

2025
Annual Site Environmental Report

***Department of Energy Operations at the
Energy Technology Engineering Center –
Area IV
Santa Susana Field Laboratory***



October 2026

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U.S. Department of Energy

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CERTIFICATE OF ACCURACY

I certify that I have personally examined, and am familiar with, the information submitted herein and, based on inquiry of those individuals immediately responsible for preparing this report, believe that the submitted information is true, accurate, and complete.

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October 2026

DOE CERTIFICATION LETTER

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ACRONYMS

μCi/mL	microcuries per milliliter
μg/L	micrograms per liter
AOC	Administrative Order on Consent
ASME	American Society of Mechanical Engineers
BCG	biota concentration guide
bgs	below ground surface
BMP	best management practice
Boeing	The Boeing Company
BTV	background threshold value
CAA	Clean Air Act
Cal-EPA	California Environmental Protection Agency
CDM	Camp Dresser & McKee
CDPH	California Department of Public Health
CFR	Code of Federal Regulations
CMS	Corrective Measures Study
CO	carbon monoxide
Co-60	cobalt-60
CoC	chain of custody
Cs-137	cesium-137
DCS	derived concentration standard
DD&R	Deactivation, Decommissioning, and Removal
DPH/RHB	Department of Public Health/Radiological Health Branch
DMR	discharge monitoring report
DOE	Department of Energy
DRO	diesel-range organic
DTSC	Department of Toxic Substances Control
EA	environmental assessment

EFH	extractable fuel hydrocarbons
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ETEC	Energy Technology Engineering Center
Eu-152	europium-152
FONSI	Finding of No Significant Impact
FR	Federal Register
FSDF	Former Sodium Disposal Facility
GRO	gasoline-range organic
GWIM	groundwater interim measure
H-3	tritium
HMSA	Hazardous Materials Storage Area
HWMF	Hazardous Waste Management Facility
IDIQ	Master Indefinite Delivery/Indefinite Quantity
LARWQCB	Los Angeles Regional Water Quality Control Board
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LUT	look-up table
MBTA	Migratory Bird Treaty Act
MDL	method detection limit
MEI	maximally exposed individual
mg/L	milligrams per liter
mG/day	milligray per day
MOU	memorandum of understanding
mR/y	milli-Roentgen per year
mrem/y	millirem per year
MRL	method reporting limit
MS	matrix spike

MSD	matrix spike duplicate
NAAQS	National Ambient Air Quality Standards
NA	not applicable
NASA	National Aeronautics and Space Administration
NBZ	Northern Buffer Zone
NDMA	N-nitrosodimethylamine
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO ₂	nitrogen dioxide
NOA	notice of availability
NOI	notice of intent
NOM	natural organic material
North Wind	North Wind Portage, Inc.
NPDES	National Pollutant Discharge Elimination System
O ₃	ozone
OCY	Old Conservation Yard
OSLD	optically stimulated luminescent detector
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PFAS	per- and polyfluoroalkyl substances
PM _{2.5}	2.5-micron particulate matter
PM ₁₀	10-micron particulate matter
QA	quality assurance
QAPP	Quality Assurance Program Plan
QAPP-GW	Quality Assurance Project Plan for Groundwater

QC	quality control
R&D	research and development
Ra-226	radium-226
Ra-228	radium-228
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RHB	Radiological Health Branch
RMHF	Radioactive Materials Handling Facility
ROD	record of decision
RPD	relative percent difference
RL	reporting limit
SDG	sample delivery group
SEIS	supplemental environmental impact statement
SETF	SNAP Environmental Test Facility
SIM	selective ion monitoring
SIP	State Implementation Plan
SNAP	Systems for Nuclear Auxiliary Power
SO ₂	sulfur dioxide
SOP	standard operating procedure
SPCC	spill prevention, control, and countermeasure
SPTF/CHCF	Sodium Pump Test Facility / Component Handling & Cleaning Facility
Sr-90	strontium-90
SRE	Sodium Reactor Experiment
SSFL	Santa Susana Field Laboratory
STP	Site Treatment Plan
SVOC	semi-volatile organic compound
TCA	trichloroethane
TCE	trichloroethene
TEQ	toxic equivalency

TLD	thermoluminescent dosimeter
TO-15	Toxic Organics Method 15
TPH	total petroleum hydrocarbons
U	uranium
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
VCAPCD	Ventura County Air Pollution Control District
VOC	volatile organic compound
WQSAP	Water Quality Sampling and Analysis Plan

1. EXECUTIVE SUMMARY

The 2025 Annual Site Environmental Report describes the environmental conditions related to work performed for the U.S. Department of Energy (DOE) at Area IV of the Santa Susana Field Laboratory (SSFL) as required by DOE Order (O) 231.1B, Administrative Change 1, “Environment, Safety and Health Reporting” (DOE 2011b). This report is used to communicate internally to DOE and externally to the public, environmental monitoring results, and the state of environmental conditions related to DOE activities in Area IV of the SSFL. The report summarizes:

- Environmental management performance for DOE activities (e.g., environmental monitoring of effluents and estimated radiological doses to the public from releases of radioactive materials)
- Environmental occurrences and responses reported during the calendar year
- Compliance with environmental standards and requirements
- Significant programs and efforts related to environmental management.

In 2025, DOE continued implementation of routine environmental monitoring, surveillance, and maintenance activities at Area IV of the SSFL. This included quarterly perimeter air monitoring and dosimetry, quarterly radiation and contamination surveys at the Radioactive Materials Handling Facility (RMHF), and both quarterly groundwater level monitoring and annual groundwater sampling and reporting. Quarterly surface water reporting was also conducted and reported to The Boeing Company (Boeing). Ongoing surveillance and maintenance tasks included inspection and upkeep of DOE infrastructure, vegetation control, road maintenance, and ensuring the structural integrity and operability of groundwater monitoring wells. Additionally, groundwater management activities at the Building 4024 basement involved regular inspection, monitoring, pumping, storage, transport, and off-site disposal of infiltrated groundwater. These actions support regulatory compliance and environmental stewardship in alignment with DOE’s cleanup responsibilities at SSFL.

Results of the radiological monitoring program continue to indicate that there were no significant releases of radioactive material from Area IV at the SSFL. All potential exposure pathways were sampled and/or monitored, including air, soil, surface water, groundwater, direct radiation, transfer of property (i.e., land, structures, and/or waste), and recycling. No radioactive waste was processed for disposal during 2025. No liquid radioactive waste was released into the environment.

Additional groundwater-related activities performed across Area IV during 2025 included quarterly sitewide groundwater monitoring and sampling; continued operation, maintenance, monitoring, sampling, and extraction and disposal of contaminated groundwater as part of the Groundwater Interim Measure (GWIM) at the Former Sodium Disposal Facility (FSDF); and annual sampling of near-surface seep wells in the Northern Buffer Zone (NBZ) and on neighboring Brandeis University property.

Key 2025 accomplishments outside of routine monitoring included the following:

- Implementation of a groundwater pilot study at the Hazardous Materials Storage Area (HMSA)
- Continued revisions of the groundwater Corrective Measures Study (CMS) in support of the Resource Conservation and Recovery Act (RCRA) process
- Initial sampling for the per- and polyfluoroalkyl substances (PFAS) groundwater investigation
- Initiation of the draft Method Reporting Limit (MRL) study report
- Completion of a supplemental background soil investigation to develop new background threshold values (BTVs) and initiation of the draft report
- Evaluation of off-site backfill material sources used to replace contaminated soil anticipated for removal from SSFL
- Drafting of Building 4024 Systems for Nuclear Auxiliary Power (SNAP) Environmental Test Facility (SETF) basement demolition plan and supporting documents, and initiation of supporting field preparation activities.

These achievements reflect DOE's continued commitment to regulatory compliance, environmental stewardship, and transparent coordination with the Department of Toxic Substances Control (DTSC) and stakeholders.

The following sections in this report provide information related to ensuring protection of human health and the environment for DOE's operations in Area IV:

- **Section 2, Introduction**—Highlights the location, setting, and mission of DOE operations at SSFL.
- **Section 3, Compliance Summary**—Identifies and provides the status of applicable permits and other regulatory requirements for DOE's closure mission.
- **Section 4, Environmental Management System**—Summarizes the programs in place to characterize, monitor, and respond to known or potential releases to the environment that may pose a threat to human health and the environment.
- **Section 5, Environmental Non-Radiological Program Information**—Summarizes the data collection activities and associated results for non-radiological contaminants.
- **Section 6, Environmental Radiological Protection Program and Dose Assessment**—Summarizes the data collection activities and associated results for radiological contaminants.
- **Section 7, Groundwater Protection and Monitoring Program**—Addresses collection and analysis of groundwater samples and measurement of the water levels at SSFL.
- **Section 8, Ambient Air Monitoring Program**—Addresses daily air monitoring, along with the collection and analysis of air samples at SSFL.
- **Section 9, Soil Program**—Summarizes soil investigation with the objectives of determining the nature and extent of chemicals in soil and the potential threat to groundwater.

- **Section 10, Quality Assurance Program**—Summarizes the quality assurance/quality control (QA/QC) elements incorporated into the data analysis program.

2. INTRODUCTION

This Annual Site Environmental Report (ASER) presents DOE's environmental monitoring results, compliance status, and site stewardship activities conducted in 2025 at Area IV of the SSFL located in Ventura County, California.

The mission of DOE at SSFL Area IV is to safely manage and remediate legacy contamination resulting from past nuclear and energy-related operations, while protecting human health and the environment. This includes ongoing environmental monitoring, waste management, remediation efforts, and regulatory compliance to support site closure goals.

During calendar year 2025, DOE's primary operations at Area IV focused on:

- Conducting environmental monitoring and sampling of air, groundwater, soil, and surface water to assess radiological and chemical conditions.
- Continuing remediation and waste management activities to address legacy contamination.
- Implementation of decontamination and decommissioning of inactive legacy site areas and structures.
- Ongoing surveillance, inspection, and maintenance of Area IV property, remaining infrastructure, monitoring and remediation equipment, facilities, and related assets to ensure continued operability.
- Coordinating with regulatory agencies and stakeholders to maintain compliance with applicable environmental requirements.
- Preparing technical documentation to support decision-making related to site closure and long-term stewardship.

This report fulfills the requirements of DOE O 231.1B, "Environment, Safety and Health Reporting," and DOE O 458.1, "Radiation Protection of the Public and the Environment." It provides:

- A summary of site operations, environmental setting, and regulatory context,
- A summary of environmental monitoring programs and results,
- Evaluation of environmental compliance with applicable federal, state, and local regulations,
- Radiological and chemical calculations verifying no associated public exposure, and
- Ongoing progress updates regarding remediation, closure, and legacy management efforts.

The data and analyses in this report are intended to inform site managers, regulators, and the public of DOE's environmental stewardship at Area IV, reflecting a commitment to transparency and environmental protection.

2.1 Site Location and Setting

The SSFL site occupies 2,850 acres located in the Simi Hills of Ventura County, California, approximately 48 kilometers (km) (30 miles) northwest of downtown Los Angeles. SSFL is situated on rugged terrain with elevations at the site varying from 500 to 700 meters (m) (1,640 to 2,250 feet [ft]) above sea level. The location of the SSFL site in relation to nearby communities is shown in Figure 2-1. No significant agricultural land use exists within 30 km (19 miles) of the SSFL site. Undeveloped land surrounds most of the SSFL site.

Boeing owns the majority of the site, which is divided into four administrative areas (Areas I through IV) and undeveloped land (Table 2-1). Figure 2-2 illustrates the arrangement of the site. Area IV consists of approximately 290 acres, of which DOE leased 90 acres. Boeing and DOE-operated facilities (Figures 2-3 and 2-4) share the Area IV portion of this site. While the land immediately surrounding Area IV is undeveloped, suburban residential areas are at greater distances from Area IV. The community of Santa Susana Knolls lies 4.8 km (3.0 miles) to the northeast, the Bell Canyon area begins approximately 2.3 km (1.4 miles) to the southeast, and the American Jewish University is adjacent to the north. Except for the Pacific Ocean, which is approximately 20 km (12 miles) south, no recreational body of water of noteworthy size is located in the surrounding area. Four major reservoirs providing domestic water to the greater Los Angeles area are located within 50 km (30 miles) of SSFL; the closest to SSFL (Bard Reservoir, near the west end of Simi Valley) is more than 10 km (6 miles) from Area IV.

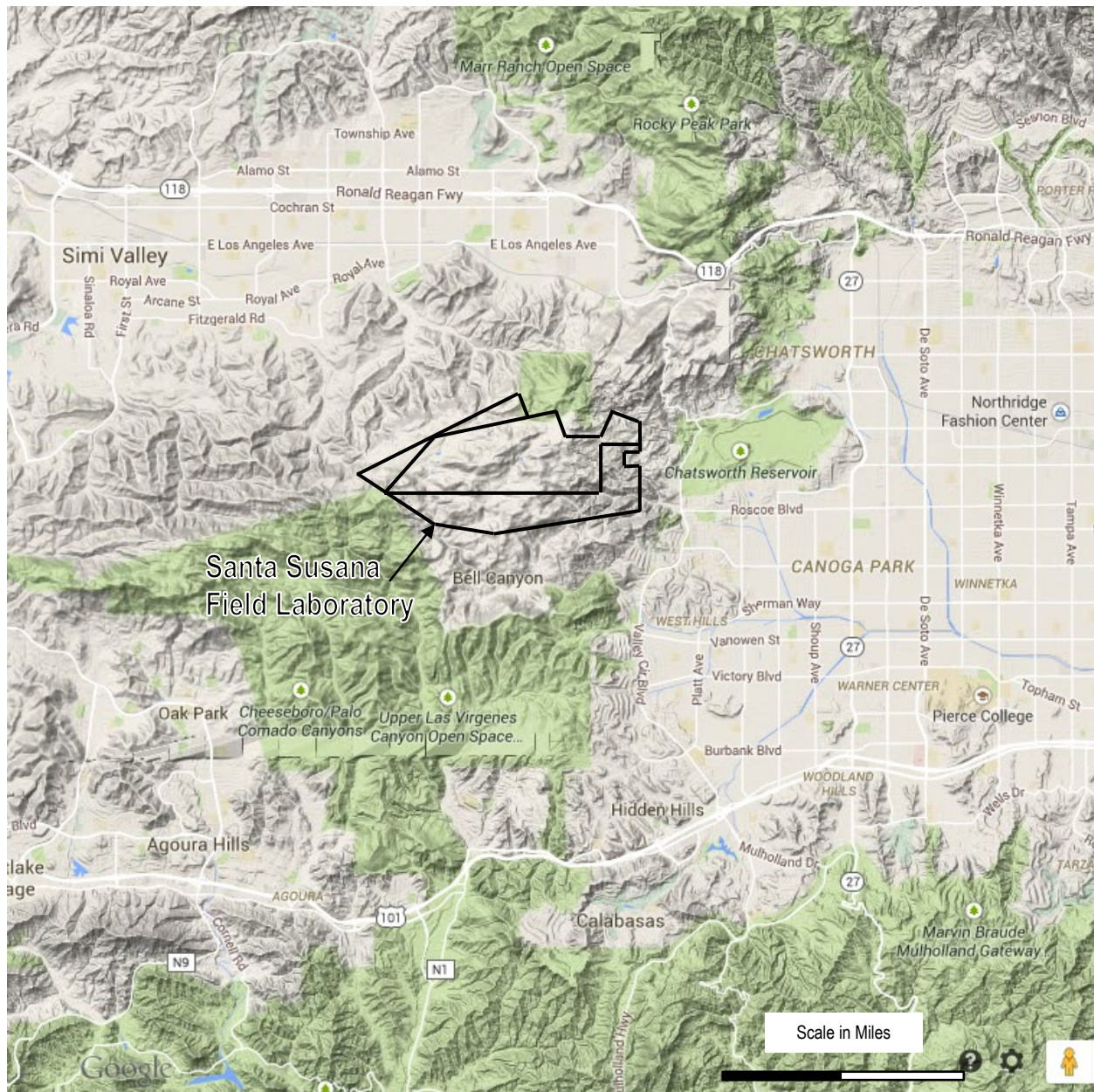


Figure 2-1. Map Showing Location of SSFL

Table 2-1. Owners and Size of Administrative Areas at SSFL

Subdivisions			
Owner	Jurisdiction	Acres	Subtotals
Boeing	Boeing—Area IV (DOE leased)	289.9	2,399.3
	Boeing—Areas I and III	784.8	
	Boeing (Undeveloped land)	1,324.6	
U.S. Government	NASA (former AFP 57)	409.5	451.2
	NASA (former AFP 64)	41.7	
Total Acres			2,850.5

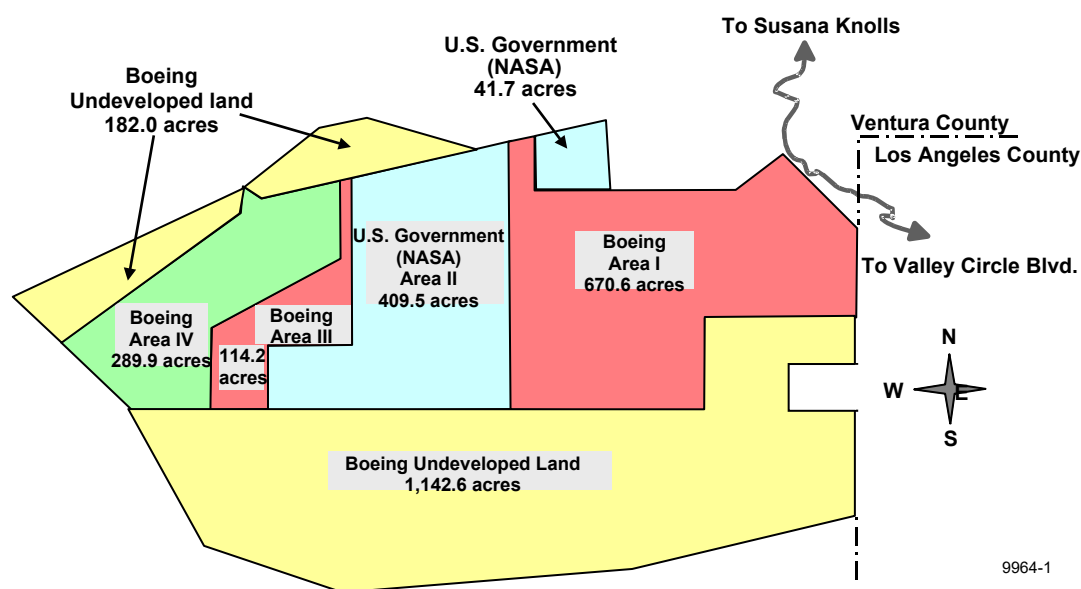


Figure 2-2. Santa Susana Field Laboratory Site Arrangement



Figure 2-3. Santa Susana Field Laboratory Site, Area IV

2.2 Operational History

SSFL has been used for various research, development, and test projects funded by several U.S. Government agencies, including DOE, Department of Defense, and National Aeronautics and Space Administration (NASA). Since 1956, various research and development (R&D) projects had been conducted in Area IV, including small tests and demonstrations of reactors and critical assemblies, fabrication of reactor fuel elements, and disassembly and de-cladding of irradiated fuel elements. Details for these projects can be found at the DOE website devoted to the ETEC closure (<https://www.energy.gov/>).

All nuclear R&D operations in Area IV ceased in 1988. The only work related to nuclear operations after 1988 has been the cleanup and decontamination of the remaining inactive radiological facilities and off-site disposal of radioactive waste. Environmental remediation and restoration activities at the ETEC Area IV of the SSFL are conducted as directed by the DOE. Since 2014, North Wind Portage, Inc. has been the prime contractor supporting the DOE's cleanup efforts.

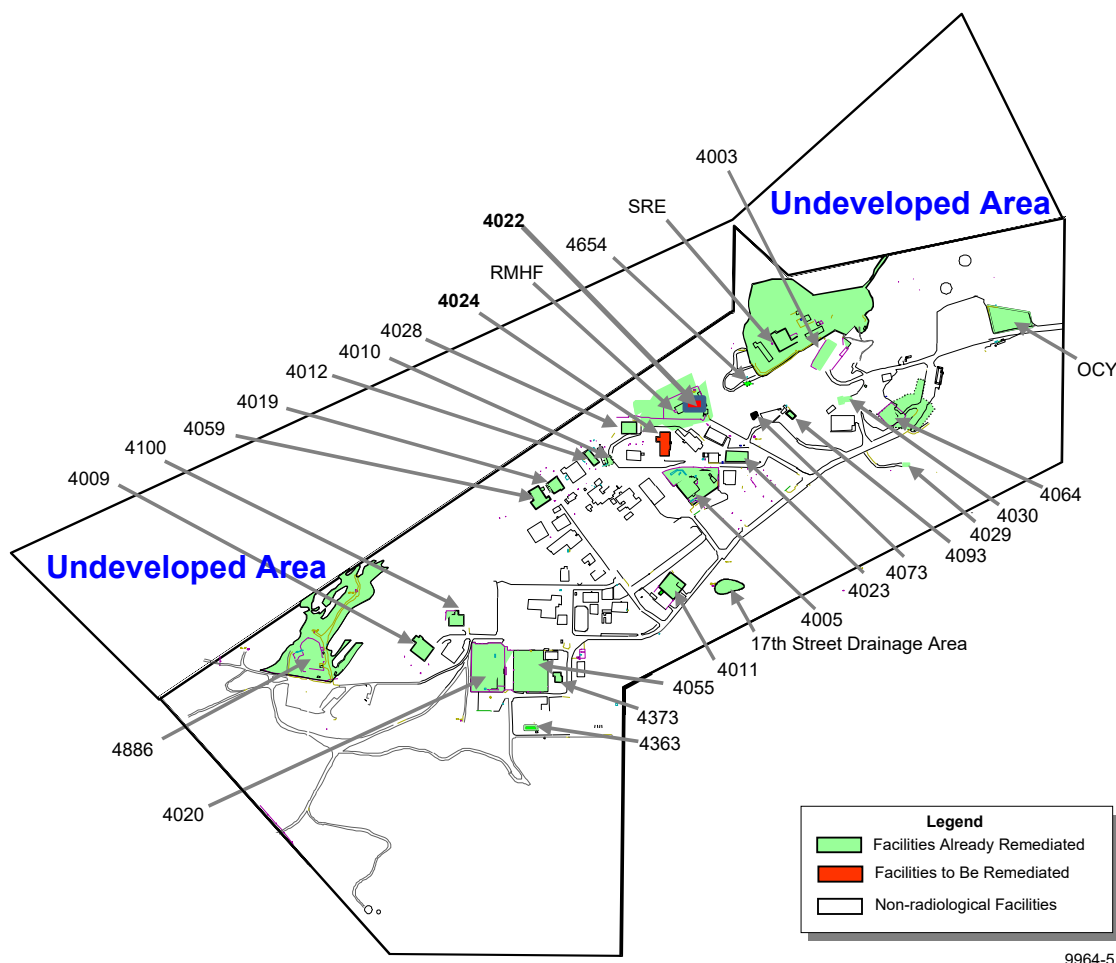


Figure 2-4. Map of Former and Current Radiological Facilities in Area IV

2.3 Facility Descriptions

A total of 28 radiological facilities operated in Area IV during its operational history (see Figure 2-4). As of the end of 2014, 20 facilities had been released for unrestricted use and four had been declared suitable for unrestricted release by DOE. The RMHF above-grade building structures were demolished in 2020. The vaults below Building 4022 at the RMHF are still present and will be remediated in the future. The other DOE-owned buildings (4019, 4024, and 4029) were demolished in 2020. The basement associated with Building 4024 is still present, and demolition is anticipated in the future (see Figure 2-4). Four remaining former radiological facilities in Area IV have been declared free of contamination and are owned by Boeing: Buildings 4009, 4011, 4055, and 4100.

In addition to radiological facilities, two inactive sodium and related liquid metal test facilities (Sodium Pump Test Facility/Component Handling & Cleaning Facility [SPTF/CHCF] and the Hazardous Waste Management Facility [HWMF]) were located in Area IV, as well as various support facilities. These were constructed at SSFL to support development testing of components

for liquid metal electrical power production systems. These facilities underwent closure and above-grade demolition in 2020.

2.3.1 Radiological Facilities

2.3.1.1 Radioactive Materials Handling Facility

The RMHF complex consisted of Buildings 4021, 4022, 4034, 4044, 4075, 4563, 4621, 4658, 4663, 4665, and 4688, with the above-grade portions of the buildings demolished in 2020. Sump 4614 was a holdup pond located at the base of the drainage channel west of the RMHF complex. The use of the pond was discontinued, and the pond was excavated in 2006. The drainage channel and pond have been replaced with an above-ground storage tank that receives storm water runoff from the RMHF via a drainage pipe.

Historical operations at RMHF included processing, packaging, and temporary storage of radioactive waste materials for off-site disposal at DOE-approved facilities. The radioactive waste included uranium, plutonium, mixed fission products such as cesium-137 (Cs-137), strontium-90 (Sr-90), and activation products, including cobalt-60 (Co-60), europium-152 (Eu-152), and tritium (H-3).

Historically, effluents were released into the atmosphere through the stack at the RMHF, and no radioactive liquid effluents were released from the facility. DOE developed a RCRA closure plan for Buildings 4021, 4022, and 4621 of the RMHF complex, collectively permitted as an Interim Status (Part A) facility, which DTSC approved on August 14, 2020. Demolition of the RMHF structures was completed in November 2020. The Phase 1 Closure Plan, which addresses the demolition of all above-grade building structures, was completed, and accepted by DTSC on August 14, 2020.

2.3.1.2 Building 4024

Building 4024, SETF, housed four experimental reactor systems in the 1960s. Following the termination of the experimental projects, all equipment and fuel were removed from the facility. The shielding concrete in the vaults has low-level activation products, including Co-60 and Eu-152. Building remediation began in 2004, and portions of the building used to support the office space and the mechanical ventilation systems were demolished.

The ventilation stack was removed, and a geophysical study supporting final building demolition was completed. In 2007, the final demolition of the building was put on hold by DOE pending completion of the environmental impact statement (EIS). The Final EIS was issued in November 2018, asbestos abatement was performed in 2020, and demolition of above-grade structures was completed in May 2021.

Figure 2-5 shows the above-ground structures that have been demolished to date and the four remaining buildings owned by Boeing.

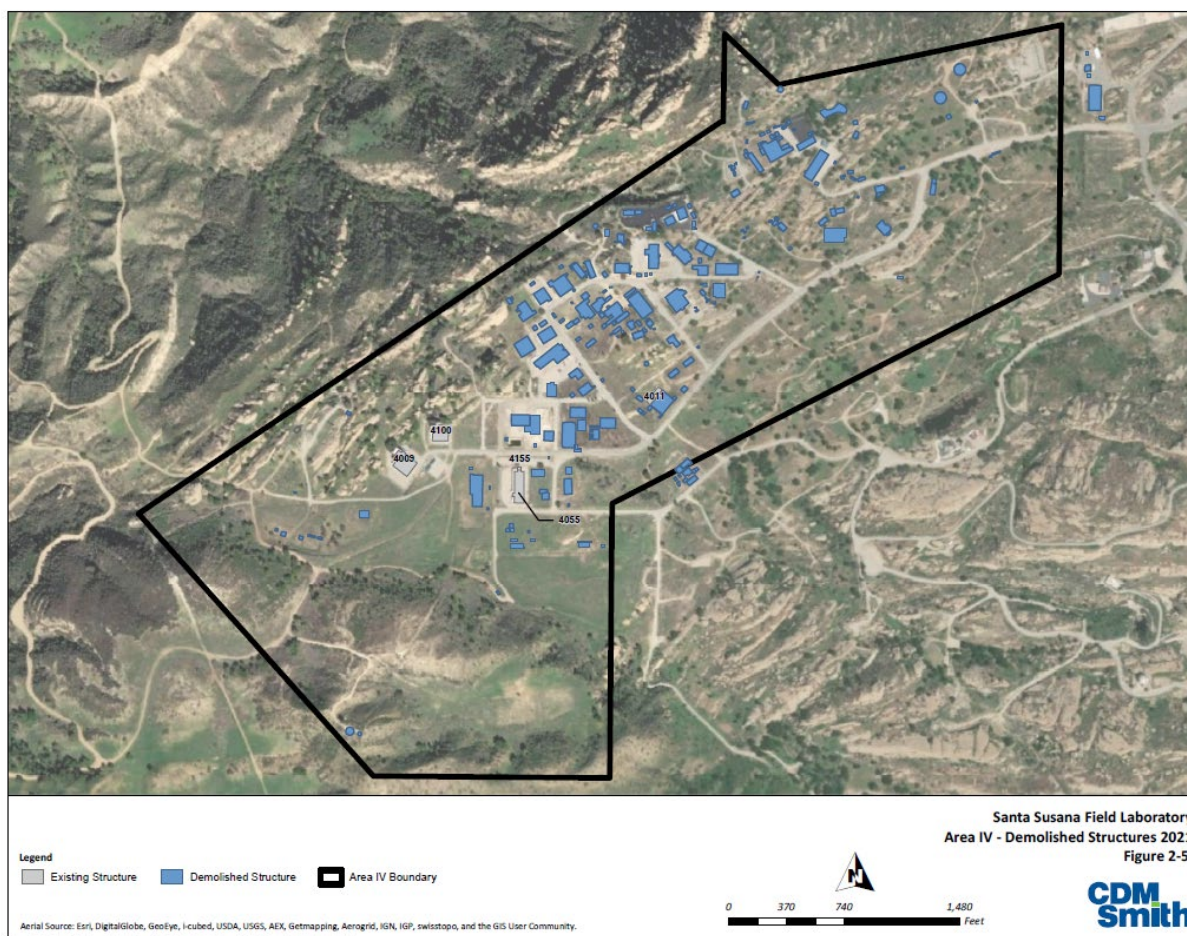


Figure 2-5. Area IV – Existing and Demolished Structures

2.3.2 Former Sodium Facilities

2.3.2.1 Sodium Pump Test Facility / Component Handling & Cleaning Facility

All utility connections to the SPTF/CHCF buildings were severed in 2007. Demolition of Building 4461 was completed in early 2007. In May 2007, DOE halted demolition and the remaining buildings (4462 and 4463) were placed into a safe shutdown condition. Asbestos abatement started in 2020, and demolition was completed in October 2021.

2.3.2.2 Hazardous Waste Management Facility

Historical operations at the HWMF performed under the RCRA permit included the storage of sodium, sodium-potassium, or lithium waste or equipment contaminated with these metals at Building 4029; transfer of the wastes and contaminated equipment to Building 4133; and treatment of the metal wastes and contaminated equipment at Building 4133. At Building 4133, the metal waste treated was placed in an iron bowl in a metal-lined treatment chamber. The bowl was heated using natural gas, and the waste metals reacted with the air to form metal oxides. The metal oxides were then removed from the air with an air pollution control device (an air

scrubber) under a Ventura County Air Pollution Control District (VCAPCD) Permit. After the heat treatment, the residual metal oxides were rinsed from the inside of the treatment chamber with water. The air scrubber produced liquid wastewater which, along with the treatment chamber rinse water, was drained to a below-grade tank and then pumped to an above-ground tank for temporary storage. Both tanks were located within the Building 4133 boundary. The alkali wastewater was transferred to wastewater trucks for off-site disposal.

The HWMF was approved for closure and demolition by the DTSC in 2006. In May 2007, DOE halted plans for demolition pending completion of the EIS. The EIS was finalized in November 2018. DOE developed a RCRA closure plan for the HWMF, which DTSC approved on November 9, 2020. Phase 1 of the closure plan, which addresses the demolition of all above-grade building structures, was initiated in 2020. Both buildings were demolished in November/December 2020.

3. COMPLIANCE STATUS

3.1 Compliance Status Overview

The ETEC site is subject to various environmental statutes and regulations as well as DOE and Executive Orders as discussed in the following sections. In 2025, the site successfully complied with all applicable requirements, with no regulatory violations, permit deviations, or environmental releases noted.

Compliance obligations are presented in Table 3-1. Table 3-2 lists the permits applicable to activities in Area IV. Table 3-3 states that no violations occurred in 2025. Two regulatory agencies with oversight responsibilities made visits to the site during 2025, as presented in Table 3-4.

Table 3-1. Environmental Compliance Obligations Overview

Regulation Requirement	2025 Compliance Overview	Reference Section
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA)	NA	NA
Emergency Planning and Community Right-to-Know Act (EPCRA)	Compliant	3.2.1.1
Resource Conservation and Recovery Act (RCRA), Hazardous and Solid Waste Amendments of 1984 (HSWA), and Pollution Prevention Act (PPA)	Compliant	3.2.1.2
Federal Facilities Compliance Act (FFCA)	Compliant	3.2.1.3
National Environmental Policy Act (NEPA)	Compliant	3.2.1.4
Toxic Substances Control Act (TSCA)	NA	NA
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	NA	NA
Atomic Energy Act of 1954 (AEA)	Compliant	3.2.2
DOE O 458.1, Radiation Protection of the Public and the Environment, Chg 4, 2020	Compliant	3.2.2
DOE O 435.1 Radioactive Waste Management	NA	NA
Clean Air Act (CAA)	Compliant	3.2.3.1
National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR Part 61 Subpart H, National Emissions Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities	Compliant	3.2.3.1
American Innovation and Manufacturing (AIM) Act of 2020 and Hydrofluorocarbon (HFC) Phasedown	NA	NA
Clean Water Act (CWA)	Compliant	3.2.4.1
Safe Drinking Water Act (SDWA)	NA	NA
Endangered Species Act (ESA)	Compliant	3.2.5.1
E.O. 13751 Safeguarding the Nation from the Impacts of Invasive Species (December 5, 2016)	Compliant	3.2.5.2
National Historic Preservation Act (NHPA)	Compliant	3.2.5.3
Migratory Bird Treaty Act (MBTA)	Compliant	3.2.5.4

Regulation Requirement	2025 Compliance Overview	Reference Section
E.O. 11988, Floodplain Management (May 24, 1977)	NA – no floodplains present at ETEC	NA
E.O. 11990, Protection of Wetlands (May 24, 1977)	NA – no activities affected wetlands	NA

NA – not applicable

Table 3-2. SSFL Permits

Permit/License	Facility	Valid
Air (VCAPCD)		
Permit 00232	Combined permit renewed	Current
Treatment/Storage (Cal-EPA/DTSC)		
CAD000629972 (93-3-TS-002)	HWMF (Bldg. 4133 and Bldg. 4029)	<u>Active pending final closure.</u>
CA3890090001	RMHF	<u>Active pending final closure.</u>
NPDES (LARWQCB)		
CA0001309	SSFL	Current

DTSC = Department of Toxic Substances Control

EPA = Environmental Protection Agency

HWMF = Hazardous Waste Materials Facility

LARWQCB = Los Angeles Regional Water Quality Control Board

NPDES = National Pollutant Discharge Elimination System

RMHF = Radioactive Material Handling Facility

VCAPCD = Ventura County Air Pollution Control District

Table 3-3. Environmental Violations Cited by Regulators/Noncompliance Areas

Issuing Agency	Relevant Statute/Regulations	Violation Type	Reason for Violation	Violation Status	Penalty/ Fine	Corrective Actions	Report Chapters
NA – no compliance violations in 2025							

Table 3-4. 2025 Agency Inspections, Audits, and Visits Related to DOE Operations

Date	Agency	Subject Area	Results
January 22, 2025	CDPH	Quarterly Environmental TLD Exchange	Compliant
April 3, 2025	CDPH	Quarterly Environmental TLD Exchange	Compliant
July 9, 2025	CDPH	Quarterly Environmental TLD Exchange	Compliant
October 1, 2025	CDPH	Quarterly Environmental TLD Exchange	Compliant
April 7 – 9, 2025	DTSC	DOE Backfill Source Study Soil Sampling – Gillibrand Facility	No Issues
April 10 – 11, 2025	DTSC	DOE Backfill Source Study Soil Sampling – Granite Construction Gardner Ranch	No Issues
May 5 – 9, 2025	DTSC	Supplemental Background Study Soil Sampling	No Issues
October 28, December 3, 11, 2025	DTSC	HMSA Pilot Study	No Issues

CDPH = California Department of Public Health
DTSC = Department of Toxic Substances Control
HMSA = Hazardous Materials Storage Area
TLD = thermoluminescent dosimeter

3.2 Compliance Summary

3.2.1 Environmental Restoration and Waste Management

3.2.1.1 Emergency Planning and Community Right-to-Know Act (EPCRA)

EPCRA (42 U.S.C. §11001 et seq.), also known as Title III of Superfund Amendments and Reauthorization Act, requires Federal facilities that use, produce, or store extremely hazardous substances, hazardous substances, hazardous chemicals, and/or toxic chemicals in quantities that exceed specific thresholds to report these inventories and planned or accidental environmental releases to Federal, State, and local emergency planning authorities.

SSFL as a site files Tier II and Form R reports, as required, with Boeing requesting chemical information from ETEC annually for the roll-up evaluation. The ETEC project does not typically use or store hazardous materials, with de minimis quantities potentially used as sample preservatives.

3.2.1.2 RCRA

RCRA allows the Environmental Protection Agency (EPA) broad authority to regulate the handling, treatment, storage, and disposal of hazardous wastes. This authority has been delegated to the California Environmental Protection Agency (Cal-EPA) and DTSC. DOE owns and co-operates two areas that are RCRA-permitted treatment and storage facilities within ETEC: the RMHF and the HWMF. Although the permits remain active, the areas are undergoing closure, with Phase 1 completed for both in 2020 (see below). Permit numbers are listed in Section 3.1.

- **RMHF**—In 2025, remaining concrete slabs and subsurface structures for Buildings 4021, 4022, and 4621 of the RMHF Complex continued to be permitted collectively as an Interim

Status (Part A) facility. The site remained in safe shutdown mode with operations limited to routine inspections and surveys. Above-grade building structures were demolished in 2020 pursuant to Phase 1 of the DTSC-approved closure plan. The permit will remain active until final closure (Phase 2 and 3 completion) has been achieved.

- **HWMF**—In 2025, remaining concrete slabs for Buildings 4029 and 4133 of HWMF continued to be permitted collectively as an Interim Status (Part A) facility. Above-grade building structures were demolished in 2020 pursuant to Phase 1 of the DTSC-approved closure plan. The permit will remain active until final closure (Phase 2 and 3 completion) has been achieved.
- **RCRA Facility Investigation (RFI)**—Under the Hazardous and Solid Waste Amendments of 1984, RCRA facilities can be brought into the corrective action process when an agency is considering any RCRA permit action for the facility. SSFL was initially made subject to the corrective action process in 1989 by the EPA, Region IX. The EPA has completed the Preliminary Assessment Report and the Visual Site Inspection portions of the RCRA Facility Assessment process. ETEC has transitioned from the RFI phase to the CMS phase. DOE first drafted the CMS report and submitted it to DTSC in September 2018. Based on comments from the DTSC and the Los Angeles Regional Water Quality Control Board (LARWQCB) requesting additional studies, work plans, and modeling to be completed, additional work in support of the CMS report has been ongoing since 2022. In 2025, DOE developed a list outlining the additional studies and data collection to support the CMS phase and completed each requested component for submission to DTSC for review. In addition, in late 2025, DOE began updating the previously submitted CMS report, incorporating the newly obtained data from these additional studies requested by the DTSC. DOE is scheduled to resubmit the revised groundwater CMS report to DTSC in 2026 for review. Following DTSC’s concurrence on the reports and work plans, DOE will formally submit the documents for final DTSC approval.
- **Administrative Order on Consent**—In December 2010, DOE and DTSC signed an Administrative Order on Consent (AOC) <https://www.energy.gov/etec/consent-orders>, which defined the process for characterization of the soil and the cleanup end-state for Area IV of the SSFL, including regional “background” for chemicals that currently have a background value, and MRLs for those chemicals that have no background value. Background values and MRLs have been incorporated into a look-up table (LUT), per the AOC, by DTSC. The LUT provides the cleanup standards, per the AOC, for Area IV.

In November 2012, EPA made recommendations to DTSC regarding how the AOC LUT values for radionuclides should be calculated based on background soil data (EPA 2012). Subsequently, in January 2013, DTSC issued draft provisional LUTs for 16 radionuclides (DTSC 2013a). In May 2013, DTSC issued a “Chemical LUT Technical Memorandum” for more than 130 chemicals (DTSC 2013b). Both DTSC’s and DOE’s technical staff have identified implementation issues with the DTSC published soil cleanup values. Several of the LUT values fall within the range of background, meaning remediation of soil could remove uncontaminated soils. To develop the laboratory MRLs, DTSC modified analytical methods, resulting in MRLs not supported by the analytical industry. Negotiations were ongoing between DOE and DTSC. In 2024, DOE initiated a laboratory MRL study to evaluate the

ability of analytical laboratories to meet the project’s soil cleanup requirements, which is discussed in Section 9.

Groundwater investigation and remediation are still being conducted under RCRA corrective action requirements specified in the 2007 Consent Order among DTSC, DOE, NASA, and Boeing. Groundwater and soil samples collected, and analyses performed during 2025 at DOE locations are summarized in Sections 7 and 9.

Area IV is registered as a large quantity generator. No hazardous waste was generated in 2025.

Table 3-5. Hazardous Waste Disposal

Type of Waste	Quantity	Hauler	Disposal Facility
No hazardous waste was generated at the site in 2025.			

3.2.1.3 Federal Facilities Compliance Act

Historically, any mixed wastes were managed in accordance with the Federal Facilities Compliance Act–mandated Site Treatment Plan (STP), approved in October 1995. All mixed wastes that required extended on-site storage were managed within the framework of the STP. Characterization, treatment, and disposal plans for each of several different waste streams are defined in the STP with enforceable milestones. Previous management of mixed waste has been in full compliance with the STP. In 2022, mixed wastes were newly generated in association with the building demolition on the ETEC project and were transported to a licensed or permitted facility outside of the State of California. Because demolition is complete, there were no mixed wastes that needed to be managed or shipped from the ETEC site in 2025.

3.2.1.4 National Environmental Policy Act

The National Environmental Policy Act (NEPA) establishes a national policy to ensure consideration is given to environmental factors in federal planning and decision-making. For those projects or actions with a potential to affect human health or the environment, DOE requires that appropriate NEPA actions (e.g., Categorical Exclusion, Environmental Assessment [EA], Finding of No Significant Impact [FONSI], or Notice of Intent [NOI], draft EIS, final EIS, and/or Record of Decision [ROD]) be incorporated into project planning documents.

Following is a timeline of NEPA-related actions at the site.

- March 31, 2003: DOE issued a FONSI and the final EA.
- 2004: Natural Resources Defense Council, City of Los Angeles, and the Committee to Bridge the Gap filed a lawsuit in federal court claiming DOE had violated NEPA; the Comprehensive Environmental Response, Compensation, and Liability Act; and the Endangered Species Act.
- 2007: Court directed DOE to complete an EIS. DOE issued an Advance NOI to prepare the EIS in October 2007.

- 2010: DOE signed the AOC (Section 3.2.1.2), which identified a multi-agency (DTSC, USEPA, and DOE) soil data collection program. Work on the EIS was put on hold until completion of the soil program.
- 2014: DOE published supplemental NOI to prepare the EIS.
- 2015: AOC soil program completed. Work reinitiated on EIS.
- January 6, 2017: *Draft EIS for Remediation of Area IV and the Northern Buffer Zone of the SSFL* (DOE 2017) released, Notice of Availability (NOA) published in the Federal Register on January 13, 2017
- March 17, 2017: NOA extending the comment period for an additional 30 days.
- December 28, 2018: NOA for the *Final EIS for the Remediation of Area IV and the Northern Buffer Zone of the SSFL* (DOE 2018) published in the Federal Register.
- September 2019: DOE issued the ROD for building demolition
- November 2020: DOE issued the ROD for groundwater remediation
- December 27, 2025: DOE published a NOI in the Federal Register to prepare a Supplemental Environmental Impact Statement (SEIS) for Remediation of Area IV and the Northern Buffer Zone of the SSFL.

The Final EIS analyzed the potential environmental and community impacts of remediation alternatives for soil, buildings, and groundwater associated with Area IV and the Northern Buffer Zone and presents the preferred remediation alternatives, which are consistent with the site's end use as open space and are protective of human health and the environment. Based on the analysis presented in the Final EIS (<http://www.ssflareaiveis.com/>), in September 2019, DOE issued the ROD for building demolition detailing the path forward for achieving remediation objectives established for the remaining building structures in these areas ([fr-rod-eis-0402-ssfl-area-iv-buildings-2019-09-27.pdf](#)). In November 2020, DOE issued the ROD for groundwater remediation, identifying proposed remedies for seven chemical or radiological impacted locations in Area IV ([FINALSIGNEDDOC-Federal Register Notice for ETEC Groundwater ROD Issuance Signed \(11-2-20\).pdf](#)).

Stemming from the DTSC soil cleanup negotiations, several issues with implementation of an AOC soil cleanup identified a need for additional soil remediation alternatives. DOE determined the need to assess those alternatives under the NEPA process and prepared and published a NOI in the Federal Register on December 27, 2024, to prepare a SEIS for Remediation of Area IV and the Northern Buffer Zone of the SSFL. Soil studies, including MRL and backfill and total petroleum hydrocarbon/polycyclic aromatic hydrocarbon (TPH/PAH) evaluations, were completed in 2025, with reports pending (see Section 9). Results of these studies will be used to inform NEPA analysis and cleanup decisions.

3.2.2 Radiation Protection

DOE O 458.1 establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE pursuant to the AEA of 1954, as amended. The objectives of this Order are to conduct DOE radiological activities so that exposure to members of the public is maintained within the dose limits established in the Order, to control the radiological clearance of DOE real and personal property, and to ensure that potential radiation exposures to members of the public are as low as reasonably achievable (ALARA). The radiological monitoring programs at SSFL comply with this order as well as all applicable federal, state, and local environmental regulations. The monitoring results (Section 6) indicate that SSFL does not pose any significant radiological impact to the health and safety of the public. All potential pathways to the public or the environment, as illustrated in Figure 3-1, are monitored. These include air, soil, surface water, groundwater, direct radiation, transfer of property (i.e., land, structures, and/or waste), and recycling.

3.2.3 Air Quality and Protection

3.2.3.1 Clean Air Act

The 1970 Clean Air Act (CAA) (amended in 1977 and 1990) authorized the EPA to establish National Ambient Air Quality Standards (NAAQS) to limit the concentrations of pollutants in ambient (i.e., outdoor) air. The EPA has promulgated NAAQS for six “criteria” pollutants: ozone (O₃), nitrogen dioxide (NO₂), carbon monoxide (CO), sulfur dioxide (SO₂), 10-micron and 2.5-micron particulate matter (PM₁₀ and PM_{2.5}), and lead (Pb). All areas of the United States must maintain ambient levels of these pollutants below the ceilings established by the NAAQS; any area that does not meet the standards is considered a NAAQS “nonattainment” area. Under the CAA, states are required to develop State Implementation Plans (SIPs) that define how each state will carry out its responsibilities under the CAA, mainly through promulgation and enforcement of air pollution control rules and regulations. However, the EPA must approve each SIP, and it can enforce the CAA itself under a Federal Implementation Plan if it deems a state’s SIP unacceptable and the state or region is unwilling or unable to develop an acceptable SIP. Other requirements, including National Emission Standards for Hazardous Air Pollutants (NESHAP), New Source Performance Standards, and ambient air monitoring programs, were established to ensure that ambient air quality is acceptable for public health and environmental protection.

Area IV is regulated by the VCAPCD and must comply with all applicable rules, regulations, and permit conditions. DOE previously operated under Permit to Operate No. 00271. In 2008, this permit was consolidated with the existing Federally Enforceable State Operating Permit No. 00232 for SSFL, which currently covers Areas I, III, and IV. The NASA property – Area II and the former LOX Plant site located in Area I – was removed from the permit in January 2014. On December 15, 2014, VCAPCD issued administrative changes to the permit, relieving Boeing from responsibility for Area IV, except for activities and contractors under Boeing’s direct control. DOE activities currently being performed in Area IV are not subject to air permitting. DOE conducts air quality monitoring for Area IV, as described in Section 8, and the data are published in quarterly reports submitted to DTSC.

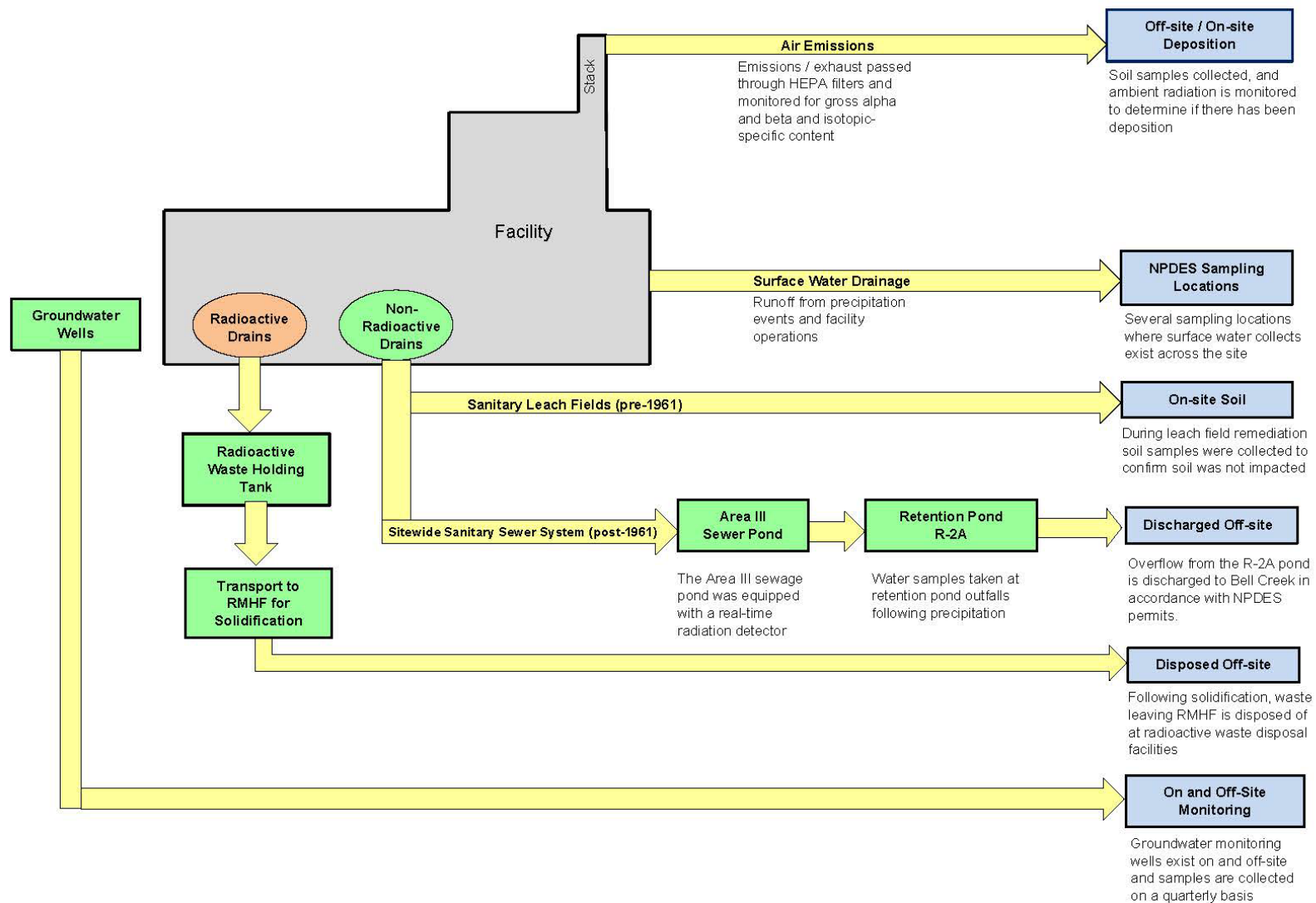


Figure 3-1. Conceptual Model of Potential Pathways

3.2.4 Water Quality and Protection

3.2.4.1 Clean Water Act

The Clean Water Act is the primary authority for water pollution control programs, including the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program regulates point source discharges of surface water and the discharge of storm water runoff associated with industrial activities.

Table 3-6. NPDES Permits

Permit Type	Issuing Authority	Permit Number	Outfalls	Pollutants Covered by Permit	Violations	Date(s)	Cause, Corrective Actions, Status
Surface Water	LARWQCB	CA0001309 Issued 1/1/2024	RMHF: Outfall 003; Sodium Reactor Experiment: Outfall 004; FSDF #1: Outfall 005; FSDF #2: Outfall 006 Building 4100: Outfall 007	Gross alpha, gross beta, tritium, Sr-90, total combined Ra-226 and Ra-228, potassium-40, Cs-137, and uranium isotopes	NA	NA	NA

FSDF = Former Sodium Disposal Facility

LARWQCB = Los Angeles Regional Water Quality Control Board

RMHF = Radioactive Material Handling Facility

Surface water discharges from SSFL are regulated under the California Water Code (Division 7), as administered by the LARWQCB. The existing Boeing NPDES Permit (CA0001309) for SSFL, which was renewed and became effective January 1, 2024, requires monitoring of storm water runoff, treated groundwater, and fire suppression water into Bell Creek, a tributary to the Los Angeles River. The permit also regulates the discharge of storm water runoff from Area IV northwest slope locations into the Arroyo Simi, a tributary of Calleguas Creek. Storm water is collected at the five northwest outfalls (RMHF: Outfall 003; Sodium Reactor Experiment [SRE]: Outfall 004; FSDF #1: Outfall 005; FSDF #2: Outfall 006; and Building 4100: Outfall 007), pumped to a centralized storage and treatment center at Silvernale Pond in Area III, and subsequently discharged into Bell Creek. The permit applies the numerical limits for radioactivity established for drinking water suppliers to these discharges. The permit requires radiological measurements of gross alpha, gross beta, tritium, Sr-90, total combined radium-226 (Ra-226) and radium-228 (Ra-228), potassium-40, Cs-137, and uranium isotopes. North Wind Portage (North Wind), on behalf of DOE, provided quarterly discharge monitoring reports (DMRs) in 2025, notifying Boeing of any activities related to the following surface water activities:

- 1) Waste manifests related to stormwater or spilled materials.

- 2) Copies of all Initial Site Assessment and Remediation Act (ISRA)/Best Management Practices (BMPs) effectiveness/performance monitoring data.
- 3) Figures/descriptions of any maintenance or installation of BMPs.
- 4) List of all new orders, permits, 401c documents, and California Water Code Section 13383 letters related to stormwater and/or protection of waters of the U.S.

During 2025, DOE did not have any reportable surface water–related activity information/data addressing any of the categories listed above in its quarterly DMRs.

<https://www.boeing.com/sustainability/environment/santa-susana/monitoring-reports#accordion-f9ee1141e6-item-ef5a41c2cf>

Dischargers whose projects disturb ≥ 1 acre of soil or whose projects disturb < 1 acre but are part of a larger common plan of development that in total disturbs ≥ 1 acre, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity ([Construction General Permit Order 2009-0009-DWQ](#)). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground (i.e., stockpiling and/or excavation). During 2025, there were no activities requiring a stormwater CGP.

The Oil Pollution Act (OPA) requires the development of a spill prevention, control, and countermeasure (SPCC) plan for facilities meeting certain industry categories and/or having the capacity to store an aggregate of 1,320 gallons of oil in containers 55-gallons or greater in size to prevent uncontrolled discharge into or upon the navigable waters of the State of California or the United States. Although ETEC does not currently meet criteria to require an SPCC plan, Boeing does maintain the SSFL Facility Spill Prevention and Response Plan, which serves as the site-wide SPCC Plan. ETEC utilizes BMPs outlined in this plan to ensure that oils/hazardous materials are handled properly.

3.2.5 Natural and Cultural Resources

3.2.5.1 Endangered Species Act (ESA)

The ESA of 1973 (16 U.S.C. §1531 et seq.) protects Federally listed threatened and endangered species and their habitats from “take” and ensures that Federal actions do not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. If any aspect of a DOE action may affect a listed species or designated critical habitat, consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration – National Marine Fisheries Service is required. Based on information provided by DOE, the USFWS prepared the Biological Opinion for Cleanup of Area IV of SSFL (2018-F-0407, transmitted 8/31/2018). The Biological Opinion includes 17 conservation measures that DOE will execute to avoid or reduce negative effects to federally listed species and designated critical habitat. The 17 conservation measures apply to the planning and execution of ground disturbance, demolition, and remediation activities at SSFL DOE Area IV ([Santa Susana Field Laboratory Area IV Environmental Impact Statement](#)). In 2025, conservation measures were implemented for all field activities that triggered regulatory

requirements. Documented occurrences of listed species and designated critical habitats were monitored as part of ongoing surveillance, maintenance, investigation, and monitoring programs.

3.2.5.2 E.O. 13751 Safeguarding the Nation from the Impacts of Invasive Species (December 5, 2016)

In accordance with Executive Order 13751, invasive species are defined as, “with regards to a particular ecosystem, a non-native organism whose introduction does or is likely to cause economic or environmental harm or harm to human health.” Several invasive species have been documented during surveys conducted in 2009 (SAIC 2009a, 2009b). Area IV of the SSFL, including the NBZ, is recovering from a wildfire that burned through the area in September 2005. The 2009 survey (SAIC 2009a) noted that the NBZ was relatively free of human disturbance and, consequently, was relatively free of invasive species. The same was noted for most of the hilly area in the southwestern part of Area IV, including much of the critical habitat of the Braunton’s milk-vetch. The previously developed portions of Area IV and nearby areas had a higher concentration of invasive species (SAIC 2009b, 2010) than other portions of Area IV. Areas currently more vulnerable to invasion than under pre-fire conditions, due to the relatively open vegetation, include areas where woody vegetation is re-establishing after the 2005 fire, and areas that were mowed or otherwise mechanically treated between 2010 and 2014. Table 3-6 presents the invasive plant species that have been identified at the SSFL ETEC Area IV and the NBZ.

During all on-site activities performed in 2025, project personnel ensured that vehicle tires were brushed to remove seeds when exiting off-road areas to minimize the dispersion of invasive plant species. In addition, on a quarterly basis, vegetation maintenance is performed on access roads and areas surrounding monitoring wells to provide safe access during monitoring and sampling events and reduce fire hazards. During ongoing vegetation maintenance activities, observed invasive plant species are removed by project personnel.

In 2025, remediation activities and associated soil disturbance were limited, thereby reducing the likelihood of introduction or proliferation of invasive plant species. However, as remediation efforts are expected to ramp up in the future, a comprehensive invasive plant management plan will be developed to implement strategies aimed at preventing and minimizing the risk of invasive species establishment and spread.

Table 3-7. Invasive Plant Species Present at the SSFL Area IV and the Northern Buffer Zone and the California Invasive Plant Council (Cal-IPC) and the California Department of Food and Agriculture (CDFA) Ratings

<i>Common Name</i>	<i>Scientific Name</i>	<i>Cal IPC Overall Rating</i>	<i>CDFA Rating</i>	<i>Comments</i>
Castor bean	<i>Ricinus communis</i>	Limited	---	Not noted during surveys but would be a high priority to contain and eradicate if discovered.
Fountain grass	<i>Pennisetum setaceum</i>	Moderate	non-rated	Becoming widespread along roads and facilities sites. Occupies same habitat in sandstone boulders as Santa Susana Tarplant.
Giant reed or Arundo	<i>Arundo donax</i>	High	B	Not noted during surveys but would be a high priority to contain and eradicate if discovered.
Horehound	<i>Marrubium vulgare</i>	Limited	---	Numerous localized occurrences.
Italian thistle	<i>Carduus pycnocephalus</i>	Moderate	C	Occurrences on site in formerly disturbed areas.
Mexican fan palm	<i>Washingtonia robusta</i>	Moderate	---	Volunteer plants of this or a similar species occurring chiefly along roadsides.
Milk thistle	<i>Silybum marianum</i>	Limited	C	Occurrences on site in formerly disturbed areas north of critical habitat.
Puncture vine	<i>Tribulus terrestris</i>		C, NW	Localized.
Purple star thistle	<i>Centaurea calcitrapa</i>	Moderate	B, NW	Localized on access road to water tank. Adjacent to critical habitat.
Russian thistle	<i>Salsola tragus</i>	Limited	C	Localized.
Shortpod mustard, summer mustard	<i>Hirschfeldia incana</i>	Moderate	---	Widespread on previously disturbed areas.
Smilo grass	<i>Piptatherum miliaceum</i>	Limited	---	Numerous localized occurrences mostly on previously disturbed sites.
Stinkwort	<i>Dittrichia graveolens</i>	Moderate	Non-rated	Numerous occurrences in areas of formerly disturbed areas becoming widespread around wells and access roads.
Tamarisk	<i>Tamarix ramosissima</i>	High	B	On some remediated sites
Tocalote, Malta star thistle,	<i>Centaurea melitensis</i>		NW	Widespread on site with weedy annual grasses.
Tree tobacco	<i>Nicotiana glauca</i>	Moderate	---	Common at previously disturbed sites.
Tree-of-heaven	<i>Ailanthus altissima</i>	Moderate	C	Several localized occurrences.
Wild mustard	<i>Brassica spp.</i>	Limited to High depending on species	---	Very dense populations noted at previously disturbed areas north of critical habitat.
Wild radish	<i>Raphanus sativus</i>	Limited	B	Several localized occurrences.
Yellow star thistle	<i>Centaurea solstitialis</i>	High	C	Several localized occurrences.

Table 3-6 Notes:

California Invasive Plant Council (Cal-IPC) Ratings:

High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. These species may already be extensively naturalized limiting potential for further spread. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

California Department of Food and Agriculture (CDFA) Ratings:

“---” none

“**A**” rated weeds are normally limited in distribution throughout the state. Eradication, containment, rejection or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.

“**B**” rated weeds are more widespread. Eradication, containment, control or other holding action at the discretion of the commissioner. State endorsed holding action and eradication only when found in a nursery.

“**C**” rated weeds are generally widespread throughout the state. Action to retard spread outside of nurseries at the discretion of the commissioner. Reject only when found in a crop seed for planting or at the discretion of the commissioner.

“**Q**” rated species are treated as temporary “**A**” weeds. Denoting action outside nurseries at the state-county level pending determination of a permanent rating.

“**D**” rated weeds are organisms considered to be of little or no economic importance. No action. Anything not rated as an “**A**”, “**B**”, “**C**” or “**Q**” weed is given a “**D**” rating. In other words, the plant is not considered a significant weed. (California Noxious & Invasive Weed Action Plan, 2005)

“**NW**” = noxious weed

3.2.5.3 National Historic Preservation Act (NHPA)

The NHPA of 1966 (54 U.S.C. §100101 formerly 16 U.S.C. §470, as amended), requires Federal agencies to establish programs to identify, record, and protect cultural resources and to assess the impact of proposed projects on historic or culturally important sites, structures, or objects within the area of potential effect for a proposed project. The NHPA further requires Federal agencies to assess all archaeological sites, historic buildings, and objects on such sites to determine qualification for inclusion in the National Register of Historic Places (NRHP). In addition, the NHPA requires Federal agencies to consult with State Historic Preservation Offices and the Federal Advisory Council on Historic Preservation, as appropriate, when determining if proposed actions would adversely affect properties eligible for listing on the NRHP.

In accordance with the Programmatic Agreement (PA) between DOE and the California State Historic Preservation Officer (SHPO 2019), as amended in 2024 (SHPO 2024), and pursuant to Stipulation V of the PA, the 18 remaining building slabs in Area IV are permitted for demolition because all were formally determined ineligible for listing on the National Register of Historic Places, either individually or as contributors to a historic district, and because no known archaeological sites occur in the immediate vicinity of the building slabs. The 2024 amendment extended the PA for an additional 10 years to support continued cleanup activities while maintaining the agreed-upon process for protecting cultural resources.

Pursuant to the *Monitoring and Inadvertent Discovery Plan* (DOE 2020) (https://www.energy.gov/sites/default/files/2022-12/SSFL%20Cultural%20Monitoring%20Plan_Jun%202020_Public.pdf), cultural resource clearance surveys will be performed by a professional archaeologist who meets the PA’s

qualification standards and a Native American representative in accordance with the PA prior to commencement of field activities involving demolition, remediation, and/or soil disturbance. In 2025, site walkdowns and cultural surveys and monitoring were performed to ensure that areas already designated as cultural resources are not disturbed, and to identify and prevent disturbance of potentially undiscovered cultural resources. In addition, a Native American monitor was present during all activities involving soil disturbance.

3.2.5.4 Migratory Bird Treaty Act (MBTA)

The MBTA of 1918 (16 U.S.C. 703–712) and its amendments implement four international conservation treaties and are intended to ensure the sustainability of populations of all protected migratory bird species.

DOE, the USFWS, and the National Nuclear Security Administration authored and signed an Addendum to the Memorandum of Understanding (MOU) on Migratory Birds among the agencies in 2003. The MOU expired in 2018 and the Addendum allowed the extension of the MOU as currently written, while the agencies work together to evaluate the MOU to ensure that it still meets the stated purpose, scope, and responsibilities identified in Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (66 FR 3853, 2001). The USFWS Biological Opinion referenced previously also addresses conservation measures for migratory bird species and their protection during activities performed in Area IV.

3.3 Environmental Violations, Issues, and Noncompliance Summary

No environmental violations or noncompliance issues occurred in 2025. A summary of the ongoing SEIS related to historical NEPA lawsuits is provided below.

3.3.1 Area IV Environmental Impact Statement

As discussed in Section 3.2.1.4, DOE has completed the Final EIS and issued RODs for DOE's objectives concerning the remediation of buildings, groundwater, and soil at Area IV. In addition, DOE is currently preparing a SEIS to evaluate alternative soil remediation approaches in response to implementation challenges with AOC requirements.

The ETEC EIS-related documents are located at: <http://www.ssflareaiveis.com/>. Further discussion is provided in Section 3.2.1.4, and details of the associated soil studies are provided in Section 9.

4. ENVIRONMENTAL MANAGEMENT SYSTEM

The ETEC site has operated under an Environmental Management System (EMS) framework since the current contractor's first contract award in October 2014. This contract required that the operating company develop and maintain an EMS consistent with the requirements of ISO 14001:2004, *Environmental Management Systems – Requirements with Guidance for Use*. In response, the ETEC EMS Description (EMSD) was developed and implemented to define the scope of the EMS and provide consistency in evaluating environmental aspects and associated impacts related to planned project activities as well as consistency in significance determinations. The scope of the EMS encompassed major activities/programs that were being conducted under the ETEC Environmental Monitoring and D&D Contract. Overarching goals were tied to the Integrated Safety Management System/EMS Performance Objectives Measures, with zero Environmental Notices of Violation and zero Environmental Non-Compliances established. Implementing plans and procedures were developed in support of the goals to ensure success was achieved. The EMSD and supporting documents were in effect until the award of a new contract in July 2024. In July 2024, the Small Business Nationwide Deactivation, Decommissioning, and Removal (DD&R) Master Indefinite Delivery/Indefinite Quantity (IDIQ) contract award required an updated EMS framework to meet the requirements of ISO 14001:2015, *Environmental Management Systems – Requirements with Guidance for Use*. The EMSD was modified to meet the new ISO standard requirements, with the same overarching goals in place. New plans/procedures were developed to meet the new contract requirements in accordance with DOE O 436.1. As of January 30, 2025, DOE O 436.1 was rescinded. To date, the EMS framework remains in place in support of overarching performance goals; however, task-specific objectives and environmental controls are monitored and measured through the work control process.

4.1 Disposal of Non-Radiological Waste

During 2025, groundwater generated from GWIM pumping and monitoring well sampling was stored in a 5,000-gallon water storage tank at the FSDF, which was then profiled and disposed of as non-hazardous waste. Additional information regarding the GWIM can be found in Section 7.3.

In late 2025, an in-situ biological and chemical reduction pilot study was implemented at the HMSA to evaluate potential feasibility of the remedy to clean up groundwater contamination. Investigation-derived waste generated as part of the pilot study included water and soil. Waste disposal summaries are provided in Table 4-1. Additional details of the HMSA in-situ pilot study can be found in Section 7.3.

Non-radiological waste disposal information is provided in Table 4-1.

Table 4-1. Non-Radiological Wastes Disposal

Type of Waste	Quantity	Hauler	Disposal Facility
Non-Hazardous FSDF GWIM Water	8,085 gallons	American Integrated Services Phone: (805) 639-0884	Crosby and Overton, Inc. 1610 W. 17th Street Long Beach, CA 90813 Facility Phone: (562) 432-5445
Non-Hazardous FSDF GWIM Water with Detectable PFAS	7,600 gallons	American Integrated Services Phone: (805) 639-0884	Chemical Waste Management, Inc., 35251 Old Skyline Road, Kettleman City, CA 93239 Facility Phone: (559) 386-9711
Non-Hazardous HMSA Treatability Study Injection Well Perforation Water	7,513 gallons	American Integrated Services Phone: (805) 639-0884	Crosby and Overton, Inc. 1610 W. 17th Street Long Beach, CA 90813 Facility Phone: (562) 432-5445
Non-Hazardous HMSA Treatability Study Soil from Well Drilling	26 cubic yards (18.69 tons)	American Integrated Services Phone: (805) 639-0884	McKittrick Waste Landfill 56533 Highway 58 West, McKittrick, CA 93251 Facility Phone: (881) 782-7366

4.2 Environmental Training

North Wind conducts training and development programs as an investment in human resources to meet both organizational and individual goals. These programs are designed to improve employee performance, ensure employee proficiency, prevent obsolescence in employee capability, and prepare employees for changing technology requirements and possible advancement.

All training is administered through North Wind University. The Project Manager is responsible for individual employee development through formal training, work assignments, coaching, counseling, and performance evaluation. Managers and employees are jointly responsible for defining and implementing individual training development goals and plans, including on-the-job training.

North Wind currently maintains a list of more than 110 training courses for North Wind SSFL personnel and contractors. Classes are available as both computer-based training and instructor-led training. Specialized training programs on new technological developments and changes in regulations are provided, as needed, to ensure effective environmental protection and worker health and safety. Additional off-site courses are also encouraged.

4.3 Community Outreach and Public Participation

In 2025, DOE conducted or participated in the following community outreach and public participation activities:

- In **March 2025**, the DOE ETEC team hosted multiple SEIS public scoping meetings. The first was in-person on March 4 for tribal representatives. The second was held virtually on March 6, and the third in-person on March 18. The SEIS builds on the 2018 *Final Environmental Impact Statement* (DOE) that includes cleanup alternatives for soils and groundwater and building removal at ETEC.
- In **May 2025**, DOE hosted a booth at the Simi Valley Street Fair, a biannual event hosted by the Simi Valley Chamber of Commerce that attracts thousands of local community members. During the event, attendees could learn about SSFL, engage with staff, and pick up a copy of the CleanUpdate newsletter. ETEC staff also offered a hands-on activity about detection limits in soil backfill sampling and laboratory studies using flour, baking soda, and vinegar to demonstrate how different constituents react when mixed.

The DOE ETEC team hosted site tours in:

- **May 2025:** Simi Valley City Councilmember Joseph D. Ayala, Simi Valley City Manager Samantha Argabrite, and Rancho Simi Recreation and Park District Director Eric Lundstrom came to the site to learn about its history, DOE's past operations, and ongoing cleanup.
- **July 2025:** Social media influencer Andrew Walker returned to the site in July to collect footage for a video about DOE's Building 4024 SETF program. He toured the basement of Building 4024 to see where research and development was conducted, including SNAP-10. Mr. Walker first toured the site in October 2024 to get footage for a video looking at ETEC's history, collect radioactivity measurements at the site, and discuss the Sodium Reactor Experiment and possible future plans for SSFL.

The DOE ETEC also continued the publication of its quarterly newsletter, CleanUpdate, sharing SSFL news and activities at the site. News and activities throughout 2025 included a move into a new office, the passing of longtime cleanup champion and former ETEC staff member Stephanie Jennings, the retirement of ETEC's executive administrative assistant Debbie Kramer, and ongoing groundwater, air, and soil monitoring at the site.

The DOE ETEC team continued work to update the ETEC website, with improvements continuing into 2026 to enhance its usability for the public.



Social media influencer Andrew Walker (right) interviews Josh Mengers, DOE's ETEC federal project director, about the SNAP program on July 28, 2025.



Scoping Meeting – About 40 people attended DOE's in-person open house in March 2025 for its SEIS for cleanup at SSFL. Photo courtesy of Lucas Ray.



Stephanie Jennings – Courtesy of John Jones



ETEC site tour Simi officials – Pictured from left, Josh Mengers, federal project director for ETEC; Eric Lundstrom, Rancho Simi Recreation and Park District director; and Joseph D. Ayala, Simi Valley City Council member.



Street fair teaser – Josh Mengers, federal project director for ETEC, teaches Noelle Saenz about soil backfill sampling and laboratory studies as part of a science activity at the Simi Valley Street Fair on May 3.

5. ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

5.1 Non-Radiological Environmental Monitoring

Extensive monitoring programs for chemical contaminants in soils, surface water, and groundwater are in effect to ensure that the existing environmental conditions and restoration activities do not pose a threat to human health or the environment. Extensive soil sampling has been performed under the RFI and other site-specific remedial programs.

Groundwater beneath Area IV is extensively monitored for chemical groundwater conditions. Groundwater sampling and analysis is conducted using a DTSC-approved sampling and analysis plan and EPA-approved analytical methods and laboratories. Section 7 discusses groundwater monitoring that was conducted during 2025.

Surface storm water is contained, treated, and monitored in compliance with Boeing's NPDES permit, which was most recently renewed on October 19, 2023, and became effective on January 1, 2024. All sources of air emissions were monitored as required by the VCAPCD.

The following sections discuss the details of these programs conducted during 2025 for radiological and non-radiological monitoring:

- Groundwater monitoring (Section 7),
- Air monitoring (Section 8), and
- Soil investigations (Section 9).

5.2 Unplanned Non-Radiological Reportable Releases

No unplanned non-routine releases of non-radiological pollutants and hazardous substances occurred in 2025.

5.3 Area IV Building Remediation

The above-grade buildings in Area IV of the SSFL were demolished in 2020/2021, and remaining infrastructure requiring demolition includes building concrete slabs, subsurface vaults and basements, and surrounding asphalt surfaces. DOE turned its focus to demolition of the Building 4024 subsurface basement, also referred to as the Systems for Nuclear Auxiliary Power (SNAP) Environmental Test Facility (SETF) Building. In 2025, DOE drafted the Building 4024 SETF basement demolition plan and submitted it to DTSC for review. Additional plans and procedures, including a site mitigation and monitoring plan, waste and wastewater management plans, transportation plan, subsurface investigation work plan, and a stormwater pollution prevention plan, were drafted in support of the Building 4024 SETF basement demolition. DOE performed field tasks in support of demolition planning, including a topographic and geophysics survey, utility locates, and an asbestos-containing/other regulated material survey of the interior components of the Building 4024 basement. Work plans and procedures are currently under

review, and DOE will continue working closely with regulators towards demolition targeted to begin in 2027.

5.4 Fire Protection Management and Planning

The SSFL Area IV on-site project personnel performing site maintenance, monitoring and sampling, data collection, and remediation-related tasks made a coordinated effort to prevent, control, and respond to fire-related risks to personnel, property, and the environment during daily activities. The following measures were assessed and implemented monthly during 2025 to evaluate, prevent, and manage against potential fires at Area IV:

- Site-specific fire risk assessments were conducted for on-site operations, materials, equipment, and environmental conditions for fire hazard identification.
- Vegetation maintenance was performed regularly surrounding monitoring wells, occupied on-site offices, access roads, and parking areas for the protection of DOE infrastructure and assets, and prevention of accidental fires resulting from on-site work tasks.
- Good housekeeping practices were implemented, as well as organization and proper storage of flammable materials and fuel canisters.
- Routine equipment maintenance was completed to prevent overheating or fuel leaks.
- No-smoking policy was strictly enforced on-site.
- Suitable fire extinguishers were kept in all on-site vehicles and heavy equipment and regularly occupied offices/buildings and routinely inspected and tested for operability. All project personnel were trained in the correct usage of fire extinguishers and fire watch protocols.

Emergency response planning included the development and communication of fire emergency response, part of the broader Emergency Action Plan for the SSFL Area IV. On-site personnel reviewed the procedures, including evacuation routes, assembly areas, and emergency contact procedures in the event of a fire. Routine emergency (fire) drills and response training were conducted quarterly to ensure preparedness and familiarity with emergency procedures.

5.5 Recreational Hunting and Fishing

Recreational hunting and fishing are not permitted at Area IV of the SSFL and therefore are not applicable.

6. ENVIRONMENTAL RADIOLOGICAL PROTECTION PROGRAM AND DOSE ASSESSMENT

The environmental radiological monitoring program at SSFL started before the first radiological facility was established in 1956. In the mid-1950s, the Atomic Energy Commission, in concert with its contractor, Atomics International (then a Division of North American Aviation), began initial plans for nuclear research at its facilities in the west San Fernando Valley. In 1955, prior to initial operations, a comprehensive monitoring program was initiated to sample and monitor environmental levels of radioactivity in and around its facilities.

During the 60-year history of nuclear research and later environmental restoration, on-site and off-site environmental monitoring and media sampling have been extensive. In the early years, soil/vegetation sampling was conducted monthly. Sampling locations extended to the Moorpark freeway to the west, to the Ronald Reagan freeway to the north, to Reseda Avenue to the east, and to the Ventura freeway to the south. Samples were also taken around the Canoga and De Soto facilities, as well as around the Chatsworth Reservoir. This extensive off-site sampling program was terminated in 1989 when all nuclear research and operations (except remediation) came to an end.

During the 1990s, extensive media sampling programs were conducted in the surrounding areas, including the Brandeis-Bardin Institute (now known as the American Jewish University) and the Santa Monica Mountains Conservancy to the north, Bell Canyon to the south, the Rocketdyne Recreation Center in West Hills to the east, and various private homes in Chatsworth and West Hills. Samples were also taken from such distant areas as Wildwood Park and Tapia Park. In addition, monitoring of off-site radiation, groundwater, and storm water runoff from the site was routinely performed during this time.

Ongoing radiological environmental sampling and monitoring ensures that DOE operations at SSFL, including cleanup, do not adversely affect either on-site personnel or the surrounding community.

Additional details about on-site and off-site monitoring are available at:

<https://www.energy.gov/etec/historical-documents>

From 2009 through 2012, the EPA conducted extensive radiological sampling in off-site locations (Background Study) and on-site locations (Area IV Radiological Study). Results are available through the DOE Area IV tab at:

https://dtsc.ca.gov/santa_susana_field_lab/ssfl_document_library/

The program has continued with modifications to suit the changing operations. The selection of monitoring locations was based on several site-specific criteria (i.e., topography, meteorology, hydrology, and the locations of the nuclear facilities). The prevailing wind direction for the SSFL site is generally from the northwest, with some seasonal diurnal shifting to the southeast quadrant.

Multiple air samples are continuously collected to determine if any airborne radioactive material is present. Ambient air samples are measured on-site for gross alpha and gross beta for screening purposes. These screening measurements can quickly identify an unusual release and provide long-term historical records of radioactivity in the environment. Air sampling at ETEC during 2025 was performed by North Wind. Following screening, the air samples are combined into composite samples and sent to an off-site laboratory to be analyzed for site-specific radionuclides.

Direct radiation is monitored by optically stimulated luminescent dosimeters (OSLDs). The OSLDs used to monitor direct radiation at ETEC were placed by North Wind and analyzed by Landauer. These OSLDs are complemented by thermoluminescent dosimeters (TLDs) installed by the State of California Department of Public Health/Radiological Health Branch (DPH/RHB) for independent surveillance.

Surface water samples collected by Boeing at ETEC are analyzed for radioactivity (as well as chemical constituents) and the results compared with NPDES limits intended to protect aquatic organisms.

Groundwater was sampled by North Wind in 2025 in accordance with the monitoring programs in place at the site. Samples were analyzed for chemical constituents as well as radioactivity. The results were compared to required screening values. The analytical data suite used for laboratory analysis is updated annually after reviewing the previous year's data.

6.1 Radiological Discharges and Doses

The only historical emission source from DOE facilities in Area IV was the exhaust stack at the RMHF, which was demolished in 2020.

The EPA limit for emissions of radionuclides to ambient air from a DOE site was established to prevent an effective dose equivalent from exceeding 10 millirems per year (mrem/y), as specified in 40 CFR 61, Subpart H. The regulation also specifies that radiation exposure dose to the maximally exposed individual (MEI) be calculated using the EPA's CAP88-PC computer model (EPA 2014). Since no effluents were released to the atmosphere from the DOE facility at SSFL, the potential airborne radiation exposure dose to the MEI was zero.

6.1.1 Estimation of Radiation Dose

6.1.1.1 Individual Dose

Monitoring of the airborne and external radiation dose is performed to ensure that no individual is exposed to radiation above the limits. The monitoring conducted in 2025 demonstrated that no individual was exposed near the DOE or EPA limits. The population radiation dose was estimated to be 0 mrem/y, well below the most restrictive limit of 10 mrem/y, as stated in DOE O 458.1, "Radiation Protection of the Public and the Environment" (DOE 2013).

In accordance with regulations, the total effective dose equivalent to any member of the public from all pathways (combining internal and external dose) shall not exceed 100 mrem/y (above

background) for any DOE facility. The four TLDs deployed along the RMHF fence line near elevated sources of radiation at ETEC had an annual average exposure of 177 mrem/y for 2025. Even if a person spent the entire year at this fence line, the hypothetical external dose with background subtracted would be 34 milli-Roentgen per year (mR/y) (177 mR minus 143 mR at the background location). This is less than the 100 mrem dose limit (note that for gamma rays, 1 mR is the same as 1 mrem). In reality, because no member of the public spends any appreciable time near the RMHF fence line, the external dose to a member of the public is zero.

For DOE operations, the air pathway standard is 10 mrem/y committed effective dose equivalent, as established by the EPA.

Public exposure to radiation and radioactivity is shown in Table 6-1. The table presents the estimated exposures in comparison to the regulatory standards. Dose values in the table represent both internal and external exposures.

Table 6-1. Public Exposure to Radiation from DOE Operations at SSFL

All pathways	
1. Maximum estimated external dose to an individual from direct radiation	0 mrem/y
2. Maximum estimated internal dose to an individual	0 mrem/y
Limit (“Radiation Protection of the Public and the Environment,” DOE Order 458.1)	100 mrem/y
Air pathway (reported in NESHAP report)	0 mrem/y
Limit (40 CFR 61, Subpart H)	10 mrem/y

NESHAP = National Emission Standards for Hazardous Air Pollutants

mrem/y = millirem per year

6.1.1.2 Population Dose

Since no effluents were released to the atmosphere during 2025, the potential collective dose to the general population was zero person-rem.

6.2 Clearance of Property Containing Residual Radioactive Material

Property was not released from Area IV during 2025.

6.3 Addressing Radiation Protection of Biota

Radiation protection of the biota is also required. It is estimated through standardized processes using actual soil contamination concentrations. As shown below, the total estimated biota radiation dose is approximately 1.2% of the limit.

DOE O 458.1, “Radiation Protection of the Public and the Environment” (DOE 2013), requires that populations of aquatic organisms be protected using a dose limit of 1 rad/day. While there is no formal DOE dose limit for terrestrial biota, DOE strongly recommends that its site activities meet the internationally recommended dose limits for terrestrial biota, which are:

- The absorbed dose to aquatic animals will not exceed 1 rad/day (10 milligray per day [mGy/day]) from exposure to radiation or radioactive material
- The absorbed dose to terrestrial plants will not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material
- The absorbed dose to terrestrial animals will not exceed 0.1 rad/day (1 mGy/day) from exposure to radiation or radioactive material.

There is no aquatic system in Area IV of SSFL. Therefore, the protection of aquatic organisms on-site is not applicable.

Terrestrial biota (i.e., vegetation and small wild animals) is abundant at SSFL. It is subject to potential exposure from radioactivity in the soil. The DOE Technical Standard, “A Graded Approach for Evaluating Doses to Aquatic and Terrestrial Biota” (DOE 2002), provides a methodology for demonstrating compliance with the requirement for protection of biota. RESRAD-BIOTA, a computer program developed by DOE, implements the graded approach for biota dose evaluation. There are three levels of dose evaluations in RESRAD-BIOTA. The first level is a conservative screening tool for compliance demonstration. Once the screening test in Level 1 is met, no further evaluation is necessary. In the Level 1 dose evaluation, measured radionuclide concentrations in environmental media are compared with the biota concentration guides (BCGs). Each radionuclide-specific BCG represents the limiting concentration in environmental media that would not cause the biota dose limits to be exceeded.

EPA soil concentrations in Area IV collected in 2011 and 2012 are used for the Level 1 dose evaluation. Table 6-2 summarizes the comparison results. The total BCG fraction in Area IV, as shown in Table 6-2, is less than 1, indicating that the potential exposure is less than the dose limit recommended by DOE.

Table 6-2. Terrestrial Biota Radiation Exposure as a Fraction of Dose Limit

Isotope	Soil			
	Draft LUT (pCi/g)	BCG Limit (pCi/g)	Avg. Soil Concentration above LUT (pCi/g)	Avg. Site Isotopic Partial Fraction
Am-241	3.86E-02	3.89E+03	1.50E-05	3.966E-09
Cm-243/244	3.96E-02	4.06E+03	9.00E-06	2.223E-09
Co-60	3.63E-02	6.92E+02	4.00E-06	6.080E-09
Cs-137	2.25E-01	2.08E+01	2.11E-01	1.012E-02
Eu-152	7.39E-02	1.52E+03	3.40E-05	2.252E-08
Pu-238	2.54E-02	5.27E+03	9.00E-06	1.624E-09
Pu-239/240	2.30E-02	6.11E+03	1.65E-04	2.705E-08
Sr-90	1.17E-01	2.25E+01	4.68E-02	2.082E-03
Th-230	2.38E+00	9.98E+03	9.85E-04	9.872E-08
Th-232	3.44E+00	1.51E+03	0.00E+00	0.00E+00
Th-234	3.54E+00	2.16E+03	1.30E-03	6.026E-07
U-233/234	2.18E+00	5.13E+03	2.56E-03	4.991E-07
U-235/236	1.52E-01	2.77E+03	1.47E-04	5.322E-08
U-238	1.96E+00	1.58E+03	1.49E-03	9.445E-07
Sum of Partial Fraction				0.012

LUT = look-up table

pCi/g = picocuries per gram

6.4 Unplanned Radiological Releases

There were no unplanned radiological releases from Area IV during 2025.

6.5 Environmental Radiological Monitoring

Monitoring during 2025 at Area IV was conducted for groundwater, air, and soil. The following sections discuss the details of the programs for radiological and non-radiological monitoring:

- Groundwater monitoring (Section 7),
- Air monitoring (Section 8), and
- Soil investigations (Section 9).

Monitoring for ambient radiation was also conducted and is discussed in the following section.

6.5.1 Ambient Radiation

Both North Wind and the state RHB deployed external radiation dosimeters to measure radiation that could leave the site and to determine if there were any changes in background that would require investigation. No results were detected to indicate changes in background or radiation leaving the site.

Previous reports noted agreement between the North Wind measurements and the state measurements; any variance between the two sets of data is within the statistical range of both data sets.

The locations of the North Wind OSLDs and the state TLDs are shown in Figure 5-1. Locations marked with an “SS” have North Wind dosimeters, and all other locations have state dosimeters. There is also a dosimeter at the SSFL front gate.



Figure 6-1. Locations of External Ambient Radiation Dosimeters

All dosimeters are exchanged quarterly. The quarterly results are summed up to obtain the annual ambient gamma radiation exposure in mR/y. Note that an mR is very similar to an mrem in terms of impact; however, the unit mrem cannot be properly applied to an environmental

measurement. The annual ambient exposure data obtained during 2025 from these dosimeters are shown in Table 6-3.

Table 6-3. 2025 SSFL Ambient Radiation Dosimetry Data

Location Identifier	OSLD (mR/y) (North Wind)	TLD (mR/y) (California)	Comment
SS-1/017	139	125	OSLD and TLD collocated at SSFL front gate. Away from ETEC, not included in average.
SS-3/001	145	132	OSLD and TLD collocated at electric substation boundary fence (Substation 719).
SS-4/002	147	128	OSLD and TLD collocated W of former sodium disposal facility (H Street West Boundary).
SS-6/003	139	129	OSLD and TLD collocated at NE corner of Building 4353 former location.
006	NA	133	Near sodium disposal facility, NE site boundary at Building 4133.
SS-11/007	150	140	OSLD and TLD collocated at Building 4036, east side.
SS-12/008	139	135	OSLD and TLD collocated at RMHF NW property line boundary.
009	NA	131	RMHF N boundary fence, middle. Close to elevated radiation sources from Building 4021. Excluded from annual average.
SS-14/010	139	128	OSLD and TLD collocated at RMHF NW property line boundary (W of Building 4614).
013	NA	130	RMHF, NE fence line. Close to elevated radiation sources from Building 4021. Excluded from annual ambient average.
014	NA	135	RMHF, N central fence line. Close to elevated radiation sources from Building 4021. Excluded from annual ambient average.
015	NA	154	RMHF, NW fence line. Close to elevated radiation sources from Building 4021. Excluded from annual average.
016	NA	127	RMHF, Building 4075, N fence line. Near fixed contamination area, excluded from annual ambient average.
018	NA	138	RMHF north boundary west.
019	NA	101*	Off-site, Indian Falls Estates.
Average	143	132	Only data in both sets compared.

*Measurement is lower than in 2024 since the Quarter 4 TLD was not found per CDPH representative.

mR/y = milli-Roentgen per year

NA = Not Applicable

OSLD = optically stimulated luminescent dosimeter

RMHF = Radioactive Materials Handling Facility

TLD = thermoluminescent dosimeter

Location identifiers shown in bold font in Table 6-3 are most representative of ambient background conditions near the ETEC site. These dosimeters were used to calculate the annual

average exposure. The monitoring results from the state TLDs are comparable to, but slightly lower than, the OSLDs deployed by North Wind. This is attributed to differences in the dosimeters themselves. Note that the measurement of the off-site TLD located at Indian Falls Estates is lower than in 2024 since the fourth quarter (Q4) dosimeter was not found as per the CDPH representative. Consistent with data from previous years, the readings of the state's TLDs differed slightly from those of North Wind's OSLDs in 2025. In 2024, the TLD readings were higher compared to the OSLDs, whereas in 2025 the TLD readings were lower. However, the variances were within the statistical range of both data sets for both years. Ambient conditions at ETEC may reasonably be considered representative of natural background.

Four of the state's TLDs were deployed inside the RMHF fence near fixed subsurface elevated radiation sources at ETEC. Although no member of the public spends any significant time, if any time at all, near these four locations, the dosimeters measure radiation at all times.

When natural background of 143 mR/y is subtracted from the highest measurement of 154 mR/y, the result of 11 mR/y is below the DOE public dose limit of 100 mrem/y. This satisfies the requirements specified in DOE O 458.1, "Radiation Protection of the Public and the Environment" (DOE 2013). These dosimeter results demonstrate that the potential external exposure at the site boundary is below DOE's dose limit.

For comparison, a worker exposed to the average of these measurements (143 mR/y) for 2,000 working hours per year would receive approximately 33 mrem/y. When background is subtracted, the dose for the hypothetical worker is reduced to approximately 2 mrem/y.

7. GROUNDWATER PROTECTION AND MONITORING PROGRAM

Wells installed in both the Chatsworth Formation and the shallow subsurface are sampled annually to monitor groundwater conditions in Area IV in accordance with the Water Quality Sampling and Analysis Plan (WQSAP; Haley & Aldrich 2010a) and in coordination with DTSC. Well locations are shown in Figure 7-1. The purpose of these wells is to monitor concentrations of chemicals and/or radioactivity released by historical DOE operations. Groundwater samples are analyzed for a suite of chemical constituents, while some are selected and analyzed for radioactivity, including gross alpha, gross beta, gamma-emitting radionuclides, Ra-226, Ra-228, Sr-90, H-3, and isotopic uranium. Complete analytical results are presented in the Annual Groundwater Reports, which can be found under the *RCRA Facility Investigation – Groundwater* tab in the SSFL Document library located at the following link:

https://www.dtsc-ssfl.com/default.asp?V_DOC_ID=942&subID=112

The *RCRA Facility Groundwater Remedial Investigation Report Area IV* was submitted in August 2018 (CDM Smith 2018a). The *Report on Annual Groundwater Monitoring, Area IV 2025* was submitted in February 2026 (North Wind 2026a).

A site-wide groundwater monitoring program has been in place at SSFL since 1984. Area IV contains 104 shallow and deep wells and 12 seep wells. Routine chemical and radiological monitoring of the wells and seep wells is conducted according to the monitoring plan submitted to DTSC for the Site-Wide Groundwater Monitoring Program and the RFI Program. The following activities stipulated by the Site-Wide WQSAP were conducted during 2025:

- Measurement of groundwater levels
- Collection and submission of groundwater samples from select wells for analytical analysis
- Data validation, data analysis, and database management
- Sampling to support GWIM.

The locations of the wells and piezometers within and around DOE Area IV are shown in Figure 7-1. Groundwater quality parameters and sampling frequency have been determined based on historical water quality data, location of known or potential sources of groundwater contamination, operational requirements of groundwater extraction and treatment systems, and regulatory direction. Wells are gauged quarterly for groundwater levels and sampled annually. The specific analysis dictated for each well is modified annually by DOE and is determined by review of existing data and conditions. Ongoing coordination with DOE and state and federal regulators ensures that applicable analyses are being performed, and that the analysis for each location (including emerging contaminants) is carefully considered and addressed. The groundwater monitoring program for Area IV includes the analysis of the following parameters, which are analyzed using the appropriate EPA methods:

- Volatile organic compounds (VOCs; including 1,4-dioxane)
- Semi-volatile organic compounds (SVOCs)
- PAHs

- Polychlorinated biphenyls (PCBs)
- N-nitrosodimethylamine (NDMA)
- Pesticides
- Herbicides
- Dioxins and furans
- Formaldehyde
- Metals (total and dissolved)
- Fluoride and nitrate
- TPH (gasoline-range organics [GRO] and diesel-range organics [DRO])
- Perchlorate
- Tritium
- Radionuclides (total and dissolved).

Sampling events were conducted in first quarter (Q1) and third quarter (Q3) of 2025. Groundwater reports are submitted to the regulatory agencies following each sampling event. Summaries of the 2025 results of groundwater contaminants of concern for Area IV are presented in Table 7-1. Historical time series plots are located in Appendix A. Further information regarding the groundwater monitoring program can be found in the *Report on Annual Groundwater Monitoring, Area IV 2025* (North Wind 2026a). Groundwater reports are provided online under the *RCRA Facility Investigation – Groundwater* tab in the SSFL Document Library at the following link:

https://www.dtsc-ssfl.com/default.asp?V_DOC_ID=942&subID=112.

Table 7-1. Ranges of Contaminants of Concern in 2025 Groundwater Samples

Analytes	Ranges of Detected Results	Screening Values
1,1-Dichloroethane (µg/L)	0.36 J/J to 1.50	5 ¹
1,1-Dichloroethene (µg/L)	0.40 J/J to 10.4	6 ¹
1,2-Dichloroethane (µg/L)	0.80 J/J	0.5 ¹
1,4-Dioxane (µg/L)	0.0402 J/J to 11.4	1 ²
Carbon Tetrachloride (µg/L)	27.2	0.5 ¹
cis-1,2-Dichloroethene (µg/L)	0.34 J/J to 20.9	6 ¹
Tetrachloroethylene (PCE) (µg/L)	0.41 J/J to 27.6	5 ³
trans-1,2-Dichloroethene (µg/L)	1.10 to 27.5	10 ¹
TCE (µg/L)	0.38 J/J to 959 H/J	5 ³
Vinyl Chloride (µg/L)	no detections	0.5 ¹
Nitrate (mg/L)	12.0 J/J+ to 16.1	10 ³
TPH DRO (µg/L)	66 to 608	100 ⁴
TPH GRO (µg/L)	20.2 J/J to 411	5 ⁴
Tritium (pCi/L)	193 to 19,400	20,000 ³

1 = California maximum contaminant level

2 = Notification level (site-specific values developed by DTSC)

3 = Primary maximum contaminant level

4 = Taste/odor

$\mu\text{g/L}$ = micrograms per liter
 J = Estimated value
 pCi/L = picocuries per liter
 Qualifiers presented as laboratory qualifier / data validation qualifier.

Groundwater wells are screened in alluvium, weathered bedrock, and unweathered bedrock. Figure 7-1 shows the location of Area IV groundwater wells. For regulatory purposes, “near-surface groundwater” is defined to occur perched or vertically continuous with deeper groundwater within the site’s unconsolidated deposits (e.g., alluvium) and shallow weathered bedrock, whereas deep groundwater, referred to as “Chatsworth Formation groundwater,” occurs in unweathered bedrock. The alluvium is indicated to generally consist of unconsolidated sand, silt, and clay. Groundwater is ephemeral in some portions of the alluvium and upper weathered Chatsworth Formation. The principal water-bearing system at SSFL is the fractured Chatsworth Formation, predominantly composed of weak- to well-cemented sandstone with interbeds of siltstone and claystone. Several hydraulically significant features (i.e., fault zones and shale beds) are present at SSFL and may act as aquitards or otherwise influence the groundwater flow system.

7.1 Groundwater Elevation Monitoring

Area IV static water level measurements were gauged quarterly during 2025 to identify the effects of winter rainfall recharge to near-surface groundwater and the decline in water levels following the rains.

In a quarter-over-quarter comparison, static water level measurements in Q4 2024, Q1 2025, second quarter (Q2) 2025, Q3 2025, and Q4 2025 show a generally consistent decrease in water levels from Q4 2024 to Q1 2025, Q2 2025 to Q3 2025, and Q3 2025 to Q4 2025, with some exceptions. From Q1 2025 to Q2 2025, water levels decreased by an average of 0.12 ft. However, 30 wells had increased water levels, while 25 wells had decreased water levels. Due to the magnitude of the decreased water levels, however, the average was an overall decrease in water levels. The difference between static water levels was calculated by well for each time interval. The average increase or decrease and maximum increase and maximum decrease of static water levels by time interval are presented in Table 7-2.

The range of static water level changes across the site are indicative of the various types of recharge mechanisms and geologic conditions present, including topographic (surface terrain), stratigraphic (bedding orientation and grain size), and structural (faults, fractures, and lineaments).

Table 7-2. Average and Maximum Increase or Decrease of Static Water Levels by Time

Time Interval	Average Increase / (Decrease)	Maximum Increase	Maximum (Decrease)
Q4 2024 to Q1 2025	(1.58) ft	5.46 ft	(9.00) ft
Q1 2025 to Q2 2025	(0.12) ft	2.44 ft	(6.19) ft
Q2 2025 to Q3 2025	(1.60) ft	1.04 ft	(9.30) ft
Q3 2025 to Q4 2025	(1.07) ft	7.08 ft	(7.39) ft

7.2 Former Sodium Disposal Facility Groundwater Interim Measure

In November 2017, DOE initiated a GWIM at the FSDF using near-surface well RS-54 as the pumping well. The well exhibited TCE and 1,1,1-trichloroethane (1,1,1-TCA) concentrations greater than 1,000 micrograms per liter ($\mu\text{g/L}$), the target concentration for initiating the GWIM.

Between 2018 and 2020, coreholes C-20 through C-32 were drilled to support bedrock fracture source delineation. Pumping has continued at the site to support contaminant mass removal (Table 7-3).

https://dtsc.ca.gov/santa_susana_field_lab/ssfl_site_activities_interim_measures/

Installation of Automated Extraction System—CDM Smith teamed with Sustainable Technologies to design and install an automated groundwater extraction system for the GWIM during Q2 2024. Construction of the system started in late March 2024 and finished in May 2024. The automated extraction system replaces manual pumping of three coreholes (C-21, C-24, and C-29) and one near-surface well (RS-54) to enhance VOC-impacted water extraction and mass removal from the near-surface water-bearing sandstone fractures.

The system is powered by solar panels and operates (unattended) during daylight hours when sufficient electricity is generated. Volumes of water pumped from each extraction well are automatically recorded by totalizers and a web-based control for each well. The extraction pumps are controlled by water level switches in the wells through low-level sensors and can turn on only if water is available and no system alarm has triggered. Water extracted by the pumps is transmitted via aboveground and underground piping to a 5,000-gallon water storage tank.

GWIM Sampling—During GWIM operation in 2025, water samples from extraction wells were collected and analyzed on a quarterly schedule for VOCs and 1,4-dioxane and annually for metals and mercury (total and dissolved), TPH, and perchlorate. The FSDF GWIM will continue in 2026 because 2025 sample results showed that groundwater VOC concentrations remained above the 1,000 $\mu\text{g/L}$ VOC threshold in several samples. Data for the FSDF GWIM can be found in the *Former Sodium Disposal Facility Groundwater Interim Measure Status Report – 2025 Annual Report* (CDM Smith 2026a).

Near-Surface Water Extraction and Mass Removal— The FSDF GWIM continued in calendar year 2025 and included seven wells (C-21, C-24, C-25, C-28, C-29, RS-18, and RS-54) in the extraction network. A total of 12,400 gallons of near-surface water and 44.2 grams of VOCs were extracted in 2025 by a combination of manual and automated pumping at the seven wells in the GWIM extraction network. A total of 69,536 gallons of near-surface water and 279.5 grams of VOCs have been removed from 2017 through 2025.

The cumulative volume (gallons) of water extracted from the seven GWIM extraction wells is as follows:

Table 7-3. Summary of Volume of Water Extracted from GWIM Wells

Year	RS-54 ¹	C-21 ¹	C-24 ¹	C-25	C-28	C-29 ¹	RS-18	Total
2017	193.4	NA	NA	NA	NA	NA	NA	193
2018	140.3	54.8	NA	NA	NA	NA	18.0	213
2019	1,681.9	1,193.9	1,060.2	118.0	NA	NA	188.2	4,242
2020	2,026.0	1,830.2	1,778.8	7.0	21.0	5.0	805.0	6,473
2021	1,127.6	295.2	0.0	0.0	10.0	0.0	8.3	1,441
2022	773.0	244.0	504.5	0.0	8.3	12.5	1.0	1,543
2023	1,578.3	3,587.3	1,501.5	418.8	53.3	50.0	88.5	7,278
2024	4,165.5	7,588.5	22,323.3	6.8	75.4	305.3	1,287.5	35,752
2025	2,924.8	1,492.3	7,023.0	32.4	129.4	628.2	170.5	12,400
Cumulative Total	14,611	16,286	34,191	583	297	1,001	2,567	69,536

NA indicates the well had not yet been added to the GWIM extraction well network.

Totals are rounded to the nearest gallon

¹ In June 2024, the well was incorporated into the automated GWIM system.

The cumulative mass (grams) of VOCs removed via the seven GWIM extraction wells is as follows:

Table 7-4. Summary of VOC Mass Removed from GWIM Wells

Year	RS-54 ¹	C-21 ¹	C-24 ¹	C-25	C-28	C-29 ¹	RS-18	Total
2017	9.3	NA	NA	NA	NA	NA	NA	9.3
2018	6.8	0.7	NA	NA	NA	NA	0.0	7.5
2019	35.6	9.8	2.1	0.3	NA	NA	0.3	48.2
2020	21.1	18.8	2.9	0.0	0.2	< 0.1	1.8	44.8
2021	10.1	4.2	0.0	0.0	< 0.1	0.0	0.0	14.3
2022	7.7	3.7	1.6	0.0	< 0.1	< 0.1	0.0	13.0
2023	8.7	19.1	2.4	0.6	0.8	0.1	0.1	31.8
2024	15.3	34.5	14.0	0.0	1.0	0.2	1.4	66.4
2025	11.6	21.7	9.1	0.0	0.8	0.8	0.2	44.2
Cumulative Total	126.2	112.6	32.0	1.0	2.8	1.2	3.7	279.5

NA indicates well has not yet been added to the GWIM extraction well network.

¹ In June 2024, the well was incorporated into the automated GWIM system.

Investigation-Derived Waste—In 2025, water generated from GWIM pumping and monitoring well sampling was stored in a 5,000-gallon water storage tank at the FSDF. Groundwater investigation-derived waste (IDW) stored at the FSDF was profiled and disposed of as non-hazardous waste.

7.3 Additional Groundwater Sampling Activities

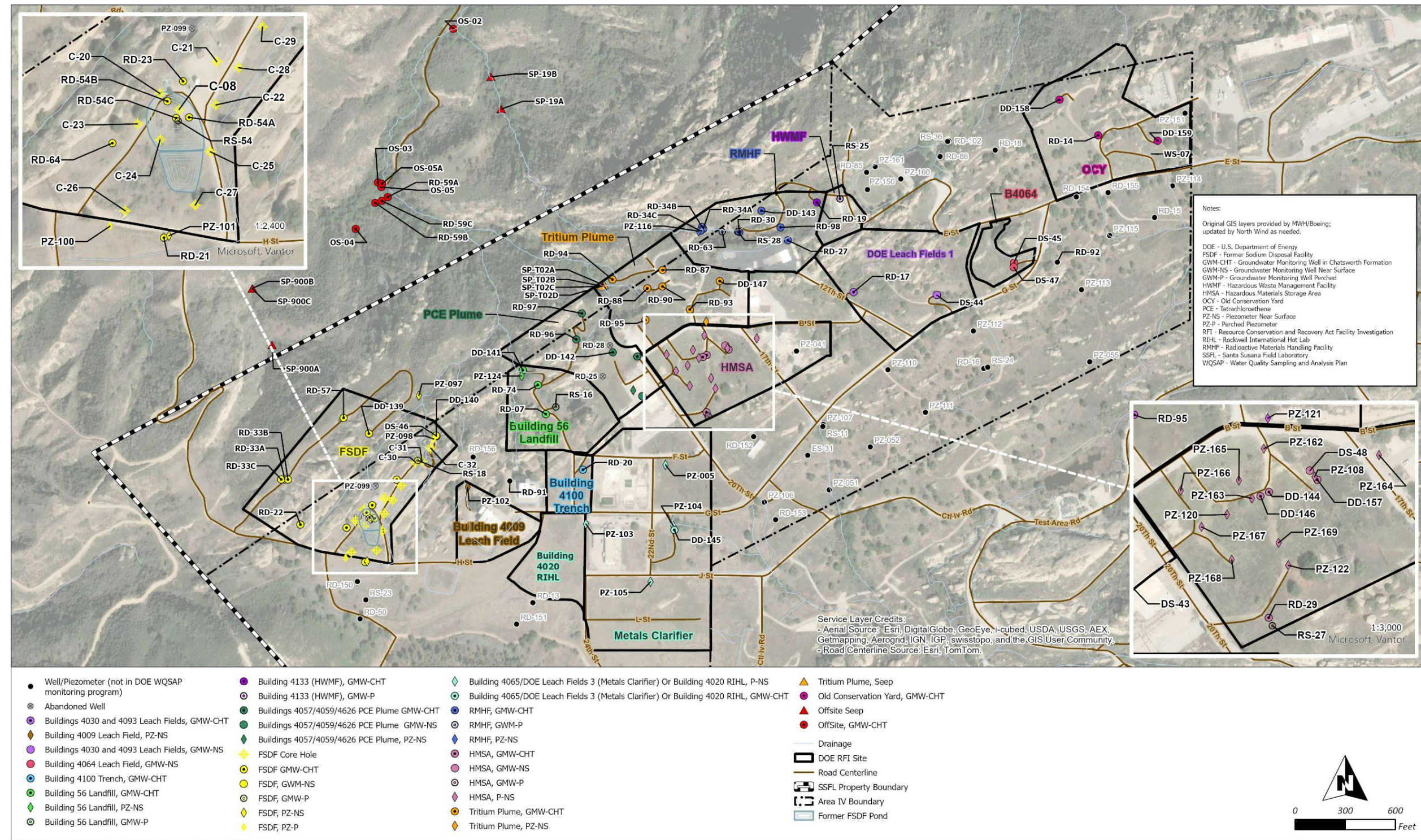
CDM Smith collected samples from various locations in Area IV for specific data quality objectives (DQOs) during 2025. Each sampling activity is summarized in the following paragraphs.

Seep Sampling—During Q2 2025, seep wells were sampled and analyzed for VOCs, 1,4-dioxane, metals and mercury (total and dissolved), perchlorate, tritium, and gross alpha/gross beta. The results of the sampling event are provided in *2025 Sampling Results for Near-Surface Seep Monitoring Wells* (CDM Smith 2025b).

FSDF GWIM Monitoring Data—In addition to the GWIM water samples collected from the extraction wells discussed in Section 7.2, water samples were collected in Q1 2025 to monitor the FSDF groundwater investigation area. Samples were analyzed for VOCs, 1,4-dioxane, and metals and mercury (total and dissolved). Selected samples were also analyzed for GRO, extractable fuel hydrocarbons (EFH), and/or perchlorate. The results of the Q1 sampling event are provided in *First Quarter 2025 Groundwater Sampling of Area IV Wells* (CDM Smith 2025a).

PFAS Groundwater Sampling—In Q2 2025, 17 wells across Area IV were sampled for PFAS. In Q3 2025, 10 wells were sampled again to confirm the results from Q2. The results of the PFAS groundwater sampling events are provided in the *PFAS Groundwater Investigation Report* (CDM Smith 2025c).

HMSA Pilot Test Baseline Groundwater Sampling—As part of the in situ chemical and biological remediation pilot study, baseline groundwater sampling was completed at 16 monitoring wells at the HMSA. Samples were analyzed for VOCs, nitrate/nitrite, boron, total dissolved solids, ferrous iron, total iron, sulfate and chloride, methane/ethene/ethane/acetylene, total organic carbon, volatile fatty acids, alkalinity, *Dehalococcoides* spp. bacterial count, and bacteria enzymes. The purpose of the sampling was to establish baseline conditions before amendment injection and to satisfy the requirements of the Waste Discharge Requirements permit. Results will be provided in a future HMSA Treatability Study Evaluation Report, anticipated for submittal in late 2026 or early 2027.



C:\Work\IETEC\Project\APRX\2025\Figure 3 2025 Q3 Location of Wells.aprx 2/26/2026

Figure 7-1. Area IV Well, Piezometer, and Seeps Locations

8. AMBIENT AIR MONITORING PROGRAM

Air particulates are collected on filters at six locations (Figure 8-1). Two locations are within the confines of the ETEC site (ETEC samplers), and four locations are on the ETEC site boundary (DOE samplers).

The two ETEC samplers operate on 7-day sampling cycles. The sample volume of a typical weekly ambient air sample is approximately 50.4 cubic meters (m^3). The four DOE sampler filters are changed twice each week. The cycle is 3 days and then 4 days. The volume of air sampled is approximately 32 m^3 and 57 m^3 , depending on whether the sample interval is 3 or 4 days. The sampling frequency of the six locations is shown in Table 8-1.

Airborne particulate radioactivity is collected on glass fiber (Type A/E) filters. The samples are analyzed for gross alpha and beta radiation following a minimum 120-hour decay period to allow the decay of short-lived radon progeny (background radioactivity).

During 2025, 414 air sample filters were collected from the DOE samplers. Each was analyzed individually. The individual measurements were then reviewed to determine if any events required investigation. No events required investigation in 2025.

Quarterly, the filters from each of the six samplers were aggregated and then sent to an off-site laboratory for radiochemical analysis. The filters were analyzed for expected background and possibly site-released material. Analyses of air samples indicate that there have been no airborne releases at the site distinguishable from background.

The results are compared to the derived concentration standards (DCSs) specified in DOE-STD-1196-2011 (DOE 2022). The conservative guideline for alpha activity is 8.1×10^{-14} microcuries per milliliter ($\mu\text{Ci/mL}$) (assuming plutonium-239), and the guideline for beta activity is $1.0 \times 10^{-10} \mu\text{Ci/mL}$ (assuming Sr-90). The values found on the air samples are less than 1% of the DCS, before correcting for background, and most radionuclides are indistinguishable from background.

The radionuclides tested include actinium-228, beryllium-7, cesium-137, cobalt-60, potassium-40, polonium-210, thorium-228, thorium-230, thorium-232, uranium-233/234, uranium-235/236, uranium-238, plutonium-238, plutonium-239/240, americium-241, strontium-90, radium-226, radium-228, and plutonium-241. The measurements for all sampling locations in Q4 for Th-232 exceeded 1% of the most restrictive limit, as did other radionuclides (Po-210, Th-228, Th-230) at other sampling locations. These are present in the environment and part of the thorium decay chain. None of the radionuclides analyzed that are associated with site operations was more than 1% of the restrictive limit. The 2025 Air Monitoring Reports can be found at:

https://www.dtsc-ssfl.com/default.asp?V_DOC_ID=992&subID=195

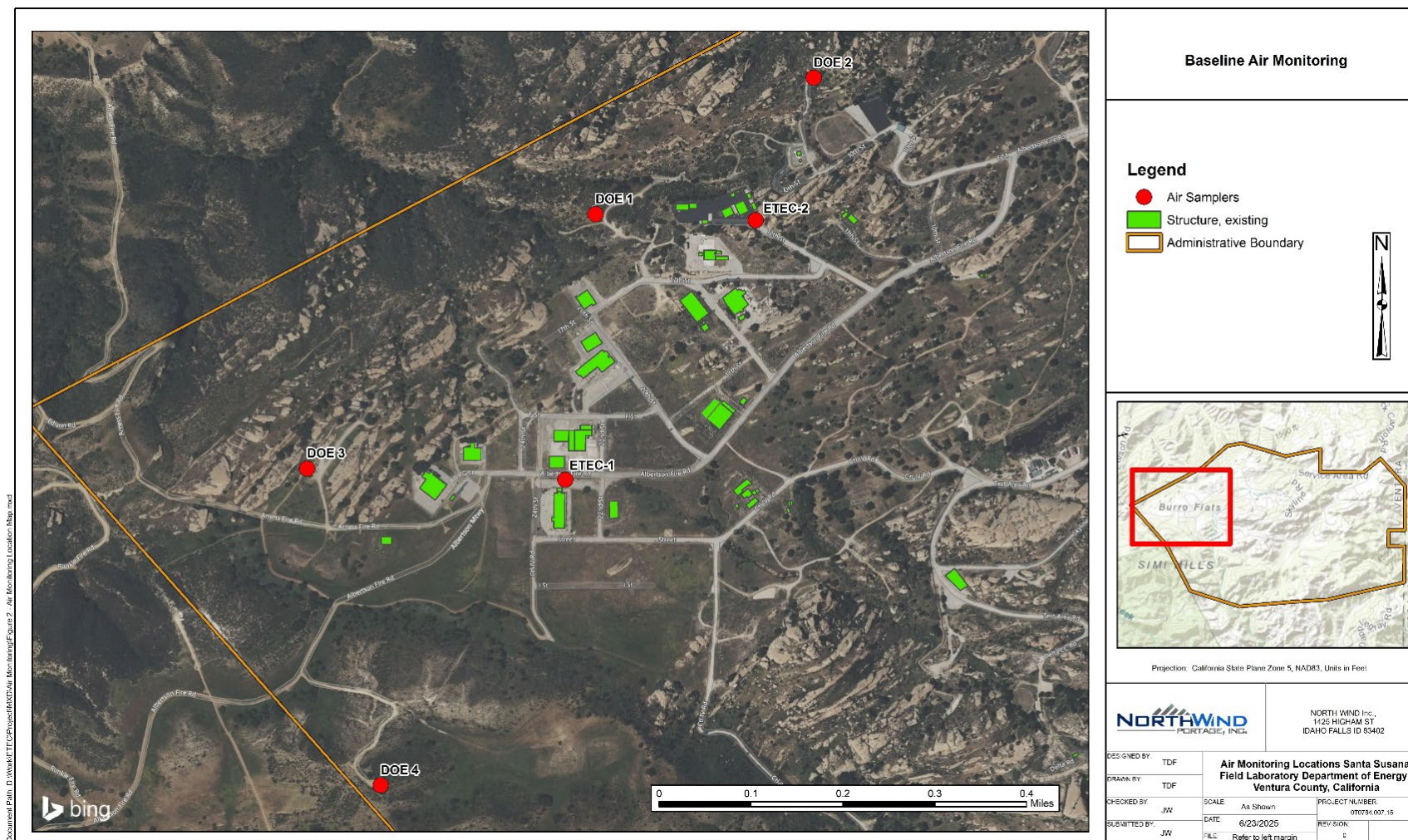


Figure 8-1. DOE Perimeter and ETEC Air Sampler Locations

Table 8-1. Air Sampling Locations

Station	Location	Sampling Frequency
Ambient Air Sampler Locations		
ETEC-1	SSFL Site, Building 4020, northeast of former 4020 site	W
ETEC-2	SSFL Site, RMHF Facility, next to main gate	W
DOE-1	North perimeter near RMHF	BW (3 or 4 days)
DOE-2	Northeast perimeter	BW (3 or 4 days)
DOE-3	Northwest perimeter	BW (3 or 4 days)
DOE-4	West-Southwest perimeter	BW (3 or 4 days)
Codes		Locations
BW	Twice Each Week	SSFL Santa Susana Field Laboratory
W	Weekly Sample	

Air monitoring data are published quarterly. Data from locations DOE-1 through DOE-4 are submitted to DTSC quarterly.

9. SOIL PROGRAM

The soils investigation program started at the SSFL site in 1996 and was completed in late 2014. Future remedial actions are being planned for impacted soils at the site. From 2010 to 2014, potential chemically contaminated soils in Area IV were evaluated under the DTSC/DOE AOC sampling program. The agreement between DOE and DTSC outlines an approach to investigate and clean up soil contamination in Area IV to specified LUT levels under DTSC oversight. The objectives are determining the nature and extent of chemicals in soil and assessing the potential threat to groundwater quality in Area IV, the adjacent undeveloped land in the NBZ, and in contiguous areas where soil contamination has migrated. Prior to signing the AOC on December 6, 2010, investigation of chemical contamination in soil was performed as part of the RFI program under DTSC oversight.

The Phase 3 Chemical Data Gap Sampling Investigation was completed in 2014. Recent information regarding the Phase 3 chemical data sampling investigation can be found at:

<https://www.energy.gov/etec/chemical-co-located-sampling>

To address the source of trichloroethylene (TCE) found in groundwater at the FSDF, a source investigation was performed by obtaining bedrock cores and analyzing core material for TCE. The results indicated that the primary bedrock VOC source is in the vicinity of well RS-54 (CDM Smith 2018b).

The Draft Chemical Data Summary Report, which summarizes the data from all soil samples collected to date, was prepared in 2016 and released by DOE in January 2017 for DTSC review and approval. The Draft Chemical Data Summary Report can be found at:

<https://www.energy.gov/etec/chemical-data-summary-report-0>

Additionally, DOE will continue evaluation of Area IV sampling data and results of the soils treatability studies for soil cleanup remedial alternatives. The Final EIS was released by DOE during November 2018. Recent information regarding the Final EIS can be found at:

https://www.ssflareaiveis.com/final_documentation.aspx

Information regarding the 2010 AOC requirements and AOC soil sampling efforts can be found at:

<https://www.energy.gov/etec/consent-orders>

As discussed in Section 3.2.1.4, DOE is currently preparing a SEIS to evaluate alternative soil remediation approaches in response to implementation challenges with AOC requirements. The soil remediation alternatives to be evaluated in the SEIS include the following:

- **Updated LUT Values Alternative** – In 2025, DOE, working with DTSC staff, identified issues with the AOC LUT background threshold values and MRLs, and began developing proposed “Updated” LUT values that reduce the false-positive decision error rate.
- **Multiple Lines of Evidence (MLE) Alternative** – Looking at options for addressing issues with AOC soil cleanup implementation, DTSC developed a soil cleanup option termed the “Multiple-Lines of Evidence” approach, which means using different types of proof to support an idea, making the argument stronger and more reliable. According to DTSC, the MLE approach uses risk assessment to ensure the protection of human health while minimizing unnecessary removal of clean soil and destruction of critical habitats and cultural resources.
- **Resident with Garden Risk-based Alternative** – The Boeing Company and DTSC entered into a settlement agreement providing a framework for the soil cleanup action for Boeing’s cleanup at SSFL. Standard risk assessment protocols would be followed in identifying locations for a soil cleanup action.
- **No Action Alternative** – In accordance with DOE NEPA regulations, DOE will evaluate a “no action” alternative. As required under NEPA, this alternative is to establish the baseline against which the environmental effects from other analyzed alternatives can be compared.

The soil studies discussed below will be used in development of the draft chapters of the SEIS, which began in 2025. Results of these studies will be used to inform NEPA analysis and cleanup decisions.

9.1 Method Reporting Limit and Backfill Study

To support and resolve the challenging issues of the AOC soil cleanup (Section 3.2.1.2) and the updated LUT values alternative in the SEIS, DOE drafted the *Implementation Plan for the Laboratory Method Reporting Limits and Backfill Source Studies* (CDM Smith 2024) on August 23, 2024, which was subsequently approved by DTSC on September 9, 2024.

The MRL study, conducted to evaluate the ability of analytical laboratories to meet the project’s soil cleanup requirements, began on October 21, 2024, and was completed on December 12, 2024. Soil samples from Areas II and IV were collected, split, and submitted to 15 commercial laboratories nationwide to assess MRL attainability, analytical capacity, and turnaround times. This effort will determine whether current project reference values are achievable or if adjustments to DOE’s provisional soil LUT values are necessary. In 2025, MRL sample results underwent validation and extensive evaluation to make recommendations for corrected provisional soil LUT values. A draft of the MRL study report was initiated in 2025 and will be submitted to the DTSC for review in 2026.

DOE, in collaboration with NASA and Boeing, initiated an evaluation of off-site backfill material sources in 2024 to replace contaminated soil anticipated for removal from SSFL. This effort included site visits to multiple commercial and county-owned soil facilities to conduct qualitative assessments. Field implementation began on April 7, 2025, and was completed on May 15, 2025. Soil samples were collected, split, and submitted to three commercial laboratories

for the backfill source study and data validation was performed. In late 2025, DOE provided the backfill data to Boeing, the lead author of the backfill study report. The final report presenting the results and conclusions is scheduled for completion in 2026.

9.2 Background Threshold Value Study

In 2011, the DTSC investigated chemical background concentrations in soil to support environmental investigations and activities at the SSFL. The results of DTSC's 2011 chemical background study soil investigation were used to develop BTVs to be used to inform cleanup levels at the SSFL. Related to the LUT assessment and update, DTSC did not analyze for TPH, precluding the development of background-based cleanup levels for the SSFL. Furthermore, since the 2011 DTSC investigation, significant wildfires have occurred in and around Los Angeles and Ventura counties, including the Woolsey Fire in 2018. In 2018 and 2020, NASA's consultants conducted on-site soil sampling to characterize areas impacted by fire activity. Samples were analyzed for a variety of analytes, including PAHs and dioxins/furans. Both PAH and dioxin/furan soil concentrations were shown to have increased following the fire, suggesting that these increases were a result of the Woolsey Fire. Due to aerial deposition, recent wildfires have the potential to impact the background soil concentrations of certain analytes associated with wildfires, particularly PAHs and dioxins/furans. As a result, DOE identified the need to revisit background soil sampling locations from DTSC's 2011 chemical background study to collect new data on chemical concentrations in soil under current conditions with the objective to establish technically defensible BTVs for TPH; estimate what fraction of reported TPH background concentrations may be attributable to natural organic material; and evaluate whether background levels for dioxins/furans and PAHs have increased since the DTSC study in 2011, and if so, to calculate revised BTVs. A supplemental background soil investigation sampling and analysis plan was developed and approved by DTSC, and the investigation was completed in May 2025. A draft of the supplemental background study report presenting the results and recommendations was initiated in late 2025 and is scheduled for completion in 2026.

10. QUALITY ASSURANCE PROGRAM

QA/QC practices encompass all aspects of the SSFL comprehensive environmental monitoring program consisting of air, groundwater, and soil investigations to ensure compliance with applicable regulations, to assess SSFL off-site human health exposures to radionuclides and chemicals, and to evaluate the potential impact of site operations on the environment. This section discusses the QA activities conducted in regard to the 2025 monitoring activities:

- Water quality samples were collected pursuant to the Site-Wide Groundwater Monitoring Program (Haley & Aldrich 2010b) and the RFI Program (CDM Smith 2015).
- GWIM groundwater samples were collected and analyzed to assess the VOC extraction of the pumping wells.
- Ambient air monitoring was conducted on a bi-weekly basis for VOCs and radiological constituents.
- Soil samples were collected as part of the backfill and supplemental background studies.

10.1 Site-Wide Groundwater Monitoring Program

During 2025, water quality samples were collected pursuant to the Site-Wide Groundwater Monitoring Program (Haley & Aldrich 2010b) and the RFI Program (CDM Smith 2015). The *Quality Assurance Project Plan for Groundwater Monitoring at the Santa Susana Field Laboratory, Area IV* (QAPP-GW-080300; North Wind 2026b) reflects how quality requirements are fulfilled in support of the environmental monitoring activities at SSFL, including EM-QA-001, *Office of Environmental Management Quality Assurance Program* (DOE 2012). QAPP-080300, *Quality Assurance Program Plan* (QAPP-080300; North Wind 2025) and QAPP-GW-080300 present the QA/QC procedures associated with tracking, reviewing, and auditing to ensure that the data collected in the field and in the off-site laboratory are of sufficient quality, as well as to ensure that the project work meets the outlined QA requirements for intended data use. The QAPP-080300 is formatted to provide a direct correlation to the management/performance/assessment criteria specified in 10 CFR 830 and DOE O 414.1D, with references to the applicable requirements of American Society of Mechanical Engineers (ASME) NQA-1.

The primary goal of an Environmental Surveillance program is to provide high-quality data so that the necessary assessments and decisions based on the data can be made. This section presents information on measures taken by the groundwater environmental monitoring program in 2025 to ensure the high quality of data collected and reported.

10.1.1 Background

The following summarizes the inorganic, metals, organic, and radiochemical data validation completed for 33 EPA Level IV sample delivery groups (SDGs) containing results from the groundwater monitoring program at SSFL Area IV in Ventura County, California. Of the 33 SDGs collected, 8 were from Q1 and 25 were from Q3. The data were acquired from

sampling efforts completed from February 17, 2025, through March 12, 2025, for the Q1 sampling event and August 11, 2025, through August 27, 2025, for the Q3 sampling event. GEL Laboratories, LLC, generated all Q1 data, and Eurofins Calscience generated all Quarter 3 data.

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

- *Site-Wide Water Quality Sampling and Analysis Plan, Revision 1, Santa Susana Field Laboratory, Ventura County, California, Appendix A, December (Haley & Aldrich 2010a)*
- *Quality Assurance Project Plan for Groundwater Monitoring at the Santa Susana Field Laboratory, Area IV, Revision 3, QAPP-GW-080300, February (North Wind, 2026b)*
- *U.S. EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, OSWER 9240.1-46, USEPA-540-R-08-01, November (EPA 2020a)*
- *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, OSWER 9240.1-35, EPA 540-R-01-008, November (EPA 2020b)*
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA publication SW-846, Third Edition, update V (EPA 2015)*
- *Multi Agency Radiological Laboratory Analytical Protocols Manual (MARLAP), EPA 402-B-04-001A, July 2004 (EPA et al. 2004)*
- *Evaluation of Radiochemical Data Usability, ES/ER-MS-5, April 1997 (Paar and Porterfield 1997).*

The following sections provide an overview of the data sets and findings of the data validation effort.

10.1.2 Sampling Summary

The SSFL 2025 groundwater data set consists of 33 EPA Level IV SDGs with a total of 274 water samples, including QC samples (matrix spike/matrix spike duplicates [MS/MSD], field blanks, rinsate blanks, trip blanks, and field duplicates). Three SDGs from Q1 (709872, 709872-1, and 709872-2) and eight SDGs from Q3 (570-242374-1, 570-243129-1, 570-242929-1, 570-242220-1, 570-242220-2, 570-243604-1, 570-242928-2, and 570-242748-1) underwent a Level IV EPA validation, comprising more than 20% of the overall data per analysis for these sampling efforts. The remaining SDGs for both events underwent an EPA Level III validation.

The samples were analyzed for the following: VOCs, SVOCs, 1,4-dioxane, PAHs, PCBs, NDMA, dioxins and furans, formaldehyde, pesticides, herbicides, GRO, DRO, dissolved and total metals (including mercury), perchlorate, fluoride, nitrate, tritium, and dissolved and total radiochemical (RAD). Table 10-1 provides the total annual number of normal and field duplicate samples analyzed for each analysis compiled from the chains of custody (CoCs).

Table 10-1. 2025 Annual Summary of Analyses for SSFL Area IV Groundwater Sampling

Analysis	Method		Number of Normal and Duplicate Analyses
VOCs	USEPA SW-846 8260B		72
SVOCs	USEPA SW-846 8270C		6
PAHs	USEPA SW-846 8270C Selective Ion Monitoring (SIM)		15
1,4-Dioxane	USEPA SW-846 8270D SIM		73
PCBs	USEPA SW-846 8082A		13
NDMA	Nitrosamines by Isotope Dilution		2
Dioxins and Furans	USEPA SW-846 8290A		6
Formaldehyde	USEPA SW-846 8315A		4
Pesticides	USEPA SW-846 8081B		6
Herbicides	USEPA SW-846 8151A		5
DRO and/or GRO	USEPA SW-846 8015D		53
Fluoride and Nitrate	EPA 300.0		20
Perchlorate	USEPA SW-846 6850 Modified		19
Metals (Total & Dissolved)	USEPA SW-846 6010 (Q1 Sodium only)		45 (each, total & dissolved)
	USEPA SW-846 6020		64 (each, total & dissolved)
	USEPA SW-846 7470		64 (each, total & dissolved)
	Isotopic U	DOE EML HASL-300, U-02-RC Modified	31 Total 31 Dissolved
	Gamma Spectroscopy	EPA 901.1	31 Total 31 Dissolved
	Gross Alpha/Beta	EPA 900.0/SW846 9310	31 Total 31 Dissolved
	Strontium-90 (Sr-90)	EPA 905.0 Modified/ DOE RP501 Rev. 1 Modified	31 Total 31 Dissolved
Radiochemical (Total & Dissolved)	Radium-226 (Ra-226)	EPA 903.1 Modified	31 Total 31 Dissolved
	Radium-228 (Ra-228)	EPA 904.0/SW846 9320 Modified	31 Total 31 Dissolved
	Tritium	EPA 906 Modified	15 Tritium

Note: Table 10-1 represents the quantity of normal samples and field duplicates only.

DRO = diesel range organics

GRO = gasoline range organics

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyls

NDMA = N-Nitrosodimethylamine

SVOC = semivolatile organic compounds

VOC = volatile organic compounds

10.1.3 Quality Control Sample Summary

Trip Blanks and Field Blanks:

A total of 24 trip blanks (15 for Q1 and nine for Q3) and two field blanks (one per quarter) were collected. Multiple trip blanks in Q1 had detections below their respective LOQs, and “J”

validation flags were applied, primarily for methylene chloride and acetone. However, none of the trip blank detections resulted in rejected data. All remaining trip blank and field blank results were either non-detect or qualified “U”. All validated data points are considered usable for evaluating site conditions.

Field Duplicates:

Thirteen pairs of field duplicates were collected during each groundwater event. All field duplicate precision results were within the 35% relative percent difference (RPD) criterion, and all validated data points are considered usable for evaluating site conditions.

Rinsate Blanks:

A total of six rinsate blanks (four for Q1 and two for Q3) were collected. Rinsate blanks from both quarterly events had detections for various analytes; however, rinsate blank detections did not result in the qualification of associated samples as the sample results were either $>5\times$ the blank concentrations or non-detect. All validated data points are considered usable for evaluating site conditions.

Matrix Spikes/Matrix Spike Duplicates

Forty-five MSs and 41 MSDs were collected during Q1, and 17 MSs and 16 MSDs were collected during Q3. Note that not all methods require an MSD, resulting in differing quantities between MSs and MSDs collected. MS/MSD results were generally within the 20% project RPD criteria, and any deviations were qualified. All validated data points are considered usable for evaluating site conditions.

10.1.4 Validation Qualifications

Qualifications were assigned in accordance with the *U.S. EPA Contract Laboratory Program National Functional Guidelines* (EPA 2020a and 2020b) and resulted from:

- Preparation and CoC issues
- Exceeded holding times
- Poor initial and continuing calibration criteria
- Positive blank detections
- Poor laboratory control sample (LCS), laboratory control sample duplicate (LCSD), MS, MSD, and serial dilution sample performance
- Results reported below the quantitation limits
- Validator professional judgment.

Table 10-2 summarizes the annual data qualifications assigned to site-wide groundwater monitoring program data for the combined Q1 and Q3 sampling efforts. Definitions of the data validation qualifiers used in this assessment are provided in Table 10-3.

Table 10-2. Summary of 2025 Annual Data Validation Qualifications for the Site-Wide Groundwater Monitoring Program

Validation Qualifier:		J	J+	J-	UJ	U or Not Qualified
Method	Total # Records	# Records	# Records	# Records	# Records	# Records
VOCs	1,596	50	1	--	32	1,513
SVOCs	324	--	--	--	4	320
PAHs	270	2	--	--	--	268
1,4-Dioxane	73	26	--	1	--	46
PCBs	91	--	--	--	--	91
NDMA	2	--	--	--	--	2
Dioxins and Furans	150	4	--	--	2	144
Formaldehyde	4	--	--	--	--	4
Pesticides	120	4	--	--	7	109
Herbicides	50	--	--	--	--	50
DRO and/or GRO	99	34	--	--	1	64
Metals	2,306	386	6	--	60	1,854
Perchlorate	19	4	3	--	--	12
Anions	23	1	1	--	--	21
Rad	1,441	20	--	--	51	1,370

J/J+/J- = value estimated, bias unknown/high/low

U/UJ = analyte not detected

DRO = diesel range organics

GRO = gasoline range organics

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyls

NDMA = N-Nitrosodimethylamine

SVOC = semivolatile organic compounds

VOC = volatile organic compounds

Table 10-3. Data Validation Qualifier Definitions

Flag	Definition
Organics and Inorganics	
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.
Radiochemical	
No qualification	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 (e.g., 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) ($\pm$ 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 (e.g., 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.

Flag	Definition
Organics and Inorganics	
	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.

10.1.5 Data Completeness

Completeness of the data collection program is defined as the percentage of samples planned for collection, as determined in coordination with DTSC based on data from the previous sampling event, versus the actual number of samples collected during the field program (see Equation A).

$$\text{Equation A: \%Completeness} = C \times \frac{100}{n}$$

Where:

C = actual number of samples collected

n = total number of samples planned

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 includes both data that pass all the QC criteria (i.e., unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (i.e., qualified but usable data).

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

Where:

V = number of measurements judged valid

n' = total number of measurements made

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

The completeness achieved for acceptable data was 100% 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. No sample data points were rejected ('R' qualified).

The completeness goal for the number of measurements judged to be valid was met for the 2025 site-wide groundwater monitoring program. The data reported are suitable for their intended use for characterization of groundwater in Area IV of SSFL.

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

No major findings were discovered during field operations. For both quarters of the annual groundwater sampling events, 100% of the data validated and reported are suitable for their intended use for site characterization.

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

The field duplicate precision criteria were met and the radiological field duplicate error ratio criterion of <2 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 the 2025 sampling events.

10.2 GWIM

During 2025, GWIM monitoring coreholes and monitoring wells were sampled using a nondedicated bladder pump that was decontaminated before each use in accordance with the Site-Wide Groundwater Monitoring Program standard operating procedures (SOPs) (Haley & Aldrich 2010b).

In Q1, GWIM samples were sent to EMAX Laboratories, Inc., for analysis of the following:

- VOCs using EPA Method 8260B
- 1,4-dioxane using EPA Method 8260B SIM
- Perchlorate using EPA Method 6850
- EFH and GRO using EPA Method 8015B
- Total and dissolved metals using EPA Method 6020A
- Total and dissolved mercury using EPA Method 7470A.

In Q2, Q3, and Q4, GWIM samples were sent to Eurofins Calscience for analysis of the following:

- VOCs using EPA Method 8260D
- 1,4-dioxane using EPA Method 8260D SIM.

Analytical results were validated using the U.S. EPA Contract Laboratory Program National Functional Guidelines (EPA 2020a, 2020b).

DQOs for data are expressed using measurement performance data quality indicators that include precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). DQOs provide a mechanism for ongoing QC and evaluation and measurement of data quality throughout the project. These DQOs are outlined in the WQSAP (Haley & Aldrich 2010a).

Data review was conducted to demonstrate that the measurement performance criteria established in the WQSAP were met. In general, the following data measurement criteria were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for PARCCS parameters
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented.

Data verification, validation, and assessment were used to verify adherence to the WQSAP procedures and requirements. These assessments were used to reconcile the planned objectives detailed in the WQSAP against the investigation results.

The WQSAP calls for low-flow purging and sampling, which cannot be performed at the four automated extraction wells (C-21, C-24, C-29, and RS-54). These wells pump water daily during daylight hours at preset speeds using dedicated GWIM submersible pumps when water is available. The constant pumping results in the water present in the corehole being representative of the targeted near-surface seepage water without additional purging. Sampling of these extraction wells is difficult when water availability is limited in the wells and requires a unique sampling procedure that is documented in a stand-alone SOP, SSFL SOP 29, GWIM Automated System Well Sampling. Sampling from the automated extraction wells will continue to follow SSFL SOP 29 to keep the method consistent and results comparable. Samples were not collected from C-23, C-31, and C-32 in Q1 due to low water availability. In Q2, Q3, and Q4, C-25 and, in Q3, RS-18 were sampled using a bailer because of limited water availability.

Applicable sample results were qualified based on field duplicates, field blanks, laboratory blanks, surrogates, calibration criteria, laboratory control sample criteria, MS criteria, internal standards, and holding times. No sample results were rejected. Sample results that required qualification are usable for project decisions.

10.3 Ambient Air

10.3.1 Background

Ambient air sampling is performed throughout the year, with VOC samples analyzed biweekly for Toxic Organics Method 15 (TO-15) by ALS Environmental, Simi Valley, CA, and radiological samples analyzed at the end of each quarter by GEL Laboratories, LLC, Charleston, SC.

10.3.2 VOCs

There were 26 annual VOC sampling events for the collection of TO-15 air samples. Each of the four locations was sampled during each sampling event. A minimum of 20% of the VOC results underwent independent data validation. During 2025, 8 of the 26 SDGs underwent data validation.

For the VOCs, the only QC samples collected were field duplicates. Twenty-six field duplicates were collected during 2025 (one per event). Verification of sample and duplicate analyte detection are calculated using the following equation:

$$RPD = \left| \frac{\text{Field Duplicate Result} - \text{Parent Sample Result}}{\frac{\text{Field Duplicate Result} + \text{Parent Sample Result}}{2}} \right| \times 100$$

Validated field duplicates were within the quality objective of +/- 15% RPD. Data completeness goals for VOCs exceeded the project goal of 85%, and the VOC data were deemed usable for their intended purpose.

10.3.3 Radiological

Samples analyzed at the off-site laboratory are QC-checked at the laboratory. These QC checks include blanks, laboratory replicates, MSs, and MSDs. While some QC tests for radium appeared to be biased low, the results do not indicate the release of radium, which is not a contaminant of concern at the site because it is a naturally occurring radionuclide. In 2025, 100% of the radiological analytical results underwent Level IV, independent data validation, and all radiological data were deemed usable for their intended purpose.

10.4 Backfill Source Soil Study

The backfill study sampling activities for the SSFL site were conducted from April through May of 2025. This backfill sampling was completed to identify and characterize potential backfill sources to support future cleanup at the SSFL. Samples were collected from three backfill sites: Gillibrand, Gardner Ranch E-W stockpile, and Gardner Ranch N-S stockpile.

Twenty-six soil samples, two field duplicates, two equipment blanks, one field blank and eight trip blank samples were collected. Seven laboratories supported this study. Samples were analyzed for alcohols, aroclors, dioxins/furans, energetics, nitrate, fluoride, perchlorate, hexavalent chromium, herbicides, metals, mercury, cyanide, methyl mercury, pesticides, phthalates, PAHs, semivolatile organic compounds, TPH with and without silica gel cleanup, volatile organic compounds, 1,4-dioxane, formaldehyde, N-nitrosodimethylamine, and radionuclides.

Fifty-two laboratory data packages were validated using the following documents as well as applicable method-specific quality control parameters:

- National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA 2020b)
- National Functional Guidelines for Organic Superfund Methods Data Review (EPA 2020a)
- National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA 2020c)
- Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) (EPA et al. 2004).

QA objectives for measurement data are expressed in PARCCS. The PARCCS parameters characterize the quality of the data and are known as data quality indicators (DQI's). The DQIs provide a mechanism for ongoing QC and evaluation and measurement of data quality for the backfill study DQOs.

Data review was conducted to demonstrate that the measurement performance criteria established in the Final Implementation Plan (IP) for the Laboratory MRL and Backfill Source Studies (CDM Smith 2024) were met. In general, the following data measurement criteria were considered:

- How well applicable laboratory analytical QC requirements were implemented
- Whether required PARCCS measurement performance criteria were met
- How well field staff adhered to the sampling design, including sampling and sample handling procedures
- How well field staff documented field deviations from the QAPP, and impacts of those deviations on data quality.

Data verification, validation, and assessment were used to verify adherence to the IP procedures and requirements and reconcile the planned sampling objectives against the sampling results. There were no significant field sample collection or handling deviations from the IP.

The DQOs were met for all analytes except for the TPH results with silica gel cleanup. It was noted during data review that a majority of the TPH results with silica gel cleanup preparation had unexpected sample results. The silica gel cleanup preparation step is used to “cleanup” the sample extract before it is analyzed for TPH so that the extract contains primarily non-polar hydrocarbons. Thus, the expectation is that TPH results with the silica gel cleanup should generally be lower than TPH results without the silica gel cleanup. The results for some samples from the laboratory reported higher TPH concentrations after using the silica gel cleanup method. The laboratory was questioned about the results, and after a few months, responded that the silica gel media used for the silica gel cleanup appeared to be contaminated and caused potentially inaccurate results. This situation affected all TPH data with silica gel cleanup for all

the laboratory's clients, not just for this study. Revised results were received from the laboratory in November 2025. For the purposes of this study, the sample results with silica gel cleanup were deemed unusable. The intent of analyzing samples with and without silica gel was to provide information on the fraction of reported TPH backfill concentrations attributed to natural organic material (NOM). The other laboratories involved in the backfill study did not analyze samples with silica gel cleanup, so this deviation did not impact the study DQOs.

Associated sample results were qualified as nondetect or estimated when laboratory control criteria elements were outside of criteria. The sample results qualified as estimated are usable for project decisions.

A small number of nondetect sample results were rejected based on laboratory control sample criteria, surrogate criteria, holding times, matrix spike criteria and contaminated silica gel cleanup media for TPH analyses. The dioxin/furan samples for one equipment blank and the field blank were lost in transit by one of the laboratories and were not analyzed. The DQOs were met for most analytes, and most of the validated data are suitable for their intended use with the qualifiers applied. The noted deviations do not impact the overall backfill DQOs.

10.5 Supplemental Background Soil Study

The supplemental background soil study sampling activities for the SSFL site were conducted from May 5 to May 9, 2025, in accordance with the governing plan, Sampling and Analysis Plan for Supplemental Background Soil Investigation (Plan) (CDM Smith 2025d). This background sampling was completed to revisit background soils locations from DTSC's 2011 chemical background study to collect new data on chemical concentrations in soil under current conditions; establish technically defensible BTVs for TPH carbon fraction ranges; estimate what fraction of reported TPH background concentrations may be attributed to NOM for each carbon fraction range; and evaluate whether background levels of dioxins/furans and PAHs have increased since the DTSC study in 2011, and if so, calculate a revised BTV for the dioxins toxic equivalency (TEQ) and benzo(a)pyrene TEQ.

Sixty soil samples, three field duplicates, two equipment blanks, and one field blank sample were collected. Three laboratories supported this study. Samples were analyzed for TPH with and without silica gel cleanup, dioxin/furan congeners, and PAHs.

Twenty-five laboratory data packages were validated using the following documents as well as applicable method-specific quality control parameters:

- National Functional Guidelines for Organic Superfund Methods Data Review (EPA 2020a)
- National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA 2020c)

QA objectives and data measurement criteria were followed as described in Section 10.4. Data verification, validation, and assessment were used to verify adherence to the Plan procedures and

requirements and reconcile the planned sampling objectives against the sampling results. There were no significant field sample collection or handling deviations from the Plan. Associated sample results were qualified as nondetect or estimated when laboratory control criteria elements were outside of criteria. The sample results qualified as estimated are usable for project decisions. No sample results were rejected.

The DQOs were met for all analytes except for the TPH results with silica gel cleanup. It was noted during data review that a majority of the TPH results with silica gel cleanup preparation had unexpected sample results. The silica gel cleanup preparation step is used to “cleanup” the sample extract before it is analyzed for TPH so that the extract contains primarily non-polar hydrocarbons. Thus, the expectation is that TPH results with the silica gel cleanup should generally be lower than TPH results without the silica gel cleanup. The results for some samples from the laboratory reported higher TPH concentrations after using the silica gel cleanup method. The laboratory was questioned about the results, and after a few months, responded that the silica gel media used for the silica gel cleanup appeared to be contaminated and caused potentially inaccurate results. This situation affected all TPH data with silica gel cleanup for all the laboratory’s clients, not just for this study. Revised results were received from the laboratory in November 2025. For the purposes of this study, the sample results with silica gel cleanup were deemed unusable. The intent of analyzing samples with and without silica gel was to provide information on the fraction of reported TPH background concentrations attributed to NOM. This deviation affects the ability to determine the NOM fraction in background soils; however, the TPH without silica gel cleanup are still usable to establish BTVs for TPH and can be used to inform an upper-limit on the potential NOM concentrations. The silica gel cleanup issue does not affect the dioxin/furan congener or PAH results. The validated data are suitable for their intended use with the qualifiers applied.

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APPENDIX A

TIME SERIES PLOTS OF ANALYTICAL DATA

Time Series Plots of Analytical Data

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

TCE

FSD/ESADA

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

RMHF

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

Bldg 65 Metals Clarifier

PZ-005
PZ-104
PZ-105

TCE (continued)

Bldg 56 Landfill

RD-07

HMSA/PDU

PZ-108
PZ-120

B4057/4059/4626

PZ-109

OCY

RD-14

Bldg 4100 Trench

RD-20

Bldg 4133

RD-19

Off-site

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

Perchlorate

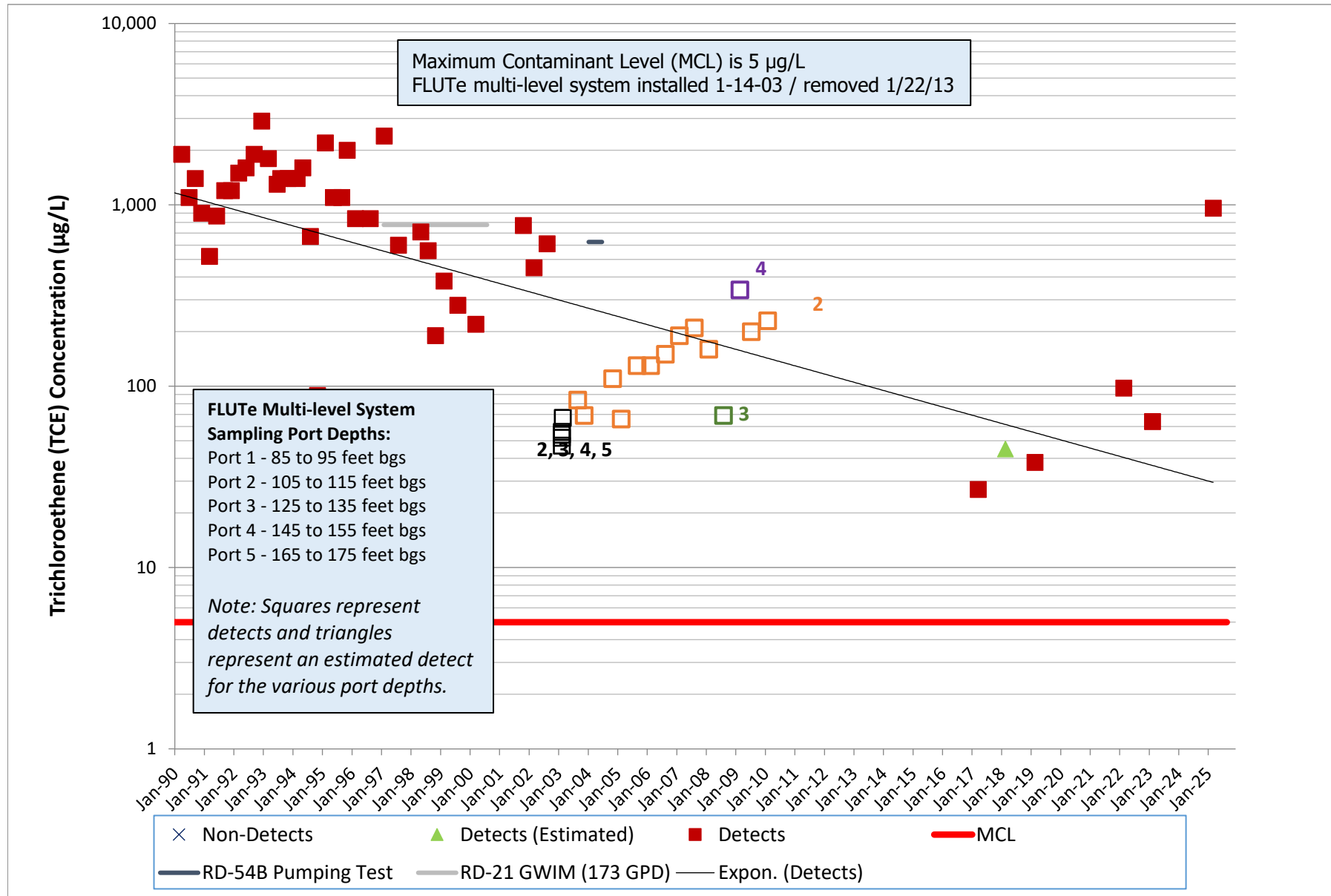
FSD/ESADA

RD-21
RD-54A
RS-18
RS-54

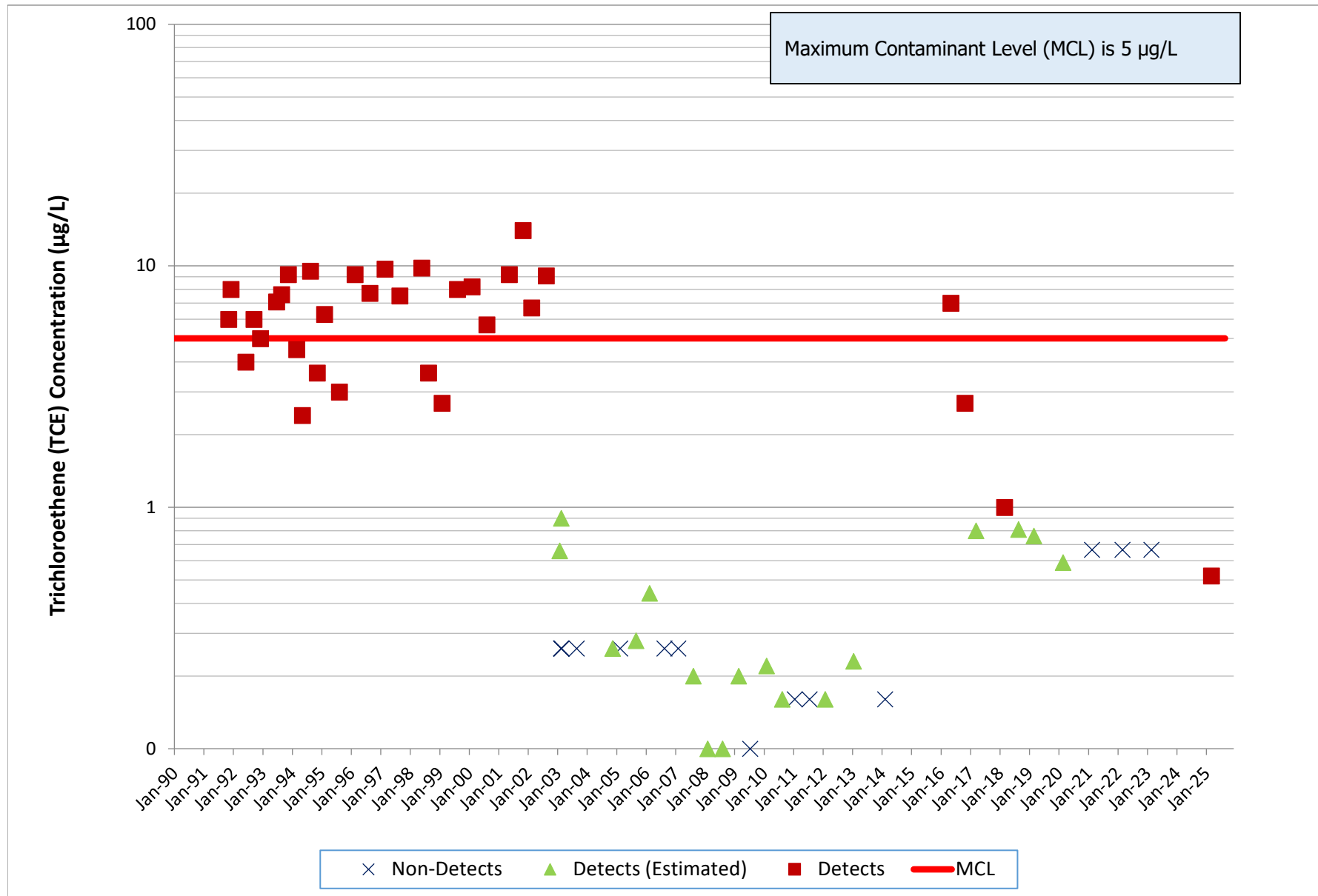
Tritium Plume

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

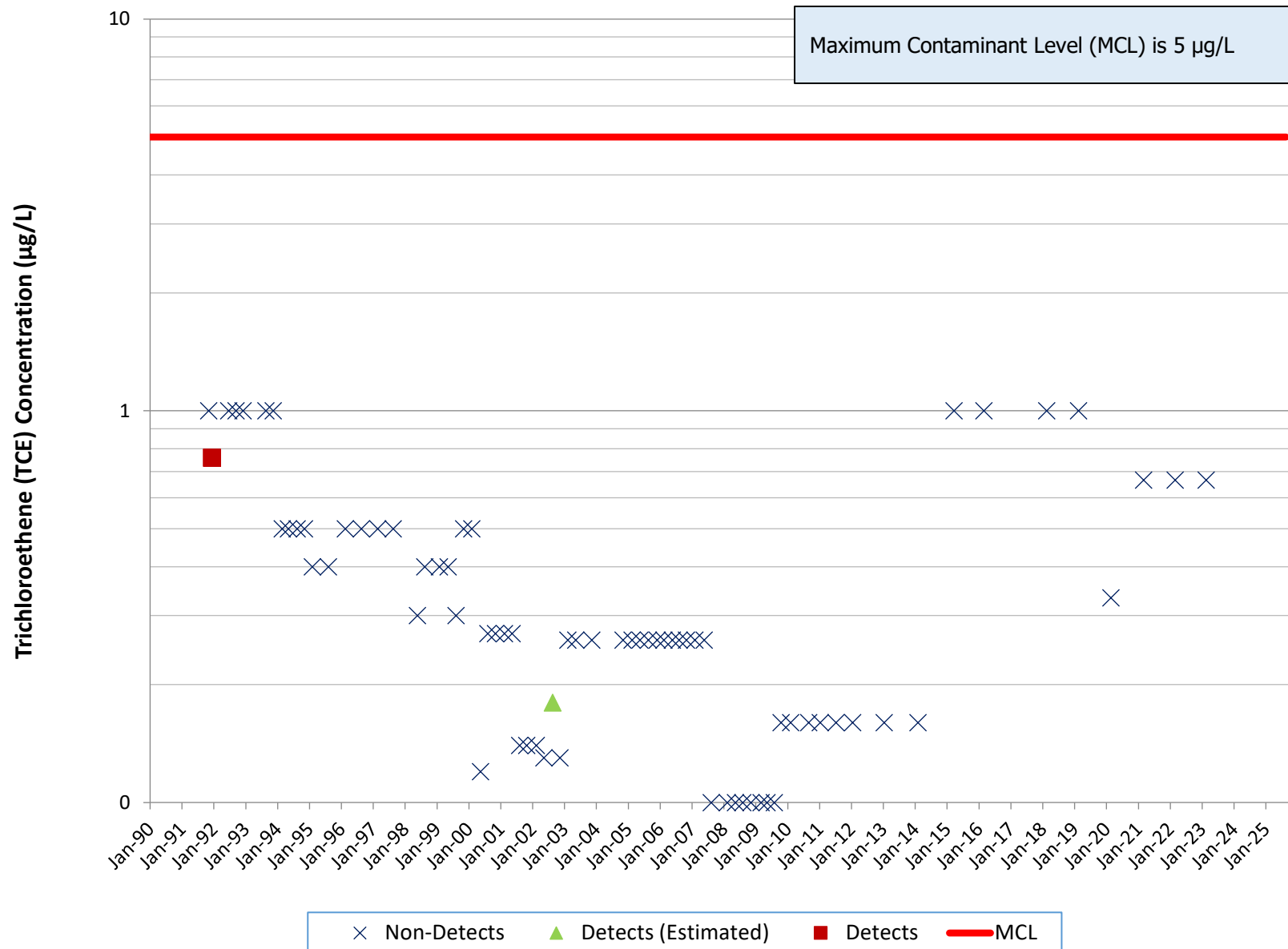
RD-21, FSDF/ESADA Trichloroethene



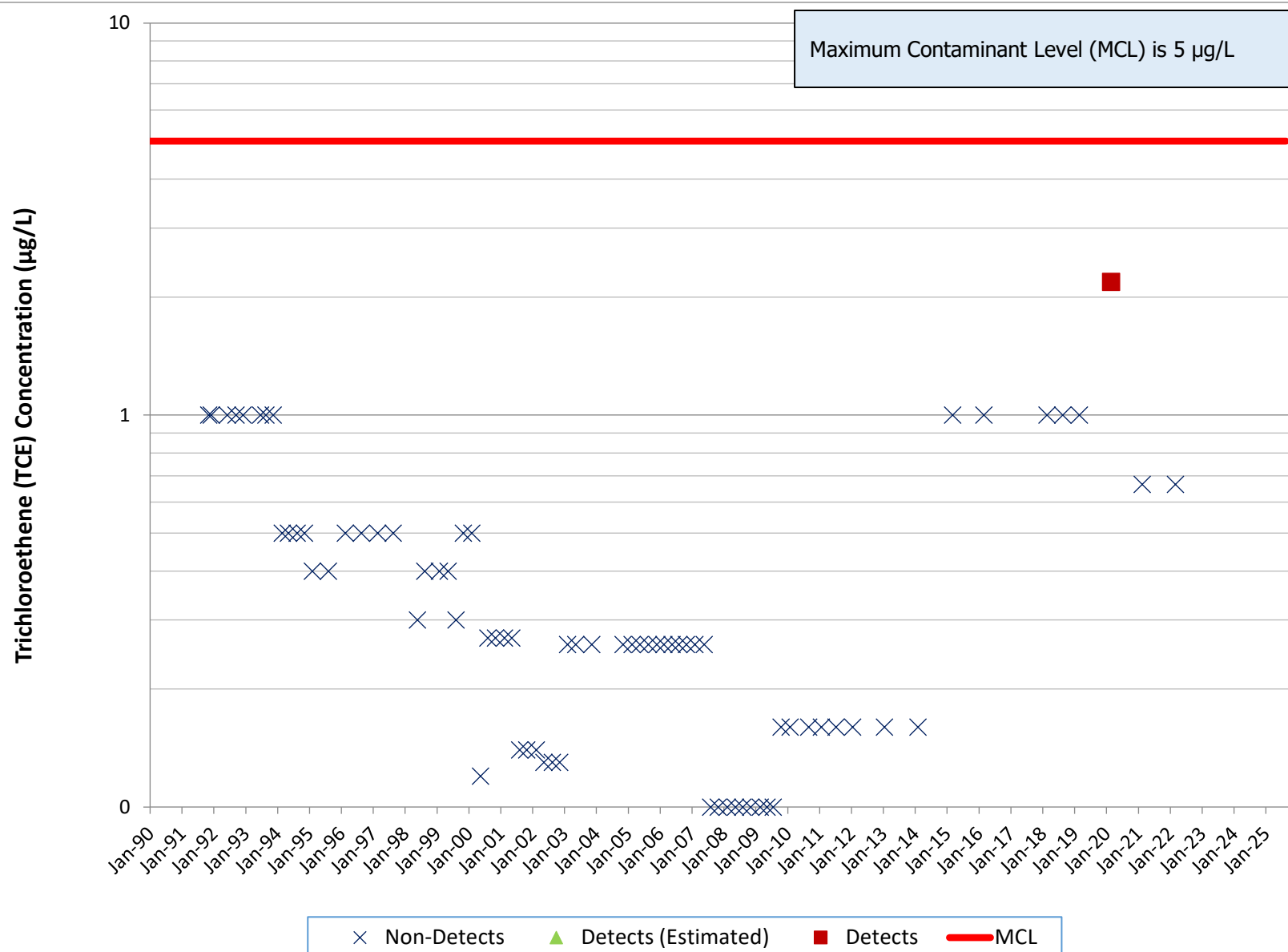
RD-33A, FSDF/ESADA Trichloroethene



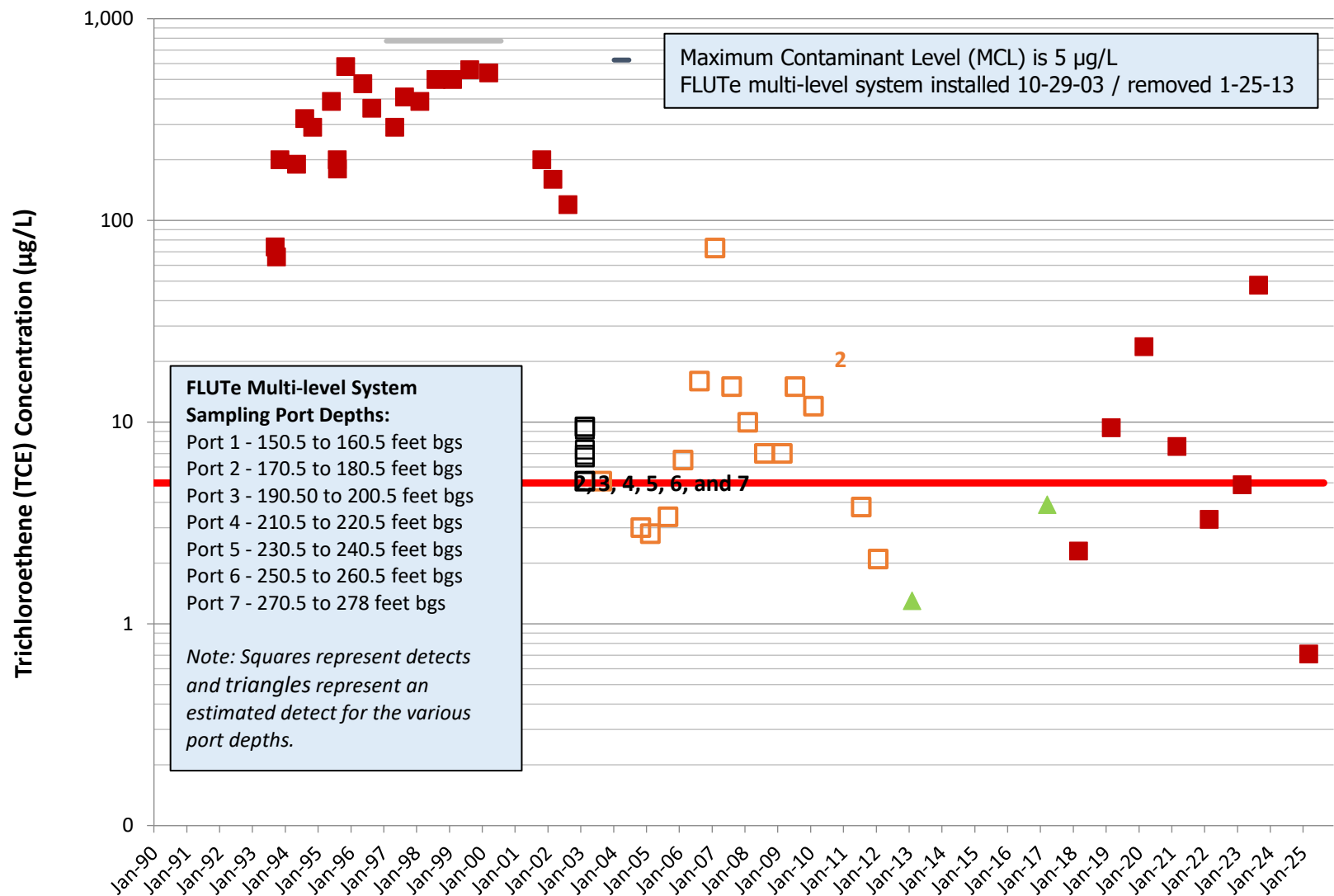
RD-33B, FSDF/ESADA Trichloroethene



RD-33C, FSDF/ESADA Trichloroethene

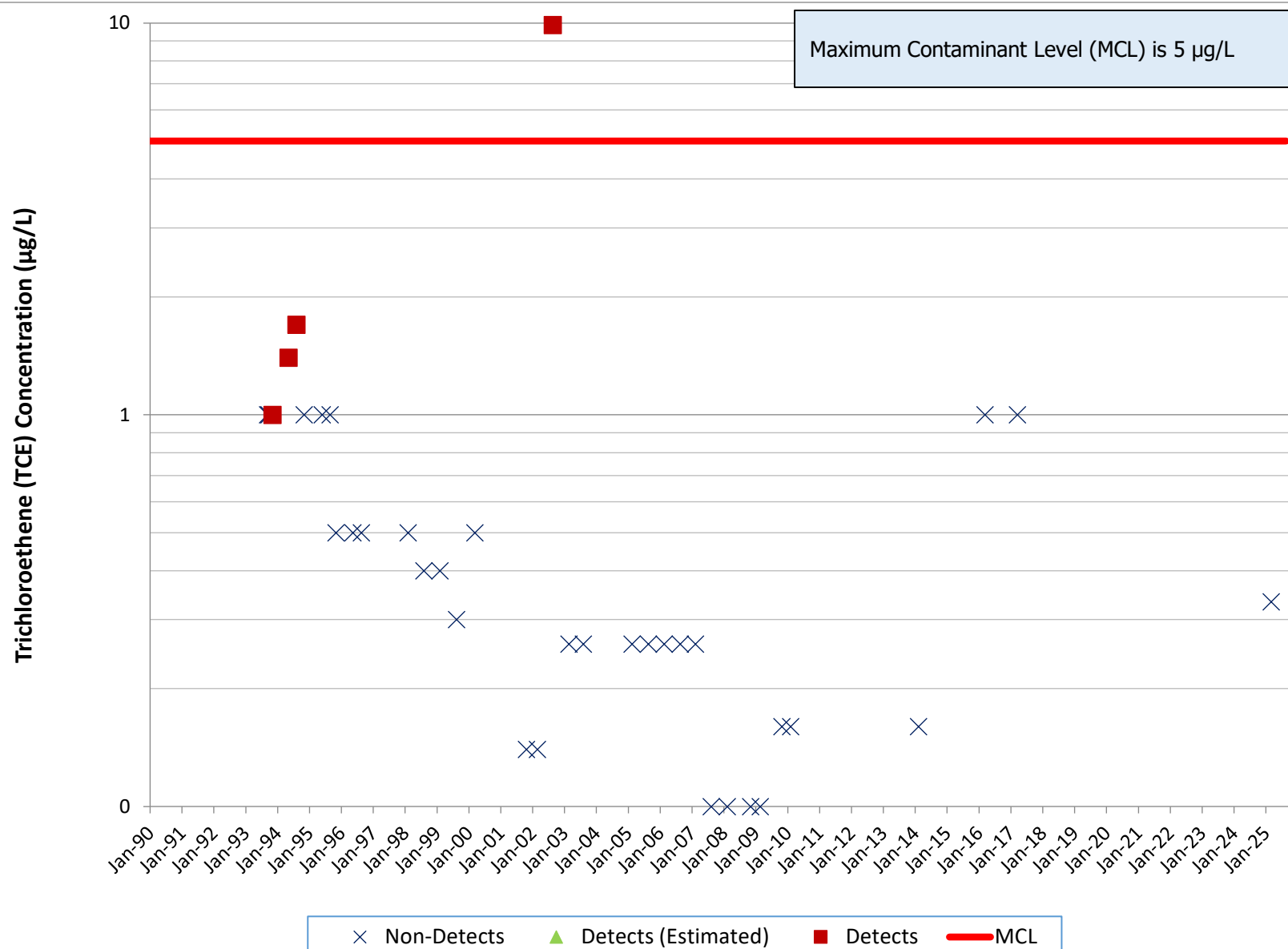


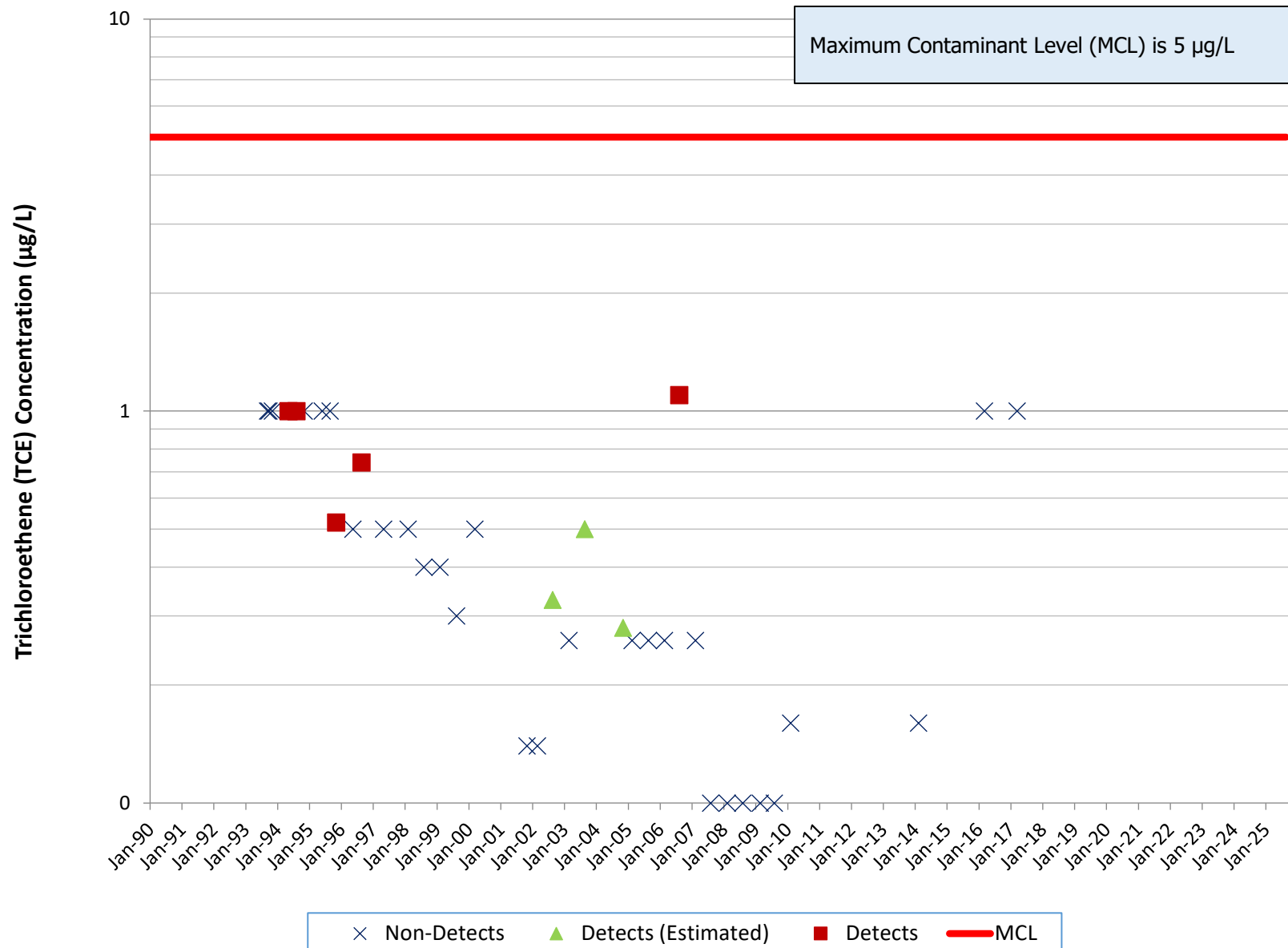
RD-54A FSDF/ESADA Trichloroethene



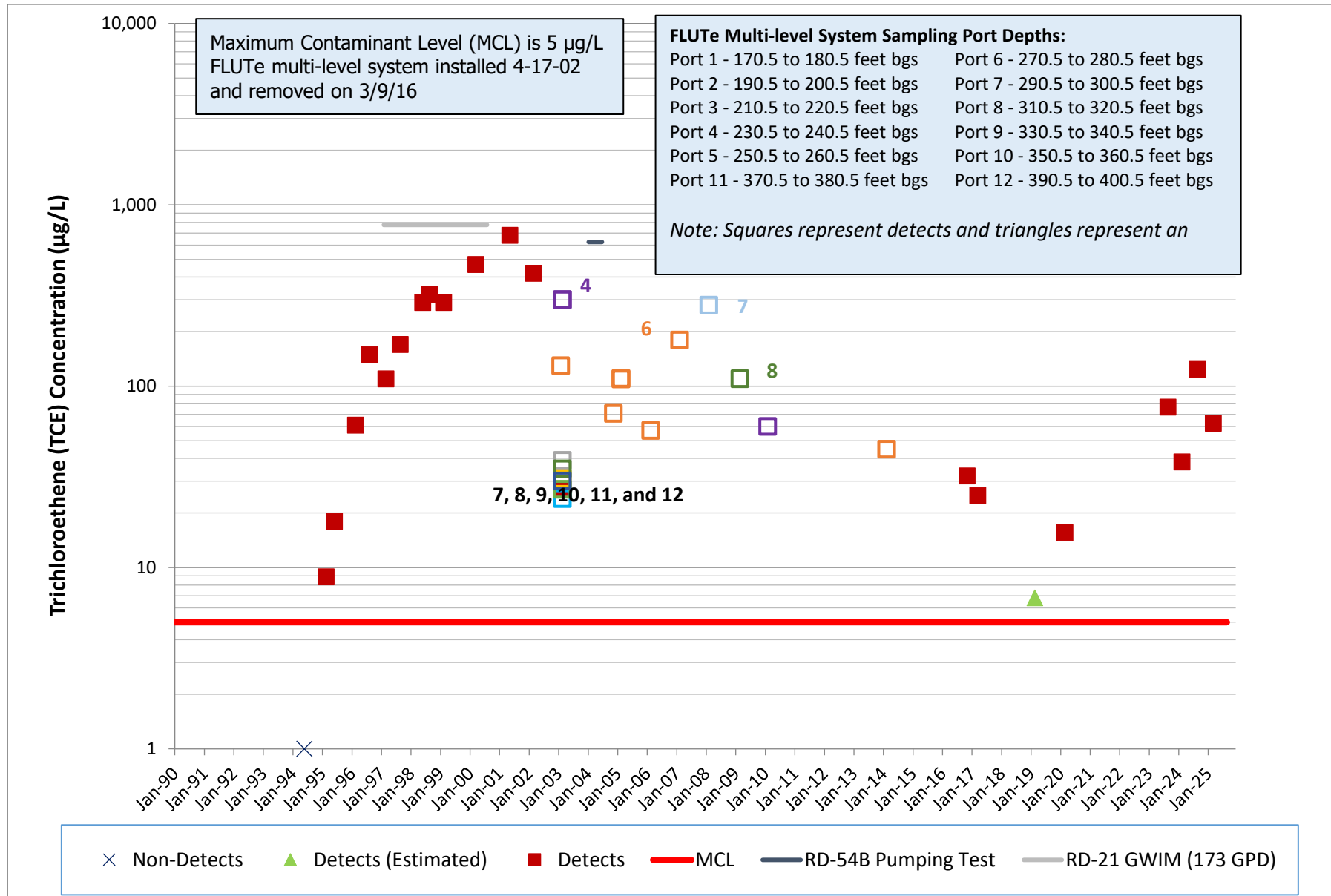
× Non-Detects
 ▲ Detects (Estimated)
 ■ Detects
 — MCL
 — RD-54B Pumping Test
 — RD-21 GWIM (173 GPD)

RD-54B, FSDF/ESADA Trichloroethene

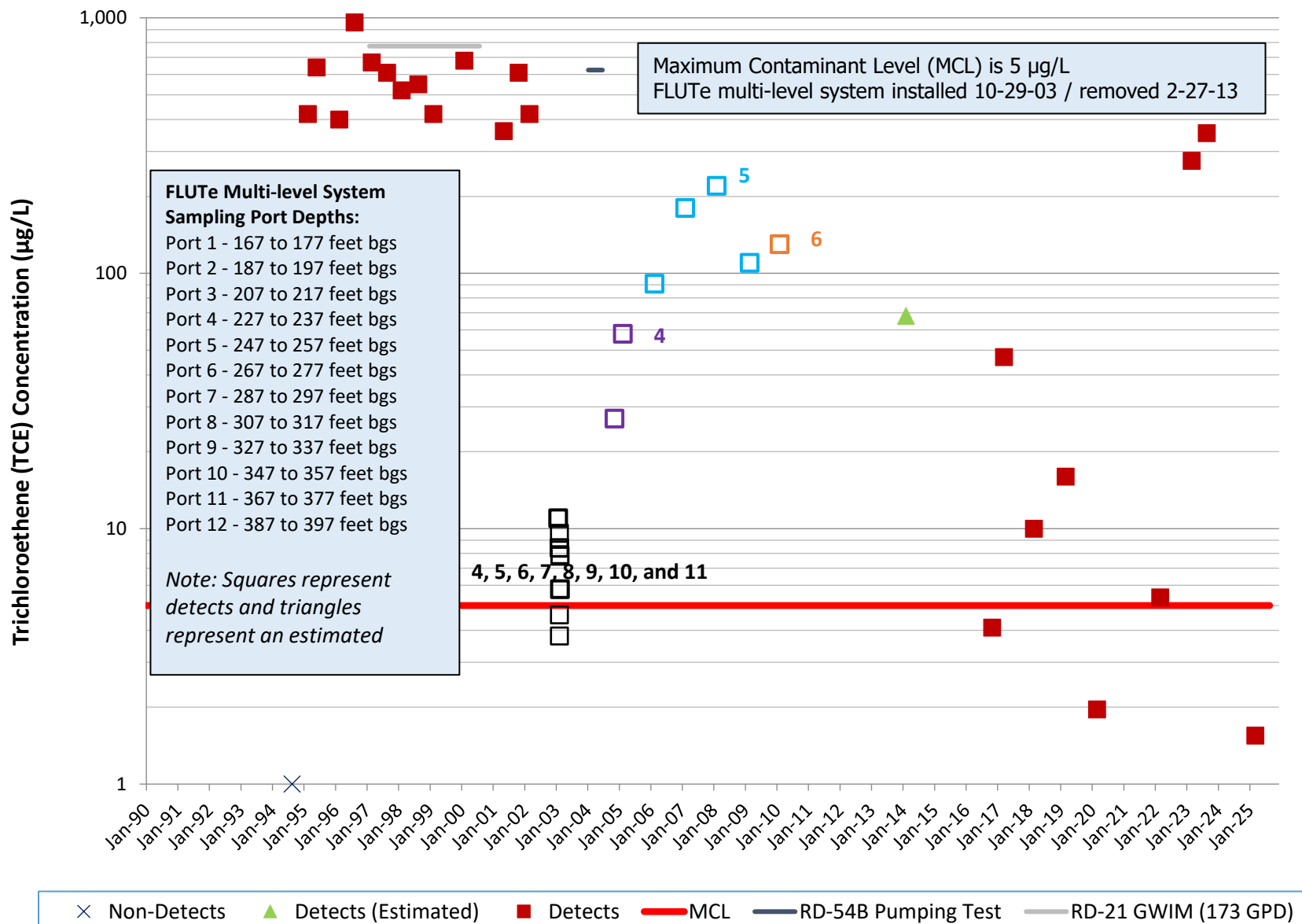


RD-54C, FSDF/ESADA
Trichloroethene

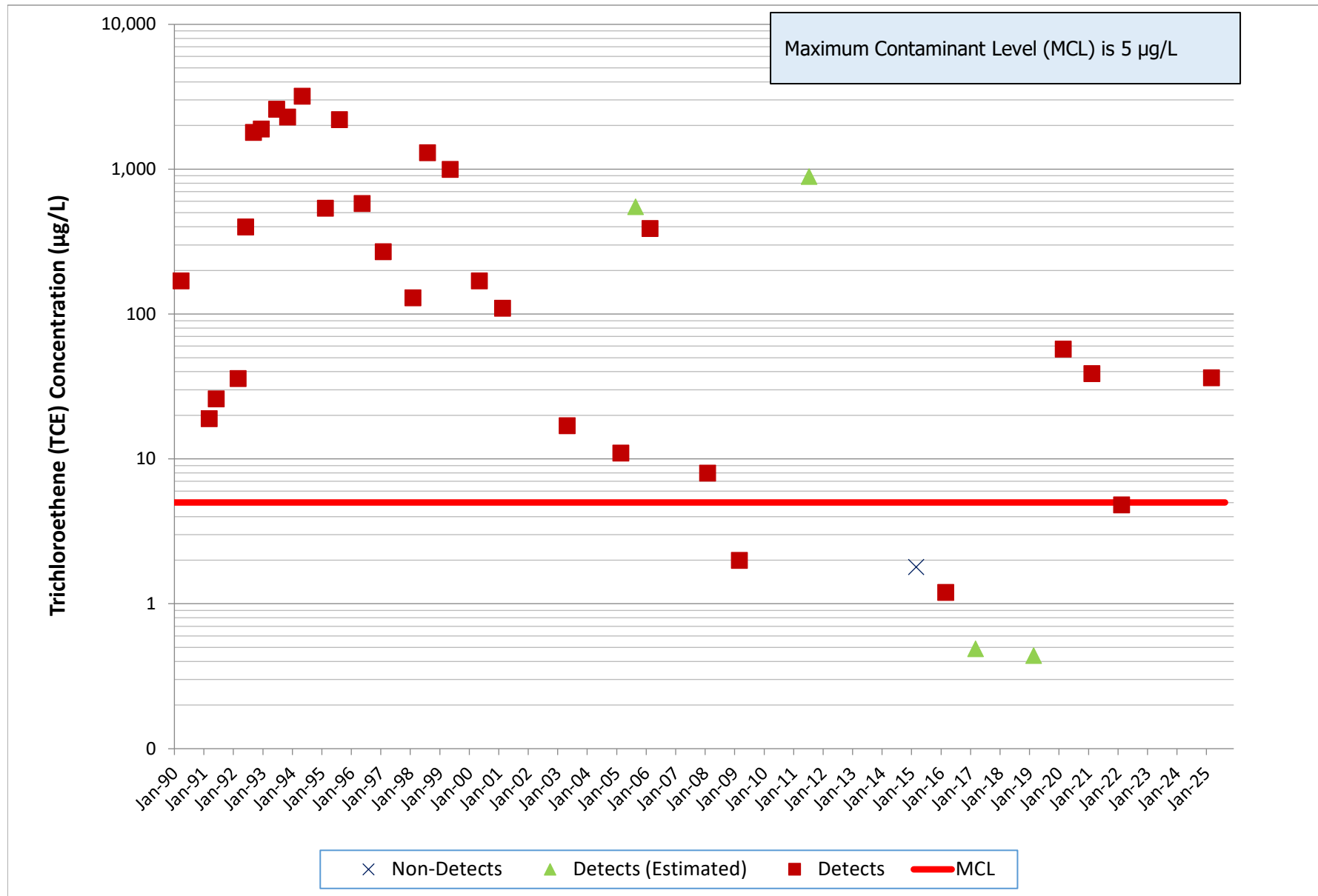
RD-64, FSDF/ESADA Trichloroethene



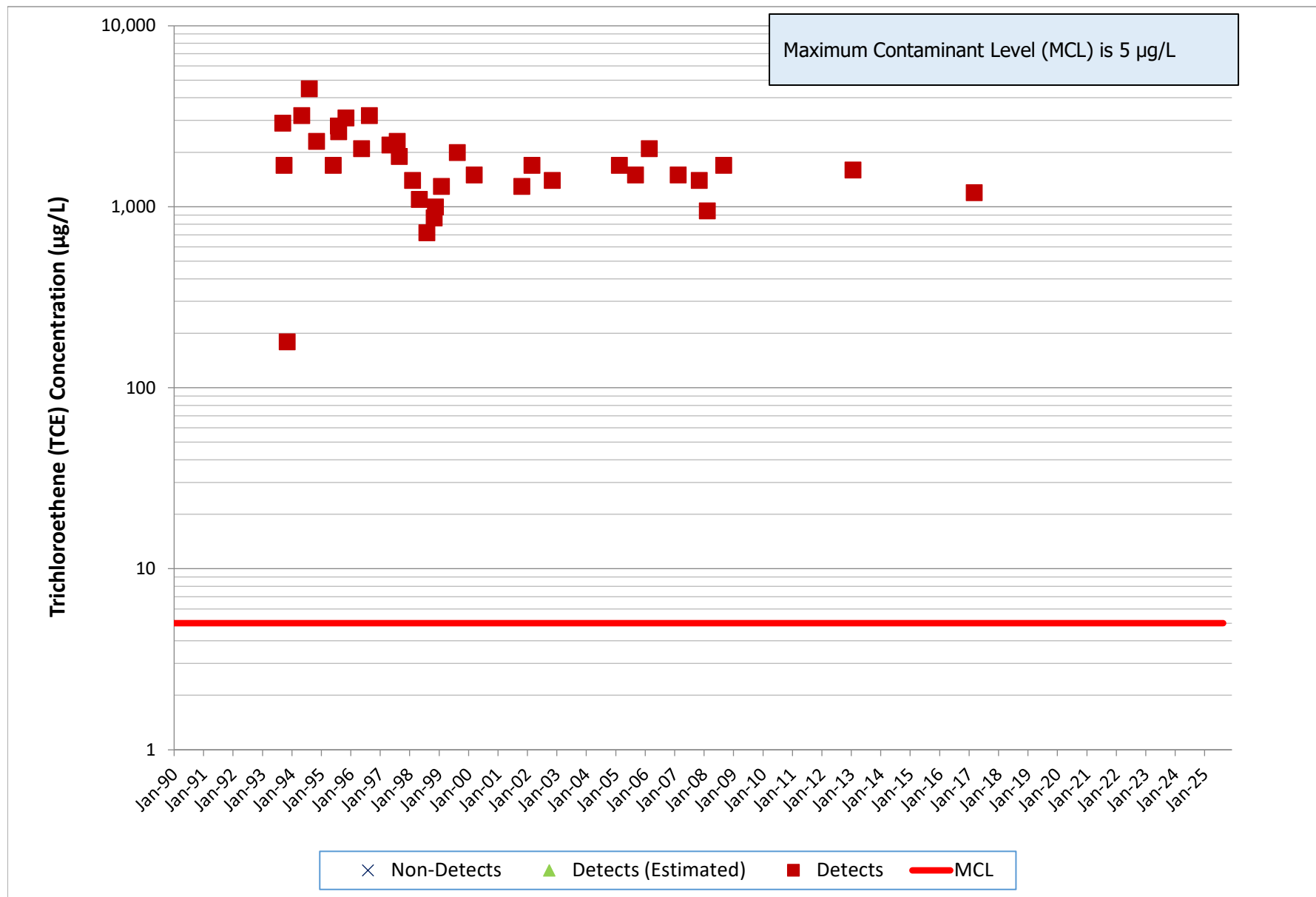
RD-65, FSDF/ESADA Trichloroethene



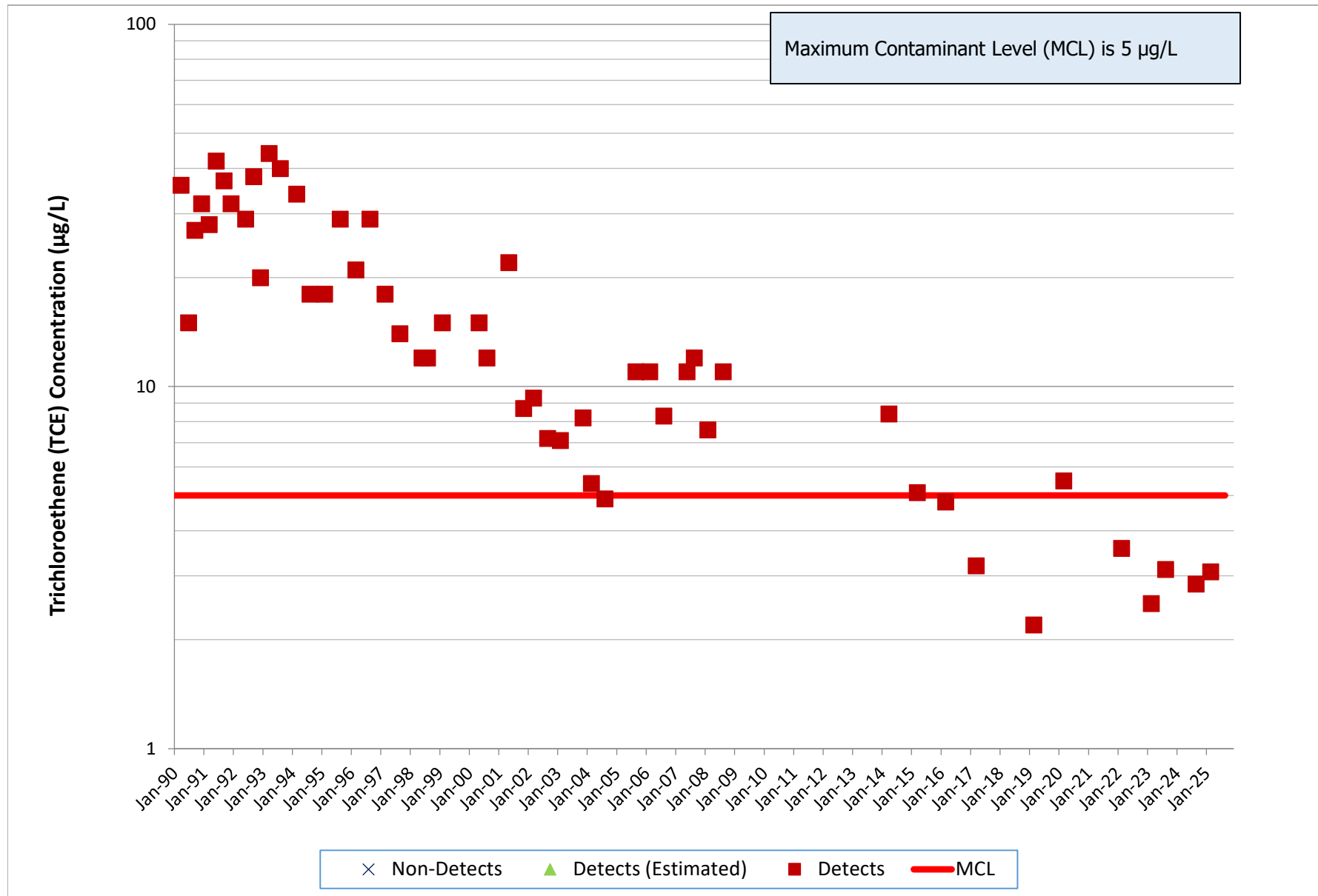
RS-18, FSDF/ESADA Trichloroethene



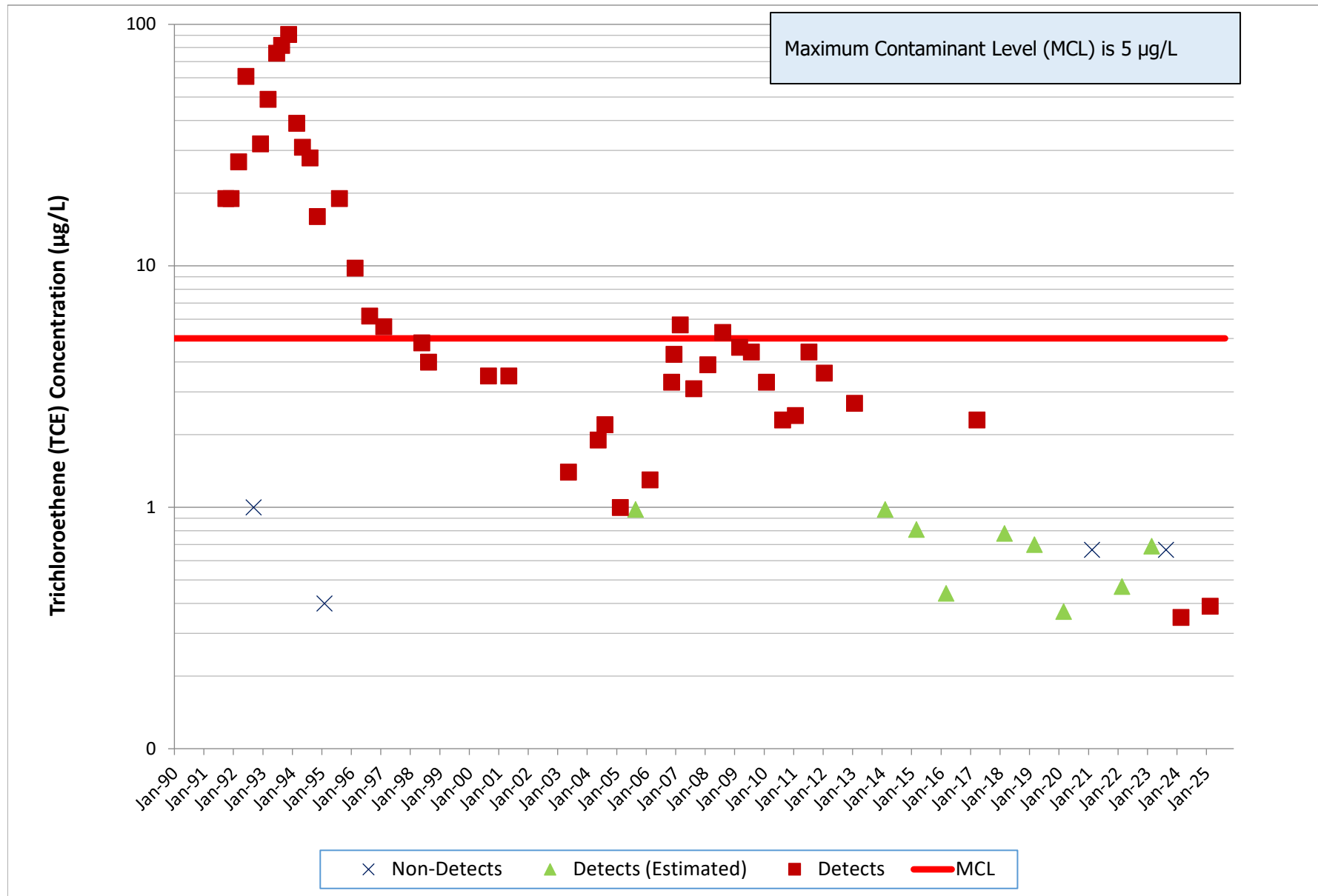
RS-54, FSDF/ESADA Trichloroethene



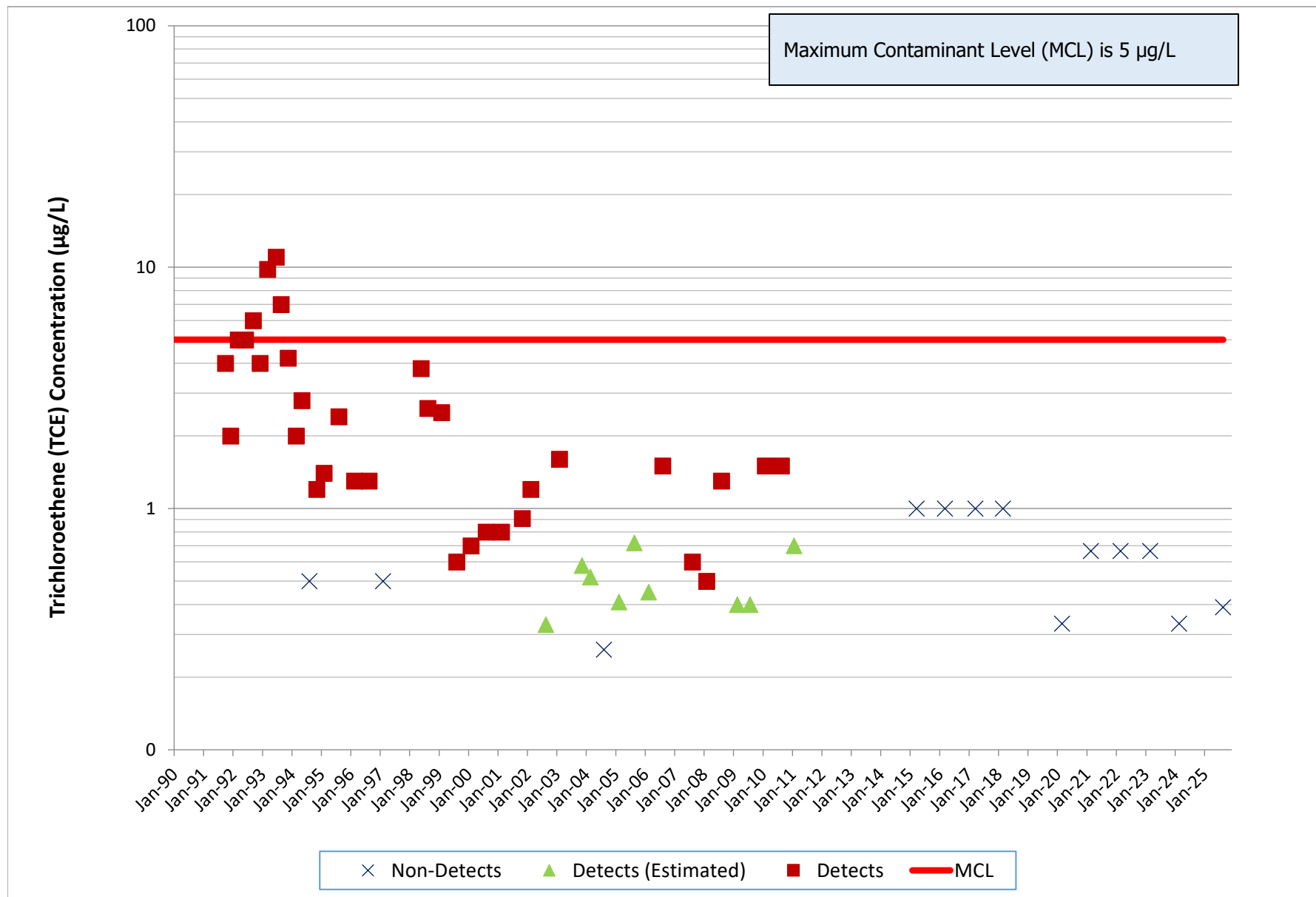
RD-30, RMHF Trichloroethene



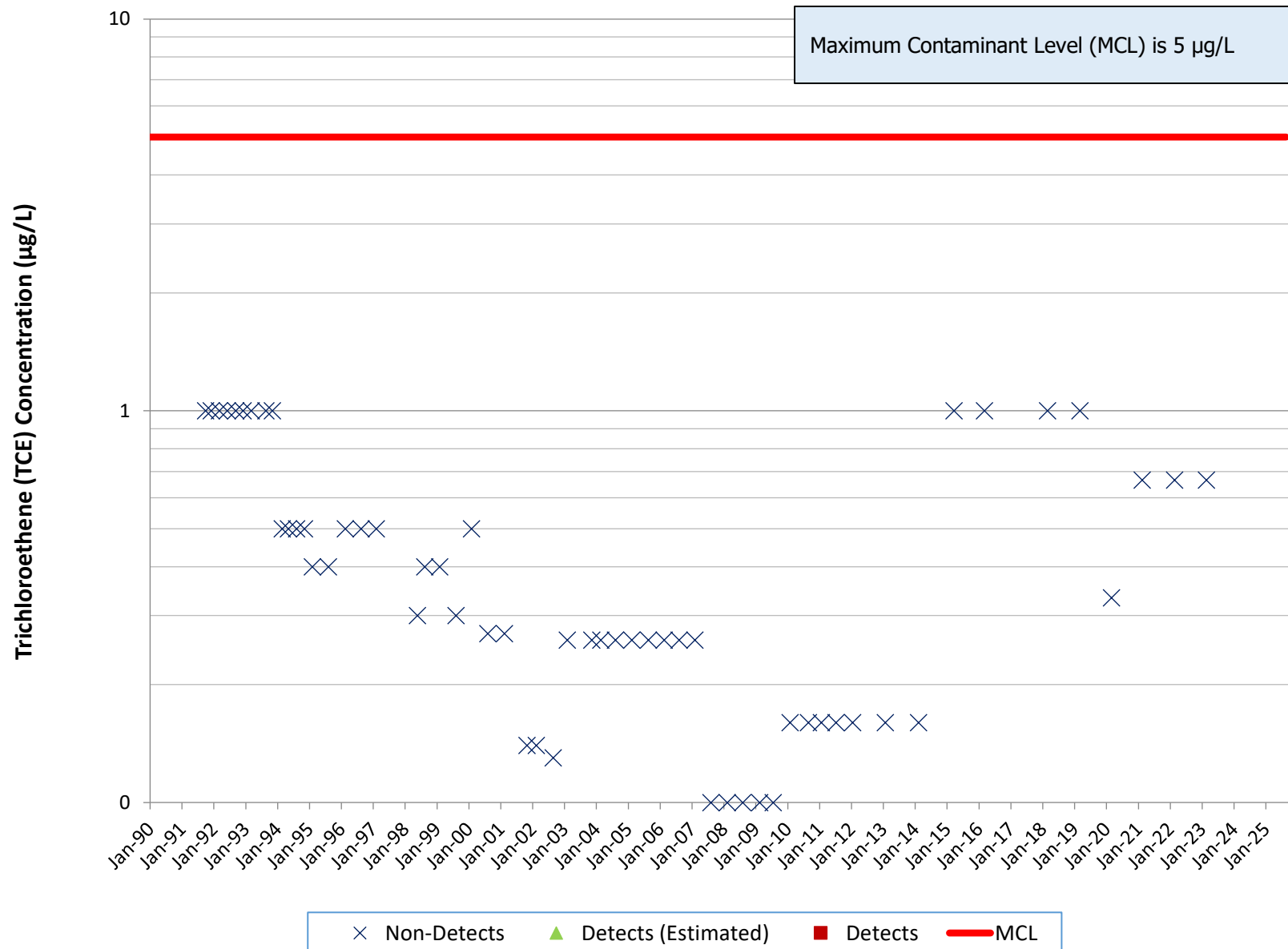
RD-34A, RMHF Trichloroethene



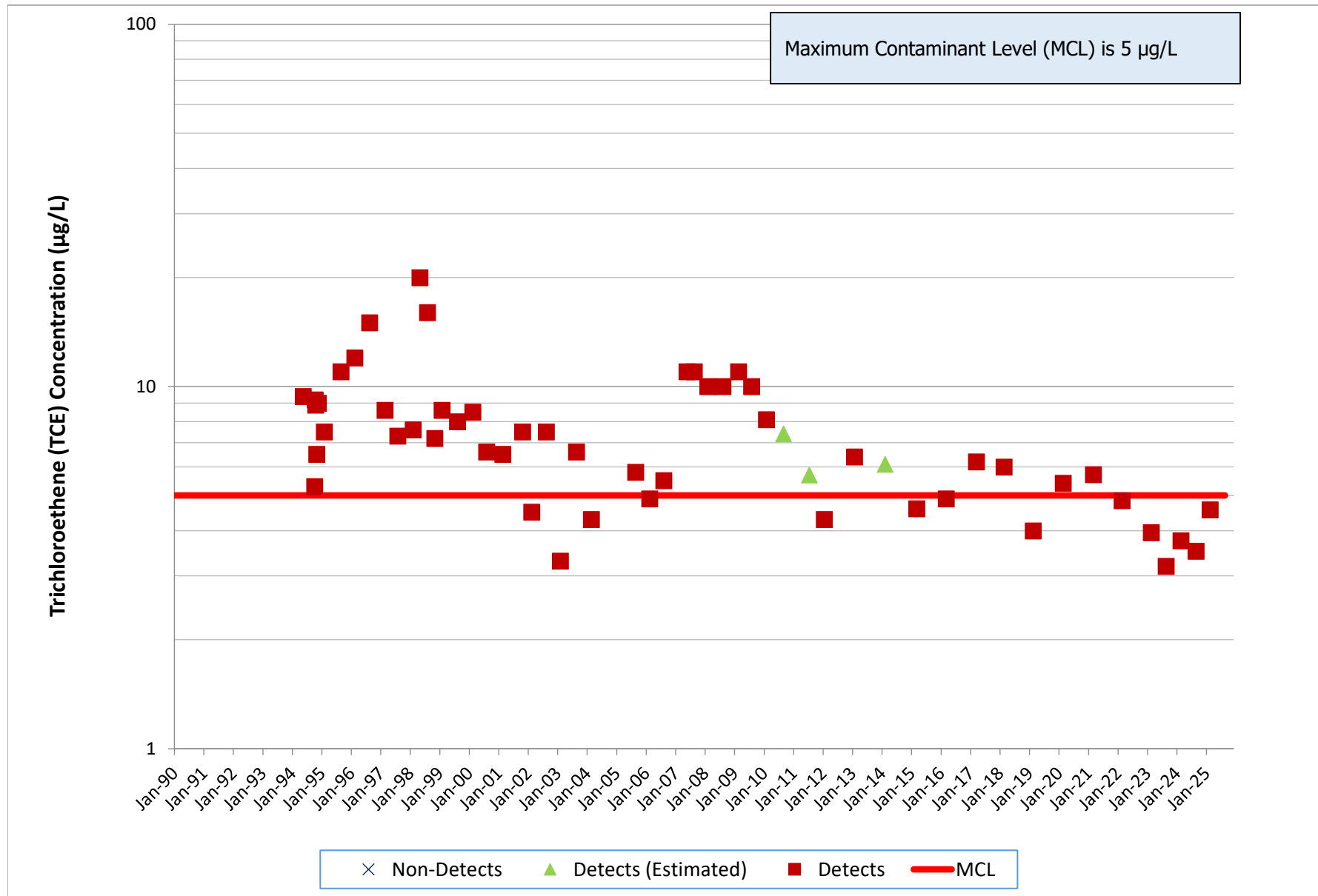
RD-34B, RMHF Trichloroethene



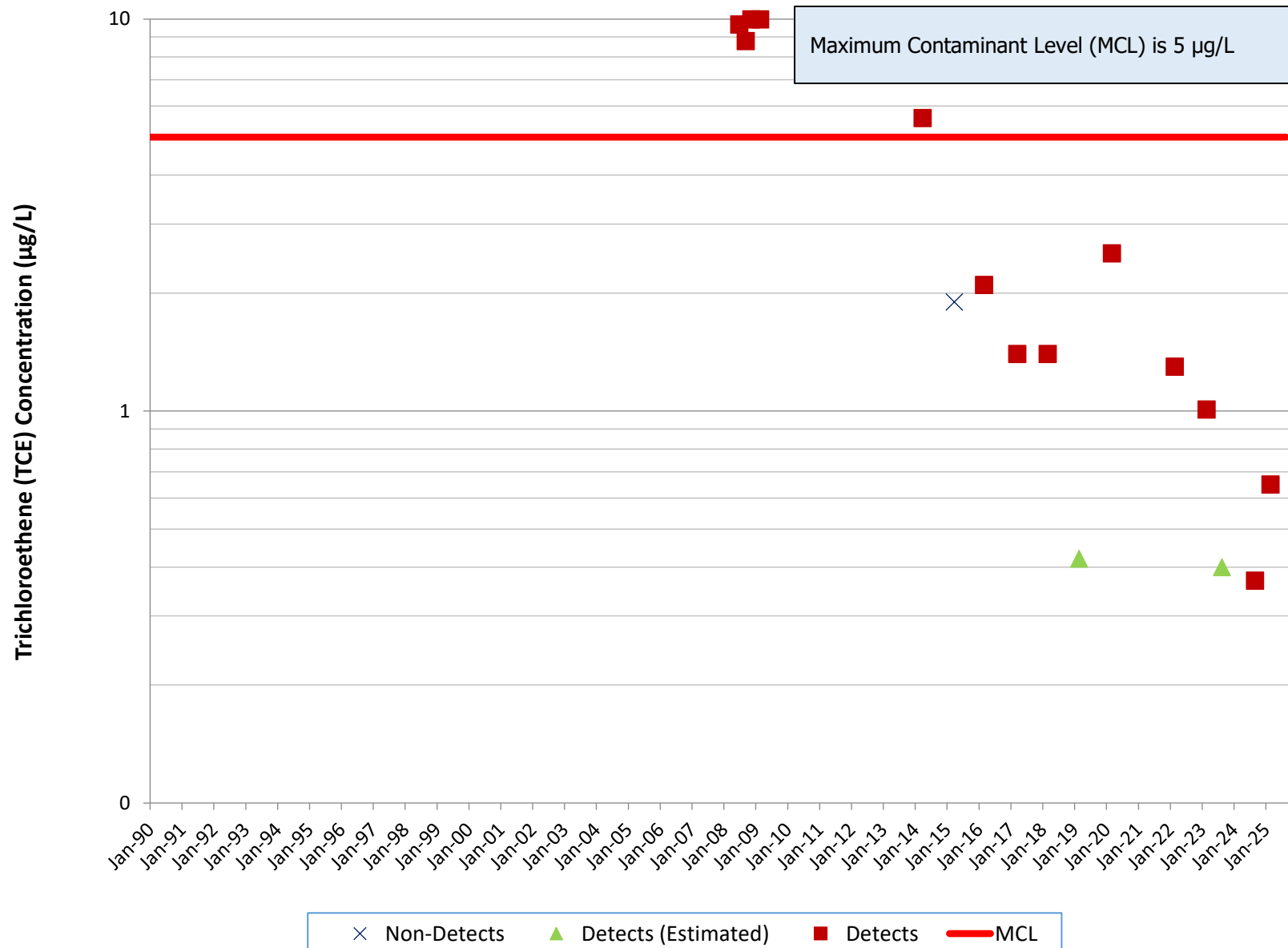
RD-34C, RMHF Trichloroethene



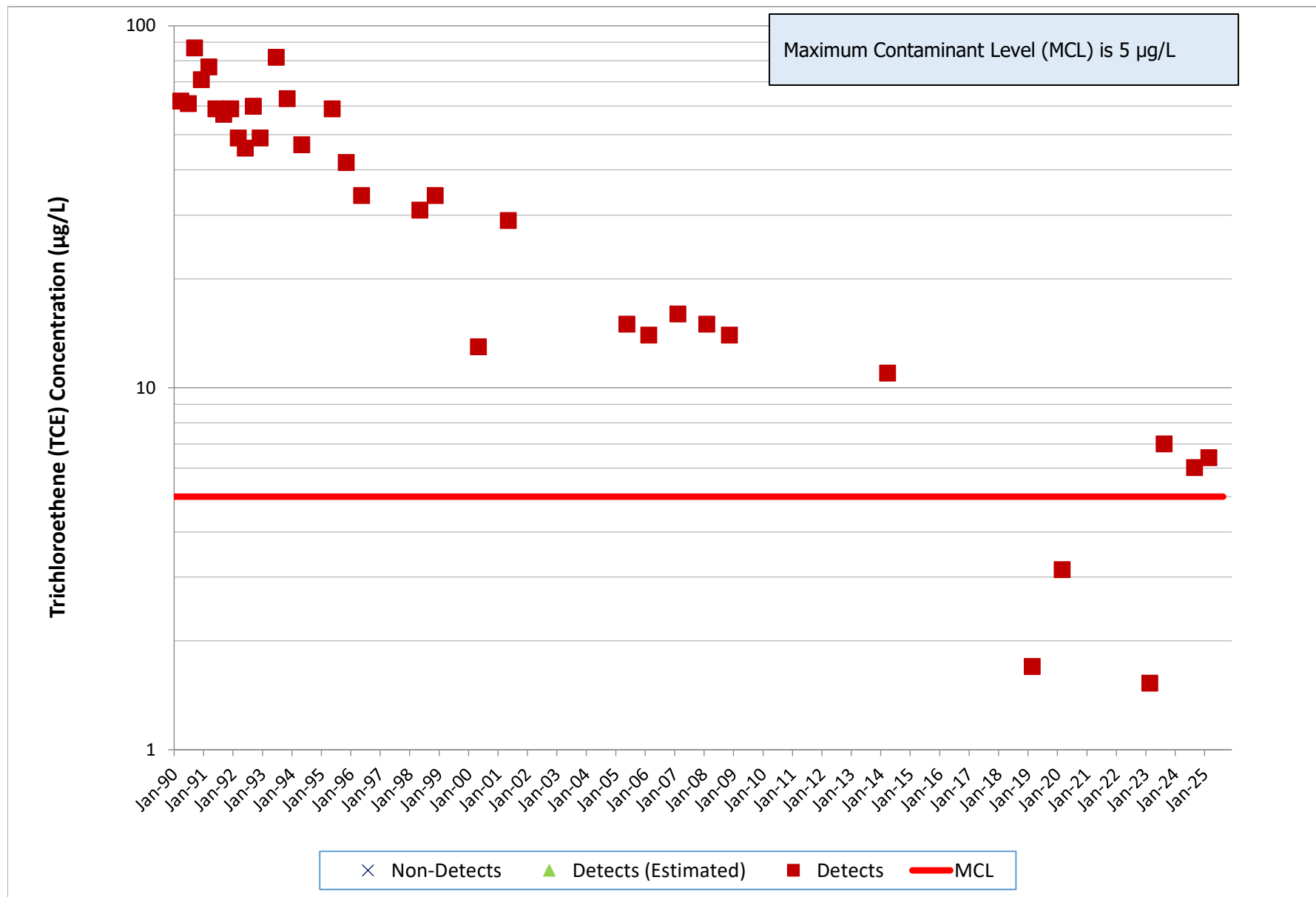
RD-63, RMHF Trichloroethene



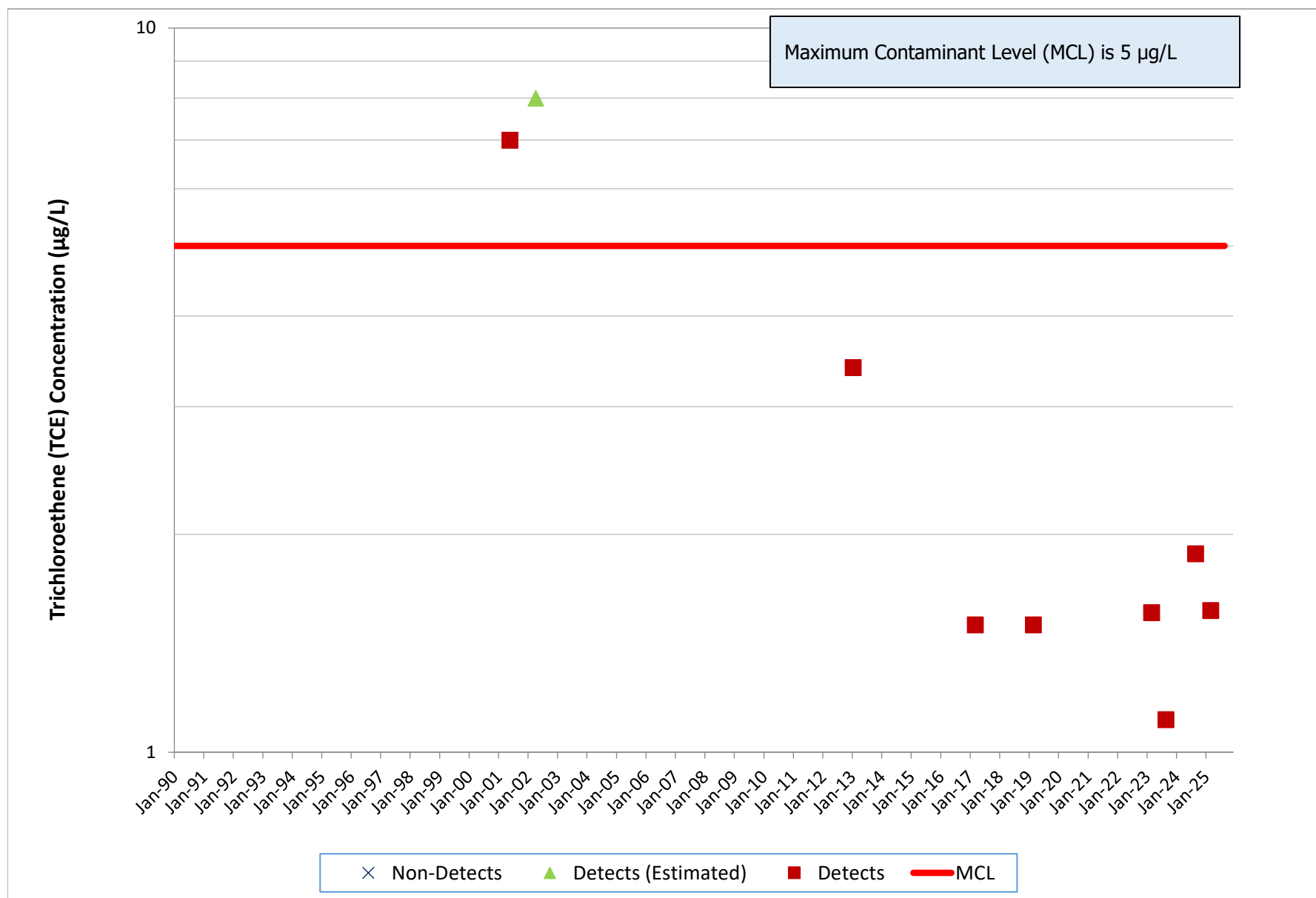
RD-98, RMHF Trichloroethene



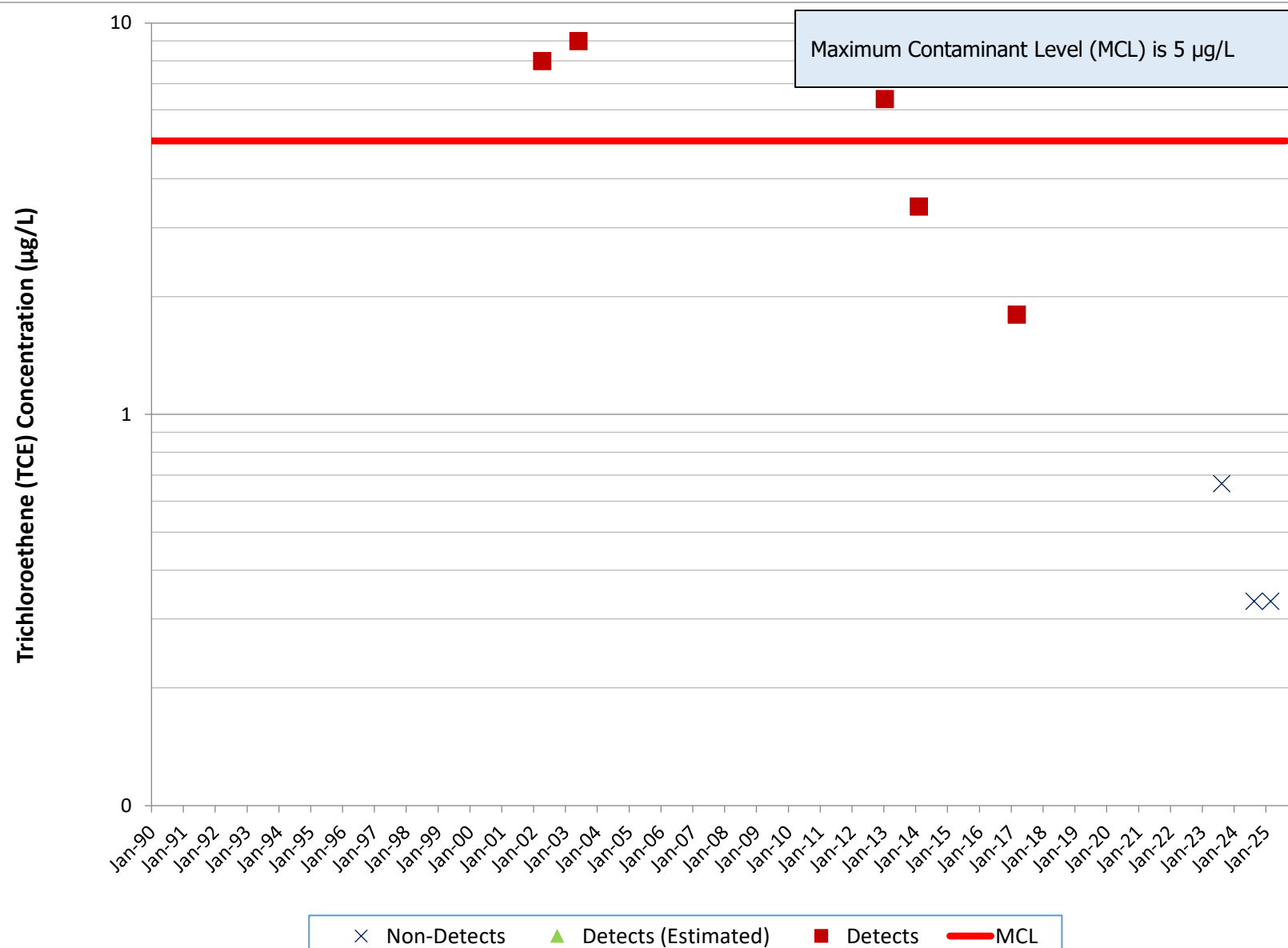
RS-28, RMHF Trichloroethene



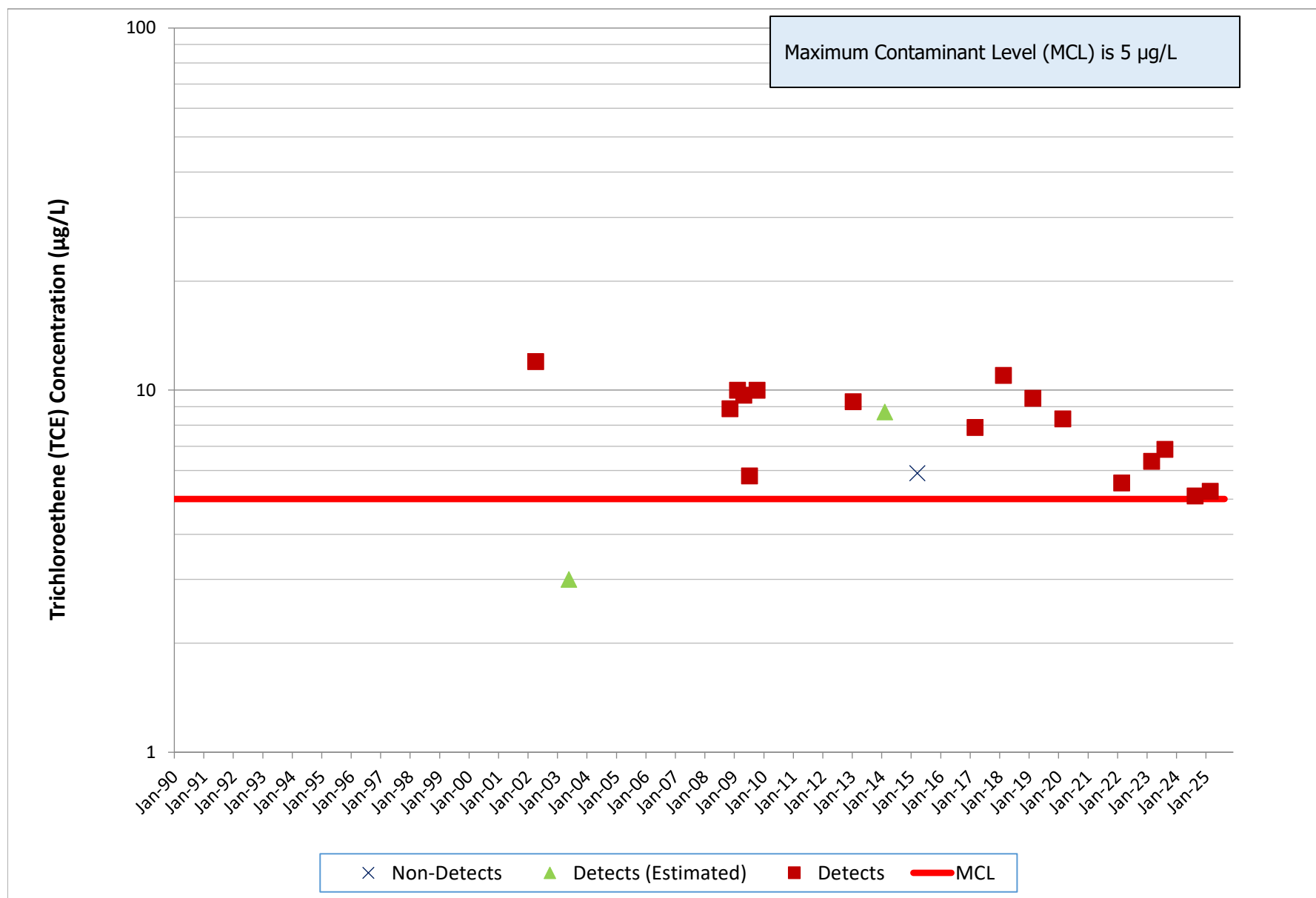
PZ-005, Bldg 65 Metals Clarifier Trichloroethene



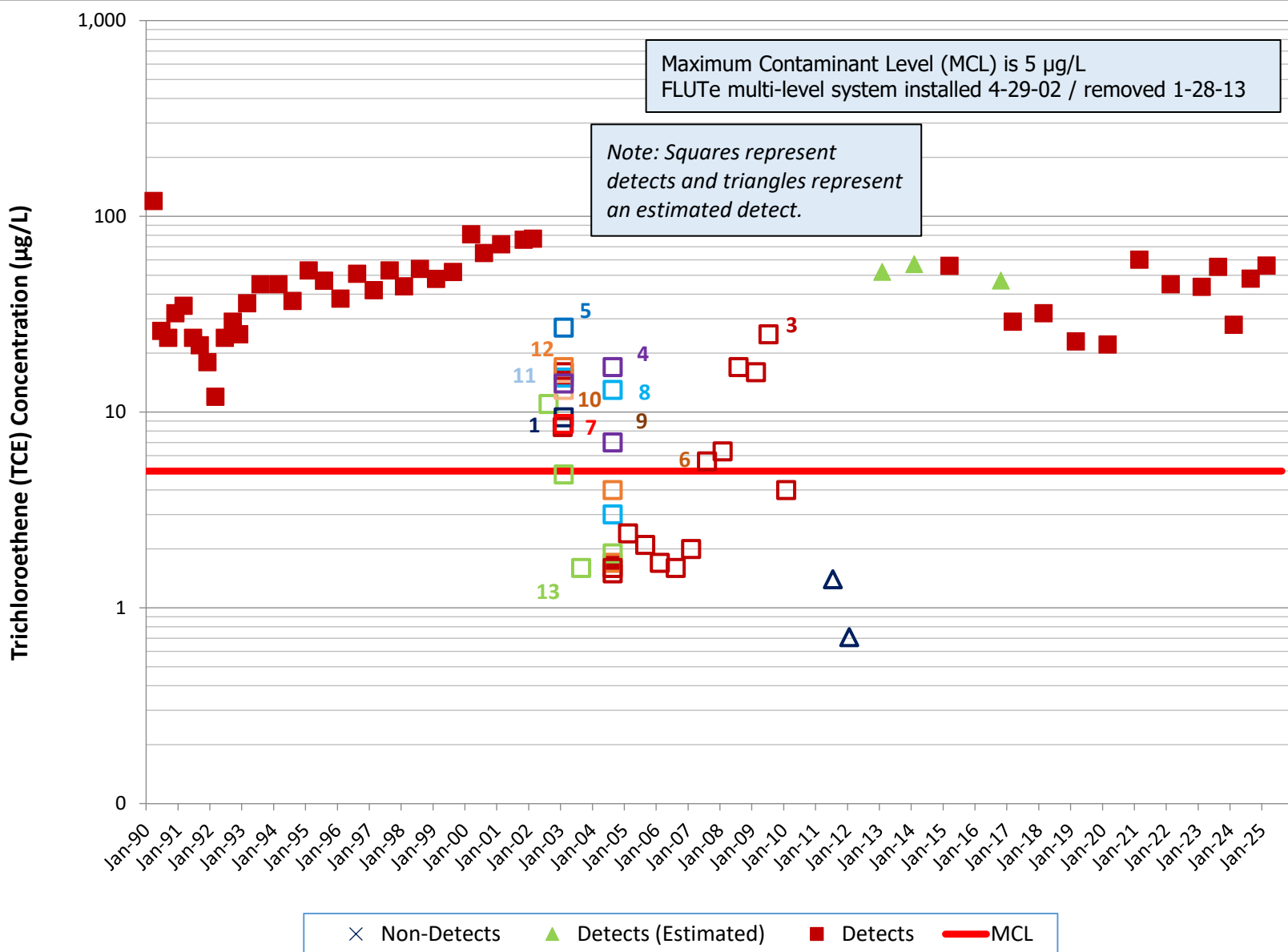
PZ-104, Bldg 65 Metals Clarifier Trichloroethene



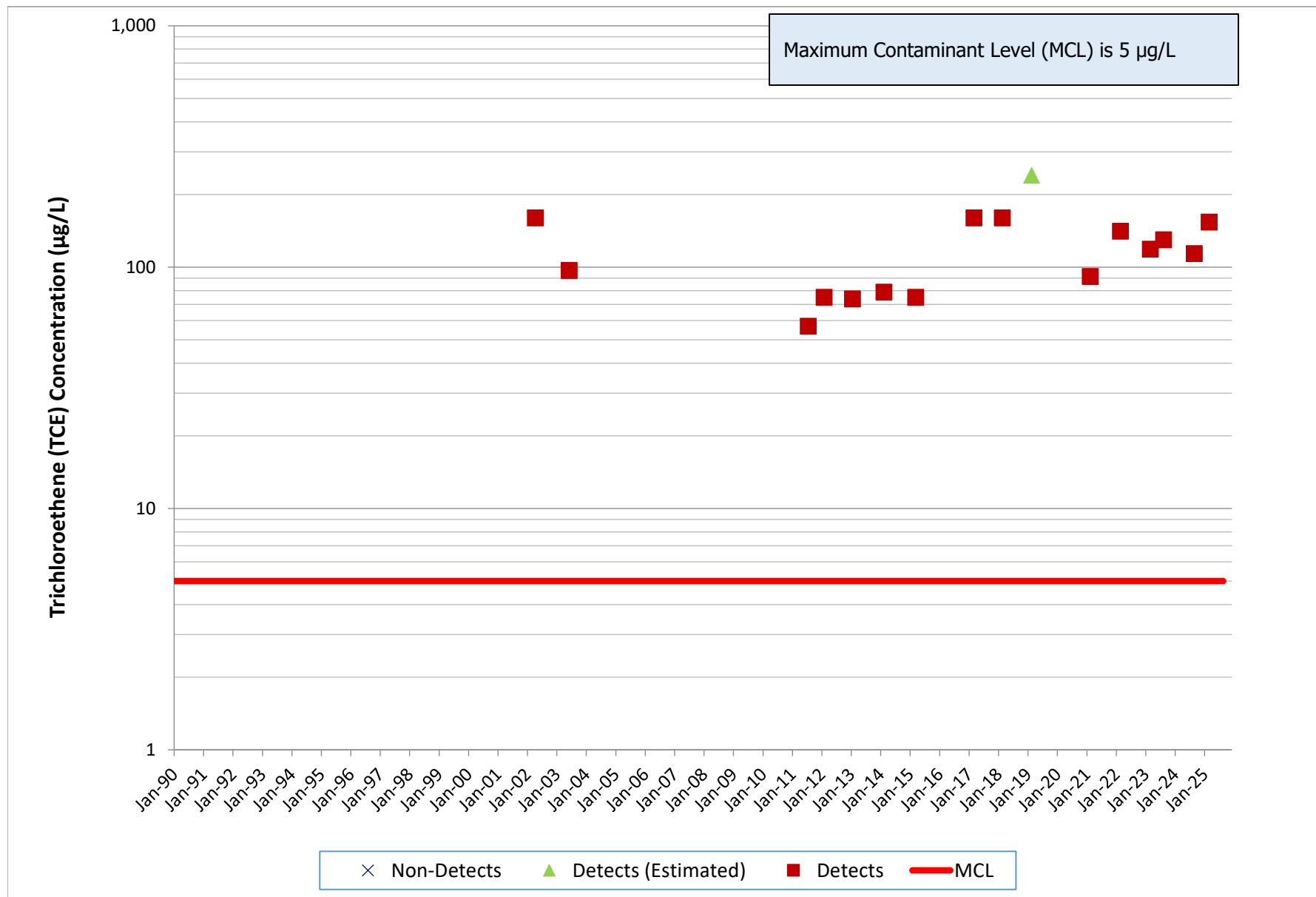
PZ-105, Bldg 65 Metals Clarifier Trichloroethene



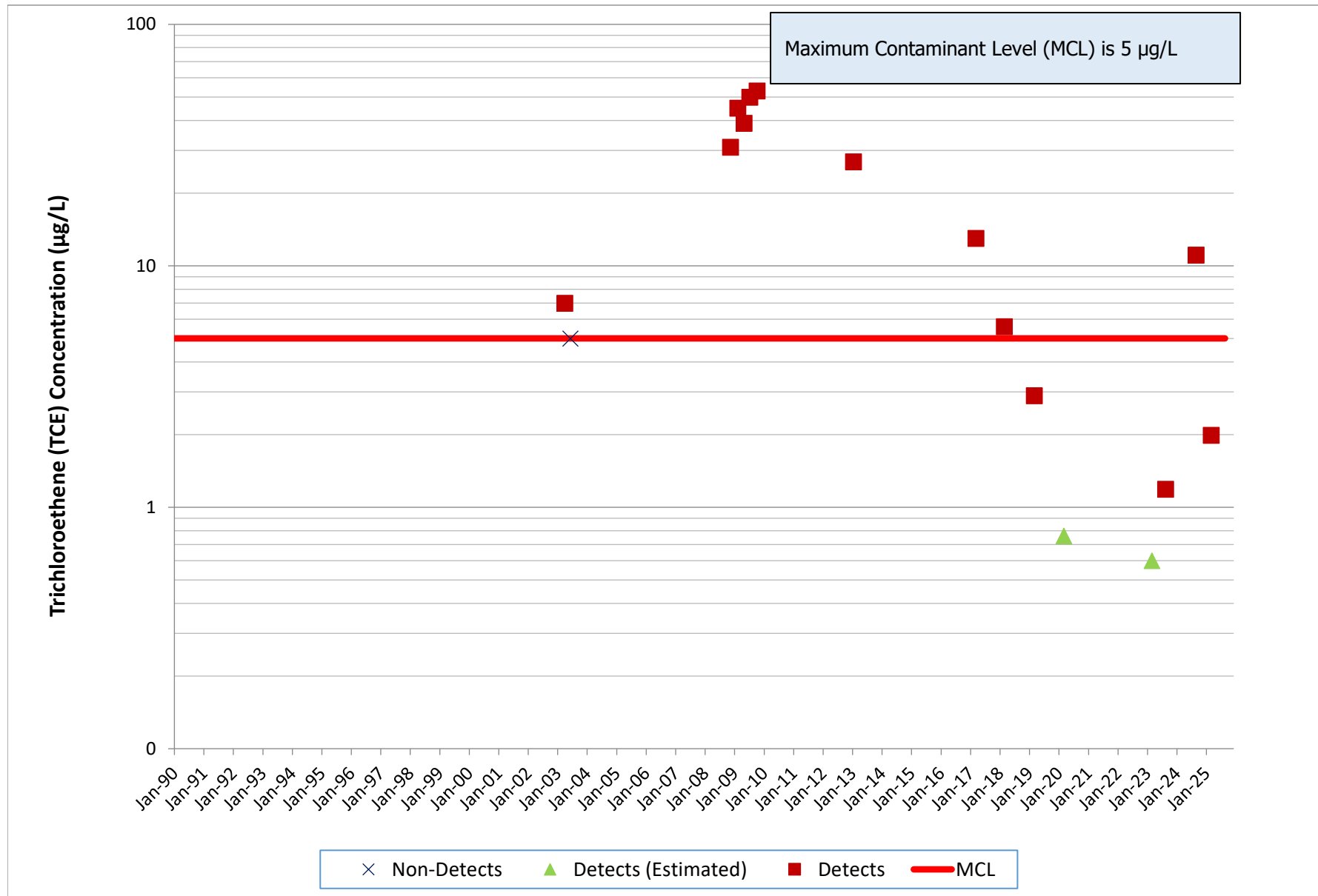
RD-07, Bldg 56 Landfill Trichloroethene



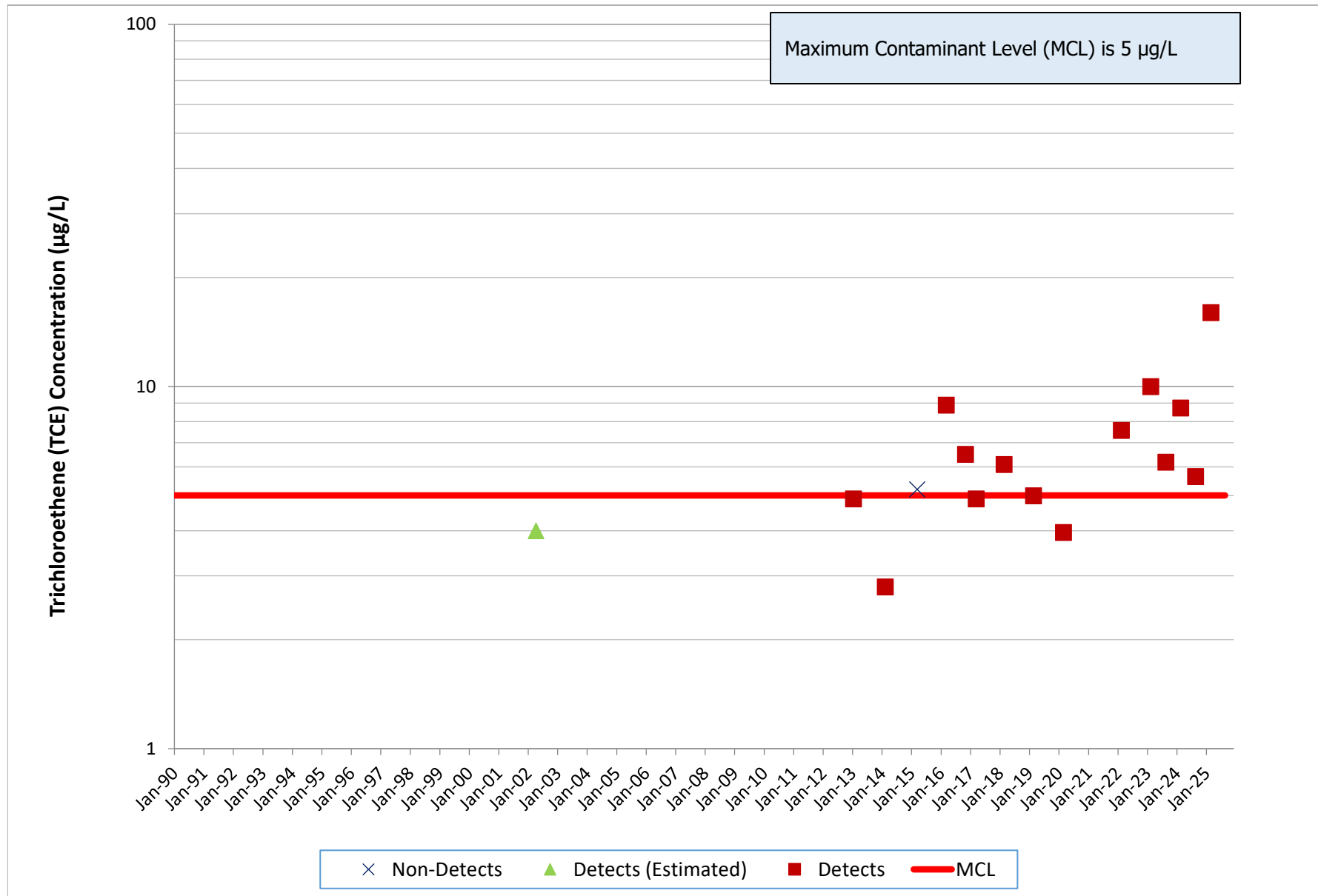
PZ-108, HMSA/PDU Trichloroethene



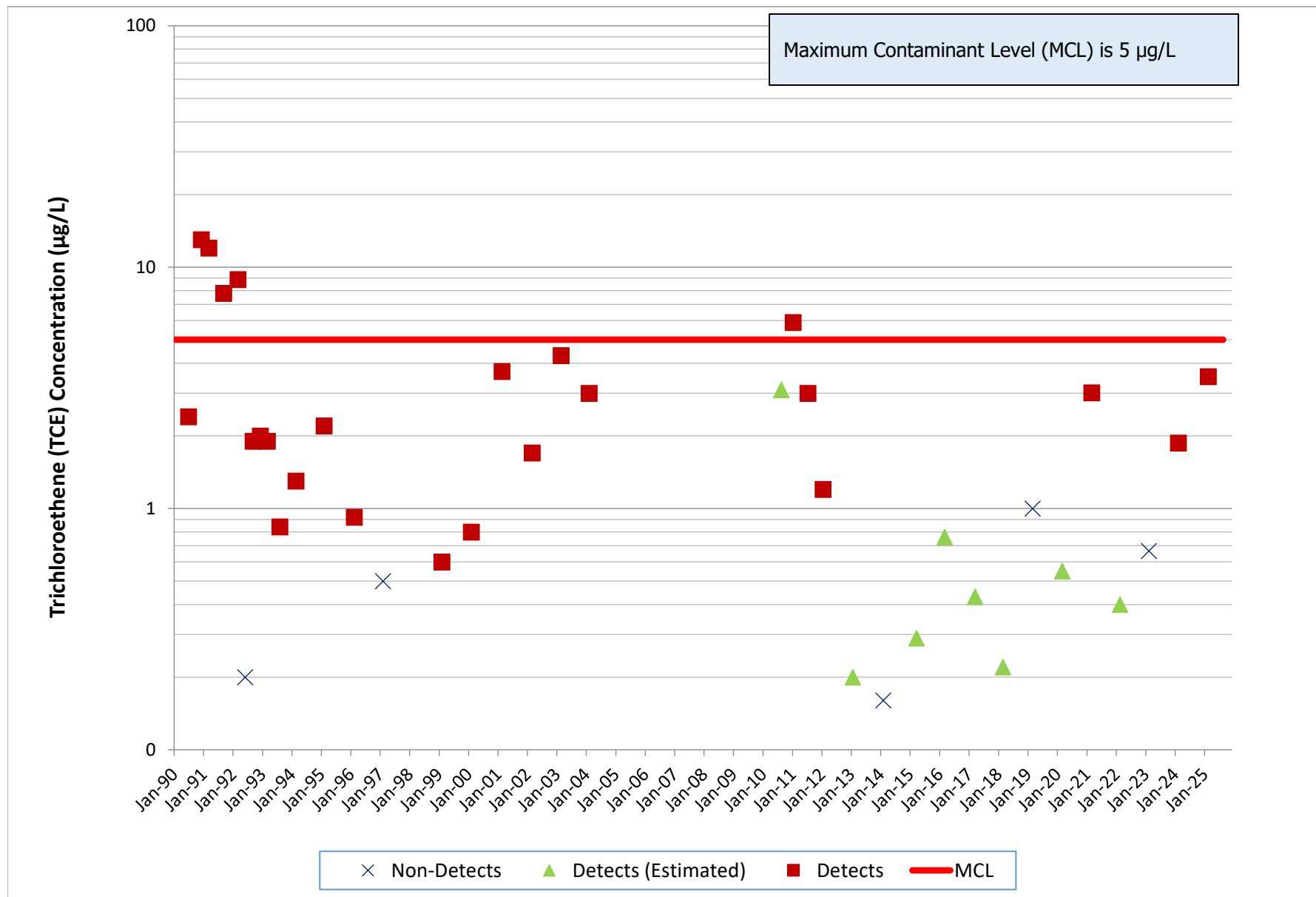
PZ-120, HMSA/PDU Trichloroethene



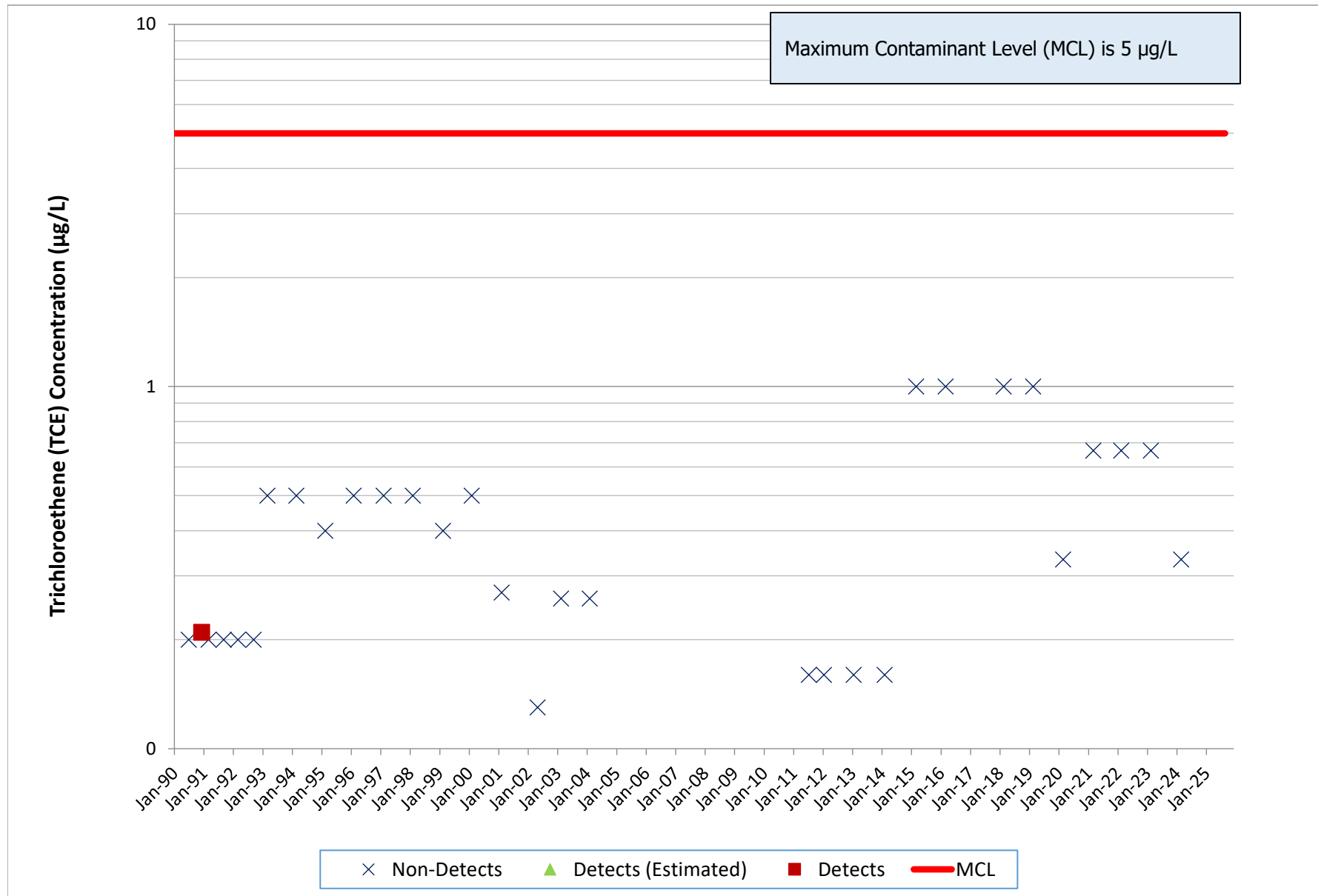
PZ-109, B4057/4059/4626
Trichloroethene



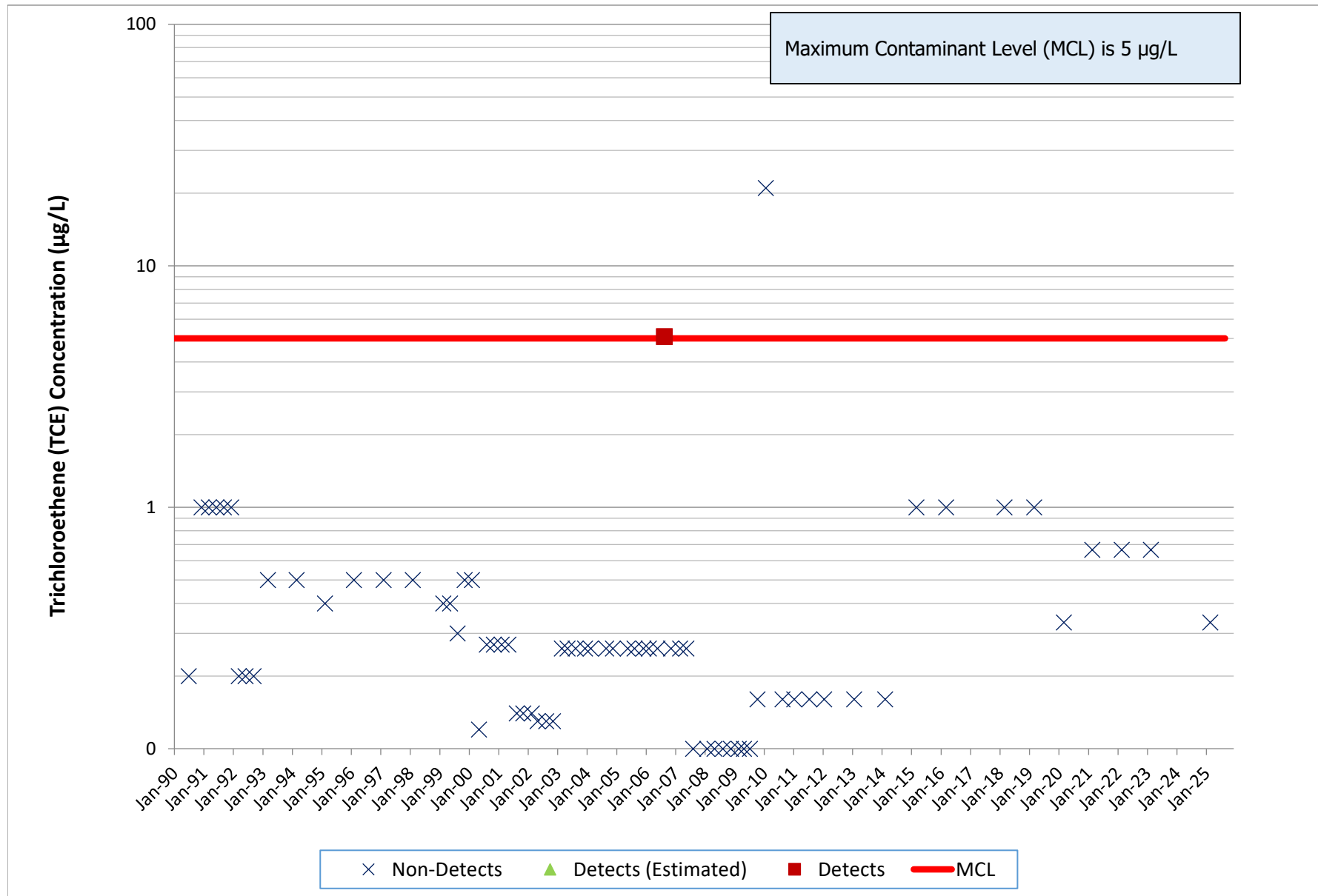
RD-14, OCY Trichloroethene



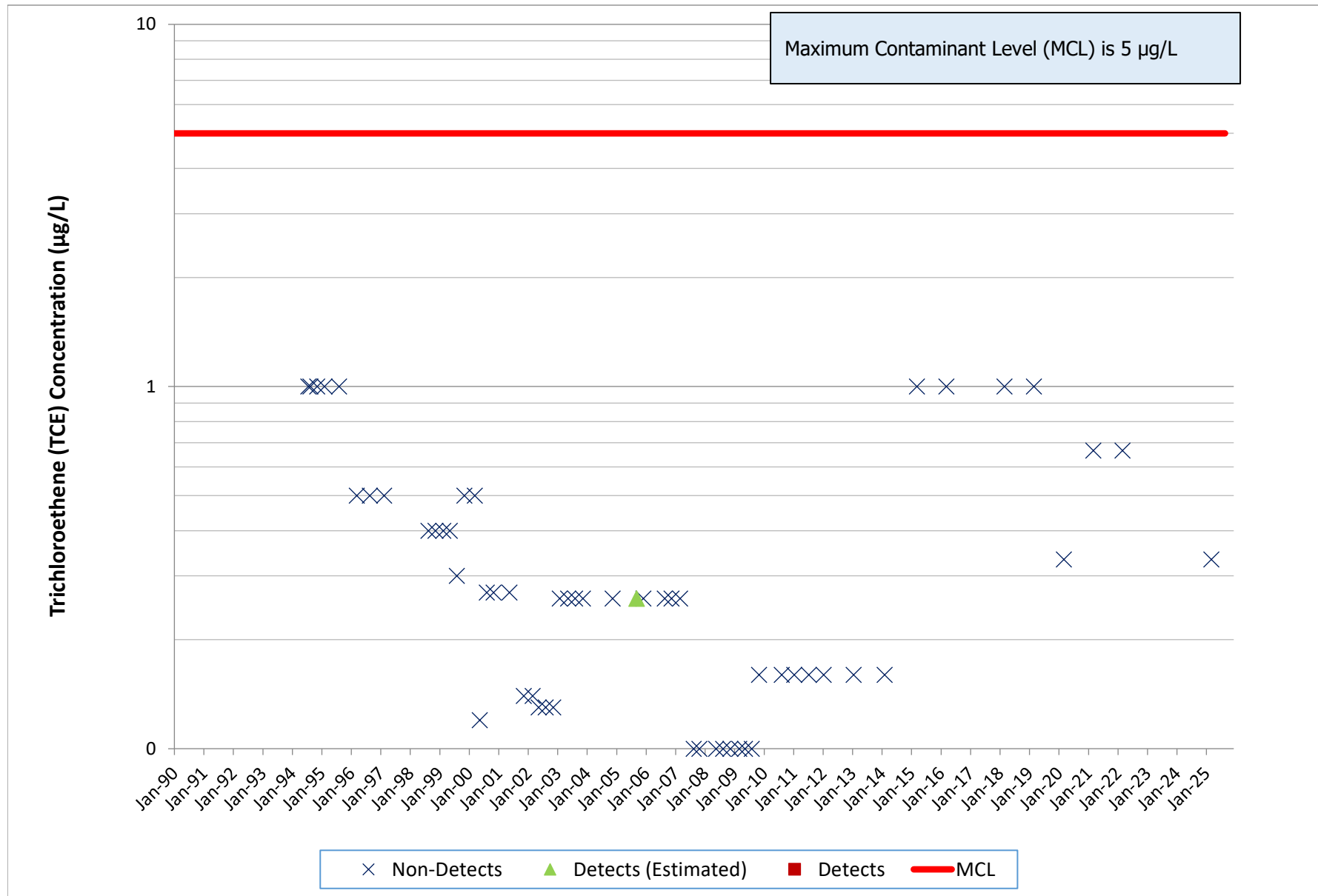
RD-20, Bldg 4100 Trench Trichloroethene



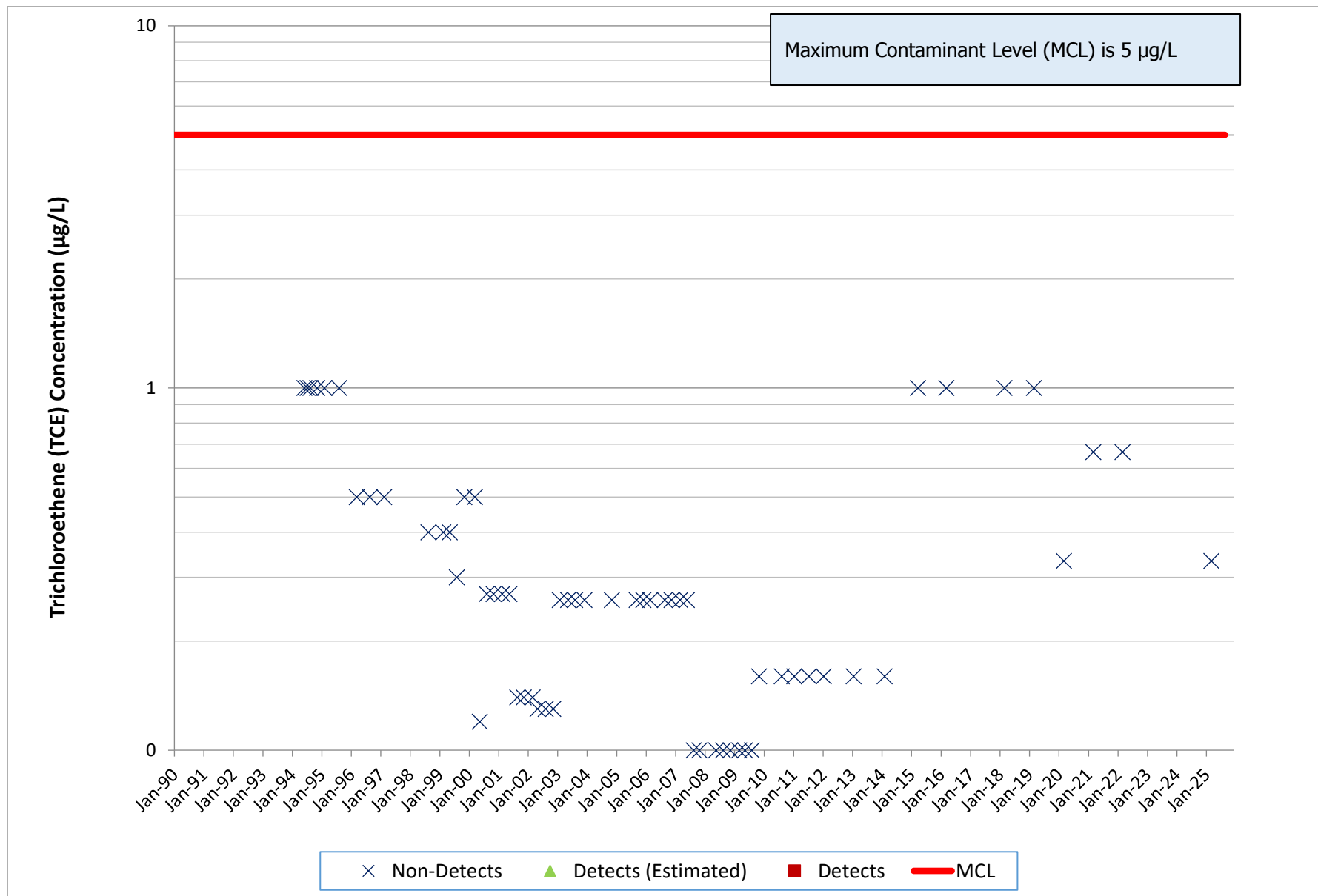
RD-19, B4133 Trichloroethene



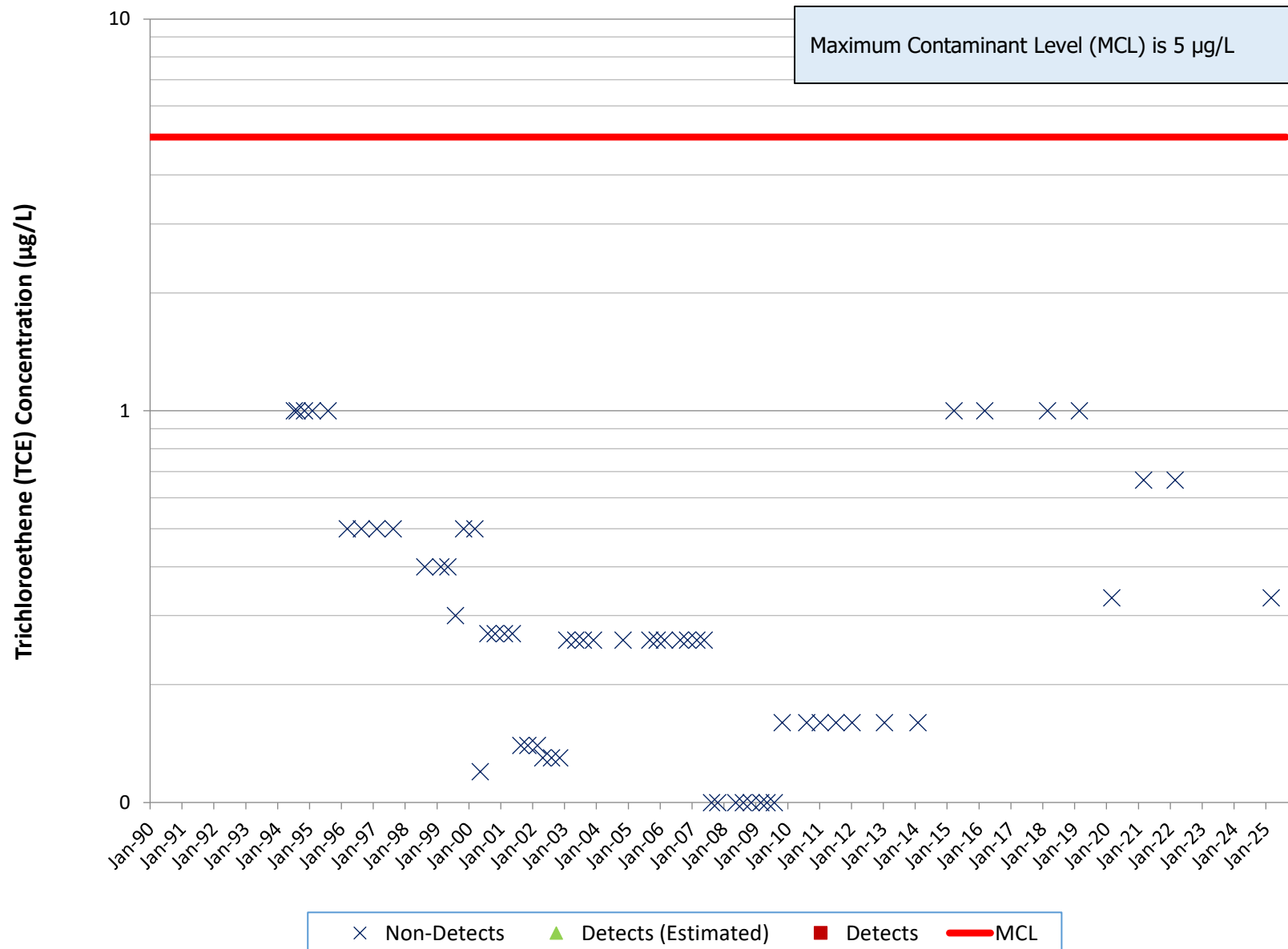
RD-59A, Offsite Trichloroethene



RD-59B, Offsite Trichloroethene



RD-59C, Offsite Trichloroethene



RD-21, FSDF/ESADA Perchlorate

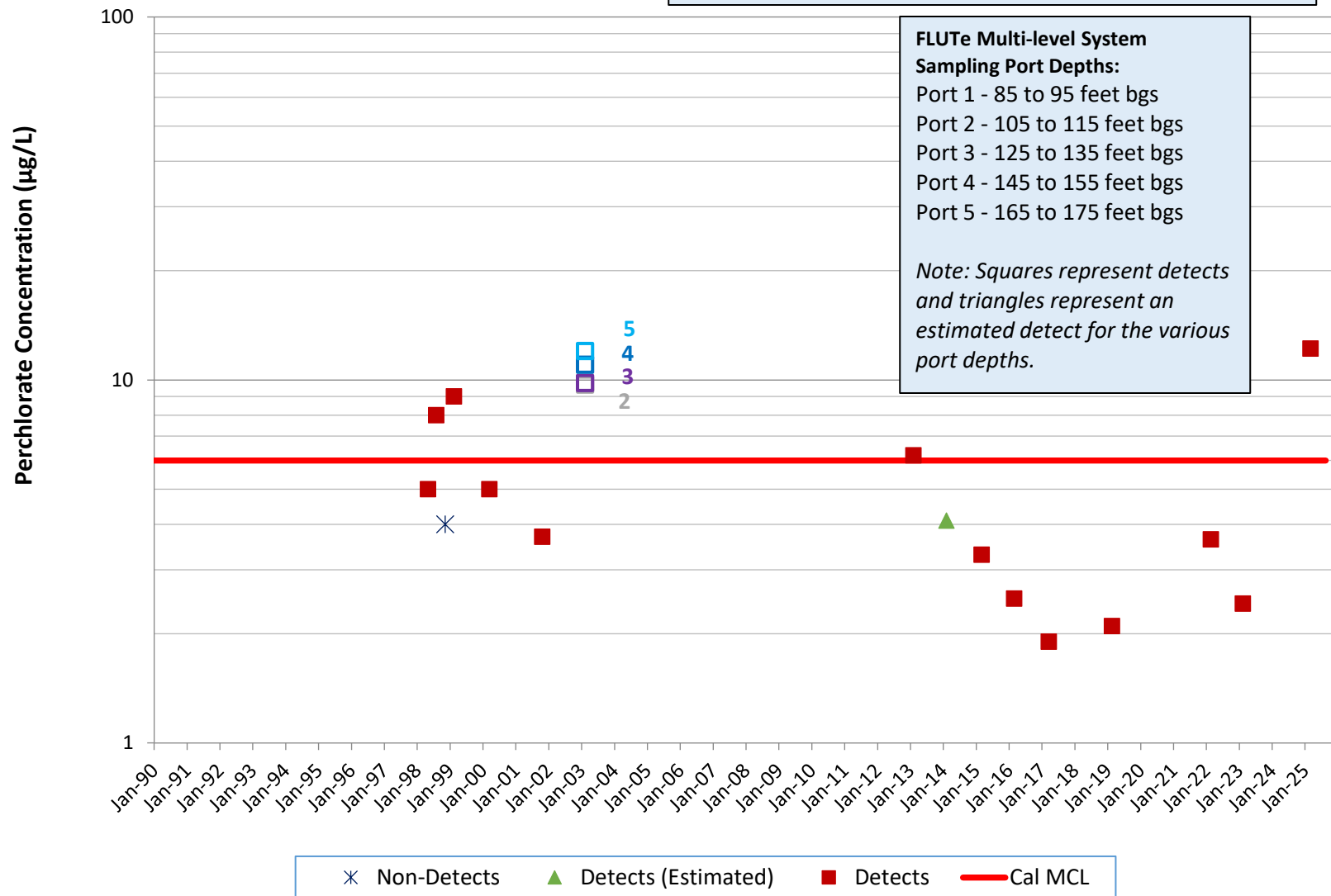
California Maximum Contaminant Level (MCL) 6 µg/L
FLUTe multi-level system installed 1-14-03 / removed 1-22-13

FLUTe Multi-level System

Sampling Port Depths:

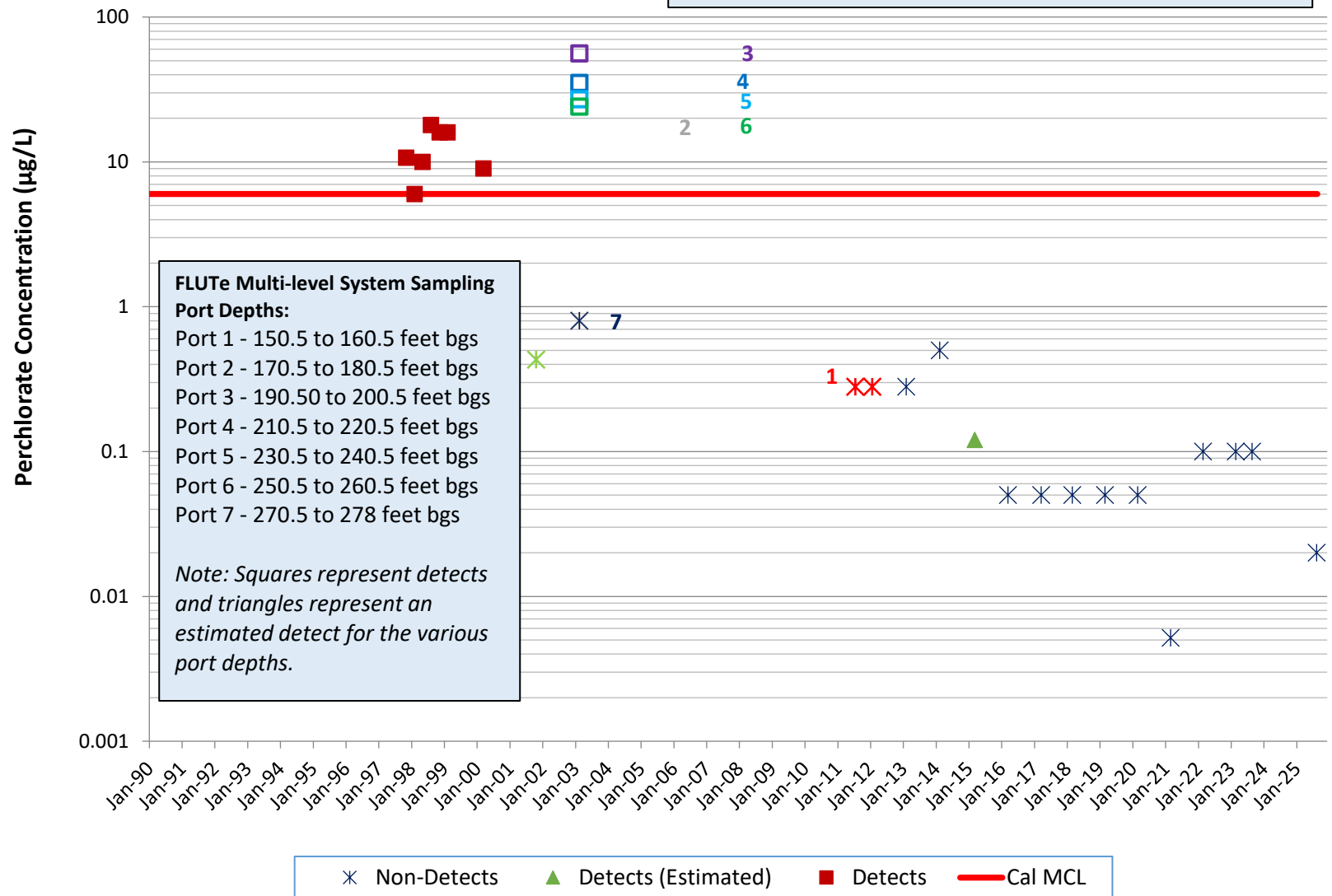
- Port 1 - 85 to 95 feet bgs
- Port 2 - 105 to 115 feet bgs
- Port 3 - 125 to 135 feet bgs
- Port 4 - 145 to 155 feet bgs
- Port 5 - 165 to 175 feet bgs

Note: Squares represent detects and triangles represent an estimated detect for the various port depths.



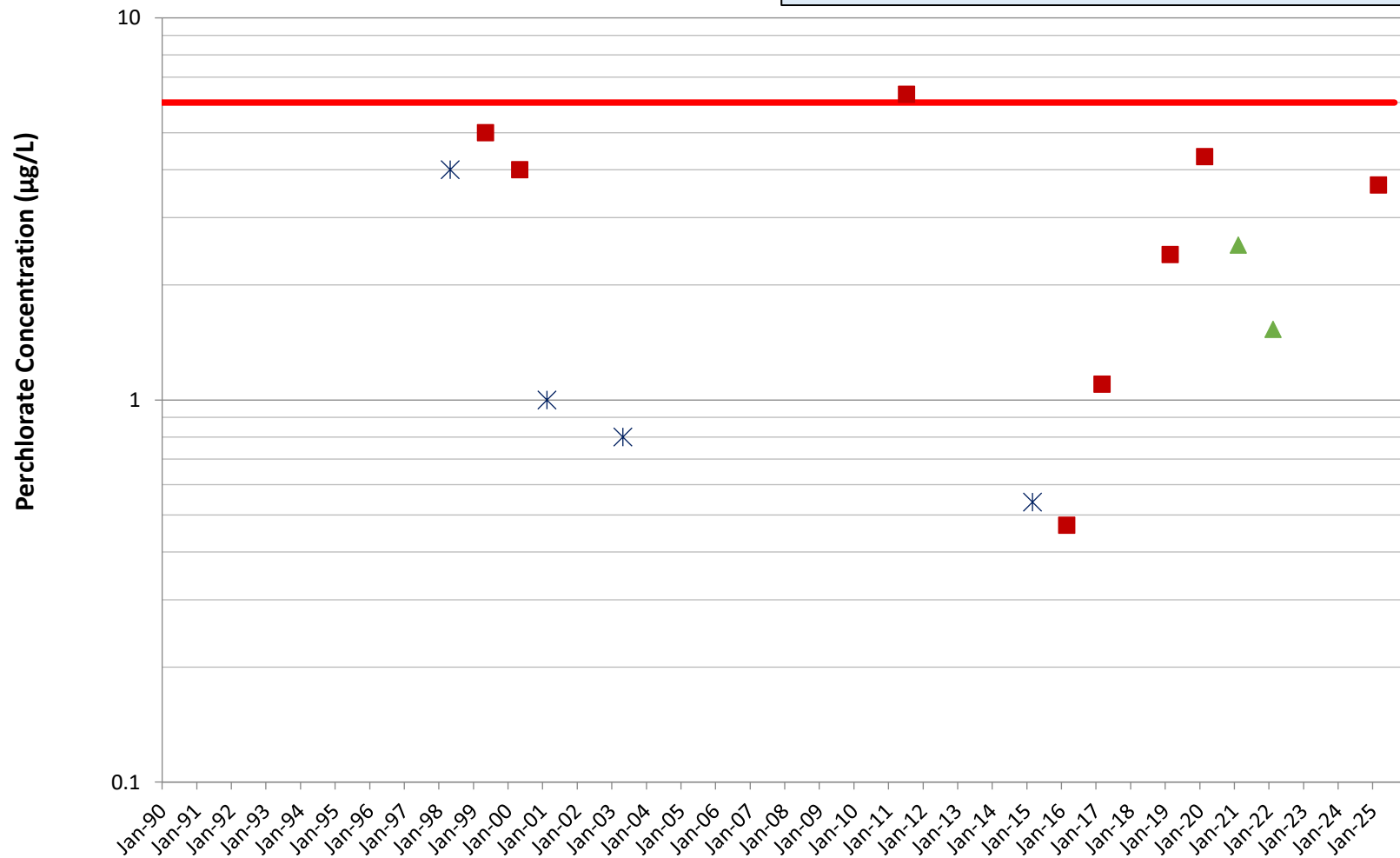
RD-54A, FSDF/ESADA Perchlorate

California Maximum Contaminant Level (MCL) 6 µg/L
FLUTe multi-level system installed 1-25-03 / removed 1-25-13



RS-18, FSDF/ESADA Perchlorate

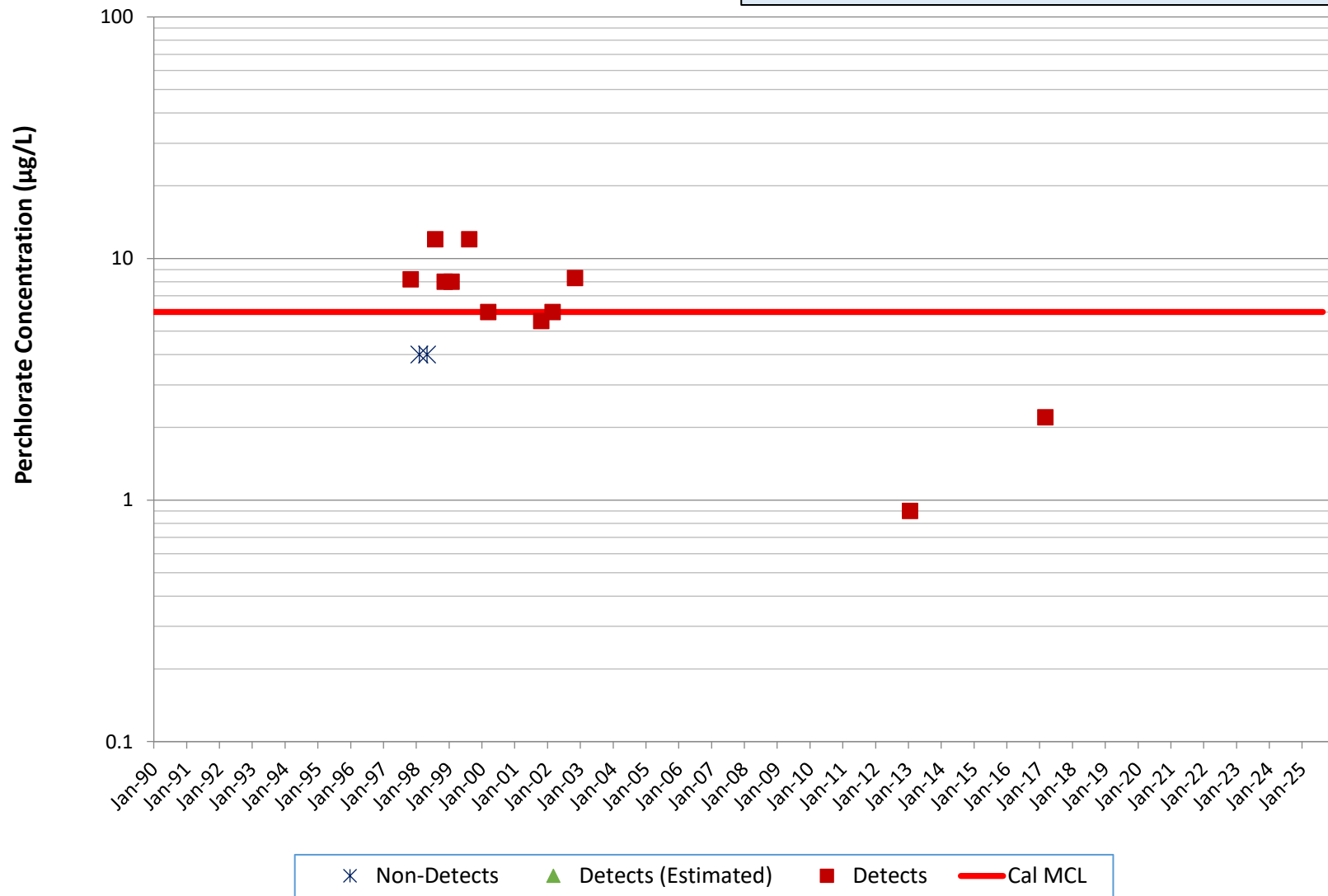
California Maximum Contaminant Level (MCL) 6 µg/L



× Non-Detects ▲ Detects (Estimated) ■ Detects — Cal MCL

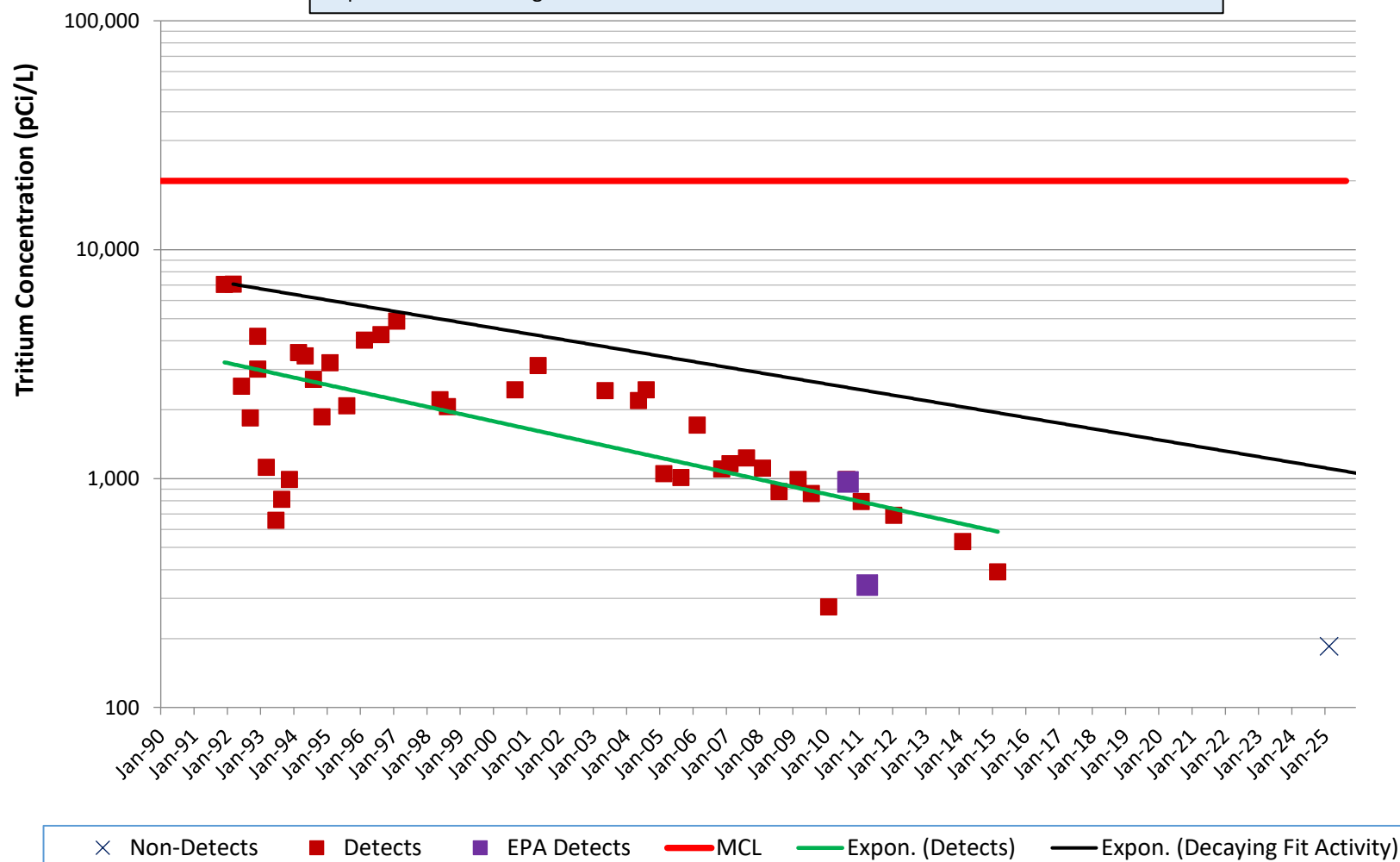
RS-54, FSDF/ESADA Perchlorate

California Maximum Contaminant Level (MCL) 6 µg/L



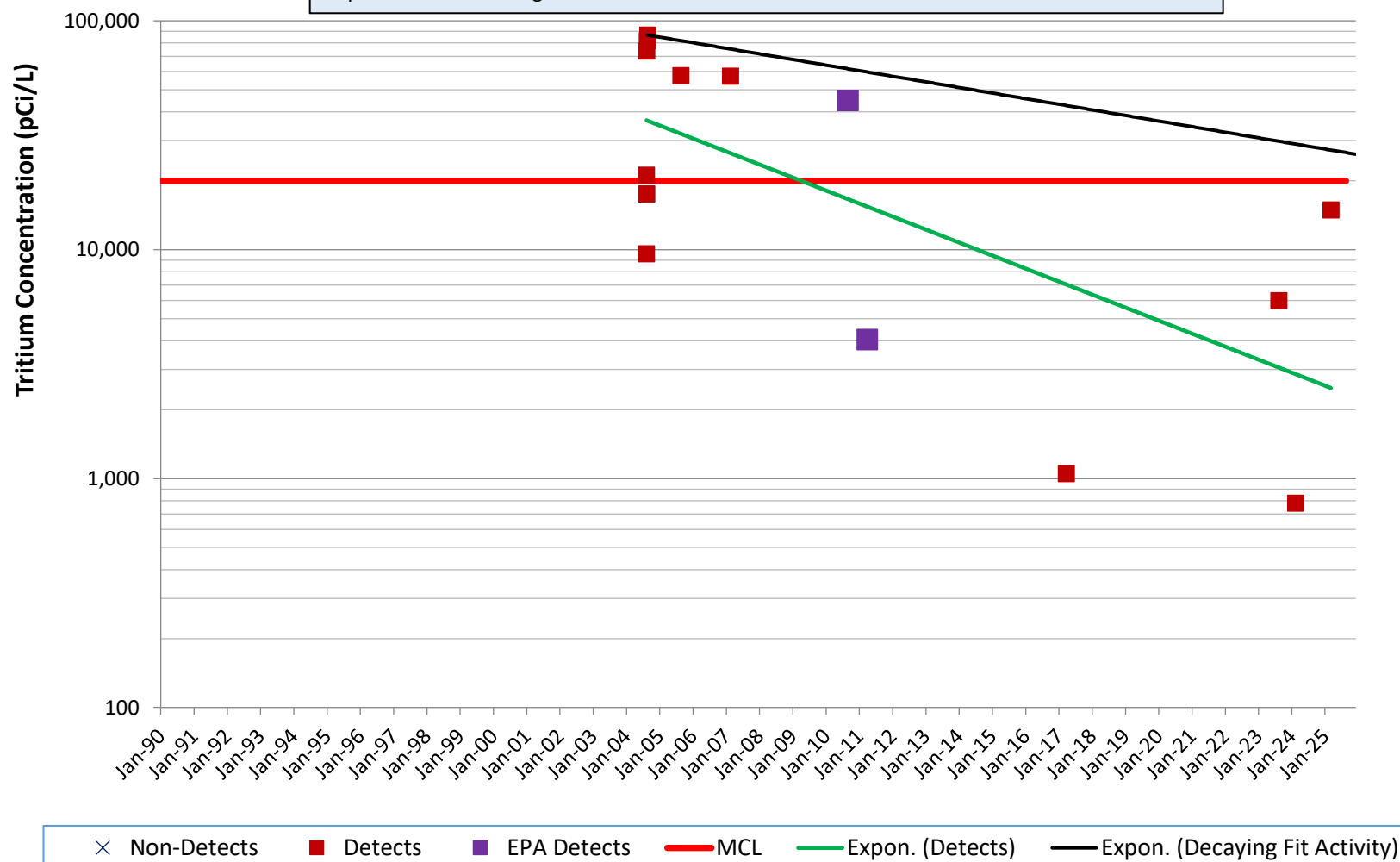
RD-34A, Tritium Plume Tritium

Maximum Contaminant Level (MCL) is 20,000 picoCuries per liter (pCi/L).
10 to 20 pCi/L for current tritium in precipitation at SSFL.
Negative activity reported data has been removed and vertical axis has been set to 0.
Tritium Decaying Fit Line ($t_{1/2} = 12.32$ years) set at highest detected value.
Exponential trendline generated from detected tritium.



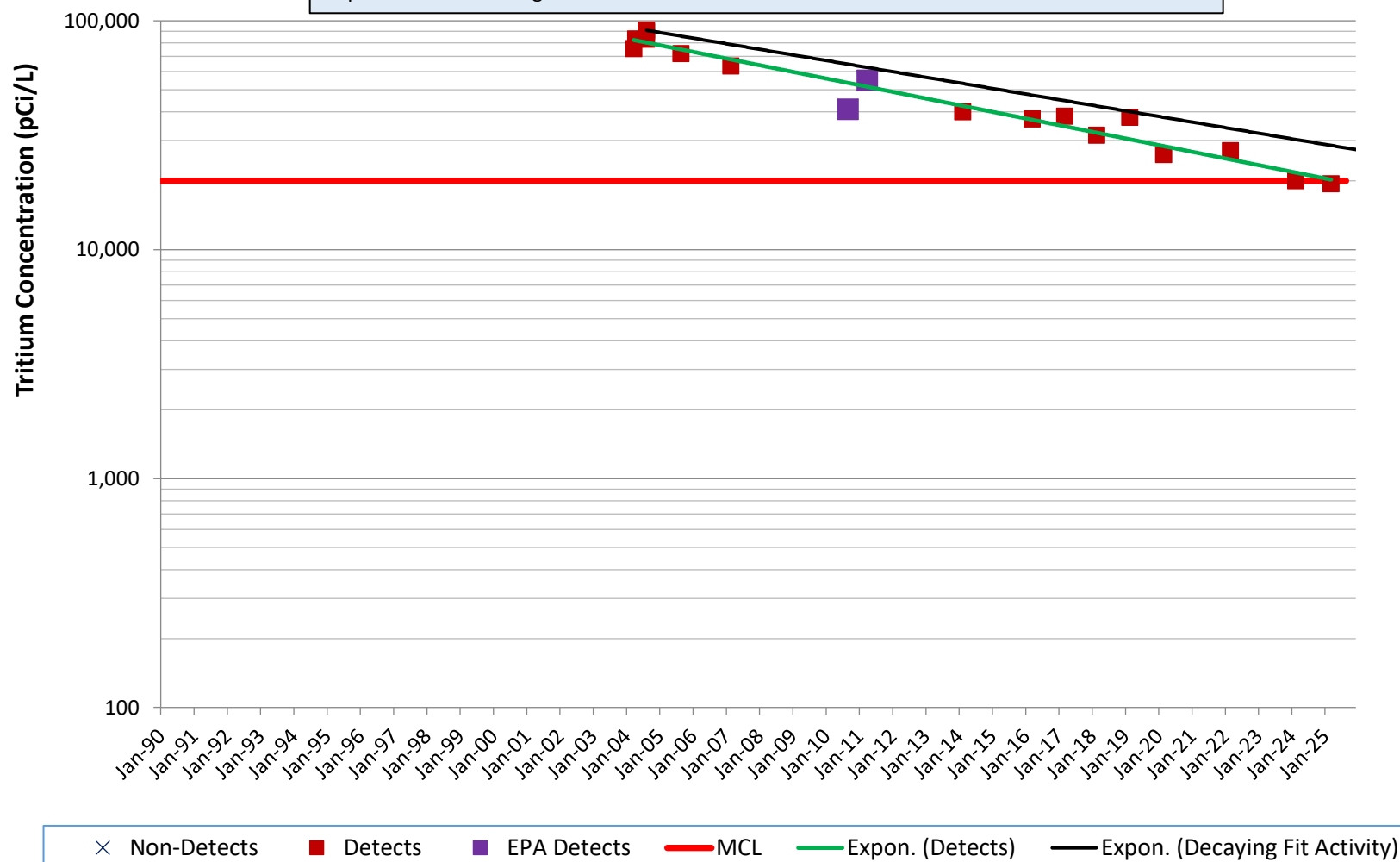
RD-88, Tritium Plume Tritium

Maximum Contaminant Level (MCL) is 20,000 picoCuries per liter (pCi/L).
10 to 20 pCi/L for current tritium in precipitation at SSFL.
Negative activity reported data has been removed and vertical axis has been set to 0.
Tritium Decaying Fit Line ($t_{1/2} = 12.32$ years) set at highest detected value.
Exponential trendline generated from detected tritium.



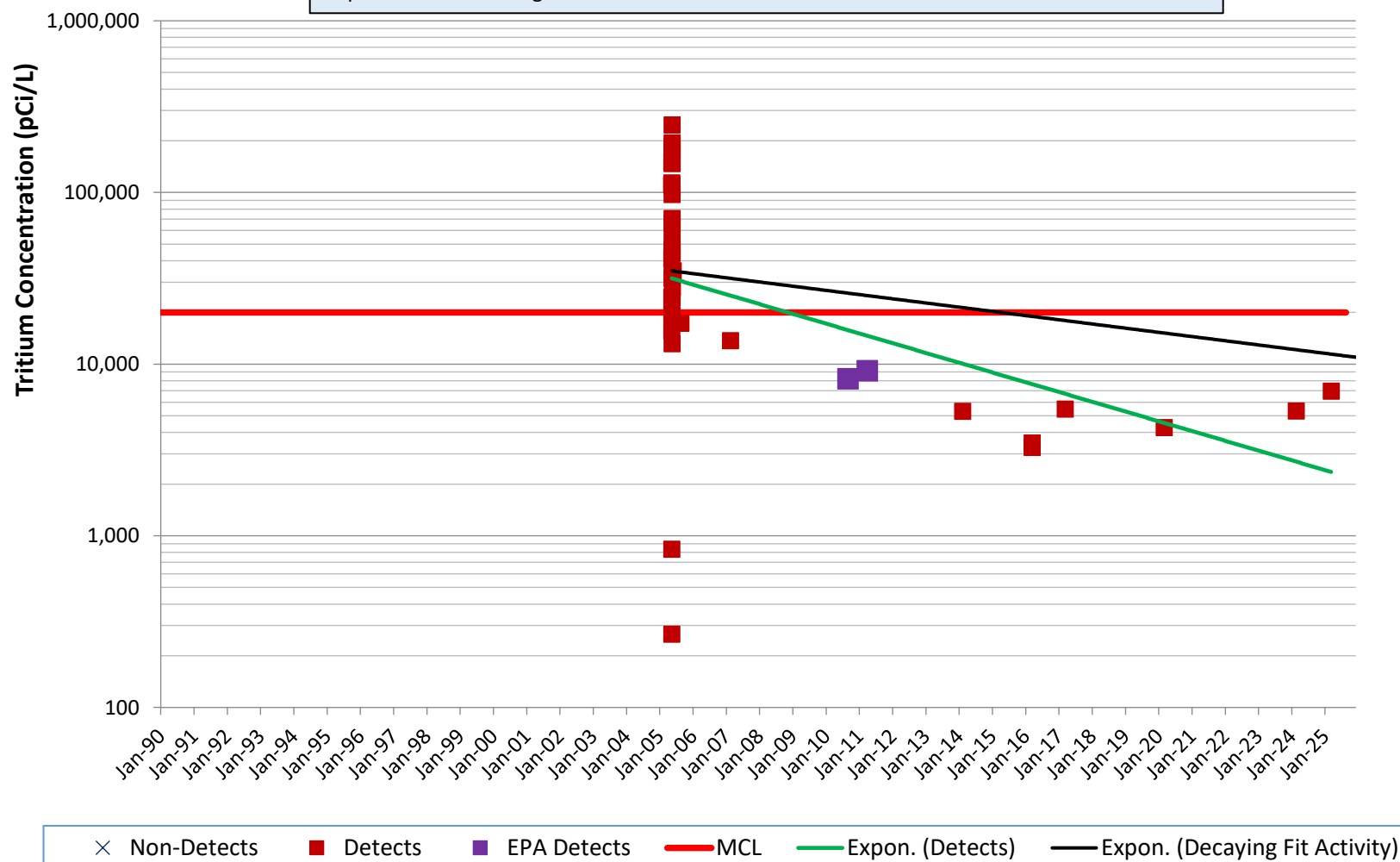
RD-90, Tritium Plume Tritium

Maximum Contaminant Level (MCL) is 20,000 picoCuries per liter (pCi/L).
10 to 20 pCi/L for current tritium in precipitation at SSFL.
Negative activity reported data has been removed and vertical axis has been set to 0.
Tritium Decaying Fit Line ($t_{1/2} = 12.32$ years) set at highest detected value.
Exponential trendline generated from detected tritium.



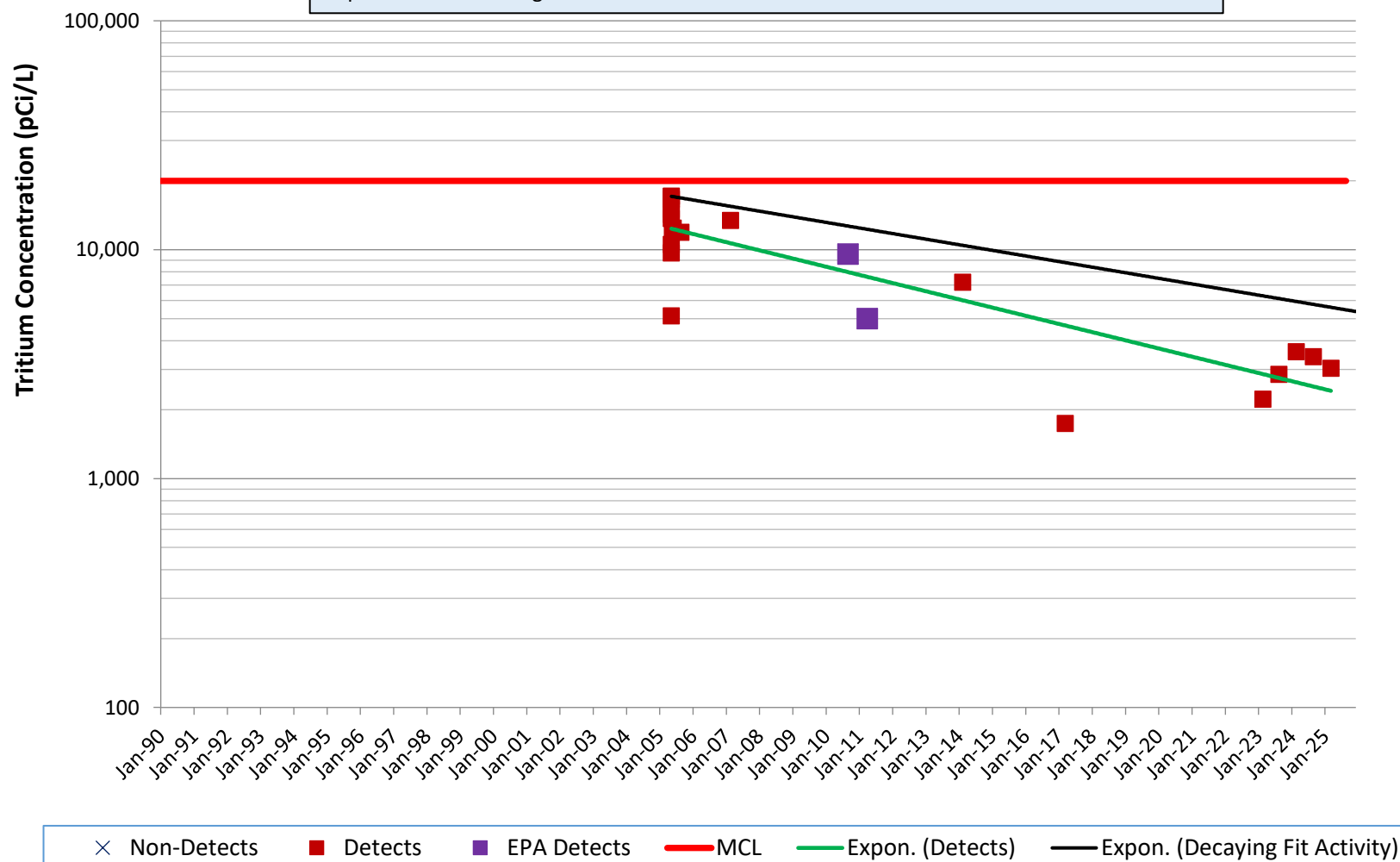
RD-93, Tritium Plume Tritium

Maximum Contaminant Level (MCL) is 20,000 picoCuries per liter (pCi/L).
10 to 20 pCi/L for current tritium in precipitation at SSFL.
Negative activity reported data has been removed and vertical axis has been set to 0.
Tritium Decaying Fit Line ($t_{1/2} = 12.32$ years) set at highest detected value.
Exponential trendline generated from detected tritium.



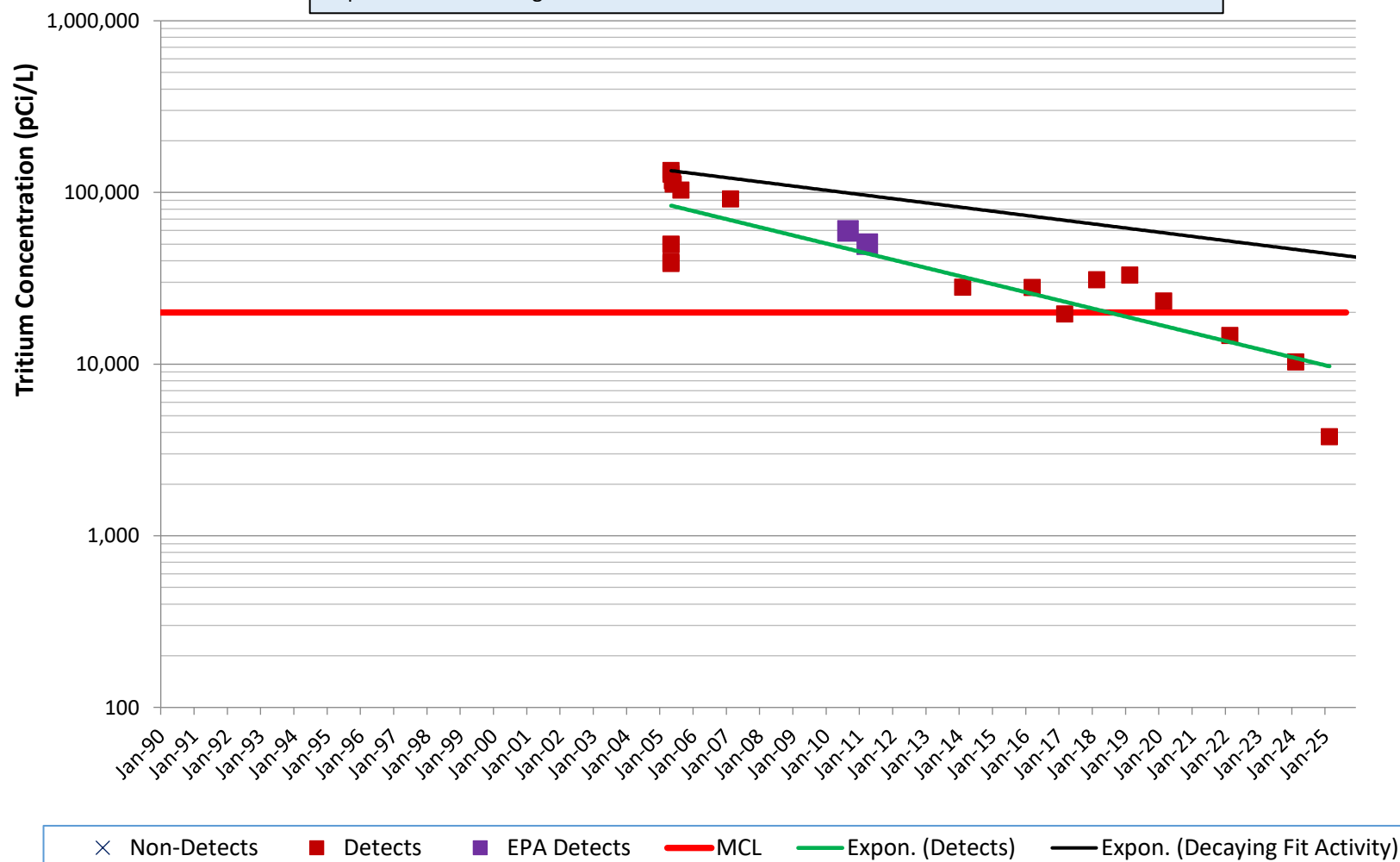
RD-94, Tritium Plume Tritium

Maximum Contaminant Level (MCL) is 20,000 picoCuries per liter (pCi/L).
10 to 20 pCi/L for current tritium in precipitation at SSFL.
Negative activity reported data has been removed and vertical axis has been set to 0.
Tritium Decaying Fit Line ($t_{1/2} = 12.32$ years) set at highest detected value.
Exponential trendline generated from detected tritium.



RD-95, Tritium Plume Tritium

Maximum Contaminant Level (MCL) is 20,000 picoCuries per liter (pCi/L).
10 to 20 pCi/L for current tritium in precipitation at SSFL.
Negative activity reported data has been removed and vertical axis has been set to 0.
Tritium Decaying Fit Line ($t_{1/2} = 12.32$ years) set at highest detected value.
Exponential trendline generated from detected tritium.



Appendix B

Glossary

GLOSSARY

A

accuracy—The closeness of the result of a measurement to the true value of the quantity.

air effluent—A release of treated or untreated air from a pipe or a stack to the environment.

Airborne effluent (also called emission) discharges into the atmosphere.

ambient—Existing in the surrounding area. Completely enveloping.

ambient air—The surrounding atmosphere as it exists around people, plants, and structures.

analyte—A constituent or parameter that is being analyzed.

B

best management practice—Sound engineering practice that is not required by regulation or by law.

biota—Plant and animal life.

C

categorical exclusion—Category of federal action that does not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required.

cleanup—Action taken to deal with the release or potential release of hazardous substances. This may mean complete removal of the substance; it also may mean stabilizing, containing, or otherwise treating the substance so that it does not affect human health or the environment.

closure—Controlling a hazardous waste management facility under Resource Conservation and Recovery Act (RCRA) requirements.

completeness—A measure of the amount of valid data obtained from a measurement system compared to the amount that was expected under optimum conditions.

compliance—Fulfilling applicable requirements of a plan or schedule ordered or approved by government authority.

composite—A blend of more than one portion to be used as a sample for analysis.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—This Act addresses the cleanup of hazardous substances and establishes a National Priority List of sites targeted for assessment and, if necessary, restoration (commonly known as “Superfund”).

concentration—The amount of a substance contained in a unit volume or mass of a sample.

contaminant—Any physical, chemical, biological, radiological substance, matter, or concentration that is in an unwanted location.

contaminant of concern—A contaminant in a given medium (usually soil or water) above a risk level that may result in harm to the public or the environment.

contamination—The state of being made impure or unsuitable by contact or mixture with something unclean, bad, etc.

D

data gap—A lack or inability to obtain information despite good faith efforts to gather desired information.

data validation—A systematic review of a data set to identify outliers or suspect values. More specifically, data validation refers to the systematic process of independently reviewing a body of analytical data against established criteria to provide assurance that the data are acceptable for their intended use. This process may use appropriate statistical techniques to screen out impossible or highly unlikely values.

deactivation—The process of placing a facility in a stable and known condition, including removing hazardous and radioactive materials to ensure adequate protection of the worker, public health and safety, and the environment, thereby limiting the long-term cost of surveillance and maintenance.

decay (radioactive)—Spontaneous transformation of one radionuclide into a different radioactive or nonradioactive nuclide, or into a different energy state of the same radionuclide.

decommissioning—The process that takes place after deactivation and includes surveillance and maintenance, decontamination, and dismantlement.

derived concentration standard (DCS)—The concentration of a radionuclide in air or water that, under conditions of continuous exposure for one year by one exposure mode (that is, ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 0.1 rem (1 mSv). Department of Energy (DOE) Order 458.1, “Radiation Protection of the Public and the Environment,” (DOE 2013) establishes this limit, and DOE Standard DOE-STD-1196-2022, “Derived Concentration Technical Standard,” (DOE 2022) provides the numerical values of DCSs.

direct radiation—External radiation from radioactive plumes or from radionuclides deposited on the ground or other surfaces.

dose—Energy imparted to matter by ionizing radiation. The unit of absorbed dose is the rad, equal to 0.01 joules per kilogram in any medium.

dosimeter—Portable detection device for measuring the total accumulated exposure to ionizing radiation.

duplicate—Result derived by taking a portion of a primary sample and performing the same analysis on that portion that is performed on the primary sample.

duplicate sample—A sample collected from the same sampling location using the same equipment and sampling technique and placed into an identically prepared and preserved container. Duplicate samples are analyzed independently as an indication of gross errors in sampling techniques.

E

effluent—Any gaseous or liquid discharge released to the environment, including storm water runoff at a site or facility.

effluent monitoring—The collection and analysis of samples or measurements of liquid and gaseous effluents to characterize and quantify the release of contaminants, assess radiation exposures to members of the public, and demonstrate compliance with applicable standards.

emission—A release of a gas (see also *air effluent*).

environment—Includes water, air, and land and the interrelationship that exists among and between water, air, and land and all living things.

environmental media—Includes air, groundwater, surface water, soil, flora, and fauna.

environmental monitoring—Vital role in determining health and safety issues for the purpose of public health or environmental health. Environmental monitoring at ETEC, Area IV, includes effluent monitoring and environmental surveillance with the dual purpose of (1) showing compliance with federal, state, and local regulations, as well as with U.S. DOE orders, and (2) monitoring any effects of Site operations on onsite and offsite natural resources and on human health.

environmental occurrence—Any sudden or sustained deviation from a regulated or planned performance at a DOE operation that has environmental protection and compliance significance.

environmental surveillance—The collection and analysis of samples of air, water, soil, foodstuffs, biota, and other media from DOE sites and their environs and the measurement of external radiation to demonstrate compliance with applicable standards, assess radiation exposures to members of the public, and assess effects, if any, on the local environment.

exposure (radiation)—The incidence of radiation on living or inanimate material by accident or intent. Background exposure is the exposure to natural background ionizing radiation or man-made radiation that is not specific to a person's occupation. Occupational exposure is the exposure to ionizing radiation that takes place during a person's working hours. Population exposure is the exposure to the total number of persons who inhabit an area.

exposure pathway—The way that a person could be impacted from releases of radionuclides into the water and air.

external dose or exposure—The portion of the dose received from radiation sources outside the body (i.e., external sources).

F

field blank—A field blank is collected to assess the potential introduction of contaminants and the adequacy of field and laboratory protocols during sampling and laboratory analysis. In air sampling, a field blank is a clean, analyte-free filter that is carried to the sampling site, exposed to sampling conditions, returned to the laboratory, and treated as an environmental sample. In water sampling, field blanks are prepared at the field site where environmental water samples are collected. A sample of analyte-free water is poured into the container in the field where environmental water samples are collected, preserved, and shipped to the laboratory with field samples. Results include relevant ambient conditions during sampling and laboratory sources of contamination.

field duplicate—An independent sample collected as closely as possible to the same point in space and time as the original sample. The duplicate and original are two separate samples taken from the same source, stored in separate containers, and analyzed independently.

fission products—The nuclei (fission fragments) formed by the fission of heavy elements plus the nuclides formed by the subsequent decay products of the radioactive fission fragments.

G

gamma radiation—A form of electromagnetic radiation, such as radio waves or visible light but with a much shorter wavelength. It is more penetrating than alpha or beta radiation and capable of passing through dense materials, such as concrete.

gamma spectroscopy—An analysis technique that identifies specific radionuclides that emit gamma radiation. It measures the particular energy of a radionuclide's gamma radiation emissions. The energy of these emissions is unique for each radionuclide, acting as a fingerprint to identify a specific radionuclide.

grab sample—A sample collected instantaneously with a glass or plastic bottle placed below the water surface to collect surface water samples (also called dip samples).

graded approach (to sampling)—A decision process in which the requirements on the system vary with the risk of exposure to contaminants.

gross alpha activity—The total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

gross beta activity—The total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

groundwater—Water found underground in cracks and spaces in soil, sand, and rocks.

H

half-life (radiological)—Time required for half of a given number of atoms of a specific radionuclide to decay. Each nuclide has a unique half-life.

hazardous material—Material considered dangerous to people or the environment.

hazardous waste—Any waste that is a toxic, corrosive, reactive, or ignitable material that could affect human health or the environment.

I

influent—Any raw or untreated gaseous or liquid stream entering a treatment system, process, or facility.

inorganic—Relating to or belonging to the class of compounds not having a carbon basis; hydrochloric and sulfuric acids, for example, are called inorganic substances.

isotope—Each of two or more forms of the same element that contain equal numbers of protons but different numbers of neutrons in their nuclei and, hence, differ in relative atomic mass but not in chemical properties; in particular, a radioactive form of an element.

L

laboratory control sample—A sample whose primary purpose (accuracy) is to demonstrate that the laboratory can perform the overall analytical approach in a matrix free of interferences (e.g., reagent water, clean sand, or another suitable reference matrix), and its analytical system is in control but does not reflect analytical performance on analyzing real-world samples.

M

matrix—The physical form (solid, liquid, or gas) or composition (soil, filter, groundwater, or air) of a sample.

maximally exposed individual (MEI)—Hypothetical individual who remains in an uncontrolled area and would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible radiation dose.

maximum contaminant level (MCL)—The maximum allowable concentration of a drinking water contaminant as legislated through the Safe Drinking Water Act.

mercury—Silver-white, liquid metal solidifying at -38.9°C to form a tin-white, ductile, malleable mass. It is widely distributed in the environment and biologically is a nonessential or nonbeneficial element. Human poisoning due to this highly toxic element has been clinically recognized.

millirem (mrem)—A unit of radiation dose that is equivalent to one one-thousandth of a rem.

millisievert (mSv)—The International System of Units (SI) for radiation dose and effective dose equivalent. The SI equivalent of the millirem (1 millisievert = 100 millirem).

mixed low-level waste —Waste that contains low-level radioactive waste and hazardous waste.

mixed waste—Waste that has both hazardous and radioactive components.

monitoring—The process whereby the quantity and quality of factors that can affect the environment or human health are measured periodically to regulate and control potential impacts.

N

nuclide—An atom specified by its atomic weight, atomic number, and energy state. A radionuclide is a radioactive nuclide.

O

optically stimulated luminescence dosimeter (OSLD)— A reusable passive device that measures the exposure from ionizing radiation.

organic—Of, relating to, or derived from living organisms (plant or animal).

outfall—A place where treated or untreated water flows out of a pipe to mix with water from a water body, such as a stream or lake.

P

parameter—Analytical constituent; chemical compound(s) or property for which an analytical request may be submitted.

person-rem—The collective dose to a population group. For example, a dose of 1 rem to 10 individuals results in a collective dose of 10 person-rem.

point source—Any defined source of emission to air or water such as a stack, air vent, pipe, channel, or passage to a water body.

precision—An estimate of the degree to which a set of observations or measurements of the property, usually obtained under similar conditions, agree. It is a data quality indicator.

purge—To remove water prior to sampling, generally by pumping or bailing.

Q

quality assurance (QA)—The planned and systematic actions necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily and safely in service. QA includes quality control. If quality is the degree to which an item or process meets or exceeds the user's requirements, then QA is the action that provides confidence that quality was in fact achieved.

quality control (QC)—Those actions necessary to control and verify the features and characteristics of a material, process, product, service, or activity to specified requirements. The aim of QC is to provide quality that is satisfactory, adequate, dependable, and economic.

R

radioactivity—Spontaneous emission of radiation, generally alpha or beta particles, or gamma rays, from the nucleus of an unstable isotope.

radioisotopes—Radioactive isotopes.

radionuclide—A type of atom that emits energy in the form of photons or particles (radiation) during transformation.

regulatory compliance—Actions taken in accordance with government laws, regulations, orders, etc., that apply to operations' effects on onsite and offsite natural resources and on human health.

release—Any discharge to the environment. Environment is broadly defined as any water, land, or ambient air.

rem—A unit of equivalent dose (absorbed dose in rads times the radiation weighting factor). Equivalent dose frequently is reported in units of millirem (mrem), which is one thousandth of a rem.

remediation—The assessment and cleanup of sites contaminated with waste due to historical activities.

Resource Conservation and Recovery Act (RCRA)—Federal legislation that regulates the transport, treatment, and disposal of solid and hazardous wastes. This act also requires corrective action for releases of hazardous waste at inactive waste units.

S

shielding—The material or process used to protect workers, the public, and the environment from exposure to radiation.

source—The point or object from which radiation or contamination emanates.

stack—A vertical pipe or flue designed to exhaust airborne gases and suspended particulate matter.

storm water—Water produced by the interaction of precipitation events and the physical environment (e.g., buildings, pavement, ground surface).

Superfund—See *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA).

surface water—Water that has not penetrated below the surface of the ground.

surveillance—Monitoring of parameters to observe trends but for which action is not required by a permit or regulation.

T

terrestrial—Living on or growing from the land.

thermoluminescent dosimeter—A device used to measure radiation dose to occupational workers or radiation levels in the environment. A dosimeter is made of one or more lithium fluoride chips that measure cumulative exposure to ionizing radiation. Lithium fluoride absorbs the energy of radiation and releases it as light when heated.

total effective dose—The sum of the effective dose (for external exposures) and the committed effective dose.

trip blank—A trip blank is a clean sample of matrix taken from the sample preparation area to the sampling site and returned to the analytical laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures.

tritium—The elemental form of the radioactive isotope of hydrogen. Occurs as a gas.

V

vadose zone—The part of the subsurface between the ground surface and the water table.

volatile organic compounds (VOCs)—The broad range of organic compounds, commonly halogenated, that vaporize at ambient, or relatively low, temperatures (for example, acetone, benzene, chloroform, methyl alcohol).

W

waste management—DOE uses this term to refer to the safe, effective management of various kinds of nonhazardous, hazardous, and radioactive waste generated at DOE facilities.

waste stream—Waste material generated from a single process or from an activity that is similar in material, physical form, isotopic makeup, and hazardous constituents.