2009 ANNUAL PROGRESS REPORT

for

Former Fairchild Building 18
644 National Avenue
Middlefield-Ellis-Whisman Study Area
Mountain View, California

prepared for

Schlumberger Technology Corporation
225 Schlumberger Drive
Sugar Land, TX 77478

June 15, 2010

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Weiss Associates work for Schlumberger Technology Corporation (STC) was conducted under my supervision. To the best of my knowledge, the data contained in this report are true and accurate and satisfy the scope of work prescribed by the client for this project in accordance with generally accepted professional engineering and geologic practice. We make no other warranty, either expressed or implied, and are not responsible for the interpretation by others of the contents in this report.

June 15, 2010

Tess Byler, P.G.
Sr. Project Geologist
(CA # 8131, expiration Nov. 2010)

Date

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ACRONYMS AND ABBREVIATIONS

106 Order	Administrative Order for Remedial Design and Remedial Action
cis-1,2-DCE	cis-1,2-dichloroethene
cm/sec	centimeter per second
DHS	Department of Health Services
Fairchild	Fairchild Semiconductor Corporation
Ft	Feet
ft bgs	feet below ground surface
FS	feasibility study
Building 18	644 National Avenue
GAC	granular activated carbon
gpm	gallons per minute
GWETS	groundwater extraction and treatment system
IRM	Interim Remedial Measure
K	hydraulic conductivity
µg/L	micrograms per liter
mg/kg	milligram per kilogram
MEW	Middlefield-Ellis-Whisman
MCLs	maximum contaminant levels
NASA	National Aeronautics and Space Administration
NPDES	National Pollutant Discharge Elimination System
PCE	Tetrachloroethene
PRPs	potentially responsible parties
QA/QC	quality analysis and quality control
RGRP	Regional Groundwater Remediation Program
RI/FS	remedial investigation and feasibility study
ROD	Record of Decision
SCRWs	source control recovery wells
SCVWD	Santa Clara Valley Water District
Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
Weiss Associates	Weiss
System 1	515 Whisman Road

The Site	Former Fairchild facilities located at 644 National Avenue, Mountain View, California
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds
VC	vinyl chloride

SUMMARY

This 2009 Annual Progress Report for the former Fairchild Semiconductor Corporation (Fairchild) Building 18 located at 644 National Avenue in Mountain View, California (the Site) contains a summary of Site activities from January 1 through December 31, 2009 and analytical data for the past five years. This report is submitted in accordance with Section XV of the 1990 Administrative Order for Remedial Design and Remedial Action (106 Order) issued by the United States Environmental Protection Agency (USEPA), Section XI of the Consent Decree entered in Action No. 20275 (N.D. Cal.) in 1992 (Consent Decree) and the USEPA's correspondence prescribing 2004 and future Annual Report contents (USEPA, 2005).

The groundwater extraction and treatment system at Building 18 consists of one Source Control Recovery Well (SCRW), RW-25A, screened in the A-zone. Groundwater from this well is plumbed via double-contained piping to Fairchild Treatment System 1, located at 515 Whisman Road (System 1), which consists of three 5,000-pound granular activated carbon (GAC) vessels in series. In addition, groundwater removed by a dewatering sump system in the basement of Building 18 is also conveyed to and treated by System 1. System 1 discharges treated groundwater to the storm drain system under National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2009-0059, which became effective October 1, 2009. Five groundwater monitoring wells are currently used to evaluate the progress of the remedy at the Site. These monitoring wells are sampled annually and water levels are collected semi-annually.

Site activities conducted in compliance with the 106 Order during this reporting period included continued operation, monitoring and maintenance activities of the Building 18 ground water extraction and treatment system, the USEPA's second five-year review site inspection and support activities, and regional activities documented in the Regional Groundwater Remediation Program Annual Report (Geosyntec 2010).

Monitoring data collected during 2009 demonstrate that RW-25A continues to achieve target capture based on converging lines of evidence, including graphical flow net analysis and chemical concentration trends. Graphical flow net evaluation in March and November indicated greater horizontal capture than the target capture. There is no vertical component to the capture evaluation because extraction well, RW-25A is screened in the same hydrostratigraphic zone as the target capture (A-zone). Volatile organic compounds (VOC) concentrations in groundwater have decreased in extent and magnitude in the vicinity of Building 18, and remain well below historical maximums.

The 644 National Avenue property was sold and Building 18 was vacated in December 2007. Redevelopment plans are currently on hold and the building remains vacant. The Interim Remedial Measure installed in the basement of Building 18 to mitigate the vapor intrusion pathway was shut down after the building was vacated. The Building 18 basement dewatering system remained operational during 2009.

1. INTRODUCTION

This 2009 Annual Progress Report contains a summary of activities from January 1 through December 31, 2009 at the former Fairchild Semiconductor Corporation (Fairchild) Building 18 located at 644 National Avenue in Mountain View, California (the Site; Figures 1, 2, and 3). This report is submitted in accordance with Section XV of the 1990 Administrative Order for Remedial Design and Remedial Action (106 Order) issued by the United States Environmental Protection Agency (USEPA), Section XI of the Consent Decree entered in Action No. 20275 (N.D. Cal.) in 1992 (Consent Decree) and the USEPA's correspondence prescribing Annual Report contents (USEPA, 1990 and USEPA, 2005). Weiss Associates (Weiss) prepared this report on behalf of Schlumberger Technology Corporation (STC), and Geosyntec Consultants (Geosyntec) assisted with the preparation of this report.

1.1 Site Background

The Building 18 Site is located at 644 National Avenue, an industrial/commercial area in Mountain View California. Building 18 functioned as an electroplating facility for Fairchild Semiconductor Corporation from 1966 to 1984. The primary constituent of concern at the Site is trichloroethene (TCE) in groundwater from historical underground tanks/piping, sumps and/or surface spills (HLA, 1987).

The Site is located within the Middlefield-Ellis-Whisman (MEW) area, an approximate 1/4-square mile area bounded by Middlefield Road on the south, Ellis Street on the east, Whisman Road on the west, and Highway 101 on the north. Work is performed under a November 1990 Administrative Order for Remedial Design and Remedial Action (106 Order) issued by USEPA, and Section XI of the Consent Decree entered in Action No. 20275 (N.D. Cal.) issued in 1992 (Consent Decree). The RI/FS was completed in 1988 (HLA, 1987, and Canonie, 1988), with the USEPA issuing a Record of Decision (ROD) in 1989. The ROD and two subsequent Explanations of Significant Differences (ESDs) specify the remedial actions for the MEW area (USEPA, 1989, 1990, 1996).

Remediation within the MEW area includes facility-specific activities by individual PRPs, (such as described herein for Building 18), and a Regional Groundwater Remediation Program (RGRP) that addresses co-mingled VOCs that have migrated beyond the facility-specific areas and cannot be attributed to a single source. One of two RGRP treatment systems, the South of 101 Treatment System, is located at 644 National Avenue but is not part of the Building 18 remedy and is discussed in the Annual Report for the RGRP program (Geosyntec, 2010).

The building at the 644 National Avenue property is the original Fairchild Building 18 structure. The property was purchased by Carr America National Avenue, LLC in 2007. Redevelopment plans include new buildings and a parking structure; however, redevelopment plans are currently on hold and the building remains vacant. There is continued coordination with the developer to maintain extraction wells, conveyance piping, and monitoring wells at 644 National Avenue, as well as the RGRP South of 101 Treatment System.

1.2 Local Hydrogeology

Subsurface geology consists of interbedded sediments ranging in grain size from silty clay to sandy gravel. The water – bearing zones defined at the MEW area are summarized below:

Groundwater Zones	Approximate Depth Interval Below Ground Surface (bgs)
A[a]	20 to 45 ft
B1[b]	50 to 75 ft
B2	75 to110 ft
B3	120 to 160 ft
C	200 to 240 ft
Deep Aquifer	>240 ft

[a] Navy and NASA refer to this zone as A1 zone north of Highway 101.

[b] Navy and NASA refer to this zone as A2 north of Highway 101.

> = greater than

The upper groundwater zone is subdivided into two water-bearing zones, the A-zone and the B-zone, which are separated by the A/B aquitard. The B-zone aquifer has been further subdivided into three zones. From youngest to oldest (shallowest to deepest), these are the B1-, B2-, and B3-zones, separated by aquitards, designated as the B1/B2 aquitard and the B2/B3 aquitard. The lower groundwater zones occur below the B/C aquitard, from about 200 ft bgs. The B/C aquitard is the major confining layer beneath the MEW area. Two lower groundwater zones have been defined: the C-zone and what has been termed the Deep Aquifer, below the C-zone (HLA, 1987; Intel, 1987).

Ranges of hydraulic conductivity (K) hydraulic gradient and Transmissivity of the upper aquifer zone i.e., above the B/C aquitard, calculated from pumping tests conducted at the MEW Site from 1986 through 2005, are presented below (Canonie 1986a, 1986b, 1987, and 1988; Geomatrix, 2004; HLA, 1986 and 1987; Locus, 1998; PRC, 1991; Navy, 2005; and Weiss, 1995 and 2005).

Water-Bearing Zone	Estimated Hydraulic Conductivity (ft/day)		Approximate Horizontal Gradient (ft/ft)	Saturated Thickness (ft)	Transmissivity (ft^2/day)	
	Low	High			Low	High
A-zone	6	480	0.004	15	44	4,400
B1-zone	20	260	0.003	25	150	2,600
B2-zone	0.4	5	0.002 to 0.005	35	2	230
B3-zone	0.5	5	0.001 to 0.002	40	5	130

Currently and historically, the lateral component of groundwater flow beneath the Site is generally towards the north during non-pumping and pumping conditions.

1.3 Description of Remedy

The Final Revised Report for Source Control Remedial Design, Basis of Design, Contract Documents, Specifications and Drawings for Fairchild Building 18, dated September 2, 1994, (Canonie, 1994) presents figures of the following activities:

- Soil removal and offsite aeration in the northwest corner of the property that extended on to adjacent properties, with dimensions of approximately 80 ft long by 50 ft wide and 13 ft deep;
- Groundwater extraction well in the vicinity of the soil removal (RW-25A), piping and other appurtenances for offsite treatment at Fairchild Treatment System 1[1]; and,
- Monitoring well network, consisting of the following five wells: 54A, 147A, 152A, 80A, and 36B2 (Table 1).

The purpose of the RW-25A source control recovery well (SCRW) and associated treatment system (System 1) is to control and remove volatile organic compounds (VOCs) in the facility-specific area.

Shallow soils exceeding the cleanup standard of 0.5 mg/kg of TCE were excavated in 1995. The Site is in the long term remedial action phase with continued extraction, treatment and monitoring of groundwater.

As specified in the ROD, the remedy consists of groundwater extraction and treatment. The remedy is designed to protect local water supplies and to remediate or control groundwater that contains elevated concentrations of chemicals, including control of discharge of such groundwater to surface water.[2] Groundwater cleanup goals are 5 µg/L for TCE in shallow groundwater (A and B zones) and 0.8 µg/L for TCE in deep groundwater (C and Deep Zones).[3] The ROD states that the chemical ratio of TCE to other chemicals found at the Site is such that achieving the cleanup goal for TCE will result in cleanup of the other Site chemicals to at least their respective federal MCLs.

1.4 Summary of 2009 Site Activities and Deliverables

The 2009 monitoring and reporting schedule is provided in Table 2. Site activities conducted in compliance with the 106 Order during this reporting period include:

- Continued quarterly reporting of System 1 discharges under NPDES Permit CAG912003;
- Continuing groundwater extraction and treatment;
- Monitoring the Site dewatering sumps for operation and flow rates;
- Collecting semi-annual groundwater elevation measurements in Site monitoring and extraction wells on March 26 and November 19;

[1] Activities related to this treatment system are presented in the Annual Report for Former Fairchild Buildings 1-4 (Weiss, 2010)

[2] The objectives of the groundwater remedy design are described in the ROD and the Feasibility Study (Canonie, 1988).

[3] Groundwater cleanup goals are presented in the ROD.

- Distributing the 2008 Annual Progress Report to the USEPA and MEW Distribution List parties on June 15;
- Collecting groundwater samples from Site monitoring and extraction wells in November and December;
- Annual settlement monitoring December 9 and10;
- Assessing the progress of remedial actions during 2009; and,
- Planning remedial actions for 2010.

Section 2 of this report provides a summary of Site groundwater extraction and treatment system and remedial activities conducted during this reporting period. Section 3 documents additional activities during 2009. Sections 3-7 document additional activities, problems encountered, technical assessment, conclusions and recommendations, and a summary of remedial activities planned for calendar year 2010. Supporting data are presented in Figures 1 through 5, Tables 1 through 7, and Appendices A through D.

2. GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

2.1 System Description

2.1.1 Extraction & Treatment System

The Revised Final Source Construction, Operation and Maintenance Plan, Fairchild Semiconductor Corporation, 644 National Avenue, Building 18 presents the remedial components for the Site (Canonie 1995). One SCRW operates in the A-zone at the Building 18 Site (RW-25A). In addition, groundwater is extracted by the dewatering sump system in the basement of the building. Groundwater from RW-25A and the basement dewatering sump are conveyed via double-contained piping to a treatment facility located at 515 Whisman Road (Fairchild Treatment System 1), which consists of three 5,000-pound granular activated carbon (GAC) vessels in series. System 1 discharges treated groundwater to the storm sewer under National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2009.

Monthly average flow rates and groundwater volumes extracted are provided in Tables 3 and 4, respectively. During 2009, RW-25A operated near its target flow rate of 5.5 gallons per minute (gpm) without significant downtime. Well RW-25A extracted approximately 2.8 million gallons of groundwater in 2009, pumping at an average rate of 5.4 gpm. During 2009, the basement dewatering sump system extracted approximately 15.5 million gallons of groundwater, and the average flow rate of the sump system was 29.4 gpm.

2.1.2 Monitoring Wells

There are currently five monitoring wells associated with the Building 18 Site. Four wells are screened in the A-zone: wells 54A, 152A, 147A, and 80A. One well is screened in the B2-zone: well 36B2 (Table 1). These wells are sampled annually for VOCs, and water levels are collected semiannually. In comparing the current list of monitoring wells to those in the 1994 design documents described in Subsection 1.3 above, monitoring of Wells 151A and 58A was discontinued prior to 2002, and Well 36B2 was added prior to 2002. The remaining 4 wells are the same as listed in the design documents. Other monitoring wells at and near the Building 18 Site are discussed in the MEW RGRP 2008 Annual Report (Geosyntec, 2010).

Measured depth to groundwater during 2009 in the Building 18 monitoring wells ranged from 9.80 to 15.10 ft bgs, representing groundwater elevations ranging from 22.55 ft to 29.33 feet above mean sea level.

2.2 Extraction and Treatment System Operation and Maintenance

Annual routine maintenance consists of well inspections and as-needed repairs. The following non-routine maintenance or repairs to RW-25A or conveyance piping occurred during 2009:

2009 Dates	Component	Comments	Regulatory Notification
February 15	RW-25A	A vault flood at RW-25A occurred on February 15. It was de-flooded and restarted the same day.	Not Required
February 16	RW-25A	A vault flood at RW-25A occurred on February 16. It was de-flooded and restarted the same day.	Not Required
February 17	RW-25A	A vault flood at RW-25A occurred on February 17. It was de-flooded and restarted the same day.	Not Required
July 5	RW-25A	RW-25A went off-line due to a power outage on July 5, and was restarted July 6 after the pump saver was reset.	Not Required

The following non-routine maintenance or repair items occurred during 2009 at the Building 18 basement dewatering system:

2009 Dates	Component	Comments	Regulatory Notification
January 7	Main Sump	A high water level alert for the Building 18 main sump occurred on January 7. The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alert was reset the same day.	Not Required
January 14	Sump 3	Pump P-3 was found to be defective and was replaced on January 14.	Not Required
February 20	Main Sump	A high water level alert for the Building 18 main sump occurred on February 20. The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alert was reset the same day.	Not Required
March 23	Main Sump	A high water level alert for the Building 18 main sump occurred on March 23. The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alert was reset the same day.	Not Required
April 8	System	The system went off-line due to power outage in Mountain View. Conditions restored within half an hour.	Not Required
August 4	Pipeline	Pipeline between Building 18 to System 1 had built up with scale and was cleaned out on August 4.	Not Required
August 10	Main Sump Pump	Pump P-1 was replaced in Main Sump on August 10, due to pumping problems.	Not Required
August 12	Main Sump	The main sump pump went off-line due to the flow switch not working. The secondary main sump pump automatically activated, and the P-1 flow switch was repaired August 12.	Not Required

2.3 Hydraulic Control and Capture Zone Analysis

2.3.1 Methodology

Capture zone analysis is the process of evaluating field observations of hydraulic heads and ground-water chemistry to estimate the capture zone achieved by the groundwater extraction system (RW-25A), and then comparing the estimated capture zone at specific measurement events to a "Target Capture Zone" to determine if capture is sufficient (USEPA, 2008).

Capture from Well RW-25A was estimated for March and November 2009 by graphical flow net evaluation of estimated groundwater flow streamlines drawn perpendicular to groundwater contours in March and November 2009 to derive time-dependent estimated capture zone snapshots. The graphical analysis was guided by calculated distances to the stagnation point and capture zone width based on the analytical solution of Javandel and Tsang (1986). Because the calculation method assumes a homogeneous, isotropic, two-dimensional groundwater flow zone and is dependent on a regionally estimated value of transmissivity, the calculated distances are of secondary importance compared to measured water level data and the resulting potentiometric surface.

2.3.2 Estimated Capture Zones for 2009

Capture in the vicinity of former Building 18 is accomplished by one SCRW, A-zone well RW-25. The following six steps were used for the Building 18 capture evaluation:

Step 1: Review Site data, Site conceptual model, and remedy objectives (Sections 1 and 2 of this report).

Step 2: Define Site-specific Target Capture: The horizontal target capture area for the Site SCRW is the modeled capture zone depicted in the final remedial design document for the MEW area south of Highway 101 shown on Figures 4 and 5 (Canonie, 1994, and Smith, 1996). The vertical target capture is groundwater in the A-zone.

Step 3: Interpret water levels: Potentiometric surface maps depicting the horizontal component of groundwater flow within the A zone were constructed using data for the entire MEW area.

Step 4: Perform calculations: The calculated capture zone width and stagnation point for RW-25A are provided in Table 6 and 7 for March and November 2009, respectively. This table presents the:

- Estimated flow rate calculation
- Capture zone width calculation

Step 5: Evaluate concentration trends for wells outside of the target capture zone (Appendix D). The figures in Appendix D present TCE, cis-1,2-dichlorethene (cis-1,2-DCE), and VC concentrations over time for Site monitoring and extraction wells. The figures indicate stable or declining TCE concentrations in downgradient monitoring wells beyond the Site capture zone (e.g., wells 80A, 147A).

Step 6: Interpret actual capture based on flow net analysis of potentiometric surface using calculated distances as a guide; compare to Target Capture Zone(s), and assess uncertainties and data gaps.

Based on converging lines of evidence from Steps 1-6 above, adequate capture was achieved in RW-25A during 2009. Graphical flow net evaluation in March and November indicated greater horizontal capture width than the target capture. Vertical capture in the A-zone was achieved since well RW-25A is screened across the A Zone.

2.3.3 Horizontal and Vertical Gradients

Because Building 18 sources have not affected the B1 and deeper aquifers, vertical gradients are not calculated for this Site.

2.4 VOC Analytical Results

The 2009 annual groundwater sample event at the Site was conducted in November-December 2009. Chemical analytic results for the previous five years are provided in Table 5. Laboratory analytical reposts are provided in Appendix B, and the QA/QC evaluation is provided in Appendix C. VOC versus time graphs for Building 18 monitoring wells and extraction well are included in Appendix D.

VOC concentrations in groundwater appear to have stabilized over the past ten years, with a general long-term decrease in VOC concentrations, based on inspection of the time concentration graphs in Appendix D. VOC concentrations in the Site extraction well, RW-25A that had been slightly increasing in recent years appear to have leveled off in 2009. Because these concentrations represent the groundwater being captured by the remedy, the increasing trend is not a concern with respect to remedy performance. The extent of TCE in groundwater has decreased in the vicinity of Well RW-25A based on comparison of 1992, 1997, 2003, 2007 and 2008 TCE isoconcentration contours (Geosyntec, et al, 2008 and Weiss, 2009).

3. OTHER ACTIVITIES

3.1 Optimization Evaluation for Groundwater

There were no optimization activities during 2009 because the USEPA has not yet provided comments or approved the Optimization Evaluation Report for the Fairchild sites that was submitted to USEPA on September 3, 2008 (Geosyntec, et al, 2008). The evaluation considered previous efficiency and slurry wall evaluations at the Site (Northgate, 2007a, 2007b, 2008a, 2008b), and recommended implementing an optimization program for the Fairchild sites in conjunction with similar optimization programs for the RGRP and other MEW facilities.

3.2 Air/Vapor Intrusion

The final Revised Supplemental Feasibility Study for Vapor Intrusion was issued on June 29, 2009 (Haley & Aldrich, 2009). As documented in this report, Interim Remedial Measures for vapor intrusion were implemented in Building 18 from 2003 until the building was vacated December 2007. The building remains unoccupied, and no additional air sampling was performed on 2009.

The USEPA issued a Proposed Plan to address Vapor Intrusion at the MEW Area in June 2009, and held a public meeting on July 23, 2009 (USEPA, 2009a). The USEPA plans to issue a ROD amendment to address vapor intrusion in 2010.

3.3 Five Year Remedy Review

The USEPA issued a Second Five-Year Remedy Review in September 2009 (USEPA, 2009b).

3.4 Annual Settlement Survey

An annual soil settlement survey was performed on December 9-10, 2009. The purpose of these annual measurements is to evaluate any potential adverse effects on the Site facilities, and whether long-term remedial groundwater extraction could affect soil settlement in the MEW Area. A qualified Geotechnical Engineer reviewed the historical settlement and water level elevation data and concluded that the measured values of ground elevation change do not appear to be related to groundwater extraction. Additional information on the settlement survey can be found in the RGRP 2009 Annual Progress Report (Geosyntec, 2010).

4. PROBLEMS ENCOUNTERED

Section 2.2 provides a summary of all non-routine Operations and Maintenance events that occurred at the Building 18 Site. No other problems related to the Building 18 Site were encountered.

5. TECHNICAL ASSESSMENT

The following assessment of the groundwater remedy performance for Building 18 was made based on data collected through 2009:

- The Remedy is Functioning as Intended. Based on the 2009 data, the extraction system and basement dewatering system continued to function as intended. An Annual Remedy Performance Checklist is included in Appendix A.

- The Capture Zone is Adequate. Extraction well RW-25A achieved adequate capture in 2009. Graphical flow net evaluation in March and November indicated greater horizontal capture than the target capture. There is no vertical component to the capture evaluation because the extraction well, RW-25A is screened in the same hydrostratigraphic zone as the target capture (A-Zone).

- VOC Concentrations are Decreasing Over Time. VOC concentrations in groundwater appear to be stable to decreasing (Appendix D). Concentrations in extraction well RW-25A that had been slightly increasing appear to have stabilized in 2009. Because RW-25A represents captured groundwater, the increasing trend is not a concern for remedy performance.

6. CONCLUSIONS AND RECOMMENDATIONS

During 2009, the Building 18 remedy continued functioning as intended. RW-25A achieved target capture based on converging lines of evidence including graphical flow net analysis, calculated capture width and groundwater concentration trends. RW-25A operated near its target flow rate of 5.5 gpm without significant downtime.

7. UPCOMING WORK IN 2010 AND PLANNED FUTURE ACTIVITES

Planned actions during 2010 include continued operations and maintenance of RW-25A and Building 18 dewatering sump. In addition, there will be continued coordination of 644 National Avenue redevelopment throughout 2010.

The effectiveness and progress of Building 18 remedial actions during 2010 will continue to be evaluated by continuing operation, maintenance, and monitoring of RW-25A, measuring water levels, and analyzing water samples in accordance with the Site monitoring and reporting schedule. Site-specific data collected during 2010 will be summarized in the Annual Progress Report, which will be submitted to the USEPA by June 15, 2011.

8. REFERENCES

Canonie Environmental (Canonie), 1986a. Pumping Test Interim Remedial Program, Mountain View Facility, Prepared for Fairchild Semiconductor Corporation, January 1986.

Canonie, 1986b. Pumping Test for Wells 69A, 73A, 82A, 83A, 47B1, 17B2, 29B3, 58B3, Moffett Field, Prepared for Harding Lawson Associates, March 1986.

Canonie, 1987. Addendum to Technical Memorandum: Short- and Long-Term Aquifer Tests, Remedial Investigation Feasibility Study, Middlefield-Ellis-Whisman Study Area, Mountain View, California, March 1987.

Canonie, 1988 Feasibility Study, Middlefield-Ellis-Whisman Area, Mountain View, California, November 1988.

Canonie, 1994, Revised Final Source Control Remedial Design, Fairchild Semiconductor Corporation, 644 National Avenue, Building 18, Middlefield-Ellis-Whisman Site, Mountain View, California, September 22, 1994.

Canonie, 1995, Revised Construction Operation and Maintenance Plan, Fairchild Semiconductor Corporation, 644 National Avenue, Building 18, Middlefield-Ellis-Whisman Site, Mountain View, California, January 1995.

Geomatrix Consultants, Inc. (Geomatrix), 2004. Revised Report, Aquifer Test and Off-Site B2 Source Control Evaluation, 401/405 National Avenue, Mountain View, California, August 2004.

Geosyntec Consultants (Geosyntec et al), 2008. Optimization Evaluation-Fairchild Sites, Middlefield-Ellis-Whisman Site, Mountain View, California, September 3.

Geosyntec, 2010. 2009 Annual Progress Report for Middlefield-Ellis-Whisman Study Area, Regional Groundwater Remediation Program Mountain View, California, June 15, 2010.

Harding Lawson Associates (HLA), 1986. Vol. 1, Technical Memorandum, Short-and Long-Term Aquifer Tests, Middlefield-Ellis-Whisman Area, Mountain View, California, April 14, 1986.

Haley and Aldrich, 2009. Revised Supplemental Feasibility Study for Vapor Intrusion Middlefield-Ellis-Whisman Vapor Intrusion Study Area, Mountain View, California, June 29.

HLA, 1987. Remedial Investigation Report, Remedial Investigation/Feasibility Study, Middlefield-Ellis-Whisman Area, Mountain View, California, Vol. 1-8, July 1987 (revised in 1988).

Intel, 1987. Remedial Investigation/Endangerment Assessment/Feasibility Study, Intel Mountain View Facility, Mountain View, California; prepared by Geraghty & Miller, Inc., Intel Corporation, and Allen Hatheway, 1987.

Javandel I., and C.F. Tsang. 1986. Capture-zone type curves: A tool for aquifer cleanup. Ground Water 24(5) 616-625.

Locus Technologies (Locus), 1998. DW3-219 Pumping Test, Regional Groundwater Remediation Program, Middlefield-Ellis-Whisman Site, Mountain View, California, December 1998.

Navy, 2005. West-Side Aquifers Treatment System Optimization Completion Report, prepared by Tetra Tech FW, Inc., DCN No. FWSD-RAC-05-1106, Revision 0, May 17, 2005.

Northgate, 2007a. Draft Fairchild Buildings Slurry Wall System Efficiency Study Report, Middlefield-Ellis-Whisman Study Area, Mountain View, California, May 29, 2007.

Northgate, 2007b. Technical Memorandum, Preliminary Results of the Efficiency Evaluation and Request to Modify the Groundwater Monitoring Network, MEW Site, Mountain View, California, October 30, 2007.

Northgate, 2008a. Efficiency Evaluation, MEW Site, Regional Groundwater Remediation Program, Mountain View, California, April 28, 2008.

Northgate, 2008b. Fairchild Buildings Slurry Wall System Efficiency Study Report, MEW Site, Mountain View, California, April 18, 2008.

PRC, 1991. Draft Technical Memorandum, Geology and Hydrogeology, Naval Air Station Moffett Field, California, Prepared for Department of the Navy, Engineering Field Activity West, December 11, 1991.

Smith Technology Corporation (Smith), 1996. Revised Final Design, Regional Groundwater Remediation Program, South of US Highway 101, Middlefield-Ellis-Whisman Site, Mountain View, California, January 8, 1996.

United States Environmental Protection Agency (USEPA), 1989, Record of Decision, Fairchild, Intel, and Raytheon Sites, Middlefield-Ellis-Whisman Study Area, Mountain View, California, Superfund Records Center Document No. 2807-02332, May 1989.

USEPA, 1990. EPA Superfund Explanation of Significant Differences: Middlefield-Ellis-Whisman Study Area, Mountain View, CA, September 1, 1990.

USEPA, 1996. EPA Superfund Explanation of Significant Differences: Middlefield-Ellis-Whisman Study Area, Mountain View, CA, April 16, 1996.

USEPA, 2005. Required Content for Annual Progress Reports, distributed by Alana Lee to the MEW distribution list via email on May 6, 2005.

USEPA, 2008. A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems EPA/600/R-08/003 January 2008.

USEPA, 2009a. Proposed Plan for the Vapor Intrusion Pathway, Middlefield-Ellis-Whisman (MEW) Superfund Study Area Mountain View and Moffett Field, California. Region 9 San Francisco, July 2009.

USEPA, 2009b. Final Second Five-Year Review Report Middlefield-Ellis-Whisman (MEW) Superfund Study Area Mountain View, California. Region 9 San Francisco, September 2009.

Weiss Associates (Weiss), 1995. VOC Transport Report for Intel Mountain View, 365 Middlefield Road, Mountain View, California, July 6, 1995.

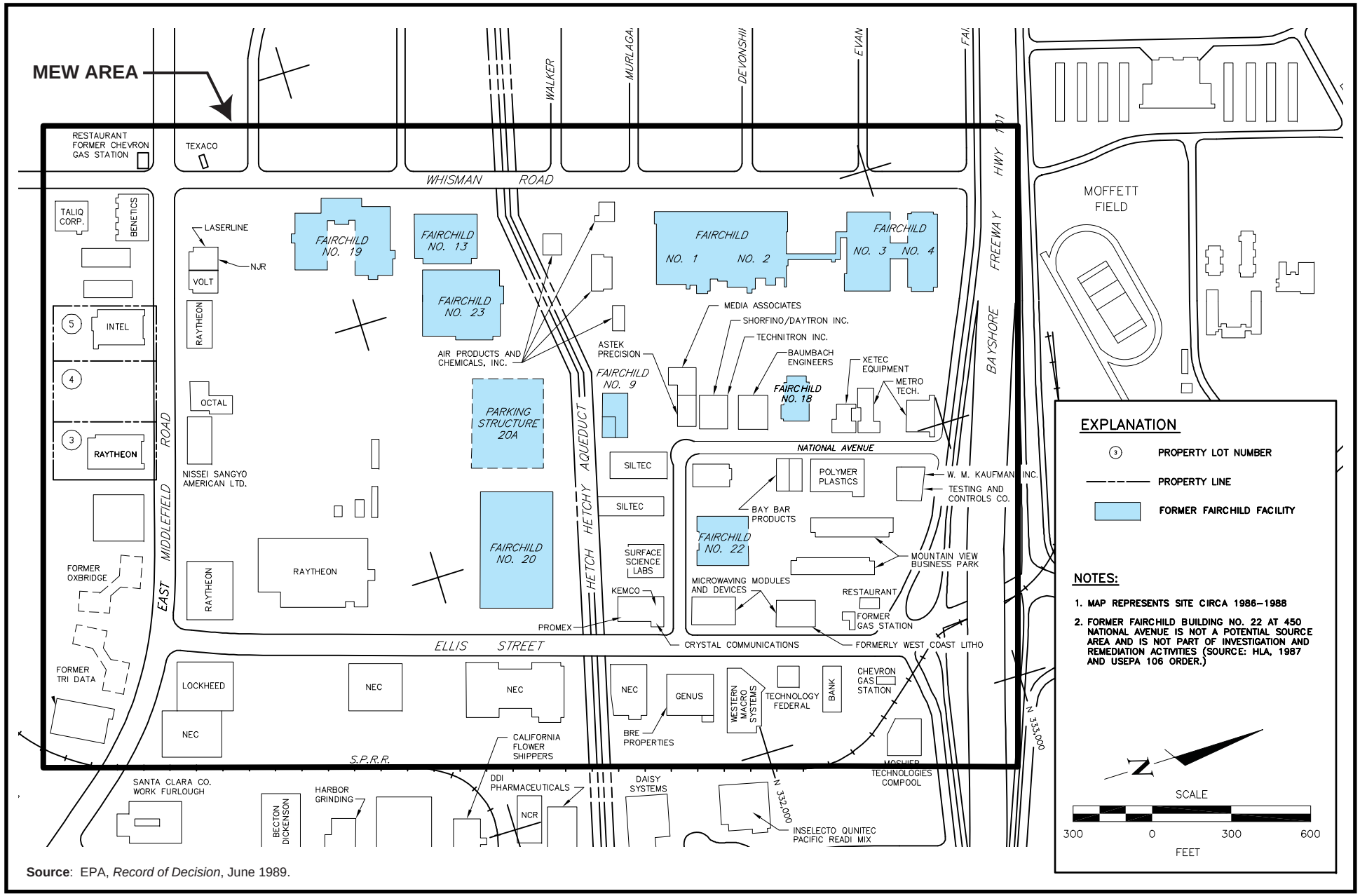
Weiss, 2005 Workplan for Enhanced *In-Situ* Bioremediation Pilot Test for Intel Mountain View, May 24, 2005.

Weiss, 2009. 2008 Annual Progress Report for Middlefield-Ellis-Whisman Study Area, Regional Groundwater Remediation Program Mountain View, California, June 15, 2009.

Weiss, 2010. 2008 Annual Progress Report for Former Fairchild Buildings 1-4, 515/545 Whisman Road and 313 Fairchild Drive, Middlefield-Ellis-Whisman Study Area, Mountain View, California, June 15, 2010.

FIGURES

Figure 1. Site Location, MEW Area, Mountain View, California



Source: EPA, *Record of Decision*, June 1989.

Figure 2. Previous Building Configurations, Former Fairchild Facilities, MEW Area, Mountain View, California

MEW Area Boundary

Fairchild System 3

Former Fairchild Buildings 1 through 4 Site

RGRP - South

36B2

80A

RW-25A

152A

54A

147A

Fairchild System 1

Former Fairchild Building 9 Site

Fairchild System 19

Former Fairchild Building 19 Site

Raytheon System

Raytheon Site

N

0 300 600 900 Feet

Explanation

Building 18 Remedy Components

- Source Recovery Well, On
- Monitoring Well

Extraction and Monitoring Wells in the Vicinity

- Regional Recovery Well
- Source Recovery Well
- Monitoring Well

- 644 National Avenue
- RGRP - South
- Groundwater Treatment Plant
- Slurry Wall
- Building
- Road
- Treatment-System Pipeline
- Treatment-System Discharge Pipeline

Figure 3

Former Fairchild Building 18
Site Map and Well Network
Mountain View, California

Weiss Associates
Environmental Science, Engineering and Management

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01-June-2010

Buildings 1 through 4 Slurry Wall

644 National Avenue
Former Fairchild
Building 18

Building 9 Slurry Wall

RW-25A ▲
(5.8)

Bayshore Fwy/Hwy 101

N. Whisman Rd

Fairchild Dr

National Ave

Explanation

A/A1 Aquifer Wells for Building 18

- Regional Recovery Well
- ▲ Source Recovery Well
- Monitoring Well

A/A1 Aquifer Wells in the Vicinity

- Regional Recovery Well
- Source Recovery Well
- Monitoring Well

- Estimated Capture zone, March 2009
- Target Capture zone
- Groundwater Elevation Index 5 ft Contour
- Groundwater Elevation Intermediate 1 ft Contour
- Slurry Wall
- Building
- Road

(2.11) = Average pumping rate in gallons per minute
(off) = Extraction well off with regulatory approval
(0.0)** = Extraction well temporarily off for efficiency evaluation

Note:
Groundwater elevation contours based on MEW Regional data presented in the 2009 Annual Report (Geosyntec 2010).
Captures are shown for wells specific to Building 18.

N

0 100 200 300 Feet

Figure 4

Former Fairchild Building 18
A/A1 Groundwater Elevation Contours,
Target Capture Area and
Estimated March 26, 2009 Capture
Mountain View, California

Weiss Associates
Environmental Science, Engineering and Management

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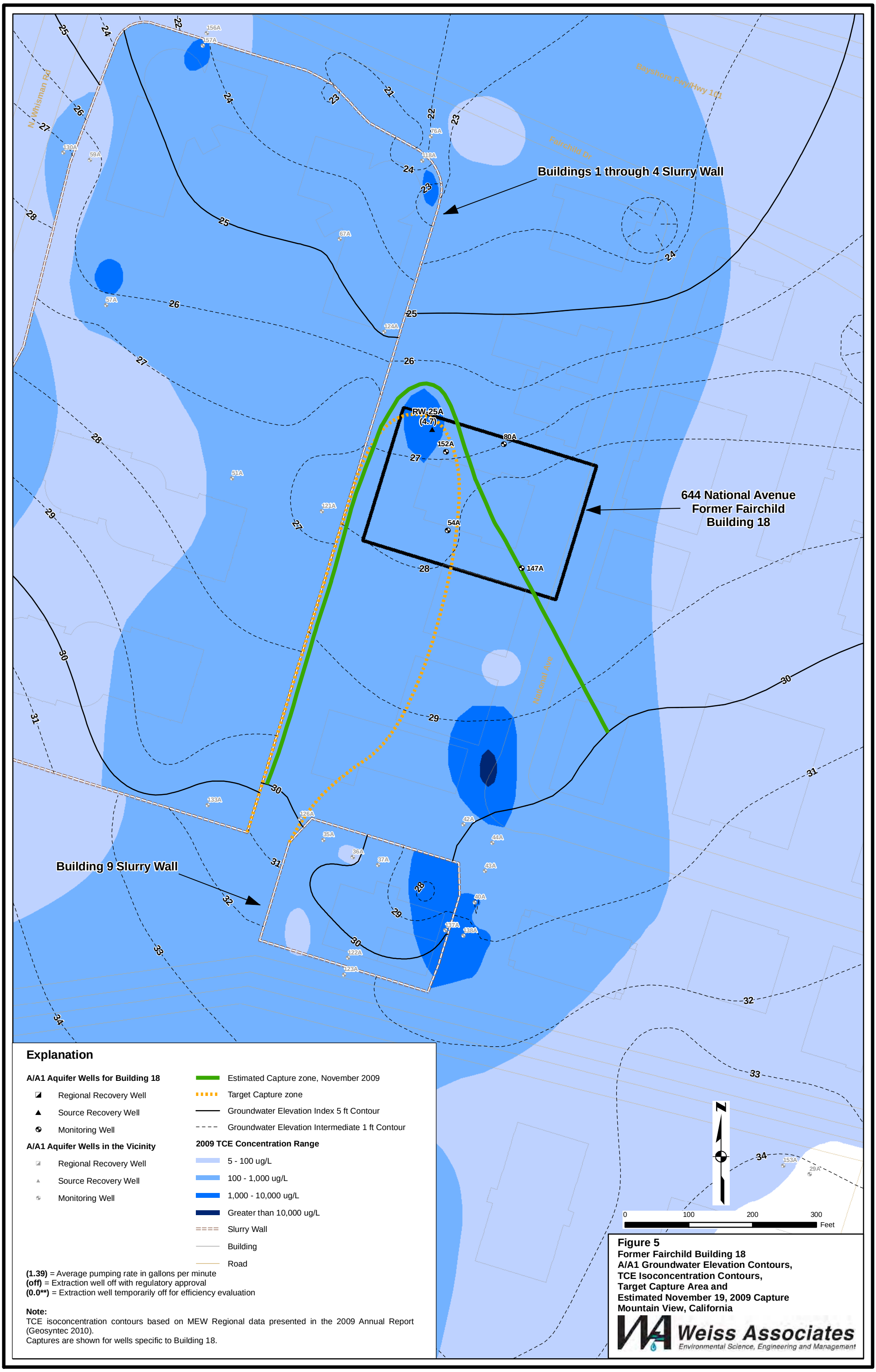
01-June-2010



Explanation

A/A1 Aquifer Wells for Building 18

- Regional Recovery Well
- Source Recovery Well
- Monitoring Well

A/A1 Aquifer Wells in the Vicinity

- Regional Recovery Well
- Source Recovery Well
- Monitoring Well

- Estimated Capture zone, November 2009
- Target Capture zone
- Groundwater Elevation Index 5 ft Contour
- Groundwater Elevation Intermediate 1 ft Contour

2009 TCE Concentration Range

- 5 - 100 ug/L
- 100 - 1,000 ug/L
- 1,000 - 10,000 ug/L
- Greater than 10,000 ug/L
- Slurry Wall
- Building
- Road

(1.39) = Average pumping rate in gallons per minute
(off) = Extraction well off with regulatory approval
(0.0)** = Extraction well temporarily off for efficiency evaluation

Note:
TCE isoconcentration contours based on MEW Regional data presented in the 2009 Annual Report (Geosyntec 2010).
Captures are shown for wells specific to Building 18.

Figure 5
Former Fairchild Building 18
A/A1 Groundwater Elevation Contours,
TCE Isoconcentration Contours,
Target Capture Area and
Estimated November 19, 2009 Capture
Mountain View, California

Weiss Associates
Environmental Science, Engineering and Management

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09-June-2010

TABLES

Table 1. Extraction and Monitoring Well Details, 644 National Avenue, Mountain View (Former Fairchild Building 18)

Well Details	Date Installed	Zone	TOC Elevation (ft amsl)	Diameter (inches)	Total Well Depth (ft btoc)	Top of Screened Interval (ft btoc)	Bottom of Screened Interval (ft btoc)	Top of Sand Pack (ft btoc)	Bottom of Sand Pack (ft btoc)	Pump Depth (midpoint) (ft)	Well Type
147A	12/12/88	A	39.13	4	30	10	30	7	31	0	Mon
152A	10/10/91	A	39.53	4	34.5	14.50	34.5	12.5	34.5	0	Mon
54A	02/02/82	A	40.17	2	40	14	40	14	40	0	Mon
80A	08/08/85	A	38.09	4	33	23	31	21	33	0	Mon
RW-25A	----	A	38.38	6	31	21	31	18	32	0	Ext
143B1	11/11/86	B1	38.88	4	70	60	70	56	76	0	Mon
36B2	08/08/85	B2	37.65	4	92.5	86	91	81.5	92.5	0	Mon

Notes and Abbreviations:

--- = date installed not available

Zone = A, B1, B2, or C water-bearing zone

ft amsl = feet above mean sea level

ft btoc = feet below top-of-casing

Well Type = extraction well (Ext), monitoring well (Mon)

Table 2. 2009 Monitoring and Reporting Schedule, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
147A			W								W, 1,o	
152A			W								W, 1,o	
54A[2]			W								W, 1,o	
80A			W								W, 1,o	
RW-25A			W								W,1,3,o	
36B2			W								W, 1,o	
143B1[4]			W								W, 1,o	
BLDG-18	Nuisance groundwater in building basement removed and treated off site at Fairchild Treatment System 1.											
Annual Progress Report						15-Jun						

Notes and Abbreviations:

W = semiannual water levels are measured

1 = Wells sampled annually for VOCs by USEPA Method 8270 for 8010 parameters.

2 = Well also sampled for Cadmium as part of the RGRP annual sampling event. These results are reported in the RGRP annual report.

3 = Well also sampled for 1,4-Dioxane as part of a treatment evaluation for Fairchild System 3.

4 = Part of the S101 RGRP sampling event, but located at the Building 18 Site. Data is discussed in the RGRP Annual Report unless pertinent to this report.

o = standard observations, including field analysis for pH, temperature, and conductivity.

pH = power of hydrogen ion

RGRP = Regional Groundwater Remediation Program

USEPA = United States Environmental Protection Agency

VOCs = volatile organic compounds

Table 3. Monthly Average Flow Rates (gallons per minute), January through December 2009, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Well ID	January	February	March	April	May	June	July	August	September	October	November	December
Bldg. 18[1]	30.41	32.95	36.17	32.17	29.75	29.19	27.96	25.22	28.67	26.50	26.85	27.40
RW-25A	5.16	5.56	5.53	5.65	5.57	5.26	6.02	5.18	5.43	5.14	5.07	4.85
Total	35.57	38.51	41.70	37.82	35.32	34.45	33.98	30.40	34.10	31.63	31.92	32.25

Notes and Abbreviations:

Bldg. 18 = Building 18 basement dewatering sump system.

1 = Water extracted at Building 18 is plumbed to Treatment System 1. However, during carbon changes or other extended shut downs at System 1 water is pumped to South of 101 Treatment System.

The 2009 annual calculated average flow rate for Bldg 18 was 29.4 gpm and for RW-25A was 5.4 gpm.

gpm = gallons per minute

Table 4. Monthly Extraction Totals (gallons), January through December 2009, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

	January	February	March	April	May	June	July	August	September	October	November	December
Bldg 18 - pumped to System 1	1,169,263	1,328,559	1,756,408	1,297,157	1,195,124	1,429,247	1,115,578	1,180,438	1,155,818	1,024,310	1,353,281	1,106,677
Bldg 18 - pumped to S101	56,859	---	66,661	---	47,042	---	51,992	54,427	---	44,020	---	37,351
Bldg 18 (total) [1]	1,226,122	1,328,559	1,823,069	1,297,157	1,242,166	1,429,247	1,167,570	1,234,865	1,155,818	1,068,330	1,353,281	1,144,028
RW-25A	207,936	224,075	278,613	227,652	232,708	257,562	251,344	253,608	218,934	207,181	255,397	202,723
Total	1,434,058	1,552,634	2,101,682	1,524,809	1,474,874	1,686,809	1,418,914	1,488,473	1,374,752	1,275,511	1,608,678	1,346,751

Notes and Abbreviations:

Bldg. 18 = Building 18 basement dewatering sump system.

S101 = Treatment System South of Highway 101, located at 644 National Avenue, Mountain View, California

1 = Water extracted at Building 18 is plumbed to Treatment System 1. However, during carbon changes or other extended shut downs at System 1 water is pumped to South of 101 Treatment System.

--- = No water pumped to S101 from Building 18

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Table 5. Groundwater Sampling Results Summary, January 2005 through December 2009, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloro-form	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOC's	1,4-Dioxane
			< micrograms per liter (µg/L) >													
54A	11/18/05	CT/8260	<13	**11**	<6.3	**13**	**200**	<6.3	**14**	<250	<6.3	<6.3	**1,400**	<6.3	**1,638**	---
54A	11/13/06	CT/8260	<20	**12**	<10	**16**	**230**	<10	**14**	<400	<10	<10	**1,400**	<10	**1,672**	---
54A	11/14/07	CT/8260	<10	**8.5**	<5.0	**13**	**470**	**9.4**	**7.8**	<200	<5.0	<5.0	**1,000**	<5.0	**1,509**	---
54A	11/15/08	CT/8260	<13	**8.2**	<6.3	**7.4**	**210**	**13**	**8.5**	<250	<6.3	<6.3	**830**	<6.3	**1,077**	---
54A	11/16/09	CT/8260	<2.0	**11**	<1.0	**9.4**	**210**	**13**	**9.7**	<40	<1.0	**4.5**	**730**	<1.0	**988**	---
80A	11/18/05	CT/8260	<6.3	<3.1	<3.1	<3.1	**110**	<3.1	<3.1	<130	<3.1	<3.1	**290**	<3.1	**400**	---
80A	11/20/06	CT/8260	<2.5	**2.6**	<1.3	**4.3**	**160**	**1.3**	**3.5**	<50	**1.3**	**1.4**	**310**	<1.3	**484**	---
80A	11/09/07	CT/8260	<4.0	**2.7**	<2.0	**3.3**	**130**	**2.4**	**2.3**	<80	<2.0	<2.0	**260**	<2.0	**401**	---
80A	11/11/08	CT/8260	<1.0	**2.1**	<0.5	**3.5**	**84**	**1.3**	**2.7**	<20	**1**	**1.7**	**230**	<0.5	**326**	---
80A	11/04/09	CT/8260	<4.0	**2.2**	<2.0	**2.8**	**96**	<2.0	<8.0	<80	<2.0	<2.0	**240**	<2.0	**341**	---
147A	11/16/05	CT/8260	<1.7	<0.8	<0.8	<0.8	**8.3**	<0.8	**1**	<33	<0.8	**1.3**	**150**	<0.8	**161**	---
147A	11/20/06	CT/8260	<2.0	<1.0	<1.0	<1.0	**10**	<1.0	**1**	<40	<1.0	**1**	**140**	<1.0	**152**	---
147A	11/09/07	CT/8260	<2.0	<1.0	<1.0	<1.0	**10**	<1.0	<1.0	<40	<1.0	<1.0	**120**	<1.0	**130**	---
147A	11/11/08	CT/8260	<1.0	**0.6**	<0.5	**0.6**	**13**	<0.5	**1.1**	<20	**0.7**	**1.2**	**130**	<0.5	**147**	---
147A	11/03/09	CT/8260	<1.0	**0.6**	<0.5	**0.5**	**14**	<0.5	<2.0	<20	**0.7**	**1.2**	**120**	<0.5	**137**	---
152A	11/18/05	CT/8260	<20	<10	<10	<10	**1,500**	**13**	<10	<400	<10	<10	**850**	**30**	**2,393**	---
152A	11/20/06	CT/8260	<40	<20	<20	<20	**2,700**	<20	<20	<800	<20	<20	**1,100**	**160**	**3,960**	---
152A	11/09/07	CT/8260	<40	<20	<20	**20**	**2,700**	**28**	<20	<800	<20	<20	**1,000**	**120**	**3,868**	---
152A	11/11/08	CT/8260	<1.0	**3.5**	<0.5	**8.5**	**780**	**7.1**	**2.9**	<20	<0.5	**1.4**	**430**	**70**	**1,303**	---
152A	11/05/09	CT/8260	<14	<7.1	<7.1	<7.1	**910**	**14**	<29	<290	<7.1	<7.1	**420**	**67**	**1,411**	---
BLDG-18	11/24/08	CT/8260	<7.1	<3.6	<3.6	<3.6	**300**	**12**	<3.6	<140	<3.6	<3.6	**510**	**4.8**	**827**	---
RW-25A	11/18/05	CT/8260	<25	<13	<13	<13	**920**	<13	**19**	<500	<13	<13	**1,300**	**32**	**2,271**	---
RW-25A	11/21/06	CT/8260	<40	<10	<10	**17**	**1,400**	**20**	**72**	<400	<10	<10	**1,700**	**37**	**3,246**	---
RW-25A	11/16/07	CT/8260	<33	<17	<17	**24**	**2,600**	**29**	**42**	<670	<17	<17	**2,200**	**91**	**4,986**	---
RW-25A	11/07/08	CT/8260	<25	<13	<13	**20**	**2,100**	**25**	**39**	<500	<13	<13	**2,100**	**55**	**4,339**	---
RW-25A (DUP)	11/07/08	CT/8260	<40	<20	<20	**21**	**2,100**	**24**	**44**	<800	<20	<20	**2,100**	**55**	**4,344**	---
RW-25A	11/05/09	CT/8260	<33	<17	<17	**18**	**2,200**	**27**	<67	<670	<17	<17	**1,900**	**46**	**4,191**	---
RW-25A (DUP)	11/05/09	CT/8260	<1.0	**13**	<0.5	**24**	**2,100**	**32**	**31**	<20	**1.7**	**6.7**	**1,800**	**62**	**4,075**	---
RW-25A	11/05/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	**3.5**

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Table 5. Groundwater Sampling Results Summary, January 2005 through December 2009, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloro-form	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOC's	1,4-Dioxane
			< micrograms per liter (µg/L) >													
RW-25A (DUP)	11/05/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	**3**
36B2	11/18/05	CT/8260	<25	<13	<13	<13	**230**	<13	**190**	<500	<13	<13	**4,400**	<13	**4,820**	---
36B2	11/13/06	CT/8260	<100	<50	<50	<50	**230**	<50	**370**	<2000	<50	<50	**11,000**	<50	**11,600**	---
36B2	11/12/07	CT/8260	<100	<50	<50	<50	**240**	<50	**390**	<2000	<50	<50	**12,000**	<50	**12,630**	---
36B2	11/15/08	CT/8260	<71	<36	<36	<36	**180**	<36	**120**	<1400	<36	<36	**6,000**	<36	**6,300**	---
36B2	11/17/09	CT/8260	<8.3	<4.2	<4.2	**4.8**	**190**	**5.9**	**210**	<170	<4.2	<4.2	**9,800**	<4.2	**10,211**	---

Notes and Abbreviations:
--- = sample not analyazed for particular analyte
< # = analyte not detected above the reported detection limit of "#" µg/L
8260 = USEPA Method 8260B for halogenated VOCs, for USEPA Method 8010 list of analytes
8270 = USEPA Method 8270C-SIM for SVOCs
CT = Curtis and Tompkins, Berkeley, California
DCA = Dichloroethane
DCE = Dichloroethene
DUP = duplicate sample
ND = no analytes detected above the laboratory detection limit
PCE = Tetrachloroethene
TCA = Trichloroethane
TCE = Trichloroethene
VOCs = volatile organic compounds
Well 36B2 is a MEW RGRP well; not facility-specific.

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Table 6. Capture Zone Calculations and Analysis, March 2009, Former Fairchild Building 18, Mountain View, California

Extraction Well:		**RW-25A**
b		18
i		0.004
K		141.120
T		2470
w		80
estimated well loss (ft):	$s_w = CQ^2$	0.006
Average extraction rate (gpm):	Mar-09	5.53
flow budget (gpm):	Q = K x (b x w) x i x factor	6.16
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-17.16
capture zone width (at extraction well; ft)	$Y_{well} = \pm Q / 4Ti$	26.94
capture zone width (maximum; ft):	$Y_{max} = \pm Q / 2Ti$	53.89

LINE OF EVIDENCE	CAPTURE?	COMMENTS
Water Levels *potentiometric surface maps*	*Adequate.*	*Potentiometric surface maps indicate horizontal capture of the target capture area.*
Calculations *flow budgets* *capture zone widths*	*Adequate.*	*The weekly average pumping rate is slightly less than the calculated flow budget for the former source area. The calculated capture zone width and stagnation point is smaller than what is interpreted from flow net analysis (potentiometric surface maps).*
Site Concentration Trends *downgradient monitoring wells*	*Adequate.*	*Concentrations in the Site wells are stable (Appendix D).*

Notes and Abbreviations:

b = aquifer or saturated thickness (ft)

C = turbulent well loss coefficient from Walton, 1962 (sec^2/ft^5); the following are coefficients and their corresponding well condition:

5 = properly designed and developed, 5 to 10 = mild deterioration, 10 to 40 = severe deterioration (40 used in the calculation)

factor = accounts for other contributions to the extraction well (a factor of 1.5 was used in the calculation)

i = regional hydraulic gradient (ft/ft)

K = hydraulic conductivity (ft/day)

Q = extraction flow rate (gallons per minute; gpm)

s_w = drawdown due to well loss

T = transmissivity (ft^2/day)

w = plume width (ft) (the width of the former source area, 80 ft, is used in the calculation)

X_0 = stagnation point (ft)

Y_{max} = maximum capture zone width (ft)

Y_{well} = capture zone width in-line w/ extraction well (ft)

Assumptions:

- homogeneous, isotropic, confined aquifer of infinite extent
- uniform regional horizontal hydraulic gradient
- no net recharge (or net recharge is accounted for in regional hydraulic gradient)
- no other sources of water introduced into aquifer due to extraction
- uniform aquifer thickness
- fully penetrating extraction well
- steady-state flow
- negligible vertical gradient

Table 7. Capture Zone Calculations and Analysis, November 2009, Former Fairchild Building 18, Mountain View, California

Extraction Well:		RW-25A
b		18
i		0.004
K		141.120
T		2470
w		80
estimated well loss (ft):	$s_w = CQ^2$	0.006
Average extraction rate (gpm):	Nov-09	5.07
flow budget (gpm):	Q = K x (b x w) x i x factor	6.16
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-15.73
capture zone width (at extraction	$Y_{well} = \pm Q / 4Ti$	24.70
capture zone width (maximum; ft)	$Y_{max} = \pm Q / 2Ti$	49.40

LINE OF EVIDENCE	CAPTURE?	COMMENTS
Water Levels *Potentiometric Surface Maps*	*Adequate*	*Potentiometric surface maps indicate horizontal capture of the target capture area.*
Calculations *Flow Budgets* *Capture Zone Widths*	*Adequate*	*The average pumping rate is slightly less than the calculated flow budget for the former source area. The calculated capture zone width and stagnation point is smaller than what is interpreted from flow net analysis (potentiometric surface maps).*
Site Concentration Trends	*Adequate*	*Concentrations in the Site wells are stable (Appendix D).*

Notes and Abbreviations:

b = aquifer or saturated thickness (ft)
C = turbulent well loss coefficient from Walton, 1962 (sec^2/ft^5); the following are coefficients and their corresponding well condition:
factor = accounts for other contributions to the extraction well (a factor of 1.5 was used in the calculation)
ft = feet
gpm = gallons per minute
i = regional hydraulic gradient (ft/ft)
K = hydraulic conductivity (ft/day)
Q = extraction flow rate (gallons per minute; gpm)
s_w = drawdown due to well loss
T = transmissivity (ft^2/day)
w = plume width (ft) (the width of the former source area, 80 ft, is used in the calculation)
X_0 = stagnation point (ft)
Y_{max} = maximum capture zone width (ft)
Y_{well} = capture zone width in-line w/ extraction well (ft)
5 = properly designed and developed, 5 to 10 = mild deterioration, 10 to 40 = severe deterioration (40 used in the calculation)

Assumptions:

- homogeneous, isotropic, confined aquifer of infinite extent
- uniform regional horizontal hydraulic gradient
- no net recharge (or net recharge is accounted for in regional hydraulic gradient)
- no other sources of water introduced into aquifer due to extraction
- uniform aquifer thickness
- fully penetrating extraction well
- steady-state flow
- negligible vertical gradient

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APPENDIX A

2009 ANNUAL REPORT REMEDY PERFORMANCE CHECKLIST

2009 Annual Report Remedy Performance Checklist

I. GENERAL SITE INFORMATION

Facility Name: **Former Fairchild Facilities, Middlefield-Ellis-Whisman Study Area (MEW Site)**

Facility Address, City, State: **515/545 North Whisman Road and 313 Fairchild Drive (former Bldgs. 1-4)**
369 and 441 North Whisman Road (former Bldgs. 13 and 19 and 23)
401 National Avenue (former Bldg. 9)
644 National Avenue (former Bldg. 18)
464 Ellis Street (former Bldg. 20 and 20A)

Checklist completion date: **June 15, 2010**

EPA Site ID: **System-1: CAR000164285**
System-3: CAD095989778
System-19: CAR000164228

Site Lead: ☐ Fund ■ PRP ☐ State ☐ State Enforcement ☐ Federal Facility ☐ Other: EPA Region IX

Site Remedy Components (Include Other Reference Documents for More Information, as appropriate):

1. **Three slurry wall enclosures around former Buildings 1-4, Building 9, and Building 19. The slurry walls extend to a depth of about 40 feet below ground surface and are keyed a minimum of two feet into the A2/B1 aquitard.**
2. **Three treatment systems as detailed below:**

System 1:

- **Three 5,000-pound GAC vessels in series, treatment pad, controls, double-contained groundwater conveyance piping, vaults, electrical distribution, controls and other appurtenances.**
- **Thirteen source control recovery wells (Four wells operated during 2009).**
- **One regional recovery wells (One well operated during 2009).**

System 3:

- **Three 5,000-pound GAC vessels in series, treatment pad, controls, double-contained groundwater conveyance piping, vaults, electrical distribution, controls and other appurtenances.**
- **Seven source control recovery wells (Five wells operated during 2009).**
- **Three regional recovery wells (Two wells operated during 2009).**

System 19:

- **Three 5,000-pound GAC vessels in series, treatment pad, controls, double-contained groundwater conveyance piping, vaults, electrical distribution, controls and other appurtenances.**
- **Fifteen source control recovery wells (Ten operated during 2009).**
- **Seven regional recovery wells (Two operated during 2009).**

II. CONTACTS

List important personnel associated with the Site: Name, title, phone number, e-mail address:

	Name/Title	Phone	E-mail
RP/Facility Representative	**Du'Bois (Joe) Ferguson Schlumberger Technology Corporation**	**281-285-3692**	dferguson3@sugar-land.oilfield.slb.com
RP Consultant	**John Gallinatti Geosyntec Consultants**	**510-285-2750**	jgallinatti@geosyntec.com
RP Consultant	**Tess Byler Weiss Associates**	**650-968-7000**	tb@weiss.com

2009 Annual Report Remedy Performance Checklist

III. O&M COSTS (OPTIONAL)

What is your annual O&M cost total for the reporting year?_____
Breakout your annual O&M cost total into the following categories (use either dollars or %):

- Analytical (e.g., lab costs): _____
- Labor (e.g., site maintenance, sampling): _____
- Materials (e.g., treatment chemicals): _____
- Oversight (e.g., project management): _____
- Utilities (e.g., electric, gas, phone, water): _____
- Reporting (e.g., NPDES, progress): _____
- Other (e.g., capital improvements): _____

Describe unanticipated/unusually high or low O&M costs (go to section [fill in] to recommend optimization methods):

IV. ON-SITE DOCUMENTS AND RECORDS (Check all that apply)

■ O&M Manual ■ O&M Maintenance Logs ☐ O&M As-built drawings ■ O&M reports
■ Daily access/Security logs
■ Site-Specific Health & Safety Plan ■ Contingency/Emergency Response Plan
■ O&M/OSHA Training Records ■ Settlement Monument Records
☐ Gas Generation Records ■ Groundwater monitoring records ☐ Leachate extraction records
■ Discharge Compliance Records
☐Air discharge permit ■ Effluent discharge permit ■ Waste disposal, POTW Permit

Are these documents currently readily available? ■ Yes ☐ No If no, where are records kept?

Documents and records are available at treatment systems and/or on-site office located at 350 E. Middlefield Road Mountain View, CA.

V. INSTITUTIONAL CONTROLS (as applicable)

List institutional controls called for (and from what enforcement document):

Signs and other security measures are in place at extraction and treatment points.

Status of their implementation:

Posted signage (Health & Safety and emergency contact information). Bay Alarm Security System at the site.

Where are the ICs documented and/or reported?

ICs are being properly implemented and enforced? ☐ Yes ☐ No, elaborate below
ICs are adequate for site protection? ☐ Yes ☐ No, elaborate below

Additional remarks regarding ICs:

2009 Annual Report Remedy Performance Checklist

VI. SIGNIFICANT SITE EVENTS
Check all Significant Site events Since the Last Checklist that Affects or May Affect Remedy Performance

☐ Community Issues
☐ Vandalism
☐ Maintenance Issues
■Other:

Please elaborate on Significant Site Events:

Second Five-Year Remedy Review by USPEA September 2009.
Proposed Plan July 2, 2009 and Public Meeting July 23, 2009 on Vapor Intrusion.

VII. REDEVELOPMENT

Is redevelopment on property planned? ■ Yes ☐ No

If yes, what is planned? Please describe below.

Is redevelopment plan complete Yes, date:_____; ■ No ? ☐ Not Applicable

Redevelopment proposal in progress? ■ Yes, elaborate below
☐ No; If no, is a proposal anticipated? ☐ Yes ☐ No

☐ Is the redevelopment proposal compatible with remedy performance? ■ Yes ☐ No

Elaborate on redevelopment proposal and how it affects remedy performance:

Planned and ongoing redevelopment in the residential area over the western edge of the MEW A/A1 and B1/A2 zone plume. Planned redevelopment of apartments on Whisman Road; ongoing redevelopment of residential area on Fairchild Drive, west of Whisman Road.

Building 18, the 644 National Avenue property has been bought by Carr America National Avenue LLC; redevelopment plans include new buildings and a parking structure.

The existing treatment systems and their components (conveyance piping, extraction wells, and monitoring wells) will be maintained or modified as appropriate to accommodate redevelopment.

2009 Annual Report Remedy Performance Checklist

VIII. GROUNDWATER REMEDY (reference isoconcentration, capture zone maps, trend analysis, and other documentation to support analysis)

Groundwater Quality Data

List the types of data that are available:	What is the source report?
Potentiometric surface maps, hydrographs	**2009 Annual Fairchild Building Reports (Weiss, 2010)**
Capture zone maps, isoconcentration maps	**2009 Annual Regional Report (Geosyntec, 2010)**

■ Contaminant trend(s) tracked during O&M (i.e., temporal analysis of groundwater contaminant trends).
■ Groundwater data tracked with software for temporal analyses.
☐ Reviewed MNA parameters to ensure health of substrate (e.g., DO, pH, temperature), if appropriate?

Groundwater Pump & Treat Extraction Well and Treatment System Data

List the types of data that are available:	What is the source report?
O&M logs	**NPDES Self-Monitoring Reports**
System Influent & Effluent water samples	**2009 Annual Fairchild Building Reports**
VOC mass and groundwater removal graphs, VOC concentration trends	

■ The system is functioning adequately.
☐ The system has been shut down for significant periods of time in the past year. Please elaborate below.

Discharge Data

List the types of data that are available:	What is the source report?
System performance data such as average flow rates, totalized flow, influent/effluent chemical data, GAC removal efficiencies	**NPDES Self-Monitoring Reports**

■ The system is in compliance with discharge permits.

Slurry Wall Data

List the types of data that are available:	What is the source report?
Water level elevations in select well pairs	**2009 Annual Reports**
Analysis of inward and upward hydraulic gradients	

Is slurry wall operating as designed? ■ Yes ☐ No

If not, what is being done to correct the situation?

The slurry walls are operating as designed and are effective at impeding flow and preventing VOCs inside the wall from migrating downgradient. However, the ROD specifies that the slurry walls, "maintain inward and upward gradients." Historically, this has not been observed in all well pairs, even under maximum historical pumping scenarios. Since 2007, pumping ceased in the lower concentration/higher pumping rate extraction wells within the slurry walls. Gradients have generally maintained trends consistent with those prior to reduced groundwater extraction rates, although in some cases the magnitude of the gradient has changed.

The chemical concentration data and potentiometric surface contours from 2009 continue to demonstrate that the slurry walls are an effective means of impeding VOC migration outside of the slurry walls.

Elaborate on technical data and/or other comments

2009 Annual Report Remedy Performance Checklist

IX. AIR MONITORING/VAPOR INTRUSION PATHWAY EVALUATION (Include in Annual Progress Report and reference document)

Walk-throughs/Surveys: Yes

In the Fall of 2009, indoor air samples were collected at ten commercial buildings in the MEW area pursuant to requests from the owners of the buildings. Samples were collected at the following buildings located at the Former Fairchild Buildings:

- **515 N. Whisman Road; and,**
- **545 N. Whisman Road.**

Reference Documents:
Haley and Aldrich, 2010. ***Air Sampling Activities Conducted Fall 2009 at the Middlefield-Ellis-Whisman Vapor Intrusion Study Area, Mountain View, California, March 19.***

Haley and Aldrich 2009. ***Revised Supplemental Feasibility Study for Vapor Intrusion Middlefield-Ellis-Whisman Vapor Intrusion Study Area, Mountain View, California*** **June 29.**

Summary of Results: **The sampling results indicated no short-term or long-term potential health risk concerns from the vapor intrusion pathway under current conditions (Haley and Aldrich 2010).**

Problems Encountered: **None**

Recommendations/Next Steps: **None**

Schedule: **All work is coordinated with the USEPA.**

X. REMEDY PERFORMANCE ASSESSMENT

A. Groundwater Remedies

What are the remedial goals for groundwater? ■ Plume containment (prevent plume migration); ■ Plume restoration (attain ROD-specific cleanup levels in aquifer); ☐ Other goals, please explain:

The groundwater remedy is hydraulic remediation by extraction and treatment. The Treatment System is reliable and consistent in its operation and mass removal ability, with greater than 95% up-time. The capture zones from the extraction wells provide sufficient overlap to achieve hydraulic control over the plume based on flow net evaluation and converging lines of evidence, including stable lateral extent of TCE exceeding 5 µg/L. Remediation is also demonstrated because concentrations within the TCE plume have continued to decrease in all zones. Groundwater with TCE concentrations exceeding 5 µg/L does not discharge to surface water.

Have you done a trend analysis? ■ Yes ☐ No; If Yes, what does it show?

(Is it inconclusive due to inadequate data? Are the concentrations increasing or decreasing?) Explain and provide source document reference

Concentrations within the core of the TCE plume have continued to decrease in all zones, while the lateral extent of TCE exceeding 5 µg/L has been stable. See Annual Reports for trends in monitoring wells (Weiss 2010).

While the lateral extent of TCE concentrations exceeding 5 µg/L has not grown since 1992 and concentrations within TCE plume have generally decreased by an order of magnitude or more, the perimeter extent of TCE concentrations has largely stabilized. Optimization of the remedy may therefore be warranted (Geosyntec et al, 2008).

If plume containment is a remedial goal, check all that apply:

2009 Annual Report Remedy Performance Checklist

■ Plume migration is under control (explain basis below)
☐ Plume migration is not under control (explain basis below)
☐ Insufficient data to determine plume stability (explain below)
(Include attachments that substantiate your answers, e.g., reference plume, trend analysis, and capture zone maps in source document)

Elaborate on basis for determining that plume containment goal is being met or not being met**:**

Plume containment goal is met, slurry walls provide physical containment of sources on 369 N. Whisman Road, 401 National Avenue, 515/545 N. Whisman Road and 313 Fairchild Drive.

Groundwater elevation and chemical monitoring results from 2009 demonstrate that the Fairchild extraction wells continue to achieve adequate horizontal and vertical capture based on converging lines of evidence, including graphical flow net analysis and chemical concentration trends. VOC concentrations in groundwater continue to remain well below historical maximums, and generally show long-term decreasing trends.

If plume restoration is a cleanup objective, check all that apply:
■ Progress is being made toward reaching cleanup levels (explain basis below)
☐ Progress is not being made toward reaching cleanup levels (explain basis below)
☐ Insufficient data to determine progress toward restoration goal (explain below)

Elaborate on basis for determining progress or lack of progress toward restoration goal:

The objective is to remediate and control the plume. The groundwater extraction, treatment, and containment systems are functioning as intended and meet the Remedial Action Objectives for the Site. While concentrations within TCE plume have generally decreased by an order of magnitude or more, treatment system influent concentrations have declined and the perimeter extent of TCE concentrations has largely stabilized. Optimization of the remedy may therefore be warranted.

B. Vertical Migration

Have you done an assessment of vertical gradients? ■ Yes ☐ No; If Yes, what does it show? (Is it inconclusive due to inadequate data?

Are the concentrations increasing or decreasing? Explain and provide source document reference

In general, vertical gradients across the B and deeper water-bearing zones are upward. Upward vertical gradients are typical from the B- to A-zone, but downward vertical gradients are observed at a few locations.

Source document reference: 2009 Annual Fairchild Building Reports (Weiss, 2010)

2009 Annual Regional Report (Geosyntec, 2010)

C. Source Control Remedies

What are the remedial goals for source control?

Capture of former source areas is the goal for source control. Cleanup standards are Maximum Contaminant Level (MCLs) in upper groundwater zones; the TCE MCL is 5 µg/L.

Elaborate on basis for determining progress or lack of progress toward these goals:

Capture zone analysis in the 2009 Annual Progress Report indicate plume containment of target capture areas.

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XI. PROJECTIONS

Administrative Issues
Dates of next monitoring and sampling events for next annual reporting period: Nov/Dec 2009

A. Groundwater Remedies - Projections for the upcoming year and long-term (Check all that apply)

Remedy Projections for **the upcoming year (2009)**

☐ No significant changes projected.
☐ Groundwater remedy will be converted to monitored natural attenuation. Target date:
☐ Groundwater Pump & Treat will be shut down. Target date:
☐ Groundwater cleanup standards to be modified. Target date:
☐PRP will request remedy modification. Target date of request:
☐ Change in the number of monitoring wells. ☐ Increasing or ☐ decreasing? Target date:
☐ Change in the number and/or types of analytes being analyzed. ☐ Increasing or ☐ decreasing? Target date:
☐ Change in groundwater extraction system. Expansion or **minimization** (i.e., number of extraction wells and/or pumping rate)? Target date:
☐ Modification on groundwater treatment? Elaborate below. Target date:
☐ Change in discharge location. Target date:
■Other modification(s) anticipated: **Optimization** Elaborate below. Target date: **2010**

During First Quarter 2010, several extraction wells were tested and new pumps were installed to support optimization of the groundwater pumping regime at Fairchild Treatment Systems 1, 3, and 19 under the jurisdiction of USEPA Region 9. Optimization of extraction rates began during the week of March 29, and extraction rates will continue to be optimized during the Second Quarter of 2010. Optimization activities will be documented in the 2010 Annual Progress Reports to USEPA for the former Fairchild Buildings 1-4, and 19.

Elaborate on Remedy Projections:

The RPs for the Former Fairchild Facilities anticipate implementing remediation optimization strategies, pending receipt of and response to EPA comments on the September 3, 2008 Optimization Evaluation Report.

Remedy Projections for **the long-term** (Check all that apply)

☐ No significant changes projected.
☐ Groundwater remedy will be converted to monitored natural attenuation. Target date:
☐ Groundwater Pump & Treat will be shut down. Target date:
☐ Groundwater cleanup standards to be modified. Target date:
☐ PRP will request remedy modification. Target date of request:
☐ Change in the number of monitoring wells. ☐ Increasing or ☐ decreasing? Target date:
☐Change in the number and/or types of analytes being analyzed. ☐ Increasing or ☐ decreasing? Target date:
☐ Change in groundwater extraction system. ☐ Expansion or ☐ minimization (i.e., number of extraction wells and/or pumping rate)? Target date:
☐ Modification on groundwater treatment? Elaborate below. Target date:
☐ Change in discharge location. Target date:
■ Other modification(s) anticipated: **Groundwater Feasibility Study** Elaborate below. Target date: **TBD**

Elaborate on Remedy Projections:

Minor changes to the EPA's January 15, 2009 Draft Process Framework for a site-wide Groundwater Feasibility Study were proposed January 30, 2009. The PRPs are prepared to implement the modified Framework as soon as the Draft Framework is finalized by EPA .

2009 Annual Report Remedy Performance Checklist

B. Projections – Slurry Walls (Check all that apply)

Remedy Projections for **the upcoming year**
☐No significant changes projected.
☐ PRP will request remedy modification. Target date of request:

☐Change in the number of monitoring wells. ☐ Increasing or ☐ decreasing? Target date:
■ Other modification(s) anticipated: **Optimization** Elaborate below. Target date: **TBD**

Elaborate on Remedy Projections:

The slurry walls are part of the groundwater remedy. The recommendations of the Optimization Evaluation Report will be implemented upon receipt of, and response to, comments from EPA. In the interim, the system continued to operate per the August 2007 groundwater extraction scheme.

Remedy Projections for **the long-term**
☐ No significant changes projected.
☐ PRP will request remedy modification. Target date of request:
☐ Change in the number of monitoring wells. ☐ Increasing or ☐ decreasing? Target date:
☐ Other modification(s) anticipated: **Groundwater Feasibility Study** Elaborate below. Target date: TBD

Elaborate on Remedy Projections:

See above. The slurry walls are part of the groundwater remedy.

C. Projections – Other Remedial Options Being Reviewed to Enhance Cleanup

Progress implementing recommendations from last report or Five-Year Review
Has optimization study been implemented or scheduled? ■ Yes; ☐ No; If Yes, please elaborate.

An Optimization Evaluation Report was submitted September 2008.

2009 Annual Report Remedy Performance Checklist

XII. ADMINISTRATIVE ISSUES
Check all that apply:

☐ Explanation of Significant Differences in progress ■ ROD Amendment in progress
☐ Site in operational and functional ("shake down") period;
☐ Notice of Intent to Delete in progress ☐ Partial site deletion in progress ☐ TI Waivers
☐ Other administrative issues:

Proposed Plan to address vapor intrusion pathway issued in 2009, with ROD amendment to follow.

Date of Next EPA Five-Year Review: **September 30, 2009**

XII. RECOMMENDATIONS

- **Initiate Second Five-Year Review Follow-up items for Fairchild.**
- **Implement optimization strategies for Fairchild systems.**
- **Follow revised groundwater feasibility study framework.**
- **Potentially responsible parties (PRPs) requested in the 2008 Annual Progress Report for Former Fairchild Building 20 that USEPA not require further facility-specific reporting for Building 20 beginning in 2009. However, this request has not yet been acknowledged by the USEPA. The PRPs are requesting again to discontinue additional facility-specific reporting for Former Fairchild Building 20. The rationale for this request is:**
    1. **No potential source areas were identified at former Fairchild Building 20 property during Site investigations.**
    2. **Analytical results for the monitoring wells sampled in 2008 continue to indicate that VOC concentrations in groundwater are generally stable to declining. This is also reported in the Regional Annual report.**
    3. **Building 20 does not have an associated groundwater treatment system.**
    4. **There is no facility-specific capture to evaluate.**

  In summary, the groundwater monitoring data are evaluated in the Regional report, and the Building 20 report is redundant with other reports at the MEW Site since all information is covered under Raytheon Facility Specific and Regional reporting.

Weiss Associates

APPENDIX B

ANALYTIC REPORTS AND CHAIN-OF-CUSTODY DOCUMENTS, JANUARY THROUGH DECEMBER 2009

(THIS APPENDIX IS BEING SUBMITTED ON CD TO THE USEPA ONLY AND IS AVAILABLE UPON REQUEST)

Weiss Associates

APPENDIX C

QA/QC REPORT, SUMMARY TABLES, AND CRITERIA

Weiss Associates

2009 QA/QC SUMMARY

The analytical laboratory data and accompanying quality assurance/quality control (QA/QC) information used in the 2009 Annual Reports for Former Fairchild Buildings 1, 2, 3, 4, 9, 13, 18, 19, 20, 20A and 23 at the Middlefield-Ellis Whisman (MEW) Area were reviewed for precision, accuracy reproducibility and completeness in accordance with the approved MEW 1991 Quality Assurance Plan.[2] In addition this data quality review is based on November 2009 Standard Operating Procedures (SOPs) for data verification and validation, and validation procedures for metals, volatile organic chemicals and semivolatile organic chemicals. The SOPs are based on the 1991 MEW "Unified" Quality Assurance Project Plan, but functionally adhere to the most recent United States Environmental Protection Agency (USEPA) data validation guidelines.

This data quality review summarizes the Level 2 and 10% Level 4 Data Quality Review for samples collected by Weiss Associates during the 2009 Annual Sampling event in accordance with the MEW Quality Assurance Project Plan (QAPP).

The analytical results for each sampling point were compared with the historical record to confirm they are representative. To assess reliability of field sampling procedures and materials, the following field QA/QC samples were collected or prepared for each sampling event by MEW parties:

- Quality Control Samples (Field Duplicate, Matrix Spike, Matrix Spike Duplicate) - Field Duplicate samples are blind duplicates that provide data to assess precision of the contract laboratory. Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples measure the accuracy and precision of the analytical methods. Field Duplicates are specified to be collected at a frequency of 5% of the field samples collected. MS/MSD samples are specified at a frequency of 5% of field samples collected. Note that only samples collected by Weiss Associates were evaluated for MS/MSD procedures.
- Rinseate Sample/Equipment Blank - Samples consisting of reagent water collected from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of rinseate samples is to determine whether the sampling equipment is causing cross contamination of samples. Following equipment decontamination, deionized/organic-free water will be used as a final rinse and collected in appropriate bottles. Rinseate samples were specified at a frequency of 5% of the field samples collected.
- Field Blank - Samples consisting of source water used for decontamination of equipment. Field blanks will be collected at a frequency of 1 per source or lot of water being used for rinsing and submitted to the laboratory for all required analyses. Field blanks are specified at a frequency of 5% of the field samples collected.

[2] 1991, Quality Assurance Project Plan Middlefield-Ellis-Whisman Site, Mountain View, California, prepared by Canonie Environmental, Rev. 1.0, August 16, 1991.

- Trip Blank - Samples consisting of a "clean," volatile organic analysis (VOA) vial filled with deionized/organic-free water and preserved. These vials are supplied by the laboratory to the field site and returned to the laboratory for storage and analysis along with the field samples as may be required in the task planning documents. Trip blanks were submitted to the contract laboratory with each shipment (cooler) of environmental samples for volatile organic compound (VOC) analyses. Trip blanks were analyzed for all VOC analyses specified for samples in the corresponding cooler. The trip blank data demonstrate that the samples were not exposed to contamination during storage and transport to the laboratory. Trip blanks were submitted for VOC analysis, therefore the containers did not contain head space. Trip blanks are typically required for VOC sampling of: groundwater; surface water; storm water; and, rinseate.

For the 2009 annual groundwater sampling event, all sample results collected for Former Fairchild Buildings were verified for completeness by completion of a Level 2 Data Review Summary. Custody seals were used for each sample location as specified in the 1991 MEW QAPP.

The following QA/QC parameters were used to assess the laboratory analytic data via Level 2 Data Review:

- Holding time;
- Detection and reporting limits;
- Surrogate recovery (organic methods only);
- Laboratory control sample recovery;
- Matrix spike and spike duplicate recovery;
- Method blank contamination;
- Travel blank contamination (organic methods only);
- Field/rinseate blank contamination; and,
- Field sample duplicates precision.

Ten percent of all sample delivery groups underwent a stringent Level 4 data validation as required by the MEW QAPP. The samples validated via Level 4 data were placed on separate Chain(s) of Custody from the Level 2 data deliverables. Level 4 validation procedures vary by method. In addition to the verification check list provided above, the Level 4 review of organic laboratory data checks the following:

- Ion abundance;
- Minimum number of initial calibration standards analyzed;
- Relative response factors in initial and continuing calibrations;
- Percent relative standard deviations in initial calibrations;
- Percent differences in continuing calibrations;
- Internal standard retention times;

- Internal standard area counts;
- Analytical sequence carryover;
- Dilutions performed appropriately;
- Calibration blank contamination; and,
- Data package completeness for all raw data, including chromatograms and bench sheets, for calibration standards, quality control data, and samples.

The Level 4 review of inorganic (metals) data checks for the following:

- Minimum number of initial calibration standards analyzed;
- All initial calibration verification recoveries are within established limits;
- Initial calibration correlation coefficients are within established limits;
- Continuing calibration verification recoveries are within established limits;
- Analytical sequence carryover;
- Dilutions performed appropriately;
- Laboratory duplicate results are within established limits;
- Initial and continuing calibration blank contamination; and,
- Data package completeness for all raw data, including bench sheets, for calibration standards, quality control data, and sample.

Technical staff assigned qualifiers to data that were found outside control limits in the MEW QAPP. Data qualifiers, or flags, communicate data issues to end users and decision makers and are defined in the USEPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review.

A total of 233 samples were submitted to Curtis and Tompkins in Berkeley, California, a state-certified analytical laboratory for specified analyses, including Volatile Organic Compounds (VOCs), semi-VOCs, Bis(2-ethylhexyl) phthalate, metals, and 1,4-dioxane analysis. Two samples were analyzed for Acute Toxicity using EPA-821-R-02-012 and turbidity using USEPA method 180.1 by Block Environmental Services, Inc, another state-certified laboratory. In addition to the monthly treatment system samples, 96 total groundwater samples were collected from the Former Fairchild Buildings Area, including Treatment Systems 1, 3, and 19 monitoring and extraction wells as a part of MEW Annual Groundwater Sampling Event. The groundwater samples were analyzed for Halogenated Volatile Organic Compounds using EPA Method USEPA 8260B for the 8010 MS Parameters by Curtis and Tompkins.

All samples were collected, stored, transported, and managed according to USEPA protocols. Sample temperature and holding times were correctly observed.

No significant analytical issues were noted and the data are usable for their intended purposes.
Table C-1 summarizes the sampling QA/QC, and Table C-2 summarizes samples for the 2009 annual groundwater sampling event at Former Fairchild Building 18.

Table C-1. Summary of Sampling QA/QC for January through December 2009, Former Fairchild Building 18, 644 National Avenue, Mountain View, California.

Who performed sampling (Firm name/address/contact/phone):	Weiss Associates 350 Middlefield Road Mountain View, CA 94043 Joyce Adams (510) 450-6162
Chain of Custody forms completed for all samples?	YES
Field parameters stabilized prior to taking sample?	YES
Zero headspace in sample containers (applicable to VOCs only)?	YES
Samples preserved according to analytical method?	YES
Required field QA/QC samples taken?	YES

*Explain any "NO" answers:

Table C-2. Summary of Analytical QA/QC for January through December 2009, Former Fairchild Building 18, 644 National Avenue, Mountain View, California.

Who performed analysis (Lab name/address/contact/phone):	Curtis & Tompkins 2323 Fifth Street Berkeley, CA 94710 Micah Smith (510) 204-2223
Analytical methods (by method number and chemical category):	Six samples analyzed by USEPA 8260B – Halogenated Volatile Organic Compounds
Are the labs state-certified for the above analytical methods?	YES
Analyses performed according to standard methods?	YES
Sample holding times met?	YES
Analytical results reported for all values above MDL?	YES
QA/QC analyses run consistent with analytical methods?	YES
QA/QC results meet all acceptance criteria?	YES[1,2]
QA/QC results and acceptance criteria on file?	YES

*Explain any "NO" answers:

1. The Analytic Reports and Chain of Custody forms are located in Appendix B.

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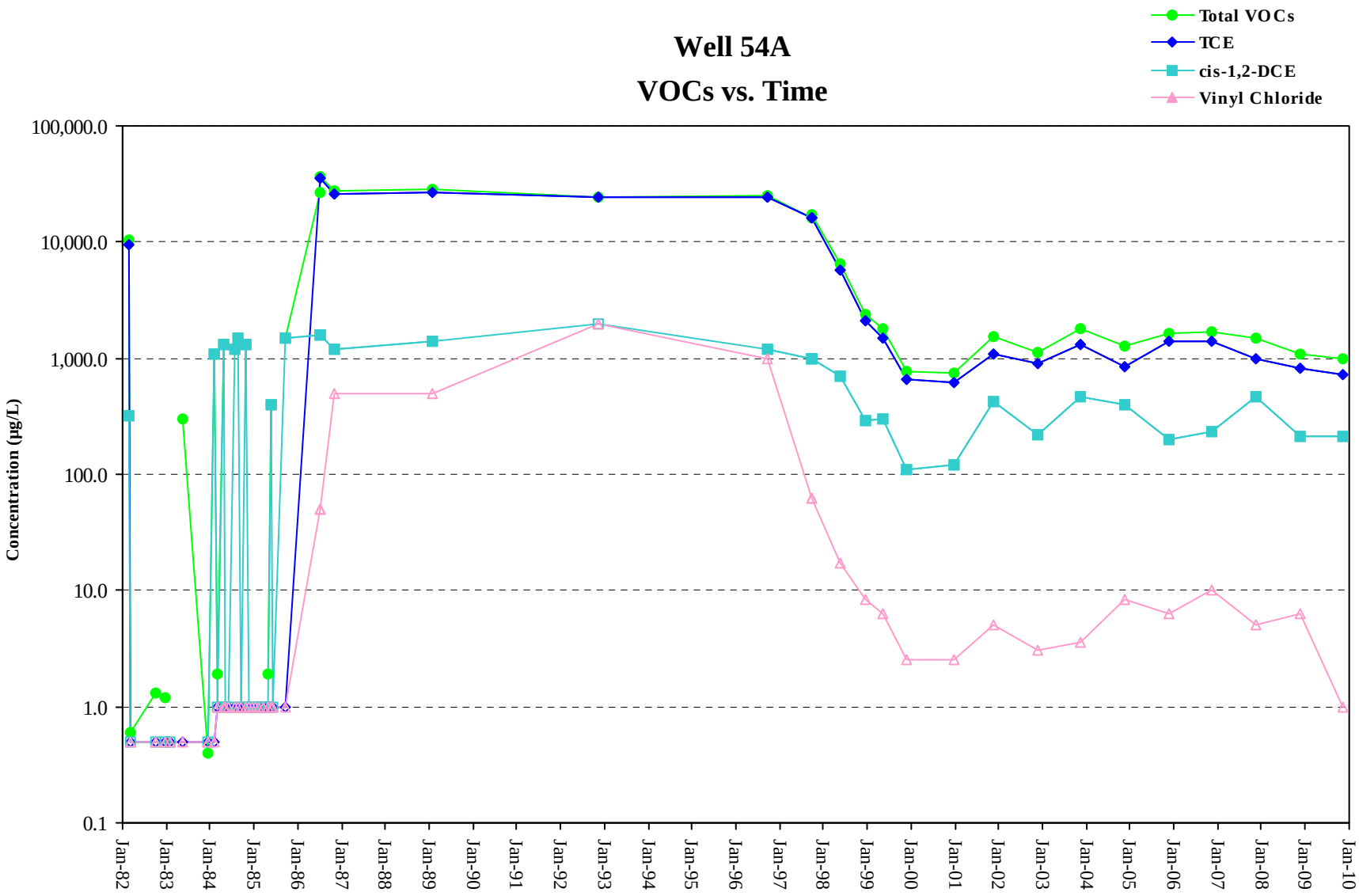
APPENDIX D

SELECTED VOCS VERSUS TIME GRAPHS

Weiss Associates

Well 54A
VOCs vs. Time



NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Abbreviations: VOC = volatile organic compounds, TCE = trichloroethylene, DCE = dichloroethelyene, µg/L = micrograms per liter

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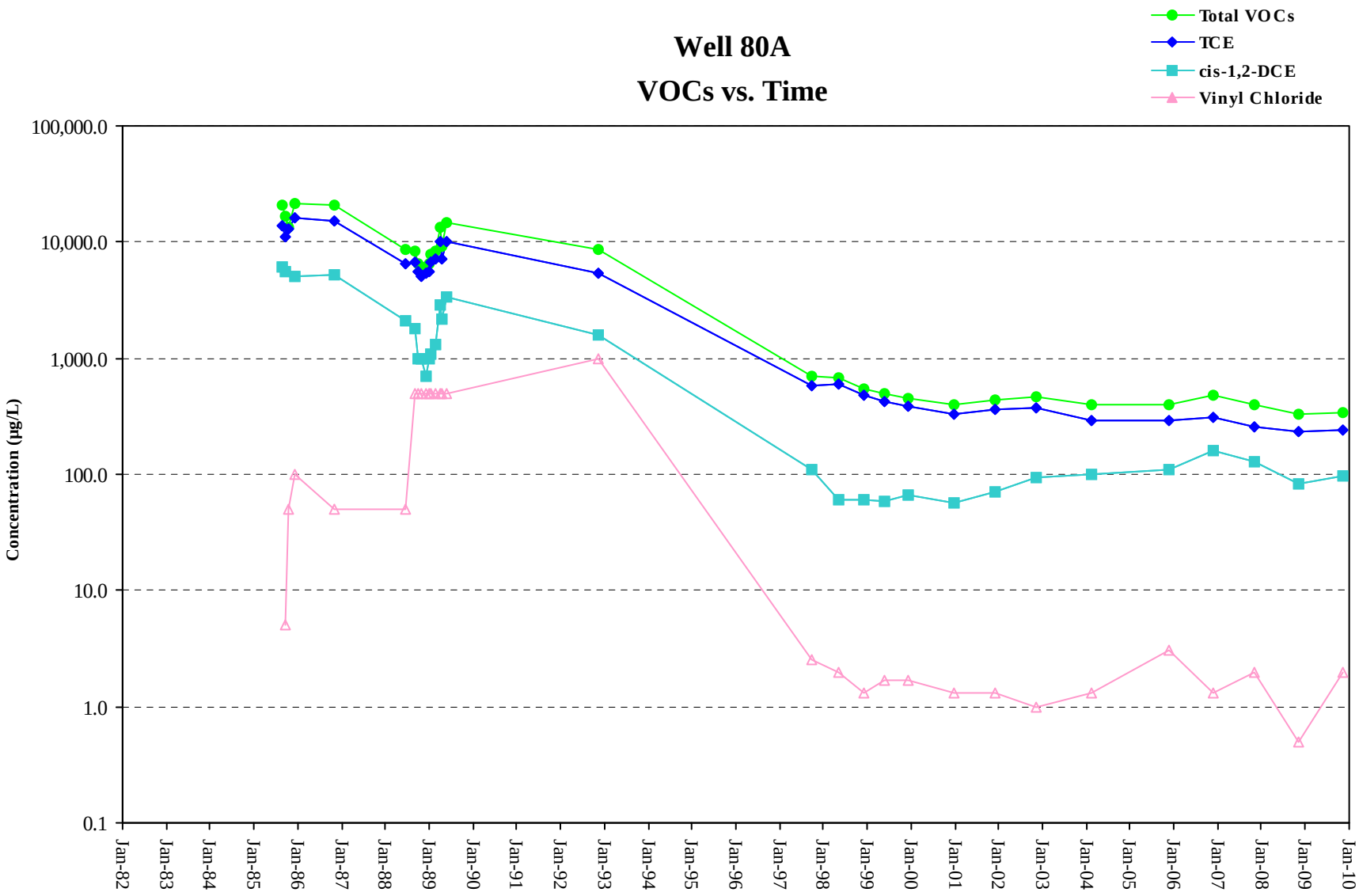

NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Abbreviations: VOC = volatile organic compounds, TCE = trichloroethylene, DCE = dichloroethelyene, µg/L = micrograms per liter

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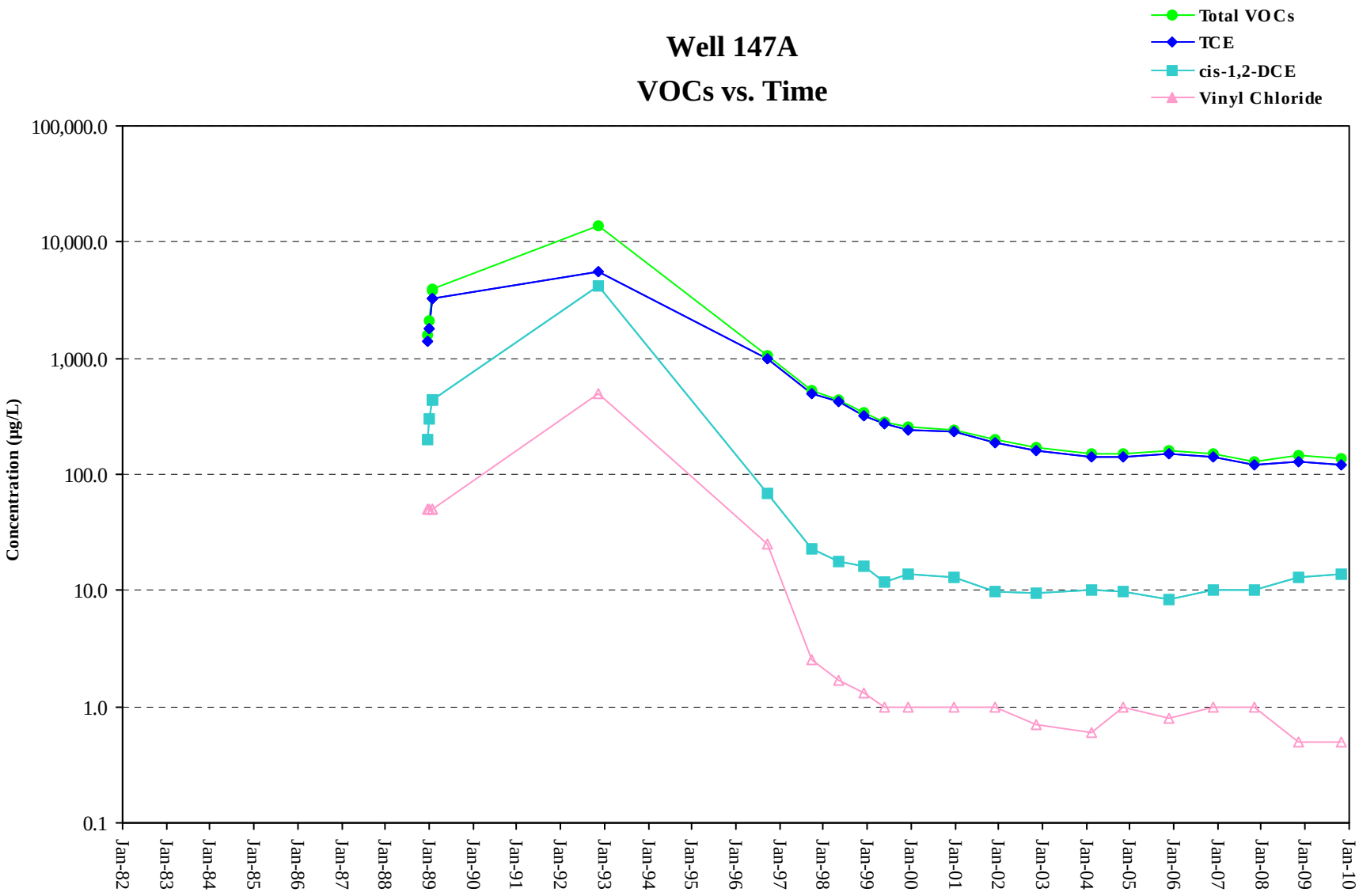

NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Abbreviations: VOC = volatile organic compounds, TCE = trichloroethylene, DCE = dichloroethelyene, µg/L = micrograms per liter

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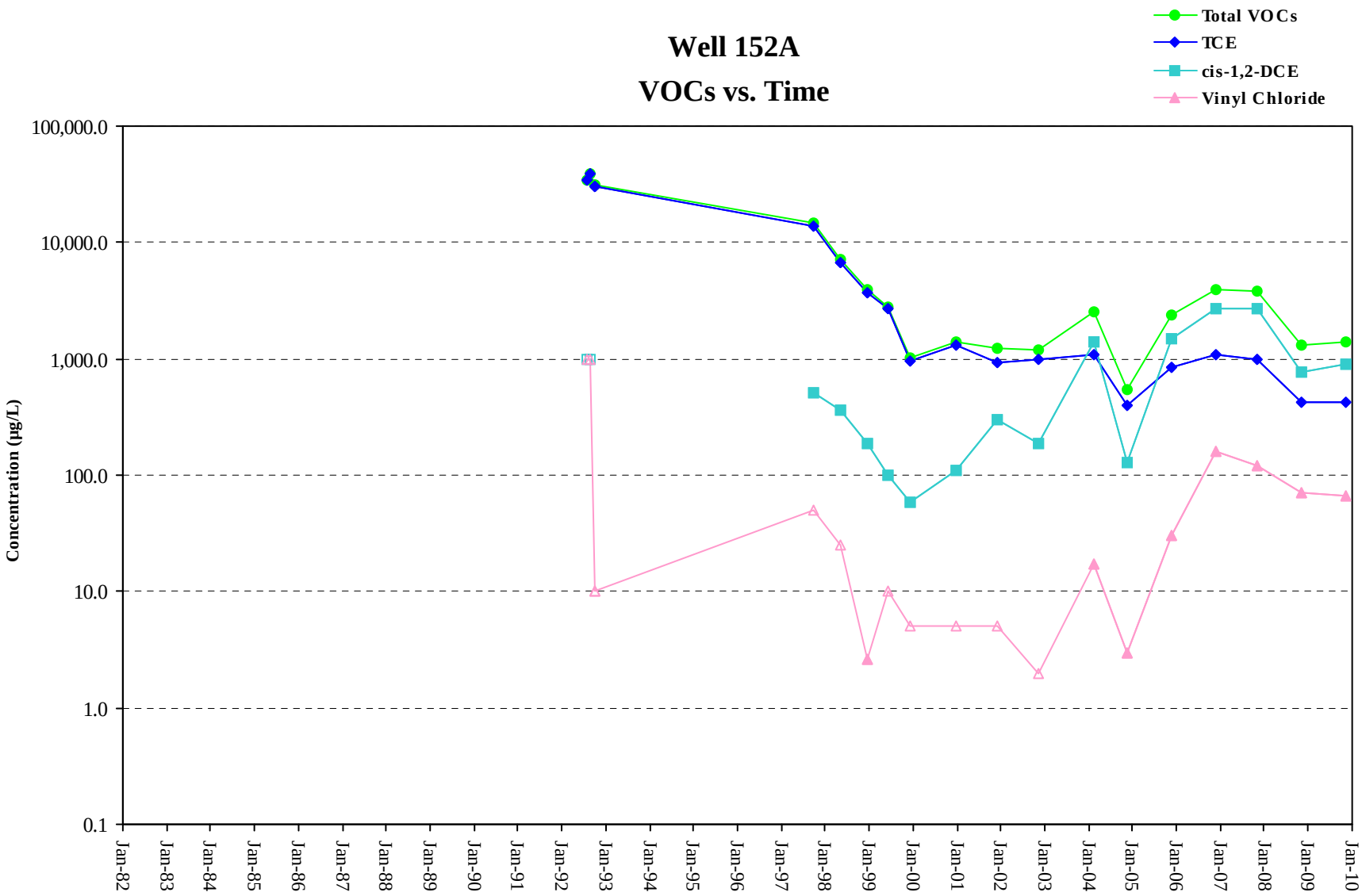
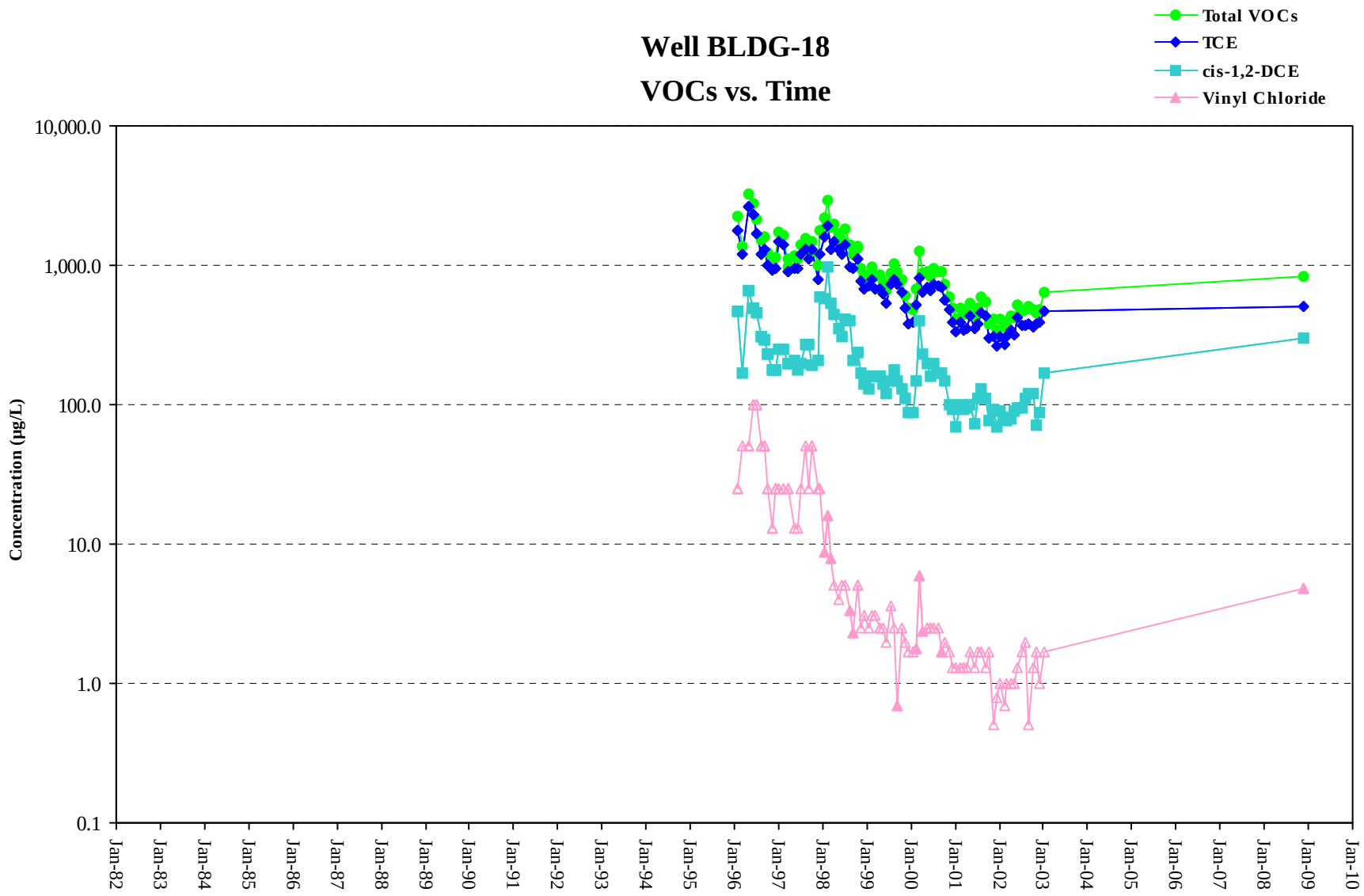
Well 152A
VOCs vs. Time



NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Abbreviations: VOC = volatile organic compounds, TCE = trichloroethylene, DCE = dichloroethelyene, µg/L = micrograms per liter

Weiss Associates



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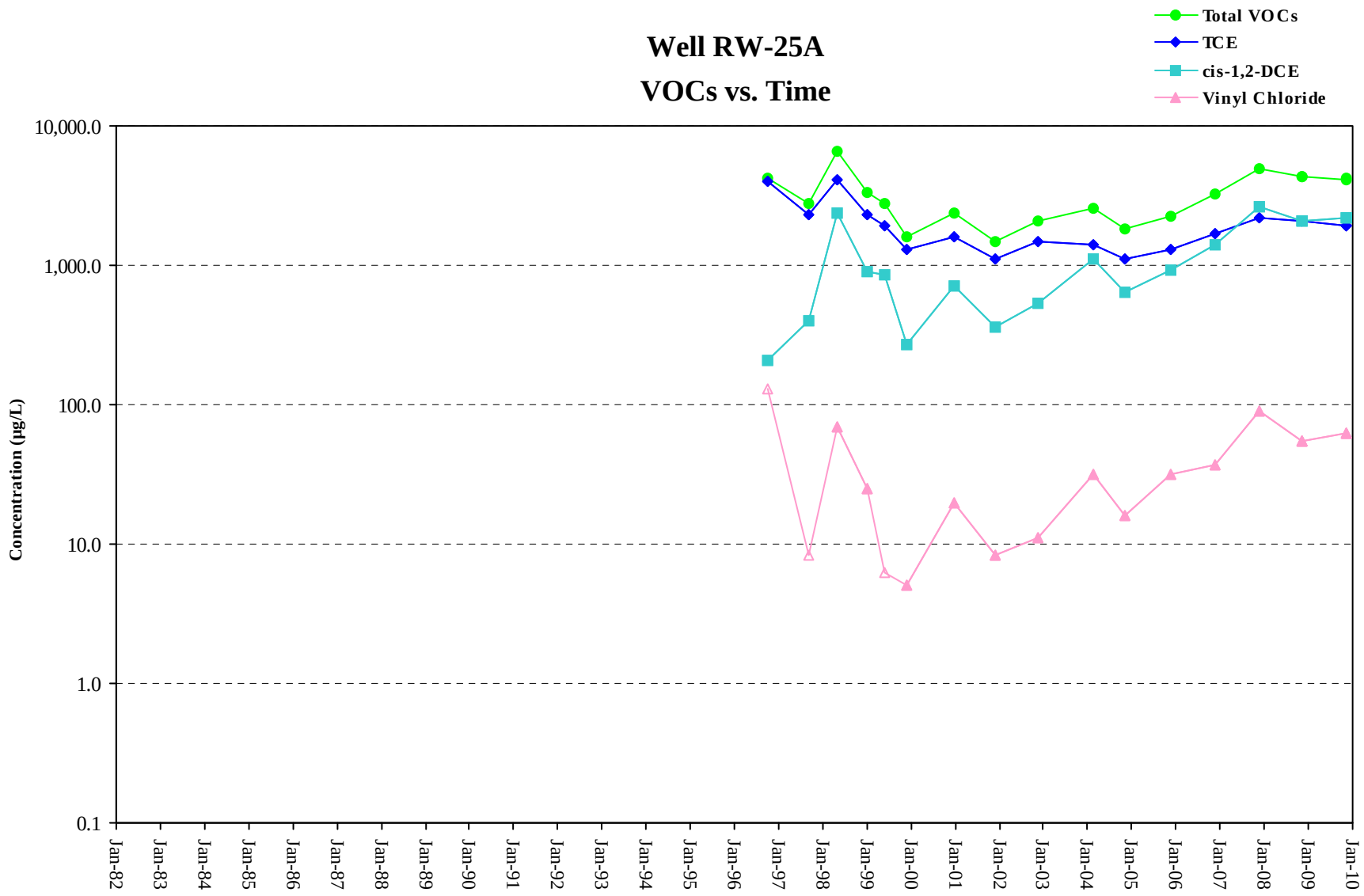
Weiss Associates



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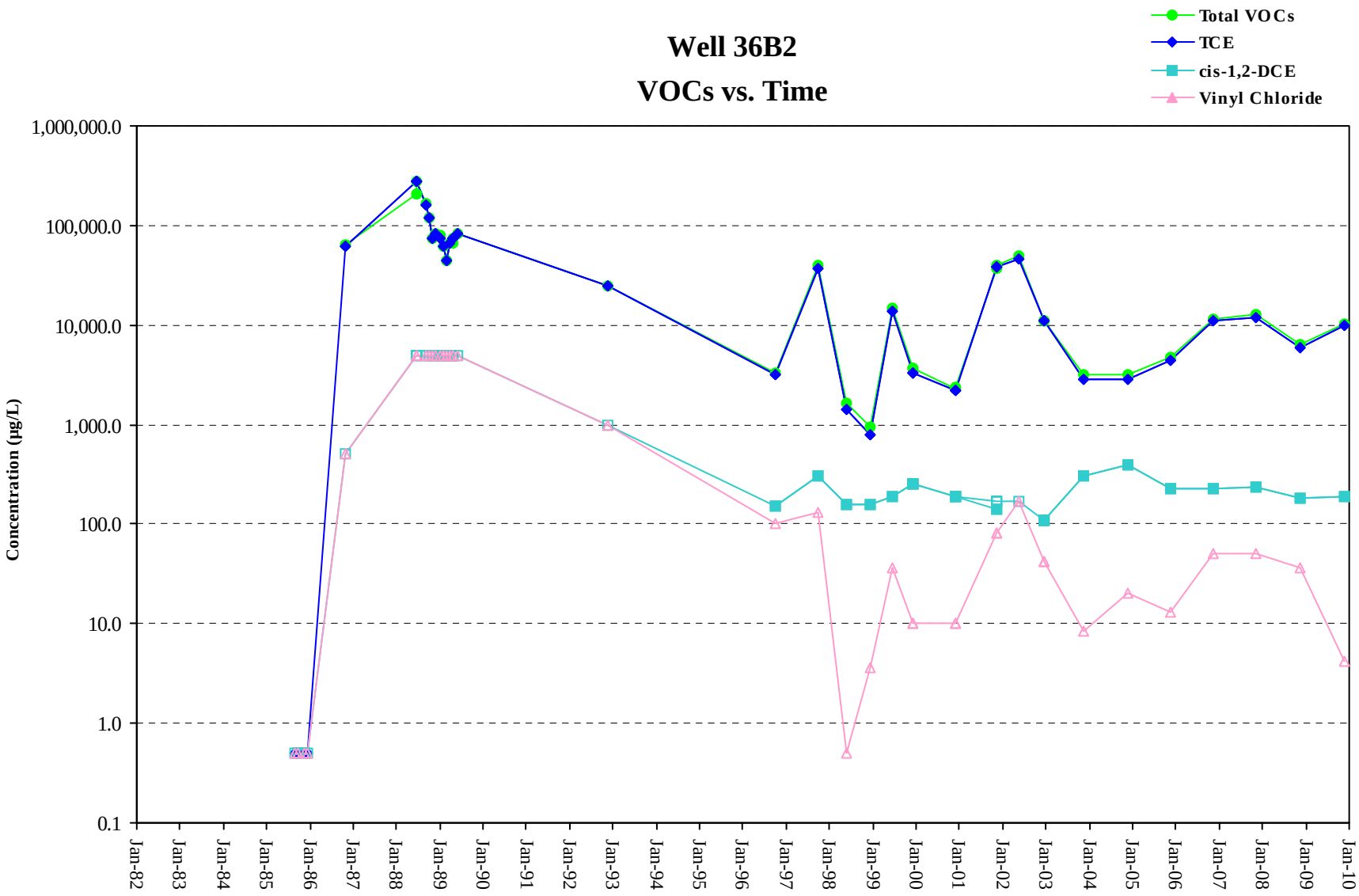
Weiss Associates



NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Abbreviations: VOC = volatile organic compounds, TCE = trichloroethylene, DCE = dichloroethelyene, µg/L = micrograms per liter