Public Health Assessment for

ADVANCED MICRO DEVICES #915
SUNNYVALE, SANTA CLARA COUNTY, CALIFORNIA
CERCLIS NO. CAT080034234
~~***JULY 29, 1992***~~

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

PUBLIC HEALTH ASSESSMENT

ADVANCED MICRO DEVICES #915

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Prepared by

California Department of Health Services
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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SUMMARY

Advanced Micro Devices, Inc. building 915 (AMD 915) served as an active semiconductor and microprocessor manufacturing facility from 1974 until 1990. AMD 915 is located in Sunnyvale, California in Santa Clara County, approximately four miles south of San Francisco Bay. AMD 915 was included on the National Priorities List (NPL) by the United States Environmental Protection Agency (EPA) in September, 1990. The San Francisco Regional Water Quality Control Board (RWQCB) is the lead agency for overseeing investigation and remediation at the site.

Waste solvents and acid-neutralization liquids contained in two underground storage tanks leaked, causing contamination of subsurface soils and groundwater. The contamination originating from the AMD 915 facility has not migrated off-site and the contaminated groundwater has not impacted any private or municipal drinking water supplies. A separate plume originating from three additional NPL sites located immediately south-southwest of AMD 915 crosses a portion of the AMD 915 site.

The underground storage tanks suspected of leaking and some subsurface soils have been removed. A system of groundwater extraction and air stripping/liquid phase carbon adsorption treatment is currently operating at the site to restore groundwater to acceptable drinking water standards. The AMD air stripper does not have an emission control device, resulting in the release of low levels of volatile organic compounds to the ambient air. However, no apparent risk exists for the community from these emissions. In its proposed clean up plan, the RWQCB projects that the treatment system will take approximately 12 years to reach targeted clean up levels.

Based on information reviewed, the United States Agency for Toxic Substances and Disease Registry (ATSDR) and the California Department of Health Services (CDHS) conclude that no apparent health hazard exists at the AMD 915 site. The available evidence indicates that humans have not been exposed to contaminants related to the AMD 915 site at levels of public health concern. Therefore, follow-up health actions are not indicated at this time. Future exposures to contaminated media are not likely to occur as long as: 1) the groundwater extraction and treatment system reduces concentrations of groundwater contaminants to below levels of health concern; 2) no future drinking water wells are placed in areas of known contamination until remediation has reduced contaminant concentrations below levels of health concern; and 3) any future excavation/construction projects at the AMD 915 facility take the necessary precautions to insure that workers are not exposed to contaminants above levels of health concern.

BACKGROUND

A. SITE DESCRIPTION AND HISTORY

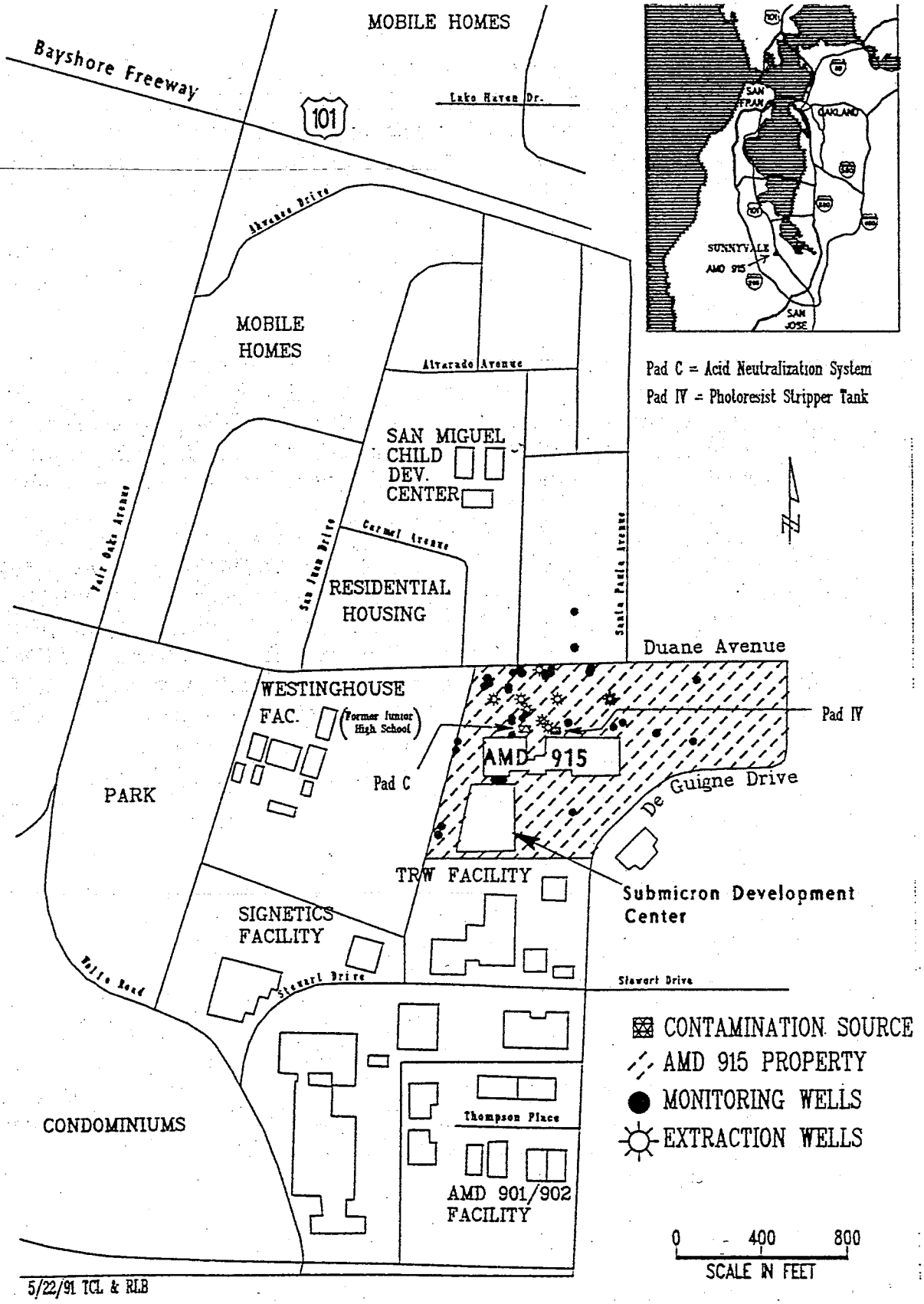
Advanced Micro Devices, Inc. building 915 (AMD 915) was an active semiconductor and microprocessor manufacturing facility from 1974 until 1990. AMD 915 is located in Sunnyvale, California in Santa Clara County, approximately four miles south of San Francisco Bay. Figure 1 shows the most important features that define the site. Duane Avenue runs to the north of the site, and DeGuigne Drive to the south and to the east. A former junior high school and surrounding recreational area now owned by Westinghouse Electric Corporation lies to the west of the site. In 1990, Advanced Micro Devices completed the construction of a new research and development facility known as the Submicron Development Center (SDC) immediately adjacent to the southwest corner of AMD 915.

The United States Environmental Protection Agency (EPA) placed AMD 915 on the National Priorities List (NPL) in September 1990. AMD contracted with Engineering-Science in 1989 to conduct a Remedial Investigation and Feasibility Study (RI/FS) after EPA proposed that the site be placed on the NPL (1). The California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region (Region 2), is the lead agency regulating the AMD 915 cleanup under a formal agreement with the EPA.

Staff from the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a site visit in February 1989 and released a preliminary public health assessment for AMD 915 in August 1990 (2). ATSDR, located in Atlanta, Georgia, is part of the Public Health Service, a Federal agency within the United States Department of Health and Human Services. ATSDR is authorized by the Comprehensive Environmental Response, Compensation, and Liability ACT of 1980 (CERCLA) to conduct public health assessments at hazardous waste sites. This public health assessment is being prepared by the California Department of Health Services (CDHS) under a cooperative agreement with the ATSDR and serves to update the preliminary public health assessment.

The ATSDR/CDHS public health assessment is a mechanism to: 1) determine if there have been exposures to hazardous substances from a particular hazardous waste site at levels that could pose a health threat; 2) determine if it is possible to better define what impact the site may have had on the community by using health related data; 3) determine whether all relevant current and future exposure pathways are being addressed or sufficiently addressed by the responsible parties and the regulatory agencies involved; and 4) provide the community with this information and address specific community health concerns. The public health assessment report is based largely on a review of environmental monitoring and health outcome data and information, a site visit, and consultation with involved agencies and the public. The environmental data and information reviewed is generally provided in the site's Remedial Investigation, Baseline Risk Assessment and Feasibility Study reports, which are required by CERCLA.

FIGURE 1
VICINITY MAP OF AMD 915



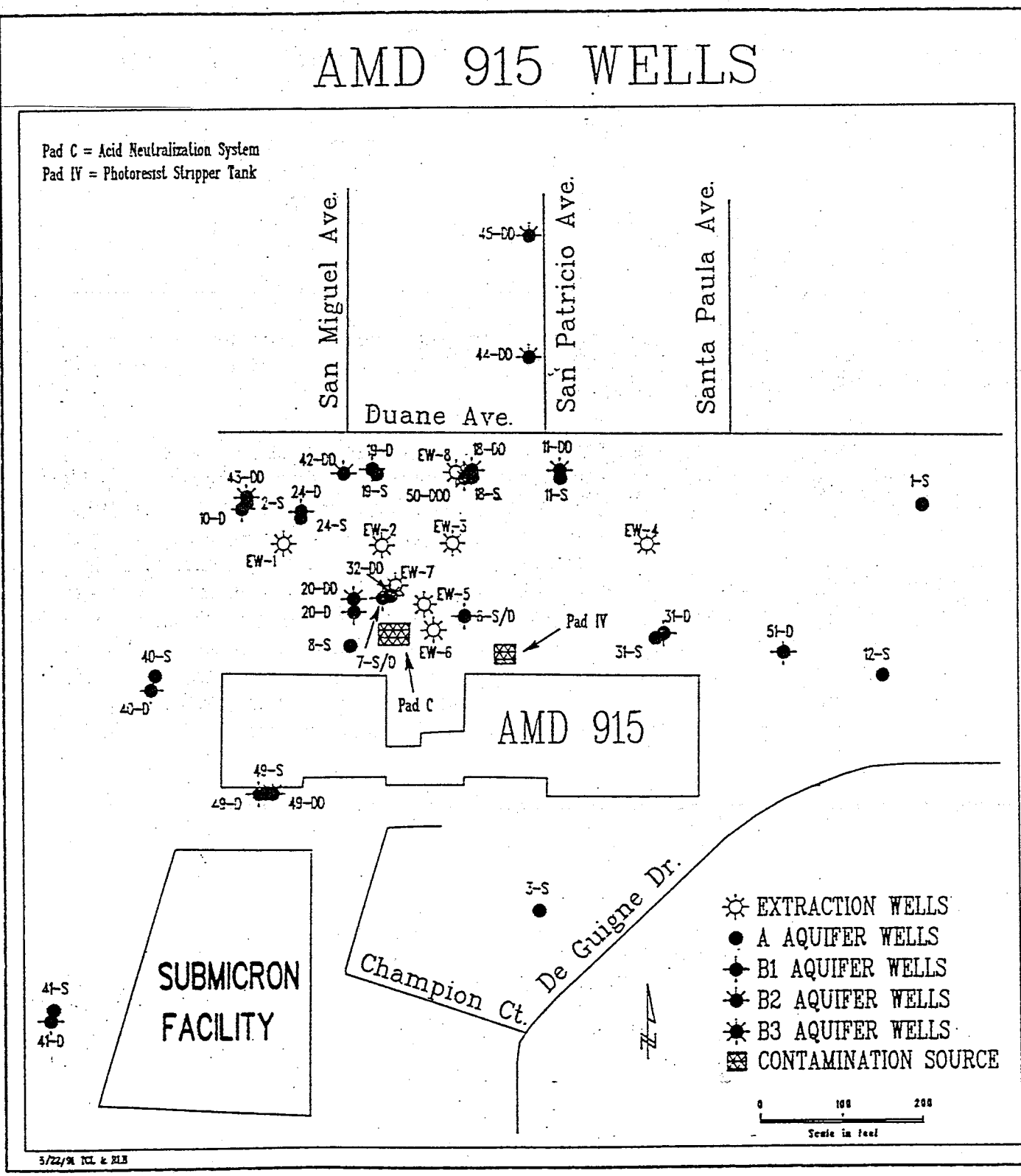
Three additional NPL sites, AMD buildings 901/902, Signetics and TRW Microwave (now owned by FEI Microwave), are located immediately south-southwest of AMD 915. Signetics is being managed under the authority of the Resources Conservation and Recovery Act. The RWQCB is also the lead agency for these three sites. Figure 1 shows where these sites exist and their proximity to AMD 915. Each of these three sites, AMD 901/902, TRW Microwave, and Signetics, has its own source of contamination, but the off-site contaminated groundwater areas have merged and the sites are treated as one unit for the purposes of the investigation and development of clean-up plans (3).

Advanced Micro Devices built building 915 in 1974 and manufactured semiconductors and microprocessors for the electronics industry at the site until 1990. The company currently uses the building for research and development and office space (4). For its manufacturing processes, Advanced Micro Devices uses or has used organic solvents such as trichloroethene (TCE), 1,1,2-trichloro- 1,2,2-trifluoroethane (Freon 113), acetone and trichlorobenzene (TCB). The company stopped using TCE in 1979. Waste solvents and acid neutralization liquids were stored in underground storage tanks. Freon waste and some waste oils and acids containing arsenic and chromium were stored in 55 gallon drums retained in a hazardous materials storage area which was expanded and renovated in 1982. A California certified hazardous waste hauler removed them to appropriate locations off site every month or two.

AMD discovered contaminated soil and groundwater at the site in 1981. When AMD's contractors began to remove some of its underground storage tanks, they discovered two point sources of contamination. Figures 1 and 2 show the location of the point sources. In 1981, International Technology, Inc. removed a leaking 1,500 gallon photoresist stripper tank from pad IV and about 300 cubic yards of contaminated soil. In 1983, Engineering-Science supervised the removal of a second point source of contamination, a 4,200 gallon acid neutralization system at pad C consisting of three tanks. One of the tanks had a hole in its wall, through which it was estimated that TCE may have leaked for up to six years. In addition to the tanks, about 5,600 cubic yards of contaminated soil were removed and taken to an approved hazardous waste landfill for proper disposal. The principal organic contaminants found in subsurface soil on site at AMD 915 are TCE and TCB. The metals arsenic and chromium were also found in soils (1).

AMD installed 27 underground storage tanks at the AMD 915 facility since its construction in 1974. Starting in 1981, AMD had all tanks removed with the exception of eight tanks used for two separate acid neutralization systems. Of all the removed tanks, only the photoresist stripper tank at pad IV and one of the pad C acid neutralization system tanks showed evidence of leaking. The remaining eight tanks still in use are double-walled and contained in concrete vaults covered with grating just below the ground. Designated AMD staff visually inspect all tank and chemical use areas daily, monitor all storage facilities, and maintain logs. A Hazardous Materials Management Plan for AMD 915 delineates all materials containment and monitoring methods.

FIGURE 2
MAP OF AMD 915 SHOWING LOCATION OF GROUNDWATER MONITORING AND EXTRACTION WELLS, AND POINT SOURCES OF CONTAMINATION



From 1982 to 1989, AMD's contractor, Engineering-Science, installed 42 monitoring wells to define the extent and magnitude of groundwater contamination. Thirty-four monitoring wells are currently operational. Organic contaminants have been detected in shallow groundwater zones to depths of approximately 65 feet below the ground surface. Multiple organic contaminants are present in groundwater on-site, including chloroform, 1,1-dichloroethane (DCA), 1,1-dichloroethene (1,1-DCE), cis and trans-1,2-dichloroethene (1,2-DCE), 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113), trichlorobenzene (TCB), 1,1,1-trichloroethane (TCA), and trichloroethene (TCE). Several metals have been found at elevated levels in groundwater on site, including antimony, arsenic, barium, beryllium, chromium, cobalt, mercury, nickel, and vanadium (1,5-9).

Between 1982 and 1983, AMD installed five on-site groundwater extraction wells to retard off-site migration of contaminated groundwater. Seven additional extraction wells were placed north of the site along Duane Avenue between 1983 and 1987 to provide an additional hydraulic barrier to trap the contaminant plume. Eight extraction wells are currently operating. The extraction wells have pumped much of the most shallow groundwater aquifer dry and have controlled the movement of pollutants in shallow groundwater to depths of approximately 65 feet (10).

In addition to the on-site sources, the investigation discovered contaminated groundwater moving toward the AMD 915 site from upgradient sources. The groundwater contaminant plume associated with the upgradient AMD 901/902, TRW Microwave and Signetics sites crosses a portion of the AMD 915 property and extends several hundred feet north. Although releases from the AMD 915 facility have contaminated the shallow aquifers beneath the site, the contamination has not migrated off-site and contributed to existing groundwater contamination north of the site. The contaminated groundwater has not impacted any private or municipal drinking water supplies (10). Groundwater contamination north of the site is being investigated separately (3).

An air stripping/liquid phase carbon adsorption system was installed in 1984 to treat the extracted groundwater. An air stripper removes the majority of volatile organic contaminants from the groundwater. After passing through the air stripper, the water is further treated using the carbon absorption system. In addition to the groundwater treated from own extraction wells, groundwater extracted from 18 other off-site wells, installed as part of the clean-up activities for AMD 901/902, TRW Microwave and Signetics, is piped to and treated at AMD 915. The water treatment system also processes water pumped from four sumps used to keep water from entering the basement of AMD 915. The treatment system removes 99% or more of the volatile organic compounds from the groundwater (10). AMD currently reuses 30% of the water, plans to reuse 60% by the end of 1991, and has a long term goal of 100% reuse (10). The treated water not currently being reused is discharged to a storm drain that empties into the Calabazas Creek under a National Pollutant Discharge Elimination System (NPDES) permit (No. CA0028797).

B. SITE VISIT

On the morning of April 22, 1991, David Borgeson, Diana Lee, Marilyn Underwood and Jane Riggan from the CDHS ATSDR cooperative agreement project visited the site under the guidance of the Senior Environmental Engineer and an Environmental Engineer for AMD. We observed the following:

1) the site is fenced and guarded with security guards. A guard house is situated at the entrance. To enter, staff must show a badge with picture identification to a guard posted at the entrance. As visitors, to gain entrance, we had to document authorization from the AMD staff persons we were meeting, sign in, and be issued a temporary numbered badge by the guard;

2) asphalt parking lots and other 2- and 3-story buildings surround the site. The terrain is flat and the existing simple landscaping consisting of young trees and bushes is neatly maintained. Potential chemical hazards around the facilities are clearly marked with Department of Transportation labels and secured behind fences or storehouses;

3) potential chemical hazards around the facilities are clearly marked with Department of Transportation labels and secured behind fences or storehouses;

4) the water treatment system is located on site and surrounded by a 12-foot cyclone/wood slat fence with a locked gate. The Senior Environmental Engineer informed us the system processes 180 gallons per minute, About 25% of the treated water comes from on-site AMD 915 wells, 75% from off-site wells related to the neighboring sites discussed previously; and

5) the monitoring and extraction well-heads lie just below the ground's surface, secured with manhole coverings. In our meeting with AMD's Senior Environmental Engineer and Environmental Engineer, they further clarified that AMD 915 was no longer used as a production facility. The main chemical usage area in the building is a laboratory used for research and development. Waste solvents used in the laboratory are put into 55 gallon drums and removed off site for disposal.

About 630 employees have offices at building 915, a two story structure with a basement. The basement, first and second floors have a total area of about 265,000 square feet. The basement has an area of about 44,000 square feet. At our request, the AMD staff gave us a tour of the basement at AMD 915. Most of the basement houses the mechanical, electrical and ventilation support systems for the building. In addition, an electronics laboratory, a work room, a training room, and two office areas take up 12,160 square feet in the basement. About 25 people work in these basement rooms (4).

During our tour, we saw some small cracks and holes in the concrete floor of the part of the basement housing the support systems. In the rooms used by AMD staff, industrial carpeting

was laid over the floor. Modular panels and furniture appeared to have been newly installed in two of the rooms with open office space configurations. We noticed some "stuffiness" and odors in the rooms, but when we asked the Environmental Engineer if there had been any complaints from the workers stationed in those rooms, he said he was not aware of any.

The AMD staff showed us the location of one of the remaining vaulted acid neutralization systems and explained how monitoring is done for any leakage. We observed backfilling of an area where several tanks had been removed the week before. No environmental sampling was conducted during the site visit.

We did not tour the Submicron Development Center (SDC). The AMD staff explained that the SDC facility is built on a concrete slab, has no basement and no underground solvent storage tanks. Waste solvents generated at the facility are stored in drums which are removed to hazardous waste disposal facilities. The SDC has a vaulted acid neutralization system. About 75 of the 630 staff with offices at building 915 spend much of their time in laboratories in the SDC (4).

C. DEMOGRAPHICS, LAND USE, AND NATURAL RESOURCES

DEMOGRAPHICS

According to 1990 census information, approximately 4,000 people live in 1,413 housing units within a half mile of the AMD 915 site. Seventy percent (70%) of this population is 18 years of age or older. The current census information does not give any further breakdown of housing units or age specific information. The census data show the ethnic/racial breakdown as follows: 38% white (not Hispanic), 34% Asian/Pacific Islander, 24% Hispanic, 3% black, and 1% American Indian, Eskimo or Aleut. About 630 employees have offices at building 915. About 25 people work in the basement at building 915. About 75 of the 630 staff with offices at building 915 spend much of their time in laboratories in the Submicron Development Center (4).

LAND USE

Residences, commercial businesses, and light industry lie within a one mile radius of the site. Most of the businesses and industry in the area are related to semiconductor and electronics manufacturing. As noted previously, AMD built a new building known as the Submicron Development Center immediately southeast of AMD 915 in 1989. In addition, two smaller AMD buildings are located to the east of building 915.

The closest homes are about 400 feet north of the site along Duane Avenue. To the south near AMD 901/902, Parkside Commons, a new residential complex, is being completed. Upon completion, this complex will have a total of 192 apartments located in eight apartment buildings and a shared recreation building. The former Sunnyvale Junior High School facility borders the west side of the AMD 915 site. Westinghouse now owns the former school and surrounding recreation facilities but does not occupy the facility. Neighborhood residents and workers use

the track, tennis courts, and softball and baseball fields surrounding the old junior high school for recreational purposes.

Lying to the north of Duane Avenue is the San Miguel School. Formerly a public elementary school, it now houses approximately 200 children a day who attend either a state child development program, a state preschool, a YMCA child care program, or a Head Start program. Not included in the fenced-off playground is about a half acre of grassy land on the west side of the school which is apparently used as a neighborhood playground. Fair Oaks Park, primarily a children's playground, also lies northwest of the site on the corner of Duane and Fair Oaks Avenue. Most of the site and areas surrounding the site consist of paved surfaces or industrial buildings. Very little, if any, agricultural activity occurs within a one mile radius of the site. The area around the site does not support abundant wildlife nor is it used for hunting.

As described in the Site Description and History section, three other facilities known to have released contaminants similar or identical to those found at the AMD 915 site are in close proximity. The three facilities and the RWQCB are treating the off-site groundwater contaminant plume attributed to these three sites as one unit for clean up purposes. This off-site plume extends under the residential neighborhoods, the former Sunnyvale Junior High School, and the San Miguel school facilities (3).

NATURAL RESOURCES

No natural surface water bodies exist in the vicinity of the site. However, the Santa Clara Valley Water District maintains a concrete-lined drainage channel (Sunnyvale East Drainage Channel) along the western portion of the AMD 901/902 site. This channel discharges storm water into the Calabazas Creek and ultimately into the San Francisco Bay. Calabazas Creek lies about 1.5 miles east of the site.

Three major water bearing zones (aquifers) defined as the A-, B- and C-aquifer zones exist below the site. The A-aquifer is the shallowest and the C-aquifer the deepest of the three zones. The B-aquifer is further defined into B1 to B5 zones. The approximate depth below ground level at which these zones occur beneath the AMD 915 site are as follows: A:7'-25'; B1:20'-38', B2:38'-65'; B3:65'-100'; B4:90'-110'; and B5:110'-123'. Below the five B aquifer zones lies a 50'-150' thick regional aquitard, known as the B-C aquitard which severely retards the movement of water and contamination from the B1 through B5-aquifers to the C-aquifer. The C-aquifer, which supplies most of the municipal water in the region, lies below the regional aquitard. Groundwater in all of the water bearing zones flows in a north-northeasterly direction.

The aquifer zones appear to consist of mostly discontinuous layers and lenses of fine to coarse sand, gravel, and often a substantial proportion of clay and silt. These predominantly discontinuous layers and lenses are separated and/or isolated by low permeability clays and silts (aquitards).

Borehole logs related to the installation of two monitoring wells and eight extraction wells at

the AMD 915 site serve as the basis for the description of the site hydrogeology. Information from the AMD 915 site borehole logs and from borehole logs for the neighboring sites (TRW, AMD 901/902, and Signetics) are comparable in describing the water bearing zones underneath the general study area.

Information obtained from a well survey conducted in the study area (11) and from the RWQCB indicates that no private or municipal drinking water supplies are affected by the site contamination. The only functional municipal drinking water well identified in the survey is a City of Sunnyvale water supply well over 3,000 feet upgradient of the groundwater contamination. All the residences located north of the site which could potentially be affected by the contaminated groundwater are connected to municipal water supplies.

D. HEALTH OUTCOME DATA

On January 1, 1988, the state's cancer reporting system, the California Tumor Registry, began collecting data for the region that includes the AMD 915 site and surrounding areas. The state released the data for 1988 on February 18, 1991 (12). The California Birth Defects Monitoring Program began collecting data for Santa Clara County in 1983.

COMMUNITY HEALTH CONCERNS

No community health concerns specifically associated with AMD 915 have been identified, although the nearby sites (AMD 901/902, Signetics and TRW) have raised some community concern regarding the possibility of soil-gas contaminated with organic substances getting into residences and the San Miguel School (13). The community relations staff from the CDHS ATSDR cooperative agreement project elicited community information about AMD 915 from the Director of the Silicon Valley Toxics Coalition, city officials from Sunnyvale, officials from the Santa Clara County Health Department, two Santa Clara County Board of Supervisors staff persons, and the community relations staff from the Environmental Protection Agency and the CDHS Toxic Substances Control Program. None of the individuals contacted were aware of any recent community health concerns regarding the AMD 915 site.

Although no health effects have been reported or ascribed to the AMD 915 site, this does not necessarily mean that they do not exist now or in the future. Following the discovery of the contamination at the Fairchild and IBM facilities in South San Jose in the early 1980's, the community became concerned about groundwater contamination in Santa Clara County. In November, 1982, a group of environmental, labor and other organizations concerned about groundwater contamination formed The Silicon Valley Toxics Coalition.

The RWQCB has been responsible for overseeing the clean-up of several of the Superfund sites in the Santa Clara Valley. In January 1990, the RWQCB released their Community Relations Plan for Sunnyvale, incorporating the community relations plans for AMD 901/902, Signetics, TRW, AMD Arques, and AMD 915 into a single plan (14). This plan identified seven primary

historical concerns in the Santa Clara area as being: 1) concern about the quality of drinking water; 2) concern whether the extent of the problem had been determined; 3) concern about what would happen if the contamination spread; 4) concern about what is being done to clean up the soil and groundwater; 5) concern about what happens to the contaminated groundwater that was pumped out; 6) concern about what the schedule for clean-up is; and 7) concern about how property values would be effected?

In March 1991, RWQCB released Fact Sheet 2 announcing the proposed cleanup plan for AMD 915 (10). On March 20, 1991 staff from the RWQCB presented the recommended cleanup alternatives to its Board. The meeting marked the beginning of the public comment period which was originally designated to end April 19, 1991 but which was extended to May 20, 1991. A public meeting held on March 28, 1991 provided information about AMD 915 and neighboring sites. Approximately 40 people attended this public meeting. People attending the meeting did not voice any concerns specific to the AMD 915 site. Rather, the comments made by attendees mainly described concerns regarding the AMD 901/902, Signetics and TRW sites and their commingled off-site groundwater contaminant plume. The contaminant plume associated with the three contiguous sites crosses a portion of the AMD 915 site.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

This section presents the contaminants of concern in each environmental medium. The environmental sampling investigation conducted at AMD 915 has resulted in a large quantity of analytical data. Analyses have detected multiple contaminants. Subsets of contaminants of concern in each medium were selected from all contaminants detected at the site in order to focus the public health assessment on those contaminants that are most likely to pose a health risk. Their selection does not necessarily mean that they pose a health threat but only that they will be evaluated further in the public health assessment. Subsequent sections will evaluate whether individuals have been or could be exposed to the contaminants of concern and will determine whether such exposures have public health significance.

The following criteria were used to select or eliminate contaminants of concern: 1) the quality and adequacy of the environmental sampling and analysis, 2) the frequency of detection, 3) a comparison with background concentrations, 4) a comparison with field and laboratory blanks (some chemicals detected in samples may not be site-related but rather the result of field or laboratory contamination), and 5) a comparison with health guidance values. Comparison values used to select contaminants of concern include the following:

EMEG - ATSDR Environmental Media Evaluation Guide

CREG - ATSDR Cancer Risk Evaluation Guide

HA - EPA Health Advisory for drinking water

MCLG - EPA Maximum Contaminant Level Goal

MCL - EPA Maximum Contaminant Level

CA MCL - California Maximum Contaminant Level

EMEGs are media specific values developed by ATSDR to serve as an aid in selecting environmental contaminants that need to be further evaluated for potential health impacts. EMEGs are based on noncarcinogenic end-points and do not consider carcinogenic effects. EMEGs are calculated from either an ATSDR Minimal Risk Level (MRL) or an EPA Reference Dose (RfD). Both the MRL and the RfD are estimates of daily exposure to a chemical that is unlikely to cause adverse, noncarcinogenic, health effects. CREGs are media specific values developed by ATSDR to serve as an aid in selecting contaminants of concern that are potential carcinogens. CREGs are based on EPA cancer slope factors which give an indication of the relative carcinogenic potency of a particular chemical.

EPA has developed health based, non-regulatory Health Advisories (HAs) for some chemicals in drinking water. HAs represent a concentration below which noncancer adverse health effects are not expected to occur. A margin of safety is included to protect sensitive members of the population. MCLGs and MCLs are developed by EPA under the authority of the Safe Drinking Water Act. MCLGs are non-enforceable goals, set at levels which would result in no known, or anticipated, adverse health effects with an adequate margin of safety. In setting MCLGs for known or probable human carcinogens, EPA makes the assumption that there is no absolutely "safe" level of exposure (i.e., known as the non-threshold assumption) and sets the MCLG at zero. MCLs are enforceable standards set as close to MCLGs as possible, but in addition to health factors, MCLs are required by law to consider the technological and economic feasibility of removing the contaminant from the water supply. The limit that is set must be feasible given the best available technology and treatment techniques. Generally, MCLs and MCLGs represent allowable lifetime exposure levels to contaminants for a 70-kg adult who is assumed to ingest two liters of water per day for a 70-year lifetime. For some chemicals, California has established its own MCL values, which are equal to or stricter than Federal EPA values.

A. TOXIC CHEMICAL RELEASE INVENTORY (TRI) SEARCH

To identify other possible releases that could contribute to environmental pollution, the CDHS ATSDR Project staff searched the Toxic Release Inventory (TRI) for the years 1987, 1988 and 1989 (the years for which TRI data were available on-line at the time this public health assessment was written). The TRI contains information on estimated annual releases (emission rates) of toxic chemicals to the environment (via air, water, soil, or underground injection) and is based on data submitted to the EPA by certain industries (Standard Industrial Classification codes 20 through 39 with 10 or more full-time employees).

The estimates are primarily based upon theoretical mass balance equations and assumed leakage rates developed by EPA. Some environmental monitoring data is reported by industry and is

incorporated into TRI. The TRI database contains information on releases from active industrial facilities from 1987 to present. Therefore, the database will not contain any information concerning closed facilities or any facilities not required to report to EPA such as landfills.

TRI data can be used in an ATSDR/CDHS Public health assessment to get a general idea of the current environmental emissions occurring at a site. The RI/FS report that is the basis of much of the exposure assessment generally only contains information and data associated with the actual "Superfund" site (e.g., a tank or lagoon on the property), and not the entire facility. TRI data can be used to determine whether the on-going facility wide emissions may be contributing an additional environmental burden to the nearby population.

As provided in TRI, Advanced Micro Devices reported in 1987 that about 3,000 pounds of six different chemicals were released to air at building 915. Each of the six chemicals was roughly estimated to contribute 500 pounds to the total air releases. The chemicals included sulfuric acid, sodium hydroxide (solution), hydrochloric acid, phosphoric acid, nitric acid, and hydrogen fluoride. No chemicals were reported to have been released to water or land in 1987.

In 1988, four different chemicals were reported to have been released to the air at AMD 915. As in 1987, 500 pounds of each of these four chemicals were roughly estimated to contribute to a total reported air release of 2,000 pounds. The chemicals included sulfuric acid, hydrochloric acid phosphoric acid, and nitric acid. No chemicals were reported to have been released to water or land in 1988.
Total air emissions from AMD 915 in 1989 were estimated at 4,900 pounds. The three chemicals reported released include sulfuric acid (250 pounds), hydrochloric acid (4,623 pounds determined from air monitoring), and phosphoric acid (27 pounds). Again in 1989, no chemicals were reported to have been released to water or land. Emissions of TCE and Freon 113 from the air stripper at AMD 915 were not reported in TRI.

B. ON-SITE CONTAMINATION

SUBSURFACE SOIL

Two point sources of subsurface soil contamination have been defined at the AMD 915 site: a photoresist stripper tank at pad IV and an acid neutralization system at pad C. Figures 1 and 2 show the location of each point source. A discussion of the contaminants found at each of the two point sources is given below. Only one contaminant, TCE, was selected as a contaminant of concern in subsurface soil.

Photoresist stripper tank, Pad IV

The photoresist stripper tank and about 300 cubic yards of contaminated soil were removed in 1981. The limited information available about the original excavation indicate that International Technology Corporation collected seven soil samples from depths of 16-19 feet on the sides of the excavation. Soil samples were found to contain elevated levels of benzene, toluene, TCB,

and xylenes. The lateral extent of the original contamination could not be fully determined due to the incomplete records.

To remove this data gap, AMD arranged in July 1990 for eight soil samples to be collected and analyzed to assess the extent of residual contamination in the soil beneath the previously excavated tank. The 1990 data show samples were taken at depths between 8 and 21.5 feet below ground surface, at points around the original excavation instead of in the original area due to the location of existing structures. The RI/FS only reported levels for 1,2,4-TCB, 1,2,3-TCB and 17 metals. Only one of the samples showed concentrations of 1,2,4-TCB and 1,2,3-TCB, at 500 ppb and 150 ppb respectively. Some of the metals were present at levels above average for the region, although all were within background ranges and not at levels of health concern. Benzene, toluene and xylenes were not detected (15). Based on the 1990 sampling, the RWQCB concluded that no residual on-site soil contamination from the leaking photoresist stripper tank exists at AMD 915 which requires further remediation.

Acid Neutralization System, Pad C

In 1981-82, Woodward-Clyde consultants identified soil contamination around a three tank acid neutralization system. The chemicals TCE, TCB and Freon 113 were reported to be the major contaminants. In 1982-83, Engineering-Science consultants supervised the excavation of the tanks, one of which had a hole in its wall, and the removal of about 5,700 cubic feet of contaminated soil. The central part of the excavation, with the tanks located in the middle, consisted of an area approximately 48' by 60' by 30-34' deep. On each side of the central area, an area approximately 18' by 45' by 20' deep was excavated. The excavation was backfilled and covered with concrete.

The RI/FS conducted by Engineering-Science states that "excavation accomplished removal of the majority of the TCE and TCB contamination." However, a comparison of soil values prior to and after excavation can not be made. Information provided in the RI/FS does not give a clear indication of the sampling done prior to excavation, although the RI/FS states that "soils were removed if they contained more than one part per million" (1000 ppb). Sampling done after excavation shows the highest concentrations of TCE and TCB appear immediately above the water table along the north and eastern boundaries of the excavation. The values of samples taken adjacent to the water table may reflect groundwater concentrations and may not be representative of actual soil levels.

For TCE the maximum concentration reported above the water table is 2,800 ppb, with the sample taken along the northern boundary of the excavation approximately 24 feet from the removed tank at a depth of approximately 15 feet. Along the southern boundary of the excavation, TCE was generally less than 50 ppb. The maximum total TCB concentration recorded above the water table was 96,000 ppb, in a sample taken approximately 45 feet east of the removed tank at a depth of 15 feet. Two other contaminants detected but below ATSDR health guidance values include Freon 113 (9,600 ppb) and TCA (1 ppb).

GROUNDWATER

Since 1982, AMD's contractor has installed 42 monitoring wells to characterize the vertical and lateral extent of groundwater contamination. Thirty-four of these wells are still operational. These wells serve to monitor water quality in the A-, B1-, B2- and B3-aquifers at AMD 915. The contaminant TCE is the primary indicator chemical for contaminated groundwater because its concentrations are the highest compared to the other contaminants, and it has widespread distribution and persistence. Also, the data consistently show 1,2-DCE, which is a by-product of TCE degradation.

Four organic compounds were detected at levels above comparison values, including chloroform, 1,1-DCE, 1,2-DCE, and TCE. Maximum concentrations detected on-site, detection frequency and comparison values for organic contaminants of concern are presented in Table 1. In samples of groundwater, TCE was the contaminant most consistently found at higher levels.

TABLE 1
MAXIMUM CONCENTRATION, DETECTION FREQUENCY AND COMPARISON VALUES FOR ORGANIC CONTAMINANTS OF CONCERN IN GROUNDWATER ON-SITE AT AMD 915[a]

Chemical	Maximum Conc. (ppb)[b]	Frequency of Detection[c]	Comparison Value (ppb)	Comparison Value Source
Chloroform	8	22/212	5.7	WATER CREG
1,1-Dichloroethene	50	40/212	0.06	WATER CREG
1,2-Dichloroethene	520	143/212	70	HA
Trichloroethene	3,800	176/212	None	

[a] Data from 14 quarterly groundwater monitoring events during the time period October 1987 through January 1991 (1,5-9).

[b] Maximum concentration detected in parts chemical per billion parts water (ppb).

[c] Number of samples with the contaminant above the detection limit, divided by the total number of samples analyzed.

In January 1990, one sample of groundwater taken from well 19-D was analyzed for arsenic and chromium. Arsenic was not detected (the detection limit was 5 ppb), but the concentration of total chromium was 90 ppb. Well 19-D is screened (open) in the B1-aquifer and is located about 200 feet downgradient (north) of the source of contamination. Sampling for priority pollutant metals in groundwater at AMD 915 has been done on a quarterly basis since April 1990. Table 2 lists the maximum concentrations of metals detected from five groundwater samplings covering

the period January 1990 through January 1991. Eight metals were detected at levels above comparison values including antimony, arsenic, barium, beryllium, chromium, mercury, nickel and vanadium. No guidance value existed for cobalt.

TABLE 2
MAXIMUM CONCENTRATION, DETECTION FREQUENCY, AND COMPARISON VALUES FOR METALS OF CONCERN IN GROUNDWATER ON-SITE AT AMD 915[a]

Chemical	Maximum Conc. (ppb)[b]	Frequency of Detection[c]	Comparison Value (ppb)	Comparison Value Source
Antimony	606	5/17	3	HA
Arsenic	12	3/18	0.03	WATER CREG
Barium	2,190	17/17	2,000	HA
Beryllium	7	1/17	0.008	WATER CREG
Chromium	653	10/18	100	HA
Cobalt	144	4/17	NA	NA
Mercury	3	6/17	2	HA
Nickel	1,110	8/17	100	HA
Vanadium	564	10/17	20	HA

[a] Based on monitoring well data from five quarterly groundwater monitoring events during the time period January 1990 through January 1991 (1,5-9).

[b] Maximum concentration detected in parts chemical per billion parts water.

[c] Number of samples with the contaminant above the detection limit, divided by the total number of samples analyzed.

NA=Not Available.

Tables 3 and 4 list the maximum concentration and detection frequency of organic and inorganic chemicals in the A-, B1-,B2- and B3-aquifers on site at AMD 915. Thirteen monitoring wells extend into the A-aquifer. However, due to the operation of the extraction wells at the AMD

915 site coupled with prevailing drought conditions, many of these wells have been dry since September 1988. During the five sampling events from January 1990 through January 1991, either nine or ten of the thirteen A-aquifer wells were dry and could not be sampled. The remaining A-aquifer monitoring wells with measurable water in them are outside the area captured by the extraction well system. Therefore, the current contamination in the A-aquifer cannot be defined. However, one well located near the original contamination point source was last sampled in December 1987 prior to going dry and found to have 65 ppb TCE, as compared to 190 ppb TCE when sampled in November 1984. Also, samples taken for the first time from another well located on the south side of AMD 915 and the newly constructed Submicron Development Center had TCE concentrations ranging from 130 ppb to 200 ppb.

Eleven monitoring wells characterize the B1-aquifer at AMD 915. Data from these wells show that the extraction systems at AMD 915 and neighboring sites have resulted in a mixture of contaminant chemicals derived from multiple sources appearing at the AMD 915 site, making characterization of the plumes very difficult. Overall, however, the RWQCB believes the extraction and treatment of groundwater since 1984 has lowered the chemical concentration in the general area and controlled the off-site groundwater migration of the contamination attributed to the AMD 915 site. Data analyses show a trend of decreasing TCE and 1,2-DCE concentrations. Other chemicals inconsistently detected in the B1-aquifer during the October 1987-January 1991 period include chloroform, DCA, 1,1-DCE, Freon 113, 1,2,4-TCB, and TCA.

There are nine monitoring wells for the B2-aquifer. TCE, 1,2-DCE, and Freon 113 were frequently detected in the B2-aquifer during the period October 1987 through January 1991. Other organic contaminants detected in the B2-aquifer during this time period include 1,1-DCE, 1,2,4-TCB and TCA. Only one monitoring well extends into the B3-aquifer. No contamination has been detected in this aquifer.

TABLE 3
MAXIMUM CONCENTRATION AND DETECTION FREQUENCY OF ORGANIC CONTAMINANTS OF CONCERN IN EACH GROUNDWATER AQUIFER ON-SITE AT AMD 915[a]

	A-Aquifer		B1-Aquifer		B2-Aquifer		B3-Aquifer	
Chemical	Max. Conc. (ppb)[b]	Det. Freq.[c]	Max. Conc. (ppb)	Det. Freq.	Max. Conc. (ppb)	Det. Freq.	Max. Conc. (ppb)	Det. Freq.
Chloroform	8	3/6	3	2/34	ND	0/44	ND	0/2
1,1-DCE	ND	0/6	3	3/34	1	1/44	ND	0/2
1,2-DCE	490	3/6	520	32/34	100	22/44	ND	0/2
TCE	150	4/6	2,800	32/34	650	35/44	ND	0/2

[a] Based on monitoring well data from five quarterly groundwater monitoring events during the time period January 1990 through January 1991 (5-9). The depths below ground surface for each aquifer are as follows: A:7'-25', B1:20'-38', B2:38'-65', B3:65'-100'.

[b] Maximum concentration detected in parts chemical per billion parts water (ppb).

[c] Detection Frequency = number of samples with the contaminant above the detection limit, divided by the total number of samples analyzed.

ND = Not detected.

TABLE 4
MAXIMUM CONCENTRATION AND DETECTION FREQUENCY OF METALS OF CONCERN IN EACH GROUNDWATER AQUIFER ON-SITE AT AMD 915[a]

Chemical	A-Aquifer		B1-Aquifer		B2-Aquifer		B3-Aquifer	
	Max. Conc. (ppb)[b]	Detect. Freq.[c]	Max. Conc. (ppb)	Detect. Freq.	Max. Conc. (ppb)	Detect. Freq.	Max. Conc. (ppb)	Detect. Freq.
Antimony	ND	0/1	606	3/8	110	2/8	NS	NS
Arsenic	ND	0/1	12	3/9	ND	0/8	NS	NS
Barium	83	1/1	2,190	8/8	237	8/8	NS	NS
Beryllium	ND	0/1	7	1/8	ND	0/8	NS	NS
Chromium	ND	0/1	653	7/9	35	3/8	NS	NS
Cobalt	ND	0/1	144	4/8	ND	0/8	NS	NS
Mercury	ND	0/1	3	5/8	1	1/8	NS	NS
Nickel	ND	0/1	1,110	6/8	47	2/8	NS	NS
Vanadium	ND	0/1	564	7/8	35	3/8	NS	NS

[a] Based on monitoring well data from five quarterly groundwater monitoring events during the time period January 1990 though January 1991 (5-9). The depths below ground surface for each aquifer are as follows: A:7'-25', B1:20'-38', B2:38'-65', B3:65'-100'.

[b] Maximum concentration detected in parts chemical per billion parts water (ppb).

[c] Number of samples with the contaminant above the detection limit, divided by the total number of samples analyzed.

NS = Not Sampled

ND = Not Detected

AIR

Release of contaminants from the air stripping treatment system are not controlled by a vapor phase activated carbon purification system. As a result, there have been and currently are some emissions released to the ambient air. On August 27 and 28, 1991, Acurex Inc. sampled emissions from the air stripper at AMD 915. Three samples were collected using vacuum canisters over a period of six hours. The canister with the highest organic concentrations contained cis 1,2-dichloroethene (780 ug/m^3), trans 1,2-dichloroethene (9.2 ug/m^3), trichloroethene (9,000 ug/m^3), 1,1,1-trichloroethane (100 ug/m^3), and vinyl chloride (1.3 ug/m^3).

C. OFF-SITE CONTAMINATION

GROUNDWATER

A large, commingled groundwater contamination plume associated with the upgradient AMD 901/902, TRW Microwave, and Signetics NPL sites crosses a portion of the AMD 915 facility and extends several hundred feet north. Although releases from the AMD 915 facility have contaminated the shallow aquifers beneath the site, the contamination has not migrated off-site and contributed to existing groundwater contamination north of the site. Groundwater contamination north of the site has been investigated separately (3), and a separate public health assessment is being prepared to address the potential public health impacts of releases from the aforementioned nearby NPL sites.

SURFACE WATER

Calabazas Creek is the closest surface water body. AMD 915 discharges treated groundwater to the storm sewer which in turn discharges to Calabazas Creek. This discharge is permitted by the National Pollution Discharge Elimination System (NPDES No. CA0028797). Concentrations of site related contaminants are monitored on a monthly basis in the effluent water. Concentrations are generally below 5 ppb for each organic contaminant, including TCE (1).

AIR

No off-site air monitoring or dispersion modeling has been conducted.

D. QUALITY ASSURANCE AND QUALITY CONTROL

In preparing this public health assessment, ATSDR and CDHS rely on the information provided in the referenced documents and assumes that adequate quality assurance and quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The accuracy of the conclusions contained in this public health assessments is determined by the completeness and reliability of the referenced information.

E. PHYSICAL AND OTHER HAZARDS

Observations made at the time of the site visit did not indicate any physical or other hazards that would be expected to present a particular threat to public health.

PATHWAYS ANALYSES

To determine whether on-site workers or nearby residents are exposed to contaminants migrating from the site, ATSDR/CDHS evaluates the environmental and human components that lead to human exposure. This pathway analysis consists of five elements: 1) a source of contamination; 2) transport through an environmental medium (e.g., air, water); 3) a point of exposure; 4) a route of human exposure; and 5) an exposed population.

ATSDR/CDHS identifies exposure pathways as completed, potential, or eliminated. Completed pathways require that the five elements exist and indicate that exposure to a contaminant has occurred in the past, is currently occurring, or will occur in the future. Potential pathways exist when at least one of the five elements is missing, but could exist. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. If based only on contaminant fate and transport modeling, or if it is questionable whether significant exposure is occurring, a pathway may be labeled as potential (but indeterminate) until information becomes available. Eliminated pathways require that at least one of the five elements is missing and will never be present. Completed and potential pathways, however, may be eliminated when they are unlikely to exist.

A. COMPLETED EXPOSURE PATHWAYS

Evaluation of existing information and data for AMD 915 did not find any pathways resulting in past or current exposures to significant levels of site-related contaminants.

B. POTENTIAL EXPOSURE PATHWAYS

One potential exposure pathway identified involves outdoor air exposure to contaminants released from the air stripping treatment system; emissions are not controlled by a vapor phase activated carbon purification system. As a result, there have been and currently are some emissions released to the ambient air. The elements of this potential pathway are summarized in Table 5.

TABLE 5
POTENTIAL EXPOSURE PATHWAYS

Pathway	Time Frame	Source of Contamination	Transport Medium	Point of Exposure	Route of Exposure	Exposed Population
Outdoor Air	Past, current, future	Air stripper	Air	Community near AMD 915 facility	Inhalation	Workers and residents near AMD 915 facility

C. ELIMINATED EXPOSURE PATHWAYS

This public health assessment evaluated and eliminated three pathways based on the fact that they are not likely to occur. The three pathways are summarized in Table 6 and discussed below.

TABLE 6
ELIMINATED EXPOSURE PATHWAYS

Pathway	Time Frame	Source of Contamination	Transport Medium	Point of Exposure	Route of Exposure	Exposed Population
Indoor Air	Past, current, future	Contaminated groundwater and subsurface soil	Air	AMD building 915	Inhalation	AMD personnel
Shallow groundwater	Future	Contaminated groundwater	Groundwater	Future water supply wells	Inhalation, ingestion, skin absorption	Future shallow groundwater well users
Construction	Future	Contaminated groundwater and subsurface soil	Soil, air	AMD 915 property	Inhalation, ingestion, skin absorption	AMD personnel and future excavation workers

INDOOR AIR

Organic contaminants transported via soil-gas may potentially enter and accumulate in structures near or above the groundwater contaminant plume. However, the groundwater plume at the AMD 915 site had its origins outside and to the north of the building. The direction of groundwater flow in the area is to the north-northeast. The contaminant plume is contained on-site and is located to the north of building 915. Groundwater plume maps indicate that only very low levels of VOCs, if any, are present in groundwater under the building. Appreciable exposure via this pathway is considered unlikely.

FUTURE SHALLOW GROUNDWATER WELL USE

The concentrations of contaminants in groundwater are at levels that would be of health concern if domestic, agricultural or industrial use of the contaminated groundwater occurred. There are no private or municipal wells in the impacted area and therefore this does not present a current pathway. The likelihood of a well being placed within the confines of AMD 915's contaminant plume is low. At this time, sufficient water for municipal use is available from other aquifers having higher quality water and water yield. Also, local regulations may make it difficult to install wells in the area due to the requirement of a 50 foot sanitary seal around the well. Since these regulations do not preclude the installation of wells in the area, the cleanup plan for the AMD 915 includes institutional controls in the form of a deed restriction to eliminate the installation of wells on-site. Appreciable exposure to groundwater contaminants in the future is unlikely if: 1) the groundwater extraction and treatment system reduces concentrations of contaminants to below levels of health concern; and 2) no future drinking water wells are placed in areas of known contamination until remediation has reduced contaminant concentrations below levels of health concern.

FUTURE CONSTRUCTION

Residual sub-surface soil contamination exists near the contaminant sources at AMD 915. Concentrations of TCE are highest immediately above the water table, at about 15 feet below ground surface. Future excavation or construction on site at AMD 915 could result in exposure to workers, and others, if runoff and tracking of contaminated soil occurs. During the construction of the Submicron Development Center on the AMD 915 property, organic compounds volatilizing from the construction site were observed, although concentrations were found not to exceed permissible exposure limits (1). While the deed restriction required by the site cleanup plan is not intended to regulate site construction activities, it is intended to serve as a reminder and as a warning to any future site owners or developers of the existence of site contamination. Appreciable exposures in the future are unlikely if construction or excavation sites are limited to authorized personnel using appropriate personal protective equipment.

PUBLIC HEALTH IMPLICATIONS

A. TOXICOLOGICAL EVALUATION

Using the current air stripper emissions data presented in the Environmental Contamination and Other Hazards Section, Acurex followed the California Air Pollution Control Officers Association (CAPCOA) facilities prioritization procedure to determine if releases from the air stripper present a public health threat to the community. The dispersion adjustment procedure, outlined in the CAPCOA Air Toxics Assessment Manual, was used to calculate cancer and non-cancer prioritization scores. The selected dispersion adjustment assumes that the stack is between 0 and 20 meters tall and that the nearest population is between 100 and 250 meters away. The total cancer and non-cancer score was approximately 0.5. According to the Bay

Area Air Quality Management District, a score of less than one would result in a cancer risk of no more than 1 x 10^{-5}. The CDHS considers this screening methodology to represent a health conservative approach. Therefore, CDHS believes that no apparent risk exists for the community due to releases from the air stripper (17).

Without additional information on dispersion of the chemicals and possible concentrations at points of human contact, it is not possible to assess the public health implications of the release information contained in the Toxic Chemical Release Inventory database. The reported releases vary substantially from year to year and the accuracy of the information is unknown.

B. HEALTH OUTCOME DATA EVALUATION

No complete past or current exposure pathways of concern were identified at the AMD 915 site nor has there been any community concerns raised about the site. Therefore, an evaluation of health related data is not warranted.

C. COMMUNITY HEALTH CONCERNS EVALUATION

As indicated previously, no community health concerns associated with AMD 915 have been identified. The public health assessment for AMD 915 was released for public comment from March 25 until April 22, 1992. The one comment received during the public comment period was from Advanced Micro Devices, Inc. No comments were received from local residents. Comments received have been incorporated into the report. The public comment draft public health assessment for AMD 915 indicated a concern about possible soil-gas transport to and accumulation within building 915. Comments received from AMD and a reevaluation of this pathway resulted in the elimination of this pathway as a pathway of concern and the reclassification of the site from "indeterminate public health hazard" to "no apparent public health hazard".

CONCLUSIONS

The available information does not indicate that humans are or have been exposed to contaminants related to the AMD 915 site at levels of concern. Therefore, ATSDR and CDHS have concluded that this site poses no apparent public health hazard. An evaluation of existing health related data is not warranted due to the absence of exposure to contaminants at levels of concern and lack of community health concerns. Significant future exposures to site related contaminants are not likely if: 1) the groundwater extraction and treatment system reduces concentrations of site-related contaminants to below levels of health concern; 2) no future drinking water wells are placed in areas of known contamination until remediation has reduced contaminant concentrations below levels of health concern; and 3) any future excavation/construction projects at the AMD 915 facility take the necessary precautions to insure that workers are not exposed to contaminants above levels of health concern.

RECOMMENDATIONS

A. CEASE/REDUCE EXPOSURE RECOMMENDATIONS

1) In the areas of known groundwater contamination, institutional controls should be implemented to prevent future use of contaminated aquifers for drinking water supplies until remediation has reduced contaminant concentrations to below levels of health concern.

2) To minimize exposures during any future excavation or construction on the AMD 915 property, the work site should be limited to authorized personnel using appropriate personal protective equipment.

B. HEALTH FOLLOW-UP RECOMMENDATIONS

1) The data and information developed in the public health assessment for the AMD 915 site has been evaluated by the ATSDR Health Activities Recommendation Panel (HARP) for follow-up health activities. The available information does not indicate that humans are or have been exposed to site related contaminants at levels of public health concern. Therefore, follow-up public health actions are not indicated at this time. However, if additional data become available, ATSDR and the California Department of Health Services may reevaluate this site for any indicated follow-up health activities.

PUBLIC HEALTH ACTIONS

1) Based on the recommendation of the ATSDR Health Activities Recommendation Panel, this site is not being considered for follow-up public health actions at this time.

3) The Record of Decision (ROD) for AMD 915 was completed and signed by EPA on August 26, 1991. The ROD presents the selected clean-up plan for the site. The clean-up action chosen was to maintain the existing groundwater extraction system with the existing treatment system of an air stripper followed by carbon absorption, until acceptable drinking water standards are attained (18).

4) Preventing the use of contaminated aquifers as drinking water supplies and minimizing exposures during any future construction on the AMD 915 property will be addressed via institutional controls. Specifically, a deed restriction will be required to limit access to site groundwater until the clean-up standards have been met (18). Although the deed restriction is not intended to regulate site construction activities, it is intended to serve as a reminder and as a warning to any future site owners or developers of the existence of site contamination (19).

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CERTIFICATION

This public health assessment was prepared by the California Department of Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health assessment was initiated.

Technical Project Officer, SPS, RPB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health assessment and concurs with its findings.

Director, DHAC, ATSDR

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