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26 June 2015

Mr. Roger Papler
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
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Subject: Phase II Enhanced Reductive Dechlorination Pilot Study Status Report
Intersil/Siemens Superfund Site
Cupertino, California

Dear Mr. Papler:

On behalf of SMI Holding LLC (SMI), ERM-West, Inc. (ERM) has prepared this *Phase II Enhanced Reductive Dechlorination Pilot Study Status Report* for the former Siemens facility located at 19000 Homestead Avenue in Cupertino, California.

If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

Kit Soo, PG
Project Manager

Heather Balfour, P.E.
Partner-in-Charge

HDB/0201040.03Sb
enclosure

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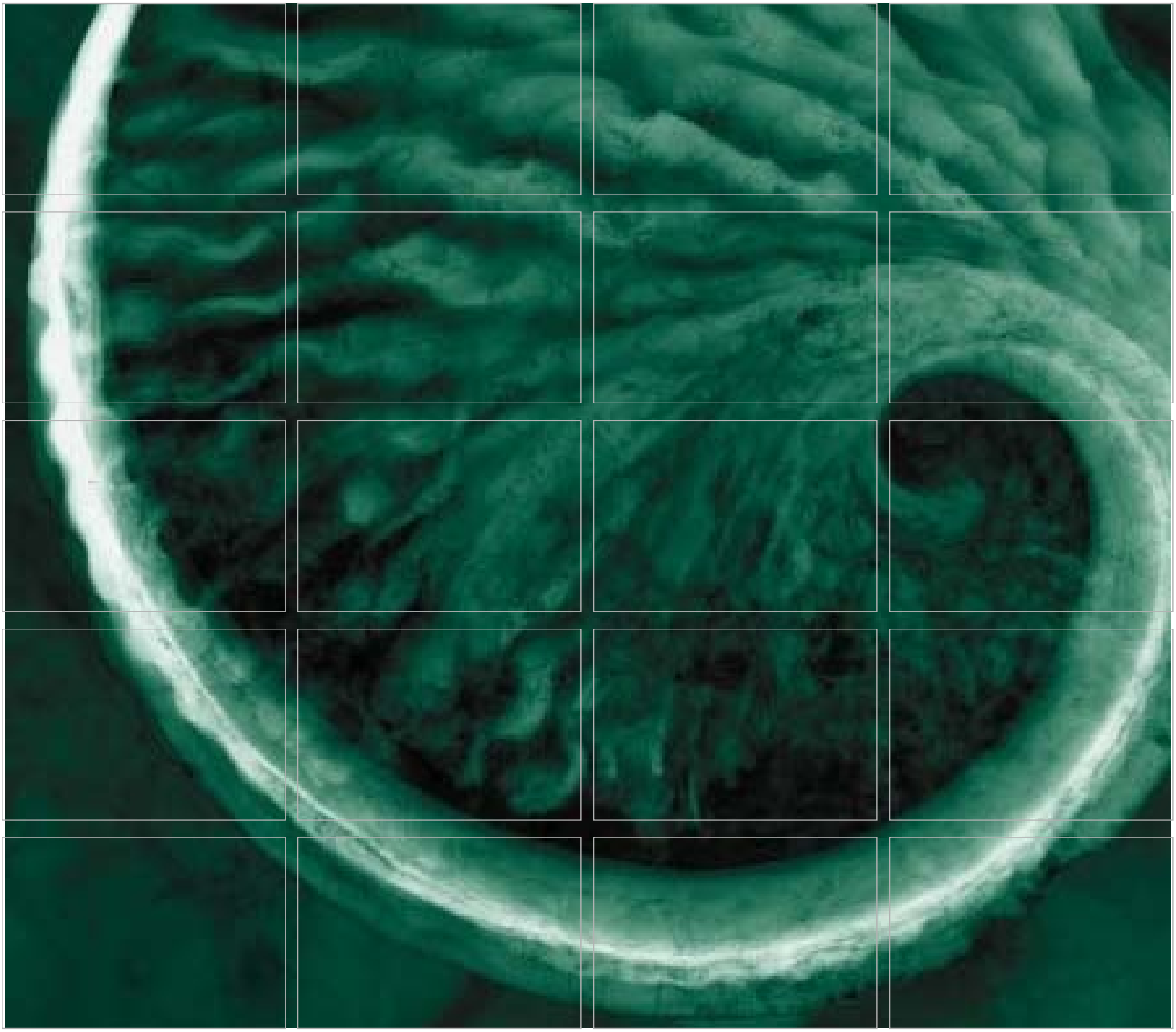

Phase II Enhanced Reductive Dechlorination Pilot Study Status Report

Prepared for:
SMI Holding LLC

19000 Homestead Avenue
Cupertino, California

June 2015

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SMI Holding LLC

Phase II Enhanced Reductive Dechlorination Pilot Study Status Report

19000 Homestead Avenue
Cupertino, California

June 2015

Project No. 0201040

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LIST OF ACRONYMS

AMEC	AMEC Environment and Infrastructure, Inc.
bgs	Below ground surface
DHC	Dehalococcoides
DO	Dissolved oxygen
ERD	Enhanced Reductive Dechlorination
ERM	ERM-West, Inc.
EVO	Emulsified vegetable oil
GE	General Electric Company
gpm	Gallons per minute
mg/L	milligrams per liter
mV	Millivolt
ORP	Oxidation reduction potentail
PCE	Tetrachloroethene
psi	Pounds per square inch
RWQCB	Regional Water Quality Control Board, San Francisco Bay Area
SMI	SMI Holding LLC
SOP	Standard Operating Procedure
TCE	Trichloroethene
TOC	Total organic carbon
USEPA	U.S. Environmental Protection Agency
VC	Vinyl chloride
vcrA	Vinyl chloride reductase
VOC	Volatile organic compound
ZVI	Zero valent iron

1.0 INTRODUCTION

On behalf of SMI Holding LLC (SMI), ERM-West, Inc. (ERM) has prepared this *Phase II Enhanced Reductive Dechlorination (ERD) Pilot Study Status Report* for the former Siemens facility located at 19000 Homestead Road in Cupertino, California (Figure 1). The Phase II ERD Pilot Study activities were performed in accordance with the *Revised Phase II Enhanced Reductive Dechlorination Pilot Study Work Plan* (Work Plan, ERM 2014), unless as indicated.

The former Siemens facility is being remediated under the August 1990 Regional Water Quality Control Board, San Francisco Bay Area (RWQCB) Final Site Cleanup Order No. 90-119, as amended by Order R-2-2013-0002 (Cleanup Order). This Cleanup Order presents site remediation requirements for the following three areas (Figure 2):

1. Former Intersil facility, located at 10900 North Tantau Avenue, Cupertino. General Electric Company (GE) is implementing the cleanup measures.
2. Former Siemens facility, located at 19000 Homestead Road, Cupertino. SMI is implementing the cleanup measures.
3. Off-Site Study Area, located north of and hydraulically downgradient of the two former facilities mentioned above. GE and SMI are jointly implementing the cleanup measures.

As noted in the *Fourth Five-Year Review* (RWQCB 2010) and the *Five-Year Status Reports For The Periods July 2009 Through June 201*4 (AMEC Environment and Infrastructure, Inc. [AMEC] 2014), the existing groundwater extraction and treatment systems at the Intersil/Siemens site have been successful in reducing concentrations of volatile organic compounds (VOCs) in groundwater and hydraulically controlling the plume; however, the rate of mass recovery has been low and asymptotic for more than the last 5 years. Concentrations of VOCs in groundwater have stabilized at concentrations substantially above the remedial goals, suggesting a very long time for restoration of groundwater. This Phase II ERD Pilot Study evaluated the effectiveness of a refined suite of treatment technologies to destroy difficult to recover VOC mass, reduce risk to site users and future groundwater resources, and effectively reduce the time to site closure.

1.1 *PHASE II ENHANCED REDUCTIVE DECHLORINATION PILOT STUDY GOALS AND OBJECTIVES*

The goal of the Phase II ERD Pilot Study is to evaluate in situ groundwater treatment using anaerobic biological and chemical reductive dechlorination for the permanent destruction of chlorinated VOCs in groundwater at the former Siemens property. Specific objectives of the Phase II ERD Pilot Study were to:

- Optimize the amendment formula and dosing to maximize long-term mass removal;
- Assess the attenuation rates and longevity of emulsified vegetable oil (EVO) and product containing a combination of a carbon substrate with zero valent iron (carbon-ZVI product);
- Assess the optimal aquifer inoculation rates (bioaugmentation) to maximize transformation of trichloroethene (TCE) to ethene through biodegradation;
- Evaluate the implementability and effectiveness of environmental hydraulic fracturing (as defined on USEPA Clean-Up Information [CLU-IN] website; for the remainder of this report this will be referred to as environmental fracturing) as a means to enhance treatment of low-permeability aquifer units; and
- Evaluate the effects of lithologic heterogeneities and significant small-scale variability in hydraulic conductivity on the feasibility of ERD, including remedy delivery and contaminant fate and transport.

1.2 *DOCUMENT ORGANIZATION*

This report is organized as follows:

- Section 1 presents the introduction.
- Section 2 presents a brief summary of the site background, including the site hydrostratigraphy, history of contamination at the site, and a summary of the Phase I ERD Pilot Study.
- Section 3 presents a brief summary of the Phase II ERD Pilot Study activities. Additional activities are provided in the Work Plan.
- Section 4 presents the Phase II ERD Pilot Study results as compared to the Phase II ERD Pilot Study objectives outlined in Section 1.1.
- Section 5 presents conclusions and recommendations.

- Section 6 provides the references cited in the report.
- Figures and tables immediately follow the text.
- Appendix A presents permits, boring logs and well completion reports.
- Appendix B presents time series concentration and molar fraction trend plots.
- Appendix C presents the data validation reports.
- Appendix D presents the groundwater potentiometric surface maps.
- Appendix E presents a detailed description of the results.

2.0 SITE BACKGROUND

Litronix and its successor, Siemens Microelectronics, Inc. (SMI), manufactured semiconductors at the former Siemens facility from 1970 to the mid-1980s. During this period, VOCs were released to soil and groundwater from manufacturing activities at the former Siemens facility. SMI no longer owns the property and the current owner, MOF II Tantau Holdings, Inc., leases the property to Kaiser Permanente for use as an administrative office and medical outpatient care facility. SMI is implementing cleanup measures with RWQCB and Region IX U.S. Environmental Protection Agency (USEPA) regulatory oversight.

2.1 SITE HYDROSTRATIGRAPHY

Previous work has identified three principal groundwater zones beneath the former Siemens facility, each of which is separated by less permeable aquitards. These water-bearing zones are named from the water table down as follows: A Zone, B Zone, and C Zone. The focus of the Phase II ERD Pilot Study is the A Zone, specifically the A1, A2, and A3 depth intervals. The observed direction of groundwater flow for the A Zone is generally north to northeast in the general direction of the San Francisco Bay.

Between 1993 and 1998, regional groundwater elevations rose approximately 40 to 50 feet. As a result, the formerly unsaturated A Zone sediments have become saturated. The saturation of the former vadose zone sediments of the A Zone prompted a re-evaluation of groundwater at the former Siemens and former Intersil facilities. As part of the re-evaluation, SMI and GE jointly prepared the *Hydrogeologic Framework Report* (AMEC Geomatrix, Inc. and ARCADIS, U.S. Inc., 2011) to address the RWQCB's request for a concise and coordinated overview of the geology, hydrogeology, and groundwater quality at both of the former facilities. The *Hydrogeologic Framework Report* developed consistent nomenclature for sediments in four different former vadose depth intervals: A1, A2, A3, and A4. The Phase II ERD Pilot Study focuses on the A1, A2, and A3 depth intervals; the distinguishing characteristics of these depth intervals are provided in the Work Plan (ERM 2014) and summarized below. The specific depths for the characteristic lithologies of the A1, A2, and A3 units were refined for the Pilot Study area as described in Section 4 of this report.

The A1 depth interval is the uppermost current water-bearing unit, occurring between approximately 40 and 60 feet below ground surface (bgs) at the former Siemens facility (depending upon seasonal groundwater elevation). This depth interval is predominantly composed of coarser-grained sands and gravels beneath the former facility and transitions to finer-grained sands and silty sands beneath the northern portion of the former facility.

The A2 depth interval is generally encountered at an approximate average of 60 feet bgs and extends to approximately 70 to 75 feet bgs beneath the former Siemens facility. This depth interval is generally composed of a mix of finer-grained sediments at the base and top of the unit, with random intervening coarser-grained sediments. Finer-grained sediments and discontinuous lenses of coarser-grained sediments in this depth interval may harbor residual VOCs, which slowly back diffuse to more transmissive deposits.

The A3 depth interval extends from approximately 70 to 75 feet bgs to approximately 90 feet bgs beneath the former facility. This depth interval contains variable stratigraphy and is generally composed of coarser-grained sediments that locally fine upward into the generally finer-grained base of the overlying A2 depth interval.

2.2 *PREVIOUS REMEDIAL ACTIONS*

Vadose zone and saturated zone remedial measures have been implemented at the former Siemens facility. These remedial measures include:

- Removal of underground storage tanks in 1982.
- Soil excavation and removal of approximately 182 cubic yards of soil impacted with VOCs and semivolatile organic compounds in 1991.
- Installation and startup of a soil vapor extraction system in 1983. The system was shut down with RWQCB approval following completion of a rebound study in August 2006.
- Installation of a groundwater extraction and treatment system in 1986. Groundwater is currently extracted from eight extraction wells (2-EP, 2-EPa, LF-6A, H-5B, LF-12A, SW-7, EX-1-RL, and H-1A).

SMI conducted an ERD bench and pilot study between March 2006 and March 2007 (Geomatrix and LFR 2007 and Geomatrix and LFR 2008) (Phase I ERD Pilot Study). This study evaluated the feasibility and effectiveness of

the ERD technology to improve both the rate and efficiency of VOC mass removal in the shallow groundwater as compared to the existing pump and treat system. The field test consisted of injecting approximately 31,000 gallons of 8-percent cheese whey solution, as a soluble carbon substrate, into three permanent injection wells (IP-1 through IP-3) (Figure 2). As a result of the Phase I ERD Pilot Study injections, the concentration of cis-1,2-dichloroethene (DCE) and vinyl chloride (VC) increased within wells IP-1, IP-2, and IP-3 and TCE concentrations significantly decreased in monitoring wells MW-1-RU and VM-2S immediately downgradient to the injection locations, relative to the baseline monitoring event (LFR 2007). Other wells located immediately downgradient of the Phase I ERD Pilot Study showed more variable trends with respect to the destruction or generation of TCE, cis-1,2-DCE, and VC.

Data from wells upgradient of the Phase I ERD Pilot Study area suggest groundwater elevation may be a significant variable in the fate and transport of VOCs in the A1 depth interval. These upgradient wells show that some changes in VOC distribution correlate with hydrologic changes and may be difficult to differentiate from the effects of the Phase I ERD Pilot Study.

Based on findings from the Phase I ERD Pilot Study, it was concluded that ERD had the potential to further reduce groundwater concentrations beyond what has been accomplished through more than 28 years of groundwater extraction and treatment. However, it should be noted that although reduction in groundwater concentrations were observed immediately downgradient and in some monitoring wells downgradient of the pilot study area, it appears that the cheese whey was consumed too rapidly to have had any lasting effect, and was not able to effectively address the VOC entrapped in the fine-grained matrix or the geochemical conditions for optimal bacterial growth.

3.0 PHASE II ENHANCED REDUCTIVE DECHLORINATION PILOT STUDY ACTIVITIES

This section presents the design, scope of work, and implementation of the Phase II ERD Pilot Study.

3.1 PHASE II ENHANCED REDUCTIVE DECHLORINATION PILOT STUDY DESIGN

The Phase I ERD Pilot Study provided valuable insights into the mechanical, geochemical, and biological conditions of the former Siemens facility. Using these insights, ERM designed a Phase II ERD Pilot Study to test the next steps toward establishing technologies that will further enhance mass removal.

SMI considered the findings of the Phase I ERD Pilot Study in the design of the Phase II ERD Pilot Study. The Phase II ERD Pilot Study combined proven and long-lasting treatment substrates; injection tool approaches to target each lithologic depth interval (A1, A2, and A3) in a way that considers the hydrologic properties and role in the fate and transport of the VOCs in the aquifer; and addresses the specific objectives described above. The design for the Phase II ERD Pilot Study included these technology components:

- Application of EVO to the higher hydraulic conductivity depth intervals (A1 and A3) using a pressure pulse injection to provide a broadly distributed long-lasting substrate for bacterial growth;
- Application of a product containing a combination of carbon-ZVI product in the zone of lower hydraulic conductivity (A2) using environmental fracturing to provide a long-term reactive zone for VOCs released by matrix diffusion; and
- Bioaugmentation of the existing bacterial populations to assure that all needed biota are present for the complete reductive dechlorination of VOCs.

The Phase II ERD Pilot Study employed two separate, but complementary, treatment media: EVO and carbon-ZVI product. The treatment media were applied differently across two halves of the treatment area to understand how the combination of these approaches can enhance the overall treatment effectiveness. The western portion of the injection area received EVO only; whereas the eastern portion of the treatment area

received both products. These different injection point types are shown on Figure 2.

3.2 *PHASE II ENHANCED REDUCTIVE DECHLORINATION PILOT STUDY SCOPE OF WORK*

The general scope of work completed for the Phase II ERD Pilot Study included:

- Pre-fieldwork activities including obtaining permits (Appendix A); completing subsurface utility clearance, including public and private utility mark-outs; and establishing staging and support areas for the fieldwork;
- Installed and developed five monitoring wells to enhance the well network within the Phase II ERD Pilot Study location;
- Installed and monitored three semi-permanent soil vapor probes between the Pilot Study Area and the former Siemens building;
- Advanced an exploratory boring within the area to receive environmental fracturing to confirm the lithology and refine the depths of the A1 and A3 intervals;
- Injected the carbon-ZVI product using environmental fracturing within the 15-foot-thick depth interval identified as containing primarily low-permeability sediments (the A2 depth interval);
- Injected EVO through pulse injection into the saturated portion of the A1 depth interval (approximately 5-feet thick) and the top 20 feet of the A3 depth interval;
- Performed bioaugmentation using inline delivery of KB-1®;
- Assessed the distribution of the EVO and carbon-ZVI product through post-injection soil borings; and
- Monitored groundwater and soil vapor to assess post-injection conditions, which included performance of mitigation measures based on performance monitoring results. Table 2 provides the performance monitoring schedule.

The following sections provide a brief description of these activities.

3.3 *PHASE II ENHANCED REDUCTIVE DECHLORINATION PILOT STUDY ACTIVITIES*

SMI implemented the Phase II ERD Pilot Study according to the approved Pilot Study Work Plan with minimal need for field modifications. Unless described below, all components of the Work Plan have been implemented as approved. This section describes the salient components of the Work Plan implementation.

3.3.1 *Monitoring Well Installation and Development*

Monitoring wells MW-01A1, MW-01A3, MW-02A1, MW-03A3, and MW-04A3 were installed between 18 and 24 August 2014 (Figures 2 and 3). The five monitoring wells were installed using sonic drilling techniques as described in the Work Plan. Monitoring well construction details are provided in Table 1. Boring logs and well construction diagrams for the monitoring wells are presented in Appendix A.

Six monitoring wells were proposed in the Work Plan; however, well MW-03A1 was not installed because no saturated or apparently permeable soils were observed in the soil core at the depth of the static water elevation or within the depth range of the A1 depth interval observed in adjacent monitoring wells and soil borings (Appendix A). The RWQCB was notified of this modification to the scope of work in an email dated 12 September 2014.

Monitoring wells were developed between 25 and 26 August 2014.

3.3.2 *Soil Vapor Probe Installation*

Three semi-permanent soil vapor probes, SVP-1 though SVP-3, were installed on 18 August 2014 between the former Siemens building and the Phase II ERD Pilot Study area to monitor volatile gas concentrations during the Phase II ERD Pilot Study (Figure 2). The soil vapor probes were installed to a depth of 7.5 feet below ground surface (bgs) with the probe inlet set at 7 feet bgs, consistent with the methodologies presented in the Work Plan. Boring logs with soil vapor probe construction details are included in Appendix A.

3.3.3 *Exploratory Soil Boring*

An exploratory soil boring (EB-1) was installed on 13 October 2014, prior to the beginning of injection activities to confirm the lithology and refine the depths of the A1 and A3 intervals within the area to receive

environmental fracturing (Figure 2). EB-1 was installed using dual-tube, direct-push technology and advanced to 75 feet bgs where refusal was met. The boring log for EB-1 is included in Appendix A.

3.3.4 *Injection Activities*

The depths of the interface between the A1, A2, and A3 depth intervals was refined from the Work Plan based on the lithology observation at EB-1 and newly installed monitoring wells (MW-01A1, MW-01A3, MW-02A1, MW-03A3, and MW-04A3. The A1 depth interval was observed at 50 to 55 feet bgs, and the A3 depth interval was observed at 65 to 85 feet bgs, beneath the Phase II ERD Pilot Study Area. These observations conform to the irregular and heterogeneous nature of these depth intervals described in the *Hydrogeologic Framework Report* (AMEC Geomatrix, Inc. and ARCADIS 2011). The injection intervals were refined from the Work Plan based upon these results.

The remainder of this section describes the Pilot Study injection activities, which took place between 3 and 31 October 2014. Vironex Technical Services, LLC. performed the drilling and injection activities.

3.3.4.1 *Carbon-ZVI Product Emplacement*

Environmental fracturing injection activities were completed on 14 through 16 October 2014. Environmental fracturing included borehole drilling, fracture initiation (notching), preparation of the slurry, and fracture propagation with injection of the EHC®. EHC® was selected as the carbon-ZVI product for use in the Phase II ERD Pilot Study. The EHC® was injected into the A2 depth interval to provide robust chemical reduction and bioremediation conditions to treat VOCs released by matrix diffusion in this depth interval. Table 3 provides a summary of dosage volumes, depth intervals, injection pressures, and flow rates.

The slurry for environmental fracturing was composed of approximately 30 percent by weight EHC® in a hydrated guar gum carrier. Mixing was achieved using a small volume, inline screw mixer. Guar gum is used within the slurry to add the increased viscosity required to carry the EHC® into the fracture. The pressure during notching ranged between 500 to 1,400 pounds per square inch (psi) and operating pressures during injection were typically between 400 and 600 psi.

As presented in Table 3, EHC® was injected in five direct-push points, IP-04 through IP-08, within the A2 depth interval. Locations of the injection points adjusted in the field due to subsurface utilities located around the

pilot study area. The injection points were spaced approximately 20 feet apart with a 15-foot-thick target treatment depth interval (55 to 70 feet bgs).

At each injection point location, two depths using a top down approach were chosen for the fracture propagation. Specifically, the 5-foot lifts were staggered between points to maximize overlap in the radius of influence.

The fracture initiation depths ranged from 56 to 69 feet bgs. Each injection point received approximately 2,800 pounds of EHC® and approximately 780 gallons of water. The slurry mixture was split evenly between the two depths at each location. Generally, the average injection rate per interval ranged from a minimum of 13.7 gallons per minute (gpm) to 18.4 gpm, with an average flow rate of 16.6 gpm and average pressure of 677.8 psi. None of the fractures resulted in surfacing of the EHC® and no significant pressure loss of other complicating factors were encountered.

3.3.4.2 *Emulsified Oil Injection*

The EVO was injected using a pulse injection between 17 and 22 October 2014. The activities included borehole drilling, EVO solution preparation, and injection. EVO injection was conducted consistent with the procedures outlined in the Work Plan, Standard Operating Procedure (SOP) No. 3. EVO was selected for the A1 and A3 depth intervals for the longer formation residence time and slower microorganism metabolism (relative to cheese whey). Specifically, Newman Zone®, an EVO containing a blend of fast (lactate) and slow (edible vegetable oil) release electron donors, was utilized. Table 3 presents the depth intervals, injection volumes, and flow rates recorded at each injection location.

The Newman Zone® EVO was received as a 46 percent by weight oil solution. This "stock solution" was combined with the site-prepared anaerobic water[i] to obtain a 4 percent EVO solution. Prior to EVO injection, uranine, a non-toxic tracer dye, was added to the frac-tank to

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[i] Anaerobic water was generated by allowing chlorine to volatilize from stored City water and then adding EHC®. Prior to use, a sample was collected from the tank to confirm that anaerobic (dissolved oxygen [DO] concentration less than 0.5 milligrams per liter [mg/L]) and oxidation reduction potential [ORP] of less than -100 millivolts (mV)] conditions had been reached within the tank.

visually monitor for the presence of the injectant in wells during performance monitoring activities.

Pulse injection activities were performed between 17 and 22 October 2014 at boring locations IP-09 through IP-14 (Figure 2). The injection locations were adjusted in the field due to subsurface utilities present in the pilot study area.

Injections were performed at each location using a top down approach in 5-foot depth intervals using a Geoprobe® direct-push drill rig, extending from approximately 50 to 55 feet bgs (A1 depth interval) and 65 to 85 feet bgs (top of the A3 depth interval). The injection points were spaced approximately 40 feet apart. At each injection location, approximately 1,254 gallons of EVO was injected into the A1 depth interval and 5,016 gallons of EVO was injected to the A3 depth interval. A total of approximately 37,620 gallons of 4-percent EVO solution was injected during the Phase II ERD Pilot Study. Generally, the average injection rate per interval ranged from a minimum of 5.4 gpm to 16.7 gpm, with an average flow rate of 11.7 gpm and average pressure of 162.3 psi.

3.3.4.3 Bioaugmentation

Bioaugmentation inoculum, KB-1® was added using an inline application assembly during the injection of the EVO in accordance with the Work Plan, SOP No. 3. The bioaugmentation is intended to provide for immediate and robust colonization of the most beneficial dehalogenating bacteria within the injection area.

Approximately 2 liters of bioaugmentation inoculation (0.4 liters per interval) was added to each pulse injection location in the A1 and A3 depth intervals. Table 3 presents the volumes of KB-1® injected at each injection point.

3.3.5 Confirmation Soil Borings

Six confirmation soil borings, SB-1 though SB-3 and SB-5 through SB-7, were installed between 23 and 31 October 2014 within the Phase II ERD Pilot Study Area (Figure 2) to assess the distribution of the EVO injected into the A1 and A3 lithology and the EHC injected in to the A2 lithology (for the eastern portion of the Pilot Study Area). The soil borings were installed consistent with the Work Plan, SOP No. 2, except that refusal was encountered at depths ranging from 63 and 75 feet bgs at all locations, likely due to the presence of coarse gravelly sands at this depth range. Boring logs are included in Appendix A.

The soil cores were visually screened to look for evidence of fractured soils with carbon-ZVI in the guar solution (viscous black slurry) or EVO as white cloudy fluids with tracer dye. The cores were also screened with a magnetic susceptibility meter to monitor approximately every 1 to 2 inches along the length of each soil core. Generally, elevated magnetic readings of approximately 10×10^{-3} to $20 \times 10^{-3}$are indicative of the presence of ZVI contained in the EHC®.

3.3.6 Performance Monitoring

The Work Plan describes Pilot Study performance monitoring to assess the performance and effectiveness of the injection activities. The performance monitoring includes confirming whether deleterious conditions have been created in either groundwater or soil vapor that pose a threat to human health or the environment. The methods for this monitoring are described in the Work Plan and the results are described in Section 4.

Note that the majority of the groundwater monitoring wells included in the performance monitoring is generally screened in the A1 or A3 depth intervals. The A2 depth interval is composed of low permeability sediments that would not be suitable for the screening of a well. Wells that include screened intervals across the A2 depth interval likely yield samples that are representative of the most hydraulically conductive zones in the screened interval, which typically includes the A1 or the A3 depth intervals.

3.3.6.1 Groundwater Performance Monitoring

Baseline performance monitoring sampling was completed prior to the initiation of the Pilot Study on 28 August 2014. Three post-injection monitoring events followed Pilot Study implementation:

- 1-month post-injection - 25 November 2014;
- 3-month post-injection - 29 January 2015; and
- 6-month post-injection - 23 April 2015.

A 12-month post-injection event is scheduled for October 2015.

All wells were sampled using the HydraSleeve™ sampler consistent with the procedures outlined in the Work Plan. Hydrasleeve ™ samplers were placed 1 foot below mid-screen in each of the wells and allowed to equilibrate for approximately 1 week before groundwater sampling. In most cases, the water levels within the wells took less than a few hours to

equilibrate. In cases where there were issues with the HydraSleeve™ samplers, the samplers were reinstalled on the same day, and verification that the water levels had equilibrated were performed prior to sample collection (usually completed at least 4 hours after deployment). Where the well screen was not fully saturated, the sampler was placed half the distance from the water elevation to the bottom of the casing. If limited water was available for collection using the HydraSleeve™ sampler, then a bailer was used to collect a sample. Samples from extraction wells with pumps present were collected either using the valve at the well head or using a bailer accompanied with its low flow insert.

The monitoring wells below were not sampled or were sampled more than initially proposed, as discussed:

- Well 2B-S was not sampled during the 6-month performance monitoring sampling event as presented in the Work Plan due to obstruction within the well. Table 3 of the Work Plan erroneously identified monitoring well 2B-S for sampling during the 6-month performance monitoring sample event; this well was not intended to be included in the performance monitoring program.
- Performance monitoring samples could not be collected from a number of wells due to insufficient water for analyses. LF-13A was dry during the 1-, 3-, and 6-month sampling events and was not sampled for any constituents. For the same reason, field parameters were not taken from MW-02A1 during the baseline and 1-month sampling events or from MW-OS-1A1 during the baseline, 4-month, and 6-month sampling events.
- Additional groundwater samples were collected in February 2015 (4-month sample event) from G-1A, 2EP, 2EPa (two depth intervals), VM-5S, VM-5D, MW-OS-2A1, and MW-OS-2A1, MW-OS-2A3 as described in Section 4.6.1.

3.3.6.2 *Soil Vapor Performance Monitoring*

Soil vapor probes were sampled with procedures presented in the Work Plan. Soil vapor performance monitoring included baseline sampling of the soil vapor probes prior to initiation of the Pilot Study and post-injection monitoring during the 1- through 4-month (September 2014 through February 2015) and during the 6-month (April 2015); the 12-month sampling event is scheduled to be completed in October 2015. The monitoring frequency was adjusted following the 4-month sampling event due to stable or decreasing concentrations of VOCs.

3.3.6.3 *Extraction Well Performance Monitoring*

EVO is expected to persist in the formation for 6 to 18 months following injection. While EVO encourages favorable bacterial growth that supports VOC degradation, enhanced bacterial growth can also foul the existing treatment system and could result in elevated biological oxygen demand in the treatment system effluent. To avoid this, groundwater extraction was suspended from wells 2EP, 2EPa, and H-1A during implementation of the Phase II ERD Pilot Study. Extraction well LF-6A continued to operate because this well is screened within the A4 depth interval and below the depth of the ERD Pilot Study.

Performance monitoring activities included collection of total organic carbon (TOC) from the extraction wells and upgradient monitoring wells monitor EVO migration toward the extraction wells, as shown in Table 2.

3.3.7 *Investigation Derived Waste*

Investigation-derived waste was contained in Department of Transportation-approved, roll-off soil bins stored on the property. Samples were collected from the soil bins and analyzed for the requirements of the licensed disposal facility. Soil investigation-derived waste was profiled consistent with California Department of Toxic Substances Control requirements and disposed of by American Integrated Services, Inc. at a licensed disposal facility, Potrero Hills Landfill, Inc., in Suisun, California. All purge and decontamination water generated during the Phase II ERD Pilot Study was treated through the existing treatment system.

3.3.8 *Surveying*

The soil borings, injection locations, and monitoring wells were surveyed by San Benito Engineering & Surveying, Inc., a California-licensed surveyor based in Hollister, California. Each monitored location was surveyed to the horizontal datum consistent with the North American Datum of 1983 (NAD83), California Zone 3, and where applicable, to the vertical datum consistent with the North American Vertical Datum of 1988 (NAVD 88), and in accordance with Geotracker database requirements. Horizontal and vertical coordinates for the monitoring wells are included in Table 1.

4.0 PILOT STUDY RESULTS

Section 1.1 identified the objectives of this Phase II ERD Pilot Study. This section describes the results for the soil confirmation borings and performance monitoring for groundwater and soil vapor in meeting those objectives. Appendix E provides a detailed description of the results. Table 4 provides a summary of observations from the confirmation borings. Tables 5 through 10 include summaries of groundwater, soil vapor and extraction well performance monitoring results.

Analytical data were reviewed following the USEPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA, October 1999) and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA, October 2004). The data quality review evaluates holding times, preservation methods, method blank sample results, laboratory control sample recoveries, and matrix and surrogate spike recoveries. Based on ERM's data quality review, the quality of the data generated during this investigation is acceptable for the preparation of technically defensible documents. The results of the quality assurance/quality control review for this data set are presented in Attachment C. Laboratory analytical results are maintained with the project files.

4.1 OPTIMIZATION OF AMENDMENT FORMULA AND DOSING TO MAXIMIZE LONG-TERM MASS REMOVAL

The soil confirmation borings and groundwater performance monitoring for VOCs were used to evaluate the amendment formula and dosing to maximize long-term mass removal. As described below, the following conclusions were made based on the data:

- The confirmation borings installed after the injection did not show uniform distribution of the EHC® in the A2 depth interval or EVO in the A1 and A3 depth intervals;
- The treatment area monitoring wells, which were screened in the A1 and A3 depth intervals, generally indicate that ERD is effective in the destruction of TCE and daughter products. Data from well VM-4S suggests that chemical reduction from the ZVI has resulted in the largest changes in concentration without the production of notable VC. This suggests an advantage to the paired application of EVO and ZVI.

- The presence of increased concentrations of dissolved iron, manganese, and ethene combined with decreased concentration of nitrate and sulfate all support the presence of strongly reducing conditions that are suitable for the complete reductive dechlorination of TCE to ethene.

4.1.1 *Confirmation Soil Boring Results*

Green fluorescence from the uranine tracer dye in the EVO mixture was observed at SB-1 (11 feet northwest of IP-11) in the 53 to 54 foot interval in a silty fine sand. The EVO was not observed in the surrounding sand and gravelly sand. This verifies that EVO traveled at least 11 feet horizontally in the cross gradient direction to the west to SB-1 in the A1 depth interval.

At SB-7, a light gray milky substance like the EHC® in the guar solution and fractures were observed at 63 feet bgs (A2 depth interval), in the center of the core. Evidence for the dye in the A1 and A3 depth intervals was not observed. SB-7 was located approximately 3 feet northeast of IP-07. Fracture propagation depths at IP-07 were performed at 63 and 68 feet bgs. Similar findings were not observed at the surrounding borings (SB-5 and SB-6).

Elevated magnetic susceptibility readings were observed at 45 feet bgs at all confirmation soil borings except SB-2. Gray filings appeared as a coating and typically occurred at the 45 to 46 foot and 50 to 50.5 foot intervals. There is some uncertainty as to whether the elevated magnetic susceptibility measurements detected at 45 feet bgs and the gray filings are detecting potential metal residue from the drilling rods used for advancing the borings or from the ZVI associated with the EHC© injectate.

Evidence for the carbon-ZVI (with guar solution) and the EVO (with dye) was not identified in most of the borings. This suggests that the injection of the carbon-ZVI and EVO was neither radially or vertically uniform. This suggests that heterogeneities in the lithology throughout the A1 through A3 depth intervals were influential in the distribution of injected materials.

4.1.2 *Volatile Organic Compounds*

The analytical results for VOCs were evaluated in two ways to assess the effectiveness of the Phase II ERD Pilot Study:

- Evaluation of the data on a concentration basis to the baseline and historical dataset; and
- Evaluation of the proportions of the individual chlorinated VOCs using ratios on a molar basis.

The evaluation of absolute concentration can provide a basis for evaluating mass destruction and progress relative to remedial goals. The evaluation of the ratios (on a molar basis) for tetrachloroethene (PCE), TCE, cis-1,2-DCE and VC provides the most direct evidence for reductive dechlorination. Plots of concentration versus (vs) time and molar ratios are included for key monitoring wells in the treatment area, upgradient/crossgradient of the treatment area and downgradient of the treatment area in included in Appendix B.

Findings of the evaluation are summarized below by the following well groupings:

- Treatment Area Monitoring Wells – VM-3S, VM-3D, VM-4S, VM-4D, MW-03A3;
- Cross gradient Monitoring Wells – VM-7S, and VM-7D;
- Upgradient Monitoring Wells – G-1A, VM-8S and VM-8D; and
- Downgradient Monitoring Wells – 2EP, 2EPa, H-1A, LF-6A, LF-13A, MW-01A1, MW-01A3, MW-02A1, MW-04A3, VM-5S, VM-5D, VM-6S VM-6D, MW-OS-1A1, MW-OS-2A1, and MW-OS-2A3.

4.1.2.1 *Treatment Area Monitoring Wells*

The data from the treatment area monitoring wells show that the Phase II ERD Pilot Study was generally effective in supporting reductive dechlorination. To date, there is no evidence of TCE rebound in any of the monitoring wells, which is not unexpected given the evidence of EVO presence in the monitoring wells. However, performance has only been monitored for about six months, which is inadequate to assess rebound and the associated impacts on the treatment approach. Monitoring wells VM-3S and VM-3D are located in the western half of the Pilot Study Area that received only EVO. These monitoring wells show the progressive conversion of TCE to cis-1,2-DCE, and then to VC combined with concentration reduction that is expected. Monitoring wells VM-4S and VM-4D are located in the eastern half of the Pilot Study area that received both EVO and EHC®. Results from monitoring well VM-4D are similar to the VM-3S and VM-3D results and do not show differentiation resulting from the EHC®.

Monitoring well VM-4S is the treatment area well that had the highest baseline concentration of VOCs and its results are different than the monitoring results from the other treatment area wells. Well VM-4S appears to show less evidence for sequential conversion of VOC mass through the daughter products (TCE → cis-1,2-DCE → VC → ethene) and more evidence for the direct destruction of VOCs supported by strong reducing conditions typically associated with the application of ZVI. Specifically, trend plots show a substantial decrease in VOC concentrations and VOC mass at this well (see Figure 4 and Appendix B). TCE concentrations decreased from 0.23 mg/L to 0.0072 mg/L and cis-1,2-DCE concentrations decreased from 2.7 mg/L to 0.38 mg/L. Only a small change in the relative proportions of VOCs was observed, with a small in increase in VC that was not proportional to the decrease in TCE and cis-1,2-DCE. The absence of a strong increase in VC paired with these decreases in TCE and cis-1,2-DCE suggests chemical reduction as opposed to sequential biological dechlorination.

4.1.2.2 *Crossgradient/Upgradient Monitoring Wells*

The data from the crossgradient/upgradient monitoring wells do not appear to show obvious treatment effects; however, the reported decreases in TCE concentrations are likely related to seasonal changes during this monitoring period. For example, the sample collected at 3-month and 6-month sample events at upgradient well G-1A shows marked increase in concentration of cis-1,2-DCE, 1,1 DCE and VC while TCE concentrations were relatively stable. This result is an outlier in the historical dataset. This well is located approximately 45 feet upgradient from the closest injection point. Despite the suggestive correlation, it is not clear if the Pilot Study had a causal effect on this change in VOC distribution.

The variability in the seasonal conditions in the upgradient and cross gradient wells make it difficult to resolve from the Pilot Study dataset whether one can define the absolute change resulting from the Pilot Study. The dataset confirms that multiple lines of evidence are needed to evaluate the performance monitoring results and anomalies and outliers observed during the Pilot Study.

4.1.2.3 *Downgradient Monitoring Wells*

The data from the downgradient monitoring wells show that to date, the Phase II ERD Pilot Study has had limited effect on VOC concentrations in the downgradient areas, with the exception of MW-01A3. Only minor changes to the total VOC concentrations was observed; however, TCE

concentrations at this location decreased significantly (0.15 to 0.01 mg/L) from the baseline to the 6-month monitoring event. Trend plots show that most of the TCE has been converted to cis-1,2-DCE which is actively being converted to VC (Figure 2). This trend although less in magnitude is similar to what was observed in the treatment monitoring wells (VM-4S and VM-4D) upgradient of this monitoring well.

Increased VC concentrations were observed downgradient of the Pilot Study Area and close to the property boundary (2EPa and VM-5S) during the 3-month sample event. Similar increases in VC were not observed in the wells located between these wells and the treatment area (MW-01A1, MW-01A3, or MW-02A1). The Mitigation Plan was implemented as discussed in Section 4.6.1 based on these results.

As part of the Mitigation Plan implementation, 2EPa and VM-5S were resampled to confirm the 3-month condition. The results for the resample (4-month sample event) did not confirm the elevated VC concentrations and these results appear to be outliers. ERM reviewed the sampling methodology used to collect the groundwater sample at 2EPa during the 3-month sample event. This well is an extraction well that was shut down in October 2015 to prevent potential fouling of the existing treatment. During the 3-month sample event, the extraction well was not operating long enough to collect samples representative of the groundwater conditions.

ERM removed the pump from the well on 23 February 2015 and collected two groundwater samples from monitoring well 2EPa during the above-mentioned 4-month groundwater sampling event. Specifically, the groundwater samples were collected using HydraSleeve™ samplers set within the middle of the two screened intervals within the well (this well is screened in the A1, A2 and A3 depth intervals). The results collected from both screen intervals for the 4-month event were consistent with the baseline, 1-month, and 6–month monitoring results and show the 3-month monitoring results were anomalous and likely representative of field error. The VOC concentrations from the two depth interval samples were very similar which provided justification that a groundwater sample collected from the middle of the water column within the well would be representative. Based on the results of the 4-month sample event, ERM rejected the 3-month sample results from this well and have not included them in the data results summary.

4.1.3 Geochemical Constituents

4.1.3.1 Dissolved Iron and Manganese

The reduced forms of iron and manganese are more soluble; therefore, increases in the concentration of dissolved iron and manganese are typically used as a qualitative indicator for reducing conditions. Notable increases in dissolved iron and manganese were observed in Treatment Area wells. Dissolved iron and manganese concentrations also increased in the downgradient, upgradient, and cross gradient wells but to a lesser extent. These conditions are consistent with reductive dechlorination.

4.1.3.2 Ethane and Ethene Concentrations

Ethane and ethene concentrations are important in the assessment of the complete reductive dechlorination process as they are daughter products of completion of this process. Ethene is the direct by-product of the dechlorination of VC and is extremely transient in the aquifer and therefore is typically treated as a qualitative indicator for the presence of complete reductive dechlorination. The observation of ethene is a positive indicator for complete ERD.

As shown in Table 7, ethene was detected in the treatment area monitoring well VM-3S during the 3-month and 6-month sampling event, and in monitoring wells MW-03A3 and VM-4S during the 6-month sampling event. In the downgradient monitoring wells, ethene was detected at MW-01A3 during the 1-month and 3-month sampling events. These data support that complete biological reductive dechlorination is occurring.

The presence of ethane can indicate the inhibition of the reduction of chlorinated ethenes due to the presence of chlorinated ethanes. Ethane was not detected above the reporting limit in the sampling events. These data suggests that chlorinated ethanes present at the site do not require special attention.

4.1.3.3 Sulfate Concentrations

Sulfate is an alternate electron acceptor for microbial respiration in the absence of oxygen, nitrate, and ferric iron. Sulfate is present in the background groundwater at the site. Depleted levels of sulfate relative to the background levels indicate that the environment is reducing to sustain sulfate reduction and for reductive dechlorination to occur. Sulfate levels

less than 20 mg/L are desirable but not required for reductive dechlorination to occur.

As shown in Table 7, sulfate concentrations in groundwater collected within the treatment area monitoring wells MW-03A3, VM-3S, VM-3D, VM-4S, and VM-4D, and downgradient monitoring well MW-01A3 showed decreasing levels of sulfate to below 20 mg/L between the baseline event and the 6-month sampling event. These conditions are consistent with reductive dechlorination.

4.1.3.4 *Nitrate Concentrations*

Concentrations of nitrate less than 1.0 mg/L are desirable for reductive dechlorination of chlorinated VOCs. As shown in Table 7, treatment area monitoring wells MW-03A3, VM-3S, VM-3D, VM-4S, and VM-4D and downgradient of the Pilot Study Area monitoring wells (2EP, 2EPa, and MW-01A3), had detections of nitrate in groundwater below 1.0 mg/L during the 6-month sampling event. In addition, concentrations of nitrate in groundwater at the majority of these wells exhibited decreasing concentrations between the baseline event and the 6-month event. These conditions are consistent with reductive dechlorination.

4.2 *ASSESSMENT OF ATTENUATION RATES AND LONGEVITY*

The groundwater performance monitoring for the following chemicals and parameters were used to evaluate the attenuation rates and longevity of the EVO and carbon-ZVI product:

- Field observations;
- Field parameters; and
- Geochemical constituents.

As described below, the following conclusions were made based on the data:

- Field observations support that the EVO has persisted longer than 6 months within the treatment area and the strong decomposing odor in the treatment and downgradient areas support that robust fermentation is occurring.
- Water quality data show that reducing conditions are present in most wells within and downgradient of the treatment area. These data show

both the influence of the EVO and EHC® applied in the treatment area.

- The TOC data show high concentrations of organic materials are present within the treatment area showing the persistence of the EVO and EHC®. These results suggest that adequate EVO was injected for this Pilot Study to evaluate the effectiveness and persistence of the results and are likely close to optimum dosage for future treatment.

4.2.1 *Field Observations*

During the sample collection, visual observations were made of groundwater color and odor to screen for the EVO with the uranine dye, and to correlate with groundwater quality data for the presence of residual EVO in the Pilot Study area. The EVO is typically visible as a white or cloudy appearing solution to a concentration lower than 100 parts per million and is typically visible in wells within the injection area for several months following injection at similar sites. The odor of the fermentation by-products from the EVO typically last beyond the visible indication of the EVO and can provide evidence for anaerobic biological activity.

Based on field observations of the groundwater collected during the performance groundwater sampling events to date, a cloudy appearance and a distinct odor resembling EVO was observed at all the treatment area monitoring wells. This provides evidence that EVO is durable and can be retained within the treatment area for at least 6 months. The distinct EVO odor was also noted in several, but not all downgradient monitoring wells located approximately 60 to 90 feet from the closest injection points. Visual evidence for EVO and odor was absent in some of the closer downgradient monitoring wells (MW-02A1, MW-04A3, MW-01A1).

4.2.2 *Field Parameters*

Oxidation reduction potential (ORP) measurement of less than 0.0 mV and dissolved oxygen (DO) concentrations of less than 0.5 mg/L indicate groundwater conditions suitable for reductive dechlorination to occur. An ORP measurement of less than -100 mV is generally indicative of the conditions for robust reductive dechlorination. Additionally, pH close to neutral (i.e., 6 to 8) is the most conducive for healthy microbial populations. Most of the DO measurements were collected ex-situ and the range of values do not appear to align with the ORP and other geochemical indicators for reducing and anaerobic conditions (dissolved

iron and observed reductive dechlorination). These data are not considered reliable and are not discussed.

Following implementation of the Pilot Study, reducing conditions were observed in the treatment area and downgradient monitoring wells. The most strongly reducing condition was measured in well VM-4S located on the eastern half of the Pilot Study Area that received both EVO and EHC® treatments. This condition should be monitored as the EVO attenuates to evaluate if the persistence of the ZVI influences the long-term stability of the strong reducing conditions to effectively address continued diffusion of VOCs from fine-grained units.

Monitoring wells VM-8S and VM-8D are located approximately 120 feet upgradient of the Pilot Study area and provide a point of reference of the background variation in redox conditions. Wells VM-7S and VM-7D are located cross gradient and could potentially show some influence from the Pilot Study at other times. ORP measurements decreased at these monitoring wells during the 1-month and 3-month sampling events. These findings show that upgradient groundwater, especially in the A1 depth interval progressed to more strongly reducing conditions during the Pilot Study.

These results are positive in that this shows that reducing conditions can be sustained because of the low influx of aerobic water, but also complicate the clear attribution of the changes in groundwater geochemistry to the Pilot Study.

4.2.3 *Geochemical Constituents*

The presence of TOC indicates its background organic carbon content during the baseline monitoring in each monitoring well. It is also an indicator of EVO and fermentation by-product distribution during performance monitoring. TOC concentrations of greater than 20 to 50 mg/L are desired in the treatment zone. As shown in Table 7, concentrations of TOC in treatment area monitoring wells MW-03A3, VM-3D, VM-3S, VM-4D and VM-4S were greater than 20 to 50 mg/L during the 6-month sampling event. In addition, concentrations of TOC in groundwater collected at all the monitoring wells increased between the baseline event and the 6-month sampling event. The concentration of TOC in monitoring wells MW-03A3 and VM-3S has decreased substantially since the 1-month and 3-month monitoring events. This suggests that the EVO is either being consumed or diluted but has persisted for more than 6 months.

TOC concentrations at all downgradient and crossgradient monitoring wells have remained stable with the exception of the following downgradient wells: MW-01A3 (located approximately 60 to 65 feet downgradient from their closest injection points IP-06 and IP-11), where an increased TOC concentration of 360 mg/L from 0.48 mg/L was detected during the 1-month sampling event; and VM-5S (located approximately 40 to 50 feet downgradient from their closes injection points IP04 and IP-10) where TOC concentrations increased from 1.9 mg/L during the 4-month sampling event to 650 mg/L during the 6-month sampling event. This may indicate that some of the EVO or fermentation products are migrating downgradient potentially via preferential pathways.

4.3 ASSESSMENT OF THE OPTIMAL AQUIFER INOCULATION RATES TO MAXIMIZE BIODEGRADATION

The groundwater performance monitoring for methane and environmental molecular testing were used to assess the aquifer inoculation rates (bioaugmentation) to maximize the transformation of TCE to ethane through biodegradation. As described below, the following conclusions were made based on the data:

- The baseline data show low concentrations of dehalococcoides bacterium (DHC) and no evidence for the active expression of the vinyl choride reductase (vcrA) gene needed for the complete dechlorination of VC. These data confirm that biological augmentation is needed to achieve complete destruction of the chlorinated VOCs.
- The rate of colonization by the KB-1 and the measurement of active vcrA gene expression were slower than desired (up to 6-months) and not universally observed within the optimal range in all of the Pilot Study area wells (VM-4D). These parameters have shown strong increases during most sample events showing that KB-1 will thrive under appropriate conditions at the site.
- The inoculation rate of KB-1® was satisfactory within the Pilot Study Area (VM-3S, VM-3D and VM-4S) and in downgradient monitoring wells (2EP and VM-5S) which received additional bioaugmentation as part of the Mitigation Plan implementation. Other tested locations show concentrations of DHC and vcrA that are considered desirable for robust and complete reductive dechlorination.
- Several treatment area wells including Well VM-4D show an increasing trend in the concentration of DHC and vcrA suggesting that full and robust colonization may require more than 6 months.

- The Mitigation Plan measures applied in wells VM-5S, 2EP, and 2EPA correlate with decreases in VC concentration following bioaugmentation. These results suggest that application of KB-1® alone may enhance the destruction of chlorinated VOCs.

4.3.1 Environmental Molecular Testing

Groundwater samples were collected from wells to screen for the presence and population of the DHC, and active expression of the vcrA gene (required for the destruction of VC).

Positive identification of DHC indicates the potential for complete dechlorination of chlorinated ethenes such as TCE. The absence of vcrA, a gene expression, can cause toxic accumulation of VC and thus may indicate the need for a bioaugmentation inoculant in order to provide an environment suitable for complete dechlorination of chlorinated VOCs. According to manufacturer recommendations, values of 10^5 to 10^6 DHC or vcrA gene copies per liter of groundwater are considered as containing moderate concentrations associated with observable dechlorination activity (i.e., detectable ethene). Values at or above 10^7 DHC and vcrA gene copies per liter of groundwater indicates that the sample contains high concentrations that are often associated with high rates of dechlorination (Lu et al., 2006) and the production of ethene.

Based on a review of the data (Table 9), DHC and vcrA are reported at optimum or close to optimum concentrations (where complete dechlorination to ethene) is likely within the treatment area monitoring wells VM-3S, VM-3D and VM-4S. Concentrations of the vcrA expression increased over time without additional augmentation at wells VM-3S, VM-4S, and VM-4DS. This may be indicative of a gradual establishment of suitable conditions over time, especially in the shallower wells. Lower concentrations of DHC and vcrA were observed in downgradient monitoring wells MW-01A1, MW-01A3 and VM-6S.

Note that the additional bioaugmentation further discussed in Section 4.1.3 was performed immediately after the 4-month sampling event at monitoring wells 2EP, 2EPa and VM-5S. The results of the 6-month monitoring event show increased DHC and vcrA expression in each of these three wells. This mitigation measure is expected to support long-term beneficial reductive dechlorination.

4.3.2 *Methane Concentrations*

Increase in methane production is commonly observed following the injection of EVO and similar compounds. Excessive methane generation is indicative of the use of the EVO by non-beneficial biota and suggests bioaugmentation is needed. Extreme generation of methane can become an issue problematic for gas accumulation and vapor intrusion.

As shown in Table 7, methane concentration increased in the treatment area monitoring wells MW-03A3, VM-3S and VM-4S during the 1-month through 6-month sampling events. At monitoring wells VM-3D and VM-4D, methane was detected beginning during the 3-month through 6-month sampling event. For downgradient monitoring wells with enough data for evaluation, increasing methane concentrations was generally detected at monitoring wells 2EP, 2EPa, MW-01A1, MW-01A3 and VM-5S beginning during the 3- or 4- through 6-month sampling events. For crossgradient and upgradient monitoring wells with enough data for evaluation, increased methane concentration was only observed at VM-7S during the 3-month sampling event. These data do not show evidence for excessive methane generation, but indicate that additional bioaugmentation could be beneficial.

4.4 *EVALUATION OF ENVIRONMENTAL FRACTURING AS A MEANS TO ENHANCE TREATMENT OF LOW-PERMEABILITY AQUIFER UNITS*

As described in the Work Plan, the fracture network produced by environmental fracturing has been shown to significantly increase the formation's local permeability, allowing for increased emplacement volume and facilitating the distribution of treatment materials in situ with low permeability strata. The fracture network is also intended to enhance treatment by speeding diffusion and shortening pathways for penetration of treatment compounds and beneficial bacteria.

As presented in Section 3.3.4.1, EHC® was successfully injected into the A2 depth interval using environmental fracturing. None of the fractures resulted in surfacing of the EHC® and no significant pressure loss of other complicating factors were encountered. As discussed in Section 4.1.1, evidence for the carbon-ZVI (with guar solution) was not identified in most of the confirmation borings. This suggests that the injection of the carbon-ZVI was neither radially or vertically uniform.

Environmental fracturing was used to inject EHC® in the low permeability zones on the eastern portion of the treatment area (near VM-

4S and VM-4D). As discussed in Section 4.1.2.1, monitoring well VM-4S had very different results when compared to the other treatment area monitoring wells. This monitoring well appears to show more evidence for the direct destruction of VOCs supported by strong reducing conditions typically associated with the application of ZVI. TCE and cis-1,2-DCE concentrations were reduced significantly without a proportional molar increase in the abundance of VC. The relatively small increase in VC compared to the total mass reduction suggests that the VOCs may have been chemically reduced by the ZVI.

Based on the results of the 6-month sampling, both EVO and EHC® are actively producing reducing condition in the formation that allow degradation of TCE. Additional monitoring is needed once the EVO has dissipated and TOC has returned to near baseline conditions to allow for evaluation of rebound and differentiation between the EHC® and EVO areas.

4.5 EVALUATION OF THE EFFECTS OF LITHOLOGIC HETEROGENEITIES AND VARIABILITY IN HYDRAULIC CONDUCTIVITY ON THE FEASIBILITY OF ERD

The soil confirmation borings, groundwater elevation and groundwater performance monitoring for VOCs were used to evaluate the effects of lithologic heterogeneities and significant small-scale variability in hydraulic conductivity on the feasibility of ERD, including remedy delivery and contaminant fate and transport. The following conclusions were made based on the data:

- As described in Section 4.1.1, the confirmation borings installed after the injection did not show uniform distribution of the EHC® or EVO. This suggests that heterogeneities in the lithology throughout the A1 through A3 depth intervals were significant in the distribution of injected materials despite the injection technologies tested to overcome these known challenges.
- As described below (Section 4.5.1), although there were changes to the groundwater elevations during the six month performance monitoring period, these changes have not adversely impacted the performance of the Phase II ERD Pilot Study.
- Downgradient monitoring wells to the north and northeast, MW-01A3, VM-5S and 2EPa also showed treatment effects by the cloudy appearance and distinct odor resembling EVO in the groundwater, the decrease in TCE concentrations and conversion of TCE to cis-1,2-DCE

and then to VC (Section 4.2.1). These wells are located approximately 60 to 90 feet downgradient of the closest injection points. However, these observations were absent at some of the closer downgradient monitoring wells, which substantiates previous determinations of the heterogeneity of the aquifers observed at the site during subsurface investigations.

- Crossgradient/upgradient monitoring wells show notable variability in the concentrations of VOCs within the plume over the period of the Phase II ERD Pilot Study (Section 4.1.2.2). Wells VM-8S and VM-8D show that reducing conditions and decreased TCE were observed in upgradient areas. Well G-1A showed a large increase in the concentration if cis-1,2-DCE during the monitoring period suggesting that high concentrations of chlorinated VOCs may persist in localized areas.
- Visual evidence for EVO and odor was absent in some of the closer downgradient monitoring wells (MW-02A1, MW-04A3, MW-01A1) (Section 4.2.1). This observation supports a heterogeneous distribution of the EVO in the aquifer and differential fate and transport of the EVO and VOCs.. These observations also highlight the challenges in monitoring the distribution within the A1 depth interval due to the long screens present in some of the historical SVE wells now used as groundwater monitoring wells.

4.5.1 Groundwater Elevations

The Phase I ERD Pilot Study results suggested that some changes in VOC distribution may have been more strongly attributed to hydrologic changes than to the Pilot Study. The groundwater elevation data collected during the Phase II ERD Pilot Study are summarized in Table 5. For reference of the groundwater conditions, Appendix D provides the groundwater elevation contour maps for the A1 and A3 depth intervals associated with the 4th Quarter 2014 and 1st Quarter 2015 site-wide groundwater monitoring events.

The groundwater elevation data indicate:

- Groundwater elevations were relatively stable within the A1 interval within the treatment area and downgradient area between the baseline event in August 2014 and the 6-month post injection monitoring event in April 2015. For example, Groundwater elevations rose at monitoring well VM-4S by 0.27 feet and declined at monitoring well VM-3S by 1.33 feet between the baseline and 6-month groundwater sampling events.

- Groundwater elevations within the A3 depth interval within the treatment area and downgradient area fell approximately 5.5 feet between the baseline and 6-month sampling events.
- The existing well pairs VM-3S and VM-3D, VM-4S and VM-4D, and MW-01A1 and MW-01A3 show the significant difference in groundwater elevation (head) between the A1 and A3 depth intervals. This marked difference in elevation head over a small vertical distance is indicative of poor vertical communication between the A1 and A3 depth interval. This suggests perched conditions for the A1 and confined conditions in the A3.

Data from wells upgradient of the Phase II ERD Pilot Study suggested that some changes in VOC distribution may have been more strongly attributed to seasonal and hydrologic changes than to the Pilot Study (Section 4.1.2.2). The changes have not adversely impacted the performance of the Phase II ERD Pilot Study.

4.6 EVALUATION OF POTENTIAL ADVERSE IMPACTS

This section describes the monitoring completed to evaluate the potential off-site migration risk, soil vapor migration risk and extraction well risk. The data indicate no adverse impacts as a result of the Phase II ERD Pilot Study.

4.6.1 Off-Site Migration Risk

The Mitigation Plan presented in the Work Plan was developed to be implemented if cis-1,2-DCE, VC or other undesirable pilot study end products exhibited the potential for off-site migration. Mitigation Plan measures include increased monitoring, bioaugmentation, and groundwater extraction responses. Performance monitoring results were evaluated to determine whether complete reductive dechlorination is occurring and if there was elevated risk for VC migrating into off-site areas.

Based on the results from 2EPa and VM-5S during the 3-month sample event, the following conservative mitigation measures were implemented:

- Collected groundwater samples from the following wells on 27 February 2015 (4-month post-injection sample event): G-1A, 2EP, 2EPa (two depth intervals), VM-5S, VM-5D, MW-OS-2A1, and MW-OS-2A1, MW-OS-2A3.

- Placed filter socks containing approximately 500 grams of EHC® into the water column at approximately 52 to 56 feet bgs within well VM-5S to support anaerobic environment. The filter socks were within the well between 27 February 2015 and 13 April 2015, with the exception of 17 March 2015 when the injection of KB-1® was performed.
- Injected KB-1® at mid-screen or at the middle of the available water column using downwell tubing. A summary of the injection volumes and depths are as follows:
  - VM-5S received 3 liters of KB-1® at 56 feet bgs;
  - 2EP received approximately 1 liter of KB-1® at 53 feet bgs; and
  - 2EPa received KB-1® at mid-screen of both intervals; approximately 1 liter of KB-1® was injected at 64.5 feet bgs and 1 liter at 79.5 feet bgs.

As discussed in Section 4.1.2.2, the results for the 4-month resample event did not confirm the elevated VC concentrations; conditions represented by the earlier results appear to be outliers. In addition, the results of the 6-month monitoring event show increased DHC and vcrA expression in each of the three wells. This Mitigation Plan measure is expected to support long-term beneficial reductive dechlorination.

4.6.2 *Soil Vapor Migration Risk*

The methane and VOC concentrations in the three semi-permanent vapor probes were monitored during performance monitoring sampling events to evaluate potential methane generation and any increases in the volatilization of VOCs within the injection area. Methane was not detected in any of the soil vapor monitoring events.

There were no increases in detected VOCs were observed at the soil vapor probe locations with the exception of SVP-2 where a slight increase in 1,1,1-trichlorothane occurred between the baseline and 1-month sampling events. However, 1,1,1-trichloroethane concentrations decreased at SVP-2 following the 1-month event. Freon 113, 1,1-DCE, TCE, and PCE concentrations have either remained stable or shown decreasing trends between the baseline and 6-month sampling events. The soil vapor probes will be monitored again 12 months post-injection in October 2015; the pilot study activities show no indication of deleterious effect on soil vapor or exposure risk.

4.6.3 *Extraction Well Risk*

Enhanced bacterial growth can foul the existing treatment system and could result in elevated biological oxygen demand in the treatment system effluent. MW-01A1 and MW-01A3 were used to monitor the upgradient conditions for extraction wells 2-EP and 2-EPa, and monitoring well MW-04A3 was used to monitor the upgradient conditions for extraction well H-1A. Extraction well LF-6A, which continued to operate because it is screened in the A4 depth interval, was also assessed.

Monitoring wells MW-01A3 and MW-04A3 showed increasing concentrations of TOC between the baseline and the 6-month sampling events. Because these wells showed more than a 20 percent increase from baseline conditions, extraction wells 2EP, 2EPa, and H-1A were not restarted following the 6-month sampling event. Results of the 12-month sampling event will be used to further assess whether 2EP, 2EPa, and H-1A should be restarted. The groundwater elevation at 2EP also will need to rise in order to resume pumping operation.

The TOC concentrations at the A4 depth interval extraction well LF-6A were not detected above the reporting limit of 1 mg/L during the baseline and 1-month sample events. During the 3-month sample event, the TOC concentration increased to 1.9 mg/L. This TOC concentration decreased to 0.54 mg/L during the 6-month sample event. An additional sample will be collected at 9 months to assess whether TOC has increased, decreased or has stabilized. Considerations to shut down the well will be performed if the TOC concentrations is greater than the 3-month sampling event results.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase II ERD Pilot Study injection activities did not generate public health related risks or adverse impacts. No risk associated with methane generation or vapor migration of VOCs (which may occur during ERD applications) was noted. Performance monitoring results were evaluated to determine whether complete reductive dechlorination is occurring and whether VC presents an off-site migration risk. Following the 3-month sampling event, the Mitigation Plan was implemented due to the elevated VC concentrations, which were present at VM-5S and 2EP.

The first six month of monitoring following Phase II ERD Pilot Study injections indicates that the technology components (environmental fracturing, pulse injection, EVO, carbon-ZVI product, and bioaugmentation) can be implemented successfully at former Siemens facility without adverse exposure to public health. Additional monitoring is required to evaluate the answers to the following questions:

- How long does the EVO persist in the formation;
- How long until the carbon-ZVI substrate becomes fully effective in the formation; and
- Will carbon-ZVI substrate continue to support reductive dechlorination over time?
- Will rebound occur due to diffusion from the A2 depth interval and fine-grained units within the A1 and A3 depth intervals?

There are potentially some refinements in the injection process, which will be evaluated following additional monitoring, but overall the EVO and carbon-ZVI substrate are having the intended effect in the subsurface.

This section provides conclusions and recommendations based on the results of the Phase II ERD Pilot Study implementation activities.

5.1 CONCLUSIONS

Based on the information presented in this Report, the following conclusions have been made:

- EVO can be successfully injected into all targeted A1 and A3 depth intervals and at the targeted volumes using a pulse injection rates between 5 to 15 gallons per minute.

- Carbon-ZVI product can be injected into the A2 depth interval using environmental fracturing.
- The confirmation borings installed after the injection did not show uniform distribution of the EHC® or EVO.
- The treatment area wells generally indicate that ERD is effective in the destruction of TCE and daughter products. Data from well VM-4S suggests that chemical reduction from the ZVI has resulted in the largest changes in concentration without the production of notable VC. This suggests an advantage to the paired application of EVO and carbon-ZVI product.
- The presence of increased concentrations of dissolved iron and manganese, methane, and ethene combined with decreased concentration of nitrate and sulfate all support the presence of strongly reducing conditions that are suitable for the complete reductive dechlorination of TCE to ethene.
- Field observations support that the EVO has persisted longer than 6 months within the treatment area and the strong decomposing odor in the treatment and downgradient areas support that robust fermentation is occurring.
- Water quality data show that reducing conditions are present in most wells within and downgradient of the treatment area. These data show both the influence of the EVO and EHC® applied in the treatment area.
- The TOC data show high concentrations of organic materials are present within the treatment area showing the persistence of the EVO and EHC®. These results suggest that adequate EVO was injected for this Pilot Study to evaluate the effectiveness and persistence of the results and are likely close to optimum dosage for future treatment, assuming adequate distribution can be achieved. This persistence should be evaluated during future events.
- The inoculation rate of KB-1® was satisfactory within the Pilot Study Area (VM-3S, VM-3D and VM-4S) and in downgradient monitoring wells (2EP and VM-5S), which received additional bioaugmentation as part of the Mitigation Plan implementation. Other tested locations show concentrations of DHC and vcrA that are considered desirable for robust and complete reductive dechlorination.
- Several treatment area wells including Well VM-4D show an increasing trend in the concentration of DHC and vcrA suggesting that the full and robust colonization may require more than 6 months. The

dosage of KB-1® will be refined based on the concentrations of VOCs, DHC and vcrA in each well.

- The Mitigation Plan measures applied in wells VM-5S, 2EP, and 2EPA correlate with decreases in VC concentrations following bioaugmentation. These results suggest that application of KB-1® alone may enhance the destruction of chlorinated VOCs. As a result, the Mitigation Plan actions successfully created reducing conditions at and near the property line and adequately decreased VC concentrations at the targeted wells. There is no further evidence of elevated VC in these wells.
- The substantial challenges in achieving uniform distribution of EVO throughout the A1 and A3 depth intervals and the slow onset of robust vcrA expression especially in the A1 wells suggest that persistent long acting substrates are going to be most beneficial. These products appear to spread slowly over time achieving treatment improvements throughout the 6-month period when compared to the cheese whey treatment that was used during the Phase I ERD Pilot Study. This may suggest the advantages of treatment using a ZVI product.
- Downgradient monitoring wells to the north-northeast, MW-01A3, VM-5S and 2EPa also showed treatment effects by the cloudy appearance and distinct odor resembling EVO in the groundwater, the decrease in TCE concentrations and conversion of TCE to cis-1,2-DCE and then to VC. These wells are located approximately 60 to 90 feet downgradient of the closest injection points. However, these observations were absent at some of the closer downgradient monitoring wells, which substantiates previous determinations of the heterogeneity of the aquifers observed at the site during subsurface investigations.
- Crossgradient/upgradient monitoring wells show notable variability in the concentrations of VOCs within the plume over the period of the Pilot Study. Wells VM-8S and VM-8D show that reducing conditions and decreased TCE were observed in upgradient areas. Well G-1A showed a large increase in the concentration if cis-1,2-DCE during the monitoring period suggesting that high concentrations of chlorinated VOCs may persist in localized areas. These effects may complicate a strict evaluation of the Pilot Study performance.
- Although data from wells upgradient of the Pilot Study suggest that some changes in VOC distribution may have been attributed to seasonal and hydrologic changes than to the Pilot Study, these changes have not adversely impacted the performance of the Phase II ERD Pilot Study.

- The monitoring completed to evaluate the potential soil vapor migration risk, and extraction well risk indicates no adverse impacts as a result of the Phase II ERD Pilot Study.
- While data from the Pilot Study indicate that ERD is effective in the destruction of TCE and daughter products, long-term monitoring is needed to evaluate whether ERD can effectively reduce concentrations and show continued effectiveness over time without rebound.

5.2 *RECOMMENDATIONS*

The first six month of monitoring following Phase II ERD Pilot Study injections indicates that the technology components (environmental fracturing, pulse injection, EVO, carbon-ZVI product, and bioaugmentation) can be implemented successfully at former Siemens facility. Although long-term effectiveness is unknown, reducing conditions have been established in the formation and degradation is occurring.

Additional monitoring is needed once the EVO has dissipated and TOC has returned to near baseline conditions to allow for evaluation of rebound and differentiation between the EHC® and EVO areas. As a result, ERM recommends the following actions based on the results, findings and conclusions of this pilot study:

- The upcoming 12-month performance monitoring event scheduled for October 2015 should be implemented as scheduled (including groundwater and soil vapor monitoring).
- Future groundwater quality data collected for the assessment of the Pilot Study should be collected using a down-hole probe or from a closed flow cell in line with a submersible pump.
- Monitoring wells 2EP, 2EPa and VM-5S should be sampled in July 2015 (9-month post-injection) as an additional performance monitoring event to ensure that VC concentrations are not increasing at the property boundary. The sampling should include: field parameters, dissolved metals, VOCs, TOC, geochemical parameters and environmental molecular testing as defined in Table 2.
- Extraction well LF-6A should be sampled for TOC in July 2015 (9-month post-injection) to assess whether TOC has increased, decreased or stabilized.

The results of the Pilot Study will be further evaluated based on the results of the October 2015 performance monitoring. In the event that future monitoring demonstrates Pilot Study effectiveness to reduce concentrations over time with minimal rebound, then the treatment technologies employed should be evaluated for use at the site. This evaluation should include design refinements, effectiveness of remedy, implementability and cost.

6.0 REFERENCES

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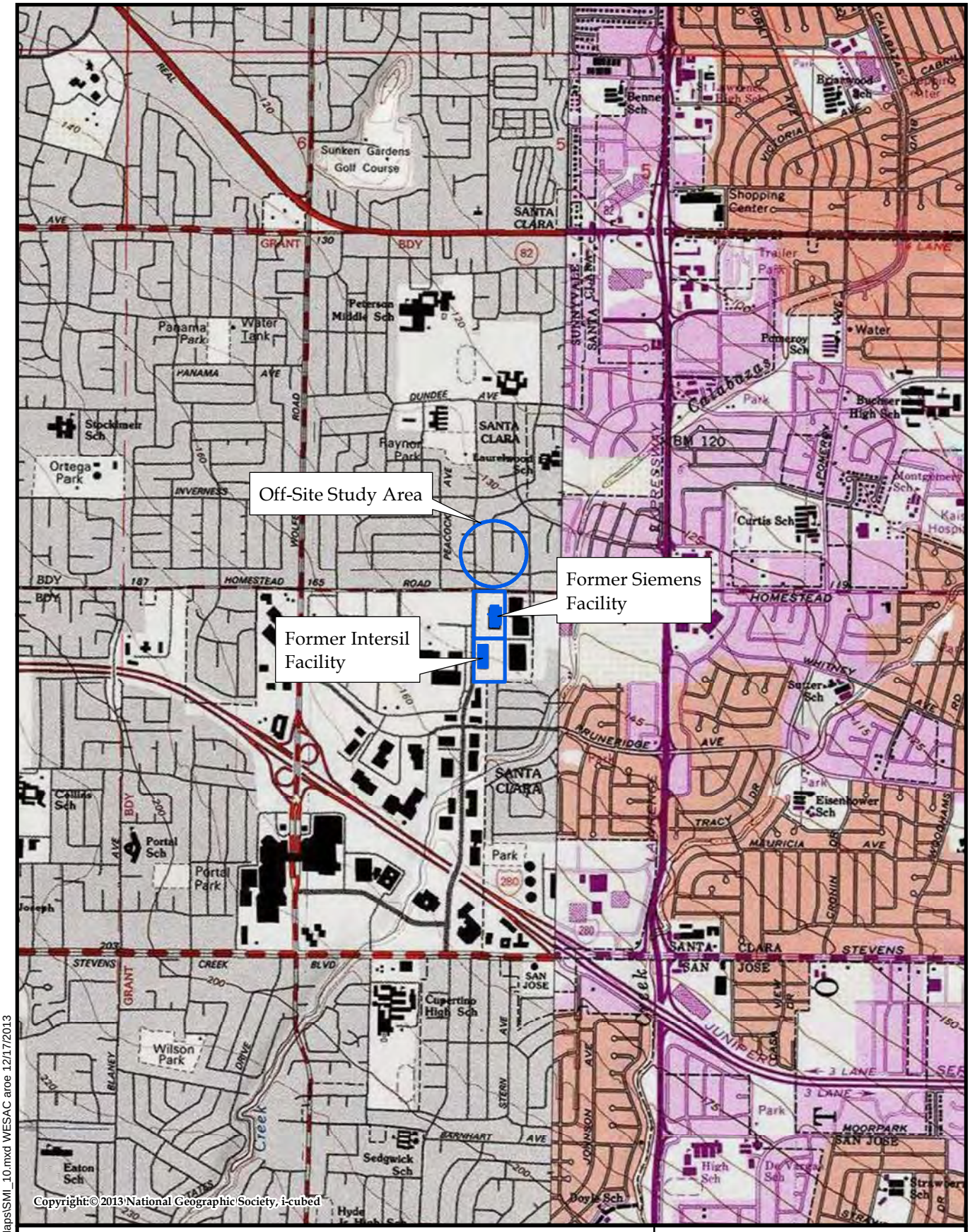
Figures



N

0 1000 2000

Scale in Feet

ERM

FIGURE 1
SITE LOCATION MAP
FORMER SIEMENS AND INTERSIL FACILITIES, AND OFF-SITE STUDY AREA
CUPERTINO, CALIFORNIA

PREPARED BY: aroe (ERM)

JOB NO. 01201040
FILE: SMI_10

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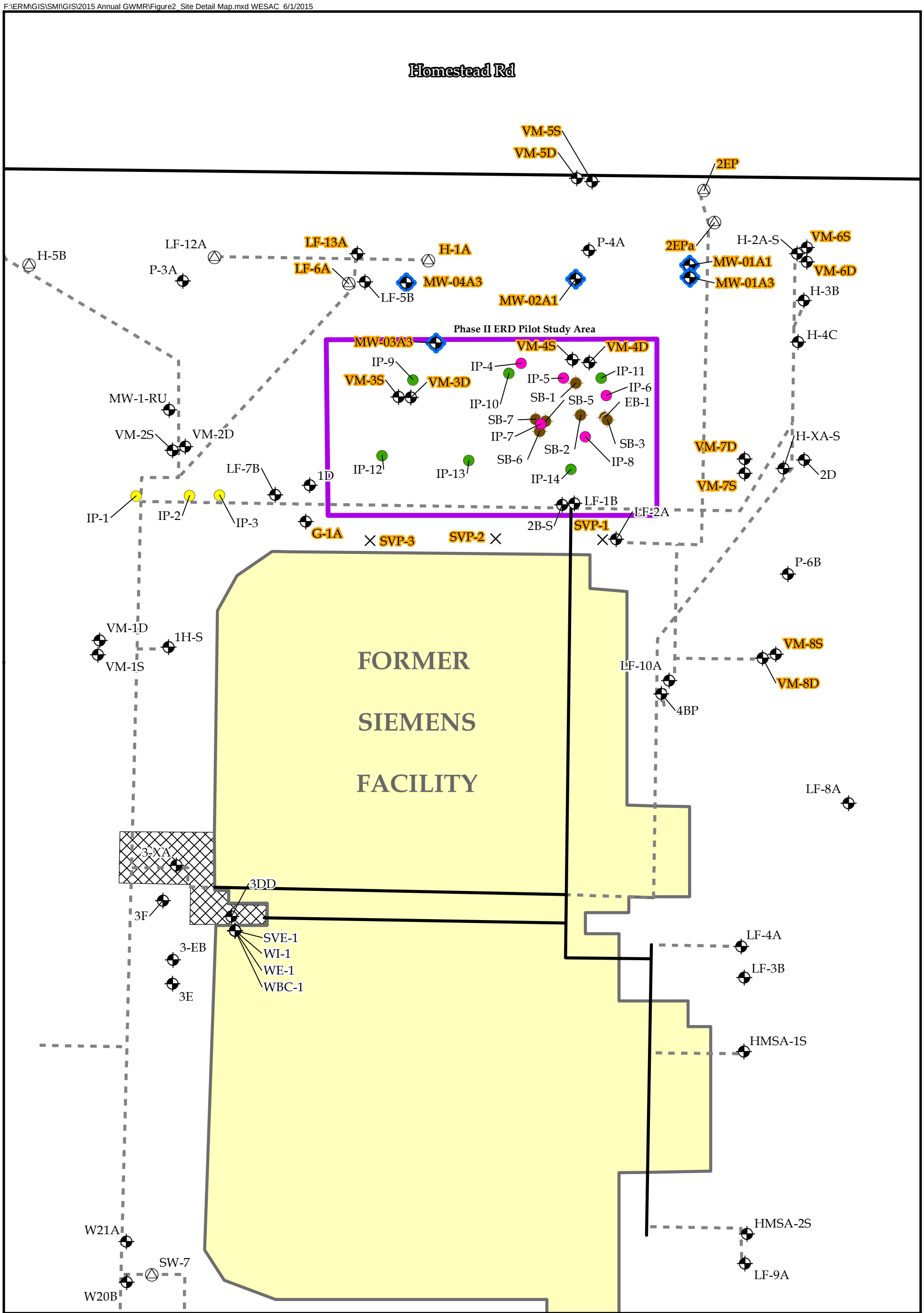

Legend

- Monitoring Well Installed August 2014
- Groundwater Extraction Well
- Injection Point
- Monitoring Well
- Piezometer
- Confirmation Soil Boring
- Soil Vapor Point
- EHC® Injection Point
- Emulsified Vegetable Oil (EVO) Injection Point
- Existing Buildings
- Groundwater Remediation Facility
- Approximate Location of Aboveground Utility
- Approximate Location of Underground Utility
- City Block
- VM-5S Performance Monitoring Well

N

0 20 40

Scale in Feet

Source: ARCADIS, Former Siemens Facility 2006 Annual Report: Figure 3 (dated 1/7/2010).

Notes:
ERD = Enhanced Reductive Dechlorination.

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Cupertino, CA

FIGURE 2

SITE DETAIL MAP

ERM

PREPARED BY: austin.phelps

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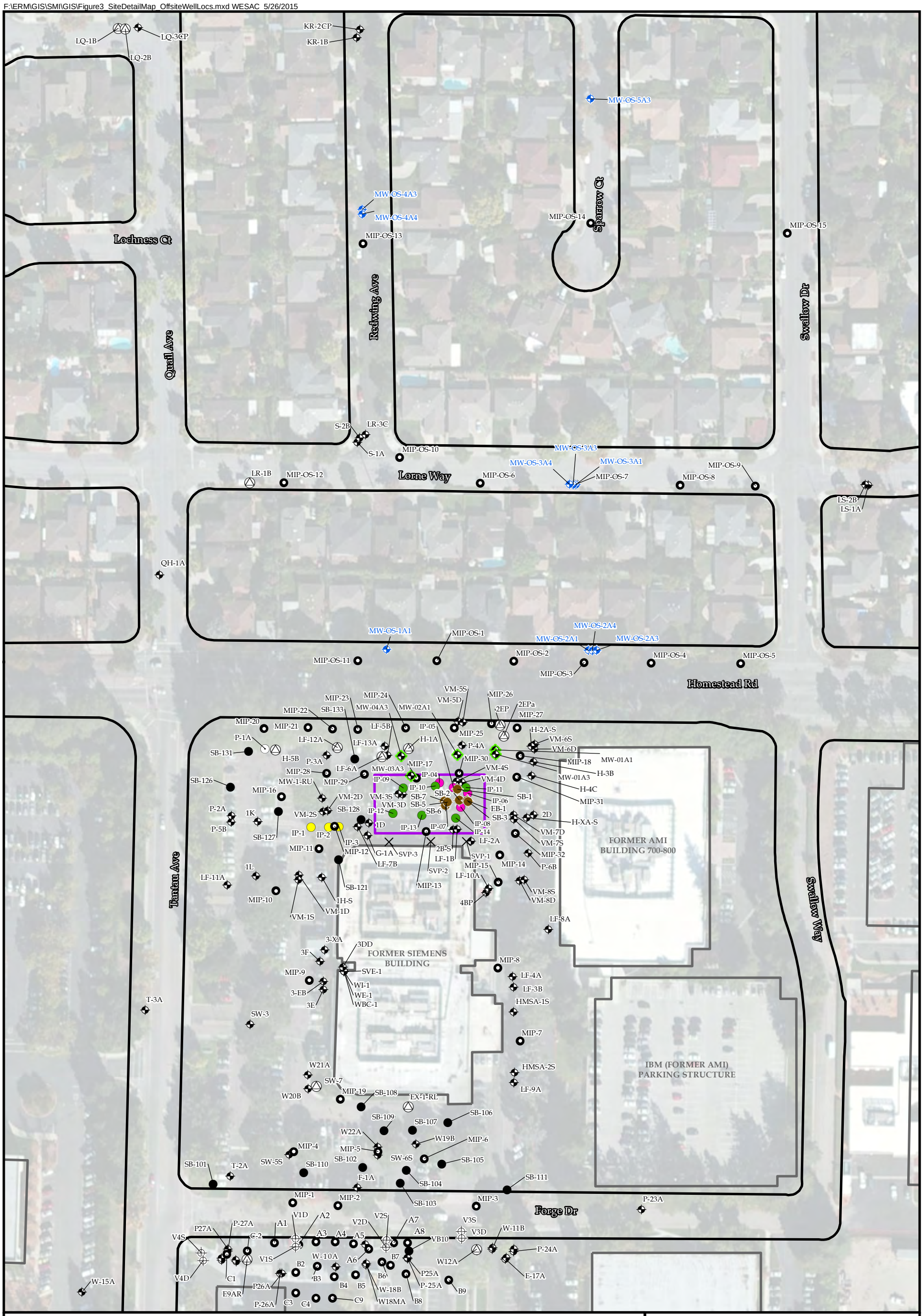

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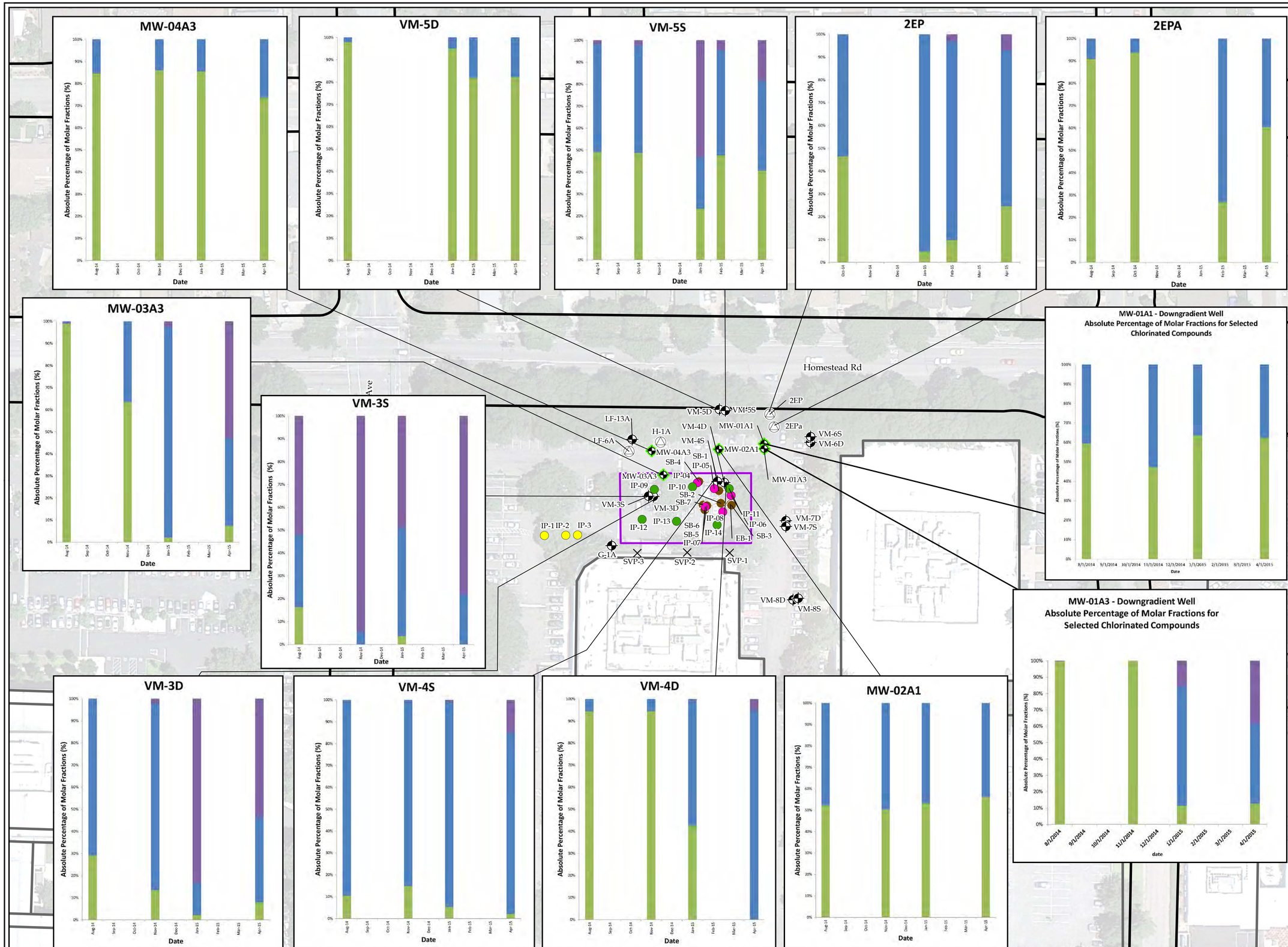
Figure 3

Site Detail Map with Offsite Well Locations

ERM

PREPARED BY: austin.phelps

JOB NO. 0201040.03SB
FILE: Figure3_SiteDetailMap_OffsiteWellLocs



Legend

- New On-Site Performance Monitoring Well
- Injection Point
- EHC® Injection Point
- Emulsified Vegetable Oil (EVO) Injection Point
- Soil Vapor Point
- Confirmation Soil Boring
- Groundwater Extraction Well
- Performance Monitoring Well
- Phase II ERD Pilot Study Area
- Tetrachloroethene (%)
- cis-1,2-Dichloroethene (%)
- Trichloroethene (%)
- Vinyl Chloride (%)

Notes:
ERD = Enhanced Reductive Dechlorination

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FIGURE 4

DATA MAP OF ABSOLUTE PERCENTAGE OF MOLAR FRACTIONS FOR SELECTED CHLORINATED COMPOUNDS

ERM

PREPARED BY: (ERM)

Job No. 0201040
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Tables

Table 1
Performance Monitoring Well Construction Details
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Well Identification	A Zone Depth Interval	Installation Date	Diameter (inch)	Total Depth (feet bgs)	Interval Depth (feet bgs)	Middle of Screen*	Horizontal Datum	
							Northing	Easting
MW-01A1	A1	8/22/2014	2	56.5	46-56	51	1948884.958	6124455.626
MW-01A3	A3	8/22/2014	2	82.5	72-82	77	1948879.622	6124455.792
MW-02A1	A1	8/23/2014	2	56.5	46-56	51	1948878.809	6124405.956
MW-03A3	A3	8/20/2014	2	86.5	76-86	81	1948850.901	6124344.971
MW-04A3	A3	8/24/2014	2	82.5	72-82	77	1948877.223	6124332.141
MW-OS-1A1	A1	7/5/2014	2	57.5	47-57	52	1949017.164	6124313.225
MW-OS-2A1	A1	7/14/2014	2	57.5	47-57	52	1949015.385	6124577.338
MW-OS-2A3	A3	7/9/2014	2	88	77.5-87.5	82.5	1949015.412	6124588.279
MW-OS-2A4	A4	7/10/2014	2	101.5	91-101	96	1949015.139	6124582.658
MW-OS-3A1	A1	7/11/2014	2	62.5	52-62	57	1949232.670	6124561.057
MW-OS-3A3	A3	7/11/2014	2	80.5	70-80	75	1949232.576	6124557.314
MW-OS-3A4	A4	7/10/2014	2	104.5	94-104	99	1949232.910	6124552.806
MW-OS-4A3	A3	7/7/2014	2	88.5	78-88	83	1949593.132	6124281.015
MW-OS-4A4	A4	7/8/2014	2	101.5	91-101	96	1949586.992	6124281.236
MW-OS-5A3	A3	7/9/2014	2	85.5	75-85	80	1949737.710	6124580.233
VM-3S	A1	3/3/1991	2	56	12-52	32	1948827.413	6124328.697
VM-3D	A2/A3	2/29/1991	2	89	85.5	73	1948827.144	6124334.101
VM-4S	A1	3/5/1991	2	58	10-55	32.5	1948843.563	6124404.554
VM-4D	A2/A3	3/5/1991	-	89	62-87	74.5	1948842.388	6124411.950
VM-5S	A1	2/28/1991	2	58.5	11-56	33.5	1948921.5	6124413.105
VM-5D	A2/A3	2/28/1991	-	79	63.5-78.5	71	1948922.771	6124406.496
VM-6S	A1	2/5/1991	2	59.5	10-55	32.5	1948892.681	6124506.935
VM-6D	A2/A3	1/7/1991	-	87.5	65-85	72.5	1948886.382	6124506.834
VM-7S	A1	2/13/1991	2	58	10-55	32.5	1948794.105	6124479.735
VM-7D	A2/A3	2/13/1991	2	86	63-83	73	1948800.407	6124479.633
VM-8S	A1	2/4/1991	2	63	10-60	35	1948715.194	6124493.296
VM-8D	A3	4/15/1991	2	72.5	73-88	80.5	1948713.392	6124487.597
2-EP	A1	9/22/1989	4	106	36-56	46	1948917.474	6124461.946
2-EPa	A1/A2/A3	8/30/1990	4	93	62-87	75	1948903.488	6124466.635
4-BP	A1	8/30/1989	4	63	37-63	50	1948697.862	6124443.355
G-1A	A2/A3	1985	4	89	66-86	76	1948773.004	6124288.191
LF-13A	A1	4/22/2002	4	60	48-58	53	1948889.898	6124310.744
LF-6A	A4	5/31/1989	4	120	104-119	111.5	1948876.739	6124307.072
LF-2A	A3	5/31/1989	4	124	118-124	121	1948765.327	6124423.708
H-1A	A3	6/7/1905	4	105	70-90	80	1948886.922	6124341.865

Abbreviations and Notes:

bgs = below ground surface

Surveyed horizontal datum are consistent with the North American Datum of 1983 (NAD83), California Zone 3.

Surveyed top of casing elevation is consistent with the North American Vertical Datum of 1988 (NAVD88)

Well installed in August 2014.

Table 2
Performance Monitoring Program Schedule
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Monitoring Phase	Timing/ Date Completed	Well Depth Interval	Monitoring Well	Well Status	Field Parameters[1]	Dissolved Metals[2]	VOCs[3]	Other Geochemical[4]	Total Organic Carbon	Environmental Molecular Testing[5]	Spatial Relationship with Respect to Pilot Study
Baseline	Prior to Injection/Fracturing 8/28/2015	A1	MW-01A1	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A3	MW-01A3	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A1	MW-02A1	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A3	MW-03A3	Existing	X	X	X	X	X		Treatment zone
		A3	MW-04A3	Existing	X	X	X	X	X		Trigger - Evaluate migration to extraction well H1-A
		A1	VM-3S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-3D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-4S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-4D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-5S	Existing	X	X	X	X	X	X	Property line monitoring
		A3	VM-5D	Existing	X	X	X	X	X		Property line monitoring
		A1	VM-6S	Existing	X	X	X	X	X	X	Evaluate potential off-site migration (northeast)
		A3	VM-6D	Existing	X	X	X	X	X		Evaluate potential off-site migration (northeast)
		A1	VM-7S	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A3	VM-7D	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A1	VM-8S	Existing	X	X	X	X	X		Upgradient
		A3	VM-8D	Existing	X	X	X	X	X		Upgradient
		A1	2-EP	Existing	X	X	X	X	X		Extraction well - Property line monitoring
		A3	2-EPa	Existing	X	X	X	X	X		Extraction well - Property line monitoring
		A3	G-1A	Existing	X	X	X	X	X		Upgradient
		A1	LF-13A	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A4	LF-6A	Existing	X				X		Evaluate biofouling of extraction well
		A3	H-1A	Existing	X	X	X	X	X		Extraction well - Downgradient migration
		NA	SVP-1	Existing	X		X				
		NA	SVP-2	Existing	X		X				
		NA	SVP-3	Existing	X		X				
Round 1	1-Month Post-Injection 11/25-26/2015	A1	MW-01A1	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A3	MW-01A3	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A1	MW-02A1	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A3	MW-03A3	Existing	X	X	X	X	X		Treatment zone
		A3	MW-04A3	Existing	X	X	X	X	X		Trigger - Evaluate migration to extraction well H1-A
		A1	VM-3S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-3D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-4S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-4D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-6S	Existing	X	X	X	X	X		Evaluate potential off-site migration (northeast)
		A3	VM-6D	Existing	X	X	X	X	X		Evaluate potential off-site migration (northeast)
		A1	VM-7S	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A3	VM-7D	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A4	LF-6A	Existing	X				X		Evaluate biofouling of extraction well
		A1	LF-13A	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
Soil Vapor Sampling	2-Month Post-Injection 12/31/2015	NA	SVP-1	Existing	X		X				
		NA	SVP-2	Existing	X		X				
		NA	SVP-3	Existing	X		X				

Table 2
Performance Monitoring Program Schedule
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Monitoring Phase	Timing/ Date Completed	Well Depth Interval	Monitoring Well	Well Status	Field Parameters[1]	Dissolved Metals[2]	VOCs[3]	Other Geochemical[4]	Total Organic Carbon	Environmental Molecular Testing[5]	Spatial Relationship with Respect to Pilot Study
Round 2	3-Month Post-Injection 1/29/2015	A1	MW-01A1	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A3	MW-01A3	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A1	MW-02A1	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A3	MW-03A3	Existing	X	X	X	X	X		Treatment zone
		A3	MW-04A3	Existing	X	X	X	X	X		Trigger - Evaluate migration to extraction well H1-A
		A1	VM-3S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-3D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-4S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-4D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-5S	Existing	X	X	X	X	X		Property line monitoring
		A3	VM-5D	Existing	X	X	X	X	X		Property line monitoring
		A1	VM-6S	Existing	X	X	X	X	X		Evaluate potential off-site migration (northeast)
		A3	VM-6D	Existing	X	X	X	X	X		Evaluate potential off-site migration (northeast)
		A1	VM-7S	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A3	VM-7D	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A1	VM-8S	Existing	X	X	X	Nitrate only	X		Upgradient
		A3	VM-8D	Existing	X	X	X	Nitrate only	X		Upgradient
		A1	2-EP	Existing	X	X	X		X		Extraction well - Property line monitoring
		A3	2-EPa	Existing	X	X	X		X		Extraction well - Property line monitoring
		A3	G-1A	Existing	X	X	X	Nitrate only	X		Upgradient
		A1	LF-13A	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A4	LF-6A	Existing	X				X		Evaluate biofouling of extraction well
		A3	H-1A	Existing	X	X	X		X		Extraction well - Downgradient migration
		NA	SVP-1	Existing	X		X				
		NA	SVP-2	Existing	X		X				
		NA	SVP-3	Existing	X		X				
Additional Sampling	4-Month Post-Injection 2/27/2015	A1	2-EP	Existing	X	X	X	X	X	X	Extraction well - Property line monitoring
		A3	2EPa-1	Existing	X	X	X	X	X	X	Extraction well - Property line monitoring
		A3	2EPa-2	Existing	X	X	X	X	X	X	Extraction well - Property line monitoring
		A1	VM-5S	Existing	X		X	X (gasses only)	X	X	Property line monitoring
		A3	VM-5D	Existing	X		X	X (gasses only)	X	X	Property line monitoring
		A1	MW-OS-2A1	Offsite	X		X		X		Off site
		A3	MW-OS-2A3	Offsite	X		X		X		Off site
		A1	MW-OS-1A1	Offsite	X		X		X		Off site
		A3	G-1A	Existing	X		X		X		Upgradient

Table 2
Performance Monitoring Program Schedule
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Monitoring Phase	Timing/ Date Completed	Well Depth Interval	Monitoring Well	Well Status	Field Parameters[1]	Dissolved Metals[2]	VOCs[3]	Other Geochemical[4]	Total Organic Carbon	Environmental Molecular Testing[5]	Spatial Relationship with Respect to Pilot Study
Round 3	6-Month Post-Injection 4/23/2015	A1	MW-01A1	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A3	MW-01A3	Existing	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A1	MW-02A1	Existing	X	X	X	X	X	X	Trigger - Evaluate potential off-site migration (north)
		A3	MW-03A3	Existing	X	X	X	X	X		Treatment zone
		A3	MW-04A3	Existing	X	X	X	X	X		Trigger - Evaluate migration to extraction well H1-A
		A1	MW-OS-1A1	Offsite	X		X		X		Off site
		A1	MW-OS-2A1	Offsite	X		X		X		Off site
		A3	MW-OS-2A3	Offsite	X		X		X		Off site
		A1	VM-3S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-3D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-4S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-4D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-5S	Existing	X		X		X	X	Property line monitoring
		A3	VM-5D	Existing	X		X		X		Property line monitoring
		A1	VM-6S	Existing	X	X	X	methane and nitrate only	X	X	Evaluate potential off-site migration (northeast)
		A3	VM-6D	Existing	X	X	X	methane and nitrate only	X		Evaluate potential off-site migration (northeast)
		A1	VM-7S	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A3	VM-7D	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A1	2-EP	Existing	X	X	X	methane and nitrate only	X	X	Extraction well - Property line monitoring
		A3	2-Epa	Existing	X	X	X	methane and nitrate only	X	X	Extraction well - Property line monitoring
		A3	LF-2A	Existing	X	X	X	X	X		Upgradient
		A1	4-BP	Existing	X	X	X	X	X		Upgradient
		A1	LF-13A	Existing	X	X	X	X	X	X	Trigger - Evaluate potential off-site migration (north)
		A4	LF-6A	Existing	X				X		Evaluate biofouling of extraction well
		A3	G-1A	Existing	X		X				Upgradient
		A3	H-1A	Existing	X		X	Nitrate only	X		Extraction well - Downgradient migration
		NA	SVP-1	Existing	X				X		
		NA	SVP-2	Existing	X				X		
		NA	SVP-3	Existing	X				X		

Table 2
Performance Monitoring Program Schedule
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Monitoring Phase	Timing/ Date Completed	Well Depth Interval	Monitoring Well	Well Status	Field Parameters[1]	Dissolved Metals[2]	VOCs[3]	Other Geochemical[4]	Total Organic Carbon	Environmental Molecular Testing[5]	Spatial Relationship with Respect to Pilot Study
Round 4	12-Month Post-Injection	A1	MW-01A1	Proposed	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A3	MW-01A3	Proposed	X	X	X	X	X	X	Trigger - Evaluate migration to extraction wells 2-EP and 2-EPa
		A1	MW-02A1	Proposed	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A3	MW-03A3	Proposed	X	X	X	X	X		Treatment zone
		A3	MW-04A3	Proposed	X	X	X	X	X		Trigger - Evaluate migration to extraction well H1-A
		A1	VM-3S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-3D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-4S	Existing	X	X	X	X	X	X	Treatment zone
		A3	VM-4D	Existing	X	X	X	X	X	X	Treatment zone
		A1	VM-5S	Existing	X	X	X	X	X	X	Property line monitoring
		A3	VM-5D	Existing	X	X	X	X	X		Property line monitoring
		A1	VM-6S	Existing	X	X	X	X	X	X	Evaluate potential off-site migration (northeast)
		A3	VM-6D	Existing	X	X	X	X	X		Evaluate potential off-site migration (northeast)
		A1	VM-7S	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A3	VM-7D	Existing	X	X	X	X	X		Evaluate potential off-site migration (east)
		A1	VM-8S	Existing	X	X	X	X	X		Upgradient
		A3	VM-8D	Existing	X	X	X	X	X		Upgradient
		A1	2-EP	Existing	X	X	X	X	X		Extraction well - Property line monitoring
		A3	2-EPa	Existing	X	X	X	X	X		Extraction well - Property line monitoring
		A3	G-1A	Existing	X	X	X	X	X		Upgradient
		A1	LF-13A	Existing	X	X	X	X	X		Trigger - Evaluate potential off-site migration (north)
		A4	LF-6A	Existing	X				X		Evaluate biofouling of extraction well
		A3	H-1A	Existing	X	X	X	X	X		Extraction well - Downgradient migration
		NA	SVP-1	Existing	X				X		
		NA	SVP-2	Existing	X				X		
		NA	SVP-3	Existing	X				X		

Notes and Key:

[1] Field Parameters - Depth to water, temperature, pH, EC, DO, and ORP. — YSI
Soil vapor will be monitored for methane, oxygen, and carbon dioxide with multimeter. — Gas multi-meter (Gem 2000)

[2] Dissolved Metals - manganese and iron. — USEPA 6010B

[3] VOCs. — USEPA 8260B

[4] Other Geochemical:
Methane, ethane, and ethene — SW3810 Modified/RSK 175
Chloride, nitrate, and sulfate — USEPA 300.0

[5] Environmental Molecular Testing:
Dehalococoides (DHC), and DHC Vinyl Chloride (VC) Reductase (vcrA) — Gene-Trac® Quantitative Polymerase Chain Reaction (qPCR) Testing

[6] The following monitoring wells will be monitoring for select constituent if 20 percent increase from baseline event are observed at upgradient well in previous sample event:
- VM-5S and VM-5D based on upgradient well MW-05A1; and
- 2-EP and 2-EPa based on upgradient wells MW-01A1 and MW-01A3.
- VM-6S and VM-6D based on upgradient wells MW-01A1 and MW-01A3
- H-1A based on upgradient well MW-04A3.

Note: The performance monitoring analyses may be re-evaluated following review of the Round 1 (1-week post-injection) performance monitoring results and recommendations to reduce performance monitoring analyses and/or number of performance monitoring wells in the program may be made based on this review.

DO = Dissolved oxygen
EC = Specific conductance (electrical conductivity)
ORP = Oxidation-reduction potential
VOCs = Volatile organic compounds
USEPA = United States Environmental Protection Agency
YSI = Yellow Springs Instrument
Shading indicates performance monitoring events that have been completed.

Table 3
Injection Summary
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Vironex Field Data Sheet													
Injection Point ID	**Start Date**	**Start Time**	**End Date**	**End Time**	**Depth**	**Initial pressure (psi) H20**	**Average Pressure (psi)**	**Average Flow Rate (gpm)**	**KB1 (liters)**	**EHC Injected (lbs)**	**H_2O Injected (gal)**	**Amended Total Gal**	**Notes**
Inj-04	10/14/14	12:25 PM	10/14/14	12:54 PM	60	1,000	1,000	15.9		1,400	391	461	Water notch fractured at 1,000 psi. After initial fracture, pressure stabilized at 500 psi. Pressure increased to 800 psi on switch to EHC solution. After approximately 20 gallons, the pressure increased to 1,000 psi and stayed constant.
	10/14/14	1:35 PM	10/14/14	2:10 PM	65	1,400	1,000	13.7		1,400	391	461	Water notch fractured at 1,400 psi. After initial fracture, pressure stabilized at 800 psi. Pressure stayed consistent on switch to EHC solution, 20 gallons into injection pressure increased to 1,000 psi and stayed constant. Post-injection flushed with 20 gallons of water.
Total H_20 782	Total EHC 2800	Total Solution 922	Additional Notes: Notched fracture with 20 gallons H20. Lost 30' of 1.75 heavy duty rod along with 1 jetting tool.										
Inj-05	10/14/14	3:38 PM	10/14/14	4:06 PM	58	800	1,000	16.5		1,400	391	461	Water notch fractured at 800 psi. After initial fracture, pressure stabilized at 500 psi. Pressure increased to 1,300 psi on switch to EHC solution. Injection pressure sustained 1,000 psi. Post-injection flushed with 20 gallons of water.
	10/15/14	9:22 AM	10/15/14	9:50 AM	67	600	500	16.5		1,400	391	461	Water notch fractured at 600 psi. After initial fracture, pressure stabilized at 400 psi. Pressure increased to 700 psi on switch to EHC solution. Pressure sustained 500 psi. Post-injection flushed with 20 gallons of water.
Total H_20 782	Total EHC 2800	Total Solution 922	\										
Inj-06	10/15/14	11:15 AM	10/15/14	11:40 AM	56	800	500	18.4		1,400	391	461	Water notch fractured at 800 psi. After initial fracture, pressure stabilized at 600 psi. Pressure increased to 800 psi on switch to EHC solution. Pressure sustained 500 psi.
	10/15/14	12:22 PM	10/15/14	12:48 PM	61	1,000	500	17.7		1,400	391	461	Water notch fractured at 1,000 psi. After initial fracture, pressure stabilized at 400 psi. Pressure increased to 700 psi on switch to EHC solution. Pressure sustained 500 psi. Post-injection flushed with 20 gallons of water.
Total H_20 782	Total EHC 2800	Total Solution 922	Additional Notes: Notched fracture with 20 gallons H20.										
Inj-07	10/15/14	1:49 PM	10/15/14	2:14 PM	63	600	500	18.4		1,400	391	461	Water notch fractured at 600 psi. After initial fracture, pressure increased to 800 psi. Pressure stabilized at 600 psi. Pressure increased to 700 psi on switch to EHC solution. Pressure sustained 500 psi. Post-injection flushed with 20 gallons of water to prevent plugging over night.
	10/16/14	9:05 AM	10/16/14	9:30 AM	68	700	600	18.4		1,400	391	461	Water notch fractured at 700 psi. After initial fracture, pressure stabilized at 400 psi. Pressure increased to 700 psi on switch to EHC solution. Pressure sustained 500 psi. Post-injection flushed with 20 gallons of water.
Total H_20 782	Total EHC 2800	Total Solution 922	Additional Notes: Notched fracture with 20 gallons H20.										

Table 3
Injection Summary
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Vironex Field Data Sheet

Injection Point ID	Start Date	Start Time	End Date	End Time	Depth	Initial pressure (psi) H20	Average Pressure (psi)	Average Flow Rate (gpm)	KB1 (liters)	EHC Injected (lbs)	H_2O Injected (gal)	Amended Total Gal	Notes
Inj-08	10/16/14	11:38 AM	10/16/14	12:08 PM	64	700	500	15.3		1,400	391	461	Water notch fractured at 700 psi. After initial fracture, pressure stabilized at 500 psi. Pressure increased to 600 psi on switch to EHC solution. Pressure sustained 500 psi.
	10/16/14	13:20 PM	10/16/14	1:50 PM	69	500		15.3		1,400	391	461	Water notch fractured at 500 psi. After initial fracture, pressure stabilized at 300 psi. Pressure increased to 600 psi on switch to EHC solution. Pressure sustained 400 psi. Post-injection flushed with 20 gallons of water.
Total H_20 782	Total EHC 2800	Total Solution 922	Additional Notes: Notched fracture with 20 gallons H20. 10:50 AM No flow at 2200 psi Pulling tooling to check for plugging. Tool plugged with dirt re-advanced tooling, start injections.11:38 AM (12:40PM) no flow at 69 feet. Pulled tooling plugged with dirt, re-advanced, continued injections.										
							Average Pressure (psi)	Average Flow Rate		EHC Injected (lbs)	H_2O Injected (gal)	Amended Total (gal)	Points Complete
							677.8	16.6		14,000.0	3,910	4,610	5.0

Injection Point ID	Start Date	Start Time	End Date	End Time	Depth	Initial Pressure (psi)	Average Pressure (psi)	Average Flow Rate (gpm)	KB1 (liters)	NZ Injected (gal)	H_2O Injected (gal)	Amended Total Gal	Notes
Inj-09	10/17/14	12:45 PM	10/17/14	2:20 PM	50' - 55'	200	100	13.2	0.4	110	1,144	1,254	300 gallons injected at 10 gpm with pressures of 100 psi manifold. 35 psi on injection cap. Increased flow rate to 12.5 gpm, pressure stayed consistent 100 psi manifold. 35 psi injection cap. 627 gallons into injection dosed in 0.4 liters KB-1. 630 gallons injected, increased flow rate to 15 gpm. Pressures increased to 110 psi manifold. 50 psi injection cap. 900 gallons increased flow rate to 17.5 gpm. Pressures increased to 140 psi manifold. 60 psi injection cap.
	10/17/14	2:45 PM	10/17/14	4:00 PM	65' - 70'	240	190	16.7	0.4	110	1,144	1,254	285 gallons into injection interval pressure subsided from 210 psi to 180 psi manifold. Flow rate increased from 12 gpm to 15 gpm. Continued with injections at this rate. 627 gallons into injection dosed in 0.4 liters KB-1. 630 gallons into injection increased flow rate to 17 gpm. Pressures increased to 190 psi manifold. 140 psi injection cap. Completed injection interval.
	10/20/14	8:25 AM	10/20/14	10:00 AM	70'- 75'	240	180	13.2	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/20/14	10:09 AM	10/20/14	11:58 AM	75' - 80'	230	160	11.5	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB1.
	10/20/14	12:20 PM	10/20/14	2:45 PM	80' - 85'	240	180	10.0	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
Total H_20 5719	Total NZ 550	Total Solution 6270	Additional Notes:										
Inj-10	10/20/14	9:28 AM	10/20/14	10:52 AM	50' - 55'	120	110	14.9	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/20/14	11:50 AM	10/20/14	1:30 PM	65' - 70'	130	110	12.5	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/20/14	2:07 PM	10/20/14	4:00 PM	70'- 75'	160	120	11.1	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/21/14	8:35 AM	10/21/14	11:20 AM	75' - 80'	220	160	12.0	0.4	110	1,144	1,254	09:00 stopped injections due to surfacing from around injection tool string. Attempted to tighten rod and create seal with bentonite. Resumed injections. 627 gallons into injection dosed in 0.4 liters KB-1.

Table 3
Injection Summary
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Vironex Field Data Sheet													
Injection Point ID	**Start Date**	**Start Time**	**End Date**	**End Time**	**Depth**	**Initial pressure (psi) H20**	**Average Pressure (psi)**	**Average Flow Rate (gpm)**	**KB1 (liters)**	**EHC Injected (lbs)**	**H_2O Injected (gal)**	**Amended Total Gal**	**Notes**
Inj-10 (cont'd)	10/21/14	11:40 AM	10/21/14	2:10 PM	80' - 85'	190	110	14.0	0.4	110	1,144	1,254	Minor daylighting from around injection string managed with shop vacuum. Continued injections. 627 gallons into injection dosed in 0.4 liters KB-1.
Total H_20 5719	Total NZ 550	Total Solution 6270	Additional Notes:										
Inj-11	10/20/14	1:25 PM	10/20/14	3:00 PM	50' - 55'	150	100	14.8	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/20/14	3:18 PM	10/20/14	4:50 PM	65' - 70'	210	120	14.0	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/21/14	9:20 AM	10/21/14	10:55 AM	70'- 75'	190	130	13.2	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/21/14	11:08 AM	10/21/14	1:04 PM	75' - 80'	240	200	10.7	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/21/14	1:20 PM	10/21/14	3:30 PM	80' - 85'	240	200	9.7	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
Total H_20 5719	Total NZ 550	Total Solution 6270	Additional Notes:										
Inj-14	10/21/14	11:05 AM	10/21/14	12:55 PM	50' - 55'	170	100	11.4	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/21/14	1:15 PM	10/21/14	2:58 PM	65' - 70'	240	140	12.2	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/21/14	3:05 PM	10/21/14	4:40 PM	70'- 75'	240	150	14.8	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/22/14	8:40 AM	10/22/14	10:50 AM	75' - 80'	250	220	9.6	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/22/14	11:05 AM	10/22/14	1:00 PM	80' - 85'	220	170	10.9	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
Total H_20 5719	Total NZ 550	Total Solution 6270	Additional Notes:										
Inj-13	10/21/14	2:20 PM	10/21/14	4:30 PM	50' - 55'	210	150	9.7	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB1.
	10/22/14	8:42 AM	10/22/14	10:32 AM	65' - 70'	220	180	11.1	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB1.
	10/22/14	10:45 AM	10/22/14	12:50 PM	70'- 75'	190	130	10.0	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB1.
	10/22/14	1:00 PM	10/22/14	2:55 PM	75' - 80'	230	210	10.5	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB1.
	10/22/14	3:02 PM	10/22/14	4:50 PM	80' - 85'	250	220	11.6	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB1.
Total H_20 5719	Total NZ 550	Total Solution 6270	Additional Notes:										
Inj-12	10/22/14	9:20 AM	10/22/14	11:17 AM	50' - 55'	240	220	10.7	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/22/14	11:30 AM	10/22/14	2:10 PM	65' - 70'	210	170	7.8	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/22/14	2:20 PM	10/22/14	4:10 PM	70'- 75'	250	210	11.4	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
	10/22/14	4:15 PM	10/22/14	4:40 PM	75' - 80'	250	220	5.4	0.0	12	123	135	Minor daylighting from around injection string managed with shop vacuum. Continued injections. 135 gallons injected. Stopped injections for the day.
	10/23/14	9:20 AM	10/22/14	10:50 AM	75' - 80'	250	230	12.4	0.4	98	1,021	1,119	08:15 No flow 250 psi. Pulled tool string to check for plugging. Re-advanced tooling. No flow pulled tooling replaced injection tool. Re-advanced. Continued injections. 492 gallons into injections dosed in 0.4 liters KB-1.
	10/23/14	10:57 AM	10/23/14	12:38 PM	80' - 85'	200	140	12.4	0.4	110	1,144	1,254	627 gallons into injection dosed in 0.4 liters KB-1.
Total H_20 5719	Total NZ 550	Total Solution 6270	Additional Notes: Injected all surfaced solution into last injection interval.										

Table 3
Injection Summary
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Vironex Field Data Sheet													
Injection Point ID	**Start Date**	**Start Time**	**End Date**	**End Time**	**Depth**	**Initial pressure (psi) H20**	**Average Pressure (psi)**	**Average Flow Rate (gpm)**	**KB1 (liters)**	**EHC Injected (lbs)**	**H_2O Injected (gal)**	**Amended Total Gal**	**Notes**
							Average Pressure (psi)	**Average Flow Rate**	**KB1 (liters)**	**NZ Injected (gal)**	**H_2O Injected (gal)**	**Amended Total (gal)**	**Points Complete**
							162.3	11.7	12.0	3,299.3	34,317	37,620	6.0

Notes:
NZ = Newman Zone
Inj = Injection
H_2O= Water
psi = pounds per square inch
gal = gallons
lbs = pounds
gpm = gallons per minute

Table 4
Confirmation Soil Boring Results
Phase II ERD Pilot Study Status Report
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Boring Identification	Installation Date	Borehole Diameter (inch)	Total Depth (feet bgs)	Corresponding Injection Point	Injection Point / Injection Interval (feet)	Evidence of Injectate
SB-1	10/28/2014	3.25	75	IP-05	58, 67	Elevated magnetic susceptibility readings at 45 feet bgs. 53- to 54-foot interval green fluorescence from tracer dye.
				IP-06	56, 61	
				IP-08	64, 69	
SB-2	10/27/2014	3.25	75	IP-08	64, 69	
SB-3	10/27/2014	3.25	75	IP-06	56, 61	Elevated magnetic susceptibility readings at 45 feet bgs.
				IP-08	64, 69	
SB-4	-	-	-	-	-	Not completed. PVC pipe encountered at 2.5 feet bgs.
SB-5	10/30/2014	3.25	67	IP-07	63, 68	Elevated magnetic susceptibility readings at 45 feet bgs.
SB-6	10/29/2014	3.25	63	IP-07	63, 68	Elevated magnetic susceptibility readings at 45 feet bgs.
SB-7	10/31/2014	3.25	64.5	IP-07	63, 68	Evidence of fracture and milky gray carbon-ZVI product in center of core at 63 feet bgs. Elevated magnetic susceptibility readings at 45 feet bgs.

Notes:
bgs = Below ground surface
PVC = Polyvinyl chloride

Table 5
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Monitoring Well	Date	Event	Top of Well Casing Elevation (feet amsl)	Depth to Groundwater (feet bmp)	Groundwater Elevation (feet amsl)
1D	10/7/2014	4Q 2014	143.14	Dry	-
1D	1/12/2015	1Q2015	143.14	41.91	101.23
1D	4/13/2015	2Q2015	143.14	41.64	101.50
1H-S	10/7/2014	4Q 2014	143.8	66.2	77.60
1H-S	1/12/2015	1Q2015	143.8	66.18	77.62
1H-S	4/13/2015	2Q2015	143.8	68.51	75.29
1L	10/7/2014	4Q 2014	143.69	64.37	79.32
1L	1/12/2015	1Q2015	143.69	64.56	79.13
1L	4/13/2015	2Q2015	143.69	64.68	79.01
2EP	9/3/2014	Baseline	139.84	51.00	88.84
2EP	10/7/2014	4Q 2014	139.84	50.90	88.94
2EP	1/12/2015	1Q2015	139.84	51.29	88.55
2EP	1/29/2015	3-month	139.84	51.41	88.43
2EP	2/27/2015	4-month	139.84	51.41	88.43
2EP	4/13/2015	2Q2015	139.84	51.51	88.33
2EP	4/23/2015	6-month	139.84	51.53	88.31
2EPa	8/28/2014	Baseline	139.87	NM	-
2EPa	10/7/2014	4Q 2014	139.87	64.28	75.59
2EPA	1/12/2015	1Q2015	139.87	62.26	77.61
2EPa	1/29/2015	3-month	139.87	62.74	77.13
2EPa	2/27/2015	4-month	139.87	63.20	76.67
2EPA	4/13/2015	2Q2015	139.87	64.5	75.37
2EPa	4/23/2015	6-month	139.87	64.72	75.15
4BP	10/7/2014	3Q 2014	141.92	58.85	83.07
4BP	1/12/2015	1Q 2015	141.92	58.69	83.23
4BP	4/13/2015	2Q 2015	141.92	58.88	83.04
4BP	4/23/2015	6-month	141.92	59.01	82.91
EX-1-RL	10/7/2014	4Q 2014	144.84	81.69	63.15
EX-1-RL	1/12/2015	1Q 2015	144.84	71.32	73.52
EX-1-RL	4/13/2015	2Q 2015	144.84	81.43	63.41
G-1A	8/28/2014	Baseline	143.40	63.28	80.12
G-1A	10/7/2014	4Q 2014	143.40	67.02	76.38
G-1A	1/12/2015	1Q 2015	143.40	67	76.40
G-1A	1/29/2015	3-month	143.40	67.41	75.99
G-1A	2/27/2015	4-month	143.40	67.90	75.50
G-1A	4/13/2015	2Q 2015	143.40	69.22	74.18
G-1A	4/23/2015	6-month	143.40	69.41	73.99
H-1A	9/3/2014	Baseline	141.64	NM	-
H-1A	10/7/2014	4Q 2014	141.64	66.28	75.36
H-1A	1/12/2015	1Q2015	141.64	64.16	77.48
H-1A	1/29/2015	3-month	141.64	67.92	73.72
H-1A	4/13/2015	2Q2015	141.64	66.3	75.34
H-1A	4/23/2015	6-month	141.64	66.35	75.29
HMSA-2S	10/7/2014	4Q 2014	143.35	65.48	77.87
HMSA-2S	1/12/2015	1Q 2015	143.35	65.32	78.03
HMSA-2S	4/13/2015	2Q 2015	143.35	67.54	75.81
IP-1	10/7/2014	4Q 2014	142.73	53.72	89.01
IP-1	1/12/2015	1Q2015	142.73	50.85	91.88
IP-1	4/13/2015	2Q2015	142.73	51.41	91.32
IP-2	10/7/2014	4Q 2014	143.55	57.79	85.76
IP-2	1/12/2015	1Q2015	143.55	48.92	94.63
IP-2	4/13/2015	2Q2015	143.55	50.5	93.05
IP-3	10/7/2014	4Q 2014	143.58	54.48	89.10
IP-3	1/12/2015	1Q2015	143.58	48.88	94.70
IP-3	4/13/2015	2Q2015	143.58	51.3	92.28

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Monitoring Well	Date	Event	Top of Well Casing Elevation (feet amsl)	Depth to Groundwater (feet bmp)	Groundwater Elevation (feet amsl)
LF-12A	10/7/2014	4Q 2014	141.36	64.86	76.50
LF-12A	1/12/2015	1Q2015	141.36	64.89	76.47
LF-12A	4/13/2015	2Q2015	141.36	67.2	74.16
LF-13A	8/28/2014	Baseline	141.60	55.95	85.65
LF-13A	10/7/2015	4Q 2014	141.60	56.36	85.24
LF-13A	11/26/2015	1-month	141.60	65.48	76.12
LF-13A	1/12/2015	1Q2015	141.60	Dry	-
LF-13A	1/29/2015	3-month	141.60	56.53	85.07
LF-13A	4/13/2015	2Q2015	141.60	56.64	84.96
LF-13A	4/23/2015	6-month	141.60	Dry	-
LF-2A	10/7/2014	4Q 2014	144.24	68.37	75.87
LF-2A	1/12/2015	1Q 2015	144.24	68.11	76.13
LF-2A	4/13/2015	2Q 2015	144.24	69.96	74.28
LF-2A	4/23/2015	6-month	144.24	71.11	73.13
LF-6A	8/28/2015	Baseline	141.00	NM	-
LF-6A	10/7/2014	4Q 2014	141.00	79.13	61.87
LF-6A	11/25/2015	1-month	141.00	NM	-
LF-6A	1/12/2015	1Q 2015	141.00	64.68	76.32
LF-6A	1/29/2015	3-month	141.00	65.16	75.84
LF-6A	4/13/2015	2Q 2015	141.00	68.51	72.49
LF-6A	4/23/2015	6-month	141.00	68.50	72.50
MW-01A1	8/28/2014	Baseline	141.46	55.10	86.36
MW-01A1	10/7/2014	4Q 2014	141.46	52.92	88.54
MW-01A1	11/25/2014	1-month	141.46	52.40	89.06
MW-01A1	1/12/2015	1Q2015	141.46	52.92	88.54
MW-01A1	1/29/2015	3-month	141.46	52.95	88.51
MW-01A1	4/13/2015	2Q2015	141.46	53.2	88.26
MW-01A1	4/23/2015	6-month	141.46	53.08	88.38
MW-01A3	8/28/2014	Baseline	141.57	61.03	80.54
MW-01A3	10/7/2015	4Q 2014	141.57	64.32	77.25
MW-01A3	11/25/2014	1-month	141.57	64.90	76.67
MW-01A3	1/12/2015	1Q2015	141.57	64.09	77.48
MW-01A3	1/29/2015	3-month	141.57	64.52	77.05
MW-01A3	4/13/2015	2Q2015	141.57	66.3	75.27
MW-01A3	4/23/2015	6-month	141.57	66.54	75.03
MW-02A1	8/28/2014	Baseline	142.58	55.47	87.11
MW-02A1	10/7/2015	4Q 2014	142.58	53.78	88.80
MW-02A1	11/25/2014	1-month	142.58	53.40	89.18
MW-02A1	1/12/2015	1Q2015	142.58	53	89.58
MW-02A1	1/29/2015	3-month	142.58	54.16	88.42
MW-02A1	4/13/2015	2Q2015	142.58	53.99	88.59
MW-02A1	4/23/2015	6-month	142.58	54.02	88.56
MW-03A3	8/28/2014	Baseline	142.99	62.40	80.59
MW-03A3	10/7/2014	4Q 2014	142.99	65.67	77.32
MW-03A3	11/26/2014	1-month	142.99	66.36	76.63
MW-03A3	1/12/2015	1Q2015	142.99	65.51	77.48
MW-03A3	1/29/2015	3-month	142.99	65.98	77.01
MW-03A3	4/13/2015	2Q2015	142.99	67.84	75.15
MW-03A3	4/23/2015	6-month	142.99	68.00	74.99
MW-04A3	8/28/2014	Baseline	142.75	62.11	80.64
MW-04A3	10/7/2015	4Q 2014	142.75	65.46	77.29
MW-04A3	11/25/2014	1-month	142.75	66.11	76.64
MW-04A3	1/12/2015	1Q2015	142.75	65.31	77.44
MW-04A3	1/29/2015	3-month	142.75	65.65	77.10
MW-04A3	4/13/2015	2Q2015	142.75	67.54	75.21
MW-04A3	4/23/2015	6-month	142.75	67.70	75.05

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Monitoring Well	Date	Event	Top of Well Casing Elevation (feet amsl)	Depth to Groundwater (feet bmp)	Groundwater Elevation (feet amsl)
MW-1-RU	10/7/2014	4Q 2014	141.18	Dry	-
MW-1-RU	1/12/2015	1Q2015	141.18	57.04	84.14
MW-1-RU	4/13/2015	2Q2015	141.18	57.69	83.49
SW-5S	10/7/2014	4Q 2014	144.47	66.68	77.79
SW-5S	1/12/2015	1Q2015	144.47	66.76	77.71
SW-5S	4/13/2015	2Q2015	144.47	71.47	73.00
SW-6S	10/7/2014	4Q 2014	146.08	68.36	77.72
SW-6S	1/12/2015	1Q2015	146.08	68.36	77.72
SW-6S	4/13/2015	2Q2015	146.08	74.22	71.86
SW-7	10/7/2014	4Q 2014	143.28	65.61	77.67
SW-7	1/12/2015	1Q2015	143.28	NM	-
SW-7	1/14/2015	1Q2015	143.28	NM	-
SW-7	4/16/2015	2Q2015	143.28	69.8	73.48
VM-1D	10/7/2014	4Q 2014	144.25	66.66	77.59
VM-1D	1/12/2015	1Q2015	144.25	66.64	77.61
VM-1D	4/13/2015	2Q2015	144.25	69.01	75.24
VM-1S	10/7/2014	4Q 2014	144.16	Dry	-
VM-1S	1/12/2015	1Q2015	144.16	53.51	90.65
VM-1S	4/13/2015	2Q2015	144.16	53.41	90.75
VM-2D	10/7/2014	4Q 2014	141.96	64.5	77.46
VM-2D	1/12/2015	1Q2015	141.96	64.44	77.52
VM-2D	4/13/2015	2Q2015	141.96	66.71	75.25
VM-2S	10/7/2014	4Q 2014	142.22	Dry	-
VM-2S	1/12/2015	1Q2015	142.22	50.39	91.83
VM-2S	4/13/2015	2Q2015	142.22	51.21	91.01
VM-3D	8/28/2014	Baseline	143.00	62.36	80.64
VM-3D	10/7/2014	4Q 2014	143.00	65.63	77.37
VM-3D	11/25/2014	1-month	143.00	66.00	77.00
VM-3D	1/12/2015	1Q2015	143.00	65.47	77.53
VM-3D	1/29/2015	3-month	143.00	66.06	76.94
VM-3D	4/13/2015	2Q2015	143.00	67.64	75.36
VM-3D	4/23/2015	6-month	143.00	67.90	75.10
VM-3S	8/28/2014	Baseline	143.07	53.37	89.70
VM-3S	10/7/2014	4Q 2014	143.07	53.48	89.59
VM-3S	11/25/2014	1-month	143.07	62.25	80.82
VM-3S	1/12/2015	1Q2015	143.07	52.14	90.93
VM-3S	1/29/2015	3-month	143.07	52.06	91.01
VM-3S	4/13/2015	2Q2015	143.07	52.16	90.91
VM-3S	4/23/2015	6-month	143.07	52.04	91.03
VM-4D	8/28/2014	Baseline	142.28	61.61	80.67
VM-4D	10/7/2014	4Q 2014	142.28	64.80	77.48
VM-4D	11/25/2014	1-month	142.28	65.10	77.18
VM-4D	1/12/2015	1Q2015	142.28	64.36	77.92
VM-4D	1/29/2015	3-month	142.28	65.12	77.16
VM-4D	4/13/2015	2Q2015	142.28	66.83	75.45
VM-4D	4/23/2015	6-month	142.28	67.11	75.17
VM-4S	8/28/2014	Baseline	142.33	53.10	89.23
VM-4S	10/7/2014	4Q 2014	142.33	53.32	89.01
VM-4S	11/25/2014	1-month	142.33	52.35	89.98
VM-4S	1/12/2015	1Q2015	142.33	53.08	89.25
VM-4S	1/29/2015	3-month	142.33	53.20	89.13
VM-4S	4/13/2015	2Q2015	142.33	53.35	88.98
VM-4S	4/23/2015	6-month	142.33	53.37	88.96
VM-5D	8/28/2014	Baseline	141.65	60.92	80.73
VM-5D	10/7/2015	4Q 2014	141.65	64.26	77.39
VM-5D	1/12/2015	1Q2015	141.65	64.1	77.61
VM-5D	1/29/2015	3-month	141.65	64.45	77.20
VM-5D	2/27/2015	4-month	141.65	65.02	76.63

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Monitoring Well	Date	Event	Top of Well Casing Elevation (feet amsl)	Depth to Groundwater (feet bmp)	Groundwater Elevation (feet amsl)
VM-5D	4/13/2015	2Q2015	141.65	66.16	75.55
VM-5D	4/23/2015	6-month	141.65	66.43	75.22
VM-5S	8/28/2014	Baseline	141.58	52.74	88.84
VM-5S	10/7/2015	4Q 2014	141.58	53.04	88.54
VM-5S	1/29/2015	3-month	141.58	53.30	88.28
VM-5S	1/12/2015	1Q2015	141.58	53.2	88.38
VM-5S	2/27/2015	4-month	141.58	53.34	88.24
VM-5S	4/13/2015	2Q2015	141.58	54.11	87.47
VM-5S	4/23/2015	6-month	141.58	54.24	87.34
VM-6D	8/28/2014	Baseline	141.24	60.51	80.73
VM-6D	10/7/2014	4Q 2014	141.24	63.73	77.51
VM-6D	11/25/2014	1-month	141.24	64.21	77.03
VM-6D	1/12/2015	1Q2015	141.24	63.62	77.62
VM-6D	1/29/2015	3-month	141.24	64.80	76.44
VM-6D	4/13/2015	2Q2015	141.24	65.73	75.51
VM-6D	4/23/2015	6-month	141.24	65.95	75.29
VM-6S	8/28/2014	Baseline	141.59	53.10	88.49
VM-6S	10/7/2015	4Q 2014	141.59	53.31	88.28
VM-6S	11/25/2014	1-month	141.59	53.04	88.55
VM-6S	1/12/2015	1Q2015	141.59	53.4	88.19
VM-6S	1/29/2015	3-month	141.59	53.72	87.87
VM-6S	4/13/2015	2Q2015	141.59	53.68	87.91
VM-6S	4/23/2015	6-month	141.59	53.61	87.98
VM-7D	8/28/2014	Baseline	141.48	60.81	80.67
VM-7D	10/7/2014	4Q 2014	141.48	64.06	77.42
VM-7D	11/25/2014	1-month	141.48	64.52	76.96
VM-7D	1/12/2015	1Q2015	141.48	63.94	77.54
VM-7D	1/29/2015	3-month	141.48	64.35	77.13
VM-7D	4/13/2015	2Q2015	141.48	66.17	75.31
VM-7D	4/23/2015	6-month	141.48	66.31	75.17
VM-7S	8/28/2014	Baseline	141.44	52.28	89.16
VM-7S	10/7/2014	4Q 2014	141.44	52.91	88.53
VM-7S	11/25/2014	1-month	141.44	52.56	88.88
VM-7S	1/12/2015	1Q2015	141.44	52.8	88.64
VM-7S	1/29/2015	3-month	141.44	52.80	88.64
VM-7S	4/13/2015	2Q2015	141.44	53.11	88.33
VM-7S	4/23/2015	6-month	141.44	53.04	88.40
VM-8D	8/28/2014	Baseline	141.9	57.14	84.76
VM-8D	10/7/2015	4Q 2014	141.9	64.43	77.47
VM-8D	1/12/2015	1Q2015	141.9	64.32	77.58
VM-8D	1/29/2015	3-month	141.9	64.78	77.12
VM-8D	4/13/2015	2Q2015	141.9	66.64	75.26
VM-8S	8/28/2014	Baseline	141.14	61.20	79.94
VM-8S	10/7/2015	4Q 2014	141.14	57.17	83.97
VM-8S	1/12/2015	1Q2015	141.14	57.04	84.10
VM-8S	1/29/2015	3-month	141.14	57.12	84.02
VM-8S	4/13/2015	2Q2015	141.14	57.01	84.13
W18MA	10/7/2014	4Q 2014	146.94	73.69	73.25
W18MA	1/12/2015	1Q2015	146.94	72.96	73.98
W18MA	4/13/2015	2Q2015	146.94	75.18	71.76
W19MA	10/7/2014	4Q 2014	146.94	70.24	76.70
W19MA	1/12/2015	1Q2015	146.94	70.29	76.65
W19MA	4/13/2015	2Q2015	146.94	72.82	74.12
MW-OS-1A1	8/13/2014	Baseline	141.24	56.40	84.84
MW-OS-1A1	10/7/2014	4Q 2014	141.24	Dry	-
MW-OS-1A1	1/12/2015	1Q2015	141.24	Dry	-
MW-OS-1A1	2/27/2015	4-month	141.24	Dry	-

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Monitoring Well	Date	Event	Top of Well Casing Elevation (feet amsl)	Depth to Groundwater (feet bmp)	Groundwater Elevation (feet amsl)
MW-OS-1A1	4/13/2015	2Q2015	141.24	Dry	-
MW-OS-1A1	4/23/2015	6-month	141.24	Dry	-
MW-OS-2A1	8/13/2014	Baseline	140.69	53.90	86.79
MW-OS-2A1	10/7/2014	4Q 2014	140.69	43.29	97.40
MW-OS-2A1	1/12/2015	1Q2015	140.69	54.47	86.22
MW-OS-2A1	2/27/2015	4-month	140.69	54.61	86.08
MW-OS-2A1	4/13/2015	2Q2015	140.69	54.78	85.91
MW-OS-2A1	4/23/2015	6-month	140.69	55.32	85.37
MW-OS-2A3	8/13/2014	Baseline	140.53	59.50	81.03
MW-OS-2A3	10/7/2014	4Q 2014	140.53	63.06	77.47
MW-OS-2A3	1/12/2015	1Q2015	140.53	63.14	77.39
MW-OS-2A3	2/27/2015	4-month	140.53	64.00	76.53
MW-OS-2A3	4/13/2015	2Q 2015	140.53	65.27	75.26
MW-OS-2A3	4/23/2015	6-month	140.53	65.36	75.17
MW-OS-2A4	8/13/2014	Baseline	140.52	60.87	79.65
MW-OS-2A4	10/7/2014	4Q 2014	140.52	64.78	75.74
MW-OS-2A4	1/12/2015	1Q 2015	140.52	64.24	76.28
MW-OS-2A4	4/13/2015	2Q 2015	140.52	67.44	73.08
MW-OS-3A1	8/13/2014	Baseline	136.38	54.99	81.39
MW-OS-3A1	10/7/2014	4Q 2014	136.38	57.56	78.82
MW-OS-3A1	1/12/2015	1Q 2015	136.38	58.05	78.33
MW-OS-3A1	4/13/2015	2Q 2015	136.38	59.99	76.39
MW-OS-3A3	8/13/2014	Baseline	136.42	55.71	80.71
MW-OS-3A3	10/7/2014	4Q 2014	136.42	59.03	77.39
MW-OS-3A3	1/12/2015	1Q 2015	136.42	59.26	77.16
MW-OS-3A3	4/13/2015	2Q 2015	136.42	61.26	75.16
MW-OS-3A4	8/13/2014	Baseline	136.35	56.99	79.36
MW-OS-3A4	10/7/2014	4Q 2014	136.35	60.73	75.62
MW-OS-3A4	1/12/2015	1Q 2015	136.35	60.35	76.00
MW-OS-3A4	4/13/2015	2Q 2015	136.35	63.35	73.00
MW-OS-4A3	8/13/2014	Baseline	134.87	55.89	78.98
MW-OS-4A3	10/7/2014	4Q 2014	134.87	58.62	76.25
MW-OS-4A3	1/12/2015	1Q 2015	134.87	59	75.87
MW-OS-4A3	4/13/2015	2Q 2015	134.87	61.39	73.48
MW-OS-4A4	8/13/2014	Baseline	134.52	55.72	78.80
MW-OS-4A4	10/7/2014	4Q 2014	134.52	58.66	75.86
MW-OS-4A4	1/12/2015	1Q 2015	134.52	58.87	75.65
MW-OS-4A4	4/13/2015	2Q 2015	134.52	61.18	73.34
MW-OS-5A3	8/13/2014	Baseline	132.93	53.17	79.76
MW-OS-5A3	10/7/2014	4Q 2014	132.93	55.96	76.97
MW-OS-5A3	1/12/2015	1Q 2015	132.93	56.34	76.59
MW-OS-5A3	4/16/2015	2Q 2015	132.93	58.27	74.66

Notes:
amsl = Above mean sea level
bmp = Below measuring point
- = Data not available
NM = Not measured; well inaccessible
Baseline = Baseline sampling event
1-, 2- 3-, 4-, 6-month = 1-,2-, 3-, 4-, 6- sampling event post-injection
1Q 2015 = First Quarter 2015 sampling event
2Q 2015 = Second Quarter 2015 sampling event
4Q 2014 = Fourth Quarter 2014 sampling event

Table 6
Field Parameters Measured in Groundwater
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Former Siemens Site
Cupertino, California

Location ID	Depth Interval (ft bgs)	Location with Respect to Pilot Study Area	Sample Date	Dissolved Oxygen mg/L	Oxidation-Reduction Potential millivolts	pH pH units	Specific Conductance mS/cm	Temperature deg C	Turbidity NTU	Groundwater Quality Notes
2EP		downgradient	10/9/2014	2.62	10	7.08	1.402	21.1	151	
2EP			1/29/2015	0.97	-103	6.85	1.078	18.7	47	
2EP*			2/27/2015	1.88	-71.9	6.96	0.709	18.8	>1000	
2EP*			4/23/2015	1.12	-65.2	7.48	0.681	16.61	731	
2EPa		downgradient	8/28/2014	2.52	216	6.61	0.732	23.0	7	
2EPa			10/8/2014	3.78	134	8.45	0.748	20.8	8	
2EPa			1/29/2015	0.79 R	-180 R	6.63 R	3.213 R	16.5 R	>1,000 R	odor, black
2EPa-1*	62-67		2/27/2015	3.16	-29.3	6.8	1.287	18.8	110	
2EPa-2*	72-87		2/27/2015	2.22	-57.4	6.75	1.290	18.7	118	
2EPa*			4/23/2015	3.17	-22.8	7.2	0.539	17.16	142	
4BP*			4/23/2015	1.75	-10.1	7.50	0.981	19.09	45	
G-1A		upgradient	8/28/2014	2.53	115	7.13	0.654	20.4	184	
G-1A			10/9/2014	3.24	50	7.8	0.686	17.8	156	
G-1A			1/29/2015	1.16	58	6.95	1.152	17.5	258	
G-1A*			2/27/2015	1.48	139.5	6.79	1.010	18.0	33	
G-1A			2/27/2015	2.22	122.0	6.88	1.017	17.6	33	
G-1A*			4/23/2015	7.75	60.7	6.47	0.971	19	48	
H-1A		downgradient	10/9/2014	3.34	95	7.74	0.678	29.2	19	
H-1A			1/29/2015	1.00	143	7.47	0.854	22.2	19	
H-1A*			4/23/2015	6.9	40.9	6.52	1.228	20.2	23	
LF-13A		downgradient	8/28/2014	Insufficient water for parameter measurements						
LF-13A			11/25/2014	Insufficient water for parameter measurements						
LF-13A			1/29/2015	Insufficient water for parameter measurements						
LF-13A			4/23/2015	Insufficient water for parameter measurements						
LF-2A*			4/23/2015	1.21	-119	6.98	0.628	19.4	11	
LF-6A		downgradient	10/9/2014	3.75	112	7.74	0.662	22.7	34	
LF-6A			11/26/2014	2.61	140.0	7.18	0.701	20.20	3	
LF-6A			1/29/2015	2.09	130	8.15	0.606	21.9	57	
LF-6A*			4/23/2015	7.08	159.7	6.5	0.802	18.6	20	
MW-01A1		downgradient	8/28/2014	NM	NM	NM	NM	NM	NM	
MW-01A1			10/9/2014	1.59	136	7.7	1.514	20.4	34	
MW-01A1			11/25/2014	0.62	13.0	7.37	1.445	17.60	NM	
MW-01A1			1/29/2015	2.54	-6	7.18	1.582	16.5	531	
MW-01A1*			4/23/2015	2.21	23.8	7.36	0.615	18.34	NM	
MW-01A3		downgradient	8/28/2014	2.88	49	7.92	0.732	20.9	728	
MW-01A3			11/25/2014	1.73	-113.0	6.98	0.823	15.19	119.00	
MW-01A3			1/29/2015	1.49	-46	6.36	1.027	16.8	>1,000	
MW-01A3*			4/23/2015	1.99	-76.9	6.96	0.964	18.83	>1,000	odor, black
MW-02A1		downgradient	8/28/2014	Insufficient water for parameter measurements						
MW-02A1			11/25/2014	Insufficient water for parameter measurements						
MW-02A1			1/29/2015	0.39	29	7.04	0.462	20	20	
MW-02A1*			4/23/2015	3.42	53.9	6.89	0.652	19.6	>1,000	
MW-03A3		within	8/28/2014	2.97	140	7.56	0.712	21.2	84	
MW-03A3			11/26/2014	1.16	-114	6.83	0.779	18	>1000	white, milky, cloudy
MW-03A3			1/29/2015	1.46	-75	6.69	1.674	19.8	98	white, milky, cloudy
MW-03A3*			4/23/2015	2.02	-93.4	6.05	2.104	18.9	103	white, milky, cloudy
MW-04A3		downgradient	8/28/2014	2.55	71	7.34	0.818	20.2	>1,000	
MW-04A3			11/25/2014	0.76	123.0	7.30	0.969	16.40	72.00	
MW-04A3			1/29/2015	0.68	100	7.7	1.082	21.8	99	
MW-04A3*			4/23/2015	2.11	-63.6	6.38	1.131	18.7	>1,000	
VM-3D		within	8/28/2014	3.69	89	7.3	0.71	18.9	123	
VM-3D			11/25/2014	0.78	-70.0	6.76	1.214	19.60	179.00	
VM-3D			11/26/2014	0.67	-46.0	6.92	1.125	20.20	69.00	
VM-3D			1/29/2015	1.75	-28	6.07	0.164	16.7	608	odor
VM-3D*			4/23/2015	8.04	-49.8	6.14	1.038	20	>1,000	milky
VM-3S		within	8/28/2014	0.54	-107	6.92	1.693	18.9	>1,000	
VM-3S			11/25/2014	0.68	-10.0	7.18	0.925	15.20	>1,000	
VM-3S			1/29/2015	2.12	-54	5.82	1.712	17.5	>1,000	odor
VM-3S*			4/23/2015	6.4	-78.1	6.54	1.235	18.9	>1,000	milky
VM-4D		within	8/28/2014	3.71	152	6.92	0.904	18.9	73	
VM-4D			11/25/2014	0.89	-74.0	7.26	1.166	19.20	89.00	
VM-4D			1/29/2015	0.90	-33	7.01	1.248	18.2	19	odor
VM-4D*			4/23/2015	4.3	-145.3	6.79	1.509	17.02	42	
VM-4S		within	8/28/2014	2.64	133	6.87	1.165	18.9	337	
VM-4S			11/25/2014	0.49	7.0	6.87	0.970	15.10	NM	
VM-4S			1/29/2015	2.26	-63	6.93	1.200	14.6	49	odor
VM-4S*			4/23/2015	3.59	-102.4	6.53	0.836	18	89	
VM-5D		downgradient	8/28/2014	2.84	132	7.36	0.844	21.0	58	
VM-5D			1/29/2015	0.92	157	7.47	1.054	21.4	28	
VM-5D*			2/27/2015	3.88	104.1	6.74	1.121	18.6	323	
VM-5D*			4/23/2015	1.87	-35.2	6.75	1.056	18.67	103	odor
VM-5S		downgradient	8/28/2014	2.08	-31	7	2.488	21.9	100	
VM-5S			10/9/2014	1.79	-74	7.1	2.821	22.0	NM	
VM-5S			1/29/2015	2.91	10	7.83	0.920	20.1	37	
VM-5S *			2/27/2015	0.52	-81.5	6.79	2.640	18.7	89	
VM-5S *			4/23/2015	1.87	-118.8	6.29	2.693	19.57	>1,000	odor, black
VM-6D		downgradient	8/28/2014	2.47	111	7.57	0.714	19.0	128	
VM-6D			11/26/2014	2.09	18.0	7.73	0.826	18.70	39	
VM-6D			1/29/2015	2.37	31	7.52	0.601	18.9	47	
VM-6D*			4/23/2015	2.08	-51.7	7.29	0.699	18.37	108	
VM-6S		downgradient	8/28/2014	3.24	24	7.12	1.157	20.6	138	
VM-6S			10/9/2014	3.09	63	7.25	1.124	22.4	61	
VM-6S			11/26/2014	3.36	43.0	6.77	1.171	18.40	85	
VM-6S			1/29/2015	2.91	20	6.9	1.100	19.0	77	
VM-6S*			4/23/2015	5.94	46.3	6.7	0.945	18.48	85	

Table 6
Field Parameters Measured in Groundwater
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Cupertino, California

Location ID	Depth Interval (ft bgs)	Location with Respect to Pilot Study Area	Sample Date	Dissolved Oxygen mg/L	Oxidation-Reduction Potential millivolts	pH pH units	Specific Conductance mS/cm	Temperature deg C	Turbidity NTU	Groundwater Quality Notes
VM-7D		crossgradient	8/28/2014	**2.37**	**139**	**7.72**	**0.735**	**19.9**	**236**	
VM-7D			11/26/2014	**0.97**	**48.0**	**7.12**	**0.819**	**17.90**	**57**	
VM-7D			1/29/2015	**0.90**	**108**	**7.64**	**0.877**	**19.2**	**137**	
VM-7D*			4/23/2015	**3.03**	**72.3**	**6.65**	**0.86**	**18.6**	**78**	
VM-7S		crossgradient	8/28/2014	**3.26**	**145**	**7.19**	**1.106**	**21**	**127**	
VM-7S			11/25/2014	**1.01**	**-37.0**	**6.72**	**0.666**	**17.60**	**202**	
VM-7S			1/29/2015	**1.14**	**-24**	**6.72**	**0.597**	**18.1**	**319**	
VM-7S*			4/23/2015	**1.69**	**-46.3**	**6.19**	**1.082**	**18.9**	**52**	
VM-8D		upgradient	8/28/2014	**3.44**	**137**	**7.69**	**0.707**	**19.9**	**142**	
VM-8D			10/8/2014	**2.51**	**143**	**7.36**	**0.672**	**19.8**	**178**	
VM-8D			1/29/2015	**0.27**	**92**	**7.77**	**0.451**	**19.2**	**41**	
VM-8S		upgradient	8/28/2014	**4.52**	**138**	**6.83**	**1.237**	**20**	**167**	
VM-8S			10/8/2014	**2.54**	**156**	**6.91**	**1.293**	**22.6**	**194**	
VM-8S			1/29/2015	**0.69**	**-113.9**	**6.92**	**1.311**	**20.1**	**51**	
MW-OS-1A1		Off-site	8/13/2014	**Insufficient water for parameter measurements**						
MW-OS-1A1			2/27/2015	**Insufficient water for parameter measurements**						
MW-OS-1A1			4/23/2015	**Insufficient water for parameter measurements**						
MW-OS-2A1		Off-site	8/13/2014	**2.72**	**137**	**7.76**	**1289**	**21.9**	**>1000**	
MW-OS-2A1*			2/27/2015	**1.98**	**141.8**	**7.11**	**1.625**	**18.4**	**>1000**	
MW-OS-2A1*			4/23/2015	**3.58**	**23.5**	**7.38**	**0.689**	**18.79**	**>1,000**	
MW-OS-2A3		Off-site	8/13/2014	**1.4**	**141**	**7.52**	**877**	**21.3**	**162**	
MW-OS-2A3*			2/27/2015	**0.18**	**-48.7**	**8.24**	**0.745**	**18.5**	**>1000**	
MW-OS-2A3			2/27/2015	**0.89**	**-53.2**	**8.18**	**0.740**	**17.9**	**>1000**	
MW-OS-2A3*			4/23/2015	**2.54**	**19.7**	**7.29**	**0.397**	**18.57**	**>1,000**	
MW-OS-2A4		Off-site	8/13/2014	**1.09**	**120**	**7.5**	**995**	**22.6**	**78**	
MW-OS-3A1		Off-site	8/13/2014	**4.07**	**162**	**7.34**	**841**	**18.9**	**121**	
MW-OS-3A3		Off-site	8/13/2014	**2.97**	**135**	**7.43**	**863**	**19**	**152**	
MW-OS-3A4		Off-site	8/13/2014	**2.5**	**153**	**7.68**	**793**	**19.1**	**976**	
MW-OS-4A3		Off-site	8/13/2014	**1.97**	**212**	**7.27**	**1155**	**19.2**	**73**	
MW-OS-4A4		Off-site	8/13/2014	**2.94**	**188**	**7.32**	**19**	**19**	**98**	
MW-OS-5A3		Off-site	8/13/2014	**5.31**	**259**	**7.02**	**2448**	**19.9**	**>1000**	

Notes and Abbreviations:

Bolded values indicate concentrations above the Reportable Detection Limit.
< = Compound not detected. Reportable detection limit shown.
°C = Degrees Celsius
mg/L = Milligrams per liter
mS/cm = MilliSiemens per centimeter
mV = Millivolts
NM = Not measured
NTU = Nephelometric turbidity units
units = pH units
* = Parameters collected with down-hole YSI.

R = Based on additional data quality assessment, ERM believes that the 29 January 2015 analytical results for 2EPa are not representative of groundwater conditions in the area, and is rejected.

Table 7
Dissolved Metals and Other Geochemical Constituents in Groundwater
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Location ID	Depth Interval (ft bgs)	Location with Respect to Pilot Study Area	Sample Date	Sample Type	Chloride	Nitrate as N	Sulfate	Methane	Ethane	Ethene	Iron	Manganese	Total organic carbon
2EP	--		1/29/2015	N	NA	NA	NA	NA	NA	NA	1.3	5.0	3.8
2EP	--	downgradient	2/27/2015	N	32	< 0.23	16	0.039	< 0.0020	< 0.0028	< 0.50	5.4	5.8
2EP	--		4/23/2015	N	NA	0.16 j	NA	0.040	NA	NA	0.51 U	7.3	3.7
2EPa	--		8/28/2014	N	78	2.4	49	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.0057	< 1.0
2EPa	--		1/29/2015	N	NA	NA	NA	NA	NA	NA	18 R	12 R	360 R
2EPa-1	62-67	downgradient	2/27/2015	N	130	< 0.23	96	0.087	< 0.0020	< 0.0028	< 0.50	5.8	1.6
2EPa-2	72-87		2/27/2015	N	130	< 0.23	95	0.090	< 0.0020	< 0.0028	< 0.50	5.8	1.5 U
2EPa	--		4/23/2015	N	NA	0.16 j	NA	0.0030	NA	NA	< 0.50	3.7	1.4
4BP	--	upgradient	4/23/2015	N	100	< 0.23	88	0.047	< 0.0020	< 0.0028	< 0.50	0.43	1.7
G-1A	--		8/28/2014	N	75	1.4	45	0.00050 j	< 0.0020	< 0.0028	< 0.50	< 0.020	0.32 j
G-1A	--	upgradient	1/29/2015	N	NA	0.54	NA	NA	NA	NA	< 0.50	2.0	1.0
G-1A	--		2/27/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	1.2 U
H-1A	--		9/3/2014	N	80	2.6	52	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	< 1.0
H-1A	--	downgradient	1/29/2015	N	NA	NA	NA	NA	NA	NA	< 0.50	< 0.020	< 1.0
H-1A	--		4/23/2015	N	110	4.0	71	NA	NA	NA	NA	NA	1.1
LF-13A	--		8/28/2014	N	49	2.6	42	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.0033 j	1.1
LF-13A	--	downgradient	1/29/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF-13A	--		4/23/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF-2A	--	upgradient	4/23/2015	N	43	<0.23	37	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.46	0.92 j
LF-6A	--		9/3/2014	N	NA	NA	NA	NA	NA	NA	NA	NA	< 1.0
LF-6A	--	downgradient	11/26/2014	N	NA	NA	NA	NA	NA	NA	NA	NA	1.0 U
LF-6A	--		1/29/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	1.9
LF-6A	--		4/23/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	0.54 j
MW-01A1	--		8/28/2014	N	870	0.59	220	0.00081 j	< 0.0020	< 0.0028	< 0.50	0.56	3.2
MW-01A1	--	downgradient	11/25/2014	N	230	1.2	130	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.40	1.6
MW-01A1	--		1/29/2015	N	210	1.8	120	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.41	1.2
MW-01A1	--		4/23/2015	N	170	2.2	120	0.0041	< 0.0020	< 0.0028	< 0.50	0.56	1.9
MW-01A3	--		8/28/2014	N	77	2.2	47	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.056	0.48 j
MW-01A3	--	downgradient	11/25/2014	N	75	< 0.23	18	< 0.00099	0.0011 j	< 0.0028	0.21 j	0.60	360
MW-01A3	--		1/29/2015	N	74	< 0.23	3.4	2.1	< 0.0020	< 0.0028	1.8	4.0	30
MW-01A3	--		4/23/2015	N	73	< 0.23	1.4	10	< 0.0020	0.00086 j	3.4 U	5.5	45
MW-02A1	--		8/28/2014	N	250	5.4	100	NA	NA	NA	< 0.50	0.091	NA
MW-02A1	--	downgradient	11/25/2014	N	140	7.6	100	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.037	0.91 j
MW-02A1	--		1/29/2015	N	4.9	< 0.23	17	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.018	11
MW-02A1	--		4/23/2015	N	110	7.4	100	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.16	1.3
MW-03A3	--		8/28/2014	N	75	1.4	47	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.077	1.0
MW-03A3	--	within	11/26/2014	N	78	< 0.23	13	0.0016	0.0011 j	< 0.0028	< 0.50	1.4	210
MW-03A3	--		1/29/2015	N	84	< 0.23	< 1.0	4.3	< 0.0020	< 0.0028	1.1	11	57
MW-03A3	--		4/23/2015	N	87	< 0.23	0.92	8.2	< 0.0020	0.017	1.5 U	9.9	23
MW-04A3	--		8/28/2014	N	83	2.5	58	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.059	0.55 j
MW-04A3	--	downgradient	11/25/2014	N	77	1.8	49	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.0049 j	0.27 j
MW-04A3	--		1/29/2015	N	84	3.2	65	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	0.81 j
MW-04A3	--		4/23/2015	N	110	3.6	78	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.041	3.2
VM-3D	--		8/28/2014	N	74	2.2	48	0.0056	< 0.0020	< 0.0028	< 0.50	< 0.020	< 1.0
VM-3D	--		11/25/2014	N	NA	NA	NA	0.19	< 0.0020	< 0.0028	NA	NA	160
VM-3D	--	within	11/26/2014	N	100	< 0.23	< 1.0	NA	NA	NA	1.6	5.6	NA
VM-3D	--		1/29/2015	N	90	< 0.23	< 1.0	4.8	< 0.0020	< 0.0028	9.5	11	300
VM-3D	--		4/23/2015	N	76	< 0.23	< 1.0	6.6	< 0.0020	< 0.0028	11	15	390
VM-3S	--		8/28/2014	N	140	< 0.23	82	2.8	< 0.0020	< 0.0028	< 0.50	4.0	3.7
VM-3S	--	within	11/25/2014	N	240	< 0.23	5.3	0.88	< 0.0020	< 0.0028	< 0.50	8.8	200
VM-3S	--		1/29/2015	N	180	0.16 j	1.2	3.0	< 0.0020	0.0012 j	9.3	13	380
VM-3S	--		4/23/2015	N	190	< 0.23	< 1.0	5.1	< 0.0020	0.0069	0.59 U	10	140
VM-4D	--		8/28/2014	N	83	4.2	61	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	0.26 j
VM-4D	--	within	11/25/2014	N	110	0.23	89	< 0.00099	< 0.0020	< 0.0028	< 0.50	8.7	1.1
VM-4D	--		1/29/2015	N	110	< 0.23	39	0.15	< 0.0020	< 0.0028	< 0.50	3.0	5.6
VM-4D	--		4/23/2015	N	120	< 0.23	6.2	2.7	< 0.0020	< 0.0028	< 0.50	1.8	29
VM-4S	--		8/28/2014	N	110	6.5	88	0.00063 j	< 0.0020	< 0.0028	< 0.50	0.38	1.6
VM-4S	--		11/25/2014	N	NA	NA	NA	0.00047 j	< 0.0020	< 0.0028	NA	NA	2.6
VM-4S	--	within	11/26/2014	N	120	< 0.23	93	NA	NA	NA	< 0.50	2.1	NA
VM-4S	--		1/29/2015	N	110	0.22 j	78	0.010	< 0.0020	< 0.0028	< 0.50	2.7	5.1
VM-4S	--		4/23/2015	N	110	< 0.23	3.8	0.075	< 0.0020	0.15	0.50 U	5.1	66
VM-5D	--		8/28/2014	N	91	3.8	57	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	1.0
VM-5D	--	downgradient	1/29/2015	N	100	4.6	71	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	0.80
VM-5D	--		2/27/2015	N	NA	NA	NA	< 0.00099	< 0.0020	< 0.0028	NA	NA	1.0 U
VM-5D	--		4/23/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	1.0
VM-5S	--		8/28/2014	N	350	< 0.23	260	0.13	< 0.0020	< 0.0028	< 0.50	0.71	4.3
VM-5S	--	downgradient	1/29/2015	N	280	< 0.23	200	0.37	< 0.0020	< 0.0028	0.43	0.11	2.2
VM-5S	--		2/27/2015	N	NA	NA	NA	0.082	< 0.0020	< 0.0028	NA	NA	1.9
VM-5S	--		4/23/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	650
VM-6D	--		8/28/2014	N	77	3.3	43	0.00048 j	< 0.0020	< 0.0028	< 0.50	< 0.020	0.77 j
VM-6D	--	downgradient	11/25/2014	N	84	5.8	44	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	0.44 j
VM-6D	--		1/29/2015	N	75	5.5	40	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	1.1
VM-6D	--		4/23/2015	N	NA	7.5	NA	< 0.00099	NA	NA	< 0.50	0.016 j	1.5
VM-6S	--		8/28/2014	N	120	10	110	0.023	< 0.0020	< 0.0028	< 0.50	0.24	0.92 j
VM-6S	--	downgradient	11/25/2014	N	130	10	110	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.094	0.63 j
VM-6S	--		1/29/2015	N	81	2.8	76	0.0037	< 0.0020	< 0.0028	< 0.50	0.41	3.6
VM-6S	--		4/23/2015	N	NA	5.9	NA	0.0068	NA	NA	< 0.50	0.44	3.5
VM-7D	--		8/28/2014	N	73	5.9	36	< 0.00099	< 0.0020	< 0.0028	< 0.50	< 0.020	0.62 j
VM-7D	--	cross-gradient	11/25/2014	N	77	9.6	21	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.15	2.4
VM-7D	--		1/29/2015	N	86	12	23	< 0.00099	< 0.0020	< 0.0028	< 0.50	0.033	0.90 j
VM-7D	--		4/23/2015	N	83	12	24	0.00077 j	< 0.0020	< 0.0028	< 0.50	< 0.020	1.4

Table 7
Dissolved Metals and Other Geochemical Constituents in Groundwater
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Location ID	Depth Interval (ft bgs)	Location with Respect to Pilot Study Area	Sample Date	Sample Type	Chloride	Nitrate as N	Sulfate	Methane	Ethane	Ethene	Iron	Manganese	Total organic carbon
VM-7S	--	cross-gradient	8/28/2014	N	**110**	**6.4**	**91**	*< 0.00099*	*< 0.0020*	*< 0.0028*	*< 0.50*	*< 0.020*	**0.85 j**
VM-7S	--		11/25/2014	N	**63**	*< 0.23*	**42**	*< 0.00099*	*< 0.0020*	*< 0.0028*	**0.45 j**	**0.95**	**29**
VM-7S	--		1/29/2015	N	**77**	**0.52**	**35**	**0.0079**	*< 0.0020*	*< 0.0028*	**0.27 j**	**1.4**	**17**
VM-7S	--		4/23/2015	N	**99**	**3.0**	**83**	*< 0.00099*	*< 0.0020*	*< 0.0028*	0.50 U	**0.14**	**2.7**
VM-8D	--	upgradient	8/28/2014	N	**73**	**3.0**	**32**	*< 0.00099*	*< 0.0020*	*< 0.0028*	*< 0.50*	*< 0.020*	*< 1.0*
VM-8D	--		1/29/2015	N	NA	**0.13**	NA	NA	NA	NA	*< 0.50*	*< 0.020*	**2.4**
VM-8S	--	upgradient	8/28/2014	N	**140**	**6.2**	**74**	*< 0.00099*	*< 0.0020*	*< 0.0028*	*< 0.50*	*< 0.020*	**0.88 j**
VM-8S	--		1/29/2015	N	NA	**0.82**	NA	NA	NA	NA	*< 0.50*	**0.051**	**7.3**
MW-OS-2A1	--	off site	2/27/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	**1.7**
MW-OS-2A1	--		4/23/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**
MW-OS-2A3	--	off site	2/27/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**
MW-OS-2A3	--		4/23/2015	N	NA	NA	NA	NA	NA	NA	NA	NA	**1.0**

Notes and Abbreviations:

Units are in mg/L = milligrams per liter
Bolded values indicate concentrations above the Reportable Detection Limit.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed
j = Laboratory qualified, result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = ERM qualified, nondetected
R = Based on additional data quality assessment, ERM believes that the 29 January 2015 analytical results for 2EPa are not representative of groundwater conditions in the area, and is rejected.

Table 8
Summary of Volatile Organic Compounds in Groundwater
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Location ID	Depth Interval	Location with Respect to Pilot Study Area	Sample Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Acetone	Bromoform	Chloroform	Dibromochloro methane	Freon 113	Tetrachloroethene	Trichloroethene	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Vinyl chloride
			CA MCL	0.2	0.005	0.006	NS	NS	NS	NS	1.2	0.005	0.005	0.01	0.006	0.0005
2EP		Downgradient	10/9/2014	< 0.01	< 0.01	< 0.01	NA	< 0.02	< 0.02	< 0.01	< 0.01	< 0.01	0.26	< 0.01	0.41	< 0.01
2EP			1/29/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	< 0.0050	< 0.0050	0.02	< 0.0050	0.54	< 0.0050
2EP			2/27/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	< 0.0050	< 0.0050	0.028	< 0.0050	0.34	0.019
2EP			4/23/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	< 0.0050	< 0.0050	0.042	< 0.0050	0.16	0.026
2EPa		Downgradient	8/28/2014	0.0012	< 0.0010	0.0012	NA	< 0.0020	< 0.0020	< 0.0010	0.0011	< 0.0010	0.16	< 0.0010	0.022	< 0.0010
2EPa			10/8/2014	< 0.0025	< 0.0025	0.0030	NA	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.13	< 0.0025	0.012	< 0.0025
2EPa			1/29/2015	< 0.00050 R	< 0.00050 R	< 0.00050 R	0.052 R	< 0.0010 R	< 0.0010 R	< 0.00050 R	< 0.00050 R	< 0.00050 R	0.00068 R	< 0.00050 R	0.0059 R	0.076 R
2EPa-1	62-67		2/27/2015	0.0086	0.0021	0.013	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0017	< 0.00050	0.047	< 0.00050	0.16	< 0.00050
2EPa-2	72-87		2/27/2015	0.0084	0.0022	0.014	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0019	< 0.00050	0.043	0.00050	0.17	< 0.00050
2EPa			4/23/2015	0.0058	0.0012	0.0076	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.00058	< 0.00050	0.088	< 0.00050	0.079	< 0.00050
4BP			10/8/2014	< 0.0050	0.011	0.07	NA	< 0.01	< 0.01	< 0.0050	0.0080	< 0.0050	0.42	0.013	3.3	< 0.0050
4BP			4/23/2015	< 0.05	< 0.05	0.061	< 5	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	0.28	< 0.05	2.4	< 0.05
G-1A		Upgradient	8/28/2014	< 0.0050	< 0.0050	< 0.0050	NA	< 0.01	< 0.01	< 0.0050	0.012	< 0.0050	0.55	< 0.0050	0.59	< 0.0050
G-1A			10/9/2014	< 0.0050	< 0.0050	< 0.0050	NA	< 0.01	< 0.01	< 0.0050	0.0061	< 0.0050	0.34	< 0.0050	0.39	< 0.0050
G-1A			1/29/2015	< 0.0050	< 0.0050	0.017	< 0.5	< 0.01	< 0.01	< 0.0050	0.039	< 0.0050	0.11	0.027	6.9	0.0088
G-1A			2/27/2015	< 0.0050	< 0.0050	0.013	< 0.5	< 0.01	< 0.01	< 0.0050	0.025	< 0.0050	0.09	0.015	5.2	0.023
G-1A			4/23/2015	< 0.05	< 0.05	< 0.05	< 5	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	0.31	< 0.05	3	< 0.05
H-1A		Downgradient	9/3/2014	0.0010	< 0.00050	0.0019	NA	< 0.0010	< 0.0010	< 0.00050	0.0013	< 0.00050	0.054	< 0.00050	0.022	< 0.00050
H-1A			10/9/2014	0.0019	< 0.00050	0.0025	NA	< 0.0010	< 0.0010	< 0.00050	0.0077	< 0.00050	0.16	< 0.00050	0.0017	< 0.00050
H-1A			1/29/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.01	< 0.00050	0.0024	< 0.00050
H-1A			4/23/2015	0.0044	< 0.00050	0.0050	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0018	< 0.00050	0.1	< 0.00050	0.022	0.0023
LF-13A		Downgradient	8/28/2014	< 0.0025	< 0.0025	< 0.0025	NA	< 0.0050	< 0.0050	< 0.0025	0.049	< 0.0025	0.14	< 0.0025	0.26	< 0.0025
LF-13A*			11/26/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF-13A*			1/29/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF-13A*			4/23/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF-2A		Upgradient	4/23/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
LF-6A		Downgradient	10/9/2014	< 0.0050	< 0.0050	< 0.0050	NA	< 0.01	< 0.01	< 0.0050	0.0058	< 0.0050	0.18	< 0.0050	0.0054	< 0.0050
MW-01A1		Downgradient	8/28/2014	< 0.00050	0.00056	0.00079	NA	0.0010	0.0011	0.0012	0.0019	0.00082	0.51	0.0023	0.48	< 0.00050
MW-01A1			11/25/2014	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.019	< 0.0050	0.85	< 0.0050	1.3	< 0.0050
MW-01A1			1/29/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.028	< 0.0050	1.4	0.0056	1.1	< 0.0050
MW-01A1			4/23/2015	0.013	0.017	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.032	< 0.0050	1.2	0.01	0.99	< 0.0050
MW-01A3		Downgradient	8/28/2014	0.00073	< 0.00050	0.00050	NA	< 0.0010	< 0.0010	< 0.00050	0.0011	< 0.00050	0.15	< 0.00050	0.00051	< 0.00050
MW-01A3			11/25/2014	< 0.0025	< 0.0025	< 0.0025	< 0.25	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.23	< 0.0025	< 0.0025	< 0.0025
MW-01A3			1/29/2015	< 0.0025	< 0.0025	< 0.0025	< 0.25	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.015	< 0.0025	0.13	0.045
MW-01A3			4/23/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.01	0.00060	0.053	0.066
MW-02A1		Downgradient	8/28/2014	< 0.01	< 0.01	< 0.01	NA	< 0.02	< 0.02	< 0.01	0.029	< 0.01	0.64	< 0.01	0.8	< 0.01
MW-02A1			11/25/2014	< 0.01	< 0.01	< 0.01	< 1	< 0.02	< 0.02	< 0.01	0.036	< 0.01	0.89	< 0.01	1.2	< 0.01
MW-02A1			1/29/2015	< 0.01	< 0.01	< 0.01	< 1	< 0.02	< 0.02	< 0.01	0.024	< 0.01	0.78	< 0.01	0.94	< 0.01
MW-02A1			4/23/2015	< 0.01	< 0.01	< 0.01	< 1	< 0.02	< 0.02	< 0.01	0.024	< 0.01	0.79	< 0.01	0.85	< 0.01
MW-03A3		Within	8/28/2014	0.00054	< 0.00050	0.00087	NA	< 0.0010	< 0.0010	< 0.00050	0.00067	< 0.00050	0.074	< 0.00050	0.0010	< 0.00050
MW-03A3			11/26/2014	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	< 0.0050	< 0.0050	0.057	< 0.0050	0.045	< 0.0050
MW-03A3			1/29/2015	0.0017	0.00060	0.0067	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.00098	< 0.00050	0.0029	0.0014	0.18	0.0078
MW-03A3			4/23/2015	0.0018	0.00057	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.00077	< 0.00050	0.00090	0.00084	0.0066	0.014
MW-04A3		Downgradient	8/28/2014	0.00095	< 0.00050	0.0025	NA	< 0.0010	< 0.0010	< 0.00050	0.0010	< 0.00050	0.044	< 0.00050	0.011	< 0.00050
MW-04A3			11/25/2014	0.0011	< 0.00050	0.0017	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0011	< 0.00050	0.04	< 0.00050	0.0089	< 0.00050
MW-04A3			1/29/2015	0.0044	< 0.00050	0.0042	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0019	< 0.00050	0.065	< 0.00050	0.015	< 0.00050
MW-04A3			4/23/2015	0.0030	< 0.00050	0.0033	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0015	< 0.00050	0.039	< 0.00050	0.019	< 0.00050
VM-3D		Within	8/28/2014	0.0011	< 0.00050	0.0055	NA	< 0.0010	< 0.0010	< 0.00050	0.0039	< 0.00050	0.087	0.0037	0.29	< 0.00050
VM-3D - Dup			8/28/2014	0.0011	< 0.00050	0.0054	NA	< 0.0010	< 0.0010	< 0.00050	0.0040	< 0.00050	0.09	0.0048	0.32	< 0.00050
VM-3D			11/25/2014	< 0.0025	< 0.0025	< 0.0025	< 0.25	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.021	< 0.0025	0.18	0.0076
VM-3D			1/29/2015	< 0.0025	< 0.0025	< 0.0025	< 0.25	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.0026	< 0.0025	0.023	0.21
VM-3D			4/23/2015	< 0.00050	< 0.00050	< 0.00050	0.19	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.0015	0.00063	0.01	0.022
VM-3S		within	8/28/2014	< 0.00050	< 0.00050	< 0.00050	NA	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.026	0.00081	0.069	0.18
VM-3S			11/25/2014	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	< 0.0050	0.0021	0.015	0.39
VM-3S			1/29/2015	< 0.0010	< 0.0010	< 0.0010	0.14	< 0.0020	< 0.0020	< 0.0010	0.0012	< 0.0010	0.0037	0.0015	0.066	0.11
VM-3S			4/23/2015	< 0.0010	< 0.0010	< 0.0010	0.15	< 0.0020	< 0.0020	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0015	0.0019	0.011
VM-4D		Within	8/28/2014	0.0056	< 0.00050	0.0069	NA	< 0.0010	< 0.0010	< 0.00050	0.0018	< 0.00050	0.15	< 0.00050	0.012	< 0.00050
VM-4D			11/25/2014	0.011	0.00063	0.013	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0025	< 0.00050	0.19	< 0.00050	0.015	< 0.00050
VM-4D			1/29/2015	0.01	0.0015	0.014	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0021	< 0.00050	0.082	< 0.00050	0.15	0.0019
VM-4D			4/23/2015	< 0.00050	0.0043	0.0054	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	0.12	0.011
VM-4S		Within	8/28/2014	0.0013	0.0013	0.0081	NA	< 0.0010	0.0015	< 0.00050	0.046	< 0.00050	0.23	0.0076	2.7	< 0.00050
VM-4S			11/25/2014	< 0.025	< 0.025	< 0.025	< 2.5	< 0.05	< 0.05	< 0.025	0.059	< 0.025	0.37	< 0.025	2.9	< 0.025
VM-4S			1/29/2015	< 0.025	< 0.025	< 0.025	< 2.5	< 0.05	< 0.05	< 0.025	0.084	< 0.025	0.074	< 0.025	1.8	0.026
VM-4S			4/23/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.013	< 0.0050	0.0072	< 0.0050	0.38	0.11

Table 8
Summary of Volatile Organic Compounds in Groundwater
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Location ID	Depth Interval	Location with Respect to Pilot Study Area	Sample Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Acetone	Bromoform	Chloroform	Dibromochloro methane	Freon 113	Tetrachloroethene	Trichloroethene	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Vinyl chloride
			CA MCL	0.2	0.005	0.006	NS	NS	NS	NS	1.2	0.005	0.005	0.01	0.006	0.0005
VM-5D			8/28/2014	0.0047	< 0.00050	0.0058	NA	< 0.0010	< 0.0010	< 0.00050	0.0020	0.00050	0.16	< 0.00050	0.0033	< 0.00050
VM-5D			1/29/2015	0.0056	< 0.00050	0.0077	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0023	0.00054	0.18	< 0.00050	0.0094	< 0.00050
VM-5D		Downgradient	2/27/2015	0.0072	< 0.00050	0.0087	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0024	0.00056	0.18	< 0.00050	0.017	< 0.00050
VM-5D			4/23/2015	0.0098	0.00063	0.012	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0022	0.00059	0.19	< 0.00050	0.042	< 0.00050
VM-5D - Dup			4/23/2015	0.0094	0.00059	0.011	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0021	0.00054	0.19	0.00057	0.041	< 0.00050
VM-5S			8/28/2014	< 0.00050	< 0.00050	< 0.00050	NA	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.053	< 0.00050	0.078	0.0045
VM-5S			10/9/2014	< 0.00050	< 0.00050	< 0.00050	NA	< 0.0010	< 0.0010	< 0.00050	0.00072	< 0.00050	0.099	0.00067	0.18	0.011
VM-5S - Dup		Downgradient	10/9/2014	< 0.00050	< 0.00050	< 0.00050	NA	< 0.0010	< 0.0010	< 0.00050	0.00074	< 0.00050	0.099	0.00073	0.18	0.0095
VM-5S			1/29/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.026	0.00073	0.11	0.13
VM-5S			2/27/2015	< 0.0010	< 0.0010	< 0.0010	< 0.1	< 0.0020	< 0.0020	< 0.0010	< 0.0010	< 0.0010	0.096	< 0.0010	0.23	0.02
VM-5S			4/23/2015	< 0.0010	< 0.0010	< 0.0010	1.7	< 0.0020	< 0.0020	< 0.0010	< 0.0010	< 0.0010	0.014	< 0.0010	0.052	0.014
VM-6D			8/28/2014	0.00075	< 0.00050	< 0.00050	NA	< 0.0010	< 0.0010	< 0.00050	0.0023	< 0.00050	0.12	< 0.00050	0.0086	< 0.00050
VM-6D		Downgradient	11/25/2014	0.00081	< 0.00050	0.00064	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0025	< 0.00050	0.12	< 0.00050	0.012	< 0.00050
VM-6D			1/29/2015	0.00051	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0014	< 0.00050	0.085	< 0.00050	0.011	< 0.00050
VM-6D			4/23/2015	0.0017	< 0.00050	0.0011	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0044	< 0.00050	0.087	< 0.00050	0.014	< 0.00050
VM-6S			8/28/2014	< 0.0050	< 0.0050	< 0.0050	NA	< 0.01	< 0.01	< 0.0050	< 0.0050	< 0.0050	0.76	< 0.0050	0.52	< 0.0050
VM-6S			10/9/2014	< 0.0050	< 0.0050	< 0.0050	NA	< 0.01	< 0.01	< 0.0050	0.0085	< 0.0050	0.83	0.0090	0.59	< 0.0050
VM-6S		Downgradient	11/25/2014	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.0052	< 0.0050	0.6	< 0.0050	0.58	< 0.0050
VM-6S			1/29/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.011	< 0.0050	1	< 0.0050	0.55	< 0.0050
VM-6S			4/23/2015	< 0.0050	< 0.0050	< 0.0050	< 0.5	< 0.01	< 0.01	< 0.0050	0.0062	< 0.0050	0.74	< 0.0050	0.46	< 0.0050
VM-7D			8/28/2014	0.00063	< 0.00050	0.00069	NA	< 0.0010	< 0.0010	< 0.00050	0.00092	< 0.00050	0.1	< 0.00050	< 0.00050	< 0.00050
VM-7D		crossgradient	11/25/2014	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.011	< 0.00050	< 0.00050	< 0.00050
VM-7D			1/29/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.00079	< 0.00050	< 0.00050	< 0.00050
VM-7D			4/23/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.0016	< 0.00050	< 0.00050	< 0.00050
VM-7S			8/28/2014	0.0074	0.0036	0.013	NA	< 0.0010	< 0.0010	< 0.00050	0.013	< 0.00050	0.051	0.0020	0.29	< 0.00050
VM-7S		crossgradient	11/25/2014	0.0075	0.0025	0.0093	< 0.25	< 0.0050	< 0.0050	< 0.0025	0.0067	< 0.0025	0.034	< 0.0025	0.13	< 0.0025
VM-7S			1/29/2015	0.0075	0.0049	0.019	< 0.25	< 0.0050	< 0.0050	< 0.0025	0.023	< 0.0025	0.073	< 0.0025	0.31	0.0065
VM-7S			4/23/2015	0.013	0.0056	0.023	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.023	< 0.00050	0.089	0.0011	0.34	0.0028
VM-8D			8/28/2014	0.00074	< 0.00050	0.00084	NA	< 0.0010	< 0.0010	< 0.00050	0.0013	< 0.00050	0.11	< 0.00050	< 0.00050	< 0.00050
VM-8D		upgradient	10/8/2014	0.00090	< 0.00050	0.0016	NA	< 0.0010	< 0.0010	< 0.00050	0.0016	< 0.00050	0.13	< 0.00050	< 0.00050	< 0.00050
VM-8D - Dup			10/8/2014	0.00091	< 0.00050	0.00090	NA	< 0.0010	< 0.0010	< 0.00050	0.0012	< 0.00050	0.097	< 0.00050	< 0.00050	< 0.00050
VM-8D			1/29/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	< 0.0010	< 0.00050	< 0.00050	< 0.00050	0.0046	< 0.00050	< 0.00050	< 0.00050
VM-8S			8/28/2014	0.015	0.0075	0.033	NA	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.27	0.0051	0.24	< 0.0025
VM-8S - Dup			8/28/2014	0.015	0.0079	0.035	NA	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.27	0.0050	0.26	< 0.0025
VM-8S		upgradient	10/8/2014	0.022	0.0074	0.04	NA	< 0.0010	< 0.0010	< 0.00050	0.0013	0.0015	0.24	0.0034	0.21	< 0.00050
VM-8S			1/29/2015	0.013	0.0054	0.022	< 0.25	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.12	< 0.0025	0.21	< 0.0025
VM-8S - Dup			1/29/2015	0.013	0.0056	0.023	< 0.25	< 0.0050	< 0.0050	< 0.0025	< 0.0025	< 0.0025	0.12	< 0.0025	0.22	< 0.0025
MW-OS-2A1			8/13/2014	< 0.00050	< 0.00050	0.00053	NA	< 0.0010	0.0051	< 0.00050	0.0051	0.0010	1	0.0018	0.56	< 0.00050
MW-OS-2A1			10/7/2014	< 0.01	< 0.01	< 0.01	NA	< 0.02	< 0.01	< 0.01	< 0.04	< 0.01	1.5	< 0.01	0.87	< 0.01
MW-OS-2A1		offsite	2/27/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	0.0037	< 0.00050	0.0099	0.0014	1.4	0.0037	0.67	< 0.00050
MW-OS-2A1			4/13/2015	< 0.00050	< 0.00050	< 0.00050	NA	< 0.0010	0.0033	< 0.00050	0.01	0.0024	1.7	0.018	0.76	< 0.00050
MW-OS-2A1			4/23/2015	< 0.00050	< 0.00050	< 0.00050	< 0.05	< 0.0010	0.0031	< 0.00050	0.0049	0.00069	1.3	0.0026	0.79	< 0.00050
MW-OS-2A3			8/13/2014	0.0026	< 0.00050	0.0046	NA	< 0.0010	< 0.0010	< 0.00050	0.0020	< 0.00050	0.084	< 0.00050	0.0033	< 0.00050
MW-OS-2A3			10/7/2014	0.0028	< 0.00050	0.0034	NA	< 0.0010	< 0.00050	< 0.00050	0.0031	< 0.00050	0.091	< 0.00050	0.0016	< 0.00050
MW-OS-2A3		offsite	2/27/2015	0.0022	< 0.00050	0.0030	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0035	< 0.00050	0.1	< 0.00050	0.0016	< 0.00050
MW-OS-2A3 - Dup			2/27/2015	0.0020	< 0.00050	0.0026	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0029	< 0.00050	0.098	< 0.00050	0.0025	< 0.00050
MW-OS-2A3			4/13/2015	0.0023	< 0.00050	0.0032	NA	< 0.0010	< 0.0010	< 0.00050	0.0040	< 0.00050	0.078	< 0.00050	0.0018	< 0.00050
MW-OS-2A3			4/23/2015	0.0023	< 0.00050	0.0035	< 0.05	< 0.0010	< 0.0010	< 0.00050	0.0038	< 0.00050	0.091	< 0.00050	0.0017	< 0.00050
MW-OS-2A4			8/13/2014	0.0083	< 0.00050	0.01	NA	< 0.0010	< 0.0010	< 0.00050	0.0042	< 0.00050	0.046	< 0.00050	0.0011	< 0.00050
MW-OS-2A4		offsite	10/7/2014	0.0086	< 0.00050	0.011	NA	< 0.0010	< 0.00050	< 0.00050	0.0046	< 0.00050	0.047	< 0.00050	0.0010	< 0.00050
MW-OS-2A4			4/13/2015	0.0072	< 0.00050	0.0093	NA	< 0.0010	< 0.0010	< 0.00050	0.0047	< 0.00050	0.04	< 0.00050	0.00057	< 0.00050
MW-OS-3A1			8/13/2014	0.0047	< 0.00050	0.0030	NA	< 0.0010	< 0.0010	< 0.00050	0.0018	< 0.00050	0.026	< 0.00050	0.0046	< 0.00050
MW-OS-3A1		offsite	10/7/2014	0.0047	< 0.00050	0.0042	NA	< 0.0010	< 0.00050	< 0.00050	< 0.0020	< 0.00050	0.025	< 0.00050	0.0056	< 0.00050
MW-OS-3A1			4/13/2015	0.0043	< 0.00050	0.0035	NA	< 0.0010	< 0.0010	< 0.00050	0.0027	< 0.00050	0.0096	< 0.00050	0.0042	< 0.00050

Table 8
Summary of Volatile Organic Compounds in Groundwater
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Location ID	Depth Interval	Location with Respect to Pilot Study Area	Sample Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	Acetone	Bromoform	Chloroform	Dibromochloro methane	Freon 113	Tetrachloroethene	Trichloroethene	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Vinyl chloride
			CA MCL	*0.2*	*0.005*	*0.006*	*NS*	*NS*	*NS*	*NS*	*1.2*	*0.005*	*0.005*	*0.01*	*0.006*	*0.0005*
MW-OS-3A3			8/13/2014	**0.0022**	*< 0.00050*	**0.0016**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0013**	*< 0.00050*	**0.12**	*< 0.00050*	**0.0020**	*< 0.00050*
MW-OS-3A3		offsite	10/7/2014	**0.0019**	*< 0.00050*	**0.0015**	NA	*< 0.0010*	*< 0.00050*	*< 0.00050*	*< 0.0020*	*< 0.00050*	**0.086**	*< 0.00050*	**0.0024**	*< 0.00050*
MW-OS-3A3			4/13/2015	**0.0045**	*< 0.00050*	**0.0052**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0047**	*< 0.00050*	**0.17**	*< 0.00050*	**0.0034**	*< 0.00050*
MW-OS-3A4			8/13/2014	**0.0060**	*< 0.00050*	**0.0067**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0059**	*< 0.00050*	**0.029**	*< 0.00050*	**0.00068**	*< 0.00050*
MW-OS-3A4		offsite	10/7/2014	**0.0073**	*< 0.00050*	**0.0085**	NA	*< 0.0010*	*< 0.00050*	*< 0.00050*	**0.0077**	*< 0.00050*	**0.028**	*< 0.00050*	**0.00065**	*< 0.00050*
MW-OS-3A4			4/13/2015	**0.0080**	*< 0.00050*	**0.0097**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0083**	*< 0.00050*	**0.04**	*< 0.00050*	**0.00077**	*< 0.00050*
MW-OS-4A3			8/13/2014	*< 0.00050*	*< 0.00050*	*< 0.00050*	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*
MW-OS-4A3		offsite	10/7/2014	*< 0.00050*	*< 0.00050*	*< 0.00050*	NA	*< 0.0010*	*< 0.00050*	*< 0.00050*	*< 0.0020*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*
MW-OS-4A3			4/13/2015	*< 0.00050*	*< 0.00050*	*< 0.00050*	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*	*< 0.00050*
MW-OS-4A4			8/13/2014	**0.0013**	*< 0.00050*	**0.00088**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0020**	*< 0.00050*	**0.019**	*< 0.00050*	*< 0.00050*	*< 0.00050*
MW-OS-4A4		offsite	10/7/2014	**0.0012**	*< 0.00050*	**0.00059**	NA	*< 0.0010*	*< 0.00050*	*< 0.00050*	*< 0.0020*	*< 0.00050*	**0.012**	*< 0.00050*	*< 0.00050*	*< 0.00050*
MW-OS-4A4			4/13/2015	**0.0012**	*< 0.00050*	**0.00057**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0011**	*< 0.00050*	**0.01**	*< 0.00050*	*< 0.00050*	*< 0.00050*
MW-OS-5A3			8/13/2014	**0.00086**	*< 0.00050*	**0.00057**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.00071**	*< 0.00050*	**0.011**	*< 0.00050*	**0.0012**	*< 0.00050*
MW-OS-5A3 - Dup		offsite	8/13/2014	**0.00087**	*< 0.00050*	**0.00052**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.00065**	*< 0.00050*	**0.011**	*< 0.00050*	**0.0012**	*< 0.00050*
MW-OS-5A3			10/7/2014	**0.0013**	*< 0.00050*	**0.00062**	NA	*< 0.0010*	*< 0.00050*	*< 0.00050*	*< 0.0020*	*< 0.00050*	**0.015**	*< 0.00050*	**0.0017**	*< 0.00050*
MW-OS-5A3			4/16/2015	**0.0020**	*< 0.00050*	**0.00082**	NA	*< 0.0010*	*< 0.0010*	*< 0.00050*	**0.0012**	*< 0.00050*	**0.02**	*< 0.00050*	**0.0017**	*< 0.00050*

Notes:
Units are in mg/L = milligrams per liter
Samples with results detected above the Reportable Detection Limit are shown
Bolded values indicate concentrations above the Reportable Detection Limit.
Shaded values indicate concentrations above the standard.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
NS = No Standard.
* = LF-13A was not sampled on 11/26/2014, 1/29/2015, and 4/23/2015 due to the well being dry.
SW8260B analyses performed by TestAmerica - Pleasanton (San Francisco), CA.
SW8260B analyses performed by TestAmerica - Irvine, CA of Irvine.
CA MCL = California Maximum Contaminant Level, updated 1 May 2014 by the California Regional Water Quality Control Board.
R = Based on additional data quality assessment, ERM believes that the 29 January 2015 analytical results for 2EPa are not representative of groundwater conditions in the area, and is rejected.

Table 9
Select Environmental Molecular Testing Parameters in Groundwater
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

Location ID	Depth Interval (ft bgs)	Location with Respect to Pilot Study Area	Sample ID	Sample Date	Dehalococcoides spp. Enumeration/Liter	Vinyl Chloride Reductase Gene Copies/Liter
MW-01A1		downgradient	MW-01A1-082814	28-Aug-14	< 20,000	NA
MW-01A1			MW-01A1-112514	25-Nov-14	< 30,000	NA
MW-01A1			MW-01A1-012915	29-Jan-15	**60,000**	**7,000,000**
MW-01A1			MW-01A1-04232015	23-Apr-15	**8,000 J**	**90,000**
MW-02A1		downgradient	MW-02A1-04232015	23-Apr-15	< 30,000	NA
2EP		downgradient	2-EP-02272015	27-Feb-15	**2,000,000**	**30,000 C**
2EP			2-EP-04232015	23-Apr-15	**10,000,000**	**30,000,000**
2EPa-1	62-67	downgradient	2-EPA-1-02272015	27-Feb-15	<30,000	NA
2EPa-2	72-87	downgradient	2-EPA-2-02272015	27-Feb-15	<30,000	NA
2EPa		downgradient	2-EPA-04232015	23-Apr-15	**2,000,000**	**5,000,000**
MW-01A3		downgradient	MW-01A3-082814	28-Aug-14	< 20,000	NA
MW-01A3			MW-01A3-112514	25-Nov-14	< 30,000	NA
MW-01A3			MW-01A3-012915	29-Jan-15	**200,000**	**500,000**
MW-01A3			MW-01A3-04232015	23-Apr-15	< 30,000	NA
VM-3D		within	VM-3D-082814	28-Aug-14	**1,000 J**	< 20,000
VM-3D			VM-3D-112514	25-Nov-14	**50,000**	**80,000 C**
VM-3D			VM-3D-012915	29-Jan-15	**2,000,000**	**6,000,000**
VM-3D			VM-3D-04232015	23-Apr-15	**10,000,000**	**3,000,000**
VM-3S		within	VM-3S-082814	28-Aug-14	**20,000,000**	< 20,000
VM-3S			VM-3S-112514	25-Nov-14	**200,000,000**	**100,000**
VM-3S			VM-3S-012915	29-Jan-15	**5,000,000**	<30,000
VM-3S			VM-3S-04232015	23-Apr-15	**40,000,000**	**60,000,000**
VM-4D		within	VM-4D-082814	28-Aug-14	< 20,000	NA
VM-4D			VM-4D-112514	25-Nov-14	**2,000 J**	<30,000
VM-4D			VM-4D-012915	29-Jan-15	**20,000 J**	**10,000 J**
VM-4D			VM-4D-04232015	23-Apr-15	**1,000,000**	**2,000,000**
VM-4S		within	VM-4S-082814	28-Aug-14	< 20,000	NA
VM-4S			VM-4S-112514	25-Nov-14	**3,000,000**	**30,000**
VM-4S			VM-4S-012915	29-Jan-15	**600,000**	**3,000,000**
VM-4S			VM-4S-04232015	23-Apr-15	**200,000,000**	**200,000,000**
VM-5D		downgradient	VM-5D-022715	27-Feb-15	<30,000	NA
VM-5S		downgradient	VM-5S-082814	28-Aug-14	**400,000**	< 20,000
VM-5S			VM-5S-022715	27-Feb-15	**700,000**	**20,000 J**
VM-5S			VM-5S-04232015	23-Apr-15	**7,000,000**	**70,000,000**
VM-6S		downgradient	VM-6S-082814	28-Aug-14	**30,000**	< 20,000
VM-6S			VM-6S-04232015	23-Apr-15	< 30,000	NA

Notes and Abbreviations:

Units are in gene copies/L = Gene Copies per liter

Bolded values indicate concentrations above the Reportable Detection Limit.

< = Compound not detected. Reportable detection limit shown.

NA = Not analyzed

Shaded values indicate concentrations greater than 10^7 considered as indicative of strong potential for complete reductive dechlorination.

Qualifiers :

C = Correction factor applied to correct for non-specific PCR amplification products, value is an estimated quantity.

J = The analyte was positively identified; associated numerical value is the approximate concentration of the analyte in the sample.

GENE-TRAC DHC analyses performed by SiREM Laboratory - Ontario of Guelph.

GENE-TRAC VC analyses performed by SiREM Laboratory - Ontario of Guelph.

Table 10
Volatile Organic Compounds and Field Measurements in Soil Gas
Phase II ERD Pilot Study Status Report
Former Siemens Site
Cupertino, California

		Analyte	Carbon Dioxide	Methane	Oxygen	Freon 113	1,1,1-Trichloroethane	1,1-Dichloroethene	Tetrachloroethene	Trichloroethene
		Method		(field measurements)		TO15	TO15	TO15	TO15	TO15
		Unit	%	%	%	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
Location ID	Sample Date	Sample ID								
SVP-1	28-Aug-14	SVP-1-082814	**7.4**	**0**	**15.3**	**100**	**560**	*< 43*	**100**	**230**
SVP-1	26-Nov-14	SVP-1-11262014	**0.5**	**0**	**21.3**	< 86	**140**	*< 44*	*< 76*	**95**
SVP-1	31-Dec-14	SVP-1-12312014	**4.3**	**0**	**15.3**	**110**	**420**	*< 43*	*<73*	**120**
SVP-1	29-Jan-15	SVP-1-01292015	**4.7**	**0**	**15.8**	**100**	**410**	*< 44*	*< 75*	**98**
SVP-1	27-Feb-15	SVP-1-02272015	**4.2**	**0**	**16.4**	**120**	**410**	*<45*	**82**	**100**
SVP-1	23-Apr-15	SVP-1-04232015	**13.6**	**0**	**7.0**	**120**	**390**	*<44*	**<76**	**83**
SVP-2	28-Aug-14	SVP-2-082814	**2.7**	**0**	**19.1**	< 83	**120**	*< 43*	*< 73*	*< 58*
SVP-2	26-Nov-14	SVP-2-11262014	**2.8**	**0**	**18.9**	**120**	**610**	**46**	**89**	**290**
SVP-2	31-Dec-14	SVP-2-12312014	**1.9**	**0**	**19**	< 82	**83**	*< 42*	*< 72*	*< 57*
SVP-2	29-Jan-15	SVP-2-01292015	**1.4**	**0**	**17.9**	< 75	**83**	*< 39*	*< 67*	*< 53*
SVP-2	27-Feb-15	SVP-2-02272015	**1.0**	**0**	**20.0**	< 86	**84**	*< 44*	*< 76*	*< 60*
SVP-2	23-Apr-15	SVP-2-04232015	**3.7**	**0**	**14.8**	<89	**74**	*<46*	*<79*	*<63*
SVP-3	28-Aug-14	SVP-3-082814	**0.6**	**0**	**20.5**	*< 84*	*< 60*	*< 44*	*< 75*	**1,700**
SVP-3	26-Nov-14	SVP-3-11262014	**0.01**	**0**	**21.7**	*< 83*	*< 59*	*< 43*	*< 73*	**1,600**
SVP-3	31-Dec-14	SVP-3-12312014	**1.7**	**0**	**14.9**	*< 83*	*< 59*	*< 43*	*< 73*	**600**
SVP-3	29-Jan-15	SVP-3-01292015	**0.2**	**0**	**18.7**	*< 86*	*< 61*	*<44*	*<76*	**550**
SVP-3	27-Feb-15	SVP-3-02272015	**0.1**	**0**	**21.2**	*< 78*	*< 56*	*< 41*	*< 70*	**320**
SVP-3	4/23/2015	SVP-3-04232015	**1.5**	**0**	**19.5**	*<91*	*<65*	*<47*	*<81*	**320**

Notes:

Only compounds that are detected are reported.

< = Compound not detected. Reportable detection limit shown.

Empty cells = Not analyzed.

µg/m^3 = Micrograms per cubic meter

% = Percent

Bolded values indicate concentrations above the Reportable Detection Limit.

TO15 analyses performed by AirToxics.

Field measurements were performed by Blainetech.

Appendix A
Boring Permits, Logs and Well Completion Reports

Santa Clara Valley Water District | 5750 Almaden Expressway, San Jose, CA 95118-3686, (408) 265-2600

APPLICATION TO DRILL EXPLORATORY BORINGS

FC 285 (04-16-13)

Date Issued: 10/07/14	Expiration Date: 04/07/15	District Permit No.: AE00163
Client (if different from property owner): Chuck Hunnewell	Property Owner: ~~Michelle Ramirez~~ MCF II Tantau Holdings Inc.	Name of Business/Residence at Site: Kaiser Santa Clara Medical Center
Client's Address: 170 Wood Avenue, City, State, Zip: South Iselin, NJ, 08830	Property Owner's Address: 2325 E. Camelback Road, Ste 1100, City, State, Zip: Phoenix, AZ, 85016	Address of Site: 19000 E. Homestead Road, City, State, Zip: Cupertino, CA, 94807
Telephone No.: (732) 476-3449	Telephone No.: (602) 778-6403	Assessor's Parcel No. of Site: Book 316 Page 09 Parcel 36

Consulting Company Name: ERM West Inc.	Drilling Company Name: Vironex	
Address: 277 Treat Blvd. Ste 500, City, State, Zip: Walnut Creek, CA 94597	Address: 1641 Challenge Dr, City, State, Zip: Concord, CA 94520	
Telephone No.: (925) 946-0455	Telephone No.: (302) 661-1400	C-57/C-61 License No.: 705927
☐ Check if address or phone number has changed	☐ Check if address or phone number has changed	

In space at right, sketch location of proposed boring(s) in sufficient detail to identify location. In addition to distances to nearest street and intersection, show distances to any existing structures, landmarks, or topographic features.

How many borings will be installed on parcel? 20

☐ Proposed borings on District property/easement (See General Condition F, page 2.)

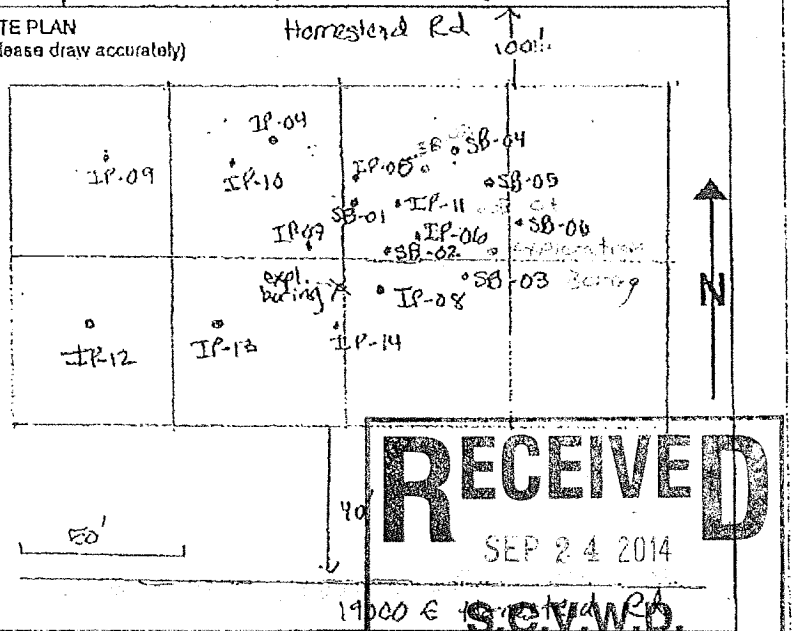
☐ Within 50 feet of the top of a creek bank or District facility

Proposed depth of boring(s):

☒ 45 to 150 feet
☐ 151 to 300 feet
☐ Over 300 feet

NOTE: No permit is required for borings under 45 feet deep.

SITE PLAN
(Please draw accurately)



Boring Type:	Boring Use:
☐ Hollow stem	☐ Geotechnical Investigation
☐ Rotary	☒ Environmental Investigation
☐ CPT	☒ Material Emplacement
☐ Hydropunch	☐ Sensor Emplacement
☒ Other: Direct Push	☐ Other:

RECEIVED
SEP 24 2014
S.C.V.W.D.
WELLS

SIGNATURES

I understand and agree that all work associated with this permit is required to be done in accordance with Santa Clara Valley Water District (District) Well Ordinance 90-1, the District Well Standards, and conditions of this permit (see page 2). I certify that the information given in this permit is correct to the best of my knowledge and that the signature below, whether original, electronic, or photocopied, is authorized and valid, and is affixed with the intent to be enforceable. I also certify that a right of entry/encroachment agreement has been formalized between the well owner and property owner, if parties differ.

Signature of Property Owner/Agent:	Print/Type Name: Michelle Ramirez, Agent for property owner	Date:
Signature of Client/Agent:	Print/Type Name: Chuck Hunnewell, Agent for SMI Holding LLC	Date:
Signature of Driller/Agent:	Print/Type Name: John McAssey	Date: 9/22/14
Signature of Consultant/Agent:	Print/Type Name: Conor McDonough	Date: 9/18/14

IMPORTANT: A minimum 24-hour notice must be given to Santa Clara Valley Water District Well Inspection Department prior to installing the annular seal. Call (408) 265-2607, ext. 2660. Please allow 10 working days to process permit application.

Santa Clara Valley Water District

5750 Almaden Expressway
San Jose, CA 95118-3686
(408) 265-2600

APPLICATION TO DRILL EXPLORATORY BORINGS

FC 285 (04-16-13)

Date Issued:	Expiration Date:	District Permit No.: See previous page
Client (if different from property owner): Chuck Hunnewell	Property Owner: MOF II Tantau ~~Michelle Ramirez~~ Holdings Inc.	Name of Business/Residence at Site: Kaiser Santa Clara Medical Center
Client's Address: 170 Wood Avenue City, State, Zip South Iselin, NJ, 08830	Property Owner's Address: 2325 E. Camelback Road, Ste 1100 City, State, Zip Phoenix, AZ, 85016	Address of Site: 19000 E. Homestead Road City, State, Zip Cupertino, CA, 94807
Telephone No.: (732) 476-3449	Telephone No.: (602) 778-6408	Assessor's Parcel No. of Site: Book 316 Page 09 Parcel 36

Consulting Company Name: ERM West Inc.	Drilling Company Name: Vironex	
Address: 277 Treat Blvd. Ste 500 City, State, Zip Walnut Creek, CA 94597	Address: 1641 Challenge Dr City, State, Zip Concord, CA 94520	
Telephone No.: (925) 946-0455	Telephone No.: (302) 661-1480	C-57/C-61 License No.: 705927
☐ Check if address or phone number has changed	☐ Check if address or phone number has changed	

In space at right, sketch location of proposed boring(s) in sufficient detail to identify location. In addition to distances to nearest street and intersection, show distances to any existing structures, landmarks, or topographic features.

How many borings will be installed on parcel?
20

☐ Proposed borings on District property/easement (See General Condition F, page 2.)

☐ Within 50 feet of the top of a creek bank or District facility

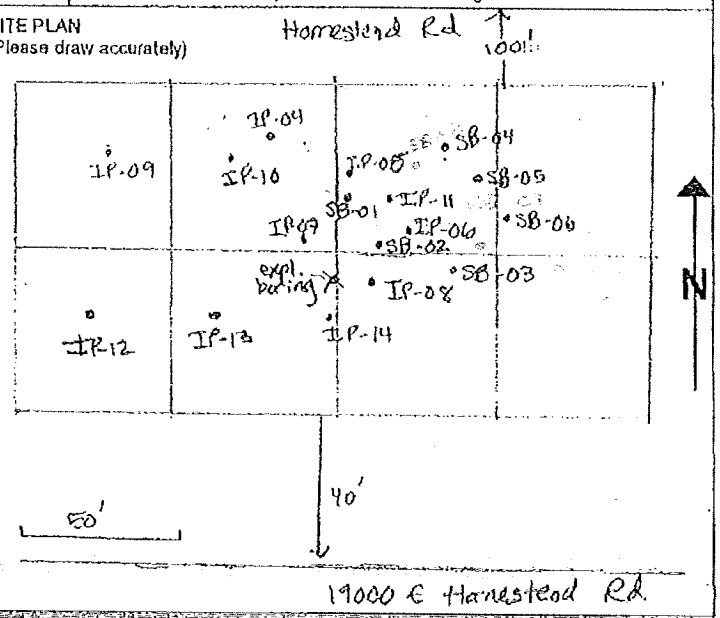
Proposed depth of boring(s):

☒ 45 to 150 feet
☐ 151 to 300 feet
☐ Over 300 feet

NOTE: No permit is required for borings under 45 feet deep.

Boring Type:	Boring Use:
☐ Hollow stem	☐ Geotechnical Investigation
☐ Rotary	☒ Environmental Investigation
☐ CPT	☒ Material Emplacement
☐ Hydropunch	☐ Sensor Emplacement
☒ Other: Direct Push	☐ Other:

SITE PLAN
(Please draw accurately)



SIGNATURES

I understand and agree that all work associated with this permit is required to be done in accordance with Santa Clara Valley Water District (District) Well Ordinance 90-1, the District Well Standards, and conditions of this permit (see page 2). I certify that the information given in this permit is correct to the best of my knowledge and that the signature below, whether original, electronic, or photocopied, is authorized and valid, and is affixed with the intent to be enforceable. I also certify that a right of entry/encroachment agreement has been formalized between the well owner and property owner, if parties differ.

Signature of Property Owner/Agent: Michelle Ramirez 2014.09.22 13:07:33 -07'00'	Print/Type Name: Michelle Ramirez, Agent for property owner	Date: 9/22/14
Signature of Client/Agent: Hunnewell Arthur Digitally signed by Hunnewell Arthur DN: cn=Hunnewell Arthur, o=Siemens, email=chuck.hunnewell@siemens.com Date: 2014.09.22 10:07:31 -04'00'	Print/Type Name: AKA: Arthur Hunnewell Chuck Hunnewell, Agent for SMI Holding LLC	Date: 09/22/14
Signature of Driller/Agent:	Print/Type Name:	Date:
Signature of Consultant/Agent:	Print/Type Name: Conor McDonough	Date: 9/18/14

IMPORTANT: A minimum 24-hour notice must be given to Santa Clara Valley Water District Well Inspection Department prior to installing the annular seal. Call (408) 265-2607, ext. 2660. Please allow 10 working days to process permit application.

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686
(408) 265-2600

APPLICATION TO DRILL EXPLORATORY BORINGS

GENERAL CONDITIONS

A. District (telephone 408-630-2660) must be notified a minimum of one working day before the exploratory boring is backfilled. An authorized District representative must be on site to witness the sealing operation. This requirement may be waived by an authorized District representative. If the District waives the inspection requirement, the District may request the permittee(s) to furnish certification under penalty of perjury that the seal was constructed in accordance with the District Well Standards.

B. This permit is valid only for the purpose specified herein. Boring destruction methods authorized under this permit may not be changed except by written approval of an authorized District representative, and only if the District believes that such a change will result in equal or superior compliance with the District and State Well Standards (e.g., if the District representative finds that site conditions warrant such a change).

C. This permit is only valid for the Assessor's Parcel No. indicated on it.

D. This permit may be voided if it contains incorrect information.

E. Borings shall be sealed within 24 hours following completion of testing or sampling activities. Borings shall not be left in such a condition as to allow for the introduction of surface waters or foreign materials into them. Borings shall be secured such that they do not endanger public health.

F. If any work associated with this permit will take place on District property/easement, an encroachment or construction permit must be granted by the District's Community Projects Review Unit (telephone 408-630-2360, -2217, or -2253).

G. The permittee(s) shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend, and hold the District, its officers, agents, and employees, free and harmless from any and all expense, cost, and liability in connection with or resulting from the granting or exercise of this permit including, but not limited to, property damage, personal injury, and wrongful death.

H. Permittees are required to be in full compliance with Cal/OSHA California Labor Code Section 6300.

I. A current C-57 or C-61 Contractor's License is required for work associated with this permit.

J. Permittee, permittee's contractors, consultants, or agents shall be responsible to assure that all materials or waters generated during drilling, boring destruction, and/or other activities associated with this permit will be safely handled, properly managed, and disposed of according to all applicable federal, state, and local statues regulating such. In no case shall these materials and/or waters be allowed to enter, or potentially enter, on- or off-site storm sewers, dry wells, or waterways or be allowed to move off the property where the work is being completed.

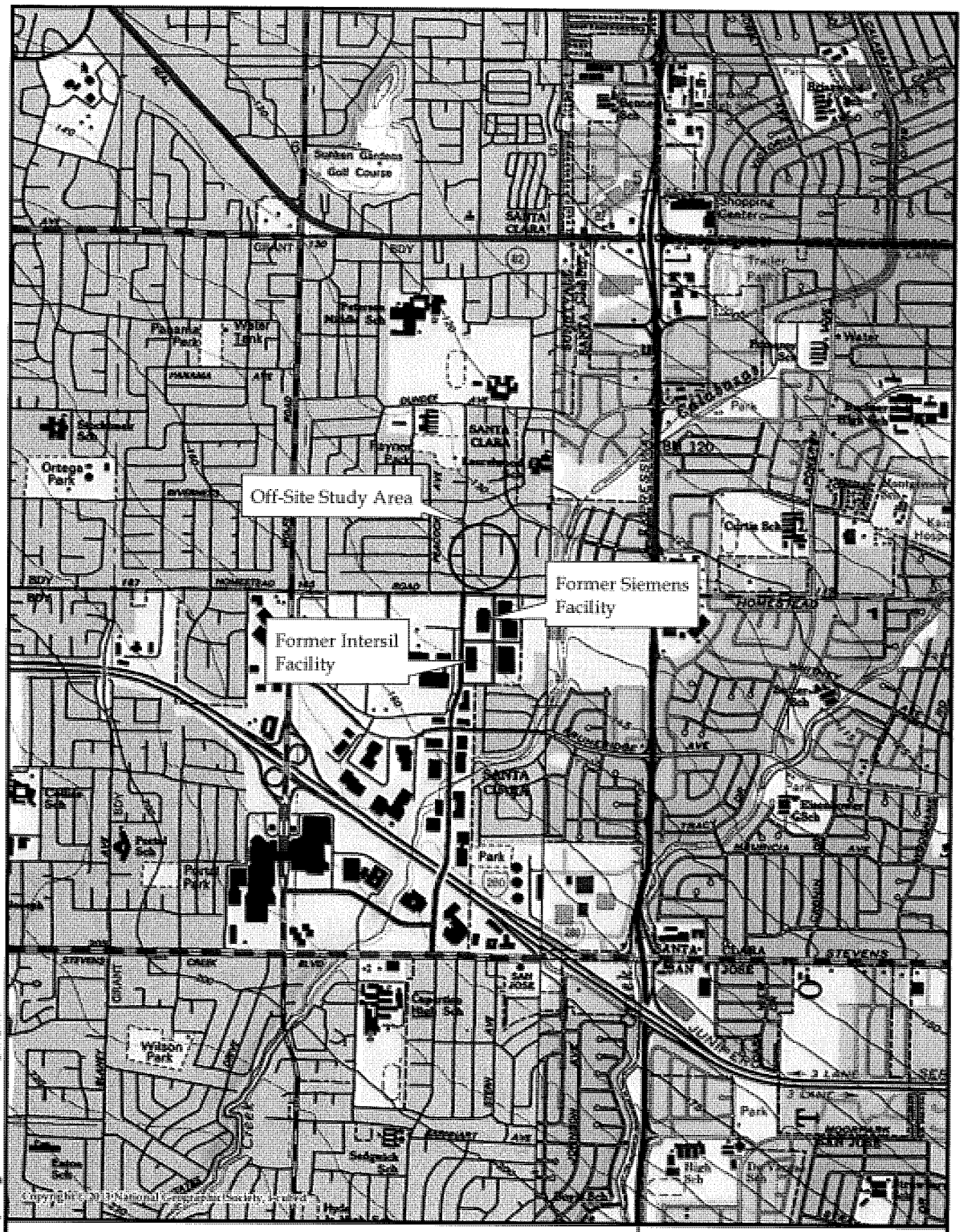
K. The driller and consultants (if applicable) shall have an active copy of their Worker's Compensation Insurance on file with District.

L. This permit shall expire if not exercised within 180 calendar days of its approval, unless an extension of the permit expiration date is granted by an authorized District representative.

M. This permit shall be kept on site during all activities associated with it and shall immediately be presented to an authorized District representative upon request.

Permit Approved by:	Date: 10/27/14

Please allow 10 working days to process this application.



N

0 1000 2000

Scale in Feet

ERM

FIGURE 1
SITE LOCATION MAP
FORMER SIEMENS AND INTERSIL
FACILITIES, AND OFF-SITE STUDY AREA
CUPERTINO, CALIFORNIA

PREPARED BY: erm (ERM)	JOB NO. 0120180 FILE: SMI_10

P:\GIS\GIS\Projects\SMI\MXD\Reports\SMI_10.mxd \\NES\ACI arcsde 12/17/2013

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF BOREHOLE: EB-1

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 10/13/2014
Date Completed: 10/13/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: No groundwater encountered
Notes: Air knifed to 8' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
1					Air knifed to 8' bgs, no samples collected.
2					
3					
4					
5					
6					
7					
8					
9			GP		GRAVEL (GP): grayish brown, coarse grained, loose, moist.
10					Drilled to 40' bgs, no samples taken 10-40' bgs.
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

SOIL BORING POSCO - - 6/26/15 15:29 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF BOREHOLE: EB-1

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Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 10/13/2014
Date Completed: 10/13/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: feet bgs

Notes: Air knifed to 8' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Drilled to 40' bgs, no samples taken 10-40' bgs.
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40			SW		GRAVELLY SAND with CLAY (SW): dark yellowish brown, fine grained, coarse subrounded gravel (30%), clay (30%), medium dense, moist.
41					
42					GRAVELLY SAND with CLAY (SW): as above, less gravel, moist.
43			CL		SILTY CLAY (CL): mottled orangish brown with olive brown, stiff, medium plasticity, trace fine sand, moist.
44					
45			GP		GRAVEL (GP): yellowish gray, coarse grained, loose, dry.
			SP		SAND (SP): yellowish brown, fine grained, loose, moist.
46			ML		SANDY SILT (ML): yellowish brown, fine sand (40%), trace clay, soft, moist.
47					SANDY SILT (ML): as above, trace fine black nodules.
48			SM		SILTY SAND (SM): yellowish brown, fine sand, fine gravel (10%), loose, moist.
			SW		. GRAVELLY SAND (SW): olive brown, fine and coarse grained, coarse gravel (30%), loose, moist.
49			SC		SANDY CLAY (SC): yellowish brown, fine sand, some silt, trace black nodules, soft, medium plasticity, moist.
50			SM		SILTY SAND (SM): dark yellowish brown, fine sand, medium dense, moist.
51			SC		SANDY CLAY (SC): yellowish brown, fine sand, subrounded coarse gravel (10%), soft, moist.
			SP		SAND (SP): yellowish brown, fine grained, coarse gravel (20%), loose, moist.

SOIL BORING POSCO - - 6/26/15 15:29 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

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Reviewed By: K. Soo, P.G.

Date Started: 10/13/2014
Date Completed: 10/13/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: feet bgs

Notes: Air knifed to 8' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
53			CL-ML		CLAYEY SILT (CL-ML): yellowish brown with orangish brown, fine sand (5-10%), trace fine black nodules, soft, moist to wet.
54			SW		SAND (SW): dark yellowish brown, fine to coarse grained, fine gravel (20%), loose, wet.
55			SC		SANDY CLAY (SC): yellowish brown, interbeds of fine sand and clay, fine gravel (5-10%), soft, high plasticity, wet.
56			SW		SAND (SW): yellowish brown, fine and coarse grained, loose, wet, trace clay.
57					
58					
59			CL		CLAY (CL): mottled yellowish brown with orange, fine sand (5-10%), stiff, medium plasticity, moist.
60					CLAY (CL): as above, very stiff, trace fine gravel, no sand.
61					CLAY (CL): dark yellowish brown, fine and coarse gravel (10-15%), stiff, hard, low plasticity, moist.
62					
63					CLAY (CL): as above, some fine sand.
64					CLAY (CL): as above, olive brown, medium stiff, medium plasticity.
65					CLAY (CL): yellowish brown with streaks of orange, fine sand (20-25%), subrounded fine gravel (5%), stiff, low plasticity, moist.
66					CLAY (CL): as above, olive brown, less stiff.
67					
68					CLAY (CL): as above, fine sand (5-10%), very stiff, hard.
69					CLAY (CL): as above, trace fine gravel.
70					CLAY (CL): dark yellowish brown, stiff, high plasticity, moist.
71					
72					CLAY (CL): as above, very stiff.
73			SW		SAND (SW): dark yellowish brown, coarse grained, trace gravel 0.25" diameter, dense, wet.
74					SAND (SW): as above, clay (20%), trace gravel 1" diameter.
75					Total Depth - 75 feet bgs
76					
77					

SOIL BORING POSCO - - 6/26/15 15:29 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF BOREHOLE: SB-1

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/28/2014
Date Completed: 10/28/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
5					
10					
15					
20					
25					

BOREHOLE TO 30 FEET PO - - 6/2/15 21:00 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
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Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF BOREHOLE: SB-1

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/28/2014
Date Completed: 10/28/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
35					
40					
45			SM		SILTY SAND (SM): dark yellowish brown, medium grained, fine gravel (20-30%), clay (5-10%), dense, moist, gray coating on outside of core from 45-46' bgs.
		0.0	CL-ML		SILTY SAND (SM): yellowish brown, fine grained, some clay, trace fine gravel, dense, moist.
		0.0	SP		CLAYEY SILT (CL-ML): yellowish brown, medium plasticity, soft, moist, thin veinlets of white mineralization.
		0.0	ML		SAND (SP): yellowish brown, fine grained, thin interbeds of clay, medium dense, moist.
		0.0	SM		CLAYEY SILT (ML): mottled orangish brown with yellowish brown, soft, moist.
		0.0	SC		SILTY CLAYEY SAND (ML): yellowish brown, fine grained, dense, moist.
50		0.0	SP		SANDY CLAY (SC): yellowish brown, fine grained, low plasticity, soft, moist.
		0.0	SM		SAND (SP): yellowish brown, fine grained, some silt, trace fine gravel, dense, moist, gray coating from 50-50.5' bgs.
		0.1	SW		SILTY SAND (SM): yellowish brown, fine grained, clay (20%), medium dense, moist.
		1.2	SM		GRAVELLY SAND (SW): grayish yellow, coarse grained, dense, wet.
		1.5			SILTY FINE SAND (SM): mottled orangish brown with yellowish brown, trace clay, medium dense, wet.
55			SP		SILTY FINE SAND (SM): as above, green florescence observed from tracer dye 53-54' bgs.
		3.0	SM		SAND (SP): dark yellowish brown, fine grained, loose, wet.
		0.4	SW		SILTY SAND (SM): yellowish brown, fine grained, clay (5-10%), trace silty clay layer at 56' bgs, dense, moist.
		0.0			SAND (SW): grayish brown, coarse grained, fine gravel (20-30%), loose, wet.
		0.0	CL		CLAY (CL): yellowish brown, some silt, stiff, low plasticity, dry.
		0.0			SILTY CLAY (CL): dark yellowish brown, very stiff, dry.

BOREHOLE TO 30 FEET PO - - 6/2/15 21:00 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF BOREHOLE: SB-1

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/28/2014
Date Completed: 10/28/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	CL-ML		SILTY CLAY (CL-ML): yellowish brown, very stiff, low plasticity, dry, gray coating on outside of core from 60-62' bgs.
		0.0	GC		GRAVELLY CLAY (GC): yellowish brown, coarse sand and fine gravel, medium plasticity, moist.
		0.0	CL		SILTY CLAY (CL): yellowish brown, medium sand (10-15%), stiff, dry.
		0.0	SP		SAND (SP): yellowish brown, fine to medium grained, loose, wet.
		0.0	CL		SILTY CLAY (CL): yellowish to orangish brown, trace fine gravel, low plasticity, very stiff, dry.
65		0.0			
		0.0	SW		GRAVELLY SAND (SW): yellowish gray, coarse grained, subangular to subrounded gravel up to 1" in diameter, loose, wet.
		0.0			
		0.0			
		0.2	CL		SILTY CLAY (CL): yellowish brown, stiff, medium plasticity, moist.
70		0.6			
		0.0	SW		GRAVELLY SAND (SW): yellowish brown, stiff, medium plasticity, moist.
		0.0			GRAVELLY SAND (SW): as above, trace clay.
		0.0			
		0.0	CL		SILTY CLAY (CL): yellowish brown, stiff, medium plasticity, moist.
75		0.0			Total Depth - 75 feet bgs
80					
85					

BOREHOLE TO 30 FEET PO - - 6/2/15 21:00 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

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LOG OF BOREHOLE: SB-2

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/24/2014
Date Completed: 10/27/2014
Total Depth: 75 feet
Borehole Diameter: 3.25
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs, drilled to 45' bgs then sampled continuously.
5					
10					
15					
20					
25					

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LOG OF BOREHOLE: SB-2

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/24/2014
Date Completed: 10/27/2014
Total Depth: 75 feet
Borehole Diameter: 3.25
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs, drilled to 45' bgs then sampled continuously.
35					
40					
45			ML		CLAYEY SILT (ML): yellowish brown, soft, trace black nodules, moist.
			SM		SILTY SAND (SM): yellowish brown, medium grained, some clay, dense, moist.
			ML		SILTY SAND (SM): as above, trace subrounded gravel, very dense, gray coating on outside of core from 47-49' bgs.
			SW		SANDY SILT (ML): mottled yellowish brown, some clay, fine grained, soft, moist, thin veins of white mineralization.
50			ML		SAND (SW): dark yellowish brown, coarse grained, fine gravel (20%), dense, moist, gray coating on outside of core.
			SP		SANDY SILT (ML): yellowish brown, fine sand, medium dense, moist, gray coating on outside of core from 50-50.5' bgs.
			SW		SAND (SP): yellowish brown, fine grained, silt (25%), dense, wet.
			CL		SAND (SW): mottled dark yellowish brown with grayish-green sand, fine to coarse grained, fine gravel (15%), medium dense, wet.
55					SAND (SW): as above, some interbeds of clay, loose, wet.
					SILTY CLAY (CL): yellowish brown, some sand, soft, wet.
					SILTY CLAY (CL): saturated, slurry-like at 54.5-55' bgs.
			SW		CLAY (CL): yellowish brown, some silt, low plasticity, stiff, dry.
					SAND (SW): dark yellowish brown with gray gravel, fine gravel (30%), loose, wet.
			CL		SAND (SW): as above, some thin interbeds of clay, saturated.
			SP		SILTY CLAY (CL): yellowish brown with orange veinlets, some fine sand, soft, high plasticity, moist.

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LOG OF BOREHOLE: SB-2

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/24/2014
Date Completed: 10/27/2014
Total Depth: 75 feet
Borehole Diameter: 3.25
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					SAND (SP): yellowish brown, fine grained, medium dense, moist.
					No Recovery at 60-63' bgs, sample stuck in rod.
65			CL		SILTY CLAY (CL): dark yellowish brown with olive, silt (30%), fine gravel (10%), medium stiff, moist, small pockets of red staining.
					SILTY CLAY (CL): as above, fine gravel (20%).
					CLAY (CL): dark yellowish brown with orange, stiff, moist, some fine black nodules.
					CLAY (CL): as above, less stiff.
					CLAY (CL): as above, high plasticity, trace fine black nodules.
70					CLAY (CL): as above, dark orangish brown, low plasticity, fine gravel up to 1" diameter, trace subrounded black, red, and brown nodules.
					CLAY (CL): yellowish brown, trace fine gravel, stiff, medium plasticity, moist.
			SW		SAND (SW): yellowish brown, coarse grained, fine gravel (20%) loose, wet.
					GRAVELLY SAND (SW): yellowish brown, coarse grained, subrounded fine gravel (30%), loose.
					GRAVELLY SAND (SW): as above, pocket of reddish sand.
75					Total Depth - 75 feet bgs
80					
85					

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LOG OF BOREHOLE: SB-3

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/27/2014
Date Completed: 10/27/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
5					
10					
15					
20					
25					

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LOG OF BOREHOLE: SB-3

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/27/2014
Date Completed: 10/27/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
35					
40					
45			SM		SILTY SAND (SM): yellowish brown with orange, fine grained, some clay, dense, moist, gray coating on outside of core from 45-45.5' bgs.
					SILTY SAND (SM): as above, fine gravel (10%), wet.
			ML		SANDY SILT (ML): yellowish brown, fine grained, some clay, medium stiff, moist.
50			SP		SAND (SP): yellowish brown, fine grained, loose, moist.
			ML		SILT (ML): yellowish brown with orange, stiff, moist.
			SW		SAND (SW): grayish brown, coarse grained, fine gravel (10%), dense, wet.
			SM		SILTY SAND (SM): yellowish brown, fine grained, some clay, medium dense, wet.
			SW		SAND (SW): yellowish brown, fine to coarse grained, some clay, dense, wet.
55			SM		SILTY SAND (SM): yellowish brown, fine grained, dense, wet.
			MH		CLAYEY SILT (MH): dark yellowish brown, (clay 30%), fine sand (10%), trace fine gravel, stiff, moist.
			ML		SANDY SILT (ML): yellowish brown, fine grained, trace fine gravel, medium stiff, moist.
			SW		SAND (SW): dark yellowish brown, fine to coarse grained, fine gravel (30%), loose, wet.
			CL		CLAY (CL): yellowish brown, stiff, moist.

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LOG OF BOREHOLE: SB-3

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/27/2014
Date Completed: 10/27/2014
Total Depth: 75 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					No Recovery at 60-62.5' bgs.
65			CL		CLAY (CL): yellowish brown, stiff, high plasticity, moist. SILTY CLAY (CL): mottled gray orange and yellowish brown, silt (30%), trace fine sand, trace fine gravel, stiff, moist. SILTY SANDY CLAY (CL): yellowish brown with some gray mottling, silt (30%), fine sand (20%), stiff, moist. SILTY SANDY CLAY (CL): as above, fine sand (30%), silt (20%), medium stiff. SILTY SANDY CLAY (CL): as above, stiff, less moisture.
70			SC		SANDY CLAY (SC): yellowish brown, fine sand, trace fine gravel, stiff.
			SW		GRAVELLY SAND (SW): yellowish brown, coarse grained, fine gravel (30%), dense, wet.
75					Total Depth - 75 feet bgs
80					
85					

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LOG OF BOREHOLE: SB-5

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/30/2014
Date Completed: 10/30/2014
Total Depth: 67 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs. Refusal at 67' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
5					
10					
15					
20					
25					

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LOG OF BOREHOLE: SB-5

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/30/2014
Date Completed: 10/30/2014
Total Depth: 67 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs. Refusal at 67' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
35					
40					
45			ML		SANDY SILT (ML): yellowish brown, fine grained sand, medium stiff, moist, gray coating on outside of core from 45-45.5' bgs.
		0.0	SM		SILTY SAND (SM): yellowish brown, fine grained, trace clay, trace fine gravel, medium dense, moist.
		0.0			
		0.0			SILTY SAND (SM): as above, clay (10%), medium dense.
		0.0	SP		SAND (SP): yellowish brown, fine grained, trace fine gravel, dense, moist, gray coating on outside of core from 50-50.5' bgs.
50		0.0			
		0.0	SW		SAND (SW): yellowish brown with gray, fine to coarse grained, fine gravel (25%), loose, moist.
		0.0			SAND (SW): as above, larger pockets of fine gravel interbedded with sand.
		0.0	SM		VERY FINE SILTY SAND (SM): yellowish brown with orange, very fine grained, trace clay, dense, moist to wet.
		0.0			
55		0.0	ML		FINE SANDY SILT (ML): yellowish brown, trace clay, soft, moist.
		0.0			
		0.0	SW		GRAVELLY SAND (SW): grayish brown, coarse grained, trace fine subrounded gravel, medium dense, moist.
		0.0	CL		CLAY (CL): dark yellowish brown, trace fine sand and silt, stiff, high plasticity, moist.
		0.0			

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LOG OF BOREHOLE: SB-5

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/30/2014
Date Completed: 10/30/2014
Total Depth: 67 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 75' bgs. Refusal at 67' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	CL		CLAY (CL): dark yellowish brown, trace fine sand and silt, stiff, high plasticity, moist.
		0.1			SILTY CLAY (CL): yellowish brown, very stiff, medium plasticity, moist, gray streaks on outside of core.
		0.3	GW-GC		GRAVELLY SAND with CLAY (GW-GC): yellowish brown, coarse grianed, fine gravel (30%), clay is interbedded with gravel, very dense, stiff, hard, moist.
		0.0			
		0.0			GRAVELLY SAND with CLAY (GW-GC): as above, light gray streaks on ouside of core.
65		0.0	GW-GM		SANDY GRAVEL with SILT (GW-GM): dark yellowish brown, fine subangular to subrounded gravel (30%), some coarse sand, trace clay, dense, moist.
		0.0	SW		GRAVELLY SAND (SW): grayish brown, coarse grained, subangular to subrounded gravel (30%), trace clay, very dense, moist.
		0.0			
					Total Depth - 67 feet bgs
70					
75					
80					
85					

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LOG OF BOREHOLE: SB-6

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/29/2014
Date Completed: 10/29/2014
Total Depth: 63 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 63' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
5					
10					
15					
20					
25					

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LOG OF BOREHOLE: SB-6

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/29/2014
Date Completed: 10/29/2014
Total Depth: 63 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 63' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
35					
40					
45			SM		SILTY SAND (SM): yellowish brown, very fine grained, trace clay, medium dense, moist, gray coating on outside of core from 45-46' bgs.
		0.0	MH		CLAYEY SILT (MH): yellowish brown with white veinlets, soft, moist, gray coating on outside of core.
		0.0	SM		FINE SILTY SAND (SM): yellowish brown, very fine grained, medium dense, moist.
		0.0			FINE SILTY SAND (SM): as above, trace fine gravel.
		0.0	MH		CLAYEY SILT (MH): yellowish brown with orange, soft, medium plasticity, moist.
50			SM		SILTY SAND (SM): yellowish brown, very fine sand, trace clay, loose, gray coating from 50-50.5' bgs.
		0.0	SP		SAND (SP): orangish brown, fine grained, fine gravel (5%), trace silt, loose, moist.
		0.0	ML		SANDY SILT (ML): dark yellowish brown, fine sand, soft, wet.
		0.0	SW		GRAVELLY SAND (SW): grayish brown, coarse grained, fine gravel (30%), medium dense, moist.
		0.0	SM		SILTY SAND (SM): yellowish brown with orange veinlets, very fine sand, very dense, wet.
		0.0			SILTY SAND (SM): as above, saturated.
55		0.0	MH		CLAYEY SILT (MH): mottled yellowish brown with orange, stiff, moist.
		0.0	SW		SAND (SW): grayish brown, coarse grained, gravel (20%), trace clay, loose, wet.
		0.4			SAND (SW): as above, fine gravel (30%).
		0.0	CL		SILTY CLAY (CL): mottled yellowish brown with orange and gray, trace fine gravel, stiff, moist.
		0.0			

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LOG OF BOREHOLE: SB-6

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/29/2014
Date Completed: 10/29/2014
Total Depth: 63 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 63' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	CL		SILTY CLAY (CL): mottled yellowish brown with orange and gray, trace fine gravel, stiff, moist.
		0.0			SILTY CLAY (CL): as above, very stiff.
					SILTY CLAY (CL): dark yellowish brown, some fine gravel and coarse sand, very stiff, low plasticity, moist.
		0.0	GC		SILTY CLAY (CL): as above, silt (40%).
					GRAVELLY CLAY (GC): orangish brown with gray, fine gravel (30%), coarse sand (5-10%), very stiff, moist.
					Total Depth - 63 feet bgs
65					
70					
75					
80					
85					

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LOG OF BOREHOLE: SB-7

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/31/2014
Date Completed: 10/31/2014
Total Depth: 64.5 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 64.5' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
5					
10					
15					
20					
25					

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LOG OF BOREHOLE: SB-7

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/31/2014
Date Completed: 10/31/2014
Total Depth: 64.5 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 64.5' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously.
35					
40					
45		0.0	SM		FINE SILTY SAND (SM): yellowish brown, fine grained, medium dense, moist, gray coating on outside of core from 45-45.5' bgs.
		0.0			FINE SILTY SAND (SM): as above, trace clay, no gray coating.
		0.2			FINE SILTY SAND (SM): as above, clay (10%), veinlets of white mineralization.
		1.3			
		2.2			FINE SILTY SAND (SM): as above, clay (20-30%), low plasticity from clay content.
50		0.0			FINE SILTY SAND (SM): as above, clay (10-15%), slight gray coating on outside of core from 50-50.5' bgs.
			SP		SAND (SP): orangish brown, fine to medium grained, loose, moist.
			SW		GRAVELLY SAND (SW): grayish brown, coarse grained, some gravel 0.75" in diameter, loose, moist.
			SM		FINE SILTY SAND (SM): yellowish brown with orange veinlets, trace clay, medium dense, fine grained, wet.
					FINE SILTY SAND (SM): as above, no clay, wet.
55		0.0	CL		SILTY CLAY (CL): dark brown, trace fine gravel, medium plasticity, very stiff, moist.
		0.1			
		0.1	SW		SAND (SW): grayish brown, coarse grained, fine gravel (20-30%), loose, wet.
		0.2	SM		FINE SILTY SAND (SM): orangish brown with grayish green, fine grained, dense, moist.
		1.0	CL		FINE SILTY SAND (SM): as above, clay (20-30%), light gray coating on outside of core.

BOREHOLE TO 30 FEET PO - - 6/2/15 21:00 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF BOREHOLE: SB-7

Project Number: 0201040
Project Name: Siemens Intersil Site
Client Name: Siemens
Location: Cupertino, California
Contractor: Vironex
Drilling Method: Direct Push
Logged By: S. Martin

Date Started: 10/31/2014
Date Completed: 10/31/2014
Total Depth: 64.5 feet
Borehole Diameter: 3.25"
Initial Water Level: Groundwater not encountered
Notes: Air knifed to 7' bgs. Drilled to 45' bgs then sampled continuously. Refusal at 64.5' bgs.
Reviewed By: Kit Soo, P.G.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	CL		SILTY CLAY (CL): dark yellowish brown, very stiff, medium plasticity, moist.
		0.0			
		0.0	GC		GRAVELLY CLAY (GC): orangish brown, some subrounded gravel up to 0.75" in diameter, moist, very stiff, hard, gray streaks on outside of core.
		0.0			GRAVELLY CLAY (GC): as above, heterogeneous mixture of clay, coarse sand, gravel, milky gray splotches of EHC on interior of core, fine textured gray coating on interior of core from 63-64' bgs.
		0.0			
65					Total Depth - 64.5 feet bgs
70					
75					
80					
85					

BOREHOLE TO 30 FEET PO - - 6/2/15 21:00 - F:\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

Environmental Resources Management

1277 Treat Blvd.
Suite 500
Walnut Creek, CA 94597
(925) 946-0455
(925) 946-9968 (fax)

30 October 2014

Ms. Victoria Garcia
Santa Clara Valley Water District
5905 Winfield Blvd.
San Jose, CA 95123-2428

Subject: Well Completion Reports for Onsite Study Area Monitoring Well Installation Intersil/Siemens Site

Ms. Garcia:

ERM-West, Inc. (ERM) has prepared a Santa Clara Valley Water District (SCVWD) Well Completion Report Submittal for the installation of five groundwater monitoring wells and three soil vapor probes. The focus of this investigation was to further characterize the extent and distribution of chlorinated volatile organic compounds (VOCs) in shallow groundwater and provide for Onsite Study Area plume monitoring. A site location map is provided as Figure 1 and well locations are presented on Figure 2.

Enclosed are copies of the Well Completion Reports for the installation of 5 wells and 3 soil vapor probes which were installed between 18 August and 24 August 2014 in the City of Cupertino, California. As presented in Figure 2, all of the wells and soil vapor probes are located within the parking lot of the 19000 East Homestead Road facility.

If you have any questions, please feel free to call me at (925) 946-0455.

Sincerely,

Kit Soo, P.G.
Project Manager/Hydrogeologist

enclosures

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234543

Page 1 of 1

Owner's Well Number MW-01A1

Date Work Began 08/22/2014 Date Work Ended 8/22/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00328 Permit Date 8/1/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method Sonic Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log

Total Depth of Boring 57 Feet

Total Depth of Completed Well 56.5 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 19000 E Homestead Rd

City Cupertino County Santa Clara

Latitude 37 Deg. 20 Min. 15 Sec. N Longitude -122 Deg. 0 Min. 14 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached Figure 2

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level 52 (Feet) Date Measured 08/23/2014

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	46	7	Blank	PVC Sch. 40		2		
46	56	7	Screen	PVC Sch. 40		2	Milled Slots	0.020
56	57	7	Blank	PVC Sch. 40		2		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	41	Cement	Neat cement
41	44	Bentonite	Hydrated seal
44	57	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed (C-57 Licensed Water Well Contractor) Date Signed 10-28-14 C-57 License Number 938110

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

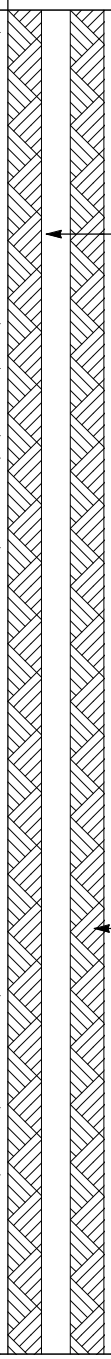
LOG OF MONITORING WELL: MW-01A1

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/22/2014
Date Completed: 8/22/2014
Total Depth: 57 feet
Borehole Diameter: 7.0"
Initial Water Level: 51.6 feet bgs
Notes: Air knifed to 8' bgs. Lithology described for 10-46' bgs from MW-01A3 log. Continuously sampled 46-56' bgs with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Asphalt 0-0.5' bgs.
			GW		GRAVEL (GW): light brown, coarse grained, loose, dry.
			GW		GRAVEL (GW): as above.
5			GW		GRAVEL (GW): light brown, well graded gravel, fine to coarse gravel, some silt and fine sand, loose, dry.
			GW		GRAVEL (GW): as above, silt (~30%), clay (~10%).
			SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained sand, fine to coarse gravel, angular to subangular, loose, dry.
			GM		SILTY GRAVEL (GM): yellowish brown, fine to coarse gravel, 20% fine gravel, 30% coarse gravel, angular to subrounded, loose, dry.
10			SW		GRAVELLY SAND (SW): dark yellowish brown, coarse grained sand, coarse subrounded gravel, some silt, loose, slightly moist.
			GM		SILTY GRAVEL (GM): light yellowish brown, coarse subrounded gravel, some fine sand, loose, dry.
			GM		SILTY GRAVEL (GM): as above, more coarse sand (~30%), pockets of moisture.
			SW		GRAVELLY SAND with SILT (SW): yellowish brown, fine to coarse grained sand, fine to coarse gravel, loose, slightly moist.
			SW		GRAVELLY SAND with SILT (SW): as above, moist.
15			SW		GRAVELLY SAND with SILT (SW): clay (~10%), cobbles up to 4" in diameter, moist.
			SW		GRAVELLY SAND with SILT (SW): as above, no clay, fine gravel (~30%), coarse gravel (~15%), no cobbles.
20			SW		WELL GRADED SAND (SW): light to dark yellowish brown, coarse grained sand, coarse subrounded gravel (~15%), loose, slightly moist.
			SW		GRAVELLY SAND (SW): dark olive brown, very coarse grained sand, angular to subrounded gravel, loose, wet.
			SW		GRAVELLY SAND (SW): as above, coarse gravel more homogenous in size 0.5" diameter average, clay (~20%).
			ML		SILT (ML): orangish brown, low dry strength, slightly stiff, dry.
			ML		SANDY SILT (ML): orangish brown, fine sand (~30-40%), cohesive but low dry strength, crumbles with finger pressure, dry.
25			SM		SILTY SAND (SM): orangish brown, fine grained, fine subangular black gravel (~20%), loose, dry to slightly moist.
			ML		SANDY SILT: orangish brown, fine sand (~30-40%), low dry strength crumbles with finger pressure, slightly moist.
			ML		SANDY SILT (ML): orangish brown, fine sand (~20%), very stiff, dry.

WELL DIAGRAM



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ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

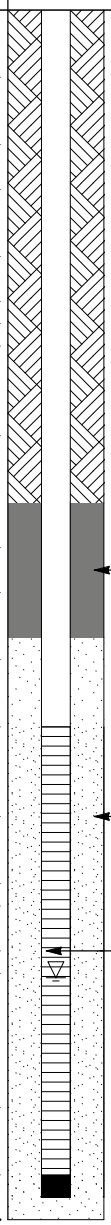
LOG OF MONITORING WELL: MW-01A1

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/22/2014
Date Completed: 8/22/2014
Total Depth: 57 feet
Borehole Diameter: 7.0"
Initial Water Level: 51.6 feet bgs
Notes: Air knifed to 8' bgs. Lithology described for 10-46' bgs from MW-01A3 log. Continuously sampled 46-56' bgs with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
			CL		SANDY CLAY (CL): olive brown, fine sand (~30%), trace silt, low plasticity, cohesive but crumbles easily, moist.
			SC-SM		CLAYEY SAND (SC-SM): olive brown, gray on outside of core, fine sand (~30%), dense, moist.
					CLAYEY SAND (SC-SM): as above, trace coarse gravel.
			SW-SM		GRAVELLY SAND with SILT (SW-SM): yellowish brown, medium to coarse sand, fine to coarse angular gravel (~30%), cohesive from silt content, dense, moist.
			ML		SANDY CLAYEY SILT (ML): dark olive brown, fine sand (~30%), clay (~30%), soft, moist.
35			SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained, some fine gravel, loose, slightly moist.
			CL		SANDY CLAY (CL): yellowish brown, some fine sand, very stiff, low plasticity, moist.
			SC-SM		CLAYEY SAND with SILT (SC-SM): dark yellowish brown, fine sand, silt (~20%), dense, moist.
			ML		SANDY SILT (ML): dark yellowish brown, fine sand (~30%), stiff, slightly moist.
					SANDY SILT (ML): as above, sand (~25%), very stiff.
40			CL		SANDY CLAY (CL): dark yellowish brown, some fine sand, low plasticity, soft, moist.
					SANDY CLAY (CL): as above, some fine gravel.
			SC		CLAYEY SAND (SC): dark yellowish brown, fine to medium grained, trace subangular gravel, loose to medium dense, moist.
			SP-SC		SAND with CLAY (SP-SC): fine grained sand, some silt, medium dense, moist.
					SAND with CLAY (SP-SC): as above, silt (~20%), trace fine gravel.
45			SM		SILTY SAND with CLAY (SM): dark yellowish brown, fine sand, clay (~20%), loose to medium dense.
		2.1	ML		SANDY SILT (ML): dark yellowish brown, fine sand, clay (~15%), medium stiff, moist.
		1.2			SANDY SILT (ML): as above, medium gravel (5%).
		0.2	SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained, some fine to coarse gravel, loose, slightly moist.
		0.0			
50			CL		CLAY (CL): dark yellowish brown, fine gravel (~10%), some fine sand, medium plasticity, moist.
		0.0	SP-SM		SAND to SANDY SILT (SP-SM): dark yellowish brown, fine sand, loose, moist.
		0.0	ML		CLAYEY SILT (ML): dark yellowish brown, clay (~30%), medium stiff, moist.
		1.1	SM		SILTY SAND (SM): dark yellowish brown, fine to medium grained, coarse subangular gravel (~20%), loose, moist to wet.
		0.6			SILTY SAND (SM): as above, some clay, moist to wet.
		0.1			
55		0.0	SW		SAND (SW): dark olive brown, fine to coarse grained, fine gravel (~25%), loose, wet.
		0.0			
					Total Depth - 57 feet bgs

WELL DIAGRAM



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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234545

Page 1 of 1

Owner's Well Number MW-01A3

Date Work Began 08/21/2014 Date Work Ended 8/22/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00331 Permit Date 8/1/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ⊙ Horizontal ○ Angle Specify

Drilling Method Sonic Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log

Total Depth of Boring 90 Feet

Total Depth of Completed Well 82.5 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 19000 E Homestead Rd

City Cupertino County Santa Clara

Latitude 37 Deg. 20 Min. 15 Sec. N Longitude -122 Deg. 0 Min. 14 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached Figure 2

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⊙ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

⊙ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level 60 (Feet) Date Measured 08/23/2014

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	72	7	Blank	PVC Sch. 40		2		
72	82	7	Screen	PVC Sch. 40		2	Milled Slots	0.020
82	83	7	Blank	PVC Sch. 40		2		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	67	Cement	Neat cement
67	70	Bentonite	Hydrated seal
70	83	Filter Pack	#2/12 sand
83	90	Bentonite	Bentonite chips

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 10-28-14 (Date Signed) 938110 (C-57 License Number)

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

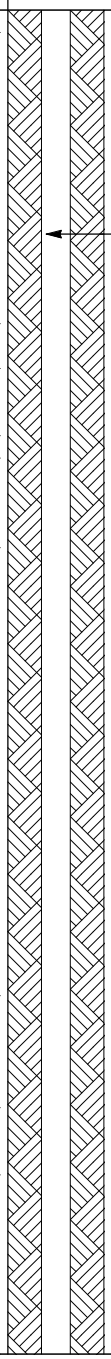
LOG OF MONITORING WELL: MW-01A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/21/2014
Date Completed: 8/22/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 59.7 feet bgs
Notes: Air knifed to 8' bgs. Sampled continuously to depth with 10' core barrel.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Asphalt 0-0.5' bgs.
			GW		GRAVEL (GW): light brown, coarse grained, loose, dry.
			GW		GRAVEL (GW): as above.
5		0.0	GW		GRAVEL (GW): light brown, well graded gravel, fine to coarse gravel, some silt and fine sand, loose, dry.
		0.0	GW		GRAVEL (GW): as above, silt (~30%), clay (~10%).
		0.0	SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained sand, fine to coarse gravel, angular to subangular, loose, dry.
			GM		SILTY GRAVEL (GM): yellowish brown, fine to coarse gravel, 20% fine gravel, 30% coarse gravel, angular to subrounded, loose, dry.
10		1.3	SW		GRAVELLY SAND (SW): dark yellowish brown, coarse grained sand, coarse subrounded gravel, some silt, loose, slightly moist.
			GM		SILTY GRAVEL (GM): light yellowish brown, coarse subrounded gravel, some fine sand, loose, dry.
			GM		SILTY GRAVEL (GM): as above, more coarse sand (~30%), pockets of moisture.
		0.0	SW		GRAVELLY SAND with SILT (SW): yellowish brown, fine to coarse grained sand, fine to coarse gravel, loose, slightly moist.
			SW		GRAVELLY SAND with SILT (SW): as above, moist.
		0.0	SW		
15			SW		GRAVELLY SAND with SILT (SW): clay (~10%), cobbles up to 4" in diameter, moist.
		0.0	SW		GRAVELLY SAND with SILT (SW): as above, no clay, fine gravel (~30%), coarse gravel (~15%), no cobbles.
		0.0	SW		
			SW		WELL GRADED SAND (SW): light to dark yellowish brown, coarse grained sand, coarse subrounded gravel (~15%), loose, slightly moist.
20		0.0	SW		GRAVELLY SAND (SW): dark olive brown, very coarse grained sand, angular to subrounded gravel, loose, wet.
			SW		GRAVELLY SAND (SW): as above, coarse gravel more homogenous in size 0.5" diameter average, clay (~20%).
		0.0	ML		SILT (ML): orangish brown, low dry strength, slightly stiff, dry.
			ML		SANDY SILT (ML): orangish brown, fine sand (~30-40%), cohesive but low dry strength, crumbles with finger pressure, dry.
		0.0	SM		SILTY SAND (SM): orangish brown, fine grained, fine subangular black gravel (~20%), loose, dry to slightly moist.
25		0.0	ML		SANDY SILT: orangish brown, fine sand (~30-40%), low dry strength crumbles with finger pressure, slightly moist.
			ML		SANDY SILT (ML): orangish brown, fine sand (~20%), very stiff, dry.
		0.0	ML		

WELL DIAGRAM



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ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

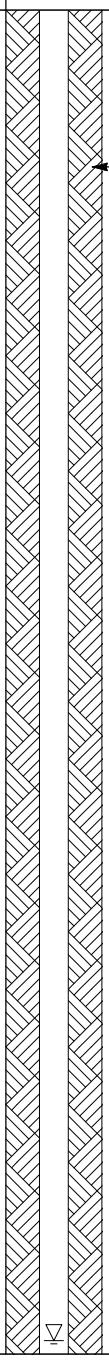
LOG OF MONITORING WELL: MW-01A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/21/2014
Date Completed: 8/22/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 59.7 feet bgs
Notes: Air knifed to 8' bgs. Sampled continuously to depth with 10' core barrel.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		1.5	CL		SANDY CLAY (CL): olive brown, fine sand (~30%), trace silt, low plasticity, cohesive but crumbles easily, moist.
			SC-SM		CLAYEY SAND (SC-SM): olive brown, gray on outside of core, fine sand (~30%), dense, moist.
					CLAYEY SAND (SC-SM): as above, trace coarse gravel.
		1.4	SW-SM		GRAVELLY SAND with SILT (SW-SM): yellowish brown, medium to coarse sand, fine to coarse angular gravel (~30%), cohesive from silt content, dense, moist.
			ML		SANDY CLAYEY SILT (ML): dark olive brown, fine sand (~30%), clay (~30%), soft, moist.
35					
		1.2	SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained, some fine gravel, loose, slightly moist.
			CL		SANDY CLAY (CL): yellowish brown, some fine sand, very stiff, low plasticity, moist.
			SC-SM		CLAYEY SAND with SILT (SC-SM): dark yellowish brown, fine sand, silt (~20%), dense, moist.
		2.0	ML		SANDY SILT (ML): dark yellowish brown, fine sand (~30%), stiff, slightly moist.
					SANDY SILT (ML): as above, sand (~25%), very stiff.
40		1.5	CL		SANDY CLAY (CL): dark yellowish brown, some fine sand, low plasticity, soft, moist.
					SANDY CLAY (CL): as above, some fine gravel.
			SC		CLAYEY SAND (SC): dark yellowish brown, fine to medium grained, trace subangular gravel, loose to medium dense, moist.
		2.3	SP-SC		SAND with CLAY (SP-SC): fine grained sand, some silt, medium dense, moist.
					SAND with CLAY (SP-SC): as above, silt (~20%), trace fine gravel.
45		1.2	SM		SILTY SAND with CLAY (SM): dark yellowish brown, fine sand, clay (~20%), loose to medium dense.
					SILTY SAND with CLAY (SM): as above, some fine gravel, less clay (~5-10%).
		1.4	SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained, some fine to coarse subangular to subrounded gravel, loose, moist.
			CL		CLAY (CL): mottled olive brown with grayish green, fine sand (~20%), trace fine gravel, very stiff, medium plasticity, moist.
50		0.0	SW-SC		SAND with CLAY (SW-SC): olive brown, fine to medium grained with thin interbeds of coarse grained sand, fine gravel (~10%), clay (~20%), loose, wet.
		1.7			SAND with CLAY (SP-SC): as above, clay (~30%), no fine gravel, wet.
			CL		CLAY (CL): dark yellowish brown, fine sand (15-20%), medium plasticity, stiff, moist.
		0.9			CLAY (CL): as above, medium plasticity.
					CLAY (CL): as above, sand (~30%), medium stiff.
55			SW		SAND (SW): dark olive brown, coarse grained, clay (~20%), loose, wet.
			ML		SANDY SILT (ML): dark yellowish brown, fine sand (~30%), fine gravel (5-10%), medium stiff, moist.
		1.5	CL		CLAY (CL): mottled orangish brown with gray, trace fine sand and silt, medium plasticity, very stiff, moist.
		2.4			CLAY (CL): as above, no mottling, dark olive brown, very stiff, dry.

WELL DIAGRAM



MW TO 30FT WC - - 10/29/14 13:40 - \\WDWALFS01\DATAWAL\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF MONITORING WELL: MW-01A3

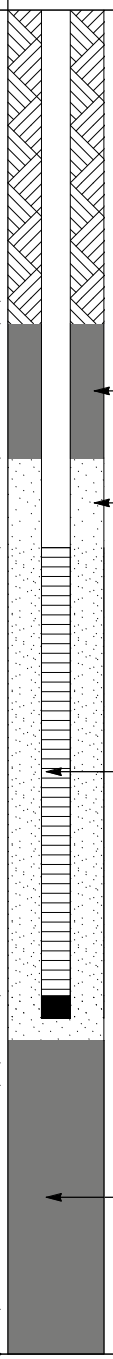
Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/21/2014
Date Completed: 8/22/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 59.7 feet bgs
Notes: Air knifed to 8' bgs. Sampled continuously to depth with 10' core barrel.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	CL		CLAY (CL): olive brown, silt (~20%), fine sand (~10%), medium plasticity, very stiff, moist.
					CLAY (CL): as above, wet.
		0.1			CLAY (CL): as above, mottled olive brown with gray, subrounded gravel (~10%), very stiff.
		0.7			
65					CLAY (CL): as above, high plasticity, with interbedded fine sand from 65-66' bgs, wet.
		2.1			CLAY (CL): as above, some pyrolusite nodules, coarse sand (~20%), moist.
			CL		GRAVELLY CLAY (CL): dark yellowish brown, very stiff, low plasticity, moist.
		3.1	CL		SILTY CLAY (CL): olive brown, subangular to subrounded gravel (10%), low plasticity, stiff, moist.
					CLAY (CL): dark yellowish brown, subangular to subrounded gravel (~5%), medium plasticity, very stiff, moist.
70		0.0	CL		SANDY CLAY (CL): olive brown, fine to coarse sand, 1" diameter gravel (~5%), medium plasticity, wet.
					SANDY CLAY (SC): as above, medium plasticity.
					SANDY CLAY (SC): as above, more sand, few cobbles.
		0.0	SW		GRAVELLY SAND (SW): olive brown, coarse grained, coarse gravel (~20%), fine gravel (~10%), loose, wet.
		0.0			GRAVELLY SAND (SW): as above, few subrounded cobbles, trace clay, wet.
75		0.0			GRAVELLY SAND (SW): as above, thin clay interbeds.
		0.0			GRAVELLY SAND (SW): as above, no clay interbeds, wet.
80		0.0			GRAVELLY SAND (SW): as above, sand grain size increases to very coarse, subangular gravel, few cobbles, wet.
		0.0	SC		CLAYEY SAND (SC): yellowish brown, fine grained sand, some fine gravel, medium dense, wet.
			SM		SILTY SAND (SM): yellowish brown, fine sand, loose, oxidation staining, moist.
85		0.0	CL		CLAY (CL): bluish gray, fine sand (~20%), high plasticity, slightly moist.
		0.0			CLAY (CL): as above, fine gravel (~10%).
		0.0			CLAY (CL): as above, fine sand (~30%), low plasticity.
		0.0	CL		SANDY CLAY (CL): greenish blue, fine sand, silt (~20%), low plasticity, moist.

Total Depth - 90 feet bgs

WELL DIAGRAM



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*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234547

Page 1 of 1

Owner's Well Number MW-02A1

Date Work Began 08/23/2014 Date Work Ended 8/23/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00329 Permit Date 8/1/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method Sonic Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log

Total Depth of Boring 60 Feet

Total Depth of Completed Well 56.5 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 19000 E Homestead Rd

City Cupertino County Santa Clara

Latitude 37 Deg. 20 Min. 15 Sec. N Longitude -122 Deg. 0 Min. 16 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West See Attached Figure 2 East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	46	7	Blank	PVC Sch. 40		2		
46	56	7	Screen	PVC Sch. 40		2	Milled Slots	0.020
56	57	7	Blank	PVC Sch. 40		2		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	42	Cement	Neat cement
42	45	Bentonite	Hydrated seal
45	57	Filter Pack	#2/12 sand
57	60	Bentonite	Bentonite pellets

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 10-28-14 (Date Signed) 938110 (C-57 License Number)

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

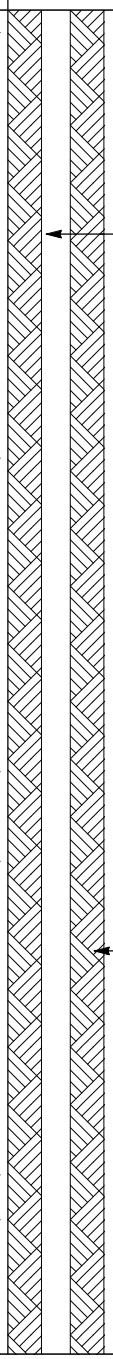
LOG OF MONITORING WELL: MW-02A1

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/23/2014
Date Completed: 8/23/2014
Total Depth: 60 feet
Borehole Diameter: 7.0"
Initial Water Level: feet bgs
Notes: Air knifed to 8' bgs. Continuously sampled to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Asphalt 0-0.5' bgs.
			GW		WELL GRADED GRAVEL (GW): light yellowish brown, very coarse gravel, some silt, loose, dry.
5					
10			SW		GRAVELLY SAND (SW): dark olive brown, coarse grained sand, some angular to subrounded coarse gravel, trace clay, loose, slightly moist.
					GRAVELLY SAND (SW): as above, few cobbles up to 5" in diameter.
					GRAVELLY SAND (SW): as above, thin bed of stiff silt at 14' bgs, dry.
15					GRAVELLY SAND (SW): olive brown, fine to coarse grained, some fine to coarse gravel, few cobbles 3" in diameter, loose, slightly moist.
					GRAVELLY SAND (SW): as above, fine to medium grained, increase in moisture.
		0.0	ML		SANDY SILT (ML): light yellowish brown, fine sand (~30%), some coarse gravel, very stiff, high dry strength, dry.
			SW		WELL GRADED GRAVELLY SAND (SW): olive brown, fine to coarse grained, subangular to subrounded coarse gravel (~30%), loose, moist.
20		0.0			WELL GRADED GRAVELLY SAND (SW): as above, some silt.
					WELL GRADED GRAVELLY SAND (SW): as above, medium dense, thin beds of stiff sandy silt.
		0.0			WELL GRADED GRAVELLY SAND (SW): as above, some stiff silt interbeds.
					WELL GRADED GRAVELLY SAND (SW): as above, few subangular to rounded cobbles up to 3" in diameter.
		0.0			
25					WELL GRADED GRAVELLY SAND (SW): as above, no cobbles, less gravel (~25%).
		0.1	ML		SILT (ML): yellowish brown, fine sand (~20%), very stiff, blocky fracture, dry.
		0.0	ML		SANDY SILT (ML): orangish brown, fine sand (~30%), medium stiff, low dry strength, moist.
					SANDY SILT (ML): as above, stiff.
		0.2			SANDY SILT (ML): as above, medium stiff.

WELL DIAGRAM



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ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

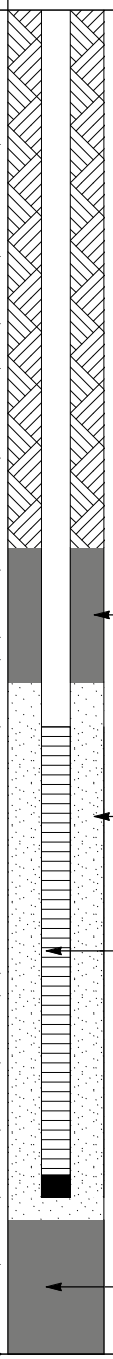
LOG OF MONITORING WELL: MW-02A1

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/23/2014
Date Completed: 8/23/2014
Total Depth: 60 feet
Borehole Diameter: 7.0"
Initial Water Level: feet bgs
Notes: Air knifed to 8' bgs. Continuously sampled to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	SM		SILTY SAND (SM): orangish brown, fine sand, loose, moist. SILTY SAND (SM): as above, silt (~40%), stiff dry silt interbeds 31 to 31.5' bgs. SILTY SAND (SM): as above, no dry silt interbeds, moist.
		0.1	SW		WELL GRADED SAND (SW): olive brown, fine to coarse grained, fine to coarse gravel (~20%), loose, moist.
35		0.0	SP-SM		SAND with SILT (SP-SM): olive brown, fine sand, fine to coarse gravel (~25%), loose, moist. SAND with SILT (SP-SM): as above, clay (~20%).
		0.1	SP		POORLY GRADED SAND (SP): yellowish brown, fine grained, fine gravel (~20-25%), loose, moist.
		0.2	SM		SILTY SAND (SM): orangish brown, fine grained sand, loose, moist. SILTY SAND (SM): as above, thin stiff silt bed at 39' bgs about 2" thick, gravel (~20%).
40		0.0	CL-ML		CLAYEY SILT (CL-ML): dark yellowish brown, interbeds of fine sand, medium stiff, moist. CLAYEY SILT (CL-ML): as above, fine to coarse gravel (~10%). CLAYEY SILT (CL-ML): as above, fine to medium grained sand (~30%), stiff.
		0.0	SC		CLAYEY SAND (SC): dark yellowish brown, fine grained sand, dense, moist. CLAYEY SAND (SC): as above, clay (~40%), coarse gravel beds from 43 to 44' bgs, dense. CLAYEY SAND (SC): as above, less clay, trace fine gravel.
			SW		GRAVELLY SAND (SW): dark yellowish brown, fine to coarse grained, some angular to subrounded gravel, loose, moist.
45		0.1	ML		SANDY SILT (ML): yellowish brown, clay (~10-15%), cohesive but crumbles with pressure, medium stiff, moist to wet.
		0.0	SM		SILTY SAND (SM): dark yellowish brown, fine grained, trace fine gravel, dense, moist to wet.
		0.0			SILTY SAND (SM): as above, silt (~20%), loose, wet.
50		0.0			SILTY SAND with CLAY (SM): dark yellowish brown, fine sand, clay (~20-25%), coarse gravel (~5%), medium dense, moist.
			SC		CLAYEY SAND (SC): dark yellowish brown, fine sand, silt (~20%), dense, moist.
		0.1	SM		SILTY SAND with CLAY (SM): yellowish brown, fine sand, loose to medium dense, crumbles with finger pressure, moist.
			SW		GRAVELLY SAND (SW): dark yellowish brown, fine to coarse grained, some fine gravel, trace clay, loose, wet.
55		0.8	SM		SILTY SAND (SM): dark yellowish brown, fine sand, trace fine gravel, loose, moist. SILTY SAND (SM): as above, clay (~20%), dense.
		0.0	ML		CLAYEY SILT (ML): yellowish brown, some fine sand, trace fine gravel, medium stiff, moist. CLAYEY SILT (ML): as above, stiff and dry at 58' bgs.
		0.0	CL		SILTY CLAY (CL): mottled gray and yellowish brown, some fine sand, very stiff, medium plasticity, slightly moist.
		0.0			Total Depth - 60 feet bgs

WELL DIAGRAM



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*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234548

Page 1 of 1

Owner's Well Number MW-03A3

Date Work Began 08/19/2014 Date Work Ended 8/20/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00332 Permit Date 8/1/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method Sonic Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log

Total Depth of Boring 90 Feet

Total Depth of Completed Well 86.5 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 19000 E Homestead Rd

City Cupertino County Santa Clara

Latitude 37 Deg. 20 Min. 15 Sec. N Longitude -122 Deg. 0 Min. 16 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

See Attached Figure 2

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level 63 (Feet) Date Measured 08/21/2014

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	76	7	Blank	PVC Sch. 40		2		
76	86	7	Screen	PVC Sch. 40		2	Milled Slots	0.020
86	87	7	Blank	PVC Sch. 40		2		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	70	Cement	Neat cement
70	75	Bentonite	Hydrated seal
75	88	Filter Pack	#2/12 sand
88	90	Bentonite	Bentonite chips

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed (C-57 Licensed Water Well Contractor) Date Signed 10-28-14 C-57 License Number 938110

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

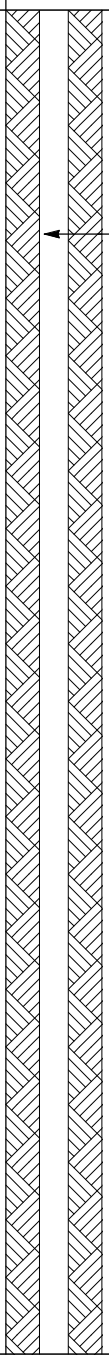
LOG OF MONITORING WELL: MW-03A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/19/2014
Date Completed: 8/20/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 63 feet bgs
Notes: Hand augered to 8' bgs. Continuously sampled to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Asphalt 0-0.5' bgs.
			ML		CLAYEY SILT (ML): olive brown, clay (~20%), soft, low dry strength, slightly moist.
		0.6			
		11.6			CLAYEY SILT (ML): as above, some coarse gravel.
		0.2			CLAYEY SILT (ML): as above, less clay (~20%), some fine to coarse gravel.
		0.5	GM		GRAVELLY SILT (GM): dark brown, clay (~10%), angular to subangular gravel (~30%), loose, slightly moist.
5		7.5			GRAVELLY SILT (GM): as above, trace fine sand.
		18.2			GRAVELLY SILT (ML): as above, dark to light brown, clay (~15%),some very coarse angular to subangular gravel.
		0.0	GW-GM		SANDY GRAVEL with SILT (GW-GM): light brown, some silt, fine to coarse gravel, well graded, gravel up to 3" in diameter, well graded sand, loose, dry.
		0.0			SANDY GRAVEL with SILT (GW-GM): as above.
		0.0			SANDY GRAVEL with SILT (GW-GM): as above, less coarse gravel, more fine gravel.
10		0.0	GW		WELL GRADED GRAVEL with SAND (GW): fine to coarse gravel, some fine to medium grained sand, slightly moist.
		0.0			
		0.0			WELL GRADED GRAVEL with SAND (GW): as above, angular to subrounded gravel with average diameter 1/8", less fine sand.
			GP		POORLY GRADED GRAVEL with SAND (GP): light brown, fine to coarse angular gravel, some subrounded cobbles, some medium grained sand, loose, dry.
		0.0			POORLY GRADED GRAVEL with SAND (GP): as above, light yellowish brown, few cobbles.
15		0.0			POORLY GRADED GRAVEL with SAND (GP): as above, angular gravel, 20% coarse gravel, 30% fine gravel, 50% sand.
		0.0	SW		GRAVELLY SAND (SW): dark brown, medium to coarse sand, angular gravel (~30%), few cobbles, loose, moist.
		0.0			
		0.0	ML		SILT (ML): light yellowish brown, stiff, crumbles with pressure, dry.
		0.0			SILT (ML): as above, some medium grained sand, moist.
20		0.0	ML		SANDY SILT (ML): dark yellowish brown, fine sand (~30%), medium dense, moist.
		0.0			SANDY SILT (ML): as above, sand (20%), moist.
		0.0	ML		SILT (ML): yellowish brown, some angular gravel, soft, dry.
			SP		SAND (SP): light yellowish brown, fine grained, poorly graded, some subangular to subrounded gravel, loose, moist.
					SAND (SP): as above, gravel (20%).
25			SW		SAND (SW): dark yellowish brown, poorly sorted, coarse grained, some fine to coarse subangular to subrounded gravel, moist.
			GW		WELL GRADED GRAVEL with SAND (GW): grayish brown gravel, brownish yellow sand,some fine to coarse sand, some silt, loose, moist.
			ML		SILT (ML): yellowish brown, very stiff, dry.
		0.0	SM		SILTY SAND (SM): orangish brown, fine sand, medium dense, moist.
					SILTY SAND (SM): as above, angular gravel (~10%).
			SW		GRAVELLY SAND with SILT (SW): light to dark yellowish brown, fine to coarse grained, fine to coarse subangular gravel, loose, moist.

WELL DIAGRAM



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ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

LOG OF MONITORING WELL: MW-03A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/19/2014
Date Completed: 8/20/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 63 feet bgs
Notes: Hand augered to 8' bgs. Continuously sampled to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations	WELL DIAGRAM
		0.0	SW		GRAVELLY SAND with SILT (SW): light to dark yellowish brown, fine to coarse grained, fine to coarse subangular gravel, loose, moist.	
					GRAVELLY SAND with SILT (SW): as above, less silt, more coarse sand, some cobbles.	
					GRAVELLY SAND with SILT (SW): as above, light yellowish brown, gravel (~30%), subrounded gravel, little silt.	
		0.0			GRAVELLY SAND with SILT (SW): as above, few subrounded cobbles 3" in diameter, no silt.	
					GRAVELLY SAND with SILT (SW): as above, coarse subrounded gravel up to 2" in diameter.	
		0.0			GRAVELLY SAND with SILT (SW): as above, higher ratio of fine versus coarse sand, some fine to coarse gravel.	
35					GRAVELLY SAND with SILT (SW): as above, gravel is more angular in shape, cobbles 3" in diameter.	Cement grout 0-70' bgs
		0.0	ML		CLAYEY SILT (ML): dark yellowish brown, angular gravel (~5%), stiff, medium dry strength, dry.	
			SW		GRAVELLY SAND (SW): yellowish brown, fine to coarse grained, fine gravel (~20%), some subrounded gravel up to 1.5" in diameter, loose, moist.	
		0.0	SM		SILTY SAND (SM): yellowish brown, fine to medium grained, angular gravel (~10%), loose, moist.	
			SW		GRAVELLY SAND (SW): light yellowish brown, fine to medium grained, some fine to coarse gravel, few gravel up to 2" in diameter, loose, moist.	
40		0.0				
		2.9	CL		CLAY (CL): olive gray to olive brown, fine angular to subangular gravel (5-10%), medium plasticity, moist.	
					CLAY (CL): as above, fine sand (~20%), dark gray gravel (~5%).	
		1.0			CLAY (CL): as above, yellowish brown, no gravel, very stiff.	
45					CLAY (CL): as above, low to medium plasticity, 1 mm veinlets of white mineralization.	
		0.5			CLAY (CL): as above, less white mineralization, fine gravel (~5%), stiff.	
			CL-ML		CLAYEY SILT with SAND (CL-ML): dark yellowish brown, 25% fine sand, trace fine gravel, stiff, medium dry strength, stiff, low plasticity, moist.	
		1.6	ML		SANDY SILT (ML): light yellowish brown, fine sand (~40%), trace clay, trace fine gravel, some oxidation staining, stiff, moist.	
					SANDY SILT (ML): as above, mottled grayish brown with orangish brown.	
50		0.9			SANDY SILT (ML): as above, thin interbed of fine to coarse gravel, clay (~15%), increase in moisture.	
					SANDY SILT (ML): as above, trace clay, little fine gravel.	
					SANDY SILT (ML): as above, clay (~25%), subrounded coarse gravel (5-10%).	
		3.7	SW		GRAVELLY SAND with CLAY (SW): dark yellowish brown, fine to coarse grained, fine to coarse gravel (~20%), trace silt, loose to medium dense, moist.	
			SC		CLAYEY SAND (SC): mottled orangish brown with grayish green, fine sand, clay (30%), trace silt, low plasticity, moist.	
					CLAYEY SAND (SC): as above, clay (~35%), laminar beds with oxidation staining.	
55			CL		SANDY CLAY (CL): mottled grayish green and yellowish brown, some fine to medium sand, stiff, low plasticity, high dry strength, dry.	
		0.0			SANDY CLAY (CL): as above, some medium to coarse sand.	
					SANDY CLAY (CL): as above, low plasticity.	
		2.1			SANDY CLAY (CL): as above, coarse sand, stiff, slightly moist.	

MW TO 30FT WC - - 10/29/14 13:40 - \\WDWALFS01\DATAWAL\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

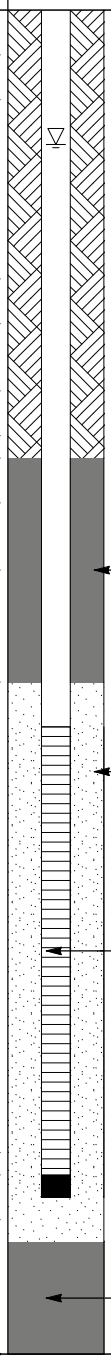
LOG OF MONITORING WELL: MW-03A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/19/2014
Date Completed: 8/20/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 63 feet bgs
Notes: Hand augered to 8' bgs. Continuously sampled to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
			CL		SANDY CLAY (CL): as above, very stiff, trace black pyrolusite nodules, moist.
		0.0	CL		GRAVELLY SANDY CLAY (CL): olive brown, subrounded gravel up to 3/4" diameter, 25% fine sand, medium plasticity, stiff, moist.
		0.0	SW		GRAVELLY SAND with CLAY (SW): olive brown, poorly sorted sand, coarse grained, some subangular gravel up to 1" diameter, clay (25%), loose, wet.
65		0.0			GRAVELLY SAND with CLAY (SW): as above, clay (~20%).
			CL		GRAVELLY CLAY (CL): greenish gray with olive brown, coarse sand, coarse subangular gravel, very stiff, low plasticity, dry.
		0.0	SW-SC		GRAVELLY SAND with CLAY (SW-SC): olive brown, coarse sand, some fine to coarse subrounded gravel, clay (~20%), medium dense, moist.
		1.5	CL		GRAVELLY CLAY (CL): yellowish brown, coarse sand, some fine to coarse subrounded gravel, low plasticity, medium stiff, wet.
70			SW		GRAVELLY CLAY (CL): as above, olive brown to yellowish brown, some coarse gravel up to 1" diameter, very stiff.
		2.2	GM		GRAVELLY SAND (SW): dark olive brown, coarse grained, some fine to coarse subrounded gravel, well graded, loose, moist.
			SW-SC		SILTY GRAVEL (GM): dark olive brown, coarse subangular to subrounded gravel, silt (30%), clay (20%), stiff, moist.
		1.9			GRAVELLY SAND with CLAY (SW-SC): dark olive brown, coarse sand, some coarse gravel, trace cobbles 3" in diameter, thin interbeds of clay, loose, wet.
			GM		SILTY GRAVEL (GM): olive brown, coarse gravel, coarse sand (~15%), dense, moist.
		1.4			SILTY GRAVEL (GM): as above, gravel up to 1" diameter, trace cobbles 3" diameter, trace clay.
75			SW		GRAVELLY SAND with CLAY (SW): olive brown, coarse sand, some coarse gravel, clay (~20%), loose, wet.
		1.5			GRAVELLY SAND with CLAY (SW): as above, trace gravel up to 1.5" diameter, wet.
		1.9			GRAVELLY SAND with CLAY (SW): clay (~30%), trace cobbles 3" in diameter, wet.
					GRAVELLY SAND with CLAY (SW): as above, clay (~15%), no cobbles.
80		0.0			GRAVELLY SAND (SW): olive brown, coarse sand, some fine to coarse subangular gravel, trace clay, loose, wet.
		0.0			GRAVELLY SAND (SW): as above, some cobbles 3" in diameter.
		0.0			GRAVELLY SAND (SW): as above, clay interbedded with sand, few cobbles.
85					GRAVELLY SAND (SW): as above, fine sand lens at 84' bgs, no clay.
			CL		SANDY CLAY (CL): olive brown, medium to coarse grained sand, angular gravel (~10%), medium plasticity, stiff, wet.
		0.0	SW-SC		GRAVELLY CLAYEY SAND (SW-SC): olive brown, fine to coarse sand, some subangular to subrounded gravel, wet.
		0.0	CL		CLAY (CL): greenish blue, very stiff, high plasticity, grades from dark orangish brown to greenish blue at 86.5' bgs, dry to slightly moist.
					CLAY (CL): as above, very stiff.
		0.0			CLAY(CL): as above, fine sand (~20-25%).
					Total Depth - 90 feet bgs

WELL DIAGRAM



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*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234549

Page 1 of 1

Owner's Well Number MW-04A3

Date Work Began 08/23/2014 Date Work Ended 8/24/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00333 Permit Date 8/4/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ⊙ Horizontal ○ Angle Specify

Drilling Method Sonic Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log

Total Depth of Boring 90 Feet

Total Depth of Completed Well 82.5 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 19000 E Homestead Rd

City Cupertino County Santa Clara

Latitude 37 Deg. 20 Min. 15 Sec. N Longitude -122 Deg. 0 Min. 16 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

See Attached Figure 2

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⊙ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

⊙ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level 63 (Feet) Date Measured 08/24/2014

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	72	7	Blank	PVC Sch. 40		2		
72	82	7	Screen	PVC Sch. 40		2	Milled Slots	0.020
82	83	7	Blank	PVC Sch. 40		2		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	67	Cement	Neat cement
67	70	Bentonite	Hydrated seal
70	83	Filter Pack	#2/12 sand
83	85	Fill	Native soil
85	90	Bentonite	Bentonite chips

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed Brad Stone (C-57 Licensed Water Well Contractor) 10-28-14 (Date Signed) 938110 (C-57 License Number)

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

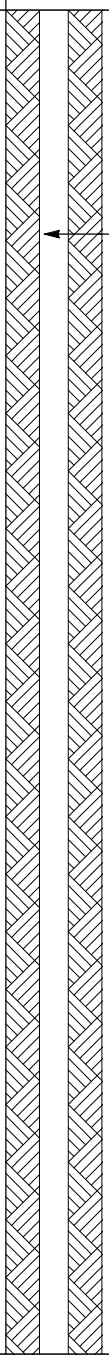
LOG OF MONITORING WELL: MW-04A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/23/2014
Date Completed: 8/24/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 62.83 feet bgs
Notes: Air knifed to 8' bgs. Sampled continuously to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					Asphalt 0-0.5' bgs.
			GW		GRAVEL (GW): light yellowish brown, coarse gravel, dense, dry.
					GRAVEL (GW): as above.
5					GRAVEL (GW): as above.
					GRAVEL (GW): as above, very dense from 7-8' bgs.
		0.1	SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained sand, some coarse angular to subrounded gravel, loose, moist.
10		0.2			GRAVELLY SAND (SW): as above.
					GRAVELLY SAND (SW): as above, less fine sand, wet.
					GRAVELLY SAND (SW): as above, some dense laminar beds, some clay.
					GRAVELLY SAND (SW): as above.
15					GRAVELLY SAND (SW): as above, dry to slightly moist, trace cobbles up to 4" diameter.
		0.1	ML		SILT (ML): orangish brown, some fine sand, stiff, medium dense, dry.
					SILT (ML): as above, dense laminar beds.
		0.0			SILT (ML): as above, less dense, loose, dry to slightly moist.
			SM		SILTY SAND (SM): orangish brown, fine sand, some stiff silty interbeds, loose, dry to slightly moist.
20		0.0			SILTY SAND (SM): as above, less stiff, more fine sand.
			SW		GRAVELLY SAND (SW): light yellowish brown, medium to coarse grained, fine to coarse gravel, angular to subrounded, few cobbles, loose, slightly moist.
		0.0			
			SP		SAND (SP): dark and light yellowish brown, medium grained sand, fine to coarse gravel (~15%), loose, dry to slightly moist.
			ML		SILT (ML): orangish brown, some fine sand, slightly stiff, dry.
		0.0	SW		GRAVELLY SAND (SW): light yellowish brown, fine to coarse grained sand, fine to coarse gravel (~35%), loose, dry.
25					SILTY SAND (SM): orangish brown, fine grained, some stiff silty interbeds, trace coarse gravel, loose, slightly moist.
			SM		SILTY SAND (SM): as above, some stiff dry silt interbeds.
		0.0	SW		SILTY GRAVELLY SAND (SW): orangish brown to yellowish brown, fine grained sand, loose, dry to slightly moist.
					GRAVELLY SAND (SW): light yellowish brown, fine sand, coarse gravel, few cobbles 2-3" diameter, loose, dry.

WELL DIAGRAM



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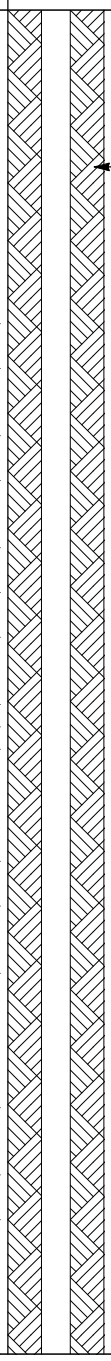
LOG OF MONITORING WELL: MW-04A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/23/2014
Date Completed: 8/24/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 62.83 feet bgs
Notes: Air knifed to 8' bgs. Sampled continuously to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
		0.0	SW		GRAVELLY SAND (SW): as above, olive brown, coarse gravel and cobbles 2" in diameter, moist.
		0.1			
		0.3			GRAVELLY SAND (SW): as above, light yellowish brown, few cobbles, dry.
35		0.7			
			SP		SAND (SP): dark yellowish brown, fine grained, fine gravel (~10%), loose, moist.
		0.1	SW		GRAVELLY SAND (SW): dark yellowish brown, fine to coarse grained sand, coarse subrounded gravel, loose, moist.
40		1.6	ML		GRAVELLY SILT (ML): olive brown, some clay, angular gravel, stiff, moist.
		1.2	CL		SILTY CLAY (CL): olive brown, fine gravel (5%), medium plasticity, moist.
		2.0	ML		CLAYEY SILT (ML): olive brown to yellowish brown, trace fine sand, low plasticity, cohesive but crumbles with finger pressure, moist.
		0.8	SM		CLAYEY SILTY SAND (SM): orangish brown, fine sand, coarse subrounded gravel (5%), medium dense, moist.
45		0.9	SC		CLAYEY SAND (SC): dark yellowish brown, fine sand, trace fine gravel, dense, low plasticity, moist.
			SM		CLAYEY SILTY SAND (SM): dark yellowish brown, fine sand, dense, moist.
			ML		CLAYEY SILT (ML): dark yellowish brown, some fine sand, medium stiff.
		2.7	SM		SILTY SAND (SM): yellowish brown, fine sand, trace clay, loose, moist. SILTY SAND (SM): as above, dense, crumbles with finger pressure, moist. SILTY SAND (SM): as above, some gray mottling, clay (~10%), dense, moist.
50		0.0	ML		CLAYEY SILT (ML): yellowish brown with oxidation stains, fine sand (~20%), stiff, moist.
		0.0	SP		SAND (SP): yellowish brown, fine grained, some silt, loose, moist to wet. SAND (SP): as above, coarse gravel 10-15%.
		0.0	ML		SANDY SILT (ML): yellowish brown, fine sand, trace clay, trace fine gravel, dense, moist. SANDY SILT with CLAY (SM): yellowish brown, fine sand, clay (~20%), slight plasticity from clay content, stiff, wet.
55		0.0	CL-ML		SILTY CLAY (CL-ML): yellowish brown with orange streaks, fine gravel (5%), medium plasticity, stiff, moist.
			ML		CLAYEY SILT (ML): dark yellowish brown, soft to slightly dense, cohesive but friable with pressure, moist.
		0.0	CL		SANDY CLAY (CL): yellowish brown, fine sand, some silt, very stiff, hard, low plasticity, dry to slightly moist. SANDY CLAY (CL): as above, fine sand lens.
		0.0			SILTY CLAY (CL): orangish to yellowish brown, 40% silt, 10% fine sand, trace fine gravel, stiff, slightly moist.

WELL DIAGRAM



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Fax: (925) 946-9968

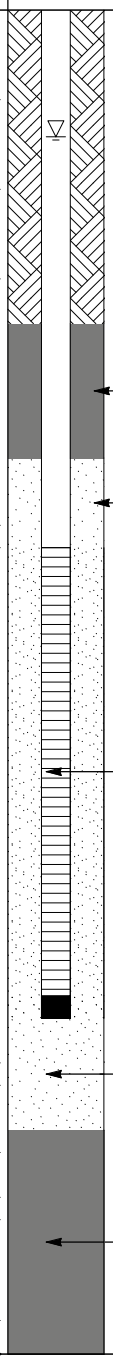
LOG OF MONITORING WELL: MW-04A3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Sonic
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/23/2014
Date Completed: 8/24/2014
Total Depth: 90 feet
Borehole Diameter: 7.0"
Initial Water Level: 62.83 feet bgs
Notes: Air knifed to 8' bgs. Sampled continuously to depth with 10' core barrel. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
			ML		CLAYEY SILT (ML): orangish brown, some fine gravel, stiff, dry to slightly moist.
		2.6			CLAYEY SILT (ML): as above, mottled olive with orangish brown.
			SW		GRAVELLY SAND (SW): olive brown, fine to coarse grained, coarse gravel, trace clay, loose, wet.
		0.9			GRAVELLY SAND (SW): as above, dense, clay (~20%), wet.
			SW-SC		GRAVELLY CLAYEY SAND (SW-SC): olive brown, coarse sand, very coarse gravel, dense, cohesive from clay content, wet.
65		0.1			GRAVELLY CLAYEY SAND (SW-SC): as above, few subrounded cobbles.
			SW		GRAVELLY SAND (SW): olive brown, coarse grained, fine to coarse subrounded gravel, wet.
		0.0			GRAVELLY SAND (SW): as above, 20% clay.
		0.0			GRAVELLY SAND (SW): as above, 10% clay, wet.
					GRAVELLY SAND (SW): as above, trace clay, few subrounded cobbles, wet.
70		0.0			GRAVELLY SAND (SW): as above, very coarse grained sand, gravel up to 1" diameter.
			SP		SAND (SP): olive brown, fine to medium grained, 10% coarse gravel, loose, wet.
		0.0	SW		SAND (SW): olive brown, fine to coarse grained, 20% clay, few cobbles, loose, wet.
					SAND (SW): as above, coarse sand, no cobbles, 15-20% coarse subrounded gravel.
		0.0			
75					SAND (SW): as above, thin interbeds of clay 75-76' bgs.
		0.0			
					SAND (SW): as above, 30% clay, few cobbles, wet.
		0.0			SAND (SW): as above, no clay, subangular to subrounded gravel.
					SAND (SW): as above, few cobbles up to 3" diameter, wet.
80		0.0			SAND (SW): as above, less gravel, wet.
					SAND (SW): as above, no cobbles, wet.
					SAND (SW): as above, cobbles 2" diameter.
		0.0			
			SM		SILTY SAND (SM): dark yellowish brown, fine sand, some clay, medium stiff, wet.
			SW		GRAVELLY SAND (SW): olive brown, coarse sand, 5% clay, fine to coarse gravel, loose, wet.
85		0.0			
			GC		GRAVELLY SANDY CLAY (GC): yellowish brown to orangish brown, fine sand, fine gravel, stiff, medium plasticity, wet.
			SW		SAND (SW): olive brown, coarse grained sand, fine to coarse subrounded gravel, change to bluish green at 87' bgs, no gravel in bluish green sand, loose, wet.
		0.0	CL		SILTY CLAY (CL): bluish green, fine angular white gravel (~5%), very stiff, moist.
					SILTY CLAY (CL): as above, some fine dark gravel (~20%).
		0.0			
		0.1	ML		SILT (ML): bluish green, fine sand (~30%), moist.

WELL DIAGRAM



Total Depth - 90 feet bgs

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234570

Page 1 of 1

Owner's Well Number SVP-1

Date Work Began 08/18/2014 Date Work Ended 8/18/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00334 Permit Date 8/4/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method Bucket Auger Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log. Completed as a soil vapor probe.

Total Depth of Boring 7.5 Feet

Total Depth of Completed Well 7 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 1081 East Homestead Road

City Cupertino, CA County Santa Clara

Latitude 37 Deg. 20 Min. 14 Sec. N Longitude -122 Deg. 0 Min. 15 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

See Attached Figure 2

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	7	3	Blank	polyethylene tubing		1/4		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	6	Bentonite	Hydrated granular bentonite
6	7	Bentonite	Dry granular bentonite
7	8	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed (C-57 Licensed Water Well Contractor) Date Signed 10-28-14 C-57 License Number 938110

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

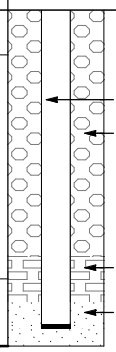
LOG OF SOIL VAPOR PROBE: SVP-1

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Hand Auger
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/18/2014
Date Completed: 8/18/2014
Total Depth: 7.5 feet
Borehole Diameter: 3"
Initial Water Level: feet bgs
Notes: Completed as a soil vapor probe. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					TOPSOIL: dark brown, loose, some roots, dry.
		3.9	ML		CLAYEY SILT with GRAVEL (ML): olive brown, coarse gravel, soft, dry.
		1.1			
		0.7			CLAYEY SILT with GRAVEL (ML): as above, clay (~30%), few coarse gravel, moist.
		1.4			CLAYEY SILT with GRAVEL (ML): as above, clay (~20%), few fine gravel, trace fine sand, dry.
5		11.2			CLAYEY SILT with GRAVEL (ML): as above, coarse gravel (~10%), fine gravel (~15%), slightly moist.
		1.7	SM		SANDY SILT (SM): light brown, fine sand, clay (~10%), loose, dry.
		0.7			SANDY SILT (SM): as above, coarse gravel (~20%), dry.
					Total Depth - 7.5 feet bgs

SOIL VAPOR WELL CONSTRUCTION



10
15
20
25

SOIL VAPOR WELL 30 FT WC - - 10/29/14 13:35 - \\WDWALFS01\DATAWAL\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234571

Page 1 of 1

Owner's Well Number SVP-2

Date Work Began 08/18/2014 Date Work Ended 8/18/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00335 Permit Date 8/4/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method Bucket Auger Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log. Completed as a soil vapor probe.

Total Depth of Boring 7.5 Feet

Total Depth of Completed Well 7 Feet

Well Owner

Name Chuck Hunnewell

Mailing Address 170 Wood Ave

City South Iselin State NJ Zip 08830

Well Location

Address 1081 East Homestead Road

City Cupertino, CA County Santa Clara

Latitude 37 Deg. 20 Min. 14 Sec. N Longitude -122 Deg. 0 Min. 15 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

See Attached Figure 2

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	7	3	Blank	polyethylene tubing		1/4		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	6	Bentonite	Hydrated granular bentonite
6	7	Bentonite	Dry granular bentonite
7	8	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Cascade Drilling, LP (Person, Firm or Corporation)

120 South 23rd St (Address) Richmond (City) CA (State) 94804 (Zip)

Signed (C-57 Licensed Water Well Contractor) Date Signed 10-28-14

C-57 License Number 938110

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

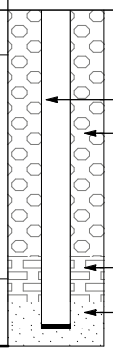
LOG OF SOIL VAPOR PROBE: SVP-2

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Hand Auger
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/18/2014
Date Completed: 8/18/2014
Total Depth: 7.5 feet
Borehole Diameter: 3"
Initial Water Level: feet bgs
Notes: Completed as a soil vapor probe. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					TOPSOIL: dark brown, loose, moist.
		3.0	ML		CLAYEY SILT (ML): olive brown, trace sand, soft, some roots, moist.
		1.5			
5		2.6			CLAYEY SILT (ML): as above.
		0.9	SM		SILTY SAND (SM): light brown, fine sand, coarse gravel (10%), loose, dry.
					Total Depth - 7.5 feet bgs

SOIL VAPOR WELL CONSTRUCTION



10
15
20
25

SOIL VAPOR WELL 30 FT WC - - 10/29/14 13:36 - \\WDWALFS01\DATAWAL\CAD\GINT BORING LOGS\SMI - 0201040\SMI.GPJ

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0234569

Page 1 of 1

Owner's Well Number SVP-3

Date Work Began 08/18/2014 Date Work Ended 8/18/2014

Local Permit Agency Santa Clara Valley Water District

Permit Number 14W00336 Permit Date 8/4/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method Bucket Auger Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		See attached geologic log. Completed as a soil vapor probe.

Total Depth of Boring 7.5 Feet

Total Depth of Completed Well 7 Feet

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City South Iselin State NJ Zip 08830

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Datum Dec. Lat. Dec. Long.

APN Book Page Parcel

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West

See Attached Figure 2

East

South

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Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	7	3	Blank	polyethylene tubing		1/4		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	6	Bentonite	Hydrated granular bentonite
6	7	Bentonite	Dry granular bentonite
7	8	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

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Signed (C-57 Licensed Water Well Contractor) 10-26-14 (Date Signed) 938110 (C-57 License Number)

ERM
1277 Treat Blvd., Suite 500
Walnut Creek, CA 94597
Phone: (925) 946-0455
Fax: (925) 946-9968

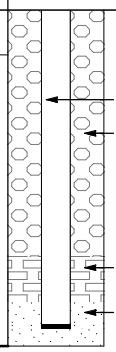
LOG OF SOIL VAPOR PROBE: SVP-3

Project Number: 0201040
Project Name: Siemens Intersil Site
Location: Cupertino, California
Contractor: Cascade Drilling
Drilling Method: Hand Auger
Logged By: S. Martin
Reviewed By: K. Soo, P.G.

Date Started: 8/18/2014
Date Completed: 8/18/2014
Total Depth: 7.5 feet
Borehole Diameter: 3"
Initial Water Level: feet bgs
Notes: Completed as a soil vapor probe. Flush completion.

Depth (ft)	Sample Interval	PID (ppm)	USCS Code	GRAPHIC LOG	Soil Descriptions and Observations
					TOPSOIL: dark brown, loose, moist.
	■	5.7	ML		CLAYEY SILT (ML): olive brown, fine sand (~10%), some coarse angular gravel, soft, dry.
	■	1.2			
5	■	1.3			CLAYEY SILT (ML): as above, clay (~30%), no coarse gravel, dry to slightly moist.
	■	0.9			CLAYEY SILT (ML): as above.
	■				CLAYEY SILT (ML): as above, clay (~40%), slightly moist.
					Total Depth - 7.5 feet bgs
10					
15					
20					
25					

SOIL VAPOR WELL CONSTRUCTION



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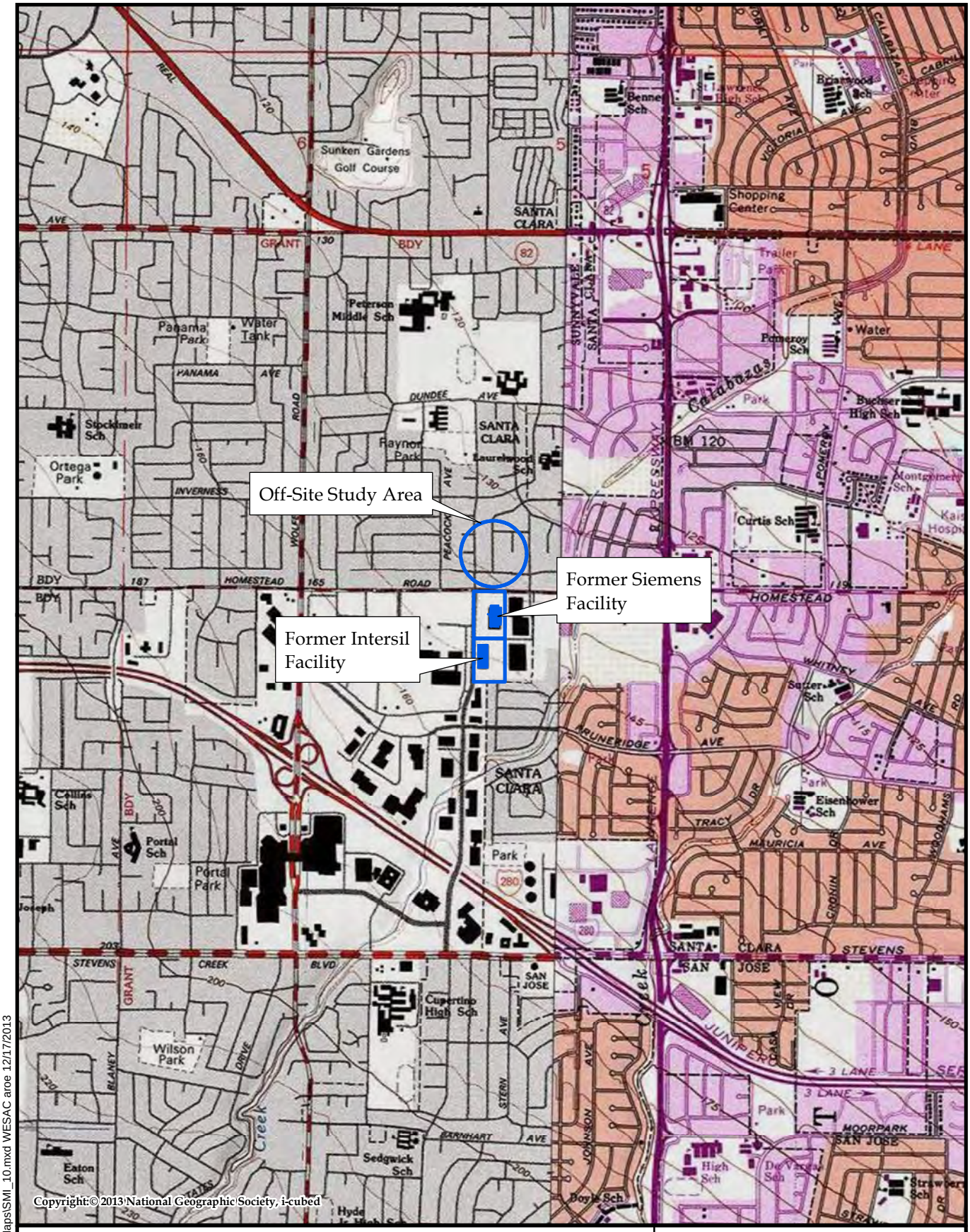


N

0 1000 2000

Scale in Feet

ERM

FIGURE 1
SITE LOCATION MAP
FORMER SIEMENS AND INTERSIL FACILITIES, AND OFF-SITE STUDY AREA
CUPERTINO, CALIFORNIA

PREPARED BY: aroe (ERM)

JOB NO. 01201040
FILE: SMI_10

P:\GIS\Projects\SMI\ArcMaps\SMI_10.mxd WESAC aroe 12/17/2013

F:\ERM\GIS\SMI\GIS\Figure2_SiteDetailMap.mxd WESAC 10/28/2014

Legend

- New Injection Point
- New Off-site Monitoring Well
- Groundwater Extraction Well
- Injection Point
- Monitoring Well
- Piezometer
- Existing Buildings
- Groundwater Remediation Facility
- Approximate Location of Aboveground Utility
- Approximate Location of Underground Utility
- City Block
- Soil Vapor Point

N

0 25 50

Scale in Feet

Source: ARCADIS, Former Siemens Facility 2006 Annual Report: Figure 3 (dated 1/7/2010).

Note:
ERD = Enhanced Reductive Dechlorination.

Intersil/Siemens Superfund Site
Cupertino, California

FIGURE 2

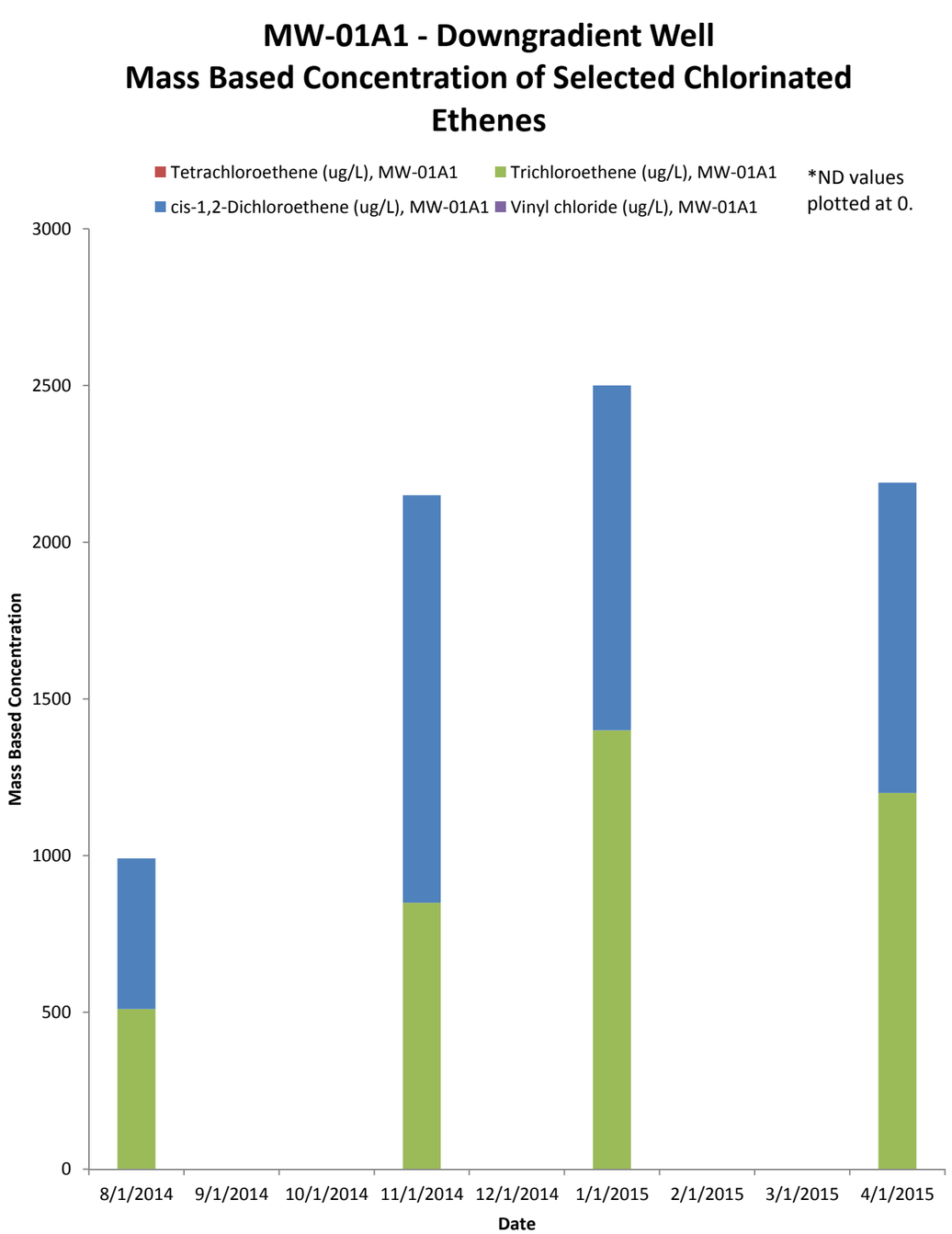
PHASE II ERD
SITE DETAIL MAP

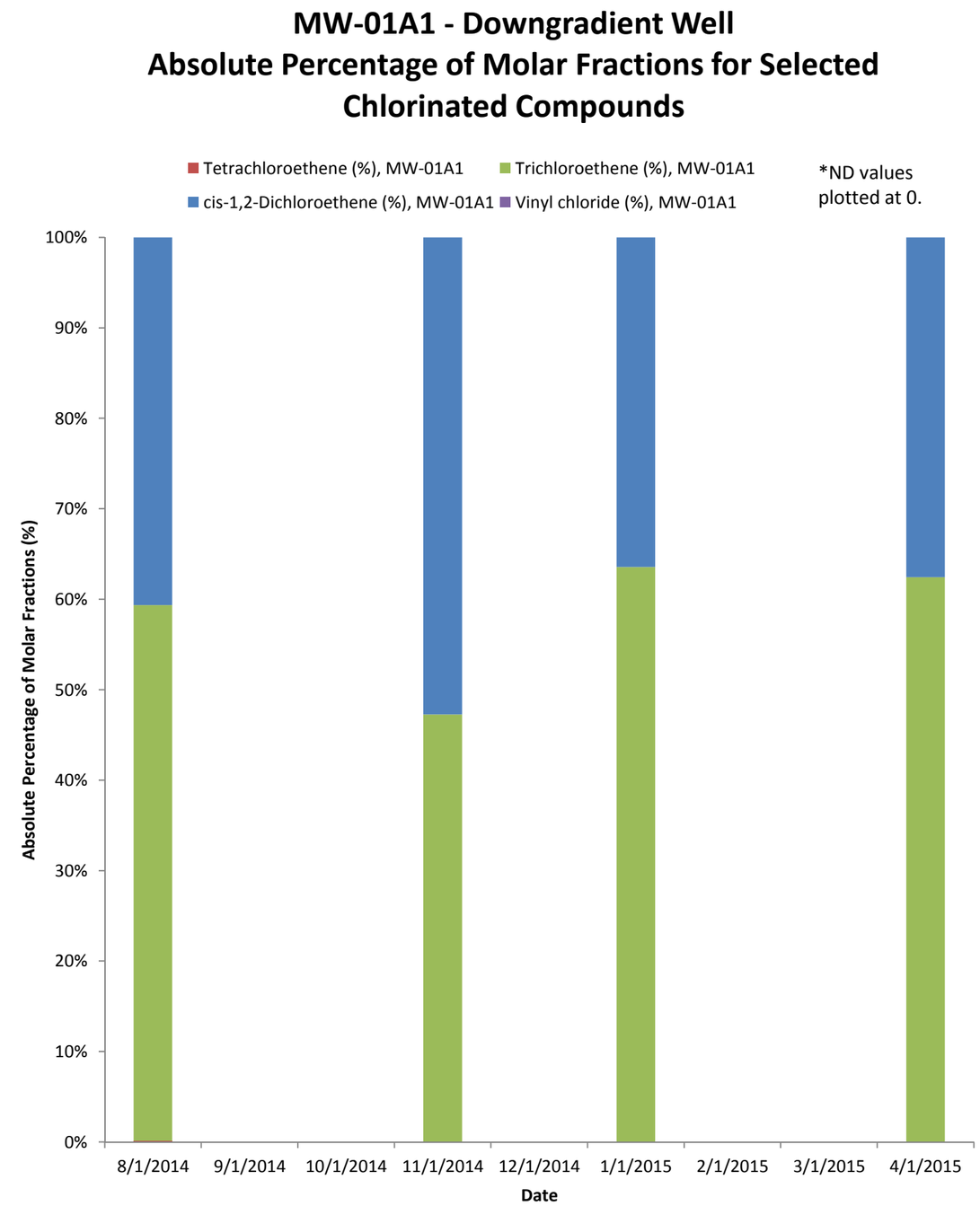
ERM

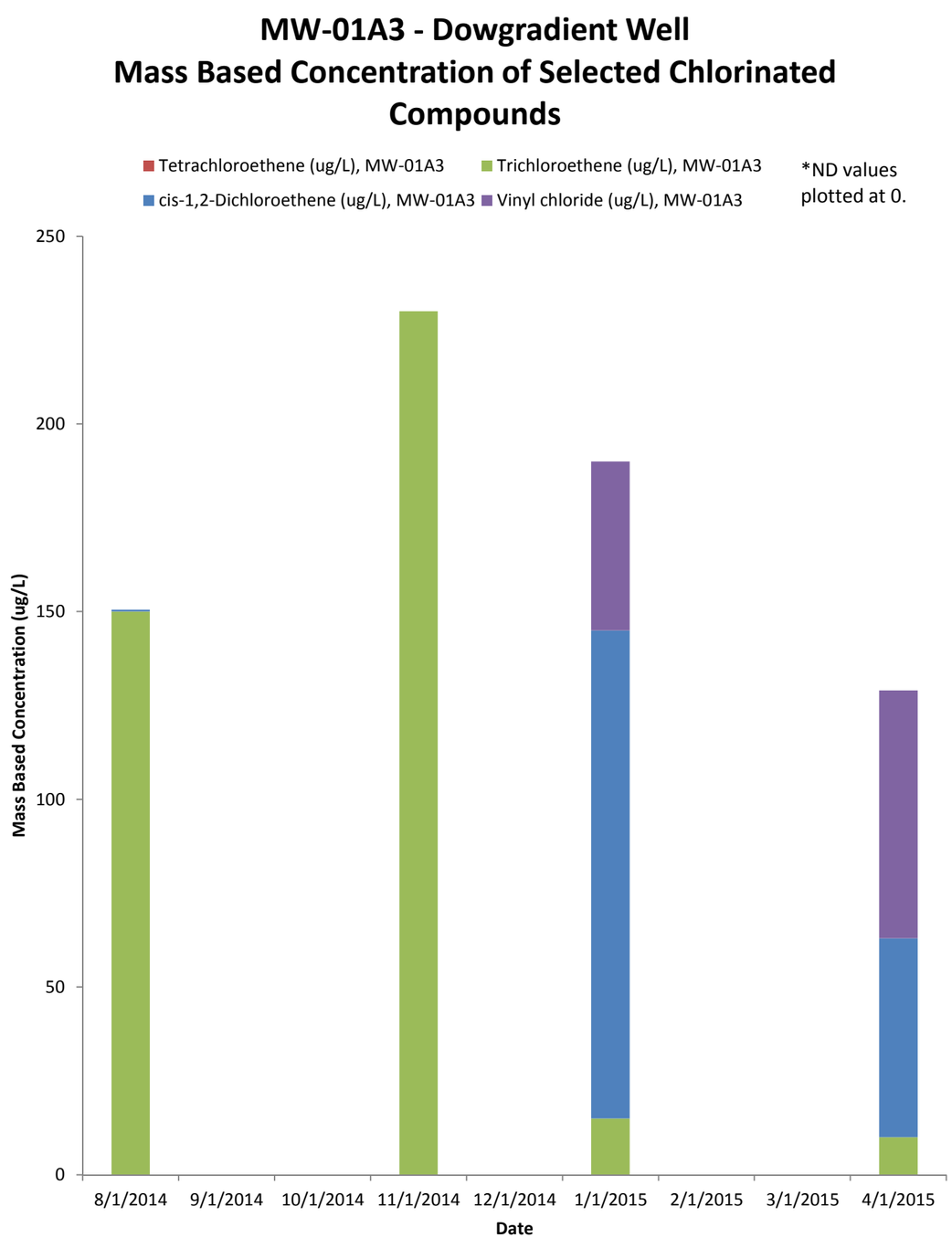
PREPARED BY: austin.phelps

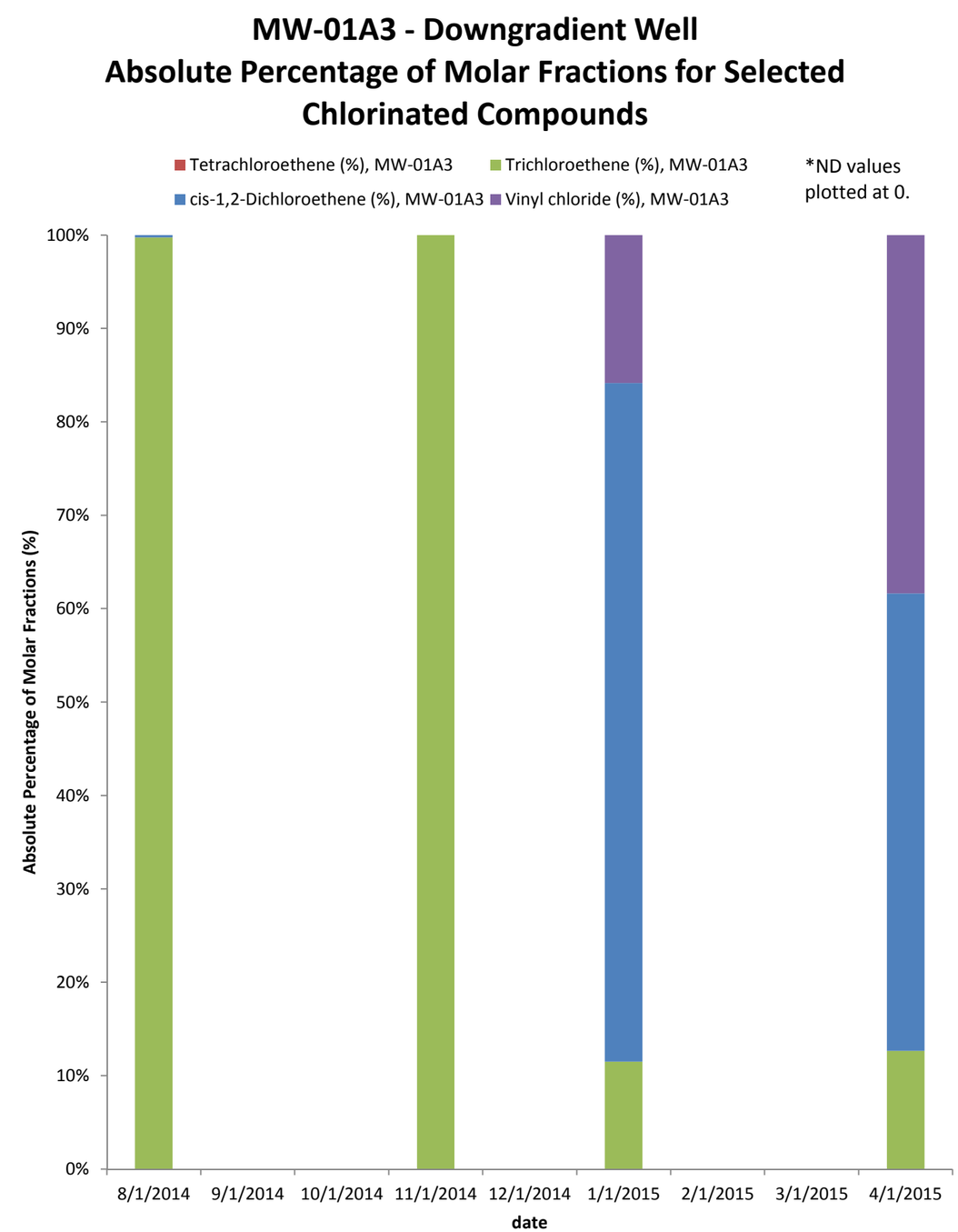
JOB NO. 0201040.04SB
FILE: Figure2_SiteDetailMap

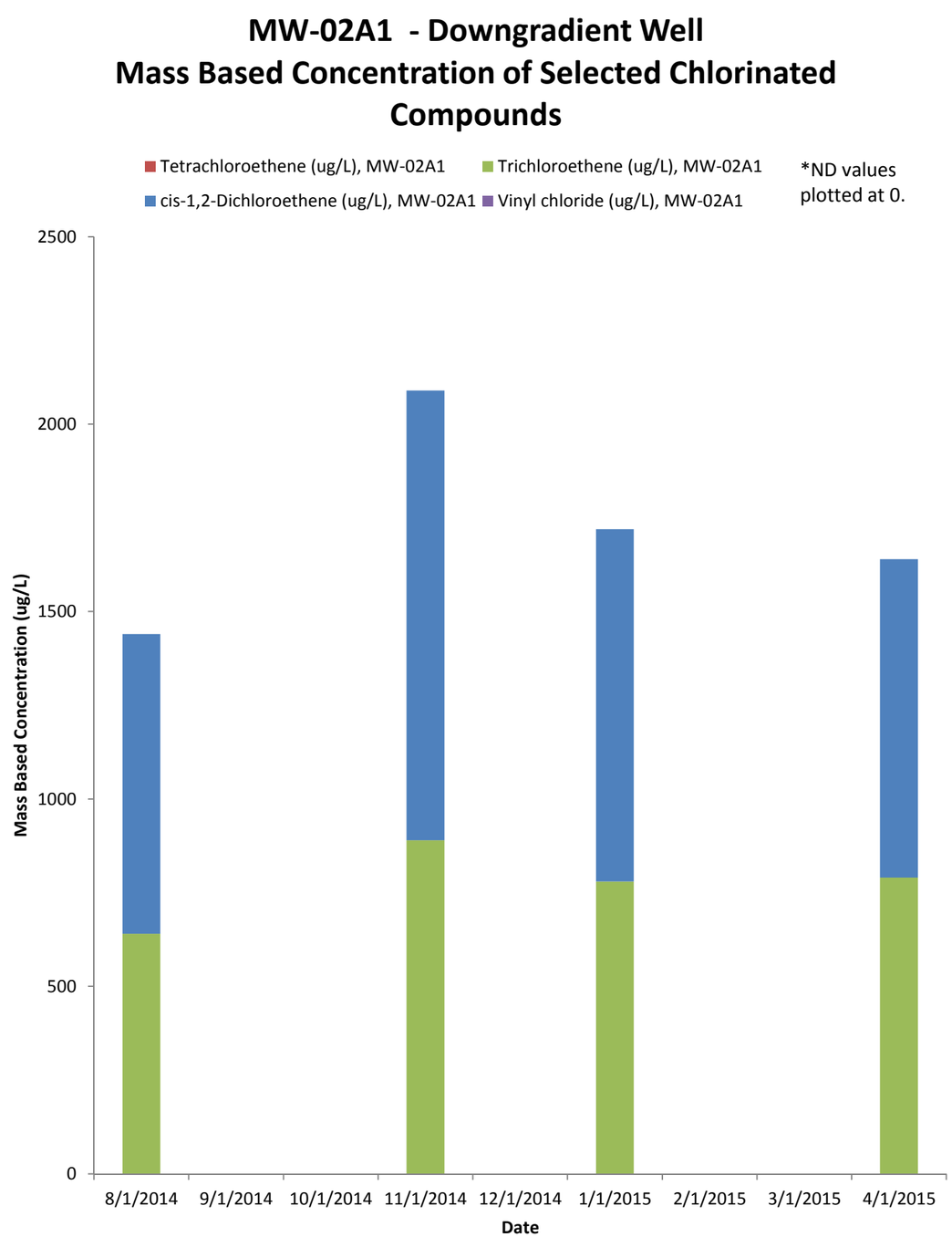
Appendix B
Trend Plots

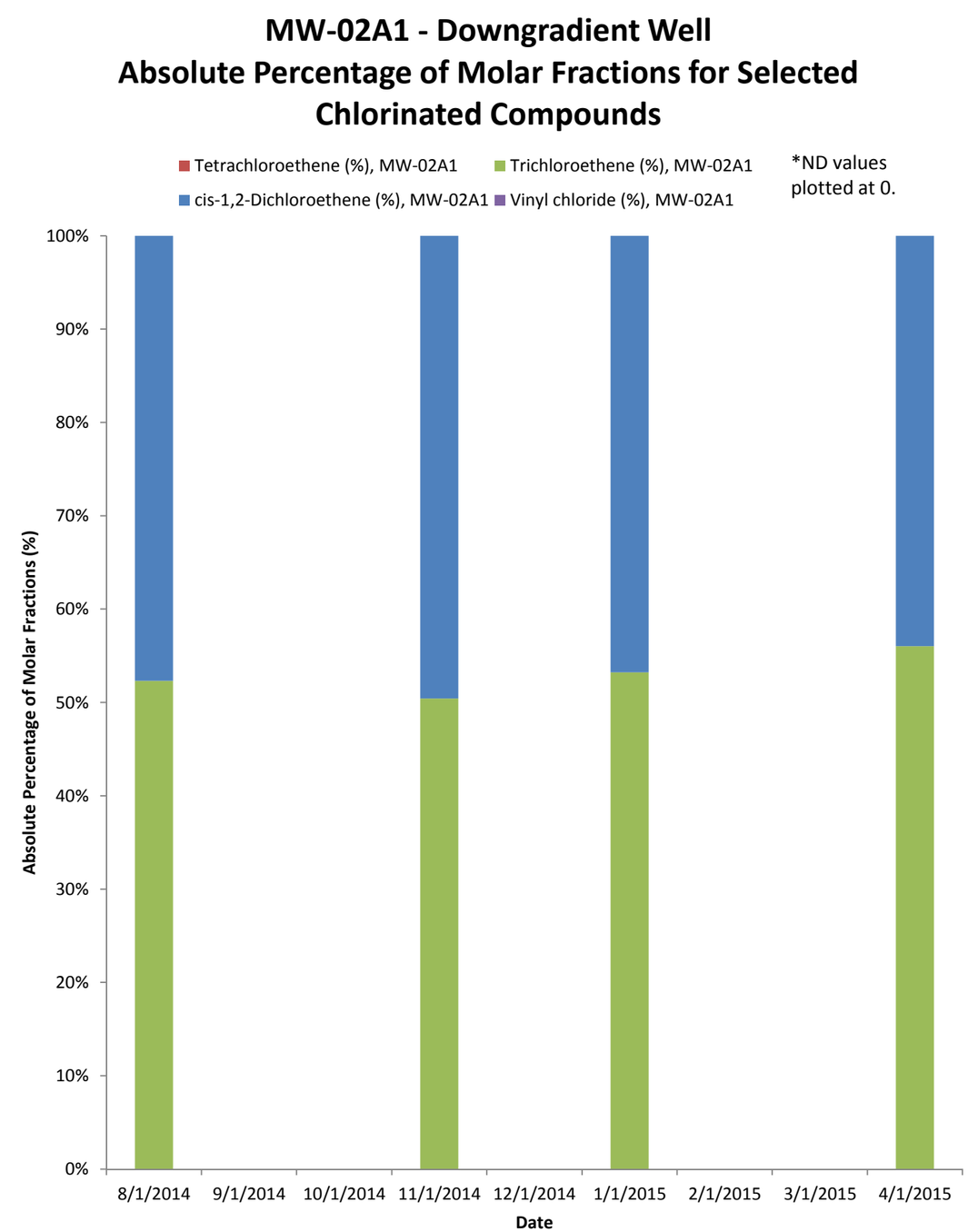

MW-01A1 - Downgradient Well
Mass Based Concentration of Selected Chlorinated Ethenes
Tetrachloroethene (ug/L), MW-01A1
Trichloroethene (ug/L), MW-01A1
cis-1,2-Dichloroethene (ug/L), MW-01A1
Vinyl chloride (ug/L), MW-01A1
*ND values plotted at 0.
Mass Based Concentration
3000
2500
2000
1500
1000
500
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

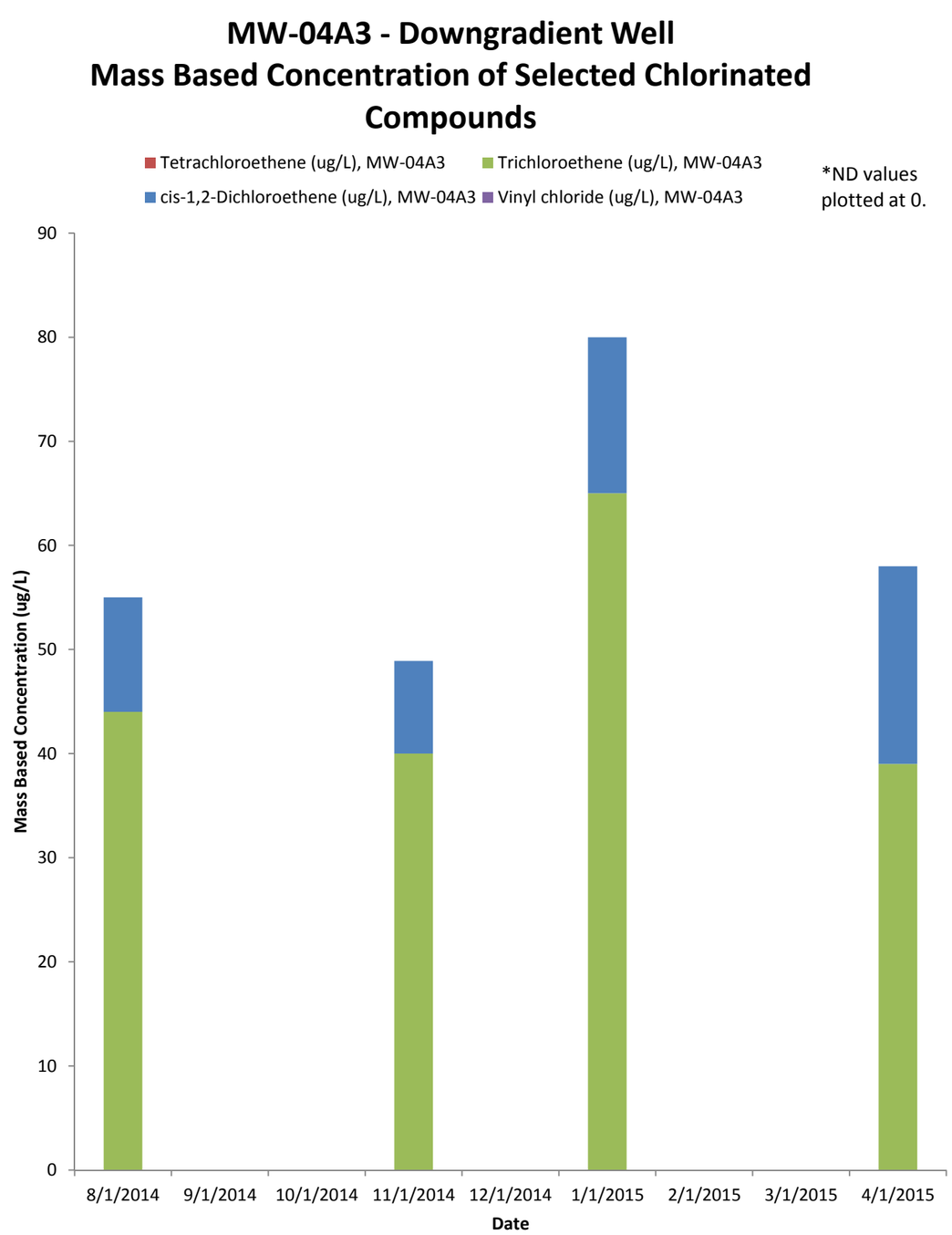

MW-01A1 - Downgradient Well
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), MW-01A1
Trichloroethene (%), MW-01A1
cis-1,2-Dichloroethene (%), MW-01A1
Vinyl chloride (%), MW-01A1
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

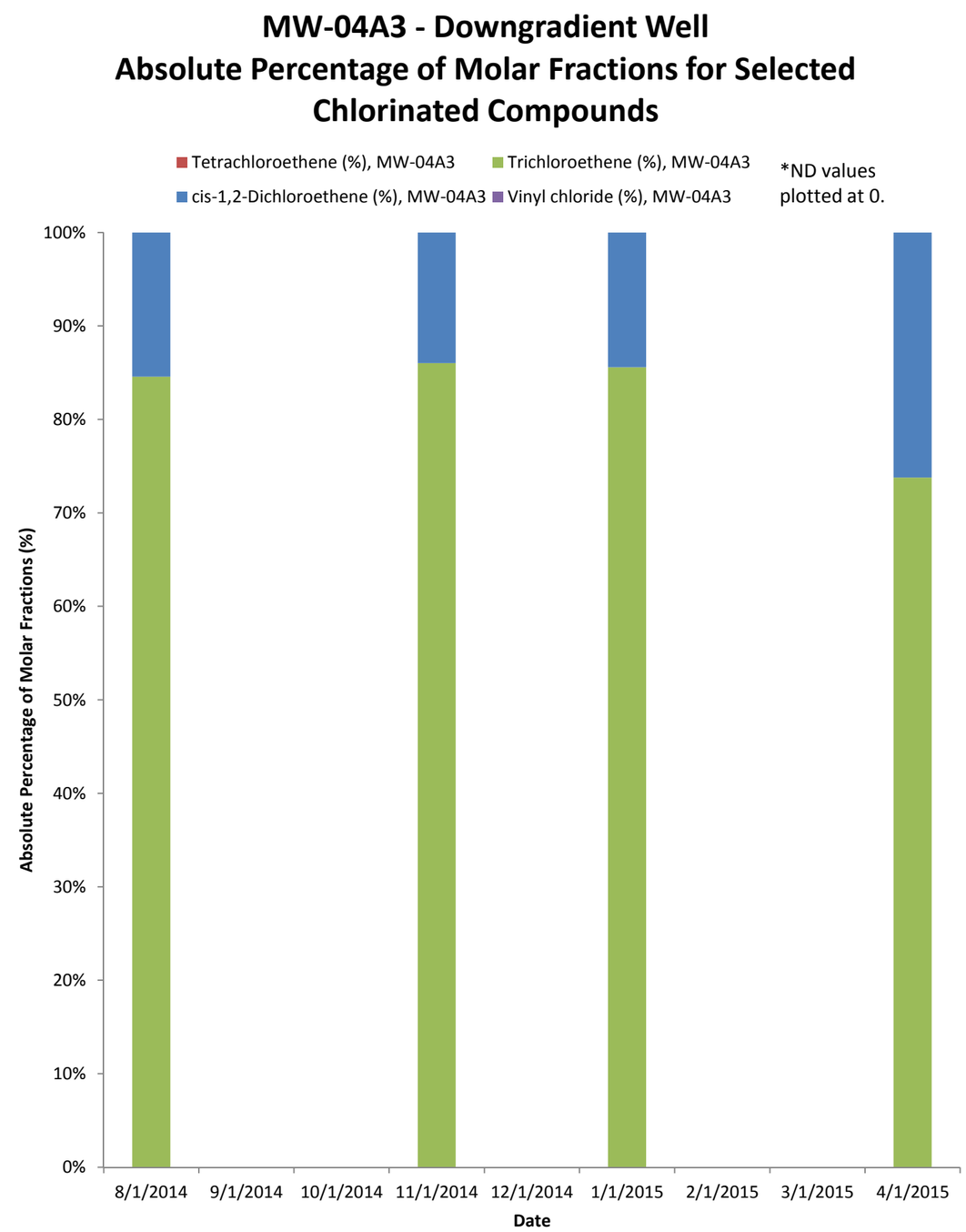

MW-01A3 - Dowgradient Well
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), MW-01A3
Trichloroethene (ug/L), MW-01A3
cis-1,2-Dichloroethene (ug/L), MW-01A3
Vinyl chloride (ug/L), MW-01A3
*ND values plotted at 0.
Mass Based Concentration (ug/L)
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

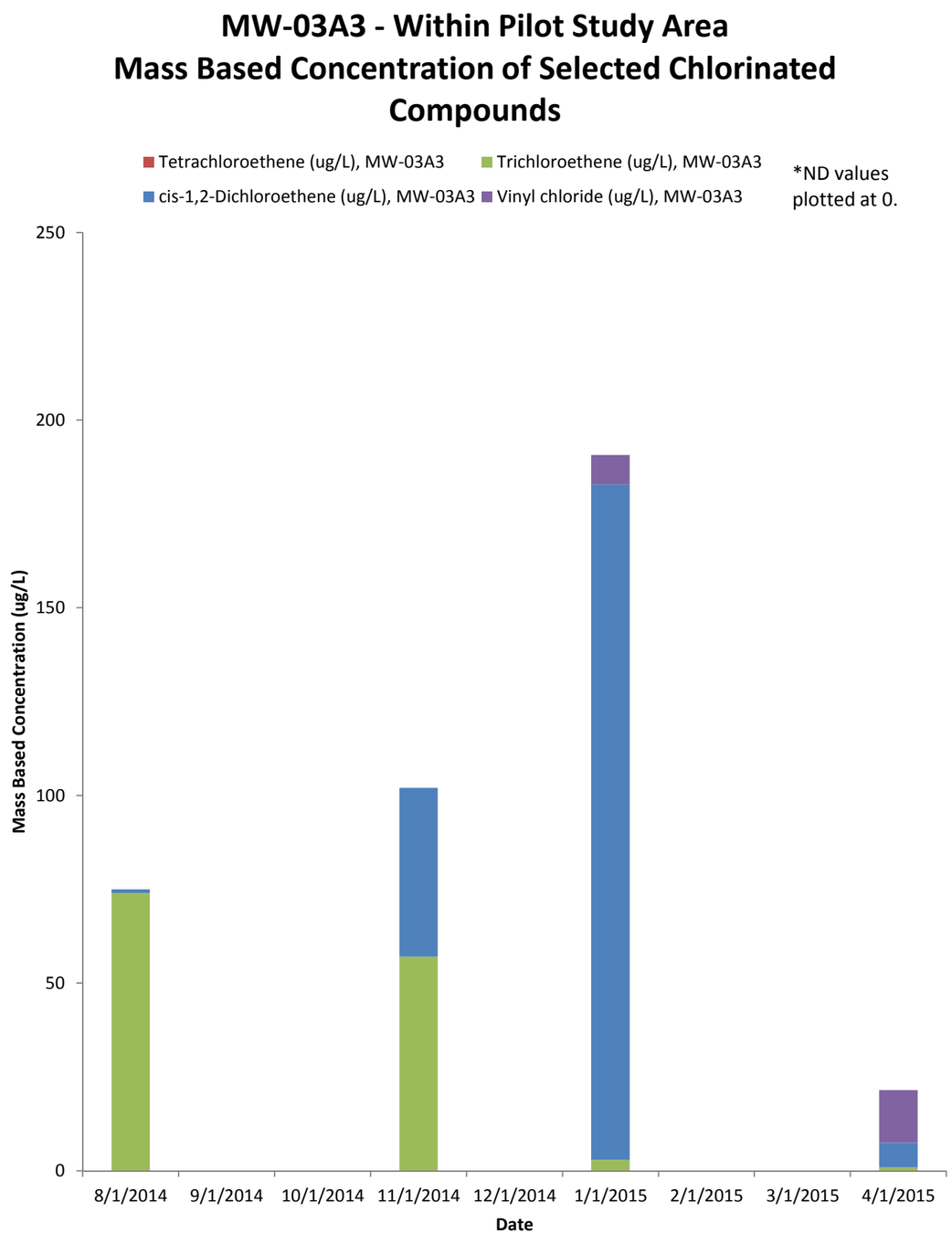

MW-01A3 - Downgradient Well
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), MW-01A3
Trichloroethene (%), MW-01A3
cis-1,2-Dichloroethene (%), MW-01A3
Vinyl chloride (%), MW-01A3
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
date

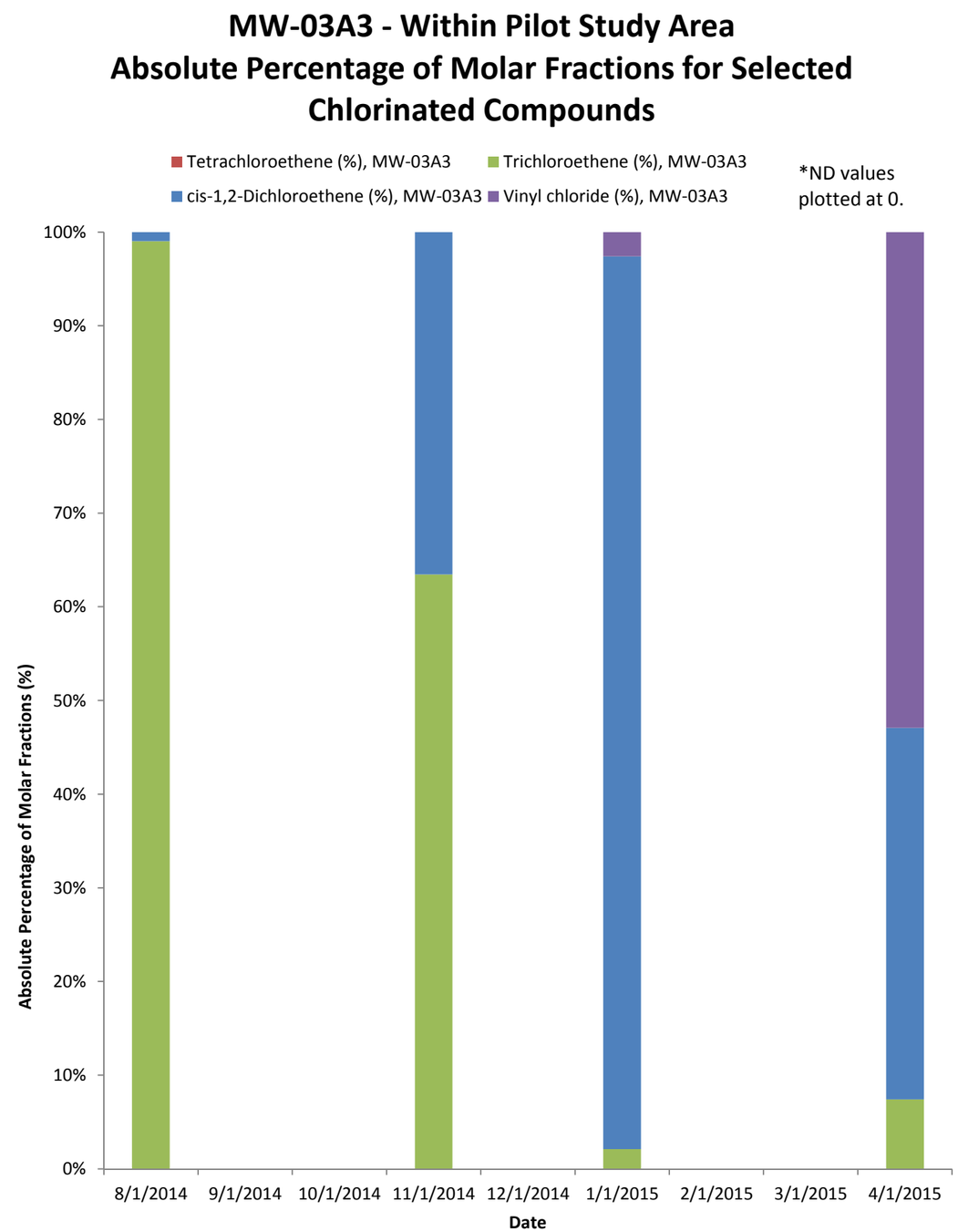

MW-02A1 - Downgradient Well
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), MW-02A1
Trichloroethene (ug/L), MW-02A1
cis-1,2-Dichloroethene (ug/L), MW-02A1
Vinyl chloride (ug/L), MW-02A1
*ND values plotted at 0.
Mass Based Concentration (ug/L)
2500
2000
1500
1000
500
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

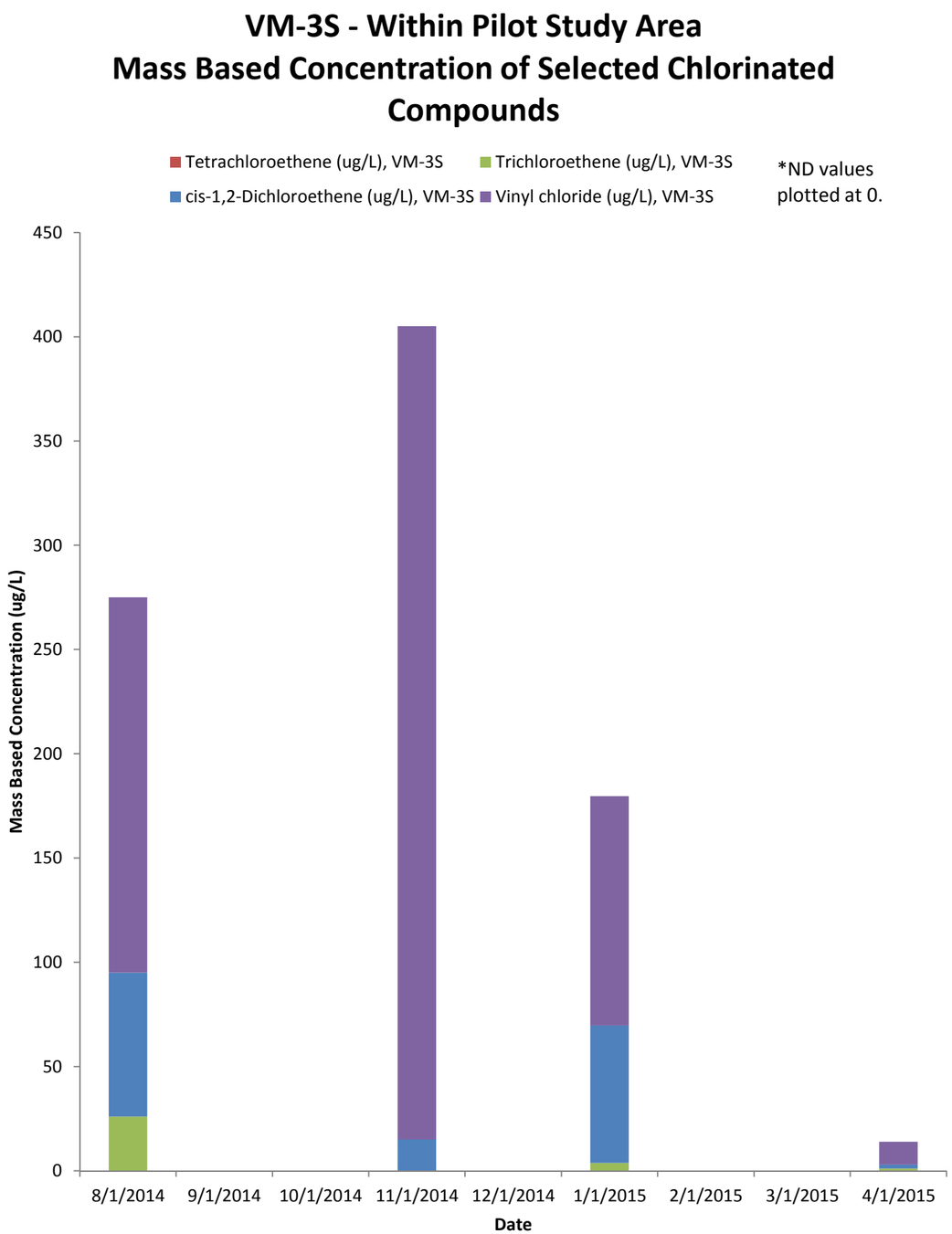

MW-02A1 - Downgradient Well
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), MW-02A1
Trichloroethene (%), MW-02A1
cis-1,2-Dichloroethene (%), MW-02A1
Vinyl chloride (%), MW-02A1
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

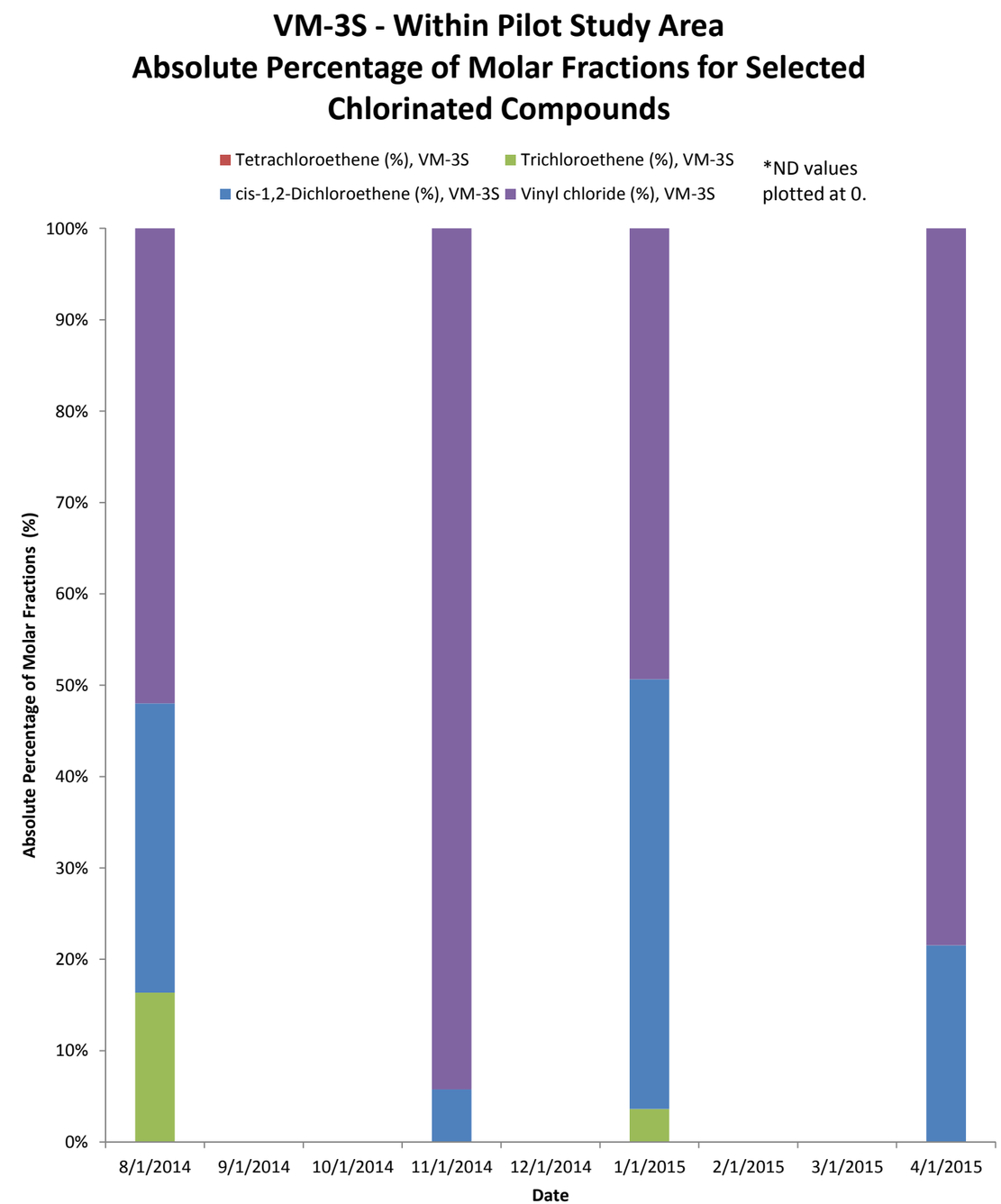

MW-04A3 - Downgradient Well
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), MW-04A3
Trichloroethene (ug/L), MW-04A3
cis-1,2-Dichloroethene (ug/L), MW-04A3
Vinyl chloride (ug/L), MW-04A3
*ND values plotted at 0.
Mass Based Concentration (ug/L)
0
10
20
30
40
50
60
70
80
90
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

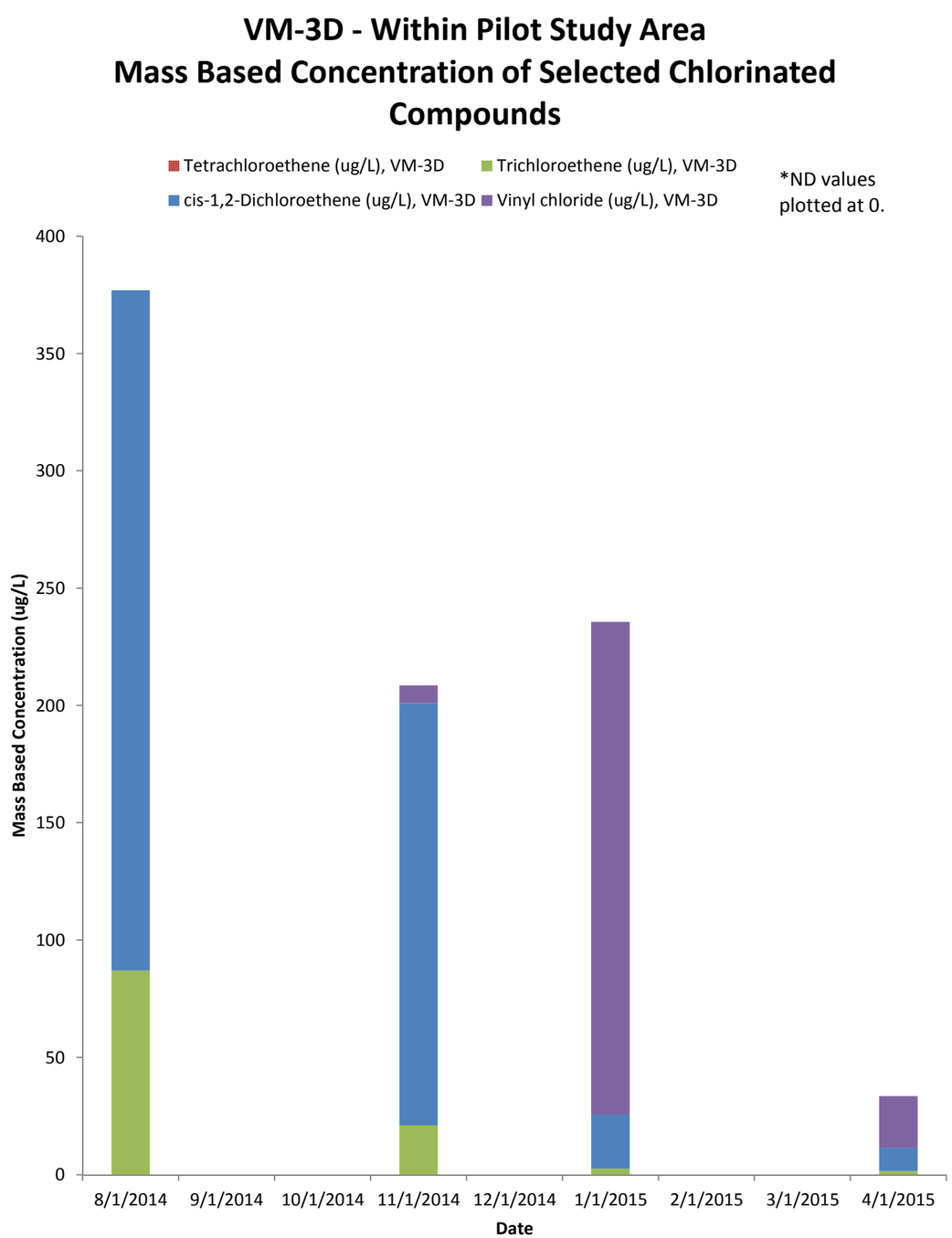

MW-04A3 - Downgradient Well
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), MW-04A3
Trichloroethene (%), MW-04A3
cis-1,2-Dichloroethene (%), MW-04A3
Vinyl chloride (%), MW-04A3
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

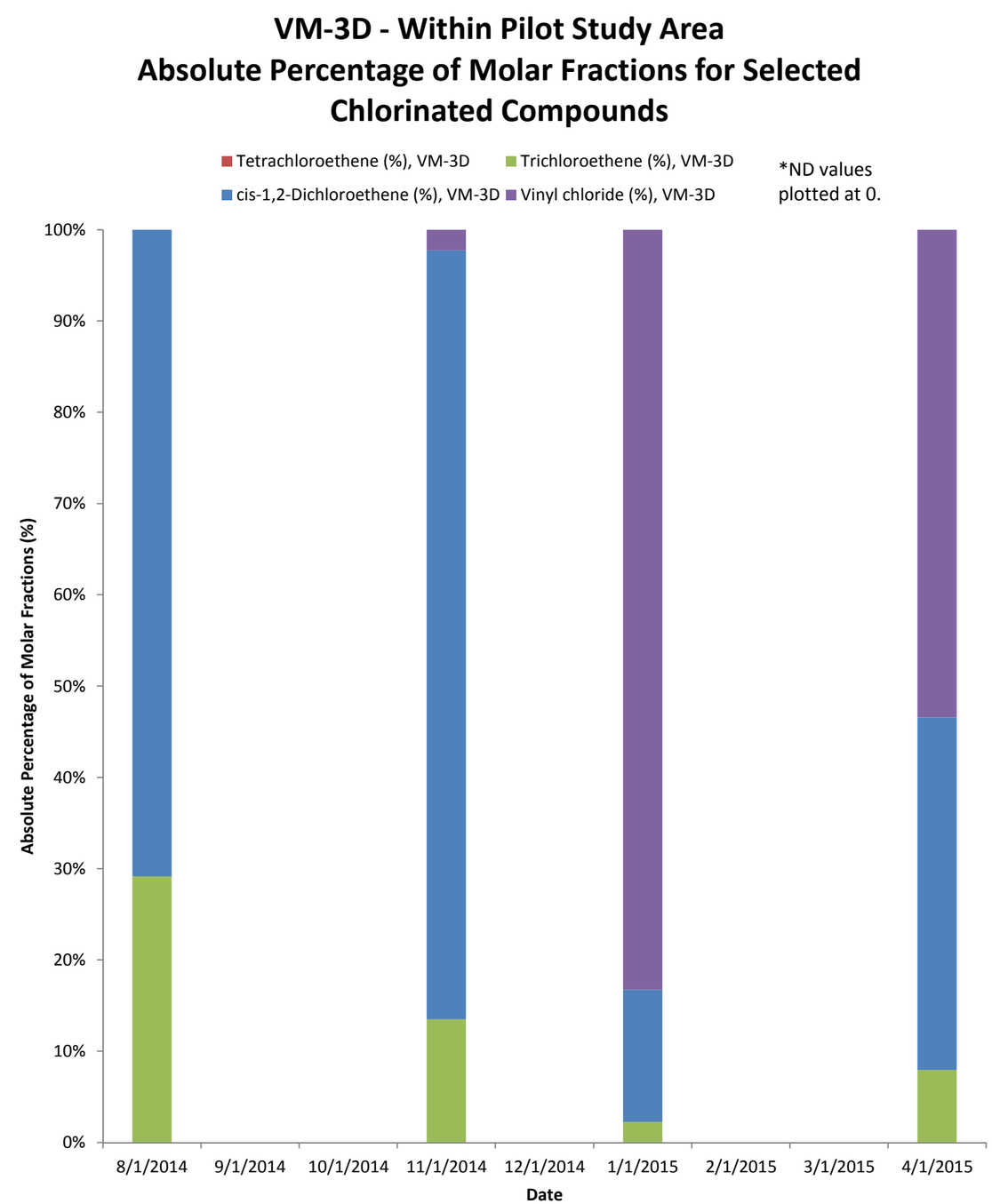

MW-03A3 - Within Pilot Study Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), MW-03A3
Trichloroethene (ug/L), MW-03A3
cis-1,2-Dichloroethene (ug/L), MW-03A3
Vinyl chloride (ug/L), MW-03A3
*ND values plotted at 0.
Mass Based Concentration (ug/L)
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

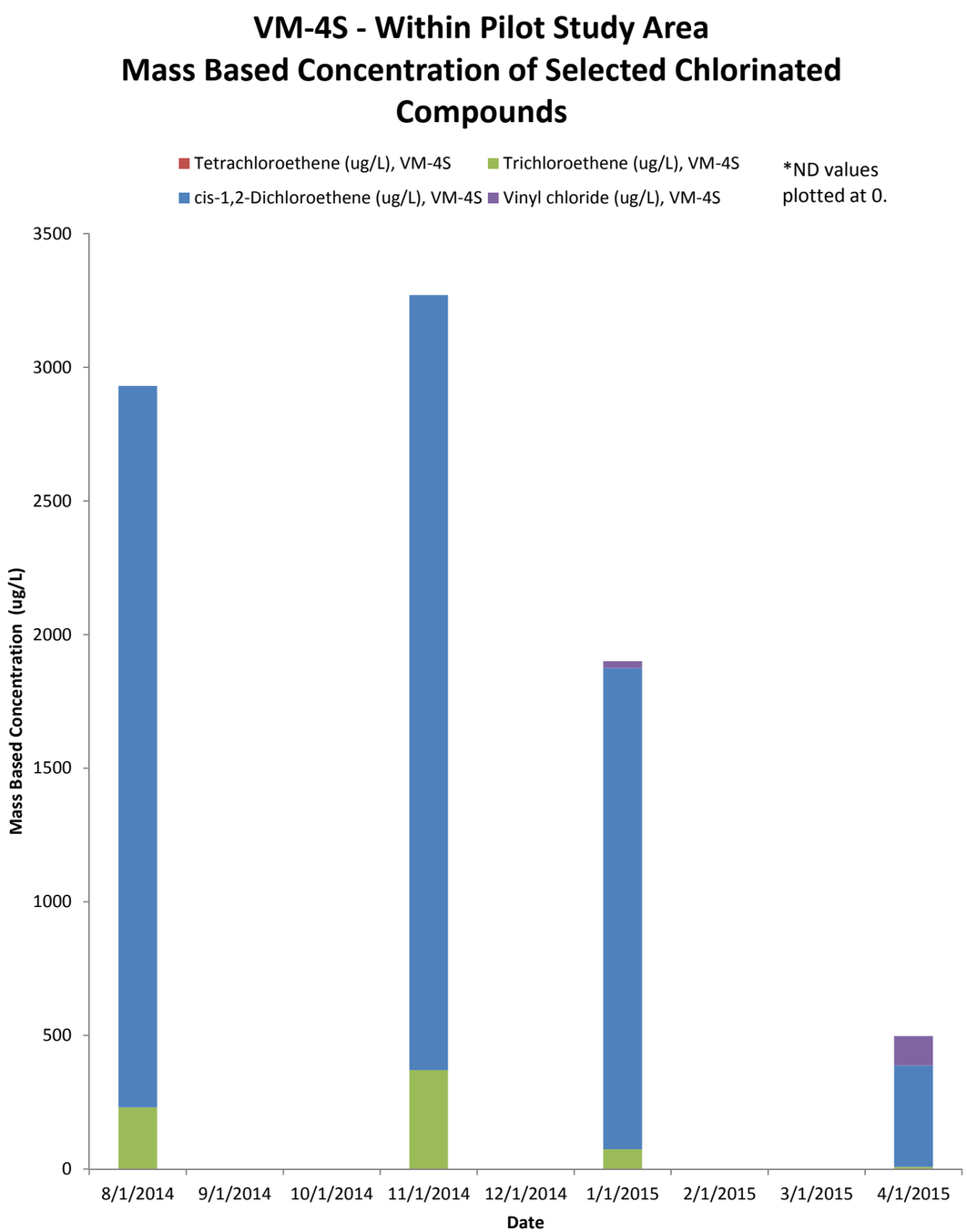

MW-03A3 - Within Pilot Study Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), MW-03A3
Trichloroethene (%), MW-03A3
cis-1,2-Dichloroethene (%), MW-03A3
Vinyl chloride (%), MW-03A3
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

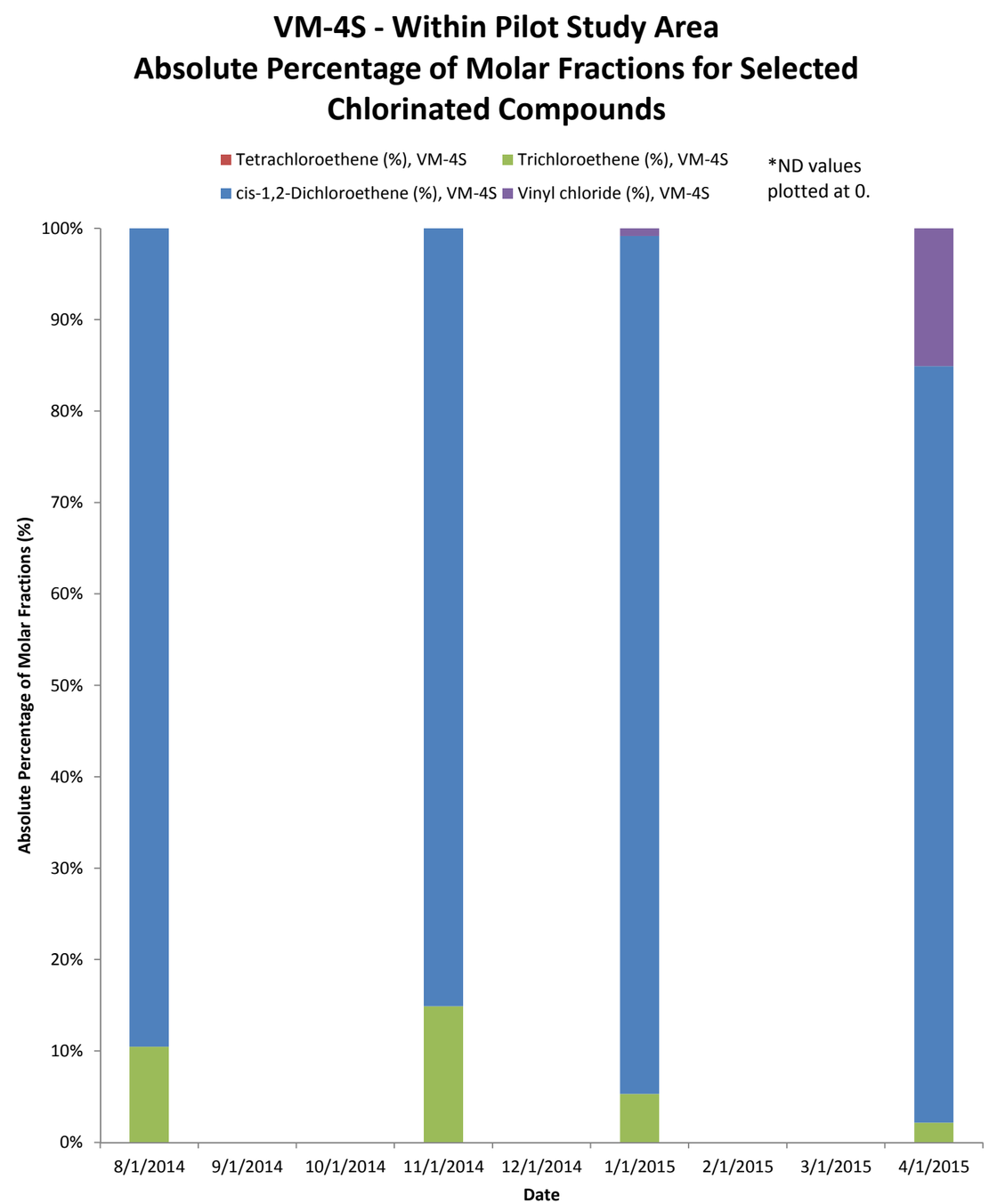

VM-3S - Within Pilot Study Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), VM-3S
Trichloroethene (ug/L), VM-3S
cis-1,2-Dichloroethene (ug/L), VM-3S
Vinyl chloride (ug/L), VM-3S
*ND values plotted at 0.
Mass Based Concentration (ug/L)
450
400
350
300
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

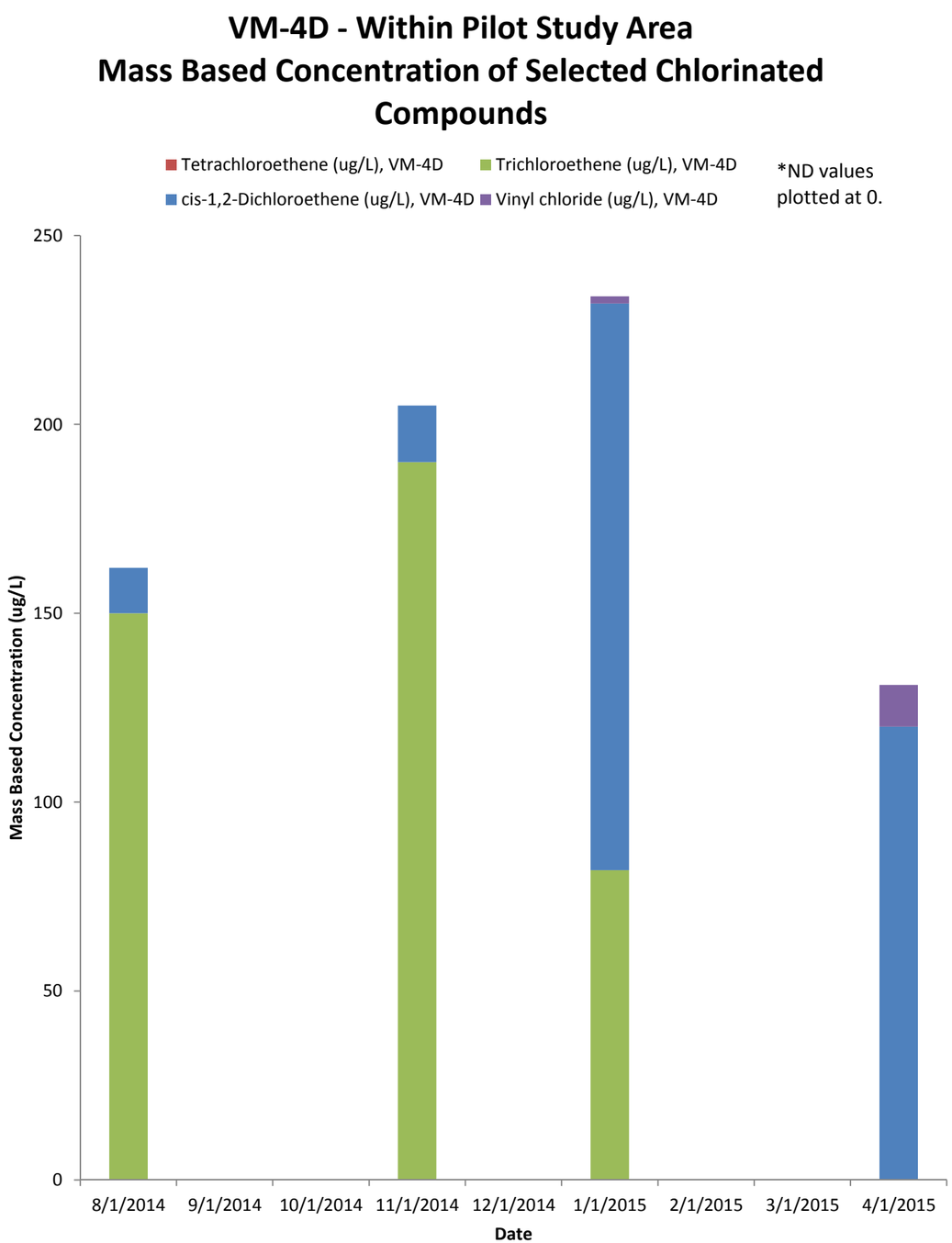

VM-3S - Within Pilot Study Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), VM-3S
Trichloroethene (%), VM-3S
cis-1,2-Dichloroethene (%), VM-3S
Vinyl chloride (%), VM-3S
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

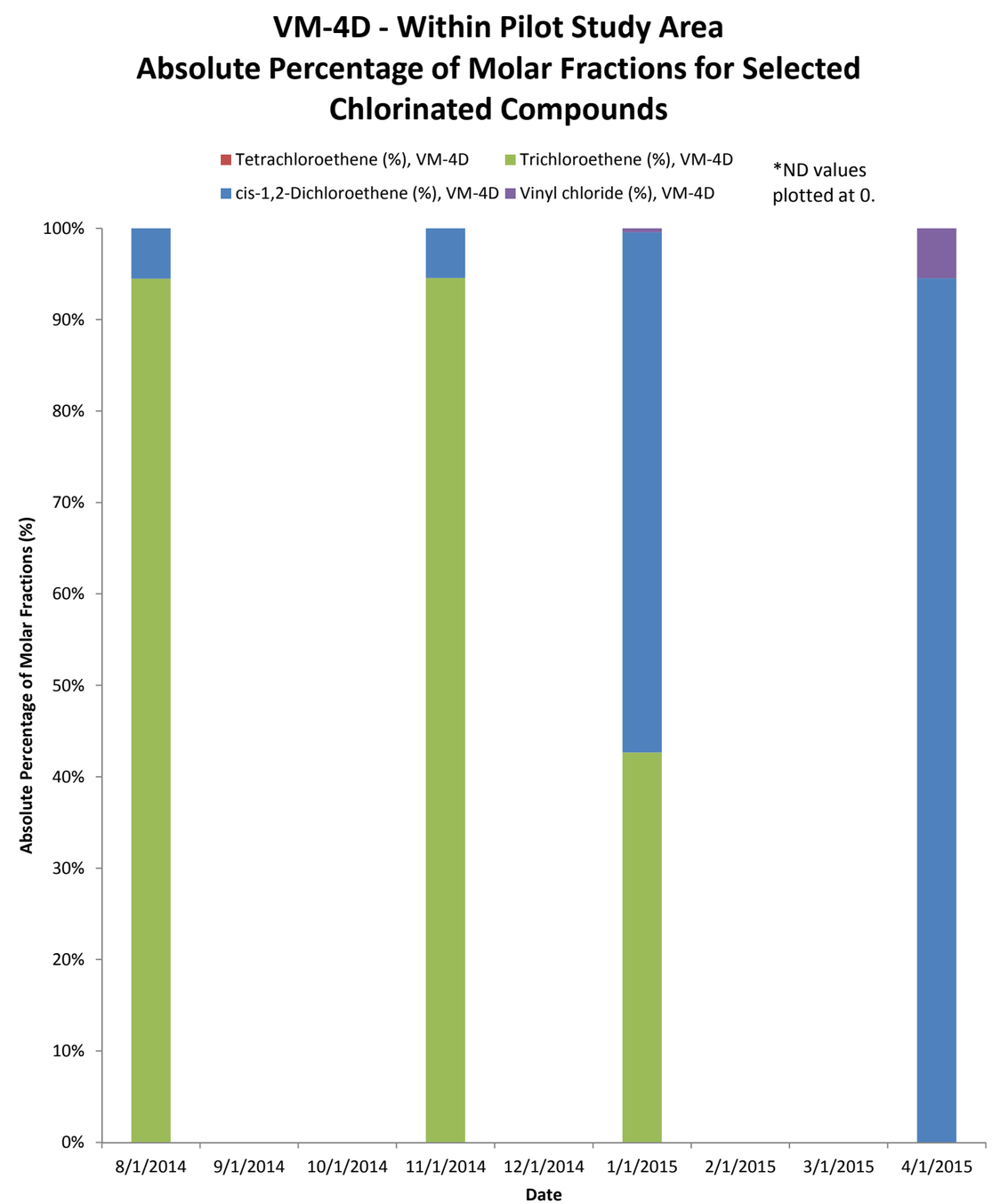

VM-3D - Within Pilot Study Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), VM-3D
Trichloroethene (ug/L), VM-3D
cis-1,2-Dichloroethene (ug/L), VM-3D
Vinyl chloride (ug/L), VM-3D
*ND values plotted at 0.
Mass Based Concentration (ug/L)
400
350
300
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

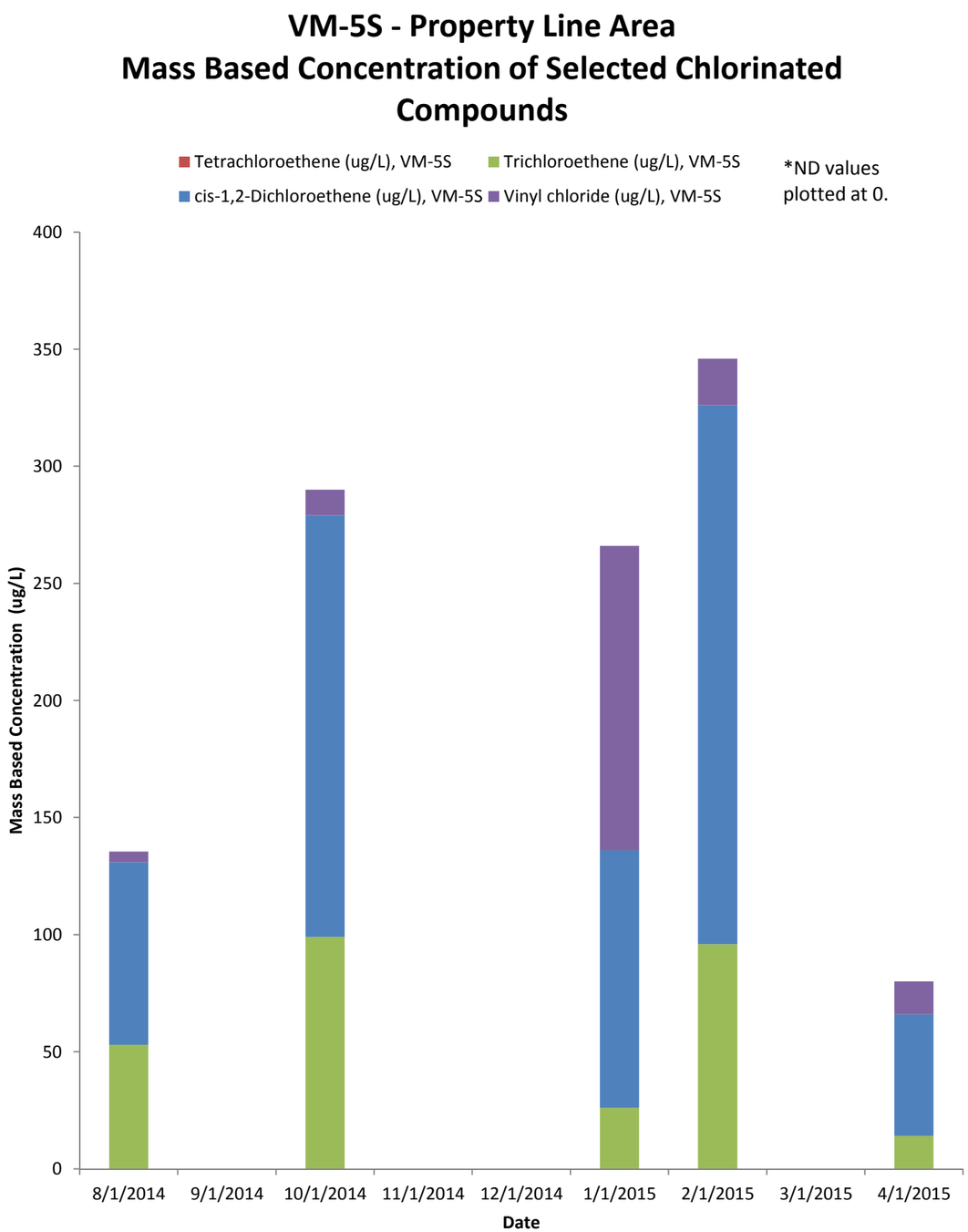

VM-3D - Within Pilot Study Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), VM-3D
Trichloroethene (%), VM-3D
cis-1,2-Dichloroethene (%), VM-3D
Vinyl chloride (%), VM-3D
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

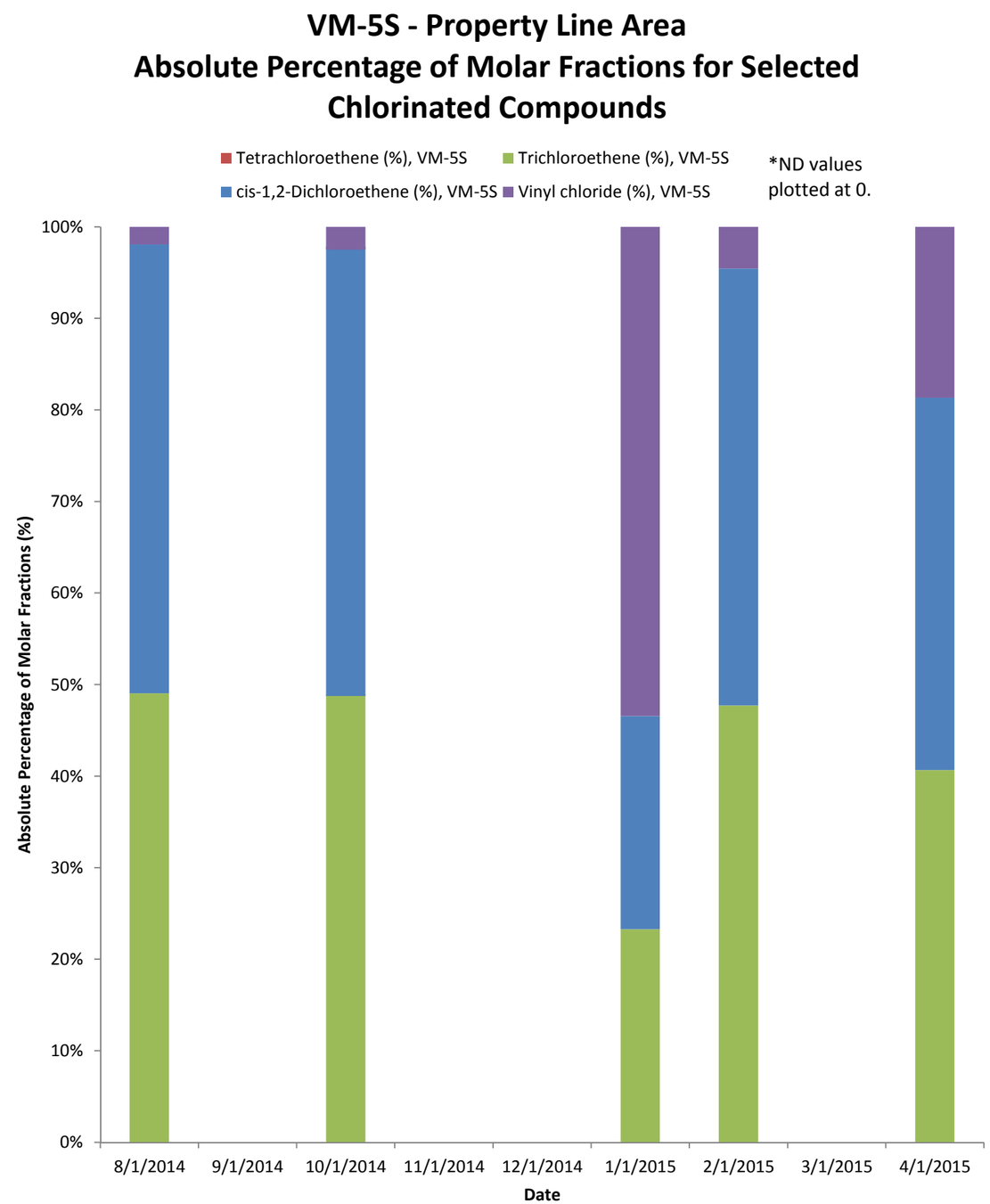

VM-4S - Within Pilot Study Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), VM-4S
Trichloroethene (ug/L), VM-4S
cis-1,2-Dichloroethene (ug/L), VM-4S
Vinyl chloride (ug/L), VM-4S
*ND values plotted at 0.
Mass Based Concentration (ug/L)
3500
3000
2500
2000
1500
1000
500
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

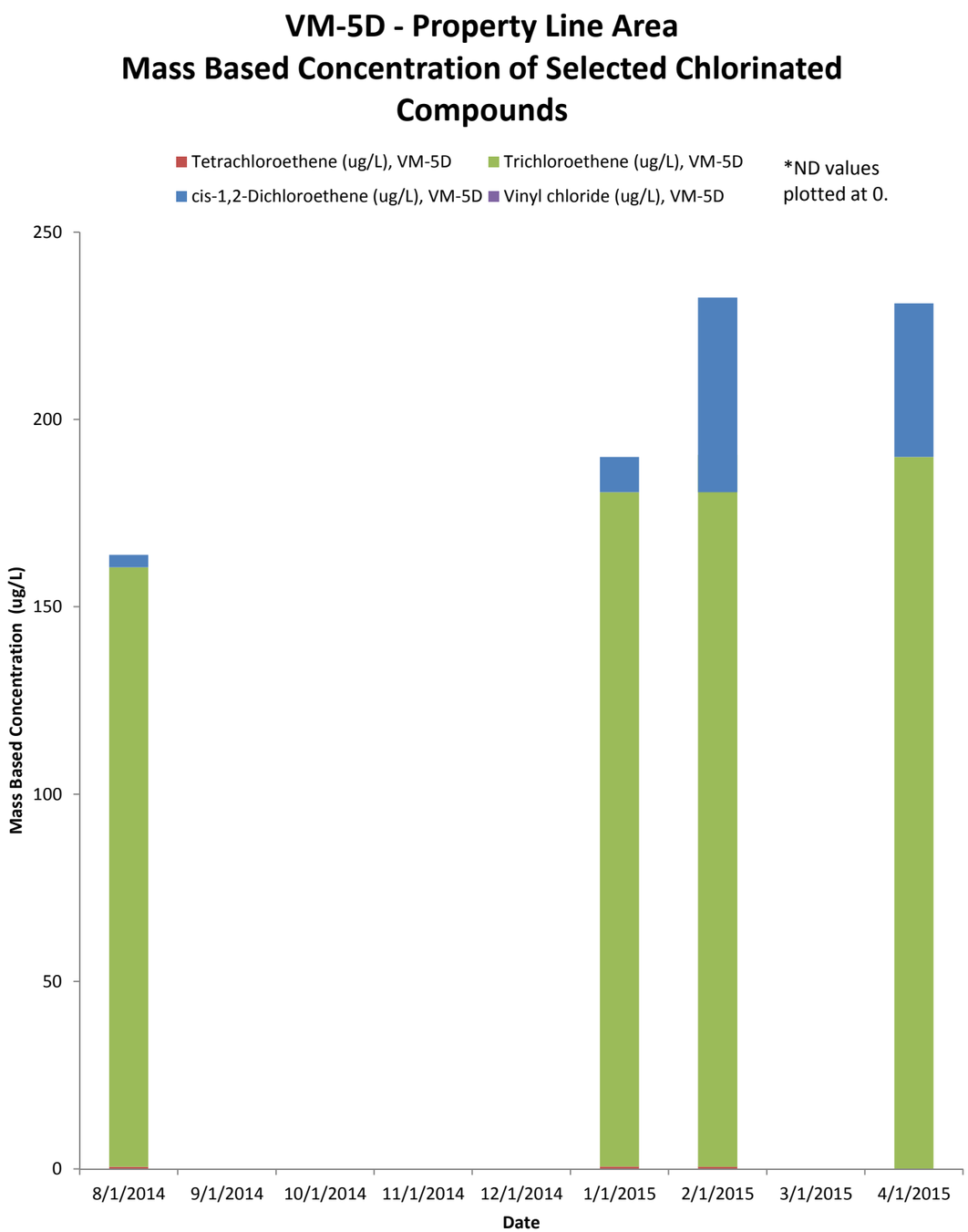

VM-4S - Within Pilot Study Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), VM-4S
Trichloroethene (%), VM-4S
cis-1,2-Dichloroethene (%), VM-4S
Vinyl chloride (%), VM-4S
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

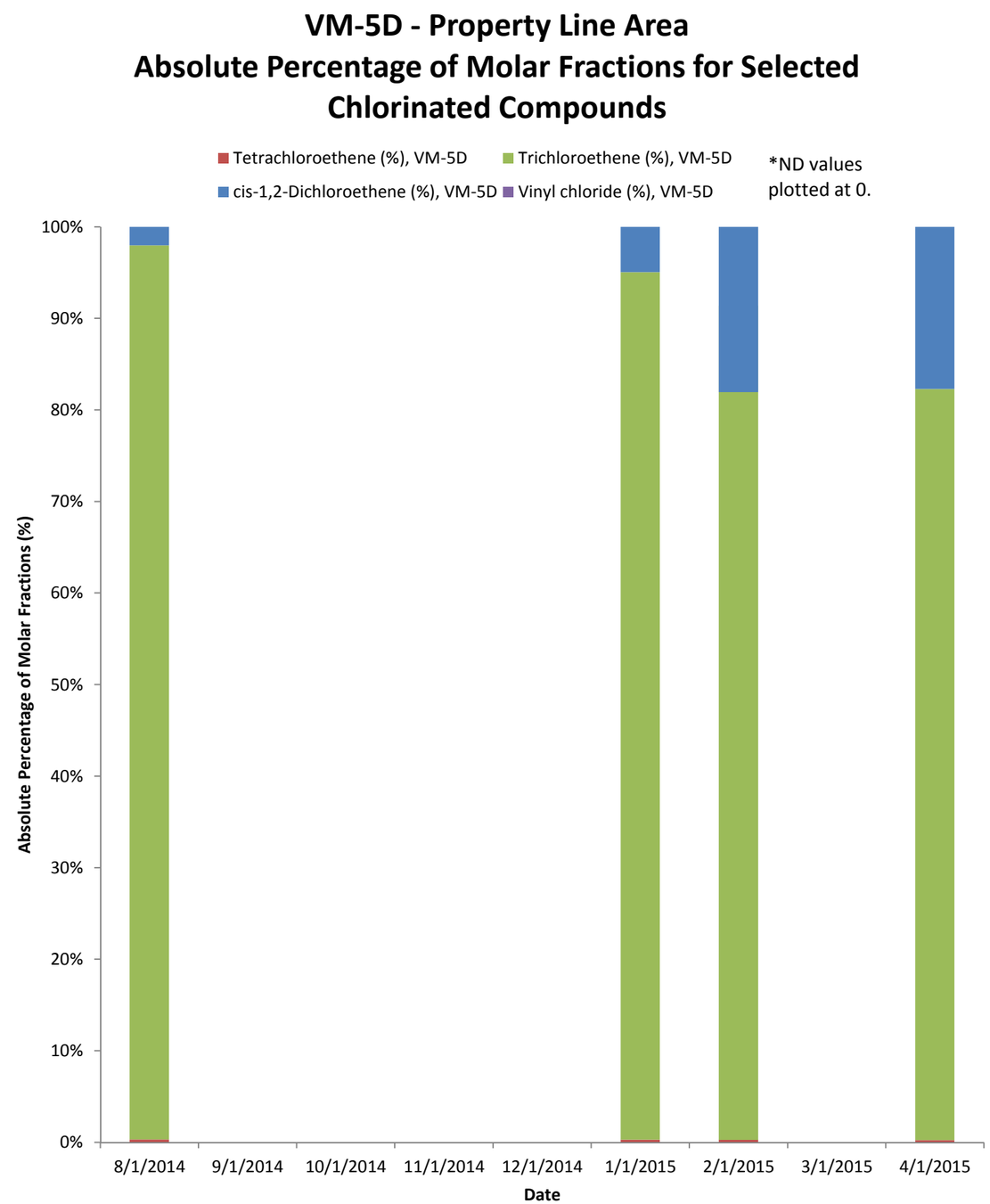

VM-4D - Within Pilot Study Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), VM-4D
Trichloroethene (ug/L), VM-4D
cis-1,2-Dichloroethene (ug/L), VM-4D
Vinyl chloride (ug/L), VM-4D
*ND values plotted at 0.
Mass Based Concentration (ug/L)
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date


VM-4D - Within Pilot Study Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), VM-4D
Trichloroethene (%), VM-4D
cis-1,2-Dichloroethene (%), VM-4D
Vinyl chloride (%), VM-4D
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

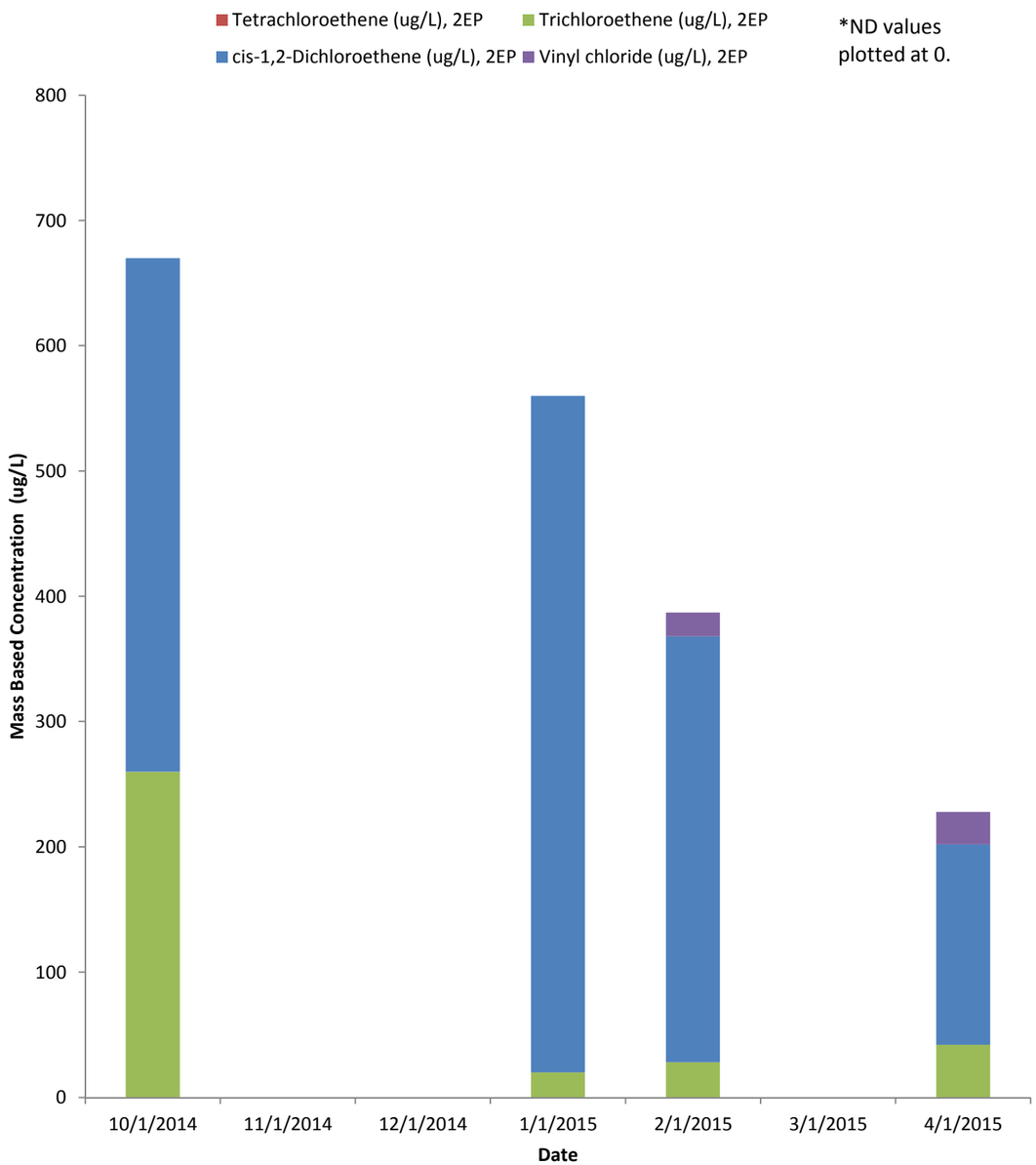

VM-5S - Property Line Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), VM-5S
Trichloroethene (ug/L), VM-5S
cis-1,2-Dichloroethene (ug/L), VM-5S
Vinyl chloride (ug/L), VM-5S
*ND values plotted at 0.
Mass Based Concentration (ug/L)
400
350
300
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date


VM-5S - Property Line Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), VM-5S
Trichloroethene (%), VM-5S
cis-1,2-Dichloroethene (%), VM-5S
Vinyl chloride (%), VM-5S
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

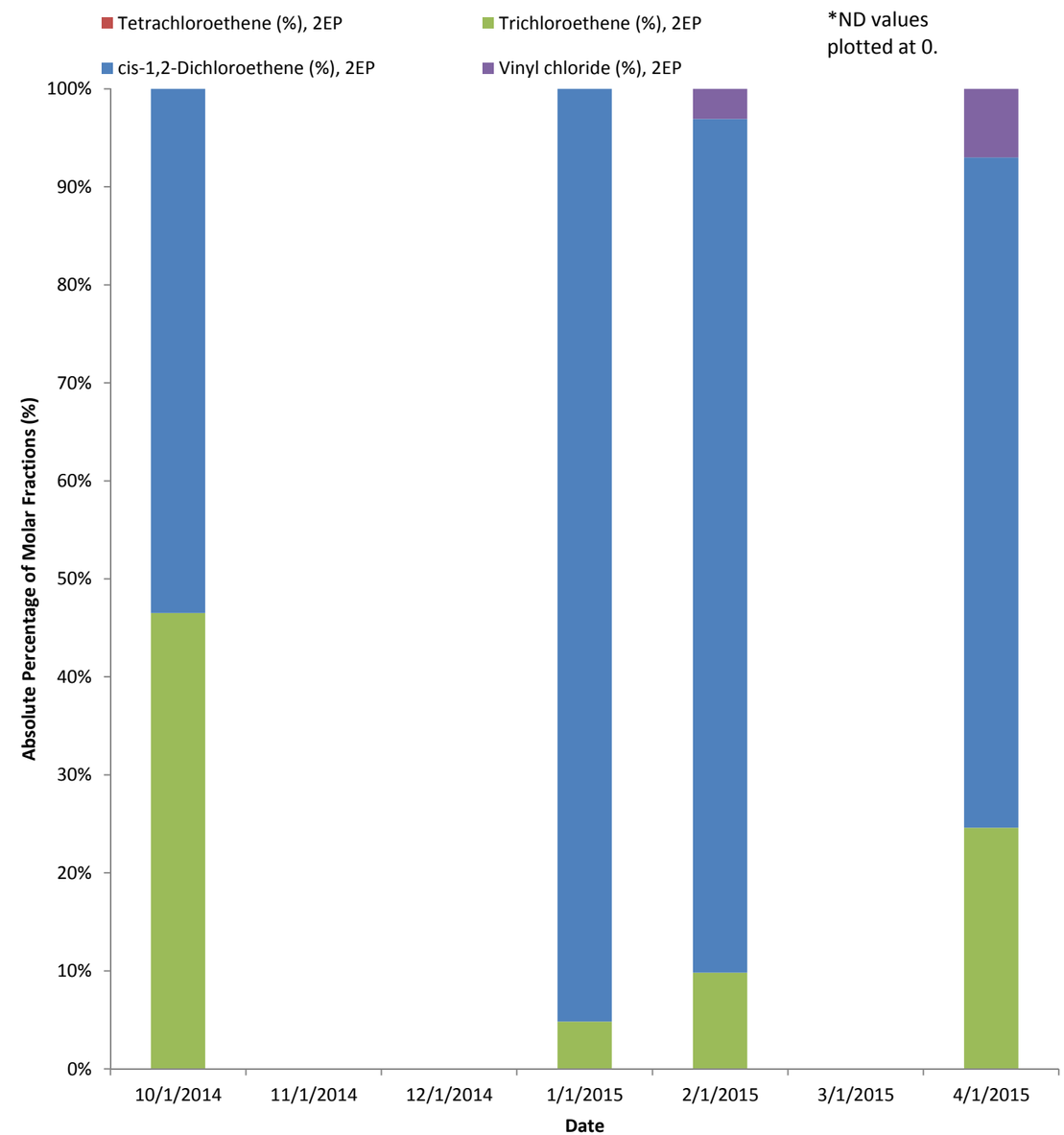

VM-5D - Property Line Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), VM-5D
Trichloroethene (ug/L), VM-5D
cis-1,2-Dichloroethene (ug/L), VM-5D
Vinyl chloride (ug/L), VM-5D
*ND values plotted at 0.
Mass Based Concentration (ug/L)
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

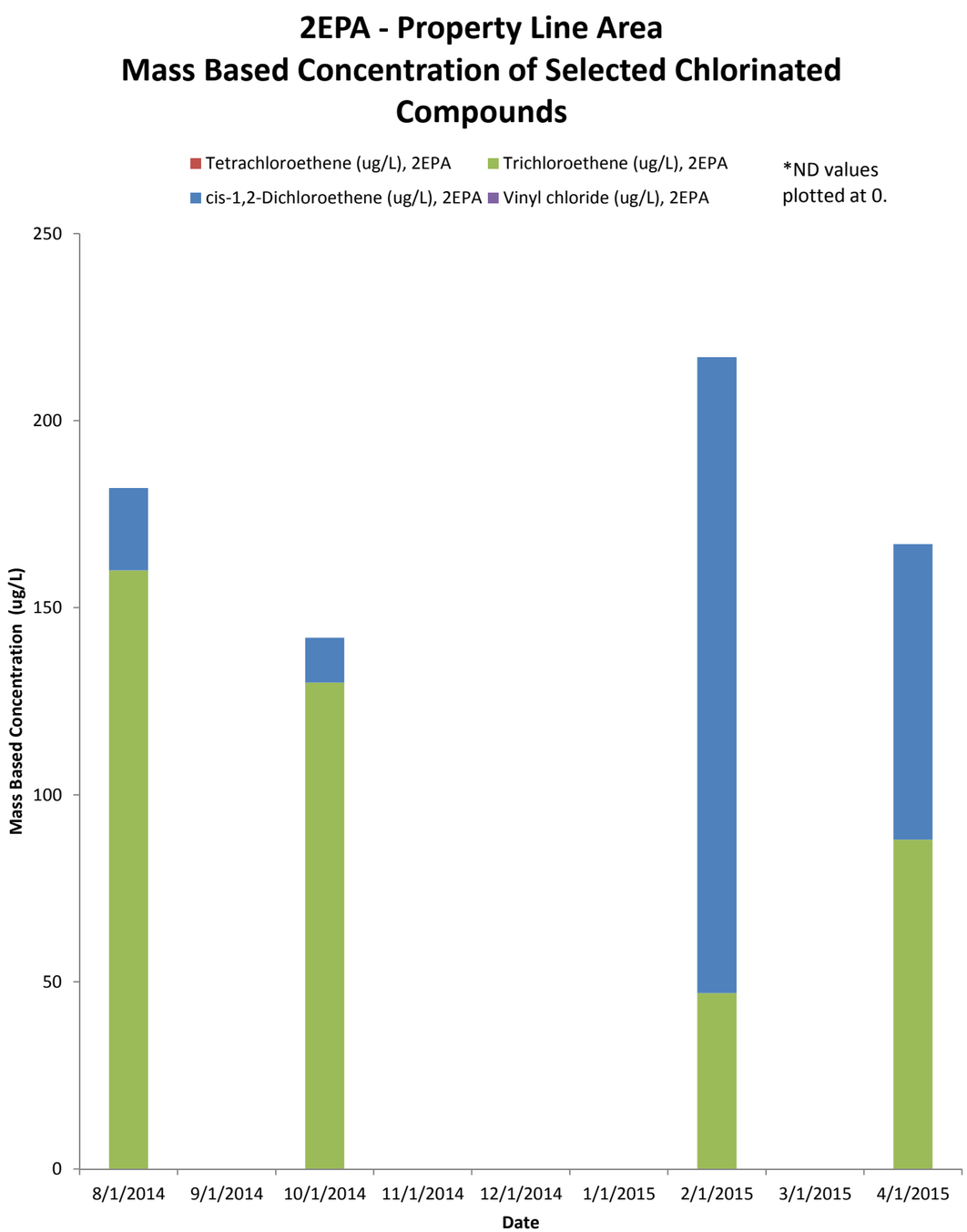

VM-5D - Property Line Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), VM-5D
Trichloroethene (%), VM-5D
cis-1,2-Dichloroethene (%), VM-5D
Vinyl chloride (%), VM-5D
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

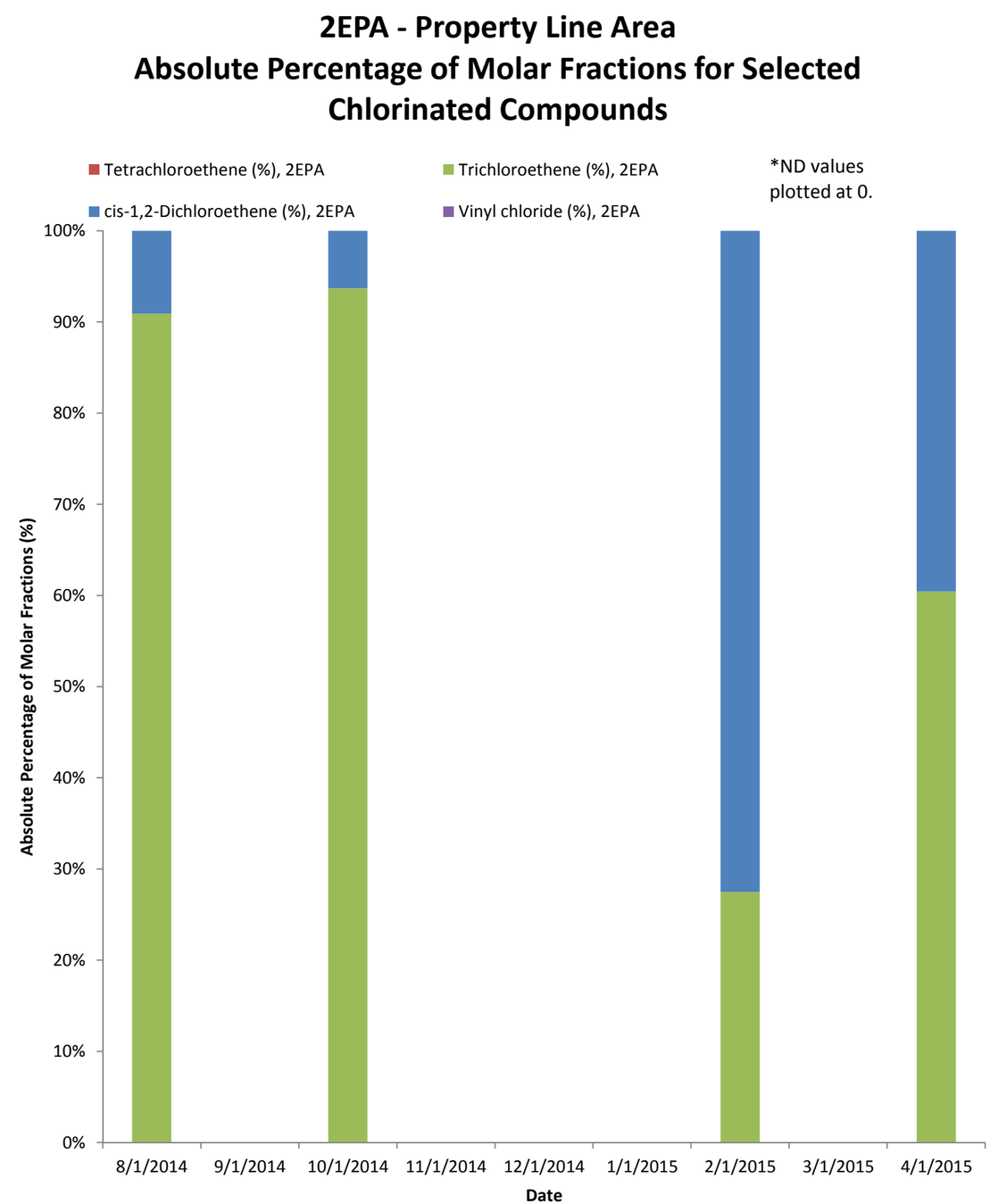
2EP - Property Line Area
Mass Based Concentration of Selected Chlorinated Compounds



2EP - Property Line Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds




2EPA - Property Line Area
Mass Based Concentration of Selected Chlorinated Compounds
Tetrachloroethene (ug/L), 2EPA
Trichloroethene (ug/L), 2EPA
cis-1,2-Dichloroethene (ug/L), 2EPA
Vinyl chloride (ug/L), 2EPA
*ND values plotted at 0.
Mass Based Concentration (ug/L)
250
200
150
100
50
0
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date


2EPA - Property Line Area
Absolute Percentage of Molar Fractions for Selected Chlorinated Compounds
Tetrachloroethene (%), 2EPA
Trichloroethene (%), 2EPA
cis-1,2-Dichloroethene (%), 2EPA
Vinyl chloride (%), 2EPA
*ND values plotted at 0.
Absolute Percentage of Molar Fractions (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
8/1/2014
9/1/2014
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
Date

Appendix C
Data Validation Reports

Memorandum

Environmental Resources Management

2875 Michelle Drive
Suite 200
Irvine, CA 92606
(949) 623-4700
(949) 623-4711 (fax)

To: Shannon Martin

From: Irene Lavigne

Date: 12 May 2015

Subject: Data Review of SMI Holdings, Performance Monitoring Samples Collected August 2014 – April 2015

Project Number: 0201040.03SB

Data Packages: TestAmerica Laboratories Data Packages 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

The quality of the data was assessed and any necessary qualifiers were applied following the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* October 1999 and the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* October 2004.

HOLDING TIME AND PRESERVATION EVALUATION

The samples were prepared and analyzed within the method-prescribed time period from the date of collection. None of the data were qualified based on holding time exceedances.

The pH of several samples were recorded outside the recommended preservation range of water samples at a pH of less than 2 (pH <2) upon receipt at the laboratory. The sample results were not qualified based on these exceedances because the samples were analyzed within the 7-day holding time for unpreserved samples. The unpreserved samples are shown in Table 1.

One sample delivery group (SDG) was received at the laboratory in exceedance of the method-prescribed temperature requirements for volatile organic compound analyses. Since the samples were collected within three hours of delivery to the laboratory, sufficient cooling time was not provided for the samples to reach the target temperature range of 2-6 ˚C; thus, none of the sample data associated with this SDG were qualified based on the temperature exceedance. The samples received outside of acceptable temperature requirements are listed in Table 2.

BLANK EVALUATION

The method blank and trip blank sample results were nondetected for each of the target analytes with limited exceptions. Detections of total organic carbon and iron below their respective reporting limits were found in various method blanks. Associated sample results were qualified as nondetected (U), as shown in Table 3. Additional sample results associated with the blank detections did not require qualification. Data were not qualified if the associated samples were nondetected for the corresponding compounds or if the sample concentrations exceeded 10 times the blank concentration.

BLANK SPIKE EVALUATION

The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) recoveries were within the laboratory's limits of acceptance with limited exceptions. No sample data were qualified based on the LCS outliers because the only one recovery in each LCS/LCSD pair exceeded control limits. The LCS outliers are presented in Table 4. The LCS recoveries indicate acceptable laboratory accuracy and precision.

MATRIX SPIKE EVALUATION

The matrix spike (MS) and matrix spike duplicate recoveries were within the laboratory's limits of acceptance with one exception. No sample data were qualified on the basis of the MS outlier because the spike sample was prepared using a non-client sample. The MS outlier is shown in Table 5. The MS recoveries indicate that the sample matrix did not interfere with the recoveries of the target compounds.

SURROGATE SPIKE EVALUATION

The surrogate recoveries were within acceptable limits. No qualifications to the data were made. The surrogate recoveries indicate minimal matrix interference in the samples.

FIELD DUPLICATE EVALUATION

Six samples were collected and submitted in duplicate. ERM calculated the relative percent difference (RPD) between detected results. The USEPA has not established control criteria for field duplicate samples; therefore, sample data are not qualified on the basis of field duplicate imprecision. A list of the field duplicate detections with the calculated RPDs is provided in Table 6.

OVERALL ASSESSMENT

No data were determined to be unusable. All of the data, including qualified data, can be used for decision-making purposes; however, the limitations indicated by the applied qualifiers should be considered when using the data. The quality of the data generated during this investigation is acceptable for the preparation of technically-defensible documents.

Table 1
Samples with Exceeded Preservation Requirements
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Sample ID	Analysis Method	Sample pH (pH units)	pH Limits	Note	ERM Qualifier
720-62650-1	2-EPA-01292015	VOC	5-8	< 2	HT	--
720-64358-1	VM-3S-04232015	VOC	NR	< 2	HT	--
720-64358-1	VM-5S-04232015	VOC	NR	< 2	HT	--

Data packages reviewed: 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

Key:
VOC = Volatile organic compound; Method 8260B
HT = Data not qualified; samples analyzed within 7-day holding time for unpreserved samples
NR = Value not reported

Table 2
Samples with Exceeded Temperature Requirements
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Sample ID	Analysis Method	Sample Temperature (°C)	Limits (°C)	Note	ERM Qualifier
720-59673-1	H-1A-090314	VOC	7.2	2 - 6	< 3 hrs	--
720-59673-1	LF-6A-090314	VOC	7.2	2 - 6	< 3 hrs	--
720-59673-1	TB-090314	VOC	7.2	2 - 6	< 3 hrs	--

Data packages reviewed: 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

Key:
°C = Degrees Celsius
VOC = Volatile organic compounds; Method 8260B
< 3 hrs = Samples received at laboratory within 3 hours of last sample collection; qualification not required

Table 3
Blank and Associated Suspect Sample Detections
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Blank ID	Associated Samples	Detected Compound	Reported Concentration	Report Limit	Units	ERM Qualifier
720-61544-1	MB 500-267093/4	See below	TOC Dup	0.296	1.0	mg/L	--
720-61544-1	--	LF6A-11262014	TOC Dup	0.50	1.0	mg/L	1.0 U
720-63254-1	MB 277977	See below	TOC	0.303	1.0	mg/L	--
720-63254-1	--	2-EPA-2-02272015	TOC	1.5	1.0	mg/L	1.5 U
720-63254-1	--	VM-5D-02272015	TOC	0.90	1.0	mg/L	1.0 U
720-63254-1	--	G-1A-02272015	TOC	1.2	1.0	mg/L	1.2 U
720-64358-1	MB 180669	See below	Iron	0.386	0.50	mg/L	--
720-64358-1	--	MW-01A3-04232015	Iron	3.4	0.50	mg/L	3.4 U
720-64358-1	--	MW-03A3-04232015	Iron	1.5	0.50	mg/L	1.5 U
720-64358-1	--	VM-3S-04232015	Iron	0.59	0.50	mg/L	0.59 U
720-64358-1	--	VM-4S-04232015	Iron	0.46	0.50	mg/L	0.50 U
720-64358-1	--	VM-7S-04232015	Iron	0.18	0.50	mg/L	0.50 U
720-64358-1	--	2-EP-04232015	Iron	0.51	0.50	mg/L	0.51 U

Data packages reviewed: 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

Key:
MB = Method blank
TOC = Total organic carbon
mg/L = Milligrams per liter
U = Nondetected

Table 4
Laboratory Control Sample Recoveries Outside of Acceptable Limits
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Spike Sample ID	Associated Sample	Compound	Recovery (%)	Limit (%)	RPD	RPD Limit	Sample Result	ERM Qualifier
720-61544-1	720-171845 LCS/LCSD	NA	2-Butanone	131/127	54-130	3	20	--	--
720-64164-1	720-179932 LCS/LCSD	NA	trans-1,3-Dichloropropene	142/140	70-140	1	20	--	--
720-64164-1	720-179932 LCS/LCSD	NA	Bromoform	134/137	68-136	2	20	--	--

Data packages reviewed: 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

Key:
RPD = Relative percent difference
LCS/LCSD = Laboratory control sample/laboratory control sample duplicate
NA = Not applicable; associated samples not qualified

Table 5
Matrix Spike Recoveries Outside of Acceptable Limits
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Spike Sample ID	Associated Sample	Compound	Recovery (%)	Limit (%)	RPD	RPD Limit	Sample Result	ERM Qualifier
720-64164-1	Batch MS/MSD	NA	trans-1,32-Dichloropropene	141/141	60-140	1	20	--	--

Data packages reviewed: 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

Key:
RPD = Relative percent difference
MS/MSD = Matrix spike/matrix spike duplicate
NA = Not applicable; associated samples not qualified

Table 6
Duplicate Results and Calculated Relative Percent Differences
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Sample/Duplicate ID	Compound	Concentration		Report Limit	Units	RPD
			Sample	Duplicate			
720-59584-1	VM-8S-082814/DUP-1-082814	1,1-Dichloroethene	33	35	2.5	µg/L	5.9
720-59584-1	VM-8S-082814/DUP-1-082814	1,1,-Dichloroethane	7.5	7.9	2.5	µg/L	5.2
720-59584-1	VM-8S-082814/DUP-1-082814	trans-1,2-Dichloroethene	5.1	5.0	2.5	µg/L	2.0
720-59584-1	VM-8S-082814/DUP-1-082814	cis-1,2-Dichloroethene	240	260	2.5	µg/L	8.0
720-59584-1	VM-8S-082814/DUP-1-082814	1,1,1-Trichloroethane	15	15	2.5	µg/L	0
720-59584-1	VM-8S-082814/DUP-1-082814	Trichloroethene	270	270	2.5	µg/L	0
720-59584-1	VM-3D-082814/DUP-2-082814	1,1,-Dichloroethene	5.5	5.4	0.50	µg/L	1.8
720-59584-1	VM-3D-082814/DUP-2-082814	trans-1,2-Dichloroethene	3.7	4.8	0.50	µg/L	26
720-59584-1	VM-3D-082814/DUP-2-082814	cis-1,2-Dichloroethene	290	320	2.5	µg/L	10
720-59584-1	VM-3D-082814/DUP-2-082814	1,1,1-Trichloroethane	1.1	1.1	0.50	µg/L	0
720-59584-1	VM-3D-082814/DUP-2-082814	Trichloroethene	87	90	0.50	µg/L	3.4
720-59584-1	VM-3D-082814/DUP-2-082814	1,1,2-Trichloro-1,2,2-trifluoroethane	3.9	4.0	0.50	µg/L	2.5
720-61521-1	VM-6S-11252014/DUP-11252014	cis-1,2-Dichloroethene	580	560	10	µg/L	3.5
720-61521-1	VM-6S-11252014/DUP-11252014	Trichloroethene	600	610	10	µg/L	1.7
720-62650-1	VM-8S-01292015/DUP-01292015	1,1-Dichloroethane	5.4	5.6	2.5	µg/L	3.6
720-62650-1	VM-8S-01292015/DUP-01292015	1,1-Dichloroethene	22	23	2.5	µg/L	4.4
720-62650-1	VM-8S-01292015/DUP-01292015	cis-1,2-Dichloroethene	210	220	2.5	µg/L	4.7
720-62650-1	VM-8S-01292015/DUP-01292015	1,1,1-Trichloroethane	13	13	2.5	µg/L	0
720-62650-1	VM-8S-01292015/DUP-01292015	Trichloroehtene	120	120	2.5	µg/L	0
720-63254-1	MW-OS-2A3-02272015/DUP-02272015	1,1-Dichloroethene	3.0	2.6	0.50	µg/L	14
720-63254-1	MW-OS-2A3-02272015/DUP-02272015	cis-1,2-Dichloroethene	1.6	2.5	0.50	µg/L	44
720-63254-1	MW-OS-2A3-02272015/DUP-02272015	1,1,1-Trichloroethane	2.2	2.0	0.50	µg/L	9.5
720-63254-1	MW-OS-2A3-02272015/DUP-02272015	Trichloroethene	100	98	0.50	µg/L	2.0
720-63254-1	MW-OS-2A3-02272015/DUP-02272015	1,1,2-Trichloro-1,2,2-trifluoroethane	3.5	2.9	0.50	µg/L	19

Table 6
Duplicate Results and Calculated Relative Percent Differences
August 2014 - April 2015 Performance Monitoring Samples
SMI Holdings
Cupertino, California

Lab Package	Sample/Duplicate ID	Compound	Concentration		Report Limit	Units	RPD
			Sample	Duplicate			
720-64358-1	VM-5D-04232015/DUP-04232015	1,1-Dichloroethane	0.63	0.59	0.50	µg/L	6.6
720-64358-1	VM-5D-04232015/DUP-04232015	1,1-Dichloroethene	12	11	0.50	µg/L	8.7
720-64358-1	VM-5D-04232015/DUP-04232015	cis-1,2-Dichloroethene	42	41	0.50	µg/L	2.4
720-64358-1	VM-5D-04232015/DUP-04232015	Tetrachloroethene	0.59	0.57	0.50	µg/L	3.4
720-64358-1	VM-5D-04232015/DUP-04232015	1,1,1-Trichloroethane	9.8	9.4	0.50	µg/L	4.2
720-64358-1	VM-5D-04232015/DUP-04232015	Trichloroethene	190	190	0.50	µg/L	0
720-64358-1	VM-5D-04232015/DUP-04232015	1,1,2-Trichloro-1,2,2trifluoroethane	2.2	2.1	0.50	µg/L	4.7

Data packages reviewed: 720-59584-1, 720-59673-1, 720-61521-1, 720-61544-1, 720-62650-1, 720-63254-1, 720-64164-1, 720-64218-1, 720-64358-1

Key:
RPD = Relative percent difference
µg/L = Micrograms per liter

Memorandum

Environmental Resources Management

2875 Michelle Drive
Suite 200
Irvine, CA 92606
(949) 623-4700
(949) 623-4711 (fax)

To: Shannon Martin

From: Irene Lavigne

Date: 12 May 2015

Subject: Data Review of SMI Holdings, Soil Vapor Samples Collected August 2014 - April 2015

Project Number: 0201040.03SB

Data Packages: Eurofins Air Toxics, Inc. Laboratory Data Packages 1409083, 1412029, 1501014, 1501386, 1503032, 1504457

The data quality was assessed and any necessary qualifiers were applied following the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* October 1999.

HOLDING TIME AND PRESERVATION EVALUATION

The samples were prepared and analyzed within the method-prescribed time period from the date of collection. The sample shipments were received at the laboratory within the method-prescribed preservation requirements. None of the data were qualified based on holding time or preservation exceedances.

CANISTER VACUUM EVALUATION

The laboratory noted no discrepancies with regard to the reported and measured canister vacuum pressures. None of the data were qualified based on canister vacuum pressure exceedances.

BLANK EVALUATION

The method blank sample results were nondetected for each of the target analytes. No sample data were qualified based on the blank evaluation. The blank results indicate that no contaminants were introduced to the samples during laboratory preparation and analyses.

BLANK SPIKE EVALUATION

The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) recoveries were within the laboratory's limits of acceptance with limited exceptions. Low recoveries for 3-chloropropene and ethanol required qualification of six associated nondetected sample results as estimated (UJ) for these compounds. Sample data were not qualified based on additional LCS/LCSD outliers. Data were not qualified if only one recovery in a LCS/LCSD pair exceeded control limits or if the recoveries were biased high and the associated samples were nondetected for the corresponding compounds. The outlying LCS recoveries and qualified samples are presented in Table 1.

SURROGATE SPIKE EVALUATION

The surrogate recoveries were within acceptable limits. No qualifications to the data were made. The surrogate recoveries indicate minimal matrix interference in the samples.

CONTINUING CALIBRATION EVALUATION

Continuing calibration verification (CCV) data were presented in the data package and reviewed. All CCV recoveries were found to be within acceptable limits with one exception. An outlying CCV recovery for 1,1,2,2-tetrachloroethane did not require qualification of associated sample results because the recovery was biased high and the sample results were nondetected for this compound. The CCV outlier is shown in Table 2.

OVERALL ASSESSMENT

No data were determined to be unusable. All of the data, including qualified data, can be used for decision-making purposes; however, the limitations indicated by the applied qualifiers should be considered when using the data. The quality of the data generated during this investigation is acceptable for the preparation of technically-defensible documents.

Table 1
Laboratory Control Sample Recoveries Outside of Acceptable Limits
Soil Vapor Samples Collected August 2014 - April 2015
SMI Holdings
Cupertino, California

Lab Package	LCS/LCSD Sample ID	Associated Sample	Compound	Recovery (%)	Limit (%)	Sample Result	ERM Qualifier
1409083	1409083-06A LCS/LCSD	See below	3-Chloropropene	57/62	70-130	--	--
1409083	--	SVP-2	3-Chloropropene	--	--	< 140 µg/m^3	UJ
1409083	--	SVP-1	3-Chloropropene	--	--	< 140 µg/m^3	UJ
1409083	--	SVP-3	3-Chloropropene	--	--	< 140 µg/m^3	UJ
1412029	1412029-06A LCS/LCSD	NA	alpha-Chlorotoluene	186/177	70-130	--	--
1412029	1412029-06A LCS/LCSD	NA	1,2,4-Trichlorobenzene	123/134	70-130	--	--
1412029	1412029-06A LCS/LCSD	NA	Hexachlorobutadiene	125/136	70-130	--	--
1501014	1501014-06A LCS/LCSD	NA	alpha-Chlorotoluene	170/167	70-130	--	--
1501014	1501014-06A LCS/LCSD	NA	Hexachlorobutadiene	132/121	70-130	--	--
1503032	1503032-06A LCS/LCSD	See below	Ethanol	63/62	70-130	--	--
1503032	--	SVP-1-02272015	Ethanol	--	--	< 86 µg/m^3	UJ
1503032	--	SVP-2-02272015	Ethanol	--	--	< 84 µg/m^3	UJ
1503032	--	SVP-3-02272015	Ethanol	--	--	< 77 µg/m^3	UJ

Data packages reviewed: 1409083, 1412029, 1501014, 1501386, 1503032, 1504457

Key:
LCS/LCSD = Laboratory control sample/laboratory control sample duplicate
UJ = Nondetected sample result qualfied as estimated
NA = Not applicable; associated sample data not affected
µg/m^3 = Micrograms per cubic meter

Table 2
Continuing Calibration Verification Recoveries Outside of Acceptable Limits
Soil Vapor Samples Collected August 2014 - April 2015
SMI Holdings
Cupertino, California

Lab Package	CCV Sample ID	Associated Sample	Compound	Recovery (%)	Limit (%)	Sample Result	ERM Qualifier
1504457	1504457-05A	NA	1,1,2,2-Tetrachloroethane	136	70-130	--	--

Data packages reviewed: 1409083, 1412029, 1501014, 1501386, 1503032, 1504457

Key:
CCV = Continuing calibration verification
NA = Not applicable; associated sample data not affected

Appendix D
Groundwater Potentiometric Surface Maps

Figure D1 - A1 Depth Interval Groundwater Elevation Contours - October 2014

Figure D2 - A3 Depth Interval Groundwater Elevation Contours - October 2014

Figure D3 - A1 Depth Interval Groundwater Elevation Contours – April 2015

Figure D4 - A3 Depth Interval Groundwater Elevation Contours – April 2015

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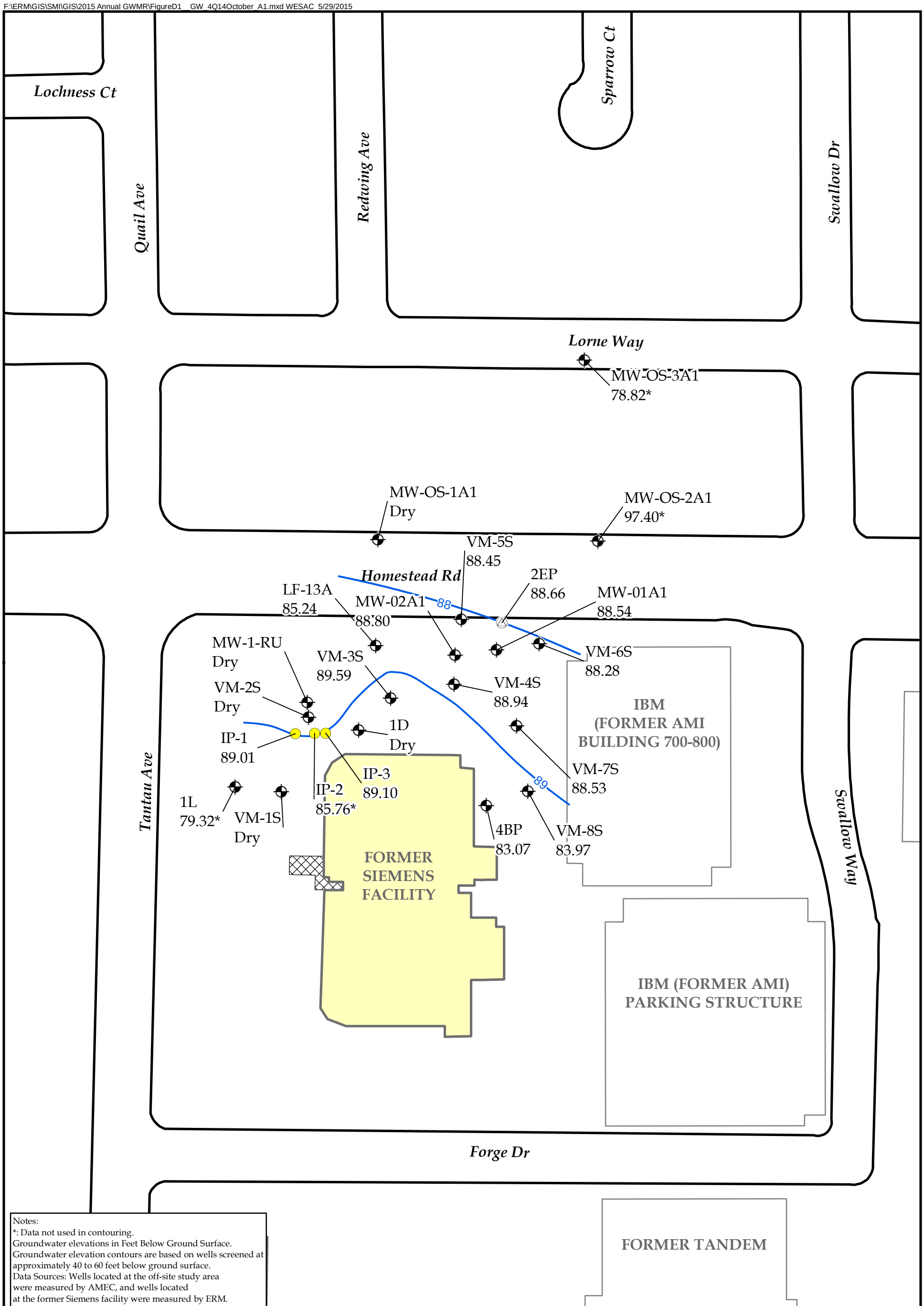

Notes:
*: Data not used in contouring.
Groundwater elevations in Feet Below Ground Surface.
Groundwater elevation contours are based on wells screened at approximately 40 to 60 feet below ground surface.
Data Sources: Wells located at the off-site study area were measured by AMEC, and wells located at the former Siemens facility were measured by ERM.

Legend

- Groundwater Extraction Well
- Injection Point
- Monitoring Well
- Existing Buildings
- Groundwater Remediation Facility
- City Block
- Groundwater Elevation Contour (1.0 ft)
- 77.67 Groundwater Elevation (feet relative to mean sea level)

Source: ARCADIS, Former Siemens Facility 2006 Annual Report: Figure 3 (dated 1/7/2010).

N

0 55 110

Scale in Feet

Intersil/Siemens Site
Cupertino, California

FIGURE D1

A1 DEPTH INTERVAL
GROUNDWATER ELEVATION CONTOURS
OCTOBER 7, 2014

ERM

PREPARED BY:
austin.phelps

JOB NO. 0201040.04SB
FILE: FigureD1__GW_4Q14October_A1

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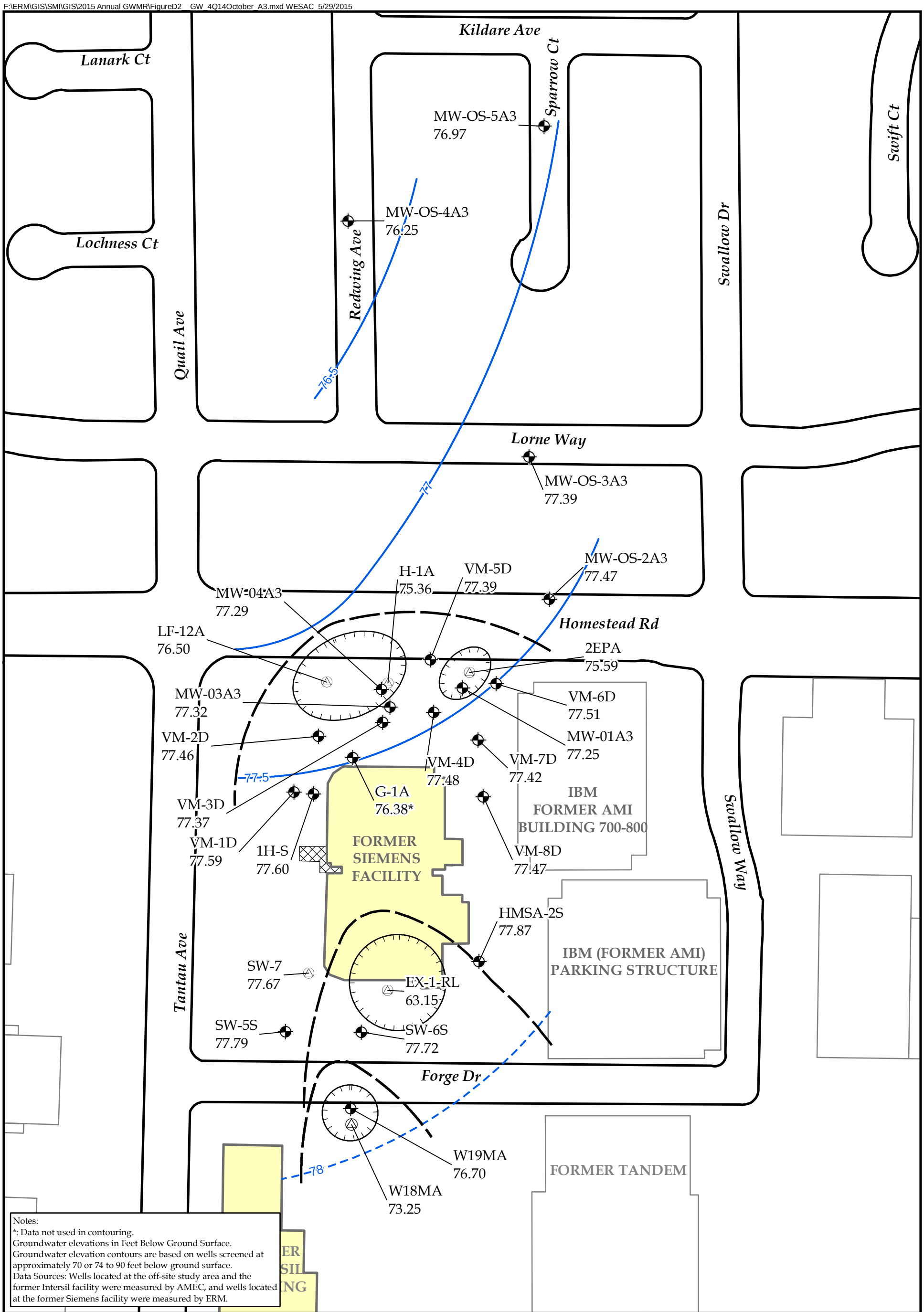

Notes:
*: Data not used in contouring.
Groundwater elevations in Feet Below Ground Surface.
Groundwater elevation contours are based on wells screened at approximately 70 or 74 to 90 feet below ground surface.
Data Sources: Wells located at the off-site study area and the former Intersil facility were measured by AMEC, and wells located at the former Siemens facility were measured by ERM.

Legend

- Groundwater Extraction Well
- Monitoring Well
- Existing Buildings
- Groundwater Remediation Facility
- City Block
- Depression in Groundwater Surface
- Groundwater Elevation Contour (0.5 ft) (Dashed Where Inferred)
- Estimated Capture Zone
- 77.67 Groundwater Elevation (feet relative to mean sea level)

Source: ARCADIS, Former Siemens Facility 2006 Annual Report: Figure 3 (dated 1/7/2010).

N

0 70 140

Scale in Feet

Intersil/Siemens Site
Cupertino, California

FIGURE D2

A3 DEPTH INTERVAL
GROUNDWATER ELEVATION CONTOURS
OCTOBER 7, 2014

ERM

PREPARED BY: austin.phelps

JOB NO. 0201040.04SB
FILE: FigureD2__GW_4Q14October_A3

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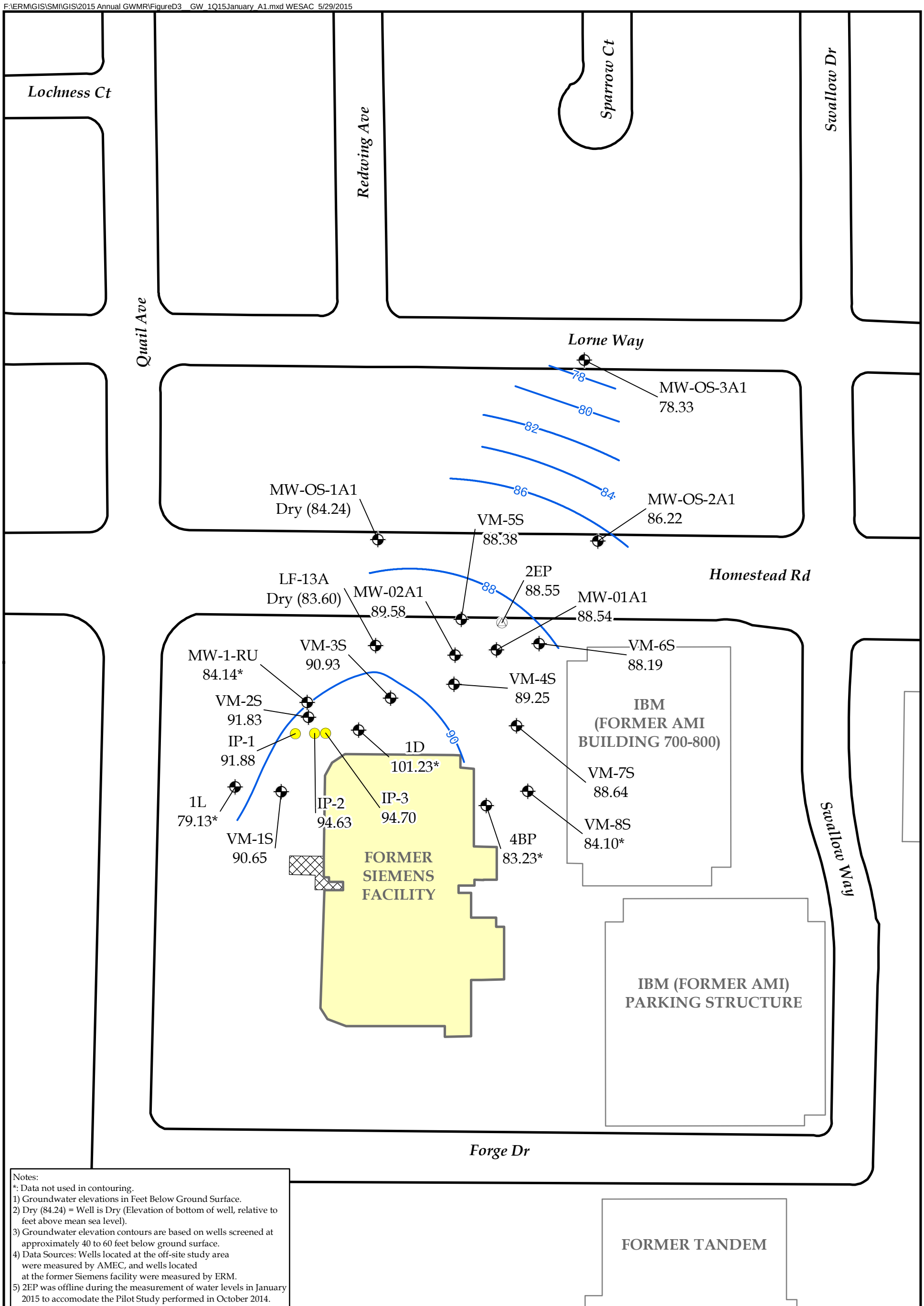

Notes:
*: Data not used in contouring.
1) Groundwater elevations in Feet Below Ground Surface.
2) Dry (84.24) = Well is Dry (Elevation of bottom of well, relative to feet above mean sea level).
3) Groundwater elevation contours are based on wells screened at approximately 40 to 60 feet below ground surface.
4) Data Sources: Wells located at the off-site study area were measured by AMEC, and wells located at the former Siemens facility were measured by ERM.
5) 2EP was offline during the measurement of water levels in January 2015 to accomodate the Pilot Study performed in October 2014.

Legend

- Groundwater Extraction Well
- Injection Point
- Monitoring Well
- Existing Buildings
- Groundwater Remediation Facility
- City Block
- Groundwater Elevation Contour (2.0 ft) (Dashed Where Inferred)
- 77.67 Groundwater Elevation (feet relative to mean sea level)

Source: ARCADIS, Former Siemens Facility 2006 Annual Report: Figure 3 (dated 1/7/2010).

N

0 55 110

Scale in Feet

Intersil/Siemens Site
Cupertino, California

FIGURE D3

A1 DEPTH INTERVAL
GROUNDWATER ELEVATION CONTOURS
JANUARY 12, 2015

ERM

PREPARED BY:
austin.phelps

JOB NO. 0201040.04SB
FILE: FigureD3__GW_1Q15January_A1

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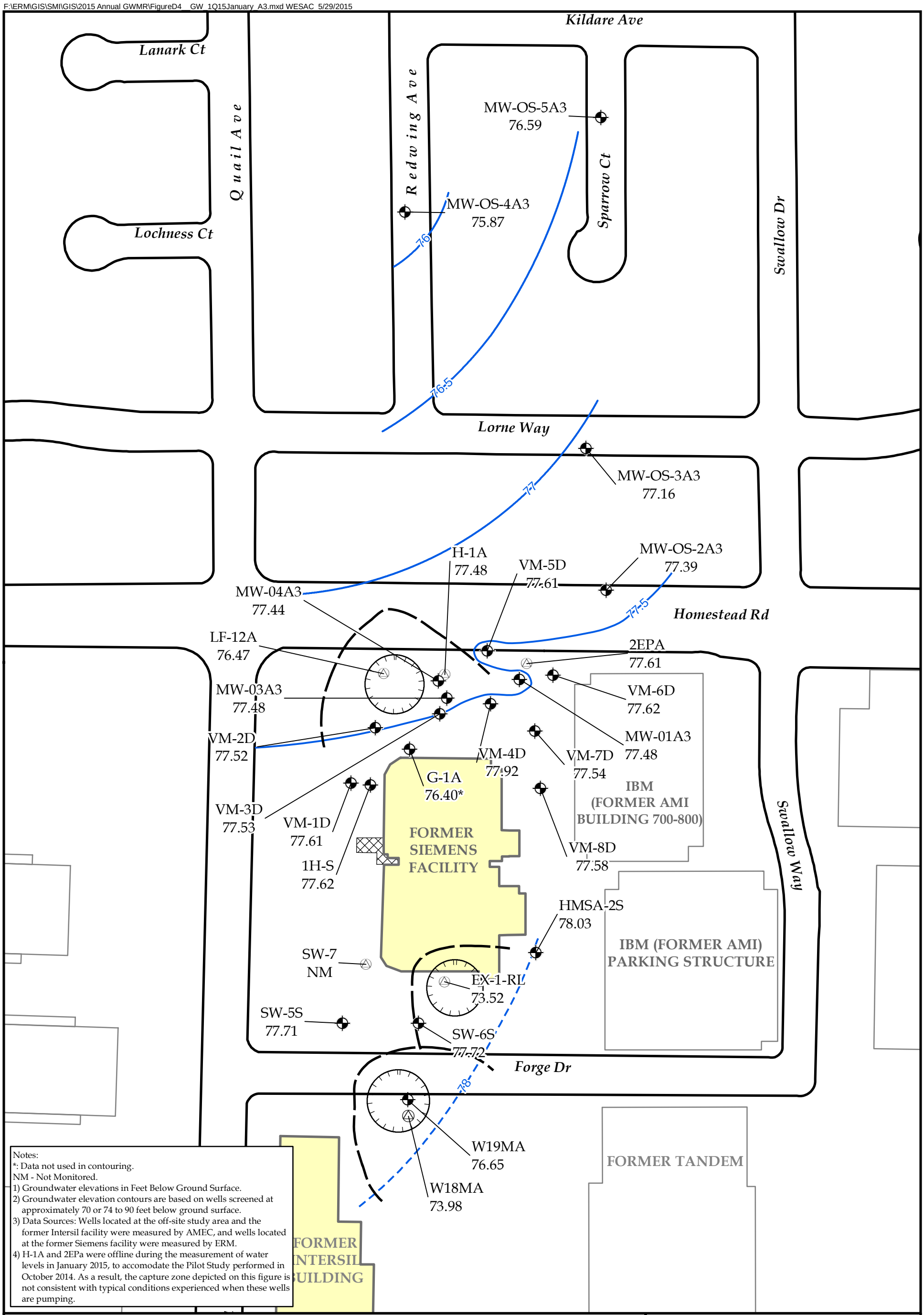

Notes:
*: Data not used in contouring.
NM - Not Monitored.
1) Groundwater elevations in Feet Below Ground Surface.
2) Groundwater elevation contours are based on wells screened at approximately 70 or 74 to 90 feet below ground surface.
3) Data Sources: Wells located at the off-site study area and the former Intersil facility were measured by AMEC, and wells located at the former Siemens facility were measured by ERM.
4) H-1A and 2EPa were offline during the measurement of water levels in January 2015, to accomodate the Pilot Study performed in October 2014. As a result, the capture zone depicted on this figure is not consistent with typical conditions experienced when these wells are pumping.

Legend

- Groundwater Extraction Well
- Monitoring Well
- Existing Buildings
- Groundwater Remediation Facility
- City Block
- Depression in Groundwater Surface
- Groundwater Elevation Contour (0.5 ft) (Dashed Where Inferred)
- Estimated Capture Zone
- 77.67 Groundwater Elevation (feet relative to mean sea level)

Source: ARCADIS, Former Siemens Facility 2006 Annual Report: Figure 3 (dated 1/7/2010).

N

0 70 140

Scale in Feet

Intersil/Siemens Site
Cupertino, California

FIGURE D4

A3 DEPTH INTERVAL
GROUNDWATER ELEVATION CONTOURS
JANUARY 12, 2015

ERM

PREPARED BY: austin.phelps

JOB NO. 0201040.04SB
FILE: FigureD4__GW_1Q15January_A3

Appendix E
Detailed Description of Results

APPENDIX E – DETAILED RESULTS REVIEW

This appendix presents a detailed summary of the performance monitoring results.

E.1 GROUNDWATER PERFORMANCE MONITORING RESULTS

The results for the performance groundwater monitoring are presented in Tables 5 through 9[1]. Figures 2, 3, and 4 illustrate the locations of the wells. The wells have been grouped as follows, based upon location, to support the assessment of this pilot study:

- Treatment Area Monitoring Wells – VM-3S, VM-3D, VM-4S, VM-4D, and MW-03A3;
- Cross-Gradient Monitoring Wells – VM-7S and VM-7D;
- Upgradient Monitoring Wells – G-1A, VM-8S, and VM-8D; and
- Downgradient Monitoring Wells – 2EP, 2EPa, H-1A, LF-6A, LF-13A, MW-01A1, MW-01A3, MW-02A1, MW-04A3, VM-5S, VM-5D, VM-6S, VM-6D, MW-OS-1A1, MW-OS-2A1, and MW-OS-2A3.

Findings of the evaluation are summarized in the following subsections by the above referenced well groupings. Table 2 identifies the monitored wells and the sampling schedule.

Field and laboratory parameters were used during monitoring as an indication of whether conditions were suitable for reductive dechlorination to occur, and whether reductive dechlorination conditions occurred post-injection.

E.1.2 Groundwater Elevations

The groundwater elevation data collected during the Phase II Pilot Study area are summarized in Table 5. For reference of the groundwater conditions, Appendix D provides the groundwater elevation contour maps for the A1 and A3 depth intervals associated with the 4th Quarter 2014 and 1st Quarter 2015 site-wide groundwater monitoring events.

---

[1] Data included in Tables 5, 6, and 8 also summarize data collected from the Annual 2014 and Second Quarter 2015 groundwater events performed on wells at the site and off site.

The groundwater elevation data indicate:

- Groundwater elevations were relatively stable within the A1 interval within the treatment area and downgradient area between the baseline event in August 2014 and the 6-month post injection monitoring event in April 2015. For example, Groundwater elevations rose at monitoring well VM-4S by 0.27 feet and declined at monitoring well VM-3S by 1.33 feet between the baseline and 6-month groundwater sampling events.
- Groundwater elevations within the A3 depth interval within the treatment area and downgradient area fell approximately 5.5 feet between the baseline and 6-month sampling events.
- The existing well pairs VM-3S and VM-3D, VM-4S and VM-4D, and MW-01A1 and MW-01A3 show the potential for a strong downward vertical gradient between the A1 and A3 depth intervals. These trends suggest both poor vertical communication between the A1 and A3 depth intervals suggesting perched conditions for the A1 and confined conditions in the A3.

E.1.2 Field Observations

During the sample collection, visual observations were made of groundwater color and odor to screen for the EVO with the uranine dye, and to correlate with groundwater quality data for the presence of residual EVO in the Pilot Study Area. The EVO is typically visible as a white- or cloudy-appearing solution to concentrations lower than 100 parts per million and is typically visible in wells within the injection area for several months following injection at similar sites. The odor of the fermentation byproducts from the EVO typically last beyond the visible indication of the EVO and can provide evidence for anaerobic biological activity.

Treatment Area Monitoring Wells

During the 1-month sampling event, a cloudy appearance was noted at treatment area monitoring well MW-03A3. During the 3-month sampling event, the cloudy appearance continued to persist at monitoring well MW-03A3, but the distinct EVO odor was also noted at monitoring wells VM-3S, VM-3D, VM-4S and VM-4D. During the 6-month sampling event, the cloudy appearance continued at monitoring well MW-03A3 and also appeared at monitoring wells VM-3S and VM-3D. These monitoring wells are located at approximately 10 to 30 feet from the closest injection points located within the treatment area.

Cross-Gradient and Upgradient Monitoring Wells

No cloudy/dye appearance or distinct EVO odor was noted in these wells during any of the sampling events. These wells range from 45 to 120 feet upgradient or crossgradient from the closest injection points located within the treatment area.

Downgradient Monitoring Wells

No cloudy water, dye, or the distinct EVO odor was noted in any of the downgradient wells during the respective sampling events with the exception of monitoring wells 2EPa, MW-01A3, VM-5S, and VM-5D. Black precipitates (potentially iron and manganese oxides) and the distinct EVO odor was noted at 2EPa during the 3-month sampling event and at VM-5S during the 6-month sampling event. During the 6-month event, the distinct EVO odor was noted at MW-01A3 and VM-5D. Monitoring wells 2EPa, MW-01A3, VM-5S and VM-5D are located at approximately 60 to 90 feet downgradient from the closest injection points located within the treatment area.

E.1.3 Field Parameters

Oxidation reduction potential (ORP) measurement of less than 0.0 mV and dissolved oxygen (DO) concentrations of less than 0.5 mg/L indicate groundwater conditions suitable for reductive dechlorination to occur. An ORP measurement of less than -100 mV is generally indicative of the conditions for robust reductive dechlorination. Additionally, pH close to neutral (i.e., 6 to 8) is the most conducive for healthy microbial populations. Most of the DO measurements were collected ex-situ and the range of values do not appear to align with the ORP and other geochemical indicators for reducing and anaerobic conditions (dissolved iron and observed reductive dechlorination). These data are not considered reliable and are not discussed.

Treatment Area Monitoring Wells

ORP measurements at the treatment area wells generally demonstrated decreased and negative values (ranging from -10 mV [VM-3S] to -145.3 mV [VM-4D]) during the 1-month through 6-month sampling events following treatment. The most strongly reducing condition was measured in well VM-4S located on the eastern half of the Pilot Study Area which received both EVO and EHC® treatment. This condition should be monitored as the EVO attenuates to evaluate in the persistence of the ZVI influences the long-term stability of the strong reducing conditions.

All pH readings ranged from 5.82 [VM-3S] to 7.26 [VM-4D]. With the exception of the 5.82 pH detected at VM-3S during the 3-month sampling event, the remaining of the measurements collected were within the desired range during the baseline through 6-month sampling events.

Cross-Gradient and Upgradient Monitoring Wells

Wells VM-8S and VM-8D are located approximately 120 feet upgradient of the Pilot Study area and provide a point of reference of the background variation in redox conditions. Wells VM-7S and VM-7D are located cross-gradient and could potentially show some influence from the Pilot Study other time. ORP measurements at monitoring wells VM-7S and VM-8S generally demonstrated decreased and negative values (ranging from -24 mV to -113.9 mV) during the 1-month and 3-month sampling event, respectively. Monitoring wells VM-7D and VM-8D demonstrated only decreased values (ranging from 48 mV to 92 mV) beginning during the 1-month sampling event. These findings show that upgradient groundwater, especially in the A1 zone progressed to more strongly reducing conditions during the Pilot Study. These results are positive in that this shows that reducing conditions can be sustained because of the low influx of aerobic water, but also complicate the clear attribution of the changes in groundwater geochemistry to the Pilot Study.

All pH measurements were within the desired range during the baseline through 6-month sampling events.

Downgradient Monitoring Wells

ORP measurements at monitoring wells 2EP, 2EPa, MW-01A3 and VM-5S generally demonstrated decreased and negative values (ranging from -22.8 mV [2EPa] to -118.8 mV [VM-5S]) beginning generally during the 3-month or 4-month sampling events. Monitoring wells MW-04A3, VM-5D and VM-6D started demonstrating reducing conditions (ranging from -35.2 mV [VM-5D] to -63.6 mV [MW-04A3]) during the 6-month sampling event. All remaining downgradient wells assessed for performance monitoring did not show any notable trends.

For off-site downgradient monitoring wells only, MW-OS-2A3 appeared to demonstrate decreased and negative ORP levels beginning at least during the 4-month sampling event. MW-OS-2A3 is located approximately 240 feet downgradient from the closes injection point. However, during the 6-month event, the ORP began to increase.

Carbon-ZVI was introduced to wells to support bioaugmentation at 2EP, 2EPa and VM-5S. This resulted in the measurement of strongly reducing conditions in these wells.

All pH readings were within the desired range during the baseline through 6-month sampling events with the exception of MW-OS-2A3 where the pH measurements collected during the 4-month sampling event were slightly above 8. This change at MW-OS-2A3 is not likely attributable to the Pilot Study.

E.1.4 Geochemical Constituents

Groundwater monitoring results for geochemical constituents from baseline though the 6-month sampling events are presented in Table 7 and discussed in this section.

Dissolved Iron and Manganese

The reduced forms of iron and manganese are more soluble; therefore, increases in the concentration of dissolved iron and manganese are typically used as a qualitative indicator for reducing conditions. Notable increases in dissolved iron and manganese were observed in Treatment Area wells. Dissolved iron and manganese concentrations also increased in the downgradient, upgradient, and cross gradient wells but to a lesser extent.

Methane Concentrations

Increase in methane production is commonly observed following the injection of EVO and similar compounds. Excessive methane generation is indicative of the use of the EVO by non-beneficial biota and suggests bioaugmentation is needed. Extreme generation of methane can become an issue problematic for gas accumulation and vapor intrusion.

As shown in Table 7, methane concentration increased in the treatment area monitoring wells MW-03A3, VM-3S and VM-4S during the 1-month through 6-month sampling events. At monitoring wells VM-3D and VM 4D, methane was detected beginning during the 3-month through 6-month sampling event. For downgradient monitoring wells with enough data for evaluation, increasing methane concentrations was generally detected at monitoring wells 2EP, 2EPa, MW-01A1, MW-01A3 and VM-5S beginning during the 3- or 4- through 6-month sampling events. For cross-gradient and upgradient monitoring wells with enough data for evaluation, increased methane concentration was only observed at VM-7S during the 3-month sampling event.

Ethane and Ethene Concentrations

Ethane and ethene concentrations are important in the assessment of the complete reductive dechlorination process as they are daughter products of completion of this process. Ethene is extremely transient in the aquifer and therefore is typically treated as a qualitative indicator for the presence of complete reductive dechlorination. The presence of ethane can indicate the inhibition of the reduction of chlorinated ethenes due to the presence of chlorinated ethanes.

As shown in Table 7, ethene was detected in the treatment area monitoring well VM-3S during the 3-month and 6-month sampling event, and in monitoring wells MW-03A3 and VM-4S during the 6-month sampling event. In the downgradient monitoring wells, ethane and ethene were detected at MW-01A3 during the 1-month and 3-month sampling events, respectively.

Sulfate Concentrations

Sulfate is an alternate electron acceptor for microbial respiration in the absence of oxygen, nitrate, and ferric iron. Sulfate is present in the background groundwater at the site. Depleted levels of sulfate relative to the background levels indicate that the environment is reducing to sustain sulfate reduction and for reductive dechlorination to occur. Sulfate levels less than 20 mg/L are desirable but not required for reductive dechlorination to occur.

As shown in Table 7, sulfate concentrations in groundwater collected within the treatment area monitoring wells MW-03A3, VM-3S, VM-3D, VM-4S, and VM-4D, and downgradient monitoring well MW-01A3 showed decreasing levels of sulfate to below 20 mg/L between the baseline event and the 6-month sampling event.

Chloride Concentrations

Chloride ions are produced by reductive dechlorination. Elevated levels of chloride may indicate that reductive dechlorination is occurring if concentrations are greater than three times the background and consistent with chlorinated VOC molar concentrations. As shown in Table 7, chloride concentrations in groundwater have not consistently shown this trend between the baseline event and the 6-month sampling event; however, chloride is only an indicator that reductive dechlorination may be occurring. Chloride was detected in all wells sampled during the baseline event and concentrations have remained stable through the 6-month event.

Nitrate Concentrations

Concentrations of nitrate less than 1.0 mg/L are desirable for reductive dechlorination of chlorinated VOCs. As shown in Table 7, treatment area monitoring wells MW-03A3, VM-3S, VM-3D, VM-4S, and VM-4D and downgradient of the Pilot Study Area monitoring wells (2EP, 2EPa, and MW-01A3), had detections of nitrate in groundwater below 1.0 mg/L during the 6-month sampling event. In addition, concentrations of nitrate in groundwater at the majority of these wells exhibited decreasing concentrations of nitrate between the baseline event and the 6-month event.

Total Organic Carbon Concentrations

The presence of total organic carbon (TOC) indicates its background organic carbon content during the baseline monitoring in each monitoring well. It is also an indicator of EVO and fermentation by-product distribution during performance monitoring. TOC concentrations of greater than 20 to 50 mg/L are desired in the treatment zone. As shown in Table 7, concentrations of TOC in treatment area monitoring wells MW-03A3, VM-3D, VM-3S, VM-4D and VM-4S were greater than 20 to 50 mg/L during the 6-month sampling event. In addition, concentrations of TOC in groundwater collected at all the monitoring wells increased between the baseline event and the 6-month sampling event. The concentration of TOC in monitoring wells MW-03A3 and VM-3S has decreased substantially since the 1-month and 3-month monitoring events. This suggests that the EVO is either being consumed or diluted but has persisted for more than 6 months.

TOC concentrations at all downgradient and cross-gradient monitoring wells have remained stable with the exception of the following downgradient wells: MW-01A3 (located approximately 60 to 65 feet downgradient from their closest injection points IP-06 and IP-11), where an increased TOC concentration of 360 mg/L from 0.48 mg/L was detected during the 1-month sampling event; and VM-5S (located approximately 40 to 50 feet downgradient from their closes injection points IP04 and IP-10) where TOC concentrations increased from 1.9 mg/L during the 4-month sampling event to 650 mg/L during the 6-month sampling event.

E.1.5 Volatile Organic Compounds

Groundwater monitoring results for VOCs are presented in Table 8 and are discussed below. The analytical results for VOCs were evaluated in two ways to assess the effectiveness of the Phase II Pilot Study:

- Evaluation of the data on a concentration basis to the baseline and historical dataset; and
- Evaluation of the proportions of the individual chlorinated VOCs using ratios on a molar basis.

The evaluation of absolute concentration can provide a basis for evaluating mass destruction and progress relative to remedial goals. The evaluation of the ratios (on a molar basis) for tetrachloroethene (PCE), TCE, cis-1,2-DCE and VC provides the most direct evidence for reductive dechlorination. Plots of concentration versus (vs) time and molar ratios are included for key monitoring wells in the treatment area, upgradient/crossgradient of the treatment area and downgradient of the treatment area in included in Appendix B.

Results of the evaluation are summarized below. Certain wells in some of the downgradient and crossgradient/upgradient groupings are not discussed further if there are no notable findings to report.

Treatment Area Monitoring Wells

The data from the treatment area monitoring wells show that the Phase II Pilot Study was effective in supporting reductive dechlorination. No rebound of TCE concentrations were evident in any of the monitoring wells to date.

- VM-3S (EVO injection area) – The concentrations of all VOCs at this location decreased from the baseline to the 6-month monitoring event. TCE was completely eliminated (0.026 mg/L to non-detect) and the data suggest cis-1,2-DCE was actively converted to VC. Data from this well did not suggest an accumulation of VC and support complete reductive dechlorination.
- VM-3D (EVO injection area) – The results at this location are similar to monitoring well VM-3S. TCE (0.087 to 0.0015 mg/L) and cis-1,2-DCE (0.29 to 0.01 mg/L) have been destroyed or converted to VC. Total VOC concentrations show a strong reduction. Data from this well did not suggest an accumulation of VC and support complete reductive dechlorination.
- VM-4S (EVO and EHC injection area) – Well VM-4S was the well with the highest concentration of VOCs on the property. Trend plots show a substantial decrease in VOC concentrations and VOC mass at this well. TCE concentrations were reduced drastically (0.23 to 0.0072 mg/L). Only a small change in the relative proportions of VOCs was observed, with an increase in VC. Data from this well did not suggest an accumulation of VC and support complete reductive dechlorination. Data from this well may support the complete destruction of VOCs via chemical reduction expected from the application of ZVI.

- VM-4D (EVO and EHC injection area) – Concentration trends show only moderate increases and decreases during the monitoring period. TCE concentrations decreased from 0.15 mg/L to non-detect and was completely converted to cis-1,2-DCE, and the proportion of VC appears to be increasing with time.
- MW-03A3 (EVO and EHC injection area) - Concentration trends show only moderate increases and decreases during the monitoring period. TCE was generally converted to cis-1,2-DCE, and the proportion of VC is increasing with time

Cross-Gradient and Upgradient Monitoring Wells

The data from the cross-gradient/upgradient monitoring wells do not appear to show obvious treatment effects, but the decreases in TCE concentrations are likely related to seasonal changes during this monitoring period.

- VM-7S and VM-7D - Cis-1,2-DCE and VC concentrations in monitoring well VM-7S have increased slightly during this monitoring period. For monitoring well VM-7D, its TCE concentration has decreased drastically while all other VOC concentrations have generally remained consistent and not detected during this monitoring period. The decrease in TCE concentrations correlates with the decline in groundwater elevation at VM-7D. These wells are located approximately 70 to 75 feet cross-gradient from the closest injection points.
- VM-8S and VM-8D – VOC concentrations at monitoring well VM-8S has decreased slightly from the baseline to 6-month monitoring event. TCE concentrations in monitoring well VM-8D has decreased drastically during this monitoring period. These wells are located approximately 120 feet upgradient from the closest injection point.
- G-1A - Increase in concentrations of cis-1,2-DCE, 1,1 DCE and VC were noted. This result is an outlier in the historical dataset. This well is located approximately 45 feet upgradient from the closest injection point. Despite the suggestive correlation, it is not clear if the Pilot Study had a causal effect on this change in VOC distribution.

Downgradient Monitoring Wells

The data from the downgradient monitoring wells show that to date, the Phase II Pilot Study has had limited effect on VOC concentrations in the downgradient areas, with the exception of MW-01A3.

- MW-01A3 – Only minor changes to the total concentration of VOCs was observed; however, TCE concentrations at this location decreased drastically

(0.15 to 0.01 mg/L) from the baseline to the 6-month monitoring event. Trend plots show that most of the TCE has been converted to cis-1,2-DCE which is actively being converted to VC.

- VM-5S and 2EPa – With the exception of the 3-month monitoring event, these wells show variability in VOC concentration, but little evidence for impact from the Pilot Study. Increased VC concentrations were observed downgradient of the Pilot Study Area and close to the property boundary (2EPa and VM-5S) during the 3-month sample event. Similar increases in VC were not observed in the wells located between these wells and the treatment area (MW-01A1, MW-01A3, or MW-02A1). The Mitigation Plan was implemented as discussed in Section 4.6.1 based on these results. As part of the Mitigation Plan implementation, 2EPa and VM-5S were resampled to confirm the 3-month condition. The results for the resample (4-month sample event) did not confirm the elevated VC concentrations and these results appear to be outliers.
- MW-01A1, MW-02A1, MW-04A3, VM-5D and 2EP - Downgradient wells have generally not shown strong evidence of treatment effects during the monitoring period because TCE concentrations and ratios have not shown notable decreases and dechlorination product concentrations and ratios are generally stable and consistent.

E.1.6 Environmental Molecular Testing

Groundwater samples were collected from wells to screen for the presence and population of dehalococcoides (DHC) and active expression of the vinyl chloride reductase (vcrA) gene (required for the destruction of VC). Results for these samples are presented in Table 9.

Positive identification of DHC indicates the potential for complete dechlorination of chlorinated ethenes such as TCE. The absence of vcrA, a gene expression, can cause toxic accumulation of VC and thus may indicate the need for a bioaugmentation inoculant in order to provide an environment suitable for complete dechlorination of chlorinated VOCs. According to manufacturer recommendations, values of 105 to 106 DHC or vcrA gene copies per liter of groundwater are considered as containing moderate concentrations associated with observable dechlorination activity (i.e., detectable ethene). Values at or above 107 DHC and vcrA gene copies per liter of groundwater indicates that the sample contains high concentrations that are often associated with high rates of dechlorination (Lu et al., 2006) and the production of ethene.

Based on a review of the data (Table 9), DHC and vcrA are reported at optimum or close to optimum concentrations (where complete dechlorination to ethene) is

likely within the treatment area monitoring wells VM-3S, VM-3D and VM-4S. Concentrations of the vcrA expression increased over time without additional augmentation at wells VM-3S, VM-4S, and VM-4DS. This may be indicative of a gradual establishment of suitable conditions over time, especially in the shallower wells. Lower concentrations of DHC and vcrA were observed in downgradient monitoring wells MW-01A1, MW-01A3 and VM-6S.

Note that the additional bioaugmentation further discussed in Section 4.1.3 was performed immediately after the 4-month sampling event at monitoring wells 2EP, 2EPa and VM-5S. The results of the 6-month monitoring event show increased DHC and vcrA expression in each of these three wells.

E.2 SOIL VAPOR PERFORMANCE MONITORING RESULTS

The methane and VOC concentrations in the three semi-permanent vapor probes were monitored during performance monitoring sampling events to evaluate potential methane generation and any increases in the volatilization of VOCs within the injection area. Methane was not detected in any of the soil vapor monitoring events.

There were no increases in detected VOCs were observed at the soil vapor probe locations with the exception of SVP-2 where a slight increase in 1,1,1-trichlorothane occurred between the baseline and 1-month sampling events. However, 1,1,1-trichloroethane concentrations decreased at SVP-2 following the 1-month event. Freon 113, 1,1-DCE, TCE, and PCE concentrations have either remained stable or shown decreasing trends between the baseline and 6-month sampling events.

E.3 EXTRACTION WELL PERFORMANCE MONITORING RESULTS

Enhanced bacterial growth can foul the existing treatment system and could result in elevated biological oxygen demand in the treatment system effluent. MW-01A1 and MW-01A3 were used to monitor the upgradient conditions for extraction wells 2EP and 2EPa, and monitoring well MW-04A3 was used to monitor the upgradient conditions for extraction well H-1A. Extraction well LF-6A, which continued to operate because it is screened in the A4 depth interval, was also assessed.

Monitoring wells MW-01A3 and MW-04A3 showed increasing concentrations of TOC between the baseline and the 6-month sampling events. Because these wells showed more than a 20 percent increase from baseline conditions, extraction

wells 2EP, 2EPa, and H-1A were not restarted following the 6-month sampling event.

The TOC concentrations at the A4 depth interval extraction well LF-6A were not detected above the reporting limit of 1 mg/L during the baseline and 1-month sample events. During the 3-month sample event, the TOC concentration increased to 1.9 mg/L. This TOC concentration decreased to 0.54 mg/L during the 6-month sample event. An additional sample will be collected at 9 months to assess whether TOC has increased, decreased, or has stabilized.