CASE CLOSURE PROCESS FOR UNDERGROUND STORAGE TANK CASES

California Regional Water Quality Control Board
Lahontan Region

STAFF REPORT

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by

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INTRODUCTION

This Staff Report describes and clarifies criteria that Regional Board staff (Staff) currently use to determine whether no further work is needed at a leaking underground storage tank (UST) site, and the case should, therefore, be "closed[1]." Clarification is provided for deciding when cases can be closed where contaminant concentrations in ground water are above water quality objectives.

Underground storage tank cases are closed when:

1. Ground water is not threatened by soil contamination and any contaminants in ground water have been removed to background (non-detectable) levels, or
2. Ground water contains detectable contaminants below water quality objectives and concentrations are expected to attenuate to background conditions within a reasonable period of time, or
3. Ground water contains contaminants above water quality objectives but risk to beneficial uses is minimal.

The first of these scenarios is the desired outcome of remediation efforts, but there are circumstances when this is not technically possible or economically justifiable.

BACKGROUND

Releases from UST systems have contaminated water throughout much of the State and the nation. Petroleum products have been released into the environment from underground tanks, piping, pumps, and related operations at gas stations and other sites where fuels have been stored in underground tanks. These contaminated waters typically are no longer suitable for their designated beneficial uses, which often include use as a drinking water supply.

The Lahontan Regional Water Quality Control Board (Regional Board) implements the State's UST Program within its region in accordance with the goals, policies, regulations, and procedures set forth by the State Water Resources Control Board (State Board), the Porter-Cologne Water Quality Control Act (California Water Code), and the Regional Board's Water Quality Control Plan (Basin Plan). UST owners and other responsible parties (RPs) are required to clean up and abate the effect of releases from underground tanks and to restore the beneficial uses of water bodies.

[1] A UST case is determined to be "closed" when it is no longer necessary for the responsible parties to conduct work at a site, including remediation, monitoring, and reporting.

Sometimes, ground water cannot be fully restored following cleanup activities at UST release sites. In these circumstances, case closures are approved on a case-by-case basis. Factors considered in determining case closure include:

- the environmental characteristics of the hydrographic unit under consideration;
- past, present, and future beneficial uses of the water;
- economic factors; and
- the need to prevent nuisance conditions.

How these factors are considered by Board Staff in the decision making process will be discussed in a later section of this staff report.

The UST Program

The California Code of Regulations (CCR), Title 23, Division 3, Chapter 16, contains the State's regulations regarding underground tank construction, monitoring, repair, release reporting, and corrective action. The cleanup and enforcement responsibilities of the UST Program are shared between the Lahontan Regional Board and certain local agencies under the Local Oversight Program (LOP). The LOP agencies in the Lahontan Region are Kern and San Bernardino Counties. When releases occur, Regional Board staff or LOP staff are responsible for ensuring that the responsible parties (who are typically the owners and operators of gas stations) clean up and abate the effects of fuel releases in a manner that promotes attainment of background water quality or, if background levels cannot be restored, the highest water quality that is reasonable and that is protective of beneficial uses.

The UST Regulations specify corrective actions to clean up and abate releases. The most important remedial action is to identify and stop the source of the release. Other actions include removing free-phase petroleum products from ground water and in soil; remediating contaminated soil (that leads to dissolved hydrocarbon plumes in the ground water); containing ground water pollution to prevent it from migrating; remediating dissolved-phase ground water pollution; and, conducting ground water monitoring and reporting.

Section 2725 of the UST regulations outlines what elements are required to be included in a Corrective Action Plan (CAP) for a leaking UST site. Excavation is the corrective action most often used to clean up and abate releases in soil. Other methods include soil vapor extraction and bioremediation. For ground water contamination, the most common methods are pump and treat, air sparging, biosparging, and natural attenuation. Currently, pump and treat is primarily used for plume containment and secondarily used for cleanup. Section 2725(g) requires the establishment of target cleanup levels for ground water in a final CAP. Any proposal to leave contaminants in ground water at levels above background must include documentation to show that all of the feasible work elements required by Section 2725 have been completed.

Like the Lahontan Regional Board, LOP agencies oversee the investigation and remediation of petroleum releases that threaten or have impaired water quality. LOP agencies must provide the Regional Board with notification regarding UST cases identified for closure (both soil and ground water). The Regional Board has a 30-day period to concur with case closure or indicate disagreement with the request. This action is handled at the staff level.

Local Implementing Agencies (LIAs), which are typically county environmental health departments, are responsible for overseeing UST releases that impact soil only. LIAs are not required to seek concurrence from the Regional Board for closing local agency cases. However, LIAs are encouraged to work with Board staff as needed to evaluate whether a case may pose a threat to water quality. Cases where water quality is threatened or impaired are then referred to the Regional Board.

As of August 2001, Regional Board staff was overseeing 238 cases of UST releases to ground water, and the LOPs in the Region were overseeing 146 such cases in their respective counties. Over the years, the Regional Board, LOPs, and LIAs have closed more than 200 cases in the Lahontan Region.

Case Closure Process

The term "closure" means that the responsible party is no longer required to conduct work at a site, including remediation, monitoring, or reporting. When an RP believes a UST case is ready for closure, several documents are required to be submitted to the Regional Board with the closure request. The responsible party or their designee completes a *Case Closure Summary Form* and a letter or report containing the justification for the closure request. The closure documentation, at minimum, summarizes the site history, geology and hydrogeology, chemical data changes over time, describes potential receptors (e.g., drinking water wells and surface waters), and existing conditions. The supporting rationale for closure must include a finding about any risk that the site may still represent to public health, water quality and beneficial uses of the water.

The Lahontan Regional Board is one of four Regional Boards that have a guidance document available for public use to request case closure. The Regional Board's closure process and required information are described in a fact sheet (Attachment 1) and are available on the Regional Board's Internet web page at: http://www.swrcb.ca.gov/rwqcb6/.

In general, case closure is requested when the petroleum source in soil is abated and ground water has been cleaned up to levels protective of beneficial uses. It usually takes four quarters of ground water monitoring (after remediation systems are turned off) to demonstrate that seasonal ground water fluctuations will not dissolve any remaining petroleum in soil in quantities sufficient to affect water quality. The four-quarter criterion is reduced in areas of the Lahontan Region that do not experience seasonal ground water fluctuations. Similarly, the four-quarter criterion is sometimes extended for sites that leave significant petroleum mass in soil and have been experiencing abnormally low ground water levels due to drought conditions.

When documentation supports a request that a case should be closed, a Case Closure letter is issued by the agency. All regulatory agencies, including the Regional Board, are required to issue a standard Case Closure letter as prescribed in Section 25299.37 of the Health and Safety Code. For consistency, the Assistant Executive Officer signs all Case Closure letters issued by the Region Board. Case Closure letters are copied to all title holders of the property, the county, and other interested parties.

Senate Bill 562

If Regional Board staff denies an RP's request to close a UST case, the RP can petition the State Board for review under Senate Bill 562 (Health and Safety Code Section 25299.39.2(b). The petitioner must provide information describing the extent of contamination from the UST release and list corrective actions taken, if any. The petitioner must also describe the reasons why the case should be reviewed for closure.

State Board staff reviews each petition for compliance with state regulations and policies. Every effort is made to resolve issues raised in the petitions with the RP and lead agency staff. If that effort fails, the petition will either be dismissed by the State Board staff for lack of justification or be presented to the State Board for consideration at a public meeting. The State Board has the authority to close underground storage tank cases.

WATER QUALITY POLICIES AND GUIDANCE

The surface and ground waters within the boundaries of the Lahontan Regional Board contain some of the highest quality waters found in California. The California Water Code (CWC Section 13000 et seq.) gives the State Board and the Regional Board the primary responsibility for the protection of water quality. The Regional Board achieves this task by implementing state and federal laws and regulations. In addition, the Regional Board implements statewide policies set by the State Board.

Ideally, the goal of ground water remediation is to ensure that contaminants are cleaned up to background levels that existed prior to the release. However, contaminants may be allowed to remain in the water above background levels in certain cases. Any proposal to leave contaminants in ground water at levels above background must include justification for such degradation. Cleanup levels above background must also conform to regulations and statewide policies. The primary policies that apply in such instances are discussed below.

SWRCB Resolution No. 68-16

The State Board's 1968 Resolution No. 68-16 is titled *"Statement of Policy with Respect to Maintaining High Quality of Waters in California"* (Attachment 2). It was adopted as part of State policy for water quality control and has also been incorporated into all 16 of the State's regional water quality control plans. This resolution policy states that:

> *Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*

It restricts a reduction in the quality of surface or ground waters even though such a reduction might still allow the protection of beneficial uses associated with the water prior to the quality reduction. The policy goal is to maintain high quality waters. Most of the waters in the Lahontan Region are of exceptionally high quality. The policy allows changes in water quality only if: (1) it

is consistent with maximum benefit to the people of the State, (2) it does not unreasonably affect present and anticipated beneficial uses, and (3) it does not result in water quality less than that prescribed in water quality control plans or policies.

SWRCB Resolution No. 88-63

Resolution No. 88-63, *"Sources of Drinking Water"* (Attachment 3), specifies which ground and surface waters are considered to be suitable or potentially suitable for the beneficial use of municipal and domestic water supply (MUN). Regional Boards are to ensure that the MUN beneficial use is designated for protection wherever the use is presently being attained and shall make certain that any changes in beneficial use designation is consistent with all applicable regulations adopted by the U.S. Environmental Protection Agency. The policy allows Regional Boards some discretion in making MUN determinations and in de-designating the MUN beneficial use in some water bodies.

SWRCB Resolution No. 92-49

Resolution No. 92-49, *"Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304"* (Attachment 4), was adopted by the State Board initially in 1992 and again in a revised version in 1996. The Resolution contains the policies and procedures pertaining to *site investigations* as well as *cleanup and abatement activities* related to all types of discharges. Regional Boards can determine cleanup and abatement schedules that are based on factors such as the degree of threat or impact on water quality and beneficial uses and the financial and technical resources available to the discharger. In approving cleanup levels less stringent than background, the Resolution requires that any such cleanup level shall consider criteria and conditions listed in past policies, such as Resolutions No. 68-16 and 88-63.

Resolution 92-49 allows Regional Boards to make determinations of technological or economic infeasibility after a discharger either: (1) implements a cleanup program and cannot reasonable attain cleanup objectives or (2) does not implement clean up but can demonstrate that it is unreasonable to clean up to water quality objectives[2]. The latter demonstration typically relies on the results of modeling, or other analysis, such as a risk assessment.

The policy states that the State Board recognizes that in some cases attainment of applicable water quality objectives for ground water cannot reasonably be achieved. In these cases, the establishment of *a containment zone* may be appropriate and consistent with the maximum benefit to the people of the State. A containment zone is defined as a specific portion of a water-bearing unit where a Regional Board finds it is unreasonable to cleanup to the level that meets water quality objectives. Before establishing a containment zone, a Regional Board is to:

- Determine whether water quality objectives can be achieved within a reasonable period, considering what is technologically and economically feasible, and
- Consider environmental characteristics of the hydrogeologic unit under consideration and the degree of impact of any remaining pollutants.

[2] Water quality objectives are the limits or levels of water quality constituents or characteristics that are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

Examples of sites that may qualify for containment zone designation may be those having either strong sorption of pollutants on soils, pollutant entrapment, or complex geology due to heterogeneity or fractures. A containment zone is not a site that the Regional Board expects ground water to reach water quality objectives or background conditions in the foreseeable future.

The Policy also contains procedures, conditions, and restrictions for establishing containment zones. A site having a containment zone is not considered "closed" because the RPs must monitor and submit reports to the Regional Board.

In the Lahontan Region, there have been no containment zones established for UST sites. The Regional Board has approved containment zones at several military bases in the southern portion of the Region.

Basin Plan

The 1995 Basin Plan does not contain a discussion on closure of UST cases. It does, however, set forth water quality standards and objectives for the surface and ground waters of the Lahontan Region, which include both designated beneficial uses of water and the narrative and numerical objectives which must be maintained or attained to protect those uses. Narrative and numerical water quality objectives define the upper concentrations or limits that the Board considers protective of beneficial uses or implements the policy for maintaining high quality waters.

In determining compliance with narrative and numerical objectives, the Regional Board uses the definitions of pollution and nuisance from the CWC. Pollution is an alteration of the waters of the State to the degree that unreasonably affects either the beneficial uses of the water or facilities that serve those beneficial uses. Pollution may include "contamination," which means impairment of the quality of the waters of the State by waste to a degree that creates a hazard to the public health. Contamination also includes any equivalent effect resulting from the disposal of waste, whether or not waters of the State are affected. Nuisance, on the other hand, is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property. Nuisance can only occur during or as a result of the treatment or disposal of wastes.

The Basin Plan states that ground water designated as MUN is not to contain concentrations of chemical constituents in excess of either the primary maximum contaminant level (MCL) or the secondary MCL for drinking water. Nor shall ground water contain concentrations of chemical constituents producing taste and odor that cause nuisance or that adversely affects beneficial uses. These objectives apply to all ground waters, rather than only at the wellhead, at a point of consumption, or at point of application of discharge. Regional Board staff determines compliance with objectives by considering relevant and scientifically valid water quality goals. These include sources such as drinking water standards from the California Department of Health Services (State "Action Levels"), the National Interim Drinking Water Standards, Proposition 65 Lawful Levels, National Ambient Water Quality Criteria, and the National Academy of Sciences' Suggested No-Adverse-Response Levels (SNARLs).

CLOSING CASES ABOVE BACKGROUND CONDITIONS

Cases Not Exceeding Water Quality Objectives (Low Risk)

The Regional Board staff has closed UST cases that do not meet background water quality standards, but the water quality objectives at the site are met. In most of these instances, the primary and secondary drinking water standards were met in ground water prior to closure.

Table 1 shows the numerical water quality objectives that are most often applicable to UST cases.

Cases that have been closed above background conditions were deemed to be low risks to receptors such as surface water or drinking water wells. Regional Board staff considers the following factors when making this determination:

Low Risk Factors:

1. The source of the UST release has been identified and stopped.

2. Free-phase product in soil and ground water has been removed to the full extent practicable, in accordance with Title 23, CCR, Section 2655, Article 5 of the UST Regulations.

3. Contaminants remaining in the vadose zone do not cause concentrations in ground water to increase due to seasonal fluctuations in ground water elevations.

4. There are no existing drinking water wells, surface waters or other receptors threatened in the foreseeable future by remaining contaminants.

5. Pollutants remaining in ground water do not create or threaten to create risk to human health and safety or to future beneficial use(s) of the aquifer.

6. The plume size is essentially stable over time and contaminant concentrations detected in ground water show a decreasing trend with time. One hydrologic cycle (four quarters) of monitoring after active remediation measures have ceased is usually considered to be the minimum necessary to determine site ground water and plume conditions. Less monitoring may be appropriate for areas that do not have seasonal or annual hydrologic fluctuations.

TABLE 1

Numerical Water Quality Objectives for Petroleum Hydrocarbons to meet MUNICIPAL[1] Beneficial Use

Constituent	Adopted MCLs		Action Levels	SMCL of 3 Odor Units	Other Action Levels	Maximum Levels to Meet WQOs
	Primary	Secondary				
Benzene	1.0 µg/L					1.0 µg/L
Toluene	150.0 µg/L			42.0 µg/L		42.0 µg/L
Ethylbenzene	700.0 µg/L			29.0 µg/L		29.0 µg/L
Xylenes, total (or m, p, & o)[2]	1,750 µg/L			17.0 µg/L		17.0 µg/L
Total Petroleum Hydrocarbons (gas)				50.0 µg/L		50.0 µg/L
Total Petroleum Hydrocarbons (diesel)				100.0 µg/L		100.0 µg/L
Naphthalene					20.0 µg/L	20.0 µg/L
Lead (elemental Pb)	15.0 µg/L		15.0 µg/L			15.0 µg/L
Methyl Tertiary Butyl Ether (MTBE)	13.0 µg/L[3]	5.0 µg/L[4]	13.0 µg/L		14.0 µg/L[5]	5.0 µg/L
Tertiary Butyl Alcohol (TBA)			12.0 µg/L			12.0 µg/L
Color		15 Units[6]				15 Units
Odor Threshold		3 Units[6]				3 Units

Notes:
1. Sources include *Water Quality Control Plan for the Lahontan Region, 1995 (Basin Plan)* and *A Compilation of Water Quality Goals, Central Valley Regional Board, 1998.*
2. Concentration of single isomer of sum of the isomers.
3. CA Department of Health Services MCL.
4. CA Department of Health Services Secondary MCL
5. CA Office of Environmental Health Hazard Assessment Adopted Public Health Goal
6. American Water Works Association.

Issuing Case Closure letters for the above low-risk cases is consistent with State regulations and policies. The practice of closing low risk cases is also consistent with the actions taken by the State Board and other Regional Boards.

Regional Board staff believes that most of the readily remediated UST cases, with regards to achieving cleanup to either background conditions or to drinking water standards, have already been closed in the Region. Many of the remaining UST cases are viewed as being the more difficult cases in terms of complex geology and soil conditions and complex contaminants. These cases require more resources and time to remediate ground water to drinking water standards and to background conditions.

Cases Exceeding Water Quality Objectives

The Regional Board is receiving more requests each year from UST owners or operators to grant closure of UST cases where ground water has not attained water quality standards. The RPs believe that they have implemented reasonable cleanup and abatement at these sites and that it is no longer economically or technologically feasible to continue corrective actions and monitoring. A common example is when remedial actions have reduced ground water contaminants by more than 90 percent, but constituents still exceed water quality objectives. This often occurs at sites where hard-to-reach soil contamination remains beneath building foundations, and the contamination continues to leach to ground water. Another example is when contaminants are not readily remediated due to complex geology such as fractured bedrock.

In these difficult cases, RPs may argue that the incremental cost for mass removal exceeds the incremental benefit. In some cases, there is pressure from the State's Underground Storage Tank Cleanup Fund staff to close the site because of the high costs of continuing to pursue cleanup to lower levels.

Regional Board staff believes in some cases it is reasonable to issue a Case Closure letter for sites that do not meet water quality objectives but present a low risk and are expected to meet water quality objectives in the near future. To receive such case closure, RPs need to demonstrate that natural attenuation will eventually reduce water quality impacts to levels protective of beneficial uses.

Methodology for Evaluating Closure at Sites Exceeding Water Quality Objectives

Responsible parties requesting closure for sites that exceed water quality objectives must demonstrate that the site does not pose a risk to the beneficial uses of the water body. Formal risk assessments, which are detailed evaluations of risks to human health and the environment, are commonly completed for facilities where there are often complex and widespread contamination problems. However, for UST cases, the data necessary to evaluate risk need not be extensive and can be collected and presented less formally than in a full risk assessment. Board staff currently are requiring the information listed in the box below to support requests to close UST cases with contaminant concentrations above water quality objectives.

Required Information To Support Requests To Close UST Cases With Contaminant Concentrations Above Water Quality Objectives

1) Proof that there is no current beneficial use of the water that is impaired by the UST release.
2) Demonstration that the plume has been stable with either an overall annual decrease in size or an annual decrease in contaminant concentration trend.
3) Calculations or modeling results that show when water quality standards are predicted to be met.

   Calculations must be based on data for normal precipitation years and not on anomalous years of drought or excess precipitation.
4) Verification that there are no anticipated uses of the impaired water within the time projected to meet water quality objectives.

CONCLUSION

Implementing reasonable cleanup and abatement at UST sites has become more complex and costly over the years. At some point, cleanup and abatement becomes economically or technologically infeasible at some sites. Often, extensive taxpayer money is spent removing minor amounts of contaminants from ground water.

Regional Board staff routinely close UST cases where ground water quality has reached background levels or where contaminants are below water quality standards and are expected to meet background conditions in the near future. Regional Board staff believes it is reasonable to issue a Case Closure letter for certain UST sites where remaining contaminants still exceed water quality objectives. Responsible parties should be allowed to demonstrate to the Regional Board that natural attenuation would eventually achieve water quality standards and be protective of future beneficial uses of the water body. Staff believes that issuing Case Closure letters for such cases is consistent with actions being implemented by the State Board and a majority of the other Regional Boards.

Regional Board staff is developing a database to record and keep track of all case closures. The database will include data on every case that is closed and will include data such as contaminant levels remaining in soil and ground water, the location of nearby receptors, calculated natural attenuation rates, etc. Reports of cases closed will be printed from the database and provided to the Regional Board on a quarterly basis. These data will supplement the monthly case-closure reports in the Executive Officer's report.

ATTACHMENTS