13 April 2017

Chevron Environmental Management Company
c/o Brian Waite
6101 Bollinger Canyon Road
San Ramon, CA 94583

CERTIFIED MAIL
7011 2970 0003 8939 4249

WATER CODE SECTION 13267 ORDER NO. R5-2017-0812 FOR SUBMITTAL OF TECHNICAL AND MONITORING REPORTS, FORMER UNOCAL STATION #0187, 437 EAST MINER AVENUE, STOCKTON, SAN JOAQUIN COUNTY, CASE # 390698

You are legally required to respond to this Order. Please read it carefully.

As described in the findings below, an unauthorized release of petroleum constituents was discovered in 1992 at former Unocal station #0187, located at 437 East Miner Avenue in Stockton, California (Site) and identified by San Joaquin County assessor parcel number 139-240-17.

The unauthorized release originated from an underground storage tank (UST) system. In 2013, following extensive investigation and remedial efforts, the Central Valley Water Board conditionally concluded that the Site met the requirements of State Water Board Resolution No. 2012-0016, the State Water Board Low-Threat Underground Storage Tank Case Closure Policy (*Low-Threat Closure Policy*), provided that the public was given an opportunity to comment on the closure plan and that the monitoring and remediation wells at the Site were properly destroyed pursuant to local ordinances and in compliance with county permitting requirements. Despite multiple requests from the Central Valley Water Board to Chevron Environmental Management Company (hereafter referred to as the Responsible Party), the wells were never destroyed. Therefore, the case remains open.

The Central Valley Water Board is issuing the attached Technical Reporting Order R5-2017-0812 (Order) pursuant to Water Code section 13267 to ensure that the 38 abandoned or permanently inactive groundwater monitoring wells and the 44 abandoned or permanently inactive remediation wells at the Site are not acting as conduits posing a continuing threat to water quality. The Order will require periodic sampling of these wells, and will authorize the Central Valley Water Board to impose civil liability if the wells are not monitored in accordance with the schedule specified herein.

As an alternative to complying with the monitoring requirements imposed by this Order, the Responsible Party may elect to properly destroy the abandoned or permanently inactive wells within 60 days of the issuance of this Order, thereby ameliorating any future risk to water quality posed by these wells.

The Assistant Executive Officer finds, with respect to the Responsible Party's acts, or failure to act, the following:

1. In January 1992 Union Oil Company of California (Unocal), now Chevron, discovered an unauthorized release of petroleum during the removal of the USTs and associated piping at 437 East Miner Avenue in Stockton, according to an 11 September 1992 *Tank Removal Observation Report* produced by GeoStrategies Inc. (GeoStrategies). Chevron is named as the Responsible Party under this Order because it, or its corporate predecessor, had control over a UST at the time of or following an unauthorized release of a hazardous substance. (Cal. Code Regs, tit. 23, § 2720.)

2. Between January and May 1992 Unocal removed two 10,000-gallon gasoline USTs, one 280-gallon waste oil UST, and one 130-gallon waste oil UST as documented GeoStrategies' 11 September 1992 *Tank Removal Observation Report*.

3. In October 1993 Unocal advanced eight soil borings and detected elevated concentrations of petroleum hydrocarbons in soil below the Site as documented in a 13 December 1993 *Exploratory Soil Boring Report* produced by GeoStrategies.

4. Between July 1994 and January 1999 Unocal installed nine groundwater monitoring wells, one vapor extraction well, and two nested piezometer wells according to GeoStrategies' 21 October 1997 *Well Installation Report* and ARCADIS Geraghty & Miller's *Supplemental Site Characterization Report* dated 3 June 1999.

5. Between May 2000 and November 2000 Unocal installed fifteen groundwater monitoring wells and seven remediation wells. Unocal conducted a vapor extraction pilot test between 27 November and 1 December 2000 and removed less than 25 pounds of hydrocarbon mass during the pilot test. The results of this work are documented in a 22 December 2000 *Monitoring Well Installation Report, Vapor Extraction Pilot Test Report, and Interim Remedial Action Plan* produced by Gettler-Ryan Inc.

6. Between December 2000 and July 2001 Unocal conducted an ozone microsparging interim remedial action test and found ozone microsparge remediation to be an effective remedial option at the Site. The results of this work are documented in a 28 August 2001 *Interim Remedial Action Test Report and Additional Subsurface Assessment Work Plan* produced by Gettler-Ryan Inc.

7. In February 2002 Unocal installed one groundwater monitoring well and eight ozone microsparge wells as documented in a 15 July 2002 *Monitoring Well and Sparge Point Installation Report* produced by Gettler-Ryan Inc.

8. Unocal operated the ozone sparge system from December 2000 until April 2005 when the system ceased operation due to equipment failure according to ENSR International's 17 August 2005 *Quarterly Groundwater Monitoring and Ozone Microsparge System Status Report, Second Quarter 2005*.

9. In December 2010 Chevron installed twelve injection wells and four control monitoring wells for an enhanced anaerobic biological oxidation pilot study as documented in a 28 October 2011

First Semiannual 2011 Groundwater Monitoring and Enhanced Anaerobic Biological Oxidation Pilot Study Assessment Update produced by ARCADIS.

10. On 2 January 2013 ARCADIS, on behalf of Chevron, submitted a *Site Closure Request* report. On 6 May 2013 San Joaquin County Environmental Health Department (SJCEHD) recommended the Site for closure and on 5 June 2013 Central Valley Water Board staff conditionally approved the Site for closure following completion of a public comment period and the destruction of the Site monitoring wells.

11. In a 13 June 2013 letter SJCEHD staff requested that a work plan for destruction of all wells associated with the Site investigation and remediation be submitted by 11 September 2013. Chevron failed to meet this requested deadline.

12. In a 24 February 2014 letter SJCEHD staff again requested a work plan for the destruction of all wells associated with the Site cleanup and investigation. ARCADIS on behalf of Chevron submitted a 17 June 2014 *Work Plan for Well Destruction*. In a 19 August 2014 letter, SJCEHD staff denied Chevron's proposal for well destruction by blast perforation and requested an addendum to the *Work Plan for Well Destruction* which proposed an alternate well destruction method.

13. On 1 July 2015 the Central Valley Water Board assumed oversight of the UST case.

14. On 9 October 2015 Central Valley Water Board staff contacted Chevron by email requesting an update on the status of the destruction of the Site well. Chevron staff responded via email on 9 October 2015 stating that the majority of the Site wells had already been destroyed but that SJCEHD would not allow destruction of the deep, smaller diameter remediation wells by blast perforation.

15. On 13 January 2016 Central Valley Water Board staff contacted Chevron's consultant, ARCADIS by phone and then by email following up on the status of the Site well destructions. The ARCADIS staff person for the Site explained via telephone that Chevron was still working through the permitting process with SJCEHD.

16. On 15 August 2016 and 1 September 2016 Central Valley Water Board staff contacted Chevron's consultant, ARCADIS, by email requesting a timeline from Chevron for the destruction of the remaining wells. On 1 September 2016 Chevron contacted Central Valley Water Board staff by email and explained that Chevron was planning to destroy the Site well by the end of October [2016].

17. On 22 November 2016 Central Valley Water Board staff contacted Chevron by email requesting an update on the status of the destruction of the Site wells. Chevron responded via email on 30 November 2016 stating they have not been able to secure permits from SJCEHD for destruction via blast perforation and they would work with their consultant to schedule the well destruction via over drilling.

18. This facility is in an urban area and is subject to industrial runoff and vandalism. Improperly maintained and sealed monitoring wells may act as conduits allowing contaminants to migrate quickly to groundwater. Site monitoring wells have not been sampled since November 2012.

19. California Well Standards[1] state that a monitoring well is considered abandoned or permanently inactive if it has not been used for one year, unless the owner demonstrates intention to use the well again. The wells at the Site are considered abandoned or inactive.

20. California Well Standards state that an inactive or abandoned monitoring well must be properly destroyed to:

    a. Ensure the quality of groundwater is protected; and

    b. Eliminate a possible physical hazard to humans and animals.

21. The *Low-Threat Closure Policy* states that all wells and borings installed for the purpose of investigating, remediating, or monitoring the unauthorized release must be properly destroyed before a case is closed under the *Low-Threat Closure Policy*.

22. Health and Safety Code section 115700, subdivision (d) defines a "permanently inactive well" as “a well that has not been used for a period of one year, unless the person owning land in fee simple or in possession thereof under lease or contract of sale demonstrates an intent for future use for water supply, groundwater recharge, drainage, or groundwater level control, heating or cooling, cathodic protection, groundwater monitoring, or related uses.”

23. Water Code section 13267 (b)(1) states that:

    > In conducting an investigation the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or, discharging, or who proposes to discharge waste within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

The technical reports required by this Order are necessary to ensure the protection of human health and reasonable progress toward closure of this case. The Site wells were last monitored on 8 November 2012, are inactive, and are a potential conduit for pollutants to migrate from above ground to below ground. The burden, including costs, for regularly reporting progress, is justified due to the ongoing concerns articulated in this Order.

REQUIRED ACTIONS

IT IS HEREBY ORDERED that, pursuant to Water Code section 13267, the Responsible Party is required to:

---

[1] Publicly available at http://www.water.ca.gov/pubs/groundwater/water_well_standards__bulletin_74-81_/ca_well_standards_bulletin74-81_1981.pdf, as supplemented by Department of Water Resources Bulletin 74-90, publicly available at http://www.water.ca.gov/pubs/groundwater/water_well_standards__bulletin_74-90_/ca_well_standards_bulletin74-90_1991.pdf.

Monitoring Specifications

1. Monitor and sample all wells installed in conjunction with the Site investigation which have not been properly abandoned. As shown in Figure 1, which is attached and made part of this Order by reference, 38 groundwater monitoring wells and 44 remediation wells were installed. Chevron has stated that some of these wells have been properly abandoned but has not submitted confirming documentation. Groundwater samples shall be collected from all remaining wells and analyzed quarterly using standard Environmental Protection Agency (EPA) protocol and methods shown in Table 1, below.

TABLE 1
Monitoring and Reporting Program No. R5-2017-0812
FORMER UNOCAL STATION #0187, 437 EAST MINER AVENUE
STOCKTON, SAN JOAQUIN COUNTY

Constituents		TPHg	TPHd and TPHmo	BTEX	Fuel Oxygenates	TBA	Lead Scavengers	Halogenated Solvents	Metals	PAHs
EPA Method		8015M or 8260B	8015M	8020 or 8260B	8260B	8260B	8260B	8260B	6010	8270 SIM
Maximum Practical Quantitation Limit[1] (µg/L)		50	50	0.5	0.5	5	0.5	0.5	Varies	Varies
Sampling Frequency[2]	Well									
Quarterly	All Monitoring Wells	x	x	x	x	x	x	x	x	x
	All Remediation Wells	x	x	x	x	x	x	x	x	x

[1] If the maximum practical quantitation limit is exceeded for a non-detectable result, the Responsible Party shall provide an explanation in the report text. All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as trace.

[2] All wells shall be monitored quarterly for free phase petroleum product thickness and water levels, which shall be reported in feet and feet mean sea level, respectively, to the nearest 0.01 foot.

TPHg – total petroleum hydrocarbons as gasoline	**TBA** – tertiary butyl alcohol	**µg/L** – micrograms per liter
TPHd – total petroleum hydrocarbons as diesel	**Lead Scavengers** – ethylene dichloride, ethylene dibromide	**Metals** – cadmium, chromium (VI and total), lead, nickel, zinc.
TPHmo – total petroleum hydrocarbons as motor oil	**Halogenated Solvents** – trichloroethylene, tetrachloroethylene	**BTEX** – benzene, toluene, ethylbenzene, and total xylenes
Fuel Oxygenates – methanol, ethanol, methyl tertiary butyl ether, tertiary amyl methyl ether, diisopropyl ether, ethyl tertiary butyl ether	**PAHs** (polycyclic aromatic hydrocarbons) – naphthalene, acenaphthene, acenaphthylene, anthracene, phenanthrene, fluorene, chrysene, fluoranthene, pyrene, benzo(b)fluoranthene, benzo(a) pyrene, benzo(k)fluoranthene, benzo(a)anthracene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene.	

Reporting Specifications

2. When reporting data, the Responsible Party shall arrange the information in tabular form so that the date, constituents, and concentrations are readily discernible and shall summarize the data in such a manner as to illustrate clearly the compliance with this Order.

3. **Quarterly reports are due by the first day of the second month following the close of each calendar quarter** (i.e. 1 May, 1 August, 1 November, and 1 February). The first monitoring report is due 1 August 2017. Quarterly reports are to conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30, and shall be submitted

electronically over the internet to the State Water Resources Control Board GeoTracker database until such time as the Executive Officer determines that the reports are no longer necessary. Each report shall include the following minimum information:

(a) A description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants, groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated and stable.

(b) Groundwater elevation contour maps for all groundwater zones.

(c) Isocontour pollutant concentration maps for all groundwater zones and all detected constituents.

(d) Map(s) showing all soil and groundwater sampling locations, permanent and temporary.

(e) Tabulated monitoring well and remediation well construction details, such as well number/name, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom.

(f) Tabulated historical and current groundwater analytical results, measured depth to groundwater, and thickness of product (if applicable) for all monitoring wells and remediation wells.

(g) Tabulated historical and current vertical (if applicable) and lateral flow directions and gradients.

(h) Tabulated soil analytical results and sample depths for all samples collected in association with the Site investigation. Denote which sample locations have been excavated or are located in an area subject to active soil remediation.

(i) A copy of the laboratory analytical data report for all samples analyzed during the reporting period.

(j) Field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, volume of water purged, method of purging, depth of water, and, if applicable, depth and thickness of floating free phase petroleum product.

4. The results of any monitoring done more frequently than required at the locations specified in this Order shall be reported to the Central Valley Water Board.

5. The Responsible Party shall submit electronic copies of reports, documents and electronic data which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30, over the Internet to the State Water Board's Geographic Environmental Information Management System (GeoTracker) database system at https://geotracker.waterboards.ca.gov. Electronic submittals shall comply with GeoTracker standards and procedures as specified on the State Water Board's website.

6. As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, Responsible Party must have appropriate reports prepared by, or under the supervision of, a registered professional engineer or geologist and signed and stamped by the registered professional. All technical reports submitted by the Responsible Party shall include a cover letter signed by the Responsible Party, or authorized representative(s), certifying under penalty of perjury under the laws of the State of California that the signer has examined and is familiar with the report and that the report is true, complete, and accurate. The Responsible Party shall also state if they agree with any recommendations or proposals and whether they approved implementation of said proposals.

7. All work performed in conjunction with this Order shall conform to the requirements of *Appendix A of the Tri-Regional Board Staff Recommendations for the Preliminary Investigation and Evaluation of Underground Tank Sites* which are attached and a part of this Order. Copies may be found on the Internet at:

   http://www.waterboards.ca.gov/centralvalley/water_issues/underground_storage_tanks/tri-regionals_appendix_a.pdf

8. The Responsible Party shall implement the above monitoring program **within 60 days** of the effective date of the Order. Should all of the monitoring and remediation wells associated with the Site investigation be destroyed by the due date of the first required monitoring report, a report documenting the proper destruction of these wells and the proper disposal of investigation derived waste may substitute for the first required monitoring report if it is submitted by the due date of the first monitoring report.

9. The Responsible Party shall not implement any changes to this Order or discontinue groundwater monitoring unless and until a revised order is issued by the Assistant Executive Officer, this Order is rescinded by the Assistant Executive Officer, or all monitoring and remediation wells are property destroyed. **Within 60 days** of the proper destruction of all Site monitoring wells, the Responsible Party shall submit a report of well destruction which also documents that all investigation derived waste has been removed from the Site and properly disposed.

Failure to submit the required reports to the Central Valley Water Board according to the schedule detailed herein may result in an enforcement action being taken against the Responsible Party, which may include the imposition of administrative civil liability pursuant to Water Code section 13268. The Central Valley Water Board may impose administrative civil liability of up to $1,000 per day if the Responsible Party fails to comply with this Order. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at:

http://www.waterboards.ca.gov/public_notices/petitions/water_quality

or will be provided upon request.

If you have questions, please contact Emily Cushman at (916) 464-4696 or emily.cushman@waterboards.ca.gov.

This Order is issued under authority delegated to the Executive Officer by the Central Valley Water Board pursuant to Resolution R5-2009-0027 and is effective upon signature.

Original signed by

ANDREW ALTEVOGT, Assistant Executive Officer

13 April 2017

(Date)

Enclosures: Figure 1, Site Map; *Appendix A of the Tri-Regional Board Staff Recommendations for the Preliminary Investigation and Evaluation of Underground Tank Sites*

cc : Ben Heningburg, Underground Storage Tank Cleanup Fund, Sacramento (via email)
Michael Kith, San Joaquin County Environmental Health, Stockton (via email)
David Irey, District Attorney, SJCADA, 222 E. Weber Avenue Room 202, Stockton 95205
Tamera Rogers, Arcadis U.S. Inc., Walnut Creek (via email)

LEGEND:

- U-8 GROUNDWATER MONITORING WELL – A ZONE
- U-27A' GROUNDWATER MONITORING WELL – A' ZONE
- U-24 GROUNDWATER MONITORING WELL – B ZONE
- U-27B' GROUNDWATER MONITORING WELL – B' ZONE
- U-25 GROUNDWATER MONITORING WELL – C ZONE
- UV-2 VAPOR EXTRACTION WELL
- NP-1-22 NESTED PIEZOMETER WELL
- SVP-4A SOIL VAPOR PROBE
- U-26 DESTROYED MONITORING WELL
- IW-5A INJECTION WELL – A ZONE
- IW-5A' INJECTION WELL – A' ZONE
- IW-5B INJECTION WELL – B ZONE
- IW-5B' INJECTION WELL – B' ZONE
- SP-4A OZONE SPARGE WELL

NOTES:

1. BASE MAP DIGITIZED FROM MAP SUPPLIED BY ADVANCED GEOENVIRONMENTAL, INC. TITLED "SITE PLAN" DATED OCTOBER 1, 2003.
2. LOCATIONS OF ALL WELLS AND BORINGS PROVIDED BY MUIR CONSULTING, INC., DATED APRIL 7, 2009, MAY 9, 2011 AND MAY 27, 2011.
3. LOCATION OF U-27A' IS APPROXIMATE.

0 75' 150'

GRAPHIC SCALE

FORMER UNOCAL #0187, CHEVRON SITE ID 306415
437 EAST MINER AVENUE, STOCKTON, CALIFORNIA

SITE PLAN

ARCADIS

FIGURE 1

CITY: PETALUMA, CA DIV/GROUP: ENV DB: J. HARRIS LD:--- PIC:--- PM:--- TM:--- LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\CostaMesa\RETURN TO\Petaluma-CA\B0046957.0008\00003\B46957B02.dwg LAYOUT: 2 SAVED: 4/24/2014 2:08 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ARCADIS_PETALUMA.CTB PLOTTED: 4/24/2014 2:09 PM BY: MURESAN, ELENA
XREFS: 46957X02 46957X00 IMAGES: PROJECTNAME: ---

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

APPENDIX A - REPORTS

TRI - REGIONAL BOARD STAFF RECOMMENDATIONS FOR PRELIMINARY INVESTIGATION AND EVALUATION OF UNDERGROUND TANK SITES

16 April 2004

Prepared by Staff of the
Central Valley Regional Water Quality Control Board

State of California
California Environmental Protection Agency

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

Robert Schneider, Chair
Karl Longley, Vice Chair
Beverly Alves, Member
Alson Brizard, Member
Christopher Cabaldon, Member
Cher Kablanow, Member
Robert Fong, Member
Lucille Palmer-Byrd, Member

Thomas R. Pinkos, Executive Officer

11020 Sun Center Drive #200
Rancho Cordova, CA 95670

Phone: (916) 464-3291

DISCLAIMER
This publication is a technical report by staff of the California Central Valley Region. No policy or regulation is either expressed or intended. This publication does not constitute Regional Board endorsement or recommendation for, or against, the information, technology or products.

Appendix A
Table of Contents

1.0 Introduction 1
1.1 Authority 1
1.2 Reference Documents 2

2.0 Reporting Recommendations and Legal Requirements 2

3.0 Investigation Process 3
3.1 Site Investigation Workplan (SIW) 3
3.2 Preliminary Investigation and 5
Evaluation Report (PIER) 5

Table 1. Water Quality Limits for Petroleum Fuel 7
Mixtures, Constituents and Add (cont) 8
Notes for Table 1 9

3.3 Quarterly Status Report 10

Table 2. Recommended Minimum Verification Analyses
For Underground Storage Tank Investigations 11
Explanation for Table 2 12

4.0 Corrective Action Plan (CAP) 14
4.1 Problem Assessment Report (PAR) 14
4.2 Feasibility Study Report (FS) 15

Figure 1. A General Site Conceptual Model 16

4.3 Final Remediation Plan (FRP) 17

5.0 Verification Monitoring 17

6.0 No Further Action Required (NFAR) Reporting 17
6.1 NFAR Process 18
6.2 Case Evaluation 18
6.3 NFAR Criteria for Low Risk Vadose Zone Cases 19
6.4 NFAR for Cases Above Background Groundwater 19
6.5 NFAR for Cases Exceeding Water Quality Objectives 20
6.6 NFAR Documentation 21

Disclaimer 22
Acronyms Used in Appendix A 23
NFAR Checklist 24

APPENDIX A

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

STAFF RECOMMENDATIONS FOR REPORTING AT SITES CONTAMINATED BY UNDERGROUND STORAGE TANK RELEASES

1.0 INTRODUCTION

Appendix A to the *Tri-Regional Board Staff Recommendations for Preliminary Investigation and Evaluation of Underground Storage Tank Sites* (Tri-Regional Recommendations) provides recommendations from Region 5 (Central Valley RWQCB) staff for reporting work for: site investigations, corrective actions, and no further action required documentation associated with leaking underground storage tank (UST) sites. Adherence to recommendations in Appendix A facilitates efficient regulatory review of investigations and cleanups at UST sites and assures compliance with UST Regulations found in CCR Title 23, Chapter16.

Recommendations in Appendix A:

- Provide a format for consistency of documents;
- Reduce cost of reporting to dischargers and the UST Cleanup Fund by providing the dischargers and environmental consultants with information for developing complete workplans and reports.
- Complete the investigative phase in a timely, cost-effective and efficient manner; and
- Insure the appropriate remedial action is completed as quickly as possible.

1.1 Authority

The authority for Regional Board and Lead Agencies to direct UST investigations is found in the following:

- Porter-Cologne Water Quality Control Act (also known as the California Water Code Section 13000 ff.);
- The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region (Sacramento River Basin, San Joaquin River Basin and Tulare Lake Basin – current editions), which include beneficial use designations, water quality objectives and implementation plans (especially the *Policy for Investigation and Cleanup of Contaminated Sites*);
- State Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Water in California;
- State Board Resolution No. 88-63, Sources of Drinking Water;
- State Board Resolution No. 92-49: Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304, as amended;

- Chapter 6.7 of the Health and Safety Code: Underground Storage of Hazardous Substances;

- Title 23, Division 3, Chapter 16 of the California Code of Regulations, Underground Storage Tank Regulations, Sections 2610 through 2729 - with current amendments. (Regulation sections as shown in the Underground Storage Tank Regulations, are designated; e.g. - §2652);

- Title 23, Division 3, Chapter 15 of the California Code of Regulations, Water Monitoring; and

- Department of Water Resources (DWR) Bulletin 74-81 and 74-90, California Well Standards for installing, maintaining, and destroying all wells and exploratory borings (boreholes).

1.2 Reference Documents

- Central Valley Regional Water Quality Control Board staff report, *A Compilation of Water Quality Goals*, available on the internet at: http://www.waterboards.ca.gov/programs/water_issues/water_quality_goals/search.shtml.

These protocol and procedures are not new, but rather, documents that have been made available to responsible parties since the inception of the Central Valley Regional Board leaking UST program.

2.0 REPORTING RECOMMENDATIONS AND LEGAL REQUIREMENTS

General report recommendations are as follows:

1. By submitting a report or work plan to the Local Implementing Agency (LIA) and the Regional Board, the discharger acknowledges the statement of facts, conclusions, and recommendations included in the report or work plan. A cover letter, signed by the responsible party(s), should accompany all reports and workplans expressing argument or disagreement with the contents.

2. Reports and workplans should have pagination and a table of contents listing the enclosed tables, figures, and appendices as applicable.

3. Time schedules should be included in all workplans and remedial action plans showing key steps to site investigation and cleanup.

4. Each report should be presented as a stand-alone document to assure that it may be reviewed independently, and must include conclusions and recommendations. It is not acceptable to reference a table, figure, or borehole log in another report.

5. Technical assistance for completing reports and workplans may be provided by environmental consultants in the private sector. Reports, documents, and plans that contain engineering, geology, and/or geophysical information must be prepared under the "responsible charge" of properly licensed (professional) individuals in the State of California (See Sections 6735, 7835, and 7835.1 of the California Business and Professions Code). This assures the regulatory agencies of a registered professionals responsibility for preparing accurate technical documents and protects the discharger's interests. The signature and professionals stamp (seal) of the licensed individual indicates responsibility for the technical information submitted. More than one signature may be required where more than one professional specialty is included in the technical document submitted.

6. All geologic logs (borehole and monitoring well logs) shall be prepared by a professional geologist or civil engineer (see #5 above) who is registered or certified by the State of California and who is experienced in the use of the Unified Soil Classification System. The geologic logs may also be prepared by a qualified technician trained and experienced in the use of the Unified Soil

Classification System working under the direct supervision of one of the aforementioned professionals, provided that the professional reviews the logs and assumes responsibility for the accuracy and completeness of the logs. (See Section 2649 of Title 23, Division 3, Chapter 16 of the California Code of Regulations).

7. All monitoring wells, extraction wells, etc and exploratory boreholes are to follow local ordinances and the guidance and requirements of the DWR Bulletin 74-81 and 74-90, California Well Standards. The text for Bulletin 74-81 and 74-90 may be downloaded and printed from the DWR website at dwr.water.ca.gov, and click on the "publications" button.

8. Printed or electronic reports are to be submitted to both Regional Board and LIA agencies.

9. As of September 2001, dischargers are also to submit analytical and site data electronically to the State Water Resources Control Board (SWRCB) at the same time as the hard copy reports. For more information, please log on to the SWRCB web site at: http://geotracker.waterboards.ca.gov and click on the information link to "AB 2886". (See Sections 2729 and 2729.1 of Title 23, Division 3, Chapter 16 of the California Code of Regulations).

10. As of January 2002, in addition to the laboratory data, site specific information is required to be submitted electronically for the following: 1) the latitude and longitude of groundwater monitoring wells (including any other well or permanent sampling point designated as part of the site monitoring program) accurate to within one meter; 2) the surveyed elevation, relative to mean sea level, for any groundwater sampled, accurate to within a tenth of a foot; 3) groundwater information, including depth to water, free product presence/thickness and well status; and 4) a site map in electronic format showing property boundaries, buildings, and soil and water sampling locations. (See Sections 2729 and 2729.1 of Title 23, Division 3, Chapter 16 of the California Code of Regulations).

3.0 INVESTIGATION PROCESS

After notification of the unauthorized release to the LIA agency, the lead agency is determined and the investigation and reporting process initially begins with a Site Investigation Workplan to collect soil or soil and groundwater samples for analysis of potential contaminants. All workplans and reports prepared for investigation and remedial actions are to be submitted to both the LIA and the Regional Board. The lead agency will review the workplan and send a letter to the discharger listing conditions of approval, or requesting additional information prior to approval of the proposed workplan.

Responsible parties seeking reimbursement funding from the UST Cleanup Fund will also need to submit all workplans with regulatory approval letters to the UST Cleanup Fund for review and pre-approval of costs.

Note: The lack of funding by the UST Cleanup Fund does not relieve responsible parties from their responsibility to perform work required by the Regional Board or a local enforcement agency pursuant to the Water Code or the Health & Safety Code. Amended time schedules may be considered to accommodate funding constraints.

3.1 Site Investigation Workplan - §2654, §2723

Once a release of petroleum hydrocarbon to soil has been detected, soil problems that cannot be resolved by a "scoop and run" cleanup may remain to be further identified and remediated. To successfully achieve site cleanup, subsequent site investigations must define (to the non-detect limits) the lateral and vertical extent of impacted soil and groundwater. An initial Site Investigation Workplan is used to develop preliminary information to direct subsequent work.

Upon approval of the workplan by the lead agency to define the extent of impacted soil and groundwater, the discharger or their consultant must obtain the necessary permits from the LIA, and then

implement the approved Site Investigation Workplan. If workplan revisions are necessary, the discharger may submit a letter addendum briefly detailing any proposed changes to the workplan or additional work.

The following background information is to be included in the initial Site Investigation Workplan:

- Name and address of the site, the discharger and contact person, if different.

- An appropriately scaled area map showing the site location relative to nearby landmarks such as rivers and other surface water features, highways, urban or industrial areas, etc.

- A scaled drawing of the site showing adjacent streets and buildings, all above ground structures including canopies and power lines, underground structures including fuel USTs, utility lines (water, sewer, electrical, natural gas, and communication lines), buried pipes, septic tanks, and leachfields. The map scale should be appropriate to show site features.

- Pertinent information that could influence the migration of contaminants from the site is to be included in the workplan including: topography, climate, local geology and subsurface soil conditions, local and regional hydrogeology, nearby surface waters.

- History of tank installation, type of products stored, operation, and repair.

- Layout of all former and existing USTs and piping systems on the property, with each tank labeled for content.

- History of leaks, spills and accidents at the site involving the tank system and dispensers.

- Tank testing results, dates, and inventory reconciliation methods.

- Summary of initial site information collected during UST removal including:
  - Date of tank(s) removal and condition of the tank system;
  - Table of soils and/or water analyses;
  - Soil sampling and analytical procedures used;
  - Stratigraphy identified from excavations or borings;
  - Depth to groundwater, if encountered; and
  - Description of any unusual site conditions encountered.

- Estimate of the quantity and composition of contaminant released into the environment and how the estimate was derived.

- Include initial abatement actions including a description of liquid or solid wastes removed and where they were disposed with copies of all manifests.

In addition to the background information requested for the Site Investigation Workplan listed above, the methods and procedures that will be used to investigate both impacted soil and groundwater should be included, and an estimated time schedule for completion of proposed work must also be included with the workplan.
Specific to the soil contamination, describe or identify the method, technique, and/or rationale for:

- Collecting soil, soil gas, and sediment samples, as appropriate.

- Determining the number of proposed boreholes, sampling locations, and sampling depths.

- Determining the extent of soil contamination from samples collected.

- Analyzing soil, soil gas, and sediment samples by appropriate federal EPA Methods or other non-proprietary, performance-based analytical procedures.

- Containing and disposing of investigation-derived waste.

- Completing a Quality Assurance/ Quality Control plan including chain-of-custody procedures for field sampling and analysis.

Specific to the groundwater investigation, the workplan is to include the following:

- A proposal to complete a sensitive receptor survey to show water supply wells and surface water bodies within 2,000 feet of the site. With field observation and verification of any wells within 500 feet of the leaking underground storage tank site and attempting to obtain depth of annular seal for those wells.

- A rationale for installing monitoring wells including well location, total depths, screen intervals, and annular seal depth.

- A construction diagram for any proposed monitoring wells including the well diameter, casing and screen type, annular sealing method and depth.

- The drilling method to be implemented and decontamination procedures used between borings.

- The method of well development, and the criteria for selecting the proposed method.

- Disposal plans for soil and purge water.

- Plans for completing a location survey of the installed monitoring wells.

- Free product measurement method.

- Water level measurement procedure.

- Well purging procedure.

- Sample collection procedures.

- Analytical methods to be used and appropriate detection limits. (Analytical laboratories are to report all peaks identified from the soil and groundwater testing, and provide chromatograms as necessary).

- Quality Assurance/ Quality Control plan including chain-of-custody procedures for field sampling and analysis.

<u>3.2 Preliminary Investigation and Evaluation Report (PIER) - §2654, §2723</u>

The soil and groundwater data collected from implementing the Site Investigation Workplan is to be presented in the PIER and used to create the Site Conceptual Model. Information developed for this report will be used to determine what additional work is needed at the site. The PIER is to contain:

- Summarized background information developed from the Site Investigation Workplan and results of the completed sensitive receptor survey.

- The area of investigation is to be accurately delineated on maps and cross sections to scale to depict the lateral and vertical extent of impacted soil and groundwater identified to date.

- Cross sections must include stratigraphy based upon boreholes, trenches, monitoring wells, or any other supporting information, and must show analytical results and construction details for all monitoring wells to demonstrate the degree of impact to groundwater and site soils.

- Tables summarizing analytical data and methodologies used to collect and analyze the samples.

- Depth to groundwater, and calculated groundwater elevation.

- Groundwater quality contoured on a site map for each groundwater unit investigated.

- A graphical and narrative site conceptual model (SCM) showing the extent of known soil contamination and groundwater degradation relative to the leaking UST system and potential receptors. The SCM should be updated as characterization data becomes available, and used to make determinations for future investigations.

Note: To satisfy Basin Plan requirements and Resolution No. 88-63, which states in part " all surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply…"see Table 1, for a list of Numerical Water Quality Limits for Petroleum Based Fuel components for protection of existing or potential sources of drinking water.

These Limits change from time-to-time. The current list of numerical limits may be found on the internet at http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/search.shtml.

- Appropriate conclusions, and recommendations for additional work, as necessary.

Monitoring well diagrams are to represent the completed well and show or describe the following:

- An accurate depiction of monitoring well construction.
- Types and quantities of materials placed in the borehole.
- Placement method of the annular seal materials, (e.g. pumped through a tremie pipe, or poured from the surface).
- Location of screen interval, transition seal, and sanitary seal details.
- Nominal inner diameter (ID) and outer diameter (OD) of the auger and casing.
- Copies of drillers and/or geologist logs for drilling and construction.
- Appropriate field notes from well development with descriptions of parameter stabilization (e.g. tables showing pH, electrical conductivity, temperature, turbidity, development method, and volume of groundwater purged from the well).
- Type of drilling rig equipment used for well construction, names of the driller and supervising field geologist, plus any difficulties encountered during drilling that could affect the future quality of data from the well.

Workplans and summary reports are to be prepared and submitted to the LIA and Regional Board until the lateral and vertical extent of contamination is defined. The proposed additional work may be submitted separately, or with the quarterly status reports.

<u>Please note that site conditions may warrant interim cleanup and removal actions before the lateral and vertical extent of contamination is completely defined. For interim remedial actions, the discharger shall follow the requirements outlined in the UST Regulations, §2722(b).</u>

Table 1: Water Quality Numerical Limits for Petroleum Fuel Mixtures, Constituents and Additives *

Constituent	Water Quality Objective (a)	Numerical Limit Interpreting Water Quality Objective		
		Source	Limit	Units
Aromatic Hydrocarbons:				
Benzene	Chemical Constituents	California Primary MCL (b)	1.0	ug/L
	Toxicity	California Public Health Goal (OEHHA)	0.15	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	170	ug/L
n-Butylbenzene	Toxicity	California Drinking Water Action Level (DHS)	260	ug/L
sec-Butylbenzene	Toxicity	California Drinking Water Action Level (DHS)	260	ug/L
tert-Butylbenzene	Toxicity	California Drinking Water Action Level (DHS)	260	ug/L
Ethylbenzene	Chemical Constituents	California Primary MCL (b)	300	ug/L
	Toxicity	California Public Health Goal (OEHHA)	300	ug/L
	Tastes and Odors	Federal Register, Vol. 54, No. 97, pp. 22138,22139	29	ug/L
Isopropyl benzene	Toxicity	USEPA IRIS Reference Dose (i)	700	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	0.8	ug/L
Toluene	Chemical Constituents	California Primary MCL (b)	150	ug/L
	Toxicity	California Public Health Goal (OEHHA)	150	ug/L
	Tastes and Odors	Federal Register, Vol. 54, No. 97, pp. 22138,22139	42	ug/L
1,2,4-Trimethylbenzene	Toxicity	California Public Health Goal (OEHHA)	330	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	15	ug/L
1,3,5-Trimethylbenzene	Toxicity	California Public Health Goal (OEHHA)	330	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	15	ug/L
Xylenes (sum of isomers)	Chemical Constituents	California Primary MCL (b)	1750	ug/L
	Toxicity	California Public Health Goal (OEHHA)	1800	ug/L
	Tastes and Odors	Federal Register, Vol. 54, No. 97, pp. 22138,22139	17	ug/L
Aliphatic Hydrocarbons:				
n-Hexane	Toxicity	USEPA Health Advisory (e)	400	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	6.4	ug/L
Hydrocarbon Mixtures:				
Diesel or Kerosene	Toxicity	USEPA Superfund Provisional Reference Dose (i)	56-140	ug/L
	Tastes and Odors	Taste & odor threshold from USEPA Health Advisory	100	ug/L
Gasoline	Toxicity	USEPA Superfund Provisional Cancer Slope Factor (c)	21	ug/L
	Tastes and Odors	McKee & Wolf, *Water Quality Criteria* , SWRCB, p. 230	5	ug/L
Additives:				
Lead	Chemical Constituents	California Primary MCL (b)	15	ug/L
	Toxicity (h)	California Public Health Goal (OEHHA)	2	ug/L
Ethylene dibromide (EDB)	Chemical Constituents	California Primary MCL (b)	0.05	ug/L
	Toxicity	California Public Health Goal (OEHHA)	0.01	ug/L
Ethylene dichloride (1,2-Dichloroethane)	Chemical Constituents	California Primary MCL (b)	0.5	ug/L
	Toxicity	California Public Health Goal (OEHHA)	0.4	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	7000	ug/L
Methyl t-butyl ether (MtBE)	Chemical Constituents	California Primary MCL (b)	13	ug/L
	Chemical Constituents	California Secondary MCL (f)	5	ug/L
	Toxicity	California Public Health Goal (OEHHA)	13	ug/L
	Tastes and Odors	California Secondary MCL	5	ug/L
Di-isoproply ether (DIPE)	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	0.8	ug/L
t-Butyl alcohol (TBA)	Toxicity	California Drinking Water Action Level (DHS)	12	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	290,000	ug/L
Ethanol	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	760,000	ug/L
Methanol	Toxicity	USEPA IRIS Reference Dose (i)	3500	ug/L
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	740,000	ug/L

Table 1: Water Quality Numerical Limits for Petroleum Fuel Mixtures, Constituents and Additives (Cont.) *

Constituent	Water Quality Objective (a)	Numerical Limit Interpreting Water Quality Objective			OEHHA PEF
		Source	Limit	Units	
Polynuclear Aromatic Hydrocarbons (PAHs or PNAs) and derivatives:					
Acenaphthene	Toxicity	USEPA IRIS Reference Dose (i)	420	ug/L	
	Tastes and Odors	USEPA National Ambient Water Quality Criteria	20	ug/L	
Anthracene	Toxicity	USEPA IRIS Reference Dose (i)	2100	ug/L	
Benz(a)anthracene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Benzo(a)pyrene	Chemical Constituents	California Primary MCL	0.2	ug/L	
	Toxicity	Public Health Goal	0.004	ug/L	1 (index)
Benzo(b)fluoranthene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Benzo(j)fluoranthene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Benzo(k)fluoranthene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Chrysene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.4	ug/L	0.01
Dibenz(a,j)acridine	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Dibenz(a,h)acridine	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Dibenz(a,h)anthracene	Toxicity	Cal/EPA Cancer Potency Factor (c)	0.0085	ug/L	
7H-Dibenzo(c,g)carbazole	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.004	ug/L	1
Dibenzo(a,e)pyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.004	ug/L	1
Dibenzo(a,h)pyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.0004	ug/L	10
Dibenzo(a,l)pyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.0004	ug/L	10
Dibenzo(a,l)pyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.0004	ug/L	10
7,12-Dimethylbenz(a)anthracene	Toxicity	Cal/EPA Cancer Potency Factor (c)	0.00014	ug/L	
1,6-Dinitropyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.0004	ug/L	10
1,8-Dinitropyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.004	ug/L	1
Fluoranthene	Toxicity	USEPA IRIS Reference Dose (i)	280	ug/L	
Fluorene	Toxicity	USEPA IRIS Reference Dose (i)	280	ug/L	
Indeno(l ,2,3-c,d)pyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
3-Methylcholanthrene	Toxicity	Cal/EPA Cancer Potency Factor (c)	0.0016	ug/L	
5-Methylchrysene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.004	ug/L	1
2-Methylnaphthalene	Toxicity	USEPA IRIS Reference Dose (i)	28	ug/L	
Naphthalene	Toxicity	California DHS Action Level in drinking water	170	ug/L	
	Tastes and Odors	Amoore and Hautala, *J. Applied Tox.* , Vol.3, No.6, 1983	21	ug/L	
5-Nitrtoacenaphthene	Toxicity	Cal/EPA Cancer Potency Factor (c)	0.27	ug/L	
6-Nitrocrysene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.0004	ug/L	10
2-Nitrofluorene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.4	ug/L	0.01
I-Nitropyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
4-Nitropyrene	Toxicity	Public Health Goal for benzo(a)pyrene & OEHHA PEFs	0.04	ug/L	0.1
Pyrene	Toxicity	USEPA IRIS Reference Dose (i)	210	ug/L	

Notes for Table 1:

(a) Water Quality Objectives for groundwater from the *Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and the San Joaquin River Basin* , Fourth Edition. Similar language is found in the Tulare Lake Basin Plan.

Chemical Constituents

Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.
At a minimum, ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. To protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs.

Toxicity

Ground waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial use(s). This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances.

Tastes and Odors

Ground waters shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

(b) Primary MCLs are human health based, but also may reflect other factors relating to technologic and economic feasibility of attainment and monitoring in a water distribution system and at the tap. These factors may not be relevant for the water resource.

(c) 1-in-a-million cancer risk estimate derived from published oral cancer slope factor by assuming 2 liters/day water consumption and 70 kg body weight.

(d) If adopted as proposed, this limit would become the numerical limit used to interpret this objective.

(e) Health advisory = 4000 ug/L for 10 day exposure or less. No lifetime exposure advisory has been developed. However, lifetime health advisories are normally at least ten-fold lower than 10-day advisories. Therefore, a level of 400 ug/L would be a reasonable estimate of a lifetime protective level.

(f) Secondary MCLs are human welfare based, but also may reflect other factors relating to technologic and economic feasibility of attainment and monitoring in a water distribution system and at the tap. These factors may not be relevant for the water resource.

(g) Value listed is for 1,3,5-trimethylbenzene. Taste and odor treshold should be similar for 1,2,4-trimethylbenzene.

(h) Liability under Proposition 65 may also exist for responsible parties where levels in water exceed 0.25 ug/L.

(i) Listed value assumes 2 liters/day water consumption, 70 kg body weight, and 20% relative source contribution from drinking water.

(j) Concentrations of individual PAHs are adjusted by dividing the concentrations by the potency equivalency factors (PEFs) in the table on the following page. The limit applies to the sum of these adjusted concentrations.

* For definitions of terms and acronyms used in Table 1, please see the staff report, *A Complication of Water Quality Goals* , available on the internet at http:www.swrcb.ca.gov/rwqcb5/available_documents/wq_goals pages 9 to 13.

3.3 Quarterly Status Report- §2652(d)

Dischargers, UST operators, or permittees are to report at least quarterly to the Regional Board and LIA until investigation and cleanup of the site is deemed adequate (more frequent reporting may be required by the Lead Agency. These reports are to include the following minimum information:

1. A description of the groundwater sampling event, including field logs. Field logs shall contain depth to water, method of purging, water quality parameters, volume of water purged, site conditions, and any changes noted in the condition of the well and/or water quality data.

2. A table(s) listing all monitoring well details including: well number, date installed, casing diameter, casing material, slot size, surveyed elevation, reference elevation, screen interval, filter pack interval, and aquifer zone.

3. Cumulative data tables containing all soil and groundwater analytical results, reporting limits, depth to groundwater, groundwater elevations and Analytical Laboratory.

4. Groundwater elevation maps for appropriate water bearing units, as applicable. If the site is in remediation with groundwater pump and treat operations, define the zone of capture for any extraction well(s) on the contour map.

5. A groundwater flow diagram showing historical flow directions and gradients (Rose Diagrams).

6. Isoconcentration contour maps for petroleum products and constituents in appropriate water bearing units, as applicable.

7. A printed copy of the laboratory analytical data report. Water samples are to be analyzed for the appropriate minimum verification analyses specified in Table #2, (below) unless otherwise directed by the lead regulatory agency.

8. Status and timelines of investigation and cleanup activities including the results of all investigations implemented or proposed to date.

9. If applicable, the status of any ongoing remediation, including operational data on the mass of contaminant removed from the subsurface, system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system.

10. Method of disposal of any contaminated soil or water, and manifests for transport of all hazardous substances.

11. Applicable conclusions and recommendations. For example, if the existing monitoring well network does not define the lateral and vertical extent of groundwater degradation, the discharger is to submit a proposal and workplan to complete additional work as needed to define the extent.

Once a year, preferably following the fourth quarter monitoring that includes one complete hydrologic cycle; the quarterly report is to include the following additional information:

1. A description of all remedial activities conducted during the year, periodic and cumulative removal rates, an analysis of system effectiveness and operational schedule, and plans to optimize remediation system effectiveness, if appropriate.

2. An analysis of whether the contaminant plume is being remediated effectively, or is continuing to migrate.

TABLE #2 RECOMMENDED MINIMUM VERIFICATION ANALYSES FOR UNDERGROUND STORAGE TANK INVESTIGATIONS

(See explanation on following page.)

Tank Contents (Carbon Range)	Gasoline by 8015M or 8260B	Diesel by 8015M	BTEX by 8021B or 8260B	VOCs by 8260B (1)	Semi-VOCs by 8270C (2)	Oil & Grease by 1664A	PCBs by 8082	Total Lead by 7421	Title 22 Metals (3)
Unknown Fuel (C4-C36)	X	X		X				X	
Gasoline (C4-C20)	X			X				X	
Diesel (C10-C36)		X	X	X					
Jet Fuel/Kerosene (C9-C20)		X	X						
Heating Oil (C10-C32)		X	X						
Stoddard Solvent (C8-C20) (Non-Chlorinated)		X		X					
Chlorinated Solvents				X	X				
Waste Oil or Unknown Contents	X	X		X	X	X	X		X

Notes:

1. EPA Method 8260B analyses must include all analytes listed in the method plus fuel oxygenates methyl-tertiary-butyl ether (MTBE), diisopropyl ether (DIPE), ethyl-tertiary-butyl ether (EtBE), tertiary-amyl-methyl ether (TAME), tertiary-butanol (TBA), methanol and ethanol and fuel additives 1,2-dichloroethane (1,2-DCA) and ethylene dibromide (EDB or 1,2-dibromoethane).
2. If pentachlorophenol (PCP) is identified, analyze the soil and/or water sample for dioxins and furans by EPA Method 8290 and pesticides by EPA Method 8081A.
3. Method 6010B may be used for all but the following metals, for which individual AA methods are required: Antimony & Arsenic by 7062, Cadmium by 7131A, Lead by 7421, Mercury by 7471A, Nickel by 7521, Selenium by 7742, and Thallium by 7841.
4. Non-proprietary, performance based analytical methods may be used with approval of Regional Board staff

Explanation for TABLE #2: MINIMUM VERIFICATION ANALYSES

1. As other methodologies are developed and accepted by the USEPA and the DHS, they may also be used if they have equal or better performance than the listed methods.

2. For drinking water sources, USEPA and DHS recommend that the 500 series methods for volatile organics be used in preference to the 8000-wastewater series methods due to lower detection limits and superior laboratory QA/QC. The 500 series currently comparable to Method 8260B is Method 524.2.

3. Appropriate analyses are to be used for detection of leaking tank contents. For example, there may be multiple fuels dispensed from the individual tank over its active life. Regulators must determine if the UST was used for multiple fuels, and require the appropriate analyses.

4. Total Petroleum Hydrocarbons as gasoline (TPHg) and diesel (TPHd) ranges (volatile and extractible, respectively) are to be analyzed and characterized by GC/FID with a fused capillary column and prepared by EPA method 5030 (purge and trap) for volatile hydrocarbons, or extracted by sonication using Method 3550 for extractible hydrocarbons. Fused capillary columns are preferred to packed columns; a packed column may be used as a “first cut" with "dirty" samples or once the hydrocarbons have been characterized and proper QA/QC is followed.

5. Silica gel cleanup of TPHg and TPHd samples to remove weathered hydrocarbons or breakdown products is not acceptable, as these compounds removed may contribute to impairment of beneficial uses of water through adverse taste and odor and/or toxicity. If natural background compounds are suspected to be contributing to high TPH concentrations that are not associated with the petroleum hydrocarbon release, comparison with samples from background locations, out of the influence of the petroleum hydrocarbon release may be used to justify adjusting TPH concentrations.

6. Tetraethyl lead analysis may be requested if the total lead concentration exceeds the naturally occurring (or background) concentration for lead.

7. Oil and Grease (O & G) analysis may be requested when heavy, straight chain hydrocarbons are present. As of 1 January 2002, US EPA requires O & G analysis by EPA Method 1664A.

8. Practical Quantitation Limits (PQLs), also called Reporting Limit by many laboratories, are influenced by analytical method selection, matrix problems and laboratory QA/QC procedures. The PQLs shall be equal to or lower than the detection limits (DLRs) for purposes of reporting published by DHS (http://www.dhs.ca.gov/ps/dsdwem/chemicals/DLR/dlrindex.htm).

9. PQL chain-of-custody and the signed laboratory data sheets are to be submitted containing the laboratory's assessment of the condition of the samples on receipt including temperature, suitable container type, air bubbles present/absent in VOA bottles, proper preservation, appropriate holding time, etc. The sheets must also include the dates sampled, submitted, prepared for analysis, and analyzed.

10. PEAKS THAT DO NOT CONFORM to the standards must be reported by the laboratories, including any unknown complex mixtures that elute at times which vary from the standards. These mixtures may not compare to the standards and may not be readily identified; however, they are to be reported. At the discretion of the LIA or the Regional Board the following information is to be contained in the laboratory report:

- The relative retention time for the unknown peak(s) relative to the reference peak in the standard;
- Copies of the chromatogram(s);
- Type of column used;
- Initial temperature;
- Temperature program in degrees Celsius per minute; and
- Final temperature.

3. Hydrographs and plots of chemical concentrations versus time for each monitoring well that has had detectable levels of contaminants.

4. An estimate of the quantity of contaminants remaining in soil and groundwater.

5. The anticipated date for completion of cleanup activities.

6. An identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program.

7. A proposal and rationale for any necessary revisions to the groundwater sampling plan and/or list of analytes.

4.0 CORRECTIVE ACTION PLAN (CAP) -§2725

Once the lateral and vertical extent of soil and groundwater degradation is defined, the discharger is to proceed with the CAP. The CAP is separated into the Problem Assessment Report (PAR), the Feasibility Study (FS), and the Final Remediation Plan (FRP). At every step of the CAP, the lead regulatory agency will review submitted documentation, and direct the discharger to proceed with proposed actions, or modify these actions to meet regulatory compliance for protection of water resources, health and safety, and sensitive ecological receptors until the FRP is successfully implemented and no further action is required at the site.

4.1 Problem Assessment Report (PAR)

The PAR summarizes the PIER and all additional investigations that characterize the site. The PAR should include sufficient detail on the nature and extent of the contamination to provide a basis for future decisions regarding subsequent cleanup and abatement actions. The discharger is to propose site-specific cleanup goals, and identify available remedial alternatives that have a substantial likelihood to achieve cleanup goals and objectives.

Investigations and characterization activities are to be presented accurately in the PAR, and should include the following minimum information:

- The depth and extent of free product found, including an estimate of volume removed and volume remaining.

- Figures delineating lateral and vertical extent of soil contamination, groundwater degradation plume(s), and vapor plumes as appropriate.

- Tables summarizing analytical data such as compound concentrations found in soil and groundwater, and sample depth.

- An evaluation of the physical and chemical characteristics of the hazardous substance or its constituents, including its toxicity, persistence and potential for migration in water, soil, and air.

- An estimate of the mass of contaminants remaining in soil and groundwater.

- Identification of applicable cleanup levels for affected or threatened groundwater and surface water, and a rationale for selecting these levels.

  Note: Cleanup levels for leaking underground storage tanks sites are based on regulatory requirements as presented in *State Water Board Resolution 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under California Water Code Section 13304, and Water Quality Control Plans of the Central Valley Region, including "Policy for Investigation and Cleanup of Contaminated Sites*."

- Cross sections based upon boreholes, monitoring wells, trenches, and supporting geological mapping logs.

- A site map showing sensitive receptors

(i.e.) local water supply wells, buildings or utilities impacted or potentially threatened).

- A risk assessment will be necessary to demonstrate that the site poses no unacceptable risks to human health or the environment. The site-specific risk assessment must use the Office of Environmental Health Hazard (OEHHA) toxicity date (cancer slopes). This information may streamline the consideration of remedial alternatives and the timeline for implementation.

- Appropriate conclusions and recommendations for the next phase of work.

- An updated Site Conceptual Model illustrating site conditions showing the extent of known soil and groundwater impact relative to the leaking UST system and the relationship between contaminants and potential receptors. (See Figure 1 below for an example).

4.2 Feasibility Study (FS) Report

The FS Report provides a summary of remedial alternatives evaluated to address applicable cleanup levels for affected or threatened human health and/or waters of the State. The FS Report must include a cost evaluation for at least two remedial alternatives and a recommendation for the preferred remedial action. The FS should identify the preferred remedial technologies and may recommend pilot testing of the selected remedial technologies before full-scale design.

The FS Report is to include the following minimum information:

1. An evaluation of remedial alternatives that have a substantial likelihood to achieve cleanup of all impacted soils and/or soils and groundwater. At a minimum, two of the following technologies must be evaluated for implementability, cost and effectiveness, (other technologies not listed may also be evaluated):
   - Excavation;
   - Soil vapor extraction;
   - Bioventing;
   - Bioremediation (bio barriers);
   - Groundwater extraction and treatment;
   - Biosparging;
   - In-situ oxidation;
   - Dual-phase extraction and treatment and
   - Monitored natural attenuation.

2. The rationale for selecting the preferred remedial alternative for restoring and protecting impacted or threatened waters.

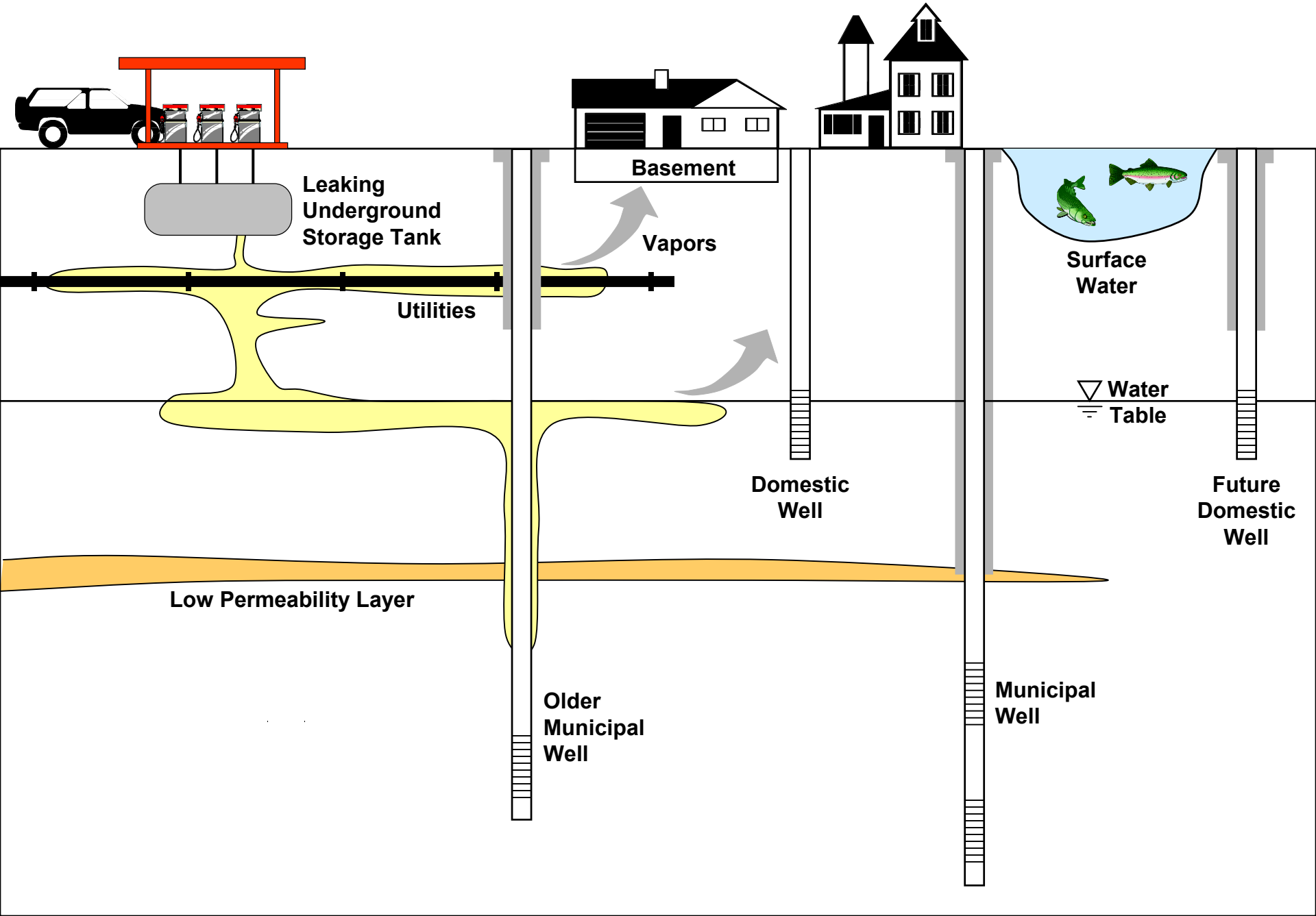
3. A timeframe for achieving remedial goals.

4. A cost comparison for remedial alternatives evaluated.

With minimal investigation and explanation, some remedial alternatives may be eliminated as simply not feasible for the site. For instance, soil vapor extraction is practical in sandy soils but difficult to justify for tighter clay soils where excavation and landfill disposal may be more effective in meeting cleanup levels.

Note: If the proposed alternatives include either soil disposal to a landfill, groundwater discharge to the sanitary sewer, or venting vapor to the atmosphere, etc., the discharger must include assurances from each appropriate regulating agency that the proposed activity is acceptable and permissible.

A General Site Conceptual Model



5. Disposal methods requiring either the Regional Board's General Permit for discharge to surface water (NPDES) or land (WDRs) may be evaluated. Selection of this type of disposal requires the responsible party to submit an application and supporting documentation in a timely manner. (See Region 5 Web page).

4.3 Final Remediation Plan (FRP)

The FRP is a corrective action implementation plan with detailed plans of the approved remedial system to be installed, and a proposed schedule for system construction and startup.

The FRP is to include the following minimum information:

- A description of the remedial technology approved by the LIA and/or Regional Board.
- A listing of the approved cleanup levels from the PAR, and predicted timeframe to meet these cleanup levels using the selected remedial alternative.
- Detailed plans for installation of the approved remedial alternative, such as soil to be excavated, layout of the soil vapor extraction system, air sparge injection points, the number and placement of remedial wells and associated equipment, the proposed pumping rate, disposal of wastes, etc.
- A discussion of implementation, including a phased schedule for construction and system startup.
- Operation and maintenance procedures, tests, and schedules including startup, long-term monitoring program for influent and effluent concentrations and periodic evaluation of the need for system optimization.

Should delays occur or time extensions be needed, such requests, with supporting documentation, are to be submitted by letter to the LIA and/or Regional Board.

5.0 VERIFICATION MONITORING-§2727

Verification monitoring includes all activities required to verify implementation of the CAP and evaluate its effectiveness. The discharger shall verify successful completion of the CAP through sampling or other monitoring of soil and/or groundwater for a period of time determined by the lead agency to demonstrate that seasonal groundwater fluctuations will not mobilize any remaining contamination in quantities sufficient to degrade water quality and that rebound of contaminant concentrations will be insignificant. Using the monitoring results obtained during this period, the discharger shall evaluate the effectiveness of corrective actions at the site.

6.0 NO FURTHER ACTION REQUIRED (NFAR) REPORTING

All regulatory agencies, including the Regional Board, are required to issue a standard Case NFAR letter when closure is appropriate. That letter is described in Section 25296.10(g) of the Health and Safety Code. The purpose for a NFAR report is to provide a document upon which the regulator may make an objective decision regarding a request by the responsible party for site NFAR when contaminants remain but are no longer considered to be a significant risk. (See Disclaimer, page 2). In general, Regional Board staff approve NFAR requests when risks to public health and safety and ecological receptors are reduced to insignificant levels and:

1. Groundwater quality/beneficial uses are not threatened by soil contamination, and chemical contaminants in groundwater have been remediated to non-detectable levels, or
2. Groundwater contains detectable contaminants below water quality objectives and concentrations are expected to reach background conditions through natural processes within a reasonable period of time, or
3. Groundwater contains contaminants above water quality objectives, where best avail-

> able, cost-effective technology has been implemented and chemical concentrations in groundwater are projected to meet water quality objectives through natural processes within a reasonable period of time, i.e., prior to any potential future beneficial use of groundwater. Patterns of existing and projected future demands for usable water resources in the area must be considered in determining what period of time is reasonable.

Regional Board staff recognize that the total cleanup of a site, although possible, is not always technically or economically feasible. Therefore, a NFAR designation for a UST site may be considered if the source has been removed and analysis of the groundwater concentration trends indicates the chemical plume is reducing in size, such that compliance with water quality objectives will be achieved within a reasonable period.

6.1 NFAR Process

When Regional Board or LIA staff concur that the petroleum source is removed or remediated, risks to public health and safety and ecological receptors are reduced to insignificant levels, and groundwater has been cleaned up to levels protective of existing and future beneficial uses, no further action is appropriate for a site.

At this point, the discharger will be requested to submit a closure report to the lead agency and the Regional Board with a formal request for no further action at the subject site. The discharger must also certify in writing a complete list of all record fee title owners to the Regional or LIA. Once the lead agency has reviewed the closure report and the NFAR request, and determines that the NFAR report substantiates the request for closure, Regional Board or LIA staff will notify all current record owners of fee title to the site of the determination that no further corrective action is required. The lead agency will request monitoring wells and remedial systems are properly destroyed, transferred or maintained under City/County approved permit. A NFAR letter will be issued once verification of proper well destruction/equipment removal is received.

A NFAR letter indicates that the discharger is no longer required to conduct active remediation, monitoring, or reporting work at the site unless new information indicates the presence of previously unknown water quality impacts or threats to health, safety or sensitive ecological receptors or that prior site characterization is shown to have been misrepresented.

6.2 Case Evaluation

The following recommendations in sections 6.3, 6.4 and 6.5 below apply only to sites contaminated with petroleum hydrocarbon fuels, (i.e., gasoline, diesel, kerosene, stoddard solvent, mineral spirits, fuel oil, aviation fuel mixtures and their additives), and should not be used for release cases involving chlorinated solvents, metals or other types of contaminants.
Each site is evaluated on a case-by-case basis to determine if it is a “low risk” site. (A site may be considered a low risk site by definition, or achieve a low risk status by site remediation.) For each site, complete characterization is required to determine the lateral and vertical extent of contamination, the risk to human health and safety and the environment (including the unsaturated zone, groundwater, and surface water), and the impacts on or threats to existing and potential future beneficial uses of water resources. The discharger must demonstrate that the selected remedial measure(s) are effective, and site monitoring must show that the remedial measure(s) applied by the discharger has a high probability to reduce or remove the petroleum hydrocarbons to acceptable levels within a reasonable period.

6.3 NFAR Criteria for Low Risk Vadose Zone Cases

Vadose zone cases are those sites for which documentation has been provided to demonstrate that fuel hydrocarbons or additives have not reached and are not expected to reach groundwater. If site conditions do not meet the criteria below, then additional remediation may be required. All of the following must be demonstrated in order to designate a vadose zone site as "low risk".

1. The release has been stopped and the source of contamination has been removed or remediated. Soil that contains mobile constituents in concentrations that threaten to degrade water quality or result in a significant risk to human health and safety or the environment (as determined by site specific data, or as concluded using appropriate mathematical models) should be considered a source.

2. The site has been adequately characterized. The vertical and lateral extent of subsurface impact must be defined to the degree that it is necessary to evaluate whether the site currently poses, or in the future may pose, a significant threat to human health and safety, waters of the State, or other nearby sensitive receptors. The level of detail required at a given site will depend on the contaminants of concern, the types of potential receptors and exposure pathways, and the proximity of the potential receptors. Groundwater beneath a site and adjacent surface waters are to be considered as receptors.

3. No waters of the State, or other sensitive receptors are likely to be impacted. Waters of the State include all groundwater and surface water regardless of current use. Central Valley aquifers generally are not segregated into discrete units, but are subject to vertical and horizontal migration of water (either by natural or man-induced mechanisms) and any pollutants carried by or in the water may degrade the waters of the State. Groundwater sample(s) are required in all cases unless it can be shown that the collection of such sampling) is unreasonable or unattainable, (e.g., the estimated depth to water is greater than 100 feet below the deepest soil impacts).

6.4 NFAR for Cases Above Background Groundwater Conditions

Ideally, the goal of remediation is to ensure that contaminants are cleaned up to background water quality. However, contaminants may be allowed to remain in the groundwater above background levels in certain cases. Any proposal to leave contaminants in groundwater at levels above background must include justification for such degradation. Cleanup levels above background must also conform to all applicable state policies, regulations and procedures. See *Policy for Investigation and Cleanup of Contaminated Sites* in Chapter IV of the Water Quality Control Plans (Basin Plans) for the Central Valley Region.

Central Valley Regional Water Quality Control Board staff have closed UST cases that do not meet background water quality levels, but the water quality objectives at the site are met, or will be met within a reasonable timeframe. In most of these instances, concentrations of pollutants were either below or close to applicable water quality objectives prior to closure.

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

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

2. Free-phase product in groundwater has been removed to the full extent practicable, in accordance with the UST Regulations (Title 23, CCR, Section 2655).

3. Contaminants remaining in the vadose zone cannot migrate in soil vapor or leach at concentrations that would cause

groundwater to exceed water quality objectives.

4. There are no existing water supply wells, surface waters or other receptors threatened by the remaining contaminants in soil or groundwater.

5. Pollutants remaining in groundwater do not create or threaten to create risk to human health and safety, or to future beneficial use(s) of the groundwater. Patterns of existing and future demands for usable water resources in the area must be considered in determining what period of time is reasonable to reach non-detectable (or background) concentrates.

6. The plume size is stable and sufficiently limited in lateral and vertical extent and contaminant concentrations detected in groundwater 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 groundwater and plume conditions.

Issuing NFAR letters for 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 Water Resources Control Board and Regional Boards throughout the State.

6.5 NFAR for Cases Exceeding Water Quality Objectives

The Regional Board and LIA staff are receiving more requests each year from UST owners or operators to grant closure of UST cases where groundwater has not attained water quality objectives. The responsible parties believe that they have implemented reasonable cleanup and abatement at these sites and that it is no longer technologically or economically feasible to continue corrective actions and monitoring.

A common example is when remedial actions have reduced groundwater contaminants by a large percentage, but constituents still exceed water quality objectives. This may occur at sites where hard to reach soil contamination remains beneath building foundations, and the contamination continues to leach to groundwater. In these difficult cases, responsible parties may argue that the incremental cost for further mass removal exceeds the incremental benefit.

Regional Board staff believe that in some cases it is reasonable to issue a NFAR 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, responsible parties need to demonstrate that site contaminants are degrading, and that site contaminants will reduce to levels protective of beneficial uses in a reasonable period of time.

Numerical water quality limits for petroleum fuel mixtures, constituents and additives, consistent with applicable water quality objectives, are available in the following staff document *Beneficial Use-Protective Water Quality Limits for Components of Petroleum-Based Fuels*. This document is updated regularly and available on the Regional Board website at: http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/search.shtml.

Board staff are currently requiring the following information to support requests to issue a NFAR letter at UST sites with contaminant concentrations above water quality objectives:

1. Demonstration that the plume is stable with either an overall annual decrease in size or an annual decrease in contaminant concentration trend.

2. Calculations or modeling results, including monitoring verification of model conclusions, which show when water quality objectives are predicted to be achieved.

3. Verification that there are no current or anticipated uses of the impaired water within the timeframe projected to meet water quality objectives. Institutional controls may be needed to prevent such use if this period is not sufficiently short.

6.6 NFAR Documentation

The purpose for a NFAR request report is to provide a document upon which the regulator may make an objective decision regarding the requested closure. At a minimum, the NFAR request must include the information outlined below. Responsible parties are to provide a one or two sentence narrative summary for each numbered item below, and list the section number where supporting information can be found in the NFAR request. Additional information submitted, such as fate and transport modeling, must include the assumptions and variables used. The NFAR request must include signatures of registered professionals as required by the California Business and Professions Code.

1. Site history and current site conditions.

2. Site geology and hydrogeology.

3. Sensitive potential receptors including water supply wells and surface water.

4. Provide a map showing the location of all water supply wells used for municipal, domestic, agriculture, industrial and other uses within 2,000 feet of the site. Provide well details and distances in a table.

5. Provide scaled site maps of the area impacted showing locations of former and existing tank systems, excavation and sample locations, boring and monitoring well locations, groundwater elevation contours, subsurface utilities, buildings, streets, and any nearby surface waters.

6. Provide boring logs and cross-sections to show site lithology.

7. Report the volume of excavated soil disposed off-site, or remaining on-site.

8. Describe the fate of any remaining monitoring and remediation wells (destroyed, ownership transferred, or to remain in use).

9. Provide tabulated results of all groundwater elevations and depths to water.

10. Provide tabulated results of all sample analyses, including the sampling method and detection limits. Analytical results must include TPH and BTEX constituents, lead, MtBE, EtBE, TBA, ETBE, DIPE, TAME, ethanol, methanol, ethylene dibromide, 1,2-dichloroethane and other constituents as indicated in Table #2 above. Provide any WET or TCLP results.

11. Discuss concentration and mass changes over time, and current concentrations of contaminants remaining in groundwater at the site.

12. Provide isoconcentration contour maps of contaminants of concern to define the lateral and vertical extent of contaminants remaining in soil and groundwater. The contour maps should present an estimated "zero line" of contaminant concentrations both on-site and off-site.

13. Provide a summary of the remedial method(s) used to clean up the site. Include the calculated zone of influence, assumptions used to design the remedial system(s), and the duration of remedial activities.

14. Provide a discussion of whether background is unattainable using best available remediation method(s).

15. Provide a discussion (and estimate) of contaminant mass remaining in soil and groundwater versus contaminant mass removed or destroyed by soil excavation or remedial actions.

16. Provide assumptions, parameters, calculations and the model used in any risk assessments.

17. Provide assumptions, parameters, calculations and the model used in fate and transport modeling.

18. Provide a rationale why the conditions remaining at the site will not adversely impact water quality, human health, and safety, or other beneficial uses. The rationale for NFAR must include a finding about present and future water use, and risks the site may still represent to human health and safety, and water quality.

19. Provide a list of technical reports submitted for site assessment, corrective action, confirmation sampling, and closure.

20. Provide any additional comments supporting site NFAR.

    When the lead agency determines that the closure report substantiates the closure request, remedial and monitoring activities may cease. A request to destroy monitoring and remedial wells will be issued, and upon verification of proper well destruction, transfer of ownership, or other lead agency approved use, Board or LIA staff will issue a NFAR letter for the site.

DISCLAIMER

The NFAR letter does not relieve the tank owner of any responsibilities mandated under the California Health and Safety Code and California Water Code if existing, additional, or previously unidentified contamination at the site causes or threatens to cause pollution or nuisance or is found to pose a threat to public health or water quality. Changes in land use may require further assessment and possible mitigation.

ACROMYMS
(As used in Appendix A)

CAL EPA	California Environmental Protection Agency
CAP	Corrective Action Plan
CCR	California Code of Regulations
DHS	Department of Health Services
DLR	Detection Limits Reportable
FRP	Final Remediation Plan
FS	Feasibility Study
GCFID	Gas Chromatography - Flame Ionization Detector
H&SC	Health & Safety Code
IRIS	Integrated Risk Information System - US EPA
LIA	Local Implementing Agency
LOP	Local Oversight Program (An LIA Receiving SWRCB funds)
LUFT	Leaking Underground Fuel Tank
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MVA	Minimum Verification Analysis
NFAR	No Further Action Required
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
PAH/PNA	Polynuclear Aromatic Hydrocarbon/Polynuclear Aromatic
PAR	Problem Assessment Report
PEF	Potency Equivalent Factors
PIER	Preliminary Investigation and Evaluation Report
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RB	Regional Water Quality Control Board (Regional Board)
SWRCB	State Water Resources Control Board
TCLP	Total Concentrate Leachate Procedure
US EPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
WET	Waste Extraction Test
WDR	Waste Discharge Requirements

TABLE 1 - CHECKLIST OF REQUIRED DATA FOR NO FURTHER ACTION REQUESTS AT UNDERGROUND TANK SITES

Site Name and Location:

☐ *1. Distance to production wells for municipal, domestic, agriculture, industry and other uses within 2000 feet of the site;*

☐ *2. Site maps, to scale, of area impacted showing locations of any former and existing tank systems, excavation contours and sample locations, boring and monitoring well elevation contours, gradients, and nearby surface waters, buildings, streets, and subsurface utilities;*

☐ *3. Figures depicting lithology (cross section), treatment system diagrams;*

☐ *4. Stockpiled soil remaining on-site or off-site disposal (quantity);*

☐ *5. Monitoring wells remaining on-site, fate;*

☐ *6. Tabulated results of all groundwater elevations and depths to water;*

☐ *7. Tabulated results of all sampling and analyses:*

- ☐ *Detection limits for confirmation sampling*
- ☐ *Lead analyses*

☐ *8. Concentration contours of contaminants found and those remaining in soil and groundwater, and both on-site and off-site:*

- ☐ *Lateral and* ☐ *Vertical extent of soil contamination*
- ☐ *Lateral and* ☐ *Vertical extent of groundwater contamination*

☐ *9. Zone of influence calculated and assumptions used for subsurface remediation system and the zone of capture attained for the soil and groundwater remediation system;*

☐ *10. Reports / information* ☐ *Unauthorized Release Form* ☐ *QMRs (Dates)*

☐ *Well and boring logs* ☐ *PAR* ☐ *FRP* ☐ *Other (report name)*

☐ *11. Best Available Technology (BAT) used or an explanation for not using BAT;*

☐ *12. Reasons why background was/is unattainable using BAT;*

☐ *13. Mass balance calculation of substance treated versus that remaining;*

☐ *14. Assumptions, parameters, calculations and model used in risk assessments, and fate and transport modeling;*

☐ *15. Rationale why conditions remaining at site will not adversely impact water quality, health, or other beneficial uses; and*

☐ *16. WET or TCLP results*

By:	*Comments:*
Date:	