

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R09-90/054
September 1990



Superfund Record of Decision:

Applied Materials, CA

APPLIED MATERIALS
LIBRARY

Library Use Only
Do NOT Remove



REPORT DOCUMENTATION PAGE		1. REPORT NO. EPA/ROD/R09-90/054	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Applied Materials, CA First Remedial Action			5. Report Date 09/28/90	
7. Author(s)			6.	
9. Performing Organization Name and Address			8. Performing Organization Rept. No.	
			10. Project/Task/Work Unit No.	
			11. Contract(C) or Grant(G) No. (C) (G)	
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000	
			14.	
15. Supplementary Notes				
16. Abstract (Limit: 200 words) The 9-acre Applied Materials site is an active equipment manufacturing facility in Santa Clara, Santa Clara County, California. The site is located within the San Tomas Aquino floodplain, and land use in the area is primarily light industrial, commercial, and residential. Shallow ground water at the site is a potential drinking water source. Onsite operations include manufacturing vapor deposition equipment for use by the semiconductor industry. In 1983, Applied Materials discovered that several leaks and spills from three onsite underground tanks near Building 1 had contaminated onsite soil and shallow ground water with VOCs and other organics. In 1984 and 1985, as part of interim onsite cleanup activities, Applied Materials excavated and removed underground tanks, piping, and more than 60 cubic yards of contaminated onsite soil, and installed an air stripping unit onsite to treat VOC-contaminated ground water. This Record of Decision (ROD) provides a final remedy for contaminated onsite ground water at the Building 1 area. Remediation of onsite contaminated soil will be addressed in a subsequent ROD. The primary contaminants of concern affecting the ground water are VOCs including PCE, TCE, and 1,1,1-TCA. (See Attached Page)				
17. Document Analysis a. Descriptors Record of Decision - Applied Materials, CA First Remedial Action Contaminated Medium: gw Key Contaminants: VOCs (PCE, TCE) b. Identifiers/Open-Ended Terms c. COSATI Field/Group				
18. Availability Statement		19. Security Class (This Report) None		21. No. of Pages 84
		20. Security Class (This Page) None		22. Price

EPA/ROD/R09-90/054
Applied Materials, CA
First Remedial Action

Abstract (Continued)

The selected remedial action for this site includes onsite pumping and treatment of contaminated ground water using an existing air stripping unit, followed by onsite discharge of the treated water to surface water; ground water monitoring; and implementing institutional controls including deed restrictions. The estimated present worth cost for this remedial action is \$715,000. No O&M costs were provided for this remedial action.

PERFORMANCE STANDARDS OR GOALS: Ground water cleanup levels will meet State and Federal Drinking Water MCLs and include PCE 0.005 ug/l (MCL), TCE 0.005 ug/l (MCL), and 1,1,1-TCA 0.0032 ug/l (MCL). It is estimated that the time needed to restore ground water to beneficial use will be 50 years.

**RECORD OF DECISION
DECLARATION STATEMENT**

SITE NAME AND LOCATION

Applied Materials Inc., Superfund Site
Santa Clara, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the groundwater operable unit for the Applied Materials Superfund site located in Santa Clara, California, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Section 9601, (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300, 55 Fed. Reg. 8666 (3/9/90) (NCP). The decision is based on the administrative record for this site.

The State of California has no objections to the technical elements of the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to the public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for the Applied Materials site addresses groundwater contamination, in which trichloroethane (TCA) is the primary contaminant detected above drinking water standards. Analytical results from January - June 1989 indicate the presence of the following contaminants in groundwater: 1,1,1-TCA at 1,100 ppb; 1,1-DCA at 120 ppb; 1,1-DCE at 50 ppb; TCE at 20 ppb; PCE at 9 ppb; 1,2-DCA at 2.3 ppb; 1,2-DCE at 0.6 ppb; 1,1,2-TCA at 1.0 ppb; Freon 113 at 170 ppb; and Freon 11 at 48 ppb.

This action represents the final remedial action to remove contaminants from groundwater. Several response measures were previously implemented at the site by Applied Materials. The major components of the selected remedy are:

- a. Continue pumping from existing groundwater extraction wells until drinking water standards for TCE (5 ppb); 1,2-DCA (0.5 ppb); 1,1-DCE (6ppb); 1,1-DCA (5 ppb), cis-1,2-DCE (6 ppb); trans-1,2-DCE (10 ppb); 1,1,1-TCA (200

ppb), 1,1,2-TCA (32 ppb), Freon 113 (1200 ppb), and Freon 11 (150 ppb) chloroform (6 ppb), and vinyl chloride (0.5 ppb) are achieved;

- b. Treat extracted groundwater using an existing air stripping system;
- c. Continue groundwater monitoring at the site during the cleanup period;
- d. Implement institutional controls, such as deed restrictions, which will control and restrict the withdrawal and use of contaminated groundwater and control and limit activities that could result in exposure to volatile organic compound (VOC) contamination. Controls and restrictions within the plume will be necessary until drinking water levels have been achieved for all VOCs.
- e. Reclamation and/or reuse of 100% of the groundwater that is extracted and treated is a goal of this remedial action.
- f. Discharge treated water off-site to a storm sewer system tributary of San Tomas Aquino Creek pursuant to an NPDES permit.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable and satisfies the statutory preference for selecting remedies that employ treatment as a principal element and that significantly and permanently reduces the toxicity, mobility, or volume of the hazardous substances.

A review of the remedial action will be conducted every five years after commencement to ensure that the remedy continues to provide protection of human health and the environment.

9.28.95
Date

John Wise
for Daniel W. McGovern
Regional Administrator
EPA Region IX

DECISION SUMMARY

1. Site Name, Location, and Description

APPLIED MATERIALS, INC.
3050 BOWERS AVENUE BUILDING 1 FACILITY
CITY OF SANTA CLARA, SANTA CLARA COUNTY
STATE OF CALIFORNIA

The Applied Materials, Inc. Superfund site (AM or the site), is located at 3050 Bowers Avenue in the City of Santa Clara. Applied Materials manufactures vapor deposition equipment used in the semiconductor industry in its Building 1 plant. Building 1 is located on a nine-acre parcel about 6.4 miles south of San Francisco Bay and within one mile of Calabazas, Saratoga, and San Tomas Aquino Creeks (see figures 1 and 2.)

The population of the City of Santa Clara is about 90,000. The population density in the vicinity of the site is about 4,660 people per square mile. Land use near the site is primarily light industrial, commercial and residential. Agricultural use dominated the area before 1970 but presently represents only a small percentage of land use near the site.

The two primary natural resources in the vicinity of AM are land and water. The potential for agricultural use has been greatly reduced by conversion of land to light industrial, commercial and residential use.

Ground water for human consumption is extracted from wells from about 150 to 500 ft deep in the Santa Clara Valley. The nearest drinking water supply well to the AM site is located 3,500 ft upgradient, to the southwest.

Volatile organic compounds (VOCs) were first detected in groundwater in November 1983, in the vicinity of three underground tanks at the west side of Building 1. The predominant pollutant in 1983 was trichloroethane (1,1,1-TCA) at concentrations up to 12,000 parts per billion (ppb); also detected were trichloroethylene (TCE), dichloroethylene (1,1-DCE), dichloroethane (DCA), Freon 113, and other VOCs.

2. Site History and Enforcement Activities

In 1983, Applied Materials discovered that underground tank leakage and/or spills had resulted in the contamination of soil and shallow groundwater with organic solvents, principally 1,1,1-trichloroethane (TCA), with lower concentrations of 1,1-dichloroethane (DCA) 1,1-dichloroethylene (DCE), and with trace amounts of perchloroethylene (PCE), and Freon 113.

AM has been conducting interim cleanup activities consisting of tank and soil removal and groundwater extraction with treatment by air stripping.

In 1984 and 1985, VOCs were detected at concentrations up to 65 milligrams per liter (mg/l) in soil samples collected in the vicinity of the underground tanks. These data suggested that the VOCs were released from the tanks and/or associated piping. The tanks have been excavated and removed. Above 60 cubic yards of contaminated soil were also removed. The excavation was filled and converted into an extraction pit. About 10,000 gallons of water were extracted to remove sediment and develop the pit. Soil borings indicated that some contaminated soils remain in place in the immediate vicinity of the former tanks. Additional soil was not removed because of a perceived threat to the integrity of the Building 1 structure.

Interim groundwater extraction and treatment began in July 1984. AM has installed and maintains nine onsite monitoring wells, including seven in the A zone and two in the underlying B zone, and three piezometers in the A zone in the vicinity of the extraction pit. The extraction system consists of three wells and the extraction pit and removes from 20,000 to 26,000 gallons of water per day. The extracted groundwater is processed through an air stripping unit which discharges to San Tomas Aquino Creek and ultimately to South San Francisco Bay. This discharge is regulated under a NPDES permit from the California Regional Water Quality Control Board, San Francisco Bay Region (the Board).

Prior to the discovery of subsurface contamination at the site, significant VOC concentrations had been detected at three sites bordering the AM property. However, VOC plumes from the neighboring sites do not appear to extend to the AM site and it is probable that no VOCs were present in the shallow groundwater at Building 1 prior to onsite release.

Lead Agency. Pursuant to the South Bay Multi-Site Cooperative Agreement and the South Bay Ground Water Contamination Enforcement Agreement, entered into on May 2, 1985 (as subsequently amended) by the California Regional Water Quality Control Board, San Francisco Bay Region, EPA, and DHS, the Regional Board has been acting as the lead regulatory agency. The Regional Board will continue to oversee the remediation of the site pursuant to CERCLA, the NCP and applicable state law.

Site Listing History and Enforcement Chronology

The site is on the National Priorities List (NPL) and is regulated under Site Cleanup Requirements of the Regional Board as indicated herein:

October 15, 1984	Site proposed for the NPL.
June 19, 1985	Regional Board adopted NPDES Permit NO. CA0028851, for the discharge of treated water to a storm drain system tributary to San Tomas Aquino Creek and South San Francisco Bay.
September 17, 1986	Regional Board adopted waste discharge requirements for the site.
July 22, 1987	Site added to the final NPL.
December 21, 1988	Regional Board adopted a revised NPDES Permit No. CA9928851
September 20, 1989	Regional Board adopted site cleanup requirements Order No. 89-167.
June 20, 1990	Regional Board adopted permit renewal for NPDES Permit No. CA9928851.
September 19, 1990	September 19, 1990 Regional Board adopted amendments to site cleanup requirements Order No. 90-134.

3. Community Participation

May 1989:	Fact Sheet No.1 RI/FS completed
June 1989:	Fact Sheet No. 2, Proposed Final Cleanup
June 15, 1989:	Notice of public meeting published in <u>Santa Clara American</u>
June 21, 1989 - July 21, 1989:	Public Comment Period Documents available at the Santa Clara -----Public Library and the Regional Board
June 21, 1989:	Public Hearing on Proposed Plan
June 22, 1989:	Notice of public meeting published in the <u>Santa Clara American</u>

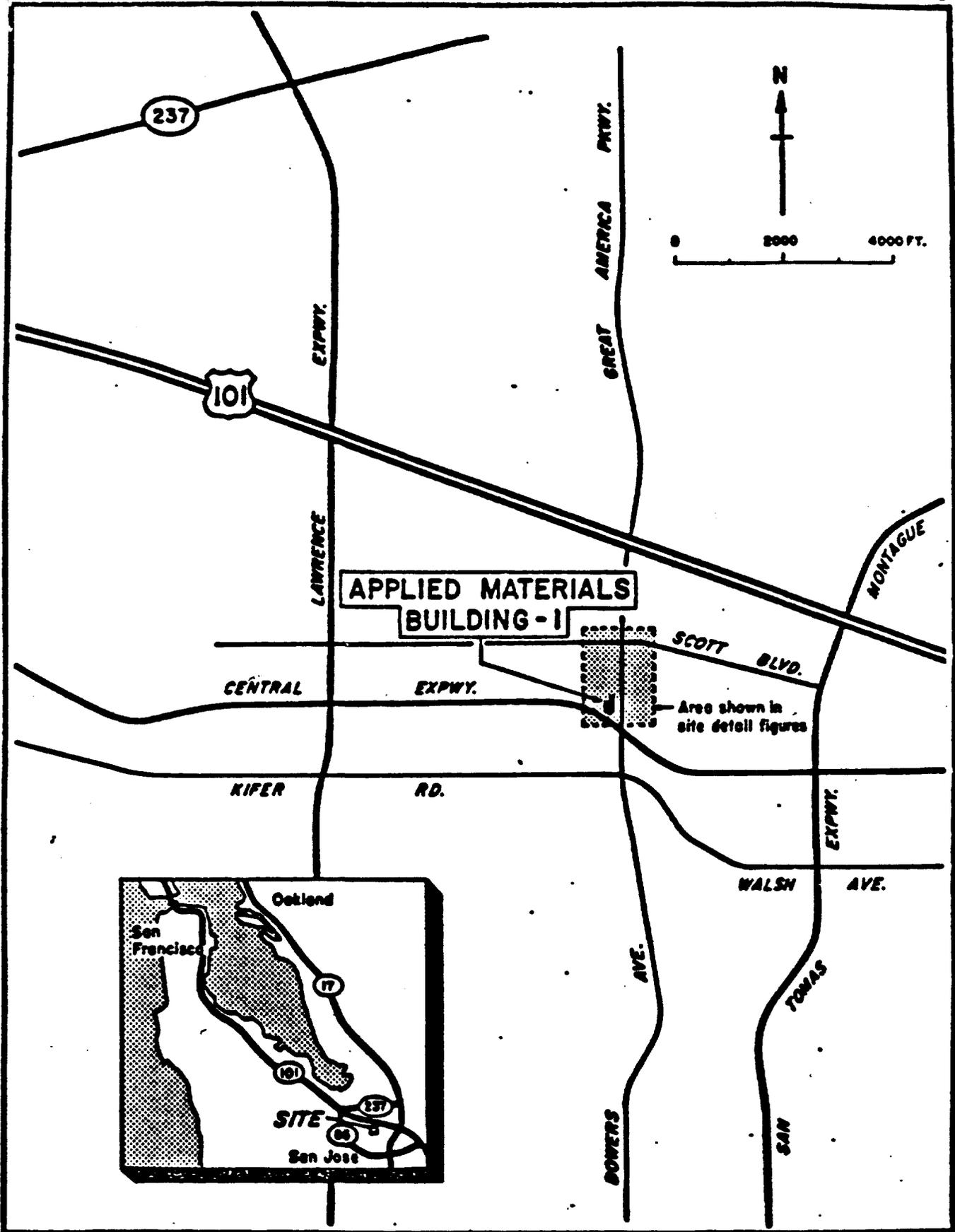


Figure 1. Location of Applied Materials Building 1

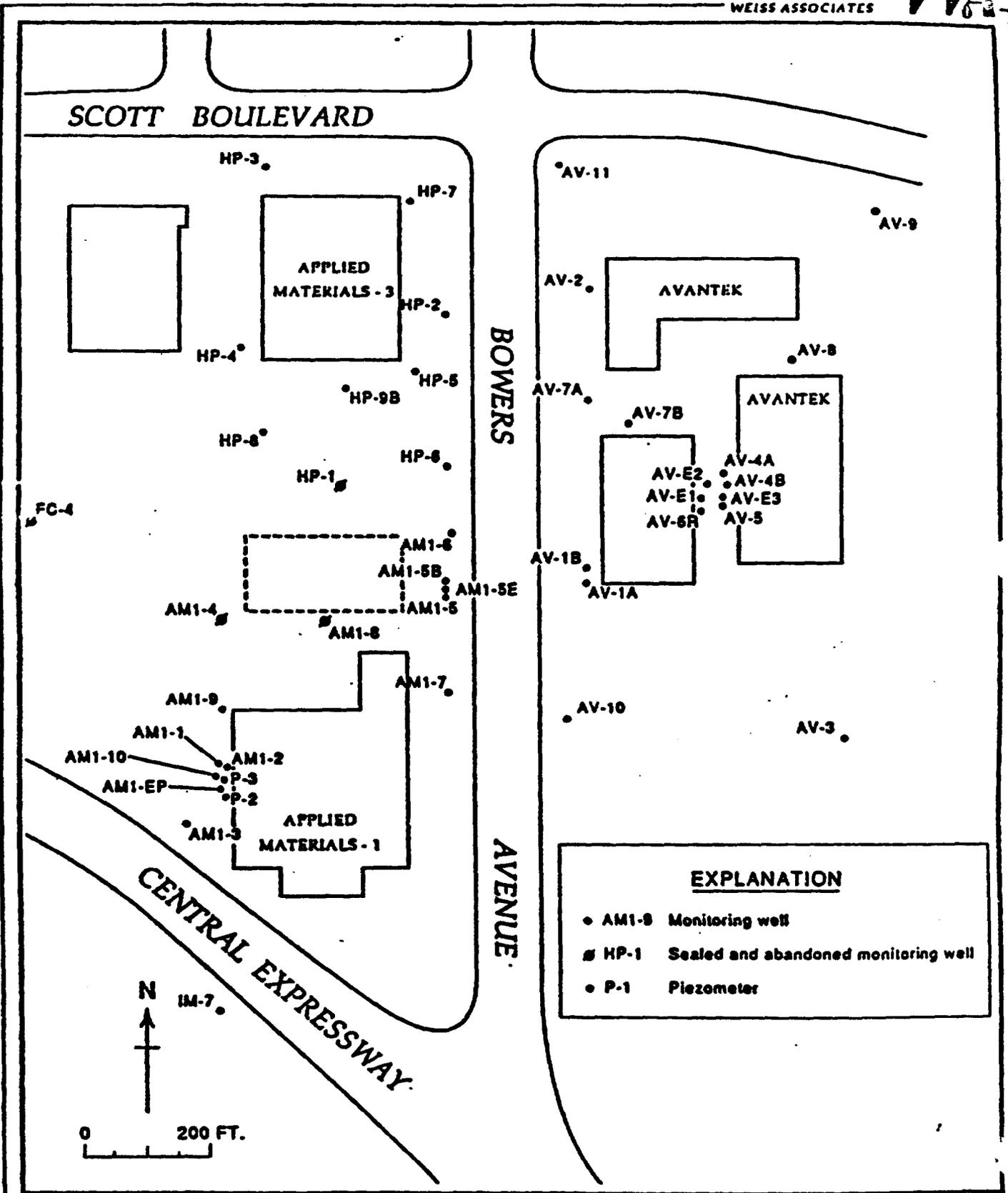


Figure 2. Wells in the Vicinity of Applied Materials Building 1

June 29, 1989: Public Meeting on Proposed Plan
Sept. 20, 1989: Public Hearing to Adopt Proposed Plan and
Regional Board Site Cleanup Orders

Aug. 1990: Fact Sheet No. 3, Revised Final Cleanup Plan
Aug. 15, 1990: Public Hearing on Proposed Plan
Aug. 15, 1990 - Sept. 15, 1990: Public Comment Period

Documents available at the Santa Clara
-----Public Library and the Regional Board
Sept. 19, 1990: Public Hearing to Adopt Proposed Plan
and Regional Board site cleanup orders

The comments received during the public comment period and at the public hearings are addressed in the Responsiveness Summary which is attached to this ROD.

4. Scope and Role of the Operable Unit Within the Site Strategy

The principal threat posed by the site is from contaminated groundwater that may be used as drinking water or may migrate to contaminate a drinking water aquifer. The selected remedy is for an operable unit that will address the principle threat by capturing and removing contaminated groundwater and treating it to health-based levels. The remedial action will prevent any further migration of contaminants in the groundwater, prevent any future exposure of the public to contaminated groundwater and restore the groundwater to drinking water quality. This operable unit does not address cleanup of soils. Contaminated soils known to exist under Building 1 and the utility pad and dock will be addressed in the future in another operable unit or as part of a final site-wide ROD.

5. Summary of Site Characteristics

This ROD addresses groundwater contamination from all known or suspected sources.

Chemicals Detected. VOCs were first detected in groundwater in November 1983, in the vicinity of three underground tanks at the west side of Building 1. The predominant pollutant in 1983 was trichloroethane (1,1,1-TCA) at concentrations up to 12,000 parts per billion (ppb); also detected were trichloroethylene (TCE), dichloroethylene (1,1-DCE), dichloroethane (1,1-DCA), Freon 113, and other VOCs.

Analytical results from January through June 1989 indicate the presence of the following VOCs in groundwater onsite: 1,1,1-TCA at 1,100 ppb; 1,1-DCA at 120 ppb; 1,1-DCE at 50 ppb; TCE at 20 ppb; PCE at 9 ppb; 1,2,-DCA at 2.3 ppb; 1,2-DCE at 0.6 ppb; 1,1,2-TCA at 1.0 ppb; Freon 113 at 170 ppb; and Freon 11 at 48 ppb.

VOCs are identified as either carcinogenic (cancer-causing) or noncarcinogenic (not cancer-causing). The VOCs found in the subsurface at this site include several which have been categorized by the EPA as capable of causing cancer in humans: (1) possible human carcinogen - 1,1-DCE, and 1,1,2-TCA; (2) probable human carcinogen - TCE, PCE, 1,1-DCA and 1,2-DCA (EDC). Chloroform, a probable human carcinogen, was detected in onsite samples collected from 1983 through 1986 and in 1988. Vinyl chloride, a known human carcinogen, was detected twice, once in 1983 and once in 1985, in samples from two different source-area wells; and more recently (1990) in samples from a newly installed extraction well.

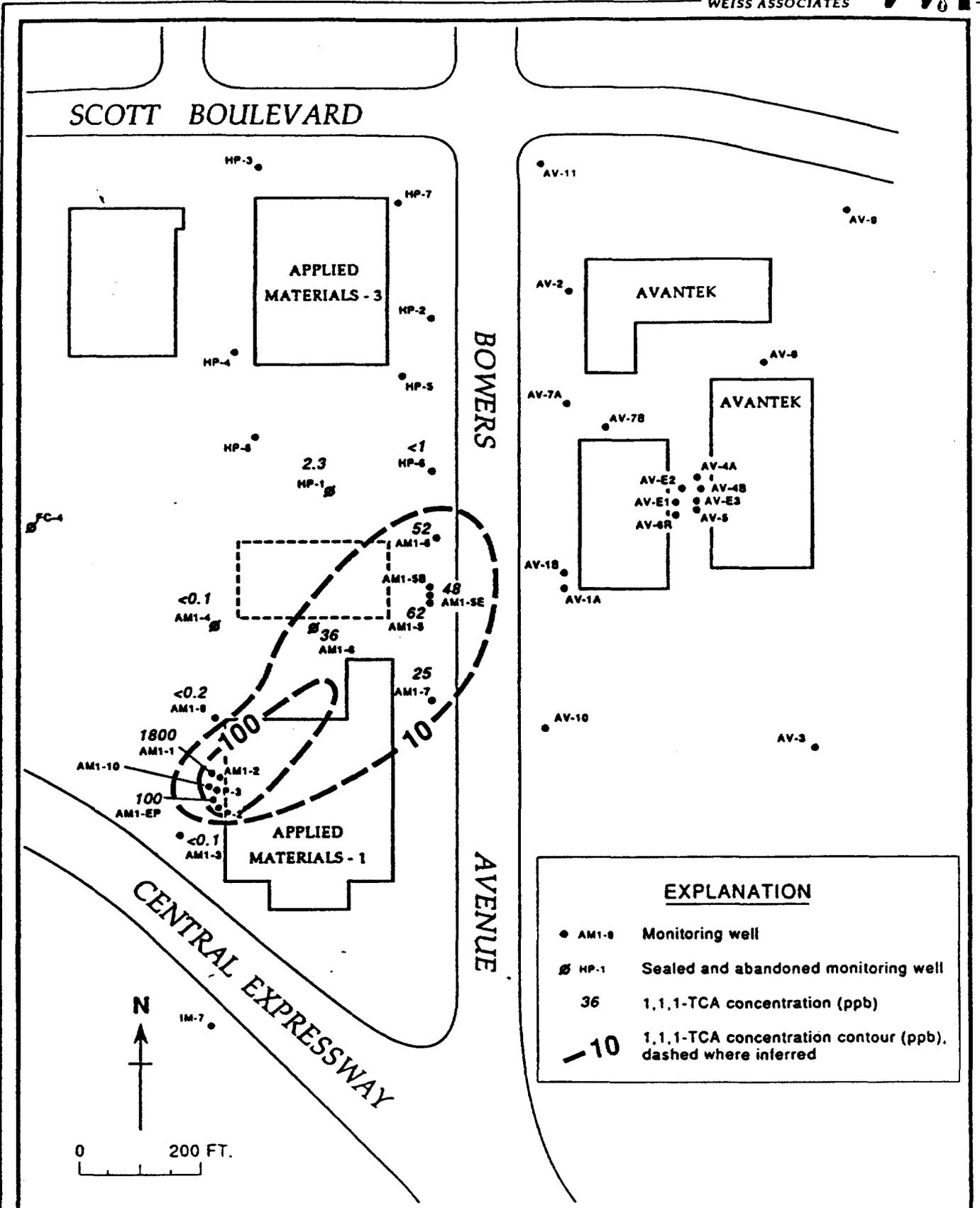
Hydrogeology. The site is in the Santa Clara Valley, a sedimentary basin filled with unconsolidated heterogeneous alluvial material, sometimes interspersed with layers of marine clay. The alluvium is a mixture of permeable water-bearing sands and gravels interbedded with less permeable silts and clays. The soils are extremely variable over short distances, both horizontally and vertically.

Water-bearing deposits in the Santa Clara Valley and at the Building 1 site are generally divided into three laterally traceable units, beginning with the near-surface A zone and progressing with depth through the B zone and into the C zone. The top of the A zone is found at depths between 9 and 15 feet below the surface; the B zone at between 42 and 47 feet. The A and B zones are separated by a layer of silty clay at least 5 feet thick.

Groundwater is found at a depth of about eight feet in the A zone and is confined or semi-confined. Groundwater flow is to the northeast, at a calculated velocity of about two feet per day. Water level measurements indicate an upward hydraulic gradient between the A and B zones. Water in the A and B zones at this site is not withdrawn for any current use other than the interim remedial actions presently underway.

The C zone is located from 150 to more than 500 feet below the surface, and contains aquifers which produce water for domestic and other uses. The C zone aquifers are separated from the shallow A and B aquifers by clay layers ranging from 50 to 150 feet. These clay layers can provide an effective natural barrier to vertical groundwater movement, but are not universally present. The integrity of clay barriers that are present may be compromised at specific locations by abandoned wells that are improperly sealed and act as conduits for the vertical migration of pollutants.

VOCs at this site are found in fine-grained silts and clays in the depth interval of 8 to 19 feet, and in the groundwater and soils of the underlying gravelly sand of the A zone aquifer which is five or more feet thick. VOCs have also been found in the B zone, to a limited extent. By 1983, the AM plume had migrated a



EXPLANATION	
● AM1-9	Monitoring well
⊗ HP-1	Sealed and abandoned monitoring well
36	1,1,1-TCA concentration (ppb)
-10	1,1,1-TCA concentration contour (ppb), dashed where inferred

Figure 3. Applied Materials Building 1 and Vicinity - Distribution of 1,1,1-TCA (ppb) in the A1 Water-Bearing Zone - May 3, 1990

distance of 700 feet or more downgradient, 500 feet cross-gradient, and vertically downward to a depth of about 50 feet below the surface. The current (1990) areal extent of the plume is similar to what it was in 1983, but the concentration of 1,1,1-TCA has decreased from a range of 4,000 to 12,000 ppb in 1983, to 25 to 1,800 ppb at present (Figure 3.)

The primary migration pathway is through the aquifers. There are no surface migration pathways. No water supply wells, active or abandoned, are located within the plume. The nearest former water supply well, more than 500 feet deep in the C zone, was located east of Building 1 and just beyond the eastern margin of the plume. This well was closed in April 1986 under supervision of the Santa Clara Valley Water District. The nearest public water supply well is 3500 feet upgradient to the southwest. No contaminants have been detected in this well. It is beyond the capture zone of the extraction wells at this site.

Several thousand people in the city of Santa Clara would be exposed to contamination from the AM site if it were allowed to migrate to public or private water wells. Groundwater contamination could eventually migrate into San Francisco Bay.

6. Summary of Site Risks

The primary exposure route is through the ingestion (drinking) of contaminated groundwater. Another exposure route is through inhalation. Potential human health effects resulting from the presence of VOCs in the groundwater have been evaluated by (1) calculating exposure point concentrations for indicator VOCs, then comparing these to Applicable or Relevant and Appropriate Requirements (ARARs); and (2) calculating exposure risks for a Maximally Exposed Individual (MEI) at the location of highest estimated exposure.

The shallow groundwater in the A and B zones is designated a potential source of drinking water. Cleanup standards are derived which provide an acceptable residual risk to an individual drinking the water and inhaling VOCs emitted during indoor uses. In addition to achieving the cleanup standard for each chemical, the total upperbound cancer risk for the summed oral and inhalation (and dermal if appropriate pathways must be below the accepted risk level (1×10^{-4} in this case), and the sum of the non-carcinogenic Hazard Indices for all pathways must be less than 1.0.

Cleanup standards for this site, as revised herein, are shown in Table 1. The table also shows the type of carcinogen, as determined by the EPA, grouped according to the weight of evidence from epidemiological studies and animal studies:

Group A - Human Carcinogen (sufficient evidence of carcinogenicity in humans)

Group B - Probable Human Carcinogen (B1-limited evidence of carcinogenicity in humans; B2-sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)

Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)

TABLE 1
Cleanup Standards

Chemical	Group	Cleanup Standard (mg/l)
Vinyl Chloride	A	0.0005 (1)
Chloroform	B2	0.006 (2)
1,2-Dichloroethane (1,2-DCA)	B2	0.0005 (1)
Tetrachloroethylene (PCE)	B2	0.005 (1)
Trichloroethylene (TCE)	B2	0.005 (1)
1,1-Dichloroethane (1,1-DCA)	B2/C	0.005 (1)
1,1,2-Trichloroethane (1,1,2-TCA)	C	0.032 (1)
1,1-Dichloroethylene (1,1-DCE)	C	0.006 (1)
1,1,1-Trichloroethane (1,1,1-TCA)	NC	0.200 (1)
1,2-Dichloroethylene (1,2-DCE)		
cis (c-)	NC	0.006 (1)
trans (t-)	NC	0.010 (1)
Freon 11 (F 11)	NC	0.150 (1)
Freon 113 (F 113)	NC	1.200 (1)

NC Non-carcinogen

(1) DHS Maximum Contaminant Level - MCL

(2) DHS Applied Action Level - AL

Table 2 gives the cancer potency factors (CPFs) and reference doses (RfDs) for each VOC identified. Table 3 shows the calculated risk for identified carcinogens; Table 4 shows the calculated non-carcinogenic risks.

TABLE 2
Cancer Potency Factors (CPF) for Carcinogens
and
Risk Reference Doses (RfDs) for Non-carcinogens

Chemical	CPF oral	CPF inhal	RfD oral	RfD inhal
Vinyl Chloride	2.3	0.295	---	---
Chloroform	0.0061	0.081	0.01	ND
1,2-DCA	0.091	0.091	---	---
PCE	0.051	0.0033	0.01	ND
TCE*	0.011	0.017	0.007	---
1,1-DCA	0.091	0.091**	0.1	0.1
1,1,2-TCA	0.057	0.057	0.004	ND
1,1-DCE	0.6	1.2	0.009	ND
1,1,1-TCA	---	---	0.09	0.3
c-1,2-DCE	---	---	0.01	
t-1,2-DCE	---	---	0.02	ND
F 11	---	---	0.3	0.2
F 113	---	---	30	ND

ND = No Data; oral = ingestion; inhal = inhalation.

* TCE is under review by the EPA; the given CPFs and RfDs may change.

** An inhalation factor is not given for 1,1-DCA, but the EPA believes that the laboratory data are sufficient to apply the oral factor as an inhalation factor.

TABLE 3
Carcinogenic Risk

Carcinogen/Group	Risk due to Ingestion	Risk due to Inhalation	Risk Total
Vinyl Chloride/A	13.8×10^{-6}	1.8×10^{-6}	15.6×10^{-6}
Chloroform/B2	0.4×10^{-6}	5.8×10^{-6}	6.2×10^{-6}
1,2-DCA/B2	0.55×10^{-6}	0.55×10^{-6}	1.1×10^{-6}
PCE/B2	3.1×10^{-6}	0.2×10^{-6}	3.3×10^{-6}
TCE/B2	0.7×10^{-6}	1×10^{-6}	1.7×10^{-6}
1,1-DCA/B2-C	5.5×10^{-6}	5.5×10^{-6}	11×10^{-6}
1,1,2-TCA/C	2.2×10^{-5}	2.2×10^{-5}	4.4×10^{-5}
			8.3×10^{-5}

$$\begin{aligned} \text{Risk} &= (C_w) \times (\text{CPF}) \times (\text{HIF}) \\ C_w &= \text{MCL or AL} \\ \text{HIF} &= 0.012 \text{ for carcinogen} \end{aligned}$$

1,1-DCE is classified as a Group C carcinogen by the EPA, but is evaluated using the modified RfD approach so that the risk is considered independently and is not added to the carcinogenic risk calculated for the other listed carcinogens. Using the modified RfD approach, which is applied only to the ingestion route of exposure, the carcinogenic risk for 1,1-DCE is determined by comparing the CDI exposure to the RfD/10. This comparison shows that the exposure would be less than the RfD/10, and therefore we assume there is no significant risk due to 1,1-DCE.

TABLE 4
Non-carcinogenic Risk

Chemical	Ingestion HQ	Inhalation HQ
Chloroform	0.0174	NA
1,1-DCA	0.00145	0.00145
PCE	0.0145	NA
1,1,2-TCA	0.232	NA
1,1-DCE	0.0193	NA
1,1,1-TCA	0.064	0.0193
t-1,2-DCE	0.0145	NA
F 11	0.0145	0.0218
F 113	0.0012	NA
Hazard Index	<u>0.37885</u> = 0.38	<u>0.04255</u> = 0.04

HQ = Hazard Quotient
NA = Not Applicable

$$HQ = \frac{CDI}{RfD}$$

$$CDI = (C_w) \times (HIF)$$

$$C_w = MCL \text{ or } AL$$

$$HIF = 0.029 \text{ for non-carcinogen}$$

The total excess cancer risk number shown in Table 3 (excluding risk due to exposure to 1,1-DCE), is 8.3×10^{-5} ; and the risk due to 1,1-DCE at its DHS drinking water MCL of 0.006 mg/l is considered insignificant. The Hazard Index calculations show an HI of 0.38 for the ingestion pathway and an HI of 0.04 for the inhalation pathway (Table 4).

The risk due to non-carcinogens at this site was also assessed. The Hazard Index (HI) for each potential exposure route, summed from calculated Hazard Quotients (HQs), was less than 1.0.

The total carcinogenic risk, as now determined, is within the accepted EPA range when based on an evaluation of DHS MCLs, and the non-carcinogenic risk derived from these MCLs is less than 1.0 for each pathway. As a consequence of these determinations none of the cleanup standards must be reduced to less than the DHS MCL or AL, or the non-zero MCLG.

7. Description of Alternatives

EPA and the Regional Board evaluated five remedial action alternatives for the site in accordance with CERCLA Section 121, the National Contingency Plan ("NCP"), and the Interim Guidance on Superfund Selection of Remedy, December 24, 1986 (OSWER Directive No. 9355.0-19).

The Feasibility Study initially screened the following five groundwater remedial action technologies: (a) active containment of the groundwater plume and removal of VOCs by groundwater extraction and treatment; (b) passive containment of the groundwater plume using a slurry wall system and groundwater extraction and treatment; (c) bioremediation with down gradient groundwater extraction and treatment; (d) steam and/or hot air injection with groundwater extraction and treatment; and (e) no further action with monitoring. The two remedial alternatives that passed the initial screening and were evaluated utilizing the nine criteria. The two alternatives are listed below:

Remedial Alternative 1

Remedial Alternative 1 is a "no further action" alternative, retained for base-line comparison purposes in accordance with EPA guidance. The use of remedial technologies is not proposed at the site under this alternative. The existing groundwater recovery, treatment and discharge operations would be discontinued, but groundwater monitoring would continue for at least 100 years. The total present worth cost of this alternative is \$655,000.

Remedial Alternative 2

Remedial Alternative 2 consists of the following:

- o Institutional constraints on on-site activities and use of groundwater
- o Groundwater monitoring
- o Pumping from existing extraction wells until cleanup standards are met (an estimated 50 years)
- o Treatment using the existing air stripping system
- o Discharge of treated water to surface water under existing RWQCB NPDES permit

Total present worth cost = \$715,000

The Proposed Plan identified several additional cleanup alternatives that included soils. Since this ROD is for the groundwater operable unit, the soils alternatives are not described in this ROD.

8. Summary of Comparative Analysis of Alternatives

Threshold Criteria

Overall protection of human health and the environment:

Alternative 2, would be protective of human health and the environment. Alternative 1, the "no action" alternative is not protective of human health and the environment, because it is expected that the groundwater plume would continue to migrate, further degrading the aquifer.

Compliance with applicable or relevant and appropriate requirements (ARARs)

Cleanup standards for this site are determined by the DHS action levels, State and federal Maximum Contaminant Levels, and California Resolution 68-16. Alternative 2 would meet these ARARs. Alternative 1 does not meet these ARARs.

Primary Balancing Criteria

Long-term effectiveness and permanence:

Alternative 2 would mitigate potential future risks by preventing the migration of VOCs in groundwater and restoring the groundwater quality of the A zone to drinking water standards. Long-term monitoring and operation and maintenance would be required. Alternative 1 is not effective or permanent.

Reduction of toxicity, mobility, or volume through treatment;

Alternative 2 would reduce contaminants at the site through extraction and treatment of contaminated groundwater. Alternative 1 would not result in a reduction of toxicity, mobility or volume since it relies on natural attenuation mechanisms, such as dispersion, sorption, diffusion and degradation.

Short-term effectiveness;

Implementation of Alternative 2 will provide short-term effectiveness. Risks associated with groundwater monitoring, recovery, treatment and discharge are mitigated by the health and safety measures to be implemented at the site although no direct exposure to contaminants is anticipated.

Alternative 1 will not be effective in containing the contaminant plume and in the short term will allow further migration of contaminants.

Implementability;

Alternative 2 utilizes proven and readily available technology; the existing recovery and treatment systems are already implemented at the site.

Alternative 1, "no action", can be readily implemented at the site as it involves discontinuing the current remedial actions.

Cost

The cost to implement Alternative 1 would be lower compared to the other remedial alternative for the site. Monitoring wells would need to be maintained for many years. Long term monitoring of contamination would be required for at least 100 years. The existing extraction wells would need to be plugged and abandoned and the treatment system could be disassembled and removed from the site. The present worth value is \$655,000.

The cost to implement Alternative 2 would be higher. The groundwater recovery, treatment, and discharge systems are already built and operating at the site. The system would require maintenance to remain operable. The present worth value is \$715,000 for Alternative 2.

Modifying Criteria

State/support agency acceptance:

The State of California has no objections to the technical elements of the remedial action selected in this ROD.

Community acceptance

The community is supportive of the preferred alternative. Applied Materials indicated a preference for Alternative 2 for groundwater.

9.0 Applicable and Relevant and Appropriate Requirements (ARARS) and To Be Considered Criteria

Remedial actions selected under CERCLA must attain levels of cleanup of hazardous substances released into the environment and control of further release which assure protection of human health and the environment. CERCLA requires the selection remedial actions that achieve a level or standard of cleanup that meets legally applicable or relevant and appropriate requirements, standards, criteria, or limitations (ARARS).

ARARS are generally separated into three categories: (1) chemical specific requirements that set health or risk-based concentration limits or ranges for particular activities; (2) action-specific requirements; and (3) location-specific requirements.

The regulatory framework for setting remedial objectives for the cleanup of groundwater at the site and for the selection of ARARS is based on the beneficial (current or potential) use of local ground water as a drinking water supply.

9.1 Chemical-Specific ARARS

Chemical-specific ARARS for the site are federal and State of California drinking water standards. Applicable federal and State drinking water standards are presented in the first column of Table 5.

9.1.1 Federal Drinking Water Standards

Potential ARARS for the site include Maximum Contaminant Levels (MCLs), and Maximum Contaminant Level Goals (MCLGs) when set at a level above zero.

Table 5

Chemical Specific ARARs

Chemical	EPA MCLs	EPA IRIS ^a	CA DHS MCLs	CA ACTION LEVELS
		<u>level (ppb or ug/l)</u>		
1,1-dichloroethane (1,1-DCA)	-	-	5	5
1,2-dichloroethane (1,2-DCA)	5	0.4	0.5	-
1,1-dichloroethylene (1,1-DCE) ^e	7	0.06	6	-
1,2-dichloroethylene (1,2-DCE) ^e				
cis	70 ^b	-	6	6
trans	100 ^b	-	10	10
tetrachloroethylene (PCE)	5 ^b	-	5	-
1,1,1-trichloroethane(1,1,1-TCA) ^e	200	-	200	-
1,1,2-trichloroethane(1,1,2-TCA)	5 ^b	0.06	32	-
trichloroethylene (TCE)	5	3	5	-
freon 113	-	-	1200	1200
freon 11	-	-	-	150
chloroform	100 ^c	6	-	6 ^d
vinyl chloride	2	-	-	0.5

-
- a. EPA's Integrated Risk Information System (10^{-6} risk level)
 - b. Proposed MCL
 - c. Total trihalomethanes
 - d. California DHS applied action level
 - e. Chemicals for which the MCL and the non-zero MCLG are the same.

The relevant and appropriate standards to establish groundwater cleanup levels at the site are the federal and State Maximum Contaminant Level (MCLs), as established under the Safe Drinking Water Act.

9.1.2 State Drinking Water Standards

California Drinking Water Standards establish enforceable limits for substances that may affect health or aesthetic qualities of water and apply to water delivered to customers. The State's Primary Standards are based on federal National Interim Primary Drinking Water Regulations. Currently, for contaminants found at this site, California has promulgated MCLs for those contaminants at the site as listed on Table 5.

9.1.3 Discharge of Treated Effluent to Surface Water

Substantive National Pollutant Discharge Elimination System (NPDES) permit requirements would apply to treated effluent discharged to surface waters. These requirements would primarily be effluent limitations and monitoring requirements. The California Regional Water Quality Control Board (RWQCB) regulates NPDES discharges. Ambient Water Quality Criteria and technology-based standards are used by the RWQCB to set NPDES effluent discharge limitations.

9.1.4 Air Emissions Standards

Any new source that emits toxic chemicals to the atmosphere at levels determined by the Bay Area Air Quality Management District (BAAQMD) to be appropriate for review must have authorization to construct and a permit to operate from the BAAQMD. Although on-site treatment facilities are exempted by CERCLA from the administrative requirements of the permitting process, emission limits and monitoring requirements imposed by the BAAQMD must be met.

Vapor phase GAC units for air-stripping towers must be used if required by EPA OSWER Directive 9355.0-28 Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites.

9.2 Location-Specific ARARS

9.2.1 Fault Zone

The Applied Materials site is not located within 61 meters (200 feet) of a fault. Therefore, the fault zone requirements of 40 CFR Section 264.18(a) is satisfied.

9.2.2 Floodplain

A hazardous waste treatment facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood. This facility is located in the 100-year floodplain of the San Tomas Aquino Creek drainage system.

9.2.3 California Resolution 68-16

Resolution 68-16 is California's "Statement of Policy With Respect to Maintaining High Quality of Waters in California". EPA regards Resolution 68-16 as criteria to establish ground water cleanup levels. The policy requires maintenance of existing water quality unless it is demonstrated that a change will benefit the people of the state, will not unreasonably affect beneficial uses of the water, and will not result in water quality less than prescribed by other state policies.

A beneficial use of the ground water in the aquifer system is drinking water. Establishing a cleanup level which maintains this beneficial use would attain the requirements of Resolution 68-16.

9.3 Action-Specific ARARs

No action-specific ARARs have been identified for this site.

9.4 To Be Considered Criteria

In establishing selected remedial alternatives, EPA considers various procedures, criteria, advisories, and resolutions. These "to be considered" criteria (TBCs) do not carry the weight of ARARs, but are relevant to the cleanup of the site. The following discussion presents selected criteria relevant to the selection of remedial alternatives.

9.4.1 State Criteria for Groundwater Cleanup

California's criteria for evaluating drinking water quality and ground water cleanup are advisory Drinking Water Action Levels and advisory Applied Action Levels respectively. These criteria are presented in Table 5.

Drinking Water Action Levels are health-based concentration limits set by the Department of Health Services (DHS) to limit public exposure to substances not yet regulated by promulgated standards.

Applied Action Levels (AALs) were developed by DHS for use with the California guidance in the "Site Mitigation Decision Tree". AALs are guidelines that DHS uses to evaluate the risk a

site poses. While the DHS Applied Action Levels are not promulgated standards and are not, therefore, ARARs, they have been taken into consideration in developing cleanup standards for the site pursuant to the National Contingency Plan (NCP).

10. The Selected Remedy

Based upon consideration of the requirements of CERCLA, the selected remedy is Alternative 2 which includes the following components: 1) institutional constraints, 2) groundwater monitoring, 3) pumping from existing extraction wells and 4) treatment with existing air stripping systems and 5) discharge of treated water to surface water under existing NPDES permit.

The goal of this remedial action is to restore groundwater to its beneficial use. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA and the State of California believe that the selected remedy will achieve this goal. It may become apparent, during implementation or operation of the system, that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal, that goal and/or the remedy may be reevaluated.

The selected remedy will include groundwater extraction and treatment. The system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include:

- a) at individual wells where cleanup standards have been attained, pumping may be discontinued;
- d) alternative pumping at wells to eliminate stagnation points
- c) pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into ground water; and
- d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

The final cleanup levels (Table 6) are calculated to result in a total excess cancer risk of 8.3×10^{-5} and a total toxic risk of less than 1.0 (Hazard Index).

Table 6

FINAL CLEANUP LEVELS

APPLIED MATERIALS, INC.
 3050 BOWERS AVENUE BUILDING 1 facility
 SANTA CLARA

<u>Chemical</u>	<u>Level (ppb or ug/l)</u>
1,1-DCA	5
1,2-DCA	0.5
1,1-DCE	6
1,2-DCE	6
cis	6
trans	10
PCE	5
1,1,1-TCA	200
1,1,2-TCA	32
TCE	5
Freon 113	1,200
Freon 11	150
Chloroform	6
Vinyl chloride	0.5

11. Statutory Determinations

The selected remedy is protective of human health and the environment in that contaminated groundwater will be treated to at least maximum contaminant levels (MCLs), which fall within EPA's acceptable carcinogenic risk range of one-in-a-million (10^{-6}) to one-in-ten-thousand (10^{-4}) individual lifetime excess cancers that may develop in a population. In addition, the remedy complies with all federal and state ARARs. The selected remedy is cost effective. The overall effectiveness of the remedial action is proportional to its cost, in that it represents a reasonable value for the cost. The selected remedy will permanently and significantly reduce the toxicity, mobility, or volume of the hazardous substances in the groundwater and will utilize treatment of groundwater as a principal element.

IRENE, 12/4/90

I checked w/

The RPM and

there is NO

Page 1.

This is correct
as is.

Deborra.

SUMMARIZED COMMENTS AND RESPONSES

1. Finding 2. (AMI) Request deleting methylene chloride and vinyl chloride from the list of chemicals detected; the detection of these chemicals is thought to be the result of laboratory error. Also, delete the reference to neighboring sites.

Response by RWQCB. Reference to the neighboring sites is deleted, and the statement in question is rewritten as, "Chloroform, a probable human carcinogen, was reported episodically in onsite samples collected from 1983 through 1986 and in 1988. Methylene chloride, a probable human carcinogen, was reported one time, in 1985. Vinyl chloride, a known human carcinogen, was reported twice, once in 1983 and once in 1985, in samples from two different source area wells."

The discharger has been requested to obtain a data verification report from the lab that performed the original GCMS analysis and forward it to the RWQCB.

2. Finding 5. (SCVWD) It was reported that the water-bearing deposits at the site are generally divided into three laterally traceable units as follows: A-zone at depths of about 10 to 25 feet, B-zone at about 40 to 50 feet, and the C-zone at a depth greater than 150 feet. It was not reported that other B-zone aquifer units occur at depths below 50 feet and above the C-zone, in the intervals of 60 to 80 feet and 110 to 130 feet. It would be appropriate that, at a minimum, the B2-zone (60 to 80 feet deep) be tested for pollution.

The list of potential conduits for this site does not include the Vernis Page well (350 feet total depth) which, according to available information, was perforated in both the B and C zones. The disposition of this well, installed in 1936, is not known.

Response by RWQCB. Staff requested the discharger to respond to this comment. The discharger's response indicates that it is not justified to sample water-bearing materials in the intervals suggested in this comment, because pollution seen thus far in the B zone at this site is minimal. Staff agrees but recognizes that future monitoring data may show a rising pollutant-concentration trend which could provide the necessary justification.

3. Finding 6. (AMI) Conclusion by RWQCB that the analytical result of a sample of water collected from the extraction pit

after construction in 1985, which showed greater than 400 mg/l total VOCs, may indicate the presence of a soil "hot spot" is not supportable.

Response by RWOCB. Board staff believes the analytical result does indicate that a "hot spot" may have existed, and "hot spots" may still exist. In support of this belief, staff makes reference to the RI/FS Report prepared for AMI:

- (1) On page 44 it is stated, "The initial 1,1,1-Trichloroethane concentration of 370,000 ppb (Figure 21) far exceeds the highest subsequent values reported and may be anomalous. If accurate, this suggests the presence of pockets of concentrated VOCs in the pit area." Staff notes that there is nothing of record to indicate that the analysis referred to was fallacious.
- (2) On page 52 the following appears: "Given that the former VOC source has been removed, the continued presence and stability of VOC concentrations in the well AM1-1 vicinity indicates that significant concentrations of VOCs are present that were not detected in the soil sampling associated with the tank excavation."
- (3) The report also shows, by calculations, that the amount of VOCs thus far removed is greater than the amount thought to have been present in the subsurface originally, and VOCs are still being removed.

Staff concludes that soil "hot spots" may be present, and if they are, they are probably leaching VOCs into groundwater.

4. Finding 8. (AMI) Recommend adding the words, "in the absence of cleanup", to the end of the last sentence in paragraph 3.

In paragraph 7, third sentence, the words, "could probably", should be deleted and replaced with the word, "may".

Response by RWOCB. The recommended changes will be made. The sentences, as revised, will read:

(Par.3) "---the discharger concluded that there probably would be no health hazards associated with exposure to non-carcinogenic chemicals, but there would be some risk due to the presence of carcinogens, in the absence of cleanup."

(Par. 7) "These latter alternatives may attain cleanup goals in five to seven years."

5. Finding 8. (SCVWD) One open-ended item that still needs consideration is the additional soils investigation ordered by the Board, with a report due in early March 1990.

Response by RWOCB. Staff anticipates that some significant information resulting from this soil survey will be available in the near future; however, the complete results of the survey may not be available until February of 1990.

There are a number of Tasks assigned in the Tentative Order which require the discharger to address soil pollution on the site, beginning with an evaluation of all data and an assessment of remaining soil pollution, through a proposal for soil remediation if required, and culminating in the actual soil remediation.

6. Finding 9. (EPA) In item b., delete the word, "economically", on the first line.

Response by RWOCB. The word "economically" has been deleted. This does not imply that the Board does not consider economics in its review of alternative Remedial Action Plans. For example, the Order states elsewhere that the Final Remedial Action Plan is cost-effective, and that the plan is reasonable. In conformity with these other statements, the part of Finding 9 in question is changed to read, "If it has been determined, after a reasonable effort utilizing best practicable treatment or control, that the primary objective is not cost-effective and zero background concentration cannot be achieved, then achieving drinking water quality at an aggregate risk level not exceeding 1×10^{-4} throughout the source area and plume is an appropriate secondary goal for this site."

7. Finding 9. (AMI) In item e., we feel that it is highly unlikely that a laboratory or field study of biodegradation and/or transformation of onsite chemicals, directed at an evaluation of the potential for the formation of vinyl chloride and other chemicals will generate any meaningful conclusions. We do not foresee that any laboratory or field experiments can substantially improve on the discussion of 1,1,1-TCA degradation in the RI/FS Report (pages 66-67). Also, we feel it is impractical to require confirmation of all potential exposure pathways, since all are hypothetical and impossible to confirm.

Subsequent to the above statement, the discharger has recommended that a limited number of analyses (three) in September, October, and November of 1989 be done on samples from a source-area well to determine whether or not vinyl chloride is present.

Response by RWOCB. Board staff is concerned about the possible presence of vinyl chloride in soils and groundwater at this site. Vinyl chloride is a known human carcinogen, with a 10^{-6} risk number of 0.02 ppb. While the onsite presence of vinyl chloride has been reported only twice and from two different wells, staff has noted on records of analytical results that the detection limit used when attempting to detect this carcinogen near the source area and elsewhere (but not everywhere) frequently is above 1 ppb and often ranges from 5 to 100 ppb, and sometimes as high as 250 and 500 ppb. Staff also notes the EPA concern, evidenced by the EPA procedure of assuming that vinyl chloride is present in some concentration if a known suite of antecedant chemicals has been detected (see Comment 17). Staff does not believe that past analyses have been entirely adequate for determining the presence or absence of vinyl chloride at this site. Based on present knowledge, staff does not discount the possibility that vinyl chloride may be detected onsite in the future as a consequence of chemical degradation or transformation.

Staff also recognizes that the comment does have some validity, and is amenable to the recommendation made by the discharger. Therefore, the requirement is revised to read as follows:

- e. A review of the presence or potential presence of vinyl chloride within the plume, including (1) the existing sampling and analysis program directed at establishing procedures that will consistently utilize detection limits not to exceed 0.5 ppb, and (2) chemicals identified onsite which may degrade or transform into vinyl chloride.

The procedures of (1) should be repeated annually.

A new task is assigned to cover this revised requirement. Task 22, with a Completion Date of November 17, 1989, requires the submittal of a technical report concerning the detection of vinyl chloride.

8. Finding 10. (AMI) In paragraph 3, second sentence, it should be noted that the potential cancer risk only exists if there is a completed exposure pathway and receptors. The presence of a carcinogen alone does not necessarily create a risk.

Response by RWOCB. If the exposure pathway was completed so that humans could be exposed, staff would consider the risk to be actual or existing, more than potential.

The sentence in question will be rewritten as: "When cancer-causing substances are present and a threat of exposure to

these substances exists, a potential risk is present. There is no "zero-risk" level associated with the threat of exposure to carcinogens."

9. Finding 10. (AMI) In paragraph 5, suggest changing the first sentence to read, "Even though the risk number of 3.5×10^{-4} results from an extreme worst-case hypothetical consideration, it and the the associated VOC residual concentrations expected to be present at the source area thirty years in the future are sufficient cause to pursue a remedial alternative other than no-further-action". The no-further-action alternative is not an acceptable recommended remedial action plan, nor is it the plan proposed in this tentative site cleanup order.

Response by RWOCB. The risk number of 3.5×10^{-4} does not result from an extreme worst-case hypothetical consideration. A much greater risk number would be generated if the present onsite maximum concentration of carcinogens were used in the calculation, instead of a concentration projected 30 years later.

Staff will agree to rewrite the sentence as, "Even though the risk number of 3.5×10^{-4} results from a hypothetical consideration, it and the associated VOC residual concentrations expected to be present at the source area thirty years in the future are sufficient cause to pursue a remedial alternative other than no-further-action."

10. Finding 10. (AMI) Change the second sentence in paragraph 5 to read, "The VOC concentrations may be reduced to, or below, drinking water MCLs by remediation.", since the results of remediation are not certain.

Response by RWOCB. The sentence will be changed to read, "The VOC concentrations can be further reduced, and may be reduced to, or below, drinking water MCLs, by remediation."

11. Finding 10. (AMI) Sentence 3 of the same paragraph, "The postulated residual VOC concentrations, including carcinogens, 30 years in the future reinforces the conclusion that source-area soil remediation will be necessary for protection of public health and the environment.", should be deleted since Alternative 4A, pump and treat, is projected to reduce VOC concentrations to drinking water standards within less than half of the thirty years cited in the no-further-action alternative projection. We object to the existing wording which states that soil remediation is necessary to protect public health and the environment, when equal protection can be achieved by groundwater pumping and treatment under Alternative 4A.

Response by RWOCB. Alternative 4A is projected to reduce VOC concentrations to drinking water standards, which, at an aggregate cancer-risk number not to exceed 1×10^{-4} , is the secondary cleanup objective at this site. The primary objective is a return to background quality, which is not projected by Alternative 4A. Further, it is not clearly stated in the alternative that a reduction of the TCA concentration will result in significant reductions of the concentrations of carcinogens. Staff does not expect Alternative 4A to result in a return to background water quality in more than 30 years of pump and treat, based on the projection provided by Figure 40 in the RI/FS Report. For the protection of public health, the desirable cleanup goal for all carcinogens is zero concentration. Even though the secondary objective is to achieve drinking water quality at an appropriate risk number of 1×10^{-4} , the Regional Board expects the discharger to make a good-faith effort to reduce VOC concentrations to background, or levels approaching background; i.e., attempt to achieve the primary objective throughout the site and in the identified offsite wells.

Staff does not believe the intent of the referenced sentence should be deleted. The sentence will be rewritten as, "The postulated residual VOC concentrations, including carcinogens, 30 years in the future indicates that source-area soil remediation may be necessary in order to achieve background levels and to restore groundwater to its original use-suitability within a reasonable time frame; and, if required, to provide an extra margin of protection to human health and the environment.

12. Finding 10. (EPA) The Hazard Index is no longer being used by the EPA. This finding should reflect the new approach being developed by the EPA.

If an alternative to the Hazard Index (HI) is not used, then the site HI should be described more fully, and the cleanup levels should be determined so that the sum of the non-carcinogen ratios does not exceed the value of One. Similarly, the risk number for all carcinogens at the cleanup level should be summed, and the sum should be within the 10^{-4} to 10^{-7} range.

Response by RWOCB. The methodology of the new approach under development is not yet available, and the data necessary to implement the use of this methodology may not be available for this site. Staff believes it is not feasible to use the new methodology at this site; therefore, the HI was used by Board staff, and required changes in some of the cleanup levels applied in the secondary cleanup objective.

13. Self-Monitoring Program. (AMI) We object to sampling and analyses of all onsite and offsite wells quarterly. We believe that the sampling frequency should be reduced to twice annually for monitoring wells during the period while cleanup goals are being achieved and during the stability period. The considerable additional expense of increased sampling and analysis seems to have little benefit. We find the proposed sampling plan to be unacceptable and recommend implementation of the sampling plan we proposed in the draft RI/FS.

Response by RWQCB. RWQCB staff are interested in the maintainance of a cost-effective monitoring program which is responsive to identified purposes and data needs; staff recognizes the importance of economics as one factor influencing monitoring frequency, but finds that other factors are just as important, as discussed next.

Previous monitoring has identified pollutants and described the plume and water quality trends. Monitoring began on a more-frequent schedule but became routinely a schedule of only three sampling events per year. For the purposes of the Tentative Order, staff was of the opinion that a quarterly schedule (four sampling events per year) should be implemented. AMI wanted a biannual schedule (two sampling events per year). Staff recommended a revised schedule: continue the existing program of three samples per year until cleanup goals are achieved, then change to quarterly for at least one year to prove stability.

Staff believes fewer than three samples per year will not be responsive to purposes and data needs. Staff views the present purposes of the program to include:

- a. Protection of offsite groundwater users by providing early warning that pollutants could be descending vertically towards the C aquifer, which would be indicated by data from onsite B zone wells.
- b. Protection of downgradient A and B zone aquifers by providing early warning that excessive concentrations of pollutants are moving offsite, indicated by data from onsite boundary wells.
- c. Tracking the plume and recording changes in groundwater quality, including those resulting from implemented cleanup actions such as soil remediation.
- d. Determining that cleanup goals have been achieved and any potential threat to public health and the environment has been alleviated.

At the present time, staff will recommend a continuation of the existing monitoring frequency and not recommend a biannual sampling schedule for all wells on this site.

14. General Comment. (EPA) There appears to be ambiguity concerning when cleanup could be achieved by pump and treat. The Tentative Order states 12 years, 15 years, and 7 years at three different places.

Response by RWQCB. Staff will make revisions to remove any ambiguity. The discharger infers that cleanup of TCA to its MCL can be achieved in 12 years. By this same inference, 1,1-DCA will not be reduced to its AL in this time period.

15. General Comment. (EPA) The phrase, "cleanup goal", is preferred over "cleanup level" unless numerical levels are stated.

Response by RWQCB. "Cleanup goal" will be used where appropriate.

16. General Comment. (RWQCB) 1,1-Dichloroethane, formerly reported as non-carcinogenic, is now (as of April, 1989) considered by the EPA to be a possible or probable human carcinogen.

Response by RWQCB. The Tentative Order will be revised accordingly.

17. General Comment. (RWQCB) Because of the known potential degradation of some of the pollutants at this site to vinyl chloride, a known human carcinogen, vinyl chloride should be assumed to be present at half the detection limit. This information was provided in the EPA's review comments of the risk assessment portion of the most recent edition of the RI/FS Report.

Response by RWQCB. Staff will review the applicability of this information, and use it as may be appropriate for this site, based on an evaluation of data obtained from the three consecutive vinyl chloride samples to be made later this year using the 0.5 ppb detection limit.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD**SAN FRANCISCO BAY REGION**1800 HARRISON STREET, SUITE 700
OAKLAND, CA 94612Phone: Area Code 415
464-1386September 7, 1990
File No. 2189.8152 (AJM)Mr. James J. DeLong
Director, Legal Affairs
Applied Materials, Inc.
P. O. Box 58039
Santa Clara, CA 95052

Subject: Additional Comments Prepared by Weiss Associates Concerning Proposed Revised Tentative Order, Amending Order No. 89-167 for the Building 1 Facility at 3050 Bowers Avenue in Santa Clara

Dear Mr. DeLong:

This will acknowledge receipt of your Fax Letter of September 6, 1990, concerning the subject matter. We have accepted the submitted suggestions and incorporated all of them into the Revised Tentative Order. Because these comments apply to the monitoring program, the Self-Monitoring Program for the site also requires revision.

Due to the nature of written comments from Applied Materials and verbal comments from the EPA, it seems less confusing to prepare a revised Order than to propose numerous amendments. You will receive a thicker package for the proposed final Order than you received previously for the Order initially proposed last month.

If you have subsequent comments, please submit them verbally to A. J. Mancini at (415) 464-0825 as soon as possible.

Sincerely,


Steve Morse, Chief
South Bay Toxics Divisioncc: Jerry Schoening
Applied MaterialsPatti Collins
EPA Region IX (H-3-6)Linda Glick
Weiss Associates

SEP



September 6, 1990

Mr. Anthony J. Mancini
Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, CA 94612

Dear Tony:

I am forwarding a letter which Lindee Glick of Weiss Associates wrote to Jerry Schoening dated August 28, 1990. Applied Materials endorses Lindee's comments and requests that you accept these suggestions for revisions to the Applied Materials Building 1 proposed Order.

Sincerely,

A handwritten signature in cursive script that reads "James J. DeLong".

James J. DeLong
Director, Legal Affairs

Enclosure

cc: Lindee L. Glick
Weiss.Associates

Kip Edwards
Orrick, Herrington & Sutcliffe

Jerry Schoening

149JD.90



WEISS ASSOCIATES

Geologic and Environmental Services

Fax: 415-547-5043

Phone: 415-547-5420

5500 Shellmound Street, Emeryville, CA 94608

August 28, 1990

Mr. Jerry Shoening, Corporate Manager
Safety and Health
Applied Materials, Inc.
3050 Bowers Avenue
Santa Clara, CA 95054

Re: Revisions to Applied Materials
Building 1 Site Cleanup Order

Dear Mr. Shoening:

This letter provides Weiss Associates suggestions for revisions to the Applied Materials Building 1 Facility Order dated September 21, 1989 and amended by the Notice of Tentative Order dated August 1, 1990 issued by the California Regional Water Quality Control Board - San Francisco Bay Region (WQCB).

In the order dated September 21, 1989, Provision 6 states that a quarterly report will be submitted every three months beginning on February 15 (subsequent dates being May 15, August 15, November 15, and February 15 of each year). It is also stated that the first quarterly report for each calendar year shall provide a cross section or geologic map describing the hydrogeologic setting. Provision 7 states that an annual report be submitted on February 15 evaluating the progress of cleanup measures.

As has occurred in the past, quarterly monitoring reports are submitted on a different schedule than outlined above, also the annual report including fourth quarter results, has been accepted as a substitute for the fourth quarter technical monitoring report. We propose a new schedule for report submittal that will reflect the most current data available. Because ground water is sampled triannually, we propose triannual reports based on this data. Ground water sampling occurs in January, May, and September, and accordingly, reports could be submitted to the WQCB on March 15, July 15, and November 15 of each calendar year. It is also proposed that the March 15 report will be the annual report detailing: 1) all of the data from the previous calendar year, 2) data collected from the January ground water sampling, and 3) all requirements listed in Provision 7 of the site cleanup order. The geologic map and/or cross

Jerry Shoening
August 28, 1990

2

WEISS ASSOCIATES



section will be included in this annual report.

The Notice of Tentative Order dated August 1, 1990 amends Provision 6 with the requirement of isoconcentration maps of 1,1,1-TCA, 1,1-DCA, and 1,1-DCE in each technical monitoring report showing an isoconcentration contour of the cleanup goal. Due to the small number of data points, and the present concentrations of 1,1-DCA and 1,1-DCE generally greater than 10 $\mu\text{g/L}$, there are not enough constraints to realistically plot the cleanup goal isocontour between the 10 $\mu\text{g/L}$ contour and nondetectable VOCs. The isoconcentration maps will be provided in each monitoring report as proposed in the Notice of Tentative Order, but the isoconcentration contour for the cleanup goal should not necessarily be required, but instead we select isoconcentration contours that most accurately depict the data. When concentrations reach levels where we can reasonably define the cleanup goal contour, this will be included in the map.

In addition, Provision 2: Tasks 6 and 7, require a soil cleanup evaluation report and soil cleanup proposal report, respectively. These two tasks overlap in content and would be more appropriately combined into one report. We request that the combined report is submitted by January 15, 1991. At the suggestion of the WQCB, a letter report presenting the borings logs and analytical soil data from additional borings at Applied Materials Building 1 will be submitted by November 2, 1990.

We hope you find these suggestions beneficial. If you have any questions please call me or Richard Weiss.

Sincerely,
Weiss Associates

Lindee L. Glick
Project Geologist

LLG:jg

D:\ALL\169AM\169L8AU0.WP

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

1800 HARRISON STREET, SUITE 700
OAKLAND, CA 94612Phone: Area Code 415
484-1256August 28, 1990
File No. 2189.8152 (AJM)

Mr. Jerry Schoening
Corporate Manager, Safety and Health
Applied Materials, Inc.
P. O. Box 58039
Santa Clara, CA 95052

Subject: Response to Applied Materials' Comments Regarding the Proposed Tentative Order and Staff Report: Your Fax Letter Dated August 7, 1990

Dear Mr. Schoening:

Copies of your letter were made available to Members of the Regional Board for the regular Board Meeting of August 15, but without any response by Board staff. Copies of this letter will be provided to the Board preparatory to the Board Meeting scheduled for September 19, 1990. Our responses are made in the sequence of the comments in your letter.

1. We acknowledge previous correspondence in which the term "proactive manner" is used. We don't know what is meant by that term; a previous letter suggested proposed language if Finding 6 were to be amended, and also for Finding 2. We did not then propose amending either Finding 2 or 6. However, inasmuch as you have requested a revision in your letter of 08/07/90, we reviewed both Findings for possible revision. The suggested language is not appropriate for Finding 2: this Finding dates the initial discovery of VOCs in groundwater at the site, identifies the pollutants detected, and gives analytical results measured in 1989.

Finding 6 includes a brief history of cleanup activities, which is amenable to slight revision. We propose amending Finding 6 by adding, at the beginning, the following new first paragraph:

6. Interim Actions. On its own volition, AM in November 1983 installed a monitoring well downgradient of a nest of three underground tanks on the west side of Building 1. When VOCs were detected in groundwater by this well AM voluntarily began an investigative program and has conducted site investigations and remedial actions, in cooperation with the Regional Board, since that time.

The remainder of the Finding is unchanged other than the original first paragraph becoming the second paragraph, and the rest being in sequence after this paragraph.

2. Finding 5 in the Amended Order (AO) will be revised to read as follows:

5. Tasks 6 and 7 related to soil cleanup evaluation and soil cleanup proposal have not been completed as required by the current Order. Because Task 5 showed that additional soil investigation was required, Task 5 was not completed until approximately ten weeks after its due date, and therefore Task 6 could not be completed by its due date of February 28, 1990. Board staff concurred in delays for completion of Tasks 5 and 6 in order to allow time for a more complete assessment required by Task 5 and provide better information for use in the completion of Task 6.

The completion of Task 7, with an original due date of March 16, 1990, is sequential following Task 6. Since Task 6 is delayed, Task 7 is also delayed and therefore has not been completed. Board staff concurred in a delay for completion of Task 7. A soil remediation system most likely will not be constructed and/or implemented as required in Task 8 and the dates for completion of other Tasks probably will not be met. Completion dates, with Board staff concurrence, are changed as shown herein.

3. Your comments shown as "Finding 8, page 2" are wide-ranging in scope; we will address part of this comment by revising Finding 7 (AO), by adding at the end, a new sentence which reads:

The discharger states that the cleanup time for extraction alone may or may not be improved by some excavation of the source materials.

In Finding 8 we will revise the portion within the parentheses to read:

(50 years, length for Alternative 4, pump-and-treat, estimated for purposes of comparison by AM)

Your comments show that AM and Board staff still are not in complete agreement concerning soil remediation. We agree that the linear model is not dependably accurate. The model originally told you that groundwater cleanup in the source area could be accomplished in about 12 years (for TCA); now it tells you that cleanup of TCA may take as long as 20 years and cleanup of all VOCs may take much longer. According to what the EPA has determined, the time actually required to achieve cleanup goals is greater than the time extrapolated from a linear model, and may be considerably greater because the rate at which VOCs are removed by pump-and-treat declines over time, and pumping becomes less efficient; increasing the rate of groundwater pumping does not necessarily produce a similar increase in VOCs removed. Other extraction techniques that may be implemented will increase the time required to reach cleanup goals. If your linear model shows that cleanup goals might be reached in 53 years, Board staff intuitively reasons that the time required to attain this goal will be longer than 53 years.

As stated in your letter, the model output did include a range of possible times and not just a maximum time of 50 years. The report that you submitted to the Board uses the high end of the range when it compares alternatives, because (according to the report) it is suspected that it will take a significant amount of time for VOCs to reach cleanup goals. We agree that pump-and-treat alone will take a significant amount of time to reach cleanup goals.

Your comment touches on another facet of this subject: VOC adsorption by soils throughout the length of the plume. You state that soils that have adsorbed VOCs exist throughout the length of the plume and not only at the source. The soil surveys completed by AM have been limited in areal extent, in and near the source area. The results of these surveys cannot be used to describe the full length of the plume without additional documentation. The report of 07/25/90 uses the history of extraction at Well 5E to illustrate that there is a difference between the source area and the downgradient area, and the model predicts a 30 % reduction in the time for VOC cleanup to MCLs if the source is removed, based on extraction at Well 5E. The recently submitted report does not indicate or imply that VOC adsorption throughout the plume is a significant factor to be considered.

Staff does not agree that the best solution is to continue pump-and-treat for an indefinite period while more data are being collected for the linear model. We propose to monitor the extraction process closely and evaluate the potential for accelerating groundwater remediation through practical methods such as source soil removal if an opportunity to do so arises. In the interim it appears that AM has an opportunity to develop another model and/or collect additional information to support a new or modified approach if AM desires to do so.

4. Page 4, first paragraph: the report of 07/25/90 puts more credance in the high end of the range and we agree. As referred to elsewhere in this letter, EPA's review of historical records of pump-and-treat projects shows that the time actually required to achieve cleanup goals (MCLs) in most cases is greater than the time predicted by a linear model such as the one developed by AM.
5. Page 4, part b. second paragraph: There is a "typo" in the Tentative Order - this should be part c. Staff believes that 50 years may not be adequate because the time extrapolated from the linear model, based on EPA's study, is less than the time actually required to achieve MCL cleanup goals. This statement will be rewritten to read:

Board staff believes that, without some soil removal, even a period of 50 years may not be adequate for extraction alone to achieve cleanup goals.

6. Staff Report (Appendix B), page 9, second paragraph: Board staff has not been provided with information that shows VOCs to be distributed in the fine-grained sediments adjacent to the A-zone throughout the length of the plume. As stated earlier in this letter, we agree with the tentative

approach taken in the report submitted by AM which points out the difference in pollution in the source area from that in downgradient areas.

7. Staff Report "Conclusion" (stated as a belief): Staff believes that soil removal combined with groundwater extraction will reasonably accelerate VOC removal at reasonable costs. This appears logical to us, especially if current operations at Building 1 are phased out in the near future.

If you have any questions about this letter please contact A.J. Mancini at (415) 464-0825.

Sincerely,



Steve Morse, Chief
South Bay Toxics Division

cc: Patti Collins, EPA IX
Tom Iwamura, SCVWD
Howard Hatayama, DHS/TSCD
Lee Esquibel, SCCHD

copy

**APPLIED MATERIALS INC.
EMPLOYEE DEVELOPMENT - SANTA CLARA**

TELEPHONE: 408-748-5747

FACSIMILE: 408-733-3238

FACSIMILE

TO:

Gony Mancini (415) 464-1380

Kip Edwards (415) 773-5959

Jim Delany 727-2222

(PLEASE PRINT)

TEXT:

SENDER:

Jerry Schoening

DATE:

8/7/90

FAX LOG #

BY:

JG



August 7, 1990

California Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, CA 94612

Attention: Mr. A. Mancini

Dear Mr. Mancini:

This letter is to provide Applied Materials comments regarding the Notice of Tentative Order dated August 1, 1990 and the attached appendices to that order.

In previous correspondence from our attorney in May regarding this order revision, we requested a revision to findings 2 and 6 to reflect the proactive manner in which Applied Materials has handled the site since its discovery by Applied. The proposed order revision does not include any of this language. Please make the revisions as requested.

APPENDIX A

Finding 5 should be changed to provide a brief explanation of the reasons for the items that "have not been completed as required." The board staff concurrence with the non-completion under the circumstances should also be noted.

Finding 8, page 2: the time estimated to obtain complete cleanup to the MCLs was based on a model that is not dependably accurate due to the short time that data has been taken for input to the model. The model output also included a range of possible times not just the maximum time you stated as 50 years. The cleanup time for extraction alone may or may not be improved by some excavation of the source materials. It is likely that the time improvement, if any, would be minimal because the soils that have adsorbed VOCs in fine-grained sediments exist throughout the length of the plume not only at the source. Because of this situation and the limited data that

150 Bowers Avenue
Santa Clara, California 95054
Phone: (408) 727-5555
Telex: 34-6332

Mailing Address:
Applied Materials, Inc.
P.O. Box 58038
Santa Clara, California 95052

exists, the best solution is to continue extraction and monitoring of the site until sufficient data is obtained to more accurately determine the time to cleanup for the extraction-only alternative. At such time as the data is more conclusive, the next opportunity to do excavation will be taken if the analysis indicates that excavation will be effective.

Page 4, first paragraph: there is no evidence to support the statement that "within a reasonable period of time cannot be determined with exactness but appears minimal;" The range of time developed in the model all have the same probability of happening based on any factual data - it is only a judgement that the time may be at the long or short end of the range. It would be more accurate to state the ranges found.

Page 4, part b. second paragraph: The last sentence again states that "without some soil removal, even a period of 50 years may not be adequate for extraction alone to achieve cleanup goals." The same argument applies - we have insufficient data to draw any conclusion at this time, therefore a statement like this should not be made.

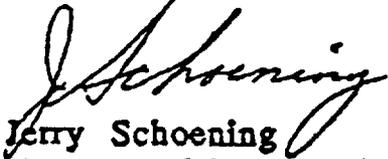
APPENDIX B

Page 9, second paragraph: This paragraph and the following one on conclusions both ignore that the remaining VOCs are distributed in the fine-grained sediments adjacent to the A zone throughout the length of the plume, and that excavation of the source soils may or may not have any significant effect on the cleanup time.

The conclusion that excavation will "reasonably accelerate VOC removal at reasonable costs" is an opinion, not a logically drawn conclusion based on any factual data. This should be pointed out and a statement should be made regarding the need for ongoing data collection and analysis prior to making any such conclusion.

Thank you for your attention to these comments. This submittal to the board should be as accurate as possible so they are properly informed of all the uncertainties of the site and also of our intention to continue to analyze data and pursue cleanup in the most effective ways.

Sincerely Yours,

A handwritten signature in cursive script, appearing to read "J. Schoening".

Jerry Schoening
Corporate Manager, Safety and Health

Page No. 1
07/05/89

Applied Materials Building 1
Administrative Record
Table of Contents
Volume I: Up to and including 1983

** Date: Author: _____	Recipient: _____	Contents: _____	Volume: _____
** 08/01/67 Ca Dept. Water Resources		Bulletin 118-1 Evaluation of Ground Water Resources, South Bay Appendix A: Geology	I B

Applied Materials Building 1
Administrative Record
Table of Contents
Volume II: 1984

** Date: Author:	Recipient:	Contents:	Volume:
** 01/16/84 J. DeLong, AM	D. Eisenberg, RWQCB	Results of soil and water sampling at AM Buildings 1,7, and 8, draft well construction and lithologic logs	II A
** 02/03/84 R.B. Weiss, WA	J. DeLong, AM	Proposal for Phase II Ground water monitoring Program at AM-1	II B
** 02/29/84 R.B. Weiss, WA	J. Lam, RWQCB	Description of water sampling techniques for Volatile Organic Compounds	II A
** 03/12/84 R.B. Weiss, WA	J. Lam, RWQCB	Letter documenting proposed well locations at AM-1	II A
** 04/18/84 W.A. McIlvride, WA	J. Lam, RWQCB	Request for WQCB to contact representatives of adjoining property and to provide written approval of Phase II program	II A
** 04/24/84 D. Dalke, RWQCB	R.B. Weiss, WA	Recommendations concerning ground water sampling techniques	II A
** 08/21/84 J. DeLong, AM	J. Lam, RWQCB	Letter forwarding analytical results of water samples taken to date at AM-1	II A
** 08/27/84 R.C. Johnson, U.S. EPA		Proposed NPL Listing, Documentation for Hazard Ranking	II E

Page No. 2
07/05/89

Applied Materials Building 1
Administrative Record
Table of Contents
Volume II: 1984

** Date: Author:	Recipient:	Contents:	Volume:
** 09/11/84 Weiss Associates	J. Schoening, AM	Ground Water Protection Study Phase III Proposal	II B
** 09/18/84 J. DeLong, AM	J. Lam, RWQCB	Letter forwarding AM Phase III Proposal, dated Sept. 11, 1984	II A
** 10/10/84 J. DeLong, AM	J. Lam, RWQCB	Proposal to conduct hydraulic testing and commence ground water extraction from wells AM1-5 and extraction pit	II A
** 10/15/84 Stoner Laboratories	City of Santa Clara	Analytical Report EPA 601 Analysis of CSC-24	II E
** 11/19/84 J. DeLong, AM	A.W. Olivieri, RWQCB	Comments concerning 205J Study, case summary	II A
** 12/05/84 R. McMurtry, RWQCB	J. DeLong, AM	Responses to proposed work plan and request for description of wastewater treatment system	II A
** 12/13/84 J. DeLong, AM	R.H. Wyer, U.S. EPA	Comments on proposed amendment to National Priorities List	II A
** 12/21/84 R.B. Weiss, WA	J. Lam, RWQCB	Letter forwarding results of water analyses from interim treatment system	II A

02/23/90

Applied Materials Building 1
Administrative Record
Table of Contents
Volume III: 1985

WEISS ASSOCIATES



** Date: Author:	Recipient:	Contents:	Volume:
** 01/29/85 W.A. McIlvride, WA	E. Basanese, Avantek	Letter requesting permission to measure water levels and sample wells at 3175 Bowers Avenue	III A
W.A. McIlvride, WA	A.W. Olivieri, RWQCB	Letter noting errors in November 19, 1984 letter from J. DeLong of AM to A.W. Olivieri	III A
** 02/06/85 J. Schoening, AM	J. Lam, RWQCB	Application for NPDES Permit	III A
** 03/05/85 R.B. James, RWQCB	J. Schoening, AM	Written Approval of Applied Materials Interim On-site Groundwater Remedial Action Plan	III A
** 03/21/85 J. Schoening, AM	A.W. Olivieri, RWQCB	205j Study Report Corrections	III A
** 04/25/85 Weiss Associates	SCVWD	Approved Water Well Construction Application forms for all AM wells	III E
** 04/29/85 W.A. McIlvride, WA	R. Marek, RWQCB	Results of water analyses from AM-1	III E
** 04/30/85 R.B. James, RWQCB	J. Schoening, AM	Tentative Order (NPDES Permit)	III E
R.W. Marek, RWQCB	E. Anton, Ca WRCB	Transmittal of Application for NPDES Permit	III A
R.B. James, RWQCB	J. Schoening, AM	Notice of Tentative Order (NPDES)	III A

02/23/90

Applied Materials Building 1
Administrative Record
Table of Contents
Volume III: 1985

WEISS ASSOCIATES



** Date:	Author:	Recipient:	Contents:	Volume:
** 05/13/85	B. Hunter, DFG, Region 3	R.B. James, RWQCB	Recommendation for effluent limits on discharges as interim criteria	III A
** 05/20/85	J. Schoening, AM	R.B. James, RWQCB	Comments regarding tentative order (NPDES Permit) for AM	III A
** 05/21/85	W.A. McIlvride, WA	R. Marek, RWQCB	Draft cross-sections, location map and lithologic log for AM1-5B	III A
** 06/06/85	R.K. McMurtry, RWQCB	J. Schoening, AM	Rationale for requiring receiving water monitoring in self-monitoring program	III A
** 06/17/85	K.H. Sutherland, U.S.EPA	L. Kolb, WQCB	Comments concerning AM NPDES Permit	III A
** 06/19/85	RWQCB	Applied Materials	Waste Discharge Order #85-70	III E
	RWQCB		Executive Officer Summary Report	III E
** 08/13/85	R.K. McMurtry, RWQCB	J. Schoening, AM	Approval for Groundwater Extraction Monitoring Program	III A
** 08/14/85	J. Schoening, AM	R. Marek, RWQCB	Monthly Monitoring Report	III D

02/23/90

Applied Materials Building 1
Administrative Record
Table of Contents
Volume III: 1985

WEISS ASSOCIATES 

** Date: Author:	Recipient:	Contents:	Volume:
** 08/21/85 Weiss Associates	Ca. Dept. Water Resources	Water Well Drillers Report Forms for All AM Wells	III E
** 09/11/85 W.A. McIlvride, WA	J. Schoening, AM	Monthly Monitoring Report	III D
** 09/16/85 J. Schoening, AM	R. Marek, RWQCB	Letter Transmitting Monthly Monitoring Report	III A
** 10/18/85 W.A. McIlvride, WA	J. Schoening, AM	Monthly Monitoring Report	III D
W.A. McIlvride, WA	R. Marek, RWQCB	Draft Monthly Monitoring Report	III
** 10/22/85 J. Schoening, AM	R. Marek, RWQCB	Letter Transmitting Monthly Monitoring Report	III A
** 11/15/85 W.A. McIlvride, WA	J. Schoening, AM	Monthly Monitoring Report	III D
** 11/22/85 J. Schoening, AM	R. Marek, RWQCB	Letter Transmitting Monthly Monitoring Report	III A
** 12/09/85 P.D. Weiler, WA	J. Schoening, AM	Monthly Monitoring Report	III D
** 12/13/85 J. Schoening, AM	R. Marek, RWQCB	Letter Transmitting Monthly Monitoring Report	III A

Applied Materials Building 1
Administrative Record
Table of Contents
Volume IV: 1986

** Date: Author:	Recipient:	Contents:	Volume:
** 01/28/86 Weiss Associates	J. Schoening, AM	1985 Year-End Ground Water Monitoring Report	IV C
** 01/30/86 Weiss Associates	J. Schoening, AM	Ground Water Protection Study and Proposed Remedial Action Alternatives	IV B
** 04/19/86 Arthur & Orum Drilling Co	SCVWD	Water Well Drillers Report for Well Destruction 06S1W28K01	IV E
** 04/21/86 L. Bejar, SCVWD	Applied Materials	Well Destruction Completion Notice 06S1W28K01	IV E
** 07/02/86 J. Schoening, AM	R.B. James, RWQCB	Request for extension of due date for Quality Assurance Project Plan	IV A
** 07/09/86 S. Morse, RWQCB	J. Schoening, AM	Request for proposal to investigate potential for wells to serve as migration conduits in the AM-1 vicinity	IV A
** 07/18/86 S. Morse, RWQCB	J. Schoening, AM	Tentative Order (Waste Discharge Requirements)	IV E
** 09/05/86 H. Seraydarian, U.S. EPA	R. James, RWQCB	Comments on tentative Waste Discharge Requirements	IV A
** 09/17/86 RWQCB	Applied Materials	Waste Discharge Order # 86-71	IV E



Applied Materials Building 1
Administrative Record
Table of Contents
Volume IV: 1986

** Date: Author: <hr/>	Recipient: <hr/>	Contents: <hr/>	Volume: <hr/>
RWQCB		Executive Officer Summary Report	IV E
** 09/19/86 Weiss Associates	J. Schoening, AM	Quality Assurance/Quality Control Plan For The Geohydrologic Investigation and Remedial Action Program at AM-1	IV E
** 10/30/86 R.W. Marek, RWQCB	J. Dunn, U.S. EPA	Transmittal of AM QA/QC Plan	IV A
** 12/24/86 T. Stumph, U.S. EPA	K. Takata, U.S. EPA	Comments concerning review of AM-1 Quality Assurance/Quality Control Plan, dated September 19, 1986	IV A
** 12/31/86 Applied Materials	RWQCB	Air Stripper Operation Logs: 1986	IV E

Applied Materials Building 1
Administrative Record
Table of Contents
Volume V: 1987

** Date: Author:	Recipient:	Contents:	Volume:
** 03/03/87 Weiss Associates	J. Schoening, AM	1986 Year-End Ground Water Monitoring Report	V C
** 07/01/87 Weiss Associates	J. Schoening, AM	Quarterly Ground Water Monitoring Report	V C
** 07/22/87 J. Zelikson, U.S. EPA	J. Morgan, AM	Notification of inclusion in National Priorities List	V A
** 08/31/87 S. Morse, RWQCB	J. Schoening, AM	Comments concerning Revised Quality Assurance/Quality Control, Sampling and Site Safety Plans dated June 1, 1987	V A
** 09/24/87 R.W. Marek, RWQCB	K.A. Isaacson, WA	Memorandum confirming telephone conversation concerning revision of AM Quality Assurance/Quality Control Plan	V A
** 09/25/87 Weiss Associates	J. Schoening, AM	Addendum Revised Quality Assurance Project Plan & Revised Sampling Plan	V E
** 10/05/87 Weiss Associates	J. Schoening, AM	Quarterly Ground Water Monitoring Report	V C
** 11/30/87 S. Morse, RWQCB	J. Schoening, AM	Comments Concerning Content of Technical Report Required by C.l.e of Order No. 86-71	V A

Page No.
07/05/89

2

WEISS ASSOCIATES



Applied Materials Building 1
Administrative Record
Table of Contents
Volume V: 1987

** Date:
Author:

Recipient:

Contents:

Volume:

** 12/31/87
Applied
Materials

RWQCB

Air Stripper Operation Logs: 1987 V E

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VI: 1988

** Date: Author:	Recipient:	Contents:	Volume:
** 01/04/88 J. Schoening, AM	R.W. Marek, RWQCB	Letter requesting extension of due date for AM-1 RI/FS report	VI A
** 01/05/88 Weiss Associates	J. Schoening, AM	1987 Year-end Ground Water Monitoring Report	VI C
** 01/19/88 J. Schoening, AM	S. Morse, RWQCB	Letter requesting extension of due date for AM-1 RI/FS report	VI A
** 02/29/88 R.W. Marek, RWQCB	J. Schoening, AM	Compliance Monitoring Report	VI B
** 03/25/88 Weiss Associates	J. Schoening, AM	Quarterly Ground Water Monitoring Report	VI C
** 05/31/88 J. Schoening, AM	R.W. Marek, RWQCB	Summary of May 13, 1988 meeting to discuss long-term cleanup plan	VI A
** 06/06/88 R.W. Marek, RWQCB	J. Schoening, AM	Compliance Monitoring Report	VI B
** 06/21/88 G. Kistner, U.S. EPA	R.W. Marek, RWQCB	EPA Comments on AM-1 Remedial Investigation/Feasibility Study	VI A
** 07/01/88 Weiss Associates	J. Schoening, AM	Quarterly Ground Water Monitoring Report	VI C
R.W. Marek, RWQCB		Case Transfer Form	VI B

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VI: 1988

** Date:	Author:	Recipient:	Contents:	Volume:
** 07/20/88	S. Morse, RWQCB	J. Schoening, AM	Review of Remedial Investigation/Feasibility Study Report for AM-1	VI A
** 07/29/88	K.A. Isaacson, WA	R.W. Marek, RWQCB	Discussion of Soil Gas Venting as inappropriate technology for AM-1 site	VI A
** 08/25/88	RWQCB		Work Plan for AM-1	VI B
** 09/07/88	G. Kistner, U.S. EPA	B. Wolf, RWQCB	Review of Risk Assessment Section of AM-1 Remedial Investigation/Feasibility Study	VI A
	G. Kistner, U.S. EPA	B. Wolf, RWQCB	EPA comments on Risk Assessment portion of AM RI/FS, dated 2/19/88	VI A
** 09/30/88	S. Havlicek, CCAS	K.A. Isaacson, WA	Data Validation for 10 Samples Collected By Weiss Associates at AM-1 During Triannual Sampling, Sept. 1, 1988	VI E
** 10/04/88	Weiss Associates	J. Schoening, AM	Addendum to Remedial Investigation/Feasibility Study	VI B
	Weiss Associates	J. Schoening, AM	Proposed Remedial Action For VOCs in Ground Water At AM-1	VI B
	K.A. Issacson, WA	B. Wolf, RWQCB	Responses to July 20, 1988 RWQCB Comments Concerning AM1-RI/FS Report	VI B



Applied Materials Building 1
Administrative Record
Table of Contents
Volume VI: 1988

** Date: Author:	Recipient:	Contents:	Volume:
** 10/05/88 Weiss Associates	J. Schoening, AM	Quarterly Ground Water Monitoring Report	VI C
** 10/21/88 J. Schoening, AM	A.J. Mancini, RWQCB	Notification of Extraction System Maintenance	VI A
** 11/17/88 S. Morse, RWQCB	J. Schoening, AM	Notice of Revised NPDES Permit	VI E
** 11/29/88 A.J. Mancini, RWQCB	M.D. Kent, RWQCB	Review of Additional RI/FS Revisions	VI A
** 12/06/88 P.D. Weiler, WA	J. Schoening, AM	Comments on NPDES Permit Revisions	VI A
** 12/12/88 G. Kistner, U.S. EPA	A.J. Mancini, RWQCB	EPA Comments on AM RI/FS Study	VI A
** 12/21/88 RWQCB	Applied Materials	Waste Discharge Order #88-171	VI E
RWQCB		Executive Officer Summary Report	VI E
** 12/31/88 Applied Materials	RWQCB	Air Stripper Operation Logs: 1988	VI E



Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date: Author:	Recipient:	Contents:	Volume:
** 01/05/89 Weiss Associates	J. Schoening, AM	1988 Year-End Ground Water Monitoring Report	VII C
** 01/12/89 J. Clifford, U.S.EPA	RWQCB	Memo regarding need for environmental evaluation at Superfund Sites	VII A
** 01/23/89 S. Morse, RWQCB	J. Schoening, AM	Comments on Additional Information Submitted To Revise the Remedial Investigation/Feasibility Study for AM-1	VII A
** 02/22/89 S. Kusum Perera, DHS	S. Morse, RWQCB	Comments on Data Validation Package Submitted for AM-1	VII A
** 02/23/89 P.D. Weiler, WA	J. Schoening, AM	Draft Revised Risk Assessment Portions of AM-1 RI/FS	VII B
** 02/24/89 G. Kistner, U.S. EPA	A.J. Mancini, RWQCB	Preliminary Health Assessment for AM-1	VII B
** 03/07/89 S. Morse, RWQCB	J. Schoening, AM	Compliance Monitoring Report	VII B
** 03/09/89 S. Morse, RWQCB	J. Schoening, AM	Letter Forwarding Comments on Data Validation Package Submitted for AM-1	VII A
** 03/10/89 S. Morse, RWQCB	J. Schoening, AM	Request for Schedule of Administrative Record Compilation	VII A

Page No. 2
06/12/90

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date: Author:	Recipient:	Contents:	Volume:
** 03/14/89 P.D. Weiler, WA	A.J. Mancini, RWQCB	Correction to Page 14 of Draft Revised Public Health and Environmental Impacts chapter of the AM-1 RI/FS Report	VII B
** 03/16/89 R. Saito, Jacobs Eng.	A.J. Mancini, RWQCB	Data from Public Health Risk Evaluation Database	VII A
** 03/21/89 G. Kistner, U.S. EPA	A.J. Mancini, RWQCB	EPA comments on revised draft Risk Assessment portions of AM RI/FS, dated 2/19/88	VII A
** 03/22/89 P.D. Weiler, WA	A.J. Mancini, RWQCB	Schedule Agreement for Administrative Record Compilation	VII A
** 03/27/89 S. Morse, RWQCB	J. Schoening, AM	Comments on Revised Risk Assessment Portion of the AM RI/FS	VII A
** 04/02/89 S. Havlicek, CCAS	M.L. Stallard, WA	Responses to Comments on Data Validation Package	VII A
** 04/04/89 S. Morse, RWQCB	J. Schoening, AM	Confirmation of Extension of Time Granted AM for Submittal of Revised Risk Assessment	VII A
** 04/05/89 Weiss Associates	J. Schoening, AM	Quarterly Ground Water Monitoring Report	VII C

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date:	Author:	Recipient:	Contents:	Volume:
** 04/10/89	M.L. Stallard, WA	A.J. Mancini, RWQCB	Letter Forwarding CCAS Responses to Comments on Data Validation Package	VII A
** 04/13/89	P.D. Weiler, WA	A.J. Mancini, RWQCB	Responses to January 23, 1989 RWQCB Comments Concerning AM-1 RI/FS Report	VII B
	S. Havlicek, CCAS	M.L. Stallard, WA	Special Comments EPA Check Sample for Data Validation Package	VII A
** 04/14/89	M.L. Stallard, WA	A.J. Mancini, RWQCB	Letter Forwarding Special Comments EPA Check Sample for Data Validation	VII A
** 04/19/89	D. Spath, DHS	RWQCB	List of Revised Action Levels for Contaminants of Drinking Water	VII A
** 05/11/89	G. Kistner, U.S. EPA	A.J. Mancini, RWQCB	List of EPA guidance documents for admin. record references	VII A
	A.J. Mancini	P. Weiler, WA	List of reference documents used by RWQCB 2	VII A
** 05/18/89	G. Kistner, U.S. EPA	A.J. Mancini, RWQCB	EPA comments on AM revised Endagerment Assessment dated 3/15/89	VII A
** 05/19/89	P.D. Weiler, WA	J. Schoening, AM	Near-Source Soil Sampling Investigation Plan	VII B

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date: Author:	Recipient:	Contents:	Volume:
** 05/23/89 S. Morse, RWQCB	J. Schoening, AM	Compliance Monitoring Report	VII B
** 06/14/89 Weiss Associates	J. Schoening, AM	Remedial Investigation and Feasibility Study For Applied Materials Building 1	VII B
** 06/21/89 Reporting Service	RWQCB	Reporter's Transcript of Proceedings, June 21, 1989	VII E
CA RWQCB	J. Schoening, AM	Tentative Order of Site Cleanup Requirements for AM-1	VII E
** 06/23/89 Applied Materials	RWQCB	Air Stripper Operation Logs: 1989	VII E
** 06/29/89 CA RWQCB		Presentation by RWQCB Staff, Public Meeting, 6/29/89	VII E
** 07/05/89 A. Martorana, WA	J. Schoening, AM	Quarterly Ground Water Monitoring Report	VII C
** 07/20/89 T.I. Iwamura, SCVWD	A.J. Mancini, RWQCB	Comments on 7/16/89 Proposed Final RAP for AM-1	VII A
** 07/21/89 J. Schoening, AM	A.J. Mancini, RWQCB	Letter transmitting responses to 6/21/89 tentative order	VII A
P.D. Weiler, WA	J. Schoening, AM	Responses to 6/21/89 tentative order for AM-1	VII A

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date: Author:	Recipient:	Contents:	Volume:
G. Kistner, USEPA	A.J. Mancini, RWQCB	EPA Comments on Public Health Evaluation from 7/14/89 RI/FS for AM-1	VII A
** 08/21/89 S.K. Perera, DHS	S. Morse, RWQCB	Final Data Validation Report for AM-1	VII E
P.D. Weiler, WA	J. Schoening, AM	Comments on draft responses for tentative order for AM-1	VII A
** 08/28/89 P.D. Weiler, WA	J. Schoening, AM	Responses to SCVWD comments, dated 7/20/89	VII A
** 09/01/89 CA RWQCB		Community Relations Plan for Superfund Sites in the City of Santa Clara	VII E
** 09/05/89 S. Morse, RWQCB	J. Schoening, AM	Response to letter dated 8/21/89 concerning tentative order for AM-1	VII A
S. Morse, RWQCB	J. Schoening, AM	Responses to comments dated 8/21/89 concerning tentative order for AM-1	VII A
** 09/06/89 S. Morse, RWQCB		Responsiveness Summary to Comments Concerning Tentative Order for AM-1	VII E
P.D. Weiler, WA	J. Schoening, AM	Preliminary Report of Near-Source Soil Sampling Investigation Results	VII B
** 09/08/89 CA RWQCB	J. Schoening, AM	Revised Tentative Order of Site Cleanup Requirements for AM-1	VII E

Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date: Author:	Recipient:	Contents:	Volume:
** 09/18/89 J.T. Wondolleck, CDM	A.J. Mancini, RWQCB	Review Comments on AM-1 Ground Water Remedial Alternatives	VII A
** 09/19/89 D.W. Alden, OHS	CA RWQCB	Comments on Revised Tentative Order and Site Cleanup Requirements for AM-1	VII A
** 09/21/89 CA RWQCB	Applied Materials, Inc.	Order for Site Cleanup Requirements for AM Building 1	VII E
** 09/25/89 S. Ritchie, WQCB	State of California	Notice of Exemption, Section 15321, Title 14, CA Code of Regulations	VII A
** 09/28/89 S. Morse, WQCB	J. Schoening, AM	Letter Transmitting Order 89-167	VII A
** 10/05/89 A. Martorana, WA	J. Schoening, AM	Quarterly Ground Water Monitoring Report	VII C
** 10/31/89 Weiss Associates	Applied Materials	Final Plan for disposal and reclamation of extracted ground water	VII B
** 11/06/89 A. Martorana, WA	T. Mancini, RWQCB	Request for change of submittal date of quarterly report	VII A
** 11/07/89 S. Morse, WQCB	J. Schoening, AM	Request for Due Date Extension for Assessment of VOCs in Soil Rpt.	VII A



Applied Materials Building 1
Administrative Record
Table of Contents
Volume VII: 1989

** Date: Author:	Recipient:	Contents:	Volume:
** 11/14/89 S. Morse, WQCB	J. Schoening, AM	Reply to Request to Change Due Date for Submittal of Quarterly Report	VII A
** 11/17/89 Weiss Associates	J. Schoening, AM	Report on detection and formation of vinyl chloride in ground water	VII B
** 11/28/89 S. Morse, WQCB	J. Schoening, AM	Letter Noting Reports Required by Order No. 89-167, Site Cleanup Requirements	VII A
** 11/29/89 Weiss Associates	J. Schoening, AM	Progress Report on assessment of VOCs in soil at AM	VII B
** 12/18/89 S. Morse, WQCB	J. Schoening, AM	Comments on Report and Letter on Disposal and Reclamation of Extracted Ground Water	VII A
S. Morse, WQCB	J. Schoening, AM	Comments Concerning Soil Cleanup Evaluation at the Building 1 Site	VII A

**APPLIED MATERIALS BUILDING 1
ADMINISTRATIVE RECORD
TABLE OF CONTENTS
VOLUME VIII: 1990**

<u>Date:</u> <u>Author:</u>	<u>Recipient</u>	<u>Contents:</u>	<u>Volume</u>
**01/05/90 J. Schoening Applied Materials	A.J. Mancini RWQCB	Response to water use constraints in the event of a change in ownership	VIIIA
**01/11/90 Weiss Associates	J. Schoening Applied Materials	1989 Year-end ground water monitoring report	VIIIC
**01/22/90 D. Wang DHS	J. Schoening Applied Materials	Notification that DHS does not require further information regarding the site	VIIIA
**01/29/90 Weiss Associates	J. Schoening Applied Materials	Assessment of VOCs in soil at AM-1	VIIIB
**02/15/90 Weiss Associates	J. Schoening Applied Materials	Final plan for disposal and reclamation of extracted ground water	VIIIB
**03/05/90 J. Thompson RWQCB	J. Schoening Applied Materials	Site update document for Santa Clara Superfund sites	VIIIA
**03/06/90 S. Morse RWQCB	J. Schoening Applied Materials	Requirements for NPDES permit renewal	VIIIA
S. Morse RWQCB	L.K. Silva EPA	Renewal application for NPDES permit No. CA0028851	VIIIE
**03/13/90 Weiss Associates	J. Schoening Applied Materials	Quarterly ground water monitoring report	VIIIC



<u>Date:</u> <u>Author:</u>	<u>Recipient</u>	<u>Contents:</u>	<u>Volume</u>
**03/15/90 J. Thompson RWQCB	C. Johnson Santa Clara	Site update document for Santa Clara Superfund sites	VIIIA
**03/20/90 S. Morse RWQCB	J. Schoening Applied Materials	Letter request for additional NPDES renewal permit materials	VIIIA
**03/21/90 S. Morse RWQCB	J. Schoening Applied Materials	Letter regarding recommendation of amending Order 89-167	VIIIA
**04/06/90 J. Schoening Applied Materials	T. Mancini RWQCB	Clarification that AM is not required to complete form 3510-3	VIIIA
**04/18/90 S. Morse RWQCB	J. Schoening Applied Materials	Comments to quarterly ground water monitoring report, January - March 1990	VIIIA
S. Morse RWQCB	J. Schoening Applied Materials	Letter requesting the update of Administrative Record	VIIIA
S. Morse RWQCB	G. Toney Applied Materials	Signature authorization, NPDES permit renewal	VIIIA
S. Morse RWQCB	J. Schoening Applied Materials	Letter addressing completion of NPDES permit renewal and need for signature authorization	VIIIA
S. Morse RWQCB	A. Matthews CA - WRCB	Transmittal or remainder of renewal application for NPDES permit CA 0028851	VIIIA
S. Morse RWQCB	L.K. Silva EPA	Transmittal of remainder of renewal application for NPDES permit CA 0028851	VIIIA
**05/07/90 S. Morse RWQCB	J. Schoening Applied Materials	Need for public comment period for amended Board Order No. 89-167	VIIIA



<u>Date:</u> <u>Author:</u>	<u>Recipient</u>	<u>Contents:</u>	<u>Volume</u>
**05/08/90 D. Wang DHS	J. Schoening Applied Materials	Notification that DHS does not require further information regarding the site	VIIIA
**05/14/90 Weiss Associates	A.J. Mancini RWQCB	AM Sampling letter in response to letter dated April 18, 1990	VIIIA
**05/17/90 G. Toney Applied Materials	S. Morse RWQCB	Authorization for Jerry Schoening to sign reports, applications, etc.	VIIIA
S. Morse RWQCB	J. Schoening Applied Materials	Notification that Amended Board Order No. 89-167 will not be presented in June	VIIIA
**05/29/90 S. Morse RWQCB	J. Schoening Applied Materials	Response to AMs comments to tentative NPDES permit renewal requirements	VIIIA
**06/19/90 J. Schoening Applied Materials	A.J. Mancini RWQCB	Notification of problems with ground water extraction due to construction	VIIIA
**06/25/90 S. Morse RWQCB	J. Schoening Applied Materials	Problems affecting ground water extraction due to construction	VIIIA
**06/28/90 RWQCB	Applied Materials	Guidance document for the development of health-based remedial clean-up levels for the South Bay	VIIIE
**07/10/90 Weiss Associates	RWQCB	Diagrams and figures presented at July 10, 1990 meeting	VIIIE
**07/12/90 S. Morse RWQCB	J. Schoening Applied Materials	Summary of July 10, 1990 meeting	VIIIA
**07/13/90 Weiss Associates	J. Schoening Applied Materials	Quarterly ground water monitoring report	VIIIC



<u>Date:</u> <u>Author:</u>	<u>Recipient</u>	<u>Contents:</u>	<u>Volume</u>
**07/16/90 RWQCB	RWQCB	Maximum Contaminant Levels	VIII E
S. Morse RWQCB	J. Schoening Applied Materials	Transmittal of compliance monitoring report for NPDES permit	VIII A
**07/17/90 S. Morse	J. Schoening Applied Materials	Compliance monitoring report	VIII A
**07/20/90 S. Morse RWQCB	J. Schoening Applied Materials	Discussion of monthly self- monitoring report for June 1990	VIII A
**07/23/90 G. Hiatt EPA	A.J. Mancini RWQCB	Treatment of 1,1-DCE for the purposes of risk assessment	VIII A
**07/25/90 J. Schoening Applied Materials	S. Morse RWQCB	Deed restriction text	VIII A
Weiss Associates	J. Schoening Applied Materials	AM Clean-up plan fact sheet summary	VIII B
Weiss Associates	J. Schoening Applied Materials	Updated feasibility study alternatives evaluation	VIII B
**08/01/90 S. Morse RWQCB	J. Schoening Applied Materials	Notice of revised tentative Order amending Order No. 89-167	VIII E
**08/15/90 RWQCB	Public Record	AM Building 1 Santa Clara Superfund Site Fact Sheet No. 3	VIII E
Executive Officer	Board Members	Item 18, Executive Officer, Summary Report for meeting 08/15/90, with correspondence from AM to WQCB dated 08/07/90	VIII E
**08/28/90 S. Morse RWQCB	J. Schoening Applied Materials	Response to AMs comments regarding proposed tentative order and staff report	VIII A



<u>Date</u> <u>Author:</u>	<u>Recipient</u>	<u>Contents:</u>	<u>Volume</u>
**09/07/90 S. Morse RWQCB	J. Schoening/J. DeLong Applied Materials	Revised tentative order and accompanying correspondence	VIII E
Weiss Associates	J. Schoening Applied Materials	NPDES reporting and analytic reports	VIII D
**09/13/90 Applied Materials	Weiss Associates	Air stripper logs from March 1989 through August 1990	VIII D
**09/19/90 Executive Officer	Board Members	Supplemental to revised tentative Order No. 89-167	VIII E

GUIDANCE DOCUMENTS

The following is a list of the U.S. EPA Guidance Documents consulted during development and selection of the Response Action for the Applied Materials Superfund site in Santa Clara, CA. These documents are included in the Compendium of CERCLA Response Selection Guidance Documents (Volumes 1-35), which is available for public review at the Superfund Records Center, EPA Region IX, San Francisco.

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----
** RI/FS - GENERAL								
2002	3	GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA	10/01/88	- OSWER/OERR	FINAL	390	1	OSWER #9355.3-01
2012	5	SUPERFUND STATE-LEAD REMEDIAL PROJECT MANAGEMENT HANDBOOK	12/01/86	- OERR	FINAL	120	1	OSWER #9355.2-1
** RI/FS - RI DATA QUALITY/SITE & WASTE ASSESSMENT								
2100	5	A COMPENDIUM OF SUPERFUND FIELD OPERATIONS METHODS	12/01/87	- OERR	FINAL	550	1	OSWER #9355.0-14
2101	5	6 DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES: DEVELOPMENT PROCESS	03/01/87	- CDM FEDERAL PROGRAMS CORP.	FINAL	150	1	OSWER #9355.0-7B
2102	6	DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES: EXAMPLE SCENARIO: RI/FS ACTIVITIES AT A SITE W/CONTAMINATED SOILS AND GROUNDWATER	03/01/87	- CDM FEDERAL PROGRAMS CORP.	FINAL	120	1	OSWER #9355.07B
2112	8	GUIDELINES AND SPECIFICATIONS FOR PREPARING QUALITY ASSURANCE PROGRAM DOCUMENTATION	06/01/87	- ORD/QUALITY ASSURANCE MANAGEMENT STAFF	FINAL	31	2	1) MEMO: GUIDANCE ON PREPARING QAPP# DATED 6/10/87

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----
2113	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES	07/01/88	- EPA DATA REVIEW WORK GROUP - BLEYLER, R.VIAR AND CO./SAMPLE MCMT. OFFICE	DRAFT	20	2	
2114	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING ORGANIC ANALYSES	02/01/88	- BLEYLER, R./VIAR AND OC./SAMPLE MCMT. OFFICE - EPA DATA REVIEW ORKGROUP	DRAFT	45	2	
2115	8	PRACTICAL GUIDE FOR GROUND-WATER SAMPLING	09/01/85	- BARCELONIA, M.J., ET. AL./ILLINOIS ST. WATER SURVEY	FINAL	175	1	EPA/600/2-85/104
2116	8	PRACTICAL GUIDE FOR GROUND-WATER SAMPLING	07/01/85	- BARCELONA, M.J., ET. AL./ILLINOIS ST. WATER SURVEY				
** R1/FS - LAND DISPOSAL FACILITY TECHNOLOGY								
2204	13	LAND DISPOSAL RESTRICTIONS	08/11/87	- LONGEST, H.L./OERR	FINAL	23	2	1) SUMMARY OF MAJOR LDR PROVISIONS AND CALIFORNIA LIST PROHIBITIONS 2) OTHER ATTACHS CITED ARE AVAILABLE IN FED. REG.

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----
** RI/FS - OTHER TECHNOLOGIES								
2300	16	A COMPENDIUM OF TECHNOLOGIES USED IN THE TREATMENT OF HAZARDOUS WASTES	09/01/87	- ORD/CERI	FINAL	49	2	EPA/625/8-87/014
** ARARS								
3001	25	CERCLA COMPLIANCE AND OTHER ENVIRONMENTAL STATUTES	10/02/05	- PORTER, J.W./OSWER	FINAL	19	1	1) POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OSWER #9234.0-2
3002	25	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL	08/08/88	- OERR	DRAFT	245	2	OSWER #9234.1-01
** WATER QUALITY								
4003	26	QUALITY CRITERIA FOR WATER 1986	05/01/87	- OFFICE OF WATER REGULATIONS AND STANDARDS	FINAL	325	2	EPA/440/5-86-001
** RISK ASSESSMENT								
5001	27	CHEMICAL, PHYSICAL & BIOLOGICAL PROPERTIES OF COMPOUNDS PRESENT AT HAZARDOUS WASTE SITES	09/27/85	- CLEMENT ASSOCIATES, INC.	FINAL	320	2	OSWER #9850.3

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier	Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----	-----
5002	27	FINAL GUIDANCE FOR THE COORDINATION OF ATSDR HEALTH ASSESSMENT ACTIVITIES WITH THE SUPERFUND REMEDIAL PROCESS	05/14/87	- PORTER, J.W./OSWER/OERR	FINAL	22	2	1) SAME TITLE, DATED 4/22/87	OSWER #9285.4-02
5003	27	GUIDELINES FOR CARCINOGEN RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, P.33992)	09/24/86	- EPA	FINAL	13	2		
5004	27	GUIDELINES FOR EXPOSURE ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, P. 34042)	09/24/86	- EPA	FINAL	14	2		
5005	27	GUIDELINES FOR HEALTH ASSESSMENT OF SUSPECT DEVELOPMENTAL TOXICANTS (FEDERAL REGISTER, SEPTEMBER 24, 1986. P. 34028)	09/24/86	- EPA	FINAL	14	2		
5006	27	GUIDELINES FOR MUTAGENECITY RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, P. 34006)	09/24/86	- EPA	FINAL	8	2		
5007	27	GUIDELINES FOR THE HEALTH RISK ASSESSMENT OF CHEMICAL MIXTURES (FEDERAL REGISTER, SEPTEMBER 24, 1986, P.34014)	09/24/86	- EPA	FINAL	13	2		

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
...
5008	28+	HEALTH EFFECTS ASSESSMENT DOCUMENTS (58 CHEMICAL PROFILES) VOL. 28: ACETONE, ARSENIC, ASBESTOS, BARIUM, BENZO(A)PYRENE, CADMIUM, ETC.	09/01/84	- ORD/CHEA/ECAO	FINAL	1750	2	EPA/540/1-86/001-058
5009	31	INTEGRATED RISK INFORMATION SYSTEM (IRIS) [A COMPUTER-BASED HEALTH RISK INFORMATION SYSTEM AVAILABLE THROUGH E-MAIL--BROCHURE ON ACCESS IS INCLUDED]	/ /	- CHEA	FINAL	--	2	
5011	31	PUBLIC HEALTH RISK EVALUATION DATABASE (PHRED) [USER'S MANUAL AND TWO DISKETTES CONTAINING THE DBASE!!! PLUS SYSTEM ARE INCLUDED]	09/16/88	- OERR/TOXICS INTEGRATION BRANCH	FINAL	--	2	
5013	31	SUPERFUND EXPOSURE ASSESSMENT MANUAL	04/01/88	- OERR	FINAL	160	1	OSWER #9285.5-1
5014	31	SUPERFUND PUBLIC HEALTH EVALUATION MANUAL	10/01/86	- OERR	FINAL	500	1	OSWER #9285.4-1

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
...
** COMMUNITY RELATIONS								
7000	32	COMMUNITY RELATIONS IN SUPERFUND: A HANDBOOK (INTERIM VERSION)	06/01/88	- OERR	FINAL	188	2 1) CHAP. 6 OF THE COM. REL. HANDBOOK 11/03/88	OSWER #9230.0-03B
** SELECTION OF REMEDY/DECISION DOCUMENTS								
9000	32	INTERIM GUIDANCE ON SUPERFUND SELECTION OF REMEDY	12/24/86	- PORTER, J.W./OSWER	FINAL	10	2	OSWER #9355.0-19
** NEW ADDITIONS								
9002	33	INTERIM FINAL GUIDANCE ON PREPARING SUPERFUND DECISION DOCUMENTS	06/01/89		INTERIM FINAL			OSWER #9355.3-02
9005	33	GROUND WATER ISSUE: PERFORMANCE EVALUATIONS OF PUMP-AND-TREAT REMEDIATIONS	/ /	-KEELEY, J.F.				EPA/540/4-89/005
9009	33	NATIONAL OIL & HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY GUIDANCE, PART 300, 40 CFR CH. 1 (7/1/85 EDITION), pp. 664 - 755	07/01/85			92		
9010	33	SUPERFUND AMENDMENTS & REAUTHORIZATION ACT OF 1986 (SARA)	10/17/86	99TH CONGRESS OF U.S.		130		

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----
9011	1	RISK ASSESSMENT GUIDANCE FOR SUPERFUND - VOLUME 1, HUMAN HEALTH EVALUATION MANUAL (PART A)	12/01/89		INTERIM FINAL			EPA/540/1-89/002
9012	2	RISK ASSESSMENT GUIDANCE FOR SUPERFUND - VOLUME 2, ENVIRONMENTAL EVALUATION MANUAL	03/01/89		INTERIM FINAL			EPA/540/1-89/001A
9013		INTERIM GUIDANCE ON ADMINISTRATIVE RECORDS FOR SELECTION OF CERCLA RESPONSE ACTIONS	03/01/89		INTERIM	85		OSWER 9833.3A
9014		INTERIM GUIDANCE ON COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	07/09/87		INTERIM	9		OSWER 9324.0-05
9015		CERCLA COMPLIANCE WITH OTHER LAWS MANUAL: PART II - CLEAN AIR ACT AND OTHER ENVIRONMENTAL STATUTES AND STATE REQUIREMENTS	08/01/89		INTERIM FINAL			OSWER 9234.1-02
9017		REGION 9 ENVIRONMENTAL PROTECTION AGENCY DRINKING WATER STANDARDS AND HEALTH ADVISORY TABLE	06/01/89			28		

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----
9018		CONSIDERATIONS IN GROUNDWATER REMEDIATION AT SUPERFUND SITE	10/18/89			8		OSWER 9355.4-03
9019		SUPERFUND LDR GUIDE #7: DETERMINING WHEN LAND DISPOSAL RESTRICTIONS (LDRA) ARE "RELEVANT AND APPROPRIATE" TO CERCLA RESPONSE ACTIONS	12/01/89			2		OSWER 9347.3-08FS
9020		RISK ASSESSMENT GUIDANCE FOR SUPERFUND HUMAN HEALTH RISK ASSESSMENT: U.S. EPA REGION IX RECOMMENDATIONS	12/15/89		INTERIM FINAL			
9021		A GUIDE TO DEVELOPING SUPERFUND RECORDS OF DECISION	05/00/90		FACT SHEET	4		OSWER 9335.3-02FS-1
9022		GUIDANCE ON REMEDIAL INVESTIGATIONS UNDER CERCLA	06/01/85		FINAL			OSWER 9355.0-06B
9023		GUIDANCE ON FEASIBILITY STUDIES UNDER CERCLA	06/01/85		FINAL			OSWER 9355.0-05C
9024		CONTROL OF AIR EMISSIONS FROM SUPERFUND AIR STRIPPERS AT SUPERFUND GROUNDWATER SITES	89/06/15		FINAL			OSWER 9355.0-28

-INDEX-
COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS

Doc No	Vol	Title	Date	Authors	Status	Pages	Tier Attachments	OSWER/EPA Number
---	---	-----	-----	-----	-----	-----	-----	-----
9025		GROUND WATER POLICY - REGION 9	05/00/89					