2009 ANNUAL PROGRESS REPORT

for

Former Fairchild Building 9
401 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

2009 ANNUAL PROGRESS REPORT

for

Former Fairchild Building 9
401 National Avenue
Middlefield-Ellis-Whisman Study Area
Mountain View, California

prepared by

Weiss Associates
350 East Middlefield Road
Mountain View, Caifornia 94043

Weiss Project No. 363-1900-2-04

submitted to

USEPA, Region 9, Superfund Division
75 Hawthorne Street
San Francisco, California 94105

Joyce Adams, P.G.
Sr. Project Geologist

Alison Petti, E.I.T.
Staff Engineer

Mary Cunningham
Staff Engineer

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. — Date
Sr. Project Geologist
(CA # 8131, expiration Nov. 2010)

CONTENTS

		Page
SUMMARY		ix
1. INTRODUCTION		1
1.1	Site Background	1
1.2	Local Hydrology	2
1.3	Description of Remedy	3
1.4	Summary of Site Activities and Deliverables	4
2. GROUNDWATER EXTRACTION AND TREATMENT SYSTEM		5
2.1	System Description	5
2.1.1	Extraction and Treatment System	5
2.1.2	Monitoring Wells	5
2.2	Extraction and Treatment System Operation and Maintenance	5
2.3	Groundwater Level Monitoring	6
2.4	Groundwater Quality Monitoring	6
2.5	Hydraulic Control and Capture Zone Analysis	6
2.5.1	Methodology	6
2.5.2	Horizontal and Vertical Gradients	7
2.5.3	Capture Assessment	8
3. OTHER ACTIVITIES		9
3.1	Optimization Evaluation for Groundwater	9
3.2	Air/ Vapor Intrusion	9
3.3	Five Year Remedy Review	9
3.4	Soil Settlement Survey	9
4. PROBLEMS ENCOUNTERED		10

5. TECHNICAL ASSESSMENT 11

6. CONCLUSIONS AND RECOMMENDATIONS 12

7. UPCOMING WORK IN 2010 AND PLANNED FUTURE ACTIVITIES 13

8. REFERENCES 14

FIGURES

Figure 1.	Site Location, MEW Area, Mountain View, California
Figure 2.	Previous Building Configurations, Former Fairchild Facilities, MEW Area, Mountain View, California
Figure 3.	Former Fairchild Building 9 Site Map and Well Network, Mountain View, California
Figure 4.	Hydrographs - Groundwater Elevation Measurements, Slurry Wall Well Pairs – Upgradient Wells
Figure 5.	Hydrographs - Groundwater Elevation Measurements, Slurry Wall Well Pairs – Downgradient Wells
Figure 6.	Hydrographs - Groundwater Elevation Measurements, Slurry Wall Well Pairs – Crossgradient Wells
Figure 7.	Hydrographs - Groundwater Elevation Measurements, Slurry Wall Well Pairs – Vertical gradient Wells
Figure 8.	A/A1 Groundwater Elevation Contours, Target Capture Area and Estimated March 26, 2009 Capture
Figure 9.	A/A1 Groundwater Elevation Contours, TCE Isoconcentration Contours, Target Capture Area and Estimated November 19, 2009 Capture

TABLES

Table 1. Extraction and Monitoring Well Details, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Table 2. 2009 Monitoring and Reporting Schedule, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Table 3. Monthly Average Flow Rates, January through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Table 4. Monthly Extraction Totals, January through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Table 5. Groundwater Elevations Slurry Wall Well Pairs, January through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Table 6. Groundwater Sampling Results Summary, January 2005 through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Table 7. Capture Zone Calculations and Analysis, March 2009, Former Fairchild Building 9, Mountain View, California

Table 8. Capture Zone Calculations and Analysis, November 2009, Former Fairchild Building 9, Mountain View, California

APPENDICES

Appendix A. 2009 Annual Report Remedy Performance Checklist

Appendix B. Laboratory Analytical Reports

Appendix C. QA/QC Report, Summary Tables and Criteria

Appendix D. VOC versus Time Graphs

ACRONYMS AND ABBREVIATION

ESD	Explanation of Significant Differences
Fairchild	Fairchild Semiconductor Corporation
ft bgs	feet below ground surface
ft	feet
ft/ft	foot per foot
ft/day	foot per day
ft^2/day	feet squared per day
gpm	gallons per minute
GAC	granular activated carbon
Geosyntec	Geosyntec Consultants
K	hydraulic conductivity
µg/L	micrograms per liter
mg/kg	milligram per kilogram
$\mu g/m^3$	micrograms per cubic meter
MCLs	maximum contaminant levels
MEW	Middlefield-Ellis-Whisman
NASA	National Aeronautics and Space Administration
NPDES	National Pollutant Discharge Elimination System
PRPs	potentially responsible parties
QA/QC	quality assurance and quality control
RAO	remedial action objective
RGRP	Regional Groundwater Remediation Program
RI/FS	remedial investigation and feasibility study
ROD	Record of Decision
RRWs	regional recovery wells
SCRWs	source control recovery wells
Water Board	Regional Water Quality Control Board, San Francisco Bay Region
Weiss Associates	Weiss
SVE	soil vapor extraction
System 1	515 Whisman Road
the Site	401 National Avenue, Mountain View, California (Building 9)
TCE	trichloroethene

USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

SUMMARY

This 2009 Annual Progress Report for the former Fairchild Semiconductor Corporation (Fairchild) Building 9 located at 401 National Avenue in Mountain View, California (the Site; Figures 1, 2, and 3) summarizes 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) and the USEPA's correspondence prescribing Annual Report contents (USEPA, 1990a, and USEPA, 2005). The 2009 Annual Report Remedy Performance Checklist is included as Appendix A.

The groundwater remedy for Building 9 at 401 National Avenue consists of the following:

- A slurry wall installed in 1986 around former Fairchild Building 9 that is approximately 40 feet (ft) deep and extends to the A/B1 aquitard;
- Two operating Source Control Recovery Wells (SCRWs), AE/RW-9-1 and AE/RW-9-2, located inside of the slurry wall;
- Two non-operating SCRWs[1], RW-20A and RW-21A, located inside of the slurry wall; and,
- Twelve groundwater monitoring wells.

Groundwater extracted by these SCRWs is conveyed via double-contained piping to an offsite treatment facility located at 515 Whisman Road known as Fairchild Treatment (System 1). The Fairchild Treatment System 1 is discussed in the Annual Progress Report for Former Fairchild Buildings 1 through 4 (Weiss, 2010).

In addition to the Site remedy, a groundwater treatment system located at 401 National Ave is part of a neighboring facility remedy and is discussed in the Annual Progress Report for 405 National Avenue, Mountain View California (AMEC Geomatrix Inc., 2010).

Site activities conducted in compliance with the 106 Order during this reporting period included operation, monitoring, and maintenance activities of the Building 9 extraction and monitoring wells, quarterly slurry wall water level monitoring, semiannual groundwater level monitoring in March and November, annual groundwater sampling in November 2009, regional activities documented in the Regional Groundwater Remediation Program Annual Report (Geosyntec, 2010a), and submitting information related to the USEPA's Second Five Year Remedy Review for the Fairchild Sites in May and June 2009, including a USEPA Site inspection on May 5, 2009.

The slurry wall provides the primary method of containment at the Building 9 Site. Groundwater elevation and chemical monitoring results from 2009 demonstrate that the Site extraction wells continue to achieve adequate plume capture based on converging lines of evidence, including graphical flow net analysis and chemical concentration trends. Volatile organic compound (VOC) concentrations in groundwater continue to remain well below historical maxima, and generally show long-term decreasing trends.

[1] SCRWs RW-20A and RW-21A have been shut down since August 2007 with approval from the USEPA (e-mail from Alana Lee, USEPA, to Maile Smith, Northgate Environmental Management, Inc., August 2, 2007).

During 2009 quarterly monitoring of Building 9 slurry wall well pairs, inward and upward gradients were generally observed within the slurry wall. Exceptions are the eastern (crossgradient) area, which exhibited both inward and outward gradients in 2009, and the northwest (downgradient) corner, which has exhibited an outward gradient since August 2007. This outward gradient may be attributed to the 2007 shutdown of wells RW-20A and RW-21A. These wells were higher volume but low concentration wells inside the slurry wall enclosure.

1. INTRODUCTION

This 2009 Annual Progress Report was prepared by Weiss Associates (Weiss) on behalf of Schlumberger Technology Corporation for the former Fairchild Semiconductor Corporation (Fairchild) facility located at 401 National Drive in Mountain View, California (the Site; Figures 1, 2 and 3). Geosyntec Consultants (Geosyntec) assisted with the preparation of this report.

This report summarizes Site activities from January 1 through December 31, 2009, and monitoring data from 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, 1990a, and USEPA, 2005).

1.1 Site Background

Former Fairchild Building 9 is located within the Middlefield-Ellis-Whisman (MEW) area at 401 National Avenue. Building 9 functioned as a facility for receiving, mixing, and delivering chemicals for Fairchild from 1966 to 1987. The primary constituent of concern at the Site is trichloroethene (TCE) in groundwater from historical underground tanks/piping, sumps and/or surface spills. The Former Fairchild Building 9 Site is currently occupied by Adema Technologies Inc, an electronic circuits manufacturing facility, and the land use remains industrial/commercial with surrounding residential development. The Former Fairchild Building 9 Site is located within the MEW Study Area, as defined by USEPA (USEPA, 1989) an approximately 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 (Figure 2).

The 401 National Avenue property is part of a joint source control responsibility of Vishay General Semiconductor (formerly General Instrument Corporation), Sumitomo Mitsubishi Silicon America (formerly Siltec Corporation), and Fairchild. Further discussion regarding remediation outside of the Building 9 slurry wall boundaries and the treatment system located at 401 National Avenue is provided in the 2009 Annual Progress Report for 405 National Avenue (AMEC Geomatrix, 2010).

The remedial investigation and feasibility study (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, 1990b, 1996).

Remediation within the MEW area includes facility-specific activities by individual potential responsible parties (PRPs), such as Building 9, and a Regional Groundwater Remediation Program (RGRP) that addresses commingled volatile organic compounds (VOCs) that have migrated beyond the facility-specific areas and cannot be attributed to a single source.

1.2 Local Hydrology

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/B1 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 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 groundwater zone i.e., above the B/C aquitard, calculated from pumping tests conducted at the MEW Area from 1986 through 2005 are presented in the table 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 (ft2/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 horizontal component of groundwater flow beneath the Site is generally towards the north during non-pumping and pumping conditions. The Site groundwater gradients and velocities have been locally altered near source control recovery wells (SCRWs), regional recovery wells (RRWs), and the Fairchild and Raytheon slurry walls.

The vertical component of groundwater flow is generally upward from the B1- to the A-zone, but is locally downward in some areas of the Site (HLA, 1987). Groundwater extraction has likely exerted an influence on measured vertical gradients. Vertical gradients below the B1-zone are generally upward (Geosyntec et al, 2008).

1.3 Description of Remedy

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.

As specified in the ROD, cleanup has been addressed in two stages: initial actions and a long-term remedial phase (USEPA, 1989). Initial cleanup actions included tank removals, well sealing, soil removal and treatment, slurry wall construction, and local groundwater extraction and treatment. The Site is in the long term remedial phase that consists of extraction and treatment of groundwater by air stripping towers or liquid-phase granular activated carbon (GAC). Remedial activities are being conducted by individual MEW PRPs as well as the MEW RGRP.

All soil remediation at the MEW Area was completed by 2001. The soil cleanup standards for the MEW Area are 0.5 milligram per kilogram (mg/kg) of TCE for all soils outside of the slurry walls and 1 mg/kg TCE for soil inside the slurry walls. Soil cleanup actions included *in-situ* vapor extraction with treatment by vapor-phase GAC, and excavation and treatment by aeration. In 1995, 3,000 cubic yards of soil were excavated to a depth of 6 ft and aerated at the 401 National Avenue Site. A soil vapor extraction (SVE) system operated from 1996 to 1997 to remediate soil from 6 ft bgs to 18 inches above the water table. Soil samples collected after the SVE system was shut down showed that soils had reached the cleanup standards both inside and outside the slurry walls (Locus, 1997; Smith, 1997a; Smith, 1997b).

In 1986, Fairchild installed a subsurface slurry wall at Building 9 which is approximately 40 ft deep and extending to the A/B1 aquitard.

The ROD-approved groundwater remedy, groundwater extraction and treatment by air strippers or liquid-phase GAC. The groundwater cleanup standard of 5 µg/L of TCE for the shallow groundwater zones includes groundwater inside the slurry wall.

An additional plume definition program for the MEW Area was completed in 1992, and between 1991 and 1995, preliminary and final design documents for soil and groundwater source control measures were developed and submitted to the USEPA (Canonie, 1993, 1994, and 1995). Fairchild first installed extraction wells and groundwater treatment systems (air strippers) at its former facilities in 1982-1986. The treatment systems were replaced with GAC systems in 2003 (RMT, 2003). The First Five-Year Remedy Review for the MEW Site was completed in 2004 (USEPA, 2004). The Second Five-Year Remedy Review was completed in October 2009 (USEPA, 2009a).

In 1986, four SCRWs were installed inside the Building 9 slurry wall (AE/RW-9-1, AE/RW-9-2, RW-20A, and RW-21A). Groundwater is conveyed via double-contained piping to a treatment facility consisting of three 5,000-pound GAC vessels in series and located at 515 Whisman Road (System 1). Extraction and monitoring well construction details for the Building 9 Site are provided in Table 1.

[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.

1.4 Summary of Site Activities and Deliverables

Table 2 provides the 2009 monitoring and reporting schedule for the Site. Site activities conducted in compliance with the 106 Order (USEPA, 1990a) during this reporting period include:

- Continuing groundwater extraction and treatment;
- Submitting a Notice of Intent on January 21 to reauthorize the discharge and/or reuse of treated groundwater with VOCs under California Regional Water Quality Control Board, San Francisco Bay Region (Water Board) Permit No. CAG912003;
- Continued quarterly reporting of System 1 discharge under the National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2004-0055 during the first three quarters of 2009;
- Continued quarterly reporting of System 1 discharge during the fourth quarter in compliance with the new general VOC permit Water Board Order No. R2-2009-0059 for Fairchild Treatment Systems 1. This permit was issued by the Water Board in August 2009 and is effective October 1, 2010 through September 2014;
- Collecting quarterly groundwater elevation measurements in Site slurry wall well pairs on March 26, May 28, August 27, and November 19;
- Collecting semi-annual groundwater elevation measurements in Site monitoring and extraction wells on March 26 and November 19;
- Responding to USEPA information requests for Second Five-Year Remedy Review April-June, and on-site inspection May 5;
- 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- December 2009;
- Annual settlement monitoring on December 9 and 10;
- 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 remedial activities conducted during this reporting period. 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 9, Tables 1 through 8, and Appendices A through D.

2. GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

2.1 System Description

2.1.1 Extraction and Treatment System

The groundwater extraction and treatment system consists of the following components:

- Slurry wall, installed in 1986, around former Fairchild Building 9. The Building 9 Slurry wall enclosure is approximately 40 ft deep and extends a minimum of two ft into the A/B1 aquitard; and,
- Four SCRWs located inside of the slurry wall: AE/RW-9-1, AE/RW-9-2, RW-20A, and RW-21A. In 2009, two of the four SCRWs (AE/RW-9-1 and AE/RW-9-2) were pumping.

There is no treatment system specifically associated with the Building 9 remedy. Extracted groundwater is piped via double contained piping to offsite Fairchild Treatment System 1 located at 515/545 Whisman Road.

The average monthly flow rates and total volume of groundwater extracted by these wells during 2009 are provided in Tables 3 and 4, respectively. The average combined groundwater extraction flow rate of the two SCRWs at Building 9 was 7.4 gallons per minute (gpm). During 2009, these two SCRWs extracted approximately 3.9 million gallons of groundwater. These wells are treated at Fairchild Treatment System 1. Further discussion of extraction wells that are treated by Fairchild System 1 are provided in the 2009 Annual Progress Report for Former Fairchild Buildings 1-4 (Weiss, 2010).

2.1.2 Monitoring Wells

Twelve monitoring wells are used to evaluate the Building 9 Site (Table 1). Eleven of the monitoring wells are in the A-zone, and one monitoring well is located in the B1-zone. Water levels are measured quarterly in four slurry wall well pairs (8 wells), semiannually in other monitoring wells, and water quality samples are collected annually in seven of the 12 monitoring wells. Wells 35A and 122A located inside the slurry wall are sampled once every five years and were last sampled in 2007. Monitoring wells 69B1, 123A, 126A, and 138A are not part of the water quality sampling program, and are used to assess horizontal and vertical gradients at the Building 9 Slurry Wall.

2.2 Extraction and Treatment System Operation and Maintenance

From January 1 through December 31, 2009, the following maintenance or operational activities were conducted on the Site extraction wells during this reporting period:

2009 Dates	Component	Comments	Regulatory Notification
February 4	AE/RW 9-2	The flow totalizer on extraction well AE/RW 9-2 was not sending correct signals to site computers on February 4. The totalizer was repaired the same day.	Not Required
March 23	AE/RW-9-2	Well AE/RW-9-2 went off-line due to a low flow alert on March 23, and could not be restarted. The pump was replaced and the well was restarted on March 24.	Not Required
October 5	AE/RW-9-2	Well AE/RW-9-2 went off-line due to a bad pulse alert on October 5. Paddle wheel of the flow meter was cleaned and the pump was restarted the same day.	Not Required

2.3 Groundwater Level Monitoring

During this reporting period, groundwater elevations were recorded in all Site monitoring wells on March 26 and November 19, 2009. Water levels were measured in slurry wall well pairs quarterly from March through November 2009 (Table 5). Hydrographs of Site slurry wall well pair measurements are presented in Figures 4 through 7.

Potentiometric surface maps with estimated capture zones for the two extraction wells at Building 9 are presented in Figures 8 and 9 for March and November, respectively.

2.4 Groundwater Quality Monitoring

The 2009 Annual Groundwater Sampling Event was conducted in November and December 2009. Laboratory Analytical reports are provided in Appendix B. Appendix C contains the quality assurance/quality control (QA/QC) evaluation and summary tables. A summary of chemical analytic results for the previous five years (2005 through 2009) is provided in Table 6. VOC concentration versus time graphs for Site wells are included in Appendix D.

The data provided in Table 6 and Appendix D show that, in general, TCE concentrations in 2009 in Building 9 wells are less than 2008 concentrations, much less than historical TCE maximums, and currently appear mostly stable to declining.

Annual water quality samples are collected for specified wells outside the slurry wall and water quality samples every five years are collected for wells inside the slurry walls. The last 5-year sampling event for wells inside the slurry walls was in 2007. In 2009, extraction wells inside the slurry walls were voluntarily added to the annual sampling schedule as part of slurry wall evaluation activities.

2.5 Hydraulic Control and Capture Zone Analysis

2.5.1 Methodology

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

Hydraulic capture from the Building 9 extraction wells was estimated for March and November 2009 by graphical flow net evaluation of groundwater flow streamlines drawn perpendicular to groundwater contours to derive time-dependent estimated capture zones 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.

The following six steps were used for the Building 9 capture evaluation:

Step 1: Review Site data, Site conceptual model, and remedy objectives.

Step 2: Define Site-specific target capture zones.

Step 3: Generate potentiometric surface maps based on interpolation of measured water levels.

Step 4: Perform capture zone width calculations.

Step 5: Evaluate concentration trends for wells outside of the target capture zone.

Step 6: Estimate capture based on steps 1-5, compare to target capture zone(s), assess uncertainties and data gaps (Section 2.5.3).

The Target Capture Area for wells inside the slurry wall, AE/RW-9-1 and AE/RW-9-2, was assumed to be the width of the slurry wall. Estimated 2009 captures based on graphical flow net evaluation depicted on Figures 8 and 9 indicate that target captures are achieved for both of these extraction wells.

2.5.2 Horizontal and Vertical Gradients

Groundwater elevations were recorded quarterly in March, May, August and November 2009 in monitoring wells; 123A/122A, 126A/35A, 138A/137A, (slurry wall well pairs) and 69B1/37A (A/B1 aquitard pair) (Table 5). These well pairs are used to evaluate the direction of horizontal gradient across the slurry wall and the direction of vertical gradient across the A/B aquitard. Well locations are shown in Figure 3.

Figures 4 through 7 present graphs of head difference between slurry wall well pairs at the Site grouped by upgradient, cross-gradient, downgradient, and vertical gradient well pairs. Results of the well pair analysis indicate:

- During this reporting period, an inward hydraulic gradient was consistently observed at well pair 123A/122A.
- Both inward and outward hydraulic gradients were observed at well pair 138A/137A in 2009, which historically had an inward hydraulic gradient.
- Upward hydraulic gradients from the B1 to the A aquifer were consistently observed at well pair 69B1/37A.
- A slight outward gradient was observed in well pair 126A/35A during 2009. This outward gradient was initially observed in August 2007 and is likely the result of turning off wells RW-20A and RW-21A in 2007.

2.5.3 Capture Assessment

A summary of the 2009 capture evaluation is presented below:

Step	2009 Status
Step 1: Review Site Data, Site Conceptual Model and Remedy Objectives	Site data, Site conceptual model, and remedy objectives were reviewed and determined to be adequate to assess capture.
Step 2: Define "Target Capture Zone(s)"	Target Capture is based on the slurry wall enclosure boundaries, since the extraction wells are located within the Building 9 slurry wall. The slurry wall provides the primary containment methodology.
Step 3a: Water Level Maps	Potentiometric surface contours are presented in Figures 8 and 9 Water levels at extraction wells were measured through piezometers constructed in the filter packs and therefore were considered reliable for use in constructing potentiometric surface maps. Water levels inside and outside the slurry wall enclosures were contoured separately.
Step 3b: Water Level Pairs	As shown in Table 5 and Figures 4 through 7, there is an inward gradient observed in the upgradient slurry wall well pairs, and both inward and outward gradients observed in the downgradient and crossgradient slurry wall well pairs. The vertical gradient well pairs have an upward gradient.
Step 4: Perform Capture Zone Widths Calculation	Tables 7 and 8 present the results of the capture zone width calculations for March and November 2009. Calculated captures indicated that the groundwater within the slurry wall is effectively contained since widths were similar to or greater than target capture width of slurry wall.
Step 5: Concentration Trends	Long term trends in VOC concentrations are generally decreasing to stable based on time concentration plots in Appendix D.
Step 6: Estimate Capture Zones and Compare To Target Capture Zone(s)	VOC plume capture in 2009 meets target capture for the A/A1 groundwater zone based on converging lines of evidence, including concentration trends, and graphical flow net analysis and calculated captures.

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 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.

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 the Final *Revised Supplemental Feasibility Study for Vapor Intrusion,* the Site building at 401 National Avenue had TCE concentrations that exceeded the interim action level, with a maximum of 74 micrograms per cubic meter ($\mu g/m^3$) in the building utility area. In August 2003, cracks and dry conduits in the utility room of the building were sealed, and improvements to the heating, ventilation and cooling system were completed in March 2004. After mitigation, concentrations detected in indoor air samples ranged from 0.2 to 2.2 $\mu g/m^3$, and 2.3 to 6.4 $\mu g/m^3$ in the utility room (Haley & Aldrich 2009).

The USEPA issued a Proposed Plan to address Vapor Intrusion in June 2009, and a public meeting was held July 23, 2009 (USEPA 2009b). 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, 2009a).

3.4 Soil 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 study 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 operations. Additional information on the settlement survey can be found in the RGRP 2009 Annual Progress Report (Geosyntec, 2010a).

4. PROBLEMS ENCOUNTERED

Section 2.2 provides a summary of all non-routine O&M events that occurred at the Building 9 extraction wells. No other problems related to Building 9 were encountered.

5. TECHNICAL ASSESSMENT

The following assessment of the groundwater remedy performance for Building 9 was made based on data collected through 2009.

- The Remedy is Functioning as Intended. The Building 9 Site continues to function as planned. The 2009 Annual Report Remedy Performance Checklist for the Site, and four other former Fairchild facilities, is included in Appendix A.

- Plume Capture is Achieved. Groundwater elevations, calculated captures zones and chemical monitoring results from 2009 demonstrate that the two extraction wells at the Site continue to achieve adequate target capture based on calculated captures, graphical flow net analysis and chemical concentration trends.

- The Vertical Gradients Inside and Gradients Across Slurry Walls are Variable. Inward and upward gradients are generally observed within the Building 9 slurry wall enclosure. One exception is the eastern (crossgradient) area, at which both inward and outward gradients were observed starting in 2009; another is the northwestern (downgradient) area. The slight outward gradient (at 126A/35A) was initially observed in August 2007 and is likely the result of ceasing groundwater extraction from wells RW-20A, and RW-21A since 2007. These are low concentration extraction wells within the Building 9 Slurry Wall. Although inward and upward gradients are not always achieved, the slurry wall provides an effective barrier to groundwater flow and VOC migration.

- Chemical Concentrations are Decreasing Over Time. Chemical concentration trends in Building 9 wells within and downgradient of the slurry wall indicate stable or declining concentrations over time based on inspection of concentration-time plots in Appendix D and Table 6. Current concentrations are below historical VOC concentrations for this area, and TCE isoconcentrations contours indicate an overall reduction in VOC magnitude.

6. CONCLUSIONS AND RECOMMENDATIONS

The Building 9 remedy is functioning as intended. Capture snapshots from March and November 2009 meet target capture area inside the Building 9 Slurry wall based on converging lines of evidence, including graphical flow net analysis, capture zone width calculations and concentration trends.

Recommendations from the 2008 Optimization Evaluation for the Fairchild Sites should be implemented after receipt of comments or approval from the USEPA.

7. UPCOMING WORK IN 2010 AND PLANNED FUTURE ACTIVITIES

Activities for 2010 include the following:

- Continuing groundwater extraction in AE/RW-9-1 and AE/RW-9-2 and monitoring in accordance with the Site monitoring and reporting schedule;
- Optimization of extraction well rates; and,
- Continued coordination with USEPA's ROD amendment for vapor intrusion.

The effectiveness and progress of groundwater restoration activities during 2010 will continue to be evaluated by continuing operation, maintenance, and monitoring accordance with the Site monitoring and reporting schedule. All Site-specific data, including optimization activities, will be documented in the 2010 Annual Progress Report, which will be submitted to the USEPA by June 15, 2011.

8. REFERENCES

AMEC Geomatrix, Inc. 2010. Annual Progress Report—2009, Facility Specific Work, 405 National Avenue, Mountain View, California, April 15.

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, 1993. Plume Definition Program, Middlefield-Ellis-Whisman Site, Mountain View, California, March 1993.

Canonie, 1994. Revised Final Source Control Remedial Design, Fairchild Semiconductor Corporation, 515 and 545 North Whisman Road and 313 Fairchild Drive, Buildings 1, 2, 3, and 4, Middlefield-Ellis-Whisman Site, Mountain View, California, November 1994.

Canonie, 1995. Construction Operation and Maintenance Plan, Fairchild Semiconductor Corporation, 515 and 545 North Whisman Road and 313 Fairchild Drive, Buildings 1, 2, 3, and 4, Middlefield-Ellis-Whisman Site, Mountain View, California, February 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 Area, Mountain View, California, September 3, 2008.

Geosyntec, 2010a. 2009 Annual Progress Report for Middlefield-Ellis-Whisman Study Area, Regional Groundwater Remediation Program Mountain View, California, June 15, 2010.Geosyntec, 2010b. Letter from Nancy T. Bice to Ms. Alana Lee/USEPA, regarding Addendum to 3 September 2008 Optimization Evaluation Fairchild Sites, Middlefield-Ellis-Whisman Study Area, Mountain View, California, April 28, 2010.

Geosyntec, 2010b. Letter from Nancy T. Bice to Ms. Alana Lee/USEPA, regarding Addendum to 3 September 2008 Optimization Evaluation Fairchild Sites, Middlefield-Ellis-Whisman Study Area, Mountain View, California, April 28, 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.

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

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

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

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.

Locus Technologies (Locus), 1997. Confirmatory Soil Sampling Report, Area 3, Fairchild Semiconductor Corporation, 401 National Avenue, Building 9, Mountain View, California, July 15, 1997.

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. Technical Memorandum, Fairchild Buildings 1-4 Slurry Wall Extraction Rate Optimization Study, MEW Site, Mountain View, California, January 5, 2007.

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

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

Northgate, 2008b. Efficiency Evaluation Report for the Middlefield-Ellis-Whisman (MEW) Regional Groundwater Remediation Program (RGRP), MEW Site, Mountain View, California, April 28, 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.

RMT, 2003. Revised Operation and Maintenance Manual, 515 and 545 North Whisman Road – System 1, 313 Fairchild Drive – System 3, Mountain View, California, November 14, 2003.

Smith Technology Corporation (Smith), 1997a. Confirmatory Soil Sampling Report, Area 1, Fairchild Semiconductor Corporation, 401 National Avenue, Building 9, Mountain View, California, March 6, 1997.

Smith, 1997b. Confirmatory Soil Sampling Report, Area 2, Fairchild Semiconductor Corporation, 401 National Avenue, Building 9, Mountain View, California, April 24, 1997.

United States Environmental Protection Agency, 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, 1990a. EPA, Region 9, (106 Order) Docket No. 91-04. Administrative Order for Remedial Design and Remedial Action in the Matter of the MEW Study Area, Proceedings under Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Reauthorization Act of 1986 (42 U.S.C. Sections 9606(a), November 29, 1990.

USEPA, 1990b. 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, 2004. Final First Five Year Review Report for the Middlefield-Ellis-Whisman Study Area, Mountain View, California, Region 9 San Francisco, California, September 2004.

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

USEPA, 2007. E-mail from Alana Lee/USEPA, to Maile Smith/Northgate Environmental Management, Inc., regarding temporary approval to turn off selected extractions wells as part of Slurry wall evaluation Study. August 2, 2007.

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

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

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

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

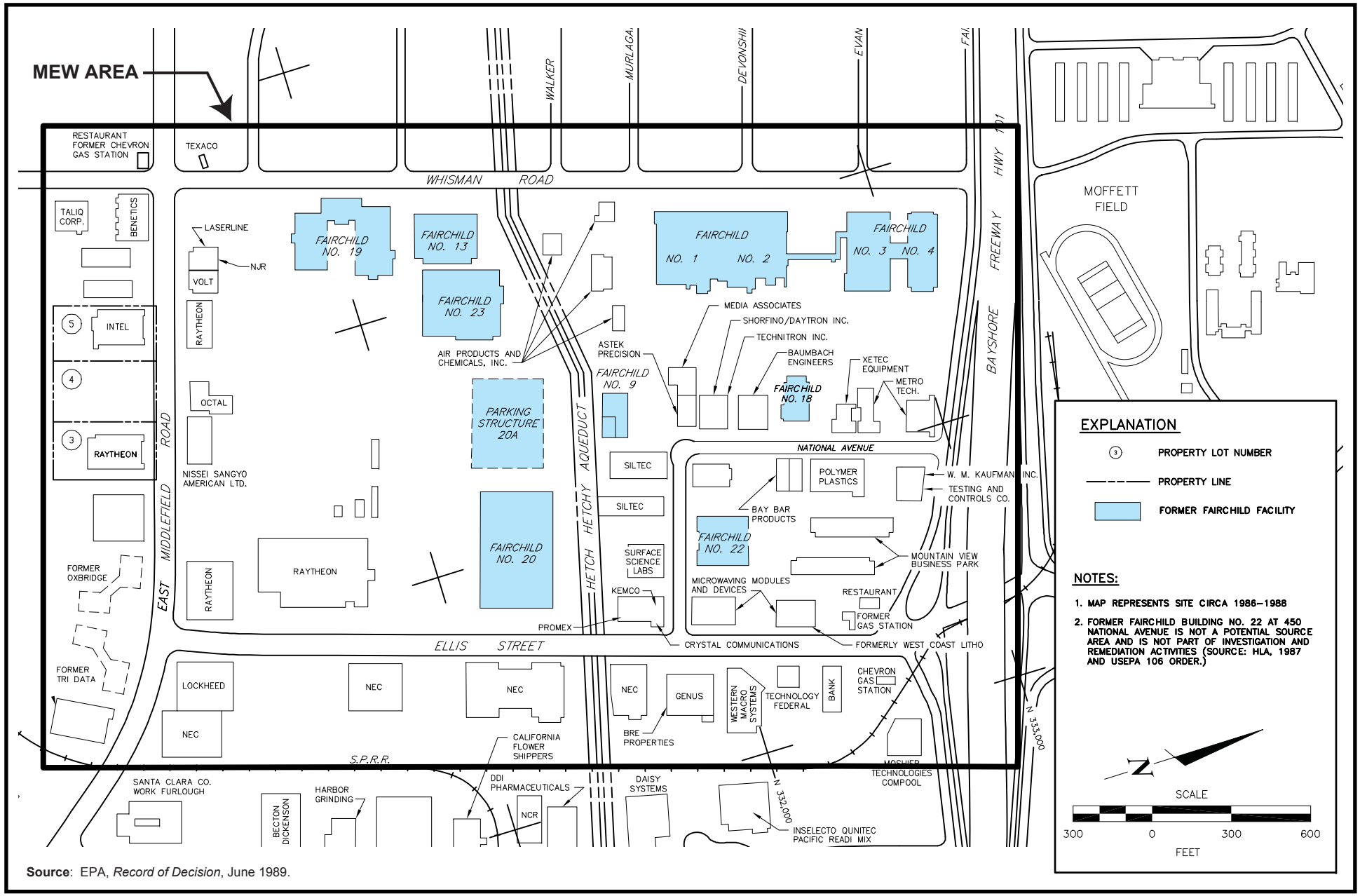
Weiss, 2005 Workplan for Enhanced *In-Situ* Bioremediation Pilot Test for Intel Mountain View, May 24, 2005

Weiss, 2010a. 2009 Annual Progress Report For Former Fairchild Building 18, 644 National Avenue, Middlefield-Ellis-Whisman Study Area Mountain View, California, June 15, 2009.

Weiss, 2010b. 2009 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

Perimeter Rd
Bailey Rd
Dailey Rd
Cody Rd
Bayshore Fwy/Hwy 101
Fairchild Dr
Evandale Ave
Devonshire Ave
Murlagan Ave
National Ave
Ellis St
Sherland Ave
N. Whisman Rd
Flynn Ave
Middlefield Road

Fairchild System 3
Former Fairchild Buildings 1 through 4 Site
RGRP - South
Fairchild System 1
126A
35A
36A
69B1
37A
44A
43A
40A
AE/RW-9-1
AE/RW-9-2
RW-21A
122A
137A
138A
123A
RW-20A
Fairchild System 19
Former Fairchild Building 19 Site
Raytheon System
Raytheon Site

N

0 300 600 900 Feet

Explanation

Building 9 Remedy Components

- Source Recovery, On
- Source Recovery, Off
- Monitoring Well

Extraction and Monitoring Wells in the Vicinity

- Regional Recovery Well
- Source Recovery Well
- Monitoring Well

- 401 National Avenue
- Fairchild System 1
- Groundwater Treatment Plant
- Slurry Wall
- Building
- Road
- Treatment-System Pipeline
- Treatment-System Discharge Pipeline

Figure 3

Former Fairchild Building 9
Site Map and Well Network
Mountain View, California

Weiss Associates
Environmental Science, Engineering and Management

T:\MEW\Maps\AnnRpt\draft2009\Bdlg18SiteMapWellNetWrk.mxd

01-June-2010

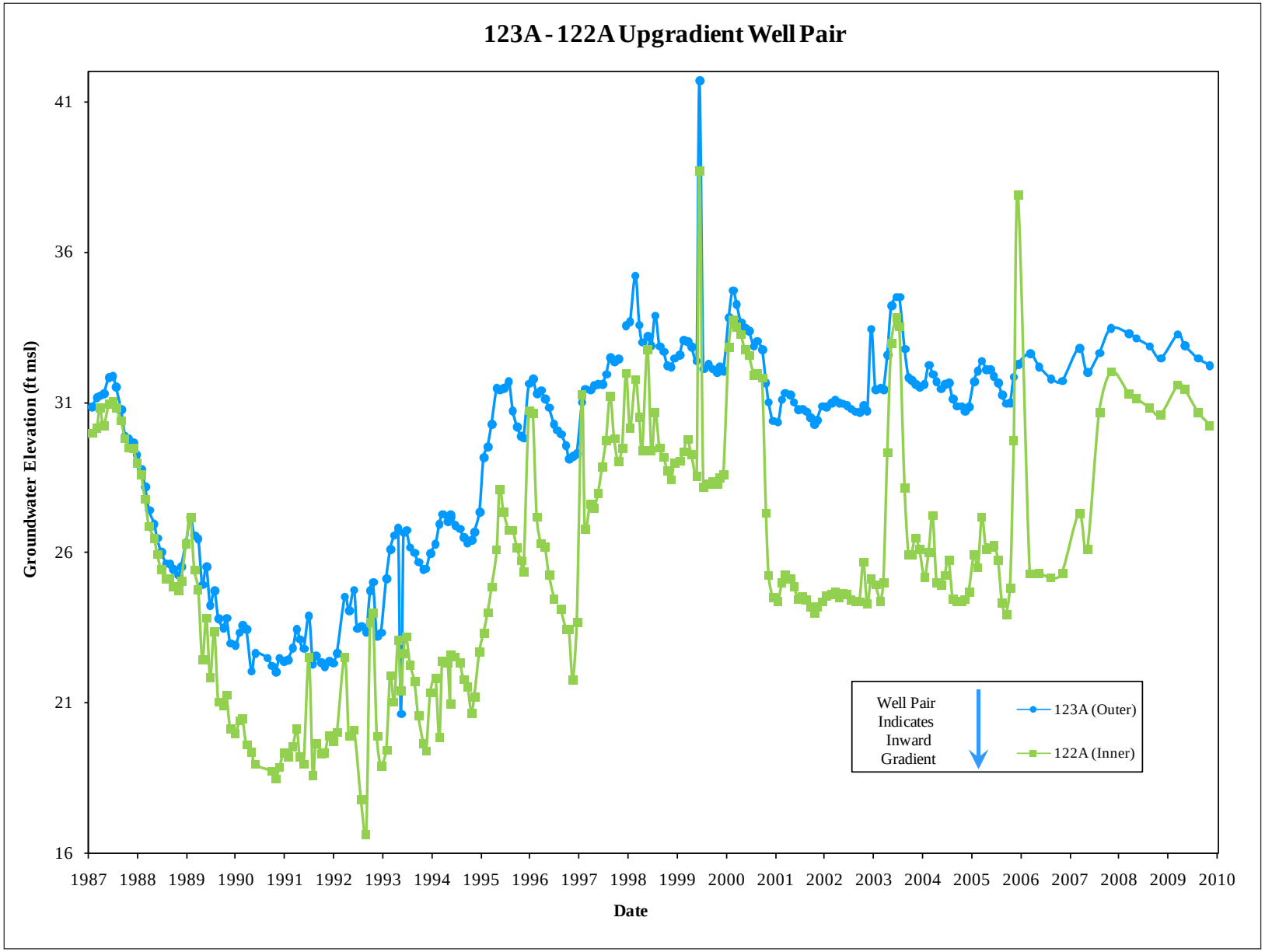


Figure 4. Hydrographs – Groundwater Elevation Measurements, Slurry Wall Well Pairs – Upgradient Wells, Building 9, MEW Fairchild Site, Mountain View, California

R:\Schlumberger\02-MEW Fairchild\Reports\Bldg 9\2009\Figures\Figure 4.doc

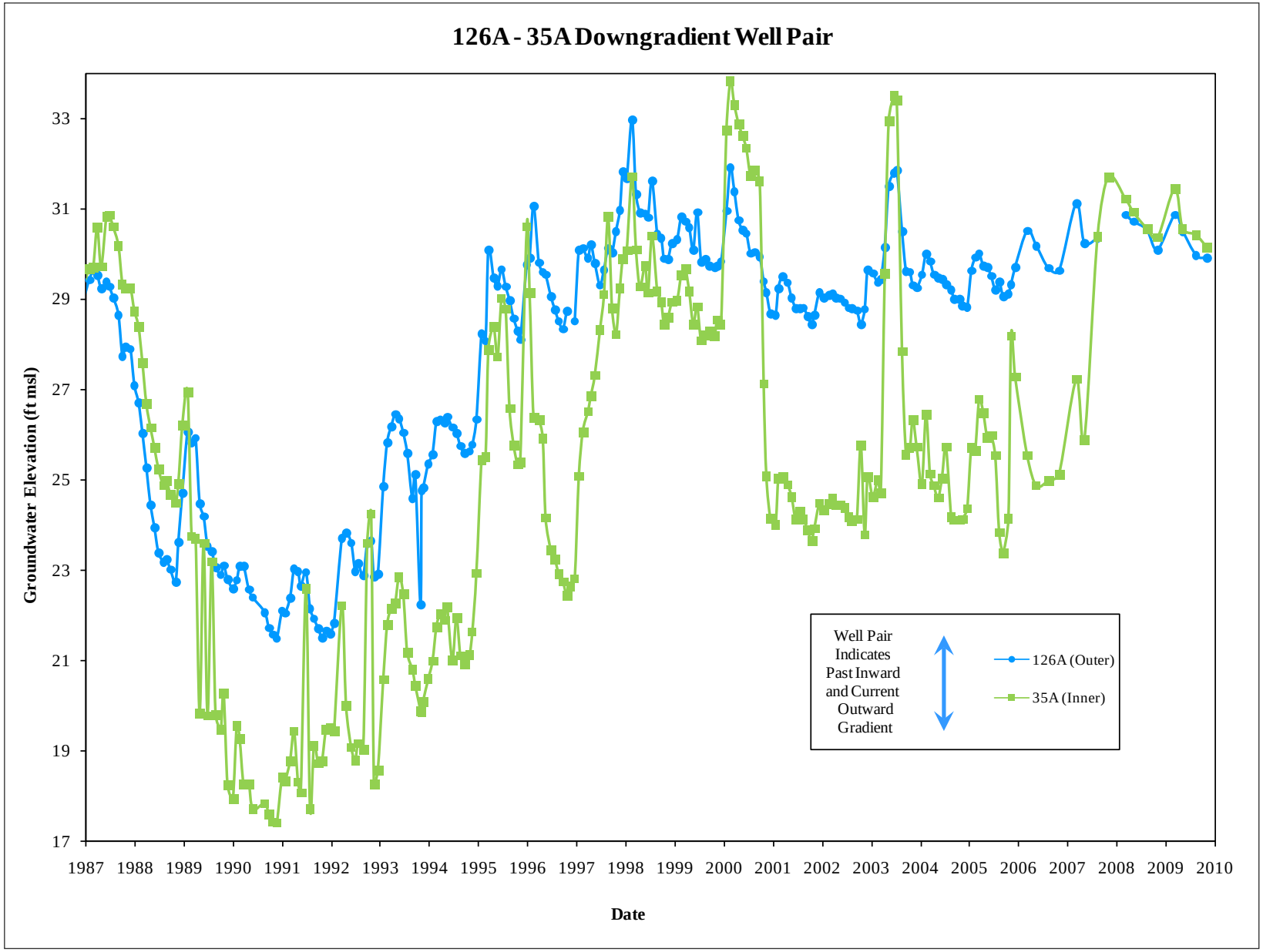


Figure 5. Hydrographs – Groundwater Elevation Measurements, Slurry Wall Well Pairs – Downgradient Wells, Building 9, MEW Fairchild Site, Mountain View, California

R:\Schlumberger\02-MEW Fairchild\Reports\Bldg 9\2009\Figures\Figure 5.doc

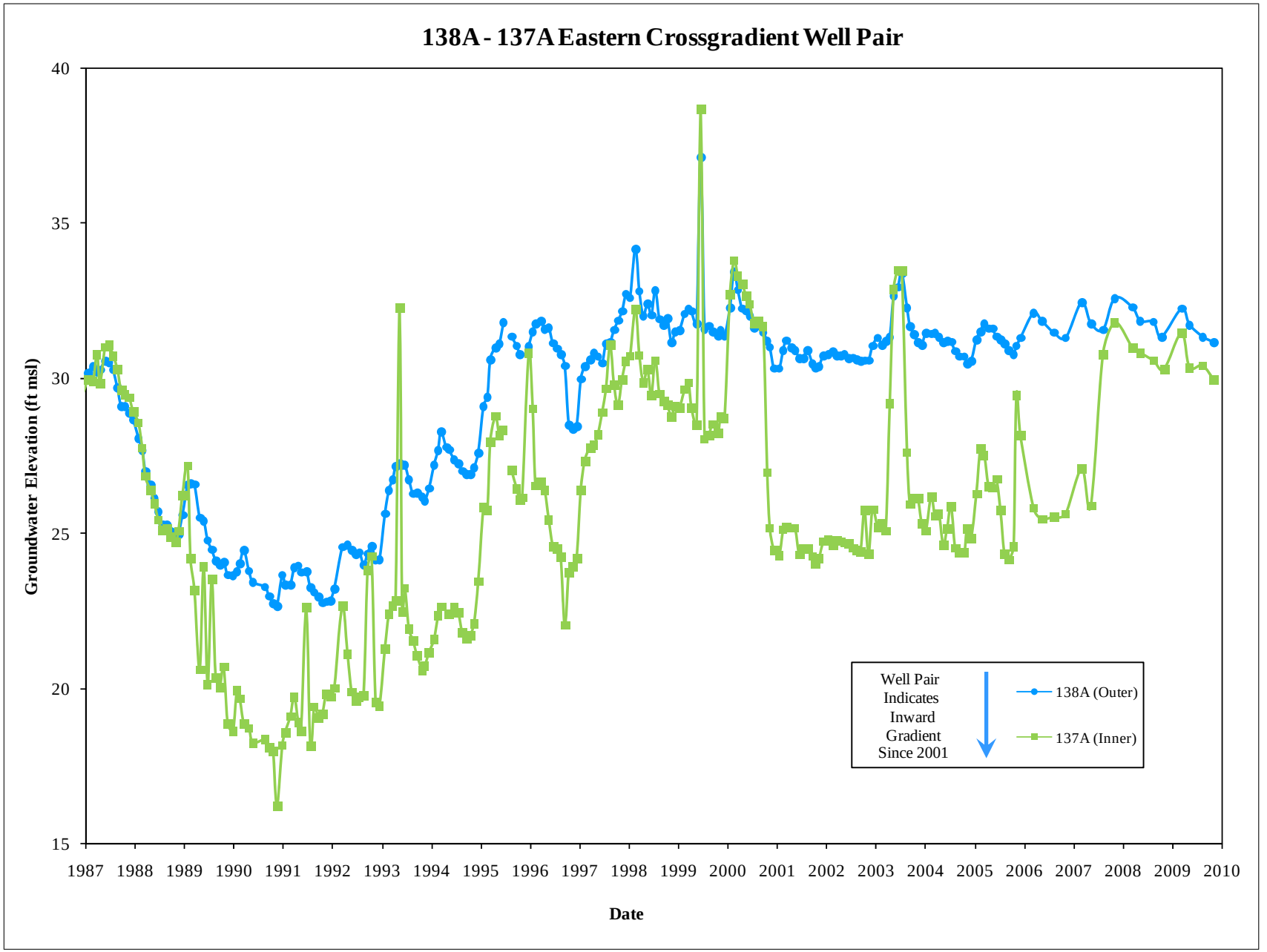


Figure 6. Hydrographs – Groundwater Elevation Measurements, Slurry Wall Well Pairs – Crossgradient Wells, Building 9, MEW Fairchild Site, Mountain View, California

Weiss Associates

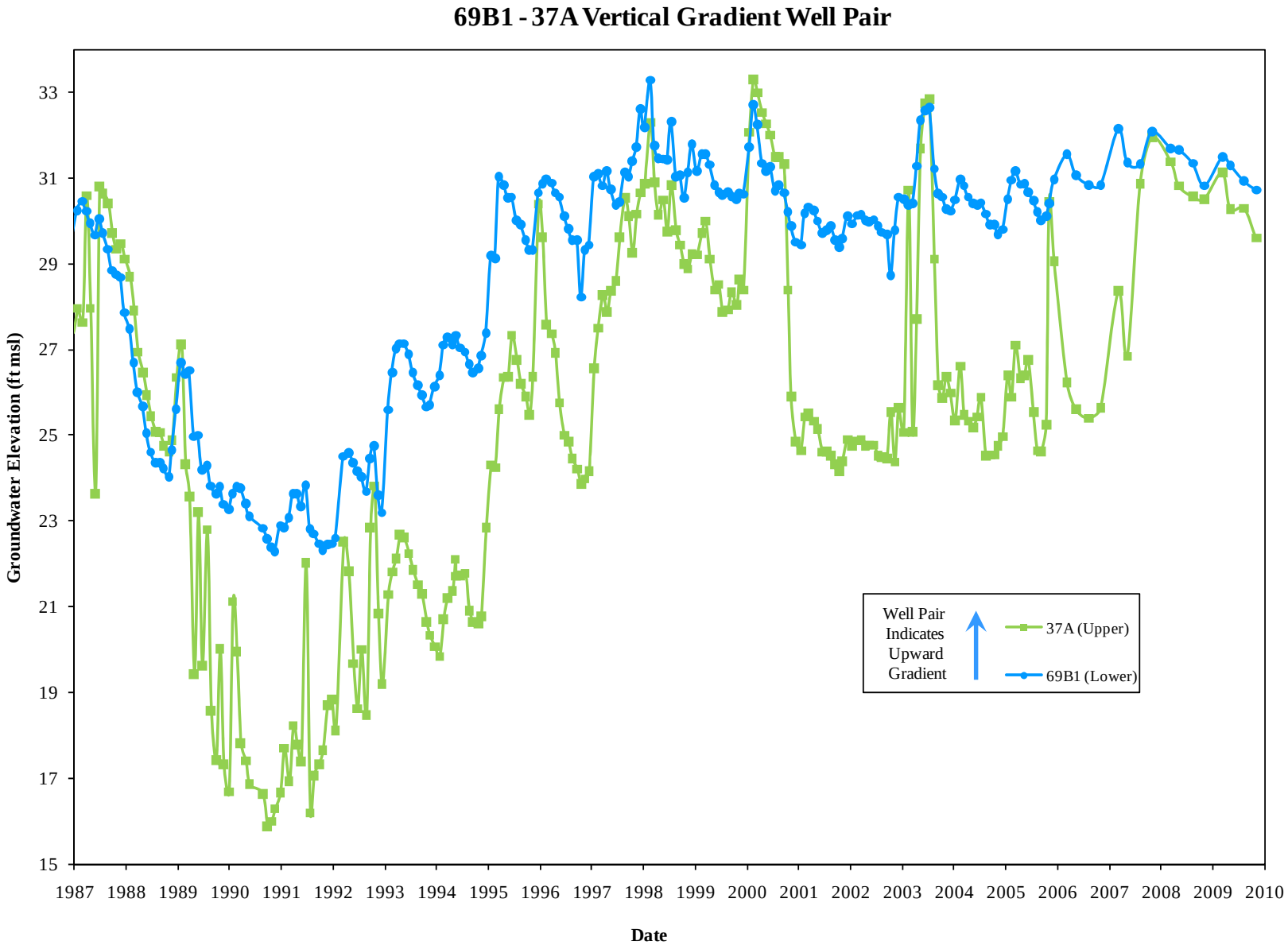


Figure 7. Hydrographs – Groundwater Elevation Measurements, Slurry Wall Well Pairs – Vertical Gradient Wells, Building 9, MEW Fairchild Site, Mountain View, California

C:\Users\mcunningham\Desktop\Figure 7.doc

Buildings 1 through 4 Slurry Wall

Building 9 Slurry Wall

National Ave

121A
54A
147A
133A
126A
42A
35A
44A
36A
37A
43A
AE/RW-9-1
(5.3)
AE/RW-9-2
(2.1)
40A
RW-21A
(0.0**)
137A
138A
122A
RW-20A
(0.0**)
123A
99A

28 29 29 30 32 31 31 33 32 31 31 32 34 33 35 36 37 38

Explanation

A/A1 Aquifer Wells for Building 9

- 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
- 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:
Captures are shown for wells specific to Building 9.

N

0 50 100 150 Feet

Figure 8

Former Fairchild Building 9
A/A1 Groundwater Elevation Contours,
Target Capture Area and
Estimated March 26, 2009 Capture
Mountain View, California

Weiss Associates
Environmental Science, Engineering and Management

T:\MEW\Maps\AnnRpt\draft2009\Bdlg9CaptureZonesAA1_mar.mxd

09-June-2010

Buildings 1 through 4 Slurry Wall

Building 9 Slurry Wall

AE/RW-9-1
(5.0)

AE/RW-9-2
(1.5)

RW-21A
(0.0**)

RW-20A
(0.0**)

National Ave

0 50 100 150 Feet

N

Explanation

A/A1 Aquifer Wells for Building 9

- 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
- 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 9.

Figure 9
Former Fairchild Building 9
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

T:\MEW\Maps\AnnRpt\draft2009\Bdlg9CaptureZonesAA1_nov.mxd

09-June-2010

TABLES

Table 1. Extraction and Monitoring Well Details, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

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)	Well Type
122A	09/25/86	A	44.23	4	38	28	38	18	39	Mon
123A	09/29/86	A	44.37	4	38	28	38	18	39	Mon
126A	09/30/86	A	42.85	4	38	23	38	18	40	Mon
137A	10/10/86	A	43.68	4	36	34	36	32	38	Mon
138A	10/10/86	A	43.60	4	37	34	37	32	38	Mon
35A	02/02/82	A	42.67	2	37	12	37	12	37	Mon
36A	02/02/82	A	42.32	2	40	35	40	15	40	Mon
37A	02/02/82	A	43.21	2	30	15	30	12	30	Mon
40A	04/04/82	A	43.44	2	27	11.5	27	12	27	Mon
42A	02/02/82	A	42.97	2	35	10	35	12	35	Mon
43A	02/02/82	A	43.38	2	27	15	27	15	27	Mon
44A	04/04/82	A	43.13	2	28	13.5	28	13.5	28	Mon
AE/RW-9-1	---	A	43.15	6	33	8	33	6	36	Ext
AE/RW-9-2	---	A	43.85	6	37	8	37	6	38	Ext
RW-20A	---	A	43.57	8	37.5	26.5	36.5	11	38	Ext
RW-21A	---	A	43.16	6	37	21	36	11	38	Ext
69B(1)	12/12/85	B1	42.62	4	59	54	59	50	61	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 9, 401 National Avenue, Mountain View, California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
122A			S		S			S			#, W	
123A[5]			S		S			S			W	
126A[5]			S		S			S			W	
137A			S		S			S			1, W	
138A[5]			S		S			S			W	
35A			S		S			S			#, W	
36A			W								1, W	
37A			S		S			S			1, W	
40A			W								2, W	
42A[6]			W								2, 3, W	
43A			W								2, W	
44A			W								2, W	
AE/RW-9-1			W								2, 4, W	
AE/RW-9-2			W								2, 4, W	
RW-20A			W								2, 4, W	
RW-21A			W								2, 4, W	
69B1[5]			S		S			S			W	
Annual Progress Report[7]						6/15/2009						

Notes and Abbreviations:

Standard observations were recorded whenever a sample was collected for chemical analysis, as required by NPDES Permit CAG912003, Order No. R2-2004-0055 during the first three quarters of 2009 and Order No. R2-2009-0059 which became effective October 1, 2009.

MEW RGRP = Middlefield Ellis Whisman Regional Groundwater Remediation Program

USEPA = United States Environmental Protection Agency

VOCs = volatile organic compounds

S = Slurry wall water levels measured on March 26, May 21, August 27, and November 19, 2009

W = Water levels measured on March 26 and November 19, 2009

= Wells sampled every five years and last sampled during 2007 sampling event.

1 = Well has been sampled annually using USEPA Method 8260 for Halogenated VOCs (using 8010 MS parameters) since 2008 as part of the slurry wall evaluation.

2 = Well has been sampled annually using USEPA Method 8260 for Halogenated VOCs (using 8010 MS parameters) since 2008. Prior to 2008, well was on a 5 year sampling schedule.

3 = Well sampled for antimony and cadmium using USEPA Method 200 series

4 = Well sampled for 1,4-dioxane or SVOCs using USEPA Method 8270C as part of a treatment evaluation for Fairchild System 3.

5 = Only water levels measurements taken in 2009. No sampling is required.

6 = Part of the MEW RGRP S101 sampling event, but are located at the Building 9 Site. Data for these discussed in RGRP report unless pertinent to this report.

7 = The 2008 Annual Progress Report is distributed to the USEPA and MEW Distribution List parties.

Table 3. Monthly Average Flow Rates, January through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Month	RW-20A	RW-21A	AE/RW-9-1	AE/RW-9-2	Total
			gallons per minute		
January	0	0	5.14	2.10	7.24
February	0	0	5.19	2.00	7.19
March	0	0	5.11	1.99	7.10
April	0	0	5.20	1.89	7.09
May	0	0	5.14	3.07	8.22
June	0	0	5.36	3.58	8.94
July	0	0	5.25	2.75	8.00
August	0	0	5.11	2.18	7.29
September	0	0	5.44	1.96	7.40
October	0	0	5.23	1.78	7.01
November	0	0	5.36	1.55	6.91
December	0	0	5.12	1.60	6.72

Notes and Abbreviations

The 2009 annual average flow rate calculated for AE/RW-9-1 was 5.22 gpm and for AE/RW-9-2 was 2.21 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

Table 5. Groundwater Elevations Slurry Wall Pairs, January 2006 through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Date	Well ID Outer/B1 Well	Groundwater Elevation (ft msl)	Well ID Inner/A Well	Groundwater Elevation (ft msl)	Difference (ft)	Inward/Outward Gradient from Slurry Wall or Upward/Downward
Southern Wall - Upgradient Well Pairs						
3/23/2006	123A	32.62	122A	25.3	7.32	Inward
5/25/2006	123A	32.18	122A	25.31	6.87	Inward
8/24/2006	123A	31.8	122A	25.16	6.64	Inward
11/16/2006	123A	31.72	122A	25.31	6.41	Inward
3/22/2007	123A	32.81	122A	27.31	5.5	Inward
5/24/2007	123A	32.01	122A	26.13	5.88	Inward
8/23/2007	123A	32.66	122A	30.68	1.98	Inward
11/15/2007	123A	33.46	122A	32.03	1.43	Inward
3/27/2008	123A	33.31	122A	31.31	2	Inward
5/22/2008	123A	33.14	122A	31.13	2.01	Inward
8/28/2008	123A	32.87	122A	30.82	2.05	Inward
11/20/2008	123A	32.47	122A	30.59	1.88	Inward
3/26/2009	123A	33.28	122A	31.59	1.69	Inward
5/21/2009	123A	32.9	122A	31.42	1.48	Inward
8/27/2009	123A	32.47	122A	30.68	1.79	Inward
11/19/2009	123A	32.22	122A	30.25	1.97	Inward
Northwest Corner - Downgradient Well Pair						
3/23/2006	126A	30.52	35A	25.56	4.96	Inward
5/25/2006	126A	30.18	35A	24.88	5.3	Inward
8/24/2006	126A	29.7	35A	24.99	4.71	Inward
11/16/2006	126A	29.64	35A	25.14	4.5	Inward
3/22/2007	126A	31.12	35A	27.23	3.89	Inward
5/24/2007	126A	30.25	35A	25.89	4.36	Inward
8/23/2007	126A	30.36	35A	30.39	-0.03	Outward
11/15/2007	126A	NM	35A	31.71	NM	------
3/27/2008	126A	30.87	35A	31.23	-0.36	Outward
5/22/2008	126A	30.73	35A	30.93	-0.2	Outward
8/28/2008	126A	30.55	35A	30.57	-0.02	Outward
11/20/2008	126A	30.1	35A	30.37	-0.27	Outward
3/26/2009	126A	30.87	35A	31.45	-0.58	Outward
5/21/2009	126A	30.51	35A	30.56	-0.05	Outward
8/27/2009	126A	29.97	35A	30.42	-0.45	Outward
11/19/2009	126A	29.92	35A	30.15	-0.23	Outward
Eastern Wall - Crossgradient Well Pairs						
3/23/2006	138A	32.1	137A	25.82	6.28	Inward
5/25/2006	138A	31.84	137A	25.48	6.36	Inward
8/24/2006	138A	31.49	137A	25.53	5.96	Inward
11/16/2006	138A	31.31	137A	25.65	5.66	Inward
5/24/2007	138A	31.77	137A	25.9	5.87	Inward
8/23/2007	138A	31.57	137A	30.78	0.79	Inward
3/27/2008	138A	32.3	137A	31	1.3	Inward
5/22/2008	138A	31.85	137A	30.83	1.02	Inward
8/28/2008	138A	31.83	137A	30.58	1.25	Inward
11/20/2008	138A	31.33	137A	30.31	1.02	Inward
3/26/2009	138A	32.26	137A	31.47	0.79	Inward
5/21/2009	138A	31.73	137A	30.34	1.39	Inward
8/27/2009	138A	31.33	137A	30.42	0.91	Inward
11/19/2009	138A	31.16	137A	29.97	1.19	Inward

Table 5. Groundwater Elevations Slurry Wall Pairs, January 2006 through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California

Date	Well ID Outer/B1 Well	Groundwater Elevation (ft msl)	Well ID Inner/A Well	Groundwater Elevation (ft msl)	Difference (ft)	Inward/Outward Gradient from Slurry Wall or Upward/Downward
A-B1 Aquitard - Vertical Gradient Well Pairs						
3/23/2006	69B1	31.55	37A	26.23	5.32	Upward
5/25/2006	69B1	31.07	37A	25.6	5.47	Upward
8/24/2006	69B1	30.84	37A	25.39	5.45	Upward
11/16/2006	69B1	30.83	37A	25.63	5.2	Upward
3/22/2007	69B1	32.14	37A	28.37	3.77	Upward
5/24/2007	69B1	31.36	37A	26.84	4.52	Upward
8/23/2007	69B1	31.32	37A	30.87	0.45	Upward
11/15/2007	69B1	32.08	37A	31.95	0.13	Upward
3/27/2008	69B1	31.69	37A	31.37	0.32	Upward
5/22/2008	69B1	31.66	37A	30.81	0.85	Upward
8/28/2008	69B1	31.34	37A	30.56	0.78	Upward
11/20/2008	69B1	30.82	37A	30.51	0.31	Upward
3/26/2009	69B1	31.49	37A	31.12	0.37	Upward
5/21/2009	69B1	31.3	37A	30.27	1.03	Upward
8/27/2009	69B1	30.92	37A	30.29	0.63	Upward
11/19/2009	69B1	30.72	37A	29.6	1.12	Upward

Notes and Abbreviations:

ft = feet

ft amsl = feet above mean sea level

NM = Groundwater elevation not measured due to well being inaccessible

Well ID = well identifier used in Middle Field-Ellis-Whisman database

Table 6. Groundwater Sampling Results Summary, January 2005 through December 2009, Former Fairchild Building 9, 401 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) >													
35A	11/13/07	CT/8260	<1.0	**34**	<0.5	**22**	**420**	**4.3**	**11**	<20	<0.5	**5.9**	**370**	**9.7**	**878**	---
36A	11/13/07	CT/8260	<5.0	**18**	<2.5	**7.3**	**360**	**6.4**	<2.5	<100	<2.5	**45**	**160**	<2.5	**597**	---
36A	12/11/08	CT/8260	<3.3	**20**	<1.7	**9.2**	**370**	**3**	**4**	<67	<1.7	**21**	**110**	<1.7	**537**	---
36A	11/17/09	CT/8260	<1.0	**7.2**	<0.5	**7.5**	**490**	**3.9**	**2.2**	<20	<0.5	**2**	**98**	**1.6**	**613**	---
37A	11/13/07	CT/8260	<50	**1,100**	<25	**610**	**1,100**	<25	**98**	<1000	<25	**2,700**	**2,900**	**78**	**8,586**	---
37A	12/11/08	CT/8260	<25	**3,000**	<13	**610**	**2,000**	**20**	**140**	<500	<13	**2,600**	**2,300**	**280**	**10,950**	---
37A	11/17/09	CT/8260	<1.0	**18**	<0.5	**17**	**140**	**1.9**	**7.5**	<20	<0.5	**160**	**300**	**1.9**	**646**	---
40A	11/16/05	CT/8260	<8.3	**7**	<4.2	**5.9**	**120**	<4.2	**14**	<170	<4.2	**12**	**1,100**	<4.2	**1,259**	---
40A	11/14/06	CT/8260	<14	**7.7**	<7.1	<7.1	**140**	**13**	**51**	<290	<7.1	**12**	**960**	<7.1	**1,184**	---
40A	11/14/07	CT/8260	<13	<6.3	<6.3	<6.3	**140**	<6.3	**13**	<250	<6.3	**8.5**	**780**	<6.3	**942**	---
40A	11/07/08	CT/8260	<20	<10	<10	<10	**150**	<10	**20**	<400	<10	**11**	**1,000**	<10	**1,181**	---
40A	11/17/09	CT/8260	<1.0	**6.3**	<0.5	**11**	**310**	**4.3**	**22**	<20	<0.5	**9.4**	**1,100**	**30**	**1,493**	---
42A	11/16/05	CT/8260	<4	**2.7**	<2	**2.1**	**44**	<2	**11**	<80	<2	**4.5**	**480**	<2	**544**	---
42A	11/14/06	CT/8260	<6.3	**3.3**	<3.1	**3.8**	**49**	<3.1	**25**	<130	<3.1	**4.8**	**480**	<3.1	**566**	---
42A	11/14/07	CT/8260	<5.0	**3.6**	<2.5	**3.1**	**55**	<2.5	**15**	<100	**3.5**	**5.6**	**430**	<2.5	**516**	---
42A	11/15/08	CT/8260	<6.3	**4.2**	<3.1	**3.4**	**61**	<3.1	**9.9**	<130	<3.1	**5.2**	**380**	<3.1	**464**	---
42A	11/24/09	CT/8260	<5.0	**3.6**	<2.5	<2.5	**49**	**3.9**	**12**	<100	<2.5	**6.1**	**430**	<2.5	**505**	---
43A	11/15/05	CT/8260	<5	**3.3**	<2.5	<2.5	**47**	<2.5	**7.2**	<100	<2.5	**5.2**	**480**	<2.5	**543**	---
43A	11/08/06	CT/8260	<4.0	**2.5**	<2.0	**3**	**58**	<2.0	**8.4**	<80	<2.0	**4.3**	**350**	<2.0	**426**	---
43A	11/12/07	CT/8260	<8.3	**5.4**	<4.2	**4.7**	**91**	<4.2	**21**	<170	<4.2	**9.5**	**480**	<4.2	**612**	---
43A	11/07/08	CT/8260	<6.3	**4.5**	<3.1	**3.9**	**72**	<3.1	**12**	<130	<3.1	**6.8**	**390**	<3.1	**489**	---
43A	11/16/09	CT/8260	<5.0	**5.6**	<2.5	**4.4**	**88**	**4.5**	**11**	<100	<2.5	**6.7**	**320**	<2.5	**440**	---
44A	11/15/05	CT/8260	<4	**2.8**	<2	**2.4**	**110**	**2.8**	**7.4**	<80	**2.6**	**3.1**	**660**	<2	**791**	---
44A	11/08/06	CT/8260	<6.3	<3.1	<3.1	**3.6**	**100**	<3.1	**23**	<130	**3.5**	**3.4**	**730**	<3.1	**864**	---
44A	11/12/07	CT/8260	<10	<5.0	<5.0	<5.0	**93**	<5.0	**7.8**	<200	<5.0	<5.0	**560**	<5.0	**661**	---
44A	11/07/08	CT/8260	<7.1	<3.6	<3.6	<3.6	**40**	<3.6	**7**	<140	<3.6	**5**	**450**	<3.6	**502**	---
44A	11/16/09	CT/8260	<6.3	**4.4**	<3.1	**3.4**	**54**	<3.1	<13	<130	<3.1	**5.2**	**360**	<3.1	**427**	---

Table 6. Groundwater Sampling Results Summary, January 2005 through December 2009, Former Fairchild Building 9, 401 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) >													
122A	11/13/07	CT/8260	<1.0	**71**	<0.5	**17**	**120**	**1.7**	**6.6**	<20	<0.5	**190**	**250**	**0.8**	**658**	---
137A	11/13/07	CT/8260	<100	<50	<50	<50	**9,100**	**82**	<50	<2000	<50	<50	**4,600**	**83**	**13,865**	---
137A	11/18/08	CT/8260	<63	<31	<31	<31	**3,800**	**69**	<31	<1300	<31	<31	**2,100**	<31	**5,969**	---
137A	11/17/09	CT/8260	<33	<17	<17	<17	**4,200**	**45**	<67	<670	<17	<17	**1,700**	<17	**5,945**	---
AE/RW-9-1	08/08/07	CT/8260	<33	**500**	<17	**74**	**1,000**	<17	**24**	<670	<17	**2,600**	**1,200**	**71**	**5,469**	---
AE/RW-9-1	04/22/08	CT/8260	<8.3	**47**	<4.2	**22**	**430**	**11**	**16**	<170	<4.2	**140**	**650**	**5.1**	**1,331**	---
AE/RW-9-1	11/07/08	CT/8260	<13	**54**	<6.3	**24**	**460**	**10**	**19**	<250	<6.3	**360**	**730**	<6.3	**1,668**	---
AE/RW-9-1	11/17/09	CT/8260	<2.0	**19**	<1.0	**11**	**400**	**12**	**11**	<40	**4.4**	**36**	**460**	**2.6**	**966**	---
AE/RW-9-1	11/17/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	**3.4**
AE/RW-9-2	08/08/07	CT/8260	<100	<50	<50	<50	**5,100**	**59**	**110**	<2000	<50	**84**	**5,400**	**220**	**10,973**	---
AE/RW-9-2	11/16/07	CT/8260	<50	**58**	<25	**39**	**3,700**	**45**	**56**	<1000	<25	**74**	**2,500**	**170**	**6,642**	---
AE/RW-9-2	11/06/08	CT/8260	<100	<100	<100	<100	**3,100**	<100	<100	<100	<100	<100	**4,100**	**130**	**7,330**	---
AE/RW-9-2	11/17/09	CT/8260	<4.0	**58**	<2.0	**27**	**2,700**	**35**	**67**	<80	<2.0	**42**	**3,000**	**95**	**6,024**	---
AE/RW-9-2	11/17/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	**3.2**
RW-20A	08/08/07	CT/8260	<13	**23**	<6.3	**18**	**860**	**11**	**9.1**	<250	<6.3	**34**	**790**	**15**	**1,768**	---
RW-20A	11/16/07	CT/8260	<6.3	**83**	<3.1	**69**	**480**	**8.6**	**7.1**	<130	**8.5**	**420**	**440**	<3.1	**1,516**	---
RW-20A	11/15/08	CT/8260	<5.0	**21**	<2.5	**18**	**590**	**8.4**	**6.7**	<100	**3.1**	**48**	**360**	**4.2**	**1,063**	---
RW-20A	11/13/09	CT/8260	<1.0	**13**	<0.5	**14**	**680**	**9.7**	**8.5**	<20	**2.4**	**6.5**	**840**	**5.1**	**1,588**	---
RW-20A	11/13/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	**3.9**
RW-21A	08/08/07	CT/8260	<6.3	**8.7**	<3.1	**7.4**	**250**	**6.9**	**12**	<130	**6.3**	**8.5**	**340**	<3.1	**644**	---
RW-21A	11/16/07	CT/8260	<1.4	**8.1**	<0.7	**5**	**64**	**4.8**	**52**	<29	**3.5**	**4.9**	**71**	**1.1**	**214**	---
RW-21A	11/17/08	CT/8260	<1.0	**7.8**	<0.5	**5.8**	**68**	**8.1**	**49**	<20	<0.5	**1.7**	**58**	**1.3**	**200**	---
RW-21A (DUP)	11/17/08	CT/8260	<1.0	**8**	<0.5	**5.5**	**68**	**8.7**	**50**	<20	<0.5	**1.6**	**60**	**1.3**	**203**	---
RW-21A	11/13/09	CT/8260	<1.0	**4.9**	<0.5	**4.2**	**68**	**0.7**	**50**	<20	<0.5	**0.5**	**79**	**0.8**	**208**	---
RW-21A (DUP)	11/13/09	CT/8260	<1.0	**4.9**	<0.5	**3.9**	**65**	**0.6**	**50**	<20	<0.5	<0.5	**79**	**0.9**	**204**	---
RW-21A	11/13/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	**2.1**

Table 6. Groundwater Sampling Results Summary, January 2005 through December 2009, Former Fairchild Building 9, 401 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) >													

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

Table 7. Capture Zone Calculations and Analysis, March 2009, Former Fairchild Building 9, Mountain View, California

Extraction Well:		**AE/RW-9-1**	**AE/RW-9-2**
b		15	15
i		0.004	0.004
K		7.9	7.9
T		119	119
w		275	275
estimated well loss (ft):	$s_w = CQ^2$	0.006	0.001
extraction rate (gpm):		5.30	2.13
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-342	-137
capture zone width (at extraction well; ft):	$Y_{well} = \pm Q / 4Ti$	536	216
capture zone width (maximum; ft):	$Y_{max} = \pm Q / 2Ti$	1,073	431

LINE OF EVIDENCE	**CAPTURE?**	**COMMENTS**
Water Levels *Potentiometric Surface Maps*	*Adequate*	*Groundwater extraction consists of two operating wells inside the Building 9 Slurry Wall. The slurry wall provides the primary comtainment methodology for VOC cpature, as demonstrated by piezometric surface contours and water level differences inside and outside the wall.*
Calculations *Capture Zone Widths*	*Adequate*	*The calculated stagnations points and capture zone width at extraction well are smaller than target capture of total slurry wall width. Maximum capture zone with is greater than slurry wall enclosure width.*
Concentration Trends *Downgradient Monitoring Wells*	*Adequate*	*TCE is decreasing to stable in downgradient wells, with possible exception of 35A and RW-2A within the slurry wall enclosure (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 Site slurry wall, 275 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

Table 8. Capture Zone Calculations and Analysis, November 2009, Former Fairchild Building 9, Mountain View, California

Extraction Well:		**AE/RW-9-1**	**AE/RW-9-2**
b		15	15
i		0.004	0.004
K		7.9	7.9
T		119	119
w		275	275
estimated well loss (ft):	$s_w = CQ^2$	0.005	0.000
extraction rate (gpm):		4.98	1.48
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-321	-96
capture zone width (at extraction well; ft):	$Y_{well} = \pm Q / 4Ti$	505	150
capture zone width (maximum; ft):	$Y_{max} = \pm Q / 2Ti$	1,009	301

LINE OF EVIDENCE	CAPTURE?	COMMENTS
Water Levels *Potentiometric Surface Maps*	*Adequate*	*Groundwater extraction consists of two operating wells inside the Building 9 Slurry Wall. The slurry wall provides the primary comtainment methodology for VOC cpature, as demonstrated by piezometric surface contours and water level differences inside and outside the wall. November capture snapshot appears slightly greater than March capture snapshot.*
Calculations *Capture Zone Widths*	*Adequate*	*The calculated stagnations points and capture zone width at extraction well are smaller than target capture of total slurry wall width. Maximum capture zone with is greater than slurry wall enclosure width.*
Concentration Trends *Downgradient Monitoring Wells*	*Adequate*	*TCE is decreasing to stable in downgradient wells, with possible exception of 35A and RW-2A within the slurry wall enclosure (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 Site slurry wall, 275 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

Weiss Associates

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.

2009 Annual Report Remedy Performance Checklist

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

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.[4] 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.

[4] 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. Ten percent of all sample delivery groups underwent a stringent Level 4 data validation as required by the 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.

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.

From January through December 2009, the extraction wells at Building 9 (401 National Avenue) pumped to Fairchild System 1 (515 Whisman Road) where combined influent is sampled monthly as required by the NPDES permit. In addition to monthly treatment system sampling, a total of 15 groundwater samples from the MEW Annual Groundwater Sampling Event were submitted to Curtis and Tompkins in Berkeley, California, a state-certified analytical laboratory for VOCs and/or 1,4-dioxane analysis.

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. Tables C-1 and C-2 present a summary of sampling and analysis QA/QC for 2009 at Former Fairchild Building 9.

Table C-1. Summary of Sampling QA/QC for January through December 2009, Former Fairchild Building 9, 401 National Avenue, Mountain View, California.

Who performed sampling (Firm name/address/contact/phone):	Weiss Associates 350 East 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 9, 401 National Avenue, Mountain View, California

Who performed analysis (Lab name/address/contact/phone):	Curtis & Tompkins 2323 Fifth Street Berkeley, CA 94710 Anna Pajarillo (510) 486-0900
Analytical methods[1] (by method number and chemical category):	Eleven samples analyzed by USEPA 8260B – Halogenated Volatile Organic Compounds (8010 MS Parameters) Four samples analyzed by USEPA 8270C-SIM-1,4 Dioxane
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 F of the *2008 Annual Progress Report for Middlefield-Ellis-Whisman Study Area Regional Groundwater Remediation Program, Mountain View, CA.*

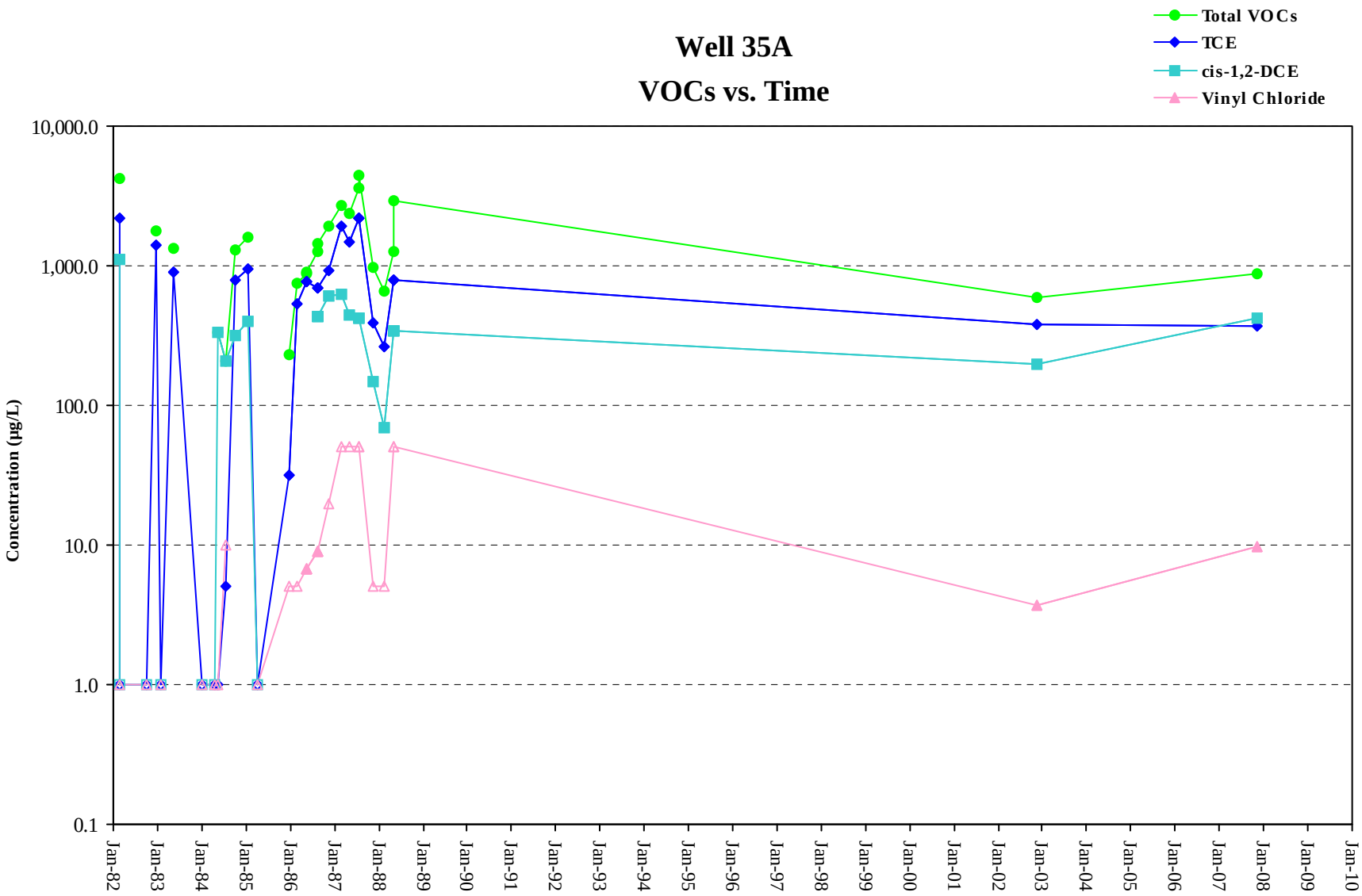
2. Analytical issues for groundwater samples collected during the 2009annual groundwater sampling event are summarized in Appendix G of the *2009 Annual Progress Report for Middlefield-Ellis-Whisman Study Area Regional Groundwater Remediation Program, Mountain View, CA.*

APPENDIX D

SELECTED VOCS VERSUS TIME GRAPHS

Weiss Associates

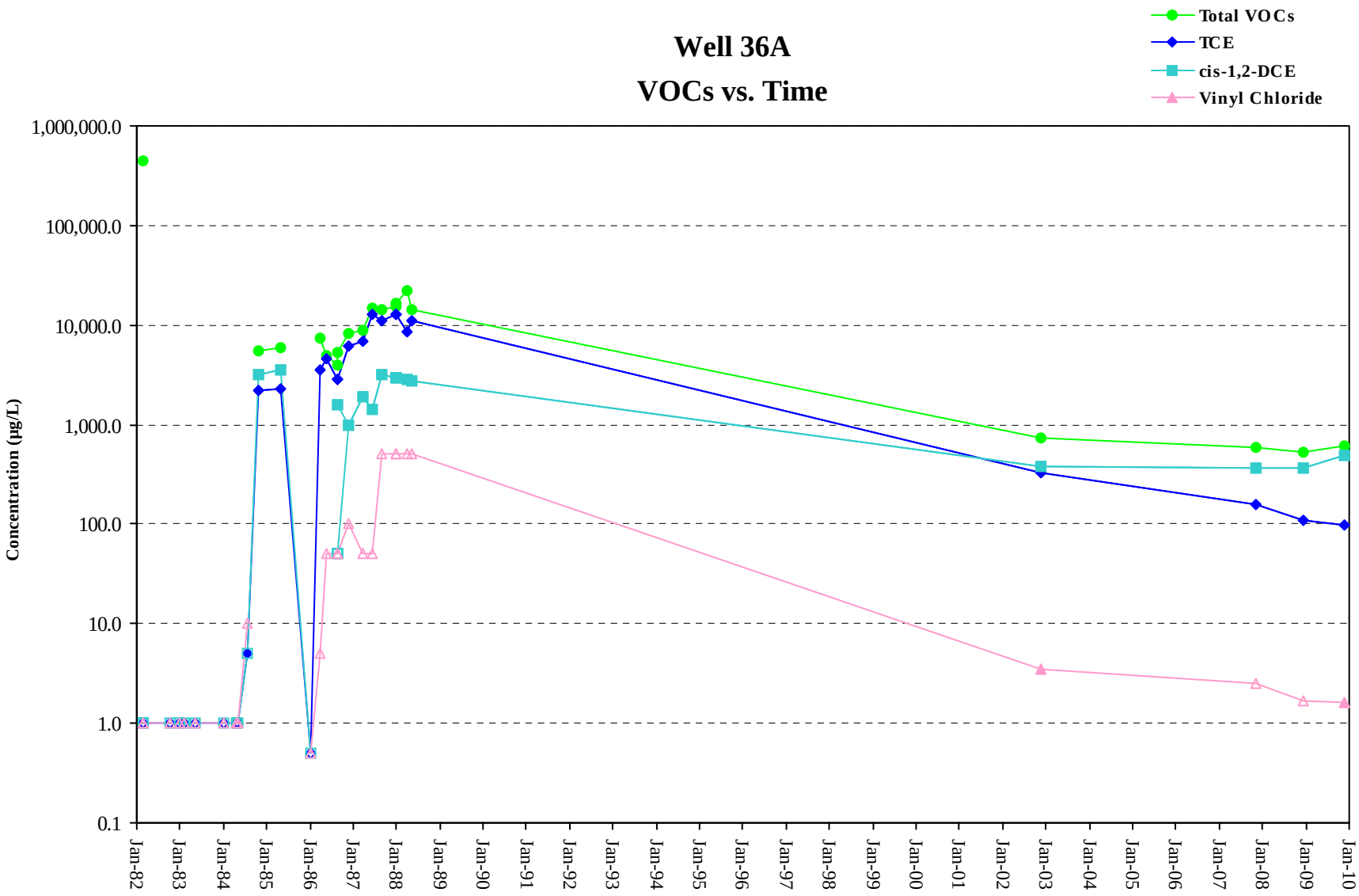
Well 35A
VOCs vs. Time



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

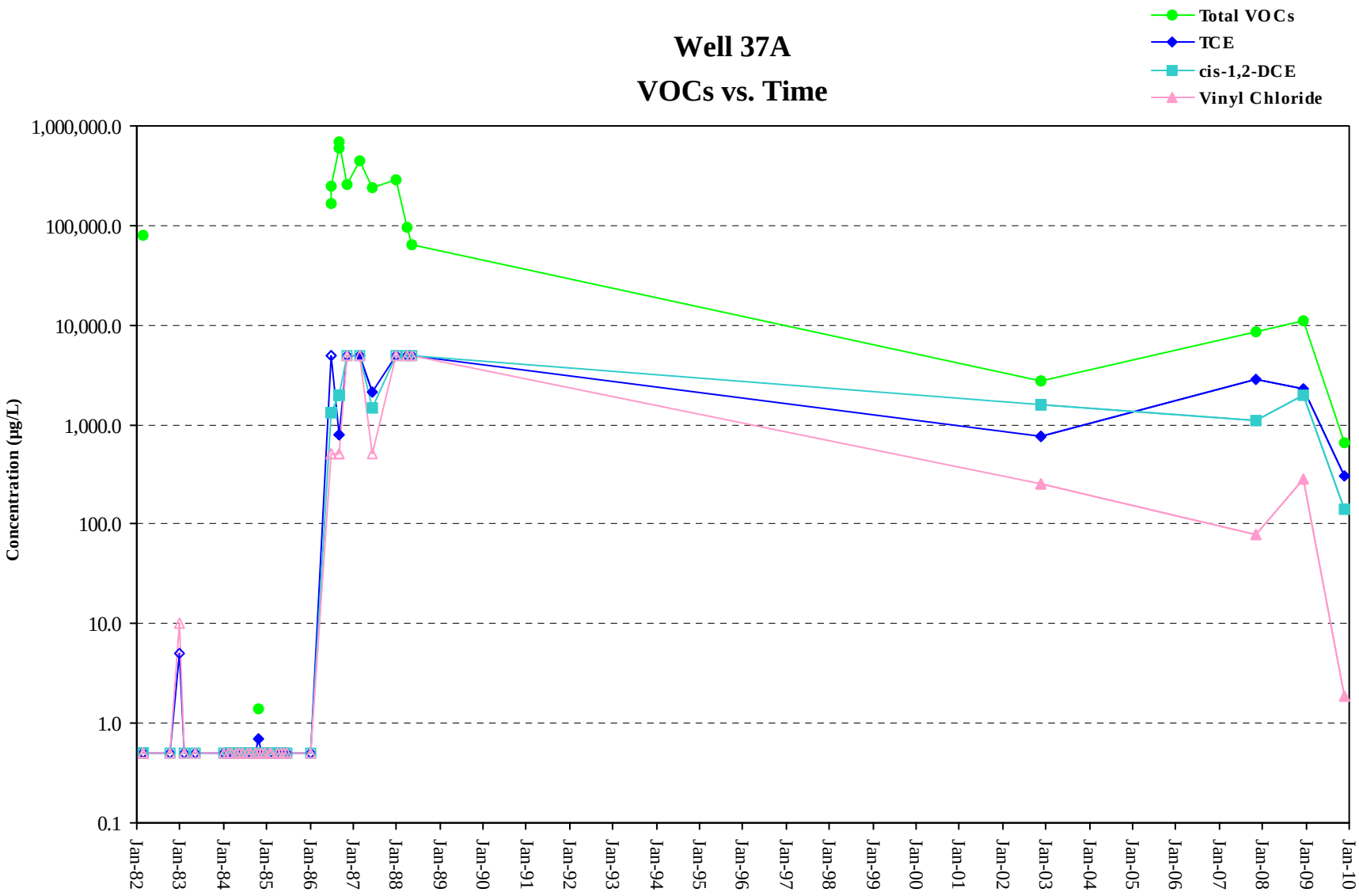


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

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

Weiss Associates

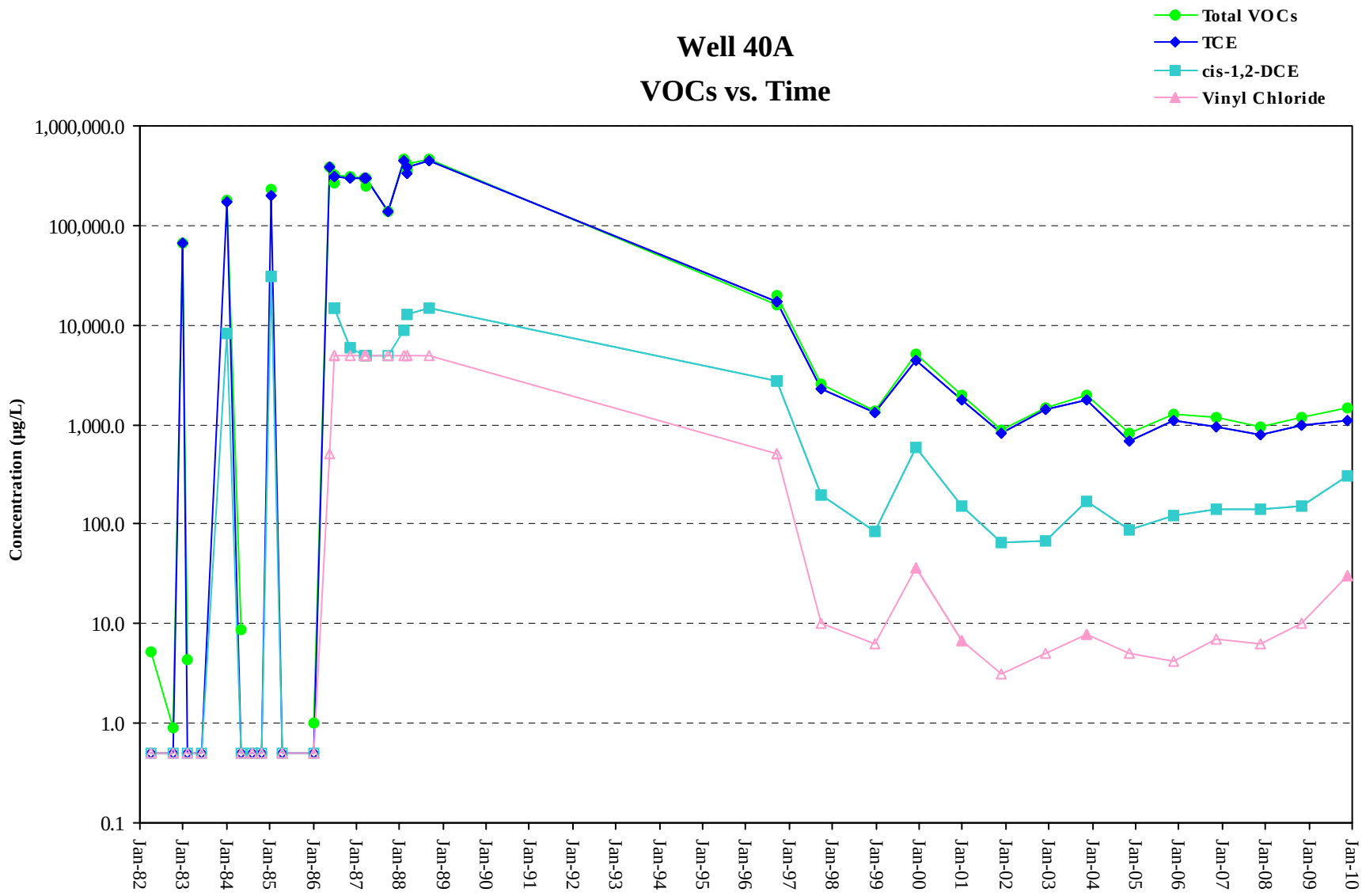
Well 37A
VOCs vs. Time



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

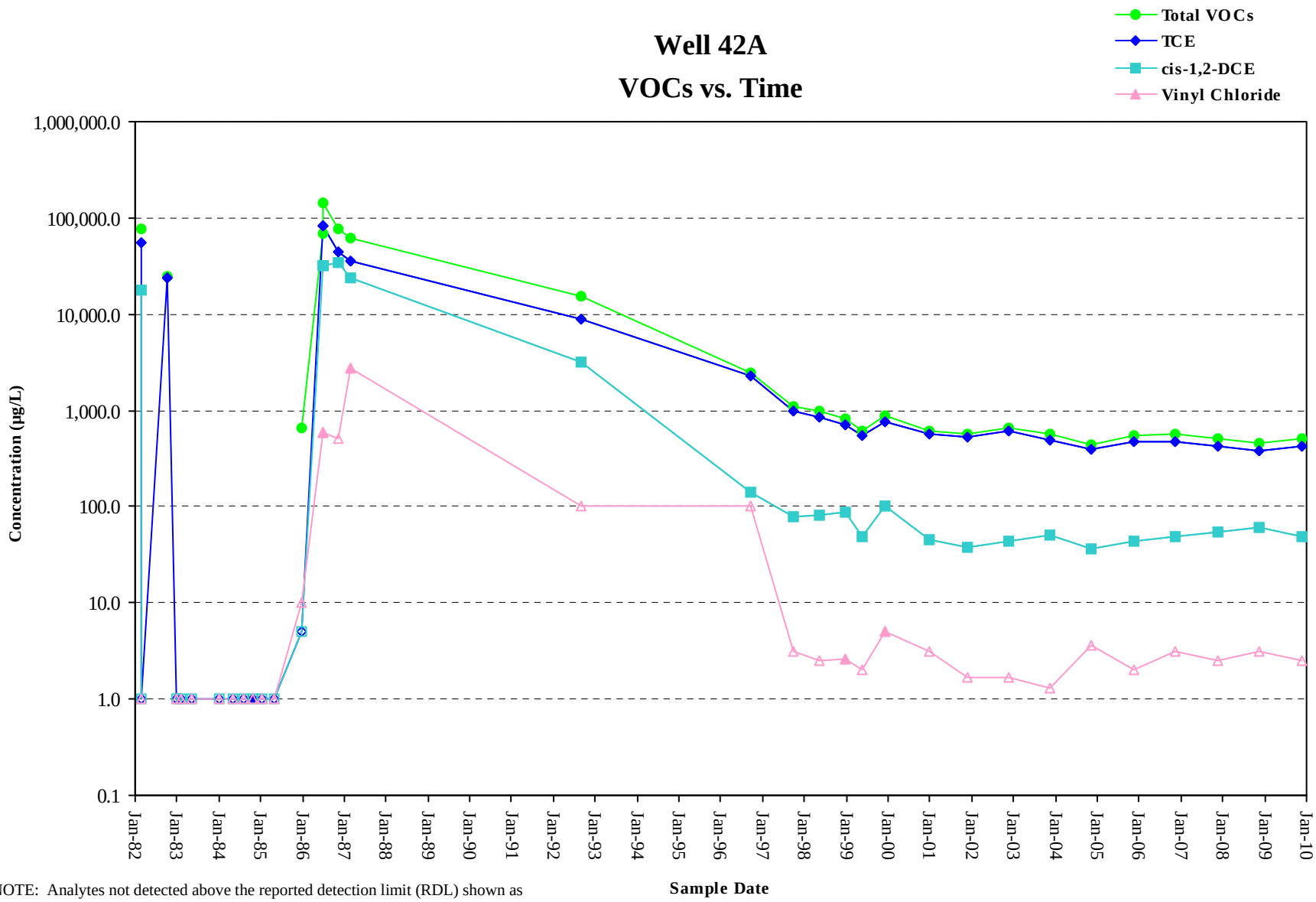


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

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

Weiss Associates

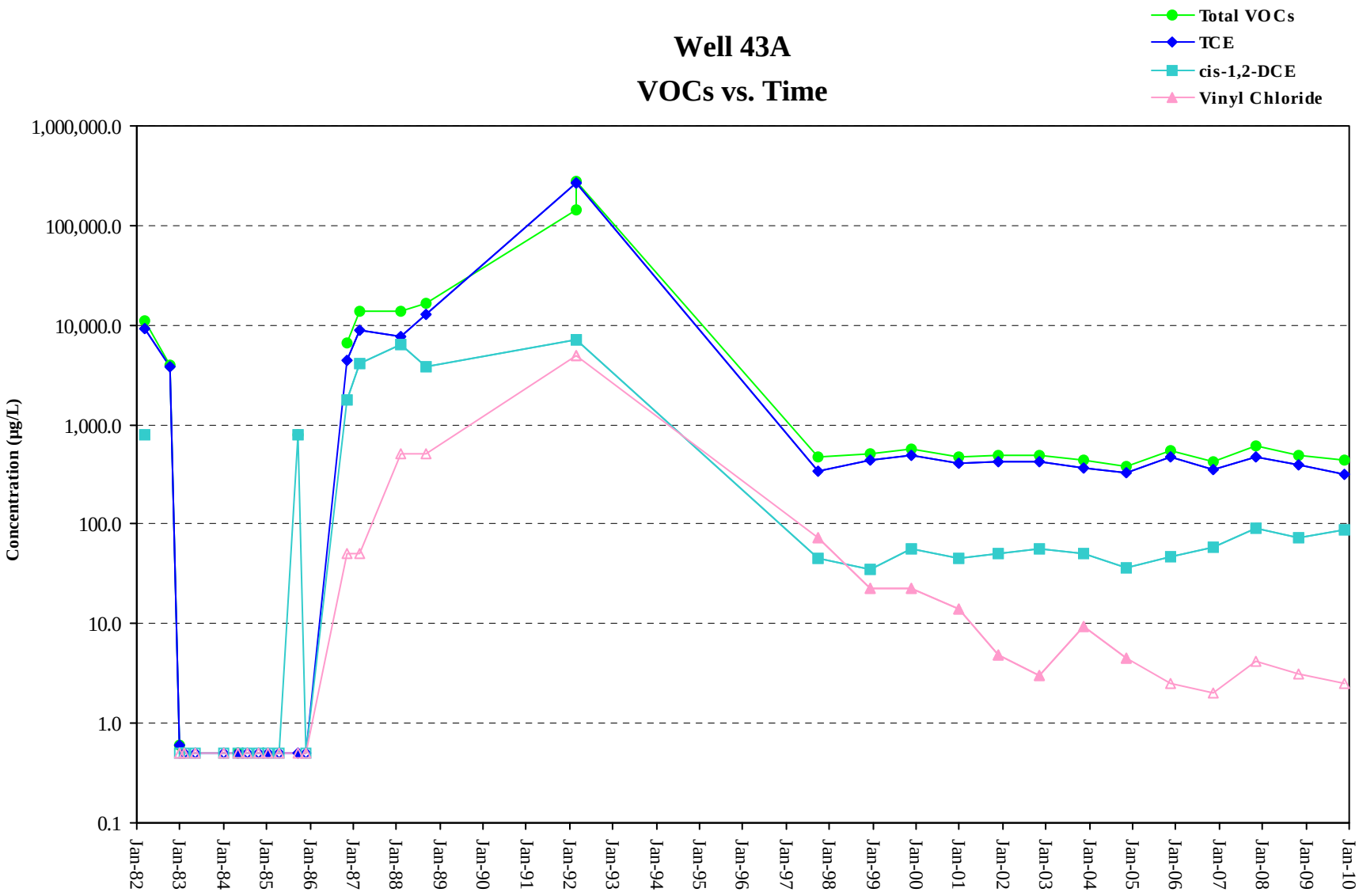
Well 42A
VOCs vs. Time



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

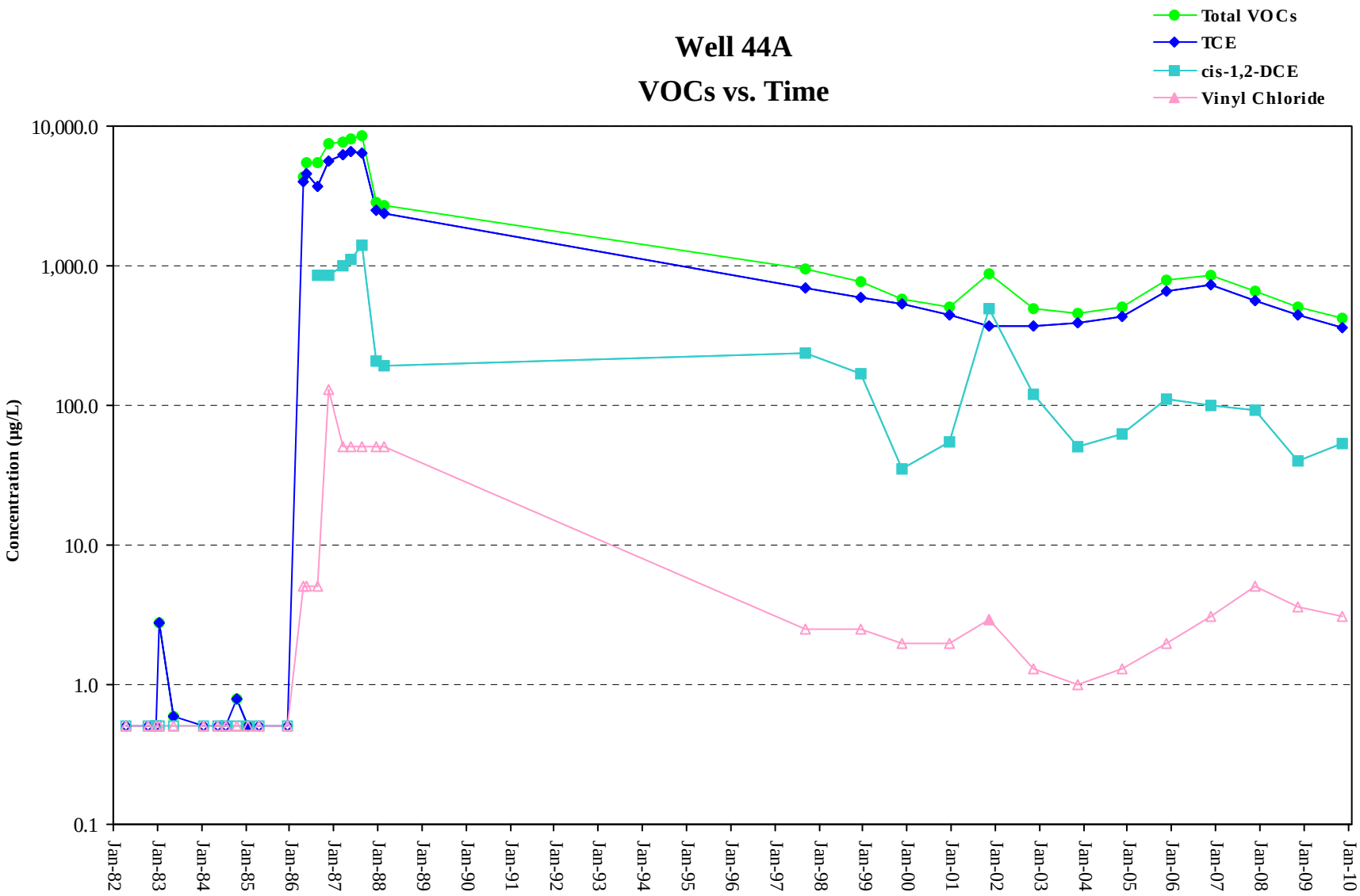


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

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

Weiss Associates

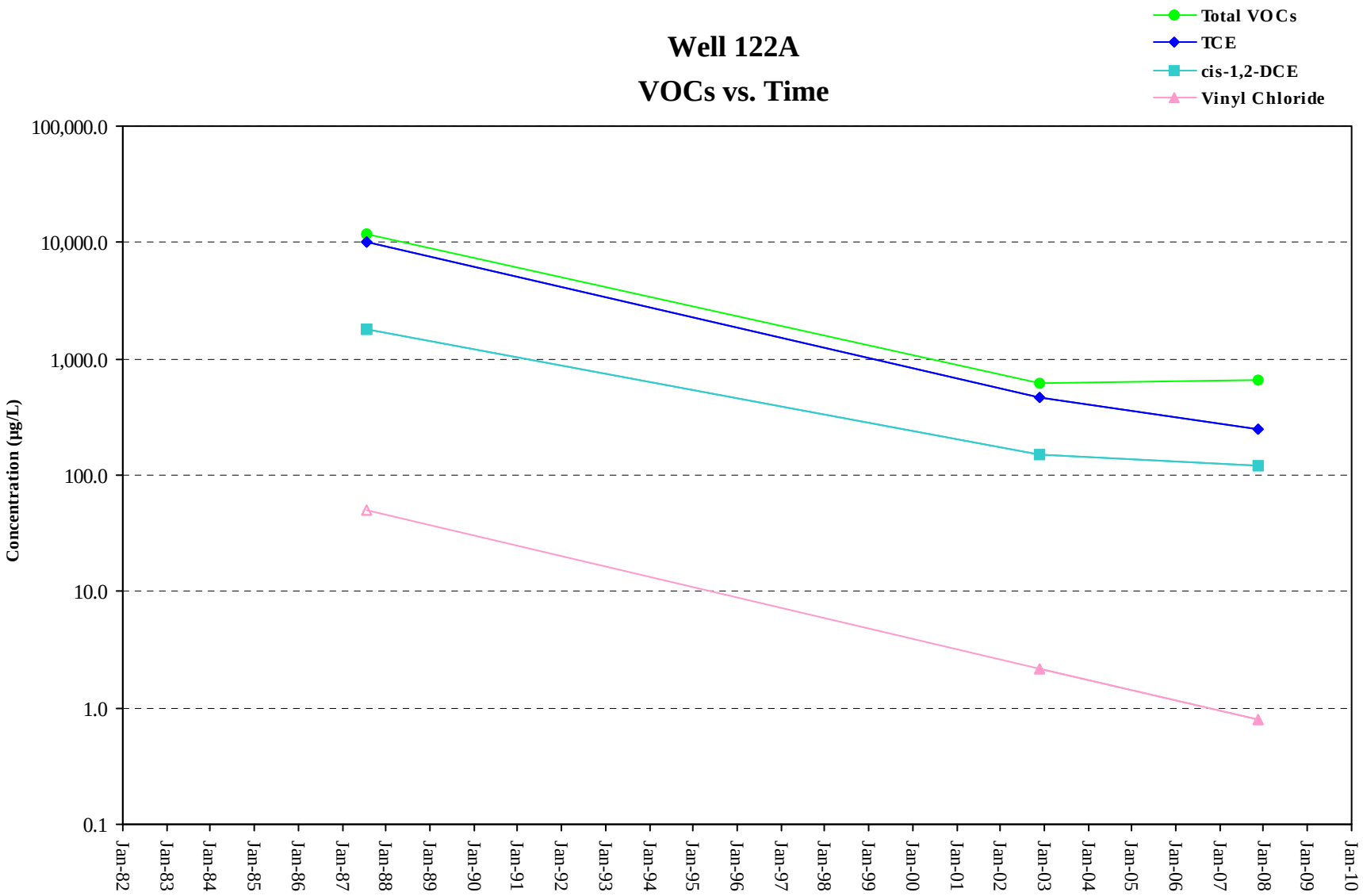
Well 44A
VOCs vs. Time



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

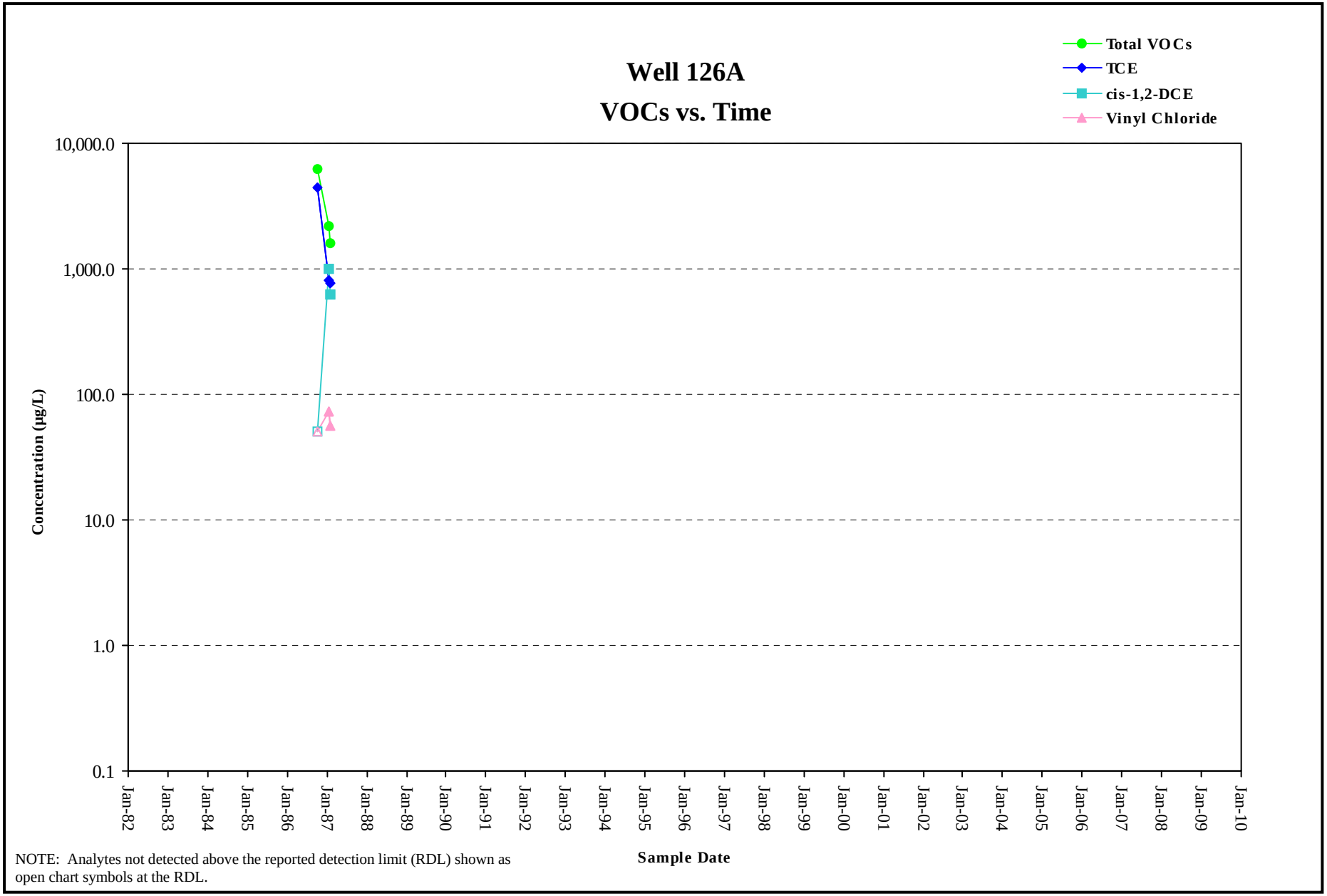
Weiss Associates



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

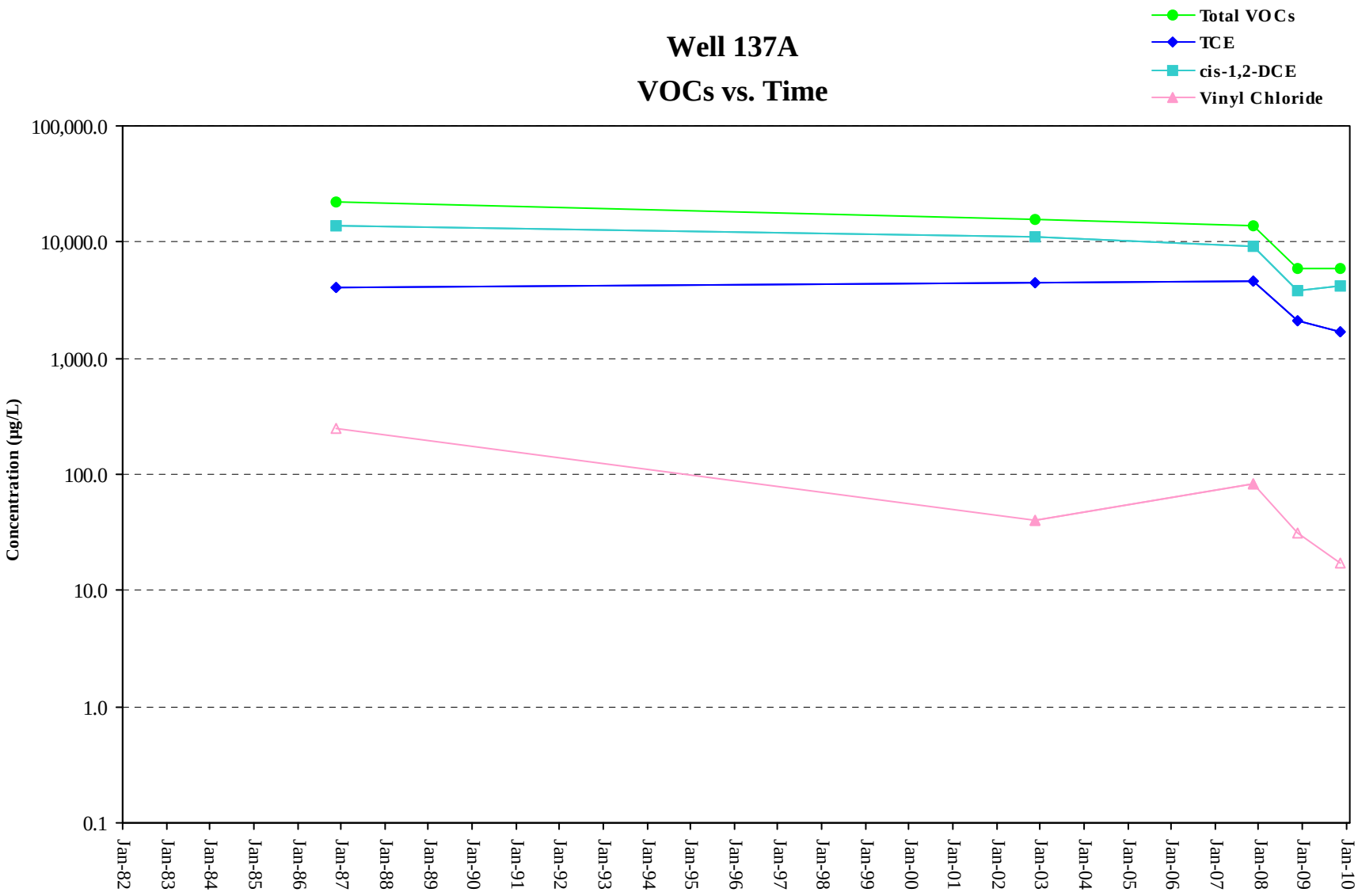
Weiss Associates



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

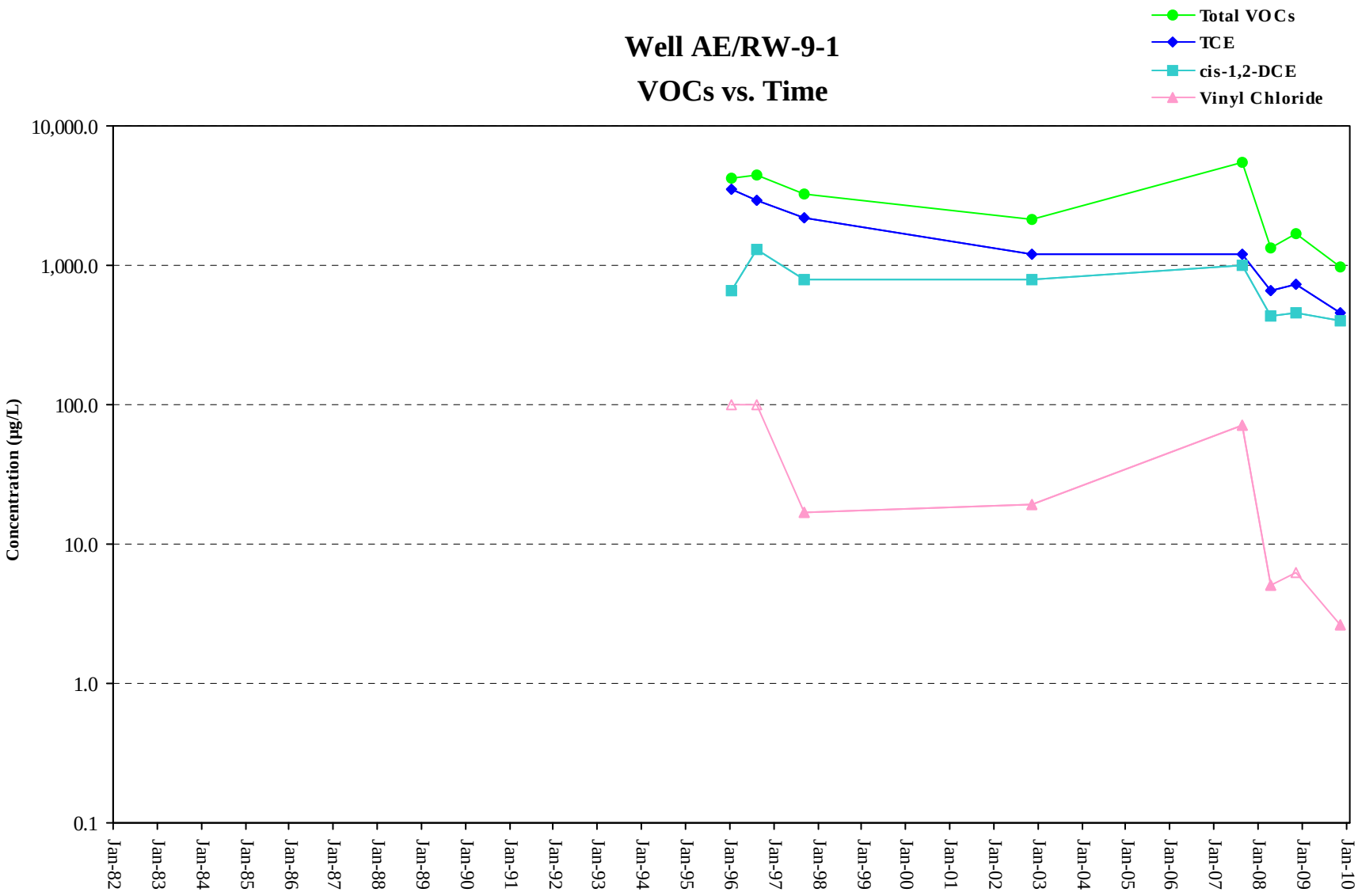
Weiss Associates



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

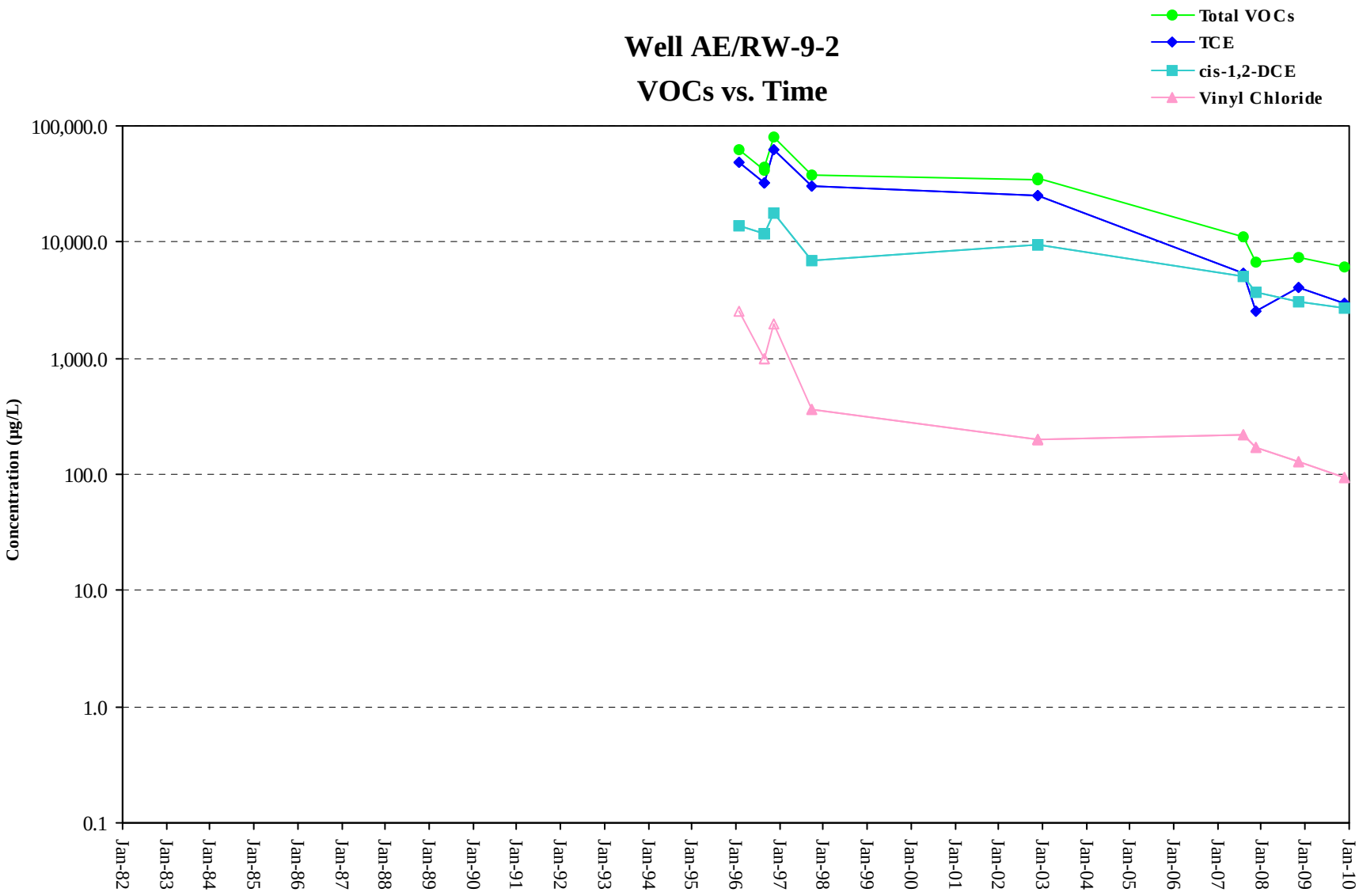
Weiss Associates



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

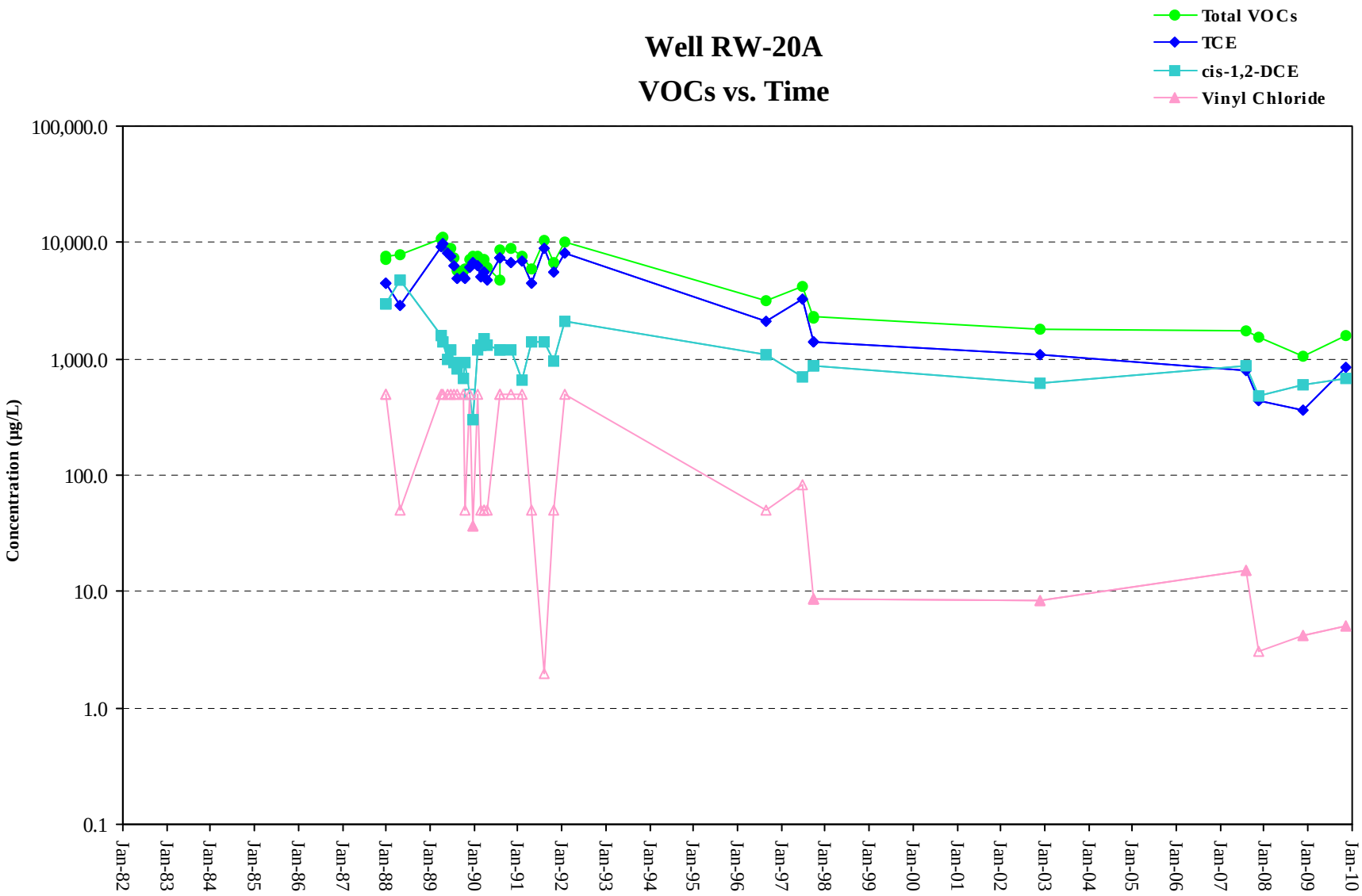


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

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

Weiss Associates

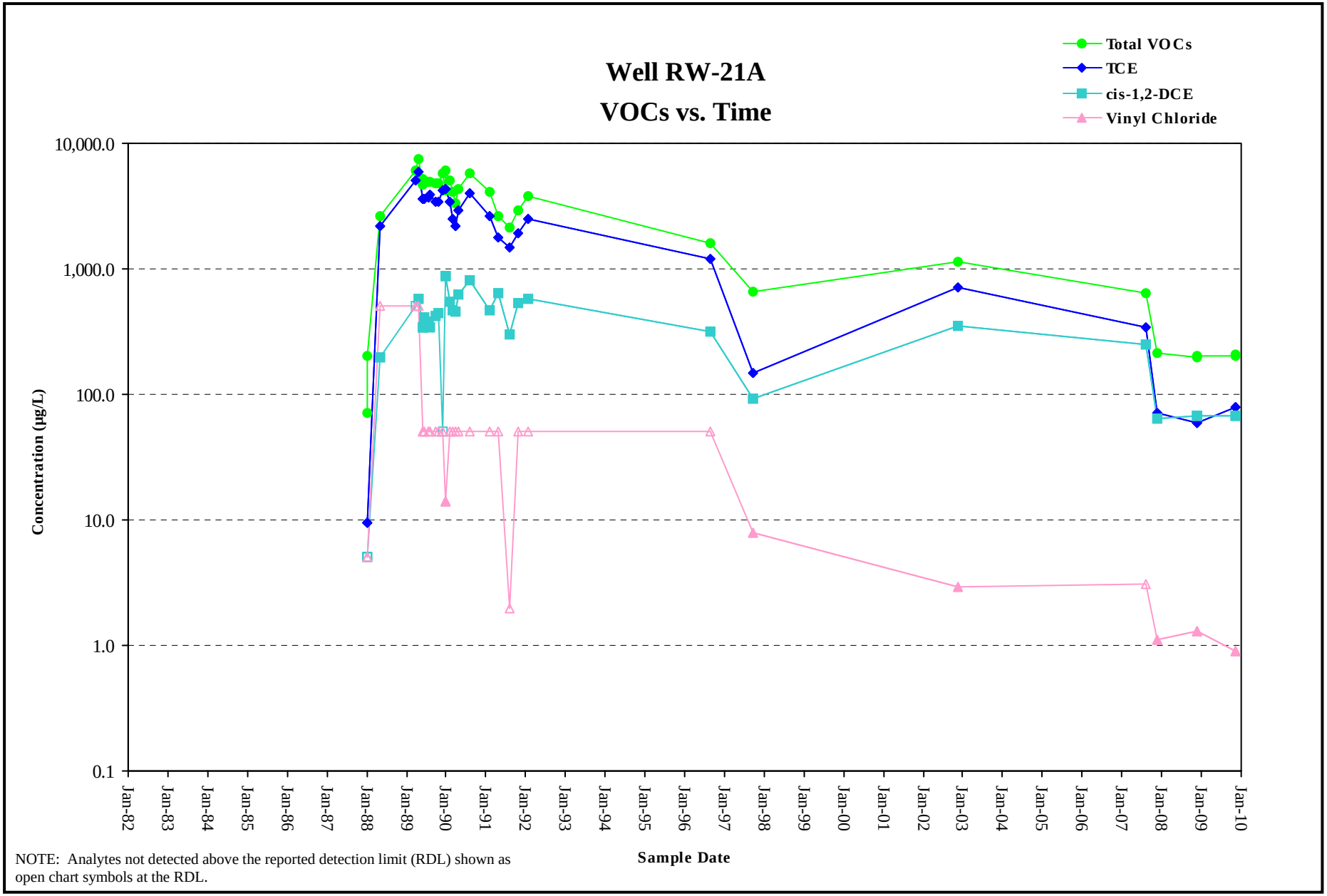
Well RW-20A
VOCs vs. Time



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



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