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MEMORANDUM

To:	Robin F. Cobbs, Santa Barbara County Air Pollution Control District
From:	Adam Poll, Dudek
Subject:	AB 2588 2018 Risk Reduction Audit and Plan for the University of California, Santa Barbara
Date:	December 9, 2025
cc:	Ali Aghayan and Mason King, University of California, Santa Barbara
Attachment(s):	A – Modeling Protocol Tables for HRA Report and ARAM Files B – AERMOD Modeling Files

1 Introduction

1.1 Purpose

Dudek prepared a risk reduction audit and plan (RRAP) to identify the sources that contribute to acute non-cancer health impact exceedances and ways to reduce them below the Santa Barbara County Air Pollution Control District (SBCAPCD) thresholds from operation of the University of California, Santa Barbara (UCSB). The analysis in this HRA uses air dispersion modeling methodology to evaluate potential public health risks associated with the project. Results of the modeling analysis are compared with the most recent significance thresholds established by the SBCAPCD in accordance with the SBCAPCD's *Modeling Guidelines for Health Risk Assessments (APCD-15i)* (SBCAPD 2025). This RRAP was prepared in accordance with the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) with an Air Toxics Emission Inventory Plan (ATEIP) approved by the SBCAPCD on March 30, 2023, an Air Toxics Emissions Inventory Report (ATEIR) approved by the SBCAPCD on May 3, 2023, the Health Risk Assessment (HRA) approved by the SBCAPCD on May 28, 2025, and the HRA Addendum dated September 12, 2025. This RRAP utilizes the Tier 2 approach used in the HRA approved by the SBCAPCD on May 28, 2025.

1.2 Facility Information

Stationary Source Name: University of California, Santa Barbara

Stationary Source Identification Number (SSID): 02795

Location: Office of Environmental Health & Safety, Building 565, Santa Barbara, California 93106

All facility names and facility identification numbers (FIDs) associated with the stationary source:

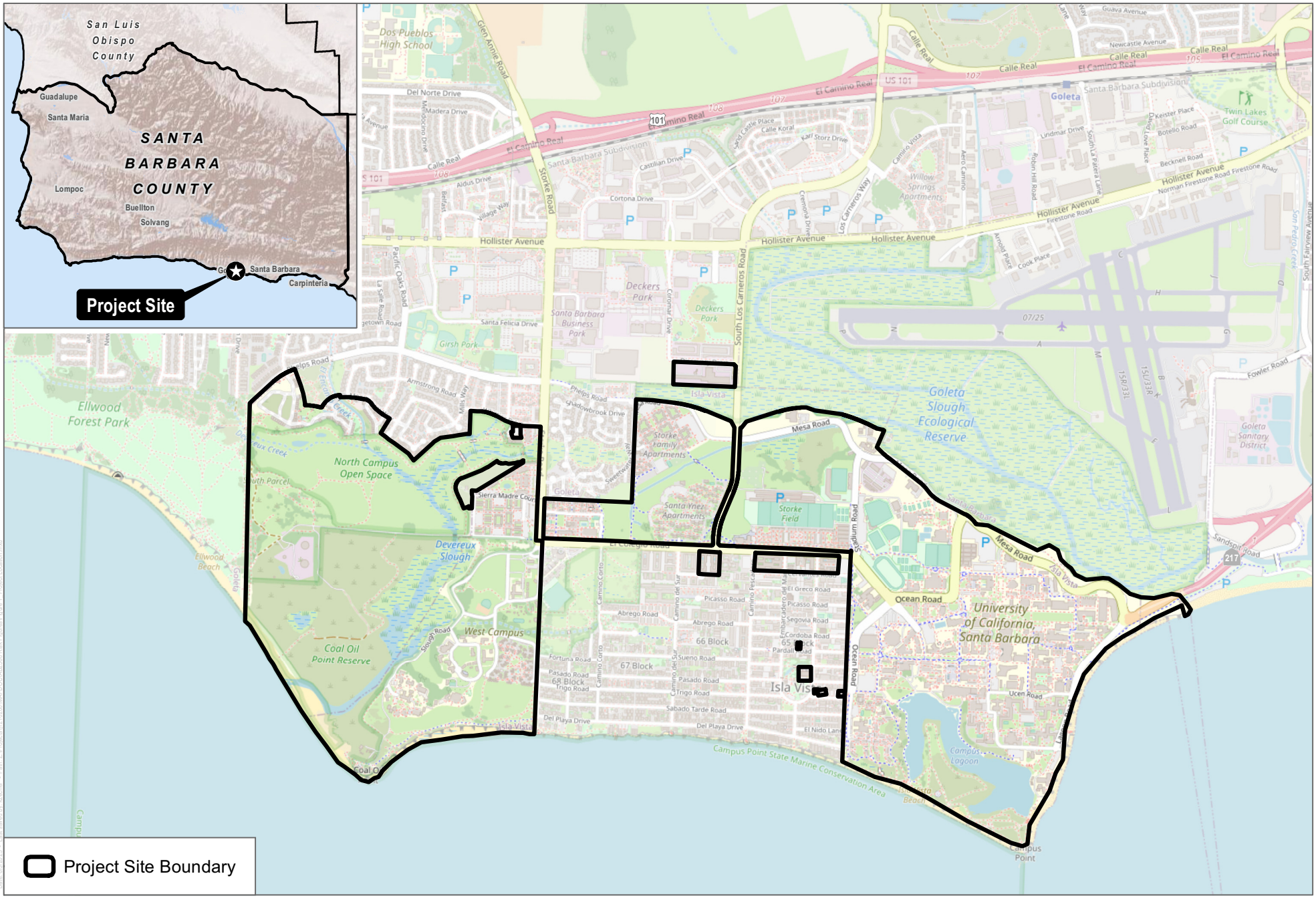
02795

Location (street address and UTM coordinates, including datum): Office of Environmental Health & Safety, Building 565, Santa Barbara, California 93106; (238036.80m E, 3812437.44m N); WGS84.

The boundary locations for the facility are provided in Appendix C to the approved 2018 ATEIR. The property boundary coordinates were used to set up the receptor grid for dispersion modeling.

Description of stationary source operations: This facility consists of a university campus located in Santa Barbara, California. Natural gas–fired external combustion equipment is used for space heating and diesel-fired internal combustion engines are used for emergency backup power. There are also two gasoline-fueling stations, two paint spray booths, laboratory processes, and a hazardous waste collection center (HWCC). The facility and its emitting sources currently operate under SBCAPCD PTO 13725-R3 and Part 70 Operating Permit 13725.

Plot plan of stationary source: See Figures 1 and 2 for the plot plan and aerial maps for UCSB.



SOURCE: Open Street Map

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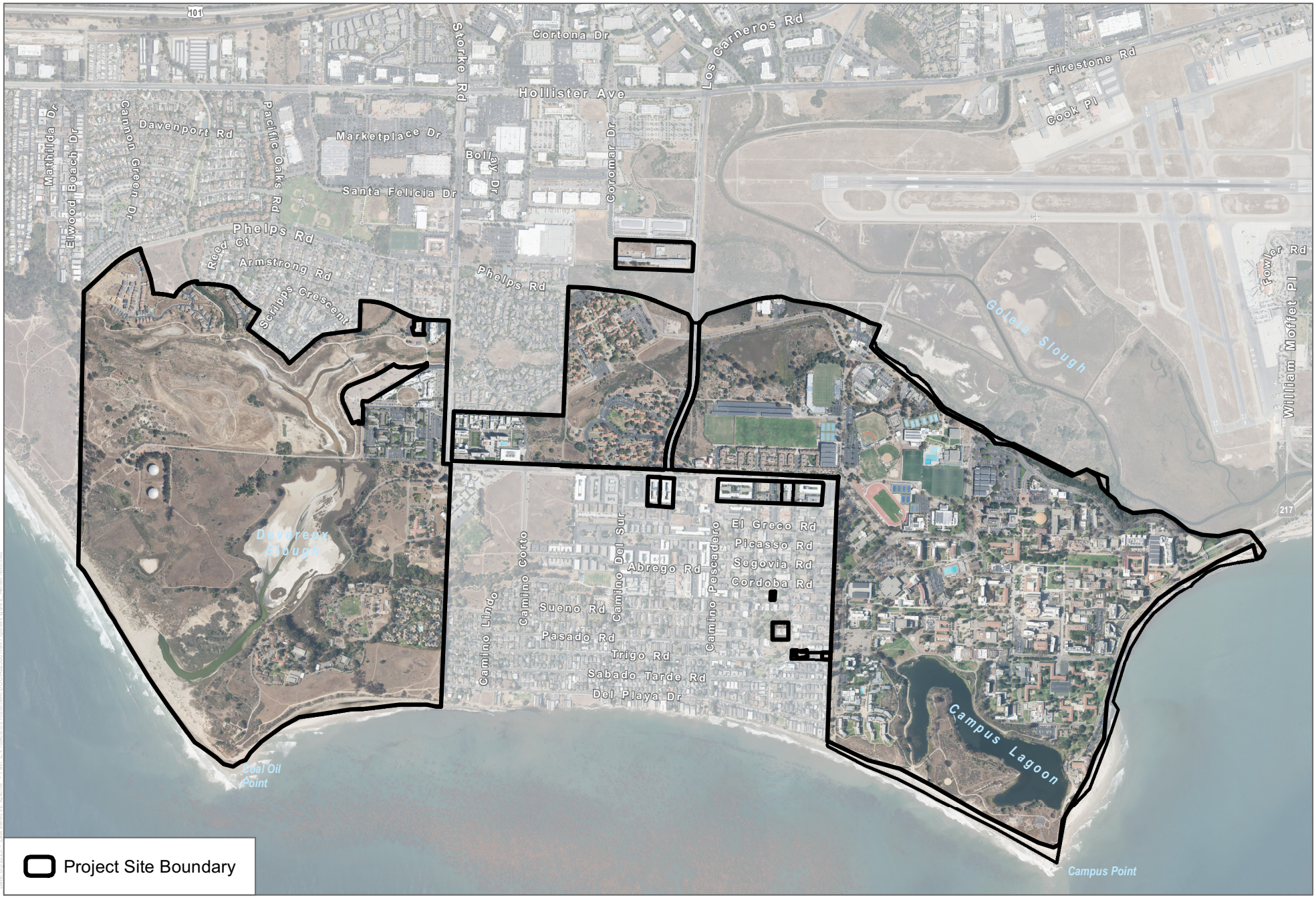
FIGURE 1

Project Location

UCSB 2018 AB 2588 RRAP



SOURCE: Sanborn, August 2022

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FIGURE 2

Aerial Photo

UCSB 2018 AB 2588 RRAP

2 Background

The HRA showed that the emissions of toxic air contaminants (TACs) from UCSB in 2018 did not exceed the SBCAPCD thresholds for cancer, chronic non-cancer, and 8-hour chronic non-cancer. However, the HRA showed that the maximum acute non-cancer risk was 12.9, which is greater than the SBCAPCD threshold of 1.0. Therefore, in accordance with AB 2588 guidelines and SBCAPCD's May 28, 2025 letter, a RRAP must be prepared along with public notification. This RRAP evaluates the sources that contribute the most to the acute non-cancer risk on UCSB and identifies opportunities to reduce the risk below the SBCAPCD threshold of 1.0.

3 Alternative Refined Acute Method

The first step used to identify the sources contributing to the acute non-cancer exceedance was to perform the alternative refined acute method (ARAM) as outlined in the SBCAPCD's Appendix H of the APCD-15i (SBCAPCD 2025). Running the refined acute analysis for a single receptor in HARP 2 can take hours or even days for a large project, a facility with hundreds of emitting sources and thousands or tens of thousands of receptors. In situations where there are dozens or hundreds of receptors with a simple acute risk greater than one, using HARP 2 to calculate the refined acute risk is unfeasible. The ARAM significantly reduces the run time required to calculate the refined acute risk. ARAM uses normalized emission rates directly in AERMOD, accounting for each pollutant's reference exposure level (REL) and target endpoints, to determine the refined acute risk for all receptors simultaneously.

ARAM uses the air dispersion model (AERMOD) with normalized emission rates that account for each pollutant's REL and target endpoints, avoiding the need to run the refined acute analysis within HARP 2. To calculate the normalized hourly emission rate from each source, the maximum hourly emission rate (in grams per second) of each pollutant emitted from that source is divided by its corresponding acute REL and then multiplied by a temporary scaling factor of 1,000 (to avoid any loss of data from low emission rates). When two or more acute pollutants are emitted by a single source, the normalized emission rates are summed and then assigned to applicable acute target organs to arrive at the source-specific acute target organ normalized emission rates. Separate refined acute modeling runs (AERMOD dispersion runs) are then conducted for each of the applicable acute target organs. When these normalized emissions rates are input into AERMOD, the 1 hour "concentration" output from AERMOD is the refined acute hazard index (HI) for that specific target organ. The maximum 1-hour AERMOD results for each target organ are then compared for each receptor to determine the highest value and the dominant endpoint. The highest value is the refined acute HI for that receptor.

The SBCAPCD approved HRA showed a simple acute non-cancer risk above 1 (the SBCAPCD threshold) for 685 receptors of the 21,308 receptors modeled. However, to provide an extra buffer beyond the SBCAPCD threshold of 1.0 in the ARAM evaluation, receptors were selected that had an acute non-cancer risk greater than 0.985, which was 761 receptors. By reducing the number of receptors to evaluate from 21,308 to 761 greatly reduces the processing time while ensuring that all receptors that exceeded the threshold were evaluated. The first step in the ARAM using the SBCAPCD's *Alternate Refine Acute Calculation* spreadsheet is to enter hourly emissions from the approved HRA into the Source Emissions worksheet (SBCAPCD n.d.). This worksheet automatically detects whether the pollutant entered for each source has an acute REL or not. The emission rates are then combined for each health endpoint in the AERMOD Emission Rates worksheet. Any endpoint that is shown in blue in the AERMOD Emission Rates worksheet that has a simple acute HI greater than 1.0 must be modeled separately in AERMOD.

For UCSB, the endpoints that met these criteria were immunological, reproductive/developmental, respiratory, eye, and blood.

For each of the endpoints identified above, a separate AERMOD run was performed. For each AERMOD run, the emission rates for the specific endpoint from the AERMOD Emission Rates worksheet of the SBCAPCD's *Alternate Refine Acute Calculation* workbook were uploaded into AERMOD.

To accurately model the acute risk for purposes of risk reduction, it was necessary to evaluate the status and any plans for the sources, as this was based on a 2018 inventory. There were six sources identified in the 2018 HRA that had been modified or removed as of 2025 that may impact acute non-cancer health risk. These sources and their status are shown in Table 1. Sources 387, 395, and 435 were removed completely from UCSB and this assessment. Sources 388, 396, and 402 were replaced with diesel engines that are Tier 3 or Tier 4. In accordance with SBCAPCD policy, speciated pollutants from Tier 3 and Tier 4 engines and Tier 2 engines greater than 750 bhp are not required to be included in the HRA (SBCAPCD 2023). As diesel particulate matter does not have an acute reference exposure level, no acute emissions from Sources 388, 396, and 402 were included in this analysis.

Table 1. Modified or Removed Emission Sources

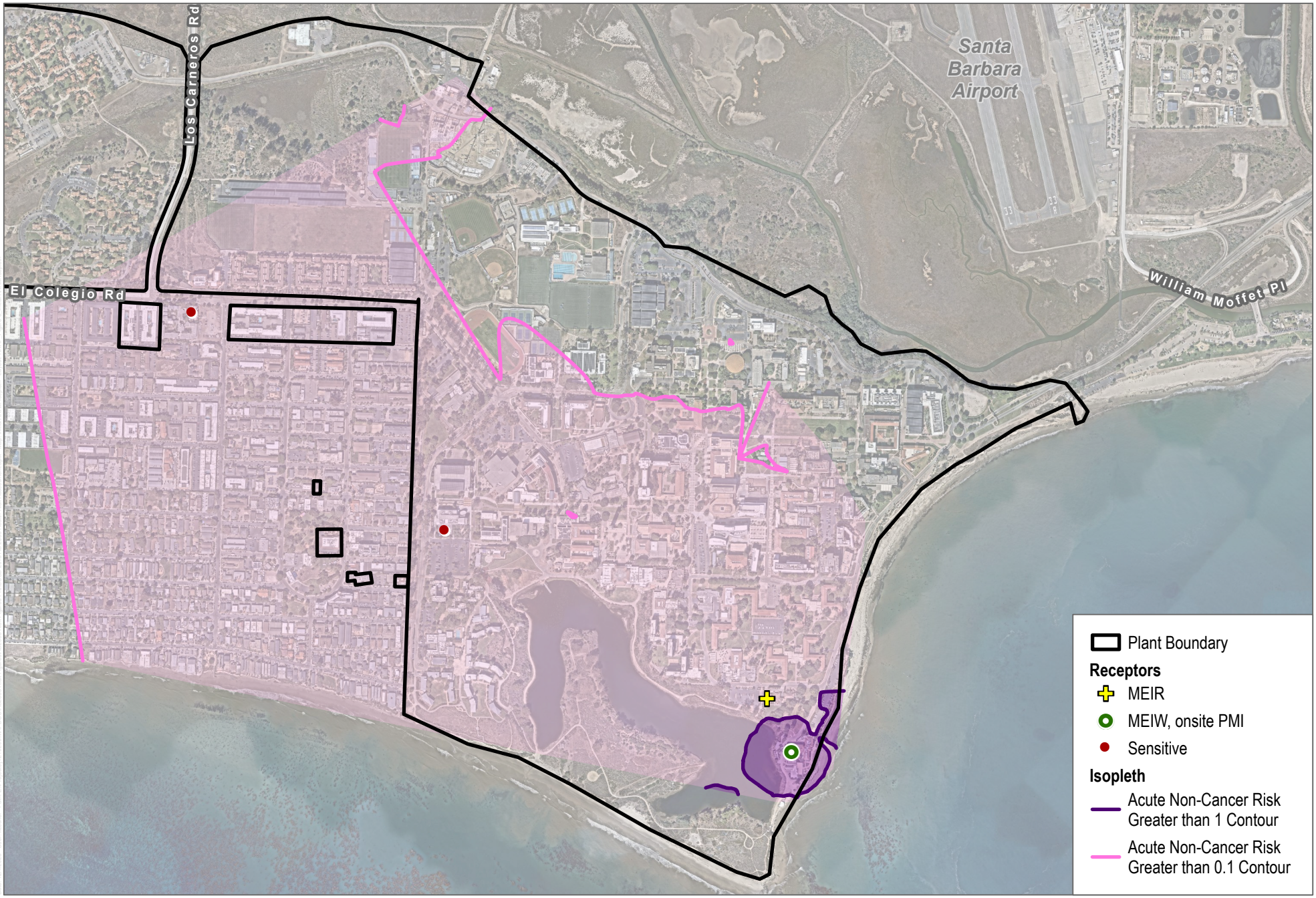
Source ID	Building	Building No.	Source Type	Fuel Type	Status
402	Devereux Lift Station	6990	Generator	Gasoline	Replaced with diesel
435	Facilities Management Yard	336	Gas Dispensing Facility	Gasoline	Removed
387	Facilities Management Yard	500	Generator	Natural Gas	Removed
395	Cheadle Hall	552	Generator	Natural Gas	Replaced with diesel
396	Snidecor Hall	554	Generator	Natural Gas	Replaced with diesel
388	Geology	526	Generator	Natural Gas	Replaced with diesel

3.1 ARAM Results

The initial ARAM results showed that of the 761 receptors modeled, there were 87 that showed a refined acute HI greater than 1.0. The acute PMI had a hazard index of 12.7 located at 238631.32 Universal Transverse Mercator East (UTME) and 3811044.80 Universal Transverse Mercator North (UTMN). Immunological was the maximum endpoint for this initial ARAM. To further refine and identify which sources contributed to the receptors with an acute HI greater than 1.0, it was necessary to visually investigate each hotspot over 1.0 and nearby sources. There

was one hotspot identified surrounding the Marine Biotechnology Center near Campus Point. Based on the simple acute HI from the 2018 HRA it was identified by the SBCAPCD that the Fuel Storage at Marine Biology (Source ID 436) was the primary contributor to the simple acute point of maximum impact. The only pollutant with an acute immunological endpoint from Source ID 436 is benzene. The isopleth of the initial ARAM results is shown in Figure 3. It should be noted that there were no residential or sensitive receptors with a simple acute HI greater than 1 and therefore weren't included in the ARAM. The MEIR is included in the figures from the 2018 Tier 2 HRA.

A refined ARAM was performed that excluded emissions (emission rates were set to zero) from the Fuel Storage at Marine Biology (Source ID 436) discussed above to identify other sources contributing to the acute HI greater than 1.0. The refined ARAM results showed that no receptors remained with an acute HI greater than 1.0. The acute PMI had a hazard index of 0.5 located at 238703.77 UTME and 3811714.77 UTMN. The eye was the maximum endpoint for this refined ARAM. There are several sources near this receptor with pollutants that have an acute eye endpoint, including two natural gas water heaters (Source IDs 250 and 263) and four laboratories (Source IDs 428, 434, 417, and 429). Pollutants from these sources that contribute to the eye endpoint include 1,4-dioxane, epichlorohydrin, formaldehyde, hydrochloric acid, hydrogen fluoride, isopropyl alcohol, perchloroethylene, toluene, triethylamine, xylenes, acetaldehyde, acrolein, and vanadium. The isopleth for the refined ARAM results is shown in Figure 4.



SOURCE: NearMap imagery accessed 12/04/25

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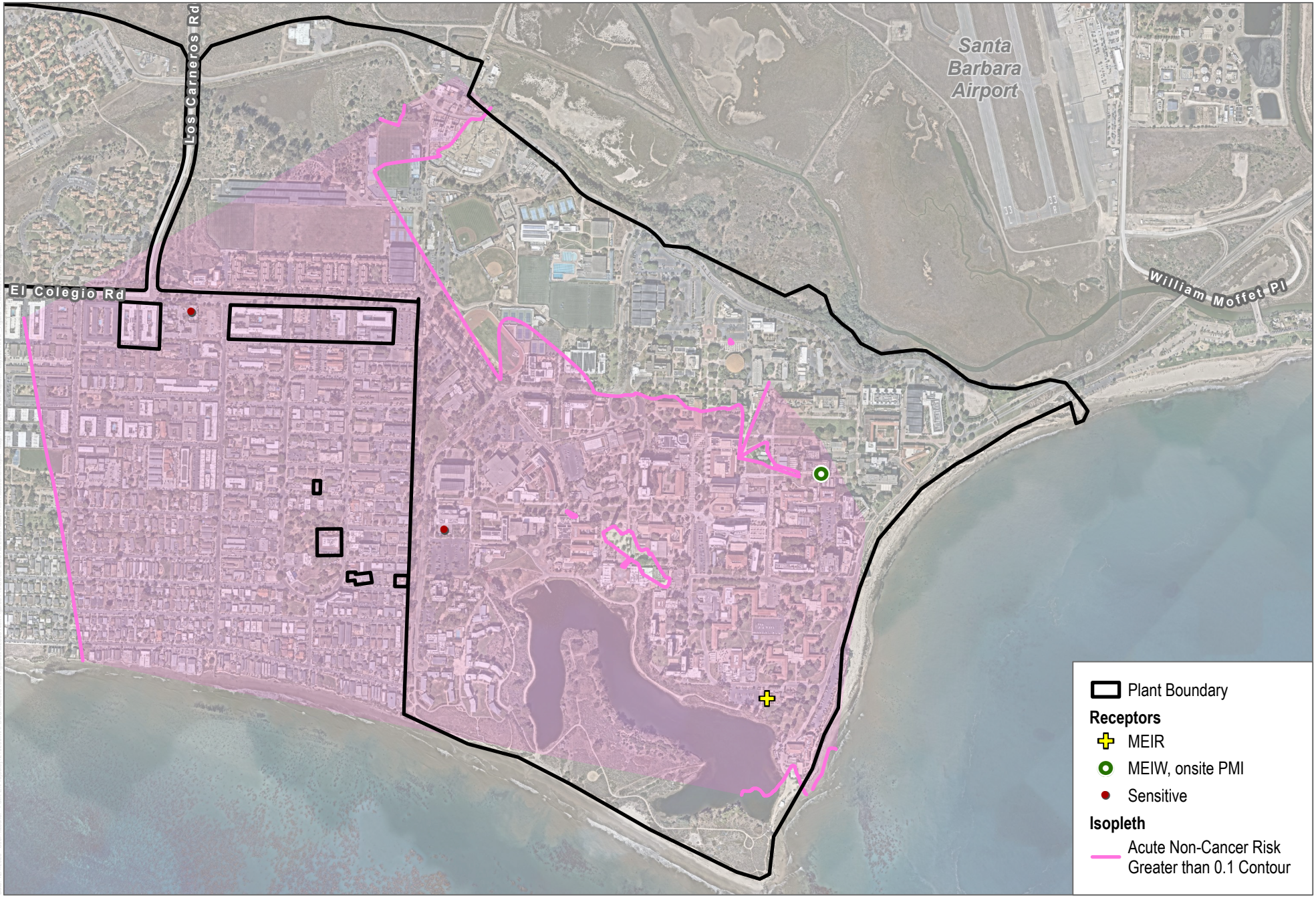
FIGURE 3

Initial ARAM Isopleth

UCSB 2018 AB 2588 RRAP



SOURCE: NearMap imagery accessed 12/04/25

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FIGURE 4

Refined ARAM Isopleth

UCSB 2018 AB 2588 RRAP

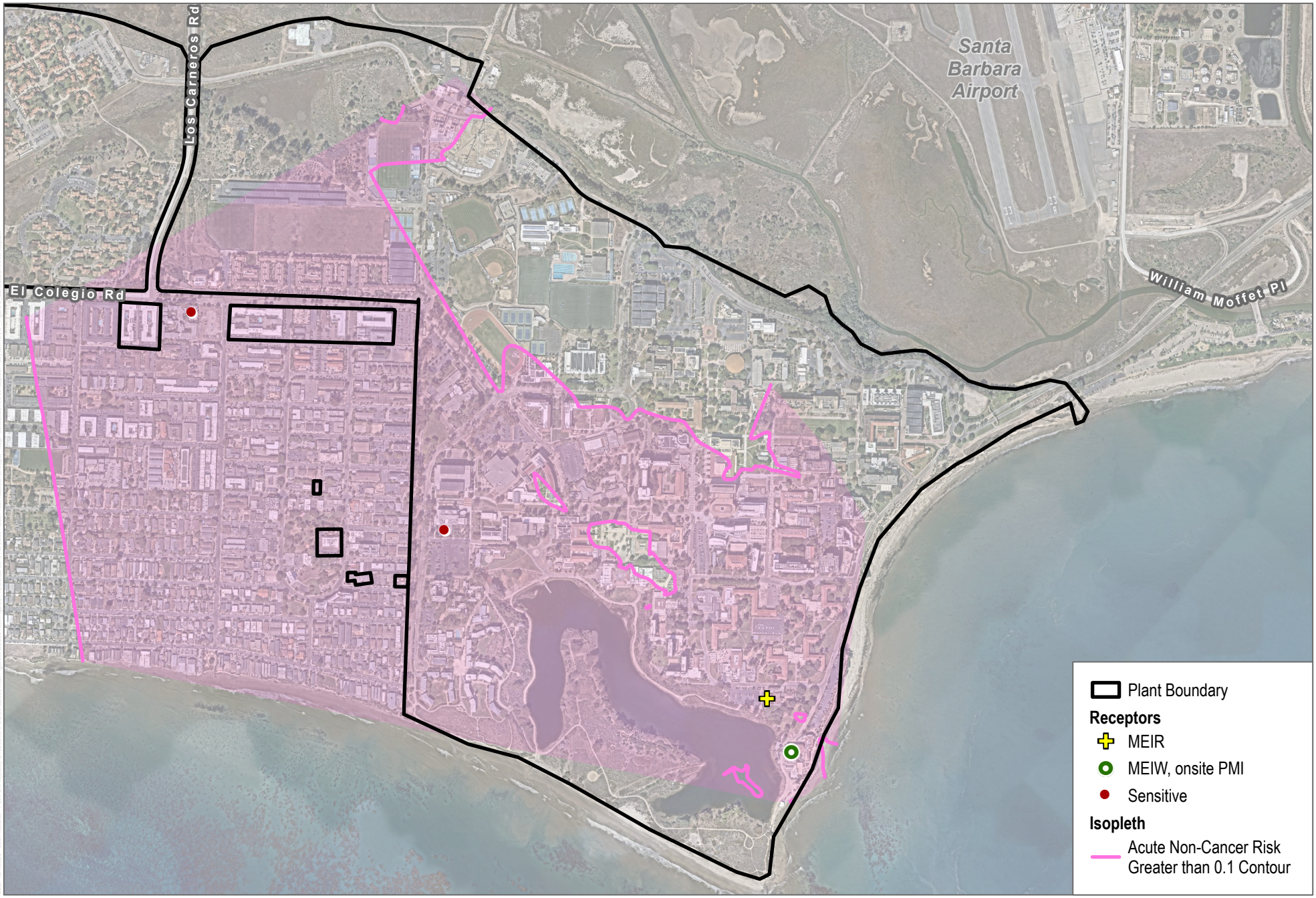
4 Risk Reduction

The ARAM results showed that the Fuel Storage at Marine Biology (Source ID 436) contributed to simple acute non-cancer HI greater than 1.0 in the 2018 HRA, accounting for changes to existing sources since 2018. The Fuel Storage at Marine Biology (Source ID 436) currently consists of a 500-gallon above-ground storage tank, Pre-EVR Phase I only. UCSB coordinated with fuel dispensing vendors to identify emission controls strategies that were feasible for the Fuel Storage at Marine Biology (Source ID 436). It was identified that a Phase II vapor recovery system was feasible to be installed on Source ID 436. Phase II vapor recovery systems control the vapors displaced from vehicle fuel tanks during fueling. The vapors recovered from vehicle tanks return to the fueling station's storage tank. Both balance and assist vapor recovery systems are currently certified to achieve both EVR and pre-EVR standards.

The modification of Source ID 436 to a Phase II vapor recovery system resulted in a 95 percent reduction in ROC emissions from refueling and a 31 percent reduction from spillage. Emissions from Source ID 436 were estimated in accordance with the ROC and toxic emission factors from system type A3 from the SBCAPCD's GDF Emission Calculations with Santa Barbara County Approved Emission Factors – October 2024 (SBCAPCD 2024). The fuel tank at Source ID 436 has 50 gallons of fuel that always remain in the bottom of the tank, only allowing a maximum of 450 gallons of fuel to be loaded at a time. Therefore, it was assumed that only 450 gallons of fuel would be loaded per hour in the emission calculation. It was also assumed that the dispensing of fuel would operate at a maximum of 190 gallons per hour.

5 Residual Risk

The controlled ARAM was run as discussed in Section 4 and the results showed that no receptors remained with an acute HI greater than 1.0. The acute PMI had a hazard index of 0.989 located at 238631.32 UTME and 3811044.80 UTMN. Immunological was the maximum endpoint for the controlled ARAM. The only pollutant with an acute immunological endpoint from Source ID 436 is benzene. The isopleth for the controlled ARAM results is shown in Figure 5.



SOURCE: NearMap imagery accessed 12/04/25

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FIGURE 5

Controlled ARAM Isopleth

UCSB 2018 AB 2588 RRAP

6 Implementation Schedule

In accordance with Senate Bill 1731 Risk Reduction Audits and Plans guidelines (CARB 1997), a facility has up to 5 years to implement the risk reduction measure identified within the RRAP. UCSB will submit an authority to construct (ATC) application within six (6) months of approval of the RRAP. UCSB will then install and begin operation of the Phase II equipment within one (1) year of receiving the final ATC Permit from SBCAPCD. If extenuating circumstances exist such that this schedule can't be completed, UCSB will request an extension from the SBCAPCD not extending greater than an additional 5 years.

7 References Cited

CARB (California Air Resources Board). 1997. Senate Bill (SB) 1731 Risk Reduction Audits and Plans. November. https://ww2.arb.ca.gov/sites/default/files/classic/ab2588/rrap-iwra/genguidl.pdf.

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SBCAPCD. n.d. ARAM Calculation Spreadsheet. https://www.ourair.org/wp-content/uploads/Alternate-Refined-Acute-Calculation-Template.xlsx.

Attachment A

Modeling Protocol Tables for HRA Report and ARAM Files

Attachment B

AERMOD Modeling Files