
APPENDIX D3
Health Risk Assessment



MEMO

TO: Kevin Beery, Planning Division, City of Redlands

FROM: Michael B. Rogozen, D. Env.

DATE: Wednesday, May 14, 2025

PROJECT #: 7214

RE: Screening Health Risk Assessment for Kaiser Permanente Medical Center, Redlands, CA

1.0 INTRODUCTION AND PURPOSE

This memorandum supports a Program Environmental Impact Report (PEIR) under the California Environmental Quality Act (CEQA) for the proposed expansion of medical facilities at the Kaiser Permanente Medical Center at 1301 California Street in the city of Redlands, California. After UltraSystems Environmental Inc. (UltraSystems) determined, through an initial study, which types of environmental impacts from this project would be potentially significant and needed further evaluation, the City of Redlands issued a Notice of Preparation (NOP) of the PEIR.¹

In response to the NOP, the South Coast Air Quality Management District (SCAQMD), as a Responsible Agency under CEQA Guidelines §15096, sent the City recommendations for the CEQA air quality analysis that was to be done.² Noting that the proposed project is near several warehouses, the SCAQMD said, "... to facilitate the purpose of an EIR as an informational document, it is recommended that the Lead Agency perform a mobile source health risk assessment to disclose the potential health risks." In a subsequent telephone conversation,³ Mr. Sam Wang of the SCAQMD clarified to UltraSystems that the recommendation was for a qualitative discussion of the fact that the project will put future onsite medical workers and patients at some risk because of the diesel particulate emissions from the warehouses and the diesel trucks that visit them. A qualitative discussion of this issue is in **Section 4.2.6** of the PEIR.

On April 3, 2025, in a follow-up email, Mr. Wang said that if the proposed project is not expected to generate "a significant number of diesel mobile sources during operation," the EIR can explain that the SCAQMD's Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source

¹ City of Redlands, Notice of Preparation of a Program Environmental Impact Report for the Proposed Kaiser Permanente Medical Center Project in the City of Redlands. January 21, 2025. Available online at https://www.cityofredlands.org/sites/main/files/file-attachments/1 - kaiser_nop_and_public_scoping_meeting.pdf.

² Notice of Preparation of a Draft Program Environmental Impact Report for the Kaiser Permanente Medical Center Project (Proposed Project) (SCH No. 2025010666). Letter from Sam Wang, South Coast Air Quality Management District, to Kevin Beery, City of Redlands. February 13, 2025.

³ Telephone conversation between Sam Wang, South Coast Air Quality Management District and Michael Rogozen, UltraSystems Environmental, Inc. February 28, 2025.

Diesel Idling Emissions for CEQA Air Quality Analysis does not apply to the project.⁴ However, in the same email, Mr. Wang stated, “If implementation of the Proposed Project would require the use of new stationary or portable sources—such as emergency generators, fire water pumps, or boilers—air permits from South Coast AQMD will be required, and an evaluation of the associated air quality, health risk, and greenhouse gas impacts should be included in your CEQA document.” The only permitted sources likely to emit toxic air contaminants will be diesel-powered emergency generators.

The air quality analysis for this project determined that emergency generators for the new facilities would be a source of diesel particulate matter (DPM), a known carcinogen, during operations. The South Coast Air Quality Management District (SCAQMD) has established CEQA significance levels for cancer and noncancer risk. These are:⁵

- Maximum incremental cancer risk (MICR) ≥ 10 in 1 million.
- Cancer burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million).
- Chronic and acute hazard index ≥ 1.0 (project increment).

The purpose of this analysis was to determine whether a full, formal health risk assessment (HRA) under SCAQMD guidelines would be necessary.

2.0 PROJECT SETTING

Figure 1 shows the project site and its surroundings.⁶ An existing Kaiser Permanente medical office building (not part of the project) is on the east side of the property. The Kaiser property on which the proposed project will operate is surrounded on all four sides by commercial structures, most of which are warehouses and office buildings. Interstate 10 is approximately 0.25 mile to the south, and the runways of San Bernardino International Airport are approximately 1.4 miles to the northwest. The nearest residence is about 2,440 feet from the center of the project site. The nearest school is about a mile away. The nearest worker exposures would be at the existing Kaiser medical office building about 295 feet to the east of the project.

3.0 PROJECT DESCRIPTION

The proposed project will be implemented in four phases. **Table 1** summarizes the proposed key project features in each phase of development. Estimated completion dates for the four phases are: Phase 1, 2029; Phase 2, 2039; Phase 3, 2045; and Phase 4, 2050.⁷

⁴ Email from Sam Wang, South Coast Air Quality Management District, to Michael Rogozen, UltraSystems Environmental Inc. April 3, 2025.

⁵ South Coast Air Quality Management District, 2023. South Coast AQMD Air Quality Significance Thresholds, March 2023. Available at https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf?sfvrsn=f7601d61_25. Last accessed April 22, 2025.

⁶ This figure is in Attachment 1 to this memorandum.

⁷ Email from Kevin Beery, Senior Planner, City of Redlands, to Robert Reicher, UltraSystems Environmental Inc., 2004.

Table 1
PROJECT SUMMARY

Phase	Description	Purpose	Building Square Feet	Footprint Square Feet	Building Height (Feet)	Levels
Existing	Medical Office Building 1	Medical Office	120,000	40,000	Existing	3
1	ASC/ Medical Office Building 2	Ambulatory Surgery/ Medical Office	165,000	36,000	62	4
2	Hospital	213 Bed Acute Care Hospital	400,000	122,000	107	7+base-ment
2	Central Utilities	Mechanical & Electrical Utilities	35,000	15,000	18	2+base-ment
3	Medical Office Building 3	Medical Office	83,000	20,000	62	4
4	Hospital Addition	108 Bed Hospital Addition	180,000	30,000	77	5+base-ment

4.0 OPERATIONAL AIR TOXICS EMISSIONS

To obtain an idea of the types and quantities of toxic air contaminant (TAC) emissions from project operations, we searched for permitted equipment information in the SCAQMD’s Facility Information detail (F.I.N.D.) online database.⁸ For an example, we chose the Kaiser Foundation Hospital at 28525 South Vermont Avenue, in Harbor City, California (Facility ID 43522). This facility’s only active operating permits were for diesel-powered internal combustion engine-based emergency electrical generators and natural gas-fired boilers. We did not consider the boilers because the project will generate base load electricity and heat without burning fossil fuels.

The Harbor City facility has five diesel-powered electrical generators with power rating ranging from 170 to 2,206 brake horsepower (BHP). **Table 2** summarizes their characteristics.

⁸ Available at <https://xappprod.aqmd.gov/find/>.

Table 2
PERMITTED EMERGENCY GENERATORS AT KAISER HARBOR CITY HOSPITAL

A/N ^a	Manufacturer	Model	Cylinders	BHP ^b	Hrs/yr ^c	DPF ^d
625969	Caterpillar	3512C-DTA	12	2206	200	Yes
542470	Caterpillar	3512C-DTA	12	2206	200	No
542469	Caterpillar	3512C-DTA	12	2206	200	No
453920	Detroit Diesel	R1237M36	12	985	200	No
412661	Cummins	6BT5-G6	6	170	199	No
^a SCAQMD permit application number. ^b BHP = brake horsepower. ^c Maximum permitted hours per year. Typical permitted hours per year for maintenance and testing is 50. ^d DPF = Diesel particulate filter installed on generator exhaust.						

For the screening HRA, we assumed that the project at full buildout would have five Caterpillar Model 3512C-DTA diesel-fueled internal combustion electrical generators. We assumed that no add-on particulate filters or other emission controls would be used. This is a conservative assumption because by 2050 a high percentage of emergency generators would meet Tier 4 requirements and have lower emissions. All five engines would have a power rating of 2,206 BHP. It was also assumed that the engines would be operated 50 hours per year for testing and maintenance.⁹

5.0 SCREENING METHODOLOGY

Emergency generators at the proposed Kaiser facility would be subject to SCAQMD Rule 1401 (New Source Review of Toxic Air Contaminants), as last amended on September 1, 2017. Pursuant to Rule 1401(e), the SCAQMD has published guidelines for reviewing permit applications for equipment subject to this rule. The latest guidelines are Risk Assessment Procedures for Rules 1401, 1401.1 and 212.¹⁰ The procedures cover four “tiers” of analysis:¹¹

- Tier 1 HRA: Screening Emission Levels.
- Tier 2 HRA: Screening Risk Assessment.
- Tier 3 HRA: Screening Dispersion Modeling.
- Tier 4 HRA: Detailed Health Risk Assessment.

The tiers are designed to be used in order of increasing complexity with each higher tier providing a more refined estimate of risk than the lower tier. If compliance cannot be demonstrated using one tier, the permit applicant may proceed to the next tier or limit the emissions so that compliance can

⁹ Operating permits would likely allow up to 200 hours per year of operation for any purpose, leaving 150 hours per year for emergencies. Any prediction of emergency hours per year over the 30-year screening HRA exposure period would be speculative, although it is highly unlikely that the 150 hours would be needed every year during that period.

¹⁰ Risk Assessment Procedures for Rules 1401, 1401.1, and 212. Version 9.0. October 31, 2024. South Coast Air Quality Management District, Diamond Bar CA. Available online at https://www.aqmd.gov/docs/default-source/permitting/hra-procedures/hraprocedures9-0_103124.pdf?sfvrsn=8. Last accessed May 5, 2025.

¹¹ SCAQMD, Op. Cit., p. 4.

be demonstrated. A permit applicant who can show compliance by using a lower tier does not need to perform an analysis for the higher tiers.¹²

The SCAQMD has recently made available an online “HRA Tool,”¹³ which does the calculations required for Tiers 1 through 3. As the project “screened out” at Level 2, only Tiers 1 and 2 will be discussed.

5.1 Tier 1 Screening Analysis

5.1.1 Emissions Estimate

Since a Rule 1401 risk assessment is usually performed for one piece of permitted equipment at a time, emissions were first calculated for one engine, and the results were multiplied by 5. Emissions were calculated by:

$$E = \text{BHP} \times \text{hours/year} \times \text{LF} \times \text{hours per year} \times \text{EF}$$

where

$$\text{BHP} = \text{Brake horsepower}$$

$$\text{LF} = \text{Load factor (fraction of maximum BHP actually used)}$$

$$\text{EF} = \text{Emission factor (grams per horsepower hour)}$$

As a worst case, LF was assumed to be 1; i.e., the engine was assumed to run continuously at the maximum rate. Each engine was assumed to operate for one hour per week, for 50 weeks per year. The assumed engine type has been certified by the SCAQMD to satisfy all regulatory requirements. Emission factors for criteria pollutants for this and other certified engines makes and models are found on the SCAQMD website.¹⁴ No emission factors for DPM are listed. Instead, the compilation lists emission factors for “PM,” which we assume to be particulate matter with a median aerodynamic diameter of 10 micrometers and is known as “PM₁₀.” Since DPM’s fraction of PM₁₀ is generally less than one, use of a PM₁₀ emission factor represents a maximum emissions case. The emission factor listed for the 2,206-BHP engines shown in **Table 2** is 0.084 grams per brake horsepower hour (g/BHP-hr). Annual emissions were estimated as follows.

$$\begin{aligned} \text{BHP-hr} &= \text{BHP} \times \text{LF} \times \text{hours} \\ &= (2206 \text{ BHP})(1)(50 \text{ hr/yr}) \\ &= 110300 \text{ BHP-hr/yr} \end{aligned}$$

$$\begin{aligned} E &= (\text{BHP-hr/yr}) \times \text{EF} \\ &= (110300 \text{ BHP-hr/yr})(0.084 \text{ g/BHP-hr}) \end{aligned}$$

¹² Ibid.

¹³ Health Risk Assessment Tool and AERMOD-Ready Meteorological Data Files for Use in South Coast Air Quality AQMD permit Applications and CEQA Purposes. South Coast Air Quality Management District, Diamond Bar, CA. Available online at https://www.aqmd.gov/assets/aermet/AERMET_files_And_HRA_Tool.html. Last accessed May 2, 2025.

¹⁴ South Coast Air Quality Management District Certified ICE-Emergency Generators, Diesel Fuel, Except as Specified. Updated December 20, 2024. Available at <https://www.aqmd.gov/home/programs/business/business-detail?title=certified-equipment&parent=certified-products>. Last accessed on May 6, 2025.

$$= (9265.2 \text{ g/yr}) / (453.6 \text{ lb/g}) = \mathbf{20.43 \text{ lb/year per generator}}$$

5.1.2 Analysis

This analysis depends only on the annual mass emissions of a toxic air contaminant. The HRA Tool uses the worst-case air pollutant dispersion from a non-buoyant source anywhere in the South Coast Basin and calculates TAC concentrations at 25, 50 and 100 meters. The concentrations are then divided by a pollutant-specific Annual Pollutant Screening Level ($PSL_{TAC, Annual}$) to obtain the Pollutant Screening Index (PSI_{TAC}). If the PSI is less than or equal to one, then no further risk assessment is needed. If the PSI exceeds one, then the analysis moves to Tier 2.

5.2 Tier 2 Screening Analysis

For the Tier 2 screening analysis, the HRA Tool does simplified, but more project-specific, dispersion modeling and then calculates carcinogenic risk and chronic and acute noncancer risk. Since no acute risk criteria have been developed for DPM, the tool only calculates chronic noncancer risk for that TAC. HRA Tool inputs include:

- Maximum annual emissions of the TAC.
- The distance from the source to the nearest offsite residential and worker receptor(s). For a point source, such as a diesel generator, the distance is from the center of the generator stack to the property line of the nearest receptor location.
- Certain source characteristics such as stack height and building dimensions. For certain types of emissions sources, including diesel-fueled emergency generators, the HRA Tool has default values for several of these source characteristics.
- Operating schedule of the source.
- Geographic location of the source; this determines the local meteorology. The SCAQMD has divided its jurisdiction into 38 source/receptor areas (SRAs).

Three types of risk calculation results are reported:

- Maximum individual cancer risk: number in one million.
- Cancer burden: number of cases per million population.
- Noncancer hazard index: average annual exposure divided by pollutant-specific reference exposure level (REL); both values are in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Note that the cancer burden is not calculated if the cancer risk is less than one in one million.

6.0 SCREENING RESULTS

6.1 Tier 1 Screening Results

Inputs and results for the Tier 1 screening are in **Attachment 2**. The nearest residential receptor is 740 meters away. The screening index for cancer or chronic noncancer risk is **2.43** for one engine and would be **12.15** for five engines. Thus, the project “fails” the Tier 1 screening, and we must go to

Tier 2. Note that no result was calculated for acute (maximum hourly) exposure, because no Acute Pollutant Screening Level for DPM has been established.

6.2 Tier 2 Screening Results

Table 3 shows the inputs to the Tier 2 module of the SCAQMD’s HRA Tool. **Table C** summarizes the results. See **Attachment 3** for additional information. Results are in **Table 4**.

Table 3
INPUTS TO TIER 2 HRA TOOL

Parameter	Value
Pollutant	Diesel particulate matter
Equipment Type	Diesel internal combustion engine
Power rating	2,206 BHP
Annual emissions	20.43 lb/year
Distance to nearest residence	740 meters ^a
Distance to nearest worker	90 meters ^a
Distance to nearest school	1,609 meters ^a
Exposure period for residences	30 years
Exposure period for worker	25 years
Operating hours per day	1
Operating days per week	1
Source/receptor area	35
^a The distances reported in Section 2 were converted to meters for input to the HRA Tool.	

Table 4
TIER 2 HRA RESULTS

Receptor	Maximum Incremental Cancer Risk (per million)		Chronic Hazard Index Target Organ: Respiratory System	
	Per Engine	Facility	Per Engine	Facility
Residential	0.231	1.2	0.000062	0.00031
School	0.217	1.1	0.000058	0.00029
Worker	0.402	2.0	0.00041	0.0021

The facilitywide MICR is less than the CEQA threshold of 10 in one million and the chronic hazard index is less than the CEQA threshold of 1.0. As discussed above, cancer burden is considered only where the MICR is greater than or equal to 1 in one million. Although the Tier 2 screening level for the project does slightly exceed 1 in one million, the risk calculations are deliberately designed to produce risk values greater than what they would be if more realistic, project-specific dispersion modeling were performed. As a result, a Tier 3 or Tier 4 screening analysis would very likely show MICR values less than 1 in one million.

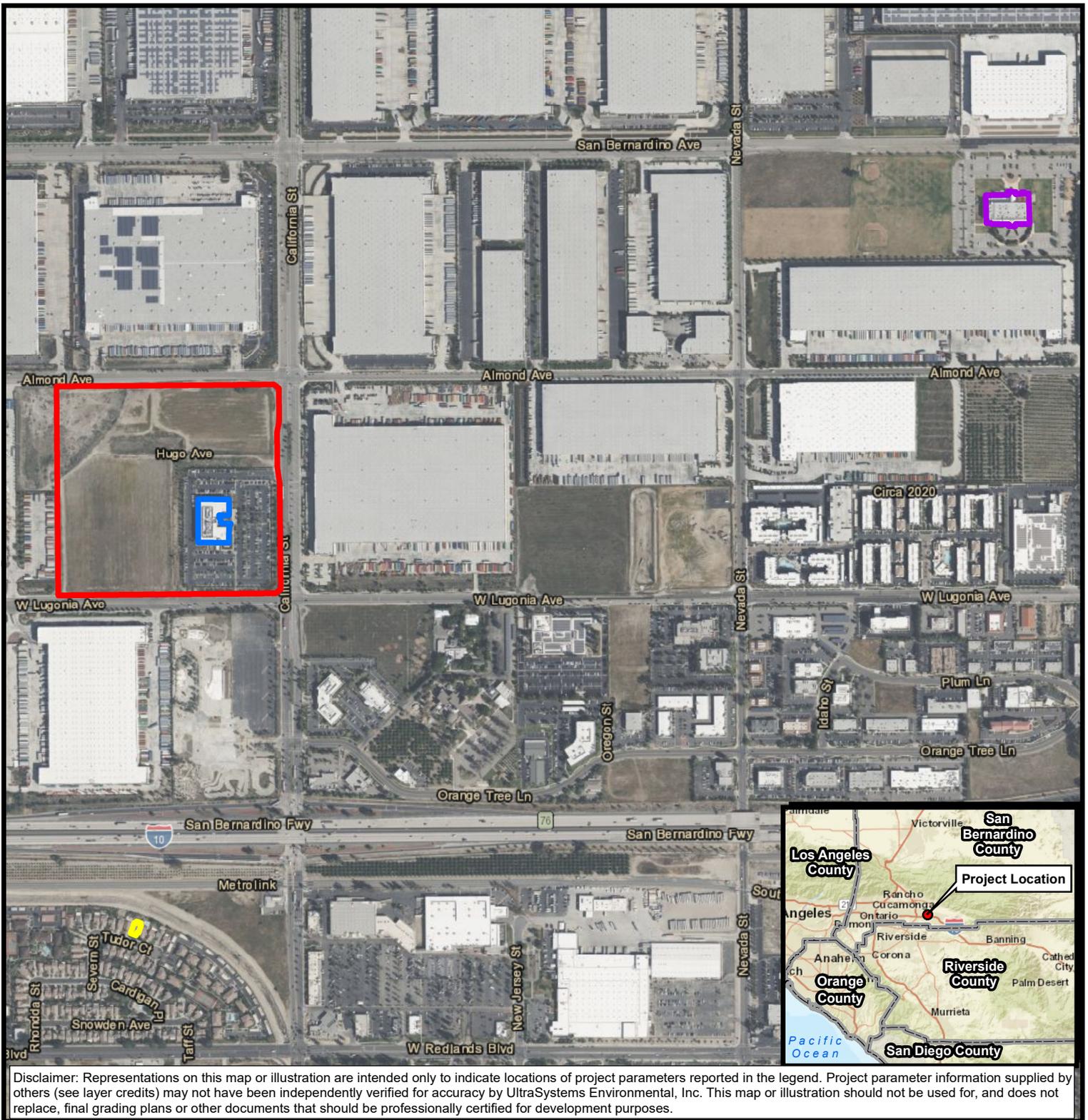
7.0 CONCLUSIONS

Cancer and chronic noncancer health risks to the surrounding community from operation of diesel emergency generators will be less than significant and no additional HRA analysis is needed. No mitigation is necessary.

attachments

ATTACHMENT 1

Figure 1



Disclaimer: Representations on this map or illustration are intended only to indicate locations of project parameters reported in the legend. Project parameter information supplied by others (see layer credits) may not have been independently verified for accuracy by UltraSystems Environmental, Inc. This map or illustration should not be used for, and does not replace, final grading plans or other documents that should be professionally certified for development purposes.

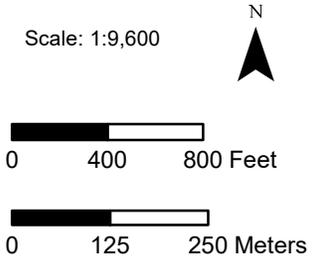
Legend

Sensitive Receptors for HRA

- Project Boundary
- Nearest Residence
- Nearest School
- Nearest Worker

Kaiser Permanente Medical Center

Sensitive Receptors for Screening Health Risk Assessment



ATTACHMENT 2
Tier 1 Screening Results

Screening Index results for Kaiser Redlands Expansion (CEQA). Deemed complete date: 2025-05-06

Toxic Air Contaminant (CAS No)	Date Toxicity Criteria Last Updated	Highest long term risk from	Cancer Slope Factor	Acute REL ug/m3	Chronic REL ug/m3	Chronic 8hr REL ug/m3	Screening Index for cancer, 8hr or chronic at 740m	Screening Index for acute exposure at 740m
Diesel engine exhaust, particulate matter (Diesel PM) (9901)	10/16/2000	Cancer	1.1		5		2.43339432	
Total							2.43339432	0

ATTACHMENT 3
Tier 2 Screening Results

Tier 2 User Inputs

Description	Value
Date & time files saved	2025-05-06 23:03:38
Facility Name	Kaiser Redlands Expansion CEQA)
Deemed complete date	2025-05-06
Facility type selected	Diesel Reciprocating Internal Combustion Engines
Equipment characteristics selected	600 < Rating ≤ 1150 BHP
Project duration	30 yrs (25 yrs for workers)
Hours of operation per day	1
Days of operation per week	1
Residential receptor distance	740
School receptor distance	1609
Worker receptor distance	94
Meteorological station selected	RDLD

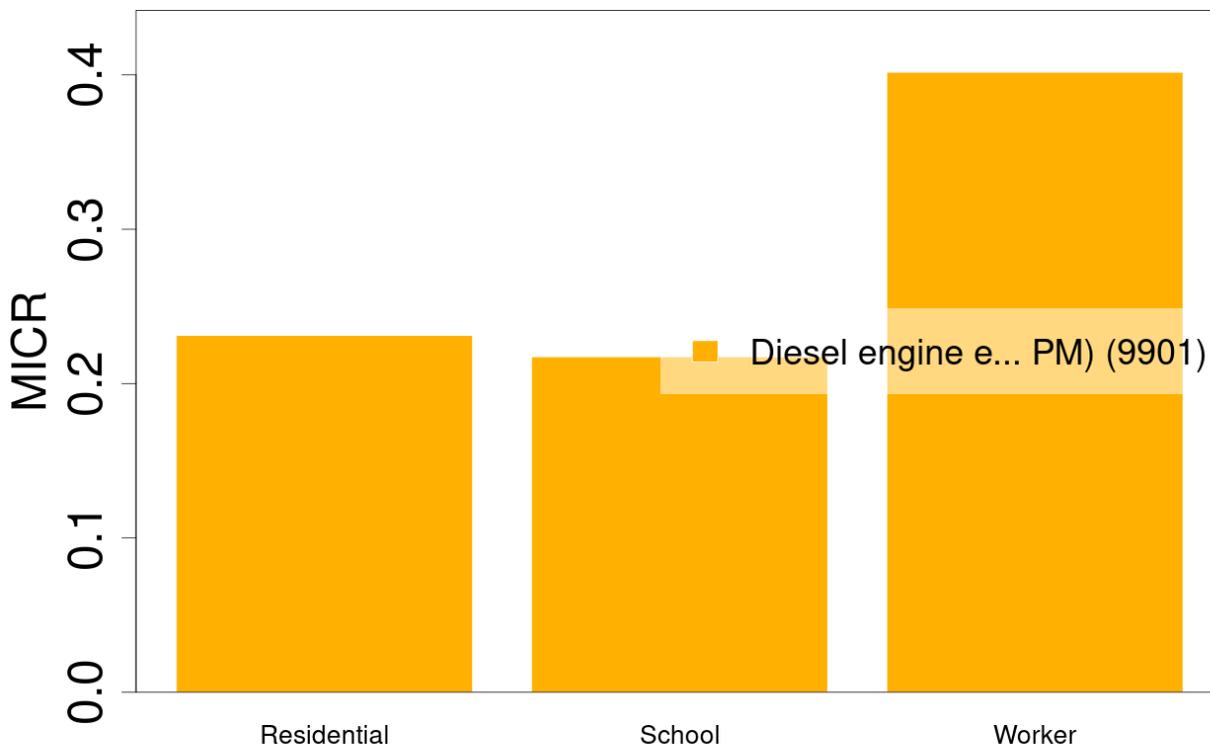
Emissions

Toxic Air Contaminant (CAS No)	Max hourly ER (lb/hr)	Max annual ER (lb/yr)
Diesel engine exhaust, particulate matter (Diesel PM) (9901)	0.4085	20.43

Health Impacts

Receptor	Annual mean conc. of Diesel engine exhaust, particulate matter (Diesel PM) (9901) ($\mu\text{g}/\text{m}^3$) from Diesel Reciprocating Internal Combustion Engines with $600 < \text{Rating} \leq 1150$ BHP at RDLD	MICR from Diesel engine exhaust, particulate matter (Diesel PM) (9901), per million	MICR, per million	HQ Chronic	HQ Chronic 8hr	Max hourly conc of Diesel engine exhaust, particulate matter (Diesel PM) (9901) ($\mu\text{g}/\text{m}^3$) from Diesel Reciprocating Internal Combustion Engines with $600 < \text{Rating} \leq 1150$ BHP	HQ Acute
Residential	0.000310283	0.23120403	0.23120403	6.2057E-05		1.09	
School	0.000291638	0.21731133	0.21731133	5.8328E-05		0.637	
Worker	0.001556439	0.40167522	0.40167522	0.00031129		14	

MICR



Carcinogenic, Chronic, Chronic 8-Hour and Acute impacts for Kaiser Redlands Expansion (CEQA).

Deemed complete date: 2025-05-06

Receptor	MICR, per million	HQ Chronic	HQ Chronic 8hr	HQ Acute
Residential	2.31E-01	6.21E-05		
School	2.17E-01	5.83E-05		
Worker	4.02E-01	3.11E-04		

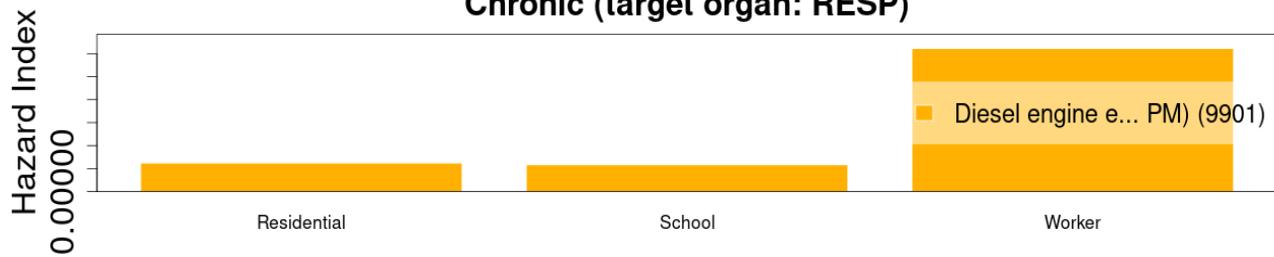
Tier 2 Health Impacts Breakdown

Toxic Air Contaminant (CAS No)	Contribution to Total	Max Impacted Target Organ	Receptor Type	Acute REL (ug/m3)	Chronic REL (ug/m3)	Chronic 8hr (REL ug/m3)
Diesel engine exhaust, particulate matter (Diesel PM) (9901)	6.20565E-05	RESP	HI Residential Chronic		5	
Diesel engine exhaust, particulate matter (Diesel PM) (9901)	5.83277E-05	RESP	HI School Chronic		5	
Diesel engine exhaust, particulate matter (Diesel PM) (9901)	0.000311288	RESP	HI Worker Chronic		5	

Acute

No Hazard Indices for selected TACs

Chronic (target organ: RESP)



Chronic 8hr

No Hazard Indices for selected TACs