SEVENTH FIVE-YEAR REVIEW REPORT
FOR
APPLIED MATERIALS SUPERFUND SITE
SANTA CLARA, SANTA CLARA COUNTY, CALIFORNIA

PREPARED BY

EA Engineering, Science, and Technology, Inc.

FOR

United States Environmental Protection Agency
Region 9

Approved by: MICHAEL MONTGOMERY Digitally signed by MICHAEL MONTGOMERY Date: 2025.09.30 09:03:44 -07'00' Date:

Michael Montgomery, Director
Superfund and Emergency Response Division
United States Environmental Protection Agency
Region 9

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Executive Summary

This is the Seventh Five-Year Review of the Applied Materials Superfund Site (Site), located in Santa Clara, California. The purpose of this Five-Year Review is to review information to determine if the remedy is and will continue to be protective of human health and the environment.

The Site is approximately 9 acres in size and consists primarily of a single large industrial building. Applied Materials, Inc. was a semi-conductor wafer manufacturing facility that operated from 1974 to 2002 in the City of Santa Clara, California. Several underground storage tanks housed volatile organic compounds used for cleaning and degreasing of equipment at the facility. In 1983 it was discovered that these compounds had leaked from these storage tanks into the shallowest zone of groundwater. The primary contaminants of concern in groundwater were 1,1,1-trichloroethane, 1,1-dichloroethene, 1,1-dichloroethane, trichloroethene, Freon 113 and other volatile organic compounds. In 1987, the United States Environmental Protection Agency (EPA) added the Site to the National Priorities List.

In 1990, the EPA selected a remedy for the Site to protect long-term human health and the environment that includes soil excavation from the saturated zone; groundwater extraction and treatment groundwater monitoring; and institutional controls to prevent human exposure to contaminated groundwater.

Soil excavation was completed and achieved cleanup targets in 1993. The groundwater extraction and treatment system operated until 2002, when it was shut down due to low yield, technical issues, and contamination levels approaching cleanup goals. It was operated intermittently from 2014 to 2015 and again from 2016 to 2017. When residual groundwater contamination persisted, Applied Materials voluntarily implemented a pilot study which was not part of the selected remedy: PlumeStop® liquid granulated carbon injection into groundwater near the monitoring wells. The first injection of PlumeStop® occurred in 2018. A second PlumeStop® injection event was completed in 2020. Groundwater monitoring activities and institutional controls have been in place to the present day.

The remedy at the Applied Materials Superfund Site currently protects human health and the environment. Contaminant concentrations have been reduced to levels close to or less than cleanup levels, and institutional controls are preventing exposure to contaminants in groundwater.

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List of Acronyms and Abbreviations

1,1-DCA	1,1-dichloroethane
µg/L	microgram(s) per liter
bgs	below ground surface
EA	EA Engineering, Science, and Technology, Inc., an environmental firm and consultant for the EPA
EPA	United States Environmental Protection Agency
PFAS	per- and polyfluoroalkyl substances
Regional Water Board	Regional Water Quality Control Board
ROD	Record of Decision
Site	Applied Materials Superfund Site
VOC	volatile organic compound

1. Introduction

The purpose of a Five-Year Review is to evaluate the implementation and performance of a remedy to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121, 40 Code of Federal Regulation Section 300.430(f)(4)(ii) of the National Contingency Plan and EPA policy.

This is the Seventh Five-Year Review for the Applied Materials Superfund Site (Site). The triggering action for this statutory review is the completion date of the previous Five-Year Review, which was signed on September 22, 2020. This Five-Year Review has been prepared because hazardous substances, pollutants, or contaminants remain at the Site and exceed levels that allow for unlimited use and unrestricted exposure. The summary form for this Five-Year Review can be found as Table 1.

The Site consists of two operable units[1]: groundwater and soil. The groundwater operable unit will be addressed in this Five-Year Review.

The Applied Materials Superfund Site Five-Year Review was led by Kelia Liang, EPA Region 9 Remedial Project Manager. Participants included Cynthia Ruelas, EPA Region 9 Superfund Five-Year Review Coordinator; and from EA Engineering, Science, and Technology, Inc. (EA): Catherine LeCours, EA Five-Year Review Project Manager; Emily Rozok, EA Five-Year Review Deputy Project Manager and technical lead; Alan Pacheco Malagon, EA technical support; and Samuel Kalb, EA main author. The review began on December 3, 2024. A list of documents reviewed in the preparation of this Five-Year Review Report can be found in Appendix A.

[1] During cleanup, a site can be divided into distinct areas depending on the complexity of the problems associated with the site. These areas, called operable units, may address geographic areas of a site, specific site problems, or areas where a specific action is required.

Table 1. Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Applied Materials Superfund Site		
EPA ID: CAD042728840		
Region: 9	**State:** CA	**City/County:** Santa Clara/Santa Clara
SITE STATUS		
National Priorities List Status: Final		
Multiple Operable Units? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Kelia Liang		
Author affiliation: EPA Region 9		
Review period: 12/3/2024 - 7/19/2025		
Date of site inspection: 3/6/2025		
Type of review: Statutory		
Review number: 7		
Triggering action date: 9/22/2020		
Due date *(five years after triggering action date)*: 9/22/2025		

1.1. Background

The Site is located at 3050 Bowers Avenue, Santa Clara, California (Figure 1). The Site was operated by Applied Materials, Inc. as a semi-conductor manufacturing facility from 1974 to 2003, after which it was converted into office space and educational facilities. During manufacturing operations in the 1970s, chemicals including volatile organic compounds (VOCs) were used for cleaning and degreasing of equipment and were stored in underground storage tanks. In 1983, three leaking underground storage tanks were discovered (Figure 2). Contamination by VOCs was found in groundwater and soil at the Site. The EPA added the Site

to the National Priorities List on July 22, 1987. Appendix B presents a summary of the Site chronology.

The California Regional Water Quality Control Board (Regional Water Board) – San Francisco Bay Region was the lead agency overseeing the initial cleanup at the Site until 2006, pursuant to the South Bay Multi-Site Cooperative Agreement and the South Bay Ground Water Contamination Enforcement Agreement. Under Regional Water Board supervision, Applied Materials, Inc. completed an investigation into the extent of groundwater and soil contamination at the Site. In July of 2006, the Regional Water Board proposed a case transfer which transferred the Site to the EPA in August of that year. Since August 2006, the EPA has been the lead agency providing enforcement oversight for the Site with limited involvement from the Regional Water Board.

1.2. Physical Characteristics

The Site is approximately 9 acres in size and consists primarily of a single large industrial building (Applied Materials Building 1; Figure 2). Land use in the area around the Site is primarily industrial, commercial, and residential. There are no residences bordering the Site. Topography in this area is largely flat and gently slopes northwestward towards San Francisco Bay. The Site is 6.4 miles south of the Bay, and three water bodies (Calabazas Creek, Saratoga Creek, and San Tomas Aquino Creek) lie within 1 mile of the Site. Deed restrictions prevent the use of groundwater at the Site for drinking water purposes. The closest drinking water supply well is located 3,500 feet to the southwest, which is upgradient of the Site.

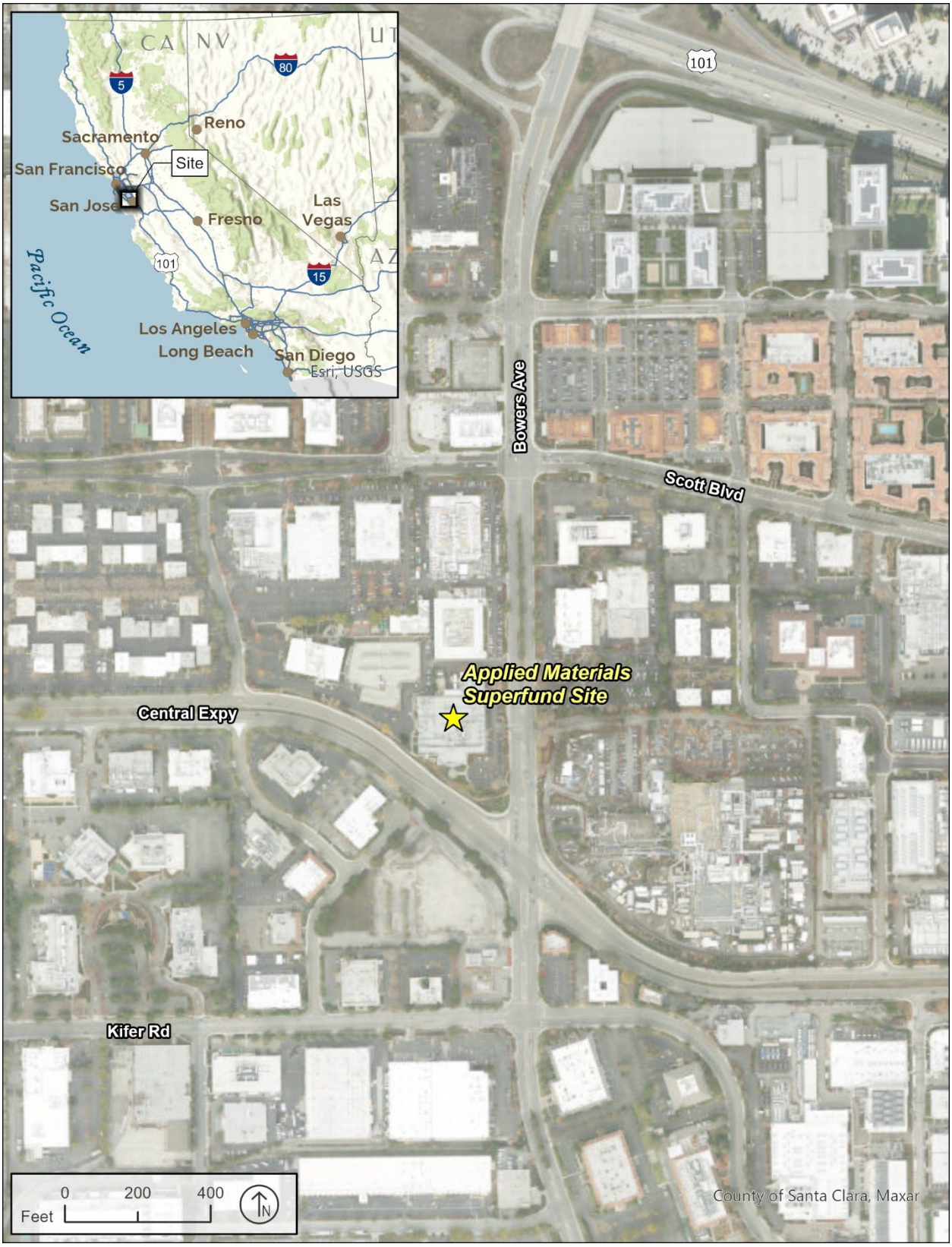


Figure 1. Location Map

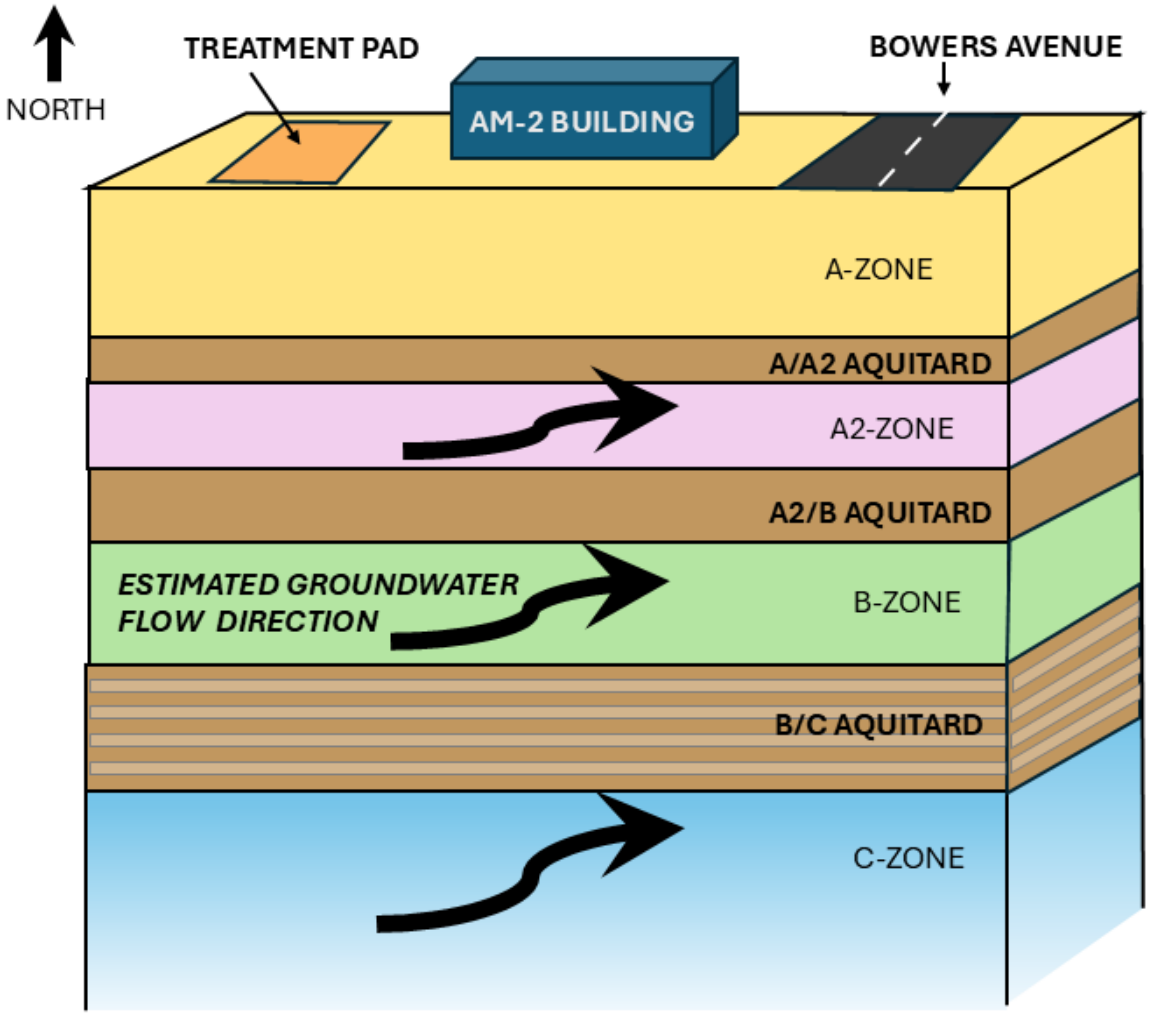
Figure 2. Detailed Map

1.3. Hydrology

The Site is located in Santa Clara Valley, California. Underlying the Site are sand and gravel deposits which are permeable to water, interbedded with layers of silt and clay that are impermeable and act as confining layers between water-bearing deposits. Groundwater flow is generally to the northeast, towards San Francisco Bay.

There are three primary hydrogeologic zones beneath the Site: the A-zone, B-zone, and C-zone (Figure 3). The A-zone is composed of sand and silty sand deposits and extends from 0 to 31 feet below ground surface (bgs) and is divided into two subsections (A and A2) separated by a very thin aquitard (the A/A2 aquitard). A somewhat thicker aquitard (the A2/B aquitard) separates the A-zones from the B-zone, which extends from 47 to 150 feet bgs and is composed of permeable course-grained sediments. The A-zones and the B-zone are collectively categorized as the shallow aquifers.

An aquitard of thickness ranging from 50 to 150 feet (the B/C aquitard) separates the B-zone from the C-zone. Depending on the thickness of the B/C aquitard, the depth of the C-zone aquifer ranges from 300 to more than 500 feet bgs. The C-zone aquifer is categorized as the deep aquifer and is the source of much of the municipal drinking water in Santa Clara County. The nearest drinking water supply well is located 3,500 feet upgradient to the southwest from the Site.



Source: Weiss Associates, 2025. PlumeStop® Injection Pilot Study and Sampling Status Report Update 4, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California; California Regional Water Quality Control Board – San Francisco Bay Region. 1990. Order No. 90-134, Site Cleanup Requirements for Applied Materials, Inc., 3050 Bowers Avenue Building 1 Facility, City of Santa Clara, Santa Clara County. September 19. EPA. 2020. Weiss Associates. 2004. Five-Year Status Report and Effectiveness Evaluation for Applied Materials Building 1, 3050 Bowers Avenue, Santa Clara, California. September 30.

Figure 3. Generalized Cross Section

2. Remedial Actions Summary

2.1. Basis for Taking Action

In 1983, Applied Materials, Inc. discovered leaking underground storage tanks and spills from the manufacturing facility which had contaminated soil and shallow groundwater in a downgradient monitoring well with organic solvents. The contaminants of concern in groundwater are VOCs, especially 1,1-dichloroethane (1,1-DCA).

2.2. Remedy Selection

In 1990, the EPA issued a Record of Decision (ROD) to address groundwater contamination. The goal of the groundwater remedy is to restore groundwater to its beneficial use as a potential drinking water source. Cleanup standards for the Site were based on California Maximum Contaminant Levels[2] (Table 2).

The selected remedy includes these major components:

- Extract groundwater until cleanup standards are achieved.
- Treat extracted groundwater through an air stripping system.
- Discharge treated groundwater off-Site to a storm sewer system tributary of San Tomas Aquino Creek in accordance with National Pollutant Discharges Elimination System permit.
- Monitor groundwater.
- Restrict installation of water supply wells in the impacted aquifer and control and limit activities that could result in potential exposure through institutional controls.

Table 2. Groundwater Cleanup Levels

Contaminant of Concern	Cleanup Level (µg/L)	Basis for Cleanup Level	Decision Document
1,1,1-Trichloroethane (1,1,1-TCA)	200	State MCL	1990 ROD
1,1,2-Trichloroethane (1,1,2-TCA)	3	Federal MCLG	1993 ROD
1,1-Dichloroethane (1,1-DCA)	5	State MCL	1990 ROD
1,1-Dichloroethene (1,1-DCE)	6	State MCL	1990 ROD
1,2-Dichloroethane (1,2-DCA)	0.5	State MCL	1990 ROD

[2] Drinking water standards are the maximum permissible concentration of a chemical in water considered safe to drink, as established by the Safe Drinking Water Act. These are also referred to as Maximum Contaminant Levels.

Contaminant of Concern	Cleanup Level (µg/L)	Basis for Cleanup Level	Decision Document
Chloroform	6	State MCL	1990 ROD
cis-1,2-Dichloroethene (*cis*-1,2-DCE)	6	State MCL	1990 ROD
Tetrachloroethene (PCE)	5	State MCL	1990 ROD
trans-1,2-Dichloroethene (*trans*-1,2-DCE)	10	State MCL	1990 ROD
Trichloroethene (TCE)	5	State MCL	1990 ROD
Trichlorofluoromethane (or Freon 11)	150	State MCL	1990 ROD
Trichlorotrifluoroethane (or Freon 113)	1,200	State MCL	1990 ROD
Vinyl chloride	0.5	State MCL	1990 ROD

Notes:
µg/L = microgram(s) per liter
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal

The 1990 ROD allows for adjustments to the groundwater extraction and treatment system as needed to optimize the treatment system's performance. The adjustments make the best use of Site-specific hydrogeologic and geochemical data collected during operations. Allowable adjustments include:

- Installing additional extraction wells to facilitate or accelerate cleanup of the plume.
- Discontinuing pumping at wells where cleanup standards have been attained.
- Alternating pumping at wells to eliminate stagnation points.
- Pulsing pumping to allow aquifer equilibration and adsorbed contaminants to partition into groundwater.

The 1990 ROD identified these remedial action objectives for the remedy:

- Restore groundwater quality by removing chemical mass and reducing volatile organic chemical concentrations as much as feasible; set groundwater cleanup standards at California proposed or adopted Maximum Contaminant Levels.
- Prevent migration of shallow groundwater containing volatile organic chemicals to adjacent shallow groundwater or to deeper water-bearing layers which presently supply water for domestic and other beneficial uses.
- Prevent human exposure to groundwater containing chemicals.

In 1993, the EPA issued a Site-wide ROD for groundwater and soil. The 1993 ROD adopted the Regional Water Board soil cleanup level of 1 milligram per kilogram for total volatile chemicals

(Table 3) as identified in Regional Water Board Order 90-134. The 1993 ROD found that no further remedial action would be required for soils other than what had already been implemented at the Site to ensure protection of human health and the environment. The 1993 ROD adopted a cleanup level for 1,1,2-Trichloroethane (1,1,2-TCA) of 3 micrograms per liter (µg/L) based on the EPA Maximum Contaminant Level Goal (Table 2).

Table 3. Soil Cleanup Level

Contaminant of Concern	Cleanup Level (mg/kg)	Basis for Cleanup Level	Decision Document
Total Volatile Chemicals	1	Regional Water Board Order No. 90-134	1993 ROD

Notes:
mg/kg = milligram(s) per kilogram

2.3. Remedy Implementation

In 1984, prior to the Site's listing on the National Priorities List, a groundwater extraction and treatment system consisting of three extraction wells and an extraction pit was installed to remove contaminants from groundwater. Initially this system treated groundwater using activated carbon; later the method was changed to air stripping. The EPA chose to continue using this system to implement the remedy selected in the 1990 ROD. From 1985 to 1999 groundwater was extracted and treated from the A-zone, and from 1990 to 2002 groundwater was extracted and treated from the A2-zone. Approximately 560 pounds of VOC mass was removed from groundwater during this period. In 2002, the air stripping system was shut down due to a combination of low groundwater yield, equipment issues, and groundwater concentrations of VOCs approaching cleanup levels. In 1992, a deed restriction was implemented as an institutional control to prevent use of shallow groundwater as drinking water in the vicinity of the Site (Table 4). During this Five-Year Review, EA examined the language in this deed restriction and noted that the area of land to which it applies is unclear and may not represent current Site conditions.

Groundwater monitoring continued during subsequent years, and VOC concentrations were consistently detected at two monitoring wells (AM1-5E and AM1-7), with select VOCs greater than cleanup levels. This led to additional groundwater extraction and treatment events from April 2014 to March 2015 and again from August 2016 to December 2017. Groundwater was extracted from well AM1-5E, which also increased groundwater flushing at AM1-7. Groundwater flushing occurs when groundwater is extracted from a given well (in this case AM1-5E) and the reduced volume of groundwater in the area leads to drawdown of groundwater levels in wells within the extraction well's radius of influence.

Table 4. Summary of Implemented Institutional Controls

Media, Engineered Controls, and Areas	Institutional Controls Needed	Institutional Controls Called for in the Decision Document	Impacted Parcel(s)	Objective	Title and Date (or planned)
Groundwater and Soil	Yes	Yes	Applied Materials Building 1 Facility, 3050 Bowers Avenue, Santa Clara	Prevent use of or exposure to contaminated media by preventing the extraction of groundwater for uses other than the remediation of the Site	Covenant to Restrict Use of Property: Applied Materials, Inc., 3050 Bowers Building I Facility, City of Santa Clara, Santa Clara County – June 9, 1992

2.4. System Operations/Operation and Maintenance

No operations and maintenance activities are carried out at the Site, as continuous operation of the groundwater extraction and treatment system was discontinued in 2002; however, Applied Materials, Inc. conducts ongoing groundwater monitoring as part of the remedy selected by the EPA in the 1990 ROD. During this Five-Year Review period, Applied Materials, Inc. conducted periodic groundwater monitoring at various wells at the Site, including VOC monitoring at AM1-7 (ongoing) and AM1-5E (discontinued January 2021), as well as water level measurement at wells AM1-4, AM1-5E, AM1-6, AM1-7, and AM1-11. Applied Materials, Inc. also continued the voluntary PlumeStop® injection pilot study that began during the last Five-Year Review period and is described in Section 3.2.

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statement and Issues

The protectiveness statement from the 2020 Five-Year Review for the Site stated:

> "The remedy at the Applied Materials Superfund Site protects human health and the environment because contaminant concentrations in the groundwater plume have been

reduced to levels close to or below the maximum contaminant level cleanup standards and institutional controls prevent exposure to contaminants in groundwater."

The 2020 Five-Year Review did not identify any issues.

3.2. Work Completed at the Site During this Five-Year Review Period

In 2018, the EPA approved a plan to conduct a pilot study of in situ remediation. Applied Materials, Inc. implemented the pilot study. Under this pilot study, PlumeStop® liquid activated carbon was injected directly into the groundwater in the vicinity of two wells with elevated VOC concentrations; additionally, well AM1-7 received injections of BDI PLUS™ (a consortium of microbes capable of bioremediation of chlorinated compounds) and Hydrogen Release Compound (a compound designed to assist microbes in bioremediation). Groundwater samples collected for several months after the 2018 injections showed VOCs to be less than detection levels. However, after 7 months 1,1-DCA was detected at monitoring well AM1-7, and within 14 months slightly exceeded cleanup levels. Based on this finding, a second injection of PlumeStop® was completed in 2020. Groundwater sample analysis after this event once again initially showed VOC concentrations less than cleanup levels (and showed only 1,1-DCA greater than laboratory reporting levels); however, contaminant concentrations were found to increase in subsequent months. As of December 2024, the concentration of 1,1-DCA at monitoring well AM1-7 hovered above the cleanup level.

The previous Five-Year Review erroneously stated that wells other than AM1-5E and AM1-7 have been abandoned or destroyed. Although AM1-5E and AM1-7 were the only wells where VOC sampling occurred during this Five-Year Review period, Applied Materials, Inc. continued to record groundwater levels from AM1-3, AM1-5E, AM1-6, AM1-7, and AM1-11 on the same schedule by which VOC monitoring occurred.

4. Five-Year Review Process

4.1. Community Notification and Site Interviews

4.1.1. Five-Year Review Community Notifications

The EPA issued a press release on February 20, 2025 (https://www.epa.gov/newsreleases/sign-progress-superfund-cleanups-across-pacific-southwest-epa-perform-five-year) notifying the public that the Site was undergoing a Five-Year Review. A copy of the press release is presented in Appendix E. The EPA also placed a notification on the Site's website (https://www.epa.gov/superfund/appliedmaterials) stating that the Site was undergoing a Five-

Year Review. The EPA did not receive public questions or comments regarding the Five-Year Review in response to the press release or Site website notice. Results of the review and the report will be made available electronically on the Site's website (https://www.epa.gov/superfund/appliedmaterials) and at the Site information repository located at:

EPA Superfund Records Center
75 Hawthorne Street, Third Floor
San Francisco, California 94105

4.1.2. Site Interviews

During the Five-Year Review process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Emily Barron, Applied Materials, Inc. Global Environmental Manager; Vicky Cai, Applied Materials, Inc. Senior Environmental Engineer; and Joyce Adams, Weiss Associates Senior Project Geologist (Environmental consultant for Applied Materials, Inc.) were interviewed. The interview records are provided in Appendix F and summarized here.

Both Applied Materials, Inc. and Weiss Associates reported that the trends from the monitoring data show that the overall contaminant levels are decreasing or remaining consistent. However, that there has been a recent increase in concentrations at one monitoring well, AM1-7. The sampling efforts have been adjusted from annual to semi-annual to monitor concentrations in this specific well.

4.2. Data Review

4.2.1. Groundwater

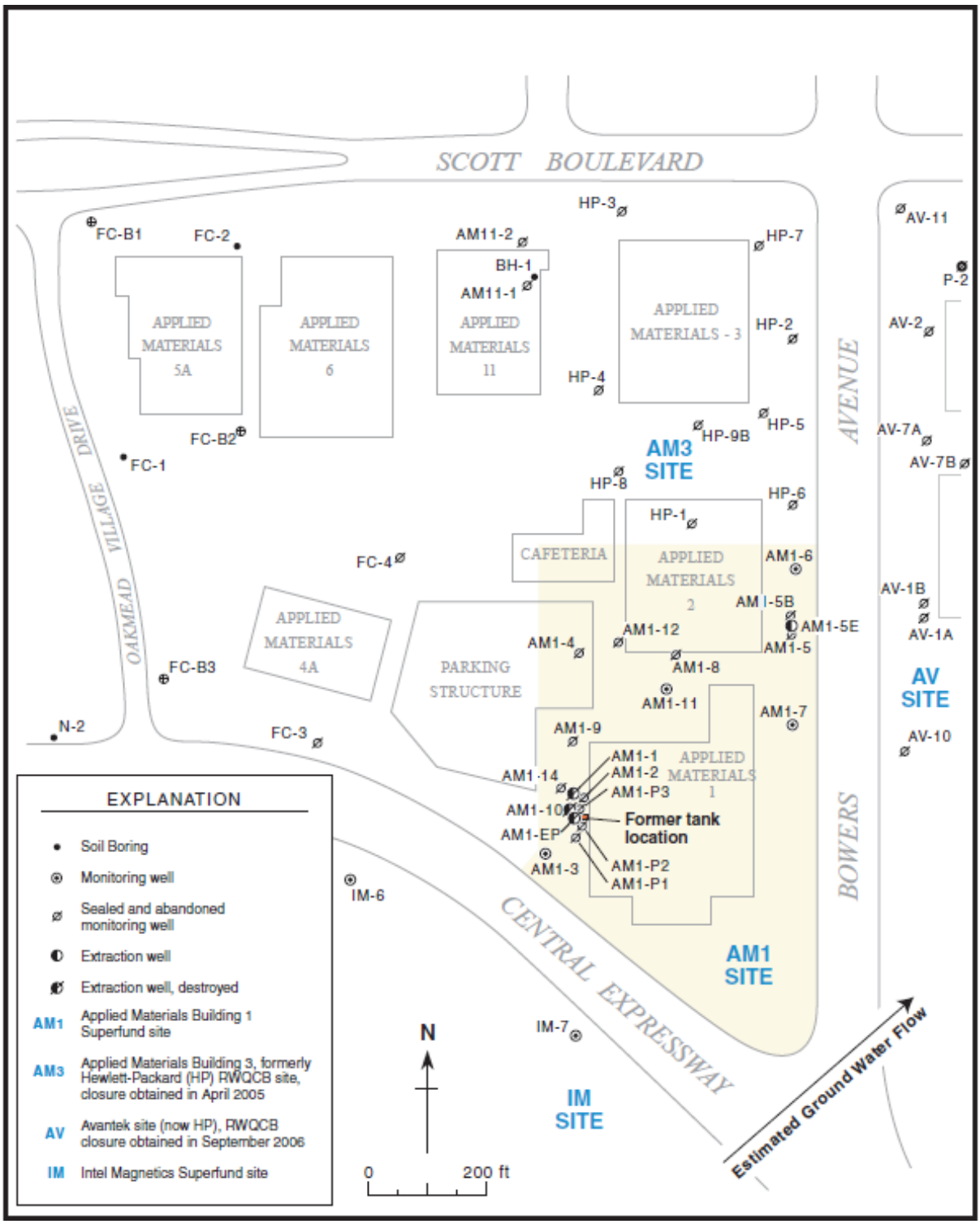
In general, the concentration and extent of VOCs at the Site have declined since the initial investigation in 1983. Concentrations of most contaminants are nearing established cleanup levels. However, at one monitoring well, AM1-7, concentrations of 1,1-DCA slightly exceed cleanup levels (Figure 4 and Figure 5).). Appendix C includes a table of historical groundwater data for monitoring wells AM1-7 and AM1-5E.

Following the second injection of PlumeStop® in January 2020, groundwater samples were collected and analyzed for VOCs at monitoring wells AM1-7 and AM1-5E through January 2021. Quarterly groundwater samples from AM1-5E showed VOC concentrations at less than the Site cleanup levels and the laboratory reporting limits throughout this period. Due to this consistent

lack of VOC concentrations greater than the laboratory reporting limits, after January 2021 samples were no longer collected from AM1-5E for VOC analysis. Groundwater elevation data is still recorded from this well and from three additional wells (AM1-3, AM1-6, and AM1-11) at the same frequency as sample collection from AM1-7.

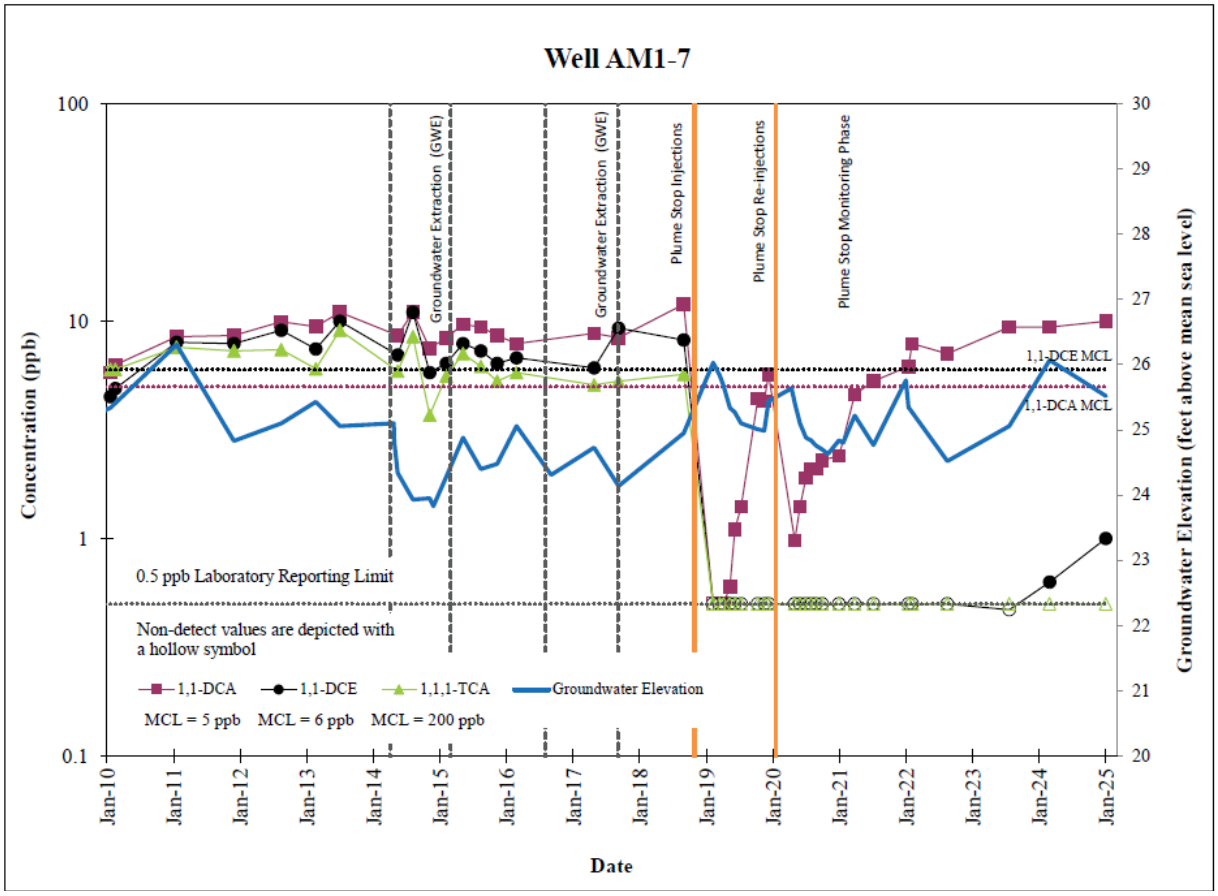
Following each PlumeStop® injection, contaminant concentrations at monitoring well AM1-7 dropped below cleanup levels. Only 1,1-DCA remained detectable above laboratory reporting limits for the injection and post-injection period, though very low levels of 1,1-DCE were detected in January of 2024 and 2025. However, 1,1-DCA concentrations rebounded as shown in Figure 5--as of the most recent available data in December 2024, the concentration of 1,1-DCA at well AM1-7 was 10 µg/L. Importantly however, the 1,1-DCA plume has been stable (no statistically significant monotonic trend, per Mann-Kendall analysis) since February 2022, suggesting that further rebound is likely to be limited in magnitude. This is reinforced by the observation that the mean value of 8.39 ppb for 1,1-DCA from the pre-groundwater extraction period (2010-2013) is statistically indistinguishable from the modern (2022-2024) post-extraction and injection mean value of 8.15 ppb.

Note that Figure 5 presents concentrations in parts per billion (ppb), which is equivalent to µg/L (1 ppb = 1 µg/L). See Appendix C for a more detailed review of the available data.



Source: Weiss Associates, 2025. PlumeStop® Injection Pilot Study and Sampling Status Report Update 4, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California

Figure 4. Monitoring Well Locations and Estimated Groundwater Flow Direction



Source: Weiss Associates, 2025. PlumeStop® Injection Pilot Study and Sampling Status Report Update 4, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California

Figure 5. Signature Volatile Organic Compound Concentration History in Groundwater Monitoring Well AM1-7

4.2.2. Vapor Intrusion from Groundwater

The most recent analytical results for groundwater samples collected in December 2024 indicate that groundwater concentrations of VOCs are less than their corresponding Target Groundwater Concentrations for identifying vapor intrusion risk. Table 5 presents concentrations of the primary contaminants of concern (1,1-DCA, 1,1-Dichloroethene, and 1,2-Dichloroethane) during the latest sampling event and corresponding Target Groundwater Concentrations. The most recent groundwater data indicate that the risk of vapor intrusion from groundwater into overlying buildings is *de minimis*, and further vapor intrusion investigation or mitigation from groundwater is not needed based on current conditions.

Table 5. Concentrations of Contaminants in Site Groundwater and Target Groundwater Concentrations for Vapor Intrusion Risk

Contaminant	Concentration in Groundwater December 31, 2024 (µg/L)	Target Groundwater Concentration for Vapor Intrusion Risk (µg/L)
1,1-Dichloroethane (1,1-DCA)	10	33.4
1,1-Dichloroethene (1,1-DCE)	0.47	16.3
1,2-Dichloroethane (1,2-DCA)	0.1	9.78

4.2.3. Climate Resilience Screening

EA consulted a variety of climate change tools to determine which climate hazards, including and not limited to extreme temperatures, landslides, hurricanes and sea level rise, have the potential to impact the remedy. The tools that EA consulted to assess risks from climate change include:

- Flooding (Precipitation): Federal Emergency Management Agency's (FEMA's) National Flood Hazard Layer Viewer
- Wildfires: University of California Merced Climate Toolbox Climate Mapper
- Drought: National Oceanic and Atmospheric Administration (NOAA) Climate Explorer

The remedy implemented at the Site, as defined in Section 2 of this document, has a low risk of being impacted by climate change. Possible risks identified for the location of the Site include sea level rise, flooding (storm surge and precipitation), wildfires and drought.

Based on the FEMA viewer, there is a low exposure to precipitation related flooding with a 0.2 percent annual chance flood hazard. Wildfire risk, based on fuel moisture (the amount of water present in vegetation), is greater than 10 percent in all seasons (winter, spring, summer, fall) making the likelihood of the exposure of the system to wildfires in the future low. Based on the NOAA Climate Explorer tool there is a less than 10 percent change in the annual number of consecutive dry days meaning the drought exposure is low.

4.3. Site Inspection

The inspection of the Site was conducted on March 6, 2025. In attendance were Kelia Liang and Grace Beery with EPA Region 9, Vicky Cai with Applied Materials, Inc., Joyce Adams with Weiss Associates, and Alan Pacheco Malagon with EA. The purpose of the inspection was to assess the condition of the remedy and verify that the remedy is operating as intended.

The Site inspection participants met in the lobby of Applied Materials Building 2. The Site inspection consisted of a brief discussion of the Site history and background, discussion of the status of the remedy, and a tour around the facility. The inspection included visual observation of the existing groundwater monitoring well network. No active remediation is currently being conducted. Participants toured the Site and observed evidence of recent remedial work and the existing well network. The inspection trip report is included in Appendix G.

5. Technical Assessment

5.1. Question A: Is the remedy functioning as intended by the decision documents?

The remedy is not operating as originally proposed; however, the remedial action objectives are being achieved in most locations, as intended by the ROD.

In 2002, the Regional Water Board approved shutdown of the groundwater extraction and treatment system, which was part of the selected remedy. This decision was based on low groundwater yield and concentrations of contaminants of concern approaching cleanup levels. However, residual contamination issues persisted, and additional groundwater extraction and treatment actions from 2014 to 2017 failed to achieve the remedial action objectives. Concentrations of 1,1-DCA at monitoring well AM1-7 are slightly greater than the groundwater cleanup levels, though the plume appears to be stable since 2022.

The other portions of the selected remedy — institutional controls to prevent human contact with contaminated groundwater and groundwater monitoring — remain in effect. These institutional controls continue to effectively prevent human exposure to contaminated groundwater. However, it was noted during this Five-Year Review that the language in the deed restriction is unclear about the area of land to which it applies.

5.2. Question B: Are the exposure assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of Remedy Selection Still Valid?

No. There have been changes in toxicity values and potential standards since the 1990 ROD was issued.

The changes described in this section are not expected to alter the protectiveness of the remedy because institutional controls are in place that restrict the use of groundwater and prevent exposure to contaminants in the groundwater.

New standards (federal or state statutes and regulations, as well as new to-be-considered guidance), should be considered during the Five-Year Review process as part of the protectiveness determination. Under the National Contingency Plan, if a new federal or state statute or regulation is promulgated or a new "to-be-considered" guidance is issued after the ROD is signed, the Five-Year Review process should determine whether the standard needs to be attained or new guidance procedures followed to ensure that the remedy is protective of human health and the environment. If so, then the Five-Year Review should recommend that the EPA should issue a future decision document that adds the new standard as an applicable or relevant and appropriate requirement or guidance as a "to-be-considered" to the remedy.

Aside from per- and polyfluoroalkyl substances (PFAS), there have been no changes to relevant standards for contaminants of concern at the Site. See Appendix D for a full assessment of chemical-specific applicable or relevant and appropriate requirements.

PFAS

On April 10, 2024, the EPA issued drinking water Maximum Contaminant Levels for six PFAS contaminants, including perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA) (Gen-X), perfluorohexanesulfonic acid (PFHxS), and perfluorobutanesulfonic acid (PFBS) (Table 6).

Table 6. Maximum Contaminant Levels for PFAS Contaminants

Compound	Maximum Contaminant Level
HFPO-DA (Gen X)	10 ng/L
PFHxS	10 ng/L
PFNA	10 ng/L
PFOA	4 ng/L

Notes:
ng/L = nanograms per liter

PFAS testing has not occurred at the Site and it is unknown whether PFAS are present. Institutional controls are set in place to restrict the use of groundwater and prevent exposure to contaminants.

Vapor Intrusion

The 1990 ROD did not include consideration of vapor intrusion from soil or groundwater. Based on the evidence as discussed in Section 4.2.2, vapor intrusion is not believed to be a complete exposure pathway and is unlikely to have any unacceptable risk.

5.3. Question C: Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No. No additional information has come to light which would affect the protectiveness of the remedy.

6. Issues and Recommendations

There were no issues or recommendations identified in this Five-Year Review.

6.1. Other Findings

Recommendations that may improve performance of the remedy, operations and maintenance, and system operations that do not affect current and future protectiveness were identified during the Five-Year Review.

- Remedial action objectives for 12 of 13 COCs have been achieved at the Site. Concentrations of the remaining COC, 1,1-DCA, are close to the MCL and appear to be stable. Continue monitoring well AM1-7, and consider a completion analysis if concentrations decrease.
- The EPA recognizes that although PFAS was not identified as a chemical of concern in the ROD, PFAS may be present at the Site. The EPA accordingly plans to work with the Applied Materials to develop a desktop study, which may include a review of products used historically during manufacturing operations, site conditions, and nature and extent. The desktop study would assess the potential presence of PFAS, evaluate potential impacts on the Site's Remedial Action Objectives, and consider potential impacts on remedy components and overall protectiveness of the remedy.
- Applied Materials, Inc. should examine the language in the deed restriction and ensure that the area of land to which it applies is clearly defined and representative of current Site conditions.

7. Protectiveness Statement

Table 7. Protectiveness Statement

Protectiveness Statement(s)	
Operable Unit: Groundwater	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at the Applied Materials Superfund Site currently protects human health and the environment. Contaminant concentrations have been reduced to levels close to or less than cleanup levels, and institutional controls are preventing exposure to contaminants in groundwater.	

8. Next Review

The next Five-Year Review report for the Applied Materials Superfund Site is required 5 years from the completion date of this review.

Appendix A: List of Documents Reviewed

California Regional Water Quality Control Board – San Francisco Bay Region. 1989. Order 89-167 Site Cleanup Requirements for Applied Materials, Inc., 3050 Bowers Avenue Building 1 Facility, City of Santa Clara, Santa Clara County. September 20.

California Regional Water Quality Control Board – San Francisco Bay Region. 1990. Order No. 90-134, Site Cleanup Requirements for Applied Materials, Inc., 3050 Bowers Avenue Building 1 Facility, City of Santa Clara, Santa Clara County. September 19.

California Regional Water Quality Control Board – San Francisco Bay Region. 1992. Covenant to Restrict Use of Property: Applied Materials, Inc., 3050 Bowers Building 1 Facility, City of Santa Clara, Santa Clara County. June 09.

California Regional Water Quality Control Board – San Francisco Bay Region. 1993. Order No. 93-056 Amending Order No. 90-134 Which Amended Order No. 89-167, Site Cleanup Requirements for Applied Materials. Inc., 3050 Bowers Avenue Building 1 Facility, City of Santa Clara, Santa Clara County. June 16.

California Regional Water Quality Control Board – San Francisco Bay Region. 2006. Proposed Case Transfer – Applied Materials Building 1, 3050 Bowers Avenue, Santa Clara, Santa Clara County. July 07.

EPA (United States Environmental Protection Agency). 1989. Groundwater Contamination Cleanups at South Bay Superfund Sites Progress Report. April.

EPA. 1990. Superfund Record of Decision, Applied Materials, California, First Remedial Action. September.

EPA. 1993. Applied Materials, Inc., Santa Clara, California, Record of Decision. August.

EPA. 2010. Fourth Five-Year Review Report for Applied Materials Bowers Campus, Santa Clara, California. September 28.

EPA. 2015. Fifth Five-Year Review Report for Applied Materials Superfund Site Santa Clara, California. September 17.

EPA. 2020. Sixth Five-Year Review Report for Applied Materials Superfund Site Santa Clara County, California. September 22.

Federal Emergency Management Agency. 2024. National Flood Hazard Layer Viewer. <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd> Accessed July.

National Oceanic and Atmospheric Administration. 2025. Sea Level Rise Viewer. <https://coast.noaa.gov/slr/#/layer/sce/6.5/-13581261.53681698/4495557.188454524/13.932/satellite/45418/0.8/2100/high/noAccretion/NOS_Minor> Accessed April.

National Oceanic and Atmospheric Administration. 2025. The Climate Explorer. < https://crt-climate-explorer.nemac.org/> Accessed April 2025.

Santa Clara Valley Water District. 2025. Water Year 2024 Groundwater Report. March.

University of California – Merced. 2025. Climate Toolbox: Climate Mapper. <https://climatetoolbox.org/tool/climate-mapper> Accessed April.

United States Army Corps of Engineers. 2020. Sixth Five-Year Review Report for Applied Materials Superfund Site, Santa Clara, California. September 22.

United States Geological Survey. 2025. Hazard Exposure Reporting and Analytics – Impact of Sea Level Rise and Storms on Coastal Flooding Hazards. <https://www.usgs.gov/apps/hera/floodTool.php> Accessed April.

Weiss Associates. 2004. Five-Year Status Report and Effectiveness Evaluation for Applied Materials Building 1, 3050 Bowers Avenue, Santa Clara, California. September 30.

Weiss Associates. 2023. PlumeStop® Injection Pilot Study and Sampling Status Report Update, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California. September 15.

Weiss Associates. 2025. PlumeStop® Injection Pilot Study and Sampling Status Report Update 4, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California. March 03.

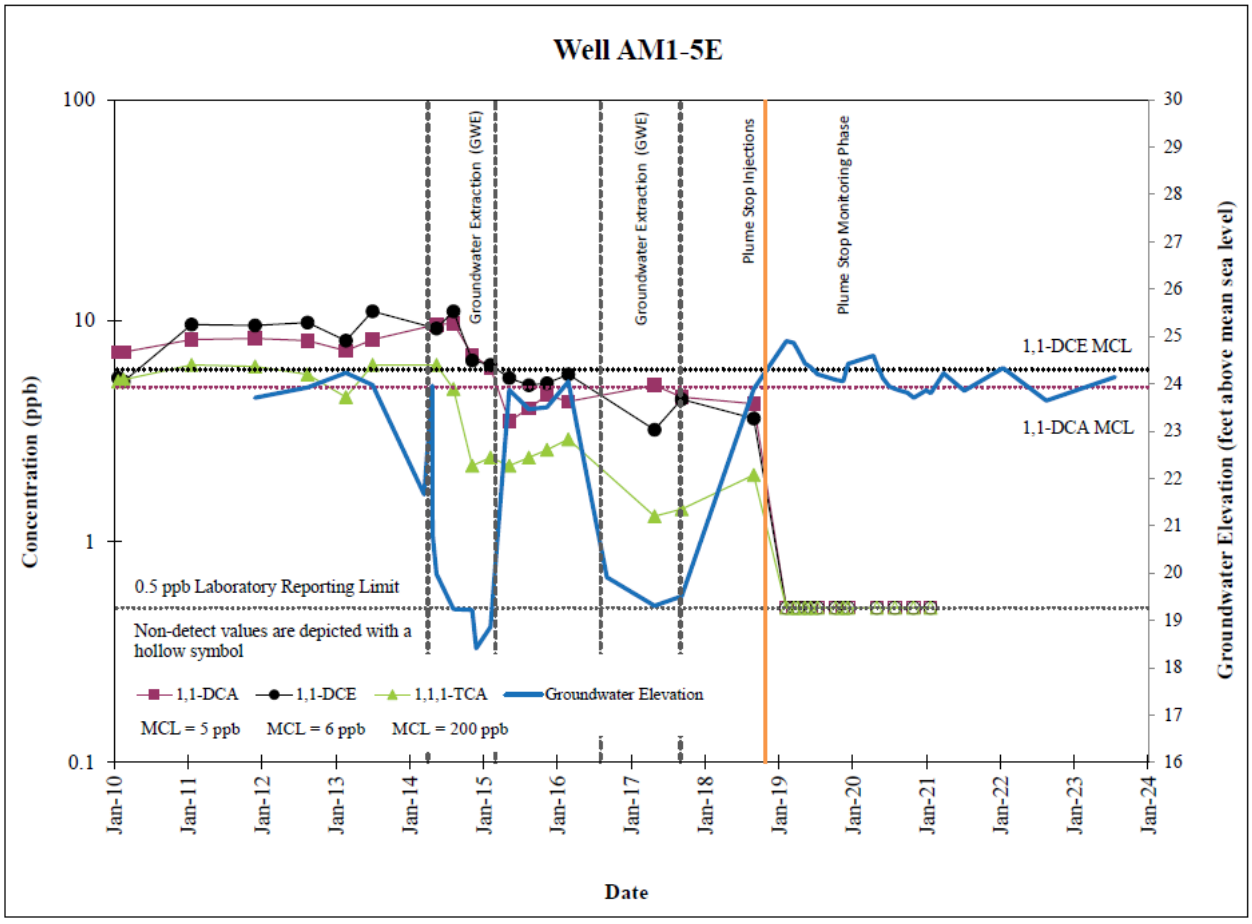
Appendix B: Site Chronology

Event	Date
Applied Materials, Inc. voluntarily investigates its underground tank locations	11/1983
Several extraction wells and monitoring wells are installed to treat contaminated groundwater, together with granular activated carbon and air stripping treatment systems	1983-1985
Combined Remedial Investigation/Feasibility Study, OU 01	10/1/1983-9/28/1990
Initial Assessment Completed	7/1/1984
Proposed to National Priorities List	10/15/1984
Applied Materials, Inc. implements initial response measures, including soil excavation, underground tank removal, and construction of an extraction pit and monitoring well AM1-EP	1/1985
An air stripper system with connections and pumps at wells AM1-1, AM1-5E, and AM1-EP is installed and tested. Downgradient monitoring wells AM1-6, AM1-7, AM1-8, and AM1-9 are installed.	3/1985-6/1985
Regional Water Board adopts WDRO No. 86-71	9/1986
Applied Materials added to the National Priorities List	7/22/1987
Regional Water Board adopts WDRO No. 88-171	12/1988
Regional Water Board issues Site Cleanup Order No. 89-167. The Self-Monitoring Program includes tri-annual volatile chemical analysis for groundwater from AM1 wells and off-Site wells HP-1 and HP-6	9/1989
Regional Water Board adopts revised Cleanup Order No. 90-134	9/1990
Record of Decision OU01	9/28/1990
Final Remedial Action started	9/28/1990
Administrative Order on Consent	9/28/1992
Combined Remedial Investigation/Feasibility Study, OU02	9/28/1990-8/25/1993
Regional Water Board adopts Site Cleanup Order No. 93-056	6/1993
Record of Decision OU02	8/25/1993
Construction Completed	9/27/1993
First Five-year Review	4/28/1995
Shallow-tray air stripper replaced with Carbonair, stainless steel, low-profile air stripper	2/1998
Regional Water Board approved the discontinuation of monitoring at several wells	1990-2005
Second Five-year Review	7/11/2000
Groundwater extraction and treatment remedy shut down	2/2002
Regional Water Board approves shutdown of last active extraction well, AM1-10	12/2002

Event	Date
Third Five-year Review	8/29/2005
Regional Water Board transfers Site back to EPA	8/2006
Final Focused Feasibility Study	12/21/2007
Fourth Five-year Review	9/28/2010
Site Ready for Reuse and Redevelopment	9/30/2010
Groundwater extraction operation at AM1-5E; sampling continued	4/2014-3/2015
Fifth Five-Year Review	9/28/2015
Groundwater extraction operation at AM1-5E; sampling continued	8/2016-9/2017
Injection of PlumeStop® approved and utilized	10/21/2018
Additional injection of PlumeStop®	1/19/2020
Sixth Five-Year Review	9/17/2020

Appendix C: Data Review

Most of the data collected since the last Five-Year Review on volatile organic compound (VOC) contamination in groundwater comes from monitoring well AM1-7, with a small number of samples analyzed for VOCs from monitoring well AM1-5E (monitoring discontinued after January 2021). Figure 5, presented in Section 4.2.1, displays the timeseries of 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA) and 1,1-dichloroethene (1,1-DCE) at well AM1-7. Figure C-1 shows the available data on VOC concentrations (in parts per billion [ppb] and 1 ppb = 1 µg/L) in groundwater at well AM1-5E.



Source: Weiss Associates, 2025. PlumeStop® Injection Pilot Study and Sampling Status Report Update 4, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California

Figure C-1. Signature Volatile Organic Compounds Concentrations History in Monitoring Well AM1-5E

Table C-1 presents the concentrations of each targeted VOC at monitoring wells AM1-5E and AM1-7 from 2010 to the most recent data available.

As can be seen in Table C-1, after each injection of PlumeStop®, concentrations of each VOC decreased and except for 1,1-DCA at AM1-7 after the 2020 injection event, decreased to below laboratory reporting limits. Monitoring at well AM1-5E continued for 1 year, until January 2021 when it was discontinued due to all COCs being below the detection limit.

Monitoring at AM1-7 continued due to the observation that the concentrations of 1,1-DCA remained greater than reporting limit in the post-injection monitoring periods Very low levels of 1,1-DCE were detected in 2024 and 2025. Based on the most recent available data from December 2024, the concentration of 1,1-DCA at well AM1-7 was 10 µg/L. However, the 1,1-DCA plume has remained stable since February 2022, showing no statistically significant monotonic trend according to Mann-Kendall analysis. This stability suggests that any further rebound will likely be limited in magnitude. This conclusion is further supported by comparing historical data: the mean 1,1-DCA concentration during the pre-groundwater extraction period (2010-2013) was 8.39 ppb, which is statistically indistinguishable from the modern post-extraction and injection mean of 8.15 ppb (2022-2024).

The timing and magnitude of the observed rebound in AM1-7 does not match the signal observed in AM1-5E, and notably, AM1-7 is screened from 17 to 27 feet below ground surface in high permeability sand and gravel deposits. It's possible that the stable 1,1-DCA trend in AM1-7 reflects a locally higher mass flux zone due to the higher hydraulic conductivity and not a broader residual mass problem in the aquifer. It's also notable that parent compound 1,1,1-TCA concentrations have been non-detect since the first round of injections in October 2018. Taken together with the achievement of 12 of 13 COCs, this suggests that the remedy has been effective and that water quality in AM1-7 likely does not reflect conditions on broader spatial scales within aquifer.

Table C-1. Volatile Organic Compounds in Groundwater at AM1-5E and AM1-7, Applied Materials Building 1 and Vicinity - January 2010 to December 2024

Well ID	Sampling Date	Days since PlumeStop® Injection	Chloroform (ppb)	1,1-DCA (ppb)	1,2-DCA (ppb)	1,1-DCE (ppb)	*cis*-1,2-DCE (ppb)	*trans*-1,2-DCE (ppb)	PCE (ppb)	1,1,1-TCA (ppb)	1,1,2-TCA (ppb)	TCE (ppb)	Vinyl Chloride (ppb)	Freon 113 (ppb)	Freon 11 (ppb)
AM1- 5E	1/19/2010	---	<1	7.2	<0.5	5.5	<0.5	<0.5	<0.5	5.3	<0.5	<0.5	<0.5	0.98	<1
AM1- 5E	2/16/2010	---	<1	7.2	<0.5	5.3	<0.5	<0.5	<0.5	5.4	<0.5	<0.5	<0.5	0.96	<1
AM1- 5E	1/18/2011	---	<1	8.2	<0.5	9.6	<0.5	<0.5	<0.5	6.3	<0.5	0.76	<0.5	2.00	<1
AM1- 5E	11/14/2011	---	<1	7.0	<0.5	4.2	<0.5	<0.5	<0.5	4.1	<0.5	<0.5	<0.5	0.78	<1
AM1- 5E	8/14/2012	---	<1	8.1	<0.5	9.8	0.52	<0.5	<0.5	5.7	<0.5	0.89	<0.5	2.4	<1
AM1- 5E	2/19/2013	---	<1	7.3	<0.5	8.1	<0.5	<0.5	<0.5	4.5	<0.5	0.73	<0.5	1.9	<1
AM1- 5E	7/16/2013	---	<1	8.2	<0.5	11	0.56	<0.5	<0.5	6.3	<0.5	1.4	<0.5	2.6	<1
AM1- 5E	5/14/2014	---	<1	9.6	<0.5	9.2	<0.5	<0.5	<0.5	6.3	<0.5	<0.5	<0.5	2.3	<1
AM1- 5E	8/6/2014	---	<1	9.7	<0.5	11	<0.5	<0.5	<0.5	4.9	<0.5	0.73	<0.5	5.0	<1
AM1- 5E	11/6/2014	---	<1	7.0	<0.5	6.6	<0.5	<0.5	<0.5	2.2	<0.5	0.61	<0.5	3.4	<1
AM1- 5E	2/5/2015	---	<1	6.1	<0.5	6.3	<0.5	<0.5	<0.5	2.4	<0.5	0.58	<0.5	3.3	<1
AM1- 5E	5/8/2015	---	<1	3.5	<0.5	5.5	<0.5	<0.5	<0.5	2.2	<0.5	0.58	<0.5	1.6	<1
AM1- 5E	8/13/2015	---	<1	3.9	<0.5	5.0	<0.5	<0.5	<0.5	2.3	<0.5	0.67	<0.5	1.3	<1
AM1- 5E	11/11/2015	---	<1	4.6	<0.5	5.2	<0.5	<0.5	<0.5	2.6	<0.5	0.81	<0.5	1.4	<1
AM1- 5E	2/25/2016	---	<1	4.3	<0.5	5.6	<0.5	<0.5	<0.5	2.9	<0.5	0.71	<0.5	1.7	<1
AM1- 5E	4/26/2017	---	<1	5.1	<0.5	3.2	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	1.1	<1
AM1- 5E	9/7/2017	---	<1	4.5	<0.5	4.4	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	1.6	<1
AM1- 5E	8/30/2018	---	<1	4.2	<0.5	3.6	<0.5	<0.5	<0.5	2.0	<0.5	<0.5	<0.5	1.3	<1
AM1- 5E	3/15/2019	138	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	4/5/2019	159	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	5/10/2019	194	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	6/7/2019	222	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	7/11/2019	256	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	10/10/2019	347	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	11/15/2019	383	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	12/9/2019	407	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	4/30/2020	550	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	7/28/2020	639	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.02	<0.5	<0.5
AM1- 5E	10/29/2020	732	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 5E	1/21/2021	816	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	1/19/2010	---	<1	5.8	<0.5	4.5	<0.5	<0.5	<0.5	6	<0.5	0.5	<0.5	1.4	<1
AM1- 7	2/16/2010	---	<1	6.3	<0.5	4.9	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	1.2	<1
AM1- 7	1/18/2011	---	<1	8.5	<0.5	8	<0.5	<0.5	<0.5	7.6	<0.5	<0.5	<0.5	1.7	<1
AM1- 7	11/14/2011	---	<1	7.9	<0.5	7.3	<0.5	<0.5	<0.5	6.4	<0.5	<0.5	<0.5	1.6	<1
AM1- 7	8/14/2012	---	<1	9.9	<0.5	8.9	<0.5	<0.5	<0.5	7.3	<0.5	<0.5	<0.5	1.9	<1
AM1- 7	2/19/2013	---	<1	9.3	<0.5	7.3	<0.5	<0.5	<0.5	6.1	<0.5	<0.5	<0.5	1.6	<1
AM1- 7	7/16/2013	---	<1	11	<0.5	9.6	<0.5	<0.5	<0.5	8.8	<0.5	<0.5	<0.5	2.0	<1

Well ID	Sampling Date	Days since PlumeStop® Injection	Chloroform (ppb)	1,1-DCA (ppb)	1,2-DCA (ppb)	1,1-DCE (ppb)	*cis*-1,2-DCE (ppb)	*trans*-1,2-DCE (ppb)	PCE (ppb)	1,1,1-TCA (ppb)	1,1,2-TCA (ppb)	TCE (ppb)	Vinyl Chloride (ppb)	Freon 113 (ppb)	Freon 11 (ppb)
AM1- 7	5/14/2014	---	<1	8.6	<0.5	7	<0.5	<0.5	<0.5	5.9	<0.5	<0.5	<0.5	1.4	<1
AM1- 7	11/6/2014	---	<1	7.5	<0.5	5.8	<0.5	<0.5	<0.5	3.7	<0.5	<0.5	<0.5	1.0	<1
AM1- 7	2/5/2015	---	<1	8.4	<0.5	6.4	<0.5	<0.5	<0.5	5.6	<0.5	<0.5	<0.5	1.3	<1
AM1- 7	5/8/2015	---	<1	9.7	<0.5	7.9	<0.5	<0.5	<0.5	7.1	<0.5	<0.5	<0.5	1.5	<1
AM1- 7	8/13/2015	---	<1	9.4	<0.5	7.3	<0.5	<0.5	<0.5	6.2	<0.5	<0.5	<0.5	1.3	<1
AM1- 7	11/11/2015	---	<1	8.6	<0.5	6.4	<0.5	<0.5	<0.5	5.3	<0.5	<0.5	<0.5	1.2	<1
AM1- 7	2/25/2016	---	<1	7.9	<0.5	6.8	<0.5	<0.5	<0.5	5.8	<0.5	<0.5	<0.5	1.5	<1
AM1- 7	4/26/2017	---	<1	8.8	<0.5	6.1	<0.5	<0.5	<0.5	5.1	<0.5	<0.5	<0.5	0.99	<1
AM1- 7	9/7/2017	---	<1	8.4	<0.5	9.3	<0.5	<0.5	<0.5	5.3	<0.5	<0.5	<0.5	1.4	<1
AM1- 7	8/30/2018	---	<1	12	<0.5	8.2	<0.5	<0.5	<0.5	5.7	<0.5	<0.5	<0.5	1.9 J+	<1
AM1- 7	3/15/2019	138	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	4/5/2019	159	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	5/10/2019	194	<1	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	6/7/2019	222	<1	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	7/11/2019	256	<1	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	10/10/2019	347	<1	4.4	<0.5	0.34 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	11/15/2019	383	<1	4.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	12/9/2019	407	<1	5.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	4/30/2020	102	<1	0.98	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	5/28/2020	130	<0.2	1.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.02	<0.5	<0.5
AM1- 7	6/30/2020	163	<0.2	1.9	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	0.027	<0.5	<0.5
AM1- 7	7/28/2020	191	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.02	<0.5	<0.5
AM1- 7	8/25/2020	219	<0.2	2.1	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.02	<0.5	<0.5
AM1- 7	9/29/2020	254	<1	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	12/29/2020	345	<1	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	3/25/2021	431	<1	4.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	7/6/2021	534	<1	5.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	1/14/2022	726	<1	6.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	2/3/2022	746	<1	7.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	8/15/2022	939	<1	8.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	8/15/2022	939	<1	7.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	8/15/2022	939	<1	6.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
AM1- 7	7/21/2023	1279	<0.1	9.4	0.1	0.47	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
AM1- 7	2/27/2024	1500	<0.1	9.4	0.12	0.63	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
AM1- 7	12/31/2024	1808	<0.1	10	0.1	0.47	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	0.037	<0.5	<0.5

Notes:
Source: Weiss Associates, 2025. PlumeStop® Injection Pilot Study and Sampling Status Report Update 4, Applied Materials, Building 1, 3050 Bowers Avenue, Santa Clara, California
PlumeStop® was injected in the vicinity of AM1-5E on October 20 and 21, 2018 and AM1-7 on October 27 and 28, 2018. Days since PlumeStop® Injections are based on last day of all injections, October 28, 2018.
PlumeStop® was re-injected in the vicinity of AM1-7 on January 18 and 19, 2020. Days since PlumeStop® Injections are based on last day of all injections, January 19, 2020.
< = contaminant not detected above the listed laboratory detection limit
--- = before PlumeStop® injection
J = estimated result
J+ = estimated result, may be biased high
Samples analyzed at Eurofins in West Sacramento, CA, at McCampbell Analytical in Pittsburg, CA and at Test America in Pleasanton, CA. Analytical method for volatile organic compounds is U.S. Environmental Protection Agency Method 8260B.

Appendix D: Applicable or Relevant and Appropriate Requirements Assessment

Section 121 (d)(2)(A) of Comprehensive Environmental Response, Compensation, and Liability Act specifies that Superfund remedial actions must meet any federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). ARARs are those standards, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Comprehensive Environmental Response, Compensation, and Liability Act Site.

Changes (if any) in ARARs are evaluated to determine if the changes affect the protectiveness of the remedy. Each ARAR and any change to the applicable standard or criterion are discussed in this appendix.

Chemical-specific ARARs identified in the 1990 Record of Decision (ROD) for groundwater were evaluated (Table D-1).

The 1990 ROD established the groundwater cleanup criteria for the Site. The goal of this remedial action is to restore groundwater to its beneficial use. The final cleanup levels 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). The groundwater cleanup criteria established for the Site in the 1990 ROD (Table D-1), as well as the current state and federal standards, are:

Table D-1. Summary of Groundwater Chemical-Specific ARAR Changes

Contaminant of Concern	1990 ROD Cleanup Level (µg/L)	Basis for Cleanup Level	Current State MCL (µg/L)	Current Federal MCL (µg/L)	ARARs More or Less Stringent than Cleanup Level?
1,1,1-Trichloroethane (1,1,1-TCA)	200	State MCL, Federal MCL	200	200	Equal To
1,1,2-Trichloroethane (1,1,2-TCA)	3	Federal MCLG	5	5	Less Stringent

Contaminant of Concern	1990 ROD Cleanup Level (µg/L)	Basis for Cleanup Level	Current State MCL (µg/L)	Current Federal MCL (µg/L)	ARARs More or Less Stringent than Cleanup Level?
1,1-Dichloroethane (1,1-DCA)	5	State MCL	5	None	Equal To
1,1-Dichloroethene (1,1-DCE)	6	State MCL	6	7	Equal To
1,2-Dichloroethane (1,2-DCA)	0.5	State MCL	0.5	5	Equal To
Chloroform	6	State MCL	80[1]	80 (as total trihalomethanes)	Less Stringent
cis-1,2-Dichloroethene (*cis*-1,2-DCE)	6	State MCL	6	70	Equal To
Tetrachloroethene (PCE)	5	State MCL, Federal MCL	5	5	Equal To
trans-1,2-Dichloroethene (*trans*-1,2-DCE)	10	State MCL	10	100	Equal To
Trichloroethene (TCE)	5	State MCL, Federal MCL	5	5	Equal To
Trichlorofluoromethane (or Freon 11)	150	State MCL	150	None	Equal To
Trichlorotrifluoroethane (or Freon 113)	1,200	State MCL	1,200	None	Equal To
Vinyl chloride	0.5	State MCL	0.5	2	Equal To

Notes:

[1] Total trihalomethanes have a MCL of 80 parts per billion. Total trihalomethanes include: bromodichloromethane, bromoform, chloroform, and dibromochloromethane. The 2010 Five-Year Review ARARs appendix discussed the revision of the chloroform cleanup level from a California action level to a California MCL. It stated: "The action level for chloroform has changed from 6 µg/L for only chloroform to 80 µg/L as measured by total trihalomethanes (Table C-1). There are no other changes to existing chemical-specific ARAR stated in the ROD."

µg/L = microgram(s) per liter

MCL = Maximum Contaminant Level

MCLG = Maximum Contaminant Level Goal

Federal and state laws and regulations other than the chemical-specific ARARs discussed in Table D-1 that have been promulgated or changed since the 1990 ROD are described in Table D-2. There have been no revisions to laws or regulations that affect the protectiveness of the remedy.

Action- or location-specific ARARs that have not changed since the 1990 ROD, and therefore do not affect protectiveness[3] are:

- California Drinking Water Standards, California Code of Regulations Title 22, Division 4, Chapter 15, Article 3.5 Ground Water Rule § 64430
- California Code of Regulations, Title 22, Division 4.5, Chapter 39, § 67391.1 Requirements for Land Use Covenants
- Safe Drinking Water Act Amendments of 1996 (Pub. L 104-182), National Drinking Water Regulations United States Code, Title 42, U.S.C., Chapter 6A, Subchapter XII, Part B § 300g, 300h (setting MCLs and protection of underground sources of drinking water, respectively)

Table D-2. Summary of ARAR Changes for Site Since the Decision Document(s)

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
Safe Drinking Water Act Regulations, 40 CFR §§ 141.24 and 141.61	1990 ROD	Federal MCLs are ARARs for the Site and were used to establish groundwater cleanup levels.	Changes do not affect protectiveness.	Addition of per- and polyfluoroalkyl substances (PFAS) to list of regulated chemicals, and minor text changes.	June 25, 2024

[3] State Water Resources Control Board Resolution No. 68-16 is a policy / resolution rather than a promulgated standard and therefore should not have been an ARAR. Nevertheless, it has not changed since the 1990 ROD.

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
Safe Drinking Water Act Regulations, 40 CFR §§ 141.24 and 141.61	1990 ROD	Federal MCLs are ARARs for the Site and were used to establish groundwater cleanup levels.	Changes do not affect protectiveness.	Changes to alternate testing procedures for analysis of some contaminants.	October 12, 2018
California Safe Drinking Water Regulations, 22 California Code of Regulations § 64444	1990 ROD	California MCLs are ARARs for the Site and were used to establish groundwater cleanup levels.	Changes do not affect protectiveness.	Amendment of first paragraph, table, and Note.	December 14, 2017

Appendix E: Press Release

Media Contact: Mikayla Rumph, 213-244-1806, rumph.mikayla@epa.gov

In sign of progress in Superfund cleanups across Pacific Southwest, EPA to perform Five-Year Reviews at 27 Superfund sites in 2025

SAN FRANCISCO (Feb. 20, 2025) – In an important marker of progress achieved on long-term Superfund cleanups across the Pacific Southwest region, in 2025 the U.S. Environmental Protection Agency (EPA) will perform comprehensive Five-Year Reviews of cleanups at 27 Superfund sites across Arizona, California, Hawaii and Nevada. EPA will undertake these legally required reviews to ensure that cleanup efforts, some of which were completed years ago, continue to be protective of public health and the environment.

"Reviewing the long-term, complex cleanup work at these Superfund sites is critical to ensuring that public health and the environment will continue to be protected," **said EPA Pacific Southwest Superfund and Emergency Management Director Michael Montgomery. "**Cleanups at these sites also promote redevelopment, providing communities with the opportunity for a variety of reuse options."

Once the Five-Year Reviews are complete, the findings will be posted to each Superfund site's webpage. The reviews to be completed in 2025 are:

Arizona:

- Mountain View Mobile Homes, Globe, Ariz.
- Nineteenth Avenue Landfill, Phoenix, Ariz.
- Phoenix-Goodyear Airport Area, Goodyear, Ariz.
- Yuma Marine Corps Air Station, Yuma, Ariz.

California:

- Applied Materials, Santa Clara, Calif.
- Casmalia Resources, Casmalia, Calif.
- CTS Printex, Inc., Mountain View, Calif.
- Del Amo, Los Angeles, Calif.
- Fresno Municipal Sanitary Landfill, Fresno, Calif.
- Hewlett-Packard (620-640 Page Mill Road), Palo Alto, Calif.
- Intersil Inc./Siemens Components, Cupertino, Calif.
- J.H. Baxter & Co., Weed, Calif.
- Liquid Gold Oil Corp., Richmond, Calif.
- Lorentz Barrel & Drum Co., San Jose, Calif.
- Mather Air Force Base (AC&W Disposal Site), Mather, Calif.
- Moffett Field Naval Air Station, Moffett Field, Calif.
- Montrose Chemical Corp., Torrance, Calif.
- Norton Air Force Base (Landfill 2), San Bernardino, Calif.
- Operating Industries, Inc., Landfill, Monterey Park, Calif.
- Pemaco Maywood, Maywood, Calif.
- Rockets, Fireworks, and Flares Site, Rialto, Calif.
- Southern California Edison Co. (Visalia Pole Yard), Visalia, Calif.
- South Bay Asbestos Area, Alviso, Calif.
- Tracy Defense Depot (USARMY), Tracy, Calif.

Hawaii:

- Del Monte Corp. (Oahu Plantation), Kunia, Hawaii.
- Naval Computer and Telecommunications Area Master Station Eastern Pacific, Wahiawa, Hawaii.

Nevada:

- Anaconda Copper Mine, Yerington, Nev.

Background

Throughout the process of designing and constructing a Superfund cleanup (also called a remedy) at a hazardous waste site, EPA's primary goal is to make sure the remedy will be protective of public health and the environment. After the remedy has begun to move forward, EPA continues to ensure it remains protective by requiring reviews of cleanups every five years. It is important for EPA to regularly check on these sites to ensure the remedy is working properly. These reviews identify issues (if any) that may affect the protectiveness of the constructed remedy and, if necessary, recommend action(s) necessary to address them.

There are many phases of the Superfund cleanup process, including considering future use and redevelopment of sites as well as conducting post cleanup monitoring of sites. EPA must ensure that any redevelopment will uphold the protectiveness of the remedy into the future.

More information:

The Superfund program, a federal program established by Congress in 1980, investigates and cleans up the most complex, uncontrolled or abandoned hazardous waste sites in the country and endeavors to facilitate activities to return them to productive use. In total, there are 140 Superfund sites (this includes sites currently on the National Priorities List, deleted sites, and sites under the Superfund Alternative Approach program) across EPA's Pacific Southwest Region.

Learn more about Superfund and other cleanup sites in the Pacific Southwest.

Learn more about EPA's Superfund program.

Learn more about EPA's Pacific Southwest Region. Connect with us on Instagram, Facebook and on X.

Appendix F: Interview Forms

Five-Year Review Interview Record

Interview Questionnaire

Site: Applied Materials

EPA Identification Number: CAD042728840

Date: 02/20/2025

Interviewee Name	Organization	Title	Telephone	Email
Emily Barron	Applied Materials	Global Environmental Manager	586-389-0712	Emily_barron@amat.com
Vicky Cai	Applied Materials	Senior Environmental Engineer	669-213-6970	Vicky_cai@amat.com

Questions

1. **What is your role in the project (e.g. property owner, groundwater user, drinking water provider, impacted adjacent property, consultant)?**

   Applied Materials is the PRP on the property and current property owner.

2. **How do you interact with the Superfund Project Manager regarding concerns with the cleanup?**

   Applied Materials interacts with the Superfund Project Manager via email, written report as required on an annual basis, through the inspection process, and via phone as necessary.

3. **Has a private well or a non-public water system ever served the property? Can you provide details?**

   No, Applied Materials is the only property owner and operator.

4. **Do you have evidence or prior knowledge that a public or private well, water system, or aquifer has been designated contaminated by any government or health agency? Please describe.**

   No, Applied Materials is the only property owner and operator.

5. **Do you review any of the published data/reports and what is your overall impression of the project? (If the answer is no continue on to question 12).**

   I review the sampling data and reports that are submitted to the EPA regarding the project. I have no concerns on the direction of the data.

6. **When you are reviewing the monitoring data, are there any trends that show contaminant levels decreasing?**

   The trends from the data usually show that the levels are decreasing or remaining consistent. However, recently there has been an increasing trend in the one monitoring wells sampled onsite.

7. **Is the cleanup functioning as expected and how well is it performing?**

   A groundwater pump and treat operated from 1985 through 2002. Currently, the Site is in a natural attenuation phase and monitoring after a pilot study was conducted.

8. **Is there a continuous O&M presence? If so, please describe staff and activities. If there is not a continuous on-Site presence, describe staff and frequency of Site inspections and activities?**

   Currently there is no O&M presence, we are in a monitoring phase after a pilot study.

9. **Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? Please describe changes and impacts.**

   No.

10. **Have there been unexpected O&M difficulties at the Site in the last five years (e.g. fence damage, vandalism, storm damage)? If so, please give details.**

    No.

11. **Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and desired results or improved efficiency (e.g. better warning system for groundwater wells, repair/replace outdated equipment).**

    The sampling efforts have been adjusted from annual to semi-annual to monitor concentrations in well AM1-7.

12. **Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the recovery of the existing contamination or how the cleanup will be conducted?**

    Applied Materials is unaware of any changes that would lead to changes in the project.

13. Do you have any comments, suggestions, or recommendations regarding the project?

No additional comments at this time on the project.

14. Do you wish to be included in the contact roster for receiving additional data reports or Five Year Reports?

Yes, if there is additional information to be provided by EPA, Applied Materials would request the information.

Five-Year Review Interview Record

Interview Questionnaire

Site: Applied Materials

EPA Identification Number: CAD042728840

Date: 02/25/2025

Interviewee Name	Organization	Title	Telephone	Email
Joyce Adams	Weiss Associates	Sr. Project Geologist II	925-325-2698	jea@weiss.com

Questions

1. **What is your role in the project (e.g. property owner, groundwater user, drinking water provider, impacted adjacent property, consultant)?**

   I am the Environmental Consultant for Applied Materials on this project.

2. **How do you interact with the Superfund Project Manager regarding concerns with the cleanup?**

   I interact with the EPA Superfund Project Manager via email or phone, as needed.

3. **Has a private well or a non-public water system ever served the property? Can you provide details?**

   I don't believe so. The historical documents mention a well east of the Site but none on the Site.

4. **Do you have evidence or prior knowledge that a public or private well, water system, or aquifer has been designated contaminated by any government or health agency? Please describe.**

   No.

5. **Do you review any of the published data/reports and what is your overall impression of the project? (If the answer is no continue on to question 12).**

   Currently groundwater is sampled from one well on a periodic basis and I prepare the reports and send them to Applied for review and then we submit the report to EPA.

6. **When you are reviewing the monitoring data, are there any trends that show contaminant levels decreasing?**

   The trends from the data usually show that the levels are decreasing or remaining consistent. However, recently there has been an increasing trend in the one monitoring wells sampled onsite.

7. **Is the cleanup functioning as expected and how well is it performing?**

   A groundwater pump and treat operated from 1985 through 2002. Currently, the Site is in a natural attenuation phase and monitoring after a pilot study was conducted.

8. **Is there a continuous O&M presence? If so, please describe staff and activities. If there is not a continuous on-Site presence, describe staff and frequency of Site inspections and activities?**

   Currently there is no O&M presence, we are in a monitoring phase after a pilot study.

9. **Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? Please describe changes and impacts.**

   No.

10. **Have there been unexpected O&M difficulties at the Site in the last five years (e.g. fence damage, vandalism, storm damage)? If so, please give details.**

    No.

11. **Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and desired results or improved efficiency (e.g. better warning system for groundwater wells, repair/replace outdated equipment).**

    The sampling efforts have been adjusted from annual to semi-annual to monitor concentrations in well AM1-7.

12. **Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the recovery of the existing contamination or how the cleanup will be conducted?**

    I am not aware of any changes that would lead to changes in the project.

13. Do you have any comments, suggestions, or recommendations regarding the project?

No additional comments at this time on the project.

14. Do you wish to be included in the contact roster for receiving additional data reports or Five Year Reports?

Yes, if there is additional information to be provided by EPA, Weiss Associates and Applied Materials would request the information.

Appendix G: Site Inspection Report and Photos

Trip Report

Applied Materials Superfund Site (Site), Santa Clara County, California

1. INTRODUCTION

   a. Date of Visit: March 6, 2025; Time of Visit: 12:00 – 02:00 PM PST

   b. Location: Santa Clara, California

   c. Purpose: A Site visit was conducted to visually inspect and document the conditions of the remedy, the Site, and the surrounding area for inclusion into the Five-Year Review Report.

   d. Participants:

Alan Pacheco Malagon	EA Engineering, Science, and Technology, Inc. (EA)	916-604-4375
Kelia Liang	U.S. Environmental Protection Agency Region 9	415-972-3069
Grace Beery	U.S. Environmental Protection Agency Region 9	415-972-3207
Vicky Cai	Applied Materials	408-460-1294
Joyce Adams	Weiss Associates	925-325-2698

2. SUMMARY

A site inspection at the Site was conducted on March 6, 2025, as part of the Seventh Five-Year Review. The Applied Materials, Inc. facility is accessed from Bower Avenue on the east, from Oakmead Village Drive on the west, and from Scott Boulevard on the north. Participants met in the lobby of Applied Materials Building 2 (AM2) at noon. The site inspection consisted of a safety meeting followed by a brief discussion of the Site history and background, discussion of the status of the remedy, and a tour around the facility. The inspection included visual observation of overall Site conditions and inspection of remedy components. No active remediation is currently being conducted. Participants toured the Site and observed evidence of recent remedial work and the existing well network.

3. DISCUSSION

The weather was partly cloudy, calm, and in the mid 50 degrees Fahrenheit. The site visit participants met at the AM2 lobby, where they signed in. Participants introduced themselves, EA and the EPA personnel gave an overview of the objectives of the site inspection, and the group discussed safety. Joyce Adams gave an overview and history of the project.

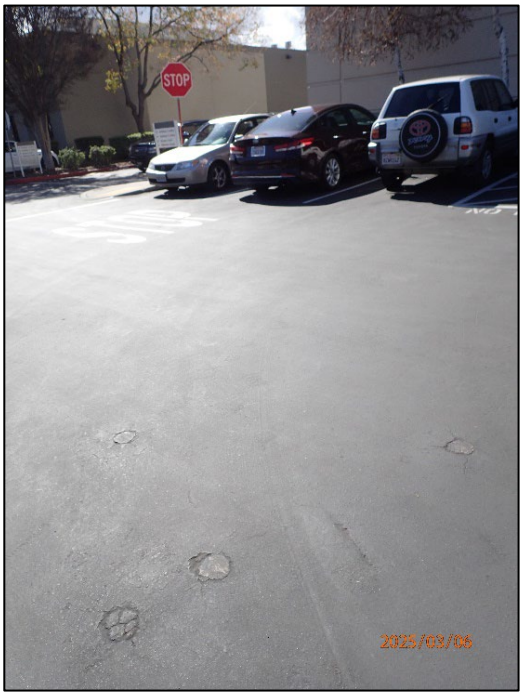
The Applied Materials inspection team proceeded to tour the facility. Joyce Adams escorted the participants around buildings AM1 and AM2. Participants visited the location of the former groundwater treatment system. EA verified that the groundwater treatment system and associated components have been decommissioned. No active treatment is being conducted at the facility. There are five monitoring wells currently used for measuring water levels: AM1-3, AM1-5E, AM1-6, AM1-7, and AM1-11. These monitoring wells are secured and appeared to be in good condition. Joyce Adams showed the locations of PlumeStop® injections. AM1-5E was located and inaccessible as a vehicle was parked on top of the well. Evidence of abandoned wells and injection points was observed. Some areas of the parking lot have been repaved.

After inspecting the well network and location of injection points, the site inspection was concluded.

Alan Pacheco Malagon
Environmental Engineer
EA Engineering, Science, and Technology, Inc.

Site Visit Photos

Photograph 1. March 6, 2025 at 2:35 PM
Conveyance line to sanitary sewer. Facing south.



Photograph 2. March 6, 2025 at 2:42 PM
Evidence of injection points. Facing southwest.

Photograph 3. March 6, 2025 at 2:46 PM
Monitoring well AM1-7. Facing north.