

Rule 11-18 Preliminary Health Risk Assessment:



Chevron Refinery – Facility Boundary

Chevron Refinery in Richmond, CA

A **Health Risk Assessment** (HRA) evaluates the potential health risks from exposure to toxic air pollutants emitted by facilities like refineries, wastewater treatment plants, landfills, and chemical plants. HRAs help us understand how emissions from these stationary air pollution sources may affect the health of nearby residents, offsite workers, students, and sensitive populations. Health risk assessments are an important tool for understanding potential health risks and supporting the Air District's ongoing work to protect public health. They are the first step in ensuring successful implementation of risk reduction efforts.

The Air District requires facility-wide HRAs as part of our Rule 11-18 Facility Risk Reduction Program to **identify and reduce toxic emissions, protect public health, and inform communities about potential sources of health risk.**

To learn more about the 11-18 program and the health risk assessment process visit [the Rule 11-18 Facilities webpage](#).

This document serves as a summary of the results from the preliminary HRA conducted at the Chevron Refinery located in Richmond, California. For the full technical report, please refer to the [Preliminary Facility-Wide Health Risk Assessment Report](#) on the Rule 11-18 Facilities webpage.

Health Risk from Chevron Refinery

The Chevron Refinery (Refinery) is a petroleum refinery located in Richmond, California, that occupies approximately 2,900 acres along the San Francisco Bay and has been operating since 1902. The Refinery was identified as having the potential to pose elevated health risk to the surrounding community. As part of Rule 11-18 implementation, the Air District conducted a preliminary HRA for the facility based on 2021 emissions along with site and equipment specific details. The results of this HRA show that long-term cancer risk for nearby residents and short-term one-hour ("acute") risk **exceed** the risk action levels defined in Rule 11-18, as shown in **Figure 1**. Risk Action Levels are the health risk thresholds that, if met or exceeded, the facility is required to develop and implement a risk reduction plan.

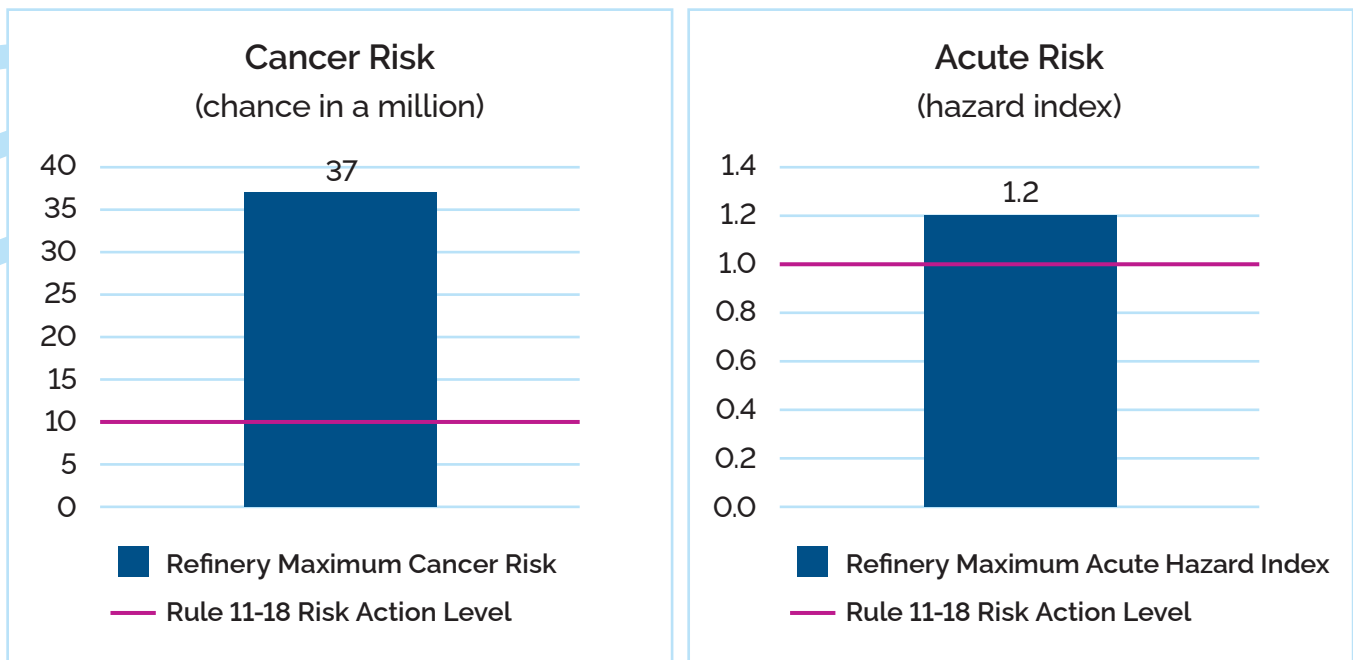


Figure 1: Chevron Refinery Maximum Cancer and Acute Risk vs Rule 11-18 Risk Action Levels

Cancer Risk

Cancer risk is an estimate of the chance that an individual may develop cancer from long-term exposure to harmful air pollutants known as carcinogens.

The Air District estimates cancer risk for three different exposure scenarios:

- exposure for a person living in the area (Resident, 24 hrs per day, over 30 years)
- exposure for a person working in the area (Offsite worker, 8 hrs per day, over 25 years), and
- exposure for a student in the area (Student, 8 hrs per day, over 9 years).

For each exposure scenario, the Air District identifies the cancer risk for the maximally exposed individual (MEI). This is the individual who is estimated to experience the highest potential long-term health risk based on factors such as proximity to the source, local air dispersion patterns, and estimated exposure durations. The MEI represents a worst-case scenario used to evaluate the highest potential health risk from exposure to facility emissions.

The results of the preliminary HRA for the Refinery show the highest cancer risk occurring for the Resident exposure scenario. Cancer risk for the Resident MEI is 37 chances in a million which exceeds the Rule 11-18 risk action level. Based on these preliminary results, the facility will be required to develop a Risk Reduction Plan.

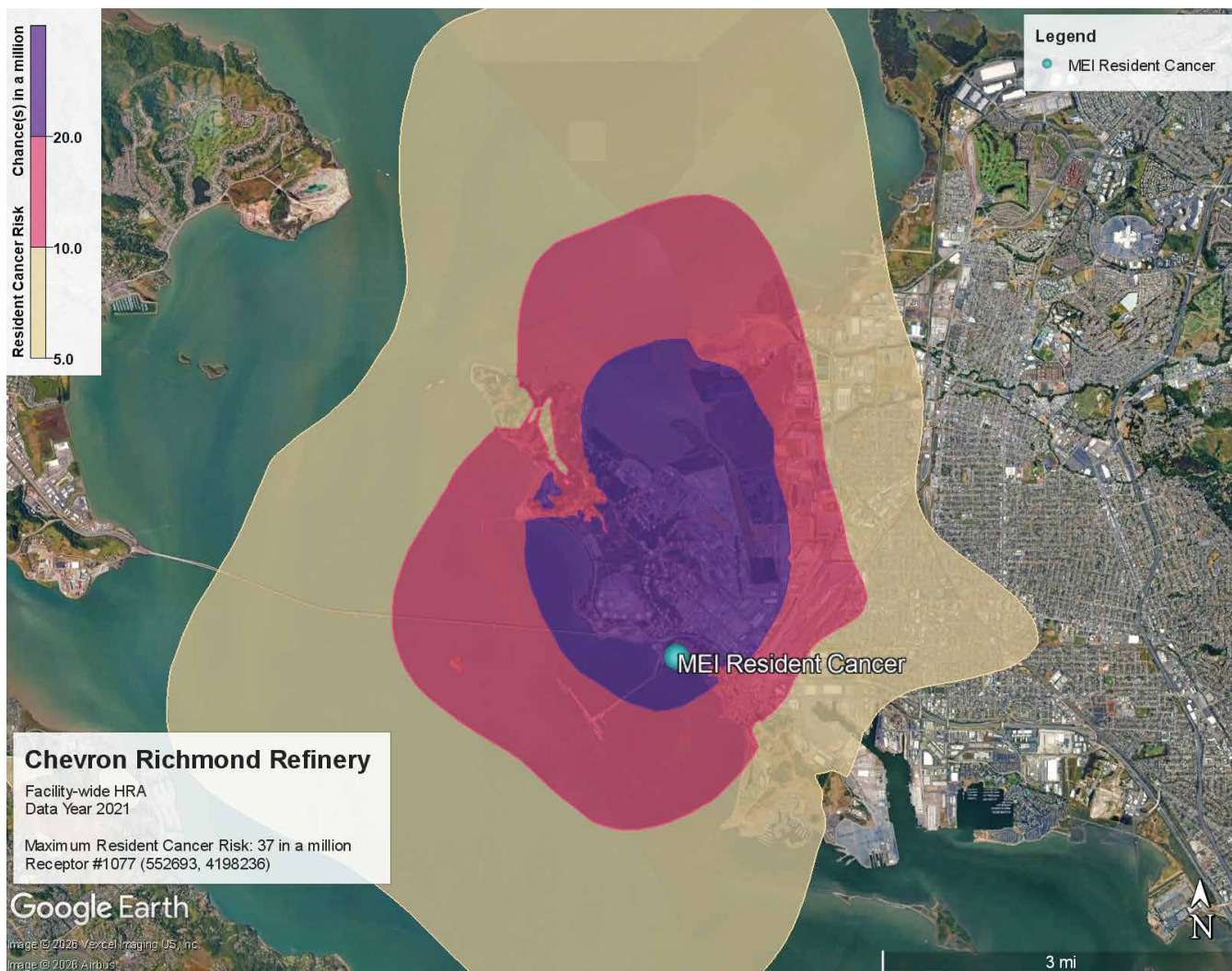


Figure 2: Resident Cancer Risk (chance in a million)

Significant Sources Contributing to Cancer Risk at the MEI

When the risk action level is exceeded, the Air District evaluates which stationary sources contribute significantly to the cancer risk at the MEI location. These sources will be prioritized in the Risk Reduction Plan.

Under Rule 11-18, a "significant source" is defined as a source that contributes a cancer risk greater than or equal to 1.0 in a million at the MEI location. **For the Resident MEI, the significant sources identified account for more than 70% of the total estimated cancer risk.** These significant sources are summarized in the table on page 4.

Category	Source #	Source Description	Cancer Risk (per million)
Fugitives	32103	Fugitive Sources - Pumps & Compressor Seals	7.52
Storage Tank	3216	Tank 3216: Organic Liquid Storage Tank	3.83
Fugitives	32102	Fugitive Sources - Valves, Flanges, and Connectors	3.43
Storage Tank	32158	Fixed Roof Tank 3217, Diesel	3.22
Storage Tank	3195	T-3195 Waxy Heavy Neutral Storage Tank	2.92
Storage Tank	32159	Fixed Roof Tank 3218, Distillate Oil	1.85
Storage Tank	32164	Fixed Roof Tank 3227, Diesel	1.31
Generator	32121	Internal Combustion Engine (TV: S-7503)	1.28
Generator	32122	Internal Combustion Engine (TV: S-7504)	1.28

Table 1: Cancer Risk Contribution by Significant Source to Resident Cancer Risk at the MEI

Toxic Air Contaminants Contributing to Cancer Risk at the MEI

Each of the significant sources identified above emits toxic air contaminants. Because some contaminants are more harmful than others, they contribute more to the overall cancer risk. The chart and table below identify the primary contaminants contributing to the total cancer risk at the Resident MEI.

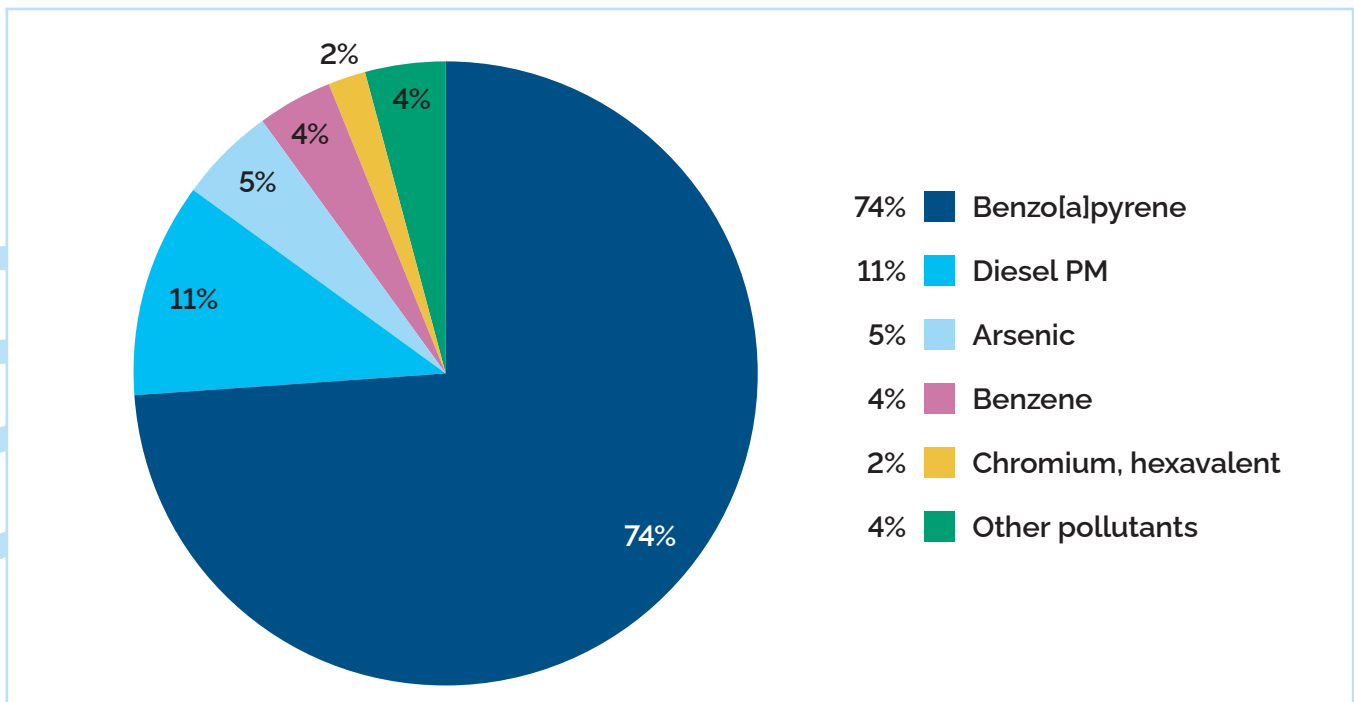


Figure 3: Contribution by Pollutant to Resident Cancer Risk at the MEI

Polycyclic aromatics hydrocarbons, modeled as Benz[a]pyrene, contributes the largest share of cancer risk at the MEI, accounting for approximately 74% of estimated cancer risk.

Benz[a]pyrene is a toxic air contaminant resulting from leaks, often referred to as fugitive losses, from pipe fittings on equipment and from storage tanks used to process or hold intermediate additives or products, such as diesel fuel. Exposure to benz[a]pyrene may increase the risk of cancer and may cause damage to the developmental, reproductive, and immune systems.

Toxic Air Contaminant	Percent Contribution to Cancer Risk at Maximally Exposed Individual
Benz[a]pyrene	74%
Diesel PM	11%
Arsenic	5%
Benzene	4%
Chromium, hexavalent	2%
Other pollutants	4%

Table 2: Contribution by Pollutant to Resident Cancer Risk at the MEI

Chronic Risk

Chronic risk estimates the potential non-cancer health effects from long-term exposure to toxic air pollutants. Chronic risk is quantified using a hazard index (HI). A hazard index of less than 1.0 indicates that non-cancer health effects are not expected. The maximum chronic HI from the Refinery is estimated at 0.26.

Acute Risk

Acute risk estimates the potential non-cancer health effects from short-term exposure to toxic air pollutants over a *one-hour period*. Acute risk is also quantified using a hazard index. A hazard index of less than 1.0 indicates that people are not expected to experience non-cancer health effects. The term *point of maximum impact (PMI)* is conventionally used instead of *maximally exposed individual (MEI)* for acute risk assessments, while retaining the same meaning.

The results of the preliminary HRA for the Refinery show the acute hazard index at the PMI is 1.2, which exceeds the Rule 11-18 risk action level. Based on these preliminary results, the facility will be required to develop a Risk Reduction Plan.

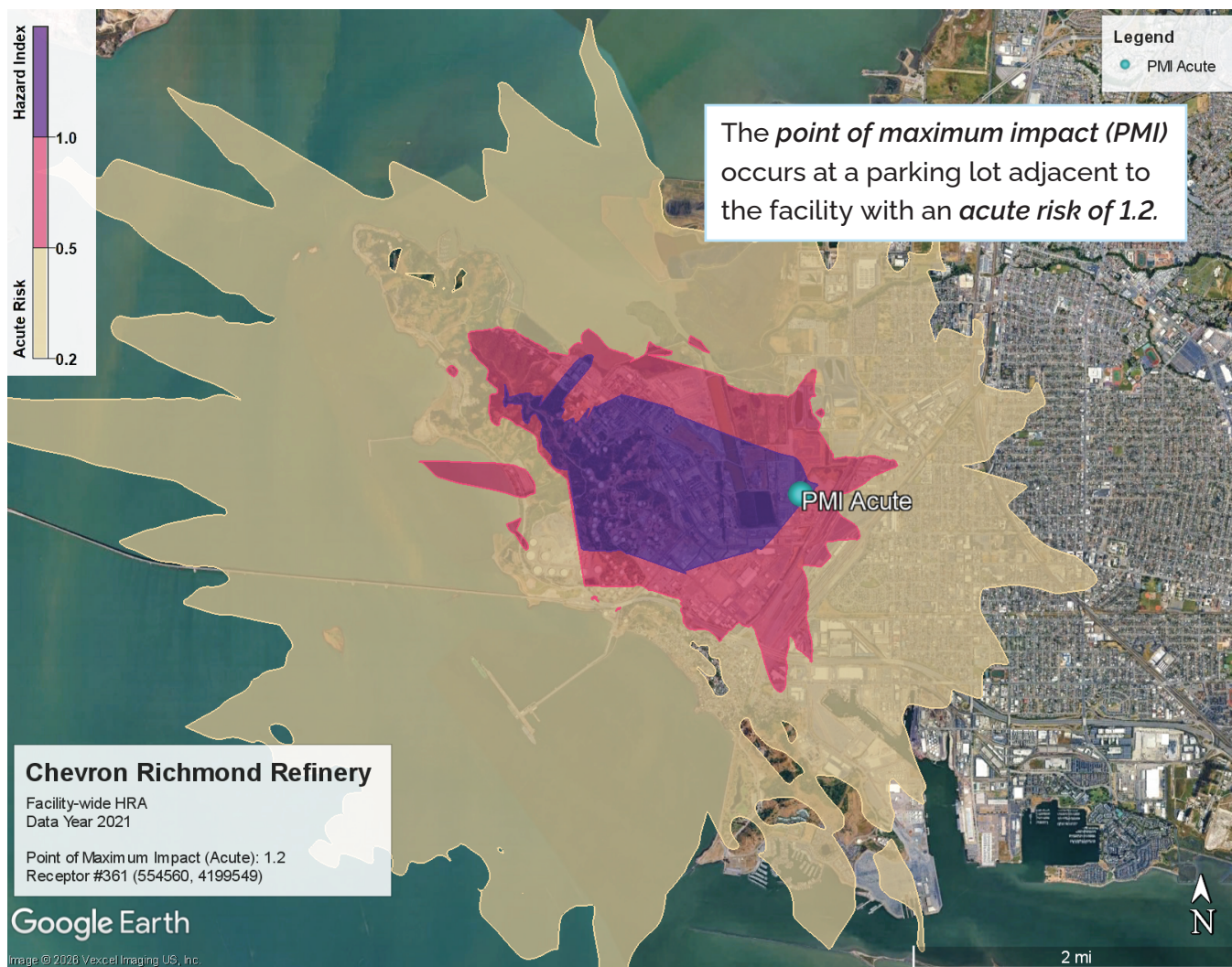


Figure 4: Acute Hazard Index (HI)

Significant Sources Contributing to Acute Risk

When the risk action level is exceeded, the Air District evaluates which stationary sources contribute significantly to the acute risk at the PMI location. These sources will be prioritized in the Risk Reduction Plan.

Under Rule 11-18, a “significant source” is defined as a source that contributes an acute hazard index greater than or equal to 0.20 at the PMI location. **There is only one significant source for acute risk– the bio-reactor. This source contributes more than 80% of the total acute risk at the PMI location.**

The acute risk associated with the bio-reactor is summarized in the table below:

Category	Source #	Source Description	Acute Hazard Index
Wastewater Treatment	4393	Bio-reactor	1.0

Table 3: Acute Risk Contribution by Significant Source at the PMI

Toxic Air Contaminants Contributing to Acute Risk at the PMI

The significant source identified above emits toxic air contaminants. Because some contaminants are more harmful than others, they contribute more to the overall acute risk. The chart and table below show each contaminant and its contribution to the total acute risk at the PMI.

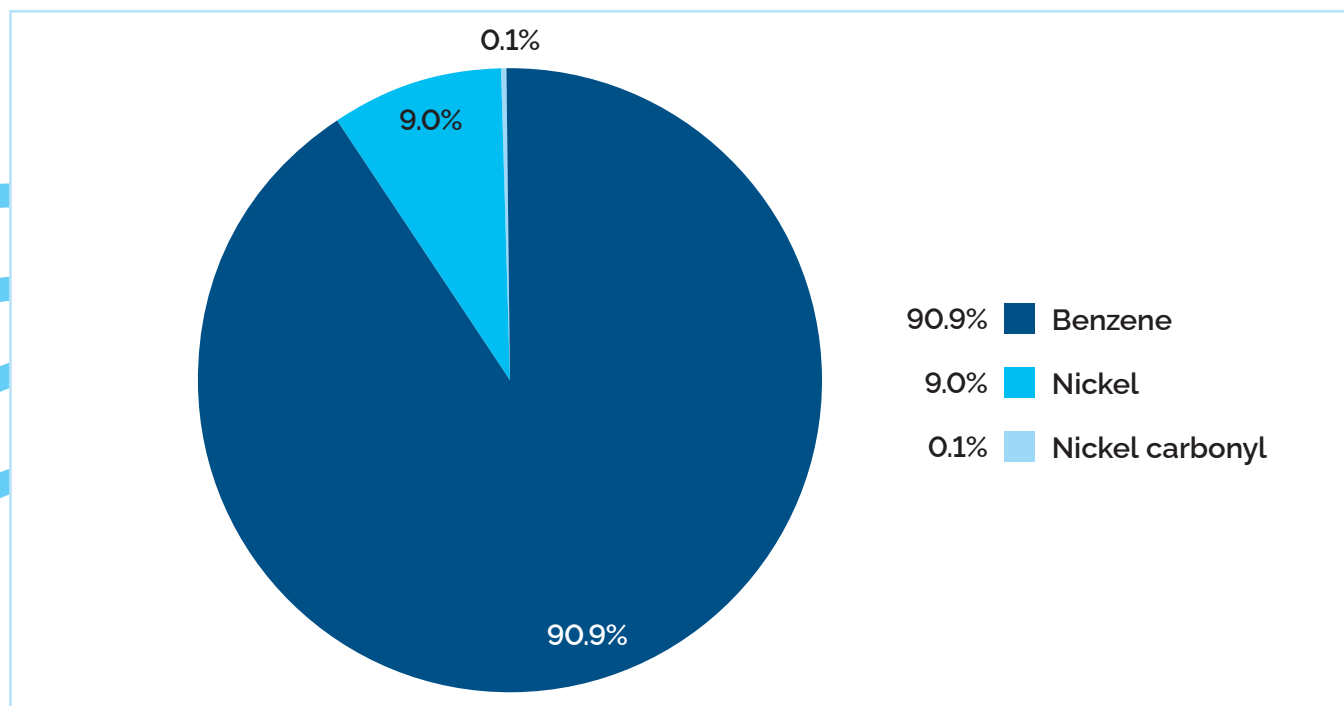


Figure 5: Contribution by Pollutant to Acute Risk at the PMI

Benzene is the main driver of acute risk and results from evaporation of organics from the wastewater treatment system. Short-term exposure to benzene may cause temporary eye, nose, throat and lung irritation, headaches, dizziness, and other health effects.

Toxic Air Contaminant	Percent Contribution to Acute Hazard Index Point of Maximum Impact
Benzene	90.9%
Nickel	9%
Nickel Carbonyl	0.1%

Table 4: Contribution by Pollutant to Acute Risk at the PMI



Next steps

These results are considered preliminary and have not been finalized. Before the Air District finalizes these results, the following steps will occur:

- The public and the facility have 90 days to comment on the preliminary HRA.
- The Air District reviews these comments and may make changes to the preliminary HRA based on new information received. These changes may result in a decrease or increase in the preliminary risk results.
- If the risk remains at or above the risk action levels in Rule 11-18, the facility will be required to create and implement a risk reduction plan – a plan outlining detailed risk reduction measures that will be implemented, or the application of best available retrofit control technology for toxics.

How to Comment

Public comment on the preliminary report is open on August 25th and closes on November 23rd, 2026, at 5 pm.

Comments may be sent via email with the subject line of ***FID10_hra_[last name/group identifier]*** to **Reg11-18@baaqmd.gov**.

Public Meeting

The Air District will host a public meeting on September 21, 2026, from 5:30 – 7:30 pm at the Richmond Memorial Auditorium and Convention Center, Lobby Area, 403 Civic Center Plaza in Richmond.

Additional Information

Visit our **[Rule 11-18 Facility Risk Reduction](#)** page to view:

- The full Preliminary HRA report for Chevron Refinery
 - Rule 11-18 Frequently Asked Questions
 - Rule 11-18: Understanding Health Risk Assessments fact sheet
 - List of facilities subject to Rule 11-18
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Additional Air District Efforts to Protect Public Health

Rule 11-18 is only one way in which the Air District regulates industrial sources of air pollution. As part of its mission to protect public health, the Air District maintains active oversight of the Chevron Refinery through a range of programs. These include monitoring air quality along the refinery's fenceline, measuring emissions from refinery equipment, investigating and reducing flaring, inspecting wastewater treatment operations, processing permit applications for new and modified sources, frequent facility inspections, and additional air quality rules to protect public health.

The Air District also regularly engages with stakeholders. This includes coordination with the refinery on operational and environmental matters, as well as meaningful engagement with the nearby communities. These efforts occur through a range of forums and activities, including, but not limited to, AB 617 Path to Clean Air (PTCA) Community Steering Committee Meetings and Air District working groups such as the Refinery Technical Working Group and Refinery Corridor Bi-Monthly meetings.