for 1998 and later are based on local conditions (except for sites in the South Coast Air Basin, where State statistics for 2002 and later are based on local conditions). National statistics are based on standard conditions.
- State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

Measurements are usually collected every six days. Measured days counts the days that a measurement was greater than the level of the standard; Estimated days mathematically estimates how many days concentrations would have been greater than the level of the standard had each day been monitored.

3-Year statistics represent the listed year and the 2 years before the listed year.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements

at Long Beach-2425 Webster Street

	2019		2020		2021	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:	Nov 4	71.8		*		*
Second High:	Oct 24	71.2		*		*
Third High:	Oct 22	62.9		*		*
Fourth High:	Apr 8	58.7		*		*
California:						
First High:	Oct 24	71		*		*
Second High:	Nov 4	71		*		*
Third High:	Oct 22	62		*		*
Fourth High:	Apr 8	58		*		*
National:						
1-Hour Standard Design Value:		64		*		*
1-Hour Standard 98th Percentile:		55.4		*		*
# Days Above the Standard:		0		0		0
Annual Standard Design Value:		16		*		*
California:						
1-Hour Std Designation Value:		80		*		*
Expected Peak Day Concentration:		84		*		*
# Days Above the Standard:		0		0		0
Annual Std Designation Value:		18		*		*
Annual Average:		16		*		*
Year Coverage:		83		*		*

Notes:

Hourly nitrogen dioxide measurements and related statistics are available at Long Beach-2425 Webster Street between 2010 and 2019. Some years in this range may not be represented.

All concentrations expressed in parts per billion.
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements

at Long Beach-Route 710 Near Road

	2019		2020		2021	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:	Nov 4	97.7	Sep 16	100.1	Oct 4	91.5
Second High:	Oct 24	96.4	Oct 15	99.4	Nov 12	90.3
Third High:	Oct 16	90.8	Sep 30	96.7	Nov 15	86.9
Fourth High:	Oct 25	88.4	Sep 11	91.7	Dec 21	83.4
California:						
First High:	Nov 4	97	Sep 16	100	Oct 4	91
Second High:	Oct 24	96	Oct 15	99	Nov 12	90
Third High:	Oct 16	90	Sep 30	96	Nov 15	86
Fourth High:	Oct 25	88	Sep 11	91	Dec 21	83
National:						
1-Hour Standard Design Value:		80		81		80
1-Hour Standard 98th Percentile:		78.3		86.3		76.0
# Days Above the Standard:		0		0		0
Annual Standard Design Value:		23		23		25
California:						
1-Hour Std Designation Value:		100		100		100
Expected Peak Day Concentration:		102		101		100
# Days Above the Standard:		0		0		0
Annual Std Designation Value:		25		23		25
Annual Average:		22		23		25
Year Coverage:		97		90		94

Notes:

Hourly nitrogen dioxide measurements and related statistics are available at Long Beach-Route 710 Near Road between 2015 and 2021. Some years in this range may not be represented.

All concentrations expressed in parts per billion.
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Top 4 Summary: Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements

at Long Beach-Signal Hill

	2019		2020		2021	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:		*	Oct 15	75.3	Dec 22	59.0
Second High:		*	Nov 4	72.3	Jan 13	58.9
Third High:		*	Oct 13	61.0	Jan 14	58.6
Fourth High:		*	Sep 16	60.3	Nov 15	58.5
California:						
First High:		*	Oct 15	75	Dec 22	59
Second High:		*	Nov 4	72	Jan 13	58
Third High:		*	Oct 13	61	Jan 14	58
Fourth High:		*	Sep 16	60	Jan 16	58
National:						
1-Hour Standard Design Value:		*		*		*
1-Hour Standard 98th Percentile:		*		56.3		55.3
# Days Above the Standard:		0		0		0
Annual Standard Design Value:		*		13		13
California:						
1-Hour Std Designation Value:		*		70		70
Expected Peak Day Concentration:		*		73		71
# Days Above the Standard:		0		0		0
Annual Std Designation Value:		*		12		12
Annual Average:		*		12		12
Year Coverage:		*		95		94

Notes:

Hourly nitrogen dioxide measurements and related statistics are available at Long Beach-Signal Hill between 2020 and 2021. Some years in this range may not be represented.

All concentrations expressed in parts per billion.
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Welcome to California

Air Resources Board

View a Different Site
View a Different Substance

Annual Toxics Summary

Los Angeles-North Main Street

Lead

nanograms per cubic meter

iADAM

FAQs

Read About Estimated Risk

Year	Months Present	Minimum	Median	Mean	90th Percentile	Maximum	Standard Deviation	Number of Observations	Detection Limit	Estimated Risk
2020	----------	2.4	*	*	*	8.6	2.09	7	1.3	*
2019	----------	0.65	7.2	*	11.2	20.5	4.41	29	1.3	*
2018	----------	3.0	6.8	7.89	11.4	26.4	4.65	28	1.3	0.3
2017	----------	1.4	6.4	*	11.6	20.2	4.04	27	1.3	*
2016	----------	1.7	5.6	7.15	15.7	24.9	5.69	31	1.3	0.2
2015	----------	0.65	4.5	5.41	8.2	19.3	3.50	30	1.3	0.2
2014	----------	0.85	5.9	6.73	10.4	25	4.96	29	1.7	0.2
2013	----------	1.7	5.9	*	10.7	19	4.06	24	1.0	*
2012	----------	2.6	8.1	*	11.2	30	5.71	20	1.5	*
2011	----------	3.3	10.1	*	14.9	15	3.93	12	1.5	*
2010	----------	3.3	7.8	*	130	220	69.2	12	1.5	*
2009	----------	0.75	10	12.2	23	32	7.00	30	1.5	0.4
2008	----------	*	*	*	*	*	*	0	*	*
2007	----------	3.9	12	*	26.5	43	10.1	18	1.5	*
2006	----------	*	*	*	*	*	*	0	*	*
2005	----------	*	*	*	*	*	*	0	*	*
2004	----------	*	*	*	*	*	*	0	*	*
2003	----------	7.0	*	*	*	34	9.88	5	3.0	*
2002	----------	7.0	19	22.2	35.4	48	10.3	29	3.0	0.8
2001	----------	2	19	*	32.8	48	11.4	22	4.0	*
2000	----------	2	18	18.5	30	52	11.6	31	4.0	0.6
1999	----------	5.0	20	31.1	33	570	101	30	4.0	1
1998	----------	2	19	*	30.5	45	9.97	26	4.0	*
1997	----------	2	22	*	43.2	59	15.0	17	4.0	*
1996	----------	5.0	32	35.3	66.2	97	22.3	29	4.0	1
1995	----------	2	29	34.3	64	77	21.2	28	4.0	1
1994	----------	2	38.5	55.5	93.7	310	59.8	28	4.0	2
1993	----------	14	36	*	83.4	250	48.8	23	4.0	*
1992	----------	2	59	*	120	170	39.5	21	4.0	*
1991	----------	17	68.5	80.5	140	190	44.1	28	4.0	3
1990	----------	23	67	*	120	170	37.4	28	1.0	*
1989	----------	*	*	*	*	*	*	0	*	*

Graph It!

Toxics Statistics Home

Notes: Values below the Limit of Detection (LoD) assumed to be ½ LoD.
Means and risks shown only for years with data in all 12 months.
"*" means there was insufficient or no data available to determine the value.

Data Descriptions Page

APPENDIX B. PROJECT EMISSION CALCULATIONS

Baseline Emissions

Source	Emissions (lbs/year)						Emissions (tons/year)						Emissions (lbs/day)					
	ROG	NOx	CO	SOx	PM10	PM2.5	ROG	NOx	CO	SOx	PM10	PM2.5	ROG	NOx	CO	SOx	PM10	PM2.5
Site 1	838.2	-	-	-	-	-	0.42	-	-	-	-	-	2.30	-	-	-	-	-
Site 2	5,709.3	8,961.4	5,498.7	374.8	3,073.2	-	2.85	4.48	2.75	0.19	1.54	-	15.64	24.55	15.06	1.03	8.42	-
Site 3	1,607.3	-	-	-	-	-	0.80	-	-	-	-	-	4.40	-	-	-	-	-
Site 4	1,826.1	-	-	-	-	-	0.91	-	-	-	-	-	5.00	-	-	-	-	-
Site 5	3,907.4	-	-	-	-	-	1.95	-	-	-	-	-	10.71	-	-	-	-	-
Site 6	25.6	-	-	-	-	-	0.01	-	-	-	-	-	0.07	-	-	-	-	-
Site 7	68.8	-	-	-	-	-	0.03	-	-	-	-	-	0.19	-	-	-	-	-
Mobile Sources	13.8	67.7	78.2	0.36	10.9	10.4	0.01	0.03	0.04	0.00	0.01	0.01	0.04	0.19	0.21	0.00	0.03	0.03
Total	**13,996.60**	**9,029.13**	**5,576.86**	**375.15**	**3,084.12**	**10.45**	**7.00**	**4.51**	**2.79**	**0.19**	**1.54**	**0.01**	**38.35**	**24.74**	**15.28**	**1.03**	**8.45**	**0.03**

Project Emissions

Construction Emissions

Source	Emissions (lbs/year)						Emissions (tons/year)						Emissions (lbs/day)					
	ROG	NOx	CO	SOx	PM10	PM2.5	ROG	NOx	CO	SOx	PM10	PM2.5	ROG	NOx	CO	SOx	PM10	PM2.5
LTS Construction	19.3	162.3	124.7	0.52	5.80	5.64	0.01	0.08	0.06	0.00	0.00	0.00	0.16	1.35	1.04	0.004	0.05	0.05
Well Cellar Construction	0.53	5.47	7.83	0.01	0.27	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.78	1.12	0.002	0.04	0.04
Total	**19.79**	**167.75**	**132.54**	**0.53**	**6.07**	**5.89**	**0.01**	**0.08**	**0.07**	**0.00**	**0.00**	**0.00**	**0.24**	**2.13**	**2.16**	**0.006**	**0.09**	**0.08**

Operational Emissions

Source	Emissions (lbs/year)						Emissions (tons/year)						Emissions (lbs/day)					
	ROG	NOx	CO	SOx	PM10	PM2.5	ROG	NOx	CO	SOx	PM10	PM2.5	ROG	NOx	CO	SOx	PM10	PM2.5
LTS Components	625.2	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	1.71	0.00	0.00	0.00	0.00	0.00
Redrilling	52.7	578.6	1,002.9	0.00	5.79	5.79	0.03	0.29	0.50	0.00	0.00	0.00	0.14	1.59	2.75	0.00	0.02	0.02
Drilling	43.9	482.2	835.7	0.00	4.82	4.82	0.02	0.24	0.42	0.00	0.00	0.00	0.12	1.32	2.29	0.00	0.01	0.01
New Well Cellar	637.2	-	-	-	-	-	0.32	-	-	-	-	-	1.75	-	-	-	-	-
New Well Heads	32.2	-	-	-	-	-	0.02	-	-	-	-	-	0.09	-	-	-	-	-
Total	**1,391.26**	**1,060.73**	**1,838.60**	**0.01**	**10.61**	**10.61**	**0.70**	**0.53**	**0.92**	**0.00**	**0.01**	**0.01**	**3.81**	**2.91**	**5.04**	**0.00**	**0.03**	**0.03**

Site 1

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	66.36	0.16	0.00	0.02	0.07	2.11
Well Cellar	769.07	2.08	-	-	-	-
Well Head	2.80	0.00756	-	-	-	-

Site 2

Average Emissions (lbs/year)[1]

Pollutant	CAS	Gas Turbine	Tank T-1	Tank T-2	Tank T-3	Tank T-4	Tank T-5	Tank T-6	Tank T-7	Tank T-10	R219 Diesel Ice	R219 Gasoline Ice	NGL Truck Loading	Oil Water Separation Basin	Solvent Usage
VOC		1,292.4254	212.1913	212.5801	56.5936	51.9128	70.3858	70.3858	176.8071	267.2060	60.0958	174.2594	7.4483	51.3722	245.5815
NOx		8,123.5620	-	-	-	-	-	-	-	-	751.5987	86.2838	-	-	-
SOx		369.9694	-	-	-	-	-	-	-	-	0.3365	4.4834	-	-	-
CO		2,002.3090	-	-	-	-	-	-	-	-	163.4607	3,332.9256	-	-	-
PM		3,014.0153	-	-	-	-	-	-	-	-	53.6856	5.4985	-	-	-
Benzene	71432	78.4335	0.5794	0.5804	0.1542	0.1415	0.1922	0.1922	0.4828	0.1130	0.2986	3.2196	0.9753	0.1690	-
Ethyl Benzene	100414	-	0.0104	0.0105	0.0024	0.0025	0.0035	0.0035	0.0091	0.0020	0.0174	1.0246			-
Toluene	108883	-	0.1122	0.1128	0.0275	0.0284	0.0385	0.0385	0.0971	0.0227	0.1683	4.6379			-
Hexane	110543	-	0.0146	0.0147	0.0035	0.0036	0.0049	0.0049	0.0127	0.0029	0.0430	0.8948			-
Xylenes	1330207	-	0.0418	0.0418	0.0101	0.0106	0.0143	0.0143	0.0360	0.0084	0.0677	-			-
Naphthalene	91203	-	0.0003	0.0003	0.0001	0.0001	0.0001	0.0001	0.0003	0.0001	0.0209	0.1076	-	-	-
1,2,4-Trimethyl Benzene	95636	-	0.0026	0.0026	0.0005	0.0006	0.0008	0.0008	0.0022	0.0005	-	0.8606		-	-
Formaldehyde	50000	576.6584	-	-	-	-	-	-	-	-	2.7662	2.9201	-	-	-
PAHs	1151	6.9061	-	-	-	-	-	-	-	-	0.0580	-	-	-	-
Ammonia	7664417	4,488.9612	-	-	-	-	-	-	-	-	1.2944	-	-	-	-
1,3-Butadiene	106990	-	-	-	-	-	-	-	-	-	0.3484	0.7768	-	-	-
Acrolein	107028	-	-	-	-	-	-	-	-	-	0.0541	0.1229	-	-	-
Chromium (VI)	18540299	-	-	-	-	-	-	-	-	-	0.0002	-	-	-	-
Lead	7439921	-	-	-	-	-	-	-	-	-	0.0133	-	-	-	-
Manganese	7439965	-	-	-	-	-	-	-	-	-	0.0049	0.0020	-	-	-
Mercury	7439976	-	-	-	-	-	-	-	-	-	0.0032	-	-	-	-
Nickel	7440020	-	-	-	-	-	-	-	-	-	0.0062	0.0027	-	-	-
Arsenic	7440382	-	-	-	-	-	-	-	-	-	0.0026	-	-	-	-
Cadmium	7440439	-	-	-	-	-	-	-	-	-	0.0024	-	-	-	-
Copper	7440508	-	-	-	-	-	-	-	-	-	0.0065	0.0020	-	-	-
Acetaldehyde	75070	-	-	-	-	-	-	-	-	-	1.2507	0.5123	-	-	-
Hydrochloric Acid	7647010	-	-	-	-	-	-	-	-	-	0.2975	-	-	-	-
Selenium	7782492	-	-	-	-	-	-	-	-	-	0.0023	-	-	-	-

1. Average annual emissions based on the emissions reported to South Coast AQMD's AER portal from 2017-2021.

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	1,856.16	4.47	0.13	0.51	2.03	58.71
Well Cellar	898.28	2.42	-	-	-	-
Well Head	5.60	0.01512	-	-	-	-

Site 3

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	115.60	0.28	0.01	0.03	0.13	3.69
Well Cellar	1,486.80	4.01	-	-	-	-
Well Head	4.90	0.01323	-	-	-	-

Site 4

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	92.99	0.22	0.01	0.03	0.10	3.02
Well Cellar	1,727.52	4.66	-	-	-	-
Well Head	5.60	0.01512	-	-	-	-

Site 5

Average Emissions (lbs/year)[1]

Pollutant	CAS	Clean Brine	Crude Storage Tank	Distillate Fuel Oil No. 2 Tank	Raw Blend Tank	Raw Brine Tank	Skim Tank	Solvents	Underground Sludge Tank
VOC		68.8237	286.2827	1.1019	79.0023	44.4310	63.6193	204.0060	778.9032
Benzene	71432	0.2327	0.9686	-	0.2671	0.1500	0.2150	-	2.0960
Ethyl Benzene	100414	0.0079	0.0345	-	0.0091	0.0050	0.0073	-	-
Toluene	108883	0.0277	0.1198	-	0.0318	0.0178	0.0256	-	-
Hexane	110543	0.0074	0.0323	-	0.0086	0.0048	0.0069	-	-
Xylenes	1330207	-	-	-	-	-	-	-	-
Naphthalene	91203	0.0003	0.0011	-	0.0003	0.0002	0.0002	-	-
1,2,4-Trimethyl Benzene	95636	0.0015	0.0069	-	0.0018	0.0010	0.0014	-	-
m-Xylene	108383	0.0241	0.1041	-	-	0.0277	0.0154	0.0222	-

1. Average annual emissions based on the emissions reported to South Coast AQMD's AER portal from 2017-2021.

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	649.53	0.74	0.02	0.09	0.19	48.22
Well Cellar	1,727.52	4.66	-	-	-	-
Well Head	4.20	0.01134	-	-	-	-

Site 6

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	24.20	0.06	0.00	0.01	0.03	0.77
Well Cellar	0.00	0.00	-	-	-	-
Well Head	1.40	0.00378	-	-	-	-

Site 7

Other Process Emissions

Category	Total Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fugitive Components	11.47	0.03	0.00	0.00	0.01	0.36
Well Cellar	56.64	0.15	-	-	-	-
Well Head	0.70	0.00189	-	-	-	-

Mobile Sources

Truck Emissions

Truck Type	Emission (lbs/year)					
	ROG	NOx	CO	SOx	PM10	PM2.5
Light Duty Truck	13.79	62.35	77.82	0.29	10.85	10.38
Heavy Duty Truck	0.06	5.33	0.35	0.07	0.07	0.06

Total Project Emissions

Activity	Emission (lbs/year)					
	ROG	NOx	CO	SOx	PM10	PM2.5
LTS Construction	19.3	162.3	124.7	0.52	5.80	5.64
LTS Components	625.2					
Well Cellar Construction	0.532	5.47	7.83	0.01	0.27	0.25
Redrilling	52.7	578.6	1002.9	0.00	5.79	5.79
New Well Drilling	43.9	482.2	835.7	0.00	4.82	4.82
New Well Cellar	637.2					
New Well Heads	32.2					

Construction Emissions

LTS Construction

Off-Road Equipment Emissions

Equipment	Emission (lbs/year)					
	ROG	NOx	CO	SOx	PM10	PM2.5
Backhoe	0.76	7.68	11.16	0.02	0.38	0.35
Dump Truck	2.02	14.27	13.15	0.05	0.52	0.47
Water Truck	2.52	17.84	16.44	0.07	0.65	0.59
Crane Truck	4.56	49.60	23.85	0.08	2.07	1.90
Welder	4.58	30.20	25.57	0.05	0.99	0.99
Concrete/Pavement Saw	0.67	5.17	7.31	0.01	0.03	0.26
Redi-Mix Concrete Truck	4.03	28.54	26.31	0.11	1.03	0.95
Total	**19.13**	**153.31**	**123.79**	**0.38**	**5.67**	**5.52**

On-Road Vehicle Emissions

Equipment	Emission (lbs/year)					
	ROG	NOx	CO	SOx	PM10	PM2.5
Heavy Duty Trucks (Equipment/Deliveries)	0.01	1.23	0.08	0.02	0.02	0.01
Construction/Gear Trucks	0.04	0.11	0.34	0.01	0.01	0.01
Redi-Mix Concrete Truck	0.07	7.64	0.50	0.12	0.10	0.10
Total	**0.12**	**8.98**	**0.92**	**0.14**	**0.13**	**0.13**

Well Cellar Construction

	Emission (lbs/year)					
	ROG	NOx	CO	SOx	PM10	PM2.5
Construction Emissions	0.53	5.47	7.83	0.01	0.27	0.25

Operational Emissions

Activity	Emission (lbs/year)					
	ROG	NOx	CO	SOx	PM10	PM2.5
LTS Components	625.24					
Redrilling	52.70	578.58	1002.87	0.00	5.79	5.79
New Well Drilling	43.92	482.15	835.73	0.00	4.82	4.82
New Well Cellar	637.2					
New Well Heads	32.2					

Baseline

CARB Reported GHG Emissions[1]

Year	Total CO2e
2016	28,084
2017	30,153
2018	31,084
2019	32,561
2020	41,756

1. GHG emissions for all of SHP operations as reported through CARB MRR GHG reporting.

Mobile Sources

Source	Emissions (MT/year)			
	CO2	CH4	N2O	CO2e
Employee Truck Trips	13.81	0.000	0.002	14.46
Heavy Duty Trucks	3.35	0.000	0.001	3.50
Total	**17.15**	**0.000**	**0.003**	**17.97**

Project

Construction Emissions

Source	Emissions (MT/year)			
	CO2	CH4	N2O	CO2e
LTS Construction Equipment	16.08	4.70E-03	0.000	16.20
LTS On-Road Equipment	6.68	2.57E-06	0.001	6.99
Well Cellar Construction Equipment	0.48	1.55E-04	0.000	0.48
Well Cellar On-Road Equipment	0.07	5.95E-08	0.000	0.07
Total Construction Emissions	**23.31**	**0.005**	**0.001**	**23.75**

Operations Emissions

Source		Emissions (MT/year)			
	MWh	CO2	CH4	N2O	CO2e
Redrilling		81.2	0.03	-	81.8
New Drilling		67.7	0.02	-	68.2
New Well Heads/Components		0.00	0.09	-	2.26
Annual Electricity Usage	6,416.9	1,016	0.10	0.012	1,022
Total Operational Emissions		**1,165**	**0.23**	**0.012**	**1,174**

1. Emission factors are based on year 2022 for SCE published in CalEEMod version 2022.1 User Guide Appendix G, Default Data Tables.

Toxic Air Contaminants

Toxics Emissions

Baseline Emissions

Site 1

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA1	1	Fugitive Components	Benzene	71432	0.16	1.81E-05
			Ethyl Benzene	100414	0.00	5.49E-07
			m-Xylene	108383	0.02	2.09E-06
			Toluene	108883	0.07	8.30E-06
			Hexane	110543	2.11	2.41E-04
S1WC	74	Well Cellar	Benzene	71432	2.08	2.37E-04
S1A58	15	Site 1 A-58	Benzene	71432	0.00	4.32E-07
S1A57	14	Site 1 A-57	Benzene	71432	0.00	4.32E-07

Site 2

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA2	2	Fugitive Components	Benzene	71432	4.47	5.10E-04
			Ethyl Benzene	100414	0.13	1.53E-05
			m-Xylene	108383	0.51	5.82E-05
			Toluene	108883	2.03	2.31E-04
			Hexane	110543	58.71	6.70E-03
		General Site Emissions	Benzene	71432	4.66	5.32E-04
			Ethyl Benzene	100414	1.04	1.19E-04
			Toluene	108883	4.81	5.49E-04
			Hexane	110543	0.94	1.07E-04
			Xylenes	1330207	0.07	7.73E-06
			Naphthalene	91203	0.13	1.47E-05
			1,2,4-Trimethyl Benzene	95636	0.86	9.82E-05
			Formaldehyde	50000	5.69	6.49E-04
			PAHs	1151	0.06	6.62E-06
			Ammonia	7664417	1.29	1.48E-04
			1,3-Butadiene	106990	1.13	1.28E-04
			Acrolein	107028	0.18	2.02E-05
			Chromium (VI)	18540299	0.00	1.83E-08
			Lead	7439921	0.01	1.52E-06
			Manganese	7439965	0.01	7.94E-07
			Mercury	7439976	0.00	3.65E-07
			Nickel	7440020	0.01	1.03E-06
			Arsenic	7440382	0.00	2.93E-07
			Cadmium	7440439	0.00	2.74E-07
			Copper	7440508	0.01	9.76E-07
			Acetaldehyde	75070	1.76	2.01E-04
			Hydrochloric Acid	7647010	0.30	3.40E-05
			Selenium	7782492	0.00	2.65E-07

Site 2

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
S2T2	29	Tank 2	Benzene	71432	0.58	6.63E-05
			Ethyl Benzene	100414	0.01	1.20E-06
			Toluene	108883	0.11	1.29E-05
			Hexane	110543	0.01	1.68E-06
			Xylenes	1330207	0.04	4.78E-06
			Naphthalene	91203	0.00	3.76E-08
			1,2,4-Trimethyl Benzene	95636	0.00	2.92E-07
S2T3	30	Tank 3	Benzene	71432	0.15	1.76E-05
			Ethyl Benzene	100414	0.00	2.79E-07
			Toluene	108883	0.03	3.14E-06
			Hexane	110543	0.00	3.97E-07
			Xylenes	1330207	0.01	1.15E-06
			Naphthalene	91203	0.00	1.00E-08
			1,2,4-Trimethyl Benzene	95636	0.00	5.48E-08
S2T1	27	Tank 1	Benzene	71432	0.58	6.61E-05
			Ethyl Benzene	100414	0.01	1.19E-06
			Toluene	108883	0.11	1.28E-05
			Hexane	110543	0.01	1.67E-06
			Xylenes	1330207	0.04	4.77E-06
			Naphthalene	91203	0.00	3.76E-08
			1,2,4-Trimethyl Benzene	95636	0.00	2.92E-07
S2T4	31	Tank 4	Benzene	71432	0.14	1.62E-05
			Ethyl Benzene	100414	0.00	2.88E-07
			Toluene	108883	0.03	3.25E-06
			Hexane	110543	0.00	4.11E-07
			Xylenes	1330207	0.01	1.21E-06
			Naphthalene	91203	0.00	9.08E-09
			1,2,4-Trimethyl Benzene	95636	0.00	6.85E-08
S2T5	32	Tank 5	Benzene	71432	0.19	2.19E-05
			Ethyl Benzene	100414	0.00	3.97E-07
			Toluene	108883	0.04	4.40E-06
			Hexane	110543	0.00	5.62E-07
			Xylenes	1330207	0.01	1.63E-06
			Naphthalene	91203	0.00	1.23E-08
			1,2,4-Trimethyl Benzene	95636	0.00	9.59E-08
S2T6	33	Tank 6	Benzene	71432	0.19	2.19E-05
			Ethyl Benzene	100414	0.00	3.97E-07
			Toluene	108883	0.04	4.40E-06
			Hexane	110543	0.00	5.62E-07
			Xylenes	1330207	0.01	1.63E-06
			Naphthalene	91203	0.00	1.23E-08
			1,2,4-Trimethyl Benzene	95636	0.00	9.59E-08

Site 2

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
S2T7	34	Tank 7	Benzene	71432	0.48	5.51E-05
			Ethyl Benzene	100414	0.01	1.04E-06
			Toluene	108883	0.10	1.11E-05
			Hexane	110543	0.01	1.45E-06
			Xylenes	1330207	0.04	4.11E-06
			Naphthalene	91203	0.00	3.09E-08
			1,2,4-Trimethyl Benzene	95636	0.00	2.47E-07
S2T10	28	Tank 10	Benzene	71432	0.11	1.29E-05
			Ethyl Benzene	100414	0.00	2.33E-07
			Toluene	108883	0.02	2.59E-06
			Hexane	110543	0.00	3.29E-07
			Xylenes	1330207	0.01	9.59E-07
			Naphthalene	91203	0.00	7.25E-09
			1,2,4-Trimethyl Benzene	95636	0.00	5.48E-08
S2TG23	37	Turbine Generator	Benzene	71432	78.43	8.95E-03
			Formaldehyde	50000	576.66	6.58E-02
			PAHs	1151	6.91	7.88E-04
			Ammonia	7664417	4,488.96	5.12E-01
S2WC	76	Site 2 Well Cellar	Benzene	71432	2.42	2.77E-04
S2BW9	25	Site 2 BW-9	Benzene	71432	0.00	4.32E-07
S2BW6	24	Site 2 BW-6	Benzene	71432	0.00	4.32E-07
S2BW3	23	Site 2 BW-3	Benzene	71432	0.00	4.32E-07
S2B71	19	Site 2 B-71	Benzene	71432	0.00	4.32E-07

Site 3

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA3	3	Fugitive Components	Benzene	71432	0.28	3.15E-05
			Ethyl Benzene	100414	0.01	9.55E-07
			m-Xylene	108383	0.03	3.63E-06
			Toluene	108883	0.13	1.44E-05
			Hexane	110543	3.69	4.21E-04
S3WC	78	Site 3 Well Cellar	Benzene	71432	4.01	4.58E-04
S3DW1	41	Site 3 DW-1	Benzene	71432	0.00	5.03E-07
S3D77	38	Site 3 D-77	Benzene	71432	0.00	5.03E-07
S3DW7	42	Site 3 DW-7	Benzene	71432	0.00	5.03E-07

Site 4

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA4	4	Fugitive Components	Benzene	71432	0.22	2.52E-05
			Ethyl Benzene	100414	0.01	7.61E-07
			m-Xylene	108383	0.03	2.89E-06
			Toluene	108883	0.10	1.15E-05
			Hexane	110543	3.02	3.45E-04
S4WC	80	Site 4 Well Cellar	Benzene	71432	4.66	5.32E-04
S42316	44	Site 4 23-16	Benzene	71432	0.00	2.16E-07
S4236	50	Site 4 23-6	Benzene	71432	0.00	2.16E-07
S43210	51	Site 4 23-10	Benzene	71432	0.00	2.16E-07
S42326	49	Site 4 23-26	Benzene	71432	0.00	2.16E-07
S42321	46	Site 4 23-21	Benzene	71432	0.00	2.16E-07
S42320	45	Site 4 23-20	Benzene	71432	0.00	2.16E-07
S42324	47	Site 4 23-24	Benzene	71432	0.00	2.16E-07
S42325	48	Site 4 23-25	Benzene	71432	0.00	2.16E-07

Site 5

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA5	5	Fugitive Components	Benzene	71432	0.74	8.48E-05
			Ethyl Benzene	100414	0.02	2.09E-06
			m-Xylene	108383	0.09	9.72E-06
			Toluene	108883	0.19	2.12E-05
			Hexane	110543	48.22	5.51E-03
		General Site Emissions	Benzene	71432	3.93	4.49E-04
			Ethyl Benzene	100414	0.06	7.29E-06
			Toluene	108883	0.22	2.54E-05
			Hexane	110543	0.06	6.84E-06
			Xylenes	1330207	0.00	0.00E+00
			Naphthalene	91203	0.00	2.40E-07
			1,2,4-Trimethyl Benzene	95636	0.01	1.43E-06
			m-Xylene	108383	0.19	2.21E-05
S5WC	83	Site 5 Well Cellar	Benzene	71432	4.66	5.32E-04
S5T1	58	Tank 1 Crude Oil	Benzene	71432	0.48	5.53E-05
			Ethyl Benzene	100414	0.02	1.97E-06
			Toluene	108883	0.06	6.84E-06
			Hexane	110543	0.02	1.84E-06
			Naphthalene	91203	0.00	6.39E-08
			1,2,4-Trimethyl Benzene	95636	0.00	3.93E-07
			m-Xylene	108383	0.05	5.94E-06
S5T2	62	Tank 2 Crude Oil	Benzene	71432	0.48	5.53E-05
			Ethyl Benzene	100414	0.02	1.97E-06
			Toluene	108883	0.06	6.84E-06
			Hexane	110543	0.02	1.84E-06
			Naphthalene	91203	0.00	6.39E-08
			1,2,4-Trimethyl Benzene	95636	0.00	3.93E-07
			m-Xylene	108383	0.05	5.94E-06

Site 5

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
S5T4	64	Tank 4 Raw Blend Tank	Benzene	71432	0.27	3.05E-05
			Ethyl Benzene	100414	0.01	1.04E-06
			Toluene	108883	0.03	3.63E-06
			Hexane	110543	0.01	9.77E-07
			Naphthalene	91203	0.00	3.09E-08
			1,2,4-Trimethyl Benzene	95636	0.00	2.01E-07
S5T5	65	Tank 5 Brine Tank	Benzene	71432	0.15	1.71E-05
			Ethyl Benzene	100414	0.01	5.75E-07
			Toluene	108883	0.02	2.04E-06
			Hexane	110543	0.00	5.48E-07
			Naphthalene	91203	0.00	2.28E-08
			1,2,4-Trimethyl Benzene	95636	0.00	1.10E-07
			m-Xylene	108383	0.03	3.16E-06
S5T6	66	Tank 6 Skim Tank	Benzene	71432	0.21	2.45E-05
			Ethyl Benzene	100414	0.01	8.31E-07
			Toluene	108883	0.03	2.92E-06
			Hexane	110543	0.01	7.85E-07
			Naphthalene	91203	0.00	2.74E-08
			1,2,4-Trimethyl Benzene	95636	0.00	1.64E-07
			m-Xylene	108383	0.02	1.76E-06
S5T7	67	Tank 7 Clean Brine Tank	Benzene	71432	0.23	2.66E-05
			Ethyl Benzene	100414	0.01	9.04E-07
			Toluene	108883	0.03	3.16E-06
			Hexane	110543	0.01	8.49E-07
			Naphthalene	91203	0.00	3.09E-08
			1,2,4-Trimethyl Benzene	95636	0.00	1.74E-07
			m-Xylene	108383	0.02	2.75E-06
S52711	53	Site 5 27-11	Benzene	71432	0.01	1.29E-06

Site 6

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA6	6	Fugitive Components	Benzene	71432	0.06	6.65E-06
			Ethyl Benzene	100414	0.00	2.00E-07
			m-Xylene	108383	0.01	7.61E-07
			Toluene	108883	0.03	3.03E-06
			Hexane	110543	0.77	8.74E-05
S6WC	85	Site 6 Well Cellar	Benzene	71432	0.00	0.00E+00
S647	70	Site 6 47	Benzene	71432	0.002	2.16E-07
S648	71	Site 6 48	Benzene	71432	0.002	2.16E-07

Site 7

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
AREA7	7	Fugitive Components	Benzene	71432	0.03	3.16E-06
			Ethyl Benzene	100414	0.00	9.49E-08
			m-Xylene	108383	0.00	3.61E-07
			Toluene	108883	0.01	1.44E-06
			Hexane	110543	0.36	4.12E-05
S7WC	87	Site 7 Well Cellar	Benzene	71432	0.15	1.75E-05
S744	72	Site 7 44	Benzene	71432	0.00	2.16E-07

Vehicle Emissions

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions[1] (lb/year)	Emissions (lb/hr)
RDS1S2	8	Road between Sites 1 & 2	Diesel Particulate Matter	9901	2.18	0.0017
RDS2S3	9	Road between sites 2 & 3			2.18	0.0017
RDS3S4	10	Road between Sites 3 & 4			2.18	0.0017
RDS4S5	11	Road between Sites 4 & 5			2.18	0.0017
RDS567	12	Road between Sites 5/6/7			2.18	0.0017

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

Project Emissions

Construction Emissions

LTS Construction Off-Road Equipment

AERMOD Source ID	AERMOD Source Group #	Emission Source	Exposure Duration[1] (years)	PM10 Emissions[2] (lb/year)
S2LTS	88	Construction Off-Road Equipment	0.5	5.80

1. LTS construction is expected to take 4 months. The shortest exposure duration is 0.5 years (6 months), which is a conservative exposure duration.

2. Conservatively assuming all PM10 emissions are diesel particulate matter emissions.

LTS Construction Onroad Vehicle Emissions

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions[1] (lb/year)
RDS1S2	8	Road between Sites 1 & 2	Diesel Particulate Matter	9901	0.07
RDS2S3	9	Road between sites 2 & 3			0.07

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

Well Cellar Construction

Site	AERMOD Source ID	AERMOD Source Group #	Exposure Duration (years)	PM10 Emissions[1] (lb/year)
1	S1WC	74	2	0.27
2	S2WC	76	1	0.19
3	S3WC	78	1	0.19
4	S4WC	80	1	0.19
5	S5WC	83	1	0.19
6	S6WC	85	1	0.08
7	S7WC	87	1	0.08

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

Well Cellar Construction Onroad Vehicle Emissions

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Exposure Duration	Emissions[1,2] (lb/year)
RDS1S2	8	Road between Sites 1 & 2	Diesel Particulate Matter	9901	2	0.002
RDS2S3	9	Road between sites 2 & 3			1	0.002
RDS3S4	10	Road between Sites 3 & 4			1	0.002
RDS4S5	11	Road between Sites 4 & 5			1	0.002
RDS567	12	Road between Sites 5/6/7			1	0.002

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

2. Conservatively assuming that all onroad truck emissions from well cellar construction (provided in the "Construction" tab) occurs for each site.

Operational Emissions

New Fugitives

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
S2LTS	88	Site 2 New LTS Components	Benzene	71432	1.506	0.0002
			Ethyl Benzene	100414	0.045	0.0000
			m-Xylene	108383	0.171	0.0000
			Toluene	108883	0.680	0.0001
			Hexane	110543	19.948	0.0023

New Drilling

AERMOD Source ID	AERMOD Source Group #	Emission Source	Pollutant	CAS	Exposure Duration (years)	Emissions (lb/year)	Emissions (lb/hr)
S1DR	73	Site 1 Drilling	Diesel Particulate Matter	9901	2	4.82	0.0149
S2DR	75	Site 2 Drilling	Diesel Particulate Matter	9901	2	4.82	0.0149
S3DR	77	Site 3 Drilling	Diesel Particulate Matter	9901	3	4.82	0.0149
S4DR	79	Site 4 Drilling	Diesel Particulate Matter	9901	3	4.82	0.0149
S5DR	82	Site 5 Drilling	Diesel Particulate Matter	9901	3	4.82	0.0149
S6DR	84	Site 6 Drilling	Diesel Particulate Matter	9901	1	1.93	0.0149
S7DR	86	Site 7 Drilling	Diesel Particulate Matter	9901	1	1.93	0.0149

Redrilling

Source ID	Source Group #	Source	Pollutant	CAS	Exposure Duration (years)	Emissions (lb/year)	Emissions (lb/hr)
S1DR	73	Site 1 Redrilling	Diesel Particulate Matter	9901	2	5.79	0.0149
S2DR	75	Site 2 Redrilling	Diesel Particulate Matter	9901	3	5.79	0.0149
S3DR	77	Site 3 Redrilling	Diesel Particulate Matter	9901	2	5.79	0.0149
S4DR	79	Site 4 Redrilling	Diesel Particulate Matter	9901	2	5.79	0.0149
S5DR	82	Site 5 Redrilling	Diesel Particulate Matter	9901	2	5.79	0.0149
S6DR	84	Site 6 Redrilling	Diesel Particulate Matter	9901	1	1.93	0.0149
S7DR	86	Site 7 Redrilling	Diesel Particulate Matter	9901	1	0.96	0.0149

New Well Emissions

AERMOD Source Group #	AERMOD Source ID	Site	Emission Source	Pollutant	CAS	Emissions (lb/year)	Emissions (lb/hr)
S1A58	15	Site 1 A-58	New Well Heads	Benzene	71432	0.00945	1.08E-06
S1A57	14	Site 1 A-57				0.00945	1.08E-06
S1WC	74	Site 1	New Well Cellar	Benzene	71432	0.86	9.82E-05
S2BW9	25	Site 2 BW-9	New Well Heads	Benzene	71432	0.00473	5.39E-07
S2BW6	24	Site 2 BW-6				0.00473	5.39E-07
S2BW3	23	Site 2 BW-3				0.00473	5.39E-07
S2B71	19	Site 2 B-71				0.00473	5.39E-07
S2WC	76	Site 2	New Well Cellar	Benzene	71432	0.43	4.91E-05
S3DW1	41	Site 3 DW-1	New Well Heads	Benzene	71432	0.00945	1.08E-06
S3D77	38	Site 3 D-77				0.00945	1.08E-06
S3DW7	42	Site 3 DW-7				0.00945	1.08E-06
S3WC	78	Site 3	New Well Cellar	Benzene	71432	0.43	4.91E-05
S42316	44	Site 4 23-16	New Well Heads	Benzene	71432	0.00354	4.05E-07
S4236	50	Site 4 23-6				0.00354	4.05E-07
S43210	51	Site 4 23-10				0.00354	4.05E-07
S42326	49	Site 4 23-26				0.00354	4.05E-07
S42321	46	Site 4 23-21				0.00354	4.05E-07
S42320	45	Site 4 23-20				0.00354	4.05E-07
S42324	47	Site 4 23-24				0.00354	4.05E-07
S42325	48	Site 4 23-25				0.00354	4.05E-07
S4WC	80	Site 4	New Well Cellar	Benzene	71432	0.43	4.91E-05
S52711	53	Site 5 27-11	New Well Heads	Benzene	71432	0.02835	3.24E-06
S5WC	83	Site 5	New Well Cellar	Benzene	71432	0.43	4.91E-05
S647	70	Site 6 47	New Well Heads	Benzene	71432	0.00189	2.16E-07
S648	71	Site 6 48				0.00189	2.16E-07
S6WC	85	Site 6	New Well Cellar	Benzene	71432	0.17	1.96E-05
S744	72	Site 7 44	New Well Heads	Benzene	71432	0.00378	4.32E-07
S7WC	87	Site 7	New Well Cellar	Benzene	71432	0.17	1.96E-05

Toxics Emissions Summary

HRA Results

Baseline

Cancer Health Risk

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	4.42 in a million	0.74 in a million
Threshold	10 in a million	10 in a million
Exceeds Threshold?	**No**	**No**

Chronic Health Impacts

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	0.02	0.02
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**

Acute Health Impacts

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Baseline	0.01	0.01
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**

Project

Cancer Health Risk

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Construction	0.2693 in a million	0.005 in a million
Operational	1.4452 in a million	0.036 in a million
Total	**1.7145 in a million**	**0.041 in a million**
Threshold	10 in a million	10 in a million
Exceeds Threshold?	**No**	**No**

Chronic Health Impacts

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Construction	0.00032	0.002
Operational	0.00183	0.001
Total	**0.00215**	**0.003**
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**

Acute Health Impacts

Category	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Construction	0.000	0.000
Operational	0.001	0.002
Total	**0.001**	**0.002**
Threshold	1.0	1.0
Exceeds Threshold?	**No**	**No**

Emission Calculations

Baseline Component Fugitive Emissions

Emission Factors (lb/year for each component)

VOC Emission Factors (Site 1-4, 6, 7)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017	1.77E-01	1.01E-01	2.49E-01	1.01E+00	4.42E+00	1.12E+00	1.16E+00	1.16E+00
2018	1.36E-01	8.10E-02	3.29E-01	5.74E-01	2.43E+00	7.71E-01	8.00E-01	8.00E-01
2019	1.41E-01	7.23E-02	2.45E-01	5.45E-01	2.33E+00	7.51E-01	8.69E-01	8.69E-01
2020	1.22E-01	6.67E-02	2.71E-01	5.30E-01	2.17E+00	6.57E-01	8.91E-01	8.91E-01
2021	1.50E-01	7.75E-02	2.01E-01	5.72E-01	2.54E+00	7.42E-01	1.16E+00	1.16E+00

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the West site (Site 2, ID 101977). EFs are based on a weighted average of all EFs for each component type. EFs are used to represent sites 1-4 and 6-7. Note - emission factors used are higher than the default EPA Protocol for Equipment Leak Emission Estimates "Oil and Gas Production Operations Average Emission Factors", Table 2-4).

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

VOC Emission Factors (Site 5)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017	1.88E-01	8.84E-02	2.62E-01	1.17E+00	3.89E+00	1.14E+00	1.06E+00	1.06E+00
2018	1.86E-01	8.01E-02	2.56E-01	1.07E+00	3.72E+00	1.07E+00	1.90E+00	1.90E+00
2019	1.86E-01	8.59E-02	2.54E-01	1.07E+00	4.05E+00	1.07E+00	1.46E+00	1.46E+00
2020	1.49E-01	7.08E-02	2.03E-01	8.52E-01	3.23E+00	8.52E-01	2.34E+00	2.34E+00
2021	1.94E-01	9.51E-02	2.65E-01	1.11E+00	4.22E+00	1.11E+00	2.38E+00	2.38E+00

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the Central site (Site 5, ID 45086). EFs are based on a weighted average of all EFs for each component type.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Emission Factors (lb/year for each component)

Benzene (CAS 71432) Emission Factors (Site 1-4, 6, 7)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017	4.66E-04	2.65E-04	6.55E-04	2.56E-03	7.15E-03	2.39E-03	2.81E-03	2.81E-03
2018	3.70E-04	2.21E-04	7.42E-04	1.44E-03	5.45E-03	1.68E-03	2.11E-03	2.11E-03
2019	3.84E-04	1.97E-04	6.67E-04	1.38E-03	3.84E-03	1.64E-03	2.31E-03	2.31E-03
2020	3.70E-04	2.04E-04	8.35E-04	1.56E-03	3.97E-03	1.63E-03	2.52E-03	2.52E-03
2021	2.01E-04	1.04E-04	2.70E-04	7.66E-04	3.41E-03	9.94E-04	1.56E-03	1.56E-03

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the West site (Site 2, ID 101977). EFs are based on a weighted average of all EFs for each component type. EFs are used to represent sites 1-4 and 6-7.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Benzene (CAS 71432) Emission Factors (Site 5)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017	1.71E-04	8.04E-05	2.41E-04	1.13E-03	3.65E-03	1.09E-03	9.68E-04	9.68E-04
2018	1.66E-04	7.16E-05	2.33E-04	1.07E-03	3.50E-03	1.04E-03	1.85E-03	1.85E-03
2019	1.71E-04	7.86E-05	2.41E-04	1.14E-03	4.31E-03	1.14E-03	1.41E-03	1.41E-03
2020	1.52E-04	7.17E-05	2.13E-04	1.01E-03	3.81E-03	1.01E-03	2.53E-03	2.53E-03
2021	3.26E-04	1.60E-04	4.45E-04	1.87E-03	7.09E-03	1.87E-03	3.99E-03	3.99E-03

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the Central site (Site 5, ID 45086). EFs are based on a weighted average of all EFs for each component type.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Emission Factors (lb/year for each component)

Ethyl Benzene (CAS 100414) Emission Factors (Site 1-4, 6, 7)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019	1.50E-05	7.72E-06	2.76E-05	6.29E-05	7.19E-05	7.35E-05	9.45E-05	9.45E-05
2020	1.47E-05	8.07E-06	3.15E-05	7.08E-05	7.38E-05	7.41E-05	9.88E-05	9.88E-05
2021	1.50E-06	7.75E-07	2.01E-06	5.72E-06	2.54E-05	7.42E-06	1.16E-05	1.16E-05

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the West site (Site 2, ID 101977). EFs are based on a weighted average of all EFs for each component type. EFs are used to represent sites 1-4 and 6-7.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Ethyl Benzene (CAS 100414) Emission Factors (Site 5)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019								
2020	6.88E-06	3.31E-06	8.75E-06	2.56E-05	9.69E-05	2.56E-05	9.37E-05	9.37E-05
2021	1.94E-06	9.51E-07	2.65E-06	1.11E-05	4.22E-05	1.11E-05	2.38E-05	2.38E-05

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the Central site (Site 5, ID 45086). EFs are based on a weighted average of all EFs for each component type.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Emission Factors (lb/year for each component)

m-Xylene (CAS 108383) Emission Factors (Site 1-4, 6, 7)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019	5.63E-05	2.90E-05	1.04E-04	2.35E-04	1.70E-04	2.67E-04	3.54E-04	3.54E-04
2020	5.54E-05	3.04E-05	1.18E-04	2.66E-04	1.76E-04	2.71E-04	3.65E-04	3.65E-04
2021	7.50E-06	3.87E-06	1.00E-05	2.86E-05	1.27E-04	3.71E-05	5.83E-05	5.83E-05

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the West site (Site 2, ID 101977). EFs are based on a weighted average of all EFs for each component type. EFs are used to represent sites 1-4 and 6-7.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

m-Xylene (CAS 108383) Emission Factors (Site 5)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019								
2020	3.00E-05	1.45E-05	3.77E-05	1.01E-04	3.85E-04	1.01E-04	3.98E-04	3.98E-04
2021	1.16E-05	5.70E-06	1.59E-05	3.60E-05	2.53E-04	6.68E-05	1.43E-04	1.43E-04

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the Central site (Site 5, ID 45086). EFs are based on a weighted average of all EFs for each component type.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Emission Factors (lb/year for each component)

Toluene (CAS 108883) Emission Factors (Site 1-4, 6, 7)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019	2.26E-04	1.16E-04	4.03E-04	8.61E-04	1.39E-03	9.85E-04	1.38E-03	1.38E-03
2020	2.19E-04	1.21E-04	4.84E-04	9.79E-04	1.44E-03	9.93E-04	1.46E-03	1.46E-03
2021	3.00E-05	1.55E-05	4.03E-05	1.14E-04	5.09E-04	1.48E-04	2.32E-04	2.32E-04

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the West site (Site 2, ID 101977). EFs are based on a weighted average of all EFs for each component type. EFs are used to represent sites 1-4 and 6-7.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Toluene (CAS 108883) Emission Factors (Site 5)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019								
2020	6.68E-05	3.16E-05	9.31E-05	4.28E-04	1.62E-03	4.28E-04	1.10E-03	1.10E-03
2021	1.16E-05	5.70E-06	1.59E-05	6.68E-05	2.53E-04	6.68E-05	1.43E-04	1.43E-04

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the Central site (Site 5, ID 45086). EFs are based on a weighted average of all EFs for each component type.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Emission Factors (lb/year for each component)

Hexane (CAS 110543) Emission Factors (Site 1-4, 6, 7)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019	2.25E-03	1.15E-03	3.94E-03	8.81E-03	3.37E-02	1.17E-02	1.38E-02	1.38E-02
2020	2.17E-03	1.18E-03	4.78E-03	9.80E-03	3.48E-02	1.14E-02	1.56E-02	1.56E-02
2021	9.21E-03	4.76E-03	1.24E-02	3.51E-02	1.56E-01	4.55E-02	7.13E-02	7.13E-02

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the West site (Site 2, ID 101977). EFs are based on a weighted average of all EFs for each component type. EFs are used to represent sites 1-4 and 6-7.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Hexane (CAS 110543) Emission Factors (Site 5)[1]

Year	Fittings[2]	Threaded Connection	Valve	Compressor	Pump	Atmospheric PRD	Other	Drain[3]
2017								
2018								
2019								
2020	1.07E-03	5.09E-04	1.44E-03	5.84E-03	2.21E-02	5.84E-03	1.65E-02	1.65E-02
2021	2.28E-02	1.12E-02	3.12E-02	1.31E-01	4.97E-01	1.31E-01	2.79E-01	2.79E-01

1. Emission factors pulled from facility's annual emission reporting (AER) from South Coast AQMD's AER portal for the Central site (Site 5, ID 45086). EFs are based on a weighted average of all EFs for each component type.

2. Assuming fittings and flanges are the same category.

3. Using "Other" emission factors.

Current Components by Site

Component Type	Site 1			Site 2		
	# of Gas	# of Light Liquid	# of Heavy Liquid	# of Gas	# of Light Liquid	# of Heavy Liquid
Fittings	67	50	16	4820	898	31
Threaded Connection	0	0	0	0	0	0
Valve	34	21	6	926	355	17
Compressor	0	0	0	14	0	0
Pump	0	0	0	0	2	0
Atmospheric PRD	0	0	0	3	0	0
Other	23	7	2	573	107	1
Drain	0	0	0	0	3	0

Current Components by Site

Component Type	Site 3			Site 4		
	# of Gas	# of Light Liquid	# of Heavy Liquid	# of Gas	# of Light Liquid	# of Heavy Liquid
Fittings	114	124	0	68	91	0
Threaded Connection	0	0	0	0	0	0
Valve	45	53	0	23	32	0
Compressor	0	0	0	0	0	0
Pump	0	0	0	0	0	0
Atmospheric PRD	0	0	0	0	0	0
Other	38	19	0	43	14	0
Drain	0	0	0	0	0	0

Current Components by Site

Component Type	Site 5			Site 6		
	# of Gas	# of Light Liquid	# of Heavy Liquid	# of Gas	# of Light Liquid	# of Heavy Liquid
Fittings	726	272	0	36	38	0
Threaded Connection	0	0	0	0	0	0
Valve	280	85	0	9	9	0
Compressor	2	0	0	0	0	0
Pump	0	5	0	0	0	0
Atmospheric PRD	1	0	0	0	0	0
Other	153	42	0	3	6	0
Drain	0	0	0	0	0	0

Current Components by Site

Component Type	Site 7		
	# of Gas	# of Light Liquid	# of Heavy Liquid
Fittings	20	16	0
Threaded Connection	0	0	0
Valve	6	3	0
Compressor	0	0	0
Pump	0	0	0
Atmospheric PRD	0	0	0
Other	1	3	0
Drain	0	0	0

Emissions by Site

Site 1 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	75.89	0.19	0.00	0.00	0.00	0.00
2018	63.78	0.16	0.00	0.00	0.00	0.00
2019	61.45	0.17	0.01	0.03	0.10	0.98
2020	61.26	0.18	0.01	0.03	0.11	1.08
2021	69.42	0.09	0.00	0.00	0.01	4.26
Average	**66.36**	**0.16**	**0.00**	**0.02**	**0.07**	**2.11**

Site 2 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	2162.42	5.51	0.00	0.00	0.00	0.00
2018	1772.87	4.57	0.00	0.00	0.00	0.00
2019	1735.82	4.69	0.19	0.70	2.78	27.75
2020	1675.48	4.97	0.19	0.73	2.91	29.65
2021	1934.22	2.59	0.02	0.10	0.39	118.72
Average	**1856.16**	**4.47**	**0.13**	**0.51**	**2.03**	**58.71**

Site 3 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	132.73	0.34	0.00	0.00	0.00	0.00
2018	110.25	0.28	0.00	0.00	0.00	0.00
2019	107.00	0.29	0.01	0.04	0.17	1.71
2020	106.36	0.31	0.01	0.05	0.18	1.88
2021	121.67	0.16	0.00	0.01	0.02	7.47
Average	**115.60**	**0.28**	**0.01**	**0.03**	**0.13**	**3.69**

Emissions by Site

Site 4 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	108.01	0.27	0.00	0.00	0.00	0.00
2018	85.35	0.22	0.00	0.00	0.00	0.00
2019	85.36	0.23	0.01	0.03	0.14	1.36
2020	85.08	0.25	0.01	0.04	0.14	1.50
2021	101.16	0.14	0.00	0.01	0.02	6.21
Average	**92.99**	**0.22**	**0.01**	**0.03**	**0.10**	**3.02**

Site 5 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	512.62	0.47	0.00	0.00	0.00	0.00
2018	672.16	0.63	0.00	0.00	0.00	0.00
2019	586.67	0.56	0.00	0.00	0.00	0.00
2020	698.27	0.74	0.03	0.12	0.32	4.94
2021	777.94	1.31	0.01	0.05	0.05	91.51
Average	**649.53**	**0.74**	**0.02**	**0.09**	**0.19**	**48.22**

Site 6 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	28.04	0.07	0.00	0.00	0.00	0.00
2018	23.21	0.06	0.00	0.00	0.00	0.00
2019	22.64	0.06	0.00	0.01	0.04	0.36
2020	21.91	0.07	0.00	0.01	0.04	0.39
2021	25.19	0.03	0.00	0.00	0.01	1.55
Average	**24.20**	**0.06**	**0.00**	**0.01**	**0.03**	**0.77**

Emissions by Site

Site 7 Emissions

Year	Emissions (lb/year)					
	VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
2017	13.26	0.03	0.00	0.00	0.00	0.00
2018	11.07	0.03	0.00	0.00	0.00	0.00
2019	10.75	0.03	0.00	0.00	0.02	0.17
2020	10.39	0.03	0.00	0.00	0.02	0.18
2021	11.86	0.02	0.00	0.00	0.00	0.73
Average	**11.47**	**0.03**	**0.00**	**0.00**	**0.01**	**0.36**

Project Components

LTS Components[1]

Component Type	# of Gas	# of Light Liquid	# of Heavy Liquid	Emissions (lb/year)					
				VOC	Benzene	Ethyl Benzene	m-Xylene	Toluene	Hexane
Fittings	2000	158	0	313.53	0.77	0.02	0.09	0.34	9.81
Threaded Connection	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Valve	229	75	0	78.70	0.19	0.01	0.02	0.09	2.14
Compressor	4	0	0	2.59	0.01	0.00	0.00	0.00	0.07
Pump	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Atmospheric PRD	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Other	210	26	0	230.42	0.53	0.02	0.06	0.24	7.93
Drain	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00

1. Component counts for LTS and membrane are from "SHPI_Inventory Information_07182022.xlsx" received from Shannon Smith on 7/19/2022.

Well Cellars

Existing Cellar Sizes

Site	Size (sq ft)[1]
1	869
2	1015
3	1680
4	1952
5	1616
6	0
7	64

1. Provided through "2021 Well Cellar Count and Sizes.xlsx".

Cellar Emission Factors

Pollutant	Emission Factor[1] (lb/sq ft)
VOC	1.77
Benzene	0.004778

1. Emission factors pulled from AER reporting, which are South Coast AQMD's default emission factors for well cellar. The default emission factors assume a wet cellar 24/7.

Existing Sites - Cellar Annual Emissions

Site	VOC Emissions[1] (lb/year)	Benzene Emissions (lb/year)
1	769.07	2.08
2	898.28	2.42
3	1,486.80	4.01
4	1,727.52	4.66
5	1,430.16	3.86
6	0.00	0.00
7	56.64	0.15

1. VOC emissions calculated using the default emission factor and a conservative 0.5 factor. This factor conservatively assumes that the well cellars are wet and have organic liquids 50% of the time. Per Rule 1148.1, the well cellar is not alllowed to store organic liquids.

New Well Cellars

Category	Well Cellars[1]	VOC Emissions[2] (lb/year)	Benzene Emissions (lb/year)
Total Project	20	637.2	1.72

1. Per Project Description, new well cellars are approximately 6 feet wide, 6 feet long, and 5 feet deep, which gives a surface area size of 36 square feet.

2. VOC emissions are calculated using the default emission factor and a conservative 0.5 factor. This factor conservatively assumes that the well cellars are wet and have organic liquids 50% of the time. Per Rule 1148.1, the well cellar is not alllowed to store organic liquids.

Well Heads

Existing Well Heads

Site	Number[1]
1	4
2	8
3	7
4	8
5	6
6	2
7	1

1. Based on data provided by Shannon Smith on 11/1/2023. Number of existing well heads is equal to the number of "Active Producers" and "Idle Producers".

Well Head Emission Factors

Pollutant	Emission Factor[1] (lb/head)
VOC	0.7
Benzene	0.00189

1. Emission factors pulled from AER reporting.

Existing Sites - Well Head Annual Emissions

Site	VOC Emissions (lb/year)	Benzene Emissions (lb/year)
1	2.80	0.008
2	5.60	0.015
3	4.90	0.013
4	5.60	0.015
5	4.20	0.011
6	1.40	0.004
7	0.70	0.002

New Well Head Emissions

Category	Well Heads[1]	VOC Emissions (lb/year)	Benzene Emissions (lb/year)
Total Project	46	32.2	0.08694

1. Per Project Description, forecasted annual average of new wells per year.

HRA

New Well Cellars - Site Activity Levels

CUP Site #	Number of Well Cellars[1]
1	10
2	5
3	5
4	5
5	5
6	2
7	2

1. Maximum number of new well cellars per site during the 20-year permit term.

Well Cellar Emission Factors

Pollutant	Emission Factor[1] (lb/sq ft)
Benzene	0.004778

1. Emission factors pulled from AER reporting, which are South Coast AQMD's default emission factors for well cellar. The default emission factors assume a wet cellar 24/7.

New Well Cellars - Toxics Emissions

CUP Site #	Benzene Emissions[1]	
	Annual Emissions[2] (lb/year)	Hourly Emissions[3] (lb/hr)
1	0.86	9.82E-05
2	0.43	4.91E-05
3	0.43	4.91E-05
4	0.43	4.91E-05
5	0.43	4.91E-05
6	0.17	1.96E-05
7	0.17	1.96E-05

1. Emissions are calculated using the default emission factor and a conservative 0.5 factor. This factor conservatively assumes that the well cellars are wet and have organic liquids 50% of the time. Per Rule 1148.1, the well cellar is not alllowed to store organic liquids.

2. Per Project Description, new well cellars are approximately 6 feet wide, 6 feet long, and 5 feet deep, which gives a surface area size of 36 square feet.

3. Emissions are fugitive and therefore are distributed across 8760 hours per year.

New Well Heads - Site Activity Levels

CUP Site #	Number of New Well Heads[1]
1	10
2	10
3	15
4	15
5	15
6	2
7	2

1. Maximum number of new well per site during the 20-year permit term.

Well Head Emission Factors

Pollutant	Emission Factor[1] (lb/head)
Benzene	0.00189

1. Emission factor pulled from AER reporting.

New Well Heads - Toxics Emissions

CUP Site #	Benzene Emissions	
	Annual Emissions (lb/year)	Hourly Emissions[1] (lb/hr)
1	0.019	2.16E-06
2	0.019	2.16E-06
3	0.028	3.24E-06
4	0.028	3.24E-06
5	0.028	3.24E-06
6	0.004	4.32E-07
7	0.004	4.32E-07

1. Emissions are fugitive and therefore are distributed across 8760 hours per year.

Existing Truck Trips

Truck Trip Vehicle Miles Traveled

Trip Category	Round Trips[1] per Day	Miles per Trip	Days per Year[2]	Miles Traveled per Year
Operations Surveillance	2	7	365	5,110
Plant Operations	2	5	365	3,650
Surface Equipment Maintenance	6	7	312	13,104
Down Hole Maintenance	2	6.5	260	3,380
Misc. Maintenance	2	7	260	3,640
Drilling/Redrilling Operations	8	5	173	6,920
General Heavy Duty Truck Activity	4	5	104	2,080

1. Provided by SHP.
2. Provided by SHP based on historical activity levels; however, certain annual activity levels have been scaled up to ensure the emissions calculations are conservative.

Employee Truck Trips (LDT2)

Total Miles Traveled per Year 35,804

	ROG	NOx	CO	SOX	PM10	PM2.5	CO2	CH4	N2O	CO2e
EF (grams/mile)[1]	1.75E-01	7.90E-01	9.86E-01	3.65E-03	1.37E-01	1.32E-01	3.86E+02	8.12E-03	6.08E-02	
Lbs/Mile	3.85E-04	1.74E-03	2.17E-03	8.06E-06	3.03E-04	2.90E-04				
Lbs/Year	13.7938	62.3545	77.8165	0.2884	10.8528	10.3833				
Tons/year	0.0069	0.0312	0.0389	0.0001	0.0054	0.0052				
MT/year							13.81	0.000	0.002	14.46

1. Average of EMFAC2021 emission factors for LDT1/LDT2 vehicle types, diesel fueled.

Heavy Duty Truck Activity

2,080 total miles traveled per year

	ROG	NOx	CO	SOX	PM10	PM2.5	CO2	CH4	N2O	CO2e
EF (grams/mile)[1]	1.20E-02	1.16E+00	7.62E-02	1.52E-02	1.42E-02	1.36E-02	1.61E+03	5.58E-04	2.54E-01	
Lbs/Mile	2.65E-05	2.56E-03	1.68E-04	3.36E-05	3.13E-05	3.00E-05				
Lbs/Year	0.0551	5.3263	0.3496	0.0699	0.0652	0.0623				
Tons/year	0.0000	0.0027	0.0002	0.0000	0.0000	0.0000				
MT/year							3.35	0.000	0.001	3.50

1. EMFAC2021 emission factors for T7 Single Other Class 8 vehicles.

LTS Construction

LTS Construction Equipment

Equipment	Total Operating Hours	Default HP[1]	Load Factor[1]
Backhoe	40	97	0.37
Dump Truck[2]	32	402	0.38
Water Truck[2]	40	402	0.38
Crane Truck	104	231	0.29
Welder	144	46	0.45
Concrete/Pavement Saw	16	81	0.73
Redi-Mix Concrete Truck[2]	64	402	0.38

1. Default HP and load factor based on CalEEMod 2020.4.0 User Guide Appendix D, Table 3.3, *OFFROAD Default Horsepower and Load Factors*.

2. Dump truck, water truck, and concrete truck are using the "Off-Highway Trucks" category from CalEEMod 2020.4.0 User Guide Appendix D, Table 3.3, OFFROAD Default Horsepower and Load Factors. and OFFROAD.

Equipment Emission Factors

Equipment	Emission Factors (g/bhp-hr)[1]								
	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	CO2e
Backhoe	0.239	2.42607	3.52504	0.005	0.12	0.11	476.4307	0.154	
Dump Truck	0.187	1.32428	1.22057	0.005	0.048	0.044	475.0488	0.154	
Water Truck	0.187	1.32428	1.22057	0.005	0.048	0.044	475.0488	0.154	
Crane Truck	0.297	3.22938	1.55262	0.005	0.135	0.124	472.9738	0.153	
Welder	0.697	4.596	3.891	0.007	0.151	0.151	568.299	0.062	
Concrete/Pavement Saw	0.32	2.478	3.507	0.006	0.0123	0.123	568.3	0.028	
Redi-Mix Concrete Truck	0.187	1.32428	1.22057	0.005	0.048	0.044	475.0488	0.154	

1. Default EF for horsepower and 2023 construction year from CalEEMod 2020.4.0 User Guide Appendix D, Table 3.4, *OFFROAD Equipment Emission Factors (g/bhp-hr)*.

Equipment Emissions

Equipment	Emission (lbs/year)						Emissions (MT/year)		
	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	CO2e
Backhoe	0.7564	7.6784	11.1566	0.0158	0.3798	0.3481	0.6840	0.0002	0.6895
Dump Truck	2.0153	14.2716	13.1540	0.0539	0.5173	0.4742	2.3222	0.0008	2.3410
Water Truck	2.5191	17.8395	16.4425	0.0674	0.6466	0.5927	2.9027	0.0009	2.9263
Crane Truck	4.5618	49.6017	23.8475	0.0768	2.0735	1.9046	3.2952	0.0011	3.3218
Welder	4.5804	30.2028	25.5699	0.0460	0.9923	0.9923	1.6940	0.0002	1.6986
Concrete/Pavement Saw	0.6674	5.1685	7.3147	0.0125	0.0257	0.2565	0.5377	0.0000	0.5383
Redi-Mix Concrete Truck	4.0306	28.5433	26.3079	0.1078	1.0346	0.9484	4.6444	0.0015	4.6820

On-Road Vehicle Trips

Vehicle Type	Round Trips[1] per Day	Miles per Trip	Day per Year	VMT[1]
Heavy Duty Trucks (Equipment/Deliveries)	2	5	48	480
Construction/Gear Trucks	6	3	48	864
Redi-Mix Concrete Truck	2	10	173	3460

1. Provided by SHP in "SHP CUP 97-03 - Supplemental AQ Data.xlsx". Round trips per day is pulled from "PCE Equivalent Roundtrips".

On-Road Vehicle Emission Factors

Equipment	Emission Factors (g/mile)									
	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e
Heavy Duty Trucks (Equipment/Deliveries)[1]	1.20E-02	1.16E+00	7.62E-02	1.52E-02	1.42E-02	1.36E-02	1.61E+03	5.58E-04	2.54E-01	
Construction/Gear Truck[2]	2.05E-02	5.60E-02	1.80E-01	3.13E-03	6.97E-03	6.67E-03	3.30E+02	9.52E-04	5.20E-02	
Redi-Mix Concrete Truck[3]	9.19E-03	1.00E+00	6.51E-02	1.54E-02	1.36E-02	1.30E-02	1.62E+03	4.27E-04	2.56E-01	

1. Heavy Duty Trucks use EMFAC2021 Category T7 Single Other Class 8.
2. Contractor/Gear Trucks use EMFAC2021 Category LDT2.
3. Concrete Trucks use EMFAC2021 Category T7 Single Concrete/Transite Mix Class 8.

On-Road Vehicle Emissions

Equipment	Emission (lbs/year)						Emissions (MT/year)			
	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e
Heavy Duty Trucks (Equipment/Deliveries)	1.27E-02	1.23E+00	8.07E-02	1.61E-02	1.50E-02	1.44E-02	7.72E-01	2.68E-07	1.22E-04	8.09E-01
Construction/Gear Trucks	3.90E-02	1.07E-01	3.42E-01	5.96E-03	1.33E-02	1.27E-02	2.85E-01	8.22E-07	4.49E-05	2.99E-01
Redi-Mix Concrete Truck	7.01E-02	7.64E+00	4.96E-01	1.17E-01	1.04E-01	9.94E-02	5.62E+00	1.48E-06	8.86E-04	5.89E+00

Construction Emissions

Well Cellar Construction

Maximum Annual Emissions

Based on:	97	HP (default for backhoe)
	0.37	load factor (default for backhoe)
	4	hours/cellar
	7	max cellars/year
	28	max hours/year

Backhoe Equipment Emissions

	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	CO2e
EF (g/bhp-hr)[1]	0.239	2.426	3.525	0.005	0.120	0.110	476.431	0.154	
Total Emissions (lb/year)	0.529	5.375	7.810	0.011	0.266	0.244			
Total Emissions (MT/year)							0.479	0.0002	0.483

1. Default EF based on horsepower and 2023 construction year from CalEEMod 2020.4.0 User Guide Appendix D, Table 3.4, *OFFROAD Equipment Emission Factors (g/bhp-hr)*.

On-Road Trucks

Vehicle Type	Round Trips[1] per Day	Miles per Trip	Day per Year	VMT[1]
Employee Truck	2	3	7	42
Equipment Delivery	1	5	7	35

1. Provided by SHP in "SHP CUP 97-03 - Supplemental AQ Data.xlsx". Round trips per day is pulled from "PCE Equivalent Roundtrips".

On-Road Vehicle Emission Factors

Equipment	Emission Factors (g/mile)									
	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e
Employee Truck[1]	2.05E-02	5.60E-02	1.80E-01	3.13E-03	6.97E-03	6.67E-03	3.30E+02	9.52E-04	5.20E-02	0.00E+00
Equipment Delivery[2]	1.20E-02	1.16E+00	7.62E-02	1.52E-02	1.42E-02	1.36E-02	1.61E+03	5.58E-04	2.54E-01	0.00E+00

1. Employee Truck is using EMFAC2021 Category LDT2.
2. Equipment Delivery is using EMFAC2021 Category T7 Single Other Class 8.

On-Road Vehicle Emissions

Equipment	Emission (lbs/year)						Emissions (MT/year)			
	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e
Employee Truck	1.90E-03	5.18E-03	1.66E-02	2.90E-04	6.45E-04	6.17E-04	1.39E-02	4.00E-08	2.18E-06	1.45E-02
Equipment Delivery	9.27E-04	8.96E-02	5.88E-03	1.18E-03	1.10E-03	1.05E-03	5.63E-02	1.95E-08	8.87E-06	5.90E-02

HRA

Backhoe Activity Usage

PM10 Emission Factor (g/bhp-hr)	Horsepower	Load Factor	Hours per Cellar
0.12	97	0.37	4

New Well Cellar Construction - Site Activity Levels

CUP Site #	Number of Well Cellars[1]	Maximum Well Cellars/Year[2]	Number of Years[3]
1	10	7	2
2	5	5	1
3	5	5	1
4	5	5	1
5	5	5	1
6	2	2	1
7	2	2	1

1. Maximum number of new well cellars per site during the 20-year permit term.
2. Project includes a maximum number of new well cellars per year per CUP Site.
3. Number of years to reach maximum number of new well cellars at each CUP Site, conservatively assuming the maximum number of new well cellars per year.

New Well Cellar Construction - Emissions per CUP Site

CUP Site #	PM10 Emissions	
	lb/year	lb/hr
1	0.27	0.01
2	0.19	0.01
3	0.19	0.01
4	0.19	0.01
5	0.19	0.01
6	0.08	0.01
7	0.08	0.01

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

Drilling Rig

Drill Rig #5 - Emission Factors (g/bhp-hr)[1]

ROG[2]	NOx	CO	SOx	PM10	PM2.5[4]	CO2	CH4
0.137	1.5	2.6	0.000011	0.015	0.015	464.0407	0.15

1. Emission factors for criteria pollutants pulled from CARB's Off Road Compression - Ignition Diesel Engine Standards table. Emission factors for GHG pulled from CalEEMod 2020.4.0 User Guide, Appendix D.

2. ROG converted from NMHC using EPA conversion factors from "Conversion Factors for Hydrocarbon Emission Components"

3. SOx emission factor converted using mass balance based on current diesel fuel standard of 15 ppm for sulfur. EF converted using following equation:

$$\frac{0.000015\ lb\ S}{lb\ fuel} * \frac{7.1\ lb\ fuel}{gallon} * \frac{2\ lb\ SO_2}{1\ lb\ S} * \frac{1\ gal}{137{,}000\ Btu} * \frac{1\ bhp\ input}{0.35\ bhp\ output} * \frac{2{,}542.5\ Btu}{hp \cdot hr}$$

4. Conservatively assuming PM2.5 = PM10.

Redrilling

Redrilling - Maximum Annual Activity Levels

Max # of Wells/ Year[1]	Days/Well	Hours/Day	Hours per Year
6	27	24	3888

1. Maximum number of redrills per year at all of the CUP Sites combined.

Redrilling - Drill Rig Parameters

Drill Rig	HP	Hours per Year[1]
Rig #5 - Diesel	450	389
Rig #6 - Electric	1000	3499

1. Rig #6 is used 90% of the time. The remaining 10% is Rig #5.

Redrilling - Annual Emissions

Category	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	CO2e
	(lb/year)						(MT/year)		
Total	52.7	579	1003	0.004	5.79	5.79	81.19	0.026	81.84

New Drilling

New Drilling - Maximum Annual Activity Levels

Max # of Wells/ Year[1]	Days/Well	Hours/Day	Hours per Year
5	27	24	3240

1. Maximum number of new wells per year at all of the CUP Sites combined.

New Drilling - Drill Rig Parameters

Drill Rig	HP	Hours per Year[1]
Rig #5 - Diesel	450	324
Rig #6 - Electric	1000	2916

1. Rig #6 is used 90% of the time. The remaining 10% is Rig #5.

New Drilling - Annual Emissions

Category	ROG	NOx	CO	SOx	PM10	PM2.5	CO2	CH4	CO2e
	(lb/year)						(MT/year)		
Total	43.916	482.151	835.728	0.003630	4.822	4.822	67.66	0.0219	68.20

HRA

Redrilling - Activity Duration[1]

Days/Well	Hours/Day
27	24

1. Number of days and hours per day to redrill one well.

Redriling - Site Activity Levels

CUP Site #	Number of Redrills[1]	Maximum Redrills/ Year[2]	Number of Years[3]
1	10	6	2
2	15	6	3
3	10	6	2
4	10	6	2
5	12	6	2
6	2	2	1
7	1	1	1

1. Maximum number of well redrills per site during the 20-year permit term.
2. Project includes a maximum redrillings per year per CUP Site.
3. Number of years to reach maximum number of redrills at each CUP Site, conservatively assuming the maximum number of redrills per year.

Redrilling - Drill Rig Parameters

Category	Rig #5 - Diesel	Rig #6 - Electric
Horsepower	450	1000
Percent Usage	10%	90%

Redrilling - Drill Rig Activity per CUP Site

CUP Site #	Hours per Year	
	Rig #5 - Diesel	Rig #6 - Electric
1	389	3,499
2	389	3,499
3	389	3,499
4	389	3,499
5	389	3,499
6	130	1,166
7	64.8	583

1. Rig #6 is used 90% of the time. The remaining 10% is Rig #5.

Redrilling - Emissions per CUP Site

CUP Site #	PM10 Emissions	
	lb/year	lb/hr
1	5.79	0.01
2	5.79	0.01
3	5.79	0.01
4	5.79	0.01
5	5.79	0.01
6	1.93	0.01
7	0.96	0.01

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

Well Drilling Emissions

New Drilling - Activity Duration[1]

Days/Well	Hours/Day
27	24

1. Number of days and hours per day to drill one new well.

New Drilling - Site Activity Levels

CUP Site #	Number of New Drills[1]	Maximum New Drills/Year[2]	Number of Years[3]
1	10	5	2
2	10	5	2
3	15	5	3
4	15	5	3
5	15	5	3
6	2	2	1
7	2	2	1

1. Maximum number of new well drills per site during the 20-year permit term.
2. Project includes a maximum new well drills per year per CUP Site.
3. Number of years to reach maximum number of new well drills at each CUP Site, conservatively assuming the maximum number of new well drills per year.

New Drilling - Drill Rig Parameters

Category	Rig #5 - Diesel	Rig #6 - Electric
Horsepower	450	1000
Percent Usage	10%	90%

New Drilling - Drill Rig Activity per CUP Site

CUP Site #	Hours per Year	
	Rig #5 - Diesel	Rig #6 - Electric
1	324	2,916
2	324	2,916
3	324	2,916
4	324	2,916
5	324	2,916
6	130	1,166
7	130	1,166

New Drilling - Emissions per CUP Site

CUP Site #	PM10 Emissions	
	lb/year	lb/hr
1	4.82	0.01
2	4.82	0.01
3	4.82	0.01
4	4.82	0.01
5	4.82	0.01
6	1.93	0.01
7	1.93	0.01

1. Conservatively assuming all PM10 is diesel particulate matter per OEHHA Guidance Manual For Preparation of Health Risk Assessments, February 2015, Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Section D-2, Calculation/Risk Assessment Procedures. https://oehha.ca.gov/media/downloads/crnr/2015gmappendicesaf.pdf.

Well Drilling Emissions

GHG Leaks

Average Component Counts for Well Heads[1]

Valves	Flanges	Connectors	Open-ended Lines	Other Components
5	10	4	0	1

1. Appendix A, Table 1C of CARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions.

Estimated Total Component Counts for New Well Heads[1]

Valves	Flanges	Connectors	Open-ended Lines	Other Components
230	460	184	0	46

1. Based on Project maximum of 46 new well heads.

Component Emission Factors - Light Crude Service[1]

Valves	Flanges	Connectors	Open-ended Lines	Other Components
scf/hour/component				
0.05	0.003	0.007	0.05	0.3

1. Appendix A, Table 1A of CARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions.

Estimated Total Leakage Volume[1]

Valves	Flanges	Connectors	Open-ended Lines	Other Components
scf				
1,932	232	216	0	2,318

1. Due to CalGEM requirements, any leaks are repaired within one day (24 hours). To be conservative, a one week time frame is assumed (168 hours).

Estimated GHG Concentration

CO_2[1] Concentration	CH_4[1] Concentration	CO_2 Emissions (scf)	CH_4 Emissions (scf)
0%	100%	0	4,699

1. CO_2 and CH_4 concentrations are typically measured through gas sampling points. To be conservative, all leakage volume is assumed to be CH_4, which has a higher global warming potential.

Estimated GHG Mass Emissions

CO_2 Density[1] (kg/scf)	CH_4 Density[1] (kg/scf)	CO_2 Emissions (MT)	CH_4 Emissions (MT)	CO_2e Emissions[2] (MT)
0.0526	0.0192	0.000	0.090	2.255

1. CO_2 and CH_4 density per CARB MRR GHG Regulation §95153(t).
2. Global Warming Potential (GWP) of CH_4 = 25.

APPENDIX C. HEALTH RISK ASSESSMENT MODELING FILES

Electronic Files – Available Here: https://files.trinityconsultants.com/message/hQ6TiYuIktQPEC2lT25L3D

Appendix E Biological Resources Technical Report

July 11, 2022 (revised August 14, 2023)

Mr. John Hecht, P.E.
Sespe Consulting, Inc
374 Poli Street, Suite 200
Ventura, CA 93001
jhecht@sespe.com

RE: Biological Resources Assessment for Seven CUP Sites in the City of Signal Hill, Los Angeles County, California

Dear Mr. Hecht:

The purpose of this letter report is to provide the results of the biological reconnaissance-level survey that ECORP Consulting, Inc. (ECORP) conducted for the seven Conditional Use Permit (CUP) sites (Project): CUP Site No. 1 (A-Site); CUP Site No. 2 (B-Site); CUP Site No. 3 (D-Site); CUP Site No. 4 (North Site); CUP Site No. 5 (Central Site); CUP Site No. 6 (East Unit); and CUP Site No. 7 (Test Station), located in the City of Signal Hill, Los Angeles County, California. ECORP conducted a search of the California Natural Diversity Data Base (CNDDB) and the California Native Plant Society (CNPS) online inventory, reviewed aerial photographs, and conducted a pedestrian survey within the 7 CUP sites. The results of these database searches are provided in Attachment A.

LOCATION, SETTING, AND PROJECT DESCRIPTION

The Project consists of seven CUP sites. The combined sites total approximately 21.6 acres of partially developed land within the City of Signal Hill, Los Angeles County, California (Figure 1). The Project is located within the Los Alamitos and Los Cerritos Land Grants of the United States Geological Survey (USGS) 7.5-minute Long Beach topographic quadrangle.

The CUP site locations are included in Table 1 below:

Table 1. Project Site Locations

CUP Site No.	Location
1	North of Spring Street between California and Atlantic Avenues
2	South of Spring Street between Orange and Gundry Avenues
3	North of Willow Street, south of 27th Street, between Walnut and Gardena Avenues
4	South of Combellack Drive between Cherry and Junipero Avenues
5	Southwest of Junipero Avenue and Combellack Drive behind Home Depot
6	South of 20th Street between Redondo and Obispo Avenues
7	South of Grant Street between Redondo and Obispo Avenues

The California Interstate 405 freeway is located to the north of the Project (Figure 2). The elevation between the seven sites varies from 130-195 feet (39 to 59 meters) above mean sea level.

The proposed Project primarily includes the continuation of the City of Signal Hill's seven specific consolidated *Oil Operation Sites* and *Drill Sites* (CUP 97-03) existing operations for 20 years beyond its current term, which ends in 2023 as well as proposed redundancy and efficiency modifications to the existing natural gas system located at CUP Site No. 2. The proposed Project would not expand or have a change in the site boundaries, nor would there be a change in the scope of operations from the current operations with the exception of certain natural gas processing redundancy and efficiency planned at CUP Site No. 2.

METHODS

Literature Review

Prior to conducting the biological reconnaissance level-survey, ECORP biologists performed a literature review using the California Department of Fish and Wildlife's (CDFW) CNDDB (CDFW 2022) and the CNPS online inventory (2022) to determine the special-status plant and wildlife species that have been documented on or near the Project site. The CNDDB and CNPS database searches were conducted on June 6 and 7, 2022. ECORP searched CNDDB and CNPS records within the Project site boundaries located in the USGS 7.5-minute Long Beach topographic quadrangle, plus the surrounding eight topographic quadrangles, including South Gate, Inglewood, Whittier, Torrance, Seal Beach, San Pedro, Los Alamitos, and Los Angeles.

The CNDDB and CNPS contain records of reported occurrences of federally or state-listed endangered, threatened, proposed endangered or threatened species, California Species of Special Concern (SSC), and/or other special-status species or habitat. The literature review focused on previously documented special-status plant and wildlife species recorded in the vicinity of the Project site that could occur on the sites and/or could be affected by Project activities. A list of special-status species with potential to occur on or adjacent to the Project site was generated from the results of the literature review and the Project was evaluated for suitable habitat that could support any of the special-status plant or wildlife species on the list.

Biological Reconnaissance Survey

A biological reconnaissance survey was conducted on June 8, 2022, by ECORP biologists with experience identifying special-status biological resources and their habitat requirements. The biologists conducted a walkover survey of each site to characterize the existing vegetation communities and wildlife habitats. The CUP sites are located on private property so areas surrounding the CUP sites were not surveyed due to access restrictions and current land use cover that are not expected to be suitable for sensitive biological resources. When possible, immediately adjacent areas were scanned using binoculars to determine if suitable habitat for sensitive biological resources was present.

The biologists documented current conditions, vegetation communities/land cover, plant and wildlife species observed, and assessed the potential habitat for special-status plant and wildlife species within

the Project site during the survey. A one-day survey cannot be used to conclusively determine presence or absence of a species; therefore, assessments of presence/absence and potential for occurrence were made based on presence of suitable habitat to support the species, diagnostic signs (e.g., burrows, scat, tracks, vocalizations, and nests), known records or occurrence within the area, known distribution and elevation range, and habitat utilization from the relevant literature. Data were recorded on a Global Positioning System (GPS) unit, field notebooks, and/or maps. Photographs were also taken during the survey to provide visual representation of the current conditions on each site.

RESULTS

Literature Review

The literature review and database searches identified 36 special-status plant and 28 special-status wildlife species that have been documented near the Project site. A list was generated from the results of the literature review and the Project was evaluated for suitable habitat that could support the special-status plant or wildlife species on those lists.

Biological Reconnaissance Survey

ECORP biologists Verity Richardson and Carla Marriner conducted the biological reconnaissance survey on June 8, 2022. Weather conditions during the survey consisted of humid, cloudy skies with temperatures ranging from 64 to 72 degrees Fahrenheit (°F) and 0-2 mile-per-hour (mph) winds. The results of the survey are summarized below, including site characteristics, vegetation/land cover types, wildlife and special-status species observed, and special-status habitats present (including any potential wildlife corridors).

CUP Site Characteristics, Vegetation Communities, and Plants

The Project allows for oil and gas production at each CUP site, as well as storage, processing, and shipping of these materials. There are existing industrial, commercial, and residential developments surrounding each of the seven CUP sites. Plant communities were mapped using field observations and utilizing aerial imagery in Google Earth.

The CUP sites have been previously developed and primarily include disturbed/developed land cover where existing structures, above ground pipes, storage tanks, wellheads, access areas, concrete pads, partially dismantled oil pumps, injectors, and storage sheds are located. Disturbed land is not a vegetation classification, but rather a land cover type and is not restricted by elevation. The disturbed/developed land cover areas support ornamental trees and patches of scattered nonnative vegetation such as flax-leaved horseweed (*Erigeron bonariensis*), pigweed (*Amaranthus albus*), Bermuda grass (*Cynodon dactylon*), puncture vine (*Tribulus terrestris),* and other nonnative grasses (*Bromus* sp.), which are present at a low cover. The tree dominated vegetation communities identified during the survey include eucalyptus groves and ornamental trees. Vegetation communities/land cover for each site are shown on Figures 3A-3F. Representative site photographs of each of the CUP sites are included in Attachment B.

CUP Site No. 1 consists of mostly disturbed/developed areas with injectors primarily located in the middle portion of the site. Climbing fig (*Ficus pumila*), an evergreen climbing vine, was observed growing on the walls surrounding the site. Chinese elm trees (*Ulmus parvifolia*) were observed within the site and palm trees (*Washingtonia* sp.) are located outside bordering the site (Figure 3A).

CUP Site No. 2 consists primarily of disturbed/developed areas with injectors, above ground pipes, storage tanks, and other structures were observed at the time of the survey. Ornamental trees occur in some portions of the site including Brazilian peppertree (*Schinus terebinthifolius*), Chinese elm, and ash trees (*Fraxinus* sp.) One native mulefat (*Baccharis salicifolia*) shrub was observed on the western slope of the site. Eucalyptus trees (*Eucalyptus* spp.) were observed outside the site boundary along the northern portion of the CUP site and the canopies of the trees overhang the site boundary (Figure 3B).

CUP Site No. 3 consists of disturbed/developed areas with injectors and other structures observed within the site. Ornamental trees including eucalyptus trees, bottlebrush (*Melaleuca viminalis*), and wattle trees (*Acacia* sp.) are located primarily outside the CUP site; however, the tree canopies overhang the site boundary (Figure 3C).

CUP Site No. 4 consists of disturbed/developed areas with injectors, above ground pipes and other structures present primarily along the western portion of the site. Ash and eucalyptus tree canopies overhang the site boundary primarily on the western and southern portions as shown on Figure 3D.

CUP Site No. 5, which is also known as the Central Drill Site, is the largest CUP site. Eucalyptus groves are present within and adjacent to the site to the south and southwest. The vegetation community is dominated by eucalyptus trees (*Eucalyptus* spp.) with an open and continuous sparse to intermittent shrub layer. Low density of other ornamental trees and shrubs including Chinese elm and Peruvian peppertree (*Schinus molle)* are also present within this community along the western edge of the site. Ornamental trees and shrubs located in the middle and north/northeast portions of the site include a mix of Mexican fan palm tree, eucalyptus trees, pine trees (*Pinus* sp.), jade (*Crassula ovata*), and common nonnative ice plant (*Carpobrotus* sp.). The rest of the site is considered disturbed/developed with existing structures, above ground pipes, and storage tanks as shown on Figure 3E.

CUP Site No. 6 consists of mainly disturbed/developed areas with existing structures and a storage tank. Ornamental trees are present within the western portion of the site. Eucalyptus and pepper trees were observed outside the site and their canopies overhang the site boundary (Figure 3F).

CUP Site No. 7 is a test station that consists of disturbed/developed areas with some structures and an active oil producer located on the eastern portion of the site (Figure 3F).

Wildlife

The Project provides suitable foraging, nesting, and cover habitats that could be used by locally common wildlife species. Wildlife species observed/detected during the survey include common raven (*Corvus corax*), house sparrow (*Passer domesticus*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottos*), black phoebe (*Sayornis nigricans)*, barn swallow (*Hirundo rustica),* Allen's hummingbird (*Selasphorus sasin*), western fence lizard (*Sceloporus occidentalis*), and side-blotched lizard (*Uta stansburiana elegans*). Raptor species are typically seen in similar habitat within the ornamental and

eucalyptus trees, but not observed during the survey include red-tailed hawk (*Buteo jamaicensis*). Any of the common mammal species found in the suburban areas of southern California may utilize or traverse some of the Project on occasion including raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), and small rodents.

Wildlife Movement Corridors

During the biological resources survey, the Project was assessed for the ability to facilitate wildlife movement and for the presence of wildlife corridors. A wildlife corridor is defined as a linear landscape element that serves as a linkage between historically connected habitats/natural areas and is meant to facilitate movement between these natural areas (Beier and Loe 1992). Wildlife movement corridors are critical for the survivorship of ecological systems for several reasons. Corridors can connect water, food, and cover sources, spatially linking these three resources with wildlife in different areas. In addition, wildlife movement between habitat areas provides for the potential of genetic exchange between wildlife species populations, thereby maintaining genetic variability and adaptability to maximize the success of wildlife responses to changing environmental conditions. This is especially critical for small populations subject to loss of variability from genetic drift and effects of inbreeding.

The CUP sites do not function as wildlife movement corridors because the sites are disturbed/developed, support minimal vegetation cover, and are surrounded by roads and urban development. The sites are not contiguous with large, contiguous blocks of native habitat that would support wildlife movement and Interstate 405, which is located north of the sites, essentially acts as a barrier to wildlife movement. In addition, the fencing and gates on the sites and the surrounding commercial, industrial, and residential structures are not conducive to wildlife movement. The Project is also not situated along any major drainages or washes that would be considered movement corridors for wildlife. While wildlife may utilize the limited vegetation on the sites during local movement, the Project is not considered to be part of a regional wildlife movement corridor or a linkage or corridor between natural habitat areas.

Critical Habitat

The CUP sites are not located within critical habitat for threatened and endangered species. Therefore, no significant impacts to critical habitat is anticipated due to Project activities.

Special-Status Plants

Thirty-six special-status plant species appeared in the literature review and database searches for the CUP sites (Attachment A). A list was generated from the results of the literature review and the CUP sites were evaluated for suitable habitat that would support the plant species on the list. Those species identified in the literature review that typically occur in elevations or habitat types that are not present on the CUP sites were presumed absent. The reported occurrence (Occurrence #28) of one special status plant, Horn's milkvetch (*Astragalus hornii* var. *hornii),* overlaps with a portion of CUP Site No.6 and is adjacent to CUP Site No.7. However, the exact location of the observation is unknown, and the historical museum occurrence reported it from 1896. A significant amount of development has occurred since the collection was made and no other nearby occurrences of the species have been reported.

After evaluating the existing conditions on each of the CUP sites, a determination was made that the plant species reported in the literature review and database searches have a low potential or are presumed absent from the CUP sites due to a lack of suitable habitat and/or a lack of recent documented occurrences.

Special-Status Wildlife

Twenty-eight special-status wildlife species appeared in the literature review and database searches for the CUP sites (Attachment A). A list was generated from the results of the literature review and the CUP sites were evaluated for suitable habitat to support any of the special-status wildlife species on the list.

Of the 28 special-status wildlife identified, two species have a moderate (or low to moderate) potential to occur on CUP Sites No. 1, 2, 3, 4, 6, and 7, and three species have a moderate (or low to moderate) potential to occur on CUP Site No. 5. Most of the special-status species on the list that occur in the region surrounding the sites have very specific habitat types that are not present on the CUP sites, such as marine aquatic, riparian habitats, coastal salt marsh, or vernal pools. As such, these species were eliminated from further consideration. Two protected bird species, including peregrine falcons (*Falco peregrinus*) and bank swallows (*Riparia riparia*), may fly over the CUP sites but there is a low probability they would reside on the CUP sites due to lack of habitat, so these species were eliminated from consideration.

A brief natural history and discussion of the three special-status species with a potential to occur on or adjacent to the CUP sites is included below. The remaining 25 species identified during the literature review either have a low potential to occur or are presumed absent from the CUP sites due to a lack of suitable habitat and/or a lack of recent documented occurrences.

Silver-haired bat (Lasionycteris noctivagans)

- International Union for Conservation of Nature (IUCN): Least Concern (LC)
- Western Bat Working Group (WBWG): WBWG Medium (M) Priority

Silver-haired bats often roost in tree cavities or in bark crevices on tree trunks, especially during migration. Their unique coloration makes them blend in with their roosting environment. However, some individuals seem to overwinter in buildings, which may allow them to spend the winter in places that would otherwise be too cold for them. This species was documented in 1986 approximately 1.6 miles southwest of CUP Site No. 1 (approximately 2.7 miles west of CUP Sites No. 6 and 7) in Long Beach just south of the intersection of 20th Street and Maine Avenue; and 5 miles northeast of the CUP sites between I-605 and SR-91 (CNDDB Occurrences #48 and #50; CDFW 2022a). Based on the presence of potential suitable roosting habitat in the ornamental trees within or surrounding the CUP sites, as well as the existing structures/buildings located in CUP Sites No. 5, 6 and 7, this species was determined to have a low to moderate potential to occur.

Big Free tailed Bat (Nyctinomops macrotis)

- CDFW: Special Status Species (SSC)

- IUCN: LC
- WBWG: Medium-High (MH) Priority

This species is a seasonal migrant. It roosts mainly in the crevices of cliff rocks though there is some documentation of roosting in buildings, caves, and tree cavities. This species typically lives in deserts and arid grasslands where rocky outcrops, canyons, or cliffs provide ideal roosts. The big free tailed bat was documented in Long Beach in 1983 approximately 1.5 to 2.5 miles southwest of the CUP sites (CNDDB Occurrence #5; CDFW 2022). Based on the recorded occurrence of this species 1.5 miles from the CUP sites and the presence of potential suitable roosting habitat in the ornamental trees within the CUP sites and existing structures/buildings located in CUP Sites No. 5, 6 and 7, this species has a low to moderate potential to occur.

Monarch Butterfly (Danaus plexippus) Overwintering Population

- Federal Candidate Species
- U.S. Fish and Wildlife Service (USFWS): Sensitive (S)

The monarch butterfly is currently a federal candidate species for listing as endangered. With few exceptions, the overwintering monarch phenomenon in California is dependent on nonnative trees, particularly eucalyptus planted in the mild coastal zone. The success of these overwintering sites in attracting and retaining monarch butterflies is a function of appropriate microclimate. Groves must provide good shelter from wind and a varied light environment ranging from full sun to deep shade. The structure of groves, not the species composition, is the primary determinant of microclimate. Overwintering population of monarch butterflies have been documented approximately 1 mile southeast, 2.4 miles northeast, 3.7 miles east, and 4.4 miles west of the CUP sites. The eucalyptus groves on CUP Site No.5 provides potentially suitable roosting habitat; however, overwintering populations have not been documented onsite and they were not observed during the survey. Based on the recorded observations of monarch butterflies in the region surrounding the CUP sites and the presence of suitable eucalyptus groves, the monarch butterfly has a moderate potential to occur on CUP Site No. 5. At present, no impacts to potentially suitable habitat for monarch butterflies is anticipated. Over the course of the 20-year permit, there is the potential for other CUP sites to develop more extensive eucalyptus habitat that could potentially support monarch butterflies.

Bats

Bats tend to be underreported in biological resources surveys due to a lack of focused surveys targeting their activity periods and roosting sites. Evidence of the presence of roosting bats was not observed on any of the CUP sites during the biological reconnaissance survey. However, potential suitable roosting habitat for bats is present in the existing structures/buildings and ornamental trees on the CUP sites.

Raptors and Migratory Birds

Potential nesting habitat for migratory birds and raptors, which are protected by the Migratory Bird Treaty Act (MBTA; U.S. Fish and Wildlife Service [USFWS] 1918) and California Fish and Game Code, is present in

the ornamental trees, eucalyptus groves, shrubs, utility poles, and structures/buildings on the CUP sites. Habitat for ground-nesting bird species is present on each of the CUP sites. The trees and other vegetation located adjacent to the CUP sites could also provide nesting habitat for raptors and other bird species. Raptors typically breed between February and August, while passerines (e.g., songbirds) generally nest between March and August. During the biological reconnaissance survey, signs of nesting activity was observed in the ornamental trees on CUP Sites No. 6 and 7.

Aquatic Resources

A desktop review of the National Wetland Inventory mapping (USFWS 2022) showed no blue line streams or drainages within any of the CUP sites. A formal aquatic resources delineation was not completed as part of this biological survey and assessment. However, no jurisdictional Waters of the U.S. or Waters of the State were identified on the CUP sites.

DISCUSSION

A biological resources assessment was conducted of the seven CUP sites in the City of Signal Hill, Los Angeles, California. The study included reviews of public databases and a pedestrian survey of the CUP sites. The condition of all of the CUP sites consists primarily of disturbed and developed areas associated with the existing development and ongoing activities. The CUP sites also support nonnative plants species and ornamental trees.

Special status wildlife and plant species were not observed on any of the CUP sites during the biological reconnaissance survey.

Even though evidence of the presence of bats was not observed on any of the CUP sites, the existing structures/buildings and ornamental trees could provide potential habitat for two species of special-status bats (silver-haired bat and big free-tailed bat) and other common species of bats. The potential for the special-status bat species to occur is considered low to moderate, primarily because there have been reported sightings in the vicinity of the CUP sites. Additionally, the Project would not involve the removal of any existing structures/buildings or trees that could affect bat species.

Title 14, Section 251.1 of the California Code of Regulations prohibits harassment (defined in that section as an intentional act that disrupts an animal's normal behavior patterns, including breeding, feeding, or sheltering) of nongame mammals (i.e., bats), and California Fish and Game Code Section 4150 prohibits take or possession of all nongame mammals or parts thereof. Any activities resulting in bat mortality (i.e., the destruction of an occupied bat roost that results in the death of bats), disturbance that causes the loss of a maternity colony of bats (resulting in the death of young), or various modes of nonlethal pursuit or capture may be considered take as defined in Section 86 of the California Fish and Game Code. Impacts to maternity roosting sites of any native bat species, regardless of status, may be considered a significant impact to a "native wildlife nursery site" under the California Environmental Quality Act. Therefore, to ensure potential impacts to roosting bats are avoided, no existing structures/buildings or trees on or near the CUP Sites shall be removed as a result of the Project. A protection measure is provided in the recommendations section to ensure bats are not impacted by the Project.

Evidence of bird nesting activity was observed on the CUP sites during the biological reconnaissance survey. The vegetation observed on the CUP sites, as well as the existing utility poles and buildings/structures may support the nesting activities of raptors and other migratory and resident bird species. Similarly, ground-nesting bird species also have the potential to occur. Nesting migratory birds and raptors are protected by the MBTA and California Fish and Game Code. If new construction, vegetation maintenance, or tree removal activities will be conducted during the nesting season (February 1 through August 31), then there is a potential that nesting birds could be impacted by Project activities. New ground-disturbing or construction activities could directly affect birds protected by the MBTA and their nests through the removal of habitat on the Project and indirectly through increased noise, vibrations, and human activity. To avoid impacting nesting birds during new construction or vegetation management activities, a protection measure is included in the recommendations section.

RECOMMENDATIONS

The following protection measures are recommended to avoid and minimize potential impacts to special-status wildlife species and common wildlife species (i.e., bats, nesting birds) as a result of new construction activities (i.e., gas system improvements at CUP Site #2, and well cellar construction). Note, these measures would not apply to existing and ongoing oil and gas operations occurring at the CUP Sites.

Bat Avoidance Measures. To ensure potential impacts to roosting bats are avoided, no existing structures/buildings or trees located on or near the existing CUP Sites shall be removed or demolished as a result of the Project.

If structures/buildings or trees are removed within the vicinity of the CUP Sites, a pre-construction bat survey shall be conducted by a qualified bat biologist to evaluate structures proposed for demolition, or tree removal that could potentially provide bat roosting habitat as result of the Project. If suitable roosting habitat and/or signs of bat use is identified during the assessment, focused surveys shall be conducted and appropriate avoidance and minimization measures implemented.

Pre-construction Nesting Bird Surveys. New construction activities associated with the proposed Project include installation of the new gas system components at CUP Site #2, as well as construction of new well cellars at the CUP Sites. Therefore, construction of the gas system improvements and new well cellar construction shall be conducted during the non-breeding season for birds (approximately September 1 through January 31) to avoid violations of the MBTA and California Fish and Game Code §§ 3503, 3503.5 and 3513. Although not anticipated, if the new construction activities described above occur during the bird breeding season (February 1 through August 31), a pre-construction nesting bird survey shall be conducted by a qualified biologist who is experienced in the identification of avian species and conducting nesting bird surveys no more than 3 days prior to the start of the construction, vegetation management, or tree removal activities. The nesting bird survey shall include the areas where the activities will

occur and adjacent areas where the activities have the potential to cause indirect impacts to nesting birds. If nesting birds are not observed during the survey, construction activities, vegetation management, or tree removal may begin. If nesting birds (including nesting raptors) are observed during the survey, avoidance or minimization measures shall be implemented by the Project biologist to avoid potential Project-related impacts to active nests. Measures may include but not be limited to biological monitoring during the activities, seasonal work restrictions, or establishment of a no-work buffer around active nests until nesting has been completed as determined through periodic nest monitoring conducted by the biologist. The size of the no-work buffer shall be determined by the Project biologist (depending on the species) until the juveniles have fledged and there has been no evidence of a second attempt at nesting, as determined by the Project biologist.

Thank you for the opportunity to conduct the biological resources assessment for this Project. If you have any questions on this report, please do not hesitate to contact Carla Marriner at (949) 241-9509 or cmarriner@ecorpcosulting.com or Stacie Tennant at (949) 344-8867 or stennant@ecorpconsulting.com.

Sincerely,

Stacie Tennant
Senior Biologist/Project Manager

REFERENCES

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ATTACHMENT A

Database Search Results

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Los Angeles (3411812) OR Long Beach (3311872) OR Inglewood (3311883) OR South Gate (3311882) OR Whittier (3311881) OR Torrance (3311873) OR Seal Beach (3311861) OR San Pedro (3311863) OR Los Alamitos (3311871))
 AND County IS (Los Angeles)

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Agelaius tricolor tricolored blackbird	G1G2 S1S2	None Threatened	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_EN-Endangered NABCI_RWL-Red Watch List USFWS_BCC-Birds of Conservation Concern	20 75	955 S:4	0	0	0	0	1	3	4	0	3	1	0
Anniella stebbinsi Southern California legless lizard	G3 S3	None None	CDFW_SSC-Species of Special Concern USFS_S-Sensitive	31 726	426 S:13	0	0	1	7	1	4	7	6	12	0	1
Aphanisma blitoides aphanisma	G3G4 S2	None None	Rare Plant Rank - 1B.2 SB_SBBG-Santa Barbara Botanic Garden	100 100	82 S:3	0	1	1	0	0	1	1	2	3	0	0
Arizona elegans occidentalis California glossy snake	G5T2 S2	None None	CDFW_SSC-Species of Special Concern	490 490	260 S:1	0	0	0	0	0	1	1	0	1	0	0
Aspidoscelis tigris stejnegeri coastal whiptail	G5T5 S3	None None	CDFW_SSC-Species of Special Concern	591 1,053	148 S:4	1	2	0	0	0	1	1	3	4	0	0
Astragalus hornii var. hornii Horn's milk-vetch	GUT1 S1	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive		28 S:1	0	0	0	0	1	0	1	0	0	0	1
Astragalus tener var. titi coastal dunes milk-vetch	G2T1 S1	Endangered Endangered	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden		6 S:1	0	0	0	0	1	0	1	0	0	1	0
Athene cunicularia burrowing owl	G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	10 790	2011 S:3	0	1	0	0	0	2	2	1	3	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Atriplex coulteri Coulter's saltbush	G3 S1S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank		121 S:2	0	0	0	0	2	0	2	0	0	0	2
Atriplex pacifica south coast saltscale	G4 S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	12 345	109 S:5	0	0	1	0	0	4	1	4	5	0	0
Atriplex parishii Parish's brittlescale	G1G2 S1	None None	Rare Plant Rank - 1B.1 SB_CRES-San Diego Zoo CRES Native Gene Seed Bank USFS_S-Sensitive	15 75	15 S:3	0	0	0	0	1	2	3	0	2	0	1
Atriplex serenana var. davidsonii Davidson's saltscale	G5T1 S1	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden		26 S:2	0	0	0	0	2	0	2	0	0	2	0
Bombus crotchii Crotch bumble bee	G2 S1S2	None None		20 1,200	437 S:11	0	0	0	0	0	11	6	5	11	0	0
Calochortus plummerae Plummer's mariposa-lily	G4 S4	None None	Rare Plant Rank - 4.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	800 1,100	230 S:5	0	2	1	1	1	0	1	4	4	1	0
Calochortus weedii var. intermedius intermediate mariposa-lily	G3G4T3 S3	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden USFS_S-Sensitive	1,050 1,290	197 S:2	0	0	1	1	0	0	0	2	2	0	0
Calystegia felix lucky morning-glory	G1Q S1	None None	Rare Plant Rank - 1B.1	30 30	10 S:2	0	0	0	0	0	2	1	1	2	0	0

Summary Table Report

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California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Centromadia parryi ssp. australis southern tarplant	G3T2 S2	None None	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank SB_SBBG-Santa Barbara Botanic Garden	5 125	94 S:16	0	3	2	0	3	8	9	7	13	0	3
Centromadia pungens ssp. laevis smooth tarplant	G3G4T2 S2	None None	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden		137 S:1	0	0	0	0	1	0	1	0	0	1	0
Chelonia mydas green turtle	G3 S4	Threatened None	IUCN_EN-Endangered	0 0	2 S:1	0	0	1	0	0	0	0	1	1	0	0
Chloropyron maritimum ssp. maritimum salt marsh bird's-beak	G4?T1 S1	Endangered Endangered	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank SB_SBBG-Santa Barbara Botanic Garden	5 35	26 S:3	0	0	0	0	3	0	3	0	0	2	1
Cicindela hirticollis gravida sandy beach tiger beetle	G5T2 S2	None None		10 16	34 S:3	0	0	0	0	3	0	3	0	0	0	3
Cicindela latesignata western beach tiger beetle	G2G3 S1	None None		3 20	27 S:3	0	0	0	0	3	0	3	0	0	0	3
Cicindela senilis frosti senile tiger beetle	G2G3T1T3 S1	None None		10 10	9 S:1	0	0	0	0	1	0	1	0	0	0	1
Coccyzus americanus occidentalis western yellow-billed cuckoo	G5T2T3 S1	Threatened Endangered	BLM_S-Sensitive NABCI_RWL-Red Watch List USFS_S-Sensitive	10 70	165 S:5	0	0	0	0	5	0	5	0	0	0	5

Summary Table Report

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California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Crossosoma californicum Catalina crossosoma	G3 S3	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	580 1,000	80 S:2	0	1	1	0	0	0	1	1	2	0	0
Danaus plexippus pop. 1 monarch - California overwintering population	G4T2T3 S2S3	Candidate None	USFS_S-Sensitive	20 100	383 S:7	0	0	2	0	1	4	3	4	6	1	0
Dudleya multicaulis many-stemmed dudleya	G2 S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden USFS_S-Sensitive		154 S:1	0	0	0	0	0	1	1	0	1	0	0
Dudleya virens ssp. insularis island green dudleya	G3?T3 S3	None None	Rare Plant Rank - 1B.2	70 70	23 S:3	0	1	0	0	0	2	2	1	3	0	0
Empidonax traillii extimus southwestern willow flycatcher	G5T2 S1	Endangered Endangered	NABCI_RWL-Red Watch List	280 280	70 S:3	0	0	0	0	0	3	3	0	3	0	0
Emys marmorata western pond turtle	G3G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_VU-Vulnerable USFS_S-Sensitive	20 48	1404 S:3	0	0	0	0	3	0	3	0	0	3	0
Eryngium aristulatum var. parishii San Diego button-celery	G5T1 S1	Endangered Endangered	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank		83 S:1	0	0	0	0	1	0	1	0	0	0	1
Eumops perotis californicus western mastiff bat	G4G5T4 S3S4	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern WBWG_H-High Priority	50 490	296 S:5	0	0	0	0	0	5	5	0	5	0	0
Glaucopsyche lygdamus palosverdesensis Palos Verdes blue butterfly	G5T1 S1	Endangered None		100 1,200	12 S:7	1	0	0	0	6	0	7	0	1	6	0
Glyptostoma gabrielense San Gabriel chestnut	G2 S2	None None		189 675	24 S:5	0	0	0	0	4	1	5	0	1	4	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Gonidea angulata western ridged mussel	G3 S1S2	None None		283 283	157 S:1	0	0	0	0	1	0	1	0	0	0	1
Habroscelimorpha gabbii western tidal-flat tiger beetle	G2G4 S1	None None		20 30	9 S:2	0	0	0	0	2	0	2	0	0	1	1
Helianthus nuttallii ssp. parishii Los Angeles sunflower	G5TX SX	None None	Rare Plant Rank - 1A	700 700	7 S:2	0	0	0	0	2	0	2	0	0	0	2
Horkelia cuneata var. puberula mesa horkelia	G4T1 S1	None None	Rare Plant Rank - 1B.1 USFS_S-Sensitive	600 600	103 S:1	0	0	0	0	1	0	1	0	0	0	1
Isocoma menziesii var. decumbens decumbent goldenbush	G3G5T2T3 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_CRES-San Diego Zoo CRES Native Gene Seed Bank		126 S:1	0	0	0	0	1	0	1	0	0	0	1
Lasionycteris noctivagans silver-haired bat	G3G4 S3S4	None None	IUCN_LC-Least Concern WBWG_M-Medium Priority	10 60	139 S:2	0	0	0	0	0	2	2	0	2	0	0
Lasiurus cinereus hoary bat	G3G4 S4	None None	IUCN_LC-Least Concern WBWG_M-Medium Priority		238 S:1	0	0	0	0	0	1	1	0	1	0	0
Lasthenia glabrata ssp. coulteri Coulter's goldfields	G4T2 S2	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_SBBG-Santa Barbara Botanic Garden	20 175	111 S:7	0	0	0	0	4	3	7	0	3	4	0
Lepidium virginicum var. robinsonii Robinson's pepper-grass	G5T3 S3	None None	Rare Plant Rank - 4.3		142 S:1	0	0	0	0	0	1	1	0	1	0	0
Lycium brevipes var. hassei Santa Catalina Island desert-thorn	G5T1Q S1	None None	Rare Plant Rank - 3.1	100 100	7 S:1	0	0	1	0	0	0	0	1	1	0	0
Microtus californicus stephensi south coast marsh vole	G5T2T3 S1S2	None None	CDFW_SSC-Species of Special Concern	200 300	7 S:2	0	0	0	0	0	2	2	0	2	0	0

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						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Nama stenocarpa mud nama	G4G5 S1S2	None None	Rare Plant Rank - 2B.2		22 S:1	0	0	0	0	0	1	1	0	1	0	0
Navarretia fossalis spreading navarretia	G2 S2	Threatened None	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank		82 S:1	0	0	0	0	1	0	1	0	0	0	1
Navarretia prostrata prostrate vernal pool navarretia	G2 S2	None None	Rare Plant Rank - 1B.2	40 40	61 S:6	0	0	0	0	6	0	6	0	0	5	1
Nemacaulis denudata var. denudata coast woolly-heads	G3G4T2 S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank	20 20	42 S:2	0	0	0	0	0	2	2	0	2	0	0
Neotoma lepida intermedia San Diego desert woodrat	G5T3T4 S3S4	None None	CDFW_SSC-Species of Special Concern	200 200	132 S:1	0	0	0	1	0	0	1	0	1	0	0
Nyctinomops femorosaccus pocketed free-tailed bat	G5 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern WBWG_M-Medium Priority	50 100	90 S:2	0	0	0	0	0	2	2	0	2	0	0
Nyctinomops macrotis big free-tailed bat	G5 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern WBWG_MH-Medium-High Priority	20 300	32 S:2	0	0	0	0	0	2	2	0	2	0	0
Orcuttia californica California Orcutt grass	G1 S1	Endangered Endangered	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank	40 125	39 S:3	0	0	0	0	3	0	3	0	0	0	3

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						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Passerculus sandwichensis beldingi Belding's savannah sparrow	G5T3 S3	None Endangered	USFWS_BCC-Birds of Conservation Concern	5 5	39 S:1	0	0	0	0	0	1	0	1	1	0	0
Pelecanus occidentalis californicus California brown pelican	G4T3T4 S3	Delisted Delisted	BLM_S-Sensitive CDFW_FP-Fully Protected USFS_S-Sensitive	0 0	27 S:1	1	0	0	0	0	0	1	0	1	0	0
Pentachaeta lyonii Lyon's pentachaeta	G1 S1	Endangered Endangered	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	100 100	45 S:3	0	0	0	0	3	0	3	0	0	3	0
Perognathus longimembris pacificus Pacific pocket mouse	G5T1 S1	Endangered None	CDFW_SSC-Species of Special Concern	30 100	14 S:2	0	0	0	0	2	0	2	0	0	0	2
Phacelia stellaris Brand's star phacelia	G1 S1	None None	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	50 90	15 S:2	0	0	0	0	1	1	2	0	1	1	0
Phrynosoma blainvillii coast horned lizard	G3G4 S3S4	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	10 500	784 S:10	0	0	0	0	10	0	10	0	0	7	3
Polioptila californica californica coastal California gnatcatcher	G4G5T3Q S2	Threatened None	CDFW_SSC-Species of Special Concern NABCI_YWL-Yellow Watch List	50 1,317	1087 S:17	3	4	3	0	2	5	4	13	15	2	0
Ribes divaricatum var. parishii Parish's gooseberry	G5TX SX	None None	Rare Plant Rank - 1A	1,000 1,000	5 S:1	0	0	0	0	1	0	1	0	0	1	0
Riparia riparia bank swallow	G5 S2	None Threatened	BLM_S-Sensitive IUCN_LC-Least Concern	20 60	298 S:4	0	0	0	0	3	1	4	0	1	0	3
Sagittaria sanfordii Sanford's arrowhead	G3 S3	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive	8 8	143 S:1	0	0	0	0	0	1	0	1	1	0	0
Sidalcea neomexicana salt spring checkerbloom	G4 S2	None None	Rare Plant Rank - 2B.2 USFS_S-Sensitive	10 10	30 S:3	0	0	0	0	2	1	3	0	1	2	0
Siphateles bicolor mohavensis Mohave tui chub	G4T1 S1	Endangered Endangered	AFS_EN-Endangered CDFW_FP-Fully Protected	720 720	24 S:1	0	0	0	0	1	0	1	0	0	0	1

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						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Southern Coastal Bluff Scrub	G1	None		40	23	0	0	0	0	0	1	1	0	1	0	0
Southern Coastal Bluff Scrub	S1.1	None		40	S:1											
Southern Coastal Salt Marsh	G2	None			24	0	0	0	0	0	1	1	0	1	0	0
Southern Coastal Salt Marsh	S2.1	None			S:1											
Spea hammondii	G2G3	None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_NT-Near Threatened	21	1422	0	2	0	1	8	0	10	1	3	7	1
western spadefoot	S3	None		1,190	S:11											
Sternula antillarum browni	G4T2T3Q	Endangered	CDFW_FP-Fully Protected NABCI_RWL-Red Watch List	5	75	0	0	0	0	4	3	7	0	3	0	4
California least tern	S2	Endangered		30	S:7											
Streptocephalus woottoni	G1G2	Endangered	IUCN_EN-Endangered	80	83	0	0	0	0	0	1	0	1	1	0	0
Riverside fairy shrimp	S1S2	None		80	S:1											
Suaeda esteroa	G3	None	Rare Plant Rank - 1B.2	0	39	0	1	0	0	0	2	1	2	3	0	0
estuary seablite	S2	None		5	S:3											
Symphyotrichum defoliatum	G2	None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_CRES-San Diego Zoo CRES Native Gene Seed Bank USFS_S-Sensitive	10	102	0	0	0	0	5	0	5	0	0	0	5
San Bernardino aster	S2	None		20	S:5											
Symphyotrichum greatae	G2	None	Rare Plant Rank - 1B.3 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden		56	0	0	0	0	2	0	2	0	0	2	0
Greata's aster	S2	None			S:2											
Taxidea taxus	G5	None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	280	594	0	0	0	0	0	1	1	0	1	0	0
American badger	S3	None		280	S:1											
Tryonia imitator	G2	None	IUCN_DD-Data Deficient	50	39	0	0	0	0	1	1	1	1	1	0	1
mimic tryonia (=California brackishwater snail)	S2	None		59	S:2											

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						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Vireo bellii pusillus least Bell's vireo	G5T2 S2	Endangered Endangered	IUCN_NT-Near Threatened NABCI_YWL-Yellow Watch List	50 600	504 S:7	0	0	0	0	7	0	7	0	0	7	0
Walnut Forest Walnut Forest	G1 S1.1	None None		700 700	6 S:1	0	1	0	0	0	0	1	0	1	0	0

ScientificName	CommonName	Family	Lifeform	CRPR	GRank	SRank	CESA	FESA	BloomingPeriod
Chloropyron maritimum ssp. maritimum	salt marsh bird's-beak	Orobanchaceae	annual herb (hemiparasit	1B.2	G4?T1	S1	CE	FE	May-Oct(Nov)
Astragalus pycnostachyus var. lanosissimus	Ventura Marsh milk-vetch	Fabaceae	perennial herb	1B.1	G2T1	S1	CE	FE	(Jun)Aug-Oct
Astragalus tener var. titi	coastal dunes milk-vetch	Fabaceae	annual herb	1B.1	G2T1	S1	CE	FE	Mar-May
Suaeda esteroa	estuary seablite	Chenopodiaceae	perennial herb	1B.2	G3	S2	None	None	(Jan-May)Jul-Oct
Abronia maritima	red sand-verbena	Nyctaginaceae	perennial herb	4.2	G4	S3?	None	None	Feb-Nov
Nemacaulis denudata var. denudata	coast woolly-heads	Polygonaceae	annual herb	1B.2	G3G4T2	S2	None	None	Apr-Sep
Suaeda taxifolia	woolly seablite	Chenopodiaceae	perennial evergreen shrub	4.2	G4	S4	None	None	Jan-Dec

A search for the United States Geological Survey (USGS) 7.5-Minute Topographic Map Long Beach Quadrangle, plus the surrounding eight topographic quadrangles, including South gate, Inglewood, Whittier, Torrance, Seal beach, San Pedro, Los Alamitos, and Los Angeles within a range of 0-400 feet elevation provided information regarding the distribution and habitats of special status plants in the vicinity of the Project. Area.

ATTACHMENT B

Representative Site Photographs

Photo 1: CUP Site No.1. View of oil injectors within the middle portion of the site. Disturbed/developed land cover is observed throughout the site, facing southeast.

Photo 2: CUP Site No.1. View of palm trees outside the site boundary; climbing fig observed on the walls, facing southwest.

Photo 3: CUP Site No.1. View from the middle portion of the site, facing northeast.

Photo 4: CUP Site No. 2. View of oil injectors, structures and typical land cover within the site; ornamental trees observed in the background, facing southwest.

Photo 5: CUP Site No. 2. View of eucalyptus trees on the northeast corner outside the site.

Photo 6: CUP Site No.2. Site entrance; view of disturbed/developed land cover, facing northwest.

Photo 7: CUP Site No.3. View of disturbed/developed land cover; ornamental trees in the background outside the site boundary, facing southeast.

Photo 8: CUP Site No.4. View of structures and oil injectors within the site; mature eucalyptus trees in the background, facing southwest.

Photo 9: CUP Site No. 5. View of disturbed/developed land cover; eucalyptus grove along western edge, facing west.

Photo 10: CUP Site No. 5. Ornamental trees on steep slope, along roadside, facing northeast.

Photo 11: CUP Site No. 5. Ornamental trees along steep slope between two working areas of the site, facing southwest.

Photo 12: CUP Site No. 6. Ornamental trees outside boundary wall, facing northeast.

Photo 13: CUP Site No. 6. View of existing structures within the site; eucalyptus trees along boundary wall, facing northwest.

Photo 14: CUP Site No. 6, West side of site; palm trees to the left and eucalyptus trees to the right, facing north.

Photo 15: CUP Site No. 7. View of disturbed/developed land cover; active oil producer observed in the background, facing northwest.