

State Water Resources Control Board

D R A F T
UST Case Closure Summary
Beacon Station #3556
Ultramar Inc. (Petitioner)
900 Morro Bay Boulevard, Morro Bay, California (Site)

Summary:

The site is an operating gasoline service station located in a mixed commercial and residential area at 900 Morro Bay Blvd. In January 2010, Petitioner requested that the Central Coast Regional Water Quality Control Board (Central Coast Regional Board) close the case asserting that site conditions do not present a significant risk to human health, safety, or the environment. The Central Coast Regional Board denied the request for closure explaining that concentrations of gasoline constituents in monitor well MW-1 exceed Basin Plan Water Quality Objectives and that further remediation in the vicinity of the well is needed to reduce the concentrations in groundwater. In March 2011, Petitioner petitioned the State Water Resources Control Board (State Water Board) for review of the Central Coast Regional Board's closure denial contending that corrective actions performed at the site ensure the protection of human health, safety, or the environment, that the effort and cost of additional remediation would produce negligible benefit and have statewide technical and economic implications, and that case closure is consistent with State Water Board Resolution No. 92-49. In its response to the petition for State Water Board review, the Central Coast Regional Board asserts that the site is not a low-risk UST case and that closure is inconsistent with State Water Board Resolution No. 92-49.

Soil and groundwater analytical data demonstrate that residual gasoline remains in a localized area in a stratum of fine sand and clay at a depth of 26 feet and that the plume is stable and contained to the site. Considering the geology, hydrology, and land use at and in the vicinity of the site, the residual gasoline constituents remaining in site soil do not and will not threaten human health, safety, or the environment. The shallow affected groundwater is not presently used as a source of drinking water or other beneficial use and it is highly unlikely it will be used as such during the anticipated period of impairment. Closure is consistent with the maximum benefit to the people of the state and State Water Board Resolution No. 92-49.

Background:

Three underground storage tanks (USTs) were removed and replaced with three double-walled fiberglass USTs in August 1992. The release from the former USTs was limited to the immediate area of the UST installation. The UST pit was over-excavated to a depth of 21 feet removing the bulk of the fugitive hydrocarbons. Site soil and groundwater characterization began in 1993 and remediation efforts commenced in 2000.

Case Information:

Ultramar Inc.	Address: PO Box 696000, San Antonio, TX 78296,
Facility Name: Beacon Station #3556	Facility Address: 900 Morro Bay Blvd, Morro Bay
Global ID No: T0607900058	Petition Date: March 24, 2010
USTCUF Claim No: 7661	USTCUF expenditures: \$0

Agency Information:

Central Coast Regional Water Quality Control Board	Address: 81 Higuera Street, #200, San Luis Obispo, CA 93401-5427
Agency Case No. 2371	Years case open: 19

Release Information:

USTs:

Tank No.	Size	Contents	Status	Date
1	10,000 gallons	Gasoline	Removed	August 1992
2	8,000 gallons	Gasoline	Removed	August 1992
3	6,000 gallons	Gasoline	Removed	August 1992

- Discovery Date: August 31, 1992
- Affected Media: Soil and shallow groundwater.
- Source: Residual gasoline in fine sand and clay soil.
- Corrective Actions:
 - August 1992: UST removal and soil excavation (712 cubic yards).
 - April 1993: Soil and groundwater assessment.
 - December 1993: Soil and groundwater assessment.
 - April 1997: Groundwater and vapor extraction pilot test.
 - 2000 - 2002: Seventeen monthly 8-hour dual-phase extraction events.
 - June 2005: Soil and groundwater assessment.
 - May 2007: Soil and groundwater assessment.
 - June 2007 – January 2010: Enhanced in-situ bioremediation.

Site Description/Conditions:

- Groundwater Basin: Estero Bay Hydrologic Unit, Morro Sub area (310.21).
- Surface Waters: Morro Bay 2,700 feet west. Morro Creek 5,200 feet northwest. Chorro Creek 5,500 feet southeast.
- Geology: Quaternary eolian and marine terrace deposits overlying Jurassic/Cretaceous Franciscan Formation mélange.
- Depth to Groundwater: Seasonally fluctuates two to four feet within the range of 20 and 30 feet below ground surface.
- Groundwater flow direction: Northwesterly
- Hydrology: Groundwater is recharged via infiltration of precipitation and subsurface inflow. Groundwater discharges via subsurface outflow and evapotranspiration.
- Land Use: Mixed commercial and residential.
- Nearest Well: The City of Morro Bay Highway 1 well field (four wells) in the Morro Groundwater Basin is one mile northwest.
- Designated Beneficial Uses: Municipal (MUN), Agricultural (AGR), Industrial (IND), and Industrial Process Supply (PRO).
- Time to meet Water Quality Objectives: Decades to hundreds of years.

Site History:

The site is an operating gasoline service station. In 1992, three single-walled steel USTs were removed and replaced with two 10,000 gallon and one 12,000 gallon double-walled fiberglass USTs. During the UST removal and replacement, the UST pit was over-excavated to a depth of 21 feet. Subsequent corrective actions included multiple 24-hour and 8-hour dual-phase extraction (DPE) and groundwater over-purge events between November 2000 and May 2002. These remediation efforts recovered the equivalent of about 7 gallons of gasoline but had little effect on concentrations of gasoline constituents reported for groundwater samples from monitor well MW-1. Monitor well MW-6 was installed in June 2005 and wells MW-7 and MW-8 in May 2007. From June 2007 until January 2010, oxygen was infused into groundwater in monitor wells MW-1, MW-6, MW-7¹, and MW-8 to stimulate biodegradation of the residual gasoline. This effort resulted in a reduction of toluene concentrations in groundwater samples from well MW-8 and TPHg, ethylbenzene, and xylene concentrations in samples from well MW-6 but had little effect on concentrations of gasoline constituents reported for groundwater samples from monitor well MW-1 (see Figure 1 below).

Contaminant Concentrations:

Concentrations of gasoline constituents reported for groundwater samples obtained from monitor well MW-1 reflect the solubility limits of the constituents in accordance with Raoult's law. Benzene concentrations have declined significantly since monitoring began in 1992 reflecting the aerobic groundwater environment present in the sand stratum between 19 and 24 feet bgs.

Discussion:

The site is an active gasoline station. The unauthorized petroleum release was limited to within about 10 feet laterally from the former USTs and has been removed to the extent practical. The remaining residual dissolved-phase petroleum constituents do not extend beyond the property boundaries. Constituent concentrations in the plume are stable or decreasing. Remediation has been attempted and shown to be ineffective in significantly reducing the mass of constituents remaining in the stratum of fine sand and clay at a depth of 26 feet. Current and anticipated beneficial uses are not affected.

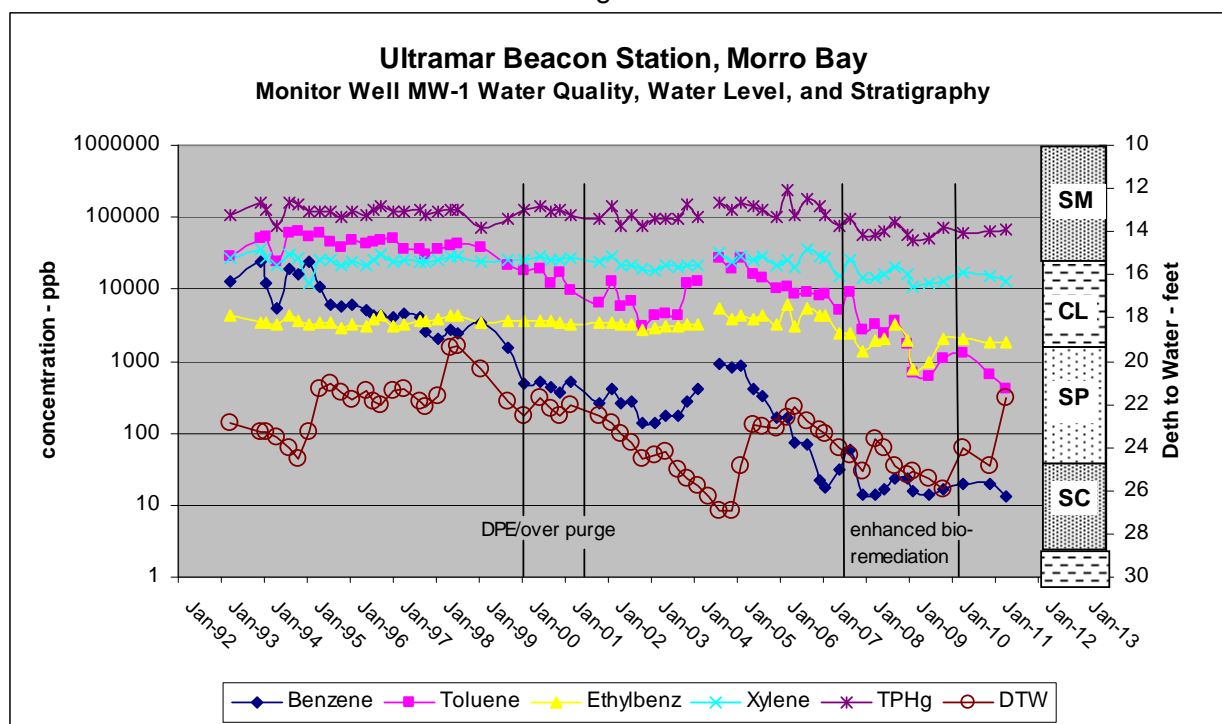
Objection to Case Closure and Response:

The Central Coast Regional Board contends that:

1. Closure is not consistent with the maximum benefit to the people of the state (or the City of Morro Bay), site conditions have the potential to unreasonably affect current and anticipated beneficial groundwater uses and prior petroleum releases will continue to degrade groundwater as gasoline constituent concentrations are greater than water quality objectives.
2. Site conditions do not meet the Central Coast Regional Board's narrative and numeric criteria for low-risk closure.
3. The site is located in a "sensitive aquifer" where a UST release "...could quickly threaten..." beneficial groundwater uses or nearby surface waters.
4. There are compelling reasons to require additional corrective actions at the site:
 - a. Usable groundwater supplies are scarce in the Central Coast hydrologic region.
 - b. It is not reasonable to allow a long time frame for attainment of water quality objectives.

¹ Well MW-7 is located about 15 feet up-gradient of well MW-1 and has produced groundwater samples devoid of gasoline constituents since its installation.

Figure 1



Response 1: As explained below, although groundwater in a limited area of the site will be degraded with gasoline constituents for an extended time, site conditions do not unreasonably affect current or anticipated beneficial groundwater uses or threaten local surface waters.

Response 2: Closure must be consistent with State Water Board Resolution No. 92-49 and be consistent with the maximum benefit to the people of the state. The Central Coast Regional Board's closure criteria referred to in its objection to closure have not been adopted by the Central Coast Regional Board or the State Water Board.

Response 3: Central Coast Regional Board staff was unable to define the descriptive term "sensitive aquifer." The site is located mid-way between the Morro Valley and the Chorro Valley Groundwater Basins in an area underlain by impermeable rocks of the Jurassic to Cretaceous age Franciscan Group (Department of Water Resources Bulletin No. 118, February 27, 2004). A limited amount of shallow groundwater is present in the Quaternary sediments overlying the Franciscan Group rocks. This groundwater is degraded by nitrate concentrations greater than twice the Basin Plan Water Quality Objectives, and the yield from the sediments is insufficient to produce economically significant quantities of water for municipal, agricultural, or industrial beneficial uses².

Response 4a: Although more than 80% of the agricultural and municipal water demand in the Central Coast hydrologic region is derived from groundwater, the limited groundwater resource affected by the petroleum release will not impact the groundwater supply to any practical extent in the region.

² Well sampling data indicate the wells tend to de-water after about ten minutes when pumped at a rate of about two gallons per minute.

Response 4b: Residual gasoline will remain in the stratum of fine sand and clay at a depth of 26 feet and affect localized shallow groundwater for decades to hundreds of years. This time period is reasonable because the shallow affected groundwater is not presently used as a source of drinking water or other beneficial use and it is highly unlikely it will be used as such during the anticipated period of impairment.

Although concentrations of gasoline constituents will exceed water quality objectives in groundwater within the source area for a considerable period of time, data in the record show that natural attenuation of the residual gasoline mass of constituents is occurring, that dissolved-phase constituents are attenuating via biological metabolism, and that concentrations rapidly decline in groundwater down-gradient of the source area. Based on these facts and the current and anticipated future land use, site conditions do not represent a threat to human health, safety, or the environment.

Minimal benefit will be gained by expending additional money in efforts to extract the diminishing mass of residual petroleum hydrocarbons and routinely monitor and report on the status of the case. Nearby wells and water bodies are not, and will not be, impacted by the release. Continued monitoring or in-situ remediation efforts are unlikely to reduce the time to meet water quality objectives. Shallow groundwater in the source area will exceed water quality objectives for decades to hundreds of years, but this extended period is reasonable because the groundwater is not currently used as a source of drinking water, and it is unlikely that the shallow groundwater beneath the site will be used as a source of drinking water in the foreseeable future.

Closure:

Does corrective action performed to date ensure the protection of human health, safety and the environment? Yes.

Are corrective actions and UST case closure consistent with State Water Board Resolution 92-49? Yes.

Though the requisite level of water quality has not been met, background water quality will be achieved via natural attenuation in decades to hundreds of years. In this case, this is a reasonable period in which to meet water quality objectives because groundwater is not currently being used as a source of drinking water and it is highly unlikely that the affected water will be used as a source of drinking water in the foreseeable future. In addition, it is not anticipated that other beneficial uses will be affected during the period of impairment.

Is achieving background water quality feasible? No.

Achieving background water quality is infeasible. Although the alternative cleanup level exceeds water quality prescribed in the Central Coast Regional Board Basin Plan, closure is consistent with the maximum benefit to the people of the state and will not unreasonably affect present and anticipated beneficial uses of water.

To remove all traces of residual petroleum constituents at the site would require significant effort and cost. While technologically feasible, the resulting action would require excavation of soil in close proximity to the existing USTs and site structure to a depth of about 30 feet³. If complete removal of detectable traces of petroleum constituents becomes the standard for UST corrective actions the statewide technical and economic implications will be enormous. For example, disposal of soils from comparable areas of excavation throughout the state would greatly impact already limited landfill space. Continued operation of the vapor extraction system and associated groundwater monitoring and reporting would be costly and generate a large carbon footprint. In light of the precedent that would be set by requiring additional corrective actions at this site and given the fact that beneficial uses are not threatened nor will they be threatened in the foreseeable future additional corrective action is not necessary.

- **Is the alternative cleanup level consistent with the maximum benefit to the people of the State?** Yes.
It is impossible to determine the precise level of water quality that will be attained given the limited residual petroleum hydrocarbons that remain at the site. In light of the factors discussed above, and the fact that the residual petroleum constituents will not unreasonably affect present and anticipated beneficial uses of groundwater beyond the immediate vicinity of the site of the UST excavation, a level of water quality will be attained that is consistent with the maximum benefit to the people of the state.
- **Will the alternative cleanup level unreasonably affect present and anticipated beneficial uses of water?** No.
Impacted groundwater is not used as a source of drinking water or for any other beneficial use currently and for the above-mentioned reasons it is highly unlikely that the impacted groundwater will be used as a source of drinking water or for other beneficial use in the foreseeable future.
- **Will the alternative level of water quality exceed water quality prescribed in applicable Basin Plan?** No.
The final step in determining whether cleanup to a level of water quality less stringent than background is appropriate for this Site requires a determination that the alternative level of water quality will not result in water quality less than that prescribed in the relevant basin plan. Pursuant to State Water Board Resolution 92-49, a site may be closed if the basin plan requirements will be met within a reasonable time frame. Based on the above-mentioned discussion and analysis, the State Water Board finds that decades to hundreds of years is a reasonable time frame to meet water quality objectives.

³ The Central Coast Regional Board suggests continued application of the in-situ oxygen delivery system employed previously or other remedial alternatives to reduce contaminant concentrations in groundwater in the area of MW-1. Because the residual gasoline is sequestered in the stratum fine sand and clay at 26 feet below ground surface and is dissolution limited, excavation of the affected soil is the only remedial alternative capable of attaining the Central Coast Regional Board's low-risk criteria.

Have factors contained in Title 23 of the California Code of Regulations, Section 2550.4 been considered? Yes.

In determining the level of corrective action at the site that is consistent with the maximum benefit to people of the State with regard to potential adverse effects on groundwater quality and beneficial uses, the following have been considered:

- Physical and chemical characteristics of the waste;
- Hydrogeologic characteristics of the site and surrounding area;
- Quantity of groundwater and the direction of ground-water flow;
- Proximity and withdrawal rates of groundwater;
- Current and potential future uses of groundwater in the area;
- Existing quality of groundwater, including other sources of contamination or pollution and their cumulative impact on the groundwater quality;
- Potential for health risks caused by human exposure to waste constituents;
- Potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
- Persistence and permanence of the potential adverse effects.

Considering the above-mentioned factors, minimal benefit will be achieved by performing additional corrective actions. Site conditions do not and will not represent a significant threat to human health, safety or the environment.

Has the requisite level of water quality been met? No.**If no, the approximate time period in which the requisite level of water quality will be met:**

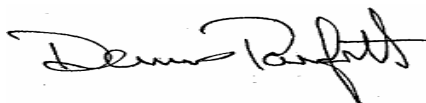
The approximate time period in which the requisite level of water quality for dissolved petroleum hydrocarbons will be met in the localized groundwater is estimated to be decades to a hundreds of years. This is a reasonable period in which to meet the requisite level of water quality because the affected groundwater is not currently being used as a source of drinking water and it is highly unlikely that the affected groundwater will be used as a source of drinking water in the future. Other designated beneficial uses of water are not adversely impacted.

Methyl Tertiary Butyl Ether (MTBE Testing):

Site soil and groundwater has been tested for MTBE pursuant to reporting requirements of Health and Safety Code section 25296.15.

Summary and Conclusion:

Based on the hydrology, geology, and other factors present at, and in the vicinity of the site, shallow affected groundwater does not represent a threat to human health, safety, or the environment. Shallow groundwater is not presently used as a source of drinking water or for other beneficial uses and it is unlikely it will be used as such in the foreseeable future. Given the site-specific factors, Central Coast Regional Board Basin Plan Water Quality Objectives will be achieved in a reasonable period of time. Case closure is appropriate.



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Senior Engineering Geologist

August 8, 2011
Date