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June 10, 2021

Mr. Steven Becker
California Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826

Subject: Q1 2021 Groundwater Monitoring Report

Dear Mr. Becker:

The attached report summarizes the United States Department of Energy (DOE) groundwater quarterly monitoring activities conducted during the first quarter (Q1) 2021 from January 1,2021 through March 31, 2021at Area IV within the Santa Susana Field Laboratory (SSFL), located in Ventura County, California. The Q1 2021 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. In general, sample results were consistent with historical results. Any newly detected sample results will be monitored in future sampling events. Areas of impact to groundwater from COCs remained consistent and will be further evaluated with the 2021 results to see if any changes are required.

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this submittal is true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact me at (805) 416-0994 or by email joshua.mengers@emcbc,doe,gov, or contact John Jones at (805) 416-0992 or by email john.jones@emcbc.doe.gov .

Sincerely,

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Report on Quarterly Groundwater Monitoring, Area IV, First Quarter 2021 Santa Susana Field Laboratory Ventura County, California

Prepared for:
United States Department of Energy

Prepared by:
North Wind Portage, Inc.

June 2021

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Report on Quarterly Groundwater Monitoring, Area IV, First Quarter 2021

Santa Susana Field Laboratory Ventura County, California

June 2021

Prepared for:
United States Department of Energy
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PROFESSIONAL CERTIFICATION

Report on Quarterly Groundwater Monitoring, Area IV
First Quarter 2021
Santa Susana Field Laboratory
Ventura County, California

June 2021

This Quarterly Groundwater Monitoring Report has been prepared by a team of qualified professionals under the supervision of the senior staff whose seal and signature appears below.

Reviewed by
T. Stewart Williford
ETEC Manager

Prepared by
Brian Dow, PG, PMP
Principal Geologist

Approved by
Brad Frazee
Project Manager

Executive Summary

This report summarizes the United States Department of Energy (DOE) groundwater monitoring activities conducted during the first quarter (Q1) 2021 at Area IV within the Santa Susana Field Laboratory (SSFL), located in Ventura County, California. The reporting period for this report is 01 January 2021 to 31 March 2021. This quarterly 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." DOE has gone above and beyond meeting the groundwater requirements outlined in the Site-Wide Groundwater Water Quality Sampling and Analysis Plan (WQSAP) by including additional water quality samples in support of the Groundwater Resource Conservation and Recovery Act Facility Investigations (RFI) Program (CDM Smith 2015a).

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 2021. All results are considered sufficient to meet project requirements. Site-wide samples were collected from 18 of 21 DOE Site-wide wells. The three DOE Site-wide wells that were not sampled were: wells PZ-097 and PZ-124, which were dry and not sampled; and well RD-57, which has an obstruction and was not sampled.

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 2021:

- 1,4-dioxane in well RS-18;
- Total boron in well RD-20;
- Total vanadium in well RD-33B; and
- Gross alpha in well RD-50.

Additionally, actinium-228 was reported for the first time in well RD-33C but does not have an established screening limit and is not a radionuclide of concern for this well. Actinium-228 is part of the decay chain of a natural radionuclide and historically was not used by DOE in Area IV. Actinum-228 is a part of the thorium-232 decay series, has a half-life of only 6 hours, and can be found in most samples in the environment (depending on conditions).

No new maximum values for previously detected radiochemistry analytes were detected during Q1 2021 exceeding the associated SSFL screening level. However, some non-radiological analytes were reported at a new maximum concentration and above the associated SSFL screening criteria in wells with established historical data during 2021:

- cis-1,2-dichloroethene (cis-1,2-DCE) in well PZ-108; and
- Various dissolved and total metals including arsenic, boron, cobalt, selenium, silver, and vanadium in wells PZ-108, RD-20, RD-33A, RD-34A, RD-34C, RD-50, RD-96, and RD-18.

It is notable that the increase of trichloroethene (TCE) daughter product cis-1,2-DCE in well PZ-108 provides a line of evidence that TCE is naturally attenuating in the Hazardous Materials Storage Area (HMSA).

Off-site wells sampled during 2021 included RD-59A, RD-59B, and RD-59C. Dissolved and total mercury were detected for the first time and at new maximums that exceed the screening level in well RD-59B. New maximums were detected below the SSFL screening level for total and dissolved arsenic and boron and total zinc in one or more of these wells and for radium-226 and radium-228 in wells RD-59A, RD-59B, and RD-59C.

Analytes that were above any associated SSFL screening criteria in a particular well will be sampled in 2021. New first-time detected analytes will also be sampled for in 2021.

Conclusions

The 2021 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 2021 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 changes in seasonal rainfall amounts and/or movement of groundwater caused by pumping of wells in the Former Sodium Disposal Facility area. Analytical results will be discussed in more detail in the 2021 Annual Report.

Recommendations

After review of the 2021 sampling, some outstanding issues were identified and recommendations have been made for potential follow-up work:

- Recommend DOE have discussions with the Department of Toxic Substances Control (DTSC) presenting rationale for replacing obstructed Site-Wide well RD-57 with well DD-139.
- Recommend add radiochemistry analysis for DD-139 during future sampling rounds to match Site-Wide Data Quality Objectives specified for RD-57.
- Continue sampling 1,4-dioxane at wells where it was detected during Q1 2021 (e.g., DS-48, PZ-108, RD-14, RD-33A, RD-33C, RD-34A, RD-54A, RD-63, and RS-18).

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
1,1,1-TCA	1,1,1-trichloroethane
1,2-DCA	1,2-dichloroethane
1,2,3-TCP	1,2,3-trichloropropane
22 CCR	Title 22 California Code of Regulations
Boeing	The Boeing Company
CDM Smith	CDM Federal Programs Corporation
cis-1,2-DCE	cis-1,2-dichloroethene
DOE	United States Department of Energy
DPH	Department of Public Health
DRO	diesel-range organic
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
FSDF	Former Sodium Disposal Facility
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
mrem/yr	millirems per year
MSL	mean sea level
MWH	Montgomery Watson Harza
NASA	National Aeronautics and Space Administration
North Wind	North Wind Portage, Inc.
PCP	Post-Closure Permit
Q1	first quarter
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RWQCB	Regional Water Quality Control Board
SSFL	Santa Susana Field Laboratory
SWGW RBSL	site-wide groundwater risk-based screening level
TCE	trichloroethene
VOC	volatile organic compound

WQSAP	Water Quality Sampling and Analysis Plan

Report on Quarterly Groundwater Monitoring, Area IV, First Quarter 2021 Santa Susana Field Laboratory Ventura County, California

1. INTRODUCTION

This report summarizes the groundwater monitoring activities conducted during the first quarter (Q1) 2021 by the United States Department of Energy (DOE) within Administrative Area IV of the Santa Susana Field Laboratory (SSFL) located in Ventura County, California (Figure 1). This report, combined with reports developed by The Boeing Company (Boeing) and the National Aeronautics and Space Administration (NASA), constitute the reporting requirements for SSFL. DOE is submitting data 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 during Q1 2021 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. There are 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 2010a), and site-wide activities conducted 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 the 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 of these Areas. 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 submission of this quarterly report, groundwater sampling activities for Area IV were reported along with results from Areas I, II, and III. As a result, some historical groundwater monitoring 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 2010a). 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;
- 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; 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 2022.
- Section 6 provides references.

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. This has caused the Western Transverse Ranges in the vicinity of SSFL 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 within the boundary of 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 approximately 11% 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 is 01 January 2021 to 31 March 2021. The Q1 groundwater samples were collected from 15 February 2021 through 05 March 2021 as part of the Area IV Site-Wide Groundwater Monitoring Program and to support the DOE Groundwater RFI Program. It is notable that sample cooler shipping issues were experienced during the unseasonably freezing winter storms experienced in the south, central, and southeast United States from 13 February through 20 February, 2021. Due to the shipping issues, some analytes were outside of holding time and temperature preservation requirements upon laboratory receipt. Corrective action was applied immediately and affected wells/analytes were resampled and resubmitted to the laboratory during the same mobilization within temperature and holding time requirements; thus, this is a non-issue and provides explanation for wells with multiple sample dates.

The Site-Wide Groundwater Monitoring Program – December 2010 Site-Wide WQSAP (Haley & Aldrich 2010a) was implemented to fulfill the groundwater monitoring program specific to Area IV at SSFL. 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 Q1 2021 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.

All data collection activities reported herein were performed by North Wind Portage, Inc., (North Wind) under contract 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.

North Wind completed field groundwater monitoring activities during Q1 of the 2021 reporting period. Field activities were conducted in general accordance with the Site-Wide WQSAP (Haley & Aldrich 2010a), with exceptions described in Section 3.6. Field personnel followed the sampling and analysis requirements described in the Site-Wide WQSAP.

3.1 Former Sodium Disposal Facility Groundwater Interim Measure

In November 2017, DOE initiated a groundwater interim measure (GWIM) at the Former Sodium Disposal Facility (FSDF). The objective of the GWIM was to remove contaminant mass for trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) associated with near-surface bedrock fractures (approximately 30 feet below ground surface). During Q1 2021, the GWIM at the FSDF was continued. Two wells were pumped on a weekly basis and a total of 576 gallons of volatile organic

compound (VOC) impacted groundwater were extracted resulting in the removal of 5.3 grams of total VOC mass.

Groundwater was sampled above and below the packer assembly installed in Chatsworth Formation monitoring well RD-23. TCE was detected in the sample from the packer level (200 feet bgs) at 2,000 ug/L and was detected in the sample beneath the packer at 14 ug/L. This provides a line of evidence that RD-23 was drilled through a secondary source of VOCs in near-surface bedrock and the well became a conduit for down hole VOC migration. The decrease in TCE concentrations from above the packer to below the packer demonstrate its effectiveness in precluding the migration of VOCs downward into the Chatsworth Formation.

3.2 Water Level Measurement Studies

During Q1, water level measurements were taken from near-surface wells at the FSDF and the Hazardous Materials Storage Area (HMSA) to assess the effects of the winter rainfall. Due to the lack of rainfall this year, water elevations dropped about 0.5 feet each month (in contrast with the rising elevations that were observed during the same time period of 2020).

3.3 Modifications to Well Network and Equipment

Wells and piezometers were inspected during Q1 2021. Well maintenance needs were noted and either completed or are pending approval of recommended actions. Table 2 presents well maintenance, equipment modifications, well construction, and well development activities performed on Area IV wells and piezometers during Q1 2021.

3.4 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 wells (e.g., loose caps and 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 during Q1 2021 as summarized in Table 3.

3.5 Groundwater Sampling and Analysis

Area IV monitoring wells are scheduled to be sampled annually in accordance with the Site-Wide WQSAP. DOE is responsible for 21 wells in the Area IV Site-Wide Groundwater Monitoring Sampling Program. Of those 21, three wells (PZ-097, PZ-124, and RD-57) were not sampled. Thus, a total of 18 Site-wide Program wells were sampled. An additional 56 wells are subject to groundwater sampling under the RFI Program and 9 were selected to be sampled during this reporting period. Thus, a total of 27 DOE wells were sampled during Q1 2021.

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 2021 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 analytical results and methods, respectively.

3.6 Deviations from Water Quality Sampling and Analysis Plans

Exceptions to the Site-Wide WQSAP (Haley & Aldrich 2010a) (presented in Table 4) include:

- Stabilization readings for some wells that 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.

- Well RD-34B was sampled above an obstruction, which is a variance to being placed halfway between the depth to water and the bottom of the saturated open interval of the well.

- Wells PZ-097 and PZ-124 were dry and not sampled

- Well RD-57 was not sampled due to an obstruction.

The reporting limit for vinyl chloride (0.666 micrograms per liter (µg/L)) was above the SSFL groundwater screening level reference value (i.e., SSFL screening criterion) maximum contaminant level (MCL) criterion of 0.5 µg/L; however, the method detection limit (MDL) was 0.333 µg/L so the 1 µg/L reporting limit is considered sufficient for project purposes. The reporting limit was also elevated for 1,2-dichloroethane (1,2-DCA) at 0.666 µg/L (MDL = 0.333 µg/L), whereas 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 0.666 µg/L; the MDL was 0.333 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 that needed 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.

No exceptions, other than those listed in Table 4, occurred for Area IV wells during 2021.

4. GROUNDWATER MONITORING RESULTS

This section provides a review of Area IV Q1 2021 groundwater levels, 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, 2019, 2020, 2021).

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 2017. For wells installed after 2017, sufficient data do 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 Q1 2021 ranged from a low of approximately 1,314 feet above mean sea level (MSL) at well RD-59A to a high of approximately 1,797 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 1,815 feet above MSL at RS-54.

Figure 5 presents contours of first-encountered, non-perched groundwater elevations, as determined from water levels measured during Q1 2021. 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 2021, 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, which represent water levels primarily within the Chatsworth Formation, 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 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 can in turn 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 conditions (CDM Smith 2018).

4.2 Groundwater Quality

Laboratory analytical results for groundwater samples are tabulated in Tables 10 through 15. Constituents reported for the first time and/or at new maximum concentrations in groundwater sampled from individual locations are presented in Table 9 for wells that were installed prior to 2016. For wells installed after 2016, sufficient data do 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 the 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, 2017, 2018, 2019, and 2020 Annual Reports (CDM Smith 2015b, 2016d; North Wind 2017, 2018, 2019, 2020, 2021).

4.2.1 Quality Assurance and Quality Control

Based on the quality of all results considered, completeness goals were found to be met with the data for Q1 2021 suitable for the intended uses (Appendix A). Per the Site-Wide WQSAP (Haley & Aldrich 2010a), 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

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 MCLs, 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 (i.e., more conservative) value is used. When EPA and California DPH values for MCLs differ, the lower value is used. In cases where the secondary MCL is lower than the primary MCL, the secondary MCL 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). Groundwater screening reference values are presented in Table 8.

4.2.3 Analytical Results

During the Q1 2021 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 Q1 2021 detected result is a new maximum value for that analyte at that well. Table 9 includes only wells that were installed prior to 2016. For wells installed after 2016, sufficient data do not exist to establish trends for these wells. The purpose of Table 9 and the below sections is to help identify changes from established trends to support decision-making processes. 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 Q1 2021; and
- Analytes that were analyzed for the first time ever for that well (none for Q1 2021).

Of these analytes, the detected values are compared to all data to see if the Q1 2021 value is the new maximum value for that well. The cases that warrant further discussion are presented below.

4.2.3.1 On-Site Detects

Constituent concentrations (except for radiochemical constituents, which are discussed separately in Section 4.2.4) detected in groundwater samples collected from all on-site wells in Q1 2021 are presented in Table 9 and discussed below.

First-Time Analyses of an Analyte at a Particular Well

There were no new analytical suites included in the Q1 2021 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 Q1 2021 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 exceeding the associated SSFL screening criteria values include:

- 1,4-dioxane in well RS-18;
- Total boron in well RD-20; and
- Total vanadium in well RD-33B.

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

As shown in Table 9, certain analytes were detected as new maximum values in various wells during Q1 2021 sampling event. 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 include:

- cis-1,2-dichloroethene (cis-1,2-DCE) in well PZ-108; and

- Various dissolved and total metals including arsenic, boron, cobalt, selenium, silver and vanadium in wells PZ-108, RD-20, RD-33A, RD-34A, RD-34C, RD-50, RD-96, and RD-18.

It is notable that the increase of TCE daughter product cis-1,2-DCE in well PZ-108 provides a line of evidence that TCE is naturally attenuating in the HMSA.

4.2.3.2 Off-Site Detections

Off-site wells sampled during Q1 2021 included RD-59A, RD-59B, and RD-59C. Dissolved and total mercury were detected for the first time and at new maximums that exceed the screening level in well RD-59B.

Total and dissolved arsenic and boron and total zinc were detected at new maximums and below the respective screenings level in one or more of these off-site wells.

4.2.4 Radiochemistry Results

Radiochemistry analyses were performed for samples collected during the Q1 2021 reporting period under the site-wide and RFI programs, and the 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.

First-Time Analyses of an Analyte at a Particular Well

There were no new analytical suites included in the Q1 2021 sampling event.

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

As shown in Table 9, a radiochemistry analyte was reported for the first time and a new maximum exceeding the screening limit during Q1 2021. New maximum concentrations in this category exceeding the associated SSFL screening criteria values include:

- Gross alpha in well RD-50.

Additionally, actinium-228 was reported for the first time in well RD-33C but does not have an established screening limit and is not a radionuclide of concern for this well. Actinium-228 is part of the decay chain of a natural radionuclide and historically was not used by DOE in Area IV. Actinum-228 is a part of the thorium-232 decay series, has a half-life of only 6 hours, and can be found in most samples in the environment (depending on conditions).

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

As shown in Table 9, gross beta, radium-226, radium-228, uranium-233/234, uranium-235/236, and uranium-238 were reported as new maximum values in various wells during Q1 2021. Each reported concentration was not the first time each analyte was seen in the well; however, the value is now a new maximum concentration.

- No new maximum values for previously detected radiochemistry analytes were detected during Q1 2021 exceeding the associated SSFL screening level.

4.2.4.1 Off-Site Detections

Off-site wells sampled during Q1 2021 included RD-59A, RD-59B, and RD-59C. As shown in Table 9, no radiochemistry analytes were reported for the first time and a new maximum in off-site wells above the associated SSFL screening level. New maximums were detected for radium-226 and radium-228 in wells RD-59A, RD-59B, and RD-59C below the SSFL screening level.

4.2.5 2020 Results Follow-up

This section evaluates whether the sampling and analyses performed during Q1 2020 are sufficient to resolve documented follow-up sampling issues from the previous annual report (North Wind 2020) and assesses the need for changes to the groundwater monitoring programs.

4.2.5.1 2020 Outstanding Issues

Follow-up for 2020 Recommendations

It was recommended to analyze for 1,4-dioxane from all wells scheduled for VOC analysis during Q1 2021. This was completed and the issue is resolved.

It was recommended to remove well RD-57 from Site-Wide sampling list and replace it with well DD-139. Data from well DD-139 meets the same data quality objectives as RD-57 and will continue to be sampled during future sampling rounds for VOCs, metals, perchlorate, and radiochemistry. Recommend abandoning RD-57 due to obstruction from damaged FLUTE liner. DTSC has requested DOE supply additional information regarding this recommendation so the issue is ongoing.

It was recommended to discontinue 1,2,3-trichloropropane (1,2,3-TCP) analysis at well RD-14 since it has been non-detect for the past four or more years. 1,2,3-TCP was not analyzed from well RD-14 during Q1 2021.

Follow-up for 2019 First-Time and New Maximum Results

During 2019, TCE was detected at a new maximum concentration of 240 µg/L in well PZ-108. This well was not sampled during Q1 2020 and during Q1 2021 TCE was detected at 91.5 µg/L. Thus, an increasing trend is not confirmed to be established for this well and the issue is resolved.

Follow-up for 2020 First-Time and New Maximum Results

During 2020, gross alpha was detected at a new maximum in wells RD-54A, RD-63, and RD-98. The gross alpha detections in these wells decreased during Q1 2021 and provide a line of evidence that 2020 new maximums were transitory. This issue is resolved.

During 2020, radium-228 was detected at a new maximum in wells RD-17 and RD-19. The radium-228 detections in these wells decreased during Q1 2021 and do not confirm an increasing trend. This issue is resolved.

Follow-up for Potentially Increasing Trends Identified during 2019

During 2019, TCE was detected in RD-54A at 9.4*/ µg/L. The concentration increased from the result detected below the MCL in 2018 (2.3 µg/L), and increased again during Q1 2020 to 23.7 µg/L. During Q1 2021, the concentration decreased to 7.59 µg/L. This provides a line of evidence that concentration increases may be influenced by shallow impacted groundwater migrating downward from near-surface bedrock fractures during years with higher than average rainfall.

During 2019, 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). Well PZ-108 was not sampled during Q1 2020. During Q1 2021 the concentration remained stable at 19.2 µg/L. It is recommended to continue to evaluate for a potentially increasing trend during the 2022 sampling round.

During 2019, diesel-range organic (DRO) was detected in well PZ-103 above the 100 µg/L threshold criterion at an estimated concentration of 230J/J µg/L for a first-time and new maximum detection and the well was not sampled during 2020. During Q1 2021, DRO was not detected in this well with a detection limit of 75 µg/L. This provides a line of evidence that the 2019 detection may be attributed to high seasonal rains causing the shallow zone groundwater elevation to rise and flush DRO from soils overlying groundwater. This issue is resolved.

Follow-up for Potentially Increasing Trends Identified during 2020

During the 2020 sampling round, 1,4-dioxane was detected above the notification level of 1 µg/L in DS-46 at a concentration of 3.7 µg/L. The concentration was a new maximum and increased from the results detected in 2019 (2.2/J µg/L) and 2018 (1.5 µg/L). This well was installed in 2016 and has a limited dataset for evaluating trends. This is not a Site-Wide program well and isn't currently scheduled for sampling under the RFI program. The next time it is sampled, it will be compared to historical data as part of the evaluation for new maximum detections. Thus, this issue is resolved.

5. 2022 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 2022.

5.1 Outstanding Issues and/or Follow-Up Work

After review of the Q1 2021 sampling, some outstanding issues were identified and recommendations have been made for potential follow-up work.

- Recommend DOE have discussions with the DTSC presenting rationale for replacing obstructed Site-Wide well RD-57 with well DD-139.
- Recommend add radiochemistry analysis for DD-139 during future sampling rounds to match Site-Wide Data Quality Objectives specified for RD-57.
- Continue sampling 1,4-dioxane at wells where it was detected during Q1 2021 (e.g., DS-48, PZ-108, RD-14, RD-33A, RD-33C, RD-34A, RD-54A, RD-63, and RS-18).

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TABLES

TABLE 1
LIST OF DOE 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
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-23	RFI			FSDF B4886

TABLE 1
LIST OF DOE 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
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
DS-48	RFI			B4457 HMSA
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
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
DD-157	RFI			B4457 HMSA
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, Q1 2021 - 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 obstruction.	--	--
RD-57	SW	2016Q1	3/10/2016	FLUTe was only partially removed due to an obstruction. Well cap welded shut.	Unresolved	--	--
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.	--	--

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:
GW RFI - Groundwater RCRA Facility Investigation

TABLE 3
WATER LEVEL DATA, 1Q 2021 - 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	2/10/21	210.21	1632.02	
Q1	DD-139	Chatsworth	1793.01	2/10/21	151.12	1641.89	
Q1	DD-140	Chatsworth	1798.16	2/9/21	146.47	1651.69	
Q1	DD-141	Chatsworth	1762.79	2/10/21	73.70	1689.09	
Q1	DD-142	Chatsworth	1812.22	2/9/21	56.54	1755.68	
Q1	DD-143	Chatsworth	1789.74	2/10/21	36.78	1752.96	
Q1	DD-144	Chatsworth	1810.69	2/10/21	20.14	1790.55	
Q1	DD-145	Chatsworth	1798.90	2/9/21	26.23	1772.67	
Q1	DD-146	Chatsworth	1812.72	2/10/21	22.50	1790.22	
Q1	DD-147	Chatsworth	1814.18	2/10/21	44.16	1774.14	(3)
Q1	DS-43	Chatsworth	1809.52	2/9/21	16.87	1792.65	
Q1	DS-44	Chatsworth	1851.21	2/10/21	68.79	1782.42	
Q1	DS-45	Chatsworth	1866.58	2/10/21	72.16	1794.42	
Q1	DS-46	Chatsworth	1797.79	2/9/21	42.97	1754.82	
Q1	DS-47	Chatsworth	1867.94	2/10/21	106.56	1761.38	
Q1	PZ-097	Shallow	1761.87	2/10/21	DRY	---	
Q1	PZ-108	Shallow	1809.36	2/9/21	19.18	1790.18	
Q1	PZ-124	Shallow	1764.11	2/10/21	DRY	---	
Q1	RD-07	Chatsworth	1812.82	2/10/21	93.06	1719.76	
Q1	RD-14	Chatsworth	1824.18	2/9/21	93.68	1730.50	
Q1	RD-17	Chatsworth	1836.30	2/10/21	39.54	1796.76	
Q1	RD-19	Chatsworth	1853.16	2/10/21	83.33	1769.83	
Q1	RD-20	Chatsworth	1819.52	2/10/21	46.00	1773.52	
Q1	RD-21	Chatsworth	1866.96	2/10/21	99.05	1767.91	
Q1	RD-22	Chatsworth	1853.41	2/10/21	299.62	1553.79	
Q1	RD-23	Chatsworth	1838.19	2/10/21	244.00	1594.19	
Q1	RD-24	Chatsworth	1809.93	2/10/21	40.66	1769.27	
Q1	RD-27	Chatsworth	1841.67	2/10/21	56.53	1785.14	
Q1	RD-29	Chatsworth	1806.29	2/9/21	20.54	1785.75	
Q1	RD-30	Chatsworth	1768.69	2/10/21	16.03	1752.66	
Q1	RD-33A	Chatsworth	1792.97	2/10/21	212.63	1580.34	
Q1	RD-33B	Chatsworth	1793.72	2/10/21	282.59	1511.13	
Q1	RD-33C	Chatsworth	1793.61	2/10/21	284.15	1509.46	
Q1	RD-34A	Chatsworth	1761.91	2/10/21	46.79	1715.12	
Q1	RD-34B	Chatsworth	1762.51	2/10/21	54.30	1708.21	
Q1	RD-34C	Chatsworth	1762.79	2/10/21	18.12	1744.67	
Q1	RD-54A	Chatsworth	1841.72	2/10/21	184.72	1657.00	
Q1	RD-54B	Chatsworth	1842.54	2/10/21	243.08	1599.46	
Q1	RD-54C	Chatsworth	1843.77	2/10/21	230.47	1613.30	
Q1	RD-59A	Chatsworth	1340.59	2/10/21	26.48	1314.11	
Q1	RD-59B	Chatsworth Artesian	1342.49	2/10/21	20.00	1322.49	(1)
Q1	RD-59C	Chatsworth Artesian	1345.41	2/10/21	20.00	1325.41	(1)

TABLE 3
WATER LEVEL DATA, 1Q 2021 - 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	RD-63	Chatsworth	1764.83	2/10/21	28.62	1736.21	
Q1	RD-64	Chatsworth	1857.04	2/10/21	249.72	1607.32	
Q1	RD-65	Chatsworth	1819.14	2/10/21	223.02	1596.12	
Q1	RD-74	Chatsworth	1810.90	2/10/21	DRY	---	(2)
Q1	RD-87	Chatsworth	1789.09	2/10/21	50.61	1738.48	
Q1	RD-88	Chatsworth	1774.62	2/10/21	DRY	---	
Q1	RD-90	Chatsworth	1784.75	2/10/21	37.54	1747.21	
Q1	RD-91	Chatsworth	1818.04	2/10/21	62.21	1755.83	
Q1	RD-92	Chatsworth	1833.74	2/10/21	69.45	1764.29	
Q1	RD-93	Chatsworth	1810.48	2/10/21	36.60	1773.88	
Q1	RD-94	Chatsworth	1744.38	2/10/21	24.23	1720.15	
Q1	RD-95	Chatsworth	1811.36	2/10/21	57.86	1753.50	
Q1	RD-96	Chatsworth	1805.49	2/10/21	70.44	1735.05	
Q1	RD-97	Chatsworth	1792.22	2/10/21	60.15	1732.07	
Q1	RD-98	Chatsworth	1808.73	2/10/21	47.68	1761.05	
Q1	RS-18	Shallow	1802.86	2/9/21	8.65	1794.21	
Q1	RS-23	Shallow	1887.25	2/9/21	DRY	---	
Q1	RS-25	Shallow	1862.71	2/10/21	DRY	---	
Q1	RS-27	Shallow	1804.78	2/9/21	DRY	---	
Q1	RS-28	Shallow	1768.59	2/10/21	15.81	1752.78	
Q1	RS-54	Shallow	1846.66	2/10/21	31.38	1815.28	

(1) = Pressure transducers installed on artesian well.
(2) = Obstruction at 95.1 feet bgs; 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
2020 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

DOE SITE-WIDE WELLS NOT SAMPLED

Well Identifier	Notes
RD-57	Not sampled due to obstruction (lid welded shut)
PZ-097, PZ-124	Wells were dry.

STABILIZATION CRITERIA COLLECTED AT FIXED INTERVALS GREATER THAN 5 MINUTES

Well Identifier	Notes
RS-18, RD-20, DD-139	Readings were collected every 6 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
Low-flow Stabilization Criteria was met on all wells sampled.	

QUALITY ASSURANCE PROJECT PLAN (QAPP) REQUIREMENTS

Requirement	Exceptions
Trip Blanks submitted daily with samples analyzed for volatile organic compounds (VOCs) and gasoline-range organics.	None
Quality control (QC) samples collected	See Appendix E
Precision/Accuracy requirements met	See Appendix E

OTHER

RD-34B	The pump was placed immediately above an obstruction at 169 feet bgs (variance from intake placed halfway between the depth to water and the bottom of the saturated open interval of the well).

ELEVATED REPORTING LIMITS AND ANALYTES NOT ANALYZED

The below analytes had reporting limits (RLs) above values listed in WQSAP Table B-II that are based on SSFL screening criteria. However, the method detection limits (MDLs) were below the applicable screening criterias and are considered sufficent for project purposes.

Analyte	WQSAP RL	2020 RL	2020 MDL	Notes
1,1,2-trichloro-1,2,2-trifluoroethane (µg/L)	5	5.96	2.98	MDL below respective screening criterion.
1,2-dichloroethane (µg/L)	0.5	0.666	0.333	MDL below respective screening criterion.
Benzene (µg/L)	0.5	0.666	0.333	MDL below respective screening criterion.
Carbon tetrachloride (µg/L)	0.5	0.666	0.333	MDL below respective screening criterion.
m-xylene & p-xylene (µg/L)	1	1.33	0.667	MDL below respective screening criterion.
Vinyl chloride (µg/L)	0.5	0.666	0.333	MDL below respective screening criterion.

Analyte Not Analyzed	Notes
None	

TABLE 5
GROUNDWATER FIELD PARAMETERS, 1Q 2021 - 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-139	2/26/2021	16.80	6.56	0.712	1.04	3.0	175.5
DD-157	2/19/2021	20.70	7.49	0.651	0.77	5.0	-41.9
DD-157	3/4/2021	20.60	7.62	0.666	0.85	17.0	-60.3
DD-158	2/22/2021	21.40	7.16	0.714	1.53	54.0	95.8
DD-159	2/25/2021	18.70	6.95	0.791	0.97	5.0	194.0
DS-48	2/15/2021	18.40	7.35	0.972	0.78	7.0	-112.0
PZ-097	Dry	---	---	---	---	---	---
PZ-102	Dry	---	---	---	---	---	---
PZ-103	2/15/2021	13.10	7.31	1.108	3.96	50.0	233.8
PZ-103	3/2/2021	18.90	6.44	1.180	4.02	42.0	272.5
PZ-108	2/15/2021	19.80	7.34	1.195	1.24	9.0	177.7
PZ-108	3/2/2021	20.80	6.43	1.138	2.44	15.0	225.4
PZ-124	Dry	---	---	---	---	---	---
RD-07	2/16/2021	16.10	7.52	0.739	1.54	1.0	153.2
RD-07	3/3/2021	15.40	7.12	0.769	1.06	1.0	235.4
RD-14	2/22/2021	18.30	6.95	0.776	0.86	1.0	267.3
RD-14	3/4/2021	20.40	7.17	0.692	0.96	1.0	176.1
RD-17	2/16/2021	15.50	7.33	0.876	1.72	5.0	163.3
RD-17	3/3/2021	18.70	7.24	0.821	4.02	6.0	237.4
RD-19	2/22/2021	20.20	7.98	1.495	0.55	1.0	50.4
RD-20	2/24/2021	15.40	7.41	1.672	3.55	1.0	187.6
RD-20	3/4/2021	15.30	7.29	1.420	3.76	1.0	195.7
RD-33A	2/18/2021	15.10	7.51	0.677	1.37	6.0	-31.2
RD-33B	2/22/2021	18.30	7.74	0.424	2.26	2.0	-30.6
RD-33B	3/5/2021	18.30	7.92	0.406	1.79	2.0	-86.5
RD-33C	2/18/2021	16.70	7.53	0.424	2.27	4.0	-62.1

TABLE 5
GROUNDWATER FIELD PARAMETERS, 1Q 2021 - 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)
RD-33C	3/4/2021	17.50	9.46	286.400	0.86	1.0	85.1
RD-34A	2/17/2021	14.00	6.94	1.458	0.64	6.0	-12.1
RD-34A	3/4/2021	17.40	7.81	6.460	1.19	1.0	108.1
RD-34B	2/25/2021	11.40	6.55	0.261	1.42	4.0	112.9
RD-34C	2/17/2021	17.40	7.75	0.575	0.55	3.0	-176.3
RD-50	2/17/2021	14.60	7.30	0.732	1.96	4.0	189.7
RD-54A	3/1/2021	18.80	7.20	0.816	2.97	9.0	250.8
RD-59A	3/5/2021	16.00	7.86	1.054	0.59	1.0	243.3
RD-59B	3/5/2021	19.20	9.31	0.830	0.25	1.0	-44.1
RD-59C	3/5/2021	19.50	9.02	0.859	0.20	1.0	80.6
RD-63	2/19/2021	11.50	7.05	1.177	1.05	8.0	-127.1
RD-63	3/5/2021	14.60	6.87	1.083	0.88	2.0	-90.6
RD-96	2/19/2021	21.50	7.06	1.111	1.81	2.0	201.8
RD-96	3/4/2021	18.70	7.17	0.825	2.01	2.0	146.8
RS-18	2/15/2021	13.60	6.66	0.861	6.38	4.0	221.2
RS-18	3/2/2021	14.50	6.78	1.071	5.14	6.0	256.4
RS-28	2/19/2021	13.10	6.67	0.890	3.37	1.0	202.4

NOTES AND ABBREVIATIONS

° C - degrees Celsius
mmhos - millimhos
mg/L - milligrams per liter
mV - millivolt
NTU - nephelometric turbidity unit

TABLE 6
SAMPLES ANALYZED, 2021 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program Analytes	DOE Area IV Groundwater RFI Analytes
DD-139	2021 Q1	NA	VOCs 1,4-Dioxane Metals Perchlorate
DD-157	2021 Q1	NA	VOCs 1,4-Dioxane Metals
DD-158	2021 Q1	NA	VOCs 1,4-Dioxane Metals Radiochemistry
DD-159	2021 Q1	NA	VOCs 1,4-Dioxane Metals Radiochemistry
DS-48	2021 Q1	NA	VOCs 1,4-Dioxane Metals
PZ-097	2021 Q1	DRY, Not Sampled	NA
PZ-102	2021 Q1	NA	DRY, Not Sampled
PZ-103	2021 Q1	NA	GRO, DRO
PZ-108	2021 Q1	NA	VOCs 1,4-Dioxane Metals
PZ-124	2021 Q1	DRY, Not Sampled	NA
RD-07	2021 Q1	VOCs Radiochemistry	1,4-Dioxane Metals
RD-14	2021 Q1	VOCs Fluoride Radiochemistry	1,4-Dioxane Metals GRO, DRO
RD-17	2021 Q1	NA	Metals Radiochemistry
RD-19	2021 Q1	VOCs Metals Radiochemistry Fluoride	1,4-Dioxane GRO, DRO
RD-20	2021 Q1	VOCs Radiochemistry	1,4-Dioxane Metals Nitrates
RD-33A	2021 Q1	VOCs Metals Perchlorate Radiochemistry	1,4-Dioxane
RD-33B	2021 Q1	VOCs Metals Perchlorate Radiochemistry	1,4-Dioxane
RD-33C	2021 Q1	VOCs Metals Perchlorate Radiochemistry	1,4-Dioxane
RD-34A	2021 Q1	VOCs Metals Radiochemistry Fluoride	1,4-Dioxane

TABLE 6
SAMPLES ANALYZED, 2021 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Well ID	Event	Site-Wide Monitoring Program Analytes	DOE Area IV Groundwater RFI Analytes
RD-34B	2021 Q1	VOCs Metals Radiochemistry Fluoride	1,4-Dioxane
RD-34C	2021 Q1	VOCs Metals Radiochemistry Fluoride	1,4-Dioxane
RD-50	2021 Q1	NA	VOCs 1,4-Dioxane Metals Perchlorate Radiochemistry
RD-54A	2021 Q1	VOCs Metals Perchlorate Radiochemistry	1,4-Dioxane GRO, DRO
RD-57	2021 Q1	Obstruction, Not Sampled	NA
RD-59A	2021 Q1	VOCs Metals Perchlorate Radiochemistry Fluoride	1,4-Dioxane
RD-59B	2021 Q1	VOCs Metals Perchlorate Radiochemistry Fluoride	1,4-Dioxane
RD-59C	2021 Q1	VOCs Metals Perchlorate Radiochemistry Fluoride	1,4-Dioxane
RD-63	2021 Q1	VOCs Radiochemistry	GRO, DRO 1,4-Dioxane
RD-96	2021 Q1	NA	VOCs 1,4-Dioxane Metals Perchlorate Radiochemistry GRO, DRO
RS-18	2021 Q1	VOCs 1,4-Dioxane Metals Radiochemistry Perchlorate	NA
RS-28	2021 Q1	NA	Radiochemistry

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

TABLE 7
GROUNDWATER MONITORING PROGRAM ANALYSES, 2021 - DOE AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Analytes			**Analytical Method**
1,4-Dioxane			8270E SIM
Fluoride, Nitrate			300.0
Metals[1]:	Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium,		6010C/6020A/7470A
	Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium,		
	Selenium, Silver, Sodium, Strontium, Thallium, Tin, Vanadium, Zinc		
Perchlorate			6850
Radiochemistry:	Cesium-137 and other Gamma-emitting radionuclides[2]		901.1
	Gross Alpha and Gross Beta		900.0
	Radium-226		903.1
	Radium-228		904.0
	Strontium-90		905.0
	Tritium		906.0
	Isotopic Uranium		901.1 / 300 U-02-RC
Gasoline Range Organics			8015B
Diesel Range Organics			8015B
Volatile Organic Compounds:			8260B
	1,1,1-Trichloroethane	Chloroform	
	1,1,2-Trichloro-1,2,2-trifluoroethane	cis-1,2-Dichloroethene	
	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)	

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

Laboratory: GEL Laboratories, Charleston

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

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Radiochemistry	Actinium-228		pCi/L	
Radiochemistry	Antimony-125	300	pCi/L	Primary MCL [a]
Radiochemistry	Barium-133	1520	pCi/L	Primary MCL [b]
Radiochemistry	Barium-137m	2150000	pCi/L	Primary MCL [b]
Radiochemistry	Bismuth-212		pCi/L	
Radiochemistry	Bismuth-214		pCi/L	
Radiochemistry	Carbon-14	2000	pCi/L	Primary MCL [a]
Radiochemistry	Cesium-134	80	pCi/L	Primary MCL [a]
Radiochemistry	Cesium-137	200	pCi/L	Primary MCL [a]
Radiochemistry	Cobalt-57	1000	pCi/L	Primary MCL [a]
Radiochemistry	Cobalt-60	100	pCi/L	Primary MCL [a]
Radiochemistry	Europium-152	200	pCi/L	Primary MCL [a]
Radiochemistry	Gross alpha	15	pCi/L	Primary MCL
Radiochemistry	Gross beta	50	pCi/L	Cal MCL
Radiochemistry	Gross beta	4	mrem/yr	Primary MCL
Radiochemistry	Iodine-129	1	pCi/L	Primary MCL [a]
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]
Radiochemistry	Neptunium-236	5960	pCi/L	Primary MCL [b]
Radiochemistry	Niobium-94	707	pCi/L	Primary MCL [b]
Radiochemistry	Radium-226/228	5	pCi/L	Primary MCL
Radiochemistry	Sodium-22	400	pCi/L	Primary MCL [a]
Radiochemistry	Strontium-90	8	pCi/L	Primary MCL
Radiochemistry	Thallium-208		pCi/L	
Radiochemistry	Thorium-234		pCi/L	
Radiochemistry	Thulium-171	1000	pCi/L	Primary MCL [a]
Radiochemistry	Tin-126	293	pCi/L	Primary MCL [b]
Radiochemistry	Tritium	20000	pCi/L	Primary MCL
Radiochemistry	Uranium-233/234	20	pCi/L	Cal MCL
Radiochemistry	Uranium-235	20	pCi/L	Cal MCL
Radiochemistry	Uranium-238	20	pCi/L	Cal MCL
Halogenated Ethenes	1,2-Dichloroethene	130	ug/L	SWGW RBSL
Halogenated Ethenes	Chlorotrifluoroethylene		ug/L	
Halogenated Ethenes	Tetrachloroethene	5	ug/L	Primary MCL
Halogenated Ethenes	Trichloroethene	5	ug/L	Primary MCL
Halogenated Ethenes	cis-1,2-Dichloroethene	6	ug/L	Cal MCL
Halogenated Ethenes	trans-1,2-Dichloroethene	10	ug/L	Cal MCL
Halogenated Ethenes	1,1-Dichloroethene	6	ug/L	Cal MCL
Halogenated Ethenes	Vinyl chloride	0.5	ug/L	Cal MCL
Halogenated Ethanes	1,1,1,2-Tetrachloroethane		ug/L	
Halogenated Ethanes	1,1,2,2-Tetrachloroethane	1	ug/L	Cal MCL
Halogenated Ethanes	1,1,2-Trichloroethane	5	ug/L	Primary MCL
Halogenated Ethanes	1,1,1-Trichloroethane	200	ug/L	Primary MCL
Halogenated Ethanes	1,2-Dichloroethane	0.5	ug/L	Cal MCL
Halogenated Ethanes	1,1-Dichloroethane	5	ug/L	Cal MCL
Halogenated Ethanes	Chloroethane	16	ug/L	Taste/Odor
Halogenated Ethanes	2-Chloro-1,1,1-trifluoroethane		ug/L	
Halogenated Ethanes	1,2-Dibromoethane	0.05	ug/L	Primary MCL
Halogenated Ethanes	Dichlorodifluoroethane		ug/L	
Halogenated Ethanes	1,1,2-Trichloro-1,2,2-trifluoroethane	1200	ug/L	Cal MCL
Halogenated Ethanes	1,2-Dichloro-1,1,2-trifluoroethane	190000	ug/L	SWGW RBSL

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

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Halogenated Ethanes	Dichlorotrifluoroethane		ug/L	
Halogenated Ethanes	2,2-Dichloro-1,1,1-trifluoroethane	190000	ug/L	SWGW RBSL
Halogenated Ethanes	Trichlorotrifluorethane		ug/L	
Halogenated Methanes	Dichlorofluoromethane		ug/L	
Halogenated Methanes	Isocyanomethane		ug/L	
Halogenated Methanes	Carbon Tetrachloride	0.5	ug/L	Cal MCL
Halogenated Methanes	Chloroform	80	ug/L	Primary MCL
Halogenated Methanes	Methylene chloride	5	ug/L	Primary MCL
Halogenated Methanes	Chloromethane	5.7	ug/L	SWGW RBSL
Halogenated Methanes	Trichlorofluoromethane	150	ug/L	Cal MCL
Halogenated Methanes	Dichlorodifluoromethane	1000	ug/L	Notification Level
Halogenated Methanes	Bromochloromethane	34000	ug/L	Taste/Odor
Halogenated Methanes	Bromodichloromethane	80	ug/L	Primary MCL
Halogenated Methanes	Bromoform	80	ug/L	Primary MCL
Halogenated Methanes	Bromomethane	8.8	ug/L	SWGW RBSL
Halogenated Methanes	Dibromochloromethane	80	ug/L	Primary MCL
Halogenated Methanes	Dibromomethane		ug/L	
Halogenated Methanes	Iodomethane		ug/L	
Non-Halogenated VOCs	Total Complex Matrix		ug/L	
Non-Halogenated VOCs	1-Chlorohexane		ug/L	
Non-Halogenated VOCs	1-Hexanol		ug/L	
Non-Halogenated VOCs	1-Octanol		ug/L	
Non-Halogenated VOCs	2-Heptanone	280	ug/L	Taste/Odor
Non-Halogenated VOCs	2-Naphthaleneethanol		ug/L	
Non-Halogenated VOCs	Acetic Acid Ester		ug/L	
Non-Halogenated VOCs	Acetic Acid, 2-Methylpropyl Ester		ug/L	
Non-Halogenated VOCs	Acetic Acid, Butyl Ester		ug/L	
Non-Halogenated VOCs	Acetic Acid, Hexyl Ester		ug/L	
Non-Halogenated VOCs	Benzene, 1-Bromo-3-fluoro-		ug/L	
Non-Halogenated VOCs	Benzyl chloride	12	ug/L	Taste/Odor
Non-Halogenated VOCs	Butanoic Acid, Ethyl Ester		ug/L	
Non-Halogenated VOCs	Butyl Cyclooctane		ug/L	
Non-Halogenated VOCs	Cumene	770	ug/L	Notification Level
Non-Halogenated VOCs	Ethanol	760000	ug/L	Taste/Odor
Non-Halogenated VOCs	Ethanone, 1-(2,4,6-Trihydroxyphenyl)-		ug/L	
Non-Halogenated VOCs	Ethyl acetate	2600	ug/L	Taste/Odor
Non-Halogenated VOCs	Ethyl cyanide		ug/L	
Non-Halogenated VOCs	Ethyl ether	750	ug/L	Taste/Odor
Non-Halogenated VOCs	Formic acid, octyl ester		ug/L	
Non-Halogenated VOCs	Heptanal		ug/L	
Non-Halogenated VOCs	Hexanoic Acid, Ethyl Ester		ug/L	
Non-Halogenated VOCs	Methanol	740000	ug/L	Taste/Odor
Non-Halogenated VOCs	Methyl sulfide		ug/L	
Non-Halogenated VOCs	m-Xylene & p-Xylene	1750	ug/L	Cal MCL
Non-Halogenated VOCs	Naphthalene, 1-(2-Propenyl)-		ug/L	
Non-Halogenated VOCs	n-Hexane	6.4	ug/L	Taste/Odor
Non-Halogenated VOCs	Octanal		ug/L	
Non-Halogenated VOCs	p-Cymene		ug/L	
Non-Halogenated VOCs	Pentanal	17	ug/L	Taste/Odor
Non-Halogenated VOCs	Propanoic Acid, 2-Methyl-, ethyl ester		ug/L	
Non-Halogenated VOCs	sec-Butyl alcohol	19000	ug/L	Taste/Odor
Non-Halogenated VOCs	tert-Butyl alcohol	12	ug/L	Notification Level
Non-Halogenated VOCs	tert-Butyl ethyl ether		ug/L	
Non-Halogenated VOCs	Tetrahydrofuran		ug/L	

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

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Non-Halogenated VOCs	Tetramethylurea		ug/L	
Non-Halogenated VOCs	Trimethylcyclopentane Isomer		ug/L	
Non-Halogenated VOCs	1,3,5-Trimethylbenzene	330	ug/L	Notification Level
Non-Halogenated VOCs	Biphenyl		ug/L	
Non-Halogenated VOCs	1,2,4-Trimethylbenzene	330	ug/L	Notification Level
Non-Halogenated VOCs	2-Hexanone	250	ug/L	Taste/Odor
Non-Halogenated VOCs	Acetone	20000	ug/L	Taste/Odor
Non-Halogenated VOCs	Acetonitrile	300000	ug/L	Taste/Odor
Non-Halogenated VOCs	Acrolein	110	ug/L	Taste/Odor
Non-Halogenated VOCs	Acrylonitrile	910	ug/L	Taste/Odor
Non-Halogenated VOCs	Benzene	1	ug/L	Cal MCL
Non-Halogenated VOCs	Carbon Disulfide	160	ug/L	Notification Level
Non-Halogenated VOCs	Diisopropyl ether		ug/L	
Non-Halogenated VOCs	Ethane	7500	ug/L	Taste/Odor
Non-Halogenated VOCs	Ethyl methacrylate		ug/L	
Non-Halogenated VOCs	Ethylbenzene	300	ug/L	Cal MCL
Non-Halogenated VOCs	Ethylene	39	ug/L	Taste/Odor
Non-Halogenated VOCs	Isobutanol		ug/L	
Non-Halogenated VOCs	Isopropanol	160000	ug/L	Taste/Odor
Non-Halogenated VOCs	m-Xylene	1750	ug/L	Cal MCL
Non-Halogenated VOCs	Methacrylonitrile	2100	ug/L	Taste/Odor
Non-Halogenated VOCs	Methane	3100	ug/L	SWGW RBSL
Non-Halogenated VOCs	Methyl ethyl ketone	3800	ug/L	SWGW RBSL
Non-Halogenated VOCs	Methyl isobutyl ketone (MIBK)	120	ug/L	Notification Level
Non-Halogenated VOCs	Methyl methacrylate	25	ug/L	Taste/Odor
Non-Halogenated VOCs	Methyl tert-butyl ether	5	ug/L	Secondary MCL
Non-Halogenated VOCs	n-Butylbenzene	260	ug/L	Notification Level
Non-Halogenated VOCs	n-Propylbenzene	260	ug/L	Notification Level
Non-Halogenated VOCs	Naphthalene	17	ug/L	Notification Level
Non-Halogenated VOCs	o + p Xylene	1750	ug/L	Cal MCL
Non-Halogenated VOCs	o-Xylene	1750	ug/L	Cal MCL
Non-Halogenated VOCs	sec-Butylbenzene	260	ug/L	Notification Level
Non-Halogenated VOCs	Styrene	100	ug/L	Primary MCL
Non-Halogenated VOCs	tert-Amyl methyl ether		ug/L	
Non-Halogenated VOCs	tert-Butylbenzene	260	ug/L	Notification Level
Non-Halogenated VOCs	Toluene	150	ug/L	Cal MCL
Non-Halogenated VOCs	Vinyl acetate	88	ug/L	Taste/Odor
Non-Halogenated VOCs	Xylenes, Total	1750	ug/L	Cal MCL
Halogenated Benzenes	1,4-Dichlorobenzene-d4		ug/L	
Halogenated Benzenes	1,2,3-Trichlorobenzene	2.1	ug/L	SWGW RBSL
Halogenated Benzenes	1,2,4-Trichlorobenzene	5	ug/L	Cal MCL
Halogenated Benzenes	1,2-Dichlorobenzene	600	ug/L	Primary MCL
Halogenated Benzenes	1,3-Dichlorobenzene	600	ug/L	Archived Advisory Level
Halogenated Benzenes	1,4-Dichlorobenzene	5	ug/L	Cal MCL
Halogenated Benzenes	Bromobenzene		ug/L	
Halogenated Benzenes	Chlorobenzene	70	ug/L	Cal MCL
Halogenated Benzenes	Dichlorobenzenes		ug/L	
Halogenated Propene/Propanes	cis-1,4-Dichloro-2-butene		ug/L	
Halogenated Propene/Propanes	Dichloropropane		ug/L	
Halogenated Propene/Propanes	sec-Dichloropropane		ug/L	
Halogenated Propene/Propanes	1,1-Dichloropropene		ug/L	
Halogenated Propene/Propanes	1,2,3-Trichloropropane	0.005	ug/L	Notification Level
Halogenated Propene/Propanes	3-Chloro-2(Chloromethyl)-1-Propene		ug/L	
Halogenated Propene/Propanes	1,2-Dibromo-3-chloropropane	0.2	ug/L	Primary MCL

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES SANTA SUSANA FIELD LABORATORY
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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Halogenated Propene/Propanes	1,2-Dichloropropane	5	ug/L	Primary MCL
Halogenated Propene/Propanes	1,3-Dichloropropane	130	ug/L	SWGW RBSL
Halogenated Propene/Propanes	1,3-Dichloropropene	0.5	ug/L	Cal MCL
Halogenated Propene/Propanes	Allyl chloride	8.9	ug/L	Taste/Odor
Halogenated Propene/Propanes	cis-1,3-Dichloropropene	0.5	ug/L	Cal MCL
Halogenated Propene/Propanes	trans-1,3-Dichloropropene	0.81	ug/L	SWGW RBSL
Other Halogenated VOCs	1,1-Dichlorobutane		ug/L	
Other Halogenated VOCs	o-Chlorotoluene	140	ug/L	Notification Level
Other Halogenated VOCs	p-Chlorotoluene	140	ug/L	Notification Level
Other Halogenated VOCs	Total Organic Halogens		ug/L	
Other Halogenated VOCs	trans-1,4-Dichloro-2-butene		ug/L	
Other Halogenated VOCs	Hexachlorobutadiene		ug/L	
Other Halogenated VOCs	Chloroprene		ug/L	
Other Halogenated VOCs	2-Chloroethylvinyl ether		ug/L	
1,4-Dioxane	1,4-Dioxane	1	ug/L	Notification Level
SVOC	2-n-Butoxyethanol		ug/L	
SVOC	Amino Hexanoic Acid		ug/L	
SVOC	Benzene Alcohol		ug/L	
SVOC	Benzophenone		ug/L	
SVOC	Carboxylic Acid		ug/L	
SVOC	Decanol		ug/L	
SVOC	Dibenzyl Ether		ug/L	
SVOC	Dichloro Alkene		ug/L	
SVOC	Dichloromethylpropene		ug/L	
SVOC	Dichloropropene, NOS		ug/L	
SVOC	Dimethyl Decene		ug/L	
SVOC	Dimethyl Undecane		ug/L	
SVOC	Diphenyl ether	630	ug/L	SWGW RBSL
SVOC	Molecular Sulfur		ug/L	
SVOC	p-Cresol	63	ug/L	SWGW RBSL
SVOC	p-Dinitrobenzene	1.3	ug/L	SWGW RBSL
SVOC	Trimethyl Decane		ug/L	
SVOC	1,1-Dimethylhydrazine		ug/L	
SVOC	1,2-Dinitrobenzene		ug/L	
SVOC	1-Chloronaphthalene		ug/L	
SVOC	1-Nitronaphthalene		ug/L	
SVOC	2,3,4-Trichlorophenol		ug/L	
SVOC	4-Am-2,6-DNT		ug/L	
SVOC	4-Nitroquinoline-1-oxide		ug/L	
SVOC	Acetamidofluorene		ug/L	
SVOC	alpha, alpha-Dimethylphenethylamine		ug/L	
SVOC	alpha-Naphthylamine		ug/L	
SVOC	alpha-Picoline		ug/L	
SVOC	beta-Naphthylamine		ug/L	
SVOC	Carbazole		ug/L	
SVOC	Decamethylcyclopentasiloxane		ug/L	
SVOC	Diazinon	1.2	ug/L	Notification Level
SVOC	Dibenz(a,j)acridine		ug/L	
SVOC	Diethyl phthalate	10000	ug/L	SWGW RBSL
SVOC	Ethylene glycol	14000	ug/L	Notification Level
SVOC	Formaldehyde	100	ug/L	Notification Level
SVOC	Hydrazine	160000	ug/L	Taste/Odor
SVOC	m+p Cresol		ug/L	
SVOC	m-Cresol	37	ug/L	Taste/Odor

TABLE 8
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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
SVOC	Monomethylhydrazine		ug/L	
SVOC	o-Cresol	630	ug/L	SWGW RBSL
SVOC	p-Chloroaniline		ug/L	
SVOC	p-Nitroaniline		ug/L	
SVOC	Surfactants		ug/L	
SVOC	sym-Trinitrobenzene		ug/L	
SVOC	Zinophos		ug/L	
SVOC	1,1'-Phenylene-Bis-Ethanone		ug/L	
SVOC	1,2,3-Trichloropropene	0.005	ug/L	Notification Level
SVOC	1,2,4,5-Tetrachlorobenzene		ug/L	
SVOC	1,2-Diphenylhydrazine		ug/L	
SVOC	1,3-Dinitrobenzene	1.3	ug/L	SWGW RBSL
SVOC	1,4-Naphthoquinone		ug/L	
SVOC	2,3,4,6-Tetrachlorophenol		ug/L	
SVOC	2,4,5-Trichlorophenol		ug/L	
SVOC	2,4,6-Trichlorophenol	2.1	ug/L	SWGW RBSL
SVOC	2,4-Dichlorophenol		ug/L	
SVOC	2,4-Dimethylphenol	100	ug/L	Archived Advisory Level
SVOC	2,4-Dinitrophenol		ug/L	
SVOC	2,4-Dinitrotoluene		ug/L	
SVOC	2,6-Dichlorophenol		ug/L	
SVOC	2,6-Dinitrotoluene	0.22	ug/L	SWGW RBSL
SVOC	2-Butoxyethoxyethanol		ug/L	
SVOC	2-Chloronaphthalene		ug/L	
SVOC	2-Chlorophenol	63	ug/L	SWGW RBSL
SVOC	2-Nitroaniline		ug/L	
SVOC	2-Nitrophenol		ug/L	
SVOC	3,3'-Dichlorobenzidine	0.12	ug/L	SWGW RBSL
SVOC	3-Methylcholanthrene		ug/L	
SVOC	3-Nitroaniline		ug/L	
SVOC	4,6-Dinitro-o-cresol	1.3	ug/L	SWGW RBSL
SVOC	4-Aminobiphenyl		ug/L	
SVOC	4-Bromophenyl phenyl ether		ug/L	
SVOC	4-Chlorophenylphenyl ether		ug/L	
SVOC	4-Nitrophenol		ug/L	
SVOC	5-Nitro-o-toluidine		ug/L	
SVOC	7,12-Dimethylbenz(a)anthracene		ug/L	
SVOC	Acetophenone		ug/L	
SVOC	Alkene		ug/L	
SVOC	Aniline	65000	ug/L	Taste/Odor
SVOC	Aramite		ug/L	
SVOC	Azobenzene		ug/L	
SVOC	Benzidine	0.0003	ug/L	SWGW RBSL
SVOC	Benzo (b+k) fluoranthene (Total)		ug/L	
SVOC	Benzoic acid	50000	ug/L	SWGW RBSL
SVOC	Benzyl alcohol		ug/L	
SVOC	bis(2-Chloroethoxy)methane	38	ug/L	SWGW RBSL
SVOC	bis(2-Chloroethyl) ether	360	ug/L	Taste/Odor
SVOC	bis(2-Chloroisopropyl) ether		ug/L	
SVOC	bis(2-Ethylhexyl) phthalate	4	ug/L	Cal MCL
SVOC	Butyl benzyl phthalate	78	ug/L	SWGW RBSL
SVOC	Di-n-butyl phthalate	1300	ug/L	SWGW RBSL
SVOC	Di-n-octyl phthalate	500	ug/L	SWGW RBSL
SVOC	Dibenzofuran		ug/L	

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES SANTA SUSANA FIELD LABORATORY
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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
SVOC	Dimethyl phthalate	130000	ug/L	SWGW RBSL
SVOC	Diphenylamine		ug/L	
SVOC	Ethyl methanesulfonate		ug/L	
SVOC	Hexachlorobenzene	1	ug/L	Primary MCL
SVOC	Hexachlorocyclopentadiene	50	ug/L	Primary MCL
SVOC	Hexachloroethane	10	ug/L	Taste/Odor
SVOC	Hexachlorophene		ug/L	
SVOC	Hexachloropropene		ug/L	
SVOC	Isodrin		ug/L	
SVOC	Isophorone	5400	ug/L	Taste/Odor
SVOC	Isosafrole		ug/L	
SVOC	Methapyrilene		ug/L	
SVOC	Methyl methanesulfonate		ug/L	
SVOC	n-Nitrosodi-n-butylamine		ug/L	
SVOC	n-Nitrosodi-n-propylamine	0.01	ug/L	Notification Level
SVOC	n-Nitrosodiethylamine	0.01	ug/L	Notification Level
SVOC	n-Nitrosodiphenylamine	16	ug/L	SWGW RBSL
SVOC	n-Nitrosomethylethylamine		ug/L	
SVOC	n-Nitrosomorpholine		ug/L	
SVOC	n-Nitrosopiperidine		ug/L	
SVOC	n-Nitrosopyrrolidine		ug/L	
SVOC	Nitrobenzene	110	ug/L	Taste/Odor
SVOC	o,o,o-Triethylphosphorothioate		ug/L	
SVOC	o-Tolidine		ug/L	
SVOC	o-Toluidine	11000	ug/L	Taste/Odor
SVOC	p-Chloro-m-cresol		ug/L	
SVOC	p-Dimethylaminoazobenzene		ug/L	
SVOC	p-Phenylenediamine		ug/L	
SVOC	Pentachlorobenzene		ug/L	
SVOC	Pentachloroethane		ug/L	
SVOC	Pentachloronitrobenzene	20	ug/L	Archived Advisory Level
SVOC	Pentachlorophenol	1	ug/L	Primary MCL
SVOC	Phenacetin		ug/L	
SVOC	Phenol	4200	ug/L	Archived Advisory Level
SVOC	Pronamide		ug/L	
SVOC	Pyridine	950	ug/L	Taste/Odor
SVOC	Safrole		ug/L	
SVOC	Tetrachloropropene		ug/L	
PAH	1-Methyl naphthalene		ug/L	
PAH	2-Methylnaphthalene	50	ug/L	SWGW RBSL
PAH	Acenaphthene		ug/L	
PAH	Acenaphthylene		ug/L	
PAH	Anthracene	3800	ug/L	SWGW RBSL
PAH	Benzo(a)anthracene		ug/L	
PAH	Benzo(a)pyrene	0.2	ug/L	Primary MCL
PAH	Benzo(b)fluoranthene		ug/L	
PAH	Benzo(ghi)perylene		ug/L	
PAH	Benzo(k)fluoranthene		ug/L	
PAH	Chrysene		ug/L	
PAH	Dibenzo(a,h)anthracene		ug/L	
PAH	Fluoranthene		ug/L	
PAH	Fluorene		ug/L	
PAH	Indeno(1,2,3-cd)pyrene		ug/L	
PAH	Phenanthrene	3800	ug/L	SWGW RBSL

TABLE 8
GROUNDWATER SCREENING REFERENCE VALUES SANTA SUSANA FIELD LABORATORY
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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
PAH	Pyrene	380	ug/L	SWGW RBSL
NDMA	n-Nitrosodimethylamine	0.01	ug/L	Notification Level
Energetics	Perchlorate	6	ug/L	Cal MCL
Energetics	2-Amino-4,6-Dinitrotoluene		ug/L	
Energetics	2-Nitrotoluene		ug/L	
Energetics	3-Nitrotoluene		ug/L	
Energetics	4-Nitrotoluene		ug/L	
Energetics	Nitroglycerin		ug/L	
Energetics	PETN		ug/L	
Energetics	Tetryl		ug/L	
Energetics	2,4,6-Trinitrotoluene	1	ug/L	Notification Level
Energetics	HMX	350	ug/L	Notification Level
Energetics	RDX	0.3	ug/L	Notification Level
TPH	Fuel Hydrocarbons, C4-C12, as heavy Hydrocarbons	500	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C6-C14, as JP-4	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C6-C15, as JP-4	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C6-C16, as JP-4	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C6-C16, C21-C24, as JP-4	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C6-C7	500	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C6-C7, C10-C16, as kerosene		ug/L	
TPH	Fuel Hydrocarbons, C7-C10, as gasoline	5	ug/L	Taste/Odor
TPH	Fuel Hydrocarbons, C7-C14, as JP-4	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C7-C16, as JP-4	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C8-C10, as gasoline	5	ug/L	Taste/Odor
TPH	Fuel Hydrocarbons, C8-C12, as heavy Hydrocarbons	1800	ug/L	SWGW RBSL
TPH	Fuel Hydrocarbons, C8-C14, as heavy Hydrocarbons	1800	ug/L	SWGW RBSL
TPH	Gasoline Range Organics (C4-C12)	5	ug/L	Taste/Odor
TPH	Gasoline Range Organics (C6-C14)	5	ug/L	Taste/Odor
TPH	Gasoline Range Organics (C6-C7)		ug/L	
TPH	Gasoline Range Organics (C7-C12)	5	ug/L	Taste/Odor
TPH	Total Extractable Hydrocarbons C10-C18		ug/L	
TPH	Total Hydrocarbons C8-C18		ug/L	
TPH	Diesel Range Organics	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C12-C14)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C13-C22)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C14-C20)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C15-C20)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C20-C30)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C21-C24)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C21-C30)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C8-C11)	100	ug/L	Taste/Odor
TPH	Diesel Range Organics (C8-C30)	100	ug/L	Taste/Odor
TPH	Fuel Hydrocarbons, C6-C17, as JP-4	1800	ug/L	SWGW RBSL
TPH	Gasoline Range Organics (C8-C11)	1800	ug/L	SWGW RBSL
TPH	Jet Fuel 4 (C6-C13)	1800	ug/L	SWGW RBSL
TPH	Kerosene (C10-C12)	1800	ug/L	SWGW RBSL
TPH	Kerosene (C10-C14)	1800	ug/L	SWGW RBSL
TPH	Kerosene (C6-C14)		ug/L	
TPH	Kerosene Range Organics (C11-C14)	1800	ug/L	SWGW RBSL
TPH	Oil Range Organics (C23-C32)		ug/L	
TPH	Total Petroleum Hydrocarbons		ug/L	
TPH	Total Petroleum Hydrocarbons (as Kerosene)	1800	ug/L	SWGW RBSL

TABLE 8
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Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
TPH	Total Volatile Hydrocarbons		ug/L	
TPH	Gasoline Range Organics	5	ug/L	Taste/Odor
TPH	Gasoline Range Organics (C6-C12)	5	ug/L	Taste/Odor
TPH	TRPH		ug/L	
TPH	Total Extractable Hydrocarbons C16-C25		ug/L	
TPH	Petroleum Hydrocarbons		ug/L	
PCB	Aroclor 1016	0.5	ug/L	Primary MCL
PCB	Polychlorinated biphenyls	0.5	ug/L	Primary MCL
PCB	Aroclor 1254	0.5	ug/L	Primary MCL
PCB	Aroclor 1260	0.5	ug/L	Primary MCL
PCB	Aroclor 1221	0.5	ug/L	Primary MCL
PCB	Aroclor 1232	0.5	ug/L	Primary MCL
PCB	Aroclor 1242	0.5	ug/L	Primary MCL
PCB	Aroclor 1248	0.5	ug/L	Primary MCL
Herbicides	2,4,5-Trichlorophenoxypropionic acid (Silvex)	50	ug/L	Cal MCL
Herbicides	2,4-Dichlorophenoxyacetic Acid (2,4-D)	130	ug/L	SWGW RBSL
Herbicides	2,4,5-T	130	ug/L	SWGW RBSL
Herbicides	Dalapon	200	ug/L	Cal MCL
Herbicides	Dinoseb	7	ug/L	Primary MCL
Herbicides	MCPP		ug/L	
Herbicides	Propachlor	90	ug/L	Notification Level
Pesticides	4,4'-DDT		ug/L	
Pesticides	a-Chlordane		ug/L	
Pesticides	Chlorobenzilate		ug/L	
Pesticides	Diallate		ug/L	
Pesticides	Famphur		ug/L	
Pesticides	Kepone	0.0093	ug/L	SWGW RBSL
Pesticides	Endosulfan I	75	ug/L	SWGW RBSL
Pesticides	Endosulfan II	75	ug/L	SWGW RBSL
Pesticides	Endrin ketone		ug/L	
Pesticides	gamma-BHC	0.2	ug/L	Primary MCL
Pesticides	gamma-Chlordane		ug/L	
Pesticides	Methyl parathion	2	ug/L	Archived Advisory Level
Pesticides	p,p'-Methoxychlor	30	ug/L	Cal MCL
Pesticides	Parathion	40	ug/L	Archived Advisory Level
Pesticides	Tetra ethyldithiopyrophosphate		ug/L	
Pesticides	y-Chlordane		ug/L	
Pesticides	Endosulfan sulfate	75	ug/L	SWGW RBSL
Pesticides	4,4'-DDE	0.44	ug/L	SWGW RBSL
Pesticides	Aldrin	0.002	ug/L	Archived Advisory Level
Pesticides	alpha-BHC	0.015	ug/L	Archived Advisory Level
Pesticides	beta-BHC	0.025	ug/L	Archived Advisory Level
Pesticides	Chlordane	0.1	ug/L	Cal MCL
Pesticides	delta-BHC		ug/L	
Pesticides	Dieldrin	0.002	ug/L	Archived Advisory Level
Pesticides	Dimethoate	1	ug/L	Archived Advisory Level
Pesticides	Dimethoate			
Pesticides	Disulfoton		ug/L	
Pesticides	4,4'-DDD	0.62	ug/L	SWGW RBSL
Pesticides	Toxaphene	3	ug/L	Primary MCL
Pesticides	Endrin	2	ug/L	Primary MCL
Pesticides	Endrin aldehyde		ug/L	
Pesticides	Heptachlor	0.01	ug/L	Cal MCL
Pesticides	Heptachlor epoxide	0.01	ug/L	Cal MCL

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

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Pesticides	Phorate		ug/L	
Dioxins/Furans	1,2,3,4,6,7,8-Heptachlorodibenzofuran		ug/L	
Dioxins/Furans	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin		ug/L	
Dioxins/Furans	1,2,3,4,7,8,9-Heptachlorodibenzofuran		ug/L	
Dioxins/Furans	1,2,3,4,7,8-Hexachlorodibenzofuran		ug/L	
Dioxins/Furans	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin		ug/L	
Dioxins/Furans	1,2,3,6,7,8-Hexachlorodibenzofuran		ug/L	
Dioxins/Furans	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin		ug/L	
Dioxins/Furans	1,2,3,7,8,9-Hexachlorodibenzofuran		ug/L	
Dioxins/Furans	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin		ug/L	
Dioxins/Furans	1,2,3,7,8-Pentachlorodibenzofuran		ug/L	
Dioxins/Furans	1,2,3,7,8-Pentachlorodibenzo-p-dioxin		ug/L	
Dioxins/Furans	2,3,4,6,7,8-Hexachlorodibenzofuran		ug/L	
Dioxins/Furans	2,3,4,7,8-Pentachlorodibenzofuran		ug/L	
Dioxins/Furans	2,3,7,8-Tetrachlorodibenzofuran		ug/L	
Dioxins/Furans	Heptachlorodibenzofurans		ug/L	
Dioxins/Furans	Heptachlorodibenzo-p-dioxins		ug/L	
Dioxins/Furans	Hexachlorodibenzofurans		ug/L	
Dioxins/Furans	Hexachlorodibenzo-p-dioxins		ug/L	
Dioxins/Furans	Octachlorodibenzofuran		ug/L	
Dioxins/Furans	Octachlorodibenzo-p-dioxin		ug/L	
Dioxins/Furans	PCDFs (Furans)		ug/L	
Dioxins/Furans	Pentachlorodibenzofurans		ug/L	
Dioxins/Furans	Pentachlorodibenzo-p-dioxins		ug/L	
Dioxins/Furans	Tetrachlorodibenzofurans		ug/L	
Dioxins/Furans	Tetrachlorodibenzo-p-dioxins		ug/L	
Dioxins/Furans	1,3,4,7,8-PeCDF		ug/L	
Dioxins/Furans	PCDDs (Dioxins)		ug/L	
Dioxins/Furans	2,3,7,8-TCDD	0.00003	ug/L	Primary MCL
Metals	Aluminum, Dissolved	13000	ug/L	SWGW RBSL
Metals	Boron, Dissolved	340	ug/L	SSFL Comparison
Metals	Tin, Dissolved	2.4	ug/L	SSFL Comparison
Metals	Antimony, Dissolved	2.5	ug/L	SSFL Comparison
Metals	Arsenic, Dissolved	7.7	ug/L	SSFL Comparison
Metals	Barium, Dissolved	150	ug/L	SSFL Comparison
Metals	Beryllium, Dissolved	0.14	ug/L	SSFL Comparison
Metals	Cadmium, Dissolved	0.2	ug/L	SSFL Comparison
Metals	Chromium, Dissolved	14	ug/L	SSFL Comparison
Metals	Cobalt, Dissolved	1.9	ug/L	SSFL Comparison
Metals	Copper, Dissolved	4.7	ug/L	SSFL Comparison
Metals	Hexavalent Chromium, Dissolved	38	ug/L	SWGW RBSL
Metals	Iron, Dissolved	4100	ug/L	SSFL Comparison
Metals	Lead, Dissolved	11	ug/L	SSFL Comparison
Metals	Magnesium, Dissolved	77000	ug/L	SSFL Comparison
Metals	Manganese, Dissolved	150	ug/L	SSFL Comparison
Metals	Mercury, Dissolved	0.063	ug/L	SSFL Comparison
Metals	Molybdenum, Dissolved	2.2	ug/L	SSFL Comparison
Metals	Nickel, Dissolved	17	ug/L	SSFL Comparison
Metals	Potassium, Dissolved	9600	ug/L	SSFL Comparison
Metals	Selenium, Dissolved	1.6	ug/L	SSFL Comparison
Metals	Silver, Dissolved	0.17	ug/L	SSFL Comparison
Metals	Sodium, Dissolved	190000	ug/L	SSFL Comparison
Metals	Strontium, Dissolved	800	ug/L	SSFL Comparison
Metals	Thallium, Dissolved	0.13	ug/L	SSFL Comparison

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

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Metals	Vanadium, Dissolved	2.6	ug/L	SSFL Comparison
Metals	Zinc, Dissolved	6300	ug/L	SSFL Comparison
Metals	Zirconium		ug/L	
Metals	Zirconium, dissolved		ug/L	
Metals	Aluminum	200	ug/L	Secondary MCL
Metals	Antimony	2.5	ug/L	SSFL Comparison
Metals	Arsenic	7.7	ug/L	SSFL Comparison
Metals	Barium	150	ug/L	SSFL Comparison
Metals	Beryllium	0.14	ug/L	SSFL Comparison
Metals	Boron	340	ug/L	SSFL Comparison
Metals	Cadmium	0.2	ug/L	SSFL Comparison
Metals	Chromium	14	ug/L	SSFL Comparison
Metals	Cobalt	1.9	ug/L	SSFL Comparison
Metals	Copper	4.7	ug/L	SSFL Comparison
Metals	Hexavalent Chromium	14	ug/L	SSFL Comparison
Metals	Iron	4100	ug/L	SSFL Comparison
Metals	Lead	11	ug/L	SSFL Comparison
Metals	Magnesium	77000	ug/L	SSFL Comparison
Metals	Manganese	150	ug/L	SSFL Comparison
Metals	Mercury	0.063	ug/L	SSFL Comparison
Metals	Molybdenum	2.2	ug/L	SSFL Comparison
Metals	Nickel	17	ug/L	SSFL Comparison
Metals	Potassium	9600	ug/L	SSFL Comparison
Metals	Selenium	1.6	ug/L	SSFL Comparison
Metals	Silver	0.17	ug/L	SSFL Comparison
Metals	Sodium	190000	ug/L	SSFL Comparison
Metals	Strontium	800	ug/L	SSFL Comparison
Metals	Thallium	0.13	ug/L	SSFL Comparison
Metals	Tin	2.4	ug/L	SSFL Comparison
Metals	Vanadium	2.6	ug/L	SSFL Comparison
Metals	Zinc	6300	ug/L	SSFL Comparison
Inorganics	Carbon Dioxide		ug/L	
Inorganics	Dissolved Organic Carbon		ug/L	
Inorganics	Phosphite (PO3)		ug/L	
Inorganics	Bicarbonate		ug/L	
Inorganics	Calcium, Dissolved		ug/L	
Inorganics	Carbonate		ug/L	
Inorganics	Chlorine	4000	ug/L	Primary MCL
Inorganics	Iron Oxide		ug/L	
Inorganics	Redox Potential		mV	
Inorganics	Silica, Dissolved		ug/L	
Inorganics	Silicon, Dissolved		ug/L	
Inorganics	Specific gravity		No Units	
Inorganics	Sulfide, Dissolved		ug/L	
Inorganics	Alkalinity		ug/L	
Inorganics	Alkalinity as CaCO3		ug/L	
Inorganics	Ammonia-N		ug/L	
Inorganics	Bicarbonate Alkalinity as CaCO3		ug/L	
Inorganics	Bromide		ug/L	
Inorganics	Carbonate Alkalinity as CaCO3		ug/L	
Inorganics	Calcium		ug/L	
Inorganics	Cation/Anion Balance (%)		%	
Inorganics	Chloride	250000	ug/L	Secondary MCL
Inorganics	Chlorate	800	ug/L	Notification Level

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

Analyte Group	Chemical Analyte	Screening Value	Units	Screening Type
Inorganics	Dissolved oxygen		ug/L	
Inorganics	Cyanides	150	ug/L	Cal MCL
Inorganics	Fluoride	800	ug/L	SSFL Comparison
Inorganics	Nitrate-NO3	44628	ug/L	Primary MCL
Inorganics	Nitrate-N	10	mg/L	Primary MCL
Inorganics	Nitrite-N	10000	ug/L	Primary MCL
Inorganics	Phosphate		ug/L	
Inorganics	Sulfate	376000	ug/L	SSFL Comparison
Inorganics	Sulfide		ug/L	
Inorganics	Total Dissolved Solids	500000	ug/L	Recommended SMCL
Inorganics	Total Dissolved Solids	1000000	ug/L	Upper SMCL
Inorganics	Total Dissolved Solids	1500000	ug/L	Short-Term SMCL
Inorganics	Total Kjeldahl nitrogen		ug/L	
Inorganics	Total Organic Carbon		ug/L	
Inorganics	Total Suspended Solids		ug/L	
General Parameters	Ammonium		ug/L	
General Parameters	Bulk Density		pcf	
General Parameters	Deuterium		permil	
General Parameters	Formic Acid	1700000	ug/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		ug/L	
General Parameters	Total Solids		ug/L	
General Parameters	volumetric saturation (air)		%	
General Parameters	Turbidity	5	NTU	Secondary MCL
General Parameters	Specific conductivity	900	umhos/cm	Recommended SMCL
General Parameters	Specific conductivity	1600	umhos/cm	Upper SMCL
General Parameters	Specific conductivity	2200	umhos/cm	Short-Term SMCL
General Parameters	Hardness		ug/L	
General Parameters	Coliform bacteria		MPN/100 ml	

NOTES AND ABBREVIATIONS

VOCs - volatile organic compounds
SVOC - semi volatile organic compound
PAH - polycyclic aromatic hydrocarbon
NDMA - n-Nitrosodimethylamine
TPH - total petroleum hydrocarbons
PCB - polychlorinated biphenyl

Primary MCL - Primary Maximum Contaminant Level
Cal MCL - California Primary Maximum Contaminant Level
Secondary MCL - Secondary Maximum Contaminant Level
SMCL - Secondary Maximum Contaminant Level
Taste/Odor - Taste/Odor Threshold
SSFL Comparison - site-specific values for metals developed by DTSC
SWGW RBSL - Site-Wide Groundwater Risk-Based Screening Level proposed in GW RI Report (MWH, 2009)

ug/L - micrograms per liter
pCi/L - picocuries per liter
mrem/yr - millirem per year
NTU - nephelometric turbidity units
umhos/cm - micromhos per centimeter

(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)

TABLE 9
FIRST TIME DETECTS AND NEW MAXIMUM CONCENTRATONS, 2021 – DOE AREA IV

Analyte	Well ID	Fraction	2021 Result	Units	Qualifiers	New Detection	New Max Detection	Screening Value	Screening Units	Exceeds SV
1,4-dioxane	PZ-108	Total	0.248	ug/l	J/J	Yes	Yes	1	ug/L	No
	RD-33C	Total	0.111	ug/l	J/J	Yes	Yes	1	ug/L	No
	RS-18	Total	16.8	ug/l		Yes	Yes	1	ug/L	Yes
Actinium-228	RD-33C	Total	44.6	pci/l		Yes	Yes	N/A	N/A	N/A
Antimony	PZ-108	Dissolved	1.18	ug/l	J/J	No	Yes	2.5	ug/L	No
	PZ-108	Total	1.28	ug/l	J/J	No	Yes	2.5	ug/L	No
	RD-33C	Total	1.64	ug/l	J/J	No	Yes	2.5	ug/L	No
	RD-50	Dissolved	1.02	ug/l	J/J	No	Yes	2.5	ug/L	No
	RD-50	Total	1.33	ug/l	J/J	No	Yes	2.5	ug/L	No
	RS-18	Total	1.11	ug/l	J/J	No	Yes	2.5	ug/L	No
Arsenic	PZ-108	Dissolved	3.52	ug/l	J/J	No	Yes	7.7	ug/L	No
	PZ-108	Total	3.43	ug/l	J/J	No	Yes	7.7	ug/L	No
	RD-19	Dissolved	2.8	ug/l	J/J	No	Yes	7.7	ug/L	No
	RD-19	Total	2.7	ug/l	J/J	No	Yes	7.7	ug/L	No
	RD-20	Dissolved	3.1	ug/l	J/J	Yes	Yes	7.7	ug/L	No
	RD-20	Total	3.18	ug/l	J/J	No	Yes	7.7	ug/L	No
	RD-33A	Total	8	ug/l		No	Yes	7.7	ug/L	Yes
	RD-34B	Total	2.03	ug/l	J/J	Yes	Yes	7.7	ug/L	No
	RD-59A	Dissolved	2.73	ug/l	J/J	No	Yes	7.7	ug/L	No
	RD-59A	Total	2.57	ug/l	J/J	No	Yes	7.7	ug/L	No
	RD-96	Total	2.04	ug/l	J/J	No	Yes	7.7	ug/L	No
Barium	RD-14	Total	42.1	ug/l		No	Yes	150	ug/L	No
	RD-20	Dissolved	38.4	ug/l		No	Yes	150	ug/L	No
	RD-20	Total	40.3	ug/l		No	Yes	150	ug/L	No
	RD-34A	Total	41.8	ug/l		No	Yes	150	ug/L	No
	RD-34B	Total	10.1	ug/l		No	Yes	150	ug/L	No
	RD-34C	Total	76	ug/l		No	Yes	150	ug/L	No
Boron	RD-07	Dissolved	98.1	ug/l		No	Yes	340	ug/L	No
	RD-07	Total	95	ug/l		No	Yes	340	ug/L	No
	RD-14	Dissolved	57.4	ug/l		Yes	Yes	340	ug/L	No
	RD-14	Total	57.6	ug/l		Yes	Yes	340	ug/L	No
	RD-20	Dissolved	1660	ug/l		No	Yes	340	ug/L	Yes
	RD-20	Total	1590	ug/l		Yes	Yes	340	ug/L	Yes
	RD-34B	Total	34.8	ug/l		No	Yes	340	ug/L	No
	RD-50	Dissolved	106	ug/l		No	Yes	340	ug/L	No
	RD-50	Total	104	ug/l		No	Yes	340	ug/L	No
	RD-54A	Dissolved	30.4	ug/l		No	Yes	340	ug/L	No
	RD-59B	Dissolved	84.5	ug/l		No	Yes	340	ug/L	No
	RD-59B	Total	81.9	ug/l		No	Yes	340	ug/L	No
	RD-63	Dissolved	107	ug/l		Yes	Yes	340	ug/L	No
	RD-63	Total	109	ug/l		Yes	Yes	340	ug/L	No
Chromium	RD-34C	Total	3.39	ug/l	J/J	No	Yes	14	ug/L	No
cis-1,2-DCE	PZ-108	Total	19.2	ug/l		No	Yes	6	ug/L	Yes
Cobalt	RD-34A	Total	2.38	ug/l		No	Yes	1.9	ug/L	Yes
	RD-34C	Total	2.68	ug/l		No	Yes	1.9	ug/L	Yes
	RD-50	Total	1.98	ug/l		No	Yes	1.9	ug/L	Yes
Copper	RD-14	Total	0.701	ug/l	J/J	Yes	Yes	4.7	ug/L	No
	RD-20	Dissolved	0.505	ug/l	J/J	Yes	Yes	4.7	ug/L	No
	RD-20	Total	0.383	ug/l	J/J	Yes	Yes	4.7	ug/L	No
	RD-34B	Total	1.73	ug/l	J/J	Yes	Yes	4.7	ug/L	No
	RD-63	Dissolved	0.319	ug/l	J/J	Yes	Yes	4.7	ug/L	No
	RD-63	Total	0.469	ug/l	J/J	Yes	Yes	4.7	ug/L	No
Ethylbenzene	PZ-108	Total	0.54	ug/l	J/J	Yes	Yes	300	ug/L	No

TABLE 9
FIRST TIME DETECTS AND NEW MAXIMUM CONCENTRATONS, 2021 – DOE AREA IV

Analyte	Well ID	Fraction	2021 Result	Units	Qualifiers	New Detection	New Max Detection	Screening Value	Screening Units	Exceeds SV
Fluoride	RD-14	Total	0.344	mg/l		No	Yes	800	ug/L	No
	RD-19	Total	0.42	mg/l		No	Yes	800	ug/L	No
	RD-34A	Total	0.694	mg/l		No	Yes	800	ug/L	No
	RD-34B	Total	0.765	mg/l		No	Yes	800	ug/L	No
	RD-34C	Total	0.613	mg/l		No	Yes	800	ug/L	No
Gross Alpha	RD-50	Total	16.9	pci/l		Yes	Yes	15	pCi/L	Yes
Gross Beta	RD-34C	Total	5.57	pci/l	/J	No	Yes	50	pCi/L	No
	RD-50	Total	11.7	pci/l	/J	Yes	Yes	50	pCi/L	No
	RD-63	Total	13.7	pci/l	/J	No	Yes	50	pCi/L	No
Lead	RD-33B	Total	0.856	ug/l	JJ/J	Yes	Yes	11	ug/L	No
	RD-34C	Total	3	ug/l		No	Yes	11	ug/L	No
	RD-50	Total	2.98	ug/l		No	Yes	11	ug/L	No
m,p-xylenes	PZ-108	Total	2.49	ug/l		Yes	Yes	1750	ug/L	No
Mercury	RD-59B	Dissolved	0.1	ug/l	J/J	Yes	Yes	0.063	ug/L	Yes
	RD-59B	Total	0.087	ug/l	J/J	Yes	Yes	0.063	ug/L	Yes
Nickel	RD-34C	Total	3.51	ug/l		No	Yes	17	ug/L	No
	RD-50	Dissolved	1.27	ug/l	J/J	No	Yes	17	ug/L	No
	RD-50	Total	1.37	ug/l	J/J	No	Yes	17	ug/L	No
	RD-96	Total	3.43	ug/l		No	Yes	17	ug/L	No
	RD-96	Total	4.93	ug/l		No	Yes	17	ug/L	No
Radium-226	RD-14	Dissolved	0.888	pci/l		No	Yes	5	pCi/L	No
	RD-17	Total	1.97	pci/l		No	Yes	5	pCi/L	No
	RD-33B	Total	0.762	pci/l		No	Yes	5	pCi/L	No
	RD-34B	Total	0.529	pci/l		No	Yes	5	pCi/L	No
	RD-34C	Total	0.987	pci/l		No	Yes	5	pCi/L	No
	RD-50	Dissolved	1.16	pci/l		Yes	Yes	5	pCi/L	No
	RD-50	Total	0.932	pci/l		Yes	Yes	5	pCi/L	No
	RD-59A	Total	1.18	pci/l		No	Yes	5	pCi/L	No
	RD-63	Total	2.2	pci/l		No	Yes	5	pCi/L	No
Radium-228	RD-14	Dissolved	2.4	pci/l		No	Yes	5	pCi/L	No
	RD-33A	Total	2.06	pci/l		No	Yes	5	pCi/L	No
	RD-34B	Total	3.48	pci/l		No	Yes	5	pCi/L	No
	RD-50	Dissolved	1.49	pci/l		Yes	Yes	5	pCi/L	No
	RD-50	Total	1.35	pci/l		Yes	Yes	5	pCi/L	No
	RD-54A	Total	2.38	pci/l		No	Yes	5	pCi/L	No
	RD-59A	Total	2.49	pci/l		No	Yes	5	pCi/L	No
	RD-59B	Total	1.62	pci/l		No	Yes	5	pCi/L	No
	RD-59C	Dissolved	2.3	pci/l		No	Yes	5	pCi/L	No
	RD-59C	Total	1.7	pci/l		No	Yes	5	pCi/L	No
	RS-28	Total	1.4	pci/l		No	Yes	5	pCi/L	No
Selenium	RD-20	Dissolved	3.56	ug/l	J/J	No	Yes	1.6	ug/L	Yes
Selenium	RD-20	Total	3.37	ug/l	J/J	No	Yes	1.6	ug/L	Yes
Silver	RD-96	Total	0.936	ug/l	J/J	No	Yes	0.17	ug/L	Yes
Sodium	RD-14	Total	41600	ug/l		Yes	Yes	190000	ug/L	No
	RD-20	Dissolved	145000	ug/l		No	Yes	190000	ug/L	No
	RD-20	Total	141000	ug/l		Yes	Yes	190000	ug/L	No
	RD-34B	Dissolved	46600	ug/l		No	Yes	190000	ug/L	No
	RD-54A	Dissolved	42900	ug/l		No	Yes	190000	ug/L	No
	RD-54A	Total	41400	ug/l		No	Yes	190000	ug/L	No
Toluene	PZ-108	Total	1.85	ug/l		Yes	Yes	150	ug/L	No
Uranium-233/234	RD-17	Total	2.86	pci/l		No	Yes	20	pCi/L	No
	RD-20	Dissolved	5.74	pci/l		No	Yes	20	pCi/L	No
	RD-33A	Dissolved	3.3	pci/l		No	Yes	20	pCi/L	No
	RD-33A	Total	3.24	pci/l		No	Yes	20	pCi/L	No
	RD-50	Total	7.06	pci/l		Yes	Yes	20	pCi/L	No
	RD-54A	Total	3.78	pci/l		No	Yes	20	pCi/L	No
	RD-63	Total	5.75	pci/l		No	Yes	20	pCi/L	No

TABLE 9
FIRST TIME DETECTS AND NEW MAXIMUM CONCENTRATONS, 2021 – DOE AREA IV

Analyte	Well ID	Fraction	2021 Result	Units	Qualifiers	New Detection	New Max Detection	Screening Value	Screening Units	Exceeds SV
Uranium-235/236	RD-19	Dissolved	0.874	pci/l		No	Yes	N/A	N/A	N/A
	RD-34A	Total	0.695	pci/l		No	Yes	N/A	N/A	N/A
Uranium-238	RD-17	Total	1.66	pci/l		No	Yes	20	pCi/L	No
	RD-33A	Dissolved	2.56	pci/l		No	Yes	20	pCi/L	No
	RD-33A	Total	2.19	pci/l		No	Yes	20	pCi/L	No
	RD-50	Total	6.92	pci/l		Yes	Yes	20	pCi/L	No
	RD-63	Dissolved	6.33	pci/l		No	Yes	20	pCi/L	No
Vanadium	PZ-108	Dissolved	4.52	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	PZ-108	Total	5.27	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	RD-33B	Total	3.4	ug/l	J/J	Yes	Yes	2.6	ug/L	Yes
	RD-50	Dissolved	4.98	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	RD-50	Total	5.31	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	RD-96	Total	4.24	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	RD-96	Total	4.01	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	RS-18	Dissolved	3.83	ug/l	J/J	No	Yes	2.6	ug/L	Yes
	RS-18	Total	3.79	ug/l	J/J	No	Yes	2.6	ug/L	Yes
Zinc	RD-14	Total	184	ug/l	J/	No	Yes	6300	ug/L	No
	RD-34C	Total	2380	ug/l		No	Yes	6300	ug/L	No
	RD-59A	Total	10.1	ug/l	J/J	No	Yes	6300	ug/L	No
	RD-96	Total	7.21	ug/l	J/J	No	Yes	6300	ug/L	No
	RS-18	Total	5.31	ug/l	J/J	No	Yes	6300	ug/L	No

Notes:
/ separates lab qualifiers from data validation flags.
N/A - Not applicable; screening limit not established.
Results from wells installed after 2017 are not inculded in this table due to insufficent data for establishing baseline trends.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, 2021 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: µg/L

		Analyte	1,1,1-trichloroethane	1,1,2-trichloro-1,2,2-trifluoroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane
		Method	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B	SW8270E SIM
Well Identifier	Sample Date	Sample Name	Results	Results	Results	Results	Results	Results	Results
DD-139	02/26/2021	DD-139_022621_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
DD-157	03/04/2021	DD-157_030421_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
DD-158	02/22/2021	DD-158_022221_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
DD-159	02/25/2021	DD-159_022521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
DS-48	02/15/2021	DS-48_021521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	---
DS-48	02/26/2021	DS-48_022621_01_L	---	---	---	---	---	---	0.201 J/J
PZ-108	02/15/2021	PZ-108_021521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	---
PZ-108	03/02/2021	PZ-108_030221_01_L	---	---	---	---	---	---	0.248 J/J
RD-07	03/03/2021	RD-07_030321_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-14	03/04/2021	RD-14_030421_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.495
RD-19	02/22/2021	RD-19_022221_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-20	03/04/2021	RD-20_030421_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-33A	02/18/2021	RD-33A_021821_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	---
RD-33A	03/04/2021	RD-33A_030421_01_L	---	---	---	---	---	---	1.97
RD-33B	03/05/2021	RD-33B_030521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-33C	02/18/2021	RD-33C_021821_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	---
RD-33C	03/04/2021	RD-33C_030421_01_L	---	---	---	---	---	---	0.111 J/J
RD-34A	02/17/2021	RD-34A_021721_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.229 J/J
RD-34B	02/25/2021	RD-34B_022521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-34C	02/17/2021	RD-34C_021721_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-50	02/17/2021	RD-50_021721_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-54A	03/01/2021	RD-54A_030121_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.249 J/J
RD-59A	03/05/2021	RD-59A_030521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-59B	03/05/2021	RD-59B_030521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-59C	03/05/2021	RD-59C_030521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RD-63	03/05/2021	RD-63_030521_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.45 J/J	0.58 J/J	0.333 U/U	0.882
RD-96	03/04/2021	RD-96_030421_01_L	0.333 U/U	2.98 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.1 U/U
RS-18	02/15/2021	RS-18_021521_01_L	0.69 J/J	2.98 U/U	0.333 U/U	1.2	0.35 J/J	0.333 U/U	---
RS-18	03/02/2021	RS18_030221_01_L	---	---	---	---	---	---	16.8

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
--- - Not analyzed
LAB / VALIDATION QUALIFIERS
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 MDL.
h - Sample preparation or preservation holding time exceeded.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, 2021 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: µg/L

		Analyte	2-butanone	Acetone	Benzene	Carbon tetrachloride	Chloroform	cis-1,2-Dichloroethene	Ethylbenzene
		Method	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B
Well Identifier	Sample Date	Sample Name	Results	Results	Results	Results	Results	Results	Results
DD-139	02/26/2021	DD-139_022621_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DD-157	03/04/2021	DD-157_030421_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DD-158	02/22/2021	DD-158_022221_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DD-159	02/25/2021	DD-159_022521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DS-48	02/15/2021	DS-48_021521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	25	0.333 U/U
DS-48	02/26/2021	DS-48_022621_01_L	---	---	---	---	---	---	---
PZ-108	02/15/2021	PZ-108_021521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	19.2	0.54 J/J
PZ-108	03/02/2021	PZ-108_030221_01_L	---	---	---	---	---	---	---
RD-07	03/03/2021	RD-07_030321_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	4.06	0.333 U/U
RD-14	03/04/2021	RD-14_030421_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-19	02/22/2021	RD-19_022221_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-20	03/04/2021	RD-20_030421_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-33A	02/18/2021	RD-33A_021821_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	1.63	0.333 U/U
RD-33A	03/04/2021	RD-33A_030421_01_L	---	---	---	---	---	---	---
RD-33B	03/05/2021	RD-33B_030521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U	0.333 U/U	0.333 U/U
RD-33B	03/05/2021	RD-33B_030521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U	0.333 U/U	0.333 U/U
RD-33C	02/18/2021	RD-33C_021821_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-33C	03/04/2021	RD-33C_030421_01_L	---	---	---	---	---	---	---
RD-34A	02/17/2021	RD-34A_021721_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.76 J/J	0.333 U/U
RD-34B	02/25/2021	RD-34B_022521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-34C	02/17/2021	RD-34C_021721_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-50	02/17/2021	RD-50_021721_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-54A	03/01/2021	RD-54A_030121_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	2.03	0.333 U/U
RD-59A	03/05/2021	RD-59A_030521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U	0.333 U/U	0.333 U/U
RD-59B	03/05/2021	RD-59B_030521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U	0.333 U/U	0.333 U/U
RD-59C	03/05/2021	RD-59C_030521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U	0.333 U/U	0.333 U/U
RD-63	03/05/2021	RD-63_030521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U	3.3	0.333 U/U
RD-96	03/04/2021	RD-96_030421_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RS-18	02/15/2021	RS-18_021521_01_L	1.67 U/U	1.74 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RS-18	03/02/2021	RS18_030221_01_L	---	---	---	---	---	---	---

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
--- - Not analyzed
LAB / VALIDATION QUALIFIERS
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 MDL.
h - Sample preparation or preservation holding time exceeded.

TABLE 10
VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS, 2021 – AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: µg/L

		Analyte	Methylene chloride	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride
		Method	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B	SW8260B
Well Identifier	Sample Date	Sample Name	Results	Results	Results	Results	Results	Results	Results
DD-139	02/26/2021	DD-139_022621_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DD-157	03/04/2021	DD-157_030421_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DD-158	02/22/2021	DD-158_022221_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U
DD-159	02/25/2021	DD-159_022521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
DS-48	02/15/2021	DS-48_021521_01_L	1.67 U/U	0.333 U/U	0.72 J/J	0.333 U/U	4.89	0.333 U/UJ	0.333 U/U
DS-48	02/26/2021	DS-48_022621_01_L	---	---	---	---	---	---	---
PZ-108	02/15/2021	PZ-108_021521_01_L	1.67 U/U	0.333 U/U	1.85	0.333 U/U	91.5	0.333 U/UJ	0.333 U/U
PZ-108	03/02/2021	PZ-108_030221_01_L	---	---	---	---	---	---	---
RD-07	03/03/2021	RD-07_030321_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	60.2	0.333 U/U	0.333 U/U
RD-14	03/04/2021	RD-14_030421_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	3.02	0.333 U/U	0.333 U/U
RD-19	02/22/2021	RD-19_022221_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U
RD-20	03/04/2021	RD-20_030421_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-33A	02/18/2021	RD-33A_021821_01_L	1.67 U/U	0.333 U/U	0.333 U/U	1.43	0.333 U/U	0.333 U/UJ	0.333 U/U
RD-33A	03/04/2021	RD-33A_030421_01_L	---	---	---	---	---	---	---
RD-33B	03/05/2021	RD-33B_030521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-33C	02/18/2021	RD-33C_021821_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U
RD-33C	03/04/2021	RD-33C_030421_01_L	---	---	---	---	---	---	---
RD-34A	02/17/2021	RD-34A_021721_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U
RD-34B	02/25/2021	RD-34B_022521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-34C	02/17/2021	RD-34C_021721_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U
RD-50	02/17/2021	RD-50_021721_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/UJ	0.333 U/U
RD-54A	03/01/2021	RD-54A_030121_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	7.59	0.333 U/U	0.333 U/U
RD-59A	03/05/2021	RD-59A_030521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-59B	03/05/2021	RD-59B_030521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-59C	03/05/2021	RD-59C_030521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RD-63	03/05/2021	RD-63_030521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	5.72	0.333 U/U	0.333 U/U
RD-96	03/04/2021	RD-96_030421_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U	0.333 U/U
RS-18	02/15/2021	RS-18_021521_01_L	1.67 U/U	0.333 U/U	0.333 U/U	0.333 U/U	38.9	0.333 U/UJ	0.333 U/U
RS-18	03/02/2021	RS18_030221_01_L	---	---	---	---	---	---	---

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
µg/L - micrograms per liter
--- - Not analyzed
LAB / VALIDATION QUALIFIERS
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 MDL.
h - Sample preparation or preservation holding time exceeded.

TABLE 11
PERCHLORATE ANALYTICAL RESULTS, 2021 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: µg/L Sample Type: N

			Analyte	Perchlorate
Well Identifier	**Sample Name**	**Sample Date**	**Method**	**Results**
RD-50	RD-50_021721_01_L	2/17/2021	SW6850	0.248
RS-18	RS-18_021521_01_L	2/15/2021	SW6850	2.54 J/J
RD-33A	RD-33A_021821_01_L	2/18/2021	SW6850	0.1 U/UJ
RD-33C	RD-33C_021821_01_L	2/18/2021	SW6850	0.1 U/UJ
DD-139	DD-139_022621_01_L	2/26/2021	SW6850	0.0843 J/J
RD-54A	RD-54A_030121_01_L	3/1/2021	SW6850	0.1 U/U
RD-33B	RD-33B_022221_01_L	2/22/2021	SW6850	0.1 U/U
RD-96	RD-96_030421_01_L	3/4/2021	SW6850	0.1 U/U
RD-59A	RD-59A_030521_01_L	3/5/2021	SW6850	0.1 U/U
RD-59B	RD-59B_030521_01_L	3/5/2021	SW6850	0.1 U/U
RD-59C	RD-59C_030521_01_L	3/5/2021	SW6850	0.1 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

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.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 12
FUEL HYDROCARBONS ANALYTICAL RESULTS, 2021 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: µg/L Sample Type: N

			Analyte	Diesel range organics	Gasoline Range Organics
Well Identifier	**Sample Name**	**Sample Date**	**Method**	**Results**	**Results**
RD-19	RD-19_022221_01_L	2/22/2021	SW8015B	71 U/U	16.7 U/U
PZ-103	PZ-103_030221_01_L	3/2/2021	SW8015B	75 U/U	16.7 U/U
RD-54A	RD-54A_030121_01_L	3/1/2021	SW8015B	70.1 U/U	16.7 U/U
RD-14	RD-14_030421_01_L	3/4/2021	SW8015B	70.9 U/U	16.7 U/U
RD-96	RD-96_030421_01_L	3/4/2021	SW8015B	72.8 U/U	16.7 U/U
RD-63	RD-63_030521_01_L	3/5/2021	SW8015B	70.6 QU/UJ	16.7 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
LAB / VALIDATION QUALIFIERS
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
Q - LCS recovery not within control limits
U - Analyzed for, but not detected above reported sample quantitation limit. Result shown is the Method Detection Limit.

TABLE 13
INORGANIC ANALYTES ANALYTICAL RESULTS, 2021 – AREA IV
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: mg/l Sample Type: N

			Analyte	Fluoride	Nitrate as N
Well Identifier	**Sample Name**	**Sample Date**	**Method**	**Results**	**Results**
RD-20	RD-20_030421_01_L	2/24/2020	E300	---	14.3 HQ/J-
RD-34A	RD-34A_021721_01_L	3/5/2020	E300	0.694	---
RD-34C	RD-34C_021721_01_L	2/24/2020	E300	0.613	---
RD-19	RD-19_022221_01_L	3/4/2020	E300	0.42	---
RD-34B	RD-34B_022521_01_L	3/4/2020	E300	0.765	---
RD-14	RD-14_022221_01_L	2/25/2020	E300	0.344	---
RD-59A	RD-59A_030521_01_L	3/2/2020	E300	0.75	---
RD-59B	RD-59B_030521_01_L	3/3/2020	E300	0.687	---
RD-59C	RD-59C_030521_01_L	3/2/2020	E300	0.639	---

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Method Detection Limit (MDL)
mg/L - milligrams per liter
---- - Not analyzed
N - Normal Field Sample

LAB / VALIDATION QUALIFIERS
H - Analytical holding time exceeded.
J- - Result is an estimated quantity, biased low. Associated numerical value is approximate concentration of analyte in sample.
Q - One or more quality control criteria have not been met.

NORTHWIND PORTAGE, INC.

TABLE 14
RADIOCHEMISTRY ANALYTICAL RESULTS, 2021- AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: pCi/L - picocuries per liter Sample Type: N

			Analyte Method	Actinium-228 E901.1	Americium-241 E901.1	Antimony-125 E901.1	Barium-133 E901.1	Cesium-134 E901.1	Cesium-137 E901.1	Cobalt-57 E901.1	Cobalt-60 E901.1
Well Identifier	**Sample Name**	**Sample Date**	**Fraction**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**
DD-158	DD-158_022221_01_L	2/22/2021	T	32 U / U	50.2 U / U	18.7 U / U	8.34 U / U	6.71 U / U	10 U / U	4.52 U / U	7.99 U / U
DD-158	DD-158_022221_01_L Dissolved	2/22/2021	D	36.4 U / U	50.4 U / U	19.5 U / U	7.74 U / U	8.97 U / U	10 U / U	5.51 U / U	6 U / U
DD-159	DD-159_022521_01_L	2/25/2021	T	35.3 U / U	64.8 U / U	17.7 U / U	8.42 U / U	8.51 U / U	10 U / U	5.8 U / U	10 U / U
DD-159	DD-159_022521_01_L Dissolved	2/25/2021	D	37.8 U / U	10.6 U / U	18.8 U / U	8.64 U / U	8.7 U / U	10 U / U	4.73 U / U	8.37 U / U
RD-07	RD-07_021621_01_L	2/16/2021	T	24.9 U / U	12.7 U / U	15.1 U / U	6.54 U / U	6.48 U / U	10 U / U	4.09 U / U	5.89 U / U
RD-07	RD-07_021621_01_L Dissolved	2/16/2021	D	34.7 U / U	48.8 U / U	19.6 U / U	9.04 U / U	7.24 U / U	10 U / U	6.08 U / U	8.75 U / U
RD-14	RD-14_022221_01_L	2/22/2021	T	32.3 U / U	51.5 U / U	16.5 U / U	7.63 U / U	6.82 U / U	10 U / U	5.17 U / U	7.46 U / U
RD-14	RD-14_022221_01_L Dissolved	2/22/2021	D	36.6 U / U	10.3 U / U	17.7 U / U	7.82 U / U	9.56 U / U	10 U / U	4.09 U / U	8.85 U / U
RD-17	RD-17_021621_01_L	2/16/2021	T	32.3 U / U	62.9 U / U	16.6 U / U	6.03 U / U	8.55 U / U	10 U / U	5.58 U / U	7.88 U / U
RD-17	RD-17_021621_01_L Dissolved	2/16/2021	D	41 U / U	50.3 U / U	18 U / U	7.45 U / U	7.73 U / U	10 U / U	5.39 U / U	8.85 U / U
RD-19	RD-19_022221_01_L	2/22/2021	T	24.3 U / U	20.3 U / U	12.8 U / U	5.61 U / U	6.23 U / U	10 U / U	3.75 U / U	6.2 U / U
RD-19	RD-19_022221_01_L Dissolved	2/22/2021	D	35.1 U / U	53.9 U / U	19.1 U / U	7.36 U / U	9.7 U / U	10 UI / UJ	5.68 U / U	9.15 U / U
RD-20	RD-20_022421_01_L	2/24/2021	T	24.3 U / U	13.7 U / U	13.1 U / U	6.57 U / U	5.95 U / U	10 U / U	3.68 U / U	6.18 U / U
RD-20	RD-20_022421_01_L Dissolved	2/24/2021	D	30.8 U / U	56.3 U / U	16.8 U / U	7.32 U / U	9.25 U / U	10 U / U	5.23 U / U	8.9 U / U
RD-33A	RD-33A_021821_01_L	2/18/2021	T	36.4 U / U	40.9 U / U	18.5 U / U	9 U / U	9.81 U / U	10 U / U	5.16 U / U	10.4 U / U
RD-33A	RD-33A_021821_01_L Dissolved	2/18/2021	D	40.4 U / U	10.3 U / U	21.7 U / U	8.09 U / U	9.84 U / U	10 U / U	4.33 U / U	10.5 U / U
RD-33B	RD-33B_022221_01_L	2/22/2021	T	29.5 U / U	28.7 U / U	17.3 U / U	7.93 U / U	8.09 U / U	10 U / U	4.67 U / U	7.98 U / U
RD-33B	RD-33B_022221_01_L Dissolved	2/22/2021	D	26.8 U / U	19.9 U / U	15.3 U / U	6.53 U / U	7.49 U / U	10 U / U	4.29 U / U	7.27 U / U
RD-33C	RD-33C_021821_01_L	2/18/2021	T	44.6	19.2 U / U	13.8 U / U	5.83 U / U	5.39 U / U	10 U / U	3.89 U / U	7 U / U
RD-33C	RD-33C_021821_01_L Dissolved	2/18/2021	D	26.1 U / U	43.7 U / U	14.6 U / U	7.05 U / U	6.59 U / U	10 U / U	4.96 U / U	7.59 U / U
RD-34A	RD-34A_021721_01_L	2/17/2021	T	35.6 U / U	44.5 U / U	19.8 U / U	8.77 U / U	9.62 U / U	10 U / U	5.61 U / U	9.5 U / U
RD-34A	RD-34A_021721_01_L Dissolved	2/17/2021	D	32.6 U / U	16.9 U / U	15.9 U / U	6.55 U / U	6.76 U / U	10 U / U	4.39 U / U	6.95 U / U
RD-34B	RD-34B_022521_01_L	2/25/2021	T	30.3 U / U	45 U / U	15.7 U / U	7.81 U / U	7.55 U / U	10 U / U	4.68 U / U	8.32 U / U
RD-34B	RD-34B_022521_01_L Dissolved	2/25/2021	D	39.2 U / U	36.6 U / U	21 U / U	9.93 U / U	8.57 U / U	10 U / U	5.3 U / U	11.8 U / U
RD-34C	RD-34C_021721_01_L	2/17/2021	T	25.4 U / U	26.9 U / U	14 U / U	6.83 U / U	5.99 U / U	10 U / U	4.37 U / U	7.37 U / U
RD-34C	RD-34C_021721_01_L Dissolved	2/17/2021	D	32.8 U / U	28.4 U / U	16.4 U / U	6.98 U / U	6.39 U / U	10 U / U	4.45 U / U	7.25 U / U
RD-50	RD-50_021721_01_L	2/17/2021	T	26.5 U / U	16.4 U / U	14.7 U / U	6.53 U / U	7.31 U / U	10 U / U	4.46 U / U	7.41 U / U
RD-50	RD-50_021721_01_L Dissolved	2/17/2021	D	34.9 U / U	43.2 U / U	19.9 U / U	9.31 U / U	7.87 U / U	10 U / U	5.26 U / U	8.8 U / U
RD-54A	RD-54A_030121_01_L	3/1/2021	T	33.5 U / U	41.5 U / U	14.2 U / U	7.93 U / U	7.14 U / U	10 U / U	4.78 U / U	7.56 U / U
RD-54A	RD-54A_030121_01_L Dissolved	3/1/2021	D	39.7 U / U	10.7 U / U	20 U / U	7.83 U / U	8.82 U / U	10 U / U	4.87 U / U	8.46 U / U
RD-59A	RD-59A_030521_01_L	3/5/2021	T	46.5 U / U	38.5 U / U	22.1 U / U	11.2 U / U	10.5 U / U	10 U / U	5.65 U / U	7.85 U / U
RD-59A	RD-59A_030521_01_L Dissolved	3/5/2021	D	37.6 U / U	52.4 U / U	20.9 U / U	8.66 U / U	11.5 U / U	10 U / U	5.57 U / U	11.8 U / U
RD-59B	RD-59B_030521_01_L	3/5/2021	T	35.2 U / U	41.1 U / U	20.1 U / U	9.32 U / U	7.91 U / U	10 U / U	5.02 U / U	9.1 U / U
RD-59B	RD-59B_030521_01_L Dissolved	3/5/2021	D	33.3 U / U	31 U / U	17.6 U / U	9.44 U / U	8.39 U / U	10 U / U	4.56 U / U	8.99 U / U
RD-59C	RD-59C_030521_01_L	3/5/2021	T	30.2 U / U	21.3 U / U	16.2 U / U	6.82 U / U	5.95 U / U	10 U / U	4.22 U / U	8.22 U / U
RD-59C	RD-59C_030521_01_L Dissolved	3/5/2021	D	23.5 U / U	20.8 U / U	12.4 U / U	6.51 U / U	7.09 U / U	10 U / U	3.74 U / U	7.54 U / U
RS-18	RS-18_021521_01_L	2/15/2021	T	29.4 U / U	55.2 U / U	17.2 U / U	6.94 U / U	8.38 U / U	10 U / U	5 U / U	7.75 U / U
RS-18	RS-18_021521_01_L Dissolved	2/15/2021	D	39.1 U / U	57 U / U	20.6 U / U	8.45 U / U	8.08 U / U	10 U / U	6.31 U / U	7.53 U / U
RS-28	RS-28_021921_01_L	2/19/2021	T	34.6 U / U	11.5 U / U	19.5 U / U	10.2 U / U	11.5 U / U	10 U / U	4.49 U / U	13.1 U / U
RS-28	RS-28_021921_01_L Dissolved	2/19/2021	D	22.8 U / U	12.4 U / U	14.9 U / U	6.26 U / U	6.62 U / U	10 U / U	3.21 U / U	4.92 U / U

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Minimum Detectable Concentration (MDC)
pCi/L - picocuries per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
LAB / VALIDATION QUALIFIERS
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyte was analyzed for, but not detected above the quantitation limit. Result shown is the MDC.
UI - Gamma Spectroscopy--Uncertain identification

NORTHWIND PORTAGE, INC.

TABLE 14
RADIOCHEMISTRY ANALYTICAL RESULTS, 2021- AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: pCi/L - picocuries per liter Sample Type: N

			Analyte Method	Europium-152 E901.1	Europium-154 E901.1	Europium-155 E901.1	Gross Alpha E900	Gross Beta E900	Manganese-54 E901.1	Potassium-40 E901.1	Radium-226 E903.1
Well Identifier	**Sample Name**	**Sample Date**	**Fraction**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**
DD-158	DD-158_022221_01_L	2/22/2021	T	21.3 U / U	18.9 U / U	18.9 U / U	15.5	16.1 / J	8.22 U / U	126 U / U	1.03
DD-158	DD-158_022221_01_L Dissolved	2/22/2021	D	21.9 U / U	23.8 U / U	21 U / U	8.45	11.5 / J	7.98 U / U	72.5 U / U	1
DD-159	DD-159_022521_01_L	2/25/2021	T	16.8 U / U	19.6 U / U	22.5 U / U	5.37	7.91 / J	7.12 U / U	134 U / U	0.976
DD-159	DD-159_022521_01_L Dissolved	2/25/2021	D	21.2 U / U	21.6 U / U	16.2 U / U	4.17	4.9 / J	8.9 U / U	128 U / U	1 U / U
RD-07	RD-07_021621_01_L	2/16/2021	T	16.5 U / U	19.2 U / U	14.6 U / U	9.04	5.29 / J	4.93 U / U	94 U / U	1 U / U
RD-07	RD-07_021621_01_L Dissolved	2/16/2021	D	20.1 U / U	22.3 U / U	25 U / U	5 U / U	5 U / UJ	8.24 U / U	77.3 U / U	1 U / U
RD-14	RD-14_022221_01_L	2/22/2021	T	19 U / U	21.1 U / U	22.4 U / U	5 U / U	5 U / UJ	7.95 U / U	121 U / U	0.561
RD-14	RD-14_022221_01_L Dissolved	2/22/2021	D	18.3 U / U	26 U / U	15.8 U / U	5.16	7.78 / J	7.15 U / U	129 U / U	0.888
RD-17	RD-17_021621_01_L	2/16/2021	T	22.5 U / U	24.2 U / U	23 U / U	9.31	8.57 / J	7.55 U / U	104 U / U	1.97
RD-17	RD-17_021621_01_L Dissolved	2/16/2021	D	19 U / U	18.2 U / U	19.4 U / U	5.89	9 / J	8.04 U / U	66.3 U / U	1.63
RD-19	RD-19_022221_01_L	2/22/2021	T	14 U / U	16.1 U / U	15.7 U / U	13.7	14.8 / J	5.62 U / U	61.2 U / U	0.919
RD-19	RD-19_022221_01_L Dissolved	2/22/2021	D	17.3 U / U	19.2 U / U	21.5 U / U	13.2	19.4 / J	7.5 U / U	62.9 U / U	0.995
RD-20	RD-20_022421_01_L	2/24/2021	T	14.6 U / U	18.7 U / U	13.5 U / U	7.31	8.35 / J	4.6 U / U	86.1 U / U	0.551
RD-20	RD-20_022421_01_L Dissolved	2/24/2021	D	17.7 U / U	24.7 U / U	23.6 U / U	6.57	7.86 / J	6.48 U / U	91 U / U	0.472
RD-33A	RD-33A_021821_01_L	2/18/2021	T	19.1 U / U	24.7 U / U	21.1 U / U	5.77	6.15 / J	8.66 U / U	83.1 U / U	0.676
RD-33A	RD-33A_021821_01_L Dissolved	2/18/2021	D	21.9 U / U	24.4 U / U	16.8 U / U	5.18	5.18 / J	7 U / U	124 U / U	1.33
RD-33B	RD-33B_022221_01_L	2/22/2021	T	18.7 U / U	23.8 U / U	19 U / U	5 U / U	5 U / UJ	6.47 U / U	57.9 UI / UJ	0.762
RD-33B	RD-33B_022221_01_L Dissolved	2/22/2021	D	14.9 U / U	21.7 U / U	16.8 U / U	5 U / U	5 U / UJ	7.1 U / U	66.2 U / U	0.583
RD-33C	RD-33C_021821_01_L	2/18/2021	T	14.6 U / U	11.4 U / U	15.1 U / U	5 U / U	5 U / UJ	5.25 U / U	84.3 U / U	1 U / U
RD-33C	RD-33C_021821_01_L Dissolved	2/18/2021	D	18 U / U	26.5 U / U	21.1 U / U	5 U / U	5 U / UJ	6.64 U / U	59.8 UI / UJ	1 U / U
RD-34A	RD-34A_021721_01_L	2/17/2021	T	17.6 U / U	26.2 U / U	22.8 U / U	12.5	15.1 / J	8.41 U / U	79.2 U / U	0.416
RD-34A	RD-34A_021721_01_L Dissolved	2/17/2021	D	17.9 UI / UJ	21.8 U / U	17.3 U / U	17.7	14.6 / J	5.95 U / U	108 U / U	1
RD-34B	RD-34B_022521_01_L	2/25/2021	T	18.1 U / U	22.6 U / U	19.7 U / U	5 U / U	5 U / UJ	6.91 U / U	70.7 U / U	0.529
RD-34B	RD-34B_022521_01_L Dissolved	2/25/2021	D	23.8 U / U	23.3 U / U	22.3 U / U	5 U / U	5 U / UJ	8.07 U / U	53.6 UI / UJ	1 U / U
RD-34C	RD-34C_021721_01_L	2/17/2021	T	14.8 U / U	15.6 U / U	16.9 U / U	4.39	5.57 / J	5.66 U / U	99.5 U / U	0.987
RD-34C	RD-34C_021721_01_L Dissolved	2/17/2021	D	16.5 U / U	20.9 U / U	17.4 U / U	5 U / U	4.29 / J	6.31 U / U	63.4 U / U	0.51
RD-50	RD-50_021721_01_L	2/17/2021	T	15.9 U / U	16.9 U / U	17.6 U / U	16.9	11.7 / J	6.8 U / U	111 U / U	0.932
RD-50	RD-50_021721_01_L Dissolved	2/17/2021	D	19.5 U / U	16.5 U / U	23.8 U / U	13.7	10.3 / J	5.96 U / U	110 U / U	1.16
RD-54A	RD-54A_030121_01_L	3/1/2021	T	19.6 U / U	18.1 U / U	20.1 U / U	6.42	6.98 / J	6.42 U / U	109 U / U	1.17
RD-54A	RD-54A_030121_01_L Dissolved	3/1/2021	D	18.9 U / U	29.1 U / U	17.2 U / U	5.03	5.54 / J	8.29 U / U	135 U / U	0.868
RD-59A	RD-59A_030521_01_L	3/5/2021	T	25.4 U / U	33.9 U / U	25.3 U / U	5 U / U	6.14 / J	7.9 U / U	145 U / U	1.18
RD-59A	RD-59A_030521_01_L Dissolved	3/5/2021	D	24.5 U / U	30.9 U / U	20.6 U / U	5 U / U	3.28 / J	8.56 U / U	113 U / U	0.548
RD-59B	RD-59B_030521_01_L	3/5/2021	T	18.7 U / U	19.6 U / U	22.6 U / U	5 U / U	5 U / UJ	6.76 U / U	117 U / U	0.689
RD-59B	RD-59B_030521_01_L Dissolved	3/5/2021	D	20.8 U / U	20.3 U / U	18.9 U / U	5 U / U	5 U / UJ	7.05 U / U	77.3 U / U	0.887
RD-59C	RD-59C_030521_01_L	3/5/2021	T	16.8 U / U	17.7 U / U	16.9 U / U	5 U / U	3.93 / J	6.37 U / U	89.1 U / U	1 U / U
RD-59C	RD-59C_030521_01_L Dissolved	3/5/2021	D	15.3 U / U	15.3 U / U	13.9 U / U	5 U / U	5 U / UJ	6.01 U / U	53.7 U / U	0.681
RS-18	RS-18_021521_01_L	2/15/2021	T	17.7 U / U	21.3 U / U	22.6 U / U	4.21 U / U	4.65 / J	6.36 U / U	87.6 U / U	0.206
RS-18	RS-18_021521_01_L Dissolved	2/15/2021	D	18.3 U / U	24.9 U / U	25.6 U / U	4.56 U / U	7.92 / J	7.04 U / U	57.3 U / U	0.207
RS-28	RS-28_021921_01_L	2/19/2021	T	19.8 U / U	31.7 U / U	18.4 U / U	4.23 U / U	7.73 / J	9.33 U / U	148 U / U	0.475
RS-28	RS-28_021921_01_L Dissolved	2/19/2021	D	15 U / U	15.8 U / U	14.1 U / U	4.79	5.95 / J	5.29 U / U	58.3 U / U	0.656

NOTES AND ABBREVIATIONS
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pCi/L - picocuries per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)
LAB / VALIDATION QUALIFIERS
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyte was analyzed for, but not detected above the quantitation limit. Result shown is the MDC.
UI - Gamma Spectroscopy--Uncertain identification

NORTHWIND PORTAGE, INC.

TABLE 14
RADIOCHEMISTRY ANALYTICAL RESULTS, 2021- AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: pCi/L - picocuries per liter Sample Type: N

			Analyte Method	Radium-228 E904	Sodium-22 E901.1	Strontium-90 905.0M	Uranium-233/234 EML300_U02MOD	Uranium-235/236 EML300_U02MOD	Uranium-238 EML300_U02MOD
Well Identifier	**Sample Name**	**Sample Date**	**Fraction**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**
DD-158	DD-158_022221_01_L	2/22/2021	T	3 U / U	6.61 U / U	1.06 U / U	8.69	1 U / U	8.02
DD-158	DD-158_022221_01_L Dissolved	2/22/2021	D	3.1	8.44 U / U	1.32 U / U	7.12	0.573	7.6
DD-159	DD-159_022521_01_L	2/25/2021	T	2.41	7.02 U / U	1.55 U / U	2.49	1 U / U	1.62
DD-159	DD-159_022521_01_L Dissolved	2/25/2021	D	3 U / U	7.76 U / U	1.78 U / U	1.55	1 U / U	1.58
RD-07	RD-07_021621_01_L	2/16/2021	T	3 U / U	4.92 U / U	1.3 U / U	2.59	1 U / U	2.68
RD-07	RD-07_021621_01_L Dissolved	2/16/2021	D	3 U / U	8.05 U / U	1.08 U / U	3.67	1 U / U	2.97
RD-14	RD-14_022221_01_L	2/22/2021	T	3 U / U	7.46 U / U	0.857 U / U	2.32	1 U / U	2.64
RD-14	RD-14_022221_01_L Dissolved	2/22/2021	D	2.4	9.16 U / U	1.72 U / U	2.67	1 U / U	2.52
RD-17	RD-17_021621_01_L	2/16/2021	T	3 U / U	8.49 U / U	1.2 U / U	2.86	1 U / U	1.66
RD-17	RD-17_021621_01_L Dissolved	2/16/2021	D	2.31	6.67 U / U	1.09 U / U	1.42	1 U / U	1.35 / J
RD-19	RD-19_022221_01_L	2/22/2021	T	2.44	5.72 U / U	1.02 U / U	10.6	1 U / U	9.83
RD-19	RD-19_022221_01_L Dissolved	2/22/2021	D	3 U / U	6.72 U / U	0.982 U / U	12	0.874	10.2
RD-20	RD-20_022421_01_L	2/24/2021	T	3 U / U	6.73 U / U	0.943 U / U	4.12	1 U / U	3.44
RD-20	RD-20_022421_01_L Dissolved	2/24/2021	D	3 U / U	8.69 U / U	1.24 U / U	5.74	1 U / U	3.31
RD-33A	RD-33A_021821_01_L	2/18/2021	T	2.06	8.77 U / U	1.45 U / U	3.24	1 U / U	2.19
RD-33A	RD-33A_021821_01_L Dissolved	2/18/2021	D	3 U / U	8.76 U / U	1.28 U / U	3.3	1 U / U	2.56
RD-33B	RD-33B_022221_01_L	2/22/2021	T	3 U / U	8.41 U / U	1.42 U / U	1 U / U	1 U / U	1 U / U
RD-33B	RD-33B_022221_01_L Dissolved	2/22/2021	D	3 U / U	7.75 U / U	1.93 U / U	1 U / U	1 U / U	1 U / U
RD-33C	RD-33C_021821_01_L	2/18/2021	T	3 U / U	3.96 U / U	1.79 U / U	1 U / U	1 U / U	1 U / U
RD-33C	RD-33C_021821_01_L Dissolved	2/18/2021	D	3 U / U	6.1 U / U	1.26 U / U	1 U / U	1 U / U	1 U / U
RD-34A	RD-34A_021721_01_L	2/17/2021	T	1.28	9.36 U / U	1.26 U / U	5.93	0.695	7.08
RD-34A	RD-34A_021721_01_L Dissolved	2/17/2021	D	3 U / U	7.77 U / U	1.01 U / U	7.37	0.404 / U	7.62
RD-34B	RD-34B_022521_01_L	2/25/2021	T	3.48	7.93 U / U	1.57 U / U	1 U / U	1 U / U	1 U / U
RD-34B	RD-34B_022521_01_L Dissolved	2/25/2021	D	3 U / U	8.37 U / U	1.68 U / U	1 U / U	1 U / U	1 U / U
RD-34C	RD-34C_021721_01_L	2/17/2021	T	1.34	5.54 U / U	1.29 U / U	1 U / U	1 U / U	1 U / U
RD-34C	RD-34C_021721_01_L Dissolved	2/17/2021	D	1.68	7.5 U / U	1.19 U / U	1 U / U	1 U / U	1 U / U
RD-50	RD-50_021721_01_L	2/17/2021	T	1.35	5.95 U / U	0.755 U / U	7.06	1 U / U	6.92
RD-50	RD-50_021721_01_L Dissolved	2/17/2021	D	1.49	5.95 U / U	0.687 U / U	9.13	0.472	6.68
RD-54A	RD-54A_030121_01_L	3/1/2021	T	2.38	6.41 U / U	1.78 U / U	3.78	1 U / U	1.84
RD-54A	RD-54A_030121_01_L Dissolved	3/1/2021	D	2.28	10.3 U / U	1.65 U / U	2.9	1 U / U	1.46
RD-59A	RD-59A_030521_01_L	3/5/2021	T	2.49	12.1 U / U	1.69 U / U	0.815	1 U / U	1.18
RD-59A	RD-59A_030521_01_L Dissolved	3/5/2021	D	3 U / U	10.9 U / U	1.32 U / U	1 U / U	1 U / U	1 U / U
RD-59B	RD-59B_030521_01_L	3/5/2021	T	1.62	6.82 U / U	1.07 U / U	1 U / U	1 U / U	1 U / U
RD-59B	RD-59B_030521_01_L Dissolved	3/5/2021	D	1.69	7.17 U / U	1.15 U / U	1 U / U	1 U / U	1 U / U
RD-59C	RD-59C_030521_01_L	3/5/2021	T	1.7	6.13 U / U	1.16 U / U	1 U / U	1 U / U	1 U / U
RD-59C	RD-59C_030521_01_L Dissolved	3/5/2021	D	2.3	5.39 U / U	1.21 U / U	1 U / U	1 U / U	1 U / U
RS-18	RS-18_021521_01_L	2/15/2021	T	3 U / U	7.56 U / U	1.36 U / U	2.76	1 U / U	2.51
RS-18	RS-18_021521_01_L Dissolved	2/15/2021	D	1.37 U / U	8.68 U / U	1.48 U / U	3.05	1 U / U	2.63
RS-28	RS-28_021921_01_L	2/19/2021	T	1.4	11.3 U / U	1.23 U / U	3	1 U / U	3.54
RS-28	RS-28_021921_01_L Dissolved	2/19/2021	D	3 U / U	5.6 U / U	1.08 U / U	3.74	1 U / U	3.5

NOTES AND ABBREVIATIONS
All non-detection values are reported using the Minimum Detectable Concentration (MDC)
pCi/L - picocuries per liter
---- - Not analyzed
N - Normal Field Sample
T - Total (Fraction)
D - Dissolved (Fraction)

LAB / VALIDATION QUALIFIERS
J - Result is an estimated quantity. Associated numerical value is approximate concentration of analyte in sample.
U - Analyte was analyzed for, but not detected above the quantitation limit. Result shown is the MDC.
UI - Gamma Spectroscopy--Uncertain identification

NORTHWIND PORTAGE, INC.

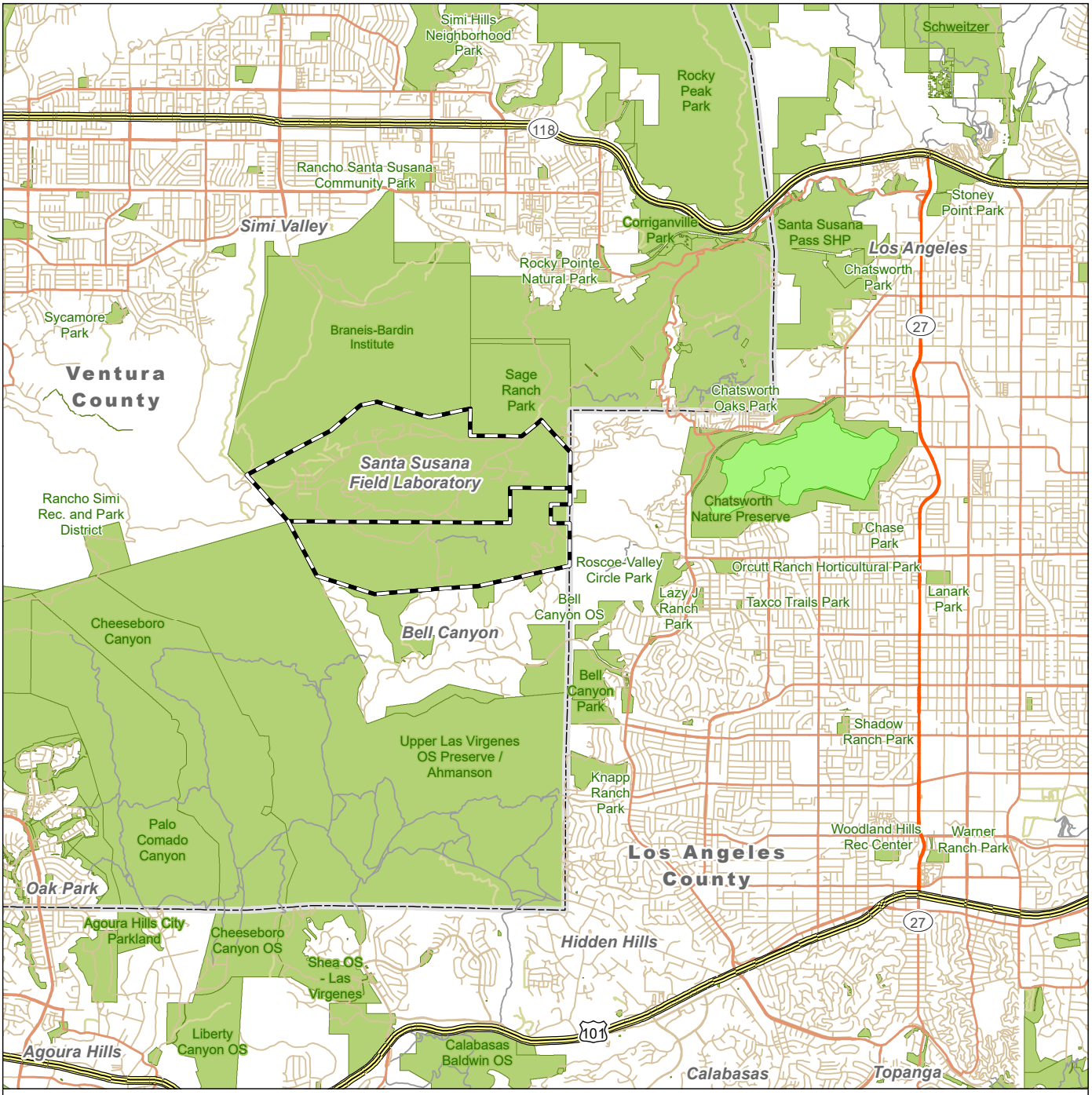
TABLE 15
METALS ANALYTICAL RESULTS, 2021 - AREA IV
SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA
Laboratory: GEL Charleston Units: µg/L Matrix: WG Sample Type: N

			Analyte Method	Antimony SW6020	Arsenic SW6020	Barium SW6020	Beryllium SW6020	Cadmium SW6020	Chromium SW6020	Cobalt SW6020	Copper SW6020	Lead SW6020	Mercury SW7470A	Nickel SW6020	Selenium SW6020	Silver SW6020	Thallium SW6020	Tin SW6020	Vanadium SW6020	Zinc SW6020
Well Identifier	**Sample Name**	**Sample Date**	**Fraction**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**	**Results**
DD-139	DD-139_022621_01_L	02/26/2021	T	1 U/U	3.06 J/J	35.6	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.519 J/J	0.5 UJ/U	0.067 U/U	1.47 J/J	2.59 J/J	0.3 U/U	0.6 U/U	1 U/U	3.7 J/J	3.3 UJ/U
DD-139	DD-139_022621_01_L DISSOLVED	02/26/2021	D	1.11 J/J	2.91 J/J	36.3	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.654 J/J	0.5 UJ/U	0.067 U/U	1.45 J/J	2.91 J/J	0.3 U/U	0.6 U/U	1 U/U	3.7 J/J	3.3 UJ/U
DD-157	DD-157_030421_01_L	03/04/2021	T	1 U/U	2 U/U	53.1	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	1.5 J/J	0.5 U/U	0.067 U/U	0.985 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	10.8 J/J
DD-157	DD-157_030421_01_L	03/04/2021	D	1 U/U	2 U/U	50.6	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.3 U/U
DD-158	DD-158_022221_01_L	02/22/2021	T	1.8 J/J	6.24	66.2	0.2 UJ/U	0.3 U/U	6.17 J/J	1.41	13.9	1.34 JJ/J	0.067 U/U	4.53	2 U/U	0.3 U/U	0.6 U/U	1 U/U	13.7 J/J	36.4 J/
DD-158	DD-158_022221_01_L DISSOLVED	02/22/2021	D	2.03 J/J	3.73 J/J	46.9	0.2 UJ/U	0.3 U/U	3 U/U	0.351 J/J	0.3 U/U	0.5 UJ/U	0.067 U/U	1.31 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	5.89 J/J	3.3 UJ/U
DD-159	DD-159_022521_01_L	02/25/2021	T	1.35 J/J	3.61 J/U	39.6	0.2 UJ/U	0.3 U/U	3 U/U	0.41 J/J	0.496 J/J	0.5 UJ/U	0.067 U/U	1.15 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.81 J/J	3.3 UJ/U
DD-159	DD-159_022521_01_L DISSOLVED	02/25/2021	D	1.33 J/J	3.37 J/J	39.5	0.2 UJ/U	0.3 U/U	3 U/U	0.344 J/J	0.3 U/U	0.5 UJ/U	0.067 U/U	1 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.36 J/J	3.3 UJ/U
DS-48	DS-48_021521_01_L	02/15/2021	T	1 U/U	2 U/U	78.1	0.2 U/U	0.3 U/U	3 U/U	0.524 J/J	1.93 J/J	0.837 J/J	0.067 U/U	2.68	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.85 J/J	14 J/J
DS-48	DS-48_021521_01_L DISSOLVED	02/15/2021	D	1 U/U	2 U/U	61.3	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.673 J/J	0.5 U/U	0.067 U/U	1.71 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	5.15 J/J
PZ-108	PZ-108_021521_01_L	02/15/2021	T	1.28 J/J	3.43 J/J	27	0.2 U/U	0.3 U/U	3 U/U	0.333 J/J	1.05 J/J	0.545 J/J	0.067 U/U	1.76 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	5.27 J/J	7.39 J/J
PZ-108	PZ-108_021521_01_L DISSOLVED	02/15/2021	D	1.18 J/J	3.52 J/J	25.3	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.407 J/J	0.5 U/U	0.067 U/U	1.07 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	4.52 J/J	3.89 J/J
RD-07	RD-07_030321_01_L	03/03/2021	T	1 U/U	2 U/U	30.4	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.526 J/J	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	11.3 J/J
RD-07	RD-07_030321_01_L DISSOLVED	03/03/2021	D	1 U/U	2.02 J/J	30.8	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.549 J/J	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	9.05 J/J
RD-14	RD-14_022221_01_L	02/22/2021	T	1 U/U	2 U/U	42.1	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.701 J/J	0.5 UJ/U	0.067 U/U	1.22 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	184 J/
RD-14	RD-14_022221_01_L DISSOLVED	02/22/2021	D	1 U/U	2 U/U	41.4	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.47 J/J	0.5 UJ/U	0.067 U/U	1.22 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	177 J/
RD-17	RD-17_030321_01_L	03/03/2021	T	1 U/U	2 U/U	109	0.2 U/U	0.3 U/U	3 U/U	0.467 J/J	0.553 J/J	2.67	0.067 U/U	0.988 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	497
RD-17	RD-17_030321_01_L DISSOLVED	03/03/2021	D	1 U/U	2 U/U	107	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.322 J/J	0.5 U/U	0.067 U/U	0.898 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	337
RD-19	RD-19_022221_01_L	02/22/2021	T	1 U/U	2.7 J/J	75.1	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.401 J/J	0.5 UJ/U	0.067 U/U	1.75 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	125 J/
RD-19	RD-19_022221_01_L DISSOLVED	02/22/2021	D	1 U/U	2.8 J/J	77.1	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.652 J/J	0.5 UJ/U	0.067 U/U	1.64 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	104 J/
RD-20	RD-20_022421_01_L	02/24/2021	T	1 U/U	3.18 J/J	40.3	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.383 J/J	0.5 UJ/U	0.067 U/U	0.655 J/J	3.37 J/J	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	22.3 J/
RD-20	RD-20_022421_01_L DISSOLVED	02/24/2021	D	1 U/U	3.1 J/J	38.4	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.505 J/J	0.5 UJ/U	0.067 U/U	0.611 J/J	3.56 J/J	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	18.7 JJ/J
RD-33A	RD-33A_021821_01_L	02/18/2021	T	1 U/U	8	48.6	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	4.85	0.811 J/J	0.067 U/U	2.72	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	105
RD-33A	RD-33A_021821_01_L DISSOLVED	02/18/2021	D	1 U/U	3.81 J/J	49.5	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 U/U	0.067 U/U	1.1 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	49.1
RD-33B	RD-33B_022221_01_L	02/22/2021	T	1 U/U	2 U/U	32.5	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.499 J/J	0.856 JJ/J	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.4 J/J	10.6 JJ/J
RD-33B	RD-33B_022221_01_L DISSOLVED	02/22/2021	D	1 U/U	2 U/U	31.3	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 UJ/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	5.66 JJ/J
RD-33C	RD-33C_021821_01_L	02/18/2021	T	1.64 J/J	2 U/U	11.6	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	4.4	1.77 J/	0.067 U/U	0.949 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	38.7
RD-33C	RD-33C_021821_01_L DISSOLVED	02/18/2021	D	1 U/U	2 U/U	10.2	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.74 J/J
RD-34A	RD-34A_021721_01_L	02/17/2021	T	1 J/J	2 U/U	41.8	0.2 U/U	0.3 U/U	3 U/U	2.38	1.36 J/J	0.5 U/U	0.067 U/U	1.42 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	36.3
RD-34A	RD-34A_021721_01_L DISSOLVED	02/17/2021	D	1 U/U	2 U/U	38.4	0.2 U/U	0.3 U/U	3 U/U	1.14	0.44 J/J	0.5 U/U	0.067 U/U	1.26 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	46
RD-34B	RD-34B_022521_01_L	02/25/2021	T	1 U/U	2.03 J/J	10.1	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	1.73 J/J	0.5 UJ/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	19.2 JJ/J
RD-34B	RD-34B_022521_01_L DISSOLVED	02/25/2021	D	1 U/U	2 U/U	9.89	0.2 UJ/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 UJ/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.3 UJ/U
RD-34C	RD-34C_021721_01_L	02/17/2021	T	1 U/U	2 U/U	76	0.2 U/U	0.3 U/U	3.39 J/J	2.68	0.499 J/J	3	0.067 U/U	3.51	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	2380
RD-34C	RD-34C_021721_01_L DISSOLVED	02/17/2021	D	1 U/U	2 U/U	63.5	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.3 U/U
RD-50	RD-50_021721_01_L	02/17/2021	T	1.33 J/J	2.37 J/J	50.6	0.2 U/U	0.3 U/U	3 U/U	1.98	0.831 J/J	2.98	0.067 U/U	1.37 J/J	2.86 J/J	0.3 U/U	0.6 U/U	1 U/U	5.31 J/J	172
RD-50	RD-50_021721_01_L DISSOLVED	02/17/2021	D	1.02 J/J	2.34 J/J	50.7	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.689 J/J	0.5 U/U	0.067 U/U	1.27 J/J	2.6 J/J	0.3 U/U	0.6 U/U	1 U/U	4.98 J/J	150
RD-54A	RD-54A_030121_01_L	03/01/2021	T	1 U/U	3.07 J/J	47.5 J/J	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.749 J/J	1.19 J/J	0.067 U/U	0.75 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	102
RD-54A	RD-54A_030121_01L DISSOLVED	03/01/2021	D	1 U/U	3.38 J/J	48.4 J/J	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.831 J/J	0.691 J/J	0.067 U/U	0.875 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	91
RD-59A	RD-59A_030521_01_L	03/05/2021	T	1 U/U	2.57 J/J	69.7	0.2 U/U	0.3 U/U	3 U/U	0.374 J/J	0.3 U/U	0.5 U/U	0.067 U/U	1.21 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	10.1 J/J
RD-59A	RD-59A_030521_01_L DISSOLVED	03/05/2021	D	1 U/U	2.73 J/J	67.8	0.2 U/U	0.3 U/U	3 U/U	0.331 J/J	0.328 J/J	0.5 U/U	0.067 U/U	1.2 J/J	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.3 U/U
RD-59B	RD-59B_030521_01_L	03/05/2021	T	1 U/U	2 U/U	42	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.303 J/J	0.5 U/U	0.087 J/J	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	8.84 J/J
RD-59B	RD-59B_030521_01_L DISSOLVED	03/05/2021	D	1 U/U	2 U/U	40.8	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 U/U	0.1 J/J	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.34 J/J
RD-59C	RD-59C_030521_01_L	03/05/2021	T	1 U/U	2 U/U	49.3	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.3 U/U	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	3.72 J/J
RD-59C	RD-59C_030521_01_L DISSOLVED	03/05/2021	D	1 U/U	2 U/U	51.6	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.328 J/J	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	6.25 J/J
RD-63	RD-63_030521_01_L	03/05/2021	T	1 U/U	2 U/U	54.2	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.469 J/J	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	7.23 J/J
RD-63	RD-63_030521_01_L DISSOLVED	03/05/2021	D	1 U/U	2 U/U	52.8	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	0.319 J/J	0.5 U/U	0.067 U/U	0.6 U/U	2 U/U	0.3 U/U	0.6 U/U	1 U/U	3.3 U/U	7.42 J/J
RD-96	RD-96_030421_01_L	03/04/2021	T	1 U/U	2.04 J/J	38.7	0.2 U/U	0.3 U/U	3 U/U	0.3 U/U	2.04	0.5 U/U	0.067 U/U	4.93	2 U/U	0.936 J/J	0.6 U/U	1 U/U	4.24 J/J	7.21 J/J
RD-96	RD-96_030421_01_L	03/04/2021	D	1 U/U	2 U/U	38.6	0.2 U/U	0.3 U/U	3 U/U	0.829 J/J	0.327 J/J	0.5 U/U	0.067 U/U	3.43	2 U/U	0.3 U/U	0.6 U/U	1 U/U	4.01 J/J	3.3 U/U
RS-18	RS-18_021521_01_L	02/15/2021	T	1.11 J/J	2 U/U	63.6	0.2 U/U	0.3 U/U	3 U/U	3.53	1.68 J/J	0.5 U/U	0.067 U/U	51.5	2.33 J/J	0.3 U/U	0.6 U/U	1 U/U	3.79 J/J	5.31 J/J
RS-18	RS-18_021521_01_L DISSOLVED	02/15/2021	D	1.07 J/J	2.13 J/J	64.2	0.2 U/U	0.3 U/U	3 U/U	3.64	2.06	0.5 U/U	0.067 U/U	43	2.65 J/J	0.3 U/U	0.6 U/U	1 U/U	3.83 J/J	4.89 J/J

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
T - Total (Fraction)
D - Dissolved (Fraction)

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.
J+ - Result is an estimated quantity, but the result may be biased high.

FIGURES



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.

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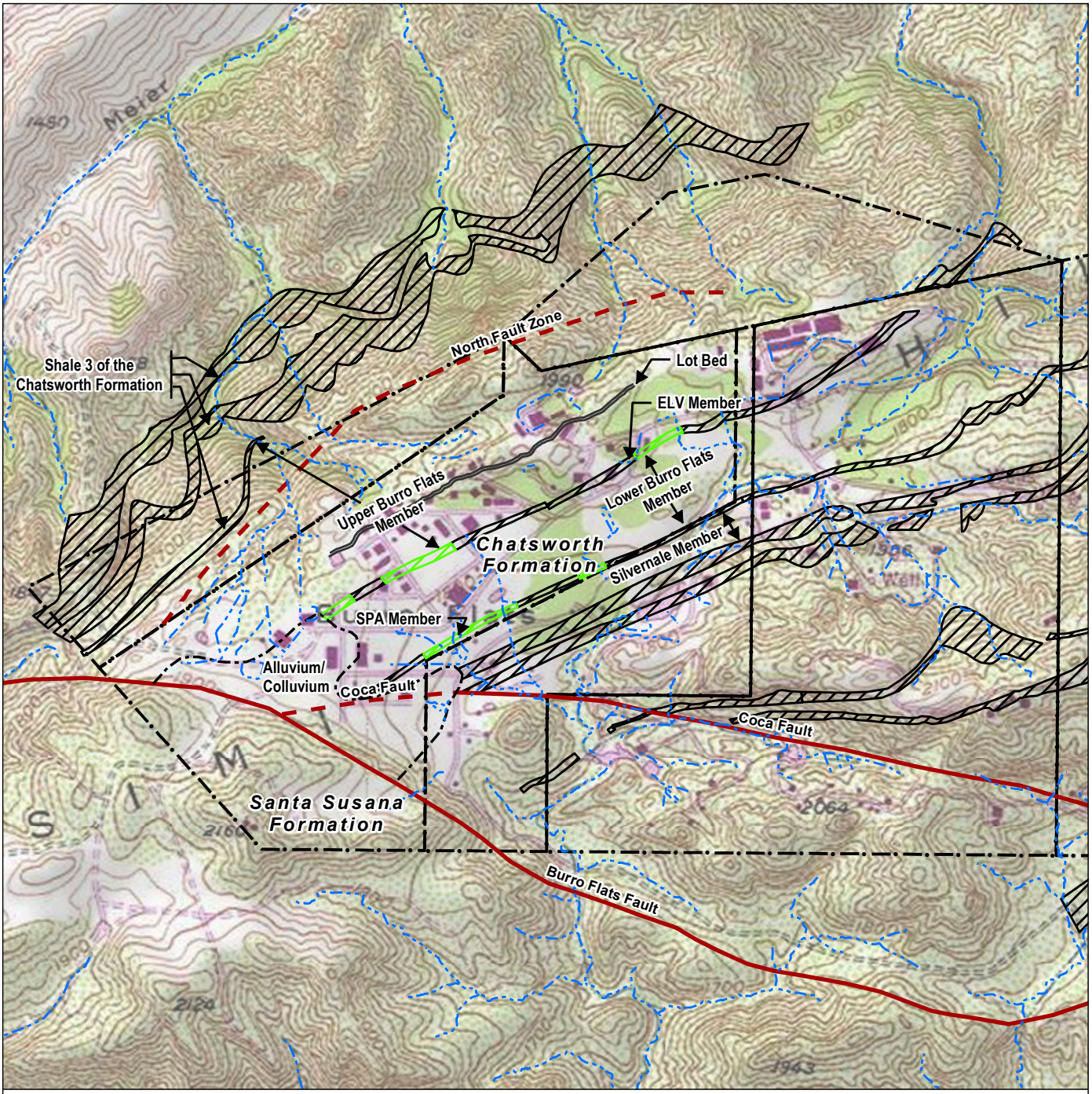
FIGURE 1
Facility Location Map



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

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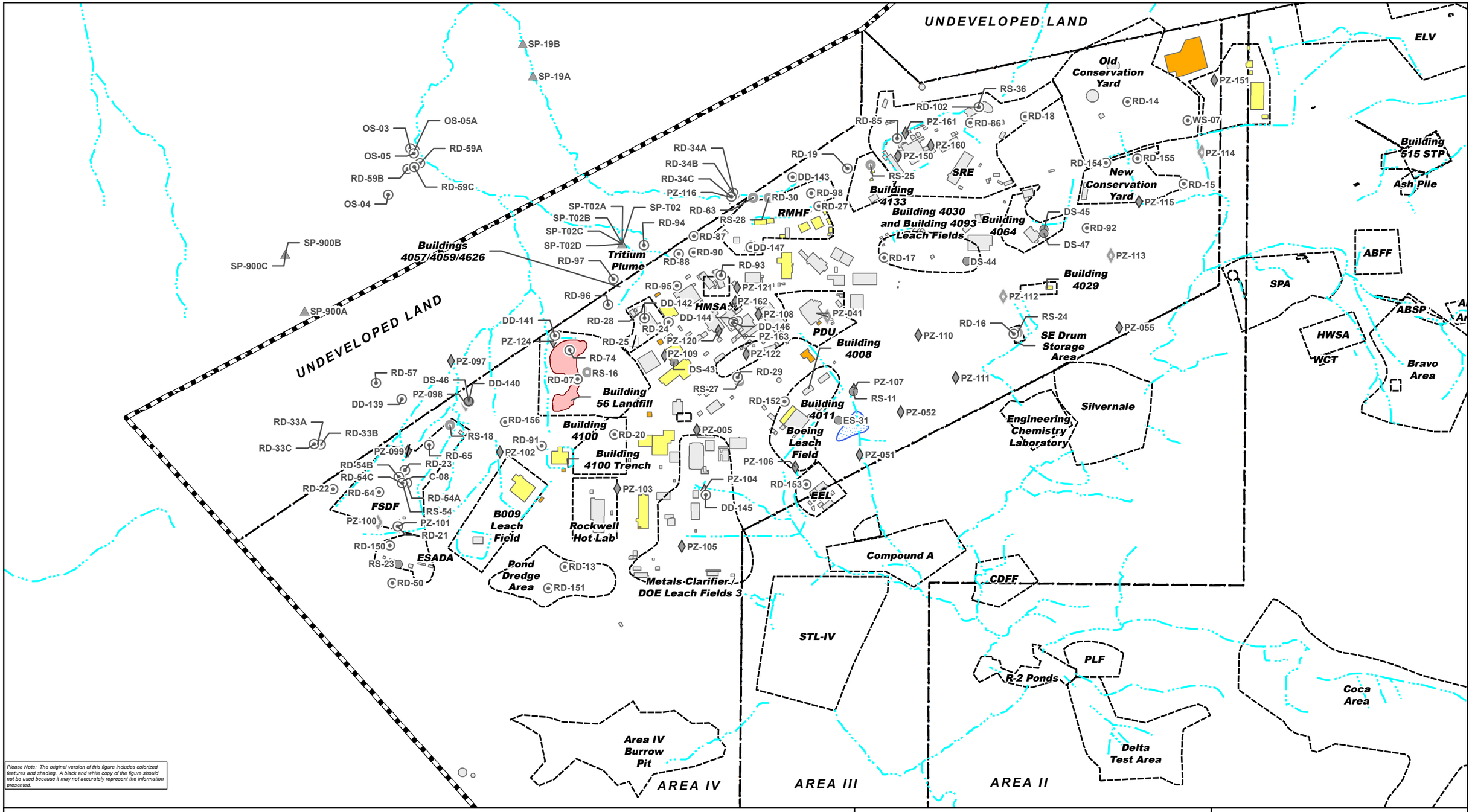
FIGURE 2
SSFL Geologic Map



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.

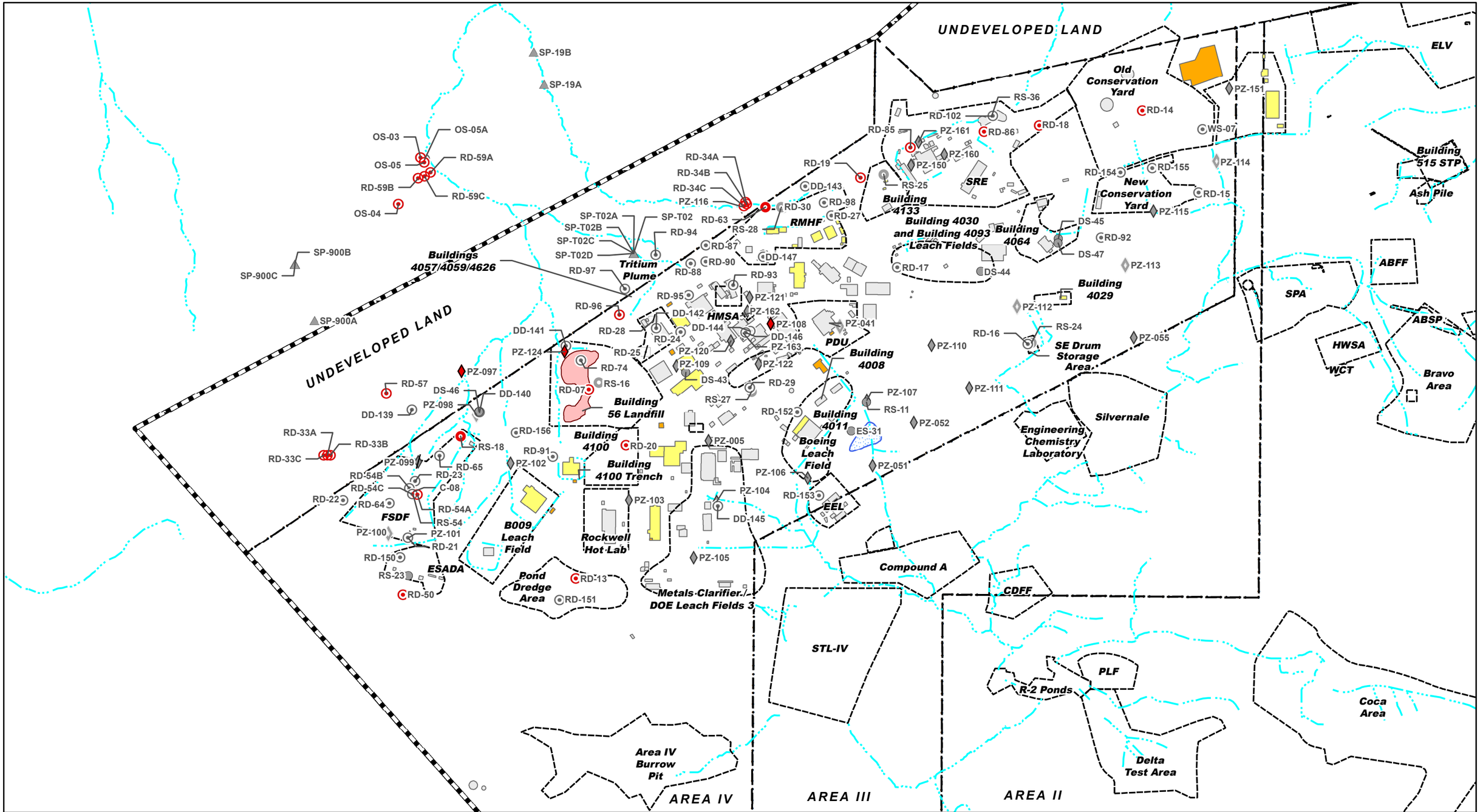
1 inch = 550 feet

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

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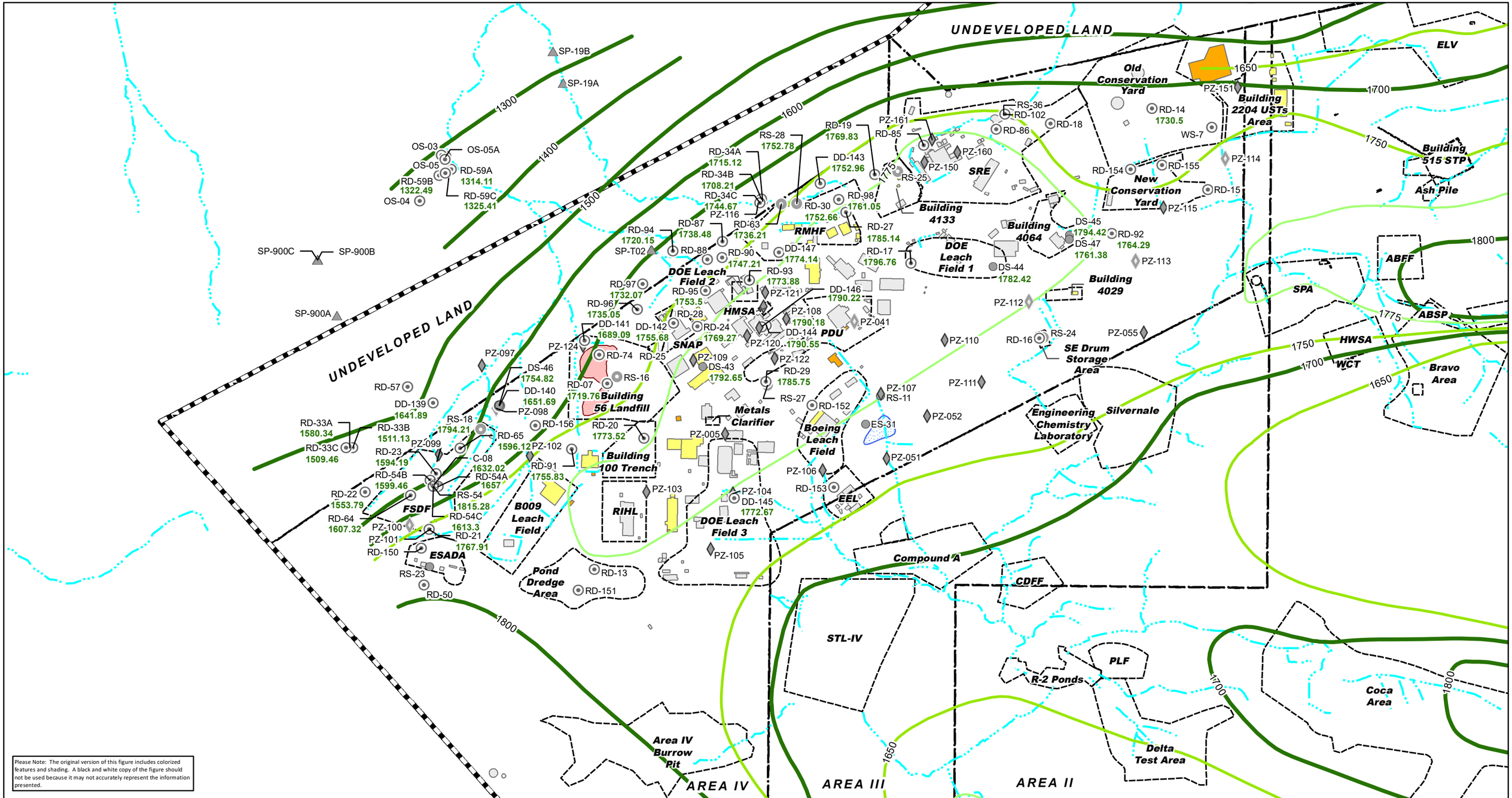

Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.

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:
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 2021; historical water level data for wells and piezometers not gauged during 2021; and the recognition that groundwater level discontinuities coincide with certain fault segments and other geologic structures. Elevations at DD-139, DS-46, RS-18, RS-25, and RS-54 were anomalous and not used for contouring.

1 inch = 550 feet

0 275 550 825 1,100 Feet

NORTHWIND PORTAGE, INC.

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA
AREA IV
GROUNDWATER ELEVATION CONTOUR MAP, 1st Quarter 2021
FIGURE 5

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Appendix A
Quality Assurance Assessment

Appendix A
Quality Assurance Assessment

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Background

The following summarizes the inorganic, metals, organic, and radiochemical data validation completed for 17 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 15, 2021, through March 10, 2021. All of the data for this summary were generated by GEL Laboratories, LLC.

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 17 EPA Level IV sample delivery groups (SDGs) with a total of 74 water samples. SDGs 535670, 537045, and 537646 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 2021 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, 2021.

Sample Type	Number of Samples
Field Samples	40 Samples (9 were designated on the chain-of-custody forms as MS/MSD)
Trip Blanks	10 Samples
Field Blank	1 Sample
Rinsates	14 Samples
Field Duplicates	9 Samples

The samples were analyzed for volatile organic compounds (VOCs), 1,4-dioxane, gasoline-range organics (GRO), diesel-range organics (DRO), dissolved and total metals including mercury, perchlorate, nitrate, fluoride, and dissolved and total radiochemical (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, 2021.

Analysis	Method		Number of Samples Analyzed
Volatile Organic Compounds	USEPA SW-846 8260B		47
1,4-Dioxane	USEPA SW-846 8270D Selective Ion Monitoring (SIM)		35
Gasoline-Range Organics	USEPA SW-846 8015B		16
Diesel-Range Organics	USEPA SW-846 8015B		10
Perchlorate	USEPA SW-846 6850 Modified		19
Nitrate as N	EPA 300.0		3
Fluoride	EPA 300.0		12
Metals (Total & Dissolved)	USEPA SW-846 6020B USEPA SW-846 7470A		38 Total Metals 38 Dissolved Metals
Radiochemical Analyses (Total & Dissolved)	Isotopic U	DOE EML HASL-300, U-02-RC Modified	34 Total Isotopic U 34 Dissolved Isotopic U
	Gamma Spectroscopy	EPA 901.1	34 Total Gamma Spectroscopy 34 Dissolved Gamma Spectroscopy
	Gross Alpha/Beta	EPA 900.0/SW846 9310	34 Total Gross Alpha/Gross Beta 34 Dissolved Gross Alpha/Beta
	Strontium-90 (Sr-90)	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	34 Total Sr-90 34 Dissolved Sr-90
	Radium-226 (Ra-226)	EPA 903.1 Modified	34 Total Ra-226 34 Dissolved Ra-226
	Radium-228 (Ra-228)	EPA 904.0/SW846 9320 Modified	34 Total Ra-228 34 Dissolved Ra-228

Data Quality Summary

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

The SSFL anions data set consists of 3 water samples analyzed for nitrate as N and 12 water samples analyzed for fluoride, which resulted in 15 data points. All 15 data points are considered usable for evaluating site conditions and indicated that:

- 12 data points for fluoride (80% of the total) were either non-detect and identified as "U" or were evaluated and remain unqualified. These results can be considered qualitative data.
- 3 data points for nitrate as N (20% of the total) were qualified with a "J-" or "UJ" validation flag and can be considered as quantitative data.

Perchlorate by USEPA SW-846 Method 6860:

The SSFL perchlorate data set consists of 19 water samples. All 19 data points are considered usable for evaluating site conditions and indicated that:

- 15 data points (78.9% of the total) were either non-detect and identified as "U" or were evaluated and remain unqualified. These results can be considered qualitative data and have been considered usable for evaluating site conditions.
- 4 data points (21.1% of the total) were qualified with a "J" or "UJ" validation flag and can be considered as quantitative data.

Total and Dissolved Metals by USEPA SW-846 Methods 6020B and 7470A:

The SSFL metals data set consists of 38 water samples analyzed for total and dissolved metals including mercury and resulted in 2,052 data points. All 2,052 data points are considered usable for evaluating site conditions and indicated that:

- 1,844 total and dissolved metals data points (89.9% 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.
- 208 total and dissolved metals data points (10.1% 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 16 GRO samples and 10 DRO samples, which resulted in 26 data points for GRO and DRO. All 26 data points are considered usable for evaluating site conditions and indicated that:

- 16 GRO data points and 8 DRO data points (24 data points, 92.3% of the total) were non-detect and qualified with a "U" validation flag. These results can be considered as qualitative data.
- 2 DRO data points (7.7% of the total) were qualified with a "UJ" validation flag and can be considered as quantitative data.

1,4-Dioxane by USEPA SW-846 Method 8270D SIM:

The SSFL 1,4-dioxane data set consists of 35 water samples. All 35 data points are considered usable for evaluating site conditions and indicated that:

- 28 data points for 1,4-dioxane (80% of the total) were either non-detect and identified as "U" or were evaluated and remain unqualified. These results can be considered qualitative data.
- 7 data points for 1,4-dioxane results (20% of the total) were qualified with a "J" validation flag and can be considered as quantitative data.

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

The SSFL VOC data set consists of 47 water samples, which resulted in 2,491 data points. Forty-seven (47) data points were rejected and are considered as unusable for evaluating site conditions, and 2,444 data points are considered usable for evaluating site conditions and indicated that:

- 2,382 data points (95.6% 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.
- 62 data points (2.5% of the total) were qualified "UJ" or "J" and can be considered quantitative data.
- 47 data points (1.9% of the total) were qualified 'R,' rejected, due to exceeded instrument calibration criteria and should not be used in evaluating site conditions.

Radiochemical Analyses:

The SSFL radiochemical data set consists of 34 samples for total and dissolved isotopic uranium, strontium-90 (Sr-90), gamma spectroscopy, gross alpha/gross beta, radium-226 (Ra-226), and radium-228 (Ra-228) which resulted in 3,944 data points. All 3,944 data points are considered usable for evaluating site conditions and indicated that:

- 3,814 data points (96.7% of the total) were statistical non-detects or were considered as truly present in the samples and can be considered qualitative data.
- 130 data points (3.3% of the total) were qualified with a "UJ" or "J" validation flag and can be considered as quantitative data.

Trip Blanks and Field Blanks:

Eleven trip blank samples and one field blank sample were collected for the SSFL Area IV groundwater 2021 sampling effort and are listed in Table E-3.

Table E-3. Trip/field blanks for SSFL Area IV groundwater sampling, 2021.

Sample Delivery Group (SDG)	Sample ID	Analysis	Quality Control (QC) Type
536128	PZ-103_021521_78_L	VOC, GRO	Trip Blank
535670	RD-34A_021721_78_L	VOC	Trip Blank
536135	RD-33C_021821_78_L	VOC	Trip Blank
535831	RD-14_022221_78_L	VOC, GRO	Trip Blank
536183	RD-34B_022521_78_L	VOC	Trip Blank
536571	RD-54A_030121_78_L	VOC, GRO	Trip Blank
536849	RD-17_030321_78_L	VOC	Trip Blank
537045	RD-20_030421_78_L	VOC, GRO	Trip Blank
537137	RD-63_030521_78_L	VOC, GRO	Trip Blank
537645	RD-59B_031021_78_L	VOC, GRO	Trip Blank
	RD-59B_031021_19F_L	VOC, 1,4-Dioxane, GRO, DRO, Total and Dissolved Metals and Radiochemical Analyses, Perchlorate, Fluoride, & Nitrate	Field Blank

Acetone was present in trip blanks RD-34B_022521_78_L and RD-59B_030121_78_L. Acetone and chloroform were present in field blank RD-59B_031021_19F_L. Acetone in two (2) rinsate samples, DD-159_022521_19R_L and DS-48_022621_19R_L, was qualified 'U' due to trip blank considerations. No other qualifications were warranted.

Field Duplicates:

Nine pairs of field duplicates were collected during the SSFL Area IV groundwater 2021 sampling effort and are listed in Table E-4.

Table E-4. Field duplicates for SSFL Area IV groundwater sampling, 2021.

SDG#	Parent ID	Field Duplicate ID	Analysis
535670 (Perchlorate) &537646 (RAD)	RD-50_021721_01_L	RD-50_021721_36_L	Perchlorate, & RAD
535670	RD-34C_021721_01_L	RD-34C_021721_36_L	Fluoride
536849	RD-17_030321_01_L	RD-17_030321_36_L	Metals
536849	RD-07_030321_01_L	RD-07_030321_36_L	VOC and 1,4-Dioxane
537045	RD-20_030421_01_L	RD-20_030421_36_L	Nitrate
537045	RD-14_030421_01_L	RD-14_030421_36_L	GRO
537137	RD-63_030521_01_L	RD-63_030521_36_L	DRO
537137 (VOC) & 537451 (Metals, Perchlorate, & Fluoride)	RD-59C_030521_01_L	RD-59C_030521_36_L	VOC, Metals, Perchlorate, & Fluoride
537137 (1,4-Dioxane) & 537937 RAD	RD-59B_030521_01_L	RD-59B_030521_36_L	1,4-Dioxane & RAD

The following field duplicate precision results exceeded the 35% relative percent difference (%RPD) criterion; however, no qualifications were warranted due to field duplicate considerations:

- Total and dissolved arsenic (57.2% & 61.0%, respectively) in field duplicate pair RD-17_030321_01_L/RD-17_030321_36_L.
- Dissolved copper (59.1%) in field duplicate pair RD-17_030321_01_L/RD-17_030321_36_L.
- Total zinc (55.8%), dissolved iron (64.2%), and dissolved mercury (42.5%) in field duplicate pair RD-59C_030521_01_L/RD-59C_030521_36_L.

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; exceeded holding times, 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 2021 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, 2021.

Analyte	Total # of	Analyte	Total # of
Nitrate as N	3	1	**UJ**
		2	**J-**
Fluoride	12	12	"U" or No Qualification
Perchlorate	19	15	"U" or No Qualification
		2	**UJ**
		2	**J**
Metals	2,052	1844	"U" or No Qualification
		4	**UJ**
		204	**J**
GRO	16	16	"U"
DRO	10	8	"U"
		2	**UJ**
1,4-Dioxane	35	28	"U" or No Qualification
		7	**J**
VOCs	2,491	2,382	"U" or No Qualification
		49	**UJ**
		13	**J**
		47	**R**
Radiochemical Data	3,944	3,814	"U" or Positively Detected in the Sample
		92	**UJ**
		38	**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. Forty-seven (47) sample data points (0.5% 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. Seventy-three (47) sample data points (0.5% 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 2021 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. $$\%Completeness = Vx\frac{100}{n'}$$

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 99.3% 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. Seventy-three (73) sample data points (0.7% 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 2021 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 2021 groundwater sampling, 99.5% of the data validated and reported in this quality assurance summary are suitable for their intended use for site characterization. Forty-seven (47) sample results (0.5%) 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:

- Total and dissolved arsenic (57.2% & 61.0%, respectively) in field duplicate pair RD-17_030321_01_L/RD-17_030321_36_L.
- Dissolved copper (59.1%) in field duplicate pair RD-17_030321_01_L/RD-17_030321_36_L.
- Total zinc (55.8%), dissolved iron (64.2%), and dissolved mercury (42.5%) in field duplicate pair RD-59C_030521_01_L/RD-59C_030521_36_L.

The remaining field duplicate precision criteria were met and all radiological field duplicate error ratio (DER)<2 criterion was 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
536128	TB	PZ-103_021521_78_L	V, G	Trip Blank
	RS-18	RS-18_021521_01_L	V, M, R, P	MS/MSD on Perchlorate
	19R	RS-18_021521_19R_L	V, M, R, P	Rinsate
	PZ-103	PZ-103_021521_01_L	G	MS/MSD on GRO
	PZ-108	PZ-108_021521_01_L	V, M	MS/MSD on VOC and Metals
	DS-48	DS-48_021521_01_L	V, M	
	19R	DS-48_021521_19R_L	V, M. G	Rinsate
535538	RD-34A	RD-34A_021721_01_L	1,4-D	
	RD-34C	RD-34C_021721_01_L	1,4-D	
	RD-50	RD-50_021721_01_L	1,4-D	
	19R	RD-50_021721_19R_L	1,4-D	Rinsate
535670	TB	RD-34A_021721_78_L	V	Trip Blank
	RD-34A	RD-34A_021721_01_L	V, M, F	
	RD-50	RD-50_021721_01_L	V, M, P	
	RD-50	RD-50_021721_36_L	P	Field Duplicate on Perchlorate
	RD-34C	RD-34C_021721_01_L	V, M, F	
	RD-34C	RD-34C_021721_36_L	F	Field Duplicate on Fluoride
	19R	RD-50_021721_19R_L	V, M, P	Rinsate
536135	TB	RD-33C_021821_78_L	V	Trip Blank
	RD-33C	RD-33C_021821_01_L	V, M, P	
	RD-33A	RD-33A_021821_01_L	V, M, P	
	19R	RD-33A_021821_19R_L	V, M, P	Rinsate
535831	TB	RD-14_022221_78_L	V, G	Trip Blank
	RD-19	RD-19_022221_01_L	V, 1,4-D, GD	
	DD-158	DD-158_022221_01_L	V, 1,4-D	
	19R	DD-158_022221_19R_L	V, 1,4-D	Rinsate
536183	TB	RD-34B_022521_78_L	V	Trip Blank
	RD-34B	RD-34B_022521_01_L	V, 1,4-D	
	DD-159	DD-159_022521_01_L	V, 1,4-D	
	19R	DD-159_022521_19R_L	V, 1,4-D	Rinsate
	DD-139	DD-139_022621_01_L	V, 1,4-D	
	DS-48	DS-48_022621_01_L	1,4-D	
	19R	DS-48_022621_19R_L	V, 1,4-D	Rinsate
536890	RD-14	RD-14_022221_01_L	M, F	
	RD-33B	RD-33B_022221_01_L	M, P	
	RD-19	RD-19_022221_01_L	M, F	

SDG	Well or Piezometer ID	Sample	Analyses	QC
	DD-158	DD-158_022221_01_L	M	
	19R	DD-158_022221_19R_L	M	Rinsate
	RD-20	RD-20_022421_01_L	M	
	RD-34B	RD-34B_022521_01_L	M, F	
	DD-159	DD-159_022521_01_L	M	
	19R	DD-159_022521_19R_L	M, F	Rinsate
	DD-139	DD-139_022621_01_L	M, P	
	19R	DS-48_022621_19R_L	M, P	Rinsate
536571	TB	RD-54A_030121_78_L	V, G	Trip Blank
	RD-54A	RD-54A_030121_01_L	V, 1,4-D, M, P, GD	
	19R	RD-54A_030121_19R_L	V, 1,4-D, M, P, GD	Rinsate
	RS-18	RS-18_030221_01_L	1,4-D	
	PZ-103	PZ-103_030221_01_L	D	MS/MSD for DRO
	PZ-108	PZ-108_030221_01_L	1,4-D	MS/MSD for 1,4-Dioxane
	19R	PZ-108_030221_19R_L	1,4-D, D	Rinsate
536849	TB	RD-17_030321_78_L	V	Trip Blank
	RD-17	RD-17_030321_01_L	M	
	RD-17	RD-17_030321_36_L	M	Field Duplicate on Metals
	RD-07	RD-07_030321_01_L	V, 1,4-D, M	
	RD-07	RD-07_030321_36_L	V, 1,4-D	Field Duplicate on VOC and 1,4-Dioxane
	19R	RD-07_030321_19R_L	V, 1,4-D, M	Rinsate
537045	TB	RD-20_030421_78_L	V, G	Trip Blank
	RD-20	RD-20_030421_01_L	V, 1,4-D, N	MS/MSD on Nitrate
	RD-20	RD-20_030421_36_L	N	Field Duplicate on Nitrate
	RD-33A	RD-33A_030421_01_L	1,4-D	
	RD-96	RD-96_030421_01_L	V, 1,4-D, GD, M, P	
	RD-33C	RD-33C_030421_01_L	1,4-D	
	RD-14	RD-14_030421_01_L	V, 1,4-D, GD	
	RD-14	RD-14_030421_36_L	G	Field Duplicate on GRO
	DD-157	DD-157_030421_01_L	V, 1,4-D, M	
	19R	DD-157_030421_19R_L	V, 1,4-D, M	Rinsate
537137	TB	RD-63_030521_78_L	V, G	Trip Blank
	RD-63	RD-63_030521_01_L	V, 1,4-D, GD	
	RD-63	RD-63_030521_36_L	D	Field Duplicate on DRO
	RD-59A	RD-59A_030521_01_L	V, 1,4-D	
	RD-59C	RD-59C_030521_01_L	V, 1,4-D	MS/MSD on 1,4-Dioxane

SDG	Well or Piezometer ID	Sample	Analyses	QC
	RD-59C	RD-59C_030521_36_L	V	Field Duplicate on VOC
	RD-33B	RD-33B_030521_01_L	V, 1,4-D	
	RD-59B	RD-59B_030521_01_L	V, 1,4-D	MS/MSD on VOC
	RD-59B	RD-59B_030521_36_L	1,4-D	Field Duplicate on 1,4-Dioxane
537451	RD-63	RD-63_030521_01_L	M	
	RD-59A	RD-59A_030521_01_L	M, P, F	
	RD-59C	RD-59C_030521_01_L	M, P, F	
	RD-59C	RD-59C_030521_36_L	M, P, F	Field Duplicate on Metals, Perchlorate, & Fluoride
	RD-59B	RD-59B_030521_01_L	M, P, F	MS/MSD on Metals, Perchlorate, & Fluoride
537645	TB	RD-59B_031021_78_L	V, G	Trip Blank
	19F	RD-59B_031021_19F_L	V, 1,4-D, GD, M, P, F, N	Field Blank
536577	RD-07	RD-07_021621_01_L	R	
	19R	RD-07_021621_19R_L	R	Rinsate
	RD-17	RD-17_021621_01_L	R	MS/MSD on RAD
	19R	RD-17_021621_19R_L	R	Rinsate
537646	RD-50	RD-50_021721_01_L	R	
	RD-50	RD-50_021721_36_L	R	Field Duplicate on RAD
	19R	RD-50_021721_19R_L	R	Rinsate
	RD-34A	RD-34A_021721_01_L	R	
	RD-34C	RD-34C_021721_01_L	R	
	RD-33C	RD-33C_021821_01_L	R	
	RD-33A	RD-33A_021821_01_L	R	
	19R	RD-33A_021821_19R_L	R	Rinsate
	RD-63	RD-63_021921_01_L	R	
537677	RS-28	RS-28_021921_01_L	R	
	RD-96	RD-96_021921_01_L	R	
	19R	DD-157_021921_19R_L	R	Rinsate
	RD-14	RD-14_022221_01_L	R	
	RD-33B	RD-33B_022221_01_L	R	
	RD-19	RD-19_022221_01_L	R	
	DD-158	DD-158_022221_01_L	R	
	19R	DD-158_022221_19R_L	R	Rinsate
	RD-20	RD-20_022421_01_L	R	
537937	RD-34B	RD-34B_022521_01_L	R	
	DD-159	DD-159_022521_01_L	R	
	19R	DD-159_022521_19R_L	R	Rinsate
	RD-54A	RD-54A_030121_01_L	R	

SDG	Well or Piezometer ID	Sample	Analyses	QC
	19R	RD-54A_030121_19R_L	R	Rinsate
	RD-59A	RD-59A_030521_01_L	R	
	RD-59C	RD-59C_030521_01_L	R	MS/MSD on RAD
	RD-59B	RD-59B_030521_01_L	R	
	RD-59B	RD-59B_030521_36_L	R	Field Duplicate on RAD
	19F	RD-59B_031021_19F_L	R	Field Blank

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

V = volatile organic compounds (VOCs)
G= gasoline range organics (GRO) and/or diesel range organics
D=diesel range organics (DRO)
M = metals, P = perchlorate
N = nitrate as N, F = fluoride
R = radiochemical analyses
1,4-D = 1,4-dioxane

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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.*