APPENDIX E

State and Local Groundwater Protection and Cleanup Programs

The following is a list of Web addresses for the state and local agencies and programs responsible for groundwater protection and cleanup in the South Bay Basins:

1. San Francisco Bay Regional Water Quality Control Board: www.swrcb.ca.gov/rwqcb2
2. Department of Toxics Substance Control: www.dtsc.ca.gov
3. California Department of Health Services: www.dhs.ca.gov
4. California Department of Water Resources: www.drw.water.ca.gov
5. Alameda County Water District: www.acwd.org
6. Santa Clara Valley Water District: www.scvwd.dst.ca.us
7. San Mateo County Environmental Health Services Division: www.smhealth.org
8. Certified Unified Program Agency: www.calcupa.net
9. Groundwater Ambient Monitoring Assessment Program : www.swrcb.ca.gov/cwphome/gama
10. Comprehensive Groundwater Quality Monitoring Program: : www.swrcb.ca.gov/cwphome/gama
11. City and County General Plans: www.ceres.ca.gov/planning

E.1 California Regional Water Quality Control Board

California's major laws regulating cleanup of pollution sites are in the Health and Safety Code and the Water Code. The nature of these pollutants and their effects on human health and the environment has long involved multi-agency oversight for the cleanup of these sites. In addition to the state agencies, several county and city agencies participate in regulatory activities. The state agencies usually have the lead in overseeing the cleanup of these sites.

E.1.1 Leaking Underground Storage Tanks

In the early 1980s, pollutants from leaking underground storage tanks were found to be affecting some drinking-water wells in the Santa Clara Valley area. Considering that drinking water in this area is obtained largely from wells tapping extensive underlying aquifers, these discharges were seen as an immediate health and environmental threat. Given the discovery that soil and groundwater pollution from leaking underground storage tanks (USTs) were the source of this threat, local, state, and federal lawmakers moved rapidly to enact laws governing the operation of USTs insofar as they could threaten groundwater resources.

California was at the forefront of crafting what essentially became the nation's first UST law (Chapter 6.7 of the Health and Safety Code) addressing the threat of discharges from underground storage tanks to groundwater. This legislation was largely accomplished through the cooperative efforts of the Santa Clara Valley Water District and legislator Byron Sher. This law authorized local agencies to regulate UST design, construction, monitoring, repair, leak reporting, and response measures. Federal legislation patterned on California's approach followed in 1984.

The UST Program is unique, because the Health and Safety Code, Division 20, Chapters 6.7 and 6.75 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. Local agencies now have independent authority under UST laws to require investigations and cleanup. The Regional Board still retains its Water Code authority to approve case closure. However, the Regional Board has authorized a few local implementing agencies (LIAs) to close fuel leak cases where groundwater has not been polluted and future groundwater 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.

Four agencies oversee cleanup of fuel USTs within the South Bay study area. These are the Regional Water Quality Control Board, the San Mateo Environmental Health Division, the Santa Clara Valley Water District, and the Alameda County Water District.

Currently there are 1,335 open fuel UST cases and 1,849 closed fuel UST cases in the study area. Largely as a result of vigorous oversight efforts by the responsible agencies, groundwater contaminants from these leaking fuel USTs have had minimal effects on municipal and domestic wells in the South Bay basins. However, a small handful of municipal and domestic wells has been affected by methyl tertiary butyl ether (MTBE) from leaking UST sites, including wells in San Jose (the south San Jose retailer well), South San Francisco, and Loma Prieta School (Santa Clara County). In each case, MTBE levels were below MCL levels or have since dropped below MCL levels. Two other factors have also limited the impacts of leaking USTs: the tendency of most fuel constituents (with the exception of MTBE) to bind to the soil matrix and then biodegrade, and the prevalence of tight soils and relatively slow groundwater flow rates in many shallow zones around the region.

E.1.2 Guidelines for Investigation and Cleanup of MTBE and Other Ether-Based Oxygenates

In March 2000, the State Board released Guidelines for Investigation and Cleanup of MTBE and Other Ether-Based Oxygenates (Final Draft, March 27, 2000) in response to Executive Order D-5-99 and Senate Bill 989 (Sher, Chapter 812, Statutes of 1999). It is intended to assist managers and staff at state and local regulatory agencies with the task of overseeing the investigation and cleanup of sites where there have been or may have been releases of MTBE-laden petroleum. The document serves as a basis for reporting to Cal/EPA and the legislature regarding progress made on cleaning up MTBE.

The essence of the document is that the standard approach for dealing with petroleum releases employed over the past decade will not suffice for MTBE, because unlike traditional petroleum constituents such as benzene, MTBE moves quickly to pollute water and is slow to degrade in the subsurface environment. Response time is critical for MTBE. A quick response to a release greatly increases the ability to check the spread of the MTBE and to clean up the mass of the release. Because time is critical, regulators will need to prioritize their cases and give first attention to those that pose the greatest risk to groundwater. It is also expected that there will be more need for vertical definition of MTBE plumes and more reliance on active cleanup technologies, such as soil vapor extraction, in situ groundwater remediation, and groundwater pump and treat systems, than there has been for non-MTBE petroleum.

For a copy of the Guidelines for Investigation and Cleanup of MTBE and Other Ether-Based Oxygenates, please visit the State Board website at: www.swrcb.ca.gov/cwphome/ust/docs/mtbe/index.html.

E.1.3 Underground Storage Tank Cleanup Programs

There are several new initiatives and programs under way that directly affect cleanup of underground storage tanks (USTs) in the South Bay Basins. These programs are a result of the UST Cleanup Program maturing and evolving from one of individual case management to that of identifying high-risk sites and marshalling each regulatory agency's efforts in those areas where they will be most protective of the South Bay's groundwater resource. The most significant of these programs are:

Reopening Closed Cases. The State Board is developing guidance on reopening closed cases. The Regional Board has provided comments to the State Board regarding this issue. Essentially, we have said that this is not an item to approach lightly. We have suggested screening criteria to be used to determine which, if any, cases should be reopened.

Monitoring Active Service Stations. The Regional Board has instituted a pilot test with the Santa Clara Valley Water District to perform environmental monitoring at operating service stations that are not currently in the UST cleanup program. The Santa Clara Valley Water District (District) has recently completed a report titled, "An Evaluation of MTBE Occurrence at Fuel Leak Sites With Operating Gasoline USTs," dated May 2000, which indicates that undetected MTBE releases may be occurring at currently upgraded operating UST facilities. The report indicates that as many as 13 of the 16 sites in the study group have undetected MTBE releases that appear to be from the currently upgraded UST system and not from historic releases. If this trend

of undetected releases is found to be consistent across a larger spectrum of sites, then Regional Board staff believes that undetected MTBE releases from operating and upgraded UST facilities are a greater threat to groundwater resources than earlier believed.

GIS Integration. Geographic information systems (GIS) are a significant part of the Regional Boards MTBE guidelines implementation. GeoTracker is the interface to the Geographic Environmental Information Management System (GEIMS), a State Board data warehouse which tracks regulatory data about underground fuel tanks, fuel pipelines, and public drinking water supplies. GeoTracker is an interface to GEIMS and is a web-based tool that will be of use to the public and local agencies for a case-by-case review of data. The Regional Board has developed a protocol using this publicly available GIS software to enhance the state's efforts. Soon we are expected to have full GIS functionality for presenting and querying all LUFT data at each caseworker's desktop. Regional Board staff will not only be able to look at individual sites and surrounding affected wells, but will also be able to view their site in the context of a groundwater basin or watershed. This will allow integration of groundwater and surface water data to arrive at more rational and global environmental decision-making, rather than looking at only a single issue.

E.1.4 Spills, Leaks, Investigation, and Cleanup (SLIC)

SLIC is the program term used by the State Board and Regional Boards to define those sites with groundwater polluted by chemicals other than petroleum hydrocarbons that are used as fuels. These chemicals include, but are not limited to, polyaromatic hydrocarbons, volatile organic chemicals (VOCs), PCBs, metals, and pesticides.

The SLIC program involves the Regional Board and some local agencies that have elected to participate, including Alameda County Water District and San Mateo County Environmental Health Division. The SLIC program encompasses all unauthorized releases of pollutants to soil and groundwater that are not regulated by other programs such as the leaking UST program. Board policy for the SLIC program can be found in State Board Resolution 92-49 as amended and in the Water Quality Control Plan for the San Francisco Bay Basin (or Basin Plan) – see especially pages 4-52 through 4-65. There are no implementing regulations. Relevant Web site addresses include:

- Regional Board groundwater policy: http://www.swrcb.ca.gov/~rwqcb2/gdwtrdef/gdwtrdef.htm
- SLIC staff contacts at the Regional Board: www.swrcb.ca.gov/~rwqcb2/gdwtrdef/SLICPage97/slicpage97.htm

In the South Bay basins, the SLIC program focuses on solvent releases to groundwater. At numerous sites not covered in the federal Superfund or leaking UST programs, solvents have been used in a variety of industrial processes and have been released to soil and groundwater. Chlorinated solvent releases have produced more significant groundwater pollution plumes compared with non-chlorinated solvent releases. There are about 190 active SLIC cases in the South Bay basins (SMS database Nov. 27, 2000).

Notable SLIC sites in the South Bay basins include: FMC in Newark, Ashland Chemical in Newark, Hewlett-Packard in Mountain View, United Technologies in San Jose, Velcon Filters in San Jose, Mohawk Labs in Sunnyvale, and the Purex site in Belmont. The Regional Board has required active groundwater remediation at most significant SLIC sites. In the future, we expect to see greater use of innovative remediation methods (e.g., enhanced biodegradation), monitored natural attenuation, and formal risk management plans at SLIC sites.

E.1.5 Municipal Landfills

In California, municipal landfills are regulated jointly by the State Board and the California Integrated Waste Management Board (CIWMB). In general, the State Board takes responsibility for water-quality protection and cleanup, while the CIWMB takes responsibility for public health and day-to-day landfill operations.

Implementing regulations are found in the California Code of Regulations, Division 2, Title 27, Subdivision 1, Chapters 1 through 7, which are collectively referred to as Title 27.

Title 27 regulations establish a classification system for landfills and include requirements for siting, construction, operation, monitoring, cleanup, and closure. Title 27 regulations must also be equivalent to the federal municipal solid waste (MSW) requirements, known as "Subtitle D" (Subpart 257 and 258, Title 40, Code of Federal Regulations). Subtitle D establishes minimum standards for design, operation, location, closure, and postclosure at public and private landfills receiving MSW.

The State Board, the Waste Management Board, and the Environmental Protection Agency regulations, policies, and guidelines can be found on the Internet at the following addresses:

Landfill-Related Websites

Agency	Subject	Address
San Francisco Bay Regional Water Quality Control Board	Regional Board home page	http://www.swrcb.ca.gov/~rwqcb2/
State Water Resources Control Board	Land Disposal Program (Chapter 15) home page	http://www.swrcb.ca.gov/cwphome/chap15
U.S. Environmental Protection Agency	Office of Solid Waste, Municipal Solid Waste Landfill Guidance	http://www.epa.gov/epaoswer/non-hw/muncpl/landfill.htm
California Integrated Waste Management Board	CIWMB home page	http://www.ciwmb.ca.gov/
U.S. Environmental Protection Agency	Code of Federal Regulations, Subchapter I, Solid Wastes	http://www.epa.gov/docs/epacfr40/chapt-I.info/subch-I.htm

There are a total of thirty active and closed municipal landfills regulated by the Regional Board located within the Niles Cone, Santa Clara Valley, and San Mateo Plain Basins. These landfills generally contain MSW, and in some cases may contain construction and demolition debris, household hazardous waste, petroleum-impacted soil, and other wastes. These wastes pose a threat to water quality because they can leach pollutants upon contact with water and other residual landfill liquids. Furthermore, municipal landfills can threaten to cause erosion and sedimentation damage to streams and creeks if surface water runoff is not managed properly. Therefore, many of these landfills operate under permits issued by the Regional Board that require control and containment systems, monitoring, and interim and final landfill covers.

Regional Board permits for municipal landfills are called Waste Discharge Requirements (WDRs) and may be issued to active, inactive, public, or private landfills, depending on the severity of the threat to water quality. WDRs typically require monitoring programs for surface water, groundwater, and leachate containment to detect leaks before they migrate off-site.

The Regional Board may issue an enforcement order requiring source control, delineation of impacts, and remedial or corrective action. Enforcement orders such as Cleanup and Abatement Orders or Site Cleanup Requirements are issued pursuant to the Regional Board's authority under the Porter Cologne Water Quality Control Act. Corrective action regulations specific to municipal landfills are found in Title 27, Subchapter 3.

E.1.6 Multi-site Cooperative Agreement

Since 1987, the Regional Board has managed the investigation and development of cleanup plans for 21 federal EPA Superfund sites in the Santa Clara Valley. Under the Multi-site Cooperative Agreement, the Regional Board agreed to regulate the sites according to federal EPA Superfund procedures, as well as appropriate California laws and regulations. In exchange, the federal EPA would use the state Remedial Action Plan as part of the federal Record of Decision under CERCLA or Superfund. All of the 21 sites have had final Record of Decisions in place for at least five years.

E.1.7 Aboveground Tank Program

The Aboveground Petroleum Storage Act (APSA), commonly referred to as the Aboveground Tank (AGT) Program, was enacted in 1990 in response to petroleum spills and releases from aboveground tanks and associated piping. APSA was enacted in direct response to the 1988 spill of 400,000 gallons from the Shell Oil Refinery in Martinez. The goal of the AGT Program is to protect vegetation, wildlife, surface water, human health, and groundwater from the damaging effects of petroleum releases by ensuring safe operation of aboveground petroleum storage facilities. The goals are to be achieved by implementing a program to:

1. Work with Certified Unified Program Agencies (CUPAs) to identify facilities that are subject to APSA
2. Review Spill Prevention Control and Countermeasure (SPCC) Plans prepared by dischargers
3. Require the installation of release-detection systems where necessary
4. Require investigations and corrective actions where releases have occurred
5. Inspect the facilities on a regular basis to ensure implementation of APSA requirements.

APSA requires owners or operators of aboveground petroleum storage tank facilities to:

1. File a Storage Statement and pay a facility fee
2. Prepare and implement a federal SPCC Plan
3. Report to the Regional Board if a release occurs of greater than one barrel (42 gallons)
4. Reimburse staff costs to oversee cleanup and abatement of releases
5. Install a release-detection (leak-detection) monitoring system if the tank facility has the potential to impact surface water, sensitive ecosystems, or groundwater.

The groundwater protection elements of the AGT program include preparation and proper implementation of SPCC Plans and implementation of release-detection monitoring. If a release occurs at an AGT site, investigation and remediation are conducted under the AGT cost-recovery program.

SPCC Plans. An SPCC Plan is a carefully thought-out plan, prepared in accordance with detailed U.S. Environmental Protection Agency (EPA) guidelines, that discusses procedures, methods, and equipment at the facility designed to prevent discharges of petroleum from reaching navigable waters. Because California designates groundwater as a source of navigable waters, implementation of the SPCC requirements is an important element of groundwater protection from releases by aboveground petroleum storage facilities.

Release Detection Monitoring. APSA requires owners and operators of petroleum facilities to install a tank bottom or line release-detection systems at the request of the executive officer. Such systems are placed where leaks may not be visible so that a release can be detected before impacts to groundwater, surface water, or sensitive ecosystems occur. Leak-detection technologies that ensure a release is identified before reaching groundwater are preferred.

Investigations and Remedial Actions. Staff is involved in determining whether petroleum releases have occurred at aboveground tank facilities. When releases that have impacted soil and groundwater or that may

be threatening surface waters are identified, the facility is placed into the AGT cost-recovery program. The Regional Board adopts orders with schedules for performing investigations and remedial actions.

There are approximately 184 aboveground petroleum storage facilities within the South Bay study area that have filed Storage Statements and paid fees to the State Board. Releases of petroleum hydrocarbons have been confirmed, and cleanup and abatement of these releases is occurring at six of these facilities. The following table is a breakdown of the number of facilities by groundwater basin:

Aboveground Petroleum Storage Tank Facilities in the South Bay Basins

Agency	Storage Statement/Fee	Cleanup And Abatement
Alameda County Water District	46	1
San Mateo Environmental Health Division	32	0
Santa Clara Valley Water District	106	5
TOTAL	*184*	*6*

The AGT Program Web site is: www.swrcb.ca.gov/~rwqcb2/Aboveground_Tanks/aboveground_tanks.html

E.2 Department of Toxic Substances Control

The Department of Toxic Substances Control (DTSC) is responsible for regulating hazardous-waste facilities and overseeing the cleanup of hazardous-waste sites. It is also responsible for investigating and cleaning up, or overseeing the investigation and cleanup of, properties contaminated by the release of toxic substances. In addition, DTSC is involved in other programs dealing with toxic substances, for example, pollution prevention, cleanup activities associated with illegal clandestine drug laboratories, and evaluating environmental technologies.

The California hazardous waste control laws giving authority to DTSC are found in the California Health and Safety Code – Division 20. Chapter 6.5, Hazardous Waste Control Law, extends the federal Resource Recovery and Conservation Act (RCRA); the state is authorized to enforce RCRA. The California Code of Regulations, Title 22, Division 4.5, Environmental Health Standards for the Management of Hazardous Waste, incorporates and extends the Code of Federal Regulations, Title 40, Parts 260 to 282. The California Code is compatible with the federal code.

The California Health and Safety Code, Chapter 6.8, Hazardous Substance Account, provides DTSC with authority to respond to releases of hazardous substances, and for state funds to be used in the cleanup of contaminated sites. Petroleum products are excluded from the list of hazardous substances. Chapter 6.8 extends the federal laws, CERCLA and SARA, and the National Contingency Plan, Code of Federal Regulations, Title 40, Parts 300 to 399.

DTSC has its headquarters in Sacramento and information on the organization, including relevant laws and regulations, can be found on its Web site, http://www.dtsc.ca.gov. As well as headquarters offices, there are four regional offices; the Northern California Region Office, located in Berkeley, covers the South San Francisco Bay Basin. DTSC has two programs that consider potential or actual impact to groundwater: the Site Mitigation Program, which administers Chapter 6.8, and the Hazardous Waste Management Program, which administers Chapter 6.5.

The Site Mitigation Program oversees investigation and remedial activities at sites where past activities may have released hazardous substances (products or wastes) and these substances now pose a threat to public health or the environment, including contaminant migration to ground or surface water. The sites may be industrial, commercial, or residential, and be owned by private parties or federal, state, or local governments.

DTSC can issue Imminent and/or Substantial Endangerment Orders to force owners to investigate and remediate contamination on the property, or can negotiate Consent Agreements. In many cases, where property owners want to clean up sites, possibly for redevelopment, DTSC will enter into a Voluntary Cleanup Agreement with the owner of the site, or proponent of a development, to conduct investigation and remedial activities. Other voluntary mechanisms for DTSC oversight of remedial actions are also available, such as Prospective Purchaser Agreements, the new Brownfields Loan Program, and the Expedited Removal Action program.

For sites where there has been a release of hazardous substances to soil, and this represents a threat to public health, but not to groundwater, DTSC would be the appropriate regulatory agency. At sites where soil and ground and/or surface waters are contaminated, or where there is a significant threat of water contamination, DTSC and the Regional Board have separate but overlapping regulatory authority. In the past, for sites in the South San Francisco Bay Basin, overlapping regulatory oversight has been minimal.

The DTSC maintains a database, CALSITES, listing all sites known or suspected to have had releases of hazardous substances. For the South Bay, approximately 350 sites are listed, of which approximately 70 are being investigated, remediated, or monitored. The remainder is sites that have been cleaned up and the remediation certified, or are sites that have been referred to other agencies. This list is not accessible through the Internet. The files on each site, identified by address or business name, can be reviewed by appointment at the DTSC regional office in Berkeley.

E.3 California Department of Health Services

The Drinking Water Program (DWP) falls within the California Department of Health Services and is part of the department's Division of Drinking Water and Environmental Management. DWP monitors and regulates public water supplies (including municipal wells), with some support from county health departments for smaller systems. Good coordination between DWP and the agencies overseeing groundwater pollution sites is critical to protecting existing groundwater users. There are about 1,000 municipal wells in the San Francisco Bay Basin, with the great majority located in Santa Clara Valley and the rest of the South Bay basins.

For further information, see DWP's Web site at http://www.dhs.ca.gov/ps/ddwem or call (510) 540-2160.

The California Department of Health Services (DHS), Division of Drinking Water and Environmental Management is the lead agency for developing and implementing the Source Water Assessment Program (SWAP), which in California is referred to as the Drinking Water Source Assessment and Protection (DWSAP) program. The DWSAP program will satisfy the mandates of both the 1986 and 1996 Safe Drinking Water Act amendments. For further information on DHS' DWSAP program, go to http://www.dhs.ca.gov/ps/ddwem/dwsap/DWSAPindex.htm.

The goals of the DWSAP program are outlined below.

Goals of the DWSAP Program

Goal	Comments
Protection and benefit of public water systems of the state.	The focus of the program is information gathering and attention to activities that may affect drinking-water quality, to enable communities and public water systems to better protect and manage the surface water and groundwater resources of the state.
Improve drinking-water quality and support effective management of water resources.	The assessments can be used to develop protection strategies that are more economical and desirable than monitoring and treatment of drinking-water supplies.

Inform communities and drinking-water systems of contaminants and possible contaminating activities that may affect drinking-water quality or the ability to permit new drinking-water sources.	As communities and public water systems gather information about activities that have contaminated or may contaminate drinking-water sources, they will be able to make better decisions about how to protect and manage existing and future drinking-water sources.
Encourage a proactive approach to protecting drinking-water sources and enable protection activities by communities and drinking-water systems.	Water suppliers, communities, planners and the public at large are encouraged to actively manage and plan activities around drinking-water sources and within their delineated protection areas and zones to reduce or eliminate the threat of contamination.
Refine and target the monitoring requirements for drinking-water sources.	State and federal regulations require water suppliers to monitor for a long list of inorganic and organic chemicals. With proper identification of PCAs, monitoring requirements can be targeted to the needs of the drinking-water source. The result is enhanced public health protection with a potential saving in monitoring costs. Similarly, regulations require monitoring for microbiological contaminants, some of which may be targeted to specific PCAs. Regulatory limits on other parameters such as turbidity must also be met by drinking-water systems. To the extent that these "non-chemical" constituents can be controlled by effective assessment and protection programs, they may bring about monitoring and/or treatment relief. Reductions in organic matter in a drinking-water source may also result in lower concentrations of disinfection byproducts.
Focus cleanup and pollution prevention efforts on serious threats to surface and groundwater sources of drinking water.	By identifying activities that may pose greater health risks than others to drinking water sources, communities and agencies may be able to prioritize their environmental activities. For example, hazardous waste cleanup, pollution prevention efforts, and other activities of environmental and public health significance that directly improve or protect drinking-water supplies may be addressed earlier or allocated more resources than others that are not related to drinking-water supplies.
Meet federal requirements for establishing wellhead protection and drinking water source assessment programs.	Compliance with requirements ensures that the California program meets the minimum national standard for source-water protection, and is necessary in order to receive future federal source-water protection funds.
Assist in meeting other regulatory requirements.	Information that is obtained in the DSWAP Program will be of assistance to state and local agencies, communities and public water systems in meeting various regulatory requirements. Examples include the requirements of the California Environmental Quality Act (CEQA) and upcoming federal regulatory requirements, such as the Ground Water Rule and the Enhanced Surface Water Treatment Rule.

The minimum requirements of the DSWAP program for groundwater sources are as follows:

- Determine the location (latitude, longitude) of the groundwater well using a global positioning system (GPS), or equivalent accuracy (within 25 meters).
- Identify recharge area boundaries to determine the source area.

- Delineate protection zones based on three different times of travel (the time for groundwater to travel from a point in the aquifer to a pumping well): Zone A (two-year), Zone B5 (five-year), and Zone B10 (10-year).
- Evaluate the physical barrier effectiveness (PBE) in preventing contaminants from reaching the well (e.g., distance to closest sewer line, surface seal, well construction).
- Inventory potentially contaminating activities (PCAs) in the source area that include activities associated with commercial, industrial, residential, municipal, agricultural, and rural operations.
- Rank and prioritize PCAs to identify to which the source is most vulnerable.
- Prepare an assessment map that shows the well location, source area, and protection zones.
- Prepare an assessment summary including a vulnerability summary that describes the PCAs to which the source is most vulnerable.
- Notify the public in the annual Consumer Confidence Report prepared by the public water supplier.

Although DHS is responsible for performing these assessments, some public water systems may also choose to perform more complex drinking-water source assessments. The water purveyors in the Niles Cone and Santa Clara Valley Basins are working in coordination with DHS to complete their DWSAP requirements. DHS is the local primacy agency in the San Mateo Plain Basin and will be completing the DSWAP requirements for the water purveyors in that basin. All assessments must be completed by May 2003. In addition, DHS will incorporate the DWSAP assessment procedures into the permit requirements for new drinking-water sources.

The DWSAP program also includes an element of groundwater protection. This aspect of the program is through the state's recommendations to encourage voluntary drinking-water source protection. Recommendations include technical assistance, financial assistance, and training to develop local protection programs; identification of management strategies that can be used to protect the water supply from contaminants associated with the PCAs; and criteria for developing contingency plans in the event that an alternative water supply is needed.

E.4 California Department of Water Resources

The Department of Water Resources can be contacted at its Web site: http://www.dwr.water.ca.gov/. DWR Bulletins/Publications, from 1955 to 1995, are listed at: http://rubicon.water.ca.gov/b17095.fdr/bulletavail.html.

Although the California Legislature created the Department of Water Resources (DWR) in 1956 to plan and guide the development of the state's water resources, its origin can be traced back to earlier years. In 1949, the California Legislature enacted legislation that, among other things, directed the Department of Public Works to investigate and survey conditions of damage to the quality of underground water caused by improperly constructed, abandoned, or defective wells and to report to the appropriate regional water pollution control board its recommendations for minimum standards of well construction.

Water Code Section 231 currently delegates these investigation and reporting responsibilities to the Department of Water Resources. In part, the Department of Water Resources is responsible for advising the Legislature and appropriate state agencies on the maintenance of groundwater quality, including protection against adverse effects caused by improper well construction or the abandonment of wells. This responsibility applies to all wells, irrespective of purpose.

During the years and organizational evolutions that followed, although the primary focus of the Department of Water Resources remained on groundwater protection through the identification of improperly constructed or abandoned wells, the scope of its responsibilities expanded to include flood control, design and construction of water facilities, and dam safety.

Today, with a staff of approximately 2,700 and a $1 billion annual budget, the DWR administers increasingly complex programs involving flood control for the Central Valley, dam safety for more than 1,200 dams statewide, local assistance projects, water management strategies, water quality improvement, and water supply data collection and studies. DWR staff provides technical and financial assistance to local water communities, works with a number of governmental and wildlife agencies on environmental issues and projects, manages State Water Project and Reclamation Board lands, educates the public about California's water resources, and operates and maintains the State Water Project, one of the largest water development and distribution systems in the nation.

E.5 Alameda County Water District

The Alameda County Water District can be contacted at its Web site: http://www.acwd.org or by phone at: (510) 659-1970.

E.5.1 Background

The Alameda County Water District (ACWD) was created by a vote of area residents in December 1913, thereby becoming the first water district in California to be formed under the County Water District Act enacted earlier that year. A five-member board of directors, elected at large, governs it.

In the years preceding the vote, local farmers and residents had become concerned about water companies and agencies exporting water from both Alameda Creek and local groundwater to nearby communities such as Oakland and San Francisco. The result of these exports was that the groundwater table was falling at a rapid rate. The voters hoped, in establishing the District, to regain control over local water supplies, to protect the underground water in the Niles Cone Groundwater Basin, and to conserve the waters of Alameda Creek.

ACWD now has several sources of supply, including water purchased from the State Water Project (SWP) (via the South Bay Aqueduct) and the San Francisco Public Utilities Commission (SFPUC) (via the Hetch Hetchy aqueduct system). But groundwater remains an important component of its supply, currently furnishing 35 percent of the water the District distributes. In dry years, groundwater has contributed over 60 percent of the supply. Thus, conservation and preservation of the groundwater basin continues to be a vitally important program for the District.

Policy Statement. It is the policy of the ACWD to efficiently protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high-quality water that satisfies present and future municipal, industrial, recreational, and agricultural water needs in the District service area. ACWD will develop and implement appropriate programs within the service area to protect and manage the groundwater basin as a long-term source of water supply for the District. It will also actively protect the groundwater basin from activities outside the service area that may negatively affect the water quality and/or water supply of the basin.

Objectives. The purpose of this policy is to protect and improve the District's groundwater resources for the benefit of both the District's customers and private well owners by taking actions designed to meet the following objectives:

1. Increase groundwater replenishment capability.
2. Increase the usable storage capacity of the groundwater basin.
3. Operate the basin to provide: (1) a reliable water supply to meet baseload and peak distribution system demands, (2) an emergency source of supply, and (3) reserve storage to augment dry year supplies.
4. Protect groundwater quality from degradation from any and all sources, including: saline water intrusion, wastewater discharges, recycled water use, urban and agricultural runoff, or chemical contamination.

5. Improve groundwater quality by (1) removing salts and other contaminants from affected areas of the basin, and (2) improving the water quality of source water used for groundwater recharge.

The specific groundwater management programs that have been developed and implemented by the District to achieve these policy objectives are listed below.

Summary Of ACWD Groundwater Management Programs

Groundwater Program	Description
Water Supply Management	Planning, managing, and optimizing the District's sources of supply: watershed runoff, SWP water for recharge, SWP water for treatment, SFPUC water for blending, and water banking.
Groundwater Replenishment	Operation of the District groundwater recharge facilities to optimize 1) capture of local runoff, 2) replacement of water extracted from production and ARP wells, and 3) maintenance of groundwater levels to prevent saltwater intrusion.
Watershed Protection and Monitoring	Assisting in the protection and monitoring of the watershed to optimize the quality of runoff water available for the District water supply.
Basin Monitoring	Sampling and measuring wells to assess and evaluate 1) groundwater quality, 2) water pressures within the basin, and 3) the direction of groundwater flow.
Wellhead Protection Program	Identify sensitive recharge and groundwater areas, maintain an inventory of potential threats within these areas, assess the vulnerability of source water, and develop management strategies to minimize the potential for groundwater quality impacts.
Aquifer Reclamation Program	Pump brackish water from degraded aquifers in order to 1) increase useable basin storage, 2) improve overall water quality, 3) prevent movement of brackish water toward the District production wells, and 4) provide (future) supply augmentation through treatment to potable water standards.
Groundwater Protection Program	Maintain an active role in 1) assisting with the identification of potential groundwater contamination, 2) implementing monitoring systems at hazardous-materials storage sites, and 3) providing technical oversight for investigations and cleanups at hazardous-materials spill sites.
Well Ordinance Administration	As enforcing agency for municipal ordinances governing construction, repair, or destruction of wells, the District provides inspection services, collects fees, and performs field searches for abandoned wells that could act as a conduit for contamination of groundwater.

E.5.2 Jurisdiction

The District conducts groundwater management and protection activities under the statutory authority granted to the District under: the County Water District Law (commencing with Section 30000 of the Water Code); the Replenishment Assessment Act of the Alameda County Water District (Section 4, Chapter 1942 of the Statutes of 1961, as amended in 1970 and 1973), which grants additional powers to the District to prevent pollution, contamination, or diminution of the quantity of the groundwater supply; local well ordinances (Fremont No. 950, as amended; Newark No. 136; and Union City No. 109-73); agreements with other agencies; and local hazardous-materials ordinances.

E.5.3 Groundwater Protection and Cleanup

The District takes an aggressive role in:

1. Assisting regulatory agencies and industry in identifying sources of potential groundwater contamination
2. Implementing monitoring systems at hazardous materials storage sites
3. Providing technical oversight for the investigation and cleanup operations at Leaking Underground Fuel Tank (LUFT) and Spills, Leaks, Investigation, and Cleanup (SLIC) sites to assure the protection of the groundwater basin.

Coordination with federal, state, county, and city agencies similarly involved is key to the success of the District's groundwater protection program. This program's objectives are to protect the basin from future water-quality degradation by ensuring that existing LUFT and SLIC sites are remediated and that future chemical releases are quickly identified and controlled.

Since 1988, the District informally provided assistance to the Regional Board in overseeing the investigation and remediation at LUFT and SLIC sites. In order to memorialize the terms of this participation and to further strengthen the coordination between the Regional Board and the District, the agencies entered into a Cooperative Agreement on June 27, 1996. The District entered into similar Cooperative Agreements with the Cities of Fremont, Newark, and Union City on March 25, 1997; June 26, 1997; and August 12, 1997 to further strengthen the interagency coordination and cost-effective implementation of groundwater protection within the cities. The District also recently entered into an agreement with the city of Hayward on July 27, 2000 to work cooperatively on sites that threaten or affect water quality in Hayward Detachment areas (properties detached from the District and annexed to the city of Hayward).

Currently, as of May 29, 2001, the District has a total of 328 Leaking Underground Fuel Tanks (LUFT) cases; 155 of these cases have been closed and 173 LUFT cases are open. The District is the lead agency for all open LUFT cases except for three LUFT cases for which the Regional Board is the lead agency. There are also a total of 114 Spills, Leaks, Investigation, and Cleanup (SLIC) cases; 48 of these cases have been closed and 66 are open. The District is the lead agency for 48 open SLIC cases and the Regional Board is the lead agency for the remaining 18 cases.

E.5.4 Well Permitting Program

The District well ordinances specify that no person shall construct, repair, reconstruct, destroy, or abandon any well unless a written permit has been obtained from the District. Written permits required by the ordinance are issued by the District subject to the conditions set forth by the District. To ensure compliance with established state standards and local special conditions, inspections are conducted for all permitted work.

Fees are established and adopted by the District's Board of Directors on an annual basis by resolution to cover the majority of field inspection costs. Before a permit is issued, the applicant must deposit with the District

cash or check in a sufficient sum to cover the fee. All governmental agencies must apply, except that no permit fee is charged unless the proposed work will constitute an undue burden to the District. The permittee must notify and schedule with the District at least five days in advance prior to the start of any work permitted under the ordinance.

The well ordinances regulate all work on wells and boreholes associated with the following four categories of drilling activities: (1) water wells; (2) geotechnical investigations; (3) chemical investigations; and (4) cathodic protection wells. Definitions and additional information for each of these drilling activities are described below.

Water Wells. A water well is defined as "...any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground" (DWR, 1981). For new construction, additional information may be required, such as the location of septic systems, sewer lines, or other possible sources of contamination. A review process is conducted on each new well to insure compliance with current construction standards and the District's supplemental standards.

Existing wells must be maintained in an active state in which water samples can be obtained. All openings at the surface must be sealed to prohibit contamination from entering the well. The area surrounding the well must be clean from debris and accessible at all times. If a well is a public nuisance, corrective action must be taken by the well owner immediately to correct the problem. If action is not taken, the District may abate the problem at the well owner's expense.

Repairing or reconstructing a well requires a permit. Additional information such as drawings may be required before a permit is issued. A review will be conducted to insure that any repair or reconstruction will not jeopardize the accessibility to the well for ultimate destruction.

Well destruction permits include specifications on the requirements for destroying a well. Specifications are determined by the depth, diameter, and location of the well, with the intent of separating the water-bearing zones. This is accomplished by ripping or perforating the well casing in the interval across the non-water-bearing zones. Establishing the ripped or perforated zones can be determined from the Drillers Report (log), well data sheet, water level data, or the geologic cross sections. Also, adjacent wells may provide some information as well as the physical features of the subject well.

Geotechnical Investigations. Geotechnical investigations are defined as any artificial excavation constructed by any method for the purpose of determining subsurface geological or hydrological conditions. Although excavations are included under the ordinance, the District currently only requires permits for geotechnical work that involves the use of drilling equipment or hand augers. Generally, the destruction of borings is required at the end of each day. Borings are not allowed to remain open overnight unless the drill rig stays over the borehole and water has not been encountered. For groundwater monitoring of piezometers or slope-indicator wells, construction and destruction diagrams may be required to insure interconnection of water-bearing zone does not occur.

Chemical Investigations. Chemical investigations are defined the same as geotechnical investigations except that soil and/or water samples are also collected and analyzed for potential contaminants. The conditions for exploratory borings, monitoring wells, and destruction of monitoring wells are identical to geotechnical investigations.

Cathodic Protection Wells. Cathodic protection wells are defined as any artificial excavation in excess of 50 feet constructed by any method for the purpose of installing equipment or facilities for the protection electrically of metallic equipment in contact with the ground, commonly referred to as cathodic protection (DWR, 1991). Construction diagrams are usually required to insure that the interconnection of water-bearing zones does not occur. The length of the anode bed is of primary concern and must be placed within one single aquifer. Each well destruction permit has a set of destruction specifications attached. The specifications are

established to destroy the well in such a manner as to insure that the well will not become a contributing factor to the degradation of the groundwater basin or become a public nuisance.

Noncompliance. Any well constructed, repaired, reconstructed or destroyed, including cathodic protection wells and exploratory holes, contrary to the terms and conditions of the ordinances or permit issued is in violation of the well ordinances. The ordinances provide the District with enforcement authority and the ability to restrict water supply to new developments that are in violation of the District's ordinances. In addition, the District can abate wells and hold the owner liable for all costs incurred.

Well Records. Well records are maintained on all wells within the District's jurisdiction. These records provide information on each well, and the information is managed in a computer database. Assignment of a well number to new wells is a critical part of tracking the status of each well and is a local responsibility delegated by the state. Following is a description of these activities:

> **Issued Well Permits.** Permits are issued as required by the ordinances. Each permit is the base record for each new well and all permits are archived.
>
> **Well Data Sheets.** Well data sheets are created for each well and include basic and non-confidential information about the well. This information includes well number, owner's name, address, location, depth, diameter, pump size, and yield. Well numbers are assigned by the District and are based on the location of the well and are determined by township and range coordinates. Previously, the well locations were developed by the District's inspector when the well was completed and were referenced to features that do not change over time, such as centerlines of street right-of-ways. Currently, well location coordinates are determined with a Global Positioning System.
>
> **Drillers Reports.** Water Well Drillers Reports are required to be completed by the California Department of Water Resources (DWR) as well as the District's permit requirement for each new well. The various geologic formations are described within the drillers report as well as additional construction information. These reports are submitted by the drilling contractor and are kept confidential pursuant to state law. After the District assigns a well number, the drillers report is sent to the DWR and it is integrated into their well system.

E.5.5 Niles Cone Well Destruction Program

Improperly constructed wells drilled in the early 1900s increased the rate of saltwater intrusion caused by overpumping. The District's well destruction program is believed to be the most comprehensive such program in California. Each water well, cathodic protection well, or monitoring well needs to be properly destroyed because they constitute a potential major threat to the groundwater basin. Wells not properly destroyed may also constitute a public nuisance and a threat to the safety of the public. The District has developed a well destruction program, outlined below, in cooperation with the cities to address these threats.

When land use changes are proposed for properties, the cities require the property owners or developers to obtain a letter from the District indicating whether wells are located within the boundaries of the development. This requirement gives the District the opportunity to conduct a search for wells before development occurs. The process is as follows:

> **Notification From Cities**. Copies of correspondence from or submitted to the city related to a development project, rezoning application, building permit, demolition permit, underground tank removal, or property transfer are sent to the District for review and comment.
>
> **Record and Field Check**. A record check is conducted for each submittal to determine if any wells exist on the property. The District's computer database, well data sheets, well logs, a 1959 well map, 1954 aerials, 1925 Sanborn maps, and 1915 well maps are all reviewed for the existence of a well on

the property. In addition, a site visit is conducted to verify that all wells have been located or properly destroyed.

Notification from the District. For each submittal, the District sends a written response to the city, developer, engineer, or contractor. If wells are not identified on the property, a brief letter is sent stating that wells were not located within the boundaries of the proposed development. If a well(s) is located within the development, the District's letter includes a site sketch indicating the location of the well(s) and requires that the well(s) be brought into compliance with the well ordinance or properly destroyed prior to development. The letter also states that the District reserves the right to refuse water service within the development until the well issues are resolved. The destruction of abandoned wells then becomes a condition for approval of the proposed development or land use change by the city building or planning departments.

Completion Correspondence. If a well is destroyed in response to the District's notification, a completion notice is sent to the city and the developer or other concerned parties.

E.5.6 Niles Cone Groundwater Basin – Ambient Groundwater Monitoring and Saltwater Intrusion Protection Programs

Weekly Groundwater Monitoring Program. The District performs weekly water level measurements of approximately 30 representative wells to monitor changes in groundwater levels in each major aquifer. This frequency of monitoring water levels allows weekly decisions to be made for overall water production, provides data for quarterly water level summaries for the District's Board of Directors, and provides a complete and current data set for the District's numerical computer model to simulate future scenarios for groundwater basin management.

The quarterly report summarizes the water elevation data from five key wells and well production data from the AHF and BHF sub-basins. Comparisons in water level data are made with the previous year and with those in 1962 (initiation of artificial recharge). Comparisons in production data are also made with the previous year. This report provides an indication of water levels in the AHF sub-basin, the Forebay region of the BHF sub-basin, and the Newark, Centerville-Fremont, and Deep Aquifers within the BHF sub-basin. The water level and production data gathered help characterize and identify trends in the storage of groundwater (as indicated by water levels) due to recharge and production well pumping in both sub-basins.

Spring/Fall Groundwater Monitoring Program. A more comprehensive monitoring program consisting of sampling and measuring water levels is performed in the spring and fall of each year to assess the groundwater quality, water pressures within the basin, and direction of groundwater flow. The Spring/Fall Groundwater Monitoring Program was initiated in 1962, with the Spring Program conducted primarily in March and the Fall Program conducted primarily in September when groundwater levels are typically at their highest and lowest levels of the year, respectively. Following completion of the Fall Program monitoring efforts, the District issues a Groundwater Monitoring Report, and a summary of the report is presented to its Board of Directors. The report describes the fall data acquisition effort, presents the water elevation and water quality data, gives an interpretation of the data, and provides conclusions and recommendations.

The Spring/Fall Groundwater Monitoring Program serves the following purposes:

- To visit wells owned by the District, Alameda County Flood Control and Water Conservation District, DWR, and private owners to evaluate their status
- To conduct water level measurements and collect water samples
- To update the District's database of water level and water quality information
- To describe the movement of groundwater
- To characterize groundwater quality within the groundwater basin.

During the Fall 2000 Groundwater Monitoring Program, 290 wells within the District's service area were visited. Water levels were measured in 207 wells, and water samples were collected for chloride, total dissolved solids, and hardness analyses from 131 wells. The status of each well, water elevation levels, and chloride results are summarized in the appendix of each year's Groundwater Monitoring Report.

In addition to the Weekly and Spring/Fall Monitoring Programs, production wells are monitored regularly for a wide variety of water quality parameters specified by state and federal regulations. The groundwater recharge area is also monitored daily for water level fluctuations to track percolation rates and to schedule water imports.

Monitoring Well Construction Project. Many privately owned water wells that the District has utilized in the past for monitoring basin water levels and saltwater intrusion have been destroyed due to property development or are no longer accessible. Since these wells are critical to the management of the District's groundwater basin, replacement monitoring wells have been included in the Capital Improvement Program. From 1997 through 1999, 32 monitoring wells have been installed as part of the Monitoring Well Construction Project. A total of approximately 60 wells are expected to be installed by 2007 to provide additional geologic information, to replace destroyed wells, and to improve water-sample and water-level data acquisition through efficiently located and appropriately designed wells.

Aquifer Reclamation Program and Salinity Barrier Project. The goal of the District's Aquifer Reclamation Program is to remove entrapped brackish water from degraded portions of Below Hayward Fault aquifers, to increase usable groundwater basin storage, to improve overall water quality, and to prevent the movement of saline water toward production wells. Pumped water from a combination of nine Aquifer Reclamation Program wells (three Newark Aquifer wells, five Centerville-Fremont Aquifer wells, and one Deep Aquifer well) is discharged to flood control channels in accordance with an NPDES permit. Operation of this program depends on the annual availability of water supplies to replace the water that is pumped out of the aquifers. Some of the wells used in this program will supply water to a desalination facility to supplement the District's drinking-water supply in 2002. The District is planning to initially construct a 5 mgd, and ultimately a 10 mgd, reverse-osmosis desalination facility to produce a low-TDS potable water supply from high-TDS groundwater.

Operation of the groundwater basin significantly below sea level during long drought periods was previously seen by the District as an unavoidable necessity. To ensure that new seawater intrusion from San Francisco Bay would not enter the aquifers during such times, the District, in cooperation with the Department of Water Resources, initiated the Salinity Barrier Project in the late 1970s. The plan was to install 14 extraction wells strategically located to create an alignment just inland of the salt evaporator ponds, running parallel along the entire stretch of the District's coastline. Simultaneous pumping of the wells would create a trough in piezometric head along the alignment to prevent inland migration of saline water originating from the Bay and evaporator ponds. In addition to preventing new seawater intrusion, the Salinity Barrier Project's operation was planned as a potential augmentation of the Aquifer Reclamation Program during non-drought periods for mitigating historic seawater intrusion in the interior part of the basin. By the late 1980s, five of the 14 wells were constructed.

In the course of comprehensive water supply and facilities planning in the 1990s, the District determined that operation of the basin below sea level during drought periods is no longer a necessary or desirable strategy relative to other water supply options that have since become available to the District. Because the basin is not likely to be operated significantly below sea level during drought periods, the Salinity Barrier Project is not likely to be needed to prevent new seawater intrusion. However, groundwater modeling results indicate that operating Salinity Barrier Project wells as part of the Aquifer Reclamation Program, especially during wet periods with high piezometric head, may accelerate the mitigation of remaining brackish water in the aquifers. More modeling work is planned to determine whether the water quality improvement would justify activation of the Salinity Barrier Project wells.

E.5.7 American Water Works Association Research Foundation Project

ACWD and Lawrence Livermore National Laboratory (LLNL) are wrapping up a groundwater research project sponsored by the American Water Works Association Research Foundation (AWWARF). The main objective of the study is to demonstrate the usefulness of isotopic tracers and age-dating techniques for characterization of groundwater flow and solute transport in a dynamic flow regime that includes artificial recharge facilities and high-capacity production well fields. A draft final report was completed in March 2001, and a final report suitable for publication is expected to be submitted to AWWARF by the end of 2001.

The project commenced in 1997 with an initial study that involved measurement of the natural background content of selected isotopes and dissolved gases. Tritium, helium, deuterium, Oxygen-18, Carbon-13, and Carbon-14 were among the targeted isotopes in the initial study. With the tritium-helium data, the average age of groundwater in the production wells was determined to vary between three and 30 years, with higher ages coinciding with deeper aquifer layers. Dissolved gases were collected to determine the amount of dissolved air in the water samples (required for an accurate age determination) and to estimate the age of the water at the time it was recharged. Carbon-14 data was also considered in the determination of groundwater age, while Carbon-13 data provided insight on processes affecting dissolved inorganic carbon content.

The Carbon-13 data suggest that dissolution of carbonates and the microbial conversion of organic carbon to carbon dioxide are occurring in the study area. By examination of deuterium and Oxygen-18, ACWD and LLNL also attempted to ascertain in groundwater samples evidence of where the water originated (inland or near the Pacific Coast) at the time of precipitation. The source water for the recharge ponds includes both state water supplies (a remote source that originates in the Sierra Nevada) and drainage of the Alameda Creek watershed (a local source). Discernment of sources was not achieved with much confidence due to mixing of deeper and shallower groundwater in long-screened wells, mixing and long retention times in ponds, and possible mixing of surface water sources in the upstream portion of Alameda Creek.

Tracer experiments, the most important part of this project, followed the initial study. Tracers were added to selected ACWD recharge ponds, and groundwater was subsequently monitored to track the progress of the tracer as it migrated through the aquifers. Tracers consisted of non-toxic, non-reactive rare isotopes of xenon and neon. ACWD and LLNL learned a great deal from the tracer experiments. In the Above Hayward Fault (AHF) portion of the basin, the time for the "first molecule" of tracer to reach the AHF well field is relatively quick, but the amount of total mass recovered at the well field in one year is small. Retention in the recharge ponds played an important role on the shape of the breakthrough curves. ACWD also learned that the water in many of the ponds Below Hayward Fault (BHF) do not reach the Mowry Wellfield within a two-year period, potentially bypassing the well field or reaching the well field through a long, circuitous route.

The ponds and groundwater monitoring wells were also sampled for general water chemistry, trace metals, and organics. There were notable differences between recharge pond water quality and groundwater quality. Groundwater had generally lower nitrate and total organic carbon. In addition, male-specific coliphage, a virus of bacteria and used in this study as an indicator of fecal contamination, was not present over the detection limit in all targeted wells. These results indicate that although the recharge water in the creek and ponds is favorable to begin with, a certain degree of water quality improvement occurs in the pond sediments or the vadose zone through which the pond water passes to recharge the aquifers.

E.6 Santa Clara Valley Water District

The Santa Clara Valley Water District (SCVWD) can be contacted at its Web site: http://www.scvwd.dst.ca.us or by phone at (408) 265-2600.

E.6.1 Background

The Santa Clara Valley Water Conservation District, the forerunner of the Santa Clara Valley Water District (SCVWD), was formed in 1929 by public vote under the provisions of the Water Conservation Act of 1929 (Jones Act). The original purpose of the SCVWD was to alleviate land surface subsidence in and around San Jose by constructing large dams to capture winter runoff and using that water to recharge groundwater aquifers. The SCVWD was merged with other water districts in Santa Clara County over the years.

Today, the SCVWD provides wholesale water supply and flood management for all of Santa Clara County. This responsibility includes managing the groundwater basin for quality and quantity. In a typical year, groundwater supplies near half of the water used in the county, and the SCVWD relies on the groundwater basin to meet water supply needs in dry years. Thus, groundwater protection and conservation continue to be high-priority programs for the SCVWD.

E.6.2 Jurisdiction

The SCVWD conducts groundwater management and protection activities under authority of the Santa Clara Valley Water SCVWD Act, California Water Code Appendix, Chapter 60, local ordinances adopted pursuant to authority granted by the SCVWD Act, and agreements with other agencies. The SCVWD Act provides the SCVWD with the authority to levy and collect groundwater production charges and to use the revenues that are collected for the protection and augmentation of water supplies. The SCVWD has adopted two ordinances that support their groundwater management activities. Ordinance 90-1 regulates wells and adopts water contamination hazard standards, and Ordinance 83-2 prohibits pollution of SCVWD water supplies. In addition, the SCVWD entered into agreements with local cities, the county, the Regional Water Quality Control Boards, and the State Water Resources Control Board to provide regulatory oversight for the investigation and cleanup of leaking underground storage tank sties.

E.6.3 Groundwater Protection and Cleanup

The SCVWD takes an aggressive role in:

- Working with local cities and the county to identify and locate sources of contamination
- Evaluating potential and existing and potential threats to groundwater quality
- Implementing programs to protect and enhance groundwater quality.

Specific SCVWD groundwater protection programs are discussed below.

Well Construction and Destruction Programs

Well Ordinance. The SCVWD Well Ordinance Program protects the County's groundwater resources by ensuring that wells and other deep excavations are constructed, maintained and destroyed so that they will not allow the vertical transport of waters of poor quality into the drinking-water aquifers. To meet this goal, the Well Ordinance Program:

- Develops standards for the proper construction, maintenance, and destruction of wells and other deep excavations
- Educates the public, including contractors, consultants and other government agencies about the Well Ordinance and the well standards
- Verifies that wells are properly constructed, maintained, and destroyed using a permitting and inspection mechanism
- Takes enforcement action against violators of the Well Ordinance
- Maintains a database and well-mapping system to document information about well construction and destruction details, well location, and well permit and well violation status.

The Well Ordinance Program began in 1971, when a SCVWD advisory committee consisting of representatives of local agencies, the SCVWD, and the Association of Drilling Contractors was established. The committee was charged with the development of well construction standards and standards for the proper sealing of abandoned wells. The Board adopted standards for well destruction and construction in October 1972 and January 1975, respectively. In 1975, the SCVWD Board of Directors passed the first SCVWD Well Ordinance.

Both the standards and the Well Ordinance have undergone numerous revisions. The Board passed SCVWD Well Ordinance 90-1 in April 1990. The most recent version of the well standards, "Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County," was adopted by the Board in July 1989. These documents address the permitting and proper construction and destruction of wells and other deep excavations, including water supply wells, monitoring wells, remedial extraction wells, vadose wells, cathodic protection wells, injection wells, storm water infiltration wells, and elevator shaft pits.

Beginning in 1975, well construction and destruction permits were required by the SCVWD, and the SCVWD began inspecting every well that was constructed. Well destruction activities were first inspected by the SCVWD in 1984. Since the inception of well permitting, the annual number of permits issued has greatly increased. The SCVWD issued from approximately 400 well permits in 1976, the first full year of permitting, to a maximum of approximately 2,544 permits in 1994. As of October 2000, the SCVWD, under the Well Ordinance Program, had permitted and inspected the construction of 2,908 water supply wells, 22,448 monitoring wells, 4,000 exploratory borings, and the destruction of 9,517 wells. The SCVWD is in compliance with Sections 13803 and 13804 of the State Water Code. Therefore, it has the authority to assume the lead role in the enforcement of the State Well Standards, the assignment of State Well Numbers, and the collection of State Drillers Reports for all wells constructed or destroyed in Santa Clara County. The SCVWD has recently converted the paper-based well maps to a GIS-based well mapping system. The GIS contains locations for more than 30,000 active, inactive, abandoned, and destroyed wells in Santa Clara County.

Dry Wells Program. The SCVWD Dry Well Program regulates dry wells to minimize their impacts on groundwater quality. The program includes controlling the installation of new dry wells, requiring the destruction of dry wells that are a contamination threat, and educating the public and local agencies about dry wells.

In Santa Clara County, at least eight serious contamination sites were caused or aggravated by dry wells introducing contamination into the groundwater. One dry well site has a solvent plume more than 2,000 feet long and more than 200 feet deep in a southern recharge area of the county where the only source of drinking water is groundwater. In August 1993, the SCVWD adopted Resolution 93-59 regarding storm water infiltration devices.

Since 1993, owners of dry wells deeper than 10 feet have been required to register their wells with the SCVWD by filing a "Notice to Continue Use." Dry well owners can continue using their wells as long as the well is not an immediate threat to groundwater quality. To date, we have received approximately 20 dry well notices. Local cities, businesses, contractors, and private citizens regularly call for SCVWD guidance on dry wells. The SCVWD continues to issue permits for dry wells deeper than 10 feet and for the destruction of dry wells. SCVWD staff advises the public and planning agencies about the appropriate use of dry wells to mediate storm-water problems.

The Dry Well Program is being incorporated into the Well Ordinance Program. Specific standards for dry wells will be incorporated into the next revision of the well standards. These standards include prohibiting the construction of dry wells greater than 10 feet and defining dry wells to include all shallow drainage wells, not just shallow drainage wells receiving storm water. Incorporating dry wells into the Well Ordinance Program will clarify permitting and construction standards for dry wells, expand the definition of devices covered by

the well standards so that all wells that bypass natural protection processes are subject to standards for protecting groundwater, and simplify the process by which dry wells are permitted.

Abandoned Water Well Destruction Assistance. The SCVWD Abandoned Well Destruction Assistance Program protects the County's groundwater resources by helping property owners properly destroy old, abandoned water supply wells that they have discovered. Due to the agricultural history of the county and to subsequent post-World War II development, many former water supply wells were abandoned and buried, and remain today as potential vertical conduits that may transport contaminants into the SCVWD's deep water supply aquifers. Some estimates indicate that there may be as many as 10,000 abandoned water supply wells within the boundaries of the Santa Clara Valley Basin. Because there are no official records of these wells, the SCVWD has little knowledge of their existence or their locations.

In the mid-1980s, the SCVWD took a proactive stance on active and abandoned water supply wells found within known contamination plumes. At that time, with assistance from the Regional Board, the SCVWD actively searched for and destroyed known active wells and abandoned wells. However, when abandoned water wells were discovered in areas not threatened by known groundwater contamination, they were not included in the SCVWD's well destruction efforts. Instead, they were treated as well violations under the Well Ordinance Program, and the SCVWD proceeded with enforcement action to force the property owner to properly destroy the well.

Unfortunately, this enforcement action often took months to complete. Property owners often did not have the $3,000 to $15,000 dollars needed to destroy the well and had to secure loans to complete the destruction. Many property owners had negative feelings about the SCVWD after the enforcement action, especially because most property owners had no previous knowledge of the well, and when they discovered the well, they were the first to inform the SCVWD of its existence.

SCVWD staff believed that though a well was found on an owner's property (and according to the Well Ordinance, the property owner is responsible for destroying it), the owner was not actually responsible for the well's current status (abandoned and buried), and because destruction of the well was in the best interest of the SCVWD, the SCVWD should destroy the well.

Therefore, in 1994, the SCVWD initiated the Abandoned Well Destruction Assistance Program to aid property owners who happen to discover an abandoned water supply well on their property. Under the Abandoned Well Destruction Program, the SCVWD destroys abandoned water wells if: 1) the property owner had no previous knowledge of the well, 2) the well was not registered with the SCVWD, 3) the well has no surface features that would have obviously indicated its presence, and 4) the property owner enters into a Right of Entry Agreement with the SCVWD.

Since the program's inception in 1994, the SCVWD has destroyed 108 abandoned wells under the Abandoned Well Destruction Program. Most of these wells were first discovered and reported to the SCVWD because they were flowing under artesian pressure. Staff will continue to implement the program. Each year, staff receives reports of approximately 20 wells that meet program criteria, and staff expect that this trend to continue.

Leaking Underground Storage Tank Oversight Program. The SCVWD provides regulatory oversight of the investigation and cleanup of fuel releases from USTs for most of Santa Clara County. In the early 1980s, several drinking-water wells in the county had been shut down as a result of contamination by chlorinated solvents. In 1983, the state Legislature enacted the UST Law (Chapter 6.7 of the Health and Safety Code) authorizing local agencies to regulate the design, construction, monitoring, repair, leak reporting and response, and closure of USTs. In 1986, the SCVWD Board of Directors decided to implement a leaking UST oversight program for petroleum fuels, in coordination with the San Francisco Regional Water Quality Control Board (Regional Board). In 1987, the SCVWD entered into an informal agreement with the Regional Board to create a pilot oversight program. In 1988, the SCVWD and the county of Santa Clara entered into a

contract with the State Water Resources Control Board to implement one of the State's first Local Oversight Programs. This allowed the SCVWD to be reimbursed with state and federal funds for costs associated with operation of the program.

The SCVWD only provides regulatory oversight on investigation and cleanup of USTs that have leaked. UST tank removals, leak prevention, and monitoring activities in the county are overseen by one of 10 other agencies, usually the local fire department. If there is evidence of a leak or if contamination is detected, the local agency notifies the SCVWD and the Regional Board. The SCVWD reviews the data to confirm releases and determine if the release poses a threat to human health and safety, the environment, or water resources. If there is a threat, a caseworker requests additional investigation and cleanup. As of January 2000, a total of 2,250 fuel leak cases have been reported in the county, the majority of which have affected groundwater. Approximately 1,460 (65 percent) of reported leak cases have been closed. About 700 cases are currently within the SCVWD's UST program. About 70 cases receive Regional Board oversight.

The presence of MTBE in gasoline has precipitated additional changes in the UST regulatory process and how sites are investigated and cleaned up. Since 1993, MTBE and other oxygenates have emerged as significant contaminants at fuel leak sites within the county, causing increased concern for the protection of drinking-water production aquifers. MTBE has been blended into gasoline in high percentages (up to 15 percent by volume) beginning in the winter of 1992 with the intent to significantly improve air quality. MTBE is a recalcitrant chemical in groundwater meaning that it does not undergo significant breakdown (bio-degradation) in groundwater. As a result, MTBE contamination can migrate considerable distances in groundwater and may impact wells miles downgradient. MTBE has been detected at more than 330 current fuel leak cases in the county. Concentrations at these sites range from 5 parts per billion to more than 1 million parts per billion. The SCVWD has taken a progressive and vigilant approach to protecting groundwater resources from MTBE contamination through the use of GIS to manage and analyze both UST site and regional information and in demanding a more intense and detailed level of work be performed at MTBE release sites.

The SCVWD is also very concerned regarding the increasing occurrence of MTBE at operating gasoline stations, which poses a significant threat to municipal drinking-water wells within the county. In 1999, the SCVWD conducted a $1,000,000 project to determine the occurrence of MTBE at operating gasoline stations. Despite the fact that gasoline stations have been upgraded to meet stringent requirements, it is clear that faulty installations, poor maintenance and poor facility operation practices are resulting in leaks, and that improvements in the management of USTs are needed to prevent widespread contamination of groundwater. The SCVWD has committed additional resources to gain a more extensive understanding of the groundwater basin, groundwater flow patterns, and groundwater pumping trends. This improved understanding will allow for better decisions regarding the level of oversight necessary at sites, how much investigation is required to properly understand the nature and extent of contamination at sites, the level of cleanup necessary to protect groundwater resources, and the effectiveness of the program in preventing significant short-term and long-term water quality degradation.

Toxic Cleanup Program. The SCVWD performs peer review of cases where toxic chemicals have contaminated groundwater and provides water use and geologic information available to the public and environmental consultants. SCVWD staff also provide expert technical assistance to the regulatory agencies (Santa Clara County, San Francisco and Central Coast Regional Boards, Department of Toxic Substances Control, and the federal Environmental Protection Agency) responsible for the oversight of investigation and cleanup at non-fuel contaminated sites within Santa Clara County.

The SCVWD has records of over 700 releases of non-fuel related cases involving the release of solvents, metals, pesticides, and a variety of other chemicals in Santa Clara County. The San Francisco Regional Water Quality Control Board provides regulatory oversight on over 600 cases in the northern half of the county. The California Department of Toxic Substances Control provides oversight of 17 cases, and the federal EPA provides oversight of 11 cases. SCVWD staff actively tracks and peer-reviews the most serious of these cases

(primarily the Superfund sites). Staff provides review and comment on Site Cleanup Requirements and Cleanup and Abatement Orders prepared by the Regional Boards and investigation and cleanup reports prepared for these sites. The SCVWD provides geologic and technical expertise to responsible parties (site owners and operators) and their consultants. Staff also regularly participates in various committees and public meetings to ensure groundwater protection is properly addressed.

E.6.4 Saltwater Intrusion Protection

Whenever there is a large saline water body adjacent to freshwater aquifers, as in the case of the San Francisco Bay, the potential for pollution of those freshwater aquifers exists. Intrusion of saltwater into a freshwater aquifer degrades the water for most beneficial uses and, when severe, can render it virtually unusable. Salty water can corrode holes in well casings and travel vertically to other aquifers not previously impacted. Once freshwater aquifers are rendered useless by a severe case of saltwater contamination or intrusion, it is almost impossible to reclaim them.

Comparison of older mineral analyses of groundwater from wells in the San Francisco bayfront area in Santa Clara and Alameda counties, some dating back to 1907 with more-recent data shows that saltwater intrusion has occurred in the upper aquifer. With much higher water demands after World War II and the occurrence of land subsidence, saltwater intrusion conditions became aggravated and encompassed a substantial area of the baylands – the area adjacent to the southern San Francisco Bay. The Bayshore Freeway (U.S. Route 101) and Nimitz Freeway (Interstate 880) delineate the southern limits of this area.

SCVWD Saltwater Intrusion Prevention Program. SCVWD staff undertook a comprehensive field canvassing effort from 1980 to 1984. Defective wells (those thought responsible for allowing seawater to invade freshwater aquifers) fronting the San Francisco Bay were located and cataloged. Thirty-nine "culprit" wells were located. In 1985, the SCVWD pursued properly destroying the 39 "culprit" wells through SCVWD Ordinance No. 85-1. This ordinance gives the SCVWD authority to require owners of wells determined to be "public nuisances" to seal and destroy the wells or upgrade them to active or inactive status. Of the 39 potential conduit wells identified, 10 were not located and were presumed destroyed without a permit. The remaining wells were all properly destroyed.

Since the inception of this program, the Board authorized a more comprehensive well sealing program, through which abandoned wells near areas of known chemical contamination can be sealed with SCVWD funds. This program began in October 1984, and was in part a result of general concerns about contamination of useable aquifers by saltwater as well as by industrial chemicals throughout the county. Several wells in the area were included in this parallel program, many of which were not identified as defective or potential conduit wells.

Saltwater Intrusion Monitoring. The SCVWD continues to monitor the extent and severity of saltwater intrusion. The current Saltwater Intrusion Monitoring Program consists of 21 monitoring wells that are sampled quarterly. Five of these wells monitor the status of saltwater intrusion in the lower aquifer zone, while the remaining 16 wells monitor the upper aquifer zone. Originally, the program consisted of 29 wells. Eight of these wells could not be located during recent field investigations and presumably were destroyed. However, work is commencing to replace the lost wells and restore the monitoring program to its original form.

Future Direction. The present status of the Saltwater Intrusion Prevention Program is subject to change, depending upon the future basin operation and groundwater demand in the area. The two economically practical ways to prevent or minimize any further intrusion are management of the groundwater basin and strict enforcement of ordinances on well construction and destruction standards. These approaches have been adopted by the SCVWD and should continue to be implemented.

E.6.5 Ambient Groundwater Monitoring

The SCVWD conducts regular groundwater quality and elevation monitoring to determine groundwater resource conditions. This monitoring provides data to assist the SCVWD in evaluating and managing the groundwater basin.

Groundwater Quality Monitoring Program. By monitoring the quality of the groundwater basin, the SCVWD can discover adverse water quality trends before conditions become severe and intractable, and implement timely remedial action to prevent or correct costly damage. Groundwater quality samples have been collected in Santa Clara County since the 1940s by the SCVWD and by others. The current monitoring well network, which includes about 60 wells, is designed to reflect general areal and vertical groundwater quality conditions in the hydrogeologic units that yield significant amounts of water. Groundwater quality samples are collected biannually and analyzed for general minerals, trace metals, and physical characteristics. The program is being revised to conduct the sampling annually and expand the parameters measured to include volatile organic compounds.

Monitoring results suggest that water quality is excellent to good for all major zones of the groundwater basin. The more common trace constituents, which are considered unwanted impurities when present in high concentrations, were generally not noted in concentrations that adversely affect beneficial uses. Areas with somewhat degraded waters in terms of total mineral salt content have been identified in the Santa Clara Valley, and elevated nitrate concentrations have been observed in the Coyote sub-basin. Special groundwater-monitoring programs have been developed to define the extent and severity of these problems and other specific water quality problems such as MTBE.

Depth-to-Water Monitoring. The SCVWD also conducts regular depth-to-water monitoring to evaluate groundwater supply conditions and formulate policies to ensure adequate water supplies and minimize any adverse impacts. Collecting depth-to-water information has been one of the SCVWD's functions since it was first formed as a water conservation district in 1929. Depth-to-water information has been used to create semiannual groundwater elevation contour maps. Depth-to-water data are also used for subsidence modeling, to generate hydrographs needed to analyze groundwater model simulations, and to provide information to SCVWD customers on current and historical groundwater elevations. Depth-to-water measurements are recorded on a monthly basis for approximately 170 wells and on a quarterly basis for 108 wells.

Nitrate Management Program. In June of 1992, the SCVWD initiated an extensive study to review historical nitrate concentrations, identify potential sources, collect and analyze groundwater samples for nitrate, and develop a set of recommendations for the prevention and control of nitrate-loading in the Llagas sub-basin. The results of the study, completed in February 1996, indicated that nitrate concentrations are generally increasing over time, and elevated concentrations still exist throughout the sub-basin. The SCVWD began the Nitrate Management Program in 1997 to implement the recommendations of the study. The objective of the program is to delineate, track, and manage nitrate contamination in the south county groundwater sub-basins, including the Coyote Valley sub-basin, in order to ensure the sub-basins' viability as a long-term potable water supply. Specific program objectives are (1) reducing the public's exposure to high nitrate concentrations, (2) reducing further loading of nitrate, and (3) monitoring the occurrence of nitrate.

To reduce nitrate exposure, the SCVWD offered free nitrate analysis to all well water users in the Coyote Valley and Llagas groundwater sub-basins. Approximately 60 wells in the Coyote Valley sub-basin and over 500 wells in the Llagas groundwater basin have been tested for nitrate. Over 30 percent of the wells in the Coyote Valley sub-basin contained nitrate concentrations above the drinking-water standard of 45 mg/l nitrate (as nitrate). Along with the results of the testing, residents are mailed a fact sheet describing what nitrate is, where it comes from, what the health effects are, how to prevent further loading, and where to find more information. Currently, the SCVWD is working with the Santa Clara County Department of Environmental Health to produce a well owner's guide. Among other things, the guide will contain information on

recommended sampling, testing, and disinfecting practices, as well as measures to protect against contamination.

To reduce nitrate loading, the SCVWD entered into a contract with a mobile irrigation lab to offer free irrigation evaluations to farmers in order to improve the efficiency of their irrigation systems and irrigation scheduling. By improving the irrigation efficiency and distribution uniformity, the irrigators can reduce the amount of water and nitrate leached beyond the active root zone of the crop and into the groundwater. In addition, the SCVWD conducted a series of irrigation, nutrient, and pesticide management seminars. Over 250 people attended seminars focusing on efficient irrigation and soil testing for nitrate. Approximately 150 free soil nitrate test kits have been prepared and distributed. A series of five fact sheets on nitrogen and water management in agriculture was produced in cooperation with Monterey County Water Resources Agency and the Pajaro Valley Water Management Agency. The SCVWD continues to schedule mobile lab evaluations and agricultural seminars. In addition, the SCVWD is a cooperator on a grant with a soil scientist to establish field trials demonstrating and evaluating the effectiveness of in-field nitrate testing in drip- and sprinkler-irrigated vegetables.

To monitor nitrate occurrence, the SCVWD monitors nitrate concentrations in approximately 60 wells throughout southern Santa Clara County. The monitoring program is designed to track seasonal, areal, vertical, and long-term trends in nitrate concentrations. Over 10 shallow monitoring wells have been installed to complete the monitoring well network.

Land Use and Development Review. The objective of the Land Use and Development Review Program is to evaluate the land use and developments occurring within the county for adverse impacts to watercourses under SCVWD jurisdiction and to other SCVWD facilities. The SCVWD reviews and comments on proposed land development, environmental documents, and city and county general plans. Review of land development proposals includes a determination of direct and indirect impacts to SCVWD facilities, including potential groundwater quality impacts. Indirect impacts could result from increased runoff and flooding due to new impervious surface or introduction of pollutants to a watercourse from construction activities or urban runoff. Direct impacts to watercourses under SCVWD jurisdiction are addressed through the SCVWD's permitting program as defined by Ordinance 83-2. This ordinance allows the SCVWD to investigate whether a proposed project or activity will pollute the water supply or otherwise affect a District facility. The SCVWD may deny or conditionally approve the permit application for the proposed project if adverse effects have been identified.

The California Environmental Quality Act (CEQA) provides the SCVWD an opportunity to comment in areas relevant to the issues listed in Ordinance 83-2. However, cities need to make certain these issues are adequately addressed and treated. The use of Ordinance 83-2 and CEQA generally have not effected adequate attention to these issues. In years past, the SCVWD has relied on local agencies to place conditions on development projects and to include provisions that address SCVWD water supply and flood protection measures. The recent increase in development and land use, coupled with more stringent environmental concerns and requirements imposed by other regulatory agencies, has made it necessary for the SCVWD to shift to a more proactive approach and to undertake greater participation in development planning activities. SCVWD land use and development review staff plan to participate on interagency project teams, general plan review and revision, and development of relevant policies (such as riparian corridor and building setback policies). The program will also seek revisions to Ordinance 83-2 and greater education of land development planning staff and officials.

Wellhead Protection. The SCVWD does not operate a traditional Wellhead Protection Program. However, there are several SCVWD programs designed to (1) delineate sensitive/vulnerable areas of the groundwater basin, (2) identify existing and potential sources of contamination, (3) develop management strategies, and (4) engage the community in groundwater protection. Activities in each of these areas are discussed below.

Delineate Sensitive Areas. In 1999, the SCVWD completed an evaluation of groundwater sensitivity using the U.S. Environmental Protection Agency's DRASTIC method. DRASTIC stands for Depth to water table, net Recharge, Aquifer media, Soil media, Topography, Impact to vadose zone, and hydraulic Conductivity of the aquifer. Separate GIS coverages were completed for each of these factors and were used to assess the relative groundwater vulnerability to contamination across the county. The SCVWD is presenting the DRASTIC model results to the city and county planning departments, so that planners can take groundwater sensitivity into account when reviewing development plans. The DRASTIC model can also be used as a tool to identify areas where more focused studies are needed or to prioritize cleanup activities at contamination sites.

The SCVWD is developing a GIS-based wellhead protection area delineation tool. The tool will be used to create maps showing zones of contribution to public water supply wells. The tool is intended to be used by local public water suppliers conducting their Drinking Water Source Assessments and by regulators trying to assess threats to individual drinking-water supply wells from contamination sites.

Identify Sources of Contamination. Through the DRASTIC model work and other programs, the SCVWD has identified and mapped many of the sources of contamination throughout the County. The SCVWD has mapped more than 30,000 wells, including almost 3,500 abandoned and destroyed wells. All the leaking underground fuel tank sites have been mapped, along with the locations of nearly 700 operating gas tanks. The SCVWD parcel map includes land use by parcel. The SCVWD is in the process of creating and obtaining coverages of dry cleaners, hazardous materials storage facilities, septic system locations, and sewer lines.

Develop Management Strategies. The SCVWD develops management strategies based on threats to groundwater quality identified through sensitivity analysis, identifying sources of contamination, and water quality monitoring results. Management strategies include programs such as the Nitrate Management Program and Leaking Underground Storage Tank Oversight Program discussed above. The SCVWD continues to be active in promoting legislation, regulations, and programs for protecting groundwater resources from a variety of threats.

Community Outreach and Participation. The SCVWD participates in the Groundwater Foundation's Groundwater Guardian Program and was designated as a Groundwater Guardian Affiliate for the year 2000 based on its groundwater protection activities. 2001 Groundwater Guardian activities include recruiting a Groundwater Guardian Community, completing a video on local groundwater management efforts, and publishing a well owner's guide. Other planned outreach activities include sponsoring workshops on groundwater protection strategies, land use planning, best management practices for operating gasoline stations, and nutrient management.

E.7 San Mateo County Environmental Health Services Division

The San Mateo County Environmental Health Services Division (SMCEHSD) can be contacted online: http://www.smhealth.org/environ/index.shtml or by telephone at (650) 363-4305.

Unlike ACWD and SCVWD, the Health Services Division is not a water district. However, it is the regulatory authority for permitting of all environmental health programs within the county, including small water systems, septic systems, water wells, underground storage tanks, contaminant site remediation, hazardous waste generators, hazardous material business plans, storm water discharge compliance, housing and farm labor camps, retail food facilities, vector control, household hazardous waste, medical waste, and solid waste. All these programs involve some component of protection to surface or groundwater resources.

E.7.1 Jurisdiction

The Health Services Division has no formal authority for groundwater management within San Mateo County, but does protect groundwater resources through various programs as outlined above. Regulatory

authority for these various programs comes from myriad sources. Specifically, the Health Services Division Groundwater Protection Program (remedial oversight), under a contract with the State Water Resources Control Board, is the Local Oversight Program (LOP) providing regulatory oversight for the investigation and remediation of leaking underground storage tank sites. Groundwater Protection Program staff also oversees SLIC and other soil- or groundwater-impacted sites based on verbal agreements with the Regional Board and DTSC, under the general authority of the Health and Safety Code. Additionally, the County of San Mateo has maintained some form a well ordinance since the early 1980s. The most recent amendment to Chapter 4.68 – Wells, San Mateo County Ordinance Code was passed by the County Board of Supervisors January 30, 2001.

E.7.2 Groundwater Protection and Cleanup

As outlined above, the Health Services Division Groundwater Protection Program, under a contract with the State Water Resources Control Board, is the LOP providing regulatory oversight for the investigation and remediation of leaking underground storage tank sites. Groundwater Protection Program (GPP) staff also oversees SLIC and other soil- or groundwater-impacted sites based on verbal agreements with the Regional Board and DTSC, under the general authority of the Health and Safety Code.

As of April 1, 2001, there are 477 active leaking underground storage tank remediation sites countywide within the LOP contract, from a total of 1,051 in the program from inception. Additionally, GPP staff also oversees 49 minor surface spills and solvent tank remediation sites on behalf of the Regional Board and DTSC. Of the total of 526 remediation sites under GPP oversight, 248 occur within the area of the San Mateo Plain Groundwater Basin.

GPP staff provides regulatory oversight on investigation and cleanup of USTs that have leaked. UST tank monitoring, leak prevention, and removals are regulated by the Certified Unified Program Agencies (CUPA) program, also within the Health Services Division. By December 2002, GPP staff will likely assume CUPA responsibilities for UST permitting, monitoring, and removal.

Additionally, local efforts to identify groundwater usage and protection strategies have been ongoing since 1993. A compilation of well data throughout the county began with the Westside Basin in 1993 and has slowly progressed south into the San Mateo Plain Basin. Well permitting was implemented by the Health Services Division in 1987, and thus all wells permitted since that time have been documented with construction details. Data retrieved from all well permit files have been entered into a database maintained by County GPP staff. Using a geographic information system software program, well locations are geocoded and eventually located using a Global Positioning System.

E.7.3 Well Permitting Program

The county of San Mateo has maintained some form of well ordinance since the early 1980s. The most recent amendment to Chapter 4.68 – Wells, San Mateo County Ordinance Code was passed by the County Board of Supervisors January 30, 2001. The Health Services Division Land Use Program is the permitting element for both installation and destruction of all agricultural, domestic water supply, and cathodic protection wells within the county, with the exception of the city of Daly City. The Health Services Division GPP is the permitting element for all geotechnical drilling and environmental investigation drilling (borings and monitoring well installation and destruction), with the exception of the city of Daly City. Drilling performed within Daly City is permitted by the city with notification to the county Environmental Health Division.

Important elements of the county well ordinance include the following: The well ordinance generally follows the state well ordinance. All domestic wells installed after April 14, 1987, must have a meter to record the volume of water removed from the well. All domestic wells within the unincorporated county area west of Interstate Highway 280 and north of state Highway 92, regardless of the installation date, must have a meter to record the volume of water removed from the well. Water-quality testing is required for domestic wells, but not for irrigation wells. Domestic wells must yield at least 2.5 gallons per minute. Unless a waiver is obtained,

wells cannot be installed within 50 feet of an existing well, within 50 feet of a sewer line or lateral, or within 100 feet of a septic tank or leachfield. Additionally, based on the San Mateo County Planning Division General Plan, although currently enforceable only by the Local Coastal Plan Ordinance (within the defined coastal zone), no well can be installed within 50 feet of the riparian corridor along a perennial stream, within 50 feet of the high-water point of a perennial stream with no riparian vegetation, within 30 feet of the riparian corridor along an intermittent stream, or within 30 feet of the centerline of an intermittent stream with no riparian vegetation It is also recognized that within the town of Atherton, a variance from surface construction regulations is required. An Atherton town ordinance requires a flush-to-ground surface well construction, within a Christy box.

E.8 Certified Unified Program Agencies

Six state environmental programs have been consolidated into one program under the authority of a Certified Unified Program Agency (CUPA). A CUPA is a local agency that has been certified by the California EPA to implement these six programs within the local agency's jurisdiction, and can be a county, city, or JPA (Joint Powers Authority). The CUPA program was established under the amendments to the California Health and Safety Code (Chapter 6.11) made by SB 1082 in 1994. Regulations implementing the CUPA program can be found in Title 27 of the California Administrative Code.

The six programs are:

1. Hazardous Waste Generator Program and Onsite Hazardous Waste Treatment activities
2. Aboveground Storage Tank Program Spill Prevention Control and Countermeasure Plan
3. Underground Storage Tank Program
4. Hazardous Materials Release Response Plans and Inventory program
5. Business Plan and Risk Management and Prevention Program
6. The Hazardous Materials Management Plans and the Hazardous Materials Inventory Statement

The Unified Program requires the CUPA in a jurisdiction to consolidate permits, coordinate enforcement of regulations and ordinances, and develop and coordinate a single inspection and enforcement program. The program takes an integrated, multimedia enforcement approach to promote the effective detection, abatement, and deterrence of violations affecting more than one environmental medium or regulatory scheme. Therefore, implementation of each of the six CUPA programs will result in some degree of groundwater protection. For more information on the CUPA programs, please visit the CUPA website at: http://www.calcupa.net/faqs.html

E.9 Groundwater Ambient Monitoring Assessment (GAMA) Program

The California Aquifer Susceptibility (CAS) assessment is a collaborative effort between the State Board, the Department of Health Services, the Department of Water Resources, Lawrence Livermore National Laboratory (LLNL), USGS, and local water agencies. It is described by the State Board in the document "Groundwater Ambient Monitoring and Assessment Program, California Aquifer Susceptibility (CAS) Assessment," as follows:

> "The State Water Resources Control Board (SWRCB), in coordination with the Department of Health Services (DHS) and the Department of Water Resources (DWR), is implementing the California Aquifer Susceptibility (CAS) assessment to determine the water quality and relative susceptibility of groundwater that serves as a source for public water supplies to potentially contaminating activities (PCAs). CAS is part of the Groundwater Ambient Monitoring and Assessment (GAMA) Program and will employ groundwater age-dating techniques and low-level analyses for volatile organic compounds (VOCs). The fundamental premise of this assessment is that groundwater age can be used as a guide for assessing aquifers in terms of susceptibility. The age of groundwater may be defined as the time since the water was recharged and isolated from the atmosphere. Tritium/helium-3

techniques will be used to determine the mean, integrated age of groundwater samples. The widespread use of regulated chemicals has occurred during the last 50 to 60 years (following World War II). Therefore, groundwater that has recharged during the past 50 years will be considered more susceptible to contamination from various land-use activities. In addition, low-level VOC analysis will be used to identify those public supply wells already impacted by certain contaminating activities, but which are still below action levels. The assessment is designed to sample the approximately 16,000 public supply wells statewide, starting with three focus areas: Sacramento Valley, Livermore Valley, and Orange County. Sampling began in September 2000 and will continue for the next several years over the entire state, depending on the availability of funding."

Groundwater supply wells are being sampled under CAS study in San Mateo, Santa Clara and Alameda Counties. For more information on the CAS and GAMA programs, please visit the State Board website at: www.swrcb.ca.gov/cwphome/gama.

E.10 Comprehensive Groundwater Quality Monitoring Program

In October 2001, the Governor approved Assembly Bill 599 (AB 599), establishing the Groundwater Quality Monitoring Act of 2001. Introduced by Assembly Member Carol Liu, the goal of AB 599 is to improve comprehensive groundwater monitoring and increase the availability of information about groundwater quality to the public.

AB 599 requires that the State Water Resources Control Board (SWRCB), in coordination with an Interagency Task Force (ITF) and Public Advisory Committee (PAC), integrate existing monitoring programs and design new program elements, as necessary, to establish a comprehensive statewide groundwater quality monitoring program.

AB 599 also requires that on or before March 1, 2003, the SWRCB submit a report to the Governor and Legislature, detailing the efforts of the joint activities with the ITF and PAC, and including the following elements:

- A detailed description of a comprehensive groundwater quality monitoring program
- A description of how the program takes maximum advantage of existing information
- An assessment of additional monitoring necessary
- A specific set of recommendations for coordinating existing monitoring programs
- An estimate of funding necessary to implement the program
- Recommendations for an ongoing source of funds
- A prioritized list of actions to increase effectiveness of monitoring efforts

E.11 City and County General Plans

Groundwater pollution prevention strategies and groundwater cleanup programs may be specified in city and county general plans. State law requires that each incorporated city and county adopt "a comprehensive, long-term general plan for its physical development." The general plan is the official city or county policy regarding the location of housing, business, industry, roads, parks and other land use, protection of the public from noise and other environmental hazards, and conservation of natural resources. The city council or county board of supervisors adopts zoning, subdivision and other ordinances to regulate land uses and to carry out the policies of its general plan. Cities and counties where groundwater is being pumped for drinking water or emergency supply may include specific groundwater pollution prevention and cleanup strategies in their plans to conserve their valuable resource.

Although state law establishes a set of basic issues for consideration in local general plans, each city and county determines the relative importance of each issue to local planning, and decides how they are addressed

in the general plan. As a result, no two cities or counties have plans that are exactly alike in form or content. The following general plan elements and corresponding planning issues are contained in a general plan:

1. Land use: housing, business, industry, open space, education, public buildings and grounds, waste disposal facilities, and others
2. Circulation: major roads, transportation routes, terminals, and public utilities and facilities
3. Housing: housing needs for all economic segments in the community
4. Conservation: natural resources including water, forests, soils, rivers, and mineral deposits
5. Open space: preserving open space for natural resources, outdoor recreation, public health and safety, and agricultural land
6. Noise: noise problems
7. Safety: seismic, geologic, flood, and wildfire hazards

The process of adopting or amending a general plan requires cities and counties to hold public hearings for each proposal. Hearing bodies, such as planning commissions, zoning adjustment boards, and architectural and design review boards, advise or approve plans for future development.

Community plans and specific plans may also be used by cities and counties to plan the future of a particular area at a finer level of detail than that provided in the general plan. A community plan is a portion of the local general plan that focuses on the issues pertinent to a particular area or community within the city or county. Specific plans describe allowable land uses, identify open space, and detail the availability of facilities and financing for a portion of the community.

For more information on general plan requirements in California, please go to http://www.opr.ca.gov/publications/GeneralPlanning.shtml. For a compilation of land use documents, including many of the South Bay's General Plans, visit http://www.ceres.ca.gov/planning/.