ADDITIONAL VAPOR INTRUSION ASSESSMENT

CALIFORNIA-OLIVE-EMERSON (COE) STUDY AREA
PALO ALTO, CALIFORNIA

Prepared for:
Hewlett-Packard Company and
Varian Medical Systems, Inc.

Prepared by:
Stantec Consulting Services Inc.
15575 Los Gatos Boulevard,
Building C
Los Gatos, California 95032-2569

July 29, 2015

Sign-off Sheet

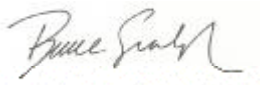
This report entitled *Additional Vapor Intrusion Assessment* was prepared by Stantec Consulting Services Inc. (Stantec) in accordance with generally accepted professional engineering and environmental consulting practices existing at the time this report was prepared and applicable to the location of the site. It was prepared for the exclusive use of Hewlett-Packard Company, Varian Medical Systems, Inc., the Regional Water Quality Control Board and the United States Environmental Protection Agency. Any re-use of this report for a different purpose or by others not identified above shall be at the user's sole risk without liability to Stantec. The opinions expressed and data collected are based on the conditions of the site existing at the time of the field investigation. No other warranties, expressed or implied are made by Stantec.

Prepared by:

(signature)
Patrick H. Vaughan, MS, CEM
Principal Facility Assessment & Indoor Environment

(signature)
Mark Becker
Principal Scientist

Reviewed by:



(signature)
Bruce Scarbrough
Principal Geologist

Stantec

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Introduction
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. INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this *Additional Vapor Intrusion Assessment* ("the Report") for the California-Olive-Emerson (COE) Study Area in Palo Alto, California on behalf of Hewlett-Packard Company and Varian Medical Systems, Inc. (collectively, "the Companies"). The COE Study Area is shown on Figure 1.

The Report presents the methods, findings and conclusions related to implementation of the January 30, 2015 *Work Plan for Additional Vapor Intrusion Assessment COE Study Area, Palo Alto, California (the "Work Plan")*. Approval of the Work Plan was issued by the San Francisco Bay Area Regional Water Quality Control Board (Water Board) on February 13, 2015.

This additional vapor intrusion assessment work is part of a comprehensive investigation and evaluation of the vapor intrusion pathway in the COE Study Area that was initiated in response to the September 30, 2010 *Third Five-Year Review for the Hewlett-Packard (620 - 640 Page Mill Rd.) Superfund Site* issued by the Water Board and concurred with by the U.S. Environmental Protection Agency (USEPA). That Five-Year Review recommended reevaluating the vapor intrusion pathway using multiple lines of evidence in the Off Property Study Area, after further plume delineation for volatile organic compound levels in first encountered groundwater.

The further plume delineation was completed in 2011. Overall, multiple rounds of indoor air testing were performed at 12 single-family and duplex residential properties, 7 multi-family residential or mixed use properties, and 10 commercial properties. None of the air samples from living spaces and regularly occupied work spaces contained chemicals of potential concern (COPCs) attributable to vapor intrusion at levels that exceeded any applicable long- or short-term screening levels or response action levels. In addition to testing in living and workspaces, potential pathway air sampling was performed in crawl spaces, elevator shafts, utility rooms and garages. Multiple lines of evidence (including subsurface lithology, depth to groundwater, chemical concentrations in first encountered groundwater, and indoor air sampling analytical results) developed by the vapor intrusion investigations and ongoing groundwater monitoring demonstrate that the existing remedy is protective with regard to the vapor intrusion pathway. HP and Varian have now completed all of the work agreed to with the agencies with respect to this vapor intrusion investigation in the COE Study Area.

The remainder of this Report is organized as follows.

- Section 2 provides a brief project background summary.
- Section 3 presents the scope of work that was completed.
- Section 4 describes the methods and procedures used to implement the work.

- Section 5 summarizes the quality assurance and quality control procedures that were utilized and the associated results.
- Section 6 summarizes the air sampling laboratory analytical results.
- Section 7 presents conclusions.

To protect the privacy of the owners and occupants, street addresses for buildings where indoor air testing was conducted are not disclosed in this Report. Floor plans showing sampling locations are not provided for the same reason. All sampling locations were mutually agreed upon with USEPA based on observations during pre-sampling building walkthroughs.

. BACKGROUND

The COE Study Area includes the Hewlett-Packard Company (HP) 620 - 640 Page Mill Road Superfund Site, the former HP 395 Page Mill Road Site, and the former Varian Medical Systems, Inc. (Varian) 601 California Avenue Site (collectively, the Sites). Areas beyond the Site boundaries are referred to as "Off Property." The Perimeter Area extends southeast of the COE Study Area as illustrated on Figure 1.

The Water Board currently regulates the investigation and cleanup of groundwater in the COE Study Area and Perimeter Area pursuant to *Revised Site Cleanup Requirements, Order No. 94-* , issued on September 21, 1994. USEPA provides technical guidance and support to the Water Board related to the HP 640 Page Mill Road Superfund Site and the Off Property Area. VOC-impacted groundwater originating from the Sites comingles in the Off Property Area, along with VOC-impacted groundwater from other sources in the area.

Previous vapor intrusion assessment in the COE Study Area was conducted by the Companies during 2012 through 2014 in accordance with the February 17, 2012 COE Study Area Water Board-approved *Revised Work Plan for Indoor Air Testing*, and the January 13, 2014 *Addendum to the February 17, 2012 Revised Work Plan for Indoor Air Testing* ("the Initial Work Plans"). Work completed pursuant to the Initial Work Plans addressed Water Board requirements to conduct indoor air testing in building structures that overlie first encountered groundwater containing trichloroethene (TCE) concentrations that exceed 50 micrograms per liter (µg/L) and 100 µg/L for residential and commercial use properties, respectively. That area is referred to as the "Initial Vapor Intrusion Study Area".

The USEPA and Water Board subsequently directed the Companies to expand the assessment area to include commercial and residential use properties located between the Initial Vapor Intrusion Study Area and the estimated 5 µg/L limit of TCE in the first encountered groundwater zone. This expanded assessment area is referred to as the "Supplemental Assessment Area".

Figure 2 is the TCE iso-concentration contour map for first encountered groundwater from 2011 that was included in the Initial Work Plans. Figure 3 is a TCE iso-concentration contour map for first encountered groundwater based on data collected in 2014 (the most recent published data). Figure 4 illustrates the Supplemental Assessment Area.

Previous vapor intrusion assessment findings are presented in the *Indoor Air Testing and Supplemental Assessment Report*, which was submitted to the Water Board on September 19, 2014 (the "IA Testing Report"), which, for completeness, is attached hereto (excluding laboratory analytical reports) as Appendix A. The IA Testing Report concluded that there is no unacceptable short- or long-term health risk to residential and commercial building occupants from the vapor intrusion pathway. The Water Board concurred with this conclusion in its January 8, 2015 IA Testing Report approval letter, which states, "There is no evidence of vapor intrusion at

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unacceptable levels in any of the continuously occupied living spaces or work spaces tested to date." The January 8, 2015 Water Board letter also required the additional investigations described in this Report.

. SCOPE OF WORK

Stantec completed the scope of work described in this section consistent with the Water Board-approved Work Plan. The scope of work consisted of the following tasks.

Task 1 – Assessment of Buildings with Sub-Surface Structures
Task 2 – Additional Residential Outreach and Testing

Task 1 – Assessment of Buildings with Sub-Surface Construction

Stantec, in cooperation with USEPA, conducted additional assessment of those buildings in the Supplemental Assessment Area with sub-surface construction (i.e., enclosed sub-grade parking garages and a finished residential basement). Stantec subsequently conducted air testing at three properties, per the direction of USEPA.

Supplemental Assessment work reported in the IA Testing Report identified properties that have subsurface construction but overlie groundwater with lower TCE concentrations than the Initial Vapor Intrusion Study Area (down to a level equal to or greater than 5 micrograms per liter, or µg/L). Stantec conducted the following additional work to assess the potential for vapor intrusion into those Supplemental Assessment Area buildings.

- Initial screening, including field reconnaissance with USEPA staff, of buildings identified as having subsurface construction to determine if further assessment is necessary.

- Further assessment of certain buildings determined to be warranted by USEPA.

Stantec and USEPA staff cooperatively conducted initial screening work on January 7, 2015. USEPA staff identified 15 properties of interest based on review of data from the IA Testing Report. Stantec accompanied USEPA staff during field reconnaissance (observations from public rights-of-way) and provided depth-to-water and groundwater TCE concentration data for wells proximate to the 15 properties of interest. Based on field reconnaissance and groundwater depth and TCE concentration data provided, USEPA staff requested, that further assessment, – including air testing be conducted at three properties. Two of the properties were developed with a single, multi-story commercial use building, and the other (Building 34) was developed with a multi-family, multi-building residential complex with a subgrade garage. Both the multi-family property and one of the commercial properties selected by USEPA are the locations of past releases not associated with HP or Varian that have been the subject of past and ongoing Water Board investigations.
Stantec conducted the following activities for the three properties specified by USEPA.

- Identified property owners and/or managers to obtain access.

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- Conducted reconnaissance in cooperation with USEPA to ascertain whether air testing would be warranted.
- Reviewed available information from online Water Board and Santa Clara Valley Water District databases and identified potential on-site subsurface sources of volatile organic compounds (VOCs) at these properties.
- Developed a site-specific sampling approach, which was approved by the USEPA.
- Conducted air testing during May 2015 in accordance with the procedures in the Initial Work Plans, as described in Section 3 of this Report. At least two rounds of testing were completed at each of the three properties.
- Maintained quality assurance, including sampling and analytical procedures, and data review, management and evaluation, in accordance with the Initial Work Plans.

Task 2 – Additional Residential Outreach and Testing

Stantec accompanied USEPA staff on January 9, 2015 to complete additional outreach to occupants of the 20 residential units (14 single-family homes, one duplex and one 4-unit complex) within the Initial Vapor Intrusion Study Area. Each of these properties previously had been contacted by USEPA and Stantec in 2012 and had either failed to respond or declined to provide access for sampling. A USEPA outreach letter was left at each of the 20 residential units. A copy of the USEPA outreach letter is included as Appendix B.

Permission to conduct air testing was provided by residents of two single-family homes (Buildings 31 and 32) where access for air sampling had not been previously granted. Permission for additional air testing was also granted for the "common room" at residential Building 19, where cold season air testing could not be performed in 2014 due to ongoing construction and associated chemical storage.

Air testing was conducted during January and February 2015 at the three properties referenced above in accordance with the procedures in the Initial Work Plans, as described in Section 3 of this Report. Two rounds of testing were completed at each of the three properties.

. METHODS AND PROCEDURES

Stantec utilized the methods and procedures described below in conducting air testing at four residential properties and two commercial properties.

. PRE-SAMPLING ACTIVITIES

Stantec completed the following activities before conducting air testing.

- Prepared a Health and Safety Plan (HASP) to cover field work conducted to implement the Work Plan and Work Plan Addendum.

- Scheduled and conducted pre-testing building walk-throughs (surveys) jointly with USEPA to identify the number, type and location of air samples to be collected. A goal of the surveys also was to identify conditions that may affect or interfere with the proposed testing. Sampling locations were reviewed by and concurred with by the building/complex owner or manager. Walk-throughs included routinely occupied living spaces, subgrade parking areas (where present), and potential vapor intrusion pathways such as maintenance and utility rooms and elevators. Stantec and USEPA gathered information regarding heating ventilation and air conditioning (HVAC) systems during walk-throughs based on field observations and input from the tenant, owner or manager. Stantec utilized the *Indoor Air Quality Building Survey* forms referenced in the initial Work Plans when conducting the walk-throughs.

. AIR SAMPLING

Stantec conducted air sampling in accordance with the procedures described in the initial Work Plans. Air samples were collected in individually certified 6-liter Summa™ canisters. Each canister was fitted with a laboratory-certified flow controller set to collect a sample over the specified time interval for the type of property; i.e. 24 hours for residential properties, and 10 hours for commercial properties. Collected samples were labelled, and then stored at ambient temperature and away from direct sunlight pending transfer to the laboratory for analysis. The types of air samples collected are classified and described as follows.

- Indoor Air samples. Time-integrated samples collected in spaces with the potential to be routinely occupied under normal or reasonably foreseeable conditions from a height considered to represent a typical breathing zone (approximately 3- to 5-feet above floor).

- Pathway samples. Time-integrated samples collected in spaces, identified in conjunction with USEPA, that are not typically occupied for extended periods of time (e.g., less than a typical workday) such as electrical, storage and mechanical rooms or other locations with slab and/or ceiling penetrations which could act as a conduit for the transport of VOCs to occupied areas of the building.

- Garage samples. Samples were collected from semi-enclosed or subterranean parking structures. Sampling procedures were the same as those used for indoor air sample collection (e.g., the same canister configuration and sampling duration, depending on building use). Samples collected from parking structures are not considered the equivalent of indoor air samples because parking structures are not routinely occupied for extended periods of time and often have separate ventilation designed for vehicle exhaust.

- Outdoor Air samples. Samples collected from locations determined at the time of sampling to be upwind of the building under evaluation. Outdoor air samples were collected over the same duration as Indoor Air samples.

Stantec conducted air testing during 2015 at four residential properties (two single-family homes, two multi-family complexes) and two multi-story commercial use properties. Table 1 is a summary of the residential building samples that were collected. The table includes information about the type of each building where sampling was conducted, the sample type and/or location, and the number of samples that were collected. Table 2 is a summary of the commercial building samples that were collected. The table identifies whether or not the HVAC system was operating when air samples were collected (where applicable), and the types and number of samples collected.

HVAC-off testing was conducted at one of the two commercial buildings (Building #35). Consistent with the USEPA-approved sampling plans, testing at the other commercial building (Building #33) was limited to subgrade garage and pathway samples. HVAC-off sampling was conducted after the building HVAC system had been shut down for at least 36-hours. The HVAC system remained off for the duration of the approximately 10-hour sampling period.

. . Laboratory Analysis

The collected air samples were transferred under chain-of-custody to Eurofins Air Toxics Inc. of Folsom, California, a State of California NELAP accredited laboratory. Samples were analyzed for the COPCs identified in the Initial Work Plans and chloroform, which was added to the analyte list at the request of USEPA using EPA Method TO-15 SIM. The project specific COPCs are trichloroethene (TCE), tetrachloroethene (PCE), cis 1,2-dichloroethene (cis-1,2-DCE), vinyl chloride (VC), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-dichlorobenzene (1,2-DCB), 1,1,1-trichloroethane (1,1,1-TCA), and Freon 113.

. . Evaluation Criteria

Per the direction of USEPA and the Water Board, results were compared to the screening criteria presented in Table 3 and described below. Only air samples collected from spaces that are, or have the potential to be, routinely occupied (i.e. "Indoor Air samples") are considered appropriate for direct comparison to these screening levels. Direct comparison of Pathway and Garage sample results to Indoor Air screening criteria is not appropriate because the screening

criteria are developed using exposure assumptions that are not met in these areas. For example, garages and utility rooms are not routinely occupied for more than short time periods, and have different natural and mechanical ventilation. Indoor air quality in a parking garage is also influenced by automobile emissions and potential automotive fluid leaks.

- *Tier 1 – Outdoor Air:* Outdoor Air samples were collected during each residential and commercial sampling event. Indoor Air sampling results were compared to outdoor air sampling results to determine whether indoor air quality may have been affected by ambient, outdoor sources unassociated with vapor intrusion.

- *Tier 2 – USEPA Region 9 Short-Term Health-Risk-Based Criteria:* This includes the following:

    - *USEPA Region 9 TCE Indoor Air Short-term Action Levels:* In December, 2013 USEPA provided *Interim TCE Indoor Air Short-term Response Action Levels and Guidelines* for TCE for use in vapor intrusion investigations conducted at South Bay National Priorities List sites identifying "Prompt Action Levels" of 2 µg/m^3 for residential exposure and 9 µg/m^3 and 7 µg/m^3 for commercial/industrial exposure for 8- and 10-hour workdays respectively. These action levels are referenced in the Work Plan Addendum.

      In July, 2014, USEPA made available an internal memorandum, "*EPA Region 9 Response Action Levels and Recommendations to Address Near-Term Inhalation Exposures to TCE in Air from Subsurface Vapor Intrusion*" which then identifies "Accelerated Response Action Levels" reducing the December, 2013 USEPA Region 9 Prompt Action Level from 9 to 8 µg/m^3 for commercial/industrial exposure for an 8-hour workday and specifying "Urgent Response Action Levels" set at 6, 24, and 21 µg/m^3 for residential use and commercial/industrial use properties with 8- or 10-hour workdays, respectively.

    - Agency for Toxic Substances and Disease Registry (ATSDR) acute (14-day) and intermediate (15- to 365-day) Minimal Risk Levels (MRL) applicable to short or moderate exposure periods to certain chemicals. An acute or intermediate MRL is an estimate of the daily human exposure to a chemical in air likely to result in no appreciable risk of adverse non-cancer health effects. The ATSDR acute and intermediate MRLs for TCE in the Work Plan were replaced by USEPA's new action levels in the Work Plan Addendum.

- *Tier 3 – Long-Term Health-Risk-Based Criteria:* USEPA Regional Screening Levels (RSLs) for Indoor Air were directed by the agencies for use as long-term screening values. These have been established based on the assumption of exposure to chemicals over 25-years, 250-days per year and 8-hours per day by workers at commercial/industrial-use properties. Screening levels for residential properties are based on exposure to chemicals over 30-years, 350-days per year and 24-hours per day. These long-term criteria are the lowest values against which the indoor air results were compared. An exception to the use of RSLs was specified by the RWQCB for PCE: because the California EPA Office of Environmental Health Hazard Assessment toxicity value for PCE is more conservative than the value used to derive the

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USEPA RSL. California-modified screening levels of 0.42 µg/m^3 for residential and 2.1 µg/m^3 for commercial/industrial use properties were used for screening PCE results.

. QUALITY ASSURANCE AND QUALITY CONTROL ANALYSIS

This section summarizes the Quality Assurance and Quality Control (QA/QC) procedures implemented during sample collection and analysis. QA/QC procedures presented in Section 4.0 (Quality Assurance Project Plan [QAPP]) of the February 17, 2012 Work Plan were used to assess the quality of data through an evaluation of accuracy, precision and completeness.

Copies of laboratory analytical reports are provided in Appendix C. Stantec evaluated each laboratory report with respect to case narratives, receiving discrepancies, ship/receipt sample vacuums, canister dilution factors, surrogate recoveries, detections in method blanks, Laboratory Control Spike (LCS) and LCS Duplicate (LSCD) recoveries, and a comparison of results for primary and duplicate field samples, including relative percent difference as feasible. In addition, 20 percent of the laboratory reports issued underwent in-depth data validation of the laboratory-supplied Level 1 electronic comprehensive validation packages. The laboratory-supplied Level 1 data validation (eCVP) packages reviewed by Stantec, and associated Stantec Analytical Data Validation Reports, are provided in Appendix D.

. FIELD QA/QC

All samples were collected in accordance with the Revised Work Plan and Work Plan Addendum, submitted to a NELAP-certified laboratory, (Eurofins Air Toxic of Folsom, California) and prepared and analyzed using USEPA Method TO-15 SIM. No replicate samples or performance evaluation samples were collected by USEPA.

Stantec collected duplicate samples at a frequency of 1 duplicate per 10 primary samples collected, or at least 1 duplicate for each day of sampling.

A total of 10 primary/duplicate pairs were collected. With the exception of sample 35-IA-5, precision as measured by the relative percent difference (percent RPD) between the primary and duplicate samples, could not be calculated because one or both results were non-detect (e.g., not detected above the laboratory reporting limit). For 35-IA-5, chloroform was detected at the same concentration (2.8 µg/m^3) in both primary and duplicate samples (RPD = 0). TCE was detected only in the primary sample at this location (0.22 µg/m^3) but not above the laboratory reporting limit (0.19 µg/m^3) in the duplicate (DUP-1). In accordance with the Initial Work Plans, the higher of the primary or duplicate results was used for comparison to screening levels.

The laboratory noted one exception to sampling procedures described in the Work Plan QAPP: final canister vacuums for samples 35-IA-6 and 35-PW-4 were measured at 0 inches (mercury) in the field and later confirmed by the laboratory upon receipt. The laboratory also noted both canisters and their flow controllers passed a leak test. This indicates that at some point (most likely at the end of the sampling duration) there was insufficient differential pressure to drive the flow controller. Although the exact sampling interval is not known, the canisters still contained a

sample. No data qualifiers were assigned to samples 35-IA-6 and 35-PW-4 by the laboratory or by Stantec during data validation. Data from samples 35-IA-6 and 35-PW-4 are considered acceptable for use.

. LABORATORY QA/QC

As specified in the QAPP, all data were subjected to Stage 2A validation which as specified in the Work Plan generally consisted of verification and validation based on completeness of receipt conditions and sample QC results. In addition, Stantec performed an EPA Stage 2B validation of the electronic comprehensive validation packages (eCVP) on 20 percent of the sample data groups (laboratory work orders). The Stage 2B validation includes all the elements of the Stage 2A validation plus an evaluation of raw data instrument-related QC results including but not limited to instrument calibration, surrogate retention time, mass and instrument response, laboratory blanks, matrix spikes and continuing calibration checks.

In accordance with the Laboratory's Standard Operating Procedures and Method requirements, a minimum of 1 laboratory blank sample was analyzed at the beginning of each day and at least once in every batch or 24-hour shift. Measured mean relative response factors and percent relative standard deviation for the initial instrument calibration were within acceptance limits for all chemicals specified for organic data review[1]. A laboratory control standard was analyzed daily prior to sample analysis. Laboratory duplicates were prepared and analyzed on approximately 10-percent of the samples submitted for analysis. Stantec's review of the internal laboratory QC sample results found no exceptions or data qualifiers.

. DATA USABILITY ASSESSMENT

Based on Stantec's review of the laboratory and field QA/QC procedures and results discussed above, the data are considered to be reliable and acceptable for their intended use.

[1] National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-014-002. U.S. EPA August 2014.

. FINDINGS

Laboratory analytical results for air samples collected at residential and commercial properties are summarized in Tables 4 and 5, respectively. Copies of laboratory analytical reports are provided in Appendix B.

As further described in the findings presented below, none of the indoor air samples collected in this study contained concentrations of chemicals of potential concern (COPCs) attributable to vapor intrusion that exceed short-term action levels or long-term screening levels.

. RESIDENTIAL BUILDING TESTING

A total of 11 Indoor Air samples, 2 Garage samples and 8 Outdoor Air samples were collected at the four residential properties. Table 1 provides a summary of the residential air samples that were collected. Analytical results are presented in Table 4.

No analytes were detected above the corresponding laboratory reporting limits in any of the 21 residential property air samples, with the exception of chloroform (not a COPC), which was detected in 2 samples. All reporting limits were below screening levels.

. COMMERCIAL BUILDING TESTING

A total of 12 indoor air samples, 15 pathway samples, 2 garage samples, and 5 outdoor air samples were collected at two commercial-use properties. Table 2 provides a summary of the commercial property air samples that were collected, including whether indoor air samples were collected with the HVAC on or off. Commercial building air testing analytical results are summarized in Table 5. None of the commercial building air samples contained COPCs at a concentration that exceeds short-term action levels or long-term screening values.

Excluding chloroform, which is not a COPC, only 3 of the 34 commercial building air samples (all from Building 35) had an analyte detected. The 3 samples (2 indoor air and 1 pathway sample) contained TCE at concentrations below screening values (maximum concentration of 0.29 μ/m^3). The pathway sample also contained PCE at a reported concentration (0.23 μ/m^3) below its screening value. No other compounds were detected in the commercial building air samples except chloroform.

. CONCLUSIONS

Air testing was conducted at four residential properties and two commercial properties as part of this Additional Vapor Intrusion Assessment. This includes two single-family residences and one multi-story commercial building within the Initial Vapor Intrusion Study Area and two multi-story commercial properties and one multi-family residential property located in the Supplemental Assessment Area.

Based on the air testing results, Stantec draws the following conclusions.

- Laboratory analytical results from the additional residential use property air testing conducted during 2015 further support the conclusion from the September 19, 2014 IA Testing Report that there is no unacceptable short- or long-term health risk to residential building occupants related to TCE or other COPCs in groundwater. TCE and other COPCs were not detected in any of the COE Area residential air samples collected during 2015 including cold season indoor air samples collected from Building 19.

- Laboratory analytical results from the additional commercial property air testing conducted during 2015 further support the conclusion from the September 19, 2014 IA Testing Report that there is no unacceptable short- or long-term health risk to the commercial building occupants related to TCE or other COPCs in groundwater. TCE and other COPCs were not detected above short- and long-term screening levels in any of the commercial use property air samples collected during 2015 including a sample collected from an occupied basement.

- Laboratory analytical results for air samples from the three Supplemental Assessment Area buildings with subsurface structures were either non-detect for TCE and other COPCs or below short- and long-term screening levels. These results further support the conclusion from the September 19, 2014 IA Testing Report that it is reasonable to expect that there is no unacceptable short- or long-term health risk related to TCE or other COPCs in groundwater for residential and commercial building occupants in the Supplemental Assessment Area.

This additional vapor intrusion work and results are part of a comprehensive investigation and evaluation of the vapor intrusion pathway in the COE Study Area. Overall, multiple rounds of indoor air testing were performed in 12 single-family and duplex residential properties, 7 multifamily residential or mixed use properties, and 10 commercial properties. None of the air samples from living spaces and regularly occupied work spaces contained COPCs attributable to vapor intrusion at levels that exceeded any applicable long- or short-term screening levels or response action levels. In addition to testing in living and workspaces, potential pathway air sampling was performed in crawl spaces, elevator shafts, utility rooms and garages.

Multiple lines of evidence (including subsurface lithology, depth to and chemical concentrations in first encountered groundwater, and indoor air sampling analytical results) developed by the

vapor intrusion investigations and ongoing groundwater monitoring demonstrate that the existing remedy is protective with regard to the vapor intrusion pathway.

HP and Varian have now completed all of the work agreed to with the agencies with respect to this vapor intrusion investigation in the COE Study Area. No further assessment of potential vapor intrusion related to COE Area groundwater impacts is warranted.

Tables

Table 1 - 2015 Air Samples Collected from Residential Properties
Table 2 – 2015 Air Samples Collected from Commercial Properties
Table 3 – USEPA Region 9 Screening Levels for Comparison to Indoor Air Results
Table 4 – 2015 Residential Building Air Testing Analytical Results
Table 5 - 2015 Commercial Building Air Testing Analytical Results

TABLE 1
2015 Air Samples Collected from Residential Properties
COE Study Area Indoor Air Testing

Building Identifier	Property Type	Samples Collected	Sampling Date	Sample ID and Type			
				Indoor Air	Outdoor Air	Sub-Grade Garage	Duplicate
19	-Multi-Family with Underground Parking	- 1 apartment (common room) sample	1/28/2015	19-IA-11	19-OA-1		19-IA-11 Dup (Dup-1)
			2/3/2015	19-IA-12	19-OA-2		19-IA-12 Dup (Dup-1)
31	-Single Family	- 1 living space sample	1/27/2015	31-IA-1	31-OA-1		31-IA-1 Dup (Dup-1)
			2/3/2015	31-IA-2	31-OA-2		
32	-Single Family	- 1 living space sample	2/12/2015	32-IA-1	32-OA-1		32-IA-1 Dup (Dup-1)
			2/19/2015	32-IA-2	32-OA-2		32-IA-2 Dup (Dup-1)
34	-Multi-Family with Underground Parking	- 1 garage sample	5/14/2015		34-OA-1	34-GAR-1	
			5/26/2015		34-OA-2	34-GAR-2	

TABLE 2
2015 Air Samples Collected from Commercial Properties
COE Study Area Indoor Air Testing

Building Identifier	Sampling Date	HVAC Operating Status	Sample ID and Type				
			Outdoor Air	Indoor Air	Pathway	Sub-grade Garage	Duplicate
33	5/15/2015	–	33-OA-1	–	33-PW-1	33-GAR-1	33-PW-1 (Dup-2)
	5/26/2015	–	33-OA-2	–	33-PW-2	33-GAR-2	33-PW-2 (Dup-2)
35	5/15/2015	HVAC-On	35-OA-1	35-IA-1, 2, 3, 4	35-PW-1, 2, 3	–	35-PW-3 (Dup-1)
	5/25/2015	HVAC-Off	35-OA-2	35-IA-5, 6, 8	35-PW-4, 5, 6	–	35-IA-5 (Dup-1)
	5/26/2015	HVAC-On	35-OA-3	35-IA-9, 10, 11, 12	35-PW-7, 8, 9	–	35-PW-9 (Dup-1)

Notes:

HVAC Operating Status:

"HVAC-On" - Building HVAC system was operating during sampling.

"HVAC-Off" - Building HVAC system was off for at least 36 hours prior to and during sampling.

TABLE 3
USEPA Region 9 Screening Levels for Comparison to Indoor Air Results
COE Study Area Indoor Air Testing

Chemical of Concern	TCE	cis-1,2-DCE	VC	PCE	1,1-DCE	1,1-DCA	1,2-DCB	1,1,1-TCA	Freon 113
Laboratory Reporting Limit	0.18	0.13	0.042	0.22	0.065	0.13	0.20	0.18	3.9
Tier 1 - Comparison to Background/Outdoor Ambient									
Background (outdoor ambient)	(See Outdoor Air Sampling Analytical Results)								
Tier 2 - Comparison to Short-Term Health Based Screening Criteria[1]									
Acute Exposure MRL[2]	NA	810*	1,278	1,357	NA	NA	NA	10,912	NA
Intermediate Exposure MRL[3]	NA	810*	77	NA	79	NA	NA	3,820	NA
EPA Region 9 TCE Indoor Air Accelerated Response Action Level-Residential, July 9, 2014	2	NA	NA	NA	NA	NA	NA	NA	NA
EPA Region 9 TCE Indoor Air Accelerated Response Action Level-Commercial (10-hour work day), July 9, 2014	7	NA	NA	NA	NA	NA	NA	NA	NA
Tier 3 - Comparison to Long-Term Health Based Screening Criteria[4]									
Residential Screening Level[5]	0.43	63*	0.17	0.41	210	1.8	210	5,200	31,000
Industrial/Commercial Screening Level[6]	3.0	260*	2.8	2.1	880	7.7	880	22,000	130,000

Notes:

Units in micrograms per cubic meter ($\mu g/m^3$)

TCE = trichloroethene
cis-1 ,2-DCE = cis-1 ,2-dichloroethene
VC = vinyl chloride
PCE = tetrachloroethene
1,1-DCE-dichloroethene
1,1-DCA = 1,1-dichloroethane
1 ,2-DCB = 1 ,2-dichlorobenzene
1,1,1 -TCA = 1,1 ,1-trichloroethane
Freon 113= Trichlorotrifluoroethane

1 = Except for TCE, short-term health risk based screening criteria obtained from the Agency for Toxic Substances & Disease Registry (ATSDR), Minimal Risk Levels (MRLs) for hazardous substances (July 2013) available at http://www.atsdr.cdc.gov/mrls/index.html)
2 = Acute screening levels (Acute MRLs) (non-cancer health effects) are derived for exposure durations of 1 to 14 days
3 = Intermediate MRLs (non-cancer health effects) are derived for exposure durations of >14 to 364 days
4 = Long-term health risk based screening criteria obtained from the United States Environmental Protection Agency (USEPA), Regional Screening Levels (RSLs USEPA 2012) for Residential and Industrial Air (rev. May 2014)
5 = Residential screening levels (Residential Air RSLs) are derived for exposure durations of 350 days per year and 30 years.
6 = Commercial/Industrial screening levels (Industrial Air RSLs) are derived for exposure durations of 8 hours per day, 250 days per year and 25 years.
* = trans-1, 2-DCE MRLs are used for cis-1, 2-DCE. RSLs not established for this compound.
NA = Not Available

Table 4
2015 Residential Building Air Testing Analytical Results
COE Study Area, Palo Alto, California

Building Number	Date	Sample ID	Sample Type[1]	Compound and Reported Concentration (µg/m)									
				VC	1,1-DCE	1,1-DCA	cis 1,2-DCE	1,1,1-TCA	TCE	PCE	Freon 113	Chloroform	1,2-DCB
	Long-term Screening Value[2]			0.16	210	1.5	63	5,200	0.43	0.41	31,000	NA	210
19	1/28/2015	19-IA-11	IA	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.84)	ND (1.0)
	1/28/2015	19-IA-11 Dup (DUP-1)	IA	ND (0.042)	ND (0.065)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.2)	ND (0.80)	ND (0.99)
	1/28/2015	19-OA-1	OA	ND (0.036)	ND (0.056)	ND (0.11)	ND (0.11)	ND (0.15)	ND (0.15)	ND (0.19)	ND (1.1)	ND (0.69)	ND (0.85)
	2/3/2015	19-IA-12	IA	ND (0.042)	ND (0.066)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	ND (0.81)	ND (1.0)
	2/3/2015	19-IA-12 Dup (DUP-1)	IA	ND (0.039)	ND (0.061)	ND (0.12)	ND (0.12)	ND (0.17)	ND (0.16)	ND (0.21)	ND (1.2)	ND (0.75)	ND (0.92)
	2/3/2015	19-OA-2	OA	ND (0.034)	ND (0.053)	ND (0.11)	ND (0.11)	ND (0.15)	ND (0.14)	ND (0.18)	ND (1.0)	ND (0.65)	ND (0.80)
31	1/27/2015	31-IA-1	IA	ND (0.040)	ND (0.063)	ND (0.13)	ND (0.12)	ND (0.17)	ND (0.17)	ND (0.21)	ND (1.2)	0.87	ND (0.95)
	1/27/2015	31-IA-1 Dup (Dup-1)	IA	ND (0.046)	ND (0.071)	ND (0.14)	ND (0.14)	ND (0.20)	ND (0.19)	ND (0.24)	ND (1.4)	ND (0.87)	ND (1.1)
	1/27/2015	31-OA-1	OA	ND (0.037)	ND (0.057)	ND (0.12)	ND (0.11)	ND (0.16)	ND (0.15)	ND (0.20)	ND (1.1)	ND (0.70)	ND (0.86)
	2/3/2015	31-IA-2	IA	ND (0.042)	ND (0.065)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	1.5	ND (0.99)
	2/3/2015	31-OA-2	OA	ND (0.042)	ND (0.065)	ND (0.13)	ND (0.13)	ND (0.18)	0.18	0.29	ND (1.2)	ND (0.80)	ND (0.99)
32	2/12/2015	32-IA-1	IA	ND (0.042)	ND (0.066)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	ND (0.81)	ND (1.0)
	2/12/2015	32-IA-1 Dup (Dup-1)	IA	ND (0.046)	ND (0.071)	ND (0.14)	ND (0.14)	ND (0.20)	ND (0.19)	ND (0.24)	ND (1.4)	ND (0.87)	ND (1.1)
	2/12/2015	32-OA-1	OA	ND (0.040)	ND (0.061)	ND (0.12)	ND (0.12)	ND (0.17)	ND (0.17)	ND (0.21)	ND (1.2)	ND (0.76)	ND (0.93)
	2/19/2015	32-IA-2	IA	ND (0.043)	ND (0.067)	ND (0.14)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.82)	ND (1.0)
	2/19/2015	32-IA-2 Dup (Dup-1)	IA	ND (0.046)	ND (0.072)	ND (0.15)	ND (0.14)	ND (0.20)	ND (0.20)	ND (0.25)	ND (1.4)	ND (0.89)	ND (1.1)
	2/19/2015	32-OA-2	OA	ND (0.039)	ND (0.061)	ND (0.12)	ND (0.12)	ND (0.17)	ND (0.16)	ND (0.21)	ND (1.2)	ND (0.75)	ND (0.92)
34	5/14/2015	34-OA-1	OA	ND (0.046)	ND (0.072)	ND (0.15)	ND (0.14)	ND (0.20)	ND (0.20)	ND (0.25)	ND (1.4)	ND (0.89)	ND (1.1)
	5/14/2015	34-GAR-1	GAR	ND (0.041)	ND (0.064)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.17)	ND (0.22)	ND (1.2)	ND (0.79)	ND (0.97)
	5/26/2015	34-OA-2	OA	ND (0.042)	ND (0.066)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	ND (0.81)	ND (1.0)
	5/26/2015	34-GAR-2	GAR	ND (0.042)	ND (0.065)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.2)	ND (0.80)	ND (0.99)

Notes:

All samples analyzed using EPA Method TO-15 GC/MS SIM/Full Scan; Samples collected over an approximately 10 hour period.

µg/m^3 = micrograms per cubic meter

VC = Vinyl Chloride

1,1-DCE = 1,1-Dichloroethene

1,1-DCA = 1,1-Dichloroethane

cis 1,2-DCE = cis-1,2-Dichloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

PCE = Tetrachloroethene

Freon 113 = Trichlorotrifluoroethane

1,2-DCB = 1,2-Dichlorobenzene

ND = Compound not detected: laboratory reporting limit in parentheses.

(1) Sample Types:

IA = 24-hour indoor air sample from a residential space with the potential to be routinely occupied

OA = 24-hour outdoor air sample

GAR = 24-hour sample from the sub-grade parking garage

(2) Long-term health risk based screening criteria from Table 1 of agency-approved February 17, 2012 Work Plan.

Table 5
May 2015 Commercial Building Air Testing Analytical Results
COE Study Area, Palo Alto, California

Building Number	Date	Sample ID	HVAC Status(1)	Sample Type(2)	Compound and Reported Concentration (µg/m)									
					VC	1,1-DCE	1,1-DCA	cis 1,2-DCE	1,1,1-TCA	TCE	PCE	Freon 113	Chloroform	1,2-DCB
		Long-term Screening Value[3]			2.8	880	7.7	260	22,000	3.0	2.1	130,000	NA	880
33	5/15/2015	33-OA-1	–	OA	ND (0.042)	ND (0.066)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	ND (0.81)	ND (1.0)
	5/15/2015	33-PW-1	–	PW	ND (0.045)	ND (0.070)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.3)	ND (0.86)	ND (1.0)
	5/15/2015	33-PW-1 Dup (Dup-2)	–	PW	ND (0.046)	ND (0.072)	ND (0.15)	ND (0.14)	ND (0.20)	ND (0.20)	ND (0.25)	ND (1.4)	ND (0.89)	ND (1.1)
	5/15/2015	33-GAR-1	–	GAR	ND (0.042)	ND (0.066)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	ND (0.81)	ND (1.0)
	5/26/2015	33-OA-2	–	OA	ND (0.043)	ND (0.066)	ND (0.14)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.82)	ND (1.0)
	5/26/2015	33-PW-2	–	PW	ND (0.046)	ND (0.072)	ND (0.15)	ND (0.14)	ND (0.20)	ND (0.19)	ND (0.24)	ND (1.4)	ND (0.88)	ND (1.1)
	5/26/2015	33-PW-2 Dup (Dup-2)	–	PW	ND (0.047)	ND (0.073)	ND (0.15)	ND (0.15)	ND (0.20)	ND (0.20)	ND (0.25)	ND (1.4)	ND (0.90)	ND (1.1)
	5/26/2015	33-GAR-2	–	GAR	ND (0.045)	ND (0.070)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.4)	ND (0.86)	ND (1.1)
35	5/15/2015	35-OA-1	–	OA	ND (0.042)	ND (0.065)	ND (0.13)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.22)	ND (1.3)	ND (0.80)	ND (0.99)
	5/15/2015	35-IA-1	on	IA	ND (0.043)	ND (0.067)	ND (0.14)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.23)	ND (1.3)	2.4	ND (1.0)
	5/15/2015	35-IA-2	on	IA	ND (0.043)	ND (0.066)	ND (0.14)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.82)	ND (1.0)
	5/15/2015	35-IA-3	on	IA	ND (0.045)	ND (0.069)	ND (0.14)	ND (0.14)	ND (0.19)	0.20	ND (0.24)	ND (1.3)	ND (0.85)	ND (1.0)
	5/15/2015	35-IA-4	on	IA	ND (0.043)	ND (0.067)	ND (0.14)	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.82)	ND (1.0)
	5/15/2015	35-PW-1	on	PW	ND (0.041)	ND (0.063)	ND (0.13)	ND (0.13)	ND (0.17)	ND (0.17)	ND (0.22)	ND (1.2)	ND (0.78)	ND (0.96)
	5/15/2015	35-PW-2	on	PW	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.84)	ND (1.0)
	5/15/2015	35-PW-3	on	PW	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.84)	ND (1.0)
	5/15/2015	35-PW-3 Dup (Dup-1)	on	PW	ND (0.046)	ND (0.072)	ND (0.15)	ND (0.14)	ND (0.20)	ND (0.19)	ND (0.24)	ND (1.4)	ND (0.88)	ND (1.1)
	5/25/2015	35-OA-2	–	OA	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.84)	ND (1.0)
	5/25/2015	35-IA-5	off	IA	ND (0.045)	ND (0.069)	ND (0.14)	ND (0.14)	ND (0.19)	0.22	ND (0.24)	ND (1.3)	2.8	ND (1.0)
	5/25/2015	35-IA-5 Dup (Dup-1)	off	IA	ND (0.046)	ND (0.071)	ND (0.14)	ND (0.14)	ND (0.20)	ND (0.19)	ND (0.24)	ND (1.4)	2.8	ND (1.1)
	5/25/2015	35-IA-6	off	IA	ND (0.034)	ND (0.053)	ND (0.11)	ND (0.11)	ND (0.15)	ND (0.14)	ND (0.18)	ND (1.0)	0.66	ND (0.80)
	5/25/2015	35-IA-8	off	IA	ND (0.048)	ND (0.074)	ND (0.15)	ND (0.15)	ND (0.20)	ND (0.20)	ND (0.25)	ND (1.4)	ND (0.91)	ND (1.1)
	5/25/2015	35-PW-4	off	PW	ND (0.034)	ND (0.052)	ND (0.11)	ND (0.10)	ND (0.14)	ND (0.14)	ND (0.18)	ND (1.0)	0.93	ND (0.79)
	5/25/2015	35-PW-5	off	PW	ND (0.048)	ND (0.074)	ND (0.15)	ND (0.15)	ND (0.20)	ND (0.20)	ND (0.25)	ND (1.4)	ND (0.91)	ND (1.1)
	5/25/2015	35-PW-6	off	PW	ND (0.045)	ND (0.070)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.3)	ND (0.86)	ND (1.0)
	5/26/2015	35-OA-3	–	OA	ND (0.044)	ND (0.069)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.3)	ND (0.85)	ND (1.0)
	5/26/2015	35-IA-9	on	IA	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	1.9	ND (1.0)
	5/26/2015	35-IA-10	on	IA	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.83)	ND (1.0)
	5/26/2015	35-IA-11	on	IA	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.84)	ND (1.0)
	5/26/2015	35-IA-12	on	IA	ND (0.046)	ND (0.070)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.4)	ND (0.87)	ND (1.1)
	5/26/2015	35-PW-7	on	PW	ND (0.045)	ND (0.069)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.3)	ND (0.85)	ND (1.0)
	5/26/2015	35-PW-8	on	PW	ND (0.042)	ND (0.065)	ND (0.13)	ND (0.13)	ND (0.18)	0.29	0.23	ND (1.2)	ND (0.80)	ND (0.98)
	5/26/2015	35-PW-9	on	PW	ND (0.044)	ND (0.068)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.18)	ND (0.23)	ND (1.3)	ND (0.84)	ND (1.0)
	5/26/2015	35-PW-9 Dup (Dup-1)	on	PW	ND (0.045)	ND (0.070)	ND (0.14)	ND (0.14)	ND (0.19)	ND (0.19)	ND (0.24)	ND (1.3)	ND (0.86)	ND (1.0)

Notes:

All samples analyzed using EPA Method TO-15 GC/MS SIM/Full Scan; Samples collected over an approximately 10 hour period.

µg/m^3 = micrograms per cubic meter

VC = Vinyl Chloride

1,1-DCE = 1,1-Dichloroethene

1,1-DCA = 1,1-Dichloroethane

cis 1,2-DCE = cis-1,2-Dichloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

PCE = Tetrachloroethene

Freon 113 = Trichlorotrifluoroethane

1,2-DCB = 1,2-Dichlorobenzene

ND = Compound not detected: laboratory reporting limit in parentheses.

(1) HVAC Status:

Building HVAC system was operating during sampling.

Building HVAC system was off for at least 36 hours prior to and during sampling.

(2) Sample Types:

OA = 10-hour outdoor air sample

IA = 10-hour sample from a space with the potential to be routinely occupied during typical business hours

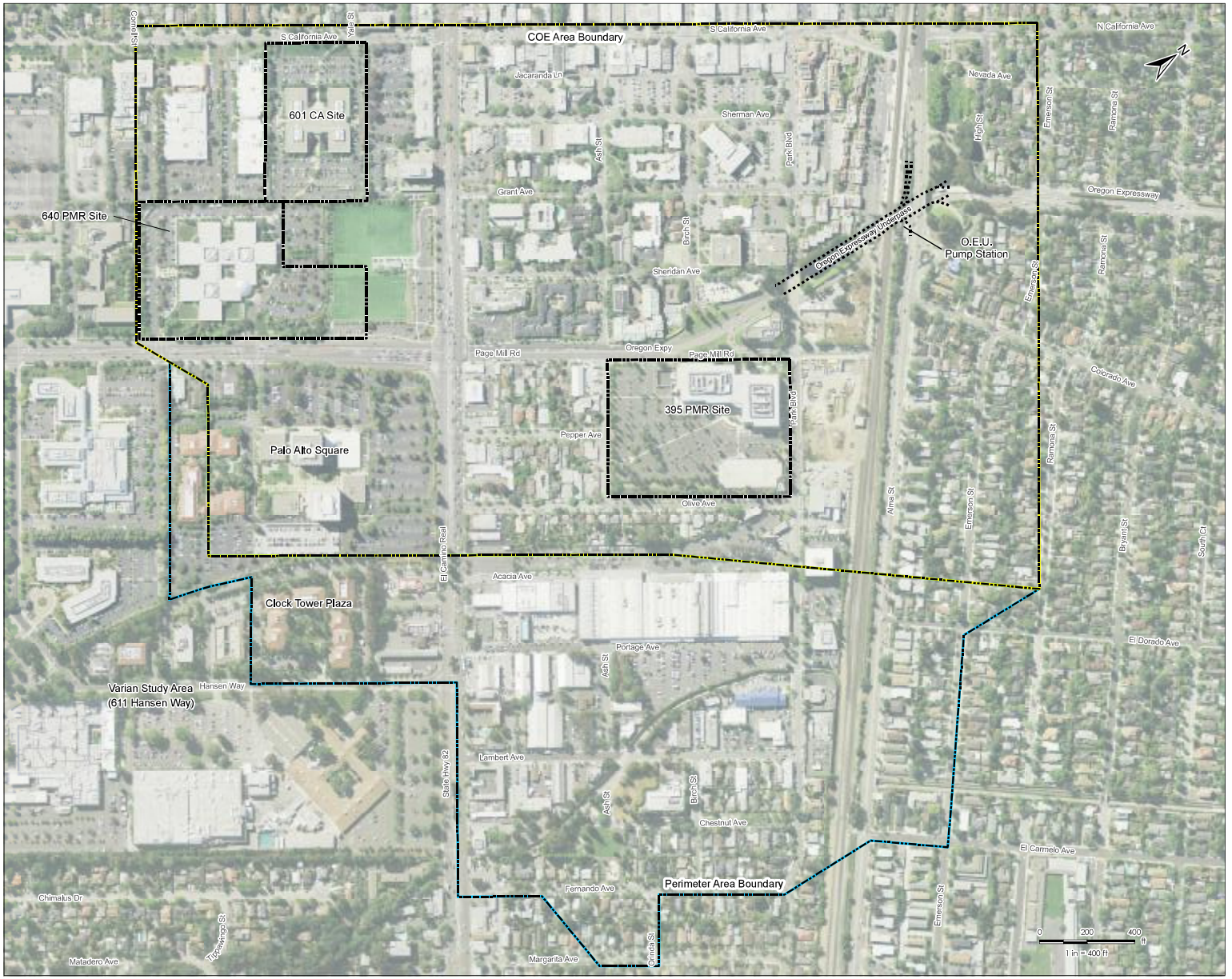
PW = 10-hour sample from a potential pathway location such as a utility room or closet

GAR = 10-hour sample from the sub-grade parking garage

(3) Long-term health risk based screening criteria from Table 1 of agency-approved February 17, 2012 Work Plan.

Figures

Figure 1 - Site Location Map
Figure 2 - TCE Concentration Contours, First Encountered Groundwater – 2011
Figure 3 - TCE Concentration Contours, First Encountered Groundwater –Second Quarter 2014
Figure 4 - Supplemental Vapor Intrusion Assessment Area



Stantec

Legend

- Site Boundary
- COE Study Area Boundary
- Perimeter Area Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
2. Aerial imagery provided by Digital Globe, 2010.

August 2014
185702767

Client/Project

Hewlett-Packard Company and Varian Medical Systems, Inc.
COE Study Area and Perimeter Area
Palo Alto, Santa Clara County, California

Figure No.

1

Title

Site Location Map

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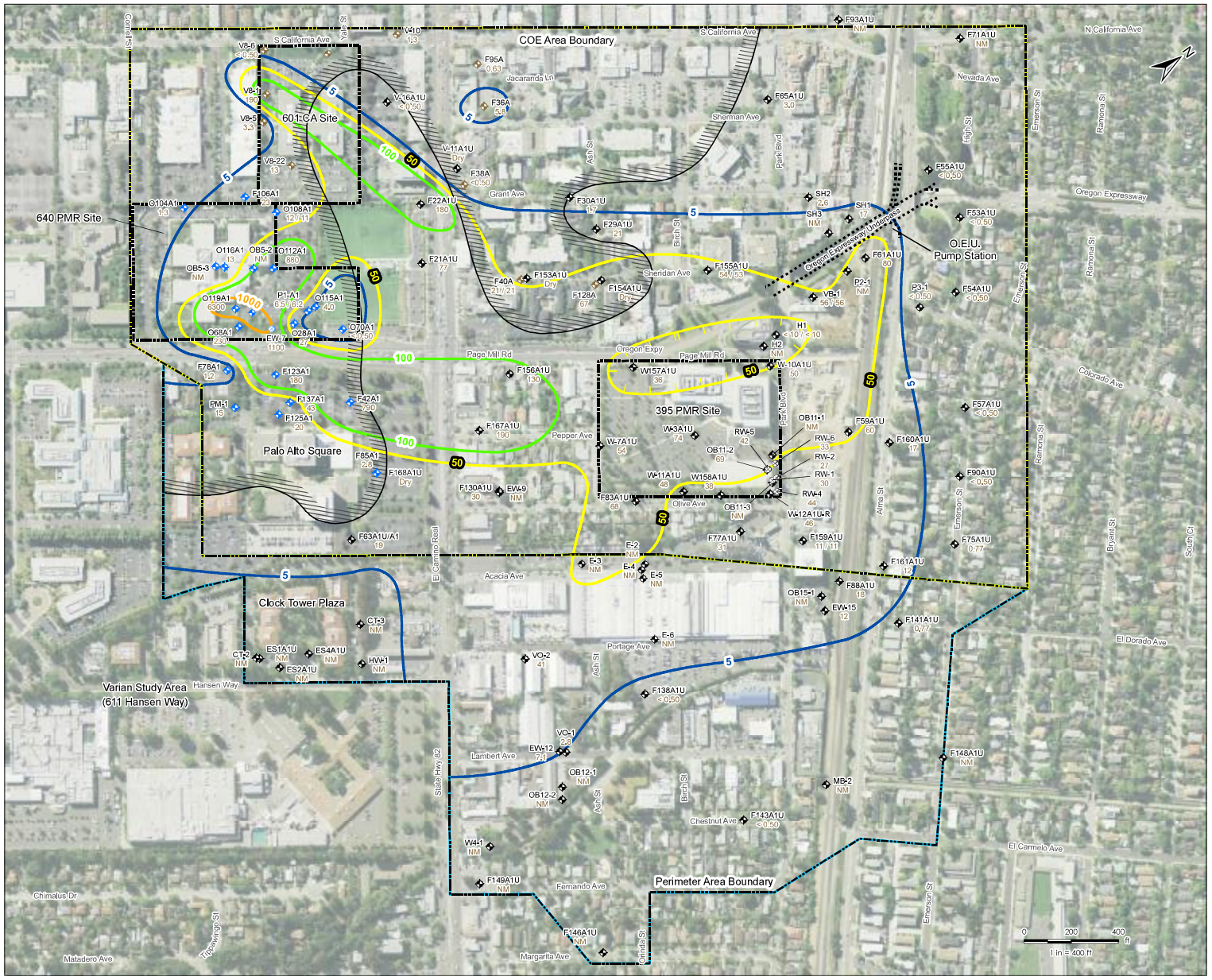

Stantec

Legend

- Site Boundary
- COE Study Area Boundary
- Perimeter Area Boundary
- A1U Zone Monitoring Well
- A1U Zone Extraction Well
- A1 Zone Monitoring Well
- A1 Zone Extraction Well
- A Zone Monitoring Well
- Approximate Extent of Unsaturated A1 Upper Zone

TCE Isoconcentration Contour (µg/L)

- 5 µg/L
- 50 µg/L
- 100 µg/L
- 1000 µg/L

25 TCE Concentration (µg/L)

NM Not Measured

DRY Well Dry or Insufficient Water to Sample

Notes

1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
2. Aerial imagery provided by Digital Globe, 2010.
3. "D" suffix indicates well screed in deep subunit.
4. "OB" prefixes indicates observation well for extraction pumping.
5. "P" prefix indicates observation well for Oregon Expressway Subdrain Pumping.
6. Data collected June through September 2011.

August 2014
185702767

Client/Project

Hewlett-Packard Company and Varian Medical Systems, Inc.
COE Study Area and Perimeter Area
Palo Alto, Santa Clara County, California

Figure No.

2

Title

TCE Concentration Contours, First Encountered Groundwater – 2011

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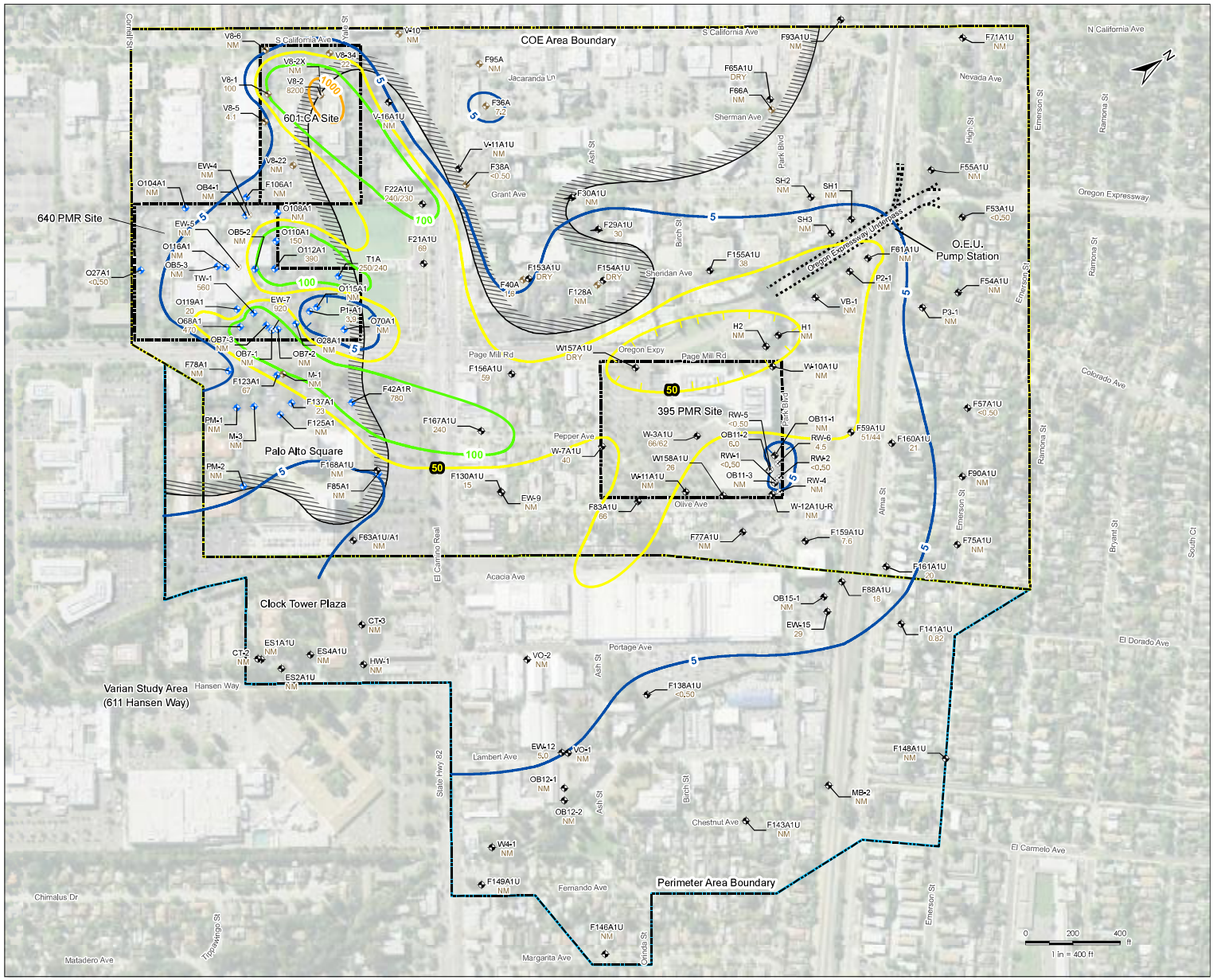

Stantec

Legend

- Site Boundary
- COE Study Area Boundary
- Perimeter Area Boundary
- A1U Zone Monitoring Well
- A1U Zone Extraction Well
- A1 Zone Monitoring Well
- A1 Zone Extraction Well
- A Zone Monitoring Well
- A Zone Extraction Well
- Approximate Extent of Unsaturated A1 Upper Zone

TCE Isoconcentration Contour (µg/L)

- 5 µg/L
- 50 µg/L
- 100 µg/L
- 1000 µg/L

25 TCE Concentration (µg/L)

NM Not Measured

DRY Well Dry or Insufficient Water to Sample

Notes

1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
2. Aerial imagery provided by Digital Globe, 2010.
3. "D" suffix indicates well screed in deep subunit.
4. "OB" prefixes indicates observation well for extraction pumping.
5. "P" prefix indicates observation well for Oregon Expressway Subdrain Pumping.
6. Data collected between June - September 2011.

August 2014
185702767

Client/Project

Hewlett-Packard Company and Varian Medical Systems, Inc.
COE Study Area and Perimeter Area
Palo Alto, Santa Clara County, California

Figure No.

3

Title

TCE Concentration Contours First Encountered Groundwater – Second Quarter 2014

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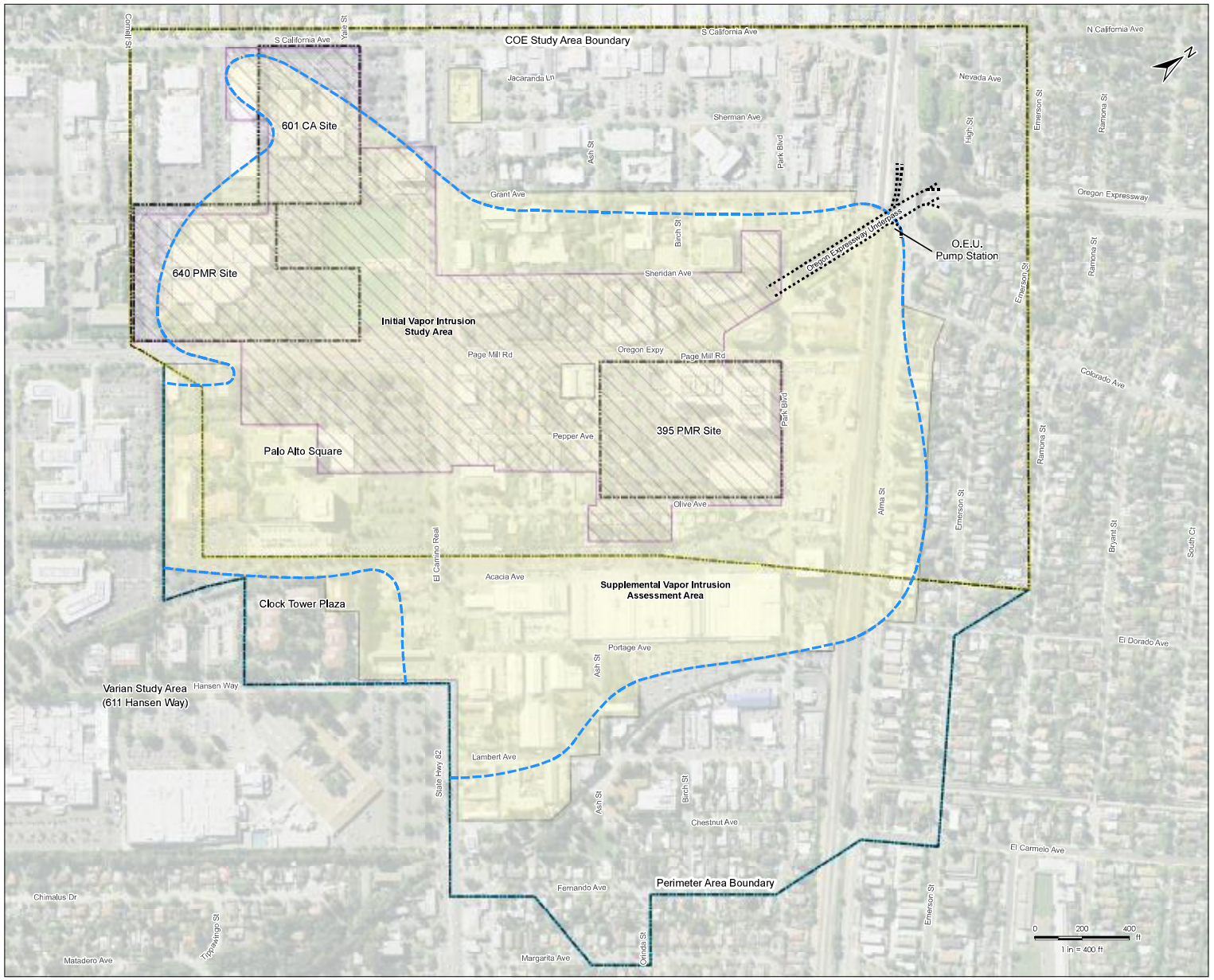
Revised: 2014-08-14 By: mkirkpatrick



Legend

- Site Boundary
- COE Study Area Boundary
- Perimeter Area Boundary
- Initial Vapor Intrusion Study Area
- Supplemental Vapor Intrusion Assessment Area
- 5 µg/L TCE Concentration

Notes

1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
2. Aerial imagery provided by Digital Globe, 2010.

June 2015
185702836

Client/Project

Hewlett-Packard Company and
Varian Medical Systems, Inc.
COE Study Area and Perimeter Area
Palo Alto, Santa Clara County, California

Figure No.

4

Title

Supplemental Vapor Intrusion Assessment Area

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Revised: 2015-06-23 By: mkilpatrick