STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 94-19

APPROVAL OF GROUND WATER AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY BASIN REGARDING PROTECTION AND CLEANUP OF GROUND WATER

WHEREAS:

1. The California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Regional Water Board) revised the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986 under Resolution No. 86-14.

2. The State Water Resources Control Board (State Water Board) approved the majority of the Basin Plan under Resolutions No. 87-49 and No. 87-82. Those portions that were remanded and subsequently readopted by the San Francisco Bay Regional Water Board were approved by the State Water Board under Resolution No. 87-92.

3. Division 7 of the California Water Code states that Basin Plans shall be periodically reviewed and, if appropriate, revised.

4. The San Francisco Bay Regional Water Board held a public workshop on September 3, 1992, conducted a public hearing on October 21, 1992, and adopted Resolution No. 92-131 (Attachment 1)amending the Basin Plan on October 21, 1992, following the public hearing.

4. The amendments modify the Basin Plan as follows:

   a. Chapter 1, Introduction: incorporates language regarding ground water into the general discussion of regional water quality;

   b. Chapter 2, Beneficial Uses: identifies specific ground water basins and designates their beneficial uses;

   c. Chapter 3, Water Quality Objectives: incorporates updated ground water quality objectives; and

   d. Chapter 4, Implementation: updates the discussion of current ground water programs and revises the implementation plan particularly with respect to cleanup of polluted ground water sites that are degrading or threatening to degrade ground water.

5. The amendments incorporate two guidance documents that are subject to the approval of the State Water Board pursuant to Water Code Section 13245.5:

a. "Designated Level Methodology for Waste Classification and Cleanup Level Determination" (Designated Level Methodology) dated June 1989;

b. "Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" (Tri-Regional Guidelines) dated August 1990;

6. The amendments incorporate State Water Board Resolution No. 92-49 which was disapproved by the Office of Administrative Law after the date of the San Francisco Bay Regional Water Board action, and it also references the "Leaking Underground Fuel Tank Field Manual" (LUFT Manual) which is out of date and undergoing revision.

7. A section of the amendments which sets an unsaturated zone cleanup level for total volatile organic compounds (VOCs) is not clearly written.

8. The term "alternative point of compliance" is defined in the amendment in a way that could result in confusion with existing regulatory language contained in Chapter 15 of the California Code of Regulations.

9. Subsection "Modification of Ground Water Cleanup Levels" contains the specification "[g]round water pollutant concentrations have reached an asymptotic level using appropriate technology" which could be interpreted as allowing the Regional Water Board to set ground water cleanup levels at concentrations exceeding water quality objectives.

10. The Basin Plan amendments are consistent with the requirements of Public Resources Code 21000 et seq. (California Environmental Quality Act).

11. San Francisco Bay Regional Water Board Resolution No. 92-131 was adopted in accordance with State laws and regulations.

12. Basin Plan amendments do not become effective until approved by the State Water Board and until regulatory provisions are approved by the Office of Administrative Law.

THEREFORE BE IT RESOLVED THAT:

The State Water Board:

1. Approves the Basin Plan amendments to Chapter 1 (Introduction), Chapter 2 (Beneficial Uses), and Chapter 3 (Water Quality Objectives) as adopted by San Francisco Bay Regional Water Board Resolution No. 92-131.

2. Approves the amendments to Chapter 4 (Implementation), except for those items specified in Attachment 2 which are remanded to the Regional Water Board for further consideration.

3. Authorizes staff to forward the regulatory provisions of the approved amendments to the Office of Administrative Law for approval.

CERTIFICATION

The undersigned, Administrative Assistant to the State Water Board, does hereby certify that the foregoing is a full, true, and correct copy of a policy duly and regularly adopted at a meeting of the State Water Resources Control Board held on February 17, 1994.

Maureen Marché
Administrative Assistant to the Board

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

RESOLUTION NO: 92-131

ADOPTING AN AMENDMENT TO THE WATER QUALITY CONTROL PLAN AND REQUESTING APPROVAL FROM THE STATE WATER RESOURCES CONTROL BOARD

Whereas, the Regional Board has developed a proposed amendment to the Water Quality Control Plan (Basin Plan) in accordance with Section 13240 et seq. of the California Water Code;

Whereas, the Regional Board circulated a draft of the proposed amendment on July 29, 1992;

Whereas, a public workshop was held on September 3, 1992, and the Regional Board held a public hearings on October 21, 1992 on the proposed Basin Plan amendment in accordance with Section 13244 of the California Water Code;

Whereas, the Basin Plan amendment must be approved by the State Board as provided in Sections 13245 and 13246 of the California Water Code before becoming effective;

Whereas, the Regional Board prepared and distributed a written report dated September 3, 1992 identifying alternatives to the proposed amendment and an environmental checklist in compliance with the Public Resources Code Section 21000 et seq. (CEQA) and found that no significant adverse environmental impacts would result from implementation of the proposed Basin Plan amendment; and

Whereas, the Regional Board concludes that this amendment as a whole involves "no potential for adverse effect, either individually or cumulatively on wildlife", and is therefore exempt from Department of Fish and Game CEQA filing fees.

Therefore, be it resolved that:

1. The Regional Board adopts the Final Draft proposed Basin Plan amendment, dated October 9, 1992, as modified at the public hearing on October 21, 1992.

2. The State Board is requested to approve the proposed Basin Plan amendment in accordance with Sections 13245 and 13246 of the California Water Code.

3. The Regional Board directs the Executive Officer to sign and file a Certificate of Fee Exemption with the Department of Fish and Game for this amendment to the Basin Plan.

I, Steven R. Ritchie, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 21, 1992.

STEVEN R. RITCHIE
EXECUTIVE OFFICER

ATTACHMENT 2

Final Version of Basin Plan Amendment

(All page references are to the Water Quality Control Plan San Francisco Bay Region, December 1986)

I. INTRODUCTION

(insert prior to last paragraph pg. 1-1)

Ground water is an important component of the hydrologic system in the San Francisco Bay Region. Ground waters in the Region supply high quality drinking, industrial process/service supply, and irrigation water. Ground waters also provide excellent natural storage, distribution, and treatment systems. Serving as an important source of freshwater replenishment, ground water may also discharge to surface streams, wetlands, and the San Francisco Bay.

A variety of historic and ongoing industrial, urban, and agricultural activities degrade the quality of ground water. Discharges to ground water associated with these activities include: industrial and agricultural chemical spills; underground and above ground tank and sump leaks; landfill leachate; septic tank failures; and chemical seepage via shallow drainage wells and abandoned wells. In addition, salt water intrusion from overpumping has degraded some aquifers. The resulting impacts on ground water quality from these discharges are often long-term and costly to remediate. Consequently, as additional discharges are identified, cleanup and containment of the source areas must be undertaken as quickly as possible. Furthermore, activities that may potentially pollute ground water must be managed to ensure that ground water quality is protected.

(replaces last sentence pg 1-1)

The California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) was created by the California legislature to protect and enhance the quality of ground and surface waters in the San Francisco Bay Region.

II. BENEFICIAL USES

GROUND WATERS

(Delete existing section on pg. II-5 and Figure II-2; insert the following on pg II-6)

Ground water is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where ground water occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer (USGS, Water Supply Paper 1988, 1972). A ground water basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers (Todd, "Groundwater Hydrology", 1980).

There are water-bearing geologic units within ground water basins in the Region that do not meet the definition of an aquifer. For instance, there are shallow, low permeability zones throughout the Region that have extremely low water yields. In addition, ground water may occur outside of currently identified basins. Therefore, for basin planning purposes the term "ground water" includes all subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified ground water basins.

The areal extent of ground water basins in the Region has been evaluated by the Department of Water Resources (DWR) (Bulletin 118, 1980). Of special importance to the Region are 31 ground water basins classified by the DWR that produce, or potentially could produce, significant amounts of ground water. A summary of the hydrogeologic characteristics of these basins is listed on Table II-3. The Regional Water Board is developing computer-based maps that will show the location of the basins. Until those maps are produced, the Regional Water Board will refer to DWR Bulletin 118-80, Figure 5, page 20.

Existing and potential beneficial uses applicable to ground water in the Region include: municipal and domestic water supply (MUN), industrial water supply (IND), industrial process water supply (PROC), agricultural water supply (AGR), and freshwater replenishment to surface waters (FRESH). Table II-4 lists the 31 identified ground water basins located in the Region and their existing and potential beneficial uses.

Unless otherwise designated by the Regional Water Board, all ground waters are considered as suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making any exceptions, the Regional Water Board will consider the criteria referenced in Regional Water Board Resolution No. 89-39, "Sources of Drinking Water", where:

- The total dissolved solids (TDS) exceed 3,000 mg/l (5,000 Us/cm, electrical conductivity) and it is not reasonably expected by the Regional Water Board (for the ground water) to supply a public water system, *or*

- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices, *or*

- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day, *or*

- The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Section 261.3.

Table II-3. Ground Water Basin Characteristics (1)

Ground Water Basin	County	DWR Basin No. (2)	Areal Extent (sq. mi.)	Depth Zone (feet) (3)	Storage Capacity (4)	Perennial Yield (5)
Alameda Creek (Niles Cone)	Alameda	2 - 9.01	97	40 - >500[a]	1.3 mil[e]	32,600[a]
Castro Valley	Alameda	2 - 8	4	NA	NA	NA
East Bay Plain	Alameda	2 - 9.01	114	25 - 596[b]	2.77 mil[c]	NA
Livermore Valley	Alameda	2 - 10	170	0-500[d]	540,000[d]	13,500[a]
Sunol Valley	Alameda	2 - 11	28	160 - 500[f]	>2,800[a] ?	140[a] ?
Arroyo Del Hambre Valley	Contra Costa	2 - 31	2	NA	NA	NA
Clayton Valley	Contra Costa	2 - 5	30	50 - 300[h]	180,000[d] ?	NA
Pittsburg Plain	Contra Costa	2 - 4	30	50 - 160[h]	NA	NA
San Ramon Valley	Contra Costa	2 - 7	30	300 - 600[f]	NA	NA
Yanacio Valley	Contra Costa	2 - 6	30	20 - 300[h]	50,000[h]	NA
Novato Valley	Marin	2 - 30	17.5	55 - 90[j]	NA	NA
Sand Point Area	Marin	2 - 27	2	20 - 300[k]	NA	NA
San Rafael	Marin	2 - 29	NA	NA	NA	NA
Ross Valley	Marin	2 - 28	18	10-60[f]	1380[f]	350[f]
Napa Valley	Napa	2-2 & 2-2.01	210	50 - 500[m]	240,000[n]	24,000[m]
Islais Valley	San Francisco	2 - 33	NA	NA	NA	NA
Merced Valley (North)	San Francisco	2 - 35	16	NA	NA	NA
San Francisco Sands	San Francisco	2 - 34	14	NA	NA	NA
Visitation Valley	San Francisco	2 - 32	7.5	NA	NA	NA
Half Moon Bay Terrace	San Mateo	2 - 22	25	20 - 150[o]	10,300[o]	2,200[o]
Merced Valley (South)	San Mateo	2 -35 (A)	16	250-745[p]	NA	NA
Pescadero Valley	San Mateo	2 - 26	2	NA	NA	NA
San Gregorio Valley	San Mateo	2 - 24	2	NA	NA	NA
San Mateo Plain	San Mateo	2 - 9 (A)	32.5	100 - 500[q]	NA	NA
San Pedro Valley	San Mateo	2 - 36	2	NA	NA	NA
Santa Clara Valley (& Coyote)	Santa Clara	2 - 9 (B)	240	10 - 1010[d]	3.0 mil[f]	100,000[f]
Suisun/Fairfield Valley	Solano	2 - 3	203	30 - 400[e,i]	40,000[f]	NA
Kenwood Valley	Sonoma	2 - 19	6	0 - 1000[d]	460,000[d]	NA
Petaluma Valley	Sonoma/Mrn.	2 - 1	41	0 - 900[d]	2.1 mil[d]	NA
Sebastopol-Merced Fm. Highlands	Sonoma	2 - 25	150	NA	NA	NA
Sonoma Valley	Sonoma	2 - 2.022	50	0 - 1000[d]	2.66 mil[d]	NA

NOTES:

1) Information compiled from DWR and local water management agencies (References are listed in Appendix F)
2) DWR Bulletin 118-80 (1980)
3) Average depth to aquifers below land surface. These depths are provided for information only and can not be used to characterize site specific conditions.
4) Total available storage in acre-feet; references are listed in Appendix F.
5) The average annual amount of ground water that can be withdrawn without producing an undesired result (References are listed on Appendix F)
6) NA - Not available

[a]-[t] References are listed in Appendix F

Table II-4. Existing and Potential Beneficial Uses of Ground Water in Identified Basins

Ground Water Basin	County	DWR Basin No.	MUN (1)	PROC (2)	IND (3)	AGR (4)	FRESH (5)
Alameda Creek (Niles Cone)	Alameda	2 - 9.01	E (6)	E	E	E	
Castro Valley	Alameda	2 - 8	P (7)	P	P	P	
East Bay Plain	Alameda	2 - 9.01	E	E	E	E	
Livermore Valley	Alameda	2 - 10	E	E	E	E	
Sunol Valley	Alameda	2 - 11	E	E	E	E	
Arroyo Del Hambre Valley	Contra Costa	2 - 31	P	P	P	P	
Clayton Valley	Contra Costa	2 - 5	E	P	P	P	
Pittsburg Plain	Contra Costa	2 - 4	P	P	P	P	
San Ramon Valley	Contra Costa	2 - 7	E	P	P	E	
Yanacio Valley	Contra Costa	2 - 6	P	P	P	P	
Novato Valley	Marin	2 - 30	P	P	P	P	
Sand Point Area	Marin	2 - 27	E	P	P	P	
San Rafael	Marin	2 - 29	P	P	P	P	
Ross Valley	Marin	2 - 28	E	P	P	E	
Napa Valley	Napa	2.28& 2-2.01	E	E	E	E	
Islais Valley	San Francisco	2 - 33	P	E	E	P	
Merced Valley (North)	San Francisco	2 - 35	P	P	P	E	
San Francisco Sands	San Francisco	2 - 34	E	P	P	E	
Visitation Valley	San Francisco	2 - 32	P	E	E	P	
Half Moon Bay Terrace	San Mateo	2 - 22	E	P	P	E	
Merced Valley (South)	San Mateo	2 -35 (A)	E	P	P	E	
Pescadero Valley	San Mateo	2 - 26	E	P	P	E	
San Gregorio Valley	San Mateo	2 - 24	E	P	P	E	
San Mateo Plain	San Mateo	2 - 9 (A)	E	E	E	P	
San Pedro Valley	San Mateo	2 - 36	P	P	P	P	
Santa Clara Valley (& Coyote)	Santa Clara	2 - 9 (B)	E	E	E	E	
Suisun/Fairfield Valley	Solano	2 - 3	E	E	E	E	
Kenwood Valley	Sonoma	2 - 19	E	P	P	E	
Petaluma Valley	Sonoma	2 - 1	E	P	P	E	
Sebastopol-Merced Fm. Highlands	Sonoma	2 - 25	E	P	P	E	
Sonoma Valley	Sonoma	2 - 2.022	E	P	P	E	

Notes:

(1) MUN = Municipal and domestic water supply

(2) PROC = Industrial process water supply

(3) IND = Industrial service water supply

(4) AGR = Agricultural water supply

(5) FRESH = Fresh water replenishment to surface water (Designation will be determined at a later date; for the interim a site-by-site determination will be made.

(6) E = Existing beneficial use; based on available information (references listed on Appendix F)

(7) P = Potential beneficial use; Based on available information (references listed on Appendix F), there is no known use of the basin for this category; however, the basin could be used for this purpose.

III. WATER QUALITY OBJECTIVES

(Insert on page III-8, delete existing Section.)

(In existing 1986 BP Table III-1, delete the objective of median <2.2/ for Municipal Supply groundwater and delete reference f. Insert <1.1 MPN/100 ml, <1 colony/100 ml, or absent/1/ -- Source: DHS; change Table III-2's title to read "SURFACE WATER QUALITY OBJECTIVES FOR MUNICIPAL AND AGRICULTURAL SUPPLY WATERS")

OBJECTIVES FOR GROUND WATER

Ground water objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Regional Water Board will establish basin- and/or site-specific numerical ground water objectives as necessary. For example, the Regional Water Board has ground water basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table III-3.

The maintenance of existing high quality of ground water (i.e., "background") is the primary ground water objective.

In addition, at a minimum, ground waters shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater.

Bacteria

In ground waters with a beneficial use of municipal and domestic supply , the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 MPN/100 mL, <1 colony/100mL, or absent as recommended by the State Department of Health Services.

Organic and Inorganic Chemical Constituents

All ground waters shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. Compliance with this objective will be determined in conjunction with the determination of existing and potential beneficial uses and by reference to criteria for chemical constituents developed by the U.S. Environmental Protection Agency (U.S. EPA), State Water Resources Control Board, State Department of Health Services, U.S. Food and Drug Administration, National Academy of Sciences, Cal/EPA Office of Environmental Health Hazard Assessment, U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control, and other appropriate organizations.

At a minimum, ground waters with a beneficial use of municipal and domestic supply shall not contain concentrations of chemical constituents in excess of the *maximum (MCL) or secondary maximum contaminant levels (SMCL)* based upon the most restrictive levels as specified in the California Code of Regulations (CCR) Title 22 , Division 4, Chapter 15 or 40 Code of Federal Regulations (CFR) Part 141.

Ground waters with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. Compliance with this objective will be determined by the Regional Water Board's reference to criteria developed by the Food and Agricultural Organization of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria".

Ground waters with a beneficial use of fresh water replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Ground waters with a beneficial use of industrial service supply or industrial process supply , shall not contain pollutant levels that impair current or potential industrial uses.

The Regional Water Board will refer to the Central Valley Regional Water Board's staff report, "A Compi-

lation of Water Quality Goals", for identifying the criteria and chemical concentrations described above. As these water quality goals are frequently revised and amended, this staff report is updated approximately every six months.

Radioactivity

Ground waters with a beneficial use of municipal and domestic supply shall not contain concentrations of radionuclides in excess of the maximum contaminant levels specified by the more restrictive of 22 CCR, Division 4, Chapter 15 or 40 CFR Part 141.

Taste and Odor

Ground waters with a beneficial use of municipal and domestic supply shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, concentrations shall not exceed adopted secondary maximum contaminant levels (i.e., the more restrictive of 22 CCR Div. 4, Chap. 15 or 40 CFR Part 141) for ground waters designated as municpal and domestic supply.

IV. IMPLEMENTATION

INTRODUCTION

(Delete first paragraph pg., IV-1 and replace with following)

The actions to protect the beneficial uses and water quality of the San Francisco Bay Basin are presented in this chapter under five categories: (1) point source control measures, (2) ground water protection and management, (3) nonpoint source control measures, (4) estuarine management, and (5) continued planning. The sum of these actions is a comprehensive water quality control program which is protective, yet flexible and aimed at achieving maximum efficiency and effect.

INDUSTRIAL WASTE DISCHARGES

(Delete third from last paragraph, pg. IV-26 and replace with following)

This section discusses industrial waste discharges to surface waters. Other industrial waste disposal practices are discussed in a later section titled "Hazardous and Nonhazardous Waste Disposal".

(Delete sections "Solid and Hazardous Waste", pgs. IV-27 through IV-30 and "Leaking Underground Tanks and Abandoned Sites", pg. IV-30, 31)

(Insert the following new section beginning on pg. IV-33)

GROUND WATER PROTECTION AND MANAGEMENT

Per Regional Water Board Resolution No. 89-39, almost all the Region's ground waters are considered to be existing or potential sources of drinking water. With limited resources, the Regional Water Board must concentrate its ground water protection and management efforts on the most important ground water basins. DWR has identified thirty-one individual ground water basins in the San Francisco Bay Region that serve, or could serve, as sources of high quality drinking water.

Increased demands on these ground water resources have become evident in the rapidly developing Bay Area. Years of drought and a decade of discoveries of ground water pollution have resulted in impacts or impairment to portions of these basins. Some municipal, domestic, industrial, and agricultural supply wells have been taken out of service due to the presence of pollution. Some of the basins have also been affected by over-pumping, resulting in land subsidence and salt water intrusion.

Such pressures on the ground water resource require that comprehensive environmental planning and management practices be developed and implemented for each individual basin by all concerned and affected parties. The Regional Water Board will foster this concept with the following ground water protection and management goals for the San Francisco Bay Region.

Program Goals:

1) *Identify and update beneficial uses and water quality objectives for each ground water basin*

   Water quality objectives must maintain the existing high quality of ground water and protect its beneficial uses. The Regional Water Board's program to identify and update objectives is described below under "Application of Water Quality Objectives".

2) *Regulate activities that impact or have the potential to impact the beneficial uses of ground waters of the Region.*

   Federal, State, and local ground water protection and remediation programs that will result in the overall maintenance or improvement of ground water quality must be implemented region-wide in a consistent manner. When a potential threat or problem is discovered, containment and cleanup efforts must be undertaken as quickly as possible to limit ground water pollution. Where activities that could affect the beneficial uses of ground water are not regulated by other Federal, State, or local programs, the Regional Water Board will

consider regulation depending upon the threat to beneficial uses and availability of Regional Water Board resources. The Regional Water Board's program for hazardous and nonhazardous waste disposal, shallow drainage wells, and cleanup of polluted sites is described below under "Regulation of Potential Pollution Sources".

3) *Prevent future impacts to the ground water resource through local and regional planning, management, and education.*

Ground water is an integral component of the hydrologic system of a watershed. A comprehensive watershed management approach is necessary to protect ground water resources. The Regional Water Board's program for broadening their information base on ground water resources and individual protection needs of basins is described below under "Ground Water Protection Program."

APPLICATION OF WATER QUALITY OBJECTIVES

Water quality objectives apply to all ground waters, rather than at a wellhead or at a point of consumption. The maintenance of the existing high quality of ground water (i.e., "background") is the primary objective. The primary objective defines the lowest concentration limit that the Regional Water Board requires for ground water protection. The Regional Water Board also has narrative and numeric water quality objectives for bacteria, chemical constituents, radioactivity, and taste and odor (see Chapter III). These objectives define the upper concentration limit that the Regional Water Board considers protective of beneficial uses. The lower and upper concentration limits define the range that the Regional Water Board considers for cleanup levels of polluted ground water. Establishment of cleanup levels are discussed below under "Cleanup of Polluted Sites".

Maximum Contaminant Levels (MCLs) or Secondary Maximum Contaminant Levels (SMCLs) are only acceptable as the upper end of a concentration range to protect the beneficial uses of municipal and domestic drinking water sources. MCLs and SMCLs are appropriate only at the upper end as they are set after technical feasibility and treatment costs are considered, leave no margin for future spills or possible changes in MCLs, and do not account for the combined risks present when many chemicals are present.

Ideally, the Regional Water Board would establish numerical ground water objectives for all constituents. However, the Regional Water Board is limited in its ability and resources to independently establish numerical objectives for ground water and will usually look to other appropriate agencies and organizations (e.g., State Water Board, U.S. EPA, California Department of Health Services, Cal/EPA's Office of Environmental Health Hazard Assessment, Cal/EPA's Department of Toxic Substances Control, etc.) to provide the numerical criteria for Regional Water Board consideration as ground water objectives. The Regional Water Board refers to the Central Valley Regional Water Board's staff report, "A Compilation of Water Quality Goals", to identify the numeric criteria from these agencies and organizations.

In practice, the Regional Water Board uses water quality objectives for ground water somewhat differently from those for surface water. For ground water, the Regional Water Board's emphasis is the regulation of sites where objectives are not being met, cleanup is required and/or under way and no further waste discharges will be allowed in the future. In contrast, surface water discharges regulated by the Regional Water Board are usually for on-going discharges regulated to meet water quality objectives in receiving waters.

In the typical situation, the Regional Board must identify and establish site- and basin-specific ground water beneficial uses and standards for the cleanup of ground water polluted by the numerous and extensive spills and leaks of toxic chemicals (e.g., organic solvents, fuels, metals, etc.).

Very few waste discharges to land are allowed by the Regional Water Board and those that are permitted (e.g., landfills, industrial waste disposal, above ground soil treatment, etc.) are closely regulated under the requirements of existing laws and regulations in order to maintain and protect ground water quality objectives. An additional category of discharges to land is the numerous individual domestic waste disposal systems (e.g., septic

systems) that are permitted and regulated by the counties. The Regional Water Board waives regulation based upon the fact that the counties' regulation of the systems complies with applicable Regional Water Board requirements.

Ground water objectives for individual basins may be developed in the future. As the Regional Water Board completes projects which provide more detailed delineation of beneficial uses within basins, revised objectives may be developed for portions of ground water basins that have unique protection needs. One such project is described below under "Ground Water Protection Programs".

REGULATION OF POTENTIAL POLLUTION SOURCES

(Insert new section "Shallow Drainage Wells" as adopted by the Regional Water Board on September 1992 and after approval by the State Water Board)

HAZARDOUS AND NONHAZARDOUS WASTE DISPOSAL

Discharges of solid, semisolid and liquid wastes to landfills, waste piles, surface impoundments, and land treatment facilities can create sources of pollution affecting the quality of waters of the state. Unlike discharges of waste that can be assimilated by the receiving waters, if the concentration of pollutants in the waste is regulated (i.e., treated waste water from municipal or industrial facilities), discharges of wastes to waste management units require long term containment or active treatment following the discharge in order to prevent waste or waste constituents from migrating to and impairing the beneficial uses of the State. Pollutants from such discharges may continue to affect water quality long after the discharger has stopped discharging new wastes at a site, either because of continued discharges from the site, or because pollutants from the site have accumulated in underlying soils from which they are reaching ground water.

Landfills for disposal of municipal or industrial solid waste (solid waste disposal sites) are the major categories of waste management units in the region, but there are also surface impoundments used for storage or evaporative treatment of liquid wastes, waste piles , and land treatment facilities where semi-solid sludge from wastewater treatment facilities and liquid wastes from refinery operations are discharged for biological treatment. The Regional Water Board issues waste discharge requirements to ensure that these discharges are properly contained to protect the Region's water resources from degradation, and to ensure that the dischargers undertake effective monitoring to verify continued compliance with requirements.

These discharges, and the waste management units at which the wastes are discharged are subject to concurrent regulation by other State and local agencies responsible for land use planning, solid waste management, and hazardous waste management. "Local Enforcement Agencies" implement the State's solid waste management laws and local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. The Department of Toxic Substance Control (DTSC) issues permits for all hazardous waste management treatment, storage, and disposal facilities (which include incinerators, tanks, and warehouses where hazardous wastes are stored in drums as well as landfills, waste piles and surface impoundments).

The State Water Board, Regional Water Boards, CIWMB, and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

The Regional Water Board regulates landfills receiving municipal solid wastes and facilities receiving industrial wastes of various types. These sites are closely regulated and monitored; however, some water quality problems have been detected and are being addressed. As a result of federal laws in the area of hazardous waste regulation, more effort is devoted to regulation of the on-site disposaltreatment, storage, and disposal of hazardous waste. These are discharges that are operated by entities that generate the waste and where only wastes generated by the entities are disposed.

The laws and regulations governing the

discharges of both hazardous and nonhazardous solid wastes have been revised and strengthened in the last few years. Implementation of the following programs is described below: California Code of Regulations (CCR) Title 23, Chapter 15; RCRA; Toxics Pits Cleanup Act; and Solid Waste Assessment Tests. The Regional Water Board's policies on two significant areas of regulatory concern with respect to landfills – Landfill Expansions and Bayfront Landfill Expansion Into Wetlands – are also included below.

CCR Title 23, Chapter 15

The most significant regulation used by the Regional Water Board in regulating hazardous and nonhazardous waste treatment, storage, and disposal is CCR Title 23, Division 3, Chapter 15, formerly Subchapter 15. These regulations include very specific siting, construction, monitoring and closure requirements for all existing and new waste treatment, storage, and disposal facilities. Chapter 15 also contains a provision requiring operators to provide assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from their waste management units. Detailed technical criteria are provided for establishing water quality protection standards, monitoring programs, and corrective action programs for releases from waste management units. Chapter 15 requires the review and update of waste discharge requirements for all hazardous waste treatment, storage, and disposal sites by January 1, 1993 and for all nonhazardous waste treatment, storage, and disposal sites by July 1, 1994.

Chapter 15 defines waste types to include hazardous wastes, designated wastes nonhazardous solid wastes, and inert waste. Hazardous wastes are defined by DTSC in CCR Title 22. Designated wastes are defined as:

1) those non-hazardous wastes that consist of or contain pollutants which under ambient conditions at the waste management unit could be released at concentrations in excess of water quality objectives, or

2) hazardous wastes pursuant to CCR Title 22, which are not considered hazardous by the Federal RCRA definition, that have been granted a variance from hazardous waste management requirements by DTSC.

Finally, nonhazardous solid wastes are those normally associated with domestic and commercial activities. Nonhazardous solid wastes and inert wastes can be regulated by the Regional Water Board if necessary to protect water quality.

The regulation of nonhazardous solid waste facilities (Class III) has been on-going by the Regional Water Board since the mid-1970's, and in some instances may extend to the early 1950's. Many of the small, older facilities have closed, and waste is now being disposed at large regional nonhazardous solid waste facilities. The Regional Water Board's main actions at nonhazardous solid waste facilities are the review and revision of waste discharge requirements for the active sites to assure consistency with the current regulations. These actions include defining the levels of designated wastes (see below), the upgrading of ground water monitoring systems to identify if water quality protection standards are violated, the establishment of corrective action programs where standards are violated, and review and oversight of the development and implementation of facility closure plans.

A significant task in implementing Chapter 15 by the Regional Water Board at nonhazardous solid waste facilities is defining designated wastes. Many wastes which are not hazardous still contain constituents of water quality concern that could become soluble in a nonhazardous solid waste facility and produce leachates and gases that could pose a threat to beneficial uses of state waters.

The criteria for determining whether a nonhazardous waste is a designated waste are based on water quality objectives in the vicinity of the site, the containment features of the solid waste facility, and the solubility/mobility of the waste constituents. Therefore, all owners and operators of active nonhazardous municipal solid waste facilities in the San Francisco Bay Region who wish to receive wastes other than municipal solid waste or inert wastes must propose waste constituent concentration criteria above which wastes will be considered designated waste and therefore, not suitable for disposal at their site. Such proposals are subject to approval by the Executive Officer when appropriately delegated by the Regional Water Board. *The Regional Water Board will refer to the Central Valley Regional Water Board's staff report, "Designated Level Methodology for*

Waste Classification and Cleanup Level Determination", or an equivalent methodology acceptable to the Executive Officer to assist in identifying designated waste criteria.

Resource Conservation and Recovery Act

The State implements RCRA's Subtitle C - Hazardous Waste Regulations for Treatment, Storage, and Disposal - through DTSC and the Regional Water Boards. In August 1992, the U.S. EPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in CCR Title 23, Chapter 15. CCR Title 23, Chapter 15 monitoring requirements were also amended in 1991 so as to be equivalent to RCRA requirements. These will be implemented through the adoption of waste discharge requirements for hazardous waste sites covered by RCRA. The discharge requirements will then become part of a State RCRA permit issued by DTSC.

Federal regulations required by the RCRA's Subtitle D have been adopted for municipal solid waste landfills (40 CFR 257 & 258). These regulations are self-implementing, with portions effective October 1991, October 1993 and later. The CIWMB is the State lead agency for Subtitle D implementation. The State Water Board and the CIWMB are applying to EPA for State program approval. It is important to note that certain federal regulatory requirements will be effective unless and until the State program is approved.

Delegation of authority for the State Water Board to implement Subtitle I (Underground Storage Tanks) will occur after U.S. EPA approves the State's program approval application.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system, or dried out by July 1, 1988, and subsequently closed to remove all contaminants or contain any residual contamination. In 1985, there were 26 sites in the Region with ponds subject to TPCA. As of 1992, one site is continuing to operate its facility following upgrading to meet TPCA requirements. he remaining sites 19 have closed and the remainder have been delayed in closure either by complications in the federal/DTSC RCRA closure process, or by the Board's decision to grant a time extension to delay closure to allow for gradual removal and reuse of materials in the ponds. All these sites are expected to close by 1995.

Solid Waste Assessment Tests

Section 13273 added to the Water Code in 1985, requires all owners of both active and inactive nonhazardous landfills to complete a Solid Waste Assessment Test (SWAT) to determine if hazardous wastes have migrated from the landfill. There were 175 sites identified in the Region subject to this program. Pursuant to a list adopted by the State Water Board, 150 site owners state-wide per year would complete this evaluation by 2001. However, due to elimination of program funding in 1991, SWAT reports currently are reviewed only for sites under regulation due to other Regional Water Board programs, thus, significantly delaying completion of the program. All sites eventually will be required to complete a SWAT and more sites will be reviewed if more program funding becomes available as is expected.

Landfill Expansions

The steady increase in the rate of solid waste generation in the Region has resulted in the filling and need for closure of existing disposal sites, and created needs for the expansion of existing sites and the creation of new ones. The Regional Water Board strongly discourages the location of new landfills or the expansion of existing facilities in sensitive ground water areas. To minimize the problems associated with the disposal of solid wastes, this Regional Water Board supports the vigorous implementation of the requirement for 50 percent reduction in the total quantity of waste disposal by the year 2000 as called for in AB 939. Designated wastes should be precluded from Class III landfills through local checking programs, recycling, and diversion. To reduce the potential for household hazardous wastes entering municipal landfills, this Regional Water Board supports local programs for public education and for household hazardous waste disposal and recycling.

Bayfront Landfill Expansions Into Wetlands

A significant issue that the Regional Water Board has addressed in a few cases and may be asked to address for other sites is the expansion of existing bayfront landfills into wetland areas. The Regional Water Board, in a few cases, allowed modest expansions (and undesirable loss of wetlands) to allow local government time to develop other disposal options. However, both expansions were only approved because there was a demonstrated immediate public need. The State Water Board, in a decision on an appeal of one of the expansions, clearly indicated that such future expansions into wetlands would not be given the same approvals and that local governments must complete the necessary planning to avoid this problem. Given that position and the wetlands provisions contained elsewhere in this Plan, the Regional Water Board will not approve further expansions of bayfront landfills into wetlands.

CLEANUP OF POLLUTED SITES

The Regional Water Board has identified over 5,400 sites with confirmed releases of constituents of concern which have polluted or threaten to pollute ground water. Sources of pollution at these sites include: leaking underground storage tanks and sumps, leaking above ground tanks, leaking pipelines, surface spills from chemical handling, transfer or storage, poor housekeeping, and illegal disposal.

The Regional Water Board's strategy for managing polluted sites is discussed below under the following five sections:

1) Program areas

2) Requirements for site investigation and remediation,

3) Progress of the board's program

4) Setting cleanup levels

5) Future regulatory management strategies

Several important Regional Water Board policies are detailed in these five sections. The following list summarizes these policies and indicates the section where they are explained:

- The Regional Water Board will follow procedures and policies in State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code 13304", regardless of the type of discharge. (Section 2)

- The Regional Water Board will consider modifying site-specific ground water cleanup requirements only when a final remedial action plan is fully implemented, aggressively pursued, and a set of specific conditions are met. (Section 3)

- Ground water and soil cleanup levels are approved by the Regional Water Board. The Executive Officer or a local agency may approve cleanup levels as appropriately established by the Regional Water Board. (Section 4)

- Ground water cleanup levels are established based on beneficial uses of the waterbody and water quality objectives outlined in Chapter III. The concentration range for cleanup levels is high quality "background" or between "background" and the more restrictive of Maximum or Secondary Maximum Contaminant Levels for ground waters with a beneficial use of municipal and domestic supply. These MCLs or SMCLs will only be considered worst case, upper concentration limits as they may not provide adequate public health protection in the instance of exposure to multiple chemicals.(Section 4)

- The Regional Water Board will use risk management techniques to consider establishment of cleanup levels above background and at or below MCLs or SMCLs for ground waters with beneficial uses of municipal and domestic supply. (Section 4)

- Compliance with ground water cleanup levels must occur throughout the pollutant plume. Alternate points of compliance may be considered under a specified set of conditions. (Section 4)

- Soil cleanup levels should be to background. Where soil cleanup levels remain above background, soil cleanup levels are established based upon acceptable health

risks, if appropriate, and to ensure that any leachate generated would not cause ground or surface water to exceed applicable water quality objectives. Minimal dilution may be considered. (Section 4)

- Verification of soil cleanup generally requires follow up ground water monitoring. (Section 4)

- The Regional Water Board will review and seek input on its overall approach to managing site cleanups. (Section 5)

1) PROGRAM AREAS

Sites with identified pollution problems are managed through five program areas. Significant implementation issues in each of the following program areas are discussed below:

a. Underground Storage Tank (UST) Program (>5,000 sites)

b. Spills, Leaks, Investigation and Cleanup (SLIC) Program (>400 sites)

c. Department of Defense/Department of Energy Program (15 sites)

d. U.S. EPA Superfund Program (30 sites)

e. Aboveground Petroleum Storage Tank Program (approx. 200 sites)

a. Underground Storage Tank Program

Implementation of the Underground Storage Tank (UST) Program is unique, as the Health and Safety Code gives local agencies the authority to oversee investigation and cleanup of UST leak sites. The Corrective Action regulations (CCR, Title 23, Chapter 16, Article 11) use the term "regulatory agency" in recognition of the fact that local agencies have the option to oversee site investigation and cleanup, in addition to their statutory mandate to oversee leak reporting and tank closure.

Several local agencies now have the authority to act on the Regional Water Board's behalf in requiring investigations and cleanup. The Regional Water Board still retains the authority to approve case closure. However, the Regional Water Board has authorized a few local agencies to close fuel leak cases where ground water has not been polluted and future ground water impacts are not expected.

Some local agencies also provide oversight for underground fuel storage tank cases under a Local Oversight Program (LOP) contract with the State Water Board. All oversight charges are billed to responsible parties. Additionally, a few other local agencies have funded their own (non-LOP) oversight programs and have developed guidance documents based upon State and Regional Water Board guidance. Table IV-9 provides a brief summary of these agencies programs.

There are several reference documents pertinent to releases from underground storage tanks as described below.

- State regulations regarding underground tank construction, monitoring, repair, release reporting, and corrective action are contained within CCR Title 23, Chapter 16.

- Specific recommendations regarding Chapter 16 soil and ground water investigations are contained in "Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites", written by the staffs of the North Coast, Central Valley, and San Francisco Bay Regional Water Boards. This document is commonly referred to as the "Tri-Regional Guidelines." The primary purpose of the document is to provide uniform procedures for performing investigations. It describes a systematic approach for determining which actions are required, including soil cleanup only or when a more comprehensive soil/ground water investigation is required.

- The State Water Board issued the "Leaking Underground Fuel Tank (LUFT) Field Manual" as a tool for conducting site investigations and cleanup at fuel leak sites. It is being revised to incorporate the corrective action regulations, which became effective December 2, 1991, and to provide general guidance on the use of models and risk appraisal.

- Other local agency reference documents are listed on Table IV-9.

Table IV - 9. Summary of Local Agency UST Programs (as of April 1992)[g]

Jurisdiction/Agency	Program Start Date	Staff	Cases	Comments
ALAMEDA COUNTY				
County Health Department	10/91	7.5	392	d,e
Alameda County Water District (Fremont, Union City, Newark)	1/89	4	330	a,c,e
CONTRA COSTA COUNTY				
County Health Services Department	1988	7	>270	c,e
MARIN COUNTY				
City of San Rafael	2/90	1	98	c,f
NAPA COUNTY				
Department of Environmental Management	5/89	2.3	152	a,e
SAN FRANCISCO COUNTY				
County Public Health Department	6/91	3	90	c
SAN MATEO COUNTY				
County Department of Health Services	1988	5	600	b
SANTA CLARA COUNTY				
Santa Clara Valley Water District	3/87	13	1134	a,b,d,e
SOLANO COUNTY				
County Health Department	1/92	1	30	c
SONOMA COUNTY				
County Health Department	4/88	8.75	360	a,e,d

Comments:

a. Guidance Document is available, contact agency.
b. Agency may close soil only pollution cases without review by RWQCB.
c. Program is self-funded; agency does not have LOP contract with State Board
d. Program is both self-funded and funded through an LOP contract
e. Agency oversees other related activities including one or more of the following: tank and pipe line inspections, well permitting and inspection, Hazardous Materials Management Plan review, and ground water protection program oversight.
f. The City of San Rafael contracts out some of their inspection and oversight work to private consulting firms. Responsible parties are billed for oversight costs.
g. For more up-to-date or detailed information, please contact the local agency directly.

b. Spills, Leaks, Investigation, and Cleanup Program (SLIC)

Sites that are managed within the SLIC program include sites with pollution from recent or historic surface spills, subsurface releases (e.g. pipelines, sumps, etc.), complaint investigations, and all other unauthorized discharges that pollute or threaten to pollute surface or ground water. There is some overlap with the UST program as many SLIC cases also have leaking underground tanks. Alternatively, some cases that involve both leaking solvent tanks and other pollution sources may end up in the UST program.

Many historic spill cases were identified by the early 1980's survey conducted by the Regional Water Board. New spills are identified in a variety of ways including: discharger reports, complaints to the Regional Water Board's field investigation team, the Regional Water Board's own surveillance, proposed property transfer reports, and local agency reports. Initial response to spill incidents is generally handled by the Regional Water Board's Field Investigation Team. The case is then screened, with notices sent as appropriate under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Subsequent to the "control" of the spill, the case is transferred to SLIC program staff. High priority cases are assigned for follow up by the SLIC program as staffing permits.

Investigation, remediation, and cleanup at SLIC sites proceeds under procedures outlined in State Water Board Resolution No. 92-49 and is discussed in Section 2 below.

c. Department of Defense and Department of Energy Program

The goal of this program is cleanup of pollution at federal military sites (Department of Defense - DoD) and federal energy agency sites (Department of Energy - DoE).

Investigation and cleanup at these sites must meet the requirements of the U.S. EPA "Superfund" hazardous waste cleanup program. This involves completion of the formal Preliminary Assessment, Site Investigation, Remedial Investigation and Feasibility Study leading to a Record of Decision on an acceptable Remedial Action Plan.

The State has signed agreements with the Department of Defense (Defense- State Memorandum of Agreement - DSMOA) and Department of Energy (Agreement in Principle) establishing procedures under which site investigation and cleanup will proceed, decisions made, and disputes resolved. Regional and State Water Board staff oversight costs are fully or partially reimbursed by various cost recovery mechanisms. At DoE sites, reimbursement is currently limited to tasks related to review of monitoring data and monitoring system adequacy to characterize sites and determine effectiveness of remedial actions. The potential exists to increase the scope of eligible reimbursement activities in the future.

The DoD program includes closing bases that are subsequently to be made available, to the extent possible, for sale or lease to private or public parties. There is considerable State and federal interest in moving parcels into economically productive uses, in part, to offset the negative economic impact of the base closures on the local community. Special care will be required to assure that such transfers are done in a manner consistent with protection of water quality, public health, and the environment.

d. U.S. EPA Superfund Program

In April 1988, the State and Regional Water Boards received a U.S. EPA grant for coordinating and enforcing ground water cleanup at Federal Superfund sites in the South Bay. The grant is known as the "South Bay Multi-Site Cooperative Agreement" (MSCA). The primary goals of MSCA are:

- To accelerate cleanup of polluted ground water at Superfund sites in the South Bay.
- To augment the Regional Water Board's existing programs to ensure that U.S. EPA's requirements, as defined in the National Contingency Plan, are met for those sites on the National Priority List (Superfund) assigned to the Regional Water Board as lead agency.
- To finance Regional Water Board staff support on U.S. EPA-lead Superfund sites to assure cleanup decisions meet state requirements.

At most of the 30 MSCA sites, the toxics threats and risks are either under short-term control

(awaiting long-term solutions) or the responsible parties have constructed and/or implemented long-term remediation projects. At the remaining sites, the Regional Water Board is requiring completion of Remedial Investigation/Feasibility studies and proposed Remedial Action Plans (RAPs). After public review and comments on these studies and plans, the Regional Water Board will adopt the RAPs in individual Site Cleanup Orders. When U.S. EPA approves of the Regional Water Board's actions, they will administratively adopt a Record of Decision.

e. Aboveground Petroleum Storage Act

The State's Aboveground Petroleum Storage Act was enacted in 1989 and amended in 1991. The Act became effective on January 1, 1990.

The purpose of this Act is to protect the public and the environment from the serious threat of spillage of millions of gallons of petroleum-derived chemicals stored in thousands of aboveground storage tanks. The Act requires that the Regional Water Board inspect aboveground petroleum storage tanks used for crude oil and its fractions, for compliance with their federally required Spill Prevention, Control and Countermeasure Plan. In the event that a release occurs that threatens surface or ground water, the Act allows the State to recover reasonable costs incurred in the oversight and regulation of the cleanup.

"Storage Statements" are required from the facilities describing the nature and size of their tanks. Filing fees are required which are intended to fund inspections, training and research. There are approximately 200 facilities within the Region that have filed their Storage Statements.

2) REQUIREMENTS FOR SITE INVESTIGATION AND REMEDIATION

The State Water Board adopted State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation, Cleanup and Abatement of Discharges Under Water Code Section 13304." This Resolution contains the policies and procedures that all Regional Water Boards shall follow for the oversight and regulation of investigations and cleanup and abatement activities resulting from all types of discharge or threat of discharge subject to Section 13304 of the Water Code. Therefore, the five program areas within the Regional Water Board, listed above (UST, AGT, SLIC, etc.), now follow the same policies and procedures outlined in Resolution No. 92-49 for determining:

- when an investigation is required;
- scope of phased investigations necessary to define the nature and extent of contamination or pollution;
- cost-effective procedures to detect, clean up or abate contamination; and,
- reasonable schedules for investigation cleanup, abatement, or any other remedial action at a site.

State Water Board Resolution No. 92-49 outlines the five basic elements of a site investigation. Any or all elements of an investigation may proceed concurrently, rather than sequentially, in order to expedite cleanup and abatement of a discharge, provided that the overall cleanup goals and abatement are not compromised. State Water Board Resolution No. 92-49 investigation components are as follows:

a. Preliminary site assessment to confirm the discharge and identity of dischargers; to identify affected or threatened waters of the state and their beneficial uses; and to develop preliminary information of the nature, and horizontal and vertical extent, of the discharge;

b. Soil and water investigation to determine the source, nature and extent of the discharge with sufficient detail to provide the basis for decisions regarding subsequent cleanup and abatement actions, if any are determined by the Regional Water Board to be necessary;

c. Proposal and selection of cleanup action to evaluate feasible and effective cleanup and abatement actions, and to develop preferred cleanup and abatement alternatives;

d. Implementation of cleanup action to implement the selected alternative and to monitor in order to verify progress; and

e. Monitoring to confirm short- and long-term effectiveness of cleanup and abatement.

State Water Board Resolution No. 92-49 requires that the Regional Water Board ensure that the discharger is aware of and considers minimum cleanup and abatement methods. The minimum methods that the discharger should be aware of and consider, to the extent that they may be applicable to the discharge or threat thereof, are:

a. Source removal and/or isolation;

b. In-place treatment of soil or water including bioremediation, aeration, and fixation;

c. Excavation or extraction of soil, water or gas for onsite or off-site treatment techniques including: bioremediation; thermal destruction; aeration; sorption; precipitation, flocculation, and sedimentation; filtration; fixation; and evaporation; and,

d. Excavation or extraction of soil, water or gas for appropriate recycling, re-use, or disposal.

3) PROGRESS OF THE REGIONAL WATER BOARD'S PROGRAM

The Regional Water Board has over 10 years of experience in the cleanup of polluted sites. The following findings are drawn from this regulatory experience:

Investigation

- A complete on- and off-site investigation of soil and ground water to determine full horizontal and vertical extent of pollution is necessary to ensure that adequate cleanup plans are proposed.

Remediation

- Immediate removal of the source, to the extent practicable, is required to prevent further spread of pollution as well as being among the most cost-effective remediation actions.
- Pump and treat ground water remediation, in some instances, is effective in hydraulically containing pollution and removing pollutants.
- Vacuum extraction of pollutants in the vadose zone can be a cost-effective method to remove pollution sources.
- Bioremediation of petroleum pollution can be a cost-effective soil and ground water treatment alternative.

Limits of Existing Technology

- Available options for removing or treating *in-situ* polluted ground water are limited.
- Recent research, much of which is being confirmed at sites within the Region, demonstrates that using pump and treat technology removes and controls pollutant mass migration. However, pump and treat technology is not adequate technology, in some situations, to meet low concentration ground water objectives because the costs and time-frames may be prohibitive.
- Ground water pollution cleanup is lengthy and requires significant resources of both the discharger and the regulator.

4) SETTING CLEANUP LEVELS

The Regional Water Board approves soil and ground water cleanup levels for polluted sites. State Water Board Resolution No. 92-49 requires conformance with the provisions of State Water Board Resolution No. 68-16 and applicable provisions of Title 23, Chapter 15, to the extent feasible.

State Water Board Resolution No. 92-49 directs the Regional Water Board to ensure that dischargers are required to cleanup and abate the effect of discharges. This cleanup and abatement shall be done in a manner that promotes attainment of background water quality, or the highest water quality which is reasonable if background levels of water quality cannot be restored. The determination of what is reasonable shall consider all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible, and intangible. Any alternative cleanup levels less stringent than background shall:

a. be consistent with maximum benefit to the people of the state;

b. not unreasonably affect present and anticipated beneficial uses of such water; and,

c. not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.

Ground Water Cleanup Levels

The overall cleanup level established for a waterbody is based upon the most sensitive beneficial use identified. In all cases, the Regional Water Board first considers high quality or naturally occurring "background" concentration objectives as the cleanup levels for polluted ground water and the factors listed above under "Setting Cleanup Levels". For ground waters with a beneficial use of municipal and domestic supply, cleanup levels are set no higher than:

- Maximum Contaminant Levels (MCLs) or adopted Secondary Maximum Contaminant Levels, whichever is more restrictive, *or*

- A more stringent level (i.e., below MCLs) based upon a site specific risk assessment. Cleanup levels must be set to maintain the excess upperbound lifetime cancer risk to an individual less than 1 in 10,000 (10^{-4}) or a cumulative toxicological effect as measured by the Hazard Index of less than one. For all sites performing risk assessments, an alternative with an excess cancer risk 1 in 1,000,000 (10^{-6}) or less must also be considered.

The Regional Water Board determines excess cancer risks and the Hazard Index following the U.S. EPA procedures (U.S. EPA's "Risk Assessment Guidance for Superfund", Volume I, Parts A, B, C, and Supplemental Guidance, 1989, or as updated). Occasionally, the Regional Water Board may modify the U.S. EPA's approach outlined in these publications based on Cal/EPA's Office of Environmental Health Hazard Assessment guidelines or more current site- or pollutant-specific information.

Ground water cleanup levels are approved on a case-by-case basis by the Regional Water Board. The Executive Officer or a local agency may approve cleanup levels as appropriately established by the Regional Water Board. Proposed final cleanup levels are based on a discharger developed feasibility study of cleanup alternatives that compares effectiveness, cost, time to achieve cleanup standards, and a risk assessment to determine impacts on beneficial uses, human health and the environment. Cleanup levels must also take into account the mobility, toxicity, and volume of pollutants. Feasibility studies of cleanup alternatives may include the guidance provided by Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300); Section 25356.1(c) of the California Health and Safety Code; U.S. EPA's Comprehensive Environmental Response, Compensation, and Liability Act; the State Water Board's Resolutions Nos. 68-16 and 92-49; and the Regional Water Board's Resolution No. 88-160.

Soil Cleanup Levels

Soil pollution can present a health risk and a threat to water quality. The Regional Water Board sets soil cleanup levels for the unsaturated zone based upon threat to water quality. Guidance from the U.S. EPA, Department of Toxics Substances Control, and Cal/EPA's Office of Health Hazard Assessment is also considered on health risks. In addition, if it is unreasonable to cleanup soils to background concentration levels, the Regional Water Board may:

- allow residual pollutants to remain in soil at concentrations such that:

  a) any leachate generated would not cause ground water to exceed applicable ground water quality objectives , *and*

  b) health risks from surface or subsurface exposure are within acceptable guidelines .

- require follow up ground water monitoring to verify that ground water is not polluted by chemicals remaining in the soil. Follow up ground water monitoring may not be required where residual soil pollutants are not expected to impact ground water.

- require measures to ensure that soils with residual pollutants are covered and managed to minimize pollution of surface waters and/or exposure to the public.

- where significant amount of wastes remain onsite, implement Chapter 15 to the extent applicable. This may include, but is not be limited to, subsurface barriers, pollutant immobilization, toxicity reduction, financial assurances.

In order for a discharger to make site specific recommendations for soil cleanup levels above background, the fate and transport of leachate can be modeled by the discharger utilizing site specific factors and appropriate models. Reasonable assumptions for minimal leachate dilution, as proposed by the discharger, may be considered by the Regional Water Board.

Cleanup levels are approved by the Regional Water Board. The Executive Officer or a local agency may approve cleanup levels as established by the Regional Water Board. Due to the tremendous number of sites with soil pollution, the Regional Water Board has considered developing "generic" cleanup levels for common soil pollutants. However, given the extreme variability of hydrogeologic conditions in the Region, the Regional Water Board is presently unable to recommend levels that would be protective of ground water at every site. One exception to this is cleanup standards for volatile organic chemicals (VOCs) and semi-volatile organic chemicals.

Several Regional Water Board Orders, adopted primarily for Superfund sites, include cleanup standards of 1 mg/kg (ppm) for total VOCs and 10 ppm for semi-volatiles (as defined by Methods 8240 and 8270, respectively). This standard applies to unsaturated soils only, and is based on the modeling results at a Superfund site in the Region, the existence of similar standards in the state of New Jersey, and the professional judgement of Regional Water Board staff. As this is a cleanup standard for total VOCs, levels for individual constituents are generally significantly lower than 1 ppm. At this time the Regional Water Board finds that this is an appropriate cleanup level for total VOCs in the unsaturated zone at sites where ground water is being monitored and where cleanup to background is unreasonable. This level can be appropriately modified by the Executive Officer if a discharger is able to demonstrate, with site-specific data, that higher levels of VOCs in the soil will not threaten the quality of waters of the State and that human health and the environment are protected.

A common misconception is that the Regional Water Board has developed "generic" cleanup levels for petroleum hydrocarbons (gasoline, gasoline by- products, and diesel). One source of the misconception is a misreading of "Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites", written by the staff of the North Coast, Central Valley, and San Francisco Bay Regional Water Boards. This document is commonly referred to as the "Tri-Regional Guidelines". The Guidelines use 100 ppm Total Petroleum Hydrocarbons in soil *as one screening tool for prioritization*. The 100 ppm level is not a "generic" cleanup level.

Modification of Ground Water Cleanup Levels

As a result of the findings regarding limits of existing technology, described above under "Progress of Regional Water Board's Program", the Regional Water Board may consider modifying points of compliance and/or established ground water cleanup standards under the conditions below.

In general, compliance with approved cleanup levels must occur at all points within the plume of pollutants unless defined otherwise by specific regulatory programs. Alternative compliance points may be considered where:

a. The ground water is in low-yielding, fine-grained sediments (silts and clays) and the discharger has demonstrated that no significant pollutant migration will occur to underlying or adjacent aquifers; ***and***

b. Adequate source removal and/or isolation is undertaken to limit future migration of chemicals to ground water; ***and***

c. Alternative or best available technologies are inappropriate or not cost-effective; ***and***

d. An acceptable plan is submitted for containing and managing the remaining risks posed by residual ground water pollution. This plan could include institutional controls (deed restrictions; site operation, maintenance, health and safety plans; utility workers notice; etc.) and a commitment to mitigating measures such as participation in a regional ground water monitoring or protection program.

The Regional Water Board may consider modifying established ground water cleanup standards based on documentation of the following:

a. An aggressive cleanup program has been fully implemented and operated for a period of time which is adequate to understand both the hydrogeology of the site and pollutant dynamics; *and*

b. Ground water pollutant concentrations have reached an asymptotic level using appropriate technology; *and*

c. Alternative or best available technologies are inappropriate or not cost-effective; *and*

d. An acceptable plan is submitted for containing and managing the remaining risks posed by residual ground water pollution. This plan could include institutional controls (deed restrictions; site operation, maintenance, health and safety plans; utility workers notice, etc.) and a commitment to mitigating measures such as participation in a regional ground water monitoring or protection program.

The Regional Water Board has not yet approved alternative points of compliance or considered amending previously adopted ground water cleanup standards at sites meeting the above conditions. However, the Regional Water Board expects to consider such sites in the near future and intends to develop policies and/or procedures on how to modify site cleanup levels and points of compliance adopted in Regional Water Board Orders.

5) FUTURE REGULATORY MANAGEMENT STRATEGIES

The following findings are drawn from the Board's current regulatory experience:

- Risk assessment and management techniques can provide the Regional Water Board with a quantitative estimate of risks to assist in decision-making.

- An inflexible, resource-intensive approach is not the most cost effective, considering the multitude of existing and potential sources of ground water pollution requiring cleanup.

- Institutional controls, such as deed restrictions, are an additional mechanism to provide protection of beneficial uses and public health and safety. Guidance from the U.S. EPA and Department of Toxics Substances Control is considered in setting institutional controls.

As a result of these findings regarding regulatory management strategy, the Regional Water Board will also review its overall approach to managing site cleanups. Table IV-10 lists options that the Regional Water Board plans to consider. Additional input regarding these and other options will be sought from all interested and affected parties during the Triennial Review of the Basin Plan.

GROUND WATER PROTECTION PROGRAMS

The intimate ties between the land, surface water, ground water, the estuary, and human activity must be acknowledged in order to promote wise, balanced, and sustainable use of water resources. In this regard, emphasis on planning and management is encouraged by supplying tools and information that will provide an integrated environmental management approach to problem-solving. It also must be recognized that ground water quality and quantity are inextricably linked. Because an informed and involved citizenry is crucial to realizing ground water protection, policies and plans should encourage and promote research, education, and public involvement as an integral part of any protection program.

Local water, fire, planning and health departments are actively involved with their own ground water protection programs. These programs include: salt water intrusion and land subsidence control, wellhead protection, ground water recharge area preservation, hazardous materials storage and management ordinances, Local Oversight Programs and non-Local Oversight Programs for cleanup of leaking underground fuel tanks, potential conduit well destruction, and well permitting and inspection. For some agencies, maintaining funding for protection programs is an ongoing challenge. Through three specific projects, the Regional Water Board is evaluating the ground water protection needs in specific basins, and thus will provide additional support for local agency efforts. These projects are described below.

Table IV-10.
OPTIONS FOR FUTURE MANAGEMENT STRATEGIES OF GROUND WATER CLEANUP SITES

CONTINUE EXISTING APPROACH:

Develop site specific cleanup levels utilizing Resolutions No. 68-16 and No. 92-49, MCLs, and risk assessment.

ADOPT MORE STRINGENT APPROACH:

Require cleanup levels based exclusively on background or a stringent risk management requirement (e.g., 10^{-6} excess cancer, etc.)

STREAMLINE EXISTING PROGRAM:

Adopt basin plan amendments or a general Regional Water Board Order with a standardized process for dischargers to identify investigation, remediation, and clean-up level requirements.

Develop a decision process whereby individual site and pollution information could be used to determine specific cleanup levels.

Develop cleanup levels and policies for individual ground water basins or sub-basins based on designated beneficial uses.

Establish procedures to change cleanup standards, including long-term monitoring and hydraulic controls, when the Regional Water Board concurs that existing cleanup technology is no longer operating efficiently or will not meet cleanup standards.

Improve access to geographical information system-based databases to assist in identifying critical ground water resources.

DEVELOP AND IMPLEMENT REGIONAL OR SUB-REGIONAL MITIGATION PROGRAMS:

Identify conditions under which measures to mitigate the effect of pollution above prescribed cleanup levels should be considered by dischargers.

Identify potential mitigation alternatives such as regional ground water programs in individual basins that will have a net benefit of protecting ground waters.

GROUND WATER RESOURCE STUDY

A basin-wide approach for implementing and prioritizing ground water cleanup was recommended in a series of reports titled "San Francisco Bay Region Ground Water Resource Study" (1987). The reports were a cooperative effort by the Regional Water Board, the University of California, Berkeley, School of Public Health, and Department of Landscape Architecture. The 10 volume series covered eight high priority ground water basins: Niles Cone, Livermore and Sunol Valley, Ygnacio/Pittsburg/Clayton/San Ramon Basins, Suisun/Fairfield Basin, Napa Valley, Sonoma Valley, and San Mateo Basin.

Information regarding well location, construction, areal geology, permeability, and depth to ground water, land use characteristics, and location of pollution sources were compiled into a relational data base. A methodology was developed which weighs site sensitivity and pollution severity factors. The resultant maps from the project illustrate the regional sensitivity of the above ground water basins to ground water pollution.

Several of the policy options listed on Table IV-10 under "Streamline Existing Program" could be addressed by utilizing the results of this planning program. In particular, the Regional Water Board will investigate the use of existing data and maps produced by the program, as well as other geographic information system-generated maps, as site screening tools to rank polluted sites and to assist in site-specific review of cleanup levels.

INTEGRATED ENVIRONMENTAL MANAGEMENT PROJECT

In 1987 the U.S. EPA completed the "Integrated Environmental Management Plan" (IEMP). This innovative study conducted in Santa Clara County sought to improve public health and environmental protection by integrating approaches for hazardous material management for land, air, and water. The IEMP's Drinking Water Subcommittee developed recommendations for addressing "how clean is clean". The committee wrote "....because contamination and cleanup impacts vary significantly in different sites and different hydrogeologic zones, the Regional Water Board should continue to develop and standardize a process for cleanup decision-making, rather than establish across-the-board

clean-up levels." This recommendation ties in with the policy options listed on Table IV-10 under "Streamline Existing Programs".

STATE WATER BOARD GROUND WATER PROTECTION PLANNING CONTRACT

At the Regional Water Board's request, the State Water Board is funding a contract with the University of California at Berkeley for development of a regional ground water protection plan. The project focuses on the most utilized, high resource value basins: Santa Clara Valley, Niles Cone, Livermore Valley, San Mateo Plain, and Half Moon Bay Terrace (Table II-4). The vulnerability to pollution of each of the basins will be determined from the U.S. EPA's DRASTIC Index Method (U.S. EPA Project No. 600/2-87-035, April 1987) on a computer based geographic information system.

An important component of the project will be the evaluation of present land and water use conditions as well as those planned for 2005 and a long-term buildout (e.g., 2025). Working closely with local agencies, comprehensive protection plans will be recommended that can mitigate or minimize future resource impacts. These plans may include revised water quality objectives for basin or subbasins that have differing protection needs. Developing basin specific objectives is one policy option listed on Table IV-10 under "Streamline Existing Program". A final regional ground water protection plan will be incorporated into the Basin Plan at a future date.

APPENDIX F

Final Adopted by RWQCB October 21, 1991

APPENDIX F

The following references are cited in Tables II-3 and Tables II-4.

a. Alameda County Water District Staff, 1992, Personal Communication.

b. Alameda County Flood Control and Water Conservation District, 1988, Geohydrology and Groundwater Quality Overview, East Bay Plain Area, 205(j) Report.

c. California Department of Water Resources, 1991, Groundwater Storage Capacity of the Alameda Bay Plain, Draft Report for Alameda Public Works Agency.

d. California Department of Water Resources, 1975, California's Groundwater, Bulletin 118.

e. U.S. Geological Survey, 1984, Water quality conditions and an evaluation of ground- and surface water based sampling in Livermore-Amador Valley, WRI 84-4352.

f. California Department of Water Resources, 1974, Evaluation of groundwater resources in the Livermore and Sunol Valleys, Bulletin 118-2.

g. California Department of Water Resources, 1963, Alameda County Investigation, Bulletin 13.

h. Contra Costa County Health Department, 1986, Small Community Water Systems.

i. California Department of Water Resources, 1964, Alameda Creek watershed above Niles; Chemical qualities of surface water, waste discharges and groundwater.

j. Blackie & Wood, Consulting Engineers, 1957, Report to the North Marin County Water District on water Supply Development, Project Number 2.

k. Wallace, Roberts & Todd, 1988, Revised Draft Dillon Beach Community Plan, prepared for Marin County Planning Department.

l. Ellis, William C. and Associates, 1978, Groundwater resources of Ross valley; A report on water planning investigations prepared for Marin Municipal Water District, Marin County, California.

The following references are cited in Tables II-3 and Tables II-4 *(cont.)*

m. Napa County Flood Control and Water Conservation District, 1991, Water Resource Study for Napa County Region.

n. U.S. Geological Survey, 1960, Geology and Groundwater in Napa and Sonoma Valleys, Water Supply Paper 1495.

o. Geoconsultants, Inc., 1991, Annual report 1990-1991 Ground-Water Resources, Half Moon Bay, California, .prepared for the City of Half Moon Bay.

p. Applied Consultants, 1991, Report on the Daly City Ground-water Investigation and Model Study, prepared for the Daly City.

q. University of California, Berkeley, Sanitary Engineering and Environmental Health Research Laboratory, 1987, San Francisco Bay region Groundwater Resource Study Volume 10 - San Mateo Ground Water Basin Characteristics, SEEHRL Report No. 87-8/10.

r. Santa Clara Valley Water District, 1975, Master Plan - expansion of in-county water distribution system.

s University of California, Berkeley, Sanitary Engineering and Environmental Health Research Laboratory, 1987, San Francisco Bay region Groundwater Resource Study Volume 6 - Suisun/Fairfield Ground Water Basin Characteristics, SEEHRL Report No. 87-8/6.

t. U.S. Geological Survey, 1960, Geology, Water Resources, and Usable Groundwater Storage Capacity of part of Solano County, California, Water Supply Paper 1464.

ATTACHMENT 2

ITEMS CONTAINED IN THE PROPOSED AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY BASIN REGARDING PROTECTION AND CLEANUP OF GROUND WATER WHICH ARE REMANDED BY THE STATE WATER BOARD

1. The following portions of Chapter 4, Implementation, which reference State Water Board Resolution No. 92-49:

   a. Page 12, the first bulleted section
   b. Page 15, first column, third paragraph
   c. Pages 16 and 17, the subsection titled "Requirements for Site Investigation and Remediation"
   d. Page 17, in the subsection titled "Setting Cleanup Levels," the last sentence of the first paragraph and the first sentence of the second paragraph
   e. Page 18, second column, 12th line "and 92-49"
   f. In Table IV-10 on page 21, line 2, "and No. 92-49"

   RATIONALE: These sections reference State Water Board Resolution No. 92-49. They should be remanded since in the interim between Regional Water Board adoption of Resolution No. 92-131 and the present, the Office of Administrative Law (OAL) has reviewed and disapproved State Water Board Resolution No. 92-49.

2. Page 13, second column, third bulleted section.

   RATIONALE: This section should be remanded because the State Water Board is in the process of revising the LUFT Manual.

3. The subsection entitled "Modification of Ground Water Cleanup Levels" on page 19, and the summary discussion on page 12, sixth bullet.

   RATIONALE: The term "point of compliance" is defined in California Code of Regulations Chapter 15 (15 CCR). The term "alternative point of compliance" is defined in the amendment. This definition is not entirely consistent with the 15 CCR definition. The similarity of the terms could cause confusion. The term "alternative point of compliance" should be remanded for lack of clarity. However, the phrase cannot be extracted without changing the amendment's meaning; therefore, the subsection "Modification of Ground Water Cleanup Levels" on page 19, and the summary discussion on page 12, sixth bullet, must be remanded.

4. The third paragraph, first column of page 19, which contains a discussion of unsaturated zone soil cleanup level(s).

RATIONALE: This paragraph lacks clarity. As written the paragraph establishes a cleanup level for total VOCs only. The Regional Water Board staff has stated the intent of the paragraph is to set cleanup levels for both total VOCs and semi-volatile organic compounds. The paragraph also refers to two analytical methods without giving the complete references. Additionally, the paragraph should be revised to clarify that reasonably achievable soil concentrations for total VOCs and semi-volatile organic compounds of less than 1 ppm and 10 ppm respectively will also be considered as soil cleanup levels.

5. Page 19, last paragraph, and page 20 first column up to but not including the subsection titled "Future Regulatory Management Strategies."

RATIONALE: This subsection discusses the specifications under which the Regional Water Board would consider modifying ground water cleanup levels. One of the specifications is: "Ground water pollutant concentrations have reached an asymptotic level using appropriate technology." Cleanup levels cannot be changed to concentrations that exceed applicable water quality objectives. If asymptotic levels occur at concentrations above water quality objectives, the process specified under the (currently termed) alternative points of compliance section should be invoked. Remanding the one specification would modify the meaning of the subsection. Therefore, the subsection addressing modification of cleanup levels should be remanded.

6. The following portions of Chapter 4:

a. Page 8, first column, last paragraph which continues to the top of the second column
b. Page 12, fourth and fifth bullets
c. Page 18, first column, first full paragraph, last sentence beginning with "For ground waters with a beneficial use ..." and the two bullets following that sentence.

RATIONALE: These sections indicate that the Regional Water Board will consider Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) as the upper concentration level for the protection of the beneficial use Municipal and Domestic Supply (MUN) for ground water cleanup activities. These sections need to be clarified to include consideration of other numeric limits, in addition to MCLs and SMCLs, that implement applicable water quality objectives.