Report on Annual Groundwater Monitoring, Area IV, 2019

Santa Susana Field Laboratory Ventura County, California

Prepared for:
United States Department of Energy

Prepared by:
North Wind Portage, Inc.

April 2020
Revision 1

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PROFESSIONAL CERTIFICATION

Report on Annual Groundwater Monitoring, Area IV, 2019
January 1 through December 31, 2019
Santa Susana Field Laboratory
Ventura County, California

April 2020
Revision 1

This Annual Groundwater Monitoring Report has been prepared by a team of qualified professionals under the supervision of the senior staff whose seal and signatures appear below.

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EXECUTIVE SUMMARY

This report summarizes the United States Department of Energy (DOE) groundwater monitoring activities conducted during 2019 at Area IV within the Santa Susana Field Laboratory (SSFL), located in Ventura County, California. This report is prepared by DOE to satisfy the California Environmental Protection Agency (EPA) and Department of Toxic Substances Control (DTSC) requirements to report on annual groundwater monitoring at SSFL. The annual report has been developed by North Wind Portage, Inc., (North Wind) in collaboration and with contributions from CDM Federal Programs Corporation (CDM Smith), and includes water quality data collected from administrative Area IV, Northern Buffer Zone, and off-site wells. For simplicity, data from these areas reported herein are referred to as "Area IV."

Water quality samples were collected pursuant to the Site-Wide Groundwater Monitoring Program (Haley & Aldrich 2010a) and the RFI Program (CDM Smith 2015a) with water levels measured quarterly during 2019. The scheduled 2019 samples were collected with exception of: samples were not collected from two Site-Wide Monitoring Program wells due to an obstruction in RD-34B and a damaged multi-level sampling liner in RD-57. All results are considered sufficient to meet project requirements.

Sample Results Evaluation

Some analytes were reported for the first time and above the associated SSFL screening criteria in wells with established historical data during 2019:

- 1,4-dioxane was detected for the first time in well RS-54. This first time detection may be attributed to elevated detection limits in historical samples caused the result to not be reported; however, the contaminant was likely present at that time. This detection may also be influenced by Groundwater Interim Measures (GWIM) pumping at this well.
- Three metals were detected in wells for the first time: aluminum in wells PZ-102 and PZ-109; molybdenum in well PZ-098; and selenium in well PZ-098. These first time detections may be influenced by high seasonal rains flushing native metals from overlying soils into shallow groundwater.

Some analytes were reported at a new maximum concentration and above the associated SSFL screening criteria in wells with established historical data during 2019:

- Trichloroethene (TCE) was detected at a new maximum concentration in well PZ-108. This increase may be influenced by pumping tests conducted at the Hazardous Materials Storage Area (HMSA) causing water with higher concentrations to be pulled into the well, and/or high seasonal rains may have flushed TCE into shallow groundwater or influenced the transport of a shallow groundwater secondary source into this well.
- Five metals were detected at new maximum values: aluminum in wells PZ-005, PZ-103, and PZ-108; antimony in well PZ-105; manganese in well RD-59A; molybdenum in wells PZ-103 and PZ-109; and vanadium in well PZ-102. These increases may be influenced by high seasonal rains flushing metals from overlying soils into shallow groundwater.
- Gross alpha was detected at new maxim values in wells RD-19, RD-34A, RD-96, RD-98, and PZ-120. The laboratory minimum detectable concentration for these samples was elevated due to high residual mass requiring the laboratory to reduce sample size. This may have caused increased uncertainty and potentially increased activity results with a high bias. Gross alpha results from these wells will be confirmed during the 2020 sampling round.

- Radium-228 was detected at a new maximum in well RD-98. This increase may be transitory and results from the 2020 sampling round will be used to confirm if an increasing trend is established.

Off-site wells sampled during 2019 included RD-59A, RD-59B, and RD-59C. Perchlorate was detected for the first time and orders of magnitude below the screening level in well RD-59C. This result will be confirmed during the next sampling round. Three metals were detected at new maximums in offsite wells, the increases likely influenced by high seasonal rains: manganese was detected at a new maximum that exceeds the screening level in well RD-59A; boron and molybdenum were detected at a new maximum and below the screening level in well RD-59C. The following radiochemistry analytes were detected for the first time during 2019: actinium-228 and uranium-235/236 in well RD-59A. The presence of these analytes will be confirmed during the next sampling round. There are no designated SSFL screening criteria for these radiochemistry analytes. A new maximum was detected for radium-228 in well RD-59C below the SSFL screening level.

Analytes that were above any associated SSFL screening criteria in a particular well will be sampled in 2020. New first-time detected analytes will also be sampled for in 2020.

Conclusions

The 2019 sampling activities met the objectives stated in the Site-Wide Groundwater Monitoring Program and Site-Wide WQSAP except where noted above and in the body of this report. Areas of impact to groundwater from contaminants of concern remained consistent and will be further evaluated with the 2020 results to see if any changes are required. Any newly detected sample results will be monitored in future sampling events.

In general, chemical sample results were consistent with historical results and any increases in concentrations were likely transitory and influenced by high seasonal rains and/or movement of groundwater caused by pumping of wells in the Former Sodium Disposal Facility and HMSA areas as part of the GWIM and Corrective Measures Study. These increases will be confirmed by comparing 2019 results to results from one or more future sampling rounds.

In general, radiological analyte trends are decreasing due to radioactive half-life decay combined with dispersion and dilution factors. New maximum detections of radiological analytes may be influenced by uncertainty due to laboratory methodology and will be confirmed by comparing 2019 results to results from the next sampling round to evaluate whether or not a trend is established.

Recommendations

After review of the 2019 sampling, some outstanding issues were identified and recommendations have been made for potential follow-up work:

- Silica gel cleanup was used for the first time to prepare 2019 DRO samples following the recommendation in the 2018 annual report. It is recommended to continue preparing DRO samples using silica gel cleanup for two future sampling rounds. Following the third sampling round using silica gel cleanup, it is recommended to complete an optimization study to potentially reduce DRO analysis at wells with three or more consecutive rounds of nondetects.
- During 2019, 1,4-dioxane was analyzed for in wells DD-140, RD-33A, RD-63, and RS-54 following the recommendation in the 2018 annual report and was detected above the screening level. It is recommended to continue to analyze 1,4-dioxane from these wells.

- Based on sampling conducted as part of the RFI program, there is a 1,4-dioxane plume in the HMSA area at a concentration near the screening level. It is recommended to analyze 1,4-dioxane from all HMSA area wells during future sampling rounds.
- During 2014, RD-23 had a diesel range organics (DRO) concentration of 17 mg/L, which is above the SSFL screening criterion. DRO was not sampled in well RD-23 during 2016, 2017, or Q1 2018. DRO was analyzed during Q1 2019 and was nondetect. It is recommended to analyze DRO in RD-23 for one or more additional sample rounds to confirm the nondetect.
- Confirm first time detections, new maximum detections, and detections that increased from 2018 results by comparing 2019 results to results from one or more future sampling rounds and evaluate for potentially increasing trends.
- Confirm radiochemistry analytes actinium-228 and uranium-235/236 detected for the first time during 2019 in off-site well RD-59A by comparing 2019 results to results from one or more future sampling rounds.
- Confirm perchlorate detection in offsite well RD-59C during the next sampling round. The estimated detection of 0.0041J/J µg/L was orders of magnitude below the MCL of 6 µg/L and near the method detection limit of 0.004 µg/L.

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APPENDICES

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
1,1,1-TCA	1,1,1-trichloroethane
1,2,3-TCP	1,2,3-trichloropropane
1,2-DCA	1,2-dichloroethane
22 CCR	Title 22 of California Code of Regulations
bgs	below ground surface
Boeing	The Boeing Company
CDM Smith	CDM Federal Programs Corporation
cis-1,2-DCE	cis-1,2-dichloroethene
COC	contaminant of concern
DOE	United States Department of Energy
DPH	Department of Public Health
DRO	diesel-range organics
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
FSDF	Former Sodium Disposal Facility
GRO	gasoline-range organics
GWIM	groundwater interim measure
GWRC	Groundwater Resources Consultants
HMSA	Hazardous Materials Storage Area
LUFT	leaking underground fuel tank
MCL	maximum contaminant level
MDL	method detection limit
mg/L	milligrams per liter
mrem/yr	millirems per year
MSL	mean sea level
MWH	Montgomery Watson Harza
NASA	National Aeronautics and Space Administration
NDMA	n-nitrosodimethylamine
North Wind	North Wind Portage, Inc.
PCE	tetrachloroethene

pCi/L	picocuries per liter
PCP	Post-Closure Permit
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RMHF	Radioactive Materials Handling Facility
RI	Remedial Investigation
RWQCB	Regional Water Quality Control Board
SMCL	secondary maximum contaminant level
SSFL	Santa Susana Field Laboratory
SWGW RBSL	site-wide groundwater risk-based screening level
TCE	trichloroethene
TPH	total petroleum hydrocarbons
trans-1,2-DCE	trans-1,2-dichloroethene
VOC	volatile organic compound
WQSAP	Water Quality Sampling and Analysis Plan

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Report on Annual Groundwater Monitoring, Area IV, 2019

Santa Susana Field Laboratory Ventura County, California

1. INTRODUCTION

This report summarizes the groundwater monitoring activities conducted during 2019 by the United States Department of Energy (DOE) within Area IV of the Santa Susana Field Laboratory (SSFL) located in Ventura County, California (Figure 1). Historical annual reports prior to 2014 reported groundwater monitoring activities performed for the entirety of SSFL, including areas administered by The Boeing Company (Boeing) and the National Aeronautics and Space Administration (NASA) at administrative Areas I, II, III, IV, and undeveloped land both to the north and south. Beginning in 2014, DOE has been submitting annual reports for wells within Area IV for which it has responsibility under the 2007 Consent Order for Corrective Action (Department of Toxic Substances Control [DTSC] 2007). This report describes groundwater monitoring activities that occurred from January through December 2019 within administrative Area IV, the Northern Buffer Zone, and off-site wells located to the north and west of Area IV. For simplicity, administrative Area IV, Northern Buffer Zone, and off-site wells associated with Area IV are termed "Area IV" in this report.

This report contains Area IV information relative to DOE activities only and as such has been modified to reflect regulatory compliance requirements for Area IV. There are currently no Post-Closure Permit (PCP) Regulated Unit Monitoring Program requirements or leaking underground fuel tank (LUFT) requirements for Area IV.

Area IV groundwater monitoring activities described in this report were the result of implementation of the December 2010 Site-Wide Water Quality Sampling and Analysis Plan (WQSAP; Haley & Aldrich 2010b), and site-wide activities in support of the DOE Area IV Groundwater Resource Conservation and Recovery Act (RCRA) Facility Investigations (RFI) Program (CDM Smith 2015a).

1.1 Site Description

The SSFL is located approximately 29 miles northwest of downtown Los Angeles, California, in the southeast corner of Ventura County (Figure 1). The SSFL occupies approximately 2,850 acres of hilly terrain, with approximately 1,100 feet of topographic relief near the crest of the Simi Hills. Figure 1 shows the geographic location and property boundaries of the site, as well as surrounding areas. The site is divided into four administrative areas (Areas I, II, III, and IV) and includes undeveloped land both to the north and south. Most of Area I and all of Areas III and IV are owned by Boeing. The United States Environmental Protection Agency (EPA) Identification Number for Areas I and III is CAD093365435. Area II is owned by the federal government and administered by NASA along with a portion of Area I. The EPA Identification Number for Area II is CA1800090010. Boeing owns the entirety of Area IV. The EPA Identification Numbers for Area IV are CAD000629972 and CA389009001. Ninety acres of Area IV were leased to the DOE, which also owns facilities in Area IV. The northern and southern undeveloped lands of SSFL were not used for industrial activities and are owned by Boeing.

1.2 Regulatory Background

Prior to 2014, groundwater sampling activities for Area IV were reported along with results from Areas I, II, and III. As a result, previous annual reports were intended to fulfill the requirements of multiple regulatory programs being implemented at SSFL. These include requirements addressed in the PCP monitoring programs (Regulated Unit Programs) for Areas I, II, and III approved by the California EPA DTSC, the Site-Wide Groundwater Monitoring Program approved by DTSC, and LUFT monitoring program overseen by DTSC. There are no Regulated Unit or LUFT requirements for Area IV and thus they are not addressed in this document.

The content of this report is in compliance with the December 2010 Site-Wide WQSAP (Haley & Aldrich 2010b). The Site-Wide Groundwater Monitoring Program is prescribed by the Site-Wide WQSAP.

1.3 Objectives

Area IV groundwater compliance requirements are presented in the Site-Wide Groundwater Monitoring Program. The objective of this report is to document compliance with that program. The scope of this report includes the following:

- Executive summary of significant findings;
- Summary of monitoring programs and activities conducted during the calendar year;
- Summary of maintenance inspections of monitored wells, if any;
- Summary of modifications made to monitoring equipment during the calendar year, if any;
- Summary of deviations from the Site-Wide WQSAP, if any;
- Discussion of significant events that may influence the occurrence and movement of groundwater;
- Summary of results of laboratory analyses of water samples;
- Summary tables indicating monitoring parameter results that lie outside of historical range for each monitoring location;
- Summary of constituent concentrations at wells that exceed SSFL groundwater screening reference values (SSFL screening criteria);
- Summary of outstanding issues and/or follow-up work;
- Contaminant plume maps with isoconcentration contours for specific regulated units or areas;
- Water level data, hydrographs, and groundwater elevation contour maps;
- Contaminant concentration versus time plots and a discussion of evident trends; and
- Results of quality assurance/quality control sampling and analysis and assessment of data quality, including accuracy, precision, and completeness with associated laboratory and data validation reports.

1.4 Report Organization

The remainder of this report is organized as follows:

- Section 2 provides a description of the site geology and hydrogeology;
- Section 3 provides a summary of the activities performed during this reporting period;
- Section 4 presents the results of field work and analytical testing;
- Section 5 presents planned activities for 2020; and
- Section 6 provides references.

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2. SITE GEOLOGY AND HYDROGEOLOGY

2.1 Geology

The SSFL is located in the Western Transverse Ranges physiographic province of southern California. The province's geology and physiography reflect at least 70 million years of geologic history. The sedimentary rocks in the portion encompassing SSFL range from coarse-grained conglomerates and sandstones to fine-grained siltstones and shale. The geologic history of the Western Transverse Ranges is complex and involves several distinct episodes of deformation involving tectonic extension, rotation, compression, and shearing. In the vicinity of SSFL, this has caused the Western Transverse Ranges to rotate more than 90 degrees clockwise. This complex geologic history is reflected in multiple fold, fault, and fracture orientations in the vicinity of SSFL.

The Chatsworth Formation underlies much of the province and is exposed across most of SSFL (Figure 2). It is a turbidic sandstone with interbedded shale, siltstone, and conglomerate approximately 6,000 feet thick and more than 65 million years old. As a result of geologic folding, the Chatsworth Formation dips moderately (typically 25 to 35 degrees) to the northwest at SSFL, along the south limb of the Simi Valley syncline. Detailed geologic mapping in the site vicinity was performed to augment published geologic maps, resulting in the subdivision of the Chatsworth Formation into upper and lower units (Montgomery Watson Harza [MWH] 2009). The lower formation is exposed in southeastern SSFL and dips northwest beneath the remainder of the site. The upper Chatsworth Formation is exposed across much of the remainder of the site and has been subdivided further into stratigraphic packages consisting of coarse- and fine-grained members. Numerous steeply dipping to near-vertical faults offset this stratigraphy. Fault gouge and fracturing, ancillary to faults, are observed at some locations.

Unconsolidated deposits at SSFL include alluvium, artificial fill, and thin soils over bedrock. The alluvium generally consists of silty sand and occurs in topographic lows and along ephemeral drainages. Areas with 5 to 30 feet of alluvium cover more than 300 acres of SSFL, or about 11 percent of the site.

2.2 Hydrogeology

Groundwater occurs at SSFL in alluvium and weathered and unweathered bedrock (Montgomery Watson 2000; MWH 2009). First-encountered groundwater may be observed in any of these media under water table conditions. For regulatory purposes, near-surface groundwater is defined to occur within the site's unconsolidated deposits (e.g., alluvium) and shallow weathered bedrock, whereas deep groundwater, referred to as “Chatsworth Formation groundwater,” occurs in the unweathered bedrock. The near-surface groundwater may be perched or vertically continuous with deeper groundwater.

The boundaries of the mountain groundwater system encompassing SSFL include where the Simi Hills meet the floor of the Simi and San Fernando valleys, and where groundwater tends to discharge to seeps and phreatophytes along several surrounding canyons. The base of the active groundwater flow system occurs at the boundary between fresh and connate groundwater, assumed to occur at approximately sea level. The upper boundary of the mountain groundwater flow system is the regional water table and localized perched water tables. Hydrogeologic boundaries internal to the groundwater flow system include areas of groundwater discharge to seeps and phreatophytes, pumped wells, and various boundary effects along faults and geologic contacts.

Portions of the Chatsworth Formation comprise locally transmissive aquifer units. These units generally consist of the fractured sandstone members of the upper Chatsworth Formation, many of which are

several hundred feet thick. Separating the major sandstone units are a series of relatively thin shale and siltstone members that typically behave as aquitards.

The arrangement and geometry of the hydrogeologic units are controlled by geologic contacts, folding, and faulting. Faults truncate permeable zones and fractures, juxtapose different units and fold orientations, and form low-permeability boundaries and zones of enhanced fracturing. Together, these structures result in a complex three-dimensional distribution of hydrogeologic units and anisotropic permeability that influence directions and rates of groundwater flow. Major faults subdivide SSFL into several large blocks, which are further subdivided by shale beds.

The SSFL water table is a subdued reflection of the topography, which, relative to the surrounding valleys, presents as a large groundwater mound that is maintained by rainfall recharge. Distinct differences in groundwater head are observed across fine-grained units and faults that impede groundwater flow. Groundwater moves from areas of recharge toward pumping wells and downward and outward toward hill slope seeps and the surrounding lowlands. The direction of vertical flow is downward at most site locations. Insight into the pattern of SSFL groundwater flow has been provided through the development and use of a representative three-dimensional groundwater flow model (CDM Smith 2018).

3. REPORTING PERIOD ACTIVITIES

The reporting period for this report covers the 2019 calendar year, from January 1, 2019, to December 31, 2019. Groundwater samples were collected as part of the Area IV Site-Wide Groundwater Monitoring Program and to support the DOE Groundwater RFI Program. by North Wind Portage, Inc., (North Wind) completed field groundwater monitoring activities and CDM Smith completed groundwater investigation and remediation activities during the first, second, third, and fourth quarters of the 2019 reporting period.

The Site-Wide Groundwater Monitoring Program – December 2010 Site-Wide WQSAP (Haley & Aldrich 2010b) was implemented to fulfill the groundwater monitoring program specific to Area IV at SSFL, with exceptions to the WQSAP described in Section 3.5. The following activities stipulated by the Site-Wide WQSAP were conducted during the reporting period:

- Measurement of groundwater levels at all accessible program wells.
- Collection and submission of groundwater samples from select wells for laboratory analysis.
- Data validation, data analysis, and database management.

The activities of Groundwater RFI (CDM Smith 2015a) sampling conducted during 2019 consisted of:

- Collecting water levels and groundwater samples from monitoring wells not sampled as part of the Site-Wide Groundwater Monitoring Program.
- Closing the remaining groundwater data gaps for existing wells through additional chemical analyses from those stated in the Site-Wide WQSAP.
- Sampling to support additional hydrogeological investigations and interim measures, as described in Section 3.1.1.

All data collection activities reported herein were performed separately by North Wind and CDM Smith under separate contracts to DOE. Table 1 lists the wells present within Area IV during the sampling and associated sampling program (i.e., sampled under the WQSAP or sampled to address groundwater RFI data needs).

Well, piezometer, and seep locations are shown on Figure 3. The wells that are identified as Site-Wide Monitoring Program wells are highlighted on Figure 4. Well construction details are provided in Appendix A.

3.1 DOE Groundwater Investigation and Remediation Activities

3.1.1 Groundwater Elevation Monitoring

In response to the 2018–2019 winter rains, which were above average, DOE increased the groundwater elevation monitoring effort at the Former Sodium Disposal Facility (FSDF) and Hazardous Materials Storage Area (HMSA). Starting in February 2019, water level measurements for wells at the FSDF and HMSA were collected weekly throughout the remainder of 2019. During February and March 2019, groundwater elevations in some FSDF coreholes increased up to approximately 60 feet below ground surface (bgs) due to the seasonal rains. The groundwater elevations then slowly declined throughout the summer, with some corehole elevations returning to the pre-rainfall levels. The water level change was observed only in the near-surface FSDF corehole wells drilled to approximately 60 feet bgs. There was no

significant change in water levels for the Chatsworth Formation bedrock wells at the FSDF. The data are provided in the Summary of FSDF 2019 Groundwater Investigations memorandum (CDM Smith 2020a).

Groundwater elevations also increased in HMSA wells following the seasonal rains, but not to the same degree as observed for the FSDF. The groundwater elevation rise for near-surface and Chatsworth Formation bedrock wells was about 12 feet in February 2019, and the decline in groundwater elevations toward pre-rainfall elevations began in June 2019. Water levels in December 2019 remained 5 feet higher than those observed in January 2019. The data are provided in the Summary of HMSA 2019 Groundwater Investigations memorandum (CDM Smith 2020b).

3.1.2 Groundwater Sampling

To assess the potential effects of the 2018–2019 winter rains on the concentrations of volatile organic compounds (VOCs) in groundwater and/or to address data gaps for the Corrective Measures Study, selected wells at the FSDF and HMSA were sampled periodically during and following the 2018–2019 rainy season. Wells C-20, C-22, C-23, C-25, C-26, C-27, and RS-18 at the FSDF were sampled. Wells PZ-041, PZ-100, PZ-104, PZ-108, PZ-109, PZ-120, PZ-122, PZ-162, PZ-163, and DD-144 at the HMSA were sampled. The data are provided in the Summary of FSDF 2019 Groundwater Investigations memorandum (CDM Smith 2020a) and the Summary of HMSA 2019 Groundwater Investigations memorandum (CDM Smith 2020b).

3.1.3 HMSA Well DD-144 Pumping Test

To obtain data for the Area IV Corrective Measure Study, two separate pumping tests were performed using well DD-144 to determine a sustainable pumping rate and to calculate the volume of impacted groundwater. The first activity was a step drawdown test performed to identify a sustainable pumping rate. The second activity was a prolonged 72-hour test to obtain data on the groundwater properties beneath the HMSA. During the 72-hour test, DD-144 was pumped at a rate between 0.75 and 1 gallon per minute. A total of 4,000 gallons were extracted during that period. The results of the pumping tests are provided in the HMSA DD-144 Pump Tests memorandum (CDM Smith 2020c).

3.1.4 Well RD-23 Packer Isolation Test

Monitoring well RD-23 is a 440-foot-deep bedrock coring at the FSDF that was drilled in 1989 through the near-surface bedrock fractures impacted by VOCs. It is therefore a conduit for near-surface VOCs to migrate to Chatsworth Formation groundwater at 240 feet bgs. In June 2019, a packer assembly was installed at a depth of approximately 200 feet bgs to capture and contain any near-surface groundwater migrating vertically down the corehole. A conventional PVC well was installed through the packer assembly to the bottom of the well, with 200 feet of screen starting at the 240 feet bgs top of bedrock groundwater. A second PVC well was placed at the top of the packer to sample and remove water that pools on the top of the packer. Groundwater within RD-23 was sampled prior to and following packer installation. A description of the packer installation is provided in the RD-23 Packer Test memorandum (CDM Smith 2020d).

3.1.5 FSDF Groundwater Interim Action

In November 2017, DOE initiated a groundwater interim measure (GWIM) at the FSDF using near-surface well RS-54 as the pumping well. In June 2018, eight near-surface coreholes (to 63 feet bgs) were drilled at the FSDF. New corehole C-21 exhibited elevated VOC concentrations and was added to the GWIM pumping. In July 2018, RS-54 stopped producing sufficient water for pumping, and C-21 was used as the sole pumping well for the remainder of the year. The winter rains of 2018–2019 recharged the

near-surface fractures at the FSDF, and water levels in the coreholes rose. Water level in RS-54 rose 28 feet in March 2019 and pumping volume increased from 10 gallons per event prior to the rains to more than 50 gallons per event. Water level in C-21 rose 16 feet between December 2018 and February 2019, and another 9 feet to its maximum elevation in March 2019. C-21 was more productive than RS-54 in February and March 2019 with extracted volume increasing from 10 gallons per event in December 2018 to 102 gallons per event in March 2019. In December 2019, water elevation in RS-54 was 24 feet higher than that measured in December 2018, and RS-54 was producing 40 gallons per pumping event. However, water elevation in C-21 in early December 2019 was at the same level as in December 2018 and the corehole was producing less than 10 gallons per event.

Three FSDF near-surface corehole wells (RS-54, C-21, and C-24) were pumped in 2019. Corehole C-24 was added to the pumping rotation when elevated trichloroethene (TCE) concentrations were observed following the winter rains. C-24 was the most productive of the wells, averaging 48.2 gallons per event. Collectively these three coreholes were pumped 108 times in 2019 with a total of 3,935 gallons of VOC-impacted groundwater extracted. To obtain trend data, each well was sampled for VOC analysis during each pumping event. The VOCs TCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), and 1,1-dichloroethene (1,1-DCE) are the primary contaminants in the groundwater. Extracted groundwater was stored in a 4,000-gallon tank, sampled for waste characteristics, and transported off-site for treatment and disposal. The data for the FSDF GWIM are presented in the FSDF GWIM 2019 Annual Report (CDM Smith 2020e).

3.2 Modifications to Well Network and Equipment

Wells and piezometers were inspected during Q1 2019 and dedicated pumps were removed from wells RD-17, RD-24, and RD-29 due to not functioning properly. These wells will be sampled using non-dedicated low-flow bladder pumps during future sampling events. Table 2 presents well maintenance, equipment modifications, well construction, and well development activities performed on Area IV wells during 2019. No new Area IV wells were installed, developed, or sampled during Q1 2019.

3.3 Water Level Gauging

Area IV static water levels were gauged at all accessible program wells. Depths to water were measured from the top of each well casing. Conditions of the well (e.g., loose caps, damaged casing) were recorded in field logs. Wells were gauged using an electronic water-level meter. Portions of the cable and meter or probe that were in contact with groundwater were decontaminated before use at each well. Water levels were obtained in first, second, third, and fourth quarters of 2019 and are summarized in Table 3.

Water level gauging as part of the FSDF and HMSA Groundwater Investigations are reported separately from this Annual Report (CDM Smith 2020a and 2020b).

3.4 Groundwater Sampling and Analysis

Area IV monitoring wells are scheduled to be sampled annually in accordance with the Site-Wide WQSAP. The Area IV Site-Wide Groundwater Monitoring Program includes 76 wells that are included in the Site-Wide Water Level Monitoring Program. Of those 76 wells, 20 wells are included for sampling under the Site-Wide Sampling Program. An additional 56 wells are subject to groundwater sampling under the RFI Program. A total of 55 DOE wells were scheduled to be sampled during Q1 2019, and 52 of those wells were sampled. There are 20 wells in the Area IV Site-Wide Groundwater Monitoring Sampling Program; 18 of those wells were scheduled to be sampled. Of those 18, one well (PZ-124) was dry and not sampled. Thus, a total of 17 Site-wide Program wells were sampled. There are an additional

56 wells listed under the RFI Sampling Program; of these 56 wells, 37 were scheduled to be sampled and two wells (PZ-104 and PZ-121) were dry and not sampled. Thus, a total of 35 RFI wells were sampled.

The sampling of four clusters of groundwater seep probes was conducted in April 2019. One cluster is in the Northern Buffer Zone and the other three on Brandeis property north of SSFL Area IV. Consistent with previous years' sampling, tritium was detected above background but below the maximum contaminant level (MCL) in the Northern Buffer Zone cluster. No Area IV–related groundwater contamination was observed in the Brandeis clusters. The results for water quality parameters and specific information regarding exceptions to the WQSAP, if any, and analyses performed are provided in a technical memorandum (CDM Smith 2019).

The locations of the wells, piezometers, and seeps are presented on Figure 3. The Site-Wide Groundwater Monitoring Program wells are presented in Table 1 and shown on Figure 4. Wells that could not be sampled in Q1 2019 and the associated reasons are discussed in Table 4. Groundwater field parameters collected during purging, prior to sample collection, are presented in Table 5. Tables 6 and 7 present the samples analyzed and analytical methods, respectively.

3.5 Deviations from Water Quality Sampling and Analysis Plans

Exceptions to the Site-Wide WQSAP (Haley & Aldrich 2010b) are presented in Table 4. Exceptions included wells that could not be sampled due to being dry; wells not sampled due to an obstruction (RD-34B) and a damaged multi-level sampling liner (RD-57); stabilization readings for some wells were collected at intervals greater than 5 minutes based on giving enough time to exchange water in the flow-through cell due to the flow rate; and low-flow stabilization criteria were not met for some wells based on the water level drawdown exceeding 0.3 feet (Table 4).

The reporting limit for vinyl chloride, 1 micrograms per liter (µg/L), was above the SSFL groundwater screening level reference value (SSFL screening criteria) MCL criterion of 0.5 µg/L. The method detection limit (MDL) was 0.10 µg/L, however, all sample results were nondetect so the 1 µg/L reporting limit is considered sufficient for project purposes. The reporting limit was also elevated for 1,2,-DCA at 1 µg/L (MDL = 0.13 µg/L), compared to the MCL criterion is 0.5 µg/L. The reporting limit for carbon tetrachloride was also above the SSFL screening criterion (MCL) of 0.5 µg/L at 1 µg/L. The MDL was 0.19 µg/L, which is below the criterion. If results are detected between the MDL and reporting limit they are reported as detected estimated results. Also, there were instances where the reporting limits for these analytes were elevated due to laboratory dilutions necessary to remain within instrument calibration limits when high concentrations of other target analytes were encountered. All these sample reporting limits are considered sufficient and meet project requirements.

The reporting limit for gasoline-range organics (GRO) is above the taste/odor threshold of 5 µg/L for the SSFL screening criteria. The reporting limit from the December 2010 Site-Wide WQSAP (Haley & Aldrich 2010b) has a value of 50 µg/L. The laboratory had a reporting limit of 25 µg/L and an MDL of 10 µg/L. Any results detected between 10 µg/L and 25 µg/L have been reported as estimated concentrations, and those above 25 µg/L have been reported as detections. The reporting limit and MDL values are both below the WQSAP stated reporting limit. Based on professional judgment the 25 µg/L reporting limit is adequate for project purposes.

No exceptions other than those listed in Table 4 occurred for Area IV wells during 2019.

4. MONITORING RESULTS

This section provides a review of Area IV 2019 groundwater levels, and groundwater quality results and trends. Historical data were summarized in previous reports by:

- Groundwater Resources Consultants (GWRC 2000);
- Haley & Aldrich (2001 through 2009; 2010b);
- MWH (2011a, 2011b, 2012, 2013, 2014);
- CDM Smith (2015b, 2016a, 2016b, 2016c); and
- North Wind (2017, 2018, 2019a, 2019b).

Groundwater screening reference values used to evaluate results are presented in Table 8. First-time detections of analytes and new historical maximum results are presented in Table 9 for wells that were installed prior to 2015. For wells installed after 2015, sufficient data does not exist to establish trends for these wells. The purpose of Table 9 is to help identify changes from established trends to support decision-making processes.

4.1 Groundwater Elevations and Flow Conditions

Groundwater elevations measured in SSFL Chatsworth Formation monitoring wells during 2019 ranged from a low of approximately 1,312 feet above mean sea level (MSL) at well RD-59A to a high of approximately 1,798 feet above MSL at well RD-17 (Table 3, Figure 5). The perched zone elevations ranged from a low of 1,753 feet above MSL at RS-28 to a high of 1,858 feet above MSL at PZ-100.

Figure 5 presents contours of first-encountered, non-perched groundwater elevations, as determined from water levels measured during fourth quarter 2019. Additional information that helped constrain the contouring included topography, the approximate elevations of identified seeps, historical water level data for wells and piezometers not gauged during 2019, and the understanding that groundwater level discontinuities coincide with certain fault segments and other geologic structures. In the case of well clusters, water levels from the shallowest wells were used. The data represent water levels primarily within the Chatsworth Formation, but include levels in younger deposits where the zone of saturation is continuous with the underlying formations.

The groundwater elevation contour map is provided to satisfy, in part, the requirements of Title 22 of California Code of Regulations (22 CCR), Section 66264.97, for determining groundwater flow rates and directions. A groundwater elevation contour map can be used in simple hydrogeologic settings to depict variations in the elevation of the water table surface, which in turn can be used to interpret apparent relative directions of groundwater flow. However, the groundwater elevation contours depicted in Figure 5 are not used to infer groundwater flow directions or rates of groundwater movement due to the hydrogeologic complexities at SSFL, as described in Section 2.2. Mountain-scale estimates of groundwater flow rates and three-dimensional groundwater flow directions from areas within SSFL were made and are presented in the draft groundwater remedial investigation (RI) report (MWH 2009). While DOE acknowledges the significant effort that has been spent calibrating the mountain-scale model, DOE believes that the model does not characterize the flow paths in Area IV with sufficient accuracy to make important investigation and remediation decisions. As part of the RFI Program, local-scale flow and transport modeling was performed for DOE by Dr. Scott James of Baylor University and Dr. Bill Arnold to reflect Area IV groundwater conditions. The results of the model revisions are reported in the Draft RCRA Facility Groundwater RI Report (CDM Smith 2018).

4.2 Groundwater Quality

Laboratory analytical results for groundwater samples are tabulated in Tables 10 through 15. Constituents detected for the first time in groundwater sampled from individual locations are presented in Table 9 for wells that were installed prior to 2015. For wells installed after 2015, sufficient data does not exist to establish trends for these wells. The purpose of Table 9 is to help identify changes from established trends to support decision-making processes. Aside from these exceptions listed in Table 9, the analytical results were within historical ranges (GWRC 2000; Haley & Aldrich 2001 through 2009; 2010b; MWH 2003, 2011a, 2011b, 2012, 2013, 2014), as presented in the 2014, 2015, 2016, and 2017 Annual Reports (CDM Smith 2015b, 2016c; North Wind 2017, 2018, 2019).Time series plots of analytical data for select wells and analytes are provided in Appendix D.

Groundwater chemical concentration data from the 2019 reporting period are presented on chemical extent maps illustrating areas of impacted groundwater for 13 chemicals on Figures 6 through 18. These chemicals were selected for mapping because they are contaminants of concern (COCs) in the Site-Wide Groundwater Monitoring Program, and were selected for presentation on chemical extent maps in the Groundwater RI Report (MWH 2009).

4.2.1 Quality Assurance and Quality Control

Completeness goals regarding the 2019 data quality were met and the data are suitable for the intended uses (Appendix E).

Per the Site-Wide WQSAP (Haley & Aldrich 2010b), the quality assurance assessment provides an assessment of data quality, including precision, accuracy, representativeness, comparability, completeness, and sensitivity. The quality assurance assessment also includes results of the data validation process, and a summary of the field sampling and analytical program, data management review procedure, and data verification process.

4.2.2 Groundwater Screening Reference Values

Groundwater screening reference values are presented in Table 8. The groundwater sampling results for individual chemicals are compared for discussion purposes to the following screening values, listed in approximate descending order of importance and/or relevance:

- Site-specific values developed by DTSC (i.e., groundwater comparison concentrations for metals) (listed as SSFL Comparison in report tables);
- Isotope-specific activity limits for individual beta/photon emitters based on the effective dose equivalent of 4 millirems per year (mrem/yr) (Federal Register 2000);
- Primary MCLs established by the EPA and promulgated by the Safe Drinking Water Act, and by the California Department of Public Health (DPH) promulgated by 22 CCR, sections 64431 through 64449 and 64672 (Regional Water Quality Control Board [RWQCB] 2008; DPH 2008) (listed as Primary MCL and Cal MCL in report tables);
- Notification Levels/Advisory Levels established by the California DPH (RWQCB 2008; DPH 2010);
- Secondary maximum contaminant levels (SMCLs), which address aesthetics such as taste and odor (RWQCB 2008; DPH 2006) (listed as Secondary MCL in report tables);
- Taste and Odor Threshold (RWQCB 2008) (listed as Taste/Odor in report tables); and

- Site-specific values developed for SSFL using risk assessment procedures assuming direct ingestion of groundwater (listed as site-wide groundwater risk-based screening level [SWGW RBSL] in report tables).

For chemicals with more than one screening value, the lower value is used to be more conservative. When EPA and California DPH values for MCLs differ, the lower value is used. In cases where the SMCL is lower than the primary MCL, the SMCL is used.

The methodology used to develop the risk-based screening values for chemicals that are not metallic elements and where there are no agency-published values is described in a technical memorandum included in Appendix 7-C of the Groundwater RI Report (MWH 2009).

4.2.3 Areas of Impacted Groundwater

Chemical concentration data from the 2019 reporting period are posted on chemical extent maps showing areas of impacted groundwater for 13 chemicals on Figures 6 through 18. For wells not sampled in 2019, the figures present the most recent sample results. The 13 chemicals were selected for mapping because they are COCs in the Site-Wide Groundwater Monitoring Program, generally exhibit more than solitary spatially isolated detects, were presented on chemical extent maps in the Groundwater RI Report (MWH 2009) and the RFI Work Plan (CDM Smith 2015a), and were based on a comprehensive site-wide evaluation of their extent in groundwater.

The COC figures presented in this report reflect data for TCE, tetrachloroethene (PCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), vinyl chloride, 1,1-DCE, 1,2-DCA, 1,1-dichloroethane (1,1-DCA), 1,4-dioxane, carbon tetrachloride, total petroleum hydrocarbons (TPH), nitrate, and tritium. Perchlorate is a COC but current conditions indicate that no areas of impacted groundwater are present. No figure is presented for this analyte. Analytes 1,2,3-trichloropropene (1,2,3-TCP), formaldehyde, n-nitrosodimethylamine (NDMA), and fluoride are discussed in this section because they were analytes identified as needing further evaluation.

Chemicals with concentrations historically exceeding screening values at five or more locations but having adequate sampling coverage in recent data to indicate the chemicals are no longer present at concentrations above the SSFL screening criteria (e.g., 1,1,1-TCA, chloroform, and benzene) were not included. Chemicals that are common laboratory contaminants (e.g., methylene chloride and bis [2-ethylhexyl] phthalate) and those that are naturally occurring and for which there is no known site-related anthropogenic source (e.g., sulfate) were also not included, even if they had concentrations exceeding screening values at five or more locations.

The 2019 analytical results were evaluated to identify any additional chemicals for which a chemical extent map was warranted according to the criteria used in the Groundwater RI Report (MWH 2009). No additional chemicals were identified for generation of a chemical extent map.

Areas of impacted groundwater from the Groundwater RFI Report (CDM Smith 2018) form the basis of those shown in the chemical extent maps in this report. Adjustments to the areas of impacted groundwater are made each year, as new data are collected. The chemical extent boundaries for each chemical are defined by the groundwater screening reference values listed in Table 8. The maximum concentrations at each location from samples collected in 2019 are posted for each chemical and the locations are color-coded to indicate whether the result exceeded the screening value, was detected below the screening value, or was not detected. For locations that were not sampled in 2019, the most recent historical result is posted along with the date the sample was collected.

Isoconcentration lines equal to screening values for selected chemicals in groundwater are depicted in Figures 6 through 18 and are based on both current and historical sampling results as well as professional judgment, particularly for chemicals that are transformation or daughter products from either the biological or abiotic decay of a parent (e.g., cis-1,2-DCE produced from the biological transformation of TCE). The screening-value isoconcentration lines represent the interpreted map-view extent of impacted groundwater based on all available data, not just the most recent reporting period. Screening-value isoconcentration lines are adjusted after a concentration at a well increases above or decreases below the screening-value for two or more consecutive years.

The areas of impacted groundwater for each of the chemicals plotted are discussed below and have been adjusted based on the results from 2019. In general, sample results were consistent with historical results and increases in concentrations were likely transitory and influenced by high seasonal rains and movement of groundwater caused by pumping of wells in the FSDF area for the Groundwater Interim Action and pumping of wells in the HMSA area as part of the Corrective Measures Study. These increases will be confirmed by comparing 2019 results to results from one or more future sampling rounds and evaluating for increasing trends.

Contaminant detections are reported as a concentration followed by the laboratory qualifier and the data validation qualifier. The qualifiers are defined in Tables 10 through 13 and in Appendix E. Concentrations with a J qualifier are considered estimated due to uncertainty in the reported value. This uncertainty is due to not meeting accuracy criteria (Appendix E) and/or the reported value was above the method detection limit (i.e., lowest concentration that can be detected) but below the quantitation limit (i.e., lowest concentration that can be quantitatively detected with accuracy and precision).

Trichloroethene (Figure 6 and Table 10)

FSDF Area

TCE concentrations detected above the MCL of 5 µg/L for this area in 2019 include wells:

- RD-21 at 38 µg/L. The concentration decreased from the estimated result detected in 2018 (45J µg/L).
- RD-23 at 300 µg/L. The concentration decreased from the result detected in 2018 (1,100 µg/L).
- RD-54A at 9.4*/ µg/L. The concentration increased from the result detected below the MCL in 2018 (2.3 µg/L). This concentration increase may be influenced by GWIM pumping in nearby wells (Section 3.1.5) pulling groundwater with higher concentrations in to the well.
- RD-64 at 6.8 /J µg/L. The estimated concentration decreased from the result detected in 2017 (25 µg/L).
- RD-65 at 16 µg/L. The concentration increased from the result detected in 2018 (10 µg/L) and is within the range of results detected since 2017.

The TCE concentration at well C-08 (4.2 µg/L) decreased to below the MCL from the result detected in 2018 (82 µg/L).

Building 4100 / Building 56 Landfill Area

TCE concentration detected above the MCL of 5 µg/L for this area in 2019 includes well:

- RD-07 at 23 µg/L. The concentration decreased from the result detected in 2018 (32 µg/L).

Metals Clarifier / DOE Leach Field 3 Area

TCE concentration detected above the MCL of 5 µg/L for this area in 2019 includes well:

- PZ-105 at 9.5 µg/L. The concentration decreased from the result detected in 2018 (11 µg/L).

HMSA Area

TCE concentrations detected above the MCL of 5 µg/L for this area in 2019 include wells:

- DD-144 at 170 µg/L. The concentration decreased from the result detected in 2018 (200 µg/L).
- PZ-108 at 240 µg/L. The concentration increased from the result detected in 2018 (160 µg/L) and is a new maximum detection. This concentration increase may be influenced by pumping tests conducted at the HMSA (Section 3.1.3) causing water with higher concentrations to be pulled into the well, and/or high seasonal rains may have flushed TCE into shallow groundwater or influenced the transport of a shallow groundwater secondary source into this well.
- PZ-162 at 15 µg/L and PZ-163 at 150 µg/L. These wells were installed in 2018 and were sampled under the annual monitoring program for the first time in 2019.
- PZ-109 at 5 µg/L. This concentration is similar to the concentration detected in 2018.

The TCE concentration at PZ-120 (2.9 µg/L) decreased to below the MCL from the result detected in 2018 (5.6 µg/L).

RMHF Area

The TCE concentration at RD-63 (4 µg/L) decreased to below the MCL from the result detected in 2018 (6 µg/L).

Tetrachloroethene (Figure 7 and Table 10)

Buildings 4057/4059/4626 Area

- PCE was detected above the MCL of 5 µg/L in well PZ-109 at a concentration of 63 µg/L. This concentration decreased from the result detected in 2018 (72 µg/L).
- PCE was detected below the MCL in well DD-142 at a concentration of 3.3 µg/L, which is similar to the result detected in 2018.

cis-1,2-Dichloroethene (Figure 8 and Table 10)

FSDF Area

- cis-1,2-DCE was detected above the MCL of 6 µg/L in well RD-23 at 8.2J/J µg/L. This concentration decreased from the estimated result detected in 2018 (28J µg/L).
- cis-1,2-DCE was detected above the MCL in well RD-65 at a concentration of 8.8 µg/L, which is similar to the result detected in 2018.

Building 4457 HMSA Area

- PZ-163 at 8 µg/L. This well was installed in 2018 and was sampled under the annual monitoring program for the first time in 2019.

- cis-1,2-DCE was detected above the MCL of 6 µg/L in well DD-144 at a concentration of 11 µg/L. This concentration decreased from the result detected in 2018 (16 µg/L).
- cis-1,2-DCE was detected above the MCL in PZ-108 at a concentration of 19 µg/L. This concentration increased from the result detected in 2018 (12 µg/L). This concentration increase may be influenced by pumping tests conducted at the HMSA (Section 3.1.3) causing water with higher concentrations to be pulled into the well and/or a groundwater secondary source that may be migrating into this well.

trans-1,2-Dichloroethene (Figure 9 and Table 10)

FSDF Area

- trans-1,2-DCE was detected in RD-65 at 18 µg/L, above the SSFL screening criterion (MCL) value of 10 µg/L. The concentration decreased from the result detected in 2018 (24 µg/L).
- trans-1,2-DCE was detected below the MCL in well RD-33A at 3.1 µg/L. This concentration is similar to the result detected in 2018.

Other Results

The other wells that were sampled in 2019 all had nondetect concentrations for trans-1,2-DCE, except wells RD-63 and RD-34A located in the Radioactive Materials Handling Facility (RMHF) Area. Both were detected at concentrations below the MCL at 0.3J/J µg/L and 0.77J*/J µg/L, respectively.

Vinyl Chloride (Figure 10 and Table 10)

FSDF Area

- Vinyl chloride results were nondetect for all wells sampled in 2019. In general, the reporting limit for vinyl chloride was 1 µg/L, which was above the SSFL screening criterion (MCL) of 0.5 µg/L. However, the MDL was 0.10 µg/L; with all sample results being nondetect, the 1 µg/L reporting limit is considered sufficient for project purposes. The vinyl chloride reporting limit and MDL at well RD-23 were elevated above the MCL to 10 µg/L and 1 µg/L, respectively, due to a 10 times laboratory dilution factor. For reference, the detected TCE concentration was 300 µg/L.

Other Results

- The vinyl chloride reporting limit and MDL at HMSA wells PZ-163 and DD-144 were elevated above the MCL to 5 µg/L and 0.5 µg/L, respectively, due to a 5 times laboratory dilution factor. The vinyl chloride reporting limit and MDL at well PZ-108 were elevated above the MCL to 10 µg/L and 1 µg/L, respectively. For reference, the detected TCE concentrations were 150 µg/L at PZ-163, 170 µg/L at DD-144, and 240 /J µg/L at PZ-108.
- The vinyl chloride reporting limit and MDL at B4057/4059/4626 well PZ-109 were elevated above the MCL to 2 µg/L and 0.2 µg/L, respectively, due to a 2 times laboratory dilution factor. For reference, the detected TCE concentration was 5 µg/L.

1,1-Dichloroethene (Figure 11 and Table 10)

FSDF Area

- 1,1-DCE was detected above the MCL of 6 µg/L in RD-23 at an estimated concentration of 8J/J µg/L. The concentration decreased from the estimated concentration detected in 2018 (30J µg/L).
- 1,1-DCE was detected above the MCL in RD-65 at a concentration of 6.3 µg/L. The concentration decreased from the result detected in 2018 (7.7 µg/L).
- RD-33A had an estimated 1,1-DCE concentration of 0.53J/J µg/L and RD-54A had an estimated concentration of 0.27J*/J µg/L, which are below the MCL. All the other wells sampled in this area had nondetect results.

RMHF Area

- Well RD-63 had an estimated concentration for 1,1-DCE of 0.52J/J µg/L, which is below the MCL. All the other wells sampled in this area had nondetect results.

MC/DOE LF3

- Well PZ-103 had a 1,1-DCE estimated concentration of 0.28J/J µg/L, which is below the MCL. The 1,1-DCE concentration in well PZ-103 was a new maximum and slight increase from the estimated concentration detected in 2017 (0.26J/J). All the other wells sampled in this area had nondetect results.

Tritium Plume

- Well RD-90 had a 1,1-DCE concentration of 4.1 µg/L, which is below the MCL. All the other wells sampled in this area had nondetect results.

HMSA

- Well PZ-162 had a 1,1-DCE estimated concentration of 0.23J/J µg/L, which is below the MCL. All the other wells sampled in this area had nondetect results.

1,2-Dichloroethane (Figure 12 and Table 10)

FSDF Area

- All wells sampled in this area had nondetect results. However, the 1,2-DCA reporting limit and MDL at RD-23 were elevated above the MCL of 0.5 µg/L to 10 µg/L and 1.3 µg/L, respectively, due to a 10 times laboratory dilution factor. For reference, the detected TCE concentration at RD-23 was 300 µg/L.

Other Results

- For the remaining wells sampled for 1,2-DCA, sample results were nondetect. In general, the reporting limit was above the MCL of 0.5 µg/L at 1 µg/L. However, the MDL for non-diluted samples was 0.13 µg/L, which is considered sufficient for project purposes.
- The 1,2-DCA reporting limit and MDL at HMSA well PZ-108 were elevated above the MCL to 10 µg/L and 1.3 µg/L, respectively, due to a 10 times laboratory dilution factor. For reference, the detected TCE concentration at PZ-108 was 240 /J µg/L. Similarly, the reporting limit and MDL were elevated at DD-144 due to a 5 times laboratory dilution factor and at PZ-109 due to a 2 times laboratory dilution factor.

1,1-Dichloroethane (Figure 13 and Table 10)

FSDF Area

- 1,1-DCA was detected at a concentration of 0.36J/J µg/L in well RD-33A, which is below the MCL of 5 µg/L.
- 1,1-DCA was detected in well RD-65 at a concentration of 2.1 µg/L. The 2017 and 2018 concentrations were also below the MCL.

Other Results

The other wells that were sampled in 2019 all had nondetect concentrations, except RD-63 in the RMHF area with an estimated concentration of 0.5J/J µg/L and RD-90 in the Tritium Plume area with an estimated concentration of 0.7J/J µg/L. These results are below the MCL.

1,4-Dioxane (Figure 14 and Table 10)

FSDF Area

- 1,4-dioxane was detected above the notification level of 1 µg/L in DS-46 at an estimated concentration of 2.2 /J µg/L. The concentration increased from the result detected in 2018 (1.5 µg/L). This concentration increase may be influenced by GWIM pumping in nearby wells (Section 3.1.5) pulling groundwater with higher concentrations into the well.
- 1,4-dioxane was detected above the notification level in well DD-140 at an estimated concentration of 1.8 /J µg/L.
- 1,4-dioxane was detected above the notification level in well RD-33A at an estimated concentration of 2.3 /J µg/L.
- 1,4-dioxane was detected above the notification level in well RS-54 at an estimated concentration of 34 /J µg/L. The 1,4-dioxane concentration detected in well RS-54 is a first-time and new maximum detection. This first time detection may be attributed to elevated detection limits in historical samples caused the result to not be reported; however, the contaminant was likely present at that time. This concentration may also be influenced by GWIM pumping at this well.
- 1,4-dioxane was detected below the notification level in well RD-65 at an estimated concentration of 0.89J/J µg/L. In 2013, RD-65 had a concentration above the screening level at 2.1 µg/L and was not sampled for 1,4-dioxane in 2015, 2016, or 2017. In 2016, DD-140 was detected above the notification level at an estimated concentration of 1.4J µg/L.

RMHF Area

- 1,4-dioxane was detected above the notification level in RD-63 at an estimated concentration of 1.3J/J µg/L. 1,4-dioxane was not analyzed in RD-63 during 2017 and 2018. However, it was analyzed during 2016 and detected above the notification level in RD-63 at 1.4 µg/L.

HMSA Area

1,4-dioxane was not sampled from HMSA wells as part of the 2019 annual sampling event. It has been detected in samples collected for the RFI program and a plume is known to exist in this area. Thus, it is recommended to analyze for 1,4-dioxane from all HMSA wells during future sampling rounds.

Carbon Tetrachloride (Figure 15 and Table 10)

FSDF Area

- Carbon tetrachloride was detected in well RD-21 at a concentration of 5.6 µg/L, which is above the MCL of 0.5 µg/L. The concentration decreased from the result detected in 2018 (11 µg/L).

Other Results

- The other wells sampled all had nondetect concentrations for carbon tetrachloride. The reporting limit for carbon tetrachloride was 1 µg/L, above the MCL of 0.5 µg/L; however, the MDL was below the MCL at 0.19 µg/L, which is considered sufficient for project purposes.
- The carbon tetrachloride reporting limit and MDL at wells PZ-108, PZ-109, PZ-163, RD-23, and DD-144 were elevated above the MCL due to laboratory dilution factors.

Total Petroleum Hydrocarbons C4-C30 (Figure 16 and Table 12)

There were three areas impacted by TPH, which are defined by two categories: diesel-range organics (DRO; C10–C28); and GRO (C6–C10). For the purposes of plume delineation the contour areas are combined.

The SSFL screening criterion for DRO is 100 µg/L and for GRO it is 5 µg/L. There were discrepancies in these criteria between Table 8 and the required reporting limit presented in the WQSAP. Both Table 8 and the reporting limits presented in the WQSAP are very low, and laboratories have shown it is difficult to achieve these limits. For evaluation in this document the limits used are as stated, and evaluation of nondetect results in cases where the values are greater than the SSFL screening criteria is performed on a case-by-case basis.

FSDF Area

- GRO was detected in well RD-33C at an estimated concentration of 10J/J µg/L, which is above the threshold criterion of 5 µg/L.
- Well RD-54A had nondetect concentrations for DRO and GRO. The reporting limits, though, were above the threshold criteria for DRO and GRO. In 2018, well RD-54A was sampled for GRO and DRO; GRO was detected above the screening criterion at 57J µg/L (estimated) and DRO at 58J µg/L (estimated).
- All other wells sampled for DRO and/or GRO and had nondetect concentrations. The reporting limits, though, were above the threshold criteria for DRO and/or GRO.

Metals Clarifier / DOE Leach Field 3 Area

- DRO was detected in well PZ-103 above the 100 µg/L threshold criterion at an estimated concentration of 230J/J µg/L. The DRO concentration detected at PZ-103 is a first-time and new maximum detection. The new detection may be attributed to high seasonal rains causing the shallow zone groundwater elevation to rise and flush DRO from soils overlying groundwater.
- DRO was detected in well PZ-105 below the 100 µg/L threshold criterion at an estimated concentration of 85J/J µg/L. The concentration decreased from the result detected in 2018 (520 µg/L).
- All other wells sampled for DRO and/or GRO and had nondetect concentrations. The reporting limits, though, were above the threshold criteria for DRO and/or GRO.

Other Results

- The other wells that were sampled all had nondetect concentrations for DRO and/or GRO. The reporting limits, though, were above the threshold criteria for DRO and/or GRO.

Nitrate as N (Figure 17 and Table 13)

- Nitrate was detected above the MCL at PZ-005 and PZ-103 at concentrations of 13 mg/L and 12 mg/L, respectively.

- Nitrate was detected below the MCL of 10 mg/L at DD-145 and PZ-105 at estimated concentrations of 3.1 /J+ mg/L and 4 /J+ mg/L, respectively. The concentrations decreased from the results detected in 2018 (4.2 mg/L and 4.4 mg/L, respectively).

Other Results

Nitrate was detected above the MCL in Building 4100 Trench area well RD-20 at a concentration of 11 mg/L. The concentration increased from the result detected in 2018 (9.4 mg/L).

Tritium (Figure 18 and Table 14)

Tritium Plume Area

- The concentrations of tritium were above the MCL of 20,000 picocuries per liter (pCi/L) for well RD-90 at 37,900 pCi/L, and for well RD-95 at 33,000 pCi/L. The concentrations increased from the results detected in 2018 (31,600 pCi/L and 31,000 pCi/L, respectively). Tritium concentration vs. time graphs illustrate overall decreasing trends for these wells (Appendix D). The graphs include trendlines generated from both actual tritium detections and projected tritium half-life decay from the highest historical detection. Based on the detection trendlines, tritium is expected to decrease to below the MCL by 2026 in RD-90 and by 2023 in RD-95. The decay trendlines indicate a much longer timeframe with tritium decaying below the MCL by 2032 in RD-90 and by 2040 in RD-95. The Groundwater RFI Report notes that the rate of diminishing tritium concentrations is faster than the half-life decay due to dispersion and dilution factors (CDM Smith 2018).

Other Analytes of Interest

The following analytes are not considered COCs but are of potential interest.

Perchlorate (Table 11)

In the past there was one area of impacted groundwater for perchlorate. Current conditions indicate that there are no areas of impacted groundwater from perchlorate since all 2019 sample results are below the MCL of 6 µg/L. Sample results for 2019 are discussed below for the former area of impacted groundwater.

FSDF Area

- Perchlorate was detected at concentrations below the MCL of 6 µg/L in FSDF area wells RS-18 and RD-21 at concentrations of 2.4 µg/L and 2.1 µg/L, respectively.

Other Results

- Perchlorate was detected as first-time and new maximum detections in offsite well RD-59C and well RD-96 at an estimated concentrations of 0.0041J/J µg/L and 0.018J/J µg/L, respectively (Table 9). These concentrations are orders of magnitude below the MCL and will be confirmed during the next round of sampling.

No figure is required for this analyte.

1,2,3-Trichloropropane (Table 10)

There are no areas in Area IV with 1,2,3-TCP impacted groundwater. No figure is required for this analyte.

Formaldehyde

Areas of impacted groundwater for formaldehyde are not present in Area IV. No figure is required for this analyte.

N-Nitrosodimethylamine

NDMA was not analyzed in any Area IV wells since there have been no previous detections in Area IV. No figure is required for this analyte.

Fluoride (Table 13)

The previous area of impact for fluoride was in the vicinity and south of the Systems Nuclear Auxiliary Power Facility. Since fluoride was not detected above the screening value for any Area IV wells in 2014, this area of impact was removed at that time. Fluoride was detected in RMHF area wells RD-34A and RD-34C and B4133 area well RD-19 at estimated concentrations below the SSFL screening criterion.

4.2.4 Analytical Results

During the 2019 sampling period, analytes in groundwater samples collected in Area IV that were detected for the first time at a particular well, and/or were analyzed for the first time, are shown in Table 9. Table 9 also shows whether the 2019 detected result is a new maximum value for that analyte at that well. The following items depict the process of identifying the analytes shown in Table 9:

- Analytes that were detected for the first time in a well in 2019.
- Analytes that were analyzed for the first time ever for that well (none for 2019).
- Of these analytes, the detected values are compared to all data to see if the 2019 value is the new maximum value for that well.

The few cases for which there are insufficient historical data to provide further context for the recent results, or that otherwise warrant further discussion, are presented below, with on-site detections (excluding radiochemical constituents) discussed in Section 4.2.4.1.

4.2.4.1 On-Site Detections

Constituent concentrations (except for radiochemical constituents, which are discussed separately in Section 4.2.5) detected in groundwater samples collected from on-site wells in 2019 and presented in Table 9 are discussed below.

First-Time Analyses of an Analyte at a Particular Well

There were no new analytical suites included in the 2019 sampling event.

First-Time Detection of the Analyte and New Maximum Value

As shown in Table 9, certain analytes were detected for the first time during 2019 in various wells and those concentrations are also now the new maximum values for those analytes at these particular wells. New maximum concentrations in this category above the associated SSFL screening criteria values are discussed below.

- 1,4-dioxane was detected for the first time in well RS-54. This first time detection may be attributed to elevated detection limits in historical samples caused the result to not be reported; however, the contaminant was likely present at that time. This detection may also be influenced by GWIM pumping at this well.
- Three metals were detected in wells for the first time: aluminum in wells PZ-102 and PZ-109; molybdenum in well PZ-098; and selenium in well PZ-098. These first time detections may be influenced by high seasonal rains flushing native metals from overlying soils into shallow groundwater.

Not a First-Time Detect but Analyte Concentration is New Maximum Value

As shown in Table 9, certain analytes were detected as new maximum values in various wells during 2019. Each detected concentration was not the first time each analyte was seen in the well; however, the value is now a new maximum concentration. New maximum values for previously detected analytes exceeding the associated SSFL screening criteria values are discussed below.

- TCE was detected at a new maximum concentration in well PZ-108. This increase may be influenced by pumping tests conducted at the HMSA causing water with higher concentrations to be pulled into the well, and/or high seasonal rains may have flushed TCE into shallow groundwater or influenced the transport of a shallow groundwater secondary source into this well.
- Five metals were detected at new maximum values: aluminum in wells PZ-005, PZ-103, and PZ-108; antimony in well PZ-105; molybdenum in wells PZ-103 and PZ-109; and vanadium in well PZ-102. These increases may be influenced by high seasonal rains flushing native metals from overlying soils into shallow groundwater.

4.2.4.2 Off-Site Detections

Off-site wells sampled during 2019 included RD-59A, RD-59B, and RD-59C. Perchlorate was detected for the first time and orders of magnitude below the screening level in well RD-59C. This result will be confirmed during the next sampling round. Three metals were detected at new maximums in offsite wells, the increases likely influenced by high seasonal rains. Manganese was detected at a new maximum that exceeds the screening level in well RD-59A. Boron and molybdenum were detected at a new maximum and below the screening level in well RD-59C.

4.2.5 Radiochemistry Results

Radiochemistry analyses were performed for samples collected during the 2019 reporting period under the Site-Wide and RFI programs, and results are presented in Table 14 and discussed further below. Radiochemistry analyses included both total (non-filtered water) and dissolved (filtered water) results.

Radiochemistry analytes reported for the first time in groundwater at individual locations, as well as any new maximum concentrations, are presented in Table 9. It is notable that false positive detections of actinium-228. were reported by the laboratory for wells DS-44, PZ-162, RD-07, RD-19, RD-30, and RD-

98 which would have been first-time detections. The false positive determination is based on review of the laboratory report (i.e., failed shape test due to spectra peak being too narrow or not close enough match for positive identification). Thus, these actinium-228 results are not included in Table 9.

First-Time Analyses of an Analyte at a Particular Well

There were no new analytical suites included in the 2019 sampling event.

First-Time Detection of the Analyte as well as the New Maximum Value

As shown in Table 9, no radiochemistry analytes were reported for the first time and a new maximum exceeding the screening limit. Additionally, antimony-125, cesium-137, europium-152, radium-228, sodium-22, strontium-90, uranium-235/236, and uranium-238 were reported for the first time in various wells, but do not exceed an established screening limit.

Not a First-Time Detect but Analyte Concentration is New Maximum Value

As shown in Table 9, gross alpha/beta, potassium-40, radium-228, strontium-90, uranium-233/234, uranium-235/236, and uranium-238 were reported as new maximum values in various wells during Q1 2019. Each reported concentration was not the first time each analyte was seen in the well; however, the value is now a new maximum concentration. New maximum values for previously detected analytes exceeding the associated SSFL screening criteria values are discussed below.

- Gross alpha was detected at new maximums values in wells RD-19, RD-34A, RD-96, RD-98, and PZ-120. The laboratory minimum detectable concentration for these samples was elevated due to high residual mass requiring the laboratory to reduce sample size. This may have caused increased uncertainty and potentially increased activity results with a high bias. Gross alpha results from these wells will be confirmed during the 2020 sampling round.
- Radium-228 was detected at a new maximum in well RD-98. This increase may be transitory and results from the 2020 sampling round will be used to confirm if an increasing trend is established.

4.2.5.1 Off-Site Detections

Off-site wells sampled during 2019 included RD-59A, RD-59B, and RD-59C. The following radiochemistry analytes were detected for the first time during 2019: actinium-228 and uranium-235/236 in well RD-59A. The presence of these analytes will be confirmed during the next sampling round. There are no designated SSFL screening criteria for these radiochemistry analytes. A new maximum was detected for radium-228 in well RD-59C below the SSFL screening level.

It is notable that a false positive detection of total europium-154 was reported by the laboratory for well RD-59C which would have been a first time detection. The false positive determination is based on review of the laboratory report (i.e., peaks in the spectra failed the shape tests and caused the laboratory software to force a fit). Thus, this result is not included in Table 9.

4.2.6 2018 Results Follow-up

This section evaluates whether or not sampling and analyses performed during 2019 are sufficient to resolve documented follow-up sampling issues from the previous annual report (North Wind 2019), and assesses the need for changes to the groundwater monitoring programs.

4.2.6.1 2018 Outstanding Issues

Vinyl chloride, carbon tetrachloride, 1,2-DCA, 1,4-dioxane, and GRO had 2018 reporting limits above the respective SSFL screening criteria in one or more samples. Similar reporting limits were used during Q1 2019 since the results are considered sufficient and meet the project requirements, as discussed in Section 3.4 and Table 4.

Silica gel cleanup was recommended to address the uncertainty of whether DRO detected in groundwater samples is from released petroleum or natural/biogenic sources. Silica gel cleanup was used for the first time to prepare Q1 2019 DRO samples. It is recommended to continue preparing DRO samples with silica gel cleanup for two additional sample rounds. Following the third sampling round, results will be presented as an optimization study within the annual report to potentially remove DRO analysis from wells where results were nondetect for three or more consecutive rounds.

It was recommended to add 1,4-dioxane to the analyte list for future sampling rounds at wells RD-33A, DS-46, DD-140, and RD-63. During Q1 2019, 1,4-dioxane was analyzed for these wells and detected above the screening level in DD-140 at an estimated concentration of 1.8 /J µg/L, in DS-46 at an estimated concentration of 2.2 /J µg/L, in RD-33A at an estimated concentration of 2.3 /J µg/L, and in RD-63 at an estimated concentration of 1.3J/J µg/L. This resolves the issue from the previous annual report and it is recommended to continue analyzing for 1,4-dioxane at these wells.

During 2014, RD-23 had a DRO concentration of 17 mg/L, which is above the SSFL screening criterion (i.e., threshold criterion) for DRO. DRO was not sampled in well RD-23 during 2016, 2017, or Q1 2018. DRO was analyzed during Q1 2019 and was nondetect. It is recommended to analyze DRO in RD-23 for one or more additional sample rounds to confirm the nondetect.

4.2.6.2 2018 On-site Detects

For on-site reported sample results included in the 2018 annual report, Section 4.2.4 (North Wind 2017), all analytes were analyzed accordingly unless the well had insufficient sample volume or was dry.

4.2.6.3 2018 Off-site Detects

There were no off-site results highlighted in the 2018 annual report, Section 4.2.4 (North Wind 2017), requiring follow-up in Area IV.

4.2.6.4 2018 Radiochemistry Results

For radiochemistry detected sample results reported in the 2018 annual report, Section 4.2.4 (North Wind 2017), all required methods were analyzed accordingly unless the well had insufficient sample volume or was dry.

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5. 2020 PLANNED ACTIVITIES

The monitoring frequency for the Site-Wide Program will be quarterly for water level monitoring and annually for sampling and analysis, with sampling to be performed in the first calendar quarter of 2020.

5.1 Outstanding Issues and/or Follow-Up Work

After review of the 2019 sampling, some outstanding issues were identified and recommendations have been made for potential follow-up work. These are listed below based on rationale provided in Section 4.2.6.1.

- Continue preparing DRO samples using silica gel cleanup for two future sampling rounds. Following the third sampling round using silica gel cleanup, complete an optimization study to potentially reduce DRO analysis at wells with three or more consecutive rounds of nondetects.
- Continue analyzing 1,4-dioxane from DD-140, RD-33A, RD-63, and RS-54 for future sampling rounds.
- Analyze DRO from RD-23 for one more sample round to confirm the nondetect result from Q1 2019.

Follow-up is recommended based on results presented in Section 4.2.4.1:

- Confirm first time detections, new maximum detections, and detections that increased from 2018 results by comparing 2019 results to results from one or more future sampling rounds and evaluate for potentially increasing trends.
- Confirm radiochemistry analytes actinium-228 and uranium-235/236 detected for the first time during Q1 2019 in off-site well RD-59A by comparing Q1 2019 results to results from one or more future sampling rounds.
- Confirm perchlorate detection in offsite well RD-59C during the next sampling round. The estimated detection of 0.0041J/J µg/L was orders of magnitude below the MCL of 6 µg/L and near the method detection limit of 0.004 µg/L.
- Analyze 1,4-dioxane from all HMSA area wells for future sampling rounds. Based on sampling conducted as part of the RFI program, there is a 1,4-dioxane plume in the HMSA area with concentrations near the screening level.

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6. REFERENCES

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TABLES

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TABLE 1
LIST OF WELLS – SITE-WIDE GROUNDWATER MONITORING PROGRAM
DOE AREA IV GROUNDWATER RFI
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CALIFORNIA

Well ID	Sampling Program[1]	WQSAP Groundwater Impact Area	Water Level Monitoring Program	Location
C-08	RFI			FSDF B4886
PZ-005	RFI			MC/DOE LF3
PZ-041	RFI			HMSA
PZ-097	S	17	W	FSDF B4886
PZ-098	RFI			FSDF B4886
PZ-100	RFI			FSDF B4886
PZ-102	RFI			MC/DOE LF2
PZ-103	RFI			MC/DOE LF3
PZ-104	RFI			MC/DOE LF3
PZ-105	RFI			MC/DOE LF3
PZ-108	S	15	W	B4457 HMSA
PZ-109	RFI			B4057/4059/4626
PZ-116	RFI			RMHF
PZ-120	RFI			B4457 HMSA
PZ-121	RFI			B4457 HMSA
PZ-122	RFI			B4457 HMSA
PZ-124	S	16	W	B56 Landfill
PZ-162	RFI			HMSA
PZ-163	RFI			HMSA
RD-07	S	16	W	B56 Landfill
RD-14	S	7	W	Old Conservation Yard
RD-17	RFI		W	B4030/4093 Leachfields
RD-19	S	13	W	B4133
RD-20	S	18	W	B4100 Trench
RD-21	RFI		W	FSDF B4886
RD-22	RFI		W	FSDF B4886
RD-23	RFI		W	FSDF B4886
RD-24	RFI		W	B4057/4059/4626
RD-27	RFI		W	RMHF
RD-29	RFI		W	B4457 HMSA
RD-30	RFI		W	RMHF
RD-33A	S	17	W	FSDF B4886
RD-33B	S	17	W	FSDF B4886
RD-33C	S	17	W	FSDF B4886
RD-34A	S	13	W	RMHF
RD-34B	S	13	W	RMHF

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SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CALIFORNIA

Well ID	Sampling Program[1]	WQSAP Groundwater Impact Area	Water Level Monitoring Program	Location
RD-34C	S	13	W	RMHF
RD-54A	S	17	W	FSDF B4886
RD-54B	RFI		W	FSDF B4886
RD-54C	RFI		W	FSDF B4886
RD-59A	S	13, 14, 16, 17	W	Offsite
RD-59B	S	13, 14, 16, 17	W	Offsite
RD-59C	S	13, 14, 16, 17	W	Offsite
RD-63	S	13	W	RMHF
RD-64	RFI		W	FSDF B4886
RD-65	RFI		W	FSDF B4886
RD-74	RFI		W	B56 Landfill
RD-87	RFI		W	Tritium Plume
RD-88	RFI		W	Tritium Plume
RD-90	RFI		W	Tritium Plume
RD-93	RFI		W	Tritium Plume
RD-94	RFI		W	Tritium Plume
RD-95	RFI		W	Tritium Plume
RD-96	S	16	W	B4057/4059/4626
RD-97	RFI		W	B4057/4059/4626
RD-98	RFI		W	RMHF
RS-16	RFI		W	B56 Landfill
RS-18	S	17	W	FSDF B4886
RS-25	RFI		W	B133
RS-27	RFI		W	B4457 HMSA
RS-28	RFI		W	RMHF
RS-54	RFI		W	FSDF B4886
DS-43	RFI			B4057/4059/4626
DS-44	RFI			B4030/4093 Leachfields
DS-45	RFI			B4064
DS-46	RFI			FSDF B4886
DS-47	RFI			B4064
DD-139	RFI			FSDF B4886
DD-140	RFI			FSDF B4886
DD-141	RFI			B56 Landfill
DD-142	RFI			B4057/4059/4626
DD-143	RFI			RMHF

TABLE 1
LIST OF WELLS – SITE-WIDE GROUNDWATER MONITORING PROGRAM
DOE AREA IV GROUNDWATER RFI
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CALIFORNIA

Well ID	Sampling Program[1]	WQSAP Groundwater Impact Area	Water Level Monitoring Program	Location
DD-144	RFI			B4457 HMSA
DD-145	RFI			MC/DOE LF3
DD-146	RFI			B4457 HMSA
DD-147[2] (Formerly RD-89)	RFI		W	Tritium Plume
Seeps and Springs[3]				
				Nearest Impact Area
SP-900A				FSDF B4886
SP-900B				FSDF B4886
SP-900C				FSDF B4886
SP-19A				Tritium Plume
SP-19B				Tritium Plume
SP-T02A				Tritium Plume
SP-T02B				Tritium Plume
SP-T02C				Tritium Plume
SP-T02D				Tritium Plume
SP-424A				RMHF
SP-424B				RMHF
SP-424C				RMHF

NOTES AND ABBREVIATIONS

S	Included in Site-Wide Sampling Program
W	Included in Site-Wide Water Level Monitoring Program
RFI	Collected as part of DOE Area IV GW RFI.
FSDF	Former Sodium Disposal Facility
MC/DOE LF3	Metals Clarifier / DOE Leach Fields 3
HMSA	Hazardous Materials Storage Area
RMHF	Radioactive Materials Handling Facility

[1] Haley & Aldrich, 2010. Site-Wide Water Quality Sampling and Analysis Plan, Santa Susana Field Laboratory, Simi Hills, Ventura County, California, Revision 1, File No. 20090-456/556/656/M489. December.
[2] RD-89 was drilled to a deeper depth in May 2018. The well ID is now DD-147 and is 257 feet deep.
[3] Seeps and springs are monitored under a separate program.

TABLE 2
MODIFICATIONS TO MONITORING WELL NETWORK AND EQUIPMENT, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

WELL MAINTENANCE

Well ID	Monitoring Program	Quarter Identified	Issue Identification Date	Issue	Issue Resolution	Quarter Resolved	Issue Resolution Date
RD-34B	SW	2010/2011	2010/2011	Borehole obstruction at 167 feet below ground surface	Groundwater samples have been collected using a pump placed immediately above the instruction	--	--
RD-57	SW	2016Q1	3/10/2016	FLUTe was only partially removed due to an obstruction. Well cap welded shut.	No planned action at this time.	--	--
RD-74	SW	2014Q1	2/4/2014	Obstruction at about 95 ft bgs due to pump left in well. Total well depth is 101 feet.	Issue discussed with DTSC in March 2016. Well is dry. No planned action at this time.	--	--
RD-17	SW	2019Q1	3/1/2019	Removed electric submersible pump (230V;1/3HP). Had problem with the pump shutting off while sampling during 2019Q1 sampling event.	In the future the well will be sampled using a non-dedicated low-flow bladder pump.	2019Q3	7/16/2019
RD-24	SW	2019Q1	2/27/2019	Removed electric submersible pump (230V;1/3HP). Removed proactively to support future sampling with non-dedicated pumps.	In the future the well will be sampled using a non-dedicated low-flow bladder pump.	2019Q3	7/16/2019
RD-29	SW	2019Q1	2/27/2019	Removed electric submersible pump (230V;1/2HP). Had problem with the pump shutting off while sampling during 2019Q1 sampling event.	In the future the well will be sampled using a non-dedicated low-flow bladder pump.	2019Q3	7/16/2019

EQUIPMENT MODIFICATIONS

Well ID	Monitoring Program	Quarter	Modification Date	Description
None				

WELL CONSTRUCTION

Well ID	Monitoring Program	Quarter	Completion Date	Description
None				

WELL DEVELOPMENT

Well ID	Monitoring Program	Quarter	Development Date	Description
None				

Notes:
SW - Well monitored under Site-Wide Program

TABLE 3
WATER LEVEL DATA, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY CALIFORNIA

Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q1	C-8	Chatsworth	1842.23	1/9/19	205.35	1636.88	
Q2	C-8	Chatsworth	1842.23	5/8/19	206.23	1636.00	
Q3	C-8	Chatsworth	1842.23	7/11/19	206.45	1635.78	
Q4	C-8	Chatsworth	1842.23	12/13/19	208.83	1633.40	
Q1	DD-139	Chatsworth	1793.01	1/10/19	182.45	1610.56	
Q2	DD-139	Chatsworth	1793.01	5/7/19	182.75	1610.26	
Q3	DD-139	Chatsworth	1793.01	7/12/19	149.46	1643.55	
Q4	DD-139	Chatsworth	1793.01	12/13/19	149.41	1643.60	
Q1	DD-140	Chatsworth	1798.16	1/9/19	159.81	1638.35	
Q2	DD-140	Chatsworth	1798.16	5/6/19	152.59	1645.57	
Q3	DD-140	Chatsworth	1798.16	7/10/19	147.79	1650.37	
Q4	DD-140	Chatsworth	1798.16	12/12/19	147.54	1650.62	
Q1	DD-141	Chatsworth	1762.79	1/10/19	79.68	1683.11	
Q2	DD-141	Chatsworth	1762.79	5/7/19	70.58	1692.21	
Q3	DD-141	Chatsworth	1762.79	7/11/19	70.58	1692.21	
Q4	DD-141	Chatsworth	1762.79	12/13/19	73.99	1688.80	
Q1	DD-142	Chatsworth	1812.22	1/9/19	64.99	1747.23	
Q2	DD-142	Chatsworth	1812.22	5/7/19	62.43	1749.79	
Q3	DD-142	Chatsworth	1812.22	7/11/19	61.35	1750.87	
Q4	DD-142	Chatsworth	1812.22	12/13/19	59.73	1752.49	
Q1	DD-143	Chatsworth	1789.74	1/10/19	50.01	1739.73	
Q2	DD-143	Chatsworth	1789.74	5/7/19	27.38	1762.36	
Q3	DD-143	Chatsworth	1789.74	7/11/19	30.61	1759.13	
Q4	DD-143	Chatsworth	1789.74	12/13/19	36.21	1753.53	
Q1	DD-144	Chatsworth	1810.69	1/9/19	27.93	1782.76	
Q2	DD-144	Chatsworth	1810.69	5/6/19	14.50	1796.19	
Q3	DD-144	Chatsworth	1810.69	7/10/19	15.61	1795.08	
Q4	DD-144	Chatsworth	1810.69	12/12/19	20.55	1790.14	
Q1	DD-145	Chatsworth	1798.90	1/9/19	31.11	1767.79	
Q2	DD-145	Chatsworth	1798.90	5/7/19	22.36	1776.54	
Q3	DD-145	Chatsworth	1798.90	7/11/19	22.18	1776.72	
Q4	DD-145	Chatsworth	1798.90	12/12/19	24.93	1773.97	
Q3	DD-146	Chatsworth	1812.72	7/10/19	16.81	1795.91	
Q4	DD-146	Chatsworth	1812.72	12/12/19	21.72	1791.00	
Q1	DD-147	Chatsworth	1814.18	1/9/19	54.03	1760.15	(3)
Q2	DD-147	Chatsworth	1814.18	5/7/19	43.61	1770.57	(3)
Q3	DD-147	Chatsworth	1818.30	7/11/19	42.96	1775.34	(3)
Q4	DD-147	Chatsworth	1818.30	12/12/19	44.55	1773.75	(3)

TABLE 3
WATER LEVEL DATA, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY CALIFORNIA

Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q1	DS-43	Chatsworth	1809.52	1/9/19	20.80	1788.72	
Q2	DS-43	Chatsworth	1809.52	5/7/19	12.59	1796.93	
Q3	DS-43	Chatsworth	1809.52	7/11/19	12.96	1796.56	
Q4	DS-43	Chatsworth	1809.52	12/13/19	15.93	1793.59	
Q1	DS-44	Chatsworth	1851.21	1/9/19	75.73	1775.48	
Q2	DS-44	Chatsworth	1851.21	5/7/19	65.45	1785.76	
Q3	DS-44	Chatsworth	1851.21	7/11/19	68.81	1782.40	
Q4	DS-44	Chatsworth	1851.21	12/12/19	68.72	1782.49	
Q1	DS-45	Chatsworth	1866.58	1/9/19	Dry	---	
Q2	DS-45	Chatsworth	1866.58	5/7/19	73.55	1793.03	
Q3	DS-45	Chatsworth	1866.58	7/11/19	73.40	1793.18	
Q4	DS-45	Chatsworth	1866.58	12/12/19	73.96	1792.62	
Q1	DS-46	Chatsworth	1797.79	1/9/19	43.18	1754.61	
Q2	DS-46	Chatsworth	1797.79	5/6/19	28.54	1769.25	
Q3	DS-46	Chatsworth	1797.79	7/10/19	33.78	1764.01	
Q4	DS-46	Chatsworth	1797.79	12/12/19	42.38	1755.41	
Q1	DS-47	Chatsworth	1867.94	1/9/19	113.00	1754.94	
Q2	DS-47	Chatsworth	1867.94	5/7/19	111.04	1756.90	
Q3	DS-47	Chatsworth	1867.94	7/11/19	109.67	1758.27	
Q4	DS-47	Chatsworth	1867.94	12/12/19	108.84	1759.10	
Q3	ES-31	Shallow	1787.01	7/10/19	14.80	1772.21	
Q3	PZ-005	Shallow	1802.47	7/10/19	16.95	1785.52	
Q3	PZ-041	Shallow	1809.10	7/10/19	12.44	1796.66	
Q1	PZ-097	Shallow	1761.87	1/10/18	Dry	---	
Q2	PZ-097	Shallow	1761.87	5/7/19	Dry	---	
Q3	PZ-097	Shallow	1761.87	7/12/19	Dry	---	
Q4	PZ-097	Shallow	1761.87	12/13/19	Dry	---	
Q3	PZ-098	Shallow	1797.78	7/10/19	26.11	1771.67	
Q3	PZ-100	Shallow	1870.11	7/10/19	11.54	1858.57	
Q3	PZ-101	Shallow	1869.71	7/10/19	Dry	---	
Q3	PZ-102	Shallow	1827.78	7/10/19	60.05	1767.73	
Q3	PZ-103	Shallow	1815.93	7/10/19	24.56	1791.37	
Q3	PZ-104	Shallow	1797.47	7/10/19	Dry	---	
Q3	PZ-105	Shallow	1803.87	7/10/19	12.12	1791.75	
Q3	PZ-106	Shallow	1784.17	7/10/19	16.35	1767.82	
Q1	PZ-108	Shallow	1809.36	1/9/19	Dry	---	
Q2	PZ-108	Shallow	1809.36	5/6/19	10.48	1798.88	
Q3	PZ-108	Shallow	1809.36	7/10/19	12.70	1796.66	
Q4	PZ-108	Shallow	1809.36	12/12/19	18.24	1791.12	
Q3	PZ-109	Shallow	1809.51	7/10/19	14.95	1794.56	
Q3	PZ-110	Shallow	1818.90	7/10/19	Dry	---	

TABLE 3
WATER LEVEL DATA, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY CALIFORNIA

Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q3	PZ-111	Shallow	1794.90	7/10/19	16.34	1778.56	
Q3	PZ-112	Shallow	1829.14	7/10/19	28.96	1800.18	
Q3	PZ-113	Shallow	1823.68	7/10/19	14.97	1808.71	
Q3	PZ-116	Shallow	1827.78	7/10/19	31.61	1796.17	
Q3	PZ-120	Shallow	1810.96	7/10/19	15.32	1795.64	
Q3	PZ-121	Shallow	1809.50	7/10/19	20.36	1789.14	
Q3	PZ-122	Shallow	1808.40	7/10/19	15.27	1793.13	
Q1	PZ-124	Shallow	1764.11	1/10/19	Dry	---	
Q2	PZ-124	Shallow	1764.11	5/7/19	Dry	---	
Q3	PZ-124	Shallow	1764.11	7/11/19	Dry	---	
Q4	PZ-124	Shallow	1764.11	12/13/19	Dry	---	
Q3	PZ-162	Shallow	1814.26	7/10/19	17.44	1796.82	
Q3	PZ-163	Shallow	1814.03	7/10/19	16.89	1797.14	
Q1	RD-07	Chatsworth	1812.82	1/10/19	102.52	1710.30	
Q2	RD-07	Chatsworth	1812.82	5/7/19	101.06	1711.76	
Q3	RD-07	Chatsworth	1812.82	7/11/19	98.90	1713.92	
Q4	RD-07	Chatsworth	1812.82	12/13/19	96.17	1716.65	
Q3	RD-13	Chatsworth	1840.01	7/10/19	66.19	1773.82	
Q1	RD-14	Chatsworth	1824.18	1/9/19	111.87	1712.31	
Q2	RD-14	Chatsworth	1824.18	5/6/19	104.49	1719.69	
Q3	RD-14	Chatsworth	1824.18	7/10/19	99.06	1725.12	
Q4	RD-14	Chatsworth	1824.18	12/12/19	97.03	1727.15	
Q3	RD-15	Chatsworth	1817.70	7/10/19	58.41	1759.29	
Q3	RD-16	Chatsworth	1808.99	7/10/19	44.21	1764.78	
Q1	RD-17	Chatsworth	1836.30	1/9/19	48.90	1787.40	
Q2	RD-17	Chatsworth	1836.30	5/6/19	38.89	1797.41	
Q3	RD-17	Chatsworth	1836.30	7/10/19	38.20	1798.10	
Q4	RD-17	Chatsworth	1836.30	12/12/19	39.85	1796.45	
Q3	RD-18	Chatsworth	1839.51	7/10/19	107.00	1732.51	
Q1	RD-19	Chatsworth	1853.16	1/9/19	95.94	1757.22	
Q2	RD-19	Chatsworth	1853.16	5/6/19	80.57	1772.59	
Q3	RD-19	Chatsworth	1853.16	7/10/19	79.82	1773.34	
Q4	RD-19	Chatsworth	1853.16	12/12/19	82.99	1770.17	
Q1	RD-20	Chatsworth	1819.52	1/9/19	54.24	1765.28	
Q2	RD-20	Chatsworth	1819.52	5/7/19	43.52	1776.00	
Q3	RD-20	Chatsworth	1819.52	7/10/19	42.51	1777.01	
Q4	RD-20	Chatsworth	1819.52	12/12/19	45.32	1774.20	
Q1	RD-21	Chatsworth	1866.96	1/9/19	109.00	1757.96	
Q2	RD-21	Chatsworth	1866.96	5/6/19	99.26	1767.70	
Q3	RD-21	Chatsworth	1866.96	7/10/19	98.55	1768.41	
Q4	RD-21	Chatsworth	1866.96	12/12/19	98.86	1768.10	
Q1	RD-22	Chatsworth	1853.41	1/10/19	298.84	1554.57	
Q2	RD-22	Chatsworth	1853.41	5/8/19	298.59	1554.82	
Q3	RD-22	Chatsworth	1853.41	7/11/19	298.75	1554.66	
Q4	RD-22	Chatsworth	1853.41	12/13/19	299.66	1553.75	
Q1	RD-23	Chatsworth	1838.19	1/10/19	240.53	1597.66	

TABLE 3
WATER LEVEL DATA, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY CALIFORNIA

Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q2	RD-23	Chatsworth	1838.19	5/8/19	239.89	1598.30	
Q3	RD-23	Chatsworth	1838.19	7/11/19	240.58	1597.61	
Q4	RD-23	Chatsworth	1838.19	12/13/19	243.89	1594.30	
Q1	RD-24	Chatsworth	1809.93	1/9/19	49.58	1760.35	
Q2	RD-24	Chatsworth	1809.93	5/7/19	43.49	1766.44	
Q3	RD-24	Chatsworth	1809.93	7/10/19	42.89	1767.04	
Q4	RD-24	Chatsworth	1809.93	12/12/19	43.05	1766.88	
Q1	RD-27	Chatsworth	1841.67	1/9/19	67.51	1774.16	
Q2	RD-27	Chatsworth	1841.67	5/8/19	55.81	1785.86	
Q3	RD-27	Chatsworth	1841.67	7/11/19	55.93	1785.74	
Q4	RD-27	Chatsworth	1841.67	12/13/19	57.84	1783.83	
Q1	RD-29	Chatsworth	1806.29	1/9/19	27.30	1778.99	
Q2	RD-29	Chatsworth	1806.29	5/6/19	10.85	1795.44	
Q3	RD-29	Chatsworth	1806.29	7/10/19	14.24	1792.05	
Q4	RD-29	Chatsworth	1806.29	12/12/19	19.11	1787.18	
Q1	RD-30	Chatsworth	1768.69	1/10/19	29.13	1739.56	
Q2	RD-30	Chatsworth	1768.69	5/6/19	6.88	1761.81	
Q3	RD-30	Chatsworth	1768.69	7/11/19	9.96	1758.73	
Q4	RD-30	Chatsworth	1768.69	12/13/19	15.46	1753.23	
Q1	RD-33A	Chatsworth	1792.97	1/10/19	211.23	1581.74	
Q2	RD-33A	Chatsworth	1792.97	5/7/19	210.99	1581.98	
Q3	RD-33A	Chatsworth	1792.97	7/12/19	209.30	1583.67	
Q4	RD-33A	Chatsworth	1792.97	12/13/19	211.23	1581.74	
Q1	RD-33B	Chatsworth	1793.72	1/10/19	280.82	1512.90	
Q2	RD-33B	Chatsworth	1793.72	5/7/19	279.67	1514.05	
Q3	RD-33B	Chatsworth	1793.72	7/12/19	281.4	1512.32	
Q4	RD-33B	Chatsworth	1793.72	12/13/19	285.35	1508.37	
Q1	RD-33C	Chatsworth	1793.61	1/10/19	282.96	1510.65	
Q2	RD-33C	Chatsworth	1793.61	5/7/19	281.85	1511.76	
Q3	RD-33C	Chatsworth	1793.61	7/12/19	282.38	1511.23	
Q4	RD-33C	Chatsworth	1793.61	12/13/19	286.51	1507.10	
Q1	RD-34A	Chatsworth	1761.91	1/10/19	51.70	1710.21	
Q2	RD-34A	Chatsworth	1761.91	5/6/19	34.09	1727.82	
Q3	RD-34A	Chatsworth	1761.91	7/10/19	38.34	1723.57	
Q4	RD-34A	Chatsworth	1761.91	12/12/19	46.05	1715.86	
Q1	RD-34B	Chatsworth	1762.51	1/10/19	69.3	1693.21	
Q2	RD-34B	Chatsworth	1762.51	5/6/19	41.03	1721.48	
Q3	RD-34B	Chatsworth	1762.51	7/10/19	42.92	1719.59	
Q4	RD-34B	Chatsworth	1762.51	12/12/19	52.17	1710.34	
Q1	RD-34C	Chatsworth	1762.79	1/10/19	27.77	1735.02	
Q2	RD-34C	Chatsworth	1762.79	5/6/19	18.08	1744.71	
Q3	RD-34C	Chatsworth	1762.79	7/10/19	14.53	1748.26	
Q4	RD-34C	Chatsworth	1762.79	12/12/19	16.96	1745.83	
Q3	RD-50	Chatsworth	1914.88	7/10/19	125.84	1789.04	
Q1	RD-54A	Chatsworth	1841.72	1/10/19	181.33	1660.39	
Q2	RD-54A	Chatsworth	1841.72	5/8/19	181.85	1659.87	

TABLE 3
WATER LEVEL DATA, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY CALIFORNIA

Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q3	RD-54A	Chatsworth	1841.72	7/11/19	182.03	1659.69	
Q4	RD-54A	Chatsworth	1841.72	12/13/19	183.15	1658.57	
Q1	RD-54B	Chatsworth	1842.54	1/10/19	243.81	1598.73	
Q2	RD-54B	Chatsworth	1842.54	5/8/19	242.79	1599.75	
Q3	RD-54B	Chatsworth	1842.54	7/11/19	243.14	1599.40	
Q4	RD-54B	Chatsworth	1842.54	12/13/19	244.1	1598.44	
Q1	RD-54C	Chatsworth	1843.77	1/10/19	232.29	1611.48	
Q2	RD-54C	Chatsworth	1843.77	5/8/19	231.04	1612.73	
Q3	RD-54C	Chatsworth	1843.77	7/11/19	230.50	1613.27	
Q4	RD-54C	Chatsworth	1843.77	12/13/19	234.62	1609.15	
Q1	RD-59A	Chatsworth	1340.59	1/8/19	26.74	1313.85	
Q2	RD-59A	Chatsworth	1340.59	5/8/19	26.37	1314.22	
Q3	RD-59A	Chatsworth	1340.59	7/12/19	28.31	1312.28	
Q4	RD-59A	Chatsworth	1340.59	12/13/19	28.25	1312.34	
Q1	RD-59B	hatsworth Artesia	1342.49	1/8/19	19.25 psi	---	(1)
Q2	RD-59B	hatsworth Artesia	1342.49	5/8/19	19.5 psi	---	(1)
Q3	RD-59B	hatsworth Artesia	1342.49	7/12/19	21.5 psi	---	(1)
Q4	RD-59B	hatsworth Artesia	1342.49	12/13/19	21.0 psi	---	(1)
Q1	RD-59C	hatsworth Artesia	1345.41	1/8/19	19.25 psi	---	(1)
Q2	RD-59C	hatsworth Artesia	1345.41	5/8/19	19.5 psi	---	(1)
Q3	RD-59C	hatsworth Artesia	1345.41	7/12/19	21.5 psi	---	(1)
Q4	RD-59C	hatsworth Artesia	1345.41	12/13/19	21.0 psi	---	(1)
Q1	RD-63	Chatsworth	1764.83	1/10/19	44.67	1720.16	
Q2	RD-63	Chatsworth	1764.83	5/7/19	21.24	1743.59	
Q3	RD-63	Chatsworth	1764.83	7/11/19	22.83	1742.00	
Q4	RD-63	Chatsworth	1764.83	12/13/19	28.35	1736.48	
Q1	RD-64	Chatsworth	1857.04	1/10/19	251.36	1605.68	
Q2	RD-64	Chatsworth	1857.04	5/8/19	230.81	1626.23	
Q3	RD-64	Chatsworth	1857.04	7/11/19	235.04	1622.00	
Q4	RD-64	Chatsworth	1857.04	12/13/19	249.00	1608.04	
Q1	RD-65	Chatsworth	1819.14	1/10/19	221.40	1597.74	
Q2	RD-65	Chatsworth	1819.14	5/8/19	221.26	1597.88	
Q3	RD-65	Chatsworth	1819.14	7/11/19	221.71	1597.43	
Q4	RD-65	Chatsworth	1819.14	12/13/19	222.74	1596.40	
Q1	RD-74	Chatsworth	1810.90	1/10/19	Dry	---	(2)
Q2	RD-74	Chatsworth	1810.90	5/7/19	Dry	---	(2)
Q3	RD-74	Chatsworth	1810.90	7/11/19	93.51	1717.39	(2)
Q4	RD-74	Chatsworth	1810.90	12/13/19	Dry	---	(2)
Q3	RD-85	Chatsworth	1849.36	7/10/19	73.94	1775.42	
Q3	RD-86	Chatsworth	1832.16	7/10/19	37.46	1794.70	
Q1	RD-87	Chatsworth	1789.09	1/9/19	57.32	1731.77	
Q2	RD-87	Chatsworth	1789.09	5/7/19	44.1	1744.99	
Q3	RD-87	Chatsworth	1789.09	7/11/19	46.46	1742.63	
Q4	RD-87	Chatsworth	1789.09	12/12/19	50.65	1738.44	
Q1	RD-88	Chatsworth	1774.62	1/9/19	Dry	---	
Q2	RD-88	Chatsworth	1774.62	5/7/19	26.84	1747.78	

TABLE 3
WATER LEVEL DATA, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY CALIFORNIA

Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q3	RD-88	Chatsworth	1774.62	7/11/19	29.19	1745.43	
Q4	RD-88	Chatsworth	1774.62	12/12/19	Dry	---	
Q1	RD-90	Chatsworth	1784.75	1/9/19	49.05	1735.70	
Q2	RD-90	Chatsworth	1784.75	5/7/19	35.68	1749.07	
Q3	RD-90	Chatsworth	1784.75	7/11/19	36.15	1748.60	
Q4	RD-90	Chatsworth	1784.75	12/12/19	38.67	1746.08	
Q1	RD-91	Chatsworth	1818.04	1/9/19	103.67	1714.37	
Q2	RD-91	Chatsworth	1818.04	5/6/19	20.65	1797.39	
Q3	RD-91	Chatsworth	1818.04	7/10/19	22.55	1795.49	
Q4	RD-91	Chatsworth	1818.04	12/12/19	30.05	1787.99	
Q3	RD-92	Chatsworth	1833.74	7/10/19	73.15	1760.59	
Q4	RD-92	Chatsworth	1833.74	12/12/19	72.11	1761.63	
Q1	RD-93	Chatsworth	1810.48	1/9/19	45.43	1765.05	
Q2	RD-93	Chatsworth	1810.48	5/7/19	37.90	1772.58	
Q3	RD-93	Chatsworth	1810.48	7/11/19	36.98	1773.50	
Q4	RD-93	Chatsworth	1810.48	12/12/19	37.41	1773.07	
Q1	RD-94	Chatsworth	1744.38	1/9/19	Dry	---	
Q2	RD-94	Chatsworth	1744.38	5/7/19	15.81	1728.57	
Q3	RD-94	Chatsworth	1744.38	7/11/19	19.20	1725.18	
Q4	RD-94	Chatsworth	1744.38	12/12/19	24.61	1719.77	
Q1	RD-95	Chatsworth	1811.36	1/9/19	69.27	1742.09	
Q2	RD-95	Chatsworth	1811.36	5/7/19	64.27	1747.09	
Q3	RD-95	Chatsworth	1811.36	7/11/19	61.87	1749.49	
Q4	RD-95	Chatsworth	1811.36	12/12/19	60.34	1751.02	
Q1	RD-96	Chatsworth	1805.49	1/10/19	80.27	1725.22	
Q2	RD-96	Chatsworth	1805.49	5/7/19	76.23	1729.26	
Q3	RD-96	Chatsworth	1805.49	7/11/19	73.59	1731.90	
Q4	RD-96	Chatsworth	1805.49	12/13/19	72.75	1732.74	
Q1	RD-97	Chatsworth	1792.22	1/10/19	71.76	1720.46	
Q2	RD-97	Chatsworth	1792.22	5/7/19	58.09	1734.13	
Q3	RD-97	Chatsworth	1792.22	7/11/19	58.87	1733.35	
Q4	RD-97	Chatsworth	1792.22	12/13/19	62.47	1729.75	
Q1	RD-98	Chatsworth	1808.73	1/10/19	60.14	1748.59	
Q2	RD-98	Chatsworth	1808.73	5/7/19	39.25	1769.48	
Q3	RD-98	Chatsworth	1808.73	7/11/19	42.27	1766.46	
Q4	RD-98	Chatsworth	1808.73	12/13/19	47.21	1761.52	
Q3	RS-11	Shallow	1790.39	7/11/19	12.42	1777.97	
Q1	RS-16	Shallow	1811.05	1/10/19	Dry	---	
Q2	RS-16	Shallow	1811.05	5/7/19	Dry	---	
Q3	RS-16	Shallow	1811.05	7/11/19	Dry	---	
Q1	RS-18	Shallow	1802.86	1/9/19	5.60	---	
Q2	RS-18	Shallow	1802.86	5/6/19	5.92	1796.94	
Q3	RS-18	Shallow	1802.86	7/10/19	9.76	1793.10	
Q4	RS-18	Shallow	1802.86	12/13/19	7.06	1795.80	
Q3	RS-23	Shallow	1887.25	7/10/19	Dry	---	
Q3	RS-24	Shallow	1809.24	7/10/19	Dry	---	

TABLE 3
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Quarter	Well Identifier	Geological Unit	Reference Point Elevation (feet above MSL)	Date of Measurement	Depth to Water (feet BTOC)	Static Water Level Elevation (feet above MSL)	Notes
Q1	RS-25	Shallow	1862.71	1/9/19	Dry	---	
Q2	RS-25	Shallow	1862.71	5/6/19	Dry	---	
Q3	RS-25	Shallow	1862.71	7/10/19	Dry	---	
Q4	RS-25	Shallow	1862.71	12/12/19	Dry	---	
Q1	RS-27	Shallow	1804.78	1/9/19	Dry	---	
Q2	RS-27	Shallow	1804.78	5/6/19	9.06	1795.72	
Q3	RS-27	Shallow	1804.78	7/10/19	Dry	---	
Q4	RS-27	Shallow	1804.78	12/12/19	Dry	---	
Q1	RS-28	Shallow	1768.59	1/10/19	Dry	---	
Q2	RS-28	Shallow	1768.59	5/7/19	6.71	1761.88	
Q3	RS-28	Shallow	1768.59	7/11/19	9.72	1758.87	
Q4	RS-28	Shallow	1768.59	12/13/19	15.17	1753.42	
Q3	RS-36	Shallow	1817.73	7/10/19	9.84	1807.89	
Q1	RS-54	Shallow	1846.66	1/9/19	43.65	1803.01	
Q2	RS-54	Shallow	1846.66	5/8/19	14.76	1831.90	
Q3	RS-54	Shallow	1846.66	7/11/19	25.96	1820.70	
Q4	RS-54	Shallow	1846.66	12/13/19	23.42	1823.24	

(1) = Pressure transducers installed on artesian well
(2) = Obstruction; prior investigators left pump in well
(3) = RD-89 was drilled to a deeper depth in May 2018. The well ID is now DD-147 and is 257 feet deep.
--- = No data available or not applicable

BTOC = below top of casing
Chatsworth = Chatsworth Formation groundwater unit.
Chatsworth Artesian = Chatsworth Formation groundwater unit - Artesian with hydrostatic head above land surface.
MSL = mean sea level
PSI = pounds per square inch
Shallow = Near Surface groundwater unit.

TABLE 4
EXCEPTIONS TO PLANNED SITE-WIDE WATER QUALITY AND RFI SAMPLING
2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

WELLS NOT SAMPLED	
Well Identifier	**Notes**
PZ-097, PZ-104, PZ-124, PZ-121	Dry
RD-34B	This well was not on the schedule of wells to be sampled during 2019 and will be sampled during 2020 using the same methodology used during 2018 with the pump placed immediately above an obstruction at 167 feet bgs (variance from intake placed halfway between the depth to water and the bottom of the saturated open interval of the well).
RD-57	Well was not sampled due to damaged FLUTe liner; the well lid is currently welded shut.
STABLILIZATION CRITERIA COLLECTED AT FIXED INTERVALS GREATER THAN 5 MINUTES	
DD-140, DS-46, PZ-098, PZ-105, PZ-108, PZ-109, RD-20, RD-90, RD-95, RD-96, RS-18, RS-54	Readings were collected every 6 to 7 minutes to give enough time to exchange water in the flow through cell due to 50 ml/min flow rate.
PURGE VOLUME REQUIREMENTS NOT MET	
Purge volume was met on all wells sampled.	
LOW-FLOW STABILIZATION CRITERIA NOT MET	
Well Identifier	**Notes**
PZ-098, PZ-109, RD-96, RS-18	Water level drawdown exceeded 0.3 feet.
QUALITY ASSURANCE PROJECT PLAN (QAPP) REQUIREMENTS	
Requirement	**Exceptions**
Trip Blanks submitted daily with samples analyzed for volatile organic compounds (VOCs), gasoline range organics, 1,4-Dioxane, and 1,2,3-Trichloropropane.	None
Quality control (QC) samples collected	See Appendix E
Precision/Accuracy requirements met	See Appendix E
OTHER	
Applicable Samples	The reporting limit for vinyl chloride was above the SSFL groundwater screening level reference value (SSFL screening criteria) maximum contaminant level (MCL) criteria of 0.5 microgram per liter (µg/L) at 1 µg/L. The method detection limit was 0.10 µg/L though and all sample results were nondetect so the 1 µg/L reporting limit is considered sufficient for project purposes. The reporting limit was also elevated for 1,2-dichloroethane at 1 µg/L (MDL 0.13). The MCL criteria is 0.5 µg/L for 1,2-dichloroethane. The reporting limit for gasoline range organics (GRO) is above the taste/odor threshold, but MDL (10 ug/L) was below the required criteria. The reporting limit for carbon tetrachloride was also above the SSFL screening criteria (MCL) of 0.5 µg/L at 1 µg/L. The MDL was 0.19 ug/L which is below the criteria. If results had been detected between the MDL and reporting limit they would have been reported as detected estimated results. All these sample results are considered sufficient and meet project requirements.

TABLE 5
GROUNDWATER FIELD PARAMETERS, 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well Identifier	Date	Temperature (°C)	pH	Conductivity (mmhos)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Oxidation Reduction Potential (mV)
PZ-005	2/25/2019	16.5	6.99	1.282	2.89	19.0	82.4
PZ-098	2/25/2019	19.5	6.51	0.861	4.52	18.0	121.2
PZ-102	2/25/2019	17.8	6.85	0.817	3.28	32.0	95.1
PZ-103	2/25/2019	16.7	6.95	1.294	4.24	34.0	125.1
PZ-105	2/18/2019	11.60	7.26	1.098	1.59	51.0	212.7
PZ-108	2/18/2019	13.17	6.72	1.239	0.78	14.0	247.3
PZ-109	2/21/2019	17.40	7.41	1.254	0.53	110.0	148.3
PZ-120	3/4/2019	16.84	7.22	1.077	2.87	12.0	119.8
PZ-162	2/18/2019	18.20	7.05	0.941	0.97	46.0	104.9
PZ-163	2/18/2019	15.00	6.67	0.996	1.06	21.0	100.3
RD-07	3/4/2019	18.19	6.98	0.715	1.67	1.0	162.8
RD-14	3/5/2019	18.08	7.04	0.758	1.69	2.0	107.7
RD-17	3/1/2019	19.30	7.21	0.825	0.87	52.0	-49.7
RD-19	3/5/2019	18.09	6.85	1.557	1.10	2.0	104.8
RD-20	2/19/2019	10.90	7.28	1.514	3.45	2.0	200.1
RD-21	2/19/2019	11.84	7.34	0.704	3.74	6.0	157.1
RD-23	2/18/2019	12.80	6.96	0.709	3.64	11.0	96.4
RD-29	2/27/2019	20.00	7.13	0.855	1.20	33.0	84.3
RD-30	2/26/2019	14.90	6.73	0.911	1.24	38.0	184.2
RD-33A	2/27/2019	15.93	6.85	0.644	1.05	2.0	-49.3
RD-33B	2/20/2019	13.61	7.74	0.438	4.04	5.0	-8.7
RD-33C	2/27/2019	17.65	7.39	0.587	2.82	3.0	-31.8
RD-34A	3/6/2019	16.01	6.72	1.324	0.57	7.0	-61.4
RD-34C	3/6/2019	13.14	7.52	0.650	0.68	4.0	-199.0
RD-54A	3/1/2018	15.94	6.74	0.775	2.20	14.0	122.9
RD-59A	2/27/2019	16.00	7.14	1.183	0.57	3.0	189.7
RD-59B	2/27/2019	19.00	7.57	0.794	0.19	3.0	-75.2
RD-59C	2/27/2019	19.40	7.82	0.820	0.15	3.0	-46.5
RD-63	2/20/2019	12.57	6.74	1.189	0.96	4.0	-121.0
RD-64	2/19/2019	18.71	6.59	1.064	1.57	4.0	195.2
RD-65	2/28/2019	19.14	6.91	0.657	1.31	4.0	27.4
RD-90	2/21/2019	12.10	7.12	1.139	2.18	8.0	154.7
RD-95	2/21/2019	9.20	6.41	1.404	1.48	23.0	176.1
RD-96	2/20/2019	11.70	7.12	0.960	1.88	2.0	163.0
RD-98	2/26/2019	18.10	7.08	490.50	5.91	13.0	136.2
RS-18	2/25/2019	13.00	7.09	0.774	5.98	7.0	163.4
RS-28	2/26/2019	17.00	6.50	1.338	3.23	8.0	153.4
RS-54	2/21/2019	10.80	6.87	1.646	0.43	175.0	-120.0
DD-139	2/21/2019	14.78	7.28	0.780	2.69	22.0	92.4
DD-140	2/28/2019	18.00	7.31	0.837	2.48	13.0	82.8
DD-141	2/26/2019	16.60	6.72	1.034	1.57	26.0	36.8
DD-142	2/21/2019	18.71	7.41	1.233	0.84	5.0	87.5
DD-143	3/1/2019	14.70	6.90	1.225	1.16	22.0	102.3

TABLE 5
GROUNDWATER FIELD PARAMETERS, 1Q 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well Identifier	Date	Temperature (°C)	pH	Conductivity (mmhos)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Oxidation Reduction Potential (mV)
DD-144	2/21/2019	19.98	6.78	1.195	0.58	68.0	-32.4
DD-145	2/18/2019	16.90	7.22	0.862	0.82	27.0	103.8
DD-146	2/21/2019	15.07	6.86	0.687	1.82	5.0	-59.1
DD-147	2/28/2019	18.33	6.74	0.924	1.14	5.0	-72.8
DS-43	2/22/2019	18.10	6.24	1.164	0.57	44.0	235.2
DS-44	2/22/2019	17.54	6.75	0.998	1.13	9.0	58.1
DS-46	2/28/2019	16.60	7.09	0.839	0.97	193.0	-100.7
DS-47	2/22/2019	17.80	7.32	0.651	1.26	6.0	185.4
C-8	2/18/2019	16.24	7.12	0.782	3.76	7.0	-50.4

NOTES AND ABBREVIATIONS
℃ degrees Celsius
mmhos millimhos
mg/L milligrams per liter
mV millivolt
NTU nephelometric turbidity unit

TABLE 6
SAMPLES ANALYZED, 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program	DOE Area IV Groundwater RFI Analytes
PZ-005	2019 Q1	NA	VOCs Metals Nitrates
PZ-098	2019 Q1	NA	VOCs Metals Perchlorate
PZ-102	2019 Q1	NA	VOCs Metals
PZ-103	2019 Q1	NA	VOCs Metals GRO, DRO Nitrates
PZ-105	2019 Q1	NA	VOCs Metals GRO, DRO Nitrates
PZ-108	2019 Q1	VOCs Metals	NA
PZ-109	2019 Q1	NA	VOCs Metals
PZ-120	2019 Q1	NA	VOCs Metals Radiochemistry
PZ-162	2019 Q1	NA	VOCs Radiochemistry
PZ-163	2019 Q1	NA	VOCs
RD-07	2019 Q1	VOCs Radiochemistry	Metals
RD-14	2019 Q1	VOCs 1,2,3-TCP Fluoride Radiochemistry	GRO, DRO
RD-17	2019 Q1	NA	VOCs Metals Radiochemistry

TABLE 6
SAMPLES ANALYZED, 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program	DOE Area IV Groundwater RFI Analytes
RD-19	2019 Q1	VOCs Metals Radiochemistry Fluoride	GRO, DRO
RD-20	2019 Q1	VOCs Radiochemistry	Nitrates
RD-21	2019 Q1	NA	VOCs Metals Perchlorate
RD-23	2019 Q1	NA	VOCs GRO, DRO
RD-29	2019 Q1	NA	VOCs
RD-30	2019 Q1	NA	VOCs Radiochemistry
RD-33A	2019 Q1	VOCs Metals Perchlorate GRO, DRO Radiochemistry 1,4 Dioxane	NA
RD-33B	2019 Q1	VOCs Metals Perchlorate Radiochemistry	NA
RD-33C	2019 Q1	VOCs Metals GRO, DRO Perchlorate Radiochemistry	NA
RD-34A	2019 Q1	VOCs Metals Radiochemistry Fluoride 1,4-Dioxane	NA
RD-34C	2019 Q1	VOCs Metals Radiochemistry Fluoride 1,4-Dioxane	NA

TABLE 6
SAMPLES ANALYZED, 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program	DOE Area IV Groundwater RFI Analytes
RD-54A	2019 Q1	VOCs Metals Perchlorate Radiochemistry	GRO, DRO
RD-59A	2019 Q1	VOCs Metals Perchlorate Radiochemistry Fluoride	NA
RD-59B	2019 Q1	VOCs Metals Perchlorate Radiochemistry Fluoride	NA
RD-59C	2019 Q1	VOCs Metals Perchlorate Radiochemistry Fluoride	NA
RD-63	2019 Q1	VOCs Radiochemistry	GRO, DRO 1,4 Dioxane
RD-64	2019 Q1	NA	VOCs Metals
RD-65	2019 Q1	NA	VOCs 1,4 Dioxane
RD-90	2019 Q1	NA	VOCs Tritium
RD-95	2019 Q1	NA	Tritium
RD-96	2019 Q1	VOCs Radiochemistry	Perchlorate GRO, DRO Metals
RD-98	2019 Q1	NA	VOCs Radiochemistry
RS-18	2019 Q1	VOCs Metals Radiochemistry Perchlorate	NA

TABLE 6
SAMPLES ANALYZED, 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program	DOE Area IV Groundwater RFI Analytes
RS-28	2019 Q1	NA	VOCs Radiochemistry
RS-54	2019 Q1	NA	1,4 Dioxane
DS-43	2019 Q1	NA	VOCs Metals
DS-44	2019 Q1	NA	VOCs Metals Radiochemistry
DS-46	2019 Q1	NA	VOCs Metals 1,4 Dioxane
DS-47	2019 Q1	NA	VOCs Metals Radiochemistry
DD-139	2019 Q1	NA	VOCs Metals Perchlorate
DD-140	2019 Q1	NA	VOCs Metals 1,4 Dioxane
DD-141	2019 Q1	NA	VOCs Metals Perchlorate GRO, DRO Radiochemistry
DD-142	2019 Q1	NA	VOCs Metals
DD-143	2019 Q1	NA	VOCs Metals Radiochemistry
DD-144	2019 Q1	NA	VOCs Metals
DD-145	2019 Q1	NA	VOCs Metals GRO, DRO Nitrates
DD-146	2019 Q1	NA	VOCs Metals
DD-147	2019 Q1	NA	VOCs Metals

TABLE 6
SAMPLES ANALYZED, 2019 – DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program	DOE Area IV Groundwater RFI Analytes
C-8	2019 Q1	NA	VOCs Metals GRO, DRO

NOTES AND ABBREVIATIONS:
GW RFI - Groundwater RCRA Facility Investigation
DOE Area IV - Department of Energy Area IV
1,2,3-TCP - 1,2,3-Trichloropropane
DRO - Diesel Range Organics
GRO - Gasoline Range Organics
VOCs - Volatile Organic Compounds
NA - Not applicable

SSFL RADIOCHEMISTRY SUITE **
Gross Alpha and Gross Beta (Particulate & Dissolved)
Isotopic Uranium (Particulate & Dissolved)
Sr-90 (Particulate & Dissolved)
Am-241 (Particulate & Dissolved)
TM-171 (Particulate & Dissolved)
Cm-243/244, Cm-245/246 (Particulate & Dissolved)
Pu-238, Pu-239/240, Pu-242 (Particulate & Dissolved)
C-14 (Particulate & Dissolved)
I-129 (Particulate & Dissolved)
** - beginning 1st QTR 2015, particulate analysis is not performed. Total and dissolved radionuclide results provided.

TABLE 7
MONITORING PROGRAM ANALYSES, 2019 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Analytes			**Analytical Method**
1,2,3-Trichloropropane			8260B/E524.2
1,4-Dioxane			8260B SIM
Fluoride, Nitrate			300.0
Metals[1]:	Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Delenium, Silver, Sodium, Strontium, Thallium, Tin, Vanadium, Zinc		6010C/6020A/7470A
Perchlorate			6860
Radiochemistry:	Cesium-137 and other Gamma-emitting radionuclides[2]		901.1
	Gross Alpha and Gross Beta		900.0
	Radium-226		903.0
	Radium-228		904.0
	Strontium-90		905.0/ASTM D5811-95
	Tritium		906.0
	Isotopic Uranium		DOE A-01-R
Gasoline Range Organics			8015B
Diesel Range Organics			8015B
Volatile Organic Compounds:			8260B
	1,1,1-Trichloroethane	cis-1,2-Dichloroethene	
	1,1,2-Trichloro-1,2,2-trifluoroethane	Dibromofluoromethane (Surr)	
	1,1,2-Trichloroethane	Ethylbenzene	
	1,1-Dichloroethane	Methylene Chloride	
	1,1-Dichloroethene	Tetrachloroethene	
	1,2-Dichloroethane	Toluene	
	1,2-Dichloroethane-d4 (Surr)	Toluene-d8 (Surr)	
	2-Butanone (MEK)	trans-1,2-Dichloroethene	
	4-Bromofluorobenzene (Surr)	Trichloroethene	
	Acetone	Trichlorofluoromethane	
	Benzene	Vinyl Chloride	
	Carbon Tetrachloride	Xylenes (Total)	
	Chloroform		

Notes:
[1] Metal analyses include total and dissolved fractions.
[2] Radionuclides by Method 901.1: Actinium-228, Americium-241, Antimony-125, Barium-133, Cesium-134, Cesium-137, Cobalt-57, Cobalt-60, Europium-152, Europium-154, Europium-155, Manganese-54, Potassium-40, Sodium-22.
MEK - Methyl Ethyl Ketone
Laboratories: Test America, St. Louis; Test America, Denver; Test America, Irvine

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Radiochemistry	Actinium-228		pCi/L					
Radiochemistry	Antimony-125	300	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Barium-133	1520	pCi/L	Primary MCL [b]	X	NA	NA	NA
Radiochemistry	Barium-137m	2150000	pCi/L	Primary MCL [b]	X	NA	NA	NA
Radiochemistry	Bismuth-212		pCi/L					
Radiochemistry	Bismuth-214		pCi/L					
Radiochemistry	Carbon-14	2000	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Cesium-134	80	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Cesium-137	200	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Cobalt-57	1000	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Cobalt-60	100	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Europium-152	200	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Gross alpha	15	pCi/L	Primary MCL				
Radiochemistry	Gross beta	50	pCi/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Radiochemistry	Gross beta	4	mrem/yr	Primary MCL	X	NA	NA	NA
Radiochemistry	Iodine-129	1	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Lead-210		pCi/L					
Radiochemistry	Lead-212		pCi/L					
Radiochemistry	Lead-214		pCi/L					
Radiochemistry	Potassium-40		pCi/L					
Radiochemistry	Manganese-54	300	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Neptunium-236	5960	pCi/L	Primary MCL [b]	X	NA	NA	NA
Radiochemistry	Niobium-94	707	pCi/L	Primary MCL [b]	X	NA	NA	NA
Radiochemistry	Radium-226/228	5	pCi/L	Primary MCL	X	5	Primary MCL	pCi/L

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Radiochemistry	Sodium-22	400	pCi/L	Primary MCL [a]	X	NA	NA	NA
Radiochemistry	Strontium-90	8	pCi/L	Primary MCL	X	NA	NA	NA
Radiochemistry	Thallium-208		pCi/L					
Radiochemistry	Thorium-234		pCi/L		X	NA	NA	NA
Radiochemistry	Thulium-171	1000	pCi/L	Primary MCL [a]				
Radiochemistry	Tin-126	293	pCi/L	Primary MCL [b]	X	NA	NA	NA
Radiochemistry	Tritium	20000	pCi/L	Primary MCL	X	NA	NA	NA
Radiochemistry	Uranium-233/234	20	pCi/L	Cal MCL	X	NA	NA	NA
Radiochemistry	Uranium-235	20	pCi/L	Cal MCL	X	NA	NA	NA
Radiochemistry	Uranium-238	20	pCi/L	Cal MCL	X	NA	NA	NA
Halogenated Ethenes	1,2-Dichloroethenes	130	µg/L	SWGW RBSL				
Halogenated Ethenes	Chlorotrifluoroethylene		µg/L					
Halogenated Ethenes	Tetrachloroethene	5	µg/L	Primary MCL				
Halogenated Ethenes	Trichloroethene	5	µg/L	Primary MCL				
Halogenated Ethenes	cis-1,2-Dichloroethene	6	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Ethenes	trans-1,2-Dichloroethene	10	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Ethenes	1,1-Dichloroethene	6	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Ethenes	Vinyl chloride	0.5	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Ethanes	1,1,1,2-Tetrachloroethane		µg/L					
Halogenated Ethanes	1,1,2,2-Tetrachloroethane	1	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Halogenated Ethanes	1,1,2-Trichloroethane	5	µg/L	Primary MCL				
Halogenated Ethanes	1,1,1-Trichloroethane	200	µg/L	Primary MCL				
Halogenated Ethanes	1,2-Dichloroethane	0.5	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Ethanes	1,1-Dichloroethane	5	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Ethanes	Chloroethane	16	µg/L	Taste/Odor				
Halogenated Ethanes	2-Chloro-1,1,1-trifluoroethane		µg/L					
Halogenated Ethanes	1,2-Dibromoethane	0.05	µg/L	Primary MCL				
Halogenated Ethanes	Dichlorodifluoroethane		µg/L					
Halogenated Ethanes	1,1,2-Trichloro-1,2,2-trifluoroethane	1200	µg/L	Cal MCL	X	190000	SWGW RBSL	µg/L
Halogenated Ethanes	1,2-Dichloro-1,1,2-trifluoroethane	190000	µg/L	SWGW RBSL				
Halogenated Ethanes	Dichlorotrifluoroethane		µg/L					
Halogenated Ethanes	2,2-Dichloro-1,1,1-trifluoroethane	190000	µg/L	SWGW RBSL				
Halogenated Ethanes	Trichlorotrifluorethane		µg/L					
Halogenated Methanes	Dichlorofluoromethane		µg/L		X	1000	Notification Limit	µg/L
Halogenated Methanes	Isocyanomethane		µg/L					
Halogenated Methanes	Carbon Tetrachloride	0.5	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Methanes	Chloroform	80	µg/L	Primary MCL				
Halogenated Methanes	Methylene chloride	5	µg/L	Primary MCL				
Halogenated Methanes	Chloromethane	5.7	µg/L	SWGW RBSL				

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Halogenated Methanes	Trichlorofluoromethane	150	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Methanes	Dichlorodifluoromethane	1000	µg/L	Notification Level				
Halogenated Methanes	Bromochloromethane	34000	µg/L	Taste/Odor				
Halogenated Methanes	Bromodichloromethane	80	µg/L	Primary MCL				
Halogenated Methanes	Bromoform	80	µg/L	Primary MCL				
Halogenated Methanes	Bromomethane	8.8	µg/L	SWGW RBSL				
Halogenated Methanes	Dibromochloromethane	80	µg/L	Primary MCL				
Halogenated Methanes	Dibromomethane		µg/L					
Halogenated Methanes	Iodomethane		µg/L					
Non-Halogenated VOCs	Total Complex Matrix		µg/L					
Non-Halogenated VOCs	1-Chlorohexane		µg/L					
Non-Halogenated VOCs	1-Hexanol		µg/L					
Non-Halogenated VOCs	1-Octanol		µg/L					
Non-Halogenated VOCs	2-Heptanone	280	µg/L	Taste/Odor				
Non-Halogenated VOCs	2-Naphthaleneethanol		µg/L					
Non-Halogenated VOCs	Acetic Acid Ester		µg/L					
Non-Halogenated VOCs	Acetic Acid, 2-Methylpropyl Ester		µg/L					
Non-Halogenated VOCs	Acetic Acid, Butyl Ester		µg/L					
Non-Halogenated VOCs	Acetic Acid, Hexyl Ester		µg/L					
Non-Halogenated VOCs	Benzene, 1-Bromo-3-fluoro-		µg/L					
Non-Halogenated VOCs	Benzyl chloride	12	µg/L	Taste/Odor				
Non-Halogenated VOCs	Butanoic Acid, Ethyl Ester		µg/L					
Non-Halogenated VOCs	Butyl Cyclooctane		µg/L					
Non-Halogenated VOCs	Cumene	770	µg/L	Notification Level				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Non-Halogenated VOCs	Ethanol	760000	µg/L	Taste/Odor				
Non-Halogenated VOCs	Ethanone, 1-(2,4,6-Trihydroxyphenyl)-		µg/L					
Non-Halogenated VOCs	Ethyl acetate	2600	µg/L	Taste/Odor				
Non-Halogenated VOCs	Ethyl cyanide		µg/L					
Non-Halogenated VOCs	Ethyl ether	750	µg/L	Taste/Odor				
Non-Halogenated VOCs	Formic acid, octyl ester		µg/L					
Non-Halogenated VOCs	Heptanal		µg/L					
Non-Halogenated VOCs	Hexanoic Acid, Ethyl Ester		µg/L					
Non-Halogenated VOCs	Methanol	740000	µg/L	Taste/Odor				
Non-Halogenated VOCs	Methyl sulfide		µg/L					
Non-Halogenated VOCs	m-Xylene & p-Xylene	1750	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Non-Halogenated VOCs	Naphthalene, 1-(2-Propenyl)-		µg/L					
Non-Halogenated VOCs	n-Hexane	6.4	µg/L	Taste/Odor				
Non-Halogenated VOCs	Octanal		µg/L					
Non-Halogenated VOCs	p-Cymene		µg/L					
Non-Halogenated VOCs	Pentanal	17	µg/L	Taste/Odor				
Non-Halogenated VOCs	Propanoic Acid, 2-Methyl-, ethyl ester		µg/L					
Non-Halogenated VOCs	sec-Butyl alcohol	19000	µg/L	Taste/Odor				
Non-Halogenated VOCs	tert-Butyl alcohol	12	µg/L	Notification Level	X	NA	NA	NA
Non-Halogenated VOCs	tert-Butyl ethyl ether		µg/L					
Non-Halogenated VOCs	Tetrahydrofuran		µg/L					
Non-Halogenated VOCs	Tetramethylurea		µg/L					
Non-Halogenated VOCs	Trimethylcyclopentane Isomer		µg/L					

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Non-Halogenated VOCs	1,3,5-Trimethylbenzene	330	µg/L	Notification Level				
Non-Halogenated VOCs	Biphenyl		µg/L					
Non-Halogenated VOCs	1,2,4-Trimethylbenzene	330	µg/L	Notification Level				
Non-Halogenated VOCs	2-Hexanone	250	µg/L	Taste/Odor				
Non-Halogenated VOCs	Acetone	20000	µg/L	Taste/Odor				
Non-Halogenated VOCs	Acetonitrile	300000	µg/L	Taste/Odor				
Non-Halogenated VOCs	Acrolein	110	µg/L	Taste/Odor				
Non-Halogenated VOCs	Acrylonitrile	910	µg/L	Taste/Odor				
Non-Halogenated VOCs	Benzene	1	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Non-Halogenated VOCs	Carbon Disulfide	160	µg/L	Notification Level				
Non-Halogenated VOCs	Diisopropyl ether		µg/L					
Non-Halogenated VOCs	Ethane	7500	µg/L	Taste/Odor				
Non-Halogenated VOCs	Ethyl methacrylate		µg/L					
Non-Halogenated VOCs	Ethylbenzene	300	µg/L	Cal MCL				
Non-Halogenated VOCs	Ethylene	39	µg/L	Taste/Odor				
Non-Halogenated VOCs	Isobutanol		µg/L					
Non-Halogenated VOCs	Isopropanol	160000	µg/L	Taste/Odor				
Non-Halogenated VOCs	m-Xylene	1750	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Non-Halogenated VOCs	Methacrylonitrile	2100	µg/L	Taste/Odor				
Non-Halogenated VOCs	Methane	3100	µg/L	SWGW RBSL				
Non-Halogenated VOCs	Methyl ethyl ketone	3800	µg/L	SWGW RBSL				
Non-Halogenated VOCs	Methyl isobutyl ketone (MIBK)	120	µg/L	Notification Level	X	500	SWGW RBSL	µg/L
Non-Halogenated VOCs	Methyl methacrylate	25	µg/L	Taste/Odor				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Non-Halogenated VOCs	Methyl tert-butyl ether	5	µg/L	Secondary MCL	X	NA	Cal MCL (incorrect)	NA
Non-Halogenated VOCs	n-Butylbenzene	260	µg/L	Notification Level				
Non-Halogenated VOCs	n-Propylbenzene	260	µg/L	Notification Level				
Non-Halogenated VOCs	Naphthalene	17	µg/L	Notification Level	X	170	Notification Level	µg/L
Non-Halogenated VOCs	o + p Xylene	1750	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Non-Halogenated VOCs	o-Xylene	1750	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Non-Halogenated VOCs	sec-Butylbenzene	260	µg/L	Notification Level				
Non-Halogenated VOCs	Styrene	100	µg/L	Primary MCL				
Non-Halogenated VOCs	tert-Amyl methyl ether		µg/L					
Non-Halogenated VOCs	tert-Butylbenzene	260	µg/L	Notification Level				
Non-Halogenated VOCs	Toluene	150	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Non-Halogenated VOCs	Vinyl acetate	88	µg/L	Taste/Odor				
Non-Halogenated VOCs	Xylenes, Total	1750	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Benzenes	1,4-Dichlorobenzene-d4		µg/L					
Halogenated Benzenes	1,2,3-Trichlorobenzene	2.1	µg/L	SWGW RBSL				
Halogenated Benzenes	1,2,4-Trichlorobenzene	5	µg/L	Cal MCL				
Halogenated Benzenes	1,2-Dichlorobenzene	600	µg/L	Primary MCL				
Halogenated Benzenes	1,3-Dichlorobenzene	600	µg/L	Archived Advisory Level	X	600	Notification Level	µg/L
Halogenated Benzenes	1,4-Dichlorobenzene	5	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Halogenated Benzenes	Bromobenzene		µg/L					
Halogenated Benzenes	Chlorobenzene	70	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Benzenes	Dichlorobenzenes		µg/L					
Halogenated Propene/Propanes	cis-1,4-Dichloro-2-butene		µg/L					
Halogenated Propene/Propanes	Dichloropropane		µg/L					
Halogenated Propene/Propanes	sec-Dichloropropane		µg/L					
Halogenated Propene/Propanes	1,1-Dichloropropene		µg/L					
Halogenated Propene/Propanes	1,2,3-Trichloropropane	0.005	µg/L	Notification Level				
Halogenated Propene/Propanes	3-Chloro-2(Chloromethyl)-1-Propene		µg/L					
Halogenated Propene/Propanes	1,2-Dibromo-3-chloropropane	0.2	µg/L	Primary MCL				
Halogenated Propene/Propanes	1,2-Dichloropropane	5	µg/L	Primary MCL				
Halogenated Propene/Propanes	1,3-Dichloropropane	130	µg/L	SWGW RBSL				
Halogenated Propene/Propanes	1,3-Dichloropropene	0.5	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Halogenated Propene/Propanes	Allyl chloride	8.9	µg/L	Taste/Odor				
Halogenated Propene/Propanes	cis-1,3-Dichloropropene	0.5	µg/L	Cal MCL	X	NA	NA	NA
Halogenated Propene/Propanes	trans-1,3-Dichloropropene	0.81	µg/L	SWGW RBSL				
Other Halogenated VOCs	1,1-Dichlorobutane		µg/L					

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Other Halogenated VOCs	o-Chlorotoluene	140	µg/L	Notification Level	X	NA	NA	NA
Other Halogenated VOCs	p-Chlorotoluene	140	µg/L	Notification Level	X	NA	NA	NA
Other Halogenated VOCs	Total Organic Halogens		µg/L					
Other Halogenated VOCs	trans-1,4-Dichloro-2-butene		µg/L					
Other Halogenated VOCs	Hexachlorobutadiene		µg/L					
Other Halogenated VOCs	Chloroprene		µg/L					
Other Halogenated VOCs	2-Chloroethylvinyl ether		µg/L					
1,4-Dioxane	1,4-Dioxane	1	µg/L	Notification Level	X	3	Notification Level	µg/L
SVOC	2-n-Butoxyethanol		µg/L					
SVOC	Amino Hexanoic Acid		µg/L					
SVOC	Benzene Alcohol		µg/L					
SVOC	Benzophenone		µg/L					
SVOC	Carboxylic Acid		µg/L					
SVOC	Decanol		µg/L					
SVOC	Dibenzyl Ether		µg/L					
SVOC	Dichloro Alkene		µg/L					
SVOC	Dichloromethylpropene		µg/L					
SVOC	Dichloropropene, NOS		µg/L					
SVOC	Dimethyl Decene		µg/L					
SVOC	Dimethyl Undecane		µg/L					
SVOC	Diphenyl ether	630	µg/L	SWGW RBSL				
SVOC	Molecular Sulfur		µg/L					

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
SVOC	p-Cresol	63	µg/L	SWGW RBSL				
SVOC	p-Dinitrobenzene	1.3	µg/L	SWGW RBSL				
SVOC	Trimethyl Decane		µg/L					
SVOC	1,1-Dimethylhydrazine		µg/L					
SVOC	1,2-Dinitrobenzene		µg/L					
SVOC	1-Chloronaphthalene		µg/L					
SVOC	1-Nitronaphthalene		µg/L					
SVOC	2,3,4-Trichlorophenol		µg/L					
SVOC	4-Am-2,6-DNT		µg/L					
SVOC	4-Nitroquinoline-1-oxide		µg/L					
SVOC	Acetamidofluorene		µg/L					
SVOC	alpha, alpha-Dimethylphenethylamine		µg/L					
SVOC	alpha-Naphthylamine		µg/L					
SVOC	alpha-Picoline		µg/L					
SVOC	beta-Naphthylamine		µg/L					
SVOC	Carbazole		µg/L					
SVOC	Decamethylcyclopentasiloxane		µg/L					
SVOC	Diazinon	1.2	µg/L	Notification Level	X	6	Notification Level	µg/L
SVOC	Dibenz(a,j)acridine		µg/L					
SVOC	Diethyl phthalate	10000	µg/L	SWGW RBSL				
SVOC	Ethylene glycol	14000	µg/L	Notification Level				
SVOC	Formaldehyde	100	µg/L	Notification Level				
SVOC	Hydrazine	160000	µg/L	Taste/Odor				
SVOC	m+p Cresol		µg/L					
SVOC	m-Cresol	37	µg/L	Taste/Odor				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
SVOC	Monomethylhydrazine		µg/L					
SVOC	o-Cresol	630	µg/L	SWGW RBSL				
SVOC	p-Chloroaniline		µg/L					
SVOC	p-Nitroaniline		µg/L					
SVOC	Surfactants		µg/L					
SVOC	sym-Trinitrobenzene		µg/L					
SVOC	Zinophos		µg/L					
SVOC	1,1'-Phenylene-Bis-Ethanone		µg/L					
SVOC	1,2,3-Trichloropropene	0.005	µg/L	Notification Level				
SVOC	1,2,4,5-Tetrachlorobenzene		µg/L					
SVOC	1,2-Diphenylhydrazine		µg/L					
SVOC	1,3-Dinitrobenzene	1.3	µg/L	SWGW RBSL				
SVOC	1,4-Naphthoquinone		µg/L					
SVOC	2,3,4,6-Tetrachlorophenol		µg/L					
SVOC	2,4,5-Trichlorophenol		µg/L					
SVOC	2,4,6-Trichlorophenol	2.1	µg/L	SWGW RBSL				
SVOC	2,4-Dichlorophenol		µg/L					
SVOC	2,4-Dimethylphenol	100	µg/L	Archived Advisory Level	X	100	Notification Level	µg/L
SVOC	2,4-Dinitrophenol		µg/L					
SVOC	2,4-Dinitrotoluene		µg/L					
SVOC	2,6-Dichlorophenol		µg/L					
SVOC	2,6-Dinitrotoluene	0.22	µg/L	SWGW RBSL				
SVOC	2-Butoxyethoxyethanol		µg/L					
SVOC	2-Chloronaphthalene		µg/L					
SVOC	2-Chlorophenol	63	µg/L	SWGW RBSL				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
SVOC	2-Nitroaniline		µg/L					
SVOC	2-Nitrophenol		µg/L					
SVOC	3,3'-Dichlorobenzidine	0.12	µg/L	SWGW RBSL				
SVOC	3-Methylcholanthrene		µg/L					
SVOC	3-Nitroaniline		µg/L					
SVOC	4,6-Dinitro-o-cresol	1.3	µg/L	SWGW RBSL				
SVOC	4-Aminobiphenyl		µg/L					
SVOC	4-Bromophenyl phenyl ether		µg/L					
SVOC	4-Chlorophenylphenyl ether		µg/L					
SVOC	4-Nitrophenol		µg/L					
SVOC	5-Nitro-o-toluidine		µg/L					
SVOC	7,12-Dimethylbenz(a)anthracene		µg/L					
SVOC	Acetophenone		µg/L					
SVOC	Alkene		µg/L					
SVOC	Aniline	65000	µg/L	Taste/Odor				
SVOC	Aramite		µg/L					
SVOC	Azobenzene		µg/L					
SVOC	Benzidine	0.0003	µg/L	SWGW RBSL				
SVOC	Benzo (b+k) fluoranthene (Total)		µg/L					
SVOC	Benzoic acid	50000	µg/L	SWGW RBSL				
SVOC	Benzyl alcohol		µg/L					
SVOC	bis(2-Chloroethoxy)methane	38	µg/L	SWGW RBSL				
SVOC	bis(2-Chloroethyl) ether	360	µg/L	Taste/Odor				
SVOC	bis(2-Chloroisopropyl) ether		µg/L					

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
SVOC	bis(2-Ethylhexyl) phthalate	4	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
SVOC	Butyl benzyl phthalate	78	µg/L	SWGW RBSL				
SVOC	Di-n-butyl phthalate	1300	µg/L	SWGW RBSL				
SVOC	Di-n-octyl phthalate	500	µg/L	SWGW RBSL				
SVOC	Dibenzofuran		µg/L					
SVOC	Dimethyl phthalate	130000	µg/L	SWGW RBSL				
SVOC	Diphenylamine		µg/L					
SVOC	Ethyl methanesulfonate		µg/L					
SVOC	Hexachlorobenzene	1	µg/L	Primary MCL				
SVOC	Hexachlorocyclopentadiene	50	µg/L	Primary MCL				
SVOC	Hexachloroethane	10	µg/L	Taste/Odor				
SVOC	Hexachlorophene		µg/L					
SVOC	Hexachloropropene		µg/L					
SVOC	Isodrin		µg/L					
SVOC	Isophorone	5400	µg/L	Taste/Odor				
SVOC	Isosafrole		µg/L					
SVOC	Methapyrilene		µg/L					
SVOC	Methyl methanesulfonate		µg/L					
SVOC	n-Nitrosodi-n-butylamine		µg/L					
SVOC	n-Nitrosodi-n-propylamine	0.01	µg/L	Notification Level				
SVOC	n-Nitrosodiethylamine	0.01	µg/L	Notification Level				
SVOC	n-Nitrosodiphenylamine	16	µg/L	SWGW RBSL				
SVOC	n-Nitrosomethylethylamine		µg/L					
SVOC	n-Nitrosomorpholine		µg/L					

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
SVOC	n-Nitrosopiperidine		µg/L					
SVOC	n-Nitrosopyrrolidine		µg/L					
SVOC	Nitrobenzene	110	µg/L	Taste/Odor				
SVOC	o,o,o-Triethylphosphorothioate		µg/L					
SVOC	o-Tolidine		µg/L					
SVOC	o-Toluidine	11000	µg/L	Taste/Odor				
SVOC	p-Chloro-m-cresol		µg/L					
SVOC	p-Dimethylaminoazobenzene		µg/L					
SVOC	p-Phenylenediamine		µg/L					
SVOC	Pentachlorobenzene		µg/L					
SVOC	Pentachloroethane		µg/L					
SVOC	Pentachloronitrobenzene	20	µg/L	Archived Advisory Level	X	20	Notification Level	µg/L
SVOC	Pentachlorophenol	1	µg/L	Primary MCL				
SVOC	Phenacetin		µg/L					
SVOC	Phenol	4200	µg/L	Archived Advisory Level	X	4200	Notification Level	µg/L
SVOC	Pronamide		µg/L					
SVOC	Pyridine	950	µg/L	Taste/Odor				
SVOC	Safrole		µg/L					
SVOC	Tetrachloropropene		µg/L					
PAH	1-Methyl naphthalene		µg/L					
PAH	2-Methylnaphthalene	50	µg/L	SWGW RBSL				
PAH	Acenaphthene		µg/L					
PAH	Acenaphthylene		µg/L					
PAH	Anthracene	3800	µg/L	SWGW RBSL				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
PAH	Benzo(a)anthracene		µg/L		X	0.1	Primary MCL (no longer current)	µg/L
PAH	Benzo(a)pyrene	0.2	µg/L	Primary MCL				
PAH	Benzo(b)fluoranthene		µg/L					
PAH	Benzo(ghi)perylene		µg/L					
PAH	Benzo(k)fluoranthene		µg/L					
PAH	Chrysene		µg/L					
PAH	Dibenzo(a,h)anthracene		µg/L					
PAH	Fluoranthene		µg/L					
PAH	Fluorene		µg/L					
PAH	Indeno(1,2,3-cd)pyrene		µg/L					
PAH	Phenanthrene	3800	µg/L	SWGW RBSL				
PAH	Pyrene	380	µg/L	SWGW RBSL				
NDMA	n-Nitrosodimethylamine	0.01	µg/L	Notification Level				
Energetics	Perchlorate	6	µg/L	Cal MCL	X	6	Notification Level	µg/L
Energetics	2-Amino-4,6-Dinitrotoluene		µg/L					
Energetics	2-Nitrotoluene		µg/L					
Energetics	3-Nitrotoluene		µg/L					
Energetics	4-Nitrotoluene		µg/L					
Energetics	Nitroglycerin		µg/L					
Energetics	PETN		µg/L					
Energetics	Tetryl		µg/L					
Energetics	2,4,6-Trinitrotoluene	1	µg/L	Notification Level	X	NA	NA	NA
Energetics	HMX	350	µg/L	Notification Level				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Energetics	RDX	0.3	µg/L	Notification Level	X	NA	NA	NA
TPH	Fuel Hydrocarbons, C4-C12, as heavy Hydrocarbons	500	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C6-C14, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C6-C15, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C6-C16, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C6-C16, C21-C24, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C6-C7	500	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C6-C7, C10-C16, as kerosene		µg/L					
TPH	Fuel Hydrocarbons, C7-C10, as gasoline	5	µg/L	Taste/Odor				
TPH	Fuel Hydrocarbons, C7-C14, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C7-C16, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C8-C10, as gasoline	5	µg/L	Taste/Odor				
TPH	Fuel Hydrocarbons, C8-C12, as heavy Hydrocarbons	1800	µg/L	SWGW RBSL				
TPH	Fuel Hydrocarbons, C8-C14, as heavy Hydrocarbons	1800	µg/L	SWGW RBSL				
TPH	Gasoline Range Organics (C4-C12)	5	µg/L	Taste/Odor				
TPH	Gasoline Range Organics (C6-C14)	5	µg/L	Taste/Odor				
TPH	Gasoline Range Organics (C6-C7)		µg/L					
TPH	Gasoline Range Organics (C7-C12)	5	µg/L	Taste/Odor				

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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
TPH	Total Extractable Hydrocarbons C10-C18		µg/L					
TPH	Total Hydrocarbons C8-C18		µg/L					
TPH	Diesel Range Organics	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C12-C14)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C13-C22)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C14-C20)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C15-C20)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C20-C30)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C21-C24)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C21-C30)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C8-C11)	100	µg/L	Taste/Odor				
TPH	Diesel Range Organics (C8-C30)	100	µg/L	Taste/Odor				
TPH	Fuel Hydrocarbons, C6-C17, as JP-4	1800	µg/L	SWGW RBSL				
TPH	Gasoline Range Organics (C8-C11)	1800	µg/L	SWGW RBSL				
TPH	Jet Fuel 4 (C6-C13)	1800	µg/L	SWGW RBSL				
TPH	Kerosene (C10-C12)	1800	µg/L	SWGW RBSL				
TPH	Kerosene (C10-C14)	1800	µg/L	SWGW RBSL				
TPH	Kerosene (C6-C14)		µg/L					
TPH	Kerosene Range Organics (C11-C14)	1800	µg/L	SWGW RBSL				

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
TPH	Oil Range Organics (C23-C32)		µg/L					
TPH	Total Petroleum Hydrocarbons		µg/L					
TPH	Total Petroleum Hydrocarbons (as Kerosene)	1800	µg/L	SWGW RBSL				
TPH	Total Volatile Hydrocarbons		µg/L					
TPH	Gasoline Range Organics	5	µg/L	Taste/Odor				
TPH	Gasoline Range Organics (C6-C12)	5	µg/L	Taste/Odor				
TPH	TRPH		µg/L					
TPH	Total Extractable Hydrocarbons C16-C25		µg/L					
TPH	Petroleum Hydrocarbons		µg/L					
PCB	Aroclor 1016	0.5	µg/L	Primary MCL				
PCB	Polychlorinated biphenyls	0.5	µg/L	Primary MCL				
PCB	Aroclor 1254	0.5	µg/L	Primary MCL				
PCB	Aroclor 1260	0.5	µg/L	Primary MCL				
PCB	Aroclor 1221	0.5	µg/L	Primary MCL				
PCB	Aroclor 1232	0.5	µg/L	Primary MCL				
PCB	Aroclor 1242	0.5	µg/L	Primary MCL				
PCB	Aroclor 1248	0.5	µg/L	Primary MCL				
Herbicides	2,4,5-Trichlorophenoxypropionic acid (Silvex)	50	µg/L	Cal MCL	X	NA	NA	NA
Herbicides	2,4-Dichlorophenoxyacetic Acid (2,4-D)	130	µg/L	SWGW RBSL				
Herbicides	2,4,5-T	130	µg/L	SWGW RBSL				
Herbicides	Dalapon	200	µg/L	Cal MCL	X	NA	NA	NA
Herbicides	Dinoseb	7	µg/L	Primary MCL				

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Herbicides	MCPP		µg/L					
Herbicides	Propachlor	90	µg/L	Notification Level	X	NA	NA	NA
Pesticides	4,4'-DDT		µg/L					
Pesticides	a-Chlordane		µg/L					
Pesticides	Chlorobenzilate		µg/L					
Pesticides	Diallate		µg/L					
Pesticides	Famphur		µg/L					
Pesticides	Kepone	0.0093	µg/L	SWGW RBSL				
Pesticides	Endosulfan I	75	µg/L	SWGW RBSL				
Pesticides	Endosulfan II	75	µg/L	SWGW RBSL				
Pesticides	Endrin ketone		µg/L					
Pesticides	gamma-BHC	0.2	µg/L	Primary MCL				
Pesticides	gamma-Chlordane		µg/L					
Pesticides	Methyl parathion	2	µg/L	Archived Advisory Level	X	2	Notification Level	µg/L
Pesticides	p,p'-Methoxychlor	30	µg/L	Cal MCL	X	NA	NA	µg/L
Pesticides	Parathion	40	µg/L	Archived Advisory Level	X	40	Notification Level	µg/L
Pesticides	Tetra ethyldithiopyrophosphate		µg/L					
Pesticides	y-Chlordane		µg/L					
Pesticides	Endosulfan sulfate	75	µg/L	SWGW RBSL				
Pesticides	4,4'-DDE	0.44	µg/L	SWGW RBSL				
Pesticides	Aldrin	0.002	µg/L	Archived Advisory Level	X	0.002	Notification Level	µg/L
Pesticides	alpha-BHC	0.015	µg/L	Archived Advisory Level	X	0.015	Notification Level	µg/L
Pesticides	beta-BHC	0.025	µg/L	Archived Advisory Level	X	0.025	Notification Level	µg/L

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Pesticides	Chlordane	0.1	µg/L	Cal MCL	X	1	Primary MCL	µg/L
Pesticides	delta-BHC		µg/L		X	0.025	Notification Level	µg/L
Pesticides	Dieldrin	0.002	µg/L	Archived Advisory Level	X	0.002	Notification Level	µg/L
Pesticides	Dimethoate	1	µg/L	Archived Advisory Level	X	1	Notification Level	µg/L
Pesticides	Dimethoate							
Pesticides	Disulfoton		µg/L					
Pesticides	4,4'-DDD	0.62	µg/L	SWGW RBSL				
Pesticides	Toxaphene	3	µg/L	Primary MCL				
Pesticides	Endrin	2	µg/L	Primary MCL				
Pesticides	Endrin aldehyde		µg/L					
Pesticides	Heptachlor	0.01	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Pesticides	Heptachlor epoxide	0.01	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Pesticides	Phorate		µg/L					
Dioxins/Furans	1,2,3,4,6,7,8-Heptachlorodibenzofuran		µg/L					
Dioxins/Furans	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin		µg/L					
Dioxins/Furans	1,2,3,4,7,8,9-Heptachlorodibenzofuran		µg/L					
Dioxins/Furans	1,2,3,4,7,8-Hexachlorodibenzofuran		µg/L					
Dioxins/Furans	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin		µg/L					

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Dioxins/Furans	1,2,3,6,7,8-Hexachlorodibenzofuran		µg/L					
Dioxins/Furans	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin		µg/L					
Dioxins/Furans	1,2,3,7,8,9-Hexachlorodibenzofuran		µg/L					
Dioxins/Furans	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin		µg/L					
Dioxins/Furans	1,2,3,7,8-Pentachlorodibenzofuran		µg/L					
Dioxins/Furans	1,2,3,7,8-Pentachlorodibenzo-p-dioxin		µg/L					
Dioxins/Furans	2,3,4,6,7,8-Hexachlorodibenzofuran		µg/L					
Dioxins/Furans	2,3,4,7,8-Pentachlorodibenzofuran		µg/L					
Dioxins/Furans	2,3,7,8-Tetrachlorodibenzofuran		µg/L					
Dioxins/Furans	Heptachlorodibenzofurans		µg/L					
Dioxins/Furans	Heptachlorodibenzo-p-dioxins		µg/L					
Dioxins/Furans	Hexachlorodibenzofurans		µg/L					
Dioxins/Furans	Hexachlorodibenzo-p-dioxins		µg/L					
Dioxins/Furans	Octachlorodibenzofuran		µg/L					
Dioxins/Furans	Octachlorodibenzo-p-dioxin		µg/L					
Dioxins/Furans	PCDFs (Furans)		µg/L					
Dioxins/Furans	Pentachlorodibenzofurans		µg/L					
Dioxins/Furans	Pentachlorodibenzo-p-dioxins		µg/L					
Dioxins/Furans	Tetrachlorodibenzofurans		µg/L					

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Dioxins/Furans	Tetrachlorodibenzo-p-dioxins		µg/L					
Dioxins/Furans	1,3,4,7,8-PeCDF		µg/L					
Dioxins/Furans	PCDDs (Dioxins)		µg/L					
Dioxins/Furans	2,3,7,8-TCDD	0.00003	µg/L	Primary MCL				
Metals	Aluminum, Dissolved	13000	µg/L	SWGW RBSL				
Metals	Boron, Dissolved	340	µg/L	SSFL Comparison				
Metals	Tin, Dissolved	2.4	µg/L	SSFL Comparison				
Metals	Antimony, Dissolved	2.5	µg/L	SSFL Comparison				
Metals	Arsenic, Dissolved	7.7	µg/L	SSFL Comparison				
Metals	Barium, Dissolved	150	µg/L	SSFL Comparison				
Metals	Beryllium, Dissolved	0.14	µg/L	SSFL Comparison				
Metals	Cadmium, Dissolved	0.2	µg/L	SSFL Comparison				
Metals	Chromium, Dissolved	14	µg/L	SSFL Comparison				
Metals	Cobalt, Dissolved	1.9	µg/L	SSFL Comparison				
Metals	Copper, Dissolved	4.7	µg/L	SSFL Comparison				
Metals	Hexavalent Chromium, Dissolved	38	µg/L	SWGW RBSL				
Metals	Iron, Dissolved	4100	µg/L	SSFL Comparison				
Metals	Lead, Dissolved	11	µg/L	SSFL Comparison				
Metals	Magnesium, Dissolved	77000	µg/L	SSFL Comparison				
Metals	Manganese, Dissolved	150	µg/L	SSFL Comparison				
Metals	Mercury, Dissolved	0.063	µg/L	SSFL Comparison				
Metals	Molybdenum, Dissolved	2.2	µg/L	SSFL Comparison				
Metals	Nickel, Dissolved	17	µg/L	SSFL Comparison				
Metals	Potassium, Dissolved	9600	µg/L	SSFL Comparison				
Metals	Selenium, Dissolved	1.6	µg/L	SSFL Comparison				

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Metals	Silver, Dissolved	0.17	µg/L	SSFL Comparison				
Metals	Sodium, Dissolved	190000	µg/L	SSFL Comparison				
Metals	Strontium, Dissolved	800	µg/L	SSFL Comparison				
Metals	Thallium, Dissolved	0.13	µg/L	SSFL Comparison				
Metals	Vanadium, Dissolved	2.6	µg/L	SSFL Comparison				
Metals	Zinc, Dissolved	6300	µg/L	SSFL Comparison				
Metals	Zirconium		µg/L					
Metals	Zirconium, dissolved		µg/L					
Metals	Aluminum	200	µg/L	Secondary MCL				
Metals	Antimony	2.5	µg/L	SSFL Comparison				
Metals	Arsenic	7.7	µg/L	SSFL Comparison				
Metals	Barium	150	µg/L	SSFL Comparison				
Metals	Beryllium	0.14	µg/L	SSFL Comparison				
Metals	Boron	340	µg/L	SSFL Comparison				
Metals	Cadmium	0.2	µg/L	SSFL Comparison				
Metals	Chromium	14	µg/L	SSFL Comparison				
Metals	Cobalt	1.9	µg/L	SSFL Comparison				
Metals	Copper	4.7	µg/L	SSFL Comparison				
Metals	Hexavalent Chromium	14	µg/L	SSFL Comparison				
Metals	Iron	4100	µg/L	SSFL Comparison				
Metals	Lead	11	µg/L	SSFL Comparison				
Metals	Magnesium	77000	µg/L	SSFL Comparison				
Metals	Manganese	150	µg/L	SSFL Comparison				
Metals	Mercury	0.063	µg/L	SSFL Comparison				
Metals	Molybdenum	2.2	µg/L	SSFL Comparison				
Metals	Nickel	17	µg/L	SSFL Comparison				

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Metals	Potassium	9600	µg/L	SSFL Comparison				
Metals	Selenium	1.6	µg/L	SSFL Comparison				
Metals	Silver	0.17	µg/L	SSFL Comparison				
Metals	Sodium	190000	µg/L	SSFL Comparison				
Metals	Strontium	800	µg/L	SSFL Comparison				
Metals	Thallium	0.13	µg/L	SSFL Comparison				
Metals	Tin	2.4	µg/L	SSFL Comparison				
Metals	Vanadium	2.6	µg/L	SSFL Comparison				
Metals	Zinc	6300	µg/L	SSFL Comparison				
Inorganics	Carbon Dioxide		µg/L					
Inorganics	Dissolved Organic Carbon		µg/L					
Inorganics	Phosphite (PO3)		µg/L					
Inorganics	Bicarbonate		µg/L					
Inorganics	Calcium, Dissolved		µg/L					
Inorganics	Carbonate		µg/L					
Inorganics	Chlorine	4000	µg/L	Primary MCL				
Inorganics	Iron Oxide		µg/L					
Inorganics	Nitrate-NO3	45000	µg/L	Cal MCL				
Inorganics	Redox Potential		mV					
Inorganics	Silica, Dissolved		µg/L					
Inorganics	Silicon, Dissolved		µg/L					
Inorganics	Specific gravity		No Units					
Inorganics	Sulfide, Dissolved		µg/L					
Inorganics	Alkalinity		µg/L					
Inorganics	Alkalinity as CaCO3		µg/L					
Inorganics	Ammonia-N		µg/L					

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
Inorganics	Bicarbonate Alkalinity as CaCO3		µg/L					
Inorganics	Bromide		µg/L					
Inorganics	Carbonate Alkalinity as CaCO3		µg/L					
Inorganics	Calcium		µg/L					
Inorganics	Cation/Anion Balance (%)		%					
Inorganics	Chloride	250000	µg/L	Secondary MCL				
Inorganics	Chlorate	800	µg/L	Notification Level	X	NA	NA	NA
Inorganics	Dissolved oxygen		µg/L					
Inorganics	Cyanides	150	µg/L	Cal MCL	X	NA	Primary MCL (incorrect)	NA
Inorganics	Fluoride	800	µg/L	SSFL Comparison				
Inorganics	Nitrate-N	10000	µg/L	Primary MCL				
Inorganics	Nitrite-N	1000	µg/L	Primary MCL				
Inorganics	Phosphate		µg/L					
Inorganics	Sulfate	376000	µg/L	SSFL Comparison				
Inorganics	Sulfide		µg/L					
Inorganics	Total Dissolved Solids	500000	µg/L	Recommended SMCL	X			
Inorganics	Total Dissolved Solids	1000000	µg/L	Upper SMCL	X			
Inorganics	Total Dissolved Solids	1500000	µg/L	Short-Term SMCL	X			
Inorganics	Total Kjeldahl nitrogen		µg/L					
Inorganics	Total Organic Carbon		µg/L					
Inorganics	Total Suspended Solids		µg/L					
General Parameters	Ammonium		µg/L					
General Parameters	Bulk Density		pcf					

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type	Updated	Previous SL	Previous Screen Type	Units
General Parameters	Deuterium		permil					
General Parameters	Formic Acid	1700000	µg/L	Taste/Odor				
General Parameters	Hydraulic Conductivity		cm/sec					
General Parameters	Moisture		%					
General Parameters	Oxygen-18		permil					
General Parameters	pH		pH Units					
General Parameters	Porosity, Total		%					
General Parameters	Total Non-Volatile Solids		µg/L					
General Parameters	Total Solids		µg/L					
General Parameters	volumetric saturation (air)		%					
General Parameters	Turbidity	5	NTU	Secondary MCL	X	1	Primary MCL	NTU
General Parameters	Specific conductivity	900	µmhos/cm	Recommended SMCL	X			
General Parameters	Specific conductivity	1600	µmhos/cm	Upper SMCL	X			
General Parameters	Specific conductivity	2200	µmhos/cm	Short-Term SMCL	X			
General Parameters	Hardness		µg/L					
General Parameters	Coliform bacteria		MPN/100 mL					

NOTES AND ABBREVIATIONS
Cal MCL - California Primary Maximum Contaminant Level
NDMA - n-Nitrosodimethylamine
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
Primary MCL - Primary Maximum Contaminant Level
Taste/Odor - Taste/Odor Threshold
TPH - total petroleum hydrocarbons
Secondary MCL - Secondary Maximum Contaminant Level
SMCL - Secondary Maximum Contaminant Level
SSFL Comparison - site-specific values for metals developed by DTSC
SVOC - semi volatile organic compound

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

SWGW RBSL - Site-Wide Groundwater Risk-Based Screening Level proposed in GW RI Report (MWH, 2009)
VOCs - volatile organic compounds
(a) - isotope-specific MCL for beta emitters based on Primary MCL of 4 mrem/yr critical organ dose limit for gross beta (EPA, 2000)
(b) - isotope-specific MCL for beta emitters based on the 4 mrem/yr effective dose equivalent for gross beta (EPA, 2000)

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van den Berg, Martin, et al., 2006. "The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds", July.

TABLE 9
FIRST-TIME DETECTS AND NEW MAXIMUM CONCENTRATIONS, 2019 – AREA IV

Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
1,1-dichloroethene	PZ-103	Total	0.28	µg/L	J/J	No	Yes	03/07/2017	6	µg/L	No	Cal MCL
1,1,1-trichloroethane	PZ-108	Total	1.9	µg/L	J/J	Yes	Yes		200	µg/L	No	Primary MCL
1,4-dioxane	RS-54	Total	34	µg/L	/J	Yes	Yes		1	µg/L	Yes	Notification Level
Actinium-228	RD-59A	Dissolved	74.5	pCi/L		Yes	Yes					
Aluminum	PZ-005	Total	1600	µg/L		No	Yes	04/10/2002	200	µg/L	Yes	Secondary MCL
	PZ-098	Total	160	µg/L		Yes	Yes		200	µg/L	No	Secondary MCL
	PZ-102	Dissolved	140	µg/L		Yes	Yes		13000	µg/L	No	SWGW RBSL
	PZ-102	Total	1800	µg/L		Yes	Yes		200	µg/L	Yes	Secondary MCL
	PZ-103	Dissolved	380	µg/L		Yes	Yes	04/09/2002	13000	µg/L	No	SWGW RBSL
	PZ-103	Total	1900	µg/L		No	Yes	04/09/2002	200	µg/L	Yes	Secondary MCL
	PZ-108	Total	650	µg/L	/J	No	Yes	02/19/2018	200	µg/L	Yes	Secondary MCL
	PZ-109	Total	2000	µg/L		Yes	Yes	02/17/2009	200	µg/L	Yes	Secondary MCL
	RS-18	Total	41	µg/L	J/J	Yes	Yes		200	µg/L	No	Secondary MCL
Antimony	PZ-105	Dissolved	2.7	µg/L		No	Yes	06/01/2017	2.5	µg/L	Yes	SSFL Comparison
	RD-34A	Total	1.2	µg/L	J/J	No	Yes	02/11/2014	2.5	µg/L	No	SSFL Comparison
Antimony-125	RS-28	Dissolved	29.5	pCi/L		Yes	Yes		300	pCi/L	No	Primary MCL (a)
Arsenic	PZ-098	Dissolved	0.68	µg/L	J/J	Yes	Yes		7.7	µg/L	No	SSFL Comparison
	PZ-098	Total	0.83	µg/L	J/J	Yes	Yes		7.7	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	1	µg/L	J/J	Yes	Yes		7.7	µg/L	No	SSFL Comparison
	PZ-102	Total	1.2	µg/L	J/J	Yes	Yes		7.7	µg/L	No	SSFL Comparison
Barium	PZ-098	Dissolved	49	µg/L		Yes	Yes	04/03/2003	150	µg/L	No	SSFL Comparison
	PZ-098	Total	51	µg/L		No	Yes	04/03/2003	150	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	8	µg/L		Yes	Yes		150	µg/L	No	SSFL Comparison

TABLE 9
FIRST-TIME DETECTS AND NEW MAXIMUM CONCENTRATIONS, 2019 – AREA IV

Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
	PZ-102	Total	22	µg/L		Yes	Yes		150	µg/L	No	SSFL Comparison
	PZ-105	Total	37	µg/L		No	Yes	02/19/2018	150	µg/L	No	SSFL Comparison
	PZ-108	Total	31	µg/L		No	Yes	01/31/2012	150	µg/L	No	SSFL Comparison
	PZ-109	Dissolved	33	µg/L		No	Yes	06/01/2016	150	µg/L	No	SSFL Comparison
	PZ-109	Total	38	µg/L		No	Yes	06/01/2016	150	µg/L	No	SSFL Comparison
	RD-64	Dissolved	70	µg/L		No	Yes	06/01/2016	150	µg/L	No	SSFL Comparison
	RD-64	Total	70	µg/L	B/	No	Yes	06/01/2016	150	µg/L	No	SSFL Comparison
Beryllium	PZ-109	Total	0.14	µg/L	J/J	Yes	Yes		0.14	µg/L	No	SSFL Comparison
	RD-64	Dissolved	0.12	µg/L	J/J	Yes	Yes		0.14	µg/L	No	SSFL Comparison
	RD-64	Total	0.12	µg/L	J/J	Yes	Yes		0.14	µg/L	No	SSFL Comparison
Boron	C-08	Dissolved	29	µg/L	J/J	No	Yes	06/01/2016	340	µg/L	No	SSFL Comparison
	PZ-005	Dissolved	160	µg/L		No	Yes	06/01/2017	340	µg/L	No	SSFL Comparison
	PZ-108	Dissolved	200	µg/L		No	Yes	02/19/2018	340	µg/L	No	SSFL Comparison
	PZ-108	Total	200	µg/L	B/	No	Yes	02/19/2018	340	µg/L	No	SSFL Comparison
	RD-21	Dissolved	57	µg/L	J/J	No	Yes	06/01/2017	340	µg/L	No	SSFL Comparison
	RD-59C	Dissolved	79	µg/L	J/J	No	Yes	06/01/2017	340	µg/L	No	SSFL Comparison
	RS-18	Dissolved	92	µg/L	J/J	No	Yes	06/01/2017	340	µg/L	No	SSFL Comparison
	RS-18	Total	92	µg/L	J/J	No	Yes	06/01/2017	340	µg/L	No	SSFL Comparison
Calcium	C-08	Dissolved	110000	µg/L		No	Yes	06/01/2016				

TABLE 9
FIRST-TIME DETECTS AND NEW MAXIMUM CONCENTRATIONS, 2019 – AREA IV

Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
	C-08	Total	110000	µg/L	/J	No	Yes	06/01/2016				
	PZ-105	Total	130000	µg/L	/J	No	Yes	06/01/2017				
	PZ-108	Dissolved	150000	µg/L		No	Yes	02/19/2018				
	PZ-108	Total	150000	µg/L	/J	No	Yes	02/19/2018				
	PZ-109	Dissolved	71000	µg/L		Yes	Yes					
	PZ-109	Total	71000	µg/L		Yes	Yes					
	RD-64	Dissolved	140000	µg/L		No	Yes	06/01/2016				
	RD-64	Total	140000	µg/L		No	Yes	06/01/2016				
	RS-18	Dissolved	110000	µg/L		No	Yes	06/01/2017				
	RS-18	Total	110000	µg/L		No	Yes	06/01/2017				
Cesium-137	RD-54A	Dissolved	8.37	pCi/L		Yes	Yes		200	pCi/L	No	Primary MCL (a)
	RS-18	Dissolved	11.5	pCi/L		Yes	Yes		200	pCi/L	No	Primary MCL (a)
Chromium	C-08	Total	13	µg/L		No	Yes	06/01/2017	14	µg/L	No	SSFL Comparison
	PZ-005	Total	3.3	µg/L	B/	No	Yes	04/10/2002	14	µg/L	No	SSFL Comparison
	PZ-098	Total	2.2	µg/L	B/	No	Yes	04/03/2003	14	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	3.4	µg/L	B/	Yes	Yes	04/03/2003	14	µg/L	No	SSFL Comparison
	PZ-102	Total	12	µg/L	B/	No	Yes	04/03/2003	14	µg/L	No	SSFL Comparison
	RD-19	Total	0.8	µg/L	J/J	No	Yes	02/28/2018	14	µg/L	No	SSFL Comparison
Cobalt	PZ-102	Dissolved	0.18	µg/L	J/J	Yes	Yes		1.9	µg/L	No	SSFL Comparison
	PZ-102	Total	1.2	µg/L		Yes	Yes		1.9	µg/L	No	SSFL Comparison
	PZ-105	Total	0.59	µg/L	J/J	No	Yes	02/19/2018	1.9	µg/L	No	SSFL Comparison
	RD-34C	Total	1.3	µg/L		No	Yes	02/24/2004	1.9	µg/L	No	SSFL Comparison

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Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
Copper	C-08	Total	1.9	µg/L	J/J	No	Yes	06/01/2016	4.7	µg/L	No	SSFL Comparison
	PZ-098	Dissolved	3	µg/L		Yes	Yes		4.7	µg/L	No	SSFL Comparison
	RD-17	Dissolved	0.6	µg/L	J/J	Yes	Yes		4.7	µg/L	No	SSFL Comparison
Europium-152	RD-20	Total	34.9	pCi/L		Yes	Yes		200	pCi/L	No	Primary MCL (a)
Gross Alpha	PZ-120	Dissolved	17.3	pCi/L	C/	No	Yes	06/01/2017	15	pCi/L	Yes	Primary MCL
	RD-14	Dissolved	10.1	pCi/L	C/	No	Yes	06/01/2015	15	pCi/L	No	Primary MCL
	RD-17	Total	12	pCi/L	C/	No	Yes	09/21/1989	15	pCi/L	No	Primary MCL
	RD-19	Dissolved	103	pCi/L	C/	No	Yes	02/15/1995	15	pCi/L	Yes	Primary MCL
	RD-34A	Dissolved	51.6	pCi/L	C/	No	Yes	02/02/2010	15	pCi/L	Yes	Primary MCL
	RD-96	Total	18.4	pCi/L	C/	No	Yes	02/13/2014	15	pCi/L	Yes	Primary MCL
	RD-98	Total	18.2	pCi/L	C/	No	Yes	06/01/2017	15	pCi/L	Yes	Primary MCL
Gross Beta	PZ-120	Dissolved	11.4	pCi/L		No	Yes	06/01/2017	50	pCi/L	No	Cal MCL
	RD-17	Total	11.4	pCi/L	F/	No	Yes	02/23/2004	50	pCi/L	No	Cal MCL
Iron	C-08	Total	430	µg/L		No	Yes	02/19/2018	4100	µg/L	No	SSFL Comparison
	PZ-005	Total	2500	µg/L		No	Yes	04/10/2002	4100	µg/L	No	SSFL Comparison
	PZ-098	Total	330	µg/L		No	Yes	04/03/2003	4100	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	250	µg/L	B/	Yes	Yes	04/03/2003	4100	µg/L	No	SSFL Comparison
	PZ-102	Total	3500	µg/L		No	Yes	04/03/2003	4100	µg/L	No	SSFL Comparison
	PZ-103	Dissolved	520	µg/L	B/	Yes	Yes	04/09/2002	4100	µg/L	No	SSFL Comparison
	PZ-103	Total	3000	µg/L		No	Yes	04/09/2002	4100	µg/L	No	SSFL Comparison
	PZ-108	Total	930	µg/L		No	Yes	02/19/2018	4100	µg/L	No	SSFL Comparison

TABLE 9
FIRST-TIME DETECTS AND NEW MAXIMUM CONCENTRATIONS, 2019 – AREA IV

Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
	PZ-109	Total	3000	µg/L		Yes	Yes	02/17/2009	4100	µg/L	No	SSFL Comparison
	RD-96	Total	260	µg/L		No	Yes	02/21/2018	4100	µg/L	No	SSFL Comparison
Lead	PZ-102	Dissolved	0.27	µg/L	J/J	Yes	Yes		11	µg/L	No	SSFL Comparison
	PZ-102	Total	1.2	µg/L		Yes	Yes		11	µg/L	No	SSFL Comparison
	RD-17	Total	9.8	µg/L		No	Yes	03/02/2018	11	µg/L	No	SSFL Comparison
Magnesium	C-08	Dissolved	7300	µg/L		No	Yes	06/01/2017	77000	µg/L	No	SSFL Comparison
	C-08	Total	7300	µg/L		No	Yes	06/01/2017	77000	µg/L	No	SSFL Comparison
	PZ-105	Dissolved	23000	µg/L		No	Yes	02/19/2018	77000	µg/L	No	SSFL Comparison
	PZ-105	Total	23000	µg/L		No	Yes	02/19/2018	77000	µg/L	No	SSFL Comparison
	PZ-108	Total	34000	µg/L		No	Yes	02/19/2018	77000	µg/L	No	SSFL Comparison
	RD-64	Dissolved	13000	µg/L		No	Yes	06/01/2016	77000	µg/L	No	SSFL Comparison
	RS-18	Dissolved	22000	µg/L		No	Yes	06/01/2017	77000	µg/L	No	SSFL Comparison
	RS-18	Total	21000	µg/L		No	Yes	06/01/2017	77000	µg/L	No	SSFL Comparison
Manganese	PZ-005	Total	27	µg/L	B/	No	Yes	04/10/2002	150	µg/L	No	SSFL Comparison
	PZ-098	Total	7.5	µg/L	B/	No	Yes	04/03/2003	150	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	6.7	µg/L		Yes	Yes	04/03/2003	150	µg/L	No	SSFL Comparison
	PZ-102	Total	72	µg/L	B/	No	Yes	04/03/2003	150	µg/L	No	SSFL Comparison
	RD-34C	Total	56	µg/L		No	Yes	02/24/2004	150	µg/L	No	SSFL Comparison

TABLE 9
FIRST-TIME DETECTS AND NEW MAXIMUM CONCENTRATIONS, 2019 – AREA IV

Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
	RD-59A	Total	420	µg/L		No	Yes	08/08/2003	150	µg/L	Yes	SSFL Comparison
Molybdenum	PZ-098	Dissolved	2.2	µg/L		Yes	Yes		2.2	µg/L	Yes	SSFL Comparison
	PZ-098	Total	2.1	µg/L	B/	Yes	Yes		2.2	µg/L	No	SSFL Comparison
	PZ-103	Dissolved	2.6	µg/L		No	Yes	06/01/2017	2.2	µg/L	Yes	SSFL Comparison
	PZ-103	Total	2.8	µg/L	B/	No	Yes	06/01/2017	2.2	µg/L	Yes	SSFL Comparison
	PZ-109	Dissolved	92	µg/L		No	Yes	02/19/2008	2.2	µg/L	Yes	SSFL Comparison
	RD-07	Total	1.3	µg/L	J/J	No	Yes	06/01/2017	2.2	µg/L	No	SSFL Comparison
	RD-17	Dissolved	0.81	µg/L	J/J	No	Yes	03/02/2018	2.2	µg/L	No	SSFL Comparison
	RD-59C	Dissolved	1.9	µg/L	J/J	No	Yes	02/28/2002	2.2	µg/L	No	SSFL Comparison
	RD-59C	Total	1.6	µg/L	J/J	No	Yes	02/28/2002	2.2	µg/L	No	SSFL Comparison
Nickel	PZ-102	Dissolved	4.1	µg/L		Yes	Yes	04/03/2003	17	µg/L	No	SSFL Comparison
	PZ-102	Total	7.7	µg/L		No	Yes	04/03/2003	17	µg/L	No	SSFL Comparison
	RD-96	Dissolved	3	µg/L		No	Yes	02/21/2018	17	µg/L	No	SSFL Comparison
	RD-96	Total	2.7	µg/L		No	Yes	02/21/2018	17	µg/L	No	SSFL Comparison
Perchlorate	RD-59C	Total	0.0041	µg/L	J/J	Yes	Yes		6	µg/L	No	Cal MCL
	RD-96	Total	0.018	µg/L	J/J	Yes	Yes		6	µg/L	No	Cal MCL

TABLE 9
FIRST-TIME DETECTS AND NEW MAXIMUM CONCENTRATIONS, 2019 – AREA IV

Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
Potassium	C-08	Total	3500	µg/L	B/	No	Yes	06/01/2017	9600	µg/L	No	SSFL Comparison
	PZ-105	Total	6800	µg/L	B/	No	Yes	02/19/2018	9600	µg/L	No	SSFL Comparison
	PZ-108	Total	7700	µg/L	B/	No	Yes	02/19/2018	9600	µg/L	No	SSFL Comparison
Potassium-40	RD-34C	Dissolved	150	pCi/L		No	Yes	02/14/2002				
Radium-228	RD-14	Total	1.49	pCi/L		No	Yes	03/02/2018	5	pCi/L	No	copied prev version
	RD-17	Total	2.05	pCi/L		No	Yes	02/16/2006	5	pCi/L	No	copied prev version
	RD-19	Dissolved	3.9	pCi/L		No	Yes	06/01/2017	5	pCi/L	No	copied prev version
	RD-59C	Dissolved	1.46	pCi/L		No	Yes	08/16/2007	5	pCi/L	No	copied prev version
	RD-96	Dissolved	2.84	pCi/L		No	Yes	06/01/2017	5	pCi/L	No	copied prev version
	RD-96	Total	3.77	pCi/L		No	Yes	06/01/2017	5	pCi/L	No	copied prev version
	RD-98	Dissolved	23.7	pCi/L		No	Yes	06/01/2015	5	pCi/L	Yes	copied prev version
	RD-98	Total	27.1	pCi/L		No	Yes	06/01/2015	5	pCi/L	Yes	copied prev version
	RS-18	Total	0.678	pCi/L		Yes	Yes	02/20/2006	5	pCi/L	No	copied prev version
Selenium	PZ-098	Dissolved	2.7	µg/L	J/J	Yes	Yes		1.6	µg/L	Yes	SSFL Comparison
	PZ-098	Total	0.84	µg/L	J/J	Yes	Yes		1.6	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	0.8	µg/L	J/J	Yes	Yes		1.6	µg/L	No	SSFL Comparison
	PZ-108	Dissolved	0.55	µg/L	J/J	Yes	Yes		1.6	µg/L	No	SSFL Comparison
Silver	RD-64	Dissolved	0.036	µg/L	J/J	Yes	Yes		0.17	µg/L	No	SSFL Comparison
Sodium-22	RD-14	Total	11.1	pCi/L		Yes	Yes		400	pCi/L	No	Primary MCL (a)

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Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
	RD-20	Total	5.66	pCi/L		Yes	Yes		400	pCi/L	No	Primary MCL (a)
	RD-33B	Total	6.33	pCi/L		Yes	Yes		400	pCi/L	No	Primary MCL (a)
	RD-34A	Dissolved	5.45	pCi/L		Yes	Yes		400	pCi/L	No	Primary MCL (a)
	RD-54A	Total	5.63	pCi/L		Yes	Yes		400	pCi/L	No	Primary MCL (a)
Strontium	C-08	Dissolved	390	µg/L		No	Yes	06/01/2016	800	µg/L	No	SSFL Comparison
	C-08	Total	390	µg/L	B/J	No	Yes	06/01/2016	800	µg/L	No	SSFL Comparison
	PZ-098	Dissolved	330	µg/L		Yes	Yes		800	µg/L	No	SSFL Comparison
	PZ-098	Total	320	µg/L		Yes	Yes		800	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	150	µg/L		Yes	Yes		800	µg/L	No	SSFL Comparison
	PZ-102	Total	160	µg/L		Yes	Yes		800	µg/L	No	SSFL Comparison
	PZ-105	Dissolved	540	µg/L		No	Yes	06/01/2017	800	µg/L	No	SSFL Comparison
	PZ-105	Total	540	µg/L	B/J	No	Yes	06/01/2017	800	µg/L	No	SSFL Comparison
	PZ-108	Dissolved	370	µg/L		No	Yes	02/19/2018	800	µg/L	No	SSFL Comparison
	PZ-108	Total	380	µg/L	B/J	No	Yes	02/19/2018	800	µg/L	No	SSFL Comparison
	RD-64	Dissolved	600	µg/L		No	Yes	06/01/2017	800	µg/L	No	SSFL Comparison
	RS-18	Dissolved	330	µg/L		No	Yes	06/01/2017	800	µg/L	No	SSFL Comparison
	RS-18	Total	320	µg/L		No	Yes	06/01/2017	800	µg/L	No	SSFL Comparison
Strontium-90	RD-19	Dissolved	0.274	pCi/L		No	Yes	03/17/2011	8	pCi/L	No	Primary MCL
	RD-20	Total	0.298	pCi/L		Yes	Yes		8	pCi/L	No	Primary MCL
	RD-30	Dissolved	0.629	pCi/L		Yes	Yes		8	pCi/L	No	Primary MCL

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Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
	RD-33B	Total	0.399	pCi/L		Yes	Yes	02/20/2018	8	pCi/L	No	Primary MCL
	RD-63	Total	0.319	pCi/L		Yes	Yes	03/22/2011	8	pCi/L	No	Primary MCL
TPH DRO (C10-C28)	PZ-103	Total	230	µg/L	J/J	Yes	Yes					
TPH GRO (C6-C10)	RD-33C	Total	10	µg/L	J/J	Yes	Yes					
trans-1,2-DCE	RD-34A	Total	0.77	µg/L	J*/J	No	Yes	06/01/2015	10	µg/L	No	Cal MCL
	RD-63	Total	0.3	µg/L	J/J	No	Yes	06/01/2016	10	µg/L	No	Cal MCL
Trichloroethene	PZ-108	Total	240	µg/L	/J	No	Yes	04/10/2002	5	µg/L	Yes	Primary MCL
Uranium-233/234	RD-19	Dissolved	17.9	pCi/L		No	Yes	02/28/2018	20	pCi/L	No	Cal MCL
Uranium-235/236	RD-19	Dissolved	0.82	pCi/L		No	Yes	02/28/2018				
	RD-20	Dissolved	0.306	pCi/L		No	Yes	03/22/2011				
	RD-30	Dissolved	0.297	pCi/L		Yes	Yes					
	RD-30	Total	0.258	pCi/L		Yes	Yes					
	RD-54A	Dissolved	0.216	pCi/L		No	Yes	03/01/2018				
	RD-59A	Total	0.123	pCi/L		Yes	Yes					
	RD-96	Total	0.393	pCi/L		No	Yes	02/21/2018				
Uranium-238	RD-14	Dissolved	2.07	pCi/L		No	Yes	03/02/2018	20	pCi/L	No	Cal MCL
	RD-20	Dissolved	3.83	pCi/L		No	Yes	02/20/2018	20	pCi/L	No	Cal MCL
	RD-20	Total	4.15	pCi/L		No	Yes	02/20/2018	20	pCi/L	No	Cal MCL
	RD-34A	Dissolved	6.52	pCi/L		No	Yes	03/02/2018	20	pCi/L	No	Cal MCL
	RD-34A	Total	5.86	pCi/L		No	Yes	03/02/2018	20	pCi/L	No	Cal MCL
	RS-18	Dissolved	3.5	pCi/L		No	Yes	06/01/2017	20	pCi/L	No	Cal MCL
	RS-18	Total	3.45	pCi/L		Yes	Yes	06/01/2017	20	pCi/L	No	Cal MCL
	RS-28	Dissolved	2.67	pCi/L		No	Yes	06/01/2017	20	pCi/L	No	Cal MCL
	RS-28	Total	2.8	pCi/L		No	Yes	06/01/2017	20	pCi/L	No	Cal MCL

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Analyte	Well ID	Fraction	Q1 2019 Result	Units	Quali-fiers	New Detection	New Maximum Detection	Date of Previous Max Detect	Screening Value	Screening Units	Result Greater Than Screening Value	Screening Type
Vanadium	PZ-102	Total	5.2	µg/L		No	Yes	04/03/2003	2.6	µg/L	Yes	SSFL Comparison
Zinc	PZ-098	Dissolved	6.7	µg/L	J/J	Yes	Yes		6300	µg/L	No	SSFL Comparison
	PZ-098	Total	2.8	µg/L	J/J	Yes	Yes		6300	µg/L	No	SSFL Comparison
	PZ-102	Dissolved	9.7	µg/L	J/J	Yes	Yes		6300	µg/L	No	SSFL Comparison
	PZ-102	Total	14	µg/L		Yes	Yes		6300	µg/L	No	SSFL Comparison
	RD-96	Dissolved	17	µg/L	F1/	No	Yes	06/01/2016	6300	µg/L	No	SSFL Comparison

Notes:
/ separates lab qualifiers from data validation flags.
B = Compound was found in the blank and sample.
J = Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
F = MS/MSD Recovery and/or RPD exceeds the control limits.
F1 = MS and/or MSD recover is outside acceptance limits.
Results from wells installed after 2015 are not included in this table due to insufficient data for establishing baseline trends.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	C-08	DD-139	DD-140	DD-141	DD-142	DD-143
				Sample Name	C-08_021819_01_L-02182019	DD-139_022119_01_L-02212019	DD-140_022819_01_L-02282019	DD-141_022619_01_L-02262019	DD-142_022119_01_L-02212019	DD-143_030119_01_L-03012019
				Sample Date	2/18/2019	2/21/2019	2/28/2019	2/26/2019	2/21/2019	3/1/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U* / U
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	0.18 U / U	0.18 U / UJ	0.18 U / U	0.18 U / U	0.18 U / UJ	0.18 U* / U
1,1,2-Trichloroethane	N	SW8260B	µg/L	0.27 U / U	0.27 U / U	0.27 U / U	0.27 U / U	0.27 U / U	0.27 U* / U
1,1-Dichloroethane	N	SW8260B	µg/L	0.22 U / U	0.22 U / U	0.22 U / U	0.22 U / U	0.22 U / U	0.22 U* / U
1,1-Dichloroethene	N	SW8260B	µg/L	0.23 U / U	0.23 U / U	0.23 U / U	0.23 U / U	0.23 U / U	0.23 U* / U
1,2-Dichloroethane	N	SW8260B	µg/L	0.13 U / U	0.13 U / U	0.13 U / U	0.13 U / U	0.13 U / U	0.13 U* / U
1,4-Dioxane	N	SW8260B	µg/L	----	----	1.8 J	----	----	----
2-Butanone (MEK)	N	SW8260B	µg/L	2 U / U	2 U / U	2 U / U	2 U / UJ	2 U / U	2 U* / U
Acetone	N	SW8260B	µg/L	1.9 U / U	1.9 U / UJ	1.9 U / U	1.9 U / U	1.9 U / UJ	1.9 U* / U
Benzene	N	SW8260B	µg/L	0.16 U / U	0.74 J / J	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U* / U
Carbon tetrachloride	N	SW8260B	µg/L	0.19 U / UJ	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U* / U
Chloroform	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U* / U
cis-1,2-Dichloroethene	N	SW8260B	µg/L	1.1	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U* / U
Ethylbenzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U* / U
Methylene chloride	N	SW8260B	µg/L	0.94 U / UJ	0.94 U / U	0.94 U / U	0.94 U / U	0.94 U / U	0.94 U* / U
Tetrachloroethene	N	SW8260B	µg/L	0.2 U / U	0.2 U / U	0.2 U / U	0.2 U / U	3.3	0.2 U* / U
Toluene	N	SW8260B	µg/L	0.17 U / U	2.5	0.17 U / U	0.17 U / U	0.17 U / U	0.17 U* / U
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U* / U
Trichloroethene	N	SW8260B	µg/L	4.2	0.16 U / U	0.82 J / J	0.16 U / U	0.16 U / U	0.16 U* / U
Trichlorofluoromethane	N	SW8260B	µg/L	0.29 U / UJ	0.29 U / U	0.29 U / U	0.29 U / U	0.29 U / U	0.29 U* / U
Vinyl chloride	N	SW8260B	µg/L	0.1 U / U	0.1 U / U	0.1 U / U	0.1 U* / U	0.1 U / U	0.1 U* / U
Xylenes, Total	N	SW8260B	µg/L	0.19 U / U	0.24 J / J	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U* / U

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
---- - Not analyzed
N - Normal Field Sample
TA-DEN - Test America Denver, Colorado
LAB / VALIDATION QUALIFIERS
B - Compound was found in the blank and sample.
* - LCS or LCSD is outside acceptance limits.
F1 - MS and/or MSD Recovery is outside acceptance limits.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	DD-144	DD-145	DD-146	DD-147	DD-147	DS-43
				Sample Name	DD-144_022119_01_L-02212019	DD-145_021819_01_L-02182019	DD-146_022119_01_L-02212019	DD-147_022819_01_L-02282019	DD-147_030519_01_L-03052019	DS-43_022219_01_L-02222019
				Sample Date	2/21/2019	2/18/2019	2/21/2019	2/28/2019	3/5/2019	2/22/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	12 J / J	0.18 U / U	0.18 U / UJ	0.18 U / UJ	0.18 U / U	0.18 U / UJ	
1,1,2-Trichloroethane	N	SW8260B	µg/L	1.4 U / U	0.27 U / U	0.27 U / U	0.27 U / UJ	0.27 U / U	0.27 U / U	
1,1-Dichloroethane	N	SW8260B	µg/L	1.1 U / U	0.22 U / U	0.22 U / U	0.22 U / UJ	0.22 U / U	0.22 U / U	
1,1-Dichloroethene	N	SW8260B	µg/L	1.2 U / U	0.23 U / U	0.23 U / U	0.23 U / UJ	0.23 U / U	0.23 U / U	
1,2-Dichloroethane	N	SW8260B	µg/L	0.65 U / U	0.13 U / U	0.13 U / U	0.13 U / UJ	0.18 JB / U	0.13 U / U	
1,4-Dioxane	N	SW8260B	µg/L	----	----	----	----	----	----	
2-Butanone (MEK)	N	SW8260B	µg/L	10 U / U	2 U / U	2 U / U	2 U / UJ	2 U / U	2 U / U	
Acetone	N	SW8260B	µg/L	9.5 U / UJ	1.9 U / U	1.9 U / UJ	1.9 U / UJ	1.9 U / U	1.9 U / UJ	
Benzene	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	
Carbon tetrachloride	N	SW8260B	µg/L	0.95 U / U	0.19 U / UJ	0.19 U / U	0.19 U / UJ	0.19 U / U	0.19 U / U	
Chloroform	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	
cis-1,2-Dichloroethene	N	SW8260B	µg/L	11	0.15 U / U	0.15 U / U	0.15 U / UJ	0.15 U / U	0.15 U / U	
Ethylbenzene	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	
Methylene chloride	N	SW8260B	µg/L	4.7 U / U	0.94 U / UJ	0.94 U / U	0.94 U / UJ	0.94 U / U	0.94 U / U	
Tetrachloroethene	N	SW8260B	µg/L	1 U / U	0.2 U / U	0.2 U / U	0.2 U / UJ	0.2 U / U	0.24 J / J	
Toluene	N	SW8260B	µg/L	0.85 U / U	0.17 U / U	0.17 U / U	0.17 U / UJ	0.17 U / U	0.17 U / U	
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.75 U / U	0.15 U / U	0.15 U / U	0.15 U / UJ	0.15 U / U	0.15 U / U	
Trichloroethene	N	SW8260B	µg/L	170	0.35 J / J	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	
Trichlorofluoromethane	N	SW8260B	µg/L	1.5 U / U	0.29 U / UJ	0.29 U / U	0.29 U / UJ	0.29 U / U	0.29 U / U	
Vinyl chloride	N	SW8260B	µg/L	0.5 U / U	0.1 U / U	0.1 U / U	0.1 U / UJ	0.1 U / U	0.1 U / U	
Xylenes, Total	N	SW8260B	µg/L	0.95 U / U	0.19 U / U	0.19 U / U	0.19 U / UJ	0.19 U / U	0.19 U / U	

NOTES AND ABBREVIATIONS
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µg/L - micrograms per liter
---- - Not analyzed
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TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	DS-44	DS-46	DS-47	PZ-005	PZ-098	PZ-102
				Sample Name	DS-44_022219_01_L-02222019	DS-46_022819_01_L-02282019	DS-47_022219_01_L-02222019	PZ-005_022519_01_L-02252019	PZ-098_022519_01_L-02252019	PZ-102_022519_01_L-02252019
				Sample Date	2/22/2019	2/28/2019	2/22/2019	2/25/2019	2/25/2019	2/25/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L		0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L		0.18 U / UJ	0.18 U / U	0.18 U / UJ	0.18 U / U	0.18 U / U	0.18 U / U
1,1,2-Trichloroethane	N	SW8260B	µg/L		0.27 U / U	0.27 U / U	0.27 U / U	0.27 U / U	0.27 U / U	0.27 U / U
1,1-Dichloroethane	N	SW8260B	µg/L		0.22 U / U	0.22 U / U	0.22 U / U	0.22 U / U	0.22 U / U	0.22 U / U
1,1-Dichloroethene	N	SW8260B	µg/L		0.23 U / U	0.23 U / U	0.23 U / U	0.23 U / U	0.23 U / U	0.23 U / U
1,2-Dichloroethane	N	SW8260B	µg/L		0.13 U / U	0.13 U / U	0.13 U / U	0.13 U / UJ	0.13 U / UJ	0.13 U / UJ
1,4-Dioxane	N	SW8260B	µg/L		----	2.2 J	----	----	----	----
2-Butanone (MEK)	N	SW8260B	µg/L		2 U / U	2 U / U	2 U / U	2 U / U	2 U / U	2 U / U
Acetone	N	SW8260B	µg/L		1.9 U / UJ	1.9 U / U	1.9 U / UJ	1.9 U / U	1.9 U / U	1.9 U / U
Benzene	N	SW8260B	µg/L		0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
Carbon tetrachloride	N	SW8260B	µg/L		0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / UJ	0.19 UF1 / UJ	0.19 U / UJ
Chloroform	N	SW8260B	µg/L		0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
cis-1,2-Dichloroethene	N	SW8260B	µg/L		0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U
Ethylbenzene	N	SW8260B	µg/L		0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
Methylene chloride	N	SW8260B	µg/L		0.94 U / U	0.94 U / U	0.94 U / U	0.94 U / U	0.94 U / U	0.94 U / U
Tetrachloroethene	N	SW8260B	µg/L		0.2 U / U	0.2 U / U	0.2 U / U	0.38 J / J	0.2 U / U	0.2 U / U
Toluene	N	SW8260B	µg/L		0.17 U / U	0.17 U / U	0.17 U / U	0.17 U / U	0.17 U / U	0.17 U / U
trans-1,2-Dichloroethene	N	SW8260B	µg/L		0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U	0.15 U / U
Trichloroethene	N	SW8260B	µg/L		0.16 U / U	0.47 J / J	0.16 U / U	1.5	1.8	0.16 U / U
Trichlorofluoromethane	N	SW8260B	µg/L		0.29 U / U	0.29 U / U	0.29 U / U	0.29 U / U	0.29 U / U	0.29 U / U
Vinyl chloride	N	SW8260B	µg/L		0.1 U / U	0.1 U / U	0.1 U / U	0.1 U / U	0.1 UF1 / U	0.1 U / U
Xylenes, Total	N	SW8260B	µg/L		0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / U

NOTES AND ABBREVIATIONS
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µg/L - micrograms per liter
---- - Not analyzed
N - Normal Field Sample
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TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

			Well Identifier	PZ-103	PZ-105	PZ-108	PZ-109	PZ-120	PZ-162
			Sample Name	PZ-103_022519_01_L-02252019	PZ-105_021819_01_L-02182019	PZ-108_021819_01_L-02182019	PZ-109_022119_01_L-02212019	PZ-120_030419_01_L-03042019	PZ-162_021819_01_L-02182019
			Sample Date	2/25/2019	2/18/2019	2/18/2019	2/21/2019	3/4/2019	2/18/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units						
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	1.9 J / J	0.32 U / U	0.16 U / U	0.25 J / J
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	0.18 U / U	0.18 U / U	1.8 U / U	0.36 U / UJ	0.22 J / J	0.18 U / U
1,1,2-Trichloroethane	N	SW8260B	µg/L	0.27 U / U	0.27 U / U	2.7 U / U	0.54 U / U	0.27 U / U	0.27 U / U
1,1-Dichloroethane	N	SW8260B	µg/L	0.22 U / U	0.22 U / U	2.2 U / U	0.44 U / U	0.22 U / U	0.22 U / U
1,1-Dichloroethene	N	SW8260B	µg/L	0.28 J / J	0.23 U / U	2.3 U / U	0.46 U / U	0.23 U / U	0.23 J / J
1,2-Dichloroethane	N	SW8260B	µg/L	0.13 U / UJ	0.13 U / U	1.3 U / U	0.26 U / U	0.13 U / U	0.13 U / U
1,4-Dioxane	N	SW8260B	µg/L	----	----	----	----	----	----
2-Butanone (MEK)	N	SW8260B	µg/L	2 U / U	2 U / U	20 U / U	4 U / U	2 U / UJ	2 U / U
Acetone	N	SW8260B	µg/L	1.9 U / U	1.9 U / U	19 U / U	3.8 U / UJ	1.9 U / UJ	1.9 U / U
Benzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	1.6 U / U	0.32 U / U	0.16 U / U	0.16 U / U
Carbon tetrachloride	N	SW8260B	µg/L	0.19 U / UJ	0.19 U / UJ	1.9 U / UJ	0.38 U / U	0.19 U / U	0.19 U / UJ
Chloroform	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	1.6 U / U	0.32 U / U	0.16 U / U	0.16 U / U
cis-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.15 U / U	19	1.5 J / J	0.3 J / J	1.6
Ethylbenzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	1.6 U / U	0.32 U / U	0.16 U / U	0.16 U / U
Methylene chloride	N	SW8260B	µg/L	0.94 U / U	0.94 U / UJ	9.4 U / UJ	1.9 U / U	0.94 U / U	0.94 U / UJ
Tetrachloroethene	N	SW8260B	µg/L	0.2 U / U	0.2 U / U	2 U / U	63	0.2 U / U	0.2 U / U
Toluene	N	SW8260B	µg/L	0.17 U / U	0.17 U / U	1.7 U / U	0.34 U / U	0.17 U / U	0.17 U / U
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.15 U / U	1.5 U / U	0.3 U / U	0.15 U / U	0.15 U / U
Trichloroethene	N	SW8260B	µg/L	0.67 J / J	9.5	240	5	2.9	15
Trichlorofluoromethane	N	SW8260B	µg/L	0.29 U / U	0.29 UF1 / UJ	2.9 U / UJ	0.58 U / U	0.29 U / U	0.29 U / UJ
Vinyl chloride	N	SW8260B	µg/L	0.1 U / U	0.1 U / U	1 U / U	0.2 U / U	0.1 U / U	0.1 U / U
Xylenes, Total	N	SW8260B	µg/L	0.19 U / U	0.19 U / U	1.9 U / U	0.38 U / U	0.19 U / U	0.19 U / U

NOTES AND ABBREVIATIONS
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µg/L - micrograms per liter
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TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	PZ-163	RD-07	RD-14	RD-17	RD-19	RD-20
				Sample Name	PZ-163_021819_01_L-02182019	RD-07_030419_01_L-03042019	RD-14_030519_01_L-03052019	RD-17_030119_01_L-03012019	RD-19_030519_01_L-03052019	RD-20_021919_01_L-02192019
				Sample Date	2/18/2019	3/4/2019	3/5/2019	3/1/2019	3/5/2019	2/19/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 UF1* / U	0.16 U / U	0.16 U / U	
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	25	0.18 U / U	0.18 U / U	0.18 UF1* / U	0.18 U / U	0.18 U / U	
1,1,2-Trichloroethane	N	SW8260B	µg/L	1.4 U / U	0.27 U / U	0.27 U / U	0.27 UF1* / U	0.27 U / U	0.27 U / U	
1,1-Dichloroethane	N	SW8260B	µg/L	1.1 U / U	0.22 U / U	0.22 U / U	0.22 UF1* / U	0.22 U / U	0.22 U / U	
1,1-Dichloroethene	N	SW8260B	µg/L	1.2 U / U	0.23 U / U	0.23 U / U	0.23 UF1* / U	0.23 U / U	0.23 U / U	
1,2-Dichloroethane	N	SW8260B	µg/L	0.65 U / U	0.13 U / U	0.13 U / U	0.16 JBF1* / U	0.18 JB / U	0.13 U / U	
1,4-Dioxane	N	SW8260B	µg/L	----	----	----	----	----	----	
2-Butanone (MEK)	N	SW8260B	µg/L	10 U / U	2 U / UJ	2 U / U	2 UF1* / U	2 U / U	2 U / U	
Acetone	N	SW8260B	µg/L	9.5 U / U	1.9 U / UJ	1.9 U / U	1.9 UF1* / U	1.9 U / U	1.9 U / UJ	
Benzene	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 UF1* / U	0.16 U / U	0.16 U / U	
Carbon tetrachloride	N	SW8260B	µg/L	0.95 U / UJ	0.19 U / U	0.19 U / U	0.19 UF1* / U	0.19 U / U	0.19 U / U	
Chloroform	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 UF1* / U	0.16 U / U	0.16 U / U	
cis-1,2-Dichloroethene	N	SW8260B	µg/L	8	1.6	0.15 U / U	0.15 UF1* / U	0.15 U / U	0.15 U / U	
Ethylbenzene	N	SW8260B	µg/L	0.8 U / U	0.16 U / U	0.16 U / U	0.16 UF1* / U	0.16 U / U	0.16 U / U	
Methylene chloride	N	SW8260B	µg/L	4.7 U / UJ	0.94 U / U	0.94 U / U	0.94 UF1* / U	0.94 U / U	0.94 U / U	
Tetrachloroethene	N	SW8260B	µg/L	1 U / U	0.2 U / U	0.2 U / U	0.2 UF1* / U	0.2 U / U	0.2 U / U	
Toluene	N	SW8260B	µg/L	0.85 U / U	0.17 U / U	0.17 U / U	0.17 UF1* / U	0.17 U / U	0.17 U / U	
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.75 U / U	0.15 U / U	0.15 U / U	0.15 UF1* / U	0.15 U / U	0.15 U / U	
Trichloroethene	N	SW8260B	µg/L	150	23	0.16 U / U	0.6 JF1* / J	0.16 U / U	0.16 U / U	
Trichlorofluoromethane	N	SW8260B	µg/L	1.5 U / UJ	0.29 U / U	0.29 U / U	0.29 UF1* / U	0.29 U / U	0.29 U / U	
Vinyl chloride	N	SW8260B	µg/L	0.5 U / U	0.1 U / U	0.1 U / U	0.1 UF1* / U	0.1 U / U	0.1 U / U	
Xylenes, Total	N	SW8260B	µg/L	0.95 U / U	0.19 U / U	0.19 U / U	0.19 UF1* / U	0.19 U / U	0.19 U / U	

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---- - Not analyzed
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TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	RD-21	RD-23	RD-29	RD-30	RD-33A	RD-33B
				Sample Name	RD-21_021919_01_L-02192019	RD-23_021819_01_L-02182019	RD-29_022719_01_L-02272019	RD-30_022619_01_L-02262019	RD-33A_022719_01_L-02272019	RD-33B_022019_01_L-02202019
				Sample Date	2/19/2019	2/18/2019	2/27/2019	2/26/2019	2/27/2019	2/20/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L		0.16 U / U	1.6 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L		0.18 U / U	1.8 U / U	0.18 U / U	0.18 U / U	0.18 U / U	0.18 U / UJ
1,1,2-Trichloroethane	N	SW8260B	µg/L		0.27 U / U	2.7 U / U	0.27 U / U	0.27 U / U	0.27 U / U	0.27 U / U
1,1-Dichloroethane	N	SW8260B	µg/L		0.22 U / U	2.2 U / U	0.22 U / U	0.22 U / U	0.36 J / J	0.22 U / U
1,1-Dichloroethene	N	SW8260B	µg/L		0.23 U / U	8 J / J	0.23 U / U	0.23 U / U	0.53 J / J	0.23 U / U
1,2-Dichloroethane	N	SW8260B	µg/L		0.13 U / U	1.3 U / U	0.13 U / U	0.13 U / U	0.13 U / U	0.13 U / U
1,4-Dioxane	N	SW8260B	µg/L		----	----	----	----	2.3 J	----
2-Butanone (MEK)	N	SW8260B	µg/L		2 U / U	20 U / U	2 U / UJ	2 U / UJ	2 U / UJ	2 U / U
Acetone	N	SW8260B	µg/L		1.9 U / UJ	19 U / U	1.9 U / U	1.9 U / U	1.9 U / U	1.9 U / UJ
Benzene	N	SW8260B	µg/L		0.16 U / U	1.6 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
Carbon tetrachloride	N	SW8260B	µg/L		5.6	1.9 U / UJ	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / U
Chloroform	N	SW8260B	µg/L		2.5	1.6 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
cis-1,2-Dichloroethene	N	SW8260B	µg/L		0.77 J / J	8.2 J / J	0.25 J / J	0.19 J / J	1.9	0.15 U / U
Ethylbenzene	N	SW8260B	µg/L		0.16 U / U	1.6 U / U	0.16 U / U	0.16 U / U	0.16 U / U	0.16 U / U
Methylene chloride	N	SW8260B	µg/L		0.94 U / U	9.4 U / UJ	0.94 U / U	0.94 U / U	0.94 U / U	0.94 U / U
Tetrachloroethene	N	SW8260B	µg/L		0.2 U / U	2 U / U	0.2 U / U	0.2 U / U	0.2 U / U	0.2 U / U
Toluene	N	SW8260B	µg/L		0.17 U / U	1.7 U / U	0.17 U / U	0.17 U / U	0.17 U / U	0.17 U / U
trans-1,2-Dichloroethene	N	SW8260B	µg/L		0.15 U / U	1.5 U / U	0.15 U / U	0.15 U / U	3.1	0.15 U / U
Trichloroethene	N	SW8260B	µg/L		38	300	2.5	2.2	0.76 J / J	0.16 U / U
Trichlorofluoromethane	N	SW8260B	µg/L		0.29 U / U	2.9 U / UJ	0.29 U / U	0.29 U / U	0.29 U / U	0.29 U / U
Vinyl chloride	N	SW8260B	µg/L		0.1 U / U	1 U / U	0.1 U* / U	0.1 U* / U	0.1 U* / U	0.1 U / U
Xylenes, Total	N	SW8260B	µg/L		0.19 U / U	1.9 U / U	0.19 U / U	0.19 U / U	0.19 U / U	0.19 U / U

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
---- - Not analyzed
N - Normal Field Sample
TA-DEN - Test America Denver, Colorado
LAB / VALIDATION QUALIFIERS
B - Compound was found in the blank and sample.
* - LCS or LCSD is outside acceptance limits.
F1 - MS and/or MSD Recovery is outside acceptance limits.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	RD-33C	RD-34A	RD-34C	RD-54A	RD-59A	RD-59B
				Sample Name	RD-33C_022719_01_L-02272019	RD-34A_030619_01_L-03062019	RD-34C_030619_01_L-03062019	RD-54A_030119_01_L-03012019	RD-59A_022719_01_L-02272019	RD-59B_022719_01_L-02272019
				Sample Date	2/27/2019	3/6/2019	3/6/2019	3/1/2019	2/27/2019	2/27/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.16 U / U	0.16 U* / UJ	0.16 U* / UJ	0.16 U* / U	0.16 U / U	0.16 U / U	
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	0.18 U / U	0.18 U* / UJ	0.18 U* / UJ	0.18 U* / U	0.18 U / U	0.18 U / U	
1,1,2-Trichloroethane	N	SW8260B	µg/L	0.27 U / U	0.27 U* / UJ	0.27 U* / UJ	0.27 U* / U	0.27 U / U	0.27 U / U	
1,1-Dichloroethane	N	SW8260B	µg/L	0.22 U / U	0.22 U* / UJ	0.22 U* / UJ	0.22 U* / U	0.22 U / U	0.22 U / U	
1,1-Dichloroethene	N	SW8260B	µg/L	0.23 U / U	0.23 U* / UJ	0.23 U* / UJ	0.27 J* / J	0.23 U / U	0.23 U / U	
1,2-Dichloroethane	N	SW8260B	µg/L	0.13 U / U	0.13 U* / UJ	0.13 U* / UJ	0.23 JB* / U	0.13 U / U	0.13 U / U	
1,4-Dioxane	N	SW8260B	µg/L	----	0.66 U / UJ	0.66 U / UJ	----	----	----	
2-Butanone (MEK)	N	SW8260B	µg/L	2 U / UJ	2 U* / UJ	2 U* / UJ	2 U* / U	2 U / UJ	2 U / UJ	
Acetone	N	SW8260B	µg/L	4.3 J / J	1.9 U* / UJ	1.9 U* / UJ	1.9 U* / U	1.9 U / U	1.9 U / U	
Benzene	N	SW8260B	µg/L	0.16 U / U	0.16 U* / UJ	0.16 U* / UJ	0.16 U* / U	0.16 U / U	0.16 U / U	
Carbon tetrachloride	N	SW8260B	µg/L	0.19 U / U	0.19 U* / UJ	0.19 U* / UJ	0.19 U* / U	0.19 U / U	0.19 U / U	
Chloroform	N	SW8260B	µg/L	0.16 U / U	0.16 U* / UJ	0.16 U* / UJ	0.16 U* / U	0.16 U / U	0.16 U / U	
cis-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	1.2 * / J	0.15 U* / UJ	2.4 *	0.15 U / U	0.15 U / U	
Ethylbenzene	N	SW8260B	µg/L	0.16 U / U	0.16 U* / UJ	0.16 U* / UJ	0.16 U* / U	0.16 U / U	0.16 U / U	
Methylene chloride	N	SW8260B	µg/L	0.94 U / U	0.94 U* / UJ	0.94 U* / UJ	0.94 U* / U	0.94 U / U	0.94 U / U	
Tetrachloroethene	N	SW8260B	µg/L	0.2 U / U	0.2 U* / UJ	0.2 U* / UJ	0.2 U* / U	0.2 U / U	0.2 U / U	
Toluene	N	SW8260B	µg/L	0.17 U / U	0.17 U* / UJ	0.17 U* / UJ	0.17 U* / U	0.17 U / U	0.17 U / U	
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.77 J* / J	0.15 U* / UJ	0.15 U* / U	0.15 U / U	0.15 U / U	
Trichloroethene	N	SW8260B	µg/L	0.16 U / U	0.7 J* / J	0.16 U* / UJ	9.4 *	0.16 U / U	0.16 U / U	
Trichlorofluoromethane	N	SW8260B	µg/L	0.29 U / U	0.29 U* / UJ	0.29 U* / UJ	0.29 U* / U	0.29 U / U	0.29 U / U	
Vinyl chloride	N	SW8260B	µg/L	0.1 U* / U	0.1 U* / UJ	0.1 U* / UJ	0.1 U* / U	0.1 U* / U	0.1 U*F1 / U	
Xylenes, Total	N	SW8260B	µg/L	0.19 U / U	0.19 U* / UJ	0.19 U* / UJ	0.19 U* / U	0.19 U / U	0.19 U / U	

NOTES AND ABBREVIATIONS
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U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	RD-59C	RD-63	RD-64	RD-65	RD-90	RD-96
				Sample Name	RD-59C_022719_01_L-02272019	RD-63_022019_01_L-02202019	RD-64_021919_01_L-02192019	RD-65_022819_01_L-02282019	RD-90_022119_01_L-02212019	RD-96_022019_01_L-02202019
				Sample Date	2/27/2019	2/20/2019	2/19/2019	2/28/2019	2/21/2019	2/20/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N	N	N
Analyte	Fraction	Method	Units							
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	0.16 U / U	
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	0.18 U / U	0.18 U / UJ	0.18 U / UJ	0.18 U / U	0.18 U / UJ	0.18 U / UJ	
1,1,2-Trichloroethane	N	SW8260B	µg/L	0.27 U / U	0.27 U / U	0.27 U / UJ	0.27 U / U	0.27 U / U	0.27 U / U	
1,1-Dichloroethane	N	SW8260B	µg/L	0.22 U / U	0.5 J / J	0.22 U / UJ	2.1	0.7 J / J	0.22 U / U	
1,1-Dichloroethene	N	SW8260B	µg/L	0.23 U / U	0.52 J / J	0.23 U / UJ	6.3	4.1	0.23 U / U	
1,2-Dichloroethane	N	SW8260B	µg/L	0.13 U / U	0.13 U / U	0.13 U / UJ	0.13 U / U	0.13 U / U	0.13 U / U	
1,4-Dioxane	N	SW8260B	µg/L	----	1.3 J / J	----	0.89 J / J	----	----	
2-Butanone (MEK)	N	SW8260B	µg/L	2 U / UJ	2 U / U	2 U / UJ	2 U / U	2 U / U	2 U / U	
Acetone	N	SW8260B	µg/L	1.9 U / U	1.9 U / UJ	1.9 U / UJ	1.9 U / U	1.9 U / UJ	1.9 U / UJ	
Benzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	0.16 U / U	
Carbon tetrachloride	N	SW8260B	µg/L	0.19 U / U	0.19 U / U	0.19 U / UJ	0.19 U / U	0.19 U / U	0.19 U / U	
Chloroform	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	0.16 U / U	
cis-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	3.8	1.7 J	8.8	0.15 U / U	0.15 U / U	
Ethylbenzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / UJ	0.16 U / U	0.16 U / U	0.16 U / U	
Methylene chloride	N	SW8260B	µg/L	0.94 U / U	0.94 U / U	0.94 U / UJ	0.94 U / U	0.94 U / U	0.94 U / U	
Tetrachloroethene	N	SW8260B	µg/L	0.2 U / U	0.2 U / U	0.2 U / UJ	0.2 U / U	0.2 U / U	0.2 U / U	
Toluene	N	SW8260B	µg/L	0.17 U / U	0.17 U / U	0.17 U / UJ	0.17 U / U	0.17 U / U	0.17 U / U	
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.3 J / J	0.31 J / UJ	18	0.15 U / U	0.15 U / U	
Trichloroethene	N	SW8260B	µg/L	0.16 U / U	4	6.8 J	16	0.16 U / U	0.16 U / U	
Trichlorofluoromethane	N	SW8260B	µg/L	0.29 U / U	0.29 U / U	0.29 U / UJ	0.29 U / U	0.29 U / U	0.29 U / U	
Vinyl chloride	N	SW8260B	µg/L	0.1 U* / U	0.1 U / U	0.1 U / UJ	0.1 U / U	0.1 U / U	0.1 U / U	
Xylenes, Total	N	SW8260B	µg/L	0.19 U / U	0.19 U / U	0.19 U / UJ	0.19 U / U	0.19 U / U	0.19 U / U	

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
---- - Not analyzed
N - Normal Field Sample
TA-DEN - Test America Denver, Colorado
LAB / VALIDATION QUALIFIERS
B - Compound was found in the blank and sample.
* - LCS or LCSD is outside acceptance limits.
F1 - MS and/or MSD Recovery is outside acceptance limits.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

				Well Identifier	RD-98	RS-18	RS-28	RS-54
				Sample Name	RD-98_022619_01_L-02262019	RS-18_022519_01_L-02252019	RS-28_022619_01_L-02262019	RS-54_022119_01_L-02212019
				Sample Date	2/26/2019	2/25/2019	2/26/2019	2/21/2019
				Lab Name	TA-DEN	TA-DEN	TA-DEN	TA-DEN
				Sample Type	N	N	N	N
Analyte	Fraction	Method	Units					
1,1,1-Trichloroethane	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	----
1,1,2-Trichloro-1,2,2-trifluoroethane	N	SW8260B	µg/L	0.18 U / U	0.18 U / U	0.18 U / U	----
1,1,2-Trichloroethane	N	SW8260B	µg/L	0.27 U / U	0.27 U / U	0.27 U / U	----
1,1-Dichloroethane	N	SW8260B	µg/L	0.22 U / U	0.22 U / U	0.22 U / U	----
1,1-Dichloroethene	N	SW8260B	µg/L	0.23 U / U	0.23 U / U	0.23 U / U	----
1,2-Dichloroethane	N	SW8260B	µg/L	0.13 U / U	0.13 U / UJ	0.13 U / U	----
1,4-Dioxane	N	SW8260B	µg/L	----	----	----	34 J
2-Butanone (MEK)	N	SW8260B	µg/L	2 U / UJ	2 U / U	2 U / UJ	----
Acetone	N	SW8260B	µg/L	1.9 U / U	1.9 U / U	1.9 U / U	----
Benzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	----
Carbon tetrachloride	N	SW8260B	µg/L	0.19 U / U	0.19 U / UJ	0.19 U / U	----
Chloroform	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	----
cis-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.15 U / U	0.15 U / U	----
Ethylbenzene	N	SW8260B	µg/L	0.16 U / U	0.16 U / U	0.16 U / U	----
Methylene chloride	N	SW8260B	µg/L	0.94 U / U	0.94 U / U	0.94 U / U	----
Tetrachloroethene	N	SW8260B	µg/L	0.2 U / U	0.2 U / U	0.2 U / U	----
Toluene	N	SW8260B	µg/L	0.17 U / U	0.17 U / U	0.17 U / U	----
trans-1,2-Dichloroethene	N	SW8260B	µg/L	0.15 U / U	0.15 U / U	0.15 U / U	----
Trichloroethene	N	SW8260B	µg/L	0.42 J / J	0.44 J / J	1.7	----
Trichlorofluoromethane	N	SW8260B	µg/L	0.29 U / U	0.29 U / U	0.29 U / U	----
Vinyl chloride	N	SW8260B	µg/L	0.1 U* / U	0.1 U / U	0.1 U* / U	----
Xylenes, Total	N	SW8260B	µg/L	0.19 U / U	0.19 U / U	0.19 U / U	----

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
---- - Not analyzed
N - Normal Field Sample
TA-DEN - Test America Denver, Colorado
LAB / VALIDATION QUALIFIERS
B - Compound was found in the blank and sample.
* - LCS or LCSD is outside acceptance limits.
F1 - MS and/or MSD Recovery is outside acceptance limits.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

TABLE 11
PERCHLORATE ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DD-139	DD-141	PZ-098	RD-21	RD-33A
			Sample Name	DD-139_022119_01_L-02212019	DD-141_022619_01_L-02262019	PZ-098_022519_01_L-02252019	RD-21_021919_01_L-02192019	RD-33A_022719_01_L-02272019
			Sample Date	2/21/2019	2/26/2019	2/25/2019	2/19/2019	2/27/2019
			Lab Name	TA DEN	TA DEN	TA DEN	TA DEN	TA DEN
			Sample Type	N	N	N	N	N
Analyte	Fraction	Method	Units					
Perchlorate	N	SW6860	µg/L	0.12	0.075	0.74	2.1	0.0052 J / J

			Well Identifier	RD-33B	RD-33C	RD-54A	RD-59A	RD-59B
			Sample Name	RD-33B_022019_01_L-02202019	RD-33C_022719_01_L-02272019	RD-54A_030119_01_L-03012019	RD-59A_022719_01_L-02272019	RD-59B_022719_01_L-02272019
			Sample Date	2/20/2019	2/27/2019	3/1/2019	2/27/2019	2/27/2019
			Lab Name	TA DEN	TA DEN	TA DEN	TA DEN	TA DEN
			Sample Type	FD	N	N	N	N
Analyte	Fraction	Method	Units					
Perchlorate	N	SW6860	µg/L	0.0062 J / J	0.0072 J / J	0.004 U / U	0.038 J / J	0.004 U / U

			Well Identifier	RD-59C	RD-96	RS-18
			Sample Name	RD-59C_022719_01_L-02272019	RD-96_030119_01_L-03012019	RS-18_022519_01_L-02252019
			Sample Date	2/27/2019	3/1/2019	2/25/2019
			Lab Name	TA DEN	TA DEN	TA-DEN
			Sample Type	N	N	N
Analyte	Fraction	Method	Units			
Perchlorate	N	SW6860	µg/L	0.0041 J / J	0.018 J / J	2.4

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
N - Normal Sample
FD - Field Duplicate Sample
TA DEN - Test America Denver, Colorado

LAB / VALIDATION FLAGS

* - RPD of the LCS and LCSD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 12
FUEL HYDROCARBONS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	C-08	DD-141	DD-145	PZ-103	PZ-105
			Sample Name	C-08_021819_01_L-02182019	DD-141_022619_01_L-02262019	DD-145_021819_01_L-02182019	PZ-103_022519_01_L-02252019	PZ-105_021819_01_L-02182019
			Sample Date	2/18/2019	2/26/2019	2/18/2019	2/25/2019	2/18/2019
			Lab Name	TA DEN	TA DEN	TA DEN	TA DEN	TA DEN
			Sample Type	N	N	N	N	N
Analyte	Fraction	Method	Units					
Diesel Range Organics (DRO) [C10-C28]	N	SW8015DRO	µg/L	31 U / U	31 U / U	31 U / U	230 J / J	85 J / J
Gasoline Range Organics (GRO) [C6-C10[	N	SW8015GRO	µg/L	10 U / U	10 U / U	10 U / U	10 J / J	10 U / U

			Well Identifier	RD-14	RD-19	RD-23	RD-33A	RD-33C
			Sample Name	RD-14_030519_01_L-03052019	RD-19_030519_01_L-03052019	RD-23_021819_01_L-02182019	RD-33A_022719_01_L-02272019	RD-33C_022719_01_L-02272019
			Sample Date	3/5/2019	3/5/2019	2/18/2019	2/27/2019	2/27/2019
			Lab Name	TA DEN	TA DEN	TA DEN	TA DEN	TA DEN
			Sample Type	N	N	N	N	N
Analyte	Fraction	Method	Units					
Diesel Range Organics (DRO) [C10-C28]	N	SW8015DRO	µg/L	31 U / UJ	31 U / UJ	31 U / U	31 U / UJ	31 U / UJ
Gasoline Range Organics (GRO) [C6-C10[	N	SW8015GRO	µg/L	10 U / U	10 U / U	10 U / U	10 U / U	10 J / J

TABLE 12
FUEL HYDROCARBONS ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-54A	RD-63	RD-96
			Sample Name	RD-54A_030119_01_L-03012019	RD-63_022019_01_L-02202019	RD-96_022019_01_L-02202019
			Sample Date	3/1/2019	2/20/2019	2/20/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	Fraction	Method	Units			
Diesel Range Organics (DRO) [C10-C28]	N	SW8015DRO	µg/L	31 U / U	31 U / U	31 U / U
Gasoline Range Organics (GRO) [C6-C10[	N	SW8015GRO	µg/L	10 U / U	10 U / U	10 U / U

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
N - Normal Field Sample
TA DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 13
INORGANIC ANALYTES ANALYTICAL RESULTS, Q1 2019 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DD-145	PZ-005	PZ-103	PZ-105
			Sample Name	DD-145_021819_01_L-02182019	PZ-005_022519_01_L-02252019	PZ-103_022519_01_L-02252019	PZ-105_021819_01_L-02182019
			Sample Date	2/18/2019	2/25/2019	2/25/2019	2/18/2019
			Lab Name	TA DEN	TA DEN	TA DEN	TA DEN
			Sample Type	N	N	N	N
Analyte	Fraction	Method	Units				
Fluoride	T	E300.0	mg/L	----	----	----	----
Nitrate as N	T	E300.0	mg/L	3.1 J+	13	12	4 J+

			Well Identifier	RD-19	RD-20	RD-34A	RD-34C
			Sample Name	RD-19_030519_01_L-03052019	RD-20_021919_01_L-02192019	RD-34A_030619_01_L-03062019	RD-34C_030619_01_L-03062019
			Sample Date	3/5/2019	2/19/2019	3/6/2019	3/6/2019
			Lab Name	TA DEN	TA DEN	TA DEN	TA DEN
			Sample Type	N	N	N	N
Analyte	Fraction	Method	Units				
Fluoride	T	E300.0	mg/L	0.39 J / J	----	0.41 J / J	0.42 J / J
Nitrate as N	T	E300.0	mg/L	----	11	----	----

			Well Identifier	RD-59A	RD-59B	RD-59C
			Sample Name	RD-59A_022719_01_L-02272019	RD-59B_022719_01_L-02272019	RD-59C_022719_01_L-02272019
			Sample Date	2/27/2019	2/27/2019	2/27/2019
			Lab Name	TA DEN	TA DEN	TA DEN
			Sample Type	N	N	N
Analyte	Fraction	Method	Units			
Fluoride	T	E300.0	mg/L	0.67	0.77	0.71
Nitrate as N	T	E300.0	mg/L	----	----	----

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
mg/L - milligrams per liter
---- - Not analyzed
N - Normal Sample
TA DEN - Test America Denver, Colorado

LAB / VALIDATION FLAGS
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
J+ - Result is an estimated quantity, biased high. Associated numerical value is approximate concentration of analyte in sample.

			Well Identifier	DD-141	DD-143	DS-44
			Sample Name	DD-141_022619_01_L-02262019	DD-143_030119_01_L-03012019	DS-44_022219_01_L-02222019
			Sample Date	2/26/2019	3/1/2019	2/22/2019
			Lab Name	TA-STL	TA-STL	TA-STL
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	-50.1 U / U	41.7 U / U	8.37 U / U
Actinium-228	D	E901.1	pCi/L	11.9 U / U	9.68 U / U	47.8
Americium-241	T	E901.1	pCi/L	-14.4 U / U	2.26 U / U	9.88 U / U
Americium-241	D	E901.1	pCi/L	7.25 U / U	6.22 U / U	-7.76 U / U
Antimony-125	T	E901.1	pCi/L	9.59 U / U	18 U / U	7.59 U / U
Antimony-125	D	E901.1	pCi/L	2.85 U / U	9.04 U / U	-0.619 U / U
Barium-133	T	E901.1	pCi/L	3.43 U / U	-0.542 U / U	-2.1 U / U
Barium-133	D	E901.1	pCi/L	-5.22 U / U	1.28 U / U	11.7 U / U
Cesium-134	T	E901.1	pCi/L	-0.483 U / U	8.68 U / U	4.66 U / U
Cesium-134	D	E901.1	pCi/L	-2.65 U / U	6.52 U / U	11.4 U / U
Cesium-137	T	E901.1	pCi/L	-6.91 U / U	1.44 U / U	-3.71 UG / U
Cesium-137	D	E901.1	pCi/L	-2.59 U / U	-1.59 U / U	-3.39 U / U
Cobalt-57	T	E901.1	pCi/L	-2.03 U / U	-3.29 U / U	-2.56 U / U
Cobalt-57	D	E901.1	pCi/L	-0.496 U / U	2.93 U / U	-2.83 U / U
Cobalt-60	T	E901.1	pCi/L	2.34 U / U	0.715 U / U	-4.67 U / U
Cobalt-60	D	E901.1	pCi/L	4.24 U / U	-0.1 U / U	-0.677 U / U
Europium-152	T	E901.1	pCi/L	16.2 U / U	5.22 U / U	24.6 U / U
Europium-152	D	E901.1	pCi/L	16.2 U / U	-5.19 U / U	-15.4 U / U
Europium-154	T	E901.1	pCi/L	0 U / U	20.4 U / U	9.32 U / U
Europium-154	D	E901.1	pCi/L	-56.6 U / U	15.4 U / U	16.3 U / U
Europium-155	T	E901.1	pCi/L	-1.82 U / U	-13.8 U / U	-6.29 U / U
Europium-155	D	E901.1	pCi/L	3.12 U / U	6.66 U / U	3.83 U / U
Gross Alpha	T	E900	pCi/L	4.17 G	10.6 G	6.12 G
Gross Alpha	D	E900	pCi/L	13.4 G	6.14 UG / U	8.99 G
Gross Beta	T	E900	pCi/L	3.43	9.52 F	2.14 U / U
Gross Beta	D	E900	pCi/L	7.76	3.84	7.24
Manganese-54	T	E901.1	pCi/L	4.65 U / U	-6.9 U / U	4.42 U / U
Manganese-54	D	E901.1	pCi/L	-5.65 U / U	-0.343 U / U	-9.03 U / U
Potassium-40	T	E901.1	pCi/L	-100 U / U	-163 U / U	21.5 U / U
Potassium-40	D	E901.1	pCi/L	6.55 U / U	-55.8 U / U	-21.5 U / U
Radium-228	T	E904	pCi/L	2.58	2.99	0.231 U / U
Radium-228	D	E904	pCi/L	2.1	3.81	0.423
Sodium-22	T	E901.1	pCi/L	4.5 U / U	-4.4 U / U	7.38 U / U
Sodium-22	D	E901.1	pCi/L	4.13 U / U	-1.48 U / U	-2.36 U / U
Strontium-90	T	E905	pCi/L	0.0294 U / U	0.0436 U / U	-0.0941 U / U
Strontium-90	D	E905	pCi/L	0.33	0.037 U / U	0.0955 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	1.97	2.7	2.66
Uranium-233/234	D	A-01-R	pCi/L	1.85	2.69	2.82
Uranium-235/236	T	A-01-R	pCi/L	0.0559 U / U	0.101 U / U	0.14
Uranium-235/236	D	A-01-R	pCi/L	0.0352 U / U	0.0566 U / U	0.114
Uranium-238	T	A-01-R	pCi/L	1.15	1.82	2.95
Uranium-238	D	A-01-R	pCi/L	1.35	2.1	2.7

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

pCi/L - picocuries per liter

---- - Not analyzed

N - Normal Field Sample

T - Total (Fraction)

D - Dissolved (Fraction)

TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

		Well Identifier		DS-47	PZ-120	PZ-162
		Sample Name		DS-47_022219_01_L-02222019	PZ-120_030419_01_L-03042019	PZ-162-022619_01_L-02262019
		Sample Date		2/22/2019	3/4/2019	2/26/2019
		Lab Name		TA-STL	TA-STL	TA-STL
		Sample Type		N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	24.6 U / U	-12.8 U / U	74.9
Actinium-228	D	E901.1	pCi/L	11.2 U / U	17.7 U / U	21.9 U / U
Americium-241	T	E901.1	pCi/L	3.65 U / U	5.45 U / U	15.4 U / U
Americium-241	D	E901.1	pCi/L	8.21 U / U	8.25 U / U	-10.1 U / U
Antimony-125	T	E901.1	pCi/L	10.9 U / U	10.8 U / U	-3.97 U / U
Antimony-125	D	E901.1	pCi/L	5.19 U / U	2.11 U / U	-9.15 U / U
Barium-133	T	E901.1	pCi/L	-1.18 U / U	4.54 U / U	-0.000165 U / U
Barium-133	D	E901.1	pCi/L	-4.85 U / U	0.881 U / U	-2.99 U / U
Cesium-134	T	E901.1	pCi/L	8.62 U / U	5.06 U / U	-3.83 U / U
Cesium-134	D	E901.1	pCi/L	0 U / U	6.01 U / U	-1.86 U / U
Cesium-137	T	E901.1	pCi/L	-4.33 U / U	-5.29 U / U	0 UG / U
Cesium-137	D	E901.1	pCi/L	-0.907 U / U	5.58 U / U	-3.99 U / U
Cobalt-57	T	E901.1	pCi/L	-1.89 U / U	-0.339 U / U	6.46 U / U
Cobalt-57	D	E901.1	pCi/L	2.77 U / U	-0.644 U / U	0.621 U / U
Cobalt-60	T	E901.1	pCi/L	2.89 U / U	1.68 U / U	8.48 U / U
Cobalt-60	D	E901.1	pCi/L	-7.78 U / U	-4.67 U / U	1.65 U / U
Europium-152	T	E901.1	pCi/L	-18.9 U / U	12.4 U / U	17.9 U / U
Europium-152	D	E901.1	pCi/L	12 U / U	4.92 U / U	11.7 U / U
Europium-154	T	E901.1	pCi/L	-52.4 U / U	-42.5 U / U	20.5 U / U
Europium-154	D	E901.1	pCi/L	-32.7 U / U	14.8 U / U	-42.5 U / U
Europium-155	T	E901.1	pCi/L	-8.11 U / U	-13.6 U / U	-18.6 U / U
Europium-155	D	E901.1	pCi/L	-2.68 U / U	9.72 U / U	-8.5 U / U
Gross Alpha	T	E900	pCi/L	6.25 G	5.92 G	16 G
Gross Alpha	D	E900	pCi/L	3.9	17.3 G	10.8 G
Gross Beta	T	E900	pCi/L	7.92	7.65 F	17.9 G
Gross Beta	D	E900	pCi/L	4.51	11.4	6.24
Manganese-54	T	E901.1	pCi/L	5.09 U / U	4.02 U / U	7.47 U / U
Manganese-54	D	E901.1	pCi/L	-3.82 U / U	-6.4 U / U	-2.67 U / U
Potassium-40	T	E901.1	pCi/L	22.1 U / U	40.6 U / U	68.6 U / U
Potassium-40	D	E901.1	pCi/L	-53.1 U / U	-43.3 U / U	-35.9 U / U
Radium-228	T	E904	pCi/L	0.63	-0.121 U / U	0.0828 U / U
Radium-228	D	E904	pCi/L	0.42	0.135 U / U	0.428
Sodium-22	T	E901.1	pCi/L	-2.31 U / U	0.703 U / U	-5.57 U / U
Sodium-22	D	E901.1	pCi/L	1.64 U / U	-4.13 U / U	4.22 U / U
Strontium-90	T	E905	pCi/L	0.00991 U / U	0.101 U / U	0.587
Strontium-90	D	E905	pCi/L	0.0429 U / U	-0.0615 U / U	-0.127 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	2.31	2.7	5.49
Uranium-233/234	D	A-01-R	pCi/L	2.19	2.56	4.51
Uranium-235/236	T	A-01-R	pCi/L	0.0807 U / U	0.0839 U / U	0.244
Uranium-235/236	D	A-01-R	pCi/L	0.0549 U / U	0.138	0.236
Uranium-238	T	A-01-R	pCi/L	1.67	2.28	4.27
Uranium-238	D	A-01-R	pCi/L	1.86	2.34	5

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

pCi/L - picocuries per liter

---- - Not analyzed

N - Normal Field Sample

T - Total (Fraction)

D - Dissolved (Fraction)

TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

			Well Identifier	RD-07	RD-14	RD-17
			Sample Name	RD-07_030419_01_L-03042019	RD-14_030519_01_L-03052019	RD-17_030119_01_L-03012019
			Sample Date	3/4/2019	3/5/2019	3/1/2019
			Lab Name	TA-STL	TA-STL	TA-STL
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	35.1	6.5 U / U	16.5 U / U
Actinium-228	D	E901.1	pCi/L	23.8 U / U	29.8 U / U	33.5 U / U
Americium-241	T	E901.1	pCi/L	7.96 U / U	4.74 U / U	-8.46 U / U
Americium-241	D	E901.1	pCi/L	-3.88 U / U	9.57 U / U	-5.99 U / U
Antimony-125	T	E901.1	pCi/L	13.6 U / U	8.97 U / U	6.73 U / U
Antimony-125	D	E901.1	pCi/L	21.4 U / U	28.9 U / U	17.2 U / U
Barium-133	T	E901.1	pCi/L	-6.62 U / U	-8.28 U / U	2.21 U / U
Barium-133	D	E901.1	pCi/L	4.63 U / U	10.4 U / U	3.62 U / U
Cesium-134	T	E901.1	pCi/L	3.26 U / U	4.86 U / U	-4.17 U / U
Cesium-134	D	E901.1	pCi/L	3.88 U / U	-1.05 U / U	-1.73 U / U
Cesium-137	T	E901.1	pCi/L	9.48 U / U	-6.69 UG / U	-4.99 U / U
Cesium-137	D	E901.1	pCi/L	-0.319 U / U	-1.07 U / U	-3.27 U / U
Cobalt-57	T	E901.1	pCi/L	1.98 U / U	-1.21 U / U	-2.98 U / U
Cobalt-57	D	E901.1	pCi/L	1.75 U / U	0.738 U / U	-0.347 U / U
Cobalt-60	T	E901.1	pCi/L	-1.44 U / U	-9.32 U / U	0.941 U / U
Cobalt-60	D	E901.1	pCi/L	3 U / U	-6.56 U / U	2.09 U / U
Europium-152	T	E901.1	pCi/L	11.9 U / U	9.7 U / U	-2.69 U / U
Europium-152	D	E901.1	pCi/L	-5.38 U / U	6.63 U / U	23.2 U / U
Europium-154	T	E901.1	pCi/L	19.8 U / U	0 U / U	18.5 U / U
Europium-154	D	E901.1	pCi/L	10.2 U / U	16.3 U / U	30.7 U / U
Europium-155	T	E901.1	pCi/L	4.44 U / U	4.29 U / U	-11.6 U / U
Europium-155	D	E901.1	pCi/L	1.85 U / U	7.03 U / U	9.04 U / U
Gross Alpha	T	E900	pCi/L	9.67 G	2.07 UG / U	12 G
Gross Alpha	D	E900	pCi/L	5.15 UG / U	10.1 G	4.98 G
Gross Beta	T	E900	pCi/L	5.43 F	6.98 F	11.4 F
Gross Beta	D	E900	pCi/L	9.93	5.81	6.68
Manganese-54	T	E901.1	pCi/L	0.348 U / U	-2.34 U / U	5.16 U / U
Manganese-54	D	E901.1	pCi/L	4.21 U / U	3.97 U / U	-7.58 U / U
Potassium-40	T	E901.1	pCi/L	-37.6 U / U	-29.8 U / U	67.5 U / U
Potassium-40	D	E901.1	pCi/L	67.5 U / U	-80.3 U / U	79.3 U / U
Radium-228	T	E904	pCi/L	0.675	1.49	2.05
Radium-228	D	E904	pCi/L	0.443	1.01	1.63
Sodium-22	T	E901.1	pCi/L	6.33 U / U	11.1	-8.21 U / U
Sodium-22	D	E901.1	pCi/L	-3.73 U / U	-5.39 U / U	-12.3 U / U
Strontium-90	T	E905	pCi/L	0.012 U / U	0.204 U / U	0.131 U / U
Strontium-90	D	E905	pCi/L	-0.0249 U / U	-0.0659 U / U	0.0955 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	2.54	1.8	1.65
Uranium-233/234	D	A-01-R	pCi/L	3.31	2.02	1.97
Uranium-235/236	T	A-01-R	pCi/L	0.0953	0.0149 U / U	0.0864 / U
Uranium-235/236	D	A-01-R	pCi/L	0.163	0.121 U / U	0.0566 U / U
Uranium-238	T	A-01-R	pCi/L	2.25	1.53	1.27
Uranium-238	D	A-01-R	pCi/L	2.36	2.07	1.31

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

pCi/L - picocuries per liter

---- - Not analyzed

N - Normal Field Sample

T - Total (Fraction)

D - Dissolved (Fraction)

TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

			Well Identifier	RD-19	RD-20	RD-30
			Sample Name	RD-19_030519_01_L-03052019	RD-20_021919_01_L-02192019	RD-30_022619_01_L-02262019
			Sample Date	3/5/2019	2/19/2019	2/26/2019
			Lab Name	TA-STL	TA-STL	TA-STL
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	7.8 U / U	12.9 U / U	62.1
Actinium-228	D	E901.1	pCi/L	54.1	8.35 U / U	20.1 U / U
Americium-241	T	E901.1	pCi/L	-8.71 U / U	4.17 U / U	6.58 U / U
Americium-241	D	E901.1	pCi/L	3.47 U / U	1.95 U / U	11.2 U / U
Antimony-125	T	E901.1	pCi/L	-4.51 U / U	14.5 U / U	23.1 U / U
Antimony-125	D	E901.1	pCi/L	-5.7 U / U	17.7 U / U	-5.22 U / U
Barium-133	T	E901.1	pCi/L	-7.39 U / U	-5.34 U / U	-5.25 U / U
Barium-133	D	E901.1	pCi/L	-1.7 U / U	-1.32 U / U	-3.49 U / U
Cesium-134	T	E901.1	pCi/L	-2.65 U / U	10.4 U / U	-7.13 U / U
Cesium-134	D	E901.1	pCi/L	-2.28 U / U	1.4 U / U	-6.09 U / U
Cesium-137	T	E901.1	pCi/L	0.419 U / U	4.56 U / U	-9.53 U / U
Cesium-137	D	E901.1	pCi/L	-2.6 U / U	4.62 U / U	-1.23 U / U
Cobalt-57	T	E901.1	pCi/L	-3.64 U / U	1.94 U / U	4.07 U / U
Cobalt-57	D	E901.1	pCi/L	-1.24 U / U	3.29 U / U	3.56 U / U
Cobalt-60	T	E901.1	pCi/L	2.52 U / U	3.13 U / U	2.07 U / U
Cobalt-60	D	E901.1	pCi/L	-5.59 U / U	0.388 U / U	0.0546 U / U
Europium-152	T	E901.1	pCi/L	14.3 U / U	34.9	-2.55 U / U
Europium-152	D	E901.1	pCi/L	5.95 U / U	6.95 U / U	0.0713 U / U
Europium-154	T	E901.1	pCi/L	6.28 U / U	13.7 U / U	38.2 U / U
Europium-154	D	E901.1	pCi/L	3.88 U / U	-54.9 U / U	28.6 U / U
Europium-155	T	E901.1	pCi/L	10 U / U	3.77 U / U	9.61 U / U
Europium-155	D	E901.1	pCi/L	7.54 U / U	9.96 U / U	8.75 U / U
Gross Alpha	T	E900	pCi/L	43.7 G	7.39 UG / U	22.4 G
Gross Alpha	D	E900	pCi/L	103 G	8.46 G	14 G
Gross Beta	T	E900	pCi/L	22.5 FG	7.07	11.1
Gross Beta	D	E900	pCi/L	41.6 G	8.18	13
Manganese-54	T	E901.1	pCi/L	-6.13 U / U	-5.87 U / U	-10.5 U / U
Manganese-54	D	E901.1	pCi/L	-0.22 U / U	-0.22 U / U	-4.37 U / U
Potassium-40	T	E901.1	pCi/L	24 U / U	-44.2 U / U	-39.2 U / U
Potassium-40	D	E901.1	pCi/L	42 U / U	-60.1 U / U	159 U / U
Radium-228	T	E904	pCi/L	2.92	1.69	0.661
Radium-228	D	E904	pCi/L	3.9	1.59	0.709
Sodium-22	T	E901.1	pCi/L	-10.1 U / U	5.66	-0.629 U / U
Sodium-22	D	E901.1	pCi/L	-5.03 U / U	0.21 U / U	-0.234 U / U
Strontium-90	T	E905	pCi/L	0.148 U / U	0.298	0.197 U / U
Strontium-90	D	E905	pCi/L	0.274	0.0529 U / U	0.629
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	16	3.57	5.23
Uranium-233/234	D	A-01-R	pCi/L	17.9	3.53	5.04
Uranium-235/236	T	A-01-R	pCi/L	0.606	0.122	0.258
Uranium-235/236	D	A-01-R	pCi/L	0.82	0.306	0.297
Uranium-238	T	A-01-R	pCi/L	13.7	4.15	5.95
Uranium-238	D	A-01-R	pCi/L	15.1	3.83	5.75

NOTES AND ABBREVIATIONS

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TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

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J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

		Well Identifier		RD-33A	RD-33B	RD-33C
		Sample Name		RD-33A_022719_01_L-02272019	RD-33B_022019_01_L-02202019	RD-33C_022719_01_L-02272019
		Sample Date		2/27/2019	2/20/2019	2/27/2019
		Lab Name		TA-STL	TA-STL	TA-STL
		Sample Type		N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	8.79 U / U	1.31 U / U	-23.8 U / U
Actinium-228	D	E901.1	pCi/L	12.1 U / U	16.5 U / U	9.07 U / U
Americium-241	T	E901.1	pCi/L	-7.33 U / U	-7.16 U / U	3.7 U / U
Americium-241	D	E901.1	pCi/L	1.84 U / U	6.46 U / U	5.73 U / U
Antimony-125	T	E901.1	pCi/L	11 U / U	-14.9 U / U	20.2 U / U
Antimony-125	D	E901.1	pCi/L	9.56 U / U	3.97 U / U	10.3 U / U
Barium-133	T	E901.1	pCi/L	2.11 U / U	2.14 U / U	5.13 U / U
Barium-133	D	E901.1	pCi/L	2.78 U / U	0.317 U / U	4.13 U / U
Cesium-134	T	E901.1	pCi/L	9.23 U / U	4.05 U / U	8.24 U / U
Cesium-134	D	E901.1	pCi/L	5.3 U / U	7.48 U / U	1.34 U / U
Cesium-137	T	E901.1	pCi/L	-7.21 U / U	-4.15 U / U	0.665 U / U
Cesium-137	D	E901.1	pCi/L	-6.06 U / U	-5.13 U / U	-1.56 U / U
Cobalt-57	T	E901.1	pCi/L	0.763 U / U	2.32 U / U	3.35 U / U
Cobalt-57	D	E901.1	pCi/L	1.14 U / U	2.14 U / U	0 U / U
Cobalt-60	T	E901.1	pCi/L	-0.107 U / U	5.62 U / U	6.11 U / U
Cobalt-60	D	E901.1	pCi/L	-0.782 U / U	1.32 U / U	8.3 U / U
Europium-152	T	E901.1	pCi/L	16.9 U / U	-2.5 U / U	30.8 U / U
Europium-152	D	E901.1	pCi/L	15.9 U / U	10.3 U / U	1.08 U / U
Europium-154	T	E901.1	pCi/L	25.6 U / U	-4.81 U / U	-51.2 U / U
Europium-154	D	E901.1	pCi/L	15.8 U / U	15.2 U / U	16.3 U / U
Europium-155	T	E901.1	pCi/L	-2.1 U / U	-6.78 U / U	-12.1 U / U
Europium-155	D	E901.1	pCi/L	19.8 U / U	-12.2 U / U	-1.82 U / U
Gross Alpha	T	E900	pCi/L	5.09	0.562 U / U	0.898 U / U
Gross Alpha	D	E900	pCi/L	6.06	1.26 U / U	0.621 U / U
Gross Beta	T	E900	pCi/L	4.68 F	2.94	2.24 F
Gross Beta	D	E900	pCi/L	3.68	3.17	2.43
Manganese-54	T	E901.1	pCi/L	5.28 U / U	-1.44 U / U	5.98 U / U
Manganese-54	D	E901.1	pCi/L	1.03 U / U	-5.54 U / U	-0.773 U / U
Potassium-40	T	E901.1	pCi/L	24 U / U	-38.3 U / U	55.6 U / U
Potassium-40	D	E901.1	pCi/L	22.1 U / U	-58.8 U / U	-11.2 U / U
Radium-228	T	E904	pCi/L	0.96	0.941	0.224 U / U
Radium-228	D	E904	pCi/L	0.948	0.422 U / U	0.182 U / U
Sodium-22	T	E901.1	pCi/L	1.49 U / U	6.33	-4.85 U / U
Sodium-22	D	E901.1	pCi/L	3.35 U / U	-4.92 U / U	-3.52 U / U
Strontium-90	T	E905	pCi/L	0.05 U / U	0.399	0.0492 U / U
Strontium-90	D	E905	pCi/L	0.166 U / U	0.179 U / U	0.158 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	2.66	0.0791 U / U	0.118
Uranium-233/234	D	A-01-R	pCi/L	2.61	0.00898 U / U	0.0532 U / U
Uranium-235/236	T	A-01-R	pCi/L	0.0871U	0.0164 U / U	0.0157 U / U
Uranium-235/236	D	A-01-R	pCi/L	0.102 U / U	0.0614 U / U	0.0331 U / U
Uranium-238	T	A-01-R	pCi/L	1.75	0 U / U	0.0379 U / U
Uranium-238	D	A-01-R	pCi/L	1.79	0.0538 U	0.0455 U

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LAB / VALIDATION QUALIFIERS

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			Well Identifier	RD-34A	RD-34C	RD-54A
			Sample Name	RD-34A_030619_01_L-03062019	RD-34C_030619_01_L-03062019	RD-54A_030119_01_L-03012019
			Sample Date	3/6/2019	3/6/2019	3/1/2019
			Lab Name	TA-STL	TA-STL	TA-STL
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	7.95 U / U	16.4 U / U	18.2 U / U
Actinium-228	D	E901.1	pCi/L	-25.6 U / U	-53.8 U / U	0.754 U / U
Americium-241	T	E901.1	pCi/L	6.46 U / U	1.28 U / U	2.76 U / U
Americium-241	D	E901.1	pCi/L	-9.67 U / U	-4.58 U / U	3.37 U / U
Antimony-125	T	E901.1	pCi/L	-2.21 U / U	19.7 U / U	9.44 U / U
Antimony-125	D	E901.1	pCi/L	-3.02 U / U	10.3 U / U	6.98 U / U
Barium-133	T	E901.1	pCi/L	3.66 U / U	7.72 U / U	6.04 U / U
Barium-133	D	E901.1	pCi/L	0.917 U / U	5.92 U / U	3 U / U
Cesium-134	T	E901.1	pCi/L	-4.97 U / U	-2.97 U / U	-0.102 U / U
Cesium-134	D	E901.1	pCi/L	2.91 U / U	12 U / U	0 U / U
Cesium-137	T	E901.1	pCi/L	6.88 U / U	3.18 U / U	-0.258 U / U
Cesium-137	D	E901.1	pCi/L	-2.02 U / U	-4.99 U / U	8.37
Cobalt-57	T	E901.1	pCi/L	-3.19 U / U	2.73 U / U	4.03 U / U
Cobalt-57	D	E901.1	pCi/L	2.25 U / U	0.833 U / U	1.02 U / U
Cobalt-60	T	E901.1	pCi/L	4.89 U / U	0.733 U / U	3.04 U / U
Cobalt-60	D	E901.1	pCi/L	-4.5 U / U	1.57 U / U	3.69 U / U
Europium-152	T	E901.1	pCi/L	11.1 U / U	2.55 U / U	8.26 U / U
Europium-152	D	E901.1	pCi/L	11 U / U	15.5 U / U	12 U / U
Europium-154	T	E901.1	pCi/L	-61.1 U / U	0.336 U / U	26.1 U / U
Europium-154	D	E901.1	pCi/L	18.9 U / U	37.7 U / U	22.8 U / U
Europium-155	T	E901.1	pCi/L	7.83 U / U	11.1 U / U	2.71 U / U
Europium-155	D	E901.1	pCi/L	2.83 U / U	2.37 U / U	-7.48 U / U
Gross Alpha	T	E900	pCi/L	20.8 G	2.75 UG / U	12.4 G
Gross Alpha	D	E900	pCi/L	51.6 G	1.83 UG / U	7.99 G
Gross Beta	T	E900	pCi/L	16.1 F	3.38 F	5.38 F
Gross Beta	D	E900	pCi/L	26.2 G	5.44	5.08
Manganese-54	T	E901.1	pCi/L	-0.444 U / U	0 U / U	-5.54 U / U
Manganese-54	D	E901.1	pCi/L	-8.45 U / U	5.98 U / U	5.47 U / U
Potassium-40	T	E901.1	pCi/L	-6.29 U / U	-39.2 U / U	-37.6 U / U
Potassium-40	D	E901.1	pCi/L	2.68 U / U	150	-43.3 U / U
Radium-228	T	E904	pCi/L	0.952	0.864	1.16
Radium-228	D	E904	pCi/L	1.05	1.3	1.12
Sodium-22	T	E901.1	pCi/L	4.5 U / U	3.35 U / U	5.63
Sodium-22	D	E901.1	pCi/L	5.45	0.373 U / U	-2.36 U / U
Strontium-90	T	E905	pCi/L	0.124 U / U	0.143 U / U	0.131 U / U
Strontium-90	D	E905	pCi/L	0.125 U / U	0.106 U / U	0.037 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	5.05	0.157	3.32
Uranium-233/234	D	A-01-R	pCi/L	6.47	0.0208 U / U	3.56
Uranium-235/236	T	A-01-R	pCi/L	0.227	0.0665 U / U	0.146
Uranium-235/236	D	A-01-R	pCi/L	0.338	0 U / U	0.216
Uranium-238	T	A-01-R	pCi/L	5.86	0.0343 U / U	2.49
Uranium-238	D	A-01-R	pCi/L	6.52	0.0581 U / U	2.51

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		Well Identifier		RD-59A	RD-59B	RD-59C
		Sample Name		RD-59A_022719_01_L-02272019	RD-59B_022719_01_L-02272019	RD-59C_022719_01_L-02272019
		Sample Date		2/27/2019	2/27/2019	2/27/2019
		Lab Name		TA-STL	TA-STL	TA-STL
		Sample Type		N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	51.1 U / U	-34.9 U / U	11.3 U / U
Actinium-228	D	E901.1	pCi/L	74.5	-43.8 U / U	16.4 U / U
Americium-241	T	E901.1	pCi/L	27.8 U / U	11.2 U / U	7.25 U / U
Americium-241	D	E901.1	pCi/L	-8.77 U / U	6.08 U / U	5.7 U / U
Antimony-125	T	E901.1	pCi/L	-33 U / U	-4.48 U / U	18.8 U / U
Antimony-125	D	E901.1	pCi/L	3.33 U / U	6.16 U / U	1.49 U / U
Barium-133	T	E901.1	pCi/L	-3.21 U / U	10.1 U / U	3.03 U / U
Barium-133	D	E901.1	pCi/L	-6.12 U / U	4.49 U / U	6.98 U / U
Cesium-134	T	E901.1	pCi/L	1.26 U / U	4.48 U / U	9.85 U / U
Cesium-134	D	E901.1	pCi/L	-6.81 U / U	-2.68 U / U	3.42 U / U
Cesium-137	T	E901.1	pCi/L	-16.8 UG / U	-12.6 UG / U	-0.582 U / U
Cesium-137	D	E901.1	pCi/L	-8.06 U / U	5.1 U / U	-3.22 U / U
Cobalt-57	T	E901.1	pCi/L	5.83 U / U	0.835 U / U	1.75 U / U
Cobalt-57	D	E901.1	pCi/L	0.113 U / U	-1.09 U / U	6.21 U / U
Cobalt-60	T	E901.1	pCi/L	-7.88 U / U	1.54 U / U	-8.51 U / U
Cobalt-60	D	E901.1	pCi/L	-14.5 U / U	-9.82 U / U	-10.5 U / U
Europium-152	T	E901.1	pCi/L	-31.8 U / U	10.3 U / U	2.07 U / U
Europium-152	D	E901.1	pCi/L	13.1 U / U	7.71 U / U	14.3 U / U
Europium-154	T	E901.1	pCi/L	17.3 U / U	-35.8 U / U	45.7
Europium-154	D	E901.1	pCi/L	6.53 U / U	20.5 U / U	-35.8 U / U
Europium-155	T	E901.1	pCi/L	9.21 U / U	13.3 U / U	9.53 U / U
Europium-155	D	E901.1	pCi/L	-16.5 U / U	9.04 U / U	-11.1 U / U
Gross Alpha	T	E900	pCi/L	2.48 UG / U	2.58 UG / U	2.1 UG / U
Gross Alpha	D	E900	pCi/L	3.69 UG / U	2.21 UG / U	0.99 UG / U
Gross Beta	T	E900	pCi/L	5.84	2.33	1.09 UF / U
Gross Beta	D	E900	pCi/L	2.93	2.49 J	3.46
Manganese-54	T	E901.1	pCi/L	-17.2 U / U	-3.03 U / U	-0.444 U / U
Manganese-54	D	E901.1	pCi/L	-1.42 U / U	3.12 U / U	3.2 U / U
Potassium-40	T	E901.1	pCi/L	-7.63 U / U	-25.9 U / U	-38.3 U / U
Potassium-40	D	E901.1	pCi/L	-92.6 U / U	35.8 U / U	-101 U / U
Radium-228	T	E904	pCi/L	0.127 U / U	0.698	0.474
Radium-228	D	E904	pCi/L	0.262 U / U	1.06	1.46
Sodium-22	T	E901.1	pCi/L	-0.746 U / U	-13.8 U / U	3.98 U / U
Sodium-22	D	E901.1	pCi/L	6.37 U / U	6.72 U / U	-0.372 U / U
Strontium-90	T	E905	pCi/L	0.0737 U / U	-0.0487 U / U	0.144 U / U
Strontium-90	D	E905	pCi/L	0.212 U / U	-0.0413 U / U	0.192 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	1.56	0.321	0.223
Uranium-233/234	D	A-01-R	pCi/L	1.71	0.105 U / U	0.194
Uranium-235/236	T	A-01-R	pCi/L	0.123	0.0368 U / U	0.0213 U / U
Uranium-235/236	D	A-01-R	pCi/L	0.105 U / U	0 U / U	0.0241 U / U
Uranium-238	T	A-01-R	pCi/L	1.27	0.143	0.0856 U / U
Uranium-238	D	A-01-R	pCi/L	0.882	0.0887 U / U	0.0232 U / U

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			Well Identifier	RD-63	RD-90	RD-95
			Sample Name	RD-63_022019_01_L-02202019	RD-90_022119_01_L-02212019	RD-95_022119_01_L-02212019
			Sample Date	2/20/2019	2/21/2019	2/21/2019
			Lab Name	TA-STL	TA-STL	TA-STL
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	21.9 U / U	----	----
Actinium-228	D	E901.1	pCi/L	-54.9 U / U	----	----
Americium-241	T	E901.1	pCi/L	-8.7 U / U	----	----
Americium-241	D	E901.1	pCi/L	10.2 U / U	----	----
Antimony-125	T	E901.1	pCi/L	2.19 U / U	----	----
Antimony-125	D	E901.1	pCi/L	2.8 U / U	----	----
Barium-133	T	E901.1	pCi/L	-7.84 U / U	----	----
Barium-133	D	E901.1	pCi/L	8.18 U / U	----	----
Cesium-134	T	E901.1	pCi/L	10.9 U / U	----	----
Cesium-134	D	E901.1	pCi/L	9.27 U / U	----	----
Cesium-137	T	E901.1	pCi/L	2.79 U / U	----	----
Cesium-137	D	E901.1	pCi/L	6.58 U / U	----	----
Cobalt-57	T	E901.1	pCi/L	-0.621 U / U	----	----
Cobalt-57	D	E901.1	pCi/L	1.54 U / U	----	----
Cobalt-60	T	E901.1	pCi/L	-2.52 U / U	----	----
Cobalt-60	D	E901.1	pCi/L	-1.58 U / U	----	----
Europium-152	T	E901.1	pCi/L	16.8 U / U	----	----
Europium-152	D	E901.1	pCi/L	9.47 U / U	----	----
Europium-154	T	E901.1	pCi/L	-61.2 U / U	----	----
Europium-154	D	E901.1	pCi/L	-15.3 U / U	----	----
Europium-155	T	E901.1	pCi/L	-14.2 U / U	----	----
Europium-155	D	E901.1	pCi/L	-0.572 U / U	----	----
Gross Alpha	T	E900	pCi/L	16.4 G	----	----
Gross Alpha	D	E900	pCi/L	15 G	----	----
Gross Beta	T	E900	pCi/L	9.65	----	----
Gross Beta	D	E900	pCi/L	13.3	----	----
Manganese-54	T	E901.1	pCi/L	-5.84 U / U	----	----
Manganese-54	D	E901.1	pCi/L	-0.556 U / U	----	----
Potassium-40	T	E901.1	pCi/L	-2.81 U / U	----	----
Potassium-40	D	E901.1	pCi/L	-29.8 U / U	----	----
Radium-228	T	E904	pCi/L	1.31	----	----
Radium-228	D	E904	pCi/L	1.42	----	----
Sodium-22	T	E901.1	pCi/L	6.2 U / U	----	----
Sodium-22	D	E901.1	pCi/L	-8.92 U / U	----	----
Strontium-90	T	E905	pCi/L	0.319	----	----
Strontium-90	D	E905	pCi/L	0.349 UJ	----	----
Tritium	T	E906.0	pCi/L	----	37900	33000
Uranium-233/234	T	A-01-R	pCi/L	4.31	----	----
Uranium-233/234	D	A-01-R	pCi/L	4.41	----	----
Uranium-235/236	T	A-01-R	pCi/L	0.148	----	----
Uranium-235/236	D	A-01-R	pCi/L	0.107	----	----
Uranium-238	T	A-01-R	pCi/L	4.5	----	----
Uranium-238	D	A-01-R	pCi/L	4.04	----	----

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T - Total (Fraction)

D - Dissolved (Fraction)

TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

			Well Identifier	RD-96	RD-98	RS-18
			Sample Name	RD-96_030119_01_L-03012019	RD-98_022619_01_L-02262019	RS-18_022519_01_L-02252019
			Sample Date	3/1/2019	2/26/2019	2/25/2019
			Lab Name	TA-STL	TA-STL	TA-STL
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Actinium-228	T	E901.1	pCi/L	16 U / U	0 U / U	15.8 U / U
Actinium-228	D	E901.1	pCi/L	25.5 U / U	62.7	3.46 U / U
Americium-241	T	E901.1	pCi/L	-5.17 U / U	7.56 U / U	-2.47 U / U
Americium-241	D	E901.1	pCi/L	6.58 U / U	5.31 U / U	-8.98 U / U
Antimony-125	T	E901.1	pCi/L	11.4 U / U	7.3 U / U	16.9 U / U
Antimony-125	D	E901.1	pCi/L	6.04 U / U	-1.26 U / U	6.56 U / U
Barium-133	T	E901.1	pCi/L	-2.59 U / U	5.51 U / U	-8.72 U / U
Barium-133	D	E901.1	pCi/L	10 U / U	-0.791 U / U	10.9 U / U
Cesium-134	T	E901.1	pCi/L	4.85 U / U	8.38 U / U	4.01 U / U
Cesium-134	D	E901.1	pCi/L	-4.84 U / U	2.55 U / U	2.35 U / U
Cesium-137	T	E901.1	pCi/L	-0.199 U / U	-1.59 U / U	-7.21 UG / U
Cesium-137	D	E901.1	pCi/L	-1.2 U / U	-2.17 U / U	11.5
Cobalt-57	T	E901.1	pCi/L	2.2 U / U	2.48 U / U	2.36 U / U
Cobalt-57	D	E901.1	pCi/L	2.67 U / U	0.307 U / U	3.3 U / U
Cobalt-60	T	E901.1	pCi/L	0.552 U / U	-14.4 U / U	8.05 U / U
Cobalt-60	D	E901.1	pCi/L	5.08 U / U	-11.8 U / U	-0.0947 U / U
Europium-152	T	E901.1	pCi/L	25.5 U / U	19.3 U / U	4.45 U / U
Europium-152	D	E901.1	pCi/L	5.64 U / U	28 U / U	21.6 U / U
Europium-154	T	E901.1	pCi/L	-49 U / U	42.3 U / U	33.5 U / U
Europium-154	D	E901.1	pCi/L	16.3 U / U	6.83 U / U	57.4 U / U
Europium-155	T	E901.1	pCi/L	-5.36 U / U	-2.54 U / U	9.66 U / U
Europium-155	D	E901.1	pCi/L	-11.8 U / U	11.4 U / U	17.9 U / U
Gross Alpha	T	E900	pCi/L	18.4 G	18.2 G	10.9 G
Gross Alpha	D	E900	pCi/L	11.6 G	11.3	10.7 G
Gross Beta	T	E900	pCi/L	9.57 F	204	7.34
Gross Beta	D	E900	pCi/L	9.62	209	6
Manganese-54	T	E901.1	pCi/L	4.91 U / U	5.47 U / U	2.73 U / U
Manganese-54	D	E901.1	pCi/L	-3.6 U / U	-3.45 U / U	-4.91 U / U
Potassium-40	T	E901.1	pCi/L	-1.46 U / U	93.9 U / U	-19.5 U / U
Potassium-40	D	E901.1	pCi/L	-112 U / U	-90.6 U / U	91.2 U / U
Radium-228	T	E904	pCi/L	3.77	27.1	0.678
Radium-228	D	E904	pCi/L	2.84	23.7	0.471
Sodium-22	T	E901.1	pCi/L	-5.02 U / U	5.64 U / U	-1.87 U / U
Sodium-22	D	E901.1	pCi/L	5.31 U / U	0.419 U / U	1.49 U / U
Strontium-90	T	E905	pCi/L	0.126 U / U	99.1	0.103 U / U
Strontium-90	D	E905	pCi/L	0.029 U / U	102	-0.0292 U / U
Tritium	T	E906.0	pCi/L	----	----	----
Uranium-233/234	T	A-01-R	pCi/L	5.68	3	4.43
Uranium-233/234	D	A-01-R	pCi/L	5.07	2.78	4.04
Uranium-235/236	T	A-01-R	pCi/L	0.393	0.124	0.188
Uranium-235/236	D	A-01-R	pCi/L	0.266	0.123 U / U	0.191
Uranium-238	T	A-01-R	pCi/L	5.14	1.02	3.45
Uranium-238	D	A-01-R	pCi/L	4.43	0.914	3.5

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

pCi/L - picocuries per liter

---- - Not analyzed

N - Normal Field Sample

T - Total (Fraction)

D - Dissolved (Fraction)

TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

		Well Identifier		RS-28
		Sample Name		RS-28_022619_01_L-02262019
		Sample Date		2/26/2019
		Lab Name		TA-STL
		Sample Type		N
Analyte	**Fraction**	**Method**	**Units**	
Actinium-228	T	E901.1	pCi/L	46.9 U / U
Actinium-228	D	E901.1	pCi/L	25 U / U
Americium-241	T	E901.1	pCi/L	7.61 U / U
Americium-241	D	E901.1	pCi/L	7.87 U / U
Antimony-125	T	E901.1	pCi/L	7.01 U / U
Antimony-125	D	E901.1	pCi/L	29.5
Barium-133	T	E901.1	pCi/L	5.15 U / U
Barium-133	D	E901.1	pCi/L	-6.43 U / U
Cesium-134	T	E901.1	pCi/L	-3.78 U / U
Cesium-134	D	E901.1	pCi/L	5.69 U / U
Cesium-137	T	E901.1	pCi/L	2.61 U / U
Cesium-137	D	E901.1	pCi/L	0.554 U / U
Cobalt-57	T	E901.1	pCi/L	-3.38 U / U
Cobalt-57	D	E901.1	pCi/L	4.72 U / U
Cobalt-60	T	E901.1	pCi/L	1.12 U / U
Cobalt-60	D	E901.1	pCi/L	-6.07 U / U
Europium-152	T	E901.1	pCi/L	11.1 U / U
Europium-152	D	E901.1	pCi/L	15.6 U / U
Europium-154	T	E901.1	pCi/L	17.2 U / U
Europium-154	D	E901.1	pCi/L	28.9 U / U
Europium-155	T	E901.1	pCi/L	10 U / U
Europium-155	D	E901.1	pCi/L	-0.306 U / U
Gross Alpha	T	E900	pCi/L	13.8 G
Gross Alpha	D	E900	pCi/L	7.81 G
Gross Beta	T	E900	pCi/L	11.3
Gross Beta	D	E900	pCi/L	10
Manganese-54	T	E901.1	pCi/L	3.1 U / U
Manganese-54	D	E901.1	pCi/L	-3.33 U / U
Potassium-40	T	E901.1	pCi/L	-157 U / U
Potassium-40	D	E901.1	pCi/L	-50.7 U / U
Radium-228	T	E904	pCi/L	0.532
Radium-228	D	E904	pCi/L	0.563
Sodium-22	T	E901.1	pCi/L	-4.45 U / U
Sodium-22	D	E901.1	pCi/L	3.28 U / U
Strontium-90	T	E905	pCi/L	1.25
Strontium-90	D	E905	pCi/L	1.55
Tritium	T	E906.0	pCi/L	----
Uranium-233/234	T	A-01-R	pCi/L	3.53
Uranium-233/234	D	A-01-R	pCi/L	3.43
Uranium-235/236	T	A-01-R	pCi/L	0.119 U / U
Uranium-235/236	D	A-01-R	pCi/L	0.21 U / U
Uranium-238	T	A-01-R	pCi/L	2.8
Uranium-238	D	A-01-R	pCi/L	2.67

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

pCi/L - picocuries per liter

---- - Not analyzed

N - Normal Field Sample

T - Total (Fraction)

D - Dissolved (Fraction)

TA-STL - Test America St. Louis, Missouri

LAB / VALIDATION QUALIFIERS

F - MS/MSD %Rec and/or RPD exceeds the control limits.

G - The Sample MDC is greater than the requested RL.

U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	C-08	DD-139	DD-140
			Sample Name	C-08_021819_01_L-02182019	DD-139_022119_01_L-02212019	DD-140_022819_01_L-02282019
			Sample Date	2/18/2019	2/21/2019	2/28/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.02 J/J	0.12	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.087 J/J	9.9	0.058 J/J
Antimony	D	SW6020A	mg/L	0.0004 U/U	0.00097 J/U	0.00056 J/U
Antimony	T	SW6020A	mg/L	0.0004 U/U	0.0004 U/U	0.00073 J/U
Arsenic	D	SW6020A	mg/L	0.001 J/J	0.00033 U/U	0.0028 J/J
Arsenic	T	SW6020A	mg/L	0.0013 J/J	0.00085 J/J	0.0024 J/J
Barium	D	SW6020A	mg/L	0.048	0.04	0.025
Barium	T	SW6020A	mg/L	0.048	0.053	0.024
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.000091 J/J	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Boron	D	SW6010C	mg/L	0.029 J/J	0.018 J/J	0.026 J/J
Boron	T	SW6010C	mg/L	0.032 JB/U	0.033 J/U	0.025 J/J
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	110	100	100
Calcium	T	SW6010C	mg/L	110 /J	110	100
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.00062 J/J	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.013	0.005	0.00077 J/J
Cobalt	D	SW6020A	mg/L	0.00011 J/J	0.00032 J/J	0.000056 J/J
Cobalt	T	SW6020A	mg/L	0.00091 J/J	0.0031	0.0011
Copper	D	SW6020A	mg/L	0.0016 J/U	0.00056 U/U	0.0017 J/J
Copper	T	SW6020A	mg/L	0.0019 J/J	0.0065	0.0019 J/J
Iron	D	SW6010C	mg/L	0.022 U/U	0.25	0.049 J/J
Iron	T	SW6010C	mg/L	0.43	16	0.77
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00018 U/U	0.0023 B/	0.00025 J/J
Magnesium	D	SW6010C	mg/L	7.3	14	21
Magnesium	T	SW6010C	mg/L	7.3	18	21
Manganese	D	SW6020A	mg/L	0.0026	0.086	0.0042
Manganese	T	SW6020A	mg/L	0.025 /J	0.22	0.033 B/
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0019 J/U	0.00057 J/U	0.00076 J/U
Molybdenum	T	SW6020A	mg/L	0.002 /U	0.00023 JB/U	0.0014 J/U
Nickel	D	SW6020A	mg/L	0.00077 J/J	0.0018 J/J	0.0029
Nickel	T	SW6020A	mg/L	0.0021	0.0048	0.0025
Potassium	D	SW6010C	mg/L	3.2	4.5	4.8
Potassium	T	SW6010C	mg/L	3.5 B/	6.4	4.8
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00078 J/J	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00059 J/J	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/UJ
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	41 B/	34 B/	40
Sodium	T	SW6010C	mg/L	41 B/J	33	40
Strontium	D	SW6010C	mg/L	0.39	0.29	0.27
Strontium	T	SW6010C	mg/L	0.39 B/J	0.32	0.27
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U^/U	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.008	0.0019 J/J
Zinc	D	SW6020A	mg/L	0.015	0.0084 J/J	0.0066 J/J
Zinc	T	SW6020A	mg/L	0.018	0.046	0.0053 J/J

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DD-141	DD-142
			Sample Name	DD-141_022619_01_L-02262019	DD-142_022119_01_L-02212019
			Sample Date	2/26/2019	2/21/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.16	0.1
Aluminum	T	SW6010C	mg/L	0.66 F1/	0.43
Antimony	D	SW6020A	mg/L	0.00075 J/J	0.0004 U/U
Antimony	T	SW6020A	mg/L	0.0004 U/U	0.0004 U/U
Arsenic	D	SW6020A	mg/L	0.00078 J/J	0.00033 U/U
Arsenic	T	SW6020A	mg/L	0.0011 J/J	0.00033 U/U
Barium	D	SW6020A	mg/L	0.08	0.031
Barium	T	SW6020A	mg/L	0.084	0.031 /S
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Boron	D	SW6010C	mg/L	0.043 J/J	0.35
Boron	T	SW6010C	mg/L	0.047 J/J	0.37
Cadmium	D	SW6020A	mg/L	0.00027 U^/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	110	100
Calcium	T	SW6010C	mg/L	120	110
Chromium	D	SW6020A	mg/L	0.00064 J/J	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.0019 J/J	0.00064 J/J
Cobalt	D	SW6020A	mg/L	0.00094 J/J	0.000054 U/U
Cobalt	T	SW6020A	mg/L	0.0028	0.000054 U/U
Copper	D	SW6020A	mg/L	0.00056 U/U	0.0013 J/J
Copper	T	SW6020A	mg/L	0.0013 J/J	0.00056 U/U
Iron	D	SW6010C	mg/L	0.3	0.022 U/U
Iron	T	SW6010C	mg/L	1.1	1
Lead	D	SW6020A	mg/L	0.00028 J/J	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00081 J/J	0.00018 U/U
Magnesium	D	SW6010C	mg/L	25	20
Magnesium	T	SW6010C	mg/L	25	21
Manganese	D	SW6020A	mg/L	0.042	0.0011
Manganese	T	SW6020A	mg/L	0.12	0.011
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0023	0.0011 J/U
Molybdenum	T	SW6020A	mg/L	0.0019 J/J	0.0011 JB/U
Nickel	D	SW6020A	mg/L	0.0011 J/J	0.00058 J/J
Nickel	T	SW6020A	mg/L	0.0026	0.0003 U/U
Potassium	D	SW6010C	mg/L	5	3.9
Potassium	T	SW6010C	mg/L	5	4
Selenium	D	SW6020A	mg/L	0.00041 J/J	0.0044 J/J
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.0046 J/J
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	62 B/	120 B/
Sodium	T	SW6010C	mg/L	59 /J	130
Strontium	D	SW6010C	mg/L	0.29	0.26
Strontium	T	SW6010C	mg/L	0.29	0.28
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0019 J/J	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0027 J/J	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.0045 J/J	0.002 U/U
Zinc	T	SW6020A	mg/L	0.0067 J/J	0.002 U/U

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DD-143	DD-144
			Sample Name	DD-143_030119_01_L-03012019	DD-144_022119_01_L-02212019
			Sample Date	3/1/2019	2/21/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.061 J/J
Aluminum	T	SW6010C	mg/L	0.37	1.4
Antimony	D	SW6020A	mg/L	0.00051 J/U	0.00062 J/U
Antimony	T	SW6020A	mg/L	0.00051 J/J	0.0004 U/U
Arsenic	D	SW6020A	mg/L	0.00049 J/J	0.00033 U/U
Arsenic	T	SW6020A	mg/L	0.00048 J/J	0.00033 U/U
Barium	D	SW6020A	mg/L	0.034	0.059
Barium	T	SW6020A	mg/L	0.039	0.065
Beryllium	D	SW6020A	mg/L	0.00012 J/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00018 J/J	0.00008 U/U
Boron	D	SW6010C	mg/L	0.078 J/J	0.12
Boron	T	SW6010C	mg/L	0.08 J/J	0.14
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	150	110
Calcium	T	SW6010C	mg/L	160	120
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.00075 J/J	0.0012 J/J
Cobalt	D	SW6020A	mg/L	0.00026 J/J	0.00047 J/J
Cobalt	T	SW6020A	mg/L	0.00066 JB/U	0.00075 J/J
Copper	D	SW6020A	mg/L	0.0018 J/J	0.00056 U/U
Copper	T	SW6020A	mg/L	0.00098 J/J,0.00056 U/U	0.0032
Iron	D	SW6010C	mg/L	0.08 J/J	0.7
Iron	T	SW6010C	mg/L	0.91 /J	15
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00054 J/J	0.003 B/
Magnesium	D	SW6010C	mg/L	29 /J	19
Magnesium	T	SW6010C	mg/L	30	21
Manganese	D	SW6020A	mg/L	0.085	0.12
Manganese	T	SW6020A	mg/L	0.095 B/	0.17
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.002	0.0017 J/U
Molybdenum	T	SW6020A	mg/L	0.0027	0.001 JB/U
Nickel	D	SW6020A	mg/L	0.00095 J/J	0.0017 J/J
Nickel	T	SW6020A	mg/L	0.0014 J/J	0.0025
Potassium	D	SW6010C	mg/L	5.6	5.2
Potassium	T	SW6010C	mg/L	5.9	5.5
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00049 J/U	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000034 J/J	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000056 J/J
Sodium	D	SW6010C	mg/L	60	61 B/
Sodium	T	SW6010C	mg/L	60	64
Strontium	D	SW6010C	mg/L	0.31	0.25
Strontium	T	SW6010C	mg/L	0.31	0.27
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0014 J/J	0.0019 J/J
Zinc	D	SW6020A	mg/L	0.0045 J/J	0.0024 J/U
Zinc	T	SW6020A	mg/L	0.0054 JB/U,0.0045 J/U	0.019

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DD-145	DD-146
			Sample Name	DD-145_021819_01_L-02182019	DD-146_022119_01_L-02212019
			Sample Date	2/18/2019	2/21/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.29 /J	0.62
Antimony	D	SW6020A	mg/L	0.00062 J/U	0.0004 U/U
Antimony	T	SW6020A	mg/L	0.00057 J/U	0.0004 U/U
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00033 U/U
Arsenic	T	SW6020A	mg/L	0.00082 J/J	0.00033 U/U
Barium	D	SW6020A	mg/L	0.038	0.034
Barium	T	SW6020A	mg/L	0.037	0.038
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Boron	D	SW6010C	mg/L	0.073 J/J	0.013 J/J
Boron	T	SW6010C	mg/L	0.075 JB/U	0.028 J/U
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	110	56
Calcium	T	SW6010C	mg/L	110 /J	62
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.0011 J/J	0.0009 J/J
Cobalt	D	SW6020A	mg/L	0.00024 J/J	0.000054 U/U
Cobalt	T	SW6020A	mg/L	0.00041 J/J	0.00014 J/J
Copper	D	SW6020A	mg/L	0.00064 J/U	0.00063 J/J
Copper	T	SW6020A	mg/L	0.00056 U/U	0.00056 U/U
Iron	D	SW6010C	mg/L	0.03 J/J	0.89
Iron	T	SW6010C	mg/L	2.6	11
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00038 J/J	0.00026 JB/U
Magnesium	D	SW6010C	mg/L	12	17
Magnesium	T	SW6010C	mg/L	12	18
Manganese	D	SW6020A	mg/L	0.013	0.049
Manganese	T	SW6020A	mg/L	0.033 /J	0.092
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0018 J/U	0.0024
Molybdenum	T	SW6020A	mg/L	0.002 /U	0.0015 JB/J
Nickel	D	SW6020A	mg/L	0.00083 J/J	0.00035 J/J
Nickel	T	SW6020A	mg/L	0.0015 J/J	0.0006 J/J
Potassium	D	SW6010C	mg/L	3.8	4.8
Potassium	T	SW6010C	mg/L	4.1 B/	4.8
Selenium	D	SW6020A	mg/L	0.001 J/J	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.0013 J/J	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	74 B/	44 B/
Sodium	T	SW6010C	mg/L	74 B/J	45
Strontium	D	SW6010C	mg/L	0.48	0.17
Strontium	T	SW6010C	mg/L	0.48 B/J	0.2
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U^/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.002 J/J	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.0024 J/J	0.0048 J/J
Zinc	T	SW6020A	mg/L	0.0047 J/J	0.011

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
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D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DD-147	DS-43	DS-44
			Sample Name	DD-147_022819_01_L-02282019	DS-43_022219_01_L-02222019	DS-44_022219_01_L-02222019
			Sample Date	2/28/2019	2/22/2019	2/22/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.034 J/J	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.075 J/J	0.57	1.4
Antimony	D	SW6020A	mg/L	0.0011 J/U	0.00041 J/U	0.0011 J/U
Antimony	T	SW6020A	mg/L	0.0004 U/U	0.00055 J/U	0.0014 J/U
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00033 U/U	0.00058 J/J
Arsenic	T	SW6020A	mg/L	0.00045 J/J	0.00061 J/J	0.00097 J/J
Barium	D	SW6020A	mg/L	0.12	0.097	0.044
Barium	T	SW6020A	mg/L	0.12	0.1	0.058
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.000082 J/J	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00015 J/J	0.00019 J/J
Boron	D	SW6010C	mg/L	0.069 J/J	0.17	0.089 J/J
Boron	T	SW6010C	mg/L	0.071 J/J	0.17	0.11
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	110	86	110
Calcium	T	SW6010C	mg/L	110	92	120
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.0005 U/U	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.00059 J/J	0.00072 J/J	0.002
Cobalt	D	SW6020A	mg/L	0.00016 J/J	0.0005 J/J	0.00012 J/J
Cobalt	T	SW6020A	mg/L	0.00017 J/J	0.00045 J/J	0.001
Copper	D	SW6020A	mg/L	0.00084 J/J	0.00073 J/J	0.0016 J/J
Copper	T	SW6020A	mg/L	0.00056 U/U	0.00056 U/U	0.0038
Iron	D	SW6010C	mg/L	0.023 J/J	0.9	0.036 J/J
Iron	T	SW6010C	mg/L	0.2	4.5 ^/J	1.8 ^/J
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00024 J/J	0.00039 J/J	0.00063 J/J
Magnesium	D	SW6010C	mg/L	17	25	22
Magnesium	T	SW6010C	mg/L	17	25	24
Manganese	D	SW6020A	mg/L	0.026	0.03	0.034
Manganese	T	SW6020A	mg/L	0.027 B/	0.044	0.11
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.002 /U	0.0035	0.0078
Molybdenum	T	SW6020A	mg/L	0.0017 J/U	0.0038	0.0059
Nickel	D	SW6020A	mg/L	0.00094 J/J	0.0031 B/	0.0014 JB/U
Nickel	T	SW6020A	mg/L	0.00044 J/J	0.0017 J/U	0.0028
Potassium	D	SW6010C	mg/L	4	5.9	4.2
Potassium	T	SW6010C	mg/L	4.1	6.3	5
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00037 U/U	0.00094 J/J
Silver	D	SW6020A	mg/L	0.000033 U/UJ	0.000033 J/J	0.000042 J/J
Silver	T	SW6020A	mg/L	0.00019 J/U	0.000033 U/U	0.0007 J/J
Sodium	D	SW6010C	mg/L	54	140 B/	53 B/
Sodium	T	SW6010C	mg/L	56	150 B/	60 B/
Strontium	D	SW6010C	mg/L	0.26	0.29 B/	0.29 B/
Strontium	T	SW6010C	mg/L	0.27	0.31	0.33
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U	0.0037 J/J
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0012 U/U	0.0039 J/J
Zinc	D	SW6020A	mg/L	0.006 J/J	0.0087 J/J	0.0045 J/J
Zinc	T	SW6020A	mg/L	0.0042 J/J	0.01	0.034

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	DS-46	DS-47	PZ-005
			Sample Name	DS-46_022819_01_L-02282019	DS-47_022219_01_L-02222019	PZ-005_022519_01_L-02252019
			Sample Date	2/28/2019	2/22/2019	2/25/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U	0.21
Aluminum	T	SW6010C	mg/L	0.026 J/J	0.018 U/U	1.6
Antimony	D	SW6020A	mg/L	0.0004 U/U	0.0013 J/U	0.00047 J/U
Antimony	T	SW6020A	mg/L	0.0006 J/U	0.00054 J/U	0.00091 J/U
Arsenic	D	SW6020A	mg/L	0.00033 UF1/U	0.00055 J/J	0.00078 J/J
Arsenic	T	SW6020A	mg/L	0.00033 U/U	0.00082 J/J	0.001 J/J
Barium	D	SW6020A	mg/L	0.031	0.038	0.06
Barium	T	SW6020A	mg/L	0.038	0.04	0.074
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Boron	D	SW6010C	mg/L	0.033 J/J	0.033 J/J	0.16
Boron	T	SW6010C	mg/L	0.034 J/J	0.038 J/J	0.14
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	87	75	120
Calcium	T	SW6010C	mg/L	90	81	110
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.0005 U/U	0.0012 JB/U
Chromium	T	SW6020A	mg/L	0.00055 J/J	0.0005 U/U	0.0033 B/
Cobalt	D	SW6020A	mg/L	0.002	0.00014 J/J	0.00013 J/J
Cobalt	T	SW6020A	mg/L	0.0023	0.00032 J/J	0.00049 J/J
Copper	D	SW6020A	mg/L	0.00056 U/U	0.00056 U/U	0.0024
Copper	T	SW6020A	mg/L	0.00056 J/J	0.00056 U/U	0.003
Iron	D	SW6010C	mg/L	6.3	0.022 U/U	0.26 B/
Iron	T	SW6010C	mg/L	22	0.049 J^/J	2.5
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00018 U/U	0.00018 U/U	0.00082 J/J
Magnesium	D	SW6010C	mg/L	14	18	18
Magnesium	T	SW6010C	mg/L	14	18	17
Manganese	D	SW6020A	mg/L	1.4	0.0041	0.0051
Manganese	T	SW6020A	mg/L	1.4 B/	0.0094	0.027 B/
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.00049 J/U	0.0056	0.0013 J/U
Molybdenum	T	SW6020A	mg/L	0.00054 J/U	0.006	0.0012 JB/U
Nickel	D	SW6020A	mg/L	0.0086	0.0003 U/U	0.0025
Nickel	T	SW6020A	mg/L	0.0079	0.0013 J/U	0.0023
Potassium	D	SW6010C	mg/L	3.8	4.3	1.5 J/J
Potassium	T	SW6010C	mg/L	3.8	4.8	1.6 J/J
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00078 J/J	0.0014 J/J
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00037 U/U	0.0014 J/J
Silver	D	SW6020A	mg/L	0.000033 UF1/UJ	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000043 J/U
Sodium	D	SW6010C	mg/L	53	35 B/	88
Sodium	T	SW6010C	mg/L	54	37 B/	81
Strontium	D	SW6010C	mg/L	0.27	0.23 B/	0.55
Strontium	T	SW6010C	mg/L	0.28	0.25	0.53
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0019 J/J	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0014 J/J	0.0049 J/J
Zinc	D	SW6020A	mg/L	0.0041 J/J	0.002 U/U	0.0076 J/J
Zinc	T	SW6020A	mg/L	0.002 J/J	0.0068 JF1/J	0.011

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	PZ-098	PZ-102	PZ-103
			Sample Name	PZ-098_022519_01_L-02252019	PZ-102_022519_01_L-02252019	PZ-103_022519_01_L-02252019
			Sample Date	2/25/2019	2/25/2019	2/25/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.14	0.38
Aluminum	T	SW6010C	mg/L	0.16	1.8	1.9
Antimony	D	SW6020A	mg/L	0.00054 J/U	0.00042 J/U	0.00042 J/U
Antimony	T	SW6020A	mg/L	0.00096 J/U	0.0013 J/U	0.00075 J/U
Arsenic	D	SW6020A	mg/L	0.00068 J/J	0.001 J/J	0.00038 J/J
Arsenic	T	SW6020A	mg/L	0.00083 J/J	0.0012 J/J	0.00061 J/J
Barium	D	SW6020A	mg/L	0.049	0.008	0.056
Barium	T	SW6020A	mg/L	0.051	0.022	0.074
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00017 J/U	0.000087 J/U
Boron	D	SW6010C	mg/L	0.037 J/J	0.041 J/J	0.063 J/J
Boron	T	SW6010C	mg/L	0.037 J/J	0.043 J/J	0.062 J/J
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00033 J/J
Cadmium	T	SW6020A	mg/L	0.00043 J/U	0.00027 U/U	0.0012 /U
Calcium	D	SW6010C	mg/L	89	17	140
Calcium	T	SW6010C	mg/L	87	18	140
Chromium	D	SW6020A	mg/L	0.0016 JB/U	0.0034 B/	0.0046 B/
Chromium	T	SW6020A	mg/L	0.0022 B/	0.012 B/	0.0085 B/
Cobalt	D	SW6020A	mg/L	0.0006 J/J	0.00018 J/J	0.00029 J/J
Cobalt	T	SW6020A	mg/L	0.00078 J/J	0.0012	0.0013
Copper	D	SW6020A	mg/L	0.003	0.0019 J/J	0.0023
Copper	T	SW6020A	mg/L	0.00056 U/U	0.0043	0.0051
Iron	D	SW6010C	mg/L	0.028 JB/J	0.25 B/	0.52 B/
Iron	T	SW6010C	mg/L	0.33	3.5	3
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00027 J/J	0.00023 J/J
Lead	T	SW6020A	mg/L	0.00018 U/U	0.0012	0.0013
Magnesium	D	SW6010C	mg/L	17	2.3	8.8
Magnesium	T	SW6010C	mg/L	16	2.7	8.7
Manganese	D	SW6020A	mg/L	0.0018	0.0067	0.011
Manganese	T	SW6020A	mg/L	0.0075 B/	0.072 B/	0.055 B/
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0022	0.0016 J/U	0.0026
Molybdenum	T	SW6020A	mg/L	0.0021 B/	0.0027 B/	0.0028 B/
Nickel	D	SW6020A	mg/L	0.027	0.0041	0.003
Nickel	T	SW6020A	mg/L	0.027	0.0077	0.0047
Potassium	D	SW6010C	mg/L	2.2 J/J	1.2 J/J	1.5 J/J
Potassium	T	SW6010C	mg/L	2.2 J/J	1.6 J/J	1.6 J/J
Selenium	D	SW6020A	mg/L	0.0027 J/J	0.0008 J/J	0.0028 J/J
Selenium	T	SW6020A	mg/L	0.00084 J/J	0.00037 U/U	0.0018 J/J
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000088 J/U
Sodium	D	SW6010C	mg/L	84	32	86
Sodium	T	SW6010C	mg/L	79	31	81
Strontium	D	SW6010C	mg/L	0.33	0.15	0.94
Strontium	T	SW6010C	mg/L	0.32	0.16	0.92
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0024 J/J	0.0052	0.0068
Zinc	D	SW6020A	mg/L	0.0067 J/J	0.0097 J/J	0.0092 J/J
Zinc	T	SW6020A	mg/L	0.0028 J/J	0.014	0.016

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	PZ-105	PZ-108	PZ-109
			Sample Name	PZ-105_021819_01_L-02182019	PZ-108_021819_01_L-02182019	PZ-109_022119_01_L-02212019
			Sample Date	2/18/2019	2/18/2019	2/21/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.082 J/J	0.025 J/J	0.019 J/J
Aluminum	T	SW6010C	mg/L	0.98 F1/J	0.65 /J	2
Antimony	D	SW6020A	mg/L	0.0027	0.00075 J/U	0.0025
Antimony	T	SW6020A	mg/L	0.002 /U	0.00053 J/U	0.0021
Arsenic	D	SW6020A	mg/L	0.001 J/J	0.00091 J/J	0.00079 J/J
Arsenic	T	SW6020A	mg/L	0.0013 J/J	0.0012 J/J	0.0013 J/J
Barium	D	SW6020A	mg/L	0.031	0.028	0.033
Barium	T	SW6020A	mg/L	0.037	0.031	0.038
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00014 J/J
Boron	D	SW6010C	mg/L	0.15	0.2	0.087 J/J
Boron	T	SW6010C	mg/L	0.15 B/	0.2 B/	0.1 /U
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00028 J/J	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00067 J/J	0.00071 J/J
Calcium	D	SW6010C	mg/L	120	150	71
Calcium	T	SW6010C	mg/L	130 /J	150 /J	71
Chromium	D	SW6020A	mg/L	0.0014 J/J	0.00057 J/J	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.003	0.0019 J/J	0.0012 J/J
Cobalt	D	SW6020A	mg/L	0.000054 U/U	0.000054 U/U	0.00018 J/J
Cobalt	T	SW6020A	mg/L	0.00059 J/J	0.00038 J/J	0.0006 J/J
Copper	D	SW6020A	mg/L	0.0017 J/U	0.0015 J/U	0.00094 J/J
Copper	T	SW6020A	mg/L	0.0017 J/J	0.0027	0.001 J/J
Iron	D	SW6010C	mg/L	0.099 J/J	0.022 U/U	0.037 J/J
Iron	T	SW6010C	mg/L	1.5	0.93	3
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00042 J/J	0.00053 J/J	0.00072 JB/U
Magnesium	D	SW6010C	mg/L	23	33	26
Magnesium	T	SW6010C	mg/L	23	34	27
Manganese	D	SW6020A	mg/L	0.0038	0.0031	0.083
Manganese	T	SW6020A	mg/L	0.038 /J	0.061 /J	0.12
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.014	0.0068	0.092
Molybdenum	T	SW6020A	mg/L	0.013	0.0065	0.084 B/
Nickel	D	SW6020A	mg/L	0.0014 J/J	0.0013 J/J	0.0022
Nickel	T	SW6020A	mg/L	0.0022	0.0022	0.002
Potassium	D	SW6010C	mg/L	6.1	7.1	7.7
Potassium	T	SW6010C	mg/L	6.8 B/	7.7 B/	8.1
Selenium	D	SW6020A	mg/L	0.0013 J/J	0.00055 J/J	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.0011 J/J	0.00037 U/U	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.00017 J/J	0.000033 U/U
Sodium	D	SW6010C	mg/L	97 B/	80 B/	200 B/
Sodium	T	SW6010C	mg/L	95 B/J	81 B/J	200
Strontium	D	SW6010C	mg/L	0.54	0.37	0.25
Strontium	T	SW6010C	mg/L	0.54 B/J	0.38 B/J	0.25
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U^/U	0.0012 U^/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0044 J/J	0.0029 J/J	0.0013 J/J
Zinc	D	SW6020A	mg/L	0.0027 J/J	0.0086 J/J	0.0045 J/U
Zinc	T	SW6020A	mg/L	0.014	0.012	0.017

NOTES AND ABBREVIATIONS

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LAB / VALIDATION QUALIFIERS

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B - Compound was found in the blank and sample.
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TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	PZ-120	RD-07	RD-17
			Sample Name	PZ-120_030419_01_L-03042019	RD-07_030419_01_L-03042019	RD-17_030119_01_L-03012019
			Sample Date	3/4/2019	3/4/2019	3/1/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.73	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.87	0.018 U/U	0.018 U/U
Antimony	D	SW6020A	mg/L	0.0013 J/J	0.0004 U/U	0.0004 U/U
Antimony	T	SW6020A	mg/L	0.0015 J/U	0.0004 U/U	0.0004 U/U
Arsenic	D	SW6020A	mg/L	0.0016 J/J	0.00033 U/U	0.00033 U/U
Arsenic	T	SW6020A	mg/L	0.0018 J/J	0.00033 U/U	0.00048 J/J
Barium	D	SW6020A	mg/L	0.027	0.034	0.11
Barium	T	SW6020A	mg/L	0.033	0.034	0.13
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U	0.00008 U/U
Boron	D	SW6010C	mg/L	1.1	0.078 J/J	0.12
Boron	T	SW6010C	mg/L	1	0.075 J/J	0.13
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	77	92	97
Calcium	T	SW6010C	mg/L	74	87	100
Chromium	D	SW6020A	mg/L	0.0024	0.0005 U/U	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.0038	0.0005 U/U	0.0005 U/U
Cobalt	D	SW6020A	mg/L	0.00084 J/J	0.000054 U/U	0.0011
Cobalt	T	SW6020A	mg/L	0.0012	0.00013 J/J	0.0011 B/
Copper	D	SW6020A	mg/L	0.0075	0.00056 U/U	0.0006 J/J
Copper	T	SW6020A	mg/L	0.011	0.00056 U/U	0.00056 U/U
Iron	D	SW6010C	mg/L	1.2 B/	0.022 U/U	1.2
Iron	T	SW6010C	mg/L	1.6	0.039 J/U	4.2 /J
Lead	D	SW6020A	mg/L	0.0021	0.00018 U/U	0.00047 J/J
Lead	T	SW6020A	mg/L	0.0037	0.00018 U/U	0.0098
Magnesium	D	SW6010C	mg/L	17	15	21 /J
Magnesium	T	SW6010C	mg/L	16	14	22
Manganese	D	SW6020A	mg/L	0.25	0.0004 J/J	0.15
Manganese	T	SW6020A	mg/L	0.42 B/	0.0066 B/	0.15 B/
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0039	0.0013 J/U	0.00081 J/J
Molybdenum	T	SW6020A	mg/L	0.0048	0.0013 J/J	0.00041 J/U
Nickel	D	SW6020A	mg/L	0.0067	0.00036 J/J	0.0021
Nickel	T	SW6020A	mg/L	0.0076	0.00038 J/J	0.00066 J/J
Potassium	D	SW6010C	mg/L	3	3.4	4.4
Potassium	T	SW6010C	mg/L	3	3.4	4.5
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00042 J/J	0.00037 U/U	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.00005 JB/U	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	88 B/	38 B/	38
Sodium	T	SW6010C	mg/L	85 B/	35 B/	39
Strontium	D	SW6010C	mg/L	0.2	0.2	0.32
Strontium	T	SW6010C	mg/L	0.19	0.19	0.34
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0025 J/J	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0037 J/J	0.0012 U/U	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.07	0.01	0.71
Zinc	T	SW6020A	mg/L	0.086	0.013	1.1 B/,1

NOTES AND ABBREVIATIONS

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LAB / VALIDATION QUALIFIERS

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U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-19	RD-21	RD-33A
			Sample Name	RD-19_030519_01_L-03052019	RD-21_021919_01_L-02192019	RD-33A_022719_01_L-02272019
			Sample Date	3/5/2019	2/19/2019	2/27/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.018 U/U	0.21	0.018 U/U
Antimony	D	SW6020A	mg/L	0.0004 U/U	0.00079 J/U	0.00040 U/U
Antimony	T	SW6020A	mg/L	0.0004 U/U	0.0011 J/U	0.00049 J/J
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00040 J/J	0.0018 J/J
Arsenic	T	SW6020A	mg/L	0.00033 U/U	0.0011 J/J	0.0019 J/J
Barium	D	SW6020A	mg/L	0.078	0.033	0.045
Barium	T	SW6020A	mg/L	0.079	0.035 B/	0.045
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.000080 U/U	0.00011 J/J
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.000080 U/U	0.000083 J/J
Boron	D	SW6010C	mg/L	0.1	0.057 J/J	0.023 J/J
Boron	T	SW6010C	mg/L	0.1	0.051 J/J	0.028 JB/U
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U^/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U	0.00027 U^/U
Calcium	D	SW6010C	mg/L	190	95	68
Calcium	T	SW6010C	mg/L	190	89	65
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.00050 U/U	0.00050 U/U
Chromium	T	SW6020A	mg/L	0.0008 J/J	0.00087 J/J	0.00050 U/U
Cobalt	D	SW6020A	mg/L	0.000091 J/J	0.000054 U/U	0.00011 J/J
Cobalt	T	SW6020A	mg/L	0.000054 U/U	0.00021 J/J	0.000085 J/J
Copper	D	SW6020A	mg/L	0.00056 U/U	0.0035	0.00056 U/U
Copper	T	SW6020A	mg/L	0.00066 J/J	0.0027	0.00056 U/U
Iron	D	SW6010C	mg/L	0.023 JB/U	0.022 U/U	0.055 J/J
Iron	T	SW6010C	mg/L	0.052 J/U	0.53	0.059 J/J
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00018 U/U	0.00076 JB/U	0.00049 J/J
Magnesium	D	SW6010C	mg/L	43	6.3	15
Magnesium	T	SW6010C	mg/L	43	5.8	15
Manganese	D	SW6020A	mg/L	0.011	0.00063 JB/J	0.016
Manganese	T	SW6020A	mg/L	0.0021 B/	0.0081	0.017
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.00074 J/U	0.0026	0.0017 J/J
Molybdenum	T	SW6020A	mg/L	0.00068 J/J	0.0023	0.0012 J/J
Nickel	D	SW6020A	mg/L	0.0019 J/J	0.00051 J/J	0.0013 J/J
Nickel	T	SW6020A	mg/L	0.0022	0.0011 J/J	0.0012 J/J
Potassium	D	SW6010C	mg/L	6.5	2.2 J/J	3.7
Potassium	T	SW6010C	mg/L	6.5	2.3 J/J	3.9
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.0023 J/J	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.0021 J/J	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000058 J/U
Sodium	D	SW6010C	mg/L	84 B/	51 B/	50 B/
Sodium	T	SW6010C	mg/L	84 B/	46	47
Strontium	D	SW6010C	mg/L	0.38	0.26	0.38
Strontium	T	SW6010C	mg/L	0.38	0.24	0.37
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U^/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0012 U/U	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.17	0.011	0.036
Zinc	T	SW6020A	mg/L	0.18	0.02	0.11

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METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-33B	RD-33C
			Sample Name	RD-33B_022019_01_L-02202019	RD-33C_022719_01_L-02272019
			Sample Date	2/20/2019	2/27/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.018 U/U	0.018 U/U
Antimony	D	SW6020A	mg/L	0.00064 J/U	0.00040 U/U
Antimony	T	SW6020A	mg/L	0.00085 J/U	0.00040 U/U
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00033 U/U
Arsenic	T	SW6020A	mg/L	0.00033 U/U	0.00033 U/U
Barium	D	SW6020A	mg/L	0.028	0.0094
Barium	T	SW6020A	mg/L	0.028	0.0094
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.000080 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.000080 U/U
Boron	D	SW6010C	mg/L	0.0063 J/J	0.022 J/J
Boron	T	SW6010C	mg/L	0.024 J/U	0.028 JB/U
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U^/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U^/U
Calcium	D	SW6010C	mg/L	24	5.6
Calcium	T	SW6010C	mg/L	23	6
Chromium	D	SW6020A	mg/L	0.0005 J/J	0.00050 U/U
Chromium	T	SW6020A	mg/L	0.0005 U/U	0.00050 J/J
Cobalt	D	SW6020A	mg/L	0.000054 U/U	0.000054 U/U
Cobalt	T	SW6020A	mg/L	0.000054 U/U	0.000056 J/J
Copper	D	SW6020A	mg/L	0.00056 U/U	0.00056 U/U
Copper	T	SW6020A	mg/L	0.00056 U/U	0.00056 U/U
Iron	D	SW6010C	mg/L	0.19	0.042 J/J
Iron	T	SW6010C	mg/L	1	0.25
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00018 U/U	0.00018 J/J
Magnesium	D	SW6010C	mg/L	6.4	4.8
Magnesium	T	SW6010C	mg/L	6.5	5
Manganese	D	SW6020A	mg/L	0.029	0.012
Manganese	T	SW6020A	mg/L	0.018	0.017
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0019 J/U	0.0017 J/J
Molybdenum	T	SW6020A	mg/L	0.0016 JB/U	0.0012 J/J
Nickel	D	SW6020A	mg/L	0.00039 J/J	0.00030 U/U
Nickel	T	SW6020A	mg/L	0.0003 U/U	0.00040 J/J
Potassium	D	SW6010C	mg/L	3.3	3.7
Potassium	T	SW6010C	mg/L	3.1	3.9
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	44 B/	44 B/
Sodium	T	SW6010C	mg/L	44	42
Strontium	D	SW6010C	mg/L	0.11	0.027
Strontium	T	SW6010C	mg/L	0.11	0.03
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.0066 J/U	0.0083 J/J
Zinc	T	SW6020A	mg/L	0.0081 J/U	0.04

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-34A	RD-34C
			Sample Name	RD-34A_030619_01_L-03062019	RD-34C_030619_01_L-03062019
			Sample Date	3/6/2019	3/6/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.018 U/U	0.018 U/U
Antimony	D	SW6020A	mg/L	0.0004 U/U	0.00048 J/J
Antimony	T	SW6020A	mg/L	0.0012 J/J	0.0006 J/J
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00033 U/U
Arsenic	T	SW6020A	mg/L	0.00033 U/U	0.00033 U/U
Barium	D	SW6020A	mg/L	0.034	0.055
Barium	T	SW6020A	mg/L	0.036	0.061
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00012 J/J	0.00008 U/U
Boron	D	SW6010C	mg/L	0.11	0.021 J/J
Boron	T	SW6010C	mg/L	0.11	0.02 J/J
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	160	49
Calcium	T	SW6010C	mg/L	160 /J	48 /J
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.0005 U/U	0.0005 U/U
Cobalt	D	SW6020A	mg/L	0.0011	0.000066 J/J
Cobalt	T	SW6020A	mg/L	0.0015	0.0013
Copper	D	SW6020A	mg/L	0.0006 J/J	0.00056 U/U
Copper	T	SW6020A	mg/L	0.00078 J/J	0.00056 U/U
Iron	D	SW6010C	mg/L	0.36	2.1
Iron	T	SW6010C	mg/L	1.2	1.8
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00018 U/U	0.0014
Magnesium	D	SW6010C	mg/L	39	16
Magnesium	T	SW6010C	mg/L	43	16
Manganese	D	SW6020A	mg/L	0.12 B/	0.048 B/
Manganese	T	SW6020A	mg/L	0.18	0.056
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.00061 J/J	0.0011 J/J
Molybdenum	T	SW6020A	mg/L	0.00067 J/J	0.0015 J/J
Nickel	D	SW6020A	mg/L	0.0024	0.00087 J/J
Nickel	T	SW6020A	mg/L	0.0011 J/J	0.0013 J/J
Potassium	D	SW6010C	mg/L	4.8 B/	3.2 B/
Potassium	T	SW6010C	mg/L	4.7	3 /U
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00037 U/U
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	61	39
Sodium	T	SW6010C	mg/L	58 B/	38 B/
Strontium	D	SW6010C	mg/L	0.32	0.24
Strontium	T	SW6010C	mg/L	0.32	0.22
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.046 B/	0.043 B/
Zinc	T	SW6020A	mg/L	0.048	1.1

NOTES AND ABBREVIATIONS

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mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-54A	RD-59A
			Sample Name	RD-54A_030119_01_L-03012019	RD-59A_022719_01_L-02272019
			Sample Date	3/1/2019	2/27/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.033 J/J	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.13	0.018 U/U
Antimony	D	SW6020A	mg/L	0.0004 U/U	0.00040 U/U
Antimony	T	SW6020A	mg/L	0.0004 U/U	0.00040 U/U
Arsenic	D	SW6020A	mg/L	0.00098 J/J	0.00082 J/J
Arsenic	T	SW6020A	mg/L	0.0024 J/J	0.00078 J/J
Barium	D	SW6020A	mg/L	0.044	0.076
Barium	T	SW6020A	mg/L	0.051	0.072
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.000087 J/J
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.000080 U/U
Boron	D	SW6010C	mg/L	0.025 J/J	0.085 J/J
Boron	T	SW6010C	mg/L	0.024 J/J	0.088 JB/U
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U^/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U^/U
Calcium	D	SW6010C	mg/L	110	110
Calcium	T	SW6010C	mg/L	100	110
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.00050 U/U
Chromium	T	SW6020A	mg/L	0.0014 J/J	0.00050 U/U
Cobalt	D	SW6020A	mg/L	0.00046 J/J	0.00022 J/J
Cobalt	T	SW6020A	mg/L	0.0037 B/	0.00032 J/J
Copper	D	SW6020A	mg/L	0.0009 J/J	0.0021
Copper	T	SW6020A	mg/L	0.0036,0.0035	0.0018 J/J
Iron	D	SW6010C	mg/L	0.053 J/J	0.022 U/U
Iron	T	SW6010C	mg/L	0.27 F1/J	0.022 U/U
Lead	D	SW6020A	mg/L	0.0017	0.00018 U/U
Lead	T	SW6020A	mg/L	0.0064	0.00018 U/U
Magnesium	D	SW6010C	mg/L	8 /J	32
Magnesium	T	SW6010C	mg/L	7.9	33
Manganese	D	SW6020A	mg/L	0.01	0.4
Manganese	T	SW6020A	mg/L	0.046 B/	0.42
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.001 J/J	0.0018 J/J
Molybdenum	T	SW6020A	mg/L	0.0014 J/U	0.0018 J/J
Nickel	D	SW6020A	mg/L	0.0011 J/J	0.0017 J/J
Nickel	T	SW6020A	mg/L	0.0015 J/J	0.0021
Potassium	D	SW6010C	mg/L	2.9 J/J	3.9
Potassium	T	SW6010C	mg/L	2.9 J/J	4.2
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00037 J/J
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000035 J/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	36	110 B/
Sodium	T	SW6010C	mg/L	36	110
Strontium	D	SW6010C	mg/L	0.31	0.77
Strontium	T	SW6010C	mg/L	0.31	0.78
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0014 J/J	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.32	0.0020 U/U
Zinc	T	SW6020A	mg/L	0.41 B/,0.38	0.0020 U/U

NOTES AND ABBREVIATIONS

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T - Total (Fraction)
D - Dissolved (Fraction)
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LAB / VALIDATION QUALIFIERS

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J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-59B	RD-59C	RD-64
			Sample Name	RD-59B_022719_01_L-02272019	RD-59C_022719_01_L-02272019	RD-64_021919_01_L-02192019
			Sample Date	2/27/2019	2/27/2019	2/19/2019
			Lab Name	TA-DEN	TA-DEN	TA-DEN
			Sample Type	N	N	N
Analyte	**Fraction**	**Method**	**Units**			
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.018 U/U	0.018 U/U	0.045 J/J
Antimony	D	SW6020A	mg/L	0.00040 U/U	0.0017 J/J	0.0015 J/U
Antimony	T	SW6020A	mg/L	0.00040 U/U	0.0017 J/J	0.0014 J/U
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00033 U/U	0.0022 J/J
Arsenic	T	SW6020A	mg/L	0.00033 U/U	0.00033 U/U	0.0018 J/J
Barium	D	SW6020A	mg/L	0.04	0.052	0.07
Barium	T	SW6020A	mg/L	0.038	0.048	0.070 B/
Beryllium	D	SW6020A	mg/L	0.000080 U/U	0.000091 J/J	0.00012 J/J
Beryllium	T	SW6020A	mg/L	0.000080 U/U	0.00021 J/J	0.00012 J/J
Boron	D	SW6010C	mg/L	0.073 J/J	0.079 J/J	0.060 J/J
Boron	T	SW6010C	mg/L	0.074 JB/U	0.080 JB/U	0.056 J/J
Cadmium	D	SW6020A	mg/L	0.00027 U^/U	0.00027 U^/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U^/U	0.00027 U^/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	55	33	140
Calcium	T	SW6010C	mg/L	55	32	140
Chromium	D	SW6020A	mg/L	0.00050 U/U	0.00050 U/U	0.00050 U/U
Chromium	T	SW6020A	mg/L	0.00050 U/U	0.0019 J/J	0.0013 J/J
Cobalt	D	SW6020A	mg/L	0.000054 U/U	0.000064 J/J	0.00032 J/J
Cobalt	T	SW6020A	mg/L	0.000054 U/U	0.000054 U/U	0.00048 J/J
Copper	D	SW6020A	mg/L	0.00056 U/U	0.00056 U/U	0.0011 J/J
Copper	T	SW6020A	mg/L	0.00056 U/U	0.00056 U/U	0.00087 J/U
Iron	D	SW6010C	mg/L	0.083 J/J	0.022 U/U	0.022 U/U
Iron	T	SW6010C	mg/L	0.076 J/J	0.022 U/U	0.11
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00025 J/J	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00027 J/J	0.00021 J/J	0.00030 JB/U
Magnesium	D	SW6010C	mg/L	15	11	13
Magnesium	T	SW6010C	mg/L	16	11	12
Manganese	D	SW6020A	mg/L	0.022	0.014	0.0075 B/
Manganese	T	SW6020A	mg/L	0.025	0.014	0.0092
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0014 J/J	0.0019 J/J	0.0021
Molybdenum	T	SW6020A	mg/L	0.0014 J/J	0.0016 J/J	0.0016 J/U
Nickel	D	SW6020A	mg/L	0.00030 U/U	0.00030 U/U	0.0014 J/J
Nickel	T	SW6020A	mg/L	0.00030 U/U	0.00030 U/U	0.0022
Potassium	D	SW6010C	mg/L	2.8 J/J	2 J/J	3.7
Potassium	T	SW6010C	mg/L	3	2.2 J/J	3.6
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.00037 U/U	0.00094 J/J
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.00037 U/U	0.00056 J/J
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000036 J/J
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000033 U/U	0.000033 U/U
Sodium	D	SW6010C	mg/L	100 B/	140 B/	66 B/
Sodium	T	SW6010C	mg/L	98	130	60
Strontium	D	SW6010C	mg/L	0.61	0.66	0.6
Strontium	T	SW6010C	mg/L	0.61	0.66	0.56
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U	0.0012 U^/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0012 U/U	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.0042 J/J	0.0062 J/J	0.35
Zinc	T	SW6020A	mg/L	0.0054 JF1/J	0.0026 J/J	0.37

NOTES AND ABBREVIATIONS

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TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

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U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

TABLE 15
METALS ANALYTICAL RESULTS, 2019 - AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA

			Well Identifier	RD-96	RS-18
			Sample Name	RD-96_022019_01_L-02202019	RS-18_022519_01_L-02252019
			Sample Date	2/20/2019	2/25/2019
			Lab Name	TA-DEN	TA-DEN
			Sample Type	N	N
Analyte	**Fraction**	**Method**	**Units**		
Aluminum	D	SW6010C	mg/L	0.018 U/U	0.018 U/U
Aluminum	T	SW6010C	mg/L	0.018 U/U	0.041 J/J
Antimony	D	SW6020A	mg/L	0.0004 U/U	0.00098 J/U
Antimony	T	SW6020A	mg/L	0.0004 U/U	0.0011 J/U
Arsenic	D	SW6020A	mg/L	0.00033 U/U	0.00042 J/J
Arsenic	T	SW6020A	mg/L	0.00033 U/U	0.00053 J/J
Barium	D	SW6020A	mg/L	0.039	0.064
Barium	T	SW6020A	mg/L	0.04	0.067
Beryllium	D	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Beryllium	T	SW6020A	mg/L	0.00008 U/U	0.00008 U/U
Boron	D	SW6010C	mg/L	0.012 J/J	0.092 J/J
Boron	T	SW6010C	mg/L	0.028 J/U	0.092 J/J
Cadmium	D	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Cadmium	T	SW6020A	mg/L	0.00027 U/U	0.00027 U/U
Calcium	D	SW6010C	mg/L	110	110
Calcium	T	SW6010C	mg/L	110	110
Chromium	D	SW6020A	mg/L	0.0005 U/U	0.0005 U/U
Chromium	T	SW6020A	mg/L	0.00051 J/J	0.0012 JB/U
Cobalt	D	SW6020A	mg/L	0.000064 J/J	0.00082 J/J
Cobalt	T	SW6020A	mg/L	0.00028 J/J	0.00084 J/J
Copper	D	SW6020A	mg/L	0.0019 J/J	0.0016 J/J
Copper	T	SW6020A	mg/L	0.00056 U/U	0.0011 J/J
Iron	D	SW6010C	mg/L	0.022 U/U	0.022 U/U
Iron	T	SW6010C	mg/L	0.26	0.19
Lead	D	SW6020A	mg/L	0.00018 U/U	0.00018 U/U
Lead	T	SW6020A	mg/L	0.00018 U/U	0.00041 J/J
Magnesium	D	SW6010C	mg/L	35	22
Magnesium	T	SW6010C	mg/L	36	21
Manganese	D	SW6020A	mg/L	0.0063	0.00059 J/J
Manganese	T	SW6020A	mg/L	0.028	0.0029 B/
Mercury	D	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Mercury	T	SW7470A	mg/L	0.000027 U/U	0.000027 U/U
Molybdenum	D	SW6020A	mg/L	0.0013 J/U	0.002
Molybdenum	T	SW6020A	mg/L	0.0014 JB/U	0.0022 B/
Nickel	D	SW6020A	mg/L	0.003	0.0076
Nickel	T	SW6020A	mg/L	0.0027	0.0075
Potassium	D	SW6010C	mg/L	4.9	0.64 J/J
Potassium	T	SW6010C	mg/L	4.7	0.52 J/J
Selenium	D	SW6020A	mg/L	0.00037 U/U	0.0044 J/J
Selenium	T	SW6020A	mg/L	0.00037 U/U	0.0027 J/J
Silver	D	SW6020A	mg/L	0.000033 U/U	0.000033 U/U
Silver	T	SW6020A	mg/L	0.000033 U/U	0.000038 J/U
Sodium	D	SW6010C	mg/L	48 B/	23
Sodium	T	SW6010C	mg/L	48	22
Strontium	D	SW6010C	mg/L	0.25	0.33
Strontium	T	SW6010C	mg/L	0.27	0.32
Thallium	D	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Thallium	T	SW6020A	mg/L	0.000089 U/U	0.000089 U/U
Tin	D	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Tin	T	SW6020A	mg/L	0.00077 U/U	0.00077 U/U
Vanadium	D	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Vanadium	T	SW6020A	mg/L	0.0012 U/U	0.0012 U/U
Zinc	D	SW6020A	mg/L	0.017 F1/	0.0051 J/J
Zinc	T	SW6020A	mg/L	0.002 U/U	0.0029 J/J

NOTES AND ABBREVIATIONS

All non-detection values are reported using the Method Detection Limit (MDL)

mg/L - miligrams per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
TA-DEN - Test America Denver, Colorado

LAB / VALIDATION QUALIFIERS

^ - Instrument related QC is outside acceptance limits.
B - Compound was found in the blank and sample.
F1 - MS/MSD %Rec and/or RPD exceeds the control limits.
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.

FIGURES

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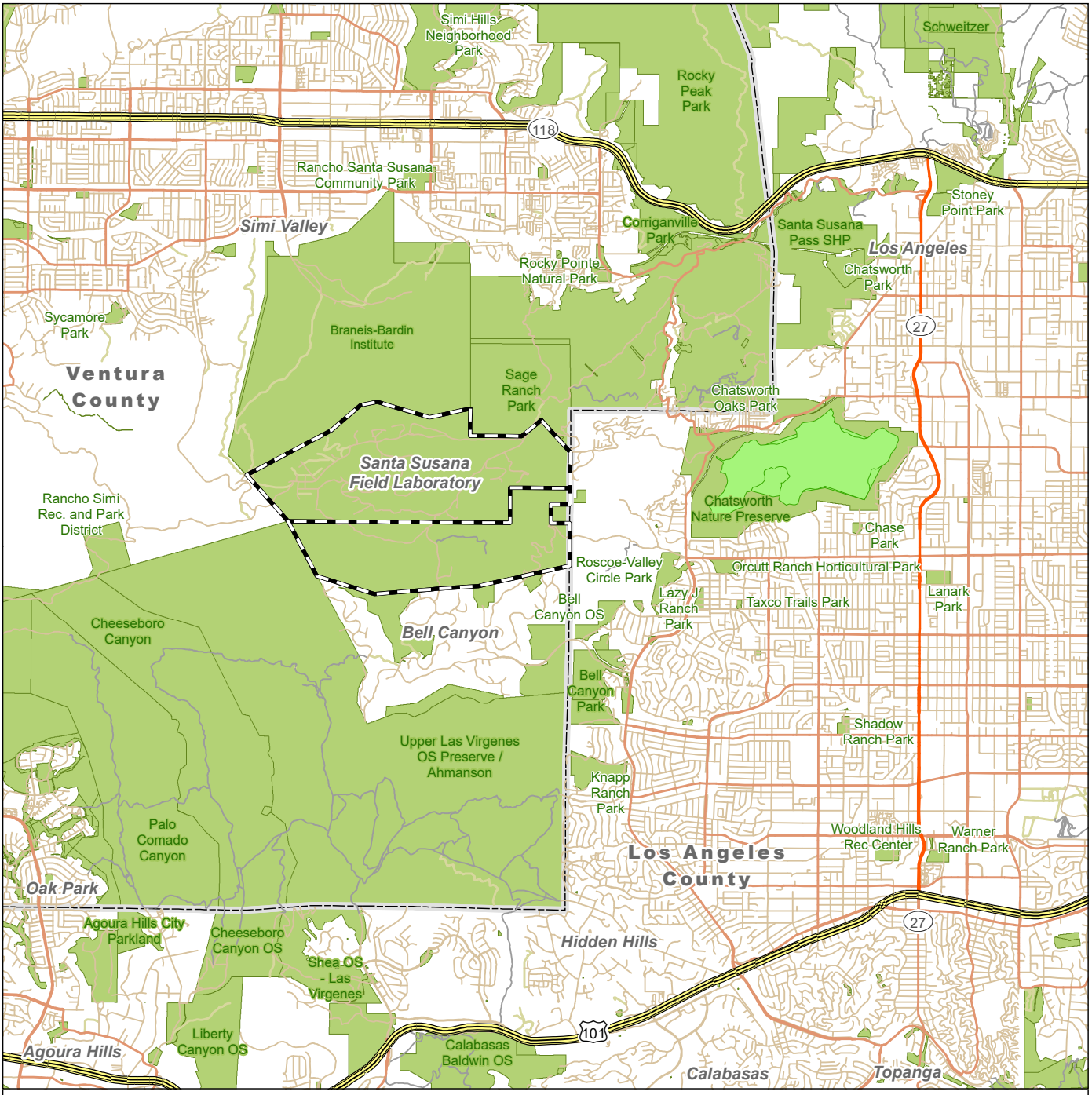


Legend

- Primary Limited Acess or Interstate
- Primary US and State Highways
- Secondary State and County Highways
- Local Street
- 4WD
- Other Thoroughfare
- Park or Open Space
- SSFL Property Boundary
- County Boundary

N

0 0.75 1.5 Miles

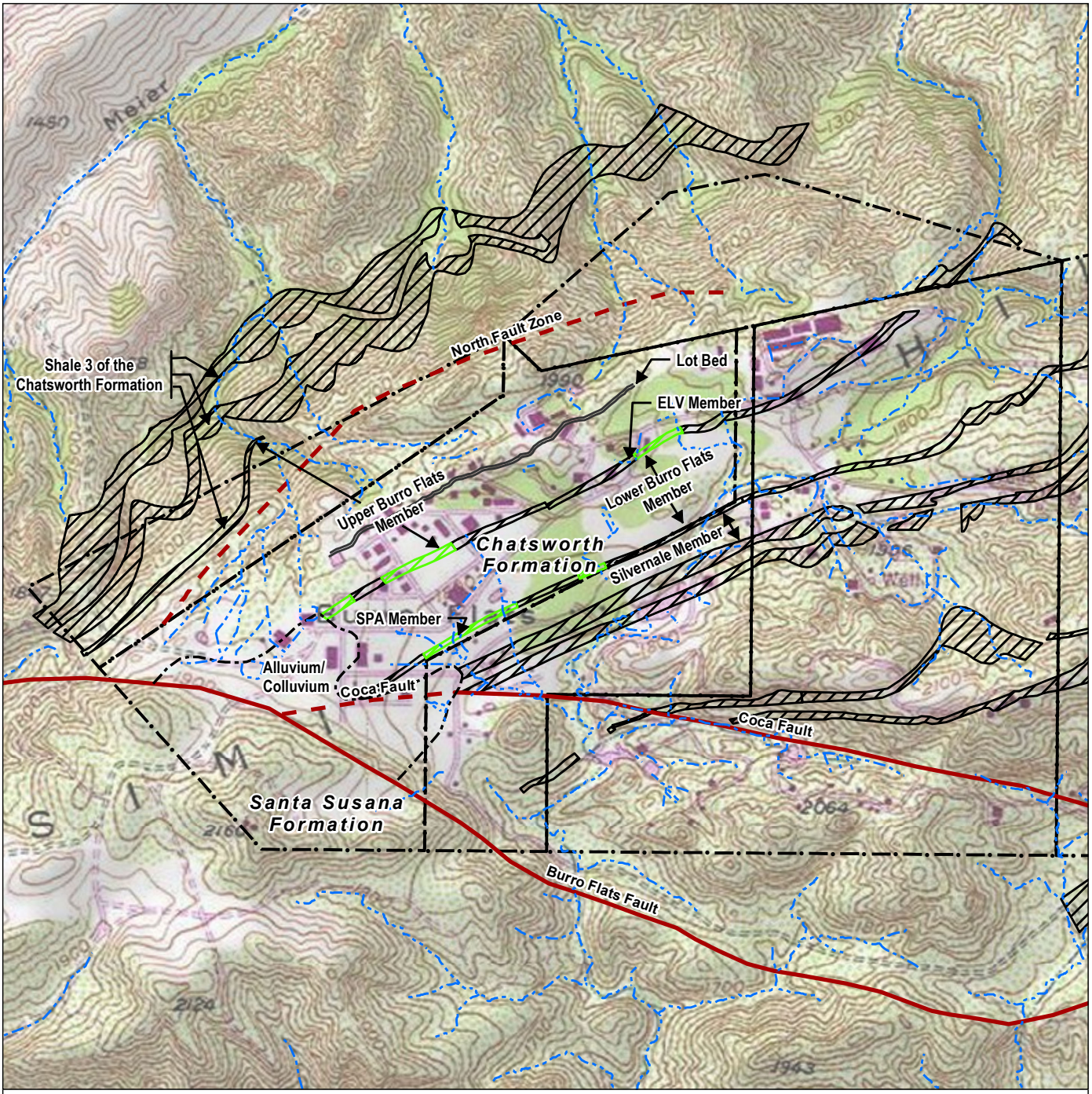
Notes:
- Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.

Service Layer Credits:
- Park and Open Space Source: California Protected Areas Database (CPAD - www.calands.org), Santa Monica Mountains Conservancy, Mountains Recreation and Conservation Authority, National Park Service (2013); Protected Areas Database, US Geological Survey Gap Analysis Program, 2011; Ventura County Resource Management Agency, 2014.
- Street Source: Esri, TomTom, 2007.
- Census County Boundary Source: United States Census Bureau, TIGER/Line Shapefiles, August 2014.

NORTHWIND INC.

C:\Temp\ETEC\Project\SSFL Annual Groundwater Report\2018\Fig 1_SSFL_2018GWAnnual_Facility_Location.mxd

FIGURE 1
Facility Location Map



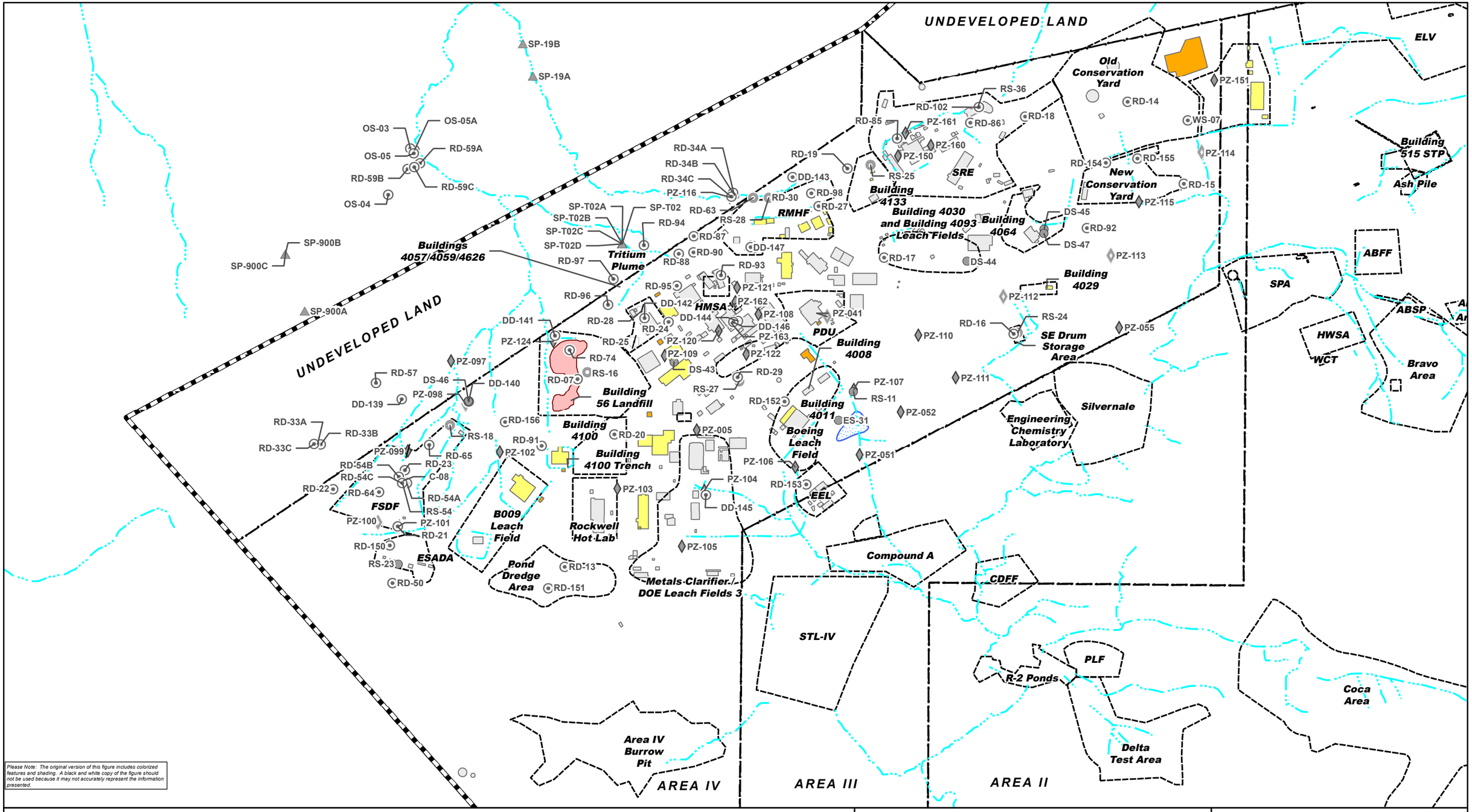
Notes:
- Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
- Geologic data provided by MWH from Draft Site-wide Groundwater Remedial Investigation Report (MWH, 2009).

Service Layer Credits:
- Topo Source: Copyright:© 2013 National Geographic Society, i-cubed

NORTHWIND INC.

C:\Temp\ETEC\Project\SSFL Annual Groundwater Report\2018\Fig 2_SSFL_2018GWAnnual_AreaIV_Geology.mxd

FIGURE 2
SSFL Geologic Map



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Drainage
- RI Site Boundary
- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.

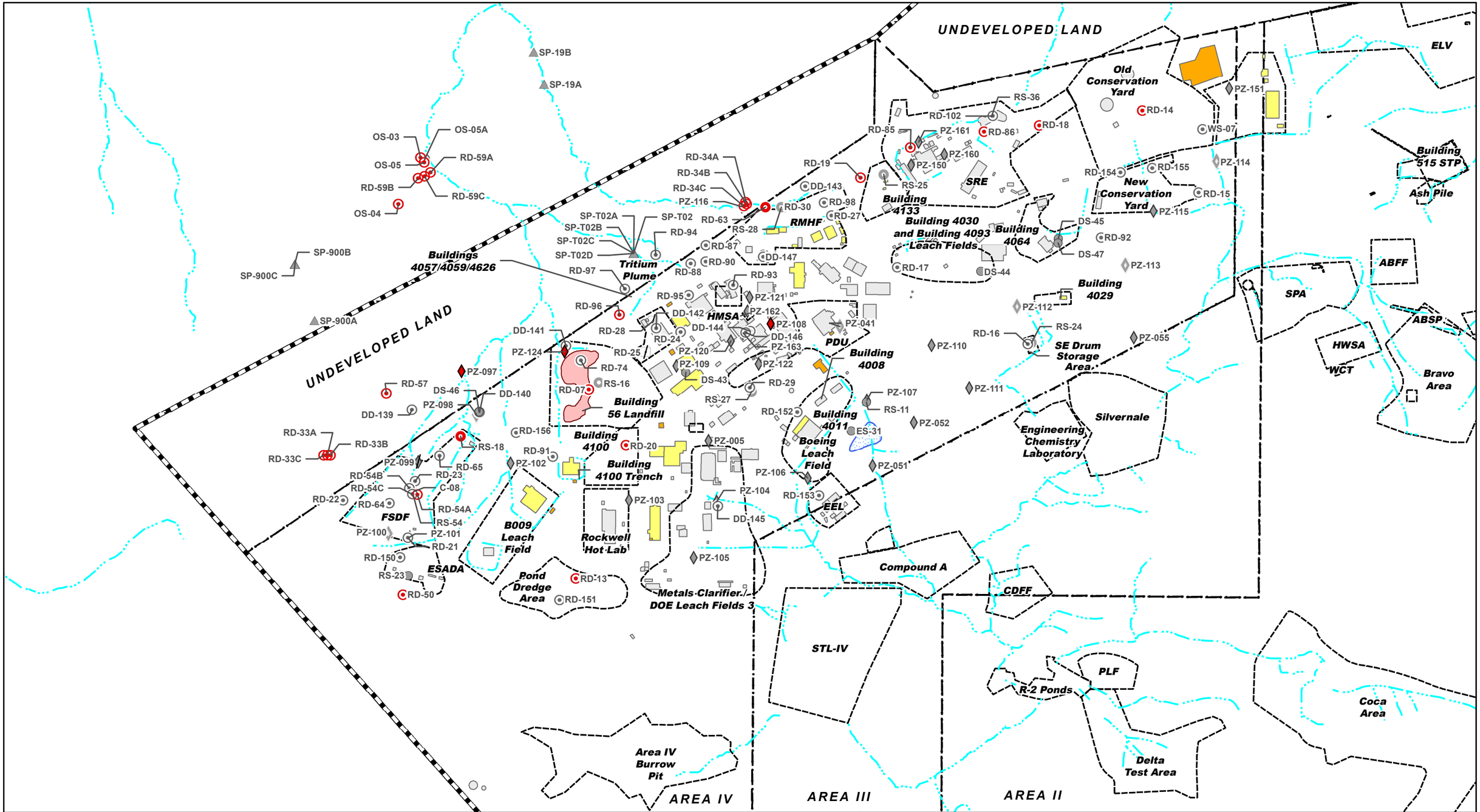
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND INC.

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
LOCATION OF WELLS, PIEZOMETERS, AND SEEPS
FIGURE 3

C:\Temp\ETEC\Project\SSFL Annual Groundwater Report\2018\Fig 3_SSFL_2018GWAnnual_Well_PZ_Seep_Locs_11x17.mxd



Symbol Color for Site-wide and LUFT Program Monitoring Locations

- Site-wide Program

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Drainage
- RI Site Boundary
- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.

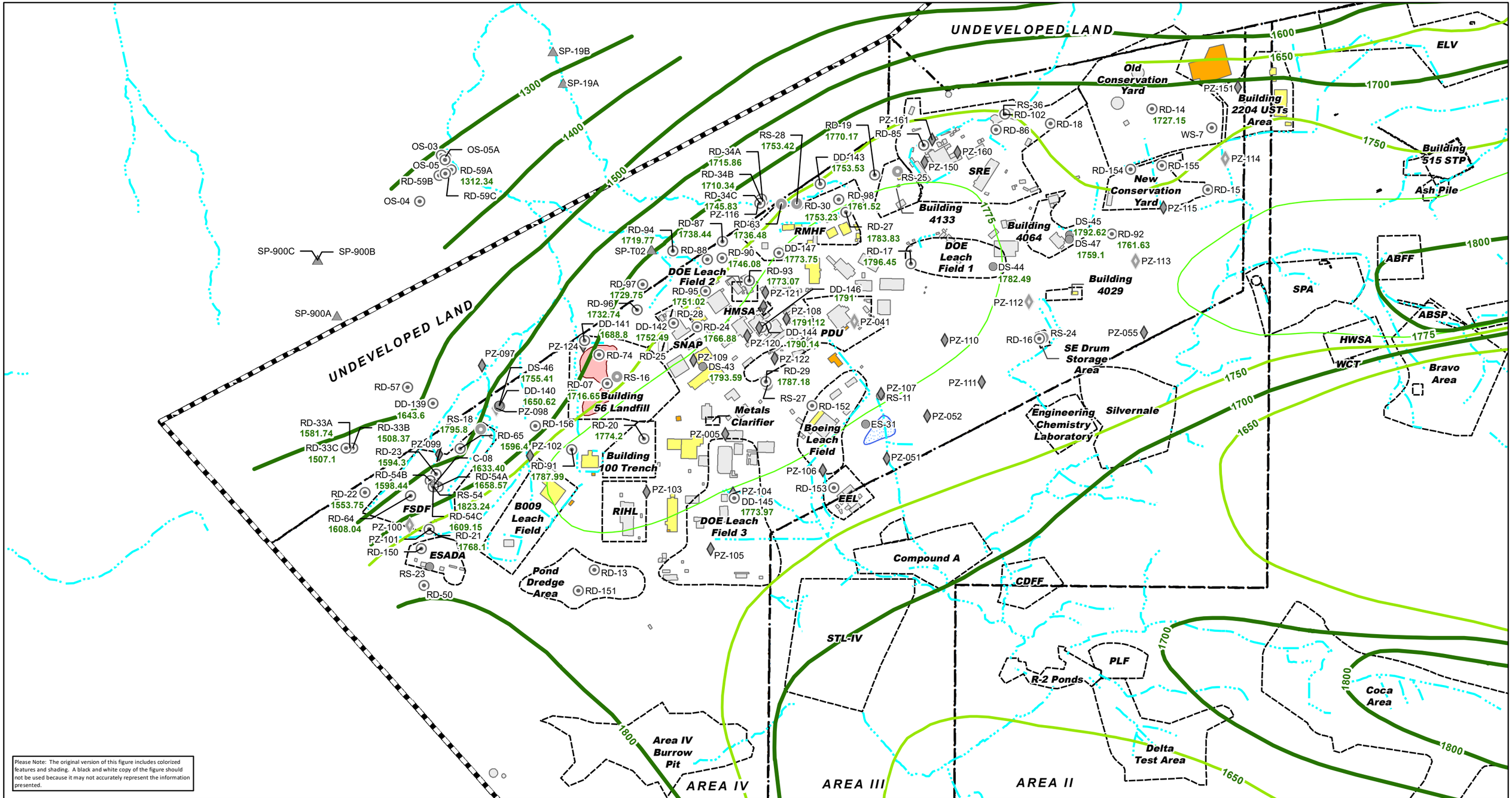
1 inch = 550 feet

0 275 550 825 1,100 *Feet*

NORTHWIND INC.

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
SITE-WIDE PROGRAM MONITORING LOCATIONS
FIGURE 4

C:\Temp\ETEC\Project\SSFL Annual Groundwater Report\2018\Fig 4_SSFL_2018GWAnnual_SWP_MW_Locs_11x17.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Drainage
- RI Site Boundary
- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Approximate Groundwater Elevation Contours (feet above sea level)

- 25-foot Contour
- 50-foot Contour
- 100-foot Contour
- 1724.99 Groundwater Level Elevation in feet above mean sea level

Notes:
Original GIS layers provided by MWH/Boeing; Updated by North Wind Inc. as needed
Information used to develop the groundwater elevation contours includes topography; the approximate elevations of identified seeps and springs; water levels measured in seep piezometers gauged during 2019; historical water level data for wells and piezometers not gauged during 2019; and the recognition that groundwater level discontinuities coincide with certain fault segments and other geologic structures. Elevations at DD-139, DS-46, RS-18, and RS-54 were

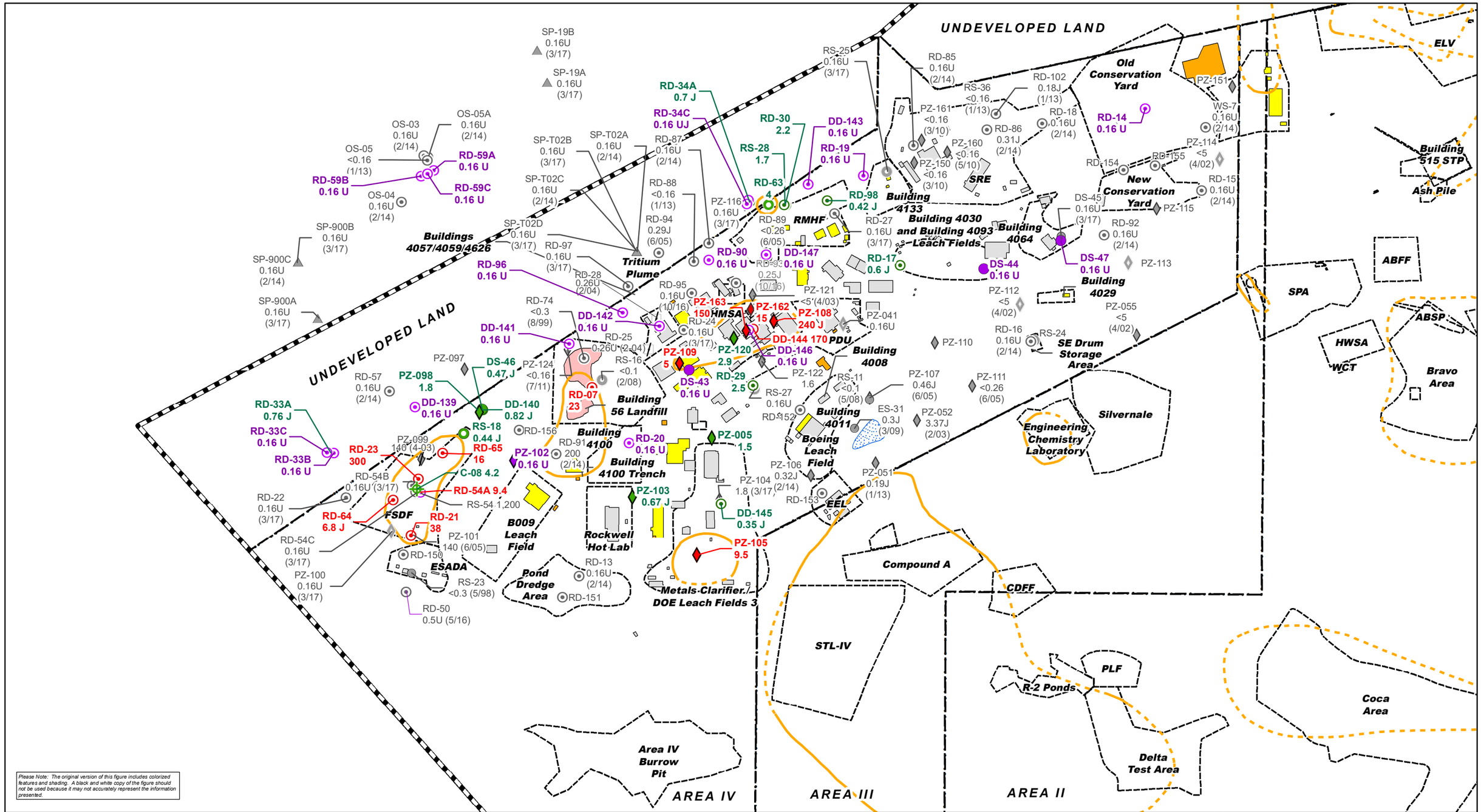
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND INC.

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
GROUNDWATER ELEVATION CONTOUR MAP, 4th Quarter 2019
FIGURE 5

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 5_SSFL_2019GW Annual_Q4_GW_Contours.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- Trichloroethene in Groundwater above Primary MCL of 5 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

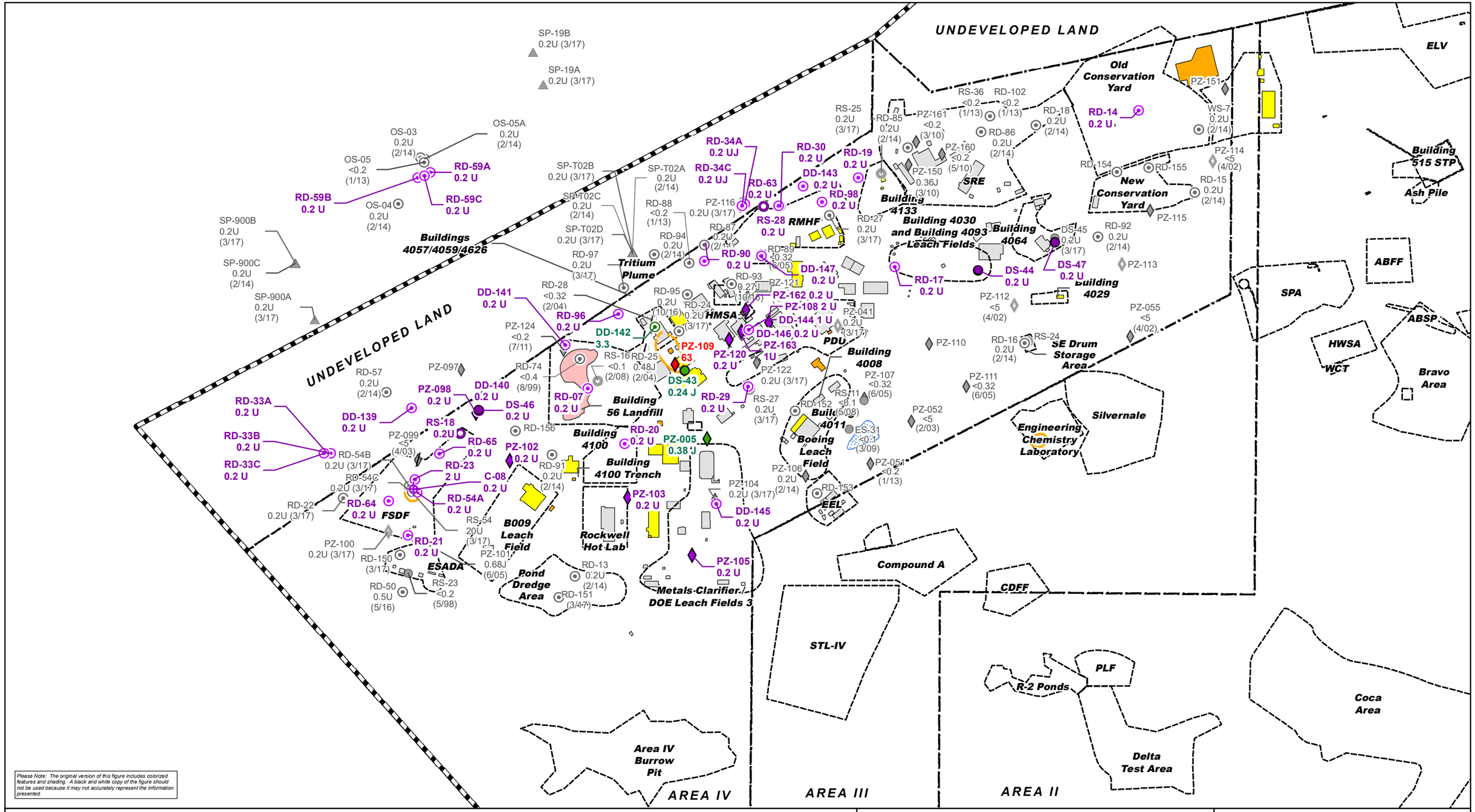
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF TRICHLOROETHENE IN GROUNDWATER, 2019
FIGURE 6

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 6_SSFL_2019GWAnnual_TCE.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results
- Detected above MCL
- Detected above detection limit, below MCL
- Not Detected above detetion limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater
- *Trichloroethene in Groundwater above Primary MCL of 5 ug/L (boundary dashed where inferred)*

Well Type and Groundwater Zone

Groundwater Monitoring Wells
- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers
- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs
- Seep/spring

Other
- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap
- Area IV Boundary
- SSFL Property Boundary

Structures
- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
GIS layers provided by MWH/Boeing.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

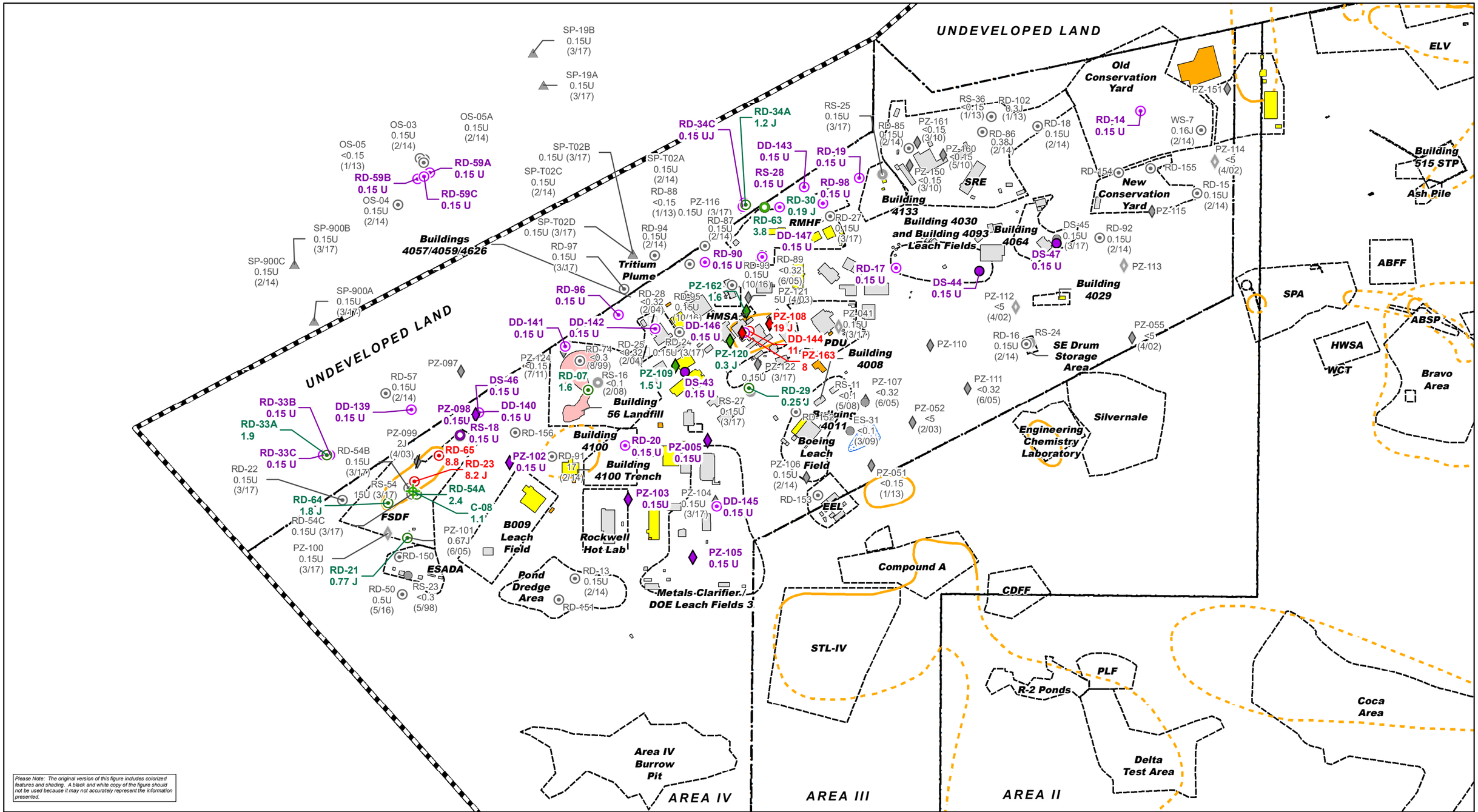
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF TETRACHLOROETHENE IN GROUNDWATER, 2019
FIGURE 7

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 7_SSFL_2019GWAnnual_PCE.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- cis-1,2-Dichloroethene in Groundwater above Cal MCL of 6 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

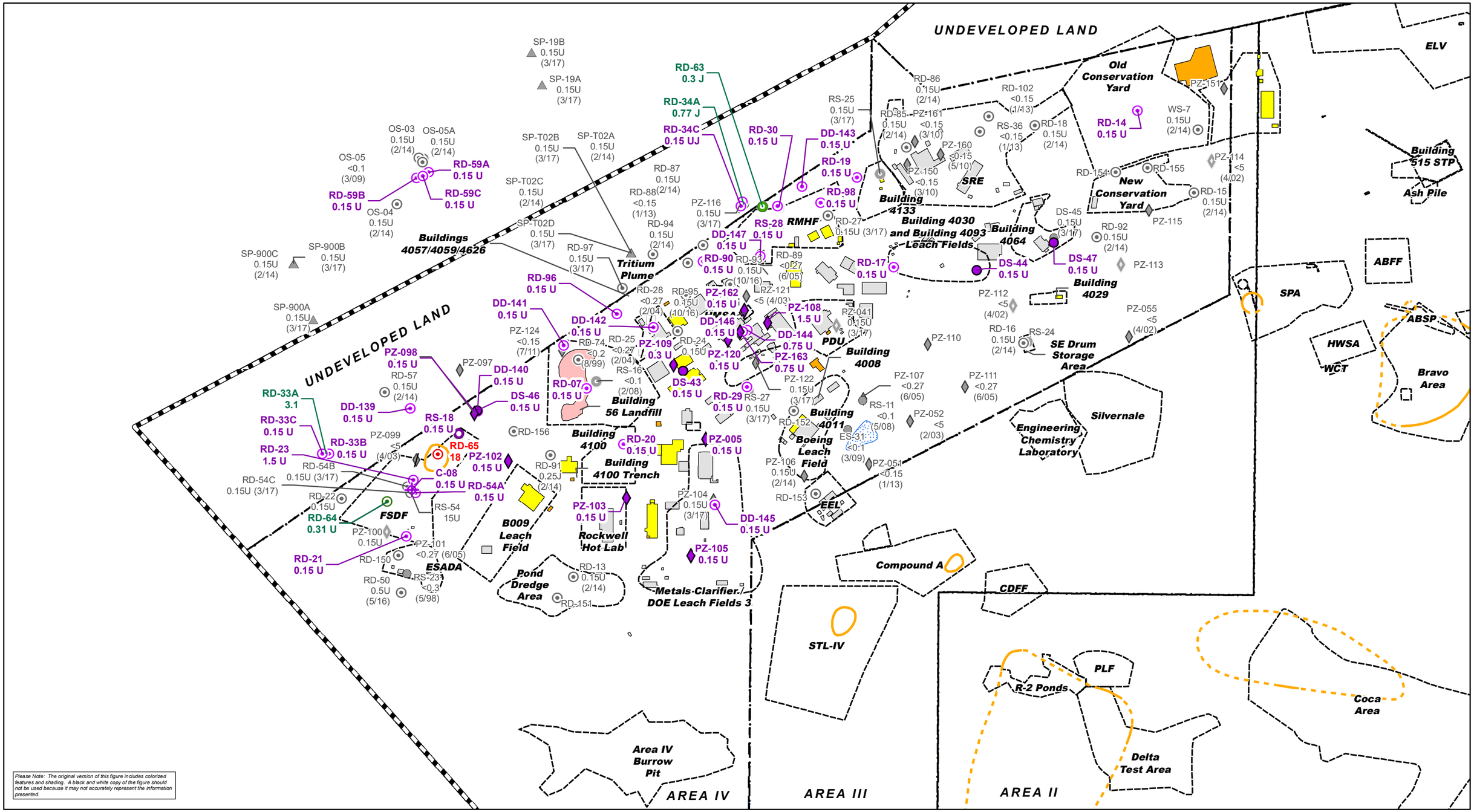
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF CIS-1,2-DICHLOROETHENE IN GROUNDWATER, 2019
FIGURE 8

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 8_SSFL_2019GWAnnual_cis12DCE.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above screening level
- Detected below screening level
- Not Detected
- Available Well/Piezometer

Areas of Impacted Groundwater

- trans-1,2-Dichloroethene in Groundwater above Cal MCL of 10 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

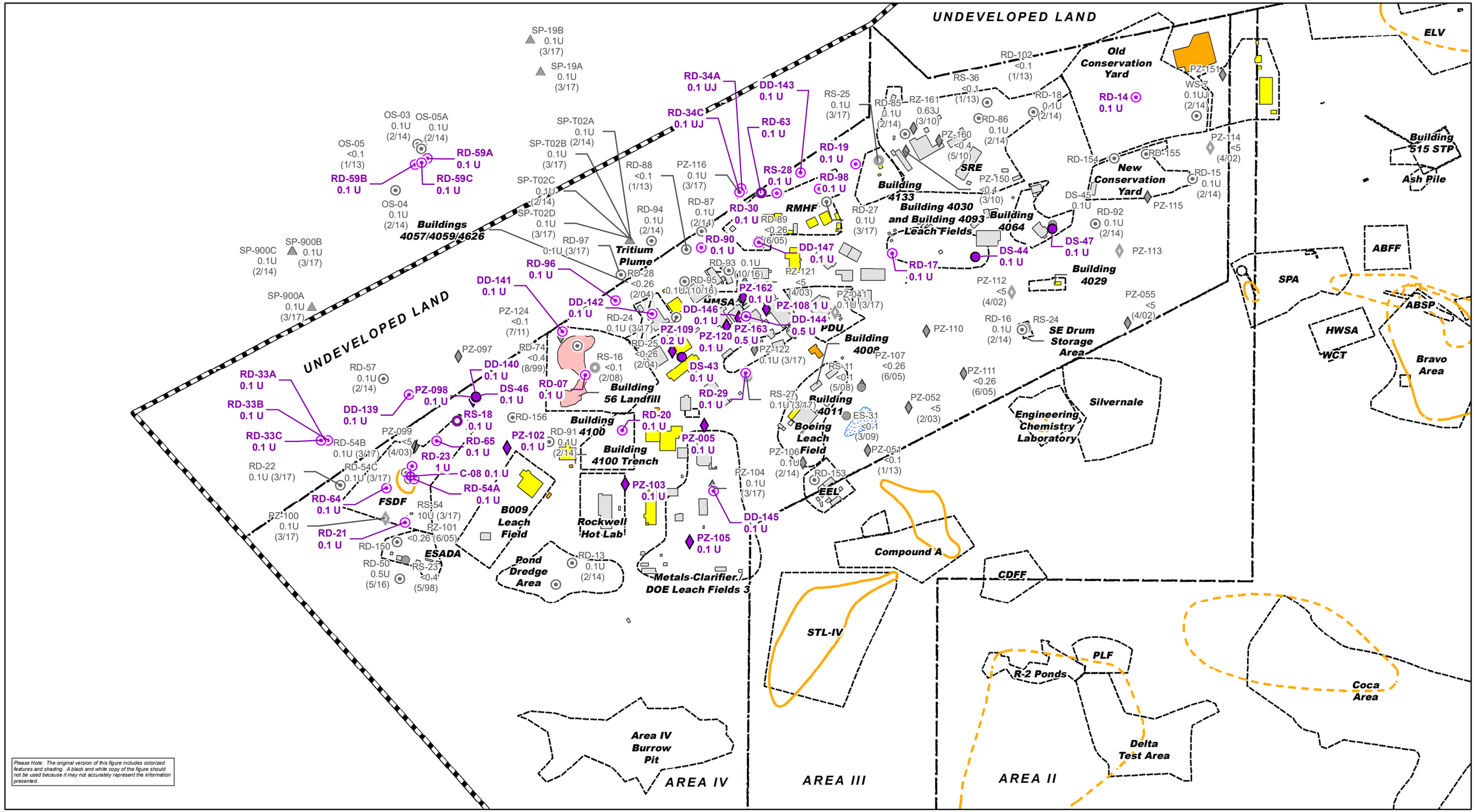
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF TRANS-1,2-DICHLOROETHENE IN GROUNDWATER, 2019
FIGURE 9

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 9_SSFL_2019GWAnnual_trans12DCE.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color fo 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- Vinyl Chloride in Groundwater above Cal MCL of 0.5 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

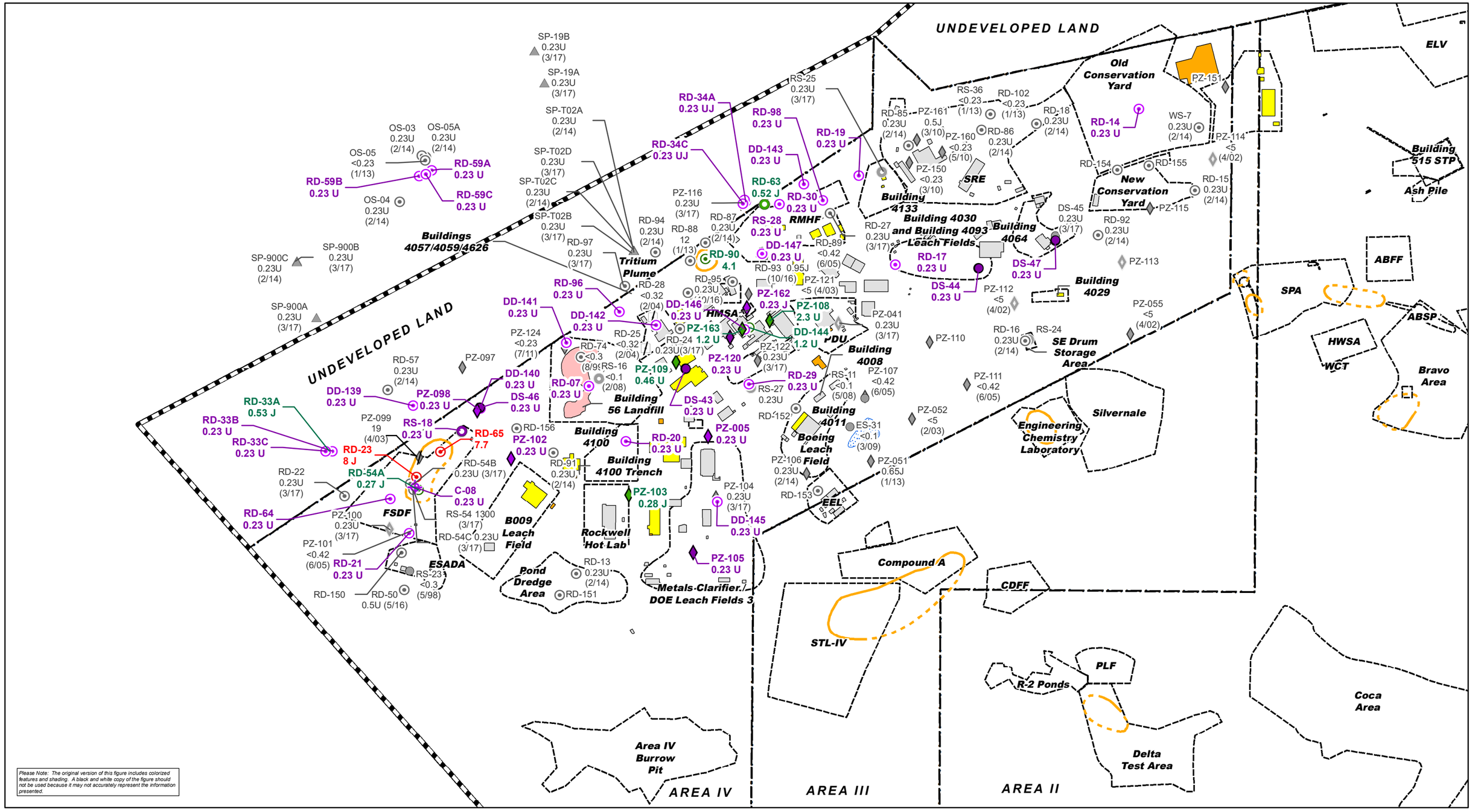
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF VINYL CHLORIDE IN GROUNDWATER, 2019
FIGURE 10

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 10_SSFL_2019GWAnnual_VinylChloride.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color fo 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- 1,1-Dichloroethene in Groundwater above Cal MCL of 6 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

1 inch = 550 feet

0 275 550 825 1,100 Feet

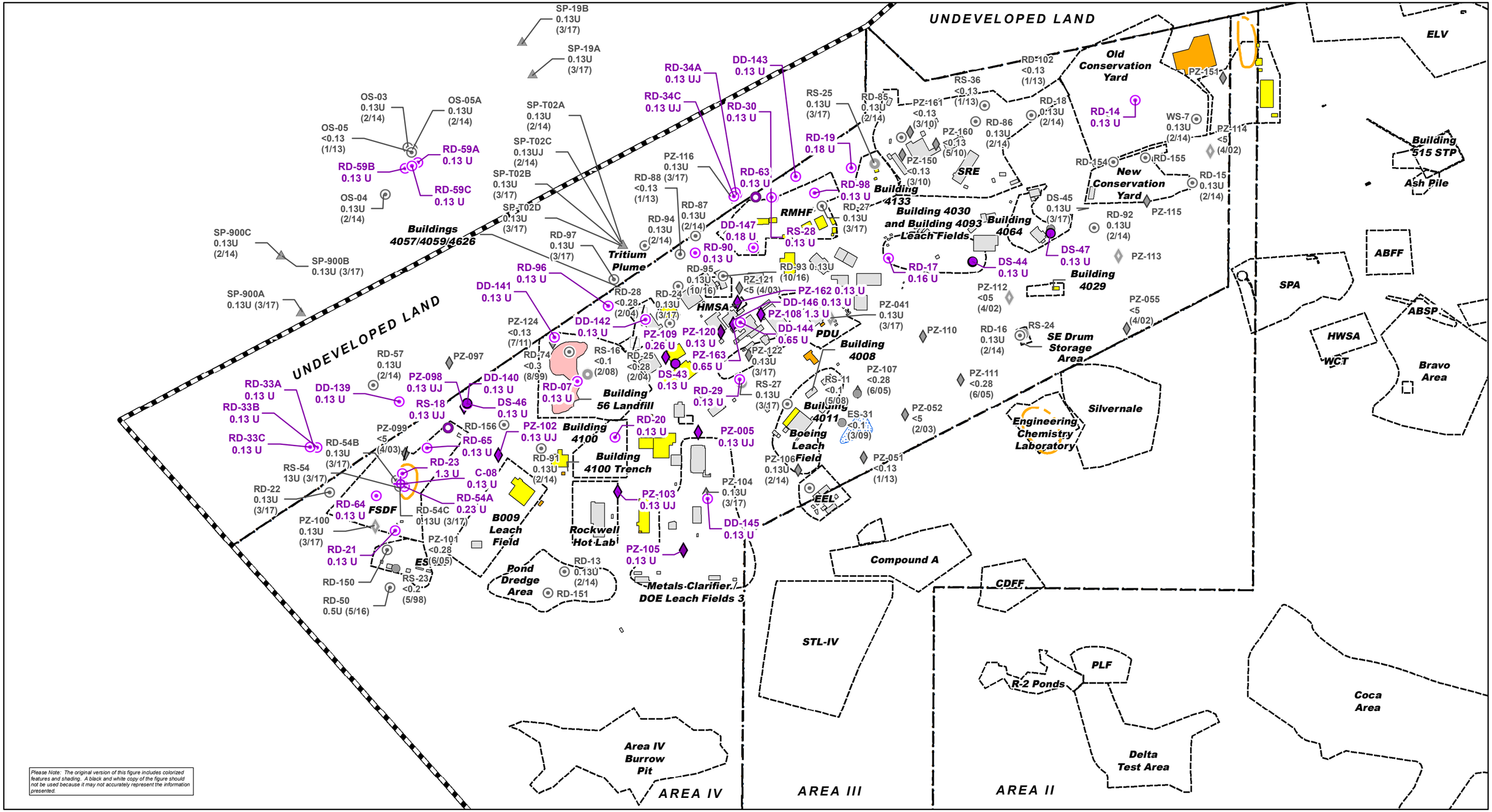
NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV

EXTENT OF 1,1-DICHLOROETHENE IN GROUNDWATER, 2019

FIGURE 11

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 11_SSFL_2019GWAnnual_11DCE_11x17.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- 1,2-Dichloroethane in Groundwater above Cal MCL of 0.5 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

1 inch = 550 feet

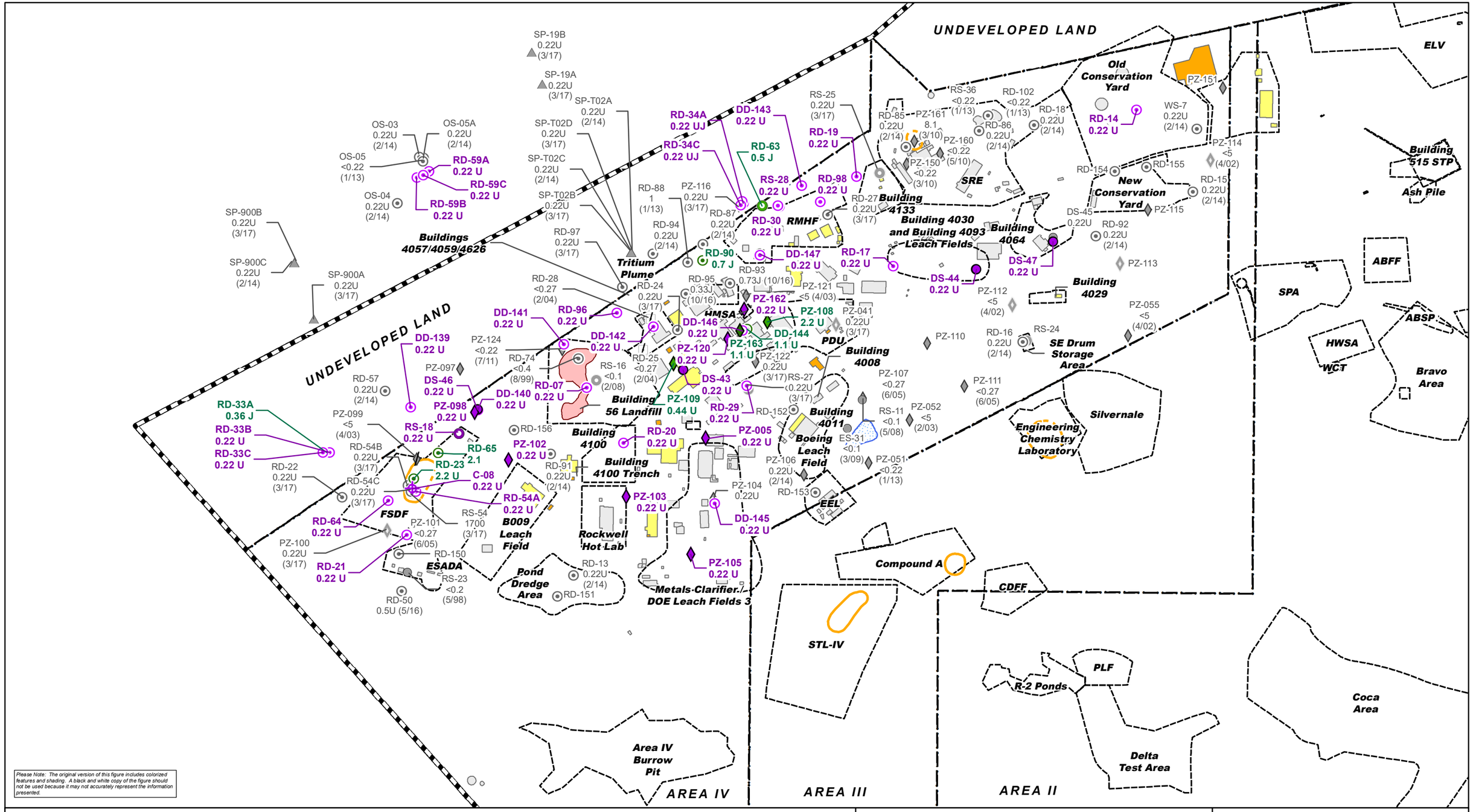
0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV

EXTENT OF 1,2-DICHLOROETHANE IN GROUNDWATER, 2019
FIGURE 12

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 12_SSFL_2019GWAnnual_12DCA.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color fo 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- 1,1-Dichloroethane in Groundwater above Cal MCL of 5 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

1 inch = 550 feet

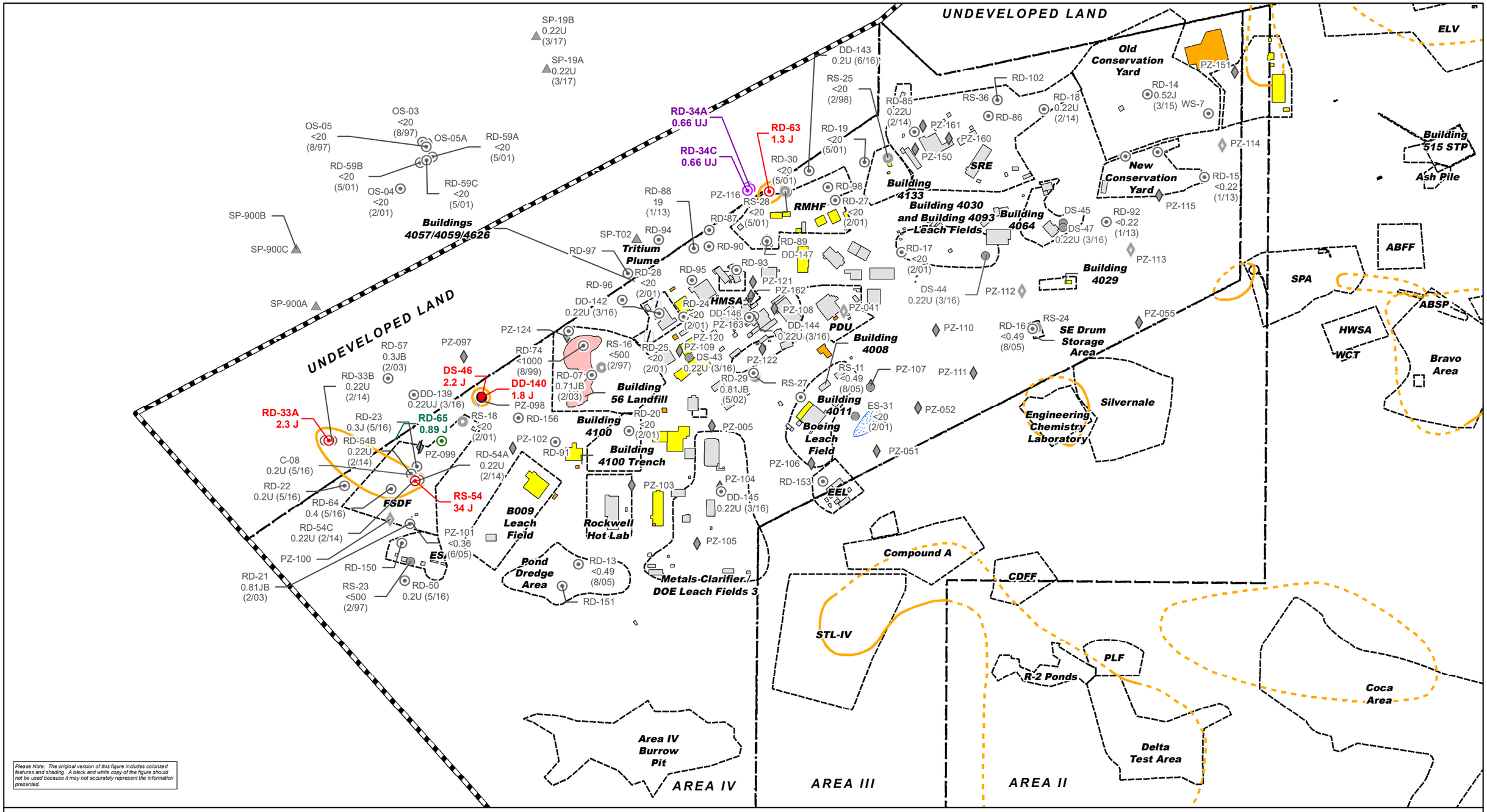
0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV

EXTENT OF 1,1-DICHLOROETHANE IN GROUNDWATER, 2019
FIGURE 13

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 13_SSFL_2019GWAnnual_11DCA.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- 1,4-Dioxane in Groundwater above Primary MCL of 1 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

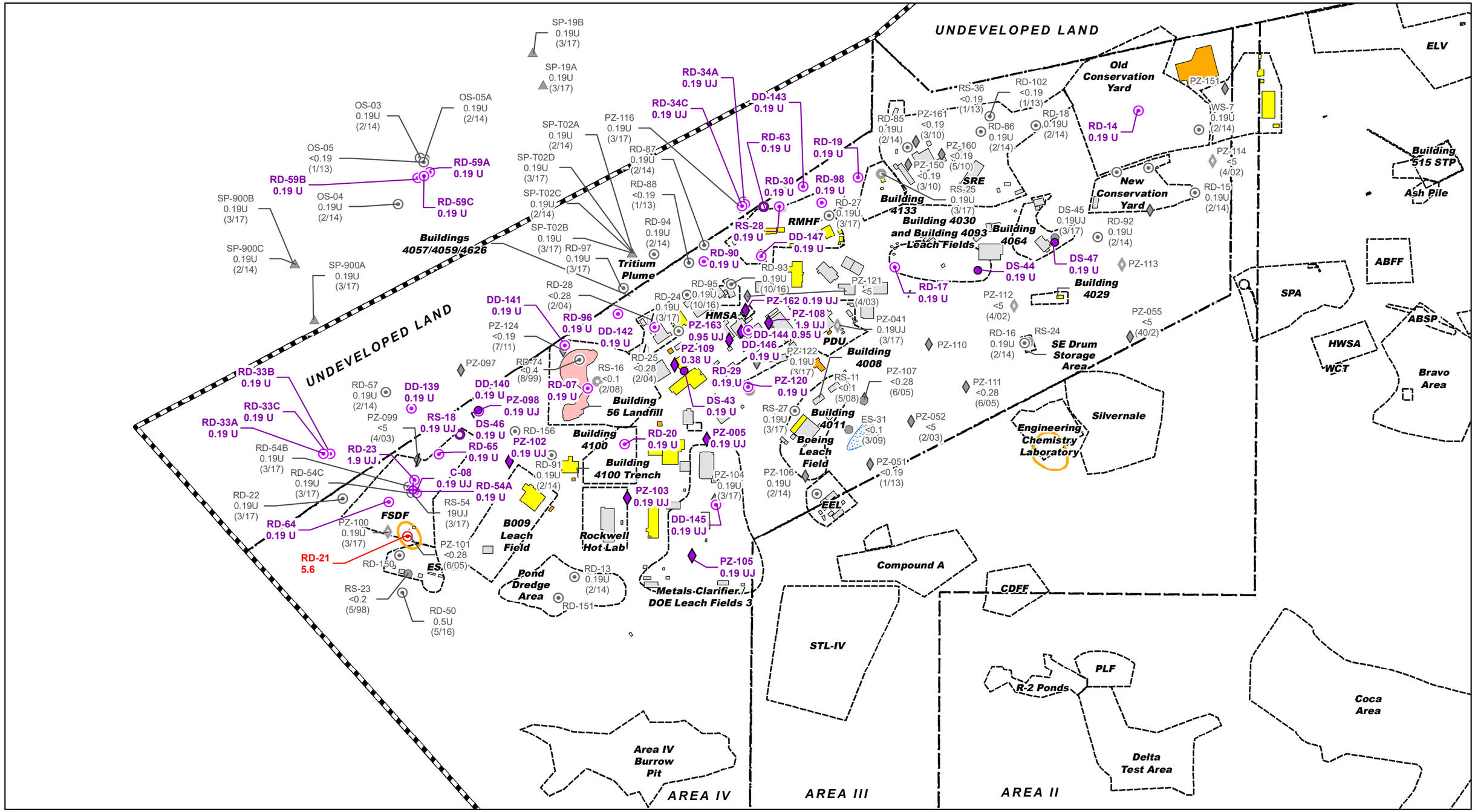
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF 1,4-DIOXANE IN GROUNDWATER, 2019
FIGURE 14

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 14_SSFL_2019GWAnnual_14Dioxane.mxd



Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- Carbon Tetrachloride in Groundwater above Cal MCL of 0.5 ug/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

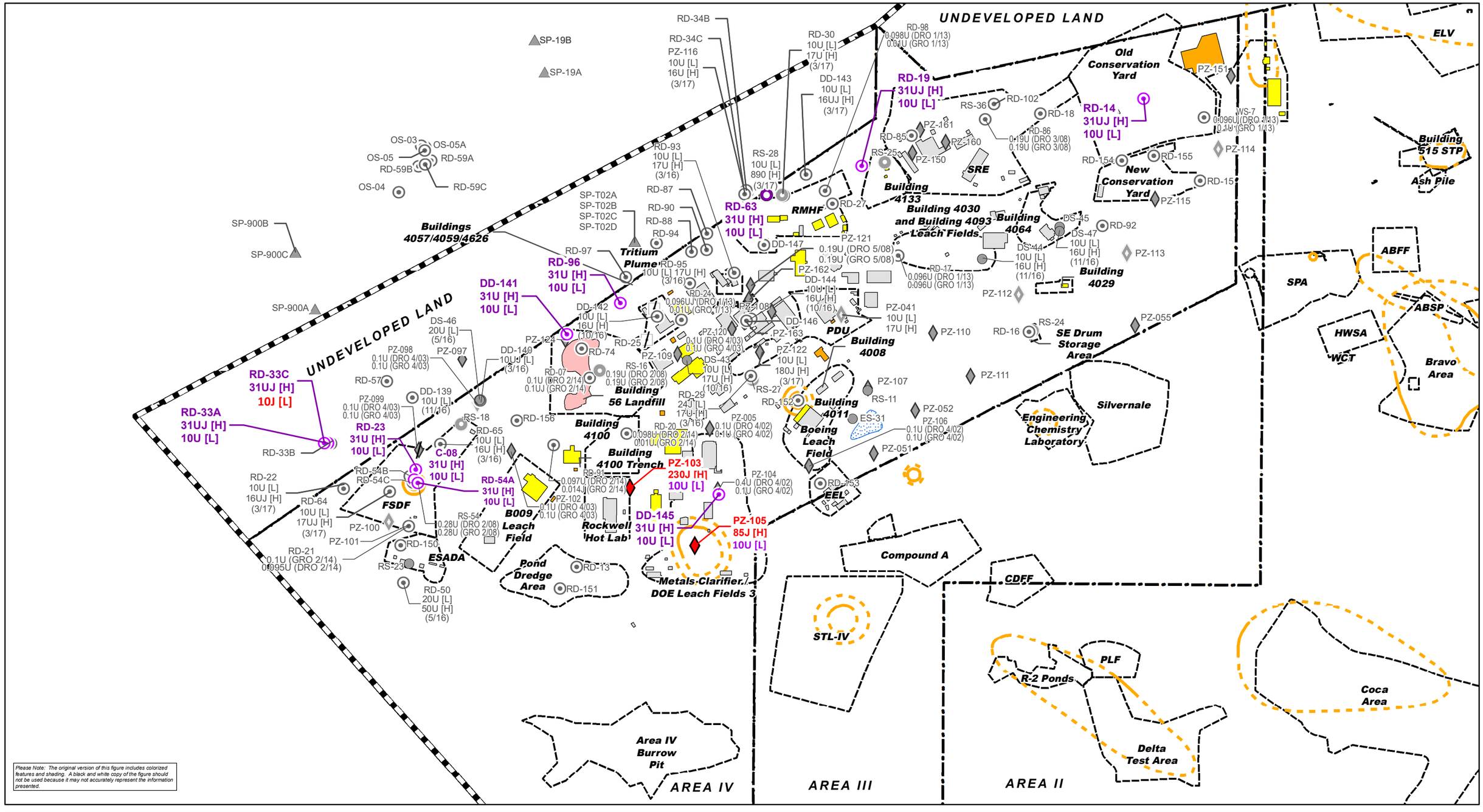
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF CARBON TETRACHLORIDE IN GROUNDWATER, 2019
FIGURE 15

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 15_SSFL_2019GWAnnual_CarbonTetrachloride_11x17.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color fo 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- TPH in Groundwater above Taste/Odor Threshold of 100 ug/L for Heavy TPH, and reporting limit of 5 ug/L for Light TPH

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in micrograms per liter (ug/L) detected in 2019 at each location. Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses. Only primary results shown. Historical TPH results are identified as GRO or DRO on the figure. For 2019, sample results have been identified as Light or Heavy in order to address the overlap in carbon ranges. The Light category consists of EFH C12-C14, EFH C8-C11, GRO C5-C12, GRO C6-C12, and GRO C6-C10. The Heavy category consists of DRO C10-C28, EFH C15-C20, EFH C21—C30, and EFH C30-C40. The GRO from the historical results is considered to be a Light TPH and the DRO is considered to be a Heavy TPH.

1 inch = 550 feet

0 275 550 825 1,100 Feet

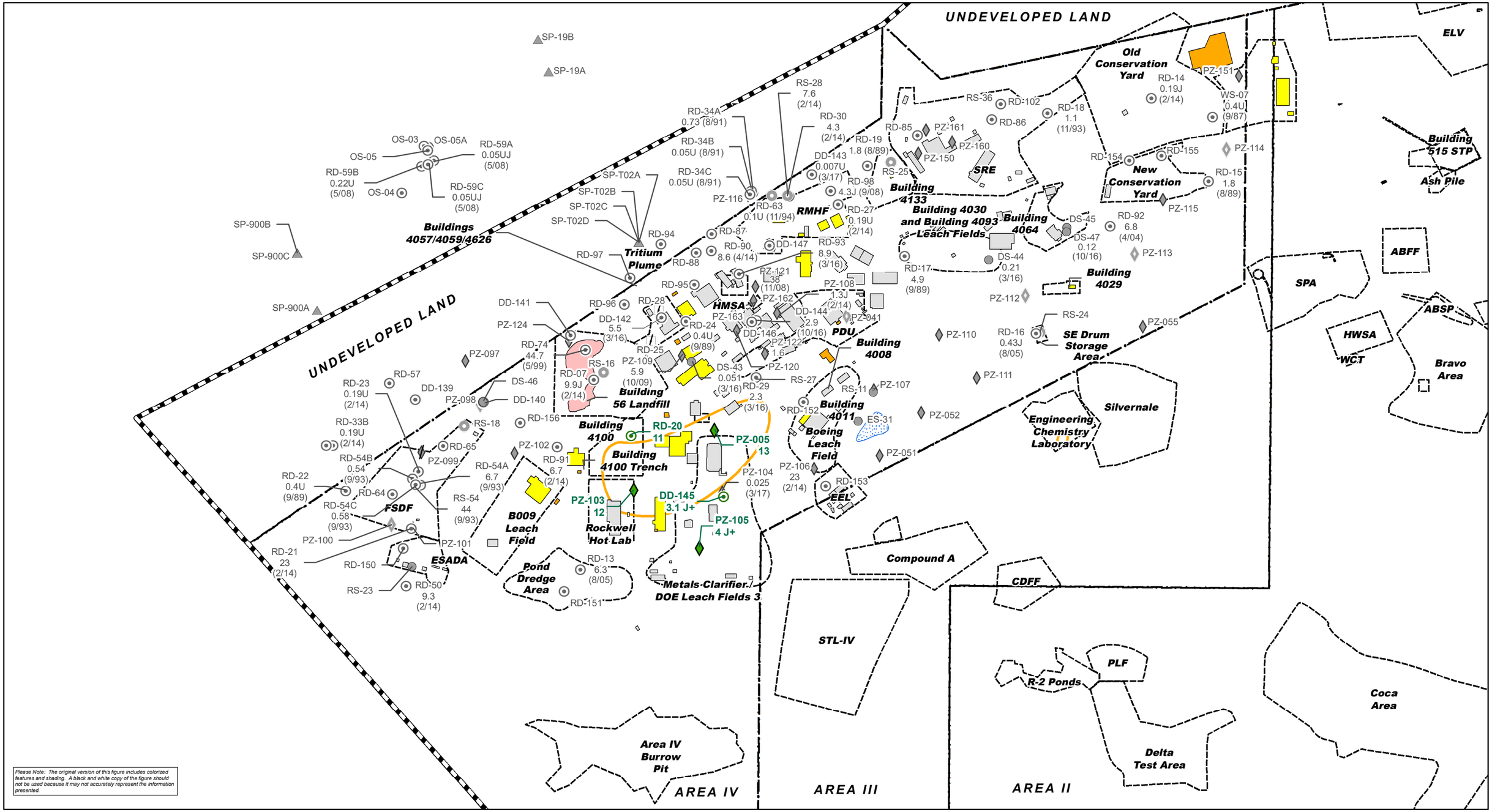
NORTHWIND

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV

EXTENT OF TOTAL PETROLEUM HYDROCARBONS C4-C30 IN GROUNDWATER, 2019

FIGURE 16

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 16_SSFL_2019GWAnnual.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- Nitrate-N in Groundwater above Cal MCL of 10 mg/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smithas needed.
Values posted beneath well identifiers are maximum concentrations in milligrams per liter (mg/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

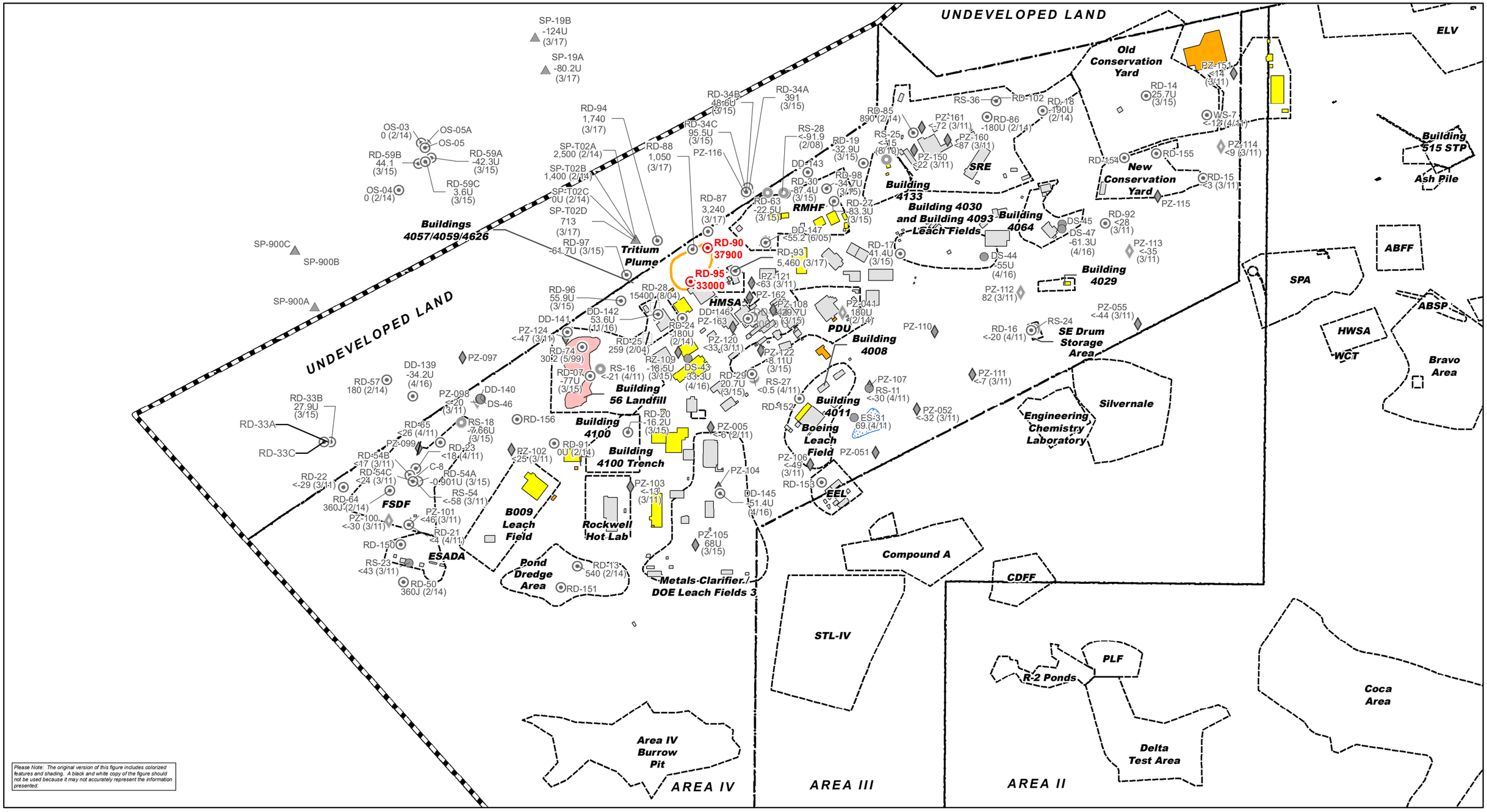
1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF NITRATE IN GROUNDWATER, 2019
FIGURE 17

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 17_SSFL_2019GWAnnual_Nitrate.mxd



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

Legend

Symbol Color for 2019 Groundwater Results

- Detected above MCL
- Detected above detection limit, below MCL
- Not detected above detection limits (ND)
- Well/Piezometer not sampled/analyzed

Areas of Impacted Groundwater

- Tritium in Groundwater above Primary MCL of 20,000 pCi/L (boundary dashed where inferred)

Well Type and Groundwater Zone

Groundwater Monitoring Wells

- Groundwater Monitoring Well, Perched
- Groundwater Monitoring Well, Near Surface
- Groundwater Monitoring Well, Chatsworth Formation

Piezometers

- Piezometer, Perched
- Piezometer, Near Surface

Seeps/Springs

- Seep/spring

Other

- Abandoned Well
- Abandoned Piezometer
- Corehole

Basemap

- Area IV Boundary
- SSFL Property Boundary

Structures

- Existing Landfill
- Existing Structure
- Existing Substation
- Former Pond
- Demolished Structure

Notes:
Original GIS layers provided by MWH/Boeing; updated by CDM Smith as needed.
Values posted beneath well identifiers are maximum concentrations in picocuries per liter (pCi/L) detected in 2019 at each location.
Values posted at location with no 2019 results are for the most recent analytical result with collection date shown in parentheses.
Only primary results shown.

1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND A CIRI COMPANY

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
EXTENT OF TRITIUM IN GROUNDWATER, 2019
FIGURE 18

Q:\Salt Lake City\Salt Lake\GIS\ETEC\MXDs\Fig 18_SSFL_2019GWAnnual_Tritium.mxd

APPENDIX A
Monitoring Well and Piezometer Construction Data

Table A-1 Well Construction Data

Table A-2(a, b) Construction Details of Piezometer Monitoring System

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TABLE A-1
WELL CONSTRUCTION DATA
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well Identifier	Area No.	Effective Borehole Depth (feet)	Borehole		Casing		Sealed Interval (feet)	Perforated Interval (feet)	Measuring Point Elevation (ft MSL)	Date Drilling Completed
			Diameter (inches)	Interval (feet)	Inside Diameter (inches)	Interval (feet)				
SHALLOW WELLS										
DS-43	IV	84	14	0 - 10	6	0 - 28	0 - 28		1809.52	02/10/16
			9-7/8	10-28	---	---				
			5-7/8	28 - 84	---	---		Open Hole		
			3-11/16	84 - 93	---	---		Open Hole		
DS-44	IV	91	14	0 - 10	6	0 - 19	0 - 19		1851.21	01/20/16
			9-7/8	10 - 19	---	---				
			5-7/8	19 - 91	---	---		Open Hole		
DS-45	IV	75	14	0 - 9	6	0 - 18	0 - 18		1866.58	01/28/16
			9-7/8	9 - 18	---	---				
			5-7/8	18 - 75	---	---		Open Hole		
			3-11/16	75 - 95	---	---		Open Hole		
DS-46	IV	52	14	0 - 5	6	0 - 37	0 - 37		1797.79	02/24/16
			9-7/8	5 - 37	---	---				
			5-7/8	37 - 52	---	---		Open Hole		
DS-47	IV	145	14	0 - 10	6	0 - 19	0 - 19		1867.94	03/17/16
			9-7/8	10 - 19	---	---				
			5-7/8	19 - 145	---	---		Open Hole		
RS-11	IV	17.5	16	0 - 17.5	4	0 - 17.5	0 - 9	10 - 17.5	1790.39	06/10/85
RS-16	IV	20.5	16	0 - 20.5	4	0 - 20.5	0 - 14.5	16.5 - 20.5	1811.05	06/11/85
RS-18	IV	13	16	0 - 13	4	0 - 13	0 - 6	7.5 - 13	1802.86	06/12/85
RS-19	I	15	16	0 - 15	4	0 - 15	0 - 4.8	4.8 - 15	1812.42	09/12/85
RS-20	I	20.5	16	0 - 20.5	4	0 - 20.5	0 - 8.5	10.5 - 20.5	1823.77	09/12/85
RS-21	II	29	16	0 - 29	4	0 - 24.6	0 - 3.5	14.5 - 24.6	1767.36	10/23/85
RS-22	II	31	16	0 - 31	4	0 - 31	0 - 4	21 - 31	1771.23	10/23/85
RS-23	IV	13	12	0 - 13	4	0 - 13	0 - 6.8	8 - 13	1887.25	08/23/88
RS-24	IV	8.5	12	0 - 8.5	4	0 - 8.5	0 - 3	4 - 8.5	1809.24	08/25/88
RS-25	IV	13.5	Trenched	0 - 13.5	4	0 - 13.5	0 - 2	8.5 - 13.5	1862.71	08/25/88
RS-27	IV	9	8	0 - 9	4	0 - 9	0 - 3	5 - 9	1804.78	08/02/88
RS-28	IV	19	8	0 - 19	4	0 - 19	0 - 9	14 - 19	1768.59	08/17/89
RS-36	IV	19.5	9-5/8	0 - 19.5	12	0 - 15	0 - 15		1817.73	11/21/11
					9-5/8	---	---	Open Hole		
RS-54	IV	38	11-1/4	0 - 7	6-1/4	0 – 7	0 - 7		1846.66	08/09/93
			5-7/8	7 - 38	---	---		Open Hole		
ES-31	IV	25	12	0 - 25	6	0 - 25	0 - 9.7	11.6 - 25	1787.01	01/29/87
CHATSWORTH FORMATION										
DD-139	IV	206	14	0 - 10	6	0 - 19	0 - 19		1793.01	03/04/16
			9-7/8	10 - 19	---	---				
			5-7/8	19 - 206	---	---		Open Hole		
DD-140	IV	167	14	0 - 10	6	0 - 60	0 - 60		1798.16	02/23/16
			9-7/8	10 - 60	---	---				
			5-7/8	60 - 167	---	---		Open Hole		
DD-141	IV	133	14	0 - 10	6	0 - 19.5	0 - 19.5		1762.79	06/29/16
			9-7/8	10 - 19.5	---	---				
			5-7/8	19.5 -133	---	---		Open Hole		
DD-142	IV	91	14	0 - 10	6	0 - 34	0 - 34		1812.22	02/05/16
			9-7/8	10 - 34	---	---				
			5-7/8	34 - 91	---	---		Open Hole		
DD-143	IV	100	14	0 - 10	6	0 - 19.7	0 - 19.7		1789.74	06/15/16
			9-7/8	10 - 19.7	---	---				
			5-7/8	19.7 -100	---	---		Open Hole		
DD-144	IV	71	14	0 - 15	6	0 - 38	0 - 38		1810.69	02/02/16
			9-7/8	15 - 38	---	---				
			5-7/8	38 - 71	---	---		Open Hole		

TABLE A-1
WELL CONSTRUCTION DATA
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well Identifier	Area No.	Effective Borehole Depth (feet)	Borehole		Casing		Sealed Interval (feet)	Perforated Interval (feet)	Measuring Point Elevation (ft MSL)	Date Drilling Completed
			Diameter (inches)	Interval (feet)	Inside Diameter (inches)	Interval (feet)				
DD-145	IV	82	14 9-7/8 5-7/8	0 - 3 3 - 27 27 - 82	6 --- ---	0 - 27 --- ---	0 - 27	 Open Hole	1798.90	02/12/16
DD-146	IV	140	10 5-7/8	0 - 40 40 - 140	6 ---	0 - 120 ---	0 - 120	 Open Hole	1818.08	06/14/18
DD-147	IV	257	13 5-7/8	0 - 30 30 - 257	8.5 ---	0 - 30 ---	0 - 30	 Open Hole	1802.96	06/14/18
RD-07	IV	300	15 8-5/8	0 - 25 25 - 300	10-1/8 ---	0 - 25 ---	0 - 25	 Open Hole	1812.82	01/08/86
RD-13	IV	160	12 6-1/2	0 - 30 30 - 160	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1840.01	07/25/89
RD-14	IV	125	12 6-1/2	0 - 30 30 - 125	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1824.18	07/27/89
RD-15	IV	152	12 6-1/2	0 - 30 30 - 152	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1817.70	07/27/89
RD-16	IV	220	12 6-1/2	0 - 30 30 - 220	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1808.99	08/15/89
RD-17	IV	125	12 6-1/2	0 - 30 30 - 125	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1836.30	08/10/89
RD-18	IV	240	12 6-1/2	0 - 30 30 - 240	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1839.51	07/28/89
RD-19	IV	135	12 6-1/2	0 - 30 30 - 135	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1853.16	07/31/89
RD-20	IV	127	12 6-1/2	0 - 30 30 - 127	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1819.52	07/27/89
RD-21	IV	175	12 6-1/2	0 - 30 30 - 175	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1866.96	08/11/89
RD-22	IV	440	12 6-1/2	0 - 30 30 - 440	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1853.41	08/15/89
RD-23	IV	440	12 6-1/2	0 - 30 30 - 440	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1838.19	08/16/89
RD-24	IV	150	12 6-1/2	0 - 30 30 - 150	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1809.93	08/09/89
RD-25	IV	Well abandoned April 2004 as part of Building 4059 demolition.								
RD-27	IV	150	12 6-1/2	0 - 30 30 - 150	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1841.67	08/10/89
RD-28	IV	Well abandoned April 2004 as part of Building 4059 demolition.								
RD-29	IV	100	12 6-1/2	0 - 30 30 - 100	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1806.29	08/10/89
RD-30	IV	75	12 6-1/2	0 - 30 30 - 75	8-1/4 ---	0 - 30 ---	0 - 30	 Open Hole	1768.69	08/11/89
RD-33A	UL-N	320	17-1/2 11 5-1/2	0 - 11 11 - 100 100 - 320	12-1/8 6-1/4 ---	0 - 11 0 - 100 ---	0 - 11 0 - 100	 Open Hole	1792.97	09/27/91
RD-33B	UL-N	415	17-1/2 11 6-1/4	0 - 20 20 - 360 360 - 415	12-1/8 6-1/4 ---	0 - 20 0 - 360 ---	0 - 20 20 - 360	 Open Hole	1793.72	09/27/91
RD-33C	UL-N	520	17-1/2 11 6-1/4	0 - 10 10 - 480 480 - 520	12-1/8 6-1/4 ---	0 - 10 0 - 480 ---	0 - 10 0 - 480	 Open Hole	1793.61	09/21/91
RD-34A	UL-N	60	12-1/4 6-1/2	0 - 16 16 - 60	8-1/4 ---	0 - 16 ---	0 - 16	 Open Hole	1761.91	07/25/91
RD-34B	UL-N	240	17-1/2 11 6-1/4	0 - 30 30 - 180 180 - 240	12-1/8 6-1/4 ---	0 - 30 0 - 180 ---	0 - 30 0 - 180	 Open Hole	1762.51	08/11/91

TABLE A-1
WELL CONSTRUCTION DATA
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well Identifier	Area No.	Effective Borehole Depth (feet)	Borehole		Casing		Sealed Interval (feet)	Perforated Interval (feet)	Measuring Point Elevation (ft MSL)	Date Drilling Completed
			Diameter (inches)	Interval (feet)	Inside Diameter (inches)	Interval (feet)				
RD-34C	UL-N	450	17-1/2 11 6-1/4	0 - 30 30 - 380 380 - 450	12-1/8 6-1/4 ---	0 - 30 0 - 380 ---	0 - 30 0 - 380	Open Hole	1762.79	08/10/91
RD-50	IV	195	12-3/4 6-1/4	0 - 18.5 18.5 - 195	8-1/4 ---	0 - 18.5 ---	0 - 18.5	Open Hole	1914.88	05/28/93
RD-54A	IV	278	17-1/2 11-1/4 5-7/8	0 - 19 19 - 119 119 - 278	12-1/8 6-1/4 ---	0 - 19 0 - 119 ---	0 - 19 0 - 119	Open Hole	1841.72	08/07/93
RD-54B	IV	437	17-1/2 11-1/4 5-7/8	0 - 19 19 - 379 379 - 437	12-1/8 6-1/4 ---	0 - 19 0 - 379 ---	0 - 19 0 - 379	Open Hole	1842.54	08/31/93
RD-54C	IV	638	17-1/2 11-1/4 6-1/4	0 - 20 20 - 558 558 - 638	12-1/8 6-1/4 ---	0 - 20 0 - 557 ---	0 - 20 0 - 557	Open Hole	1843.77	07/27/93
RD-57	UL-N	419	17-1/2 6-1/2	0 - 19.5 19.5 - 419	12-1/8 ---	0 - 19.5 ---	0 - 19.5	Open Hole	1774.15	02/23/94
RD-59A	OS	58	17-1/2 6-1/2	0 - 21 21 - 58	12-1/8 ---	0 - 21 ---	0 - 21	Open Hole	1340.59	05/19/94
RD-59B	OS	214	17-1/2 6-1/2	0 - 19.5 19.5 - 214	12-1/8 2	0 - 19.5 0 - 209	0 - 19.5 0 - 161	178 - 209	1342.49	07/02/94
RD-59C	OS	398	17-1/2 6-1/2	0 - 19 19 - 398	12-1/8 2	0 - 19 0 - 397	0 - 19 0 - 186 250 - 328	345.5 - 397	1345.41	07/02/94
RD-63	IV	230	12-3/4 6-1/2	0 - 20 20 - 230	8-1/4 ---	0 - 20 ---	0 - 20	Open Hole	1764.83	05/10/94
RD-64	IV	398	12-1/4 6-1/2	0 - 19 19 - 398	8-1/4 ---	0 - 19 ---	0 - 19	Open Hole	1857.04	05/19/94
RD-65	IV	397	12-3/4 6-1/2	0 - 19 19 - 397	8-1/4 ---	0 - 19 ---	0 - 19	Open Hole	1819.14	08/14/94
RD-74	IV	101	17-1/2 6-1/2	0 - 30 30 - 101	12 ---	0 - 30 ---	0 - 30	Open Hole	1810.90	01/21/99
RD-85	IV	90	13-3/8 5	0 - 20 20 - 90	8 ---	0 - 20 ---	0 - 20	Open Hole	1849.36	08/04/04
RD-86	IV	80	13-3/8 5	0 - 20 20 - 80	8 ---	0 - 20 ---	0 - 20	Open Hole	1832.16	08/09/04
RD-87	IV	60	13-3/8 5	0 - 20 20 - 60	8 ---	0 - 20 ---	0 - 20	Open Hole	1789.09	08/11/04
RD-88	IV	30	13-3/8 5	0 - 20 20 - 30	8 ---	0 - 20 ---	0 - 20	Open Hole	1774.62	08/16/04
RD-89	IV	50	13 3.8	0 - 30 30 - 50	8 ---	0 - 30 ---	0 - 30	Open Hole	1814.18	05/18/05
RD-90	IV	125	12-3/4 6	0 - 20 20 - 125	8 ---	0 - 20 ---	0 - 20	Open Hole	1784.75	03/11/04
RD-91	IV	140	12-3/4 6	0 - 20 20 - 140	8 ---	0 - 20 ---	0 - 20	Open Hole	1818.04	03/12/04
RD-92	IV	105	12-3/4 6	0 - 20 20 - 105	8 ---	0 - 20 ---	0 - 20	Open Hole	1833.74	03/16/04
RD-93	IV	60	13 3.8	0 - 20 20 - 60	8 ---	0 - 20 ---	0 - 20	Open Hole	1810.48	05/19/05
RD-94	UL, NW of IV	35	13 3.8	0 - 20.5 20.5 - 35	8 ---	0 - 20.5 ---	0 - 20.5	Open Hole	1744.38	05/15/05
RD-95	IV	80	13 3.8	0 - 50 50 - 80	8 ---	0 - 50 ---	0 - 50	Open Hole	1811.36	05/12/05

TABLE A-1
WELL CONSTRUCTION DATA
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well Identifier	Area No.	Effective Borehole Depth (feet)	Borehole		Casing		Sealed Interval (feet)	Perforated Interval (feet)	Measuring Point Elevation (ft MSL)	Date Drilling Completed
			Diameter (inches)	Interval (feet)	Inside Diameter (inches)	Interval (feet)				
RD-96	IV	90	13 4	0 - 20 20 - 90	8 ---	0 - 20 ---	0 - 20	 Open Hole	1805.49	05/03/06
RD-97	UL, NW of IV	74.5	13 4	0 - 20 20 - 74.5	8 ---	0 - 20 ---	0 - 20	 Open Hole	1792.22	04/28/06
RD-98	IV	65	13-3/8 5-1/2	0 - 20 20 - 65	8-1/8 ---	0 - 20 ---	0 - 20 ---	 Open hole	1808.73	06/04/08
RD-102	IV	100	10-5/8 4	0 - 30 30 - 100	6 ---	0 - 30 ---	0 - 30 ---	 Open hole	1817.50	11/16/11
RD-150	IV	170	10 5.5	0-40 40-170	6 ---	0-40 ---	0-40	 Open Hole	1877.64	04/26/16
RD-151	IV	130	10 5.5	0-40 40-130	6 ---	0-40 ---	0-40	 Open Hole	1858.38	05/09/16
RD-152	IV	60	10 5.5	0-20 20-60	6 ---	0-20 ---	0-20	 Open Hole	1798.88	04/29/16
RD-153	IV	55	10 5.5	0-20 20-55	6 ---	0-20 ---	0-20	 Open Hole	1776.26	05/11/16
RD-154	IV	145	10 5.5	0-40 40-145	6 ---	0-40 ---	0-40	 Open Hole	1827.62	05/23/16
RD-155	IV	115	10 5.5	0-40 40-115	6 ---	0-40 ---	0-40	 Open Hole	1820.72	05/17/16
RD-156	IV	170	10 5.5	0-40 40-170	6 ---	0-40 ---	0-40	 Open Hole	1819.88	06/09/16
WS-07	IV	700	15 10	0 - 400 400 - 700	12-1/8 ---	0 - 400 ---	Unknown	216 - 400 Open Hole	1826.19	1954
PRIVATE OFF-SITE WELLS AND SPRINGS										
OS-02	OS	700	Unknown	Unknown	10 ---	0 - 17 ---	0 - 17	 Open Hole	1237.01	03/18/59
OS-03	OS	100	Drilled with cable tools		8-1/4 ---	0 - 59 ---	0 - 30	30 - 60 Open Hole	1298.15	06/12/50
OS-04	OS	Well Construction Data Unresolved or Not Available							1334.00	
OS-05	OS	Well Construction Data Unresolved or Not Available								

Notes and Abbreviations:

Depth/intervals are measured in feet below land surface.

OS	Off-site	---	No casing installed over the borehole interval specified; open hole
UL-N	Undeveloped land in northern part of Facility	(v)	Top of well below land surface, installed inside zero-grade vault
UL-S	Undeveloped land in southern part of Facility	(WB)	Well completed with Westbay Multilevel System

TABLE A-2a
CONSTRUCTION DETAILS OF PIEZOMETER MONITORING SYSTEMS
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

PIEZOMETER ID	LOCATION					PIEZOMETER DESIGN DETAILS						
	Area	SWMU	Northing	Easting	MP Elevation	Date Drilled	Total Depth	Screened Interval	Sand Interval	Bentonite Interval	Grout Interval	Concrete Interval
			[feet]	[feet]	[feet]	[m/d/y]	[feet bgs]	[feet bgs]	[feet bgs]	[feet bgs]	[feet bgs]	[feet bgs]
PZ-005	IV	Central Area IV	266634.9	1784877.3	1800.97	11/7/2000	45.0	15-25	11.5-26.5	8.5-11.5	2-8.5	0-2
PZ-041	IV	PDU	267315.8	1785662.0	1809.10	1/16/2001	29.6	19-29	17-29.6	14-17	2-14	0-2
PZ-051	IV	EEL	266485.8	1785857.0	1770.87	12/14/2000	27.0	5-15	3-16	2-3	N/A	0-2
PZ-052	IV	Eastern Area IV	266742.1	1786103.7	1790.72	12/15/2000	30.0	18.9-28.9	17-30	14-17	2-14	0-2
PZ-055	IV	Eastern Area IV	267253.6	1787421.3	1818.40	1/2/2001	29.5	19-29	17-29.5	14-17	2-14	0-2
PZ-056	IV	OCY S	268068.7	1788028.0	1805.86	12/19/2000	28.0	17-27	13-28	10-13	2-10	0-2
PZ-097	UDL	FSDF	267048.9	1783400.3	1761.87	10/15/2001	44.5	33-43	31-44.5	11.5-28	2-11.5	0-2
PZ-098	IV	FSDF	266788.9	1783488.8	1797.78	10/16/2001	37.5	24-34	21.5-37.5	19-21.5	2-19	0-2
PZ-099	IV	FSDF	Abandoned in place in 2006									
PZ-100	IV	FSDF	266078.3	1782962.2	1870.11	10/17/2001	16.5	5.67-15.67	4.67-16.5	2-4.67	N/A	0-2
PZ-101	IV	FSDF	266057.5	1783090.6	1869.71	10/17/2001	27	10-20	7-27	5-7	1.75-5	0-1.75
PZ-102	IV	Central Area IV	267080.8	1784684.4	1827.78	10/18/2001	59.2	48.5-59.2	45-59.2	43-45	2-43	0-2
PZ-103	IV	Central Area IV	266281.2	1784400.9	1815.93	10/22/2001	39	28.5-38.5	26-39	23.5-26	2-23.5	0-2
PZ-104	IV	Central Area IV	266270.2	1784924.2	1797.47	10/22/2001	38.5	18-28	16-30	13-16	2-13	0-2
PZ-105	IV	Central Area IV	265935.5	1784787.9	1803.87	10/23/2001	28	17-27	15-28	12-15	2-12	0-2
PZ-106	IV	EEL	266411.9	1785469.6	1784.17	10/23/2001	35	18-28	16-30.5	12.75-16	2-12.75	0-2
PZ-107	IV	Eastern Area IV	266876.4	1785822.0	1793.62	10/24/2001	11	5-10	4-11	2-4	N/A	0-2
PZ-108	IV	HMSA	268032.6	1785076.3	1763.01	10/24/2001	30	16-26	13-28.5	10-13	2-10	0-2
PZ-109	IV	Central Area IV	267332.4	1785248.2	1809.36	10/25/2001	36.5	25-35	22-36.5	19-22	2-19	0-2
PZ-110	IV	Eastern Area IV	267204.0	1786209.6	1818.90	10/25/2001	17.5	7-17	5-17.5	2-5	N/A	0-2
PZ-111	IV	Eastern Area IV	266948.4	1786433.9	1794.90	10/26/2001	20.0	7.5-17.5	5-20	N/A	N/A	N/A
PZ-112	IV	Eastern Area IV	267435.9	1786720.8	1829.14	10/26/2001	35.0	24-34	22-35	19-22	2-19	0-2
PZ-113	IV	Eastern Area IV	267682.9	1787367.8	1823.68	10/29/2001	15.0	7-15	5-15	2-5	N/A	0-2
PZ-114	IV	Old Con Yard S	268304.0	1787913.1	1818.19	10/30/2001	48.2	37-47	35-48.2	32-35	2-32	0-2
PZ-115	IV	Eastern Area IV	268006.8	1787536.5	1817.81	10/30/2001	40	25.5-37.5	25-40	22-25	2-22	0-2
PZ-116	UDL	RMHF	266501.1	1783693.0	1827.78	10/31/2001	34	22-32	20-34	17-20	2-17	0-2
PZ-120	IV	HMSA / SCTI	267230.1	1785009.7	1810.96	3/18/2003	26	15-25	12-26	9-12	2-9	0-2
PZ-121	IV	HMSA / SCTI	267491.6	1785120.7	1808.98	3/19/2003	33	15-25	12-28	8.4-12; 28-33	1.5-8.4	0-1.5
PZ-122	IV	HMSA / SCTI	267091.9	1785176.5	1810.80	3/19/2003	27.5	15.5-25.5	12-27.5	9-12	2-9	0-2
PZ-124	IV	B056 Landfill	267166.7	1784015.9	1764.11	3/21/2003	31	14.7-24.7	11.3-31	8.3-11.3	1-8.3	0-1

Notes and Abbreviations:

The difference between the total depth and the bottom of the sand interval was filled with sloughed native material and/or bentonite.

[a] The screen for this port is perpendicular to the well casing and covers the open bottom end; therefore, the screened section is a discrete depth.

bgs - Below ground surface
MP - Measuring point
UDL - undeveloped land

TABLE A-2b
CONSTRUCTION DETAILS OF PIEZOMETER MONITORING SYSTEMS
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Northing (feet)	Easting (feet)	Surface Elevation (feet amsl)	TOC Elevation (feet amsl)	Depth to Screen Top (feet bgs)	Depth to Screen Bottom (feet bgs)	Total Depth (feet bgs)	Total Depth Drilled (feet bgs)	Borehole Diameter (inches)	Casing Diameter (inches)	Screen Material	Screen Slot Size (inches)	Casing Material	Filter Pack Grade	Filter Pack Top (feet bgs)	Filter Pack Bottom (feet bgs)	Drilling Method	Driller	Annular Seal Material	Annular Seal Top (feet bgs)	Annular Seal Bottom (feet bgs)	Wellhead Completion
PZ-150	268281.654	1786086.776	1849.92	1852.23	17.5	27.5	27.5	27.5	10 5/8	4	SCH40 PVC	0.020	SCH40 PVC	#3	14.5	27.5	Air Rotary	WDC	Cement-Bentonite Grout	11	14.5	Monument
PZ-151	268743.1285	1787988.758	1860.4	1862.60	69.5	79.5	80	82	8	2	SCH40 PVC	0.02	SCH40 PVC	#3	64	80	CME-85 HSA/HQ w/carbide bit	WDC	Cement-Bentonite Grout Bentonite chips # 60 Sand Bentonite chips	2 52 62 80	52 62 64 82	Monument
PZ-160	268345.039	1786286.124	1849.14	1851.41	17.0	27.0	27	27	10 5/8	4	SCH40 PVC	0.020	SCH40 PVC	#3	14	27	Air Rotary	WDC	Cement-Bentonite Grout	1	14	Monument
PZ-161	268418.806	1786132.353	1850.00	1852.23	18	28	28	28	10 5/8	4	SCH40 PVC	0.020	SCH40 PVC	#3	15	28	Air Rotary	WDC	Cement-Bentonite Grout	1	15	Monument
PZ-162	267406.770	1785109.590	1818.61	NM	31	41	41	41.8	8	2	SCH40 PVC	0.020	SCH40 PVC	#3	27	41	HSA		Cement-Bentonite Grout	1	27.5	Monument
PZ-163	267277.940	1785109.590	1817.63	NM	30	30	40	40	8	4	SCH40 PVC	0.020	SCH40 PVC	#3	27.5	40	HSA		Cement-Bentonite Grout	1	27	Monument

Notes and Abbreviations:

Northing and Easting Coordinates are in State Plane NAD 27, US Feet, with the exception of PZ-162 and PZ-163 are NAD83
amsl - above mean sea level
bgs - below ground surface
SCH - schedule
PVC - polyvinyl chloride
TOC - top of casing
NM -not measured

APPENDIX B
Precipitation Data

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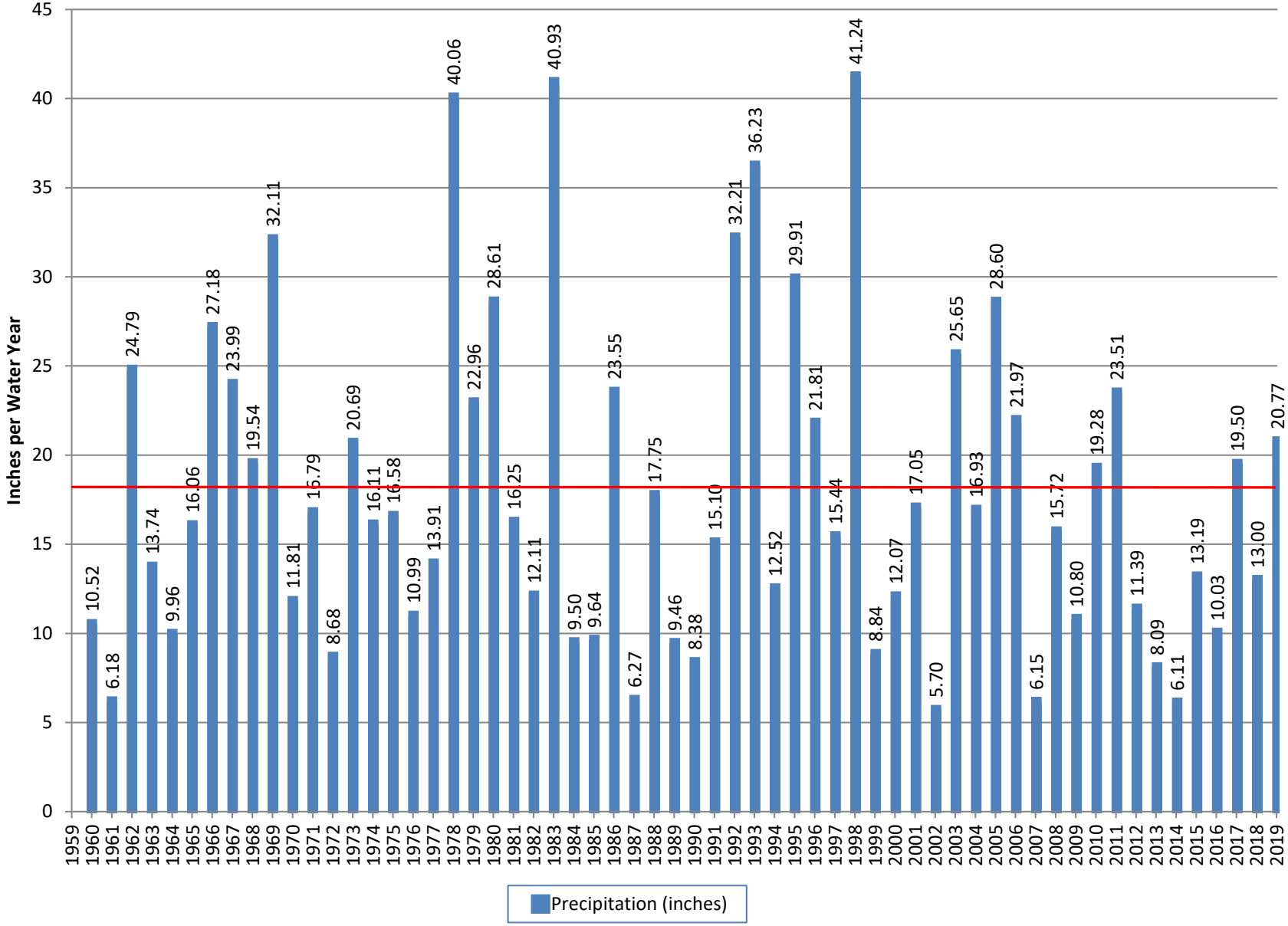
TABLE B-1
SUMMARY OF ANNUAL RAINFALL
MEASURED AT THE SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Water Year Ending in	Precipitation (inches)	Water Year Ending in	Precipitation (inches)
1960	10.52	1990	8.38
1961	6.18	1991	15.10
1962	24.79	1992	32.21
1963	13.74	1993	36.23
1964	9.96	1994	12.52
1965	16.06	1995	29.91
1966	27.18	1996	21.81
1967	23.99	1997	15.44
1968	19.54	1998	41.24
1969	32.11	1999	8.84
1970	11.81	2000	12.07
1971	16.79	2001	17.05
1972	8.68	2002	5.70
1973	20.69	2003	25.65
1974	16.11	2004	16.93
1975	16.58	2005	28.60
1976	10.99	2006	21.97
1977	13.91	2007	6.15
1978	40.06	2008	15.72
1979	22.96	2009	10.80
1980	28.61	2010	19.28
1981	16.25	2011	23.51
1982	12.11	2012	11.39
1983	40.93	2013	8.09
1984	9.50	2014	6.11
1985	9.64	2015	13.19
1986	23.55	2016	10.03
1987	6.27	2017	19.50
1988	17.75	2018	13.00
1989	9.46	2019	20.77
Average Annual Precipitation (1960-2019) =			**17.73**

NOTE: Precipitation reported annually for the period of October through September of the calendar year indicated.

Figure B-1
Annual Precipitation at the SSFL, 1960 through 2019



APPENDIX C
Water Level Hydrographs

List of Hydrographs

FSDF
RD-21
RS-54

B4100 Trench
RD-20

Bldg 56 Landfill
RD-07

B4057/4059/4626
PZ-109

HMSA/PDU
PZ-120
RD-29

Tritium Plume
RD-90
RD-95

RMHF
RD-30
RD-63

Old Conservation Yard
RD-14

Bldg 65 Metals Clarifier / DOE Leach Field 3
PZ-104
PZ-105

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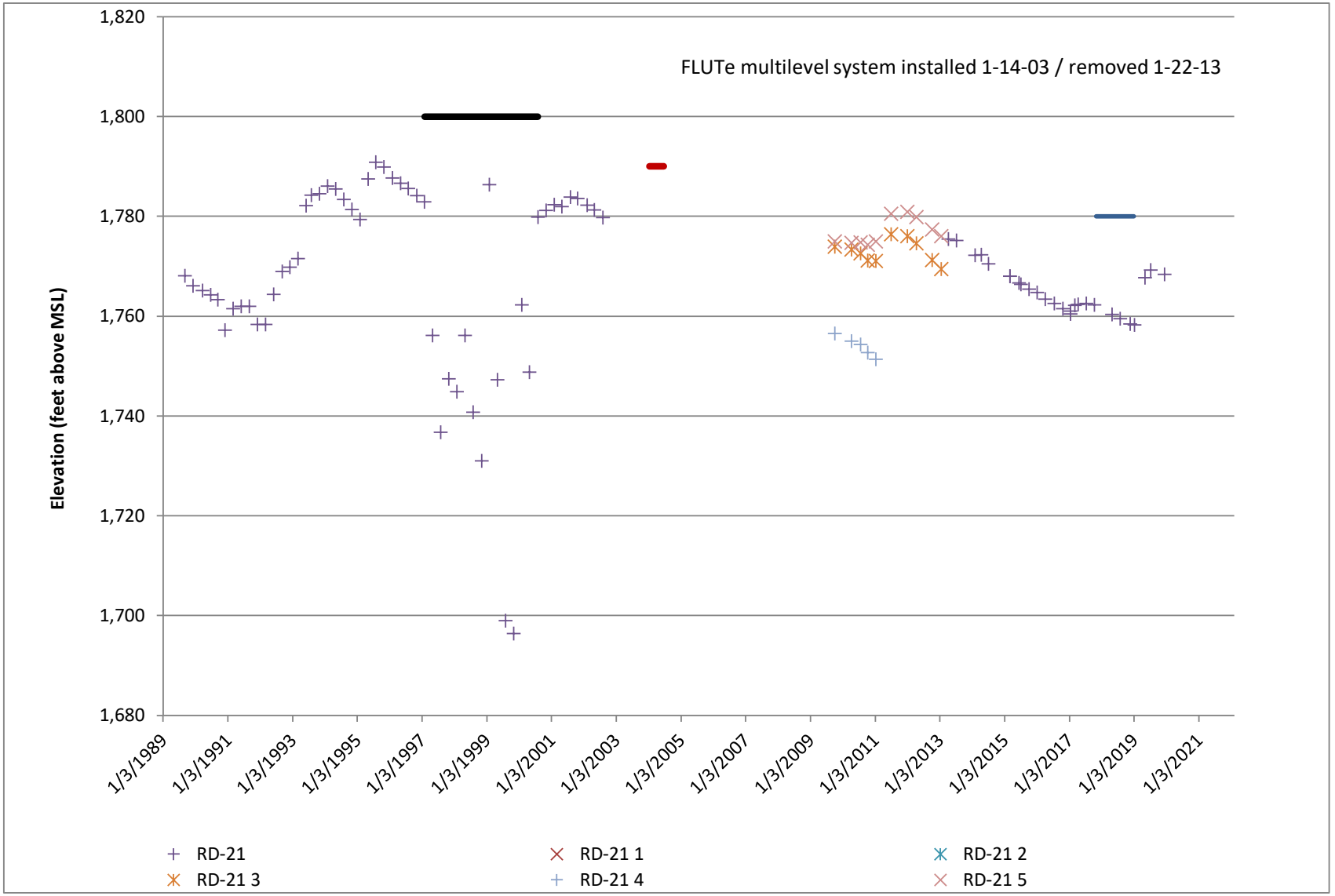
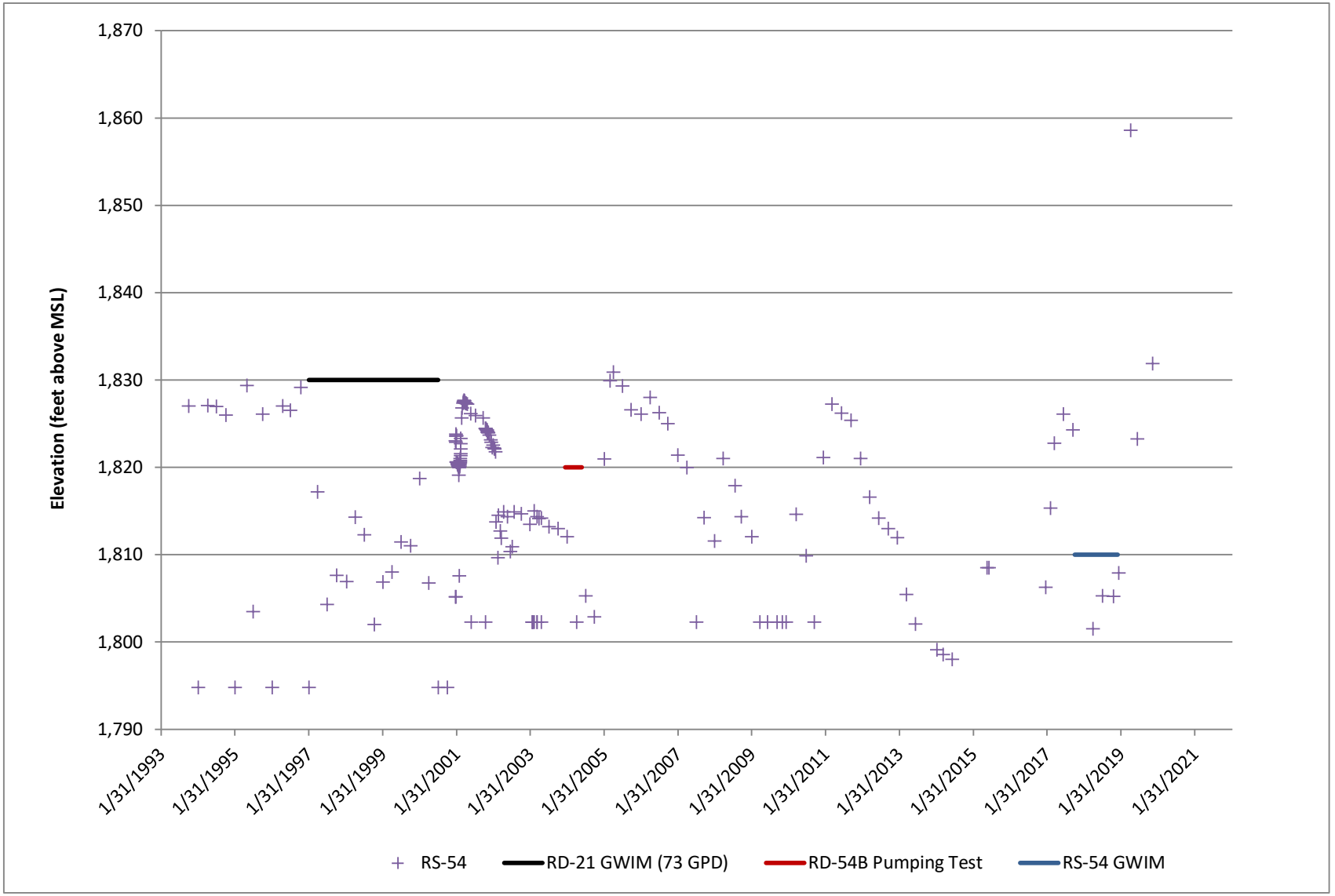
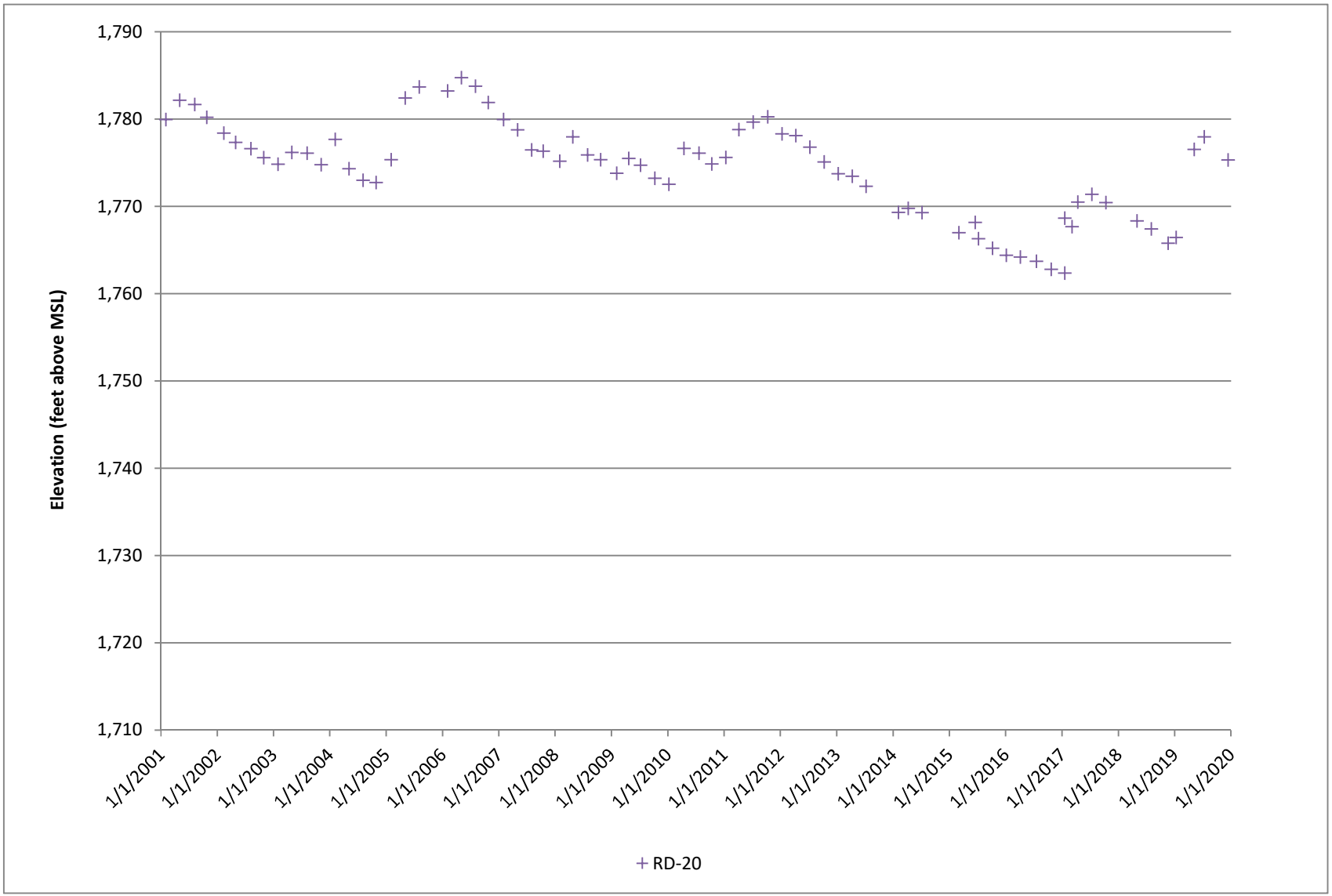
RD-21, FSDF
Hydrograph



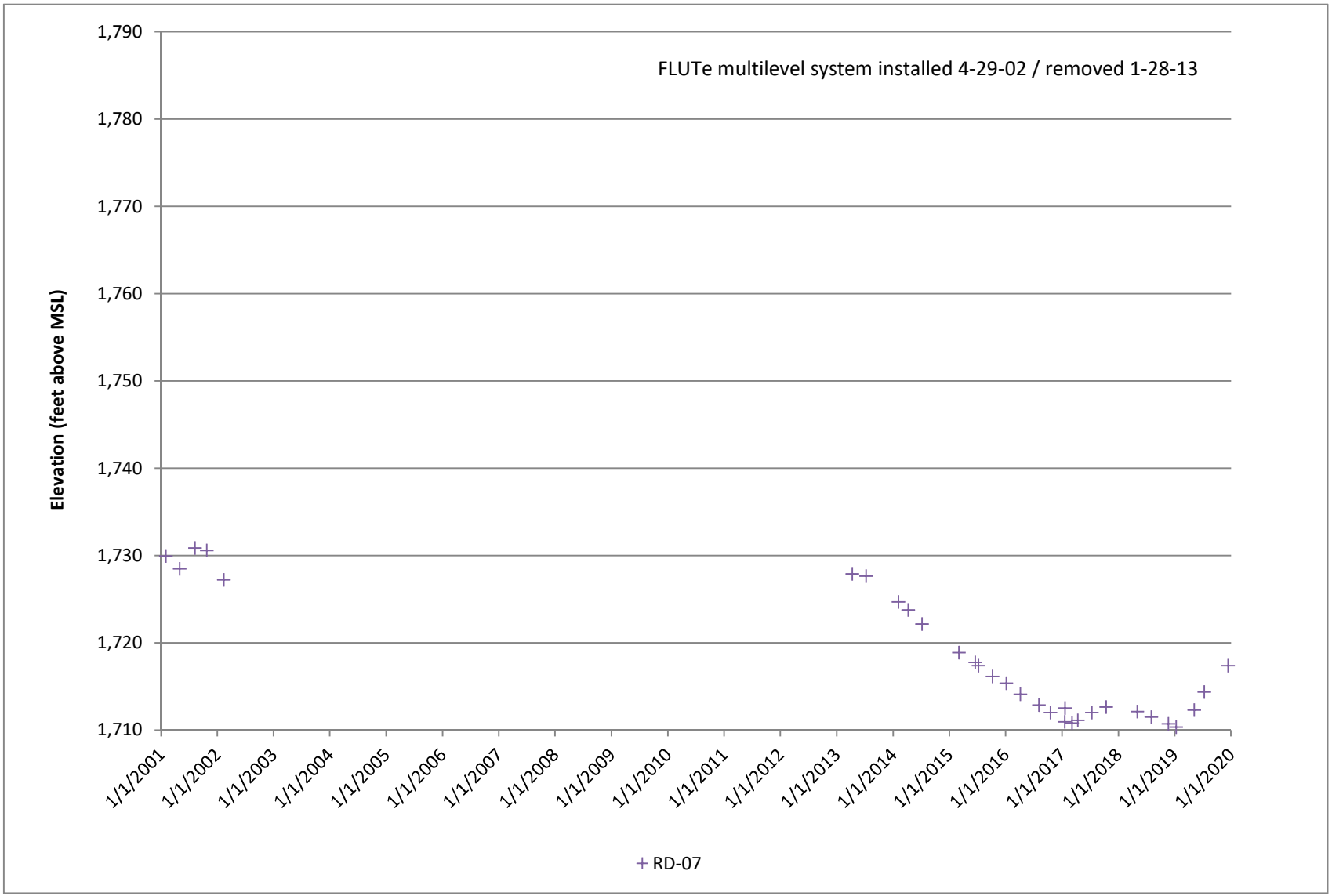
RS-54, FSDF
Hydrograph



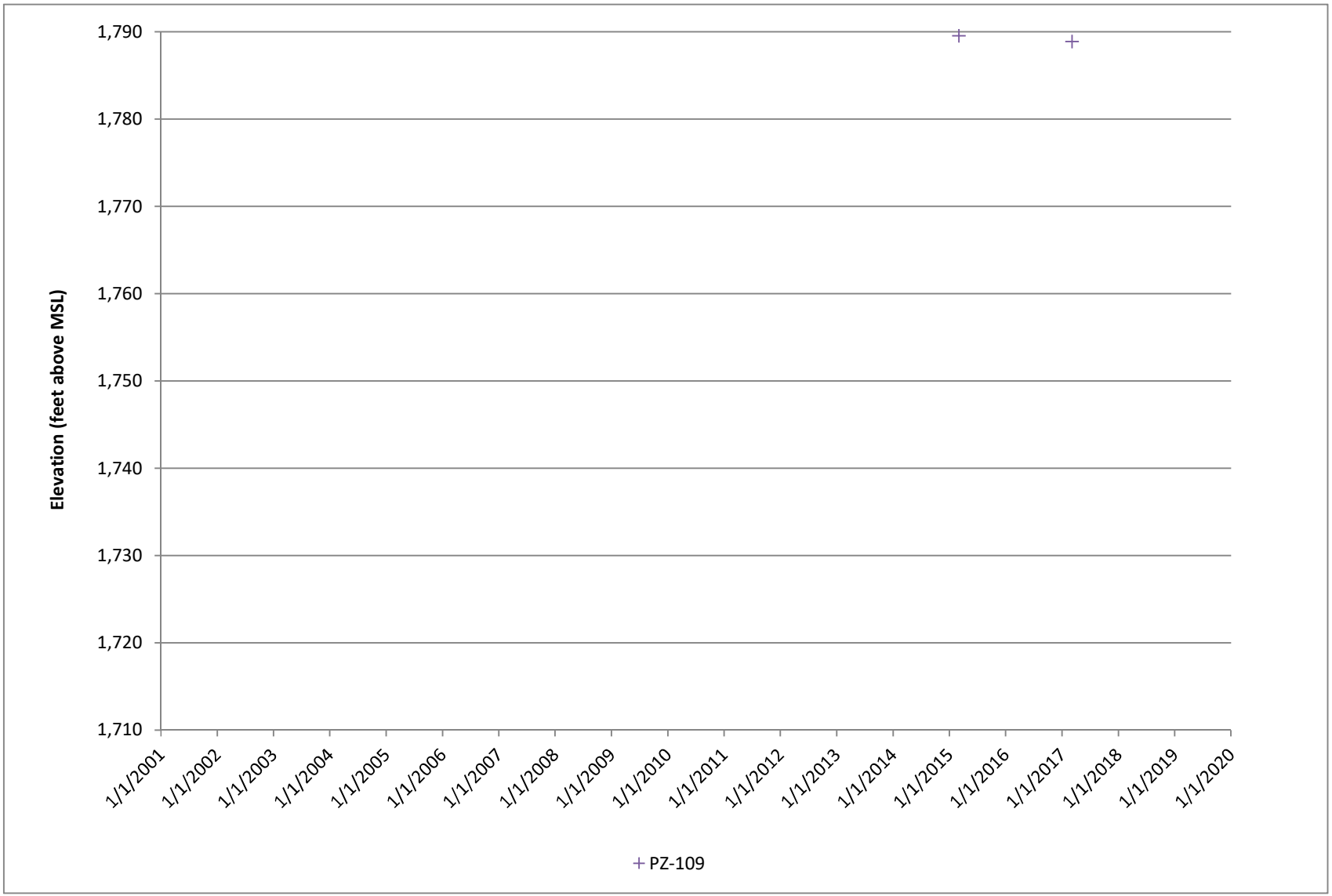
RD-20, B4100 Trench
Hydrograph



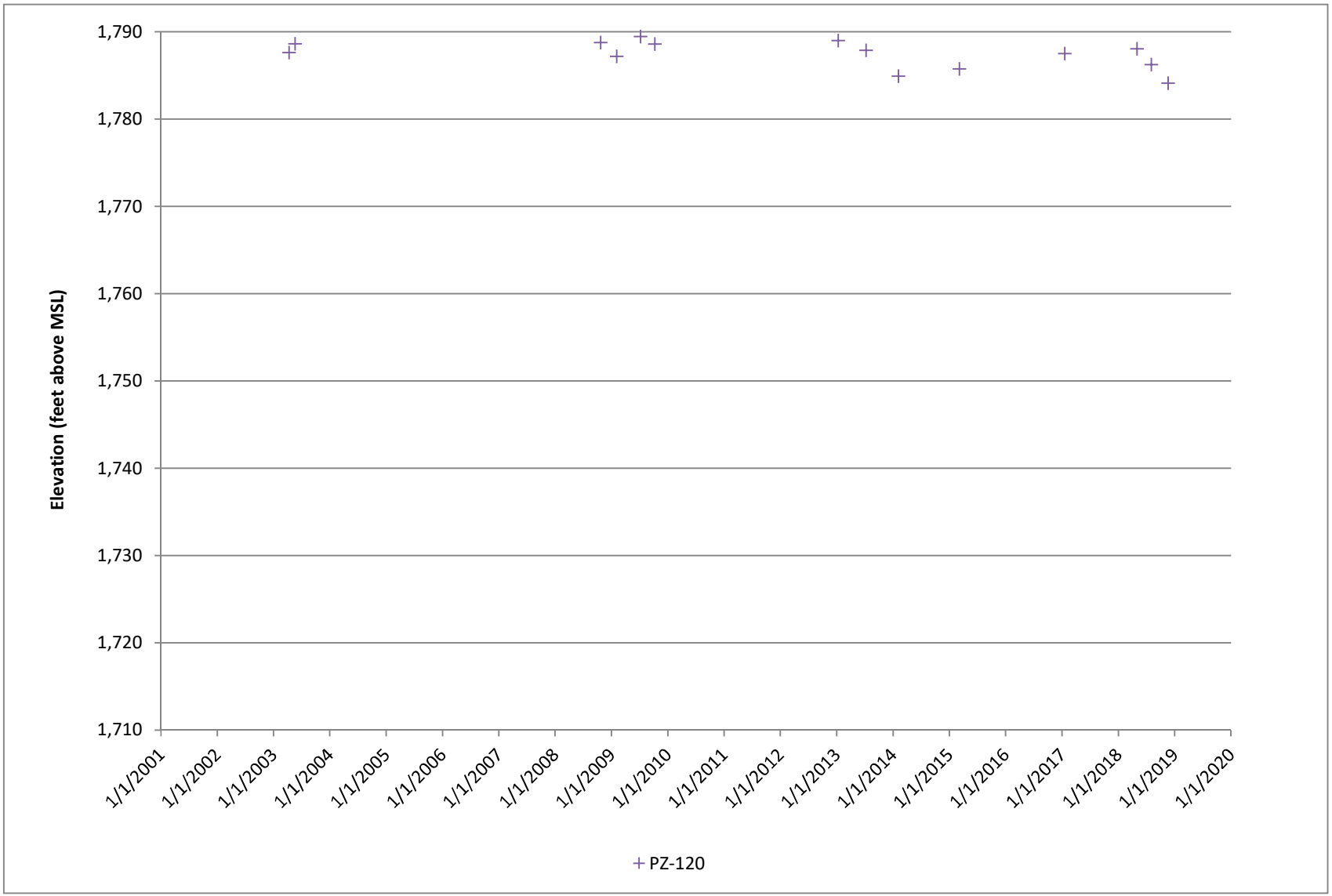
RD-07, Bldg 56 Landfill
Hydrograph



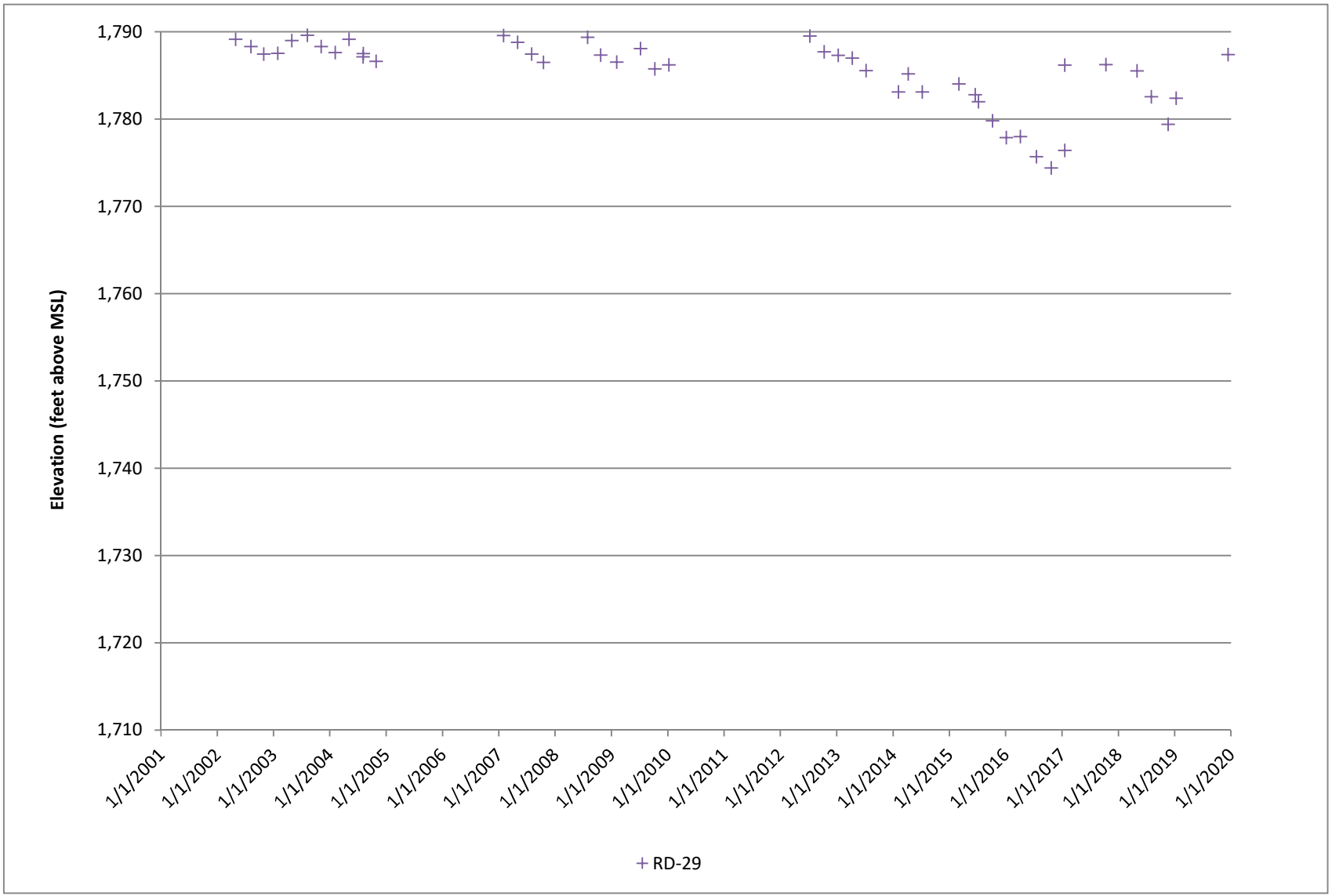
PZ-109, B4057/4059/4626
Hydrograph



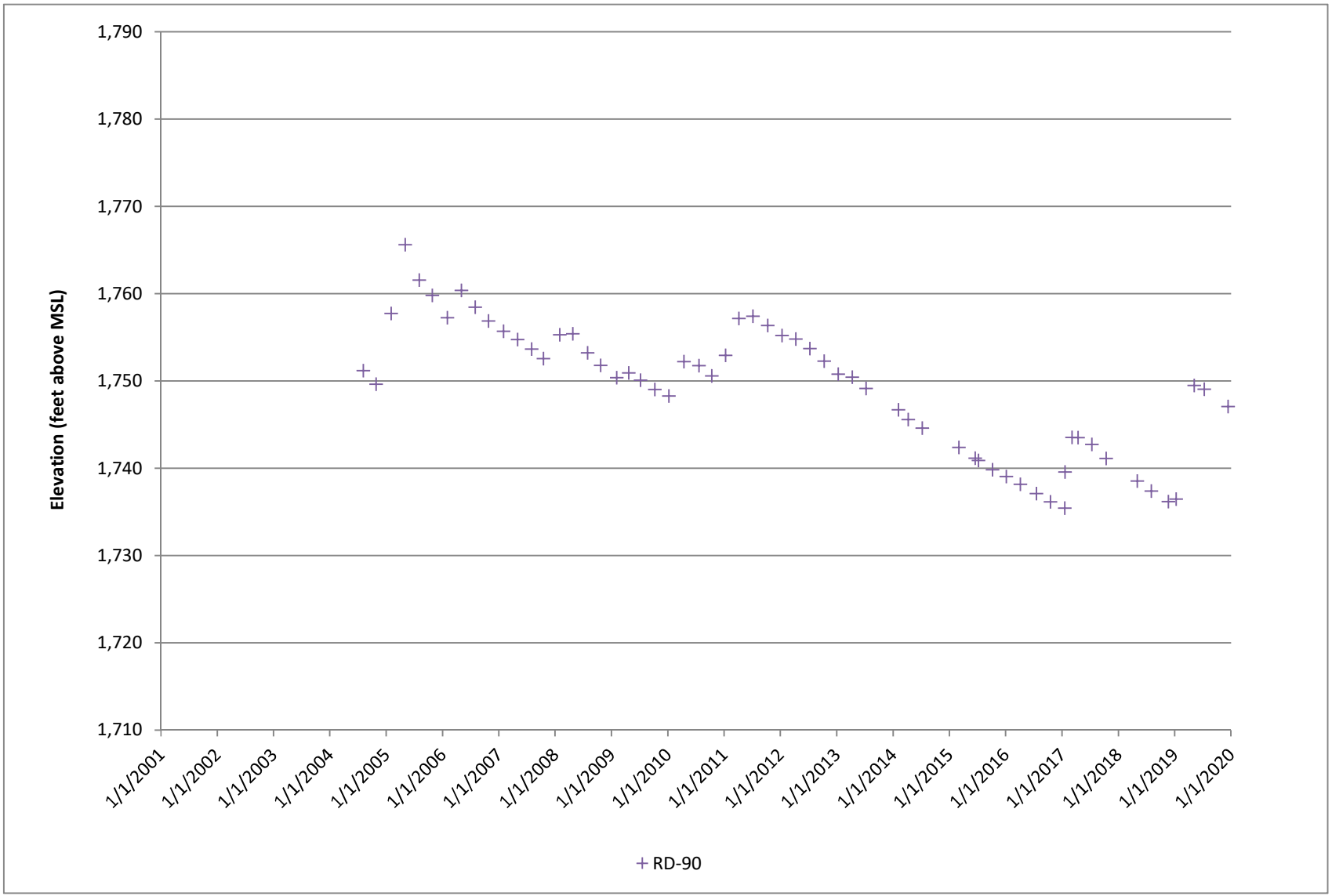
PZ-120, HMSA
Hydrograph



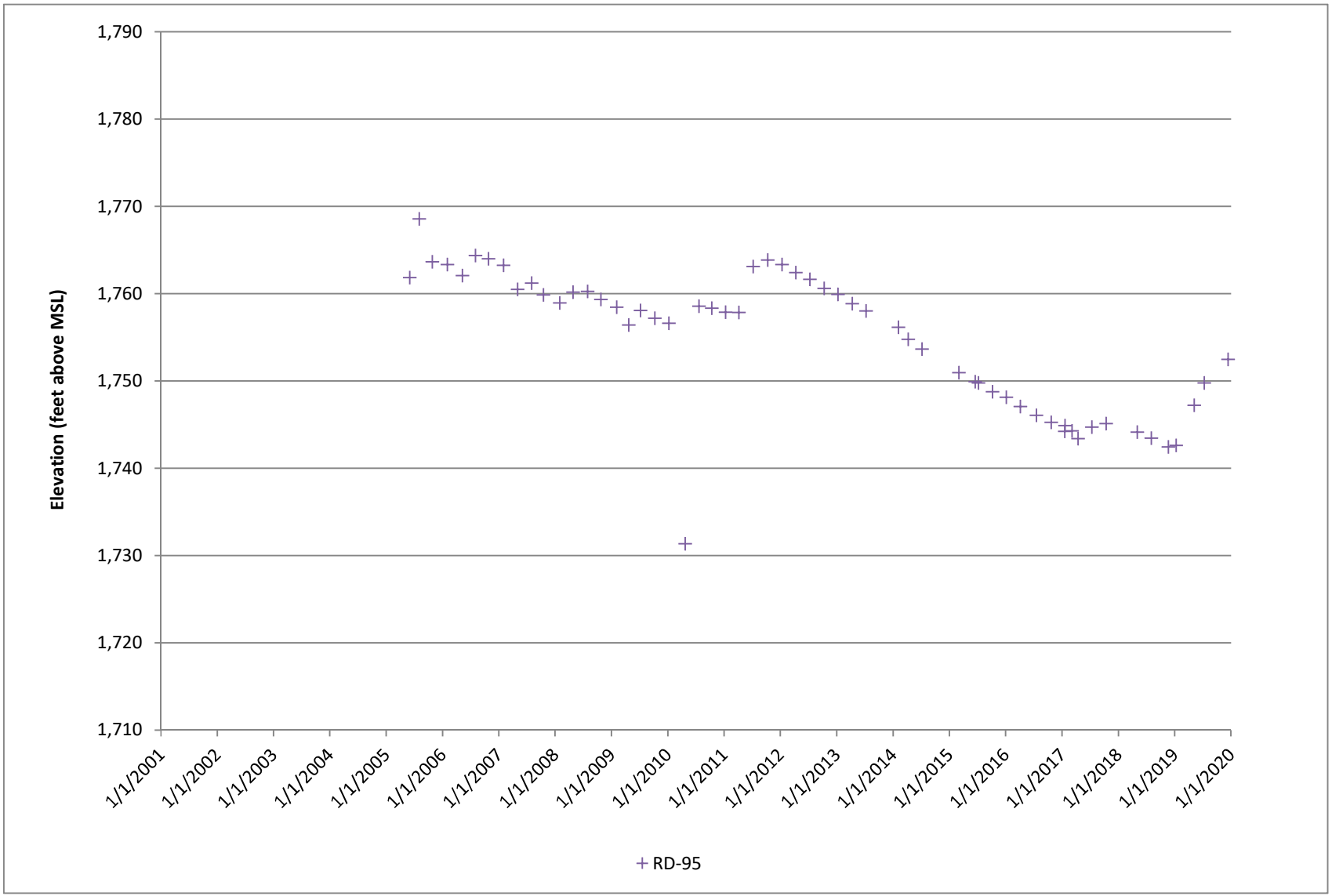
RD-29, B4457 HMSA
Hydrograph



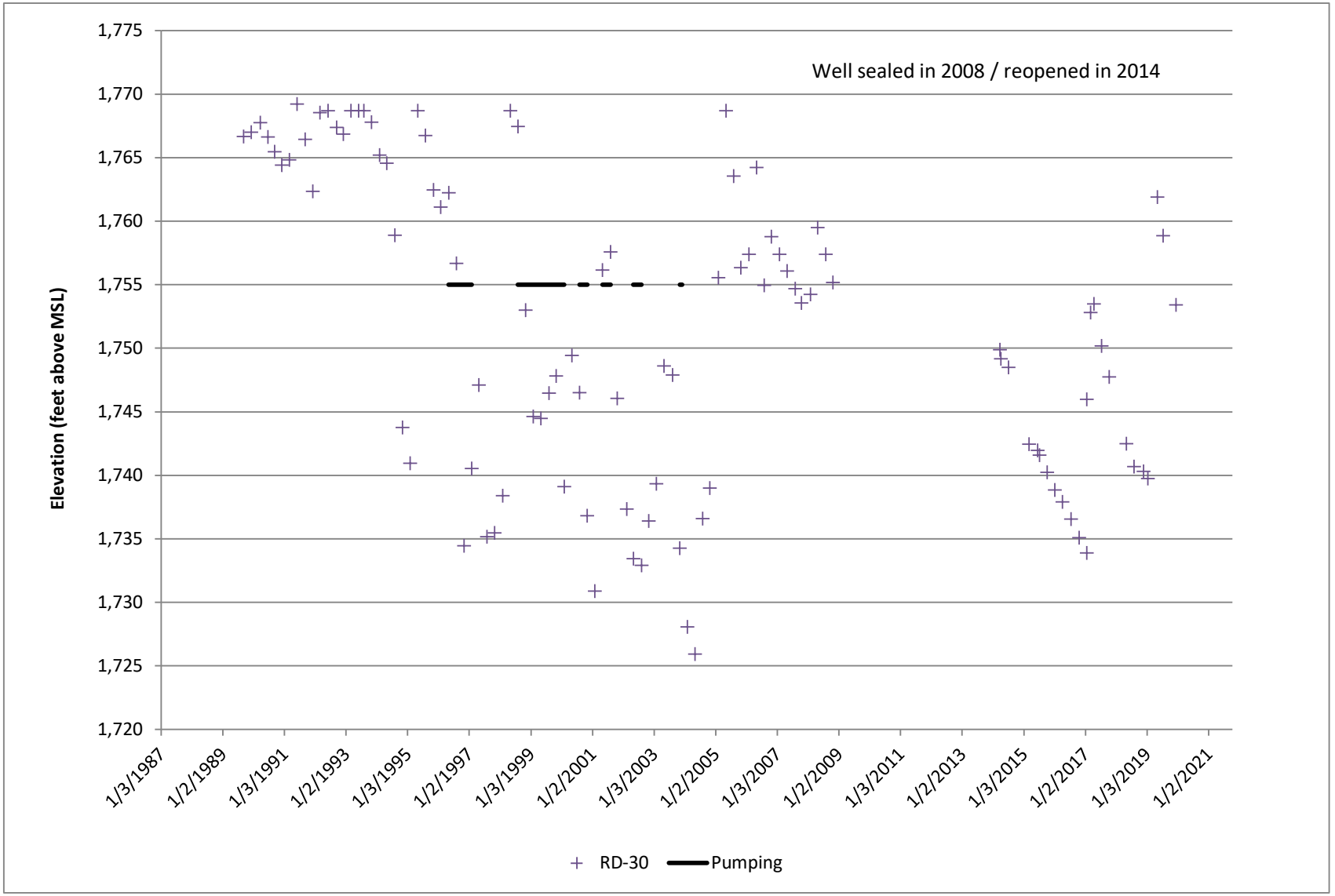
RD-90, Tritium Plume
Hydrograph



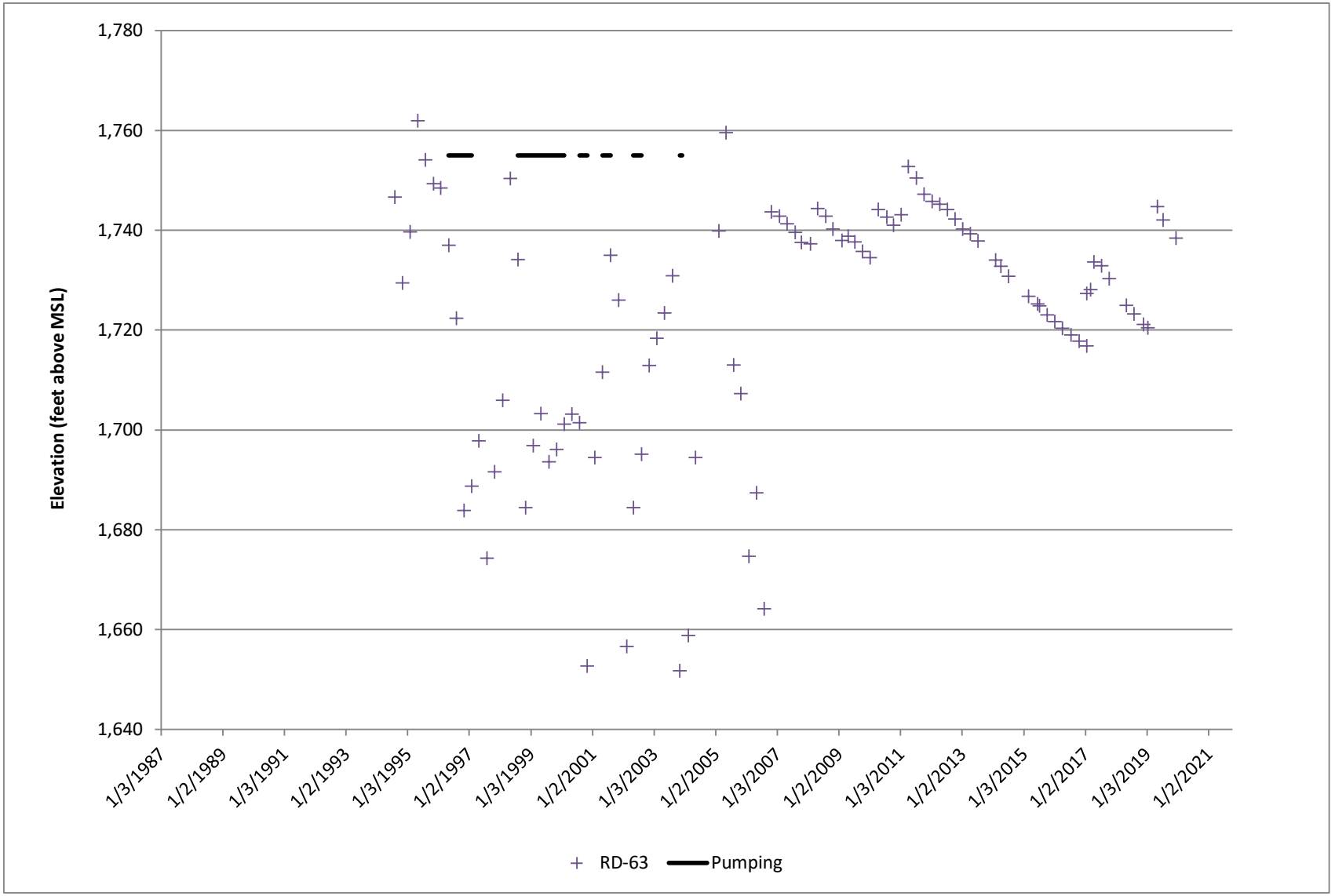
RD-95, Tritium Plume
Hydrograph



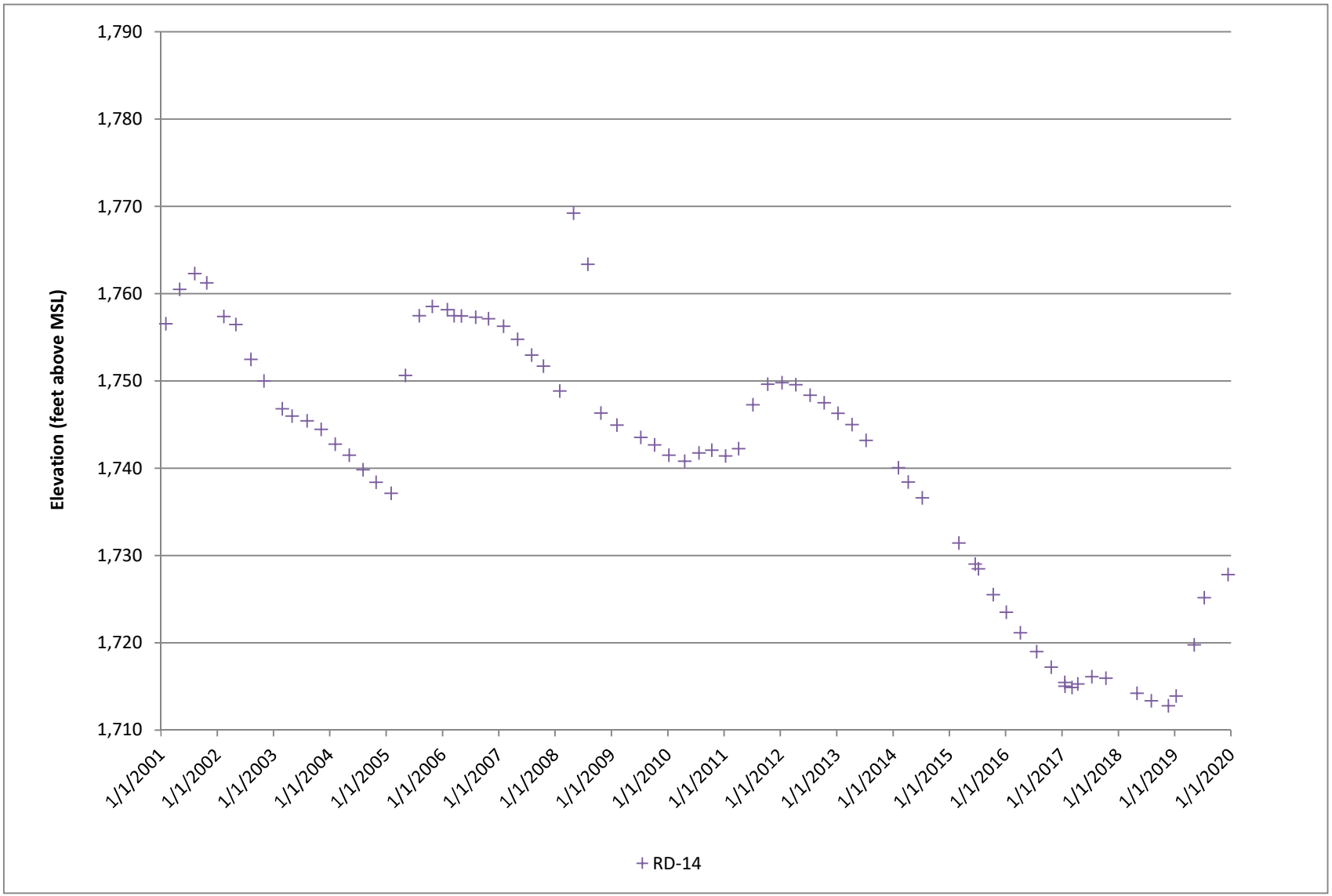
RD-30, RMHF
Hydrograph



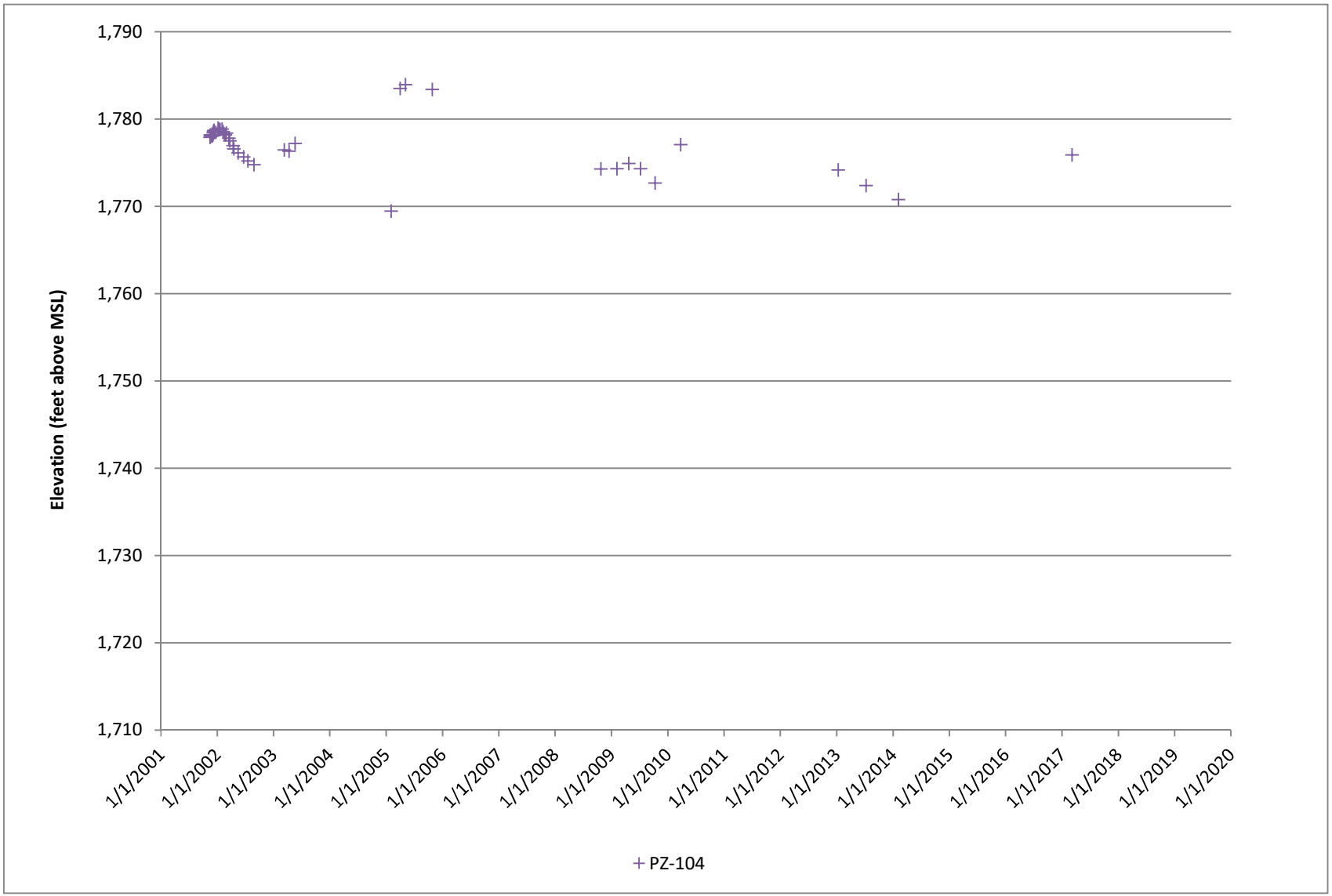
RD-63, RMHF
Hydrograph



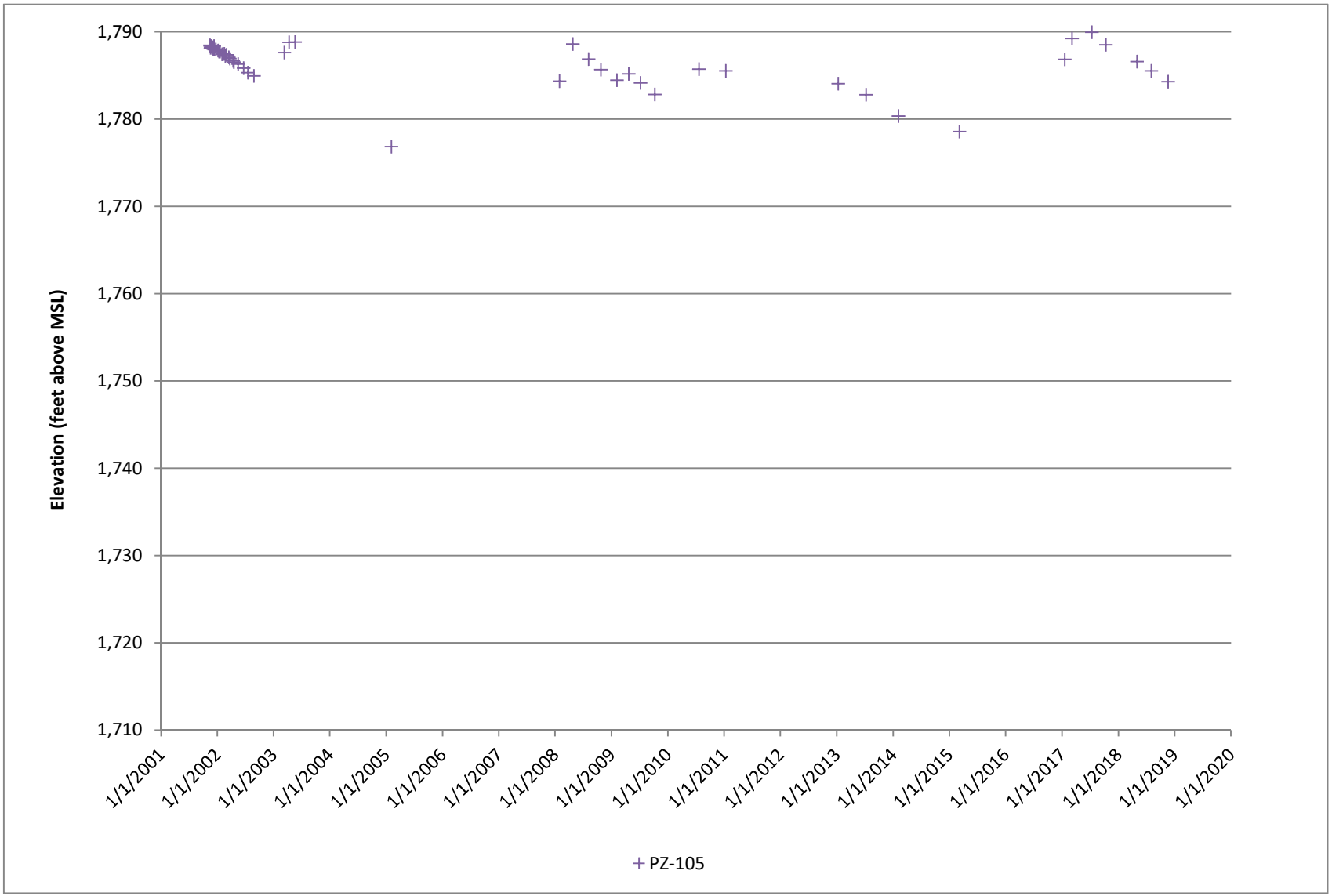
RD-14, OCY
Hydrograph



PZ-104, Metals Clarifier/DOE LF3
Hydrograph



PZ-105, Bldg 65 Metals Clarifier
Hydrograph



APPENDIX D
Time Series Plots of Analytical Data

Time series plots for trichloroethene (TCE), perchlorate, and tritium are presented in this appendix. Only primary sample results for the following wells are presented in the plots.

TCE

FSDF/ESADA
RD-21
RD-33A
RD-33B
RD-33C
RD-54A
RD-54B
RD-54C
RD-64
RD-65
RS-18
RS-54

RMHF
RD-30
RD-34A
RD-34B
RD-34C
RD-63
RD-98
RS-28

Bldg 65 Metals Clarifier
PZ-005
PZ-104
PZ-105

TCE (continued)

Bldg 56 Landfill
RD-07

HMSA/PDU
PZ-108
PZ-120

B4057/59/626
PZ-109

OCY
RD-14

Bldg 4100 Trench
RD-20

Bldg 4133
RD-19

Offsite
RD-59A
RD-59B
RD-59C

Perchlorate

FSDF/ESADA
RD-21
RD-54A
RS-18
RS-54

Tritium Plume

RD-34A
RD-88
RD-90
RD-93
RD-94
RD-95

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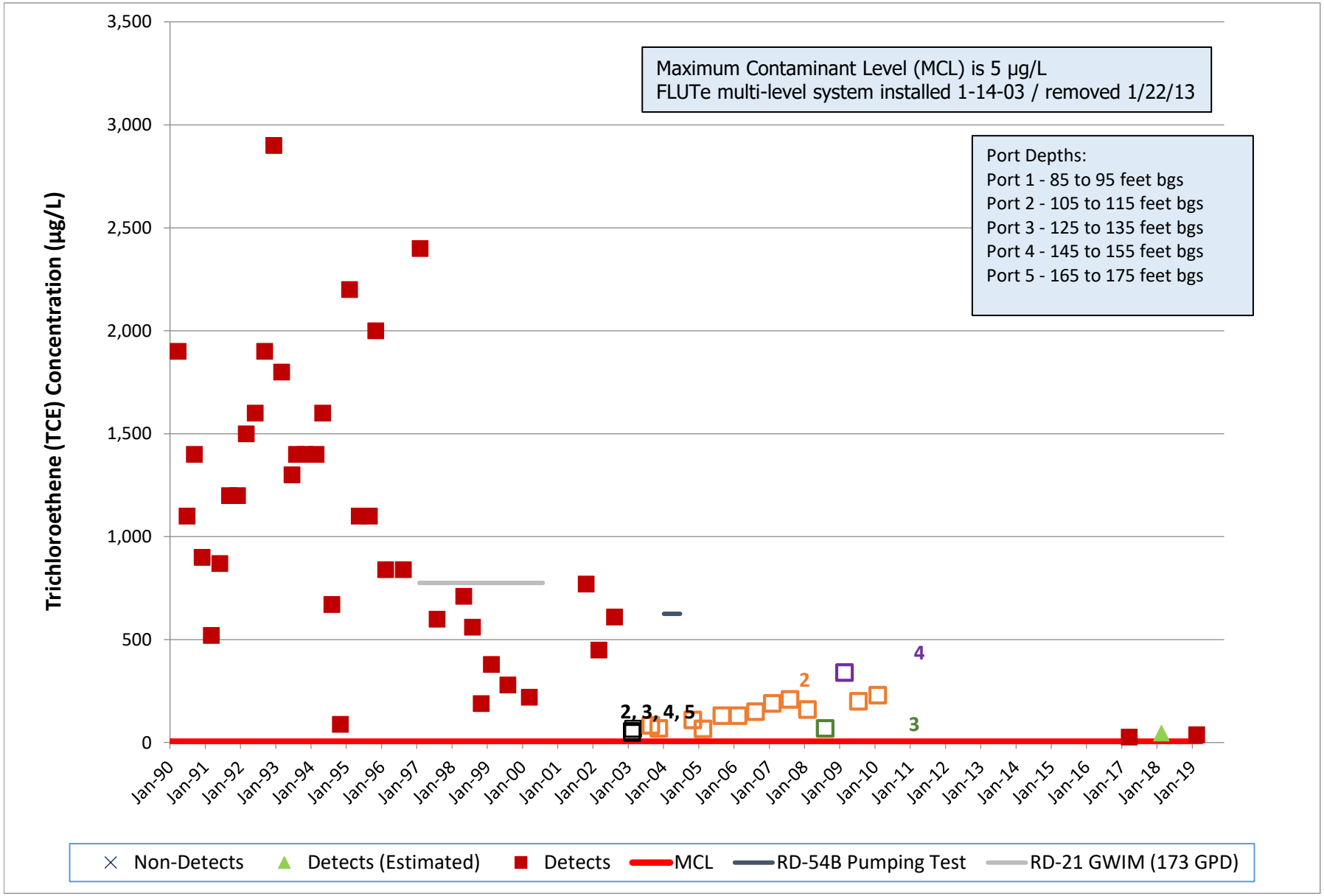
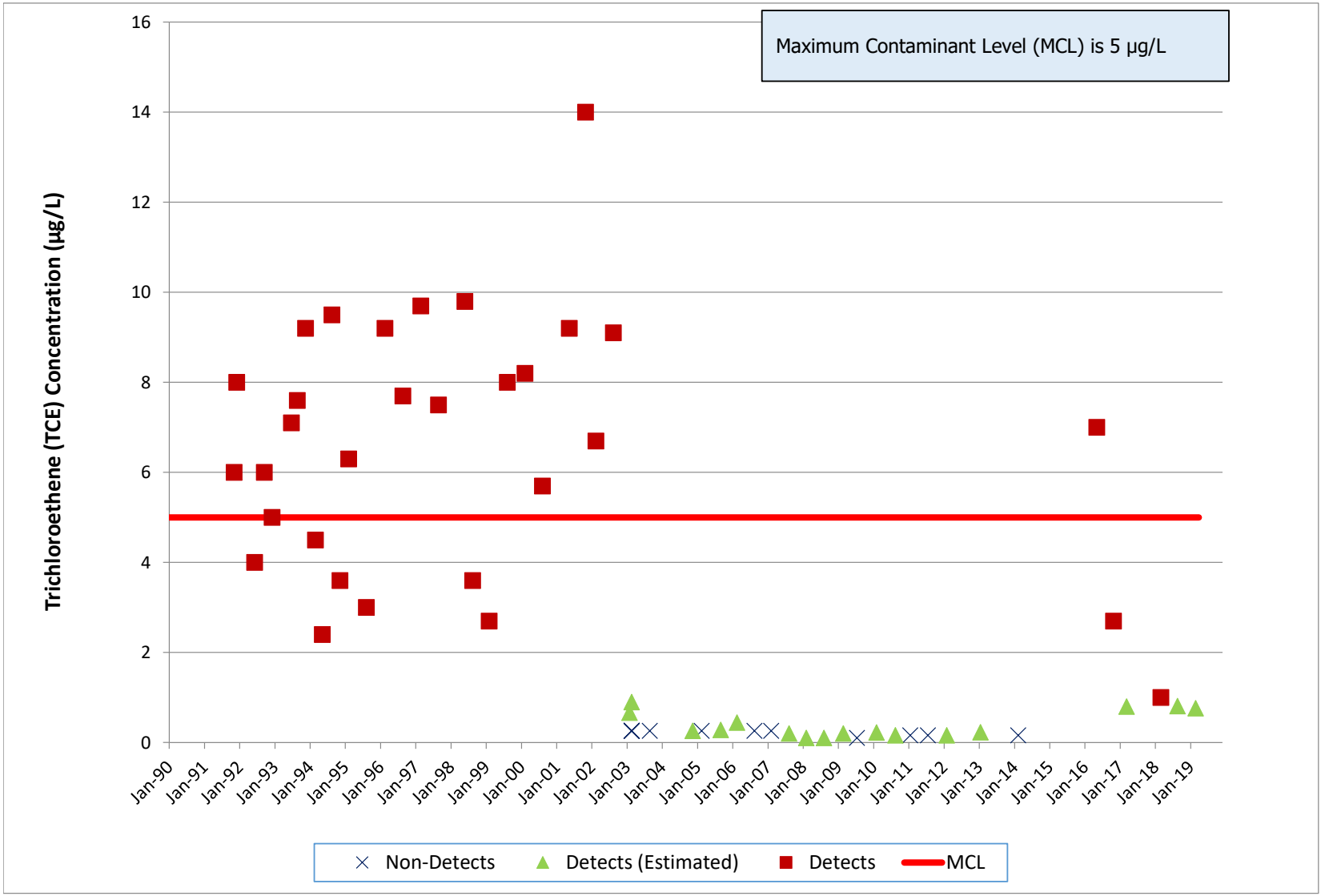
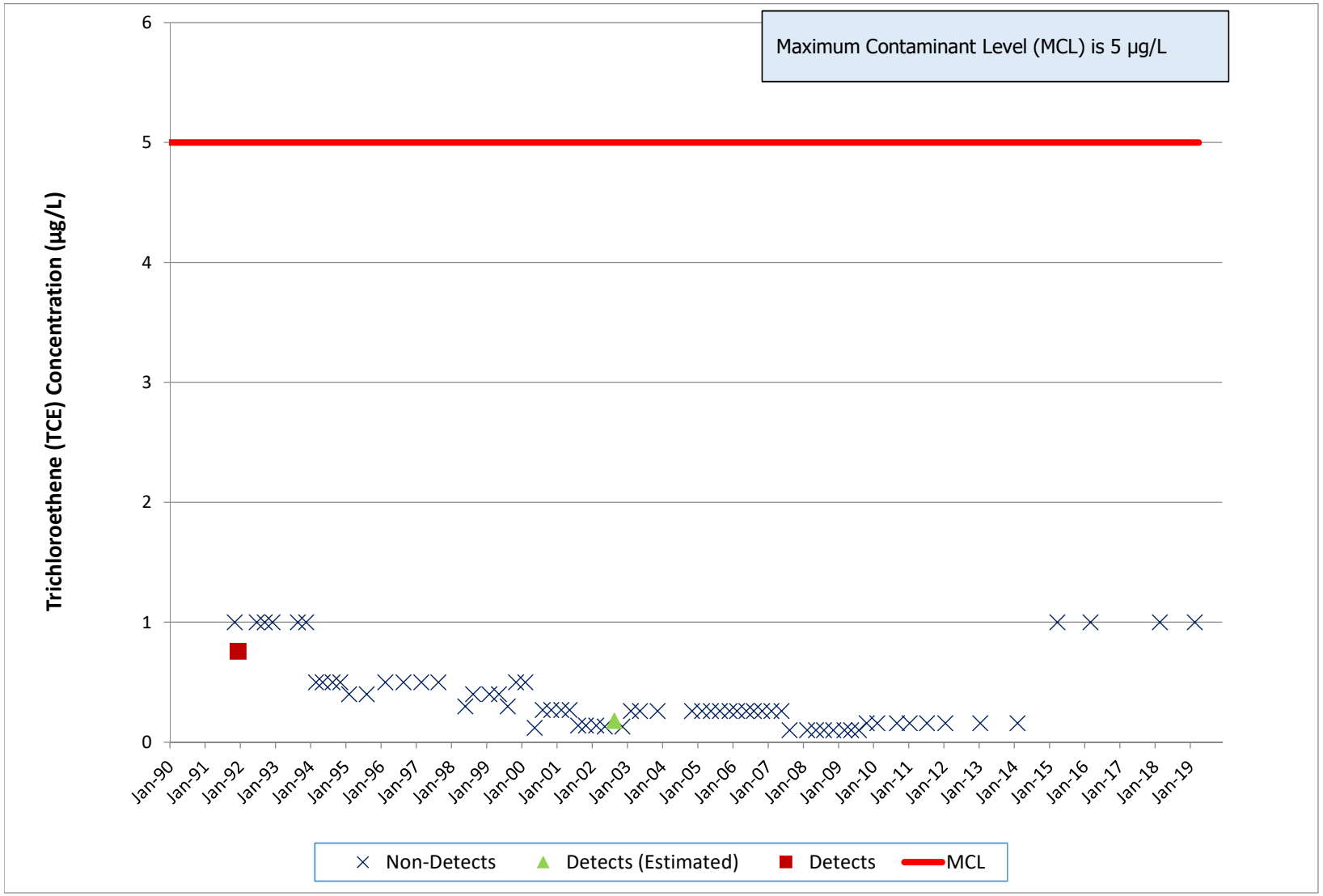
RD-21, FSDF/ESADA
Trichloroethene



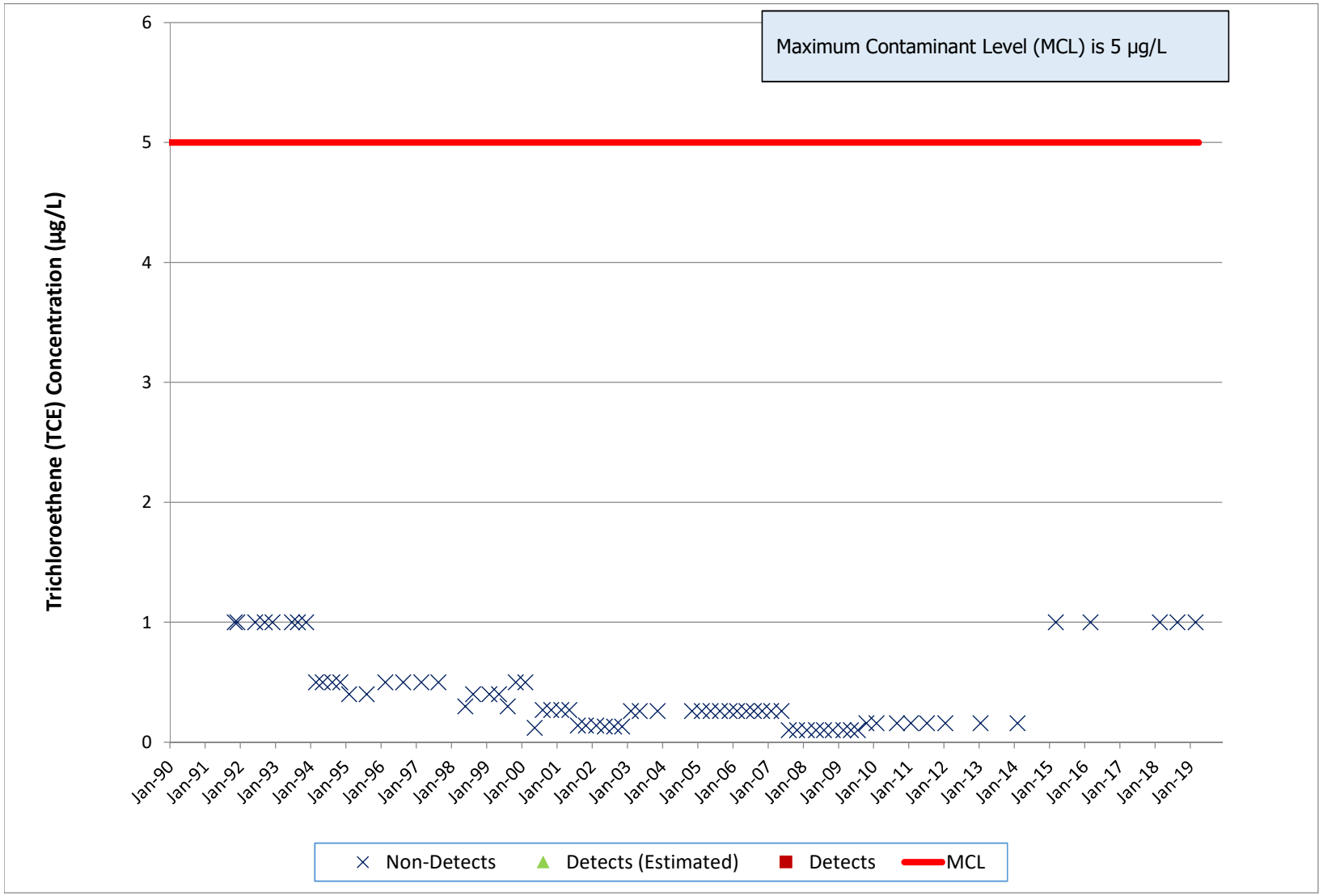
RD-33A,FSDF/ESADA
Trichloroethene



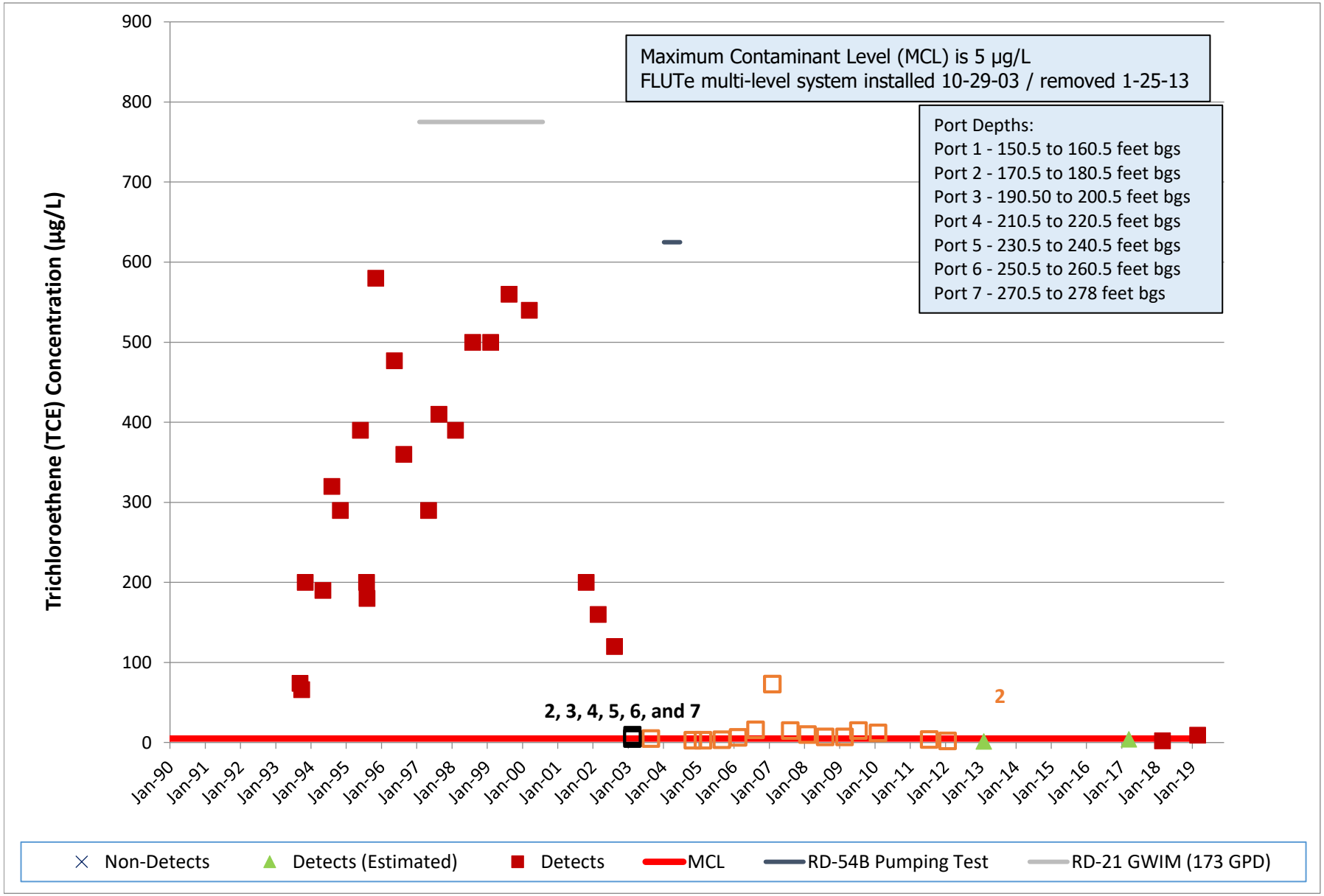
RD-33B,FSDF/ESADA
Trichloroethene



RD-33C,FSDF/ESADA
Trichloroethene



RD-54A FSDF/ESADA
Trichloroethene



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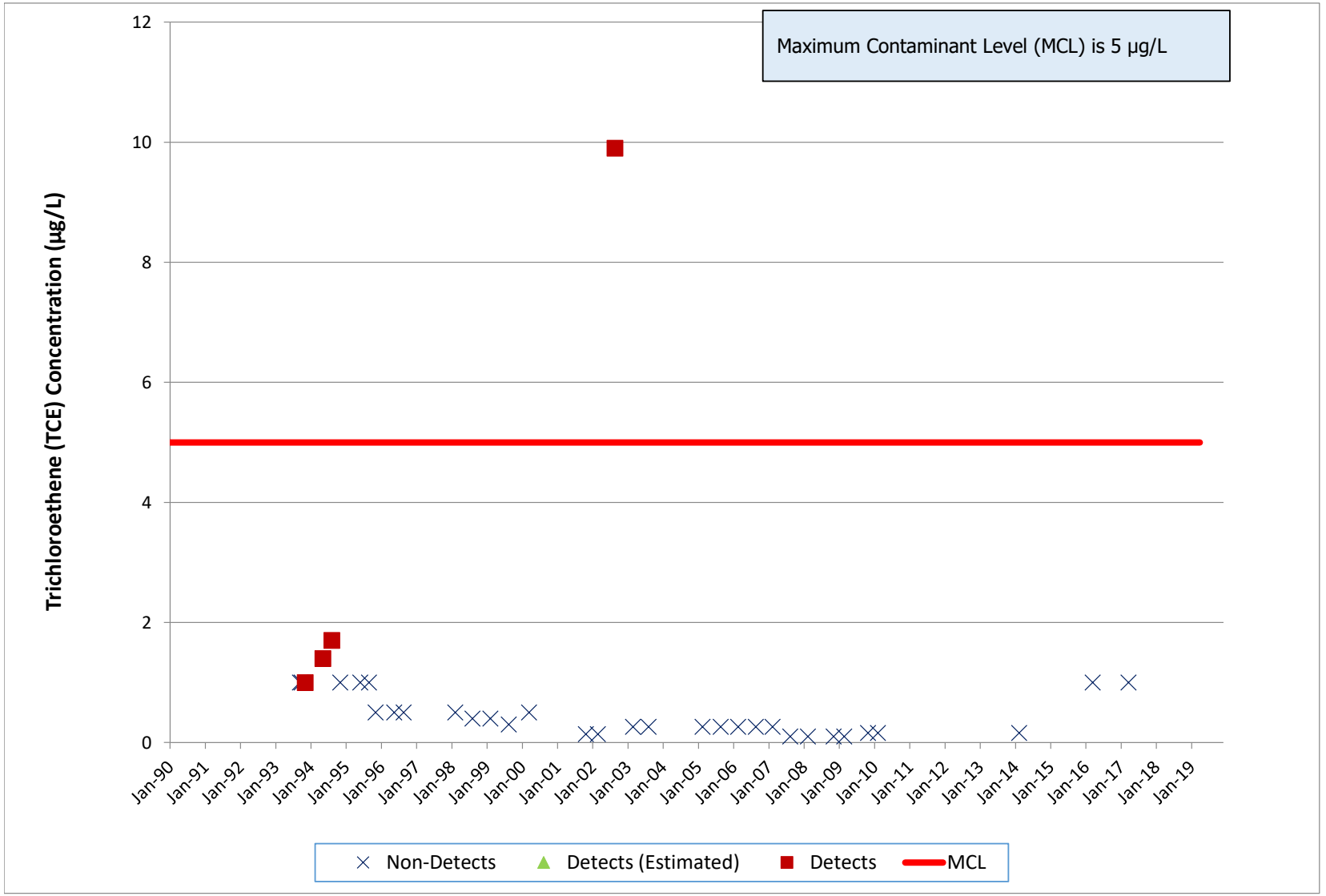
Trichloroethene



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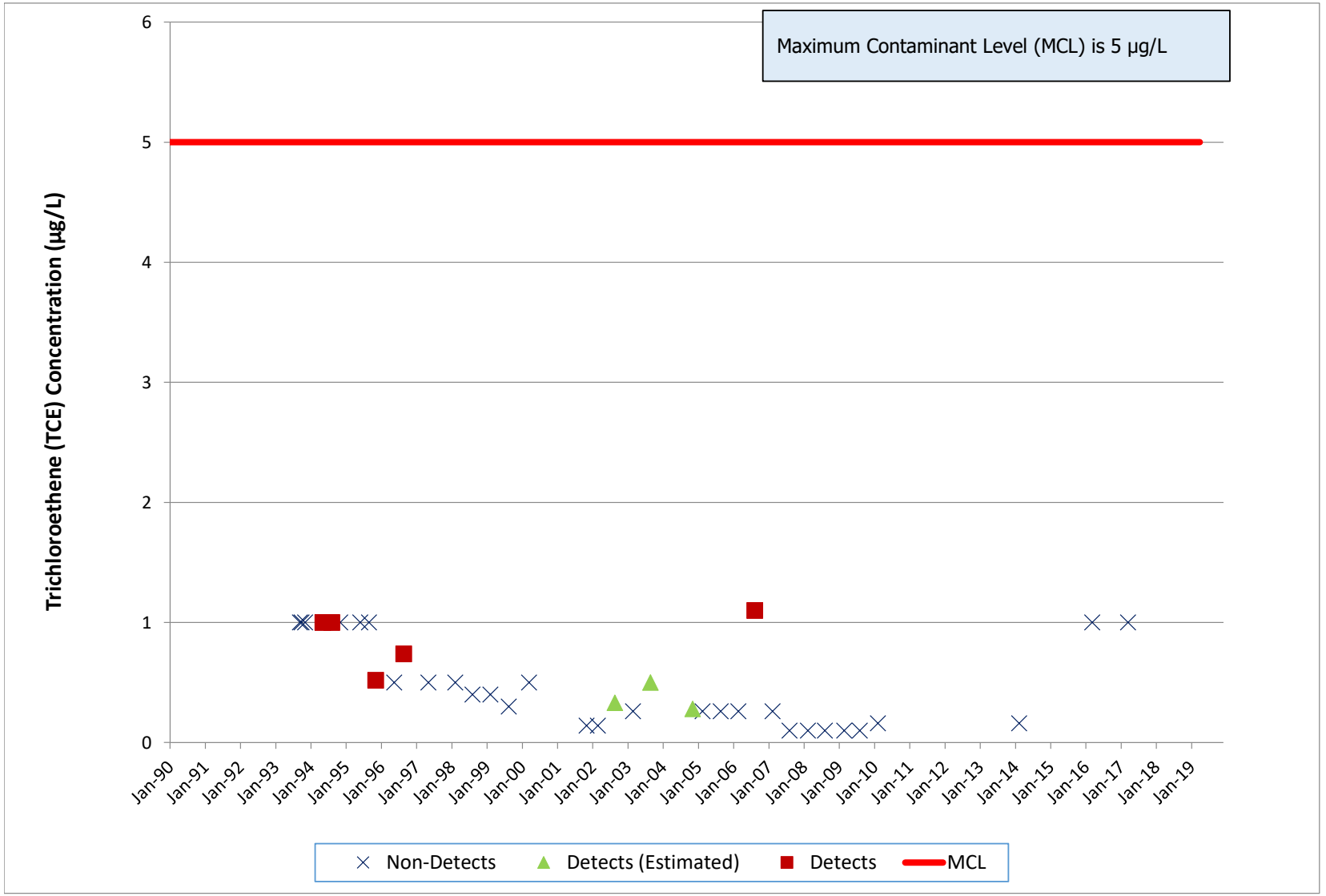
Trichloroethene



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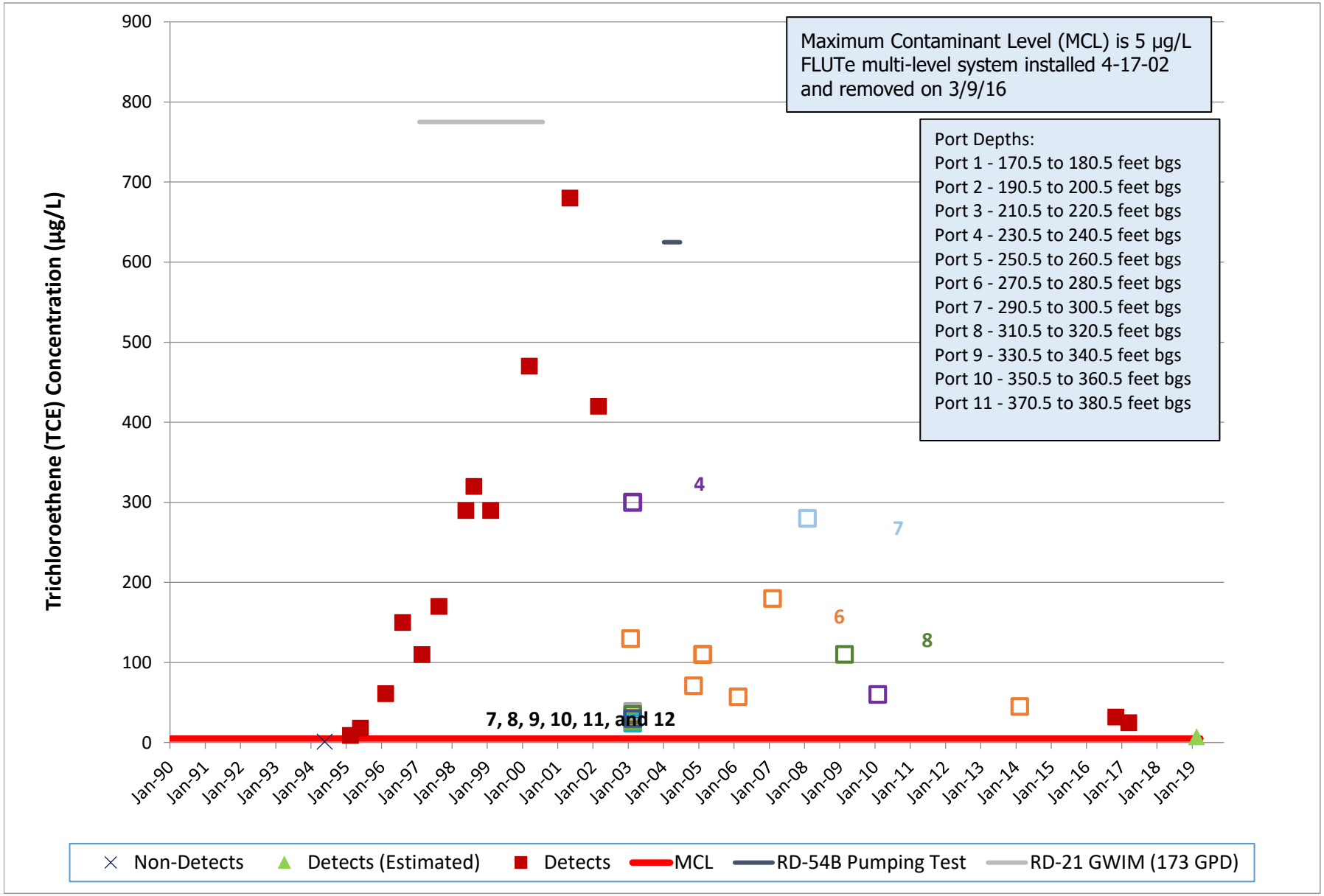

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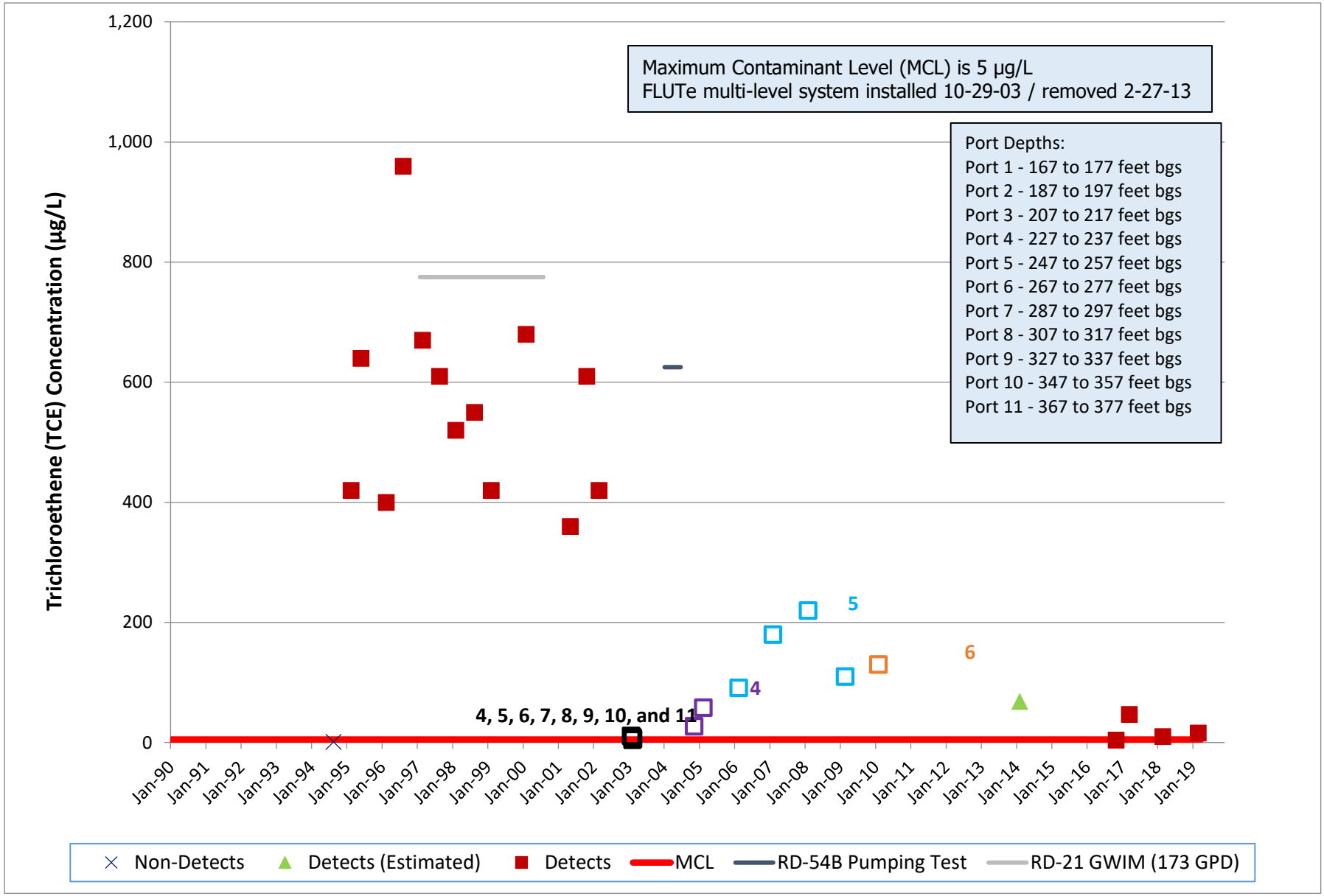

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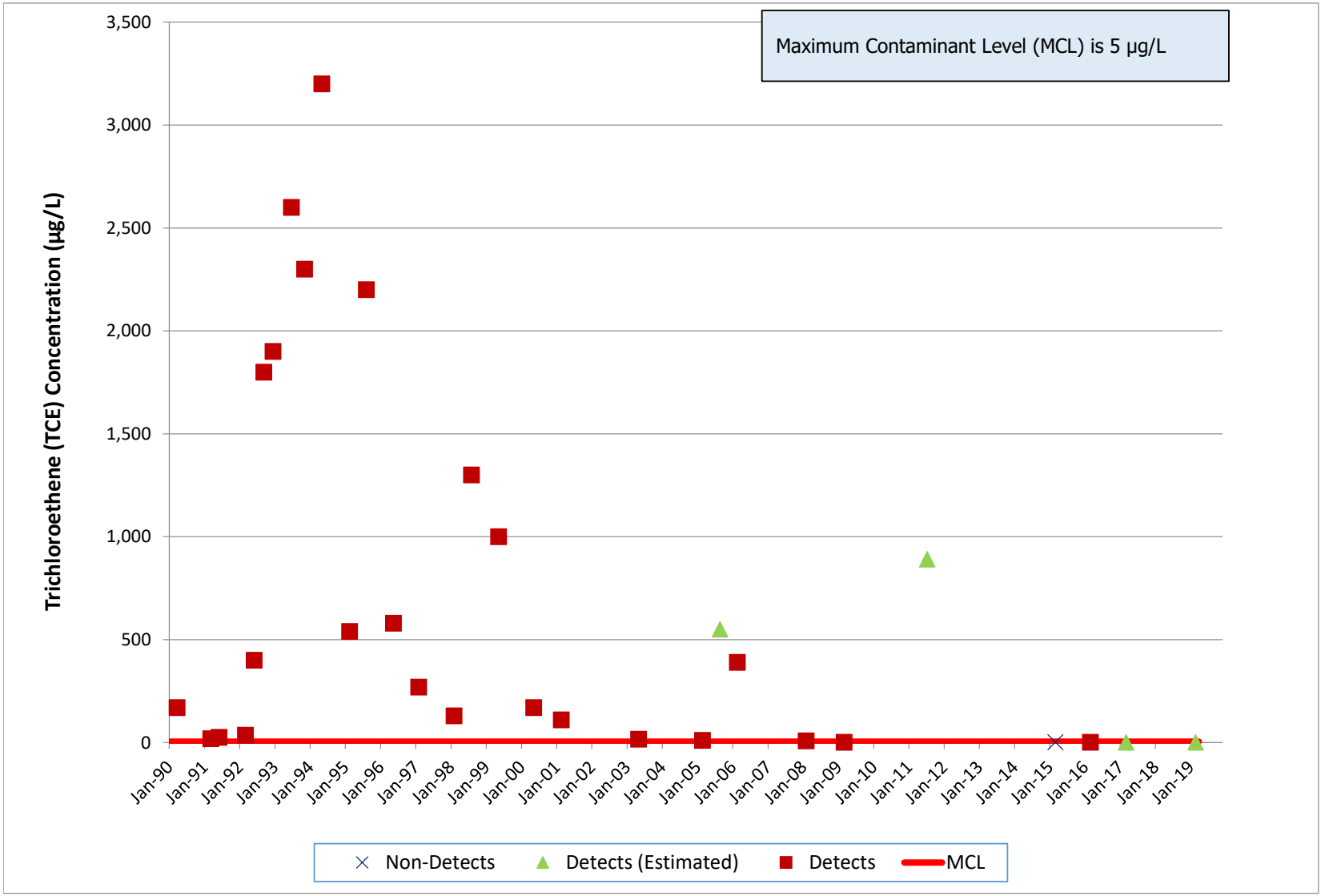

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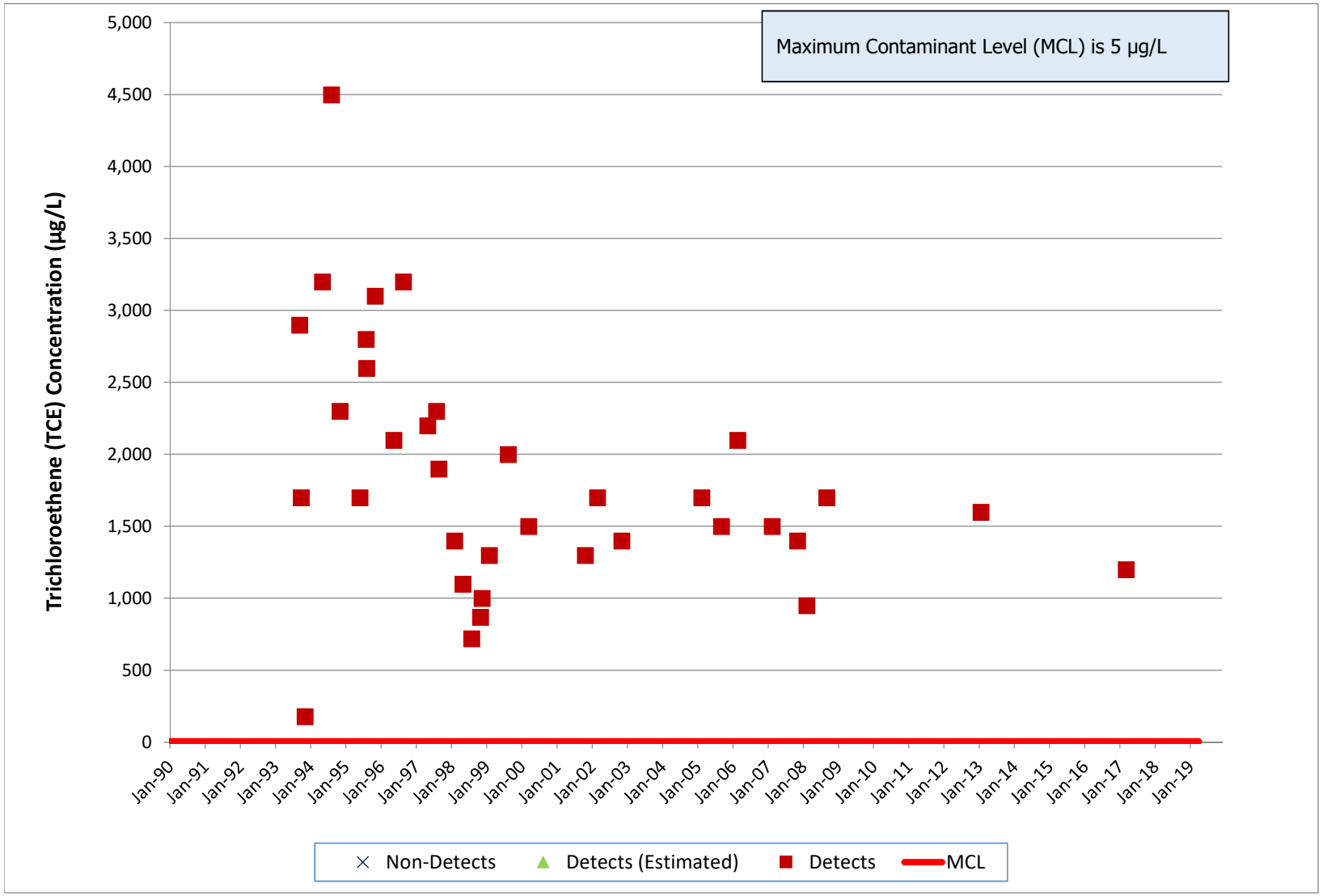

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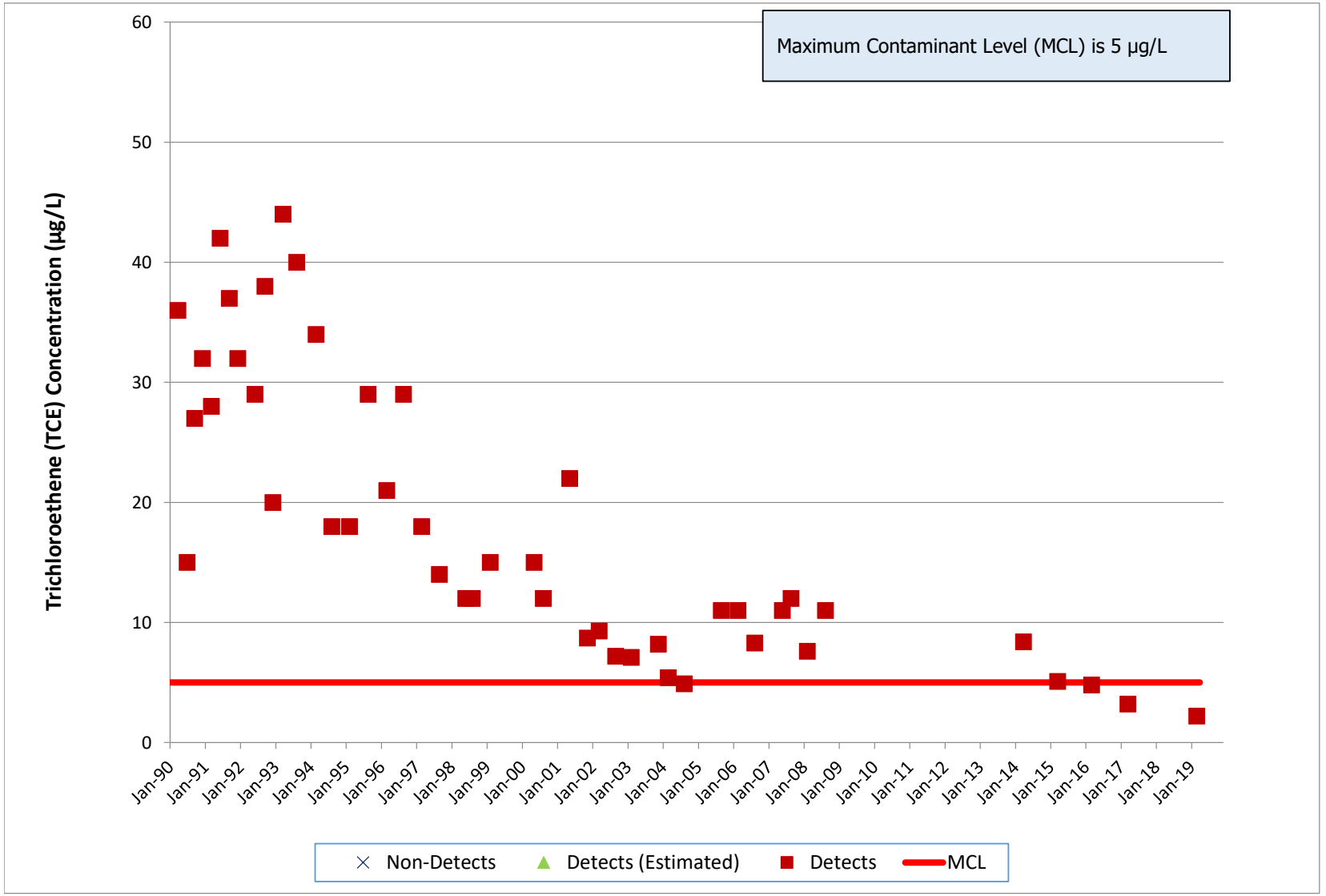

RD-34A, RMHF
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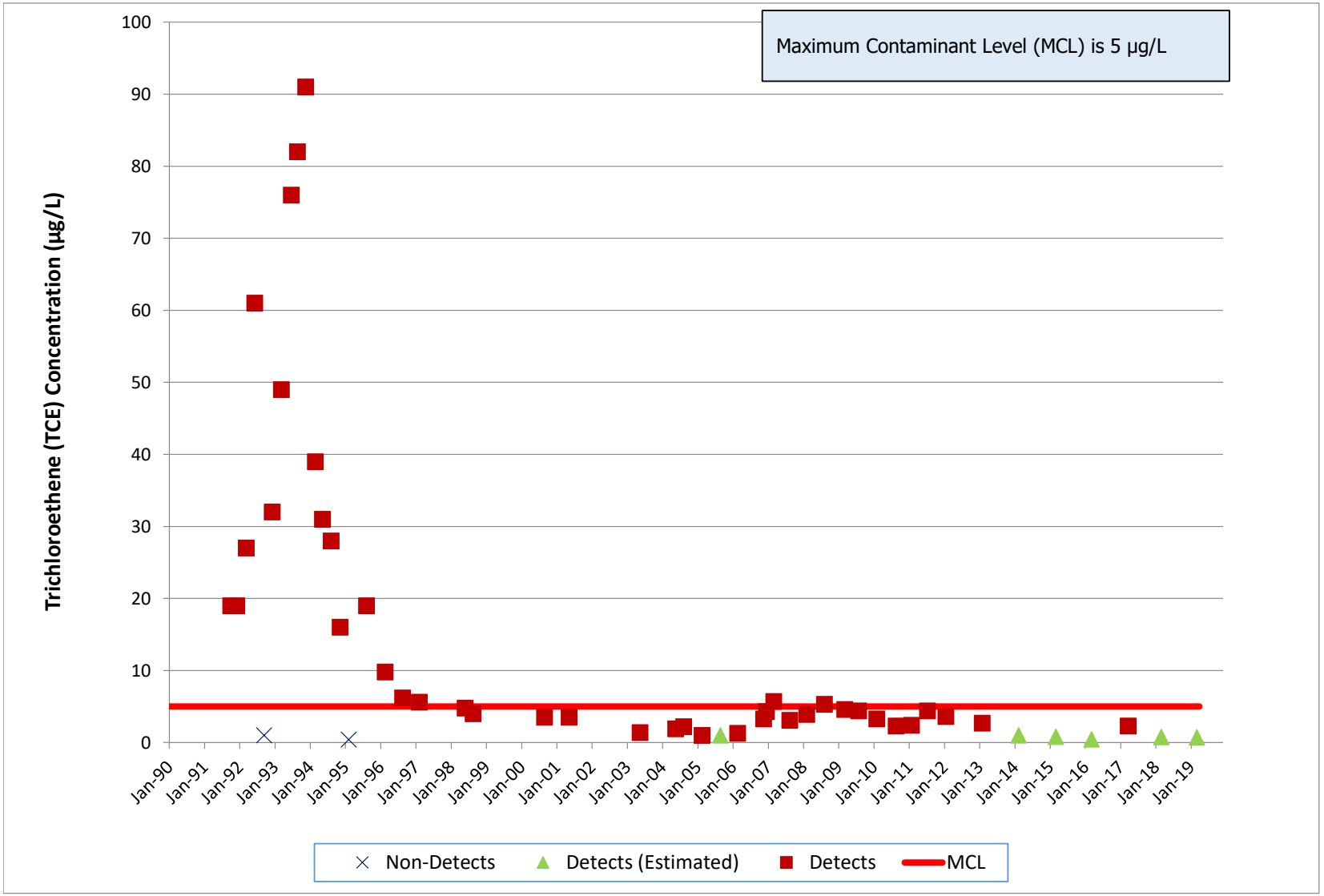

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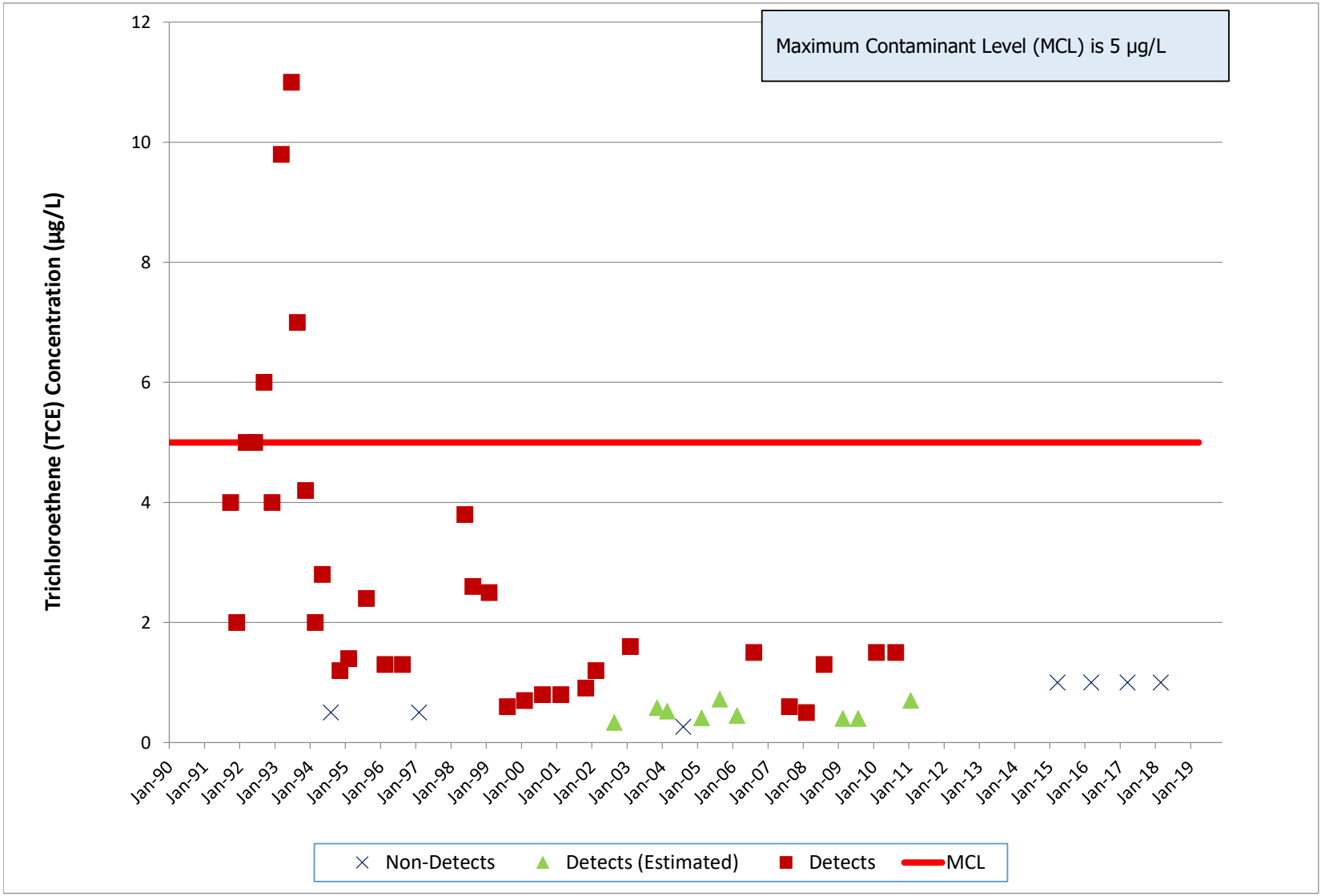
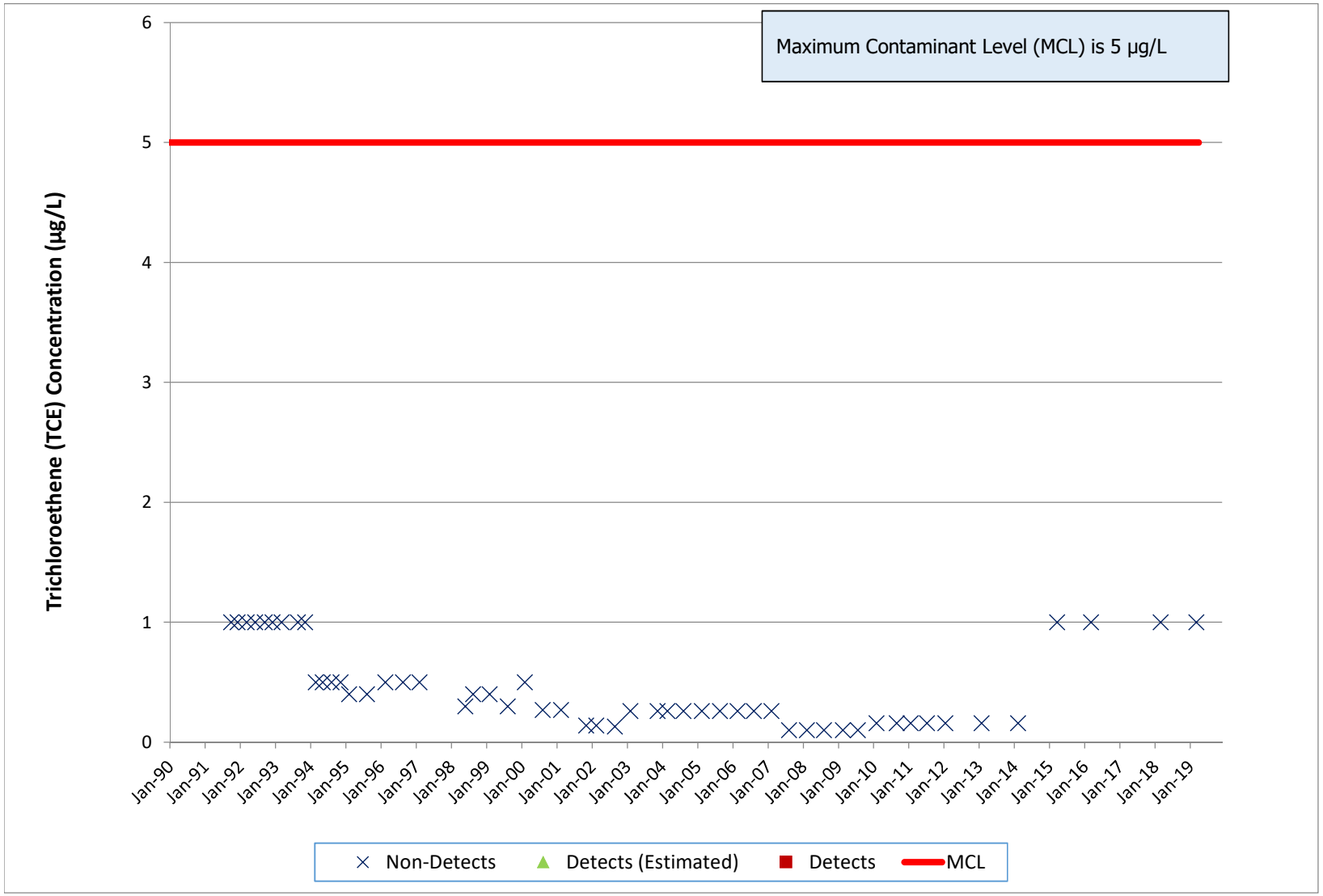
Trichloroethene



RD-34C, RMHF
Trichloroethene



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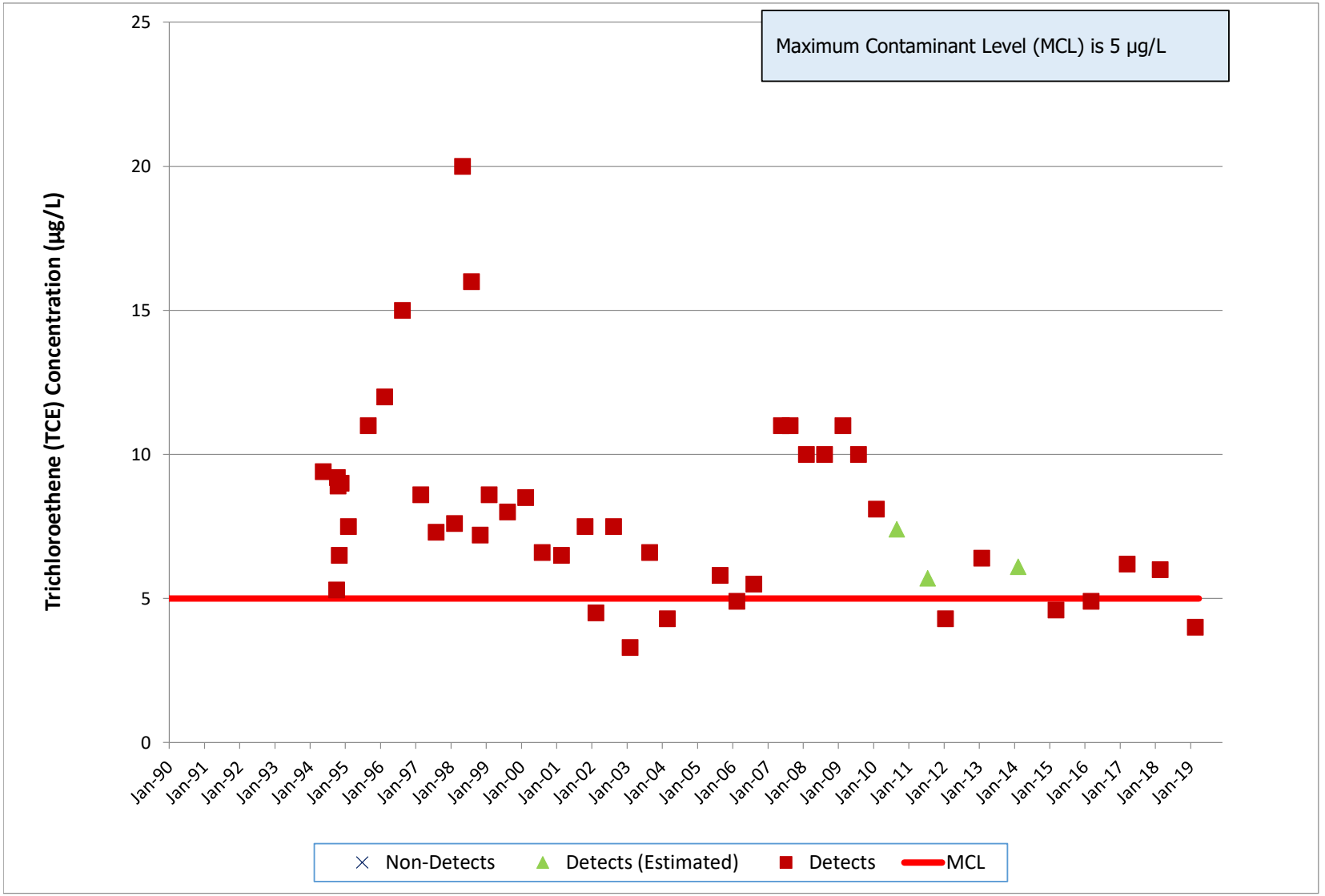
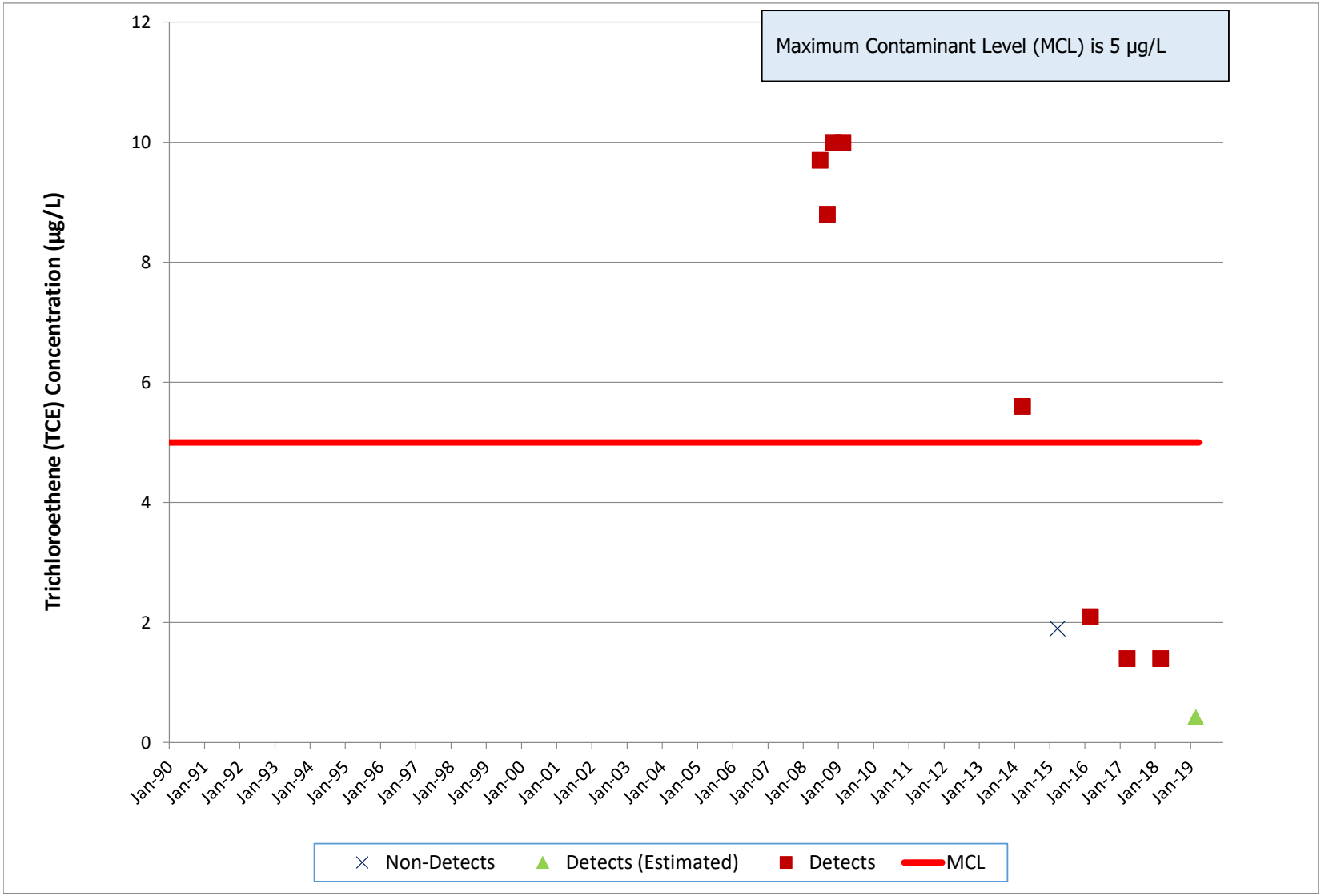
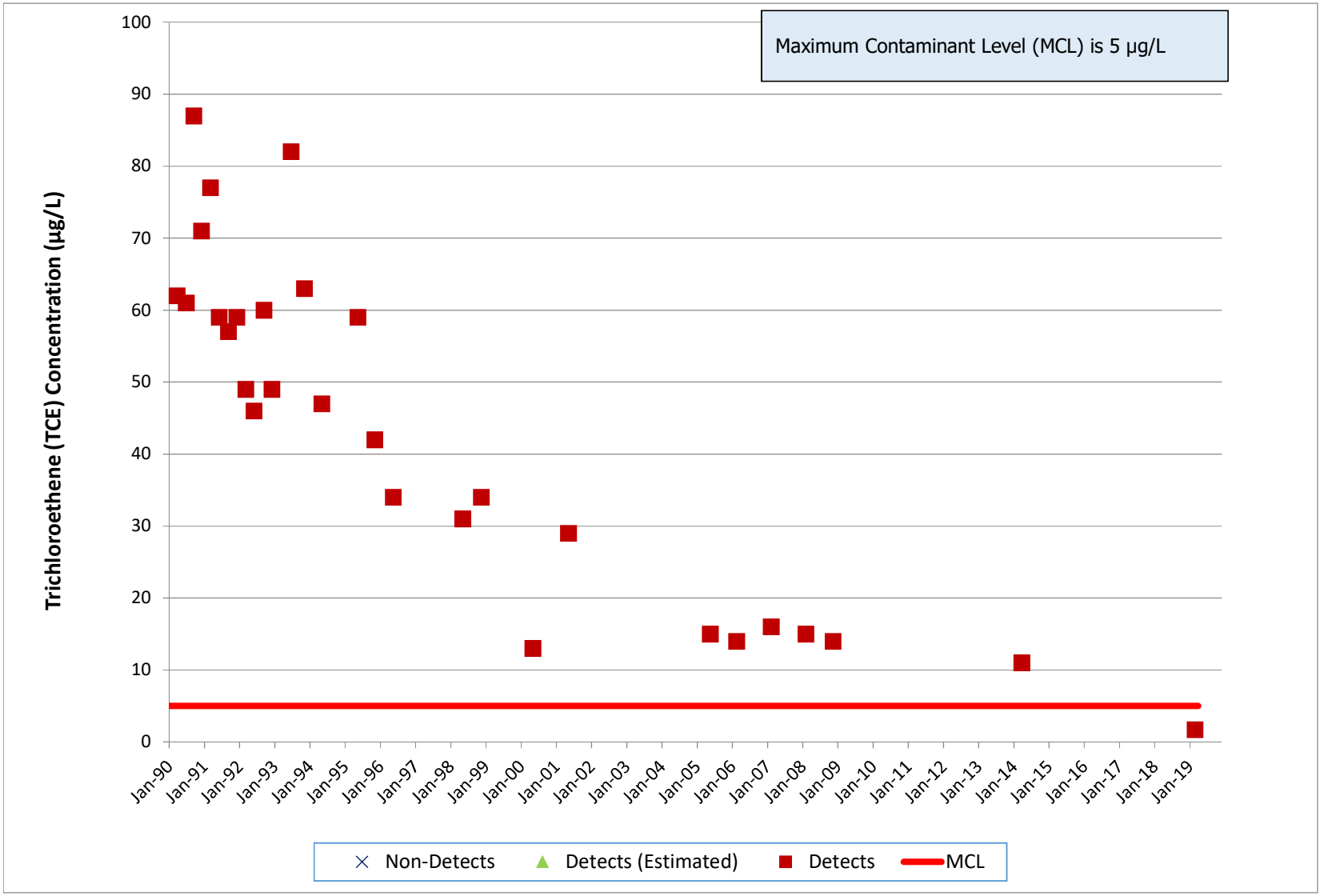


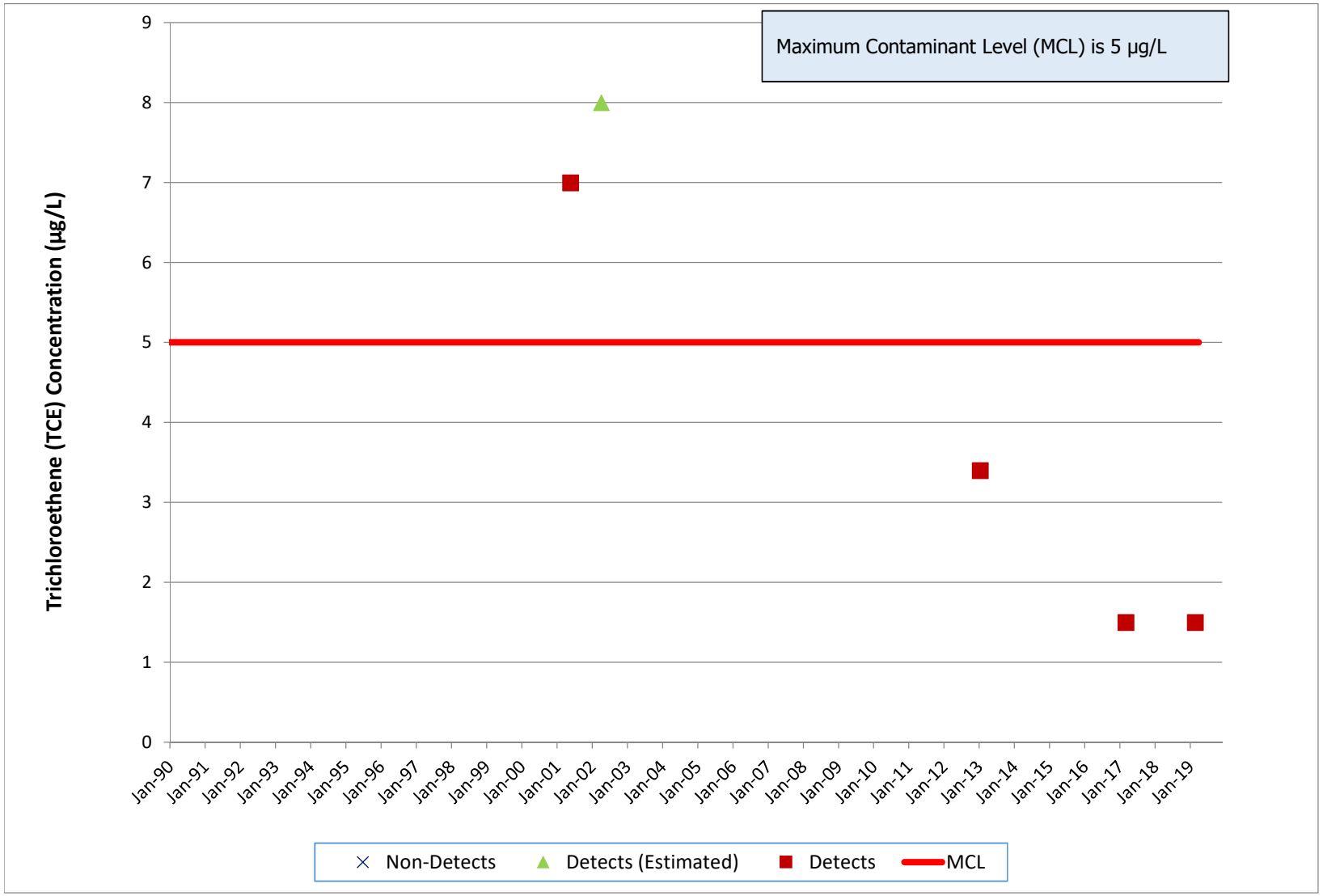
RD-98, RMHF
Trichloroethene



RS-28, RMHF
Trichloroethene



PZ-005, Bldg 65 Metals Clarifier
Trichloroethene



PZ-104, Bldg 65 Metals Clarifier
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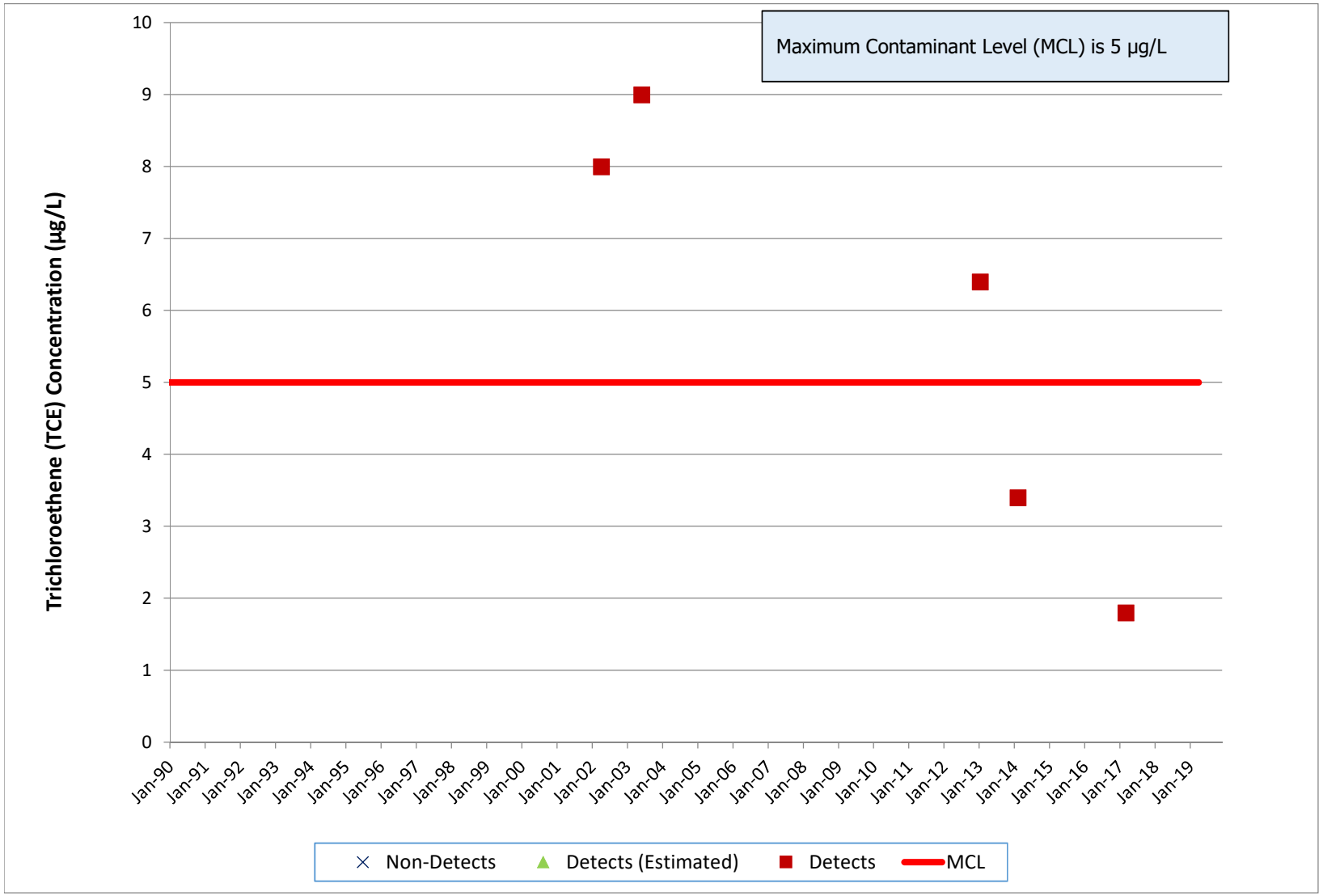

PZ-105, Bldg 65 Metals Clarifier
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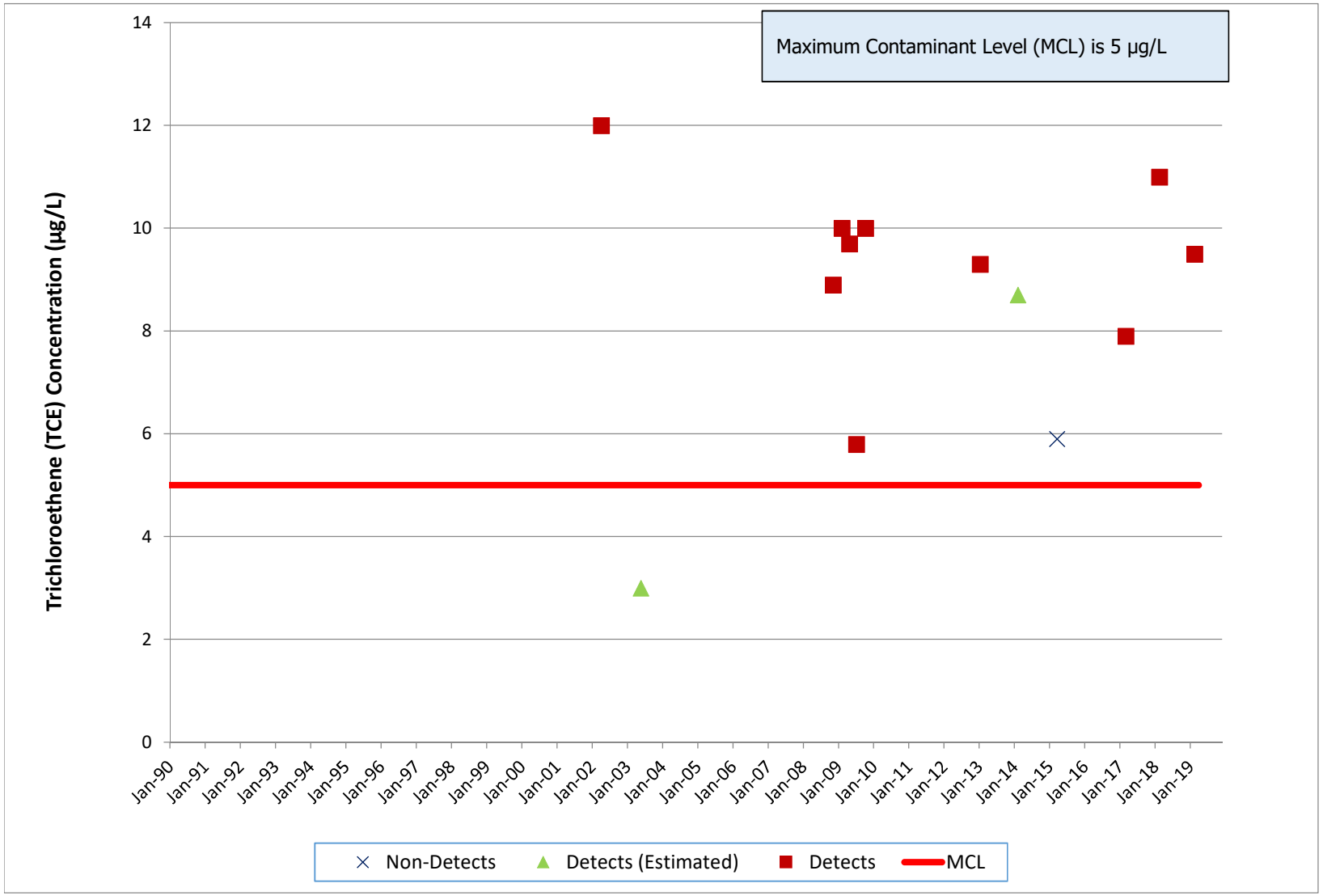
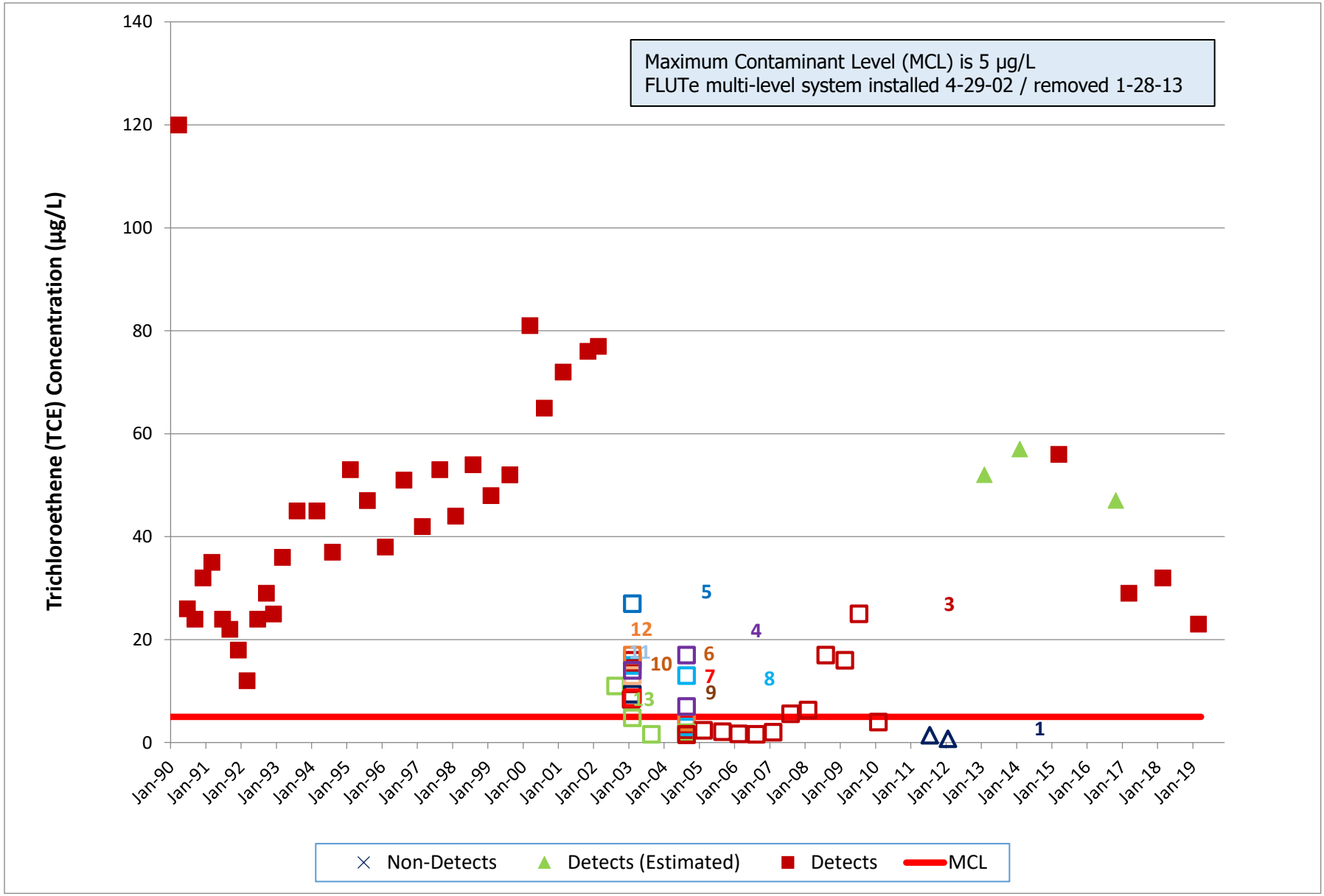


RD-07, Bldg 56 Landfill
Trichloroethene



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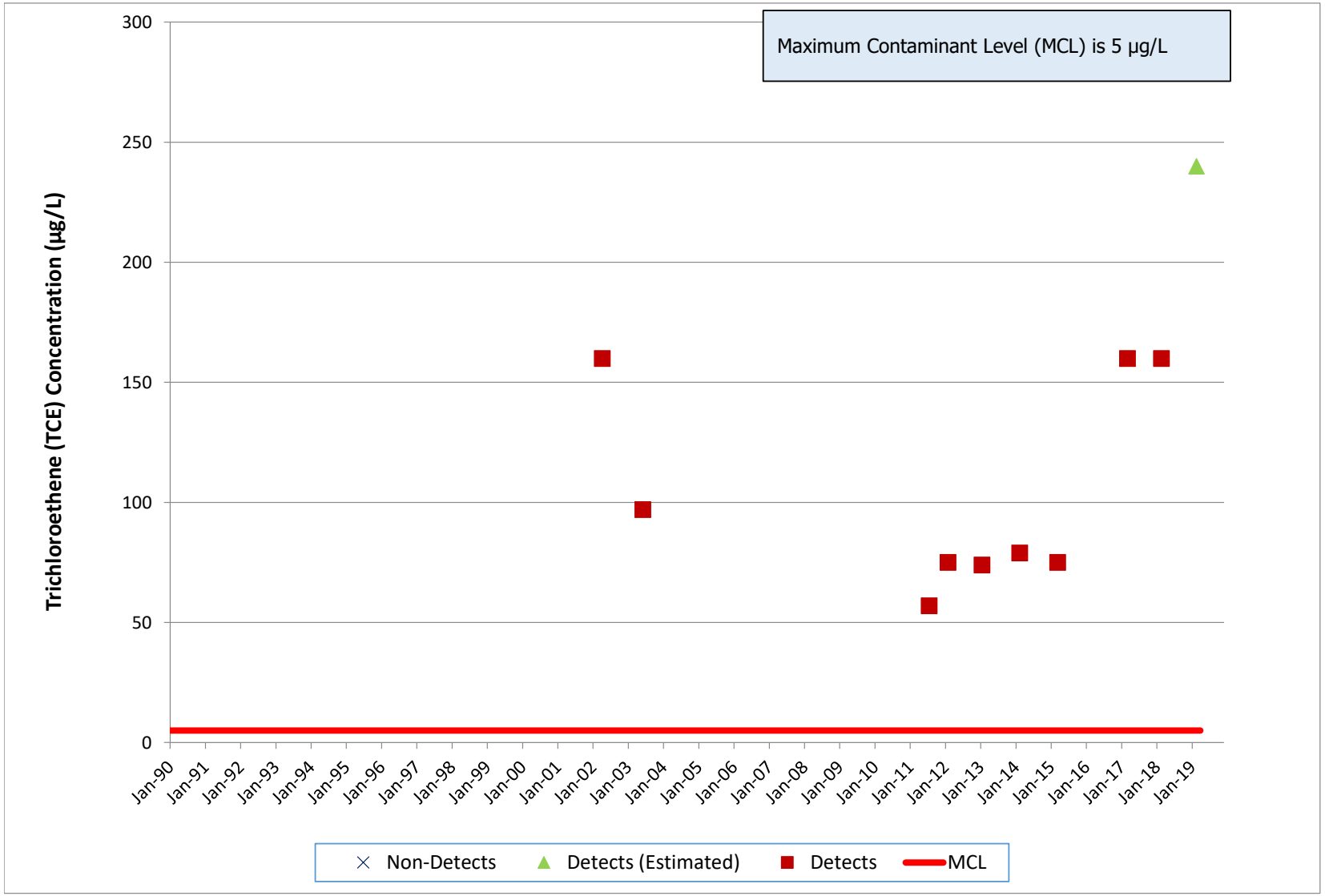
Trichloroethene



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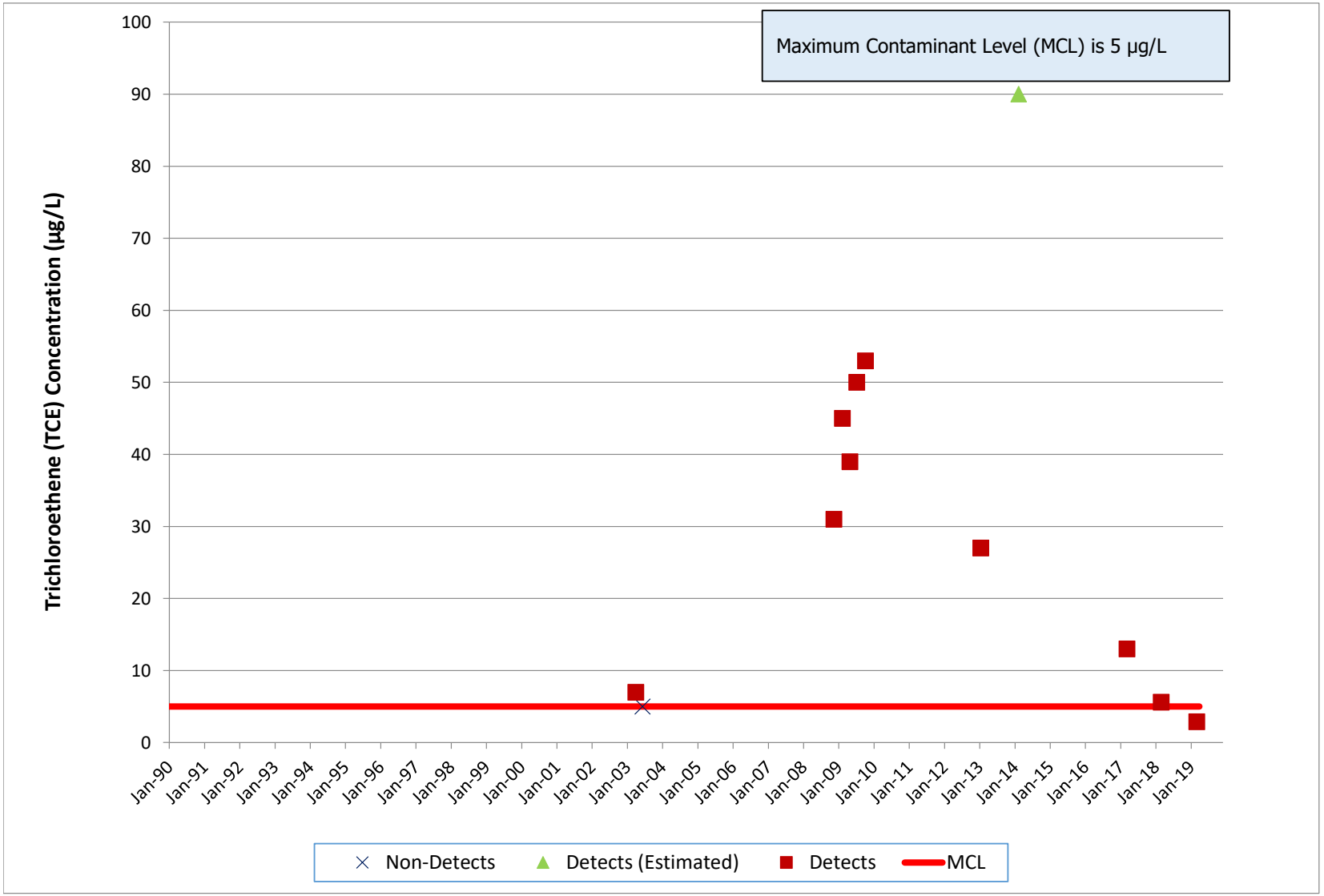

PZ-109, B4057/4059/4626
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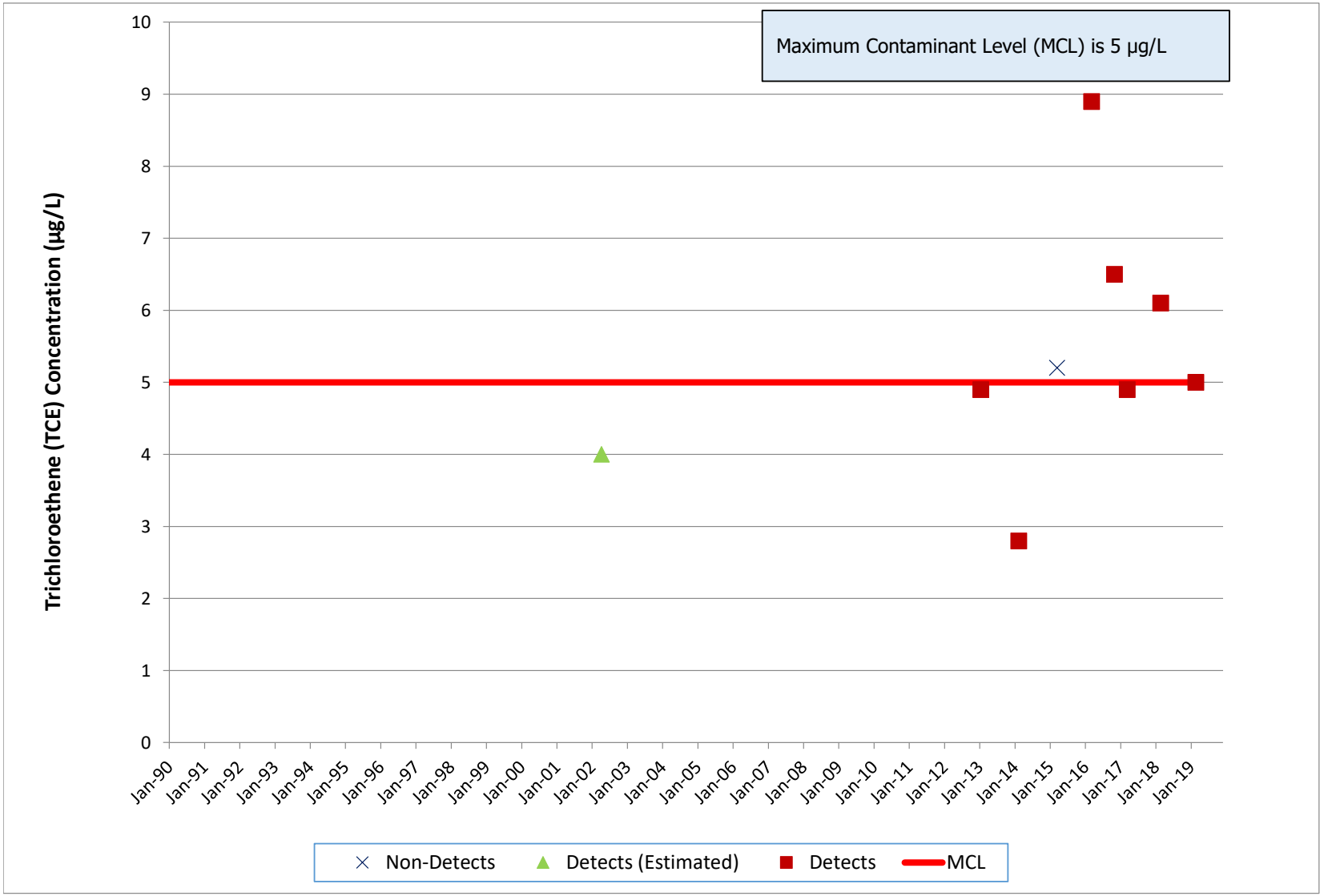
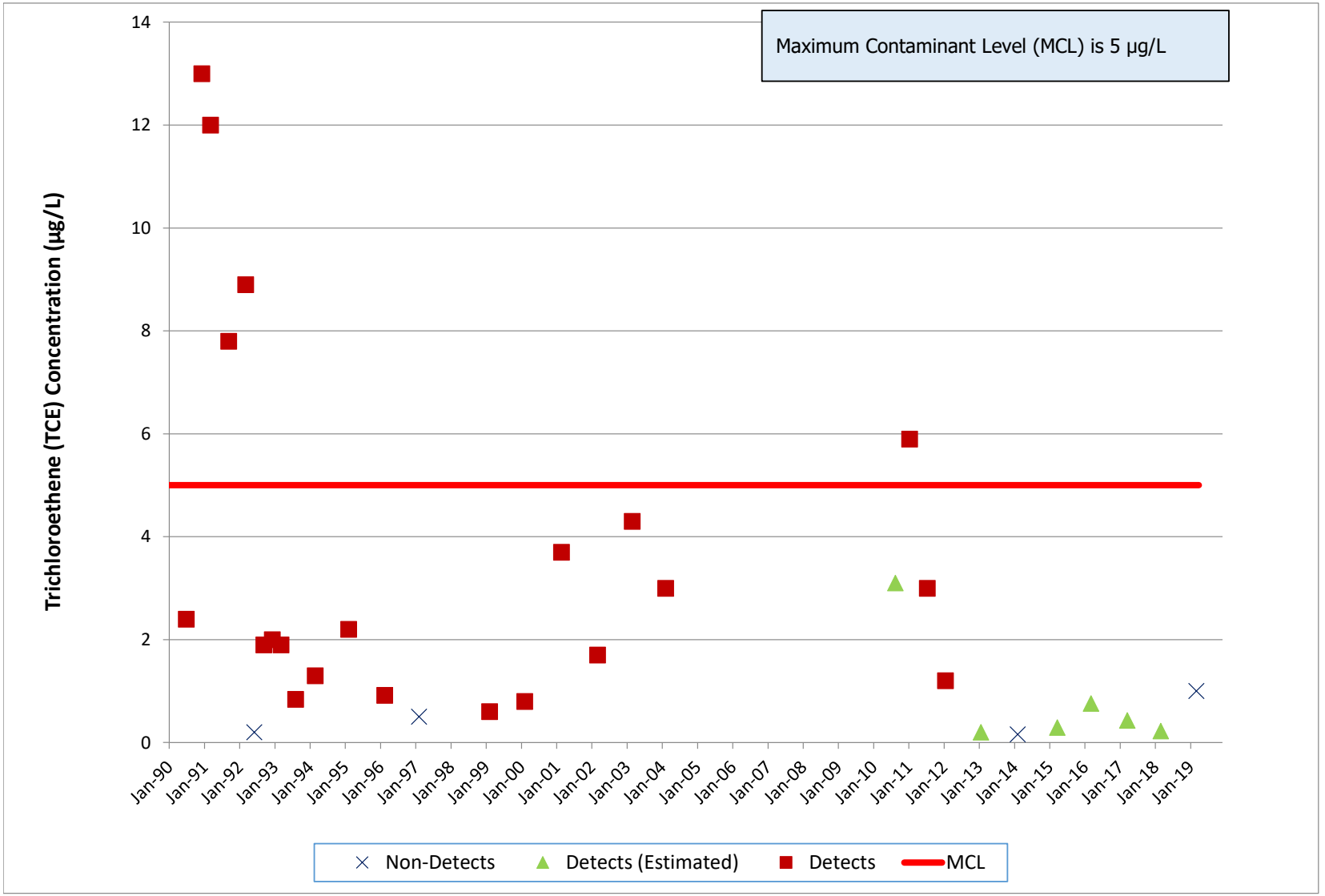
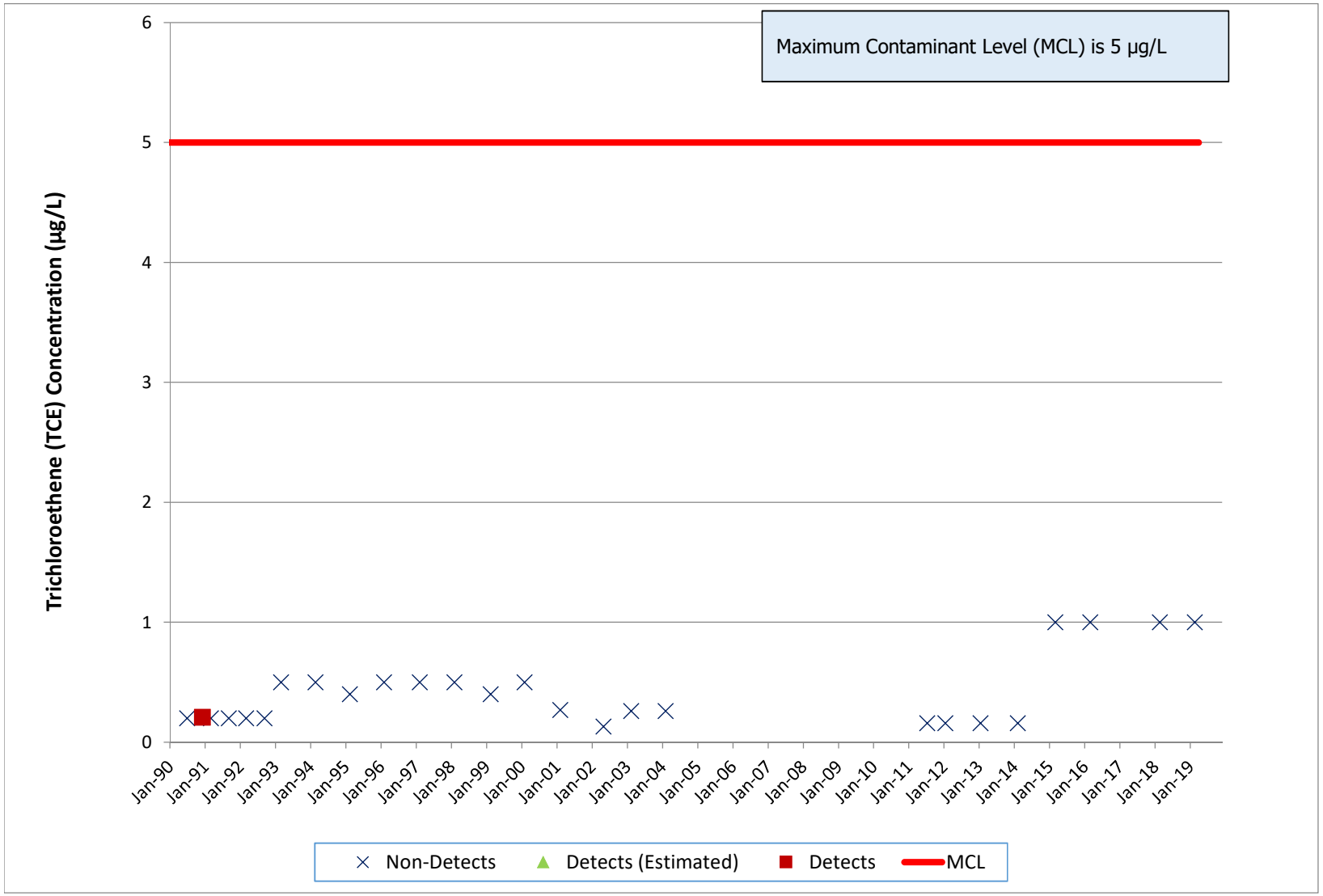


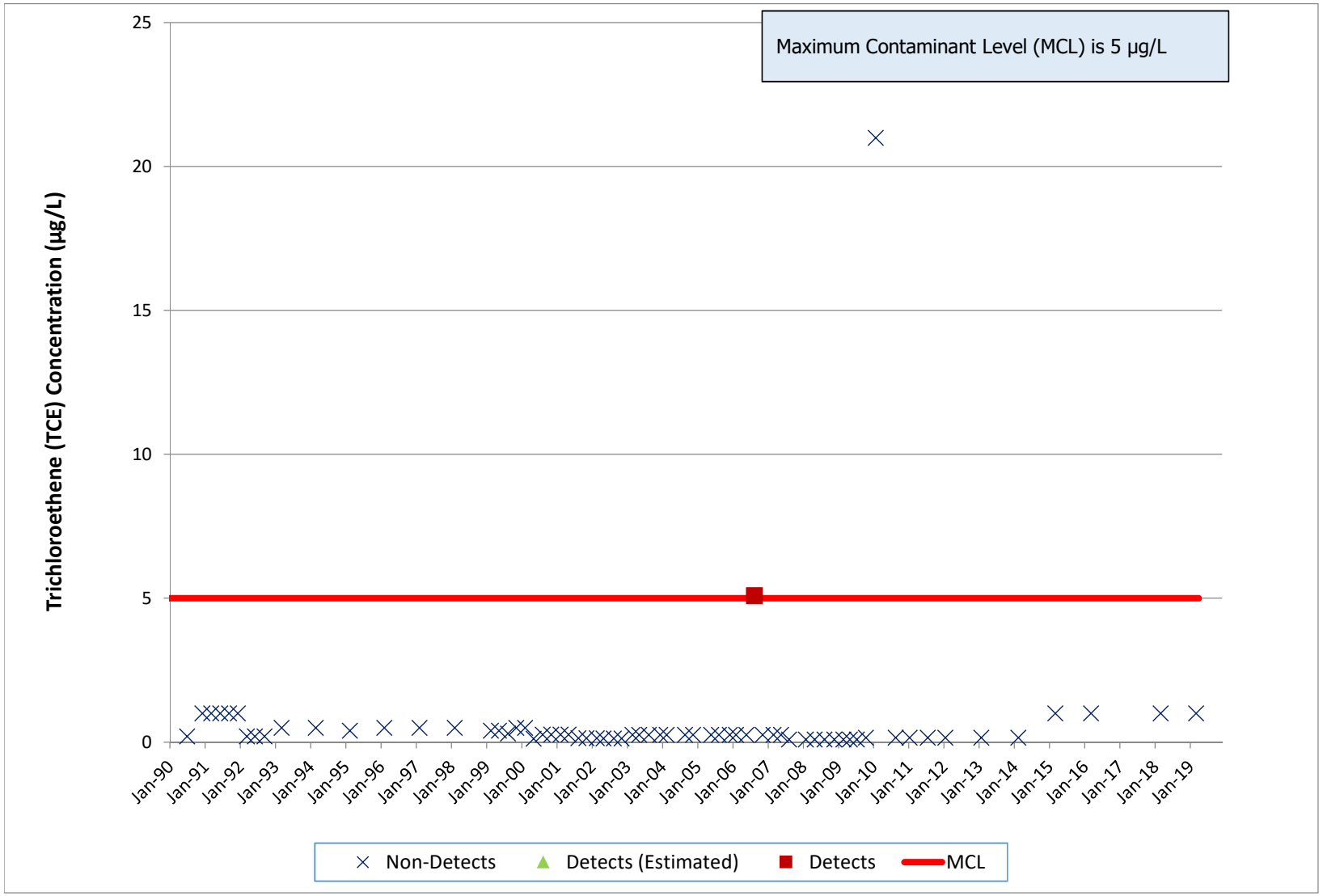
RD-14, OCY
Trichloroethene



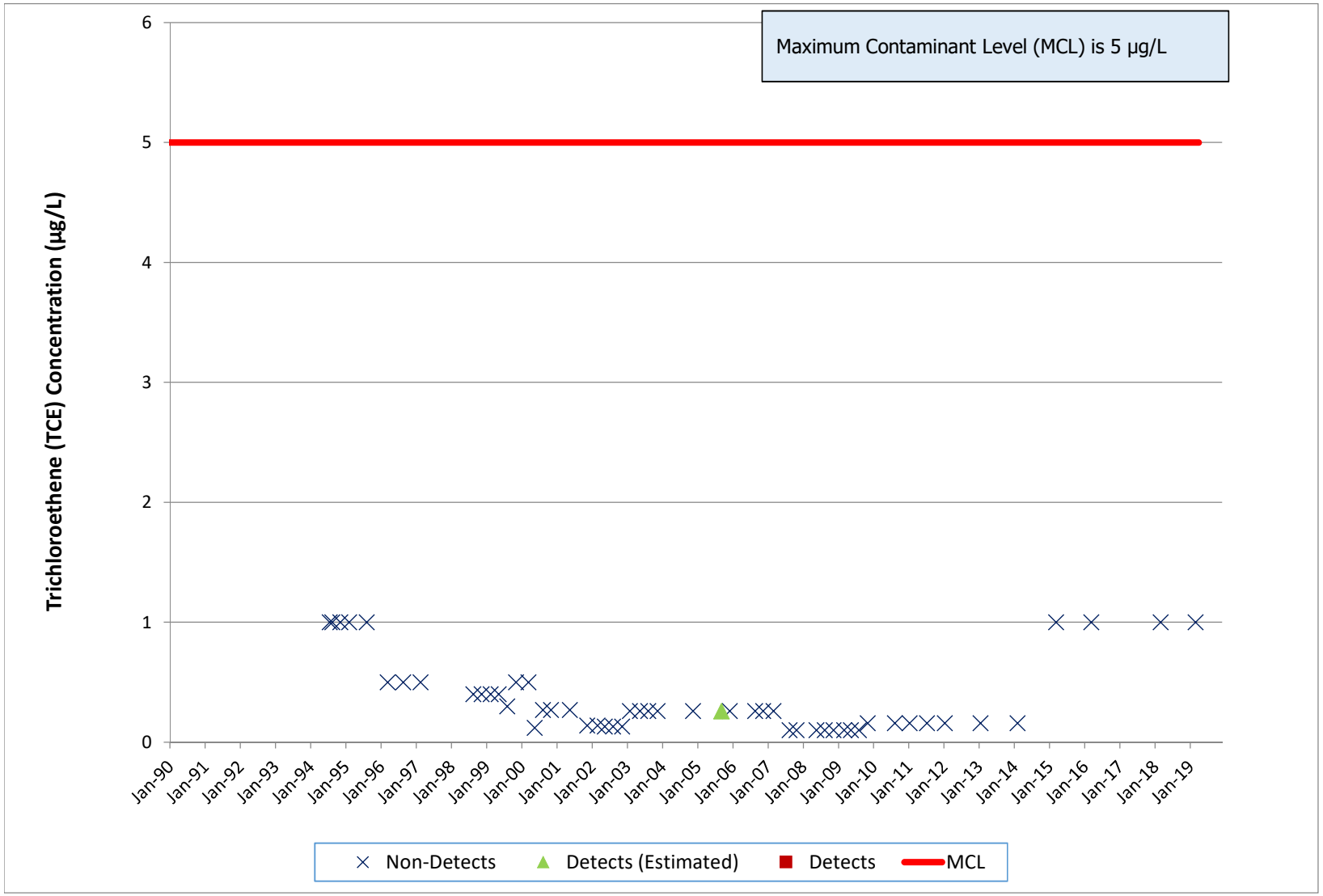
RD-20, Bldg 4100 Trench
Trichloroethene



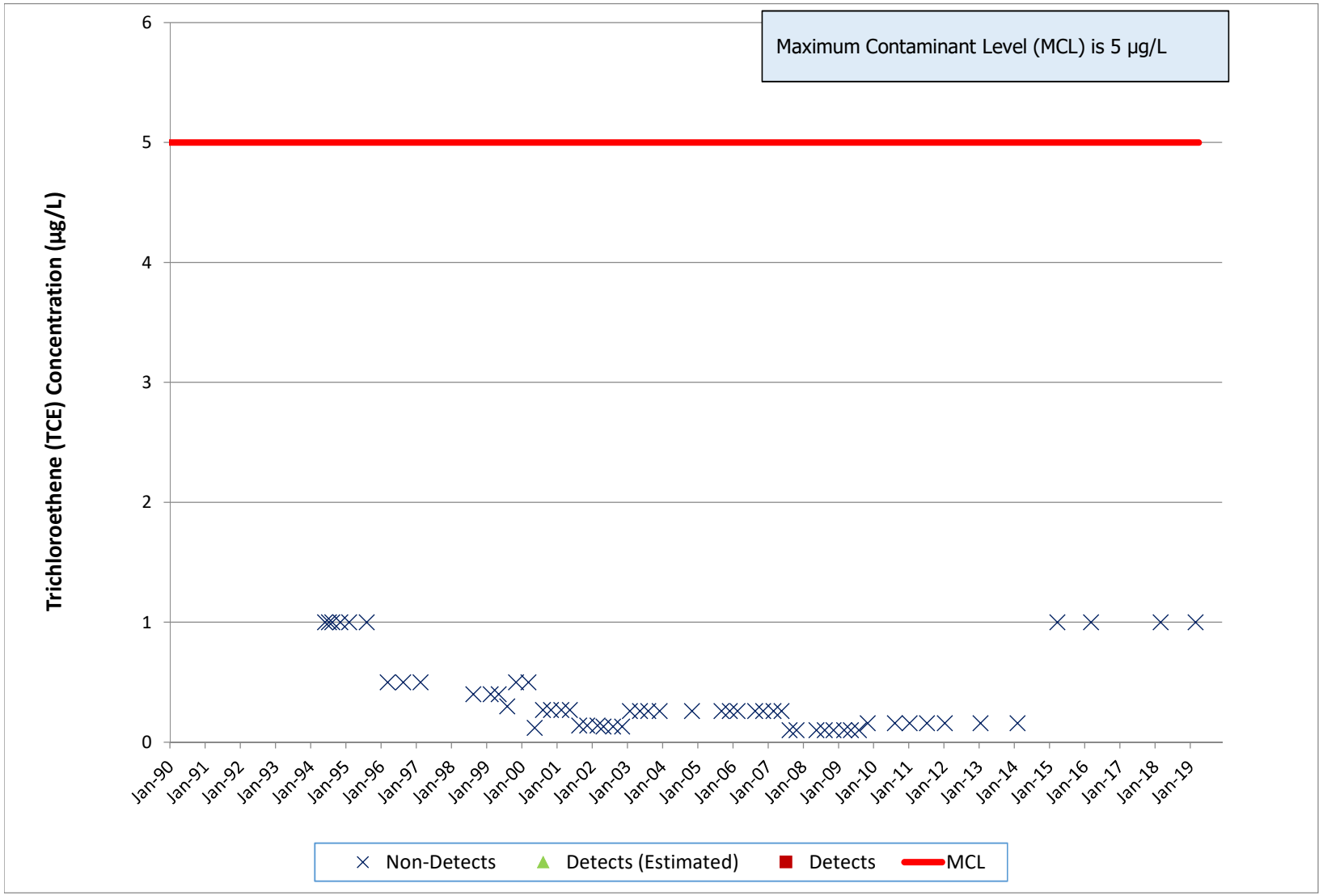
RD-19, B4133
Trichloroethene



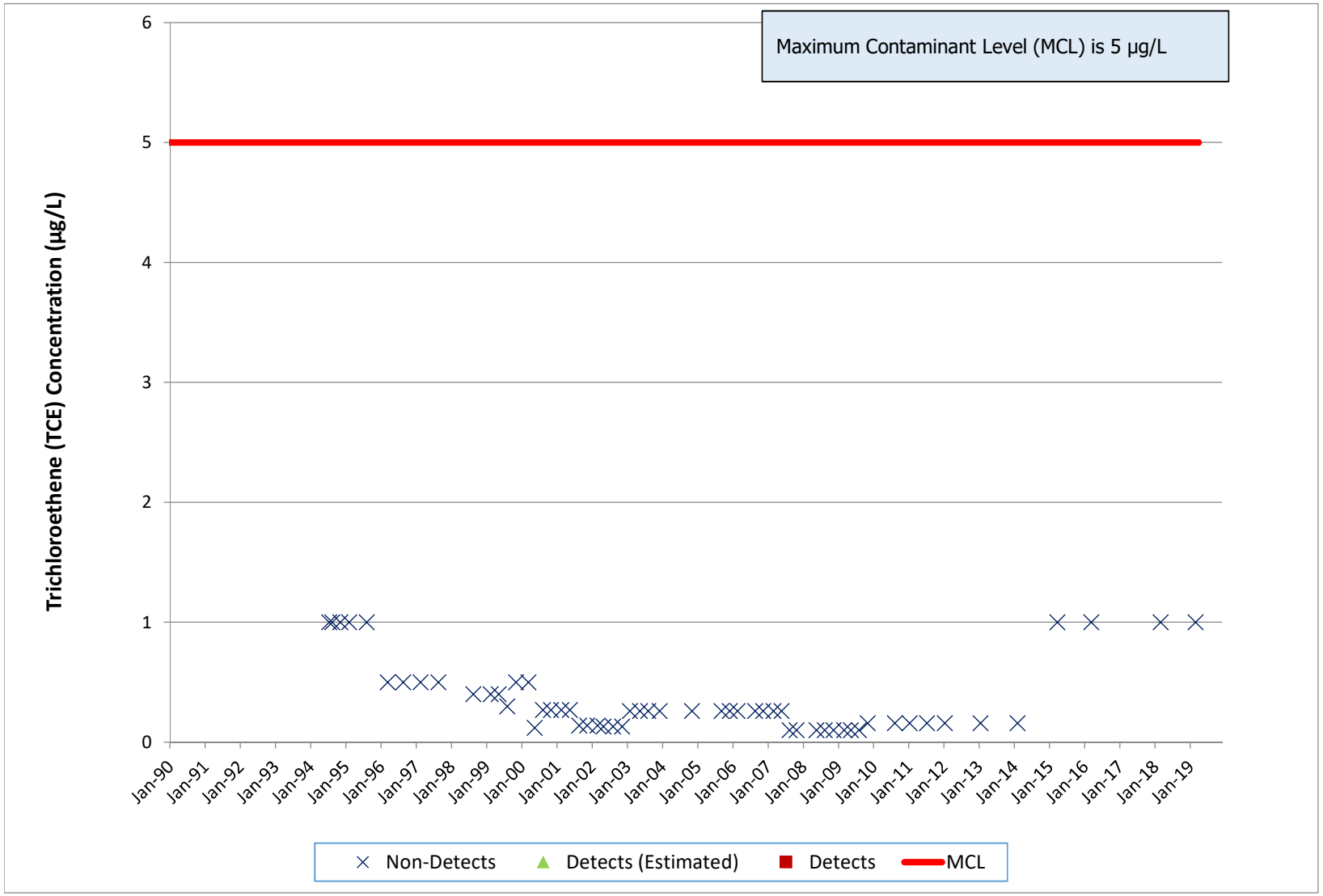
RD-59A, Offsite
Trichloroethene



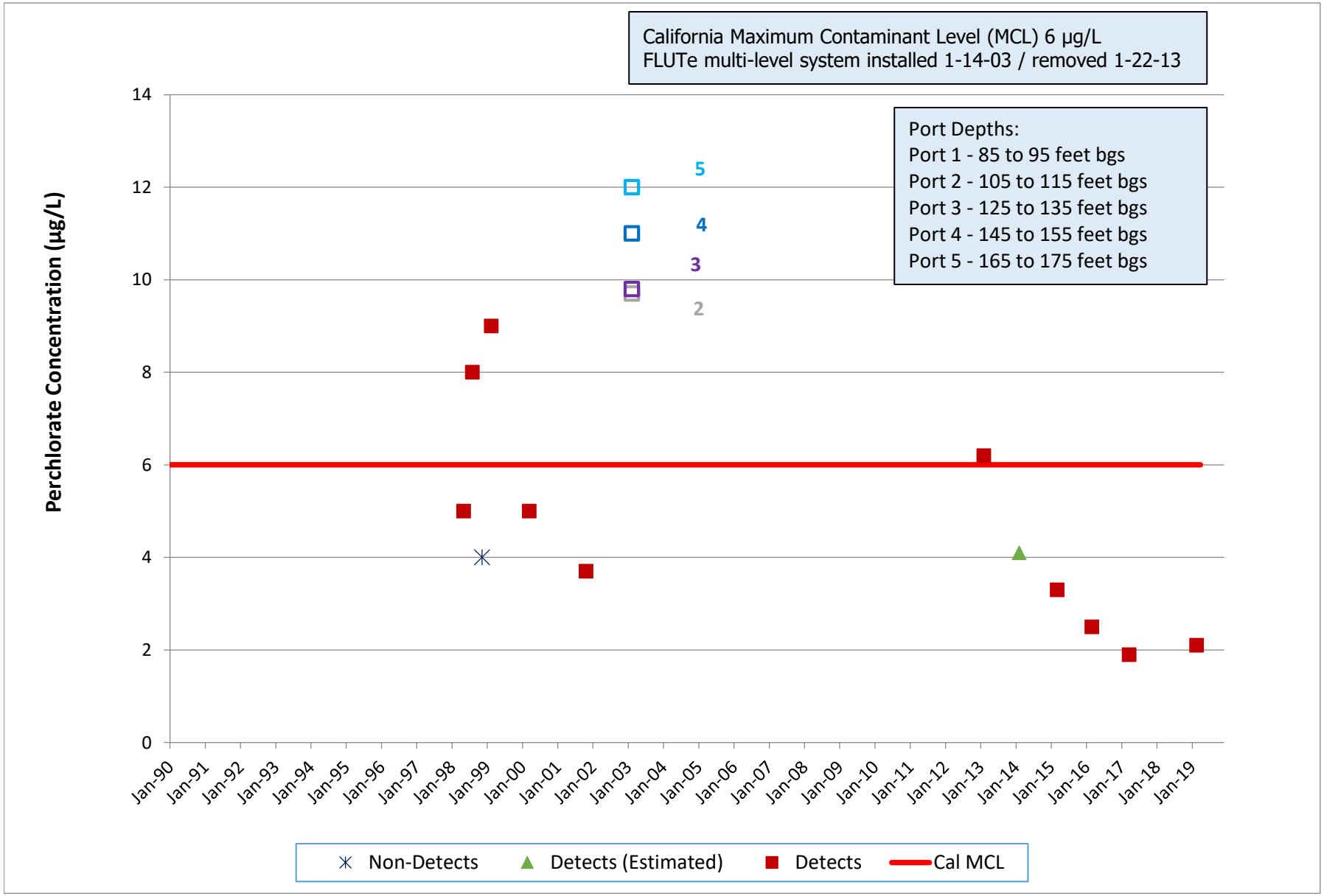
RD-59B, Offsite
Trichloroethene



RD-59C, Offsite
Trichloroethene



RD-21, FSDF/ESADA
Perchlorate



RD-54A, FSDF/ESADA
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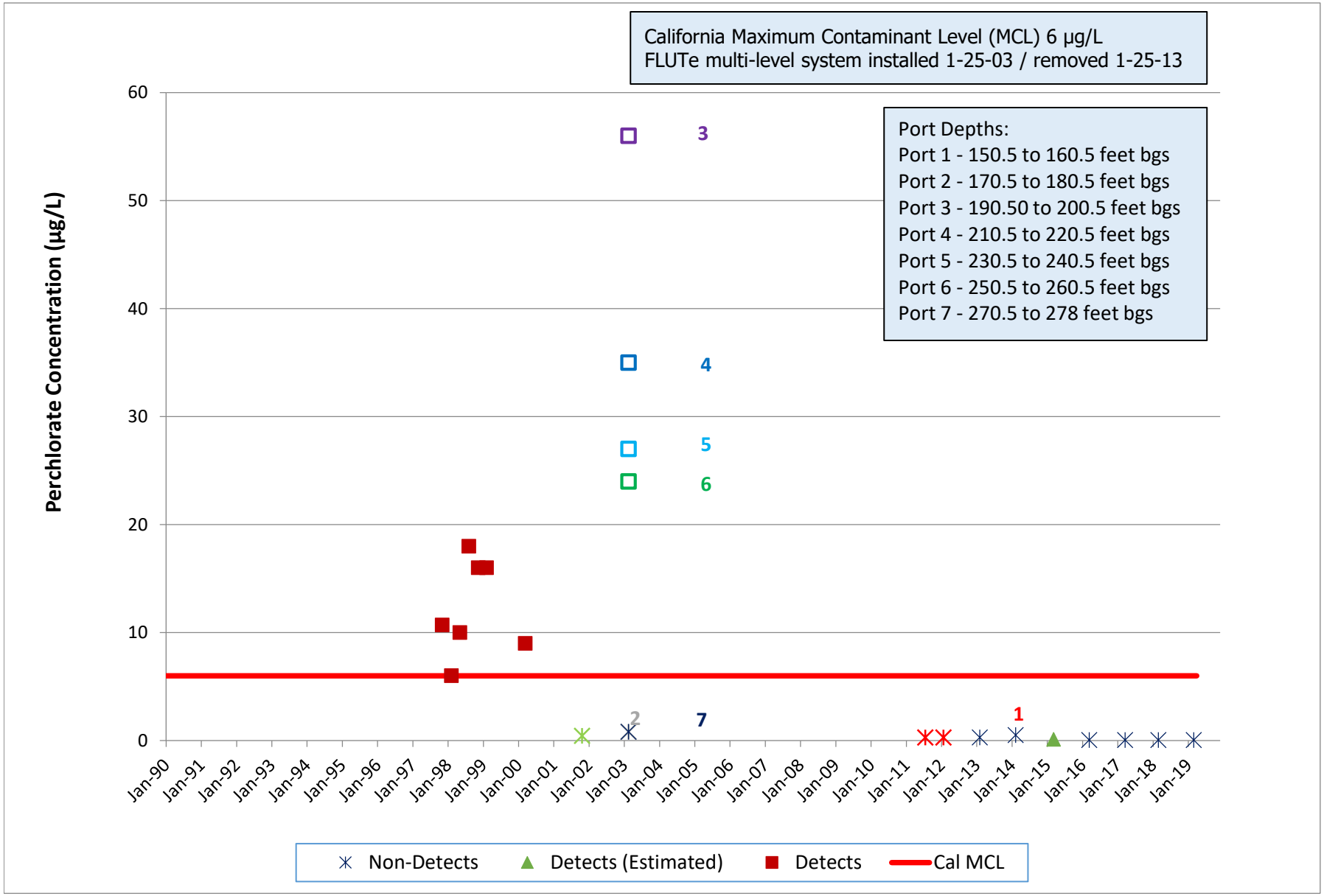

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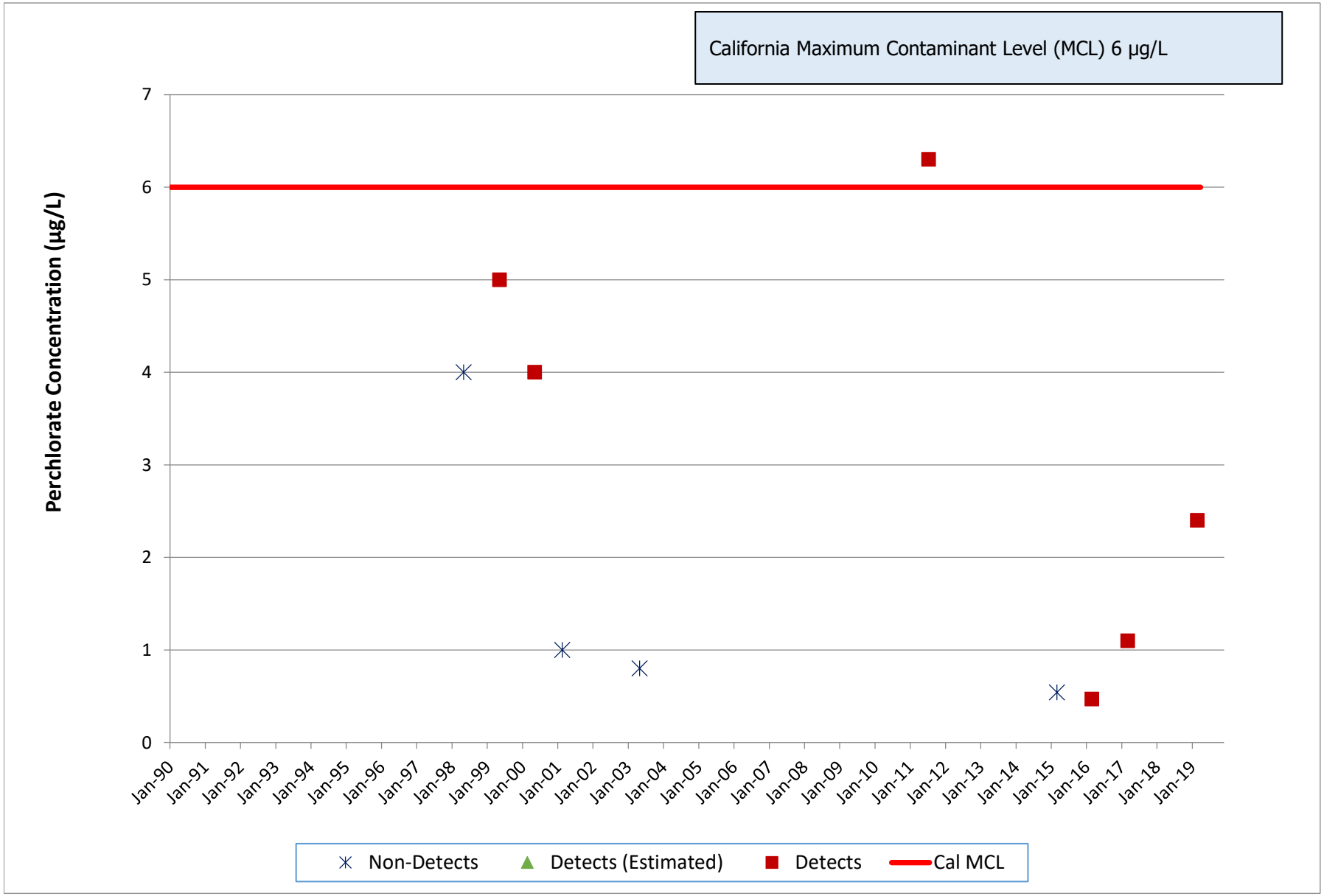

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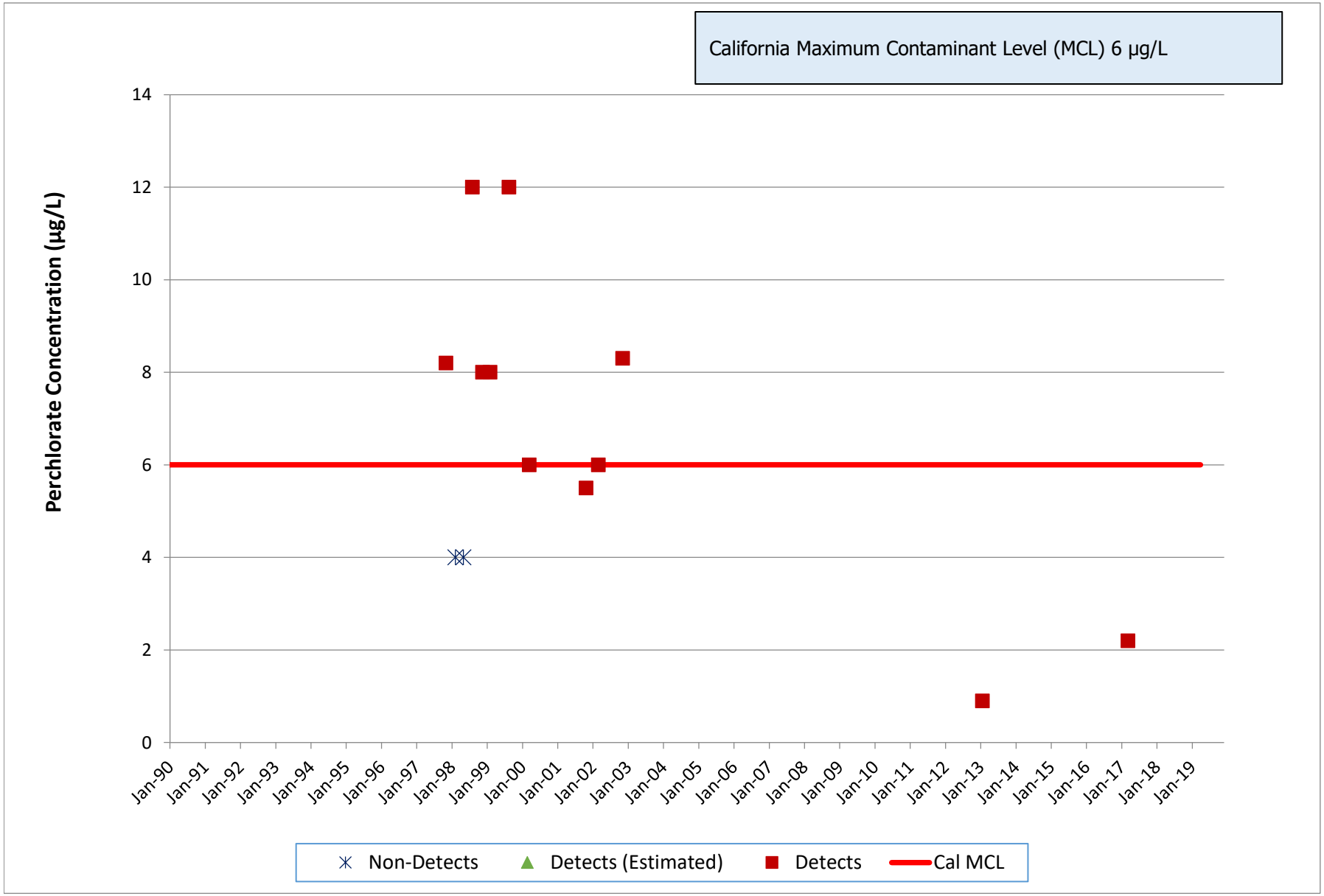
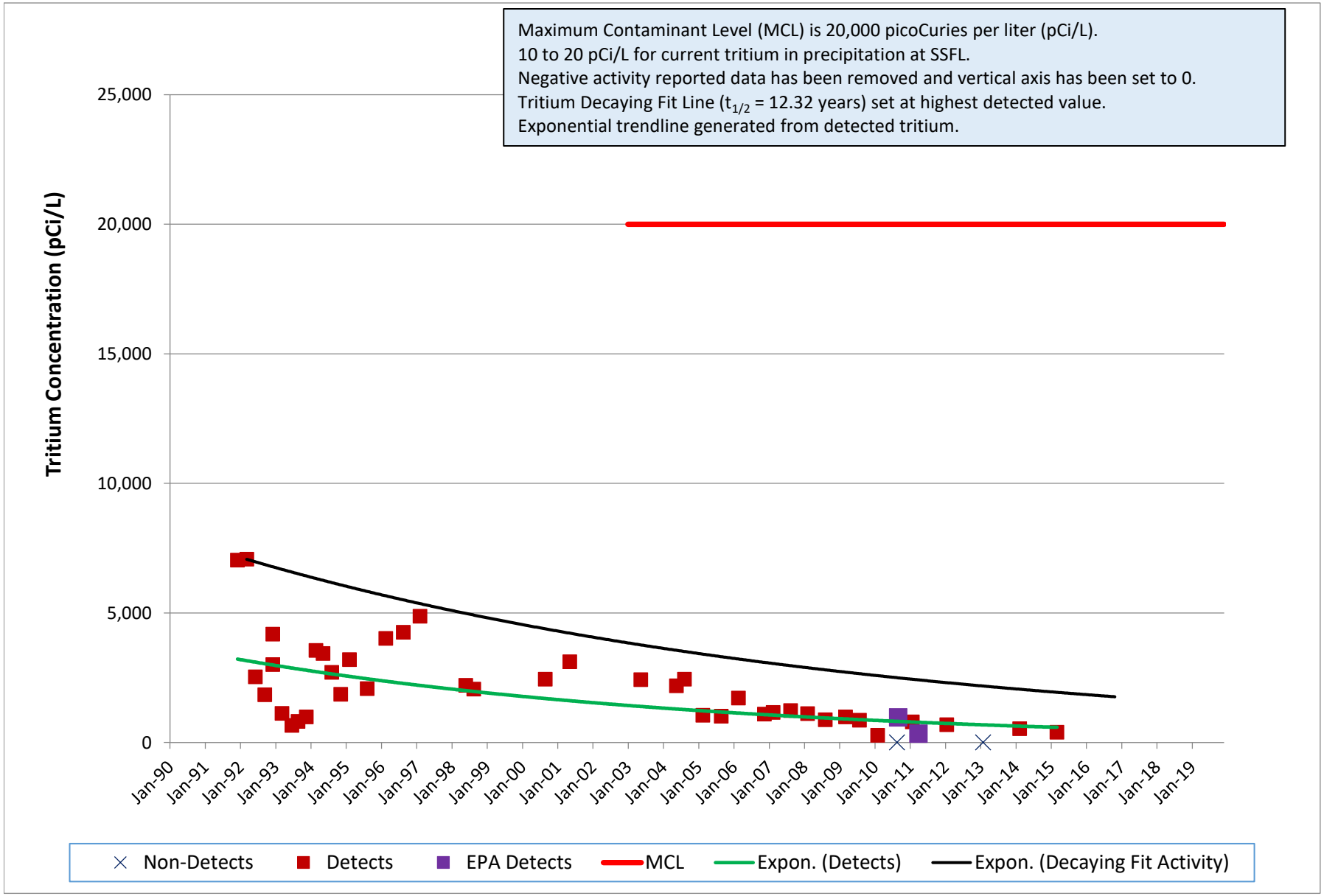


RD-34A, Tritium Plume
Tritium



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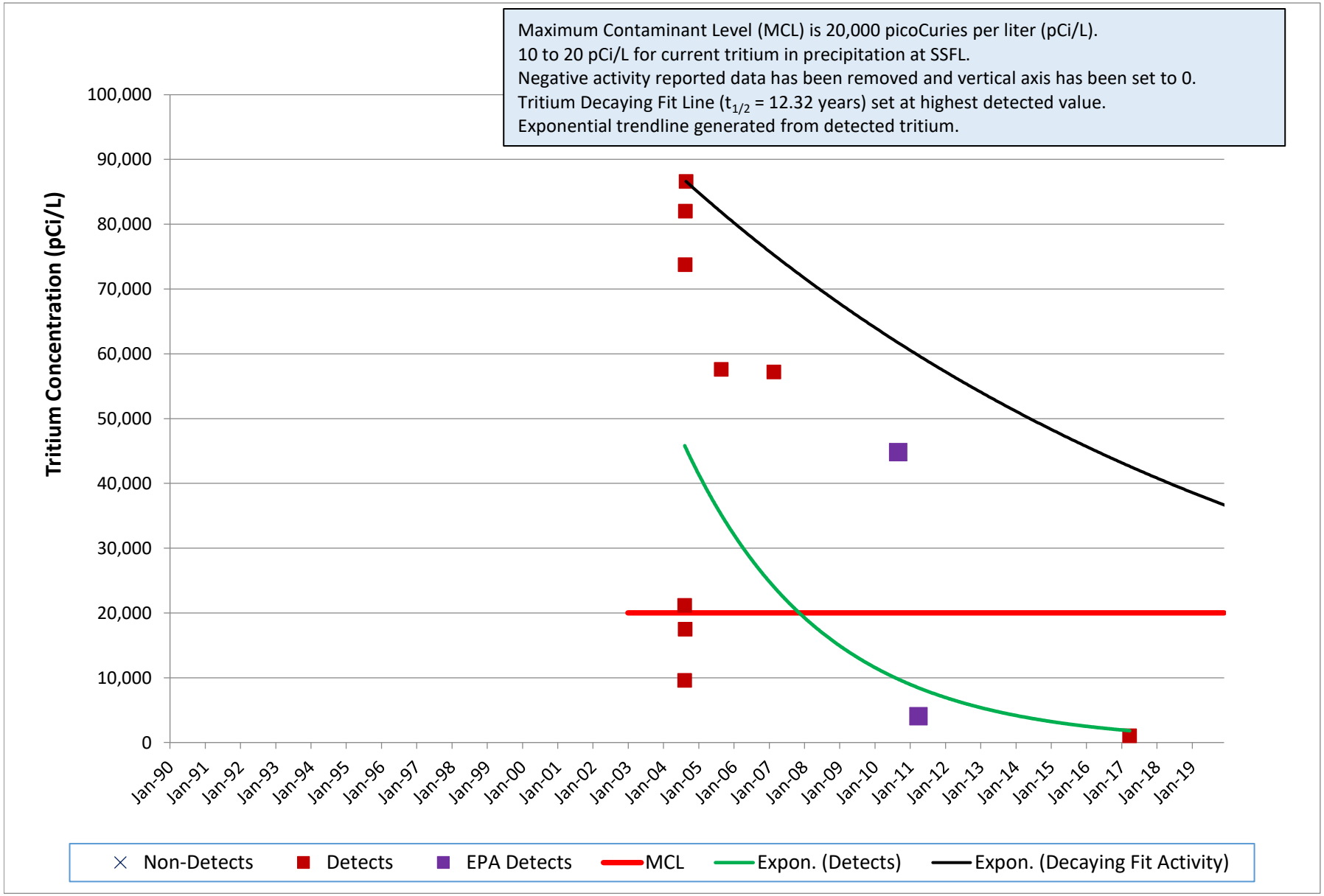
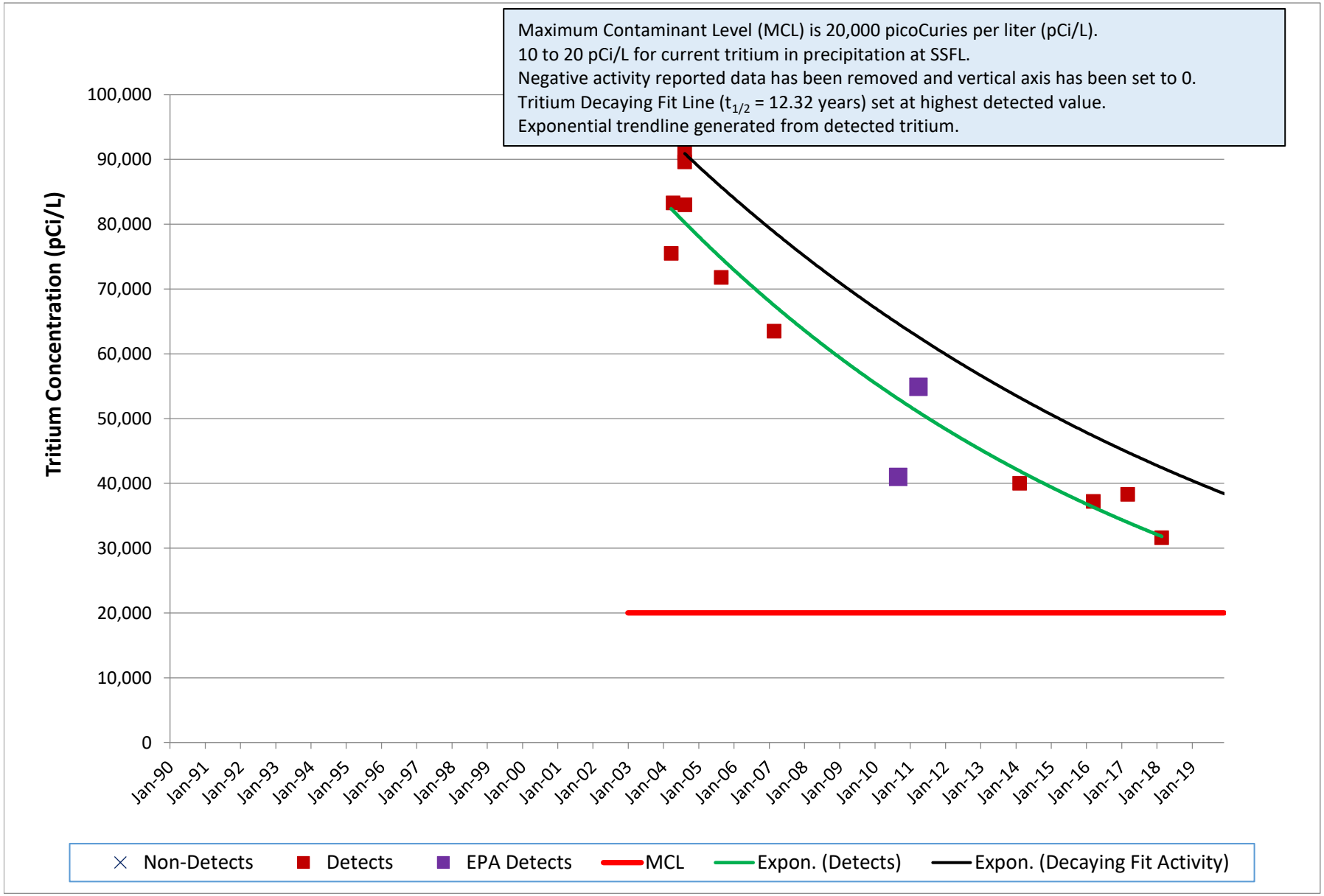
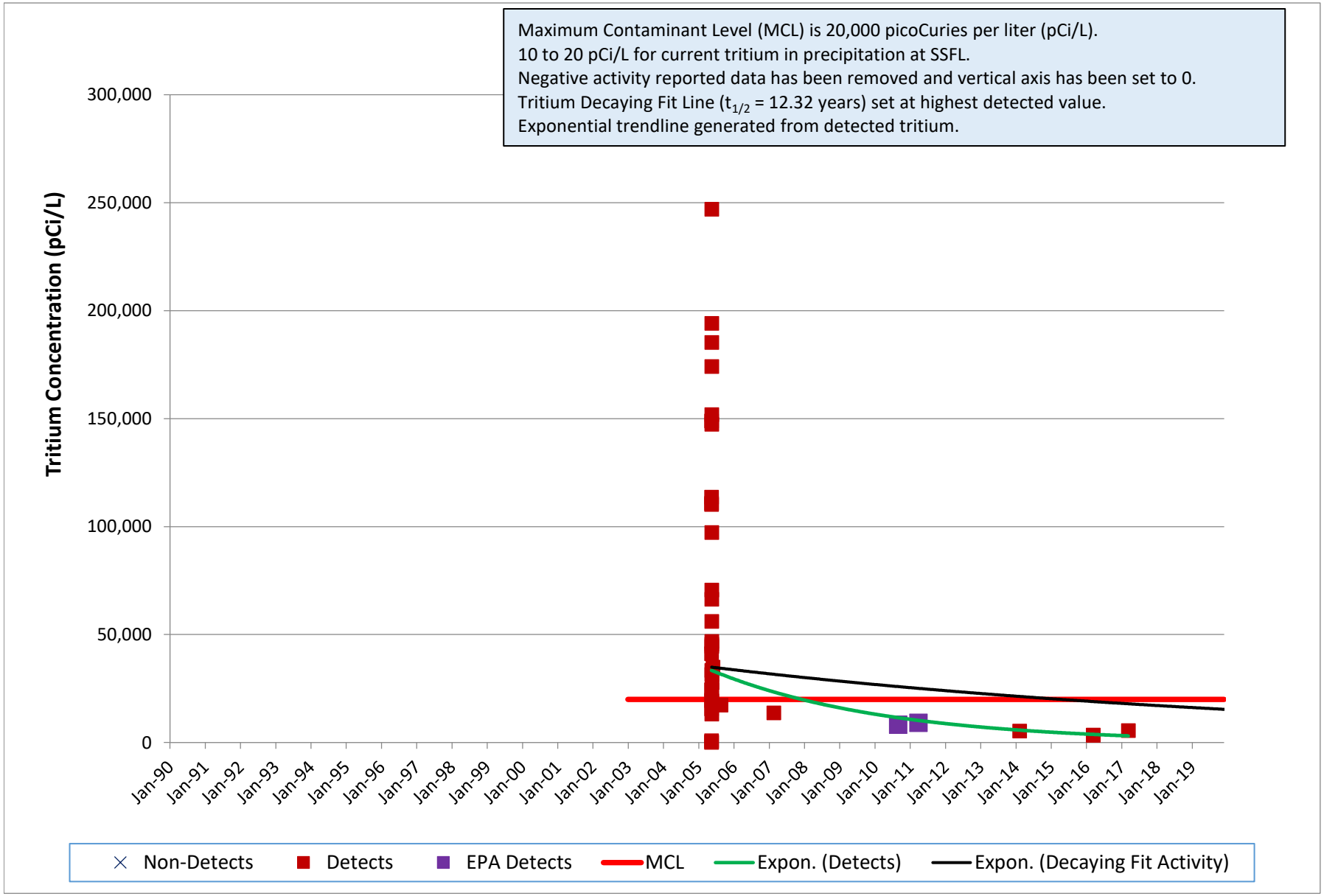
Tritium



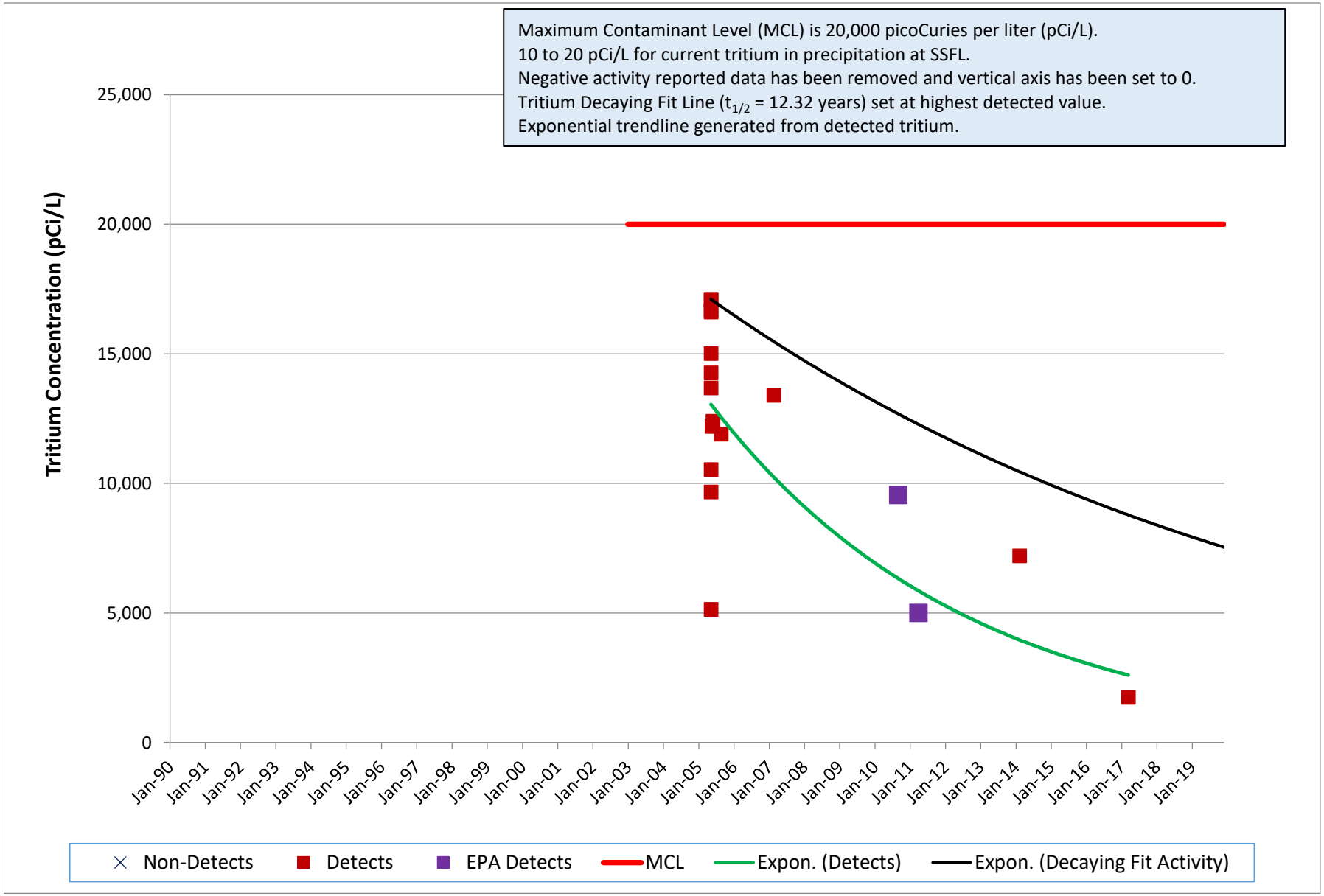
RD-90, Tritium Plume
Tritium



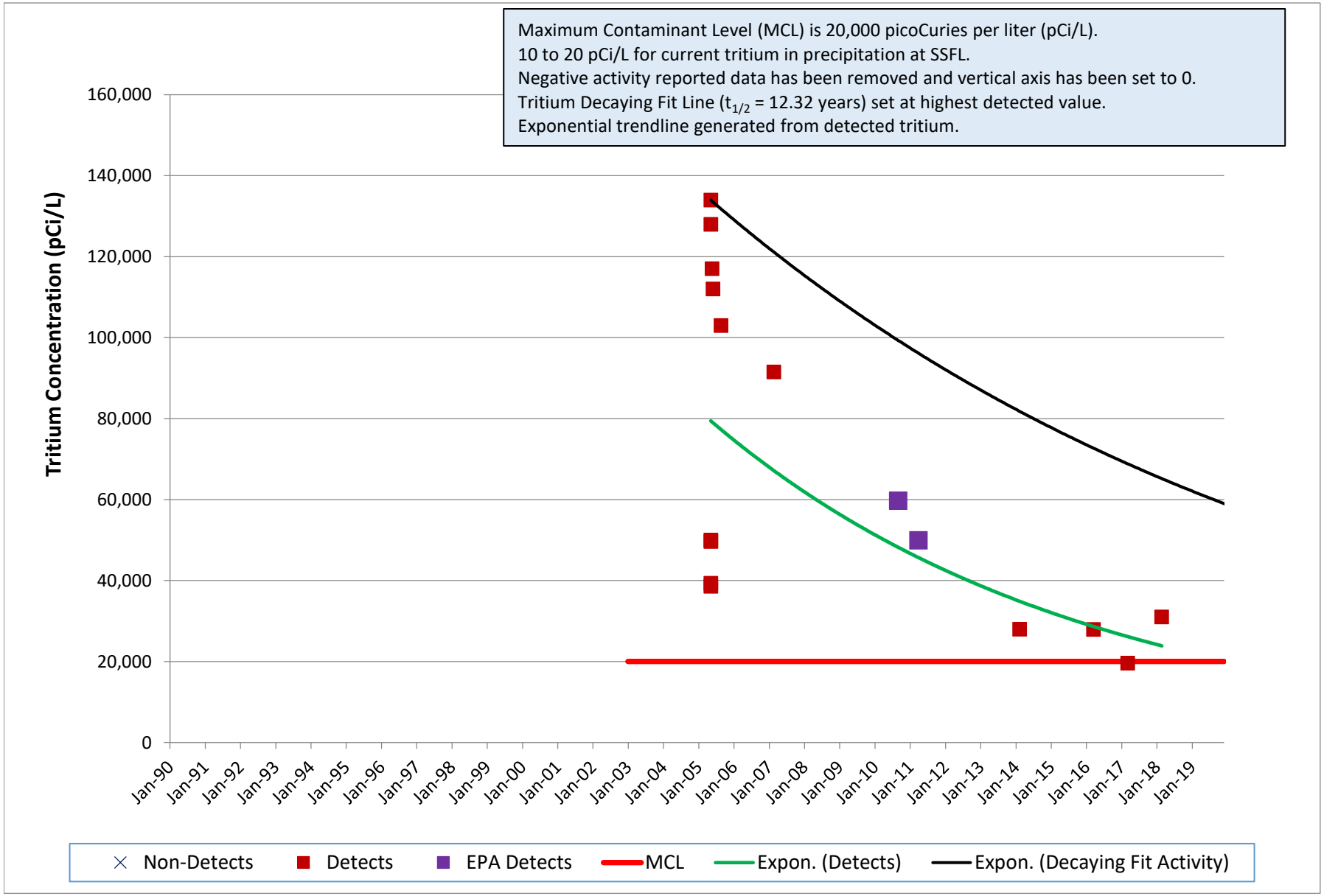
RD-93, Tritium Plume
Tritium



RD-94, Tritium Plume
Tritium



RD-95, Tritium Plume
Tritium



Appendix E
Quality Assurance Assessment

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Background

The following summarizes the inorganic, metals, organic, and radiochemical data validation completed for 20 United States Environmental Protection Agency (EPA) Level IV data packages containing results from the Santa Susana Field Laboratory (SSFL) Area IV in Ventura County, California. The data for this effort were acquired from sampling efforts completed from February 18, 2019, through March 7, 2019. All of the data for this summary were generated by Eurofins-Test America Laboratories.

The data were validated using the requirements and protocols outlined in the following documents and analytical methods:

- *Statement of Work Data Validation Services Santa Susana Field Laboratory Area IV, Ventura County, California.*
- Haley & Aldrich, 2010a, *Site-Wide Water Quality Sampling and Analysis Plan, Revision 1, Santa Susana Field Laboratory, Ventura County, California,* Appendix A, December.
- Haley & Aldrich, 2010b, *Groundwater Monitoring, Quality Assurance Project Plan, Revision 1, Santa Susana Field Laboratory, Ventura County, California,* Appendix B, December.
- U.S. EPA, 2017, *U.S. EPA National Functional Guidelines for Organic Superfund Methods Data Review,* OLEM 9355.0-136 EPA-540-R-2017-002, January.
- U.S. EPA, 2017, *U.S. EPA National Functional Guidelines for Inorganic Superfund Methods Data Review,* OLEM 9355.0-135 EPA-540-R-2017-001, January.
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA publication SW-846, Third Edition, Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015).
- *Multi Agency Radiological Laboratory Analytical Protocols, MARLAP, Manual*, EPA 402-B-04-001A, July 2004.
- *Evaluation of Radiochemical Data Usability, ES/ER-MS-5,* April 1997.

The following provides an overview of the data set and findings of the data package validation effort.

Summary

The SSFL data set consists of 20 EPA Level IV sample delivery groups (SDGs) with a total of 103 water samples. SDGs 160-33070-1, 160-33160-1, 280-120674-1, 280-120857-1, 280-120905-1, and volatile organic compounds (VOCs) in SDG 280-120762-1 underwent a Level IV EPA validation and comprised more than 20% of the overall data per an analysis for this sampling effort. The remaining SDGs underwent an EPA Level III validation.

Table E-1 shows the number and type of samples collected for the SSFL Area IV groundwater 2019 sampling effort. Attachment 1 is a comprehensive sample ID table compiled from the provided chain-of-custody forms.

Table E-1. Samples collected for SSFL Area IV groundwater sampling, 2019.

Sample Type	Number of Samples
Field Samples	54 Samples (15 were designated on the chain-of-custody forms as MS/MSD)
Trip Blanks	13 Samples
Rinsates	19 Samples
Field Blank	1 Sample
Field Duplicates	16 Samples

The samples were analyzed for volatile organic compounds (VOCs), 1,4-dioxane, 1,2,3-trichloropropane, gasoline-range organics (GRO), diesel-range organics (DRO), dissolved and total metals including mercury, perchlorate, nitrate, fluoride, and radiochemical (RAD) analyses (tritium and total/dissolved for the remaining RAD analyses). Table E-2 shows the requested analyses, analytical methods, and number of samples analyzed for each analysis compiled from the chain-of-custody forms.

Table E-2. Summary of analyses for SSFL Area IV groundwater sampling, 2019.

Analysis	Method		Number of Samples Analyzed
Volatile Organic Compounds	USEPA SW-846 Method 8260B		88
1,4-Dioxane	USEPA SW-846 Method 8260B Selective Ion Monitoring (SIM)		18
1,2,3-Trichloropropane	EPA Method 524.2 SIM		5
Gasoline-Range Organics	USEPA SW-846 Method 8015B		30
Diesel-Range Organics	USEPA SW-846 Method 8015B		22
Perchlorate	USEPA SW-846 Method 6860		22
Nitrate as N	EPA Method 300.0		9
Fluoride	EPA Method 300.0		8
Metals (Total & Dissolved)	USEPA SW-846 Method 6010C USEPA SW-846 Method 6020A USEPA SW-846 Method 7470A		58 Total Metals 58 Dissolved Metals
Radiochemical Analyses (Total & Dissolved)	Isotopic U	Method A-01-R U	38 Total Isotopic U 38 Dissolved Isotopic U
	Gamma Spectroscopy	EPA Method 900.1	38 Total Gamma Spectroscopy 38 Dissolved Gamma Spectroscopy
	Gross Alpha/Beta	EPA Method 900.0	38 Total Gross Alpha/Gross Beta 38 Dissolved Gross Alpha/Beta
	Strontium-90 (Sr-90)	EPA Method 905.0	38 Total Sr-90 38 Dissolved Sr-90
	Tritium	EPA Method 906.0	5 Tritium
	Radium-226 (Ra-226)	EPA Method 903.0	38 Total Ra-226 38 Dissolved Ra-226
	Radium-228 (Ra-228)	EPA Method 904.0	38 Total Ra-228 38 Dissolved Ra-228

Data Quality Summary

Anions (Fluoride and Nitrate as N) by EPA Method 300.0:

The SSFL anions data set consists of 9 water samples analyzed for nitrate as N and 8 water samples analyzed for fluoride, which resulted in 17 data points. All 17 data points are considered usable for evaluating site conditions and indicated that:

- 7 data points for nitrate as N and 5 data points for fluoride (12 data points, 70.6% of the total) were either non-detect and identified as "U" or were evaluated and remain unqualified. These results can be considered qualitative data.
- 2 data points for nitrate as N and 3 data points for fluoride (5 data points, 29.4% of the total) were qualified with a "J" or "J+" validation flag and can be considered as quantitative data.

Perchlorate by USEPA SW-846 Method 6860:

The SSFL perchlorate data set consists of 22 water samples. All 22 data points are considered usable for evaluating site conditions and indicated that:

- 14 perchlorate data points (63.6% of the total) were either non-detect and identified as "U" or were evaluated and remain unqualified. These results can be considered qualitative data.
- 8 perchlorate data points (36.4% of the total) were qualified with a "J" validation flag and can be considered quantitative data.

Total and Dissolved Metals by USEPA SW-846 Methods 6010C, 6020A, and 7470A:

The SSFL metals data set consists of 58 water samples analyzed for total metals and dissolved metals and resulted in 3,132 data points. All 3,132 data points are considered usable for evaluating site conditions and indicated that:

- 2,624 total and dissolved metals data points (83.7% of the total) were qualified with a "U" validation flag due to blank detections, were non-detect, or were detected in the samples and can be considered as qualitative data.
- 508 total and dissolved metals data points (16.3% of the total) were qualified with a "UJ" or "J" validation flag and can be considered as quantitative data.

Gasoline-Range Organics (GRO) and Diesel-Range Organics (DRO) by USEPA SW-846 Method 8015B:

The SSFL GRO and DRO data set consists of 30 GRO samples and 22 DRO samples, which resulted in 52 data points for GRO and DRO. All 52 data points are considered usable for evaluating site conditions and indicated that:

- 26 GRO data points and 13 DRO data points (39 data points, 75.0% of the total) were non-detect and qualified with a "U" validation flag. These results can be considered as qualitative data.
- 4 GRO data points and 9 DRO data points (25.0% of the total) were qualified with a "UJ" or "J" validation flag and can be considered as quantitative data.

1,4-Dioxane by USEPA SW-846 Method 8260B SIM and 1,2,3-Trichloropropane by EPA Method 524.2:

The SSFL 1,4-dioxane data set consists of 18 water samples, and the 1,2,3-trichloropropane data set consists of 5 water samples. Seven data points were rejected and are considered as unusable for evaluating site conditions, and 16 data points are considered usable for evaluating site conditions and indicated that:

- 5 data points for 1,2,3-trichloropropane (100%) of the total were non-detect and can be considered as qualitative data.
-
- 11 data points for 1,4-dioxane results (61.1% of the total) were qualified with a "J" or "UJ" and can be considered as quantitative data.
- 7 data points for 1,4-dioxane results (38.9% of the total) were qualified 'R,' rejected, due to exceeded instrument calibration criteria and should not be used in evaluating site conditions.

Volatile Organic Compounds by USEPA SW-846 Method 8260B:

The SSFL VOC data set consists of 88 water samples, which resulted in 1,848 data points. All 1,848 data points are considered usable for evaluating site conditions and indicated that:

- 1,493 data points (80.7% of the total) were non-detect, qualified "U" due to method, trip, or field blank detections, or were detections above the quantitation limit and can be considered qualitative data.
- 355 data points (19.2% of the total) were qualified "UJ" or "J" and can be considered quantitative data.

Radiochemical Analyses:

The SSFL radiochemical data set consists of 38 samples for total and dissolved isotopic uranium, strontium-90 (Sr-90), gamma spectroscopy, gross alpha/gross beta, radium-226 (Ra-226), radium-228 (Ra-228), and 5 samples for tritium, which resulted in 1,677 data points. All 1,677 data points are considered usable for evaluating site conditions and indicated that:

- 1,672 data points (99.7% of the total) were statistical non-detects or were considered as truly present in the samples and can be considered qualitative data.
- 5 data points (0.3% of the total) were qualified with a "UJ" or "J" validation flag and can be considered as quantitative data.

Trip Blanks and Field Blanks:

Thirteen trip blank samples and one field blank sample were collected for the SSFL Area IV groundwater 2019 sampling effort and are listed in Table E-3.

Table E-3. Trip/field blanks for SSFL Area IV groundwater sampling, 2019.

Sample Delivery Group (SDG)	Sample ID	Analysis	Quality Control (QC) Type
280-120308-1	PZ-105_021819_78_L	VOC, GRO	Trip Blank
280-120358-1	RD-21_021919_78_L	VOC	Trip Blank
280-120516-1	RD-96_022019_78_L	VOC, GRO, 1,4-Dioxane	Trip Blank
280-120532-1	DS-47_022219_78_L	VOC	Trip Blank
280-120566-1	RS-18_022519_78_L	VOC, GRO	Trip Blank
280-120633-1	DD-141_022619_78_L	VOC, GRO	Trip Blank
120-120674-1	RD-33A_022719_78_L	VOC, GRO, 1,4-Dioxane	Trip Blank
280-120714-1	DS-46_022819_78_L	VOC, 1,4-Dioxane	Trip Blank
280-120762-1	DD-143_030119_78_L	VOC, GRO	Trip Blank
280-120792-1	PZ-120_030419_78_L	VOC	Trip Blank
280-120857-1	RD-19_030519_78_L	VOC, GRO, 1,2,3-Trichloropropane	Trip Blank
280-120905-1	RD-34C_030619_78_L	VOC, 1,4-Dioxane	Trip Blank
280-120957-1	RD-34A_030719_78_L	VOC, GRO, 1,4-Dioxane, 1,2,3-Trichloropropane	Trip Blank
160-33201-1 (RAD & Tritium) 280-120957-1	RD-34A_030719_19_L	VOC, Metals, Perchlorate, GRO, DRO, RAD Analyses, Anions, 1,4-Dioxane, 1,2,3-Trichloropropane, & Tritium	Field Blank

The following compounds were detected in the trip blank and field blank samples:

- Acetone in samples PZ-105_021819_78_L, RD-21_021919_78_L, RD-96_022019_78_L, DS-47_022219_78_L, and DD-141_022619_78_L
- Acetone, chloroform, toluene, DRO, sodium-22, and total strontium in sample RD-34A_030719_19_L

The remaining detections in the trip blanks and field blank resulted in 8 acetone results being qualified "U" and 1 acetone result being qualified "UJ." The remaining trip blank and field blank results were either non-detect or were determined to be non-detect due to method blank detections. No further qualifications were warranted.

Field Duplicates:

Sixteen pairs of field duplicates were collected during the SSFL Area IV groundwater 2019 sampling effort and are listed in Table E-4.

Table E-4. Field duplicates for SSFL Area IV groundwater sampling, 2019.

SDG#	Parent ID	Field Duplicate ID	Analysis
280-120358-1	RD-64_021919_01_L	RD-64_021919_36_L	VOCs & Metals
280-120516-1	RD-63_022019_01_L	RD-63_022019_36_L	GRO & DRO
	DD-142_022119_01_L	DD-142_022119_36_L	VOCs
280-120532-1	DS-44_022219_01_L	DS-44_022219_36_L	Metals
280-120566-1	PZ-005_022519_01_L	PZ-005_022519_36_L	Nitrate as N
280-120633-1	RS-28_022619_01_L	RS-28_022619_36_L	VOCs
120-120674-1	RD-59B_022719_01_L	RD-59B_022719_36_L	Perchlorate
	RD-59C_022719_01_L	RD-59C-022719_36_L	Metals, Fluoride
280-120762-1	RD-96_030119_01_L	RD-96_030119_36_L	Perchlorate
280-120792-1	PZ-120_030419_01_L	PZ-120_030419_36_L	VOCs
280-120857-1	RD-19_030519_01_L	RD-19_030519_36_L	DRO
	RD-14_030519_01_L	RD-14_030519_36_L	1,2,3-Trichloropropane, GRO
280-120905-1	RD-34A_030619_01_L	RD-34A_030619_36_L	VOCs
160-33009-1	RD-90_022119_01_L	RD-90_022119_36_L	Tritium
160-33056-1	DS-47_022219_01_L	DS-47_022219_36_L	RAD Analyses
160-33070-1	RD-59B_022719_01_L	RD-59B_022719_36_L	RAD Analyses

The following field duplicate precision results exceeded the 35% relative percent difference (%RPD) criterion:

- Perchlorate (120%) in field duplicate pair RD-96_030119_01_L/ RD-96_030119_36_L
- Total beryllium (130.6%) and total lead (130.6%), dissolved beryllium (166.6%), cobalt (175.9%), and lead (120%) in field duplicate pair RD-59C_022719_01_L/ RD-59C_022719_36_L
- Total antimony (98.9%), beryllium (37.5%), and zinc (136.6%) and dissolved antimony (93.3%), arsenic (175%), selenium (161%), silver (197%), and zinc (68.7%) in field duplicate pair DS-44_022219_01_L/ DS-44_022219_36_L
- Total iron (37%) in field duplicate pair RD-64_021919_01_L/ RD-64_021919_36_L

The remaining field duplicate precision criteria were met.

Data Validation Qualifications

Qualifications were assigned in accordance with the *U.S. EPA Contract Laboratory Program National Functional Guidelines* and resulted from preparation and chain-of-custody issues; poor initial and continuing calibration criteria; positive blank detections; poor laboratory control sample (LCS), laboratory control sample duplicate (LCSD), matrix spike (MS), matrix spike duplicate (MSD), and serial dilution sample (SDS) performance; and results reported below the quantitation limits. Table E-5 summarizes the findings and data qualifications assigned to SSFL Area IV Groundwater 2019 data results. Please refer to Attachment 2 for definitions of the data validation qualifiers.

Table E-5. Summary of data validation qualifications for SSFL Area IV groundwater sampling, 2019.

Analyte	Total # of	Analyte	Total # of
Nitrate as N	9	7	"U" or No Qualification
		2	**J+**
Fluoride	8	5	"U" or No Qualification
		3	**J**
Perchlorate	22	14	"U" or No Qualification
		8	**J**
Metals	3,132	2,624	"U" or No Qualification
		12	**UJ**
		496	**J**
GRO	30	26	"U"
		2	**UJ**
		2	**J**
DRO	22	13	"U"
		6	**UJ**
		3	**J**
1,2,3-Trichloropropane	5	5	U
1,4-Dioxane	18	5	**UJ**
		6	**J**
		7	**R**
VOCs	1,848	1,493	"U" or No Qualification
		269	**UJ**
		86	**J**
Radiochemical Data (including Tritium)	1,677	1,672	"U" or Positively Detected in the Sample
		1	**UJ**
		4	**J**

Data Review Process

Data produced by the analytical laboratories were subject to multiple review steps to coincide with the start of distinct tasks. These steps were performed in a timely manner to ensure appropriate feedback and correction of errors. These steps included:

- Cross-reference check of sample chain-of-custody documents against the laboratory acknowledgement of sample receipt form. The laboratory acknowledgement of sample receipt was typically transmitted to the data manager via e-mail 2 to 3 days after sample receipt and log-in and included a summary of the requested analyses to be performed per sample. Sample log-in errors were identified and corrected at this step.

- Tracking of sample collection, receipt, and laboratory SDG numbers on a sample tracking spreadsheet. This spreadsheet also included field QC sample information and well sample location coordinates.

- Laboratory consultation with the project chemists on data quality issues during sample analyses such as missed holding times, poor spike recoveries, etc. These issues were discussed between the project chemists and the laboratory and were resolved based on technical merit and determined if usable in the evaluation.

Upon receipt of the laboratory report (delivered via e-mail), a preliminary review of the data was performed. This review consisted of:

- Reconciliation of the reported analyses against the analyses that were requested on the chain-of-custody documents.

- Review of the laboratory case narratives. The case narrative identified and explained quality issues encountered during the analysis of the samples. Quality issues may include (but not be limited to) expired holding times, poor spike recoveries in matrix or batch-specific QC samples, instrument calibration exceedances, and blank contamination.

- Review of the laboratory-specific QC data. These data were provided by the laboratory in summary form. Any unanticipated deviations from the project or method-specific criteria were reconciled with the laboratory at this stage.

Data Quality Indicators

This section summarizes the validation performed. Individual SDG validation reports with specific sample details are provided in Attachment 1.

Achievement of the data quality objectives (DQOs) was determined in part by the use of data quality indicators (DQIs). The DQIs for measurement data are expressed in terms of what are collectively referred to as the PARCCS parameters (precision, accuracy, representativeness, comparability, completeness, and sensitivity). The DQIs provide a mechanism for ongoing control to evaluate and measure data quality throughout the project. These criteria are defined in the sections below.

Precision

Precision is the measurement of the ability to obtain the same value on re-analysis of a sample through the entire analytical process. The closer the measurement results, the greater the precision. Precision has

nothing to do with accuracy or true values of the sample. Instead, it is focused on random errors inherent in the analysis that stem from the measurement process and are compounded by the non-homogeneous nature of some samples. Precision is measured by analyzing two portions of the sample (sample and duplicate) and then comparing the results. This comparison can be expressed in terms of relative percent difference (RPD). RPD is calculated as the absolute difference between the two measurements divided by the average of the two measurements.

$$\mathbf{RPD = [(A-B)/\frac{A+B}{2}] \times 100}$$

A condition with this formula is that it depends on the average of the two measurements, and the magnitude of the calculated RPD is intimately linked to the magnitude of the results. When sample results are close to the reporting limit (RL), the RPD is greater but does not necessarily indicate that the precision is out of control limits, just that the sample concentrations are low.

RPD as a measure of precision works very well in those cases where the same level of analyte is present in all samples; however, it does not work well as a quantitative tool when varying levels are present. Another option that is used for evaluating the differences between sample results that are close to the RL is calculating the absolute difference between the results. In this situation, the difference between the sample results is compared to the RL and if the difference is greater, the sample results are qualified as estimated "J/UJ." Sample results are also qualified as estimated "J/UJ" if the RPD is outside of criteria.

Because of the limitations with the use of RPDs for field duplicate precision evaluation, precision is also calculated on spike samples, either on an MS and MSD or on an LCS/LCSD. For spike samples, a known concentration of analyte has been added to each sample and evaluations of RPD can be made that are more applicable to variations in environmental measurements. The drawback is that the precision measurement is applicable only to the particular spike level used.

For the groundwater samples, precision was evaluated by reviewing RPD results for MS/MSDs, LCS/LCSDs, laboratory duplicates, and field duplicates.

Laboratory RPD control limits are presented in the Water Quality Sampling and Analysis Plan (WQSAP) (Haley & Aldrich 2010a) or are laboratory specific. For laboratory duplicates, if one or both of the sample results were less than five times the RL, a control limit of the absolute difference value equal to the RL was used for comparison. The field duplicate RPD criterion is 35%.

Based on laboratory and/or field duplicate precision criteria during the validation process, qualifiers were applied to applicable sample results.

Accuracy

Accuracy is a concept from quantitative analysis that attempts to address the question of how close the analytical result is to the true value of the analyte in the sample. Accuracy is determined through a spike procedure, where a known amount of the target analyte is added to a portion of the sample and then the sample and the spiked sample are analyzed. The quantitative measure of accuracy is percent recovery (%R), calculated as follows:

$$\text{Percent Recovery} = \frac{(\text{Total Analyte Found} - \text{Analyte Originally Present})}{\text{Analyte Added}} \times 100$$

Each measurement performed on a sample is subject to random and systematic error. Accuracy is related to the systematic error. Attempts to assess systematic error are always complicated by the inherent random error of the measurement.

Analytical accuracy for the entire data collection activity is difficult to assess because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques.

Accuracy is maintained to the extent possible by adhering to the EPA method and approved field and analytical standard operating procedures.

The following QC samples are used to assess laboratory accuracy:

- Matrix Spikes: These are samples with a known amount of a target analyte added to them. Analysis of the sample that has been spiked and comparison with the results from the unspiked sample (background) gives information about the ability of the test procedure to generate a correct result from the sample.
- Post-Digestion Spikes: Post-digestion spikes are performed after the sample has been prepared and is ready for analysis. These are also termed "analytical spikes." The technique is used in conjunction with an MS to provide data that can separate interferences produced as part of the sample preparation from interferences that are innate qualities of the sample.
- Laboratory Control Samples: LCSs consist of a portion of analyte-free water spiked with target analytes at a known concentration.
- Surrogates: Surrogate recovery is a QC measure limited to use in organics analysis. Surrogates are compounds added to every sample at the beginning of the sample preparation to monitor the success of the sample preparation and analytical procedures on an individual sample basis. Individual compounds used as surrogates are selected based on their ability to mimic the behavior of specific target analytes held to be particularly sensitive to the sample preparation manipulations.
- Interference Check Samples: Interference check sample analysis is a QC measure unique to metals analysis using inductively coupled plasma atomic emission spectrometry. This QC sample verifies the analytical instrument's ability to overcome interferences typical of those found in samples.
- Calibrations: Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for metals. Initial calibration

demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibrations demonstrate that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

- Internal Standards: Internal standards measure the gas chromatograph/ mass spectrometer sensitivity and response stability during each analysis.

- Serial Dilution: Serial dilutions are performed on at least one sample from every batch of analyses for metals to determine if physical or chemical interferences exist in the analyte determinations.

For the groundwater samples, accuracy was evaluated by reviewing the %R values and relative response factors of initial and continuing calibration (percent difference or percent drift [%D] for organic analyses), the initial and continuing calibration recoveries for inorganic analyses, internal standards, surrogate spikes (organic analyses only), MS/MSD, LCS/LCSD, inductively coupled plasma (ICP) interferences, and by performing serial dilution checks during metals analyses, in conjunction with method blank, calibration blank, equipment rinsate blank, and trip blank results. These QC results assist in identifying the type and magnitude of effects that may have contributed to system error introduced from field and/or laboratory procedures.

Qualifiers were applied to applicable sample results during the validation process based on laboratory accuracy results. Results were qualified based on calibrations, surrogates, internal standards, ICP serial dilutions, LCS/LCSD recoveries, and MS/MSD recoveries.

Sample preservation, handling, and holding times are additional measures of accuracy of the data. Holding times are defined as the amount of time that elapses from collection of the sample in the field to the start of the analysis. Preservation is defined as techniques used to maintain the target analytes at concentrations representative of the source sampled.

In summary, sample results that have been qualified as estimated “J, J+, J-, or UJ” due to accuracy criteria are usable for project decisions. Eight sample data points (0.1% of the total) were qualified ‘R,’ rejected, and are unusable for project decision. The remaining sample results are usable for project decisions.

Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample; preservatives added to the sample; cross contamination from other samples in transport coolers and laboratory sample storage refrigerators; standards used to calibrate instruments; glassware and reagents used to prepare samples for analysis; airborne contamination in the laboratory preparation area; and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level and steps taken to discover the source of the contamination and to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but that can arise as a problem for a specific project or over a short period of time. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination.

The data validation reports discuss the specific results that were qualified as non-detect “U” based on field and laboratory blank contamination.

Representativeness, Comparability, and Sensitivity

Representativeness, comparability, and sensitivity are achieved by using EPA-approved sampling procedures and analytical methodologies. By following the procedures described in the WQSAP and Groundwater Monitoring QAPP (Haley & Aldrich 2010a, 2010b) for this sampling event and future sampling events, sample analysis should yield results representative of environmental conditions at the time of sampling. Similarly, reasonable comparability of analytical results for this and future sampling events can be achieved if approved EPA analytical methods and standardized reporting units are employed.

Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and depth interval of sample collection. Requirements and procedures for sample collection are designed to maximize sample representativeness.

Representativeness also can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the chain-of-custody forms, laboratory sample confirmation logs, and data validation packages.

The most significant measure of representativeness is the accuracy of the sampling network and selection of appropriate locations and depths, etc. Field sampling accuracy was attained through adherence to the approved WQSAP and Groundwater Monitoring QAPP (Haley & Aldrich 2010a, 2010b) for sample location and collection and by using approved standard operating procedures for field data collection. The data should represent, as near as possible, the actual field conditions at the time of sampling.

Representativeness has been achieved by the performed field work and laboratory analyses. The analytical data generated are viewed to be a representative characterization of the project area. Seven sample data points (0.1% of the total) were qualified ‘R,’ rejected, and are unusable for project decisions. The remaining sample results are usable for project decisions.

Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, reporting units, and analytical methods assures that data from like samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures are determined to have been followed, or defined to show that variations did not affect the values reported.

To ensure comparability of data generated for the site, standard sample collection procedures were utilized by North Wind. Department of Toxic Substances Control (DTSC)-approved analytical methods were performed by Test America Laboratories. Similar methods and concentration levels to those used for previous sampling events also allow for comparable data. Utilizing such procedures and methods enables the current data to be comparable with previous and future data sets generated.

Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest, such as risk-based screening levels or action levels. Analytical detection limits for the various sample analytes should be below the level of interest to allow an effective comparison.

Detection Limits

The method detection limit (MDL) study attempts to answer the question, "What is the lowest level of analyte in a sample that will result in a signal different than zero?" The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The RL is generally defined as the lowest concentration at which an analyte can be detected in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particular matrix problem, the RL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection and RLs. The result for an analyte is flagged with a "U" if that analyte was not detected, or qualified with a "J" flag if associated QC results fall outside the appropriate tolerance limits. Also, if an analyte is present at a concentration between the MDL and the RL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects increased uncertainty in the reported value.

Qualifiers were applied to applicable sample results by the laboratory and during the validation process based on sample results being reported as detected below the RL/MDL. Details of the validation and specific sample analytes qualified are discussed in the data validation reports.

In summary, for the collected groundwater samples, results for some of the analytes were qualified as estimated due to RL criteria. For the data validated in the 2019 groundwater sampling, RLs for a majority of the sample results were low enough to compare to the RL objectives stated in the WQSAP and Groundwater Monitoring QAPP (Haley & Aldrich 2010a, 2010b). RLs above those stated in these documents are considered usable for project purposes.

Data Completeness

Completeness of the data collection program is defined as the percentage of samples planned for collection as listed in the WQSAP and Groundwater Monitoring QAPP (Haley & Aldrich 2010a, 2010b) versus the actual number of samples collected during the field program (see Equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see Equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

Equation A.

$$\%\text{Completeness} = C_x \frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

Equation B. $$\%\text{Completeness} = V \times \frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal, as defined in the WQSAP and Groundwater Monitoring QAPP (Haley & Aldrich 2010a, 2010b), for this sampling event is 90% for each analytical test for all project data.

The completeness goal achieved for acceptable data was 99.9% of the groundwater sample results for the number of measurements judged to be valid versus the total number of measurements made for all samples analyzed. Seven (7) sample data points (0.1% of the total) were qualified 'R,' rejected, and are unusable for project decisions.

The completeness goal for the number of measurements judged to be valid was met for 2019 groundwater monitoring sampling. The data reported and not rejected are suitable for their intended use for characterization of groundwater in Area IV of SSFL.

Assessment of Data Usability and Reconciliation with the Site-Wide WQSAP Goals

For the 2019 groundwater sampling, 99.9% of the data validated and reported in this quality assurance summary are suitable for their intended use for site characterization. Seven (7) sample results (0.1%) were reject and are not suitable for site characterization.

The RLs reported generally met the expected limits proposed by the analytical laboratories in their subcontract agreements with North Wind except for the analytes identified previously. Sample results that were qualified as estimated are usable for project decisions. Decisions based on results close to the RL should be made with a degree of caution.

The following field duplicate precision results exceeded the 35% relative percent difference (%RPD) criterion:

- Perchlorate (120%) in field duplicate pair RD-96_030119_01_L/ RD-96_030119_36_L
- Total beryllium (130.6%) and total lead (130.6%), dissolved beryllium (166.6%), cobalt (175.9%), and lead (120%) in field duplicate pair RD-59C_022719_01_L/ RD-59C_022719_36_L
- Total antimony (98.9%), beryllium (37.5%), and zinc (136.6%) and dissolved antimony (93.3%), arsenic (175%), selenium (161%), silver (197%), and zinc (68.7%) in field duplicate pair DS-44_022219_01_L/DS-44_022219_36_L
- Total iron (37%) in field duplicate pair RD-64_021919_01_L/ RD-64_021919_36_L.

The remaining field duplicate precision criteria were met.

The achievement of the completeness goal for the number of samples collected was met. The completeness goal for the number of sample results acceptable for use provides sufficient quality data to support project decisions for the wells that were sampled during this sampling event.

Attachment 1

SDG and Field Sample ID Table

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SDG	Well or Piezometer ID	Sample	Analyses	QC
280-120308-1	TB	PZ-105_021819_78_L	V, G	Trip Blank
	PZ-105	PZ-105_021819_01_L	V, G, M, N	
	DD-145	DD-145_021819_01_L	V, G, M, N	
	PZ-162	PZ-162_021819_01_L	V	
	PZ-163	PZ-163_021819_01_L	V	
	RS	PZ-163_021819_19R_L	V, G, M, N	Rinsate
	PZ-108	PZ-108_021819_01_L	V, M	
	RD-23	RD-23_021819_01_L	V, G	
	C-8	C-08_021819_01_L	V, G, M	
	RS	C-08_021819_19R_L	V, G, M	Rinsate
280-120358-1	TB	RD-21_021919_78_L	V	Trip Blank
	RD-21	RD-21_021919_01_L	V, M, P	MS/MSD on VOC and Metals
	RD-64	RD-64_021919_01_L	V, M	
	RD-64	RD-64_021919_36_L	V, M	Field Duplicate
	RS	RD-64_021919_19R_L	V, M, P	Rinsate
	RD-20	RD-20_021919_01_L	V, N	
280-120516-1	TB	RD-96_022019_78_L	V, G, D	Trip Blank
	RD-96	RD-96_022019_01_L	V, M, P, G	MS/MSD GRO and DRO
	RD-33B	RD-33B_022019_01_L	V, M, P	MS/MSD on Perc
	RD-63	RD-63_022019_01_L	V, G, D	
	RD-63	RD-63_022019_36_L	G	Field Duplicate
	RD-90	RD-90_022119_01_L	V	
	PZ-109	PZ-109_022119_01_L	V, M	
	RS-54	RS-54_022119_01_L	D	MS/MSD on Dioxane
	RS	RS-54_022119_19R_L	V, M, D	Rinsate
	DD-139	DD-139_022119_01_L	V, M, P	
	DD-142	DD-142_022119_01_L	V, M	
	DD-142	DD-142_022119_36_L	V	Field Duplicate
	DD-144	DD-144_022119_01_L	V, M	MS/MSD on VOCs
	DD-146	DD-146_022119_01_L	V, M	
	RS	DD-146_022119_19R_L	V, M, P	Rinsate
280-12532-1	TB	DS-47_022219_78_L	V	Trip Blank
	DS-47	DS-47_022219_01_L	V, M	MS/MSD on Metals
	RS	DS-47_022219_19R_L	V, M	Rinsate
	DS-44	DS-44_022219_01_L	V, M	
	DS-44	DS-44_022219_36_L	M	Field Duplicate
	DS-43	DS-43_022219_01_L	V, M	
	RS	DS-43_022219_19R_L	V, M	Rinsate

SDG	Well or Piezometer ID	Sample	Analyses	QC
280-12566-1	TB	RS-18_022519_78_L	V, G	Trip Blank
	RS-18	RS-18_022519_01_L	V, M, P	
	PZ-098	PZ-098_022519_01_L	V, M, P	MS/MSD on VOCs
	RS	PZ-098_022519_19R_L	V, M, P	Rinsate
	PZ-103	PZ-103_022519_01_L	V, M, G, N	
	PZ-102	PZ-102_022519_01_L	V, M	
	PZ-005	PZ-005_022519_01_L	V, M, N	
	PZ-005	PZ-005_022519_36_L	N	Field Duplicate for Nitrate
	RS	PZ-102_022519_19R_L	V, M, G, N	Rinsate
280-120633-1	TB	DD-141_022619_78_L	V, G	Trip Blank
	DD-141	DD-141_022619_01_L	V, M, P, G	
	RS	PZ-162_022619_19R_L	V, M, P, G	Rinsate
	RD-30	RD-30_022619_01_L	V	
	RS-28	RS-28_022619_01_L	V	
	RS-28	RS-28_022619_36_L	V	Field Duplicate for VOCs
	RD-98	RD-98_022619_01_L	V	
	RS	RD-98_022619_19R_L	V	Rinsate
120-120674-1	TB	RD-33A_022719_78_L	V, G, D	Trip Blank
	RD-59A	RD-59A_022719_01_L	V, M, P, F	
	RD-59B	RD-59B_022719_01_L	V, M, P, F	MS/MSD on VOCs, Metals, Fluoride
	RD-59B	RD-58B_022719_36_L	P	Field Duplicate for Perchlorate
	RD-59C	RD-59C_022719_01_L	V, M, P, F	MS/MSD on Perchlorate
	RD-59C	RD-59C-022719_36_L	V, M, F	Field Duplicate on VOCs, Metals, and Fluoride
	RD-29	RD-29_022719_01_L	V	
	RS	RD-29_022719_19R_L	V	Rinsate
	RD-33A	RD-33A_022719_01_L	V, G, M, P, D	
	RD-33C	RD-33C_022719_01_L	V, G, M, P	
	RS	RD-33C_022719_19R_L	V, G, M, P, D	Rinsate
280-120714-1	TB	DS-46_022819_78_L	V, D	Trip Blank
	DD-147	DD-147_022819_01_L	V, M	
	RD-65	RD-65_022819_01_L	V, D	
	RS	RD-65_022819_19R_L	V, M, D	Rinsate
	DS-46	DS-46_022819_01_L	V, M, D	
	DD-140	DD-140_022819_01_L	V, M, D	
	RS	DD-140_022819_19R_L	V, M, D	Rinsate

SDG	Well or Piezometer ID	Sample	Analyses	QC
280-120762-1	TB	DD-143_030119_78_L	V, G	Trip Blank
	RD-54A	RD-54A_030119_01_L	V, M, P, G	
	RD-96	RD-96_030119_01_L	P	
	RD-96	RD-96_030119_36_L	P	Field Duplicate for Perchlorate
	RS	RD-96_030119_19R_L	V, M, P, G	Rinsate
	DD-143	DD-143_030119_01_L	V, M	
	RD-17	RD-17_030119_01_L	V, M	MS/MSD on VOCs
	RS	RD-17_030119_19R_L	V, M	Rinsate
280-120792-1	TB	PZ-120_030419_78_L	V	Trip Blank
	PZ-120	PZ-120_030419_01_L	V, M	
	PZ-120	PZ-120_030419_36_L	V	Field Duplicate for VOCs
	RD-07	RD-07_030419_01_L	V, M	
	RS	RD-07_030419_19R_L	V, M	Rinsate
280-120857-1	TB	RD-19_030519_78_L	V, G, TCP	Trip Blank
	RD-19	RD-19_030519_01_L	V, M, G, F	MS/MSD on GRO
	RD-19	RD-19_030519_36_L	G	Field Duplicate for DRO
	RD-14	RD-14_030519_01_L	V, G, F, TCP	MS/MSD for DRO and TCP
	RD-14	RD-14_030519_36_L	TCP, G	Field Duplicate for TCP and GRO
	DD-147	DD-147_030519_01_L	V	
	RS	DD-147_030519_19R_L	V	Rinsate
280-120905-1	TB	RD-34C_030619_78_L	V, D	Trip Blank
	RD-34C	RD-34C_030619_01_L	V, M, F, D	
	RD-34A	RD-34A_030619_01_L	V, M, F, D	
	RD-34A	RD-34A_030619_36_L	V	Field Duplicate for VOCs
280-120957-1	TB	RD-34A_030719_78_L	V, G, D, TCP	Trip Blank
	FB	RD-34A_030719_19_L	V,M,P,G,N,F,TCP,D	Field Blank
160-33009-1	RD-20	RD-20_021919_01_L	R	
	RD-33B	RD-33B_022019_01_L	R	
	RD-63	RD-63_022019_01_L	R	
	RD-90	RD-90_022119_01_L	T	
	RD-90	RD-90_022119_36_L	T	Field Duplicate for Tritium
	RD-95	RD-95_022119_01_L	T	MS/MSD for Tritium
	RS	RS-54_022119_19R_L	T	Rinsate
160-33056-1	DS-47	DS-47_022219_01_L	R	
	DS-47	DS-47_022219_36_L	R	Field Duplicate for RAD

SDG	Well or Piezometer ID	Sample	Analyses	QC
	DS-44	DS-44_022219_01_L	R	MS/MSD
	RS	DS-47_022219_19R_L	R	Rinsate
	RS	DS-43_022219_19R_L	R	Rinsate
	RS-18	RS-18_022519_01_L	R	
	RS	PZ-098_022519_19R_L	R	Rinsate
160-33070-1	DD-141	DD-141_022619_01_L	R	
	RD-30	RD-30_022619_01_L	R	
	RS-28	RS-28_022619_01_L	R	
	RD-98	RD-98_022619_01_L	R	
	PZ-162	PZ-162_022619_01_L	R	
	RS	PZ-162_022619_19R_L	R	Rinsate
	RS	RD-98_022619_19R_L	R	Rinsate
	RD-59A	RD-59A_022719_01_L	R	
	RD-59B	RD-59B_022719_01_L	R	
	RD-59B	RD-59B_022719_36_L	R	Field Duplicate for RAD
	RD-59C	RD-59C_022719_01_L	R	MS/MSD
160-33111-1	RD-33A	RD-33A_022719_01_L	R	
	RD-33C	RD-33C_022719_01_L	R	
160-33160-1	RS	RD-33C_022719_19R_L	R	Rinsate
	RS	RD-96_030119_19R_L	R	Rinsate
	DD-143	DD-143_030119_01_L	R	
	RD-54A	RD-54A_030119_01_L	R	
	RD-17	RD-17_030119_01_L	R	
	RD-96	RD-96_030119_01_L	R	
	RS	RD-17_030119_19R_L	R	Rinsate
	RS	RD-07_030419_19R_L	R	Rinsate
	PZ-120	PZ-120_030419_01_L	R	
	RD-07	RD-07_030419_01_L	R	
160-33178-1	RD-19	RD-19_030519_01_L	R	
	RD-14	RD-14_030519_01_L	R	
	RD-34C	RD-34C_030619_01_L	R	
	RD-34A	RD-34A_030619_01_L	R	
160-33201-1	FB	RD-34A_030719_19_L	R, T	Field Blank

Note: Sample ID table compiled from the chain-of-custody forms
TB = trip blank
RS = rinsate
FB = field blank

T = tritium
V = volatile organic compounds (VOCs)
G = gasoline-range organics (GRO) and/or diesel-range organics (DRO)
M = metals, P = perchlorate
N = nitrate as N, F = fluoride

SDG	Well or Piezometer ID	Sample	Analyses	QC
			R = radiochemical analyses D = 1,4-dioxane TCP = 1,2,3-trichloropropane	

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Attachment 2

Data Validation Qualifier Definitions

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Inorganic Data Validation Qualifiers

Flag	Definition
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

Organic Data Validation Qualifiers

Flag	Definition
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.
NJ	Presumptively present at an estimated quantity (use with Tentatively Identified Compounds [TICs] only). A TIC is a compound not specified on the Target Compound List (TCL). A mass spectral library search is used to identify the compound.

Radiochemical Data Validation Qualifiers

Flag	Definition
	The analysis was performed, and radioactivity was detected (e.g., the radioanalytical result is statistically positive at the 95% confidence interval and is above its MDC). **NOTE:** *The radionuclide is considered to be present in the sample.*
U	The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence interval and/or the result was below its MDC). The "U" qualifier flag is also applicable to any result reported as zero (0) (± an associated uncertainty). **NOTE:** *The radionuclide is not considered to be present in the sample.*
UJ	The analysis was performed, but the result is highly questionable due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as: significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. The "UJ" qualifier flag could designate a possible false positive result in the case of a result that is statistically positive at the 95% confidence level. The "UJ" qualifier flag could indicate the result is considered an estimated non-detect (a non-detect that may be due to loss of analyte from lack of sample preservation, holding time exceedances, etc.). The specific use of the "UJ" flag is included by the validator in the text of the validation report. **NOTE:** *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*
J	The analysis was performed, and radioactivity was detected (i.e., the radionuclide result is statistically positive at the 95% confidence interval and is above its MDC). However, the result is questionable due to analytical and/or laboratory quality control anomalies/ irregularities and should therefore be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items as: laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. **NOTE:** *The radionuclide is considered to be present in the sample; however, the result may not be an accurate representation of the amount of activity actually present in the sample.*
R	The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. **NOTE:** *The radionuclide may or may not be present, and the result is known to be inaccurate or imprecise.*