CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MEETING OF MAY 13-14, 2015
SOUTH LAKE TAHOE

ITEM: **5**

SUBJECT: **UNDERGROUND STORAGE TANK (UST) PROGRAM WORKSHOP**

CHRONOL-OGY: Key Dates in the Implementation of the UST Program:
1984: Federal UST Program began
1988: National UST Regulations adopted by USEPA
1989: Barry Keene UST Cleanup Fund Act of 1989
1992: State Board adopted Resolution 92-49
1995: Lawrence National Livermore Laboratory Study
1995: MTBE impacts to municipal wells in Santa Monica
1998: UST Upgrade Completion Date
2003: MTBE banned in California
2012: State Board adopted Low-threat Underground Storage Tank Case Closure Policy

ISSUES: Update to the Regional Board on the status of the UST Program

DISCUSSION: The UST program was developed on a federal level in 1984. At the time, there were an estimated 2 million active USTs and a rising awareness of the threat petroleum hydrocarbons from leaking tanks posed to groundwater quality and human health. In 1988, the USEPA adopted federal UST regulations. These regulations required preventative measures including spill, overfill, and corrosion protection. They also required release detection monitoring, release reporting, corrective action, and demonstration of financial resources to carry out potential corrective actions.

The regulations required, by December 22, 1998, existing UST systems to either meet specific upgrade requirements or close their UST systems. Under the closure requirements, responsible parties had to evaluate if a release had occurred and, if contamination was found, begin corrective actions. These regulations resulted in the discovery by 1999 of approximately 35,000 leaking UST cases in California.

To help Californians comply with the financial assurance portion of the UST regulations, the Barry Keene Underground Storage Tank Cleanup Fund Act of 1989 created the UST Cleanup Fund (Fund). The Fund's

purpose was to (1) help owners and operators of USTs satisfy federal and state financial responsibility requirements and (2) reimburse eligible corrective action costs incurred for the cleanup of contamination related to unauthorized releases from USTs. The Fund's revenues are generated by a storage fee for every gallon of fuel placed into a UST. Typically, about three quarters of the revenue is used for reimbursing corrective action costs while the remaining quarter pays for state program oversight costs.

Water Board staff has worked on UST cases for over 30 years. Some cases were opened before the national UST regulations were in place. Under the authorities granted to the Water Boards, staff required cleanup of groundwater at leaking UST sites to maximum contaminant levels, or, preferably, background conditions. In 1992, the State Water Board adopted Resolution 92-49 which allowed closure of contaminated sites with concentrations above maximum contaminant levels if compliance with cleanup goals is within a reasonable time frame. While Resolution 92-49 includes flexibility on the time to reach cleanup, it left staff with the difficult decision of what is a reasonable timeframe.

In 1995, a study commissioned by the State Board and performed by Lawrence Livermore National Laboratory (LLNL), found petroleum plumes tended to stabilize at short distance from the release site, rarely exceeding 250 feet. They also found decreasing concentration trends occurred at most sites, even sites without any remediation. This report indicated petroleum hydrocarbon plumes attenuated naturally in the subsurface.

Based on the LLNL report, the State Water Board was considering a risk-based approach to the cleanup of leaking UST sites when MTBE was discovered in municipal supply wells across the country. MTBE, a gasoline additive used to meet Clean Air Act requirements, produced significantly longer plumes and did not attenuate in the way fuel hydrocarbons did. The risk-based closure of leaking UST sites was no longer appropriate. At the time in South Lake Tahoe, twelve out of thirty four municipal supply wells had been shut down due to potential or actual MTBE contamination. MTBE was removed from gasoline in 2003.

By 2008, the Fund, which is the primary funding source to remediate UST sites in California, was overdrawn. It was clear to State Board a risk-based approach to the cleanup of UST sites was needed and appropriate from a cost-benefit perspective. In 2009, the State Board passed Resolution No. 2009-0042. The resolution required a number of program reviews and process improvements including the formation

of a task force to make recommendations for improvements to the Fund's administrative procedures and to the UST Cleanup regulatory program. Task force recommendations included the need for a statewide policy establishing criteria for closure of UST cases with a low threat to human health, safety, and the environment. By 2011, a draft policy had been developed and was undergoing peer review and CEQA scoping.

In 2012, the State Board adopted the Low-threat UST Case Closure Policy (Policy). The Policy provides consistent state-wide criteria for the remediation and closure of leaking UST sites. The risk-based Policy considers threats to human health, safety, and the environment for three exposure pathways: ingestion of groundwater, inhalation of vapors, and ingestion and dermal contact of contaminated soil.

Lahontan Staff have been implementing the Policy for almost 3 years, and the Lahontan Water Board is the only UST cleanup agency in the Region. The State Water Board's Geotracker database serves as Lahontan staff's primary management tool for the UST cleanup program. Geotracker provides public access to site information including reports, data, and staff directives. Geotracker is used by State Board to track program accomplishments and therefore Geotracker provides program accountability. Lahontan Water Board staff has consistently met program performance targets and is usually within the top 25% for State Board's other program performance metrics.

We currently receive funding for three staff to manage approximately 90 open cases. Of these 90 cases, approximately 20 cases are inactive, which means the responsible parties have ceased work at the site. This is often due to financial issues. Three of the region's active cases have contaminated water supply wells. The health threat associated with these well impacts have been addressed by well head treatment, bottled water, and, in one case, the well was taken out of service. In the next two years, we expect to close approximately 50 of the 90 cases under the Policy, leaving about 40 open cases by June 2017.

With the improvements in UST systems, we expect only a few referrals a year from local agency referrals. While these may be actual new releases, about half of our referrals over the last few years have been old releases in need of attention. In September 2014, the governor signed Senate Bill 445 into law. This law has several important ramifications for the UST cleanup program in the Lahontan Region. First, it extends funding for the UST Cleanup Fund to 2026. Second, it establishes a 2025 deadline for the removal of all single-wall USTs.

Third, it changes eligibility requirements for orphan USTs, making it easier for eligible parties to access funds to remove and cleanup these USTs which lack a responsible party. Therefore, as a result of SB445, it is likely we will see additional UST cleanup cases as single wall and orphan USTs are pulled from the ground. State Board has put preliminary estimates of about 40 sites with single wall or orphan USTs in the Lahontan Region.

The current focus of our program is three-fold: actively close cases that meet the Policy; use the Policy to direct actions at open cases to protect human health, safety, and the environment; and use available tools, including enforcement actions and funding from the Emergency, Abandoned, and Recalcitrant Program to gain compliance at inactive leaking UST sites. Staff will continue to provide good customer service and ensure cleanup goals are clear and accessible to the public.

RECOMMEND-ATION: No action required. Staff will provide a presentation (see Enclosure 1) and the Water Board may provide direction to staff regarding Underground Storage Tank Program management efforts.

ENCLOSURE	ITEM	Bates Number
1	Staff PowerPoint Presentation	**5-7**
2	Low-threat Underground Storage Tank Case Closure Policy	**5-25**

ENCLOSURE 1

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Agenda Item #5
Underground Storage Tank Program Workshop

Tom Gavigan, PG, CHg
Lahontan Water Board Staff

May 13, 2015

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Overview

UST Program Background

Program Implementation in the 1990s

MTBE and its eventual phase-out

Low-Threat UST Case Closure Policy

Lahontan UST Program Today and Moving Forward

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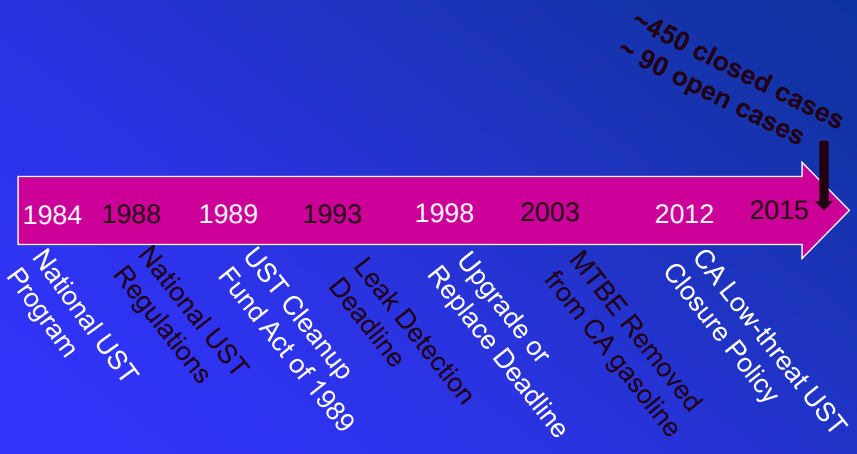
30 Years of the UST Program



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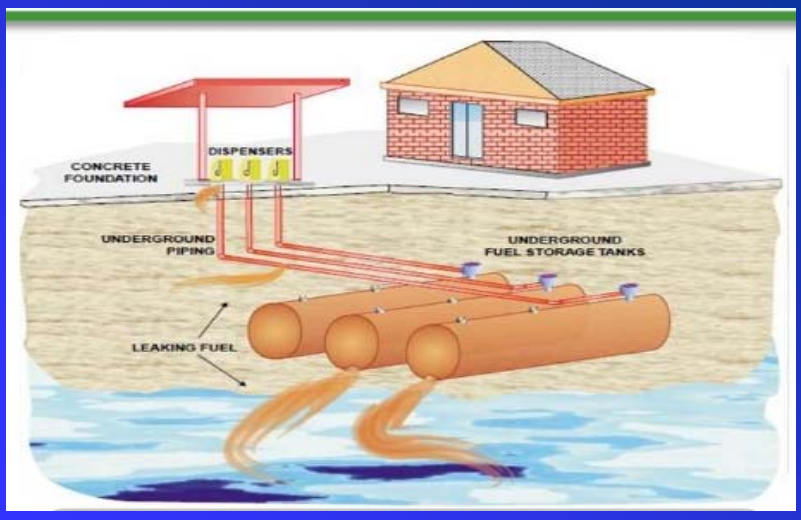
What's a LUST?



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Regulatory Approach Through 1992

Laws:

- ✓ Porter-Cologne Water Quality Control Act
- ✓ Health and Safety Code

Regulations:

- ✓ UST Regulations (CCR Title 23)
- ✓ Basin Plan

Closure Requirement:

- ✓ Water quality below MCLs, preferably background

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State Board Resolution 92-49

SWRCB Resolution No. 92-49 specifies alternative cleanup levels:

- ✓ Are of maximum benefit to people of the state
- ✓ Not affect present and anticipated beneficial uses
- ✓ Be consistent with Basin Plan water quality objectives (MCLs)

But…

- ✓ Does not require meeting cleanup levels at time of closure

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1995 Lawrence Livermore Lab Study

- Findings About Petroleum
  - Plumes tend to stabilize at short distances from release site
  - Plume lengths rarely exceed 250 feet
  - Sites show decreasing concentration trends without treatment
  - Hydrogeology has little relationship to benzene plume lengths
  - Statewide volume of groundwater that may be impacted above a concentration of 1 ppb benzene is about 7,000 acre-feet (0.0005%)

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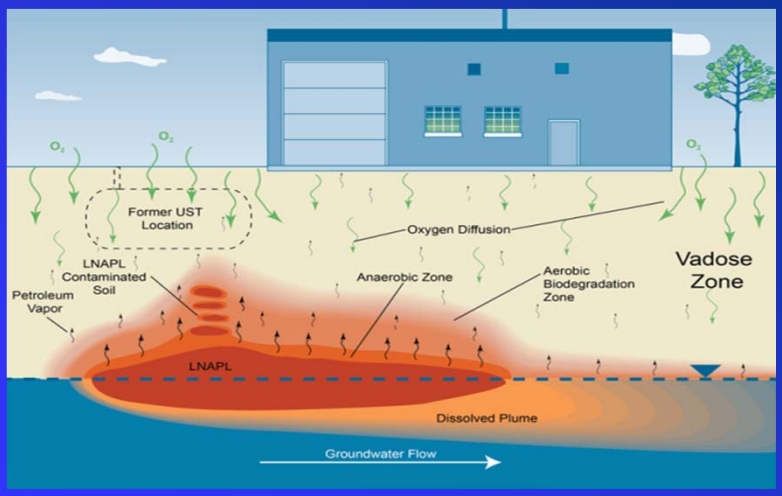
Petroleum Natural Attenuation



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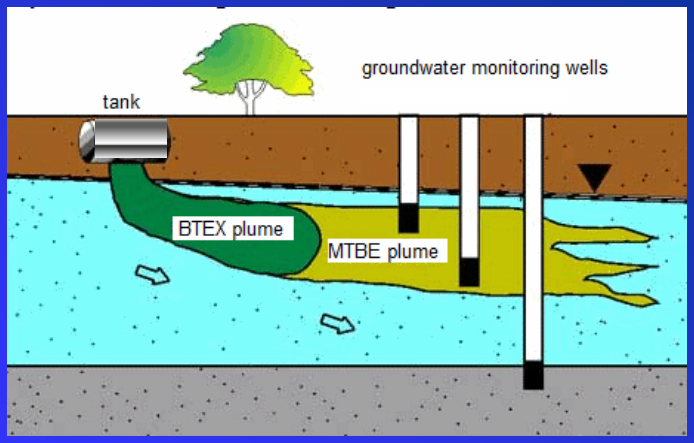
MTBE Plumes



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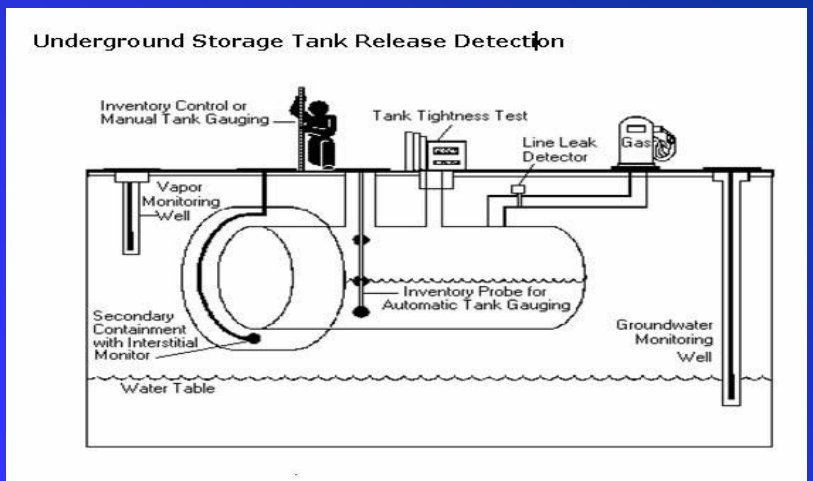
1998 UST System Requirements



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MTBE Phase Out, USTCF Funding Crisis

- **CA Phased Out MTBE in 2003**
- **UST Cleanup Fund in the Red**
- **State Board Convenes UST Task Forces**
- **Task Force Recommends State-wide policy**

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Low Threat UST Case Closure Policy

Resolution No. 2012-0016, May 1, 2012, adopted Low-threat UST Case Closure Policy

- Increase UST Cleanup process efficiency
- Preserve limited resources
- Experience shows:
  - ✓ Substantial fraction of petroleum reasonably remediated
  - ✓ Residual fraction difficult to completely remove
  - ✓ Petroleum naturally attenuates

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What's in the Policy?

I. General Criteria

II. Media Specific Criteria

- ✓ Groundwater
- ✓ Petroleum Vapor Intrusion to Indoor Air
- ✓ Direct Contact and Outdoor Air Exposure

III. Closure Requirements

- ✓ Notification
- ✓ Monitoring well destruction
- ✓ Waste removal

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What's in the Policy, #2?

General Criteria

- ✓ *Release located in service area of public water system*
- ✓ *UST release stopped*
- ✓ *Free product removed to maximum extent practicable*
- ✓ *Secondary source removed to extent practicable*

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What's in the Policy, #3?

Media Specific Criteria – Groundwater

- ✓ *Requires plumes to be stable or shrinking*
- ✓ *Specifies distances to supply wells and surface water bodies based on contaminant concentrations*
- ✓ *Allows free product in certain circumstances*
- ✓ *Water Quality Objectives attained through natural attenuation in reasonable amount of time*

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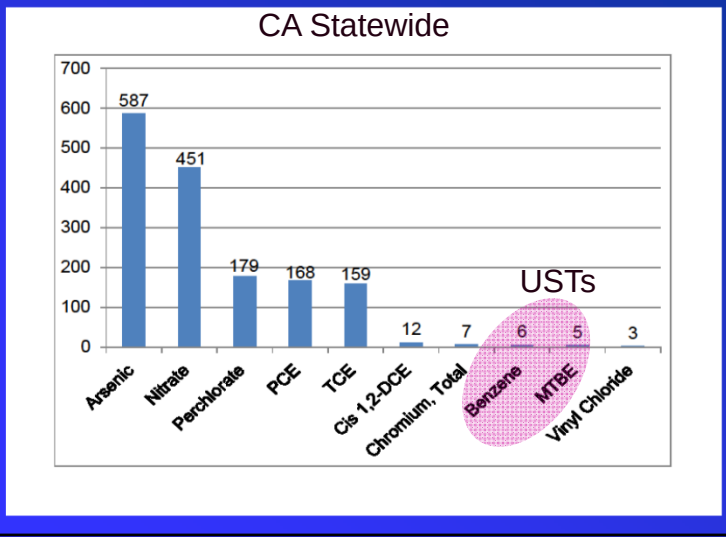
Principal Contaminant Detections in Public Supply Wells, 2002 - 2010



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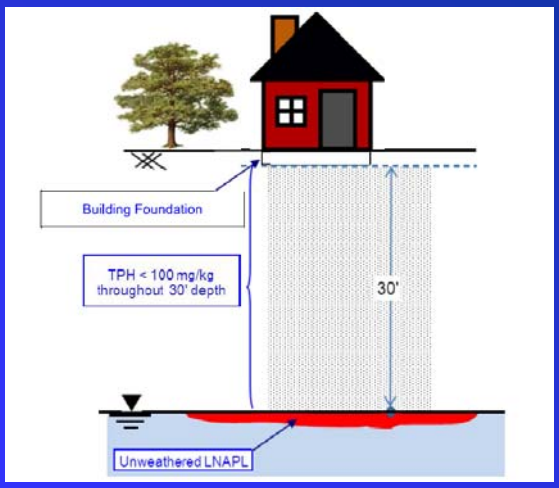
What's in the Policy, #4?

Media Specific Criteria - Petroleum Vapor Intrusion to Indoor Air



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What's in the Policy, #5?

Media Specific Criteria – Direct Contact and Outdoor Air Exposure

- *Addresses shallow (≤10 feet) soil contamination*
- *Includes screening levels for:*
  - ✓ *Residential Settings*
  - ✓ *Commercial/Industrial Settings*
  - ✓ *Utility worker exposure*

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What's in the Policy, #6

Closure Requirements:

- 60-Day Public Notification
  - ✓ *Water districts, building departments, owners and occupants of site, owners and occupants of neighboring properties*
- Monitoring Well Destruction and Waste Removal

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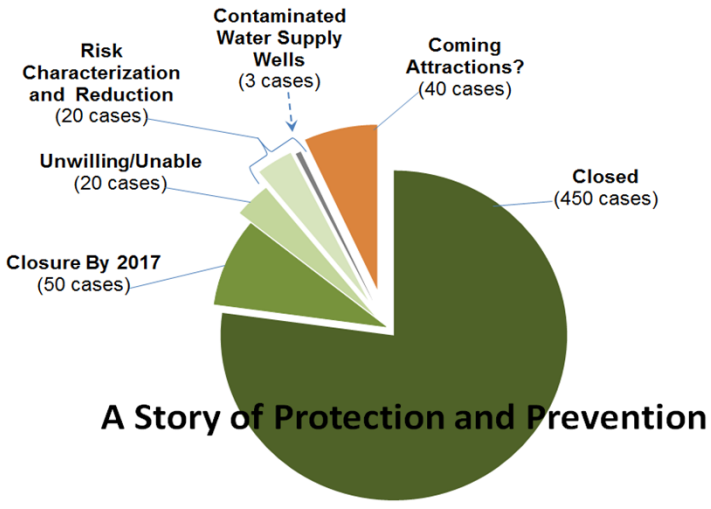
Lahontan UST Status Update



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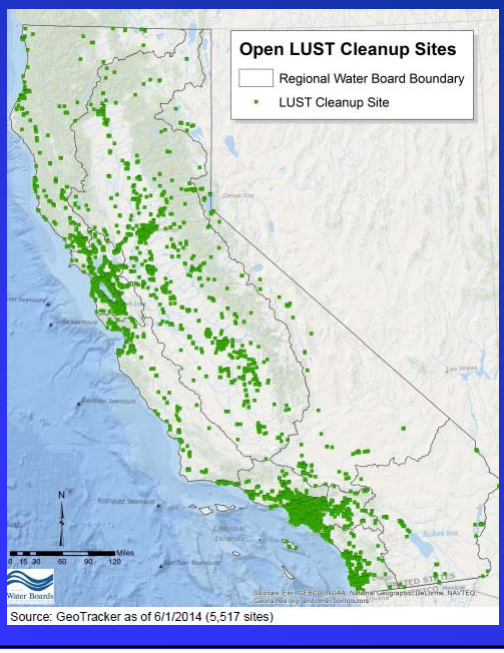
UST Case Locations



Source: GeoTracker as of 6/1/2014 (5,517 sites)

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What About New UST Cases?

- Currently receiving ~5 new cases per year
- Senate Bill 445 (September 2014)
  - ✓ Extends USTCF to 2026
  - ✓ Requires all single wall USTs closed by 2025
  - ✓ Orphan Site Cleanup Fund

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Case Management and Transparency

Public Accessibility
- ✓ Reports and data
- ✓ Staff directives

Staff Responsiveness
- ✓ Requests for Closure
- ✓ Work Plans
- ✓ Policy Checklists
- ✓ Paths To Closure

Program Tracking
- ✓ Performance Measures
- ✓ USTCF Reviews
- ✓ Data Completeness

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Example UST Sites and Strategies: Baker, CA

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R6 UST Program Focus

- Closing cases identified as eligible for closure
- Working with responsible parties to reduce threat to human health and the environment
- Using available tools to gain compliance at inactive sites

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EAR Program

- Emergency, Abandoned, and Recalcitrant Sites
  - ✓Method to address some inactive sites
  - ✓Allows staff to work with consulting firms contracted by DGS
  - ✓Closed the Yermo Truck Stop site in 2014
  - ✓Three sites currently in the program
  - ✓Will nominate three more sites this year

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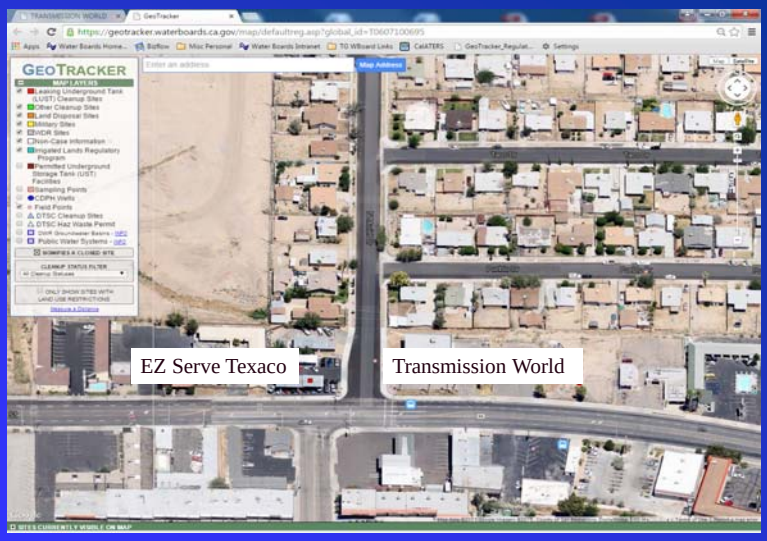
Proposed Barstow EAR Sites



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Summary

- UST Program has been around for 30 Years
- Closed over 400 cases in the Region
- Currently have approximately 90 open cases
- Low threat UST Case Closure Policy provides standardized criteria for case closure
- Expect to have about 40 open cases by June 2017
- Focus of Program is 3-fold:
  - ✓ Closing cases that meet the Policy
  - ✓ Using Policy to direct actions at active cases
  - ✓ Using available tools to address inactive cases

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Questions?

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ENCLOSURE 2

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Low-Threat Underground Storage Tank Case Closure Policy

Preamble

The State Water Resources Control Board (State Water Board) administers the petroleum UST (Underground Storage Tank) Cleanup Program, which was enacted by the Legislature in 1984 to protect health, safety and the environment. The State Water Board also administers the petroleum UST Cleanup Fund (Fund), which was enacted by the Legislature in 1989 to assist UST owners and operators in meeting federal financial responsibility requirements and to provide reimbursement to those owners and operators for the high cost of cleaning up unauthorized releases caused by leaking USTs.

The State Water Board believes it is in the best interest of the people of the State that unauthorized releases be prevented and cleaned up to the extent practicable in a manner that protects human health, safety and the environment. The State Water Board also recognizes that the technical and economic resources available for environmental restoration are limited, and that the highest priority for these resources must be the protection of human health and environmental receptors. Program experience has demonstrated the ability of remedial technologies to mitigate a substantial fraction of a petroleum contaminant mass with the investment of a reasonable level of effort. Experience has also shown that residual contaminant mass usually remains after the investment of reasonable effort, and that this mass is difficult to completely remove regardless of the level of additional effort and resources invested.

It has been well-documented in the literature and through experience at individual UST release sites that petroleum fuels naturally attenuate in the environment through adsorption, dispersion, dilution, volatilization, and biological degradation. This natural attenuation slows and limits the migration of dissolved petroleum plumes in groundwater. The biodegradation of petroleum, in particular, distinguishes petroleum products from other hazardous substances commonly found at commercial and industrial sites.

The characteristics of UST releases and the California UST Program have been studied extensively, with individual works including:

a. Lawrence Livermore National Laboratory report (1995)
b. SB1764 Committee report (1996)
c. UST Cleanup Program Task Force report (2010)
d. Cleanup Fund Task Force report (2010)
e. Cleanup Fund audit (2010)
f. State Water Resources Control Board site closure orders
g. State Water Resources Control Board Resolution 2009-0081

In general, these efforts have recognized that many petroleum release cases pose a low threat to human health and the environment. Some of these studies also recommended establishing "low-threat" closure criteria in order to maximize the benefits to the people of the State of California through judicious application of available resources.

The purpose of this policy is to establish consistent statewide case closure criteria for low-threat petroleum UST sites. The policy is consistent with existing statutes, regulations, State Water Board precedential decisions, policies and resolutions, and is intended to provide clear direction to responsible parties, their service providers, and regulatory agencies. The policy seeks to increase UST cleanup process efficiency. A benefit of improved efficiency is the preservation of limited resources for mitigation of releases posing a greater threat to human and environmental health.

This policy is based in part upon the knowledge and experience gained from the last 25 years of investigating and remediating unauthorized releases of petroleum from USTs. While this policy does not specifically address other petroleum release scenarios such as pipelines or above ground storage tanks, if a particular site with a different petroleum release scenario exhibits attributes similar to those which this policy addresses, the criteria for closure evaluation of these non-UST sites should be similar to those in this policy.

This policy is a state policy for water quality control and applies to all petroleum UST sites subject to Chapter 6.7 of Division 20 of the Health and Safety Code and Chapter 16 of Division 3 of Title 23 of the California Code of Regulations. The term "regulatory agencies" in this policy means the State Water Board, Regional Water Quality Control Boards (Regional Water Boards) and local agencies authorized to implement Health and Safety Code section 25296.10. Unless expressly provided in this policy, the terms in this policy shall have the same definitions provided in Chapter 6.7 of Division 20 of the Health and Safety Code and Chapter 16 of Division 3 of Title 23 of the California Code of Regulations.

Criteria for Low-Threat Case Closure

In the absence of unique attributes of a case or site-specific conditions that demonstrably increase the risk associated with residual petroleum constituents, cases that meet the general and media-specific criteria described in this policy pose a low threat to human health, safety or the environment and are appropriate for closure pursuant to Health and Safety Code section 25296.10. Cases that meet the criteria in this policy do not require further corrective action and shall be issued a uniform closure letter consistent with Health and Safety Code section 25296.10. Annually, or at the request of the responsible party or party conducting the corrective action, the regulatory agency shall conduct a review to determine whether the site meets the criteria contained in this policy.

It is important to emphasize that the criteria described in this policy do not attempt to describe the conditions at all low-threat petroleum UST sites in the State. The regulatory agency shall issue a closure letter for a case that does not meet these criteria if the regulatory agency determines the site to be low-threat based upon a site specific analysis.

This policy recognizes that some petroleum-release sites may possess unique attributes and that some site specific conditions may make case closure under this policy inappropriate, despite the satisfaction of the stated criteria in this policy. It is impossible to completely capture those sets of attributes that may render a site ineligible for closure based on this low-threat policy. This policy relies on the regulatory agency's use of the conceptual site model to identify the special attributes that would require specific attention prior to the application of low-threat criteria. In these cases, it is the regulatory agency's responsibility to identify the conditions that make closure under the policy inappropriate.

General Criteria
General criteria that must be satisfied by all candidate sites are listed as follows:

a. The unauthorized release is located within the service area of a public water system;
b. The unauthorized release consists only of petroleum;
c. The unauthorized ("primary") release from the UST system has been stopped;
d. Free product has been removed to the maximum extent practicable;
e. A conceptual site model that assesses the nature, extent, and mobility of the release has been developed;
f. Secondary source has been removed to the extent practicable;
g. Soil or groundwater has been tested for methyl tert-butyl ether (MTBE) and results reported in accordance with Health and Safety Code section 25296.15; and
h. Nuisance as defined by Water Code section 13050 does not exist at the site.

a. The unauthorized release is located within the service area of a public water system
This policy is protective of existing water supply wells. New water supply wells are unlikely to be installed in the shallow groundwater near former UST release sites. However, it is difficult to predict, on a statewide basis, where new wells will be installed, particularly in rural areas that are undergoing new development. This policy is limited to areas with available public water systems to reduce the likelihood that new wells in developing areas will be inadvertently impacted by residual petroleum in groundwater. Case closure outside of areas with a public water system should be evaluated based upon the fundamental principles in this policy and a site specific evaluation of developing water supplies in the area. For purposes of this policy, a public water system is a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.

b. The unauthorized release consists only of petroleum
For the purposes of this policy, petroleum is defined as crude oil, or any fraction thereof, which is liquid at standard conditions of temperature and pressure, which means 60 degrees Fahrenheit and 14.7 pounds per square inch absolute, including the following substances: motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents and used oils, including any additives and blending agents such as oxygenates contained in the formulation of the substances.

c. The unauthorized release has been stopped
The tank, pipe, or other appurtenant structure that released petroleum into the environment (i.e. the primary source) has been removed, repaired or replaced. It is not the intent of this policy to allow sites with ongoing leaks from the UST system to qualify for low-threat closure.

d. Free product has been removed to the maximum extent practicable
At petroleum unauthorized release sites where investigations indicate the presence of free product, free product shall be removed to the maximum extent practicable. In meeting the requirements of this section:

(a) Free product shall be removed in a manner that minimizes the spread of the unauthorized release into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges or disposes of recovery byproducts in compliance with applicable laws;

(b) Abatement of free product migration shall be used as a minimum objective for the design of any free product removal system; and
(c) Flammable products shall be stored for disposal in a safe and competent manner to prevent fires or explosions.

e. A conceptual site model that assesses the nature, extent, and mobility of the release has been developed

The Conceptual Site Model (CSM) is a fundamental element of a comprehensive site investigation. The CSM establishes the source and attributes of the unauthorized release, describes all affected media (including soil, groundwater, and soil vapor as appropriate), describes local geology, hydrogeology and other physical site characteristics that affect contaminant environmental transport and fate, and identifies all confirmed and potential contaminant receptors (including water supply wells, surface water bodies, structures and their inhabitants). The CSM is relied upon by practitioners as a guide for investigative design and data collection. Petroleum release sites in California occur in a wide variety of hydrogeologic settings. As a result, contaminant fate and transport and mechanisms by which receptors may be impacted by contaminants vary greatly from location to location. Therefore, the CSM is unique to each individual release site. All relevant site characteristics identified by the CSM shall be assessed and supported by data so that the nature, extent and mobility of the release have been established to determine conformance with applicable criteria in this policy. The supporting data and analysis used to develop the CSM are not required to be contained in a single report and may be contained in multiple reports submitted to the regulatory agency over a period of time.

f. Secondary source has been removed to the extent practicable

"Secondary source" is defined as petroleum-impacted soil or groundwater located at or immediately beneath the point of release from the primary source. Unless site attributes prevent secondary source removal (e.g. physical or infrastructural constraints exist whose removal or relocation would be technically or economically infeasible), petroleum-release sites are required to undergo secondary source removal to the extent practicable as described herein. "To the extent practicable" means implementing a cost-effective corrective action which removes or destroys-in-place the most readily recoverable fraction of source-area mass. It is expected that most secondary mass removal efforts will be completed in one year or less. Following removal or destruction of the secondary source, additional removal or active remedial actions shall not be required by regulatory agencies unless (1) necessary to abate a demonstrated threat to human health or (2) the groundwater plume does not meet the definition of low threat as described in this policy.

g. Soil and groundwater have been tested for MTBE and results reported in accordance with Health and Safety Code section 25296.15

Health and Safety Code section 25296.15 prohibits closing a UST case unless the soil, groundwater, or both, as applicable have been tested for MTBE and the results of that testing are known to the Regional Water Board. The exception to this requirement is where a regulatory agency determines that the UST that leaked has only contained diesel or jet fuel. Before closing a UST case pursuant to this policy, the requirements of section 25296.15, if applicable, shall be satisfied.

h. Nuisance as defined by Water Code section 13050 does not exist at the site
Water Code section 13050 defines "nuisance" as anything which meets all of the following requirements:

(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes.

For the purpose of this policy, waste means a petroleum release.

Media-Specific Criteria
Releases from USTs can impact human health and the environment through contact with any or all of the following contaminated media: groundwater, surface water, soil, and soil vapor. Although this contact can occur through ingestion, dermal contact, or inhalation of the various media, the most common drivers of health risk are ingestion of groundwater from drinking water wells, inhalation of vapors accumulated in buildings, contact with near surface contaminated soil, and inhalation of vapors in the outdoor environment. To simplify implementation, these media and pathways have been evaluated and the most common exposure scenarios have been combined into three media-specific criteria:

1. Groundwater
2. Vapor Intrusion to Indoor Air
3. Direct Contact and Outdoor Air Exposure

Candidate sites must satisfy all three of these media-specific criteria as described below.

1. Groundwater
This policy describes criteria on which to base a determination that threats to existing and anticipated beneficial uses of groundwater have been mitigated or are de minimis, including cases that have not affected groundwater.

State Water Board Resolution 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304* is a state policy for water quality control and applies to petroleum UST cases. Resolution 92-49 directs that water affected by an unauthorized release attain either background water quality or the best water quality that is reasonable if background water quality cannot be restored. Any alternative level of water quality less stringent than background must be consistent with the maximum benefit to the people of the state, not unreasonably affect current and anticipated beneficial use of affected water, and not result in water quality less than that prescribed in the water quality control plan for the basin within which the site is located. Resolution No. 92-49 does not require that the requisite level of water quality be met at the time of case closure; it specifies compliance with cleanup goals and objectives within a reasonable time frame.

Water quality control plans (Basin Plans) generally establish “background” water quality as a restorative endpoint. This policy recognizes the regulatory authority of the Basin Plans but underscores the flexibility contained in Resolution 92-49.

It is a fundamental tenet of this low-threat closure policy that if the closure criteria described in this policy are satisfied at a petroleum unauthorized release site, attaining background water quality is not feasible, establishing an alternate level of water quality not to exceed that prescribed in the applicable Basin Plan is appropriate, and that water quality objectives will be attained through natural attenuation within a reasonable time, prior to the expected need for use of any affected groundwater.

If groundwater with a designated beneficial use is affected by an unauthorized release, to satisfy the media-specific criteria for groundwater, the contaminant plume that exceeds water quality objectives must be stable or decreasing in areal extent, and meet all of the additional characteristics of one of the five classes of sites listed below. A plume that is "stable or decreasing" is a contaminant mass that has expanded to its maximum extent: the distance from the release where attenuation exceeds migration.

Groundwater-Specific Criteria

(1) a. The contaminant plume that exceeds water quality objectives is less than 100 feet in length.
   b. There is no free product.
   c. The nearest existing water supply well or surface water body is greater than 250 feet from the defined plume boundary.

(2) a. The contaminant plume that exceeds water quality objectives is less than 250 feet in length.
   b. There is no free product.
   c. The nearest existing water supply well or surface water body is greater than 1,000 feet from the defined plume boundary.
   d. The dissolved concentration of benzene is less than 3,000 micrograms per liter (µg/l), and the dissolved concentration of MTBE is less than 1,000 µg/l.

(3) a. The contaminant plume that exceeds water quality objectives is less than 250 feet in length.
   b. Free product has been removed to the maximum extent practicable, may still be present below the site where the release originated, but does not extend off-site.
   c. The plume has been stable or decreasing for a minimum of five years.
   d. The nearest existing water supply well or surface water body is greater than 1,000 feet from the defined plume boundary.
   e. The property owner is willing to accept a land use restriction if the regulatory agency requires a land use restriction as a condition of closure.

(4) a. The contaminant plume that exceeds water quality objectives is less than 1,000 feet in length.
   b. There is no free product.
   c. The nearest existing water supply well or surface water body is greater than 1,000 feet from the defined plume boundary.
   d. The dissolved concentration of benzene is less than 1,000 µg/l, and the dissolved concentration of MTBE is less than 1,000 µg/l.

(5) a. The regulatory agency determines, based on an analysis of site specific conditions that under current and reasonably anticipated near-term future scenarios, the contaminant plume poses a low threat to human health and safety and to the environment and water quality objectives will be achieved within a reasonable time frame.

Sites with Releases That Have Not Affected Groundwater
Sites with soil that does not contain sufficient mobile constituents [leachate, vapors, or light non-aqueous-phase liquids (LNAPL)] to cause groundwater to exceed the groundwater criteria in this policy shall be considered low-threat sites for the groundwater medium. Provided the general criteria and criteria for other media are also met, those sites are eligible for case closure.

For older releases, the absence of current groundwater impact is often a good indication that residual concentrations present in the soil are not a source for groundwater pollution.

2. Petroleum Vapor Intrusion to Indoor Air
Exposure to petroleum vapors migrating from soil or groundwater to indoor air may pose unacceptable human health risks. This policy describes conditions, including bioattenuation zones, which if met will assure that exposure to petroleum vapors in indoor air will not pose unacceptable health risks. In many petroleum release cases, potential human exposures to vapors are mitigated by bioattenuation processes as vapors migrate toward the ground surface. For the purposes of this section, the term "bioattenuation zone" means an area of soil with conditions that support biodegradation of petroleum hydrocarbon vapors.

The low-threat vapor-intrusion criteria described below apply to sites where the release originated and impacted or potentially impacted adjacent parcels when: (1) existing buildings are occupied or may be reasonably expected to be occupied in the future, or
(2) buildings for human occupancy are reasonably expected to be constructed in the future. Appendices 1 through 4 (attached) illustrate four potential exposure scenarios and describe characteristics and criteria associated with each scenario. Petroleum release sites shall satisfy the media-specific criteria for petroleum vapor intrusion to indoor air and be considered low-threat for the vapor-intrusion-to-indoor-air pathway if:

a. Site-specific conditions at the release site satisfy all of the characteristics and criteria of scenarios 1 through 3 as applicable, or all of the characteristics and criteria of scenario 4 as applicable; or

b. A site-specific risk assessment for the vapor intrusion pathway is conducted and demonstrates that human health is protected to the satisfaction of the regulatory agency; or

c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, the regulatory agency determines that petroleum vapors migrating from soil or groundwater will have no significant risk of adversely affecting human health.

Exception: Exposures to petroleum vapors associated with historical fuel system releases are comparatively insignificant relative to exposures from small surface spills and fugitive vapor releases that typically occur at active fueling facilities. Therefore, satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air is not required at active commercial petroleum fueling facilities, except in cases where release characteristics can be reasonably believed to pose an unacceptable health risk.

3. Direct Contact and Outdoor Air Exposure

This policy describes conditions where direct contact with contaminated soil or inhalation of contaminants volatized to outdoor air poses a low threat to human health. Release sites where human exposure may occur satisfy the media-specific criteria for direct contact and outdoor air exposure and shall be considered low-threat if they meet any of the following:

a. Maximum concentrations of petroleum constituents in soil are less than or equal to those listed in Table 1 for the specified depth below ground surface (bgs). The concentration limits for 0 to 5 feet bgs protect from ingestion of soil, dermal contact with soil, and inhalation of volatile soil emissions and inhalation of particulate emissions. The 5 to 10 feet bgs concentration limits protect from inhalation of volatile soil emissions. Both the 0 to 5 feet bgs concentration limits and the 5 to 10 feet bgs concentration limits for the appropriate site classification (Residential or Commercial/Industrial) shall be satisfied. In addition, if exposure to construction workers or utility trench workers are reasonably anticipated, the concentration limits for Utility Worker shall also be satisfied; or

b. Maximum concentrations of petroleum constituents in soil are less than levels that a site specific risk assessment demonstrates will have no significant risk of adversely affecting human health; or

c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, the regulatory agency determines that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health.

Table 1

Concentrations of Petroleum Constituents in Soil That Will Have No Significant Risk of Adversely Affecting Human Health

Chemical	Residential		Commercial/ Industrial		Utility Worker
	0 to 5 feet bgs mg/kg	Volatilization to outdoor air (5 to 10 feet bgs) mg/kg	0 to 5 feet bgs mg/kg	Volatilization to outdoor air (5 to 10 feet bgs) mg/kg	0 to 10 feet bgs mg/kg
Benzene	1.9	2.8	8.2	12	14
Ethylbenzene	21	32	89	134	314
Naphthalene	9.7	9.7	45	45	219
PAH[1]	0.063	NA	0.68	NA	4.5

Notes:
1. Based on the seven carcinogenic poly-aromatic hydrocarbons (PAHs) as benzo(a)pyrene toxicity equivalent [BaPe]. Sampling and analysis for PAH is only necessary where soil as affected by either waste oil or Bunker C fuel.
2. The area of impacted soil where a particular exposure occurs is 25 by 25 meters (approximately 82 by 82 feet) or less.
3. NA = not applicable
4. mg/kg = milligrams per kilogram

Low-Threat Case Closure

Cases that meet the general and media-specific criteria established in this policy pose a low threat to human health, safety and the environment and satisfy the case-closure requirements of Health and Safety Code section 25296.10, and case closure is consistent with State Water Board Resolution 92-49 that requires that cleanup goals and objectives be met within a reasonable time frame. If the case has been determined by the regulatory agency to meet the criteria in this policy, the regulatory agency shall notify responsible parties that they are eligible for case closure and that the following items, if applicable, shall be completed prior to the issuance of a uniform closure letter specified in Health and Safety Code section 25296.10. After completion of these items, and unless the regulatory agency revises its determination based on comments received on the proposed case closure, the regulatory agency shall issue a uniform closure letter within 30 days from the end of the comment period.

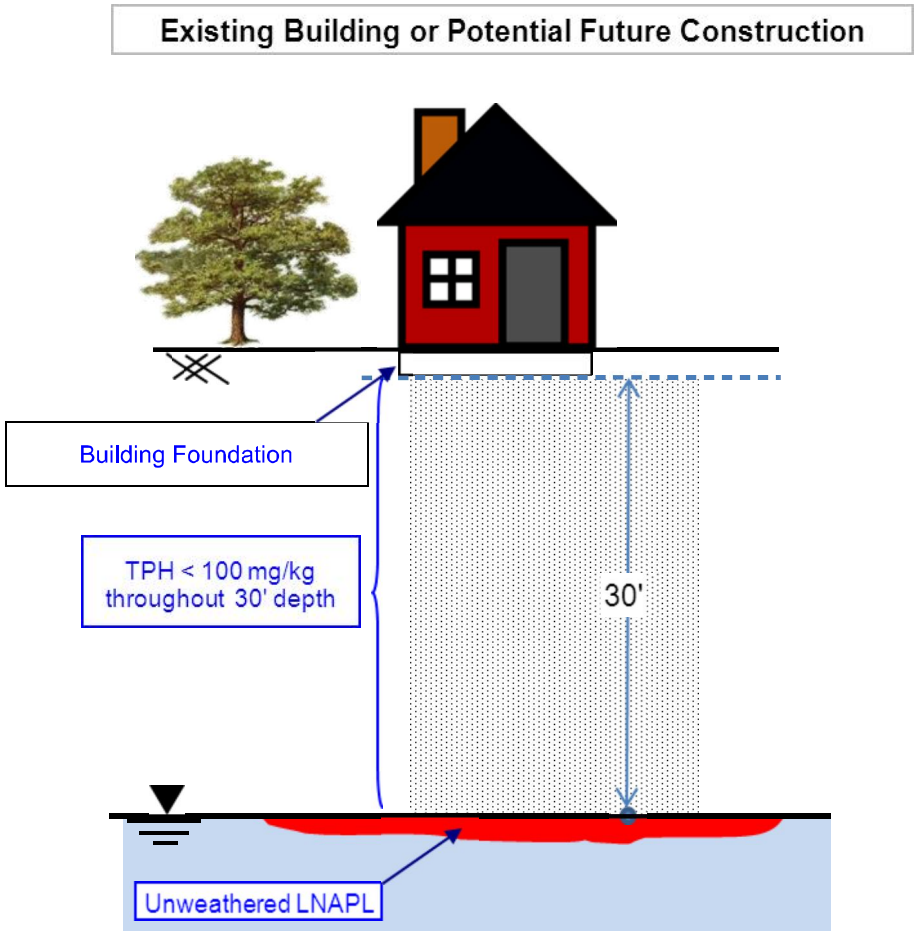
a. Notification Requirements – Municipal and county water districts, water replenishment districts, special act districts with groundwater management authority, agencies with authority to issue building permits for land affected by the petroleum release, owners and occupants of the property impacted by the petroleum release, and the owners and occupants of all parcels adjacent to the impacted property shall be notified of the proposed case closure and provided a 60 day period to comment. The regulatory agency shall consider any comments received when determining if the case should be closed or if site specific conditions warrant otherwise.

b. Monitoring Well Destruction – All wells and borings installed for the purpose of investigating, remediating, or monitoring the unauthorized release shall be properly destroyed prior to case closure unless a property owner certifies that they will keep and maintain the wells or borings in accordance with applicable local or state requirements.

c. Waste Removal – All waste piles, drums, debris and other investigation or remediation derived materials shall be removed from the site and properly managed in accordance with regulatory agency requirements.

Appendix 1
Scenario 1: Unweathered* LNAPL in Groundwater

Required Characteristics of the Bioattenuation Zone



Required Characteristics of the Bioattenuation Zone:

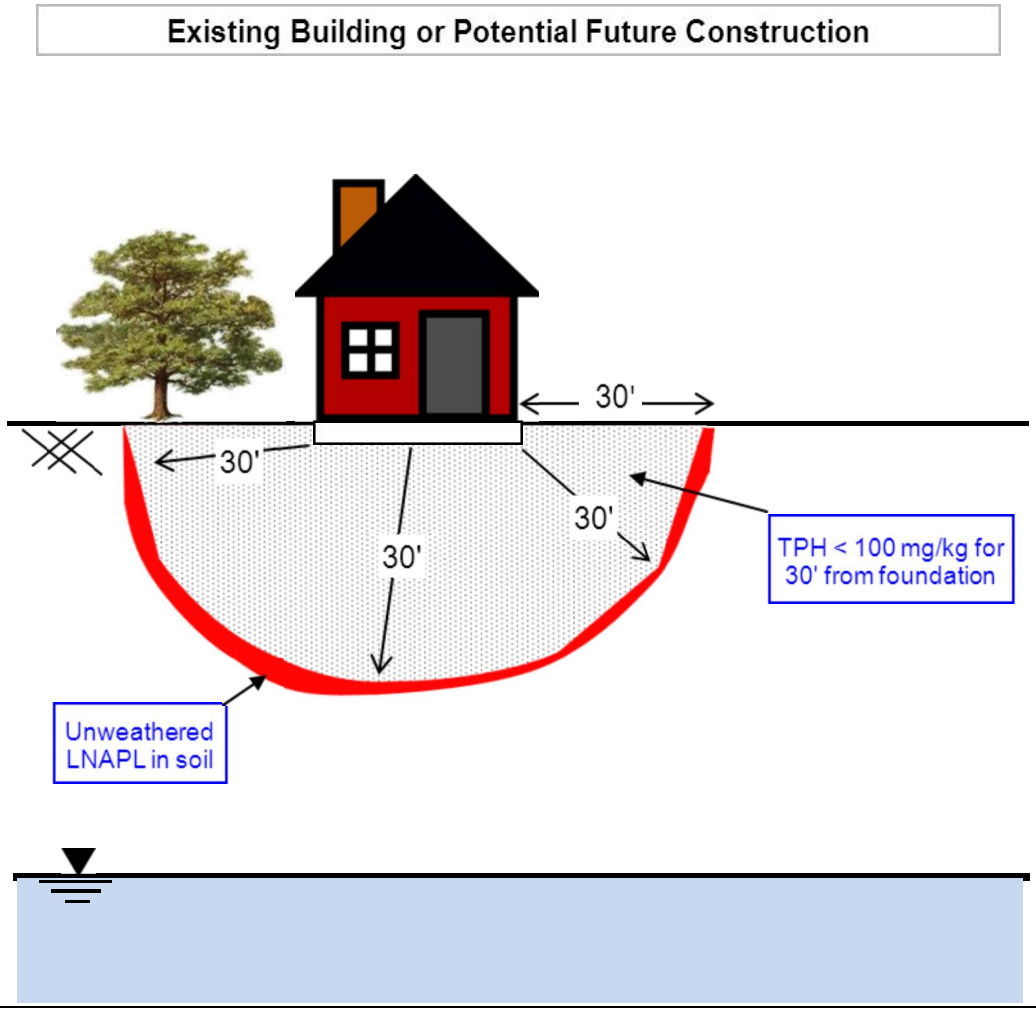
1. The bioattenuation zone shall be a continuous zone that provides a separation of at least 30 feet vertically between the LNAPL in groundwater and the foundation of existing or potential buildings; and
2. Total TPH (TPH-g and TPH-d combined) are less than 100 mg/kg throughout the entire depth of the bioattenuation zone.

TPH = total petroleum hydrocarbons
TPH-g = total petroleum hydrocarbons as gasoline
TPH-d = total petroleum hydrocarbons as diesel

*As used in this context, unweathered LNAPL is generally understood to mean petroleum product that has not been subjected to significant volatilization or solubilization, and therefore has not lost a significant portion of its volatile or soluble constituents (e.g., comparable to recently dispensed fuel).

Appendix 2
Scenario 2: Unweathered* LNAPL in Soil

Required Characteristics of the Bioattenuation Zone



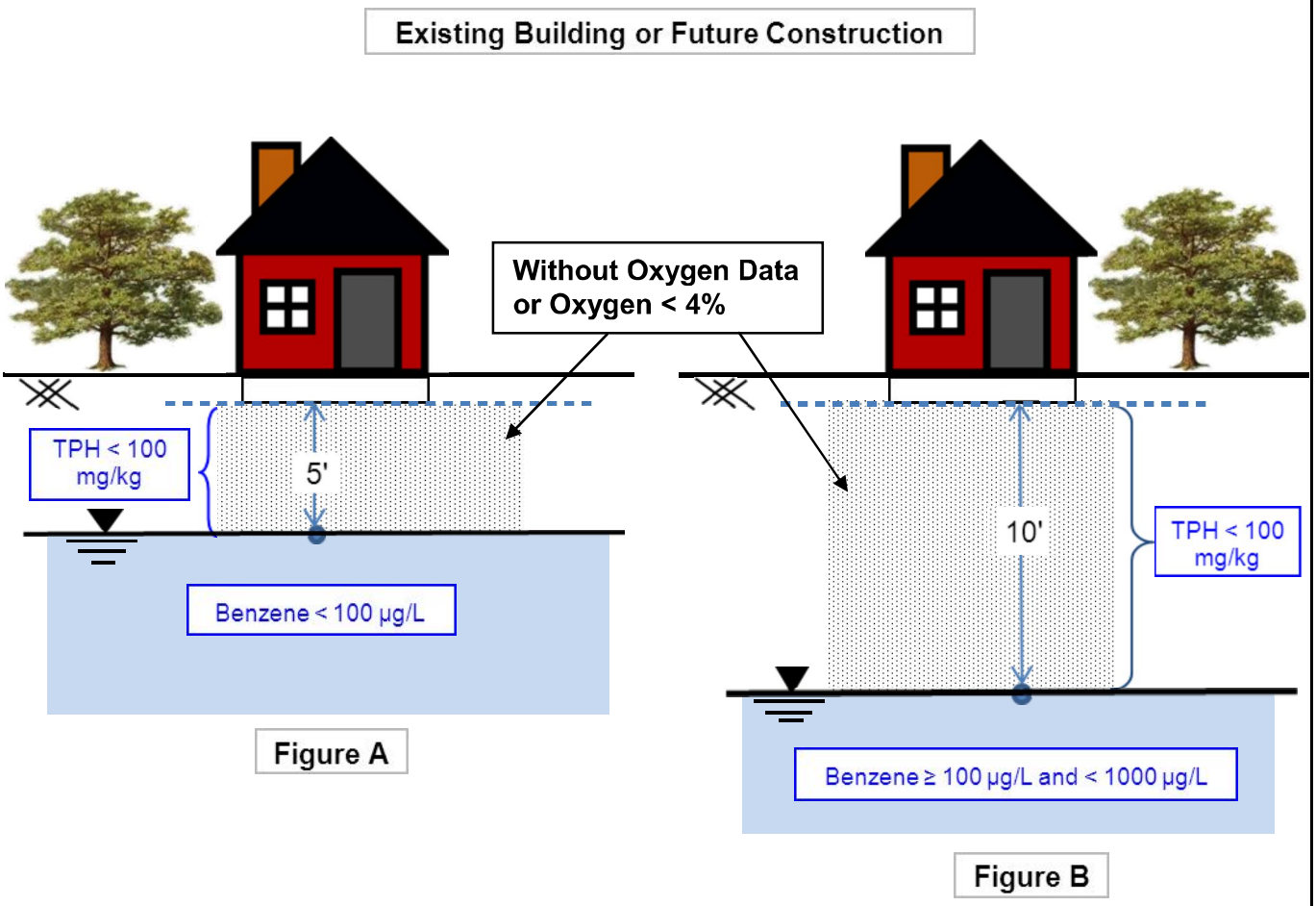
Required Characteristics of the Bioattenuation Zone:

1. The bioattenuation zone shall be a continuous zone that provides a separation of at least 30 feet both laterally and vertically between the LNAPL in soil and the foundation of existing or potential buildings, and
2. Total TPH (TPH-g and TPH-d combined) are less than 100 mg/kg throughout the entire lateral and vertical extent of the bioattenuation zone.

*As used in this context, unweathered LNAPL is generally understood to mean petroleum product that has not been subjected to significant volatilization or solubilization, and therefore has not lost a significant portion of its volatile or soluble constituents (e.g., comparable to recently dispensed fuel).

Appendix 3
Scenario 3 - Dissolved Phase Benzene Concentrations in Groundwater
(Low concentration groundwater scenarios with or without oxygen data)
(1 of 2)

Defining the Bioattenuation Zone Without Oxygen Data or Oxygen < 4%



Required Characteristics of Bioattenuation Zone for Sites Without Oxygen Data or Where Oxygen is < 4%

Figure A: 1) Where benzene concentrations are less than 100 µg/L, the bioattenuation zone:

a) Shall be a continuous zone that provides a separation of at least 5 feet vertically between the dissolved phase Benzene and the foundation of existing or potential buildings; and
b) Contain Total TPH (TPH-g and TPH-d combined) less than 100 mg/kg throughout the entire depth of the bioattenuation zone.

Figure B: 1) Where benzene concentrations are equal to or greater than 100 µg/L but less than 1000 µg/L, the bioattenuation zone:

a) Shall be a continuous zone that provides a separation of at least 10 feet vertically between the dissolved phase Benzene and the foundation of existing or potential buildings; and b) Contain Total TPH (TPH-g and TPH-d combined) less than 100 mg/kg throughout the entire depth of the bioattenuation zone.

Appendix 3
Scenario 3 - Dissolved Phase Benzene Concentrations in Groundwater
(Low concentration groundwater scenarios with or without oxygen data)
(2 of 2)

Defining the Bioattenuation Zone With Oxygen ≥ 4%

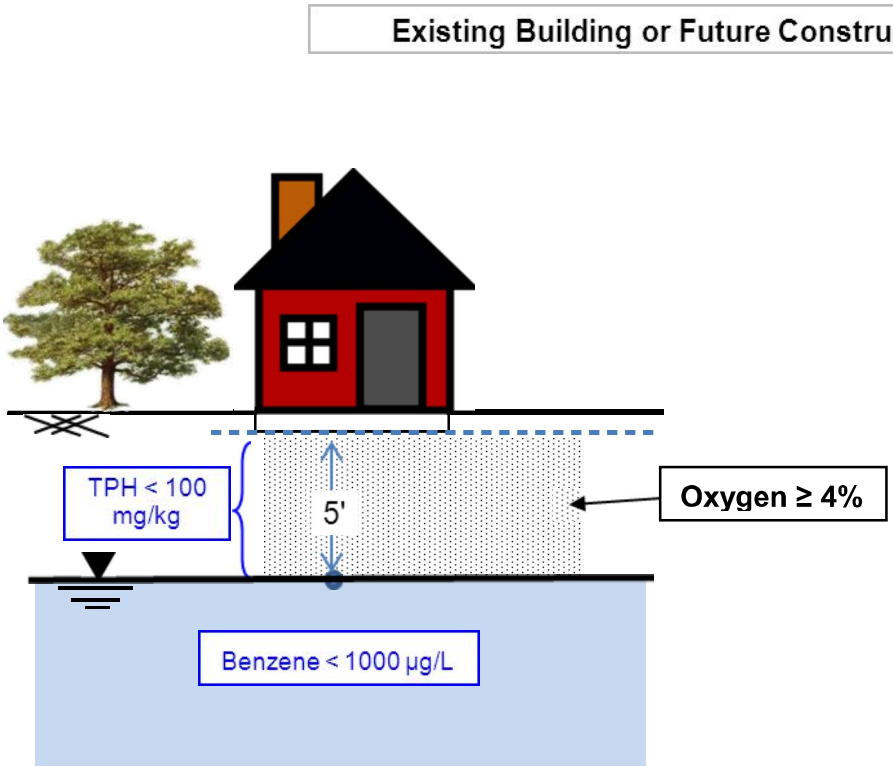


Figure C

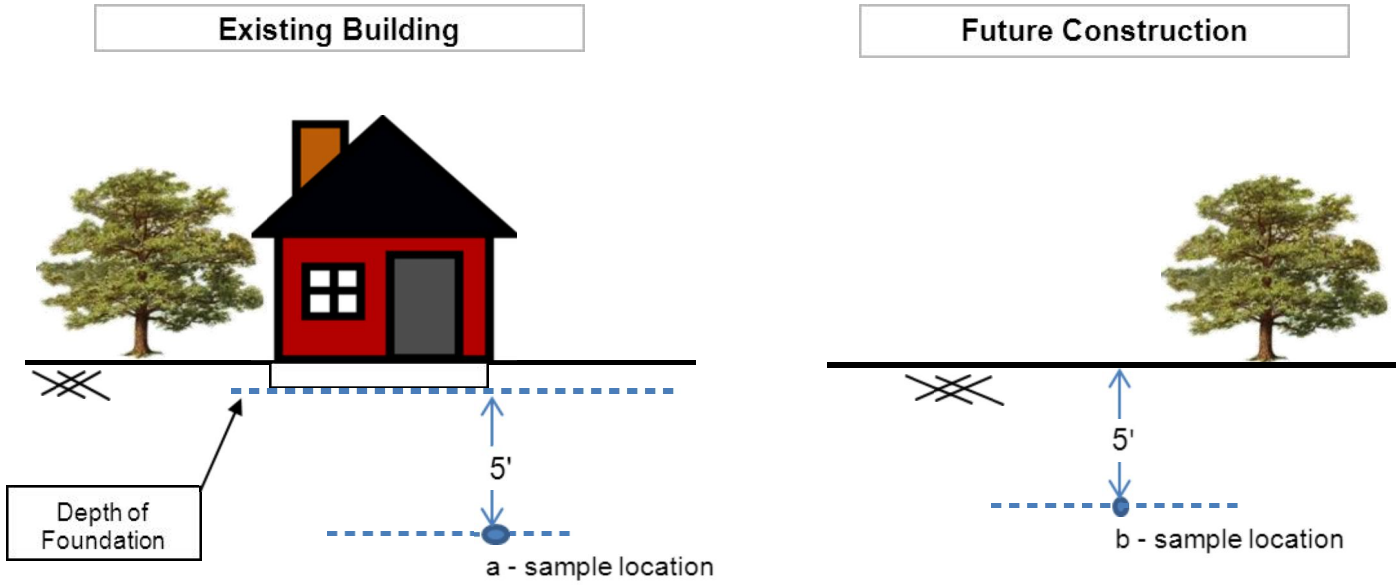
Required Characteristics of Bioattenuation Zone for Sites With Oxygen ≥ 4%

Where benzene concentrations are less than 1000 µg/L, the bioattenuation zone:

1. Shall be a continuous zone that provides a separation of least 5 feet vertically between the dissolved phase Benzene and the foundation of existing or potential buildings; and
2. Contain Total TPH (TPH-g and TPH-d combined) less than 100 mg/kg throughout the entire depth of the bioattenuation zone.

Appendix 4
Scenario 4 - Direct Measurement of Soil Gas Concentrations
(1 of 2)

Soil Gas Sampling – No Bioattenuation Zone



The criteria in the table below apply unless the requirements for a bioattenuation zone, established below, are satisfied.

When applying the criteria below, the soil gas sample must be obtained from the following locations:

a. Beneath or adjacent to an existing building: The soil gas sample shall be collected at least five feet below the bottom of the building foundation.
b. Future construction: The soil gas sample shall be collected from at least five feet below ground surface.

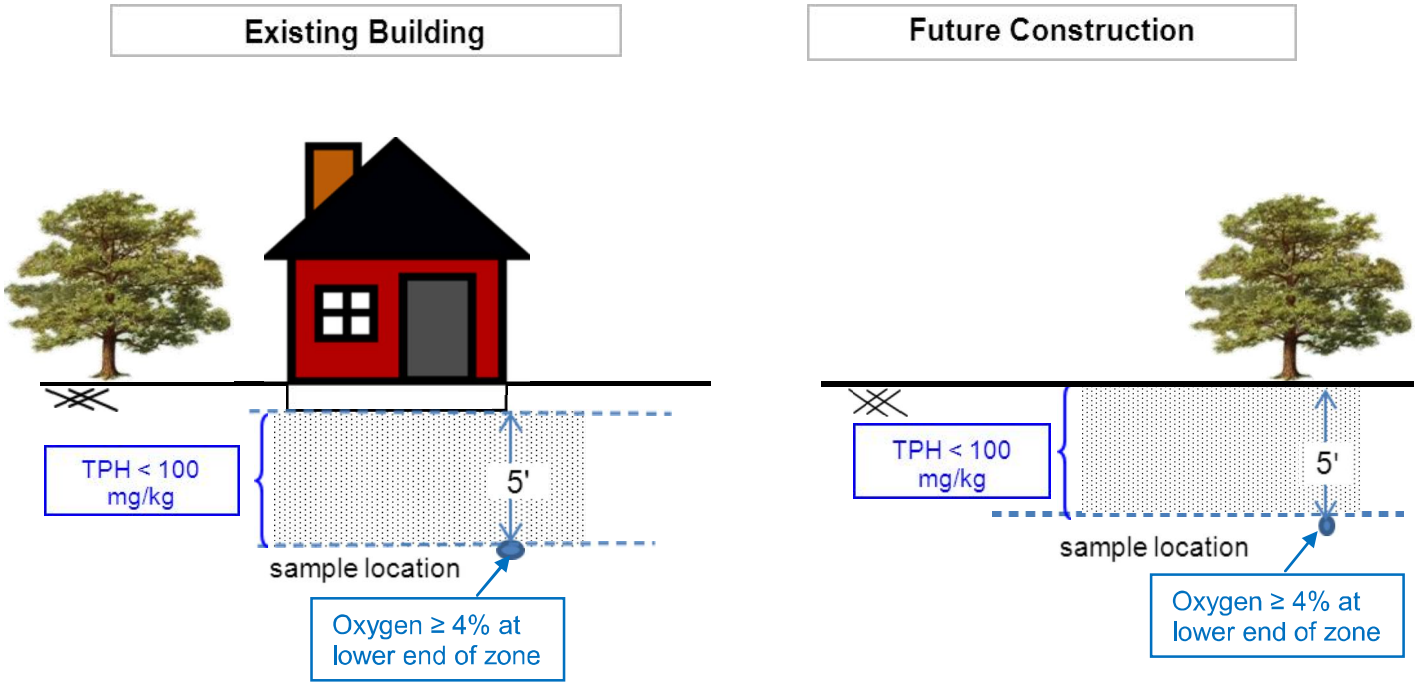
Soil Gas Criteria (µg/m^3)

	No Bioattenuation Zone*	
	Residential	**Commercial**
Constituent	Soil Gas Concentration (µg/m^3)	
Benzene	< 85	< 280
Ethylbenzene	<1,100	<3,600
Naphthalene	< 93	< 310

*For the no bioattenuation zone, the screening criteria are same as the California Human Health Screening Levels (CHHSLs) with engineered fill below sub-slab.

Appendix 4
Scenario 4 - Direct Measurement of Soil Gas Concentrations
(2 of 2)

Soil Gas Sampling – With Bioattenuation Zone



The criteria in the table below apply if the following requirements for a biattenuation zone are satisfied:

1. There is a minimum of five vertical feet of soil between the soil vapor measurement and the foundation of an existing building or ground surface of future construction.
2. TPH (TPHg + TPHd) is less than 100 mg/kg (measured in at least two depths within the five-foot zone.)
3. Oxygen is greater than or equal to four percent measured at the bottom of the five-foot zone.

Soil Gas Criteria (µg/m^3)

	With Bioattenuation Zone**	
	Residential	Commercial
Constituent	Soil Gas Concentration (µg/m^3)	
Benzene	< 85,000	< 280,000
Ethylbenzene	<1,100,000	<3,600,000
Naphthalene	< 93,000	< 310,000

**A 1000-fold bioattenuation of petroleum vapors is assumed for the bioattenuation zone.

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