



**United States Department of Energy**

**Savannah River Site**

**Effectiveness Monitoring Report for the  
Monitored Natural Attenuation (MNA) at  
the Chemicals, Metals, and Pesticides (CMP) Pits  
Operable Unit (OU) (U)**

**April 2023 through March 2024**

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## LIST OF ACRONYMS AND ABBREVIATIONS

1,1,2-TCA	1,1,2-trichloroethane
1,1-DCE	1,1-dichloroethylene
bgs	below ground surface
amsl	above mean sea level
c-1,2-DCE	cis-1,2-dichloroethylene
CCl <sub>4</sub>	carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMCOC	contaminant migration constituent of concern
CMP	chemicals, metals, and pesticides
COC	constituent of concern
CSM	conceptual site model
CY	calendar year
DCM	dichloromethane (methylene chloride)
DEHP	bis-(2-ethylhexyl) phthalate
DNAPL	dense non-aqueous phase liquid
EMP	Effectiveness Monitoring Plan
EMR	Effectiveness Monitoring Report
ERH	electrical resistance heating
ft	feet
GA	Gordon aquifer
GCCZ	Green Clay Confining Zone
GWPS	groundwater protection standard
HDPE	high-density polyethylene
LAZ	lower aquifer zone
m	meters
µg/L	microgram per liter
µg/kg	microgram per kilogram
MAZ	middle aquifer zone
MCL	maximum contaminant level
mg/kg	milligram per kilogram
MNA	monitored natural attenuation
OU	operable unit
PCE	tetrachloroethylene
PDB	passive diffusion bag
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RG	remedial goal
ROD	Record of Decision
RSL	Regional Screening Level

**LIST OF ACRONYMS AND ABBREVIATIONS (*continued, end*)**

SCDES	South Carolina Department of Environmental Services <sup>1</sup>
SCSU	South Carolina State University
SRNS	Savannah River Nuclear Solutions LLC
SRS	Savannah River Site
SVE	soil vapor extraction
TCCZ	Tan Clay Confining Zone
TCLC	Tan Clay Lower Clay
TCE	trichloroethylene
t-1,2-DCE	trans-1,2-dichloroethylene
TZ	transmissive zone
USEPA	U.S. Environmental Protection Agency
UTRA	Upper Three Runs aquifer
VC	vinyl chloride
VOC	volatile organic compound
VU	verified and unvalidated
WSRC	Westinghouse Savannah River Company LLC (before October 2005)
WSRC	Washington Savannah River Company LLC (October 2005- July 2008)

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<sup>1</sup> South Carolina Department of Environmental Services (SCDES) was known as South Carolina Department of Health and Environmental Control (SCDHEC) prior to July 1, 2024.

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## 1.0 INTRODUCTION

This Effectiveness Monitoring Report (EMR) addresses the Monitored Natural Attenuation (MNA) groundwater remedy at the Chemicals, Metals, and Pesticides (CMP) Pits Operable Unit (OU) for the period from April 2023 through March 2024. The monitoring requirements for the CMP Pits OU are identified in the Effectiveness Monitoring Plan (EMP) (WSRC 2006b).

### 1.1 Operable Unit Background

The CMP Pits OU is located in the central portion of the Savannah River Site (SRS) approximately one mile north of L Area (Figure 1). The CMP Pits were identified as a Resource Conservation and Recovery Act/Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) unit in the Savannah River Site Federal Facility Agreement in 1989. The subunits of the CMP Pits OU were evaluated in the *RCRA Facility Investigation/Remedial Investigation Addendum with Baseline Risk Assessment for the CMP Pits (U)* (WSRC 2003). The CMP Pits OU is comprised of the following subunits: Ballast Area soils; CMP Pits and associated vadose zone (Field A); vadose zone (Field B); groundwater; and surface water (e.g., Pen Branch) and sediment (Figure 2).

The CMP Pits consist of seven former, unlined pits placed in two rows that were designed to receive non-radioactive wastes (chemicals, metals, and pesticides) and operated from August 1971 until February 1979. Once the pits stopped receiving waste, all the open pits were covered with clay and graded. Contaminated soil and debris at the CMP Pits posed a contaminant migration and human health risk and were partially excavated in 1984. A second phase of excavation was performed at Pit 080-183G to remove a portion of significantly contaminated soil that also contained dense non-aqueous phase liquid (DNAPL) (Figure 2). As a maintenance action, the excavation was followed by backfilling of the pit area with clean soil and then capped across the whole pits area with a black plastic high-density polyethylene (HDPE) cover and overlying soil cover. Because the CMP Pits were not yet identified as a RCRA/CERCLA unit, the installation of the HDPE cover was not part of an interim or final remedial action and therefore was not designed to meet current infiltration/permeability specifications for RCRA/CERCLA closure at the CMP Pits. Although the highest levels of contaminated soil were removed, some contaminated soils were left in place. The previous waste in the pits and associated contaminated soils located

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in the CMP Pits vadose zone (Field A) were determined to be the source of groundwater contamination.

Electrical Resistance Heating (ERH) with Soil Vapor Extraction (SVE) was selected as the final remedial action (RA) for the CMP Pits vadose zone in and around Field A (Figure 2). This remedy targeted the deeper contaminated soil at Pit 080-183G that was underneath the previous soil excavations. This remedy also addressed the remaining DNAPL that was present in the clay horizons beneath the pits. The contaminant migration constituents of concern (CMCOCs) that were identified in the RCRA Facility Investigation/Remedial Investigation (RFI/RI) Addendum (WSRC 2003) are tetrachloroethylene (PCE) and dichloromethane (DCM) or methylene chloride.

Groundwater contamination has occurred as a result of contaminants leaching from the source area soils. Following remediation of the CMP Pits vadose zone (Field A) source area, MNA was selected as the RA for the contaminated groundwater.

Additionally, surface soil contamination in the Ballast Area and vadose zone contamination in Field B have been successfully remediated via interim RAs. There is no problem warranting action and no RA objective for the surface water and sediment; however, surface water sampling is included as part of the MNA sampling.

## **1.2 Nature and Extent of Contamination**

PCE and DCM were identified as CMCOCs and as principal threat source material for mobility (i.e., transport from the source zone to the aquifer in less than 10 years) in the vadose zone beneath the CMP Pits. The volatile organic compound (VOC) contamination was highest in the northwest pit (Pit 080-183G) at depths between 20 and 60 feet (ft) (6.10 and 18.29 meters [m]) below ground surface (bgs). PCE was the most abundant contaminant at CMP Pits. No constituents of concern (COCs) were identified in the surface soils (0-1 ft [0-0.3 m] bgs) in the CMP Pits subunit.

In accordance with the Record of Decision (ROD) (WSRC 2004), an ERH/SVE remedy was selected to remove the DNAPL from the vadose zone. Based on the limited lateral and vertical extent of PCE contamination in the vadose zone and the intent of the selected remedy defined in the ROD, the ERH treatment area included the extent of PCE contamination above the DNAPL

threshold concentrations (60 milligram per kilogram [mg/kg]) and comprised an area of approximately 0.05 acres (0.02 hectares) in Field A (Figure 2). Further details of the DNAPL remediation are available in the 2009 EMR (SRNS 2009).

The following VOCs and pesticides were identified as human health COCs in the groundwater for the future industrial worker and/or resident: alpha-benzene hexachloride, beta-benzene hexachloride, delta-benzene hexachloride, dieldrin, lindane, bis-(2-ethylhexyl) phthalate (DEHP), bromodichloromethane, carbon tetrachloride, chloroform, DCM, PCE, and trichloroethylene (TCE). Following the EMP for the CMP Pits, both groundwater and surface water have been sampled and analyzed for Target Compound List VOCs and/or lindane (WSRC 2006b). DEHP is a common laboratory artifact and is not believed to be present in the groundwater subunit. As of 2010, the constituent DEHP is no longer required to be sampled and/or reported. In 2013, emerging contaminant 1,4-dioxane was added to the list of monitored constituents on an annual sampling basis due to its presence in groundwater.

Early groundwater data indicated two VOC groundwater plumes exist at the CMP Pits, designated as the main plume (near the CMP Pits source area) and the northeast distal plume (near Pen Branch). These plumes are moving northward toward Pen Branch. Groundwater modeling indicated that the CMP Pits were the source for the main plume. Particle tracking toward and from the northeast plume suggested that its source was different from that of the main plume (WSRC 2002). A drainage ditch located approximately 361 ft (110 m) north of CMP Pits is a possible previous source area (Figure 2). It is possible that this ditch was used as a dumping location prior to the use of the actual CMP Pits. Additional characterization for the source of the distal plume using soil gas surveys was presented in the RFI/RI Addendum (WSRC 2003). Results indicated that if a source was previously present in the vadose zone, it has been depleted. It is also plausible, due to the dry zone areas within the transmissive zone (TZ) and to some degree the middle aquifer zone (MAZ), that one plume separated into two distinct plumes due to the groundwater flow paths and discharge to Pen Branch. Upwelling of the MAZ as it discharges to the stream most likely brings some contamination up into the TZ. A combination of these three explanations is probable.

As discussed below, the vertical extent of the VOC plume is mostly within the Upper Three Runs aquifer (UTRA) and includes three distinct horizons: the TZ, the MAZ, and the lower aquifer zone

(LAZ). The lateral extent of the 2008 VOC plume throughout the UTRA was estimated at 46 acres (18.6 hectares), extending from the pit area to Pen Branch. One new Gordon aquifer (GA) well, CMP010A, was installed in 2019, and is located directly to the southeast of CMP Pits. This well has shown that the GA may be contaminated with VOCs above maximum contaminant levels (MCLs). These 2019 results were the first occurrence of GA contamination above MCLs at the CMP Pits; however, it is suspected this contamination is not representative of groundwater conditions in the GA as further investigations in March 2023 indicated well CMP010A is compromised and will need to be abandoned and replaced during fiscal year 2024 as discussed in detail in section 2.2.2.1, *PCE and TCE – Gordon Aquifer*.

Although vadose zone remediations have occurred, there has been approximately 50 years for contamination to move through the aquifers, resulting in contaminants likely partitioning onto clay particles and/or diffusing into less permeable layers, not only near the original source area at the CMP Pits, but also throughout the aquifer system acting as a secondary contaminant source to groundwater. Figure 3 shows the CMP Pits Groundwater OU Conceptual Site Model (CSM) and potential sources of contamination.

### 1.3 Observed Hydrostratigraphy at the CMP Pits OU

In the vicinity of the CMP Pits OU, the aquifers of interest include the UTRA and the underlying GA. Horizontal flow within the UTRA is divided into three discrete horizons that are separated by two semi-continuous confining zones, which can be comprised of sandy clays in areas and are therefore potentially discontinuous and leaky (Figure 3). The horizons are: 1) the TZ – a thin aquifer feature that lies above the top portion of the tan clay, the tan clay confining zone (TCCZ), 2) the MAZ – a thin aquifer horizon between the TCCZ and the lower portion of the tan clay, the tan clay lower clay (TCLC), and 3) the LAZ - the most substantial portion of the UTRA in the area, which extends to the green clay confining zone (GCCZ) with a thickness up to 100 ft (30.48 m). The GCCZ separates the UTRA from the GA and is comprised of single or multiple layers of dark greenish grey to black clay to sandy clay. Fine- to medium-grained sands to silty/clayey sands exist in-between the clay layers. The confining zones are hummocky, vary in thickness, and can be almost non-existent or leaky in areas. In general, the TCCZ is thinner in the UTRA than the TCLC.

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Above the UTRA, the vadose zone is comprised of a portion of the transmissive zone and overlying sediments of the A- and AA-Horizons. Those sediments overlying the TZ are typically in the unsaturated zone and during rain events may contain areas of perched water for a limited time. These geologic layers are characterized by a higher abundance of clays and silts compared to the underlying transmissive zone.

Using the data collected from cone penetrometer lithology pushes done for the 2002 modeling effort and from well installation records, the confining zone surfaces of the TCCZ and TCLC were spatially mapped (Figure 4) and compared to the most current second quarter 2023 (2Q2023) water elevation surfaces. Areas where the TZ and MAZ are suspected to be dry were delineated and are shown on Figure 4, as well as on all TZ and MAZ figures, and can be seen in the cross sections (See Section 2.2.2). The top of the TCCZ forms a semi-circular ridge at and north of the CMP Pits (shown as white and light pink shaded elevations in Figure 4), which causes much of the TZ to be dry. This shape is mimicked in the top of the TCLC, but the subsequent dry zone is not as extensive. The dry zones at CMP Pits are not a recent occurrence. Review of water elevation data from the 1980's and 1990's from abandoned wells suggests similar dry zones have existed for decades.

Figure 5 shows the locations of the 76 monitoring wells and eight (8) surface water stations associated with the CMP Pits OU. The map also shows corresponding cross-section lines which depict the local hydrostratigraphic lithology and major contaminant plumes at the CMP Pits OU. The stratigraphy, aquifers, and plumes are all, in general, gently sloping towards Pen Branch. However, the confining units appear to slope towards the south in some areas at the main CMP Pits area (Figure 4 and cross-section B-B' [See Section 2.2.2]). Although the TCCZ and the TCLC are depicted as continuous units in the cross-sections, the aquifer behavior in this area shows various elevation heads and contaminant pathways that indicate the confining horizons are discontinuous and/or intermixed with sandy clays in many areas. This is further supported by core descriptions of the units. The TZ, TCCZ, MAZ, TCLC, and LAZ units are eventually incised by Pen Branch itself and/or the local topography. In the CMP Pits OU area of interest (extent of the maps), the TZ is incised by Pen Branch on the east side of the stream reach, the MAZ is incised in the central portion of the stream reach, and the LAZ is partially incised by Pen Branch at the

western portion of the stream. The horizontal extent of the TZ and MAZ are depicted on all TZ and MAZ maps.

#### **1.4 Observed Hydrology at the CMP Pits OU**

Regional groundwater flow for the UTRA and GA was determined from using data from other nearby wells. This was done to provide an overview of regional flow beyond the CMP Pits. Regional flow in the UTRA, as depicted in Figure 6, is to the northwest towards Pen Branch from CMP Pits. Regional groundwater flow for the GA is to the south/southwest (Figure 6). The latest compiled potentiometric surfaces specific to the CMP Pits from the calendar year (CY) 2Q2023 are displayed for each of the aquifer zones in Figure 7 and Figure 8. These potentiometric surfaces do not show any unusual pattern of flow from previous measurements.

Monthly rainfall levels from the closest monitoring station in nearby L Area for 2019 – March 2024 and the 20-year average are shown on Figure 9. Rainfall during 2023 (total of 67.2 inches) measured over 15 inches more than the 2022 measurements and was also above the 20-year average (49.08 inches). The months of June, July, and August experienced the highest rainfall totals in the year. October and November were the driest months. In 2024, January and February rainfall was below average and March was above average. In general, monitoring wells showed similar higher water elevations compared to 2022 measurements as a result of increased rainfall throughout 2023. Hydrographs of each well are presented in Appendix A.

A small region of radial flow appears to be superimposed upon the northwestward flow beneath the knoll on which the CMP Pits are located and is depicted by the groundwater flow direction arrows in Figure 7. This pattern is due to the locally high topography at CMP Pits (Figure 2) as well as the bowl-like structure of the Tan Clay, especially in the upper TCCZ (Figure 4). Based on water elevations in the MAZ not being fully saturated, it appears the TZ may consist of perched water tables in many locations. The bowl-like structure of the tan clay, as depicted in Figure 4, further supports this conclusion as the lower elevation of the TCCZ in the eastern portion of the CMP Pits may locally funnel groundwater to the south and southeast following the slope of the TCCZ before eventually flowing to the north and northwest. Water may mound up in the bowl-like structure as water is pushed towards the northwest from the overall regional groundwater

flow and as water flows downslope, as shown in Figure 7 in the TZ, the wells located directly around CMP Pits (CMP 34D, CMP 13D, CMP 35D, CMP 10D, and CMP 11D) and may exhibit a radial groundwater flow path with an additional south or southwest gradient. Some years display a more pronounced southerly flow gradient than others. With higher rainfall totals in 2023, flow patterns have not changed significantly from 2022.

The flow pattern in the MAZ generally resembles that of the TZ. Flow directions in the LAZ and GA are less defined due to the horizontal gradients being less across the area, as discussed below. In the area around the CMP Pits and towards the west and north, the water elevations in the LAZ are generally very similar and vary by up to 2 ft (Figure 8). Measurements show that groundwater in the vicinity of Pen Branch flows south towards Pen Branch on the northern side of the stream, further supporting that contaminants originating from CMP Pits are not flowing underneath Pen Branch towards the north. Figure 6 depicts the regional potentiometric surface of the UTRA illustrating the groundwater flow from both sides of Pen Branch. Water elevations in the LAZ on the north side of Pen Branch are higher than elevations on the south side of Pen Branch.

Estimated horizontal groundwater linear velocities have been calculated for the following groundwater flow paths:

- Figure 7 - TZ aquifer flow paths A – A', B – B', and C – C';
- Figure 7 - MAZ flow paths A – A' and B – B';
- Figure 8 – LAZ flow paths A – A', B – B', C – C' and D-D'; and
- Figure 8 – GA flow path A – A'.

Estimated horizontal groundwater linear velocities were calculated for each of the above flow paths using the following equation:

$$\text{Linear Velocity} \left( \frac{ft}{day} \right) = \frac{\text{Hydraulic Conductivity} \left( \frac{ft}{day} \right)}{\text{Porosity (unitless)}} \times \frac{dh (ft)}{dl (ft)}$$

The hydraulic conductivity constants (8, 50, and 30 ft/day for the TZ, MAZ, and LAZ, respectively) and porosity values (all 30%) used in the calculations are taken from the final

calibrated 2017 modeling effort (SRNS 2017). For the GA, the hydraulic conductivity constant of 35 ft/day and porosity value of 25% is used based on investigations in other nearby groundwater/waste sites at SRS (WSRC 1999a). The value  $dh$  is the difference in head;  $dl$  is the length of the groundwater flow paths shown on Figures 7 and 8. The ratio  $dh/dl$  is the horizontal gradient. The gradient, linear velocity per day, and average linear velocity per year were each determined and are provided in Table 2 and described below.

Estimated velocities vary within the TZ between 0.11 ft/day on the western side of the CMP Pits and 0.37 ft/day on the eastern side. This variation could be caused by a combination of factors including the large dry zone area and the radial groundwater flow paths at the CMP Pits knoll, as discussed above. The average for the TZ is 0.28 ft/day, or 103.73 ft/year. The MAZ is more uniform in its rates and averages at 1.74 ft/day, or 635.54 ft/year. The LAZ's rate is much less than the MAZ near the CMP Pits with a rate of 0.21 ft/day, or 77.81 ft/year (LAZ A – A' Flow Path). Flow is greater near Pen Branch, especially on the north side of Pen Branch with a flow velocity of 1.39 ft/day, or 507.70 ft/year (LAZ C – C' Flow Path); however, flow rates are still less than the MAZ. The GA potentiometric surface is extremely flat compared to the UTRA aquifer as the water elevations only vary slightly in elevation across the whole CMP Pits monitored area. Horizontal flow velocity for the GA was calculated to be an average of 0.22 ft/day, or 80.36 ft/year. Flow direction is towards the south/southwest and is consistent with the regional GA flow.

There is a significant downward component to groundwater flow throughout the UTRA. Water level measurements collected from well clusters during 2023 show an average head drop of 11.79 ft (3.59 m) across the TCCZ and an average of 12.99 ft (3.96 m) across the TCLC. There is an average of a 13.72 ft (4.18 m) drop in head across the GCCZ from the LAZ to the GA. As groundwater approaches Pen Branch, the downward gradient may decrease or even flow upward near and underneath Pen Branch as water discharges into Pen Branch. Monitoring well clusters CMP064BU and CMP064B (both screened in the LAZ) show a higher water elevation in the lower B screen than the upper BU screen (Figure 8). Additionally, wells in the wetland area near Pen Branch display water table elevations approximately 1 – 3 ft (0.3 – 0.9 m) above the stream bottom, indicating that Pen Branch is a gaining stream. Other wells, CMP 8 and CMP 8B, located upgradient of the wetland area display a much lower than average downward gradient of



approximately 3.8 ft (1.2 m) across the TCLC. The TCCZ and TCLC are not considered thick competent confining clays, but rather are hummocky, vary in thickness, and can be almost non-existent or leaky in areas allowing some degree of flow between aquifers. The steep topography south of Pen Branch incises the TCCZ and TCLC, the sediment around the stream has been reworked over time as the stream has meandered, and trees and roots have penetrated the clay layers allowing more interchange between aquifers.

## **2.0 REMEDIAL ACTIONS**

This EMR documents the performance of the MNA remedy for the groundwater. Remedial activities for the vadose zone and Ballast Area Soils subunits were performed under an interim RA in 2001 and 2005, respectively (WSRC 1999b and WSRC 2006a). ERH combined with SVE was implemented from 2007 through 2009 to remove DNAPL from the vadose zone (Figure 2). This interim RA mitigated the source within the vadose zone for the groundwater subunit which allows for the MNA remedy.

### **2.1 CMP Pits Vadose Zone Remedial Action**

The ERH/SVE RA performed for the CMP Pits vadose zone was implemented to mitigate the CMCOCs PCE and DCM. Details of system construction are provided in the Post-Construction Report (SRNS 2008). ERH/SVE operation began on March 17, 2008. Heating via ERH continued until November 2008. Two SVE systems provided the VOC removal at the CMP Pits well field. SVE well effluent vapor concentrations and soil temperature data were analyzed to determine when the source/DNAPL had been depleted. Operating data from the ERH system was provided in the EMR submitted in June 2009 (SRNS 2009).

In accordance with the EMP, confirmation samples were collected from three core locations. All sample results were below the remedial goal (i.e., cleanup level) for PCE (30.7 mg/kg) and DCM (0.2 mg/kg) (SRNS 2010), meeting the objective of the RA. All remedial equipment and SVE units have been removed. Even though the RA was successful and confirmation samples were below cleanup levels, there is residual contamination trapped within clay horizons and/or pore space in the vadose zone, in or out of the ERH/SVE zone, could act as a secondary source for

groundwater contamination, albeit much smaller contaminant concentrations than the original source.

## 2.2 Groundwater Monitored Natural Attenuation Remedy

### 2.2.1 Groundwater Aquifers

As described above, groundwater analysis has been performed around the CMP Pits in four distinct aquifer zones of the UTRA and the GA. These zones in descending order are 1) the TZ of the UTRA, 2) the MAZ of the UTRA, 3) the LAZ of the UTRA, and 4) the GA.

Groundwater within these aquifers is currently monitored by the 76 wells which have been sampled or have water elevations measured on a semi-annual or annual basis (Table 1, Figure 5). The TZ includes 13 monitoring wells, the MAZ includes 27 monitoring wells, the LAZ includes 29 monitoring wells, and the GA includes seven (7) monitoring wells. All wells are used for water level measurements and the majority (67) are sampled for VOCs and/or lindane. Eight surface water stations north of the CMP Pits located in the Pen Branch stream were used to monitor any discharge of VOCs to the stream (Figure 5). Table 1 indicates the monitoring network required sampling frequency and the constituents that are monitored. Any additional samples collected during the April 2023 through March 2024 timeframe are shaded in green and any omitted samples are shaded in orange and described in the following sections.

Based on the evaluation of monitoring data, advection and dispersion are the main MNA processes occurring at the CMP Pits. Based on sampling analysis, some degree of biodegradation is occurring in the wetland area near Pen Branch, although it is not seen in much significance upgradient in the CMP Pits area outside the immediate wetland area. The original 2002 groundwater model only accounted for advection and dispersion and estimated the plumes would remain above MCLs for a minimum of 50 years (~2050) and as long as 130 years (~2130) even if the vadose zone source was completely remediated (WSRC 2002). An updated model conducted in 2017 added sorption and continuing VOC sources in clays and estimated the plumes will remain above MCLs for approximately 100 years (~2117). The increase in minimum time is mostly attributed to sorption but is within the range of timeframes calculated in the original 2002 model (50 – 130 years [CY 2050 – 2130]).

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### 2.2.2 Groundwater Sampling Results

Groundwater samples are required to be collected from a total of 67 monitoring wells as listed in Table 1 (65 VOCs, 64 1,4-dioxane, and 20 lindane). Groundwater samples were collected from 66 monitoring wells at the CMP Pits during CY 2Q2023 and 4Q2023. GA well CMP010A was not sampled during 2023 since the well was previously determined to be compromised. CMP010A will be abandoned and a replacement well, CMP010AR, will be installed in 2024; sampling will start in 4Q2024.

Additional sampling occurred in 2023 as shown in Table 1 and as follows:

- CMP 12A was additionally sampled for VOCs and 1,4-dioxane during 4Q2023 since non-estimated detections of VOCs and 1,4-dioxane were observed in 2Q2023.
- CMP 34D was additionally sampled for VOCs during 2Q2023 and 4Q2023 due to recent increases observed in the well.
- CMP066B and CMP067B were also additionally sampled in 2Q2023 for VOCs since detections of PCE and TCE were observed during 2019 (non-estimated value) and 2022 (estimated value).
- GA well CMP011A was additionally sampled for lindane in 2Q2023.

All groundwater results from April 2023 through March 2024 are provided in Table 3. The analytical data presented in this EMR include data quality level of verified and unvalidated (VU). Plume maps were drawn based on the maximum concentration from the data collected between April 2023 through March 2024. Details on specific contaminants are described in the following subsections.

#### 2.2.2.2 PCE and TCE

PCE and TCE contamination has been identified in the TZ, MAZ, and LAZ above MCLs. The PCE plumes comprise approximately 43 acres (17.4 hectares) (Figures 10 and 11), and the TCE plumes comprise approximately 38 acres (15.4 hectares) (Figures 17 and 18). The majority of the horizontal plume movement occurs in the MAZ, which is consistent with modeling estimates. Vertical movement of the plumes are occurring as shown by an overall trend of decreasing

concentrations in the MAZ, and an increasing trend in portions of the LAZ (Appendix B and Figures 15, 16, and 32). This is also consistent with modeling, as concentrations in the LAZ are predicted to increase over time. Sixty-five (65) monitoring wells were sampled in 2023 for VOCs. Twenty-eight (28) wells had PCE concentrations above the MCL of 5.0 micrograms per liter ( $\mu\text{g/L}$ ) and 20 wells had TCE concentrations above the MCL of 5.0  $\mu\text{g/L}$ .

Monitoring wells were analyzed using GSI Mann-Kendall trend analysis for data post-ERH/SVE remediation (2010-2022 data, as available) and updated to include 2023 data if data indicated changes to those trends (as displayed in Appendix B). Figure 32 summarizes these trends. Most of the monitoring wells (85%) show a declining or steady (including consistent non-detects and no-trend) trend in PCE and TCE over the past 13 years as shown in the time-series plots for all the wells in Appendix B, Figure 32, and summarized below. Additional information is provided with the included Excel file (CMP\_EMR\_2023\_Table3\_Figure32) located on the supplied CD with this report and in the electronic submission.

The following is a summary of the PCE and TCE contaminant trends by aquifer for the April 2023 through March 2024 reporting period.

### **Transmissive Zone:**

The maximum concentrations of PCE and TCE found in the TZ were 2,600  $\mu\text{g/L}$  for PCE (Figure 10) and 1,400  $\mu\text{g/L}$  for TCE (Figure 17) both at monitoring well CMP 35D. There were six monitoring wells (out of 11 sampled) screened in the TZ that had PCE and/or TCE concentrations above the MCL in 2023. Upgradient wells CMP062D and CMP063D were non-detect for both PCE and TCE.

Wells CMP 10D and CMP 11D have shown consistently high PCE and TCE values in previous years; however, as shown in Appendix B, the trends for these wells over the past 15 years have generally declined. Concentrations in well CMP 10D slightly increased from concentrations in 2022, and concentrations in well CMP 11D decreased slightly from 2022 concentrations. Contamination in these two wells is a result of contaminants being transported by localized radial groundwater flow at the CMP Pits knoll, as described in Section 1.4 and shown in Figure 7, or by contaminants following the slopes of the confining units (Figure 4). Due to the shape of the TCCZ

surface and the subsequent dry area that is created in the TZ, contamination may have been funneled towards the south and southeast towards CMP 10D and CMP 11D. Well clusters CMP062 and CMP063 remain below MCLs and were non-detect during 2023 indicating that contamination has not spread substantially to the south/southeast.

Concentrations in 2023 at well CMP 35D remained at elevated levels similar to 2022 concentrations. Well CMP 35D has generally displayed increasing concentrations over the last 12 years. The inversely related trends in wells CMP 10D and CMP 35D (Figure 31), for both VOCs and lindane, suggest it could be tied to hydrogeologic processes associated with the complex radial groundwater flow patterns due to the surface shape of the TCCZ and resulting dry zones in the TZ. Water elevation increases due to above average precipitation in recent years possibly provided a mechanism for increased flow towards the northwest in the CMP 10D and CMP 35D area. This may also provide more opportunity for dispersion and diffusion from CMP 10D as there is more water volume available in the TZ. Additionally, the increased water elevations may allow release of trapped secondary sourced contamination in clay horizons or pore space into the groundwater since well CMP 35D is located downgradient of the CMP Pits. Soil sampling conducted in 2021 at the CMP 35D location indicated that residual VOC contamination is present in the vadose zone and upper aquifer and TCCZ (SRNS 2022). Since CMP 35D is located directly outside of the low permeability HDPE cover at the CMP Pits, the cover may retard infiltration and the effect of water elevation increases may be more pronounced. Figure 31 shows a possible correlation between water elevation and contaminant levels of PCE at well CMP 35D.

Due to the increases observed at well CMP 35D, PCE and TCE have been additionally analyzed at well CMP34D to the west of the CMP Pits. This well had previously shown high levels of PCE (1,460 µg/L) and TCE (417 µg/L) in 2001 but was not included in the CMP OU EMP for VOC analyses and therefore, no VOC results were available since 2009. SRS began sampling well CMP 34D for VOCs starting in 2019 and concentrations were observed at levels of 1,940 µg/L for PCE. The 2023 results increased to a maximum result of 2,200 µg/L for PCE and 15 µg/L for TCE (Appendix B Pages B-82 and B-132). The elevated results in the TZ for wells CMP 34D and CMP 35D indicate that some amount of contaminant source is present within the vadose zone or pore space above the water table; however, it only appears to have a localized effect on the overall TZ

plume and is not leading to plume expansion in the TZ, but is likely causing some increases in the in the MAZ and LAZ. It is noted that the PCE/TCE ratios are significantly different in the two wells, indicating a complex disposal history and source composition.

The TZ plume geometry is shown in Figure 10 for PCE and in Figure 17 for TCE. Cross-sectional views of the PCE plumes are available in crosssections A – A', B – B', and C-C' (Figures 12, 13, and 14, respectively). The main plume at and around the CMP Pits has remained roughly the same in size with concentrations near the actual pits area continuing to decrease at well CMP 10D but increasing at wells CMP 34D and CMP 35D as previously discussed. The higher concentrations have remained relatively confined near these two wells, which may indicate that the mass of contaminants is likely not extensive. PCE concentrations at well CMP 11D have generally decreased since 2010 whereas TCE concentrations at well CMP 11D have generally remained stable (Appendix B). Concentrations of PCE at CMP 13D exceeded the MCL during 2023 and PCE displays a slight increasing trend since the ERH/SVE remediation, although concentrations have remained steady for past seven years. Concentrations at well CMP 30D were non-detect for PCE and TCE.

PCE and TCE concentrations in the distal plume in the wetlands in 2023 decreased from 2022 concentrations. PCE and TCE concentrations at CMP 36D and CMP 37D were less than or near MCLs during 2023. Concentrations at CMP 38D are usually less variable and display steady concentrations; however, 2023 concentrations slightly decreased from 2022 concentrations. The distal plume was initially thought to originate from an alternative source other than the CMP Pits. Particle track modeling indicated it was potentially from a previously contaminated drainage ditch north of the CMP Pits (WSRC 2002) (located on all planar figures). As previously mentioned, characterization results of this area indicated that if a source was previously present in the vadose zone, it has been depleted (WSRC 2003). Due to the dry zone areas within the TZ, it is plausible that bifurcation of the plume into two separate plumes occurred over time, or that some contaminant flow went around the dry zone to the east. Discharging of the MAZ and LAZ into the Pen Branch stream likely brings some contamination up into the TZ as the water discharges into Pen Branch. The clay horizons between the aquifers can be thin and/or leaky and the TCCZ and TCLC are at or near ground surface at the location of the distal plume. The steep topography

south of Pen Branch incises the TCCZ and other clay layers, the sediment around the stream has been reworked over time as the stream meanders, and trees and roots have penetrated the clay layers allowing more interchange between aquifers. All of these factors are probable explanations for the disconnect between the groundwater plumes at the distal plume and source area.

A comparison of changes in PCE plume concentrations over the last 15 years (2023 values compared to 2008 values [Pre ERH/SVE]) can be seen in Figure 15 and Table 4. Additionally, a GSI Mann-Kendall trend assessment was done in 2023 for all wells using the post-ERH/SVE data (2010-2022 data, as available) (SRNS 2023) and updated to include any 2023 data if it showed any changes to the trends (as displayed in Appendix B). Figure 32 summarizes these trends. Overall, in the TZ, plume concentrations have decreased or are steady. However, the area directly north of the CMP Pits, including monitoring wells CMP 34D, CMP 35D, and CMP 13D, has increased in PCE concentrations. Concentrations to the south of the CMP Pits at wells CMP 10D and CMP 11D have both decreased more than 95% from their peak levels and show a large reduction in total mass for the TZ. Concentrations to the west at CMP 30D remain non-detect. Concentrations at CMP 35D and CMP 34D will continue to be monitored. The distal plume has decreased in both size and core concentrations indicating that the total mass being transported downgradient is decreasing. TCE trends are similar to PCE; therefore 2008/2023 plume comparisons are not mapped.

### **Middle Aquifer Zone**

The maximum concentrations found in the MAZ were 1,000 µg/L for PCE at well CMP 47D (Figure 10), and 230 µg/L for TCE at well CMP059C (Figure 17), located north of CMP Pits. The concentration of PCE detected at CMP 47D and CMP059C increased from 2022 concentrations, likely due to vertical movement from the contamination observed in the TZ.

There are 11 monitoring wells (out of 21 sampled) screened in the MAZ that had PCE concentrations above the MCL in 2023, and 10 monitoring wells had TCE exceedances above the MCL. The monitoring wells with TCE detections corresponds to monitoring wells with PCE detections. The majority of the MAZ wells display a steady or decreasing trend in concentrations (Figure 32). Well CMB 24I displays a slight increasing trend; however, the overall plume footprint

has not increased. Downgradient locations towards Pen Branch (CMP 40D, CMP 41D, and CMP 43D) were all below MCLs or either non-detect for both PCE and TCE. Also, downgradient well CMP 8 displays a decreasing trend. The remaining MAZ wells show decreasing or no significant change in PCE concentrations. Similar trends were observed for TCE in these wells.

PCE and TCE concentrations rapidly decrease once the plume reaches the wetland area near Pen Branch where VOC degradation is occurring (also see section 2.2.4). Cross-sectional views of the PCE plumes are available in crosssections A – A', B – B', and C-C' (Figures 12, 13, and 14, respectively).

A comparison of changes in PCE plume concentrations over the last 15 years (2023 values compared to 2008 values [Pre ERH/SVE]) can be seen in Figure 15 and Table 4. Additionally, a GSI Mann-Kendall trend assessment has been done in 2023 for all wells using the post-ERH/SVE data (2010-2022 data, as available) (SRNS 2023) and updated to include any 2023 data if it showed any changes to the trends (as displayed in Appendix B). These trends are summarized in Figure 32. In the MAZ, core plume concentrations are similar to 2008 concentrations due to some recent increases; however, the area of higher concentrations (100+ µg/L) has also decreased in size. The plume footprint appears to have expanded horizontally, but this is likely due to the new monitoring well data points collected starting in 2016, which further defined the plume to the east. Additionally, samples have recently been collected from well CMP 31C, located to the west, further defining the plume in that direction. Concentrations near Pen Branch at well CMP 8 and in the wetland area at wells CMP 39D and CMP 40D have decreased, indicating that the flux of VOCs from the source area are decreasing and that VOC degradation in the wetland area is attenuating the plume. TCE trends are similar to PCE; therefore 2008/2023 plume comparisons are not mapped.

### **Lower Aquifer Zone**

There are 11 monitoring wells (out of 27 sampled) screened in the LAZ that had PCE concentrations above the MCL in 2023. Ten (10) of those wells also corresponded to the locations in the LAZ having TCE concentrations above the MCL. The LAZ maximum values for PCE slightly increased from 2022 concentrations and TCE maximum concentrations slightly decreased.



The 2023 maximum concentrations of PCE and TCE within the LAZ were 330 µg/L at well CMP 32C for PCE and 160 µg/L at well CMP 52BU for TCE (Figure 11). The higher concentrations observed in the LAZ are at wells located in the upper LAZ, directly below the TCLC where contaminants are likely migrating from the MAZ and/or diffusing from the clays above. Concentrations at CMP 32C and CMP 52BU appear to have stabilized over the last seven years. Concentrations of PCE and TCE at CMP 10C display slight decreasing trends (Appendix B).

Concentrations at five wells (CMP 8B, CMP 32C, CMP035B, CMP 52BU, and CMP058B) generally display increasing trends over the last 15 years and are located in the upper or mid-LAZ aquifer (Appendix B and Figure 32). However, PCE and TCE concentrations in mid-LAZ plume wells CMP 10B and CMP 13B remained near 2022 levels and the concentrations have been stable the past five years. Contamination in the LAZ is limited to the upper half portion of the aquifer as seen in the three cross sections, A – A', B – B', and C-C' (Figures 12, 13, and 14, respectively). Other wells vertically located mid-plume and deeper remain steady, below MCLs or non-detect. Newer monitoring well CMP035B, vertically located in the upper LAZ, had a maximum PCE concentration of 47 µg/L and TCE concentration of 43 µg/L during 2023; both increased from 2022 concentrations. These concentrations are consistent with other plume concentrations and fit with the known plume geometry as can be seen in the plume maps (Figures 11 and 18) and cross section A-A' (Figure 12). This is not unexpected since the previous soil boring completed at CMP 35D indicated the presence of PCE and TCE in soil where CMP 35B was installed. Higher VOC concentrations were observed in the overlying vadose zone and TZ (SRNS 2023).

Upgradient wells CMP062B and CMP063B were non-detect for PCE and TCE during 2023. Downgradient wells CMP060B and CMP061B remain non-detect for PCE and TCE. Concentrations exceeded the PCE MCL at downgradient well CMP 8B. During 2Q2023 and 4Q2023 PCE and TCE were not detected at wells CMP066B and CMP067B, which are located north of Pen Branch (Figures 11 and 12).

Similar to the location of the northeast distal plume in the TZ and MAZ aquifers, VOC contaminants are present in the LAZ. Some upward vertical water elevation heads are present in the LAZ closer to Pen Branch (i.e., CMP064BU and CMP064B) which supports that the LAZ is

discharging into Pen Branch (Figure 8). Contaminants are from upgradient clay layers and aquifers.

A comparison of changes in PCE plume concentrations over the last 15 years (2023 values compared to 2008 values [Pre ERH/SVE]) can be seen in Figure 16 and Table 4. Additionally, a GSI Mann-Kendall trend assessment has been done in 2023 for all wells using the post-ERH/SVE data (2010-2022 data, as available) (SRNS 2023) and updated to include any 2023 data if it showed any changes to the trends (as displayed in Appendix B). These trends are summarized in Figure 32. LAZ plume concentrations have generally increased in the upper half of the aquifer. Increases in the LAZ are expected, as both the previous 2002 modeling effort and the more recent 2017 modeling effort predicted increases in the LAZ over time. The area southeast of CMP Pits in the upper LAZ (well CMP 10C) is currently on a decreasing trend over the previous 14 years, suggesting the majority of source contaminants have been remediated. Concentrations on the western edge of the plume (well CMP 33D) have also decreased indicating the LAZ plume is not expanding to the west with LAZ groundwater flow. The downgradient wells (CMP060B and CMP061B) remain below MCLs. The LAZ plume is most likely reaching Pen Branch and the wetland area east and downgradient of CMP 8B, which also correlates to the TZ and MAZ contaminants near Pen Branch. TCE trends are similar to PCE; therefore 2008/2023 plume comparisons are not mapped.

### **Gordon Aquifer**

There are seven monitoring wells screened within the GA and six were sampled during 2023. CMP010A was not sampled during 2023 since the well was previously determined to be compromised and is likely causing contaminated groundwater from above aquifers to enter the well. CMP010A will be abandoned and a replacement well, CMP010AR, will be installed in 2024; sampling will start in 4Q2024. No GA monitoring wells exceeded the PCE and TCE MCLs. Non-estimated detections were observed in 2Q2023 in one well, CMP 12A, with a concentration of 1.9 µg/L for PCE and 1.0 µg/L for TCE. Since the concentrations were non-estimated, well CMP 12A was also sampled during 4Q2023. PCE was detected at a concentration of 2.0 µg/L and TCE at 1.1 µg/L. All other GA monitoring wells were non-detect for PCE and TCE.

As stated above, contamination generally remains in the UTRA and extends down to the upper portion of the LAZ. The GA screened wells are in place to confirm contamination has not migrated farther downward than expected as described in the EMP (WSRC 2006b). Modeling did not predict contamination to reach the GA at levels above MCLs (WSRC 2002, SRNS 2017). However, low levels of PCE and TCE below MCLs have been recently observed in monitoring well CMP 12A and rarely at CMP 8A. Contamination previously observed at CMP010A is believed to be caused by in-well leakage of contaminated groundwater at around 105 ft bgs due to bends in the well causing the casing seal/joint to be compromised. Abandonment and replacement of compromised monitoring well CMP010A will occur in 2024. The new replacement well CMP010AR will be sampled at least semiannually for the first year.

#### 2.2.2.3 Cis-1,2-Dichloroethylene (c-1,2-DCE)

C-1,2-DCE was detected in nine wells in 2023 (CMP 10C, CMP 11D, CMP 34D, CMP 35D, CMP 36D, CMP 37D, CMP 39D, CMP 40D, and CMP 41D). Concentrations were all low values, with a maximum of 4.8 µg/L at well CMP 37D, far below the 70 µg/L MCL. Five of the 9 wells with c-1,2-DCE are located in the wetland area near Pen Branch, suggesting degradation of PCE and TCE is occurring in the Pen Branch wetlands because of an expansive wetland, high organic matter, anaerobic conditions leading to reductive dechlorination, and wetland vegetation attenuation. Data collected by South Carolina State University in support of providing data for MNA conditions suggests natural attenuation is occurring (see Section 2.2.4 *Additional Data from Independent Analysis*). The preferential degradation pathway for TCE is c-1,2-DCE as both trans-1,2-dichloroethylene (t-1,2-DCE) and 1,1-DCE are mainly non-detect as discussed below.

The lack of high detectable results in other monitoring wells confirms that VOC degradation is not widely occurring throughout the aquifers and plume and that advection and dispersion are the main MNA processes occurring. VOC degradation is mainly occurring in the wetland areas near Pen Branch.

#### 2.2.2.4 Trans-1,2-Dichloroethylene (t-1,2-DCE)

One detection of t-1,2-DCE was observed at well CMP 34D in 2Q2023 at an estimated concentration of 7.9 µg/L, below the MCL of 100 µg/L. All other t-1,2-DCE results were non-detect for 2023, including the 4Q2023 sampling at well CMP 34D.

#### 2.2.2.5 1,1-Dichloroethylene (1,1-DCE)

One detection of 1,1-DCE was observed at well CMP 34D in 2Q2023 at an estimated concentration of 8.1 µg/L, above the MCL of 7 µg/L. All other 1,1-DCE results were non-detect for 2023, including the 4Q2023 sampling at well CMP 34D.

#### 2.2.2.6 Vinyl Chloride (VC)

During 2023, VC was only detected at one well, CMP 11B, at an estimated value of 1.1 µg/L, below the MCL of 2 µg/L.

#### 2.2.2.7 1,4-Dioxane

1,4-Dioxane is analyzed annually at CMP Pits at 64 monitoring wells. Well CMP010A was not sampled in 2023, so 63 wells were monitored for 1,4-dioxane in 2023. There is currently no MCL for 1,4-dioxane, and the current United States Environmental Protection Agency (USEPA) tap water regional screening level (RSL) of 0.46 µg/L is used for contouring plume maps (Figures 19 and 20) and cross-sections (Figures 21, 22, and 23). During the 2023 monitoring period, 1,4-dioxane was analyzed with two analytical methods, USEPA 8260DSIM and USEPA 522. As in past years, the USEPA 8260DSIM method detection limit and sample quantitation limits could not meet the current USEPA tap water RSL of 0.46 µg/L. However, the USEPA 522 method limits are below the USEPA tap water RSL. Annual samples were collected for 1,4-dioxane and analyzed using both methods and are compared in Table 3.

Due to the lower detection limits using the USEPA 522 method, there were more detections of 1,4-dioxane than with the USEPA 8260DSIM method. Detections of 1,4-dioxane occurred in 29 of the 63 wells sampled (46%) using the USEPA 522 method compared to 22 wells (35%) using the USEPA 8260DSIM method. There was close agreement in the results between the two methods in the majority of samples.

The 1,4-dioxane plume mimics the distribution of the PCE and TCE plumes in all aquifers as detections and exceedances of the USEPA tap water RSL occurred in the TZ, MAZ (Figure 19), LAZ, and GA (Figure 20). The maximum concentration was 250 µg/L at well CMP 35D. It was not detected in any wells north of Pen Branch. As seen in Appendix B, which presents plots for the maximum 1,4-dioxane results for each sampling event, concentrations in wells that have had detections within the last seven years have remained steady or generally decreased. However, well CMP 35D has shown a general increase in 1,4-dioxane (Appendix B, page B-15) similar to other contaminant trends for this well.

There is no South Carolina certified lab that has detection limits for 1,4-dioxane that can meet the current USEPA tap water RSL. SRS will continue to look for and work with the labs to try to achieve the lowest possible detection limits. SRS will continue to utilize the USEPA 522 method that can meet the USEPA tap water RSL, in addition to the current South Carolina Department of Environmental Services (SCDES) approved method. If a lab or method has South Carolina accreditation and can meet the USEPA tap water RSL, then that would be the preferable analysis method used.

#### 2.2.2.8 Carbon Tetrachloride (CCl<sub>4</sub>)

CCl<sub>4</sub> was detected in 11 wells during 2023, but only exceeded the MCL of 5.0 µg/L in four wells: CMP 10D, CMP 10C, CMP 35D, and CMP064BU with a maximum concentration of 46 µg/L at well CMP 35D. Plume maps were not created due to the limited number of exceedances.

#### 2.2.2.9 Chloroform

Chloroform was detected in 16 wells during 2023. None of the results exceeded the MCL of 80 µg/L. The maximum result was at well CMP 35D with a value of 57 µg/L. The highest concentrations coincide with wells that have CCl<sub>4</sub> contamination as chloroform is a degradation product of CCl<sub>4</sub>.

#### 2.2.2.10 Dichloromethane (DCM)

During April 2023, all DCM results were non-detect except for one well, CMP035B, which displayed estimated concentrations of 1.1 µg/L below the 5 µg/L MCL.

#### 2.2.2.11 Bromodichloromethane

During 2023, bromodichloromethane was detected at one well, CMP 10C, in 4Q2023 at an estimated concentration of 0.41 µg/L below the MCL of 100 µg/L MCL. All other results were non-detect for bromodichloromethane.

#### 2.2.2.12 1,1,2-Trichloroethane (1,1,2-TCA)

During April 2023 through March 2024, 1,1,2-TCA was not detected in groundwater at CMP Pits.

#### 2.2.2.13 Lindane

Nineteen (19) out of 20 wells were analyzed for lindane in 2023. The MCL for lindane is 0.2 µg/L and four wells (CMP 10C, CMP 46D, CMP 47D, and CMP 35D) had lindane concentrations that exceeded this level (Figures 24 and 25). Cross-sections with lindane plumes and concentrations are provided in Figures 26 through 28. Most wells monitored for lindane show slightly decreasing or steady trends in concentrations as shown in Appendix B and Figures 29, 30, and 32.

The highest lindane concentration for 2023 was 7.7 µg/L found in CMP 35D. This well has shown fluctuations in concentrations over the years, but displayed a general increase from 2013 through 2020. Concentrations in 2021 decreased and started to increase again in 2022; however, concentrations decreased in 2023 (Appendix B, page B-56). Factors contributing to the increase in concentration include the complex hydrogeology of groundwater flow paths, surface shape of the TCCZ (Section 1.3 and Figure 4), perched water table conditions, and water elevation increases (Section 1.4, Figure 7, and Figure 9). Increases at CMP 35D have occurred as concentrations at well CMP 10D have decreased. The inversely related trends in wells CMP 10D and CMP 35D for both lindane and VOCs (Figure 31) suggest the increases could be tied to hydrogeologic processes associated with the radial groundwater flow patterns due to surface shape of the TCCZ and dry zones in the TZ. Higher water table elevations have possibly provided a mechanism to release contamination trapped in the vadose zone pore space or capillary fringe, as well as for groundwater to flow towards the northwest providing more opportunity for dispersion and diffusion from CMP 10D and the CMP Pits. The low permeability cap retards infiltration so the effect of water table elevation increases may be more pronounced since CMP 35D is located directly outside the capped

area. Figure 31 indicates a possible correlation between water elevation and contaminant levels of lindane at CMP 35D.

CMP 10C, in the Upper LAZ, shows concentrations have generally been decreasing over the past 10 years. Well CMP 10B, which is screened in the middle of the LAZ (Figure 26), had estimated detections far below the MCL with a maximum concentration of 0.033. Due to the shape of the TCCZ surface and the subsequent dry area that is created in the TZ (Figure 4), contamination may have been funneled towards the south and southeast towards CMP 10D from the high concentration area around CMP 35D and the CMP Pits. Fluctuating water elevations could move groundwater back and forth between CMP 10D and CMP 35D or potentially release contaminants into the water table that were trapped in pore space or clay zones.

The lindane plume is estimated at approximately 3.3 acres (1.3 hectares) in the UTRA (Figures 24 and 25) which is slightly larger than the 2022 area. The majority of the plume (including the highest concentrations) resides in the TZ around well CMP 35D. The MAZ contained two wells, CMP 46D and CMP 47D slightly above the MCL with concentration of 0.46 µg/L and 0.21 µg/L, respectively (Figure 24). In the LAZ, lindane was detected above the MCL (0.2 µg/L) at only one well (i.e., CMP 10C [Upper LAZ] with a maximum concentration of 0.22 µg/L). Lindane was sampled at downgradient well CMP 48D in 4Q2023 and had a concentration of 0.049 µg/L, below the 0.2 µg/L MCL.

A comparison of lindane plume concentrations over the last 15 years (2023 values compared to 2008 values) can be seen in Figures 29 and 30 and Table 5. Additionally, a GSI Mann-Kendall trend assessment has been done for all wells using the post-ERH/SVE data (2010-2022 data, as available) and updated to include any 2023 data if it showed any changes to the trends (as displayed in Appendix B). Figure 32 summarizes these trends. In the TZ, lindane concentrations above the MCL are currently limited to one well, CMP 35D. The actual TZ plume may appear larger than actual conditions on the maps due to the contour line size and scale of the maps. In the MAZ, the area to the north and northwest of the CMP Pits has experienced minor fluctuations in concentration over the past 15 years, but concentrations continue a downward trend. There was one small plume above the MCL in 2023 at wells CMP 46D and CMP 47D. Beginning in 2008, the LAZ experienced an initial increase in concentrations southeast of the CMP Pits at well CMP

10C; however, lindane concentrations at this location have decreased since 2015; concentrations in 4Q2023 dropped to below the MCL. The increase first seen at CMP 10C in 2008 is believed to be due to the shape of the surface of the Tan Clay, localized radial groundwater flow around the CMP Pits knoll, and leaky conditions within the TCCZ and TCLC. Contamination does not extend deeper than the upper portion of LAZ within the UTRA (Figures 26 and 28). The lindane plumes had minimally increased in previous years, if at all, in the TZ and LAZ. Although lindane does not diffuse in aquifers as quickly as VOCs, the factors mentioned above may be further hindering contaminant advection and dispersion.

### 2.2.3 *Surface Water Sampling Results*

Surface water in Pen Branch is sampled semi-annually at eight locations along the groundwater discharge boundary (Figure 5). Two of these stations are collected in a tributary leading to Pen Branch (CMP-SW-20 and CMP-SW-21).

VOCs are analyzed semi-annually and 1,4-dioxane is analyzed annually during the fourth quarter. Table 3 and Figures 10, 11, 17, and 18 show the PCE/TCE results at each station. Modeling results predicted VOC discharge to Pen Branch above MCLs. In 2023, there was one estimated detection of 1,4-dioxane in surface water at station CMP-SW-20. 1,4-Dioxane was analyzed with both the USEPA 8260DSIM method and the USEPA 522 method, as discussed above in Section 2.2.2.6, *1,4-Dioxane*. 1,4-Dioxane was detected at CMP-SW-20 at an estimated value of 0.59 µg/L with the USEPA 522 method; the USEPA 8260DSIM method result was non-detect (Table 3 and Figures 19 and 20). All other surface water results were non-detect for 1,4-dioxane and all other VOCs.

The CMP Pits VOC and 1,4-dioxane groundwater plume effects on Pen Branch surface water are negligible as they are generally not detected, with any detections remaining below regulatory levels of concern. Dispersion, advection, and wetland area VOC degradation are all contributing factors that reduce the groundwater plume impact to Pen Branch.



#### 2.2.4 *Additional Data from Independent Analysis*

Sampling for VOCs has been conducted in and around Pen Branch by a South Carolina State University (SCSU) group for several years under a grant provided by the United States Department of Energy (USDOE). The focus of their studies is the MNA processes occurring in the stream and wetlands around Pen Branch as the VOC plume moves towards and discharges into Pen Branch. Many of the SCSU samples are collected from the groundwater immediately before discharge into Pen Branch and surface water within Pen Branch. Their 2023 and early 2024 efforts were focused on the location where more VOC discharge was observed (upstream of SRS surface water station CMP-SW-22) and also included collection of sediment samples for VOC and microbial analyses.

During 2023 and early 2024, SCSU sampled nine (9) groundwater stations below the Pen Branch stream. Multiple samples (duplicates) were collected for statistical purposes and samples were collected at multiple times of the year. This included 62 groundwater samples within the hyporheic sediments below the stream bed within Pen Branch. Groundwater samples were collected from temporary wells up to 80 centimeters (cm) (31.5 inches) below the stream bottom. Samples were collected by pumping and/or the use of passive diffusion bags that were installed for at least two weeks prior to sample collection. Seven (7) surface water stations were also sampled and also included duplicate samples for a total of 27 samples. The surface water samples were collected by grab method (scooping water out of the stream with another bottle).

Groundwater results indicated that the VOC plume is discharging above MCLs and mixing within the hyporheic zone upgradient of the SRS CMP-SW-22 surface water station, from SCSU stations 5DB80 through station 5D1B. The maximum groundwater concentration results are as follows: PCE – 37.2 µg/L at SCSU station 5DB80; TCE – 15 µg/L at 5DB80; c-1,2-DCE – 24 µg/L at 5D1B; and VC – 30 µg/L at 5DZ3. 1,1-DCE and T-1,2-DCE were not detected in groundwater (Table 6). There were no detections of VOCs in any of the SCSU surface water samples. Figure 33 displays the SCSU sample locations and the maximum PCE concentrations in their groundwater and surface water stations.

SCSU has been sampling at CMP Pits Pen Branch for multiple years and have been collecting samples from some of the same sample locations to monitor potential changes in contaminants

over time. Their data shows that contaminant concentrations have been decreasing over time and that VOC degradation is occurring more in their downgradient, wetland/stream sample locations (Figure 34).

Sediment samples were collected at multiple depths up to 80 cm (31.5 inches) below the stream bottom for VOC and microbial analysis. Multiple sediment samples (duplicates) were also collected (Table 7). The maximum sediment concentration results are as follows: PCE – 119 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) at SCSU station 5DZ3; TCE – 21.7  $\mu\text{g}/\text{kg}$  at 5DB80; c-1,2-DCE – 48.1  $\mu\text{g}/\text{kg}$  at 5DZ3; and VC – 27  $\mu\text{g}/\text{kg}$  at 5DZ3. 1,1-DCE and t-1,2-DCE were not detected in sediment.

Additionally, SCSU continued to expanded their efforts in early 2024 with microbial studies to aid in the understanding of the VOC natural attenuation that the Pen Branch wetlands are contributing. Their efforts included utilizing gas chromatography-isotope ratio mass spectrometry (GC-IRMS) with compound specific isotope analysis (CSIA) conducted at Michigan State University with microbial analysis associated with VOC degradation conducted by Savannah River National Laboratory on sediments collected at multiple depth intervals during their temporary groundwater well installations. However, results are not yet finalized but will be provided in subsequent CMP Pits EMRs.

### 3.0 FUTURE ADDITIONAL SAMPLING AND EFFORTS

#### Additional Anion/Cation Groundwater Sampling

SRS proposes to expand upon the anion/cation groundwater sampling that was previously done in 2021 and 2022 near the CMP Pits trench area and upgradient area to include wells across the larger CMP Pits groundwater unit. Additional anion/cation samples are proposed to be collected at a total of 23 additional wells, including clusters with wells in multiple aquifer zones, wells downgradient towards Pen Branch, and wells on the north side of Pen Branch (Figure 35). The selected wells will be sampled and analyzed for cations to include aluminum, calcium, iron, potassium magnesium, manganese, and sodium. Anions include chloride, fluoride, nitrate, carbonate, and sulfate. Results of the additional sampling will be presented in subsequent EMRs and combined with the previous anion/cation results for comparison.

*Additional Wetland/Pen Branch Shallow Wells*

To further expand monitoring in the wetland area and around Pen Branch, SRS will be installing 12 permanent shallow wells in the Pen Branch stream at six locations across the CMP Pits Pen Branch Area in 2024 (Figure 36). Two wells will be installed at each of the six locations with one well screened approximately 1-2 ft bgs and the other 2-3 ft bgs which will allow the collection of groundwater in the hyporeic zone before discharge to surface water. Sampling of VOCs and 1,4-dioxane will begin in 4Q2024 and samples will be collected semiannually for at least the first two years. Data results will be included in future EMRs.

*Source Contamination Evaluation*

Concerns have been raised in recent years associated with increasing concentrations near the source area (CMP Pits trenches area), specifically with increasing contaminant concentrations at well CMP 35D and CMP 34D. The ERH/SVE remedial action conducted in 2008/2009 targeted the residual DNAPL and high VOC contamination remaining within the vadose zone beneath the CMP Pits. Although the remediation effort was successful (i.e., cleanup levels were met), residual contamination was left in place. Increasing VOC and lindane concentrations have been seen over the last 10-13 years to the north of the CMP Pits. It is expected that increasing water elevations have released residual contamination from within the capillary fringe and vadose zone. It is also plausible that the ERH action created a contaminant front that emanated from the treatment zone and helped mobilize contaminants at the CMP 35D area.

The 2017 modeling effort factored in continuing sources from residual contamination/desorption from low permeable zones located beneath the CMP Pits knoll area. With the continuing source additions to the updated model, the cleanup timeframe (approximately 100 years [~CY 2117]) was similar to what was developed in the original model in 2002 (50-130 years [CY 2050-2130]). The 2021 additional sampling effort collected numerous soil VOC headspace samples to quantify the current contamination around the CMP Pits knoll area (SRNS 2022). Additional groundwater data was also collected as new LAZ monitoring well CMP035B was installed.

During fiscal year 2024, SRS compiled the updated data from the monitoring well network, surface data, as well as data collected from the SCSU efforts. Data from the soil borings were also

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compiled. However, due to modeling code updates since the last time the model was run, data used with the 2017 model also had to be updated. This was unexpected and led to additional time needed to update the existing model with the additional data. Unfortunately, due to these unexpected changes, the updated model was not completed in time for this EMR. SRS is currently refining and conducting the modeling and will provide detailed information of the evaluation and the results in the June 2025 CMP Pits EMR.

#### **4.0 SUMMARY**

A simple graphical CSM (Figure 3) has been presented to aid in the understanding of potential sources of contamination and the subsequent groundwater transport pathways. Surface maps of the tan clay (both the TCCZ and the TCLC) have been presented to aid in the understanding of radial groundwater flow at the CMP Pits and probable contaminant transport mechanisms (Figure 4). In general, monitoring wells showed similar or higher water elevations compared to 2022 measurements due to above average rainfall during 2023. The areas estimated to be dry in the TZ and MAZ are similar in size to last year. Perched water tables most likely exist in parts of the TZ and MAZ. The shape of the tan clay layer and the level of the water table restrict groundwater flow movement in the TZ and MAZ and cause complex localized groundwater flow paths. This can explain some increasing contaminant trends, as contaminants may have become re-suspended with limited lateral movement.

Advection and dispersion are the main MNA processes occurring at CMP Pits, with some anaerobic biodegradation occurring in the hyporheic zone and within the wetlands around Pen Branch. The majority of groundwater and surface water results are consistent with modeling predictions (WSRC 2002, SRNS 2017), and the effectiveness monitoring data collected through March 2024 indicates that the MNA remedy is working as predicted as the majority of wells (85%) display steady or decreasing trends or remain non-detect. However, steady increases in PCE, TCE, 1,4-dioxane, and lindane in well CMP 35D directly north of the CMP Pits have been observed since 2012. PCE concentrations at CMP 35D increased to 2,600 µg/L in 2023. Elevated PCE has also been detected in well CMP 34D in the last 5 years; the maximum concentration in 2023 was 2,200 µg/L. This contamination appears to be related to water elevation rise and recent rainfall infiltration releasing residual contamination trapped in the vadose zone near the CMP Pits.

Due to concerns associated with increasing groundwater concentrations near the source area (CMP Pits trenches area) during fiscal year 2024, SRS is using the 2021 data soil sampling data, as well as recent groundwater data, to update the source term (and plumes) in the 2017 model to simulate if an additional action to reduce the residual source would improve cleanup timeframes. SRS is currently conducting the modeling effort and will provide detailed information of the evaluation and the results in the June 2025 CMP Pits EMR.

Due to GA well CMP010A being identified as compromised, it is believed that contaminated groundwater from the aquifer above is leaking in the CMP010A well causing the elevated TCE, PCE, and lindane levels that were seen in the groundwater samples. During fiscal year 2024, SRS will abandon well CMP010A and install a new replacement well, CMP010AR. Twelve (12) shallow wells will be installed at six locations within the Pen Branch stream to monitor groundwater before discharge to surface water. Sampling of the new wells will begin in 4Q2024.

Wells located in the distal plume area towards the northeast show a possible preferential pathway for groundwater as relatively high levels of VOCs exist to the northeast. Dry zones may be slightly redirecting groundwater flow, which may explain elevated concentrations to the northeast.

The two wells north of Pen Branch, CMP066B and CMP067B, continued to be sampled semi-annually in 2Q2023 and 4Q2023 due to a detection of PCE and TCE below MCLs at well CMP067B in 2019 and 2022. No VOCs or 1,4-dioxane were detected in the 2023 sampling events. These two wells will continue semi-annual sampling.

1,4-Dioxane was analyzed at a majority of the CMP Pits wells and at surface water stations in 2023 using two analytical methods, USEPA 8260DSIM and USEPA 522. The 1,4-dioxane plume mimics the distribution of the PCE and TCE plumes in all aquifers. The maximum 1,4-dioxane concentration was 250 µg/L at TZ well CMP 35D. 1,4-Dioxane was detected at one surface water station, CMP-SW-20, with the USEPA 522 method at a maximum estimated concentration of 0.092 µg/L, which is below the USEPA tap water RSL of 0.46 µg/L.

Screening level data that was collected in 2023 and early 2024 by SCSU demonstrate that the VOCs are present in shallow (<2.5 ft) groundwater beneath Pen Branch in discrete areas, mainly

upgradient of SRS surface water station CMP-SW-22. Their data also shows that VOC degradation is occurring as higher concentrations of cis-1,2-DCE and VC are present near Pen Branch, but surface water results are non-detect. SCSU expanded their sampling in 2023 to include additional sediment samples from the borings of the temporary monitoring well stations underneath the Pen Branch stream bed and were collected for VOCs and microbial analysis in partner with Michigan State University. Microbial results have not yet been finalized but will be provided in subsequent CMP Pits EMRs when available.

Lindane only exceeded the MCL (0.2 µg/L) in four wells (CMP 35D – TZ, CMP 46D and CMP 47D – MAZ, and CMP 10C – LAZ) with a maximum concentration of 7.7 µg/L at CMP 35D, which decreased from 2022 concentrations. All other wells were below the MCL or non-detect.

The most important indicator for the MNA remedy performing as predicted is an evaluation of the long-term concentration trends of many monitoring wells and an interpolation of the data showing decrease in plume size over time. Although the overall plume size has minimally changed since the completion of the source zone RA 15 years ago, many core concentrations (higher concentration areas of the plume) continue to decline, and surface water continues to be only minimally impacted as no VOCs were detected in 2023, and 1,4-dioxane was found in only one sample at an estimated level below the RSL. VOC biodegradation in the wetlands around Pen Branch is likely reducing the flux of VOCs into Pen Branch.

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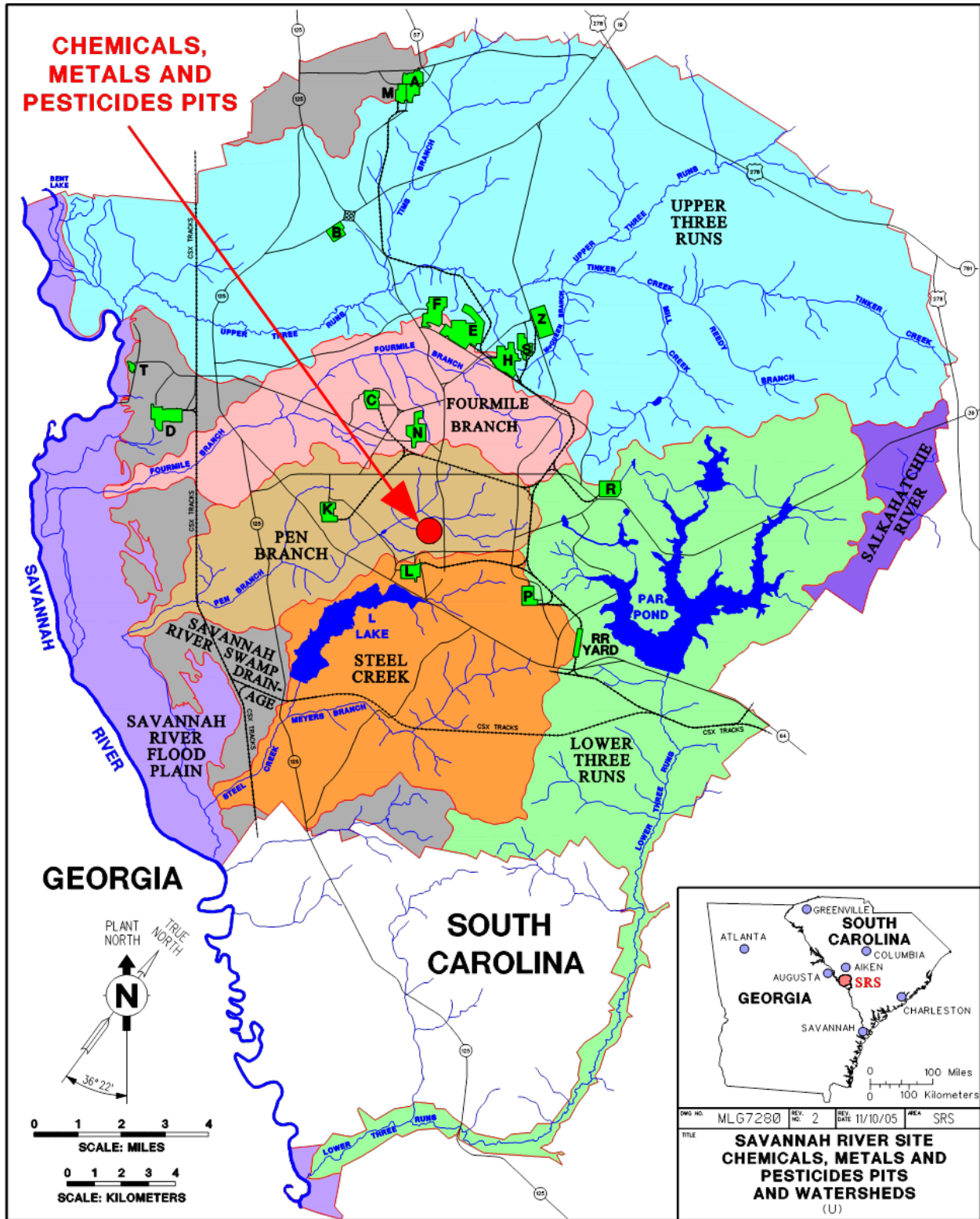


Figure 1. Location of the CMP Pits OU within the Savannah River Site

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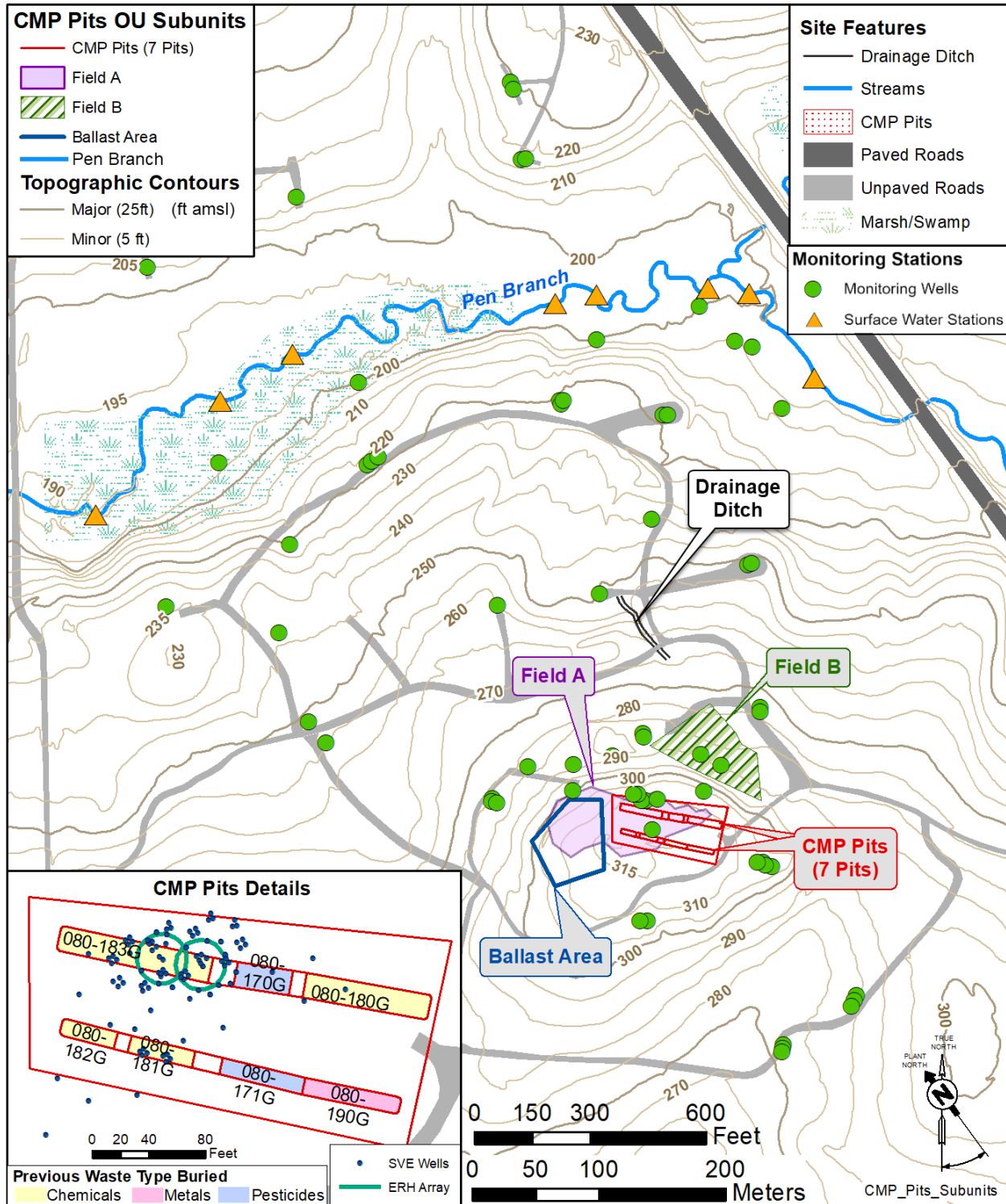
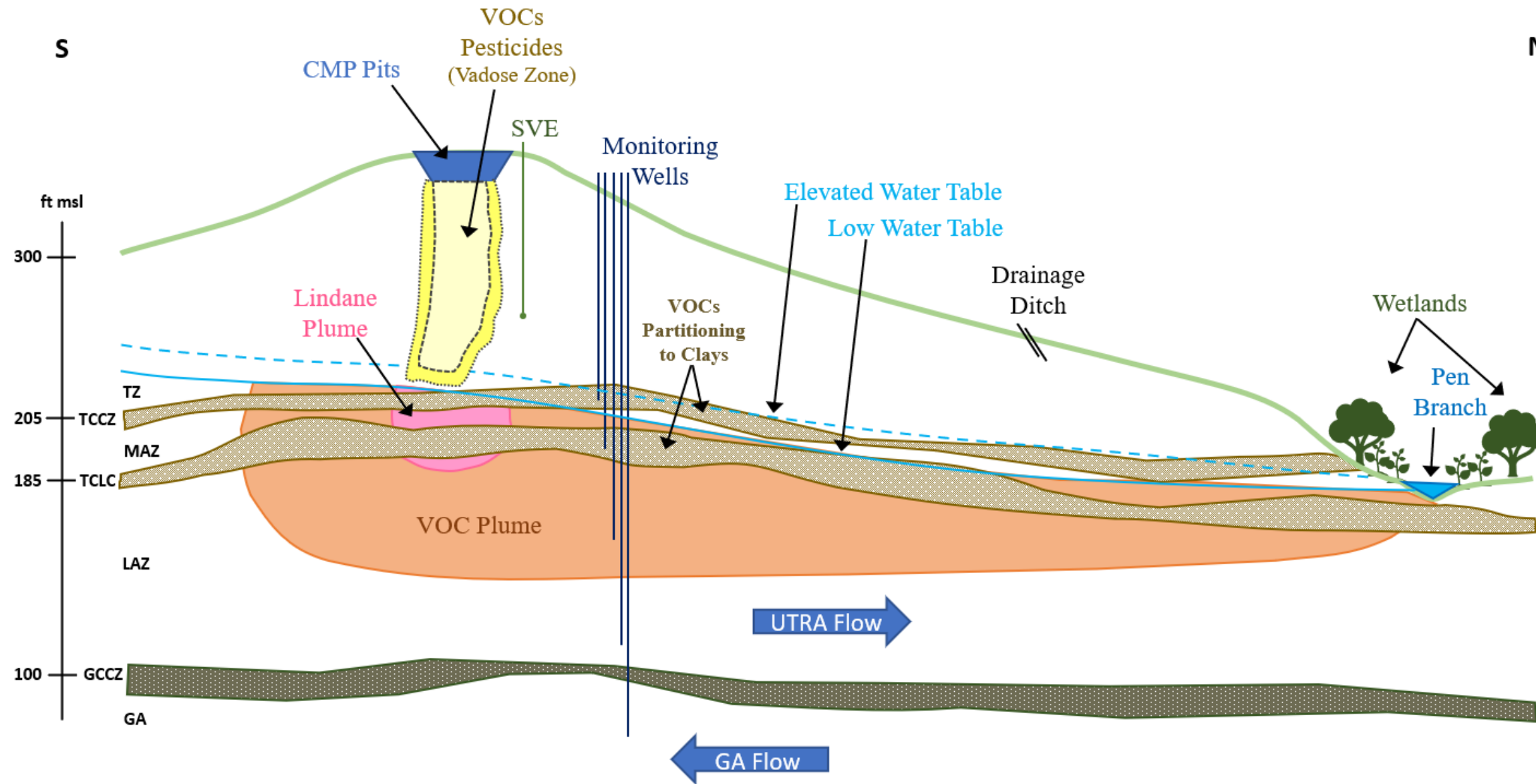


Figure 2. CMP Pits OU Subunits

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Notes: The TCCZ, TCLC, and GCCZ may not be competent clay units and may be hummocky, discontinuous, and/or leaky in some areas.  
Not drawn to scale.

Figure 3. CMP Pits Groundwater OU Conceptual Site Model (CSM)

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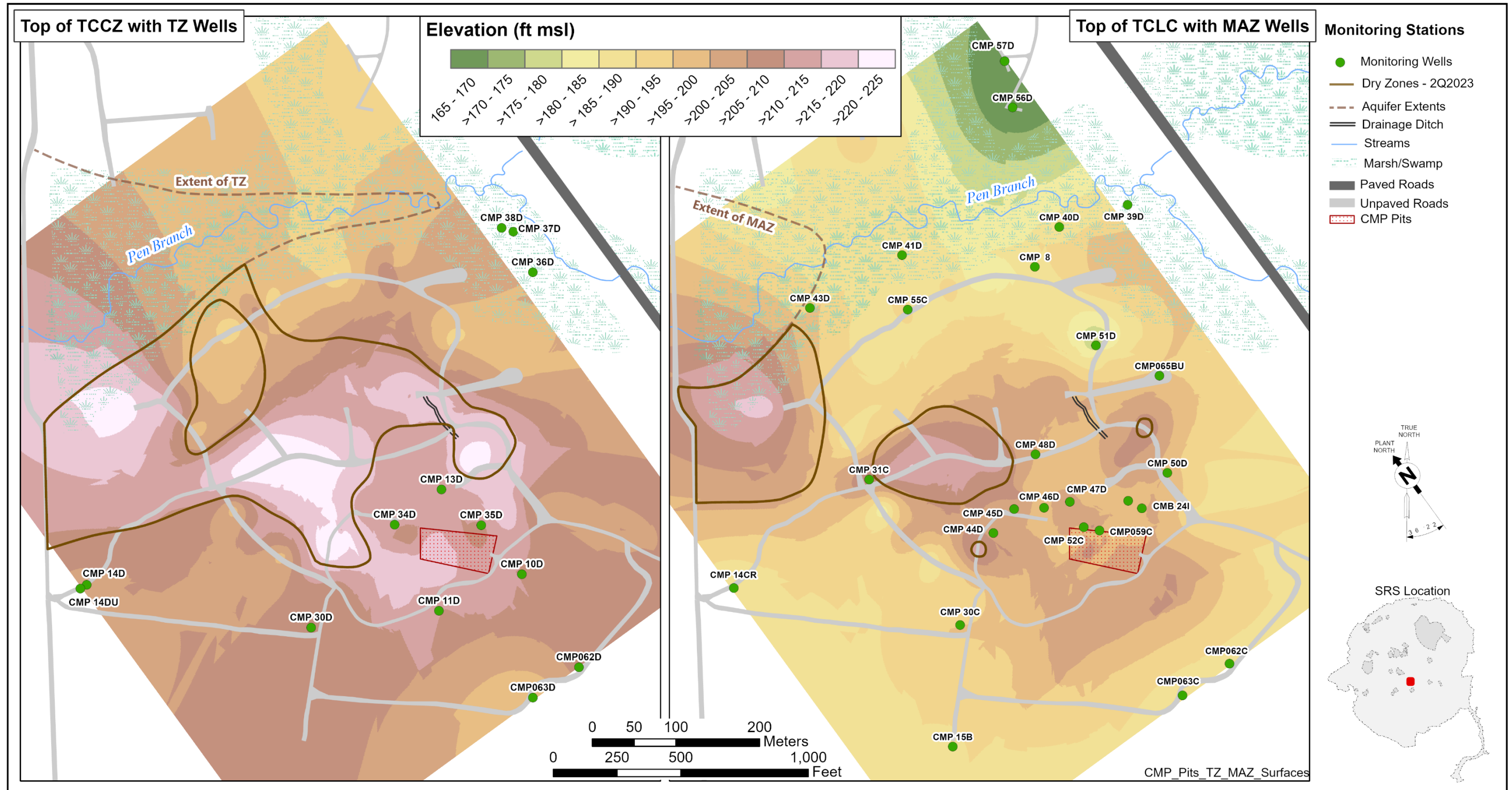


Figure 4. Stratigraphic Surfaces of the TCCZ and TLCZ with 2Q2023 Dry Zones of the TZ and MAZ

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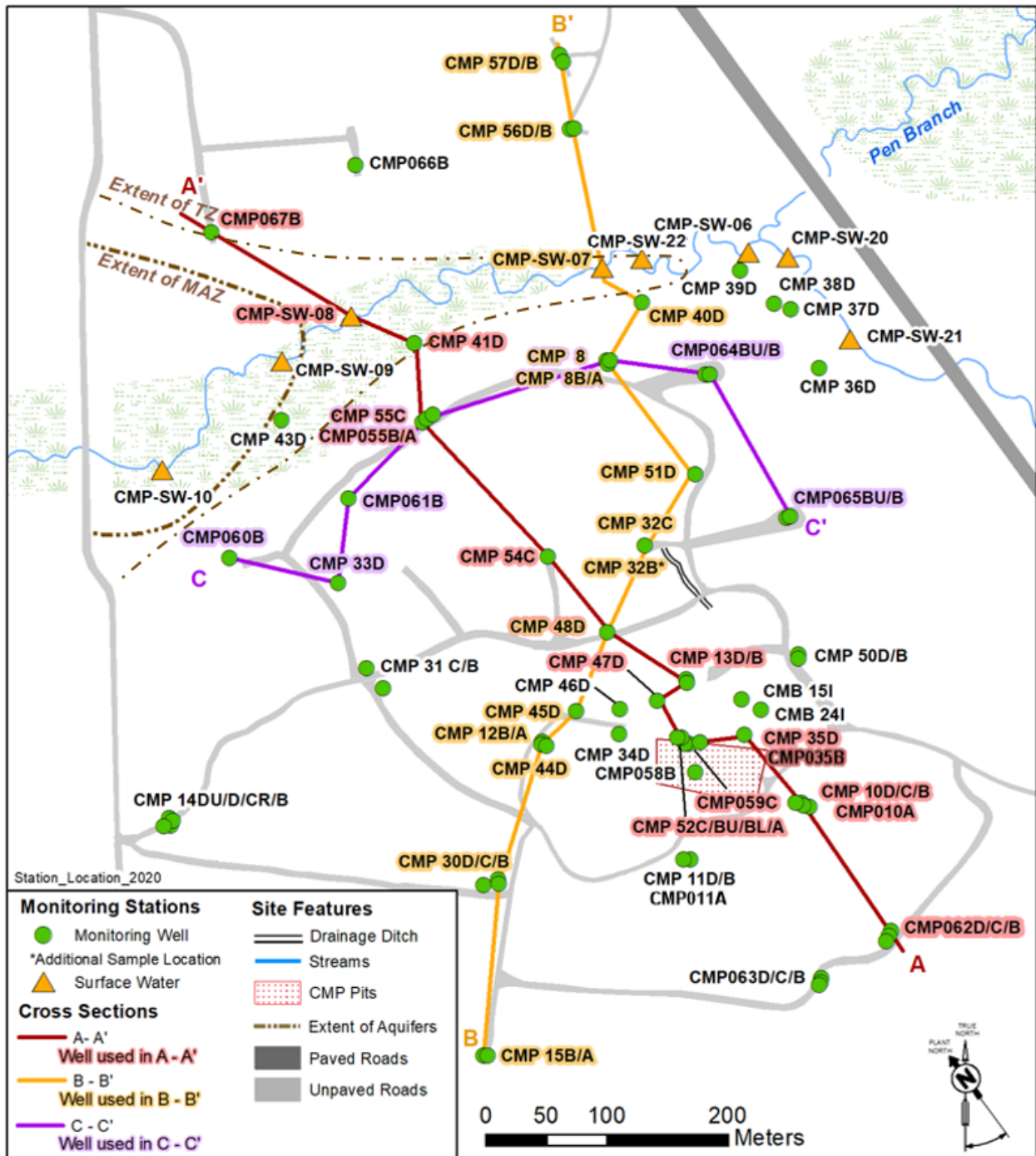


Figure 5. CMP Pits OU Monitoring Network, and Cross Section Lines

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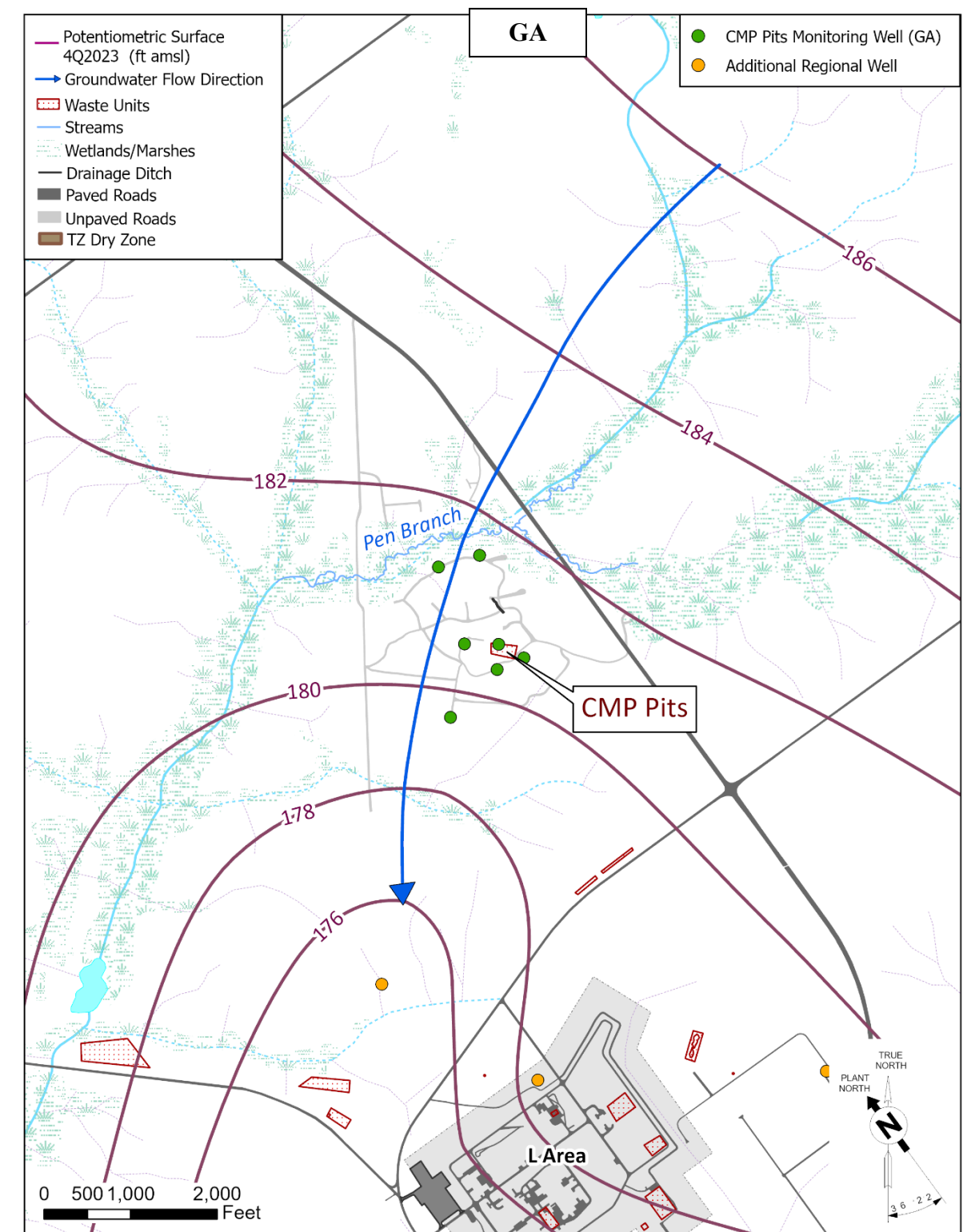
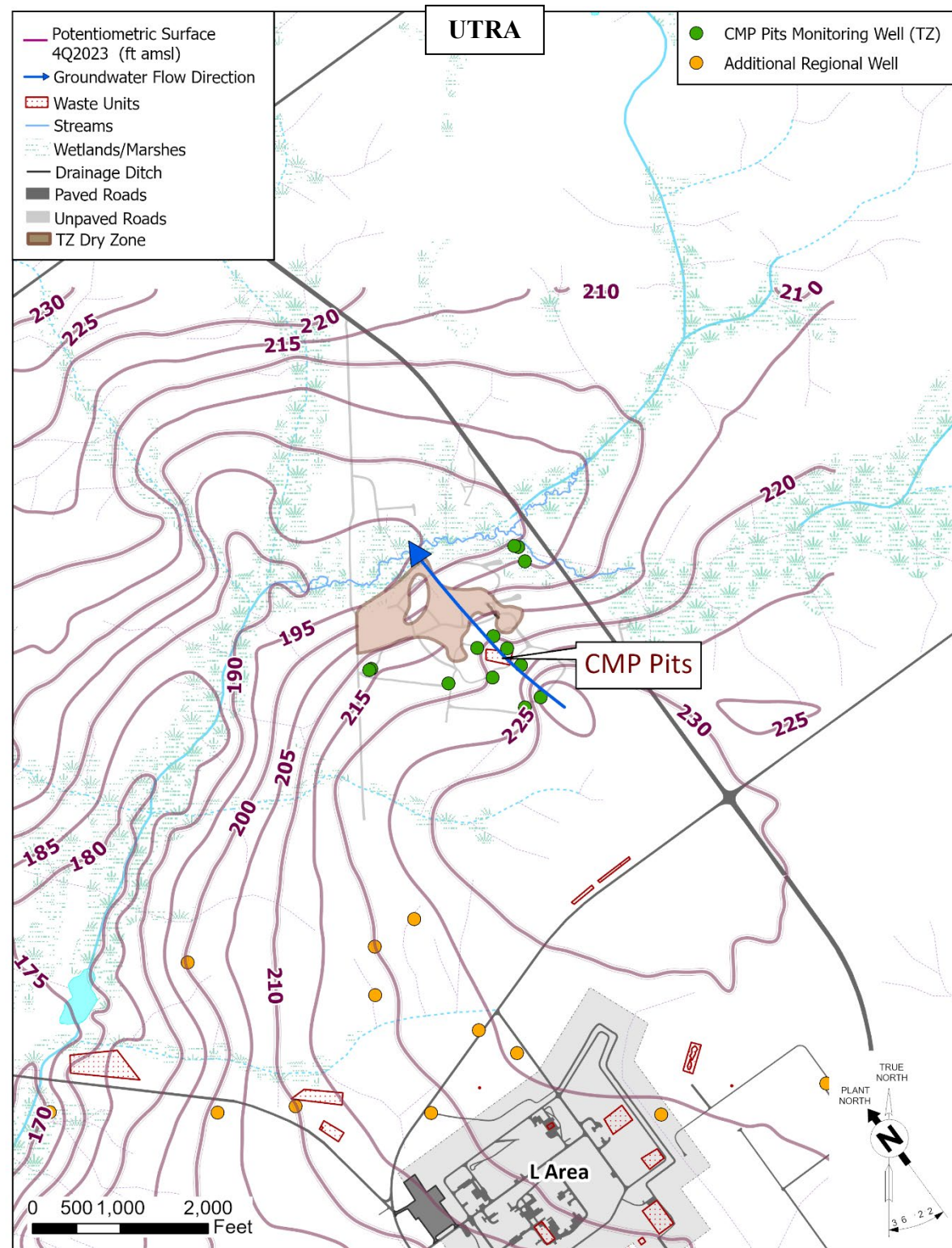


Figure 6. Regional Water Table and GA Potentiometric Surface

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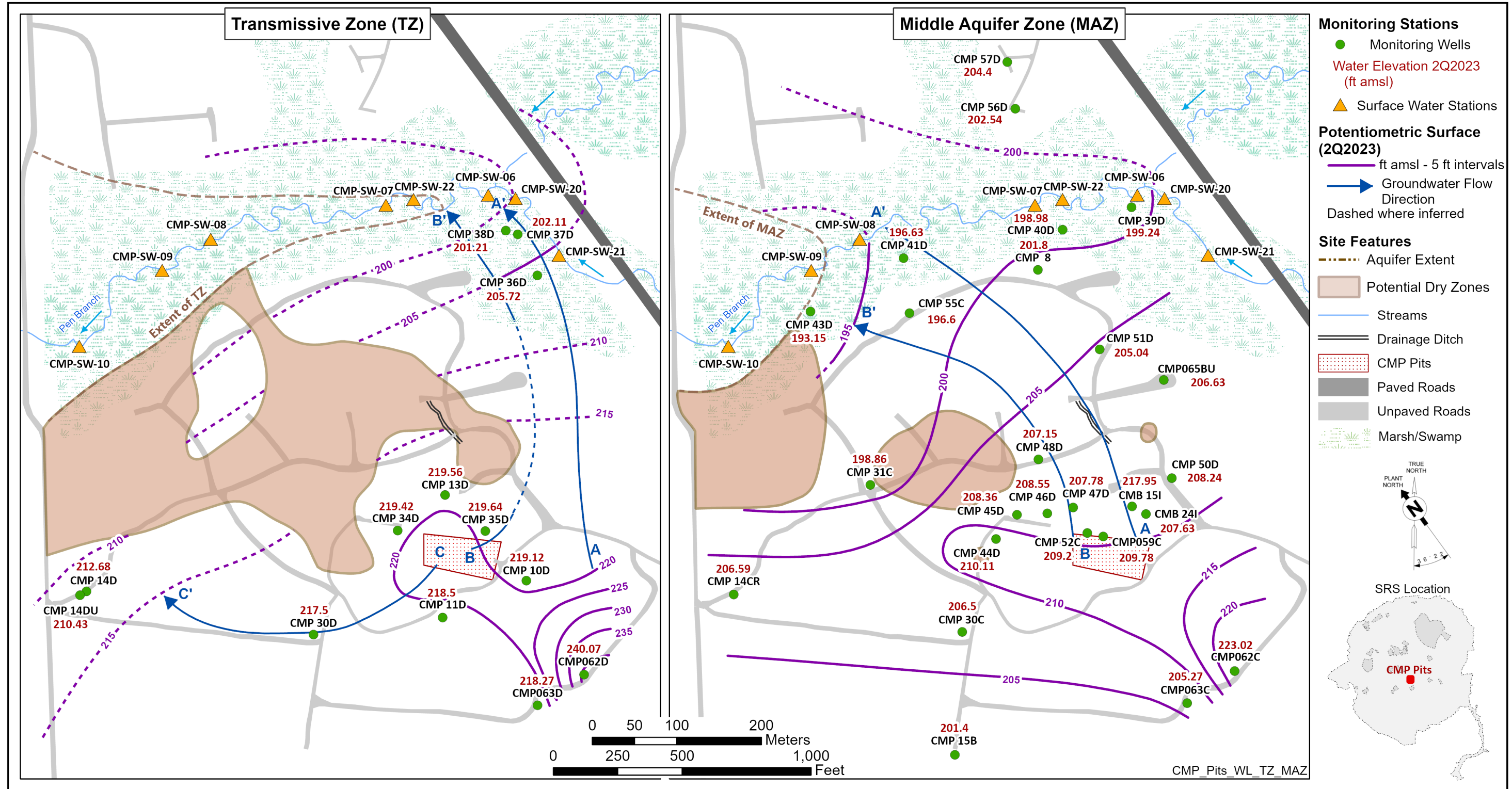


Figure 7. 2023 Potentiometric Surface for the TZ and MAZ

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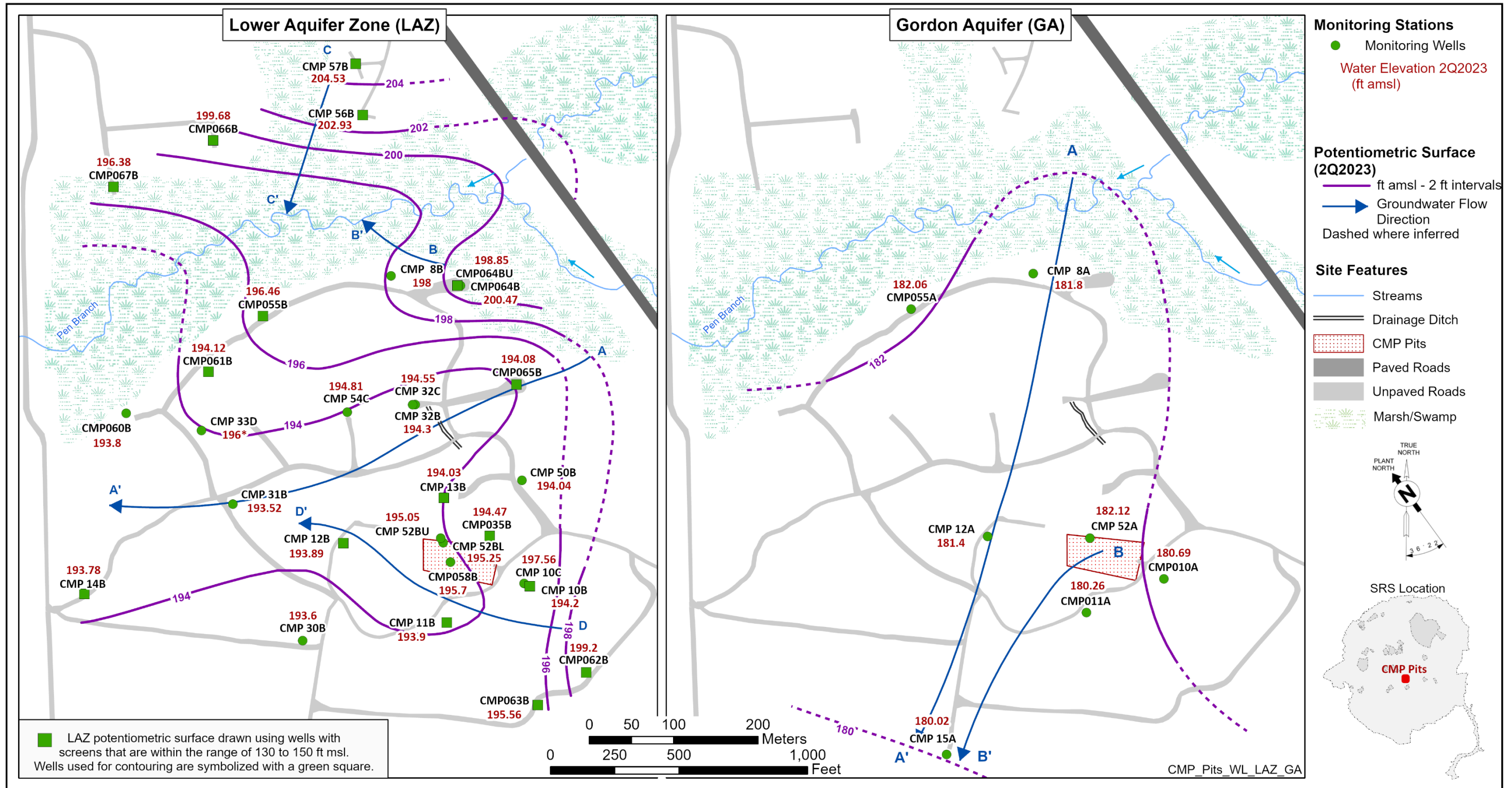


Figure 8. 2023 Potentiometric Surface for the LAZ and GA

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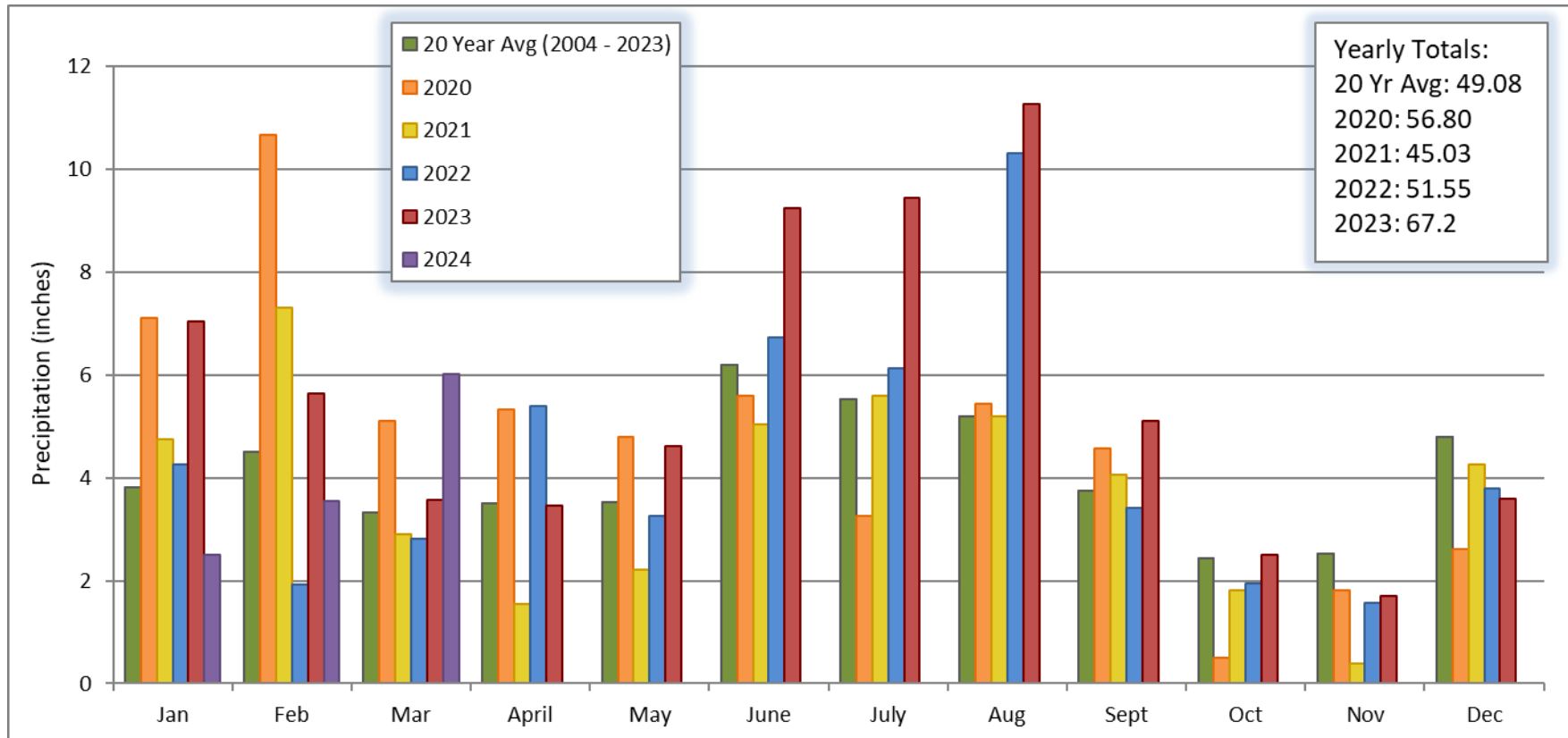


Figure 9. Monthly Rainfall Measurements in L-Area for 2024, 2023, 2022, 2021, 2020, and the 20-Year Average

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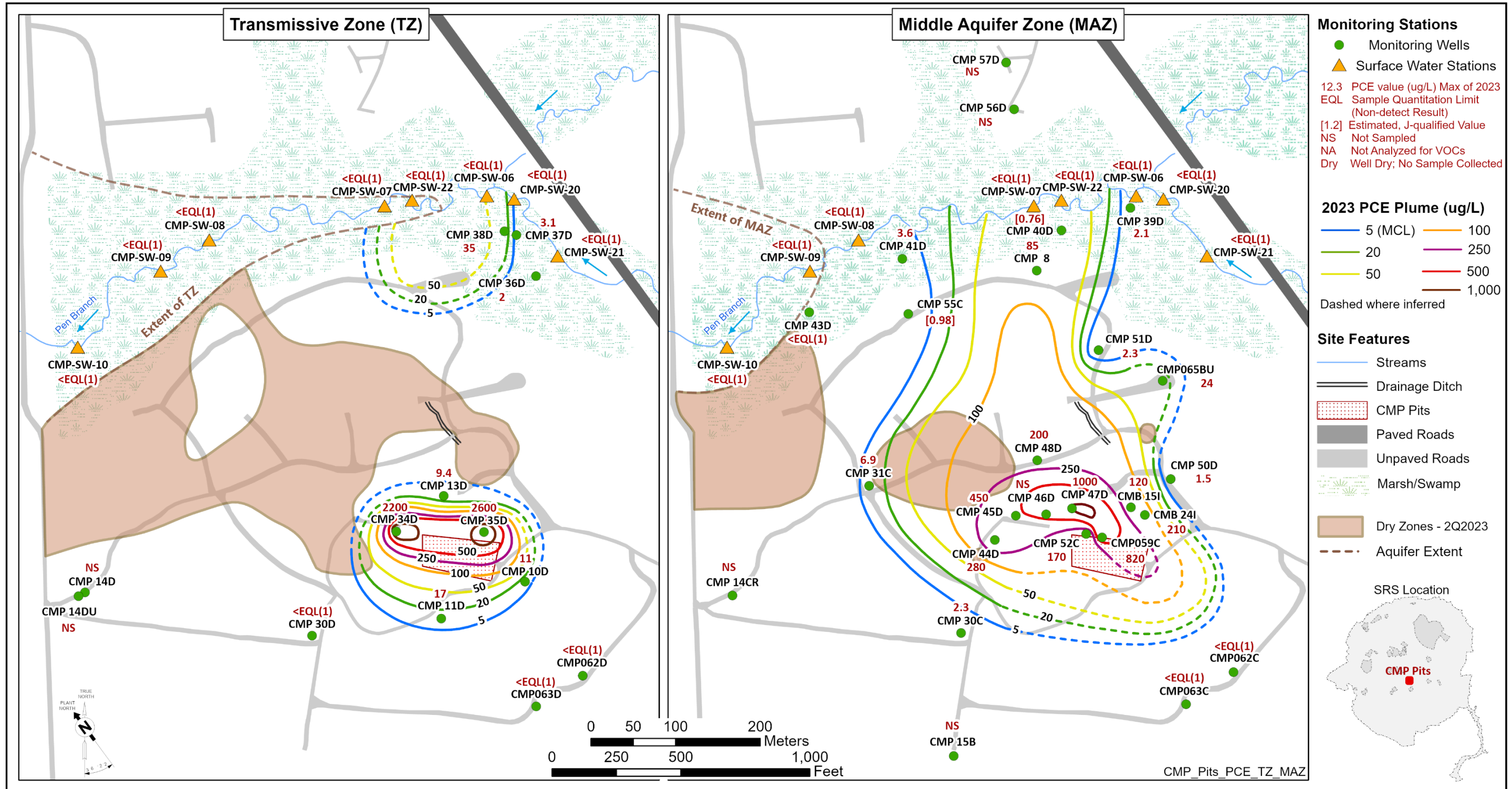


Figure 10. 2023 PCE Plume and Groundwater and Surface Water Results for the TZ and MAZ

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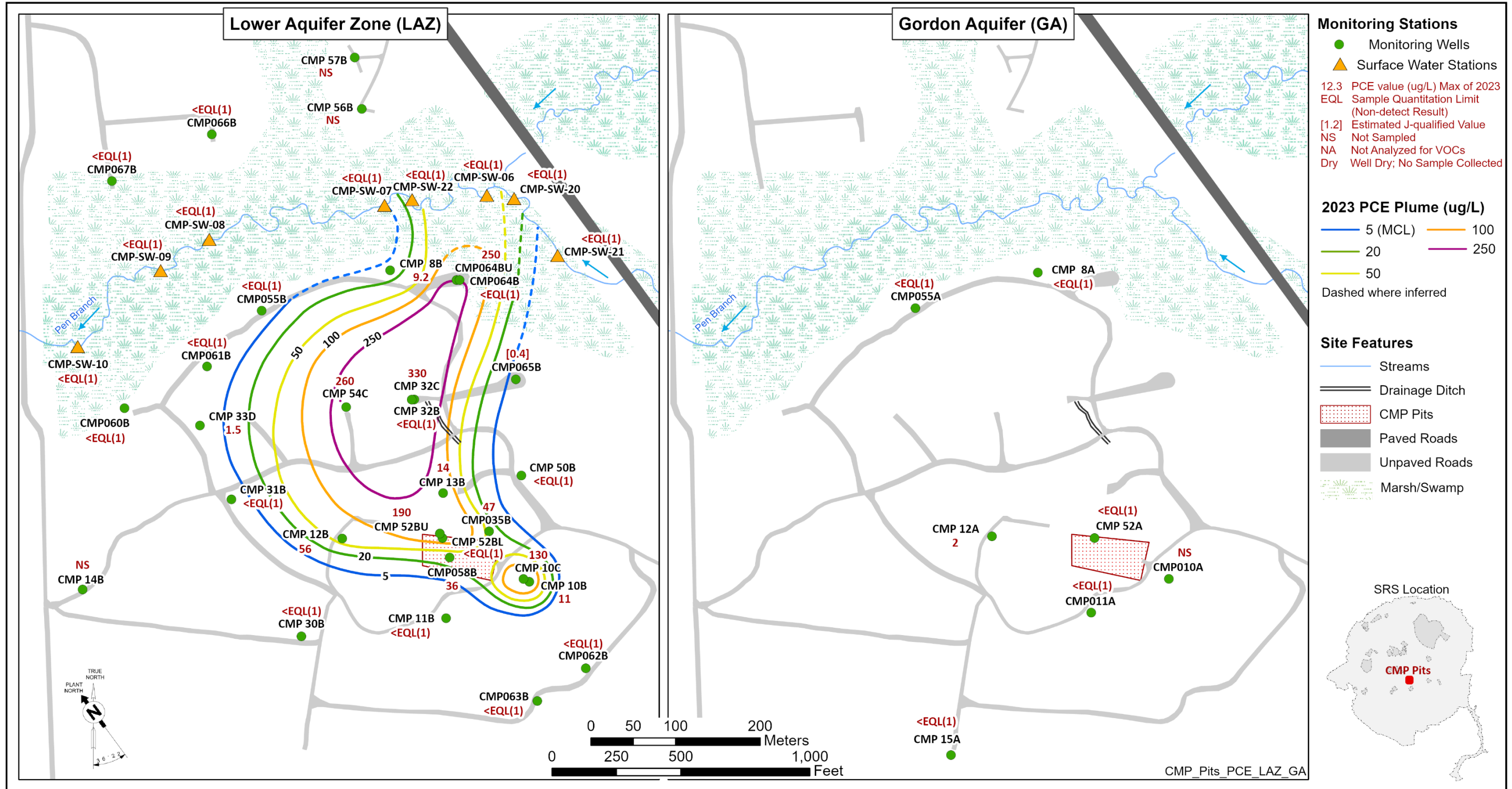


Figure 11. 2023 PCE Plume and Groundwater Results for the LAZ and GA

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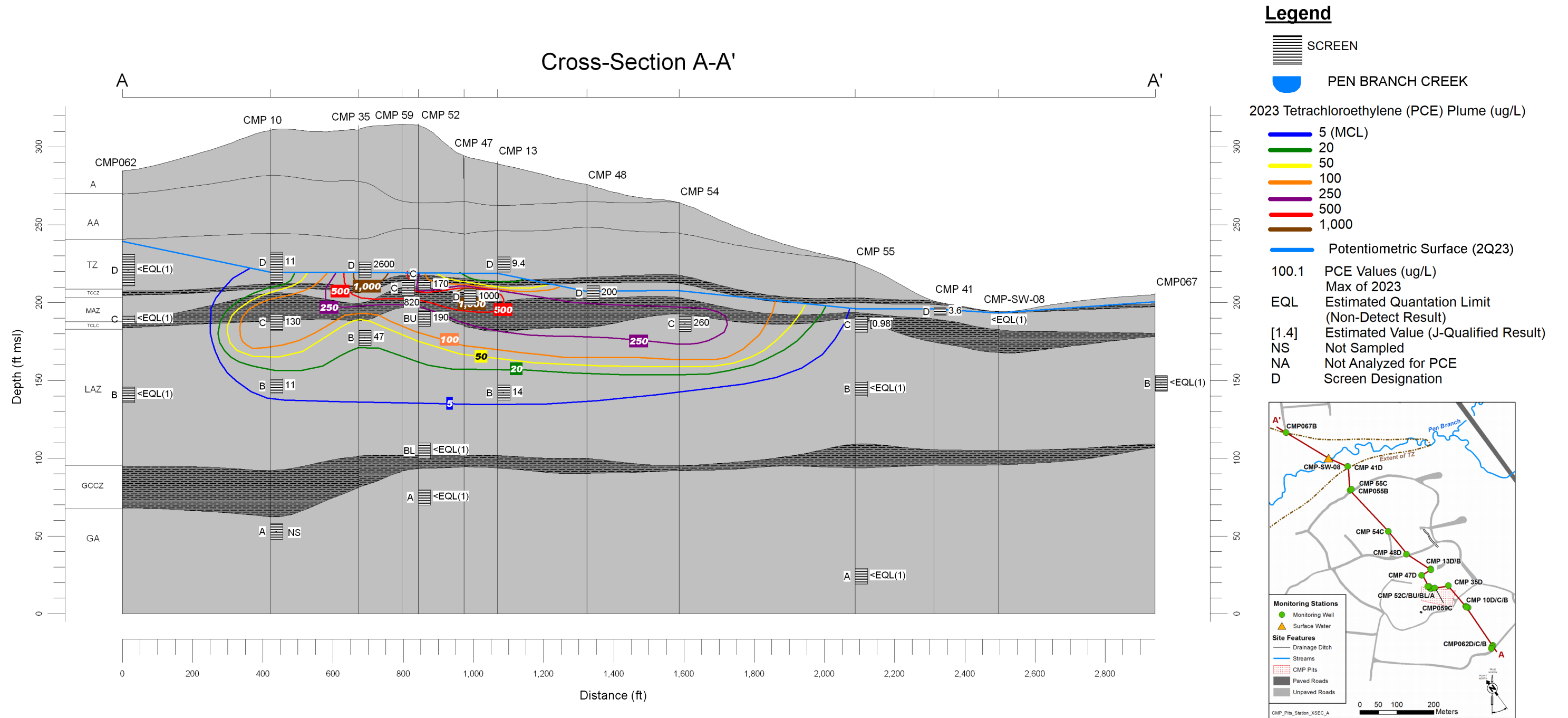


Figure 12. Cross Section A - A' at the CMP Pits OU Area with 2023 PCE Plume and Results

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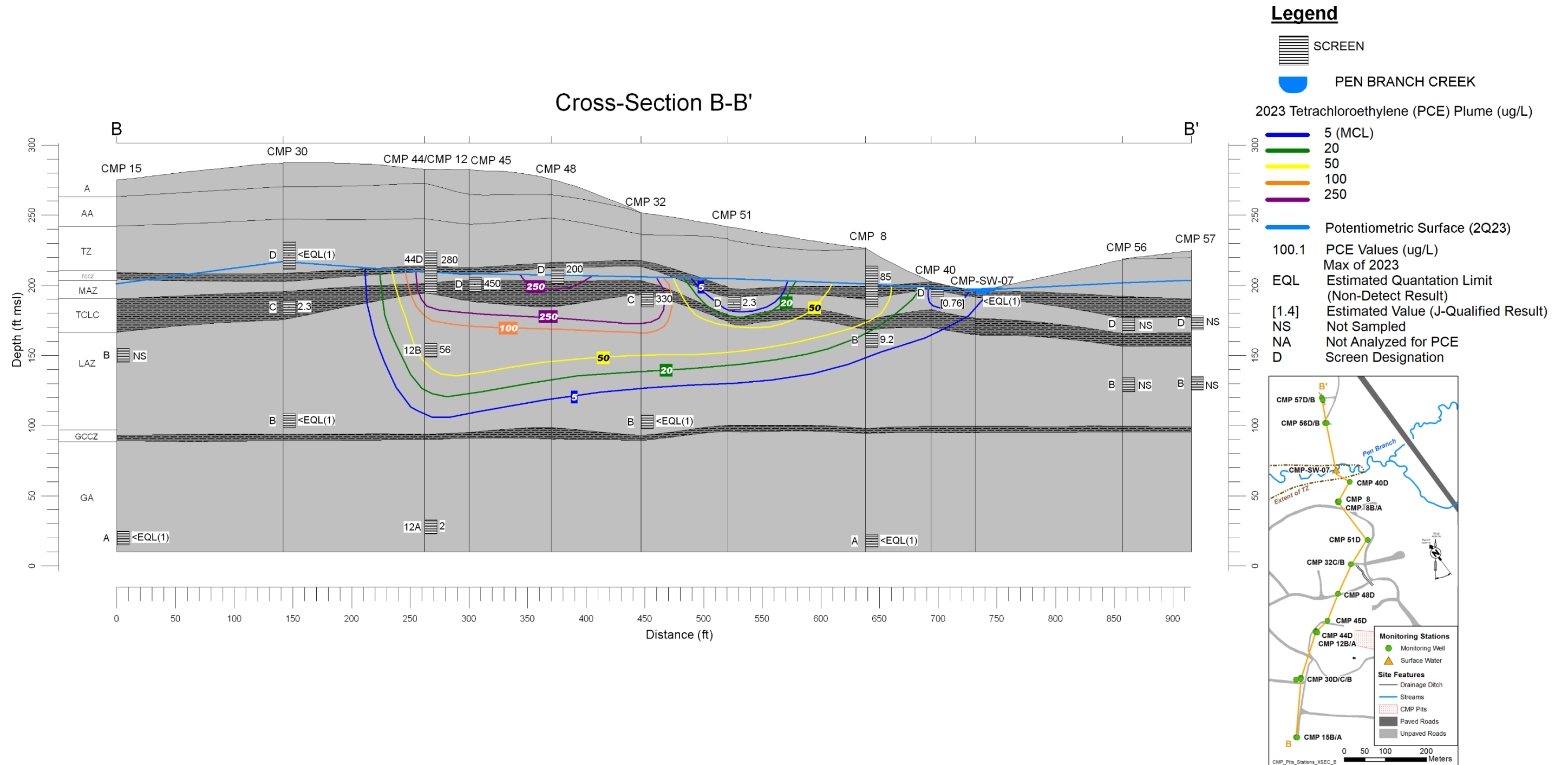


Figure 13. Cross Section B - B' at the CMP Pits OU Area with 2023 PCE Plume and Results

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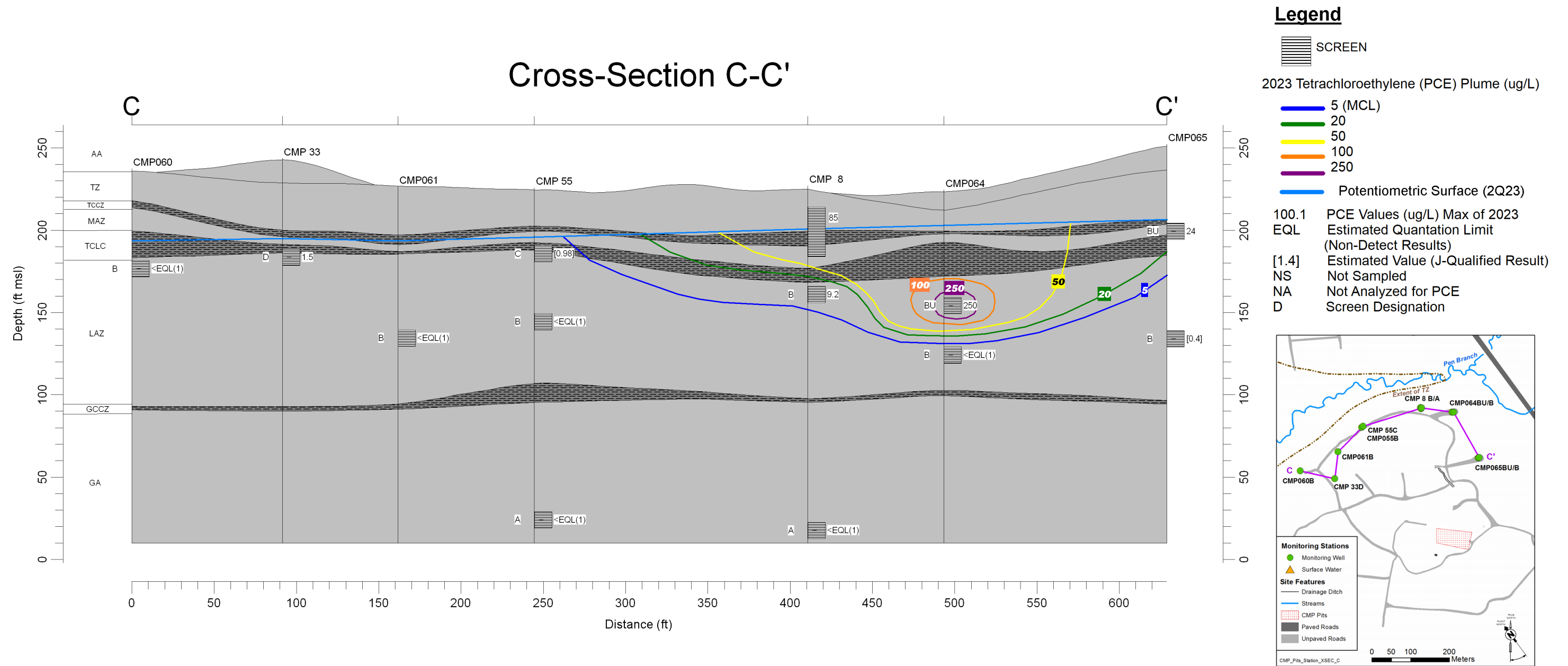


Figure 14. Cross Section C - C' at the CMP Pits OU Area with 2023 PCE Plume and Results

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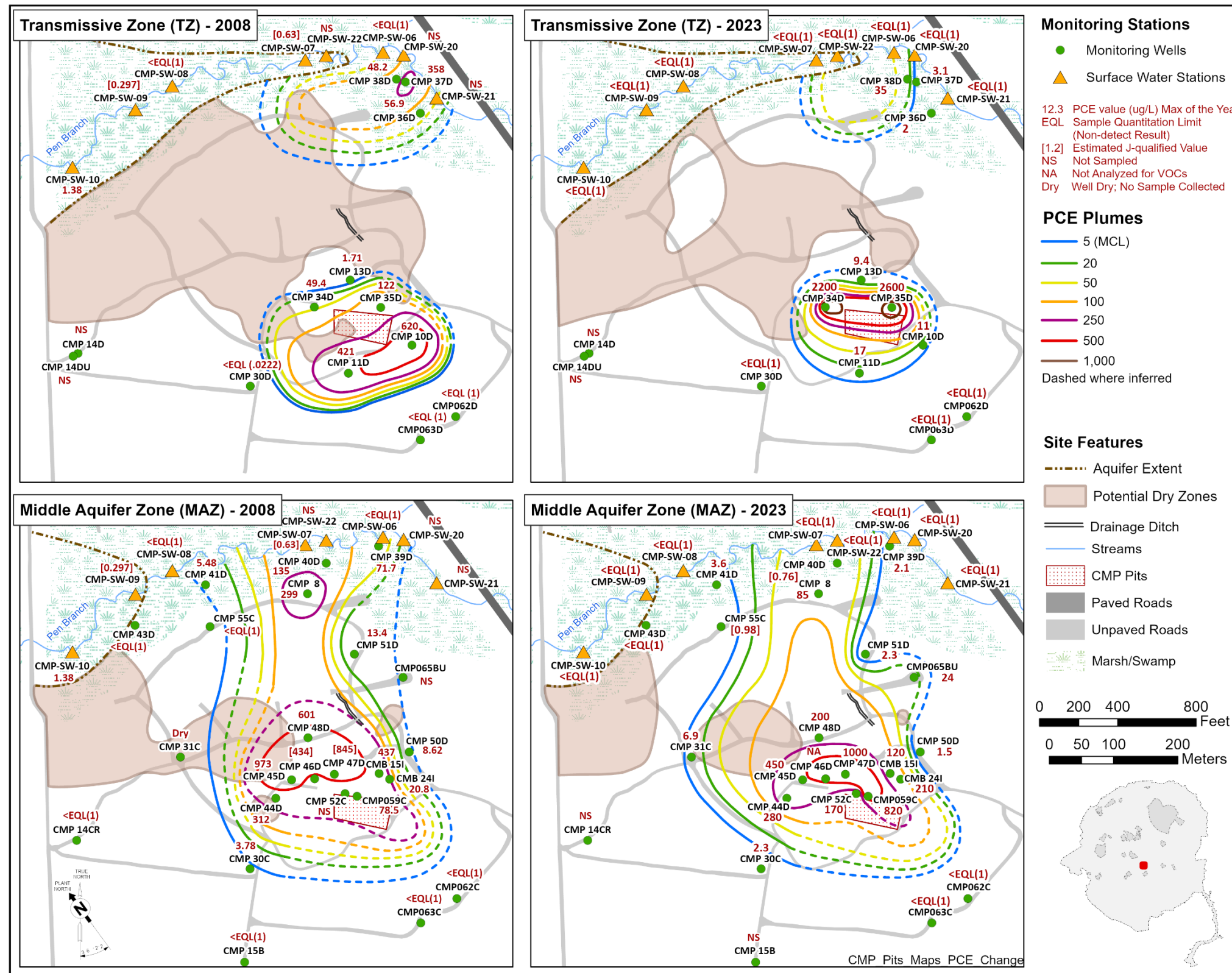


Figure 15. PCE Plume Comparison from 2008 and 2023 in the TZ and MAZ

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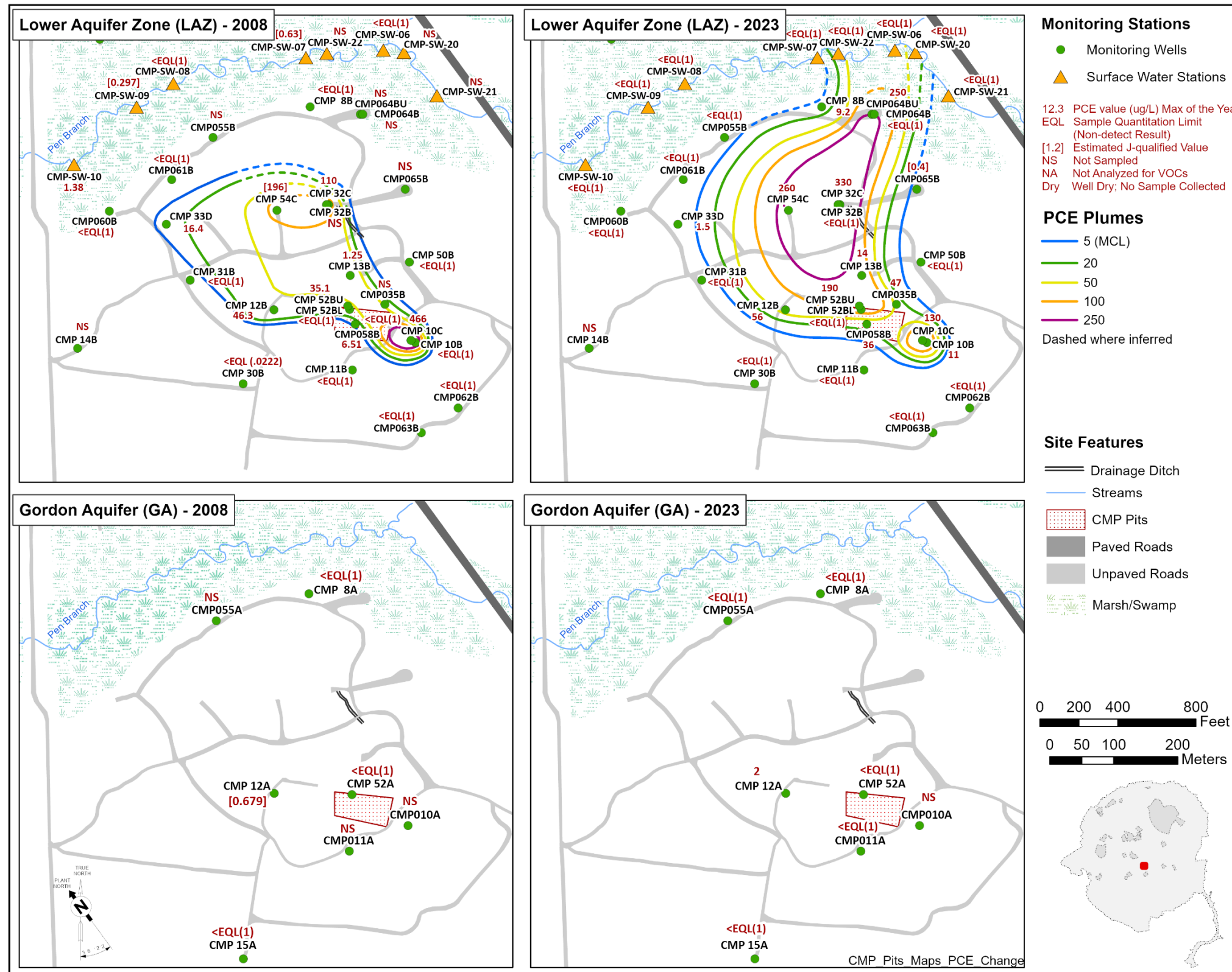


Figure 16. PCE Plume Comparison from 2008 and 2023 in the LAZ and GA

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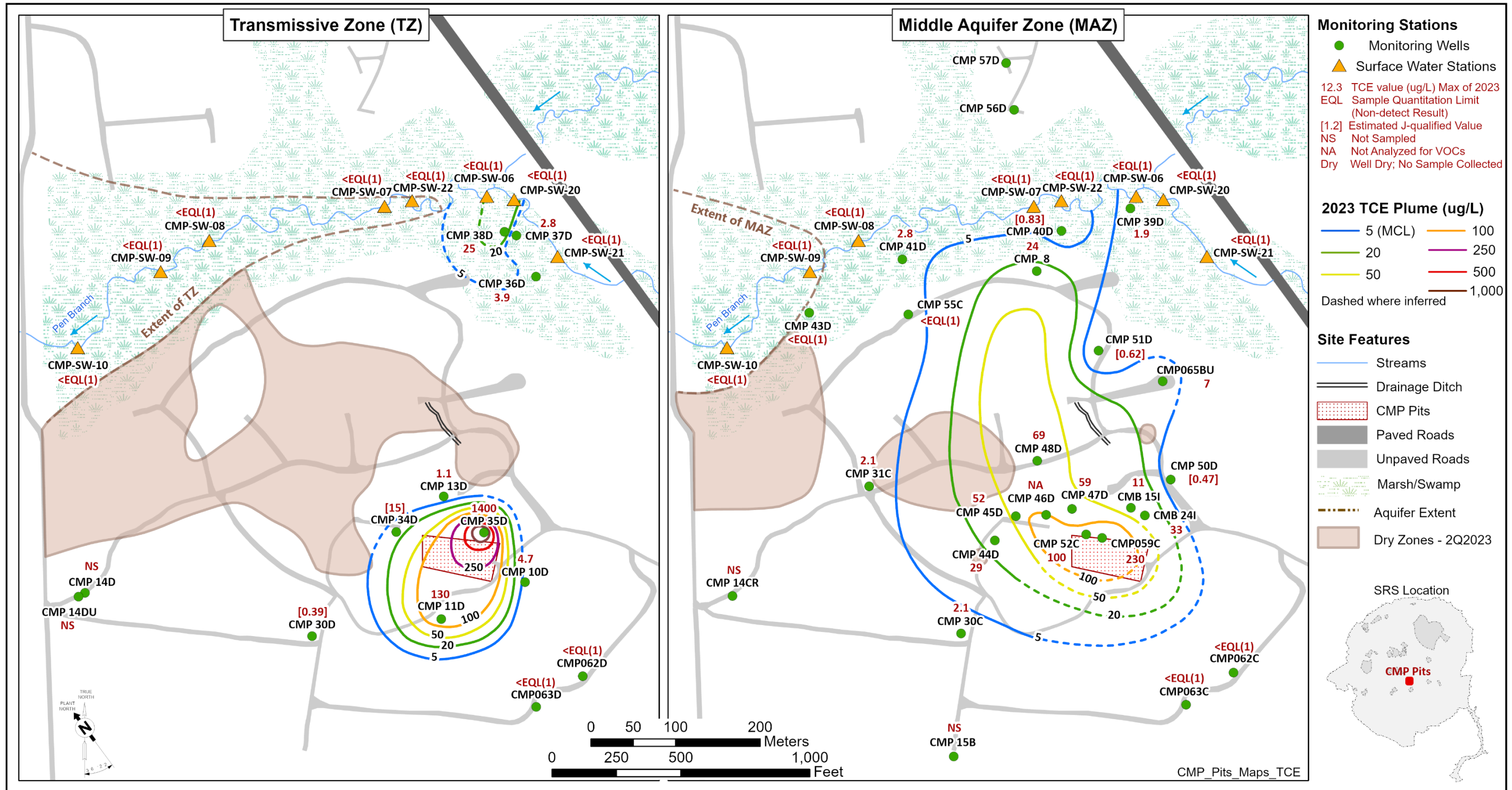


Figure 17. 2023 TCE Plume and Groundwater and Surface Water Results in the TZ and MAZ

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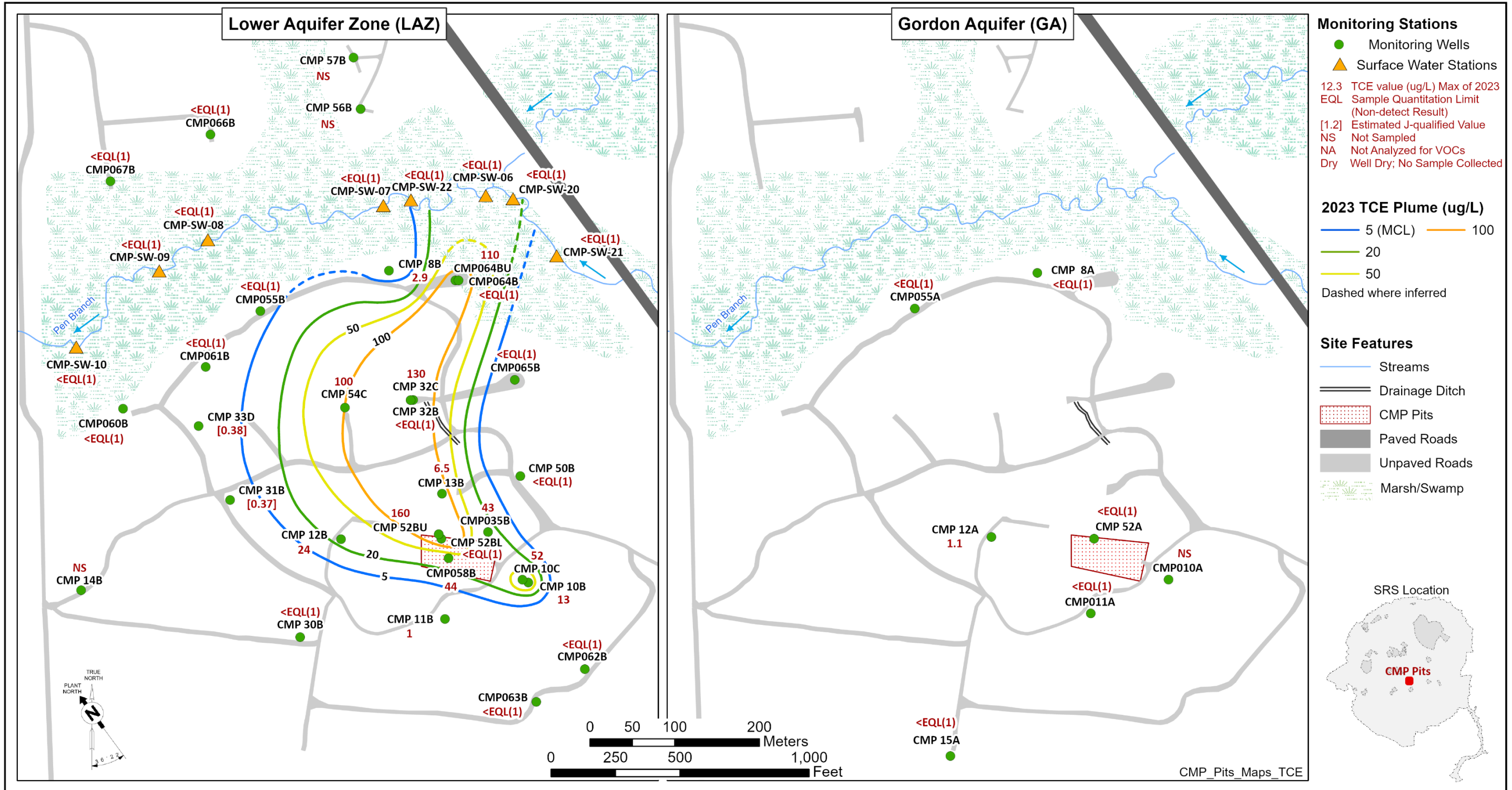


Figure 18. 2023 TCE Plume and Groundwater Results for the LAZ and GA

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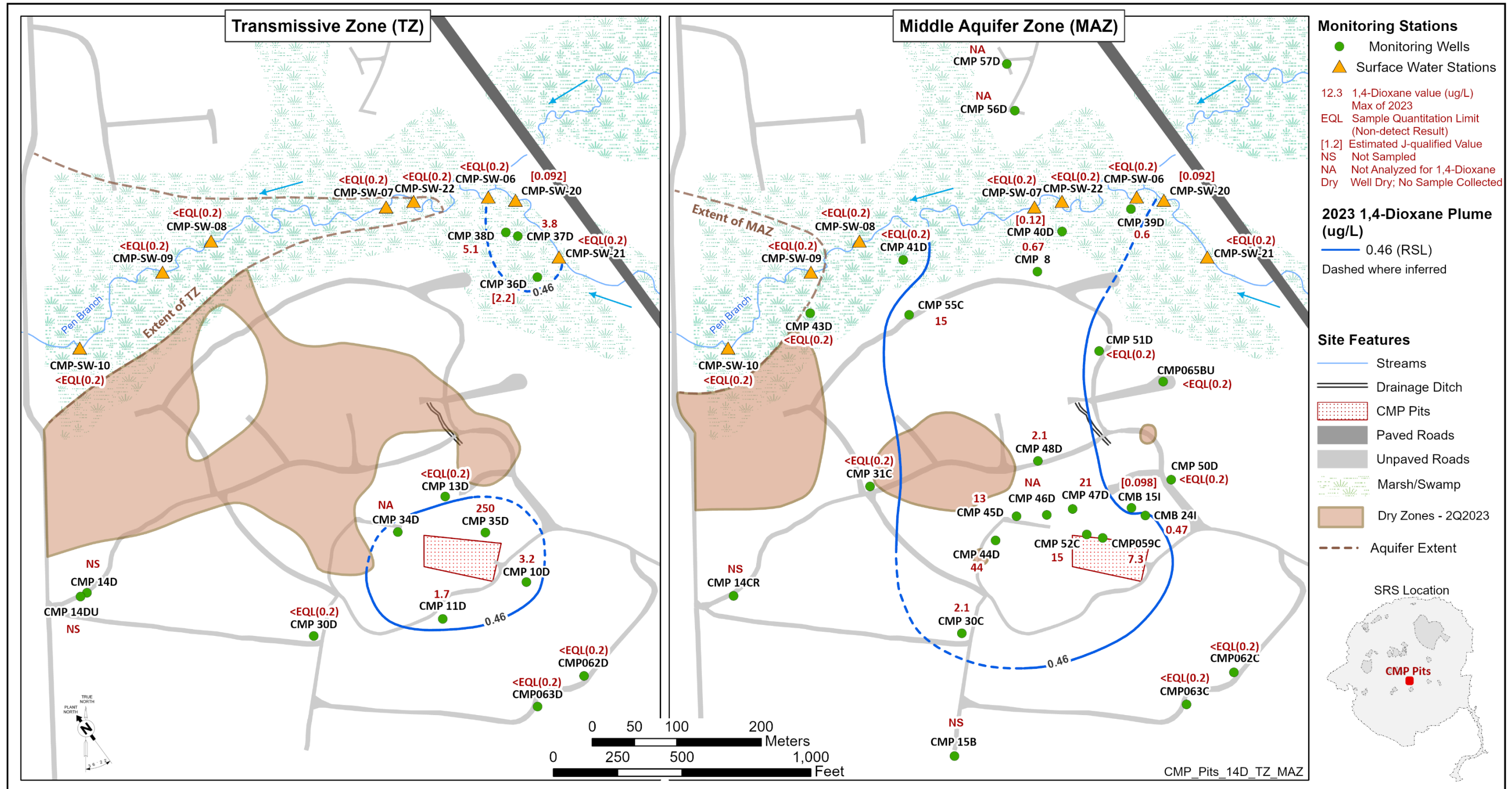
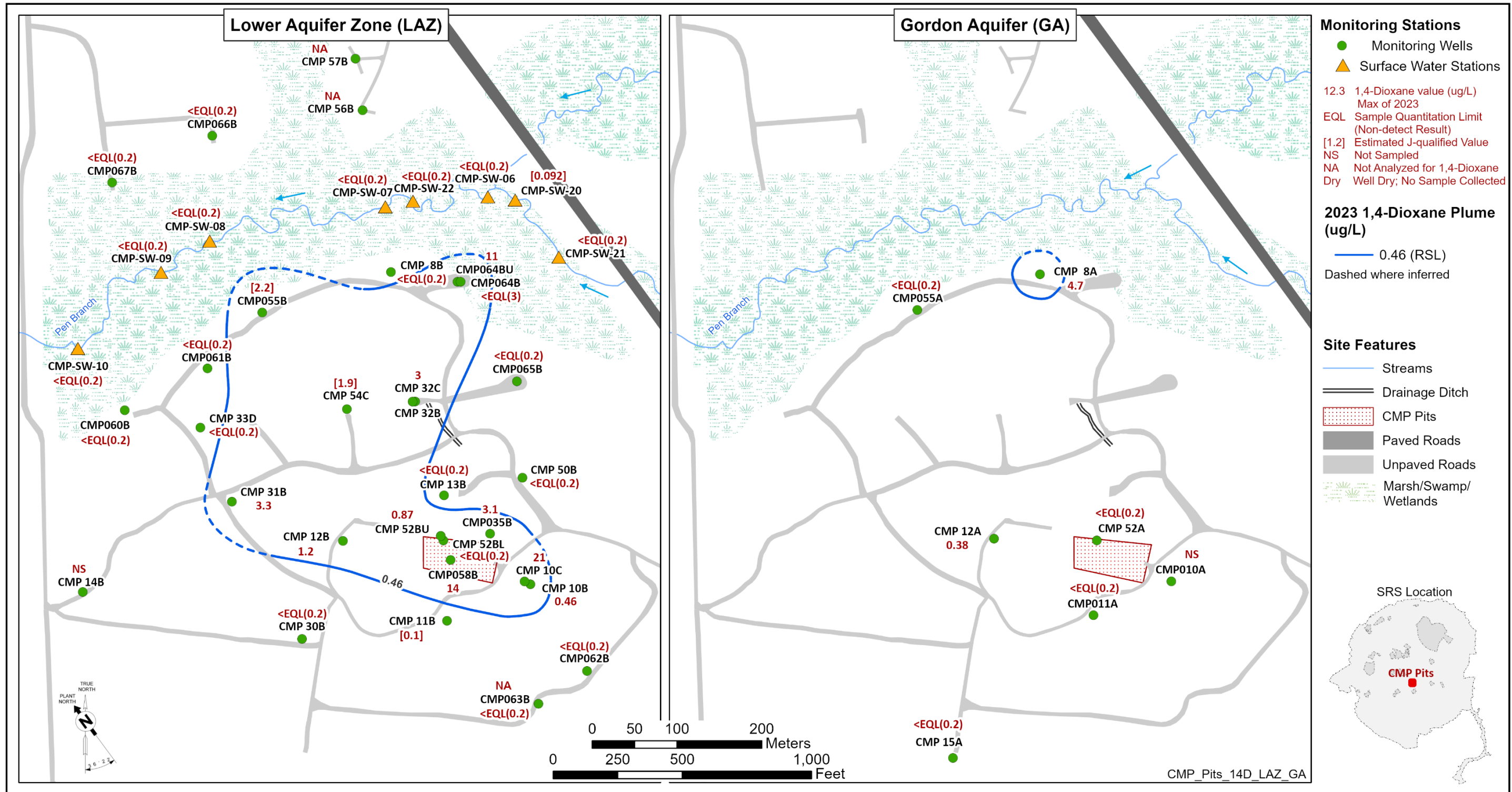


Figure 19. 2023 1,4-Dioxane Plume and Groundwater Results for the TZ and MAZ

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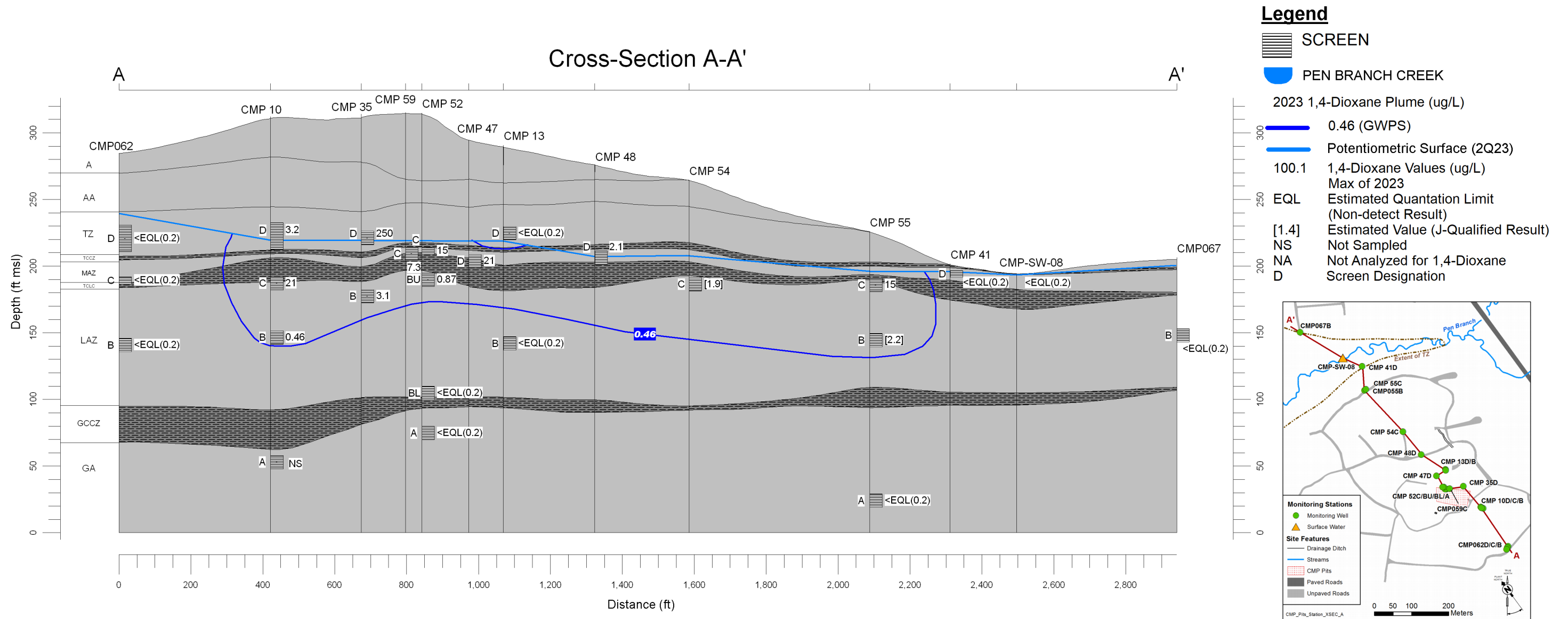


Figure 21. Cross Section A - A' at the CMP Pits OU Area with 2023 1,4-Dioxane Plume and Results

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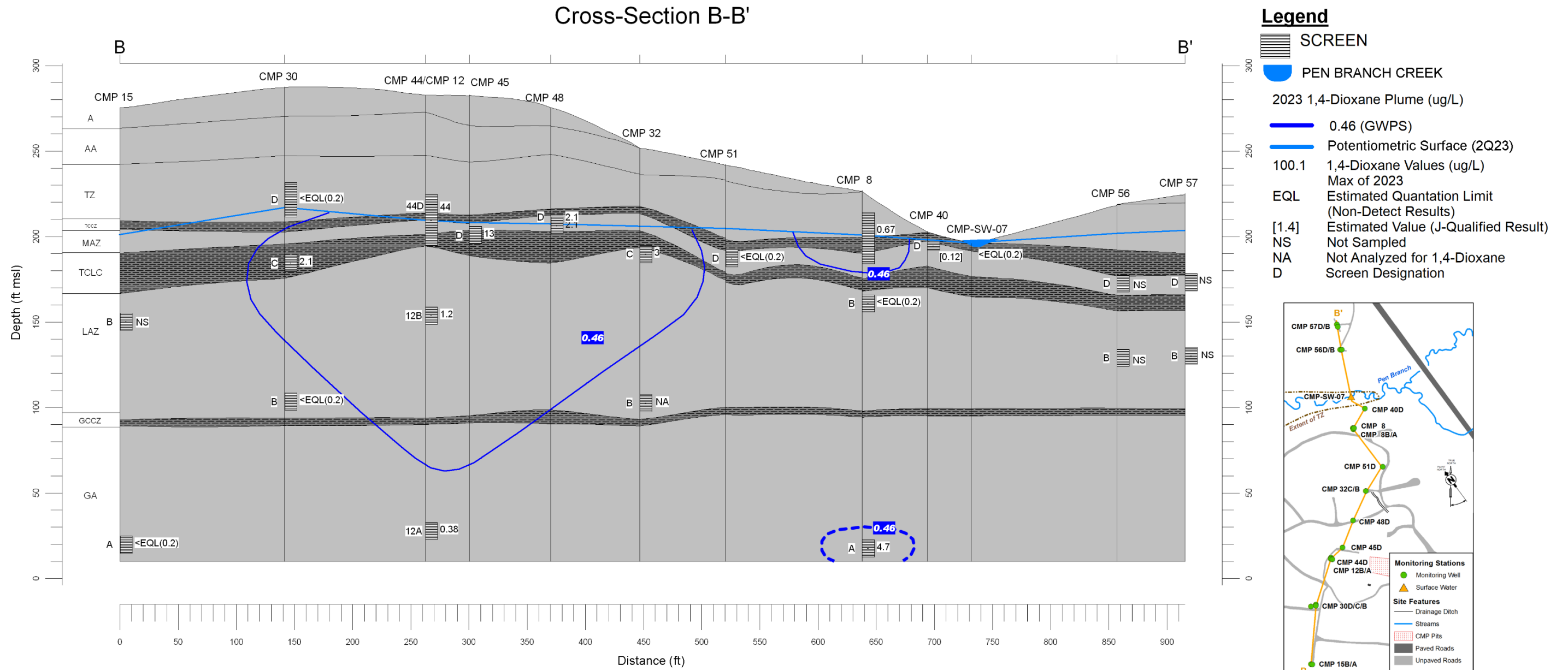


Figure 22. Cross Section B - B' at the CMP Pits OU Area with 2023 1,4-Dioxane Plume and Results

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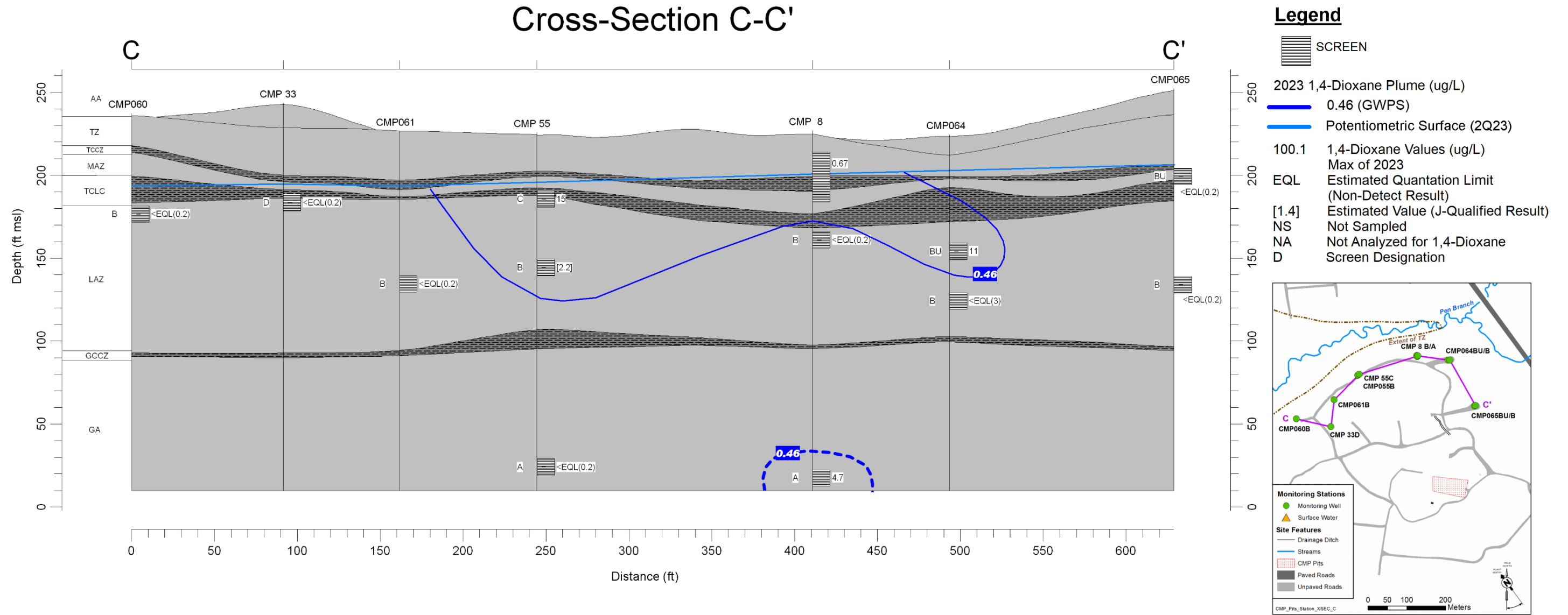


Figure 23. Cross Section C - C' at the CMP Pits OU Area with 2023 1,4-Dioxane Plume and Results

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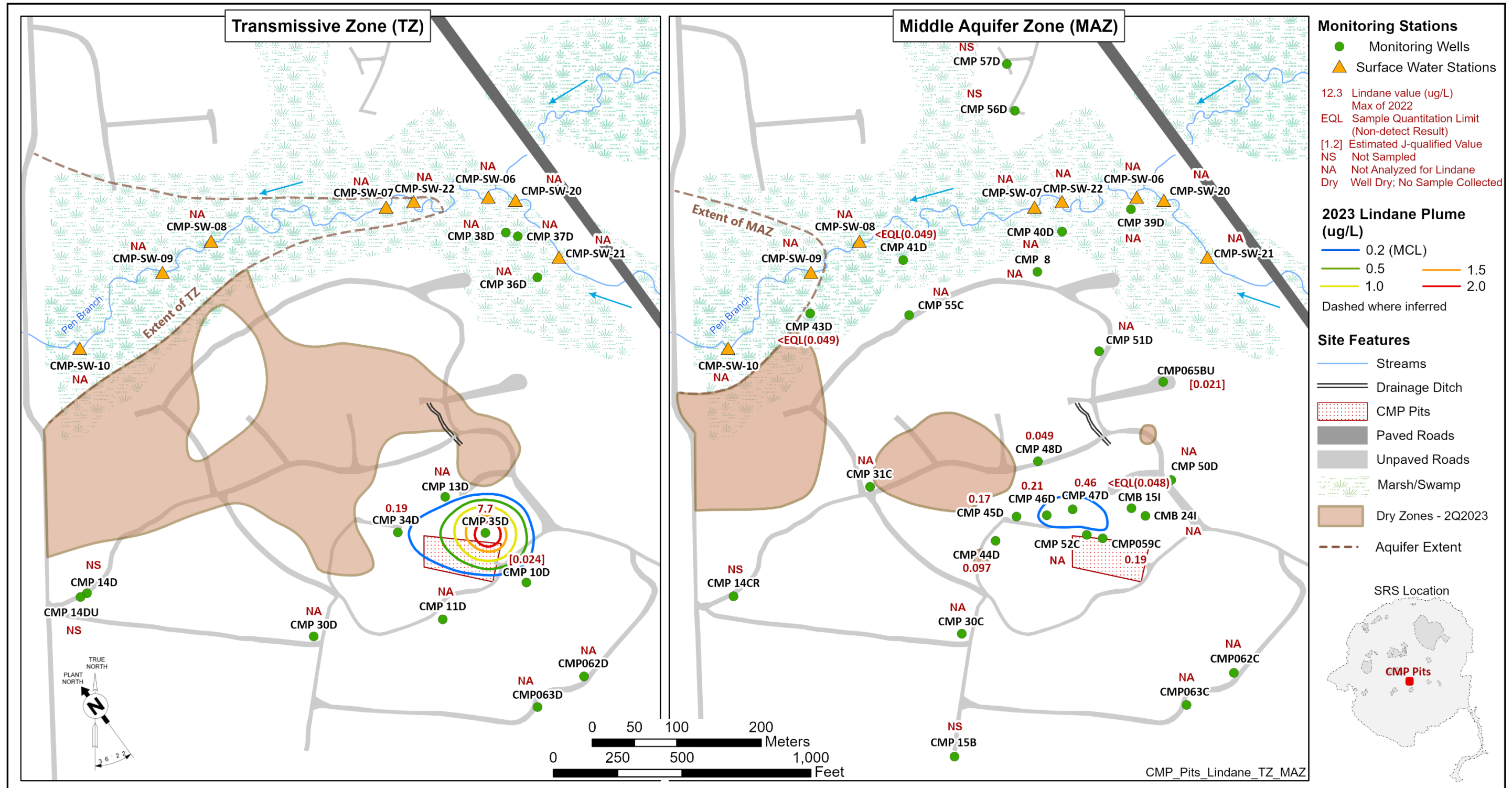


Figure 24. 2023 Lindane Plume and Groundwater Results for the TZ and MAZ

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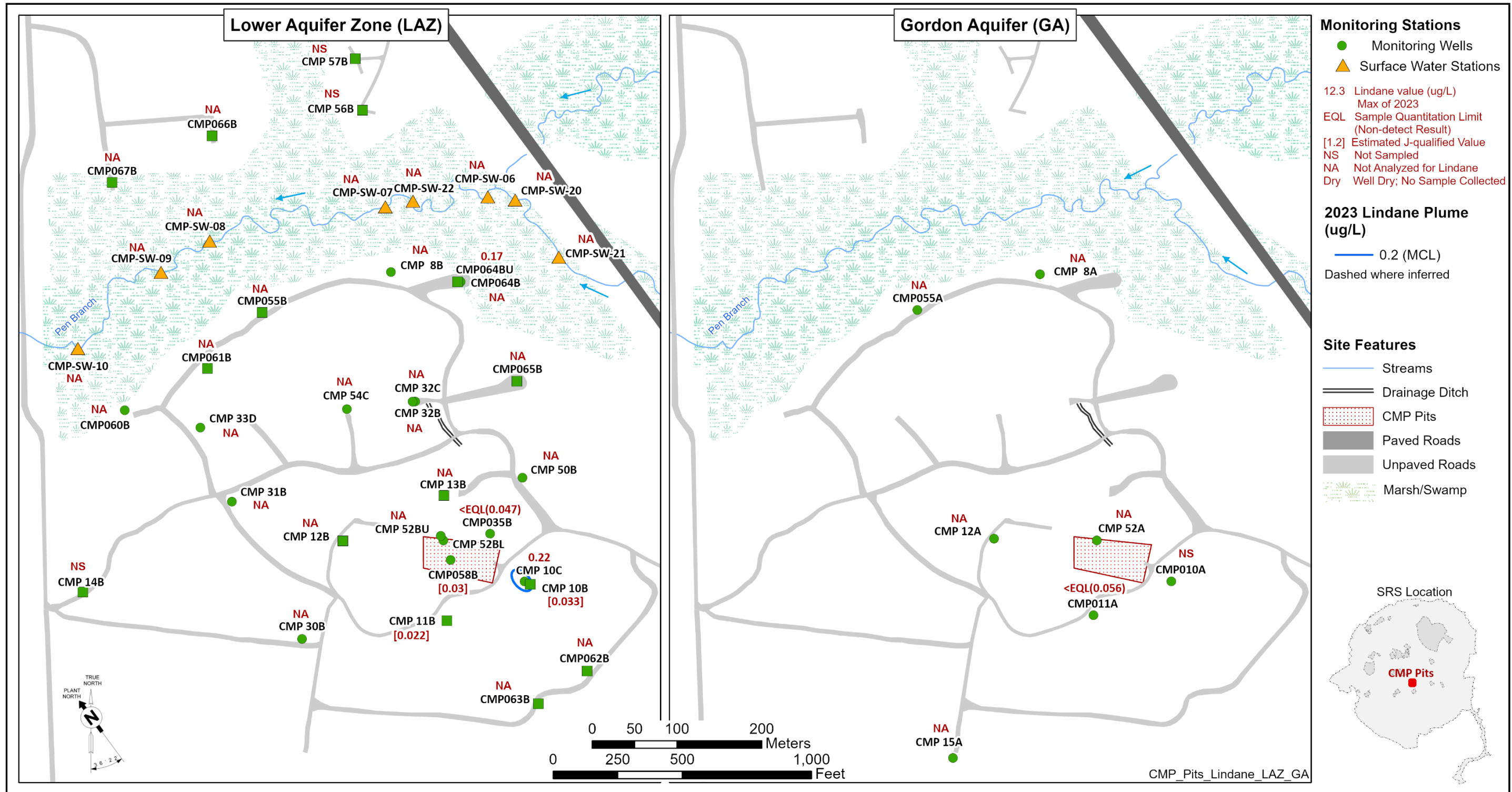
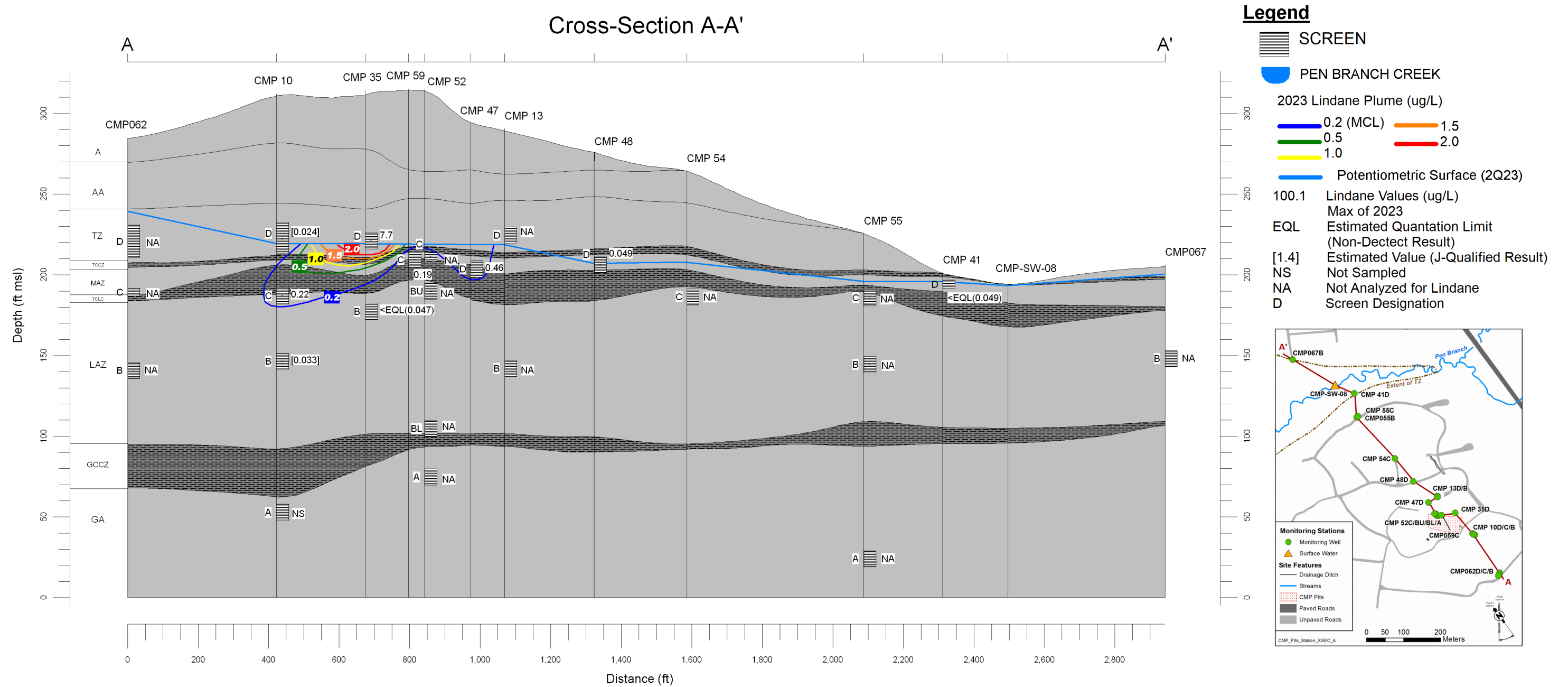


Figure 25. 2023 Lindane Plume and Groundwater Results for the LAZ and GA

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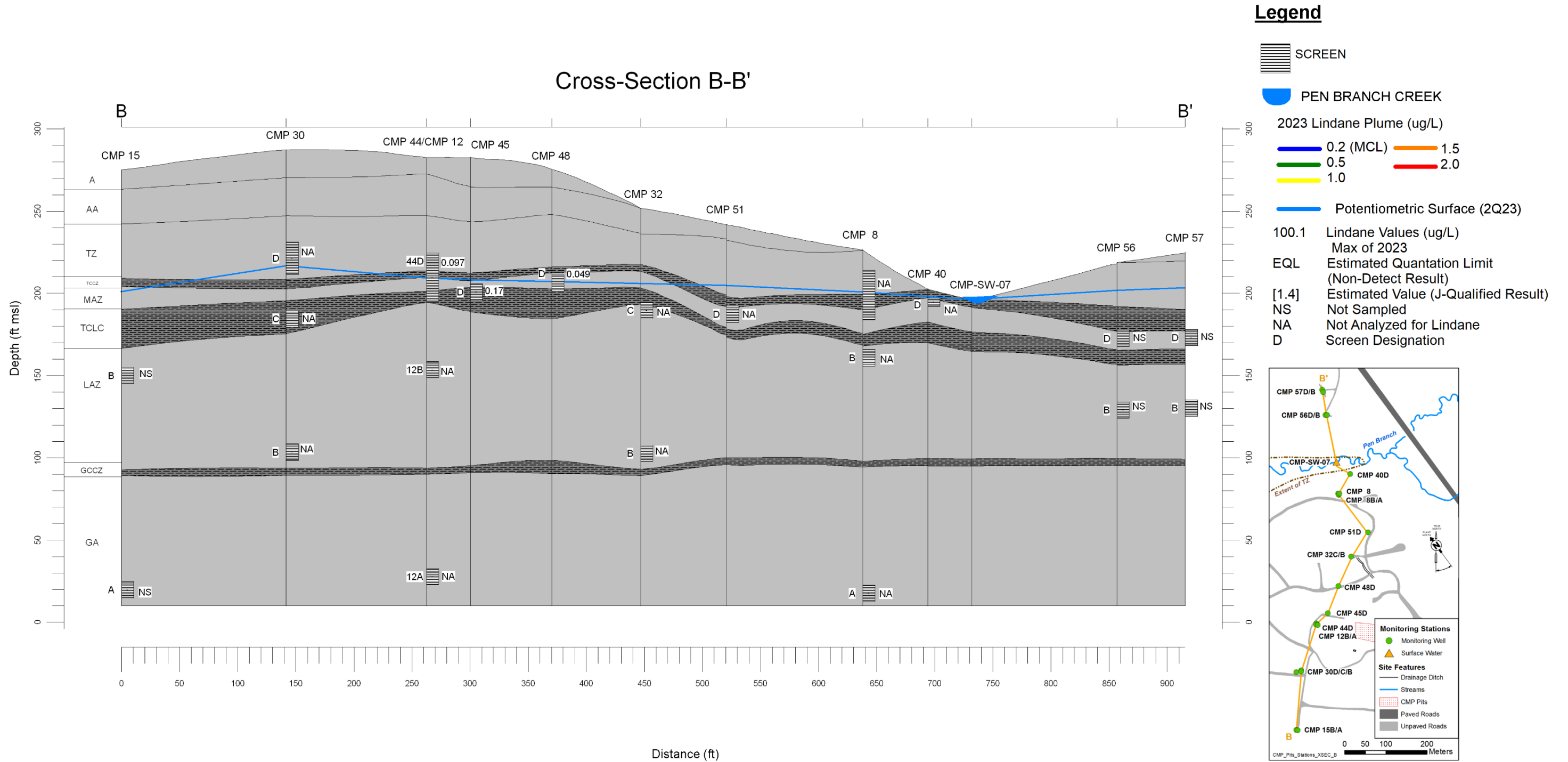


Figure 27. Cross Section B - B' at the CMP Pits OU Area with 2023 Lindane Plume and Results

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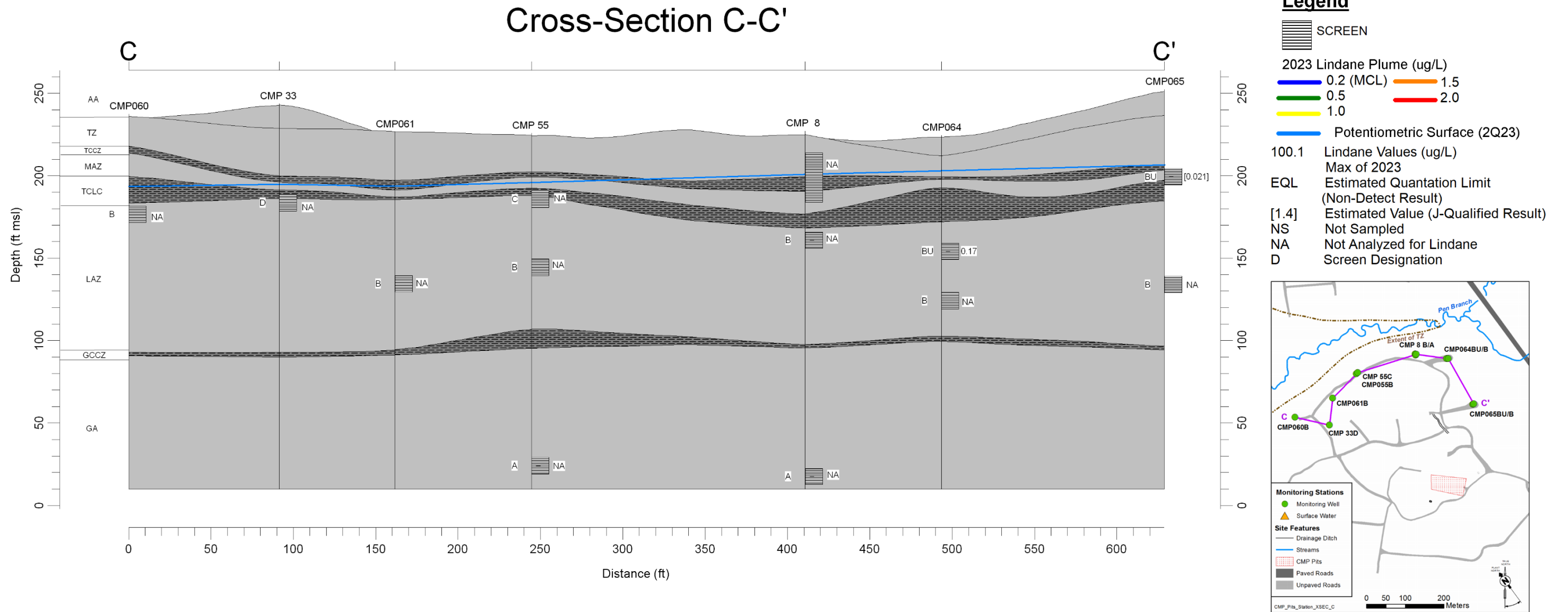


Figure 28. Cross Section C - C' at the CMP Pits OU Area with 2023 Lindane Plume and Results

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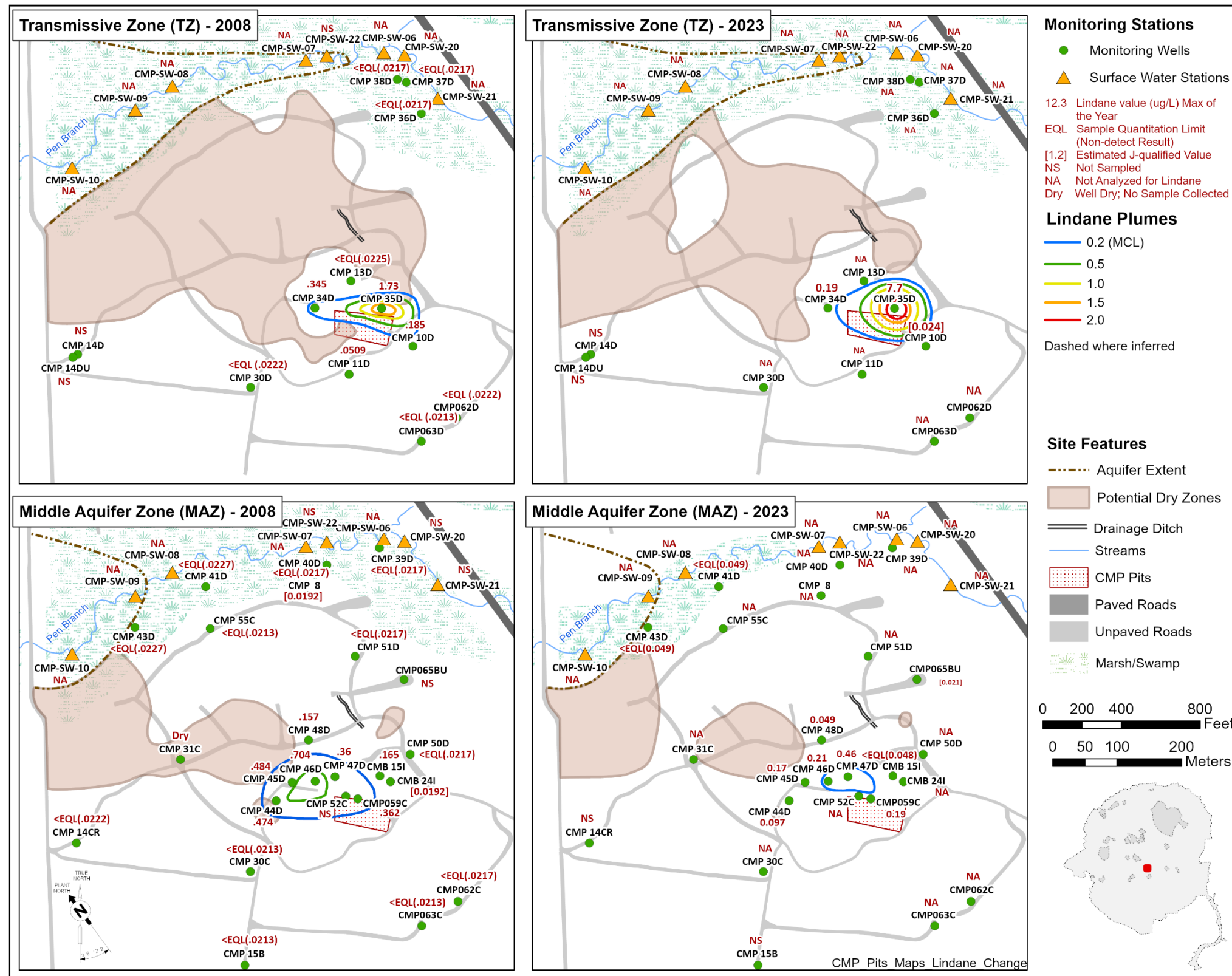


Figure 29. Lindane Plume Comparison from 2008 and 2023 in the TZ and MAZ

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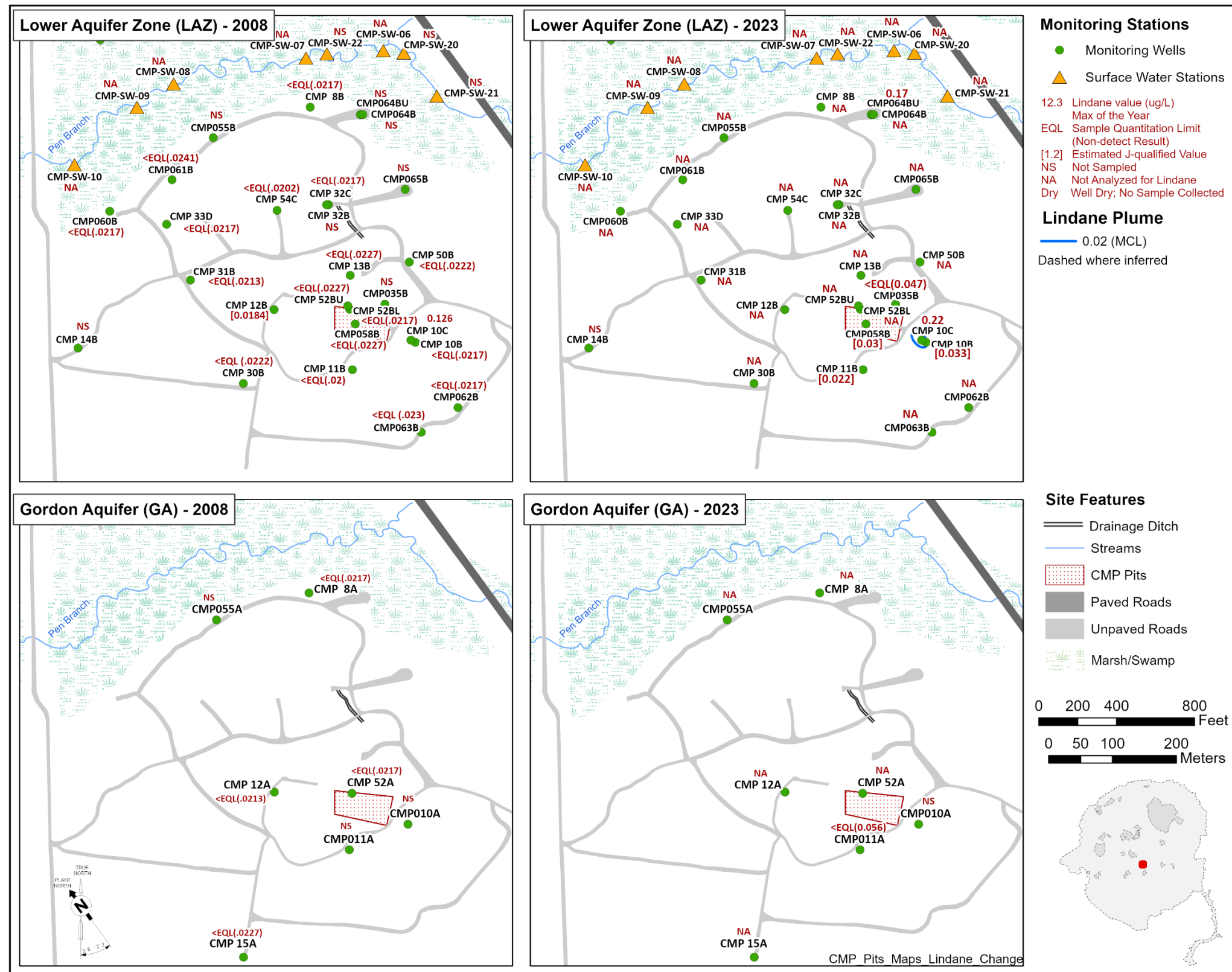


Figure 30. Lindane Plume Comparison from 2008 and 2023 in the LAZ and GA

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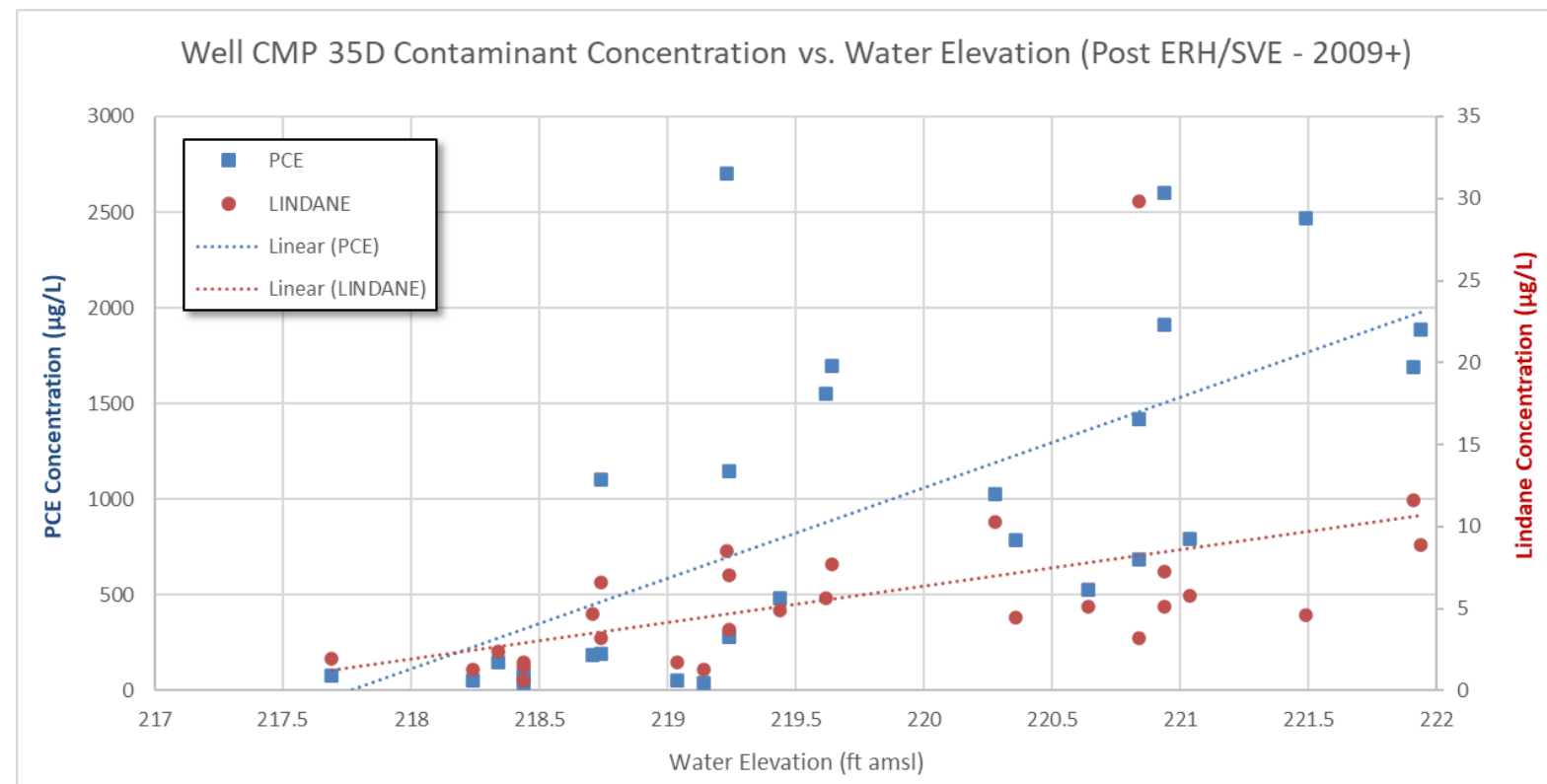
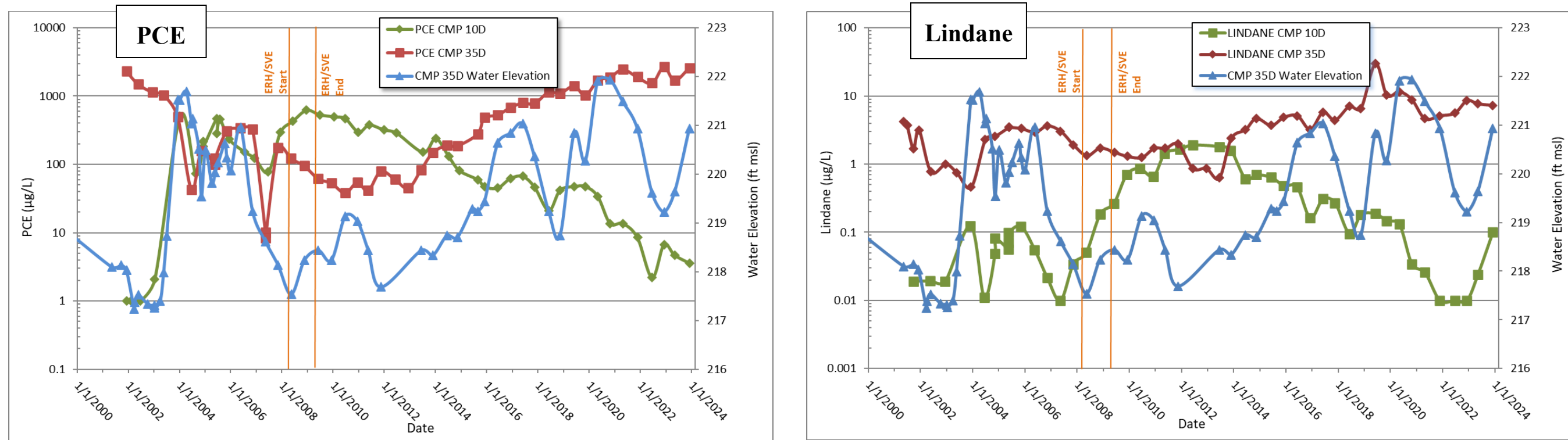
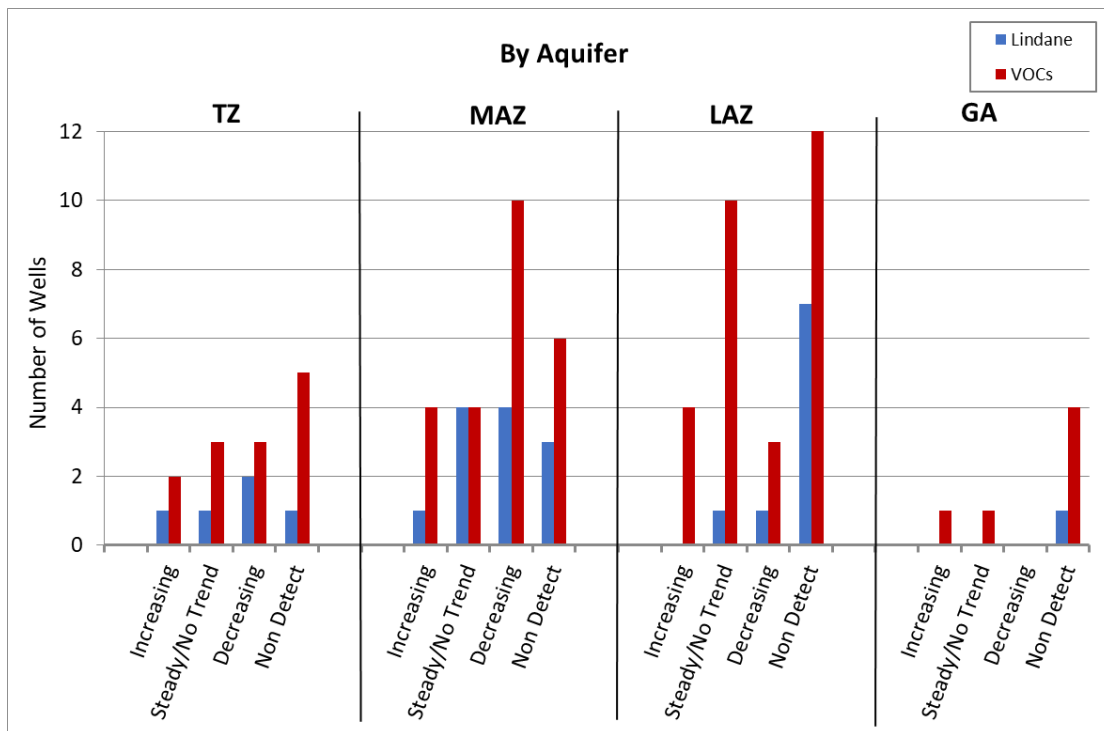
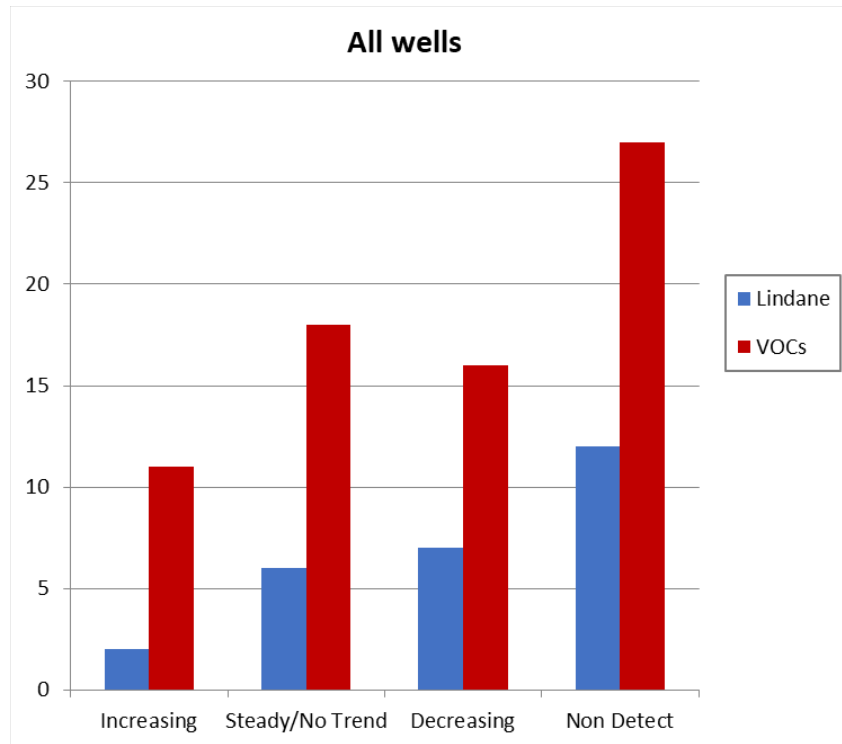


Figure 31. Comparison of PCE and Lindane Trends in CMP 10D and CMP 35D

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Identification of the wells trend type can be found on the “Trends” tab in the Excel file (CMP\_EMR\_2023\_Table3\_Figure32) located on the CD supplied with this report and in the electronic submission.

**Figure 32. Contaminant Concentration Well Trends and Well Trends by Aquifer**

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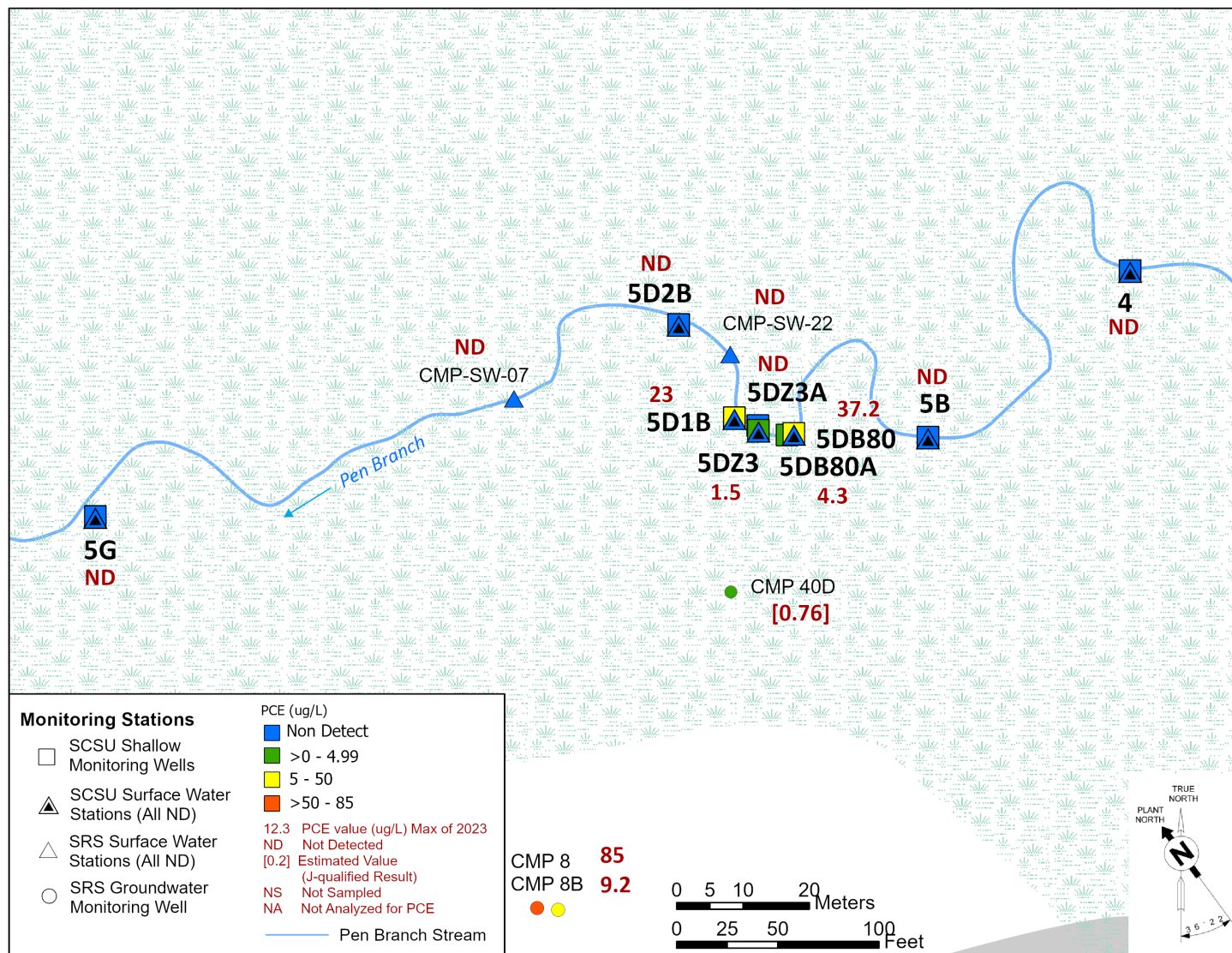


Figure 33. SCSU 2023 PCE Groundwater and Surface Water Results

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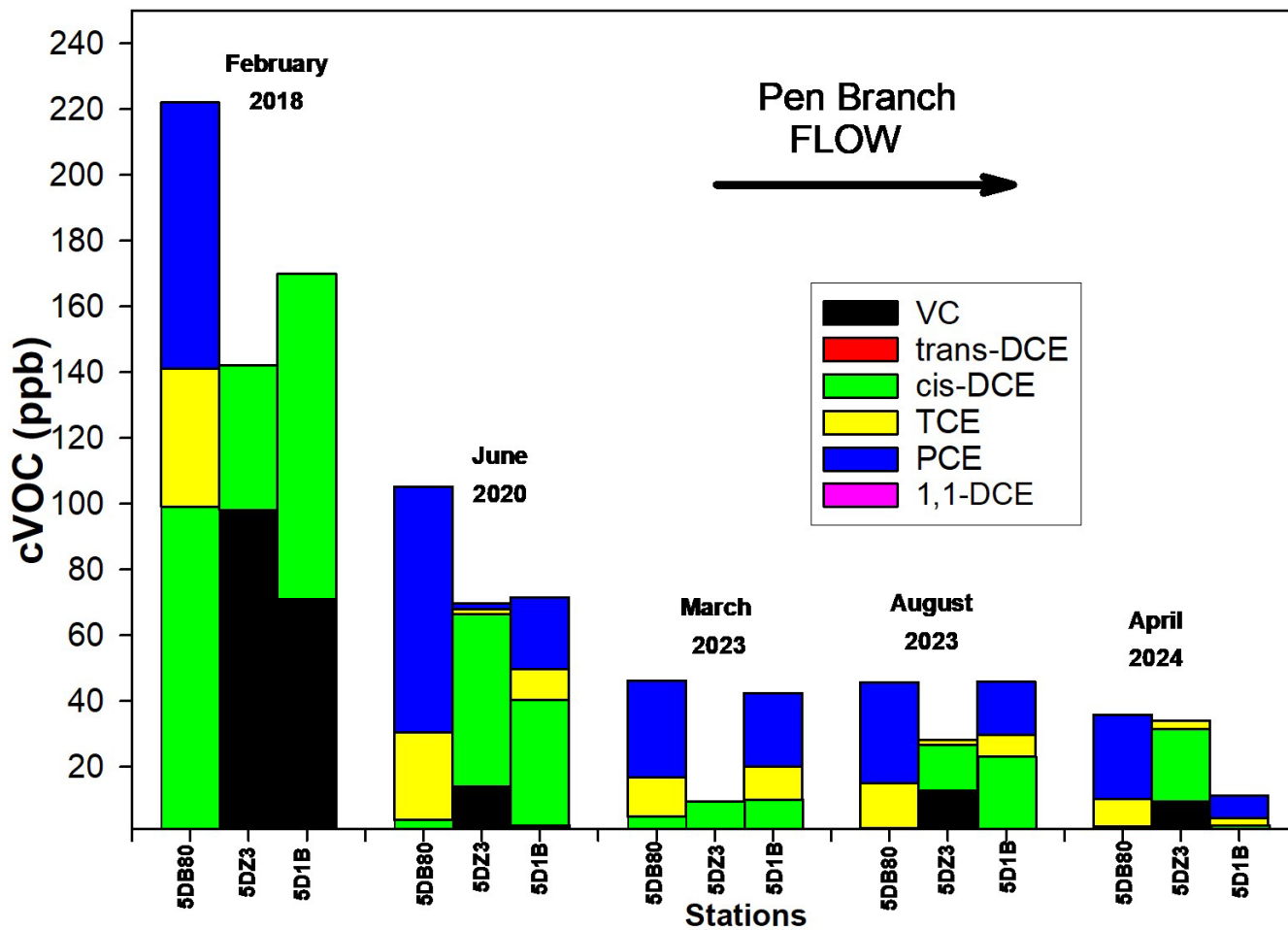


Figure 34. SCSU Long Term VOC Trends

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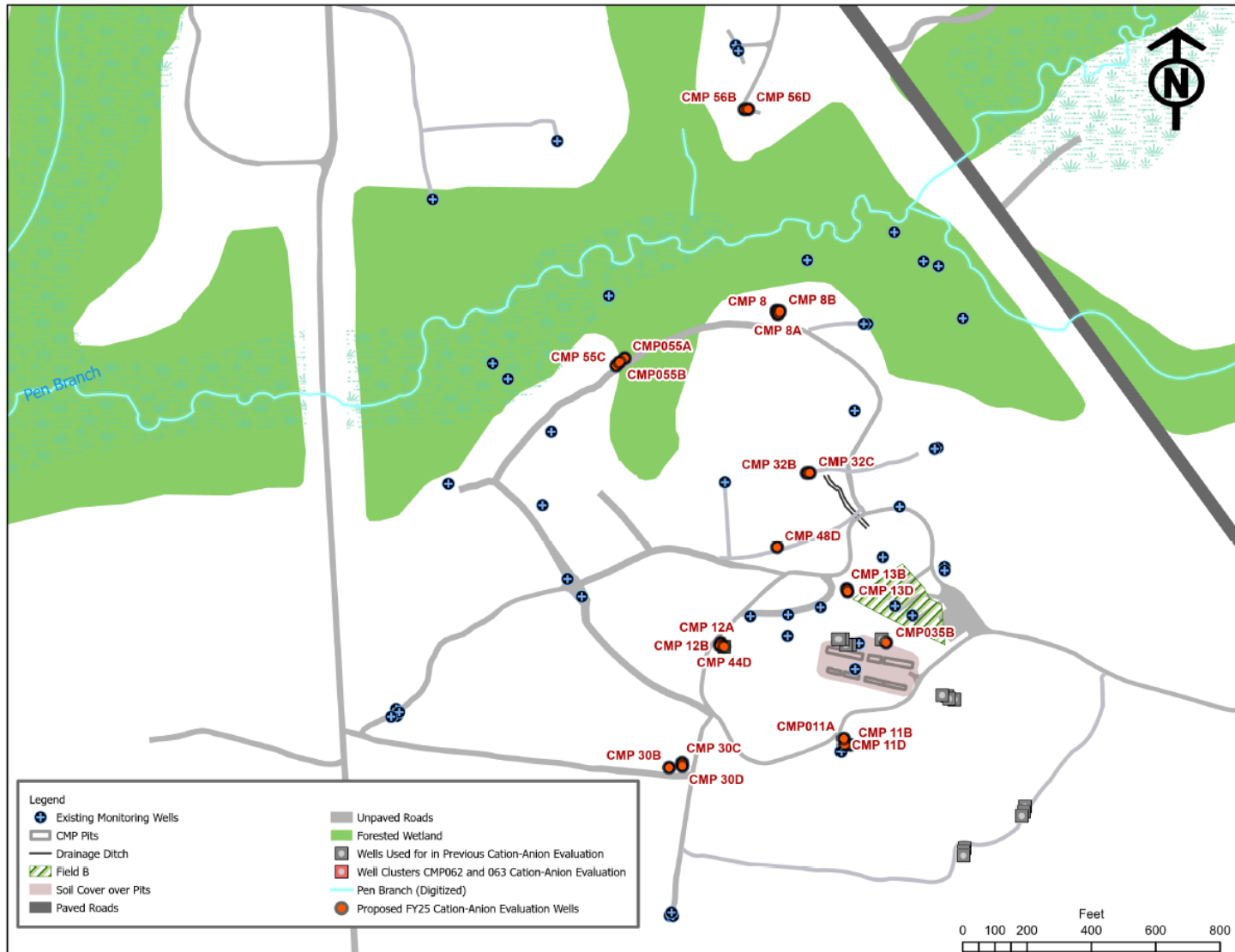


Figure 35. Proposed FY2025 Anion/Cation Evaluation Wells

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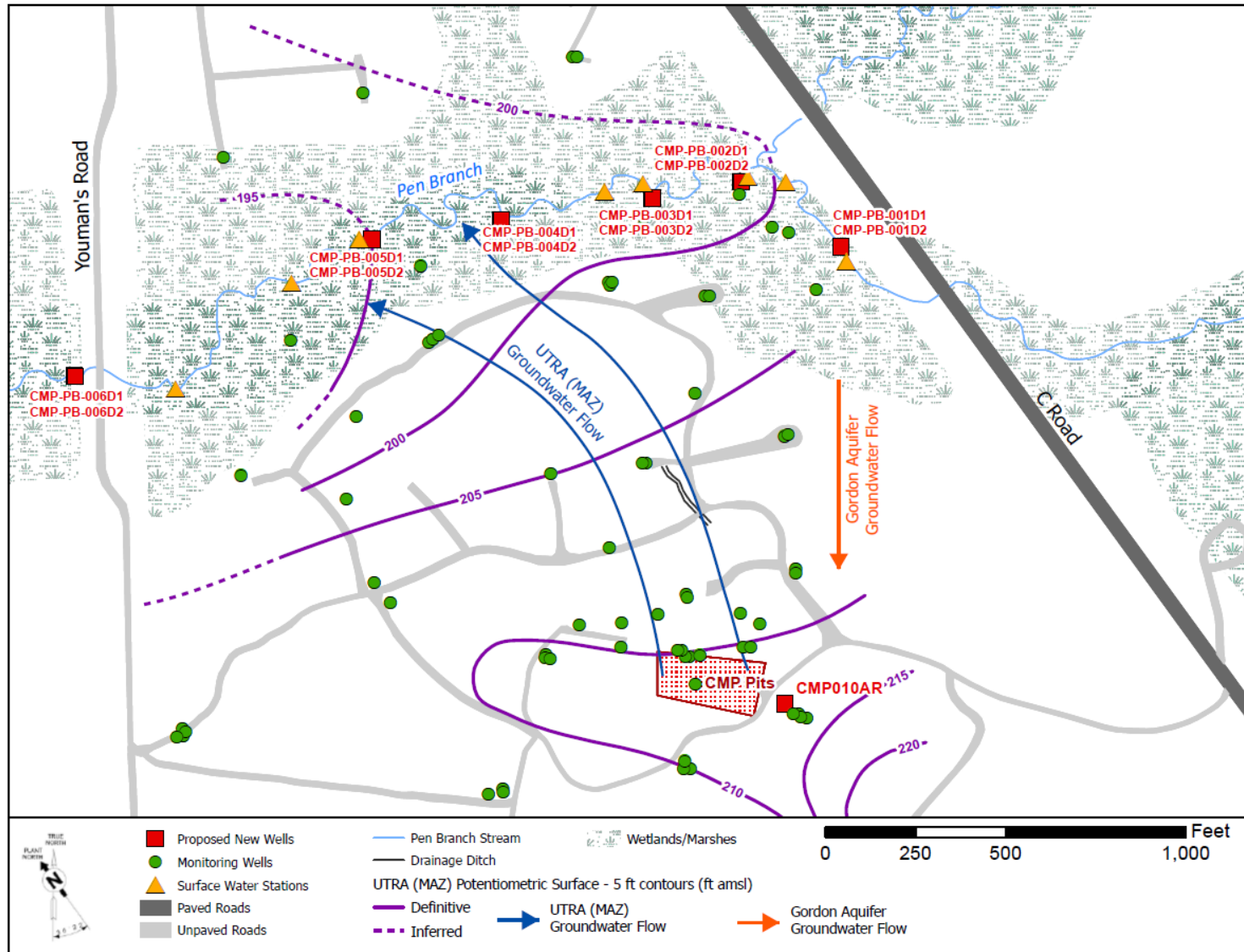


Figure 36. Monitoring Wells to be Installed in 2024

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Table 1. CMP Pits OU MNA Monitoring Network

Station	Aquifer Unit	Lab Analyses						Screen Zone (ft amsl)		Screen Length (ft)
		VOCs		1,4-Dioxane	Lindane		Bottom	Top		
CMB 15I	MAZ	2Q	4Q		4Q	2Q	4Q	210.7	212.4	1.7
CMB 24I	MAZ	2Q	4Q		4Q			201	203	2
CMP 8	MAZ	2Q	4Q		4Q			184	214	30
CMP 8A	GA	2Q		2Q				13.7	23.5	9.8
CMP 8B	LAZ (Upper)	2Q	4Q		4Q			156.6	166.6	10
CMP010A	GA	2Q	4Q	2Q	4Q	2Q	4Q	45.55	55.55	10
CMP 10B	LAZ (Mid)	2Q	4Q		4Q	2Q	4Q	137.4	147.4	10
CMP 10C	LAZ (Upper)	2Q	4Q		4Q	2Q	4Q	179.6	189.6	10
CMP 10D	TZ	2Q	4Q		4Q	2Q	4Q	209.6	229.6	20
CMP011A	GA	2Q		2Q		2Q		46.2	56.2	10
CMP 11B	LAZ (Mid)	2Q	4Q		4Q	2Q	4Q	139.7	149.7	10
CMP 11D	TZ	2Q	4Q		4Q			209.47	229.87	20.4
CMP 12A	GA	2Q	4Q	2Q	4Q			22.1	32.1	10
CMP 12B	LAZ (Mid)	2Q	4Q		4Q			148	158	10
CMP 13B	LAZ (Mid)	2Q	4Q		4Q			134.2	144.2	10
CMP 13D	TZ	2Q	4Q		4Q			217.5	227.5	10
CMP 14B	LAZ (Mid)							130	140	10
CMP 14CR	MAZ							186.49	196.49	10
CMP 14D	TZ							204.1	224.5	20.4
CMP 14DU	TZ							202.57	212.57	10
CMP 15A	GA	2Q		2Q				14.2	24.2	10
CMP 15B	MAZ							145.1	155.1	10
CMP 30B	LAZ (Lower)	2Q,	4Q		4Q			97.4	107.5	10.1
CMP 30C	MAZ	2Q	4Q		4Q			179.5	189.5	10
CMP 30D	TZ	2Q	4Q		4Q			211.6	231.6	20
CMP 31B	LAZ (Lower)	2Q	4Q		4Q			110.03	120.03	10
CMP 31C	MAZ	2Q	4Q		4Q			197.9	207.9	10
CMP 32C	LAZ (Upper)	2Q	4Q		4Q			185.2	195.2	10
CMP 32B	LAZ (Lower)	2Q						97.7	107.7	10
CMP 33D	LAZ (Upper)	2Q	4Q		4Q			178.6	188.6	10
CMP 34D	TZ	2Q	4Q			2Q	4Q	215.6	225.6	10
CMP 35D	TZ	2Q	4Q		4Q	2Q	4Q	213.8	223.8	10
CMP035B	LAZ (Upper)	2Q	4Q		4Q	2Q		169.4	179.4	10
CMP 36D	TZ	2Q	4Q		4Q			199.2	204.2	5
CMP 37D	TZ	2Q	4Q		4Q			193.3	198.3	5
CMP 38D	TZ	2Q	4Q		4Q			196.7	201.7	5
CMP 39D	MAZ	2Q	4Q		4Q			190.9	195.9	5
CMP 40D	MAZ	2Q	4Q		4Q			192.13	197.13	5
CMP 41D	MAZ	2Q	4Q		4Q	2Q		191.7	196.7	5
CMP 43D	MAZ	2Q	4Q		4Q	2Q		187.8	192.8	5
CMP 44D	MAZ	2Q	4Q		4Q	2Q	4Q	204.06	214.06	10
CMP 45D	MAZ	2Q	4Q		4Q	2Q	4Q	195.84	205.84	10
CMP 46D	MAZ					2Q	4Q	198.44	208.44	10

Table 1. CMP Pits OU MNA Monitoring Network (continued; end)

Station	Aquifer Unit	Lab Analyses					Screen Zone (ft amsl)		Screen Length (ft)	
		VOCs		1,4-Dioxane	Lindane		Bottom	Top		
CMP 47D	MAZ	2Q,	4Q		4Q	2Q	4Q	196.37	206.37	10
CMP 48D	MAZ	2Q	4Q		4Q		4Q – 3 <sup>rd</sup> year*	198.83	208.83	10
CMP 50B	LAZ (Upper)	2Q	4Q		4Q			167.33	172.33	5
CMP 50D	MAZ	2Q	4Q		4Q			202.99	212.99	10
CMP 51D	MAZ	2Q	4Q		4Q			182.27	192.27	10
CMP 52A	GA	2Q		2Q				66.65	76.65	10
CMP 52BL	LAZ (Lower)	2Q	4Q		4Q			96.59	106.59	10
CMP 52BU	LAZ (Upper)	2Q	4Q		4Q			180.91	190.91	10
CMP 52C	MAZ	2Q	4Q		4Q			204.69	209.69	5
CMP 54C	LAZ (Upper)	2Q	4Q		4Q			178.34	188.34	10
CMP055A	GA	2Q		2Q				16.92	26.92	10
CMP055B	LAZ (Mid)	2Q	4Q		4Q			136.4	146.4	10
CMP 55C	MAZ	2Q	4Q		4Q			177.62	187.62	10
CMP 56B	LAZ (Mid)							124.6	134.6	10
CMP 56D	MAZ							167.55	177.55	10
CMP 57B	LAZ (Mid)							125.25	135.25	10
CMP 57D	MAZ							168.21	178.21	10
CMP058B	LAZ (Upper)	2Q	4Q		4Q	2Q	4Q	182.7	192.6	9.9
CMP059C	MAZ	2Q	4Q		4Q	2Q	4Q	200.8	210.7	9.9
CMP060B	LAZ (Upper)	2Q	4Q		4Q			171.6	181.6	10
CMP061B	LAZ (Mid)	2Q	4Q		4Q			129.5	139.5	10
CMP062B	LAZ (Mid)	2Q		2Q				136	146	10
CMP062C	MAZ	2Q		2Q				186.8	191.8	5
CMP062D	TZ	2Q		2Q				210.6	230.6	20
CMP063B	LAZ (Mid)		4Q	2Q				126.1	136.1	10
CMP063C	MAZ		4Q	2Q				184.4	189.4	5
CMP063D	TZ		4Q	2Q				195.7	215.7	20
CMP064BU	LAZ (Upper)	2Q	4Q		4Q	2Q	4Q	149.2	159.2	10
CMP064B	LAZ (Lower)	2Q	4Q		4Q			118.8	128.8	10
CMP065BU	MAZ	2Q	4Q		4Q	2Q	4Q	194.37	204.37	10
CMP065B	LAZ (Mid)	2Q	4Q		4Q			128.94	138.94	10
CMP066B	LAZ (Mid)	2Q	4Q		4Q			138.7	148.7	10
CMP067B	LAZ (Mid)	2Q	4Q		4Q			143.1	153.1	10
CMPSW-06	SW	2Q	4Q		4Q					
CMPSW-07	SW	2Q	4Q		4Q					
CMPSW-08	SW	2Q	4Q		4Q					
CMPSW-09	SW	2Q	4Q		4Q					
CMPSW-10	SW	2Q	4Q		4Q					
CMP-SW-20	SW	2Q	4Q		4Q					
CMP-SW-21	SW	2Q	4Q		4Q					
CMP-SW-22	SW	2Q	4Q		4Q					

\*Lindane is analyzed every third year (i.e., 2023, 2026, 2029, etc.); additional samples ; omitted samples

Table 2. CMP Pits OU Horizontal Groundwater Flow Velocities (2Q2023)

GW Flow Line	dh	dl	Conductivity	Porosity	Velocity (ft/day)	Velocity (ft/year)
<b>TZ</b>						
A - A'	20	1498	8	0.3	<b>0.36</b>	130.04
B - B'	20.8	1484	8	0.3	<b>0.37</b>	136.52
C - C'	5.5	1200	8	0.3	<b>0.12</b>	44.64
<b>TZ Avg.</b>					<b>0.28</b>	<b>103.73</b>
<b>MAZ</b>						
A - A'	15	1516	50	0.3	<b>1.65</b>	602.33
B - B'	15	1410	50	0.3	<b>1.77</b>	647.61
<b>MAZ Avg.</b>					<b>1.71</b>	<b>624.97</b>
<b>LAZ</b>						
A - A'	4.25	1995	30	0.3	<b>0.21</b>	77.81
B - B'	3	362	30	0.3	<b>0.83</b>	302.69
C - C'	7.5	530	30	0.3	<b>1.42</b>	516.86
D - D'	4.12	1164	30	0.3	<b>0.35</b>	129.28
<b>LAZ Avg.</b>					<b>0.70</b>	<b>256.66</b>
<b>GA</b>						
A - A'	2	1792	20	0.3	<b>0.07</b>	<b>27.18</b>
B - B'	1.5	440	20	0.3	<b>0.23</b>	<b>83.01</b>
<b>GA Avg.</b>					<b>0.15</b>	<b>55.09</b>

dh= difference in head; dl= difference in length

**Table 3. CMP Pits OU Annual MNA Results, April 2023 through March 2024**

*See insert on the next page*

Table 3. CMP Pits OU Annual MNA Results, April 2023 through March 2024

Table with columns for Station, Well Use, Aquifer Zone, Field Data (Sample Collection Date, Sampling Event Water Elevation, Synchronous Measurement Date, Synchronous Water Elevation, Water Temperature, pH, Specific Conductance, Oxygen, Oxidation/Reduction Potential, Turbidity, Phenolphthalein Alkalinity, Total Alkalinity, Flow Rate, Air Temperature), Constituent (GWPS Unit), Field Conditions, and various Pesticides and Volatiles (Lindane, Tetrachloroethylene, Trichloroethylene, 1,1-Dichloroethylene, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene, Chloroethene, Carbon Tetrachloride, Chloroform, Dichloromethane, Bromochloromethane, 1,1,2-Trichloroethane, 1,4-Dioxane, 1,4-Dioxane (EPA522), 1,4-Dioxane (EPA520SM)).

Field Conditions: FT New field measurement flow thru cell was installed in 40 for consistent field measurement recordings. Explanation: (#) EPA Functional Guideline Code of 'J' was applied to the result, indicating an estimated quantity. (##) EPA Functional Guideline Code of 'J' was applied to the result, indicating an estimated quantity. Result exceeds applicable limit. <EQL(##) Constituent was below detection. The sample-specific Estimated Quantitation Limit is in parentheses. Result exceeds applicable limit. Result Rejected. Result is less than the applicable limit and without EPA Functional Guideline qualifiers. Requested to be sampled but was not. See comments as to why not. Blue Text Not a required sample analysis.

Table 4. CMP Pits OU PCE Max Results from 2008 and 2023 (µg/L)

Station ID	Aquifer	PCE	
		2008 Max (Pre ERH/SVE)	2023 Max
CMP 10D	TZ	620	11
CMP 11D	TZ	421	17
CMP 13D	TZ	1.71	9.4
CMP 14DU	TZ	NS	NS
CMP 14D	TZ	NS	NS
CMP 30D	TZ	<EQL(1)	<EQL(1)
CMP 34D	TZ	49.4	2200
CMP 35D	TZ	122	2600
CMP 36D	TZ	56.9	2
CMP 37D	TZ	358	3.1
CMP 38D	TZ	48.2	35
CMP062D	TZ	<EQL(1)	<EQL(1)
CMP063D	TZ	<EQL(1)	<EQL(1)
CMB 15I	MAZ	437	120
CMB 24I	MAZ	20.8	210
CMP 8	MAZ	299	85
CMP 14CR	MAZ	<EQL(1)	NS
CMP 15B	MAZ	<EQL(1)	NS
CMP 30C	MAZ	3.78	2.3
CMP 31C	MAZ	NS	6.9
CMP 39D	MAZ	71.7	2.1
CMP 40D	MAZ	135	[0.76]
CMP 41D	MAZ	5.48	3.6
CMP 43D	MAZ	<EQL(1)	<EQL(1)
CMP 44D	MAZ	312	280
CMP 45D	MAZ	973	450
CMP 46D	MAZ	[434]	NS
CMP 47D	MAZ	[845]	1000
CMP 48D	MAZ	601	200
CMP 50D	MAZ	8.62	1.5
CMP 51D	MAZ	13.4	2.3
CMP 52C	MAZ	NS	170
CMP 55C	MAZ	<EQL(1)	[0.98]
CMP 56D	MAZ	NS	NS
CMP 57D	MAZ	NS	NS
CMP059C	MAZ	78.5	820
CMP062C	MAZ	<EQL(1)	<EQL(1)
CMP063C	MAZ	<EQL(1)	<EQL(1)
CMP065BU	MAZ	NS	24
CMP 8B	LAZ (Upper)	<EQL(1)	9.2
CMP 10B	LAZ (Mid)	<EQL(1)	11
CMP 10C	LAZ (Upper)	466	130

Station ID	Aquifer	PCE	
		2008 Max (Pre ERH/SVE)	2023 Max
CMP 11B	LAZ (Mid)	<EQL(1)	<EQL(1)
CMP 12B	LAZ (Mid)	46.3	56
CMP 13B	LAZ (Mid)	1.25	14
CMP 14B	LAZ (Mid)	<EQL(1)	NS
CMP 30B	LAZ (Lower)	<EQL(1)	<EQL(1)
CMP 31B	LAZ (Lower)	<EQL(1)	<EQL(1)
CMP 32C	LAZ (Upper)	110	330
CMP 33D	LAZ (Upper)	16.4	1.5
CMP035B	LAZ (Upper)	NS	47
CMP 50B	LAZ (Upper)	<EQL(1)	<EQL(1)
CMP 52BU	LAZ (Upper)	35.1	190
CMP 52BL	LAZ (Lower)	<EQL(1)	<EQL(1)
CMP 54C	LAZ (Upper)	[196]	260
CMP055B	LAZ (Mid)	NS	<EQL(1)
CMP 56B	LAZ (Mid)	NS	NS
CMP 57B	LAZ (Mid)	NS	NS
CMP058B	LAZ (Upper)	6.51	36
CMP060B	LAZ (Upper)	<EQL(1)	<EQL(1)
CMP061B	LAZ (Mid)	<EQL(1)	<EQL(1)
CMP062B	LAZ (Mid)	<EQL(1)	<EQL(1)
CMP063B	LAZ (Mid)	<EQL(1)	<EQL(1)
CMP064BU	LAZ (Upper)	NS	250
CMP064B	LAZ (Lower)	NS	<EQL(1)
CMP065B	LAZ (Mid)	NS	[0.4]
CMP066B	LAZ (Mid)	NS	NS
CMP067B	LAZ (Mid)	NS	NS
CMP 8A	GA	<EQL(1)	<EQL(1)
CMP010A	GA	NS	NS
CMP011A	GA	NS	<EQL(1)
CMP 12A	GA	[0.679]	2
CMP 15A	GA	<EQL(1)	<EQL(1)
CMP 52A	GA	<EQL(1)	<EQL(1)
CMP055A	GA	NS	<EQL(1)
CMP-SW-06	SW	<EQL(1)	<EQL(1)
CMP-SW-07	SW	[0.63]	<EQL(1)
CMP-SW-08	SW	<EQL(1)	<EQL(1)
CMP-SW-09	SW	[0.297]	<EQL(1)
CMP-SW-10	SW	1.38	<EQL(1)
CMP-SW-20	SW	NS	<EQL(1)
CMP-SW-21	SW	NS	<EQL(1)
CMP-SW-22	SW	NS	<EQL(1)

EQL=Sample Quantitation Limit (Non-detect Result); [##]=Estimated Value (J-qualified Result); NS = Not Sampled;  
NA= Not analyzed for VOCs; >MCL of 5 µg/L

Table 5. CMP Pits OU Lindane Max Results from 2008 and 2023 (µg/L)

Station ID	Aquifer	Lindane	
		2008 Max (Pre ERH/SVE)	2023 Max
CMP 10D	TZ	0.185	[0.024]
CMP 11D	TZ	0.0509	NA
CMP 13D	TZ	<EQL(0.0225)	NA
CMP 14DU	TZ	NS	NS
CMP 14D	TZ	NS	NS
CMP 30D	TZ	<EQL(0.0222)	NA
CMP 34D	TZ	0.345	0.19
CMP 35D	TZ	1.73	7.7
CMP 36D	TZ	<EQL(0.0217)	NA
CMP 37D	TZ	<EQL(0.0217)	NA
CMP 38D	TZ	<EQL(0.0217)	NA
CMP062D	TZ	<EQL(0.0222)	NA
CMP063D	TZ	<EQL(0.0213)	NA
CMB 15I	MAZ	0.165	<EQL (0.048)
CMB 24I	MAZ	[0.0192]	NA
CMP 8	MAZ	[0.0192]	NA
CMP 14CR	MAZ	<EQL(0.0222)	NS
CMP 15B	MAZ	<EQL(0.0213)	NA
CMP 30C	MAZ	<EQL(0.0213)	NA
CMP 31C	MAZ	NS	NA
CMP 39D	MAZ	<EQL(0.0217)	NA
CMP 40D	MAZ	<EQL(0.0217)	NA
CMP 41D	MAZ	<EQL(0.0227)	<EQL (0.049)
CMP 43D	MAZ	<EQL(0.0227)	<EQL (0.049)
CMP 44D	MAZ	0.474	0.097
CMP 45D	MAZ	0.484	0.17
CMP 46D	MAZ	0.704	0.21
CMP 47D	MAZ	0.36	0.46
CMP 48D	MAZ	0.157	0.049
CMP 50D	MAZ	<EQL(0.0217)	NA
CMP 51D	MAZ	<EQL(0.0217)	NA
CMP 52C	MAZ	NS	NA
CMP 55C	MAZ	<EQL(0.0213)	NA
CMP 56D	MAZ	NS	NS
CMP 57D	MAZ	NS	NS
CMP059C	MAZ	0.362	0.19
CMP062C	MAZ	<EQL(0.0217)	NA
CMP063C	MAZ	<EQL(0.0213)	NA
CMP065BU	MAZ	NS	[0.021]
CMP 8B	LAZ (Upper)	<EQL(0.0217)	NA
CMP 10B	LAZ (Mid)	<EQL(0.0217)	[0.033]
CMP 10C	LAZ (Upper)	0.126	0.22

Station ID	Aquifer	Lindane	
		2008 Max (Pre ERH/SVE)	2023 Max
CMP 11B	LAZ (Mid)	<EQL(0.02)	[0.022]
CMP 12B	LAZ (Mid)	[0.0184]	NA
CMP 13B	LAZ (Mid)	<EQL(0.0227)	NA
CMP 14B	LAZ (Mid)	<EQL(0.0222)	NA
CMP 30B	LAZ (Lower)	<EQL(0.0213)	NA
CMP 31B	LAZ (Lower)	<EQL(0.0213)	NA
CMP 32C	LAZ (Upper)	<EQL(0.0217)	NA
CMP 33D	LAZ (Upper)	<EQL(0.0217)	NA
CMP035B	LAZ (Upper)	NS	<EQL (0.047)
CMP 50B	LAZ (Upper)	<EQL(0.0222)	NA
CMP 52BU	LAZ (Upper)	<EQL(0.0217)	NA
CMP 52BL	LAZ (Lower)	<EQL(0.0217)	NA
CMP 54C	LAZ (Upper)	<EQL(0.0202)	NA
CMP055B	LAZ (Mid)	NS	NA
CMP 56B	LAZ (Mid)	NS	NS
CMP 57B	LAZ (Mid)	NS	NS
CMP058B	LAZ (Upper)	<EQL(0.0227)	[0.03]
CMP060B	LAZ (Upper)	<EQL(0.0217)	NA
CMP061B	LAZ (Mid)	<EQL(0.0241)	NA
CMP062B	LAZ (Mid)	<EQL(0.0217)	NA
CMP063B	LAZ (Mid)	<EQL(0.023)	NA
CMP064BU	LAZ (Upper)	NS	0.17
CMP064B	LAZ (Lower)	NS	NA
CMP065B	LAZ (Mid)	NS	NA
CMP066B	LAZ (Mid)	NS	NA
CMP067B	LAZ (Mid)	NS	NA
CMP 8A	GA	<EQL(0.0217)	NA
CMP010A	GA	NS	NA
CMP011A	GA	NS	<EQL (0.056)
CMP 12A	GA	<EQL(0.0213)	NA
CMP 15A	GA	<EQL(0.0227)	NA
CMP 52A	GA	<EQL(0.0217)	NA
CMP055A	GA	NS	NA
CMP-SW-06	SW	NA	NA
CMP-SW-07	SW	NA	NA
CMP-SW-08	SW	NA	NA
CMP-SW-09	SW	NA	NA
CMP-SW-10	SW	NA	NA
CMP-SW-20	SW	NS	NA
CMP-SW-21	SW	NS	NA
CMP-SW-22	SW	NS	NA

EQL=Sample Quantitation Limit (Non-detect Result); [##]=Estimated Value (J-qualified Result); NS = Not Sampled;  
NA= Not Analyzed for lindane; >MCL of 0.2 µg/L

Table 6. SCSU Groundwater and Surface Water Results from 2023 and 2024

PEN BRANCH STATION ID	COLLECTION DATE	SAMPLE TYPE	SAMPLE LOCATION MCL	PCE	TCE	1,1-DCE	cis-1,2-DCE	trans1,2-DCE	VC
				(µg/L) 5	(µg/L) 5	(µg/L) 7	(µg/L) 70	(µg/L) 100	(µg/L) 2
SCSU-CMP-4	4/20/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-4	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-4	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-4	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-4	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	1.8	ND	2.4	ND	2.6
SCSU-CMP-4	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	1.7	ND	2.4	ND	2.6
SCSU-CMP-4	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	1.7	ND	2.4	ND	2.6
SCSU-CMP-5B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	8/3/2023	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	3.3	ND	ND
SCSU-CMP-5B	8/3/2023	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	3.9	ND	ND
SCSU-CMP-5B	8/3/2023	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	3.9	ND	ND
SCSU-CMP-5DB80	3/2/2023	GW - Pump	80 cm Below Stream Bottom	28	12	ND	4.6	ND	ND
SCSU-CMP-5DB80	3/2/2023	GW - Pump	80 cm Below Stream Bottom	29	12	ND	4.8	ND	ND
SCSU-CMP-5DB80	3/2/2023	GW - Pump	80 cm Below Stream Bottom	30	12	ND	4.8	ND	ND
SCSU-CMP-5DB80	3/2/2023	GW - Pump	80 cm Below Stream Bottom	31	12	ND	4.8	ND	ND
SCSU-CMP-5DB80	4/20/2023	GW - Pump	80 cm Below Stream Bottom	37.2	12.7	ND	2.1	ND	ND
SCSU-CMP-5DB80	4/20/2023	GW - Pump	80 cm Below Stream Bottom	35.7	12.4	ND	1.9	ND	ND
SCSU-CMP-5DB80	4/20/2023	GW - Pump	80 cm Below Stream Bottom	35.5	12.3	ND	1.9	ND	ND
SCSU-CMP-5DB80	4/20/2023	GW - Pump	80 cm Below Stream Bottom	36	12.5	ND	2.1	ND	ND
SCSU-CMP-5DB80	4/20/2023	GW - Pump	80 cm Below Stream Bottom	32.7	10.9	ND	1.8	ND	ND
SCSU-CMP-5DB80	4/20/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	8/3/2023	GW - Pump	80 cm Below Stream Bottom	31	14	ND	1.4	ND	ND
SCSU-CMP-5DB80	8/3/2023	GW - Pump	80 cm Below Stream Bottom	32	14	ND	1.4	ND	ND
SCSU-CMP-5DB80	8/3/2023	GW - Pump	80 cm Below Stream Bottom	29	13	ND	1.3	ND	ND
SCSU-CMP-5DB80	8/17/2023	PDB	80 cm Below Stream Bottom	29	15	ND	2.7	ND	ND
SCSU-CMP-5DB80	8/17/2023	PDB	65 cm Below Stream Bottom	28	14	ND	2.6	ND	ND
SCSU-CMP-5DB80	8/17/2023	PDB	65 cm Below Stream Bottom	27	14	ND	2.5	ND	ND
SCSU-CMP-5DB80	8/17/2023	PDB	80 cm Below Stream Bottom	29	15	ND	2.7	ND	ND
SCSU-CMP-5DB80	8/17/2023	PDB	80 cm Below Stream Bottom	24	13	ND	2.4	ND	ND
SCSU-CMP-5DB80	4/17/2024	GW - Pump	80 cm Below Stream Bottom	24.4	8.3	ND	1.8	ND	ND
SCSU-CMP-5DB80	4/17/2024	GW - Pump	80 cm Below Stream Bottom	26.1	8.6	ND	1.8	ND	ND
SCSU-CMP-5DB80	4/17/2024	GW - Pump	80 cm Below Stream Bottom	26.2	8.3	ND	1.9	ND	ND
SCSU-CMP-5DB80A	4/17/2024	GW - Pump	80 cm Below Stream Bottom	4.2	1.5	ND	3	ND	ND
SCSU-CMP-5DB80A	4/17/2024	GW - Pump	80 cm Below Stream Bottom	3.9	1.5	ND	3.3	ND	ND
SCSU-CMP-5DB80A	4/17/2024	GW - Pump	80 cm Below Stream Bottom	4.3	1.4	ND	3	ND	ND
SCSU-CMP-5DZ3	3/2/2023	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	9.6	ND	ND
SCSU-CMP-5DZ3	3/2/2023	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	9.5	ND	ND
SCSU-CMP-5DZ3	3/2/2023	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	9.2	ND	ND
SCSU-CMP-5DZ3	4/20/2023	GW - Pump	80 cm Below Stream Bottom	1.5	1.6	ND	12.1	ND	4.7
SCSU-CMP-5DZ3	4/20/2023	GW - Pump	80 cm Below Stream Bottom	1.3	1.3	ND	11	ND	4.9
SCSU-CMP-5DZ3	4/20/2023	GW - Pump	80 cm Below Stream Bottom	1.4	1.6	ND	12.2	ND	4.7
SCSU-CMP-5DZ3	4/20/2023	GW - Pump	80 cm Below Stream Bottom	1.5	1.5	ND	12.1	ND	4.6
SCSU-CMP-5DZ3	4/20/2023	GW - Pump	80 cm Below Stream Bottom	1.5	1.6	ND	12.4	ND	4.7
SCSU-CMP-5DZ3	4/20/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	8/3/2023	GW - Pump	80 cm Below Stream Bottom	ND	1.6	ND	14	ND	11
SCSU-CMP-5DZ3	8/3/2023	GW - Pump	80 cm Below Stream Bottom	ND	1.4	ND	14	ND	13
SCSU-CMP-5DZ3	8/3/2023	GW - Pump	80 cm Below Stream Bottom	ND	1.5	ND	14	ND	14
SCSU-CMP-5DZ3	4/17/2024	GW - Pump	80 cm Below Stream Bottom	ND	2.6	ND	22.4	ND	9.3
SCSU-CMP-5DZ3	4/17/2024	GW - Pump	80 cm Below Stream Bottom	ND	2.7	ND	22.2	ND	9.6
SCSU-CMP-5DZ3	4/17/2024	GW - Pump	80 cm Below Stream Bottom	ND	2.5	ND	21.6	ND	9.1
SCSU-CMP-5DZ3A	4/17/2024	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	10.4	ND	ND
SCSU-CMP-5DZ3A	4/17/2024	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	10.6	ND	ND
SCSU-CMP-5DZ3A	4/17/2024	GW - Pump	80 cm Below Stream Bottom	ND	ND	ND	10.2	ND	ND

ND = not detected; detection >MCL



Table 6. SCSU Groundwater and Surface Water Results from 2023 and 2024 (continued/end)

PEN BRANCH STATION ID	COLLECTION DATE	SAMPLE TYPE	SAMPLE LOCATION MCL	PCE	TCE	1,1-DCE	cis-1,2-DCE	trans1,2-DCE	VC
				(µg/L) 5	(µg/L) 5	(µg/L) 7	(µg/L) 70	(µg/L) 100	(µg/L) 2
SCSU-CMP-5D1B	3/2/2023	GW - Pump	65 cm Below Stream Bottom	23	10	ND	10	ND	ND
SCSU-CMP-5D1B	3/2/2023	GW - Pump	65 cm Below Stream Bottom	23	10	ND	10	ND	ND
SCSU-CMP-5D1B	3/2/2023	GW - Pump	65 cm Below Stream Bottom	23	10	ND	10	ND	ND
SCSU-CMP-5D1B	3/2/2023	GW - Pump	65 cm Below Stream Bottom	21	9.8	ND	10	ND	ND
SCSU-CMP-5D1B	4/20/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	8/3/2023	GW - Pump	65 cm Below Stream Bottom	16	6.2	ND	22	ND	ND
SCSU-CMP-5D1B	8/3/2023	GW - Pump	65 cm Below Stream Bottom	16	6.3	ND	23	ND	ND
SCSU-CMP-5D1B	8/3/2023	GW - Pump	65 cm Below Stream Bottom	17	7.3	ND	24	ND	ND
SCSU-CMP-5D1B	4/17/2024	GW - Pump	65 cm Below Stream Bottom	6.6	2.1	ND	2.1	ND	ND
SCSU-CMP-5D1B	4/17/2024	GW - Pump	65 cm Below Stream Bottom	6.9	2.2	ND	2.3	ND	ND
SCSU-CMP-5D1B	4/17/2024	GW - Pump	65 cm Below Stream Bottom	7	2.5	ND	2.2	ND	ND
SCSU-CMP-5D2B	4/20/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	4/20/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	6/13/2023	SW	15 cm Below Stream Surface	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	8/3/2023	GW - Pump	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND

ND = not detected; detection >MCL

Table 7. SCSU Sediment Results from 2023 and 2024

PEN BRANCH STATION ID	COLLECTION DATE	SAMPLE TYPE	SAMPLE LOCATION	PCE	TCE	1,1-DCE	cis-1,2-DCE	trans1,2-DCE	VC
				(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SCSU-CMP-4	6/7/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-4	6/7/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-4	6/7/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	6/28/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	6/28/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	6/28/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5B	6/28/2023	Sediment	65 cm Below Stream Bottom	15	ND	ND	6.3	ND	ND
SCSU-CMP-5B	6/28/2023	Sediment	65 cm Below Stream Bottom	12	9.7	ND	6.8	ND	ND
SCSU-CMP-5B	6/28/2023	Sediment	65 cm Below Stream Bottom	16	ND	ND	13	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/13/2024	Sediment	15 cm Below Stream Bottom	22.7	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/13/2024	Sediment	15 cm Below Stream Bottom	19.6	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/13/2024	Sediment	15 cm Below Stream Bottom	19.9	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	40 cm Below Stream Bottom	7.8	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	40 cm Below Stream Bottom	6.3	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	40 cm Below Stream Bottom	22	6.1	ND	8.7	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/13/2024	Sediment	40 cm Below Stream Bottom	42.7	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/13/2024	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/13/2024	Sediment	40 cm Below Stream Bottom	45.4	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	65 cm Below Stream Bottom	6.6	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	65 cm Below Stream Bottom	5.8	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	2/7/2023	Sediment	65 cm Below Stream Bottom	7.3	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	65 cm Below Stream Bottom	8.4	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D1B	7/18/2023	Sediment	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/28/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/28/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/28/2023	Sediment	15 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/28/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/28/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5D2B	6/28/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	15 cm Below Stream Bottom	ND	46	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	15 cm Below Stream Bottom	570	45	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	15 cm Below Stream Bottom	180	20	ND	ND	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	15 cm Below Stream Bottom	27	ND	ND	28	ND	7
SCSU-CMP-5DB80	7/17/2023	Sediment	15 cm Below Stream Bottom	7.1	ND	ND	16	ND	4.7
SCSU-CMP-5DB80	7/17/2023	Sediment	15 cm Below Stream Bottom	5.4	ND	ND	20	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	15 cm Below Stream Bottom	42.6	18.5	ND	146	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	15 cm Below Stream Bottom	ND	ND	ND	14.4	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	15 cm Below Stream Bottom	186	43	ND	72.3	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	40 cm Below Stream Bottom	72	9.3	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	40 cm Below Stream Bottom	90	10	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	40 cm Below Stream Bottom	77	9.9	ND	ND	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	40 cm Below Stream Bottom	130	10	ND	21	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	40 cm Below Stream Bottom	57	5.5	ND	17	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	40 cm Below Stream Bottom	80	6.8	ND	24	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	40 cm Below Stream Bottom	133	14.9	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	40 cm Below Stream Bottom	127	16.2	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	40 cm Below Stream Bottom	68.9	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	60 cm Below Stream Bottom	52	7.3	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	60 cm Below Stream Bottom	95	11	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	60 cm Below Stream Bottom	38	5.6	ND	ND	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	65 cm Below Stream Bottom	79	7.3	ND	10	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	65 cm Below Stream Bottom	93	9.4	ND	14	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	65 cm Below Stream Bottom	130	12	ND	19	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	65 cm Below Stream Bottom	82.3	19.1	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	65 cm Below Stream Bottom	78	14.3	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	65 cm Below Stream Bottom	120	17.9	ND	ND	ND	ND

ND = not detected; detection

Table 7. SCSU Sediment Results from 2023 and 2024 (continued/end)

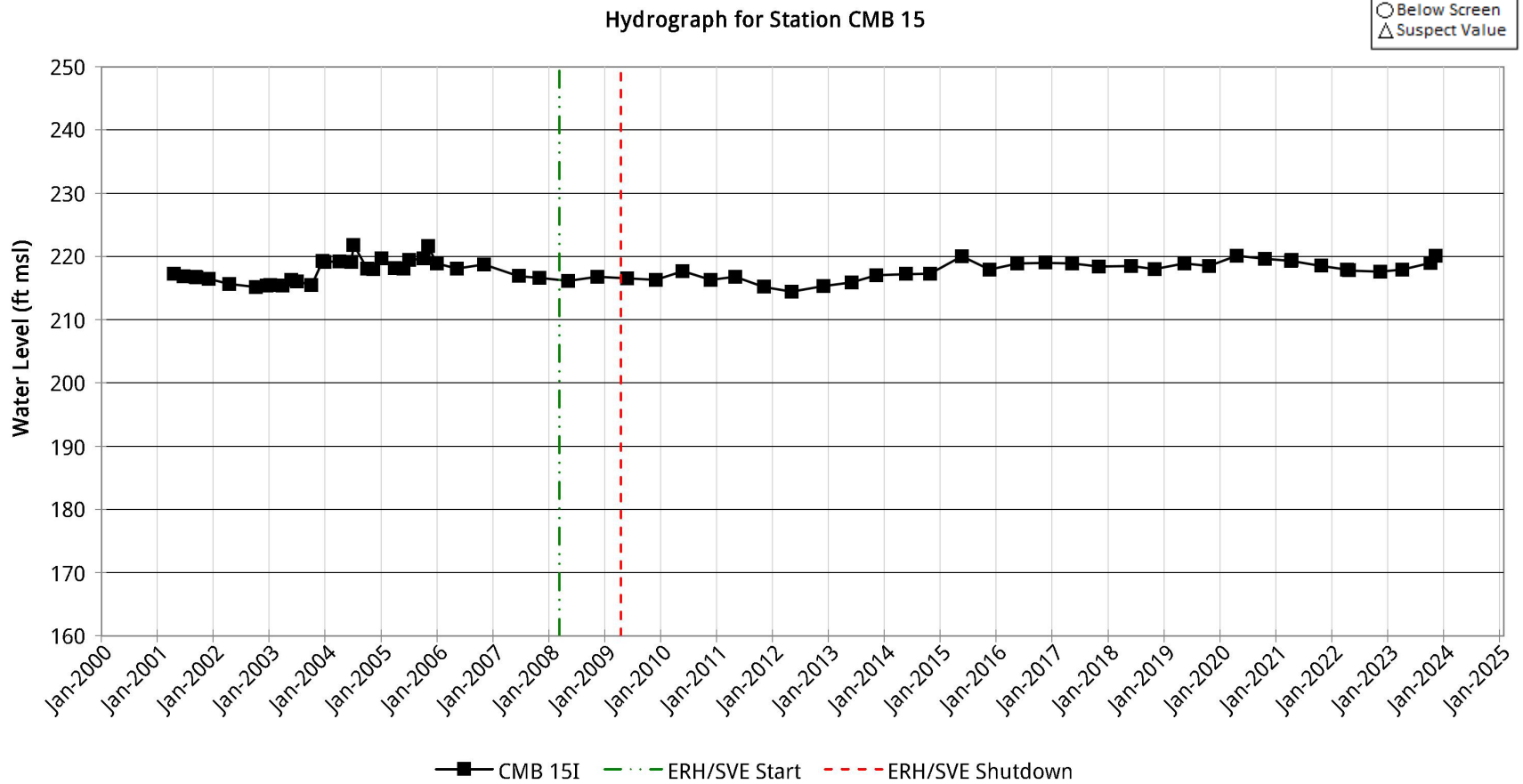
PEN BRANCH STATION ID	COLLECTION DATE	SAMPLE TYPE	SAMPLE LOCATION	PCE	TCE	1,1-DCE	cis-1,2-DCE	trans1,2-DCE	VC
				(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SCSU-CMP-5DB80	4/11/2023	Sediment	80 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	80 cm Below Stream Bottom	19	4.7	ND	ND	ND	ND
SCSU-CMP-5DB80	4/11/2023	Sediment	80 cm Below Stream Bottom	35	8.3	ND	ND	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	80 cm Below Stream Bottom	49	11	ND	ND	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	80 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DB80	7/17/2023	Sediment	80 cm Below Stream Bottom	36	9.4	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	80 cm Below Stream Bottom	77.1	21.7	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	80 cm Below Stream Bottom	42.5	13	ND	ND	ND	ND
SCSU-CMP-5DB80	4/9/2024	Sediment	80 cm Below Stream Bottom	86.7	20.5	ND	ND	ND	ND
PB bank E. of 5DB80	4/20/2023	bamboo	10 cm	ND	ND	ND	ND	ND	ND
PB bank E. of 5DB80	4/20/2023	bamboo	10 cm	ND	ND	ND	ND	ND	ND
PB bank E. of 5DB80	4/20/2023	bamboo	10 cm	ND	ND	ND	ND	ND	ND
PB bank E. of 5DB80	4/20/2023	bamboo	10 cm	ND	ND	ND	ND	ND	ND
PB bank E. of 5DB80	4/20/2023	bamboo	10 cm	ND	ND	ND	ND	ND	ND
PB bank E. of 5DB80	4/20/2023	bamboo	10 cm	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	4/2/2024	Sediment	15 cm Below Stream Bottom	ND	ND	ND	37	ND	ND
SCSU-CMP-5DZ3	4/2/2024	Sediment	15 cm Below Stream Bottom	ND	ND	ND	18.8	ND	24
SCSU-CMP-5DZ3	4/2/2024	Sediment	15 cm Below Stream Bottom	11	ND	ND	21.1	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	8.8	ND	14
SCSU-CMP-5DZ3	4/11/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	40 cm Below Stream Bottom	8.8	ND	ND	20	ND	ND
SCSU-CMP-5DZ3	7/18/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	13
SCSU-CMP-5DZ3	7/18/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	13
SCSU-CMP-5DZ3	7/18/2023	Sediment	40 cm Below Stream Bottom	ND	ND	ND	ND	ND	12
SCSU-CMP-5DZ3	4/2/2024	Sediment	40 cm Below Stream Bottom	119	17.5	ND	37.5	ND	ND
SCSU-CMP-5DZ3	4/2/2024	Sediment	40 cm Below Stream Bottom	34.1	ND	ND	17.5	ND	ND
SCSU-CMP-5DZ3	4/2/2024	Sediment	40 cm Below Stream Bottom	72.7	ND	ND	48.1	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	7.7	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	60 cm Below Stream Bottom	8.1	ND	ND	7.7	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	5.9	ND	ND
SCSU-CMP-5DZ3	7/18/2023	Sediment	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	10
SCSU-CMP-5DZ3	7/18/2023	Sediment	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	27
SCSU-CMP-5DZ3	7/18/2023	Sediment	65 cm Below Stream Bottom	ND	ND	ND	ND	ND	16
SCSU-CMP-5DZ3	4/2/2024	Sediment	65 cm Below Stream Bottom	44.4	ND	ND	20.3	ND	ND
SCSU-CMP-5DZ3	4/2/2024	Sediment	65 cm Below Stream Bottom	28.9	ND	ND	11.8	ND	ND
SCSU-CMP-5DZ3	4/2/2024	Sediment	65 cm Below Stream Bottom	49.9	ND	ND	19.4	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	80 cm Below Stream Bottom	ND	ND	ND	10	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	80 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5DZ3	4/11/2023	Sediment	80 cm Below Stream Bottom	ND	ND	ND	8.7	ND	ND
SCSU-CMP-5G	6/7/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	6/7/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND
SCSU-CMP-5G	6/7/2023	Sediment	60 cm Below Stream Bottom	ND	ND	ND	ND	ND	ND

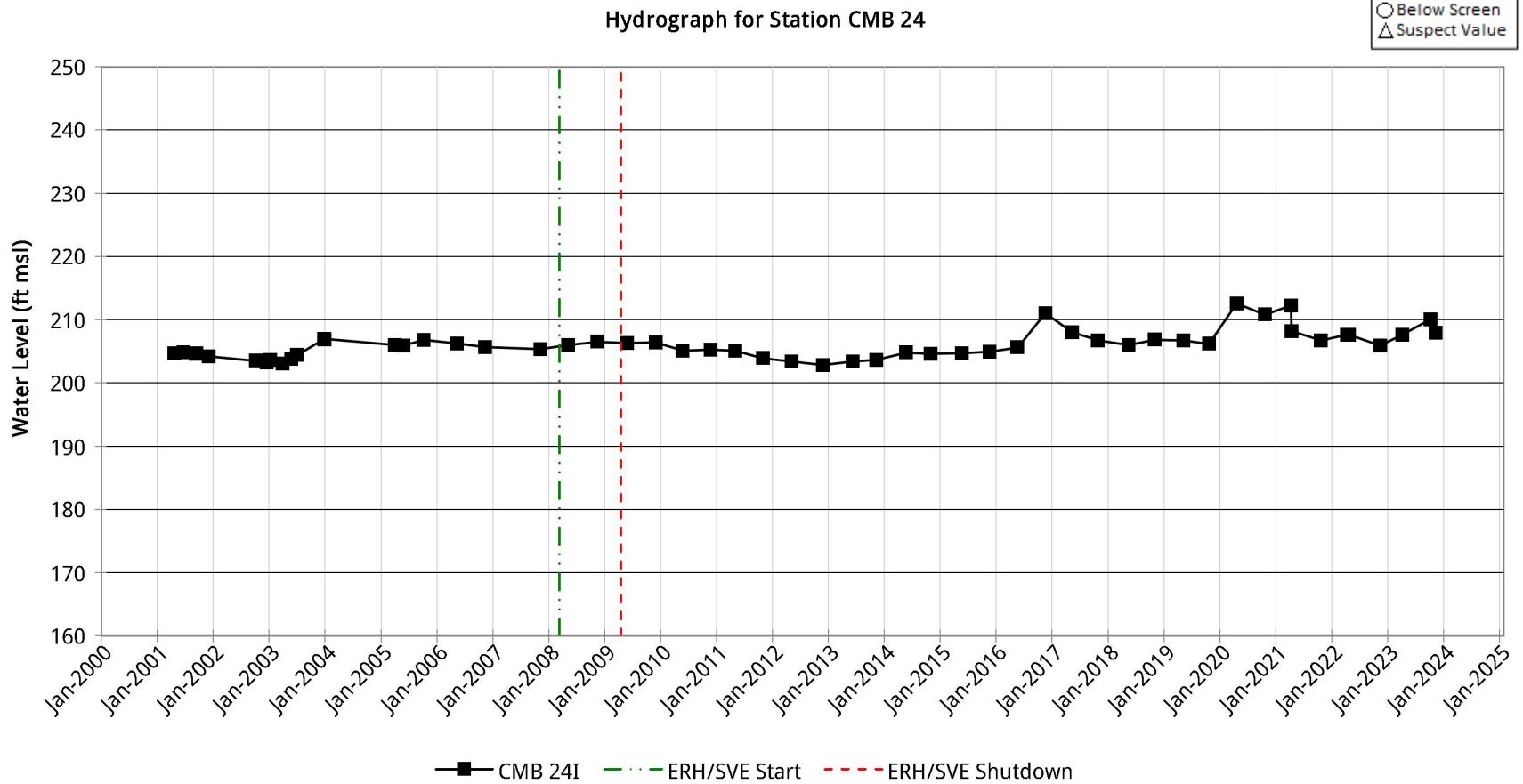
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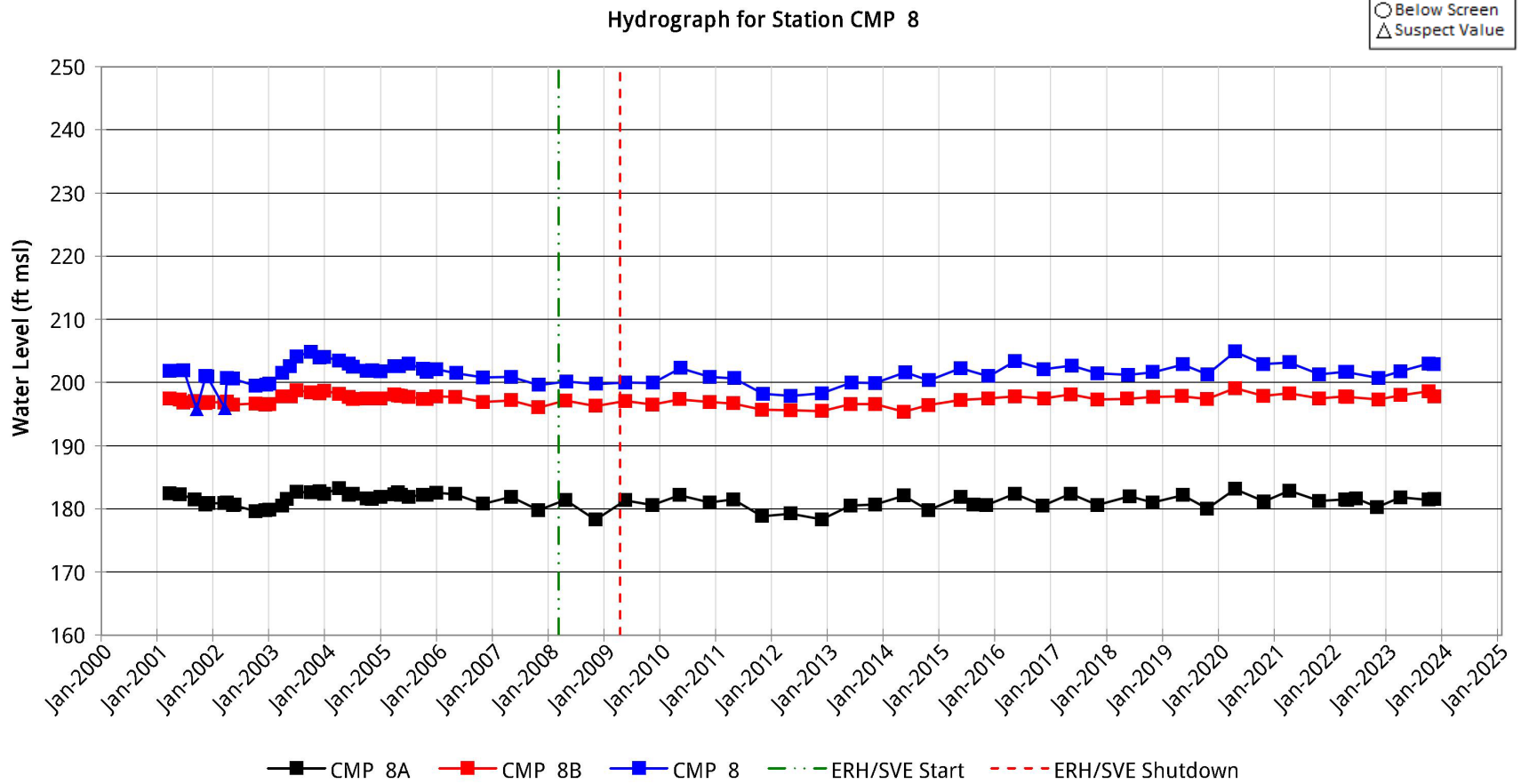
**Appendix A**

**Hydrographs**

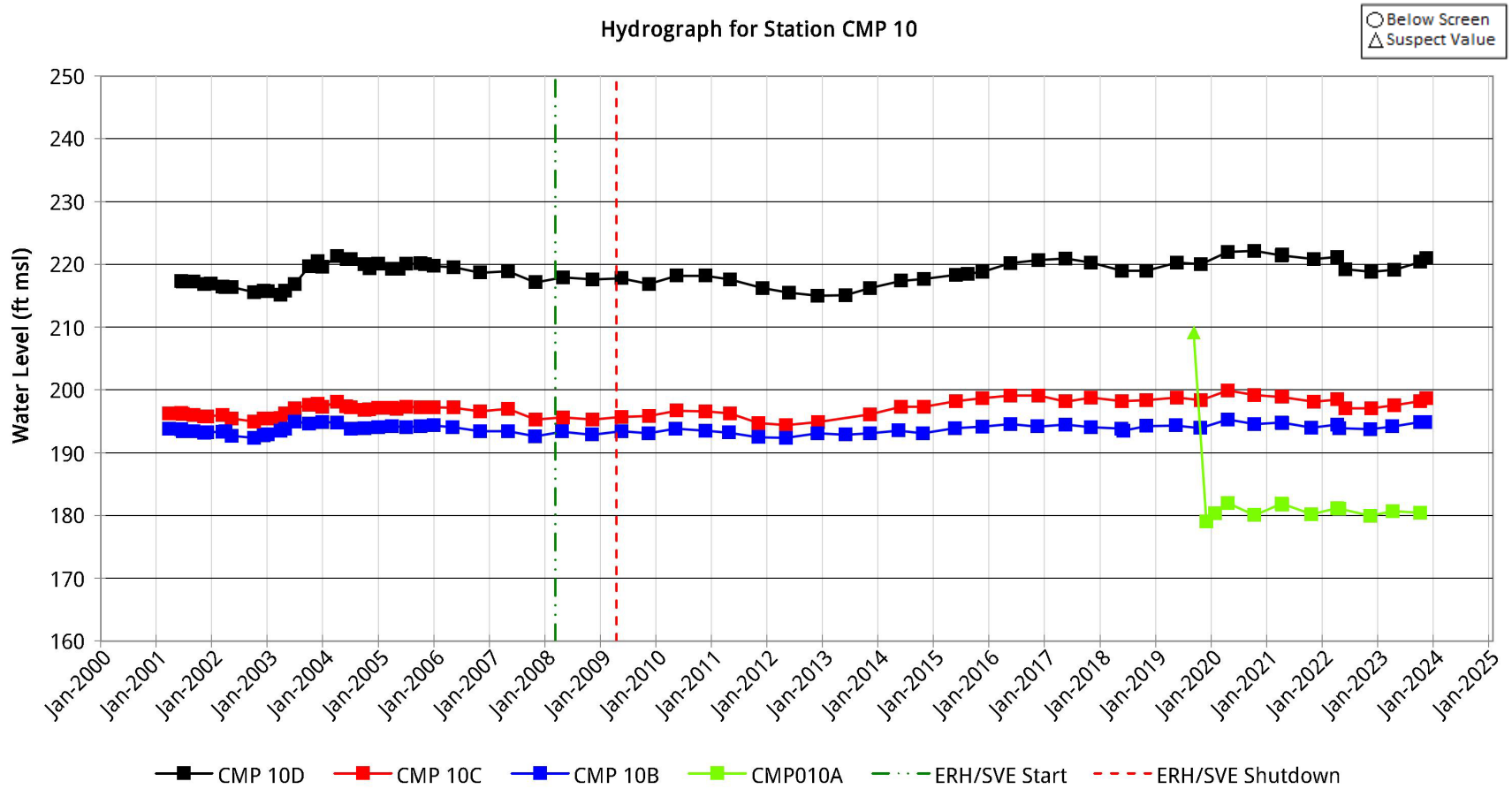
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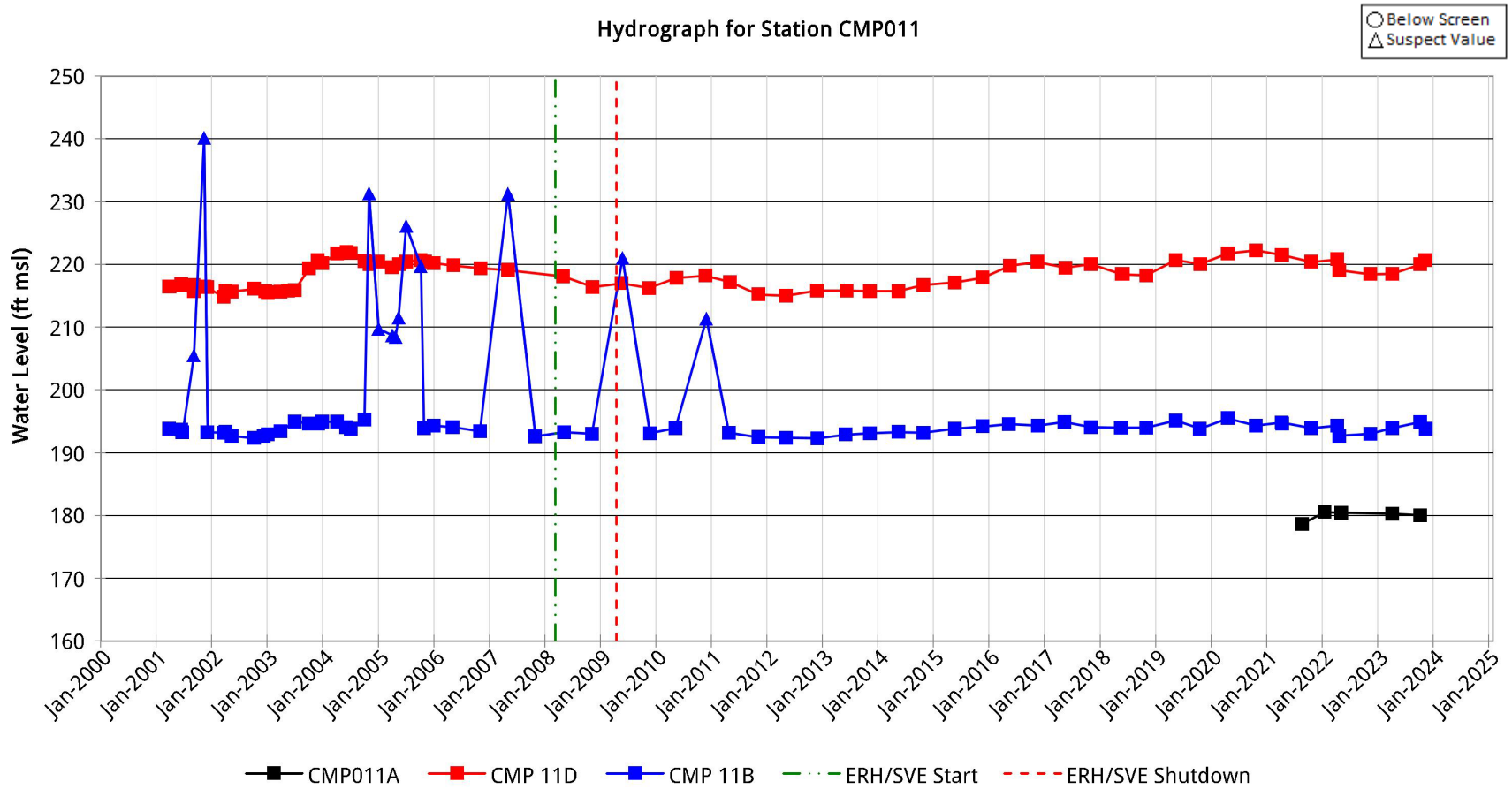


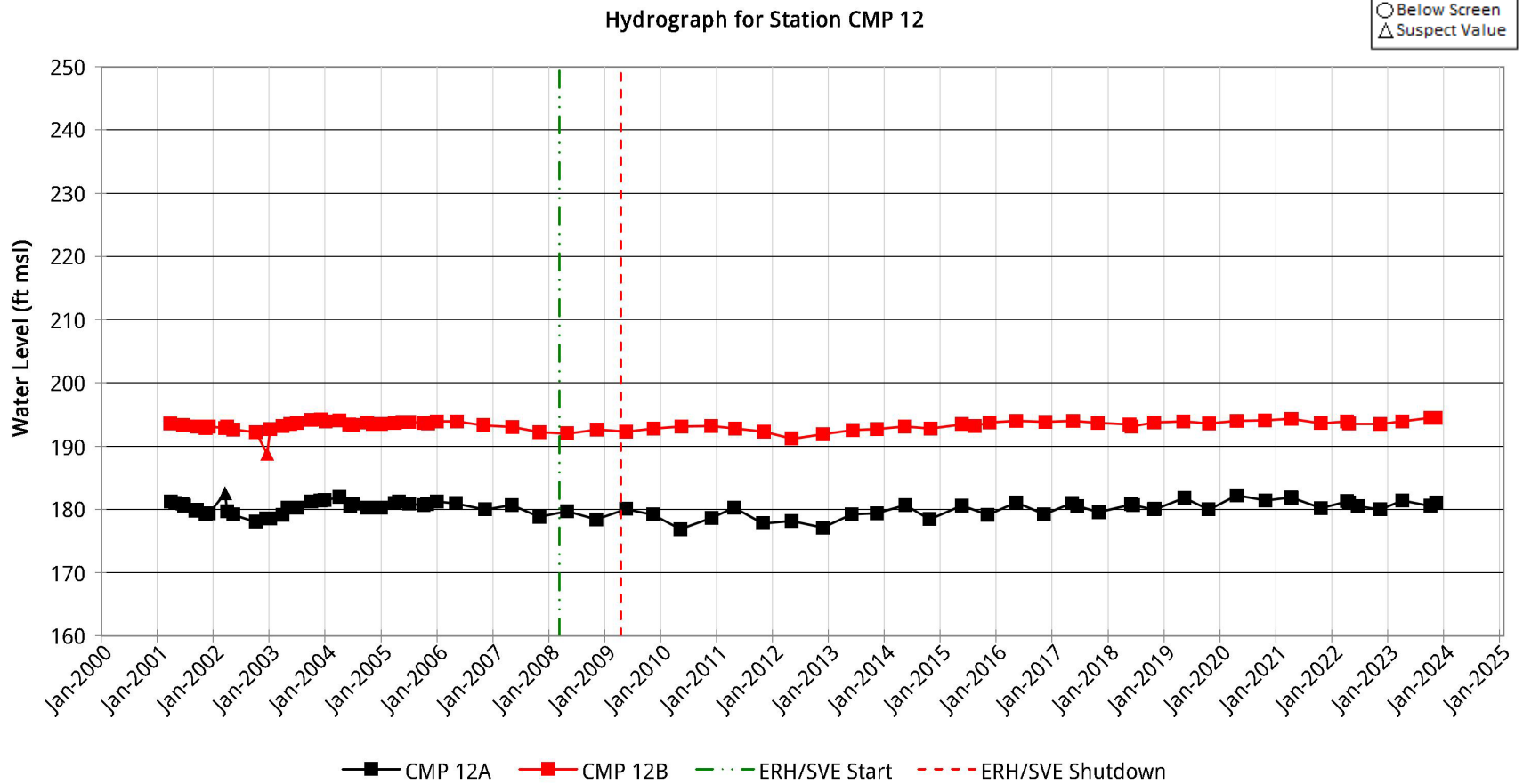


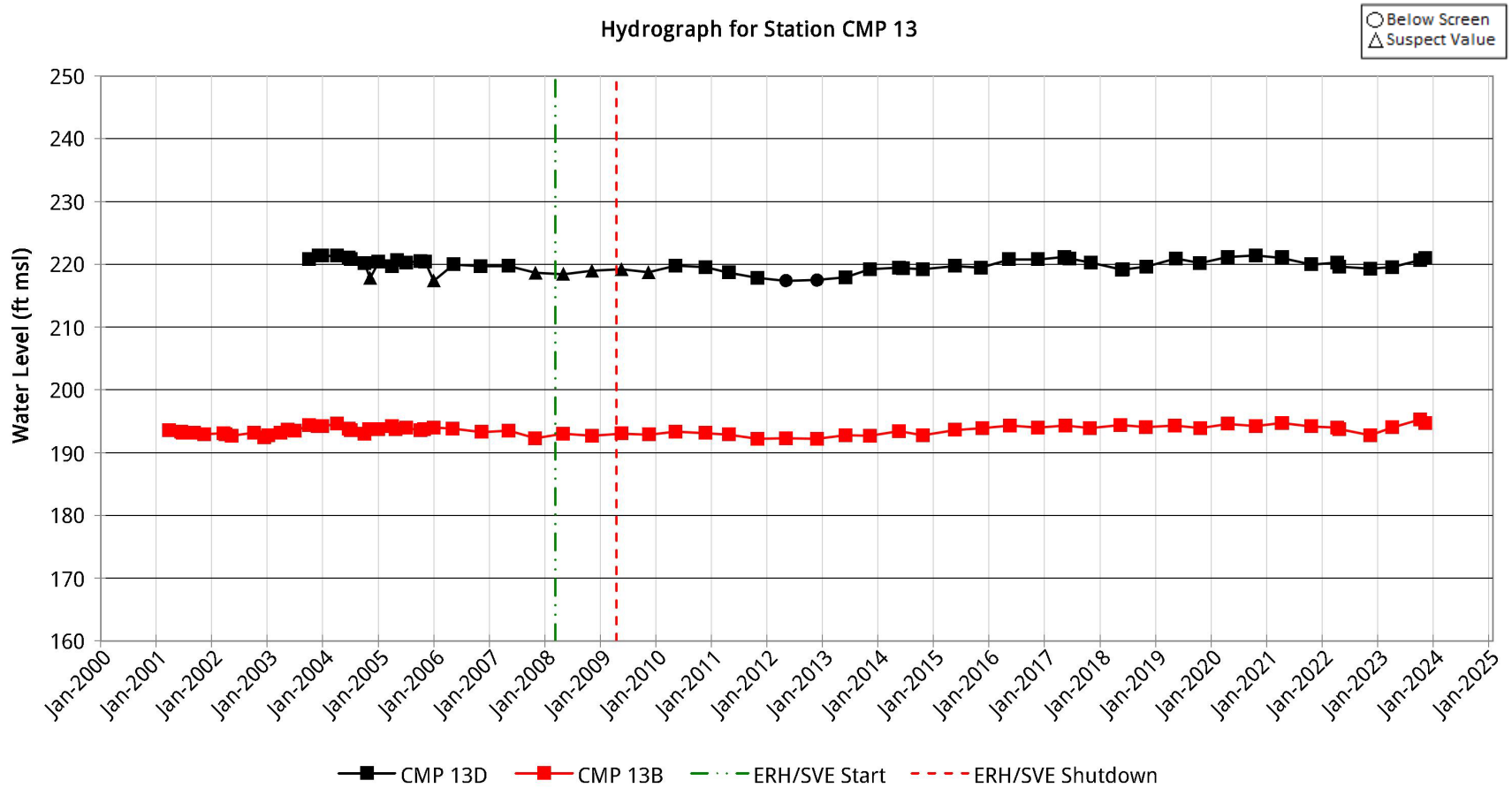


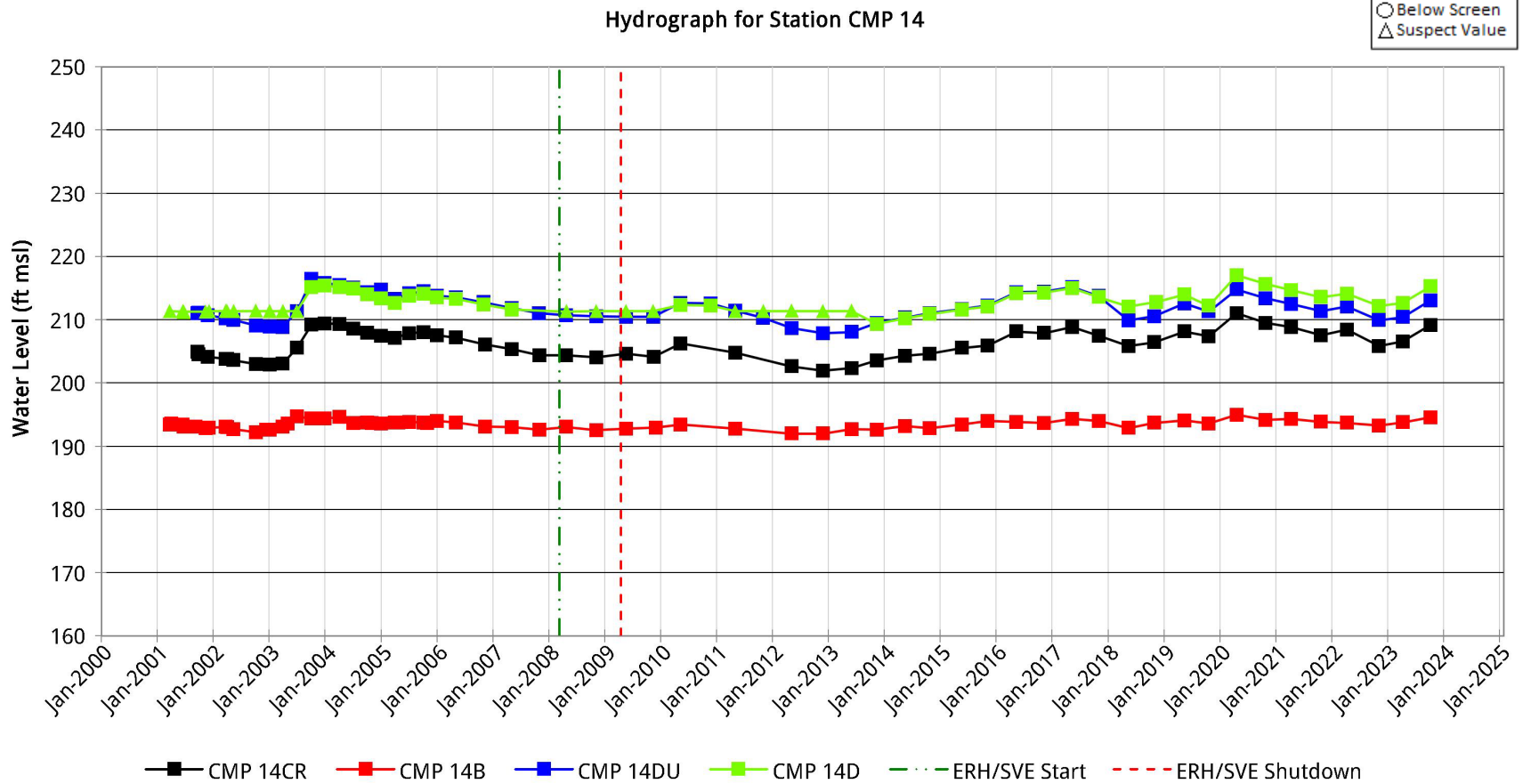


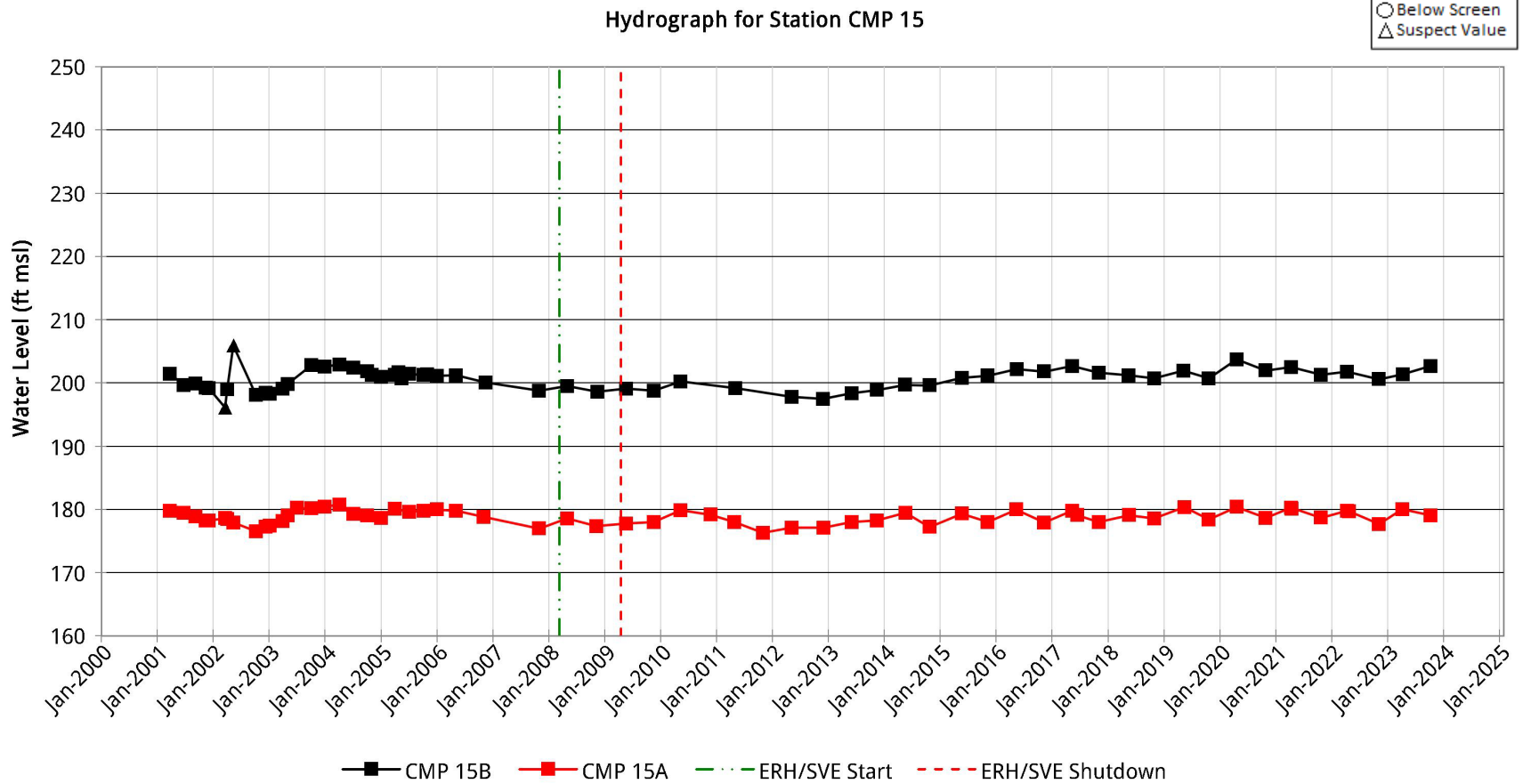


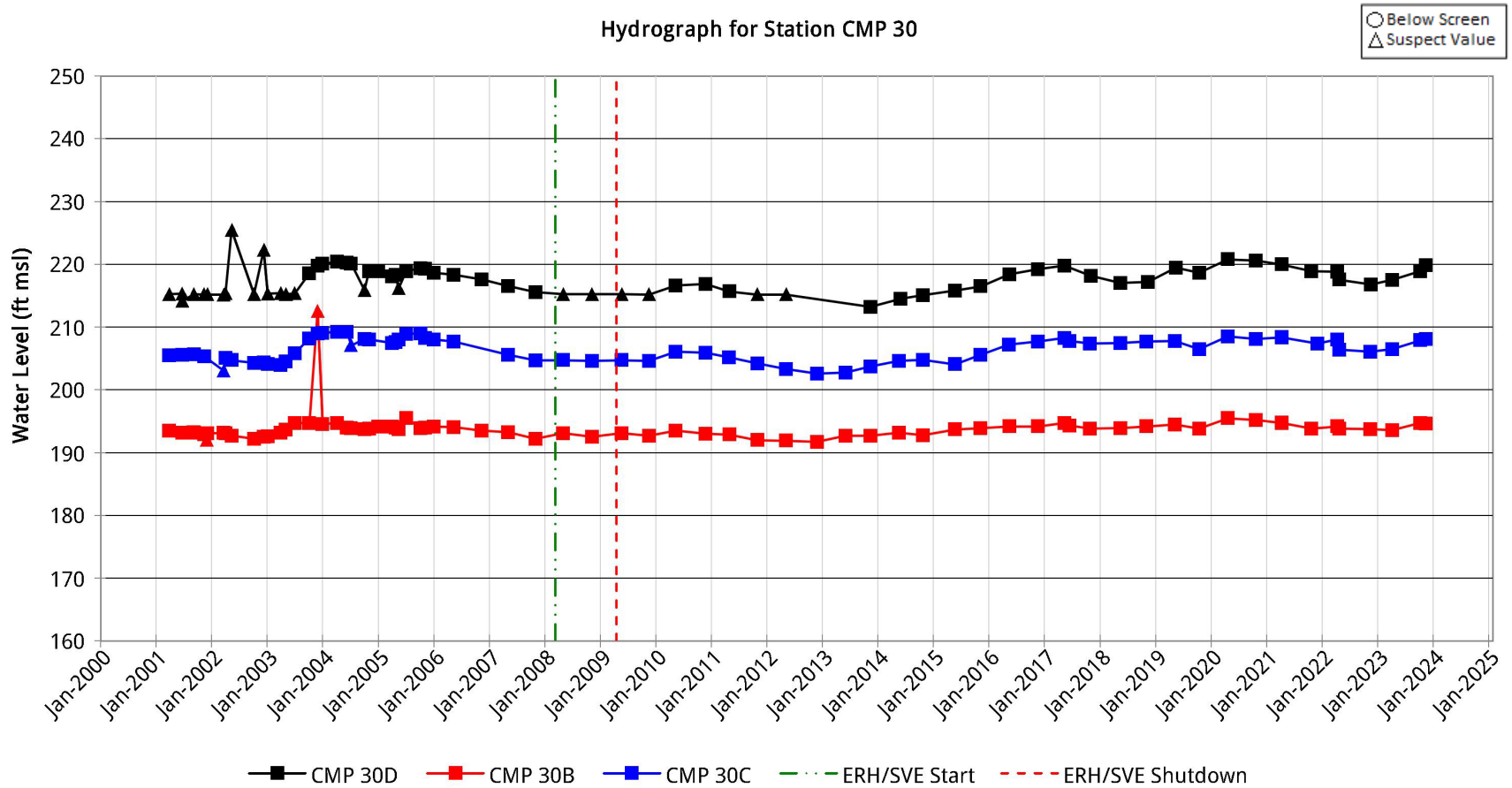


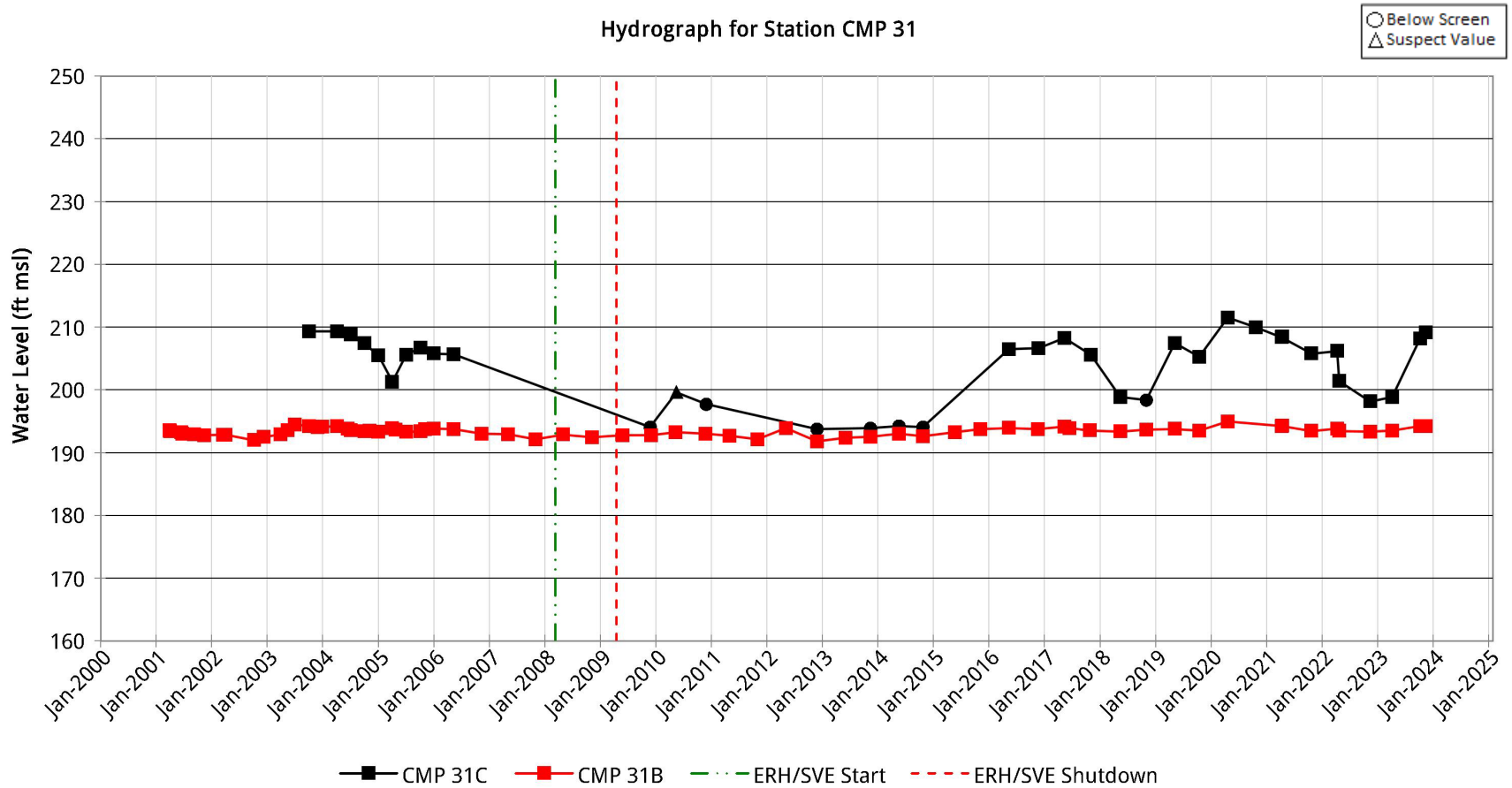




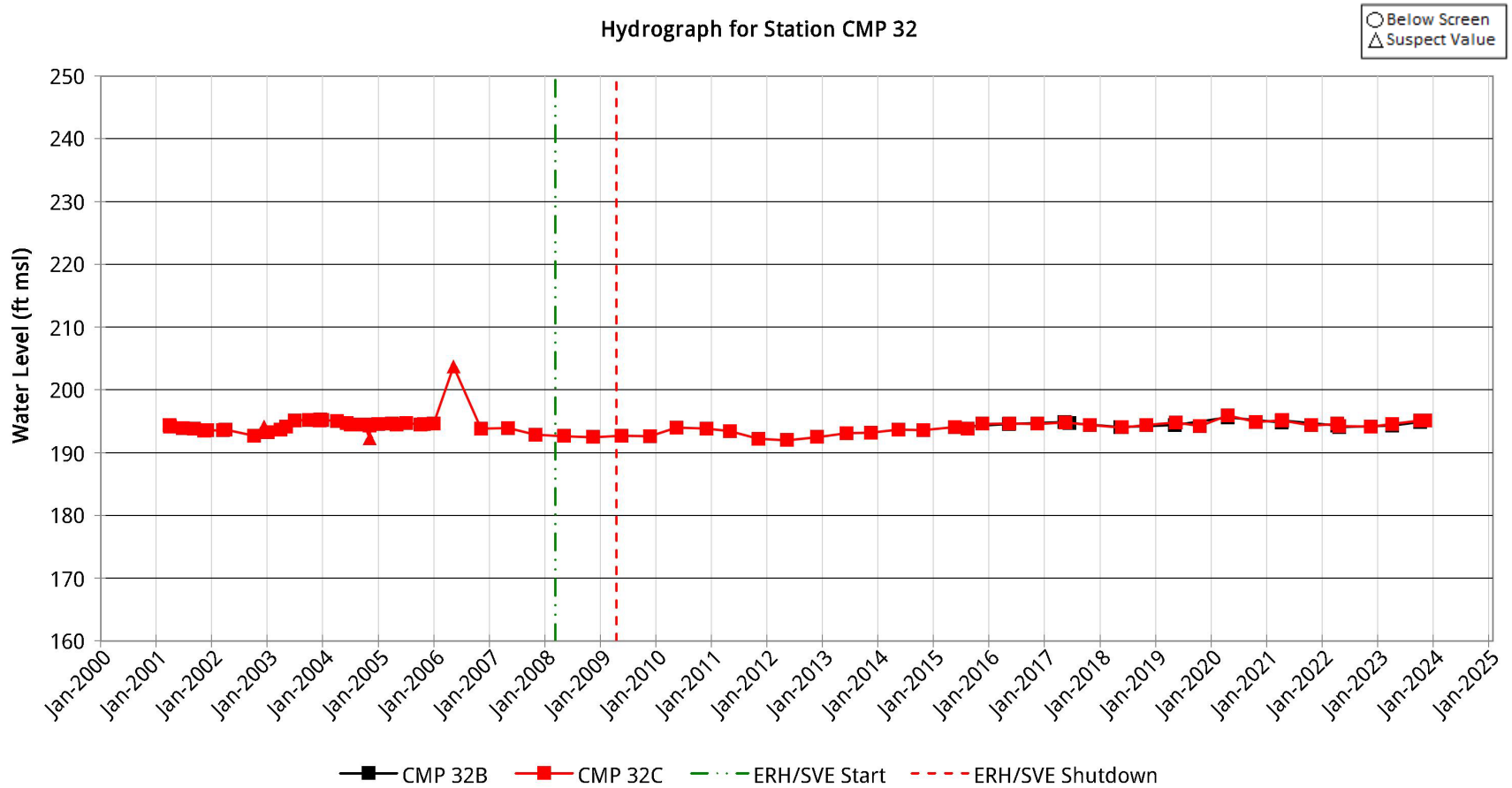


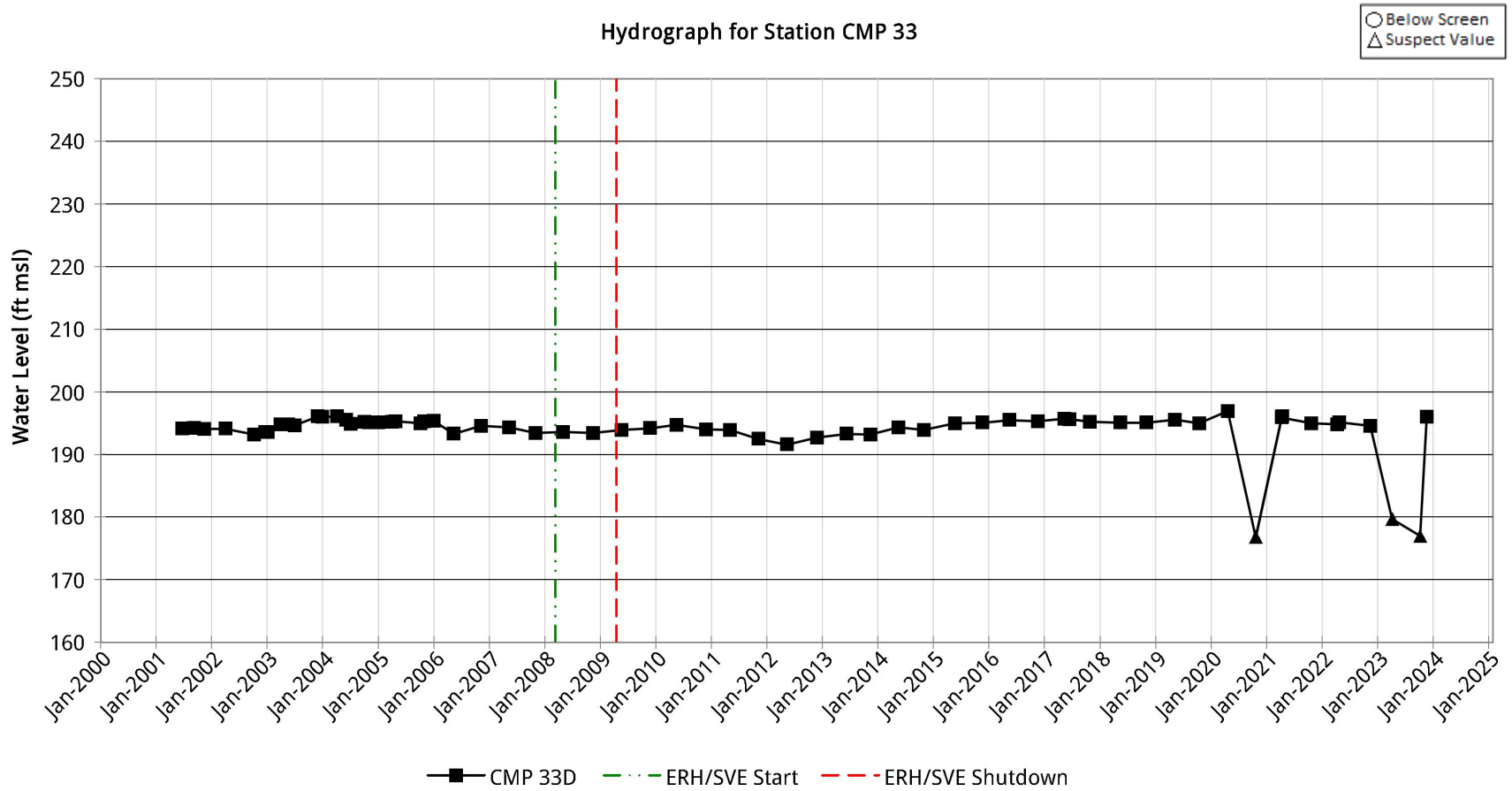


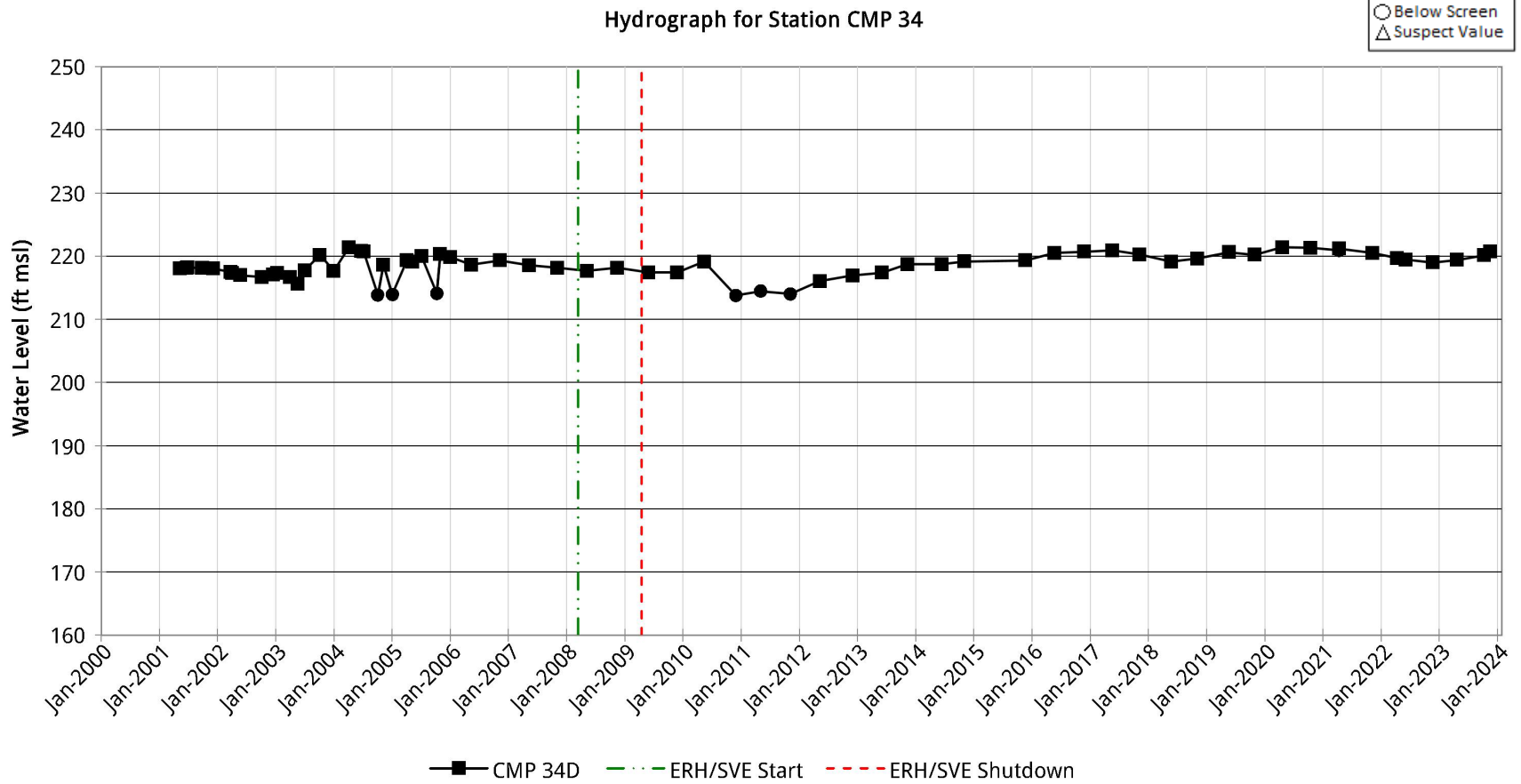


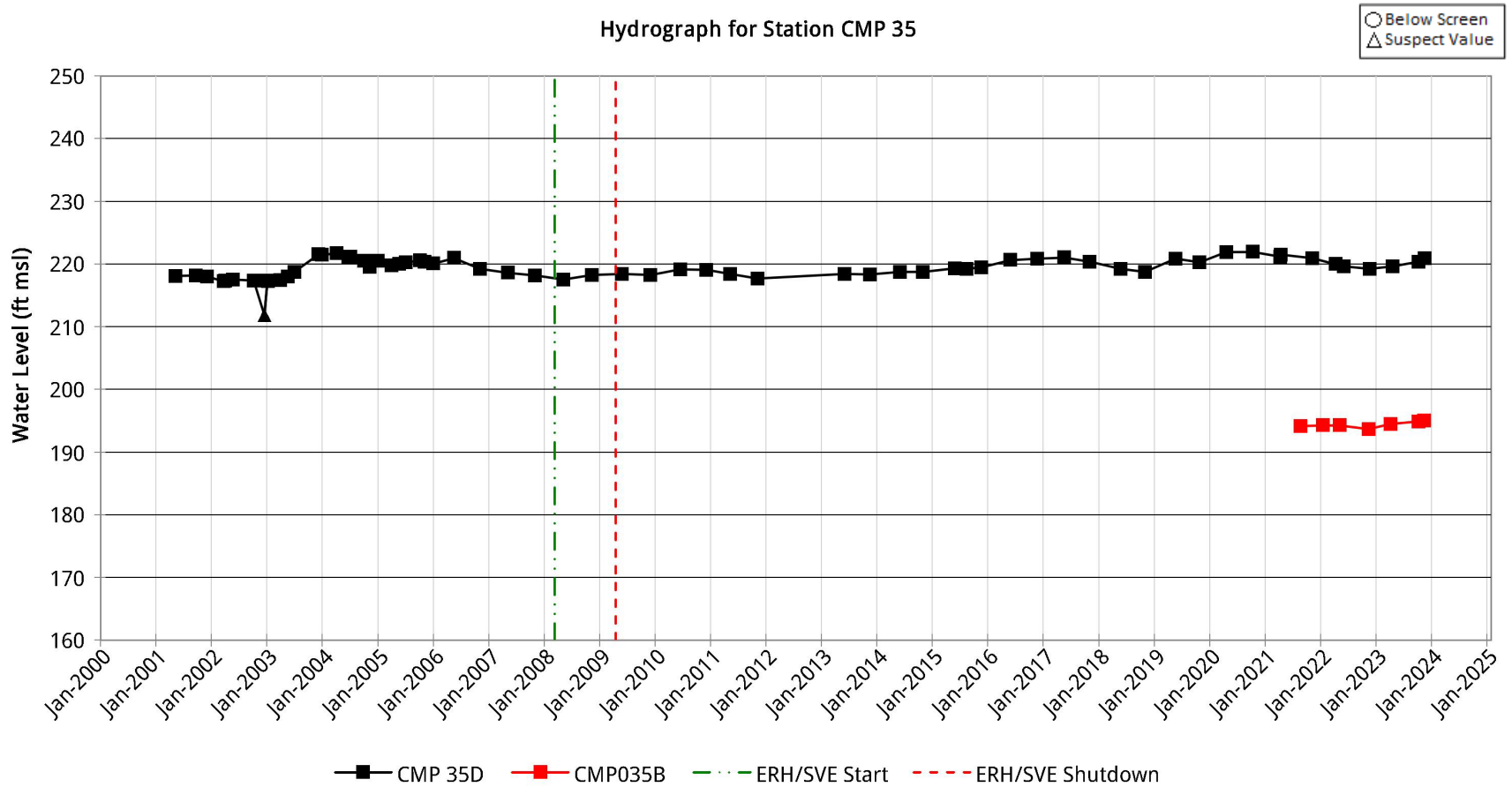


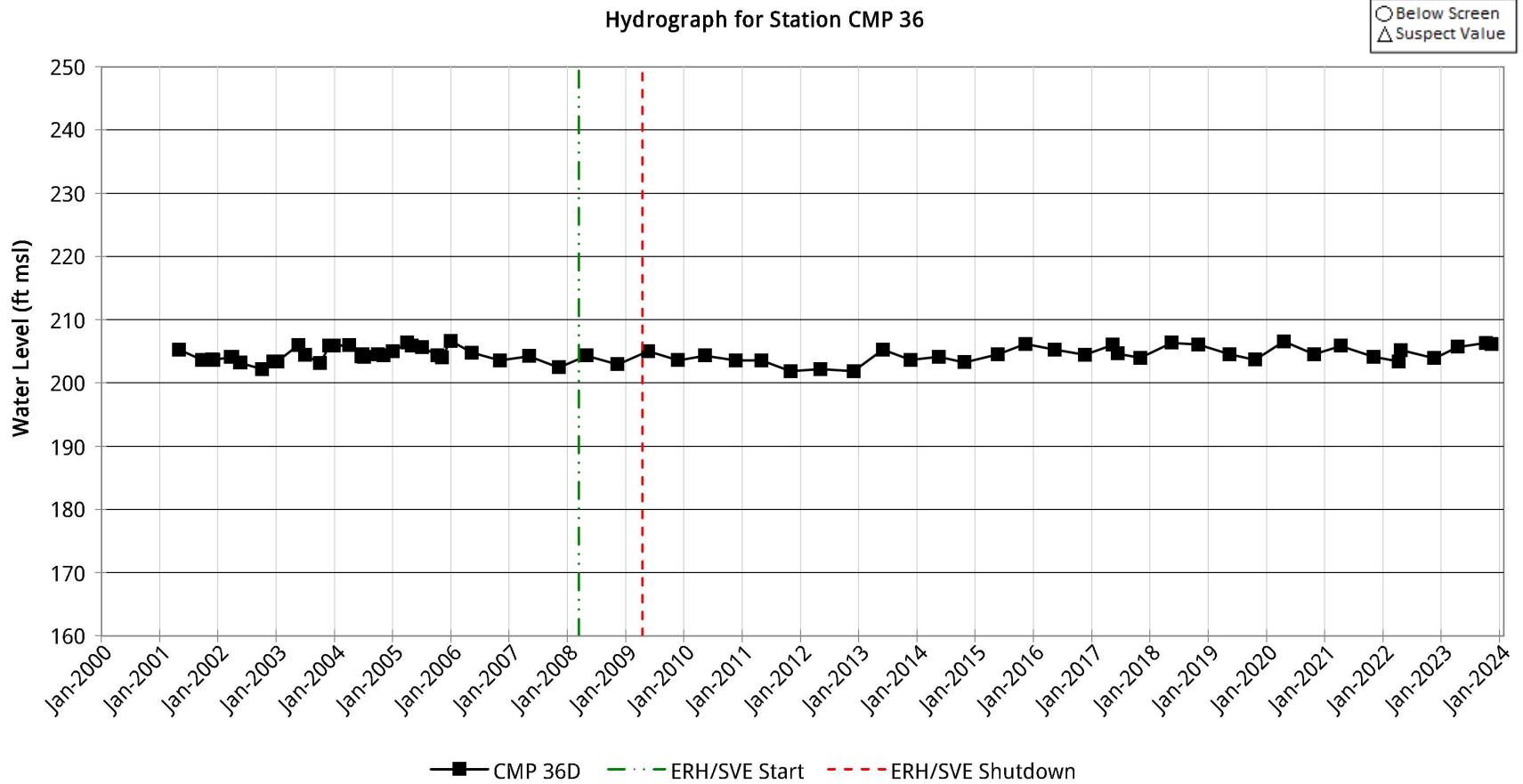


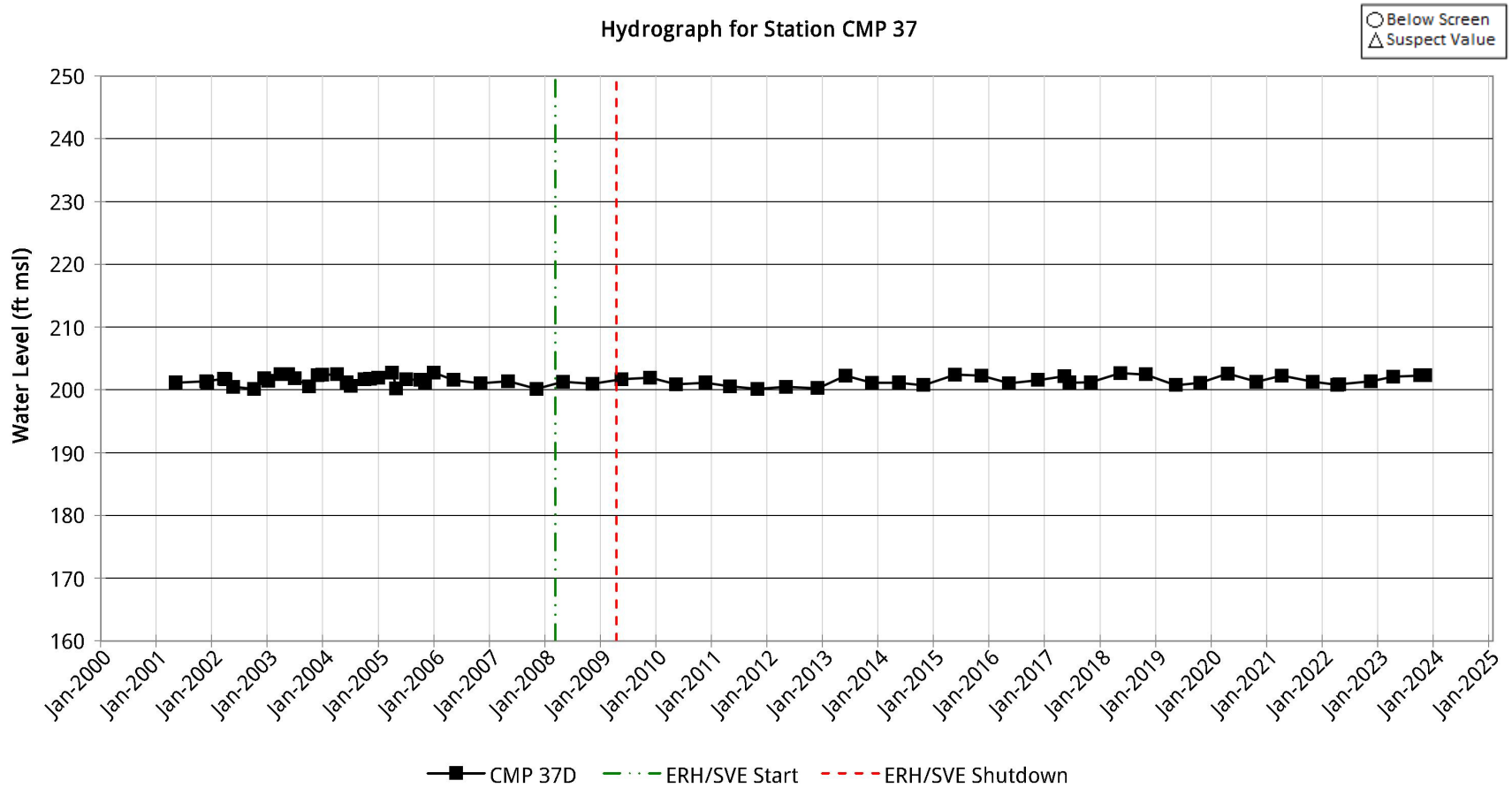


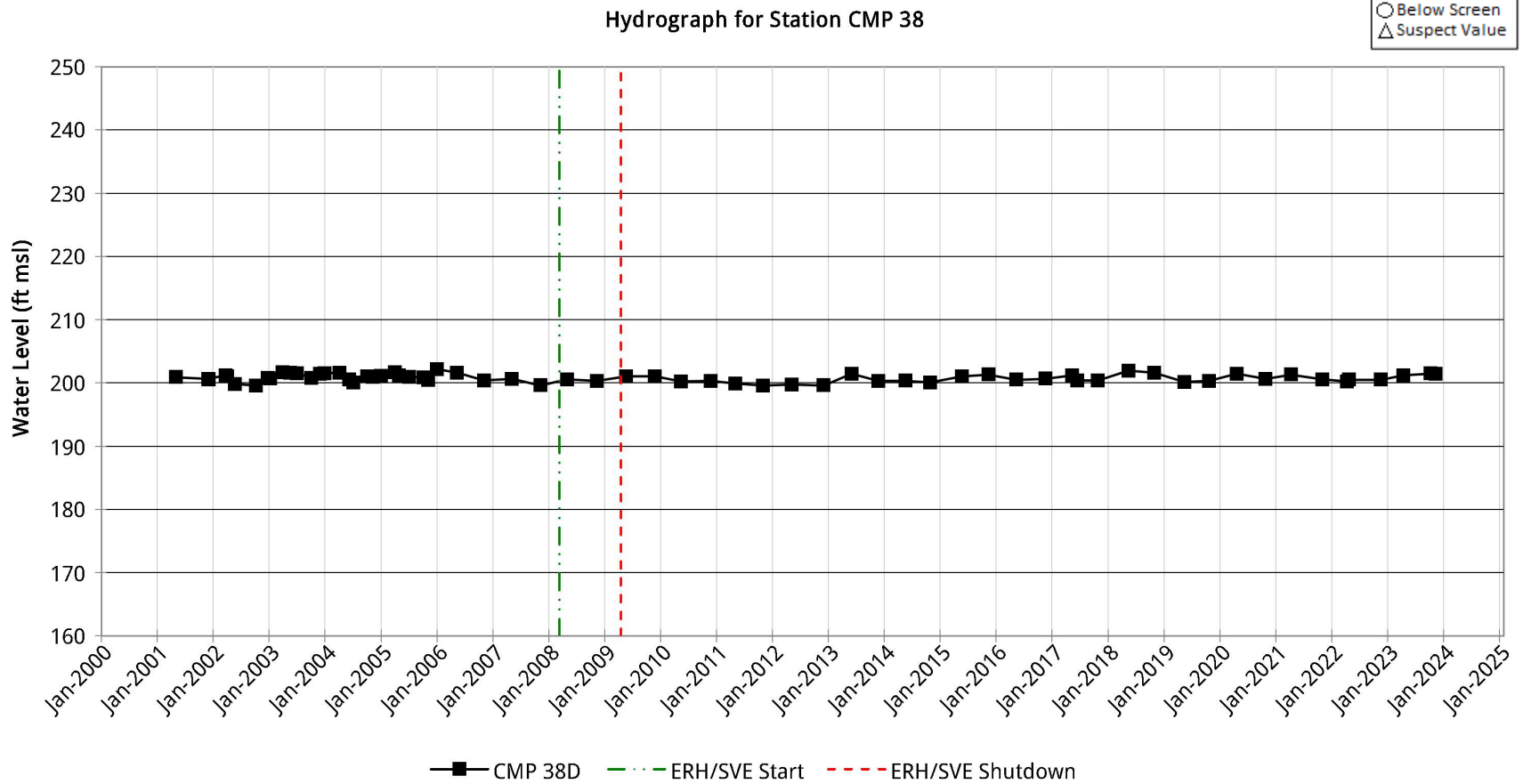


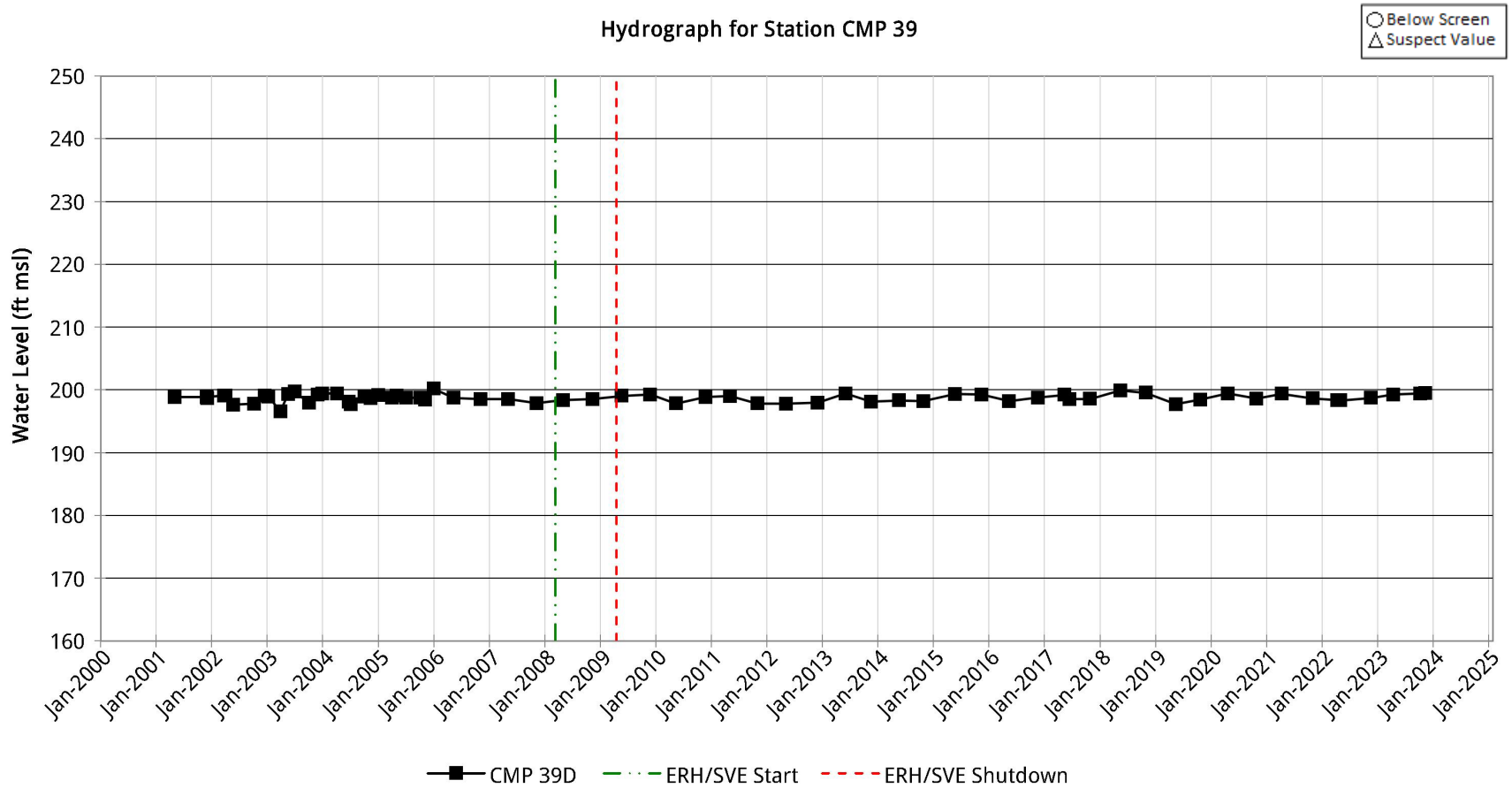




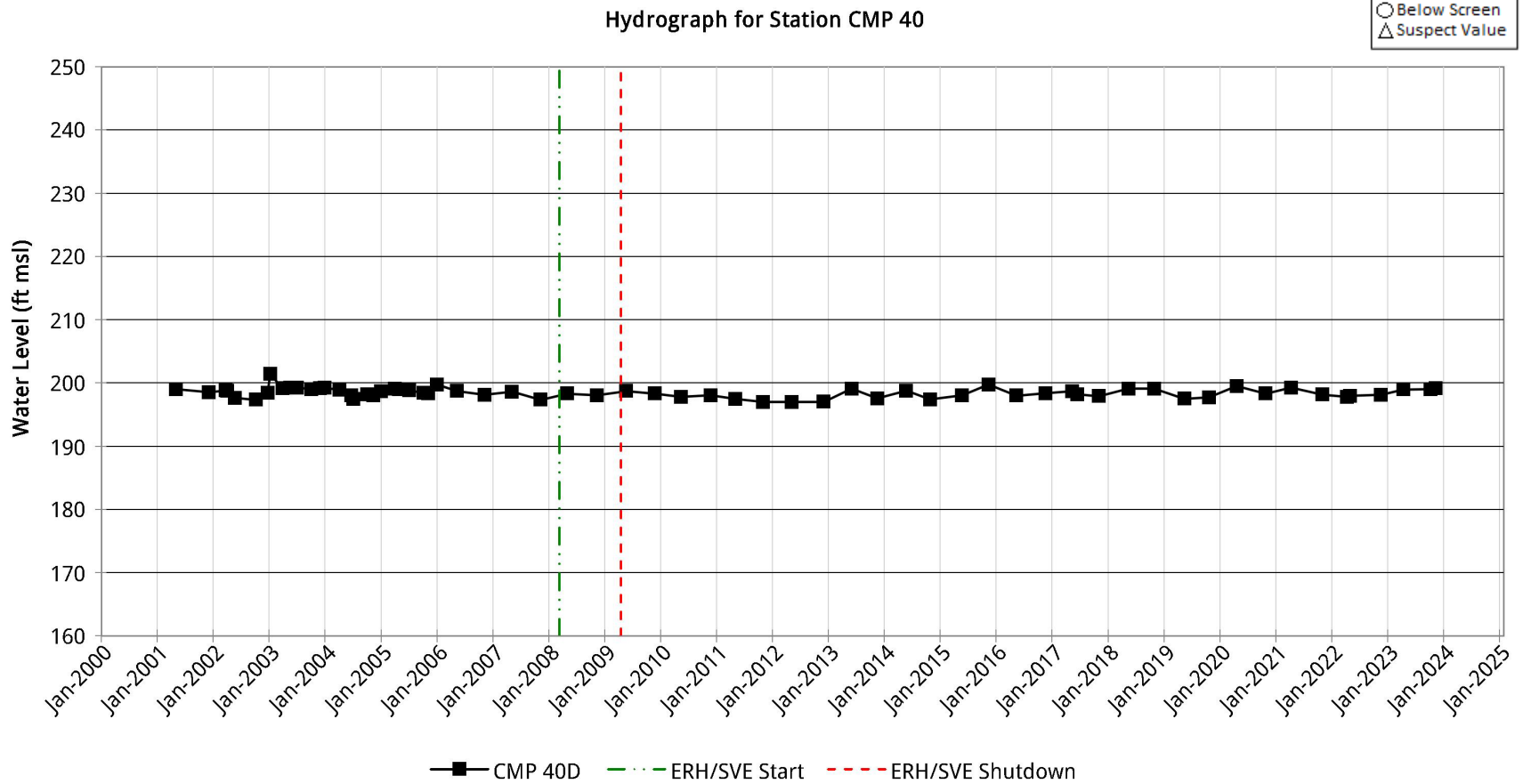


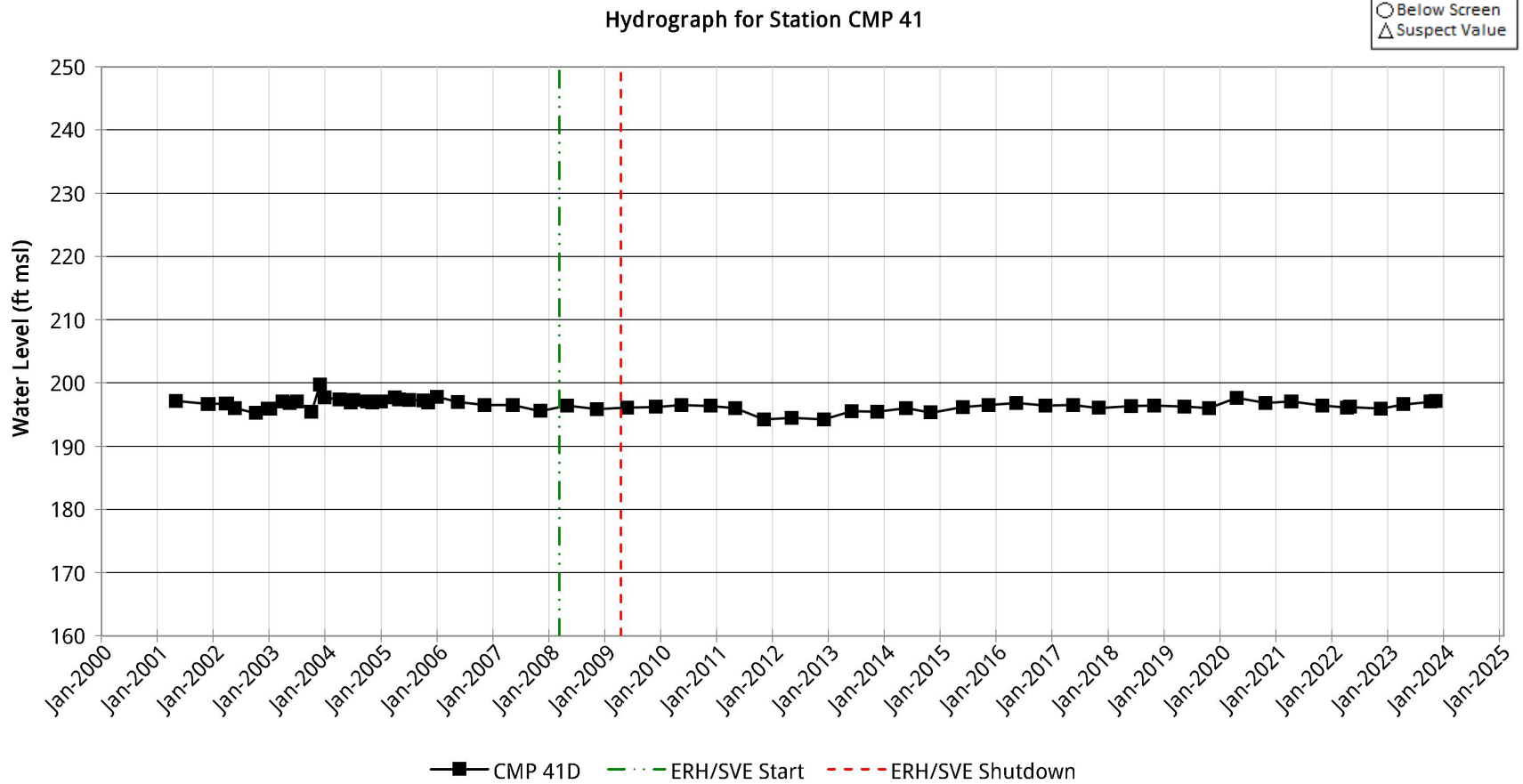


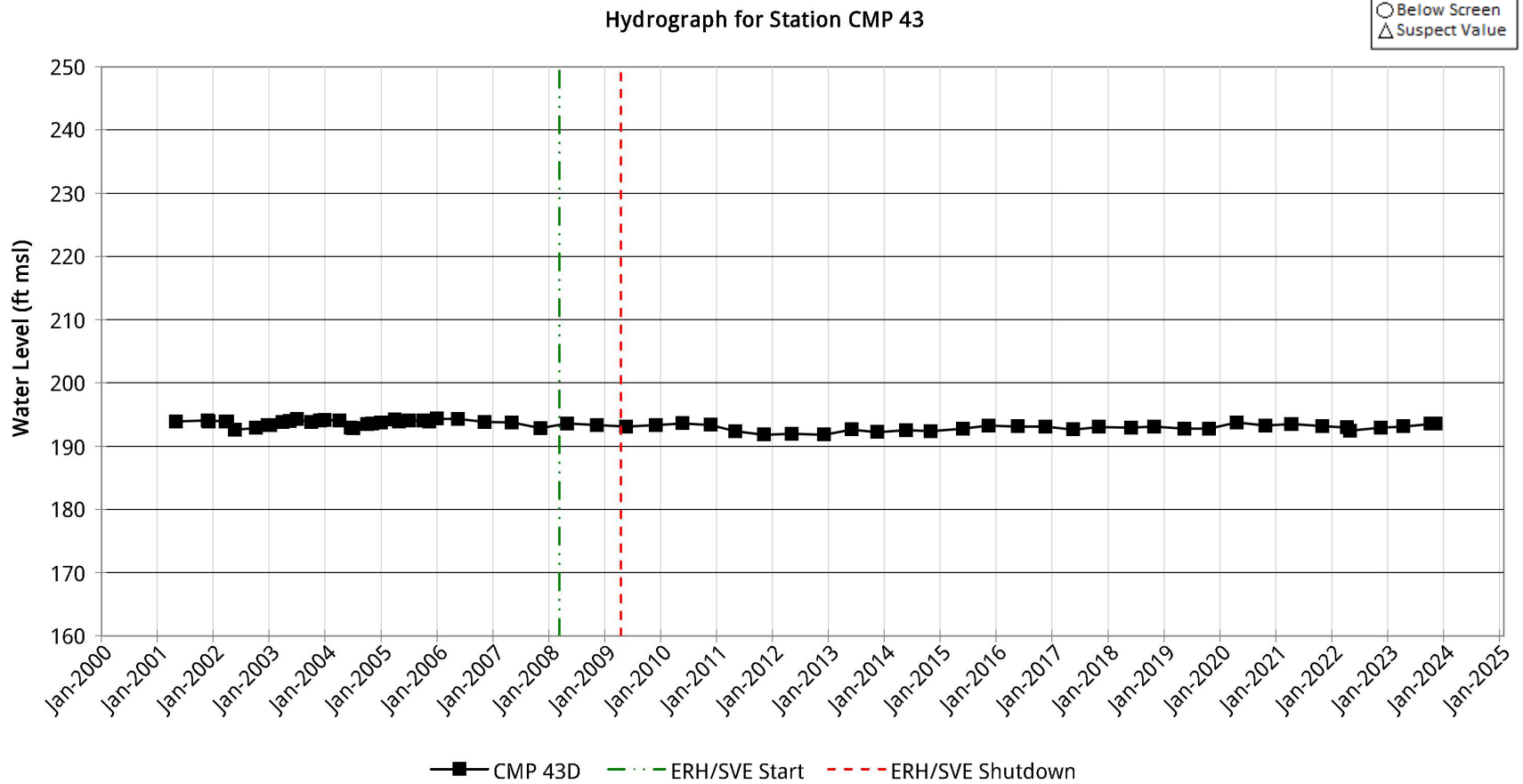


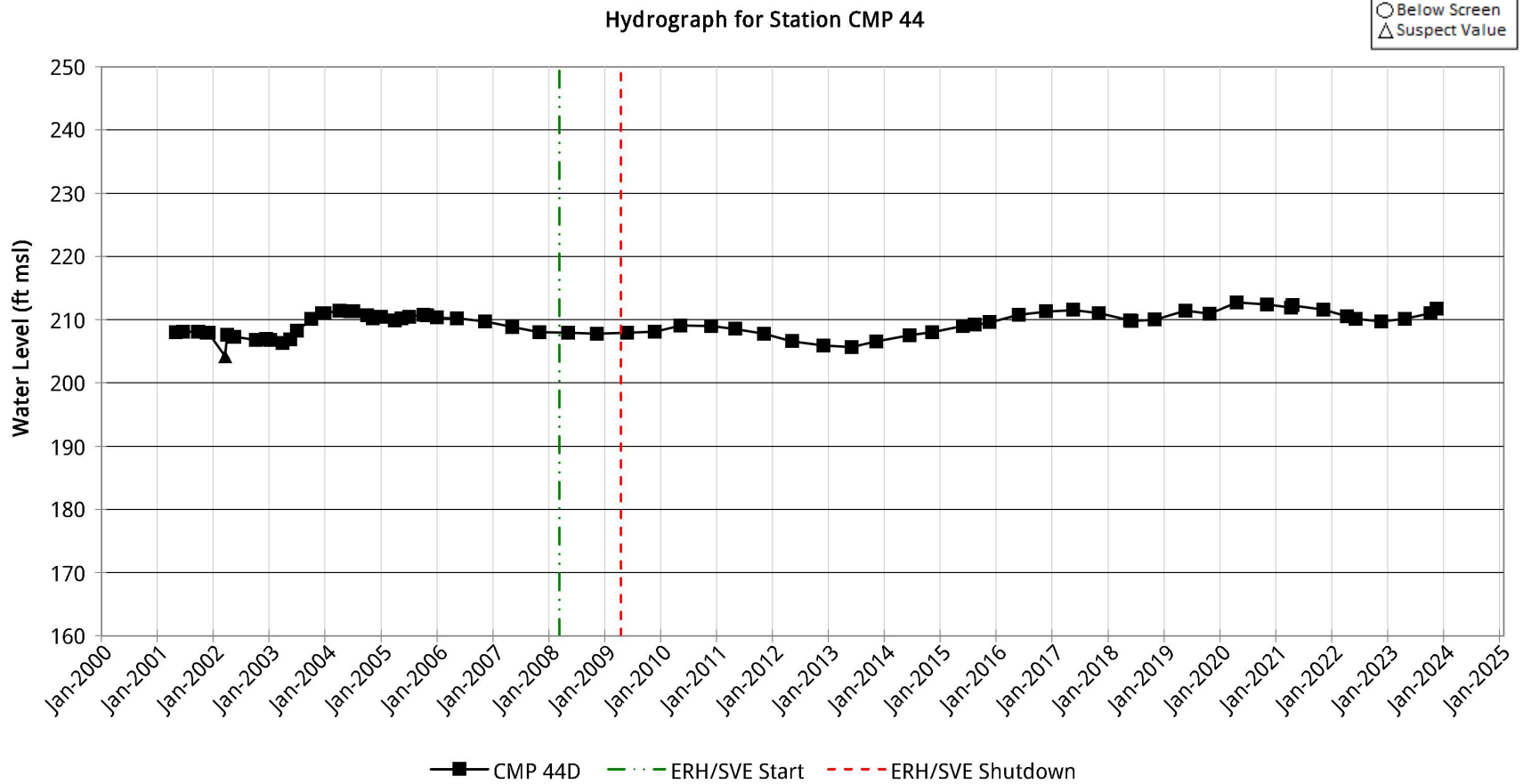


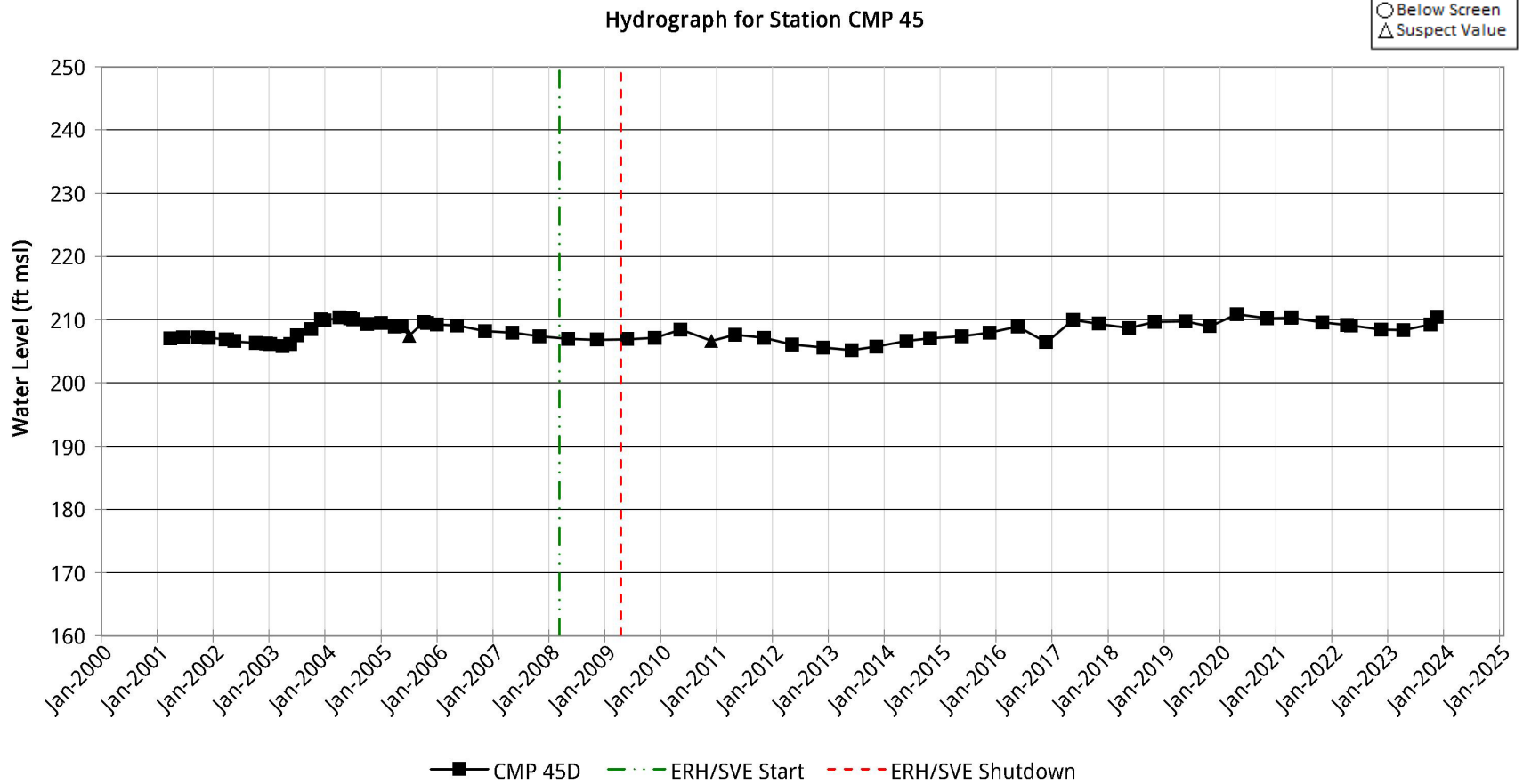


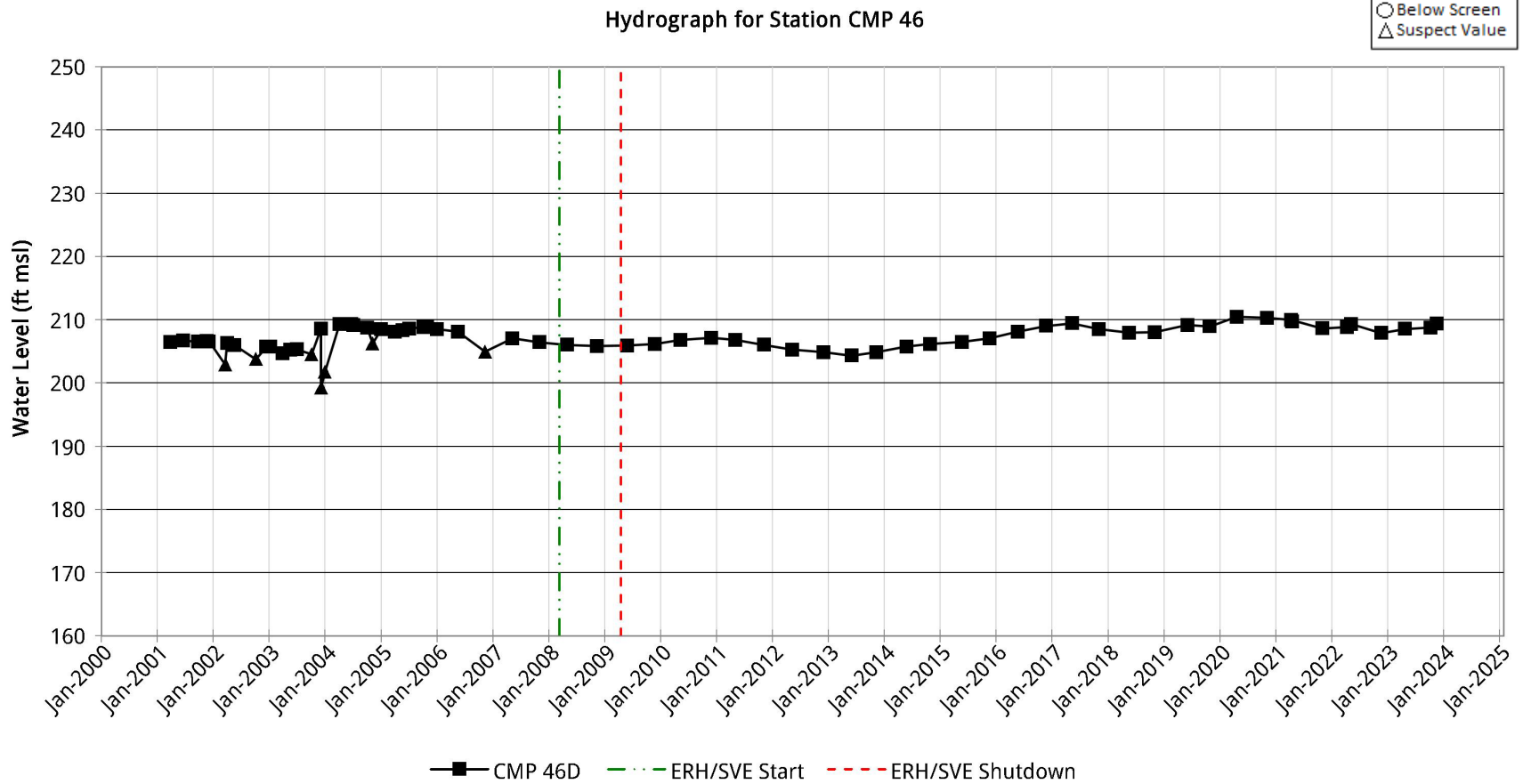


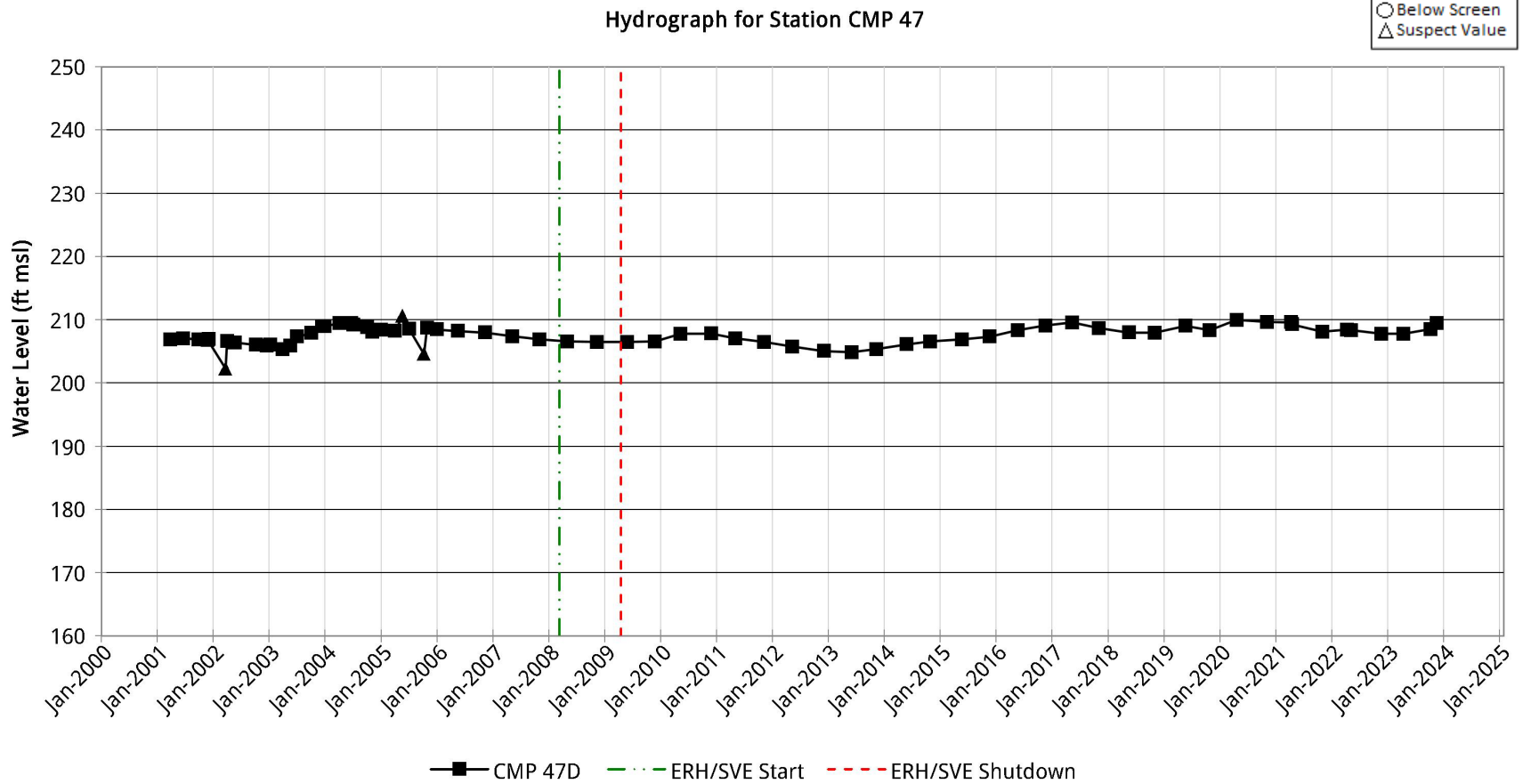


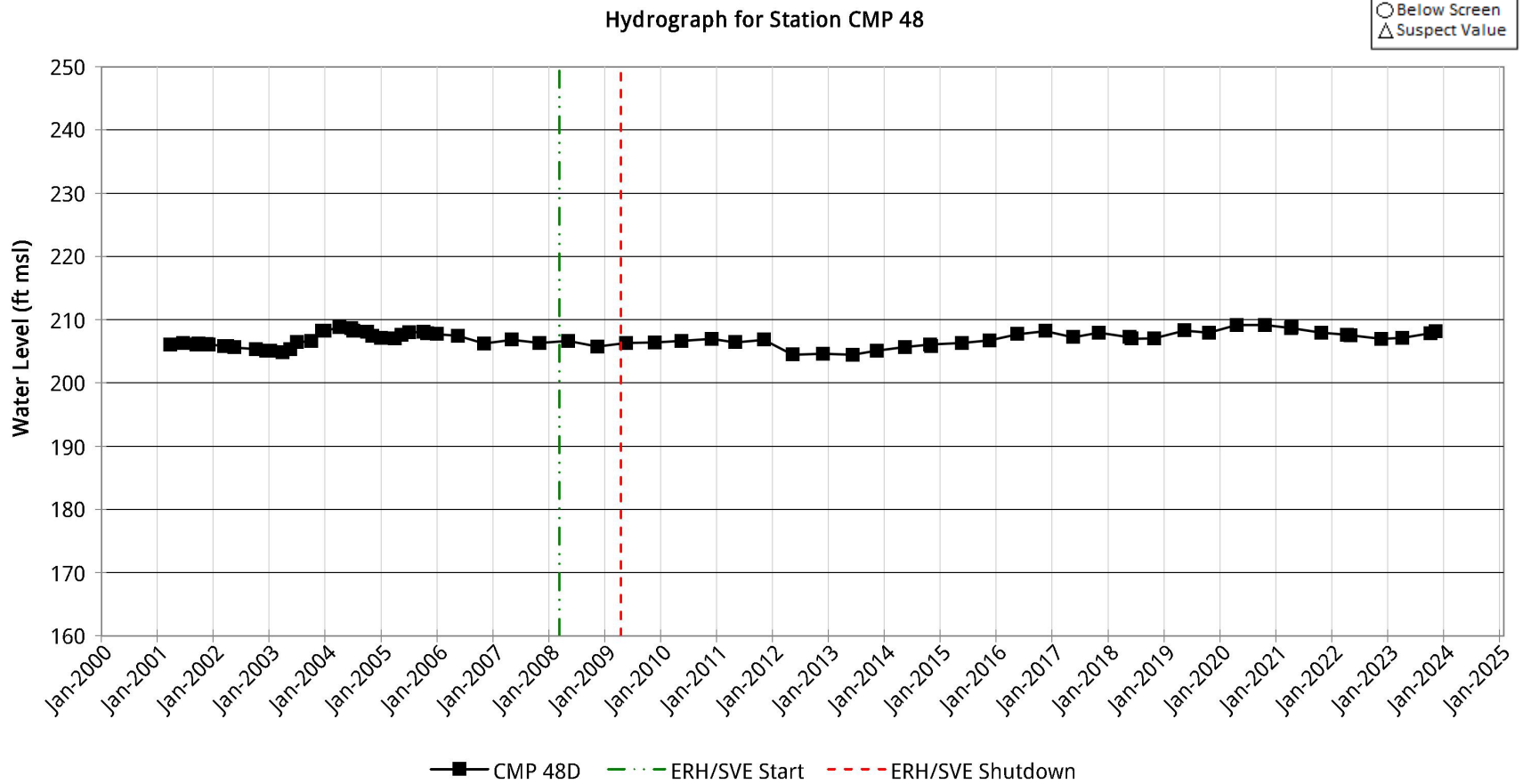




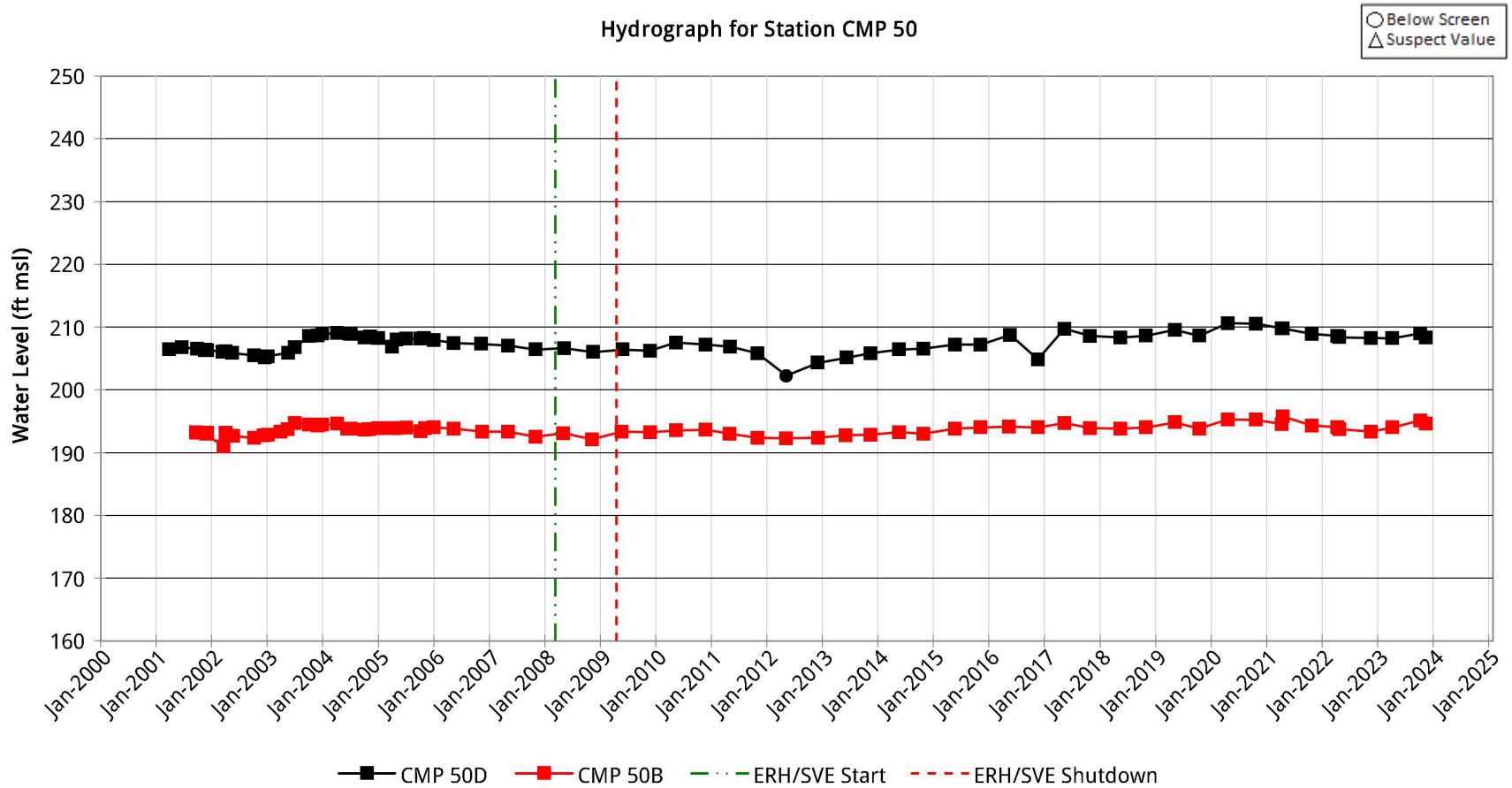


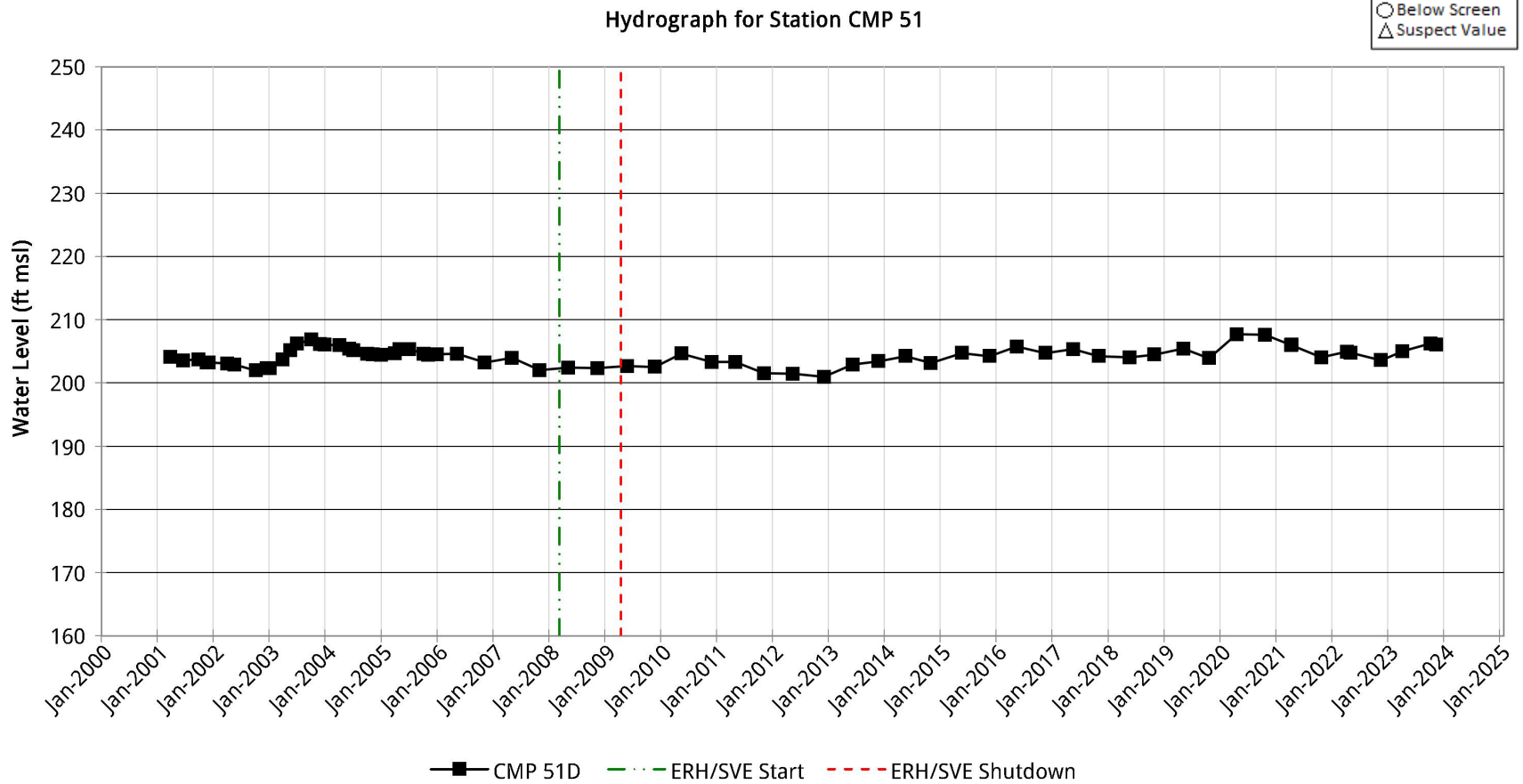


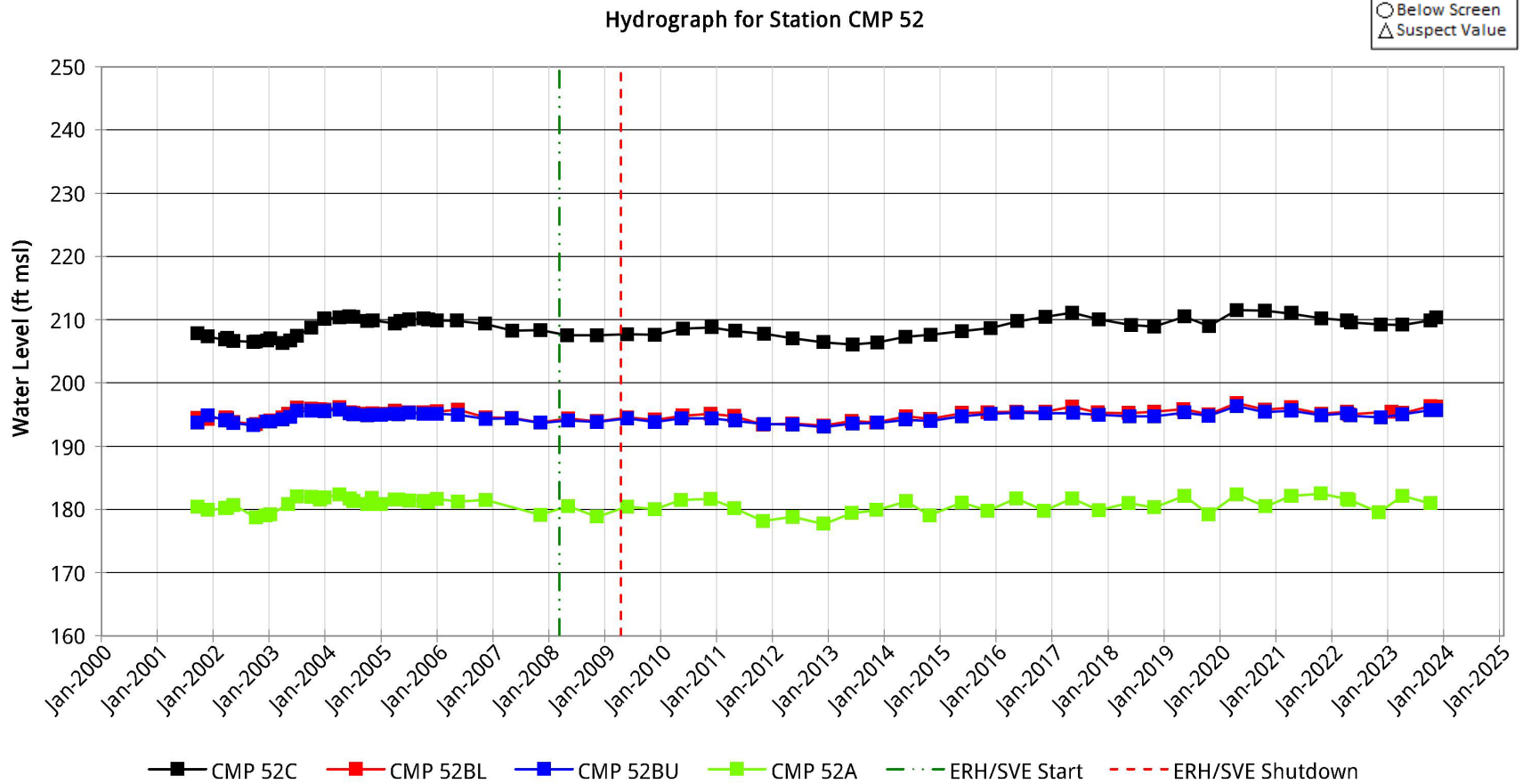


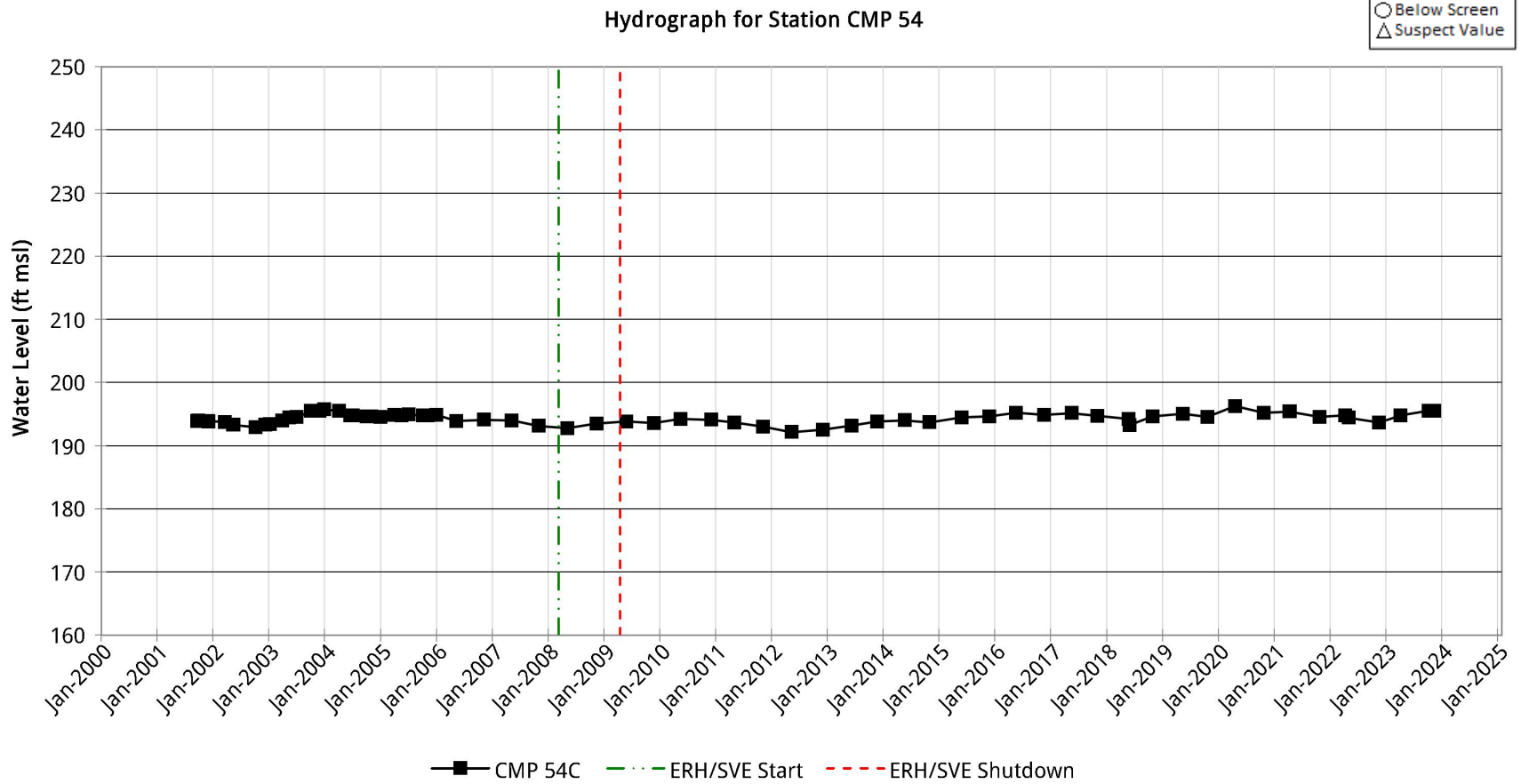


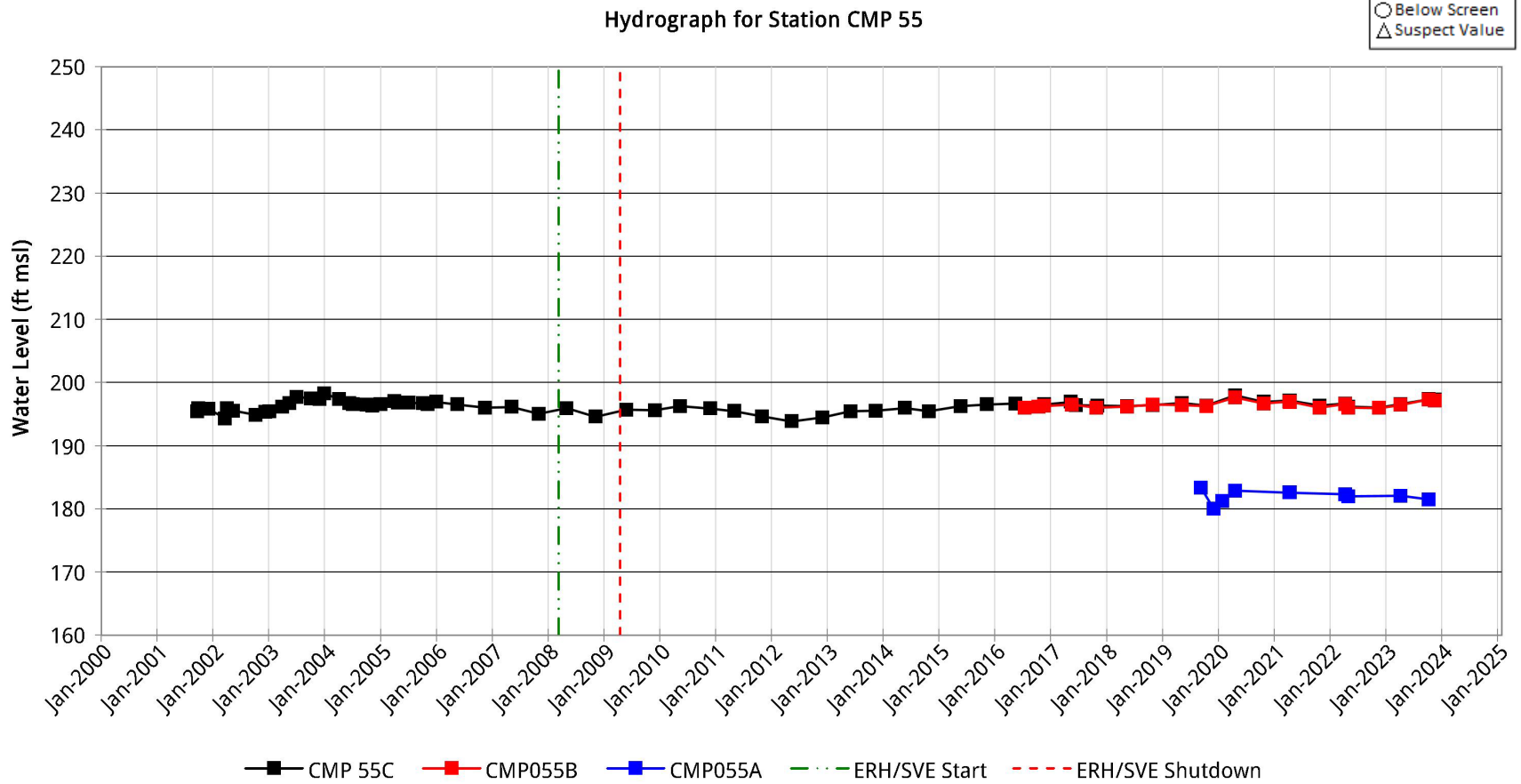


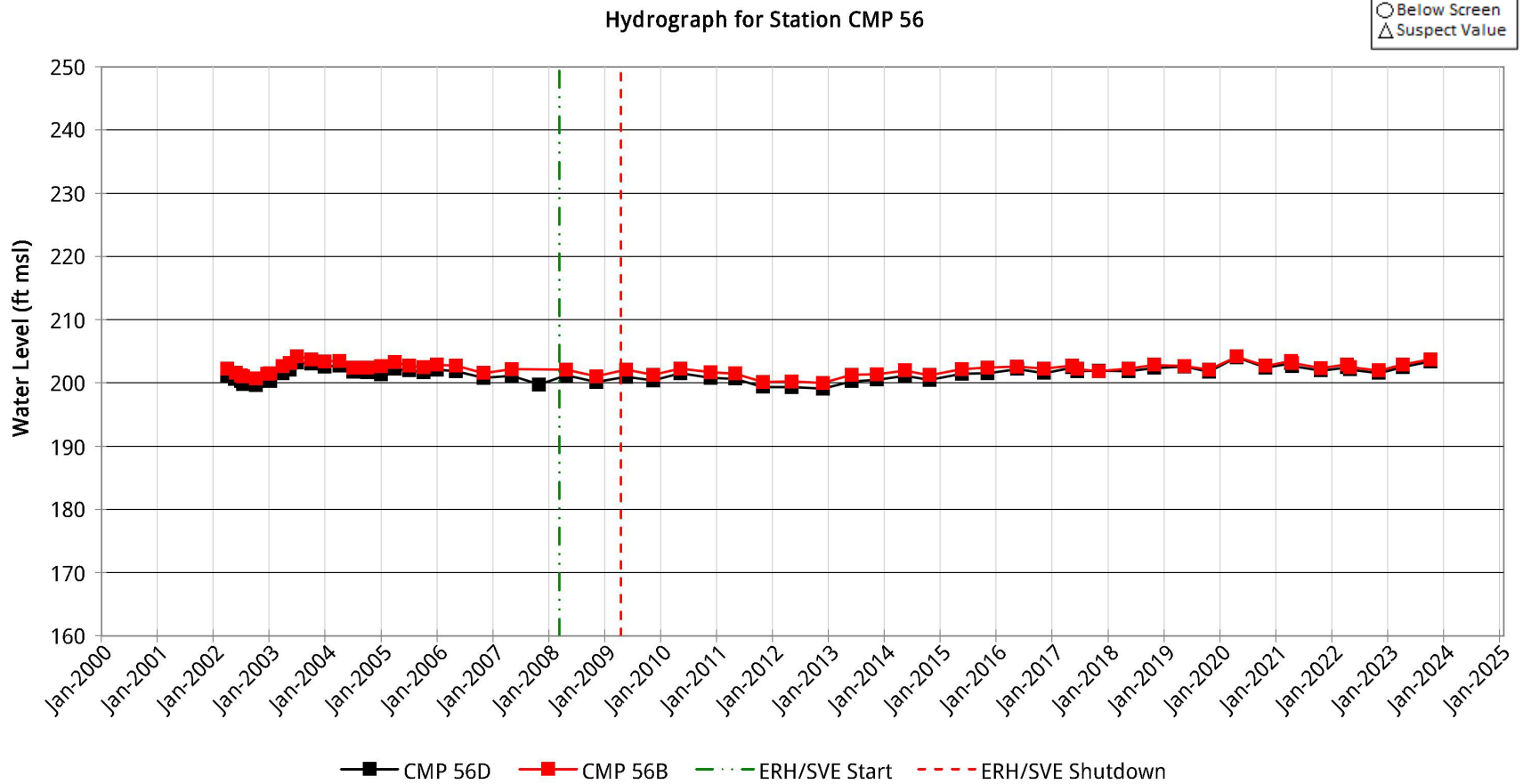


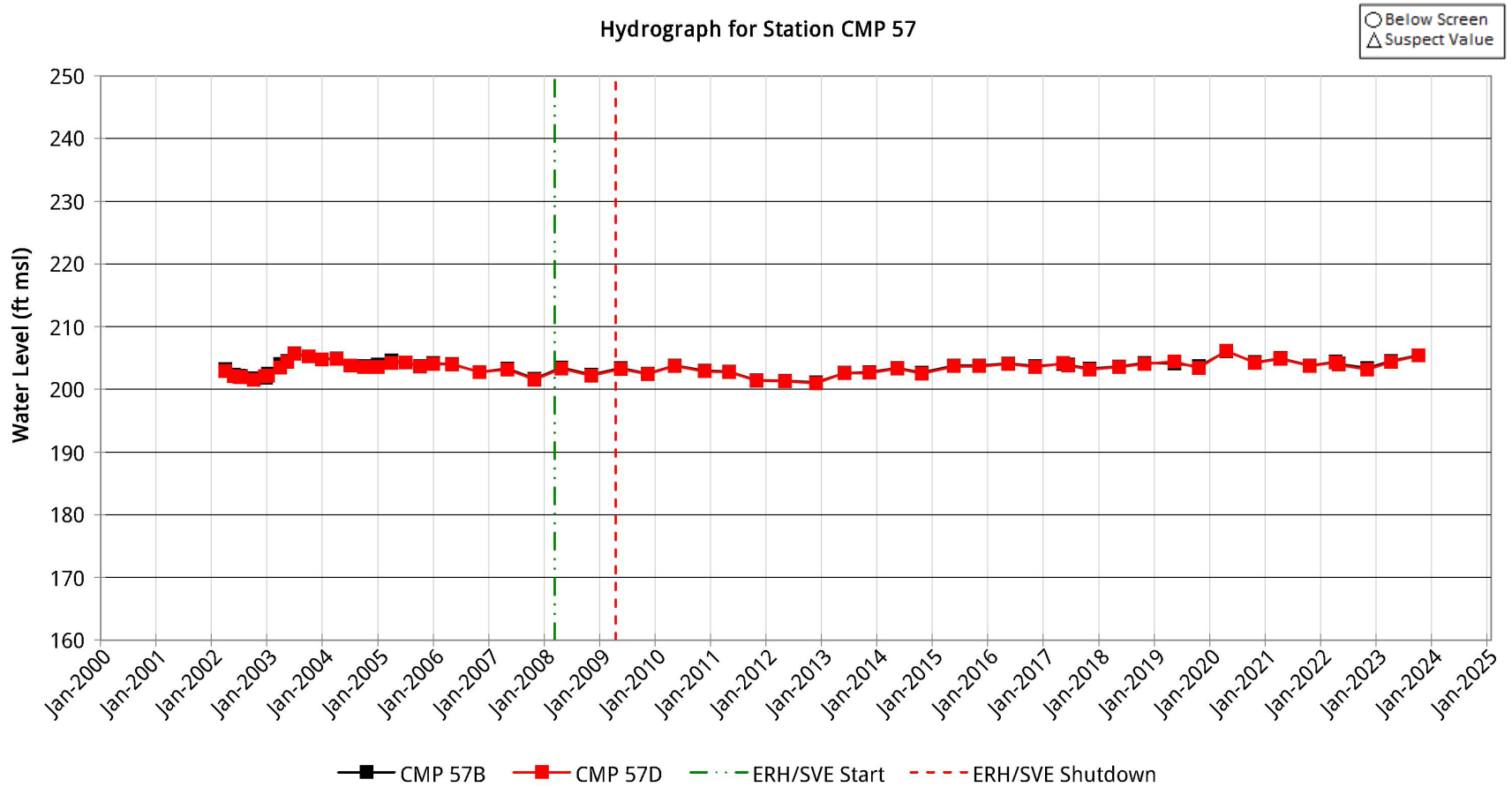


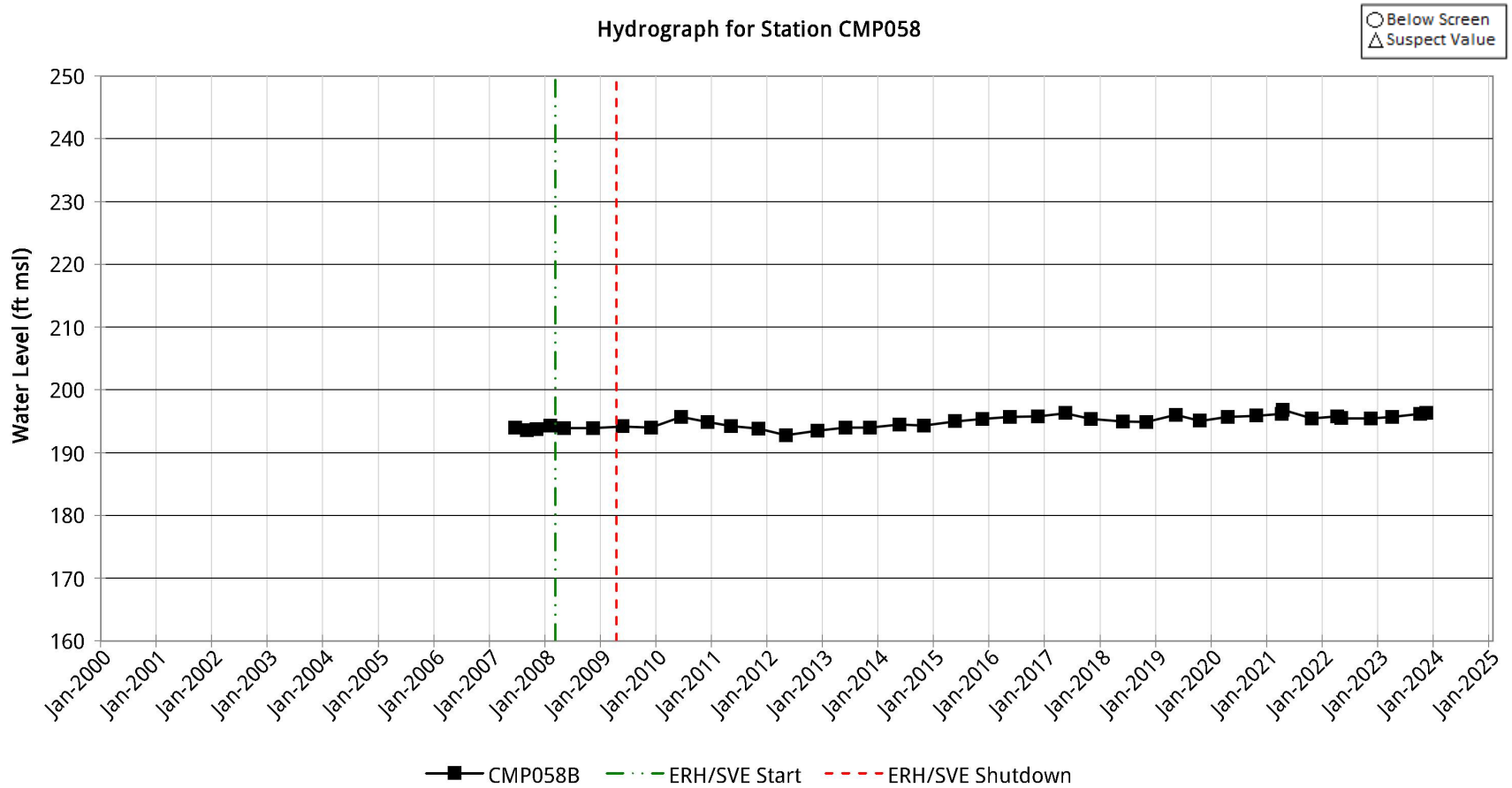




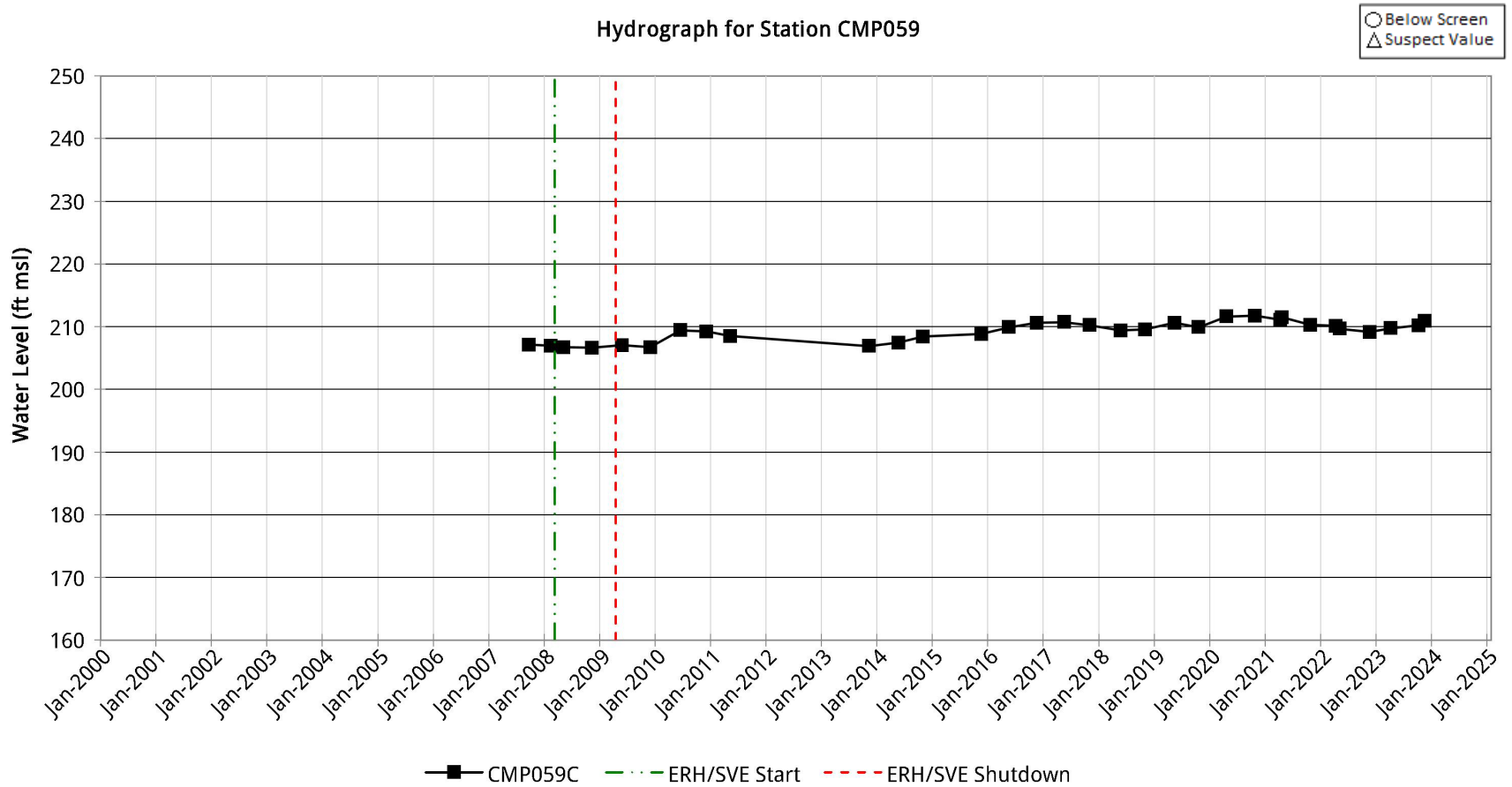


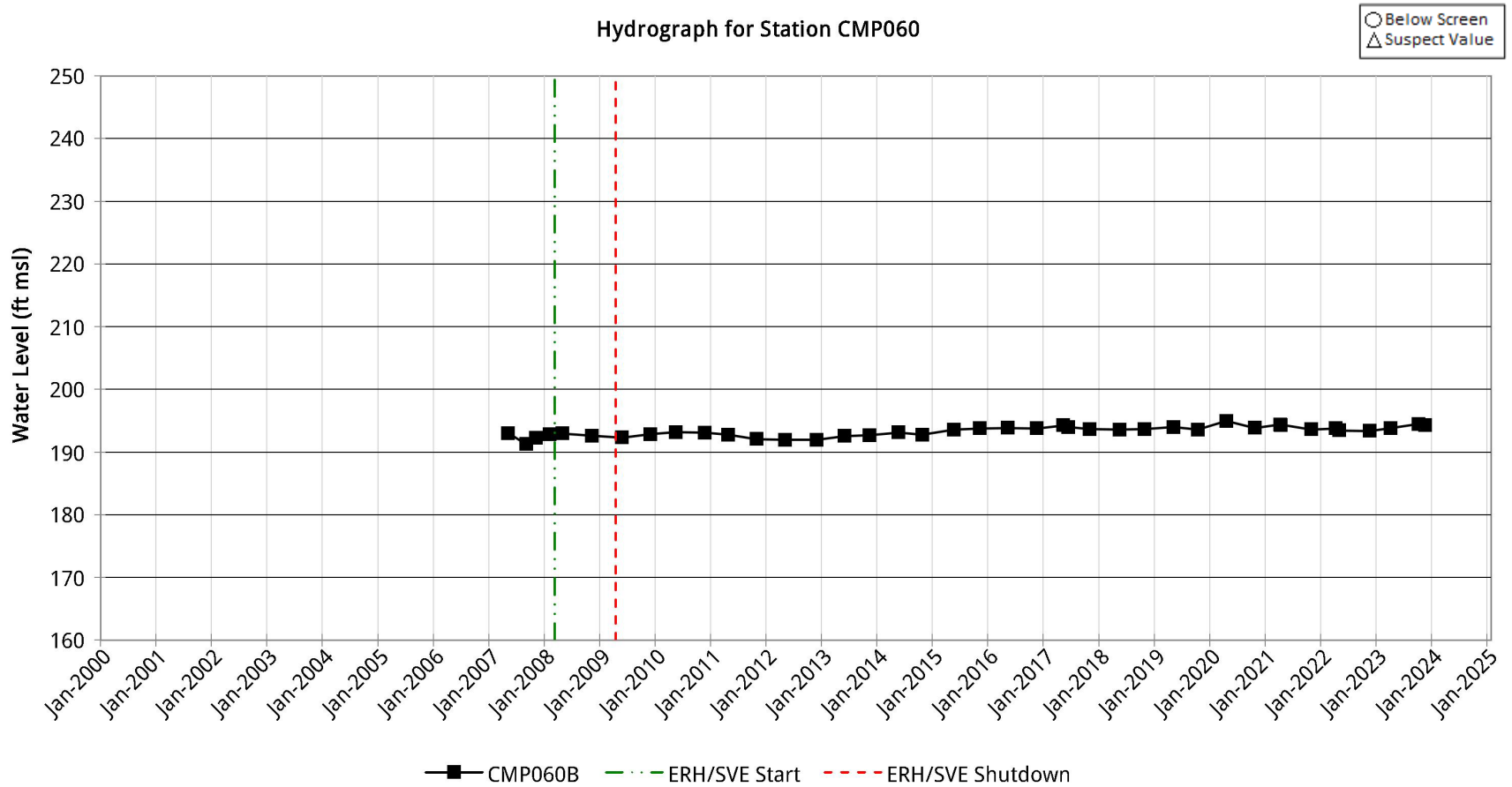


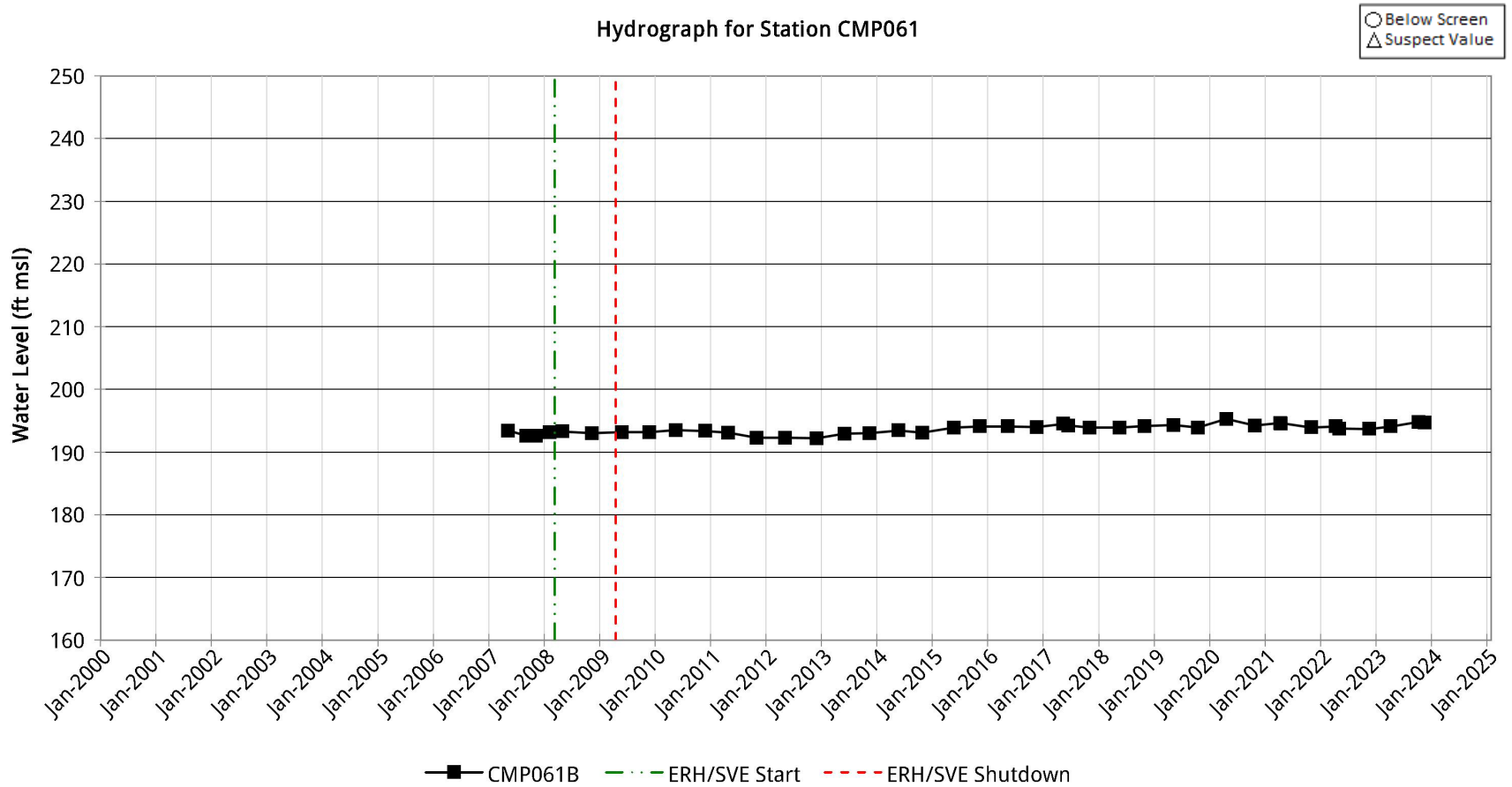


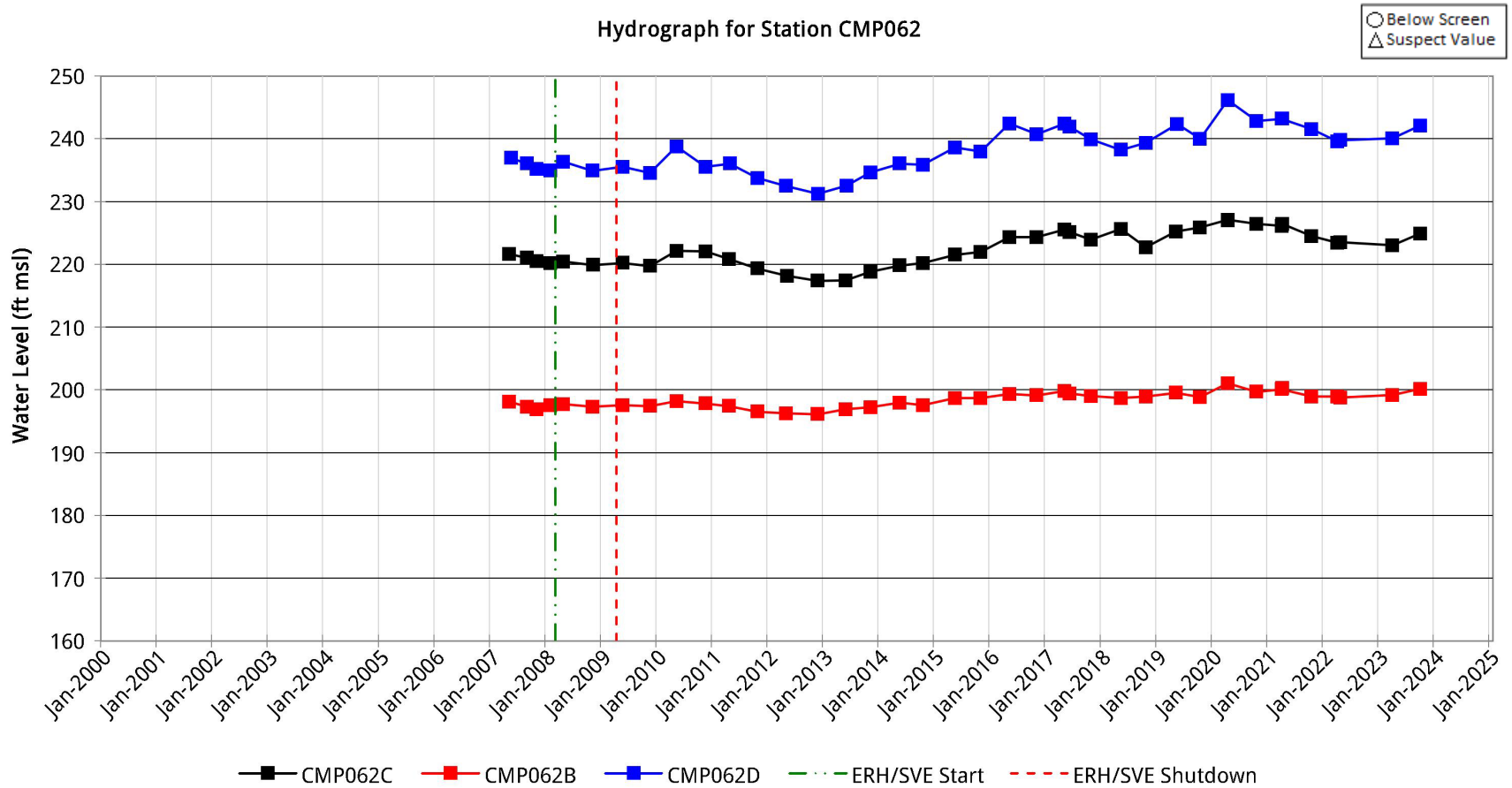


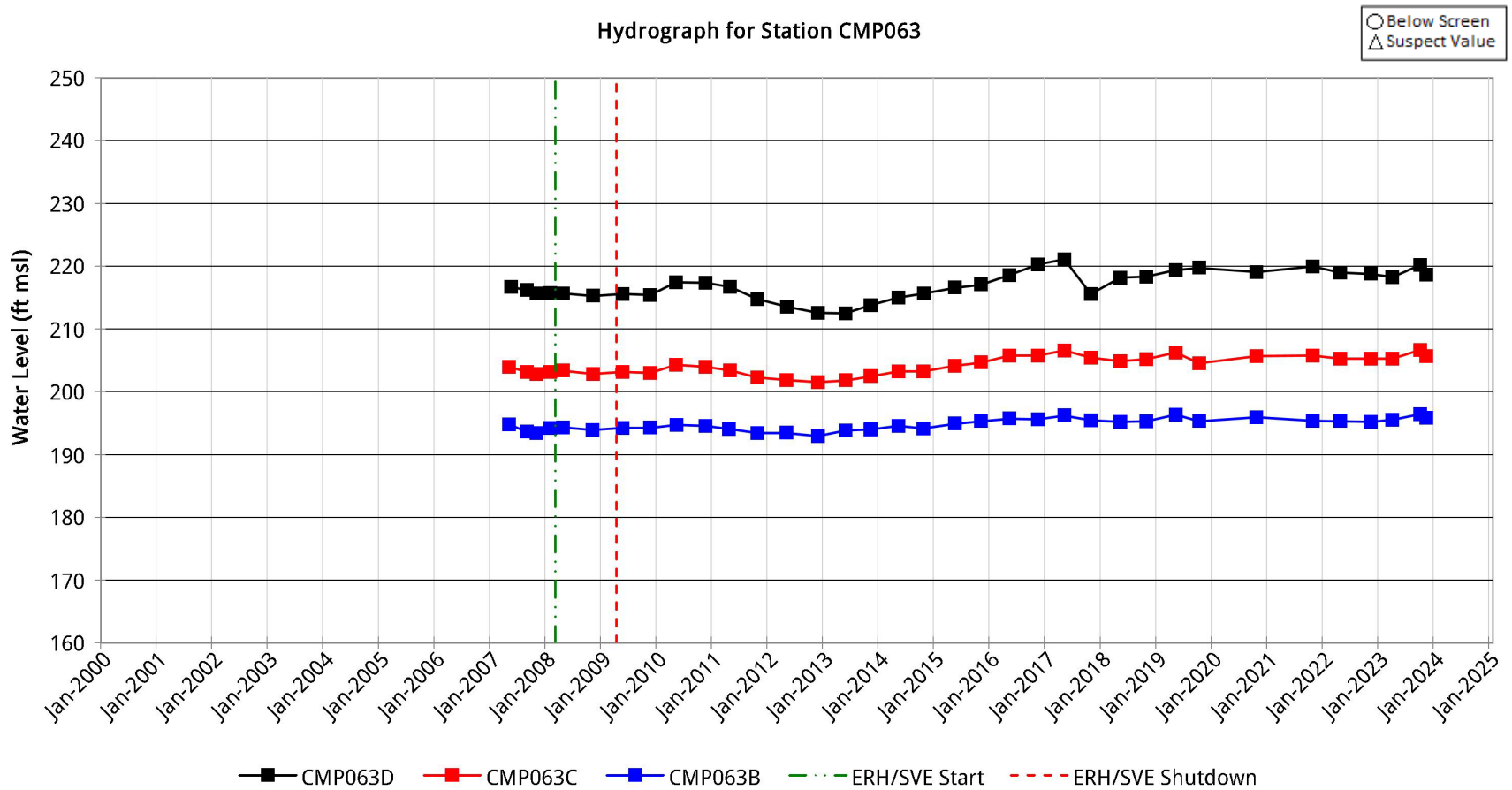


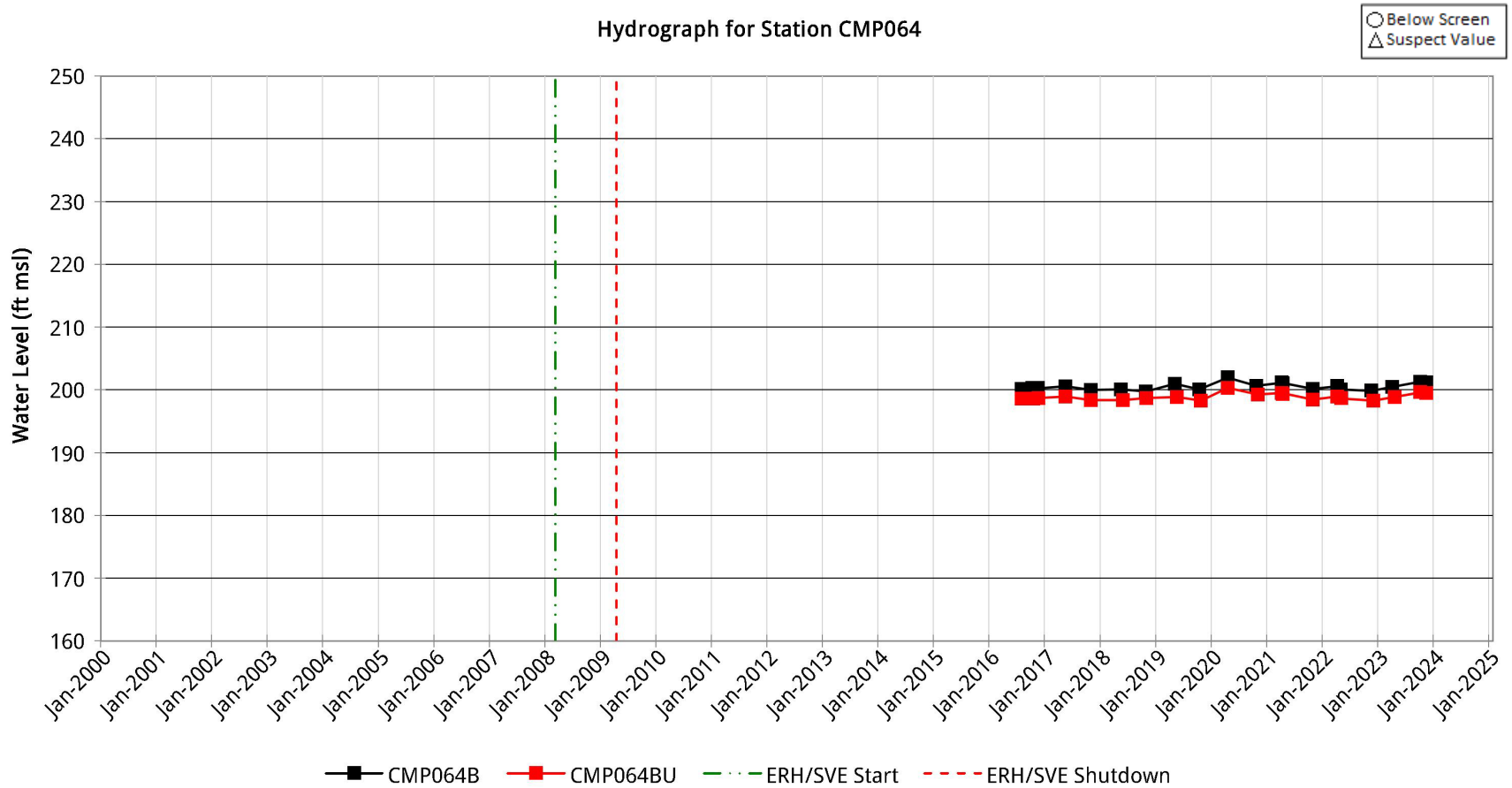


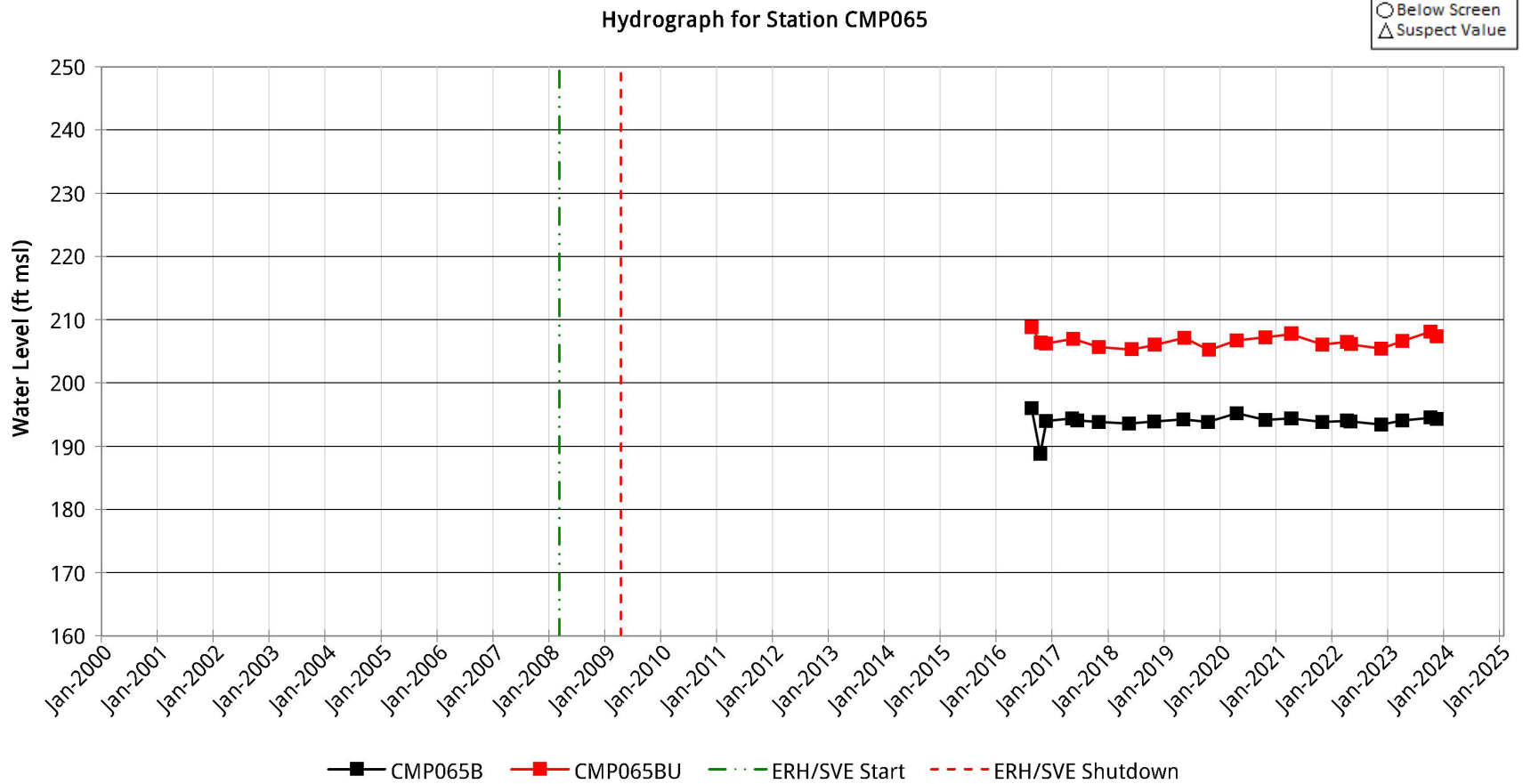


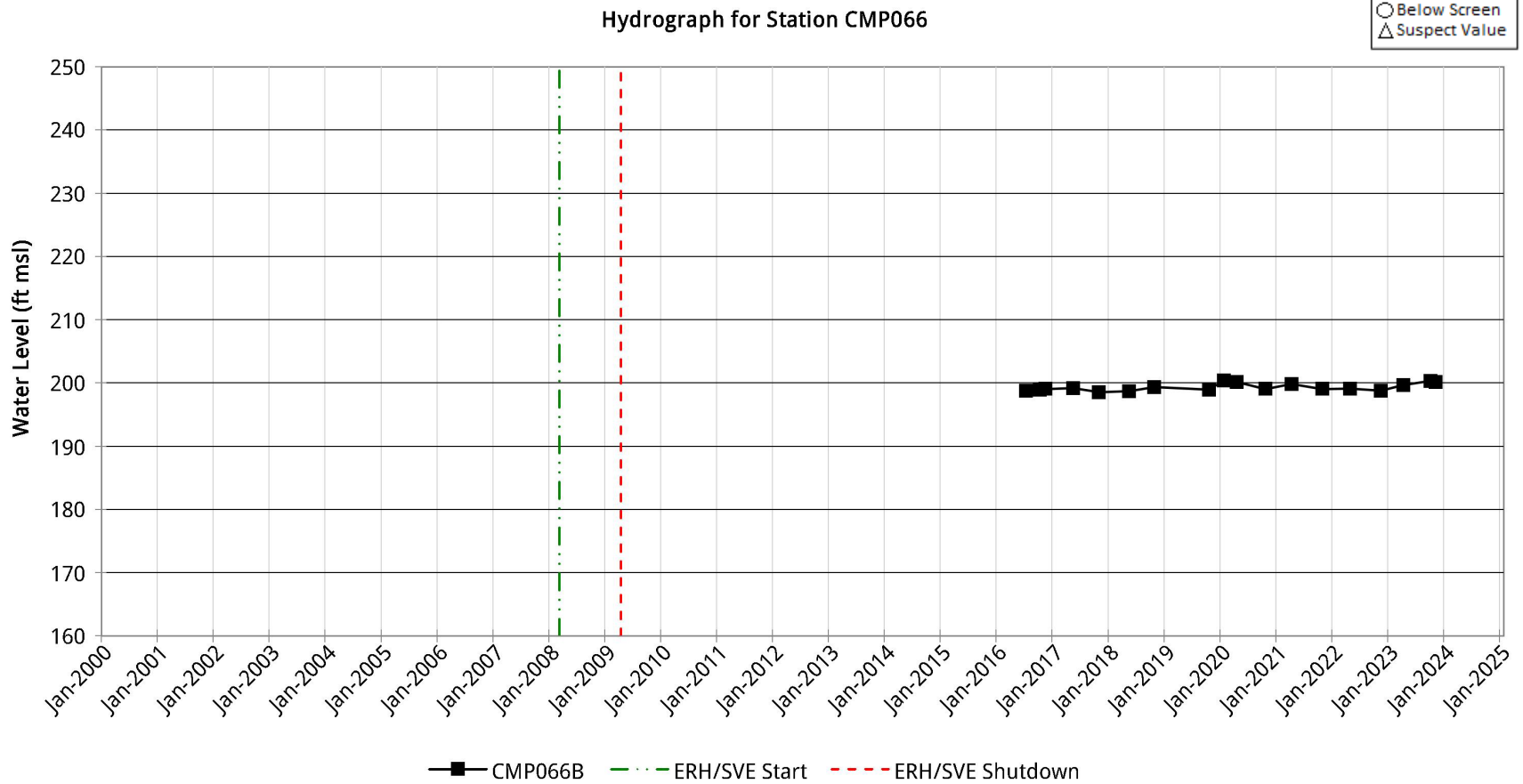




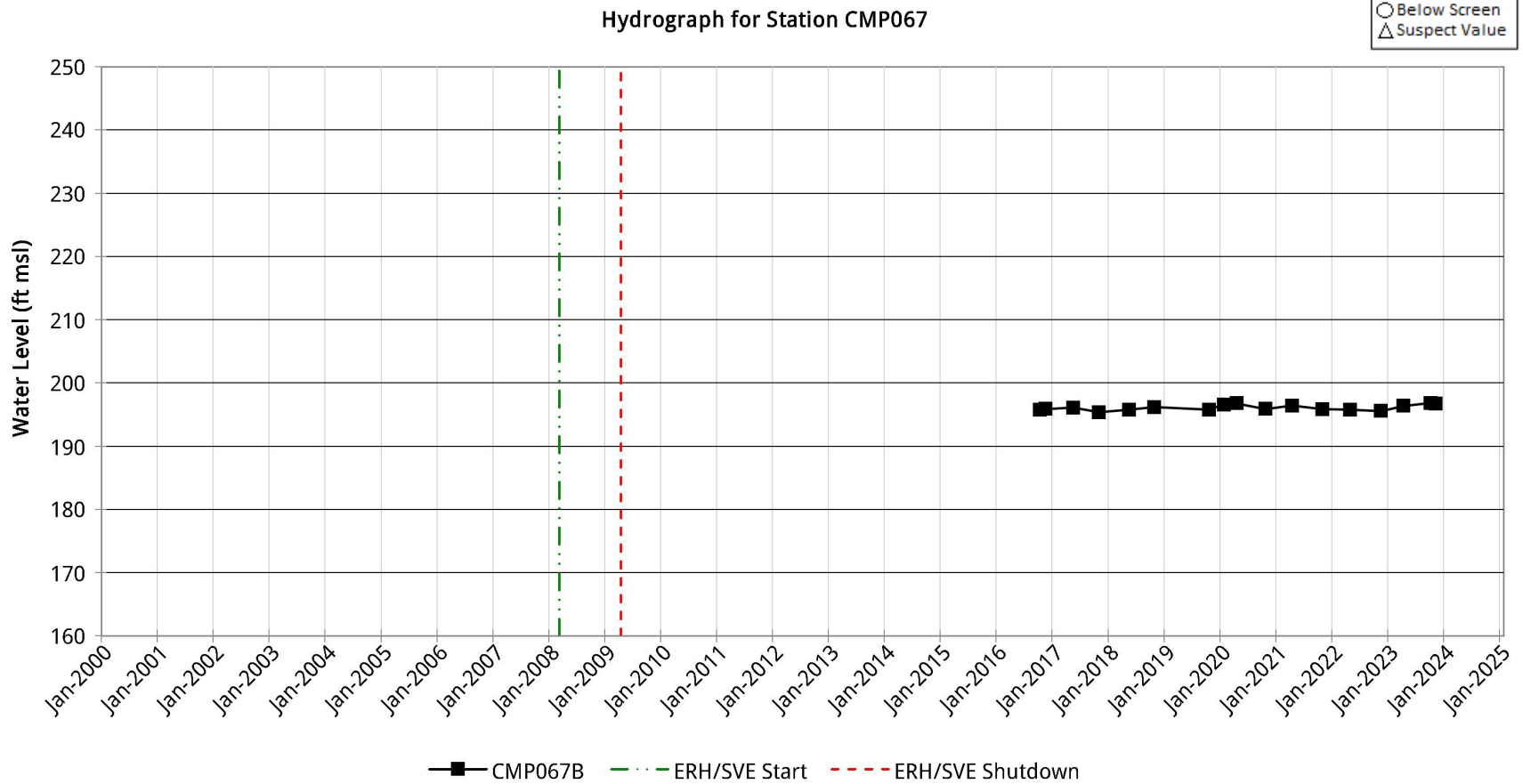








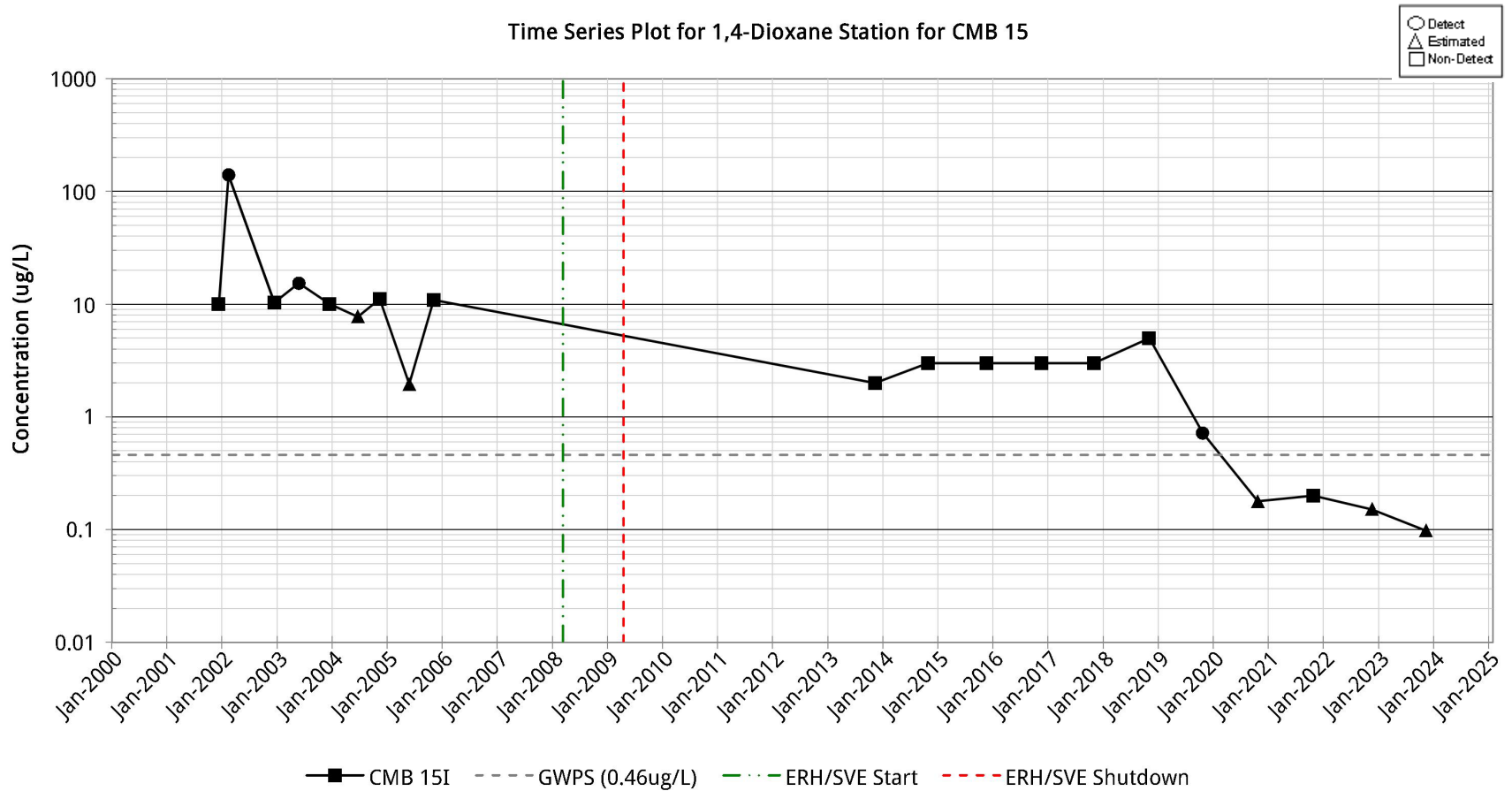


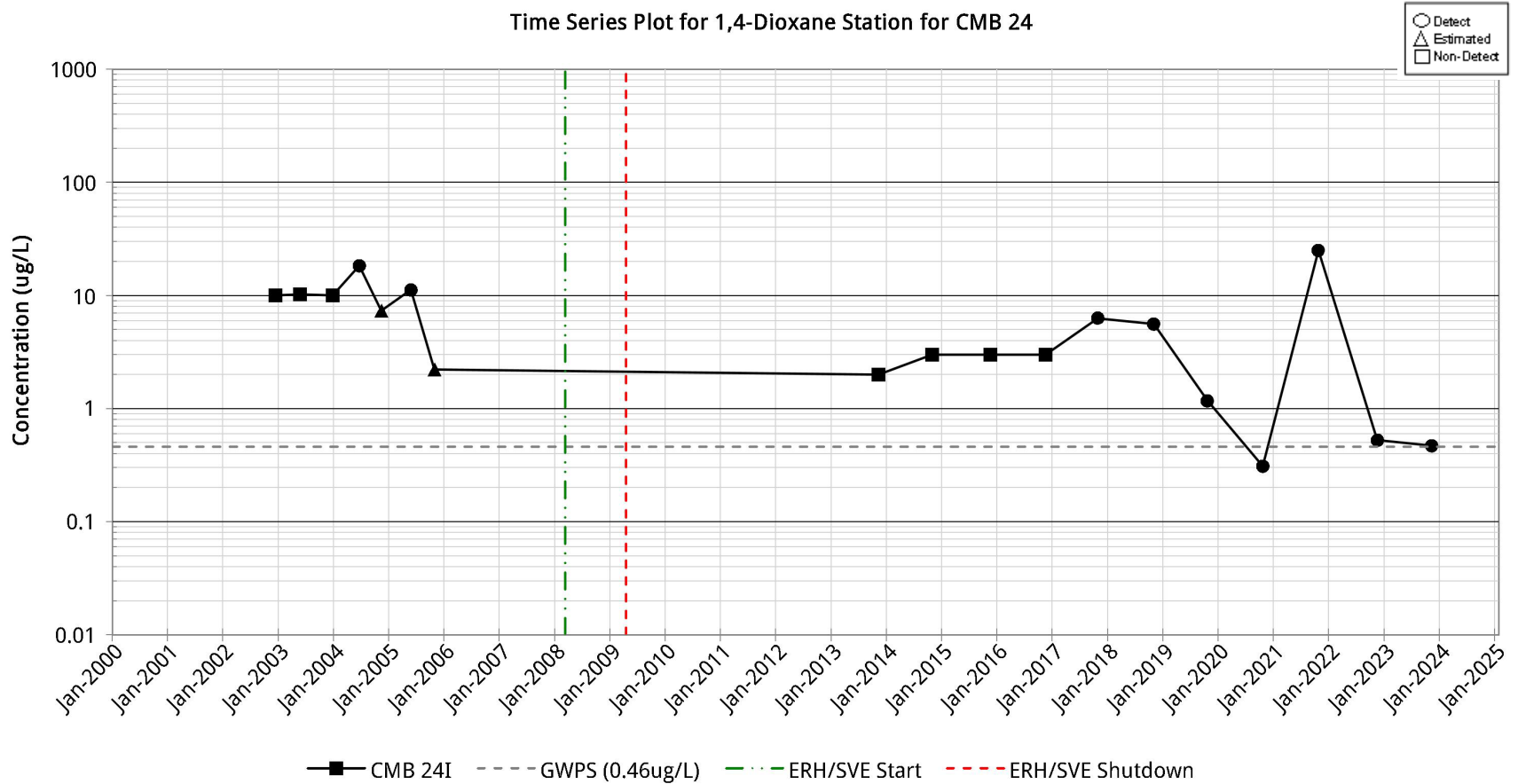


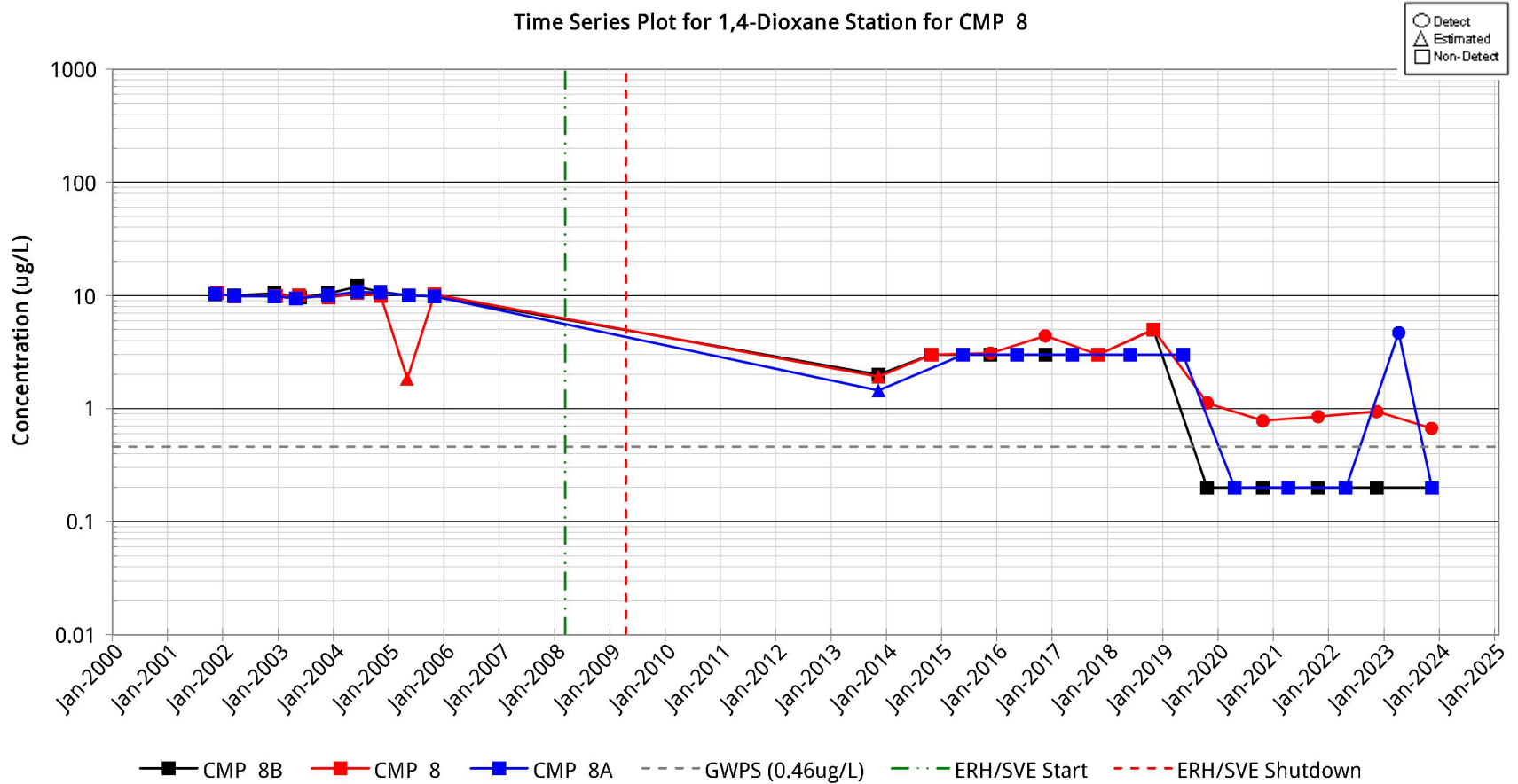
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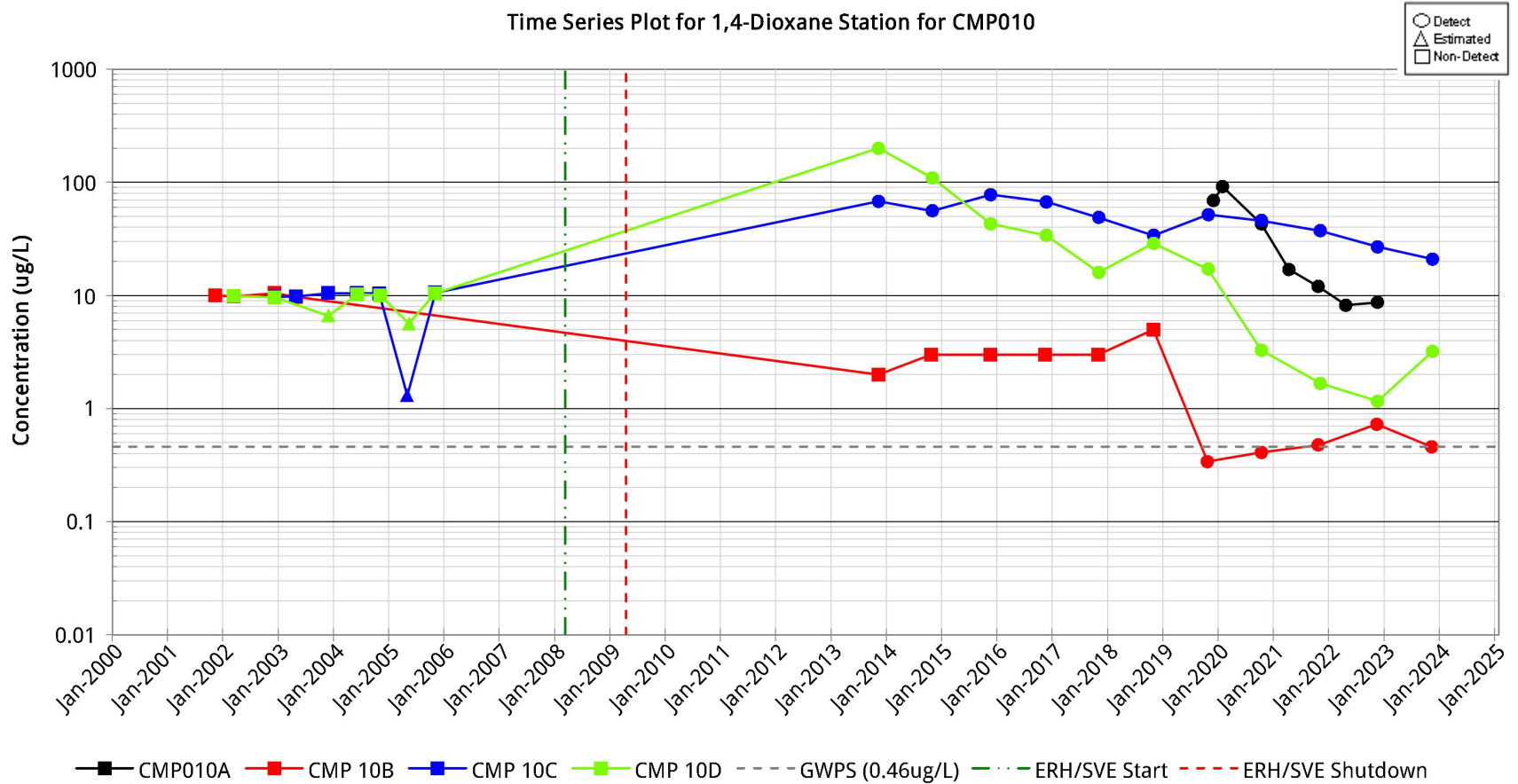
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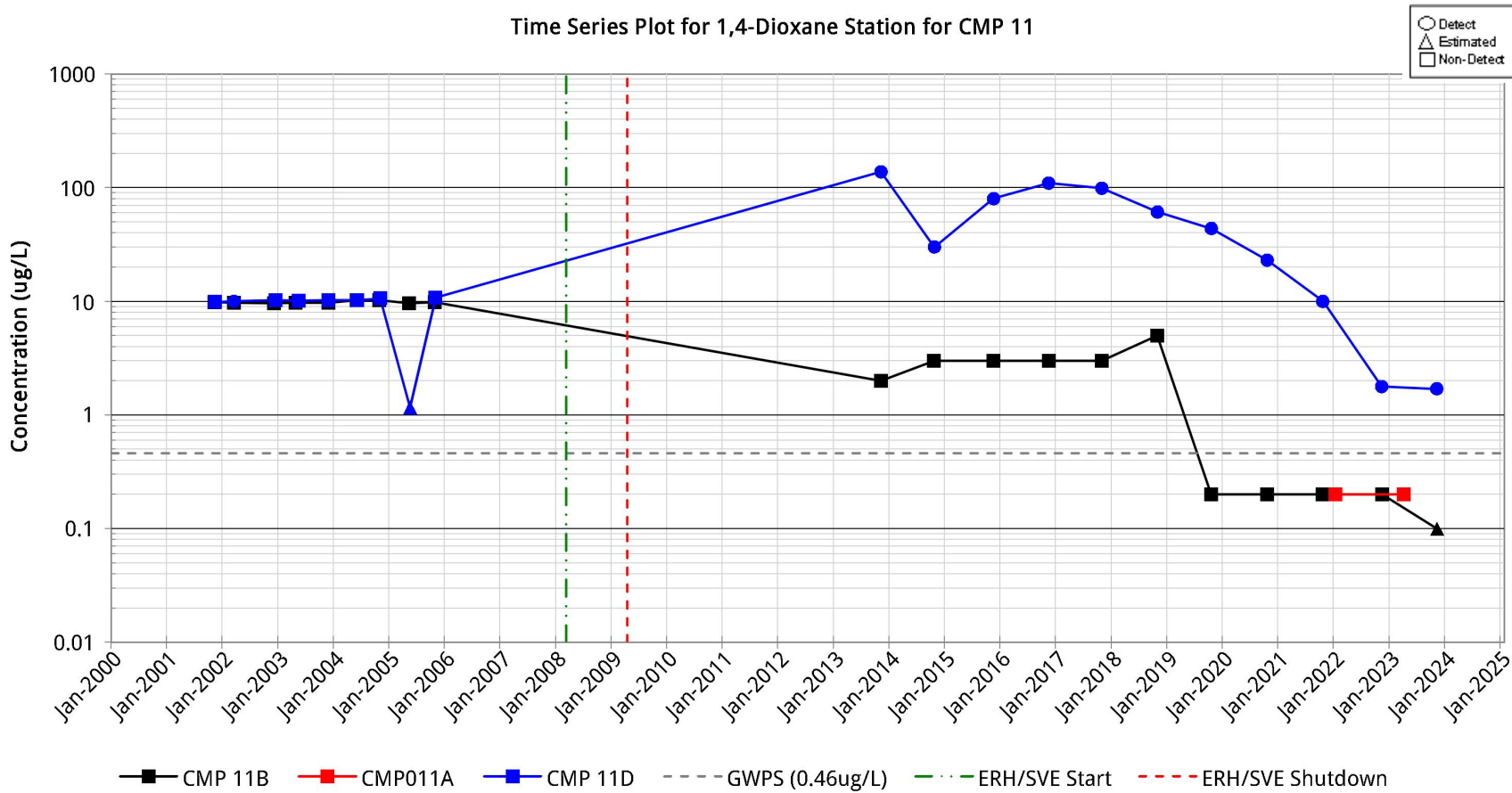
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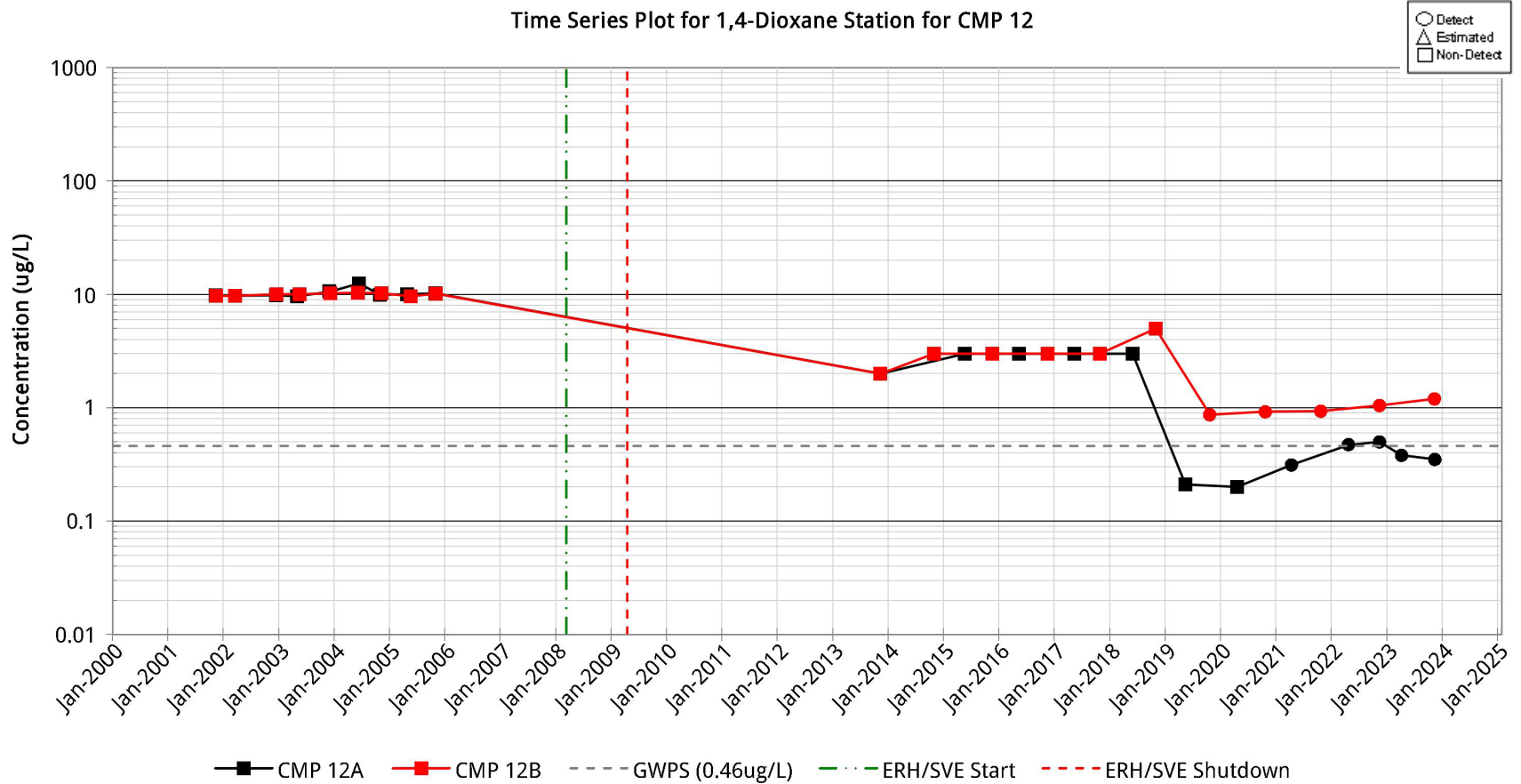


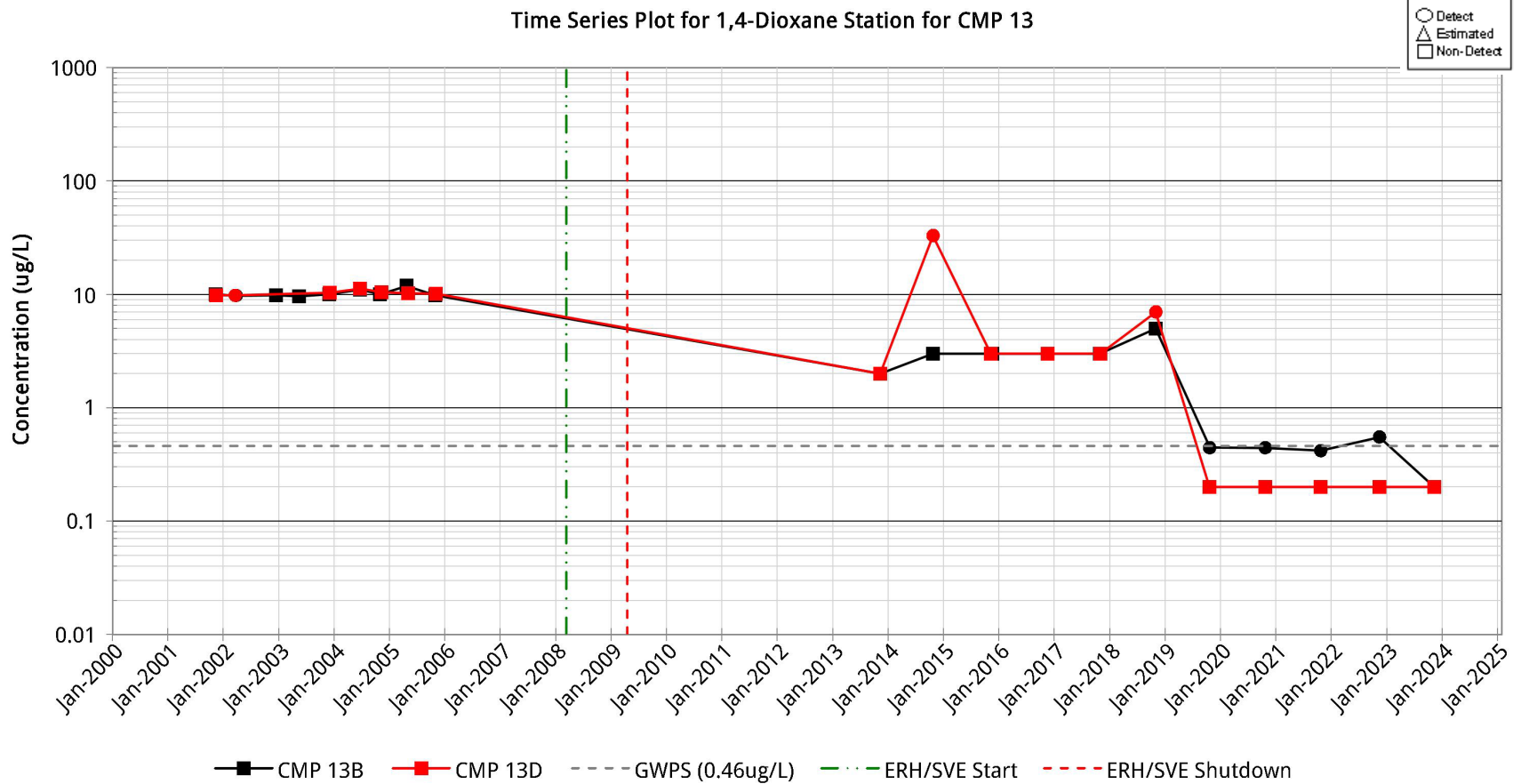


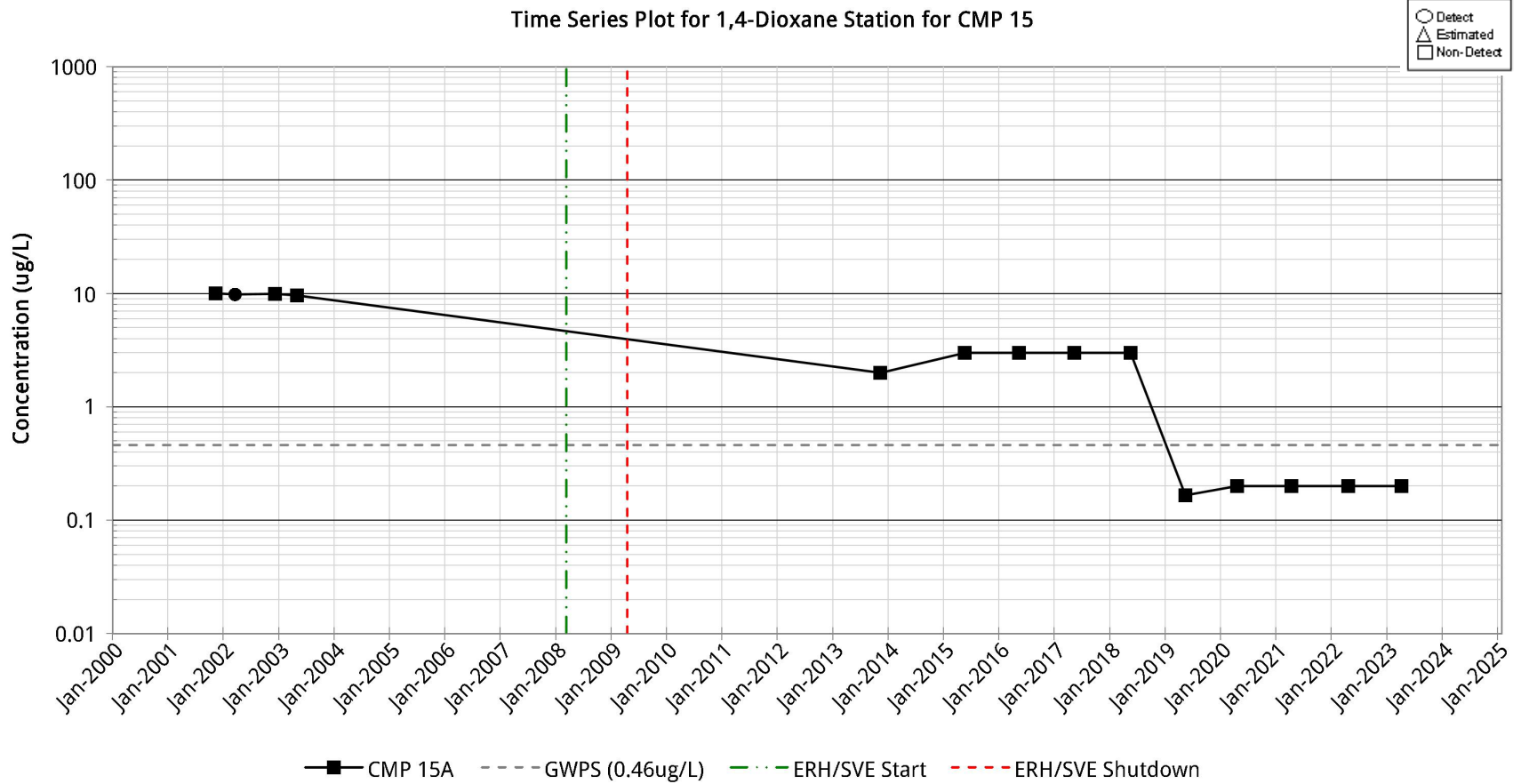


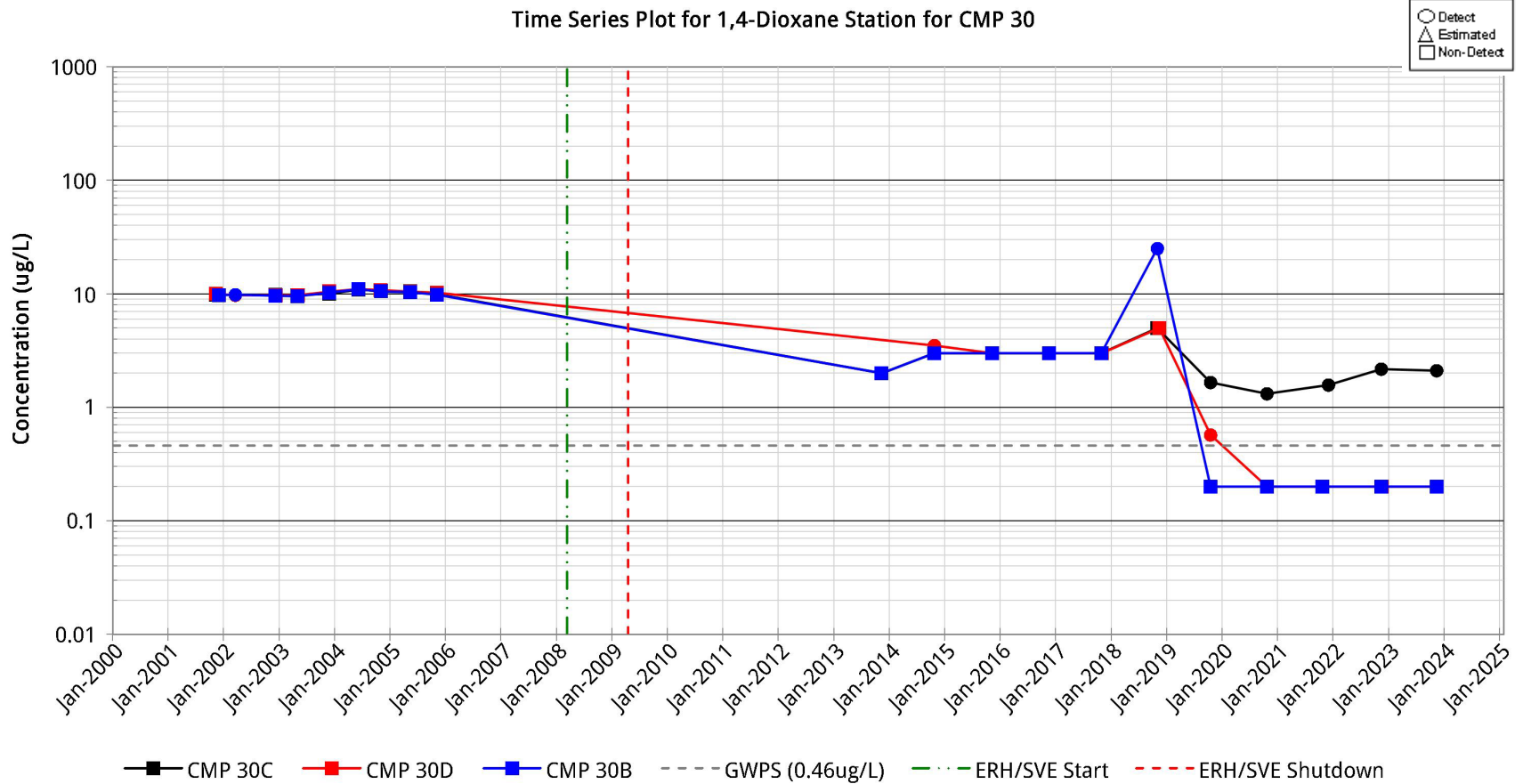


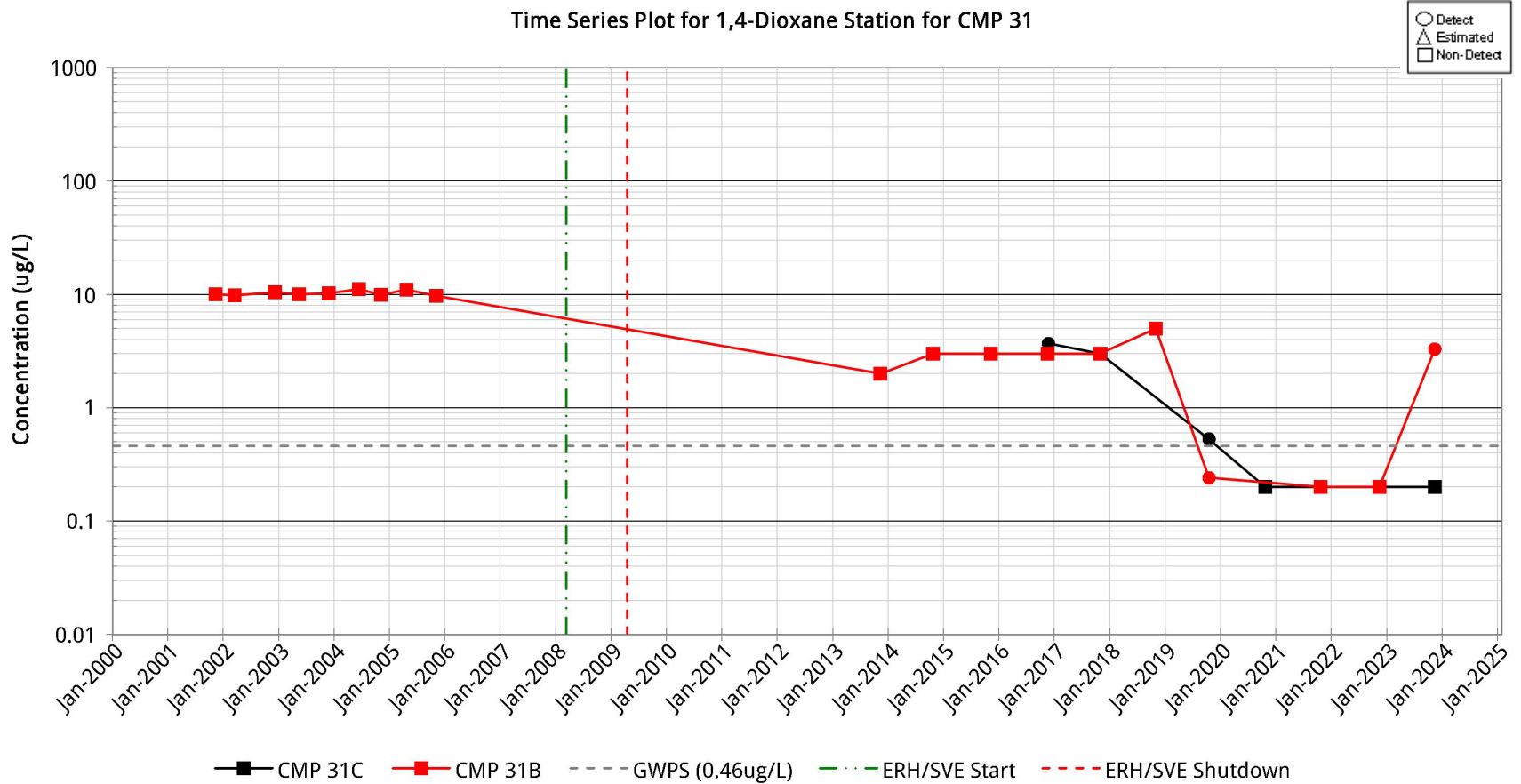


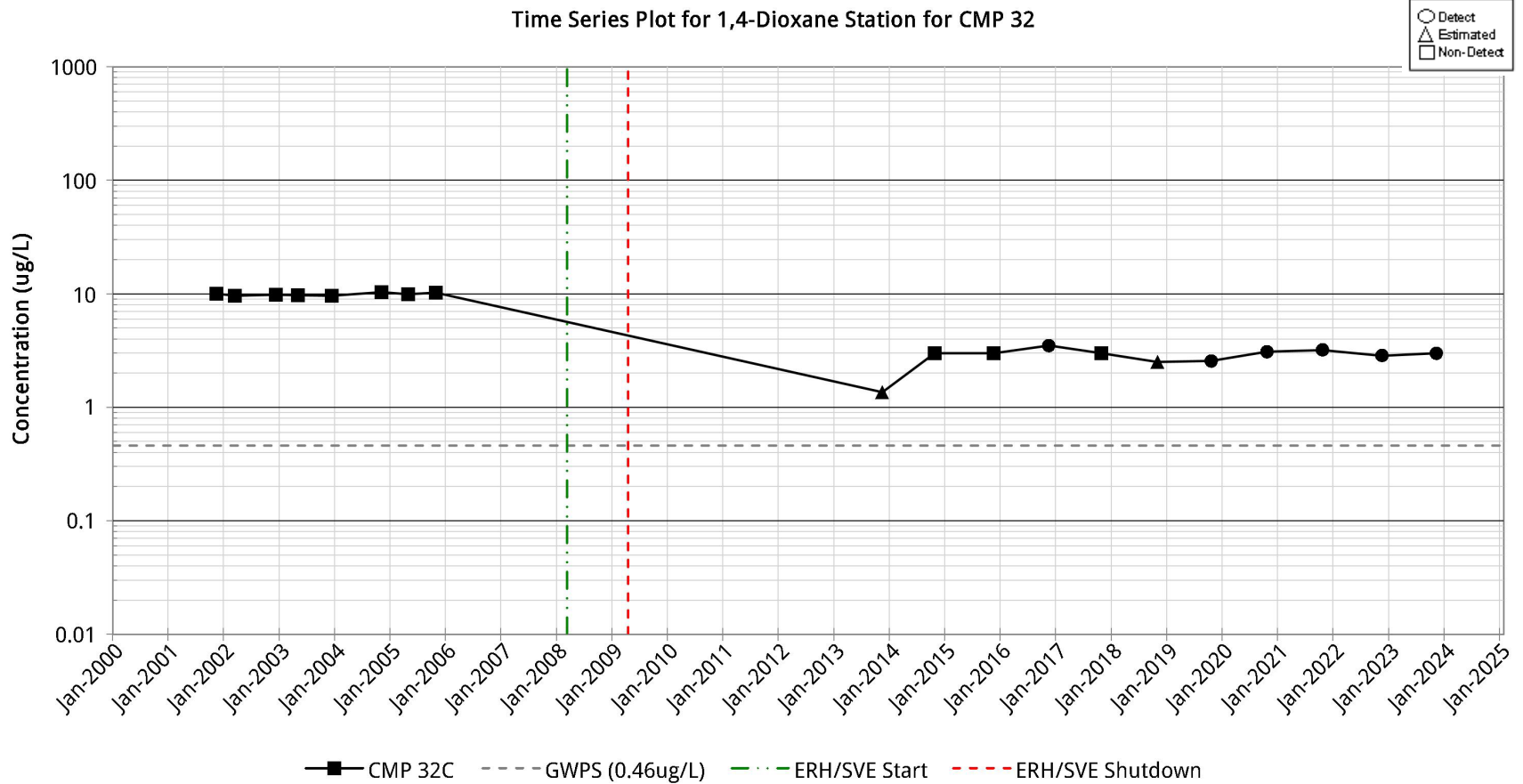


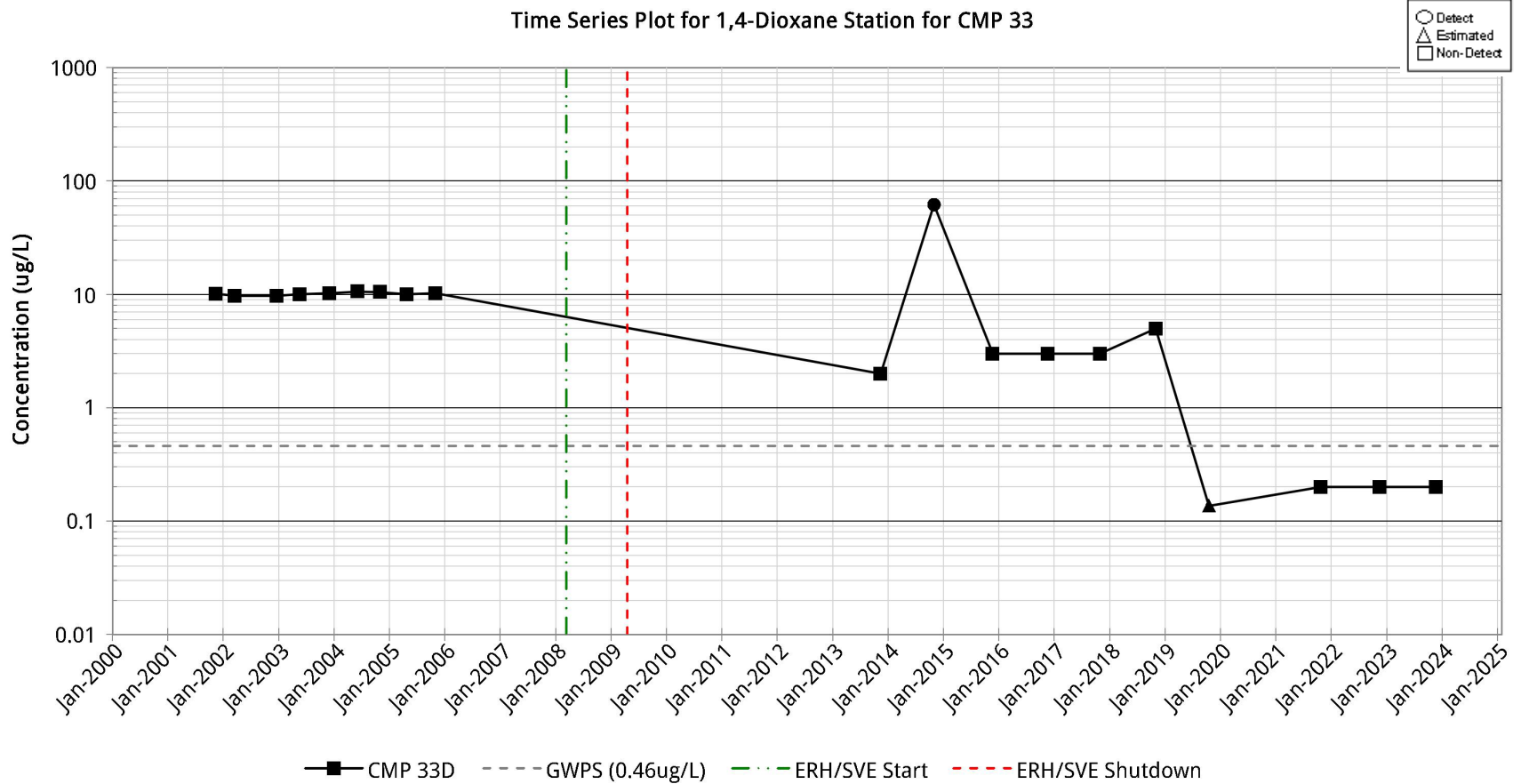


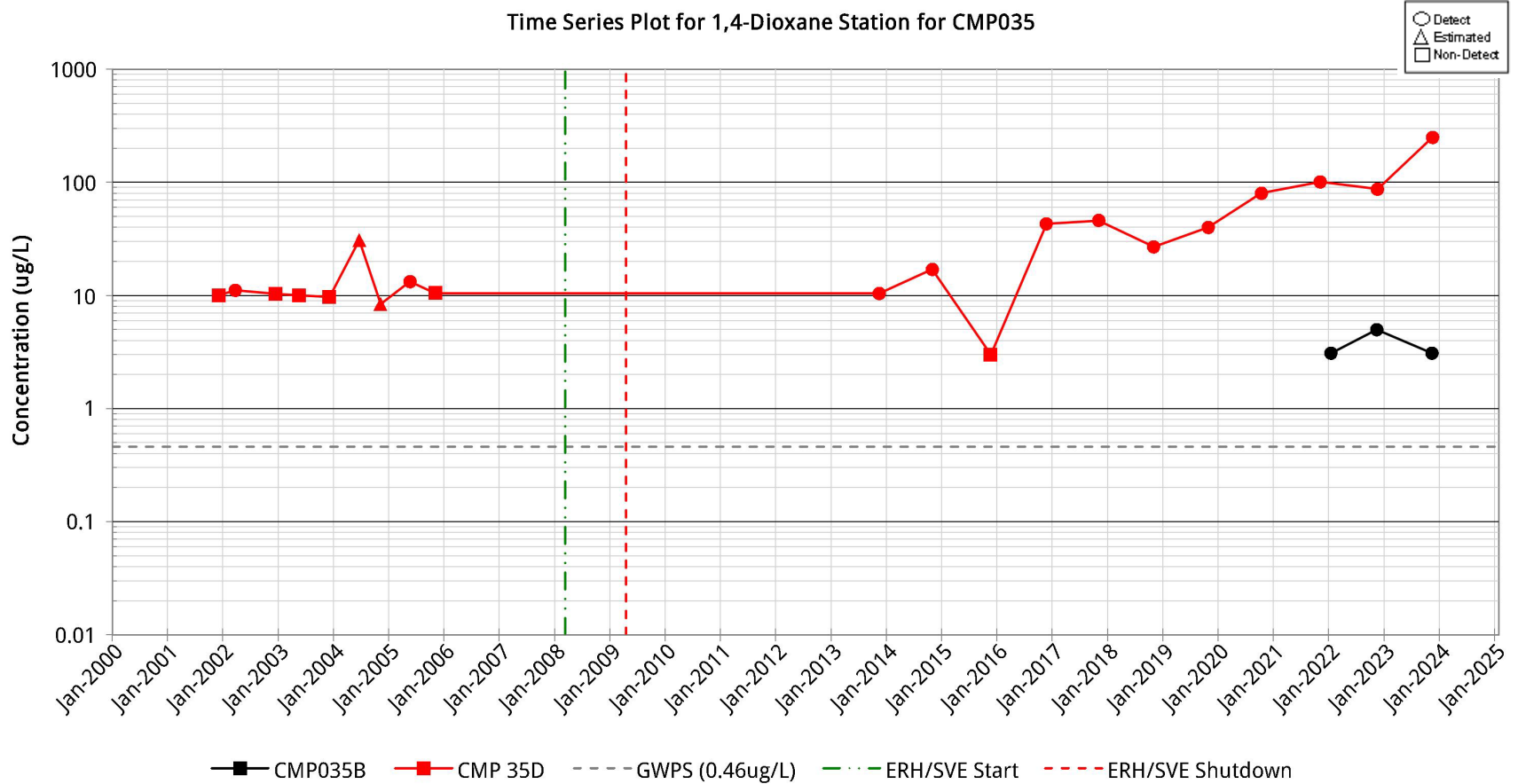




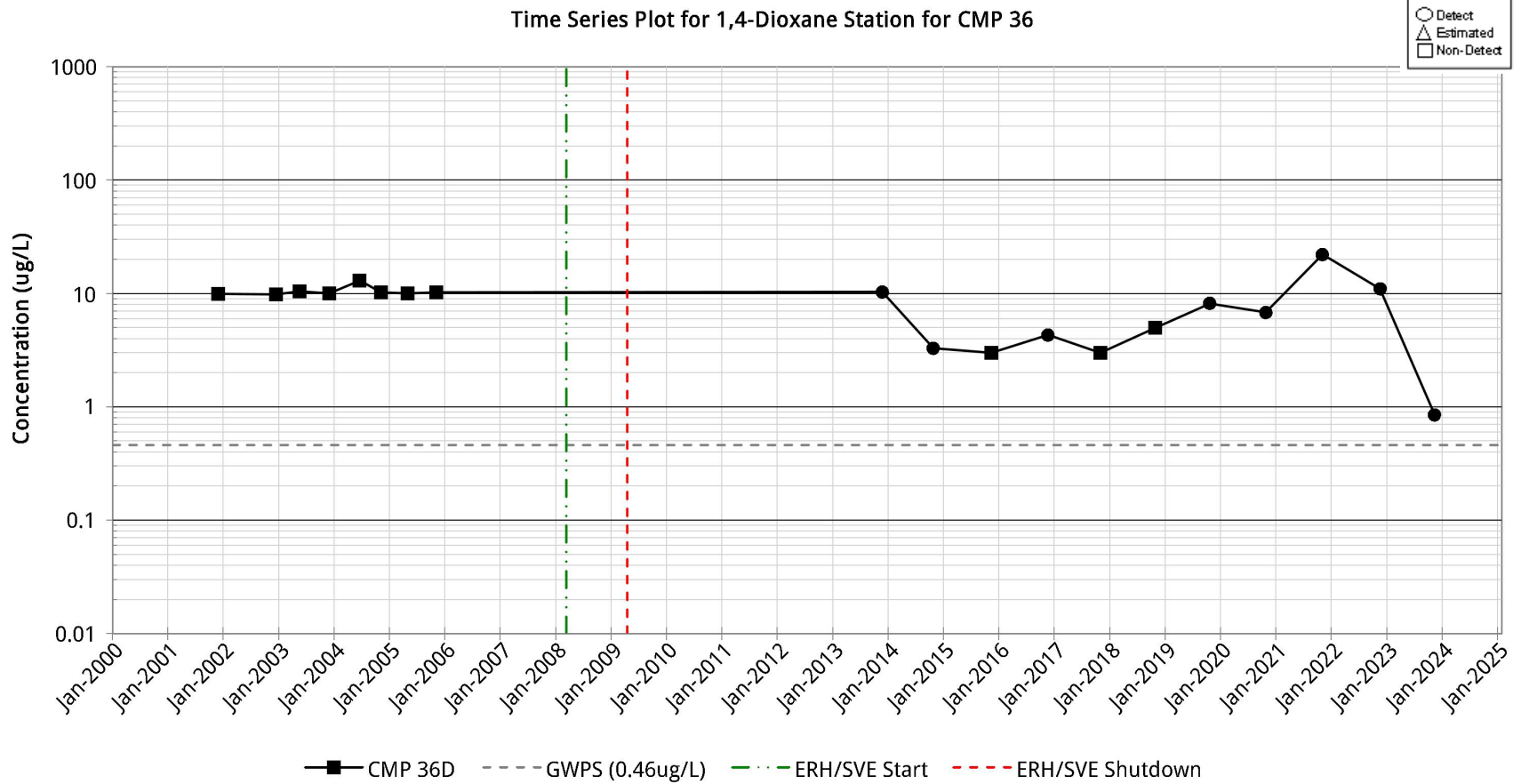


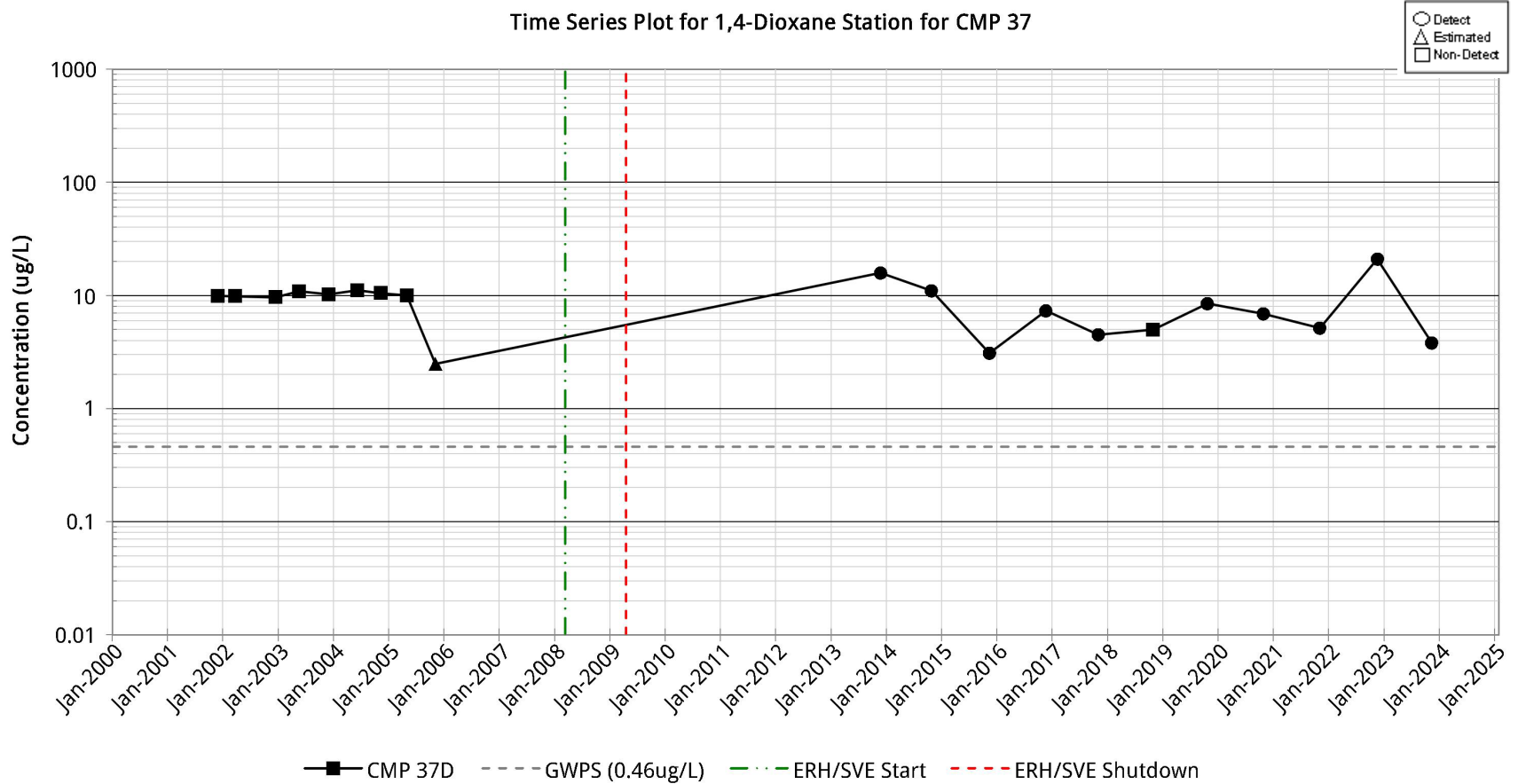


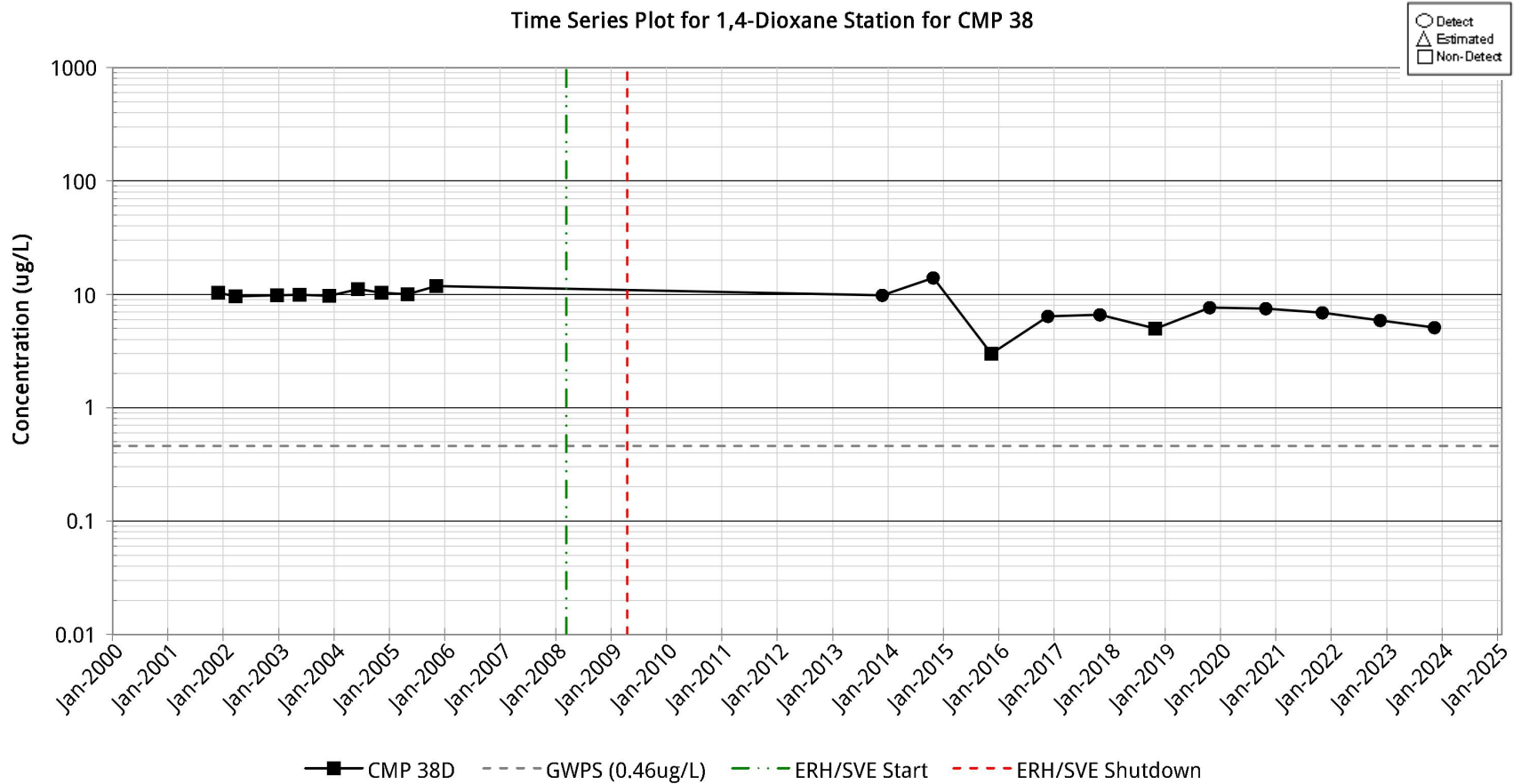


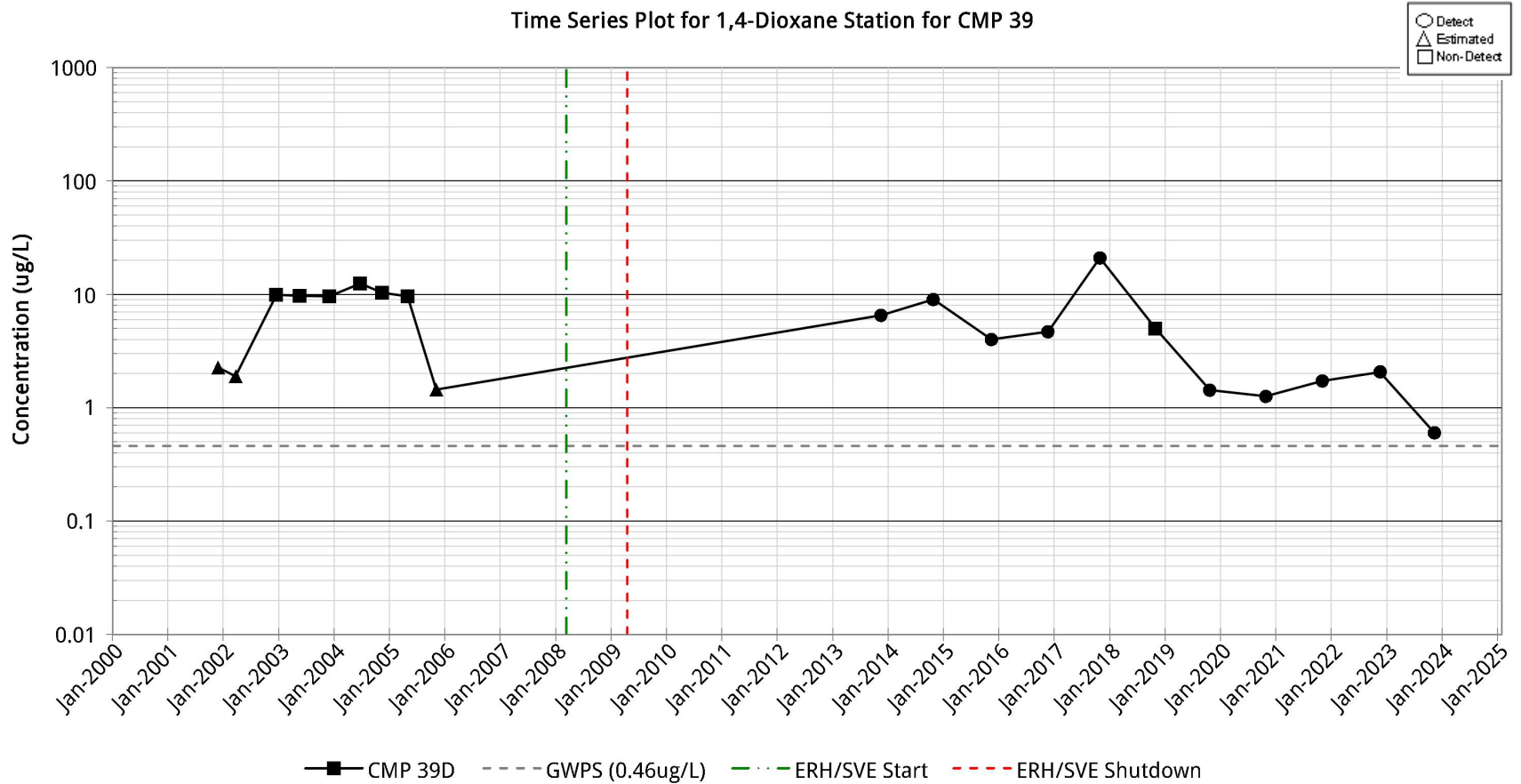


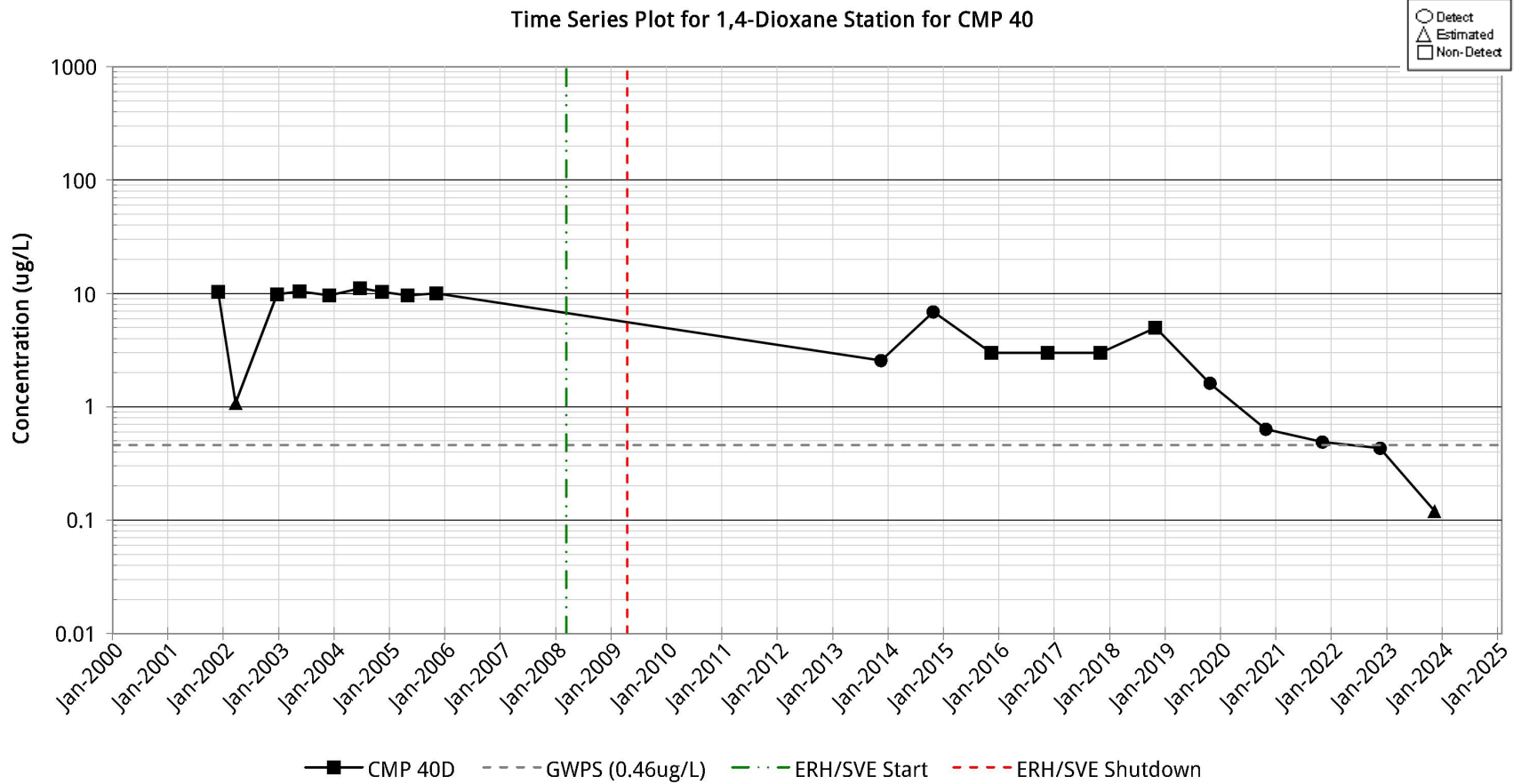


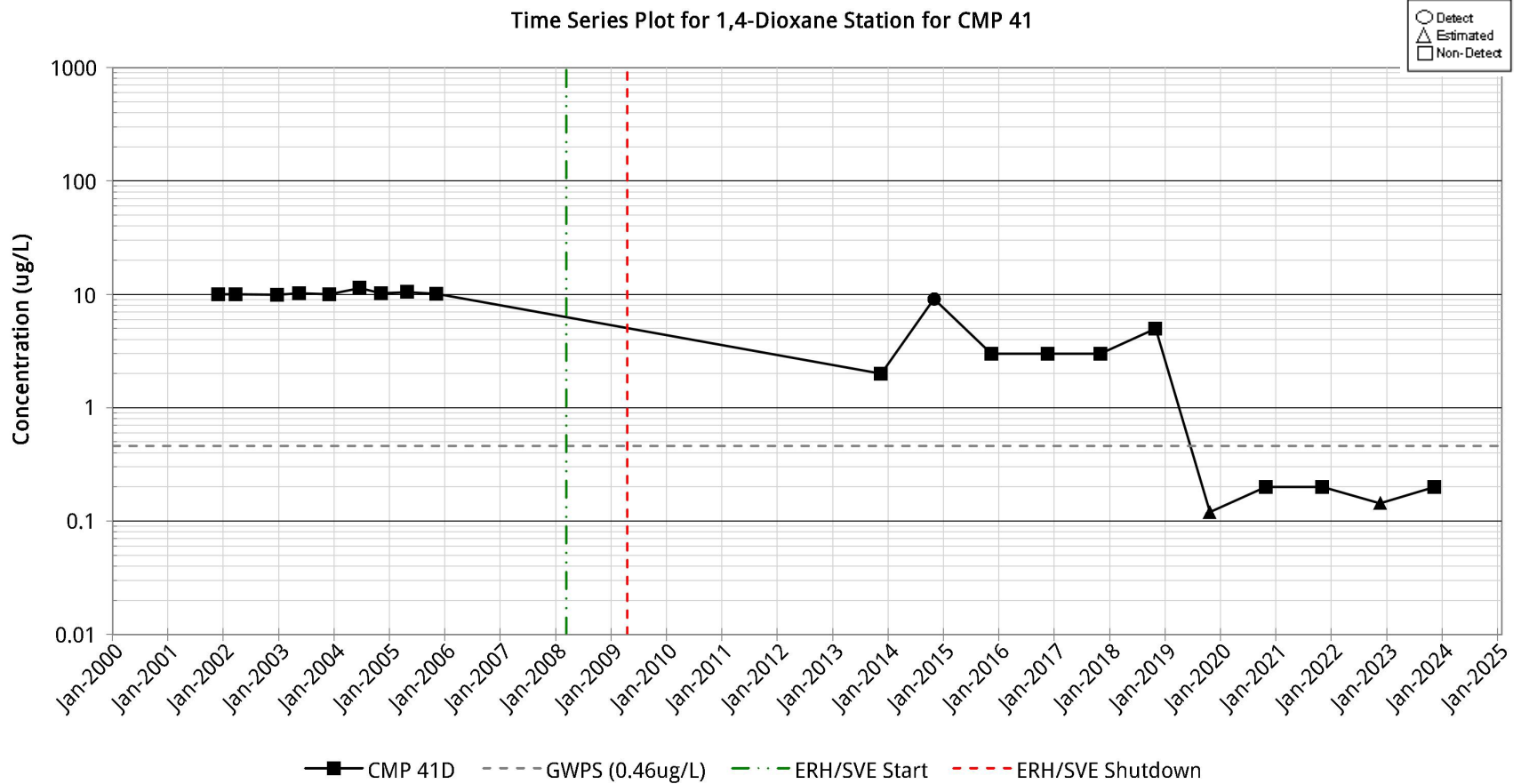


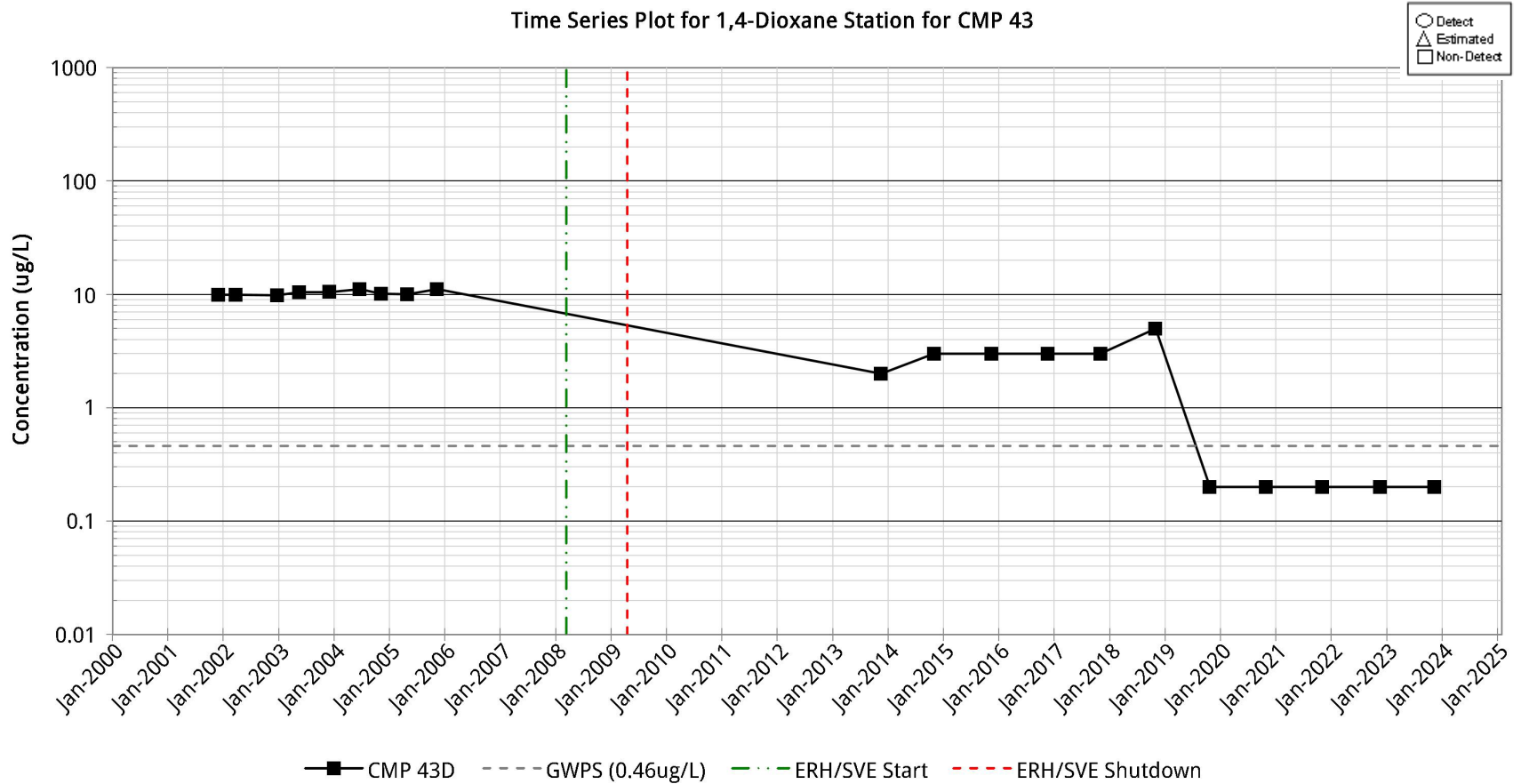


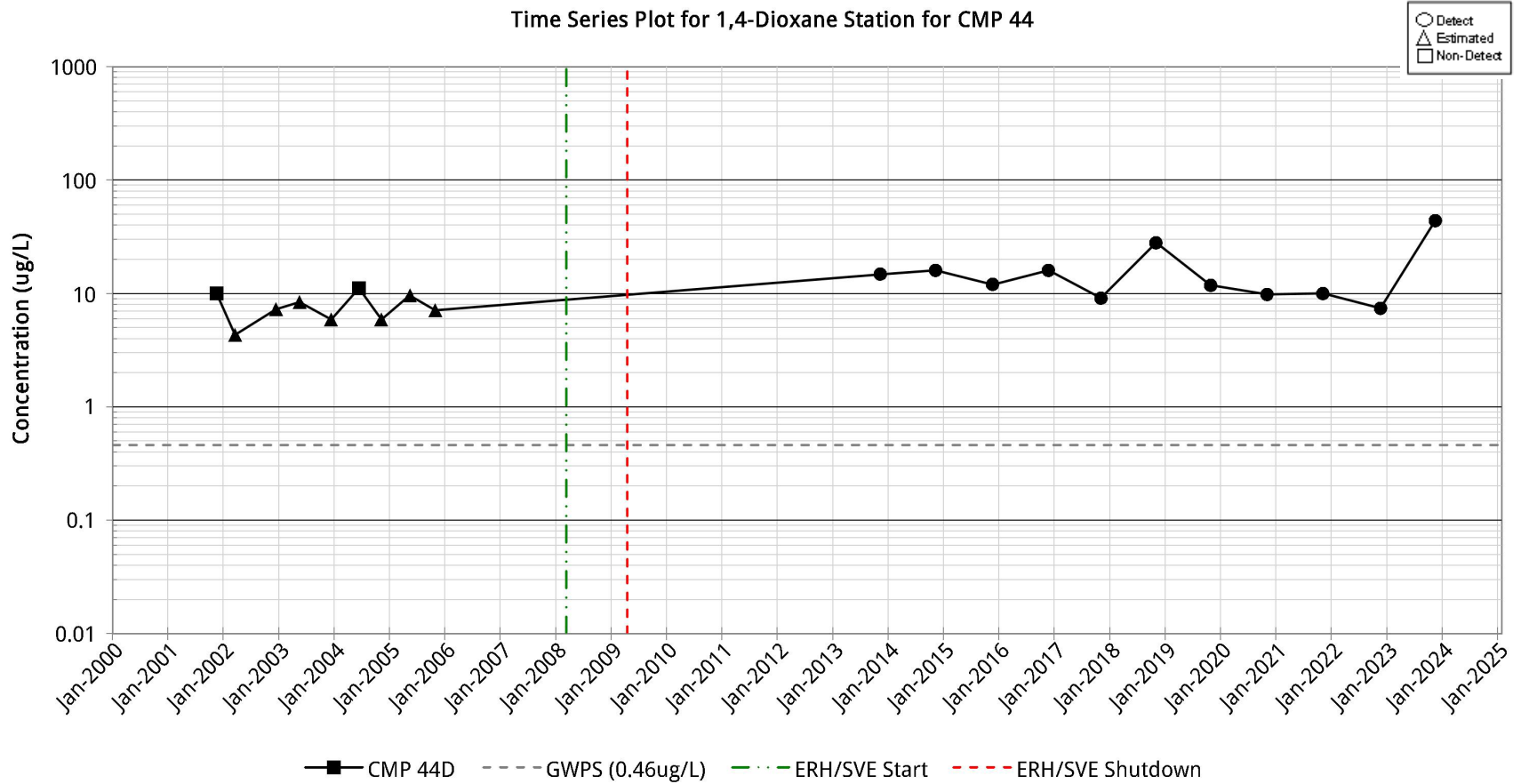




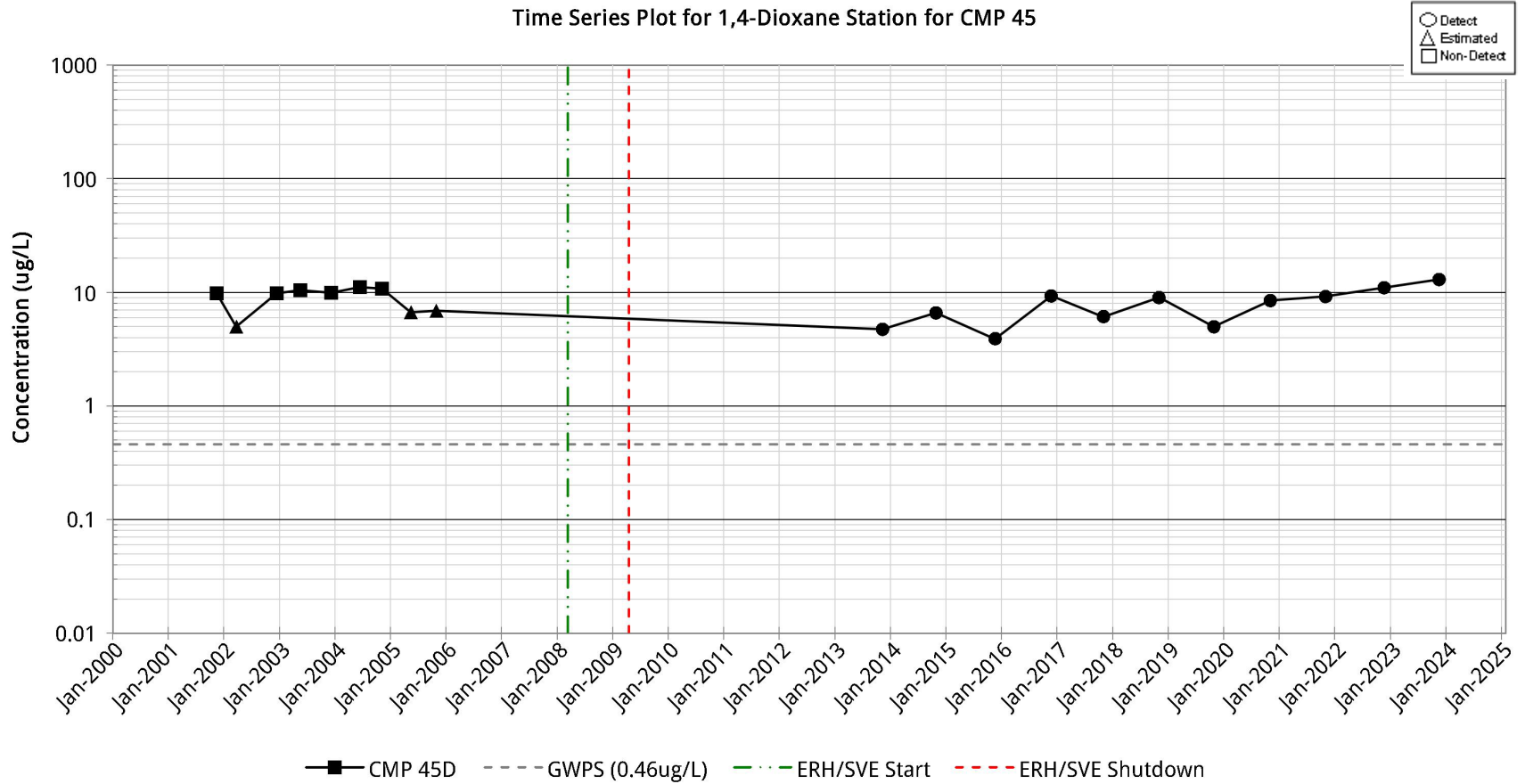


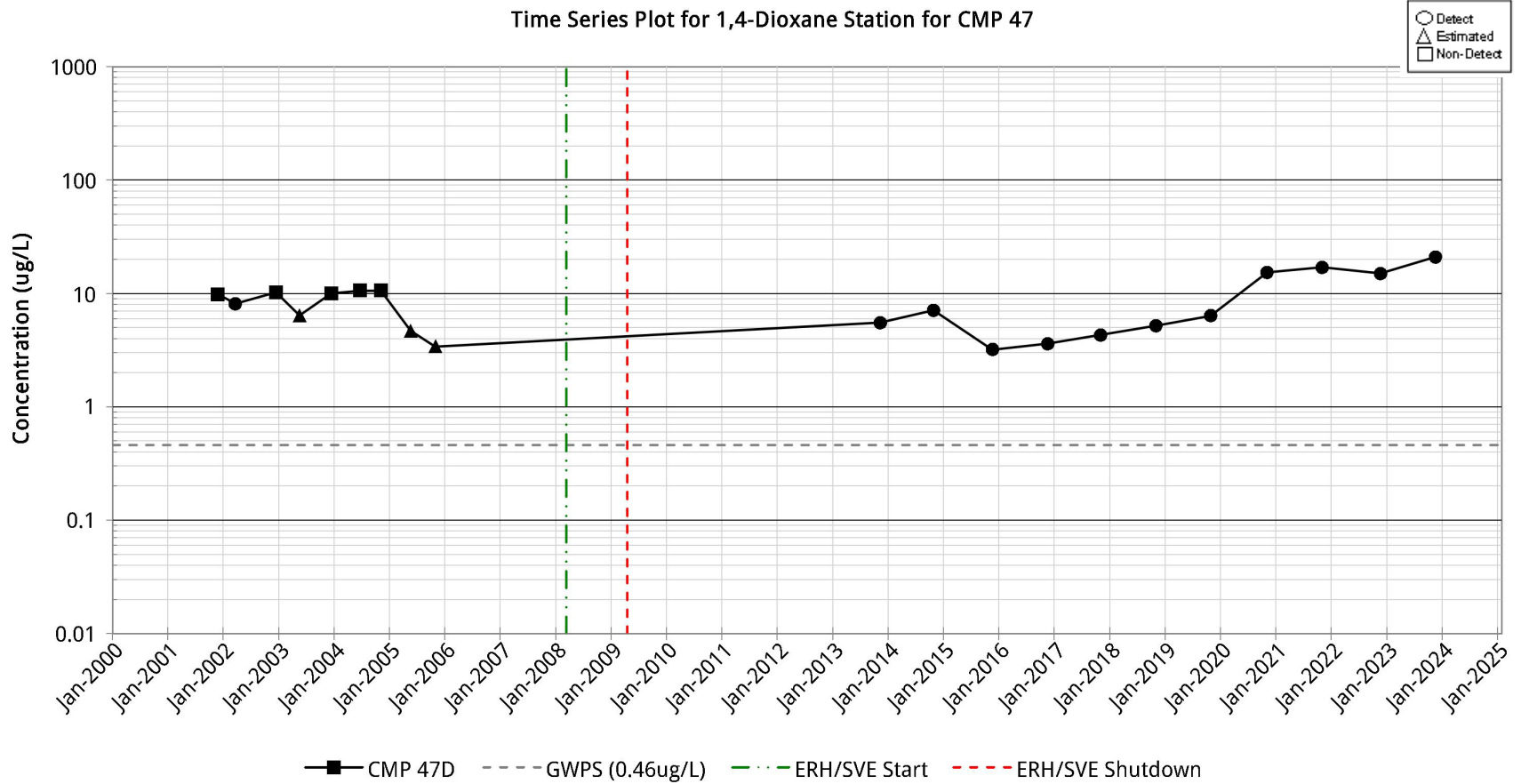


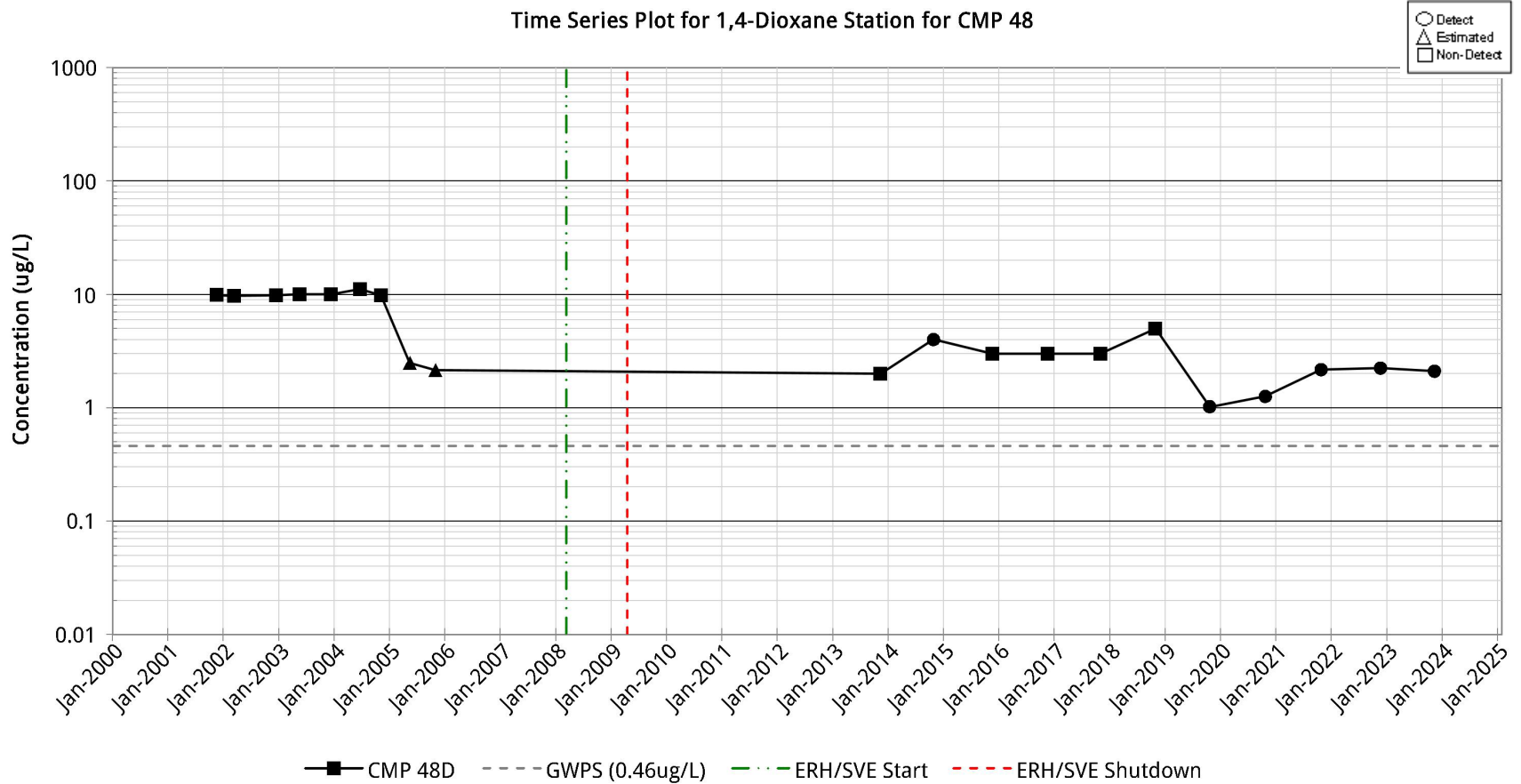


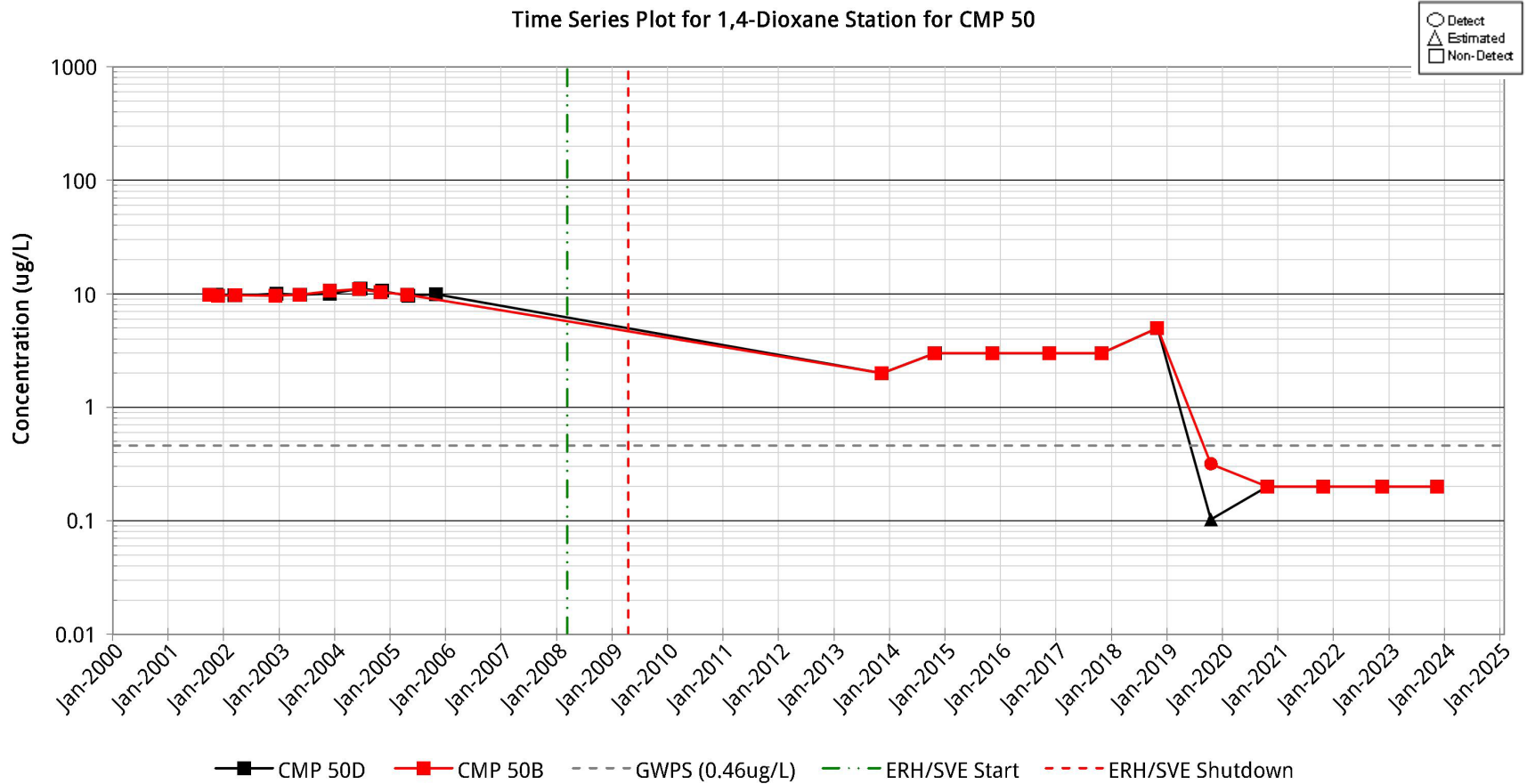


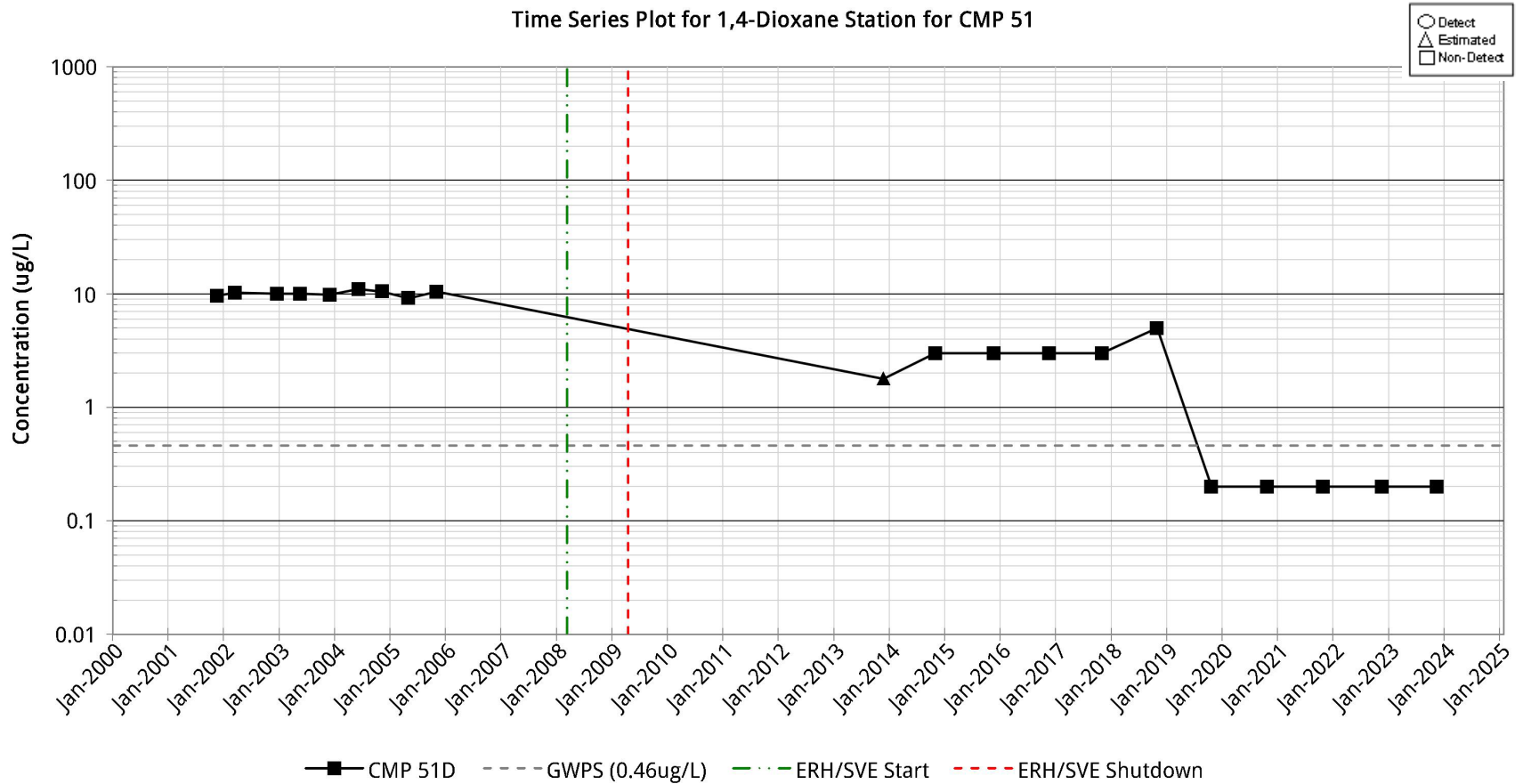


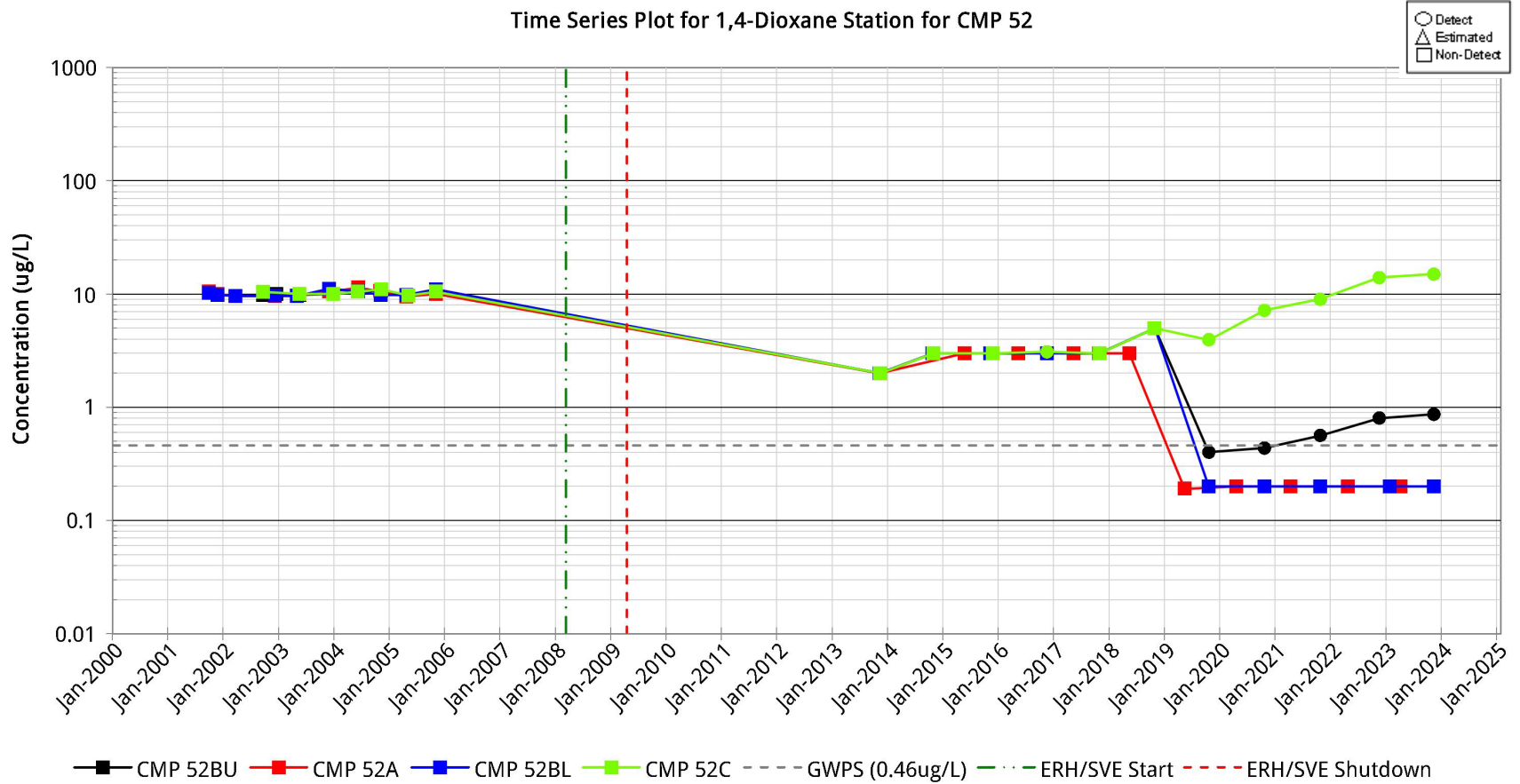


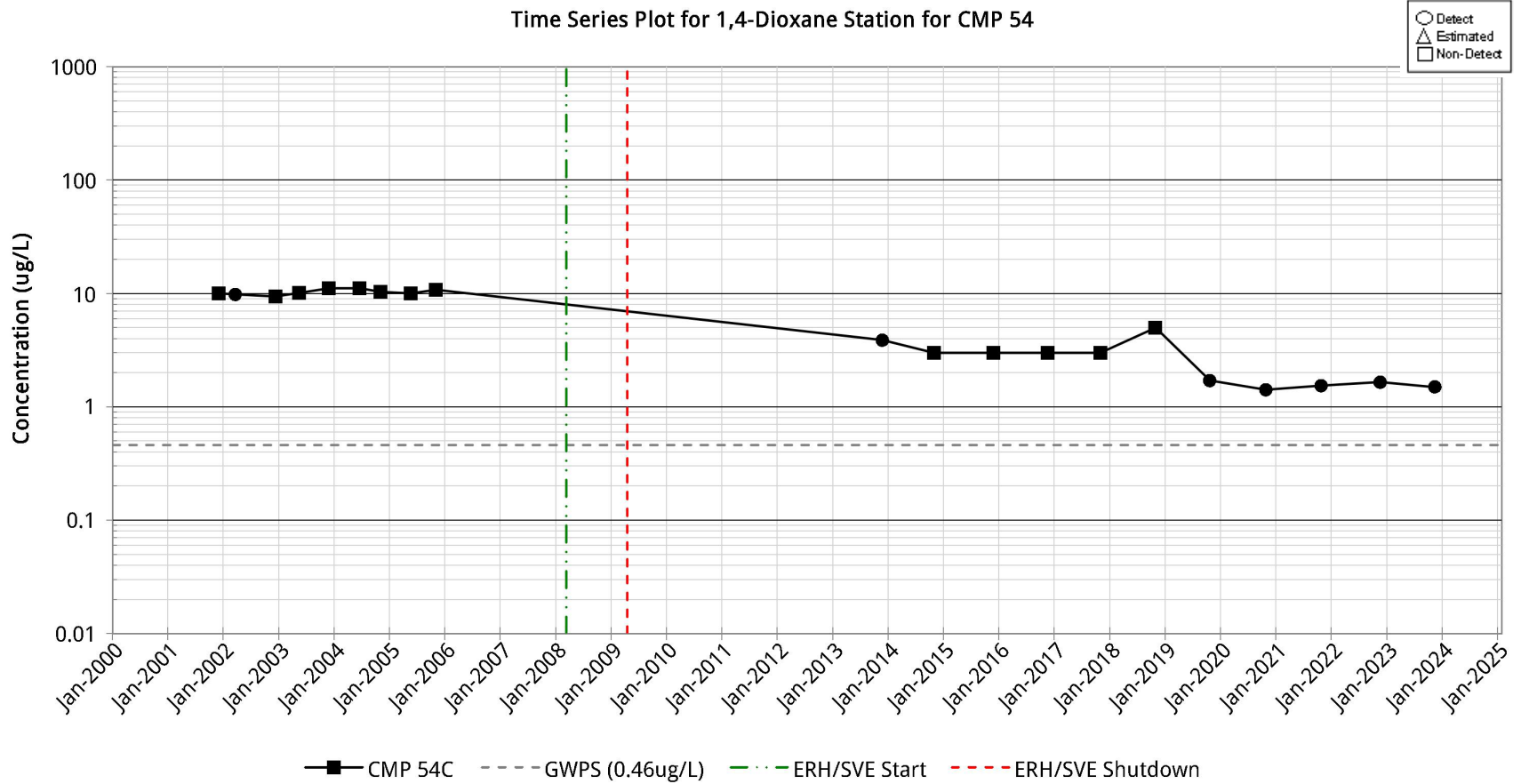


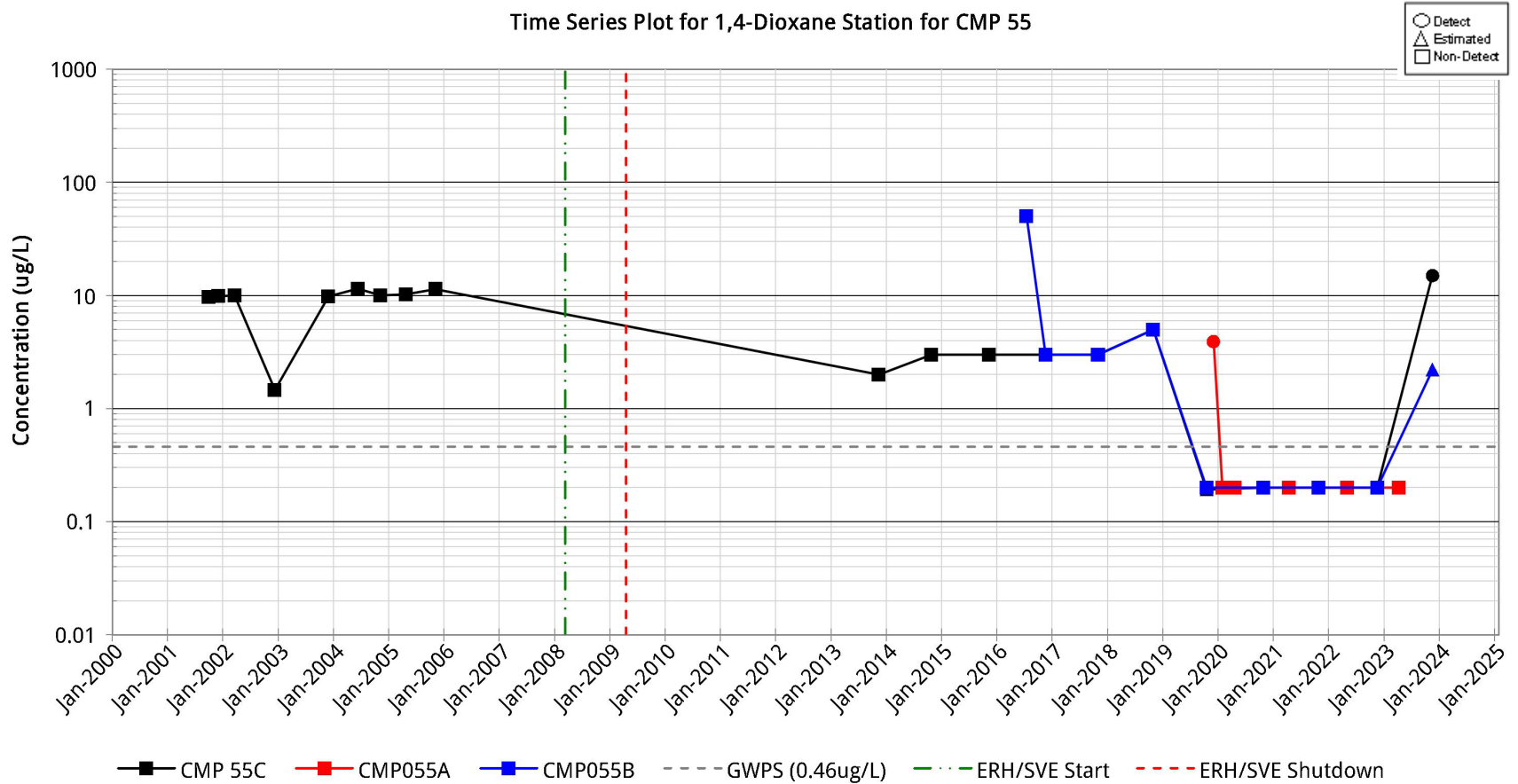




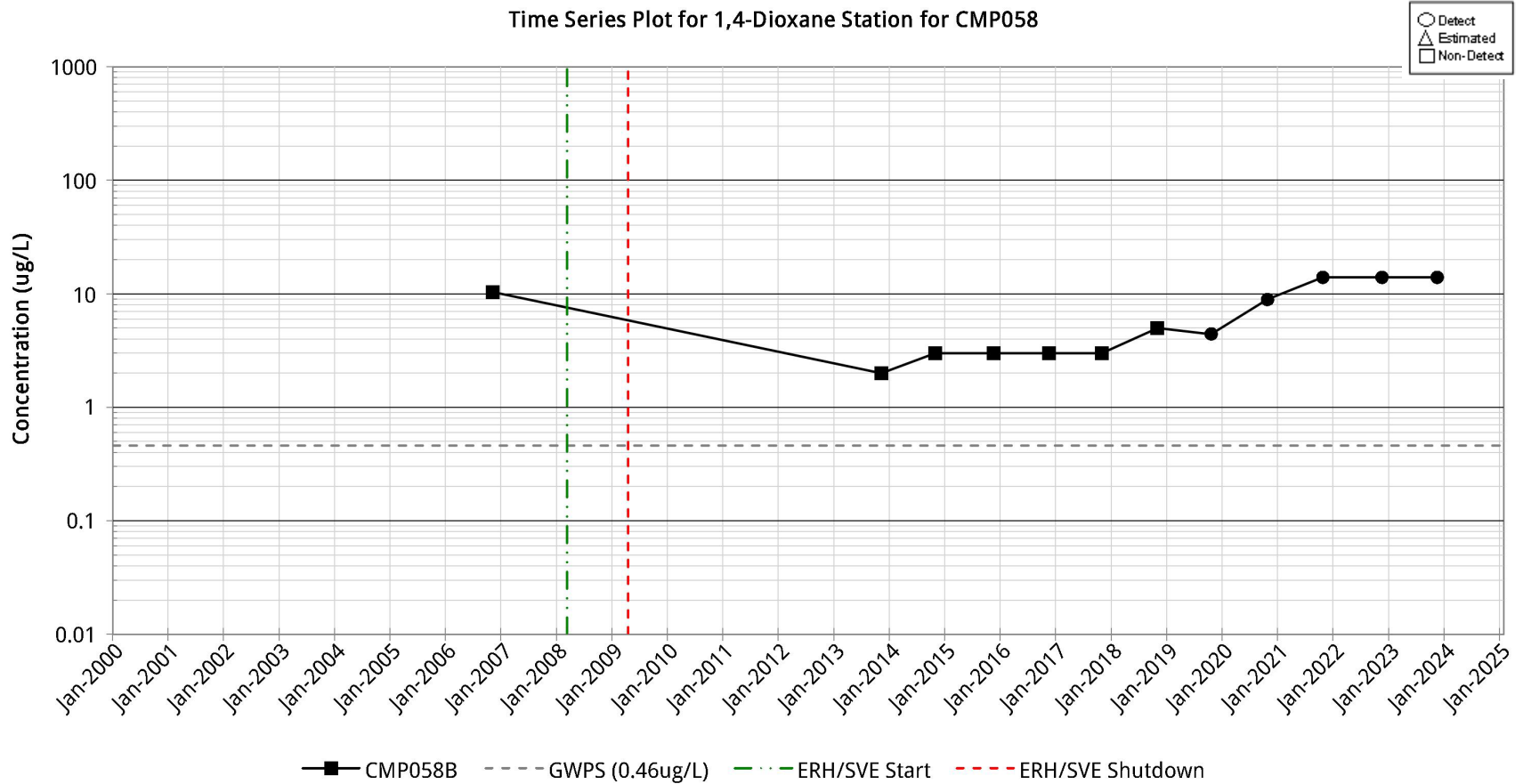


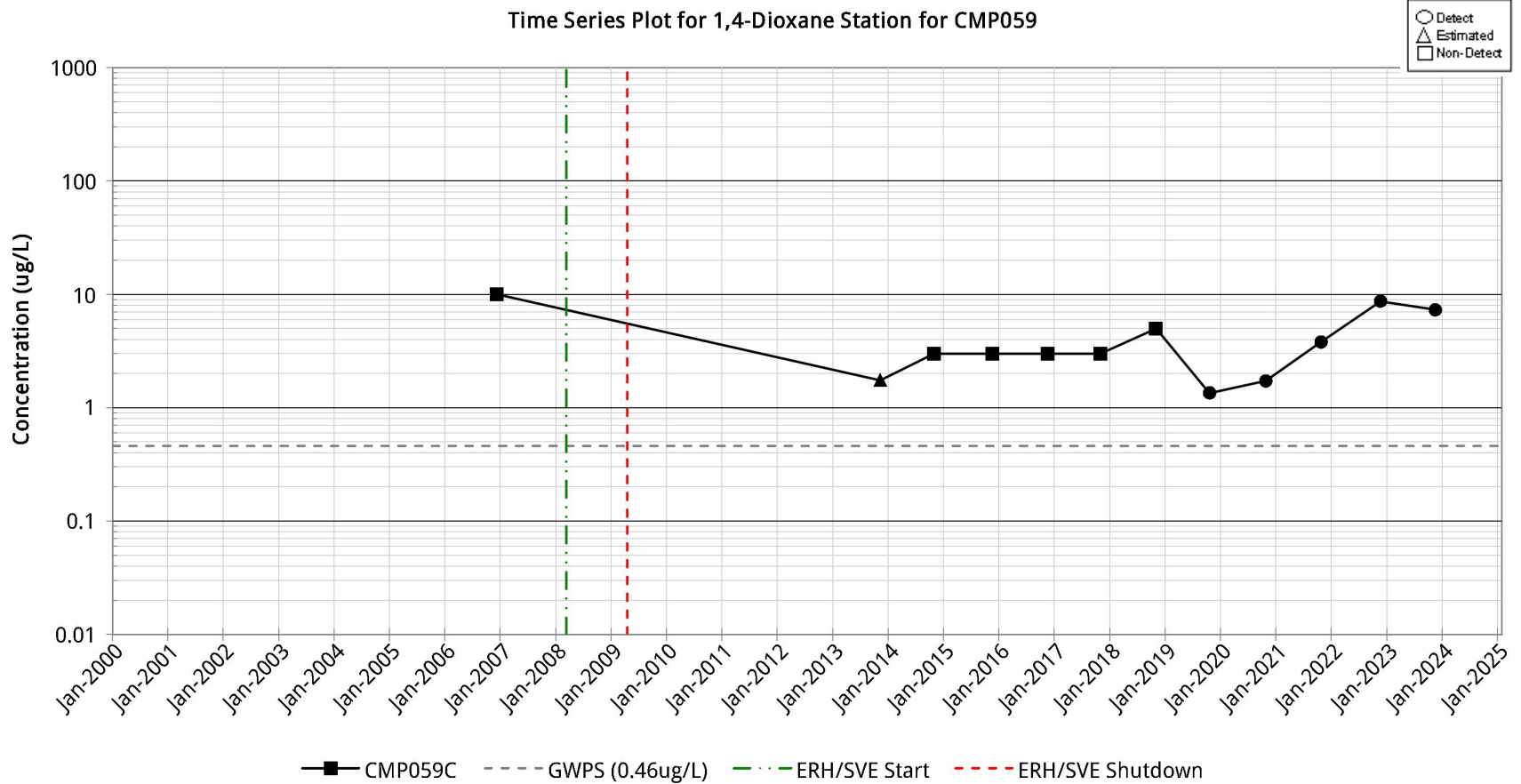


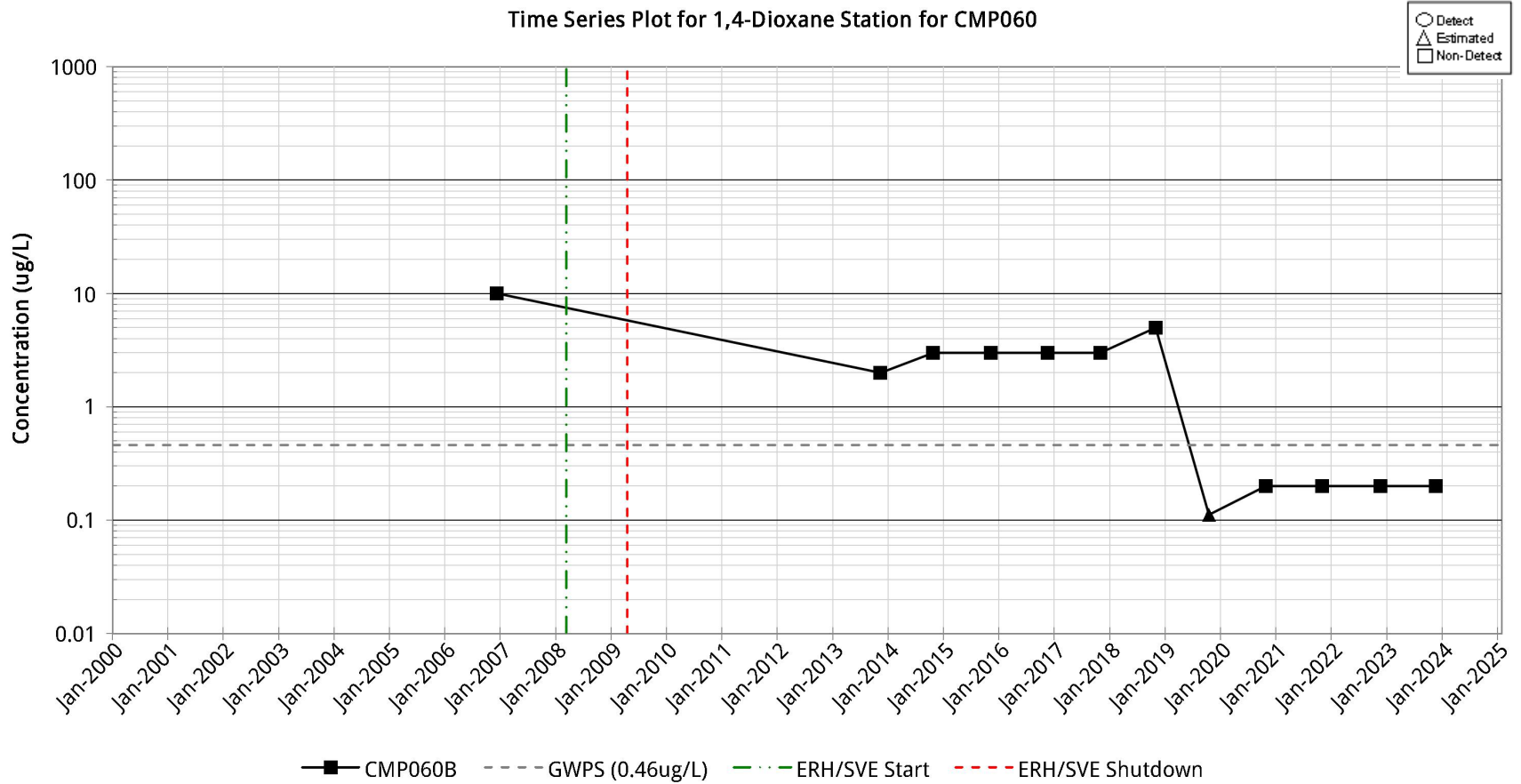


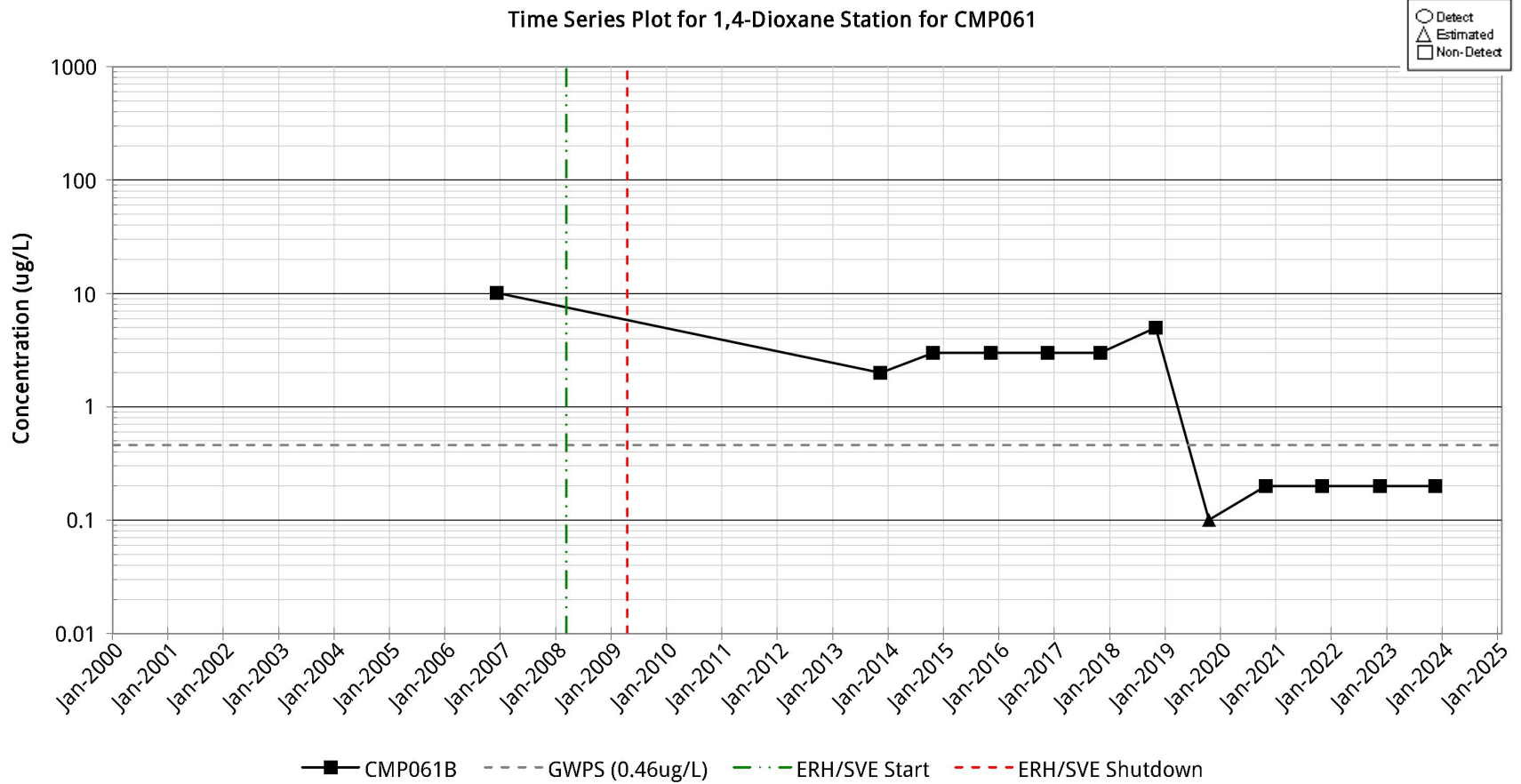


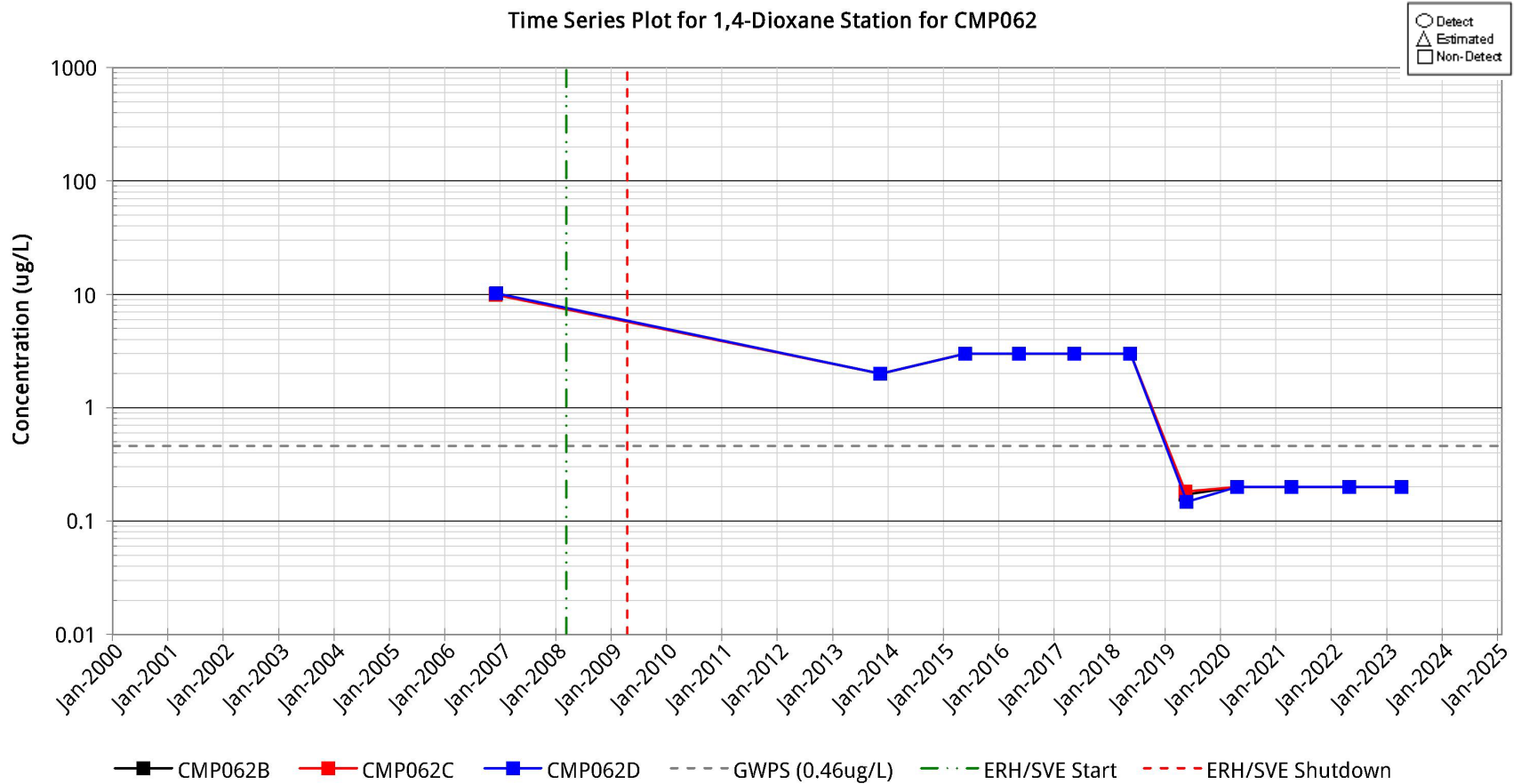


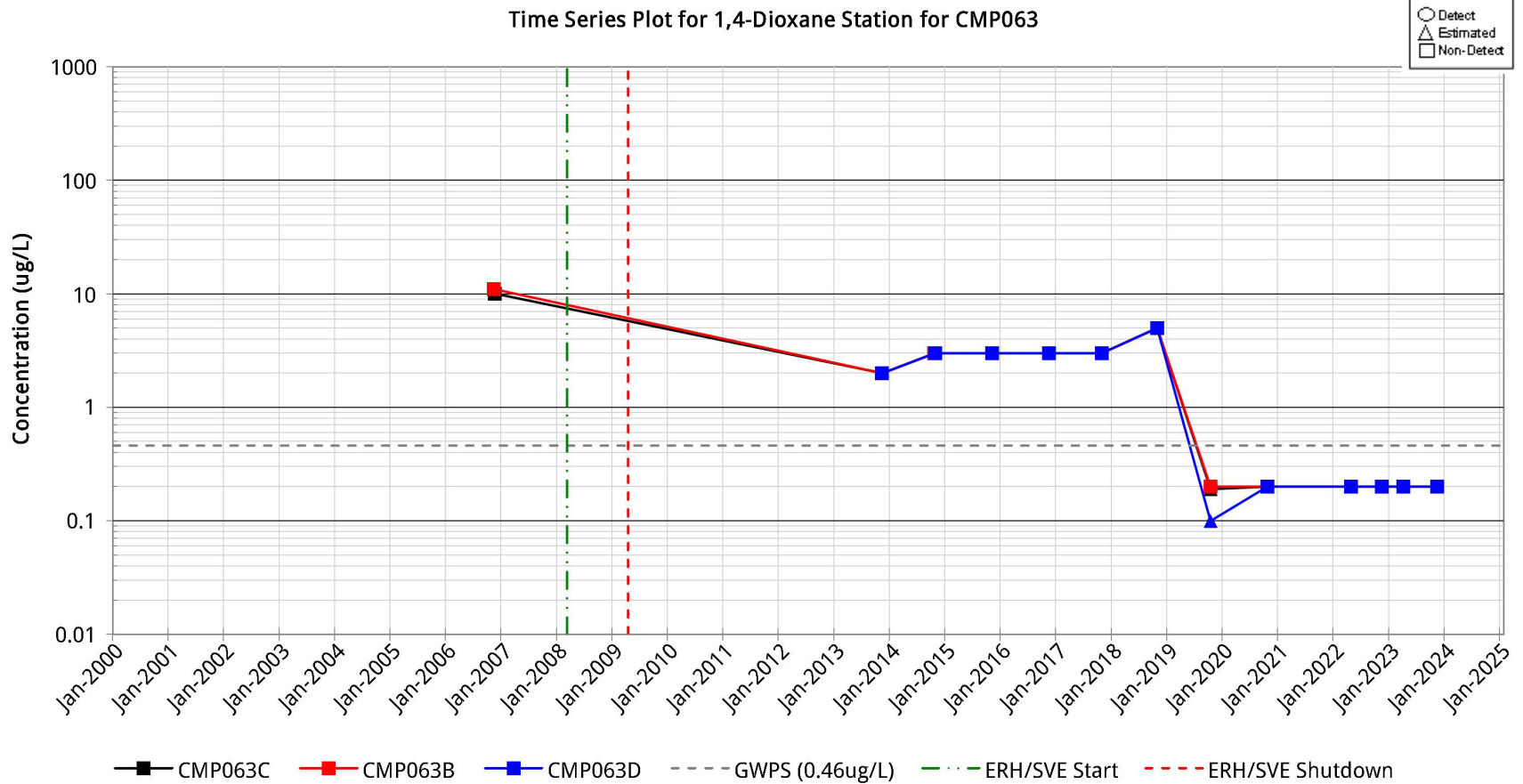


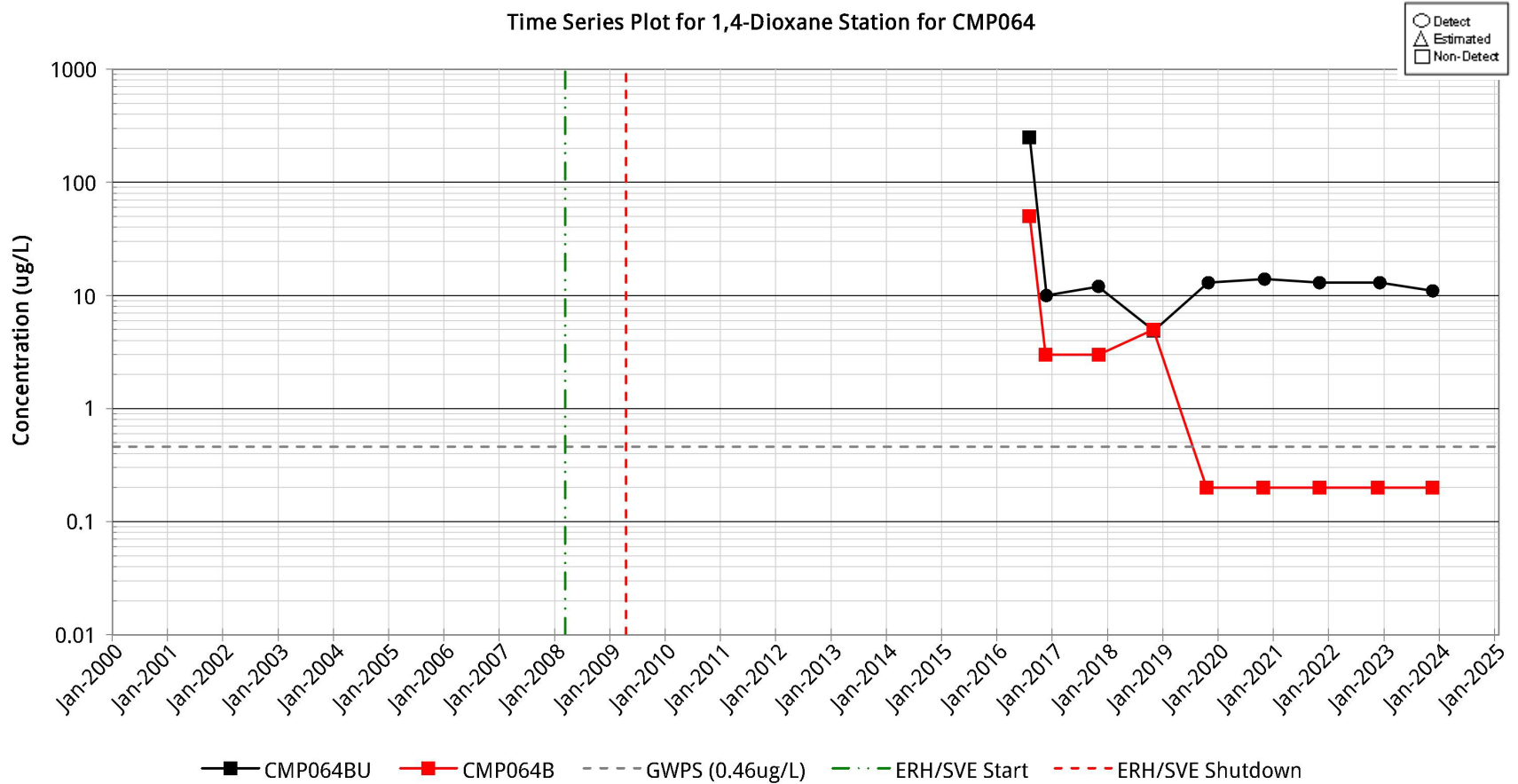


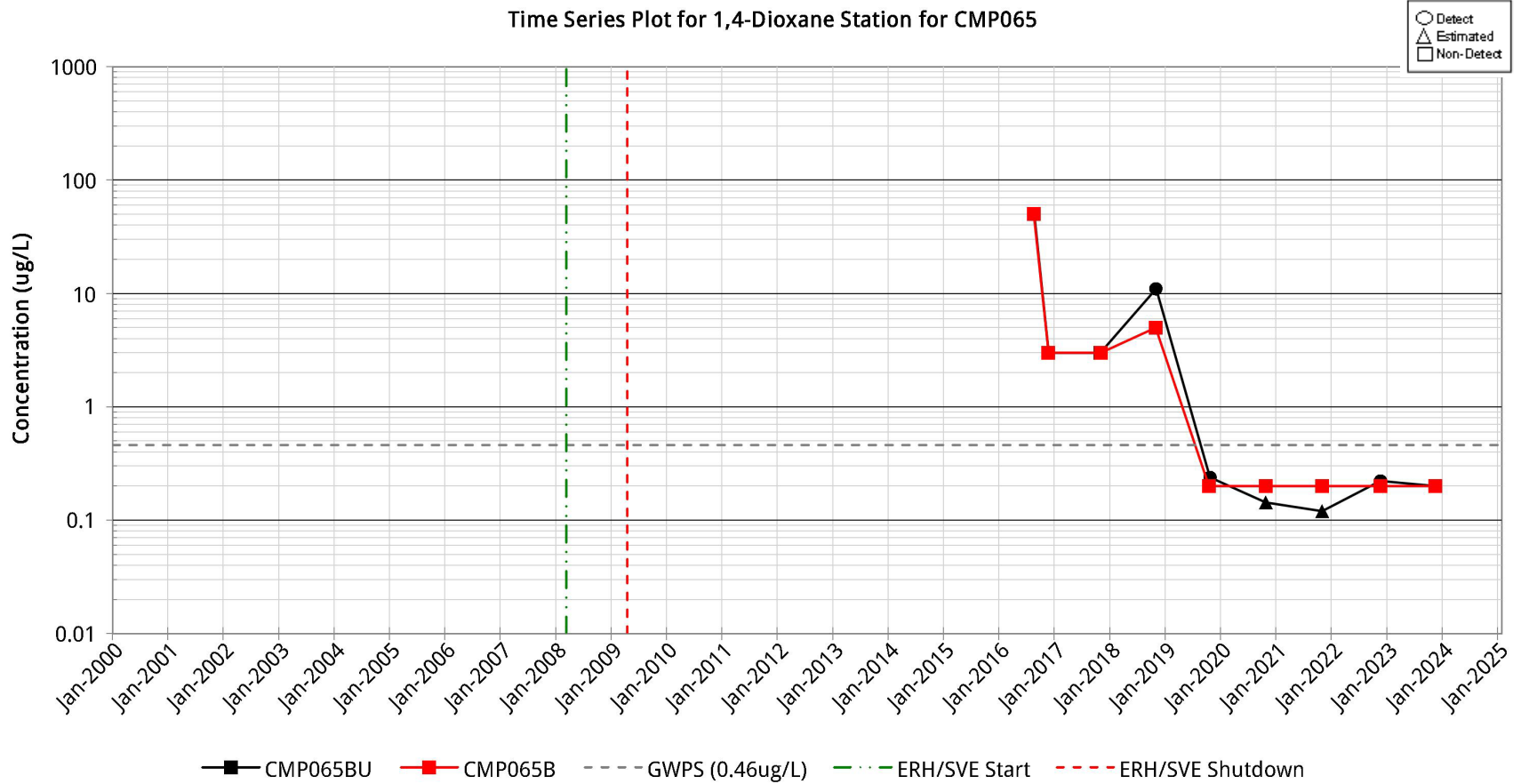




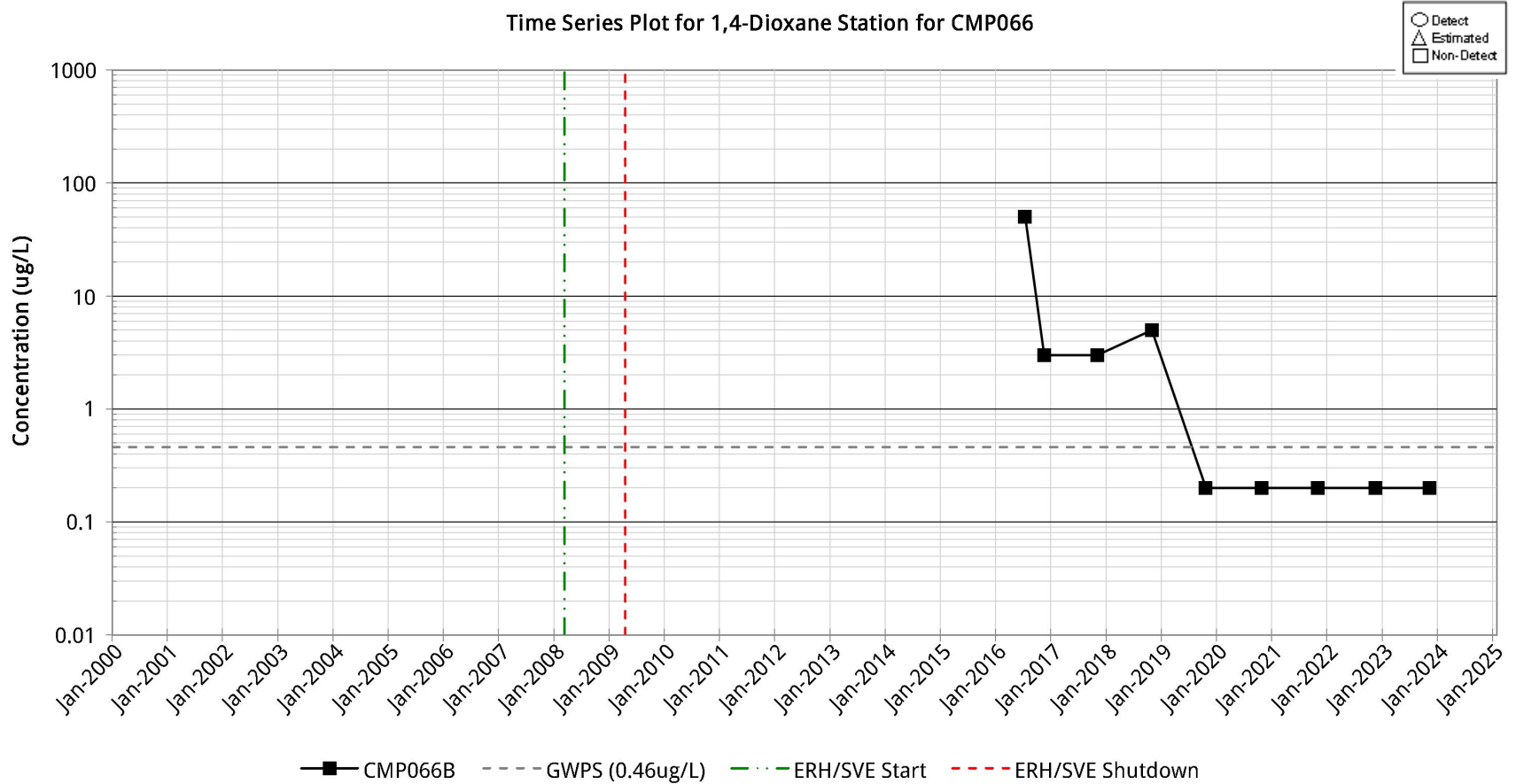


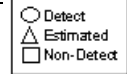




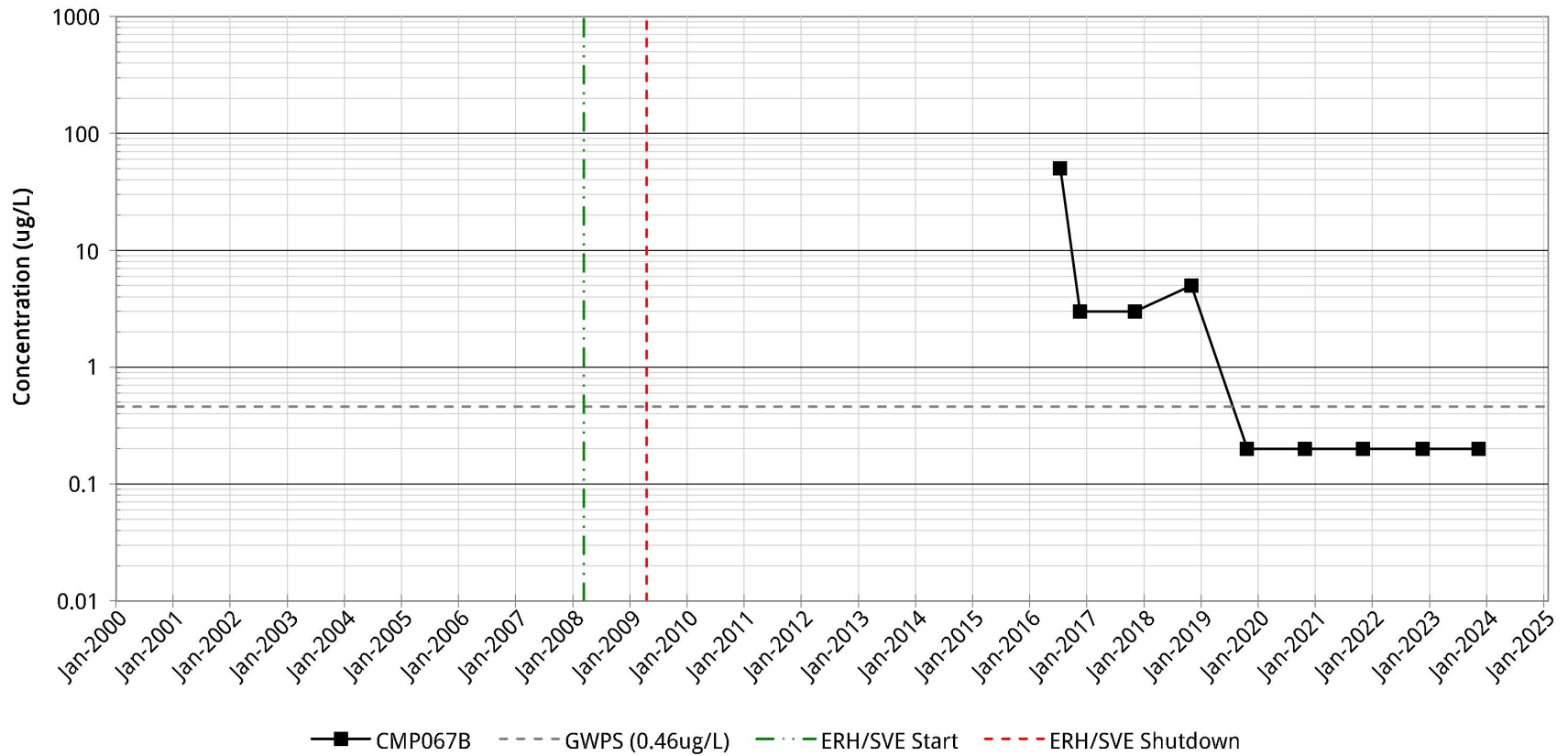


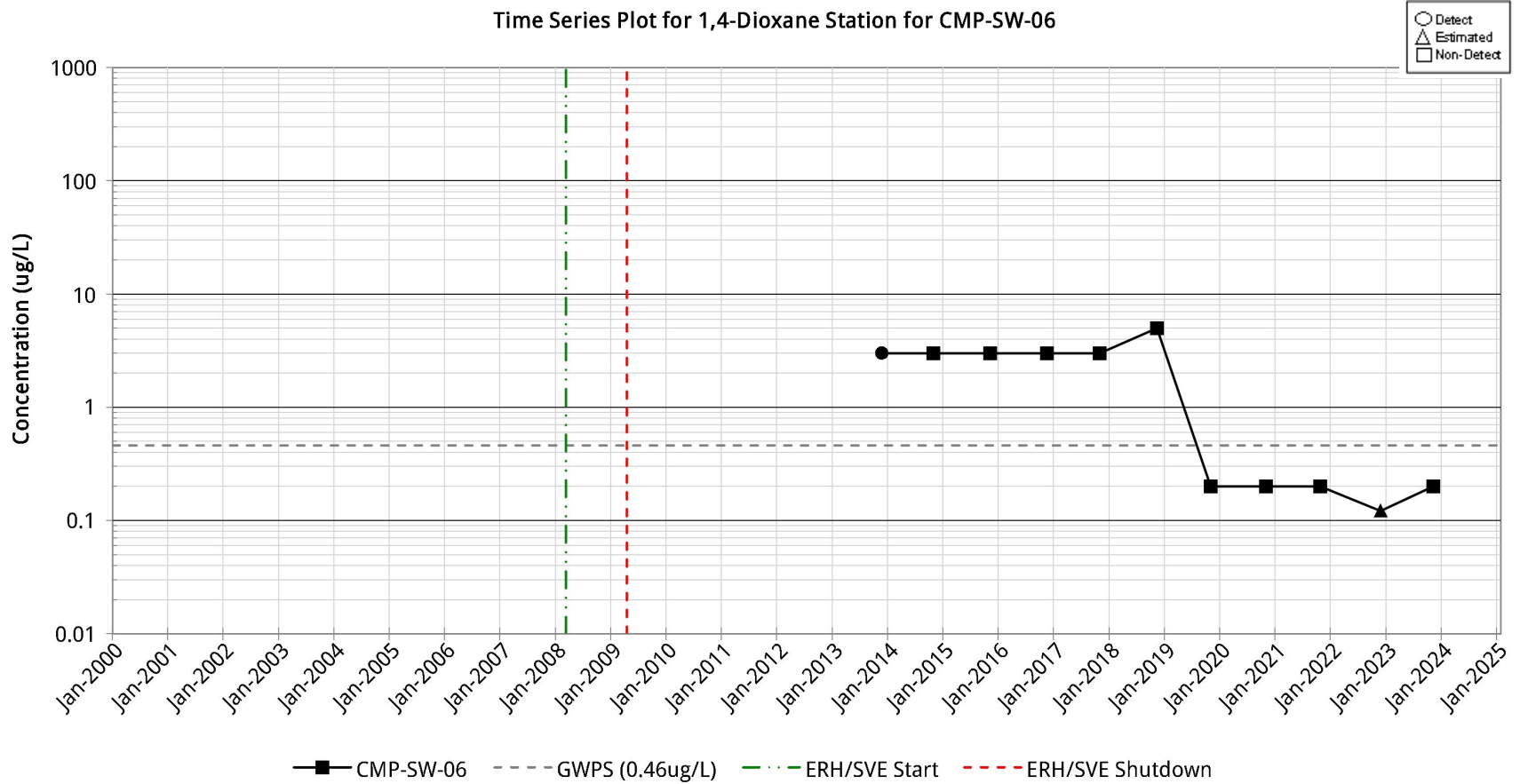


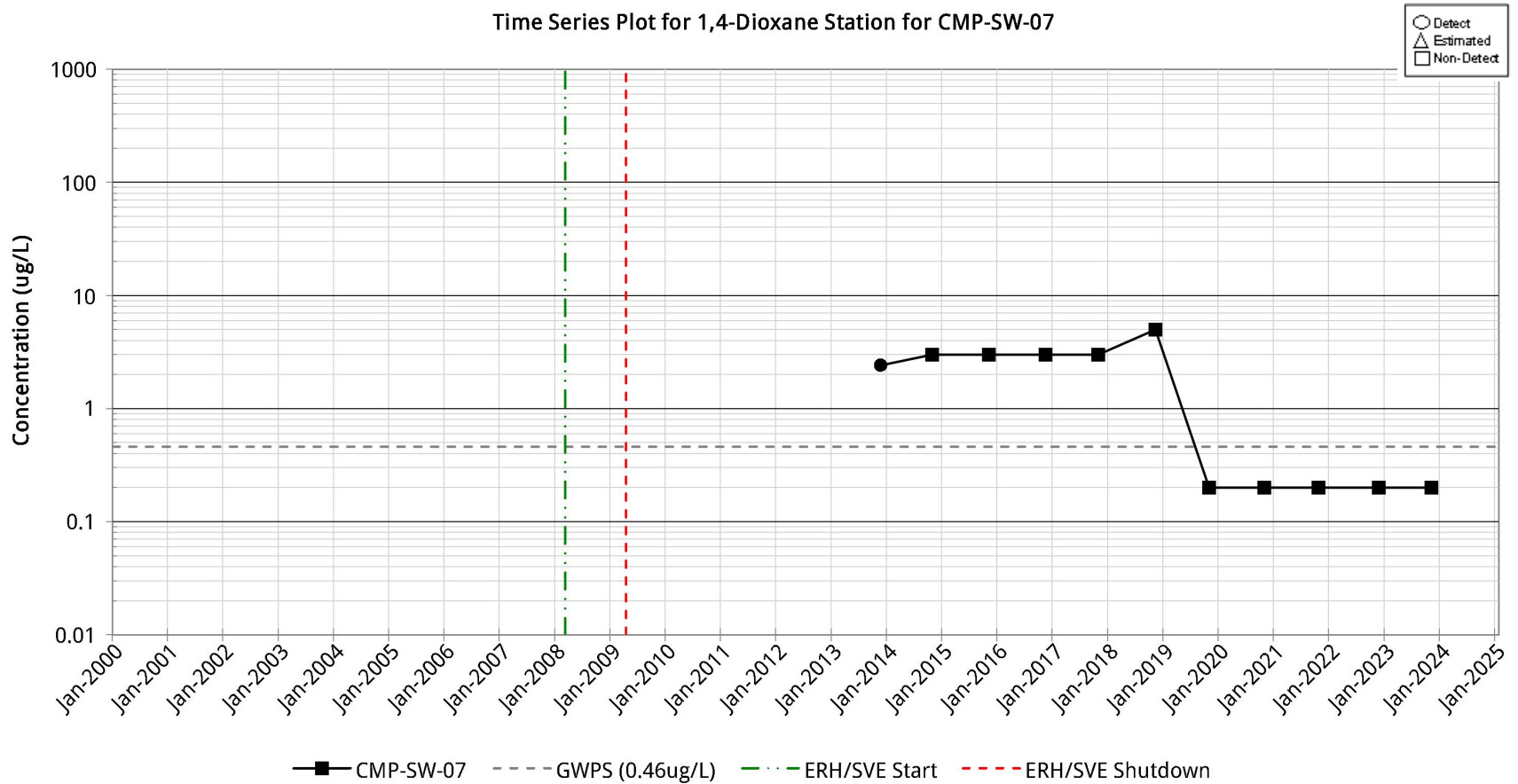


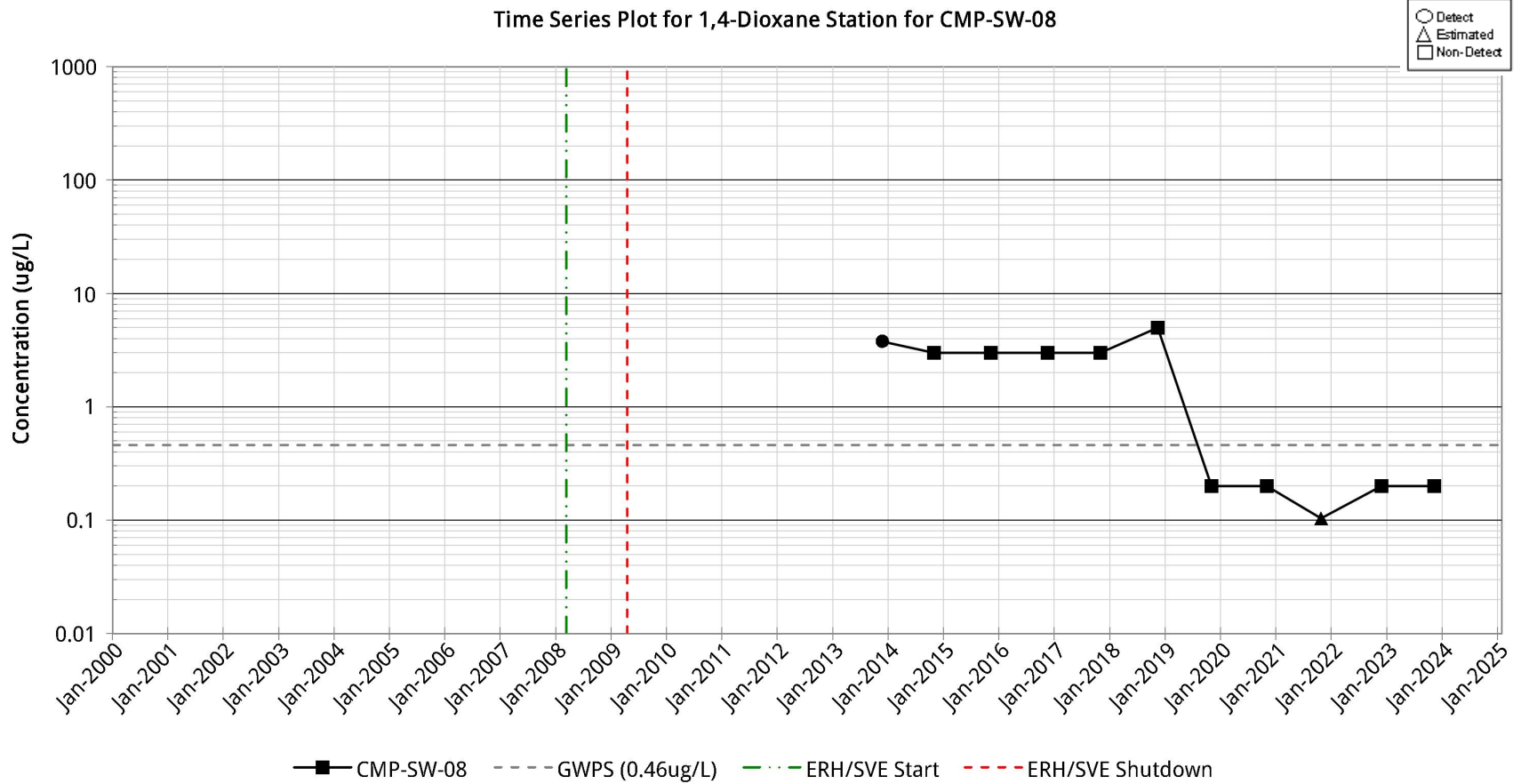


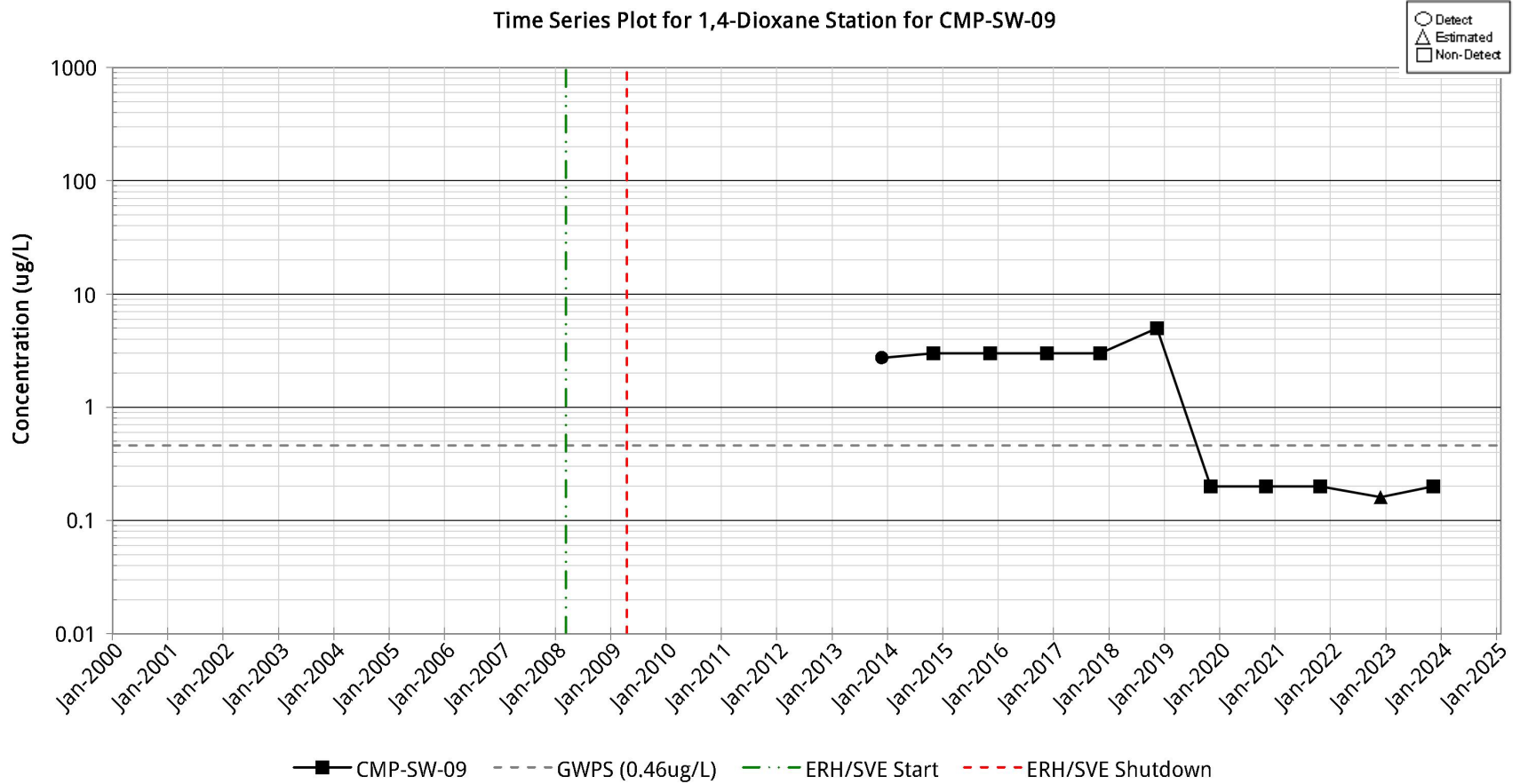
Time Series Plot for 1,4-Dioxane Station for CMP067

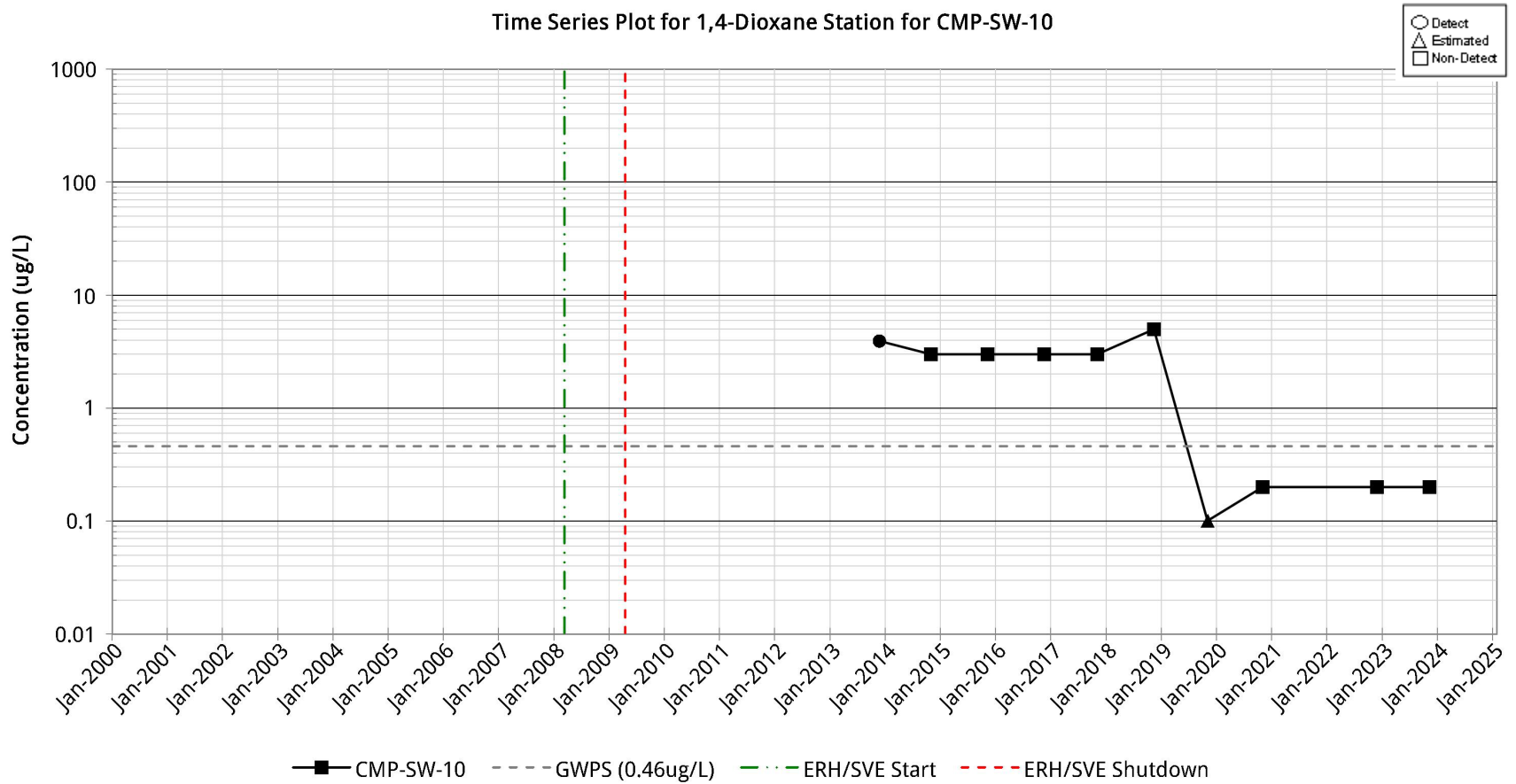


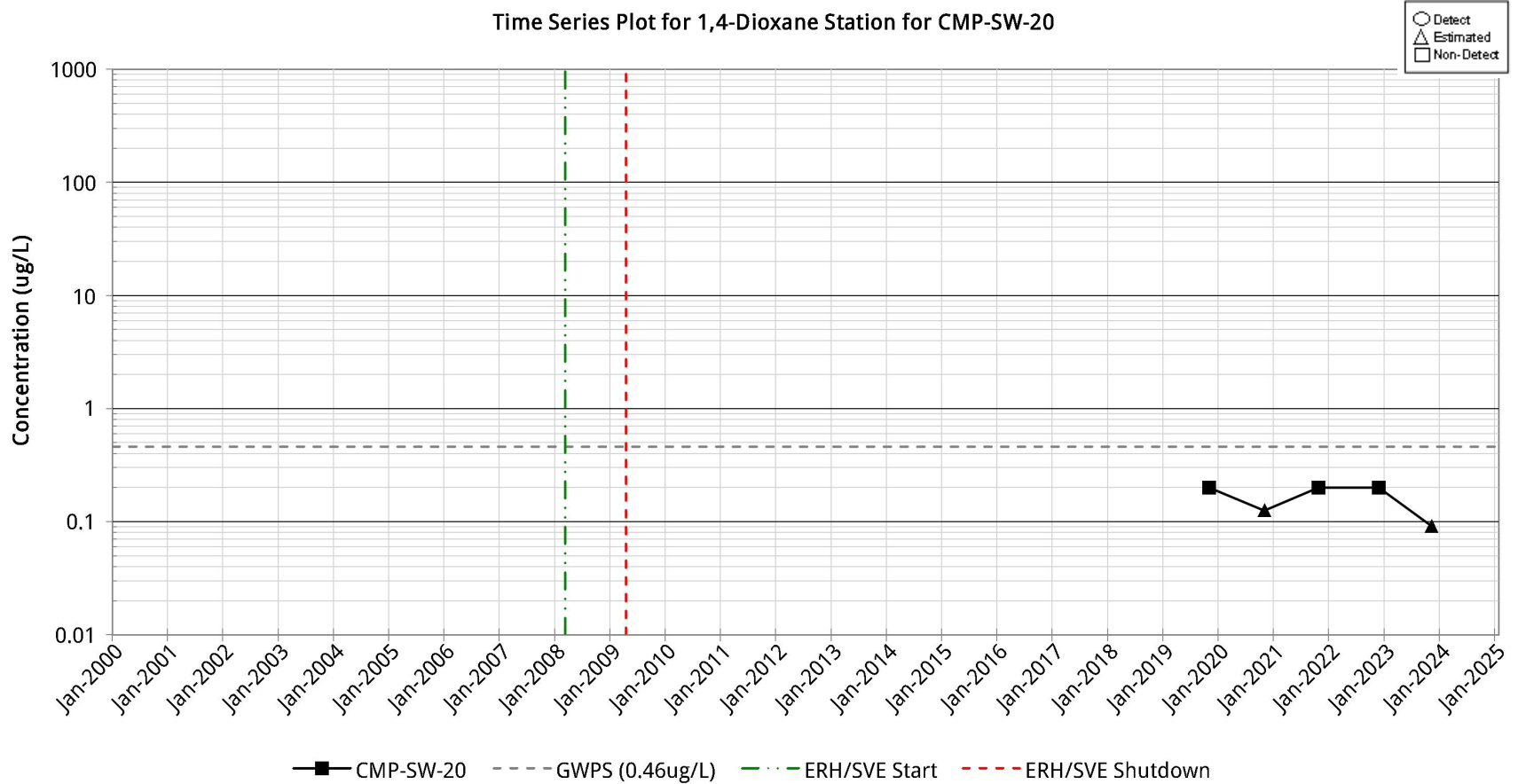




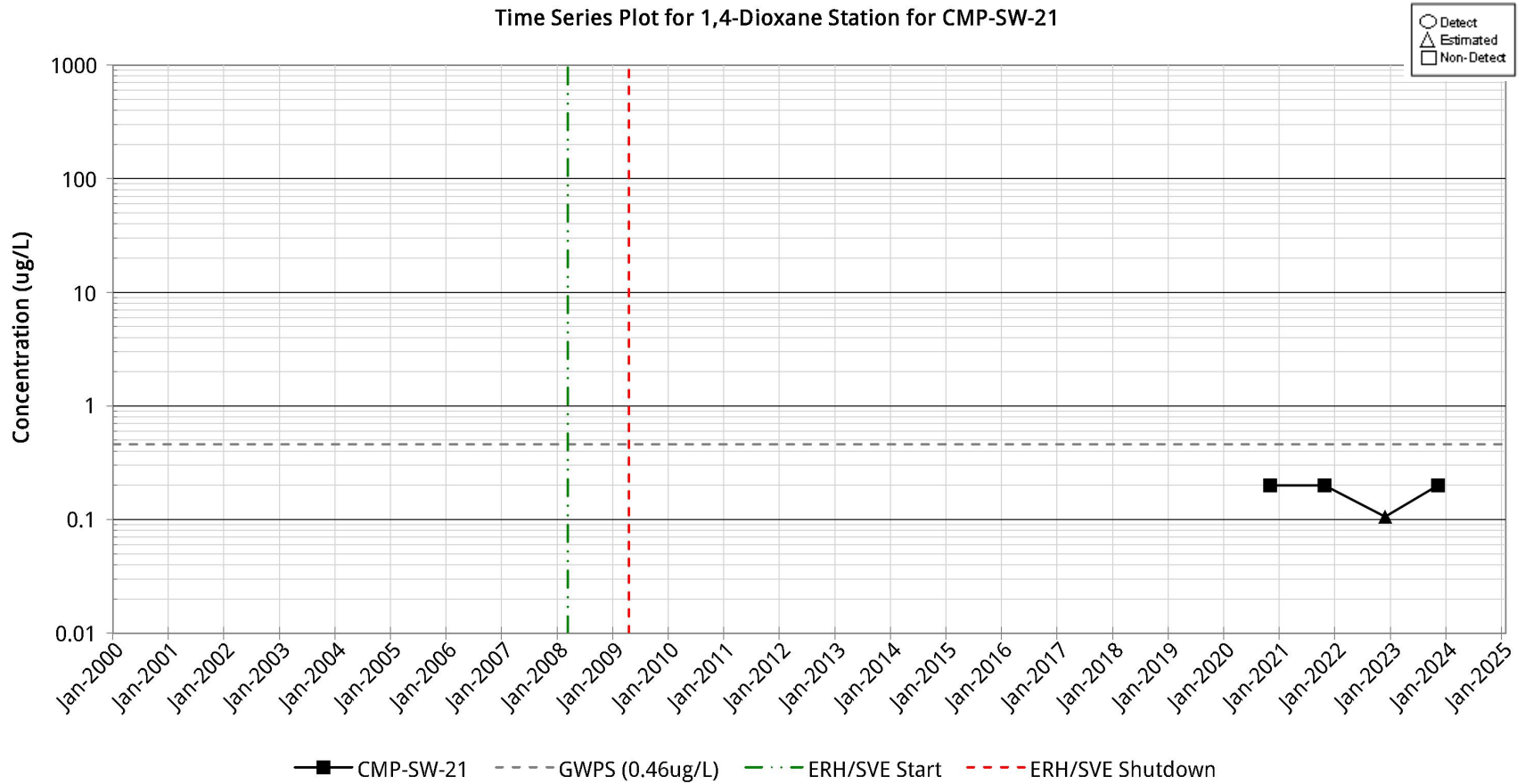


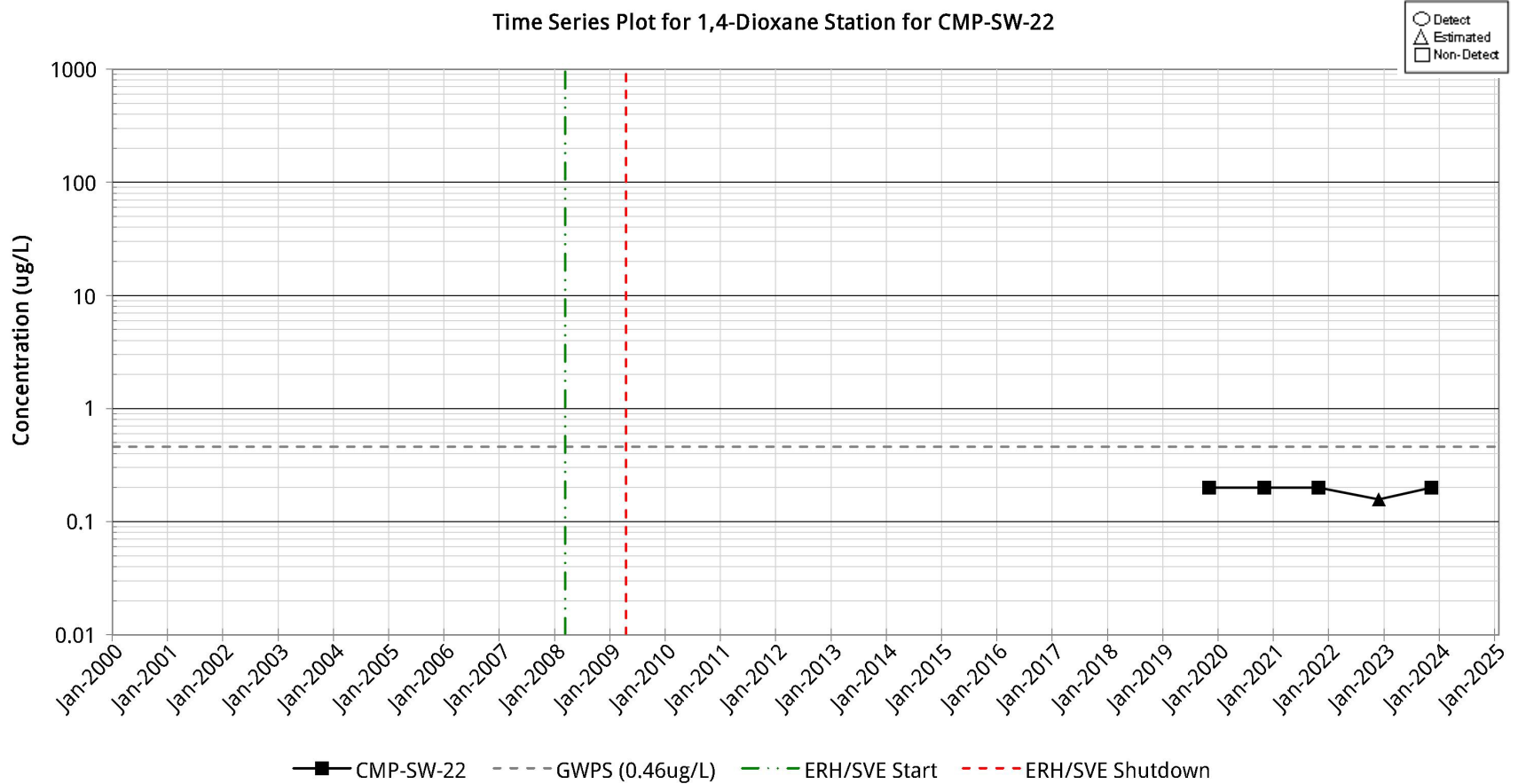


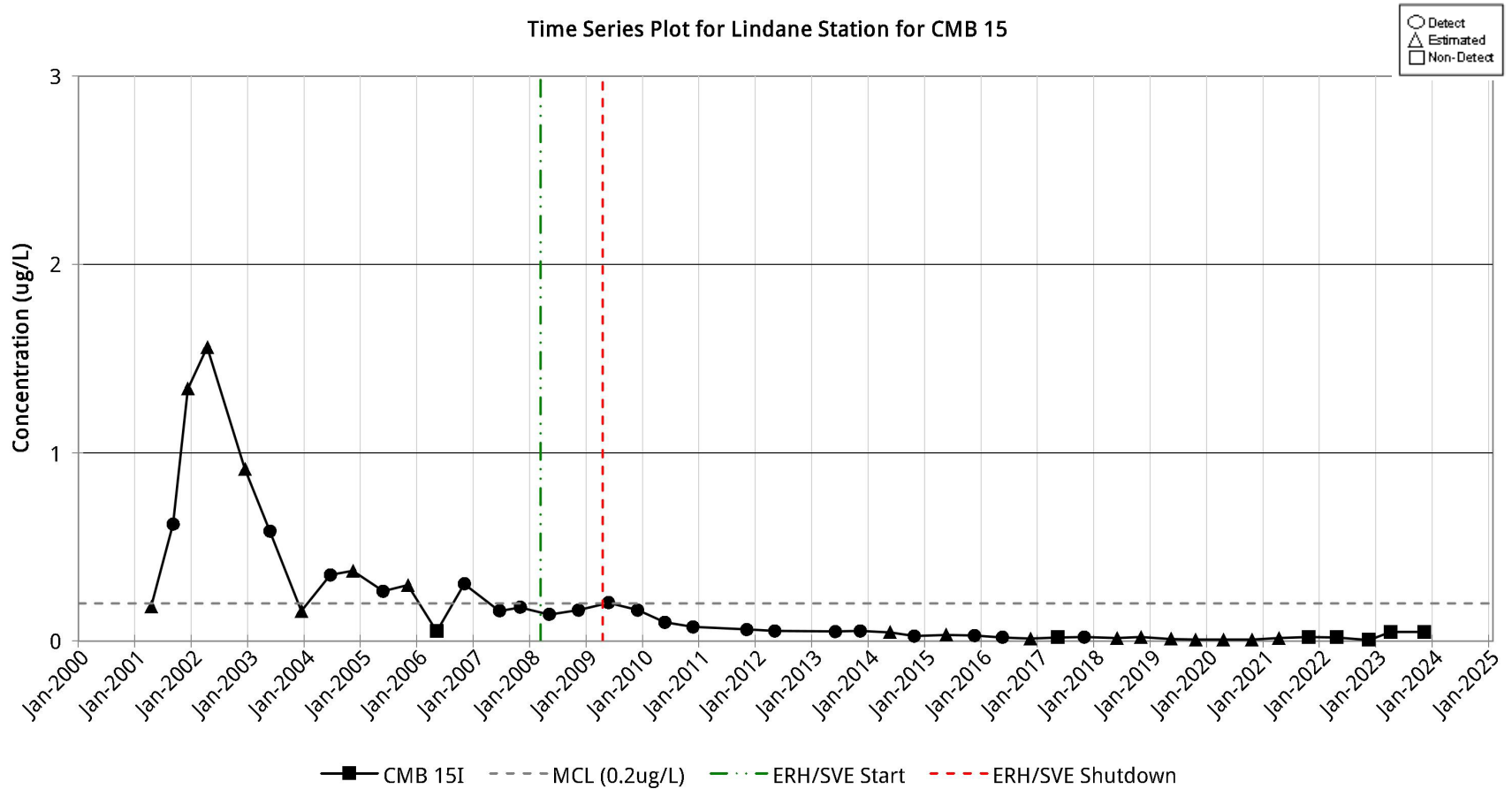


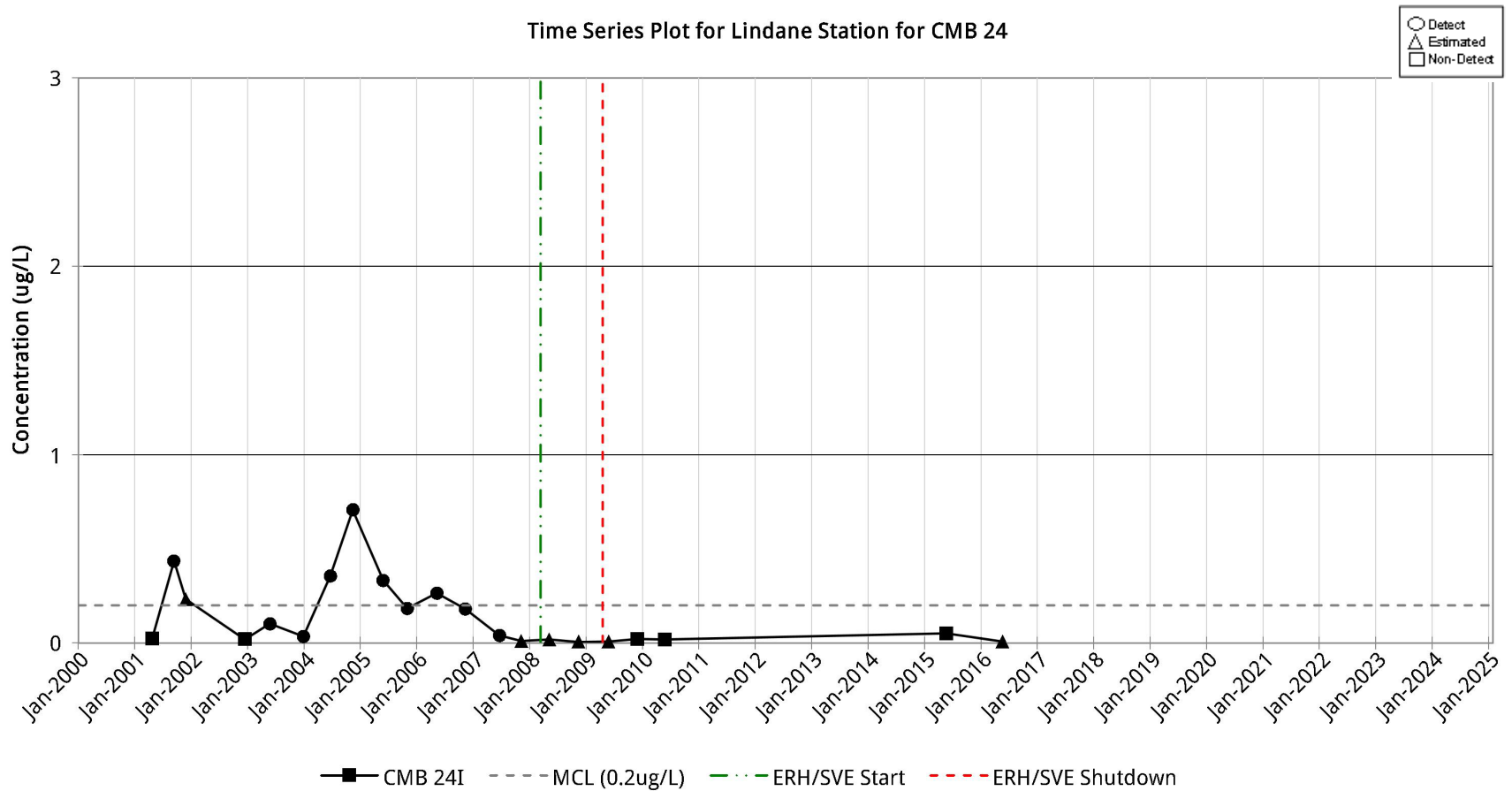


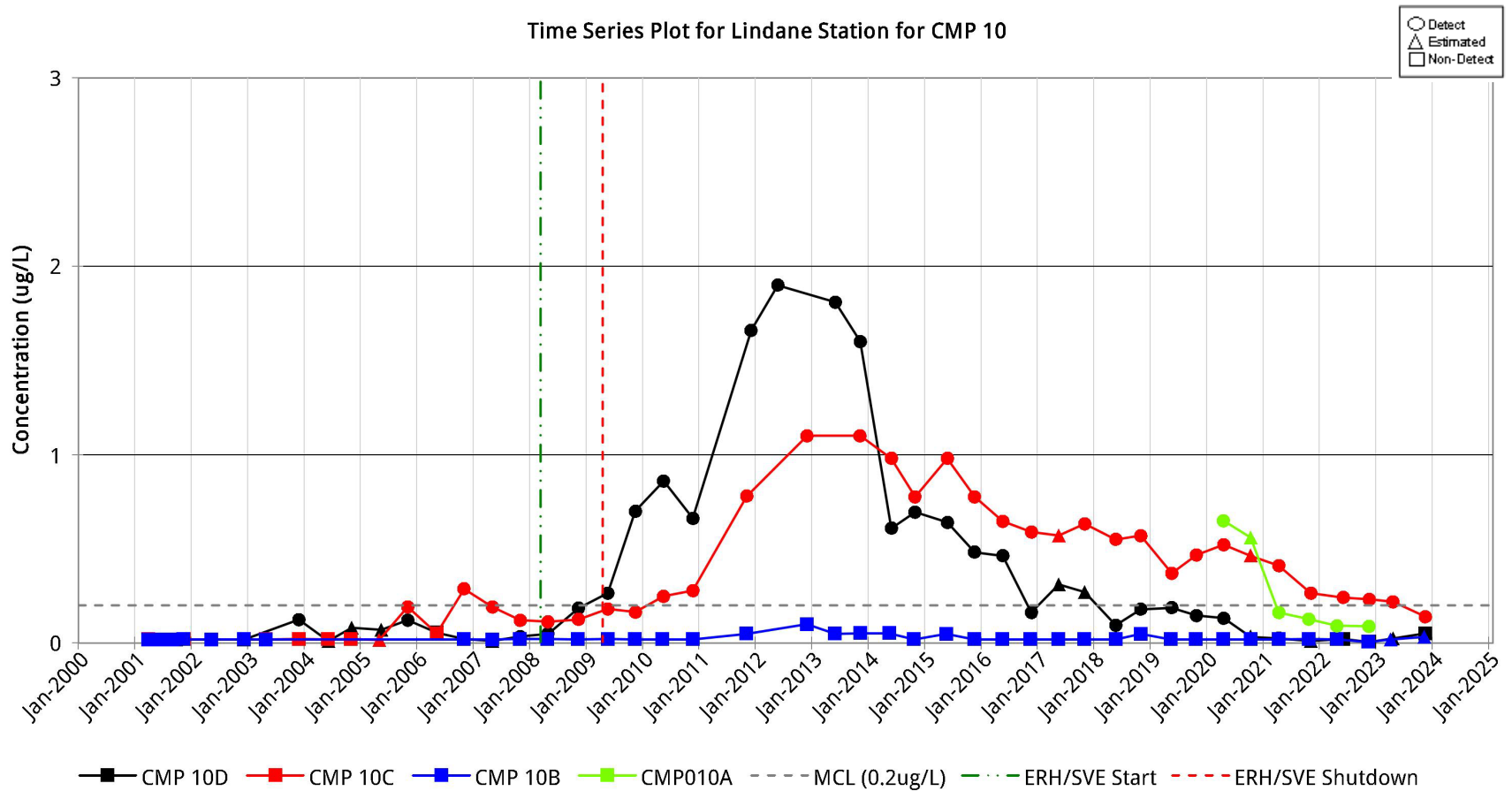


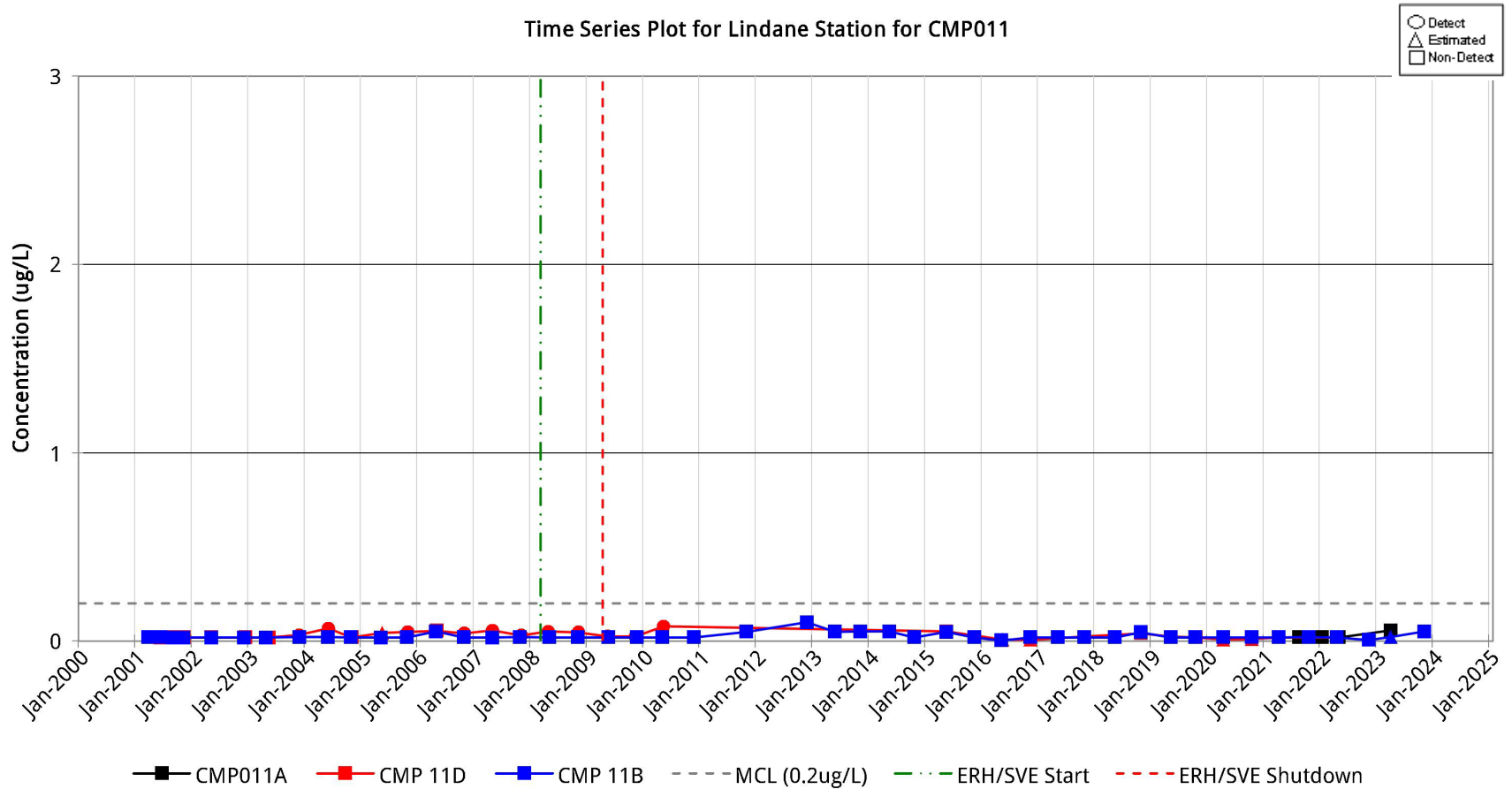


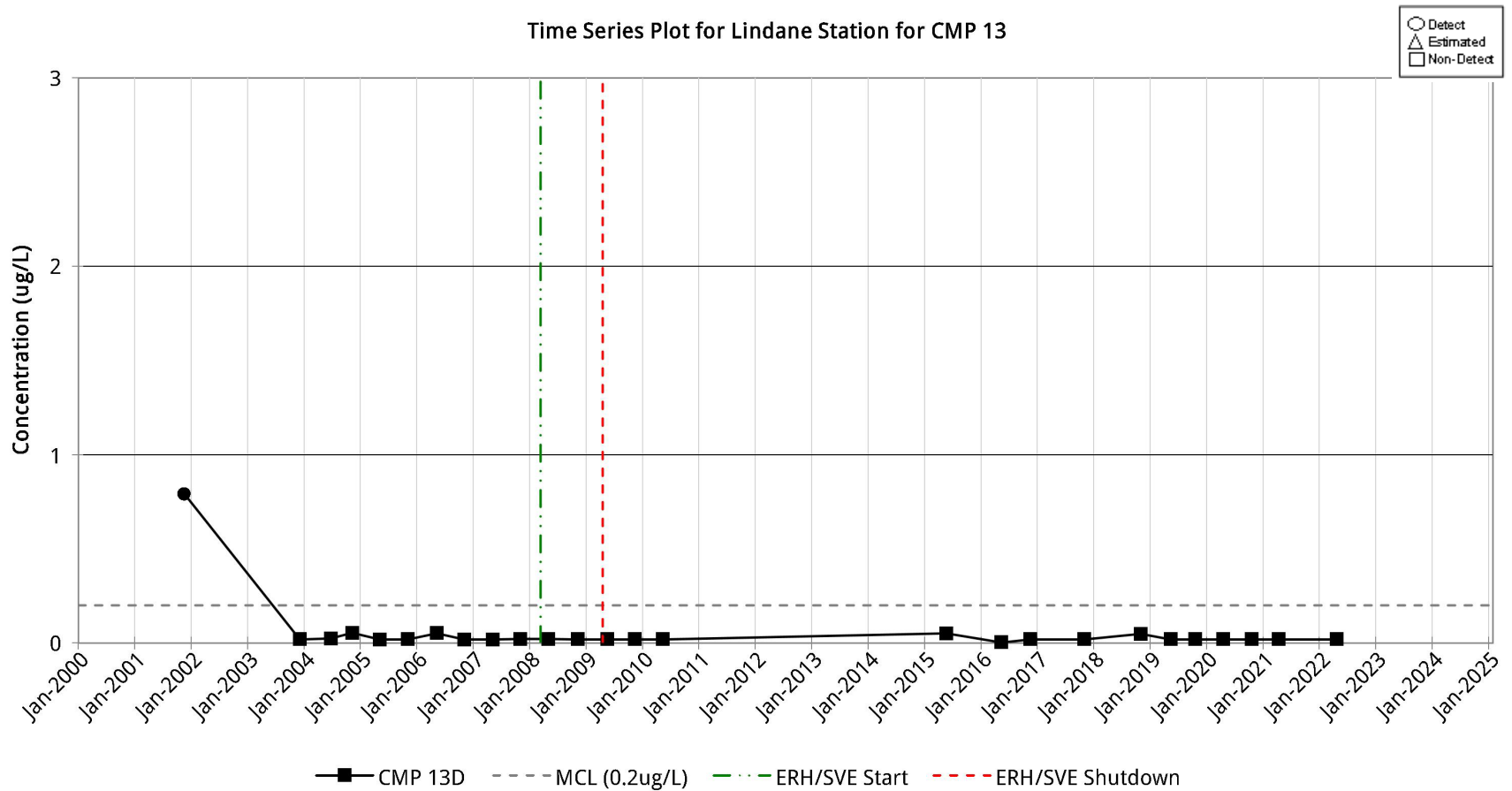


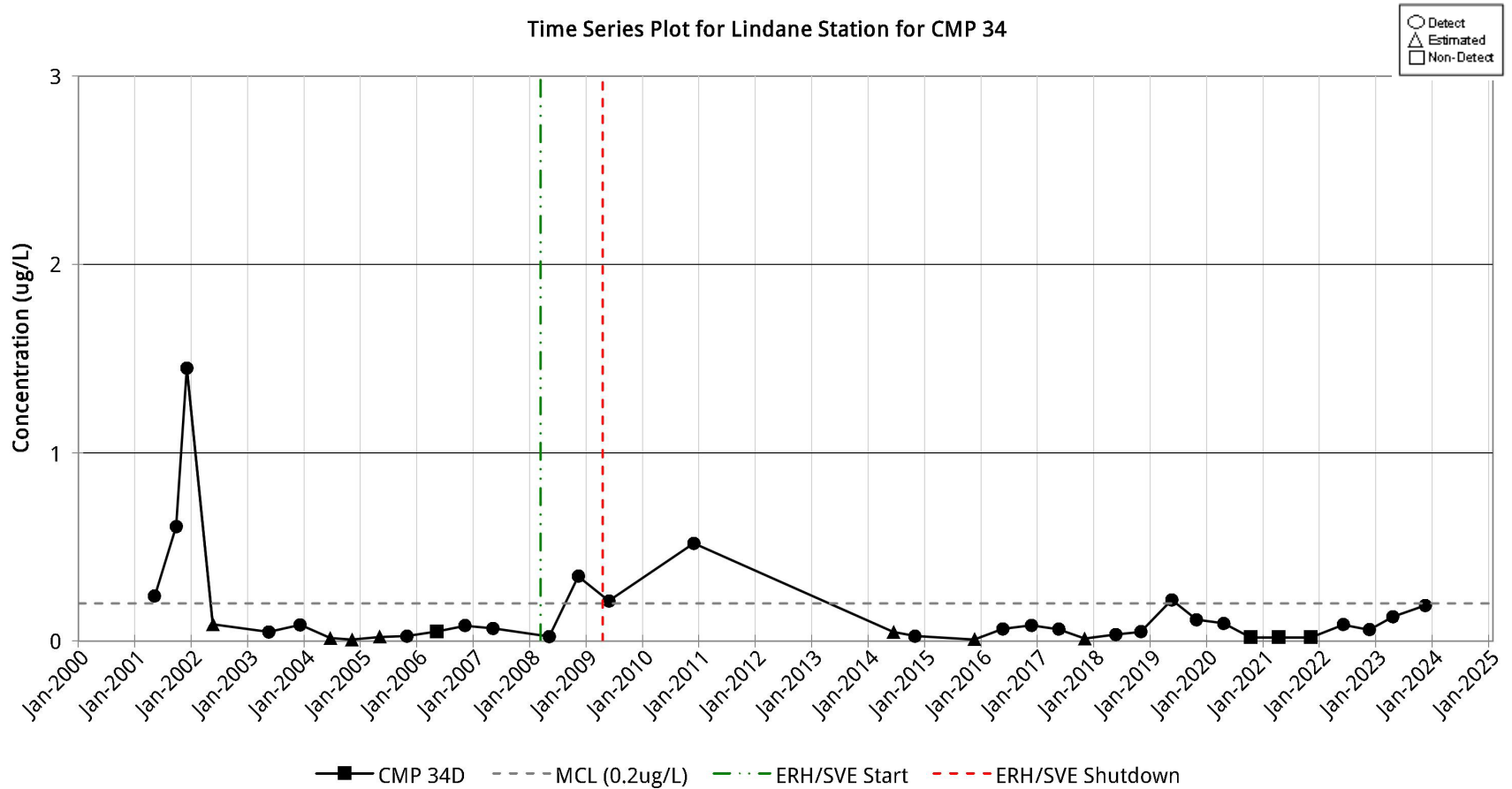




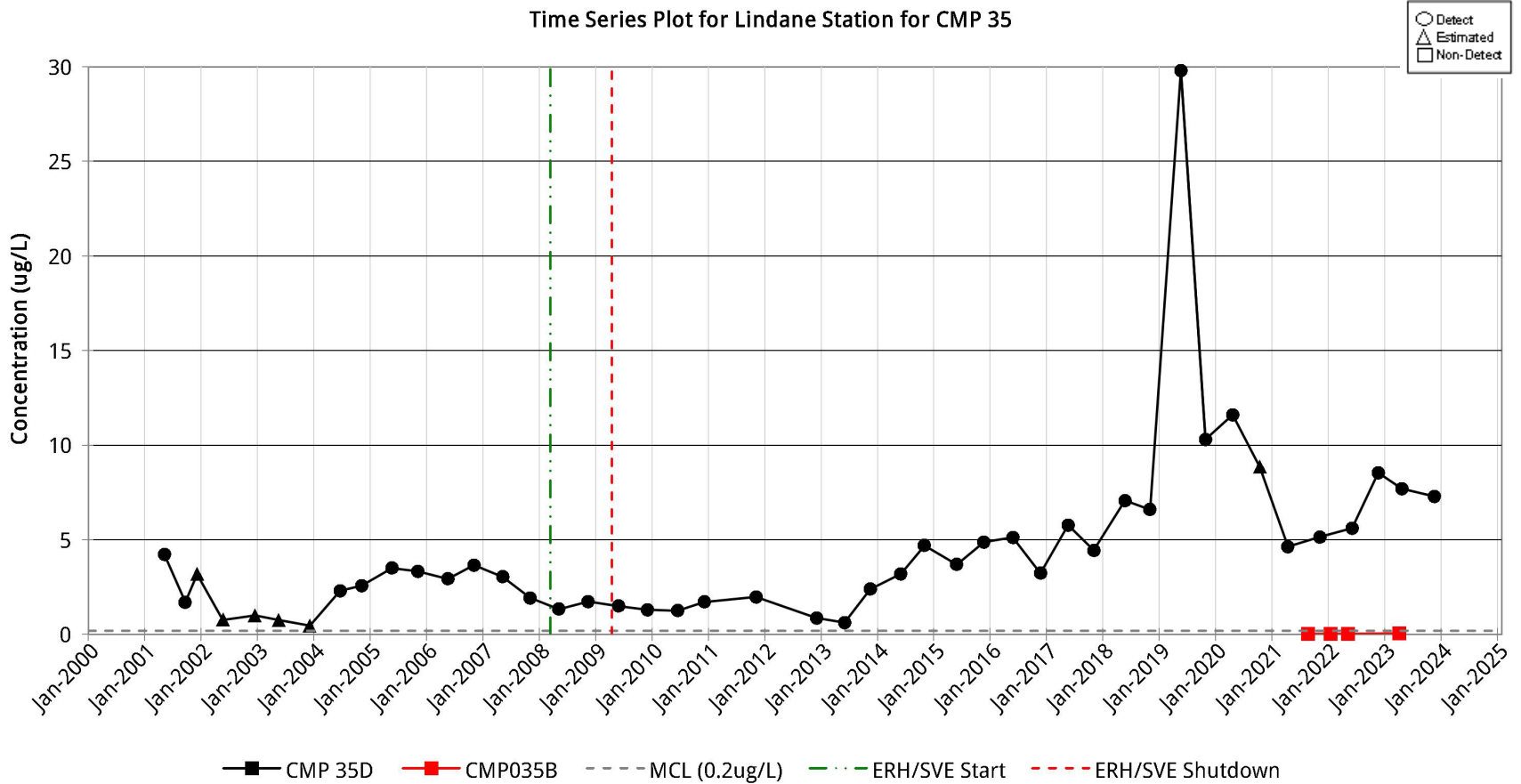


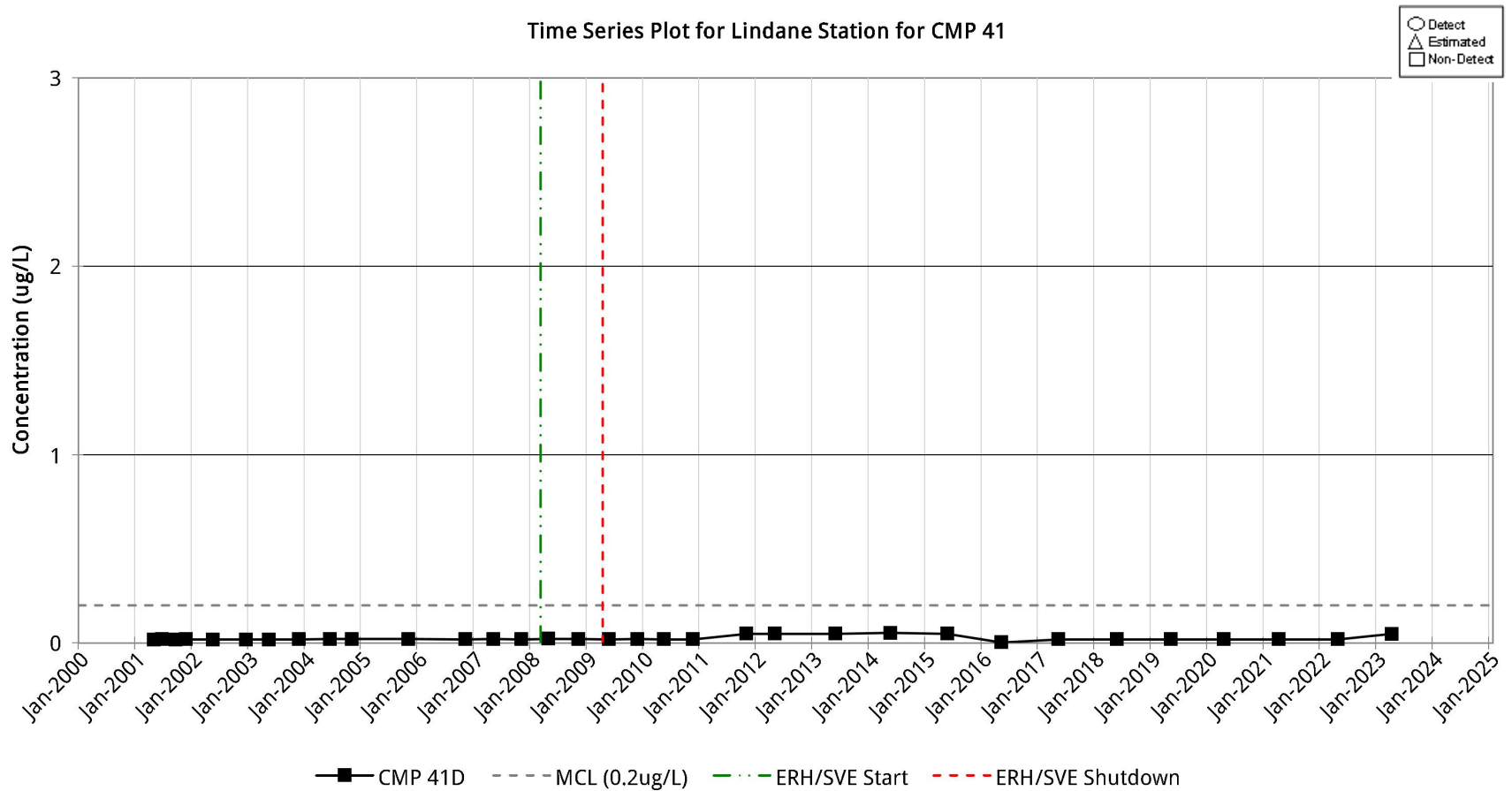


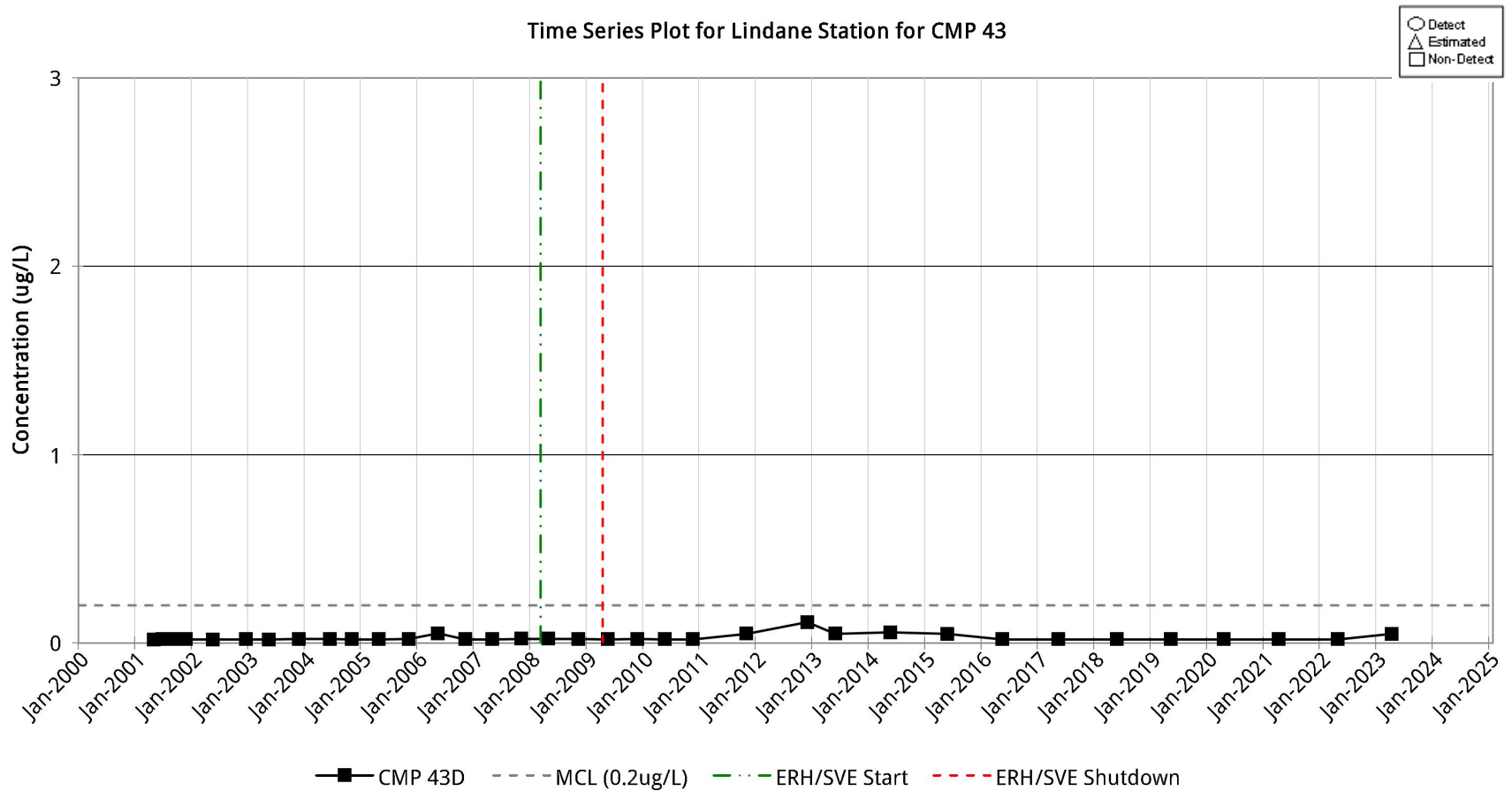


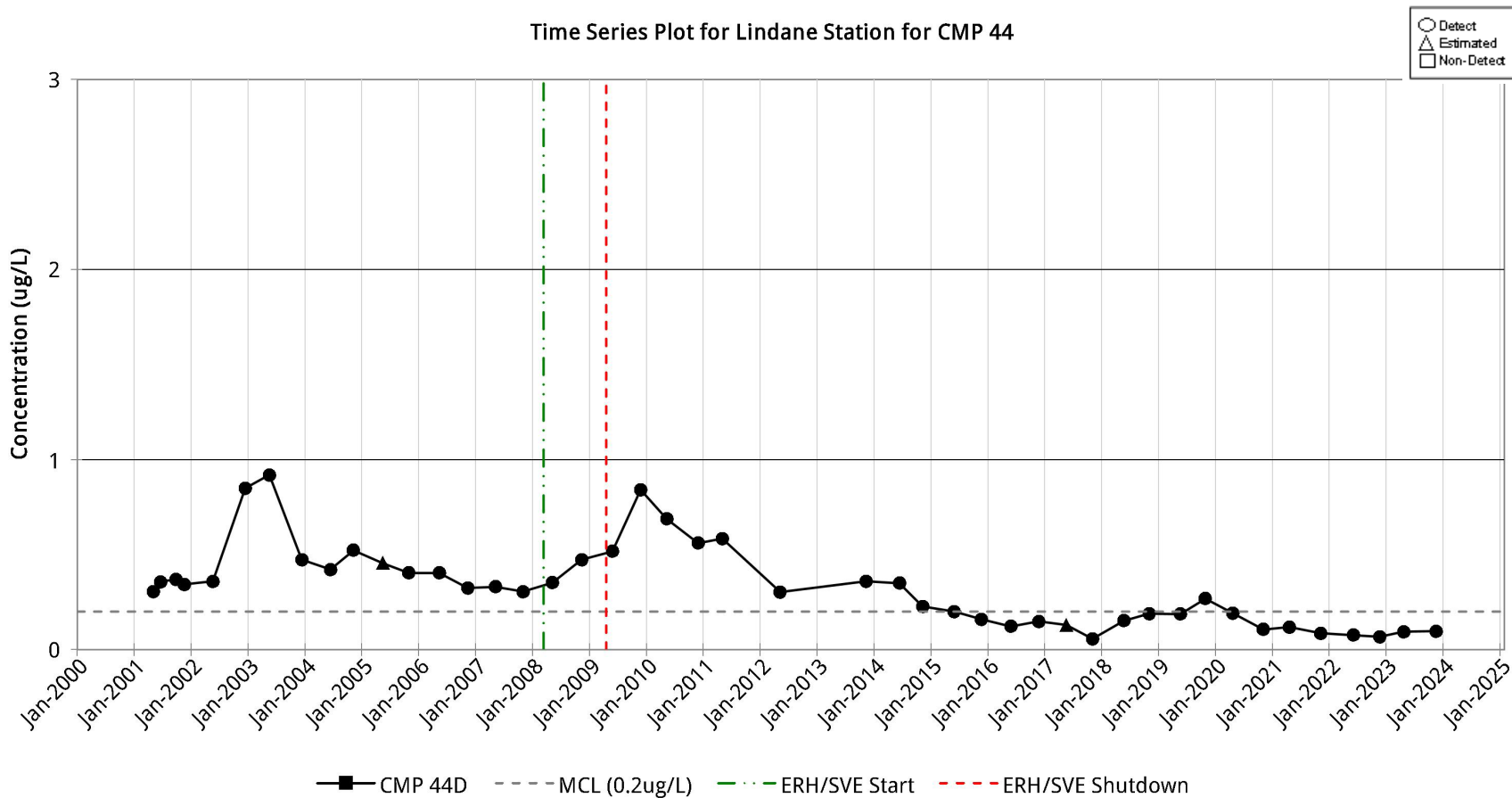


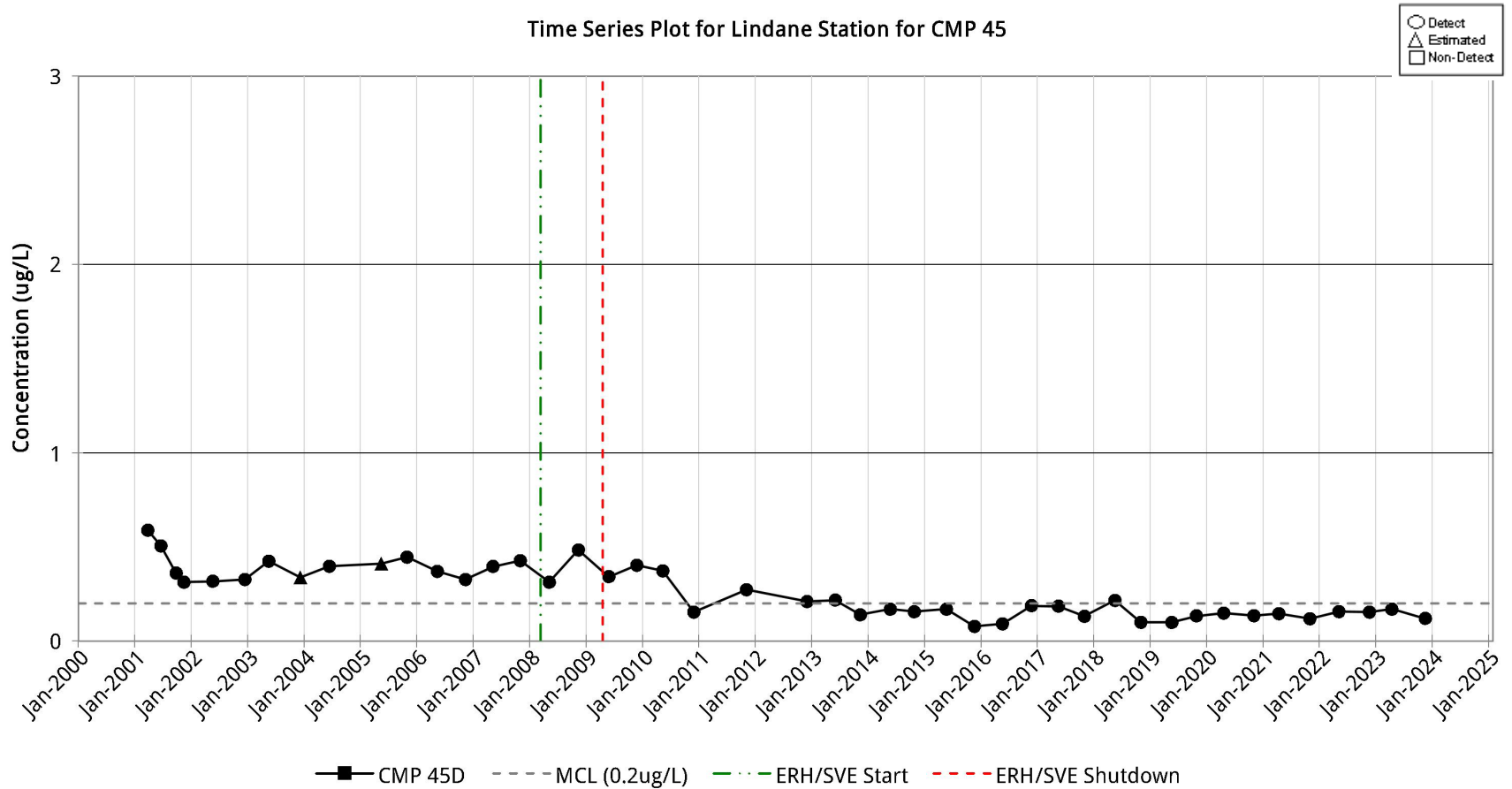


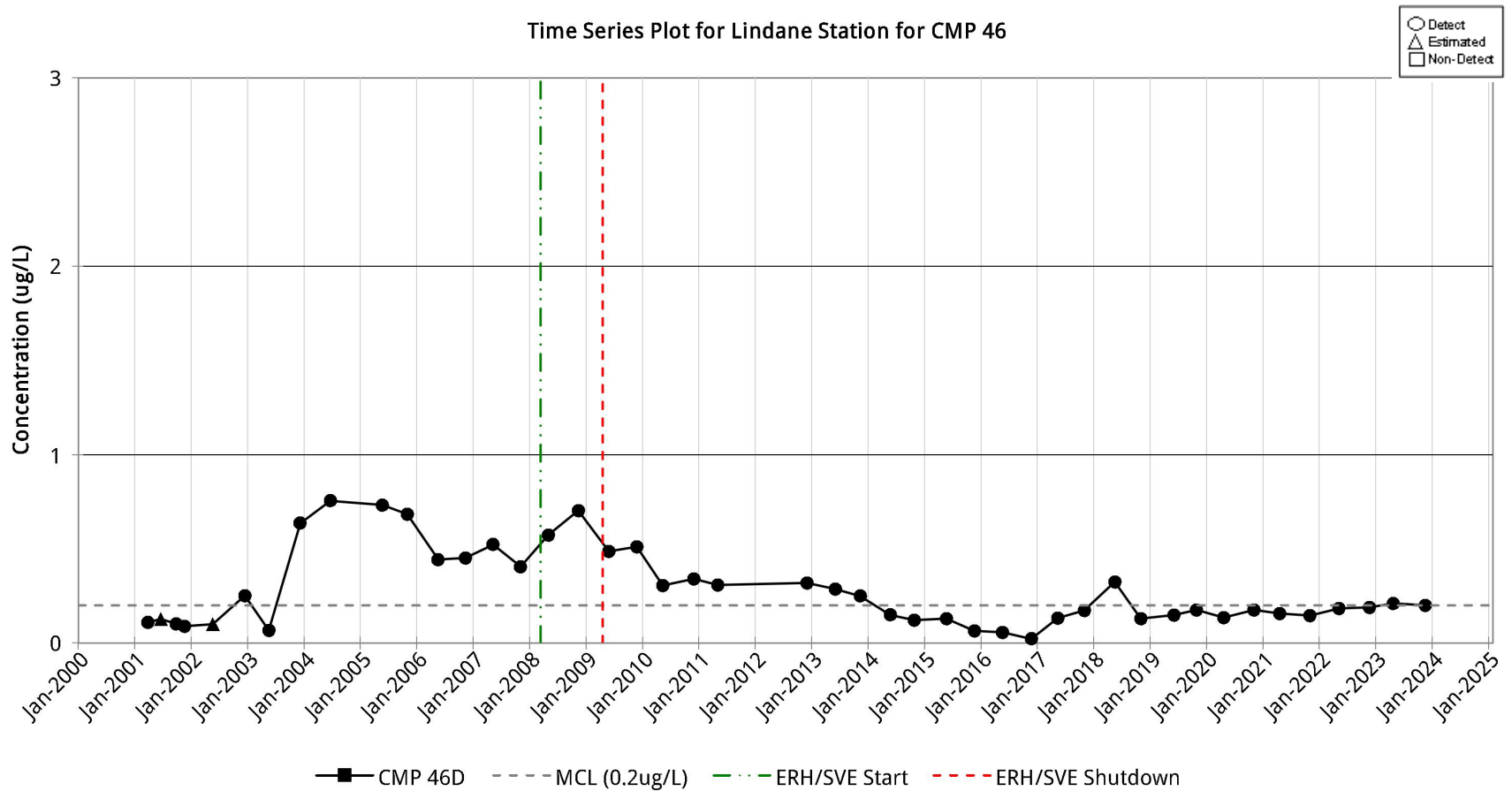


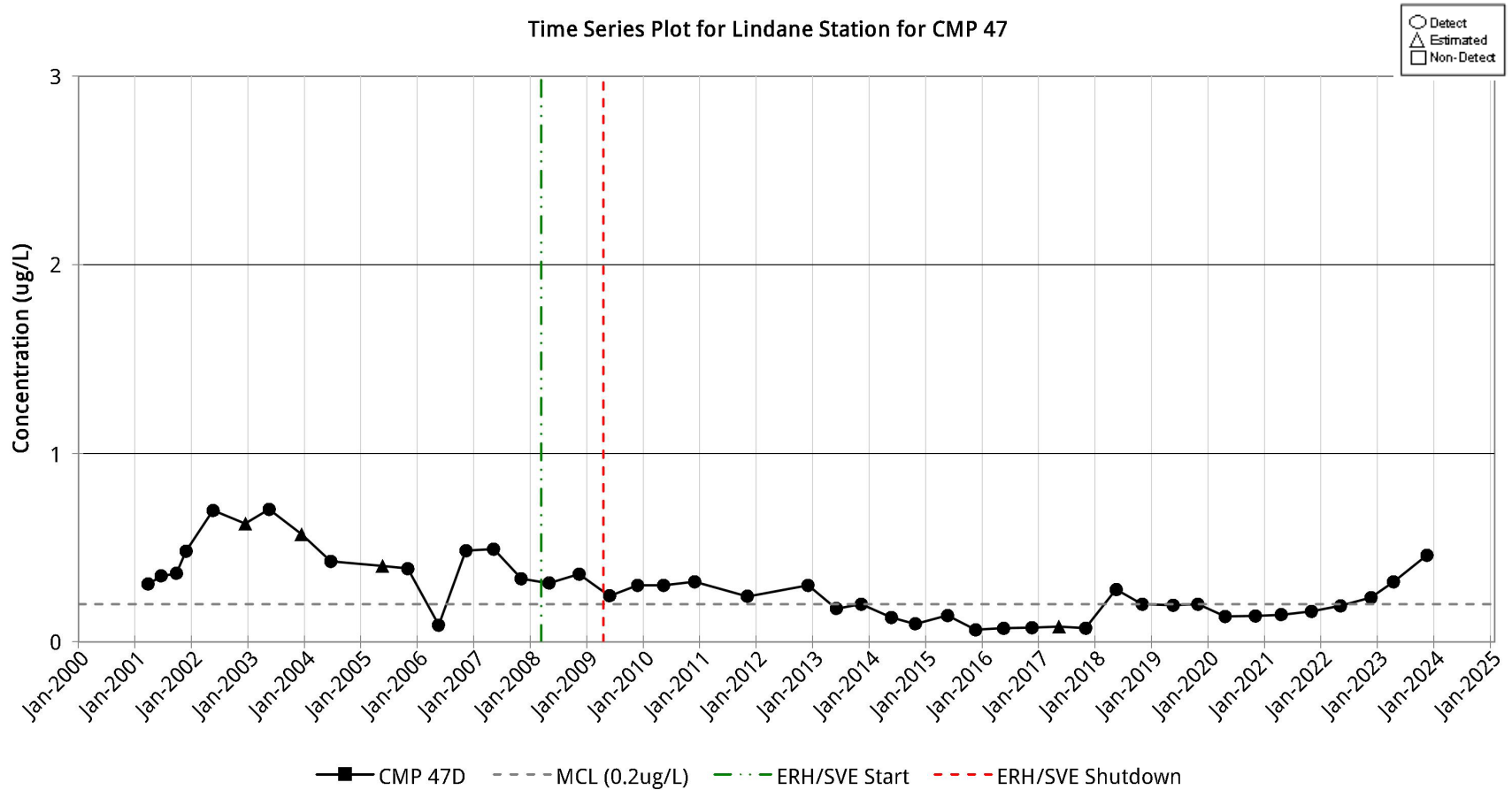


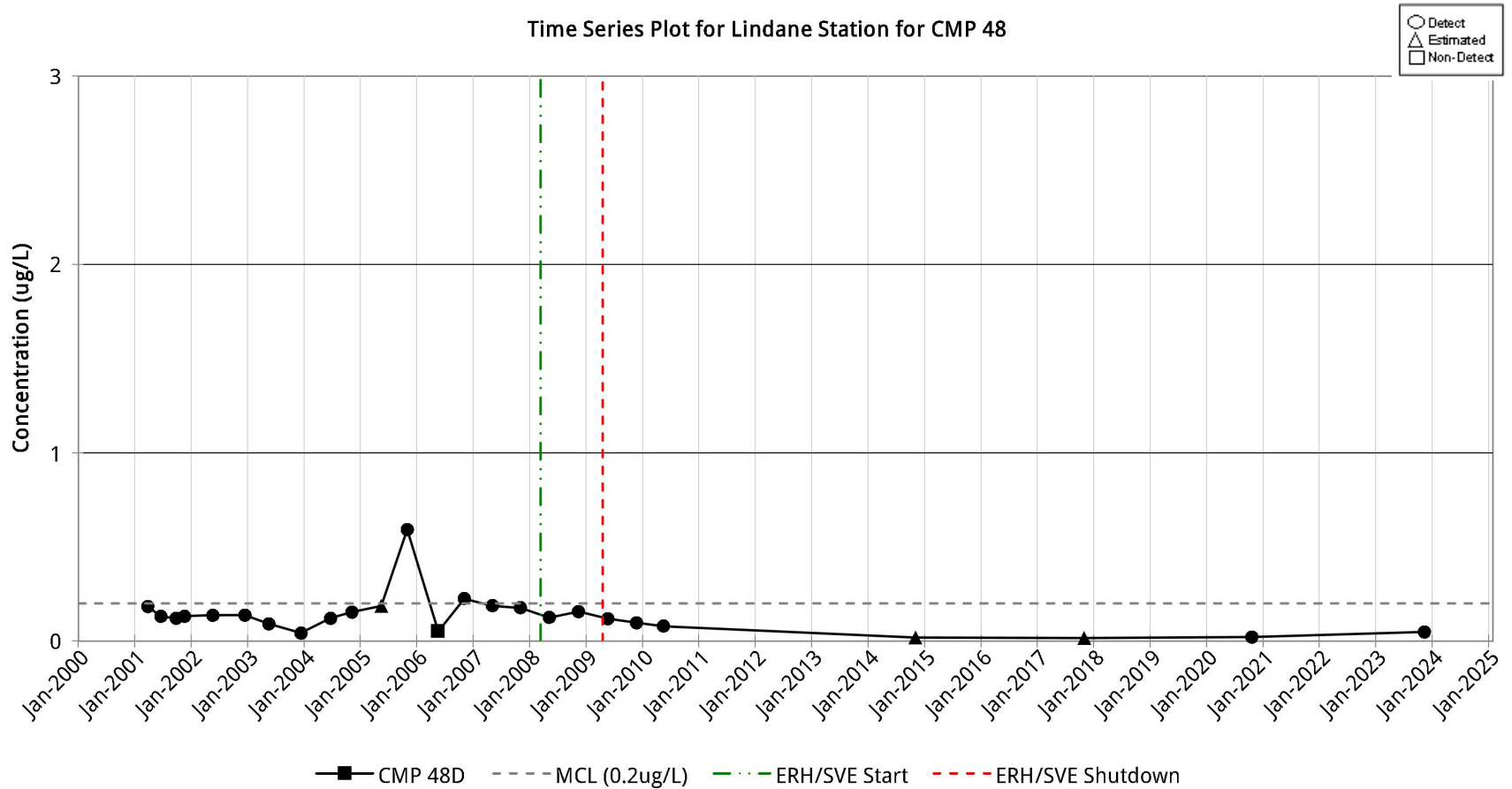




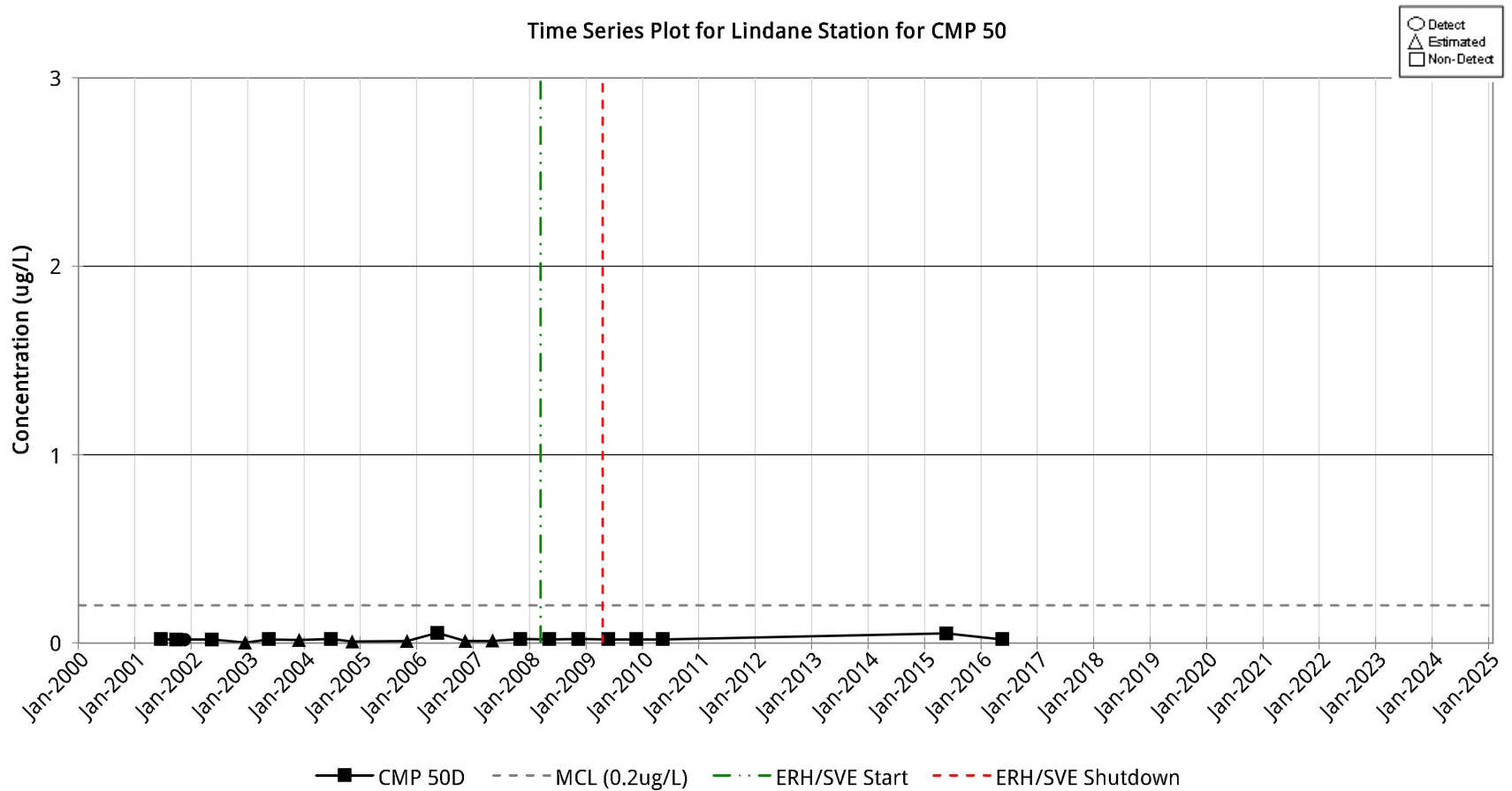


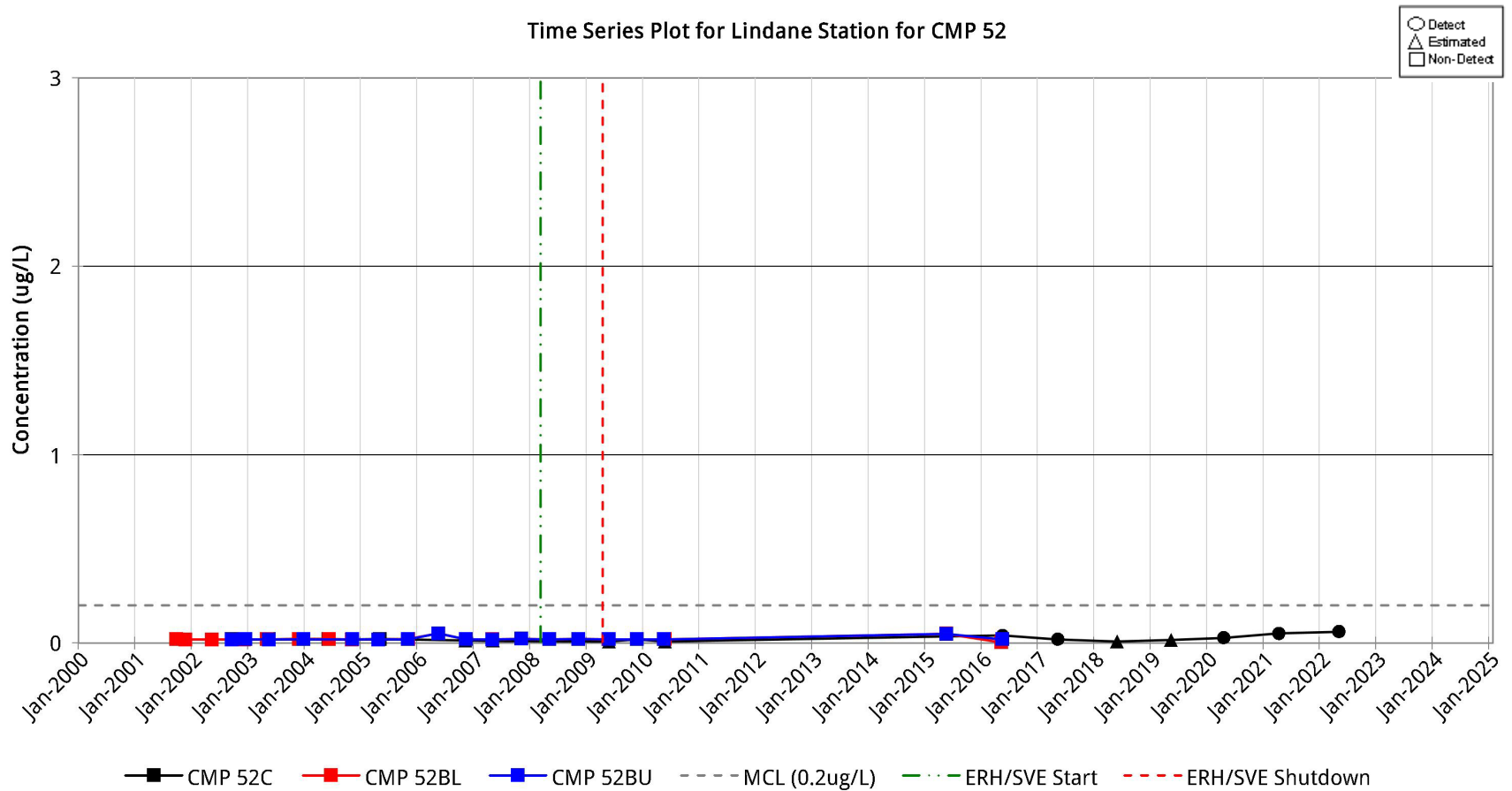


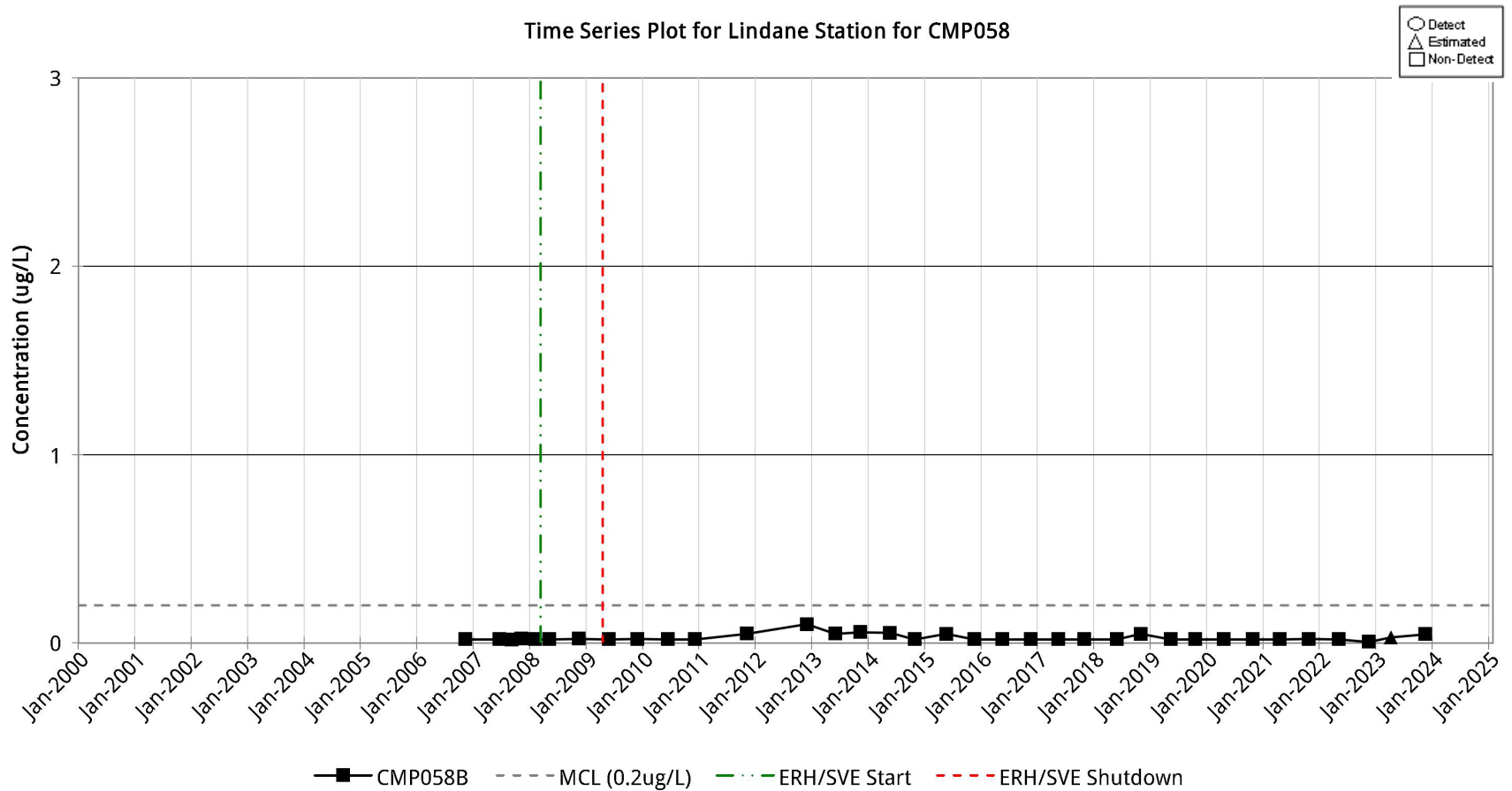


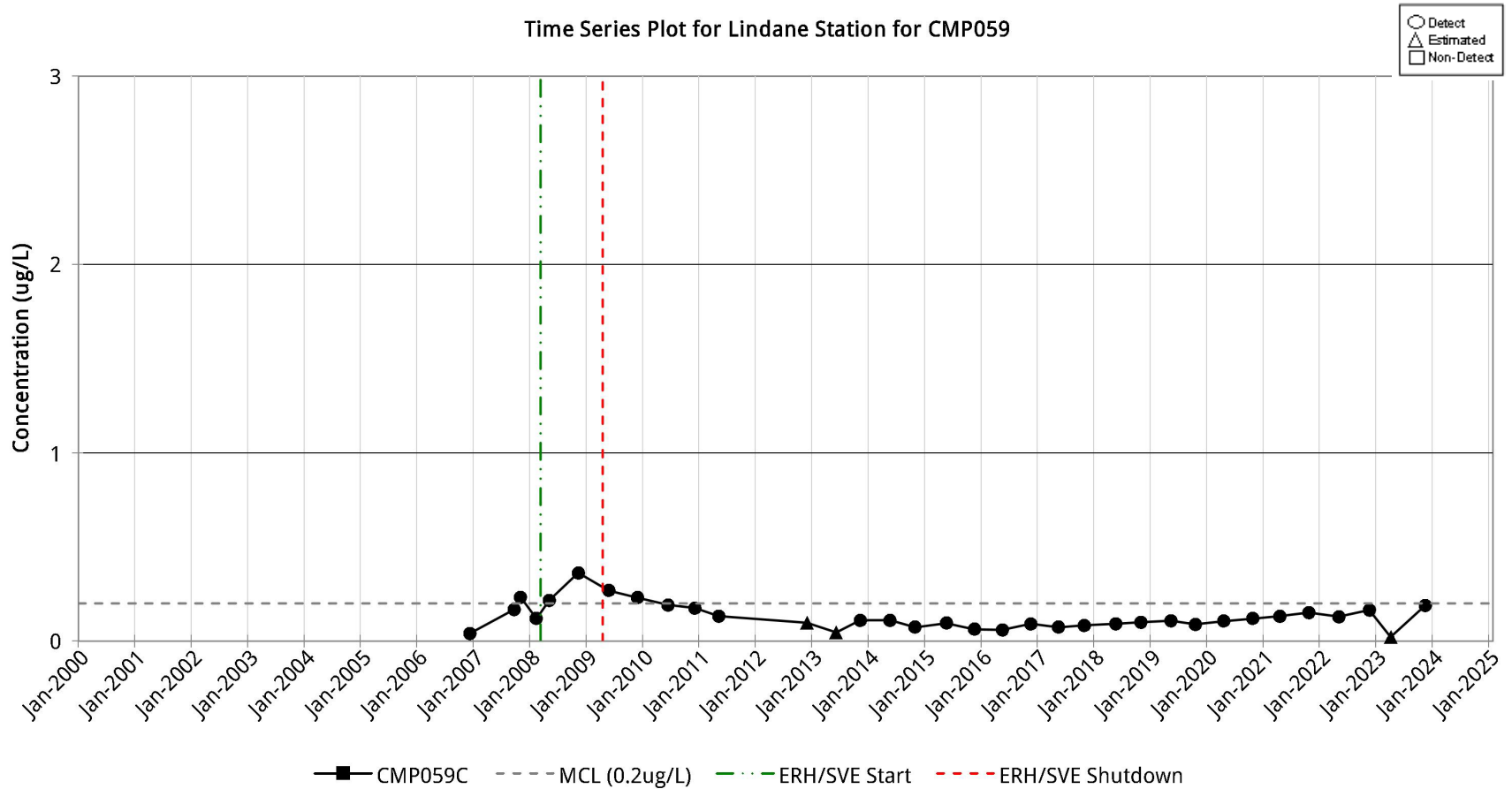


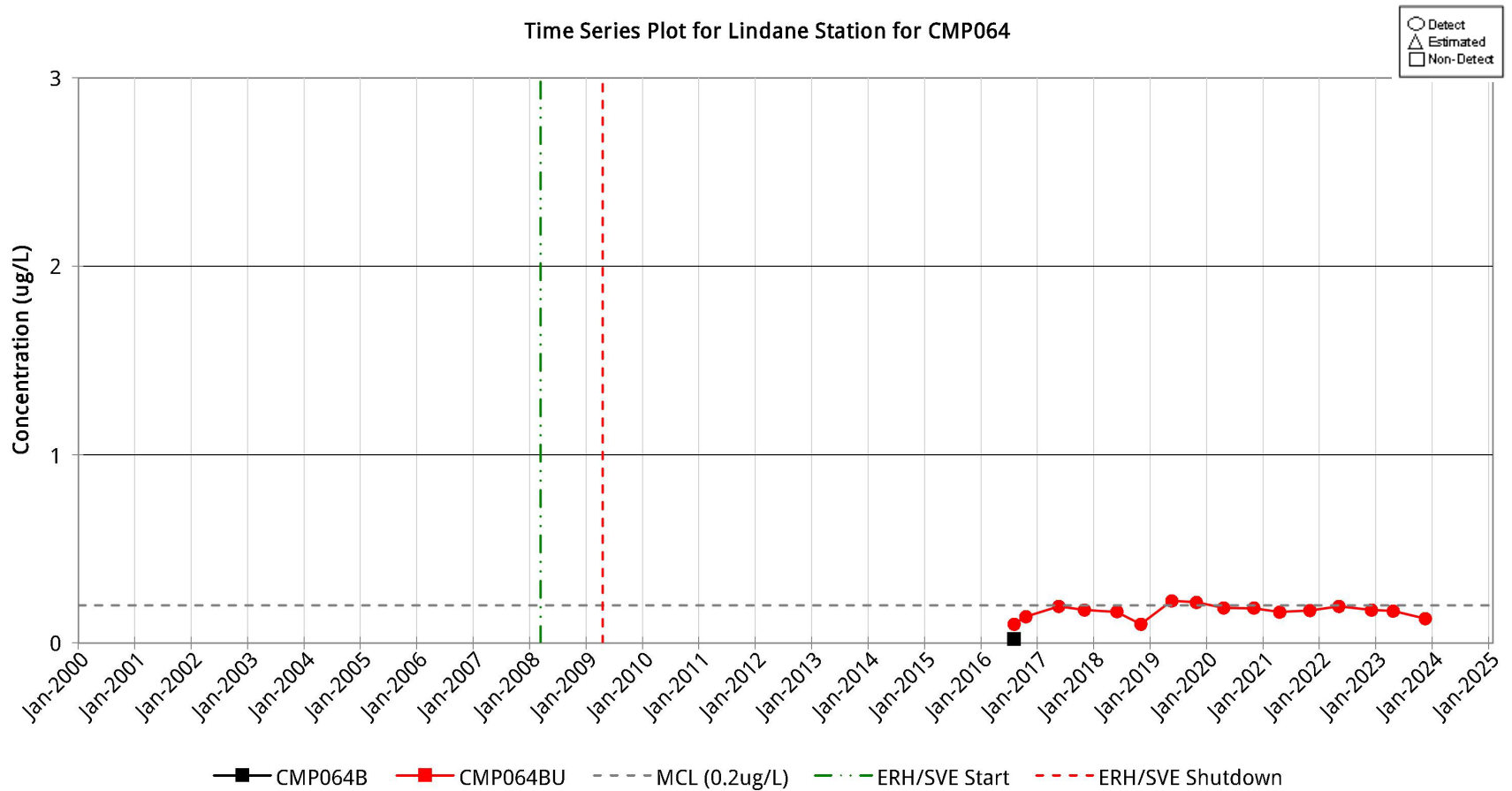


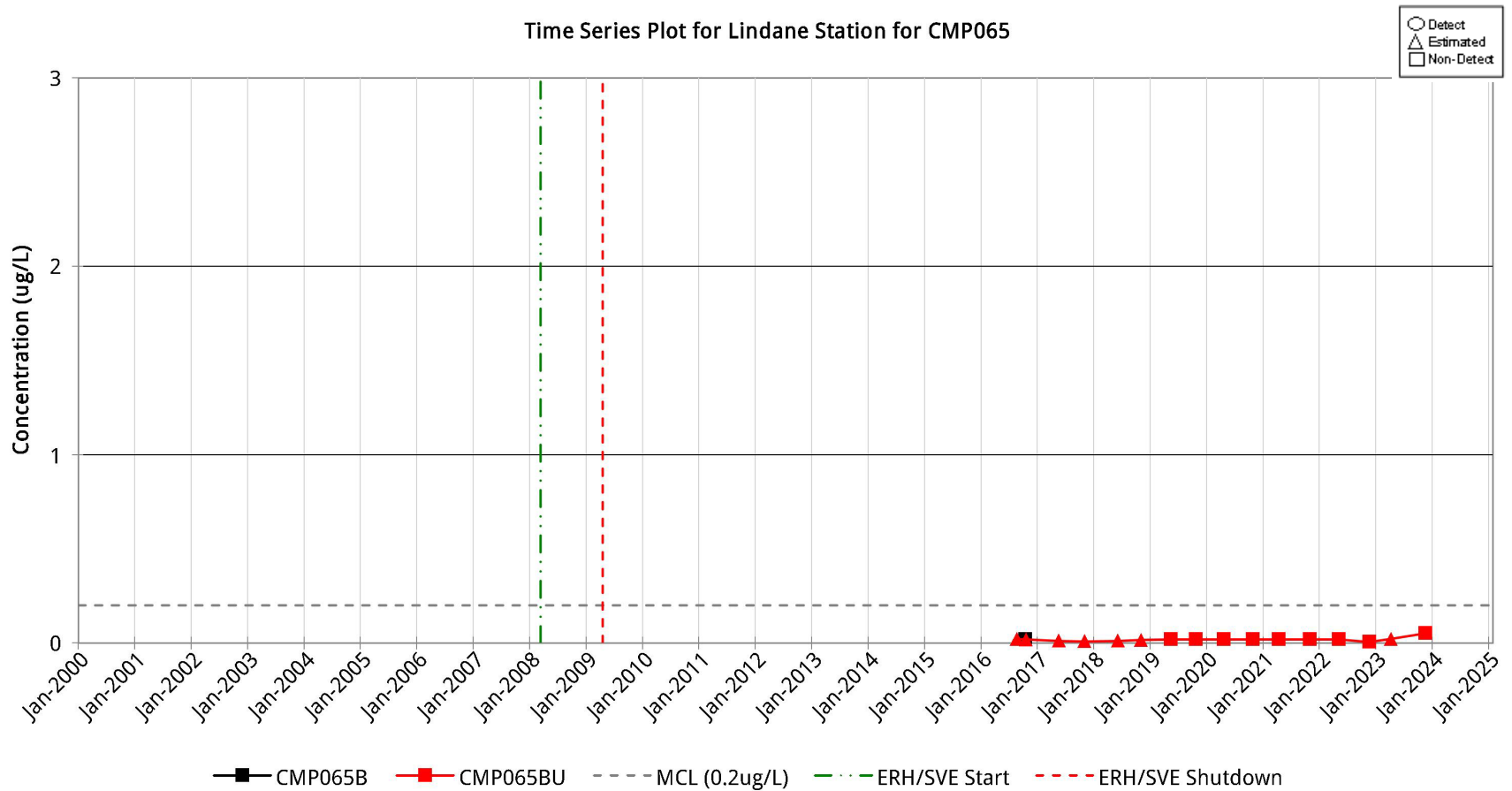


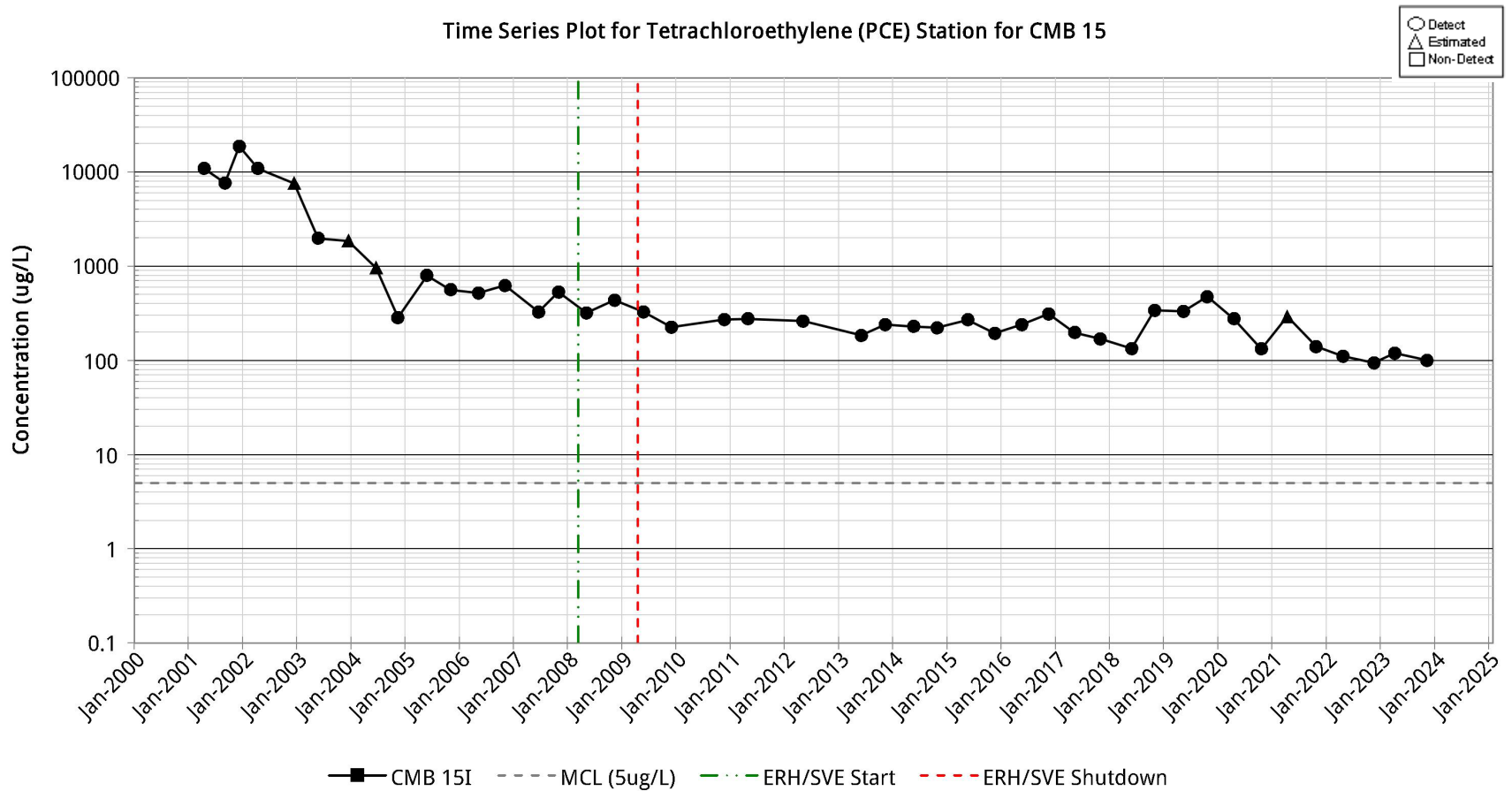


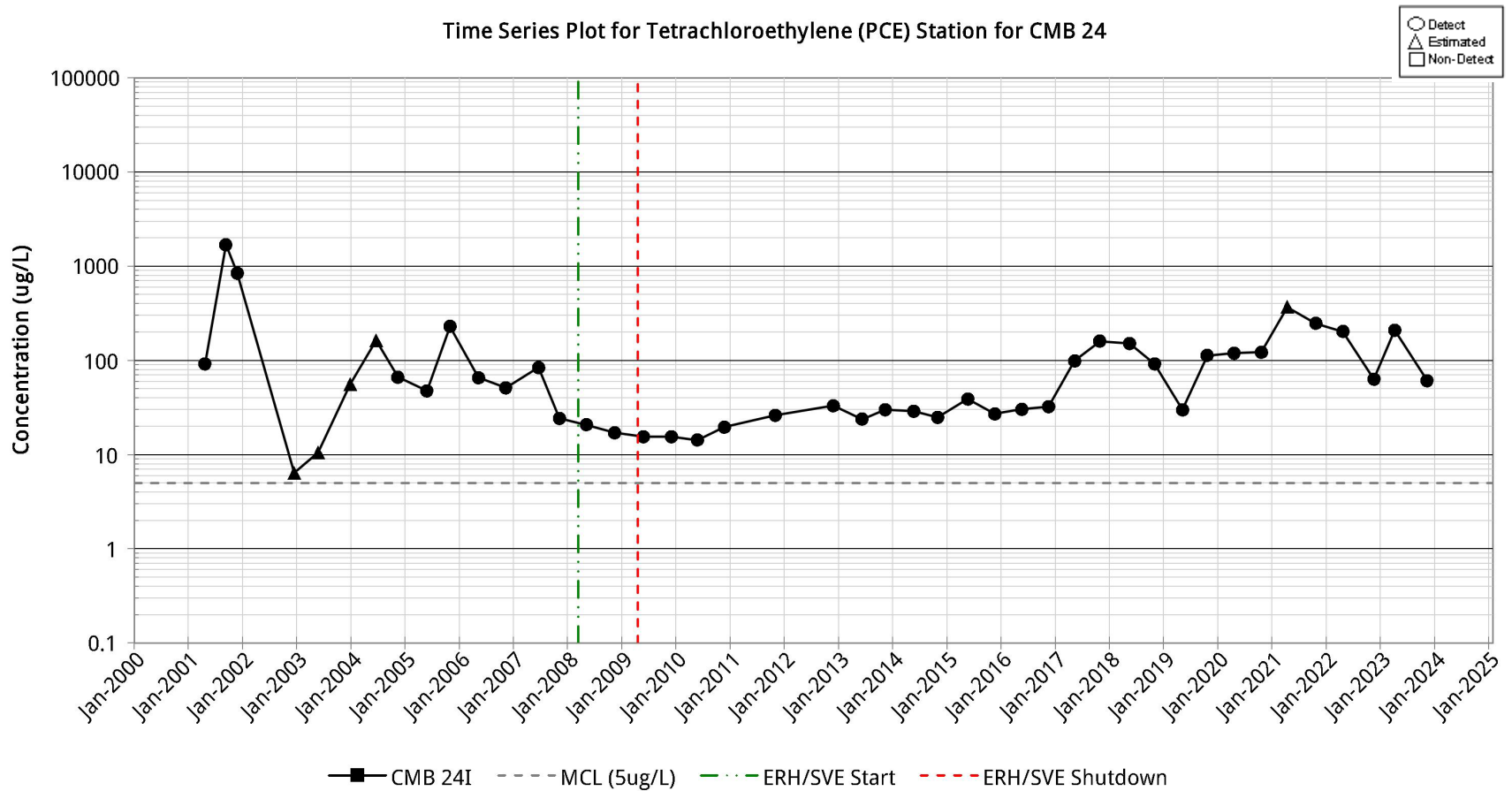




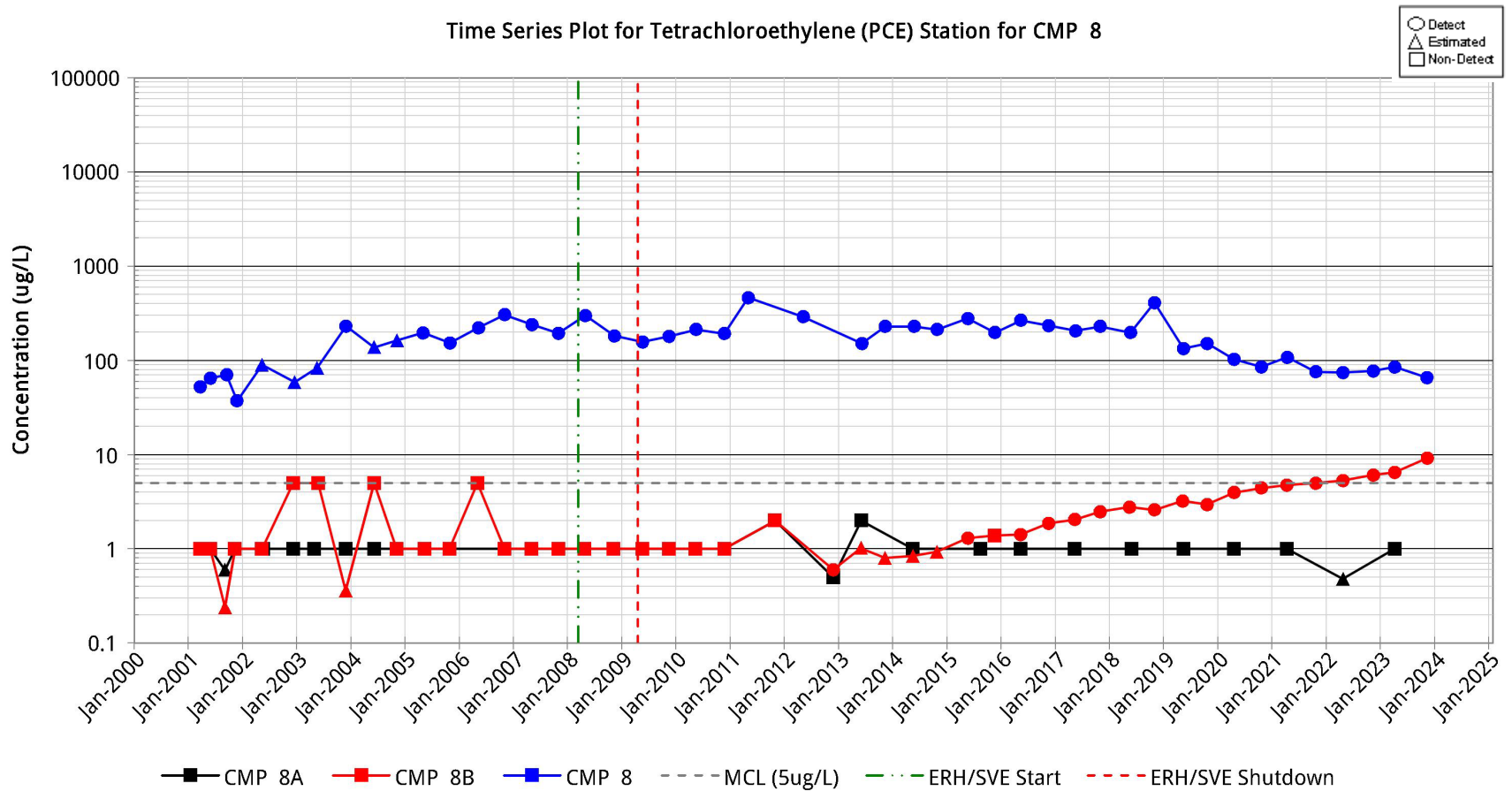


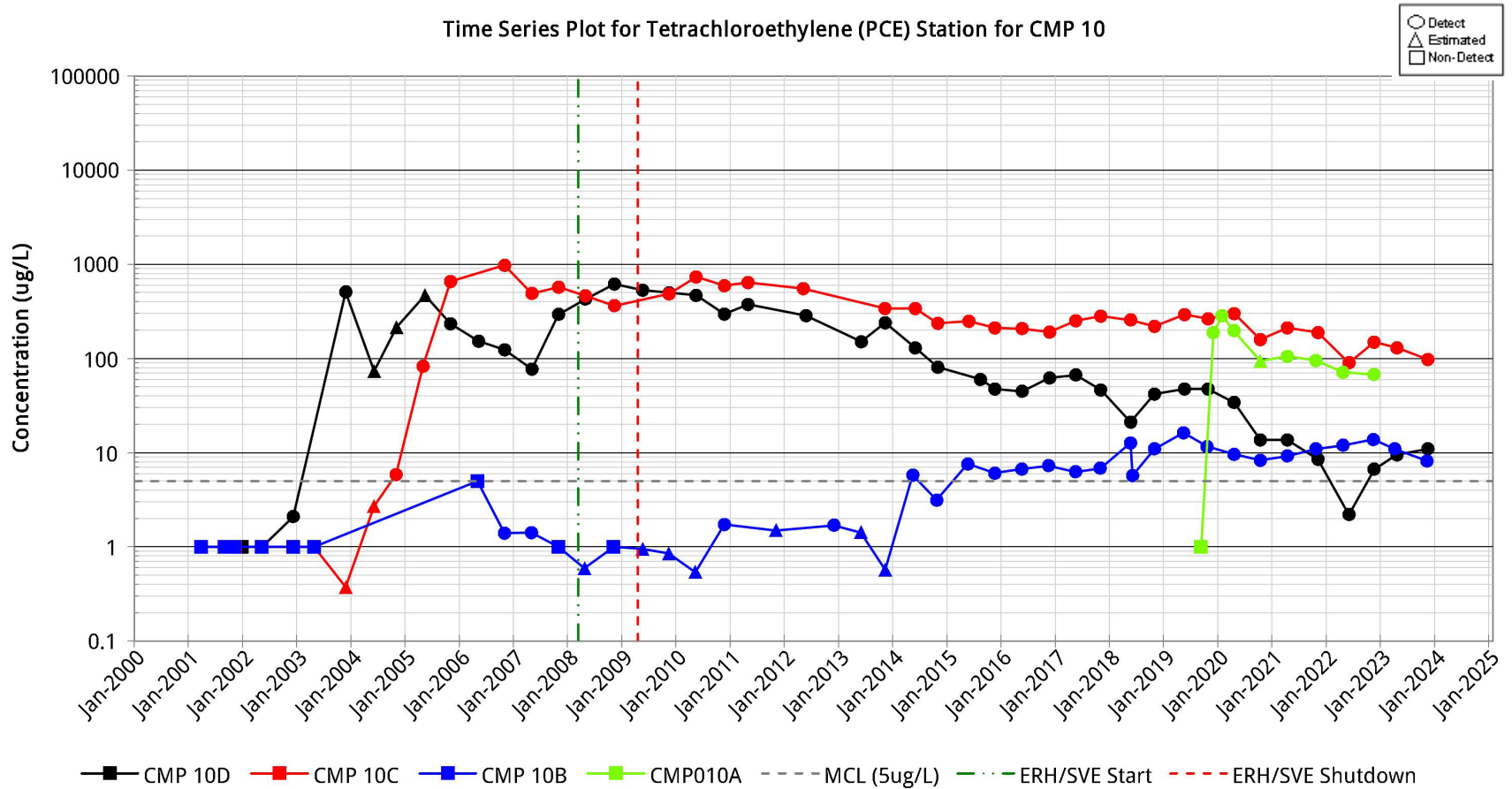


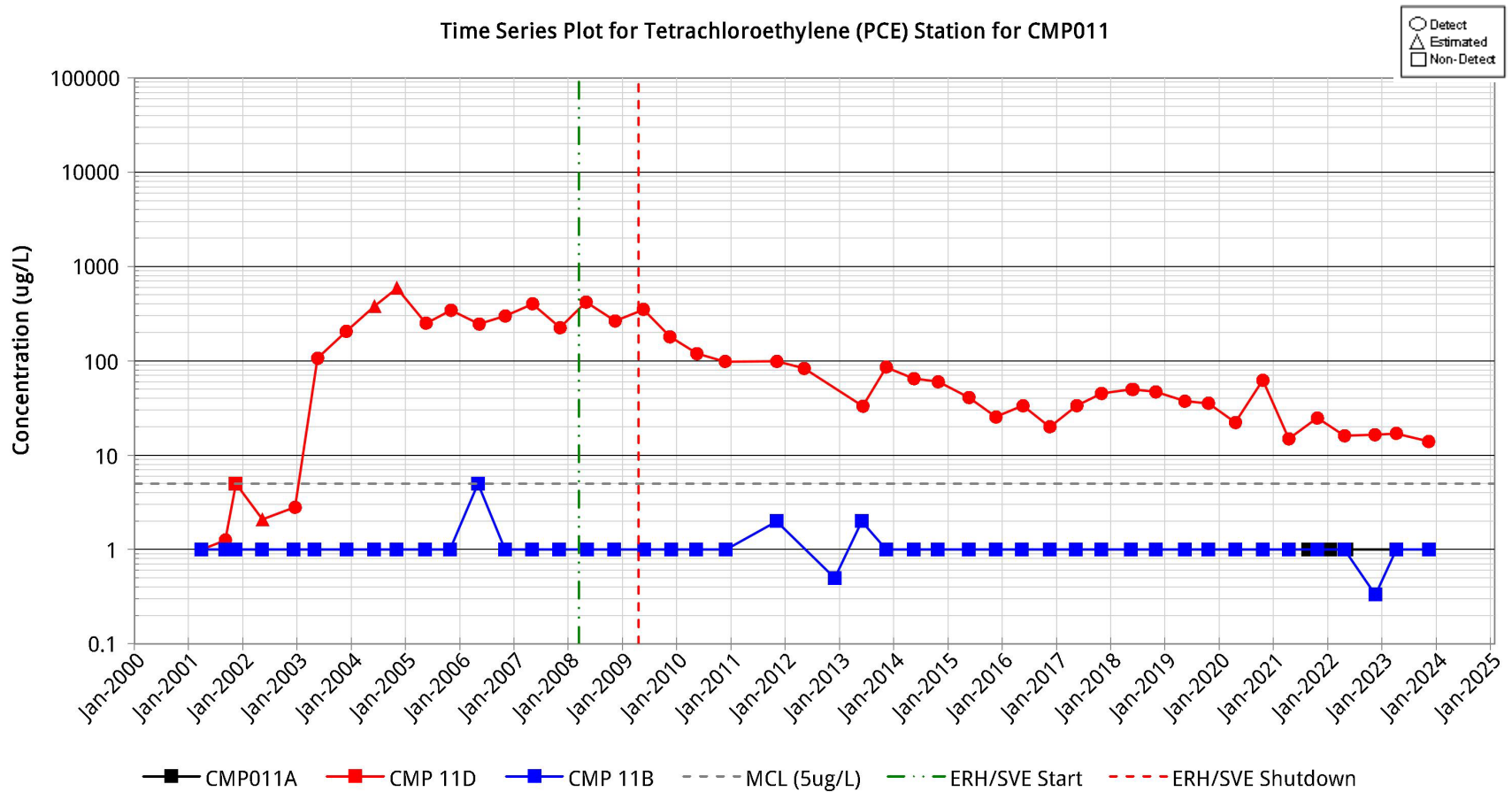


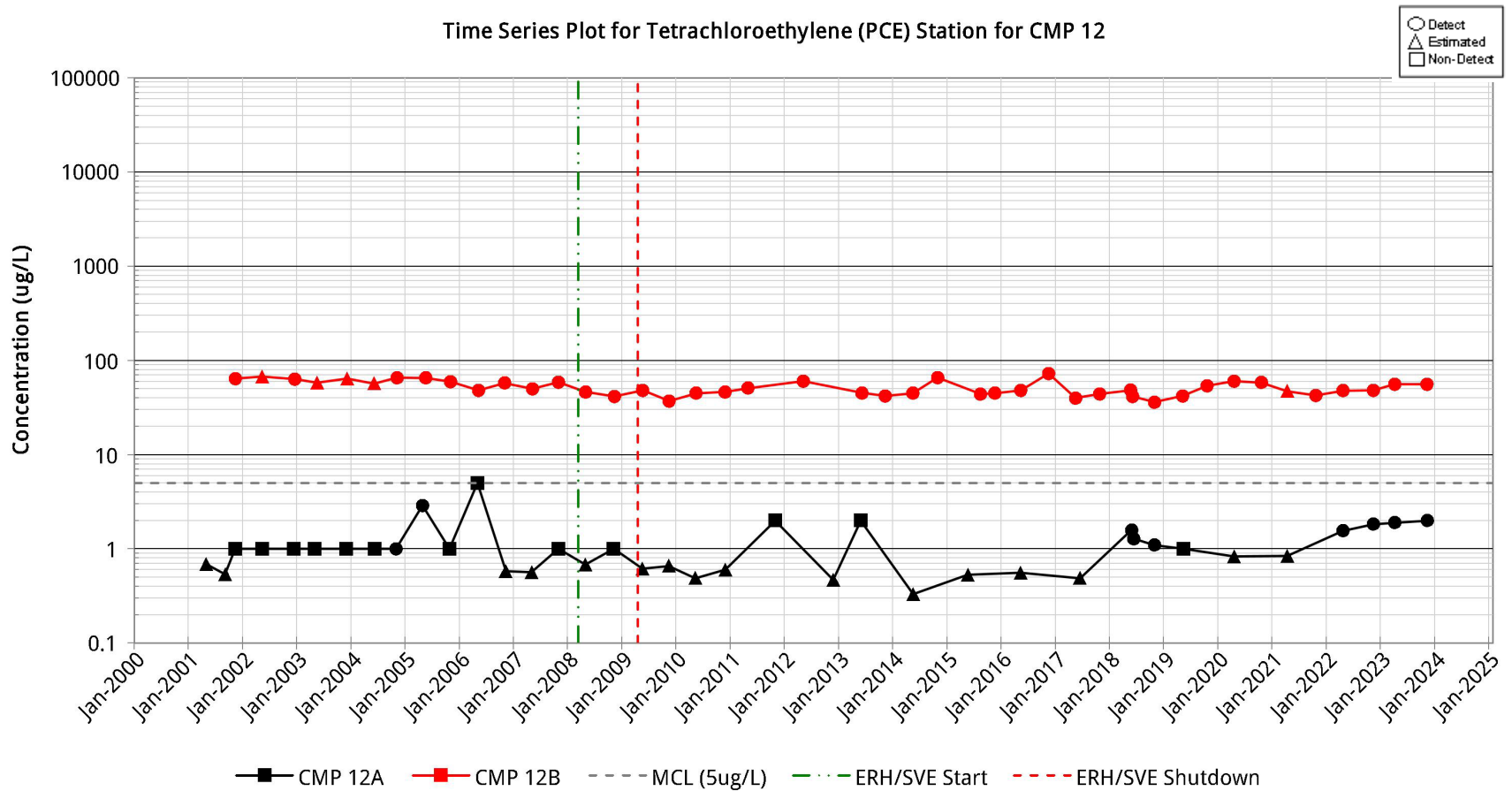


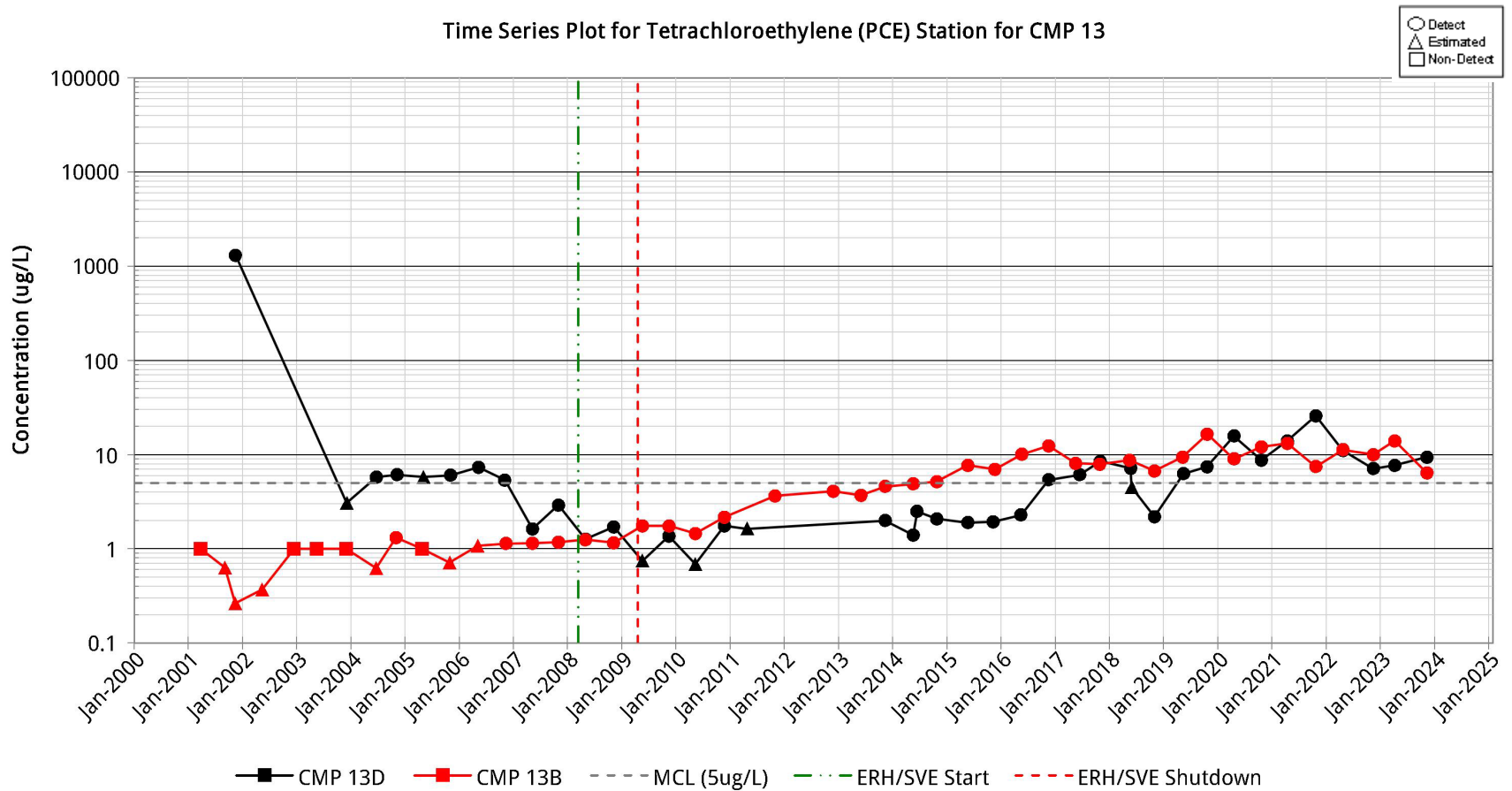


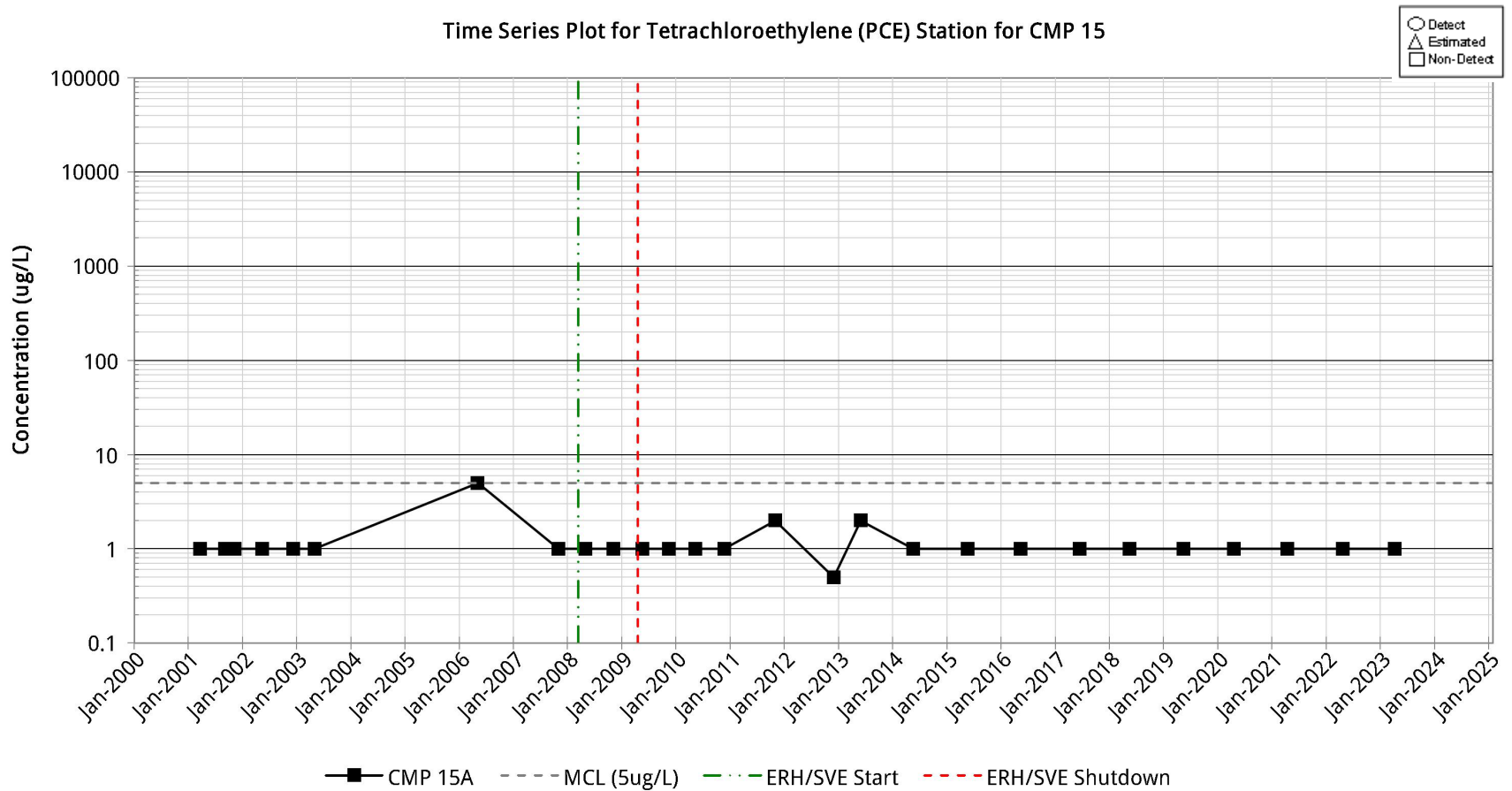


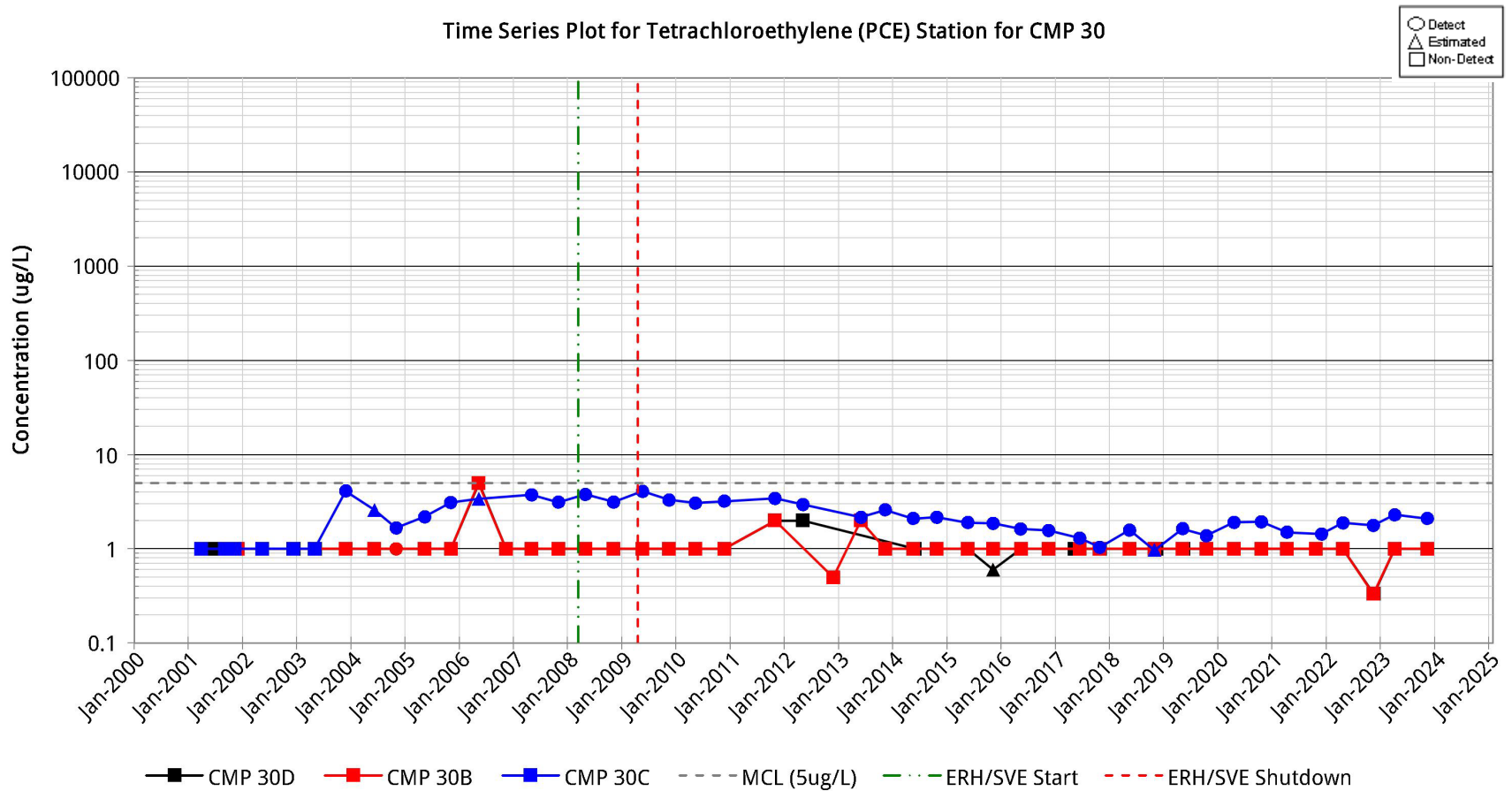


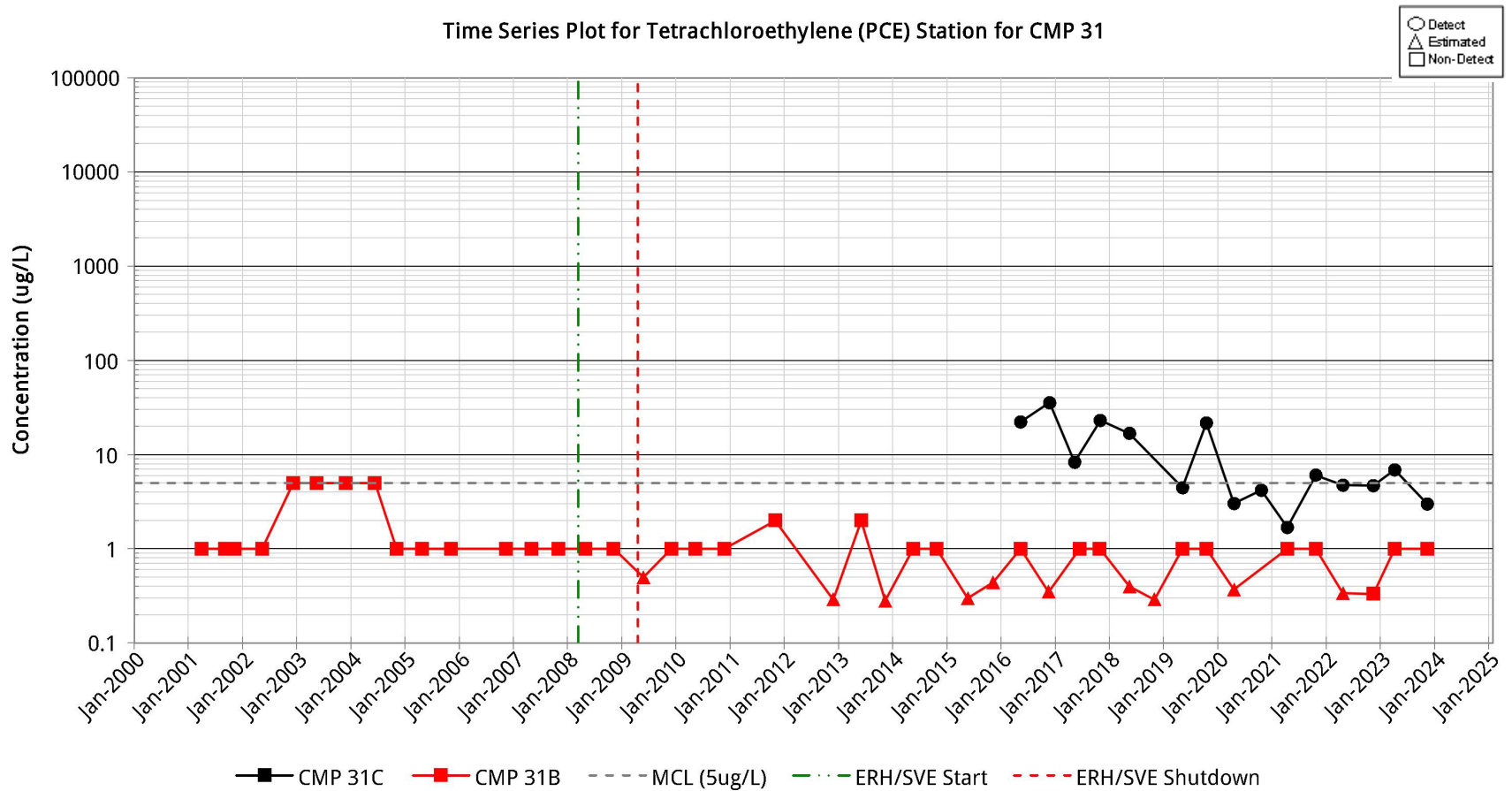




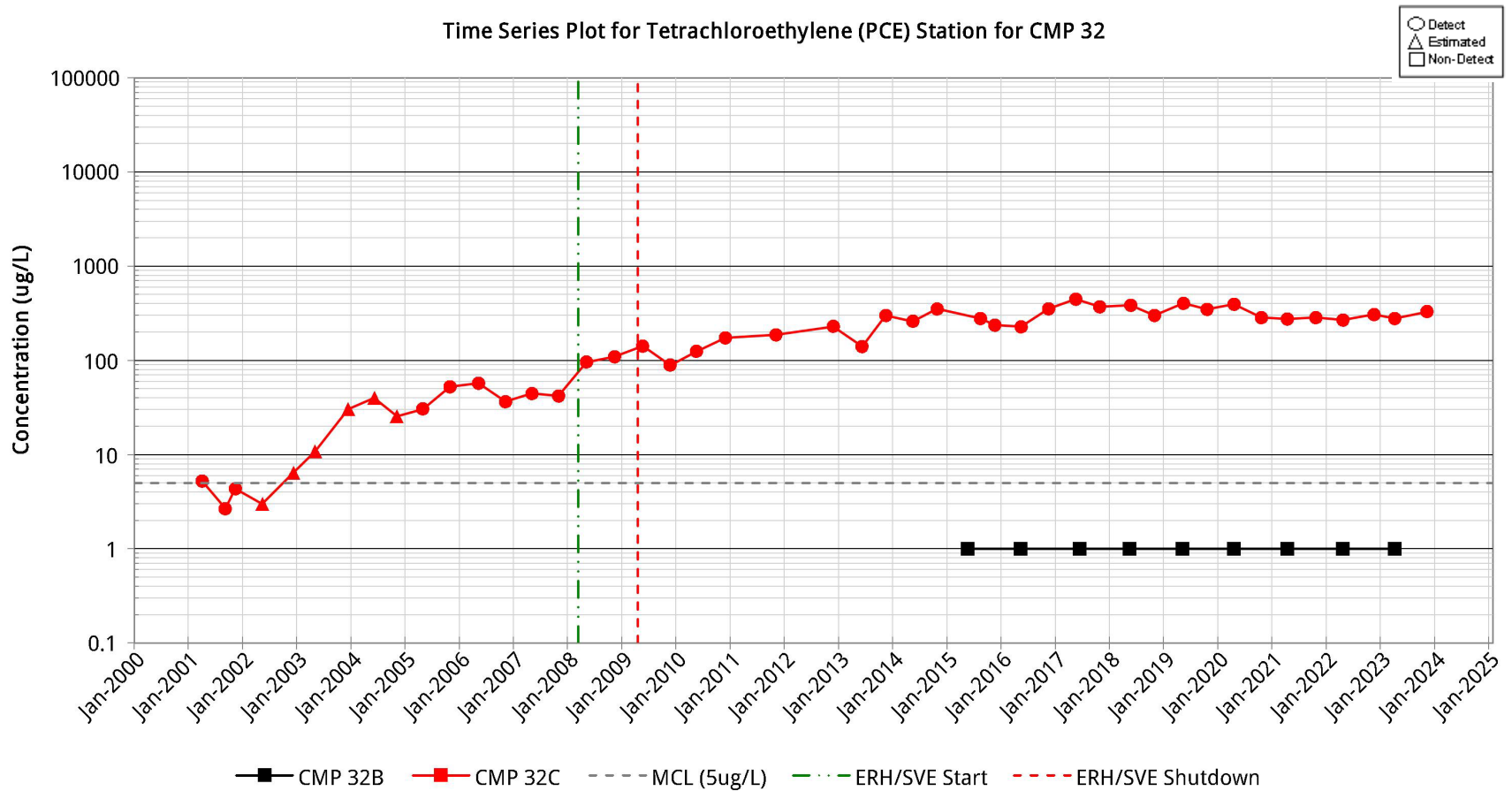


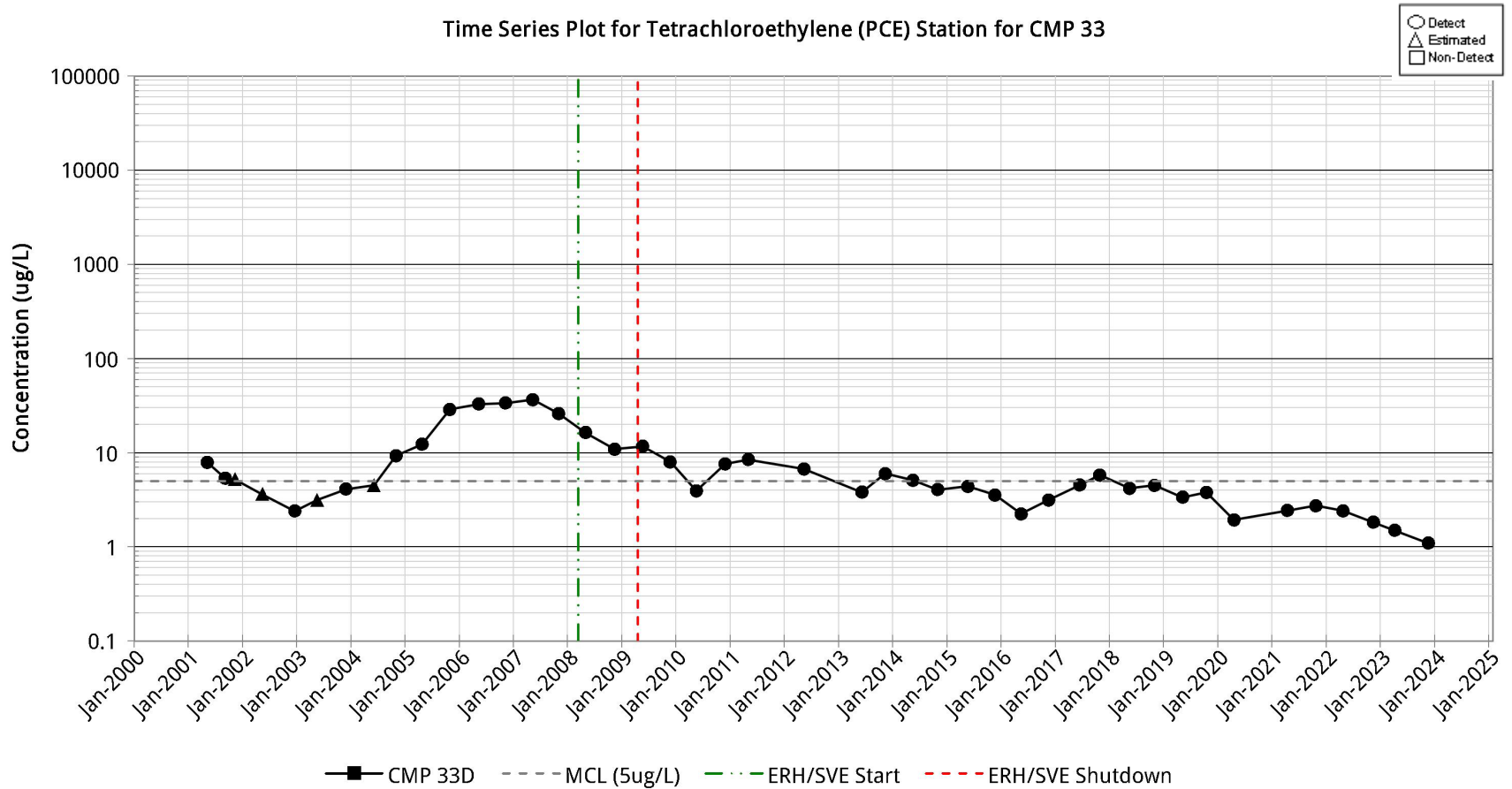


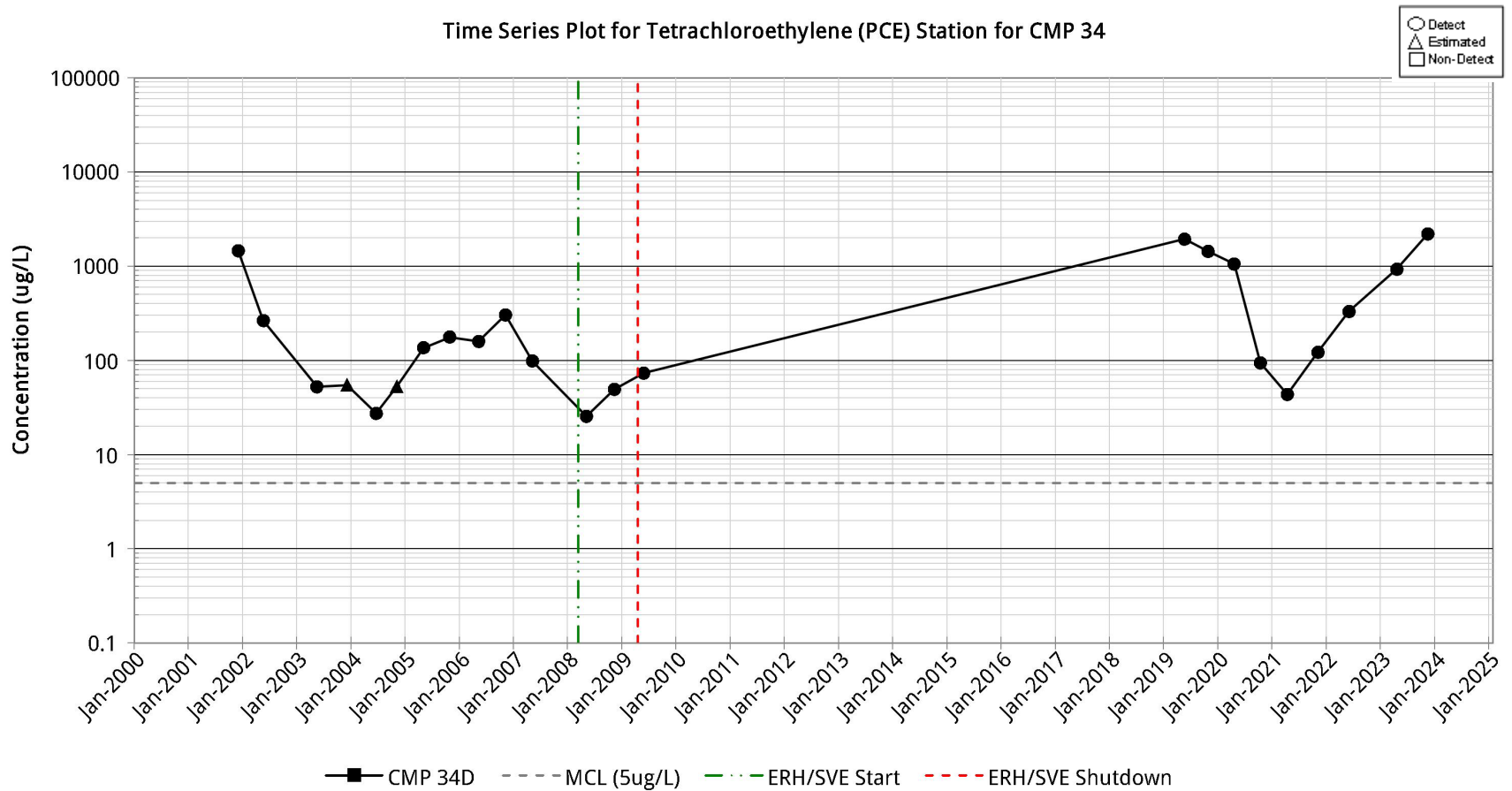


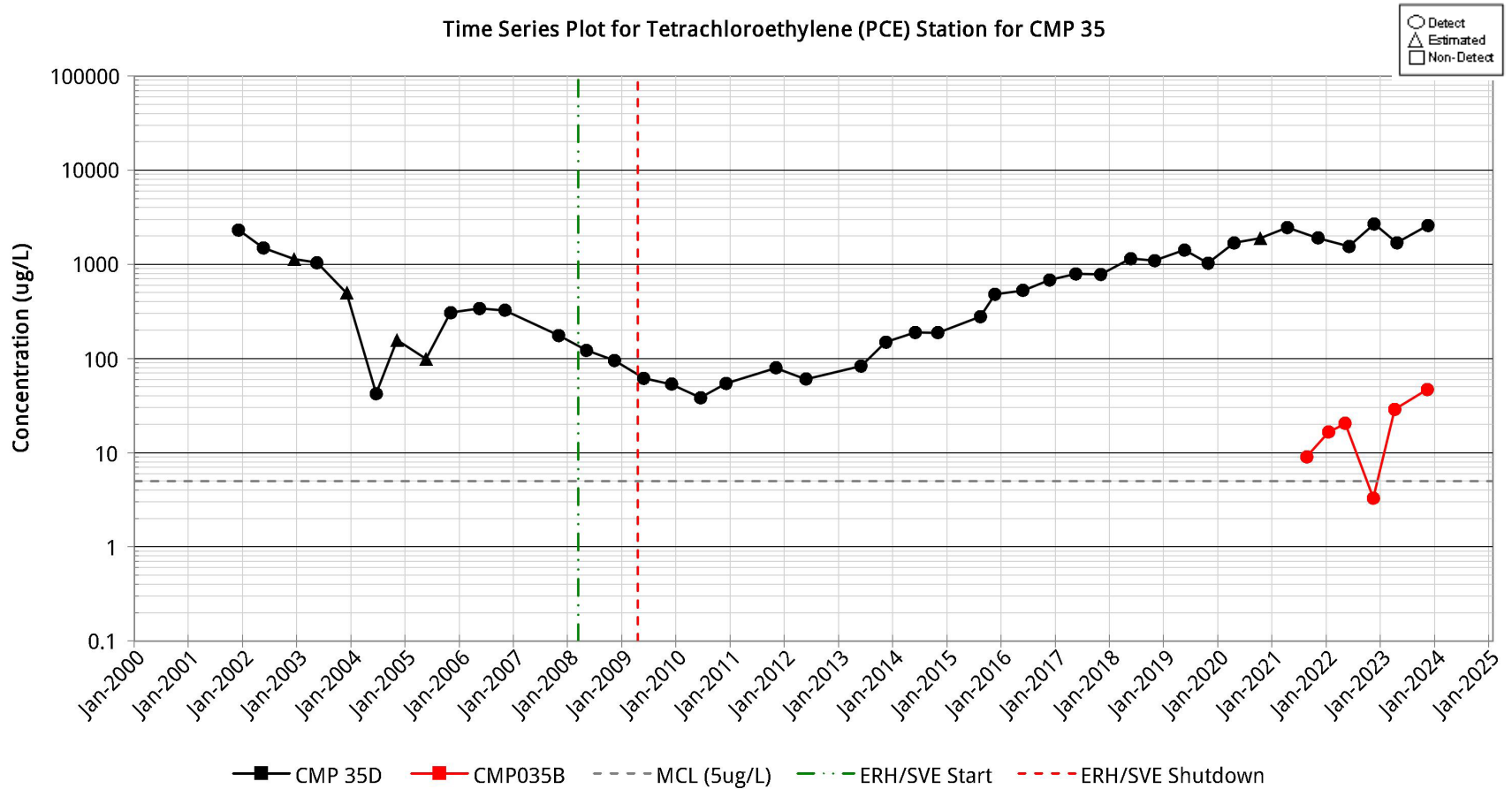


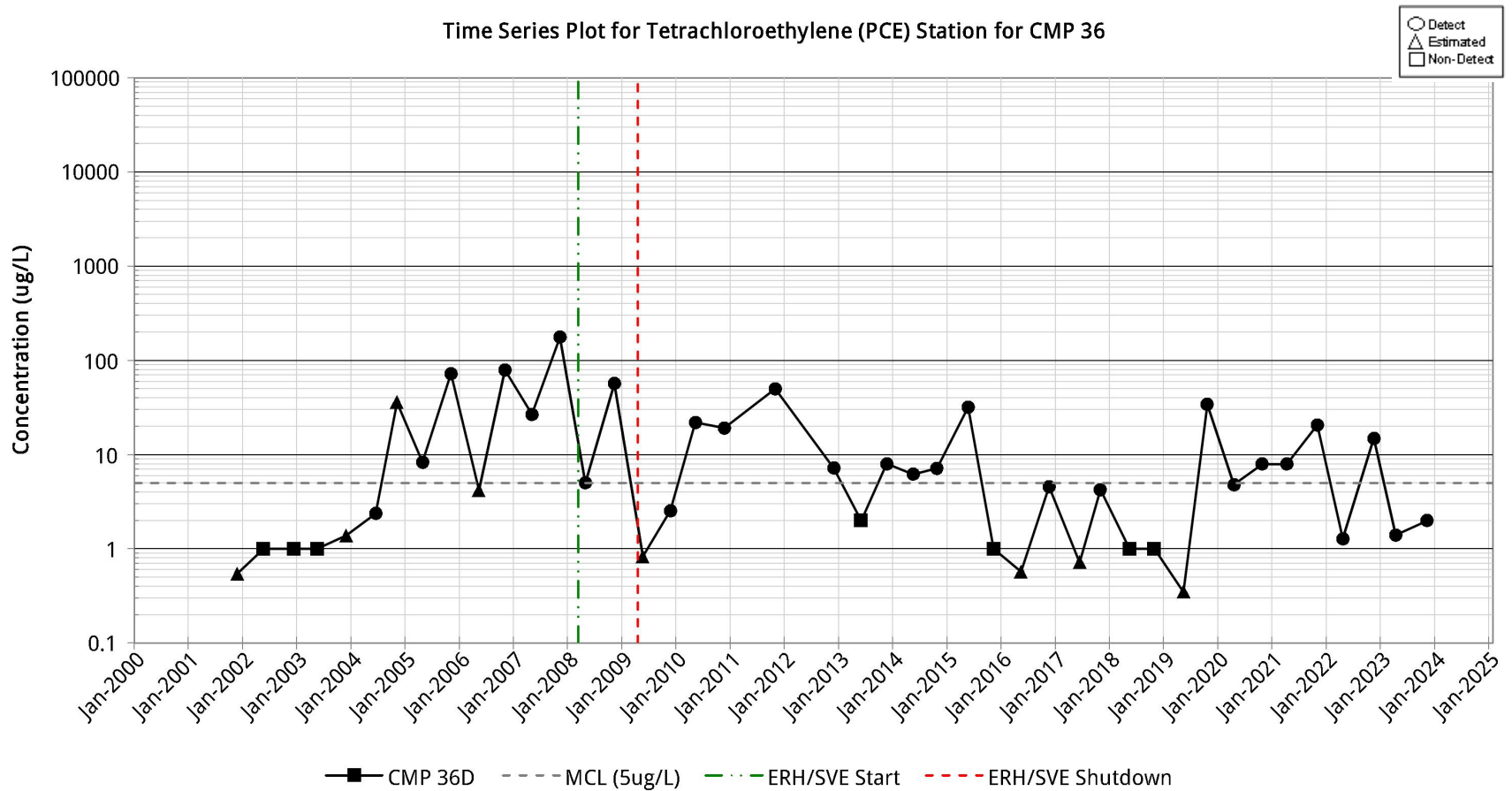


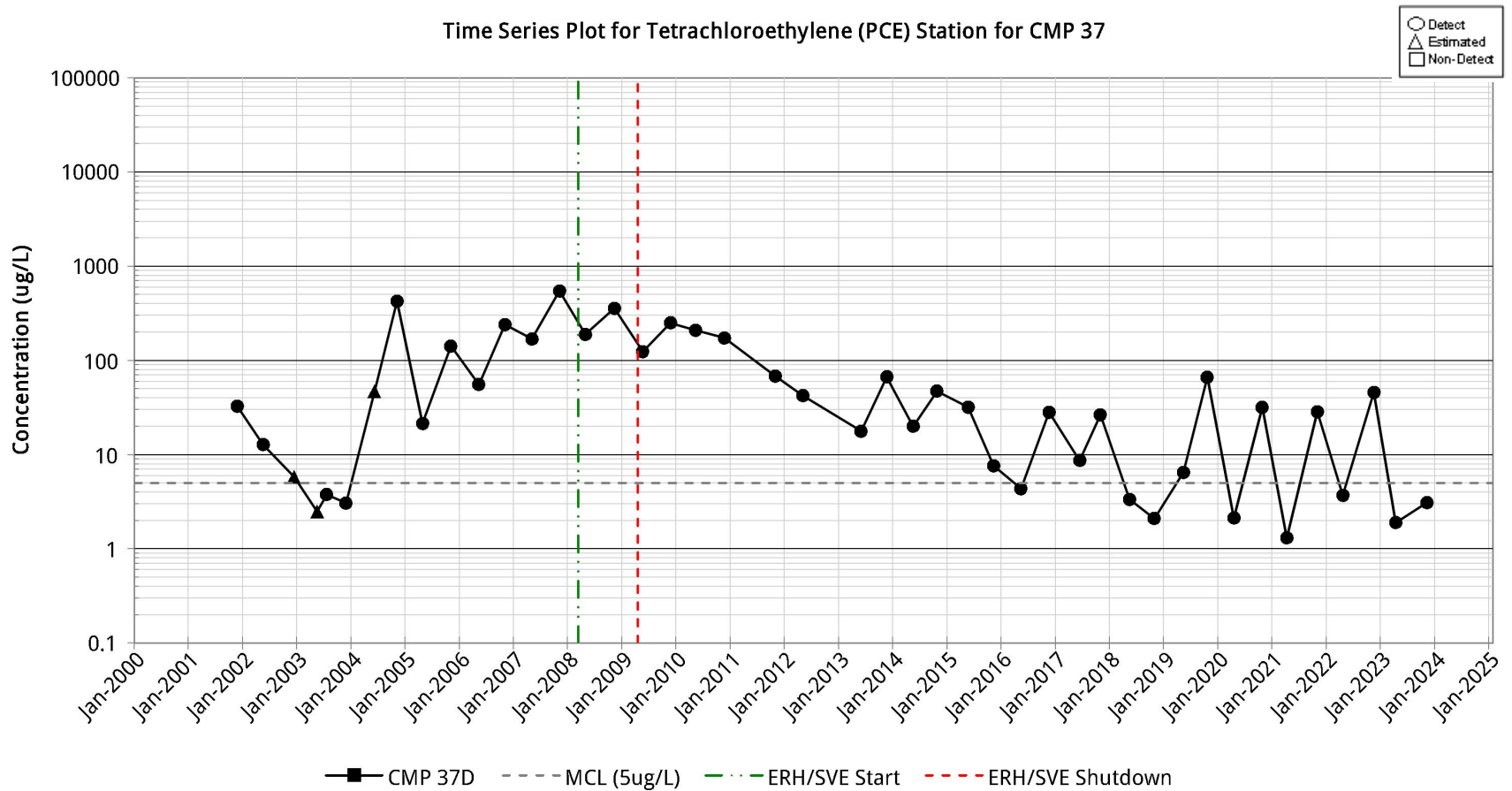


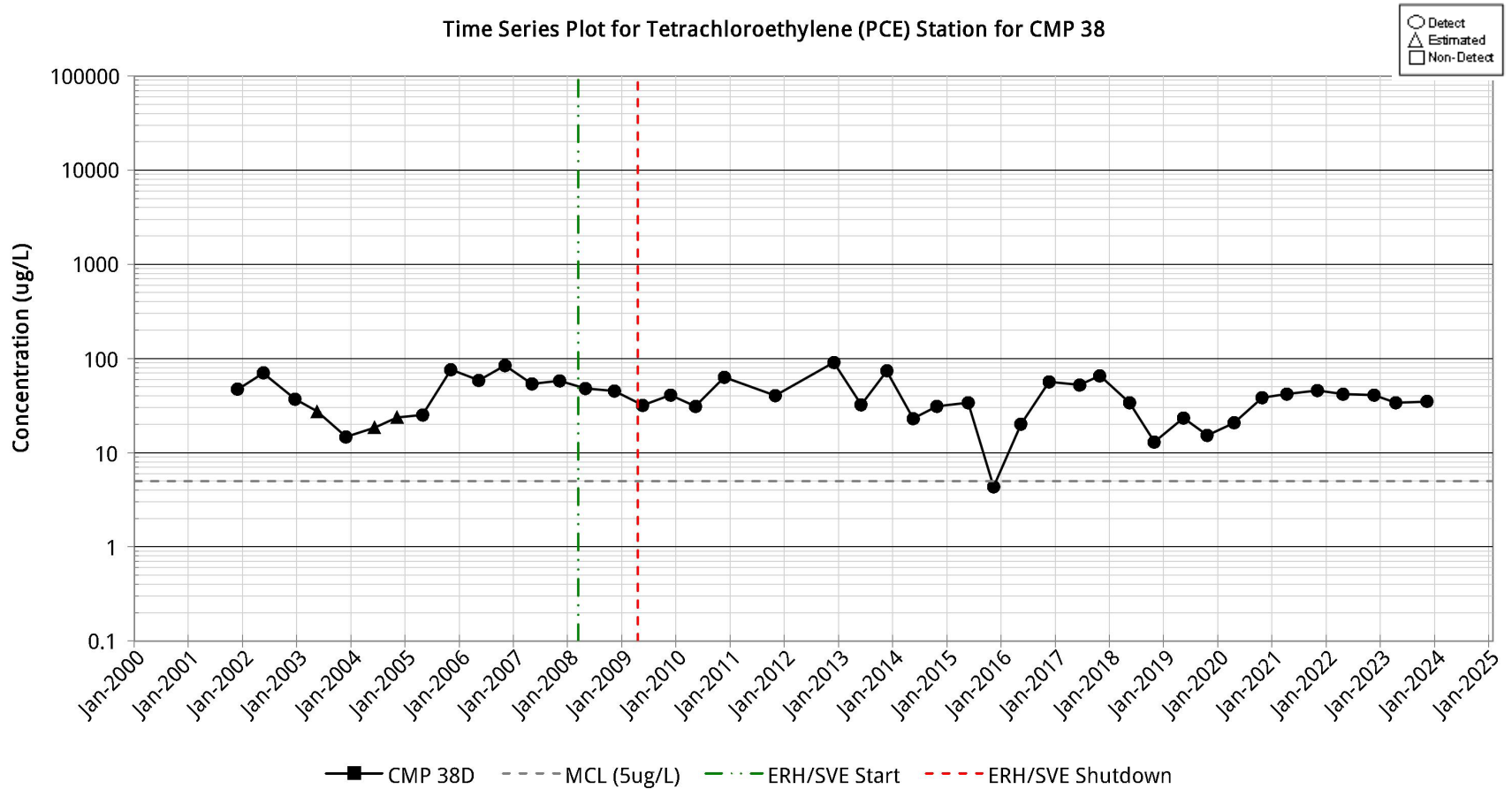


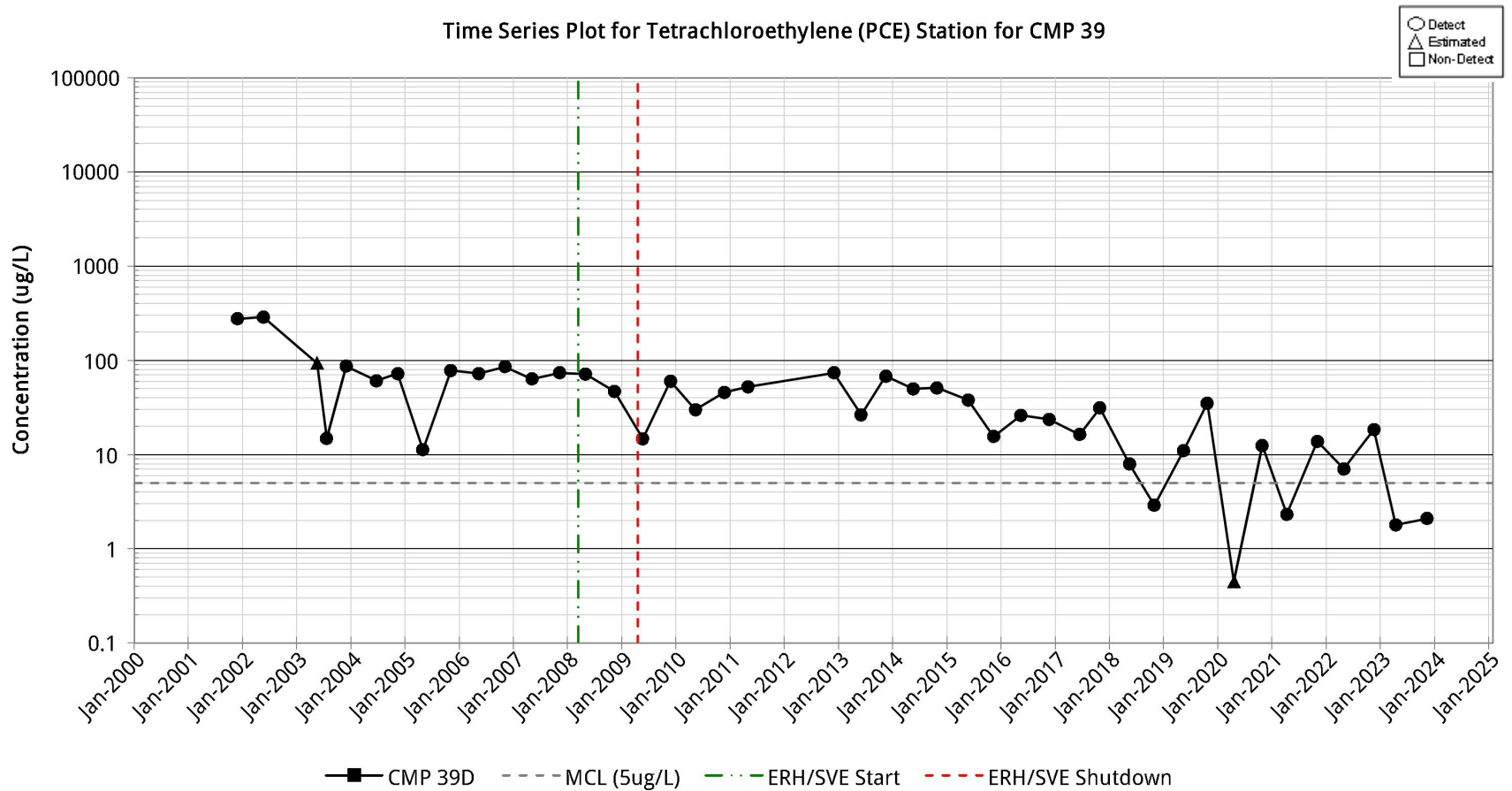




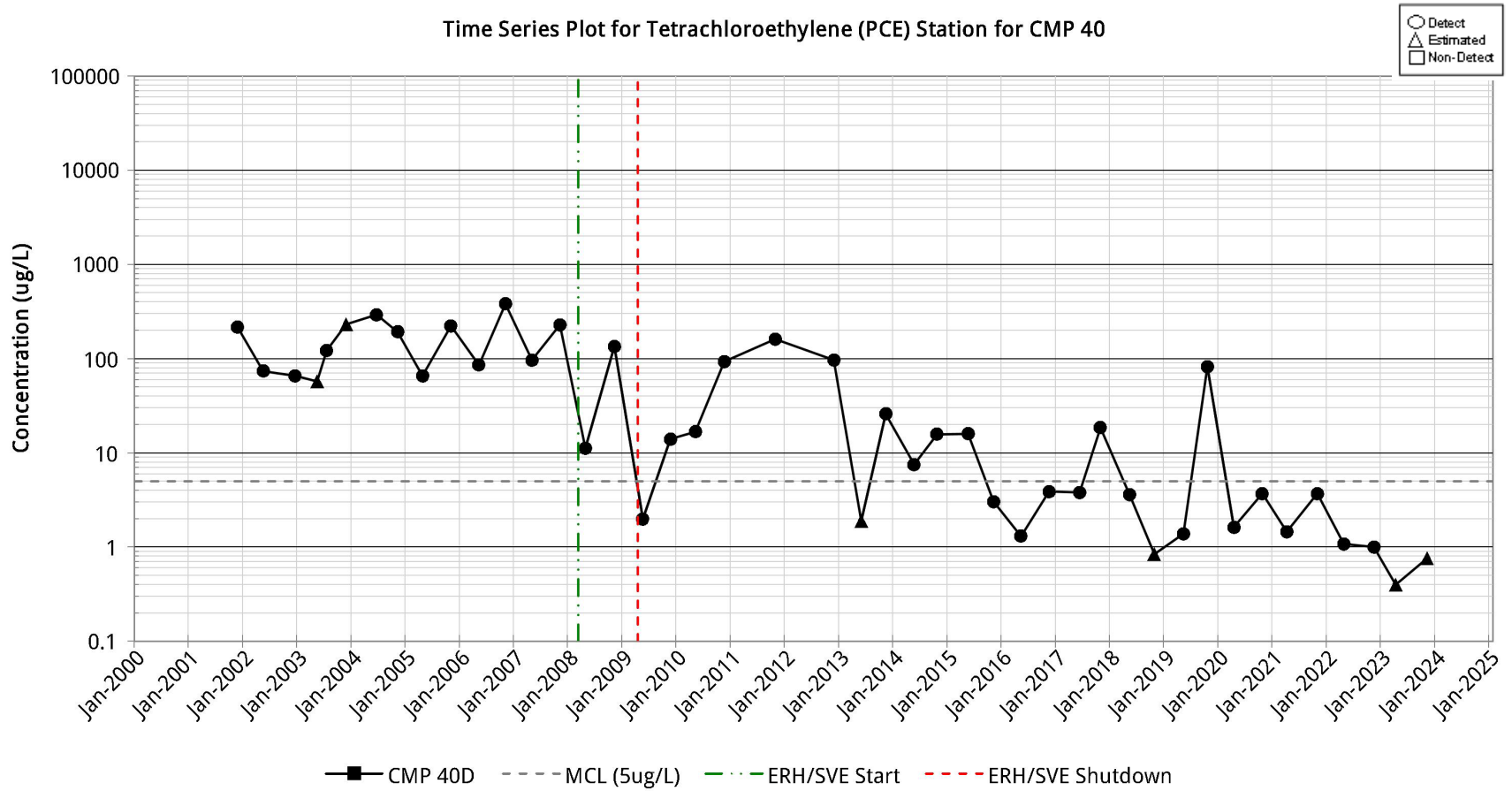


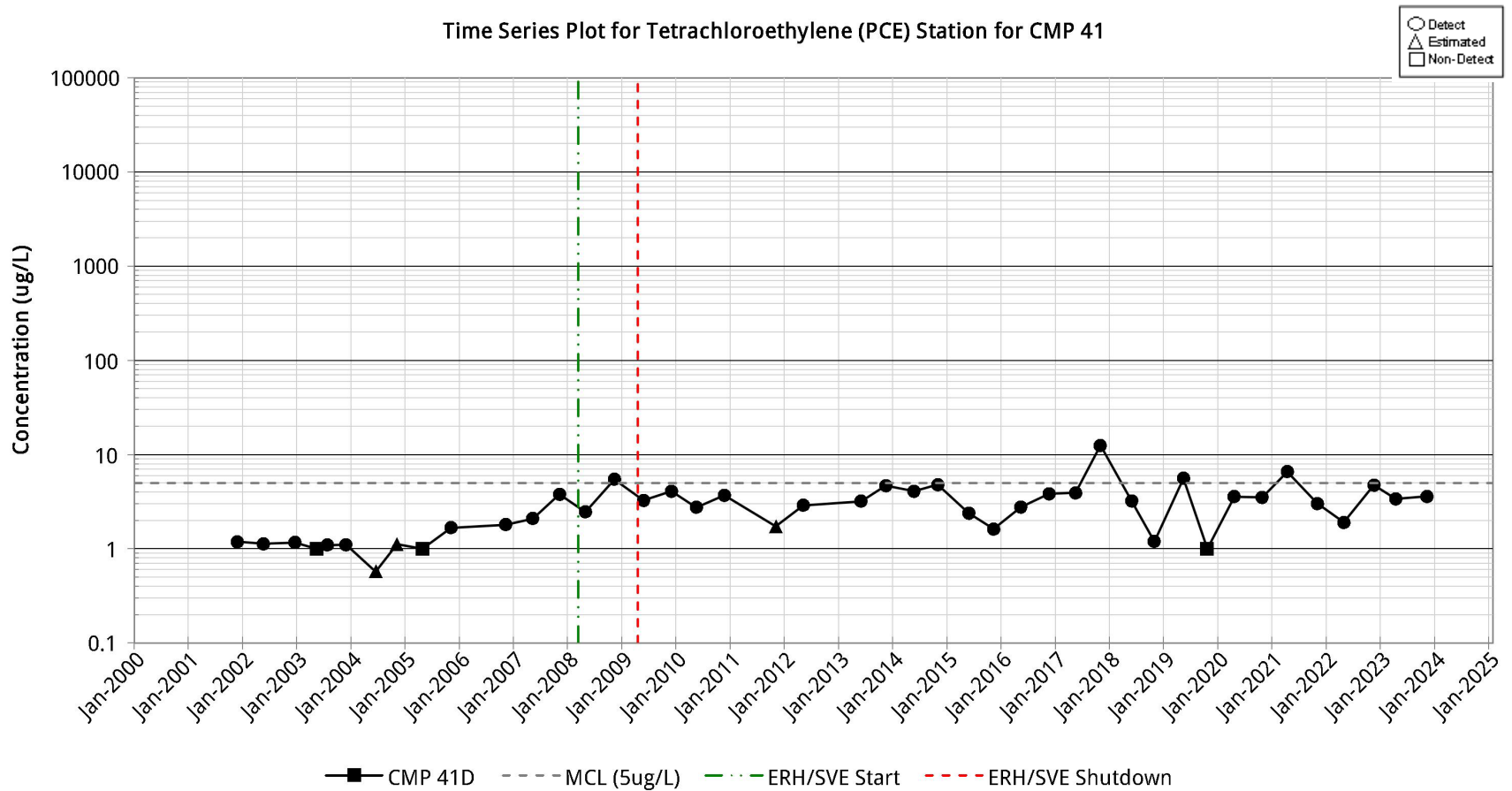


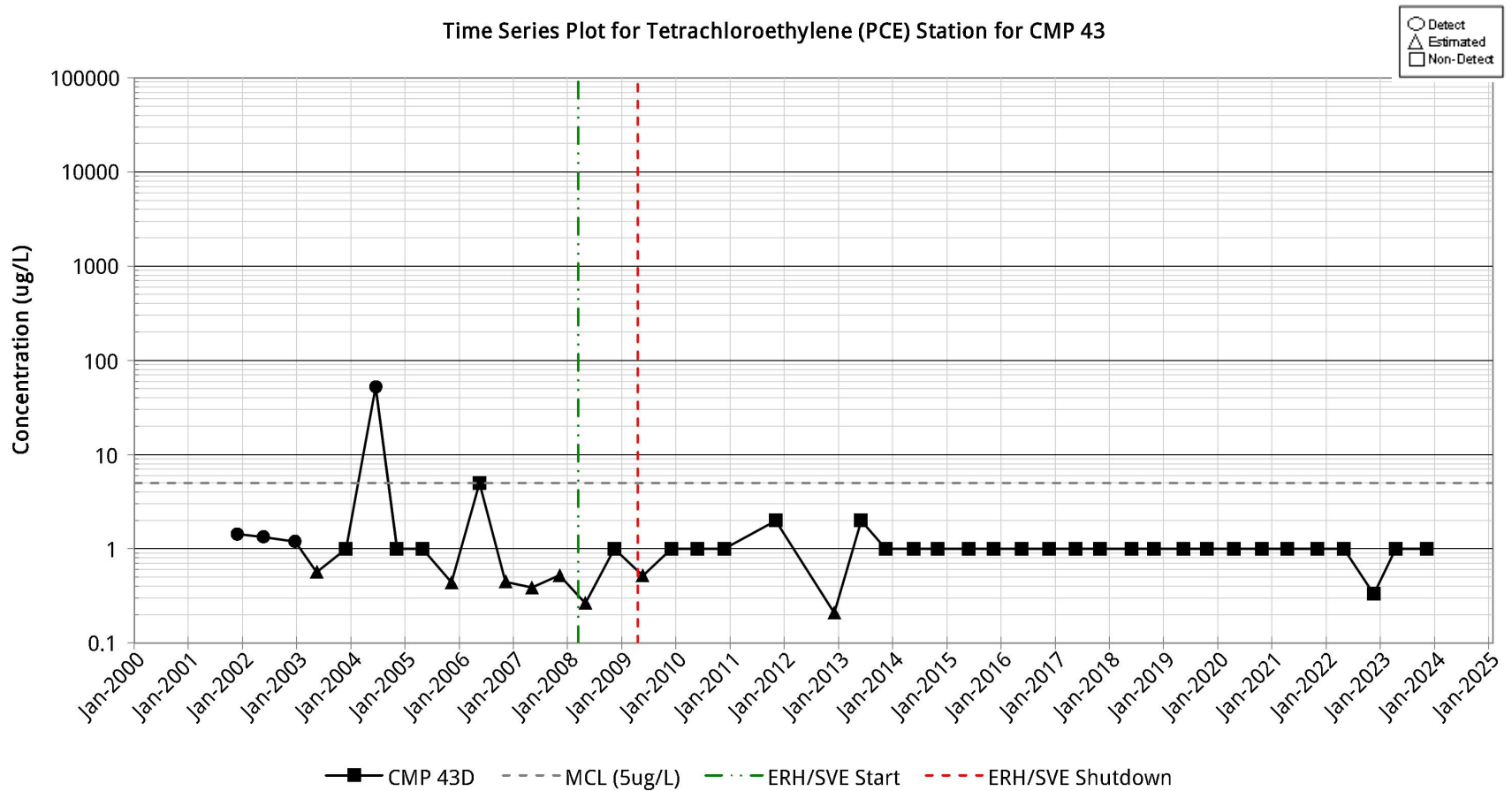


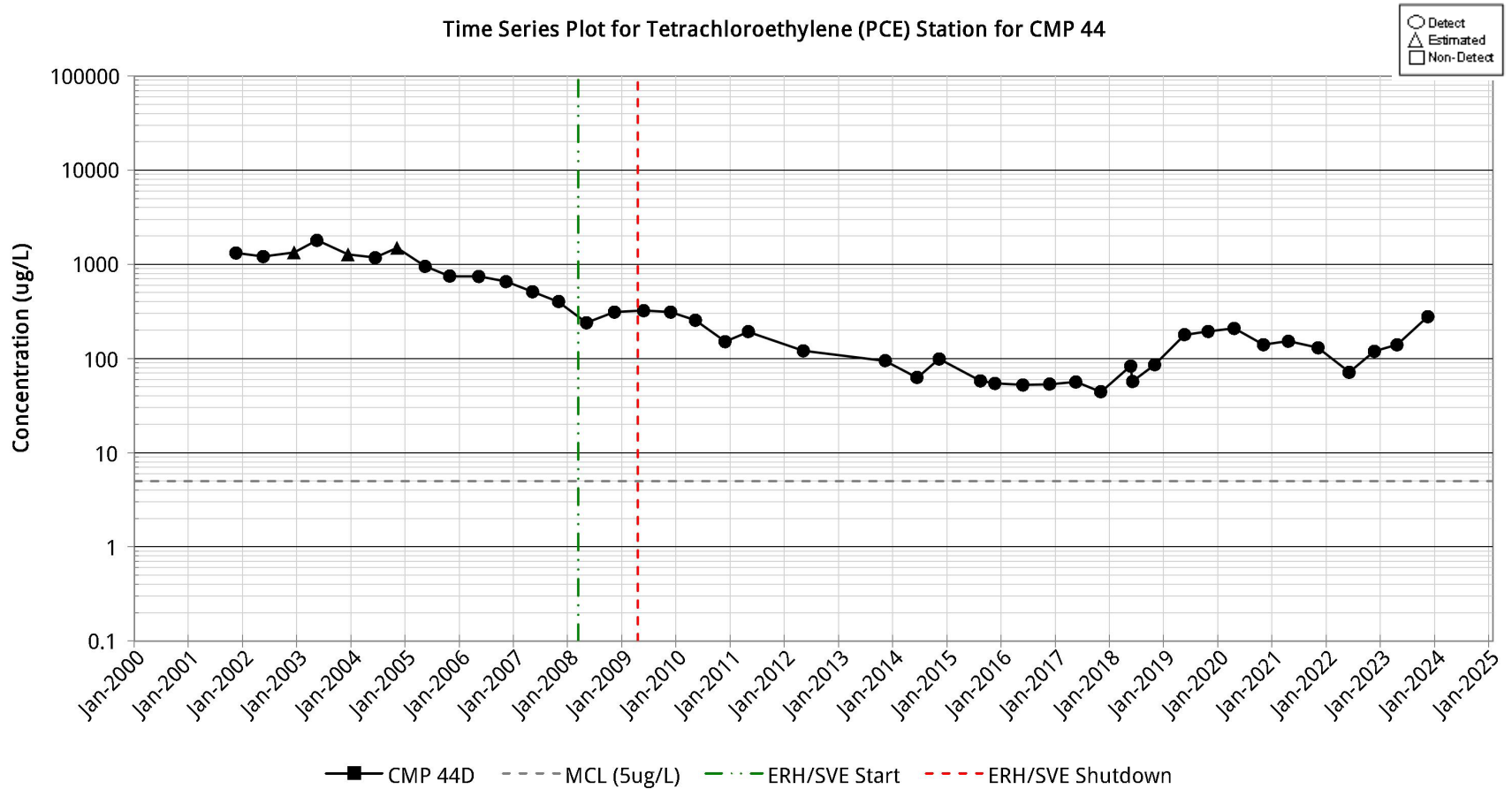


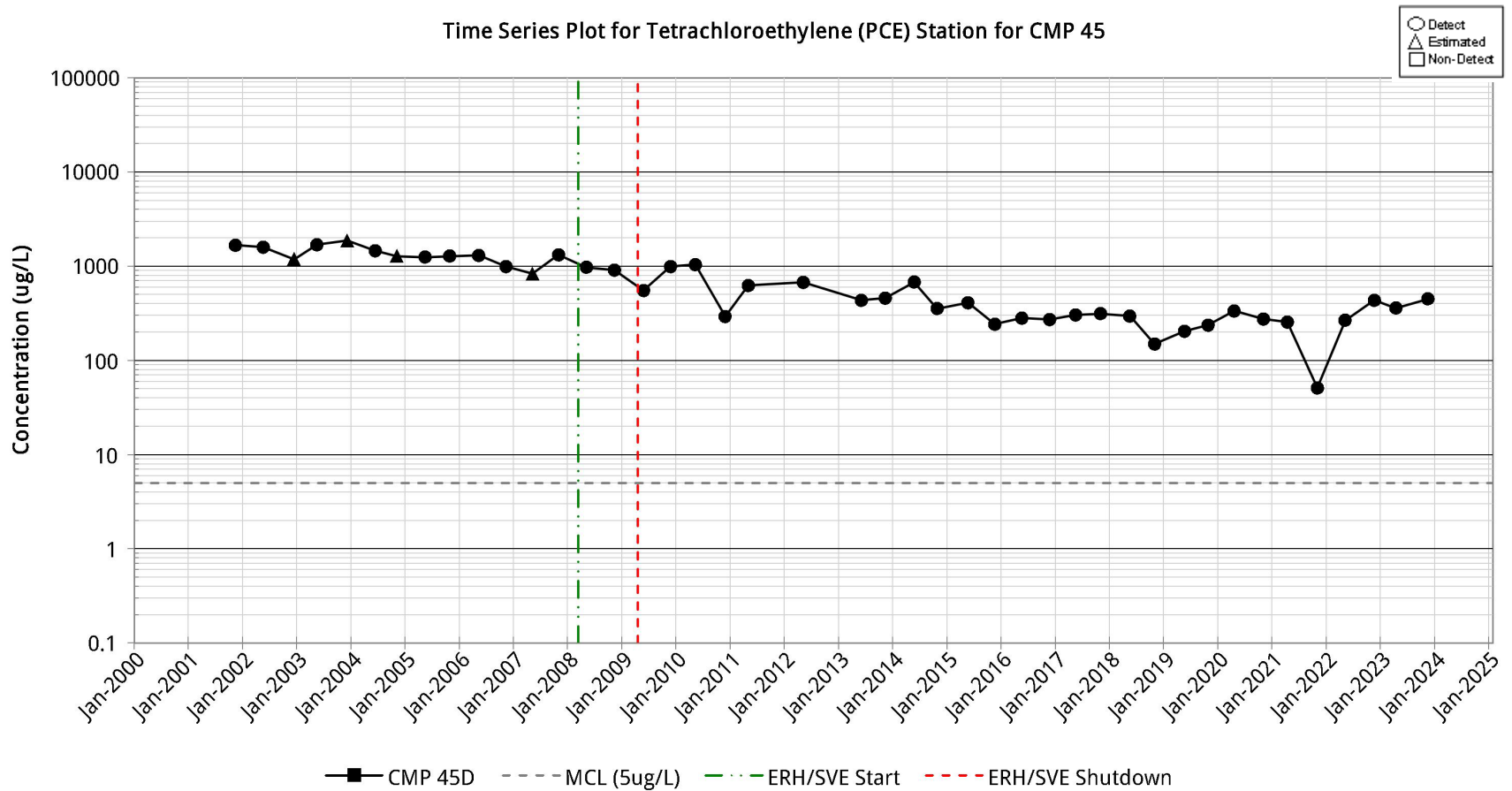


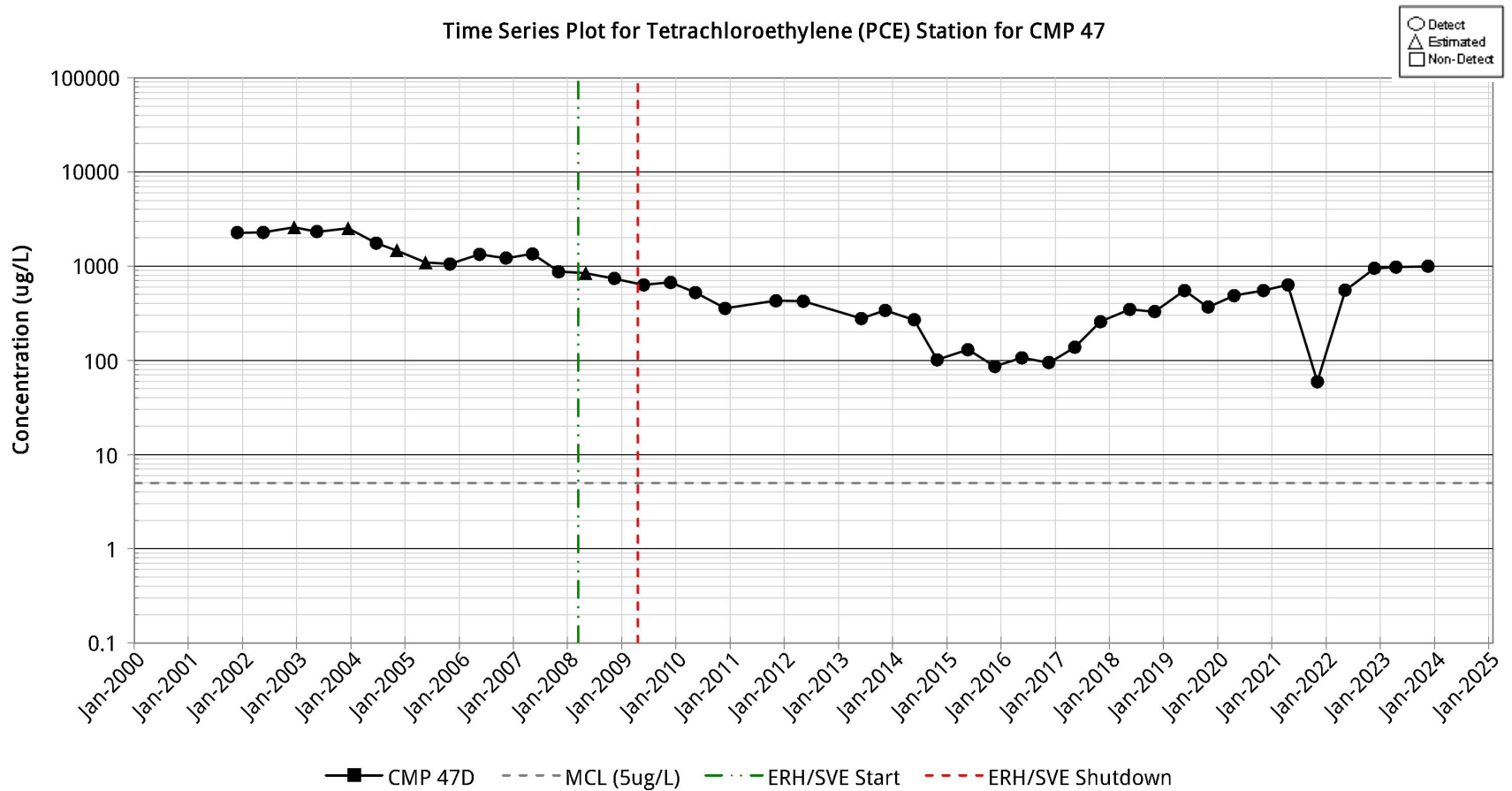


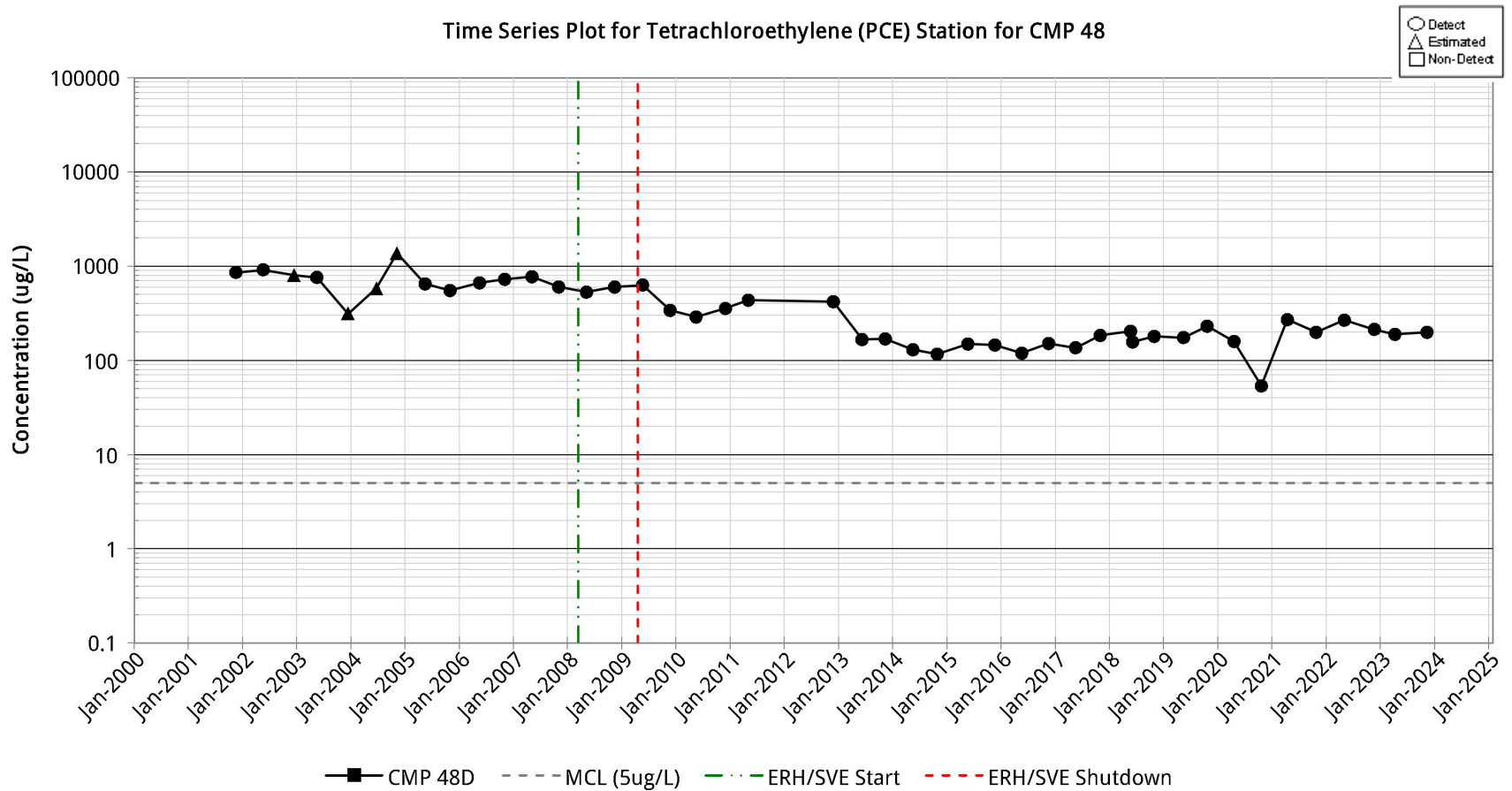


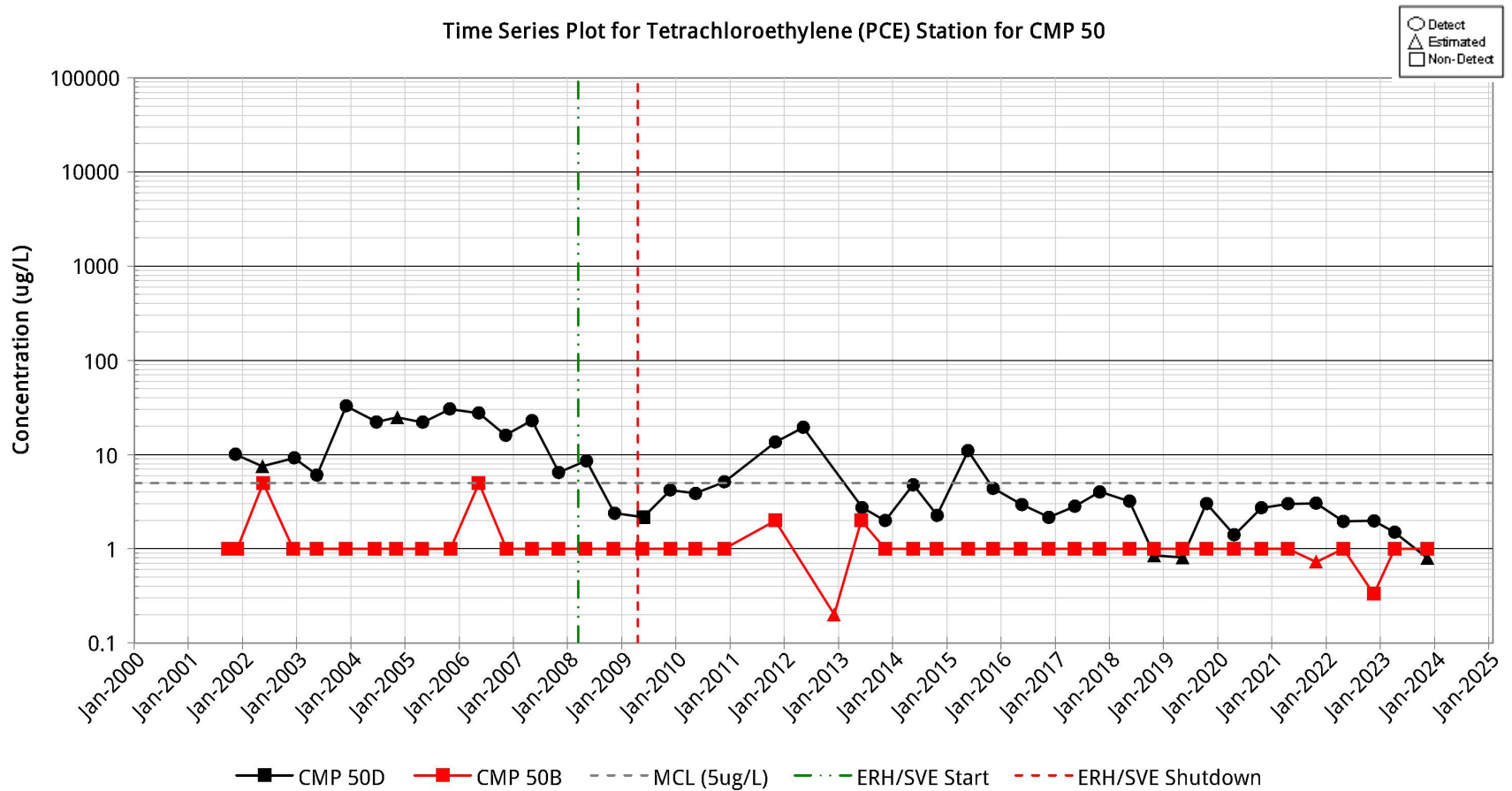




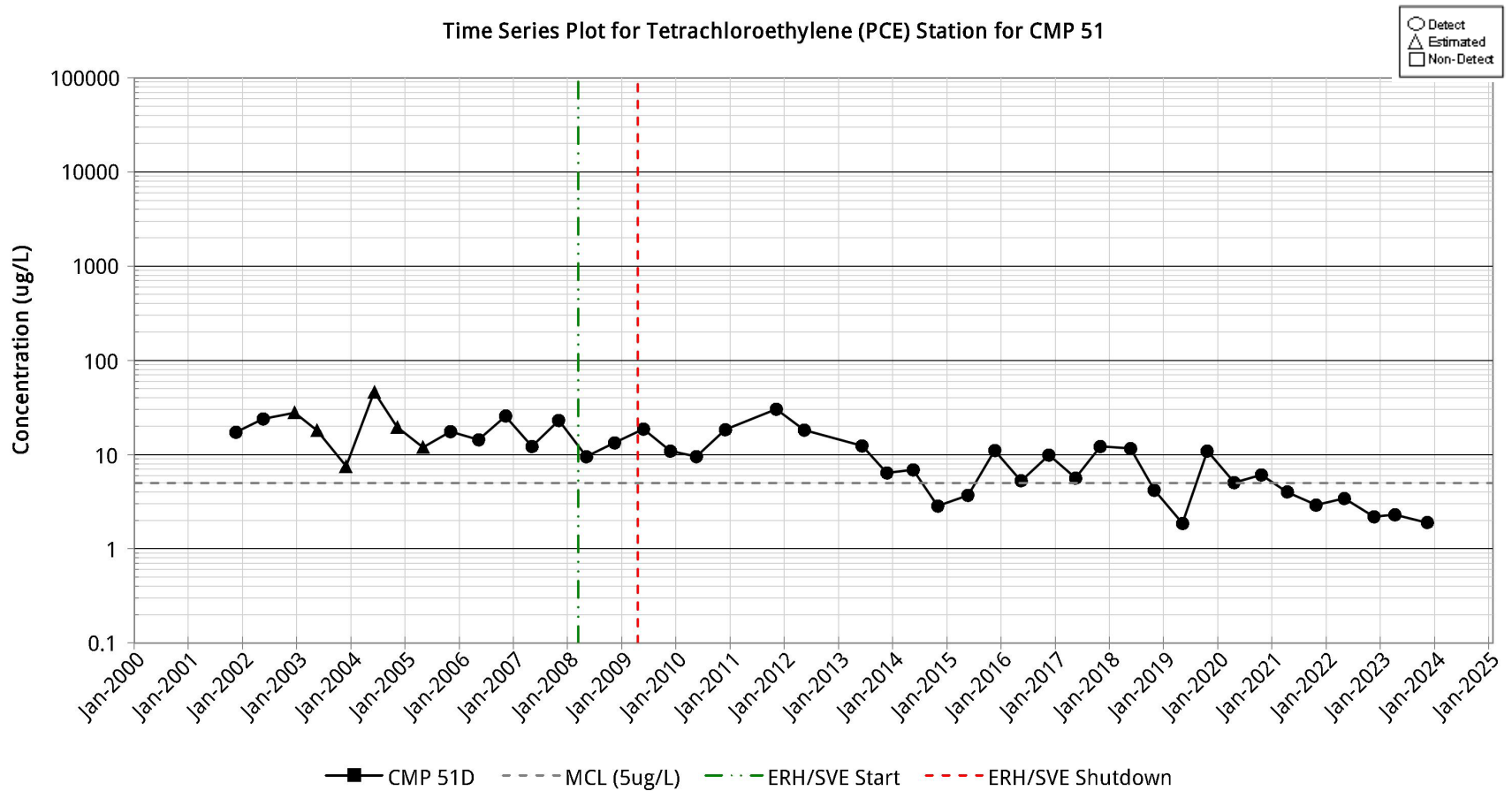


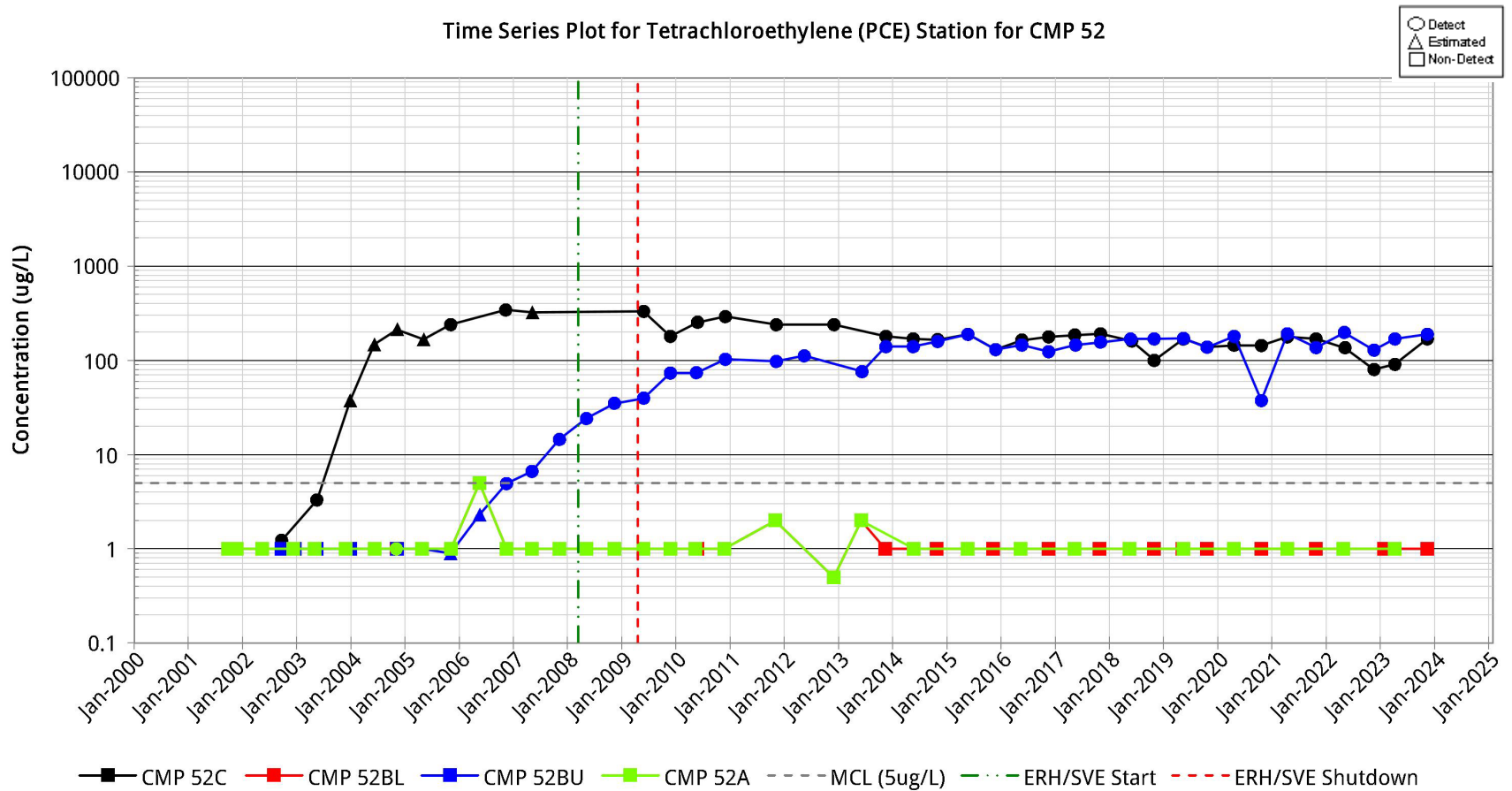


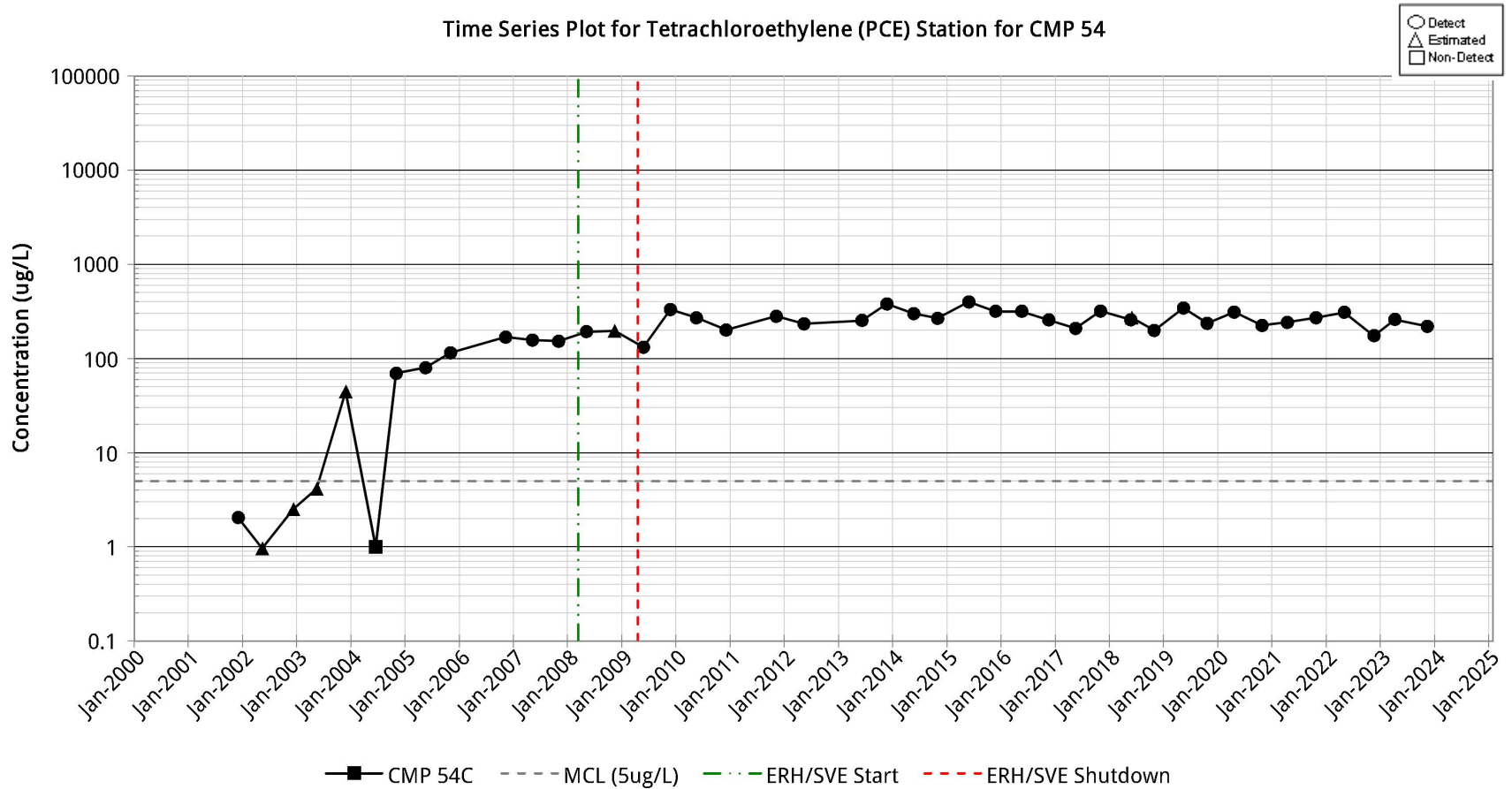


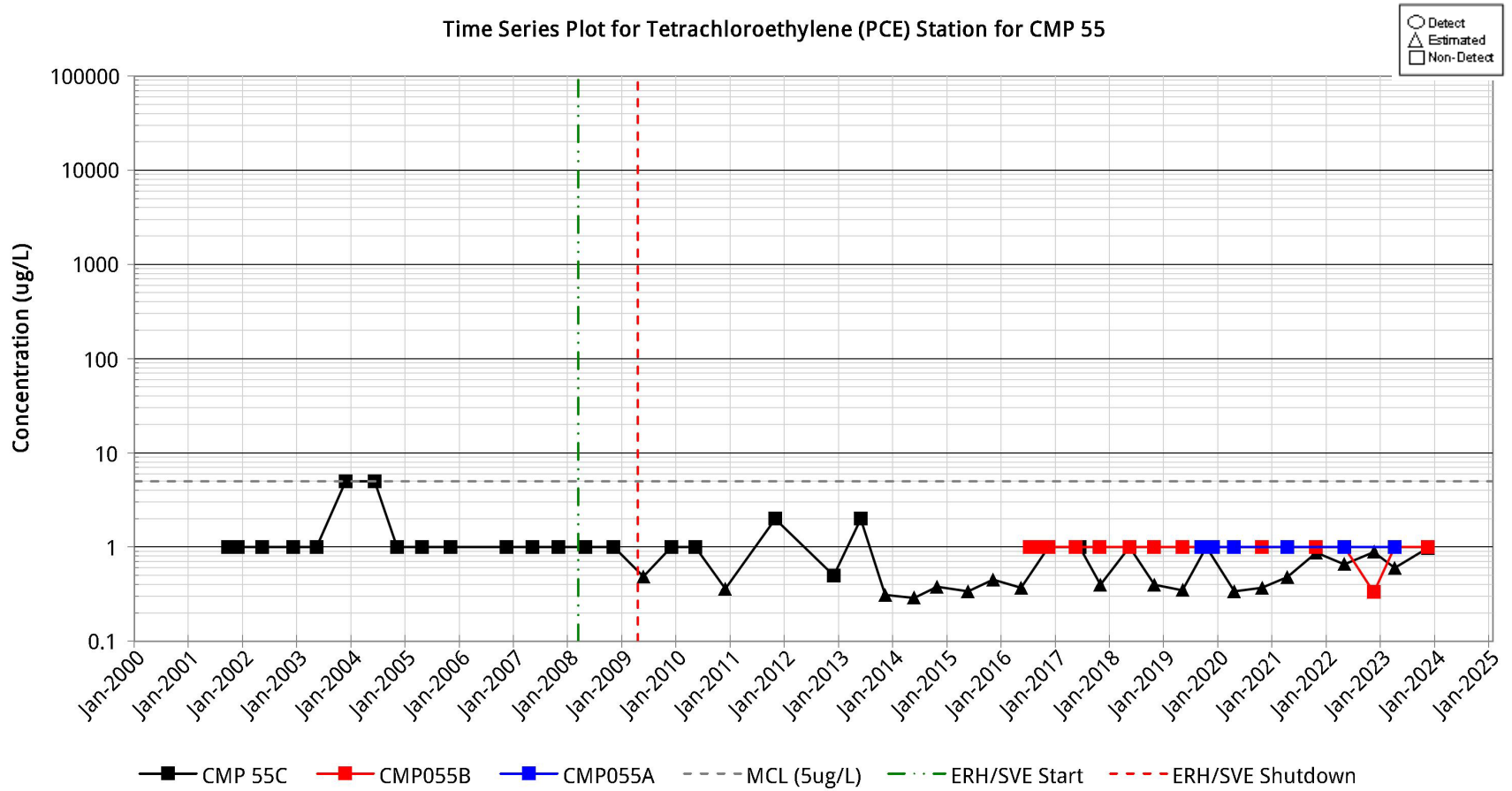


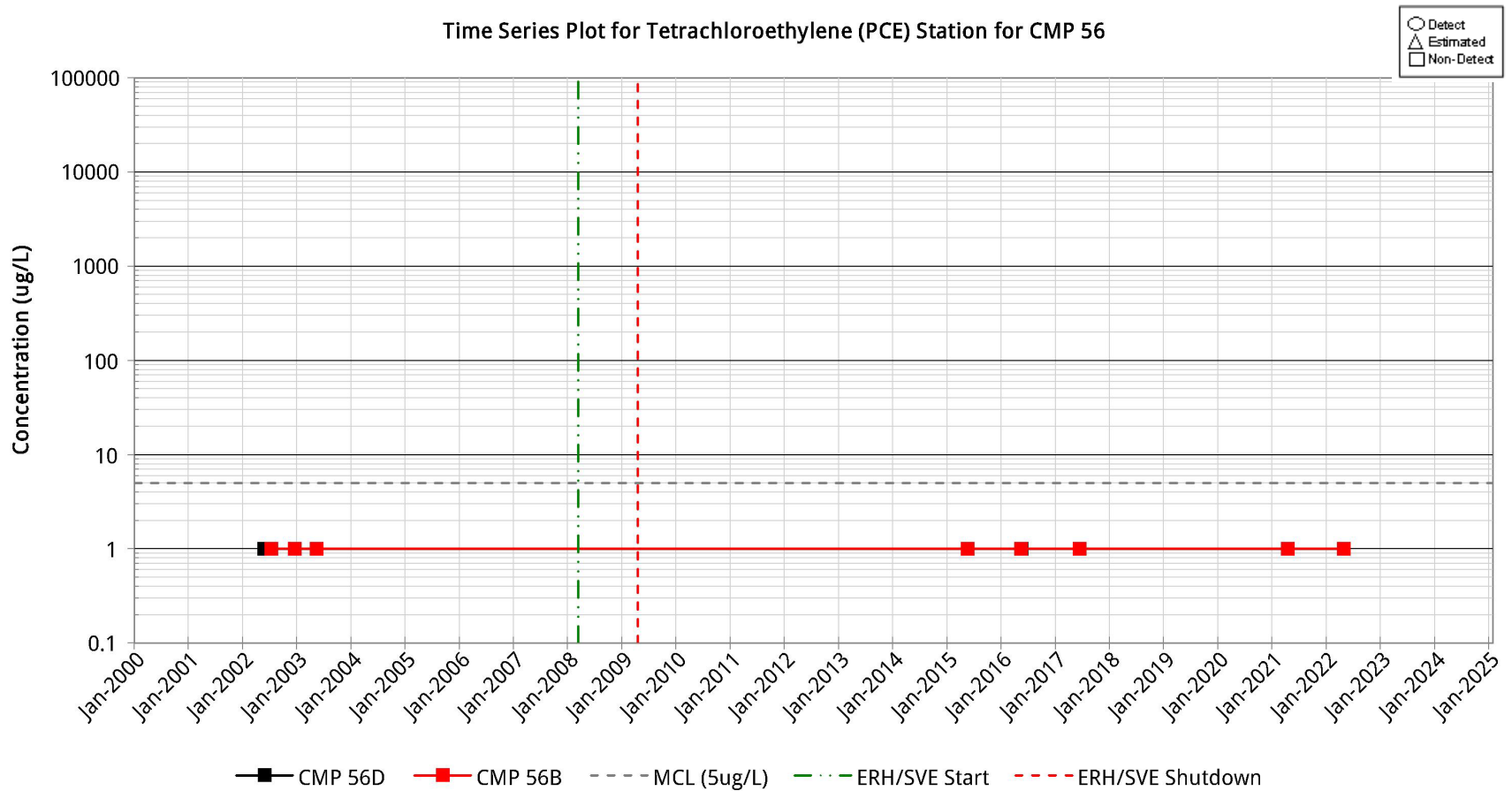


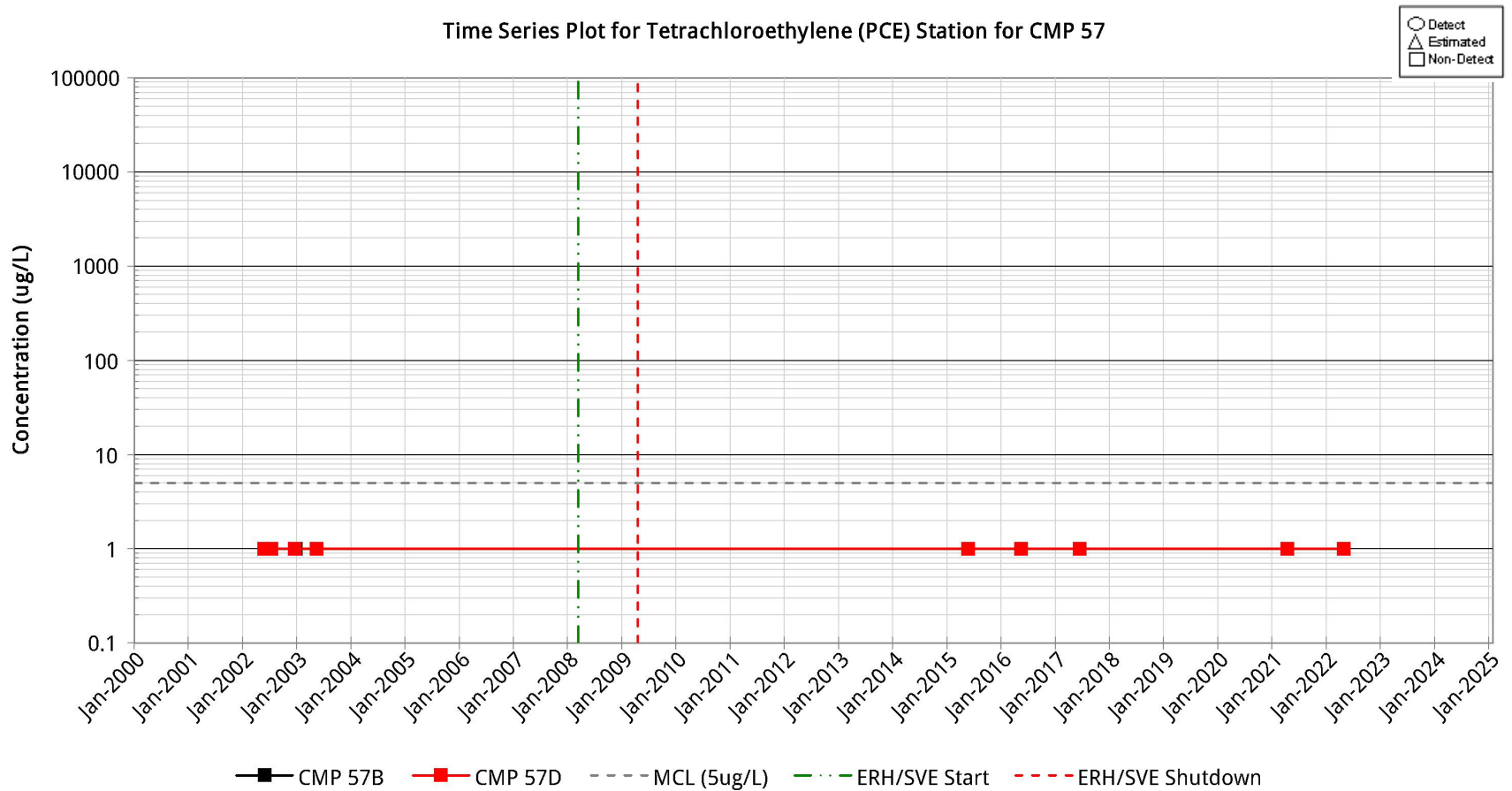


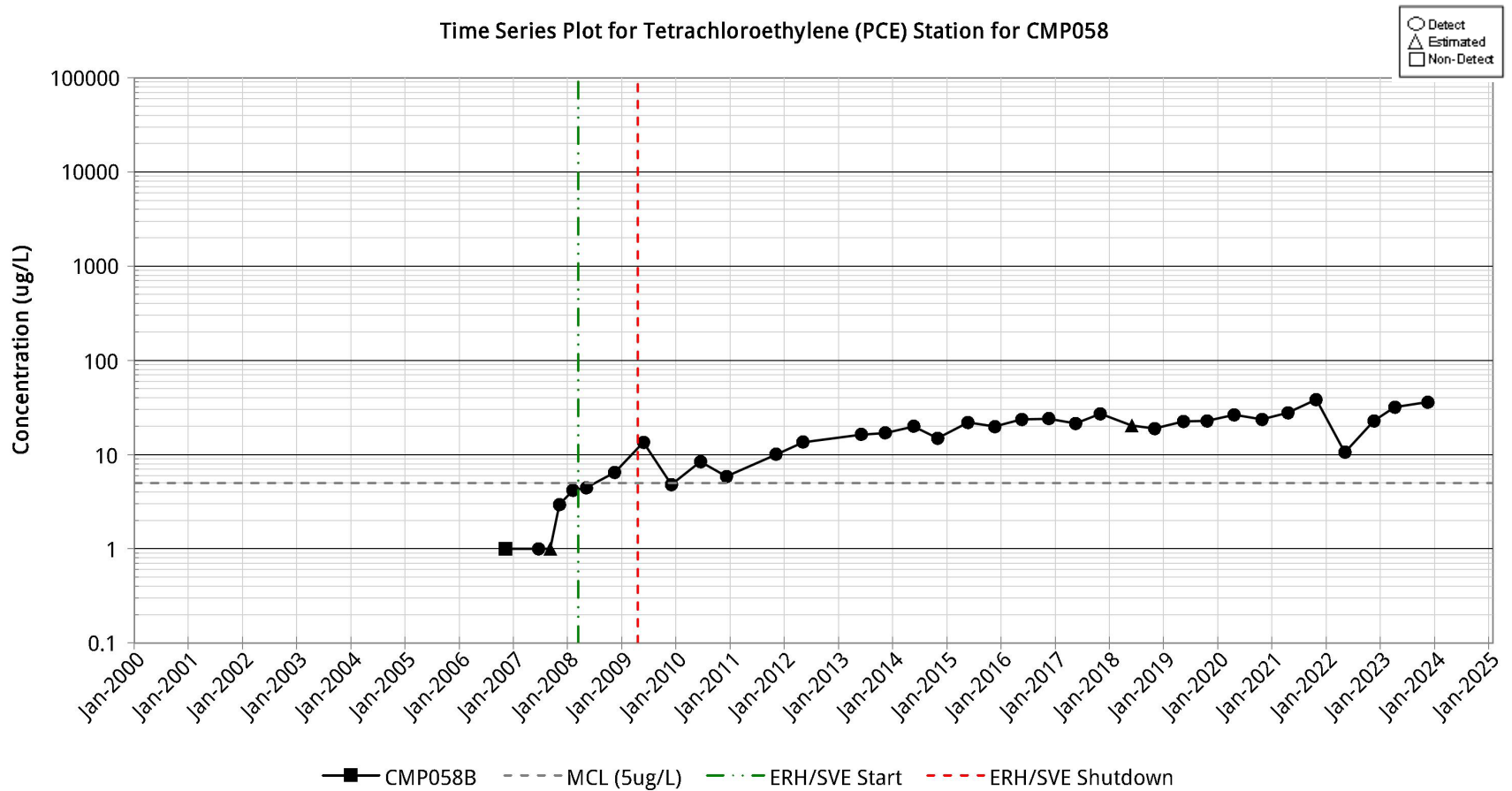


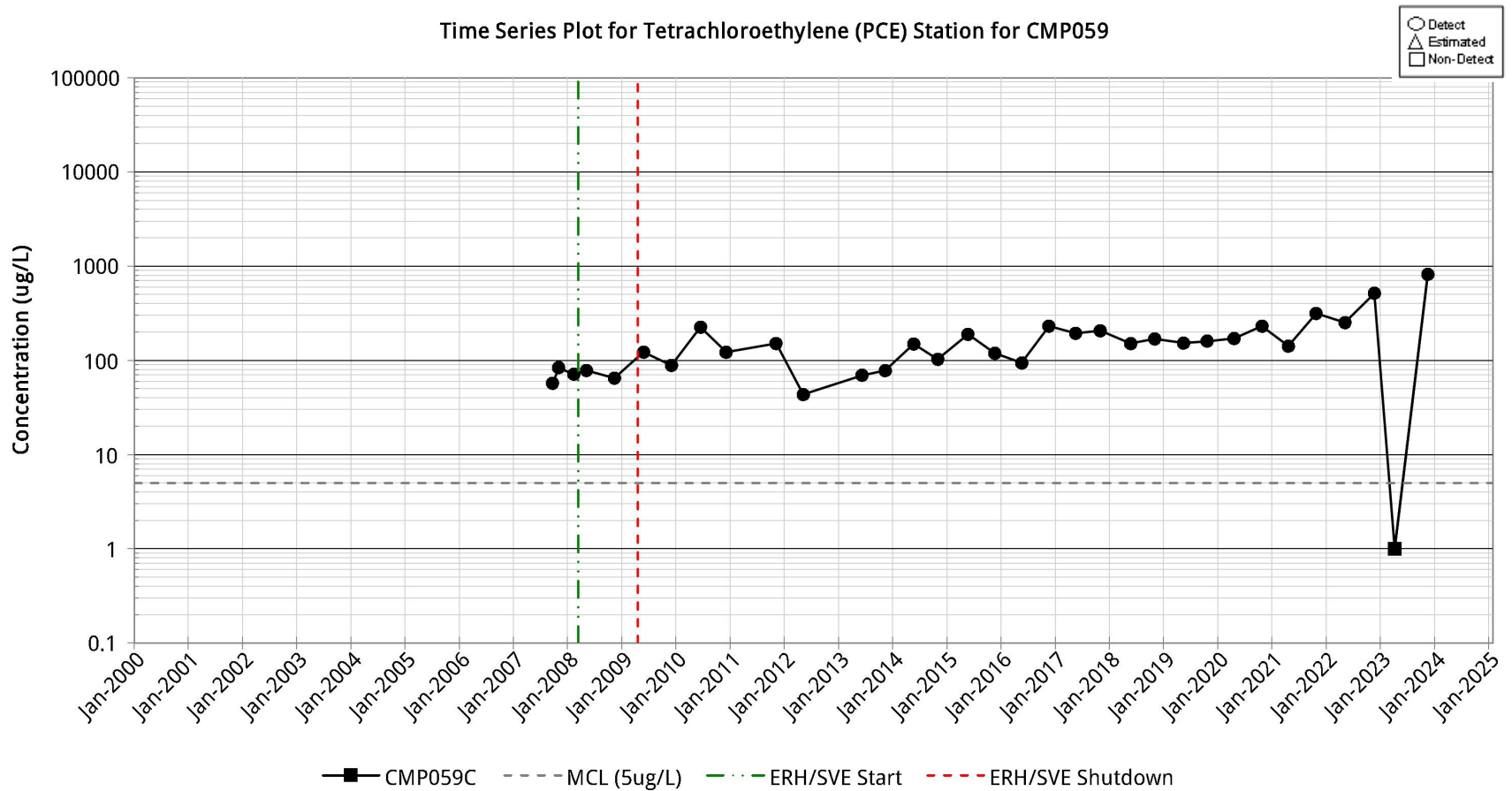




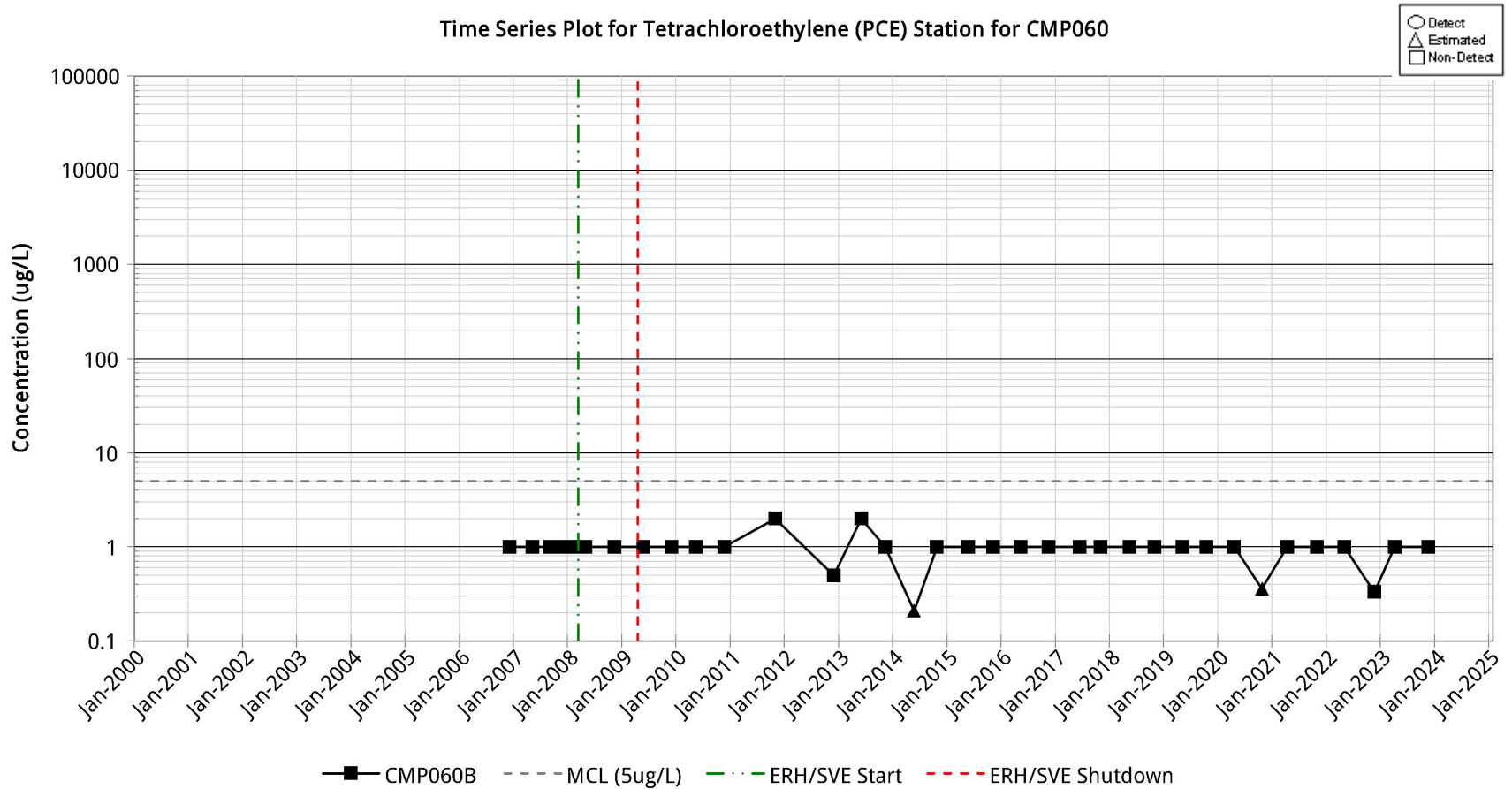


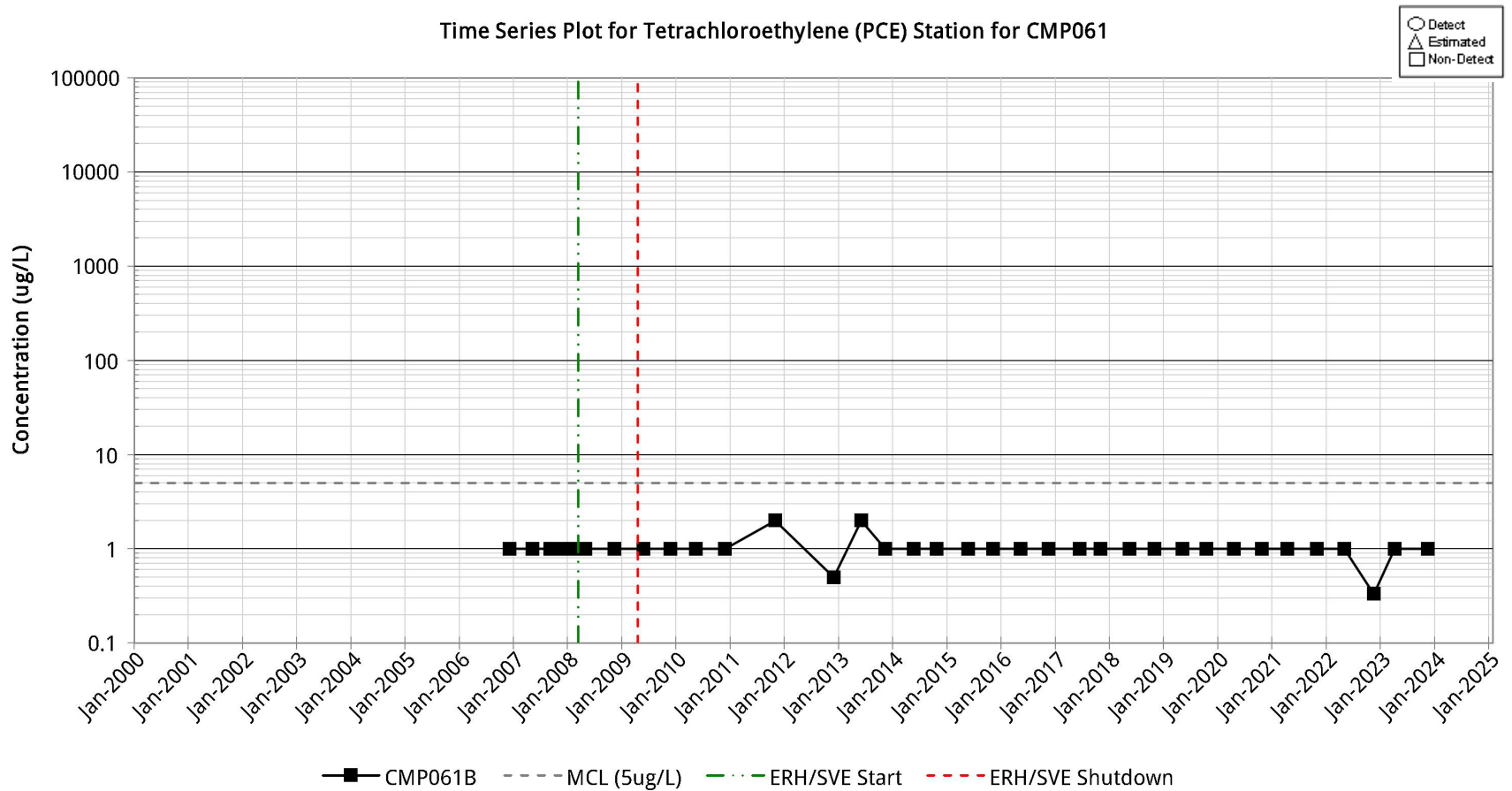


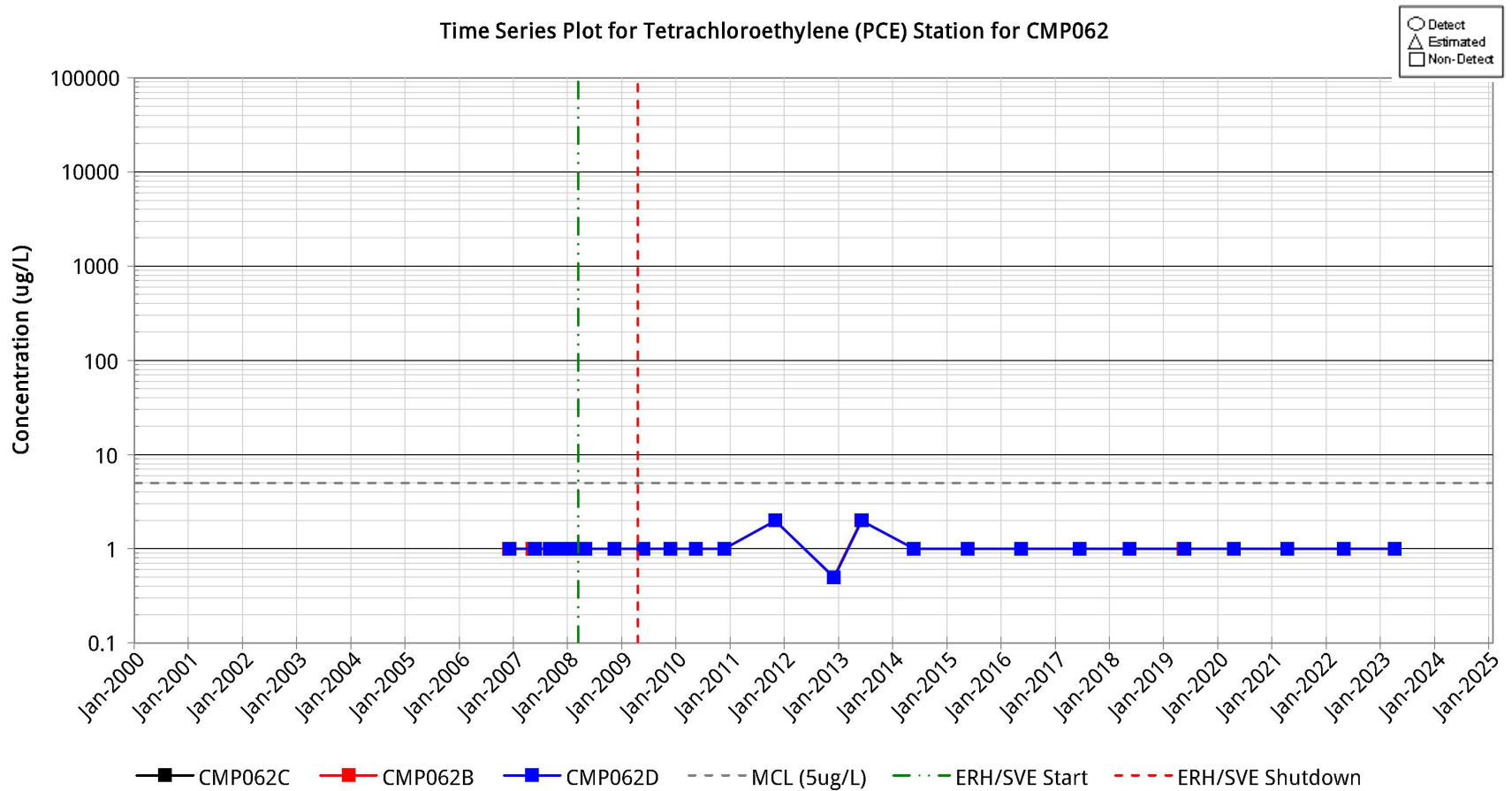


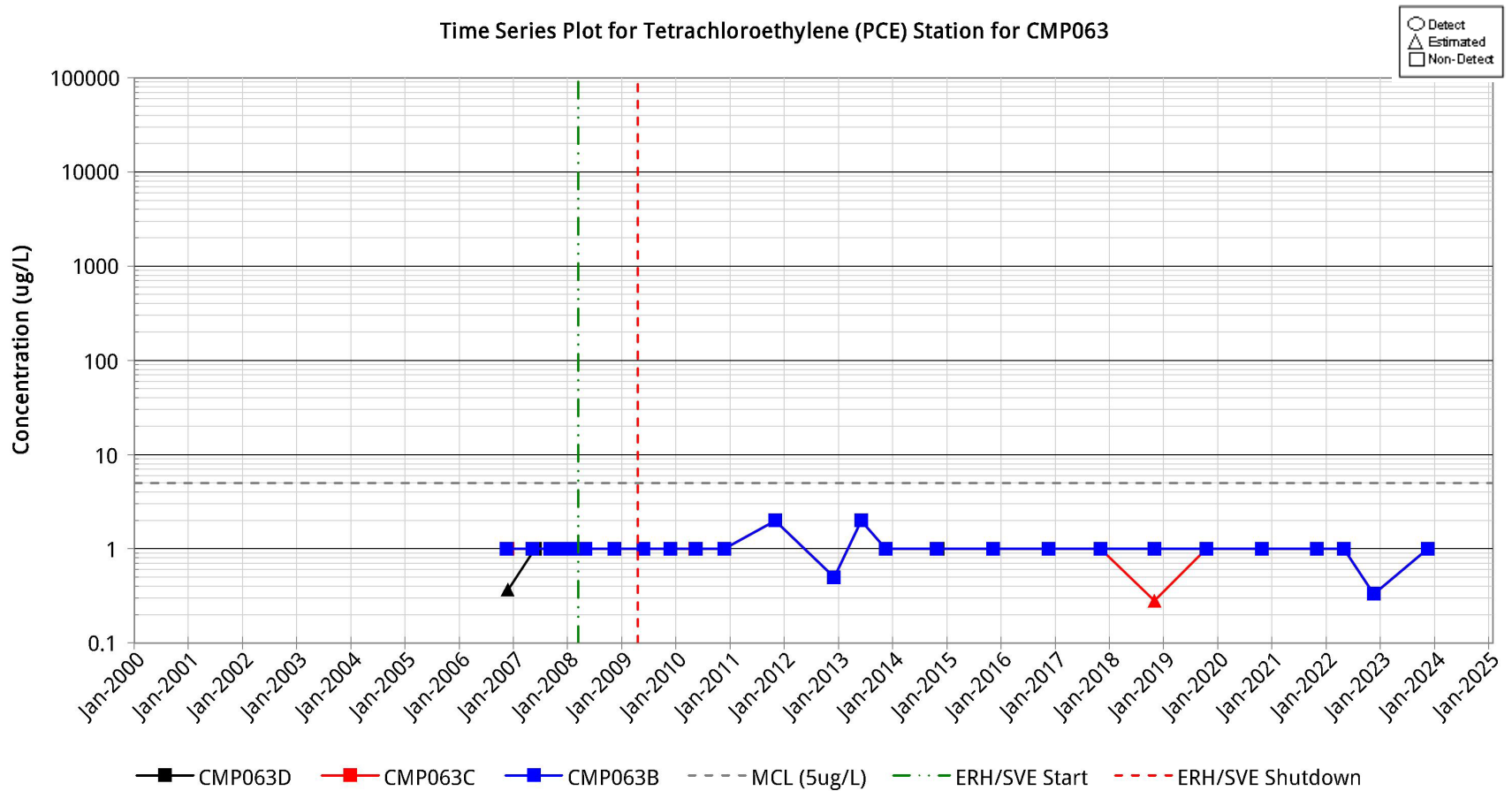


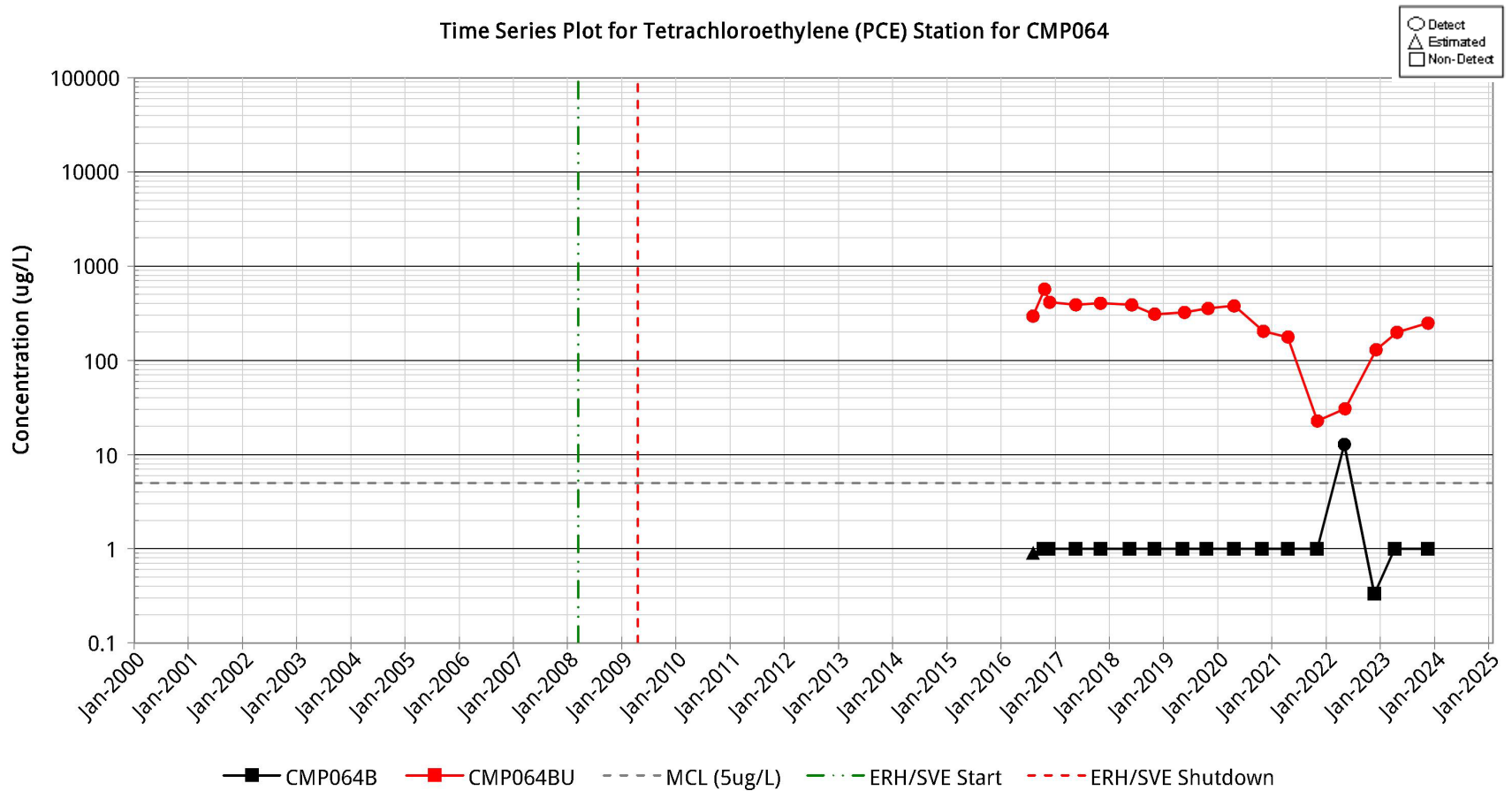


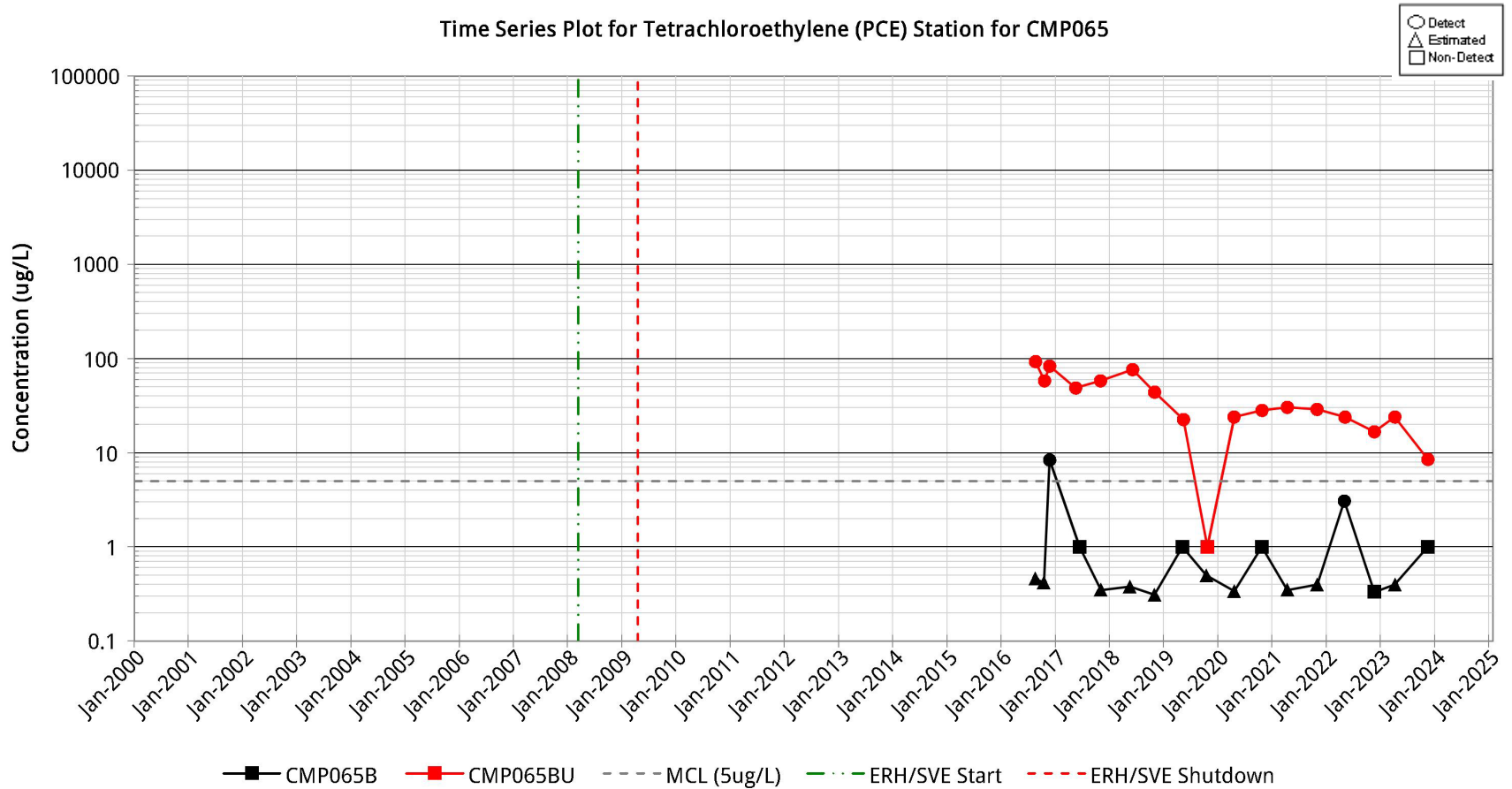


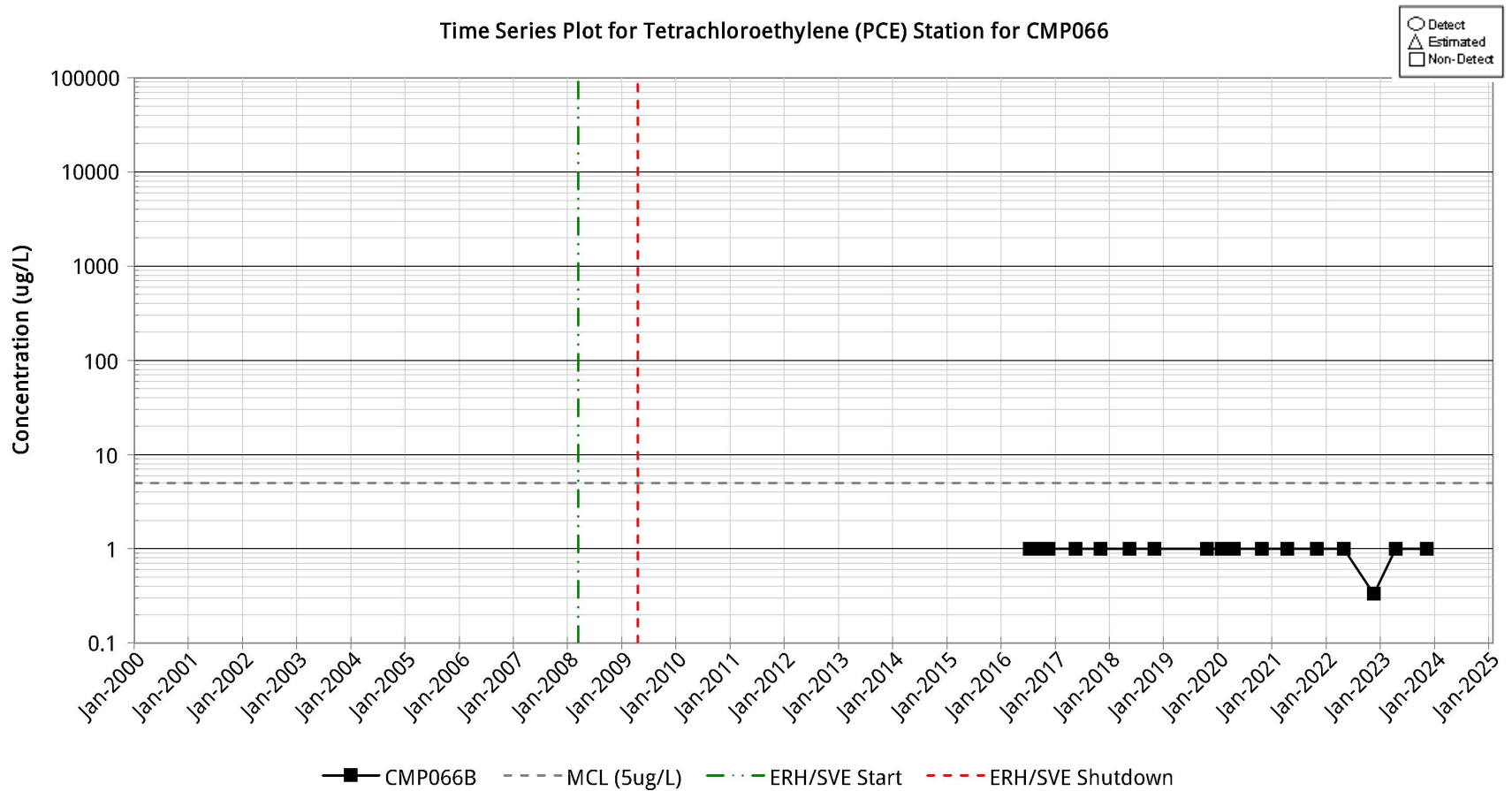


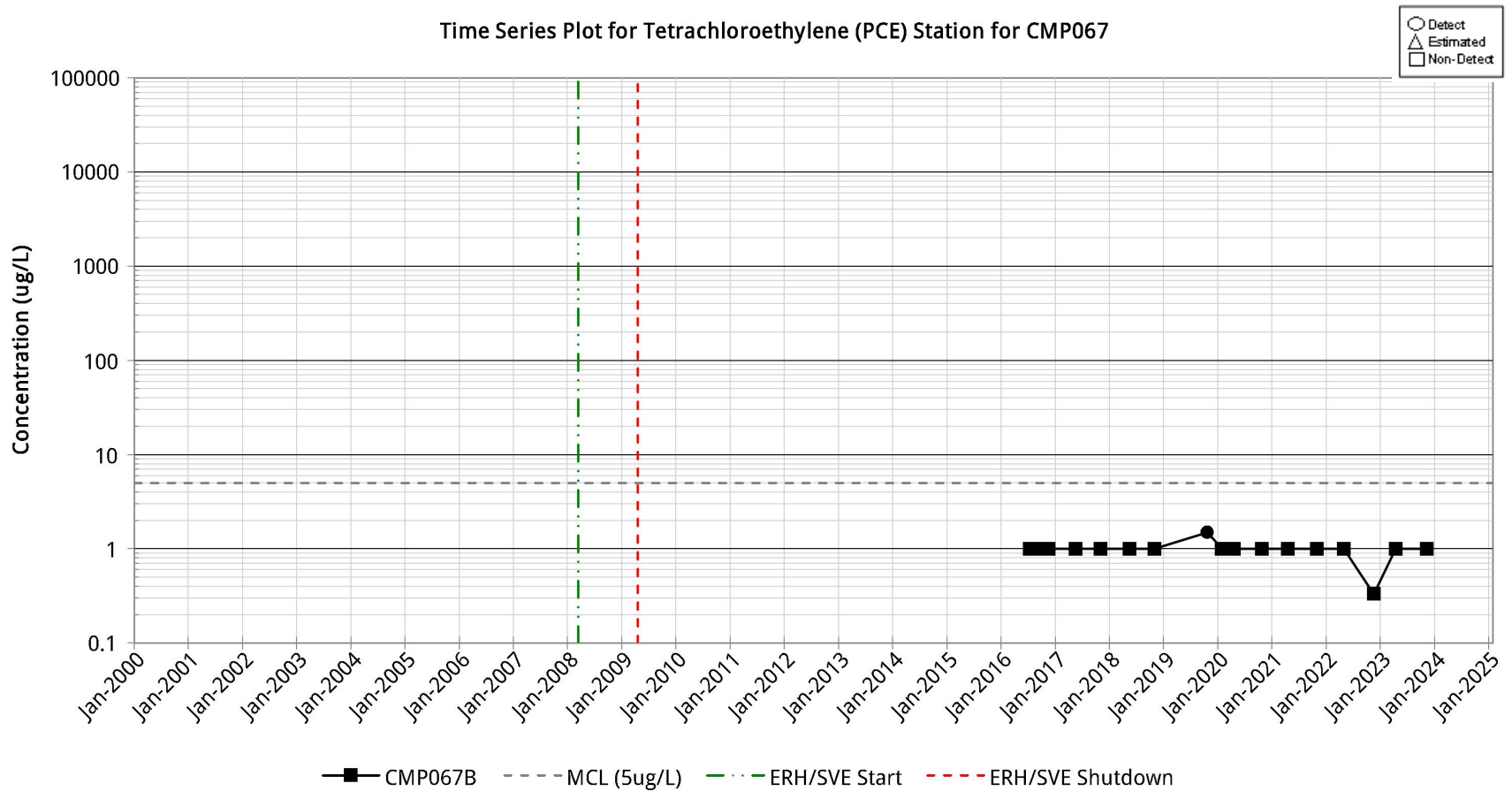




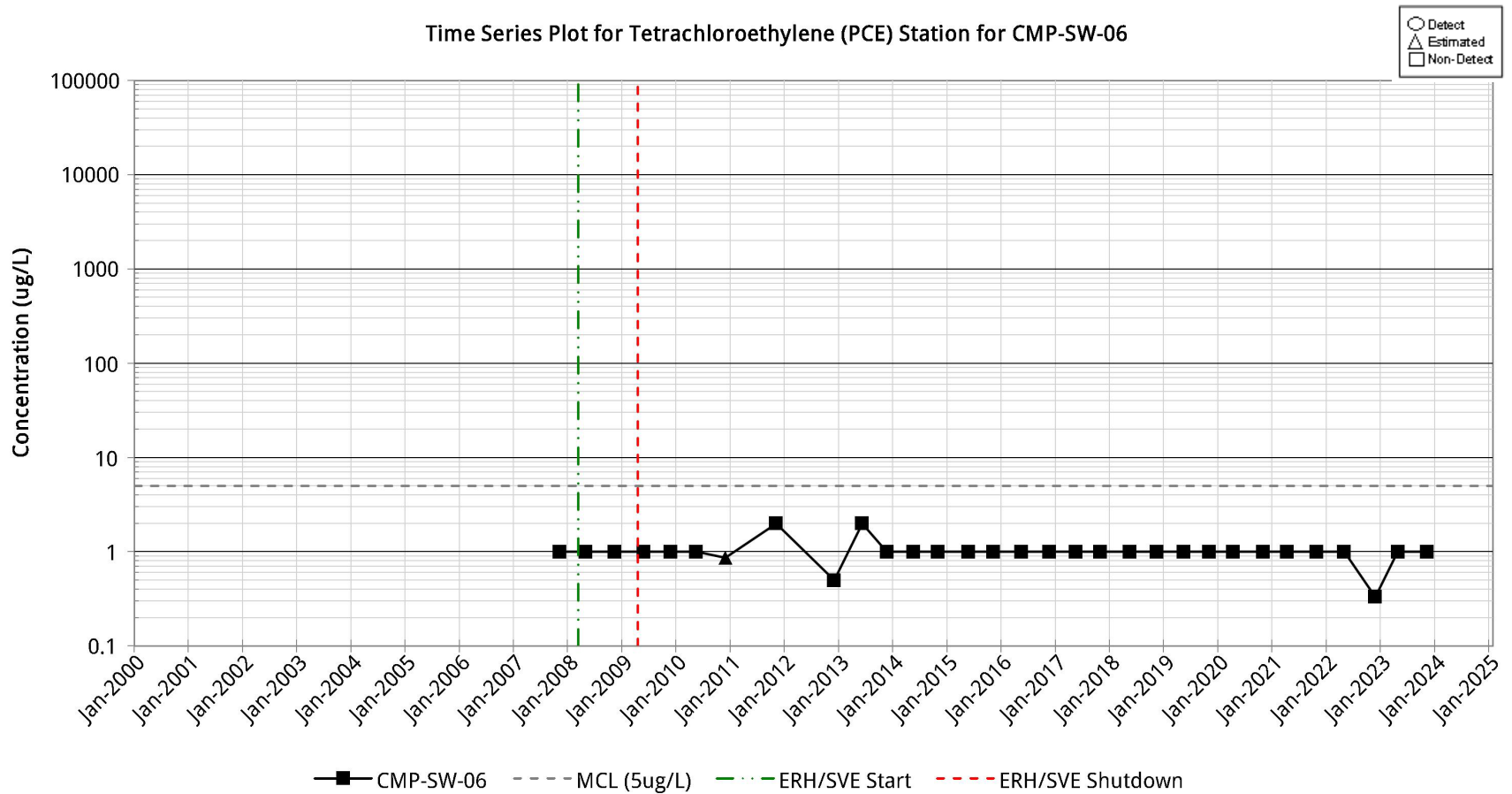


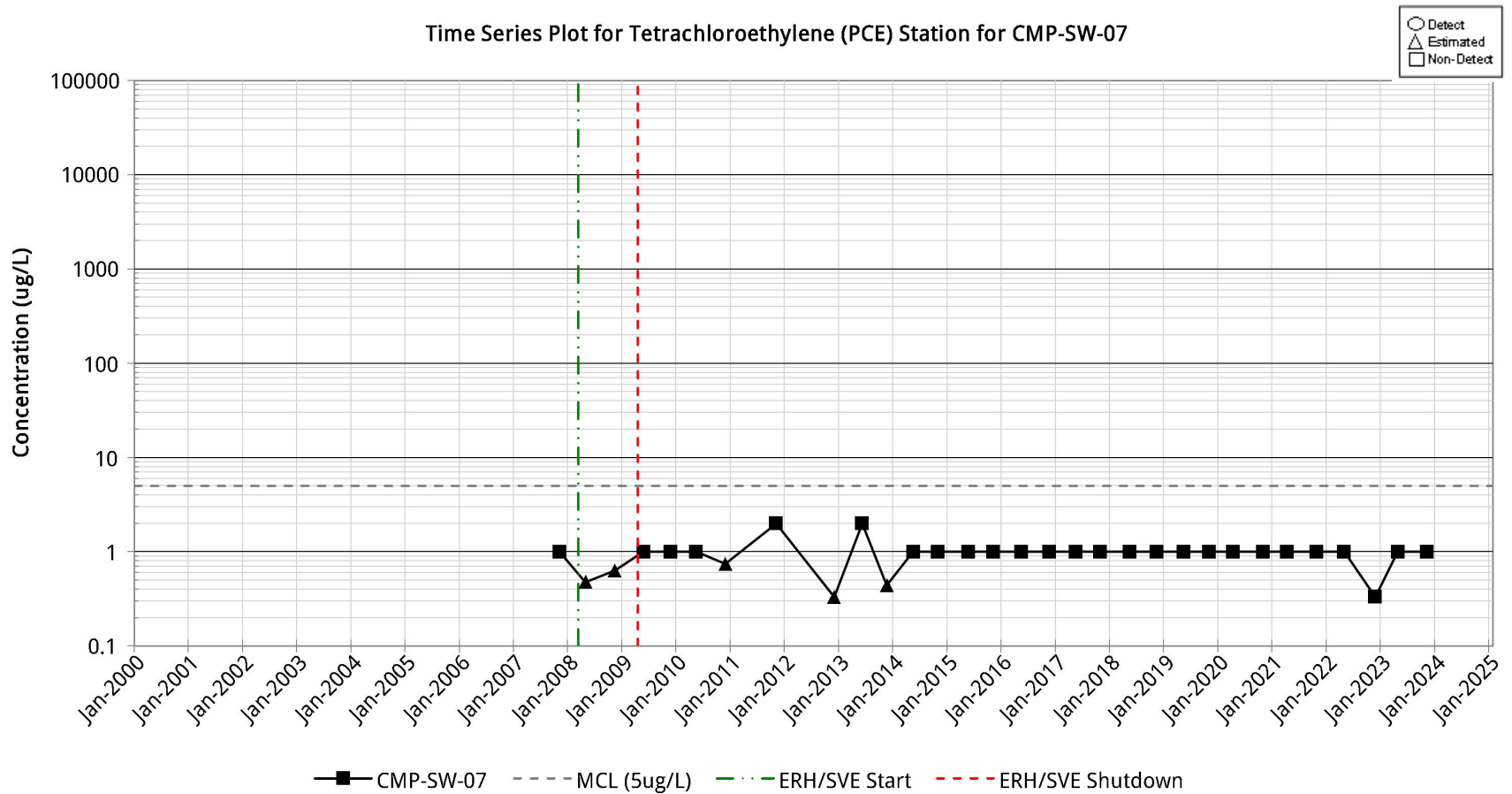


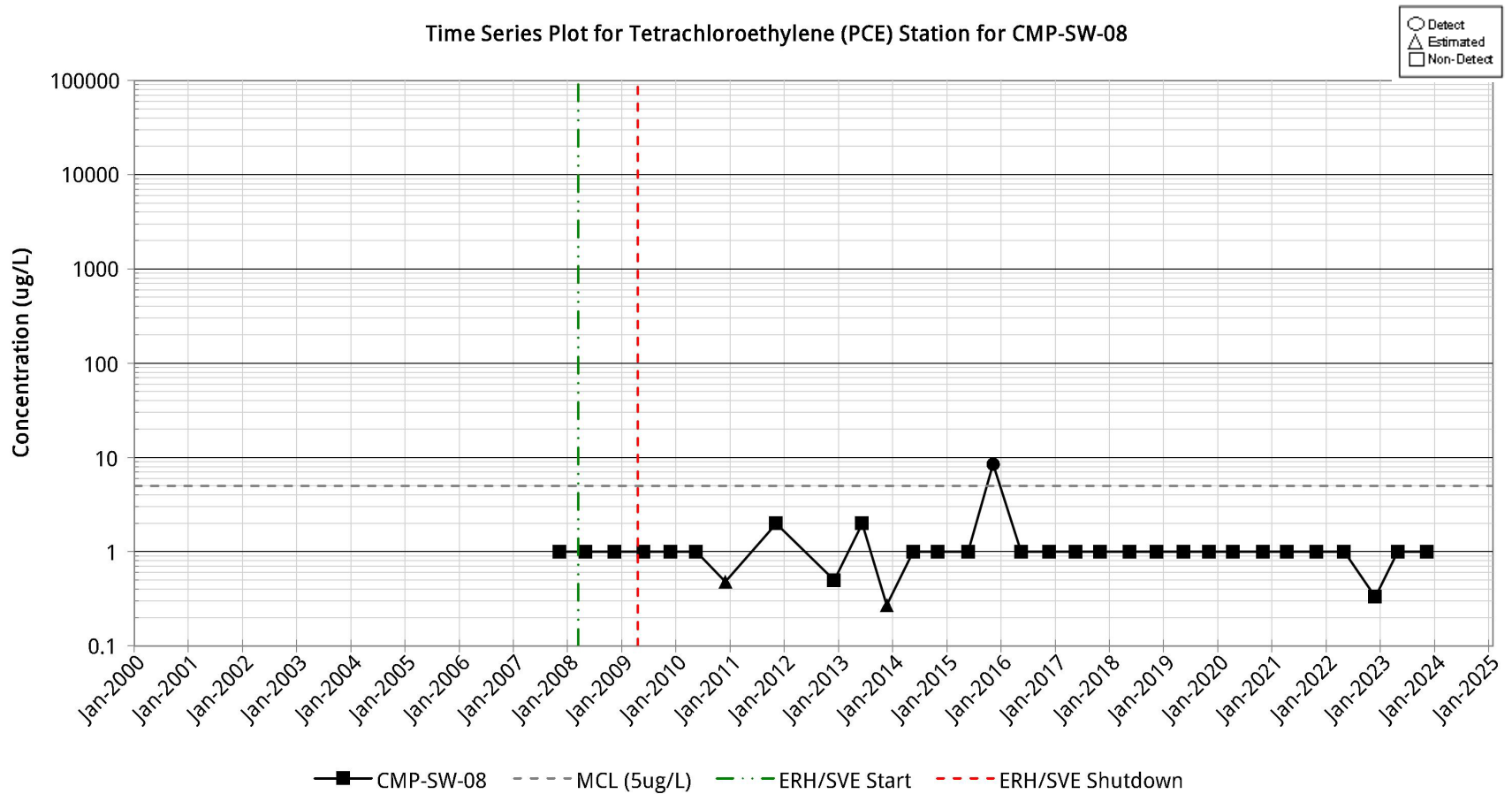


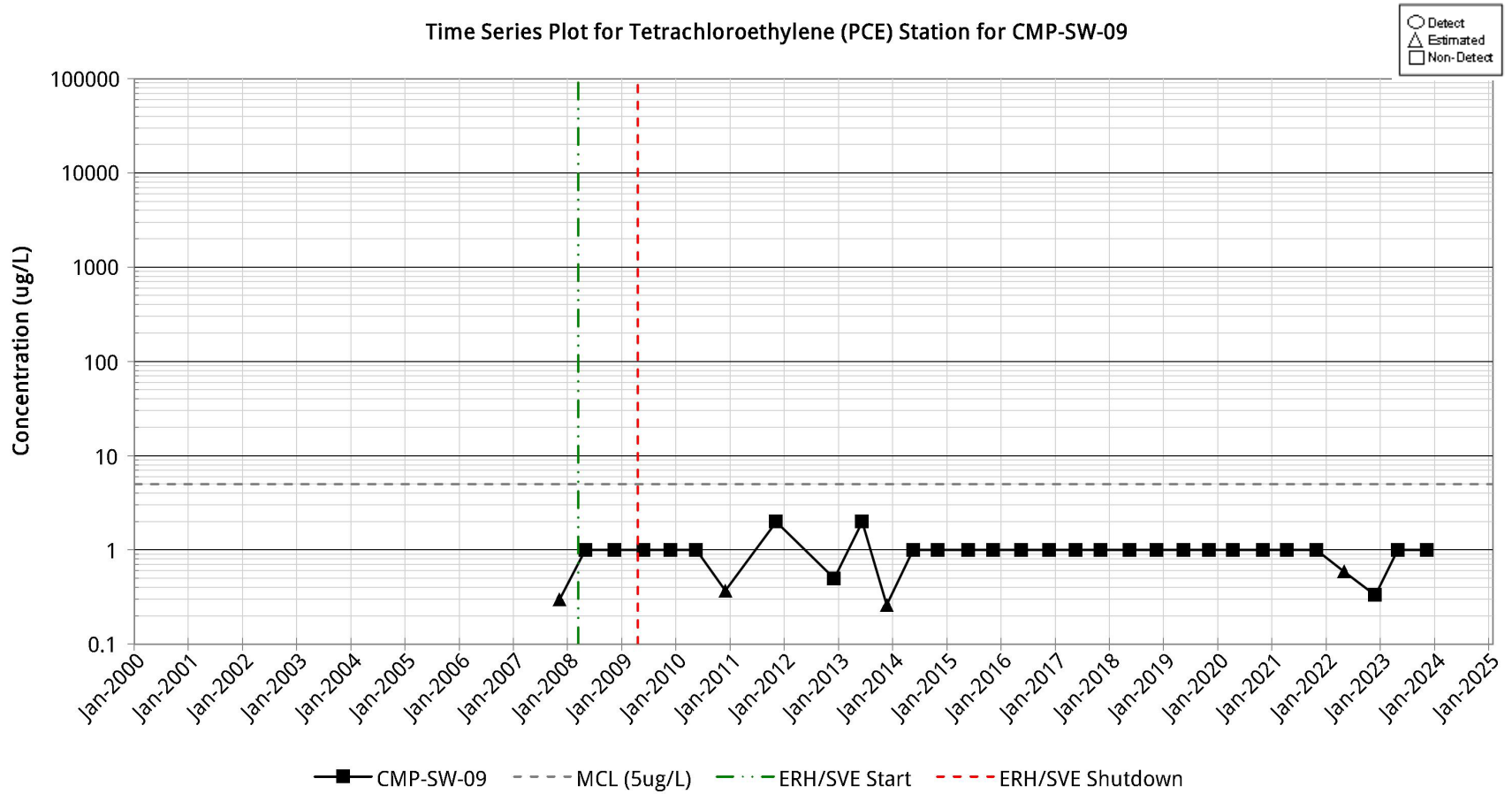


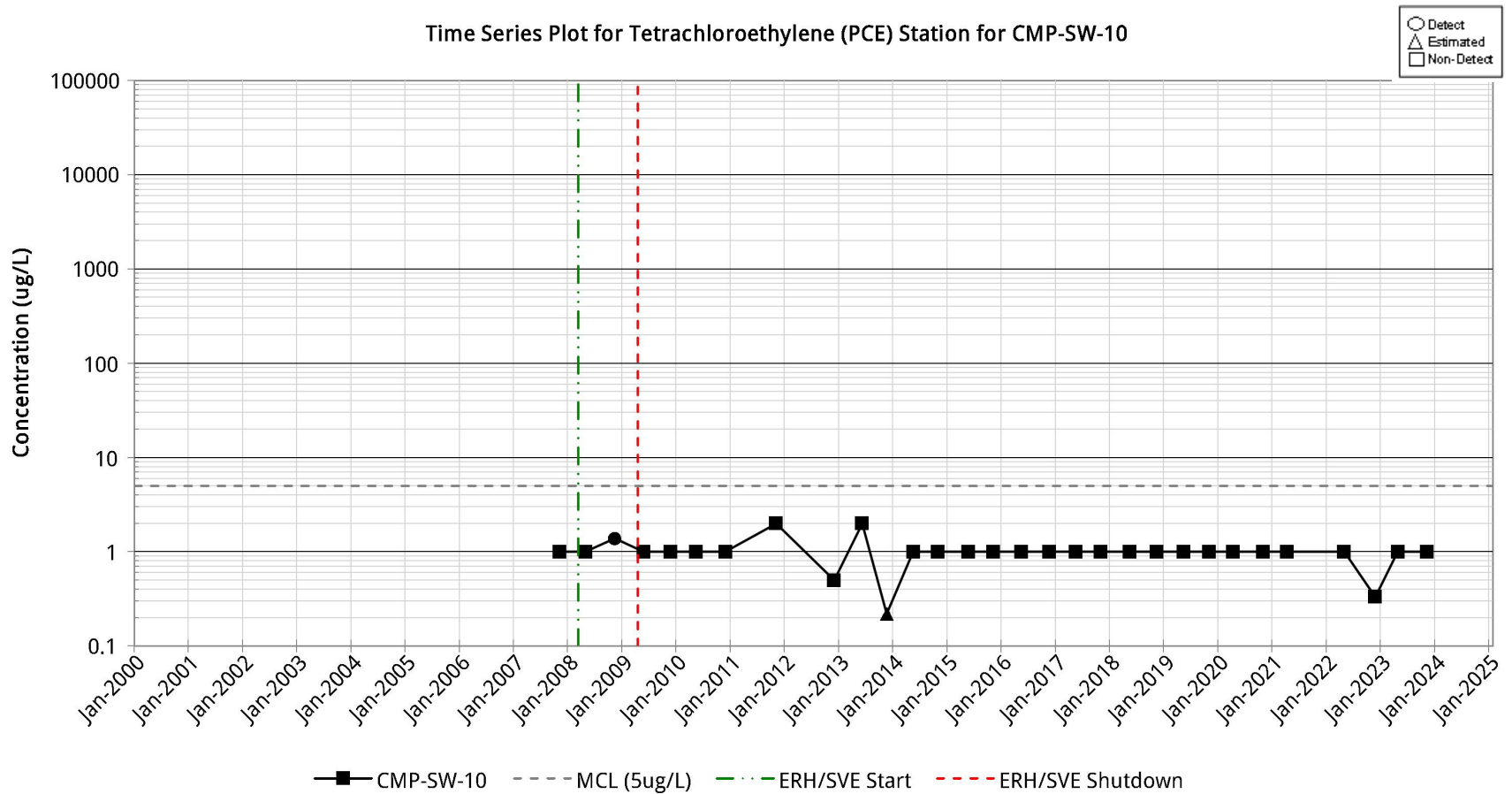


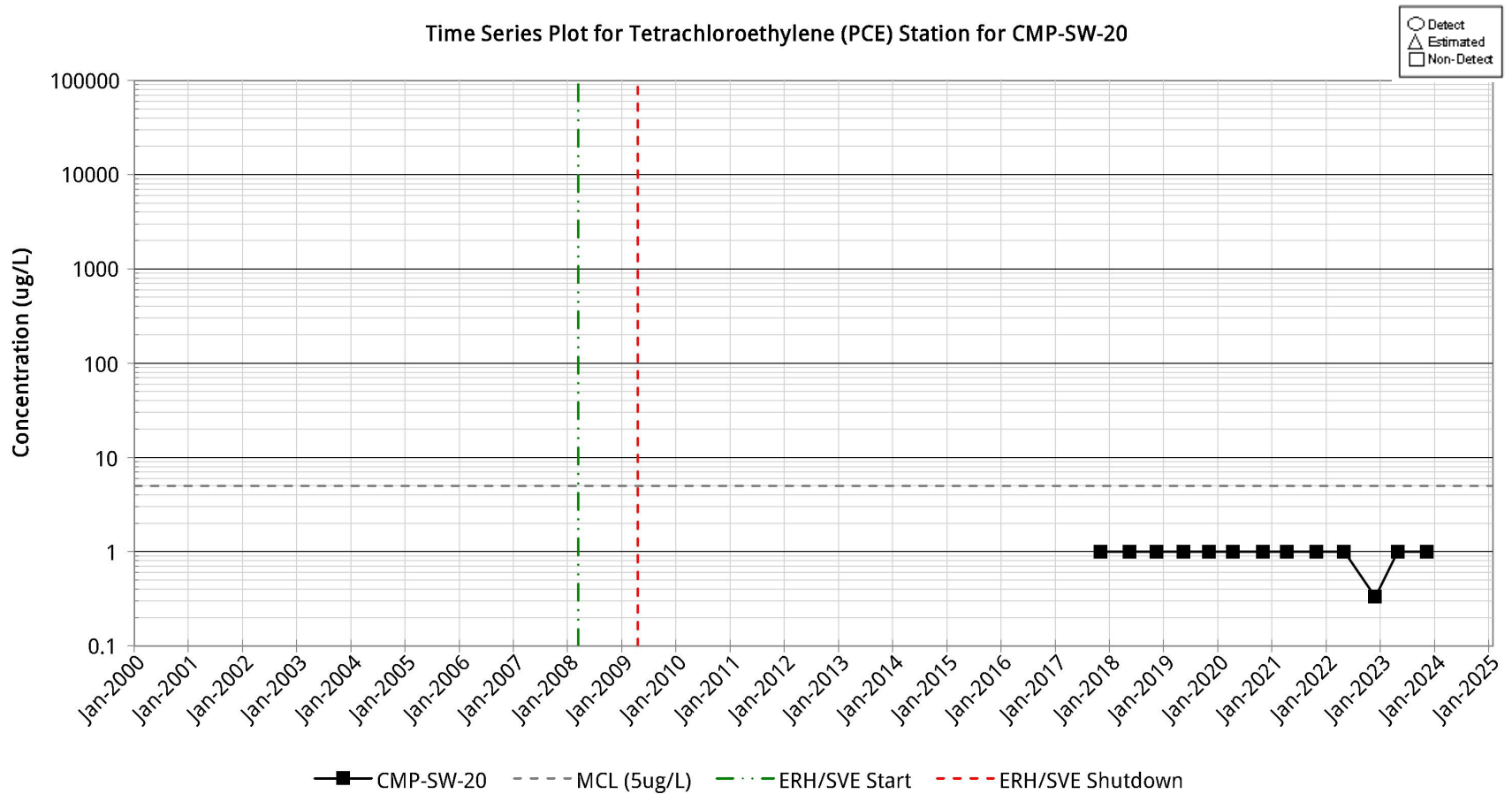


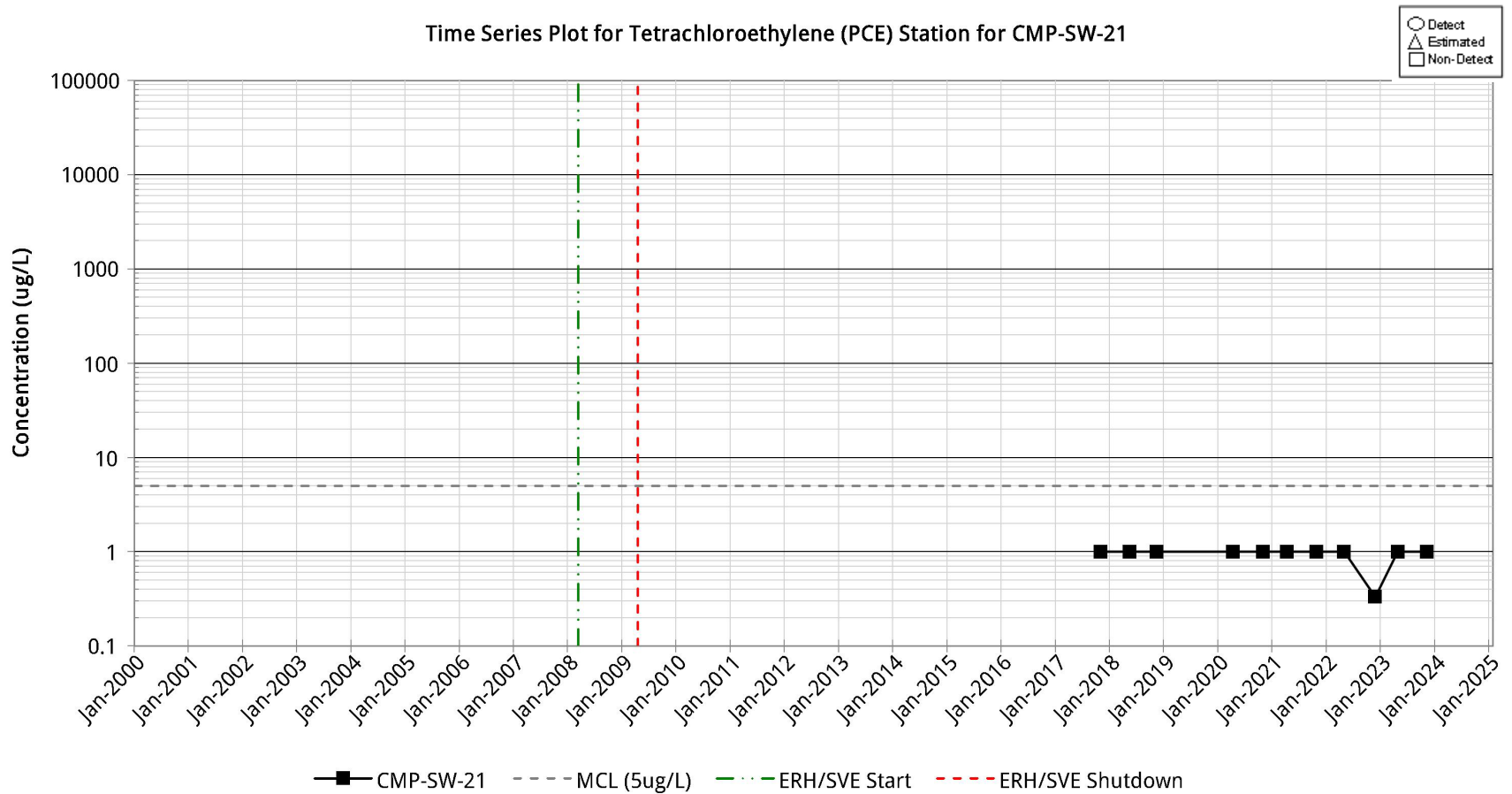


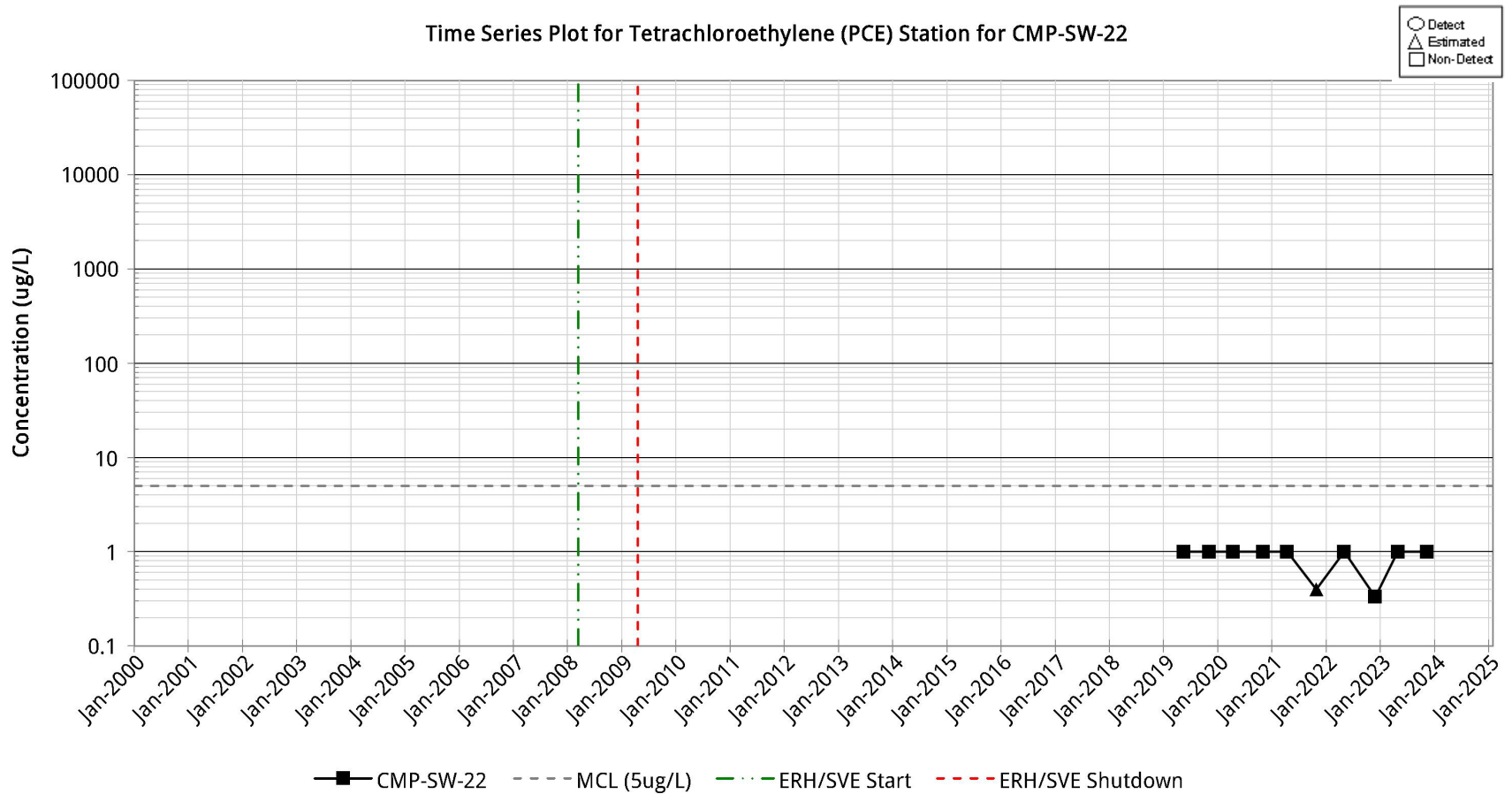




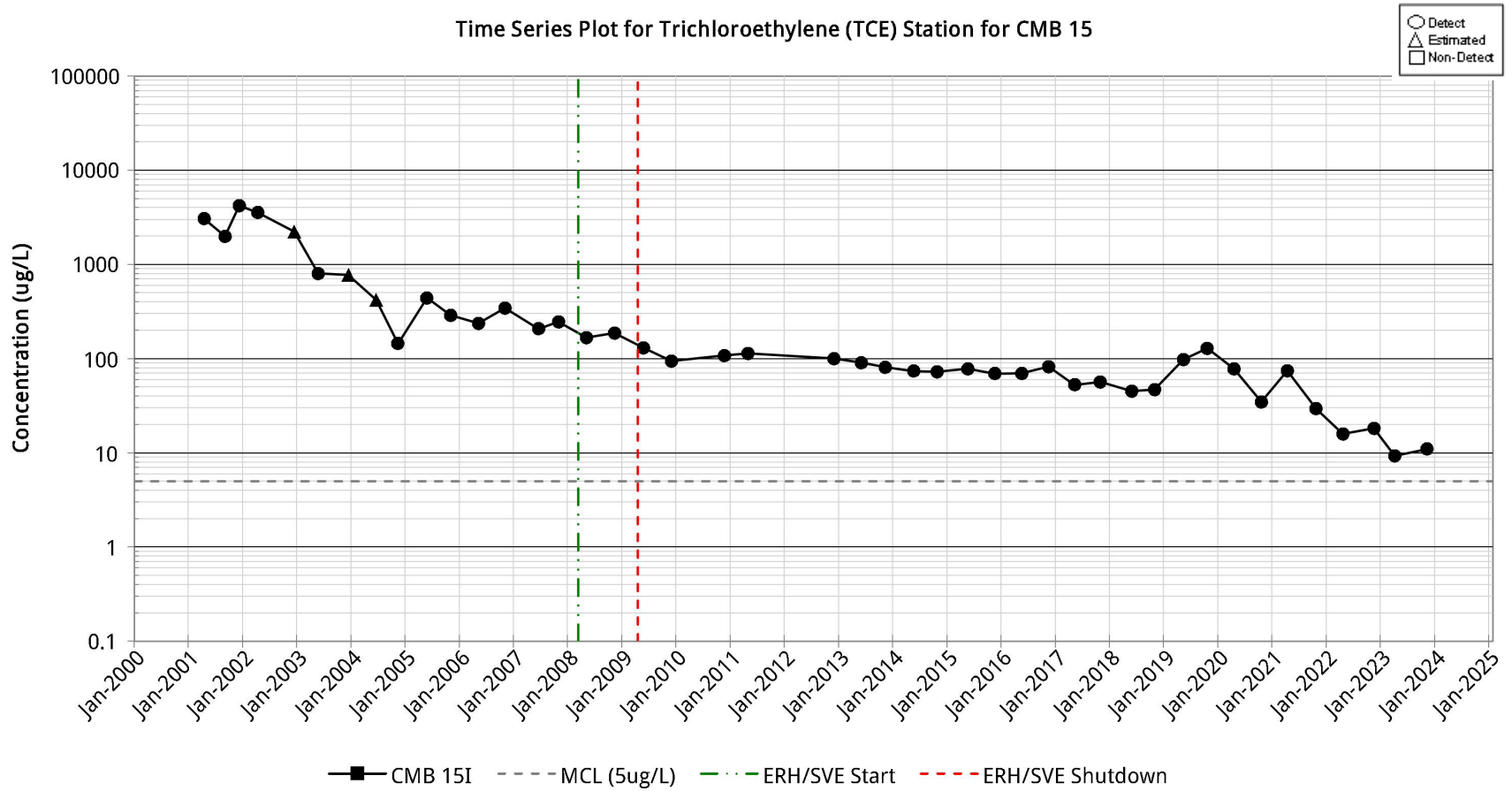


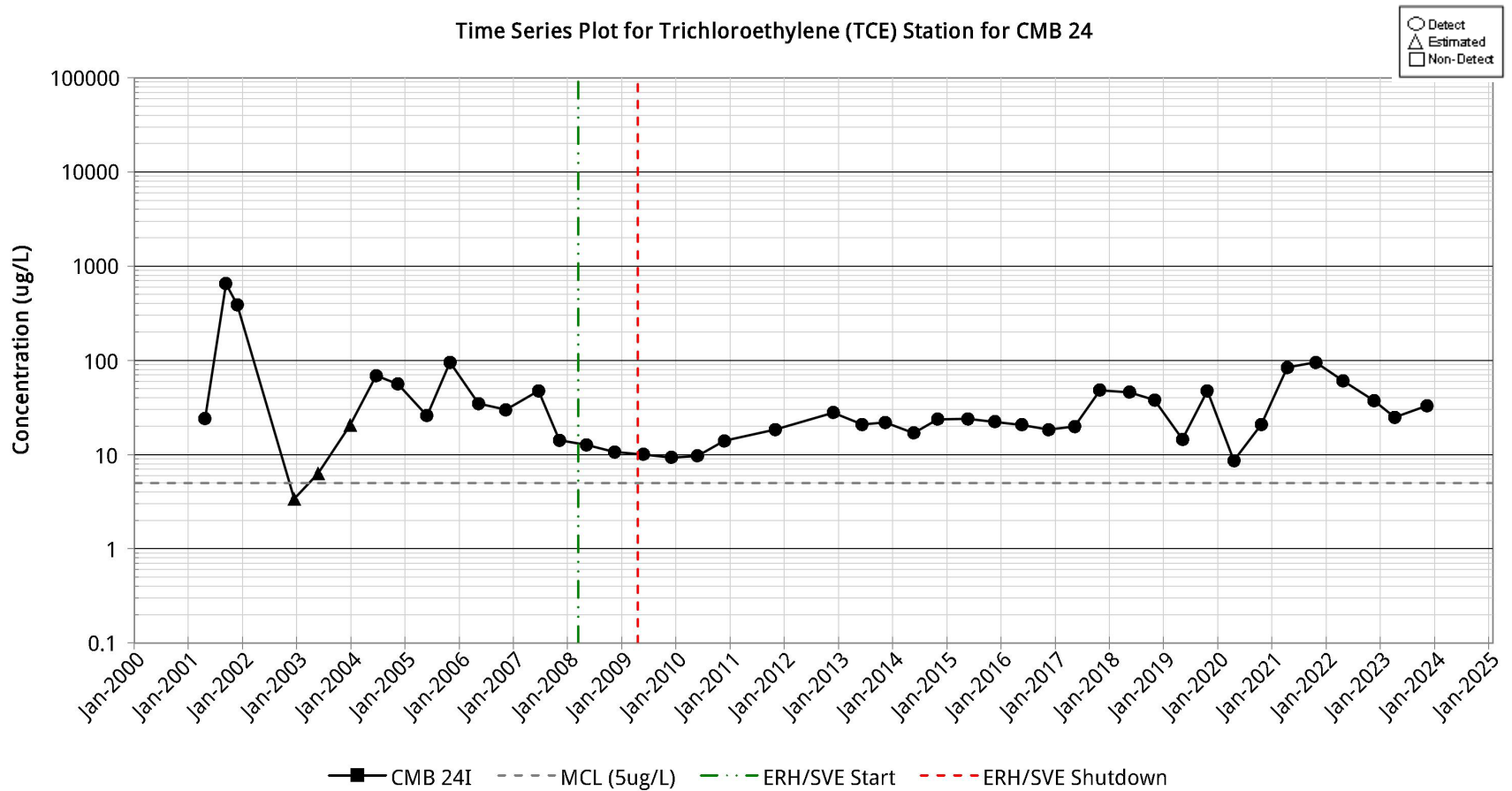


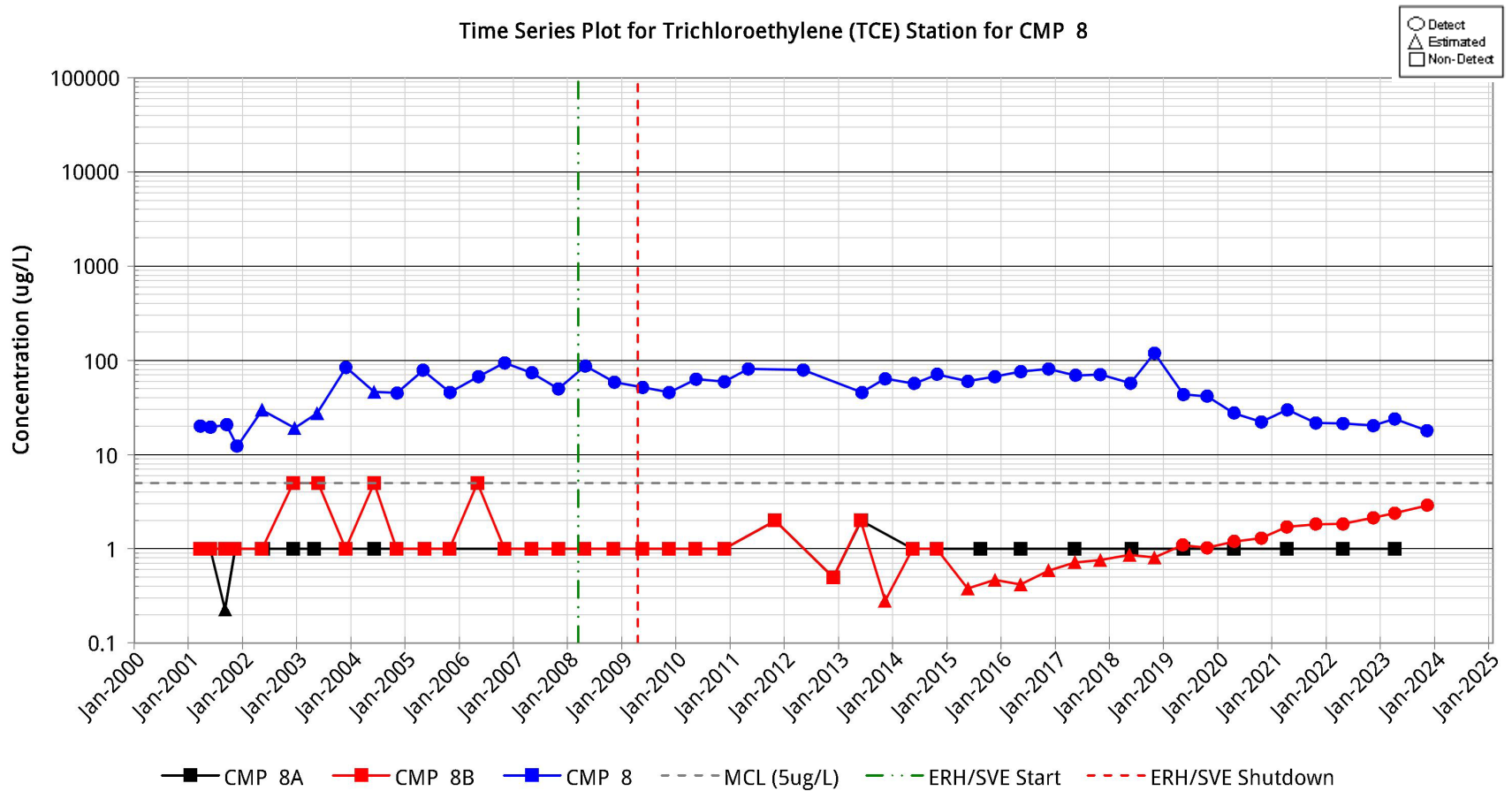


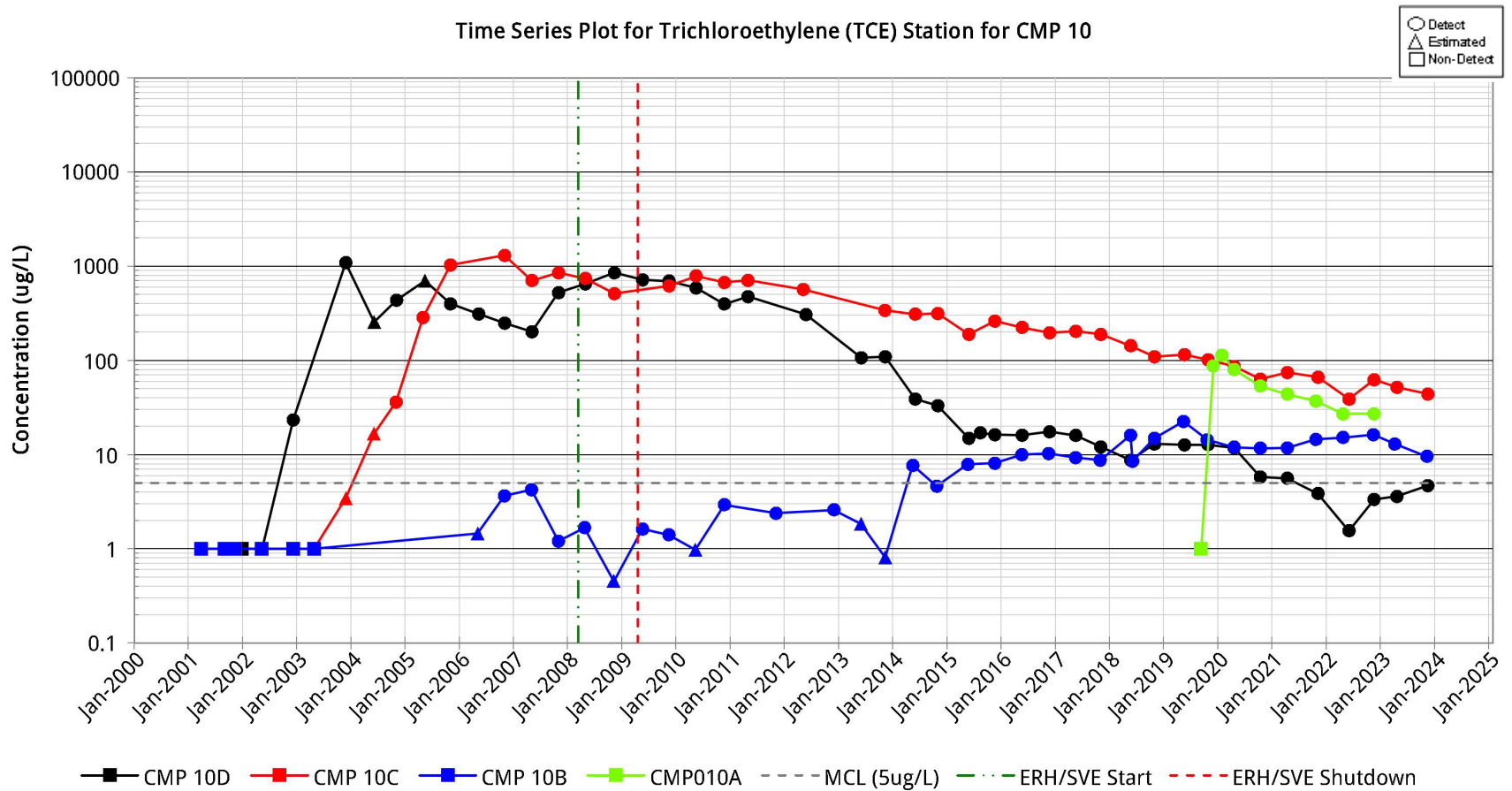


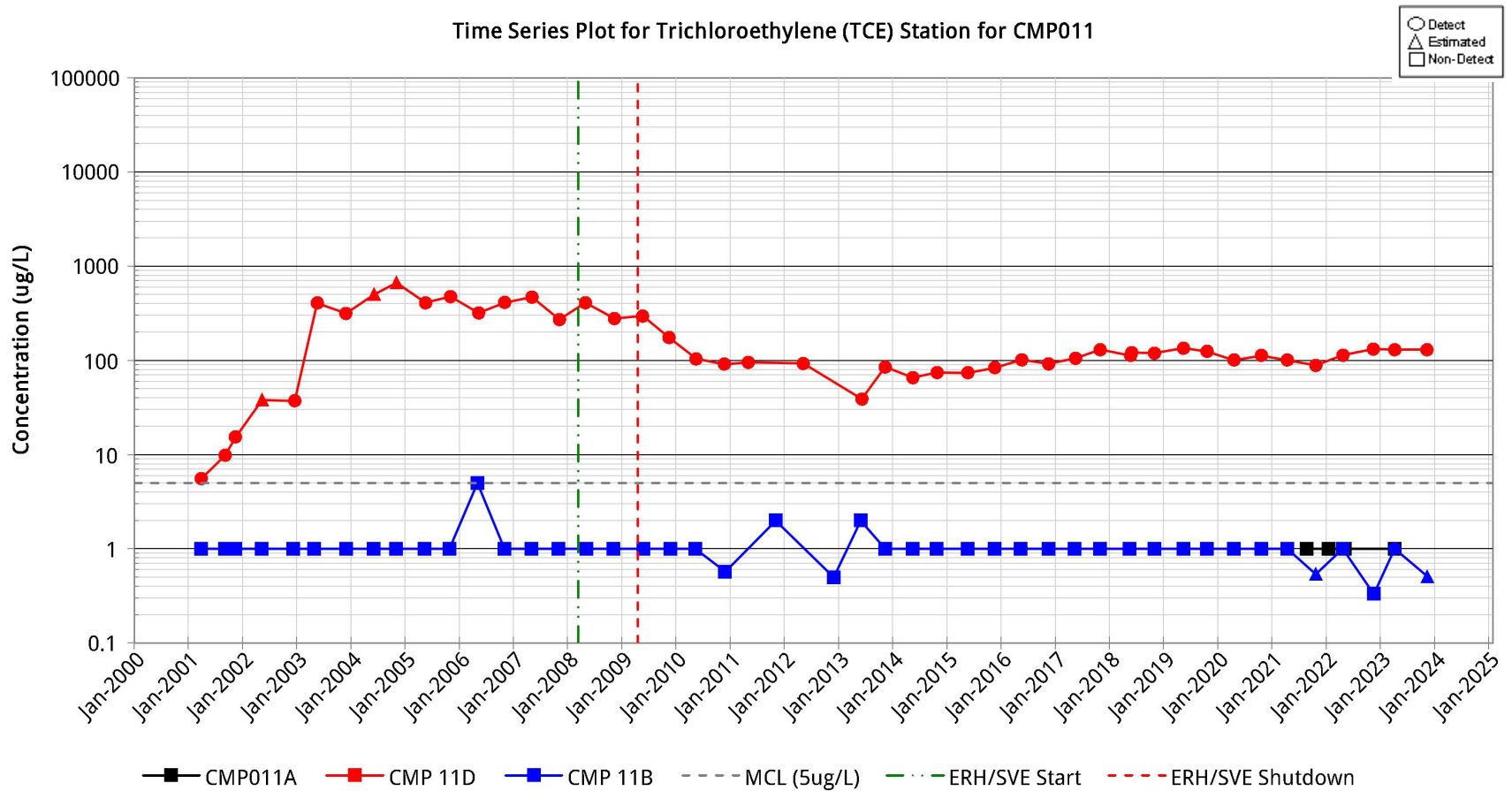


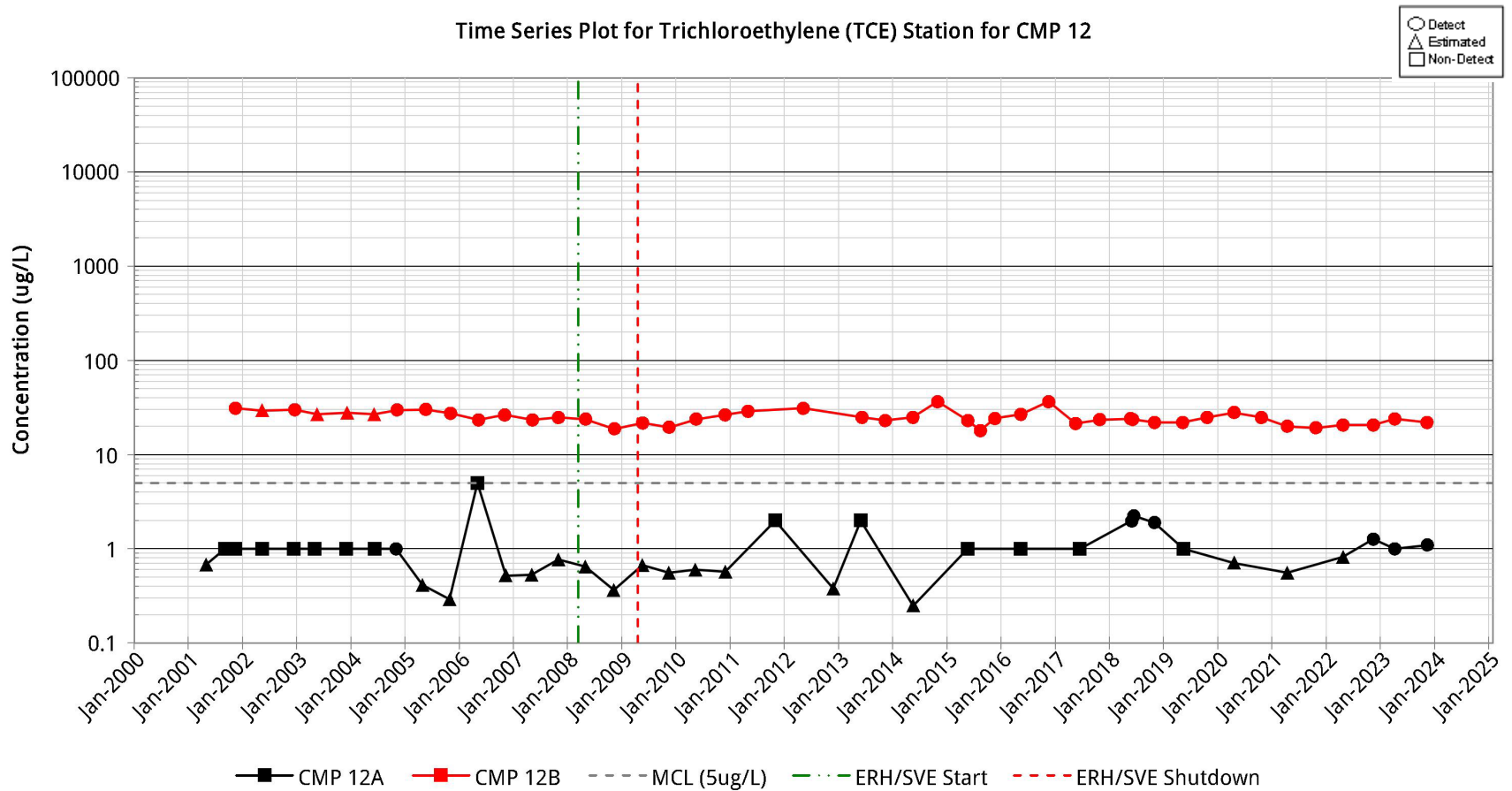


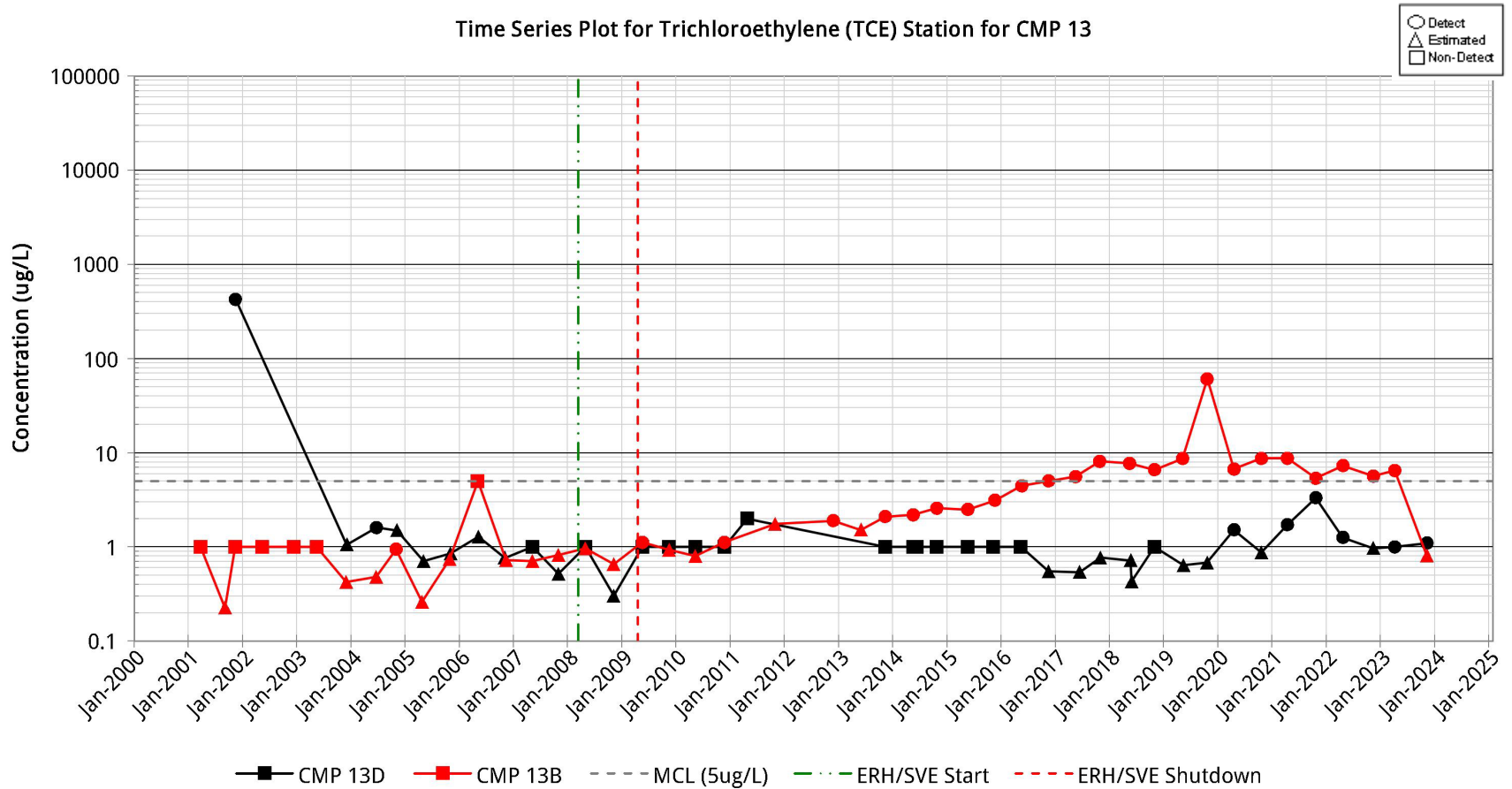


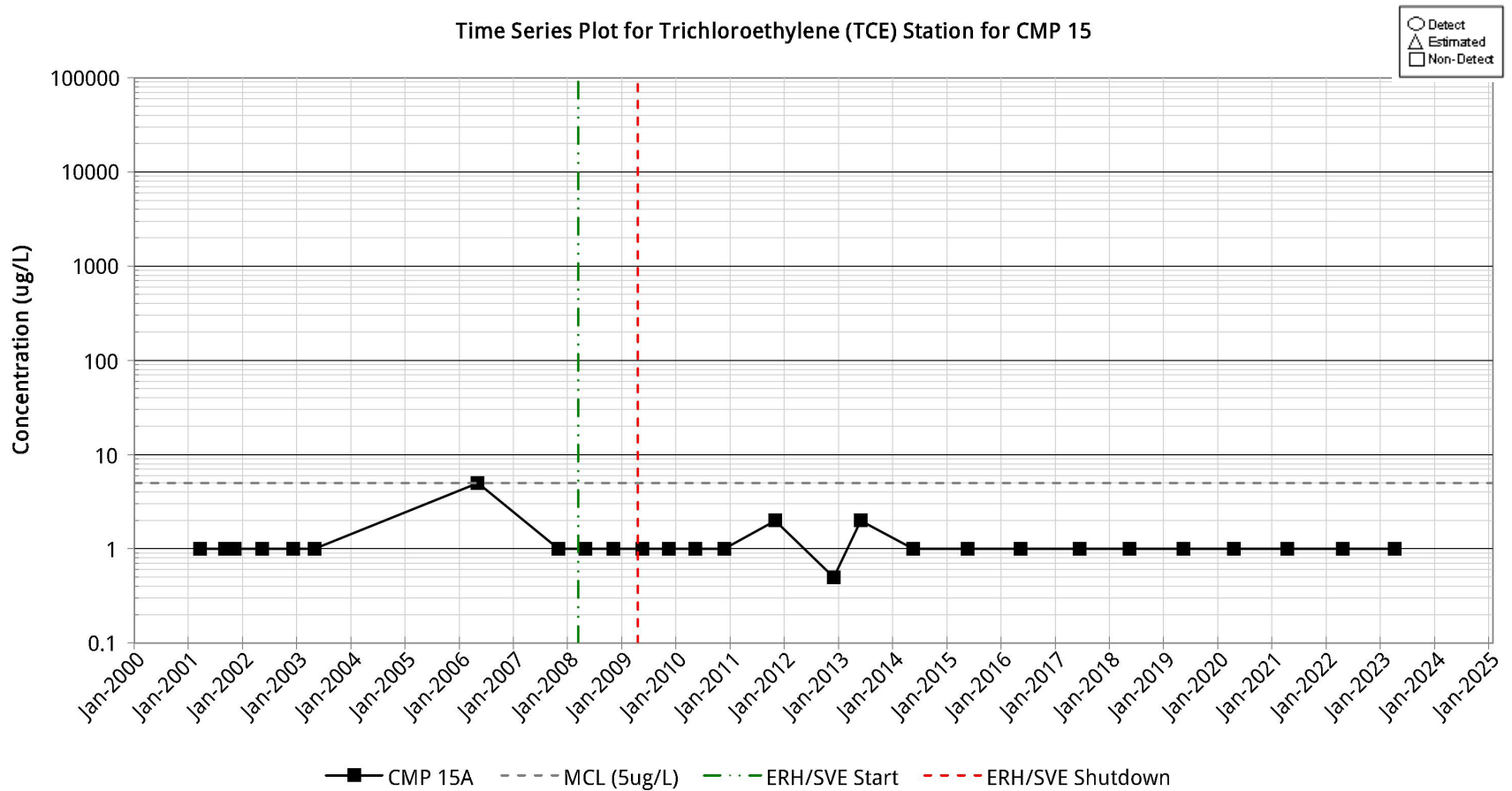




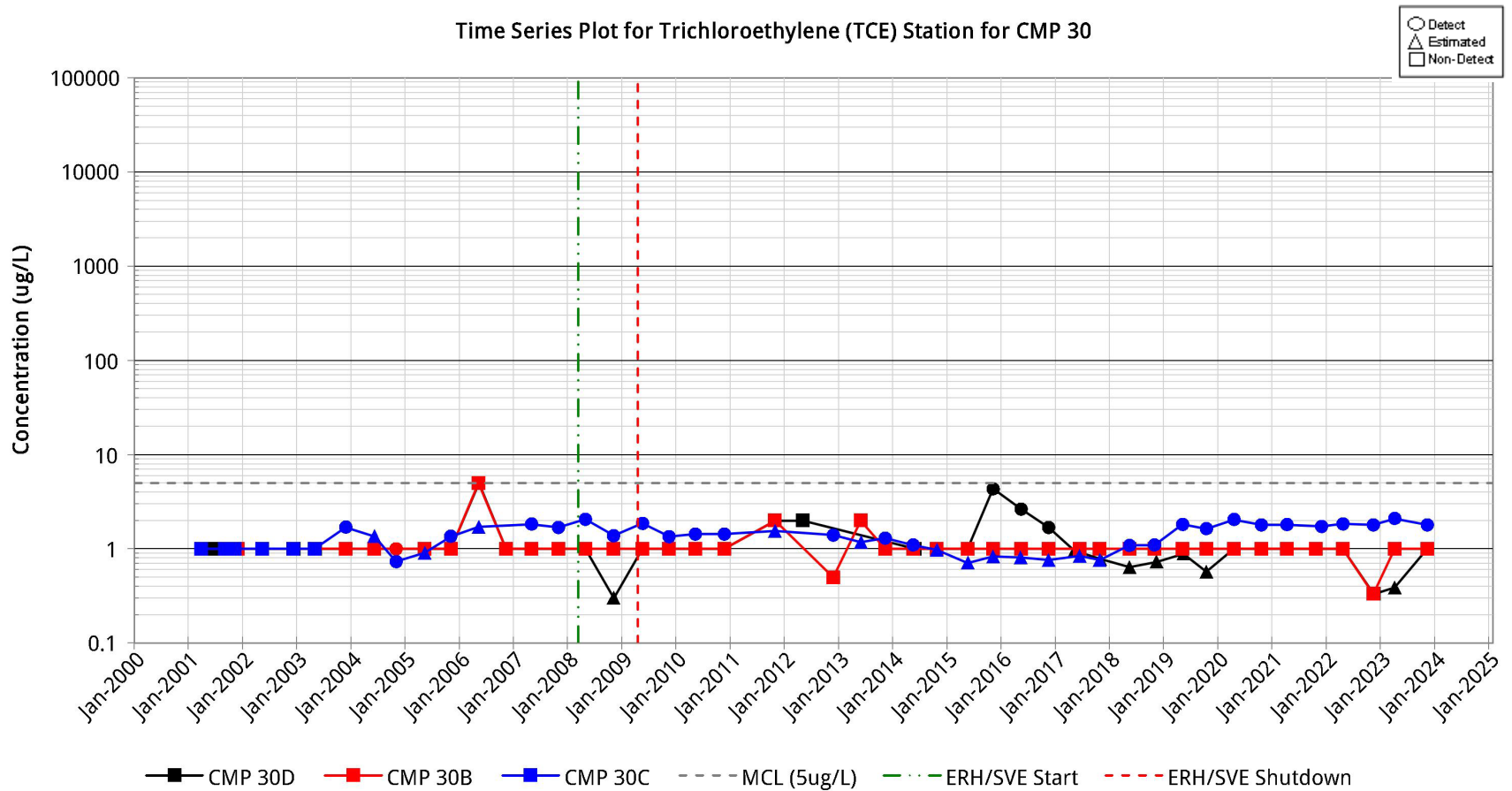


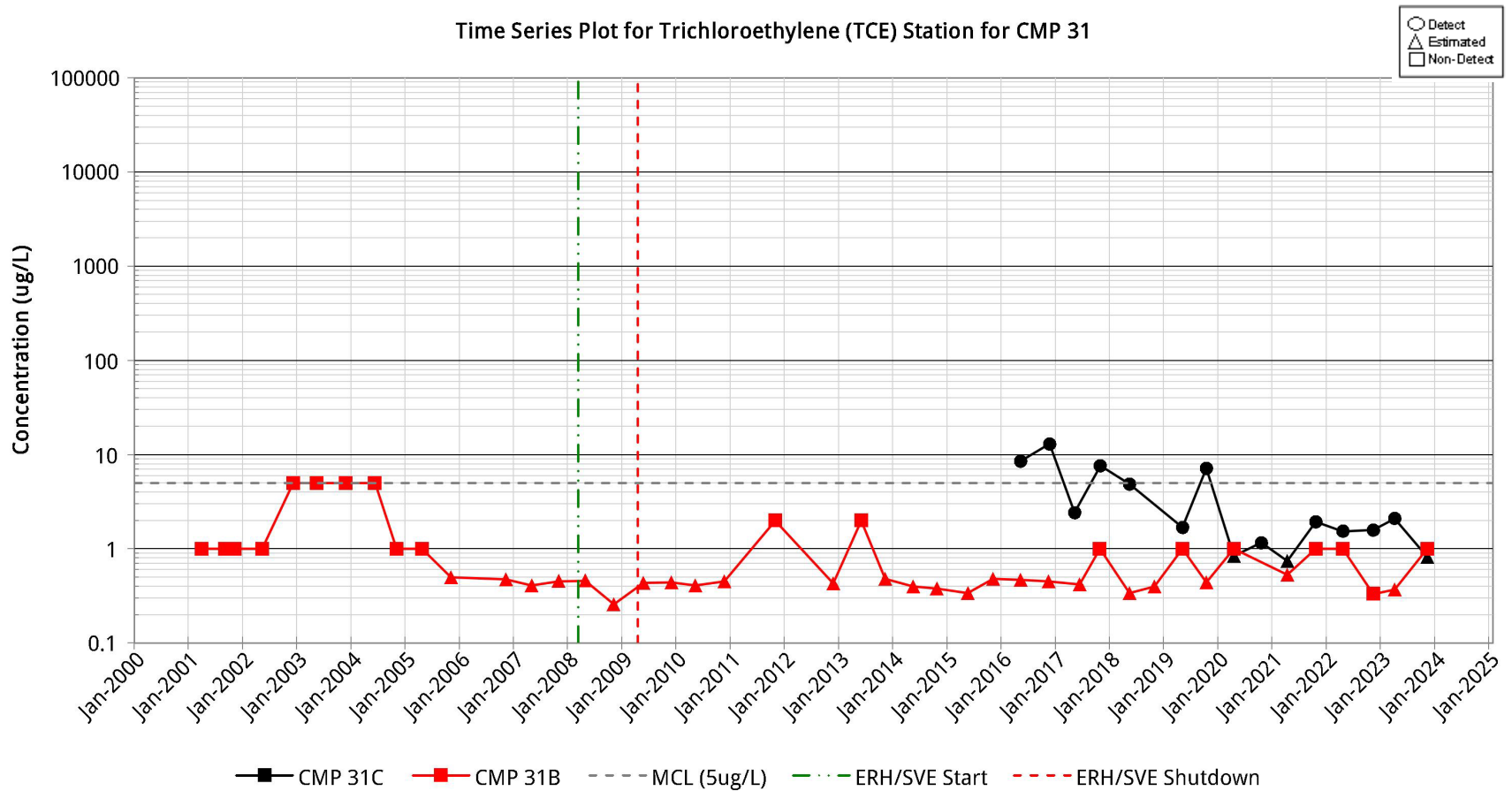


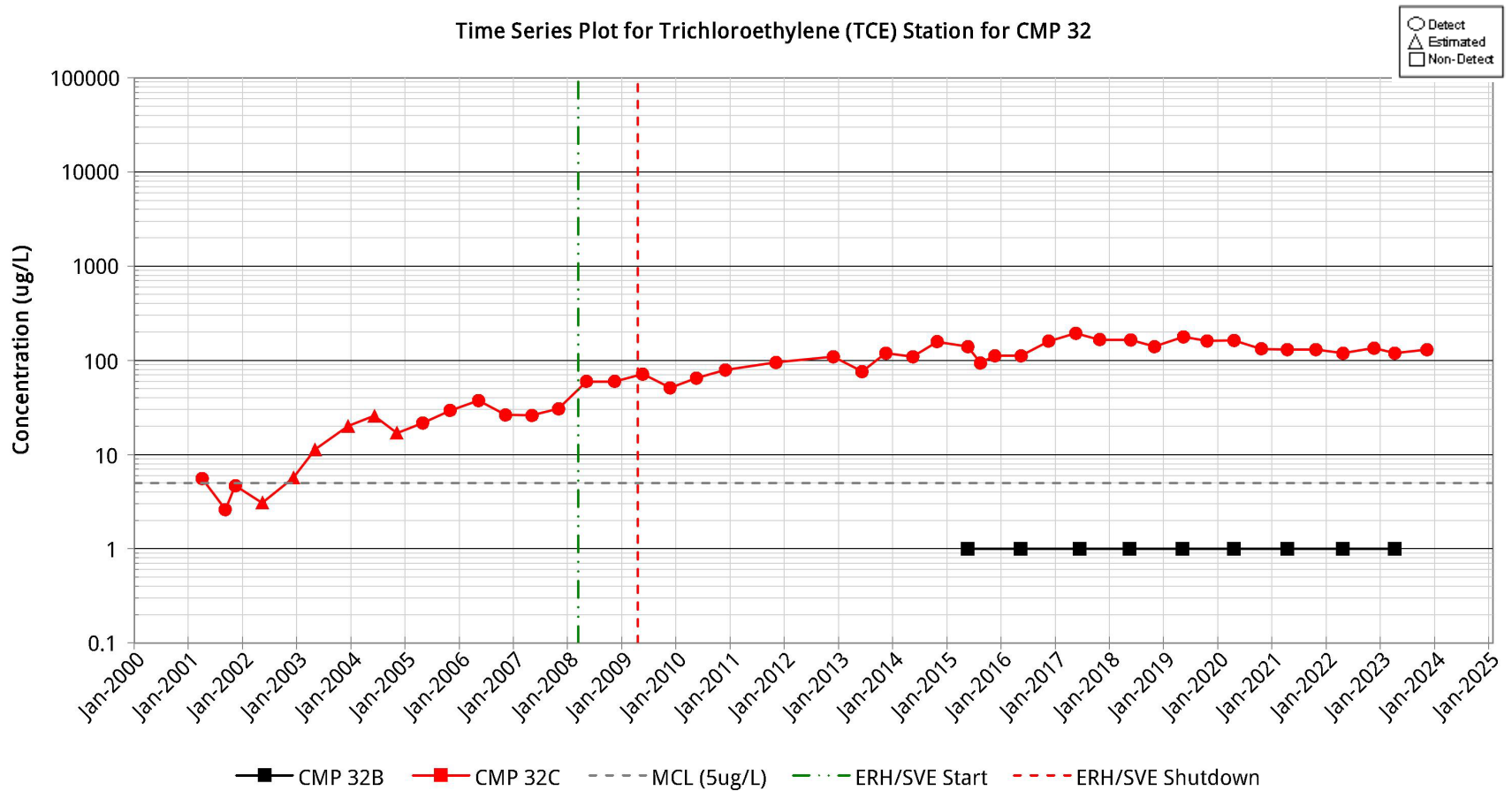


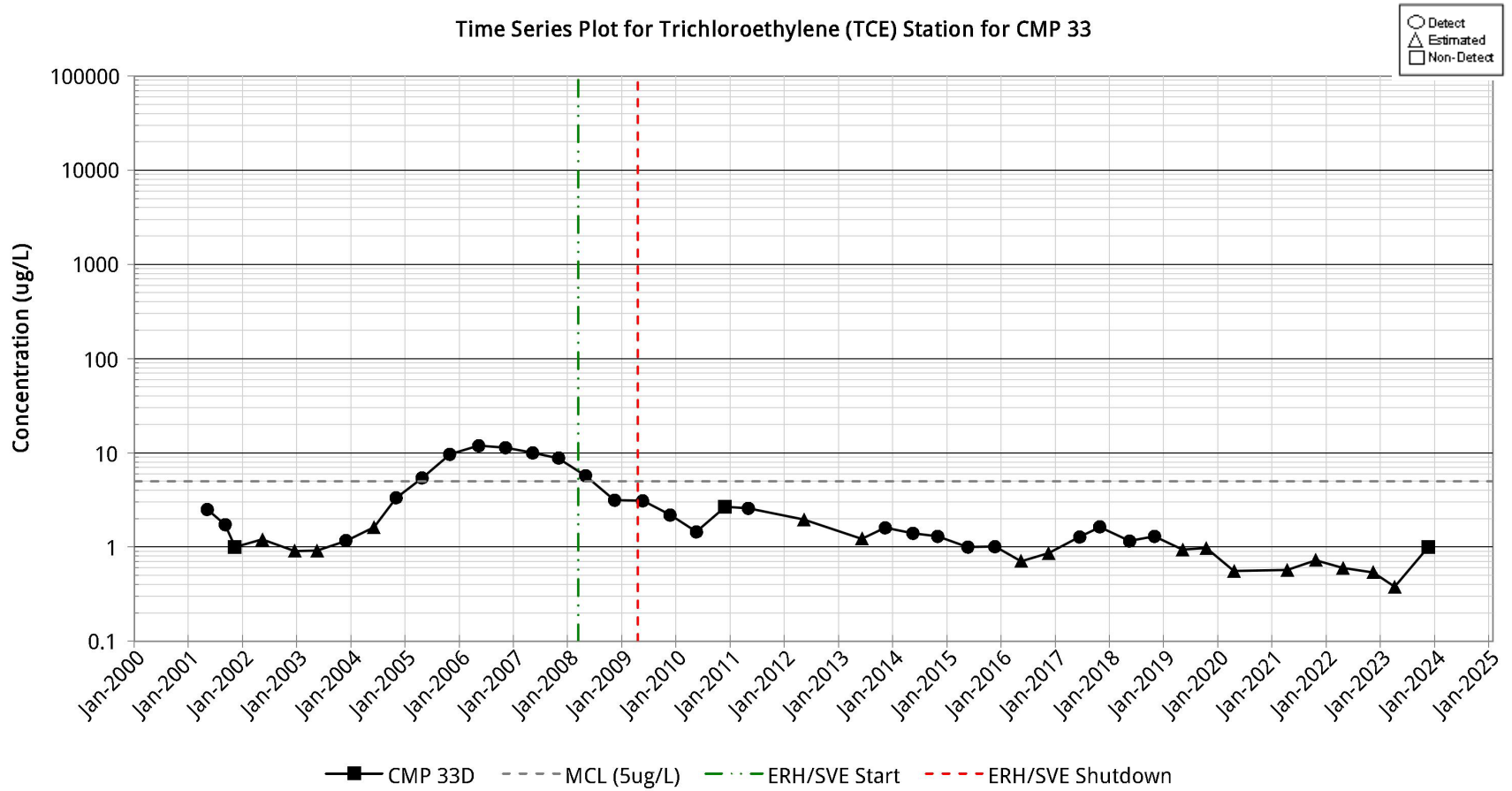


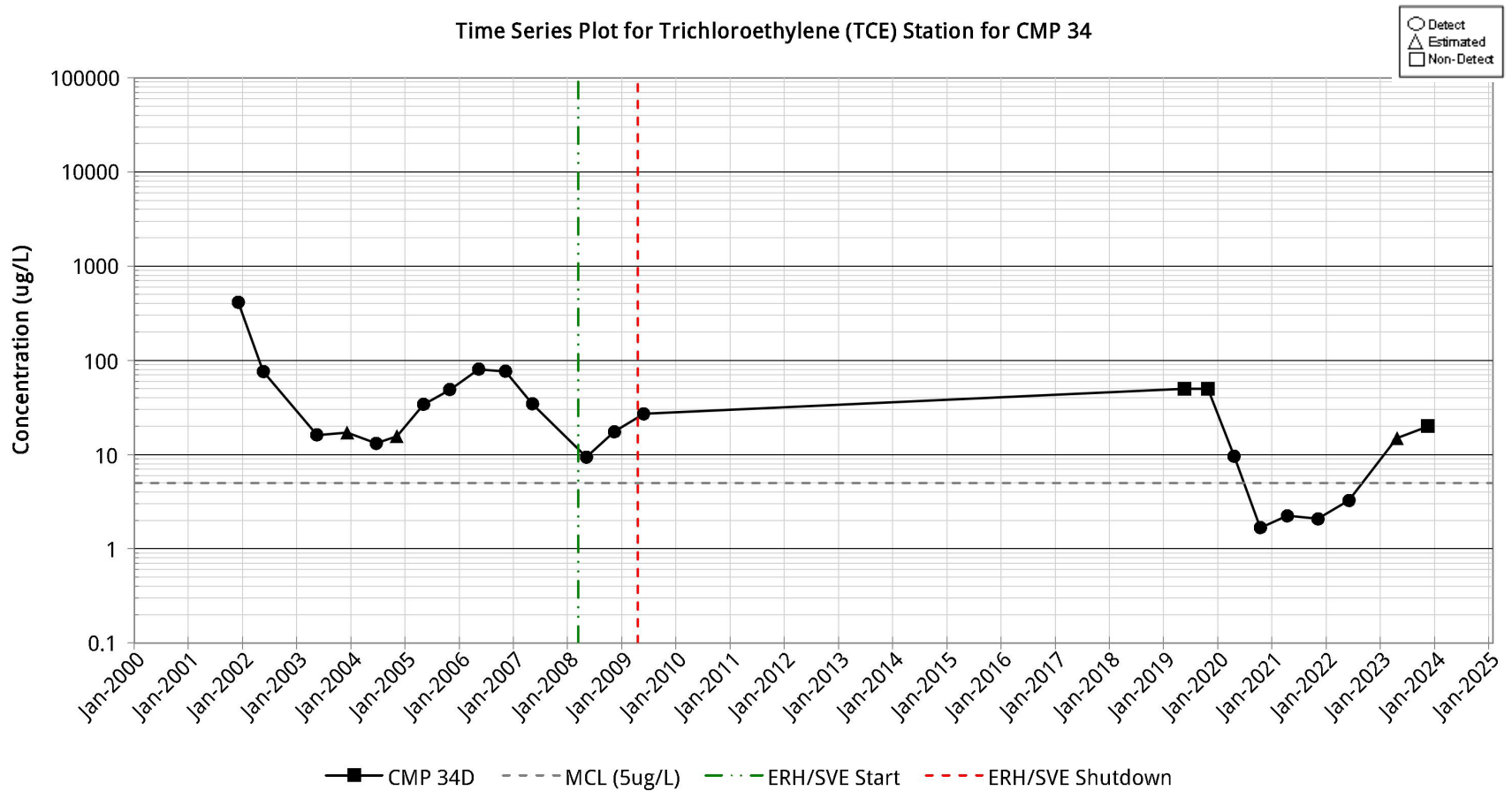


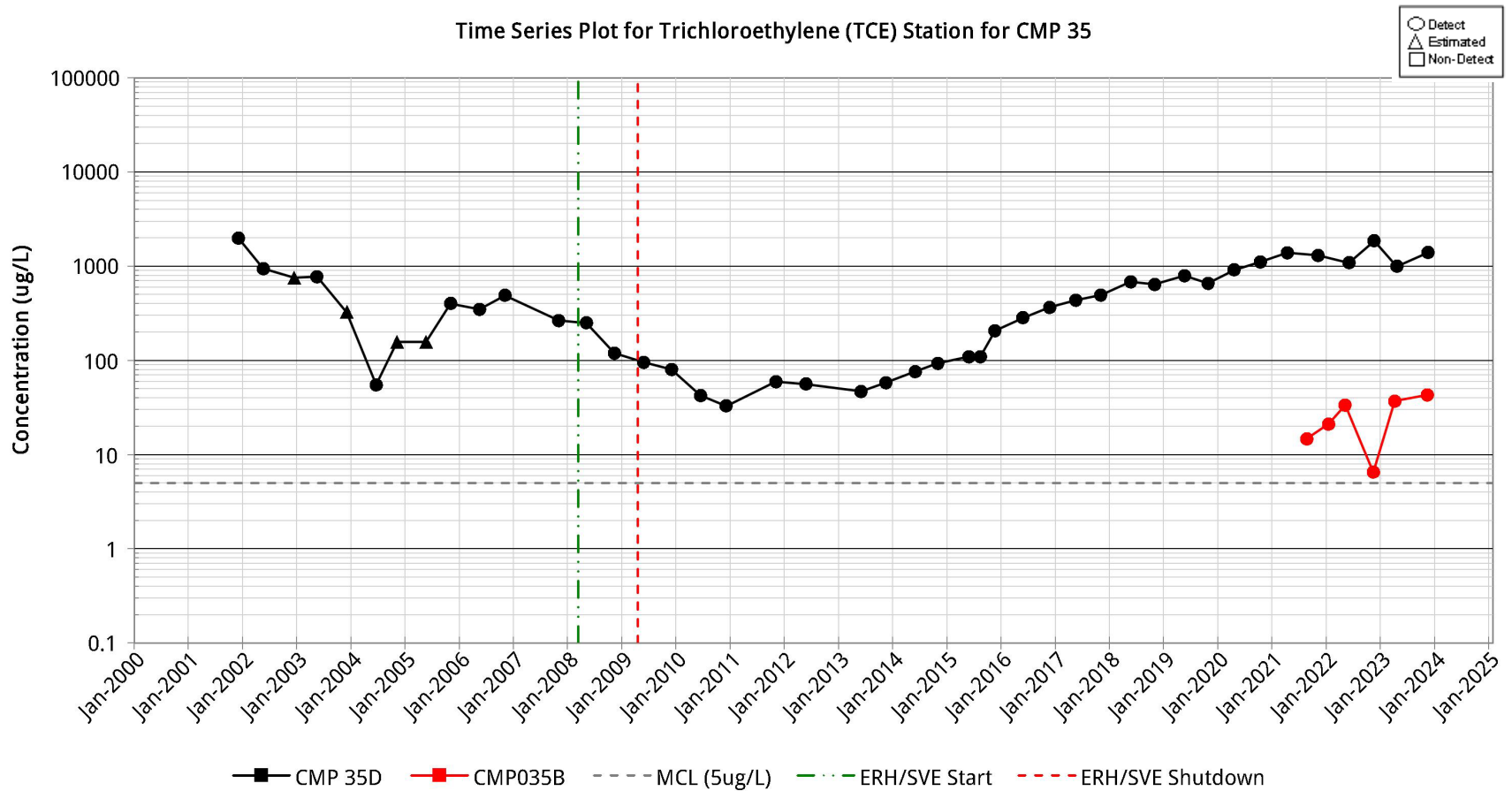


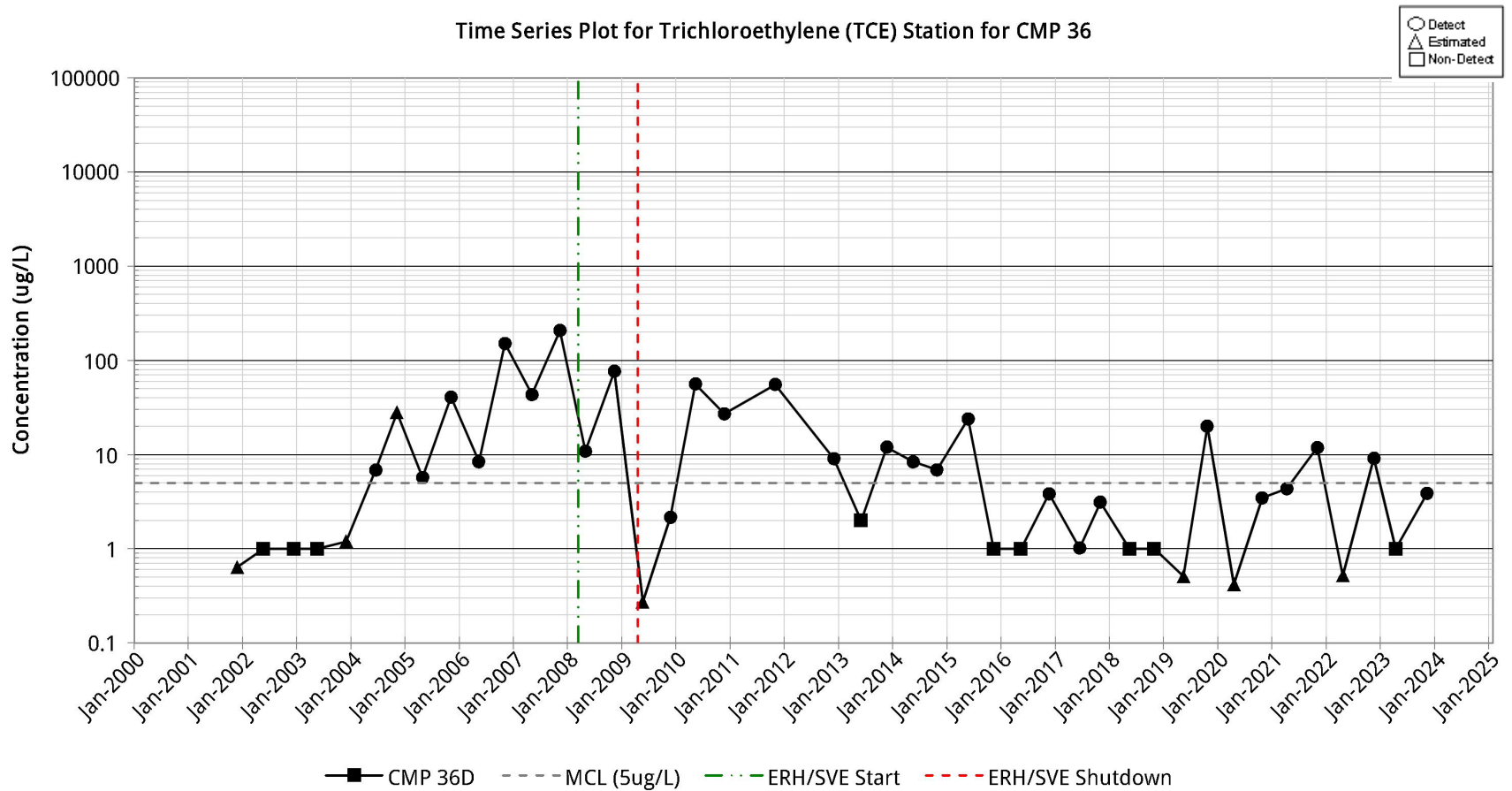


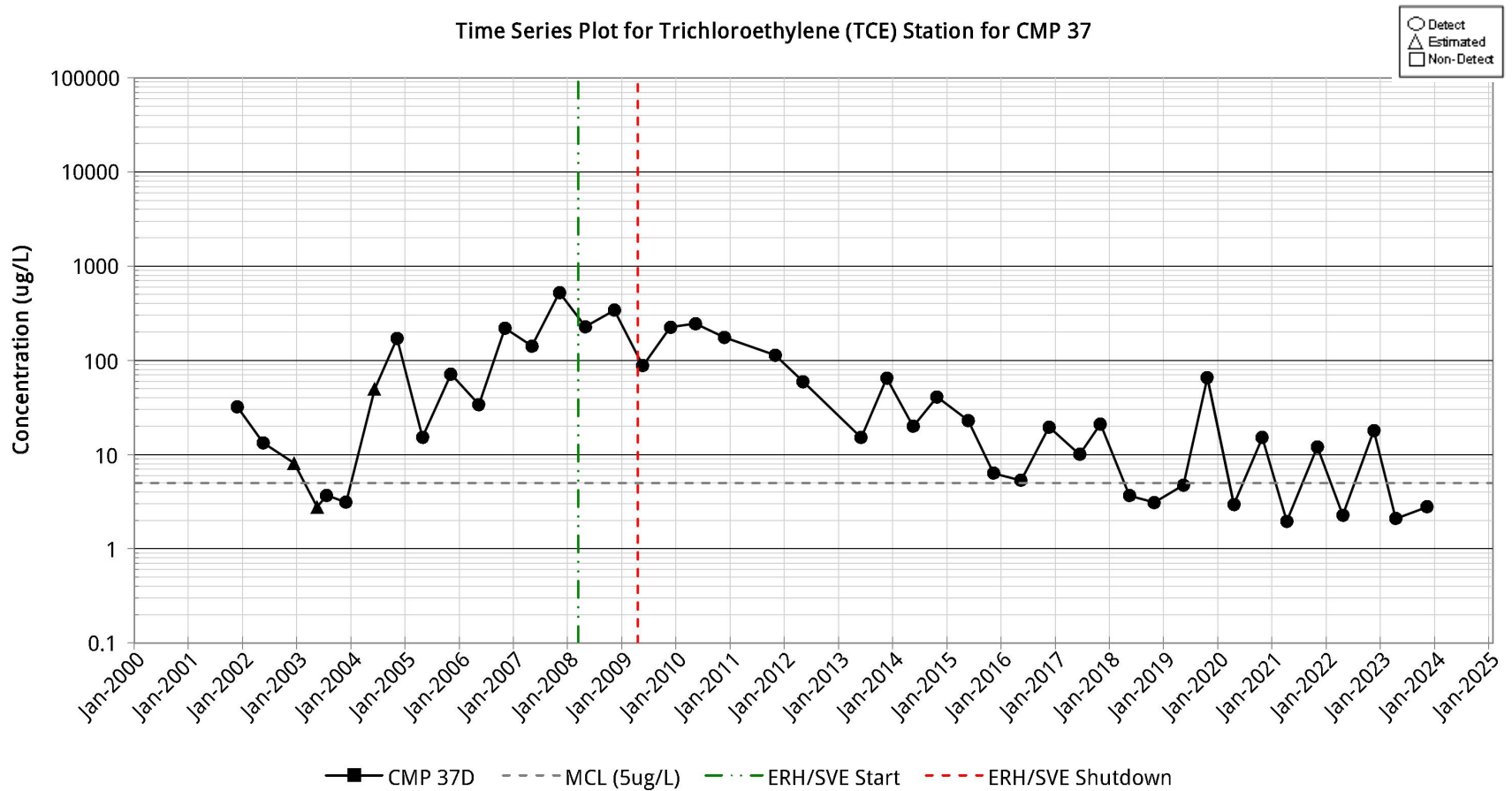




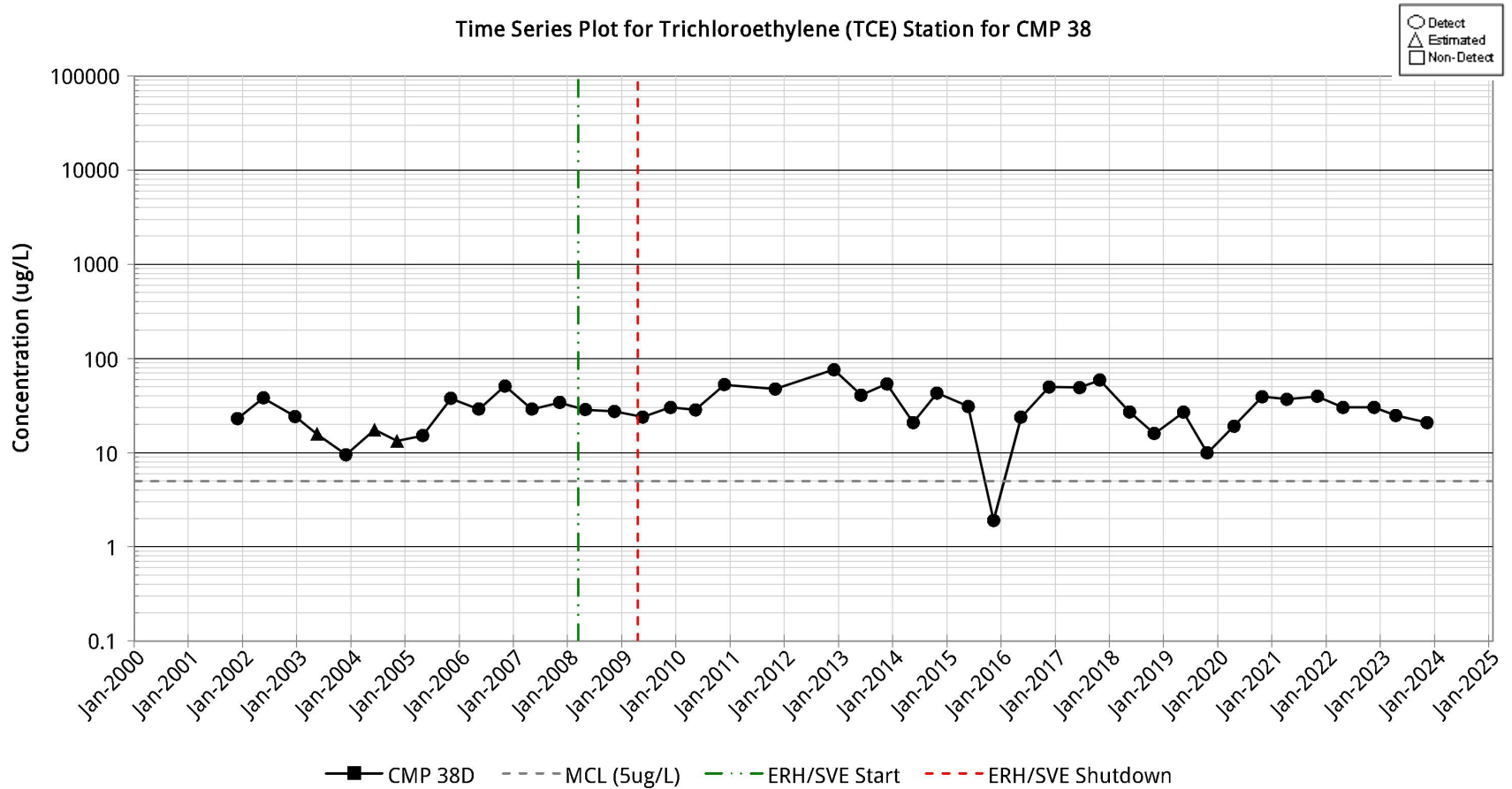


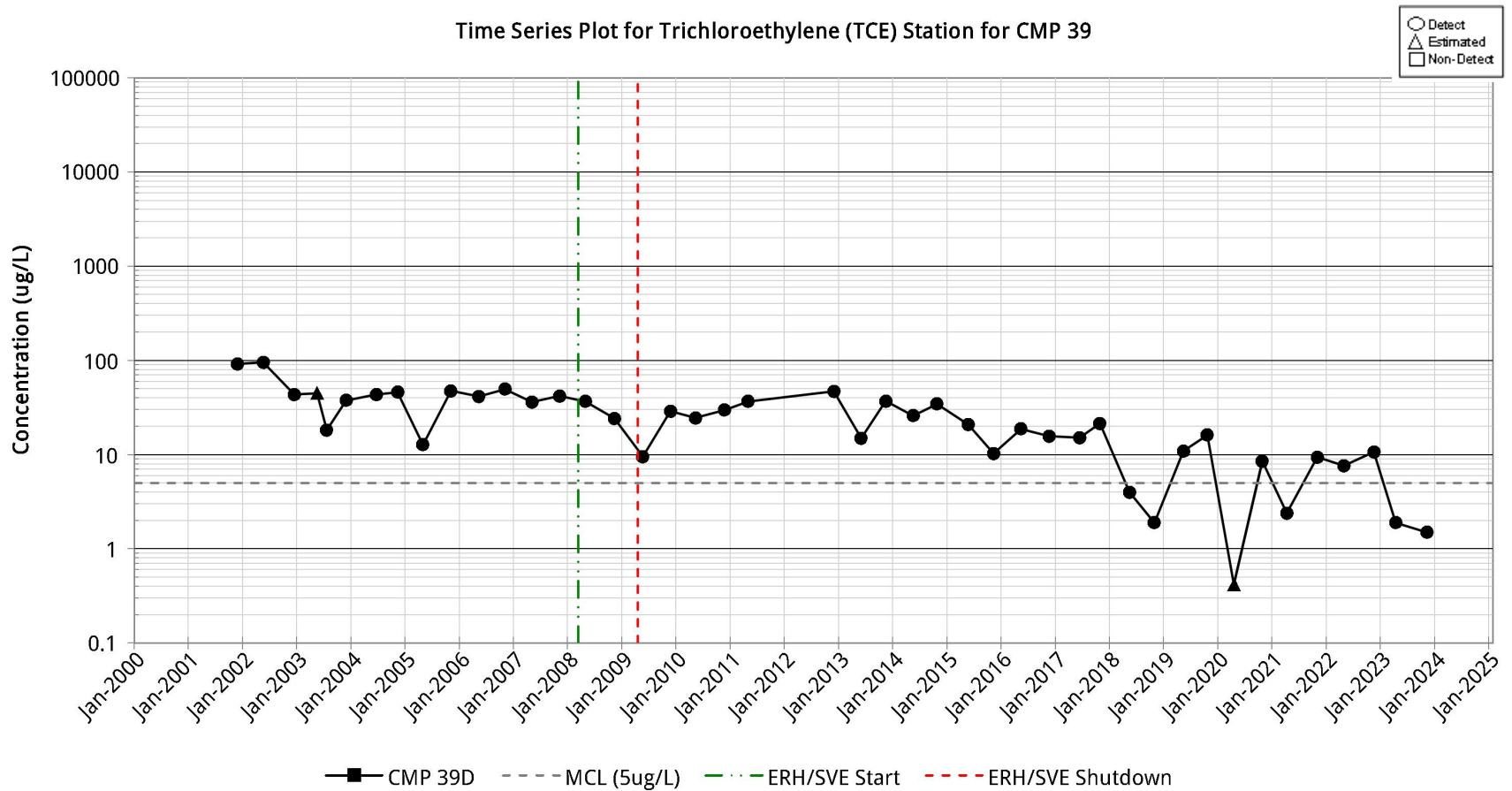


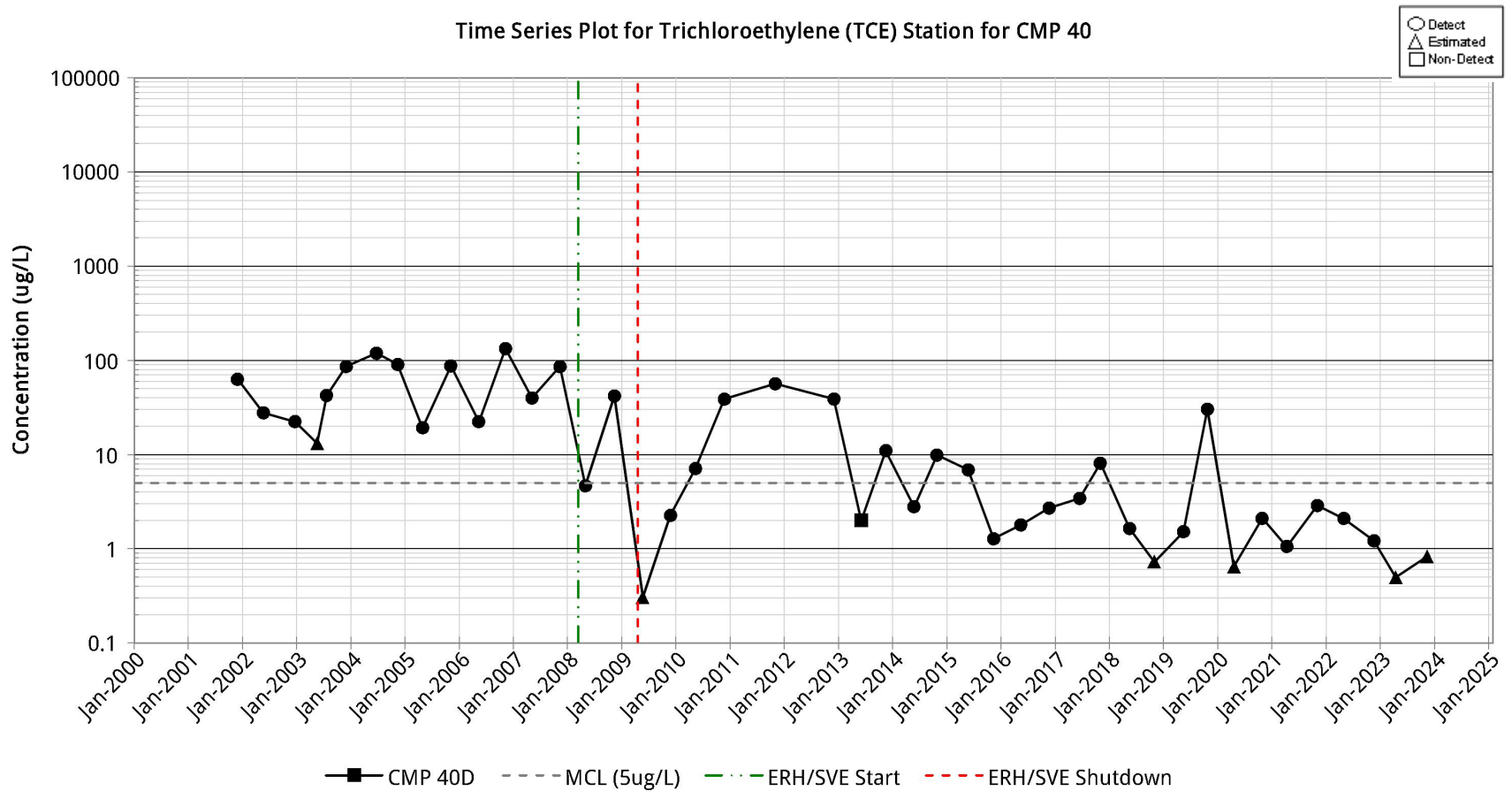


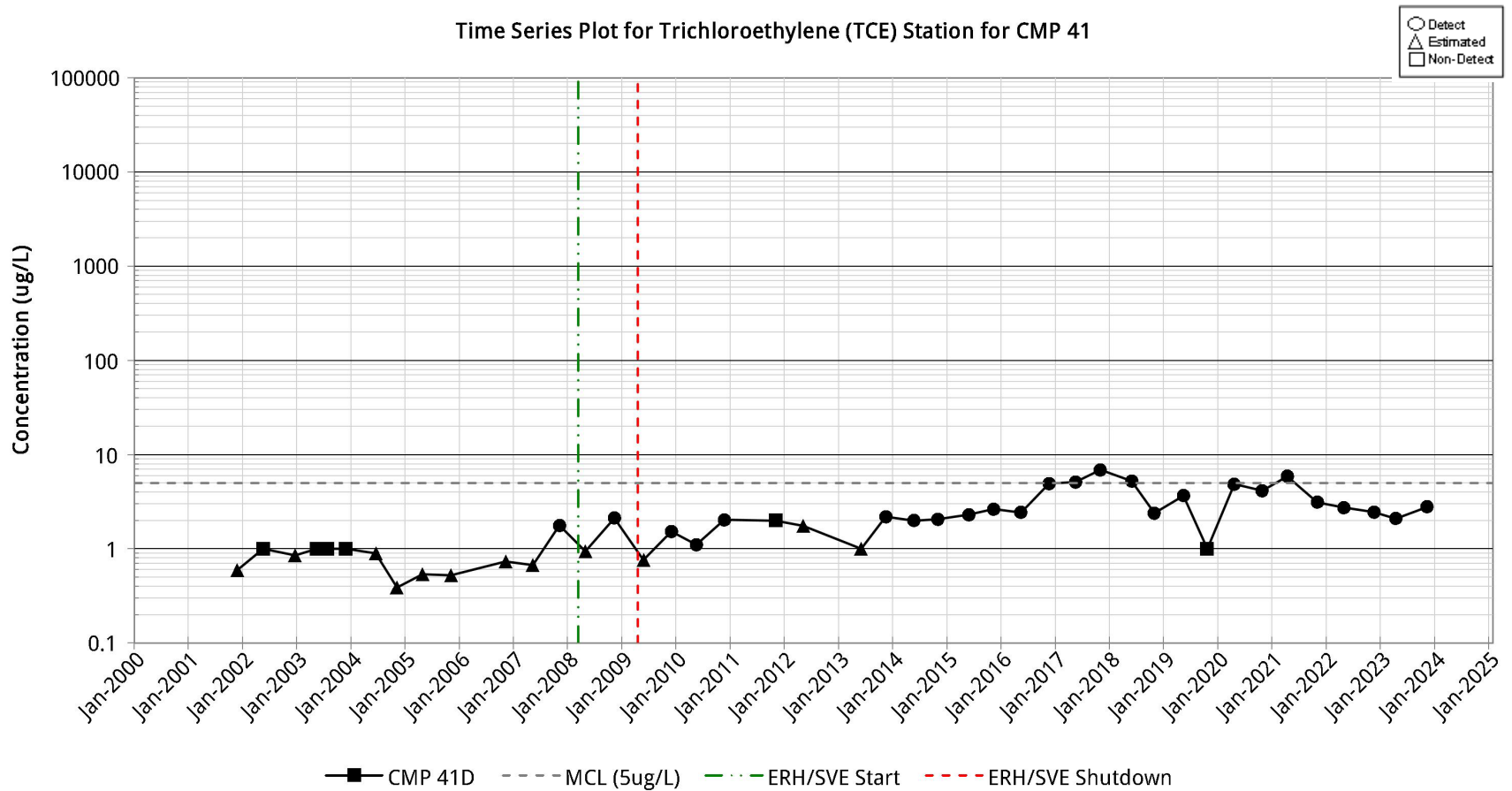


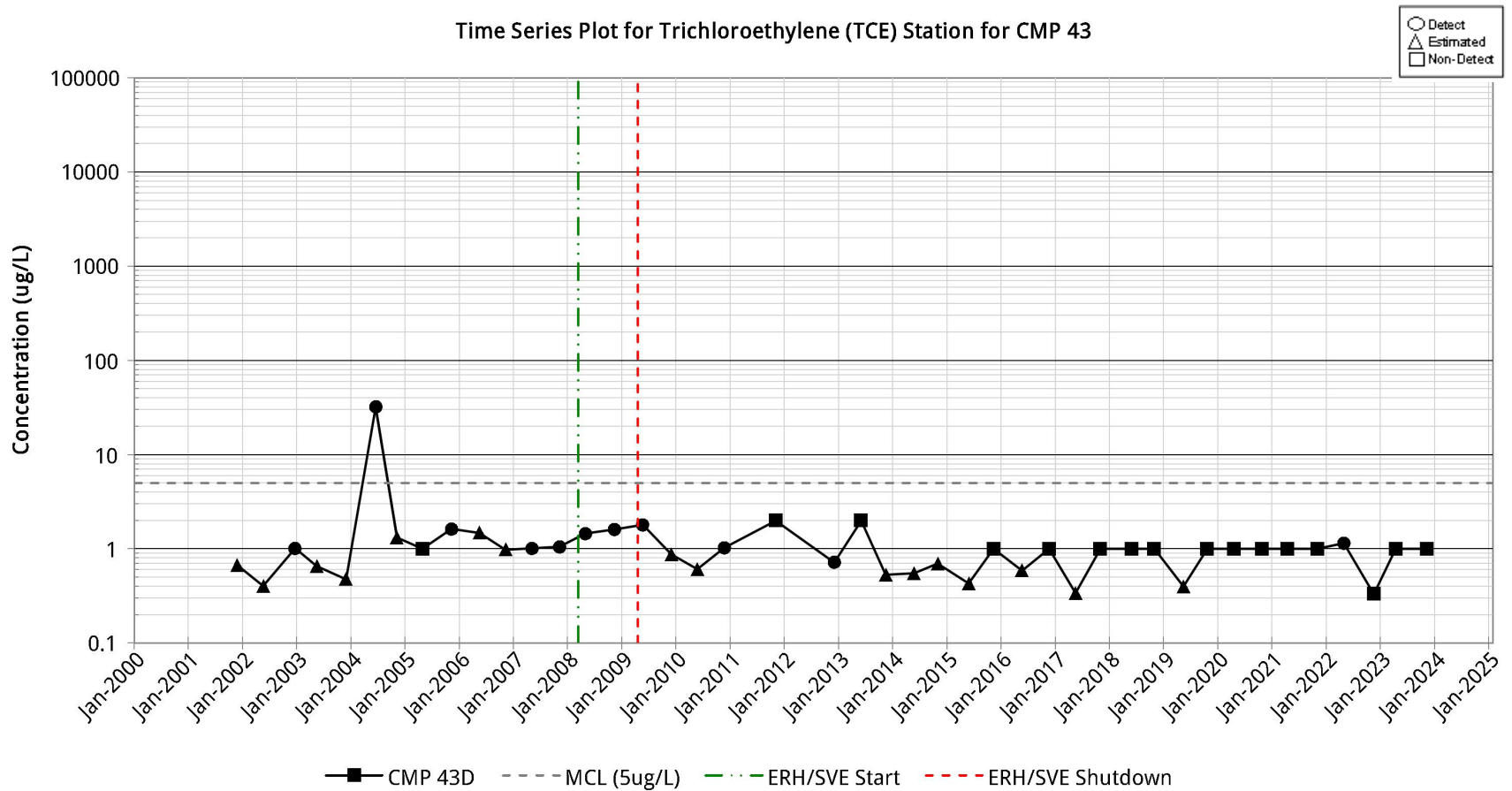


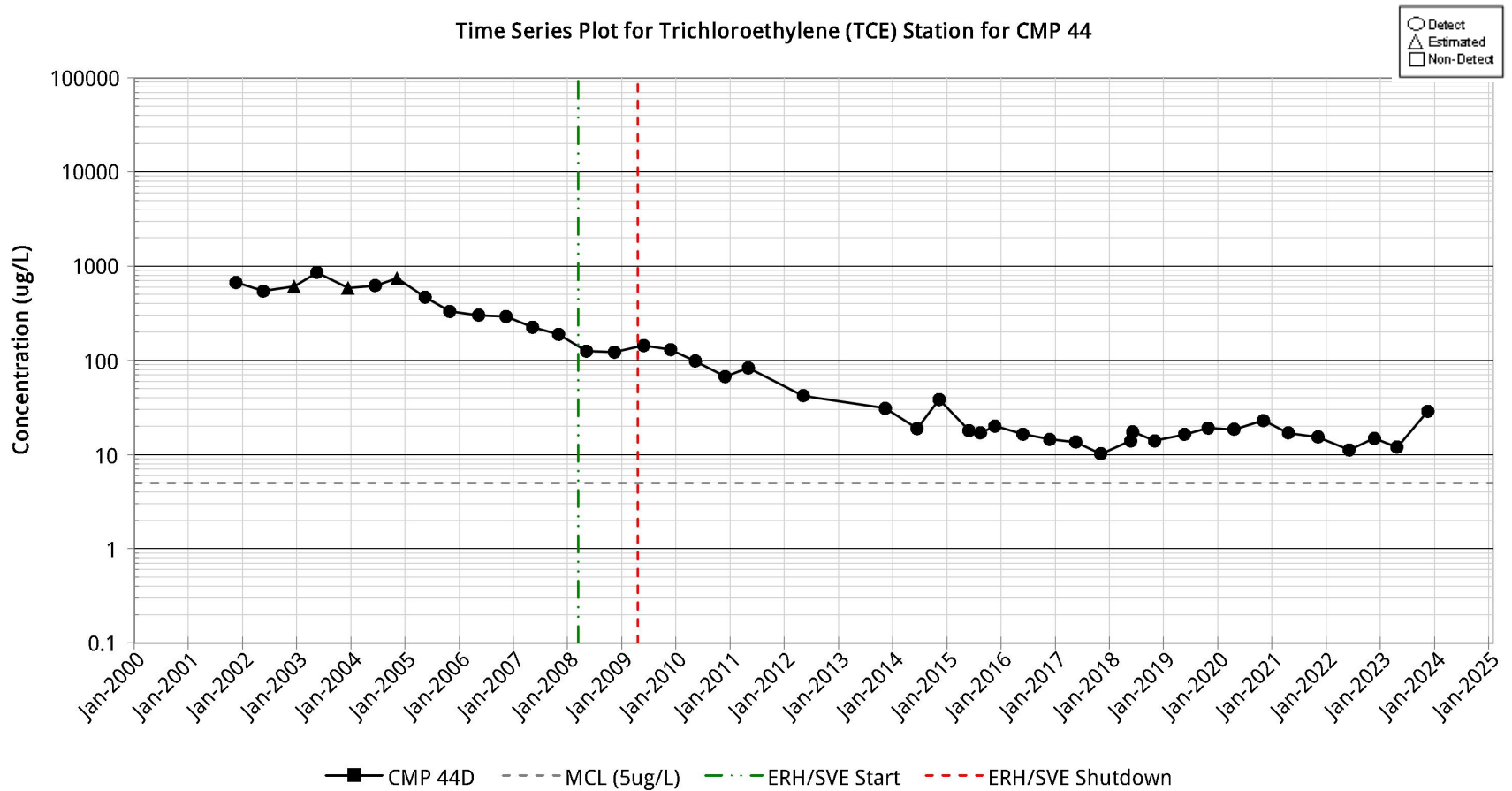


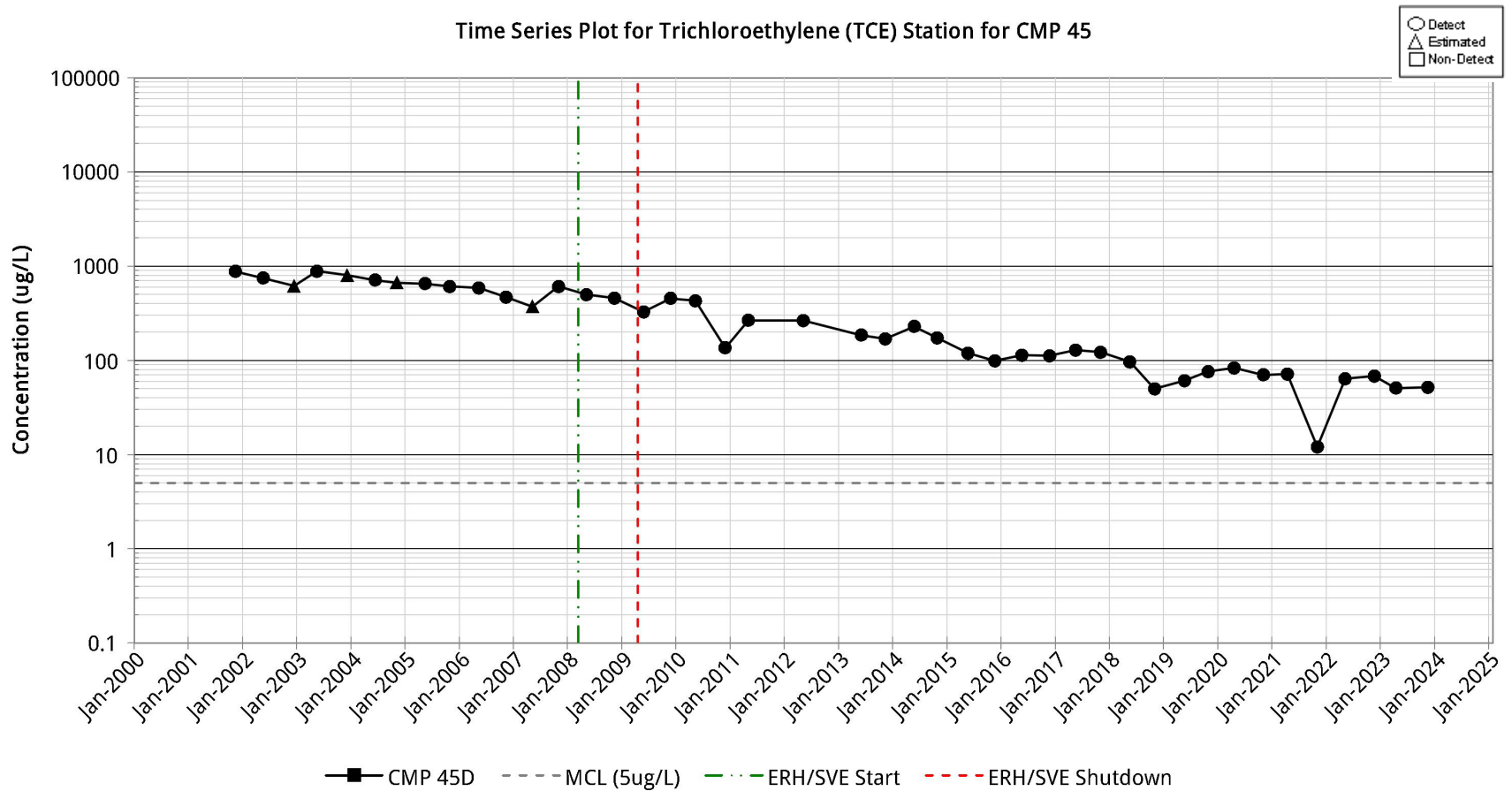


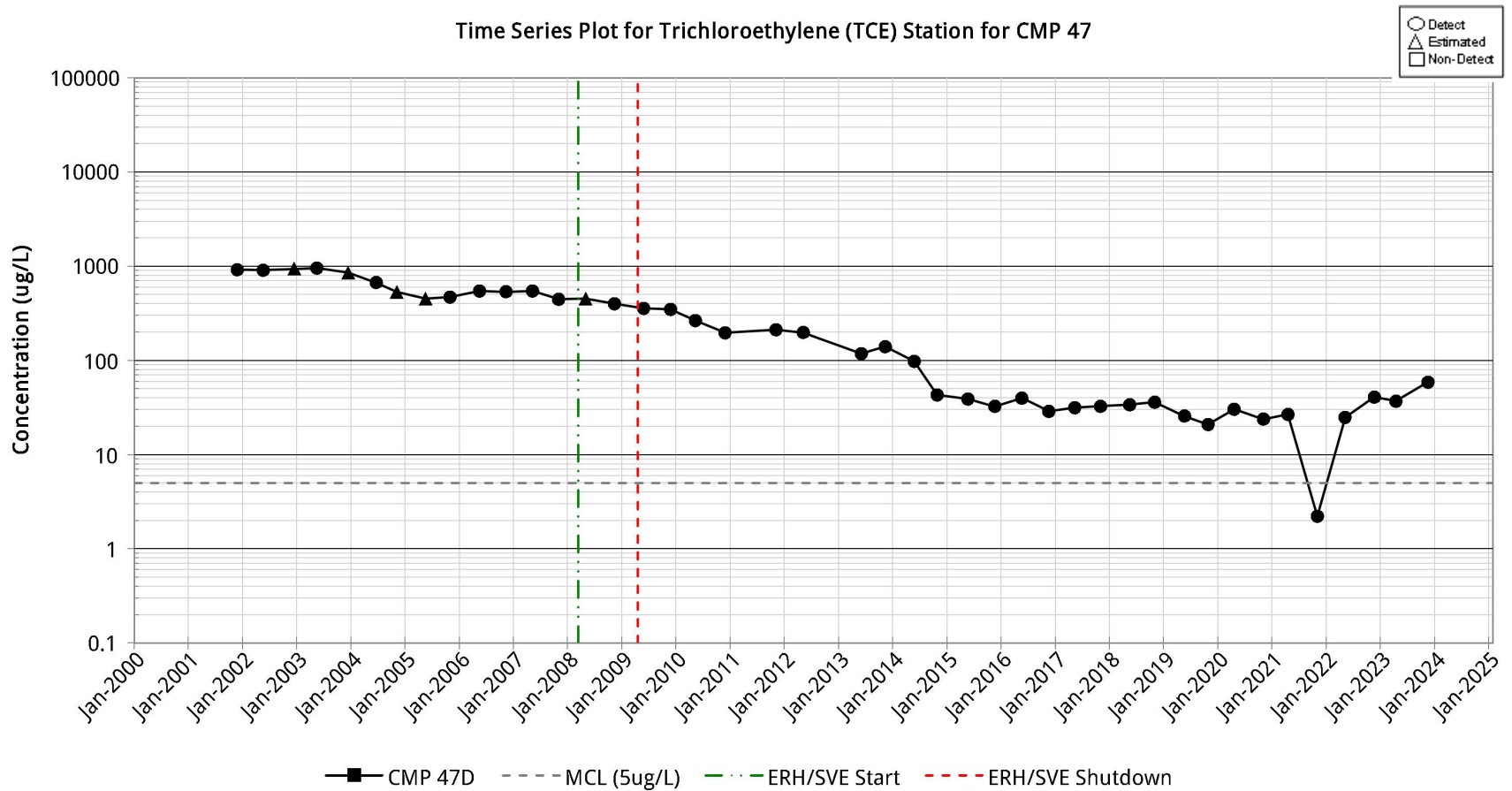




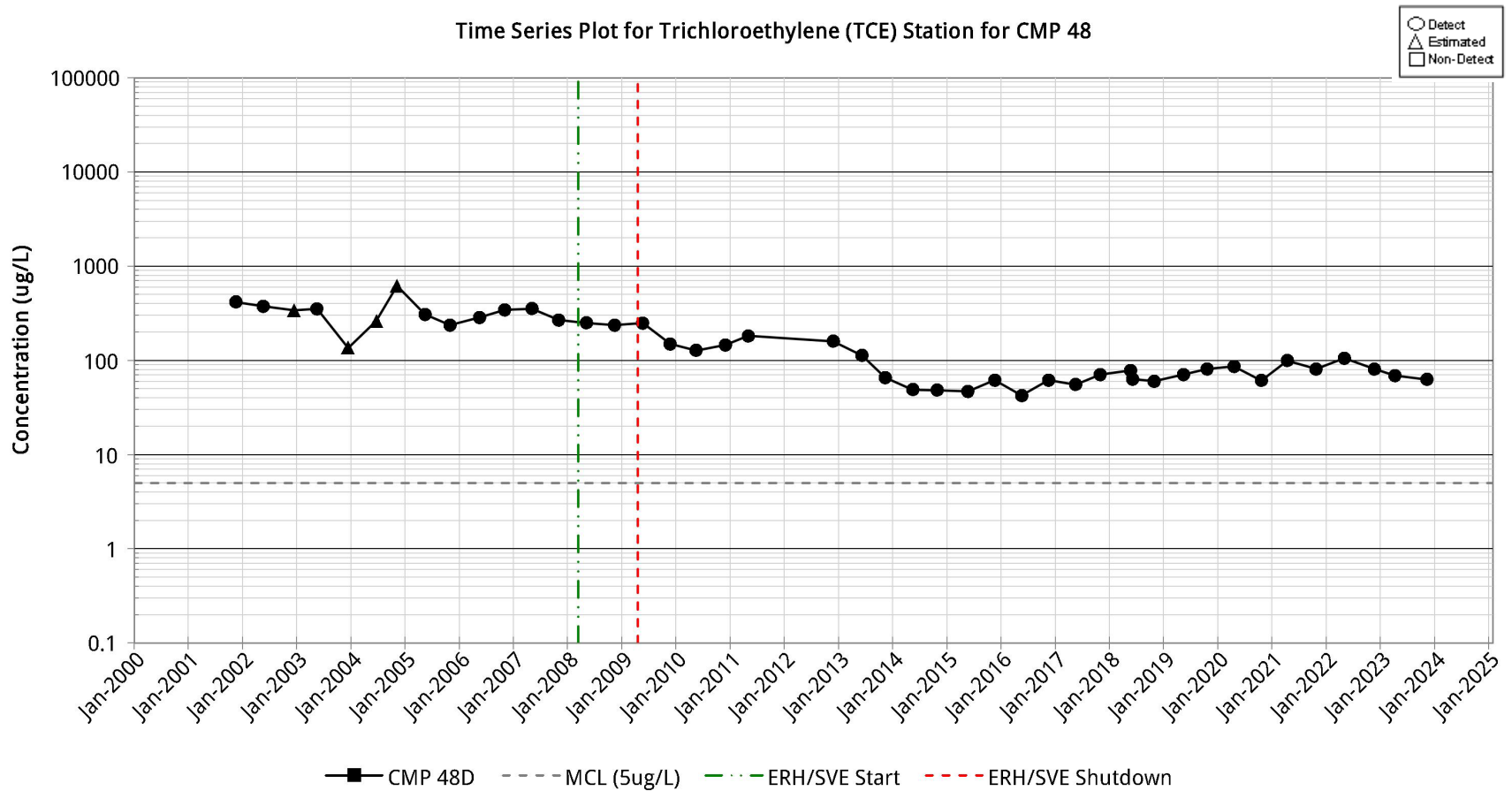


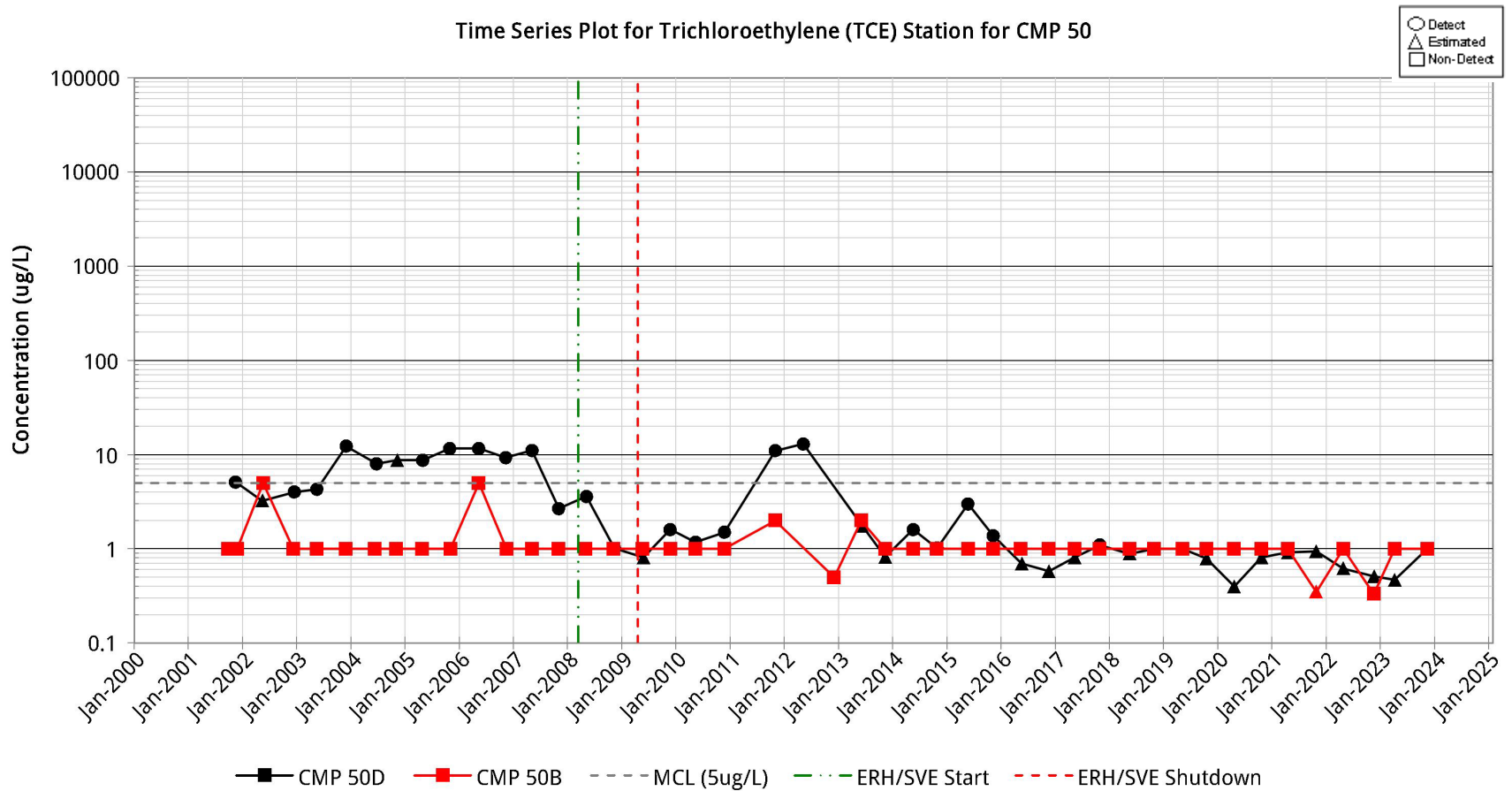


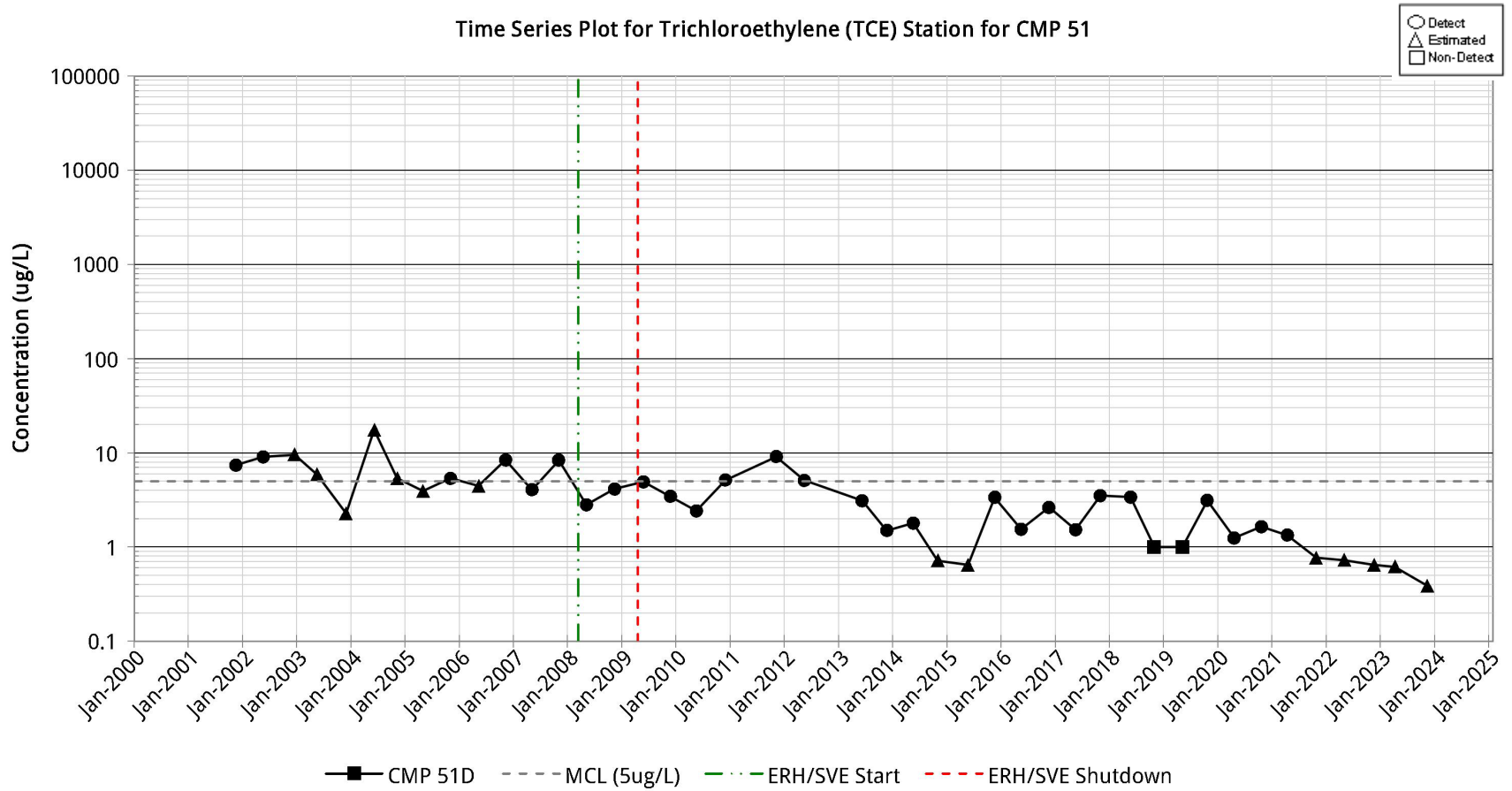


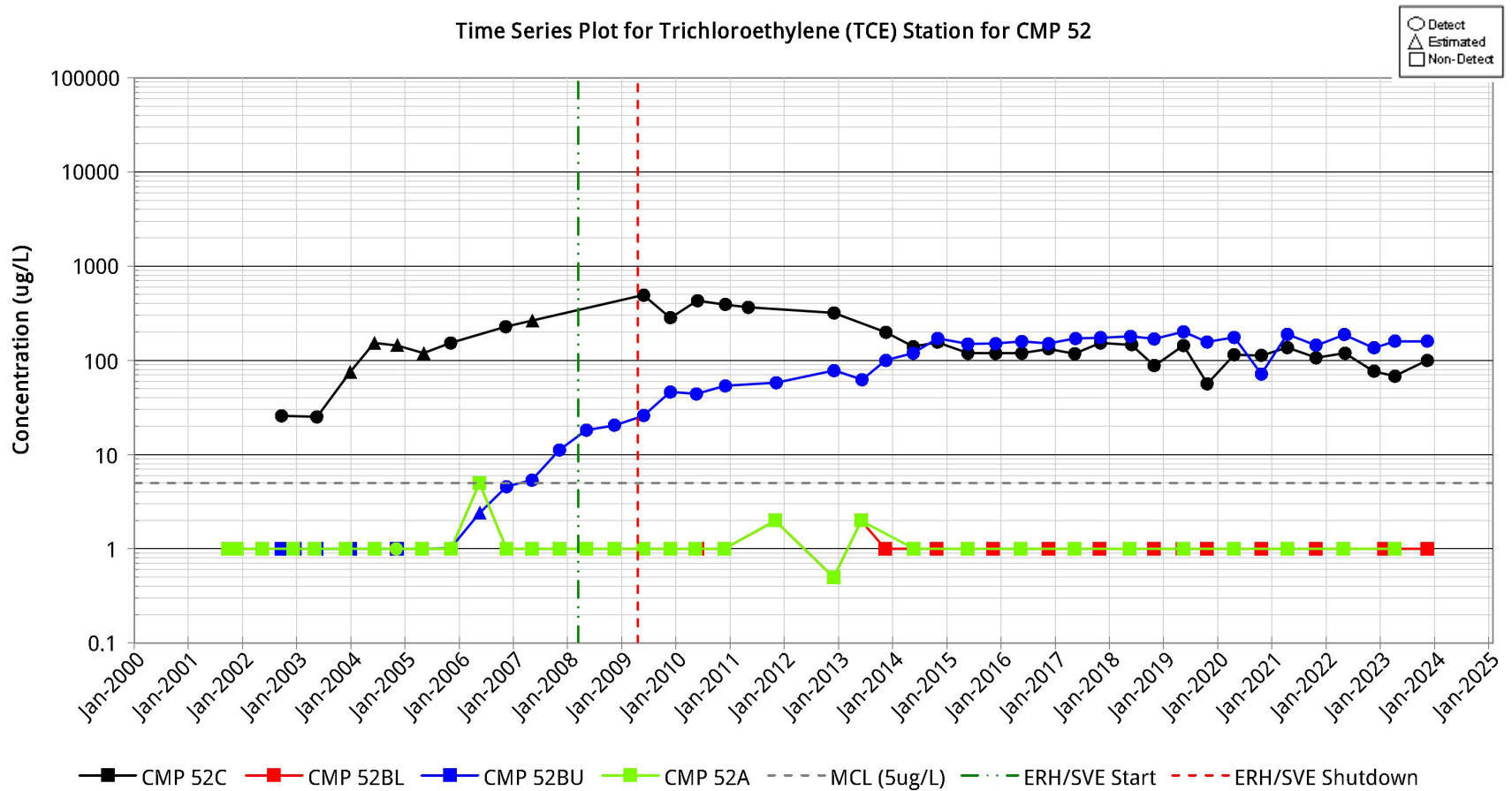


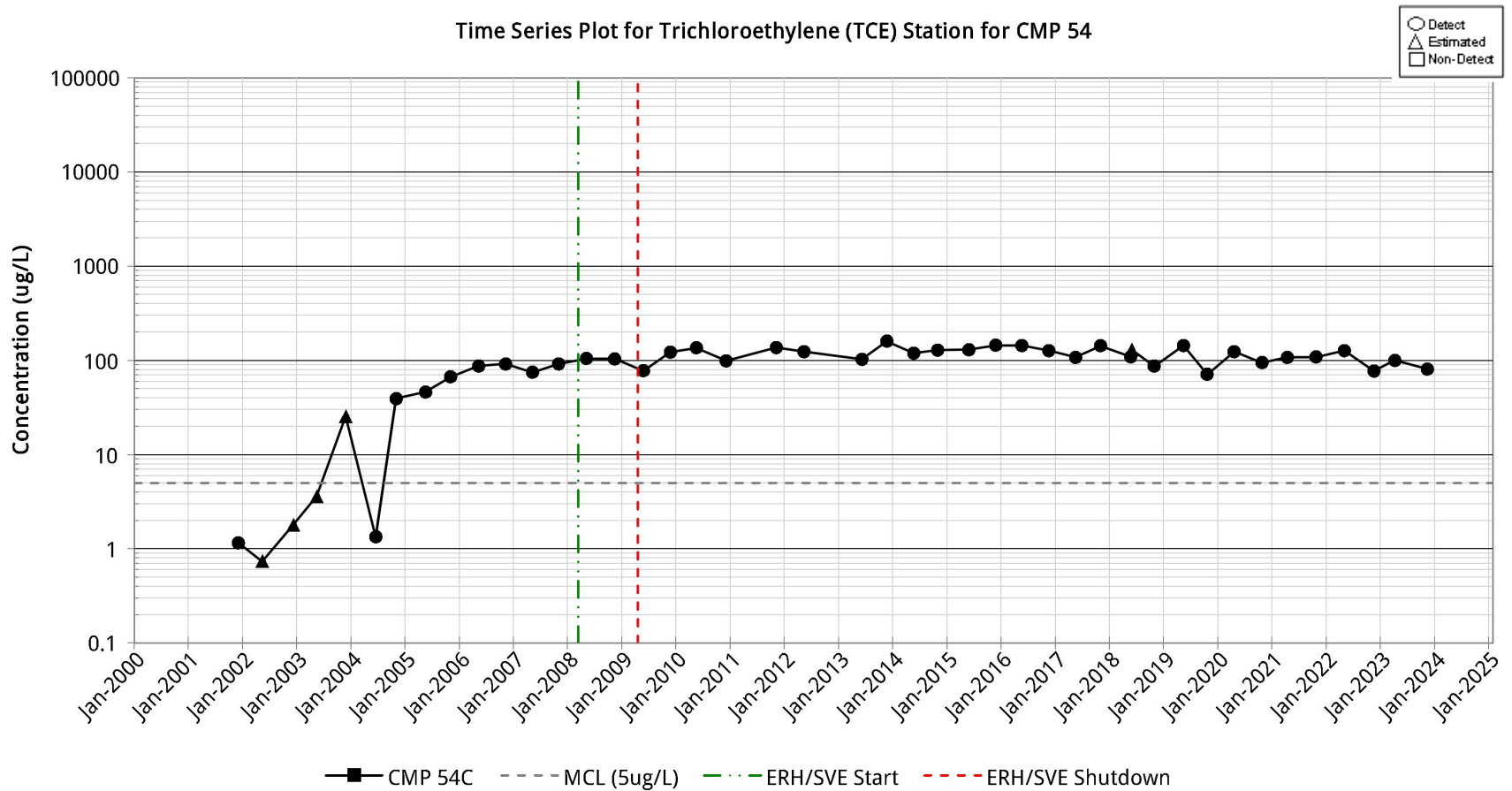


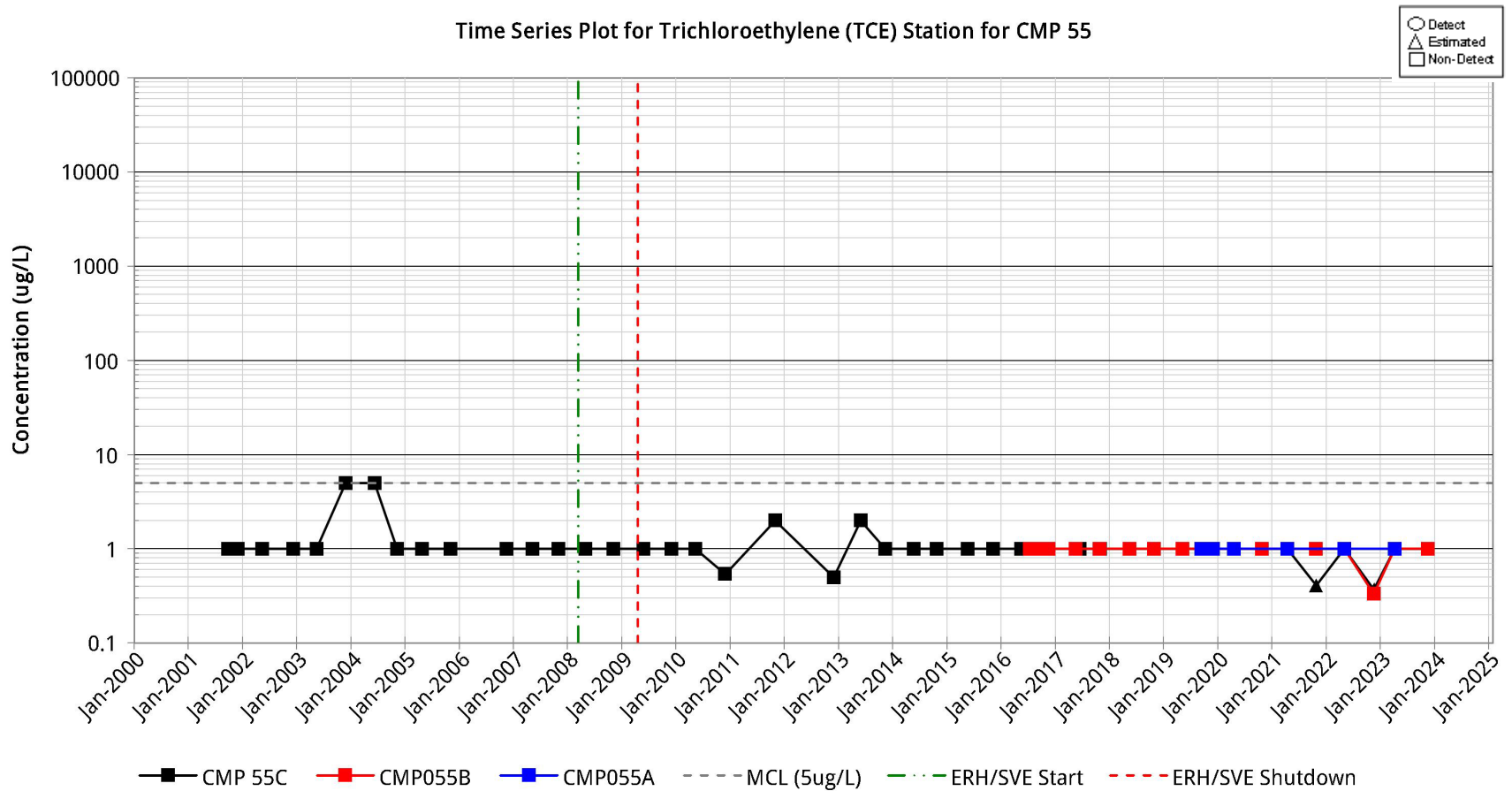


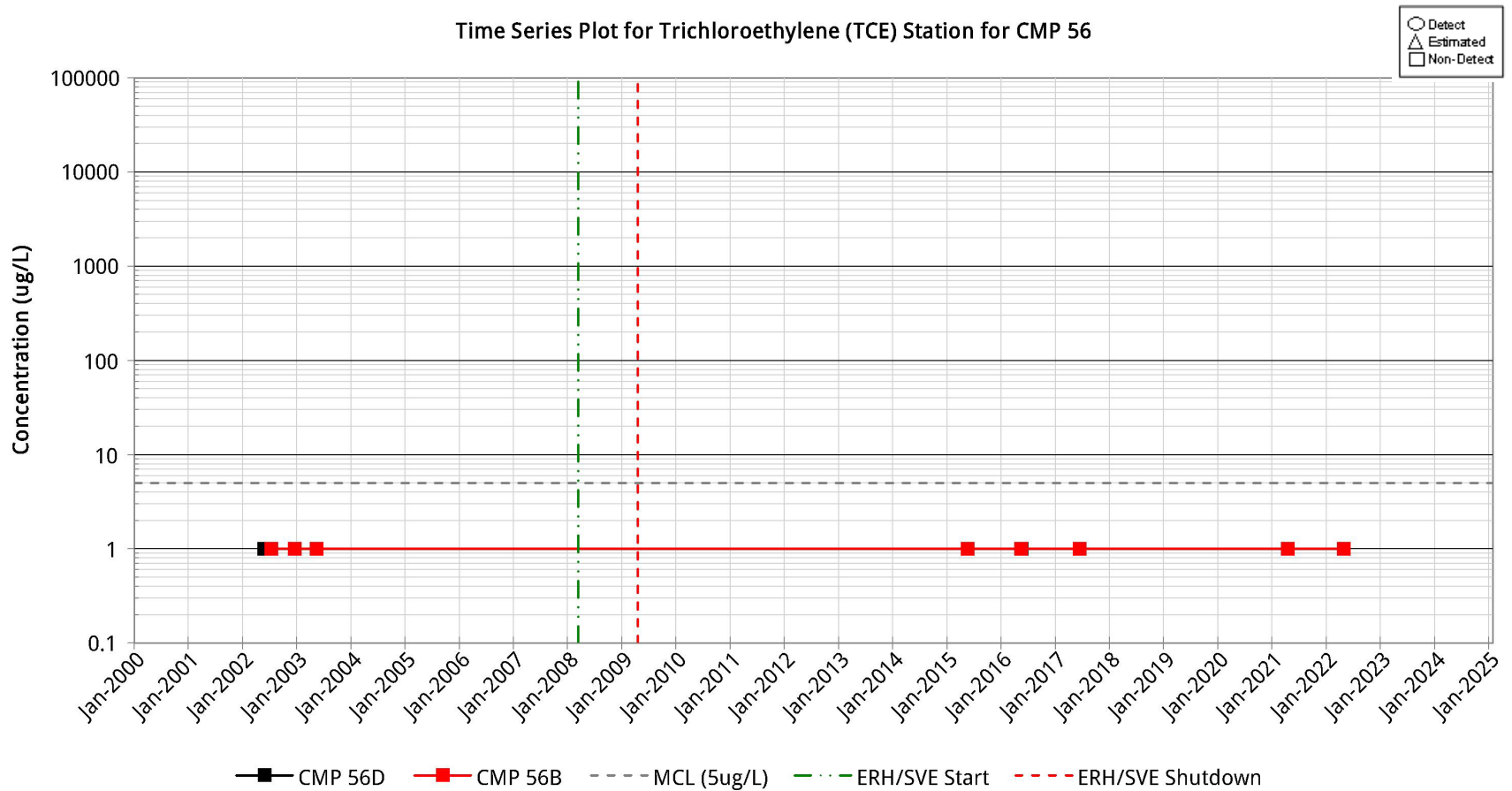


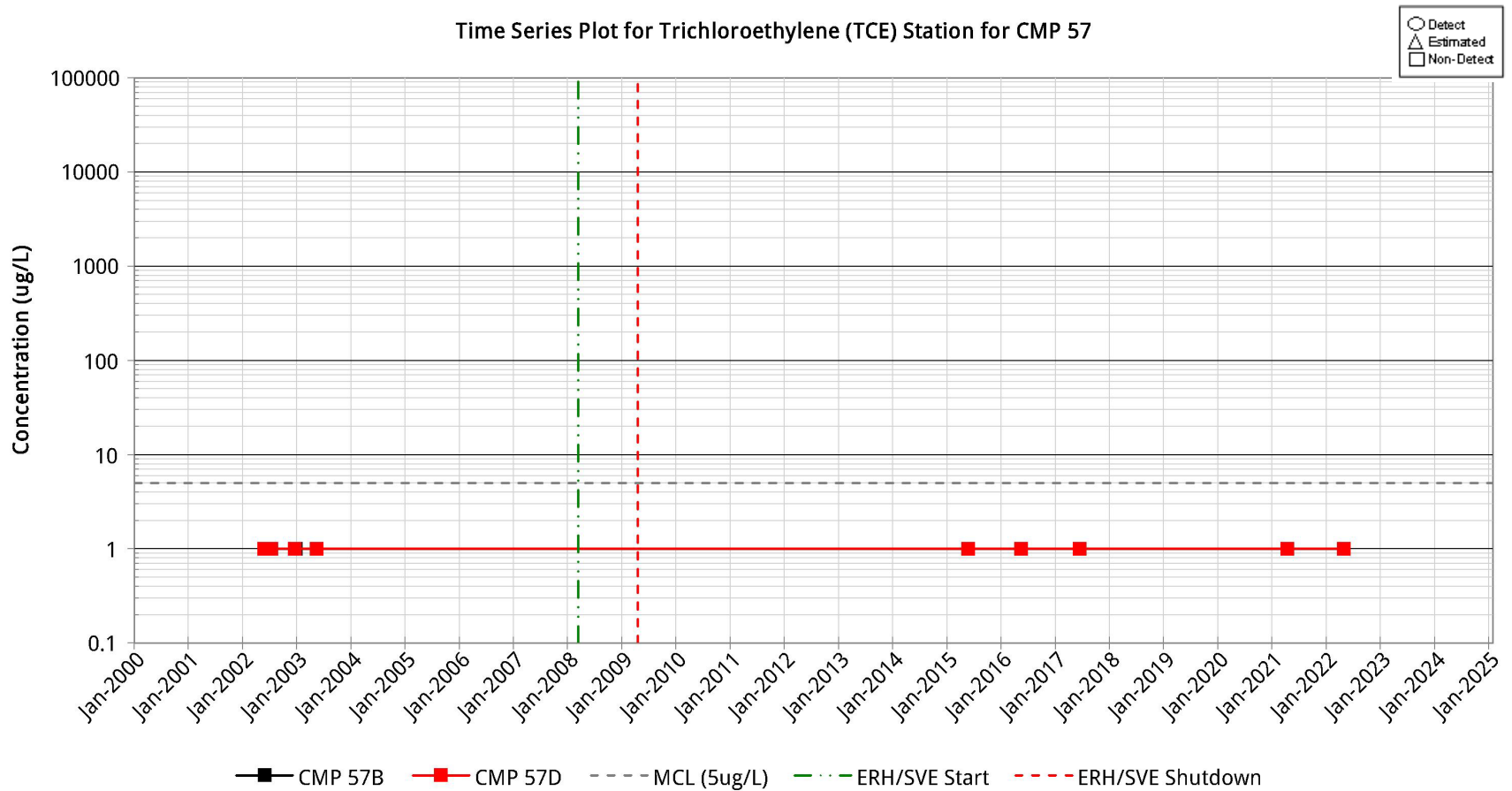




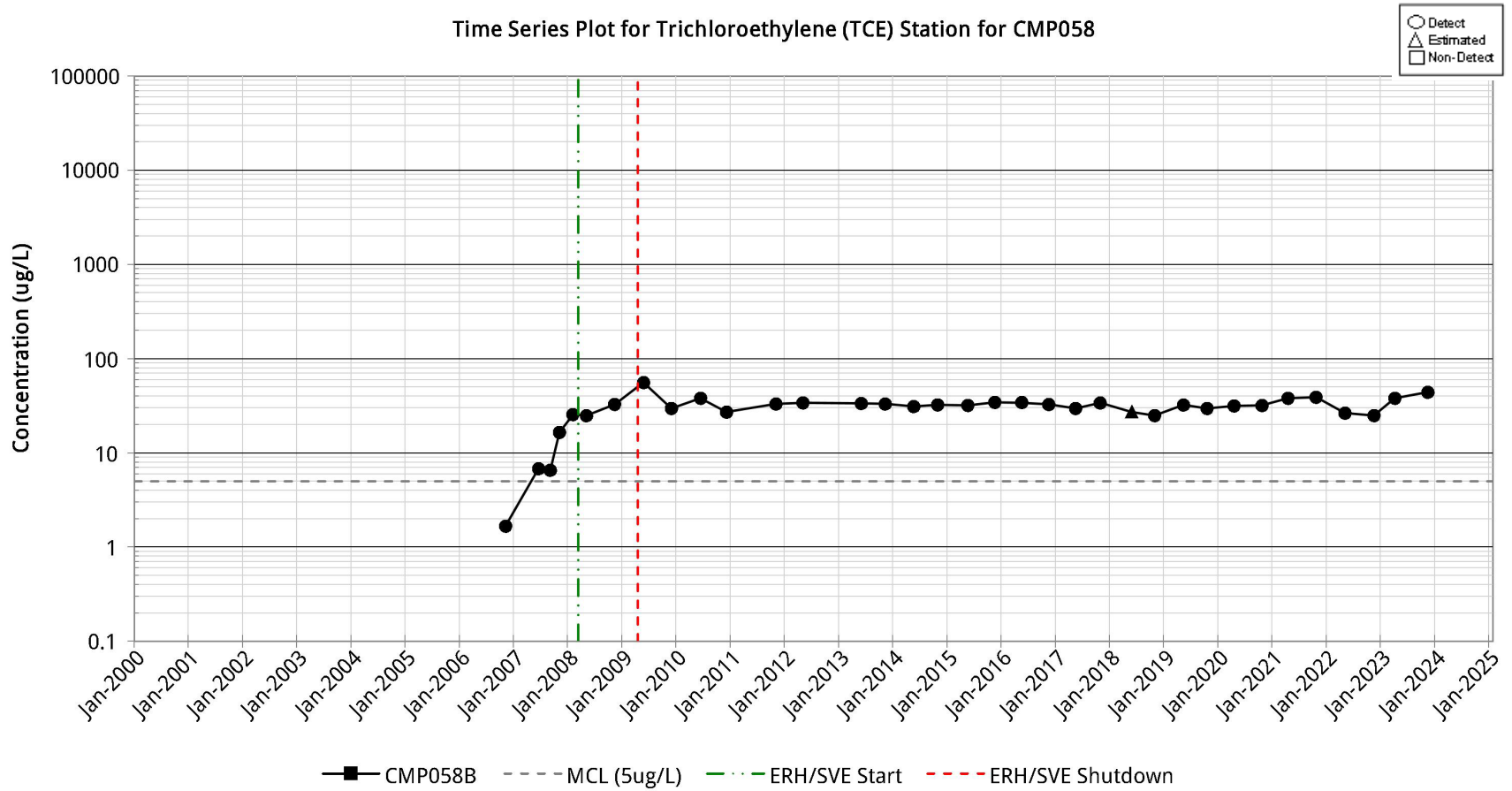


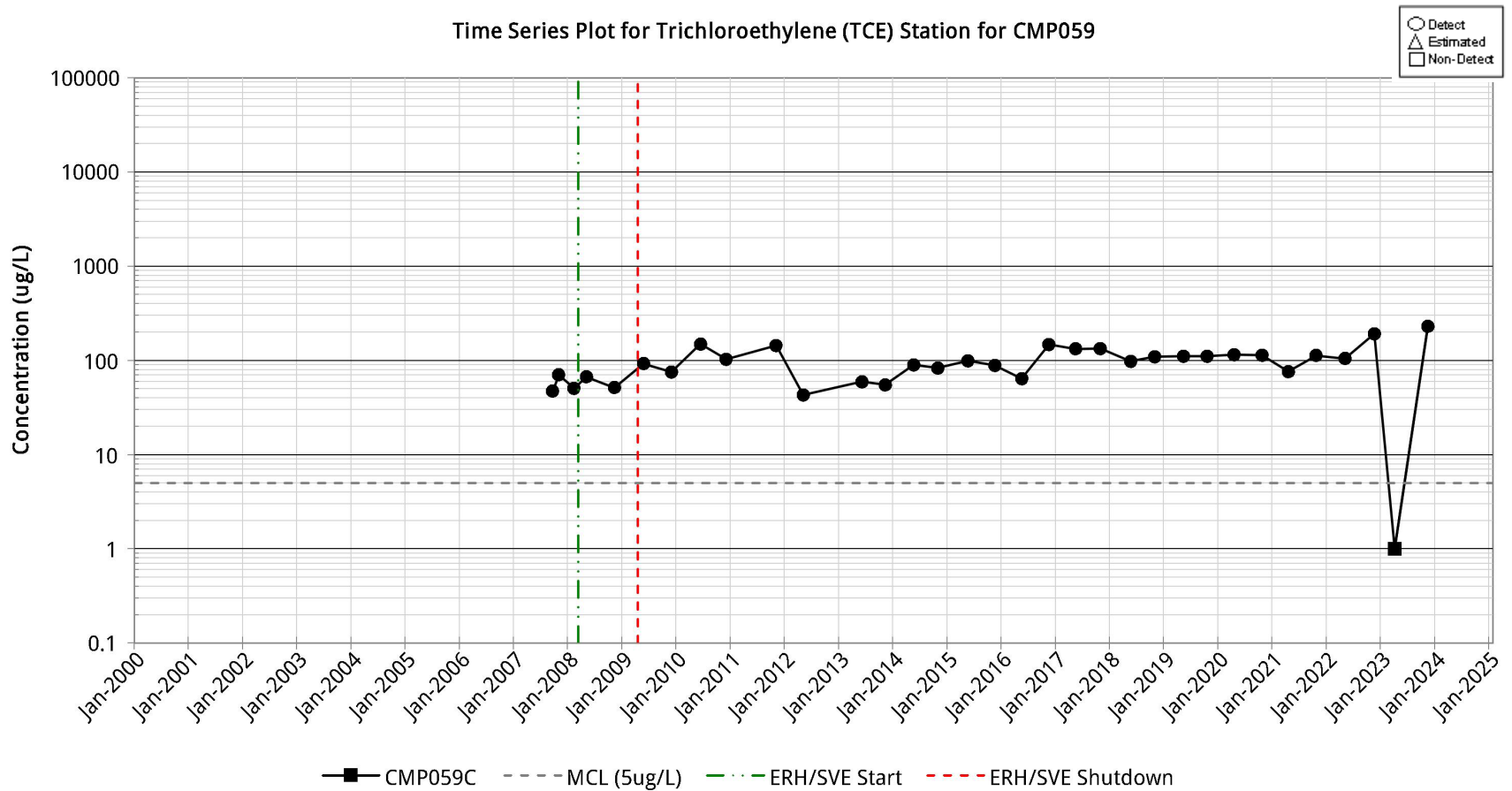


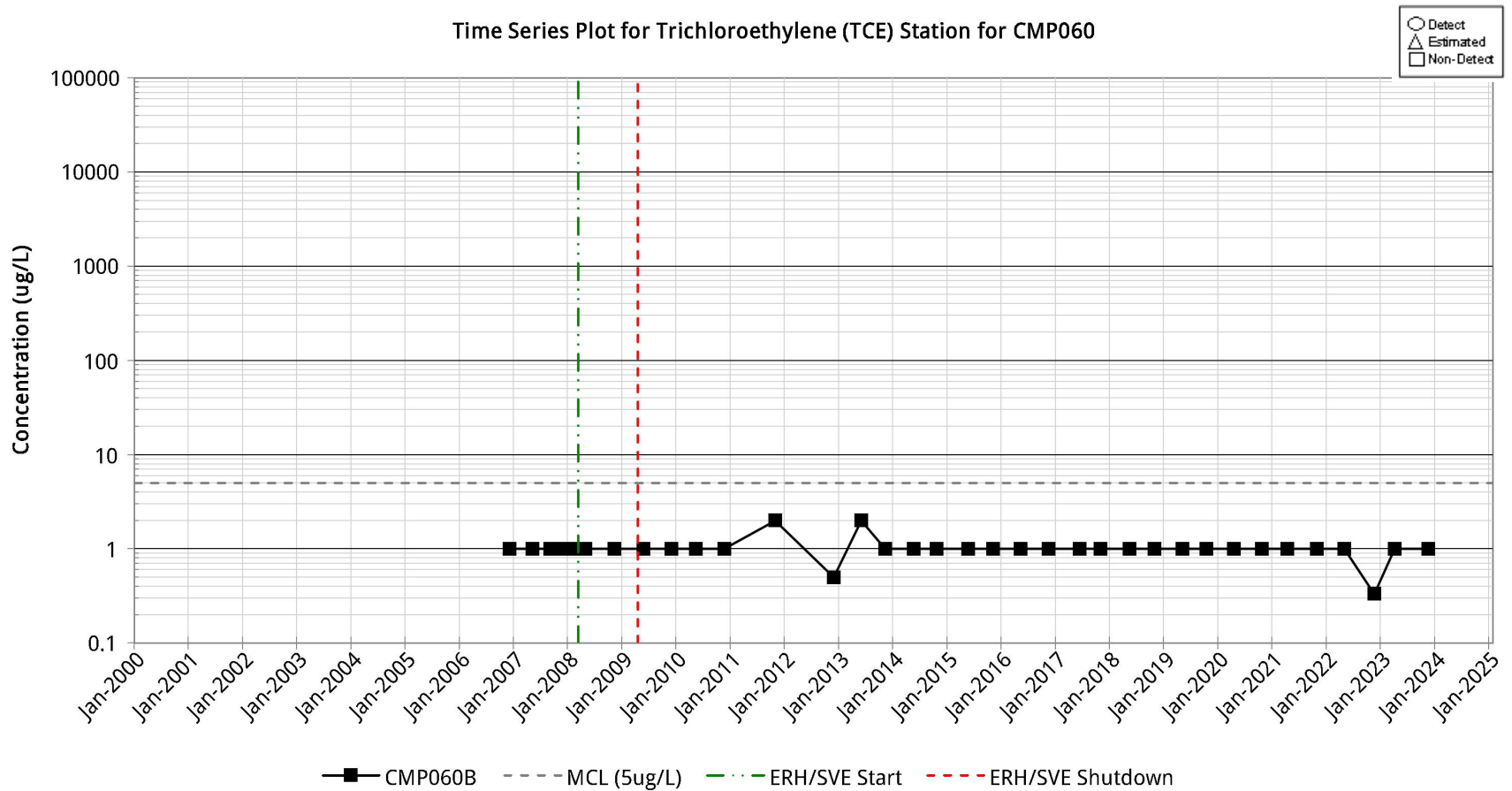


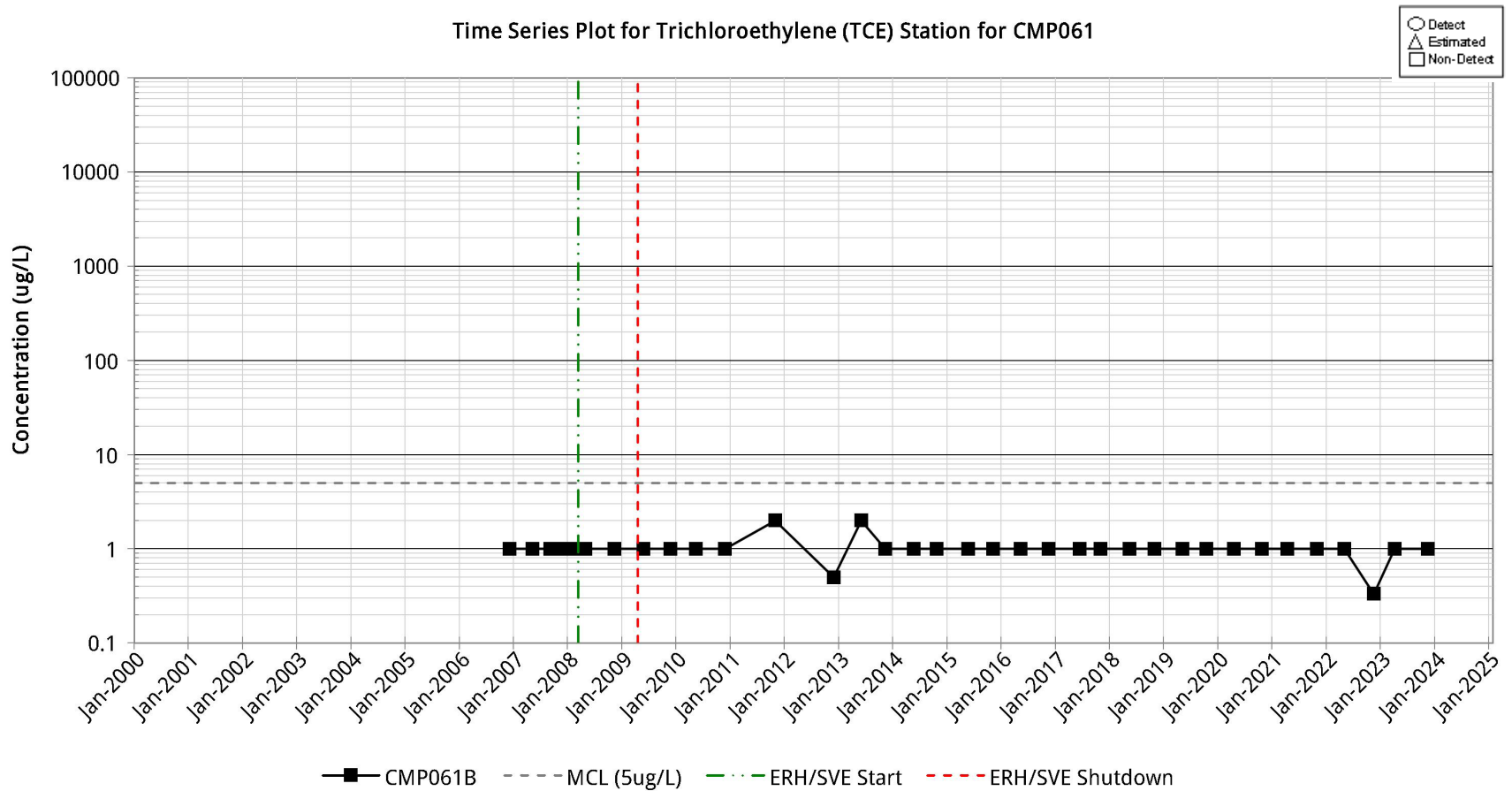


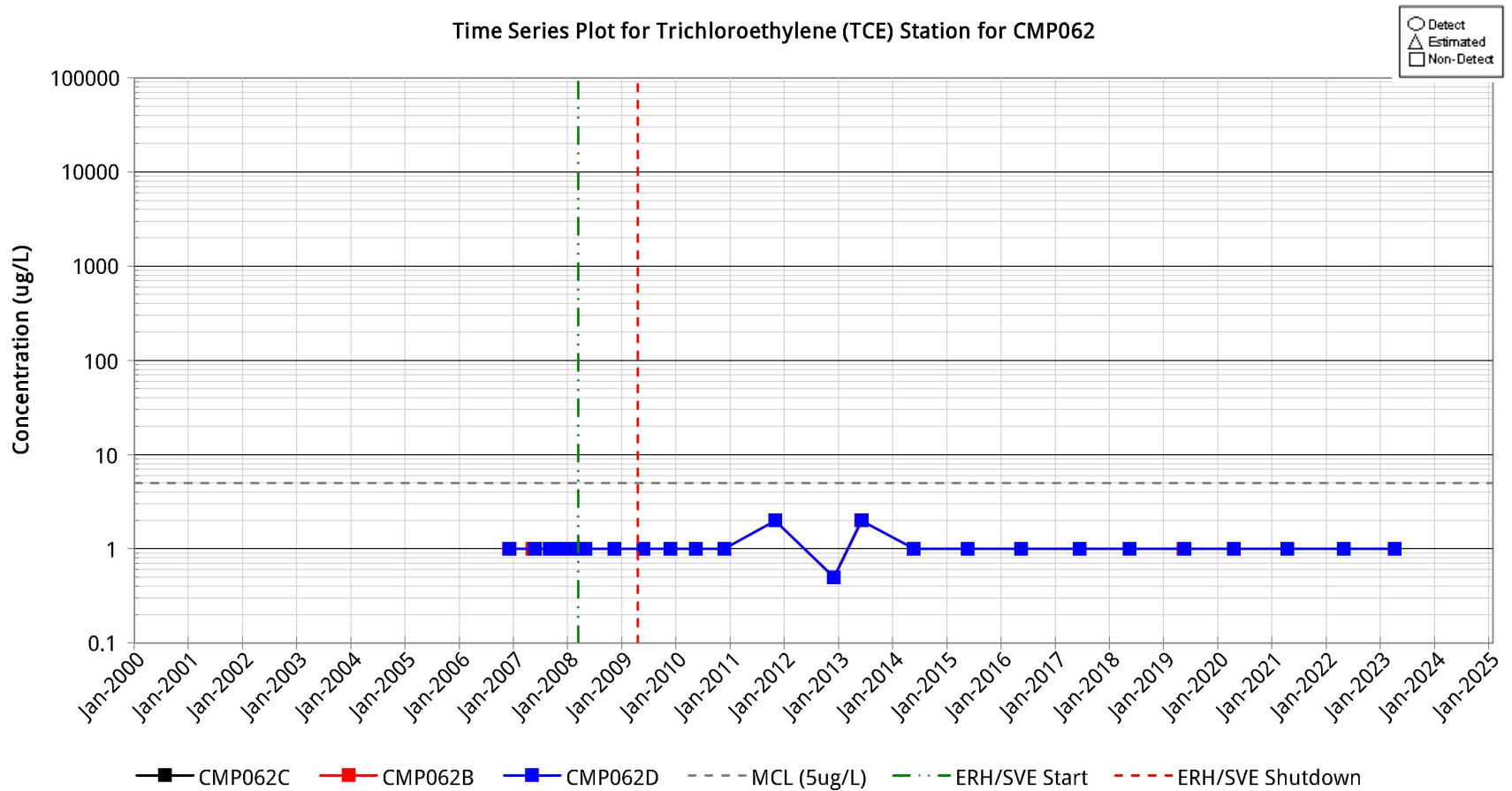


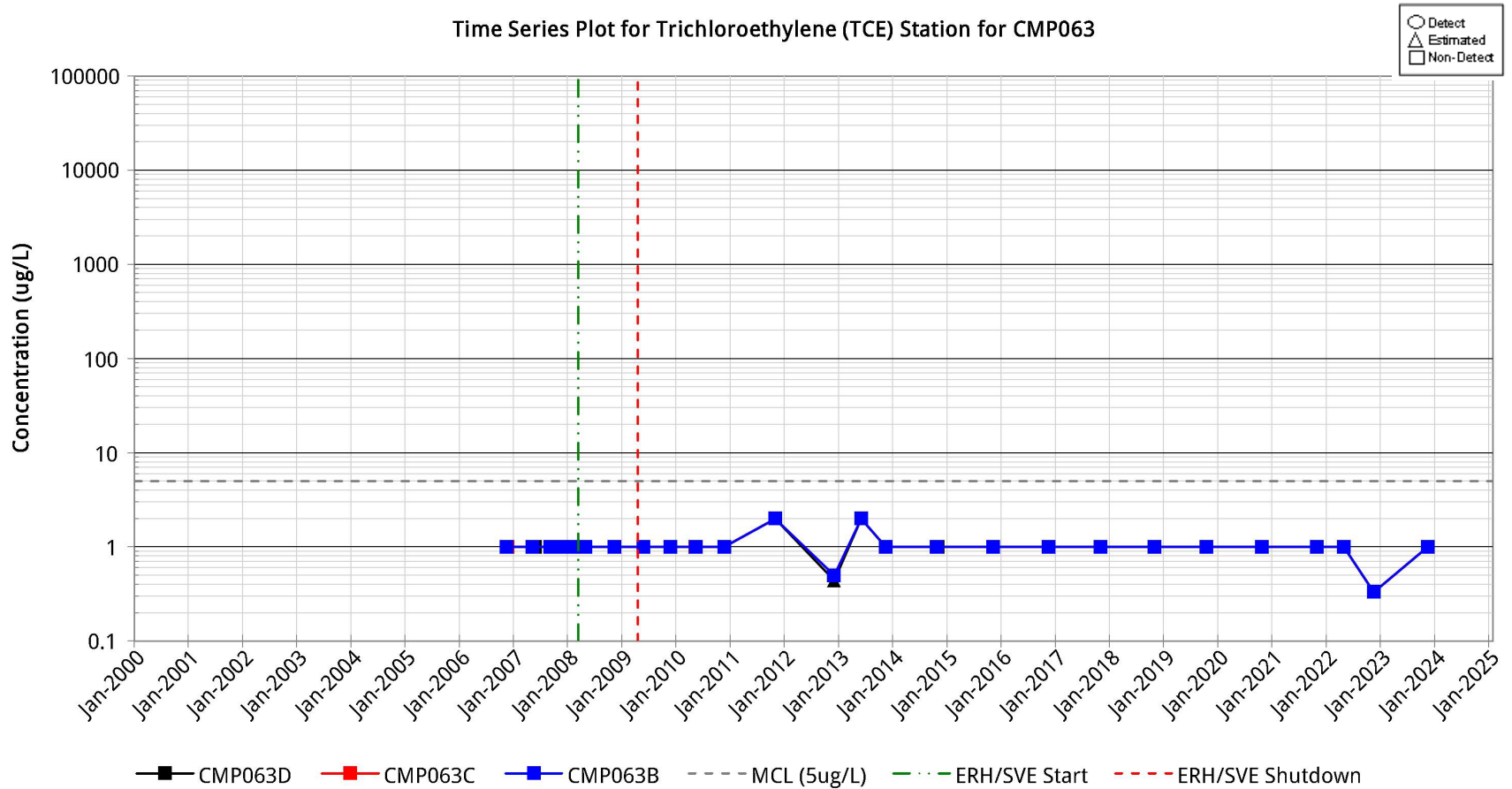


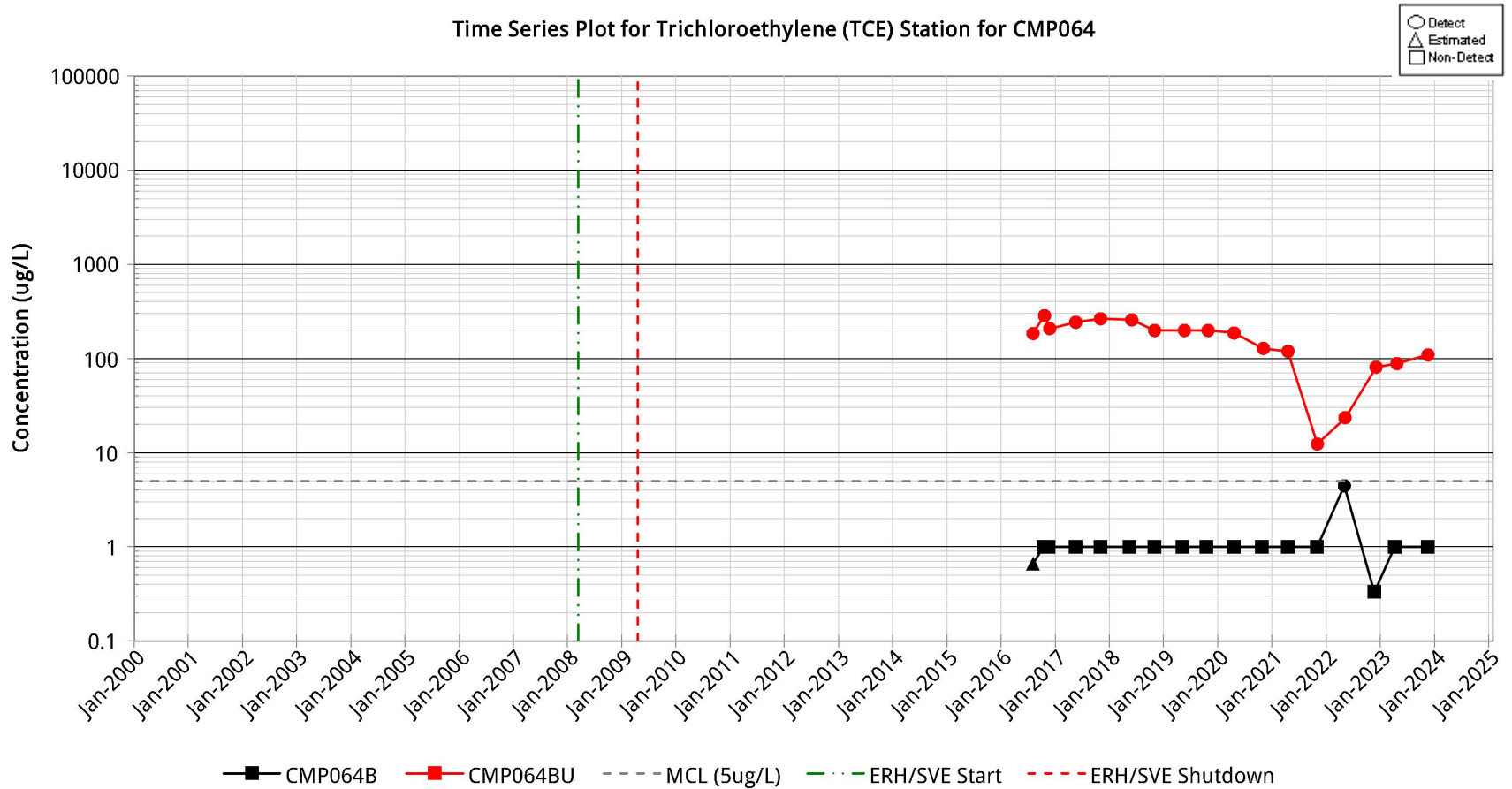


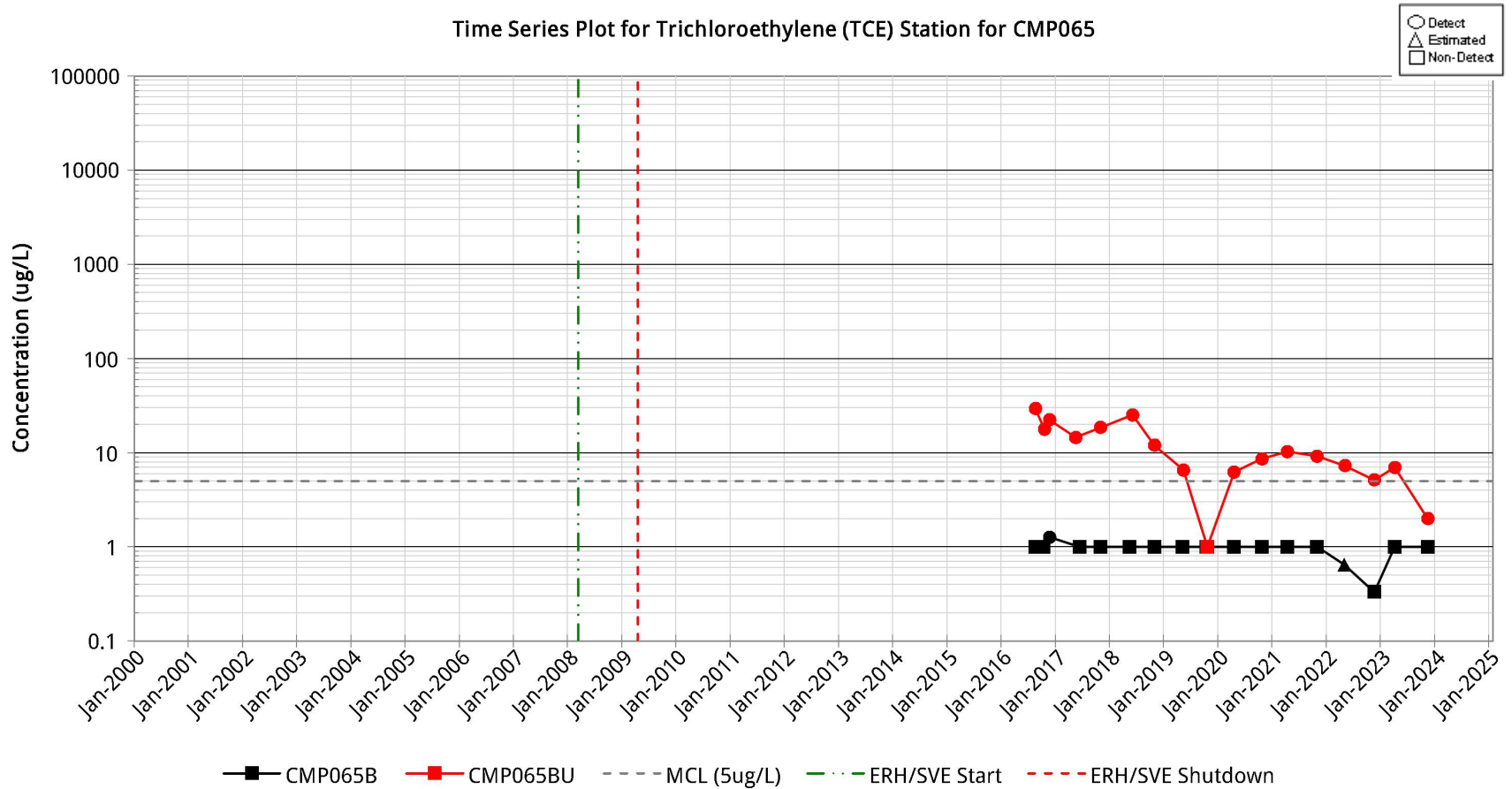




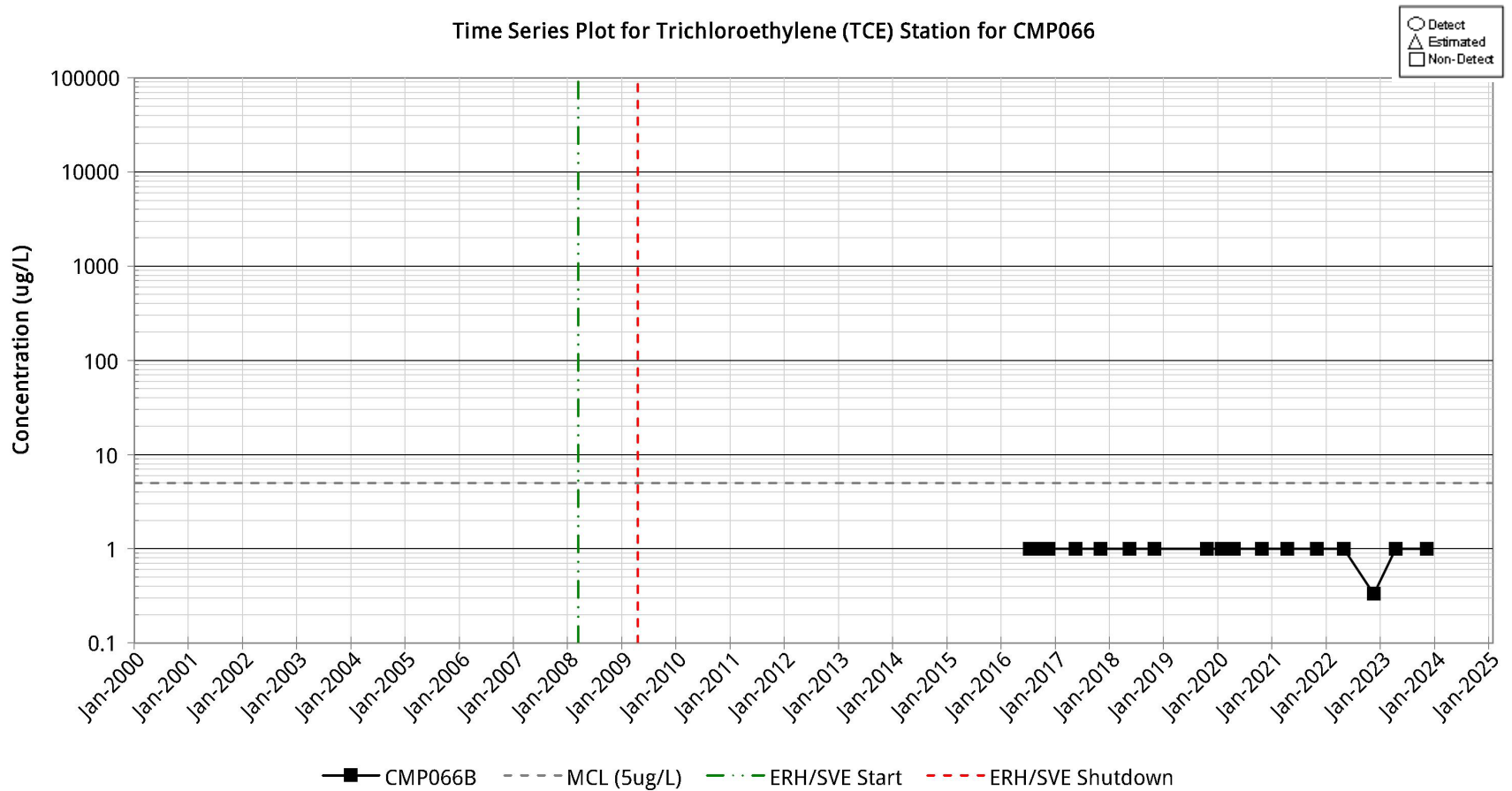


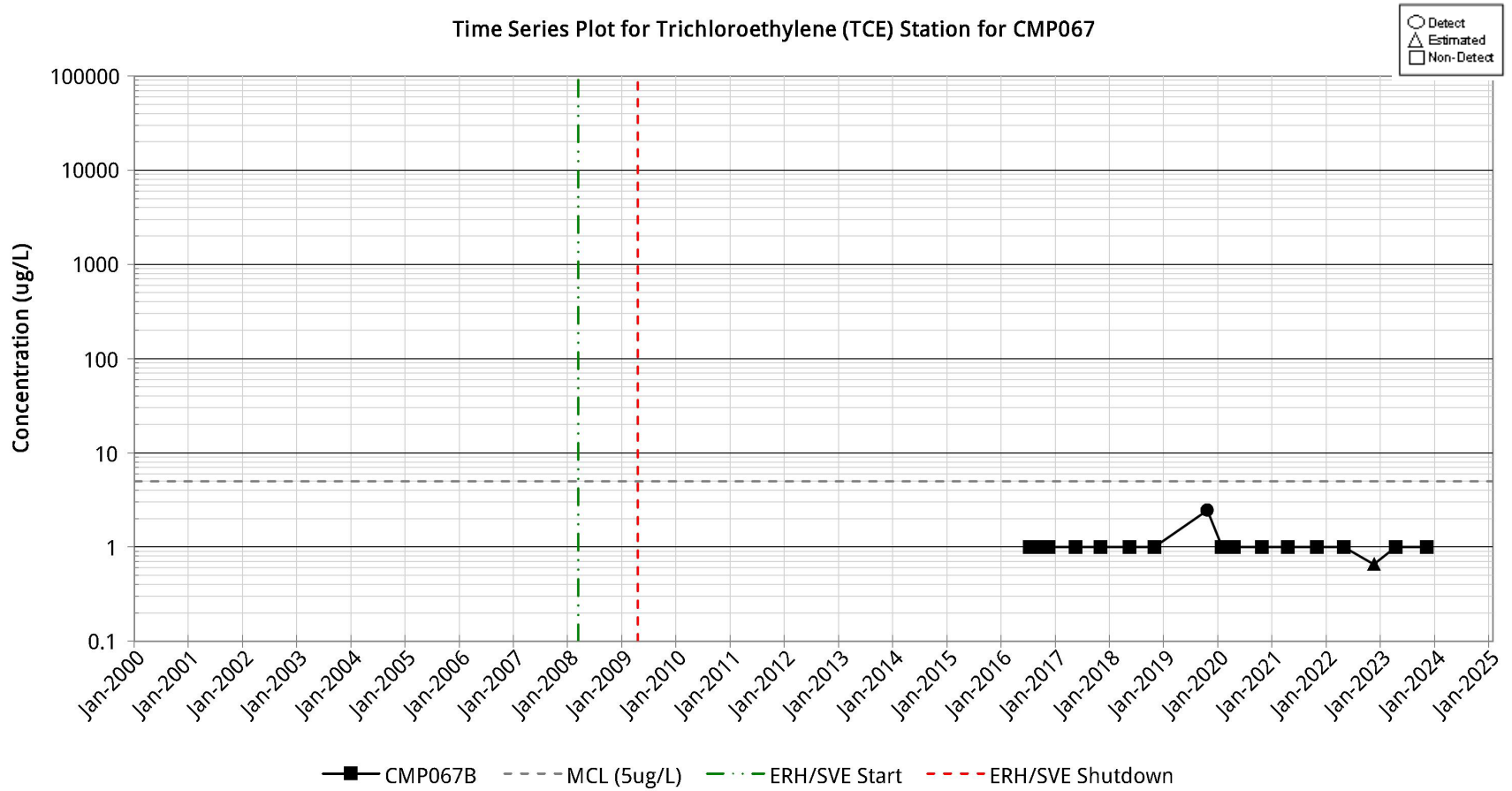


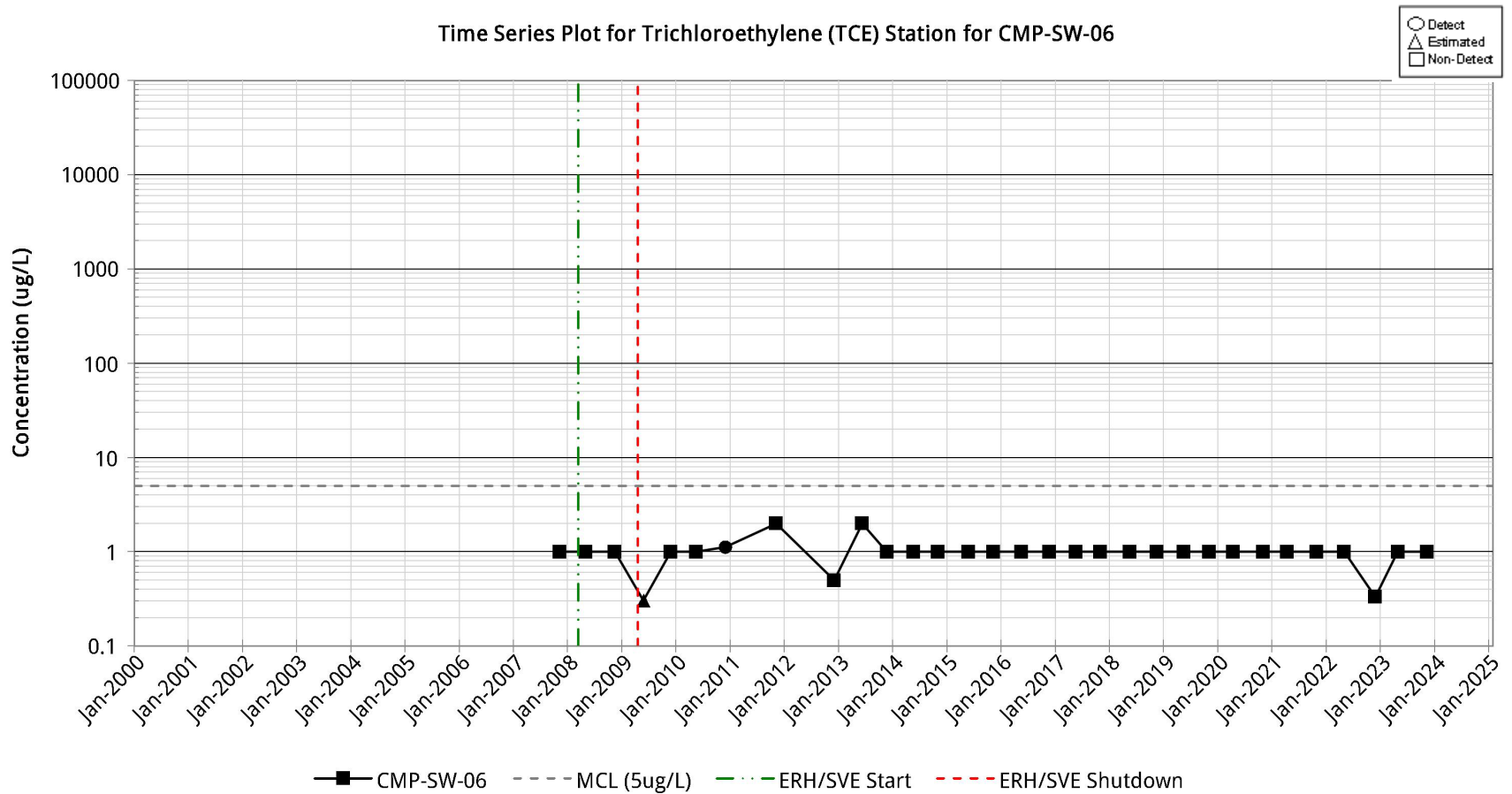


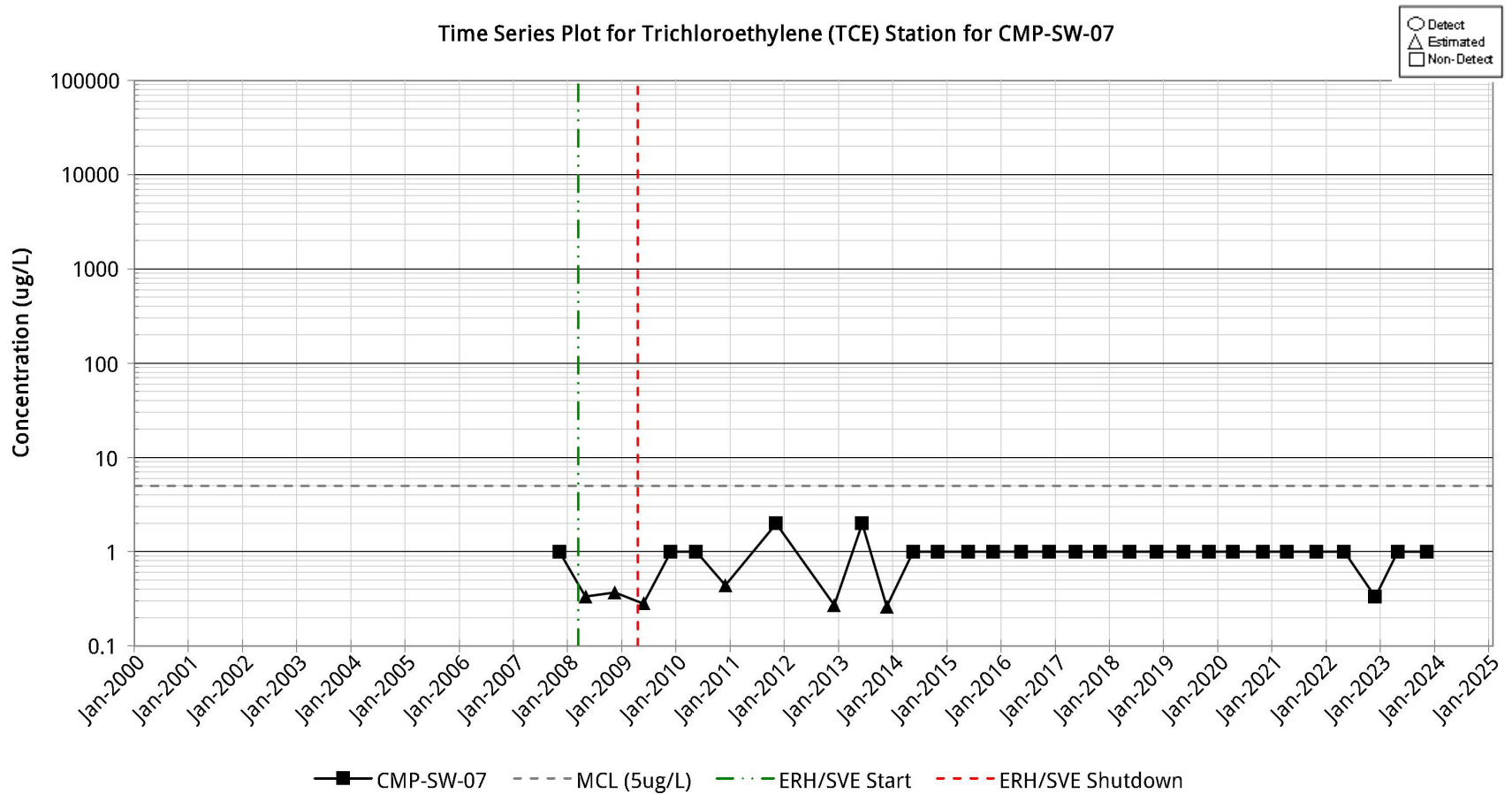


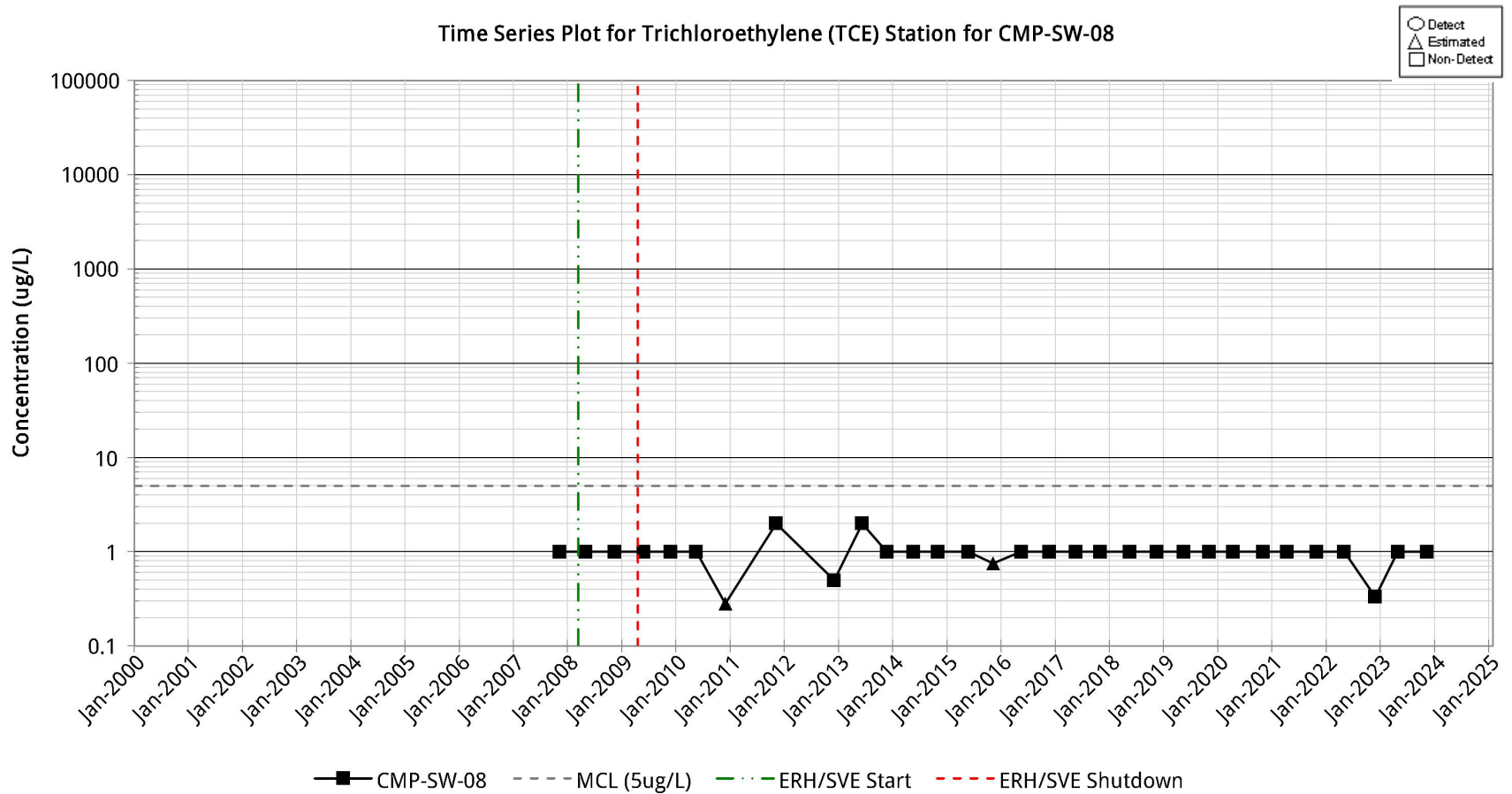


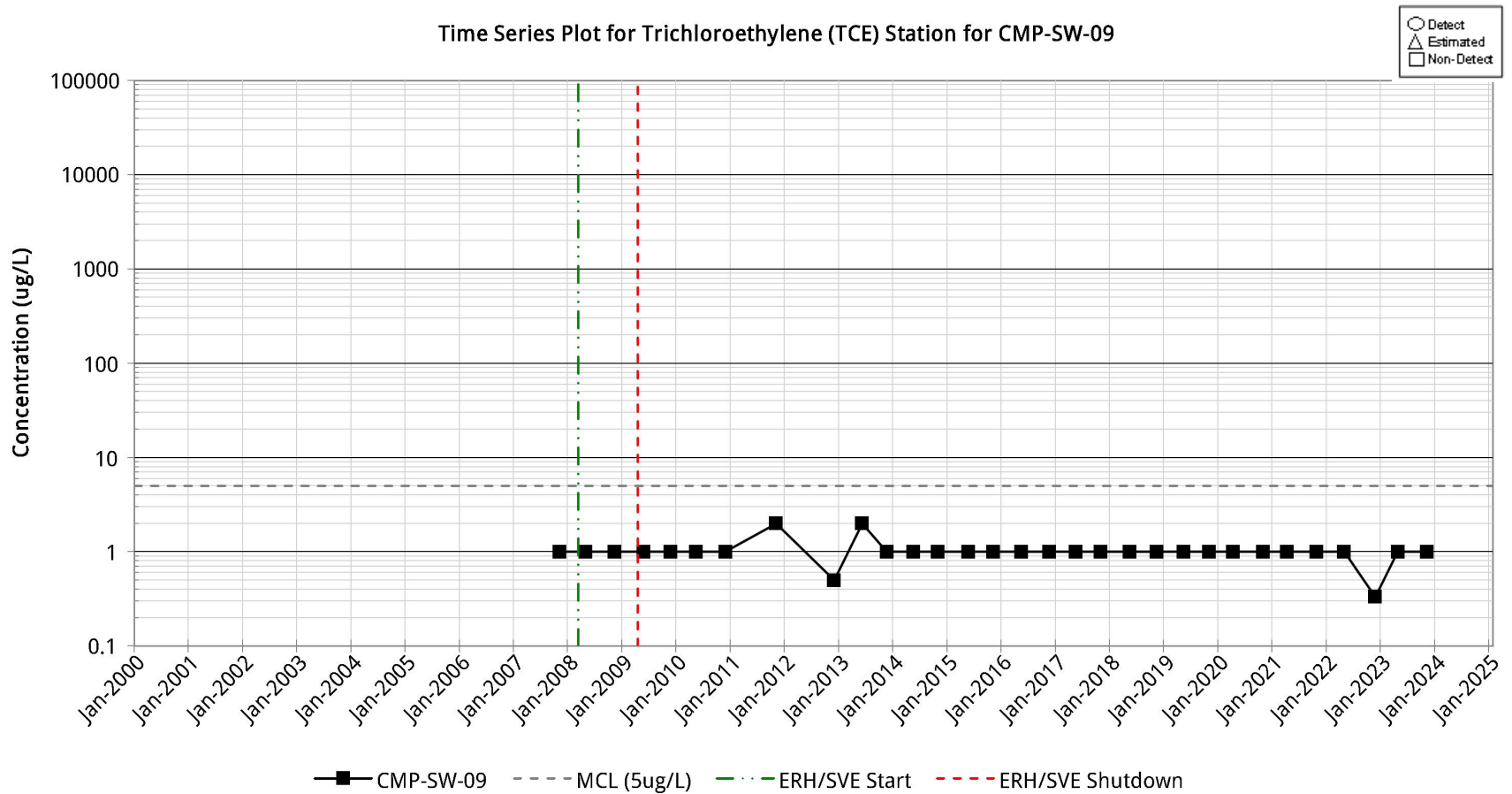


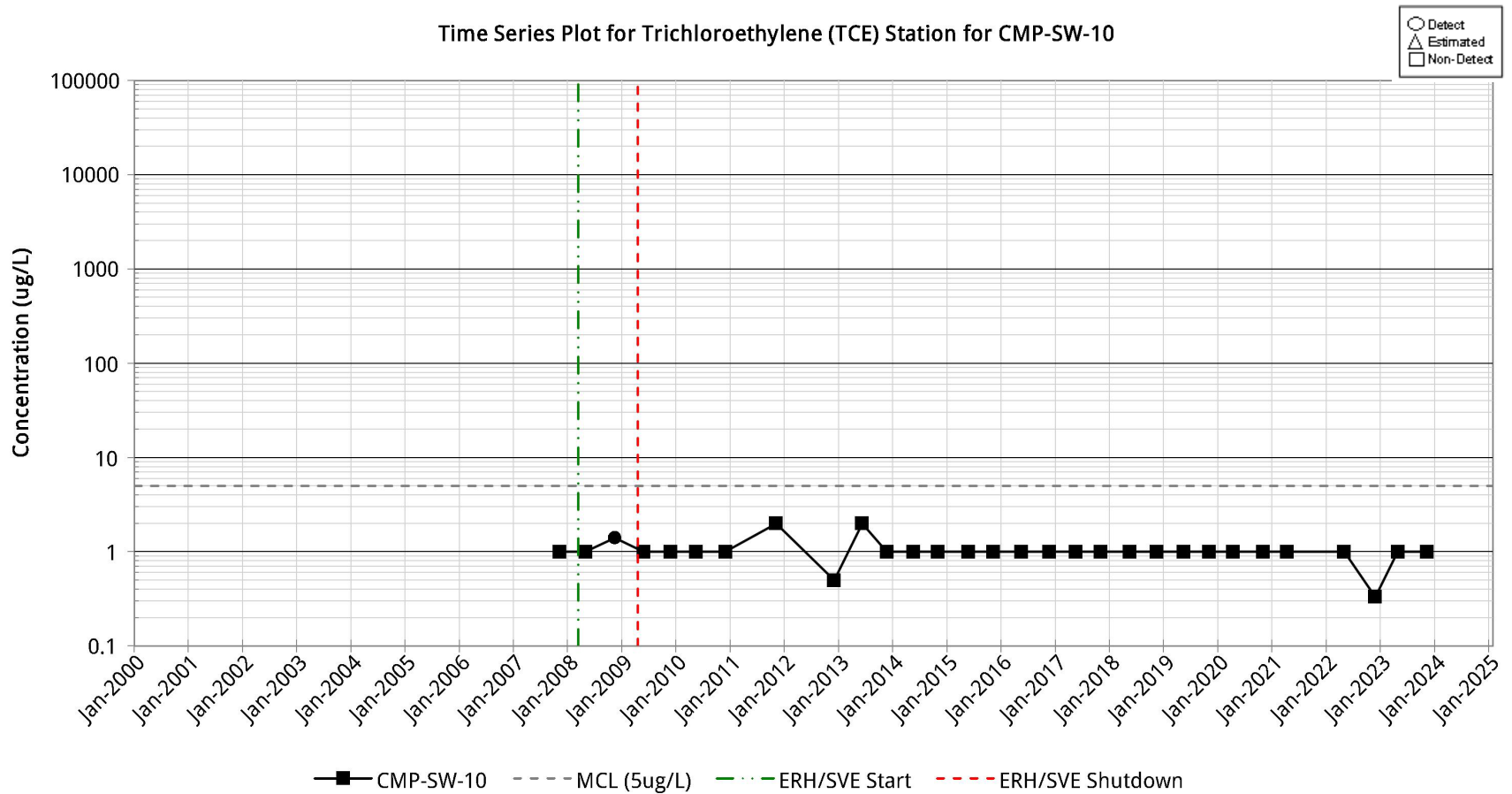


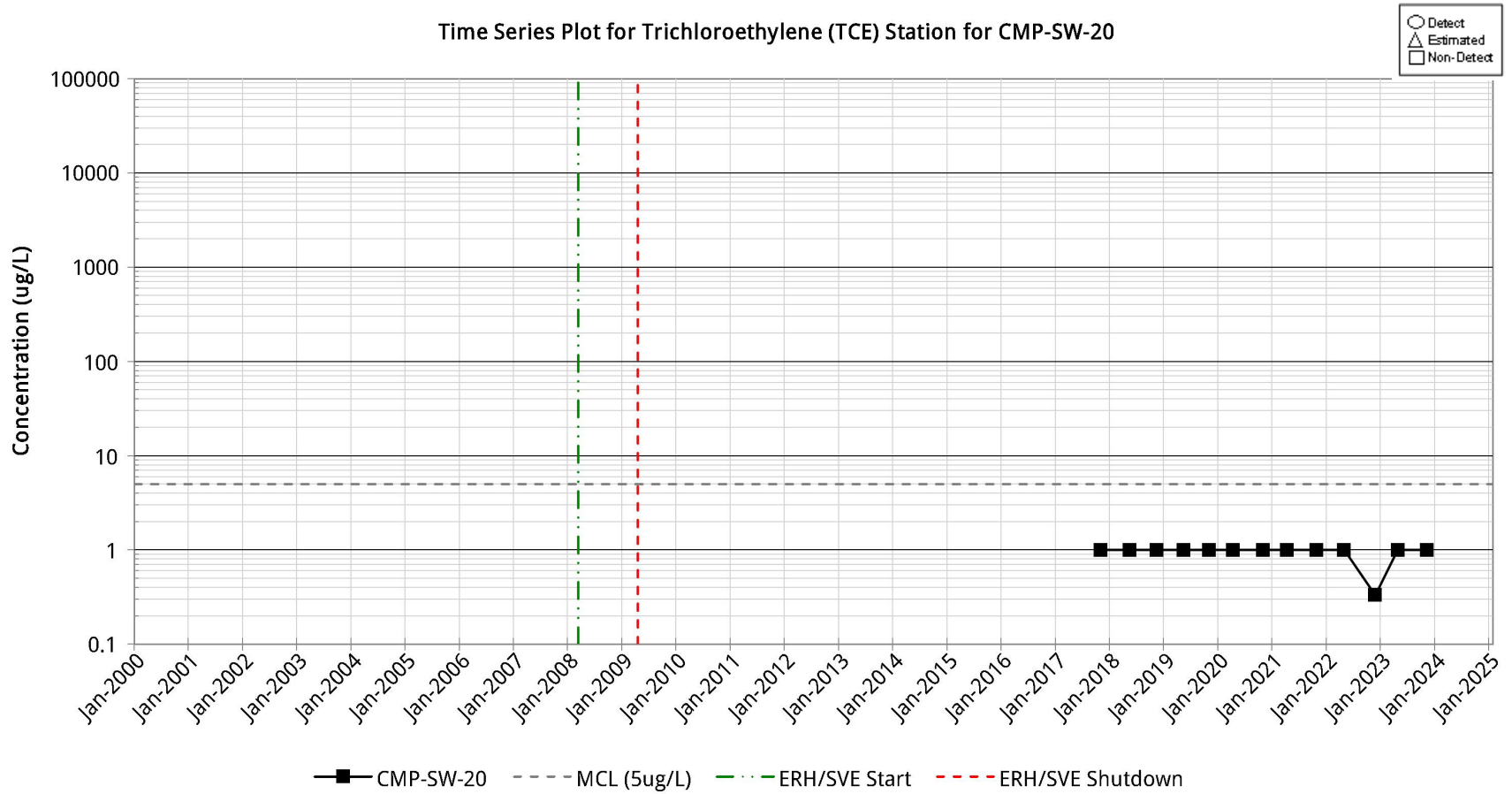




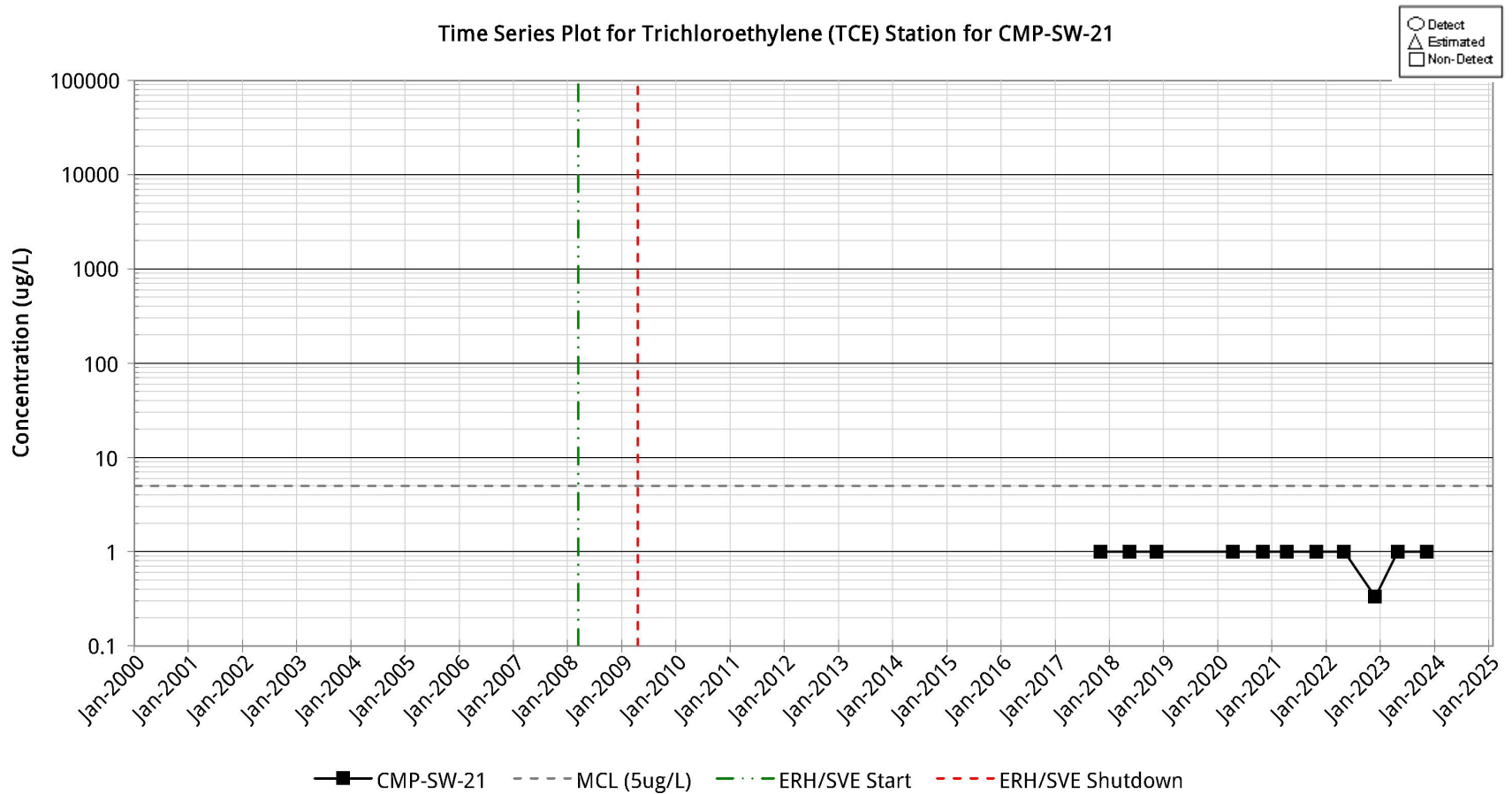


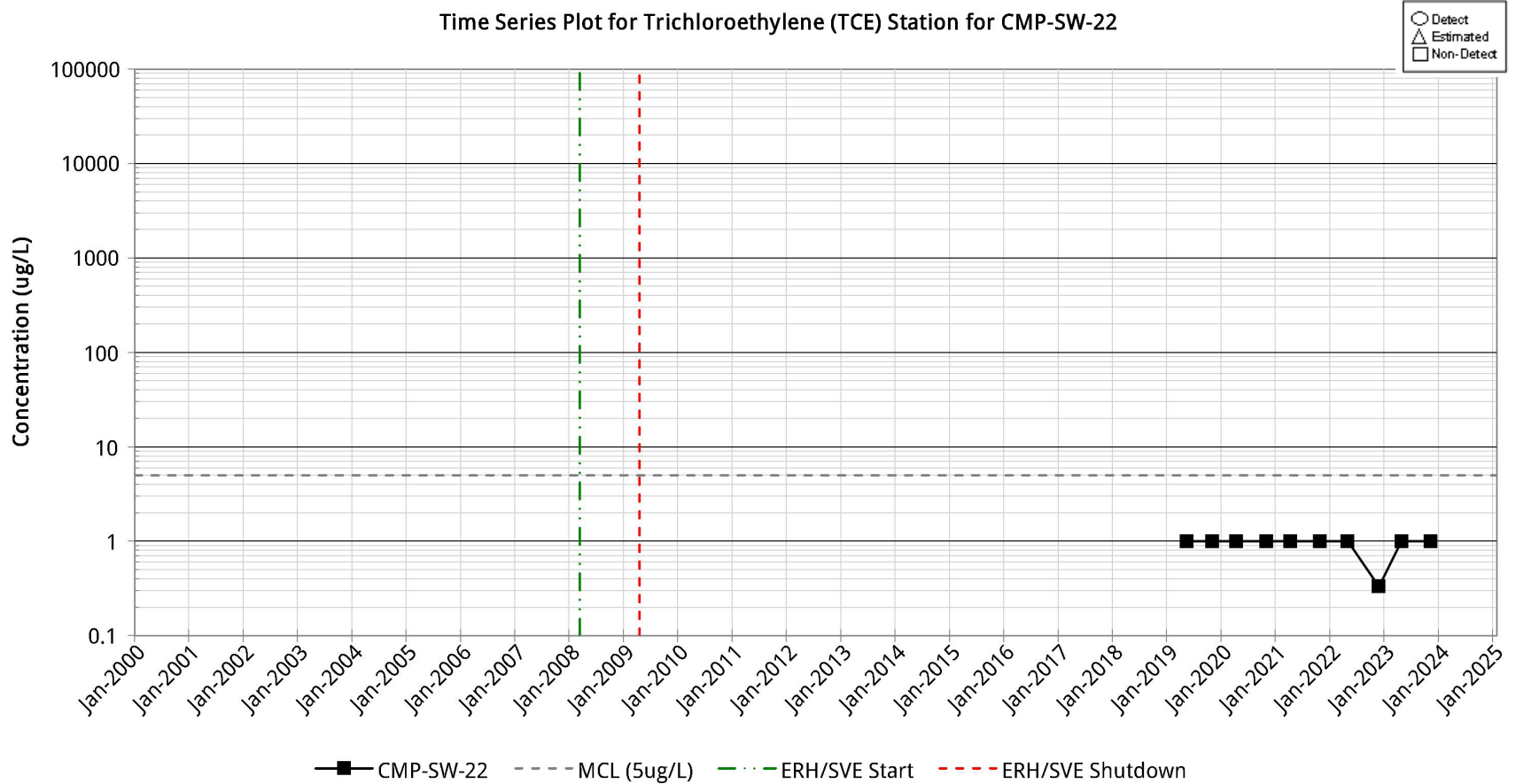












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