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2010 ANNUAL PROGRESS REPORT

for

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

prepared for

Schlumberger Technology Corporation
225 Schlumberger Drive
Sugar Land, TX 77478

June 10, 2011

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Prepared by

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Weiss Project No. 363-1922-2-04

submitted to

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

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ACRONYMS AND ABBREVIATIONS

106 Order	Administrative Order for Remedial Design and Remedial Action
cis-1,2-DCE	cis-1,2-dichloroethene
Fairchild	Fairchild Semiconductor Corporation
ft	Feet
ft bgs	feet below ground surface
GAC	granular activated carbon
gpm	gallons per minute
K	hydraulic conductivity
µg/L	micrograms per liter
mg/kg	milligram per kilogram
MEW	Middlefield-Ellis-Whisman
MCLs	maximum contaminant levels
NASA	National Aeronautics and Space Administration
NPDES	National Pollutant Discharge Elimination System
QA/QC	quality assurance and quality control
RGRP	Regional Groundwater Remediation Program
RI/FS	remedial investigation and feasibility study
ROD	Record of Decision
SCRWs	source control recovery wells
Weiss	Weiss Associates
System 1	515 Whisman Road
STC	Schlumberger Technology Corporation
Site	Former Fairchild facilities located at 644 National Avenue, Mountain View, California
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

SUMMARY

This *2010 Annual Progress Report for the former Fairchild Building 18, 644 National Avenue, Middlefield-Ellis-Whisman Study Area, Mountain View, California* (Figures 1, 2, and 3) summarizes Site activities from January 1 through December 31, 2010 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 in the Matter of the MEW Study Area* (106 Order) issued by the United States Environmental Protection Agency (USEPA), and the USEPA's correspondence prescribing 2004 and future annual report contents (USEPA 1990a and 2005).

Groundwater extraction at Building 18 consists of one source control recovery well (SCRW), RW-25A, screened in the A-zone. Groundwater from this well is conveyed via double-contained piping to Fairchild Treatment System 1, located at 515 Whisman Road (System 1). In addition, groundwater removed by a dewatering sump system in the basement of Building 18 is conveyed to and treated by System 1. System 1 discharges treated groundwater to the storm drain system under National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2009-0059, which became effective October 1, 2009. Information on System 1 can be found in the 2010 Annual Progress Report for former Fairchild Buildings 1-4 (Weiss 2011).

Ten groundwater monitoring wells are used to evaluate the progress of the remedy at the Site. Four of the ten wells are sampled annually for volatile organic chemicals (VOCs), and water levels in all ten are measured semiannually.

Site activities conducted in compliance with the 106 Order during this reporting period included continued operation, monitoring, and maintenance activities for the Building 18 groundwater extraction and treatment system, the USEPA's second five-year review site inspection and support activities, and regional activities documented in the *2010 Annual Progress Report for Middlefield-Ellis-Whisman Study Area, Regional Groundwater Remediation Program Mountain View, California* (Geosyntec 2011).

Monitoring data collected during 2010 demonstrate that RW-25A continues to achieve target capture, as indicated by converging lines of evidence including graphical flow net analysis (Figures 4 and 5) and chemical concentration trends. Graphical flow net evaluation in March and November indicated horizontal capture greater than the target capture. There is no vertical component to the capture evaluation because RW-25A is screened in the same hydrostratigraphic zone as the target capture (A-zone). Vertical gradients are upwards at the Site. Volatile organic compound (VOC) concentrations in groundwater have decreased in extent and magnitude in the vicinity of Building 18 and remain well below historical maximums.

The 644 National Avenue property was sold and Building 18 was vacated in December 2007. Redevelopment plans are currently on hold and the building remains vacant. The interim remedial measure installed in the basement of Building 18 to mitigate the vapor intrusion pathway was shut down after the building was vacated. However, the Building 18 basement dewatering system remained operational during 2010.

1. INTRODUCTION

This 2010 Annual Progress Report was prepared at the direction of Schlumberger Technology Corporation (STC) and describes activities from January 1 through December 31, 2010 at the former Fairchild Semiconductor Corporation (Fairchild) Building 18 located at 644 National Avenue in Mountain View, California (Site). It also summarizes analytical data for the past five years. The report is submitted in accordance with Section XV of the 1990 *Administrative Order for Remedial Design and Remedial Action in the Matter of the MEW Study Area* (106 Order) issued by the United States Environmental Protection Agency (USEPA) and the USEPA's correspondence prescribing annual report contents (USEPA, 1990a and 2005).

1.1 Site Background

The Site is located in an industrial/commercial area in Mountain View, California (Figure 1). Building 18 functioned as an electroplating facility for Fairchild Semiconductor Corporation from 1966 to 1984 (Figure 2). The primary constituent of concern at the Site is trichloroethene (TCE) in groundwater from historical underground tanks and piping, sumps, and/or surface spills (HLA, 1987).

The Site is located within the Middlefield-Ellis-Whisman (MEW) area, 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. Work is performed under the USEPA 106 Order. 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 Explanation of Significant Differences specify the remedial actions for the MEW area (USEPA, 1989, 1990b, 1996).

Remediation within the MEW area includes facility-specific activities by individual potentially responsible parties and a Regional Groundwater Remediation Program (RGRP) that addresses co-mingled volatile organic compounds (VOCs) that have migrated beyond the facility-specific areas and cannot be attributed to a single source. One of two RGRP treatment systems, the South of 101 treatment system, is located at 644 National Avenue but is not part of the Building 18 remedy and is discussed in the annual report for the RGRP program (Geosyntec, 2011).

The building at the 644 National Avenue property is the original Fairchild Building 18 structure. The property was purchased by Carr America National Avenue, LLC in 2007. Plans were made to redevelop the property to include new buildings and a parking structure; however, the plans are on currently hold, and the building is currently vacant. There is continued coordination with the developer to maintain the basement dewatering sump, extraction wells, conveyance piping, and monitoring wells at the Site, as well as the RGRP South of 101 treatment system located on the Site.

1.2 Local Hydrogeology

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

Groundwater Zones	Approximate Depth Interval (feet below ground surface)
A[a]	20 to 45
B1[b]	50 to 75
B2	75 to110
B3	120 to 160
C	200 to 240
Deep Aquifer	>240

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

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

> greater than

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

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

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

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

The vertical component of groundwater flow is generally upward from the B1- to the A-zone but locally downward in some areas of the Site (HLA, 1987). Vertical gradients below the B1-zone are generally upward (Geosyntec, et al., 2008a).

1.3 Description of Remedy

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

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

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

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

As specified in the ROD, the remedy consists of groundwater extraction and treatment. The remedy is designed to protect local water supplies and to remediate or control groundwater that contains elevated concentrations of chemicals, including control of discharge of such groundwater to surface water.[2] Groundwater cleanup goals are 5 micrograms per liter (µg/L) for TCE in shallow groundwater (A and B zones) and 0.8 µg/L for TCE in deep groundwater (C and the deep aquifer).[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 maximum contaminant levels (MCLs).

1.4 Summary of 2010 Site Activities and Deliverables

These Site activities were conducted in compliance with the 106 Order during this reporting period:

- Continuing groundwater extraction at RW-25A;
- Monitoring the Site dewatering sumps for operation and flow rates;

[1] Activities related to this treatment system are presented in the Annual Report for Former Fairchild Buildings 1-4 (Weiss, 2011)

[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.

- Collecting semiannual groundwater elevation measurements in Site wells on March 25 and November 18;
- Distributing the 2009 Annual Progress Report to the USEPA and MEW distribution list parties on June 15;
- Collecting groundwater samples from Site wells in November and December, 2010;
- Annual settlement monitoring on December 7 and 8;
- Assessing the progress of remedial actions during 2010; and
- Planning remedial actions for 2011.

Section 2 of this report summarizes groundwater extraction, treatment system, and remedial activities conducted during this reporting period. Sections 3 through 7 document additional activities, problems encountered, technical assessment, conclusions and recommendations, and remedial activities planned for calendar year 2011. Supporting data are presented in Figures 1 through 5, Tables 1 through 7, and Appendices A through D.

2. GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

2.1 System Description

2.1.1 Extraction and Treatment System

The *Revised Final Source Construction, Operation and Maintenance Plan, Fairchild Semiconductor Corporation, 644 National Avenue, Building 18* presents the remedial components for the Site (Canonie, 1995). One SCRW, RW-25A, operates in the A-zone (Figures 4 and 5). In addition, groundwater is extracted by the dewatering sump system in the basement of the building. Groundwater from RW-25A and the basement dewatering sump system are conveyed via double-contained piping to Fairchild System 1, a treatment facility located at 515 Whisman Road, which consists of three 5,000-pound granular activated carbon (GAC) vessels in series. System 1 discharges treated groundwater to the storm sewer under National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2009-0059.

Monthly average flow rates and groundwater volumes extracted are provided in Tables 3 and 4, respectively. During 2010, RW-25A operated near its target flow rate without significant downtime. Well RW-25A extracted approximately 2.7 million gallons of groundwater in 2010, pumping at an average rate of 5.1 gpm. During 2010, the basement dewatering sump system extracted approximately 14.9 million gallons of groundwater, and the average flow rate of the sump system was 26.3 gpm.

2.1.2 Monitoring Wells

There are 10 monitoring wells associated with the Building 18 Site. Seven wells are screened in the A-zone: wells 54A, 58A, 80A, 129A, 147A, 151A, and 152A, and three wells are screened in the B1-zone: wells 32B1, 77B1, and 143B1 (Table 1). Of these wells, four wells (54A, 80A, 157A, and 152A) are sampled annually for chemical data. All wells are measured semiannually for water levels. In addition, monitoring of well 36B2 was added to the Building 18 annual report prior to 2002 and is retained here for consistency. The sampling schedule for wells at this Site is provided in Table 2. Other monitoring wells at and near the Site are discussed in the *Annual Progress Report for Middlefield-Ellis-Whisman Study Area, Regional Groundwater Remediation Program Mountain View, California* (Geosyntec, 2011).

Measured depth to groundwater during 2010 in the Building 18 monitoring wells ranged from 9.83 to 13.18 ft bgs, representing groundwater elevations ranging from 29.30 ft to 26.84 feet above mean sea level.

2.2 Extraction and Treatment System Operation and Maintenance

Annual routine maintenance consists of well inspections and as-needed repairs. No non-routine maintenance or repairs to RW-25A or conveyance piping occurred during 2010.

2.3 Hydraulic Control and Capture Zone Analysis

2.3.1 Methodology

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

Capture from well RW-25A was estimated for March and November 2010 by graphical flow net evaluation of estimated groundwater flow streamlines drawn perpendicular to groundwater contours in March and November 2010 to derive time-dependent estimated capture zone snapshots. The graphical analysis was guided by calculated distances to the stagnation point and capture zone width using the analytical solution of Javandel and Tsang (1986). Because the calculation method assumes a homogeneous, isotropic, two-dimensional groundwater flow zone and depends on a regionally estimated value of transmissivity, the calculated distances are of secondary importance to measured water level data and the resulting potentiometric surface.

2.3.2 Estimated Capture Zones for 2010

Capture in the vicinity of former Building 18 is accomplished by one SCRW. The following six steps were used for the Building 18 capture evaluation:

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

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

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

Step 4: Perform calculations: The calculated capture zone width and stagnation point for RW-25A are provided in Tables 6 and 7 for March and November 2010, respectively.

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

Step 6: Interpret actual capture based on flow net analysis of potentiometric surface using calculated distances as a guide; compare to target capture zone(s), and assess uncertainties and data gaps: As indicated by converging lines of evidence from the steps outlined above, adequate capture was achieved in RW-25A during 2010. Graphical flow net evaluation in March and November indicated greater horizontal capture width than the target capture width. Vertical capture in the A-zone was achieved since well RW-25A is screened across the A-zone.

2.3.3 Horizontal and Vertical Gradients

The horizontal component of groundwater flow at the Site is towards the north-northwest. Hydraulic gradients are affected by groundwater extraction, and locally range from approximately 0.003 to 0.02. The vertical component of groundwater flow is upward as indicated by measured groundwater elevations in well pairs 147A/143B1 and 80A/32B1 located at Building 18. Both well pairs demonstrated upward gradients in March and November 2010, as shown below:

2010 Dates	Upper Well A Zone	Upper Well Groundwater Elevation	Lower Well B1 Zone	Lower Well Groundwater Elevation	Gradient	Direction
March 25	147A	9.83	143B1	11.76	-1.93	upward
	80A	10.75	32B1	12.23	-1.48	upward
November 18	147A	10.67	143B1	12.66	-1.99	upward
	80A	11.56	32B1	13.16	-1.6	upward

2.4 VOC Analytical Results

The 2010 annual groundwater sampling event at the Site was conducted in November and December 2010. Chemical analytical results for the previous five years are summarized in Table 5. Laboratory analytical reports are provided in Appendix B, and the quality assurance and quality control (QA/QC) evaluation is provided in Appendix C. VOC-versus-time graphs for Building 18 monitoring wells and the extraction well are included in Appendix D.

VOC concentrations in groundwater appear to have stabilized over the past 10 years, with a general long-term decrease in VOC concentrations, shown by the time concentration graphs in Appendix D. The concentrations of TCE in groundwater have decreased at the Site from greater than 10,000 µg/L in 1992 to less than 1,000 µg/L in 2010 (Appendix D).

3. OTHER ACTIVITIES

3.1 Optimization

Extraction well rates were optimized in 2010 for all Fairchild wells (Geosyntec 2010). The optimized target rate for RW-25A did not change, staying at 5.5 gpm. In 2010, the well achieved an average pumping rate of 5.1 gpm (Table 3). Well yield slightly declined from the average rate of 5.6 gpm achieved in 2009. This slight decline has not affected TCE capture of this well, since the 2010 estimated capture was greater than target capture.

3.2 Air/Vapor Intrusion

The USEPA issued a ROD amendment on August 16, 2010 to address vapor intrusion. The MEW parties continued to work with USEPA and local entities to implement the ROD amendment during 2010.

3.3 Annual Settlement Survey

An annual soil settlement survey was performed on December 7 and 8, 2010. Its purpose is to evaluate any potential adverse effects on the Site facilities, and to evaluate whether long-term remedial groundwater extraction could affect soil settlement in the MEW Area.

A qualified geotechnical engineer reviewed the historical settlement and water level elevation data and concluded that the measured ground elevation changes do not appear to be related to groundwater extraction. Additional information on the settlement survey can be found in the RGRP 2010 annual progress report (Geosyntec, 2011).

4. PROBLEMS ENCOUNTERED

Section 2.2 summarizes all non-routine operations and maintenance events that occurred at the Site. No other problems related to the Site were encountered.

5. TECHNICAL ASSESSMENT

The groundwater remedy performance for the Site was assessed as follows using the data collected during 2010.

- The remedy is functioning as intended. The 2010 data show that the extraction well and basement dewatering system at the Site continued to function as intended. An "Annual Remedy Performance Checklist" is included as Appendix A.

- The capture zone is adequate. Extraction well RW-25A achieved adequate capture in 2010 even though it operated at slightly less than target flow rate. Graphical flow net evaluation in March and November indicated that estimated capture during 2010 is larger than the target capture. The vertical component of groundwater flow is upwards, as indicated by groundwater elevations in well pairs at the Site.

- VOC concentrations are decreasing over time. VOC concentrations in groundwater appear to be stable to decreasing (Appendix D). Concentrations in extraction well RW-25A decreased in 2010.

6. CONCLUSIONS AND RECOMMENDATIONS

During 2010, the Building 18 remedy continued to function as intended. RW-25A achieved target capture, as indicated by converging lines of evidence including graphical flow net analysis, calculated capture width, and groundwater concentration trends. Yield from RW-25A decreased slightly from 5.6 gpm in 2009 to 5.1 gpm in 2010. Improved well yield will be evaluated in 2011.

7. UPCOMING WORK IN 2011 AND PLANNED FUTURE ACTIVITES

Planned actions during 2011 include continued operations and maintenance of RW-25A, the Building 18 dewatering sump, and the Site monitoring wells. In addition, there will be continued coordination of any 644 National Avenue redevelopment activities throughout 2011.

The effectiveness and progress of Building 18 remedial actions during 2011 will continue to be evaluated by operation, maintenance, and monitoring of RW-25A, measuring water levels, and analyzing water samples in accordance with the Site monitoring and reporting schedule. All activities will be documented in the 2011 Annual Progress Report, which will be submitted to the USEPA by June 15, 2012.

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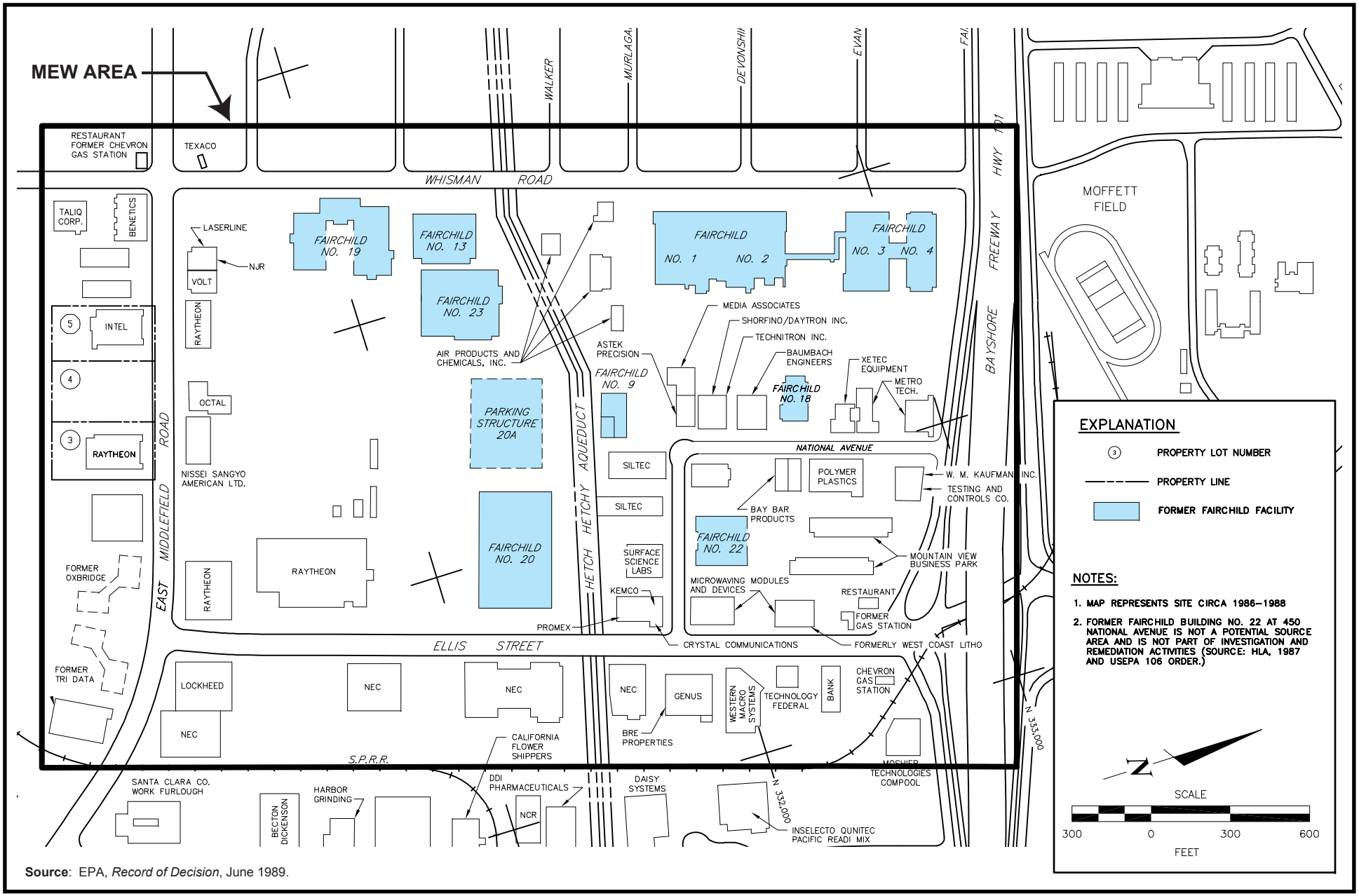
FIGURES

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

Figure 3
Site Map and Well Network
Former Fairchild Building 18
644 National Avenue
Mountain View, California

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28-April-2011

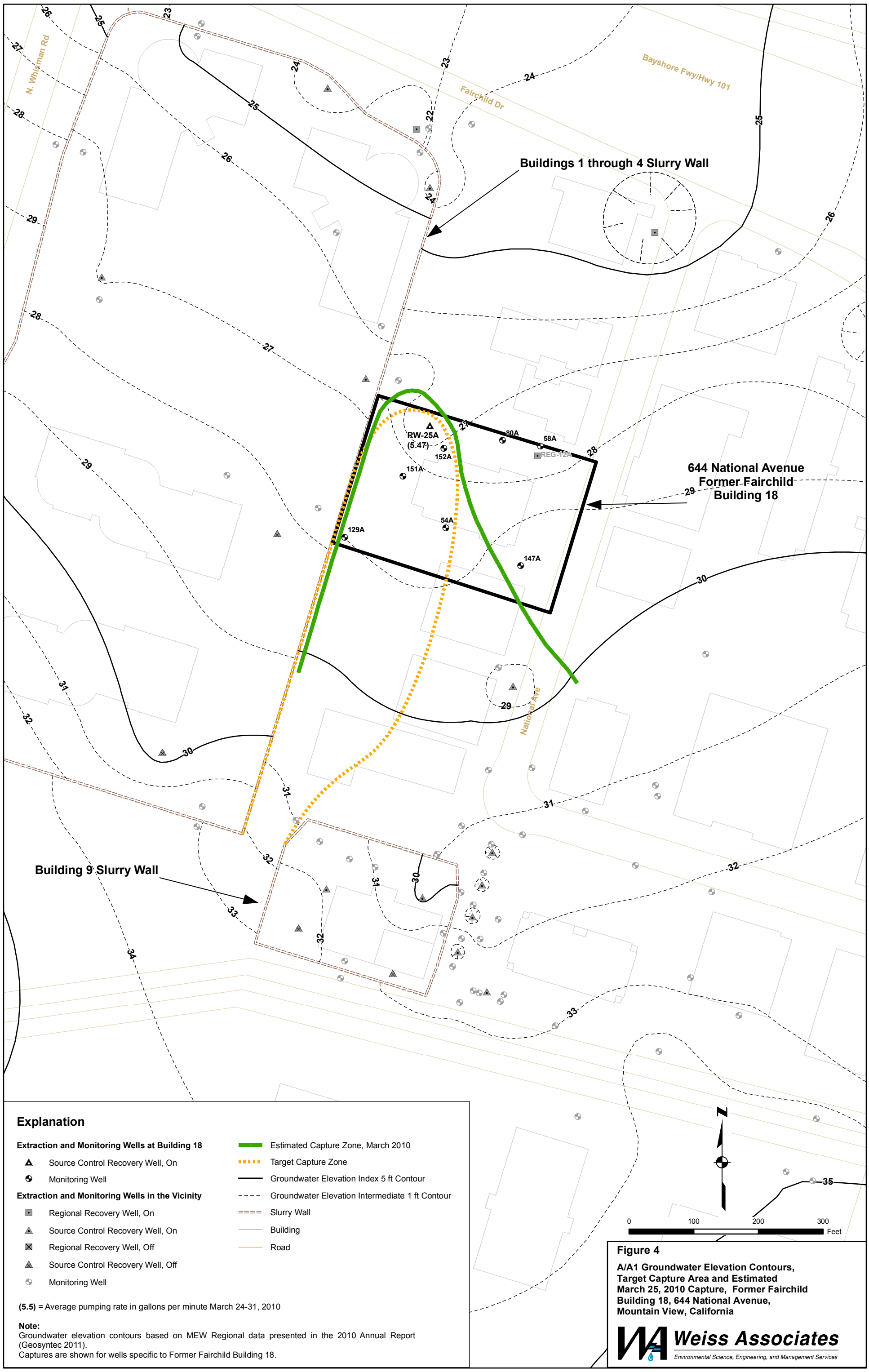
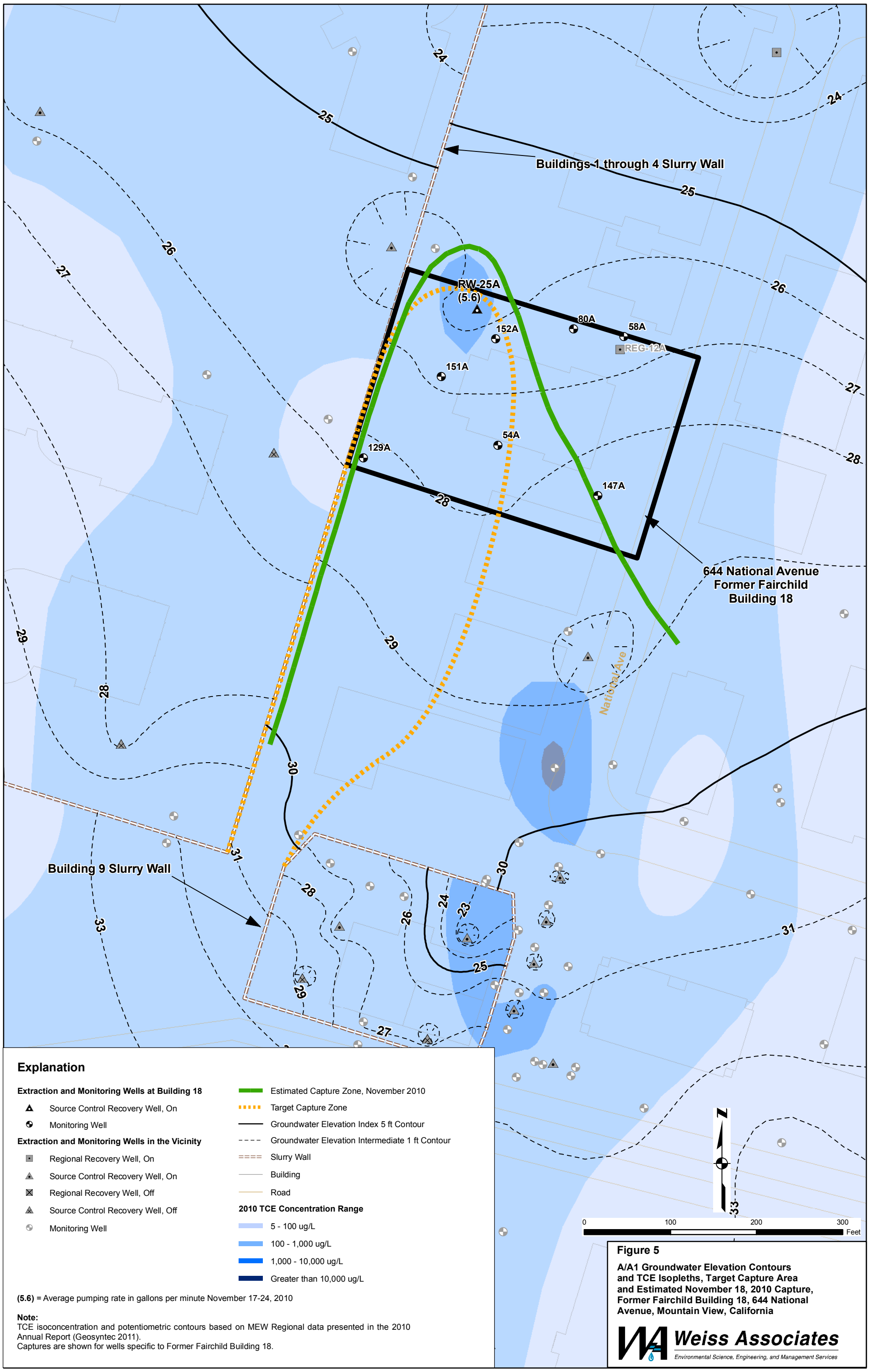


Figure 4

A/A1 Groundwater Elevation Contours, Target Capture Area and Estimated March 25, 2010 Capture, Former Fairchild Building 18, 644 National Avenue, Mountain View, California



Explanation

Extraction and Monitoring Wells at Building 18

- Source Control Recovery Well, On
- Monitoring Well

Extraction and Monitoring Wells in the Vicinity

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

- Estimated Capture Zone, November 2010
- Target Capture Zone
- Groundwater Elevation Index 5 ft Contour
- Groundwater Elevation Intermediate 1 ft Contour
- Slurry Wall
- Building
- Road

2010 TCE Concentration Range

- 5 - 100 ug/L
- 100 - 1,000 ug/L
- 1,000 - 10,000 ug/L
- Greater than 10,000 ug/L

(5.6) = Average pumping rate in gallons per minute November 17-24, 2010

Note:
TCE isoconcentration and potentiometric contours based on MEW Regional data presented in the 2010 Annual Report (Geosyntec 2011).
Captures are shown for wells specific to Former Fairchild Building 18.

Figure 5

A/A1 Groundwater Elevation Contours and TCE Isopleths, Target Capture Area and Estimated November 18, 2010 Capture, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Weiss Associates
Environmental Science, Engineering, and Management Services

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02-June-2011

TABLES

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

Well Details	Date Installed	Zone[a]	Reference Elevation[b] (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
129A	10/08/86	A	41.47	4	38	26	36	12	38	Mon
147A	12/14/88	A	39.13	4	31	10	30	7	31	Mon
151A	10/09/91	A	40.02	4	35	16.5	31.5	13.5	32	Mon
152A	10/08/91	A	39.53	4	35	14.50	34.5	12.5	34.5	Mon
54A	02/22/82	A	40.17	2	40	14	40	14	40	Mon
58A	02/22/82	A	38.28	2	30	10	30	10	30	Mon
80A	08/13/85	A	38.09	4	33	23	31	21	33	Mon
RW-25A	07/26/95	A	38.32	6	32	21	31	18	32	Ext
32B1	08/09/85	B1	38.88	4	76	64	74	59	76	Mon
77B1	04/11/86	B1	38.03	4	60.5	53	58	50	60.5	Mon
143B1	12/13/88	B1	40.96	4	76	60	70	56	71.5	Mon
36B2[c]	08/22/85	B2	37.65	4	92.5	86	91	81.5	92.5	Mon

Notes:

General Notes:

Wells associated with the Building 18 Site are shown in **bold.** All are shown in Figure 3.

Water levels for extraction wells are taken from a 2" piezometer located next to the well.

There is a dewatering sump system inside the basement of Building 18 that pumps water out of the building to Fairchild Treatment System 1 for treatment.

Referenced Notes:

a = The letter in the well ID each well's respective water-bearing zone. There are six designated water-bearing zones in the MEW area: A, B1, B2, B3, C, and deep aquifer (DW).

b = Reference Elevations are in National Geodetic Vertical Datum from 1929 (NGVD 29).

c = Sampling of well is not required. Voluntary sampling was performed for slurry wall evaluations and plume monitoring.

Abbreviations:

amsl = above mean sea level

btoc = below top-of-casing

Ext = extraction well

ft = feet

Mon = monitoring well

Table 2. 2010 Monitoring and Reporting Schedule, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
129A[a]			S		S			S			1, S	
147A			WL								1, WL	
151A			WL								WL	
152A			WL								1, WL	
54A			WL								1, WL	
58A			WL								WL	
80A			WL								1, WL	
RW-25A			WL								1, WL	
32B1[a]			WL								1, WL	
77B1			WL								1, 2, WL	
143B1[a]			WL								1, WL	
36B2[a]			WL								1, WL	
USEPA Annual Progress Report						6/15/2010						

Notes:

General Notes:

Wells associated with the Building 18 Site are shown in **bold.** All are shown in Figure 3.

All samples collected include standard observations, including field analysis for pH, temperature, conductivity, DO, and ORP.

Referenced Notes:

1 = USEPA Method 8260 for Halogenated VOCs using 8010 MS parameters

2 = This well was selected for Regional-Scale MNA Sampling. In addition to VOCs, samples from this well were also analyzed for nitrate, sulfate, and ferrous iron (FeII).

a = Sampling of well is not required. Voluntary sampling was performed for slurry wall evaluations and plume monitoring.

S = Quarterly slurry wall water levels measured.

WL = Semiannual water levels are measured

Abbreviations:

MNA = monitored natural attenuation

RGRP = Regional Groundwater Remediation Program

USEPA = United States Environmental Protection Agency

VOCs = volatile organic compounds

Table 3. Monthly Average Flow Rates (gallons per minute), January through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Well ID	January	February	March	April	May	June	July	August	September	October	November	December
Bldg. 18[a]	28.89	33.75	32.82	30.58	28.11	25.18	26.07	20.74	22.55	21.29	21.32	23.83
RW-25A[b]	4.63	5.50	5.21	5.06	4.95	4.89	5.31	4.48	4.89	5.52	5.27	5.16
Total	33.52	39.25	38.03	35.64	33.06	30.07	31.38	25.22	27.44	26.81	26.59	28.99

Notes:

General Notes

The 2010 annual calculated average flow rate for Building 18 was 26.3 gpm and for RW-25A was 5.1 gpm.

Referenced Notes

a = Water extracted at Building 18 is typically pumped to Treatment System 1. During carbon changes or other extended shutdowns at System 1, water is pumped to the RGRP South of 101 Treatment System.

b = Water extracted at RW-25A is pumped to Treatment System 1.

Abbreviations

Building 18 = Building 18 basement dewatering sump system.

gpm = gallons per minute

System 1 = Fairchild Treatment System 1, Located at 515 Whisman Road, Mountain View, California

Table 4. Monthly Extraction Totals (gallons), January through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

	January	February	March	April	May	June	July	August	September	October	November	December
Building 18 - pumped to System No. 1	1,196,778	1,409,294	1,530,362	1,187,302	1,095,788	1,231,543	996,482	953,323	939,839	854,873	828,872	1,200,215
Building 18 - pumped to S101	51,385	---	76,288	45,730	37,465	37,730	54,764	32,031	34,501	34,033	---	35,275
Building 18 (total) [a]	1,248,163	1,409,294	1,606,650	1,233,032	1,133,253	1,269,273	1,051,246	985,354	974,340	888,906	828,872	1,235,490
RW-25A[b]	193,452	221,693	262,307	204,090	199,771	246,324	214,224	212,845	211,215	222,807	212,358	260,104
Total	1,441,615	1,630,987	1,868,957	1,437,122	1,333,024	1,515,597	1,265,470	1,198,199	1,185,555	1,111,713	1,041,230	1,495,594

Notes:

a = Water extracted at Building 18 is typically pumped to Treatment System 1. During carbon changes or other extended shutdowns at System 1, water is pumped to the RGRP South of 101 Treatment System.

b = Water extracted at RW-25A is pumped to Treatment System 1.

Abbreviations:

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

Building 18 = Building 18 basement dewatering sump system.

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

System 1 = Fairchild Treatment System 1, Located at 515 Whisman Road, Mountain View, California

Weiss Associates

Table 5. Groundwater Sampling Results Summary, January 2006 through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloro-form	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOCs	1,4-Dioxane
			<						µg/L							>
54A	11/13/06	CT/8260	<20	12	<10	16	230	<10	14	<400	<10	<10	1,400	<10	1672	---
54A	11/14/07	CT/8260	<10	8.5	<5.0	13	470	9.4	7.8	<200	<5.0	<5.0	1,000	<5.0	1508.7	---
54A	11/15/08	CT/8260	<13	8.2	<6.3	7.4	210	13	8.5	<250	<6.3	<6.3	830	<6.3	1077.1	---
54A	11/16/09	CT/8260	<2.0	11	<1.0	9.4	210	13	9.7	<40	<1.0	4.5	730	<1.0	987.6	---
54A	11/22/10	CT/8260	<10	7.4	<5.0	14	190	<5.0	<20	<20	<5.0	<5.0	770	<5.0	981.4	---
80A	11/20/06	CT/8260	<2.5	2.6	<1.3	4.3	160	1.3	3.5	<50	1.3	1.4	310	<1.3	484.4	---
80A	11/09/07	CT/8260	<4.0	2.7	<2.0	3.3	130	2.4	2.3	<80	<2.0	<2.0	260	<2.0	400.7	---
80A	11/11/08	CT/8260	<1.0	2.1	<0.5	3.5	84	1.3	2.7	<20	1	1.7	230	<0.5	326.3	---
80A	11/04/09	CT/8260	<4.0	2.2	<2.0	2.8	96	<2.0	<8.0	<80	<2.0	<2.0	240	<2.0	341	---
80A	11/16/10	CT/8260	<2.5	2	<1.3	2.7	100	1.6	<5.0	<5.0	<1.3	1.4	210	<1.3	317.7	---
129A	11/17/10	CT/8260	<4.0	6.7	<2.0	7	160	2.3	<8.0	<8.0	<2.0	<2.0	340	<2.0	516	---
147A	11/20/06	CT/8260	<2.0	<1.0	<1.0	<1.0	10	<1.0	1	<40	<1.0	1	140	<1.0	152	---
147A	11/09/07	CT/8260	<2.0	<1.0	<1.0	<1.0	10	<1.0	<1.0	<40	<1.0	<1.0	120	<1.0	130	---
147A	11/11/08	CT/8260	<1.0	0.6	<0.5	0.6	13	<0.5	1.1	<20	0.7	1.2	130	<0.5	147.2	---
147A	11/03/09	CT/8260	<1.0	0.6	<0.5	0.5	14	<0.5	<2.0	<20	0.7	1.2	120	<0.5	137	---
147A	11/16/10	CT/8260	<1.0	<0.5	<0.5	0.6	19	<0.5	<2.0	<2.0	0.9	1	120	<0.5	141.5	---
152A	11/20/06	CT/8260	<40	<20	<20	<20	2,700	<20	<20	<800	<20	<20	1,100	160	3960	---
152A	11/09/07	CT/8260	<40	<20	<20	20	2,700	28	<20	<800	<20	<20	1,000	120	3868	---
152A	11/11/08	CT/8260	<1.0	3.5	<0.5	8.5	780	7.1	2.9	<20	<0.5	1.4	430	70	1303.4	---
152A	11/05/09	CT/8260	<14	<7.1	<7.1	<7.1	910	14	<29	<290	<7.1	<7.1	420	67	1411	---
152A	11/17/10	CT/8260	<10	<5.0	<5.0	11	880	7.1	<20	<20	<5.0	<5.0	360	110	1368.1	---
BLDG-18	11/24/08	CT/8260	<7.1	<3.6	<3.6	<3.6	300	12	<3.6	<140	<3.6	<3.6	510	4.8	826.8	---
RW-25A	11/21/06	CT/8260	<40	<10	<10	17	1,400	20	72	<400	<10	<10	1,700	37	3246	---
RW-25A	11/16/07	CT/8260	<33	<17	<17	24	2,600	29	42	<670	<17	<17	2,200	91	4986	---
RW-25A	11/07/08	CT/8260	<25	<13	<13	20	2,100	25	39	<500	<13	<13	2,100	55	4339	---
RW-25A (DUP)	11/07/08	CT/8260	<40	<20	<20	21	2,100	24	44	<800	<20	<20	2,100	55	4344	---
RW-25A	11/05/09	CT/8260	<33	<17	<17	18	2,200	27	<67	<670	<17	<17	1,900	46	4191	---
RW-25A (DUP)	11/05/09	CT/8260	<1.0	13	<0.5	24	2,100	32	31	<20	1.7	6.7	1,800	62	4074.6	---

Table 5. Groundwater Sampling Results Summary, January 2006 through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloro-form	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOCs	1,4-Dioxane
			<							µg/L						>
RW-25A	11/05/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	3.5
RW-25A (DUP)	11/05/09	CT/8270	---	---	---	---	---	---	---	---	---	---	---	---	---	3
RW-25A	11/16/10	CT/8260	<25	<13	<13	22	1,700	22	<50	<50	<13	<13	1,500	60	3304	---
RW-25A (DUP)	11/16/10	CT/8260	<25	<13	<13	22	1,700	21	<50	<50	<13	<13	1,400	58	3201	---
32B1	11/13/06	CT/8260	<5.0	<2.5	<2.5	<2.5	7.1	<2.5	<2.5	<100	<2.5	<2.5	430	<2.5	437.1	---
32B1 (DUP)	11/13/06	CT/8260	<1.0	<0.5	<0.5	1.1	7.9	<0.5	1.7	<20	<0.5	<0.5	430	<0.5	440.7	---
32B1	11/14/07	CT/8260	<25	<13	<13	<13	32	<13	26	<500	<13	<13	1,500	<13	1558	---
32B1	11/06/08	CT/8260	<0.50	<0.50	<0.50	1.1	7.1	<0.50	1.3	<0.50	<0.50	<0.50	440	<0.50	449.5	---
32B1	11/14/09	CT/8260	<1.0	<0.5	<0.5	0.9	5.7	<0.5	<2.0	<20	<0.5	<0.5	430	<0.5	436.6	---
32B1	11/22/10	CT/8260	<1.0	<0.5	<0.5	1.5	4.8	<0.5	<2.0	<2.0	<0.5	<0.5	370	<0.5	376.3	---
77B1	11/13/06	CT/8260	<14	<7.1	<7.1	9	520	<7.1	<7.1	<290	<7.1	<7.1	1,000	<7.1	1529	---
77B1	11/14/07	CT/8260	<40	<20	<20	<20	400	<20	41	<800	<20	<20	2,500	<20	2941	---
77B1	11/06/08	CT/8260	<0.50	6.9	<0.50	8.8	580	17	2.6	<0.50	0.51	<0.50	850	0.53	1466.34	---
77B1	11/16/09	CT/8260	<10	6.9	<5.0	9.6	650	<5.0	<20	<200	<5.0	<5.0	500	<5.0	1166.5	---
77B1	11/12/10	CT/8260	<5.0	6.5	<5.0	8.5	590	5.2	<20	<200	<5.0	<5.0	480	<5.0	1090.2	---
143B1	11/13/06	CT/8260	<63	<31	<31	<31	250	<31	450	<1300	<31	<31	4,100	<31	4800	---
143B1	11/13/07	CT/8260	<40	<20	<20	<20	120	<20	310	<800	<20	<20	2,600	<20	3030	---
143B1	11/06/08	CT/8260	<0.50	4.4	<0.50	12	290	2	200	<0.50	2.3	1.7	5,400	<0.50	5912.4	---
143B1	11/16/09	CT/8260	<7.1	5.7	<3.6	16	260	5.3	140	<140	4	<3.6	4,000	<3.6	4431	---
143B1	11/22/10	CT/8260	<33	<17	<17	<17	83	<17	<67	<67	<17	<17	2,800	<17	2883	---
36B2	11/13/06	CT/8260	<100	<50	<50	<50	230	<50	370	<2000	<50	<50	11,000	<50	11600	---
36B2	11/12/07	CT/8260	<100	<50	<50	<50	240	<50	390	<2000	<50	<50	12,000	<50	12630	---
36B2	11/15/08	CT/8260	<71	<36	<36	<36	180	<36	120	<1400	<36	<36	6,000	<36	6300	---
36B2	11/17/09	CT/8260	<8.3	<4.2	<4.2	4.8	190	5.9	210	<170	<4.2	<4.2	9,800	<4.2	10210.7	---
36B2	11/23/10	CT/8260	<200	<100	<100	<100	160	<100	<400	<400	<100	<100	11,000	<100	11160	---

Table 5. Groundwater Sampling Results Summary, January 2006 through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloro-form	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOCs	1,4-Dioxane
			< µg/L >													

Notes:

The letter in the sample location name identifies the respective water-bearing zone. There are six designated water-bearing zones in the MEW area: A, B1, B2, B3, C and deep aquifer (DW)

Well 36B2 is a MEW RGRP well; not facility-specific.

Abbreviations:

--- = sample not analyzed for particular analyte
< # = analyte not detected above the laboratory reporting 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
µg/L = micrograms per liter
VOCs = volatile organic compounds

Table 6. Capture Zone Calculations and Analysis, March 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Extraction Well:		**RW-25A**
b		18
i		0.004
K		40
T		700
w		80
estimated well loss (ft):	$s_w = CQ^2$	0.005
Average extraction rate (gpm):	Mar-10	5.21
flow budget (gpm):	Q = K x (b x w) x i x factor	1.75
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-57.04
capture zone width (at extraction well; ft)	$Y_{well} = \pm Q / 4Ti$	89.55
capture zone width (maximum; ft):	$Y_{max} = \pm Q / 2Ti$	179.11

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

Notes and Abbreviations:

b = aquifer or saturated thickness (ft)

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

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

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

ft = feet

i = regional hydraulic gradient (ft/ft)

K = hydraulic conductivity (ft/day). Value is based on the calibrated MEW groundwater flow model (Geosyntec et al., 2008b)

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

s_w = drawdown due to well loss

T = transmissivity (ft^2/day)

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

X_0 = stagnation point (ft)

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

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

Assumptions:

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

Table 7. Capture Zone Calculations and Analysis, November 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Extraction Well:		**RW-25A**
b		18
i		0.004
K		40
T		700
w		80
estimated well loss (ft):	$s_w = CQ^2$	0.006
Average extraction rate (gpm):	Nov-10	5.27
flow budget (gpm):	Q = K x (b x w) x i x factor	1.75
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-57.70
capture zone width (at extraction well; ft)	$Y_{well} = \pm Q / 4Ti$	90.58
capture zone width (maximum; ft):	$Y_{max} = \pm Q / 2Ti$	181.17

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

Notes and Abbreviations:

b = aquifer or saturated thickness (ft)

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

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

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

ft = feet

i = regional hydraulic gradient (ft/ft)

K = hydraulic conductivity (ft/day). Value is based on the calibrated MEW groundwater flow model (Geosyntec et al., 2008b)

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

s_w = drawdown due to well loss

T = transmissivity (ft^2/day)

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

X_0 = stagnation point (ft)

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

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

Assumptions:

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

APPENDIX A

2010 ANNUAL REPORT REMEDY PERFORMANCE CHECKLIST

2010 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, 2011**

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 (Eight wells operated during 2010).**
- **One regional recovery well (One well operated during 2010).**

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.**
- **Nine source control recovery wells (Seven wells operated during 2010).**
- **Three regional recovery wells (Three wells operated during 2010).**

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 (Thirteen operated during 2010).**
- **Seven regional recovery wells (Two operated during 2010).**

II. CONTACTS

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

	Name/Title	Phone	E-mail
RP/Facility Representative	**Virgilio Cocianni Schlumberger Technology Corporation**	**281-285-4747**	cocianni-v@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

2010 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).

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:

2010 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:

Record of Decision Amendment for the Vapor Intrusion Pathway August 16, 2010

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:

644 National Avenue property (former Fairchild Building 18) was purchased by Carr America National Avenue LLC in 2008; redevelopment plans remained on hold during 2010.

369 and 441 North Whisman Road (former Bldgs. 13 and 19 and 23), owned by Keenan, Lovewell Ventures, is developing a proposal for additional buildings on the site.

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

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	**2010 Annual Fairchild Building Reports (Weiss, 2011) and**
Capture zone maps, isoconcentration maps	**2010 Annual Regional Report (Geosyntec, 2011)**

■ 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	**2010 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.

2010 Annual Report Remedy Performance Checklist

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	**2010 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. In 2010, pumping was started in some wells that had been off since 2007. Slurry wall gradients have generally maintained trends consistent before and after reduced groundwater extraction rates.

The chemical concentration data and potentiometric surface contours from 2010 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

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

Walk-throughs/Surveys: Yes

Additional building sampling was performed during 2010.

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).

Reference:

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

Problems Encountered: None

Recommendations/Next Steps: None

Schedule: All work is coordinated with the USEPA.

X. REMEDY PERFORMANCE ASSESSMENT

A. Groundwater Remedies

2010 Annual Report Remedy Performance Checklist

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.

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 continued during the Second Quarter of 2010. Optimization activities are documented in the 2010 Annual Progress Reports to USEPA for the former Fairchild Buildings 1-4, and 19.

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 based on 2008 optimization report was implemented with EPA modifications in 2010.

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

■ 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 2010 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.

2010 Annual Report Remedy Performance Checklist

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: 2010 Annual Fairchild Building Reports (Weiss, 2010)

2010 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 2010 Fairchild Building and RGRP Annual Progress Reports indicate containment of target capture areas.

XI. PROJECTIONS

Administrative Issues
Dates of next monitoring and sampling events for next annual reporting period: Fall 2010

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

Remedy Projections for **the upcoming year (2011)**

■ 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: Elaborate below. Target date:

Elaborate on Remedy Projections:

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:

2010 Annual Report Remedy Performance Checklist

☐ 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: **2012**

Elaborate on Remedy Projections:

The EPA is developing a groundwater site-wide focused feasibility study.

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: Elaborate below. Target date:

Elaborate on Remedy Projections:

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: 2012

Elaborate on Remedy Projections: Site-Wide Focused Groundwater Feasibility Study being conducted by EPA may affect long term 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.

Fairchild extraction well optimization occurred during 2010.

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:

Site-Wide Focused Groundwater Feasibility Study for Groundwater being conducted by EPA.

Date of Next EPA Five-Year Review: **September 30, 2014**

XII. RECOMMENDATIONS

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APPENDIX B

ANALYTIC REPORTS AND CHAIN-OF-CUSTODY DOCUMENTS,
JANUARY THROUGH DECEMBER 2010

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

APPENDIX C

QA/QC REPORT, SUMMARY TABLES, AND CRITERIA

2010 QA/QC SUMMARY

The analytical laboratory data and accompanying quality assurance/quality control (QA/QC) information used in the 2010 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 2010 Standard Operating Procedures (SOPs) for data verification and validation, and validation procedures for metals, volatile organic chemicals (VOCs), and semivolatile organic chemicals. The SOPs are based on the 1991 MEW "Unified" *Quality Assurance Project Plan* (QAPP), but functionally adhere to the most recent USEPA data validation guidelines.

The complete data quality review is presented in Appendix G of the RGRP Annual Report (Geosyntec, 2011). This data quality review summarizes the results of the data quality review for the Former Fairchild Buildings 1, 2, 3, 4, 9, 13, 18, 19, 20, 20A, and 23 and Fairchild Treatment Systems 1, 3, and 19.

Level 2 and 10% Level 4 Data Quality Review was performed for samples collected by Weiss Associates during the 2010 annual sampling event in accordance with the MEW QAPP and SOPs.

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. In 2010, all rinseate sample/equipment blank samples had VOC concentrations below the detection limit.

[4] 1991, Quality Assurance Project Plan, Middlefield-Ellis-Whisman Site, Mountain View, California, prepared by Canonie Environmental, Rev. 1.0, August 16, 1991.

- Field blank - Samples consisting of source water used for decontamination of equipment. Field blanks will be collected at a frequency of one 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. In 2010, all field blank samples had VOC concentrations below the detection limit.
- 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 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. In 2010, all trip blank samples had VOC concentrations below the detection limit.

For the 2010 annual groundwater sampling event, all sample results collected for former Fairchild Buildings were verified for completeness by completion of a Level 2 Data Review Summary. Custody seals were used for each sample location as specified in the 1991 MEW QAPP.

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

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

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

- Ion abundance;
- Minimum number of initial calibration standards analyzed;
- Relative response factors in initial and continuing calibrations;

- Percent relative standard deviations in initial calibrations;
- Percent differences in continuing calibrations;
- Internal standard retention times;
- Internal standard area counts;
- Analytical sequence carryover;
- Dilutions performed appropriately;
- Calibration blank contamination; and
- Data package completeness for all raw data, including chromatograms and bench sheets, for calibration standards, quality control data, and samples.

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

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

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

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

All samples were collected, stored, transported, and managed according to USEPA protocols. Sample temperature and holding times were correctly observed. One sample collected from the Building 18 Site contained bubbles greater than 6mm in all three VOAs. However, the relative percent difference between 2009 and 2010 sample results was less than 35%. Therefore, the data were deemed representative and were not qualified.

No significant analytical issues were noted and the data are usable for their intended purposes. Table C-1 summarizes the sampling QA/QC, and Table C-2 summarizes samples for the 2010 annual groundwater sampling event at former Fairchild Building 18.

Table C-1. Summary of Sampling QA/QC for January through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California.

Who performed sampling (Firm name/address/contact/phone):	Weiss Associates 350 Middlefield Road Mountain View, CA 94043 Tess Byler (650) 968-7000
Chain-of-Custody forms completed for all samples?	YES
Field parameters stabilized prior to taking sample?	YES
Headspace in sample containers < 6mm(applicable to VOCs only)?	NO[1]
Samples preserved according to analytical method?	YES
Required field QA/QC samples taken?	YES

Explain any "NO" answers.

1. Headspace greater than 6mm was present in one sample collected at the Building 18 Site. However, the relative percent difference between 2009 and 2010 sample results was less than 35%. Therefore, the data were deemed representative and not qualified.

Table C-2. Summary of Analytical QA/QC for January through December 2010, Former Fairchild Building 18, 644 National Avenue, Mountain View, California.

Who performed analysis (Lab name/address/contact/phone):	Curtis & Tompkins 2323 Fifth Street Berkeley, CA 94710 Micah Smith (510) 204-2223
Analytical methods (by method number and chemical category):	Twelve samples (including 2 travel blanks) analyzed by USEPA 8260B – Halogenated Volatile Organic Compounds 1 sample analyzed by USEPA 300.0 – Nitrate and Sulfate 1 sample analyzed by USEPA 200.7 – Ferrous Iron (Fe^{II})
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]
QA/QC results and acceptance criteria on file?	YES

Explain any "NO" answers.

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

APPENDIX D

SELECTED VOCS-VERSUS-TIME GRAPHS

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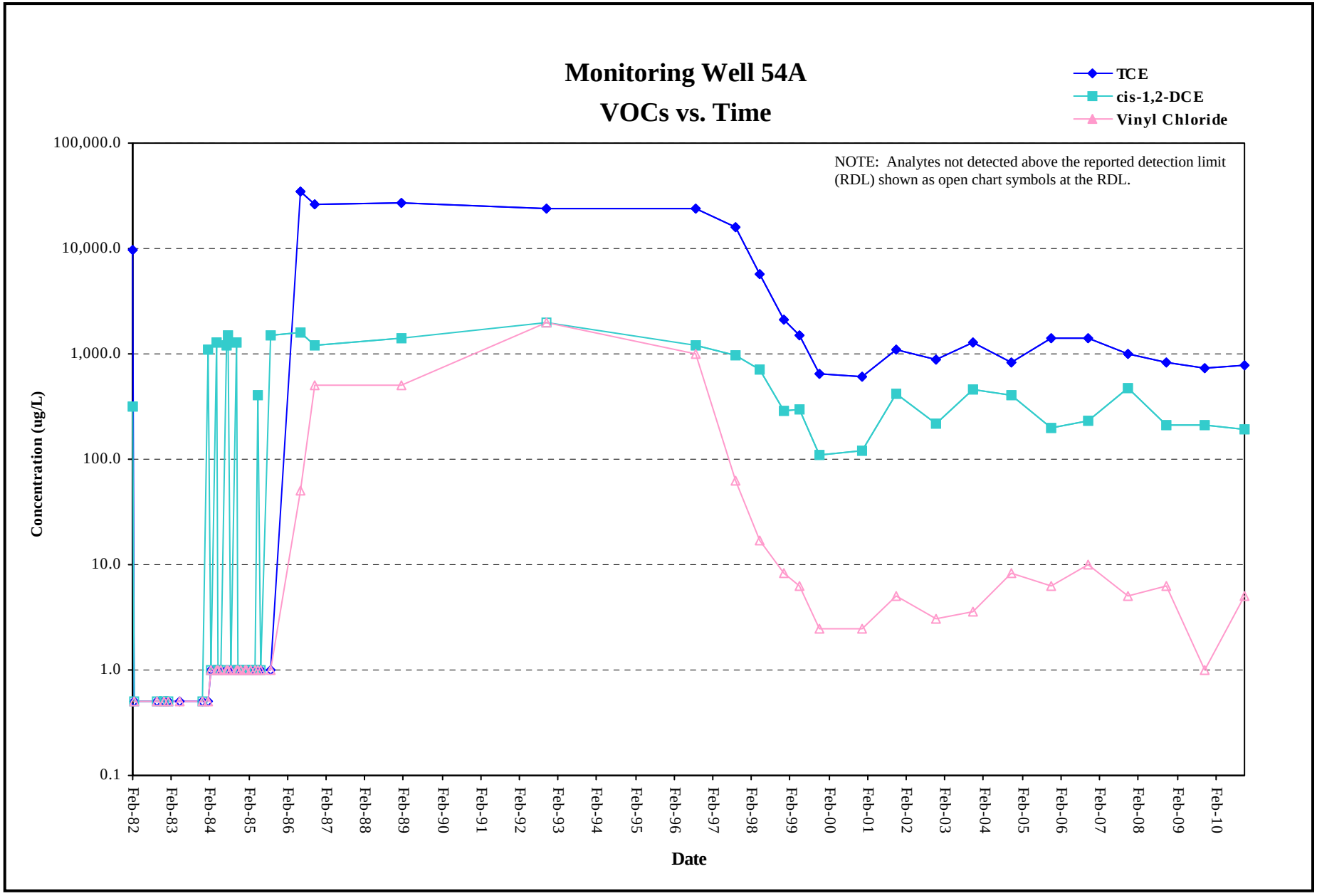

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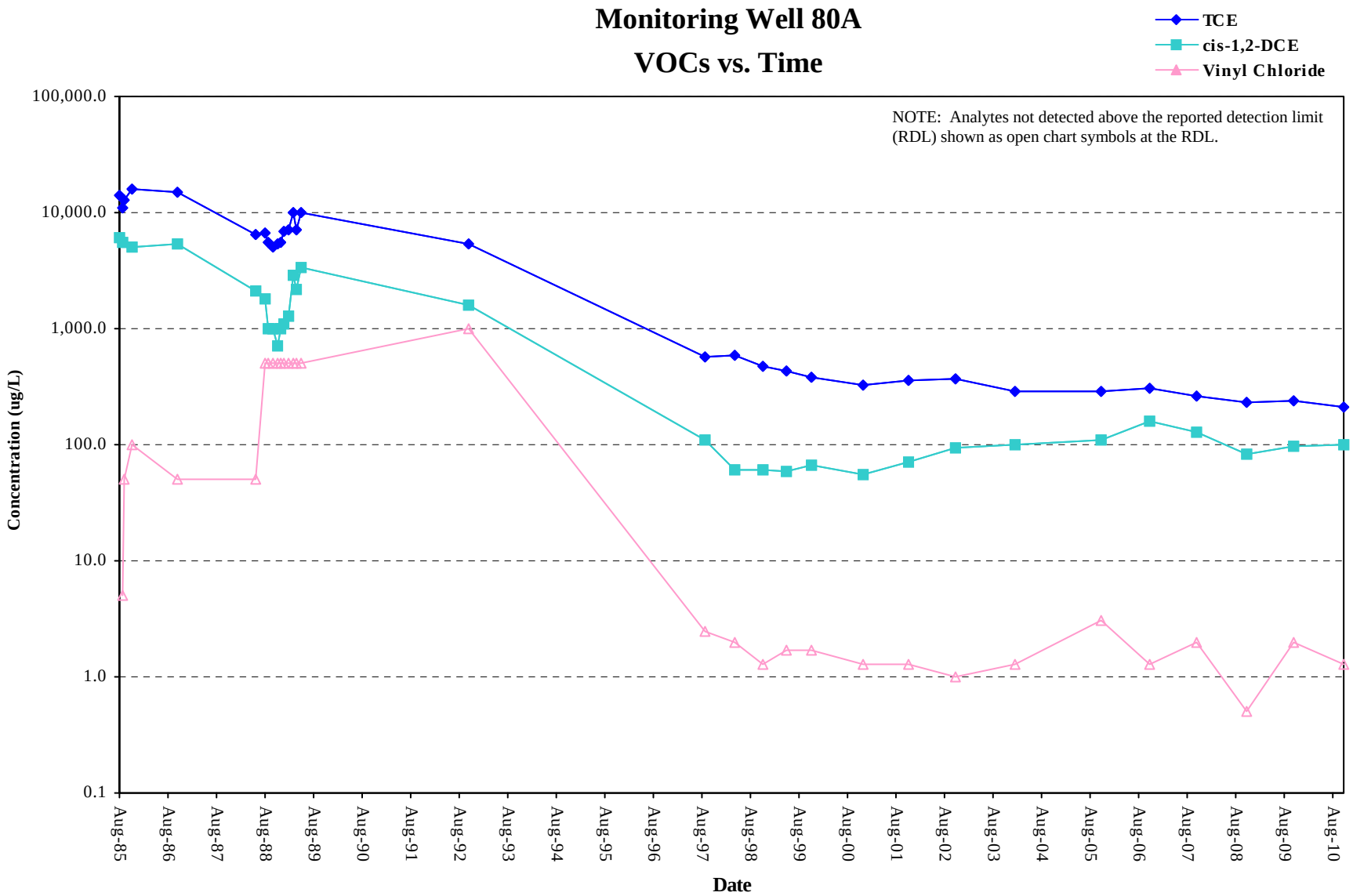

Database: S:\WELLDATA\Schlumberger\Mt View - MEW\SlmbMv.mdb
Report: rptMvChrts2010LogV2 Loc. Group: Bldg18

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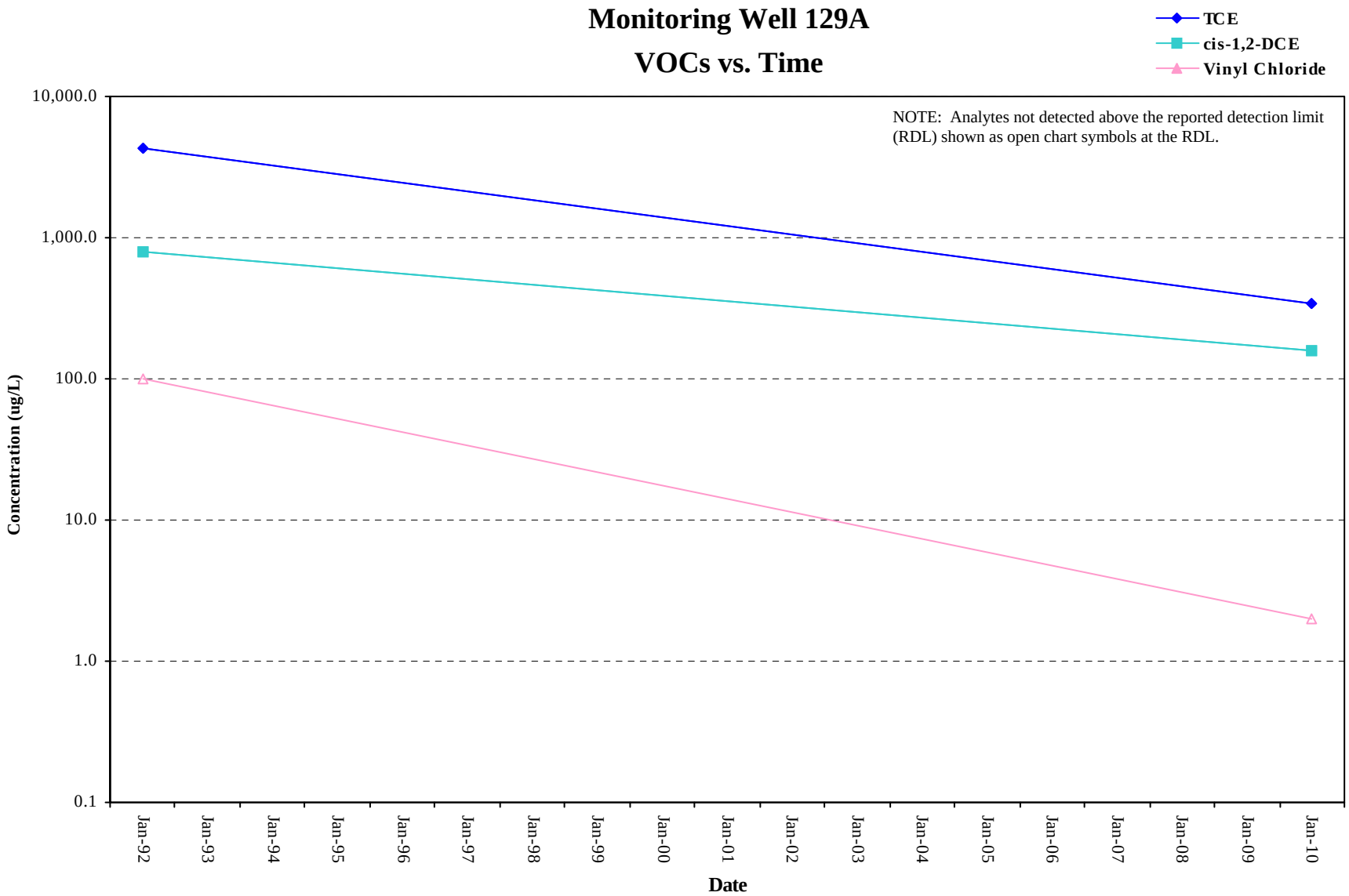
Weiss Associates



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Report: rptMvChrts2010LogV2 Loc. Group: Bldg18

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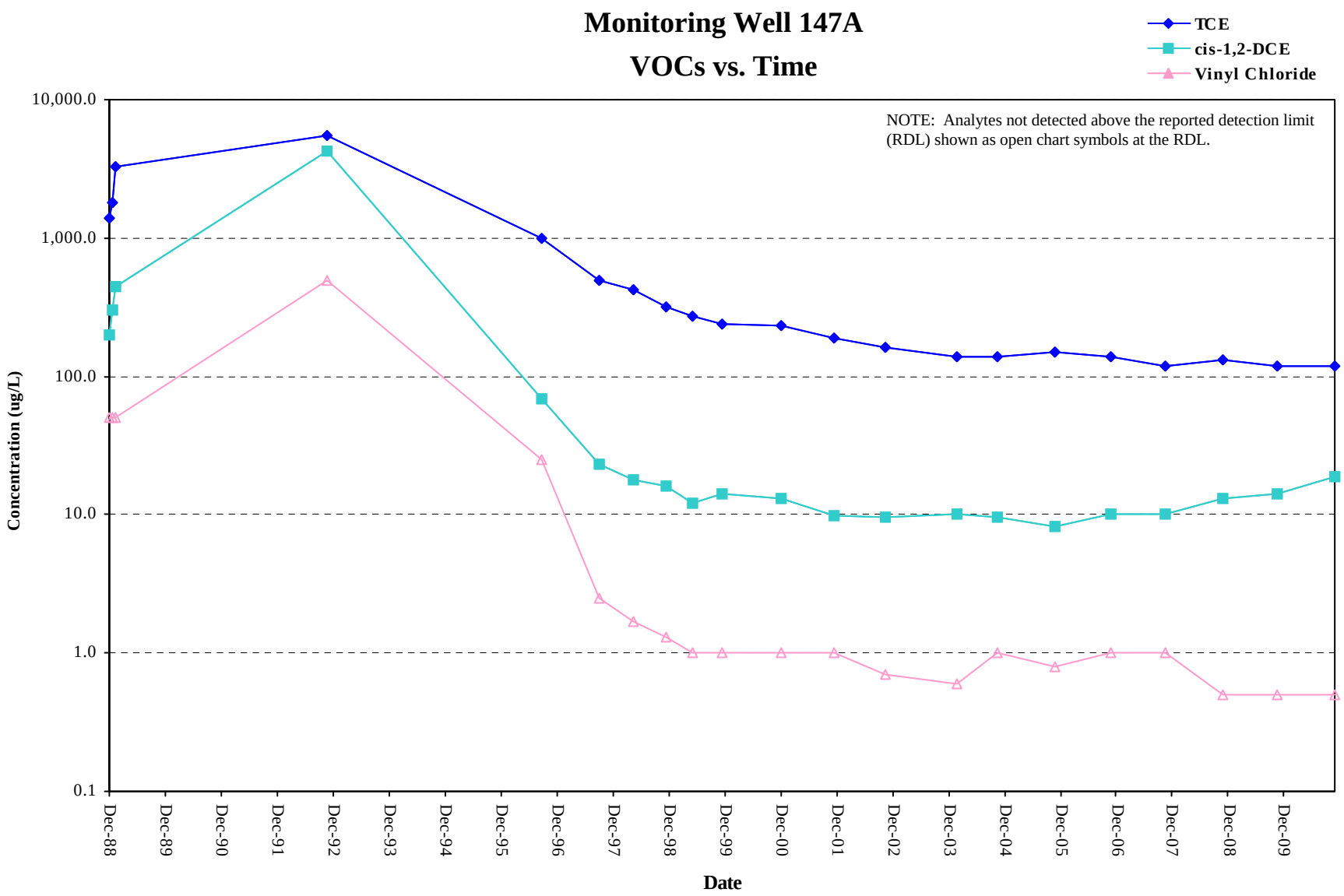
Weiss Associates



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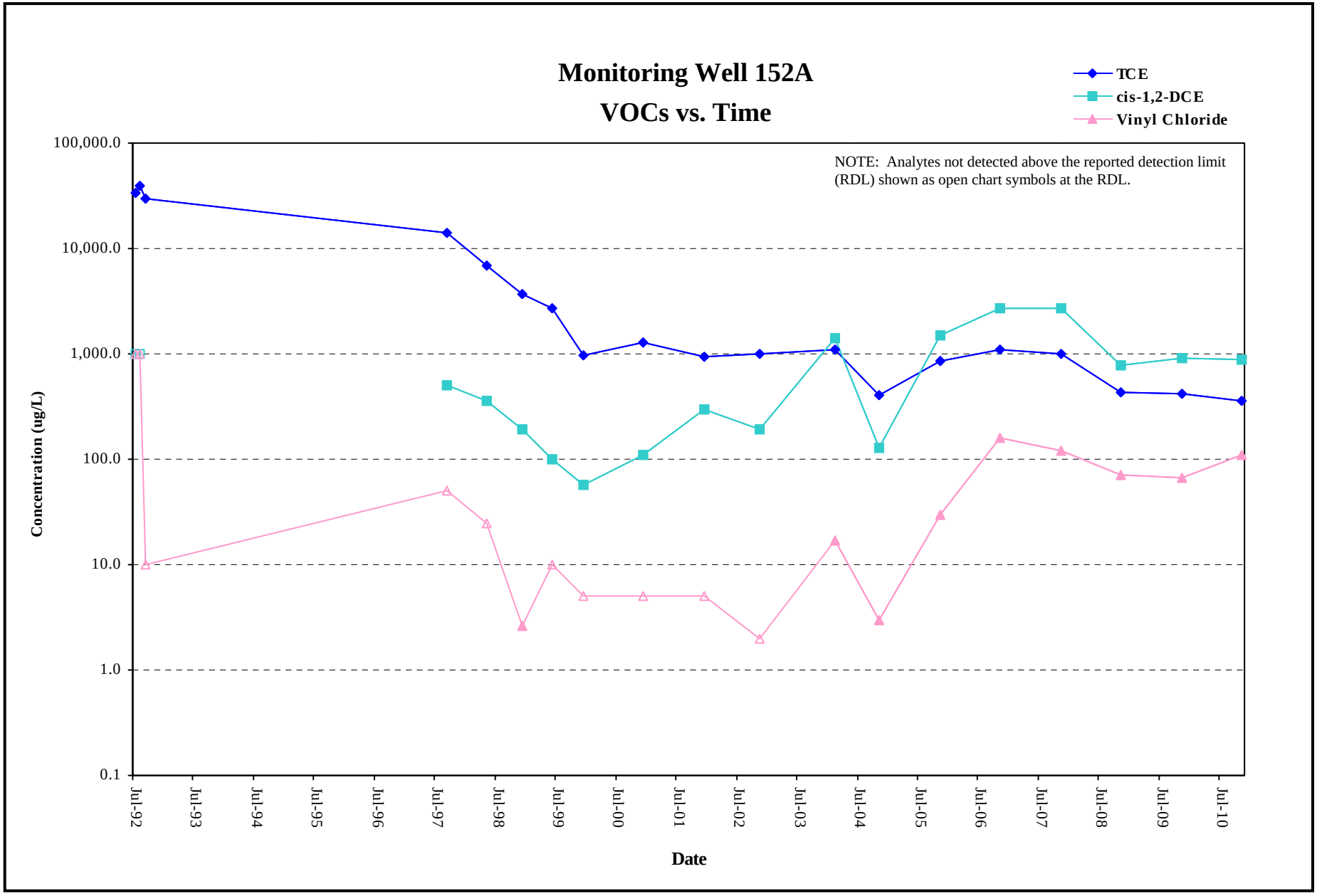

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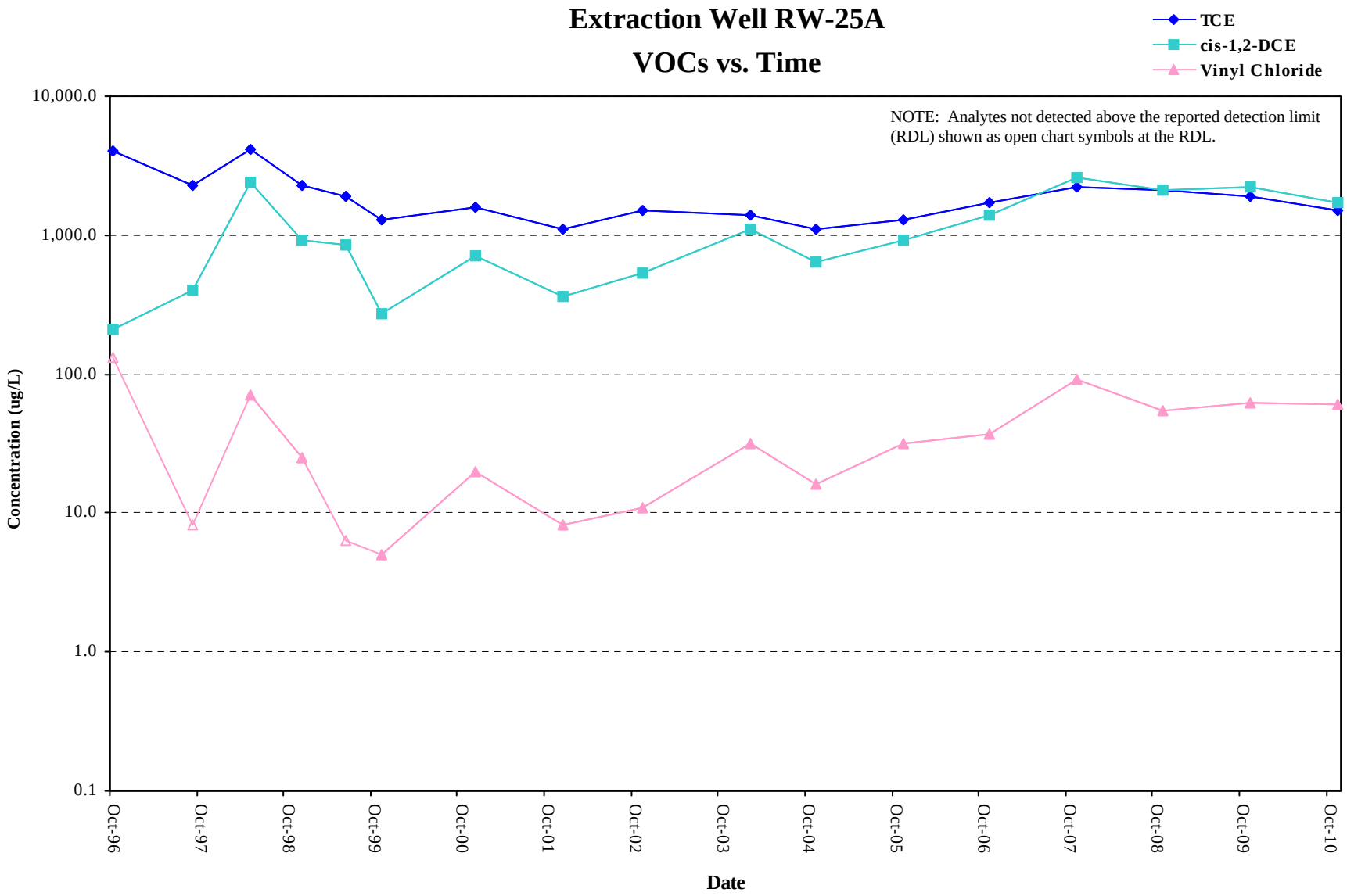

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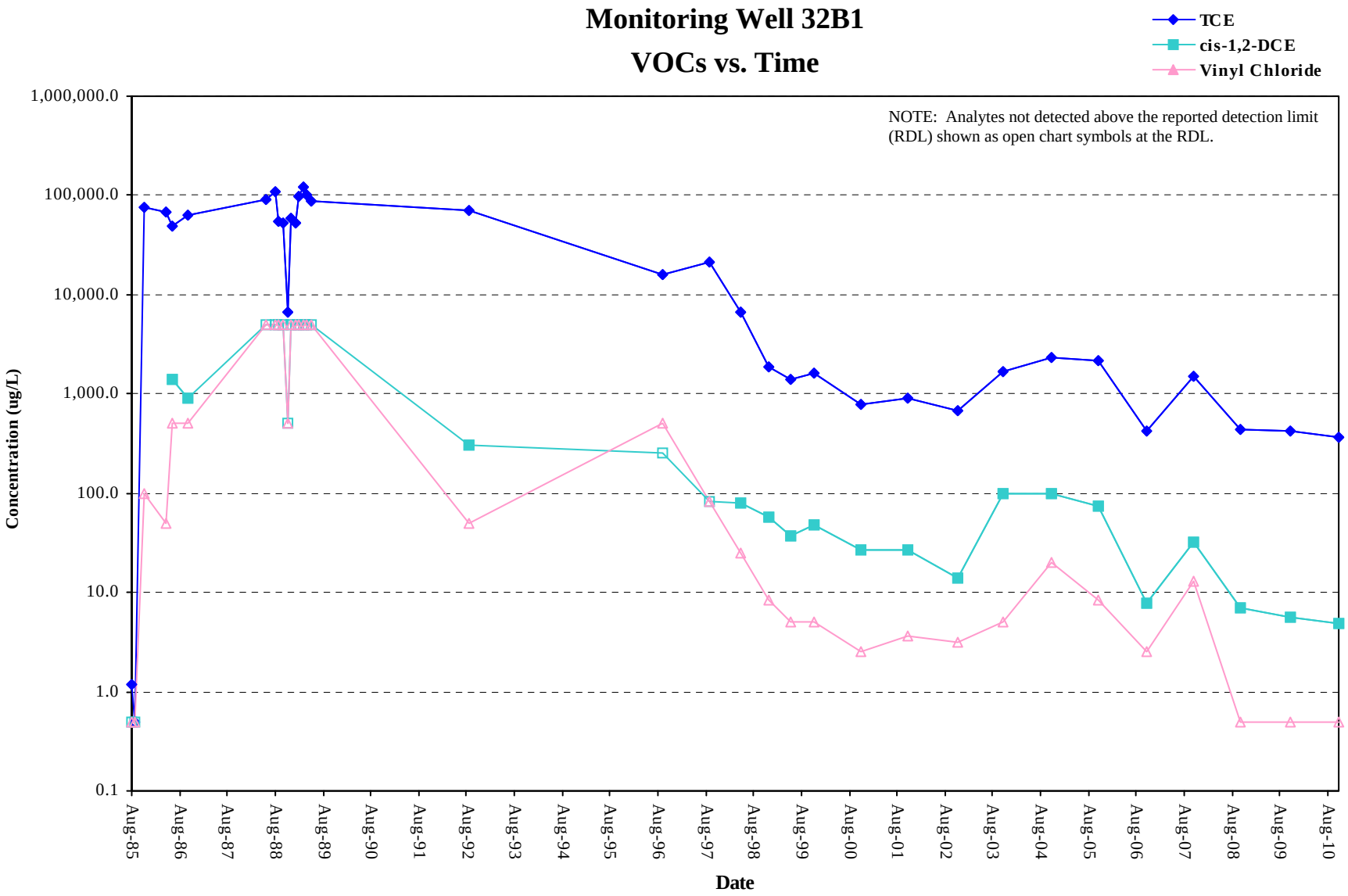
Weiss Associates



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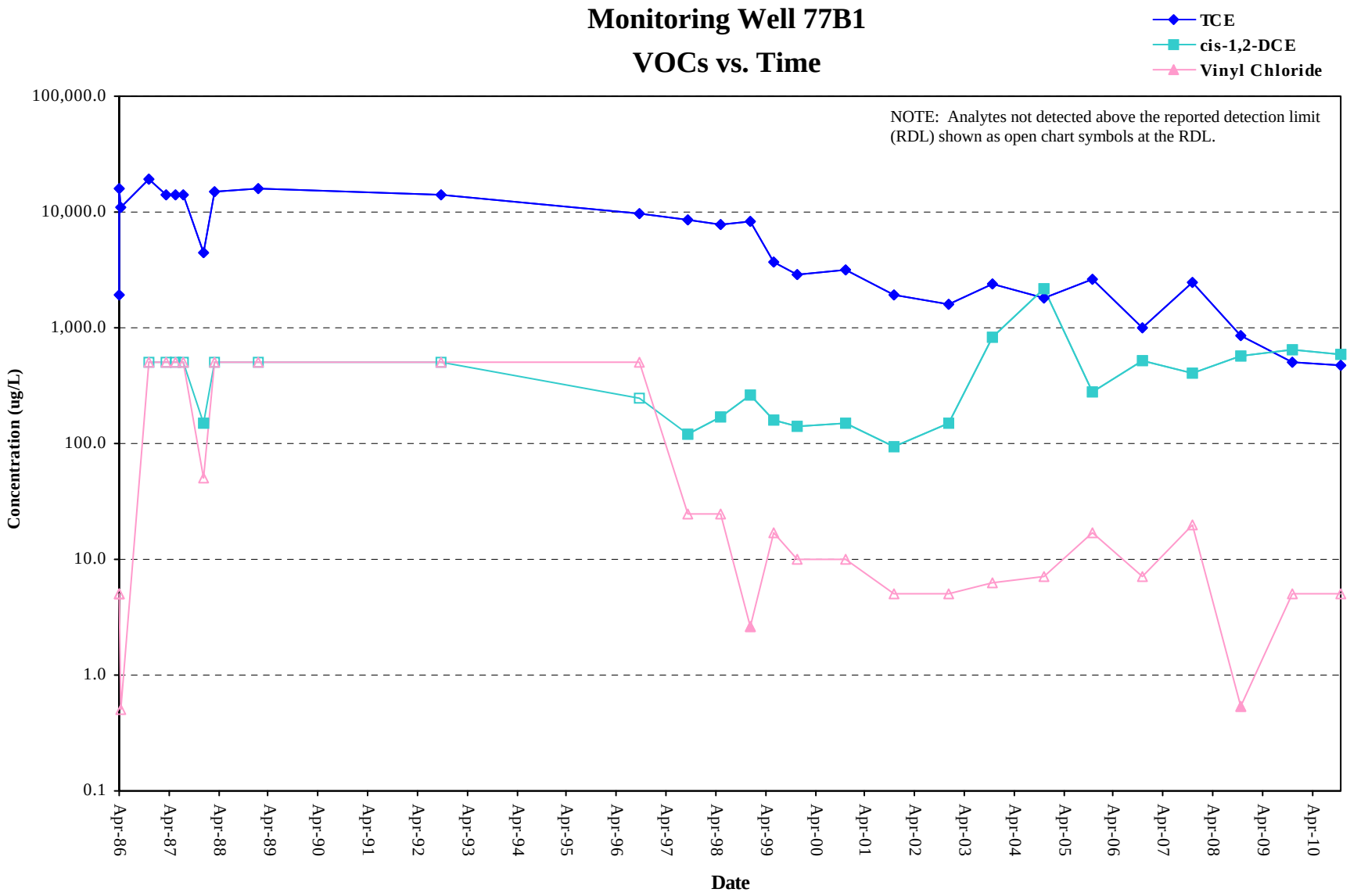
Weiss Associates



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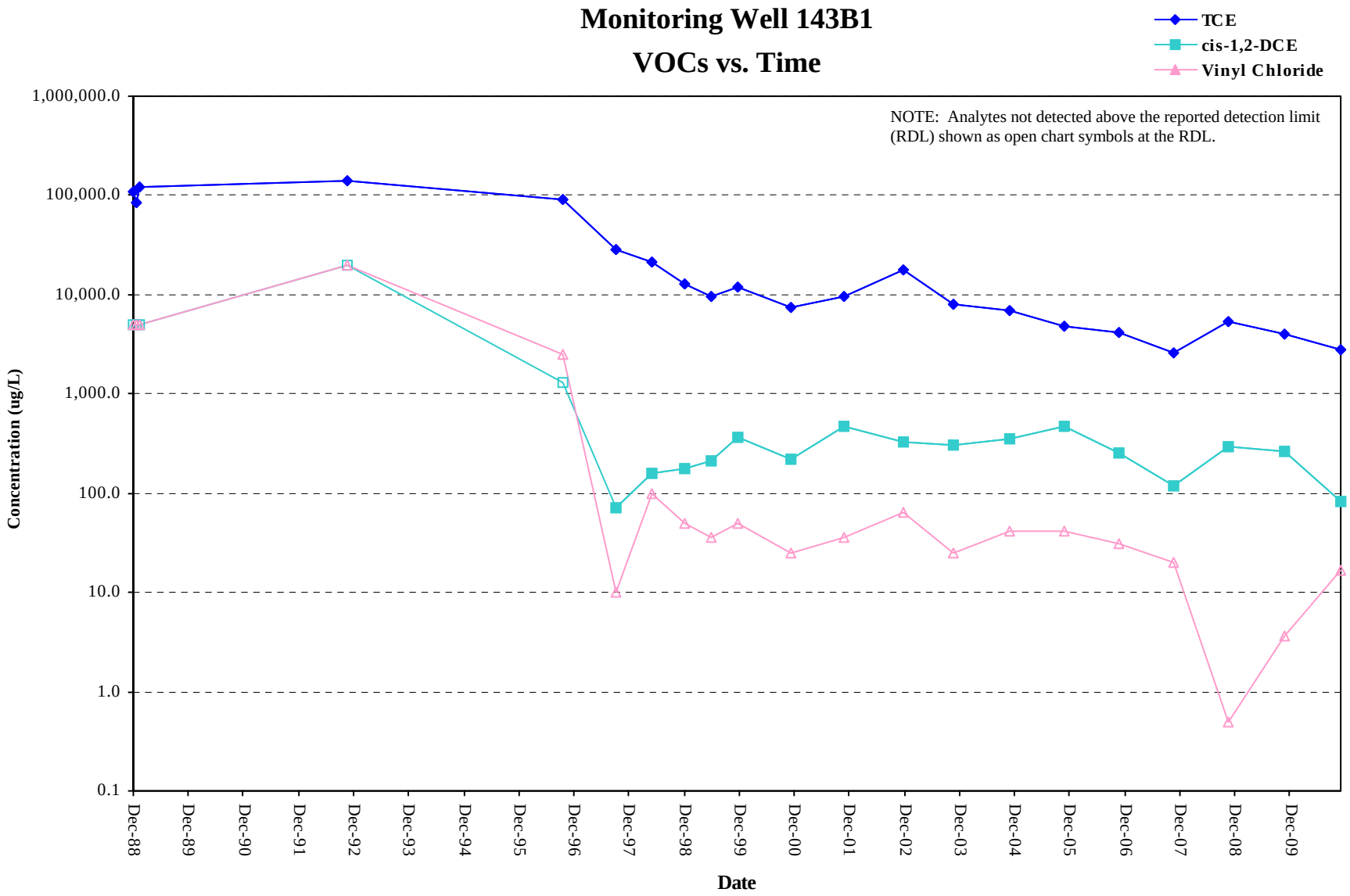

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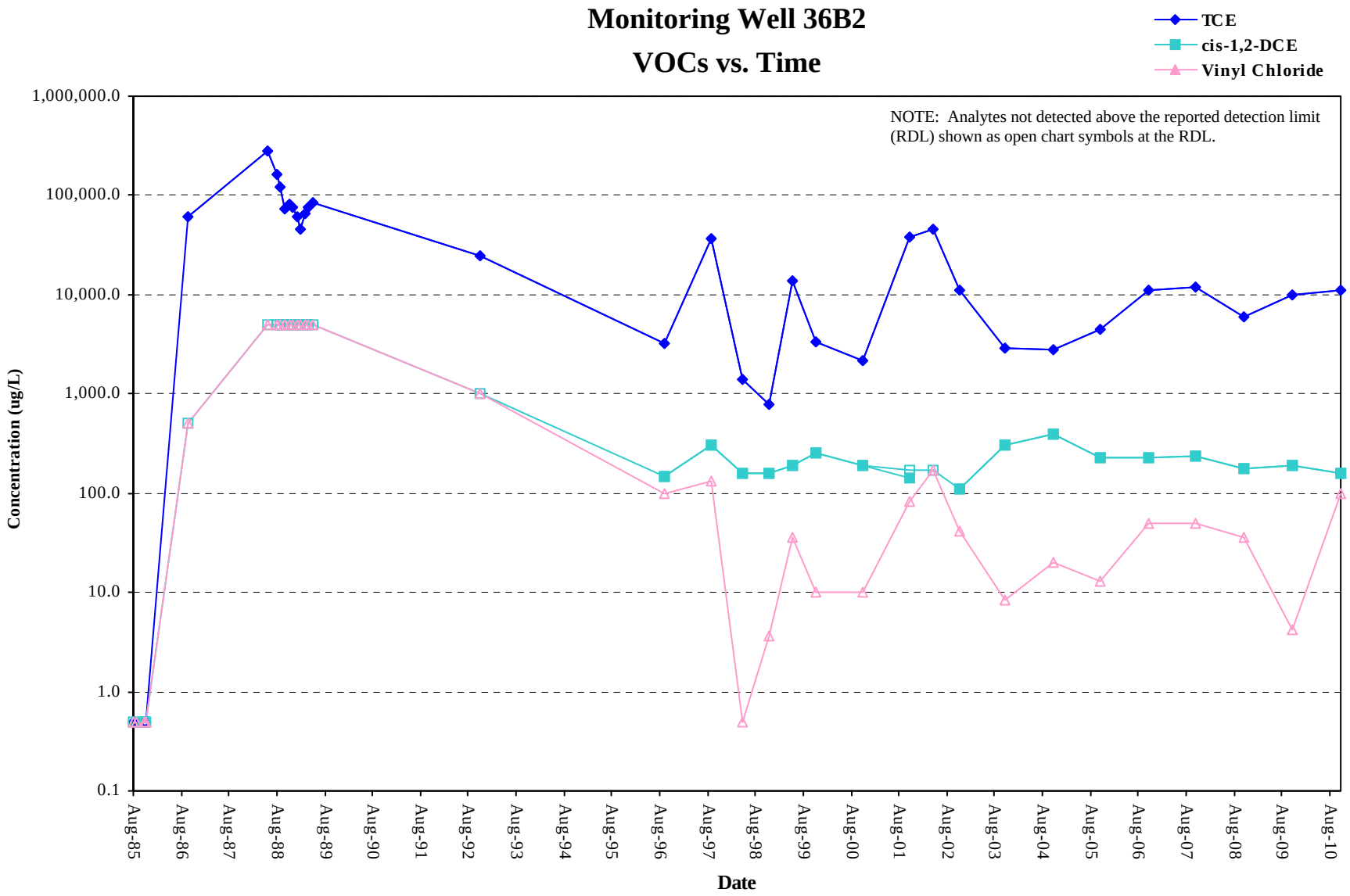

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