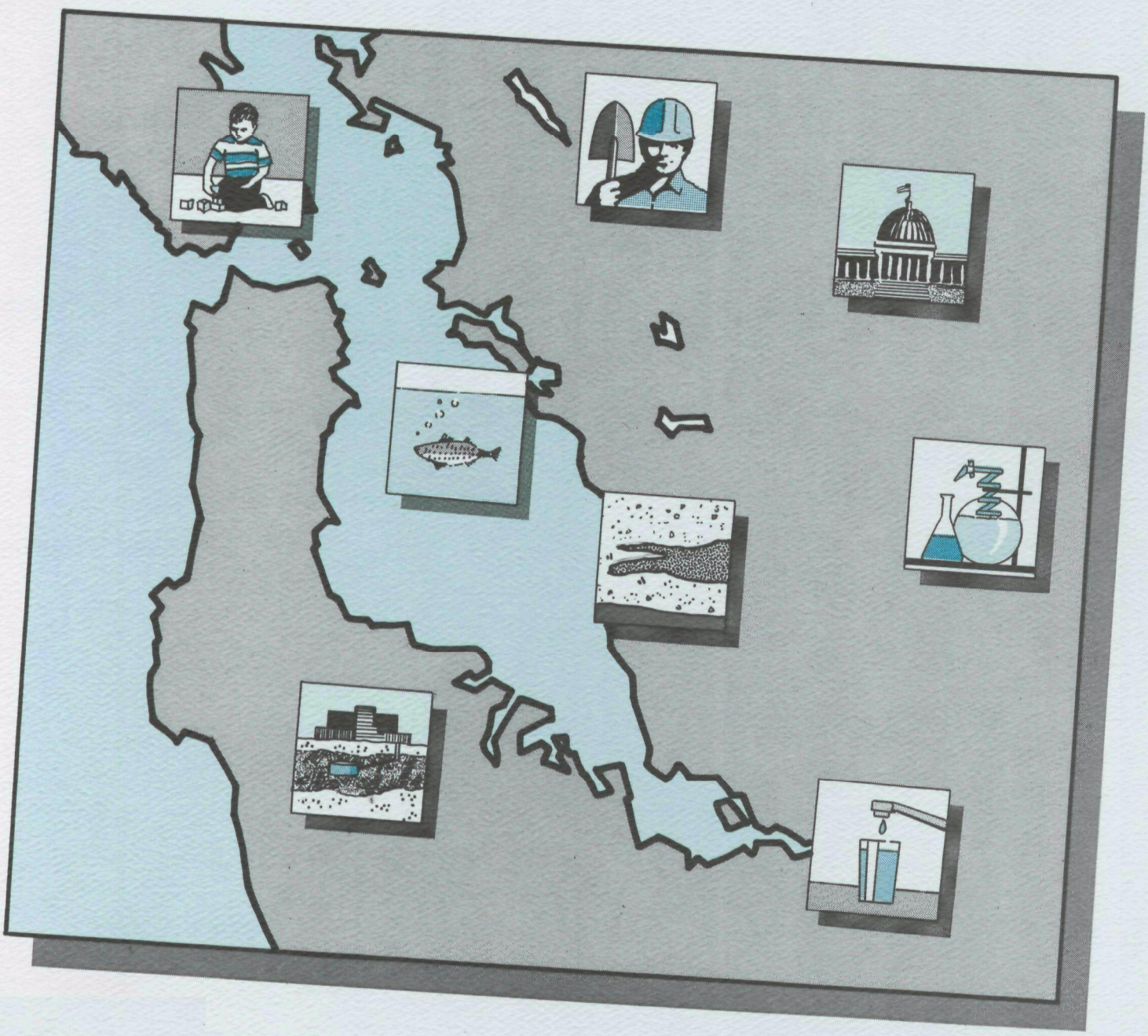
Groundwater Contamination Cleanups At South Bay Superfund Sites



Progress Report

April 1989

U. S. Environmental Protection Agency - Region IX
215 Fremont Street
San Francisco, California 94105

Preface

The Environmental Protection Agency (EPA) prepared this progress report to help you learn more about what is being done about the soil and groundwater pollution in the South Bay. The report focuses primarily on groundwater contamination problems that come under the federal Superfund program. The South Bay area refers to the southern portion of San Mateo County and the northern portion of Santa Clara County, as roughly shown in the boxed area of Figure 1. The report describes the following:

- the nature of the contamination and its effects on the South Bay area;
- the progress made in cleaning up the sites;
- the participation of industries in cleaning up the contamination; and
- the involvement of the California Regional Water Quality Control Board (the Regional Board), the California Department of Health Services (DHS), EPA, and other state and local regulatory agencies.

In addition to groundwater contamination, other potential environmental and human health threats are present in the South Bay area. While this progress report focuses on federal Superfund sites that primarily affect groundwater, it should be noted that other sources contribute to contamination in the South Bay. The South Bay Asbestos site, located in Alviso, is one of the federal Superfund sites in the South Bay. While the South Bay Asbestos site does not threaten groundwater resources, it may pose other potential health hazards. This site is not discussed in this progress report; however, if you would like more information about this site, check the appropriate box on the sign-up form on page 19.

References to many organizations are included in this progress report; you can find a consolidated listing of contact people and their phone numbers in the back. Also on page 19 is a sign-up form that you can return to request to be placed on mailing lists to receive information about any of the sites discussed in this report.

For additional copies of this progress report, contact the EPA Office of Community Relations at the toll-free message line, 1-800-231-3075.

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Groundwater Contamination Cleanups At South Bay Superfund Sites: A Progress Report

Inside:

"Silicon Valley" is well known around the country as a center for innovative high-technology industry. However, the area is also known for its widespread groundwater contamination, which results from leaking underground storage tanks and spills at these high-tech industries. Local, state, and federal government, environmental groups, and industry in the South Bay have set national precedents by aggressively responding to this contamination threat.

A major concern in the South Bay is that drinking water drawn from groundwater sources may become contaminated by the chemicals used by industry. The South Bay area refers to the southern portion of San Mateo County and the northern portion of Santa Clara County, as roughly shown in the boxed area of Figure 1. Groundwater currently provides about half of the drinking water consumed by over 1.5 million South Bay residents and is a valuable resource.

Most groundwater contamination discovered has not affected drinking water supplies. Much of the drinking water is drawn from deep groundwater reserves, called aquifers. Groundwater contamination, in most cases, has been limited to the shallower aquifers. Nonetheless, the potential for contamination to move from shallow to deep aquifers exists. In fact, in some areas, the deep aquifers have been contaminated. While drinking water currently supplied is safe, existing contamination must be cleaned up to minimize risks to public health and to preserve the groundwater as a beneficial resource for the future.

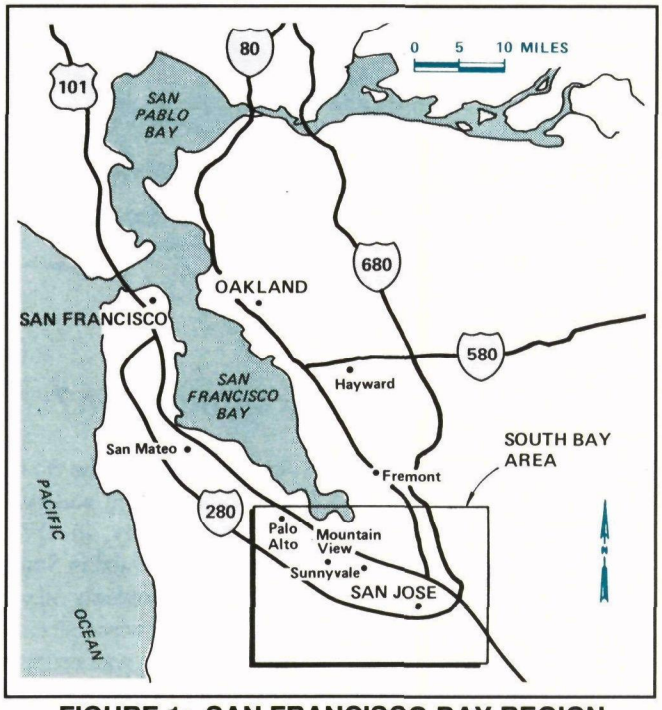


FIGURE 1: SAN FRANCISCO BAY REGION AND SOUTH BAY AREA

What is Contamination?

Contamination is the presence of chemicals, either in the air, water, or soil, that may harm people or the environment. Often these chemicals are present as a result of human activities. The type and amount of contamination vary from one area to another, but the most common industrial contaminants in the South Bay are volatile organic compounds (VOCs). VOCs are used as solvents and metal degreasers by high-tech industries. Table 1 lists VOCs that are commonly found at the South Bay sites. Heavy metals, polychlorinated biphenyls (PCBs), and pesticides are also present at a few sites. Other possible contaminants in the groundwater include herbicides, nitrates, and other fertilizers from agricultural use; bacteria and inorganic substances from septic systems; and fuels from leaking fuel tanks and pipelines.

TABLE 1: COMMONLY FOUND VOLATILE ORGANIC COMPOUNDS

Common Name	Other Names
BTX*	benzene, toluene, xylene
DCA	dichloroethane
DCE	dichloroethene, dichloroethylene
Freon	Freon 113, CFC-113
PCE	tetrachloroethene, tetrachloroethylene, perchloroethene, perchloroethylene, Perc
TCA	trichloroethane
TCE	trichloroethene, trichloroethylene

**BTX refers to benzene, toluene, and xylene collectively. These chemicals may be found and referred to individually.*

What are the Results of the Los Paseos Epidemiological Study?

Epidemiological studies identify cases of public health problems and attempt to trace their cause. A 1985 epidemiological study conducted by the California Department of Health Services (DHS) revealed an elevated rate of birth defects and miscarriages in the Los Paseos neighborhood in San Jose from December 1981 through August 1982. Los Paseos is located adjacent to the Fairchild facility in south San Jose where a 60,000-gallon TCA leak, discovered in December 1981, contaminated a public well. Because the health effects could not be linked to the Fairchild leak with any degree of certainty, follow-up studies were undertaken to determine if the health effects could be directly related to drinking contaminated groundwater.

The conclusions of these studies, released in May 1988, indicated that the contaminated drinking water was most likely not the cause of the health effects. By modeling the distribution system for the water drawn from the contaminated well, researchers determined that the water was distributed to many different areas, not just the Los Paseos area. In these additional neighborhoods, the researchers found no corresponding increase in health effects. In fact, a neighborhood that received more of the contaminated water than Los Paseos did not show evidence of a higher rate of birth defects or miscarriages. The cause of the increased number of birth defects in Los Paseos remains unknown.

For further information on this study, contact the DHS Epidemiological Studies Section at the number listed on page 21.

How Did We Find Contamination?

Groundwater contamination first came to light in the South Bay in late 1979 when IBM found contaminated soil near underground tanks in San Jose. Subsequently, in 1981, Fairchild Camera and Instrument Company, located in South San Jose, determined that 60,000 gallons of solvents mixed with water had leaked from an underground waste storage tank. Groundwater drawn from a nearby public water supply well was contaminated with trichloroethane (TCA), a solvent commonly used by high-tech industries. TCA was found at concentrations above safe drinking water levels, and the well was immediately removed from service.

This discovery prompted the San Francisco Bay Regional Water Quality Control Board (Regional Board), the state agency with primary responsibility for regulating discharges into water resources, to actively investigate other potential sources of contamination from industrial chemicals. The Regional Board initiated a Leak Detection Program, sending

questionnaires to facilities storing hazardous materials in underground storage tanks. Over 150 sites have been identified where soil and/or groundwater have been contaminated. Currently, the Environmental Protection Agency (EPA), the department responsible for conducting the federal Superfund program, is active at 28 of these sites. Figure 2 shows the location of these 28 federal Superfund sites. State and local agencies are investigating other sites, including approximately 900 locations where fuel leaks have been found.

The discovery of contamination in the South Bay from underground storage tanks and high-tech industries has received national attention, alerting regulatory agencies to a problem that exists throughout the United States. A Hazardous Materials Storage Ordinance developed by local government, industry, and public interest groups in response to the contamination has served as a model for similar laws nationwide. These ordinances establish preventative design standards and monitoring procedures that will minimize future contamination.

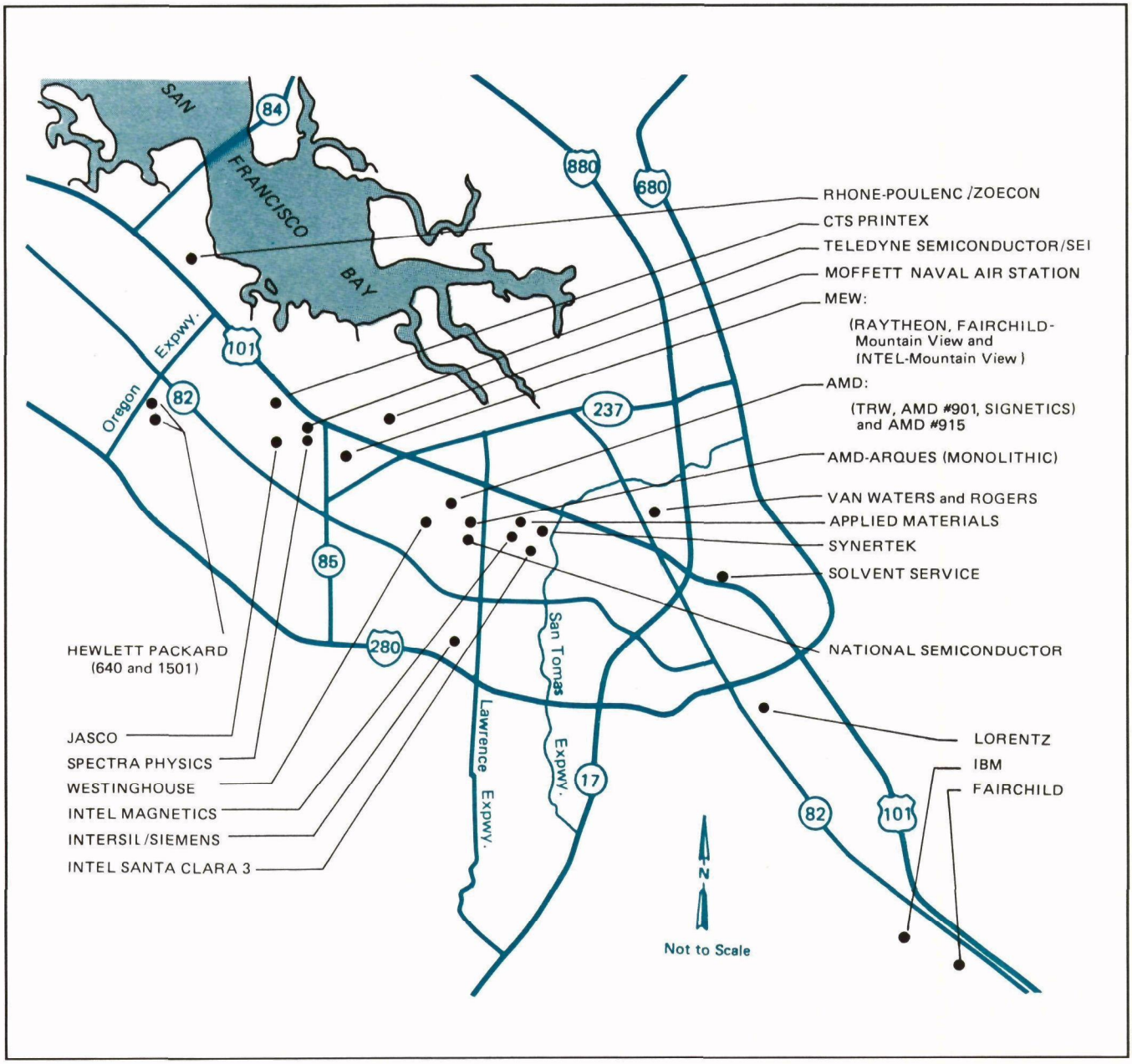


FIGURE 2: 28 FEDERAL SUPERFUND SITES WITH GROUNDWATER CONTAMINATION IN THE SOUTH BAY AREA

Where Does South Bay Drinking Water Come From ?

Drinking water comes from groundwater and surface water. As Figure 3 depicts, groundwater collects in underground layers of water-saturated rock, gravel, or sand, called aquifers. In the South Bay, aquifers are generally separated by relatively impermeable layers of clay.

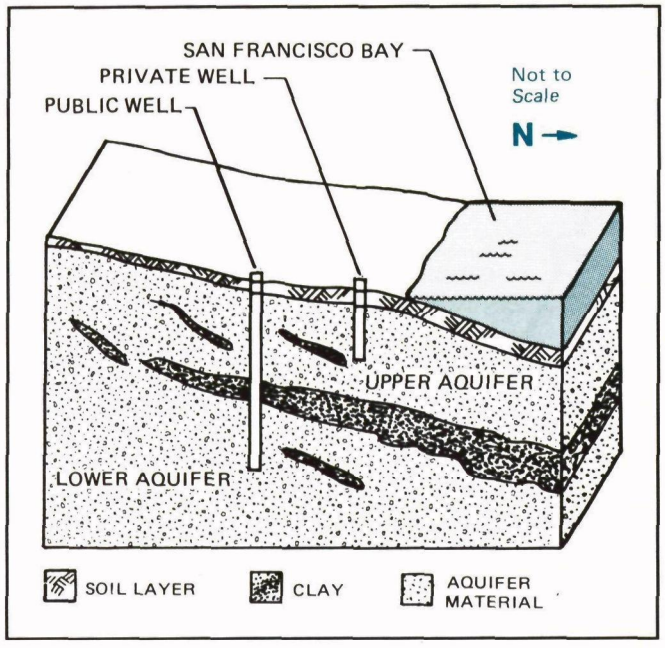


FIGURE 3: REPRESENTATION OF SOUTH BAY AQUIFER SYSTEM

Groundwater moves very slowly in comparison to surface water, such as streams or rivers. The velocity of groundwater varies depending on many factors, including the type of material through which it moves and pumping activities in the area. Water within the aquifers in the South Bay generally flows toward San Francisco Bay.

Throughout much of the South Bay, groundwater lies in two main aquifers. The shallow aquifer is separated from the deep aquifer in most places by a clay layer, which begins about 100 feet below the ground surface. The clay layer varies in thickness; in the northern area, closer to the Bay, it is approximately 100 feet thick. This clay layer acts as a barrier, preventing water and contaminants that may be released near the ground surface from easily reaching the deep aquifer. The clay layer does, however, contain natural cracks or gaps through which water and contaminants can move. Improperly sealed wells that penetrate the clay layer and connect the two aquifers may also provide a migration route for contaminants.

The general aquifer structure throughout most of the South Bay area is similar to the description earlier; however, site-specific geology varies widely. These differences are especially important in the southern section of the South Bay, where the separating clay layer "pinches out" or thins. In some areas, the shallow and deeper aquifers are not separated by a clay layer and the deeper aquifer is replenished or recharged by water filtering down from the surface. If this "recharge" water becomes contaminated, the deeper drinking water aquifers are threatened since there are no clay layers to prevent contaminants from percolating into the deeper groundwater. Figure 6 on page 8 shows this recharge process.

Most water is provided to South Bay residents through public supply systems, which draw groundwater from the deep aquifer below the protective clay layer. A few residents continue to be served by private wells. The majority of the private wells draw water from the less protected shallow aquifer. Some water is imported through aqueduct systems from reservoirs, lakes, and rivers.

If you have questions about your drinking water, contact your water supplier. To find out who provides your drinking water, contact the Santa Clara Valley Water District. Their number is listed on page 21.

Is Your Drinking Water Safe?

As mentioned earlier, a major concern in the South Bay is that contaminated groundwater may result in future contamination of drinking water. Most of the contamination has been restricted to the shallow aquifers, from which little drinking water is drawn. However, without action, contaminants could reach the deeper aquifer. At this time, all water suppliers in the South Bay are providing water that meets drinking water standards. See the inset entitled "What Are Drinking Water Standards?"

The discovery of contaminated groundwater led to extensive monitoring of water supply wells for chemicals detected at industrial sites. According to data compiled by the California Department of Health Services (DHS) in December 1988, approximately 15 percent of the large public water supply wells have been affected by some level of VOC contamination. Table 2 shows approximately how many wells are known to have been affected and the status of these wells. A number of wells were closed because contaminant levels exceeded or approached drinking water standards. Several other wells, with contaminant levels below drinking water standards, were put on standby as a precautionary measure. These wells, which produce safe water, will only be used when additional water supplies are needed. Wells with contamination far below drinking standards have remained in active use.

TABLE 2: WELLS AFFECTED BY GROUNDWATER CONTAMINATION IN THE SOUTH BAY

Information from Department of Health Services, 1988

	Closed	On Standby	In Use	Total Affected
Affected Public Wells:	6	12	20	38
Affected Private Wells:*	47	-	9	56
Total No. of Affected Wells:	53	12	29	94

* *There are over 5,000 private wells in the South Bay; not all of which have been sampled.*

How do government agencies ensure that the water you are drinking is not contaminated with industrial chemicals? Public water supply wells are monitored routinely. In addition, when a contamination source is discovered, nearby drinking water wells, including private wells, are monitored.

Water suppliers test large public water supply wells that serve over 200 households for VOCs and other potential contaminants on a yearly basis. Some of the water suppliers in the South Bay have chosen to monitor their wells more frequently. If results indicate contamination, the wells are tested more frequently. Wells are taken out of service when contaminant levels pose a significant health threat or when contaminant levels exceed the standards.

Small well systems, serving 5 to 199 households, are usually located in rural areas. The Santa Clara County Health Department (SCCHD) monitors these wells for organic chemicals on a case-by-case basis.

No formal monitoring requirements currently exist for private wells. These wells generally draw from shallow aquifers and thus have a greater chance than public wells of becoming contaminated. The SCCHD has initiated private well sampling studies to assess potential contamination. Under a grant from DHS and with funds from Santa Clara County, the SCCHD recently completed a study of 1,225 private wells (out of some 5,000). Approximately 3.3 percent of the wells sampled showed the presence of VOCs, while nearly 28 percent of the wells sampled failed to meet drinking water standards due to inorganic chemical contamination (usually nitrates), most likely from septic systems and agricultural fertilizers. About 25 percent of the samples exceeded standards for bacteria levels.

If your well was not included in this study and you would like to have it tested, you can obtain a list of state-certified labs that can perform the analysis from the SCCHD. See page 21 of this report for their phone number.

What are Drinking Water Standards?

EPA and DHS establish federal and state drinking water standards. These standards are used to determine what levels of contaminants are unacceptable in drinking water supplies. Under the federal Safe Drinking Water Act, EPA has established "Maximum Contaminant Levels" (MCLs) for several of the contaminants found in the South Bay. EPA establishes MCLs based on the contaminant's potential health effects, as well as on technological and economic feasibility of treatment. If an MCL is exceeded for a particular contaminant, the water supplier is required to notify its customers, submit a plan to EPA for meeting the standard, and correct the problem.

DHS sets "Action Levels" for numerous contaminants based solely on health criteria; these standards are not legally enforceable but are offered as guidelines. During 1989, DHS is adopting enforceable standards, called state MCLs, for many of the contaminants for which there are currently only Action Levels. State MCLs are also based on health criteria as well as cost and technological feasibility of treatment. If a water supply exceeds a state MCL, the water supplier must notify its customers and take action to reduce the contamination. If a water supply exceeds an Action Level for a particular substance, DHS recommends that the supplier notify its customers and reduce the contamination.

What is the Superfund National Priorities List?

The National Priorities List (NPL) is the nation's list of identified areas posing the greatest potential threat to human health and the environment. These areas or sites must be cleaned up in accordance with the federal program's guiding legislation: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act. CERCLA established a Trust Fund, also known as "Superfund," which is primarily financed by a tax on the chemical and petroleum industries.

EPA can use Superfund monies for investigation and cleanup at any site included on the NPL. Monies from the Trust Fund may be used when the parties responsible for contamination at NPL sites are unknown, or unwilling or unable to finance site cleanup on their own. EPA has the authority to then pursue those parties responsible for the contamination and seek financial reimbursement for the costs of any investigation and cleanup activities conducted by EPA. This cost recovery authority allows EPA to sue those parties for up to three times the cost of the cleanup activities.

Who is Responsible For Cleaning Up?

Twenty-eight sites in the South Bay with groundwater contamination are on or proposed for the federal Superfund program's National Priorities List (NPL). Figure 2 shows the location of these sites. While EPA directly oversees cleanup at seven of the Superfund sites, responsibility for 20 of them has been put in the hands of the Regional Board, the agency with the longest involvement in cleanup of South Bay groundwater. DHS is overseeing cleanup at the Rhone-Poulenc/ Zoecon Superfund site. Figure 4 shows agency involvement at these sites.

In almost all of the federal Superfund cases with groundwater contamination in the South Bay, the companies responsible for the pollution are cleaning it up. They are doing so under orders from the Regional Board, DHS, or EPA. Even though many of the companies are taking action voluntarily, these orders are important because they stipulate tasks and schedules for conducting investigation and cleanup activities, and they require compliance with federal and state regulations.

In contrast, the Lorentz Barrel & Drum site investigation and cleanup is currently being conducted by EPA, and financed by the Superfund Trust Fund. Initial cleanup activities at Lorentz were performed by DHS. Efforts are underway to identify parties who may have contributed to or caused the contamination at the site (called potentially responsible parties or PRPs) and hold them accountable for the cleanup. When PRPs are identified, EPA will negotiate with them to take over cleanup efforts; EPA would then monitor the PRP cleanup.

EPA provides support and funds for the Regional Board's activities at NPL sites through a contract known as the Multi-Site Cooperative Agreement. One of the important conditions

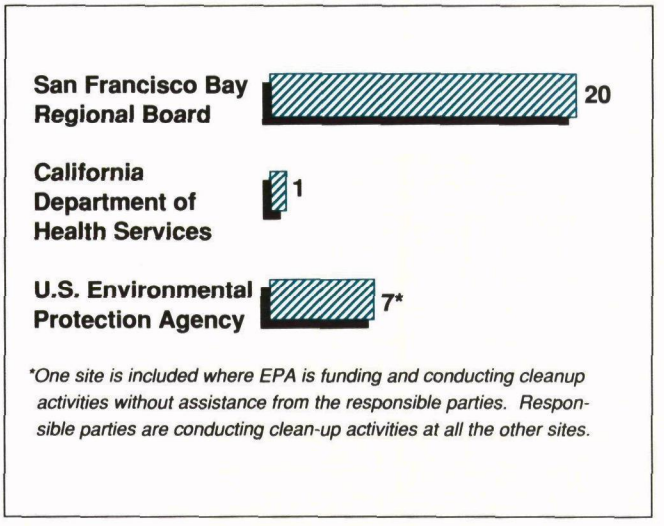


FIGURE 4: NUMBER OF FEDERAL SUPERFUND SITES IN THE SOUTH BAY WITH AGENCY INVOLVEMENT

of this agreement is that sites must be cleaned up according to federal Superfund program requirements. In addition, the agreement funds activities designed to enhance an area-wide, rather than only site-specific, approach to groundwater cleanup.

Coordination of cleanup and enforcement activities between the various regulatory agencies is enhanced by the South Bay Groundwater Contamination Enforcement Agreement between EPA, DHS, and the Regional Board. This agreement spells out the responsibilities of the lead agencies, including maintaining a data base to track and help coordinate progress at all the South

Bay sites. The agreement also sets guidelines for deciding which agency should play the lead role at a given site. See Table 4 on page 11 for a list of which agency has the lead at each site, the status of the site on the NPL, and the suspected source of contamination.

Many local and regional organizations are also involved in decisions that affect site cleanup. These include several Santa Clara County departments, the Santa Clara Valley Water District, and city fire departments or hazardous materials offices, as well as industry, community groups, and the public. Figure 5 depicts how these groups interact.

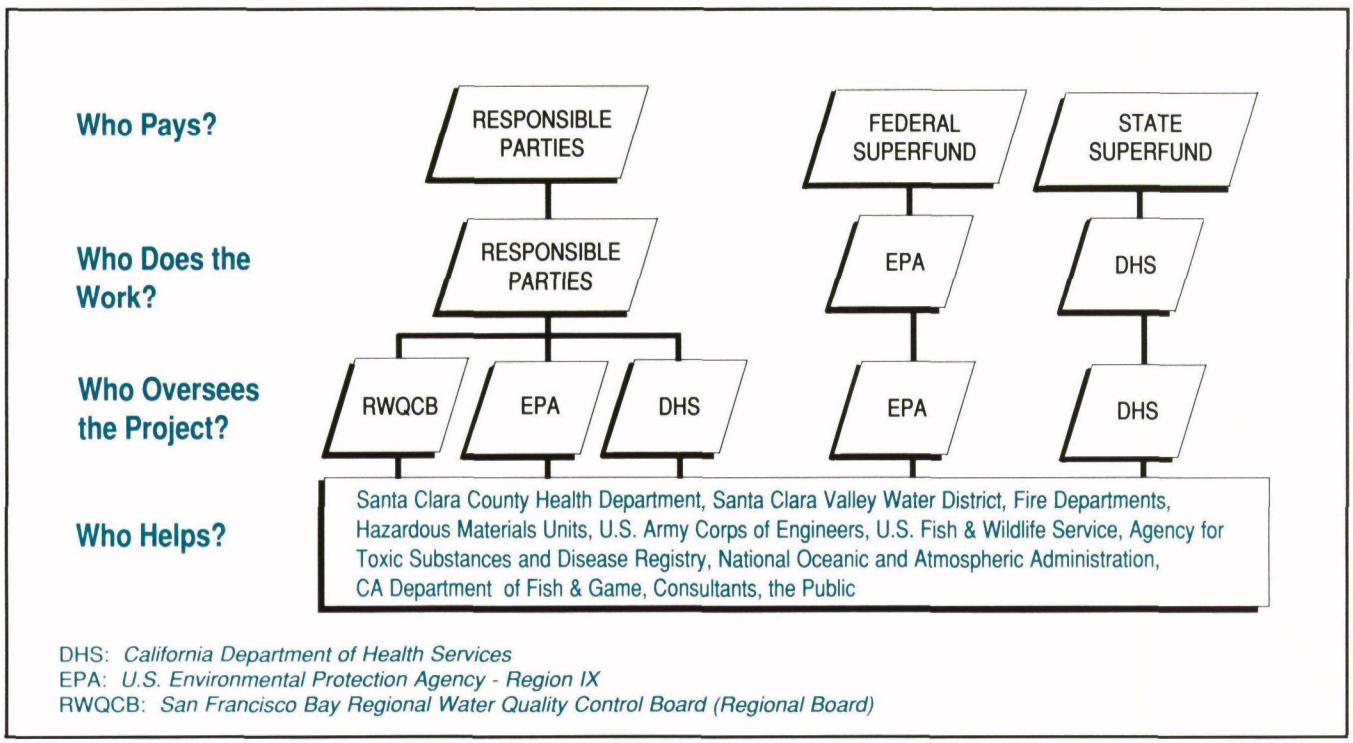


FIGURE 5: RESPONSIBILITIES AT SUPERFUND SITES IN THE SOUTH BAY

How Do We Balance Groundwater Cleanup

. . . and Water Supply Needs?

Cleaning up groundwater may involve removing millions of gallons of contaminated water from the South Bay's groundwater aquifers for treatment. Concern about the disposal of this water without further use has been heightened by recent drought conditions. Industry, government, and water suppliers are actively considering ways to reuse the extracted groundwater. Reducing pumping rates to limit the amount of water extracted is also being considered, although this may result in slower progress toward cleanup.

This water use issue is particularly relevant to IBM and Fairchild, which are located in the aquifer "recharge" zone. Figure 6 shows this recharge zone. The recharge zone is where the clay layer that separates the South Bay's two primary aquifers thins, allowing water to percolate from the surface and replenish both the shallow and deep aquifers. Contamination in the recharge zone is of particular concern because of the potential effect it can have on the entire Santa Clara Valley water basin. Once contaminants reach the deeper aquifer in the recharge zones, the contaminated groundwater could flow northward under the clay layer and contaminate the deeper drinking water supply aquifer.

Furthermore, due to the geology in the recharge area, groundwater moves much more quickly than it does in the northern area, and contaminant plumes migrate more quickly. Capturing and containing the plumes may require removing very large volumes of water.

Most pumping in the area is for drinking water supply, agriculture, and industry; pumping for cleanup activities represents only a small percentage of the extraction. However, due to drought conditions and as a result of these various pumping activities, underground water levels near IBM and Fairchild have dropped significantly. These decreased levels of water in the aquifer may also lead to increased subsidence rates. When water levels drop, the soil material that was supported by water collapses, filling in the void spaces that the water occupied. This collapsing or compaction of soils leads to the lowering of the ground's surface. This phenomenon, subsidence, can damage buildings and underground structures such as pipes and tanks, and increases the potential for flood damage. In addition, once the soils are compacted, there is less space for

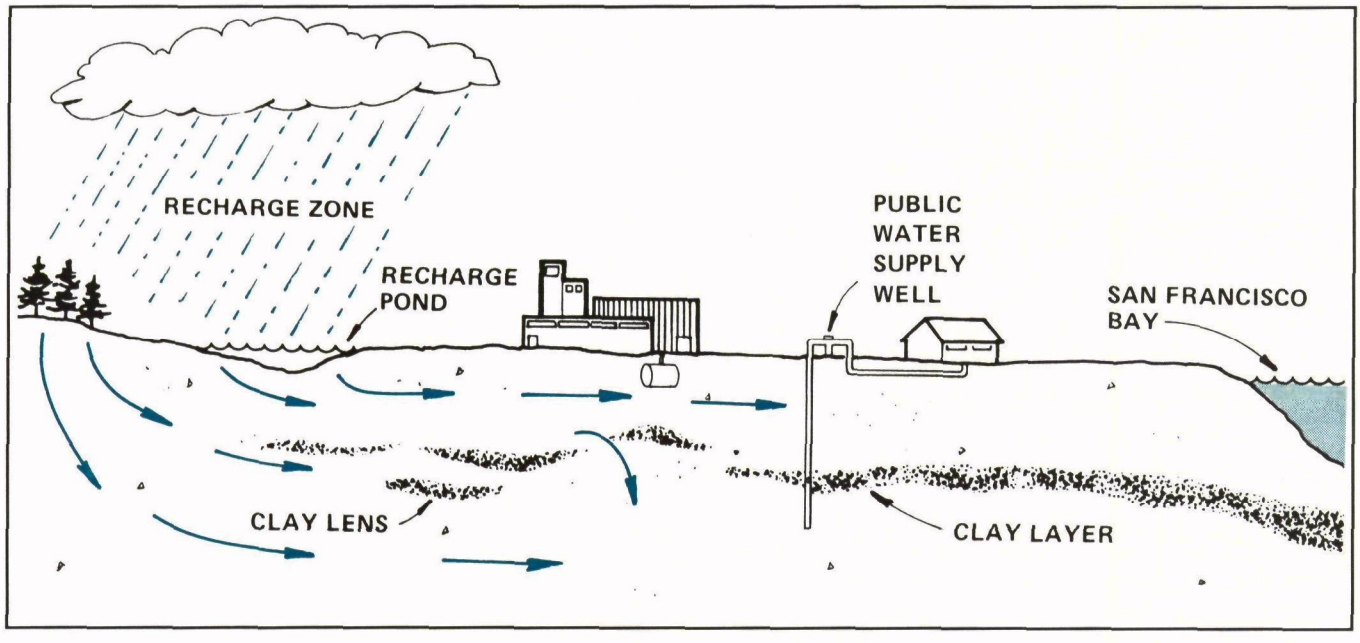


FIGURE 6: DIAGRAM OF THE RECHARGE ZONE IN THE SOUTH BAY

water storage and the aquifer is less effective for yielding water in the future.

Various alternatives for productively using the extracted and treated water and replenishing the depleted aquifer are being considered. One option focuses on delivering the water to the area's "recharge ponds," where surface water is used to replenish the groundwater aquifers. Other options explored for reuse include re-injection directly into the aquifer, and using the treated water for irrigation or industrial use. The need to avoid unnecessary waste of water is being balanced against concerns about reusing the extracted water. EPA's Superfund program encourages reuse of the water whenever water quality standards are met and public health is protected.

One short-term way to restore water levels in the aquifer is to reduce the rate at which water is being pumped from the aquifer. The disadvantage of this alternative is that the contaminant plumes may be less effectively controlled, resulting in contamination migrating further. As migration continues, more water may become contaminated and the total amount of time required to accomplish cleanup may be longer. However, because the levels of the contaminants that will continue to migrate under a reduced pumping scenario are below drinking water standards at both IBM and Fairchild, the Regional Board has determined that this measure is necessary to protect the aquifer. The Regional Board determined this action will not pose a significant threat to public health and requested that the companies reduce their pumping rates. Table 3 shows the reduction in the pumping rates.

TABLE 3: PUMPING RATES AT IBM AND FAIRCHILD, SAN JOSE

	Prior to 4/88	After 9/88
IBM	8.2 mgd*	2.2 mgd
Fairchild	4.0 mgd	1.5 mgd

** An mgd is equal to one million gallons per day. An average family of four uses approximately 600 gallons of water per day or 0.0006 mgd. Ten thousand families of four use about 6,000,000 gallons per day or 6 mgd.*

In the longer term, debate continues about how best to manage water quantity versus water quality throughout the South Bay. While the rates of groundwater extraction are significantly lower at the other groundwater contamination sites in the South Bay than at IBM and Fairchild, the issue of water supply management is of growing concern. Companies are being asked to consider water conservation and reuse as a part of their long-term plans for cleanup.

. . . and Clean Air Concerns?

Most of the contaminants found at South Bay Superfund sites are VOCs, which can evaporate readily into the air. Proven technologies exist for effectively removing these VOCs from water or soil. (VOCs can sometimes be directly eliminated by other technologies. In some cases, these technologies may not be practical due to cost, reliability, and effectiveness.) However, as these techniques are used and the VOCs are separated from the water or soil, the question remains of what to do with the VOCs.

Releasing VOCs directly to the air may adversely affect air quality. The Bay Area Air Quality Management District is responsible for monitoring air emissions to ensure that public health is protected. To prevent unacceptable air emissions, chemical vapors can be treated and removed from air. VOCs are trapped by a carbon treatment system. The used carbon will either be disposed of or regenerated through incineration. Thus, contamination does not simply go away; industry and government must balance groundwater cleanup goals with clean air considerations when designing cleanup systems.

What Progress Has Been Made in Investigation and Cleanup?

Interim Actions

In general, the first step taken at a typical South Bay site is the identification and elimination of any immediate health threats. This step is most frequently accomplished through monitoring nearby drinking water wells that could have been affected by contaminated groundwater and evaluating the risk of direct contact with contaminated water, soils, or air. If any immediate health threats are discovered, short-term cleanup actions are taken as soon as possible. Interim actions can also be taken to prevent further spread of contamination while long-term solutions are developed.

As Table 5 on page 12 indicates, a number of interim actions are currently in place and operating. These interim actions will continue as necessary until the final remedy is in place. Interim actions have been conducted at almost all of the South Bay sites. Additional current information about site-specific cleanup efforts is available from the Site Management System data base, which is maintained by the Regional Board.

Long-term Investigations

While interim actions are continuing, longer-term studies and analyses are being conducted to develop appropriate final cleanup schemes. Long-term investigations have begun at all of the federal Superfund sites in the South Bay. Investigation and cleanup activities take place within a regulatory framework designed to promote consistent decisionmaking throughout the country.

The first step in the federal Superfund process, after the site is proposed for the NPL, is to conduct a comprehensive site investigation known as a Remedial Investigation (RI) to determine the type and extent of contamination. The next phase, the Feasibility Study (FS), requires evaluating various alternatives for cleaning up the contamination at the site. For more information about the evaluation criteria, see the inset " How Do We Evaluate Cleanup Alternatives?" on page 17. After inviting public comment, a cleanup alternative is selected and cleanup activities begin. The federal Superfund process is outlined in Figure 7 on page 13.

Cleanup Levels

Deciding on a particular cleanup alternative requires determining appropriate cleanup levels. Cleanup levels are the concentration or amount of a contaminant that can safely remain after cleanup is completed. Cleanup levels are determined on a site-specific basis. Standards, such as federal MCLs established by EPA under the Safe Drinking Water Act and state MCLs and Action Levels established by DHS, are often used in establishing cleanup levels for contaminated groundwater. When standards do not exist (as is the case for many contaminants), a risk assessment is used to determine the level of cleanup necessary to protect public health. For more information, see the inset "What are Risk Assessments?" on page 14.

Final Cleanup Actions

After public comment has been considered, a final cleanup option is chosen. For information about public involvement, see the section "How Can You Become Involved?" on page 18. The first phase of cleanup is known as the Remedial Design . During this phase treatment systems are designed and tested. The next step of cleanup is the Remedial Action. At this point in the process, final cleanup activities start or on-going interim cleanup activities are modified for inclusion in the final cleanup.

What is the RCRA Listing Policy?

In November 1984, the Resource Conservation and Recovery Act (RCRA), which regulates operating hazardous waste facilities, was amended to include cleanup authorities similar to those under CERCLA. The adoption of the amendments meant that eight sites in the South Bay could be cleaned up under RCRA authority. Table 4 indicates which sites may be affected by this policy. Use of RCRA authorities does not involve the expenditure of Trust Fund monies, thus leaving the funds available to clean up other sites. If a site can be cleaned up under RCRA authority, it is EPA's policy to reconsider placement of the site on the NPL.

Despite the potential change in NPL status at several sites, very little change in the cleanup processes underway is expected. EPA recognizes the expectations created when these sites were initially proposed for the NPL, and is taking steps to ensure continuity and the continued quality of the cleanups.

More information about the RCRA listing policy and its implications for the South Bay is available in an EPA fact sheet. For a copy, call the EPA contact listed on page 21 of this progress report.

TABLE 4: FEDERAL SUPERFUND SITES WITH GROUNDWATER CONTAMINATION IN THE SOUTH BAY

SITE	STATUS*	LOCATION	LEAD AGENCY	CONTAMINATION
Advanced Micro Devices, Arques (Formerly Monolithic Memories)	F	Sunnyvale	RWQCB	VOCs from leaking pipelines
Advanced Micro Devices (#901)	F	Sunnyvale	RWQCB	VOCs beneath the site from leaking neutralization sump
Advanced Micro Devices (#915)	P	Sunnyvale	RWQCB	VOCs from leaking acid neutralization and underground storage tank
Applied Materials	F	Santa Clara	RWQCB	VOCs from leaking tanks and piping
CTS Printex	P	Mountain View	RWQCB	VOCs from leaking sump
Fairchild (MEW)	D	Mountain View	EPA	TCE from leaking tanks and pipelines
Fairchild	R	San Jose	RWQCB	VOCs from solvent tank failure
Hewlett Packard (640)	P	Palo Alto	RWQCB	VOCs from leaking underground storage tank
Hewlett Packard (1501)	D	Palo Alto	RWQCB	VOCs from leaking tanks and pipelines
IBM	D	San Jose	RWQCB	VOCs from leaking pipelines, surface spills, and other sources
Intel (MEW)	F	Mountain View	EPA	TCE from leaking tanks and pipelines
Intel Santa Clara 3	F	Santa Clara	RWQCB	VOCs from unidentified sources
Intel Magnetic/Micro Storage	F	Santa Clara	RWQCB	VOCs from unidentified sources
Intersil/Siemens	P	Cupertino	RWQCB	VOCs from leaking underground storage tanks and spills
Jasco	P	Mountain View	EPA	Methylene chloride, paint thinner, and other VOCs from spills
Lorentz Barrel & Drum	R	San Jose	EPA	PCBs; pesticides, heavy metals, and VOCs
Moffet Naval Air Station	F	Sunnyvale	EPA/RWQCB**	VOCs from sumps, tanks, piping, spills and landfill
National Semiconductor	F	Santa Clara	RWQCB	VOCs from sumps, tanks, leaking pipes, and spills
Raytheon (MEW)	F	Mountain View	EPA	TCE from leaking tanks and pipelines
Rhone-Poulenc/Zoecon	D	E. Palo Alto	DHS	Arsenic from pesticide manufacturing
Signetics	D	Sunnyvale	RWQCB	VOCs from leaking pipe
Solvent Service	P	San Jose	RWQCB	VOCs from leaking tanks and/or drums
Spectra Physics	P	Mountain View	RWQCB	VOCs from leaking sumps
Synertek	P	Santa Clara	RWQCB	VOCs from leaking undergrounf tanks
Teledyne Semiconductor/SEI	F	Mountain View	RWQCB	VOCs from leaking sump, piping and tanks
TRW Microwave	P	Sunnyvale	RWQCB	VOCs from leaking underground tank
Van Waters and Rogers	D	San Jose	RWQCB	VOCs and other solvents from leaking underground tanks and spills
Westinghouse	F	Sunnyvale	EPA	PCBs from storage tank, BTX from underground fuel tank leak

**P = Proposed for NPL with Update #7 (June 1988)*
F = Final on NPL
R = Proposed to go final on NPL based on RCRA Listing Policy (see inset on page 10)
D = Proposed to be removed from the NPL based on RCRA Listing Policy (see inset on page 10)

*** Site being transferred to EPA*

TABLE 5: INTERIM CLEANUPS CONDUCTED BY INDUSTRY ☆

SITE	SOIL REMOVED (cubic yards*)	TANKS REMOVED ✣	SLURRY WALLS	EXTRACTION WELLS †	MONITORING WELLS †	TREATMENT AS[a]	TREATMENT CA[b]	TREATMENT other
Advanced Micro Devices, Arques (formerly Monolithic Memories)	200	2 tanks and 1 sump	-	11	41	X	-	-
Advcanced Mlicro Devices (#901)	215	2 acid neutralization	-	6	24	X	-	-
Advanced Micro Devices (#915)	5,500	1 acid neutralization 1 waste stripper	-	8	32	X	X	-
Applied Materials	60	1 waste solvent 2 acid neutralization	-	2 (+1 pit)	-	X	-	-
CTS Printex	300	-	-	7	35	-	-	-
Fairchild - Mountain View (MEW)	-	60 tanks	3	26	-	X	-	-
Fairchild - San Jose	3,400	1 tank	1	4	~115	X	-	X[c]
Hewlett Packard (640)	800	1 tank	-	3	47	X	-	-
Hewlett Packard (1501)	-	6 tanks	-	3	49	-	X	-
IBM	23,000	65 tanks and piping	-	13(before 4/88) 4(after 4/88)	>300	-	-	-
Intel - Mountain View (MEW)	4,700	5 tanks 1 concrete vault	-	4	>40	-	X	-
Intel Santa Clara 3	-	-	-	2	16	-	X	-
Intel Magnetics/Micro Storage	34	1 tank replaced	-	2	14	-	X	-
Intersil/Siemens	-	5 tanks 5 sumps	-	11	~75	X	-	X[c]
Jasco	575	1 diesel tank	-	1	12	-	-	-
Lorentz Barrel & Drum	3,000	26,500 drums	-	-	6	-	-	-
Moffett Naval Air Station	Planned	6 tanks and 1 sump	-	-	82	-	-	-
National Semiconductor	500	8 tanks and 6 sumps	-	39	92	X	-	-
Raytheon (MEW)	-	tank piping	1	20	>150	X	X	X[d]
Rhone-Poulenc/Zoecon	-	-	-	-	~30	-	-	-
Signetics	5,000	1 tank and piping	-	16	117	X	X	-
Solvent Service	100	1 tank	-	5 3 trenches	~100 -	- -	- -	X[d] X[d]
Spectra Physics	-	5 sumps	-	Planned	~50	-	-	X[c]
Synertek	40	4 tanks	-	5	27	X	-	-
Teledyne Semiconductor/SEI	-	1 tank	-	2	~50	-	-	-
TRW Microwave	200	1 tank	-	8	17	X	-	-
Van Waters and Rogers	-	-	-	6	~40	X	-	-
Westinghouse	800	13 tanks	-	-	23	-	-	-

[a] *air stripping tower*
[b] *carbon adsorption unit*
[c] *soil vapor extraction*
[d] *recovery system, on-site*

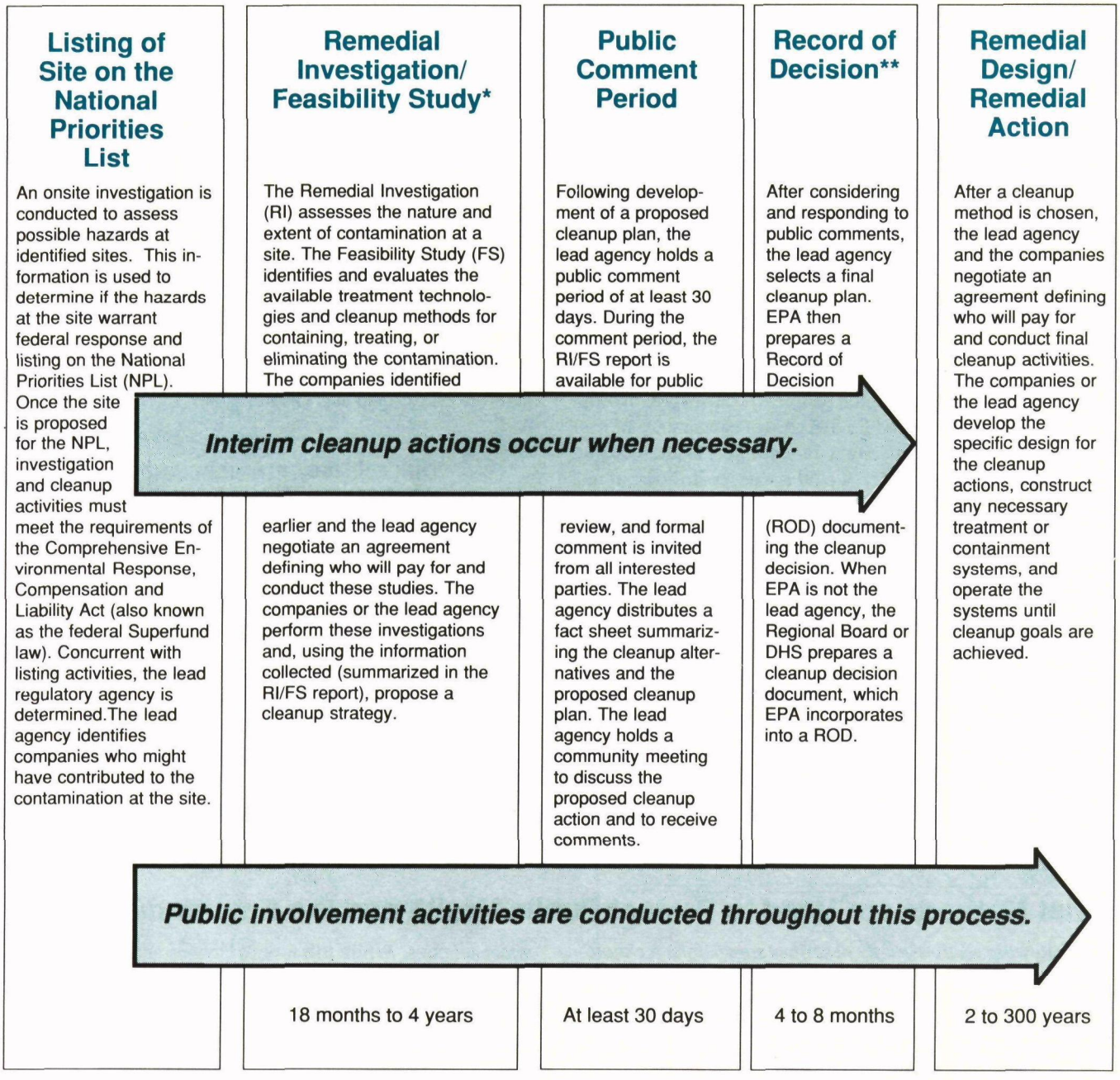
☆ *Lorentz Barrel & Drum cleanup activities not currently being conducted by industry.*

* *One cubic yard would fill a box 3 feet high, 3 feet long and 3 feet wide*

✣ *"Tanks Removed" includes tanks, piping, and drums as identified in the column below.*

† *Groundwater wells*

(1/89)



* At state-lead sites, DHS and the Regional Board refer to the RI/FS report as a Draft Remedial Action Plan (Draft RAP).

** At state-lead sites, DHS and the Regional Board refer to the cleanup decision document as a Final Remedial Action Plan (Final RAP), which is adopted as a Remedial Action Order.

FIGURE 7: FEDERAL SUPERFUND PROCESS

What are Risk Assessments?

The purpose of a risk assessment is to estimate the potential health and environmental effects of exposure to the toxic chemicals at a given site. During the risk assessment, existing levels of contamination at a site are evaluated to quantify what level of risk may be posed to human health and the environment. Risk assessments also consider factors such as potential migration pathways, types of exposure, the amount of exposure that could occur, and the risk presented by the individual contaminants.

Risk is expressed as a probability; it describes the chance of one person developing cancer due to exposure to contamination at a site. For example, a risk number of 10^{-6} (or 1 in 1,000,000) translates into the probability that for a population of one million people who are exposed to the contamination, one additional case of cancer may be observed above what might be expected in the general population. This person would not necessarily die of the cancer. (The cancer rate in the general population is approximately 1 in 4.) This risk number is often referred to as "one in a million." Table 6 shows a series of risk numbers and the corresponding probabilities.

EPA uses very conservative assumptions in preparing risk assessments to determine a worst case scenario. For example, EPA assumes that individuals consume two liters (about eight glasses) of drinking water every day from wells drawing water directly from a contaminant plume over a 70-year lifetime. Ninety-five percent of the time, the calculated risk exceeds the actual risk. The actual risk can in some cases be zero.

Based on the risk assessment, the agency must decide if the risk posed by a contaminant at a site is "acceptable" or determine what actions must be taken to reduce this risk to make it "acceptable." Under the Superfund policy, any risk number that falls within the range of 10^{-4} to 10^{-7} is generally considered an "acceptable" risk. If the risk number is higher (for instance 10^{-3}), then actions must be taken to reduce exposures to contaminant levels. This action would in turn lower the risk to within the above-mentioned range of acceptable risks. The 10^{-6} value is considered the "departure limit"; if a different value is selected, EPA must explain the use of a different level.

Risk assessments are thus used to determine what level of a particular contaminant poses an acceptable risk and is therefore established as a cleanup goal.

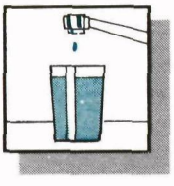
TABLE 6: RISK NUMBERS AND ASSOCIATED PROBABILITIES

Risk Number	Probability*
10^{-3}	1 in 1,000
10^{-4}	1 in 10,000
10^{-5}	1 in 100,000
10^{-6}	1 in 1,000,000

** For comparison, the risk of being hit by lightning is estimated at one in 30,000 or approximately 3×10^{-5}. The risk of being killed in an earthquake in California is approximately one in 8,000 or 1.2×10^{-4}.*

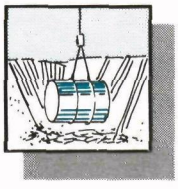
What Methods are Used to Protect Public Health and the Environment?

The following section briefly describes some of the technologies that have been or may soon be used at South Bay sites. Table 5 on page 12 lists the technologies currently being used at each site.



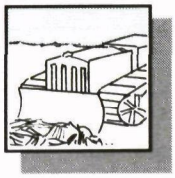
Provide Alternative Water Supply

When drinking water supplies have been affected by contamination, one of the first actions considered is providing another source of water, such as bottled water or connection to city water supplies. While this is not a cleanup activity per se, providing another source of water is an effective way to reduce the potential for human exposure to the chemicals.



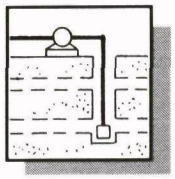
Tank Removal

Leaking underground storage tanks, piping, or drums are common sources of contamination at South Bay Superfund sites. Removal of these sources can prevent further site contamination.



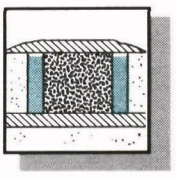
Soil Removal

Shortly after a contamination source is discovered, the highly contaminated soil immediately surrounding it will often be excavated and disposed of at a hazardous waste landfill. Such soil removal reduces the amount of contamination that may be washed from the soil and carried into groundwater by rainfall. In addition, removing highly contaminated soil minimizes the possibility of people coming into contact with the contaminants by breathing dust or handling the soil. Once longer term studies to better define the nature and extent of contamination are completed, additional soil cleanup is often undertaken.



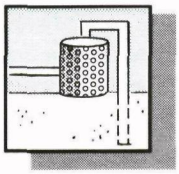
Soil Vapor Extraction

Soil vapor extraction (also called soil gas removal) is a relatively new technique now being considered and used as an alternative to soil removal and disposal at a number of sites. This technique is used to reduce contaminant levels in the soils located above the shallow groundwater table. Wells are drilled into the contaminated soil, and then contaminants in the gas or vapor stage are drawn with a vacuum from the soil and, in some cases, are passed through carbon filters that remove the contaminants from the vapor. Soil vapor extraction does not require excavation, transportation, and relocation of soil. This technique has been found to be effective in treating many of the VOCs found at South Bay sites.



Slurry Walls

Slurry walls are occasionally used as barriers to contain the flow of contaminated groundwater. They are constructed by digging a trench around a contaminated area and filling the trench with an impermeable material that prevents water from passing through it. The groundwater trapped within the area surrounded by the slurry wall can be extracted and treated. Slurry walls have been constructed at three Superfund sites: Fairchild and Raytheon in Mountain View, and Fairchild in San Jose.



Groundwater Extraction and Treatment

One of the most common interim actions at South Bay sites has been groundwater extraction designed to contain the migration of groundwater plumes and reduce the level of contaminants present. About 200 wells are pumping contaminated water at 24 of the 28 Superfund sites. Groundwater extraction is effectively limiting the spread of contamination at these sites and, in some cases, is reducing the size of the contaminant plumes. Figure 8 shows an example of how a contaminant plume has been reduced as a result of groundwater extraction.

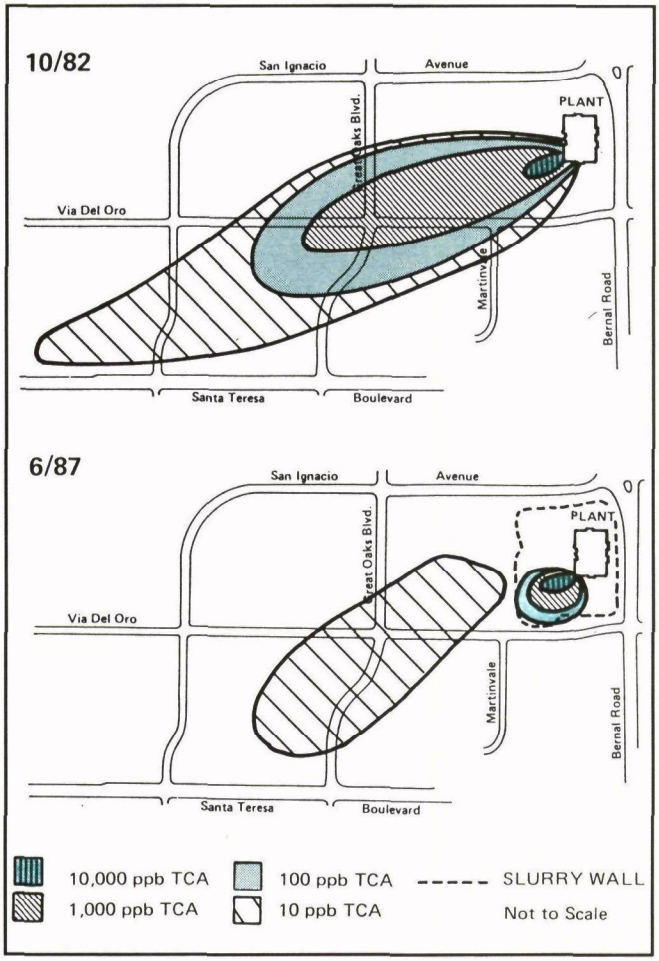


FIGURE 8: REDUCTION OF TCA PLUMES AT FAIRCHILD PLANT, SAN JOSE

However, one of the disadvantages of extensive groundwater pumping is the depletion of limited groundwater supplies. This problem has been further aggravated by the recent drought. See the discussion in "How Do We Balance Groundwater Cleanup and Water Supply Needs?" on page 8 for more information about this issue.

At many of the sites, the extracted groundwater is treated before being discharged into a sewer or stream or before being reused. The discharge of extracted water into surface waters is regulated by the Regional Board under the federal Clean Water Act's National Pollutant Discharge Elimination System program. Different treatment systems, including air stripping and carbon adsorption, can be used to lower contaminant levels. The selection of a treatment system depends on the type and amounts of contamination found at the site.

Air stripping is often an effective treatment method for removing the contaminants from the water because many of the contaminants at the South Bay sites are chemicals that evaporate easily. Extraction systems with air strippers are in use at 14 of the South Bay Superfund sites. The extracted contaminated water is sprayed down through a tower containing packing materials, and air is blown upward. The VOCs evaporate, leaving significantly reduced contaminant levels in the water. Figure 9 shows a typical air stripping tower. Air stripping usually removes at least 95 percent of VOC contaminants.

Transferring the compounds to the air may create an additional environmental problem. The VOCs released into the air are regulated by the local Air Quality Management District to ensure that their levels do not exceed health standards. If levels of contaminants being released to the air exceed federal, state, or local standards, an additional treatment system to control air emissions is required. For more information on this topic, see the discussion in "How Do We Balance Groundwater Cleanup and Clean Air Concerns?" on page 9.

Carbon adsorption is the other predominant technology used to treat extracted groundwater contaminated by VOCs, and is in use at seven of the South Bay Superfund sites. The contaminated water is pumped through tanks containing activated carbon particles that have been specially treated to attract contaminants. The contaminants "cling" to the carbon and are thus removed from the water. Carbon adsorption is capable of removing 95 percent or more of the VOCs. The contaminated carbon can then either be regenerated to be used again, or disposed of in a hazardous waste landfill.

EPA is testing an ozone/ultraviolet treatment system for use at the Lorentz Barrel & Drum site. In this method, ozone is bubbled into extracted groundwater, which is exposed to high intensity ultraviolet light at the same time. As a result, the toxic molecules are broken down into smaller, less-toxic molecules.

Many environmental factors affect the cleanup of groundwater. Contaminants that have traveled long distances from the source (i.e., have larger plumes) may take longer to clean up. Chemicals can adsorb or stick to soil and may require "flushing" to be removed. Contaminated soils may act as a continuing source even after the leaking tank, drum, or other original source has been removed. Other pumping in the area may alter the direction of the plume and the amount of water that can be pumped. These and other factors may interact to prolong groundwater cleanup.

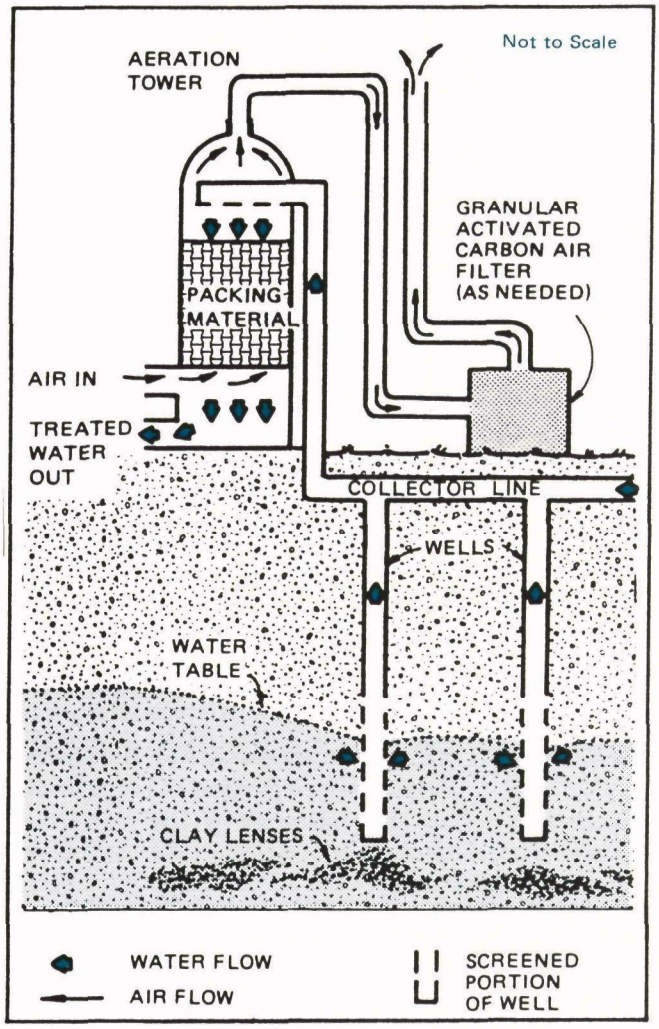


FIGURE 9: DIAGRAM OF A TYPICAL AIR STRIPPING TOWER

How Do We Evaluate Cleanup Alternatives?

Each cleanup alternative considered at a federal Superfund site is assessed using the nine criteria described below. This approach is designed to provide decisionmakers with sufficient information to compare the alternatives, select an appropriate remedy for a site, and satisfy legal requirements. The criteria are summarized below:

- **Short-term Effectiveness**

Short-term effectiveness considers the period of time needed to complete the remedy and achieve the cleanup goals. It also refers to the need to limit any adverse effects on human health and the environment that may be posed during the construction and operation of the remedy.

- **Long-term Effectiveness**

Long-term effectiveness refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

- **Reduction of Toxicity, Mobility, and Volume through Treatment**

This criteria considers the ability of a remedy to reduce the toxicity, mobility, and volume of the hazardous materials present at the site.

- **Implementability**

Implementability involves the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

- **Cost**

The capital costs and the operation and maintenance costs of each alternative are estimated.

- **Overall Protection of Human Health and the Environment**

The alternative's ability to provide adequate protection and to eliminate, reduce, or control risks through treatment, engineering controls, or institutional controls is assessed.

- **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)**

ARARs refer to the alternative's ability to comply with all federal and state environmental laws and/ or justify a waiver from those requirements.

- **State Acceptance**

This criteria considers the extent of state approval for the remedy.

- **Community Acceptance**

Community approval of the remedy and whether or not the community has a preference for any of the alternative remedies is weighed . Although public comment is an important part of the final decision, EPA is compelled by law to balance community concerns with all of the previously mentioned criteria.

Glossary of Acronyms

ARARs - Applicable or Relevant and Appropriate Requirements

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

DHS - State of California Department of Health Services

EPA - United States Environmental Protection Agency

MCL - Maximum Contaminant Level

MEW - The sites within an area bordered by Middlefield, Ellis, and Whisman streets

MGD - Million Gallons Per Day

NPL - National Priorities List

PCB - Polychlorinated Biphenyls

RCRA - Resource Conservation and Recovery Act

RI/FS - Remedial Investigation/Feasibility Study

ROD - Record of Decision

RWQCB - San Francisco Bay Regional Water Quality Control Board (Regional Board)

SCCHD - Santa Clara County Health Department

TCA - Trichloroethane

TCE - Trichloroethylene

VOC - Volatile Organic Compound

What are the Other South Bay Groundwater Programs?

In addition to the cleanup efforts at the sites on the federal Superfund list, the Regional Board, DHS, and industry are continuing work at other South Bay contamination sites. A number of other state and local organizations are working to mitigate and prevent future groundwater contamination by industrial chemicals and fuel leaks. The South Bay Groundwater Contamination Task Force, with representatives from the community, industry, federal, state, and local agencies, meets quarterly to coordinate these and other government efforts. Active state and local programs include:

Fuel Leak Program

As in most areas, storing gasoline in underground tanks is common in the Santa Clara Valley. Under the Fuel Leak Program, the Santa Clara Valley Water District, as part of a contract from the Regional Board, is evaluating the severity of reported fuel leaks in the vicinity of drinking water wells to provide guidance to the responsible parties on their cleanup. Currently, approximately 900 fuel leaks are being verified and investigated, while over 90 are active cleanup cases.

For more information on local programs, contact the Santa Clara Valley Water District at the number listed on page 21.

Well Sealing

Abandoned wells can potentially allow contaminants to migrate from the shallow aquifer to the deep aquifer used for drinking water. The Santa Clara Valley Water District, in conjunction with EPA, has been focusing on areas near but not within groundwater contamination plumes. (At federal Superfund sites, the responsible company(ies) is required to seal any abandoned wells found within the plume area.) By filling the wells with cement grout, 300 wells have been sealed since 1984, with dozens more targeted for sealing in 1989. In addition, over one thousand wells have been sealed by the private sector since 1984.

Hazardous Materials Storage Ordinances (HMSOs)

In 1982, suddenly confronted with the emerging groundwater contamination problem, representatives of government, industry and the community cooperatively drafted the first model ordinance in the country specifically designed to detect and prevent contamination from underground storage tanks. By 1983, most local governments in Santa Clara County had adopted the ordinance. State and federal laws based on this original ordinance soon followed.

The HMSOs require secondary containment, such as a vault around a tank, on all new underground storage facilities. Existing facilities must be tested for leaks and have monitoring systems installed. All facilities must submit plans for managing their hazardous materials, report suspected leaks or spills, and clean up contaminants if a leak or spill occurs. The ordinance should be in full effect by 1990.

How Can You Become Involved?

The Superfund law establishes a strong program of public participation in the decision-making process at Superfund sites. EPA, DHS, and the Regional Board all conduct public involvement activities at their respective federal Superfund sites in the South Bay. The goal of these programs is to encourage informed input from communities and/or individuals affected by these sites.

The lead regulatory agency for a particular site develops and conducts public outreach and public involvement activities throughout the investigation and cleanup process. Once the public agency responsible for overseeing cleanup has made a preliminary selection of an appropriate cleanup alternative(s) and cleanup levels, the public has the opportunity to comment on the proposed selection. For sites under federal direction,

the public can review and comment on the RI/FS and on a Proposed Plan that outlines EPA's preferred cleanup alternative. The final selection of a cleanup alternative is documented in the Record of Decision. At state-lead sites, a draft Remedial Action Plan will be available for public comment.

For all sites, the plans are made available to the public by placing the documents in a local library, mailing fact sheets that summarize key components of the plans, and placing advertisements in local newspapers announcing comment periods and community meetings.

Comments on the proposed cleanup plans can be submitted orally at public meetings held during the comment period or submitted in writing. After the public comment period has closed, the lead agency will summarize and respond to the comments in a responsiveness summary, and make changes in the proposed actions as appropriate. Additional public meetings may be held throughout the process so the lead agency can receive input from the community and keep the public informed of recent progress and proposed activities.

Below you will find a mailing list sign-up form. If you would like to be added to the mailing list for a particular site, or to be on the general mailing list, check the appropriate boxes and return the form to EPA.

Mailing List Sign-up Form

If you would like to be added to EPA's general South Bay mailing list or any of the site-specific mailing lists, please fill out the form below. Please return the form to Helen Burke, EPA Community Relations Coordinator, Office of Community Relations, U.S. EPA, 215 Fremont Street (T-1-3), San Francisco, California 94105. (If you are already on these mailing lists, you don't need to send in your name again.)

NAME _____

ORGANIZATION/COMPANY _____

STREET ADDRESS _____

CITY, STATE, ZIP CODE _____

PHONE NUMBER (OPTIONAL) _____

I would like to be included on the following mailing lists:

- ☐ South Bay - General
- ☐ Advanced Micro Devices #901
- ☐ Advanced Micro Devices #915
- ☐ Advanced Micro Devices - Arques (formerly Monolithic Memories)
- ☐ Applied Materials
- ☐ CTS Printex
- ☐ Fairchild - Mountain View (MEW)
- ☐ Fairchild - San Jose
- ☐ Hewlett Packard (640)
- ☐ Hewlett Packard (1501)
- ☐ IBM
- ☐ Intel - Mountain View (MEW)
- ☐ Intel Santa Clara 3
- ☐ Intel Magnetics/Micro Storage
- ☐ Intersil/Siemens
- ☐ Jasco
- ☐ Lorentz Barrel & Drum
- ☐ Moffett Naval Air Station
- ☐ National Semiconductor
- ☐ Raytheon (MEW)
- ☐ Rhone-Poulenc/Zoecon
- ☐ Signetics
- ☐ Solvent Service
- ☐ South Bay Asbestos Area- Alviso
- ☐ Spectra Physics
- ☐ Synertek
- ☐ Teledyne Semiconductor/SEI
- ☐ TRW Microwave
- ☐ Van Waters and Rogers
- ☐ Westinghouse

Conclusion

Significant progress has been made in reducing contamination in the South Bay. While final cleanup has not been completed at any of the South Bay Superfund sites, contaminated groundwater in the South Bay has been contained and the immediate health threats have been abated. The water provided to customers is safe to drink and is closely monitored to ensure that contamination sources do not contaminate the supply in the future. Cooperative cleanup efforts involving industry and local, state, and federal government agencies will continue until cleanup has been achieved.

At sites with contaminated groundwater, pumping and treating contaminated groundwater to reduce the concentration of the contaminants to acceptable levels may take decades. Cleanup will not necessarily return the groundwater to a pure state, but will be sufficient to protect human health and the environment.

On-going monitoring will verify the effectiveness of selected remedies. At most of the sites, interim cleanup activities have taken place. Final cleanup plans have been approved at IBM, MEW, and Fairchild; and final cleanup activities are beginning at these sites.

EPA, the Regional Board, DHS, and industry will continue to involve the public in solving the hazardous waste problems in the South Bay. We must all take responsibility for tackling these environmental problems. This challenge requires appreciating and balancing our need for a clean environment and our demand for industrial products. With increased information and an understanding of the risks of an industrial society, the public can assist government agencies and industry in setting environmental priorities and developing cleanup strategies for the South Bay.

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For More Information . . .

For more information on public involvement programs for South Bay Superfund sites, contact one of the Community Relations Coordinators listed below:

Helen Burke
U.S. Environmental Protection Agency
215 Fremont Street (T-1-3)
San Francisco, CA 94105
(415) 974-7538

Jim Thompson
Regional Water Quality Control Board
1111 Jackson Street, Room 6000
Oakland, CA 94607
(415) 464-3815

Shirley Buford
California Department of Health Services
5850 Shellmound Avenue, Suite 100
Emeryville, CA 94608
(415) 540-3401

If you would like to find out **who supplies your drinking water**, contact Teddy Morse at the Santa Clara Valley Water District at (408) 265-2600.

For information on the Santa Clara County **private well sampling program** or to obtain a list of state-certified laboratories who will sample your private well, contact Glenn Hildebrand at the Santa Clara County Health Department at (408) 299-6930.

For information on the **epidemiological study** conducted in the Los Paseos area, contact Shanna Swan at (415) 540-2828 at the California Department of Health Services.

To obtain a copy of the EPA fact sheet on the **RCRA listing policy**, contact Janice Hicks, EPA Office of Community Relations, at (415) 974-7673.

Call 1-800-231-3075 for additional information about the federal Superfund program.