



# Frequently Asked Questions

## **BRIDGEPORT COMMUNITY PETROLEUM VAPOR INTRUSION HUMAN HEALTH RISK ASSESSMENT**

***ARCO #6066, 490 PACIFIC COAST HIGHWAY, SEAL BEACH, ORANGE COUNTY, CALIFORNIA***

The Bridgeport Community is a residential neighborhood located west of Pacific Coast Highway (PCH) in Seal Beach, California. Former ARCO service station #6066 (Site) is located at the northwest corner of 5<sup>th</sup> Street and PCH, directly adjacent to the Bridgeport Community. The Site operated as a retail gasoline fueling station and auto repair facility, supporting three 12,000-gallon gasoline and one used-oil underground storage tanks (USTs) and eight fuel dispensers. A leak from the UST system was discovered in 1986 and the USTs were removed in 1987. The Orange County Local Oversight Program (OCLOP) has overseen environmental investigation and remediation to address the release since 1986. Soil vapor intrusion has been one of the OCLOP's main concerns due to the proximity of the Site to the Bridgeport Community. Following significant cleanup efforts at the Site, the OCLOP requested that the State Water Resources Control Board (State Water Board) conduct a human health risk assessment to evaluate potential vapor intrusion risks to nearby residents and businesses. The State Water Board presented its findings at a community meeting on June 11, 2025. Additionally, the OCLOP and the State Water Board held virtual office hours on July 8, July 14, July 29, August 4, and August 12, 2025, to answer additional questions from the Community.

This Frequently Asked Questions (FAQ) document was developed to address the most common questions asked by the Bridgeport Community during the community meeting and virtual office hours.

### **What type of evaluation did the State Water Board perform for the Bridgeport Community?**

The State Water Board conducted a human health risk assessment for vapor intrusion. A vapor intrusion human health risk assessment establishes whether vapor forming chemicals in soil or groundwater might harm people. It evaluates how likely people are to come into contact with these chemicals and how much chemical vapor exposure could occur. This helps determine if there is a health risk and what steps are needed to keep people safe.

### **What is soil vapor?**

Soil vapor refers to gases found in the spaces between soil particles. These vapors come from chemicals that have been spilled or dumped on the ground or in water. When these chemicals turn into gases, they can move through the soil and gather under buildings.

### **What is vapor intrusion?**

Vapor intrusion can occur when chemicals spilled or dumped on the ground or into groundwater turn into vapors. These vapors move through the soil, gather under buildings, and may move into indoor air. They can enter buildings through cracks in foundations, utility pipes, and/or sewer lines.

### **Is vapor intrusion impacting the Bridgeport Community?**

No. Based on the State Water Board's human health risk analysis of Site sampling data, vapor intrusion is not impacting the Bridgeport Community.

### **Is it safe to live in my house now and in the future?**

Based on the soil vapor and groundwater tests from 2024 and 2025, the levels of chemicals found are considered safe for people living in the area.

### **What data did the State Water Board use to conduct their evaluation?**

The State Water Board reviewed and evaluated the soil, groundwater, and soil vapor data available in the Site's [GeoTracker Case Record](http://geotracker.waterboards.ca.gov/?gid=T0605900372):  
<http://geotracker.waterboards.ca.gov/?gid=T0605900372>

### **Does OCLOP and the State Water Board believe that enough data has been collected to calculate the risk to human health?**

Yes. The OCLOP and the State Water Board believe that sufficient data has been collected to determine risk. Significant investigation and monitoring have occurred at the Site and surrounding community, which allows the OCLOP and the State Water Board to get a comprehensive look at how contamination could impact the community.

### **What has been done to clean up the contamination?**

From 2009 to 2023, the responsible party (RP), under direction of the OCLOP, conducted cleanup actions that significantly reduced petroleum contamination at the Site and in the surrounding Bridgeport Community. These actions included using a system called dual-phase extraction that removes both contaminated soil vapor and groundwater. This system uses vacuum pumps to extract contaminated vapor and

water from the ground and helps increase oxygen levels to speed up the natural breakdown of petroleum beneath the ground, called petroleum bioattenuation.

### **What is petroleum bioattenuation?**

Bioattenuation is the process by which harmful petroleum chemicals in soil, groundwater, and soil vapor are broken down by natural microbes. This process occurs more effectively when there is plenty of oxygen present. The State Water Board's Low Threat UST Case Closure Policy (Policy) (State Water Board 2012) relies on the idea that petroleum can naturally degrade and thus, pose a lower risk to human health under certain conditions. When site conditions don't fit the pre-defined low-risk scenarios, a detailed risk assessment is required to satisfy requirements of the Policy. For the Site, conditions did not match the policy's vapor intrusion evaluation scenarios due to shallow groundwater, so a site-specific human health risk assessment was performed.

### **What is the State Water Board's Low Threat UST Case Closure Policy?**

The Low Threat UST Case Closure Policy, adopted by the State Water Board in 2012, is based on 30 years of data from petroleum sites in California. This policy regulates all petroleum UST release sites in California. It is based on petroleum science studies which illustrate that a petroleum UST release can be considered low-risk to human health under certain conditions, especially since petroleum in soil, groundwater, and soil vapor can biodegrade quickly with plenty of oxygen.

### **Is bioattenuation occurring around the ARCO 6066 release?**

Bioattenuation is occurring beneath the ground throughout the Site and Bridgeport Community. Oxygen measurements have been taken with soil vapor samples since 2009. On average, oxygen concentrations at these sample locations have been greater than 4%. Based on scientific field studies on petroleum science by the U.S. Environmental Protection Agency (USEPA) and other reputable scientists, it can be concluded that petroleum vapors will attenuate when oxygen is more than 2% for a broad variety of sites. The 2023 California EPA (CalEPA) Final Draft Vapor Intrusion Supplemental Guidance (SVIG 2023) Petroleum Attachment #2 (CalEPA 2023) provides background on how to use oxygen data to evaluate bioattenuation. Generally, when bioattenuation of soil vapor is happening, oxygen levels will increase, and carbon dioxide levels will decrease. Soil vapor samples on-site show that this carbon dioxide and oxygen pattern is happening. The other evidence that bioattenuation in soil vapor is occurring is that petroleum vapor concentrations on-site have decreased to concentrations below screening levels or the laboratory method detection limit.

### **Does petroleum vapor bioattenuate?**

Yes, this is called vapor attenuation. Vapor attenuation is the process by which harmful vapor levels decrease as they move from the soil and/or groundwater into indoor air. This can happen naturally through different methods like spreading out, mixing with

other air, and being broken down by tiny living organisms, called microbes, in the soil. The type of soil, moisture levels, and the amount of oxygen can affect how well this works. Effective attenuation helps reduce the risk of harmful vapors getting into buildings and affecting indoor air quality. Scientists estimate how much vapor attenuation happens from soil vapor to indoor air using attenuation factors.

### **How did the State Water Board determine that the ARCO #6066 release is not a risk to the Bridgeport Community?**

The State Water Board performed a human health risk assessment using environmental screening levels. To understand if the amount of a chemical (or concentration) can be harmful to health, the measured chemical concentrations are compared to safety standards. These standards are called environmental screening levels. Screening levels are set to protect even the most sensitive people, like children and those with health problems. If the test results are higher than screening levels, more information is needed.

Government agencies, like the State Water Board, Department of Toxic Substances Control, California Office of Environmental Health Hazard Assessment, and the USEPA develop screening levels for many vapor forming chemicals, based on studies of how these chemicals affect animals or people.

### **Are soil vapor concentrations above the health standards?**

No. As stated earlier, the State Water Board's human health risk assessment concludes that soil vapor concentrations do not pose a health risk. Soil vapor concentrations (levels) were below San Francisco Regional Water Quality Board Screening Levels (ESLs) and USEPA Regional Screening Levels (RSLs). In California, the ESLs are the same or stricter than USEPA RSLs (safety limits).

### **Are Site chemical concentrations of benzene, ethylbenzene, and methane a risk to my health?**

No. The State Water Board's human health risk assessment indicates that soil vapor does not pose a human health risk for all chemicals analyzed, including benzene and ethylbenzene.

Methane levels in the area are not expected to pose a risk to homes and businesses. Methane is evaluated separately from other chemicals because it does not cause cancer or other long-term non-cancer health issues. The main risks from methane are asphyxiation and explosion, but only at very high levels. Methane becomes potentially explosive between 50,000 (lower explosive limit) and 150,000 parts per million by volume (ppmv) in air (upper explosive limit) when mixed with oxygen in confined spaces like basements or garages. However, methane usually dissipates when it rises from the ground into outdoor air, reducing the risk.

The potential methane risks are low since the source of contamination has been removed and petroleum contamination across the site has decreased to low levels. Sampling between 2022 and 2024 shows that methane levels are mostly non-detect (<10ppmv) or below 5,000 ppmv, which is the action level recommended by the Department of Toxic Substances Control. One location (VP-47-2) showed a level of 32,000 ppmv, which is below the lower explosive limit of 50,000 ppmv. Additionally, Site data indicates that the detected concentration in VP-47-2 is not from the former ARCO #6066 release; it is a result of other sources, such as historical oil production.

### **What are the results of the State Water Board's human health risk assessment?**

As stated previously, the State Water Board's human health risk assessment indicates that *vapor intrusion is not a current or future risk to residential homes and businesses in and around the Bridgeport Community*. This conclusion is based on the following evaluations:

#### ***Vapor Intrusion Health Risk from Site Chemicals***

The 2024 and 2025 concentrations of the primary chemicals of concern—benzene; ethylbenzene; toluene; m, p-xylene; o-xylene; naphthalene; and volatile total petroleum hydrocarbons; along with all other volatile chemicals on Site—do not pose a health risk from vapor intrusion. Health risks are considered harmful when they cause unsafe cancer or non-cancer risks; the residual chemicals associated with the Site release are not present at concentrations that are deemed harmful.

The total estimated cancer risk from these chemicals was below the 1 in 1 million excess cancer risk safety limit and below the estimated safety non-cancer limits (hazard index=1). The total non-cancer safety limit is known as a hazard index. Both cancer and non-cancer risks were evaluated based on the combined effect of these chemicals, called the cumulative cancer risk and the non-cancer hazard index.

**1 in 1 Million Excess Cancer and Non-Cancer Risks**

A “1 in 1 million excess cancer risk” means that for every million people who are exposed to a certain level of chemical(s) continuously for a lifetime, one person may develop cancer (USEPA 2020). This risk is separate from an individual's own potential cancer risk that is unrelated to the chemical exposure. This is why it is considered “excess” cancer risk. Regulatory agencies do not consider chemical concentrations below this safety limit harmful to human health.

The total non-cancer safety limit is called a hazard index (for multiple chemicals) or a hazard quotient (for one chemical). The safety limit is a ratio that compares a chemical concentration(s) in a sample to a concentration that is considered safe (such as an environmental screening level). Chemical concentrations with a hazard index or quotient ratio under 1 are generally considered safe and unlikely to cause such non-cancer health effects. These ratios help regulators determine if chemicals might cause non-cancer health effects.

These cumulative (total) risks were calculated using a bioattenuation factor of 0.001 because oxygen levels were greater than 4%, on average. Since 2009, the average oxygen levels at all sample locations have been above 4%. This is significant because when oxygen levels below the ground are higher than 4%, the natural breakdown of petroleum chemicals in soil vapor occurs more quickly. As a result, it is less likely that these chemicals will make their way into a home's indoor air. This is why we can estimate the indoor air concentration using a bioattenuation factor of 0.001.

***Total Petroleum Hydrocarbons in Soil Vapor***

Total petroleum hydrocarbon (TPH) concentrations in soil vapor do not pose an unsafe vapor intrusion health risk. Since TPH concentrations were found in all soil vapor samples across the Site, they were evaluated to understand if they posed a human health risk. Most samples of total petroleum hydrocarbons taken at 2 feet and 4 feet near residential areas showed a decrease in vapor concentrations from 2010 to 2025, either reaching non-detect levels or falling below non-cancer safety limits (see table below).

Soil Vapor Sample Location	Maximum TPH Concentrations (2009-2017)	TPH Concentrations (2024-2025)
VP-10-2	2,900,000 µg/m <sup>3</sup> (2009)	Non-detect
VP-23-4	2,900,000 µg/m <sup>3</sup> (2017)	170,000 µg/m <sup>3</sup>
VP-9-2	3,300,000 µg/m <sup>3</sup> (2014)	Non-detect
VP-15-4	530,000,000 µg/m <sup>3</sup> (2015)	1,100 µg/m <sup>3</sup>
SV424-2-2	1,100 µg/m <sup>3</sup> (2017)	240 µg/m <sup>3</sup>
SV424-2-5	Non-detect (2017)	2,200,000 µg/m <sup>3</sup>

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$\mu\text{g}/\text{m}^3$  = micrograms per cubic meter of air

The highest TPH concentration, and the only sample that showed an increase in concentrations, was SV424-2-5. Sample SV424-2-5 (5-foot sample) showed an increase from 2017 (non-detect) to 2024 (2,200,000). However, the 2024 sample concentration was below TPH residential screening levels when the bioattenuation factor was included. It is not expected to pose a health risk since the estimated indoor air concentration is below the non-cancer safety limit (hazard quotient) (see steps below). In addition, the 2-foot sample at the same location (SV424-2-2) decreased to  $240 \mu\text{g}/\text{m}^3$  (2024) from  $1,100 \mu\text{g}/\text{m}^3$  (2017). This shows that as soil vapor rises closer to the surface from 4 feet to 2 feet, the concentrations of TPH chemicals are decreasing.

Here is how the risk was calculated:

**Step 1:** Multiply soil gas concentration by soil vapor to indoor air attenuation factor.

$$2,200,000 \times 0.03 = 66,000 \mu\text{g}/\text{m}^3$$

**Step 2:** Since oxygen is greater than 4% at this location, multiply this concentration by a bioattenuation factor of 0.001. The concentration below represents the estimated amount that could enter indoor air from soil vapor.

$$66,000 \times 0.001 = 66 \mu\text{g}/\text{m}^3$$

**Step 3:** Compare the concentration to the Environmental Screening Levels. The Indoor Air Non-Cancer Screening Level (safety limit) for TPH=  $600 \mu\text{g}/\text{m}^3$ .

$$66 \mu\text{g}/\text{m}^3 \text{ is less than } 600 \mu\text{g}/\text{m}^3$$

Conclusion: TPH concentrations in soil vapor will not cause a vapor intrusion risk.

*Source for Calculations:* The 2023 California EPA (CalEPA) Final Draft Vapor Intrusion Supplemental Guidance (SVIG 2023) Petroleum Attachment #2 (CalEPA 2023)

### **Groundwater Chemical Concentrations**

Based on 2024 and 2025 sampling data, groundwater in residential and commercial areas does not pose a human health risk. Chemicals of concern were only detected on-Site in the vicinity of the former ARCO #6066. The wells near residential areas did not detect any contaminants. This indicates that remaining groundwater contamination is confined to the Site and its immediate surroundings. Therefore, residential areas' groundwater does not pose a risk for vapor intrusion.

Groundwater chemical concentrations within the ARCO #6066 site also don't pose a future health risk. The most recent concentrations of benzene and methyl tertiary butyl

ether were below groundwater safety limits in the Policy and California's Maximum Contaminant groundwater levels (California drinking water safety limits). Tertiary butyl alcohol concentrations were also below the California drinking water notification level (12 µg/L) and the vapor intrusion non-cancer risk environmental screening level (1.4 x 10<sup>7</sup> µg/L). TPH in groundwater had vapor concentrations below the safety level for non-cancer risks.

### **Does the Site meet the Low-Threat UST Case Closure Policy Criteria?**

Yes, the Site meets all the criteria of the Policy.

### **What will happen when the State Water Board closes the ARCO #6066 Case?**

The State Water Board will issue a public notice stating that they are considering closing the ARCO #6066 case. The public will have 60 days to provide any comments regarding their concerns or questions about the closure. Once all comments are received, the State Water Board will review the comments and provide responses. If new information is introduced during the public comment period, the State Water Board will evaluate if the Site still meets the Policy based on the new information. If the State Water Board decides that the Site still meets the Policy's closure criteria, it will issue an Order to instruct the Responsible Party to properly destroy all wells, remove all remediation equipment, and remove all waste associated with the case. Once these actions have been completed, the State Water Board will issue a Uniform Closure Letter stating that all required corrective action measures have been completed for the Site.

### **References**

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