

# **ASSESSMENT AND CLEANUP**

## **SECTION I**

# CHAPTER 1.0

## Introduction

### *California State and Regional Water Boards*

The California State Water Resources Control Board (State Board) and the nine Regional Boards work together to protect the quality of water (California Water Code, Sections 13000 and 13001) in waters such as lakes, estuaries, rivers, streams, ground waters, etc. By protecting water quality, these regulatory Boards seek to protect the "beneficial uses" or the many activities, uses and habitats that waters can support. Examples of "beneficial uses" include such things as boating, fishing, swimming, wildlife habitats, drinking water sources, and navigation.

In order to protect the many beneficial uses associated with our waters in California, Regional Boards often require that "actual (leaking underground fuel tanks) and potential threats" (soil contaminated with chemicals such as benzene and toluene) to water quality be assessed, and eliminated or removed, if needed. Additional water quality threats include chemical spills into the ocean, lakes or streams. In most instances, the person or entity responsible for the chemical release (Responsible Party - RP) will be required to stop the chemical release or discharge. If cleanup is determined to be needed, then the RP is required to eliminate or remove the released pollutant(s). This guidebook discusses the assessment and cleanup procedures that are needed to eliminate threats to ground waters in Los Angeles and Ventura counties.

The regulatory Boards operate under the Porter-Cologne Water Quality Control Act, which assigns overall responsibility for water quality protection to the State Board, and directs the Regional Boards to establish and enforce water quality standards within their respective boundaries. Each Regional Board is governed by nine members, all of whom are appointed by the Governor and confirmed by the State Senate. Figure 1-1 shows the organizational chart for the Los Angeles/Ventura Regional Board (Regional Board). This Regional Board is responsible for protecting the beneficial uses of surface and ground waters within the watersheds shown in Figure 1-2.

### *The Need for a Guidebook*

In December 1992, the Los Angeles Regional Board created a Water Quality Advisory Task Force (Task Force) to identify and recommend ways to reduce the costs incurred by businesses and public agencies as they strive to meet clean water laws without compromising water quality and public health. Task Force members included representatives of local government, environmental groups, businesses and public agencies.

To carry out this assignment, the Task Force conducted workshops to receive written and oral testimony from representatives of small businesses, government officials, corporate leaders, environmental groups and interested citizens. In the course of its meetings and workshops, representatives voiced a common concern -- that cities, governmental agencies and the business community face enormous

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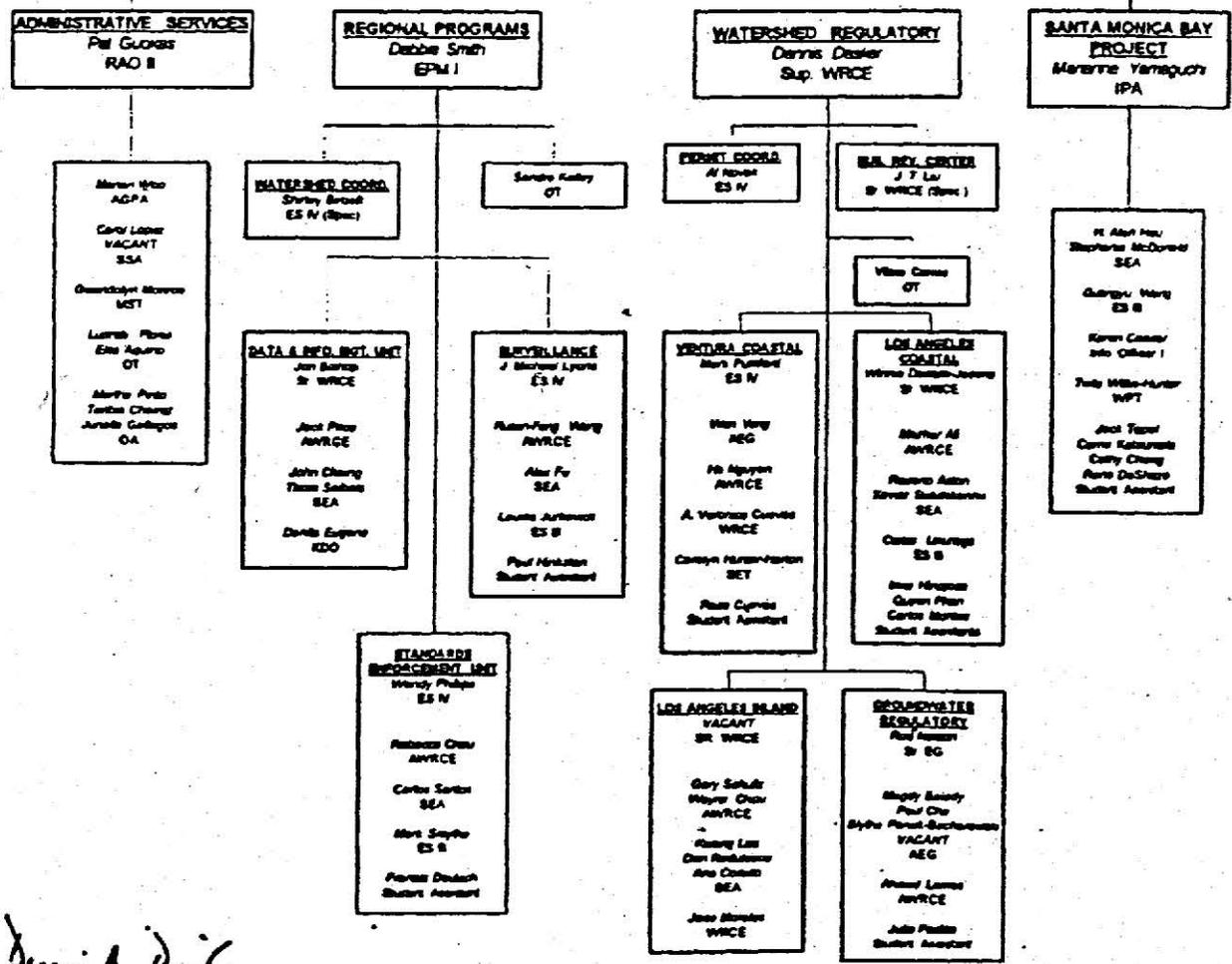
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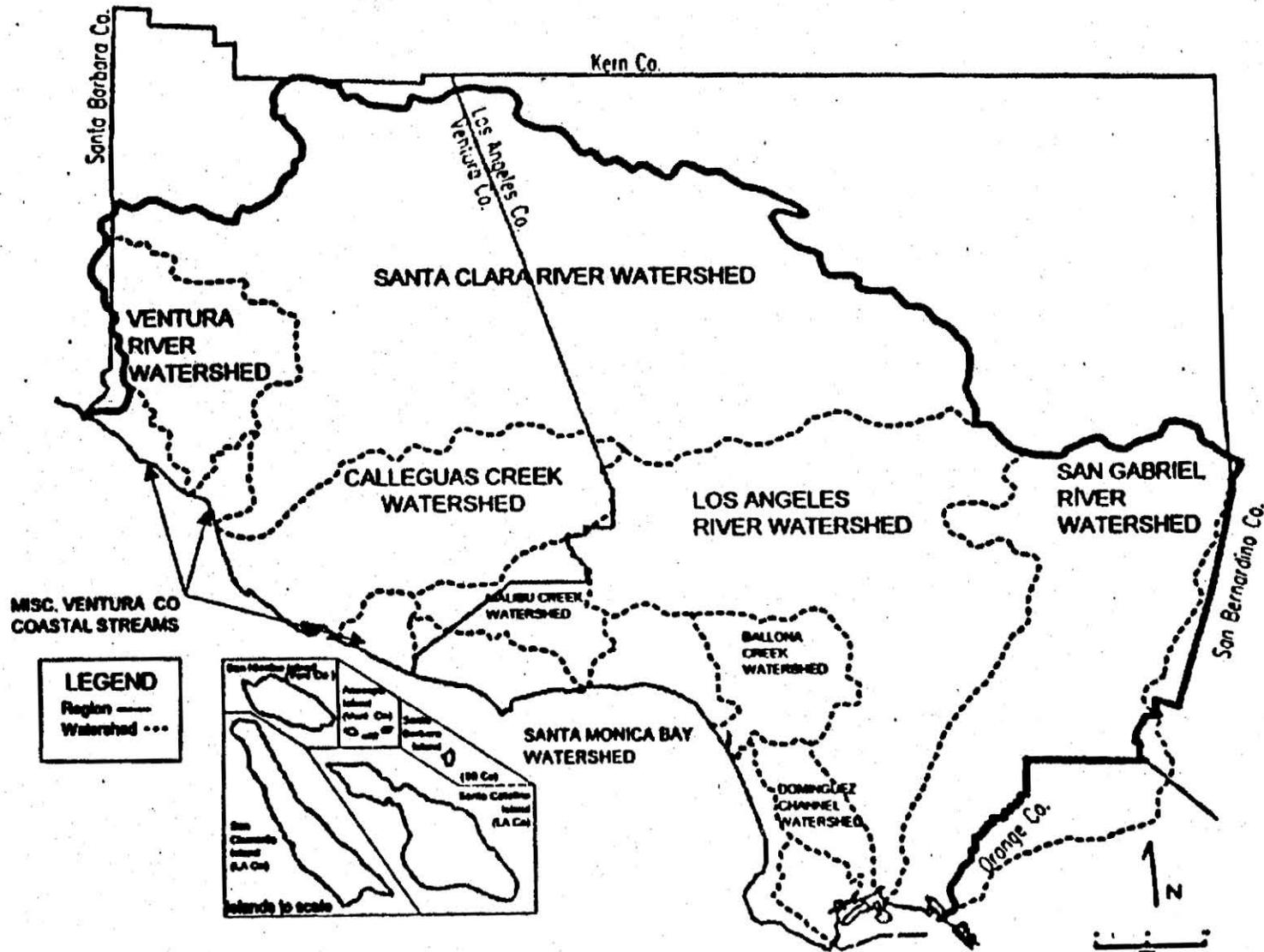


Figure 1-2: Map of the Region with Watershed Management Areas.

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costs when complying with water quality rules and regulations.

Frustrated property owners expressed the following complaints:

- ☞ the work plan development, review and approval process was costly, time consuming, needs streamlining and has an uncertain outcome,
- ☞ requirements are unclear,
- ☞ no certainty or finality to the assessment and cleanup process,
- ☞ the small businessperson must often resort to costly technical and legal assistance to settle any disputes that may arise due to the lack of a clear understanding of the appeals process, and
- ☞ no clear delineation of agency roles and responsibilities.

Based in part on the feedback from the regulated community, the Task Force concluded that "no clear and consistent work plan procedures guided the site assessment and cleanup process." To address this need, the Task Force recommended among other things that a site assessment and cleanup guidebook be developed.

The Task Force envisioned that the guidebook would promote the concept of a "total work plan" that takes into account the needs of Regional Board staff, the site owner plus his/her consultants and attorneys, lenders,

insurers, and others with an interest in the site. This "total work plan" approach helps to streamline work plan preparation, expedite review and lead to more timely processing of work plans through the Regional Board.

### *Purpose of the Guidebook*

This guidebook has been compiled to meet the specific charges of the Task Force, which were:

1. Describe the steps involved in the site assessment and cleanup process.
2. Identify the involved agencies and their oversight responsibilities.
3. Define what is needed to obtain a final sign-off or determination of "no further action" from the Regional Board when the work is completed as required.
4. Provide a concise description of the "appeals process".

Moreover, the guidebook and its appendices represent a compendium of technical information and guidance that already have been used successfully by the Regional Board in the "San Gabriel and San Fernando Valleys Cleanup Program" (formerly Well Investigation), "Underground Tank," and other programs. To assist readers, many of the technical terms, acronyms, abbreviations and regulations are explained in the text as well as listed in the glossary and appendices.

Most of the guidebook is written in plain English to serve as a road map through the

# Introduction

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process. Chapters 4 and 5 are somewhat more technical, however, as they are geared for readers with technical knowledge of the site assessment and cleanup process.

## *Protection of Water Quality*

The Regional Board protects water quality by regulating pollutants that are released or discharged into surface and ground waters. In turn, this helps to protect the beneficial uses (e.g., fishing, swimming, drinking water supply, boating, etc.) of the receiving waters.

To protect water quality, sources of pollutants must be identified, eliminated or cleaned up when necessary. Under Water Code Section 13304 (State Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges" in Appendix E), policies and procedures are specified in terms of addressing the investigation, cleanup and abatement of discharges (i.e., pollutants or contaminants). As indicated below, pollutants may enter surface and ground waters by way of the following:

### *Sources of Pollutants:*

- Above/Underground Tanks
- Drum storage areas
- Sewer leaks
- Chemical spills
- Contaminated soil
- Clarifiers
- Septic tanks/Leach fields/cesspools
- Underground piping
- Vapor degreasers
- Landfills
- Paint booths
- Toxic pits

- Percolation sumps
- Contaminated run-off
- Any structure containing and/or transporting chemicals, wastes, etc.
- Illegal or unpermitted disposal or dumping.
- Waste water treatment plants/publicly owned treatment works.

Various federal and state regulations have been created to assist regulatory agencies, consultants, and RPs (i.e., individuals who are held responsible for a particular environmental problem) with the protection of water quality. A partial list of regulations that are applicable to the protection of water quality, including assessment and cleanup activities, are listed below:

### *State regulations:*

- Porter-Cologne Water Quality Control Act
- Hazardous Substance Cleanup Bond Act
- Toxic Injection Well Control Act
- Hazardous Waste Control Act
- California Code of Regulations, Title 22, Division 4 Environmental Health
- California Code of Regulations, Title 23, Chapters 15 and 16

### *Federal regulations:*

- Clean Water Act
- Safe Drinking Water Act
- Toxic Substances Control Act
- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA - SUPERFUND)

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Additional information regarding state and federal regulations is contained in the Regional Board's Basin Plan. ☎ Contact our Business Assistance Office at (800) 500-8008 or (213) 266-7660/7671 for Basin Plan information.

### Programs

The Los Angeles/Ventura Regional Board addresses threats to water quality through several formalized programs that are listed in Table 1-1. These programs are designated to assist with the identification and elimination of pollution. An RP is required to adhere to the requirements of the applicable Regional Board program(s) that pertain to his/her site. To facilitate compliance and to simplify the process, it is suggested that face-to-face discussions between RPs and Regional Board staff begin as soon as possible. The following suggestions may assist an RP in the early stages of a project.

1. ☎ For general information, contact the Regional Board's Business Assistance Office at (213) 266-7660/7671, (800) 500-8008 or a representative listed in Table 1-1 at (213) 266-7500.
2. ☎ For bulletin board information, call (213) 266-7663.
3. Retain a consultant. Under State Board Resolution No. 92-49 (see Appendix E), appropriate qualified professionals must prepare reports

required by the state.

4. Provide staff with relevant evidence as specified in State Resolution No. 92-49, and any additional information that might assist the Regional Board:

- Known and potential sources of chemical releases on the subject property.
- Chemical usage and storage practices.
- Property photographs and maps.
- Type & nature of manufacturing operations.
- Names and addresses of prior owners & nature of businesses
- Prior & future land uses of the property.
- Financial situation for meeting requirements.
- Copies of technical reports, such as Phase I and Phase II environmental assessments, soil and groundwater assessments, foundation investigations, etc.

The above information will provide Regional Board staff with much of the data which it needs to guide you efficiently through the initial investigation.

What follows is a brief listing and summary of Regional Board programs. More detailed information regarding the programs is available in our Basin Plan. Information regarding the Regional Board's surface water programs is available through our Business Assistance office and/or bulletin board.

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Beginning 1996, the Regional Board will oversee underground tank cases that were once regulated through the Local Oversight Program at the Los Angeles Department of Public Works, Waste Management Division. The Ventura Environmental Health Division continues to oversee underground tank cases within their jurisdiction.

<b>Table 1-1: Regional Board Programs</b>		
<b>PROTECTION OF GROUNDWATER</b>	<b>Unit Chief - area(s)</b>	
<b>SAN FERNANDO and SAN GABRIEL VALLEYS: CLEANUP PROGRAM</b>	Support and Computer Network	<b>Jonathan Bishop</b>
	San Gabriel Valley	<b>Arthur Heath - Azusa; El Monte; Richwood; Monrovia; La Puente; City of Industry; South El Monte; Whittier Narrows</b>
	San Fernando Valley	<b>Eric Nupen - Burbank; Glendale; North Hollywood</b>
<b>UNDERGROUND TANK PROGRAM</b>	UST I Admin.	<b>Al Novak - Groundwater Cases</b>
	UST II Closure Unit	<b>Gregg Kwey - Site Closures</b>
	UST III	<b>Dave Bacharowski - Ventura Co./LIA</b>
<b>GROUNDWATER PROTECTION</b>	Landfills and Solid Waste Water Quality Assessment Test (SWAT)	<b>Rod Nelson - region wide</b>
	Site Cleanup	<b>Jim Ross - Spills, Leaks, Investigations and Cleanups (SLIC); Aboveground Petroleum Storage Tanks (AGST); U.S. Department of Defense (DOD) and Department of Energy (DOE) Sites; Resource Conservation and Recovery Act (RCRA); and Superfund (CERCLA)</b>
	Subsurface Investigations	<b>Hubert Kang - region wide</b>

**☎ For an updated listing of telephone numbers for the unit chiefs mentioned above, please call the Regional Board's receptionist at (213) 266-7500.**

San Gabriel and San Fernando Valleys Cleanup Program

Targeted Area:	San Fernando and San Gabriel Valley Groundwater Basins - designated as Superfund sites.
Potential Responsible Party(ies):	Property owners/operators suspected of using or storing targeted chemicals.
Targeted Chemicals:	Volatile organic compounds (VOCs) - tetrachloroethylene (PCE), trichloroethylene (TCE), etc.
Potential Source(s):	Leaking solvent tanks, clarifiers, degreasers, sumps, paint booths, inadequate handling, storage, and disposal practices, etc.
Participating Agencies:	
1) USEPA:	Administers Superfund and RCRA sites; oversees groundwater cleanup; Regional Board has a cooperative agreement with USEPA for site investigations.
2) Regional Board:	Oversees site investigations, on-site soil and groundwater cleanups.
3) DTSC:	Lead agency for RCRA, and DoD (e.g., hazardous waste TSD facilities, and federally owned facilities.
4) County of Los Angeles, Public Works, UST:	Oversees tank construction standards, monitoring requirements, unauthorized release reporting and closure requirements.
Pertinent Regulations and Policies:	CERCLA; RCRA; State Board Resolution No. 92-49; Porter-Cologne Water Quality Control Act.

Underground Storage Tanks (UST)

Targeted Area: Region wide

Responsible Party(ies): Owners/operators of underground petroleum product tanks.

Targeted Chemicals: Gasoline and diesel fuel products, waste oil.

Potential Source(s): Leaking underground tanks and/or associated piping.

Participating Agencies:

- 1) Regional Board: Lead over investigations of groundwater pollution, corrective actions and closure requirements.
- 2) Ventura Environmental Health Division, Luft Program: Oversee some groundwater pollution and corrective actions; Lead over tank construction standards, monitoring requirements, unauthorized release reporting, initial soil and groundwater assessment and abatement procedures, and closure requirements.
- 3) Local Implementing Agencies: Lead over tank construction standards, monitoring requirements, unauthorized release reporting, initial soil assessment and abatement procedures, and closure requirements.

Pertinent Regulations and Policies: California Code of Regulations, Title 23, Division 3, Chapter 16; State Board Resolutions No. 92-49 and 68-16; Porter-Cologne Water Quality Control Act..

Pertinent Information, Assessment and Cleanup Documents: Self-Directed Process  
County of Los Angeles, Department of Public Works, Industrial Waste Planning and Control Environmental Programs' Guidelines for Report Submittals; Ventura Environmental Health Division's Guidebook.

Spills, Leaks, Investigation and Cleanup (SLIC)

Targeted Area: Region wide

Responsible Party(ies): Property owners/operators of major tank farms, oil refineries, metal drum storage facilities, and etc..

Targeted Chemicals: Miscellaneous chemicals, heavy metals, solvents, and petroleum hydrocarbons.

Potential Source(s): Surface spills, metal storage drums, leaking storage facilities and/or associated piping, aboveground (e.g., tank farms) and underground solvent storage facilities.

Participating Agencies:

- 1) Regional Board: Oversees site investigation and corrective action involving sites not overseen by other programs.
- 2) DTSC: Lead agency for RCRA, state and Federal Superfund, DoD (e.g., hazardous waste storage facilities, federally owned facilities) under contract from USEPA and DoD.
- 3) USEPA: Administers Superfund and RCRA sites.

Pertinent Regulations and Policies: CERCLA; RCRA; State Board Resolution No. 92-49; Porter-Cologne Water Quality Control Act; California Code of Regulations, Title 22, Division 4, Environmental Health; California Code of Regulations, Title 23, Chapters 15 and 16.

U.S. Departments of Defense (DoD) and Energy (DoE)

Targeted Area:	Region wide
Responsible Party(ies):	Federal government - military bases and energy facilities.
Targeted Chemicals:	Hazardous wastes, solvents, gasoline and diesel fuel products, heavy metals, and low level nuclear waste.
Potential Source(s):	Surface spills, metal storage drums, leaking storage facilities and/or associated piping, aboveground and underground petroleum storage facilities, unlined pits, holding ponds, drying beds.
Participating Agencies:	
1) Regional Board:	Oversees site water quality investigation and corrective action under DTSC's lead for DoD sites and under Department of Health Services' (DHS) lead at DoE sites.
2) DTSC:	Administers DoD, federally owned facilities and sites under contract with DoD.
3) USEPA:	Lead on Superfund and RCRA sites.
4) DHS	Lead on DoE sites under contract with DoE.
Pertinent Regulations and Policies:	CERCLA; RCRA; State Board Resolution No. 92-49; Porter-Cologne Water Quality Control Act; California Code of Regulations, Title 23, Chapters 15 and 16.

Aboveground Petroleum Storage Tanks (AGST)

Targeted Area: Region wide

Responsible Party(ies): Owners/operators with aboveground petroleum storage tanks.

Targeted Chemicals: Gasoline, diesel and jet fuel products.

Potential Source(s): Leaking gasoline storage facilities and/or associated piping, aboveground petroleum storage facilities (e.g., tank farms and refineries).

Participating Agencies:

- Regional Board: Lead over site investigation and corrective action and SPCC inspections.

Pertinent Regulations and Policies: Health and Safety Code 25270.2 (Spill Prevention Control and Countermeasure Plan); State Board Resolution No. 92-49; Porter-Cologne Water Quality Control Act.

Resource Conservation and Recovery Act (RCRA)/Superfund (CERCLA)

Targeted Area:	Region wide
Responsible Party(ies):	Hazardous waste generators, transporters, and facilities that treat, store and dispose of hazardous wastes.
Targeted Chemicals:	Hazardous wastes.
Potential Source(s):	Hazardous waste generators, transporters, and facilities that treat, store and dispose of hazardous waste.
Participating Agencies:	
1) DTSC:	Administers the RCRA Program in California.
2) Regional Board:	When requested, Regional Board reviews water quality issues related to RCRA sites.
3) County of Los Angeles Fire Department, Health Hazardous Materials Division (HHMD):	Primary agency performing compliance inspections of hazardous waste generators (including overseeing corrective actions) under CAH&SC Division. 20, Chapter 6.5 (state RCRA); 22 CCR; and designation/MOU with DTSC.
Pertinent Regulations and Policies:	California Code of Regulations, Title 22; Porter-Cologne Water Quality Control Act.

Landfills

Targeted Area: Region wide

Responsible Party(ies): Property owners/operators of land disposal sites.

Targeted Chemicals: Hazardous wastes and solvents, heavy metals, leachate.

Potential Source(s): Wastes disposed at landfills.

Participating Agencies:

- 1) Regional Board: Lead agency.
- 2) County or City Planning Department: Oversees conditional use permit, flood control.
- 3) California Integrated Waste Management Board (CIWMB): Lead agency for solid waste facility permit.
- 4) County, City Health Departments: Local Enforcement Agencies (LEA) for CIWMB, oversee solid waste facility permit at the local level.
- 5) South Coast Air Quality Management District (SCAQMD): Lead agency for air emissions.

Pertinent Regulations, Policies and Assessment Test: California Code of Regulations, Title 23, Division 3, Chapter 15, 2524; California Code of Regulations, Title 14, Division 7; Porter-Cologne Water Quality Control Act, Section 13273; Solid Waste Water Quality Assessment Test<sup>1</sup>.

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<sup>1</sup> CIWMB provided funding (AB 1220) for Regional Boards to review all unreviewed in-house SWAT Reports through Rank 5. No SWAT sites beyond Rank 5 (i.e., 6 through 16) will be noticed. Program funding expires at the end of the fiscal year July 95/July 96.

Subsurface Investigations

Targeted Area:	Region wide
Responsible Party(ies):	Owners/operators of septic disposal systems.
Targeted Chemicals:	Sewage wastes and nitrates.
Potential Source(s):	Septic tank disposal systems.
Participating Agencies:	
1) Regional Board:	Oversees multiple-dwelling units, some non-domestic septic tank systems, and large developments.
2) Local Health and Public Works Departments:	Permit and regulate most single-family dwellings and certain commercial septic tank disposal systems.
Pertinent Regulations and Policies:	Porter-Cologne Water Quality Control Act, Chapter 4, Article 5,.

# CHAPTER 2.0

## Overview of the Assessment and Cleanup Process

### Cleanup Goals

The Regional Board's main goal is to protect the existing and potential beneficial uses of state waters. Ideally, this entails the cleanup of soil and groundwater contamination to "background levels", (see acceptable screening levels shown in Tables 4-1 and 5-1) which are presumed to be non-detect for man-made chemicals.

This cleanup approach stems from an interpretation of the "Statement of Policy with Respect to Maintaining High Quality of Waters in California", commonly referred to as the antidegradation policy" (see State Board Resolution 68-16 in Appendix E). The approach also follows recommendations in "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304" (State Board Resolution 92-49). In practice, the Regional Board will afford the highest possible and practical level of protection to all sources, depending on their use.

Under Water Code Sections 13267 and 13304 (Porter-Cologne Water Quality Control Act), the Regional Board is authorized to require soil and groundwater investigations, site inspections, monitoring, and to request work plans from an RP for an assessment and/or cleanup project. The Regional Board may assess fines in cases of noncompliance.

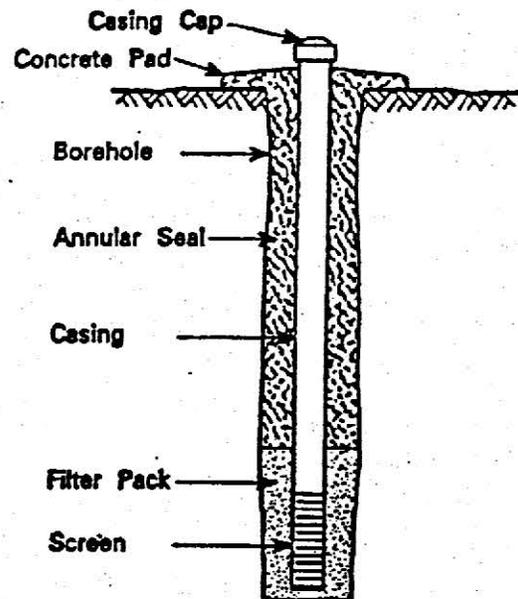
Please note that penalties potentially can be high, and, depending on the violations, may run into the tens of thousands of dollars.

Detailed enforcement information is discussed in our Basin Plan. Call Regional Board's Business Assistance Office at (213) 266-7671 or 266-7660 for Basin Plan information.

### General Report Requirements

All reports, documents, and plans that contain engineering, geologic, and/or geophysics evaluations and judgments must be prepared

Figure 2-1: Simplified Drawing of a Monitoring Well



Source: State of California, 1991. California Well Standards. California Dept. of Water Resources, Bulletin 74-90.

by, or under the direction of, a registered civil engineer, registered geologist, or certified engineering geologist licensed in the State of

## Overview of the Assessment and Cleanup Process

California (Sections 6735, 7835, and 7835.1 of the California Business and Professions Code).

All records of soil samples obtained from bore holes (holes drilled to a particular depth - see Figure 2-1 above) and water samples from groundwater monitoring wells (wells built with piping to draw water which can be sampled and analyzed - see Figure 2-1 above), monitoring well logs, as well as excavation procedures and soil/groundwater sampling must be reviewed, approved, and signed by a qualified professional. The registered or certified professional must indicate responsibility for the technical information by his/her signature and stamp or seal.

Sample collection and laboratory analyses of the samples are critical activities that occur during the site investigation, cleanup, and closure phases of a project. Analyze all soil and water samples using a laboratory that is certified by the California State Department of Health Services, for the United States Environmental Protection Agency (USEPA) analytical methods.

Prior to conducting any field work, prepare a site-specific health and safety plan complying with the California Occupational Safety and Health Agency, Health and Safety Code, Title 8, California Code of Regulations, Section 5192, and other appropriate sections.

The Regional Board may require soil and/or groundwater monitoring (collection and analysis of soil and/or groundwater samples referred to as "monitoring data") to evaluate site conditions during the site investigation and cleanup, and to verify that the corrective

action is effective. The responsible party must develop a monitoring program for an appropriate period of time based on the technical data and the site-specific conditions. In addition, the RP must collect monitoring data according to a regular schedule.

### *Monitoring Well Permit Requirements*

Well construction permits are required for all groundwater monitoring wells - wells built to sample and test groundwater quality, and to measure water elevation. General standards for well construction, reconstruction or repair, and abandonment, must comply with California Department of Water Resources Bulletins 74-81 and 74-90, and Chapter 16 Regulations, section 2649.

RPs must submit completed permit applications to the appropriate agency, and receive approval before drilling activities can begin. In Los Angeles County, the permitting agency is Los Angeles County Department of Health Services Water and Sewage Program (except in the cities of Long Beach, Pasadena, and Vernon). In Ventura County the permitting agency is Ventura County Environmental Health.

### *Other Permits*

You should obtain all other necessary permits (e.g., building, zoning, electrical, right of way encroachment, etc.) required by any agency prior to the start of work. Table 2-1 shows a partial list of permitting agencies within the region.

## Overview of the Assessment and Cleanup Process

Table 2-1: Permitting Agencies

REQUIRED PERMITS	AGENCY
Installation and Abandonment of ground water wells.	Los Angeles County Department of Health Services; Ventura County Environmental Health Division
Discharges to surface waters - NPDES Permit.	Regional Water Quality Control Boards
Discharges to land or ground water.	Regional Water Quality Control Boards
Discharges to municipal sewer system.	Local sewerage agency.
Emissions to air.	South Coast Air Quality Management District; Ventura County Air Pollution Control District.
System construction.	Local building or planning department.
Treatment of hazardous or RCRA regulated wastes.	Department of Toxic Substances Control.
Removal or installation of USTs.	Local tank permitting agency or Los Angeles County Department of Public Works or Ventura County Environmental Health Division.

## Overview of the Assessment and Cleanup Process

### *Waste Discharge Requirements*

It is the policy of the State Board and the Regional Boards to protect the surface waters and groundwaters of the State (Water Code Section 13263; California Code of Regulations, Title 23, Chapter 15) through developing Water Quality Control Plans (Basin Plans) and issuing Waste Discharge Requirements (WDRs). WDRs include National Pollutant Discharge Elimination System (NPDES) permits and non-NPDES permits.

The release of contaminants and other substances into surface waters (surface water "discharges") are subject to NPDES permits while discharges to land and groundwaters are subject to "non-NPDES" WDRs. Therefore, any discharge to groundwater, surface water, or a stormwater drain, is regulated by the Regional Board.

If a proposed corrective action (e.g., groundwater cleanup) involves a discharge to soil or water, you must obtain a waste discharge application from the Regional Board. Upon review of the discharge application by Regional Board staff, payment of fees (if any) and all other pertinent information (including comments received at a public hearing in some cases), the Regional Board may issue WDRs that include appropriate measures and limitations to protect public health and water quality. Detailed information regarding waste discharge applications and general WDRs (discussed below) can be obtained by calling either (213) 266-7660 or 266-7671, or (800) 500-8008 for assistance.

This Regional Board receives numerous discharge applications for the treatment and disposal of hydrocarbon-contaminated soil and groundwater. In order to expedite the processing and issuing of WDRs, the Regional Board has adopted several general NPDES permits and non-NPDES WDRs to cover specific cases. These general WDRs may be applied to specific sites, and typically are issued by the Regional Board's executive officer in less time than it takes to issue formal permits or WDRs, which must be adopted individually by the Regional Board. The following examples are general WDRs that may be appropriate for cleanups:

- Land Treatment of Petroleum Hydrocarbon Contaminated Soil in Los Angeles and Santa Clara River Basins (Order No. 90-148).
- General National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges of Groundwater to Surface Waters in Los Angeles and Santa Clara River Basins (Order No. 91-92).
- General Waste Discharge Requirements for Discharge of Non-Hazardous Contaminated Soils and Other Wastes in Los Angeles and Santa Clara River Basins (Order No. 91-93).
- General National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges of Hydrostatic Test Water to Surface Waters in Los Angeles and Santa Clara River Basins (Order No. 91-111).
- General National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharge of Groundwater from Investigation and/or Cleanup of Petroleum Fuel Pollution to Surface Waters in Los Angeles and Santa Clara River Basins (Order No. 92-091).

**Table 2-2: Collaborating Agencies**  
(a partial list - March 1996)

<b>STATE and FEDERAL</b>	
<b>California Environmental Protection Agency</b> Sacramento, CA Help Desk 1 (800) 808-8058	<b>Department of Toxic Substances Control</b> Glendale Office (Region 3): (818) 551-2800 Long Beach Office (Region 4): (310) 590-4868
<b>United States Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, CA 94105 (415) 744-1500</b>	
<b>State Water Resources Control Board</b> Sacramento, CA (916) 657-2390	<b>Department of Water Resources</b> Glendale, CA (818) 543-4600
<b>California Integrated Waste Management Board, Sacramento, CA (916) 255-2200</b>	<b>Air Resources Board</b> El Monte, CA (818) 575-6888
<b>Regional Water Quality Control Board</b> Los Angeles Region 4 (213) 266-7500 Help Desk 1 (800) 500-8008 Bulletin Board Service 266-7663	<b>Department of Health Services</b> Southern California Laboratory: Los Angeles (213) 580-5795
<b>COUNTY</b>	
<b>Los Angeles Department of Public Works</b> Environmental Programs Division, Underground Tanks (818) 458-3539	<b>Sanitation Districts</b> Los Angeles (213) 685-5217
<b>Los Angeles Department of Health Services</b> Water & Sewage Program (well permits) (213) 881-4147	<b>Ventura County Environmental Health Division</b> Luft Program (805) 654-3519
<b>Los Angeles County Fire Department</b> Health Hazardous Materials Division (213) 890-4089	
<b>CITY AND REGIONAL</b>	
<b>City Fire Department:</b> Burbank (818) 238-3473; Glendale (818) 548-4030; Long Beach (310) 570-2560; Los Angeles (213) 485-7543; Pasadena (818) 405-4115; Torrance (310) 618-2973; Ventura (805) 654-7794.	<b>Health Departments: City of Vernon (213) 583-8811; City of Long Beach Health Human Health Services (310) 520-4000</b>
<b>South Coast Air Quality Management District</b> Permitting Section (909) 396-2000	<b>Department of General Services:</b> Santa Monica (310) 458-8228  <b>Watermaster:</b> San Gabriel Valley (818) 815-1300 Upper Los Angeles River Area (213) 367-1020

## Overview of the Assessment and Cleanup Process

- General Waste Discharge Requirements for Specified Discharges to Groundwater in Santa Clara River and Los Angeles River Basin (Order No. 93-010).

### *Other Agencies' Requirements*

Based on the location and nature of the contamination, investigation activities and cleanup actions, more than one regulatory agency may be involved in a case. Refer to Table 2-2 for a partial list of the agencies and telephone numbers. The RP must comply with applicable regulatory requirements and must obtain the necessary permits or variances from the appropriate agencies. It is strongly recommended that you coordinate these regulatory requirements through Regional Board staff to limit the potential for redundant requirements or inappropriate responses.

For example, the South Coast Air Quality Management District regulates the emission of vapors from contaminated soils, transfer facilities, accidental spillage or other deposition of contaminants. Any party who wishes to excavate or treat soils that are contaminated with petroleum hydrocarbons and/or solvents must obtain the appropriate permit before beginning the field work. The California Department of Toxic Substances Control (DTSC) regulates the transport of toxic wastes or hazardous materials, including contaminated soil. Therefore, the RP should contact DTSC when transporting toxic or hazardous materials. Also, the RP should check with the local zoning and other permitting agencies, within the city or county where the work is being performed, to ensure compliance with local regulations.

### *Summary of the Process*

To determine whether contaminants are impacting or threatening groundwater, an RP typically must undertake a progressive sequence of investigations. They are:

- 1) Initial Site Evaluation
- 2) Soil and Groundwater Assessment
- 3) Corrective Action Plan (including cleanup)
- 4) Verification Monitoring Data and Closure Report

It is strongly recommended that an RP seek site-specific guidance from Regional Board staff before beginning work on each of these tasks or phases. Written Regional Board staff approvals are mandatory (especially when an "No Further Action" letter is requested by the responsible party before beginning required work) for Soil and Groundwater Assessment work plans and reports, Corrective Action Plans, and Closure Reports, which conclude the investigation. For the UST Self-directed Process, please contact UST staff for details regarding Regional Board approvals. Key points of the assessment and cleanup process are provided in Figures 2-2 through 2-4.

The four basic tasks are discussed in detail in Chapter 3, "Assessment and Cleanup Guidance," and are summarized below.

### *Initial Site Evaluation*

The first step in the process is a preliminary site assessment. The goal of this initial

## Overview of the Assessment and Cleanup Process

evaluation is to confirm the absence or presence of discharge(s) from potential sources of contamination, such as underground and aboveground tanks, sumps, spills, etc., on the property, and to identify the

**Figure 2-2: Initial Site Evaluation**

Perform Site Evaluation ⇒ If no Potential Sources are found ⇒ request **No Further Action**, or

If Potential Sources are found ⇒ Complete Site Evaluation:

- No contamination detected ⇒ request **No Further Action**, or
- Contamination detected ⇒ Assess the soil

responsible party(ies). RPs can include site owners, tenants, and even prospective owners, if they are willing to accept liability for the contamination.

The assessment also identifies affected or threatened state waters. The RP should collect relevant information regarding the nature, and vertical and horizontal extent of the contamination. During this assessment phase, the RP should make every effort to eliminate, remove or abate any immediate threat to health, safety or the environment.

Site inspections, soil borings (for soil sampling), soil gas/vapor surveys (used to measure contaminant vapors in soil) and groundwater wells may be used during the preliminary assessment phase to confirm a discharge. If soil contamination is not found

during this phase, the RP should request an NFA letter from the Regional Board. Please refer to appendices for details regarding requirements for assessment and monitoring.

### *Soil and GroundWater Assessment*

When contamination is found after completing the initial site evaluation, the RP must conduct soil and groundwater assessment(s) to determine the source of contamination, nature and extent of the contamination. These

**Figure 2-3: Soil Assessment**

Complete soil assessment ⇒ If contaminants are **DETECTED** in soil ⇒ Consider soil cleanup - Refer to Chapters 4 and 5 for details:

- If soil contaminants are at or below "soil cleanup screening levels", request **No Further Action**, or
- If soil contaminants are above "soil cleanup screening levels", perform soil cleanup or "risk assessment/chemical fate transport modeling".
- If necessary, assess the groundwater quality - Refer to Chapter 3 for details.

assessments should delineate the site's geology and hydrogeology in sufficient detail. The Site Assessment Report should include, but is not limited to, such information as:

1. Site background information including a facility map drawn to scale showing

## Overview of the Assessment and Cleanup Process

- all significant site features;
2. Identification of the contaminant(s) of concern (e.g., benzene, trichloroethylene, etc.) and the source of contamination (e.g., underground storage tanks);
  3. Descriptions of site-specific and regional geology plus hydrogeology;
  4. Delineation of the vertical and lateral extent of soil and groundwater contamination, as identified through, but not limited to, appropriate soil borings, soil gas investigations,

Figure 2-4: Groundwater Assessment

Complete groundwater assessment:

- If contaminants are not detected, or detected at maximum contaminant levels (MCLs), request No Further Action.
- If contaminants are detected and above MCLs, consider monitoring or cleanup and off-site assessment - Refer to Chapter 3 for details.

groundwater monitoring wells, and the analytical data generated during this work, and other means;

5. Generation of all technical data necessary to develop cleanup options.

This work will produce a Site Assessment

Report, which must be submitted to Regional Board staff for review and approval. Site Assessment Reports must address the specific requirements of the program(s) (e.g., underground tanks, etc.) which dictate actions needed for a site assessment. The appendices list these requirements, which RPs should discuss with their consultants.

### *Corrective Action Plan*

To advance to the remediation phase, the Corrective Action Plan must include an evaluation of cleanup alternatives that are feasible at the site. The RP must select a cleanup alternative which best suits their site, based on the nature and extent of the contamination, site conditions, site limitations, cost effectiveness of the various cleanup options, and the current or potential beneficial uses of the involved groundwater.

Developing a Corrective Action Plan involves the following major activities:

1. Reviewing the site history, as well as the soil and groundwater analytical data.
2. Reviewing the regional hydrogeology and evaluating the site-specific hydrogeology.
3. Evaluating the water quality of nearby surface water or groundwater, and the current and potential beneficial uses.
4. Evaluating the nature of the contaminants, including the toxicity, persistence, and potential for spreading in soil and groundwater.

## Overview of the Assessment and Cleanup Process

5. Defining the extent of contamination in soil and groundwater.
  6. Evaluating if the contaminants are treatable based on bench tests, pilot studies, or other means.
  7. Defining the cleanup objectives of the corrective action.
  8. Identifying the technologies that can achieve the objectives, based on whether the technology has been applicable, feasible, reliable and has proven effective when used at similar sites.
  9. Evaluating the cleanup alternatives, including the "no action alternative", and at least two cleanup alternatives which are able to treat the contamination at the site.
  10. Recommending and justifying a cleanup alternative.
  11. Estimating the cost involved in construction, operation and maintenance, and shutting down the treatment system.
  12. Developing a sampling and analysis plan to monitor cleanup progress, and to verify that the cleanup measures are effectively reducing contaminant concentrations.
  13. Proposing cleanup levels acceptable to the Regional Board. [Note: Cleanup Goals, Soil Screening Level Guidance, and Cleanup Performance Criteria are discussed in the following pages.]
  14. Identifying the regulatory agencies and any permits or variances necessary to do the work.
  15. Developing a time schedule for putting the plan into effect.
  16. Developing a health and safety plan.
- As an RP, you must submit a Corrective Action Plan to Regional Board staff for approval, before you can proceed with cleanup. The Regional Board allows exceptions for interim corrective actions which the RP takes on to ease an imminent threat to human health and the environment, or to remove continuing sources of contamination.

### *Verification Monitoring Data and Closure Report*

The RP must submit a "Closure Report" to show that he/she has met the cleanup goals (see Cleanup Goals section on the next page). This is achieved through a process called "verification monitoring," typically conducted at the end of a cleanup project to verify the absence of contaminants or an acceptable level of contaminants (see Chapters 4 and 5 for details). "Verification monitoring" shows whether remediation has occurred and whether the investigation can be closed.

In general, the "Closure Report" must contain, but is not limited to, the results of the cleanup (including "verification monitoring" data) and summary data collected through the Initial Site Evaluation, the Soil and Groundwater

## Overview of the Assessment and Cleanup Process

### Assessment, and Corrective Action Plan.

The "verification monitoring" process may include data from soil gas and/or soil matrix sampling and analysis, groundwater level measurements, and groundwater sampling and analysis. If the RP seeks to close the investigation, "verification monitoring" must show the following:

#### "Soil Verification" Monitoring Conditions: Investigation Closure Requirements

1. Non-detectable levels of contaminants in the soil, or
2. Detectable levels of contaminants are present in the soil, at concentrations that are less than the "soil screening levels" (Chapters 4 and 5) or other "site-specific levels" as set forth in the Corrective Action Plan, or required by the Regional Board. These indicate whether the levels of contaminants at a particular site require cleanup. Or, an RP may use a mathematical model that predicts and describes where chemicals are moving in soil and/or groundwater (known as "risk assessment/chemical transport modeling") to show that remaining contaminants won't threaten groundwater quality, or
3. Detectable levels of contaminants remain in the soil and pose a threat to the groundwater. However, measures of the effectiveness of the treatment method, or "treatment performance measures", show that additional cleanup will not reduce contaminant

levels. Under these conditions, groundwater monitoring might be required.

#### "Groundwater Verification" Monitoring Conditions: Investigation Closure Requirements

1. Groundwater has not been impacted/contaminated, or
2. Groundwater has been impacted, however, contaminant levels are below "maximum contaminant levels" (MCLs), or
3. Groundwater has been impacted and contaminant levels exceed MCLs; however, treatment performance criteria show that additional cleanup will not reduce contaminant levels. You may need to do groundwater monitoring to ensure that contaminant levels are not increasing.

### *Guidance for Remediation (Cleanup) of Soils: Soil Screening Levels*

The Regional Board recently developed two approaches for soil remediation that are intended to simplify and clarify the site assessment and cleanup process. They are:

- 1) Remediation Guidance for Petroleum-Impacted Sites (March 1996). *See Chapter 4 for details.*
- 2) Remediation Guidance for Volatile Organic Compounds (VOC)-Impacted

## Overview of the Assessment and Cleanup Process

Sites (March 1996). See Chapter 5 for details.

These procedures, explained in Chapters 4 and 5, contain numerical screening levels to help an RP determine if site cleanup is needed. You should use Tables 4-1 and 5-1 to determine the acceptable cleanup levels for your site. These approaches to cleaning up petroleum- or VOC-impacted sites seek to simplify the remediation process by making it easier to select site-specific soil cleanup levels for most impacted sites in a way that both protects water resources yet is cost effective. In addition, the approaches strive to achieve the Regional Board's cleanup goals and to promptly return the sites to their intended uses.

### Cleanup Performance Criteria

During remediation, an RP might determine that it is physically, economically and technically impractical to remove, for example, the last 1%, 5%, 10%, etc, of the estimated contaminant mass in the soils (see Figure 2-5) and/or groundwater due to significant challenges such as time, costs, and even bankruptcy.

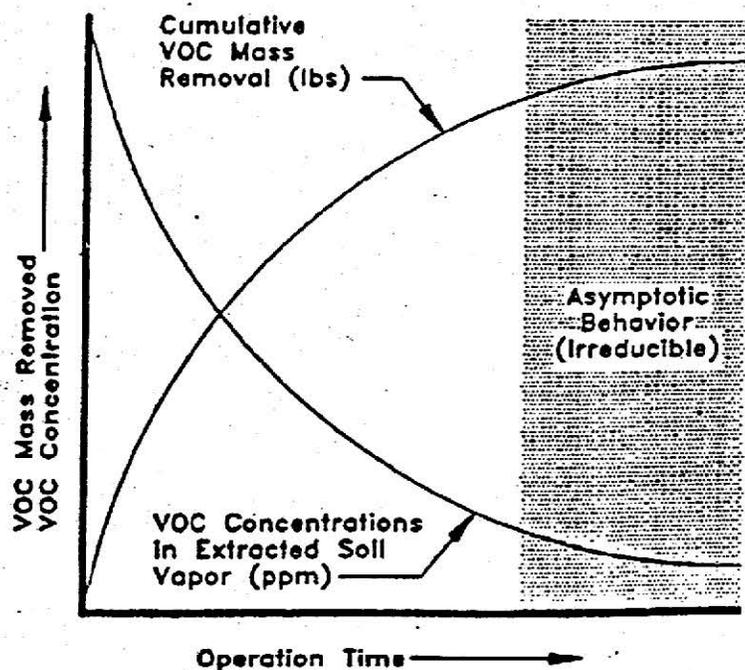
Here is one example of this situation:

*A mass of heavy petroleum waste oil is located beneath an occupied building. Further remediation/removal (i.e., excavation of contaminated soil) is not practical because it could structurally compromise the building's foundation.*

*Occupants, however, are not at risk and there is no risk to the groundwater based on a valid "risk assessment/chemical transport model." In this case, further remediation would not be cost effective nor expedient based on the modeling data.*

In such cases, the Regional Board recognizes that it might be more expedient to stop cleanup and determine, using a valid "risk assessment/chemical transport model," whether the remaining contaminants pose further threat to groundwater. If the site poses a threat to groundwater, you might need to do

Figure 2-5: Relationship Between Concentration Reduction and Contaminant Mass Removal



Source: USEPA, 1995. How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites. Solid Waste and Emergency Response 5403W, EPA 510-B-95-007.

groundwater monitoring to determine whether soil contaminants will impact the groundwater

## Overview of the Assessment and Cleanup Process

in the near future.

### "No Further Action" (NFA) Letters

The Regional Board issues a "No Further Action" letter to indicate that the responsible party's site does not pose a threat to groundwater quality; therefore, further regulatory work such as soil and groundwater assessments, remediation, etc., will not be required. Examples of NFA letters are provided in Appendix D.

In general, several scenarios for issuing an NFA letter are possible. They are discussed below and depicted in Table 2-3:

- Scenario #1 involves properties that are not found to be impacted/contaminated.

The RP should submit relevant site information (please refer to Initial Site Evaluation Section for site evaluation information) so that the Regional Board can issue an NFA letter.

- Scenario #2 represents properties in which the soil is impacted; however, neither soil nor groundwater cleanup is required. Based on soil screening levels or "risk assessment/chemical transport modeling," the site poses no threat to groundwater quality.

In this situation, the RP should submit relevant site information and request an NFA letter.

- In Scenario #3, the soil is impacted and only soil cleanup is required.

An NFA will be issued when the soil cleanup results ("Soil Verification Monitoring" data) are submitted, reviewed and approved by the Regional Board.

- In Scenario #4, only soil cleanup and groundwater monitoring are required.

The Regional Board issues an NFA letter when the soil cleanup and groundwater monitoring results ("Soil and Groundwater Verification Monitoring" data) demonstrate that the site poses no further threat to the groundwater quality or when treatment performance measures demonstrate that additional cleanup will not reduce contaminant levels. Submit the results to the Regional Board for review and approval.

- In Scenario #5, both soil and groundwater assessments and cleanups are required.

The Regional Board issues an NFA letter when it receives, reviews and approves the soil cleanup and groundwater results. An NFA letter for completion of soil cleanup phase can be issued while groundwater is being monitored or cleaned to allow use of the site's surface area.

In conclusion, it is extremely difficult to determine initially whether cleanup will be required. The step-by-step or phased approach to soil and groundwater assessments helps to determine whether cleanup is needed. The challenge is to require only those assessment activities that will provide adequate data to evaluate the need for cleanup. If disputes and/or conflicts arise during assessments and cleanups, the Regional Board recommends the following conflict resolution process.

### Conflict Resolution Process

The conflict resolution process seeks to resolve conflicts and disputes regarding technical decisions, as mentioned in Section V of the State Board Resolution 92-49 included in Appendix E. In general, every effort should be made to resolve the matter with both the

## Overview of the Assessment and Cleanup Process

project manager (i.e., person handling the case) and immediate supervisor(s). This initial step may require a meeting with both the project manager and immediate supervisor(s) of the Regional Board staff.

If a conflict/dispute cannot be resolved at the project manager and immediate supervisor levels, the disputing party should submit a written statement to the Regional Board within thirty (30) days. The written "statement of dispute" should include: 1) the nature of the dispute; 2) the work affected by the dispute; 3) the disputing party's position with respect to the dispute; 4) an explanation of all the steps taken to resolve a dispute; and 5) the technical, legal, or factual information upon which the disputing party is relying to support their position. The written statement should be addressed to both the immediate supervisor(s) and executive officer. Upon receipt, the executive officer will issue a response (i.e., meeting and/or written statement) to the disputing party's statement within two weeks.

A disputing party may ask the Regional Board to consider conflicts and disputes that were not resolved at the executive officer level. This request should be made in writing to the executive officer of the Regional Board.

Within 30 days of any action or failure to act by the Regional Board, the disputing party may petition the State Board to review such action or failure to act. In case of failure to act, the 30-day period begins upon the Regional Board's refusal to act, or 60 days after the Regional Board has been asked to act. In a public hearing, the State Board may direct the Regional Board to take the

appropriate action, take the action itself or do any combination of the above.



B) Alice Fu (10)  
RW GCB

# Overview of the Assessment and Cleanup Process

## "No Further Action" (NFA) Determination Scenarios

**TABLE 2-3  
SOIL AND GROUNDWATER ASSESSMENT AND SCENARIOS**

S C E N A R I O	Soil	Soil Cleanup	Ground Water	Ground Water Cleanup
1	Not Impacted  Issue NFA	Not Required	Not Impacted	Not Required
2	Impacted	Not Required  Issue NFA	Not Impacted	Not Required
3	Impacted	Required	Not Impacted  Issue NFA AFTER CLEAN-UP	Not Required
4	Impacted	Required	Impacted	Monitor Ground- water Quality
5	Impacted	Required	Impacted	Required

<sup>1</sup> NFA will be issued when soil cleanup and monitoring data are submitted, reviewed and approved.

<sup>2</sup> NFA will be issued when cleanup data are submitted, reviewed and approved.

# CHAPTER 3.0

## Assessment and Cleanup Guidance

This portion of the guidebook serves as a road map through the assessment and cleanup process, and includes the major steps that were described in Chapter 2. It is not a detailed description of the procedures that are needed to perform assessment and cleanup work. Please refer to the appendices, and Chapters 4 and 5 for detailed assessment and cleanup procedures.

### *Initial Site Evaluation:*

<b>STEP 1:</b>	Locate and identify potential sources on-site, if not known.
<b>STEP 2:</b>	Confirm absence or presence of discharge.
<b>STEP 3:</b>	Submit initial findings to the Regional Board.

**STEP 1:** Locate and identify "potential sources of contamination" on your property, if not known.

If the "potential source of contamination" (structure where the chemical(s) is leaking from) is known, as in the case of aboveground tanks, drum storage areas, etc., go to STEP 2

and confirm whether a chemical discharge or release has taken place at the potential source in question.

The key areas of concern for an assessment and/or cleanup are primarily limited to potential sources of contamination, which include facilities, equipment or materials that may be leaking chemicals, wastewater, solvents, gasoline, etc., into the soil or have leaked these types of substances into the soil in the past.

### Examples of potential sources of contamination:

- Above/Underground Tanks
- Drum storage areas
- Sewer leaks
- Chemical spills
- Contaminated soil
- Clarifiers
- Septic tanks/Leachfields/cesspools
- Underground piping
- Vapor degreasers
- Landfills
- Paint booths
- Toxic pits
- Percolation sumps
- Contaminated run-off
- Illegal or unpermitted disposal or dumping.
- Any structure containing and/or transporting chemicals, wastes, etc.

The following site evaluation information or relevant evidence (State Board Resolution 92-49 in Appendix E) can be used to assist the RP

## Assessment and Cleanup Guidance

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in finding out whether there are "potential sources of contamination" on his/her property:

### Site Evaluation Information:

- Use information regarding chemical, waste, solvent, gasoline, usage and storage, etc., to help establish whether substances of interest were used and discharged into the soil. Descriptions of business or manufacturing operations (e.g., solvent manufacturer) may help to clarify usage and storage practices.
- Visual inspections may be very useful to spot potential sources and/or discharges to soil.
- Historical photographs and maps showing the locations of former potential sources (e.g., aboveground tanks) may be necessary if the facility no longer exists or has been modified structurally.
- Use groundwater quality information from nearby sites with monitoring wells. If groundwater quality has been impacted beneath your property or adjacent properties, activities on your property may have contributed to the problem. This determination will depend on the types of pollutants found in groundwater and used or stored on your property.
- Perform preliminary soil and groundwater assessments that may be needed on property where you cannot accurately locate suspected potential sources. This task will require laboratory testing of soil and/or groundwater samples.
- In some cases, it is not possible to locate or identify former potential sources on your property even though the soil has been contaminated. This sometimes happens if potential sources were removed without regulatory oversight. Therefore, it is important to consult with Regional Board staff before completing this investigation phase.

If potential sources of contamination do not now or have never existed on your property, you may not need to perform an investigation. However, this finding requires sufficient documentation and should be discussed with Regional Board staff.

**STEP 2: Confirm whether contaminants have been discharged into the soil.**

Table 3-1 lists several methods to use in assessing whether a "potential source of contamination" (e.g., underground gasoline tank) has discharged its contents into the soil. Initially, you should assess the soil surrounding the "potential source" to confirm the absence or presence of suspected contaminants. After the soil investigation has been completed, the RP can then perform groundwater assessment, if warranted. For some properties, especially those sites where the groundwater is shallow (e.g., 25 feet or less), think about the possibility of assessing both the soil and groundwater quality at the same time. Such an approach typically proves to be more timely and cost-effective.

**STEP 3: Submit initial findings of the assessment results to the Regional Board for review and approval.**

After Regional Board staff has reviewed the results collected during the initial site evaluation, the staff generates a response and submits it to the RP(s) within about two weeks. Table 3-2 contains the possible evaluation outcomes and the appropriate Regional Board responses.

## Assessment and Cleanup Guidance

Table 3-1: Methods used to confirm Contaminants in Soil

STEP 2: Methods	Criteria to Consider
<p><b>ON-SITE INSPECTIONS.</b> Visual inspections should be performed to spot surface spills, chemical storage areas, poor housekeeping practices, etc.</p>	<ul style="list-style-type: none"> <li>• Have all <b>POTENTIAL SOURCES</b> of Contamination been identified?</li> <li>• Perform a site inspection/evaluation to locate all <b>POTENTIAL SOURCES</b>.</li> <li>• Check for past and present surface spills.</li> </ul>
<p><b>SOIL ASSESSMENT.</b> Soil matrix and/or soil gas sampling (shallow &amp; deep) to detect the historical or current use of chemicals.</p>	<ul style="list-style-type: none"> <li>• Lateral and vertical migration of the soil contamination.</li> </ul>
<p><b>GROUNDWATER SAMPLING.</b> Use monitoring wells or hydropunch (which is a method that can be used to sample groundwater one time without actually installing a well).</p>	<ul style="list-style-type: none"> <li>• How deep is the soil contamination?</li> <li>• Soil contaminant concentrations.</li> <li>• Depth to groundwater table.</li> </ul>

# Assessment and Cleanup Guidance

**Table 3-2: Initial Site Evaluation**

Possible Outcomes	Regional Board Response to Property Owner or RP
No soil contamination is detected.	An "No Further Action" (NFA) letter is issued to RP.
Soil contamination is detected and the extent of the contamination is defined.	Determine whether soil contaminants have entered the groundwater beneath your site. See Groundwater Assessment Section.
Soil contamination is detected, but the extent of contamination is not defined.	Define extent of soil contamination and determine whether the soil contaminants have entered the groundwater. See Soil and Groundwater Assessment Section.

## *Soil and Groundwater Assessment:*

**STEP 1:** Submit Assessment Work Plan to Regional Board staff for approval.

**STEP 2:** Define extent of soil contamination.

**STEP 3:** Determine whether groundwater quality has been impacted.

**STEP 4:** Submit assessment results to Regional Board staff.

**STEP 1:** Submit Assessment Work plan for approval.

The Assessment Work Plan should include: Detailed background site information, descriptions of the proposed assessment tools (e.g., soil borings, soil gas survey, groundwater monitoring wells, etc.), a discussion on defining the extent of the contamination, etc.

*Requirements for developing Assessment Work Plans are discussed in Chapter 2, "Overview of the Assessment and Cleanup Process."*



# Assessment and Cleanup Guidance

Table 3-4: GROUNDWATER ASSESSMENT

STEPS	CRITERIA to Consider
<p>Consider the listed criteria prior to conducting GROUNDWATER ASSESSMENT.</p>	<ul style="list-style-type: none"> <li>• Types of soil contaminants, soil type and contaminant levels, fate and transport of soil contaminants.</li> <li>• Groundwater quality in nearby drinking and/or monitoring wells.</li> <li>• Beneficial uses of the groundwater, distance to drinking water wells.</li> </ul>
<p>If GROUNDWATER ASSESSMENT is necessary, submit a work plan to the Regional Board for approval. Once the work plan is approved, collect groundwater samples. If contaminated, define extent of the contamination beneath your property. At least three (3) wells are needed to determine groundwater flow direction. But, one (1) well initially may suffice to establish groundwater quality.</p>	<ul style="list-style-type: none"> <li>• Lateral extent of groundwater contamination.</li> <li>• Direction of groundwater flow.</li> <li>• Hydraulic properties of the aquifer.</li> </ul>
<p>Has the extent of groundwater contamination been defined?</p>	<ul style="list-style-type: none"> <li>• Have groundwater contaminants migrated off-site?</li> <li>• Compare analytical data to maximum contaminant levels (MCLs) and action levels (ALs).</li> <li>• Contaminant levels upgradient and downgradient of property.</li> </ul>

## Assessment and Cleanup Guidance

**STEP 4:** Submit the assessment results to the Regional Board for review and approval. When the assessment results are submitted, Board staff will respond as shown in Table 3-5.

Table 3-5: SOIL AND GROUNDWATER SITE ASSESSMENT	
Possible Outcomes	Regional Board Response to Property Owner
Extent of soil contamination is defined.	<ol style="list-style-type: none"> <li>1) Based on soil screening levels, soil cleanup is not required. Regional Board will issue an NFA letter, assuming groundwater has not been impacted, or,</li> <li>2) Based on soil screening levels, soil cleanup is required. See section regarding Corrective Action for Soil.</li> </ol>
Extent of soil contamination is not defined.	Complete soil assessment.
Contaminants are found in the groundwater (groundwater is impacted).	<ol style="list-style-type: none"> <li>1) Groundwater contaminant concentrations exceed maximum contaminant levels (MCLs). See Corrective Action for Groundwater Section, or,</li> <li>2) Groundwater contaminants are below MCLs. See Corrective Action for Groundwater Section.</li> </ol>
Groundwater is not impacted.	Stop assessing the groundwater. Regional Board will issue an NFA letter, if soil cleanup is not required.

# Assessment and Cleanup Guidance

## **CORRECTIVE ACTION FOR SOIL:**

<b>STEP 1:</b>	Determine whether soil cleanup will be required.
<b>STEP 2:</b>	If required, select the most appropriate soil cleanup option.
<b>STEP 3:</b>	Prepare and submit a Corrective Action Plan for Board approval.

**STEP 1:** Determine whether soil cleanup is needed, based on the Regional Board's guidance plan for soil remediation or "risk assessment/chemical transport modeling" (see Chapters 4 and 5).

As noted below in Table 3-6, deciding to clean up contaminated soil depends on many factors. Here is the Regional Board stance on soil cleanup:

A. If detected soil contaminants are found to be a threat (based on the Regional Board remediation guidance for soil) to the underlying groundwater, then soil cleanup is required (see Chapters 4 and 5 for details) as follows:

Groundwater (which is used as a drinking water source) is 40 feet below the ground surface in sandy soil. Benzene has been detected at 100 ppb (the Maximum Contaminant Level (MCL) allowable in drinking water is 1 part per billion - ppb) at 20 feet below the ground surface. Based on the soil screening levels for benzene and the groundwater level being 20 feet below the source, only 11 ppb of benzene is allowed to remain in the soil. Although the benzene contamination, in this example, is located 20 feet above the groundwater table, soil cleanup would be required because the measured concentration is 9 times the allowable level.

Groundwater (in this case, drinking water) is 40 feet below the ground surface in silty soil. Benzene has been detected at 10 ppb (the MCL is 1 ppb) and is 20 feet below the ground surface. Based on the soil screening levels for benzene, 11 ppb of benzene is allowed to remain in the soil. Although the benzene contamination, in this example, is located 20 feet above the groundwater table, soil cleanup would not be required.

B. If detected soil contaminants are not found to be a potential threat to underlying groundwaters (i.e., using the Regional Board's procedures for soil remediation and/or "risk assessment/chemical transport modeling"), then soil cleanup is not

## Assessment and Cleanup Guidance

required. However, leaving detectable levels of contaminants on your property might dictate how it can be used in the future. For example, if contaminants are left in place, your ability to refinance, sell or develop the property for other than the current land uses might be restricted.

In short, it may be in your best interest to remediate as much of the soil contamination as possible.

- C. If soil contamination is detected on your property but contaminant levels are below cleanup guidance screening levels, you should consult with Regional Board staff regarding an NFA letter.

**Table 3-6: Is Soil Cleanup necessary?  
Criteria to Consider:**

- Threat to groundwater.
- Soil screening levels.
- Type of soil identified beneath the property, e.g., sand versus clay.
- Types of soil contaminants.
- Beneficial uses of the groundwater.
- Future land uses.
- Potential health effects associated with contaminants.
- Costs associated with treatment methods.
- Best available technology (BAT).

**STEP 2: Determine the best soil cleanup options for your property.**

When detected soil contaminants exceed the Regional Board's screening levels, soil cleanup may be required. Consult with Regional Board staff and your consultant before beginning a cleanup. As noted in Table 3-7 and Figure 3-1, soil cleanup options will depend on several factors. Thus, please critically review the types of contaminants, soil type (e.g., sand versus clay) and the beneficial uses of the groundwater should be examined critically with your consultant(s).

**STEP 3: Prepare and submit a Corrective Action Plan for Agency approval.**

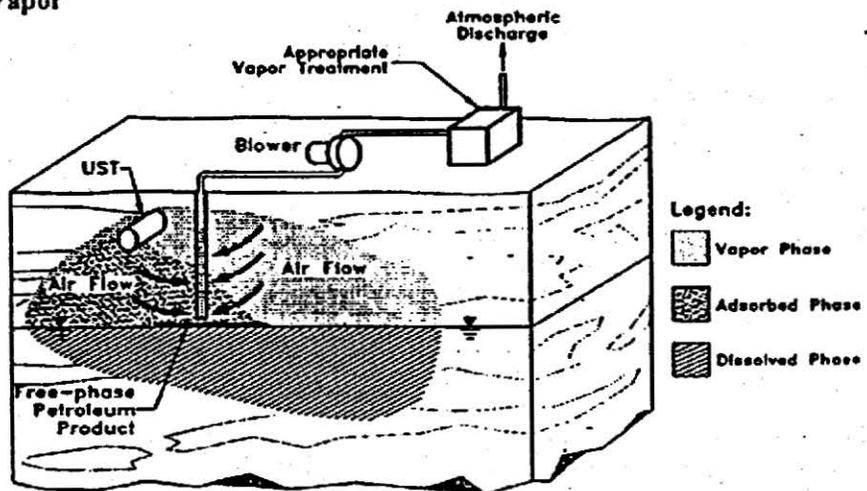
*Details on how to prepare and submit a Corrective Action Plan are discussed in Chapter 2, "Overview of the Assessment and Cleanup Process," and in the appendices.*

# Assessment and Cleanup Guidance

<p><b>STEP 2a:</b></p> <p>Once the soil contamination has been fully defined at each <b>POTENTIAL SOURCE</b>, a decision must be made regarding the <b>SOIL CLEANUP</b>. Consider <b>CLEANUP</b> options and consult with Regional Board staff.</p>	<p><b>CLEANUP Options (examples):</b></p> <ul style="list-style-type: none"> <li>• Leave in place and monitor for potential threat to groundwater.</li> <li>• Capping - control and contain.</li> <li>• Soil fixation.</li> <li>• Source removal and/or isolation.</li> <li>• Soil vapor extraction, venting, washing.</li> <li>• Bioremediation.</li> </ul>
<p><b>STEP 2b:</b></p> <p>Before finalizing your <b>SOIL CLEANUP</b> option, consider the listed criteria. These criteria will assist you in choosing the most cost effective and efficient <b>CLEANUP</b> method. See Figure 3-1 below.</p>	<p><b>Criteria to consider under CLEANUP Options:</b></p> <ul style="list-style-type: none"> <li>• Types of soil contaminants.</li> <li>• Soil type</li> <li>• Depth to groundwater.</li> <li>• Future land uses.</li> <li>• Soil screening levels.</li> <li>• Potential health effects related to contaminants.</li> </ul>

**Figure 3-1: Typical Soil Vapor Extraction System**

Sourec: USEPA, 1995.  
How to Evaluate Alternative Cleanup Technologies for Underground Tank Sites. Solid Waste and Emergency Response 5403W, EPA 510-B-95-007.



## Assessment and Cleanup Guidance

**STEP 4:** Complete the soil cleanup phase.

Soil cleanup can be terminated when one of the following conditions are met:

- A. Soil contaminant concentrations are reduced to non-detectable levels, or
- B. Soil contaminant concentrations are reduced to levels that do not pose a threat to groundwater quality, based on soil screening levels (see Chapters 4 and 5) or "risk assessment/chemical transport modeling," or groundwater quality, based on soil screening levels (see Chapters 4 and 5) or "risk assessment/chemical transport modeling," or
- C. Soil contaminant concentrations are reduced to levels that pose a threat to groundwater quality; however, cleanup performance measures reveal that additional cleanup will not reduce contaminants levels. Therefore, think about other soil treatment options or groundwater monitoring.

### ***CORRECTIVE ACTION FOR GROUNDWATER:***

**STEP 1:** Determine the need for groundwater cleanup and/or monitoring.

In some cases, groundwater cleanup guidelines levels (e.g., maximum contaminant and action levels - MCLs and ALs) are used as a basis for considering the need for groundwater cleanup.

**STEP 1:** Determine whether groundwater cleanup will be required.

**STEP 2:** If required, select the most appropriate groundwater cleanup options.

**STEP 3:** Prepare and submit a Corrective Action Plan for Agency approval.

**STEP 4:** Complete groundwater cleanup.

Additional factors (please refer to Table 3-8) may include the beneficial uses of the contaminated groundwater, and the proximity of the groundwater contamination to drinking water wells in the area. In the event that groundwater cleanup and/or monitoring are not required, request an NFA letter if all other required work is completed.

**STEP 2:** Select the most appropriate treatment option.

Groundwater treatment can be a time consuming and expensive process.

# Assessment and Cleanup Guidance

Table 3-8: GROUND WATER CLEANUP/MONITORING

STEPS	CRITERIA to Consider
<p>Consult with Regional Board staff and consider the listed criteria before deciding whether <b>GROUND WATER CLEANUP</b> or <b>MONITORING</b> is necessary.</p>	<ul style="list-style-type: none"> <li>• Depth of the soil contamination and groundwater.</li> <li>• Nature and extent of groundwater contamination.</li> <li>• Hydraulic properties of aquifer.</li> <li>• Type of soil contaminants and levels.</li> <li>• Soil type.</li> <li>• Compare ground water contaminant levels to MCLs and ALs.</li> <li>• Potential of the contaminants to migrate.</li> <li>• Location of drinking water wells in the area.</li> <li>• BAT.</li> <li>• Cleanup and monitoring costs.</li> </ul>
<p><b>GROUNDWATER MONITORING</b> may be appropriate in lieu of <b>GROUND- WATER CLEANUP</b></p>	<ul style="list-style-type: none"> <li>• Compare groundwater contaminant levels to MCLs and ALs.</li> <li>• Groundwater quality in nearby wells.</li> <li>• Regional cleanup/control strategies.</li> </ul>

# Assessment and Cleanup Guidance

Table 3-9: TREATMENT Options for GROUNDWATER CLEANUP

<p><b>STEP 2a:</b> Once the extent of groundwater contamination has been fully defined, a decision must be made regarding <b>GROUNDWATER CLEANUP</b>. Consider all <b>TREATMENT</b> options and consult with Regional Board staff.</p>	<p><b>TREATMENT Options (examples):</b></p> <ul style="list-style-type: none"><li>• Air sparging with vapor extraction.</li><li>• Pump and treat using carbon adsorption and/or air stripping.</li><li>• Ion-exchange for nitrates.</li><li>• Free product removal + pump and treat</li><li>• Bioremediation.</li></ul>
<p><b>STEP 2b:</b> Before finalizing your <b>GROUNDWATER TREATMENT</b> options, consider the listed criteria. These criteria will assist you in choosing the most cost effective and efficient <b>TREATMENT</b> method.</p>	<p><b>CRITERIA to consider under TREATMENT Option:</b></p> <ul style="list-style-type: none"><li>• Soil type.</li><li>• Hydrology of the site.</li><li>• Types of groundwater contaminants.</li><li>• Groundwater contaminant levels.</li><li>• Cleanup levels, BAT, treatment costs.</li></ul>

## Assessment and Cleanup Guidance

Therefore, you should do a considerable amount of planning before selecting the most appropriate treatment technology (Please refer to Table 3-9). Please consult with Regional Board staff before making your final choice(s).

**STEP 3:** Prepare and submit Corrective Action Plan for Agency approval.

*Details on preparing and submitting Corrective Action Plans are discussed in Chapter 2, "Overview of the Assessment and Cleanup Process," and in the appendices.*

**STEP 4:** Complete groundwater cleanup.

Groundwater cleanup can be terminated when one of the following conditions are met:

A. Groundwater contaminant concentrations are reduced below MCLs, or,

B. Groundwater contaminant concentrations are reduced and still exceed MCLs; however, cleanup performance measures show that additional cleanup will not reduce contaminant levels. Groundwater monitoring might be required.

### *Closure Report and Verification Monitoring Data:*

To obtain an NFA letter, the property owner must document that the site does not pose a threat to groundwater quality. Or, if there is a continuing threat to groundwater quality, the property owner must demonstrate that further

cleanup/treatment will not reduce the contaminant levels. The "closure report" should include the following:

- Preliminary site assessment results;
- soil and groundwater assessment results;
- results of the cleanup, including any "risk assessment/chemical transport modeling," and
- verification monitoring data.

After reviewing the "closure report," Regional Board staff will issue the RP one of the following:

- 1) An NFA letter indicating that no further investigatory or cleanup work is required, or
- 2) a letter that indicates the case requires further Regional Board evaluation or cleanup/remediation, monitoring or other action, or
- 3) a letter indicating that the case is no longer eligible for the particular Regional Board program and that it will be referred to the appropriate local, county, state, federal, or another jurisdiction program.

In some cases, the closure letter may state that more work may be required at a later time if water quality is found to be contaminated or becomes a public health problem.