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John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

**Subject: Groundwater Background Investigation Report, Revision 5**

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the Groundwater Background Investigation Report, Revision 5.

In accordance with the June 2016 Consent Order, technical meetings were held with representatives of the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Los Alamos National Security, LLC (LANS) during development of this report. The technical approach used to develop the background values presented in this report was discussed at these meeting and agreed to by NMED, DOE, and LANS.

If you have any questions, please contact Steve Paris at (505) 606-0915 (smparis@lanl.gov) or Hai Shen at (505) 665-5046 (hai.shen@em.doe.gov).

Sincerely,

Bruce Robinson, Program Director
Environmental Remediation Program
Los Alamos National Laboratory

Sincerely,

David S. Rhodes, Director
Office of Quality and Regulatory Compliance
Environmental Management
Los Alamos Field Office

Enclosures: Two hard copies with electronic files – Groundwater Background Investigation Report, Revision 5 (EP2016-0116)

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LA-UR-16-27907
October 2016
EP2016-0116

# Groundwater Background Investigation Report, Revision 5

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Associate Directorate for Environmental Management

EP2016-0116

# Groundwater Background Investigation Report, Revision 5

October 2016

Responsible project manager:

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## EXECUTIVE SUMMARY

Background water-quality data and corresponding statistical analyses are used to distinguish between natural and contaminated waters for environmental investigations conducted at Los Alamos National Laboratory (LANL or the Laboratory). These data are updated periodically to reflect installation of new wells and additional data collected from existing wells and springs.

In October 2015, the New Mexico Environment Department (NMED) presented the results of a geochemical study to establish background concentrations for the regional aquifer at and near the Laboratory. The NMED study employed analytical methods to quantify concentrations of metals in groundwater different from those used by the Laboratory (specifically high resolution−inductively coupled plasma mass spectrometry). NMED's report directed the Laboratory to begin using the NMED background concentrations for the purpose of screening groundwater monitoring data.

On November 19, 2015, staff from NMED, the U.S. Department of Energy (DOE), and Los Alamos National Security, LLC (LANS) met to the discuss technical and regulatory implications associated with using NMED's background concentrations for screening groundwater monitoring data. As a result of that meeting, DOE and LANS requested that use of NMED's background values for screening be deferred pending additional technical meetings and discussions. Based on these additional discussions, on April 22, 2016, the Laboratory submitted an implementation plan proposing a path forward for addressing the use of NMED's groundwater background concentrations. The implementation plan called for DOE and LANS to prepare a revised groundwater background investigation report, titled "Groundwater Background Investigation Report, Revision 5," and provided specific details regarding the development of the report. The implementation plan was approved by NMED on May 5, 2016. This groundwater background investigation report presents the results of the activities specified in DOE/LANS's April 22, 2016, implementation plan.

This report provides updated background water-quality data for the perched-intermediate and regional groundwater systems beneath the Pajarito Plateau and the Laboratory. The report also provides the sampling, analytical, and statistical bases for these concentrations. The new background data set includes a validated database of natural inorganic chemical and radionuclide analyses of 543 groundwater samples collected from 47 background springs and monitoring wells from January 2010 to December 2015. The term "background" as used here refers to natural waters discharged by springs or penetrated by wells that have not been impacted by Laboratory effluent or other municipal or industrial activities and that are representative of groundwater discharging from its respective aquifer material.

The overall steps followed in determining recommended groundwater background values were divided into three phases: (1) selection of locations and initial vetting and preparation of data; (2) general data analysis, including a review of time variation in the data and identification of outliers; and (3) statistical analyses, including calculation of descriptive statistics and upper tolerance limits (UTLs). UTLs were not calculated for constituents having 50% or more nondetected results.

Data-preparation steps were necessary before statistical analyses could be performed on the groundwater chemistry data. The data set was finalized to remove obvious errors, field duplicates and unmarked duplicates, organic constituents, and results from certain analytical laboratories. The general data analysis involved analyzing and removing outliers or suspect values that were exceptionally high or low relative to the rest of the data through various statistical plots and tests.

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**Acronyms and Abbreviations**

| | |
|---|---|
| AQA | Analytical Quality Associates, Inc. |
| ARSL | American Radiological Services Laboratory |
| CA | cluster analysis |
| Consent Order | Compliance Order on Consent |
| DO | dissolved oxygen |
| DOE | Department of Energy (U.S.) |
| DQO | data-quality objective |
| EPA | Environmental Protection Agency (U.S.) |
| F | filtered |
| GBIR | groundwater background investigation report |
| GEL/GELC | General Engineering Laboratories |
| GFM | Geologic Framework Model |
| HE | high explosives |
| HFO | hydrous ferric oxide |
| HR-ICPMS | high resolution–inductively coupled (argon) plasma mass spectrometry |
| HRMS | high resolution–inductively coupled (argon) plasma mass spectrometry |
| Interim Plan | Interim Facility-Wide Groundwater Monitoring Plan |
| KM | Kaplan-Meier |
| Laboratory | Los Alamos National Laboratory |
| LANL | Los Alamos National Laboratory |
| LANS | Los Alamos National Security, LLC |
| NF | nonfiltered |
| NMED | New Mexico Environmental Department |
| NTU | nephelometric turbidity unit |
| ORP | oxidation-reduction potential |
| PCA | principal component analysis |
| PCB | polychlorinated biphenyl |
| QA | quality assurance |
| QC | quality control |
| RDX | hexahydro-1,3,5-trinitro-1,3,5-triazine |
| ROS | regression-on-order statistics |
| SOP | standard operating procedure |
| SOW | statement of work |

| | |
|---|---|
| TA | technical area |
| TDS | total dissolved solids |
| TNT | trinitrotoluene |
| UTL | upper tolerance limit |

**Metric to U.S. Customary Unit Conversions**

| Multiply SI (Metric) Unit | by | To Obtain U.S. Customary Unit |
|---|---|---|
| kilometers (km) | 0.622 | miles (mi) |
| kilometers (km) | 3281 | feet (ft) |
| meters (m) | 3.281 | feet (ft) |
| meters (m) | 39.37 | inches (in.) |
| centimeters (cm) | 0.03281 | feet (ft) |
| centimeters (cm) | 0.394 | inches (in.) |
| millimeters (mm) | 0.0394 | inches (in.) |
| micrometers or microns (µm) | 0.0000394 | inches (in.) |
| square kilometers ($km^2$) | 0.3861 | square miles ($mi^2$) |
| hectares (ha) | 2.5 | acres |
| square meters ($m^2$) | 10.764 | square feet ($ft^2$) |
| cubic meters ($m^3$) | 35.31 | cubic feet ($ft^3$) |
| kilograms (kg) | 2.2046 | pounds (lb) |
| grams (g) | 0.0353 | ounces (oz) |
| grams per cubic centimeter ($g/cm^3$) | 62.422 | pounds per cubic foot ($lb/ft^3$) |
| milligrams per kilogram (mg/kg) | 1 | parts per million (ppm) |
| micrograms per gram (µg/g) | 1 | parts per million (ppm) |
| liters (L) | 0.2642 | gallons (gal.) |
| milligrams per liter (mg/L) | 1 | parts per million (ppm) |
| degrees Celsius (°C) | 9/5 + 32 | degrees Fahrenheit (°F) |

# 1.0 INTRODUCTION

## 1.1 Rationale for Investigation

The March 1, 2005, Compliance Order on Consent (the Consent Order) required Los Alamos National Laboratory (LANL or the Laboratory) to prepare and submit a groundwater background investigation report (GBIR) that establishes background concentrations for naturally occurring metals in groundwater at or near the Laboratory. The GBIR was submitted by the Laboratory in June 2005 (LANL 2005, 090580), and four revisions were subsequently submitted from 2006 to 2010 (LANL 2006, 094637; LANL 2007, 094856; LANL 2007, 095817; LANL 2010, 110535). An update to Revision 4 was submitted in November 2011 (LANL 2011, 207447). The background concentrations in the GBIRs are used to screen groundwater monitoring data collected by the Laboratory to identify the potential presence of anthropogenic contamination.

In October 2015, the New Mexico Environment Department (NMED) presented the results of a study to establish background concentrations for the regional aquifer at and near the Laboratory (NMED 2015, 600967). NMED noted that the background investigations conducted by the Laboratory were performed using methodologies designed for groundwater monitoring, as required by the Consent Order, and not methodologies for determining accurate and precise background concentrations. Specifically, the methodologies employed by the Laboratory resulted in a substantial number of data points having concentrations below detection limits for some metals. The NMED study employed high resolution−inductively coupled plasma mass spectrometry (HR-ICPMS or HRMS) to quantify dissolved concentrations of metals in groundwater. The sampling locations used by NMED were similar to, although not identical with, the locations previously used by the Laboratory. The NMED study resulted in background concentrations that were generally, although not always, lower than those reported in the Laboratory's 2011 update to Revision 4 of the GBIR (LANL 2011, 207447). NMED's report directed the Laboratory to begin using the NMED background concentrations for the purpose of screening groundwater monitoring data.

On November 19, 2015, staff from NMED, the U.S. Department of Energy (DOE), and Los Alamos National Security, LLC (LANS) met to discuss technical and regulatory implications associated with use of NMED's background concentrations for screening groundwater monitoring data. As a result of that meeting, DOE and LANS requested that use of NMED's background values for screening be deferred pending additional technical meetings and discussions (LANL 2016, 601121). Based on these additional discussions, the Laboratory submitted an implementation plan proposing a path forward for addressing use of NMED's groundwater background concentrations (LANL 2016, 601422). The implementation plan called for DOE and LANS to prepare a revised GBIR, titled "Groundwater Background Investigation Report, Revision 5," and provided specific details regarding the development of the report. The implementation plan was approved by NMED on May 5, 2016 (NMED 2016, 601465). This GBIR presents the results of the activities specified in the DOE/LANS April 22, 2016, implementation plan (LANL 2016, 601422). The implementation plan was approved before the effective date of the June 2016 Consent Order and Revision 5 of the GBIR is considered a Consent Order requirement even though it is not specifically identified in the June 2016 Consent Order.

Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

## 1.2 Scope of Report

This report provides background water-quality data for the perched-intermediate and regional groundwater systems beneath the Pajarito Plateau (the Plateau) and the Laboratory. It includes a validated database of natural inorganic chemical and radionuclide analyses and field parameters of 543 groundwater samples (i.e., the number of unique combinations of location, port, and date) collected from 47 background springs and wells. The term “background” as used in this report refers to natural groundwaters discharged by springs or penetrated by wells that have not been impacted by Laboratory effluent or other municipal or industrial activities and that are representative of groundwater discharging from its respective aquifer material.

### 1.2.1 Background Locations

The April 22, 2016, implementation plan (LANL 2016, 601422) specified incorporating the set of background locations presented in NMED’s October 2015 groundwater background report (NMED 2015, 600967), with some additions or deletions based on NMED’s criteria that a background location must have less than 3 mg/L chloride and 2 pCi/L tritium. The locations included in NMED’s report were reviewed in technical meetings to identify whether any locations should be added or removed based on more recent information. Additionally, locations for perched-intermediate groundwater were identified. Once the preliminary list of background locations was developed, chloride and tritium data were evaluated and compared with NMED’s criteria. No changes to the proposed locations were identified based on this evaluation, and the background location list was finalized. The process for evaluating and selecting background locations is described in more detail in section 3.2.

### 1.2.2 NMED Guidance

This report was prepared in accordance with the specifications contained in the April 2016 implementation plan (LANL 2016, 601422). Table 1.2-1 lists the requirements stated in the Laboratory’s letter and modifications and clarifications agreed to during subsequent discussions between NMED and the Laboratory in 2016.

## 1.3 Objectives

The primary objective of Revision 5 of the GBIR is to provide an updated set of hydrogeochemical groundwater background screening values for the Laboratory. The updated data set reflects the inclusion of additional wells, improved stability of existing wells, and revisions to sampling and analytical methodologies. The updated background data will be more representative than previous background data for comparison with groundwater monitoring data currently being collected at the Laboratory.

## 1.4 Approach

The regional geologic framework, hydrologic framework, and conceptual model of groundwater chemistry are presented in section 2. The methodology for determining groundwater background chemistry for the Laboratory is described in section 3, including field and analytical data methods, quality assurance (QA), statistical methods, and descriptive statistics. Background values and spatial and temporal trends are discussed in section 4. A summary and conclusions are presented in section 5. Appendixes provide the samples and analytical suites (Appendix A); the comprehensive data set (Appendix B, on CD included with this report); statistical and time-series plots (Appendix C); and a summary report of upper tolerance limits (UTLs) calculated using the statistical program ProUCL Version 5.1 (EPA 2013, 251074), along with its output (Appendix D, on CD included with this report).

The data set includes groundwater samples collected by the Laboratory from January 2010 to December 2015 in accordance with the Interim Facility-Wide Groundwater Monitoring Plan (the Interim Plan). Data were included only from external laboratory analyses that underwent independent validation. For the majority of the data, filtered and nonfiltered groundwater samples were collected and analyzed for chemical constituents and parameters. Inorganic chemicals analyzed included major ions, minor elements, trace elements (metals), and natural and fallout-derived radionuclides. Radiological measurements (gross alpha, gross beta, and gross gamma) were also included. These categories are based on regulatory and scientific perspectives that support decisions regarding the nature and extent of contamination and provide an understanding of geochemical reactions occurring along groundwater flow paths.

For each aquifer, results of statistical analyses are provided in this report for 59 constituents including 29 metals; 14 general chemistry parameters; 13 radionuclides; and gross-alpha, -beta, and -gamma radiological measurements. Anthropogenic organic compounds such as trichloroethene, high explosive (HE) compounds, polychlorinated biphenyls (PCBs), and other volatile and semivolatile compounds are not included as part of this investigation because they are introduced and are not indicative of background or natural values.

Various statistical methods were applied for the assessment of background groundwater data. Section 3 of this report provides details and results of statistical analyses of groundwater samples used. The figures in Appendix C provide an overview of the data set for each constituent.

### 1.5 Changes from Previous Revisions

Groundwater background values are meant to be revised periodically as new monitoring wells are installed and additional rounds of data are collected from existing wells and springs. The U.S. Environmental Protection Agency (EPA) recommends updating groundwater background values every few years. Periodic updates are particularly useful at a site such as the Laboratory because of its complex hydrogeology and the substantial number of monitoring wells that are being drilled under the Consent Order.

The original version (Revision 0) of this report was submitted to NMED on June 30, 2005 (LANL 2005, 090580). Revision 1 (LANL 2006, 094637) incorporated changes made in response to NMED comments (NMED 2006, 092742). Substantial changes in Revision 1 included an expanded hydrogeochemical model, a reduction from 15 to 12 background stations, and better alignment of interpretations with data. The following springs were removed in Revision 1: Sacred Spring because potential source contamination was being evaluated, Pajarito Spring because of anthropogenic contamination, and La Mesita Spring because of its location east of the Rio Grande.

Revision 2 of this report (LANL 2007, 094856) replaced the data set in Revision 1 with a more recent, larger data set that incorporated improved analytical methods, and in some cases, lower detection limits. Data from 1997 to 2000 were retained only if post-2000 data were not available for a particular location. Locations were added to improve the description of the regional and perched-intermediate groundwaters. The total number of locations increased from 12 to 30; however, Apache Spring was deleted because it was affected by road salt; the Otowi-4 well and Doe Spring were deleted at NMED's request because of potential anthropogenic impact (Young 2006, 094447); well Guaje-5 was replaced by the newer Guaje-5A; and Sacred Spring was reinstated from Revision 0 after data were verified to match the precise source at the spring. In addition to increasing the number of background locations, Revision 2 also provided an expanded and improved statistical analysis that included a principal component analysis (PCA) and a cluster analysis (CA) appropriate to large areas and regional data sets to distinguish more closely statistical similarities and differences between regional aquifer locations.

Revision 3 of this report (LANL 2007, 095817) was prepared in response to comments provided by NMED in its approval with direction of Revision 2 (NMED 2007, 095489). The most substantial changes involved reclassifying the water supply wells as nonfiltered and removing R-18 from the data set because of newly detected low levels of the explosive compound RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) at that location. Other changes were made for clarification and consistency. Revision 3 was approved by NMED (2007, 095489) and has been the official source of groundwater background information and screening levels for the Laboratory since 2007.

Revision 4 (LANL 2010, 110535) was prepared for the following reasons:

1. Although Revision 3 of the report was still considered to be adequate by NMED and the Laboratory, the EPA recommends updating groundwater background information every few years (EPA 2009, 110369).
2. In numerous background locations, 3 additional years of groundwater monitoring data had been collected that provided a more robust data set.
3. A few wells installed since 2006 had a sufficient amount of data to be included in the statistical analysis.
4. EPA had recently published updated authoritative guidance (EPA 2009, 110369) for establishing groundwater background for a site.

In Revision 4 of the GBIR, the number of groundwater background locations increased from 29 to 39, but some locations in the Revision 3 data set were removed. Alluvial groundwater background, consisting of data from Well LAO-B and Pine Spring, was excluded from evaluation with NMED's approval because of the statistical irrelevance of data from only two locations. Seven Springs was removed from the perched-intermediate background data set because its location west of the Valles Caldera is not relevant to groundwater background at the Laboratory. Springs 5A and 5B were removed because of their potential for mixing with water from the Rio Grande. Spring 8A was removed because of its low flow, potential for source contamination, and similarity in chemistry to the 9-series springs. Wells R-1 and R-13 were excluded from the Revision 4 data set because increased concentrations of chromium, nickel, and nitrate at those locations may be indicative of contamination or/and well corrosion.

An update to Revision 4 (LANL 2011, 207447) was prepared to address NMED's comments in its approval with modifications of Revision 4 (NMED 2011, 204539). The update retained the data set used in Revision 4, with the exception of the removal of tritium data. The update also retained the same background locations as Revision 4 and used the same assessment methods. A substantial difference between Revision 4 and the update was the removal of additional data outliers that required recalculation of screening values.

This version of the GBIR (Revision 5) incorporates changes to the background locations. Table 1.5-1 summarizes the locations for the update to Revision 4 and the locations for Revision 5. As noted in section 1.2.1, regional aquifer background locations were revised for consistency with the locations in NMED's October 2015 background report (NMED 2015, 600967). The major change was removal of groundwater supply wells and the addition of new wells now having a sufficient number of samples. The major change for perched-intermediate background locations was the removal of the perched-intermediate springs and the addition of perched-intermediate wells. The analyte list was revised slightly to be consistent with that used for groundwater monitoring under the Interim Plan. The data set consists of results from analysis of samples collected by the Laboratory during Interim Plan monitoring for the period from 2010 to 2015.

## 2.0 BACKGROUND

The hydrogeologic setting of springs and monitoring wells for perched-intermediate and regional groundwater places constraints on groundwater residence times and controls many geochemical reactions through rock/water interactions. These variables can influence major ion and trace-element aqueous chemistry mainly through adsorption/desorption and precipitation/dissolution reactions. The geologic setting of the Pajarito Plateau groundwater systems is presented in section 2.1, and the hydrology is discussed in section 2.2. Groundwater chemistry and its evolution over time are discussed in section 2.3. A more extensive discussion of the hydrogeologic framework can be found in Revision 3 of the GBIR (LANL 2007, 095817).

### 2.1 Geologic Framework

Table 2.1-1 provides lithologic descriptions of the primary rock units in the region (Broxton and Vaniman 2005, 090038; Koning et al. 2007, 106122). Cole et al. (2010, 106101) present structural contour and isopach maps for individual geologic units and geologic models of the region that represent a substantially updated stratigraphy, including major refinement within the Santa Fe Group and in units of the Jemez volcanic field.

The Pajarito Plateau lies on the east flank of the Jemez Mountains and on the west margin of the Española Basin (Figure 2.1-1). For the hydrogeologic discussions that follow, the Plateau and underlying rock units are considered as a geologic feature of the Española Basin segment of the Rio Grande Rift (Manley 1979, 011714). The rift is a major tectonic feature stretching from Colorado to northern Mexico and first developed about 25 to 30 Ma. Because of similarities in age and tectonic style, the rift is considered by some to be a part of the southern Basin and Range tectonic province (Kelley 1978, 011659). Both the rift basin sediments and the volcanic rocks underlying the Plateau have a strong influence on local hydrology and geochemistry.

The transverse structural zone separating the Española Basin from the southern end of the San Luis Basin (Figure 2.1-2) (Broxton and Vaniman 2005, 090038) is called the Embudo fault zone (Lewis et al. 2009, 111708). This fault is a structural element of a major northeast-trending crustal discontinuity called the Jemez Lineament. The largest volcanic center is the Jemez volcanic field, which formed at the intersection of the Jemez Lineament and the Rio Grande Rift. The Jemez volcanic field contains predominantly intermediate- and silicic-composition volcanic rocks.

Figure 2.1-3 shows generalized geologic relations beneath the Plateau and the Española Basin [adapted from Cole et al. (2010, 106101)]. The Pajarito Plateau is located in the western part of the Española Basin, where rocks of the Jemez and Cerros del Rio volcanic fields overlie and interfinger with Neogene basin-fill sedimentary rocks. The Plateau formed above the deepest parts of the basin, but geologic relations of Miocene and Pliocene basin-filling rocks are obscured by thick deposits of Pleistocene Bandelier Tuff and Pliocene Cerros del Rio basalt. The stratigraphy of the upper basin-fill deposits is known from over 60 new groundwater characterization and monitoring wells and surface geologic information.

The following discussion refers to geologic units shown in Figures 2.1-2 through 2.1-4 (Broxton and Vaniman 2005, 090038; Cole et al. 2010, 106101). During the early-middle Miocene, more than 130 m of fine-medium sands and silty sands of the Chama–El Rito Member (Ttc) of the Tesuque Formation were deposited in the western part of the Española Basin by south-flowing, low-energy streams. Chama–El Rito deposits are overlain by the Chamita Formation (Tcar) [400–1000 (?) m thick]. The Chamita Formation (~6–13 Ma) is primarily composed of sands and gravels deposited by two merging, south-flowing rivers: the ancestral Rio Chama (Hernandez Member) and ancestral Rio Grande (Vallito Member).

Basalts and phreatomagmatic deposits intercalated within the Chamita Formation indicate sedimentation and mafic volcanism within the western Española Basin were concurrent.

Volcanism over the last 14 Ma built up the constructional highlands of the Jemez Mountains, while contemporaneous tectonic rifting resulted in subsidence of the area extending from the Valles Caldera to the western margin of the Sangre de Cristo Mountains. During this time of coeval volcanism and rifting, the Jemez volcanic field was a source of Miocene and Pliocene volcaniclastic sediments that were deposited as alluvial fans in the rifted lowlands. To the east, these alluvial fans interfingered with basin-floor deposits of the Chamita Formation. These early Jemez alluvial fans are included in the Tcar unit of the sitewide geologic framework model (Cole et al. 2010, 106101). The upper part of these fan deposits contains abundant crystal-poor rhyolite pumice and lava detritus that represent reworked Bearhead Rhyolite tephra (Tjfp) (~6.8–7 Ma).

During the Pliocene, thick volcanogenic alluvial fans of the Puye Formation (Tpf) were shed into the western Española Basin concurrently with voluminous dacitic volcanism of the Tshichoma Formation (Tt) in the eastern part of the Jemez volcanic field. The Puye Formation is a heterogeneous assemblage of clast- to matrix-supported conglomerates, and of gravels and lithic-rich sandstones. Puye deposits interfinger eastward with ancestral Rio Grande deposits of the Totavi Lentil (Tpt). The Puye Formation also interfingers with dacitic lavas beneath the western part of the Plateau and mainly basaltic rock of the Cerros del Rio volcanic field (Tb4) to the east.

The Quaternary Bandelier Tuff represents the culminating phase of volcanism from the Jemez volcanic field, and it caps the mesas of the Pajarito Plateau, giving the area its distinctive tableland appearance. The Bandelier Tuff is made up of two large-volume rhyolitic ash-flow tuffs (ignimbrites), the Otowi and Tshirege Members, that were erupted from the Valles caldera 1.61 and 1.22 Ma, respectively. The Bandelier Tuff covers the diverse assemblage of Miocene to Pliocene basin-filling sedimentary and volcanic rocks that form the more important aquifers in the area.

## 2.2 Hydrogeologic Framework and Groundwater Occurrence

The hydrogeologic setting of springs and wells provides information on the mode of groundwater occurrence (alluvial, perched-intermediate, and regional aquifer). These different modes of groundwater have different residence times (e.g., more rapid fracture flow versus slower porous media flow). Flow variables, in turn, influence major ion and trace-element aqueous chemistry through time-dependent reactions such as adsorption/desorption and precipitation/dissolution.

The current hydrogeologic model for the Plateau is a synthesis of many previous studies and is refined continuously as the well-monitoring network is expanded. Revision 3 of the GBIR (LANL 2007, 095817) summarizes previous reporting from 1962 to 1999, and Collins et al. (2005, 092028) provide additional information for the 25 deep (regional aquifer) wells installed under the Hydrogeologic Workplan (LANL 1998, 059599). Wells installed since 2005 include regional wells R-35 through R-57 and R-60 through R-64. In addition, six older wells (R-12, R-14, R-16, R-20, R-22 [in part], and R-33) were rehabilitated and adapted from multiscreen wells to a single- or dual-screen configuration, and reinstrumented. Physical information and water-quality data from the R-wells are included in the groundwater periodic monitoring report series, whereas the most recent site-scale hydrologic compendium can be found in recent Laboratory reports (e.g., LANL 2009, 106589; LANL 2011, 201568).

The simplest conceptual hydrogeologic model for the Pajarito Plateau and the Laboratory includes saturated porous media in which the surface of the saturated zone(s) roughly mimics topography. For example, the regional water table slopes eastward-southeastward from a recharge zone in the Sierra de los Valles west of the Laboratory toward the Rio Grande discharge zone. Within this simple model, however, are zones of saturation perched above the regional water table within the vadose zone that includes shallow alluvium and perched-intermediate-depth volcanic rocks (Purtymun 1995, 045344).

At the Laboratory, groundwater has been observed to occur in three modes:

- Alluvial groundwater that is isolated at shallow depth (in the alluvium in canyon bottoms); saturation does not extend beneath adjacent mesas; recharge flows to perched saturated zones.
- Groundwater perched at intermediate depth (the Guaje Pumice Bed, Cerros del Rio basalt, Tschicoma Formation, and Puye Formation); recharge is from overlying alluvium and the Bandelier Tuff.
- A regional aquifer that lies at greater depth within various units (Tschicoma Formation, Cerros del Rio basalt, Puye Formation, and Santa Fe Group), depending on the location.

Figure 2.2-1 shows a conceptual hydrogeologic model for groundwater occurrences, which includes alluvial and perched-intermediate groundwater and the regional aquifer. Information about the regional aquifer is based on hydrogeologic data provided by boreholes, wells, and springs. The regional groundwater generally flows from west to east-southeast, and the regional aquifer appears to be a complex heterogeneous system that includes unconfined and confined zones. The degree of hydraulic communication between these zones is thought to be spatially variable. The shallow portion of the regional aquifer (near the water table) is predominantly under phreatic (unconfined) conditions. Pumping from water-supply wells causes (generally small) water-level fluctuations at the water table. These low-magnitude municipal-pumping responses on the phreatic zone do not appear to affect the velocity and direction of groundwater flow. As a result, groundwater flow is expected to follow the ambient water table gradients rather than diverting toward the municipal water supply wells (LANL 2011, 207069).

The generalized geology at the water table is well described in a Laboratory report (LANL 2009, 106589). Formations at the water table are mapped in the Geologic Framework Model (GFM) from the western reach of the Plateau to the Rio Grande. Important units from oldest to youngest in this area at the water table include the Miocene Chamita Formation to the east, northeast, and north; the Pliocene Puye Formation to the west- and southwest-central parts of the GFM modeled area; and Pliocene Cerros del Rio basalts in the central southern part of the area. Other important units include the Totavi Lentil underlying the east-central area near the Rio Grande and both older and younger Tschicoma dacite flows to the northwest and west near the Sierra de los Valles and western border of Los Alamos. The slope of the regional water table decreases to the east (Figure 2.2-2). The steeper water-table slope to the west is influenced by recharge occurring in the higher elevations (Sierra de los Valles) west of the Laboratory.

Groundwater in the regional aquifer discharges as springs in White Rock Canyon. The hydraulic gradient within the regional aquifer east of the Sierra de los Valles is downward, and overlying alluvial and perched-intermediate groundwater systems provide recharge to the regional aquifer (Broxton et al. 2002, 076006). Groundwater flow rates within the regional aquifer vary, depending on the grain size of the aquifer material, hydraulic conductivity, and hydraulic gradient. Flow within the regional aquifer occurs under porous (e.g., wells R-25, R-19, R-15, R-13, R-14) and fracture (e.g., wells R-26, R-9, R-36) conditions (LANL 2009, 106589). Recharge is especially effective along stream channels where larger volumes of water occur at any given place and time. Recharge of the shallow, intermediate, and deep groundwater systems probably occurs at different rates.

Hydraulic conductivity values are a proxy for the potential rate of groundwater flow by not including hydraulic gradient and total porosity. Cole et al. (2010, 106101, Appendix E) give extensive hydraulic conductivity information for both the Española Basin region as well as for locations on the Pajarito Plateau. These data are used as calibration points for modeling of the hydrologic system in the basin. They identify general trends for the basin, including up-section sediments showing progressively larger hydraulic conductivities (reflecting upward-coarsening trends). Valley-fill alluvium (the Qvf unit of the Española Basin model) has significantly larger conductivity values than all other units, and channel fills have larger conductivities, creating horizontal conductivity anisotropies corresponding to their orientation. North of Santa Fe, higher strata in the Santa Fe Group also tend to have larger conductivities as a result of coarsening-upward trend and compaction of stratigraphically older sediments. Koning et al. (2007, 106122) report values from Quaternary valley-fill alluvium, the Santa Fe Group, and hydraulic values obtained from specific pumping tests.

Radiocarbon dating of groundwater is another method of calculating flow rates, although it is essential to collect groundwater samples not impacted by atmospheric carbon dioxide through recharge. Such dating of regional aquifer groundwater at the Laboratory suggests preliminary flow rates in the regional aquifer ranging from a minimum of $1.93 \times 10^{-5}$ cm/s for the Tesuque Formation in lower Los Alamos Canyon to a maximum of $3.33 \times 10^{-4}$ cm/s for the Puye Formation in the area between Water Canyon and upper Ancho Canyon (Purtymun 1984, 006513).

## 2.3 Groundwater Chemistry and Conceptual Hydrogeochemical Model

The current conceptual hydrogeochemical model for the Pajarito Plateau is a synthesis of previous geochemical investigations conducted over the past several years and was most recently summarized in Collins et al. (2005, 092028). The model focuses on natural distributions of inorganic and organic solutes or dissolved species. Revision 3 of the GBIR gives extensive details on previous investigations (1950s to 2005) and elements of the model (LANL 2007, 095817). The following is a summary of the model elements.

### 2.3.1 Elements of the Conceptual Hydrogeochemical Model

Geochemical processes occurring over time and space and the effect of biogeochemical processes are implicit to this conceptual model. The elements include reactive and dissolving minerals, redox conditions, adsorption and precipitation reactions, residence time, chemical speciation, and colloid chemistry. Reactive minerals, such as $CaCO_3$ (calcite), $Fe(OH)_3$ (hydrous ferric oxide [HFO]), clay minerals, and $SiO_2$ glass, and ion exchange–adsorption reactions are the most important elements in controlling groundwater composition and mobility for major solutes and some trace elements. Processes that contribute to the measured geochemistry at monitoring points on and near the Plateau include the following.

- **Reactive constituents**, consisting of $CaCO_3$, Ca-smectite, Na-feldspar, amorphous $SiO_2$, and $Fe(OH)_3$ react with groundwater along flow paths to varying degrees and thus control groundwater composition for the major solutes and selected trace elements, including iron and aluminum. Some of these constituents are undersaturated in particular locations, such as calcite in the alluvium, or will precipitate as minerals, such as calcite in the Santa Fe Group portion of the regional aquifer where higher concentrations of calcium and bicarbonate are found (Collins et al. 2005, 092028). Reactive minerals have varying adsorption capacities for trace elements, including arsenic, chromium, nickel, lead, selenium, and uranium.

- **Adsorption** processes generally dominate over **mineral precipitation** for removing metals and radionuclides from groundwater under specific geochemical conditions, including mineral undersaturation. Smectite increases the adsorption capacity of the aquifer material for most cations (metals and radionuclides) under circumneutral pH conditions. Extensive zones of smectite were encountered in the Puye Formation in core and cutting samples collected from R-9 and R-12 (Broxton et al. 2001, 071250; Broxton et al. 2001, 071252). However, in isolated cases where effluent discharges have changed major ion chemistry and pH, trace solutes such as strontium and barium may precipitate as $SrCO_3$ and $BaSO_4$ or coprecipitate as $(Sr\text{-}Ba)SO_4$. Adsorption capacities of sediments and aquifer material may change over time and location as a result of changes in solution speciation and mineralogy. In general, adsorption of radionuclides and organic and inorganic species in the Bandelier Tuff decreases as follows: cesium-137 (highest sorption) = americium-241 > plutonium-238 = plutonium-239/240 > strontium-90 > uranium > nitrate = sulfate = chloride = perchlorate = trinitrotoluene (TNT) = RDX = pharmaceuticals = tritium (lowest sorption).
- **Oxidation-reduction reactions** and other **microbially mediated reactions** are important in determining the speciation and subsequent reactivity, sorptivity, and solution concentration of solutes. Oxidation-reduction reactions are at times controlled by HFO and dissolved ferrous and manganous solute species (Langmuir 1997, 056037) under acidic to neutral pH conditions. Solutes such as uranium(VI), sulfate, nitrate, and chromate are mobile under oxidizing conditions but can transform, precipitate, or adsorb under reducing conditions. In addition, nutrients such as nitrate and other potentially metabolically active constituents such as perchlorate can cycle as part of microbial metabolism. Analytical data for the three aquifer types (alluvial, perched-intermediate, and regional aquifer) indicate all are typically under oxidizing conditions. Special conditions, such as the presence of drilling fluids and facultative bacteria in well bores, may alter these conditions locally, but these conditions are not applicable to background monitoring wells.
- **Residence times** of groundwater and chemical solutes (mass of water or solute/flux of water or solute) increase with depth and from west to east across the Pajarito Plateau based on stable iostopes, including δD and $\delta^{18}O$ ratios, and tritium decay (Collins et al. 2005, 092028; Longmire et al. 2007, 096660). Accordingly, changes in concentrations of major ions and trace elements are detected along the groundwater flow paths from the alluvial to perched-intermediate systems and to the regional aquifer as a result of (bio)geochemical reactions occurring along flow paths. Calcium, sodium, and bicarbonate are major ion solutes that tend to vary with each groundwater zone and along flow paths from west to east. For example, sodium tends to increase relative to calcium in spring discharges versus alluvial wells. Non- and weakly adsorbing constituents (tritium, perchlorate, nitrate, chloride, sulfate, fluoride, RDX, TNT, pharmaceutical and personal care products, and/or uranium) migrate from alluvial groundwater to perched-intermediate zones and to the regional water table. These constituents are used as nonreactive tracers in some cases (Collins et al. 2005, 092028).
- **Colloids** may include natural material (silica, clay minerals, organic matter, and HFO) and possibly solid phases associated with the treated Laboratory discharges. Colloidal HFO is ubiquitously found in hydrogeologic environments and is an important adsorbent for many trace elements, including arsenic, chromium, lead, and uranium. HFO has been detected as a component of fracture-fill material at borehole R-9 within the Cerros del Rio basalt (Broxton et al. 2001, 071250). Alluvial aquifer material provides the largest reservoir for effluent-discharged constituents such as strontium-90, cesium-137, uranium, plutonium-238, plutonium-239/240, and americium-241 because the solids readily adsorb onto clay and silt-sized particles coated with clay minerals and HFO.

- **Mixing of younger waters:** A component of groundwater within perched zones in the Sierra de los Valles and the regional aquifer is less than 60 yr old. This observation is based on measurable tritium detected in springs discharging within the Sierra de los Valles (>10 pCi/L) and at several monitoring wells completed in the regional aquifer (Broxton et al. 2001, 071252; Longmire et al. 2001, 070103; Broxton et al. 2002, 076006). The initial cosmogenic baseline for tritium is approximately 17 pCi/L (Clark and Fritz 1997, 059168); however, cosmogenic tritium has decayed to <1 pCi/L as background water moved from the surface to the regional water table over several decades (Longmire et al. 2007, 096660). Most of the springs discharging within White Rock Canyon, however, do not contain tritium (Spring 4 series is an exception), and the age of groundwater ranges between 2000 and 10,000 yr (Vuataz and Goff 1986, 073687; Longmire et al. 2007, 096660). Measurable concentrations of tritium in the regional aquifer above the cosmogenic baseline occur in Pueblo Canyon, Los Alamos Canyon, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, and Cañon de Valle downgradient of release sites (LANL 2001, 071301; Longmire 2002, 073282; Longmire 2002, 072800; Longmire 2002, 073676; Longmire 2002, 072614; Longmire 2005, 088510). Carbon-14 ($^{14}C$) data provide qualitative average ages of groundwater ages on the Pajarito Plateau. Table 2.3-1 shows available values of (unadjusted) $^{14}C$ for the background locations in the GBIR. These ages range from 2000–9700 yr (Longmire et al. 2007, 096660; Dale et al. 2010, 110408).

### 2.3.2 General Compositional Trends

The geothermal gradient associated with heat flow beneath the Jemez Mountains is reflected in temperature trends in different groundwater zones. Temperature of recharge water and perched-intermediate locations near the Sierra de los Valles is generally less than 15°C, but with increasing depth, groundwaters in the perched-intermediate zones within the Cerros del Rio basalt and Puye Formation and regional aquifer are generally greater than 15°C (LANL 2011, 207447, Figure C-47).

Groundwater in the recharge zone within the Sierra de los Valles is characterized by a calcium-sodium-bicarbonate ionic composition with a specific conductance generally <110 $\mu$S/cm. Concentrations of dissolved calcium and bicarbonate increase with depth within perched-intermediate zones and the regional aquifer (LANL 2000, 068661; LANL 2001, 071301; Longmire 2002, 072713; Longmire 2002, 072800; Longmire 2002, 073282), reflecting the increase in residence times within the deeper saturated zones. Specific conductance and concentrations of dissolved barium, calcium, chloride, fluoride, sodium, and bicarbonate generally increase along some groundwater flow paths in perched-intermediate zones from the Sierra de los Valles eastward toward the Rio Grande (LANL 2011, 207447, Appendix C). A similar increase also occurs in total dissolved solids (TDS). Constituents that tend to decrease in perched-intermediate groundwater include nitrate and potassium (LANL 2011, 207447, Appendix C). Generally, silica is high throughout the region as a result of equilibration with the siliceous volcanic rocks. Concentrations of dissolved silica are slightly lower in most perched-intermediate locations (volcanic-derived rocks) than in regional aquifer locations (Appendix C). The ubiquity contributes to a flattening of the bicarbonate-TDS relationship, indicating the importance of bicarbonate.

Concentrations of dissolved iron and manganese are normally <0.05 and 0.005 mg/L, respectively, which also suggest overall oxidizing conditions within the recharge zone. Groundwater discharging from springs in this region is generally oxidizing because concentrations of chemical reductants, including hydrogen sulfide, methane, and ammonia, are less than detection. Naturally occurring and measurable mean concentrations of dissolved oxygen (DO) (1 to 9 ppm), sulfate (>3 ppm), and nitrate (typically $\leq$0.5 ppm) in many locations are characteristic of oxidizing conditions (Collins et al. 2005, 092028; LANL 2011, 207447, Appendix C). By aquifer, total carbonate alkalinity, fluoride, and TDS means are similar between the two groundwater zones, while all other constituents are lower in the perched-intermediate zone, except for sulfate.

Concentrations of tritium vary in recharge water because of local and seasonal variations. Recharge water derived from precipitation near the Sierra de los Valles contains tritium (19 pCi/L to 49 pCi/L), which decays to <3 pCi/L along groundwater flow paths within noncontaminated perched-intermediate zones and the regional aquifer beneath the Plateau (Longmire et al. 2007, 096660). These results, indicating young groundwater occurs in the Sierra de los Valles area, are corroborated by unadjusted $^{14}C$ ages showing very young ages for background locations in this area, such as Water Canyon Gallery, CdV-5.0 Spring, and PC Spring in the perched-intermediate zone (Dale 2009, 110407). Dilution of water containing tritium also occurs within the vadose zone and regional aquifer. Older waters tend to have very low tritium values. For example, Dale (2009, 110407) reports a mean unadjusted $^{14}C$ age of 3778 yr for Spring 9B, and 7033 yr for Spring 1 along the Rio Grande, whereas tritium values are typically near 1 pCi/L for both these locations.

Variations in trace-element concentration depend on solute residence time and the extent of water-rock interactions. Older groundwater within the regional aquifer tends to have higher concentrations of trace elements as a result of desorption processes. Other constituents tend to adsorb or be removed along groundwater flow paths with age, including arsenic, iron, chromium, and nickel.

### 2.3.3 Contaminant Distributions and Transport

Background distributions of chemicals in groundwater have direct relevance to defining the nature and extent of contamination. Geochemical processes controlling distributions of background solutes also occur in contaminated groundwater.

The largest mass distribution of adsorbing contaminants in Los Alamos Canyon and Mortandad Canyon have been observed within the alluvium (annual Laboratory environmental surveillance reports and Revision 3 of the GBIR [LANL 2007, 095817]). Alluvial groundwater in both Los Alamos and Mortandad Canyons contains elevated concentrations or activities of strontium-90, cesium-137, uranium, tritium, plutonium-238, plutonium-239/240, and americium-241. This observation supports the concept that most of these radionuclides, except uranium and tritium, adsorb substantially onto aquifer material. Concentrations of adsorbing radionuclides and cationic metals generally decrease downgradient along the groundwater flow path. One or more of the nonadsorbing or poorly adsorbing contaminants (tritium, perchlorate, bromide, chloride, nitrate, pharmaceuticals, uranium, RDX, and/or TNT) have been detected at wells Otowi-1, R-3i, MCOI-4, MCOI-5, MCOI-6, MCOBT-4.4 (now plugged and abandoned), SCI-1, SCI-2, 53-1i, R-4, R-5, R-6i, R-8, R-9, R-9i, R-11, R-12, R-15, R-18, R-23i, R-25, R-28, R-36, R-42, R-44, R-45, R-50, and R-62.

The presence of colloids may enhance the movement of contaminants, especially those that are adsorbed onto fine-grained particles in the shallow subsurface. Colloid transport in alluvial groundwater has been documented in Mortandad Canyon (Penrose et al. 1990, 011770). The sources of colloids probably include natural materials (clay minerals, silica glass, HFO, and solid organic matter) and possibly solid phases (silica glass and calcium carbonate) associated with the treated Technical Area 50 (TA-50) discharge. These colloids partly influence the distribution of suspended radionuclides within alluvial groundwater in Mortandad Canyon because constituents adsorbed onto colloids are transported more rapidly than they would be transported as dissolved solutes.

## 3.0 METHODOLOGY

This section provides an overview of the steps followed in determining groundwater background values for the perched-intermediate and regional aquifers. The stepwise process is described in section 3.1. Section 3.2 presents the criteria used and steps followed in selecting locations for the analysis.

Sections 3.3 and 3.4 describe field and analytical methods, respectively. Section 3.5 discusses QA, and section 3.6 provides an overview of the background locations. Section 3.7 focuses on statistical methods, and section 3.8 points to tables of descriptive statistics.

### 3.1 Overall Steps in Process

The overall steps followed in determining groundwater background values are shown in Figure 3.1-1. The figure divides the steps into three phases: (I) selection of locations and initial vetting and preparation of data, (II) general data analysis, and (III) statistical analyses, including calculation of UTLs. Where applicable, individual steps shown in boxes are keyed to sections in the EPA Unified Guidance (EPA 2009, 110369) that was followed for that step.

***Phase I**.* The implementation plan (LANL 2016, 601422) was followed in selecting background locations for the regional aquifer. Locations for perched-intermediate groundwater were recommended by the Laboratory based on the current Interim Plan monitoring network and agreed upon by NMED during project technical meetings. As described in section 3.2, chloride and tritium data were extracted from Intellus New Mexico (www.intellusnm.com) and compared with the criteria presented in the implementation plan (LANL 2016, 601422).

After the background locations were finalized, the complete data set was extracted from Intellus New Mexico (www.intellusnm.com). In accordance with the implementation plan (LANL 2016, 601422), only data from samples collected by the Laboratory were used. The applicable period of record for UTL calculation was from January 2010 to December 2015, and the data were required to have validation status. The full period of record for each location was extracted, however, for use in preparing time-series plots.

Data-preparation steps were necessary before statistical analyses could be performed on the dissolved or filtered water chemistry data and on results of field measurements. Conditions applied to the data query to eliminate unacceptable data (e.g., unvalidated or borehole data) are listed in Table 3.1-1. Criteria that were subsequently applied to the data resulting from the query eliminated the following additional data:

- All organic data (parameter category equal to "ORGANIC")
- Analytes not on the final list of constituents for background
- Americium-241 analyzed by gamma spectroscopy methods
- Data from analyses that were rejected for quality or procedural deficiencies
- Data from laboratories where data validation procedures could not be verified or the laboratory was not known
- Data collected at certain wells before they were rehabilitated. This applies to well R-26 data before June 2011.
- Field duplicates and other QA samples
- Field data for total carbonate alkalinity-$CO_3$+$HCO_3$. This was analyzed in both field and laboratory, and the laboratory data were retained.
- Original results for samples that were reanalyzed.

During Phase I, the data set was finalized to remove obvious errors, field duplicates and unmarked duplicates, organic constituents, and results from certain analytical laboratories. The final constituent list was also prepared.

***Phase II***. The steps in Phase II involved evaluation of temporal trends and analyzing outliers through comparisons by statistical plots and tests (Figure 3.1-1). Temporal trends were evaluated by plotting all results for each constituent versus time for each well (Appendix C). These plots were reviewed during technical meetings with NMED. No temporal trends were identified that indicated results should be removed from the data set.

Outliers or suspect values that were exceptionally high or low relative to the rest of the data were analyzed through comparisons by statistical plots and tests (Figure 3.1-1). In addition, in Phase II the descriptive statistics and plots were created to discern temporal and spatial trends in the data.

***Phase III***. In this phase, the UTLs were calculated only for constituents having at least 50% detected results.

## 3.2 Selection of Locations

The April 22, 2016, implementation plan (LANL 2016, 601422) specified incorporating the set of background locations presented in NMED's October 2015 groundwater background report (NMED 2015, 600967), with some additions or deletions based on NMED's criteria that a background location must have less than 3 mg/L chloride and 2 pCi/L tritium. The background locations in the NMED report were for the regional aquifer only and consisted of 34 well screens and 8 springs, for a total of 42 locations. During technical meetings, it was agreed to remove well R-44 screen 2 from the background location set because recent sampling results indicated samples may not be representative of background conditions. Monitoring well R-47 was added to the background location set. This well was not used by NMED because it was not completed until September 2014, after NMED sampling had been completed in 2012. The 8 springs used by NMED were also retained, for a total of 34 well screens and 8 springs in the regional background data set.

The October 2015 NMED background report (NMED 2015, 600967) contained data only for the regional aquifer. The background locations for perched-intermediate groundwater were identified during a July 14, 2016, meeting with LANS and NMED. The locations identified were wells CdV-37-1(i), PCI-2, R-26 screen 1, R-27i, and R-47i.

After the background locations were identified, chloride and tritium data for these locations were compared with the 3-mg/L and 2-pCi/L criteria for chloride and tritium, respectively, to determine whether any locations should be removed from the background location set. Four locations had one detection of chloride greater than 3 mg/L. Seven locations had at least one detection of tritium above 2 pCi/L or one nondetection with a detection limit greater than 2 pCi/L. These results are summarized in Table 3.2-1. Because none of the locations consistently had detections or detection limits above the criteria for chloride and tritium, no locations were removed from the background set on this basis. The detections of chloride and tritium above the criteria would instead be treated as potential outliers during the statistical evaluation of the background data. The final set of background locations is presented in Figure 3.2-1 and Table 3.2-2.

## 3.3 Field Methods

Standard operating procedures (SOPs) are followed for measuring groundwater levels; collecting groundwater and spring samples; measuring field parameters; and preparing, preserving, and transporting samples. These procedures are identified in Appendix C of the Interim Plan (e.g., LANL 2010, 109830). All data included in the data set for the GBIR were collected following relevant SOPs.

### 3.3.1 Sample Collection

***Springs.*** Water samples at springs were collected by dipping a beaker or sample bottle into the surface expression or by transferring the water directly from the spring to the sample container using a peristaltic pump. Field parameters were measured by placing the individual meters directly into the pool of spring water. Samples collected for turbidity measurements were dipped from the pool of water and placed into a sample measurement cell.

***Monitoring wells.*** A bladder pump sampling system was used to collect groundwater from intermediate well PCI-2. Submersible pump sampling systems were used to collect groundwater from single-screen perched-intermediate and regional wells. Purgeable Baski sampling systems were used to collect water from multi-screened wells. Where possible, perched-intermediate and regional wells were purged a minimum of 3 casing volumes plus the volume of the drop pipe. In some cases, it was impossible or impractical to purge 3 casing volumes, but in all cases, purging continued until water-quality indicator parameters measured in the field stabilized. Samples were collected directly from the pump discharge line as soon as practical after purging was complete. Field parameters, measured in a flow-through cell, were allowed to stabilize from these wells before samples were collected. For this work, an analysis was made of water quality of samples collected after purging 3 casing volumes and after purging fewer volumes.

***Sample preservation.*** Groundwater samples were preserved either with ice at 4°C or by using concentrated $HNO_3$ or concentrated $H_2SO_4$. The pH of acidified samples (metals, nitrate plus nitrite, and radionuclides) was lowered by the dropwise addition of acid to a pH of ≤2 or by the use of preacidified sample containers.

### 3.3.2 Method of Measurement

Groundwater samples for metals and general chemistry analyses were collected in precleaned high-density polyethylene plastic bottles. Filtered samples were processed on-site immediately after collection, using 0.45-µm acetate filter membranes or filtered during the sampling process with 0.45-µm in-line filters. Duplicate samples were collected in the field for every 10 primary samples. The field duplicate samples were separate aliquots collected during the same sampling event for a location. Alkalinity (total carbonate alkalinity) was determined in the laboratory using standard titration techniques.

The field parameters recorded for each of the sampling stations included pH, temperature (°C), DO, oxidation-reduction potential (ORP), specific conductance (µS/cm), and nephelometric turbidity units (NTUs). Based on discussions at technical meetings with the Laboratory and NMED, field measurements of ORP and NTUs were not evaluated. Appendix B provides the field-measured parameters taken at each sampling station and the sampling dates.

A YSI 556 Handheld Multiparameter Instrument was used to measure pH, temperature, specific conductance, DO, and ORP. The meters were calibrated at the beginning of each day of use. Turbidity was measured in NTUs with a Hach 2100P turbidmeter calibrated at the beginning of the field season.

## 3.4 Analytical Methods

The following laboratories analyzed groundwater samples included in the data set for the GBIR:

- General Engineering Laboratories (GEL/GELC) for general inorganics, trace metals, and radionuclides
- American Radiological Services Laboratory (ARSL) for tritium
- The Laboratory’s Earth and Environmental Science Division laboratory for bromide at monitoring wells R-47i and R-48.

### 3.4.1 Methods

A list of constituents analyzed is presented in Table 3.4-1. Analytical methods used by laboratories for the updated data set are presented in Table 3.4-2. The external laboratories followed the Laboratory's analytical services statement of work (SOW) for quality control (QC) of sample analyses for holding time and sample preservation, storage, preparation, and chain-of-custody procedures.

### 3.4.2 Analytes of Interest

Table 3.4-1 lists the constituents analyzed as part of this investigation. The samples in this data set are listed in Appendix A, and the entire analytical data set is included in Appendix B (on CD).

## 3.5 Data Quality

This section provides a discussion of the data-quality objectives (DQOs) for the background analysis, QA applied to the data, and the pedigree of data used in the analysis.

Since the inception of the Consent Order, groundwater monitoring has been guided by a series of Interim Plans and a Groundwater Protection Program Plan to collect and analyze groundwater and surface water samples at specific locations and for specific constituents to fulfill the requirements of the Consent Order. Data from this monitoring process is published in periodic monitoring reports (http://www.lanl.gov/environment/h2o/reports.shtml?1). Before this program, from 1997 to 2005, the Laboratory implemented a sitewide hydrogeologic characterization program, described in the Laboratory's Hydrogeologic Workplan (LANL 1998, 059599).

For all groundwater sampling collection, the Laboratory uses an EPA DQO process (EPA 1992, 054947; EPA 1994, 048639; EPA 1997, 057589), a strategic planning approach for data-collection activities. By using the DQO process, the Laboratory ensures that the type, quantity, and quality of background hydrogeochemical data will be appropriate to meet monitoring objectives. All groundwater monitoring is conducted as an integrated activity that uses the same operating procedures, field sampling and analytical contracts, and data-management systems. All sampling, data reviews, and data package validations have been conducted since 2000 using SOPs that are part of a comprehensive QA program. The quality program and procedures are available at http://www.lanl.gov/environment/plans-procedures.php.

The required analytical laboratory batch QC is defined by the analytical method, the analytical SOW, and generally accepted laboratory practices. The analytical laboratory assigns qualifiers to the data to indicate the quality of the analytical results. The laboratory batch QC is used in the secondary data validation process to evaluate the quality of individual analytical results, to evaluate the appropriateness of the analytical methodologies, and to measure the routine performance of the analytical laboratory. In addition to batch QC performed by laboratories, the Laboratory submits field QC samples to test the overall sampling and analytical laboratory process and to spot-check for analytical problems. These results are used in secondary validation along with information provided by the analytical laboratory.

After the Laboratory receives the analytical laboratory data packages, the packages receive secondary validation. For data collected before March 2012, validation was done by an independent contractor, Analytical Quality Associates, Inc. (AQA). After that date, validation is done by an automated process after data are loaded.

AQA's reviews followed the guidelines set in the DOE model SOP for data validation, which includes reviewing the data quality and the documentation's correctness and completeness; verifying that holding times were met; and ensuring that analytical laboratory QC measures were applied, documented, and kept within contract requirements. As a result of secondary validation, a second set of qualifiers is assigned to the analytical results.

Auto validation (1) ensures that the electronic data deliverable contains all the required fields, (2) verifies that results of all QC checks and procedures are within valid criteria limits, and (3) applies specific qualifiers and reason codes per the EPA's National Functional Guidelines for data review as well as the Laboratory's SOPs. Once auto validation is complete, the data are uploaded into the Laboratory's database system and the public database (www.intellusnm.com).

Data that are R-qualified (rejected because of noncompliance regarding QC acceptance criteria) during independent validation are considered "not detected" but are still reported to the Laboratory's database. Analytical laboratory QC results, including matrix spike and matrix spike duplicates, were not included in the data set used in the GBIR.

The selected locations have sufficient validated data generated under the current program, so older data (pre-2010) were not used in this data evaluation. The database used in this analysis consists of qualified data collected under QA procedures. Data from all locations used in this analysis have been collected from January 1, 2010, to December 31, 2015.

## 3.6 Overview of Background Locations

This section provides a discussion of the categorization of locations used in the background analysis.

### 3.6.1 Overview

The potential locations encompass geographic, geologic, geochemical, and hydrologic variation. Sections 3.1 and 3.2 discuss the steps and criteria used to select locations used for the GBIR. Based on those criteria, the 5 intermediate and 42 background locations represent locations where groundwater is hypothesized to be unaffected by Laboratory operations. Information on the geologic and hydrologic systems at the Laboratory (see section 2.0) was used to categorize background sampling sites as part of an intermediate-depth perched system or a deep regional system.

Classification of groundwater was based on (1) well depth, (2) hydrogeologic units penetrated, (3) depth to the zone of saturation sampled and observed, or (4) the projected position of the regional water table at that location. Table 2.3-1 lists each location and the primary "assigned" hydrogeologic unit for that screened zone or spring source, along with the unadjusted $^{14}C$ age in years for each location. For mean values, the number of samples used in the mean calculation is also included.

### 3.6.2 Locations in the Recharge Zone

Monitoring wells classified as perched-intermediate wells include CdV-37-1(i) and R-27i, located in Water Canyon; PCI-2, located in Pajarito Canyon; and R-26 screen 1 and R-47i, located in Cañon de Valle. These wells sample groundwater from the Puye and/or Cerro Toledo Formations (Table 2.3-1). Groundwater in these wells is probably derived from canyon-floor recharge as well as by mountain-front recharge. Carbon-14 ages were not available for these locations.

### 3.6.3 Locations on the Pajarito Plateau

This category contains the majority of the monitoring well locations in this study. These wells are newer "R-series" regional wells installed to monitor water quality and water levels in the regional aquifer. Wells are grouped by lithology, as described below:

***Chamita Formation:*** Wells R-2 and R-6 are assigned to this lithology. Groundwater ages for these locations range from 4100 to 6200 yr old.

***Puye Formation:*** Most of the wells in the GBIR are assigned to this lithology. These wells include R-17 screen 1, R-17 screen 2, R-27, R-30, R-37 screen 2, R-40 screen 2, R-46, R-47, R-51 screen 1, R-51 screen 2, R-52 screen 1, R-52 screen 2, R-53 screen 1, R-53 screen 2, R-54 screen 2, R-56 screen 1, R-56 screen 2, and R-60. Several other wells are assigned to lithologies consisting of the Puye Formation along with other units. These include the Puye Formation and Miocene pumiceous deposits (wells R-13 and R-14 screen 1), Puye Formation and Cerros del Rio volcanic field (R-21), and Puye Formation with Cerros del Rio sediments (R-38). Groundwater ages for locations in this group having data range from 2000–4600 yr old.

***Micocene Pumiceous Deposits:*** Wells R-33 screen 1, R-33 screen 2, and R-50 screen 2 are assigned to this lithology. These locations contain groundwater that is about 3500 yr in age.

***Dacite Lavas*****:** Wells R-39, R-49 screen 1, and R-57 screen 1 are assigned to this lithology, which consists of dacitic lavas of the Cerros del Rio volcanic series. These locations contain groundwater that is about 3200 yr in age.

***Totavi Lentil:*** Wells R-16r, R-49 screen 2, and R-57 screen 2, and Ancho Spring are assigned to this lithology. This formation is composed of Rio Grande deposits that may also be intermixed with other volcanic rocks such as the Cerros del Rio basalt (section 3.6.4) and is considered to be limited in geographic extent. R-16r water is fairly old, at about 7200 yr, whereas R-49 screen 2 and Ancho Spring contain water that is much younger, at 2900 yr and 3900 yr, respectively. Groundwater age data are not available for R-57 screen 2.

***Tschicoma Formation:*** Well R-48 is assigned to this lithology, which consists of dacite lava flows. Groundwater age data were not available for this well.

### 3.6.4 Locations in the Discharge Zone

Several springs in White Rock Canyon discharge from the Cerros del Rio basalt (Springs 6, 6A, 8, 9, 9A, and 9B) and from the Chamita Formation (Spring 3AA) and were assigned to the regional aquifer. Groundwater age was 9700 yr for Spring 3AA and ages ranged from 1600 to 3800 yr for other springs.

## 3.7 Statistical Methods

Data-preparation steps were necessary before statistical analyses could be performed on the groundwater chemistry data (Table 3.1-1). First, the data were compiled for intermediate and regional locations and for all field and analytical laboratory sample results. Second, the list of analytes was determined (Table 3.4-1). Third, the data were inspected for “outlier” or suspect values that were exceptionally high or low relative to the rest of the data. The outliers removed in Revision 5 are listed in Tables 3.7-1 and 3.7-2 for perched-intermediate groundwater and the regional aquifer, respectively. In addition, field duplicates were removed along with other suspect data, as discussed in section 3.1. Descriptive statistics were calculated to represent the number of sample results, detection frequencies, and concentration ranges for the analytes of interest in the groundwater background data. Also, UTLs were calculated, as appropriate, for groundwater background analytes, and these results are reported in descriptive statistics tables.

***Data compilation.*** Analytical suites and sampling dates for the background locations are provided in Appendix A. Sample results and data qualifiers based on validation for inorganic analytes, trace metals, radionuclides, and other analytes (water-quality parameters) are provided in Appendix B.

***Outlier evaluation.*** The data were reviewed to identify outlier or suspect values. The methods used to identify outliers were those described in Chapter 12 of the EPA Unified Guidance (EPA 2009, 110369). For Revision 5, the distributions of all analytes were reviewed using statistical plots (probability plots and box plots). Statistical tests using ProUCL Version 5.1 (EPA 2015, 601725) (either Dixon's Test or Rosner's Test), and plots were used to flag sample results for potential exclusion as outliers. Specifically, Rosner's Test was used to identify five or fewer outliers. The reason for allowing the software to identify up to five outliers and not more was that the locations are viewed to represent natural background conditions and the outlier evaluation is intended to identify erroneous values. Only detected results were used to identify outliers. If there were 25 or more detections, then Rosner's Test was used; otherwise Dixon's Test was implemented and could identify a single outlier. This approach is consistent with EPA Unified Guidance (EPA 2009, 110369) and the ProUCL technical guidance (EPA 2013, 600837). The outliers identified using this process and removed from the data sets are presented in Tables 3.7-1 and 3.7-2 for perched-intermediate groundwater and the regional aquifer, respectively.

***UTL calculation methods.*** UTL values were calculated for constituents using statistical methods described in the ProUCL technical guidance (EPA 2013, 600837) and in Chapter 17 of the EPA Unified Guidance (EPA 2009, 110369). ProUCL calculates UTLs for up to four different statistical distributions using robust methods to evaluate nondetected sample results. In Revision 5, UTLs were calculated for constituents that were detected at a rate greater than or equal to 50% and with a number of sample results greater than or equal to 10 because those criteria provided the most confidence for defensible values. ProUCL Version 5.1 (EPA 2015, 601725) was used to calculate the UTLs for all analytes and data groups. Appendix D includes the ProUCL output for the groundwater analytes and a summary of the selected UTL for each analyte. The following logic was applied to select the UTL:

- If the data were normally distributed, then the normal UTL was selected unless the analyte had any nondetections and the maximum likelihood estimate of the UTL was not calculated. In this case, the nonparametric UTL was selected.
- If the data were gamma-distributed, then the gamma UTL was selected (Wilson-Hilferty Approximate Gamma UTL). If there were any nondetections, then the Wilson-Hilferty Approximate Gamma UTL based on extrapolated data using the gamma regression-on-order statistics (ROS) substitution method was used.
- If the data were lognormally distributed, then the lognormal UTL was selected (95% UTL with 95% coverage). If the data contained nondetections, then the lognormal ROS substitution method was used.
- If the data did not fit a discernable distribution, then the nonparametric UTL was selected (95% UTL with 95% coverage). If there were any nondetections, then the Kaplan-Meier method was used.
- If the statistical criteria for UTL calculations in the ProUCL 5.1 software were not met for a constituent, the background value for that constituent was not established.

### 3.8 Descriptive Statistics

Results of statistical analyses of all data, including count, detections (count, minimum, maximum), nondetections (count, minimum, maximum), 25th percentile, median, mean, 75th percentile, 95th percentile, and UTL, are provided in section 4.2. Appendix C provides the statistical plots of these data to show trends by location, aquifer, and over time.

# 4.0 RESULTS

This section presents the results of spatial and temporal trends in water chemistry, the results of the UTL analysis, and groundwater background values.

## 4.1 Temporal Trends and Outlier Identification

In addition to showing the spatial trends in water chemistry, Appendix C contains temporal plots of each constituent over time for each background location. Generally, most constituents in older regional aquifer groundwater should not exhibit abrupt changes over time if they are in older background locations, although some natural variation is expected. Greater variation is expected in younger perched-intermediate waters, where input changes are proximal. In many cases, too few detections of a particular constituent are available to distinguish trends—the "trend" is a change in detection limits over time. This is particularly true for the trace metals and many radionuclides.

## 4.2 Statistics and UTL Results

Descriptive statistics were calculated using ProUCL Version 5.1 (EPA 2015, 601725). Descriptive statistics for intermediate groundwater are presented in Table 4.2-1, and descriptive statistics for the regional aquifer are presented in Table 4.2-2.

Using the approach discussed in section 3.7, UTLs were calculated for constituents in the perched-intermediate zones and the regional aquifer having greater than 50% detections. The UTLs are presented in Table 4.2-3 (for the perched-intermediate zone) and Table 4.2-4 (for the regional aquifer).

## 4.3 Recommended Background Screening Values

UTLs were calculated for 22 constituents in perched-intermediate groundwater (Table 4.2-3) and 23 constituents in the regional aquifer (Table 4.2-4). UTLs are recommended as background screening values for these constituents. The other 37 constituents in perched-intermediate groundwater and 36 constituents in the regional aquifer had greater than 50% nondetected values and UTLs were not calculated. No background screening values are recommended for these constituents.

# 5.0 SUMMARY AND CONCLUSIONS

## 5.1 Summary

As stated in section 1.0, the GBIR is meant to be a "living" document that is revised periodically as new wells are installed and additional rounds of data are collected from existing wells and springs. This report is the fifth revision of the Laboratory's analysis of groundwater background since 2005.

- EPA Unified Guidance (EPA 2009, 110369) was followed in every applicable step of the analysis (see Figure 3.1-1).
- The requirements of LANL's April 2016 implementation plan (LANL 2016, 601422) were met.
- The analytes evaluated and analytical methods used are the same as for groundwater monitoring under the Interim Plan (e.g., LANL 2014, 256728).
- The data set was obtained exclusively from Intellus New Mexico (www.intellusnm.com) and was adjusted to remove field duplicates and other factors.

- Descriptive statistics were calculated for 59 laboratory analytes and 4 field parameters for both perched-intermediate groundwater and the regional aquifer. A total of 22 laboratory analytes for perched-intermediate groundwater had greater than 50% detections and UTLs were calculated for these analytes. For the regional aquifer, 23 analytes had greater than 50% detections and UTLs were calculated for these.

## 5.2 Conclusions

This revised analysis of groundwater background for the Laboratory is an evaluation of data from 47 monitoring well/spring locations at and near the Laboratory that are free of anthropogenic influences.

- Comparisons with NMED's criteria for chloride and tritium did not identify any locations that required removal from the background set.
- Time-series plots show results from all locations to be stable with time. No locations were removed as a result of the temporal evaluation.
- The data set used to calculate UTLs consists exclusively of data collected under the IFGMP (e.g., LANL 2014, 256728) and are fully consistent with current groundwater monitoring data.
- Most constituents in the background data set have greater than 50% nondetected results, and data for these locations are not suitable to calculate UTLs.
- The UTLs and descriptive statistics are adequate to meet the requirements with respect to groundwater investigations and corrective measure evaluations required under the Consent Order.

# 6.0 REFERENCES

*The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.*

*Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.*

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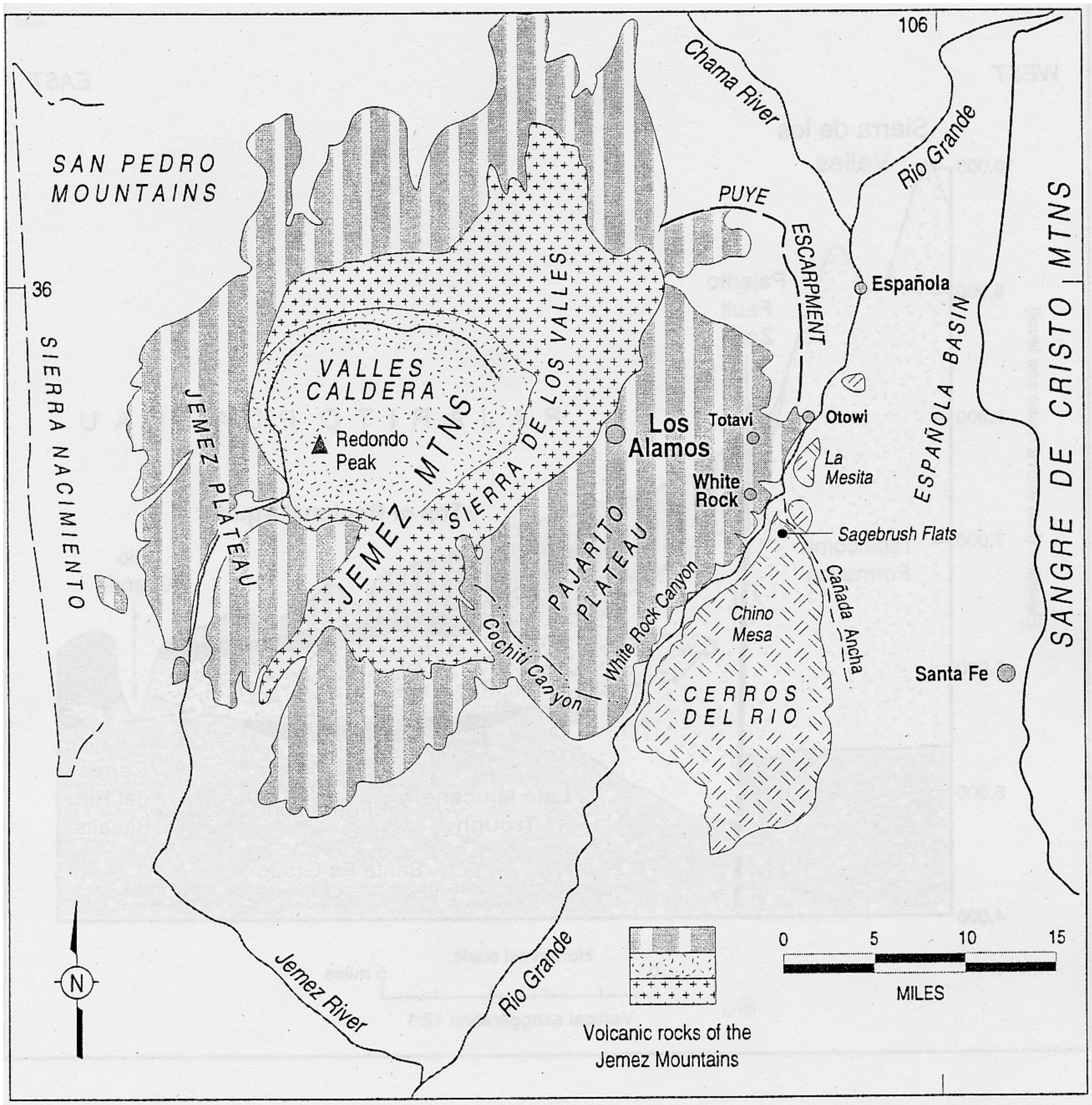
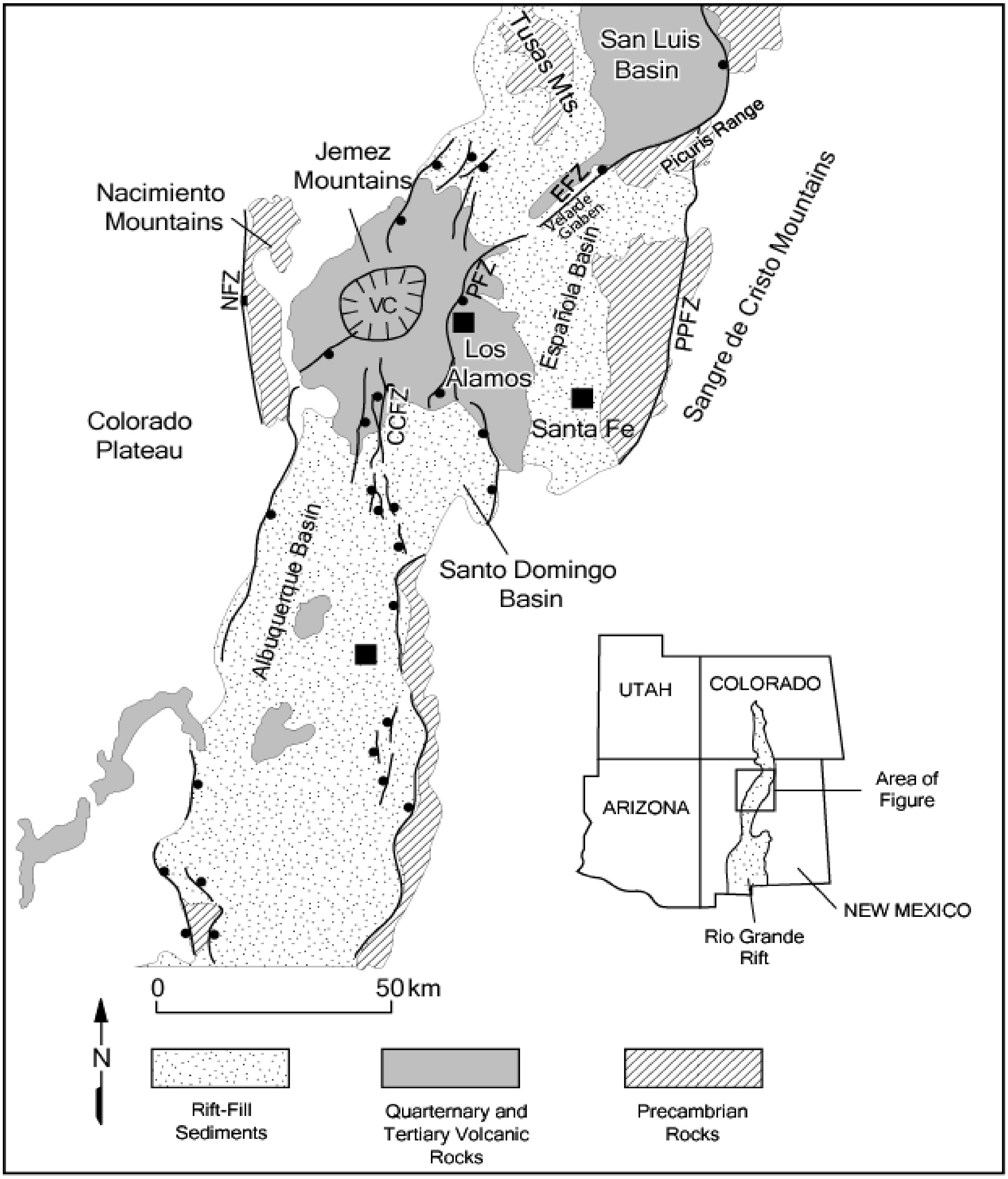
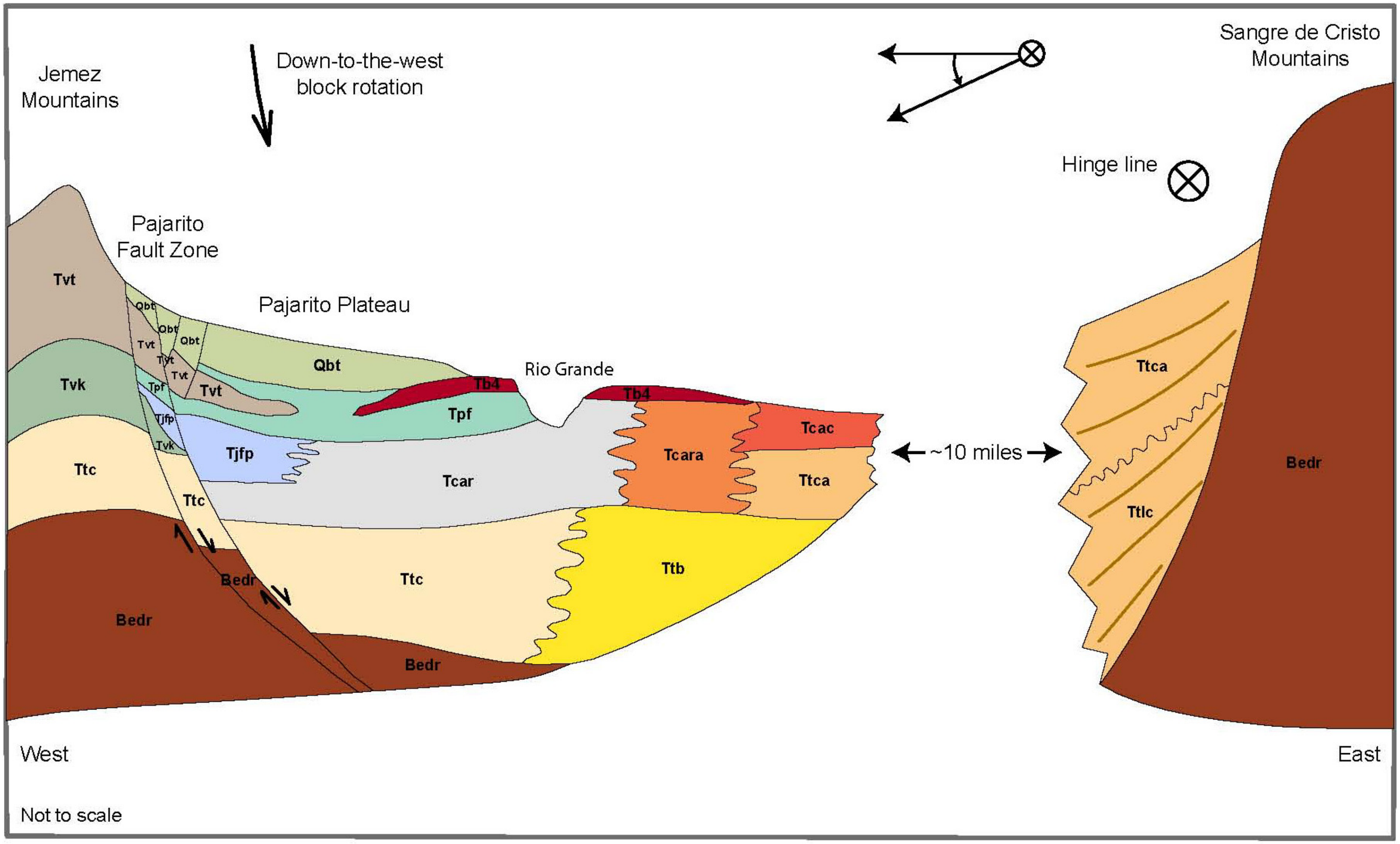



**Figure 2.1-1 Regional and tectonic setting of the Jemez Mountains, Valles Caldera, and Pajarito Plateau in relation to the Rio Grande Rift, Española Basin, Colorado Plateau, and the Sangre de Cristo Mountains, New Mexico (LANL 1998, 059599, Figure 2.3)**



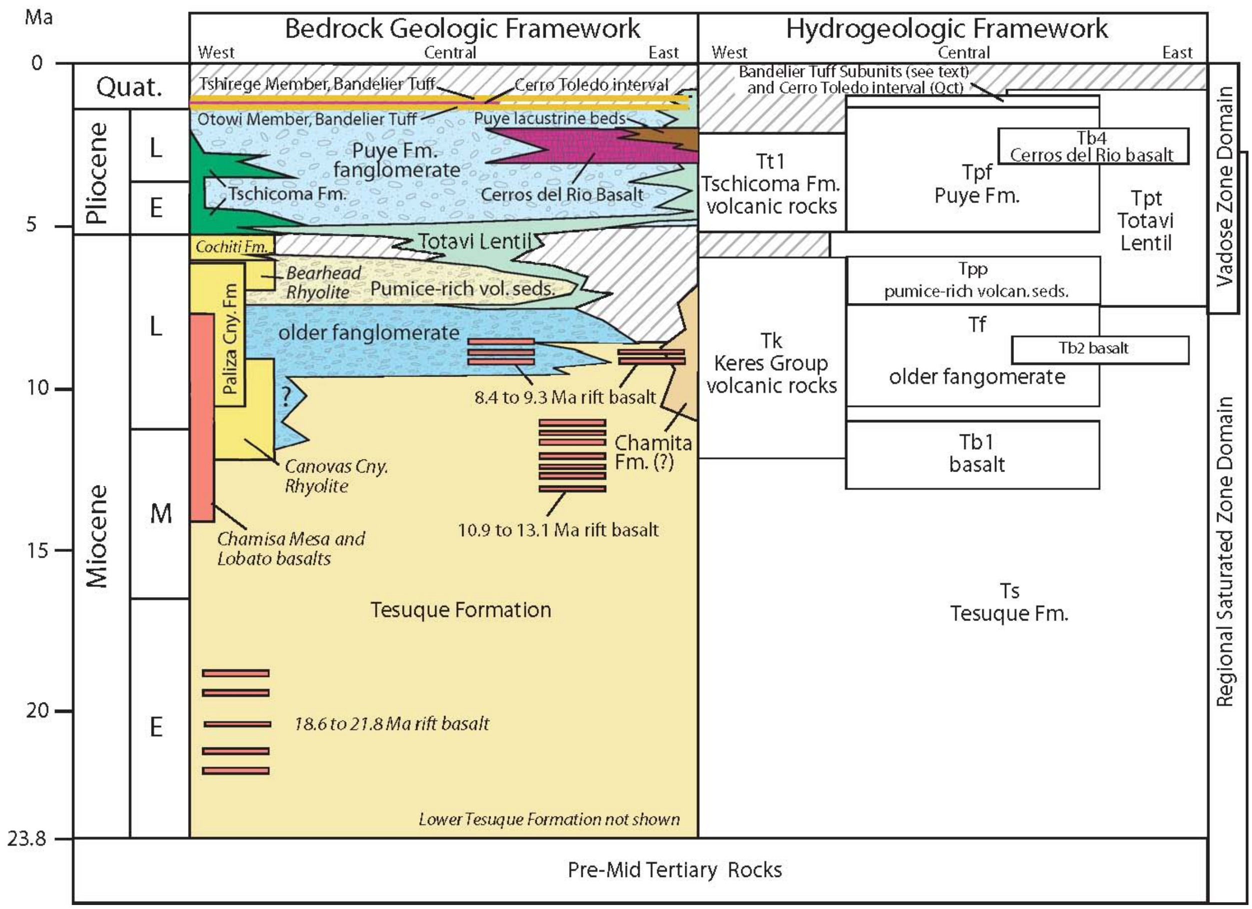

Note: Major fault systems are shown with ball on downthrown side. VC stands for Valles Caldera complex, EFZ is the Embudo fault zone; NFZ is the Nacimiento fault zone; CCFZ is the Cañada del Cochiti (La Bajada) fault zone; PFZ is the Pajarito fault zone; and PPFZ is the Picuris-Pecos fault zone.

**Figure 2.1-2 Regional geologic map (Broxton and Vaniman 2005, 090038)**




Note: Stratigraphic nomenclature in figure above, from oldest to youngest, is as follows: Bedr, bedrock; Ttlc, lower coarse-grained Tesuque Fm; Ttb, Tesuque Fm lithosome B; Ttc, Tesuque Fm – Chama-El Rito Member; Tcar, Chamita Fm – axial river gravel; Tcara, transitional zone between Ttca and Tcar; Ttca, Tesuque and Chamita Fms, finer-grained lithosome B; Tcac, Chamita Fm, coarse-grained lithosome A; Tvk, Keres volcanics; Tjfp, Bearhead Rhyolite and Fanglomerates; Tpf, Puye Fm; Tvt, Tschicoma Fm; Tb4, Cerros del Rio basalt; Qbt, Bandelier Tuff.

**Figure 2.1-3 Generalized geologic relations in the Española Basin and beneath the Pajarito Plateau (Cole et al. 2010, 106101)**




Notes: Qbt, Bandelier Tuff, Tshirege; Qct, Cerro Toledo interval; Qbof, Bandelier Tuff, Otowi Member; Tvt1, Tschicoma Fm (Tt1); Tpf, Puye Fm; Tb4, Cerros del Rio Basalt; Tpt, Totavi Lentil, Tjfp, Bearhead Rhyolite, and fanglomerates (Tf, Tpp); Tb2, 8.4-9.3 Ma Basalts (Tb2); Tvk, Keres Volcanics (Tk); Tcac, Chamita Fm. Lithosome A; Tb1, 11.6-13.1 Ma Basalts; Ttc, Tesuque Fm. (Ts).

**Figure 2.1-4 Revised stratigraphy of the Pajarito Plateau (Broxton and Vaniman, 2005, 090038)**

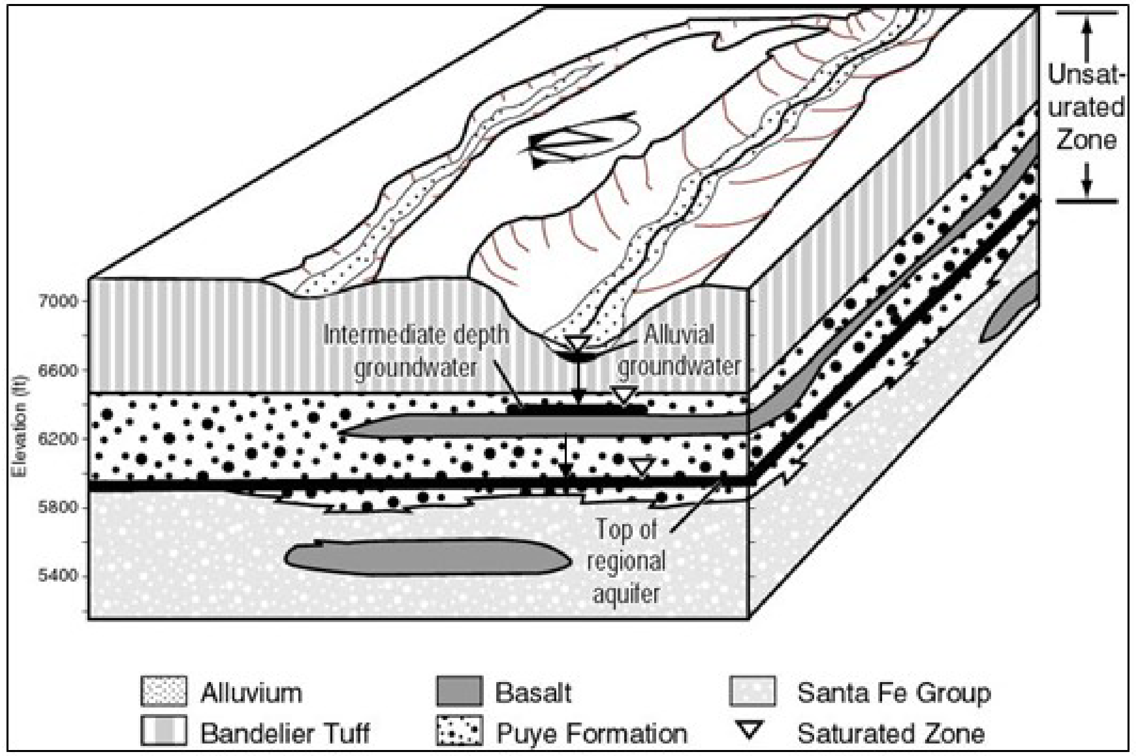



**Figure 2.2-1 Hydrologic conceptual model for the canyons of the Pajarito Plateau (modified from LANL 1998, 059599)**

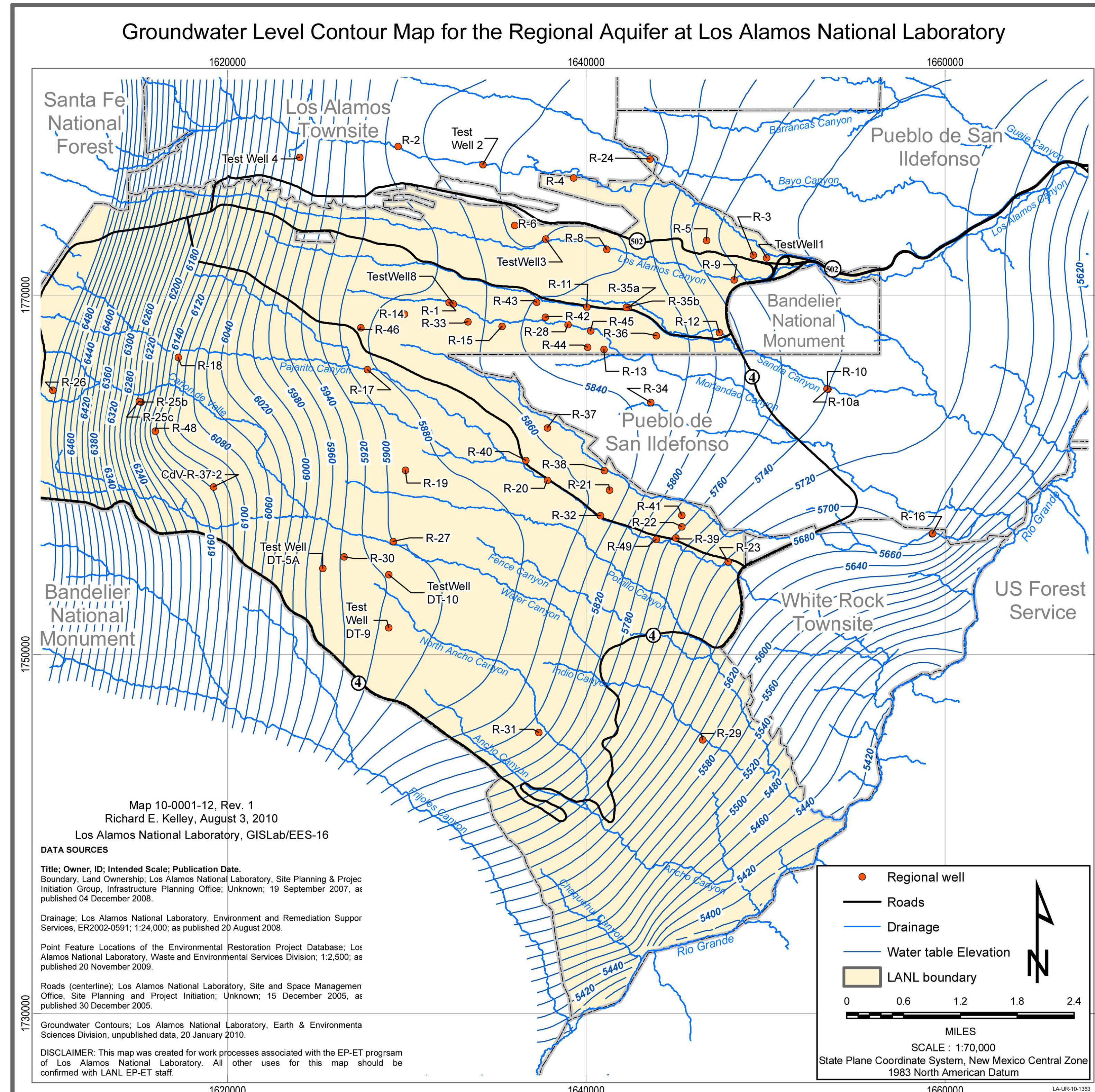



**Figure 2.2-2 Regional water-level map in the vicinity of the Pajarito Plateau**

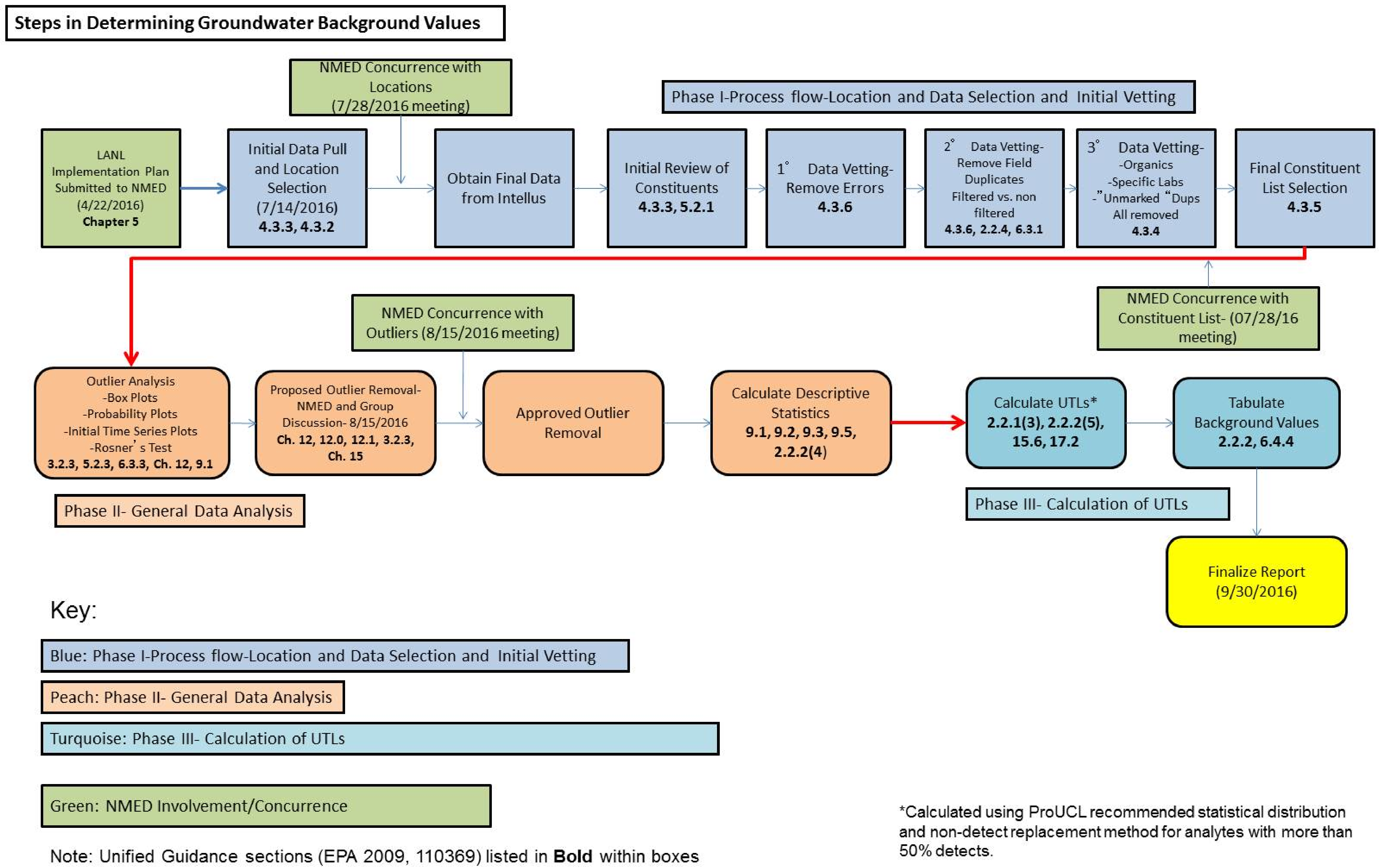



**Figure 3.1-1 Steps followed in determining background screening values and their links to the EPA Unified Guidance**

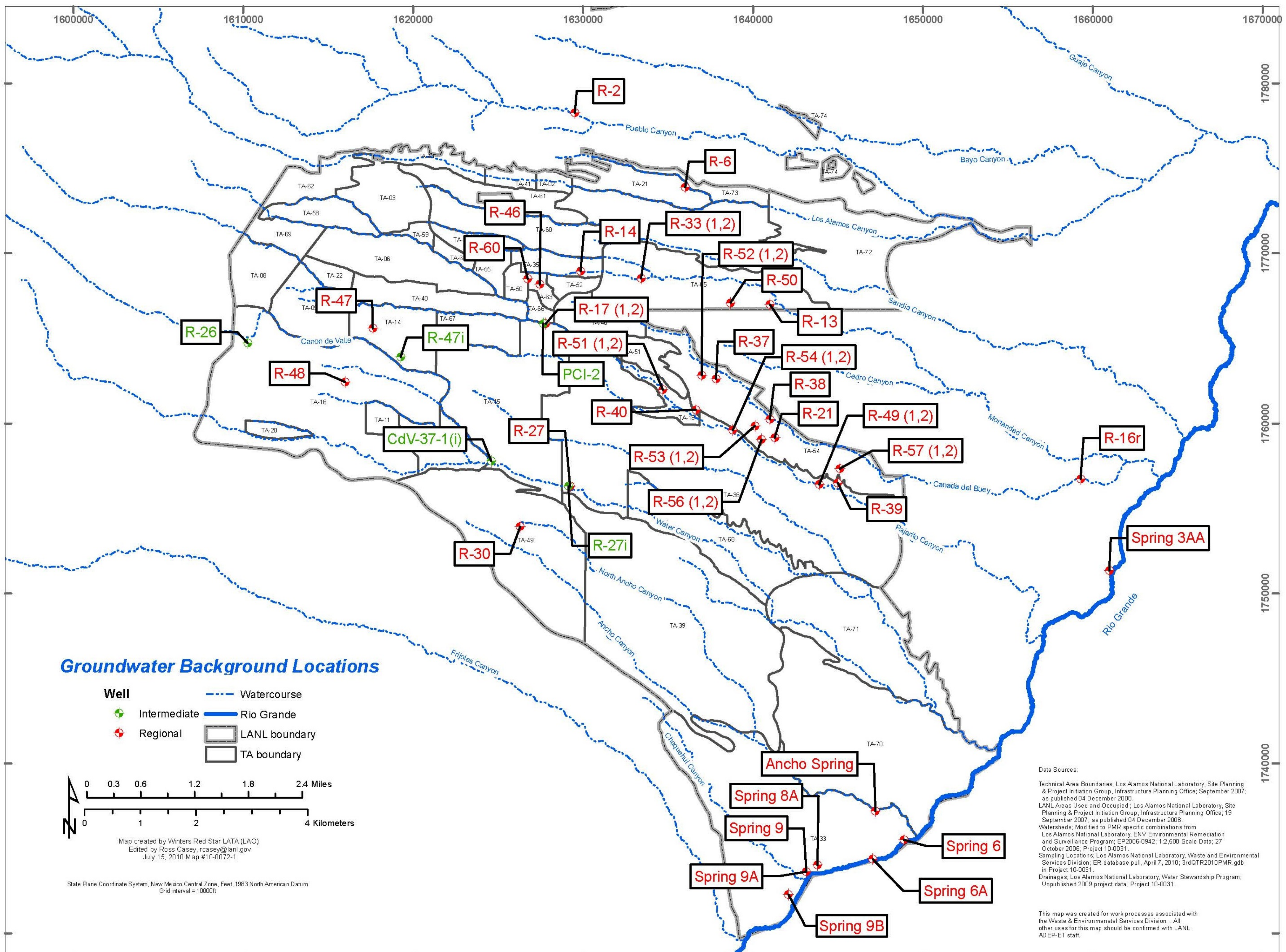



Figure 3.2-1 Groundwater background locations in and near the Laboratory

**Table 1.2-1**
**Comparison of NMED Guidance Regarding Revision 5 and Subsequent Agreements**

| Specification in April 22, 2016, Implementation Plan (LANL 2016, 601422) | Modifications/Clarifications from Technical Meetings |
|---|---|
| 1. Use EPA's ProUCL software package to analyze statistics. | 1. None |
| 2. Incorporate background locations presented in NMED's October 16, 2015, letter. Adjust background locations based on NMED criteria that a background location have less than 2 pCi/L tritium and 3 mg/L chloride. | 2. Delete well R-44 screen 2 from regional locations; add well R-47 to regional locations; use wells PCI-2, CdV-37-1(i), R-26 screen 1, R-27i, and R-47i as intermediate locations. |
| 3. Include data from the Laboratory's groundwater monitoring program conducted under Interim Plan from 2010 to 2015. | 3. Do not use results from field duplicate samples. Use only samples from R-14 screen 1, R-26 screen 1, R-33 screen 1, and R-33 screen 2 collected after conversion from Westbay or Barcad sampling systems. Use only filtered samples for metals. |
| 4. Use method detection limits rather than practical quantitation limits for statistical treatment for nondetections. | 4. None |
| 5. Use ProUCL software package and consistent with the methodology set forth in NMED's letter dated October 16, 2015, for statistical tests for normality and outliers. | 5. Perform tests for outliers in accordance with Unified Guide using Rosner's test (five or less outliers). |
| 6. Present background values for regional aquifer and perched-intermediate aquifer but not alluvial aquifer. | 6. Do not calculate UTLs if more than 50% nondetected results. |

**Table 1.5-1**
**Comparison of Background Locations with Revision 4**

| Location | Update to Revision 4 (LANL 2011, 207447) | Revision 5 |
|---|---|---|
| **Perched Intermediate** | | |
| LAOI(a)-1.1 well | X[a] | —[b] |
| Water Canyon Gallery | X | — |
| CdV-5.0 Spring | X | — |
| Barbara Spring | X | — |
| Campsite Springs | X | — |
| PC Spring | X | — |
| Sandia Spring | X | — |
| Sacred Spring | X | — |
| Spring 1 | X | — |
| PCI-2 | X | X |
| CdV-37-1(i) | — | X |
| R-26 screen 1 | — | X |
| R-27i | — | X |

**Table 1.5-1 (continued)**

| Location | Update to Revision 4 (LANL 2011, 207447) | Revision 5 |
|---|---|---|
| **Regional Aquifer** | | |
| R-47i | — | X |
| PM-2 | X | — |
| PM-4 | X | — |
| PM-5 | X | — |
| G-1A | X | — |
| G-2A | X | — |
| G-3A | X | — |
| G-4A | X | — |
| G-5A | X | — |
| Ancho Spring | X | X |
| Spring 3AA | — | X |
| Spring 6 | X | X |
| Spring 6A | X | X |
| Spring 8A | — | X |
| Spring 9 | X | X |
| Spring 9A | X | X |
| Spring 9B | X | X |
| R-13 | — | X |
| R-14 screen 1 | X | X |
| R-16r | X | X |
| R-17 screen 1 | X | X |
| R-17 screen 2 | X | X |
| R-21 | X | X |
| R-24 | X | — |
| R-27 | X | X |
| R-30 | — | X |
| R-33 screen 1 | X | X[c] |
| R-33 screen 2 | X | X[c] |
| R-34 | X | — |
| R-37 screen 2 | — | X |
| R-38 | — | X |
| R-39 | — | X |
| R-46 | — | X |
| R-47 | — | X |
| R-48 | — | X |
| R-49 screen 1 | — | X |
| R-49 screen 2 | X | X |

**Table 1.5-1 (continued)**

| Location | Update to Revision 4 (LANL 2011, 207447) | Revision 5 |
|---|---|---|
| R-50 screen 2 | — | X |
| R-51 screen 1 | — | X |
| R-51 screen 2 | — | X |
| R-52 screen 1 | — | X |
| R-52 screen 2 | — | X |
| R-53 screen 1 | — | X |
| R-53 screen 2 | — | X |
| R-54 screen 2 | — | X |
| R-56 screen 1 | — | X |
| R-56 screen 2 | — | X |
| R-57 screen 1 | — | X |
| R-57 screen 2 | — | X |
| R-60 | — | X |

[a] X = Well or spring included in background location set.

[b] — = Well or spring not included in background location set.

[c] Converted from Barcad sampling system. Only samples collected after May 2011 conversion are to be used.

**Table 2.1-1**
**Summary of Important Lithologic Units in the Pajarito Plateau Region, New Mexico**

| Unit | Age | Thickness (m) | Major Lithologic Types |
|---|---|---|---|
| Tshirege Member, Bandelier Tuff (Qbt) | Quaternary | ≤260 | Multiple flows of ash and pumice; ash-flow tuff (ignimbrite); minor surge and fall deposits; high-silica rhyolite; welded to nonwelded |
| Cerro Toledo interval (Qct) | Quaternary | ≤30 | Fall deposits (rhyolite) interbedded with volcanic sand and gravel |
| Otowi Member, Lower Bandelier Tuff (Qbof) | Quaternary | ≤75 | Moderately consolidated nonwelded ash-flow tuff (ignimbrite); minor surge and fall deposits; high-silica rhyolite |
| Guaje Pumice Bed, Otowi Member, Lower Bandelier Tuff (Qbog) | Quaternary | ~9 | Sorted vitric pumice |
| Puye Formation, Polvadera Group (Tpf) | Late Miocene to Pliocene | <660 | Volcanic gravel, debris flows, sandstone, siltstone, interbedded tephra |
| Tschicoma Formation, Polvadera Group (Tvt 2) | Miocene to Pliocene | ≥200 per unit | Mostly flows, domes, and minor tuffs; dacite to rhyodacite |
| Cerros del Rio volcanic field (Tb4) | Pliocene | ≤70 per unit | Flows, plugs, scoria, pillows, hydromagmatic deposits; basalt to dacite |

**Table 2.1-1 (continued)**

| Unit | Age | Thickness (m) | Major Lithologic Types |
|---|---|---|---|
| Totavi Lentil, Puye Formation (Tpt) | Pliocene | ≤100 | Pebble-to-cobble gravel rich in Precambrian lithologies |
| Bearhead Rhyolite and Fanglomerates (Tjfp) | Miocene to Pliocene | ≥10 | Vitric pumiceous deposits and older fanglomerates |
| Polvadera Group | Miocene to Pliocene | ≥200 per unit | Flows, domes, tuffs and volcaniclastic sediments; basalt to rhyolite |
| Chamita Formation, upper Santa Fe Group (Tcar) | Middle to Late Miocene | >400 | Nonindurated mudstone, siltstone, sandstone, gravel, conglomerate; axial river deposits |
| Mafic flows in Santa Fe Group | Miocene | 3 to 10 | Lava flows, minor scoria, and pillow-palagonite tuff; basalt to basanite |
| Chama–El Rito Member of Tesuque Formation | Miocene | >130 | Fine to medium sands, silty sands |

Source: Goff 1995, 049682; Cole, et al. 2009, 106101.

Notes: Miocene = 23 to 5.3 Ma. Pliocene = 5.3 to 2.6 Ma. Quaternary = 2.6 Ma to present.
Source: http://www.geosociety.org/science/timescale/timescl.pdf.

**Table 2.3-1**
**Groundwater Ages and Lithology of Background Locations**

| Location | Number of Samples | Unadjusted Carbon-14 Age in Years (Mean)[a] | Assigned Lithology |
|---|---|---|---|
| **Perched Intermediate** | | | |
| CdV-37-1(i) | na[b] | na | Puye (Tpf) |
| PCI-2 | na | na | Puye (Tpf) |
| R-26 screen 1 | na | na | Cerro Toledo (Qct) |
| R-27i | na | na | Puye (Tpf) |
| R-47i | na | na | Puye (Tpf) |
| **Regional Aquifer** | | | |
| Ancho Spring | 4 | 3886 | Totavi (Tpt) |
| R-2 | 3 | 4072 | Chamita (Tcar) |
| R-6 | 2 | 6219 | Chamita (Tcar) |
| R-13 | 2 | 3619 | Puye (Tpf) / Miocene (Tjfp) |
| R-14 screen 1 | 1 | 3334 | Puye (Tpf) / Miocene (Tjfp) |
| R-16r | 2 | 7285 | Totavi (Tpt) |
| R-17 screen 1 | 2 | 2356 | Puye (Tpf) |
| R-17 screen 2 | 1 | 3098 | Puye (Tpf) |
| R-21 | 3 | 3307 | Puye (Tpf) / Cerros del Rio (Tb4) |
| R-27 | 2 | 1974 | Puye (Tpf) |
| R-30 | na | na | Puye (Tpf) |
| R-33 screen 1 | 1 | 3438 | Miocene (Tjfp) |
| R-33 screen 2 | 1 | 3525 | Miocene (Tjfp) |

**Table 2.3-1 (continued)**

| Location | Number of Samples | Unadjusted Carbon-14 Age in Years (Mean)[a] | Assigned Lithology |
|---|---|---|---|
| R-37 screen 2 | na | na | Puye (Tpf) |
| R-38 | 1 | 4564 | Puye (Tpf) with Tb4 sediments |
| R-39 | 1 | 3197 | Dacite (Tb4) |
| R-40 screen 2 | na | na | Puye (Tpf) |
| R-46 | 1 | 3291 | Puye (Tpf) |
| R-47 | na | na | Puye (Tpf) |
| R-48 | na | na | Tschicoma (Tt) |
| R-49 screen 1 | 2 | 3107 | Dacite (Tb4) |
| R-49 screen 2 | 1 | 2854 | Totavi (Tpt) |
| R-50 screen 2 | na | na | Miocene (Tjfp) |
| R-51 screen 1 | na | na | Puye (Tpf) |
| R-51 screen 2 | na | na | Puye (Tpf) |
| R-52 screen 1 | na | na | Puye (Tpf) |
| R-52 screen 2 | na | na | Puye (Tpf) |
| R-53 screen 1 | na | na | Puye (Tpf) |
| R-53 screen 2 | na | na | Puye (Tpf) |
| R-54 screen 2 | na | na | Puye (Tpf) |
| R-56 screen 1 | na | na | Puye (Tpf) |
| R-56 screen 2 | na | na | Puye (Tpf) |
| R-57 screen 1 | na | na | Dacite (Tb4) |
| R-57 screen 2 | na | na | Totavi (Tpt) |
| R-60 | na | na | Puye (Tpf) |
| Spring 3AA | 2 | 9662 | Chamita (Tcar) |
| Spring 6 | 2 | 3291 | Cerros del Rio (Tb4) |
| Spring 6A | 1 | 5565 | Cerros del Rio (Tb4) |
| Spring 8A | 1 | 1592 | Cerros del Rio (Tb4) |
| Spring 9 | 3 | 2167 | Cerros del Rio (Tb4) |
| Spring 9A | 4 | 2157 | Cerros del Rio (Tb4) |
| Spring 9B | 2 | 3778 | Cerros del Rio (Tb4) |

[a] Age data are from Dale (2009, 110407).

[b] na = Not available.

**Table 3.1-1**
**Conditions Used to Query Data from Intellus**

| Condition to Select | Reason |
|---|---|
| Sample Type equals 'WG' or 'W' | Exclude soil and sediment records collected at selected locations. |
| Sample Purpose equals 'CO' or 'REG' | Exclude equipment blank, field blank, field duplicate, field trip blank, performance-equipment blank, and test records. |
| Validation Qualifier does not equal 'R' | Exclude rejected records rejected by either laboratory or secondary validation. |
| Sample Usage Code equals 'INV' | Exclude well development (DEV), screening (SCR), waste (WST), baseline evaluation (BASE), construction (CONST), and QC groundwater records. |
| Validation Status Code equals 'VAL' | Exclude records that cannot be validated for lack of sufficient documentation to be defensible. |
| Method Category does not equal 'LEGACY' | Eliminate records that cannot be validated for lack of sufficient documentation to be defensible. |

Notes: WG = Groundwater sample; W = water sample; CO = collocated sample; REG = regular investigative sample; R = rejected; INV = investigative sample for most data needs; VAL = data is valid; LEGACY = data are not supported by sufficient documentation to be defensible.

**Table 3.2-1**
**Summary of Comparisons with Criteria for Chloride and Tritium**

| Location | Chloride | | | Tritium | | |
|---|---|---|---|---|---|---|
| | Total Results | Detections above 3 mg/L | Detection Limits above 3 mg/L | Total Results | Detections above 2 pCi/L | Detection Limits above 2 pCi/L |
| R-37 screen 2 | 12 | 1 | 0 | 17 | 1 | 1 |
| R-38 | —* | — | — | 14 | 1 | 0 |
| R-39 | — | — | — | 17 | 1 | 0 |
| R-46 | — | — | — | 11 | 2 | 0 |
| R-47 | — | — | — | 4 | 1 | 0 |
| R-47i | 10 | 1 | 0 | 6 | 1 | 0 |
| R-49 screen 1 | 12 | 1 | 0 | — | — | — |
| R-49 screen 2 | 12 | 1 | 0 | — | — | — |
| R-50 screen 2 | — | — | — | 14 | 2 | 0 |

* — = All detected values and detection limits were below criterion.

**Table 3.2-2**
**Background Locations**

| Location ID | Aquifer | Lithology |
|---|---|---|
| Ancho Spring | Regional | Totavi (Tpt) |
| CdV-37-1(i) | Intermediate | Puye (Tpf) |
| PCI-2 | Intermediate | Puye (Tpf) |
| R-2 | Regional | Chamita (Tcar) |
| R-6 | Regional | Chamita (Tcar) |
| R-13 | Regional | Puye (Tpf) / Miocene (Tjfp) |
| R-14 screen 1 | Regional | Puye (Tpf) / Miocene (Tjfp) |
| R-16r | Regional | Totavi (Tpt) |
| R-17 screen 1 | Regional | Puye (Tpf) |
| R-17 screen 2 | Regional | Puye (Tpf) |
| R-21 | Regional | Puye (Tpf) / Cerros del Rio (Tb4) |
| R-26 screen 1 | Intermediate | Cerro Toledo (Qct) |
| R-27i | Intermediate | Puye (Tpf) |
| R-27 | Regional | Puye (Tpf) |
| R-30 | Regional | Puye (Tpf) |
| R-33 screen 1* | Regional | Miocene (Tjfp) |
| R-33 screen 2* | Regional | Miocene (Tjfp) |
| R-37 screen 2 | Regional | Puye (Tpf) |
| R-38 | Regional | Puye (Tpf) with Tb4 sediments |
| R-39 | Regional | Dacite (Tb4) |
| R-40 screen 2 | Regional | Puye (Tpf) |
| R-46 | Regional | Puye (Tpf) |
| R-47 | Regional | Puye (Tpf) |
| R-47i | Intermediate | Puye (Tpf) |
| R-48 | Regional | Tschicoma (Tt) |
| R-49 screen 1 | Regional | Dacite (Tb4) |
| R-49 screen 2 | Regional | Totavi (Tpt) |
| R-50 screen 2 | Regional | Miocene (Tjfp) |
| R-51 screen 1 | Regional | Puye (Tpf) |
| R-51 screen 2 | Regional | Puye (Tpf) |
| R-52 screen 1 | Regional | Puye (Tpf) |
| R-52 screen 2 | Regional | Puye (Tpf) |
| R-53 screen 1 | Regional | Puye (Tpf) |
| R-53 screen 2 | Regional | Puye (Tpf) |
| R-54 screen 2 | Regional | Puye (Tpf) |
| R-56 screen 1 | Regional | Puye (Tpf) |
| R-56 screen 2 | Regional | Puye (Tpf) |
| R-57 screen 1 | Regional | Dacite (Tb4) |
| R-57 screen 2 | Regional | Totavi (Tpt) |
| R-60 | Regional | Puye (Tpf) |

**Table 3.2-2 (continued)**

| Location ID | Aquifer | Lithology |
|---|---|---|
| Spring 3AA | Regional | Chamita (Tcar) |
| Spring 6 | Regional | Cerros del Rio (Tb4) |
| Spring 6A | Regional | Cerros del Rio (Tb4) |
| Spring 8A | Regional | Cerros del Rio (Tb4) |
| Spring 9 | Regional | Cerros del Rio (Tb4) |
| Spring 9A | Regional | Cerros del Rio (Tb4) |
| Spring 9B | Regional | Cerros del Rio (Tb4) |

* Converted from Barcad sampling system. Only samples collected after May 2011 conversion are to be used.

**Table 3.4-1**
**Analytes and Field Parameters Included in Data Presented**

| |
|---|
| **Metals** |
| Aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, silicon dioxide, silver, sodium, strontium, thallium, tin, uranium, vanadium, zinc |
| **Radionuclides** |
| Americium-241, cesium-137, cobalt-60, gross-alpha radiation, gross-beta radiation, gross-gamma radiation, neptunium-237, plutonium-238, plutonium-239/240, potassium-40, sodium-22, strontium-90, tritium, uranium-234, uranium-235/236, uranium-238 |
| **General Chemistry Parameters** |
| Alkalinity ($CO_3$+$HCO_3$), ammonia as N, bromide, chloride, cyanide (total), fluoride, hardness, nitrate-nitrite as N, perchlorate, sulfate, TDS, total kjeldahl nitrogen, total organic carbon, total phosphate as P |
| **Field Parameters** |
| DO, specific conductance, pH, temperature |

**Table 3.4-2**
**Analytes, Field Preparation, and Analytical Methods Used by Contract Laboratories**

| Analytical Suite | Analytical Group | Field Prep | Analytical Method | Analytes |
|---|---|---|---|---|
| Metals | WSP-All Metals | Filtered | EPA:245.2 | Mercury |
| Metals | WSP-All Metals | Filtered | SM:A2340B | Hardness |
| Metals | WSP-All Metals | Filtered | SW-846:6010C | Aluminum, barium, beryllium, calcium, cobalt, copper, iron, magnesium, manganese, potassium, silicon dioxide, sodium, strontium, tin, uranium, vanadium, zinc |
| Metals | WSP-All Metals | Filtered | SW-846:6020 | Antimony, arsenic, boron, cadmium, chromium, lead, molybdenum, nickel, silver, thallium, uranium |
| Radionuclides | WSP-GrossA/B | Nonfiltered | EPA:900 | Gross alpha, gross beta |
| Radionuclides | WSP-RAD | Nonfiltered | EPA:901.1 | Cesium-137, cobalt-60, gross gamma, neptunium-237, potassium-40, sodium-22 |
| Radionuclides | WSP-RAD | Nonfiltered | EPA:905.0 | Strontium-90 |
| Radionuclides | WSP-RAD | Nonfiltered | HASL-300:AM-241 | Americium-241 |
| Radionuclides | WSP-RAD | Nonfiltered | HASL-300:ISOPU | Plutonium-238, plutonium-239/240 |
| Radionuclides | WSP-RAD | Nonfiltered | HASL-300:ISOU | Uranium-234, uranium-235/236, uranium-238 |
| Tritium | WSP-H-3 | Nonfiltered | EPA:906.0 | Tritium |
| Low-Level Tritium | WSP-LL-H-3 | Nonfiltered | Generic:Low_Level_Tritium | Tritium |
| General Inorganics | WSP-GENINORG+Perchlorate | Filtered | EPA:160.1 | Total dissolved solids |
| General Inorganics | WSP-GENINORG+Perchlorate | Filtered | EPA:300.0 | Bromide, chloride, fluoride, sulfate |
| General Inorganics | WSP-GENINORG+Perchlorate | Filtered | EPA:310.1 | Alkalinity-CO3, alkalinity-CO3+HCO3 |
| General Inorganics | WSP-GENINORG+Perchlorate | Filtered | SW-846:6010C | Silicon dioxide |
| General Inorganics | WSP-GENINORG+Perchlorate | Filtered | SW-846:6850 | Perchlorate |
| General Inorganics | WSP-NH3+NO3/NO2+PO4 | Filtered | EPA:350.1 | Ammonia as nitrogen |
| General Inorganics | WSP-NH3+NO3/NO2+PO4 | Filtered | EPA:353.2 | Nitrate-nitrite as nitrogen |
| General Inorganics | WSP-NH3+NO3/NO2+PO4 | Filtered | EPA:365.4 | Total phosphate as phosphorus |
| General Inorganics | WSP-TKN+TOC | Nonfiltered | EPA:351.2 | Total Kjeldahl nitrogen |
| General Inorganics | WSP-TKN+TOC | Nonfiltered | SW-846:9060 | Total organic carbon |
| General Inorganics | WSP-CN(T) | Nonfiltered | EPA:335.4 | Cyanide (Total) |

**Table 3.7-1**
**Summary of Outliers for Perched-Intermediate Groundwater**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Number of Nondetects | Number of Outliers | Outliers |
|---|---|---|---|---|---|---|---|
| Alkalinity-CO3+HCO3 | mg/L as $CaCO_3$ | Fa | 50 | 50 | 0 | 1 | 125 |
| Ammonia as Nitrogen | mg/L | F | 49 | 17 | 32 | 1 | 0.127 |
| Arsenic | µg/L | F | 50 | 9 | 41 | 0 | None |
| Barium | µg/L | F | 50 | 49 | 1 | 1 | 18.6 |
| Calcium | mg/L | F | 50 | 50 | 0 | 0 | None |
| Chloride | mg/L | F | 50 | 50 | 0 | 0 | None |
| Chromium | µg/L | F | 48 | 9 | 39 | 1 | 5.46 |
| Fluoride | mg/L | F | 51 | 51 | 0 | 0 | None |
| Hardness | mg/L | F | 50 | 50 | 0 | 0 | None |
| Iron | µg/L | F | 48 | 10 | 38 | 1 | 148 |
| Magnesium | µg/L | F | 50 | 50 | 0 | 0 | None |
| Manganese | µg/L | F | 50 | 27 | 23 | 5 | 64.6, 31.6, 22.8, 22.1, 20.8 |
| Molybdenum | µg/L | F | 50 | 48 | 2 | 2 | 5.09, 4.51 |
| Nickel | µg/L | F | 49 | 38 | 11 | 1 | 5.23 |
| Nitrate-Nitrite as Nitrogen | mg/L | F | 50 | 47 | 3 | 0 | None |
| Perchlorate | µg/L | F | 46 | 46 | 0 | 0 | None |
| Potassium | mg/L | F | 50 | 49 | 1 | 0 | None |
| Silicon Dioxide | mg/L | F | 51 | 51 | 0 | 0 | None |
| Sodium | mg/L | F | 50 | 50 | 0 | 1 | 22.3 |
| Strontium | µg/L | F | 50 | 50 | 0 | 1 | 67.8 |
| Sulfate | mg/L | F | 50 | 49 | 1 | 3 | 11.9, 8.89, 8.65 |
| TDS | mg/L | F | 51 | 51 | 0 | 0 | None |
| Total Kjeldahl Nitrogen | mg/L | NFb | 29 | 7 | 22 | 1 | 0.527 |
| Total Organic Carbon | mg/L | NF | 29 | 25 | 4 | 4 | 3.91, 2.87, 2.86, 2.32 |
| Total Phosphate as Phosphorus | mg/L | F | 49 | 14 | 35 | 0 | None |

**Table 3.7-1 (continued)**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Number of Nondetects | Number of Outliers | Outliers |
|---|---|---|---|---|---|---|---|
| Uranium | μg/L | F | 48 | 41 | 7 | 0 | None |
| Uranium-234 | pCi/L | NF | 17 | 17 | 0 | 0 | None |
| Uranium-238 | pCi/L | NF | 17 | 17 | 0 | 0 | None |
| Vanadium | μg/L | F | 50 | 38 | 12 | 0 | None |
| Zinc | μg/L | F | 48 | 22 | 26 | 0 | None |

[a] F = Filtered.

[b] NF = Nonfiltered.

**Table 3.7-2**
**Summary of Outliers for Regional Aquifer**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Number of Nondetects | Number of Outliers | Outliers |
|---|---|---|---|---|---|---|---|
| Alkalinity-CO3+HCO3 | mg/L as $CaCO_3$ | F[a] | 424 | 422 | 2 | 5 | 160, 120, 94.2, 86.9, 81.5 |
| Aluminum | μg/L | F | 410 | 12 | 398 | 1 | 818 |
| Ammonia as Nitrogen | mg/L | F | 425 | 136 | 289 | 5 | 0.853, 0.476, 0.45, 0.399, 0.377 |
| Antimony | μg/L | F | 410 | 20 | 390 | 0 | None |
| Arsenic | μg/L | F | 410 | 80 | 330 | 2 | 4.65, 4.63 |
| Barium | μg/L | F | 410 | 409 | 1 | 0 | None |
| Boron | μg/L | F | 410 | 85 | 325 | 0 | None |
| Bromide | mg/L | F | 425 | 22 | 403 | 0 | None |
| Calcium | mg/L | F | 410 | 410 | 0 | 0 | None |
| Chloride | mg/L | F | 425 | 425 | 0 | 1 | 4.73 |
| Chromium | μg/L | F | 412 | 293 | 119 | 0 | None |
| Cobalt | μg/L | F | 410 | 10 | 400 | 0 | None |
| Copper | μg/L | F | 410 | 7 | 403 | 1 | 24.2 |
| Fluoride | mg/L | F | 425 | 425 | 0 | 2 | 0.646, 0.57 |
| Gross alpha | pCi/L | NF[b] | 181 | 8 | 173 | 1 | 62.8 |

**Table 3.7-2 (continued)**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Number of Nondetects | Number of Outliers | Outliers |
|---|---|---|---|---|---|---|---|
| Gross beta | pCi/L | NF | 181 | 52 | 129 | 2 | 17.4, 8.6 |
| Hardness | mg/L | F | 409 | 408 | 1 | 1 | 19.9 |
| Iron | µg/L | F | 410 | 54 | 356 | 5 | 462, 353, 271, 234, 187 |
| Magnesium | mg/L | F | 410 | 410 | 0 | 0 | None |
| Manganese | µg/L | F | 410 | 107 | 303 | 5 | 84, 78.6, 64.7, 50.1, 41.7 |
| Molybdenum | µg/L | F | 410 | 381 | 29 | 5 | 4.69, 4.32, 3.45, 3.21, 3.15 |
| Nickel | µg/L | F | 410 | 254 | 156 | 5 | 59.7, 12.4, 9.21, 8.97, 8.4 |
| Nitrate-Nitrite as Nitrogen | mg/L | F | 426 | 409 | 17 | 3 | 1.43, 1.39, 1.14 |
| Perchlorate | µg/L | F | 398 | 396 | 2 | 0 | None |
| Potassium | mg/L | F | 410 | 410 | 0 | 0 | None |
| Silicon Dioxide | mg/L | F | 424 | 421 | 3 | 2 | 170, 14.4 |
| Sodium | mg/L | F | 410 | 410 | 0 | 5 | 1.65, 20.1, 18.7, 18.4, 18.2 |
| Strontium | µg/L | F | 410 | 410 | 0 | 0 | None |
| Sulfate | mg/L | F | 425 | 425 | 0 | 5 | 7.84, 7.22, 7.18, 7, 7 |
| Thallium | µg/L | F | 410 | 7 | 403 | 1 | 1.16 |
| Tin | µg/L | F | 410 | 7 | 403 | 1 | 69.5 |
| TDS | mg/L | F | 425 | 423 | 2 | 1 | 204 |
| Total Kjeldahl Nitrogen | mg/L | NF | 229 | 40 | 189 | 5 | 0.873, 0.602, 0.317, 0.288, 0.255 |
| Total Organic Carbon | mg/L | NF | 229 | 152 | 77 | 5 | 3.34, 2.44, 1.95, 1.73, 1.56 |
| Total Phosphate as Phosphorus | mg/L | F | 424 | 126 | 298 | 5 | 0.345, 0.313, 0.293, 0.266, 0.225 |
| Tritium | pCi/L | NF | 241 | 8 | 233 | 0 | None |
| Uranium | µg/L | F | 410 | 392 | 18 | 2 | 1.63, 1.6 |
| Uranium-234 | pCi/L | NF | 181 | 181 | 0 | 1 | 1.04 |
| Uranium-238 | pCi/L | NF | 181 | 174 | 7 | 3 | 0.506, 0.485, 0.477 |
| Vanadium | µg/L | F | 410 | 401 | 9 | 3 | 15.1, 14.9, 14.5 |
| Zinc | µg/L | F | 410 | 169 | 241 | 5 | 221, 106, 103, 88.2, 76.3 |

[a] F = Filtered.

[b] NF = Nonfiltered.

**Table 4.2-1**
**Descriptive Statistical Data for Perched-Intermediate Groundwater**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Minimum Detect | Maximum Detect | Number of Nondetects | Minimum Nondetect | Maximum Nondetect | 25th Percentile | 50th Percentile | 75th Percentile | 95th Percentile | Average | KM[a] Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity-CO3+HCO3 | mg/L | F[b] | 49 | 49 | 43.7 | 65.4 | 0 | na[c] | na | 48.7 | 51.5 | 54.2 | 60.4 | 52.2 | 52.2 |
| Aluminum | µg/L | F | 48 | 2 | 116 | 143 | 46 | 68 | 68 | 68 | 68 | 68 | 68 | 130 | 70.6 |
| Americium-241 | pCi/L | NF[d] | 17 | 0 | na | na | 17 | -0.00446 | 0.00954 | 0 | 0.00216 | 0.00662 | 0.00829 | Na | na |
| Ammonia as Nitrogen | mg/L | F | 48 | 16 | 0.0167 | 0.085 | 32 | 0.016 | 0.017 | 0.016 | 0.0169 | 0.0247 | 0.0606 | 0.0407 | 0.0242 |
| Antimony | µg/L | F | 48 | 5 | 0.541 | 1.03 | 43 | 0.5 | 1 | 0.617 | 1 | 1 | 1 | 0.724 | 0.552 |
| Arsenic | µg/L | F | 50 | 9 | 1.96 | 3.48 | 41 | 1.5 | 1.7 | 1.55 | 1.7 | 1.7 | 2.82 | 2.55 | 1.69 |
| Barium | µg/L | F | 49 | 48 | 3.66 | 15.6 | 1 | 1 | 1 | 6.02 | 7.88 | 9.4 | 11.96 | 7.99 | 7.85 |
| Beryllium | µg/L | F | 48 | 0 | na | na | 48 | 1 | 1 | 1 | 1 | 1 | 1 | na | na |
| Boron | µg/L | F | 48 | 6 | 15.6 | 18.1 | 42 | 15 | 15 | 15 | 15 | 15 | 16.2 | 16.5 | 15.2 |
| Bromide | mg/L | F | 49 | 5 | 0.0702 | 0.0783 | 44 | 0.066 | 0.067 | 0.066 | 0.066 | 0.067 | 0.0716 | 0.0734 | 0.0668 |
| Cadmium | µg/L | F | 48 | 0 | na | na | 48 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | na | na |
| Calcium | mg/L | F | 50 | 50 | 7.54 | 10.9 | 0 | na | na | 8.4 | 8.85 | 9.56 | 10.5 | 8.99 | 8.99 |
| Cesium-137 | pCi/L | NF | 17 | 0 | na | na | 17 | -4.33 | 3.08 | -1.82 | -0.269 | 1.85 | 2.96 | na | na |
| Chloride | mg/L | F | 50 | 50 | 1.16 | 3.3 | 0 | na | na | 1.24 | 1.4 | 1.64 | 2.78 | 1.62 | 1.62 |
| Chromium | µg/L | F | 47 | 8 | 2.01 | 3.66 | 39 | 2 | 2.5 | 2 | 2 | 2.5 | 2.72 | 2.58 | 2.10 |
| Cobalt | µg/L | F | 48 | 2 | 1.12 | 1.99 | 46 | 1 | 1 | 1 | 1 | 1 | 1 | 1.58 | 1.02 |
| Cobalt-60 | pCi/L | NF | 17 | 0 | na | na | 17 | -3.38 | 3.13 | -0.336 | 0.778 | 1.14 | 2.68 | na | na |
| Copper | µg/L | F | 48 | 0 | na | na | 48 | 3 | 3 | 3 | 3 | 3 | 3 | na | na |
| Cyanide (Total) | mg/L | NF | 15 | 0 | na | na | 15 | 0.0015 | 0.0017 | 0.00167 | 0.00167 | 0.00167 | 0.0017 | na | na |
| Fluoride | mg/L | F | 51 | 51 | 0.0637 | 0.226 | 0 | na | na | 0.139 | 0.165 | 0.181 | 0.217 | 0.161 | 0.161 |
| Gross alpha | pCi/L | F | 17 | 1 | 11.4 | 11.4 | 16 | -1.35 | 1.96 | -0.151 | 0.393 | 1.02 | 3.85 | 11.4 | -0.6 |
| Gross beta | pCi/L | F | 17 | 3 | 3.14 | 13.7 | 14 | -0.855 | 1.5 | 0.263 | 0.633 | 0.961 | 9.18 | 8.30 | 0.76 |
| Gross gamma | pCi/L | F | 2 | 0 | na | na | 2 | 21.9 | 271 | 84.2 | 146 | 209 | 258 | na | na |
| Hardness | mg/L | F | 50 | 50 | 29.6 | 38.4 | 0 | na | na | 31.2 | 32.2 | 33.9 | 36.7 | 32.6 | 32.6 |
| Iron | µg/L | F | 47 | 9 | 31 | 62.9 | 38 | 30 | 30 | 30 | 30 | 30 | 54.1 | 45.6 | 33.0 |
| Lead | µg/L | F | 48 | 1 | 0.585 | 0.585 | 47 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.585 | 0.502 |
| Magnesium | mg/L | F | 50 | 50 | 2.09 | 3.24 | 0 | na | na | 2.25 | 2.41 | 2.56 | 3.00 | 2.47 | 2.47 |
| Manganese | µg/L | F | 45 | 22 | 2.06 | 15.1 | 23 | 2 | 2 | 2 | 2 | 4.41 | 8.39 | 5.36 | 3.64 |
| Mercury | µg/L | F | 48 | 0 | na | na | 48 | 0.066 | 0.067 | 0.066 | 0.066 | 0.067 | 0.067 | na | na |
| Molybdenum | µg/L | F | 48 | 46 | 0.829 | 3.08 | 2 | 0.1 | 0.1 | 0.962 | 1.115 | 1.65 | 2.72 | 1.43 | 1.38 |
| Neptunium-237 | pCi/L | NF | 17 | 0 | na | na | 17 | -6.1 | 6.1 | -3.53 | -0.43 | 1.94 | 5.84 | na | na |
| Nickel | µg/L | F | 48 | 37 | 0.504 | 4.44 | 11 | 0.5 | 0.5 | 0.528 | 0.811 | 1.73 | 2.93 | 1.52 | 1.28 |
| Nitrate-Nitrite as Nitrogen | mg/L | F | 50 | 47 | 0.0274 | 0.483 | 3 | 0.01 | 0.05 | 0.104 | 0.153 | 0.356 | 0.424 | 0.226 | 0.213 |
| Perchlorate | µg/L | F | 46 | 46 | 0.112 | 0.272 | 0 | na | na | 0.127 | 0.179 | 0.233 | 0.257 | 0.183 | 0.183 |
| Plutonium-238 | pCi/L | NF | 17 | 0 | na | na | 17 | -0.0119 | 0.012 | -0.00277 | 0 | 0.00304 | 0.00732 | na | na |
| Plutonium-239/240 | pCi/L | NF | 17 | 0 | na | na | 17 | -0.00957 | 0.0184 | -0.00576 | 0 | 0.00545 | 0.0132 | na | na |

**Table 4.2-1 (continued)**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Minimum Detect | Maximum Detect | Number of Nondetects | Minimum Nondetect | Maximum Nondetect | 25th Percentile | 50th Percentile | 75th Percentile | 95th Percentile | Average | KM[a] Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Potassium | mg/L | F | 50 | 49 | 0.292 | 2.45 | 1 | 0.05 | 0.05 | 0.378 | 0.575 | 0.928 | 2.31 | 0.904 | 0.887 |
| Potassium-40 | pCi/L | NF | 16 | 0 | na | na | 16 | -30.7 | 50 | -22.6 | 4.24 | 22.1 | 38.6 | na | na |
| Selenium | µg/L | F | 48 | 0 | na | na | 48 | 1 | 1.5 | 1 | 1.5 | 1.5 | 1.5 | na | na |
| Silicon Dioxide | mg/L | F | 51 | 51 | 53.6 | 76.5 | 0 | na | na | 59.2 | 62.5 | 68.4 | 71.8 | 63.8 | 63.8 |
| Silver | µg/L | F | 48 | 1 | 0.108 | 0.108 | 47 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.108 | 0.108 |
| Sodium | mg/L | F | 49 | 49 | 7.91 | 18.2 | 0 | na | na | 9.7 | 11.5 | 13.3 | 17.1 | 11.8 | 11.8 |
| Sodium-22 | pCi/L | NF | 17 | 0 | na | na | 17 | -2.09 | 6.36 | -0.411 | -0.0146 | 0.123 | 2.02 | na | na |
| Strontium | µg/L | F | 49 | 49 | 43.3 | 60.8 | 0 | na | na | 46.5 | 48.3 | 50.1 | 57.1 | 49.0 | 49.0 |
| Strontium-90 | pCi/L | NF | 17 | 0 | na | na | 17 | -0.373 | 0.3 | -0.13 | 0.0556 | 0.166 | 0.282 | na | na |
| Sulfate | mg/L | F | 47 | 46 | 1.11 | 7.14 | 1 | 0.1 | 0.1 | 1.60 | 1.84 | 3.10 | 6.72 | 2.60 | 2.54 |
| Thallium | µg/L | F | 48 | 2 | 0.354 | 0.354 | 46 | 0.3 | 0.45 | 0.341 | 0.45 | 0.45 | 0.45 | 0.354 | 0.308 |
| Tin | µg/L | F | 48 | 1 | 3.09 | 3.09 | 47 | 2.5 | 25 | 2.5 | 2.5 | 2.5 | 13 | 3.09 | 2.51 |
| TDS | mg/L | F | 51 | 51 | 78.6 | 151 | 0 | na | na | 97.8 | 117 | 127 | 135 | 113 | 113 |
| Total Kjeldahl Nitrogen | mg/L | F | 28 | 6 | 0.0573 | 0.204 | 22 | 0.033 | 0.18 | 0.033 | 0.034 | 0.0406 | 0.173 | 0.121 | 0.0524 |
| Total Organic Carbon | mg/L | F | 25 | 21 | 0.361 | 1.16 | 4 | 0.063 | 0.33 | 0.404 | 0.552 | 0.78 | 1.14 | 0.688 | 0.588 |
| Total Phosphate as Phosphorus | mg/L | F | 49 | 14 | 0.0275 | 0.204 | 35 | 0.015 | 0.017 | 0.015 | 0.017 | 0.037 | 0.178 | 0.0931 | 0.0373 |
| Tritium | pCi/L | F | 15 | 1 | 2.484 | 2.484 | 14 | -0.594 | 1.82 | 0.637 | 1.03 | 1.24 | 2.02 | 2.48 | -0.389 |
| Uranium | µg/L | F | 48 | 41 | 0.24 | 0.774 | 7 | 0.05 | 0.067 | 0.268 | 0.337 | 0.463 | 0.614 | 0.398 | 0.347 |
| Uranium-234 | pCi/L | NF | 17 | 17 | 0.139 | 0.463 | 0 | na | na | 0.174 | 0.214 | 0.266 | 0.445 | 0.243 | 0.243 |
| Uranium-235/236 | pCi/L | NF | 17 | 0 | na | na | 17 | -0.0082 | 0.0216 | 0.00807 | 0.0112 | 0.0168 | 0.0203 | na | na |
| Uranium-238 | pCi/L | NF | 17 | 17 | 0.0827 | 0.168 | 0 | na | na | 0.102 | 0.127 | 0.158 | 0.165 | 0.125 | 0.125 |
| Vanadium | µg/L | F | 50 | 38 | 1.14 | 9.68 | 12 | 1 | 1 | 1.16 | 1.42 | 1.74 | 9.19 | 3.37 | 2.80 |
| Zinc | µg/L | F | 48 | 22 | 3.53 | 30.7 | 26 | 3.3 | 3.3 | 3.3 | 3.3 | 9.90 | 17.4 | 11.4 | 7.03 |
| Dissolved Oxygen (Field) | mg/L | NF | 46 | 46 | 4.69 | 8.73 | 0 | na | na | 6.76 | 7.61 | 8.07 | 8.28 | 7.30 | 7.30 |
| pH (Field) | SU[e] | NF | 46 | 46 | 6.36 | 8.27 | 0 | na | na | 6.80 | 7.14 | 7.29 | 7.67 | 7.10 | 7.10 |
| Specific Conductance (Field) | µS/cm | NF | 46 | 46 | 0.6 | 173 | 0 | na | na | 102 | 109 | 118 | 146 | 111 | 111 |
| Temperature (Field) | deg C | NF | 47 | 47 | 10.88 | 23.41 | 0 | na | na | 13.4 | 13.7 | 14.9 | 15.9 | 14.2 | 14.2 |

[a] KM = Kaplan-Meier method.

[b] F = Filtered.

[c] na = Not applicable.

[d] NF = Nonfiltered.

[e] SU = Standard unit.

**Table 4.2.2**
**Descriptive Statistical Data for Regional Aquifer**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Minimum Detect | Maximum Detect | Number of Nondetects | Minimum Nondetect | Maximum Nondetect | 25th Percentile | 50th Percentile | 75th Percentile | 95th Percentile | Average | KM[a] Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity-CO3+HCO3 | mg/L | F[b] | 418 | 416 | 47.6 | 81.3 | 2 | 0.725 | 0.725 | 57.2 | 59.9 | 62.6 | 69.92 | 60.4 | 60.2 |
| Aluminum | µg/L | F | 409 | 11 | 68.1 | 283 | 398 | 68 | 68 | 68 | 68 | 68 | 68 | 124 | 69.5 |
| Americium-241 | pCi/L | NF[c] | 181 | 0 | na[d] | na | 181 | -0.0298 | 0.0594 | 1.08E-9 | 0.00464 | 0.00894 | 0.0167 | na | na |
| Ammonia as Nitrogen | mg/L | F | 420 | 131 | 0.016 | 0.331 | 289 | 0.015 | 0.017 | 0.016 | 0.017 | 0.027 | 0.1 | 0.0652 | 0.0307 |
| Antimony | µg/L | F | 410 | 20 | 0.56 | 5.26 | 390 | 0.5 | 1 | 0.569 | 1 | 1 | 1 | 2.74 | 0.612 |
| Arsenic | µg/L | F | 408 | 78 | 1.67 | 3.86 | 330 | 1.5 | 1.7 | 1.7 | 1.7 | 1.7 | 2.70 | 2.35 | 1.66 |
| Barium | µg/L | F | 410 | 409 | 4.67 | 66.9 | 1 | 1 | 1 | 18.5 | 24.8 | 29.5 | 37.4 | 24.7 | 24.6 |
| Beryllium | µg/L | F | 410 | 1 | 2.36 | 2.36 | 409 | 1 | 1 | 1 | 1 | 1 | 1 | 2.36 | 1.00 |
| Boron | µg/L | F | 410 | 85 | 15 | 25.4 | 325 | 15 | 15 | 15 | 15 | 15 | 18.7 | 17.6 | 15.6 |
| Bromide | mg/L | F | 425 | 22 | 0.0668 | 0.116 | 403 | 0.066 | 0.067 | 0.066 | 0.066 | 0.067 | 0.067 | 0.0813 | 0.0668 |
| Cadmium | µg/L | F | 410 | 1 | 0.378 | 0.378 | 409 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.378 | 0.111 |
| Calcium | mg/L | F | 410 | 410 | 2.08 | 20.8 | 0 | na | na | 10.7 | 11.6 | 12.6 | 14.5 | 11.8 | 11.8 |
| Cesium-137 | pCi/L | NF | 180 | 0 | na | na | 180 | -3.93 | 4.72 | -1.18 | -0.0596 | 1.198 | 2.93 | na | na |
| Chloride | mg/L | F | 424 | 424 | 1.46 | 3.28 | 0 | na | na | 1.84 | 2.05 | 2.31 | 2.61 | 2.08 | 2.08 |
| Chromium | µg/L | F | 412 | 293 | 2.01 | 9.83 | 119 | 2 | 2.5 | 2.20 | 3.12 | 4.56 | 6.60 | 4.16 | 3.54 |
| Cobalt | µg/L | F | 409 | 9 | 1.03 | 1.62 | 400 | 1 | 1 | 1 | 1 | 1 | 1 | 1.28 | 1.01 |
| Cobalt-60 | pCi/L | NF | 181 | 0 | na | na | 181 | -5.68 | 3.68 | -0.935 | -0.0377 | 1.03 | 2.65 | na | na |
| Copper | µg/L | F | 409 | 6 | 3.74 | 11.3 | 403 | 3 | 3 | 3 | 3 | 3 | 3 | 6.53 | 3.05 |
| Cyanide (Total) | mg/L | NF | 166 | 1 | 0.00246 | 0.00246 | 165 | 0.0015 | 0.0017 | 0.00167 | 0.00167 | 0.00167 | 0.0017 | 0.00246 | 0.00151 |
| Fluoride | mg/L | F | 423 | 423 | 0.0769 | 0.507 | 0 | na | na | 0.195 | 0.242 | 0.293 | 0.382 | 0.249 | 0.249 |
| Gross alpha | pCi/L | F | 180 | 7 | 1.41 | 8.05 | 173 | -1.41 | 2.83 | -0.231 | 0.325 | 0.785 | 2.012 | 4.05 | -1.20 |
| Gross beta | pCi/L | F | 179 | 50 | 1.17 | 5.83 | 129 | -1.45 | 2.86 | 0.655 | 1.5 | 2.48 | 3.81 | 3.03 | -0.124 |
| Gross gamma | pCi/L | F | 9 | 1 | 21.6 | 21.6 | 8 | 1.95 | 27 | 5.24 | 7.08 | 21.3 | 24.8 | 21.6 | 4.41 |
| Hardness | mg/L | F | 408 | 407 | 30.8 | 56.8 | 1 | 0.35 | 0.35 | 39.5 | 42.8 | 46.3 | 51 | 43.0 | 42.9 |
| Iron | µg/L | F | 405 | 49 | 30.3 | 184 | 356 | 30 | 30 | 30 | 30 | 30 | 53.8 | 61.0 | 33.7 |
| Lead | µg/L | F | 410 | 4 | 0.933 | 1.56 | 406 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 1.24 | 0.507 |
| Magnesium | mg/L | F | 410 | 410 | 0.27 | 4.61 | 0 | na | na | 2.97 | 3.26 | 3.62 | 4.11 | 3.24 | 3.24 |
| Manganese | µg/L | F | 405 | 102 | 2.03 | 38.7 | 303 | 2 | 2 | 2 | 2 | 2.03 | 12.1 | 8.44 | 3.62 |
| Mercury | µg/L | F | 410 | 0 | na | na | 410 | 0.066 | 0.67 | 0.066 | 0.066 | 0.067 | 0.067 | na | na |
| Molybdenum | µg/L | F | 405 | 376 | 0.648 | 3.14 | 29 | 0.1 | 0.17 | 1.07 | 1.24 | 1.54 | 2.37 | 1.40 | 1.31 |
| Neptunium-237 | pCi/L | NF | 181 | 0 | | | 181 | -7.35 | 6.49 | -1.57 | -0.164 | 1.7 | 4.72 | na | na |
| Nickel | µg/L | F | 405 | 249 | 0.503 | 7.23 | 156 | 0.5 | 0.5 | 0.5 | 0.615 | 1.12 | 2.75 | 1.27 | 0.974 |
| Nitrate-Nitrite as Nitrogen | mg/L | F | 423 | 406 | 0.0254 | 0.955 | 17 | 0.01 | 0.1 | 0.318 | 0.392 | 0.556 | 0.748 | 0.446 | 0.429 |
| Perchlorate | µg/L | F | 398 | 396 | 0.123 | 0.455 | 2 | 0.05 | 0.05 | 0.276 | 0.31 | 0.349 | 0.412 | 0.315 | 0.314 |
| Plutonium-238 | pCi/L | NF | 181 | 0 | na | na | 181 | -0.111 | 0.0277 | -0.0047 | 0 | 0.00346 | 0.00994 | na | na |
| Plutonium-239/240 | pCi/L | NF | 181 | 0 | na | na | 181 | -0.0575 | 0.0738 | -0.00195 | 0.00322 | 0.00762 | 0.0171 | na | na |

**Table 4.2-2 (continued)**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Minimum Detect | Maximum Detect | Number of Nondetects | Minimum Nondetect | Maximum Nondetect | 25th Percentile | 50th Percentile | 75th Percentile | 95th Percentile | Average | KM[a] Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Potassium | mg/L | F | 410 | 410 | 0.352 | 2.97 | 0 | na | na | 1.44 | 1.6 | 1.82 | 2.357 | 1.65 | 1.654 |
| Potassium-40 | pCi/L | NF | 180 | 0 | na | na | 180 | -43.7 | 54.8 | -13.2 | 1.41 | 14.4 | 35.6 | na | na |
| Selenium | µg/L | F | 410 | 4 | 1.02 | 1.83 | 406 | 1 | 1.5 | 1 | 1.5 | 1.5 | 1.5 | 1.51 | 1.00 |
| Silicon Dioxide | mg/L | F | 422 | 419 | 37.8 | 92.5 | 3 | 0.053 | 0.053 | 67.8 | 71 | 74.9 | 80.7 | 70.4 | 70.0 |
| Silver | µg/L | F | 410 | 1 | 0.225 | 0.225 | 409 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.225 | 0.1 |
| Sodium | mg/L | F | 405 | 405 | 8.01 | 18 | 0 | na | na | 10.3 | 10.9 | 11.8 | 15.3 | 11.3 | 11.3 |
| Sodium-22 | pCi/L | NF | 181 | 0 | na | na | 181 | -4.06 | 3.94 | -1.15 | -0.252 | 0.546 | 1.93 | na | na |
| Strontium | µg/L | F | 410 | 410 | 8.58 | 203 | 0 | na | na | 48.1 | 51.8 | 56.4 | 74.4 | 56.9 | 56.9 |
| Strontium-90 | pCi/L | NF | 181 | 0 | na | na | 181 | -0.361 | 0.462 | -0.163 | -0.0355 | 0.12 | 0.355 | na | na |
| Sulfate | mg/L | F | 420 | 420 | 1.29 | 6.96 | 0 | na | na | 1.98 | 2.48 | 3.14 | 4.51 | 2.70 | 2.70 |
| Thallium | µg/L | F | 409 | 6 | 0.338 | 0.687 | 403 | 0.3 | 0.45 | 0.3 | 0.45 | 0.45 | 0.45 | 0.507 | 0.303 |
| Tin | µg/L | F | 409 | 6 | 3.42 | 27.1 | 403 | 2.5 | 50 | 2.5 | 2.5 | 2.5 | 13 | 8.267 | 2.59 |
| Total Dissolved Solids | mg/L | F | 424 | 422 | 74.3 | 187 | 2 | 3.4 | 3.4 | 121 | 132 | 141 | 159 | 131 | 130 |
| Total Kjeldahl Nitrogen | mg/L | F | 224 | 35 | 0.0339 | 0.193 | 189 | 0.033 | 0.18 | 0.033 | 0.033 | 0.035 | 0.165 | 0.0769 | 0.0401 |
| Total Organic Carbon | mg/L | F | 224 | 147 | 0.33 | 1.37 | 77 | 0.33 | 0.33 | 0.33 | 0.436 | 0.678 | 0.982 | 0.625 | 0.524 |
| Total Phosphate as Phosphorus | mg/L | F | 419 | 121 | 0.015 | 0.211 | 298 | 0.015 | 0.017 | 0.015 | 0.017 | 0.025 | 0.0822 | 0.0593 | 0.0278 |
| Tritium | pCi/L | F | 240 | 7 | 2.213 | 13.11 | 233 | -2.25 | 3.42 | -0.17 | 0.401 | 1.02 | 2.06 | 4.66 | -2.05 |
| Uranium | µg/L | F | 408 | 390 | 0.131 | 1.4 | 18 | 0.05 | 0.067 | 0.33 | 0.441 | 0.596 | 1.06 | 0.516 | 0.495 |
| Uranium-234 | pCi/L | NF | 180 | 180 | 0.0894 | 0.805 | 0 | na | na | 0.233 | 0.293 | 0.41 | 0.653 | 0.337 | 0.337 |
| Uranium-235/236 | pCi/L | NF | 181 | 3 | 0.0415 | 0.0723 | 178 | -0.0267 | 0.084 | 0.00637 | 0.0136 | 0.0221 | 0.0423 | 0.0536 | -0.0253 |
| Uranium-238 | pCi/L | NF | 178 | 171 | 0.0545 | 0.425 | 7 | 0.0329 | 0.123 | 0.114 | 0.143 | 0.201 | 0.322 | 0.168 | 0.164 |
| Vanadium | µg/L | F | 407 | 398 | 1.37 | 13.9 | 9 | 1 | 1 | 4.83 | 5.58 | 7.17 | 10.7 | 6.20 | 6.08 |
| Zinc | µg/L | F | 405 | 164 | 3.3 | 65 | 241 | 3.3 | 3.3 | 3.3 | 3.3 | 5.38 | 14.4 | 9.02 | 5.62 |
| Dissolved Oxygen (Field) | mg/L | NF | 516 | 516 | 0.5 | 11.19 | 0 | na | na | 5.52 | 6.38 | 6.85 | 7.98 | 6.20 | 6.20 |
| pH (Field) | SU[e] | NF | 517 | 517 | 6 | 9.52 | 0 | na | na | 7.73 | 7.95 | 8.09 | 8.29 | 7.87 | 7.87 |
| Specific Conductance (Field) | µS/cm | NF | 517 | 517 | 12.6 | 186 | 0 | na | na | 126 | 134 | 143 | 162 | 135 | 135 |
| Temperature (Field) | deg C | NF | 516 | 516 | 13.78 | 24.92 | 0 | na | na | 20.3 | 21.3 | 22.0 | 23.1 | 21.0 | 21.0 |

[a] KM = Kaplan-Meier method.

[b] F = Filtered.

[c] NF = Nonfiltered.

[d] na = Not applicable.

[e] SU = Standard unit.

**Table 4.2-3**
**Summary of UTLs for Perched-Intermediate Groundwater**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Percent Detects | Number of Non-Detects | Distribution | UTL | UTL Method |
|---|---|---|---|---|---|---|---|---|---|
| Alkalinity-CO3+HCO3 | mg/L | F[a] | 49 | 49 | 100 | 0 | Normal | 62.0 | 95% UTL with 95% Coverage |
| Barium | µg/L | F | 49 | 48 | 97.96 | 1 | Normal | 13.5 | 95% KMb UTL with 95% Coverage |
| Calcium | mg/L | F | 50 | 50 | 100 | 0 | Normal | 10.7 | 95% UTL with 95% Coverage |
| Chloride | mg/L | F | 50 | 50 | 100 | 0 | Nonparametric | 3.11 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Fluoride | mg/L | F | 51 | 51 | 100 | 0 | Normal | 0.234 | 95% UTL with 95% Coverage |
| Hardness | mg/L | F | 50 | 50 | 100 | 0 | Nonparametric | 37.8 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Magnesium | mg/L | F | 50 | 50 | 100 | 0 | Nonparametric | 3.14 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Molybdenum | µg/L | F | 48 | 46 | 95.83 | 2 | Nonparametric | 2.9 | 95% UTL with 95% Coverage |
| Nickel | µg/L | F | 48 | 37 | 77.08 | 11 | Gamma | 3.65 | 95% HW Approx. Gamma UTL with 95% Coverage (with KM[b] estimates) |
| Nitrate-Nitrite as Nitrogen | mg/L | F | 50 | 47 | 94 | 3 | Nonparametric | 0.459 | 95% UTL with 95% Coverage |
| Perchlorate | µg/L | F | 46 | 46 | 100 | 0 | Nonparametric | 0.27 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Potassium | mg/L | F | 50 | 49 | 98 | 1 | Nonparametric | 2.35 | 95% UTL with 95% Coverage |
| Silicon Dioxide | mg/L | F | 51 | 51 | 100 | 0 | Normal | 75.0 | 95% UTL with 95% Coverage |
| Sodium | mg/L | F | 49 | 49 | 100 | 0 | Gamma | 18.2 | 95% HW Approx. Gamma UTL with 95% Coverage |
| Strontium | µg/L | F | 49 | 49 | 100 | 0 | Nonparametric | 59.6 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Sulfate | mg/L | F | 47 | 46 | 97.87 | 1 | Nonparametric | 7.1 | 95% UTL with 95% Coverage |
| Total Dissolved Solids | mg/L | F | 51 | 51 | 100 | 0 | Normal | 152 | 95% UTL with 95% Coverage |
| Total Organic Carbon | mg/L | F | 25 | 21 | 84 | 4 | Normal | 1.35 | 95% KM UTL with 95% Coverage |
| Uranium | µg/L | F | 48 | 41 | 85.42 | 7 | Gamma | 0.992 | 95% HW Approx. Gamma UTL with 95% Coverage (with KM estimates) |
| Uranium-234 | pCi/L | NFc | 17 | 17 | 100 | 0 | Normal | 0.477 | 95% UTL with 95% Coverage |
| Uranium-238 | pCi/L | NF | 17 | 17 | 100 | 0 | Normal | 0.201 | 95% UTL with 95% Coverage |
| Vanadium | µg/L | F | 50 | 38 | 76 | 12 | Nonparametric | 9.29 | 95% UTL with 95% Coverage |

[a] F = Filtered.
[b] KM = Kaplan-Meier method.
[c] NF = Nonfiltered.

**Table 4.2-4**
**Summary of UTLs for Regional Aquifer**

| Analyte | Unit | Filtration | Total Number of Observations | Number of Detects | Percent Detects | Number of Non-Detects | Distribution | UTL | UTL Method |
|---|---|---|---|---|---|---|---|---|---|
| Alkalinity-CO3+HCO3 | mg/L | F[a] | 418 | 416 | 99.52 | 2 | Nonparametric | 72.9 | 95% UTL with 95% Coverage |
| Barium | μg/L | F | 410 | 409 | 99.76 | 1 | Nonparametric | 38.1 | 95% UTL with 95% Coverage |
| Calcium | mg/L | F | 410 | 410 | 100 | 0 | Nonparametric | 17.03 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Chloride | mg/L | F | 424 | 424 | 100 | 0 | Nonparametric | 2.70 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Chromium | μg/L | F | 412 | 293 | 71.12 | 119 | Nonparametric | 7.48 | 95% UTL with 95% Coverage |
| Fluoride | mg/L | F | 423 | 423 | 100 | 0 | Normal | 0.377 | 95% UTL with 95% Coverage |
| Hardness | mg/L | F | 408 | 407 | 99.75 | 1 | Lognormal | 67.1 | 95% KM[b] UTL (Lognormal) 95% Coverage |
| Magnesium | mg/L | F | 410 | 410 | 100 | 0 | Nonparametric | 4.18 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Molybdenum | μg/L | F | 405 | 376 | 92.84 | 29 | Nonparametric | 2.5 | 95% UTL with 95% Coverage |
| Nickel | μg/L | F | 405 | 249 | 61.48 | 156 | Nonparametric | 2.9 | 95% UTL with 95% Coverage |
| Nitrate-Nitrite as Nitrogen | mg/L | F | 423 | 406 | 95.98 | 17 | Nonparametric | 0.769 | 95% UTL with 95% Coverage |
| Perchlorate | μg/L | F | 398 | 396 | 99.5 | 2 | Normal | 0.414 | 95% KM UTL with 95% Coverage |
| Potassium | mg/L | F | 410 | 410 | 100 | 0 | Nonparametric | 2.39 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Silicon Dioxide | mg/L | F | 422 | 419 | 99.29 | 3 | Nonparametric | 81.9 | 95% UTL with 95% Coverage |
| Sodium | mg/L | F | 405 | 405 | 100 | 0 | Nonparametric | 16.0 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Strontium | μg/L | F | 410 | 410 | 100 | 0 | Nonparametric | 157 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Sulfate | mg/L | F | 420 | 420 | 100 | 0 | Nonparametric | 4.59 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Total Dissolved Solids | mg/L | F | 424 | 422 | 99.53 | 2 | Nonparametric | 161 | 95% UTL with 95% Coverage |
| Total Organic Carbon | mg/L | F | 224 | 147 | 65.62 | 77 | Nonparametric | 1.08 | 95% UTL with 95% Coverage |
| Uranium | μg/L | F | 408 | 390 | 95.59 | 18 | Nonparametric | 1.19 | 95% UTL with 95% Coverage |
| Uranium-234 | pCi/L | NF[c] | 180 | 180 | 100 | 0 | Nonparametric | 0.715 | 95% Percentile Bootstrap UTL with 95% Coverage |
| Uranium-238 | pCi/L | NF | 178 | 171 | 96.07 | 7 | Nonparametric | 0.336 | 95% UTL with 95% Coverage |
| Vanadium | μg/L | F | 407 | 398 | 97.79 | 9 | Nonparametric | 11.4 | 95% UTL with 95% Coverage |

[a] F = Filtered.
[b] KM = Kaplan-Meier method.
[c] NF = Nonfiltered.

# Appendix A

*Samples Taken*

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| Ancho Spring | F[a] | GELC[b] | 9/28/2010 | NA[c] | X[d] | X | X | NA |
| Ancho Spring | UF[e] | Field | 9/28/2010 | X | NA | NA | NA | NA |
| Ancho Spring | F | GELC | 10/7/2011 | NA | X | X | X | NA |
| Ancho Spring | UF | Field | 10/7/2011 | X | NA | NA | NA | NA |
| Ancho Spring | F | GELC | 9/25/2012 | NA | X | X | X | NA |
| Ancho Spring | UF | ARSL[f] | 9/25/2012 | NA | NA | NA | NA | X |
| Ancho Spring | UF | Field | 9/25/2012 | X | NA | NA | NA | NA |
| Ancho Spring | UF | GELC | 9/25/2012 | NA | X | NA | NA | X |
| Ancho Spring | UF | ARSL | 12/10/2013 | NA | NA | NA | NA | X |
| Ancho Spring | UF | Field | 12/10/2013 | X | NA | NA | NA | NA |
| Ancho Spring | UF | GELC | 12/10/2013 | NA | NA | NA | NA | X |
| Ancho Spring | F | GELC | 9/30/2014 | NA | X | X | X | NA |
| Ancho Spring | UF | ARSL | 9/30/2014 | NA | NA | NA | NA | X |
| Ancho Spring | UF | Field | 9/30/2014 | X | NA | NA | NA | NA |
| Ancho Spring | UF | GELC | 9/30/2014 | NA | X | X | NA | X |
| Ancho Spring | F | GELC | 10/5/2015 | NA | X | X | X | NA |
| Ancho Spring | UF | ARSL | 10/5/2015 | NA | NA | NA | NA | X |
| Ancho Spring | UF | Field | 10/5/2015 | X | NA | NA | NA | NA |
| Ancho Spring | UF | GELC | 10/5/2015 | NA | X | X | NA | X |
| CDV-37-1(i) | F | GELC | 2/8/2010 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 2/8/2010 | X | NA | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 4/1/2010 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 4/1/2010 | X | NA | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 9/21/2010 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 9/21/2010 | X | NA | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 12/1/2010 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 12/1/2010 | X | NA | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 3/31/2011 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 3/31/2011 | X | NA | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 6/20/2011 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 6/20/2011 | X | NA | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 1/24/2012 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | Field | 1/24/2012 | X | NA | NA | NA | NA |
| CDV-37-1(i) | UF | GELC | 1/24/2012 | NA | X | NA | NA | X |
| CDV-37-1(i) | F | GELC | 3/22/2013 | NA | X | X | NA | NA |
| CDV-37-1(i) | UF | ARSL | 3/22/2013 | NA | NA | NA | NA | X |
| CDV-37-1(i) | UF | Field | 3/22/2013 | X | NA | NA | NA | NA |
| CDV-37-1(i) | UF | GELC | 3/22/2013 | NA | X | NA | NA | NA |
| CDV-37-1(i) | F | GELC | 3/7/2014 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| CDV-37-1(i) | UF | Field | 3/7/2014 | X | NA | NA | NA | NA |
| CDV-37-1(i) | UF | GELC | 3/7/2014 | NA | X | X | NA | X |
| CDV-37-1(i) | F | GELC | 2/6/2015 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | ARSL | 2/6/2015 | NA | NA | NA | NA | X |
| CDV-37-1(i) | UF | Field | 2/6/2015 | X | NA | NA | NA | NA |
| CDV-37-1(i) | UF | GELC | 2/6/2015 | NA | X | X | NA | NA |
| CDV-37-1(i) | F | GELC | 3/18/2016 | NA | X | X | X | NA |
| CDV-37-1(i) | UF | ARSL | 3/18/2016 | NA | NA | NA | NA | X |
| CDV-37-1(i) | UF | Field | 3/18/2016 | X | NA | NA | NA | NA |
| CDV-37-1(i) | UF | GELC | 3/18/2016 | NA | X | X | NA | X |
| PCI-2 | F | GELC | 3/1/2010 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 3/1/2010 | X | NA | NA | NA | NA |
| PCI-2 | F | GELC | 6/7/2010 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 6/7/2010 | X | NA | NA | NA | NA |
| PCI-2 | F | GELC | 8/2/2010 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 8/2/2010 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 8/2/2010 | NA | X | NA | NA | X |
| PCI-2 | F | GELC | 10/11/2010 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 10/11/2010 | X | NA | NA | NA | NA |
| PCI-2 | F | GELC | 5/6/2011 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 5/6/2011 | X | NA | NA | NA | NA |
| PCI-2 | F | GELC | 7/22/2011 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 7/22/2011 | X | NA | NA | NA | NA |
| PCI-2 | F | GELC | 4/24/2012 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 4/24/2012 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 4/24/2012 | NA | X | NA | NA | X |
| PCI-2 | F | GELC | 4/15/2013 | NA | X | X | NA | NA |
| PCI-2 | UF | ARSL | 4/15/2013 | NA | NA | NA | NA | X |
| PCI-2 | UF | Field | 4/15/2013 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 4/15/2013 | NA | X | NA | NA | X |
| PCI-2 | F | GELC | 4/8/2014 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 4/8/2014 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 4/8/2014 | NA | X | X | NA | X |
| PCI-2 | F | GELC | 10/27/2014 | NA | X | X | X | NA |
| PCI-2 | UF | ARSL | 10/27/2014 | NA | NA | NA | NA | X |
| PCI-2 | UF | Field | 10/27/2014 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 10/27/2014 | NA | X | X | NA | NA |
| PCI-2 | F | GELC | 4/6/2015 | NA | X | X | X | NA |
| PCI-2 | UF | ARSL | 4/6/2015 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| PCI-2 | UF | Field | 4/6/2015 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 4/6/2015 | NA | X | X | NA | X |
| PCI-2 | F | GELC | 11/3/2015 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 11/3/2015 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 11/3/2015 | NA | X | X | NA | NA |
| PCI-2 | F | GELC | 4/14/2016 | NA | X | X | X | NA |
| PCI-2 | UF | Field | 4/14/2016 | X | NA | NA | NA | NA |
| PCI-2 | UF | GELC | 4/14/2016 | NA | X | X | NA | X |
| R-13 | F | GELC | 2/11/2010 | NA | X | X | X | NA |
| R-13 | UF | Field | 2/11/2010 | X | NA | NA | NA | NA |
| R-13 | F | GELC | 5/6/2010 | NA | X | X | X | NA |
| R-13 | UF | Field | 5/6/2010 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 5/6/2010 | NA | X | X | NA | NA |
| R-13 | F | GELC | 7/13/2010 | NA | X | X | X | NA |
| R-13 | UF | Field | 7/13/2010 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 7/13/2010 | NA | X | X | NA | X |
| R-13 | F | GELC | 11/9/2010 | NA | X | X | X | NA |
| R-13 | UF | Field | 11/9/2010 | X | NA | NA | NA | NA |
| R-13 | F | GELC | 2/18/2011 | NA | X | X | X | NA |
| R-13 | UF | Field | 2/18/2011 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 2/18/2011 | NA | X | X | NA | NA |
| R-13 | F | GELC | 5/25/2011 | NA | X | X | X | NA |
| R-13 | UF | Field | 5/25/2011 | X | NA | NA | NA | NA |
| R-13 | F | GELC | 8/1/2011 | NA | X | X | X | NA |
| R-13 | UF | Field | 8/1/2011 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 8/1/2011 | NA | X | X | NA | NA |
| R-13 | F | GELC | 11/22/2011 | NA | X | X | X | NA |
| R-13 | UF | Field | 11/22/2011 | X | NA | NA | NA | NA |
| R-13 | F | GELC | 6/5/2012 | NA | X | X | X | NA |
| R-13 | UF | Field | 6/5/2012 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 6/5/2012 | NA | X | NA | NA | NA |
| R-13 | F | GELC | 10/31/2012 | NA | X | X | X | NA |
| R-13 | UF | ARSL | 10/31/2012 | NA | NA | NA | NA | X |
| R-13 | UF | Field | 10/31/2012 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 10/31/2012 | NA | X | NA | NA | X |
| R-13 | F | GELC | 5/6/2013 | NA | X | X | NA | NA |
| R-13 | UF | Field | 5/6/2013 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 5/6/2013 | NA | X | NA | NA | NA |
| R-13 | F | GELC | 11/8/2013 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-13 | UF | ARSL | 11/8/2013 | NA | NA | NA | NA | X |
| R-13 | UF | Field | 11/8/2013 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 11/8/2013 | NA | X | NA | NA | NA |
| R-13 | F | GELC | 5/5/2014 | NA | X | X | X | NA |
| R-13 | UF | Field | 5/5/2014 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 5/5/2014 | NA | X | X | NA | NA |
| R-13 | F | GELC | 11/19/2014 | NA | X | X | X | NA |
| R-13 | UF | ARSL | 11/19/2014 | NA | NA | NA | NA | X |
| R-13 | UF | Field | 11/19/2014 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 11/19/2014 | NA | X | X | NA | X |
| R-13 | F | GELC | 2/13/2015 | NA | X | X | X | NA |
| R-13 | UF | Field | 2/13/2015 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 2/13/2015 | NA | X | X | NA | NA |
| R-13 | F | GELC | 5/14/2015 | NA | X | X | X | NA |
| R-13 | UF | Field | 5/14/2015 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 5/14/2015 | NA | X | X | NA | NA |
| R-13 | F | GELC | 8/11/2015 | NA | X | X | X | NA |
| R-13 | UF | Field | 8/11/2015 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 8/11/2015 | NA | X | X | NA | NA |
| R-13 | F | GELC | 11/10/2015 | NA | X | X | X | NA |
| R-13 | UF | ARSL | 11/10/2015 | NA | NA | NA | NA | X |
| R-13 | UF | Field | 11/10/2015 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 11/10/2015 | NA | X | X | NA | X |
| R-13 | F | GELC | 2/17/2016 | NA | X | X | NA | NA |
| R-13 | UF | Field | 2/17/2016 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 2/17/2016 | NA | X | X | NA | NA |
| R-13 | F | GELC | 5/18/2016 | NA | X | X | X | NA |
| R-13 | UF | Field | 5/18/2016 | X | NA | NA | NA | NA |
| R-13 | UF | GELC | 5/18/2016 | NA | X | X | NA | NA |
| R-14 S1 | F | GELC | 2/3/2010 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 2/3/2010 | X | NA | NA | NA | NA |
| R-14 S1 | F | GELC | 5/3/2010 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 5/3/2010 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 5/3/2010 | NA | X | X | NA | NA |
| R-14 S1 | F | GELC | 7/1/2010 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 7/1/2010 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 7/1/2010 | NA | X | NA | NA | X |
| R-14 S1 | F | GELC | 11/12/2010 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 11/12/2010 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-14 S1 | F | GELC | 2/22/2011 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 2/22/2011 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 2/22/2011 | NA | X | NA | NA | NA |
| R-14 S1 | F | GELC | 5/18/2011 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 5/18/2011 | X | NA | NA | NA | NA |
| R-14 S1 | F | GELC | 8/3/2011 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 8/3/2011 | X | NA | NA | NA | NA |
| R-14 S1 | F | GELC | 11/8/2011 | NA | X | X | X | NA |
| R-14 S1 | UF | Field | 11/8/2011 | X | NA | NA | NA | NA |
| R-14 S1 | UF | ARSL | 5/29/2012 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 5/29/2012 | X | NA | NA | NA | NA |
| R-14 S1 | F | GELC | 11/5/2012 | NA | X | X | NA | NA |
| R-14 S1 | UF | ARSL | 11/5/2012 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 11/5/2012 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 11/5/2012 | NA | X | NA | NA | X |
| R-14 S1 | F | GELC | 11/5/2013 | NA | X | X | X | NA |
| R-14 S1 | UF | ARSL | 11/5/2013 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 11/5/2013 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 11/5/2013 | NA | X | NA | NA | X |
| R-14 S1 | UF | ARSL | 5/6/2014 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 5/6/2014 | X | NA | NA | NA | NA |
| R-14 S1 | F | GELC | 11/12/2014 | NA | X | X | X | NA |
| R-14 S1 | UF | ARSL | 11/12/2014 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 11/12/2014 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 11/12/2014 | NA | X | X | NA | X |
| R-14 S1 | UF | ARSL | 5/7/2015 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 5/7/2015 | X | NA | NA | NA | NA |
| R-14 S1 | F | GELC | 11/19/2015 | NA | X | X | X | NA |
| R-14 S1 | UF | ARSL | 11/19/2015 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 11/19/2015 | X | NA | NA | NA | NA |
| R-14 S1 | UF | GELC | 11/19/2015 | NA | X | X | NA | X |
| R-14 S1 | UF | ARSL | 5/18/2016 | NA | NA | NA | NA | X |
| R-14 S1 | UF | Field | 5/18/2016 | X | NA | NA | NA | NA |
| R-16r | F | GELC | 2/4/2010 | NA | X | X | X | NA |
| R-16r | UF | Field | 2/4/2010 | X | NA | NA | NA | NA |
| R-16r | F | GELC | 5/7/2010 | NA | X | X | X | NA |
| R-16r | UF | Field | 5/7/2010 | X | NA | NA | NA | NA |
| R-16r | F | GELC | 7/15/2010 | NA | X | X | X | NA |
| R-16r | UF | Field | 7/15/2010 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-16r | UF | GELC | 7/15/2010 | NA | X | X | NA | X |
| R-16r | F | GELC | 11/11/2010 | NA | X | X | X | NA |
| R-16r | UF | Field | 11/11/2010 | X | NA | NA | NA | NA |
| R-16r | F | GELC | 2/16/2011 | NA | X | X | X | NA |
| R-16r | UF | Field | 2/16/2011 | X | NA | NA | NA | NA |
| R-16r | UF | GELC | 2/16/2011 | NA | X | X | NA | NA |
| R-16r | F | Field | 5/20/2011 | X | NA | NA | NA | NA |
| R-16r | F | GELC | 5/20/2011 | NA | X | X | X | NA |
| R-16r | UF | Field | 5/20/2011 | X | NA | NA | NA | NA |
| R-16r | F | GELC | 8/10/2011 | NA | X | X | X | NA |
| R-16r | UF | Field | 8/10/2011 | X | NA | NA | NA | NA |
| R-16r | UF | GELC | 8/10/2011 | NA | X | X | NA | NA |
| R-16r | F | GELC | 8/9/2012 | NA | X | X | X | NA |
| R-16r | UF | Field | 8/9/2012 | X | NA | NA | NA | NA |
| R-16r | UF | GELC | 8/9/2012 | NA | X | NA | NA | X |
| R-16r | F | GELC | 7/24/2013 | NA | X | X | X | NA |
| R-16r | UF | Field | 7/24/2013 | X | NA | NA | NA | NA |
| R-16r | UF | GELC | 7/24/2013 | NA | X | NA | NA | X |
| R-16r | F | GELC | 7/16/2014 | NA | X | X | X | NA |
| R-16r | UF | Field | 7/16/2014 | X | NA | NA | NA | NA |
| R-16r | UF | GELC | 7/16/2014 | NA | X | X | NA | X |
| R-16r | F | GELC | 8/14/2015 | NA | X | X | X | NA |
| R-16r | UF | Field | 8/14/2015 | X | NA | NA | NA | NA |
| R-16r | UF | GELC | 8/14/2015 | NA | X | X | NA | X |
| R-17 S1 | F | GELC | 3/8/2010 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 3/8/2010 | X | NA | NA | NA | NA |
| R-17 S1 | F | GELC | 6/14/2010 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 6/14/2010 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 6/14/2010 | NA | X | X | NA | NA |
| R-17 S1 | F | GELC | 8/4/2010 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 8/4/2010 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 8/4/2010 | NA | X | NA | NA | X |
| R-17 S1 | F | GELC | 10/22/2010 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 10/22/2010 | X | NA | NA | NA | NA |
| R-17 S1 | F | GELC | 1/20/2011 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 1/20/2011 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 1/20/2011 | NA | X | NA | NA | NA |
| R-17 S1 | F | GELC | 4/27/2011 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 4/27/2011 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-17 S1 | F | GELC | 7/27/2011 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 7/27/2011 | X | NA | NA | NA | NA |
| R-17 S1 | F | Field | 5/2/2012 | X | NA | NA | NA | NA |
| R-17 S1 | F | GELC | 5/2/2012 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 5/2/2012 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 5/2/2012 | NA | X | NA | NA | X |
| R-17 S1 | F | GELC | 4/25/2013 | NA | X | X | X | NA |
| R-17 S1 | UF | ARSL | 4/25/2013 | NA | NA | NA | NA | X |
| R-17 S1 | UF | Field | 4/25/2013 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 4/25/2013 | NA | X | NA | NA | X |
| R-17 S1 | F | GELC | 4/2/2014 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 4/2/2014 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 4/2/2014 | NA | X | X | NA | X |
| R-17 S1 | F | GELC | 4/20/2015 | NA | X | X | X | NA |
| R-17 S1 | UF | ARSL | 4/20/2015 | NA | NA | NA | NA | X |
| R-17 S1 | UF | Field | 4/20/2015 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 4/20/2015 | NA | X | X | NA | X |
| R-17 S1 | F | GELC | 4/12/2016 | NA | X | X | X | NA |
| R-17 S1 | UF | Field | 4/12/2016 | X | NA | NA | NA | NA |
| R-17 S1 | UF | GELC | 4/12/2016 | NA | X | X | NA | X |
| R-17 S2 | F | GELC | 3/8/2010 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 3/8/2010 | X | NA | NA | NA | NA |
| R-17 S2 | F | GELC | 6/14/2010 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 6/14/2010 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 6/14/2010 | NA | X | X | NA | NA |
| R-17 S2 | F | GELC | 8/4/2010 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 8/4/2010 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 8/4/2010 | NA | X | NA | NA | X |
| R-17 S2 | F | GELC | 10/22/2010 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 10/22/2010 | X | NA | NA | NA | NA |
| R-17 S2 | F | GELC | 1/20/2011 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 1/20/2011 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 1/20/2011 | NA | X | NA | NA | NA |
| R-17 S2 | F | GELC | 4/27/2011 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 4/27/2011 | X | NA | NA | NA | NA |
| R-17 S2 | F | GELC | 7/27/2011 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 7/27/2011 | X | NA | NA | NA | NA |
| R-17 S2 | F | Field | 5/2/2012 | X | NA | NA | NA | NA |
| R-17 S2 | F | GELC | 5/2/2012 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-17 S2 | UF | Field | 5/2/2012 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 5/2/2012 | NA | X | NA | NA | X |
| R-17 S2 | F | GELC | 4/25/2013 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 4/25/2013 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 4/25/2013 | NA | X | NA | NA | X |
| R-17 S2 | F | GELC | 4/2/2014 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 4/2/2014 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 4/2/2014 | NA | X | X | NA | X |
| R-17 S2 | F | GELC | 4/20/2015 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 4/20/2015 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 4/20/2015 | NA | X | X | NA | X |
| R-17 S2 | F | GELC | 4/12/2016 | NA | X | X | X | NA |
| R-17 S2 | UF | Field | 4/12/2016 | X | NA | NA | NA | NA |
| R-17 S2 | UF | GELC | 4/12/2016 | NA | X | X | NA | X |
| R-2 | F | GELC | 3/9/2011 | NA | X | X | X | NA |
| R-2 | UF | Field | 3/9/2011 | X | NA | NA | NA | NA |
| R-2 | F | GELC | 4/17/2012 | NA | X | X | X | NA |
| R-2 | UF | Field | 4/17/2012 | X | NA | NA | NA | NA |
| R-2 | UF | GELC | 4/17/2012 | NA | X | NA | NA | X |
| R-2 | F | GELC | 6/12/2013 | NA | X | X | X | NA |
| R-2 | UF | Field | 6/12/2013 | X | NA | NA | NA | NA |
| R-2 | UF | GELC | 6/12/2013 | NA | X | NA | NA | X |
| R-2 | F | GELC | 6/5/2014 | NA | X | X | X | NA |
| R-2 | UF | Field | 6/5/2014 | X | NA | NA | NA | NA |
| R-2 | UF | GELC | 6/5/2014 | NA | X | X | NA | X |
| R-2 | F | GELC | 6/11/2015 | NA | X | X | X | NA |
| R-2 | UF | Field | 6/11/2015 | X | NA | NA | NA | NA |
| R-2 | UF | GELC | 6/11/2015 | NA | X | X | NA | X |
| R-2 | F | GELC | 5/31/2016 | NA | X | X | X | NA |
| R-2 | UF | Field | 5/31/2016 | X | NA | NA | NA | NA |
| R-2 | UF | GELC | 5/31/2016 | NA | X | X | NA | X |
| R-21 | F | GELC | 3/12/2010 | NA | X | X | X | NA |
| R-21 | UF | Field | 3/12/2010 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 6/11/2010 | NA | X | X | X | NA |
| R-21 | UF | Field | 6/11/2010 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 8/11/2010 | NA | X | X | X | NA |
| R-21 | UF | Field | 8/11/2010 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 10/11/2010 | NA | X | X | X | NA |
| R-21 | UF | Field | 10/11/2010 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-21 | F | GELC | 1/27/2011 | NA | X | X | X | NA |
| R-21 | UF | Field | 1/27/2011 | X | NA | NA | NA | NA |
| R-21 | F | Field | 4/19/2011 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 4/19/2011 | NA | X | X | X | NA |
| R-21 | F | GELC | 7/21/2011 | NA | X | X | X | NA |
| R-21 | UF | Field | 7/21/2011 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 11/3/2011 | NA | X | X | X | NA |
| R-21 | UF | Field | 11/3/2011 | X | NA | NA | NA | NA |
| R-21 | UF | ARSL | 5/2/2012 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 5/2/2012 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 10/15/2012 | NA | X | X | NA | NA |
| R-21 | UF | ARSL | 10/15/2012 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 10/15/2012 | X | NA | NA | NA | NA |
| R-21 | UF | GELC | 10/15/2012 | NA | X | NA | NA | X |
| R-21 | UF | ARSL | 4/22/2013 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 4/22/2013 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 12/9/2013 | NA | X | X | X | NA |
| R-21 | UF | ARSL | 12/9/2013 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 12/9/2013 | X | NA | NA | NA | NA |
| R-21 | UF | GELC | 12/9/2013 | NA | X | X | NA | X |
| R-21 | UF | ARSL | 4/11/2014 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 4/11/2014 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 10/23/2014 | NA | X | X | X | NA |
| R-21 | UF | ARSL | 10/23/2014 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 10/23/2014 | X | NA | NA | NA | NA |
| R-21 | UF | GELC | 10/23/2014 | NA | X | X | NA | X |
| R-21 | UF | ARSL | 4/6/2015 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 4/6/2015 | X | NA | NA | NA | NA |
| R-21 | UF | ARSL | 7/7/2015 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 7/7/2015 | X | NA | NA | NA | NA |
| R-21 | F | GELC | 10/20/2015 | NA | X | X | X | NA |
| R-21 | UF | ARSL | 10/20/2015 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 10/20/2015 | X | NA | NA | NA | NA |
| R-21 | UF | GELC | 10/20/2015 | NA | X | X | NA | X |
| R-21 | UF | ARSL | 1/6/2016 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 1/6/2016 | X | NA | NA | NA | NA |
| R-21 | UF | ARSL | 4/5/2016 | NA | NA | NA | NA | X |
| R-21 | UF | Field | 4/5/2016 | X | NA | NA | NA | NA |
| R-26 S1 | F | GELC | 4/2/2010 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-26 S1 | UF | Field | 4/2/2010 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 4/2/2010 | NA | X | X | NA | NA |
| R-26 S1 | F | GELC | 8/13/2010 | NA | X | X | X | NA |
| R-26 S1 | UF | Field | 8/13/2010 | X | NA | NA | NA | NA |
| R-26 S1 | F | GELC | 6/1/2011 | NA | X | X | X | NA |
| R-26 S1 | UF | Field | 6/1/2011 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 6/1/2011 | NA | X | X | NA | NA |
| R-26 S1 | F | GELC | 9/16/2011 | NA | X | X | X | NA |
| R-26 S1 | UF | Field | 9/16/2011 | X | NA | NA | NA | NA |
| R-26 S1 | F | GELC | 12/9/2011 | NA | X | X | X | NA |
| R-26 S1 | UF | ARSL | 12/9/2011 | NA | NA | NA | NA | X |
| R-26 S1 | UF | Field | 12/9/2011 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 12/9/2011 | NA | X | X | NA | X |
| R-26 S1 | F | GELC | 1/26/2012 | NA | X | X | X | NA |
| R-26 S1 | UF | ARSL | 1/26/2012 | NA | NA | NA | NA | X |
| R-26 S1 | UF | Field | 1/26/2012 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 1/26/2012 | NA | X | NA | NA | X |
| R-26 S1 | F | GELC | 7/26/2012 | NA | X | X | X | NA |
| R-26 S1 | UF | ARSL | 7/26/2012 | NA | NA | NA | NA | X |
| R-26 S1 | UF | Field | 7/26/2012 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 7/26/2012 | NA | X | NA | NA | NA |
| R-26 S1 | F | GELC | 3/15/2013 | NA | X | X | NA | NA |
| R-26 S1 | UF | Field | 3/15/2013 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 3/15/2013 | NA | X | NA | NA | NA |
| R-26 S1 | F | GELC | 3/11/2014 | NA | X | X | X | NA |
| R-26 S1 | UF | Field | 3/11/2014 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 3/11/2014 | NA | X | X | NA | X |
| R-26 S1 | F | GELC | 1/21/2015 | NA | X | X | X | NA |
| R-26 S1 | UF | Field | 1/21/2015 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 1/21/2015 | NA | X | X | NA | NA |
| R-26 S1 | F | GELC | 3/23/2016 | NA | X | X | X | NA |
| R-26 S1 | UF | Field | 3/23/2016 | X | NA | NA | NA | NA |
| R-26 S1 | UF | GELC | 3/23/2016 | NA | X | X | NA | X |
| R-27 | F | GELC | 4/9/2010 | NA | X | X | X | NA |
| R-27 | UF | Field | 4/9/2010 | X | NA | NA | NA | NA |
| R-27 | UF | GELC | 4/9/2010 | NA | X | X | NA | NA |
| R-27 | F | GELC | 9/14/2010 | NA | X | X | X | NA |
| R-27 | UF | Field | 9/14/2010 | X | NA | NA | NA | NA |
| R-27 | F | GELC | 4/4/2011 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-27 | UF | Field | 4/4/2011 | X | NA | NA | NA | NA |
| R-27 | UF | GELC | 4/4/2011 | NA | X | X | NA | NA |
| R-27 | F | Field | 2/3/2012 | X | NA | NA | NA | NA |
| R-27 | F | GELC | 2/3/2012 | NA | X | X | X | NA |
| R-27 | UF | ARSL | 2/3/2012 | NA | NA | NA | NA | X |
| R-27 | UF | GELC | 2/3/2012 | NA | X | NA | NA | X |
| R-27 | F | GELC | 3/11/2013 | NA | X | X | NA | NA |
| R-27 | UF | ARSL | 3/11/2013 | NA | NA | NA | NA | X |
| R-27 | UF | Field | 3/11/2013 | X | NA | NA | NA | NA |
| R-27 | UF | GELC | 3/11/2013 | NA | X | NA | NA | X |
| R-27 | F | GELC | 3/7/2014 | NA | X | X | X | NA |
| R-27 | UF | ARSL | 3/7/2014 | NA | NA | NA | NA | X |
| R-27 | UF | Field | 3/7/2014 | X | NA | NA | NA | NA |
| R-27 | UF | GELC | 3/7/2014 | NA | X | X | NA | X |
| R-27 | F | GELC | 2/6/2015 | NA | X | X | X | NA |
| R-27 | UF | ARSL | 2/6/2015 | NA | NA | NA | NA | X |
| R-27 | UF | Field | 2/6/2015 | X | NA | NA | NA | NA |
| R-27 | UF | GELC | 2/6/2015 | NA | X | X | NA | X |
| R-27 | F | GELC | 3/18/2016 | NA | X | X | X | NA |
| R-27 | UF | ARSL | 3/18/2016 | NA | NA | NA | NA | X |
| R-27 | UF | Field | 3/18/2016 | X | NA | NA | NA | NA |
| R-27 | UF | GELC | 3/18/2016 | NA | X | X | NA | X |
| R-27i | F | GELC | 4/15/2010 | NA | X | X | X | NA |
| R-27i | UF | Field | 4/15/2010 | X | NA | NA | NA | NA |
| R-27i | F | GELC | 9/20/2010 | NA | X | X | X | NA |
| R-27i | UF | Field | 9/20/2010 | X | NA | NA | NA | NA |
| R-27i | F | GELC | 12/1/2010 | NA | X | X | X | NA |
| R-27i | UF | Field | 12/1/2010 | X | NA | NA | NA | NA |
| R-27i | F | GELC | 4/4/2011 | NA | X | X | X | NA |
| R-27i | UF | Field | 4/4/2011 | X | NA | NA | NA | NA |
| R-27i | F | GELC | 6/20/2011 | NA | X | X | X | NA |
| R-27i | UF | Field | 6/20/2011 | X | NA | NA | NA | NA |
| R-27i | F | GELC | 2/3/2012 | NA | X | X | X | NA |
| R-27i | UF | ARSL | 2/3/2012 | NA | NA | NA | NA | X |
| R-27i | UF | Field | 2/3/2012 | X | NA | NA | NA | NA |
| R-27i | UF | GELC | 2/3/2012 | NA | X | NA | NA | X |
| R-27i | F | GELC | 3/11/2013 | NA | X | X | NA | NA |
| R-27i | UF | ARSL | 3/11/2013 | NA | NA | NA | NA | X |
| R-27i | UF | Field | 3/11/2013 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-27i | UF | GELC | 3/11/2013 | NA | X | NA | NA | X |
| R-27i | F | GELC | 3/7/2014 | NA | X | X | X | NA |
| R-27i | UF | ARSL | 3/7/2014 | NA | NA | NA | NA | X |
| R-27i | UF | Field | 3/7/2014 | X | NA | NA | NA | NA |
| R-27i | UF | GELC | 3/7/2014 | NA | X | X | NA | X |
| R-27i | F | GELC | 2/6/2015 | NA | X | X | X | NA |
| R-27i | UF | ARSL | 2/6/2015 | NA | NA | NA | NA | X |
| R-27i | UF | Field | 2/6/2015 | X | NA | NA | NA | NA |
| R-27i | UF | GELC | 2/6/2015 | NA | X | X | NA | X |
| R-27i | F | GELC | 3/18/2016 | NA | X | X | X | NA |
| R-27i | UF | ARSL | 3/18/2016 | NA | NA | NA | NA | X |
| R-27i | UF | Field | 3/18/2016 | X | NA | NA | NA | NA |
| R-27i | UF | GELC | 3/18/2016 | NA | X | X | NA | X |
| R-30 | F | GELC | 5/19/2010 | NA | X | X | X | NA |
| R-30 | UF | Field | 5/19/2010 | X | NA | NA | NA | NA |
| R-30 | F | GELC | 9/23/2010 | NA | X | X | X | NA |
| R-30 | UF | Field | 9/23/2010 | X | NA | NA | NA | NA |
| R-30 | F | GELC | 12/3/2010 | NA | X | X | X | NA |
| R-30 | UF | Field | 12/3/2010 | X | NA | NA | NA | NA |
| R-30 | F | GELC | 4/5/2011 | NA | X | X | X | NA |
| R-30 | UF | Field | 4/5/2011 | X | NA | NA | NA | NA |
| R-30 | F | GELC | 6/15/2011 | NA | X | X | X | NA |
| R-30 | UF | Field | 6/15/2011 | X | NA | NA | NA | NA |
| R-30 | F | GELC | 9/14/2011 | NA | X | X | X | NA |
| R-30 | UF | Field | 9/14/2011 | X | NA | NA | NA | NA |
| R-30 | F | GELC | 2/1/2012 | NA | X | X | X | NA |
| R-30 | UF | ARSL | 2/1/2012 | NA | NA | NA | NA | X |
| R-30 | UF | Field | 2/1/2012 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 2/1/2012 | NA | X | NA | NA | X |
| R-30 | F | GELC | 3/12/2013 | NA | X | X | NA | NA |
| R-30 | UF | ARSL | 3/12/2013 | NA | NA | NA | NA | X |
| R-30 | UF | Field | 3/12/2013 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 3/12/2013 | NA | X | NA | NA | X |
| R-30 | F | GELC | 3/5/2014 | NA | X | X | X | NA |
| R-30 | UF | ARSL | 3/5/2014 | NA | NA | NA | NA | X |
| R-30 | UF | Field | 3/5/2014 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 3/5/2014 | NA | X | X | NA | X |
| R-30 | F | GELC | 8/11/2014 | NA | X | X | X | NA |
| R-30 | UF | ARSL | 8/11/2014 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-30 | UF | Field | 8/11/2014 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 8/11/2014 | NA | X | X | NA | X |
| R-30 | F | GELC | 3/10/2015 | NA | X | X | X | NA |
| R-30 | UF | ARSL | 3/10/2015 | NA | NA | NA | NA | X |
| R-30 | UF | Field | 3/10/2015 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 3/10/2015 | NA | X | X | NA | X |
| R-30 | F | GELC | 9/22/2015 | NA | X | X | X | NA |
| R-30 | UF | ARSL | 9/22/2015 | NA | NA | NA | NA | X |
| R-30 | UF | Field | 9/22/2015 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 9/22/2015 | NA | X | X | NA | X |
| R-30 | F | GELC | 3/4/2016 | NA | X | X | X | NA |
| R-30 | UF | ARSL | 3/4/2016 | NA | NA | NA | NA | X |
| R-30 | UF | Field | 3/4/2016 | X | NA | NA | NA | NA |
| R-30 | UF | GELC | 3/4/2016 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 1/28/2010 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 1/28/2010 | X | NA | NA | NA | NA |
| R-33 S1 | F | GELC | 5/12/2010 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 5/12/2010 | X | NA | NA | NA | NA |
| R-33 S1 | F | GELC | 7/9/2010 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 7/9/2010 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 7/9/2010 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 11/18/2010 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 11/18/2010 | X | NA | NA | NA | NA |
| R-33 S1 | F | GELC | 2/10/2011 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 2/10/2011 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 2/10/2011 | NA | X | X | NA | NA |
| R-33 S1 | F | GELC | 5/16/2011 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 5/16/2011 | X | NA | NA | NA | NA |
| R-33 S1 | F | GELC | 8/4/2011 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 8/4/2011 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 8/4/2011 | NA | X | X | NA | NA |
| R-33 S1 | F | GELC | 8/21/2012 | NA | X | X | X | NA |
| R-33 S1 | UF | ARSL | 8/21/2012 | NA | NA | NA | NA | X |
| R-33 S1 | UF | Field | 8/21/2012 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 8/21/2012 | NA | X | NA | NA | X |
| R-33 S1 | F | GELC | 7/10/2013 | NA | X | X | X | NA |
| R-33 S1 | UF | ARSL | 7/10/2013 | NA | NA | NA | NA | X |
| R-33 S1 | UF | Field | 7/10/2013 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 7/10/2013 | NA | X | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-33 S1 | F | GELC | 7/9/2014 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 7/9/2014 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 7/9/2014 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 11/6/2014 | NA | X | X | X | NA |
| R-33 S1 | UF | ARSL | 11/6/2014 | NA | NA | NA | NA | X |
| R-33 S1 | UF | Field | 11/6/2014 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 11/6/2014 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 2/26/2015 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 2/26/2015 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 2/26/2015 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 5/12/2015 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 5/12/2015 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 5/12/2015 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 8/6/2015 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 8/6/2015 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 8/6/2015 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 11/12/2015 | NA | X | X | X | NA |
| R-33 S1 | UF | ARSL | 11/12/2015 | NA | NA | NA | NA | X |
| R-33 S1 | UF | Field | 11/12/2015 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 11/12/2015 | NA | X | X | NA | X |
| R-33 S1 | F | GELC | 2/5/2016 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 2/5/2016 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 2/5/2016 | NA | X | X | NA | NA |
| R-33 S1 | F | GELC | 5/11/2016 | NA | X | X | X | NA |
| R-33 S1 | UF | Field | 5/11/2016 | X | NA | NA | NA | NA |
| R-33 S1 | UF | GELC | 5/11/2016 | NA | X | X | NA | NA |
| R-33 S2 | F | GELC | 1/28/2010 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 1/28/2010 | X | NA | NA | NA | NA |
| R-33 S2 | F | GELC | 5/12/2010 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 5/12/2010 | X | NA | NA | NA | NA |
| R-33 S2 | F | GELC | 7/9/2010 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 7/9/2010 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 7/9/2010 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 11/18/2010 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 11/18/2010 | X | NA | NA | NA | NA |
| R-33 S2 | F | GELC | 2/11/2011 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 2/11/2011 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 2/11/2011 | NA | X | X | NA | NA |
| R-33 S2 | F | GELC | 5/16/2011 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-33 S2 | UF | Field | 5/16/2011 | X | NA | NA | NA | NA |
| R-33 S2 | F | GELC | 8/4/2011 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 8/4/2011 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 8/4/2011 | NA | X | X | NA | NA |
| R-33 S2 | F | GELC | 8/21/2012 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 8/21/2012 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 8/21/2012 | NA | X | NA | NA | X |
| R-33 S2 | F | GELC | 7/11/2013 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 7/11/2013 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 7/11/2013 | NA | X | NA | NA | X |
| R-33 S2 | F | GELC | 7/9/2014 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 7/9/2014 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 7/9/2014 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 11/6/2014 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 11/6/2014 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 11/6/2014 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 2/26/2015 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 2/26/2015 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 2/26/2015 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 5/12/2015 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 5/12/2015 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 5/12/2015 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 8/6/2015 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 8/6/2015 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 8/6/2015 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 11/12/2015 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 11/12/2015 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 11/12/2015 | NA | X | X | NA | X |
| R-33 S2 | F | GELC | 2/5/2016 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 2/5/2016 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 2/5/2016 | NA | X | X | NA | NA |
| R-33 S2 | F | GELC | 5/11/2016 | NA | X | X | X | NA |
| R-33 S2 | UF | Field | 5/11/2016 | X | NA | NA | NA | NA |
| R-33 S2 | UF | GELC | 5/11/2016 | NA | X | X | NA | NA |
| R-37 S2 | F | GELC | 3/3/2010 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 3/3/2010 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 6/8/2010 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 6/8/2010 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 8/10/2010 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-37 S2 | UF | Field | 8/10/2010 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 10/14/2010 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 10/14/2010 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 1/25/2011 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 1/25/2011 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 4/26/2011 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 4/26/2011 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 7/13/2011 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 7/13/2011 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 10/31/2011 | NA | X | X | X | NA |
| R-37 S2 | UF | Field | 10/31/2011 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 4/27/2012 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 4/27/2012 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 10/22/2012 | NA | X | X | NA | NA |
| R-37 S2 | UF | ARSL | 10/22/2012 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 10/22/2012 | X | NA | NA | NA | NA |
| R-37 S2 | UF | GELC | 10/22/2012 | NA | X | NA | NA | X |
| R-37 S2 | UF | ARSL | 1/24/2013 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 1/24/2013 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 4/11/2013 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 4/11/2013 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 7/12/2013 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 7/12/2013 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 12/6/2013 | NA | X | X | X | NA |
| R-37 S2 | UF | ARSL | 12/6/2013 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 12/6/2013 | X | NA | NA | NA | NA |
| R-37 S2 | UF | GELC | 12/6/2013 | NA | X | X | NA | X |
| R-37 S2 | UF | ARSL | 1/7/2014 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 1/7/2014 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 4/16/2014 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 4/16/2014 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 7/9/2014 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 7/9/2014 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 10/14/2014 | NA | X | X | X | NA |
| R-37 S2 | UF | ARSL | 10/14/2014 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 10/14/2014 | X | NA | NA | NA | NA |
| R-37 S2 | UF | GELC | 10/14/2014 | NA | X | X | NA | X |
| R-37 S2 | UF | ARSL | 1/7/2015 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 1/7/2015 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-37 S2 | UF | ARSL | 4/9/2015 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 4/9/2015 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 7/8/2015 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 7/8/2015 | X | NA | NA | NA | NA |
| R-37 S2 | F | GELC | 10/28/2015 | NA | X | X | X | NA |
| R-37 S2 | UF | ARSL | 10/28/2015 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 10/28/2015 | X | NA | NA | NA | NA |
| R-37 S2 | UF | GELC | 10/28/2015 | NA | X | X | NA | X |
| R-37 S2 | UF | ARSL | 1/13/2016 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 1/13/2016 | X | NA | NA | NA | NA |
| R-37 S2 | UF | ARSL | 4/8/2016 | NA | NA | NA | NA | X |
| R-37 S2 | UF | Field | 4/8/2016 | X | NA | NA | NA | NA |
| R-38 | F | Field | 3/12/2010 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 3/12/2010 | NA | X | X | X | NA |
| R-38 | UF | Field | 3/12/2010 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 6/2/2010 | NA | X | X | X | NA |
| R-38 | UF | Field | 6/2/2010 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 8/6/2010 | NA | X | X | X | NA |
| R-38 | UF | Field | 8/6/2010 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 10/11/2010 | NA | X | X | X | NA |
| R-38 | UF | Field | 10/11/2010 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 1/27/2011 | NA | X | X | X | NA |
| R-38 | UF | Field | 1/27/2011 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 5/6/2011 | NA | X | X | X | NA |
| R-38 | UF | Field | 5/6/2011 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 7/26/2011 | NA | X | X | X | NA |
| R-38 | UF | Field | 7/26/2011 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 10/25/2011 | NA | X | X | X | NA |
| R-38 | UF | ARSL | 10/25/2011 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 10/25/2011 | X | NA | NA | NA | NA |
| R-38 | UF | GELC | 10/25/2011 | NA | X | X | NA | X |
| R-38 | UF | ARSL | 4/24/2012 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 4/24/2012 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 10/9/2012 | NA | X | X | NA | NA |
| R-38 | UF | ARSL | 10/9/2012 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 10/9/2012 | X | NA | NA | NA | NA |
| R-38 | UF | GELC | 10/9/2012 | NA | X | NA | NA | X |
| R-38 | UF | ARSL | 4/11/2013 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 4/11/2013 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-38 | F | GELC | 12/2/2013 | NA | X | X | X | NA |
| R-38 | UF | ARSL | 12/2/2013 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 12/2/2013 | X | NA | NA | NA | NA |
| R-38 | UF | GELC | 12/2/2013 | NA | X | X | NA | X |
| R-38 | UF | ARSL | 4/1/2014 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 4/1/2014 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 10/28/2014 | NA | X | X | X | NA |
| R-38 | UF | ARSL | 10/28/2014 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 10/28/2014 | X | NA | NA | NA | NA |
| R-38 | UF | GELC | 10/28/2014 | NA | X | X | NA | X |
| R-38 | UF | ARSL | 4/7/2015 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 4/7/2015 | X | NA | NA | NA | NA |
| R-38 | UF | ARSL | 7/10/2015 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 7/10/2015 | X | NA | NA | NA | NA |
| R-38 | F | GELC | 10/19/2015 | NA | X | X | X | NA |
| R-38 | UF | ARSL | 10/19/2015 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 10/19/2015 | X | NA | NA | NA | NA |
| R-38 | UF | GELC | 10/19/2015 | NA | X | X | NA | X |
| R-38 | UF | ARSL | 1/6/2016 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 1/6/2016 | X | NA | NA | NA | NA |
| R-38 | UF | ARSL | 4/4/2016 | NA | NA | NA | NA | X |
| R-38 | UF | Field | 4/4/2016 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 2/26/2010 | NA | X | X | X | NA |
| R-39 | UF | Field | 2/26/2010 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 6/2/2010 | NA | X | X | X | NA |
| R-39 | UF | Field | 6/2/2010 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 8/12/2010 | NA | X | X | X | NA |
| R-39 | UF | Field | 8/12/2010 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 10/8/2010 | NA | X | X | X | NA |
| R-39 | UF | Field | 10/8/2010 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 1/26/2011 | NA | X | X | X | NA |
| R-39 | UF | Field | 1/26/2011 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 4/21/2011 | NA | X | X | X | NA |
| R-39 | UF | Field | 4/21/2011 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 7/28/2011 | NA | X | X | X | NA |
| R-39 | UF | Field | 7/28/2011 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 10/27/2011 | NA | X | X | X | NA |
| R-39 | UF | Field | 10/27/2011 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 4/25/2012 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-39 | UF | Field | 4/25/2012 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 10/11/2012 | NA | X | X | NA | NA |
| R-39 | UF | ARSL | 10/11/2012 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 10/11/2012 | X | NA | NA | NA | NA |
| R-39 | UF | GELC | 10/11/2012 | NA | X | NA | NA | X |
| R-39 | UF | ARSL | 1/28/2013 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 1/28/2013 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 4/9/2013 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 4/9/2013 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 7/18/2013 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 7/18/2013 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 12/16/2013 | NA | X | X | X | NA |
| R-39 | UF | ARSL | 12/16/2013 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 12/16/2013 | X | NA | NA | NA | NA |
| R-39 | UF | GELC | 12/16/2013 | NA | X | X | NA | X |
| R-39 | UF | ARSL | 1/24/2014 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 1/24/2014 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 4/14/2014 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 4/14/2014 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 7/14/2014 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 7/14/2014 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 10/21/2014 | NA | X | X | X | NA |
| R-39 | UF | ARSL | 10/21/2014 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 10/21/2014 | X | NA | NA | NA | NA |
| R-39 | UF | GELC | 10/21/2014 | NA | X | X | NA | X |
| R-39 | UF | ARSL | 1/7/2015 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 1/7/2015 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 4/23/2015 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 4/23/2015 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 7/7/2015 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 7/7/2015 | X | NA | NA | NA | NA |
| R-39 | F | GELC | 10/29/2015 | NA | X | X | X | NA |
| R-39 | UF | ARSL | 10/29/2015 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 10/29/2015 | X | NA | NA | NA | NA |
| R-39 | UF | GELC | 10/29/2015 | NA | X | X | NA | X |
| R-39 | UF | ARSL | 1/11/2016 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 1/11/2016 | X | NA | NA | NA | NA |
| R-39 | UF | ARSL | 4/13/2016 | NA | NA | NA | NA | X |
| R-39 | UF | Field | 4/13/2016 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-40 S2 | F | GELC | 2/23/2010 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 2/23/2010 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 6/3/2010 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 6/3/2010 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 7/27/2010 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 7/27/2010 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 10/19/2010 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 10/19/2010 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 1/19/2011 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 1/19/2011 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 4/26/2011 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 4/26/2011 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 7/8/2011 | NA | X | X | X | NA |
| R-40 S2 | UF | Field | 7/8/2011 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 10/20/2011 | NA | X | X | X | NA |
| R-40 S2 | UF | ARSL | 10/20/2011 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 10/20/2011 | X | NA | NA | NA | NA |
| R-40 S2 | UF | GELC | 10/20/2011 | NA | X | X | NA | X |
| R-40 S2 | UF | ARSL | 5/1/2012 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 5/1/2012 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 10/12/2012 | NA | X | X | NA | NA |
| R-40 S2 | UF | ARSL | 10/12/2012 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 10/12/2012 | X | NA | NA | NA | NA |
| R-40 S2 | UF | GELC | 10/12/2012 | NA | X | NA | NA | X |
| R-40 S2 | UF | ARSL | 4/16/2013 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 4/16/2013 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 12/3/2013 | NA | X | X | X | NA |
| R-40 S2 | UF | ARSL | 12/3/2013 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 12/3/2013 | X | NA | NA | NA | NA |
| R-40 S2 | UF | GELC | 12/3/2013 | NA | X | X | NA | X |
| R-40 S2 | UF | ARSL | 4/7/2014 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 4/7/2014 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 10/17/2014 | NA | X | X | X | NA |
| R-40 S2 | UF | ARSL | 10/17/2014 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 10/17/2014 | X | NA | NA | NA | NA |
| R-40 S2 | UF | GELC | 10/17/2014 | NA | X | X | NA | X |
| R-40 S2 | UF | ARSL | 4/10/2015 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 4/10/2015 | X | NA | NA | NA | NA |
| R-40 S2 | F | GELC | 10/30/2015 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-40 S2 | UF | ARSL | 10/30/2015 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 10/30/2015 | X | NA | NA | NA | NA |
| R-40 S2 | UF | GELC | 10/30/2015 | NA | X | X | NA | X |
| R-40 S2 | UF | ARSL | 4/15/2016 | NA | NA | NA | NA | X |
| R-40 S2 | UF | Field | 4/15/2016 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 2/5/2010 | NA | X | X | X | NA |
| R-46 | UF | Field | 2/5/2010 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 5/7/2010 | NA | X | X | X | NA |
| R-46 | F | GELC | 7/1/2010 | NA | X | X | X | NA |
| R-46 | UF | Field | 7/1/2010 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 7/1/2010 | NA | X | NA | NA | X |
| R-46 | F | GELC | 11/12/2010 | NA | X | X | X | NA |
| R-46 | UF | Field | 11/12/2010 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 2/17/2011 | NA | X | X | X | NA |
| R-46 | UF | Field | 2/17/2011 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 2/17/2011 | NA | X | NA | NA | NA |
| R-46 | F | GELC | 5/17/2011 | NA | X | X | X | NA |
| R-46 | UF | Field | 5/17/2011 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 8/3/2011 | NA | X | X | X | NA |
| R-46 | UF | Field | 8/3/2011 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 11/8/2011 | NA | X | X | X | NA |
| R-46 | UF | Field | 11/8/2011 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 5/21/2012 | NA | NA | X | NA | NA |
| R-46 | UF | ARSL | 5/21/2012 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 5/21/2012 | X | NA | NA | NA | NA |
| R-46 | F | GELC | 6/1/2012 | NA | X | X | X | NA |
| R-46 | UF | Field | 6/1/2012 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 6/1/2012 | NA | X | NA | NA | NA |
| R-46 | F | GELC | 11/16/2012 | NA | X | X | NA | NA |
| R-46 | UF | ARSL | 11/16/2012 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 11/16/2012 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 11/16/2012 | NA | X | NA | NA | X |
| R-46 | F | GELC | 5/21/2013 | NA | X | X | NA | NA |
| R-46 | UF | Field | 5/21/2013 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 5/21/2013 | NA | X | NA | NA | NA |
| R-46 | F | GELC | 11/18/2013 | NA | X | X | X | NA |
| R-46 | UF | ARSL | 11/18/2013 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 11/18/2013 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 11/18/2013 | NA | X | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-46 | F | GELC | 5/9/2014 | NA | X | X | X | NA |
| R-46 | UF | ARSL | 5/9/2014 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 5/9/2014 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 5/9/2014 | NA | X | X | NA | NA |
| R-46 | F | GELC | 11/12/2014 | NA | X | X | X | NA |
| R-46 | UF | ARSL | 11/12/2014 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 11/12/2014 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 11/12/2014 | NA | X | X | NA | X |
| R-46 | F | GELC | 5/7/2015 | NA | X | X | X | NA |
| R-46 | UF | ARSL | 5/7/2015 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 5/7/2015 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 5/7/2015 | NA | X | X | NA | NA |
| R-46 | F | GELC | 11/18/2015 | NA | X | X | X | NA |
| R-46 | UF | ARSL | 11/18/2015 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 11/18/2015 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 11/18/2015 | NA | X | X | NA | X |
| R-46 | F | GELC | 5/5/2016 | NA | X | X | X | NA |
| R-46 | UF | ARSL | 5/5/2016 | NA | NA | NA | NA | X |
| R-46 | UF | Field | 5/5/2016 | X | NA | NA | NA | NA |
| R-46 | UF | GELC | 5/5/2016 | NA | X | X | NA | NA |
| R-47 | F | GELC | 11/25/2014 | NA | X | X | X | NA |
| R-47 | UF | Field | 11/25/2014 | X | NA | NA | NA | NA |
| R-47 | UF | GELC | 11/25/2014 | NA | X | X | NA | NA |
| R-47 | F | GELC | 1/15/2015 | NA | X | X | X | NA |
| R-47 | UF | ARSL | 1/15/2015 | NA | NA | NA | NA | X |
| R-47 | UF | Field | 1/15/2015 | X | NA | NA | NA | NA |
| R-47 | UF | GELC | 1/15/2015 | NA | X | X | NA | X |
| R-47 | F | GELC | 5/18/2015 | NA | X | X | X | NA |
| R-47 | UF | Field | 5/18/2015 | X | NA | NA | NA | NA |
| R-47 | UF | GELC | 5/18/2015 | NA | X | X | NA | NA |
| R-47 | F | GELC | 7/29/2015 | NA | X | X | X | NA |
| R-47 | UF | ARSL | 7/29/2015 | NA | NA | NA | NA | X |
| R-47 | UF | Field | 7/29/2015 | X | NA | NA | NA | NA |
| R-47 | UF | GELC | 7/29/2015 | NA | X | X | NA | NA |
| R-47 | F | GELC | 12/14/2015 | NA | X | X | X | NA |
| R-47 | UF | Field | 12/14/2015 | X | NA | NA | NA | NA |
| R-47 | UF | GELC | 12/14/2015 | NA | X | X | NA | NA |
| R-47 | F | GELC | 3/21/2016 | NA | X | X | X | NA |
| R-47 | UF | ARSL | 3/21/2016 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-47 | UF | Field | 3/21/2016 | X | NA | NA | NA | NA |
| R-47 | UF | GELC | 3/21/2016 | NA | X | X | NA | X |
| R-47i | F | GELC | 4/8/2010 | NA | X | X | X | NA |
| R-47i | UF | Field | 4/8/2010 | X | NA | NA | NA | NA |
| R-47i | F | GELC | 9/23/2010 | NA | X | X | X | NA |
| R-47i | UF | Field | 9/23/2010 | X | NA | NA | NA | NA |
| R-47i | F | GELC | 12/2/2010 | NA | X | X | X | NA |
| R-47i | UF | ARSL | 12/2/2010 | NA | NA | NA | NA | X |
| R-47i | UF | Field | 12/2/2010 | X | NA | NA | NA | NA |
| R-47i | UF | GELC | 12/2/2010 | NA | X | X | NA | X |
| R-47i | F | GELC | 4/7/2011 | NA | X | X | X | NA |
| R-47i | UF | Field | 4/7/2011 | X | NA | NA | NA | NA |
| R-47i | F | GELC | 6/21/2011 | NA | X | X | X | NA |
| R-47i | UF | Field | 6/21/2011 | X | NA | NA | NA | NA |
| R-47i | F | GELC | 9/8/2011 | NA | X | X | X | NA |
| R-47i | UF | Field | 9/8/2011 | X | NA | NA | NA | NA |
| R-47i | F | GELC | 1/24/2012 | NA | X | X | X | NA |
| R-47i | UF | Field | 1/24/2012 | X | NA | NA | NA | NA |
| R-47i | UF | GELC | 1/24/2012 | NA | X | NA | NA | X |
| R-47i | F | GELC | 3/13/2013 | NA | X | X | NA | NA |
| R-47i | UF | ARSL | 3/13/2013 | NA | NA | NA | NA | X |
| R-47i | UF | Field | 3/13/2013 | X | NA | NA | NA | NA |
| R-47i | UF | GELC | 3/13/2013 | NA | X | NA | NA | NA |
| R-47i | F | GELC | 3/14/2014 | NA | X | X | X | NA |
| R-47i | UF | Field | 3/14/2014 | X | NA | NA | NA | NA |
| R-47i | UF | GELC | 3/14/2014 | NA | X | X | NA | X |
| R-47i | F | GELC | 1/26/2015 | NA | X | X | X | NA |
| R-47i | UF | ARSL | 1/26/2015 | NA | NA | NA | NA | X |
| R-47i | UF | Field | 1/26/2015 | X | NA | NA | NA | NA |
| R-47i | UF | GELC | 1/26/2015 | NA | X | X | NA | NA |
| R-47i | UF | EES6 | 12/15/2015 | NA | X | NA | NA | NA |
| R-48 | F | GELC | 2/17/2010 | NA | X | X | X | NA |
| R-48 | UF | Field | 2/17/2010 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 4/7/2010 | NA | X | X | X | NA |
| R-48 | UF | Field | 4/7/2010 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 9/22/2010 | NA | X | X | X | NA |
| R-48 | UF | Field | 9/22/2010 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 12/2/2010 | NA | X | X | X | NA |
| R-48 | UF | Field | 12/2/2010 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-48 | F | GELC | 1/6/2011 | NA | X | X | X | NA |
| R-48 | UF | Field | 1/6/2011 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 3/28/2011 | NA | X | X | X | NA |
| R-48 | UF | Field | 3/28/2011 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 6/22/2011 | NA | X | X | X | NA |
| R-48 | UF | Field | 6/22/2011 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 9/13/2011 | NA | X | X | X | NA |
| R-48 | UF | Field | 9/13/2011 | X | NA | NA | NA | NA |
| R-48 | F | GELC | 1/18/2012 | NA | X | X | X | NA |
| R-48 | UF | Field | 1/18/2012 | X | NA | NA | NA | NA |
| R-48 | UF | GELC | 1/18/2012 | NA | X | NA | NA | X |
| R-48 | F | GELC | 3/20/2013 | NA | X | X | NA | NA |
| R-48 | UF | ARSL | 3/20/2013 | NA | NA | NA | NA | X |
| R-48 | UF | Field | 3/20/2013 | X | NA | NA | NA | NA |
| R-48 | UF | GELC | 3/20/2013 | NA | X | NA | NA | NA |
| R-48 | F | GELC | 3/4/2014 | NA | X | X | X | NA |
| R-48 | UF | Field | 3/4/2014 | X | NA | NA | NA | NA |
| R-48 | UF | GELC | 3/4/2014 | NA | X | X | NA | X |
| R-48 | F | GELC | 1/26/2015 | NA | X | X | X | NA |
| R-48 | UF | ARSL | 1/26/2015 | NA | NA | NA | NA | X |
| R-48 | UF | Field | 1/26/2015 | X | NA | NA | NA | NA |
| R-48 | UF | GELC | 1/26/2015 | NA | X | X | NA | NA |
| R-48 | UF | EES6[g] | 12/22/2015 | NA | X | NA | NA | NA |
| R-48 | F | GELC | 3/22/2016 | NA | X | X | X | NA |
| R-48 | UF | ARSL | 3/22/2016 | NA | NA | NA | NA | X |
| R-48 | UF | Field | 3/22/2016 | X | NA | NA | NA | NA |
| R-48 | UF | GELC | 3/22/2016 | NA | X | X | NA | X |
| R-49 S1 | F | GELC | 3/3/2010 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 3/3/2010 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 6/14/2010 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 6/14/2010 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 7/29/2010 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 7/29/2010 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 10/7/2010 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 10/7/2010 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 1/19/2011 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 1/19/2011 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 5/2/2011 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 5/2/2011 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-49 S1 | F | GELC | 7/8/2011 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 7/8/2011 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 10/26/2011 | NA | X | X | X | NA |
| R-49 S1 | UF | Field | 10/26/2011 | X | NA | NA | NA | NA |
| R-49 S1 | UF | ARSL | 4/26/2012 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 4/26/2012 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 10/15/2012 | NA | X | X | NA | NA |
| R-49 S1 | UF | ARSL | 10/15/2012 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 10/15/2012 | X | NA | NA | NA | NA |
| R-49 S1 | UF | GELC | 10/15/2012 | NA | X | NA | NA | X |
| R-49 S1 | UF | ARSL | 4/15/2013 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 4/15/2013 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 12/9/2013 | NA | X | X | X | NA |
| R-49 S1 | UF | ARSL | 12/9/2013 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 12/9/2013 | X | NA | NA | NA | NA |
| R-49 S1 | UF | GELC | 12/9/2013 | NA | X | X | NA | X |
| R-49 S1 | UF | ARSL | 4/18/2014 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 4/18/2014 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 10/27/2014 | NA | X | X | X | NA |
| R-49 S1 | UF | ARSL | 10/27/2014 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 10/27/2014 | X | NA | NA | NA | NA |
| R-49 S1 | UF | GELC | 10/27/2014 | NA | X | X | NA | X |
| R-49 S1 | UF | ARSL | 4/10/2015 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 4/10/2015 | X | NA | NA | NA | NA |
| R-49 S1 | UF | ARSL | 7/8/2015 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 7/8/2015 | X | NA | NA | NA | NA |
| R-49 S1 | F | GELC | 10/22/2015 | NA | X | X | X | NA |
| R-49 S1 | UF | ARSL | 10/22/2015 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 10/22/2015 | X | NA | NA | NA | NA |
| R-49 S1 | UF | GELC | 10/22/2015 | NA | X | X | NA | X |
| R-49 S1 | UF | ARSL | 1/12/2016 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 1/12/2016 | X | NA | NA | NA | NA |
| R-49 S1 | UF | ARSL | 4/7/2016 | NA | NA | NA | NA | X |
| R-49 S1 | UF | Field | 4/7/2016 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 3/5/2010 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 3/5/2010 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 6/9/2010 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 6/9/2010 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 7/29/2010 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-49 S2 | F | GELC | 10/7/2010 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 10/7/2010 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 1/26/2011 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 1/26/2011 | X | NA | NA | NA | NA |
| R-49 S2 | UF | GELC | 1/26/2011 | NA | X | X | NA | X |
| R-49 S2 | F | GELC | 4/29/2011 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 4/29/2011 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 7/25/2011 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 7/25/2011 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 10/27/2011 | NA | X | X | X | NA |
| R-49 S2 | UF | Field | 10/27/2011 | X | NA | NA | NA | NA |
| R-49 S2 | UF | ARSL | 5/1/2012 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 5/1/2012 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 10/25/2012 | NA | X | X | NA | NA |
| R-49 S2 | UF | ARSL | 10/25/2012 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 10/25/2012 | X | NA | NA | NA | NA |
| R-49 S2 | UF | GELC | 10/25/2012 | NA | X | NA | NA | X |
| R-49 S2 | UF | ARSL | 4/19/2013 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 4/19/2013 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 12/13/2013 | NA | X | X | X | NA |
| R-49 S2 | UF | ARSL | 12/13/2013 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 12/13/2013 | X | NA | NA | NA | NA |
| R-49 S2 | UF | GELC | 12/13/2013 | NA | X | X | NA | X |
| R-49 S2 | UF | ARSL | 4/7/2014 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 4/7/2014 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 10/24/2014 | NA | X | X | X | NA |
| R-49 S2 | UF | ARSL | 10/24/2014 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 10/24/2014 | X | NA | NA | NA | NA |
| R-49 S2 | UF | GELC | 10/24/2014 | NA | X | X | NA | X |
| R-49 S2 | UF | ARSL | 4/9/2015 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 4/9/2015 | X | NA | NA | NA | NA |
| R-49 S2 | F | GELC | 10/22/2015 | NA | X | X | X | NA |
| R-49 S2 | UF | ARSL | 10/22/2015 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 10/22/2015 | X | NA | NA | NA | NA |
| R-49 S2 | UF | GELC | 10/22/2015 | NA | X | X | NA | X |
| R-49 S2 | UF | ARSL | 4/7/2016 | NA | NA | NA | NA | X |
| R-49 S2 | UF | Field | 4/7/2016 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 3/11/2010 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 3/11/2010 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-50 S2 | F | GELC | 5/27/2010 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 5/27/2010 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 5/27/2010 | NA | NA | X | NA | NA |
| R-50 S2 | F | GELC | 7/2/2010 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 7/2/2010 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 11/16/2010 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 11/16/2010 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 2/24/2011 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 2/24/2011 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 5/24/2011 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 5/24/2011 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 8/8/2011 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 8/8/2011 | X | NA | NA | NA | NA |
| R-50 S2 | UF | ARSL | 11/21/2011 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 11/21/2011 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 11/28/2011 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 11/28/2011 | X | NA | NA | NA | NA |
| R-50 S2 | F | GELC | 3/7/2012 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 3/7/2012 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 3/7/2012 | NA | X | NA | NA | NA |
| R-50 S2 | F | GELC | 5/31/2012 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 5/31/2012 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 5/31/2012 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 5/31/2012 | NA | X | NA | NA | NA |
| R-50 S2 | F | GELC | 8/16/2012 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 8/16/2012 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 8/16/2012 | NA | X | NA | NA | X |
| R-50 S2 | F | GELC | 11/9/2012 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 11/9/2012 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 11/9/2012 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 11/9/2012 | NA | X | NA | NA | X |
| R-50 S2 | F | GELC | 1/31/2013 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 1/31/2013 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 1/31/2013 | NA | X | NA | NA | NA |
| R-50 S2 | F | GELC | 5/13/2013 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 5/13/2013 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 5/13/2013 | NA | X | NA | NA | NA |
| R-50 S2 | F | GELC | 7/10/2013 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 7/10/2013 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-50 S2 | UF | GELC | 7/10/2013 | NA | X | NA | NA | NA |
| R-50 S2 | F | GELC | 11/12/2013 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 11/12/2013 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 11/12/2013 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 11/12/2013 | NA | X | NA | NA | NA |
| R-50 S2 | F | GELC | 1/15/2014 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 1/15/2014 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 1/15/2014 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 5/19/2014 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 5/19/2014 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 5/19/2014 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 5/19/2014 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 7/24/2014 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 7/24/2014 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 7/24/2014 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 11/13/2014 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 11/13/2014 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 11/13/2014 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 11/13/2014 | NA | X | X | NA | X |
| R-50 S2 | F | GELC | 2/23/2015 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 2/23/2015 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 2/23/2015 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 5/11/2015 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 5/11/2015 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 5/11/2015 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 5/11/2015 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 8/5/2015 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 8/5/2015 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 8/5/2015 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 11/9/2015 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 11/9/2015 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 11/9/2015 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 11/9/2015 | NA | X | X | NA | X |
| R-50 S2 | F | GELC | 2/9/2016 | NA | X | X | X | NA |
| R-50 S2 | UF | Field | 2/9/2016 | X | NA | NA | NA | NA |
| R-50 S2 | UF | GELC | 2/9/2016 | NA | X | X | NA | NA |
| R-50 S2 | F | GELC | 5/3/2016 | NA | X | X | X | NA |
| R-50 S2 | UF | ARSL | 5/3/2016 | NA | NA | NA | NA | X |
| R-50 S2 | UF | Field | 5/3/2016 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-50 S2 | UF | GELC | 5/3/2016 | NA | X | X | NA | NA |
| R-51 S1 | F | GELC | 3/8/2010 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 3/8/2010 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 6/18/2010 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 6/18/2010 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 7/26/2010 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 7/26/2010 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 10/19/2010 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 10/19/2010 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 1/11/2011 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 1/11/2011 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 5/9/2011 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 5/9/2011 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 7/28/2011 | NA | X | X | X | NA |
| R-51 S1 | UF | Field | 7/28/2011 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 10/21/2011 | NA | X | X | X | NA |
| R-51 S1 | UF | ARSL | 10/21/2011 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 10/21/2011 | X | NA | NA | NA | NA |
| R-51 S1 | UF | GELC | 10/21/2011 | NA | X | X | NA | X |
| R-51 S1 | UF | ARSL | 4/23/2012 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 4/23/2012 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 10/10/2012 | NA | X | X | NA | NA |
| R-51 S1 | UF | ARSL | 10/10/2012 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 10/10/2012 | X | NA | NA | NA | NA |
| R-51 S1 | UF | GELC | 10/10/2012 | NA | X | NA | NA | X |
| R-51 S1 | UF | ARSL | 4/25/2013 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 4/25/2013 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 12/13/2013 | NA | X | X | X | NA |
| R-51 S1 | UF | ARSL | 12/13/2013 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 12/13/2013 | X | NA | NA | NA | NA |
| R-51 S1 | UF | GELC | 12/13/2013 | NA | X | X | NA | X |
| R-51 S1 | UF | ARSL | 4/9/2014 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 4/9/2014 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 10/22/2014 | NA | X | X | X | NA |
| R-51 S1 | UF | ARSL | 10/22/2014 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 10/22/2014 | X | NA | NA | NA | NA |
| R-51 S1 | UF | GELC | 10/22/2014 | NA | X | X | NA | X |
| R-51 S1 | UF | ARSL | 4/23/2015 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 4/23/2015 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-51 S1 | UF | ARSL | 7/10/2015 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 7/10/2015 | X | NA | NA | NA | NA |
| R-51 S1 | F | GELC | 10/22/2015 | NA | X | X | X | NA |
| R-51 S1 | UF | ARSL | 10/22/2015 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 10/22/2015 | X | NA | NA | NA | NA |
| R-51 S1 | UF | GELC | 10/22/2015 | NA | X | X | NA | X |
| R-51 S1 | UF | ARSL | 1/7/2016 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 1/7/2016 | X | NA | NA | NA | NA |
| R-51 S1 | UF | ARSL | 4/5/2016 | NA | NA | NA | NA | X |
| R-51 S1 | UF | Field | 4/5/2016 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 2/22/2010 | NA | X | X | X | NA |
| R-51 S2 | UF | Field | 2/22/2010 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 6/18/2010 | NA | X | X | X | NA |
| R-51 S2 | F | GELC | 7/26/2010 | NA | X | X | X | NA |
| R-51 S2 | UF | Field | 7/26/2010 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 10/19/2010 | NA | X | X | X | NA |
| R-51 S2 | UF | Field | 10/19/2010 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 1/11/2011 | NA | X | X | X | NA |
| R-51 S2 | UF | Field | 1/11/2011 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 5/9/2011 | NA | X | X | X | NA |
| R-51 S2 | UF | Field | 5/9/2011 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 7/28/2011 | NA | X | X | X | NA |
| R-51 S2 | UF | Field | 7/28/2011 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 10/21/2011 | NA | X | X | X | NA |
| R-51 S2 | UF | ARSL | 10/21/2011 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 10/21/2011 | X | NA | NA | NA | NA |
| R-51 S2 | UF | GELC | 10/21/2011 | NA | X | X | NA | X |
| R-51 S2 | UF | ARSL | 4/23/2012 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 4/23/2012 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 10/10/2012 | NA | X | X | NA | NA |
| R-51 S2 | UF | ARSL | 10/10/2012 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 10/10/2012 | X | NA | NA | NA | NA |
| R-51 S2 | UF | GELC | 10/10/2012 | NA | X | NA | NA | X |
| R-51 S2 | UF | ARSL | 4/25/2013 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 4/25/2013 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 12/13/2013 | NA | X | X | X | NA |
| R-51 S2 | UF | ARSL | 12/13/2013 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 12/13/2013 | X | NA | NA | NA | NA |
| R-51 S2 | UF | GELC | 12/13/2013 | NA | X | X | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-51 S2 | UF | ARSL | 4/9/2014 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 4/9/2014 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 10/22/2014 | NA | X | X | X | NA |
| R-51 S2 | UF | ARSL | 10/22/2014 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 10/22/2014 | X | NA | NA | NA | NA |
| R-51 S2 | UF | GELC | 10/22/2014 | NA | X | X | NA | X |
| R-51 S2 | UF | ARSL | 4/23/2015 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 4/23/2015 | X | NA | NA | NA | NA |
| R-51 S2 | F | GELC | 10/22/2015 | NA | X | X | X | NA |
| R-51 S2 | UF | ARSL | 10/22/2015 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 10/22/2015 | X | NA | NA | NA | NA |
| R-51 S2 | UF | GELC | 10/22/2015 | NA | X | X | NA | X |
| R-51 S2 | UF | ARSL | 4/5/2016 | NA | NA | NA | NA | X |
| R-51 S2 | UF | Field | 4/5/2016 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 5/2/2010 | NA | X | X | X | NA |
| R-52 S1 | UF | Field | 5/2/2010 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 8/5/2010 | NA | X | X | X | NA |
| R-52 S1 | F | GELC | 10/12/2010 | NA | X | X | X | NA |
| R-52 S1 | UF | Field | 10/12/2010 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 1/13/2011 | NA | X | X | X | NA |
| R-52 S1 | UF | Field | 1/13/2011 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 5/4/2011 | NA | X | X | X | NA |
| R-52 S1 | UF | Field | 5/4/2011 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 7/18/2011 | NA | X | X | X | NA |
| R-52 S1 | UF | Field | 7/18/2011 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 11/1/2011 | NA | X | X | X | NA |
| R-52 S1 | UF | Field | 11/1/2011 | X | NA | NA | NA | NA |
| R-52 S1 | UF | ARSL | 4/27/2012 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 4/27/2012 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 10/16/2012 | NA | X | X | NA | NA |
| R-52 S1 | UF | ARSL | 10/16/2012 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 10/16/2012 | X | NA | NA | NA | NA |
| R-52 S1 | UF | GELC | 10/16/2012 | NA | X | NA | NA | X |
| R-52 S1 | UF | ARSL | 4/11/2013 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 4/11/2013 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 12/11/2013 | NA | X | X | X | NA |
| R-52 S1 | UF | ARSL | 12/11/2013 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 12/11/2013 | X | NA | NA | NA | NA |
| R-52 S1 | UF | GELC | 12/11/2013 | NA | X | X | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-52 S1 | UF | ARSL | 4/10/2014 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 4/10/2014 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 10/16/2014 | NA | X | X | X | NA |
| R-52 S1 | UF | ARSL | 10/16/2014 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 10/16/2014 | X | NA | NA | NA | NA |
| R-52 S1 | UF | GELC | 10/16/2014 | NA | X | X | NA | X |
| R-52 S1 | UF | ARSL | 4/9/2015 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 4/9/2015 | X | NA | NA | NA | NA |
| R-52 S1 | F | GELC | 10/21/2015 | NA | X | X | X | NA |
| R-52 S1 | UF | ARSL | 10/21/2015 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 10/21/2015 | X | NA | NA | NA | NA |
| R-52 S1 | UF | GELC | 10/21/2015 | NA | X | X | NA | X |
| R-52 S1 | UF | ARSL | 1/7/2016 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 1/7/2016 | X | NA | NA | NA | NA |
| R-52 S1 | UF | ARSL | 4/6/2016 | NA | NA | NA | NA | X |
| R-52 S1 | UF | Field | 4/6/2016 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 4/23/2010 | NA | X | X | X | NA |
| R-52 S2 | F | GELC | 8/5/2010 | NA | X | X | X | NA |
| R-52 S2 | UF | Field | 8/5/2010 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 10/12/2010 | NA | X | X | X | NA |
| R-52 S2 | UF | Field | 10/12/2010 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 1/13/2011 | NA | X | X | X | NA |
| R-52 S2 | UF | Field | 1/13/2011 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 5/4/2011 | NA | X | X | X | NA |
| R-52 S2 | UF | Field | 5/4/2011 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 7/18/2011 | NA | X | X | X | NA |
| R-52 S2 | UF | Field | 7/18/2011 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 11/1/2011 | NA | X | X | X | NA |
| R-52 S2 | UF | Field | 11/1/2011 | X | NA | NA | NA | NA |
| R-52 S2 | UF | ARSL | 4/27/2012 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 4/27/2012 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 10/16/2012 | NA | X | X | NA | NA |
| R-52 S2 | UF | ARSL | 10/16/2012 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 10/16/2012 | X | NA | NA | NA | NA |
| R-52 S2 | UF | GELC | 10/16/2012 | NA | X | NA | NA | X |
| R-52 S2 | UF | ARSL | 4/11/2013 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 4/11/2013 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 12/11/2013 | NA | X | X | X | NA |
| R-52 S2 | UF | ARSL | 12/11/2013 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-52 S2 | UF | Field | 12/11/2013 | X | NA | NA | NA | NA |
| R-52 S2 | UF | GELC | 12/11/2013 | NA | X | X | NA | X |
| R-52 S2 | UF | ARSL | 4/10/2014 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 4/10/2014 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 10/16/2014 | NA | X | X | X | NA |
| R-52 S2 | UF | ARSL | 10/16/2014 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 10/16/2014 | X | NA | NA | NA | NA |
| R-52 S2 | UF | GELC | 10/16/2014 | NA | X | X | NA | X |
| R-52 S2 | UF | ARSL | 4/9/2015 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 4/9/2015 | X | NA | NA | NA | NA |
| R-52 S2 | F | GELC | 10/21/2015 | NA | X | X | X | NA |
| R-52 S2 | UF | ARSL | 10/21/2015 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 10/21/2015 | X | NA | NA | NA | NA |
| R-52 S2 | UF | GELC | 10/21/2015 | NA | X | X | NA | X |
| R-52 S2 | UF | ARSL | 4/6/2016 | NA | NA | NA | NA | X |
| R-52 S2 | UF | Field | 4/6/2016 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 4/19/2010 | NA | X | X | X | NA |
| R-53 S1 | UF | Field | 4/19/2010 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 7/26/2010 | NA | X | X | X | NA |
| R-53 S1 | UF | Field | 7/26/2010 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 10/12/2010 | NA | X | X | X | NA |
| R-53 S1 | UF | Field | 10/12/2010 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 1/14/2011 | NA | X | X | X | NA |
| R-53 S1 | UF | Field | 1/14/2011 | X | NA | NA | NA | NA |
| R-53 S1 | F | Field | 5/6/2011 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 5/6/2011 | NA | X | X | X | NA |
| R-53 S1 | F | GELC | 7/14/2011 | NA | X | X | X | NA |
| R-53 S1 | UF | Field | 7/14/2011 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 10/25/2011 | NA | X | X | X | NA |
| R-53 S1 | UF | ARSL | 10/25/2011 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 10/25/2011 | X | NA | NA | NA | NA |
| R-53 S1 | UF | GELC | 10/25/2011 | NA | X | X | NA | X |
| R-53 S1 | UF | ARSL | 4/24/2012 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 4/24/2012 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 10/11/2012 | NA | X | X | NA | NA |
| R-53 S1 | UF | ARSL | 10/11/2012 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 10/11/2012 | X | NA | NA | NA | NA |
| R-53 S1 | UF | GELC | 10/11/2012 | NA | X | NA | NA | X |
| R-53 S1 | UF | ARSL | 4/8/2013 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-53 S1 | UF | Field | 4/8/2013 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 12/12/2013 | NA | X | X | X | NA |
| R-53 S1 | UF | ARSL | 12/12/2013 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 12/12/2013 | X | NA | NA | NA | NA |
| R-53 S1 | UF | GELC | 12/12/2013 | NA | X | X | NA | X |
| R-53 S1 | UF | ARSL | 4/2/2014 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 4/2/2014 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 10/23/2014 | NA | X | X | X | NA |
| R-53 S1 | UF | ARSL | 10/23/2014 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 10/23/2014 | X | NA | NA | NA | NA |
| R-53 S1 | UF | GELC | 10/23/2014 | NA | X | X | NA | X |
| R-53 S1 | UF | ARSL | 4/16/2015 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 4/16/2015 | X | NA | NA | NA | NA |
| R-53 S1 | UF | ARSL | 7/9/2015 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 7/9/2015 | X | NA | NA | NA | NA |
| R-53 S1 | F | GELC | 11/4/2015 | NA | X | X | X | NA |
| R-53 S1 | UF | ARSL | 11/4/2015 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 11/4/2015 | X | NA | NA | NA | NA |
| R-53 S1 | UF | GELC | 11/4/2015 | NA | X | X | NA | X |
| R-53 S1 | UF | ARSL | 1/8/2016 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 1/8/2016 | X | NA | NA | NA | NA |
| R-53 S1 | UF | ARSL | 4/19/2016 | NA | NA | NA | NA | X |
| R-53 S1 | UF | Field | 4/19/2016 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 4/14/2010 | NA | X | X | X | NA |
| R-53 S2 | F | GELC | 7/26/2010 | NA | X | X | X | NA |
| R-53 S2 | UF | Field | 7/26/2010 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 10/12/2010 | NA | X | X | X | NA |
| R-53 S2 | UF | Field | 10/12/2010 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 1/13/2011 | NA | X | X | X | NA |
| R-53 S2 | UF | Field | 1/13/2011 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 5/6/2011 | NA | X | X | X | NA |
| R-53 S2 | UF | Field | 5/6/2011 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 7/14/2011 | NA | X | X | X | NA |
| R-53 S2 | UF | Field | 7/14/2011 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 10/25/2011 | NA | X | X | X | NA |
| R-53 S2 | UF | ARSL | 10/25/2011 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 10/25/2011 | X | NA | NA | NA | NA |
| R-53 S2 | UF | GELC | 10/25/2011 | NA | X | X | NA | X |
| R-53 S2 | UF | ARSL | 4/24/2012 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-53 S2 | UF | Field | 4/24/2012 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 10/11/2012 | NA | X | X | NA | NA |
| R-53 S2 | UF | ARSL | 10/11/2012 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 10/11/2012 | X | NA | NA | NA | NA |
| R-53 S2 | UF | GELC | 10/11/2012 | NA | X | NA | NA | X |
| R-53 S2 | UF | ARSL | 4/8/2013 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 4/8/2013 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 12/12/2013 | NA | X | X | X | NA |
| R-53 S2 | UF | ARSL | 12/12/2013 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 12/12/2013 | X | NA | NA | NA | NA |
| R-53 S2 | UF | GELC | 12/12/2013 | NA | X | X | NA | X |
| R-53 S2 | UF | ARSL | 4/2/2014 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 4/2/2014 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 10/23/2014 | NA | X | X | X | NA |
| R-53 S2 | UF | ARSL | 10/23/2014 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 10/23/2014 | X | NA | NA | NA | NA |
| R-53 S2 | UF | GELC | 10/23/2014 | NA | X | X | NA | X |
| R-53 S2 | UF | ARSL | 4/16/2015 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 4/16/2015 | X | NA | NA | NA | NA |
| R-53 S2 | F | GELC | 11/4/2015 | NA | X | X | X | NA |
| R-53 S2 | UF | ARSL | 11/4/2015 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 11/4/2015 | X | NA | NA | NA | NA |
| R-53 S2 | UF | GELC | 11/4/2015 | NA | X | X | NA | X |
| R-53 S2 | UF | ARSL | 4/19/2016 | NA | NA | NA | NA | X |
| R-53 S2 | UF | Field | 4/19/2016 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 2/21/2010 | NA | X | X | X | NA |
| R-54 S2 | F | GELC | 6/18/2010 | NA | X | X | X | NA |
| R-54 S2 | UF | Field | 6/18/2010 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 7/27/2010 | NA | X | X | X | NA |
| R-54 S2 | UF | Field | 7/27/2010 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 10/13/2010 | NA | X | X | X | NA |
| R-54 S2 | UF | Field | 10/13/2010 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 1/12/2011 | NA | X | X | X | NA |
| R-54 S2 | UF | Field | 1/12/2011 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 5/5/2011 | NA | X | X | X | NA |
| R-54 S2 | UF | Field | 5/5/2011 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 7/12/2011 | NA | X | X | X | NA |
| R-54 S2 | UF | Field | 7/12/2011 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 10/31/2011 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-54 S2 | UF | Field | 10/31/2011 | X | NA | NA | NA | NA |
| R-54 S2 | UF | ARSL | 5/4/2012 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 5/4/2012 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 10/24/2012 | NA | X | X | NA | NA |
| R-54 S2 | UF | ARSL | 10/24/2012 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 10/24/2012 | X | NA | NA | NA | NA |
| R-54 S2 | UF | GELC | 10/24/2012 | NA | X | NA | NA | X |
| R-54 S2 | F | GELC | 4/16/2013 | NA | X | X | NA | NA |
| R-54 S2 | UF | ARSL | 4/16/2013 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 4/16/2013 | X | NA | NA | NA | NA |
| R-54 S2 | UF | GELC | 4/16/2013 | NA | X | NA | NA | NA |
| R-54 S2 | F | GELC | 12/16/2013 | NA | X | X | X | NA |
| R-54 S2 | UF | ARSL | 12/16/2013 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 12/16/2013 | X | NA | NA | NA | NA |
| R-54 S2 | UF | GELC | 12/16/2013 | NA | X | X | NA | X |
| R-54 S2 | UF | ARSL | 4/15/2014 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 4/15/2014 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 10/22/2014 | NA | X | X | X | NA |
| R-54 S2 | UF | ARSL | 10/22/2014 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 10/22/2014 | X | NA | NA | NA | NA |
| R-54 S2 | UF | GELC | 10/22/2014 | NA | X | X | NA | X |
| R-54 S2 | UF | ARSL | 4/14/2015 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 4/14/2015 | X | NA | NA | NA | NA |
| R-54 S2 | F | GELC | 10/27/2015 | NA | X | X | X | NA |
| R-54 S2 | UF | ARSL | 10/27/2015 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 10/27/2015 | X | NA | NA | NA | NA |
| R-54 S2 | UF | GELC | 10/27/2015 | NA | X | X | NA | X |
| R-54 S2 | UF | ARSL | 4/6/2016 | NA | NA | NA | NA | X |
| R-54 S2 | UF | Field | 4/6/2016 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 8/19/2010 | NA | X | X | X | NA |
| R-56 S1 | UF | Field | 8/19/2010 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 2/3/2011 | NA | X | X | X | NA |
| R-56 S1 | UF | Field | 2/3/2011 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 5/10/2011 | NA | X | X | X | NA |
| R-56 S1 | UF | Field | 5/10/2011 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 7/20/2011 | NA | X | X | X | NA |
| R-56 S1 | UF | Field | 7/20/2011 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 11/2/2011 | NA | X | X | X | NA |
| R-56 S1 | UF | ARSL | 4/25/2012 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-56 S1 | UF | Field | 4/25/2012 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 10/18/2012 | NA | X | X | NA | NA |
| R-56 S1 | UF | ARSL | 10/18/2012 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 10/18/2012 | X | NA | NA | NA | NA |
| R-56 S1 | UF | GELC | 10/18/2012 | NA | X | NA | NA | X |
| R-56 S1 | UF | ARSL | 1/30/2013 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 1/30/2013 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 4/24/2013 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 4/24/2013 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 7/23/2013 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 7/23/2013 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 12/17/2013 | NA | X | X | X | NA |
| R-56 S1 | UF | ARSL | 12/17/2013 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 12/17/2013 | X | NA | NA | NA | NA |
| R-56 S1 | UF | GELC | 12/17/2013 | NA | X | X | NA | X |
| R-56 S1 | UF | ARSL | 1/23/2014 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 1/23/2014 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 4/18/2014 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 4/18/2014 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 7/17/2014 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 7/17/2014 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 10/30/2014 | NA | X | X | X | NA |
| R-56 S1 | UF | ARSL | 10/30/2014 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 10/30/2014 | X | NA | NA | NA | NA |
| R-56 S1 | UF | GELC | 10/30/2014 | NA | X | X | NA | X |
| R-56 S1 | UF | ARSL | 1/14/2015 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 1/14/2015 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 4/22/2015 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 4/22/2015 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 7/14/2015 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 7/14/2015 | X | NA | NA | NA | NA |
| R-56 S1 | F | GELC | 11/3/2015 | NA | X | X | X | NA |
| R-56 S1 | UF | ARSL | 11/3/2015 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 11/3/2015 | X | NA | NA | NA | NA |
| R-56 S1 | UF | GELC | 11/3/2015 | NA | X | X | NA | X |
| R-56 S1 | UF | ARSL | 1/13/2016 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 1/13/2016 | X | NA | NA | NA | NA |
| R-56 S1 | UF | ARSL | 4/14/2016 | NA | NA | NA | NA | X |
| R-56 S1 | UF | Field | 4/14/2016 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-56 S2 | F | GELC | 8/13/2010 | NA | X | X | X | NA |
| R-56 S2 | UF | Field | 8/13/2010 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 2/7/2011 | NA | X | X | X | NA |
| R-56 S2 | UF | Field | 2/7/2011 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 5/10/2011 | NA | X | X | X | NA |
| R-56 S2 | UF | Field | 5/10/2011 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 7/20/2011 | NA | X | X | X | NA |
| R-56 S2 | UF | Field | 7/20/2011 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 11/2/2011 | NA | X | X | X | NA |
| R-56 S2 | UF | Field | 11/2/2011 | X | NA | NA | NA | NA |
| R-56 S2 | UF | ARSL | 4/25/2012 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 4/25/2012 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 10/18/2012 | NA | X | X | NA | NA |
| R-56 S2 | UF | ARSL | 10/18/2012 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 10/18/2012 | X | NA | NA | NA | NA |
| R-56 S2 | UF | GELC | 10/18/2012 | NA | X | NA | NA | X |
| R-56 S2 | UF | ARSL | 4/24/2013 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 4/24/2013 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 12/17/2013 | NA | X | X | X | NA |
| R-56 S2 | UF | ARSL | 12/17/2013 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 12/17/2013 | X | NA | NA | NA | NA |
| R-56 S2 | UF | GELC | 12/17/2013 | NA | X | X | NA | X |
| R-56 S2 | UF | ARSL | 4/18/2014 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 4/18/2014 | X | NA | NA | NA | NA |
| R-56 S2 | F | GELC | 10/30/2014 | NA | X | X | X | NA |
| R-56 S2 | UF | ARSL | 10/30/2014 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 10/30/2014 | X | NA | NA | NA | NA |
| R-56 S2 | UF | GELC | 10/30/2014 | NA | X | X | NA | X |
| R-56 S2 | F | GELC | 11/3/2015 | NA | X | X | X | NA |
| R-56 S2 | UF | ARSL | 11/3/2015 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 11/3/2015 | X | NA | NA | NA | NA |
| R-56 S2 | UF | GELC | 11/3/2015 | NA | X | X | NA | X |
| R-56 S2 | UF | ARSL | 4/14/2016 | NA | NA | NA | NA | X |
| R-56 S2 | UF | Field | 4/14/2016 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 7/1/2010 | NA | X | X | X | NA |
| R-57 S1 | UF | Field | 7/1/2010 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 5/9/2011 | NA | X | X | X | NA |
| R-57 S1 | UF | Field | 5/9/2011 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 7/13/2011 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-57 S1 | UF | Field | 7/13/2011 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 10/21/2011 | NA | X | X | X | NA |
| R-57 S1 | UF | ARSL | 10/21/2011 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 10/21/2011 | X | NA | NA | NA | NA |
| R-57 S1 | UF | GELC | 10/21/2011 | NA | X | X | NA | X |
| R-57 S1 | UF | ARSL | 4/23/2012 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 4/23/2012 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 10/10/2012 | NA | X | X | NA | NA |
| R-57 S1 | UF | ARSL | 10/10/2012 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 10/10/2012 | X | NA | NA | NA | NA |
| R-57 S1 | UF | GELC | 10/10/2012 | NA | X | NA | NA | X |
| R-57 S1 | UF | ARSL | 1/29/2013 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 1/29/2013 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 4/10/2013 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 4/10/2013 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 7/18/2013 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 7/18/2013 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 12/5/2013 | NA | X | X | X | NA |
| R-57 S1 | UF | ARSL | 12/5/2013 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 12/5/2013 | X | NA | NA | NA | NA |
| R-57 S1 | UF | GELC | 12/5/2013 | NA | X | X | NA | X |
| R-57 S1 | UF | ARSL | 1/8/2014 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 1/8/2014 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 4/3/2014 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 4/3/2014 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 7/14/2014 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 7/14/2014 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 10/16/2014 | NA | X | X | X | NA |
| R-57 S1 | UF | ARSL | 10/16/2014 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 10/16/2014 | X | NA | NA | NA | NA |
| R-57 S1 | UF | GELC | 10/16/2014 | NA | X | X | NA | X |
| R-57 S1 | UF | ARSL | 1/12/2015 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 1/12/2015 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 4/15/2015 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 4/15/2015 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 7/8/2015 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 7/8/2015 | X | NA | NA | NA | NA |
| R-57 S1 | F | GELC | 10/30/2015 | NA | X | X | X | NA |
| R-57 S1 | UF | ARSL | 10/30/2015 | NA | NA | NA | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-57 S1 | UF | Field | 10/30/2015 | X | NA | NA | NA | NA |
| R-57 S1 | UF | GELC | 10/30/2015 | NA | X | X | NA | X |
| R-57 S1 | UF | ARSL | 1/5/2016 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 1/5/2016 | X | NA | NA | NA | NA |
| R-57 S1 | UF | ARSL | 4/19/2016 | NA | NA | NA | NA | X |
| R-57 S1 | UF | Field | 4/19/2016 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 6/25/2010 | NA | X | X | X | NA |
| R-57 S2 | UF | Field | 6/25/2010 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 5/9/2011 | NA | X | X | X | NA |
| R-57 S2 | UF | Field | 5/9/2011 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 7/13/2011 | NA | X | X | X | NA |
| R-57 S2 | UF | Field | 7/13/2011 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 10/21/2011 | NA | X | X | X | NA |
| R-57 S2 | UF | ARSL | 10/21/2011 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 10/21/2011 | X | NA | NA | NA | NA |
| R-57 S2 | UF | GELC | 10/21/2011 | NA | X | X | NA | X |
| R-57 S2 | UF | ARSL | 4/23/2012 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 4/23/2012 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 10/10/2012 | NA | X | X | NA | NA |
| R-57 S2 | UF | ARSL | 10/10/2012 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 10/10/2012 | X | NA | NA | NA | NA |
| R-57 S2 | UF | GELC | 10/10/2012 | NA | X | NA | NA | X |
| R-57 S2 | UF | ARSL | 4/10/2013 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 4/10/2013 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 12/5/2013 | NA | X | X | X | NA |
| R-57 S2 | UF | ARSL | 12/5/2013 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 12/5/2013 | X | NA | NA | NA | NA |
| R-57 S2 | UF | GELC | 12/5/2013 | NA | X | X | NA | X |
| R-57 S2 | UF | ARSL | 4/3/2014 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 4/3/2014 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 10/16/2014 | NA | X | X | X | NA |
| R-57 S2 | UF | ARSL | 10/16/2014 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 10/16/2014 | X | NA | NA | NA | NA |
| R-57 S2 | UF | GELC | 10/16/2014 | NA | X | X | NA | X |
| R-57 S2 | UF | ARSL | 4/15/2015 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 4/15/2015 | X | NA | NA | NA | NA |
| R-57 S2 | F | GELC | 10/30/2015 | NA | X | X | X | NA |
| R-57 S2 | UF | ARSL | 10/30/2015 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 10/30/2015 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-57 S2 | UF | GELC | 10/30/2015 | NA | X | X | NA | X |
| R-57 S2 | UF | ARSL | 4/19/2016 | NA | NA | NA | NA | X |
| R-57 S2 | UF | Field | 4/19/2016 | X | NA | NA | NA | NA |
| R-6 | F | GELC | 1/8/2010 | NA | X | X | X | NA |
| R-6 | UF | Field | 1/8/2010 | X | NA | NA | NA | NA |
| R-6 | F | GELC | 3/17/2011 | NA | X | X | X | NA |
| R-6 | UF | Field | 3/17/2011 | X | NA | NA | NA | NA |
| R-6 | F | GELC | 8/27/2012 | NA | X | X | X | NA |
| R-6 | UF | Field | 8/27/2012 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 8/27/2012 | NA | X | NA | NA | X |
| R-6 | F | GELC | 8/7/2013 | NA | X | X | X | NA |
| R-6 | UF | Field | 8/7/2013 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 8/7/2013 | NA | X | NA | NA | X |
| R-6 | F | GELC | 2/3/2014 | NA | X | X | X | NA |
| R-6 | UF | Field | 2/3/2014 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 2/3/2014 | NA | X | NA | NA | X |
| R-6 | F | GELC | 9/12/2014 | NA | X | X | X | NA |
| R-6 | UF | Field | 9/12/2014 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 9/12/2014 | NA | X | X | NA | X |
| R-6 | F | GELC | 3/13/2015 | NA | X | X | X | NA |
| R-6 | UF | Field | 3/13/2015 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 3/13/2015 | NA | X | X | NA | X |
| R-6 | F | GELC | 9/9/2015 | NA | X | X | X | NA |
| R-6 | UF | Field | 9/9/2015 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 9/9/2015 | NA | X | X | NA | X |
| R-6 | F | GELC | 3/1/2016 | NA | X | X | X | NA |
| R-6 | UF | Field | 3/1/2016 | X | NA | NA | NA | NA |
| R-6 | UF | GELC | 3/1/2016 | NA | X | X | NA | X |
| R-60 | F | GELC | 12/16/2010 | NA | X | X | X | NA |
| R-60 | UF | Field | 12/16/2010 | X | NA | NA | NA | NA |
| R-60 | F | GELC | 1/24/2011 | NA | X | X | X | NA |
| R-60 | UF | Field | 1/24/2011 | X | NA | NA | NA | NA |
| R-60 | F | GELC | 4/27/2011 | NA | X | X | X | NA |
| R-60 | UF | Field | 4/27/2011 | X | NA | NA | NA | NA |
| R-60 | F | GELC | 7/26/2011 | NA | X | X | X | NA |
| R-60 | UF | Field | 7/26/2011 | X | NA | NA | NA | NA |
| R-60 | F | GELC | 11/22/2011 | NA | X | X | X | NA |
| R-60 | UF | Field | 11/22/2011 | X | NA | NA | NA | NA |
| R-60 | F | GELC | 5/31/2012 | NA | X | X | X | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| R-60 | UF | ARSL | 5/31/2012 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 5/31/2012 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 5/31/2012 | NA | X | NA | NA | NA |
| R-60 | F | GELC | 11/1/2012 | NA | X | X | NA | NA |
| R-60 | UF | ARSL | 11/1/2012 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 11/1/2012 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 11/1/2012 | NA | X | NA | NA | X |
| R-60 | F | GELC | 5/7/2013 | NA | X | X | NA | NA |
| R-60 | UF | ARSL | 5/7/2013 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 5/7/2013 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 5/7/2013 | NA | X | NA | NA | NA |
| R-60 | F | GELC | 11/14/2013 | NA | X | X | X | NA |
| R-60 | UF | ARSL | 11/14/2013 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 11/14/2013 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 11/14/2013 | NA | X | NA | NA | X |
| R-60 | F | GELC | 5/12/2014 | NA | X | X | X | NA |
| R-60 | UF | ARSL | 5/12/2014 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 5/12/2014 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 5/12/2014 | NA | X | X | NA | NA |
| R-60 | F | GELC | 11/17/2014 | NA | X | X | X | NA |
| R-60 | UF | ARSL | 11/17/2014 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 11/17/2014 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 11/17/2014 | NA | X | X | NA | X |
| R-60 | F | GELC | 5/12/2015 | NA | X | X | X | NA |
| R-60 | UF | ARSL | 5/12/2015 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 5/12/2015 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 5/12/2015 | NA | X | X | NA | NA |
| R-60 | F | GELC | 11/17/2015 | NA | X | X | X | NA |
| R-60 | UF | ARSL | 11/17/2015 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 11/17/2015 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 11/17/2015 | NA | X | X | NA | X |
| R-60 | F | GELC | 5/17/2016 | NA | X | X | X | NA |
| R-60 | UF | ARSL | 5/17/2016 | NA | NA | NA | NA | X |
| R-60 | UF | Field | 5/17/2016 | X | NA | NA | NA | NA |
| R-60 | UF | GELC | 5/17/2016 | NA | X | X | NA | NA |
| Spring 3AA | F | GELC | 9/27/2010 | NA | X | X | X | NA |
| Spring 3AA | UF | Field | 9/27/2010 | X | NA | NA | NA | NA |
| Spring 3AA | F | GELC | 10/3/2011 | NA | X | X | X | NA |
| Spring 3AA | UF | Field | 10/3/2011 | X | NA | NA | NA | NA |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| Spring 3AA | F | GELC | 9/24/2012 | NA | X | X | X | NA |
| Spring 3AA | UF | Field | 9/24/2012 | X | NA | NA | NA | NA |
| Spring 3AA | UF | GELC | 9/24/2012 | NA | X | NA | NA | X |
| Spring 3AA | F | GELC | 9/29/2014 | NA | X | X | X | NA |
| Spring 3AA | UF | Field | 9/29/2014 | X | NA | NA | NA | NA |
| Spring 3AA | UF | GELC | 9/29/2014 | NA | X | X | NA | X |
| Spring 6 | F | GELC | 9/28/2010 | NA | X | X | X | NA |
| Spring 6 | UF | Field | 9/28/2010 | X | NA | NA | NA | NA |
| Spring 6 | F | GELC | 10/6/2011 | NA | X | X | X | NA |
| Spring 6 | UF | Field | 10/6/2011 | X | NA | NA | NA | NA |
| Spring 6 | F | GELC | 9/25/2012 | NA | X | X | X | NA |
| Spring 6 | UF | Field | 9/25/2012 | X | NA | NA | NA | NA |
| Spring 6 | UF | GELC | 9/25/2012 | NA | X | NA | NA | X |
| Spring 6 | UF | ARSL | 12/9/2013 | NA | NA | NA | NA | X |
| Spring 6 | UF | Field | 12/9/2013 | X | NA | NA | NA | NA |
| Spring 6 | UF | GELC | 12/9/2013 | NA | NA | NA | NA | X |
| Spring 6 | F | GELC | 10/1/2014 | NA | X | X | X | NA |
| Spring 6 | UF | Field | 10/1/2014 | X | NA | NA | NA | NA |
| Spring 6 | UF | GELC | 10/1/2014 | NA | X | X | NA | X |
| Spring 6 | F | GELC | 10/5/2015 | NA | X | X | X | NA |
| Spring 6 | UF | Field | 10/5/2015 | X | NA | NA | NA | NA |
| Spring 6 | UF | GELC | 10/5/2015 | NA | X | X | NA | X |
| Spring 6A | F | GELC | 9/28/2010 | NA | X | X | X | NA |
| Spring 6A | UF | Field | 9/28/2010 | X | NA | NA | NA | NA |
| Spring 6A | F | GELC | 9/25/2012 | NA | X | X | X | NA |
| Spring 6A | UF | Field | 9/25/2012 | X | NA | NA | NA | NA |
| Spring 6A | UF | GELC | 9/25/2012 | NA | X | NA | NA | X |
| Spring 6A | F | GELC | 10/1/2014 | NA | X | X | X | NA |
| Spring 6A | UF | Field | 10/1/2014 | X | NA | NA | NA | NA |
| Spring 6A | UF | GELC | 10/1/2014 | NA | X | X | NA | X |
| Spring 8A | F | GELC | 9/28/2010 | NA | X | X | X | NA |
| Spring 8A | UF | Field | 9/28/2010 | X | NA | NA | NA | NA |
| Spring 8A | F | GELC | 10/13/2011 | NA | X | X | X | NA |
| Spring 8A | F | GELC | 9/25/2012 | NA | X | X | X | NA |
| Spring 8A | UF | Field | 9/25/2012 | X | NA | NA | NA | NA |
| Spring 8A | UF | GELC | 9/25/2012 | NA | X | NA | NA | X |
| Spring 8A | F | GELC | 10/1/2014 | NA | X | X | X | NA |
| Spring 8A | UF | Field | 10/1/2014 | X | NA | NA | NA | NA |
| Spring 8A | UF | GELC | 10/1/2014 | NA | X | X | NA | X |

| Location | Field Prep | Lab Code | Date | Field | General Chemistry | Inorganic | Perchlorate | Rad |
|---|---|---|---|---|---|---|---|---|
| Spring 9 | F | GELC | 9/29/2010 | NA | X | X | X | NA |
| Spring 9 | UF | Field | 9/29/2010 | X | NA | NA | NA | NA |
| Spring 9 | F | GELC | 9/25/2012 | NA | X | X | X | NA |
| Spring 9 | UF | Field | 9/25/2012 | X | NA | NA | NA | NA |
| Spring 9 | UF | GELC | 9/25/2012 | NA | X | NA | NA | X |
| Spring 9 | UF | ARSL | 12/16/2013 | NA | NA | NA | NA | X |
| Spring 9 | UF | Field | 12/16/2013 | X | NA | NA | NA | NA |
| Spring 9 | UF | GELC | 12/16/2013 | NA | NA | NA | NA | X |
| Spring 9 | F | GELC | 10/1/2014 | NA | X | X | X | NA |
| Spring 9 | UF | Field | 10/1/2014 | X | NA | NA | NA | NA |
| Spring 9 | UF | GELC | 10/1/2014 | NA | X | X | NA | X |
| Spring 9 | F | GELC | 10/6/2015 | NA | X | X | X | NA |
| Spring 9 | UF | Field | 10/6/2015 | X | NA | NA | NA | NA |
| Spring 9 | UF | GELC | 10/6/2015 | NA | X | X | NA | X |
| Spring 9A | F | GELC | 9/28/2010 | NA | X | X | X | NA |
| Spring 9A | UF | Field | 9/28/2010 | X | NA | NA | NA | NA |
| Spring 9A | F | GELC | 10/13/2011 | NA | X | X | X | NA |
| Spring 9A | UF | Field | 10/13/2011 | X | NA | NA | NA | NA |
| Spring 9A | F | GELC | 9/26/2012 | NA | X | X | X | NA |
| Spring 9A | UF | Field | 9/26/2012 | X | NA | NA | NA | NA |
| Spring 9A | UF | GELC | 9/26/2012 | NA | X | NA | NA | X |
| Spring 9A | UF | ARSL | 12/16/2013 | NA | NA | NA | NA | X |
| Spring 9A | UF | Field | 12/16/2013 | X | NA | NA | NA | NA |
| Spring 9A | UF | GELC | 12/16/2013 | NA | NA | NA | NA | X |
| Spring 9A | F | GELC | 10/1/2014 | NA | X | X | X | NA |
| Spring 9A | UF | Field | 10/1/2014 | X | NA | NA | NA | NA |
| Spring 9A | UF | GELC | 10/1/2014 | NA | X | X | NA | X |
| Spring 9A | F | GELC | 10/6/2015 | NA | X | X | X | NA |
| Spring 9A | UF | Field | 10/6/2015 | X | NA | NA | NA | NA |
| Spring 9A | UF | GELC | 10/6/2015 | NA | X | X | NA | X |
| Spring 9B | F | GELC | 9/29/2010 | NA | X | X | X | NA |
| Spring 9B | UF | Field | 9/29/2010 | X | NA | NA | NA | NA |

[a] F = Filtered.

[b] GELC = General Engineering Laboratories.

[c] NA = The analytical suite was not analyzed for that sample.

[d] X = The analytical suite was collected for that sample.

[e] UF = Unfiltered.

[f] ARSL = American Radiological Services Laboratory

# Appendix B

*Groundwater Background Data*
*(on CD included with this document)*

# Appendix C

*Statistical Plots*

**Figures**

The figures presented in Appendix C are based on the analytical data presented in Appendix B. For each constituent, there are three sets of figures:

1. A scatter plot of all data for perched-intermediate groundwater. Time is plotted along the *x*-axis, and the constituent concentration is plotted along the *y*-axis. Detected results are indicated by “x” and detection limits for nondetected results are indicated by “o.” The entire period of record for the constituent is plotted. Upper tolerance limits (UTLs), however, are based only on samples collected during the period from January 2010 to December 2015. A vertical yellow line on the plot indicates the beginning of 2010, and only data to the right of the vertical line are used for UTL calculations.
2. A scatter plot of all data for the regional aquifer. The format of this plot is the same as for the perched-intermediate groundwater plot.
3. A set of time-series plots for each sampling location. The format of these plots is the same as for the perched-intermediate and regional aquifer plots, except each plot contains data for only one sampling location. The perched-intermediate sampling locations are presented first, followed by the regional sampling locations. The lithological unit of the sampling location is indicated in the title of the plot as well as by the color of the title.

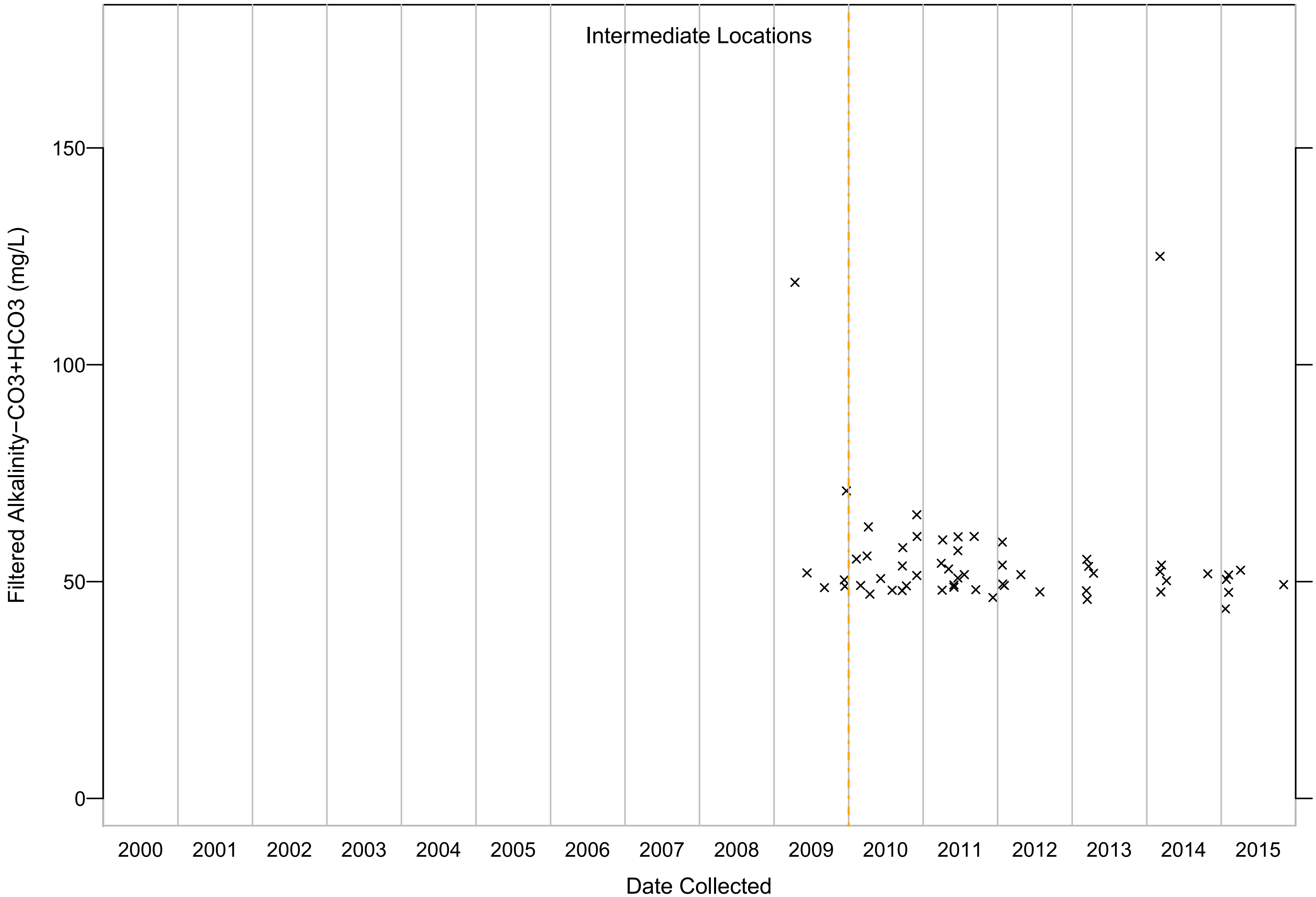



**Figure C-1** **Filtered alkalinity results for perched-intermediate groundwater**

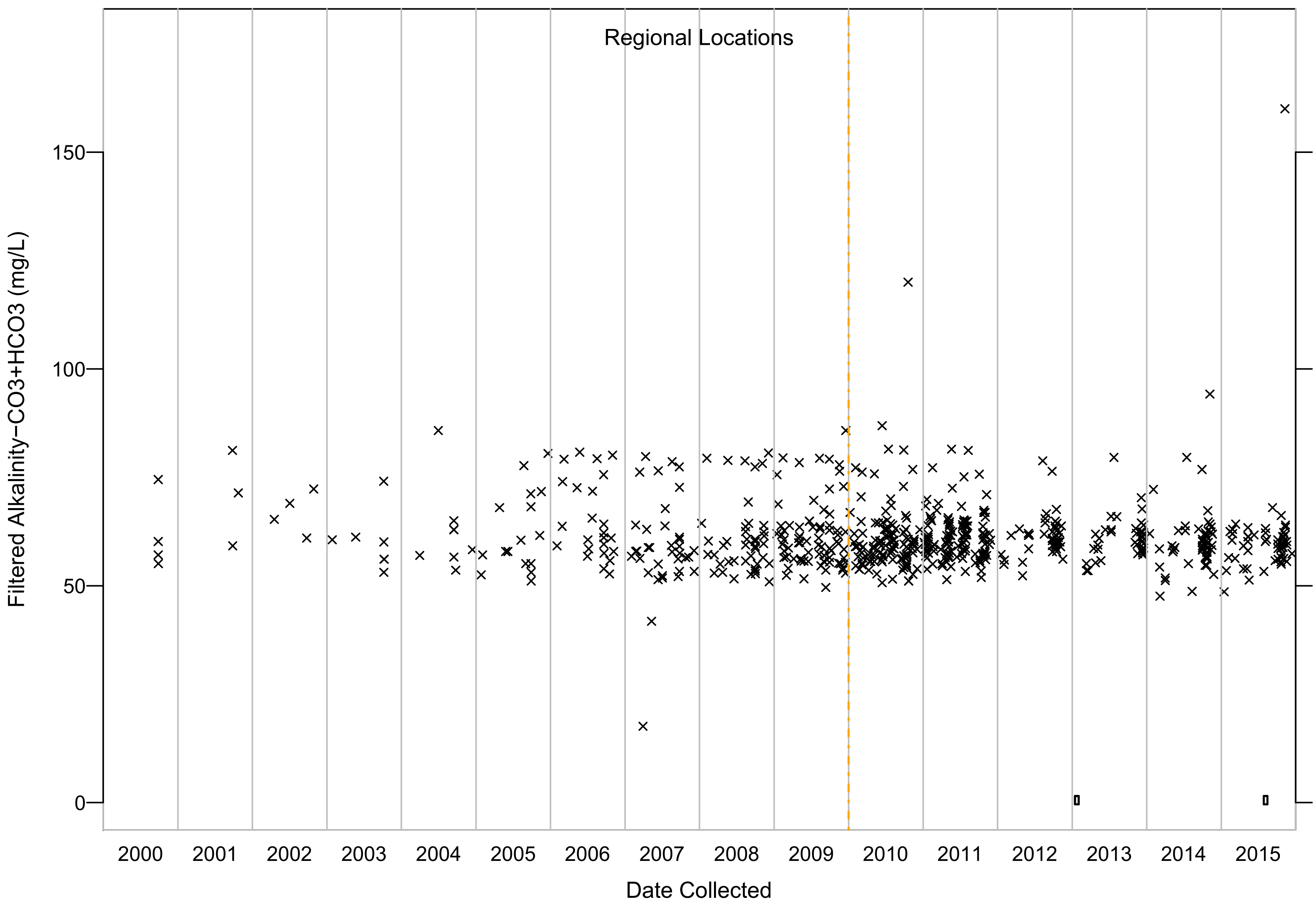



**Figure C-2 Filtered alkalinity results for regional aquifer**

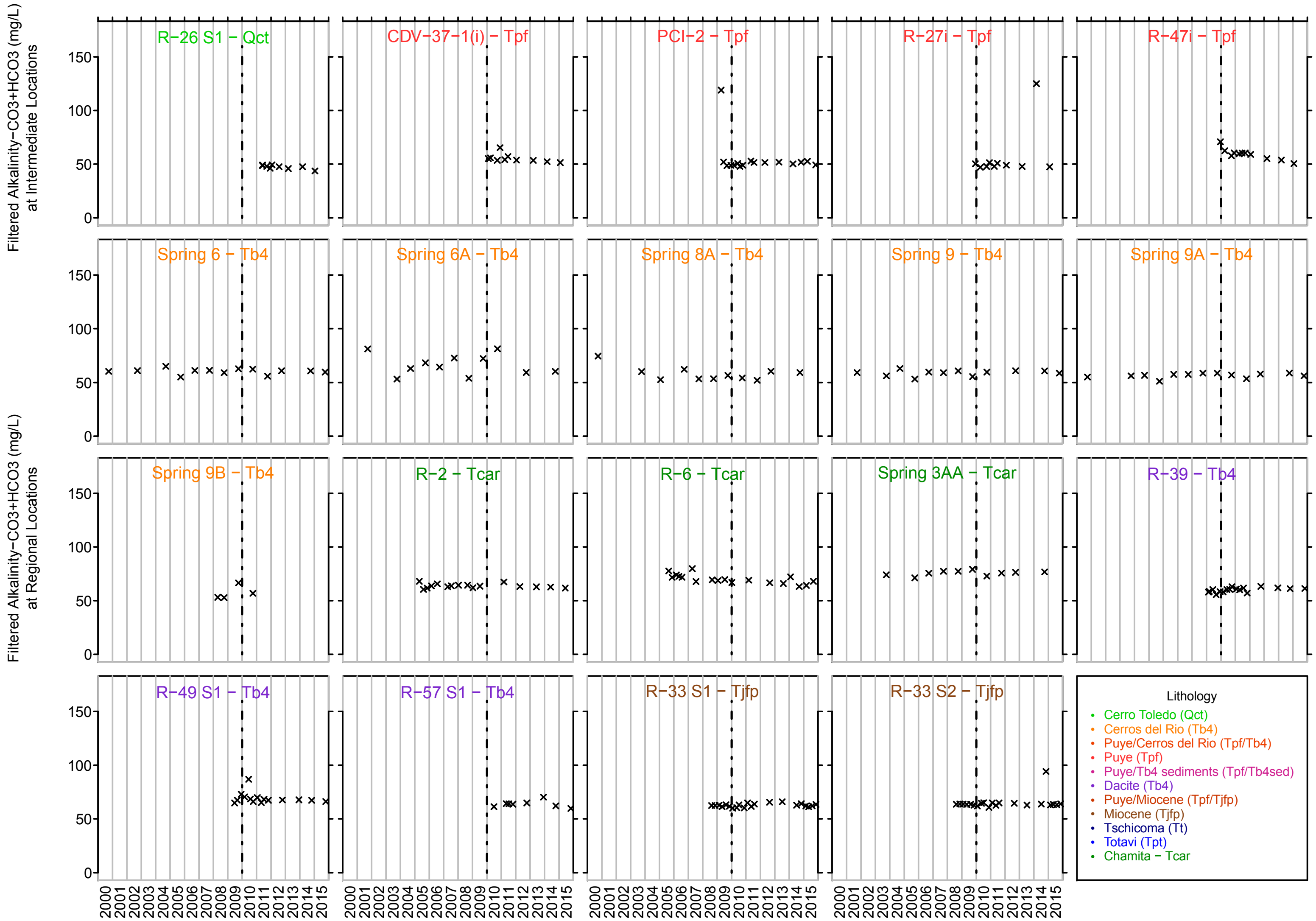



**Figure C-3 Time-series plots for filtered alkalinity**

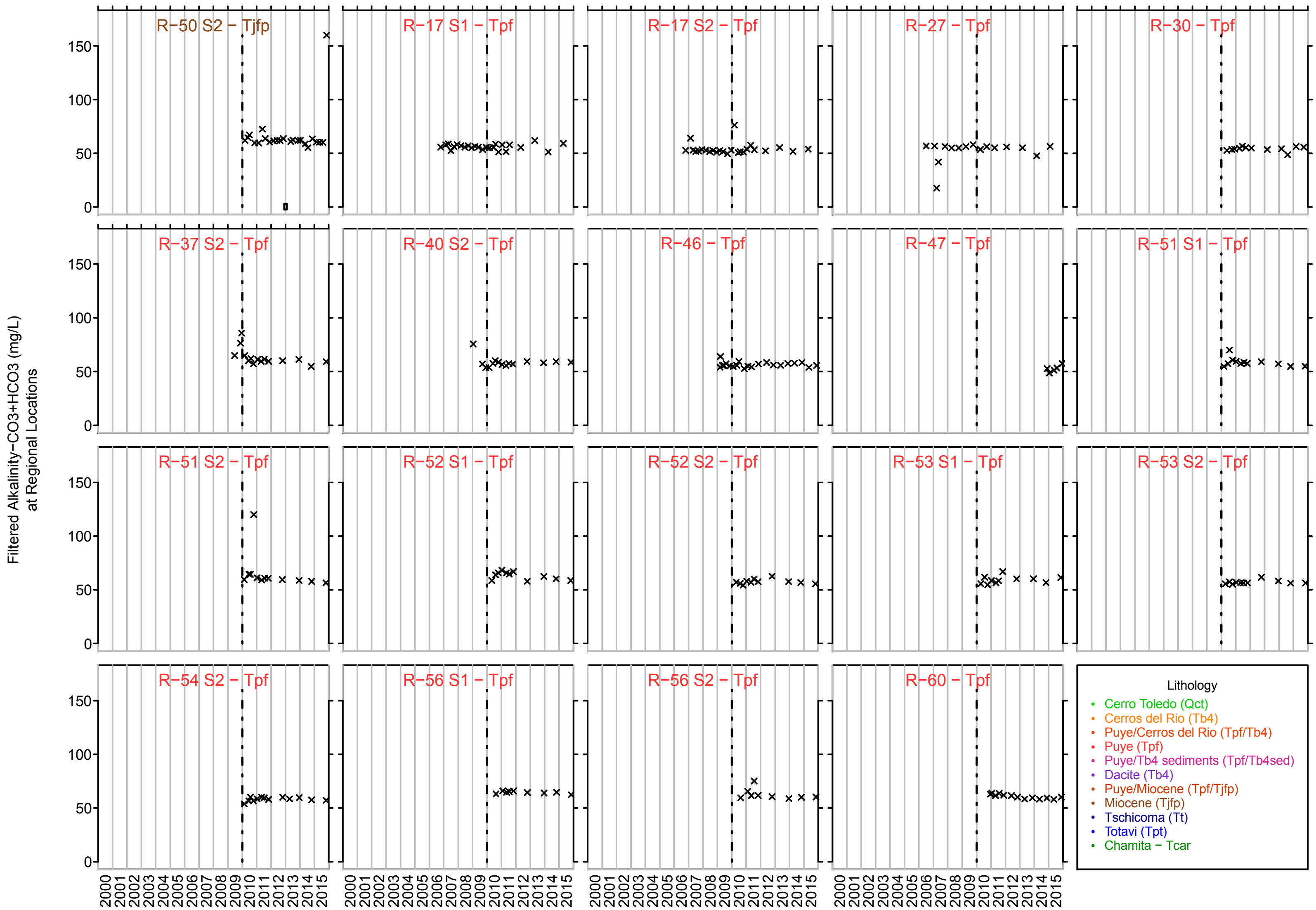



**Figure C-3 (continued)** **Time-series plots for filtered alkalinity**

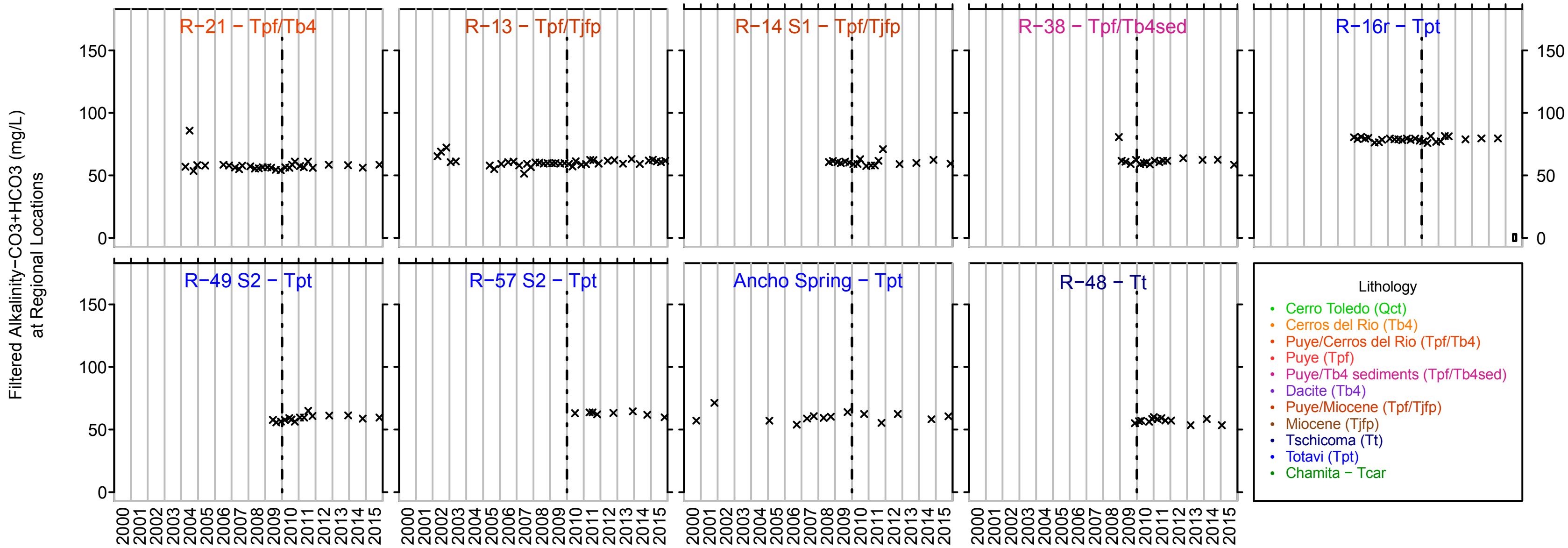



**Figure C-3 (continued)** **Time-series plots for filtered alkalinity**

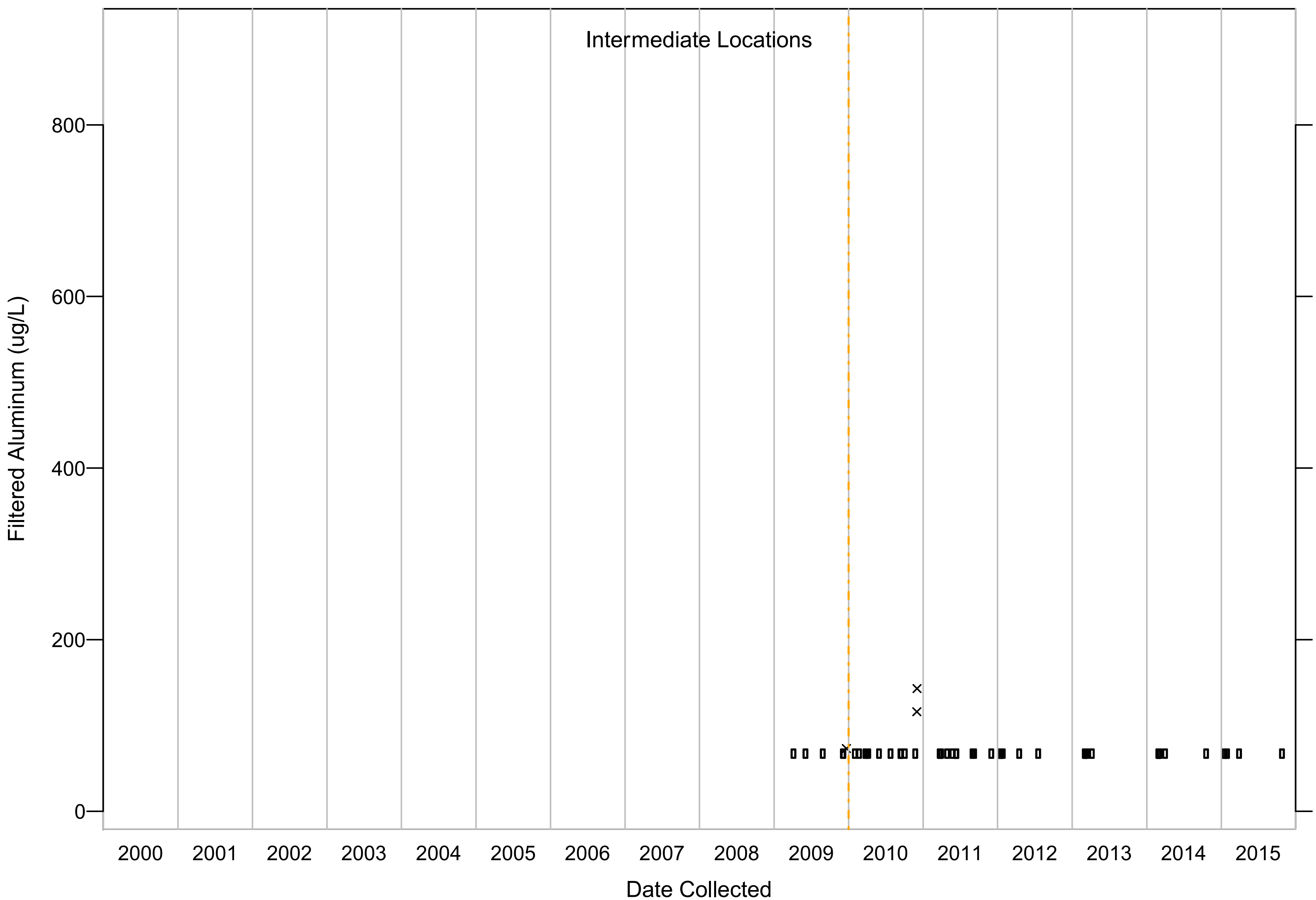



**Figure C-4 Filtered alkalinity results for perched-intermediate groundwater**

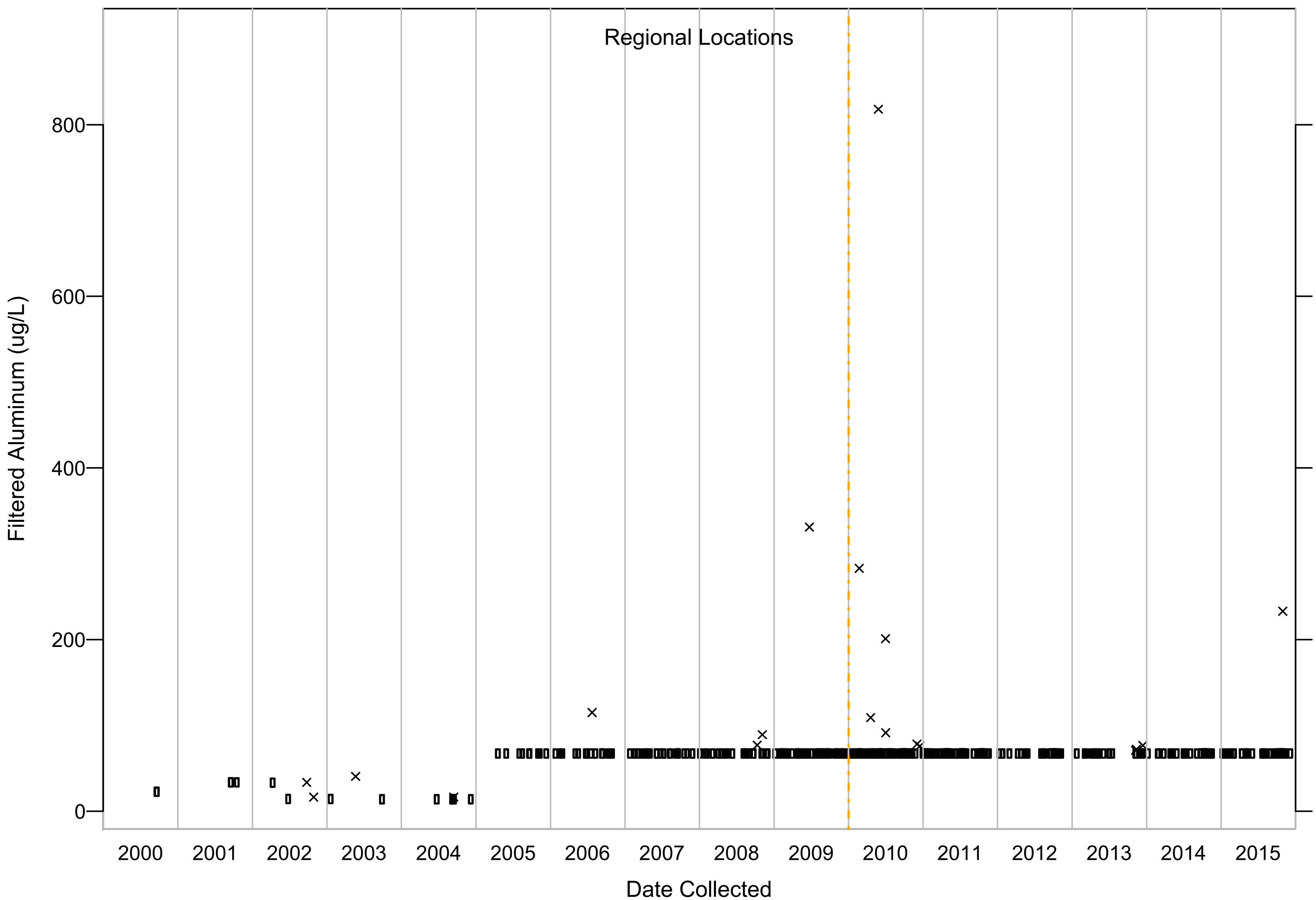



**Figure C-5** **Filtered alkalinity results for regional aquifer**

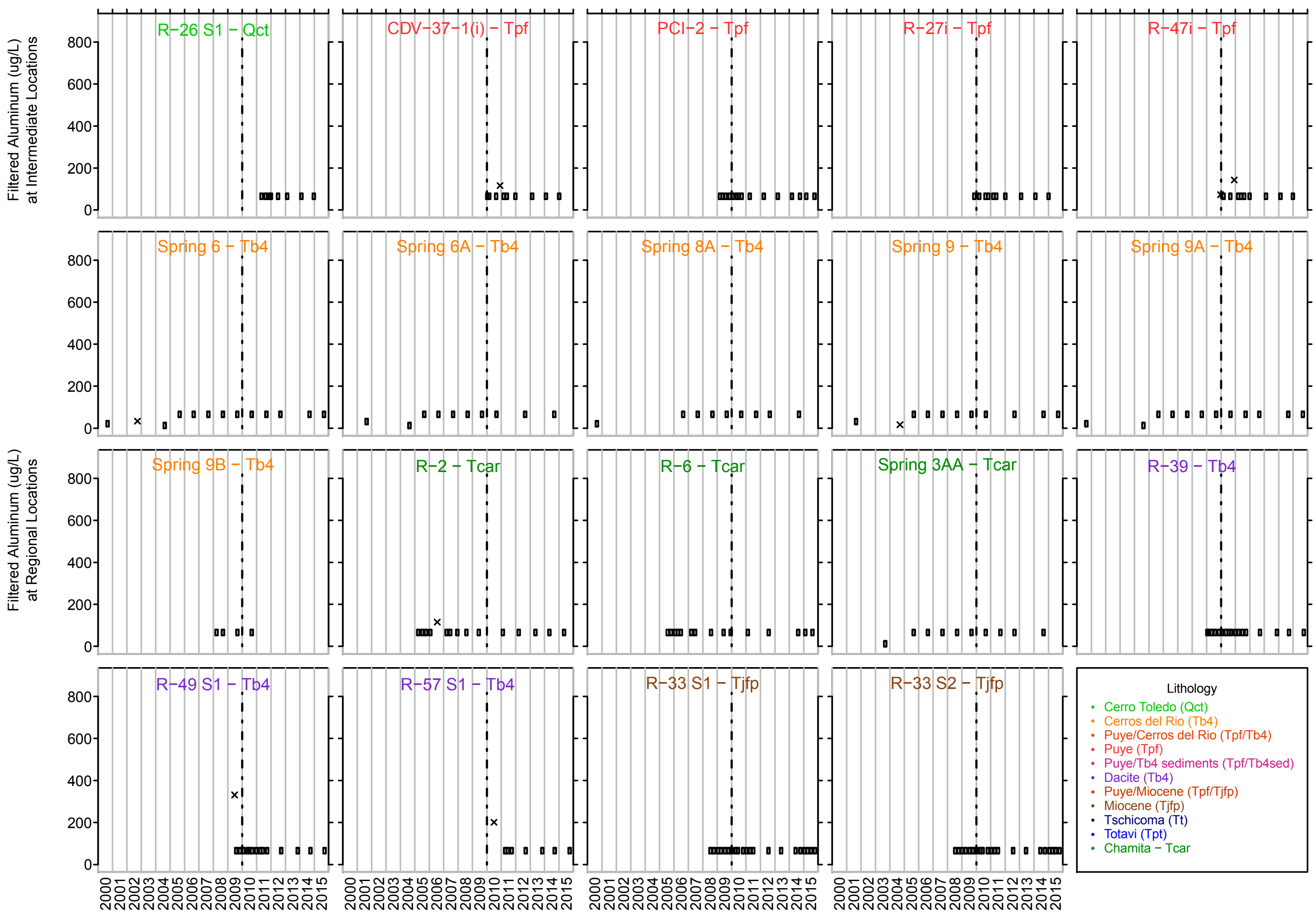



**Figure C-6 Time-series plots for filtered aluminum**

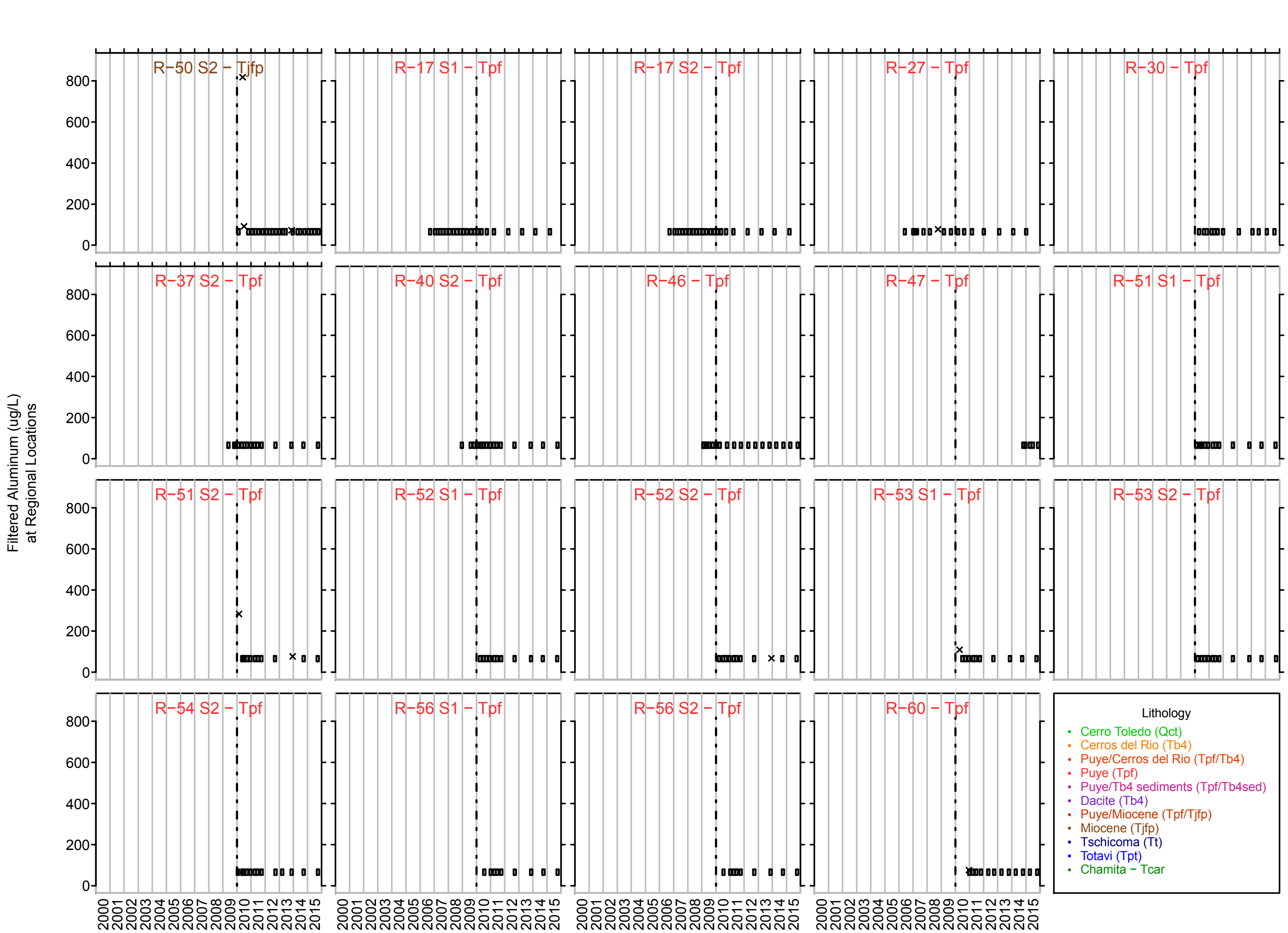



**Figure C-6 (continued)** **Time-series plots for filtered aluminum**

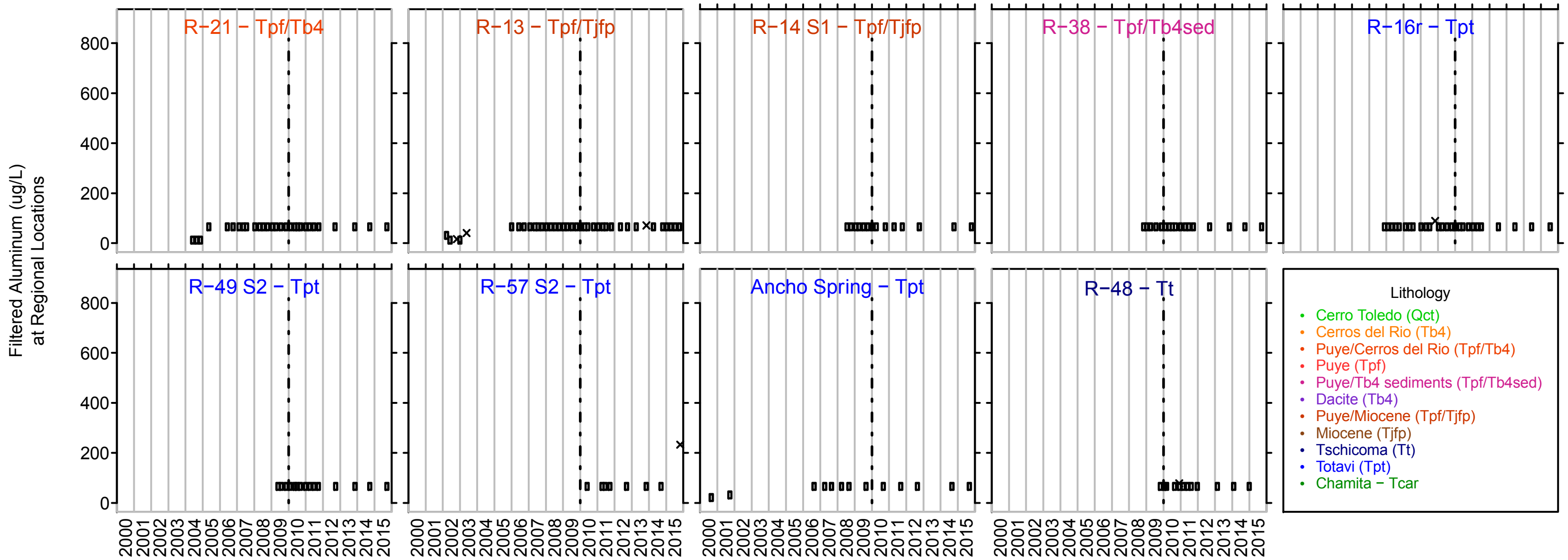



**Figure C-6 (continued)** **Time-series plots for filtered aluminum**

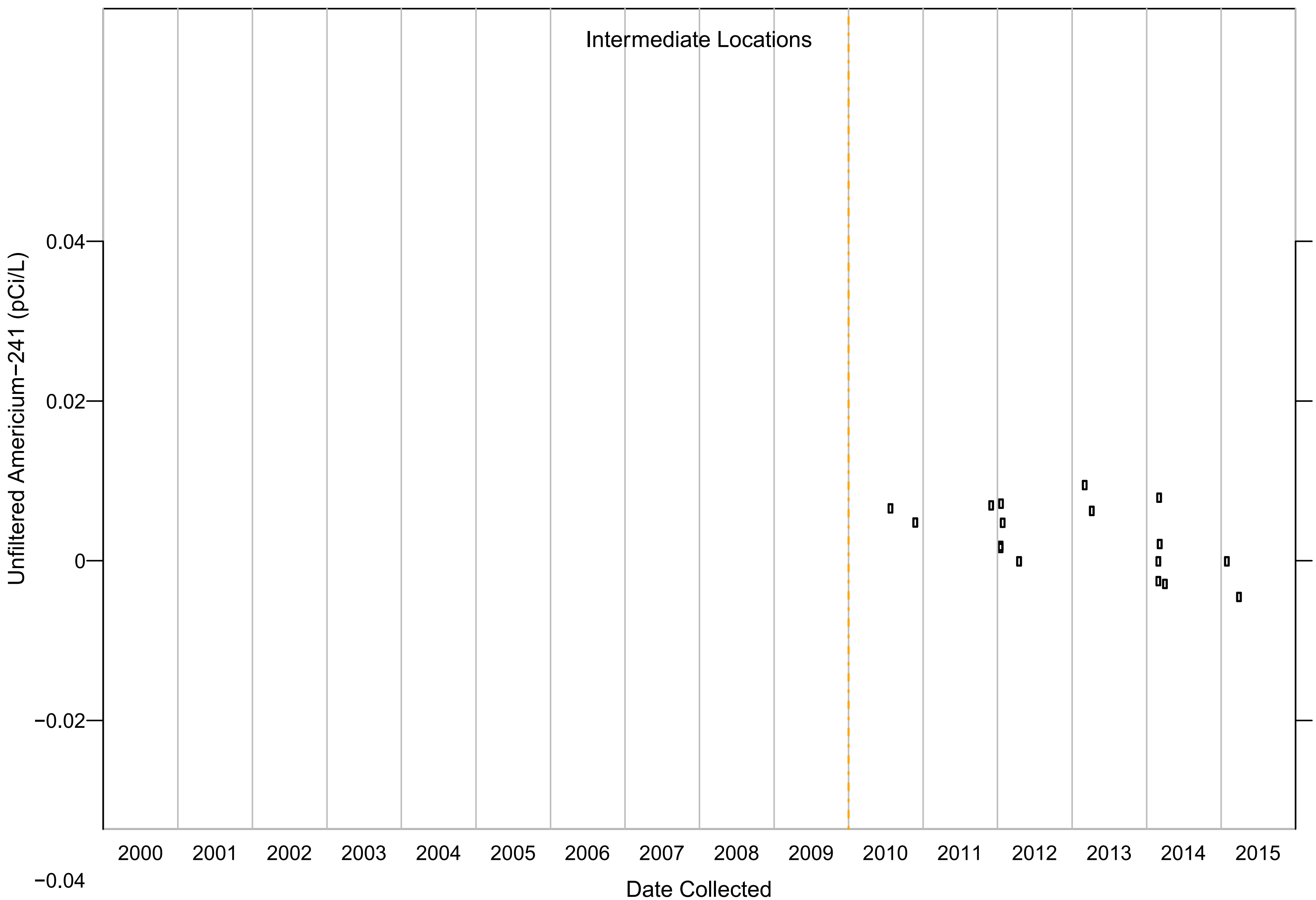



**Figure C-7 Unfiltered americium-241 results for perched-intermediate groundwater**

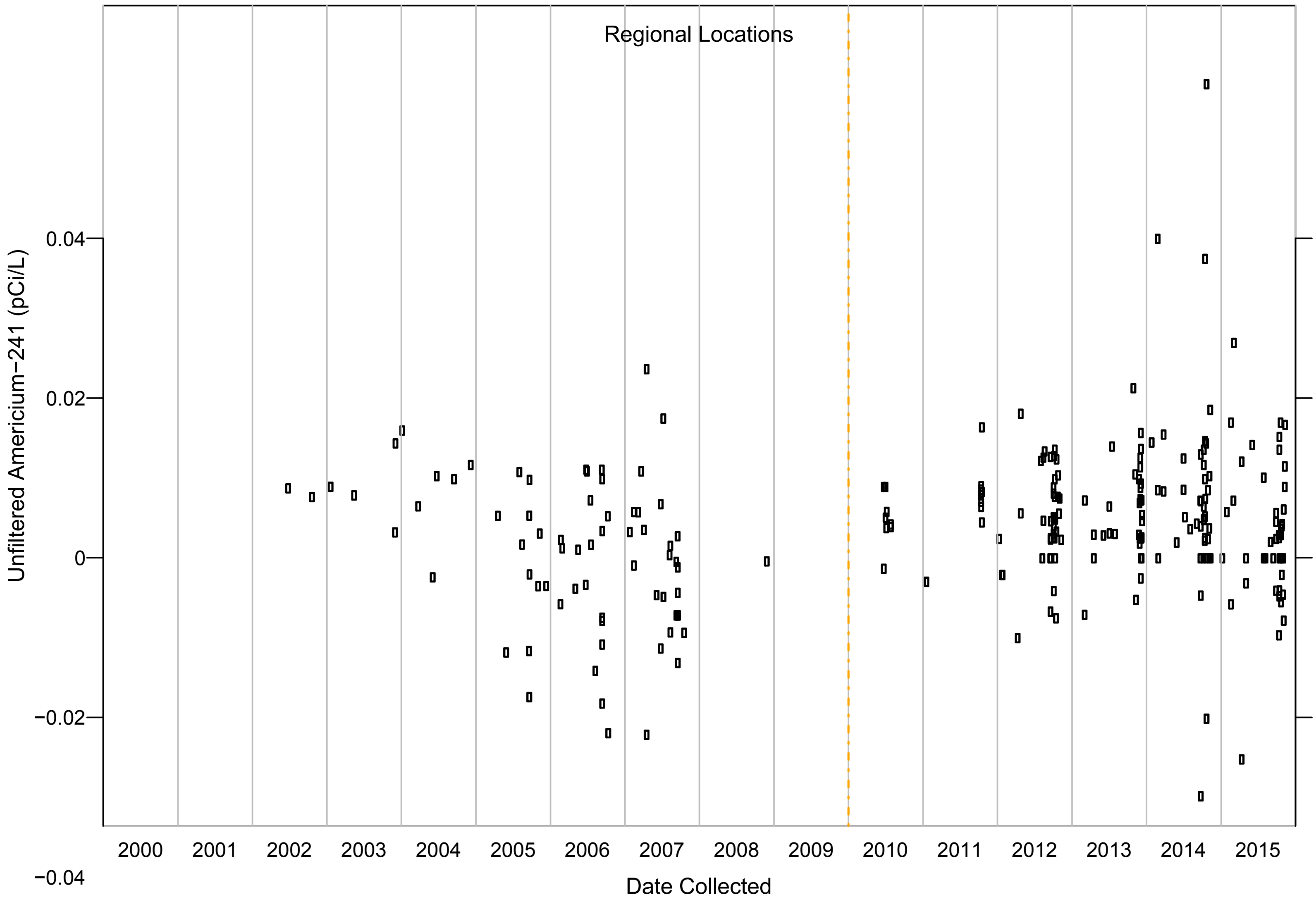



**Figure C-8 Unfiltered americium-241 results for regional aquifer**

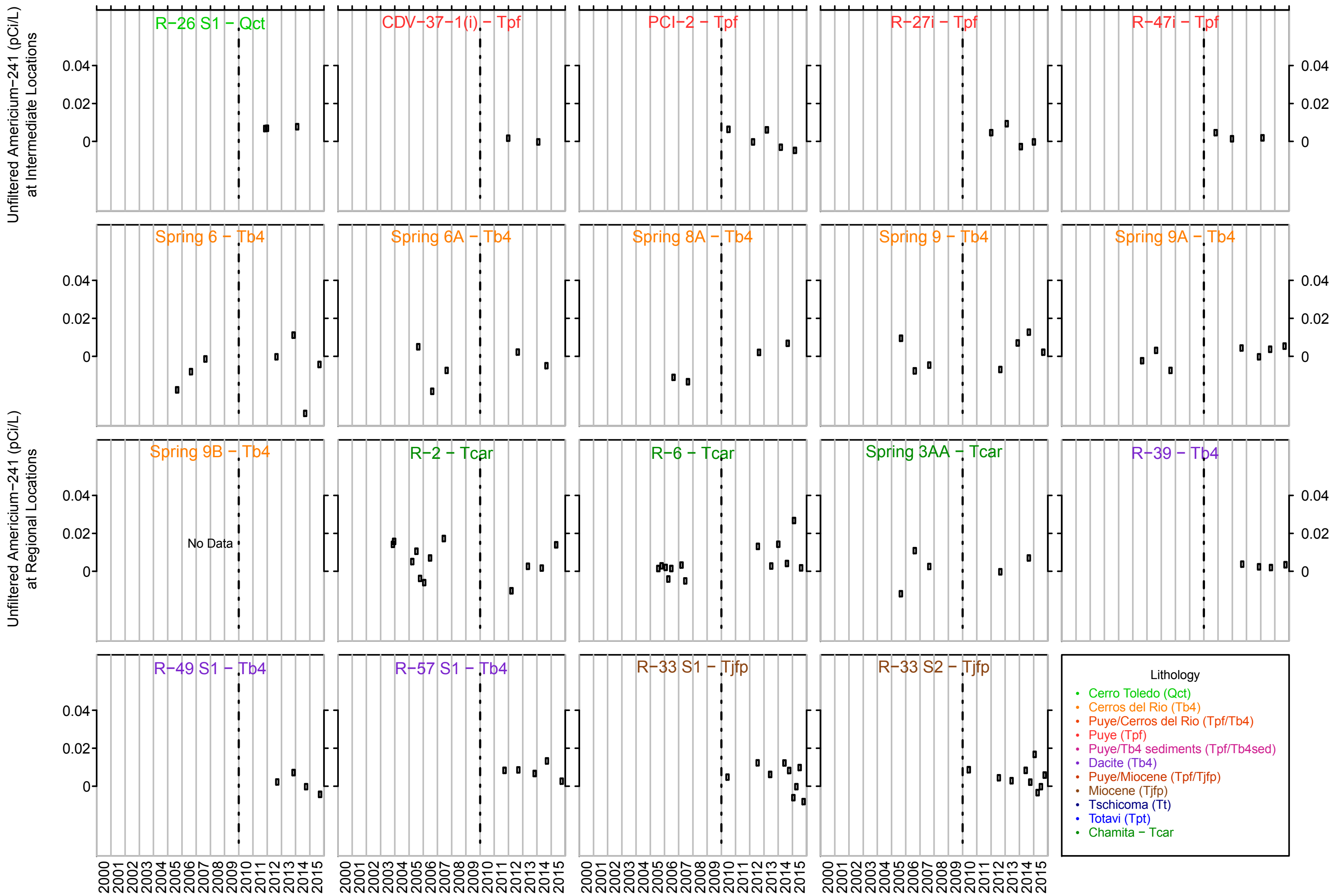



**Figure C-9 Time-series plots for unfiltered americium-241**

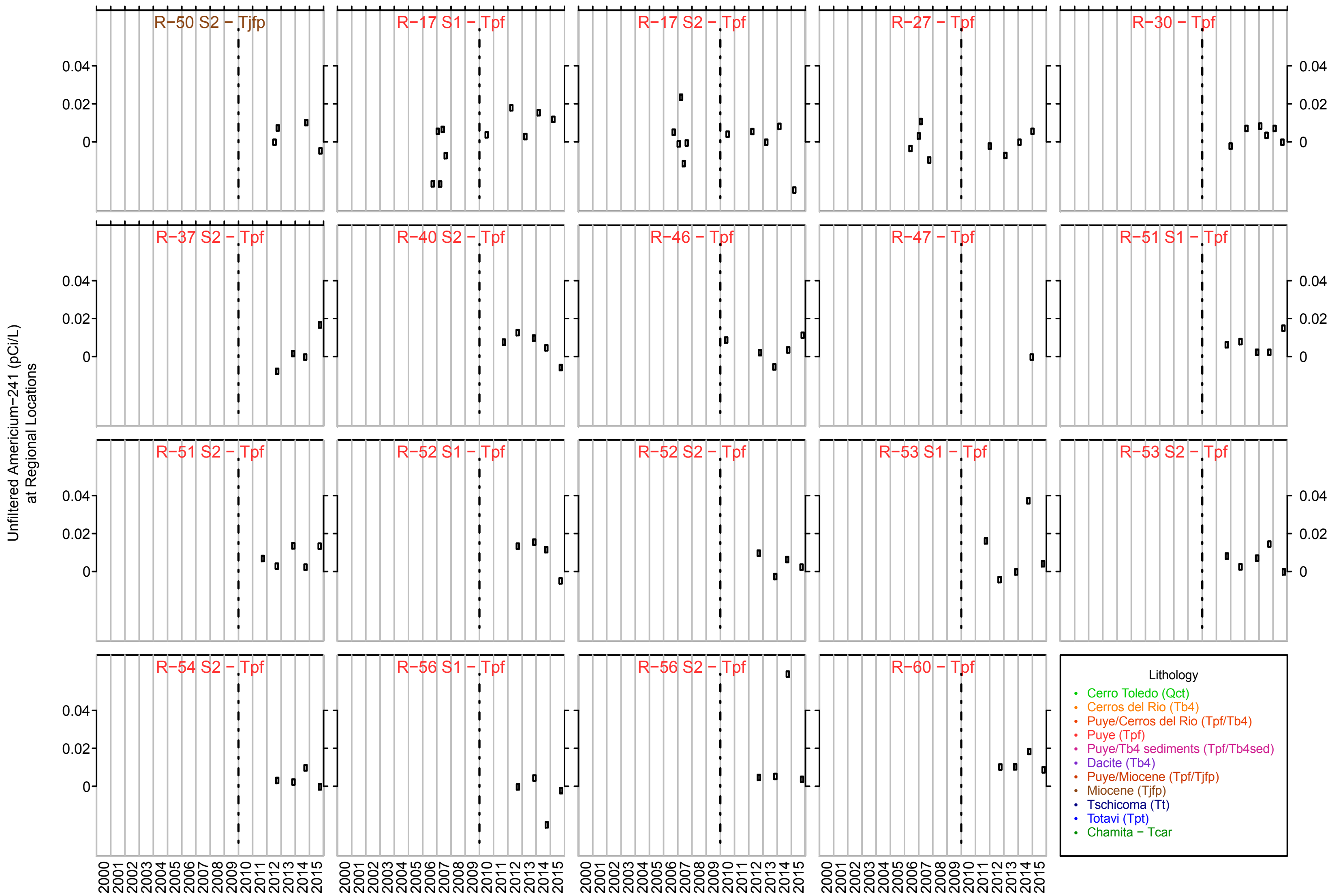



**Figure C-9 (continued)** **Time-series plots for unfiltered americium-241**

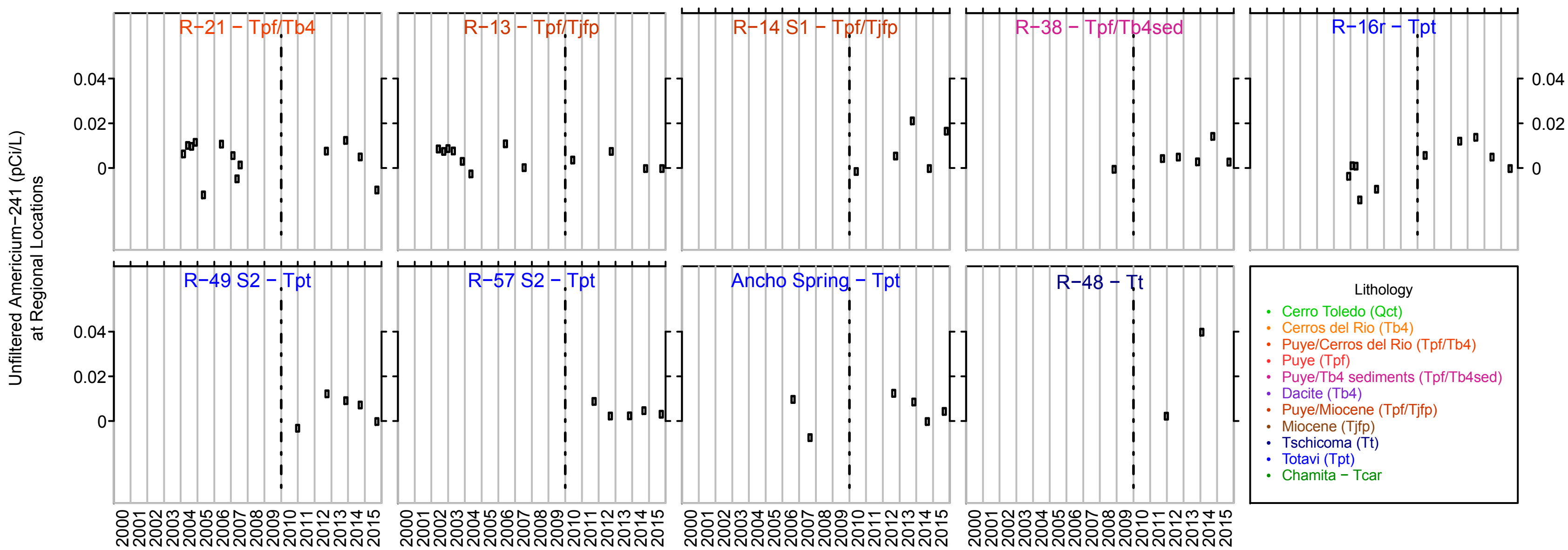



**Figure C-9 (continued)** **Time-series plots for unfiltered americium-241**

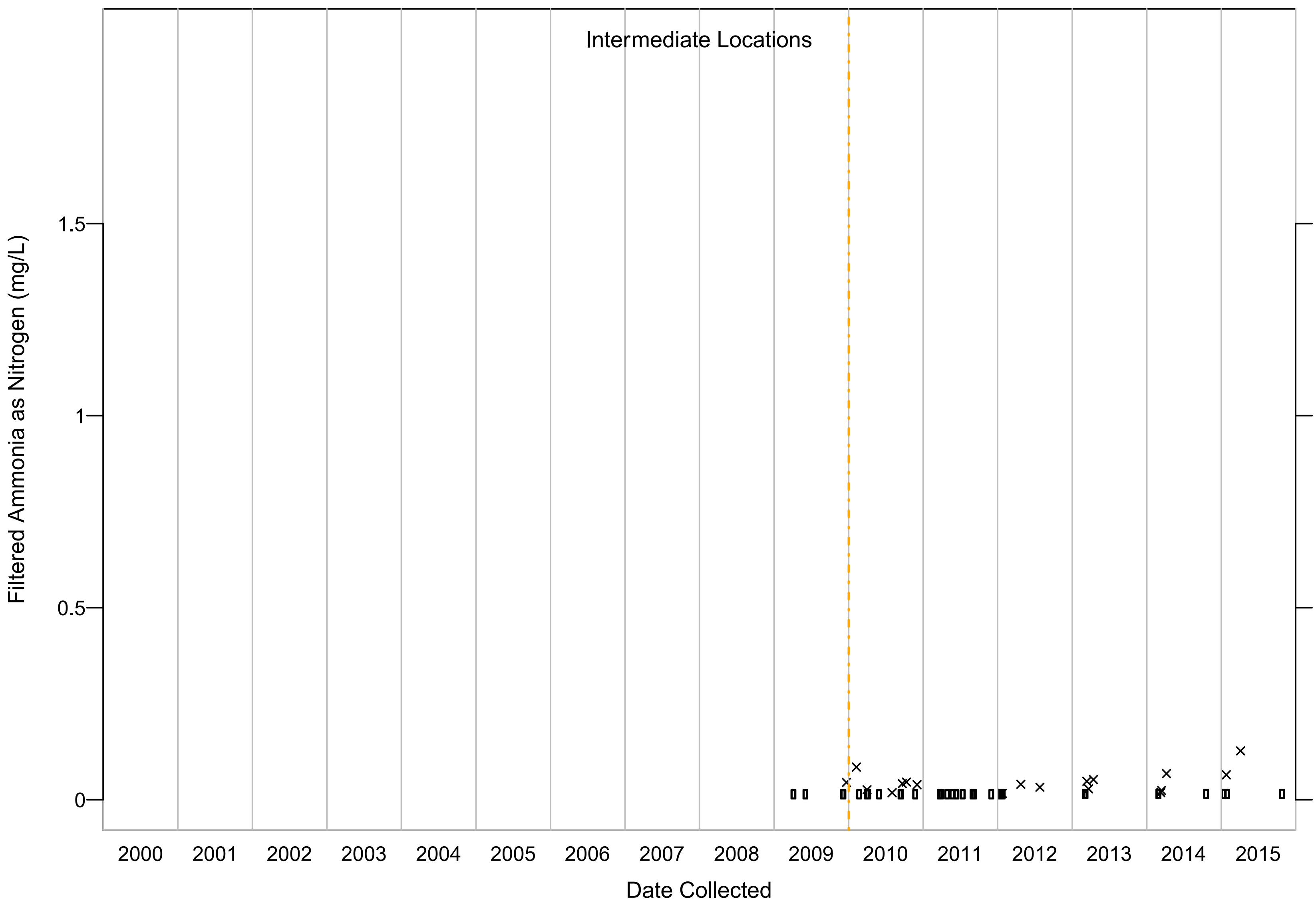



**Figure C-10 Filtered ammonia results for perched-intermediate groundwater**

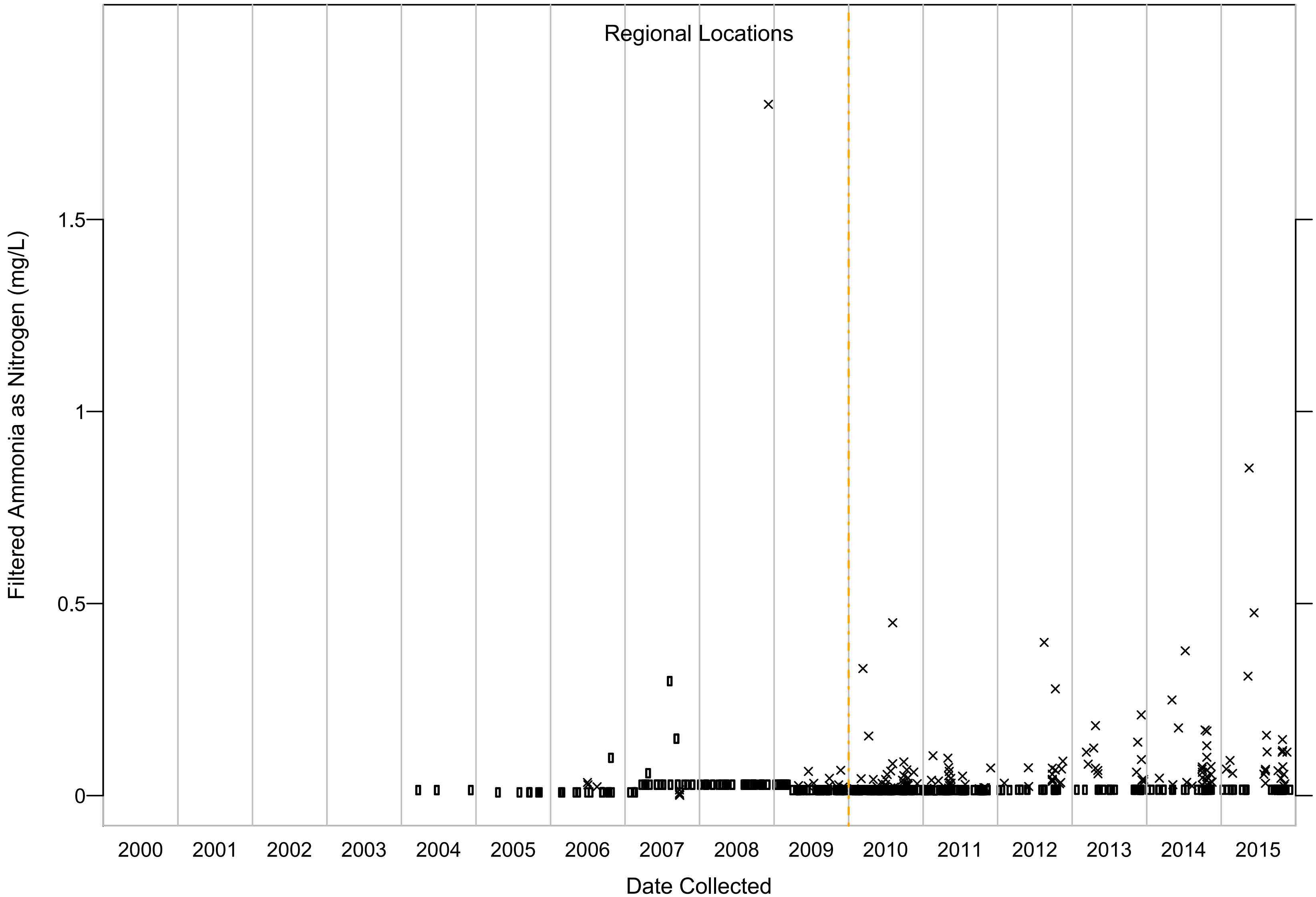



**Figure C-11** **Filtered ammonia results for regional aquifer**

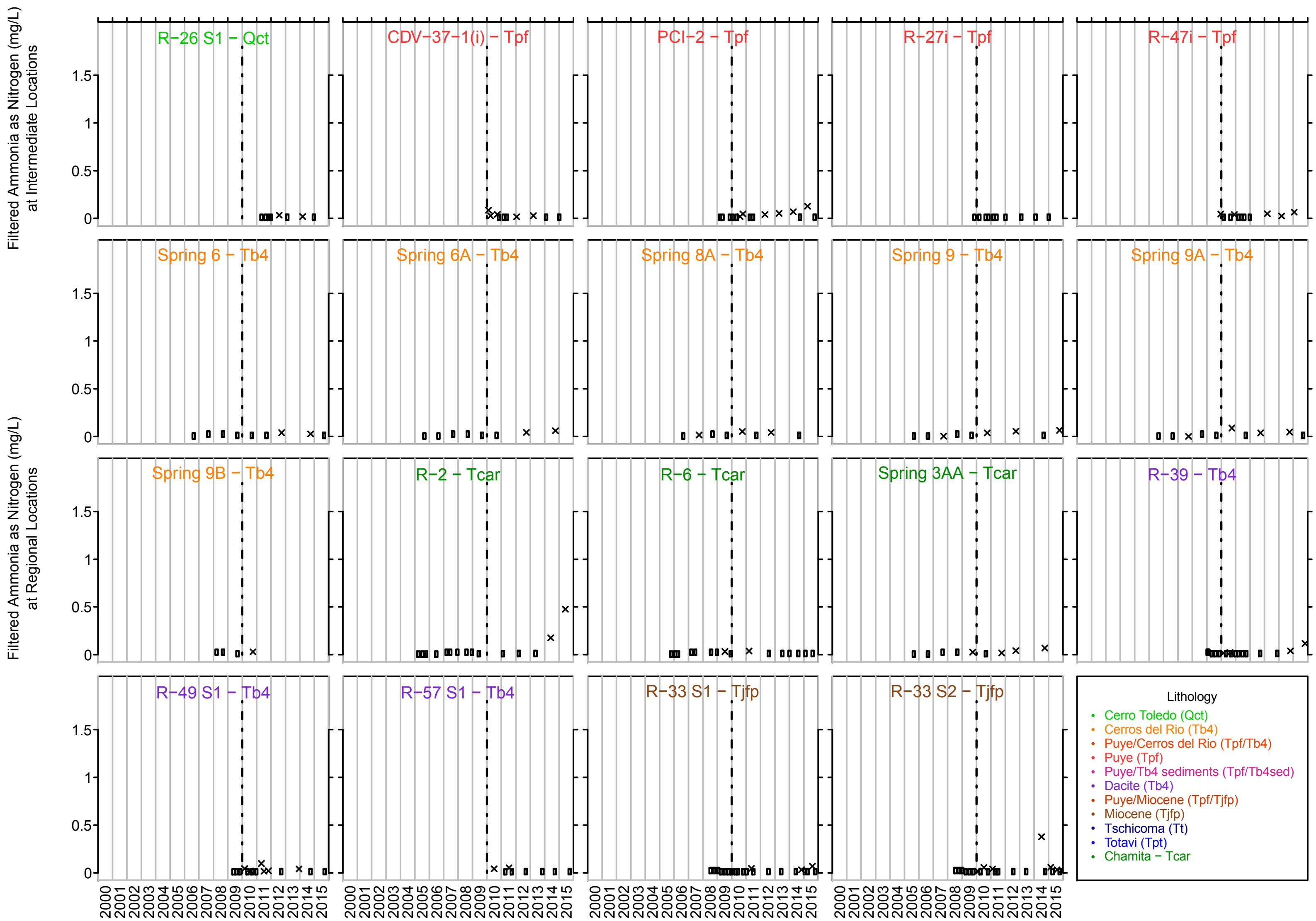



**Figure C-12 Time-series plots for filtered ammonia**

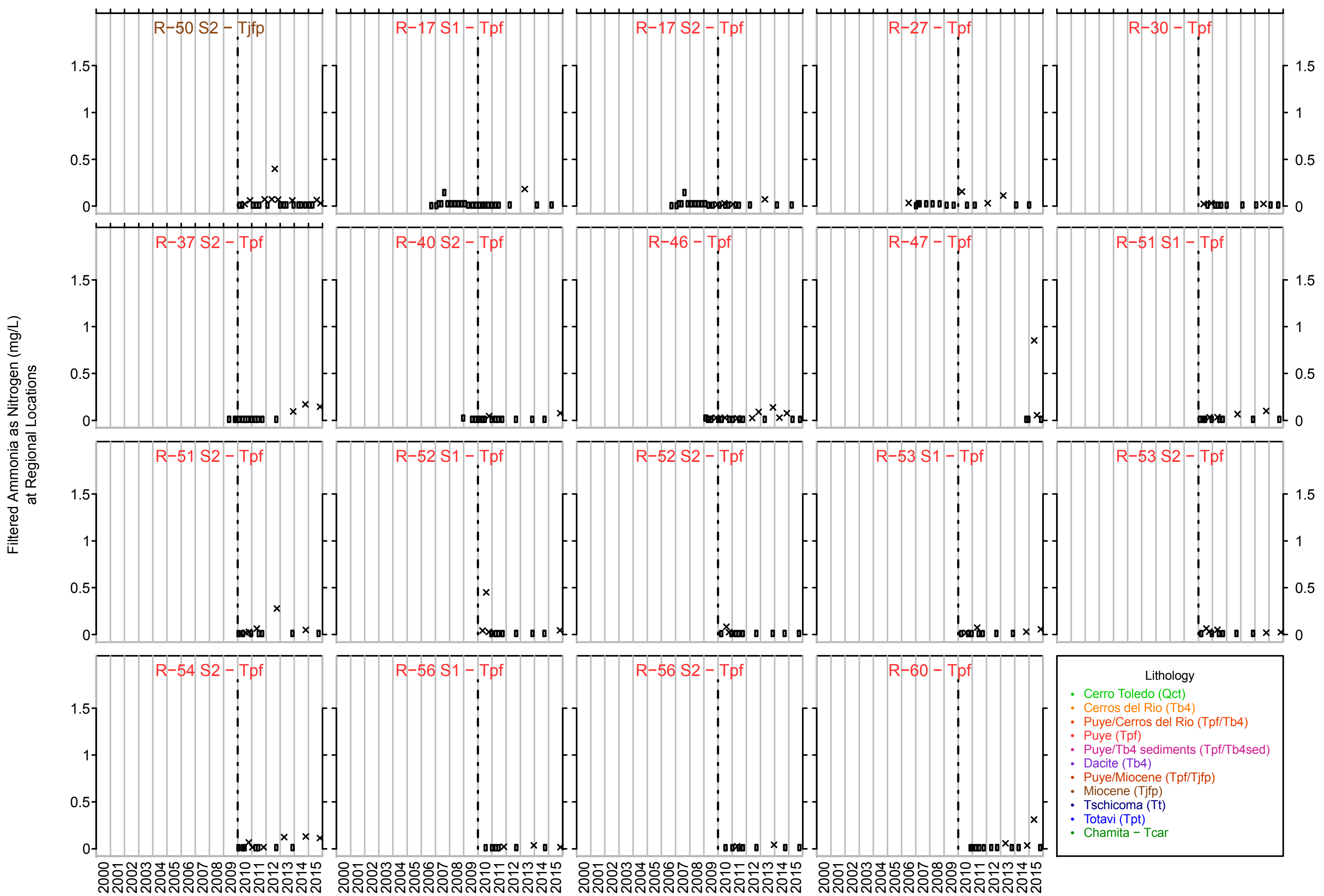



**Figure C-12 (continued) Time-series plots for filtered ammonia**

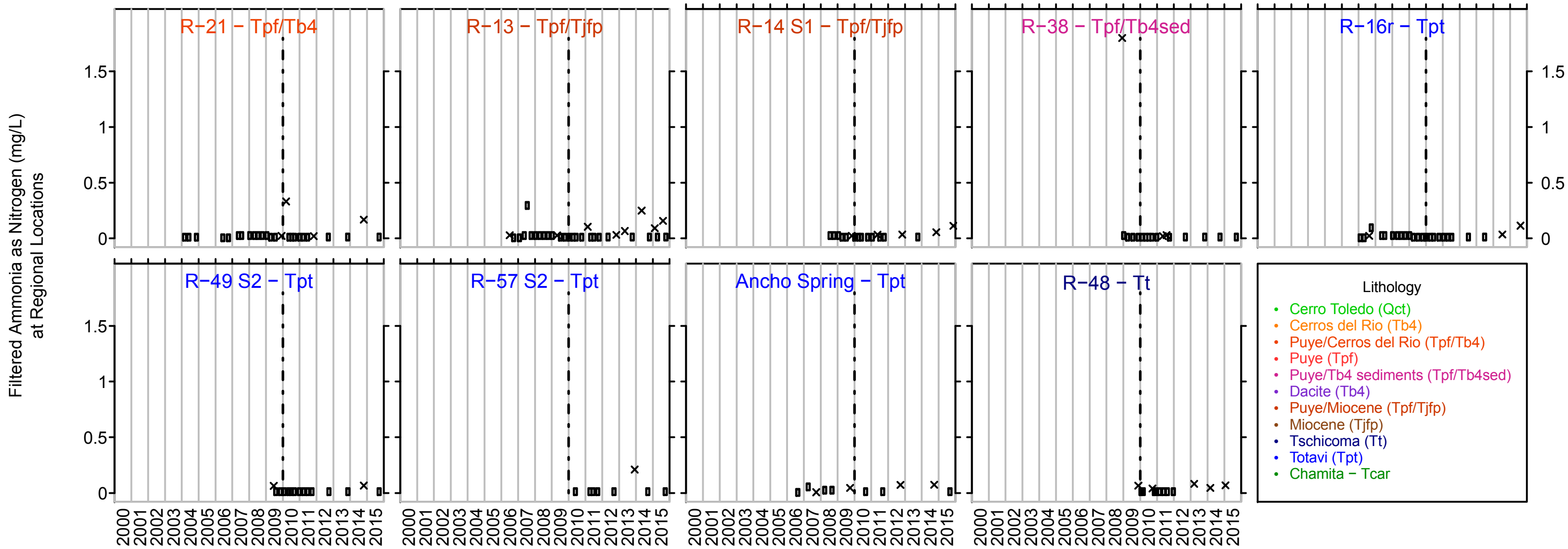



**Figure C-12 (continued)** **Time-series plots for filtered ammonia**

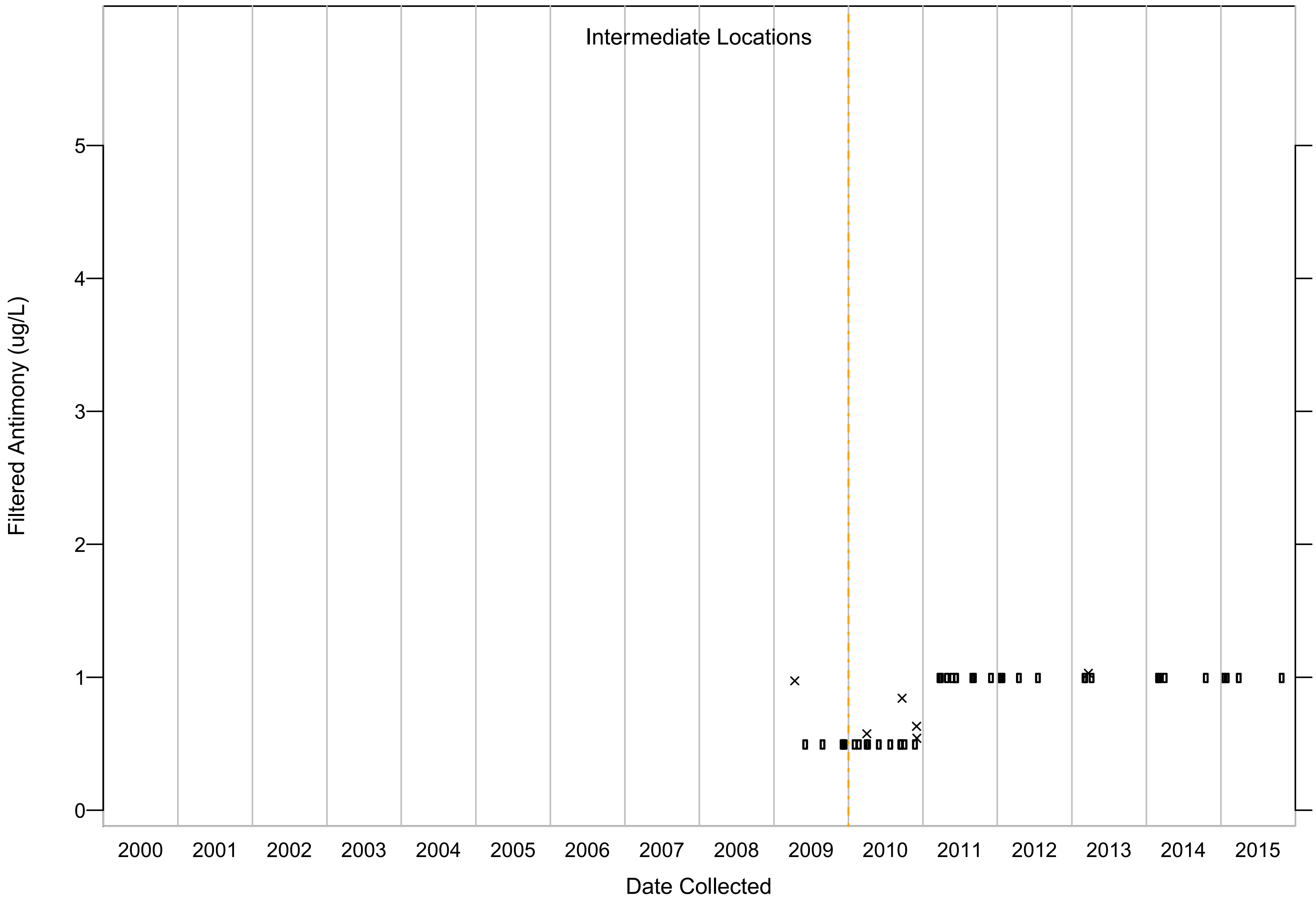



**Figure C-13 Filtered antimony results for perched-intermediate groundwater**

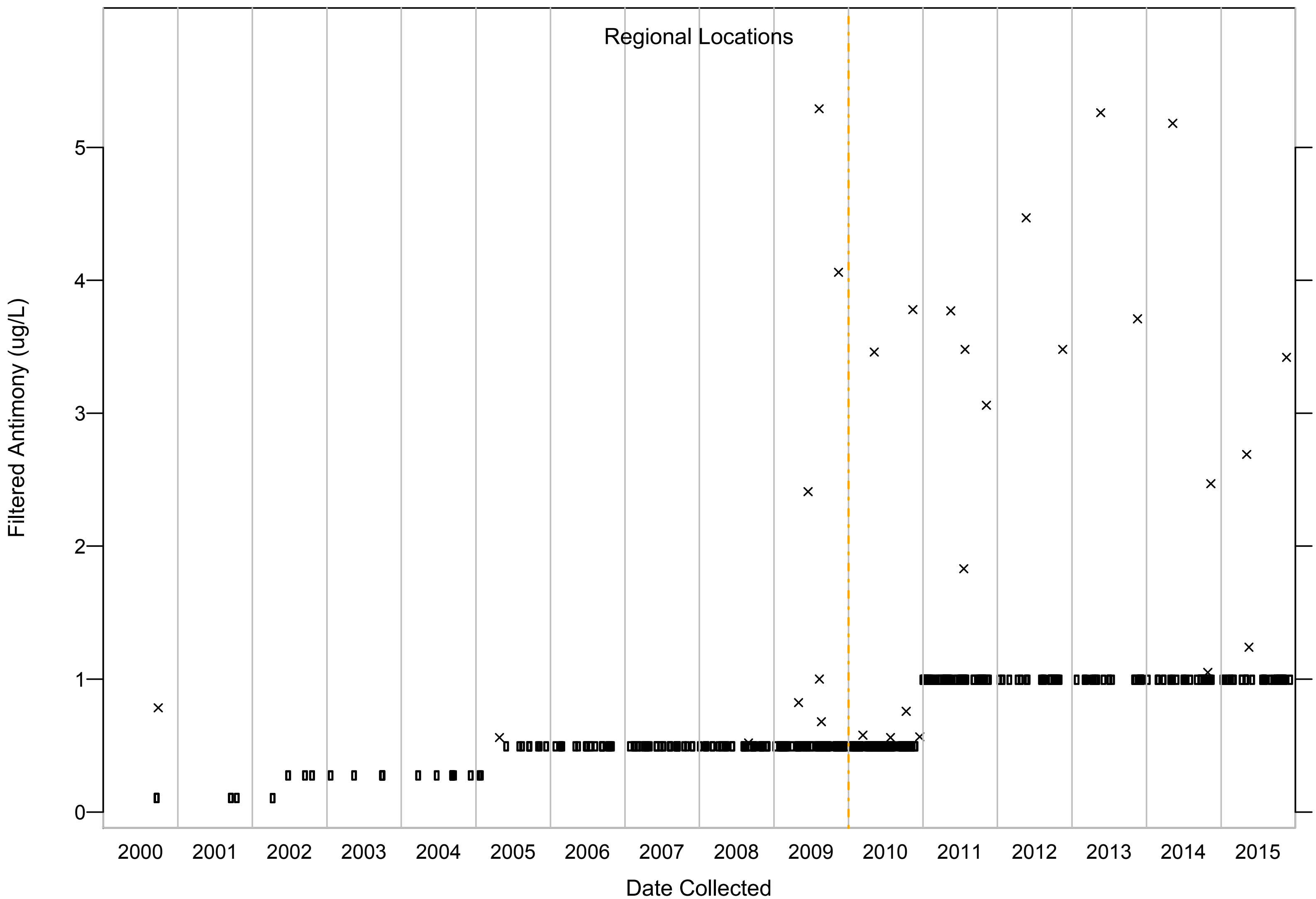



**Figure C-14 Filtered antimony results for regional aquifer**

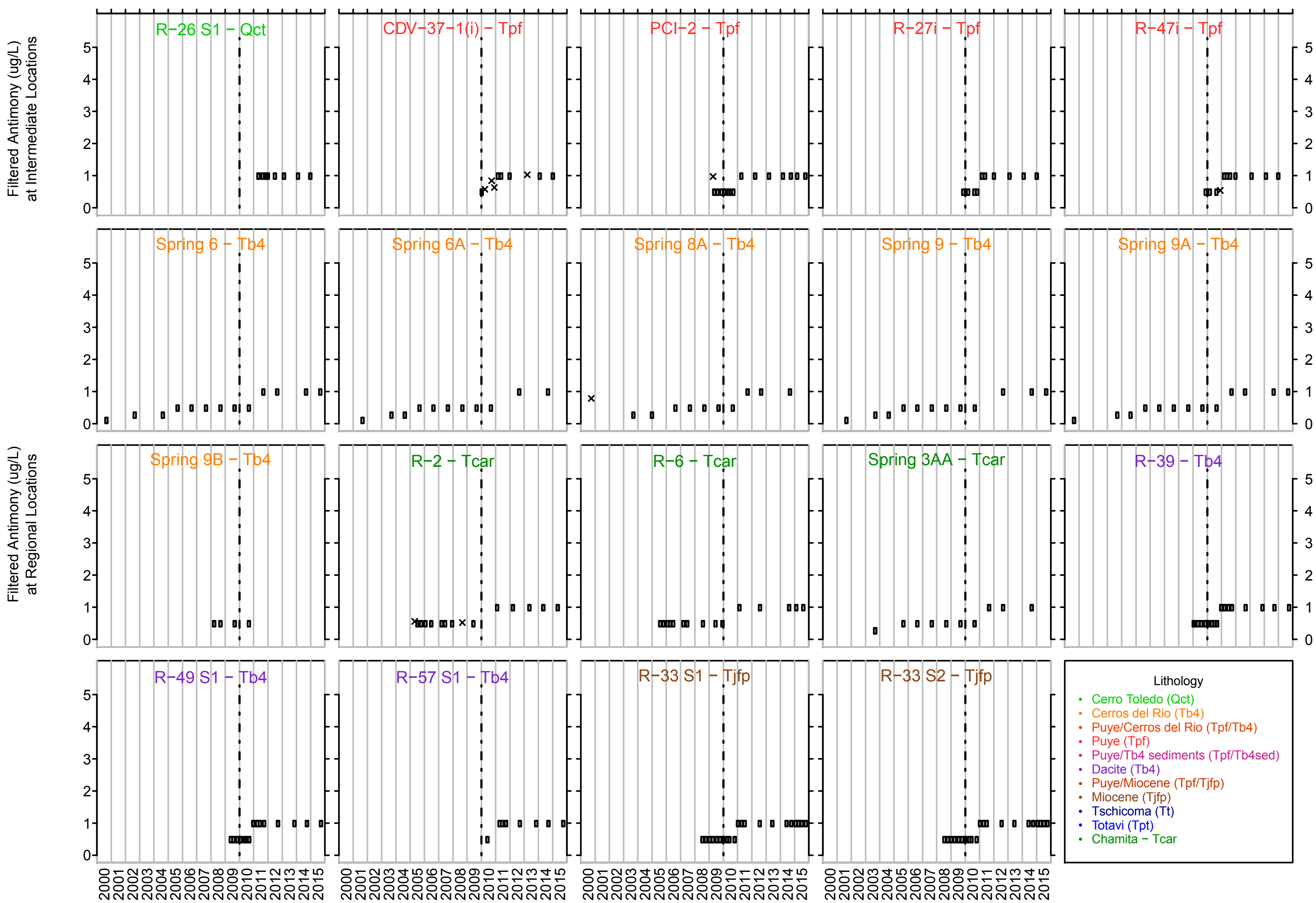



**Figure C-15 Time-series plots for filtered antimony**

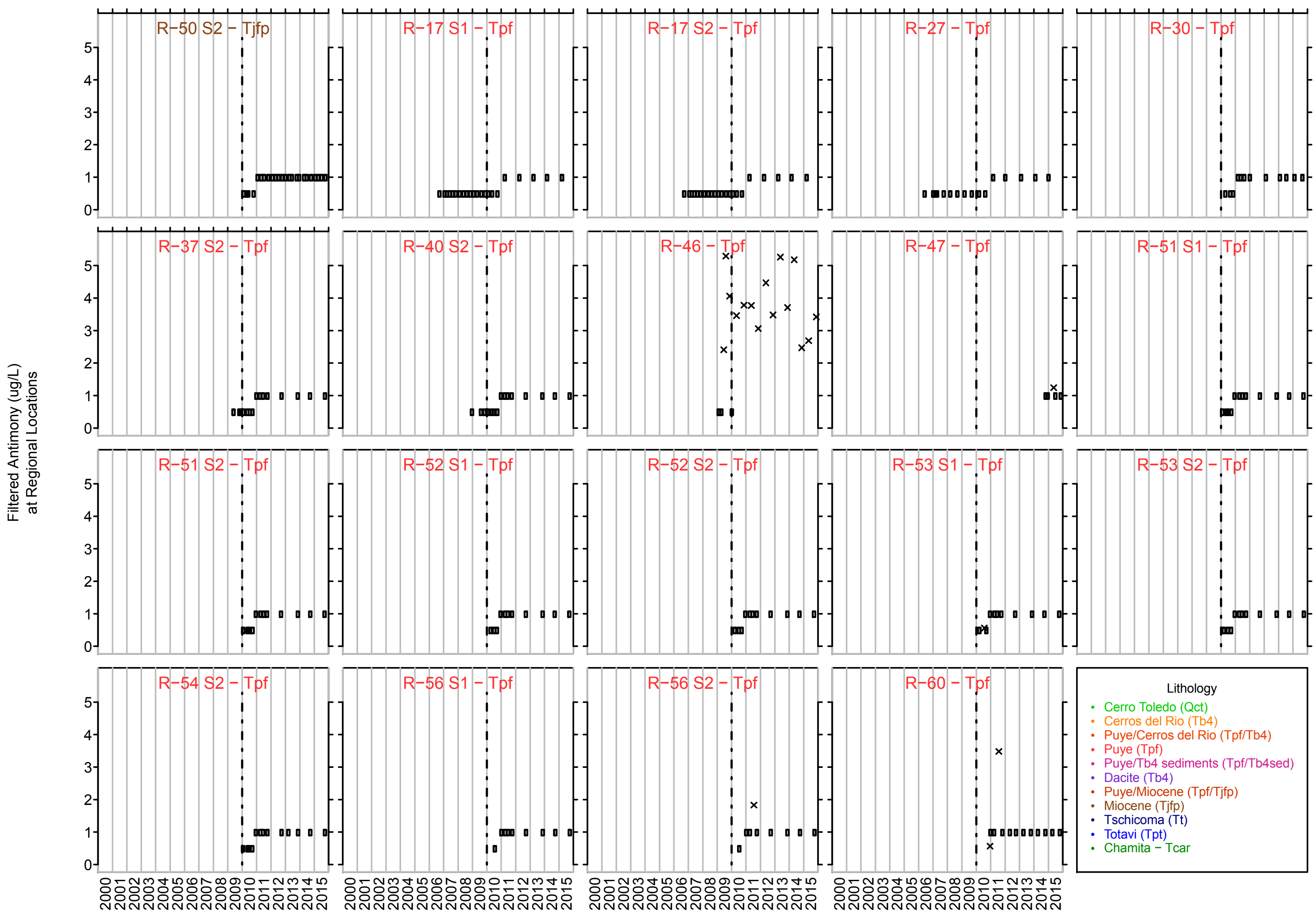



**Figure C-15 (continued) Time-series plots for filtered antimony**

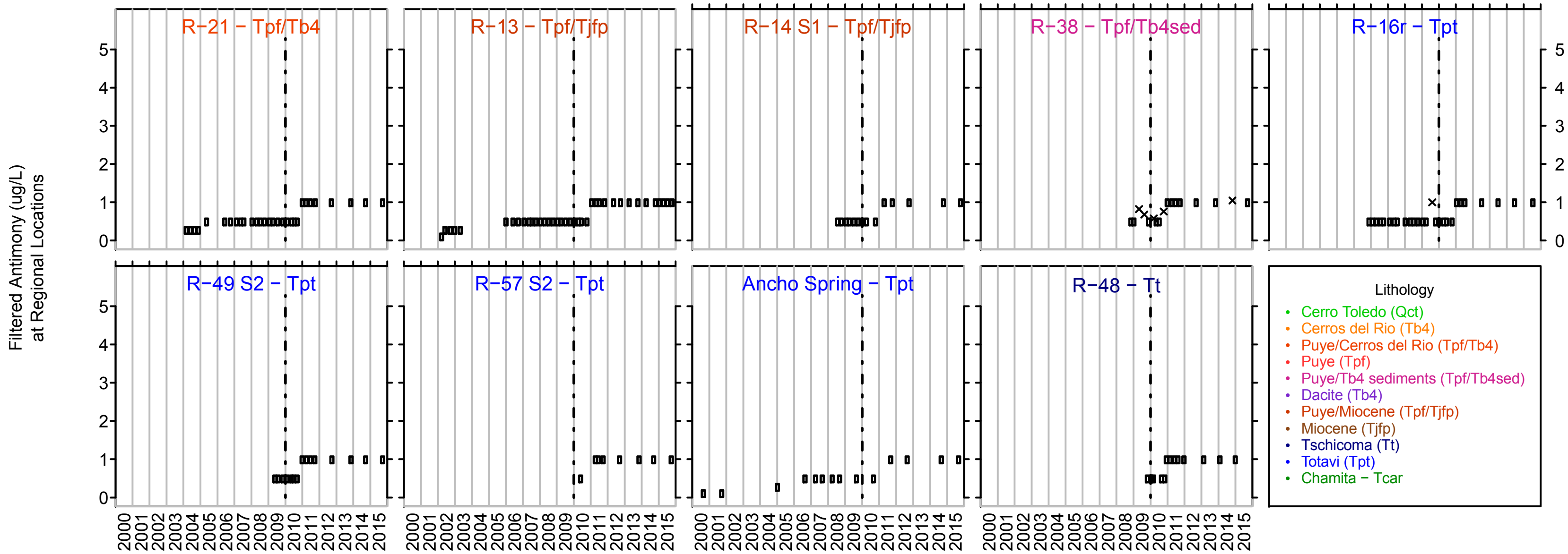



**Figure C-15 (continued)** **Time-series plots for filtered antimony**

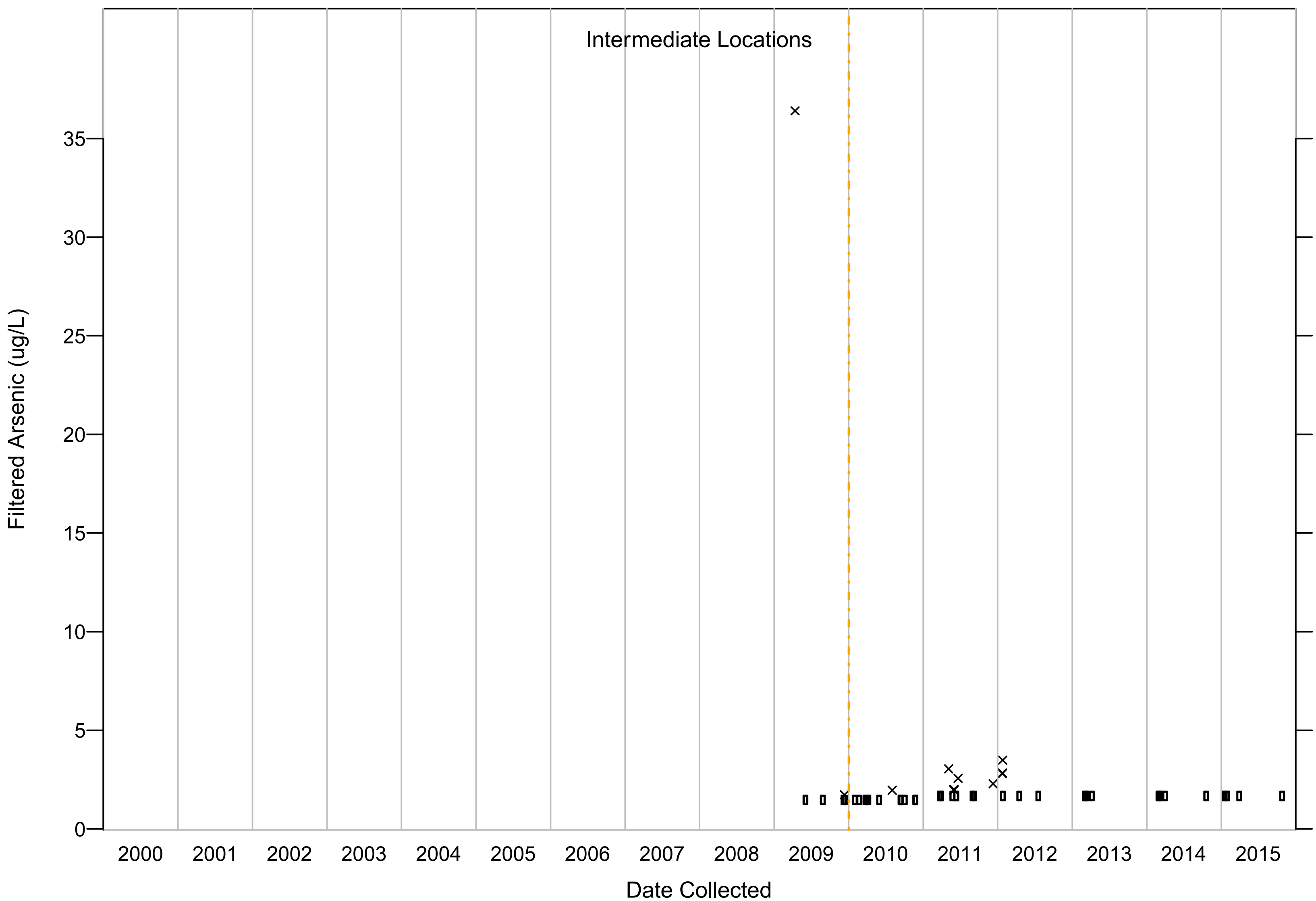



**Figure C-16 Filtered arsenic results for perched-intermediate groundwater**

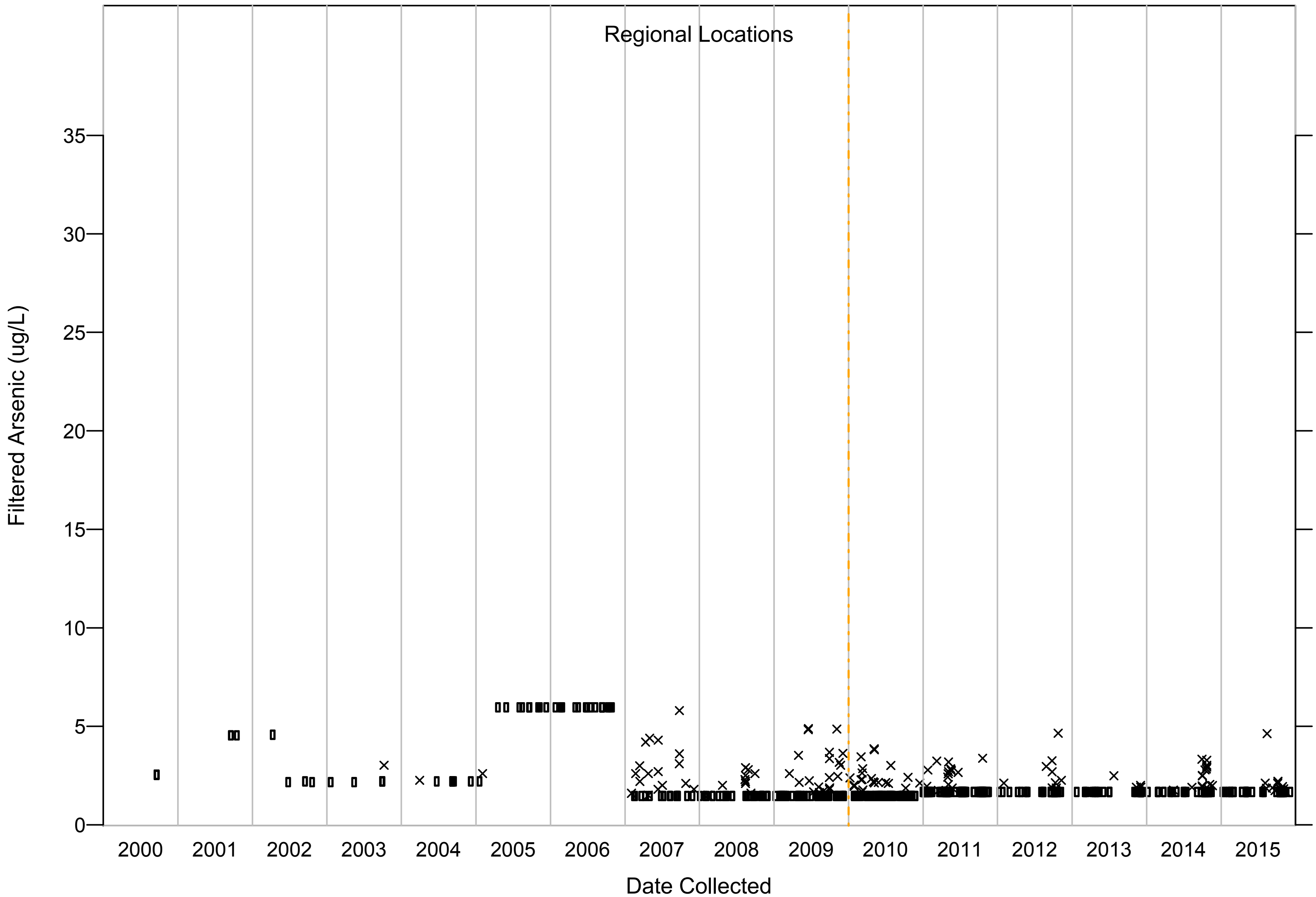



**Figure C-17 Filtered arsenic results for regional aquifer**

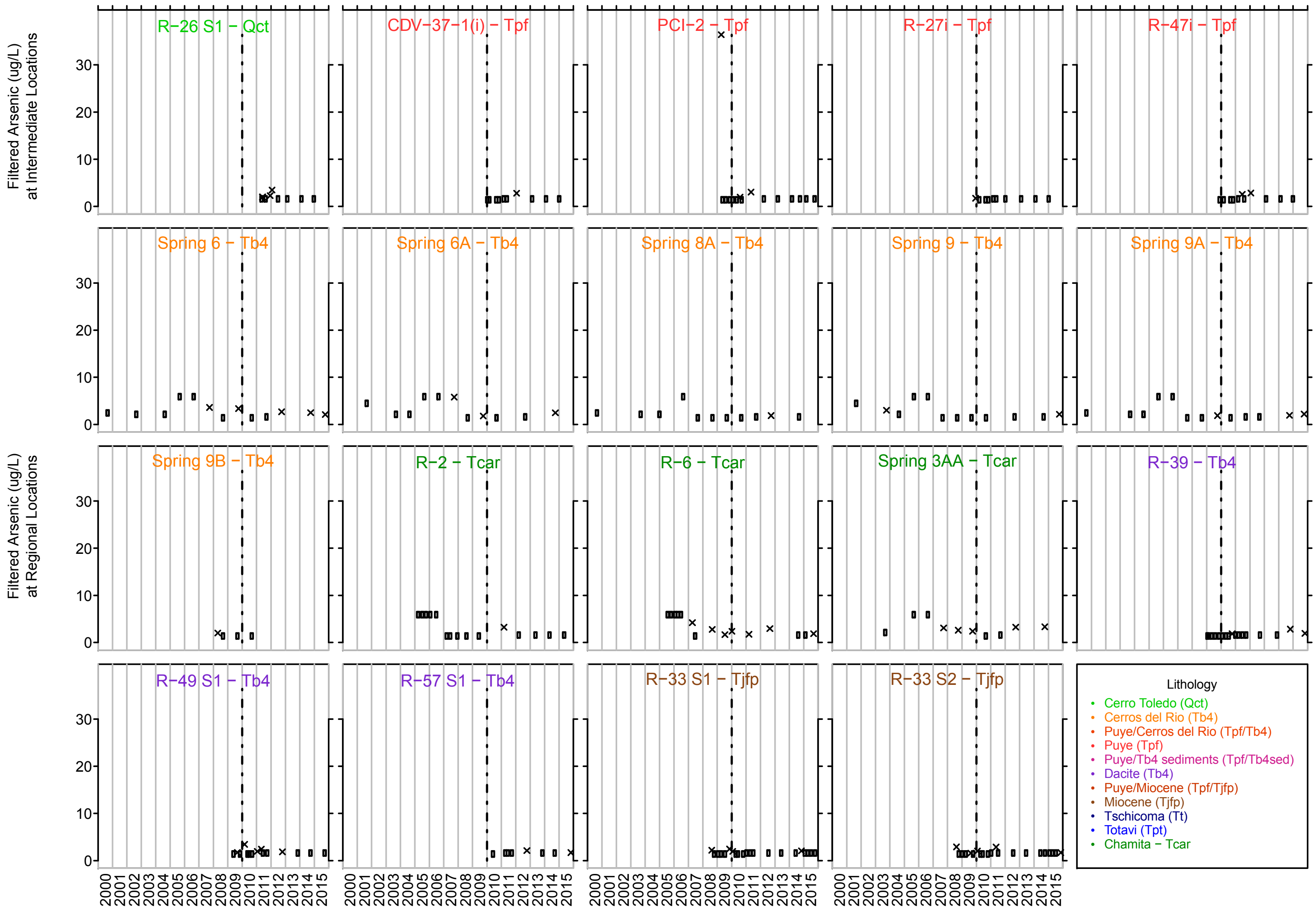



**Figure C-18 Time-series plots for filtered arsenic**

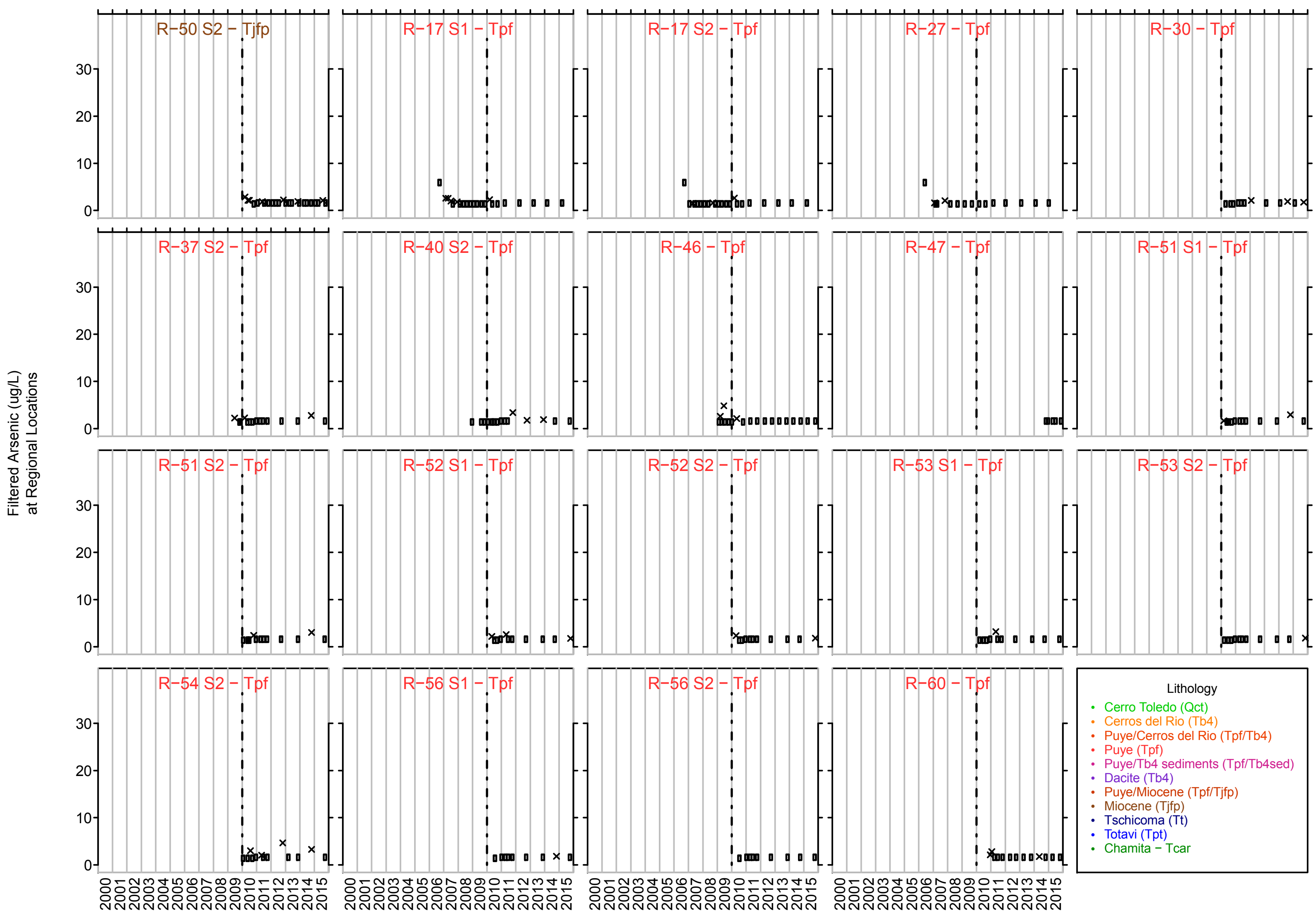



**Figure C-18 (continued) Time-series plots for filtered arsenic**

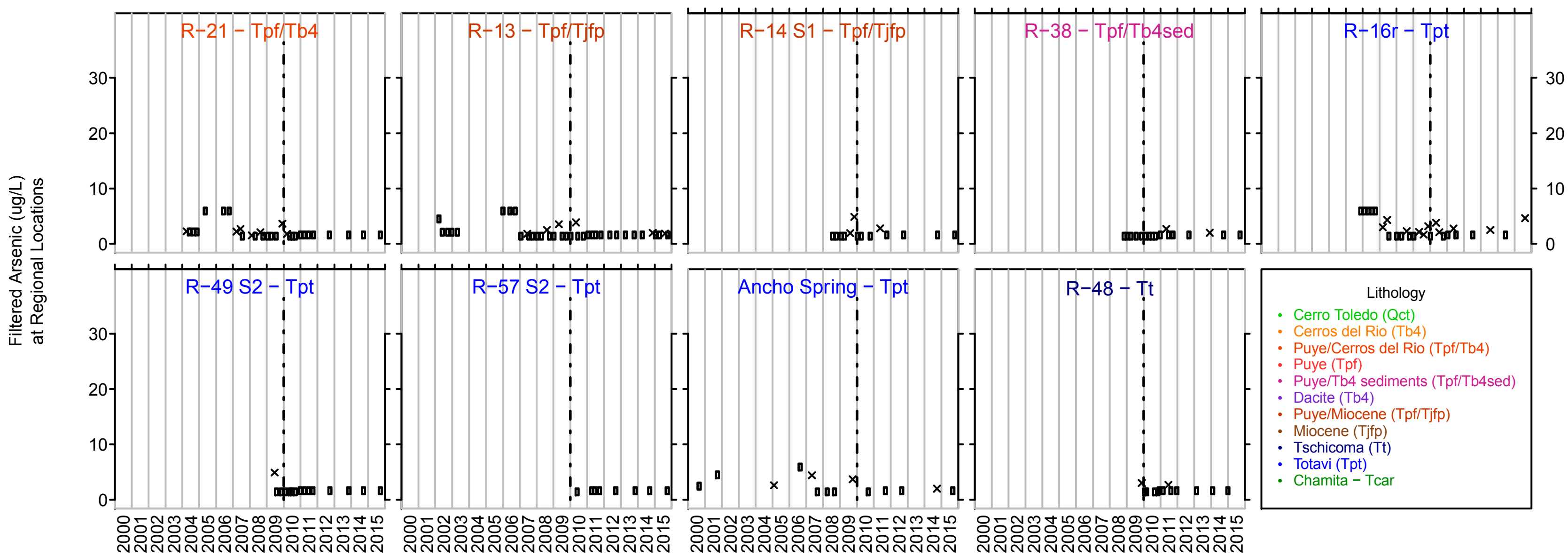



**Figure C-18 (continued)** **Time-series plots for filtered arsenic**

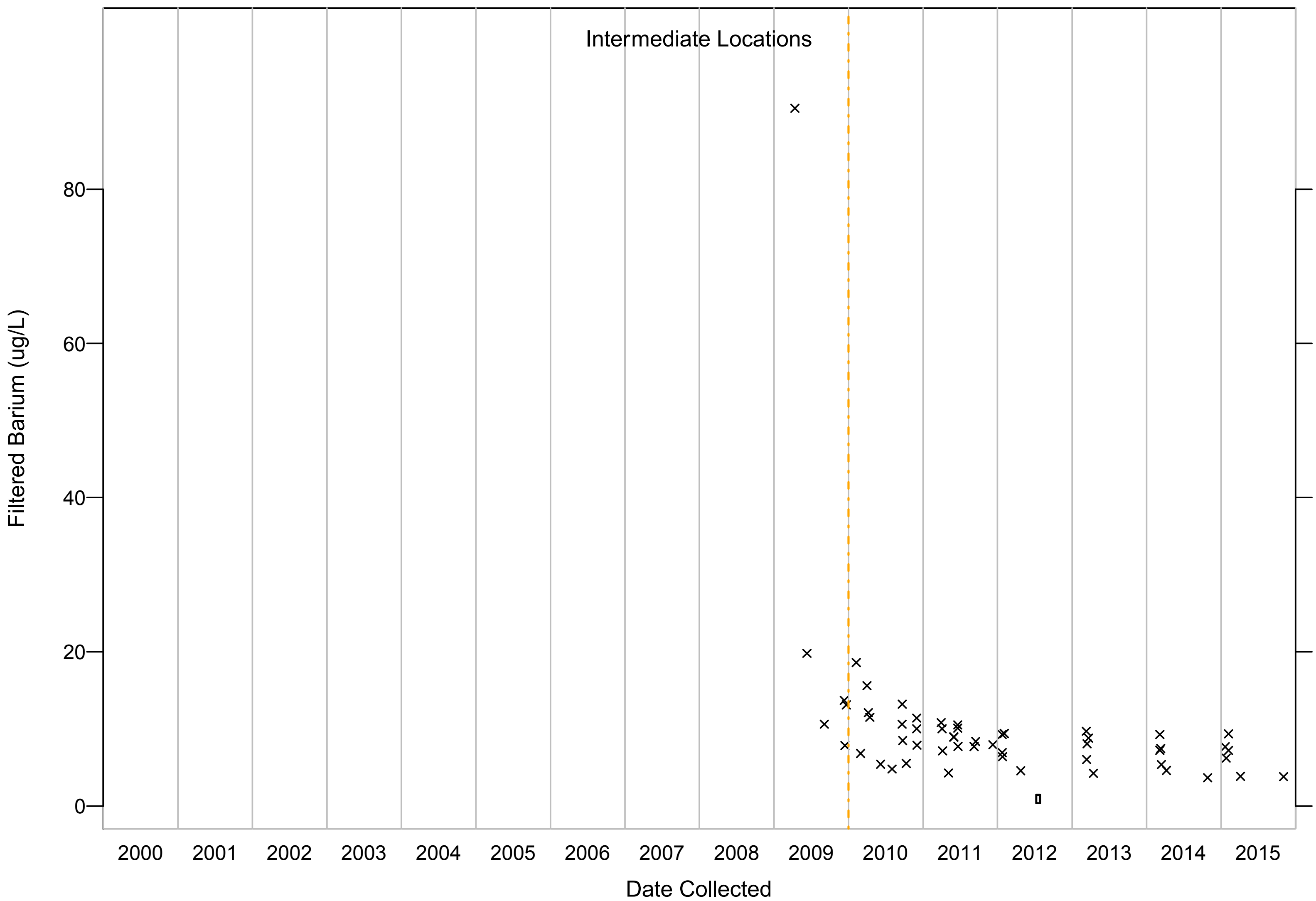



**Figure C-19 Filtered barium results for perched-intermediate groundwater**

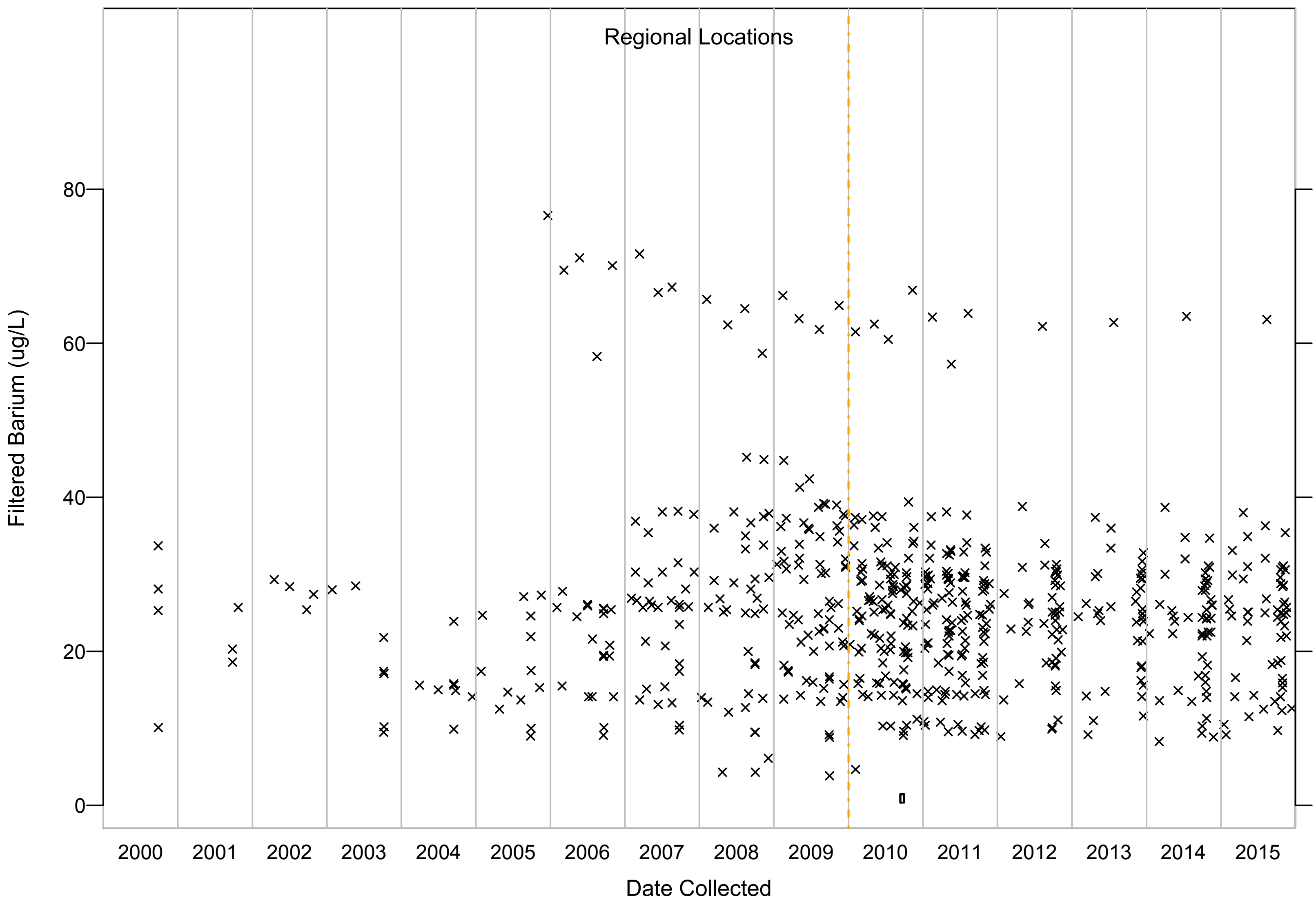



**Figure C-20 Filtered barium results for regional aquifer**

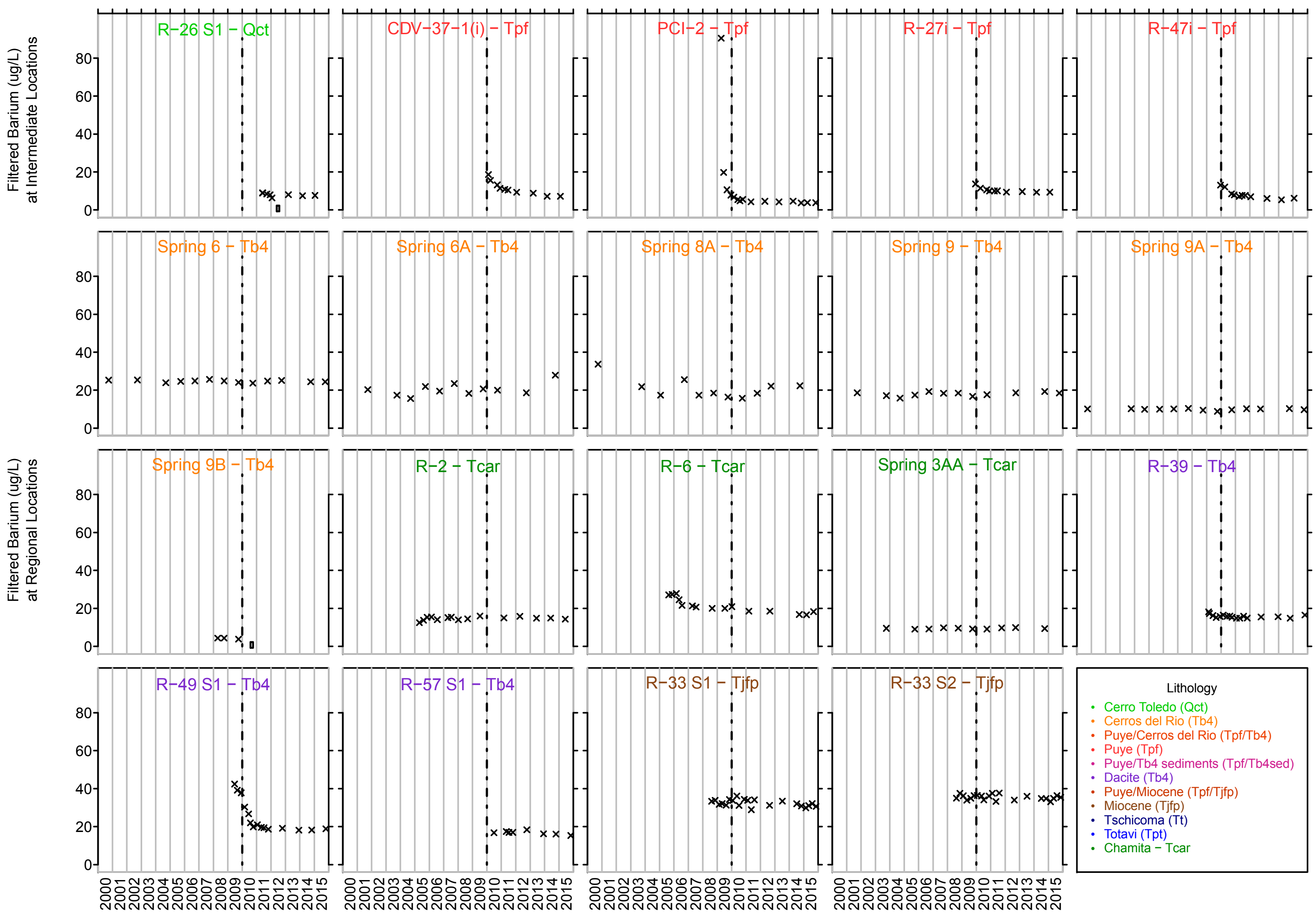



**Figure C-21 Time-series plots for filtered barium**

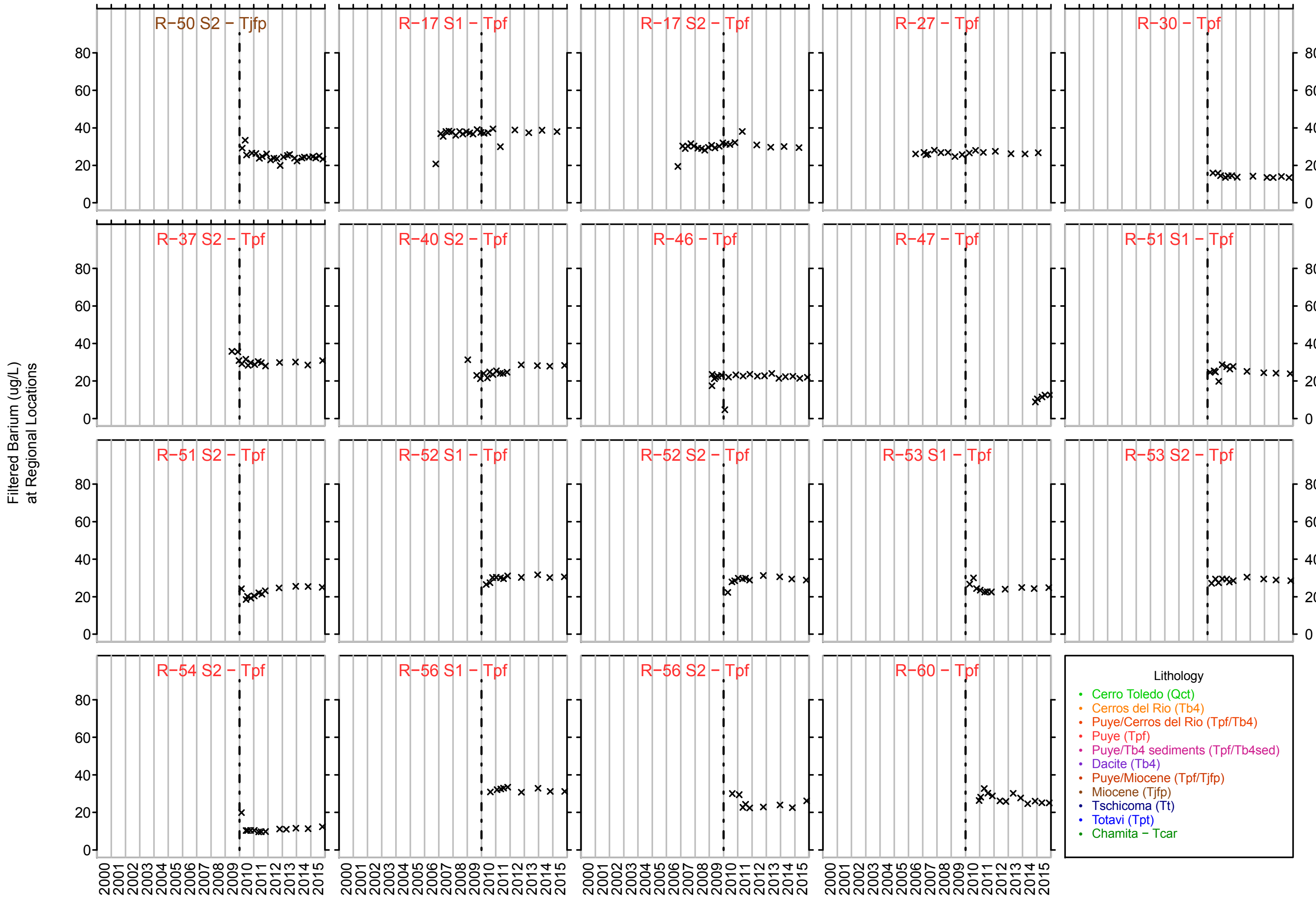



**Figure C-21 (continued)** **Time-series plots for filtered barium**

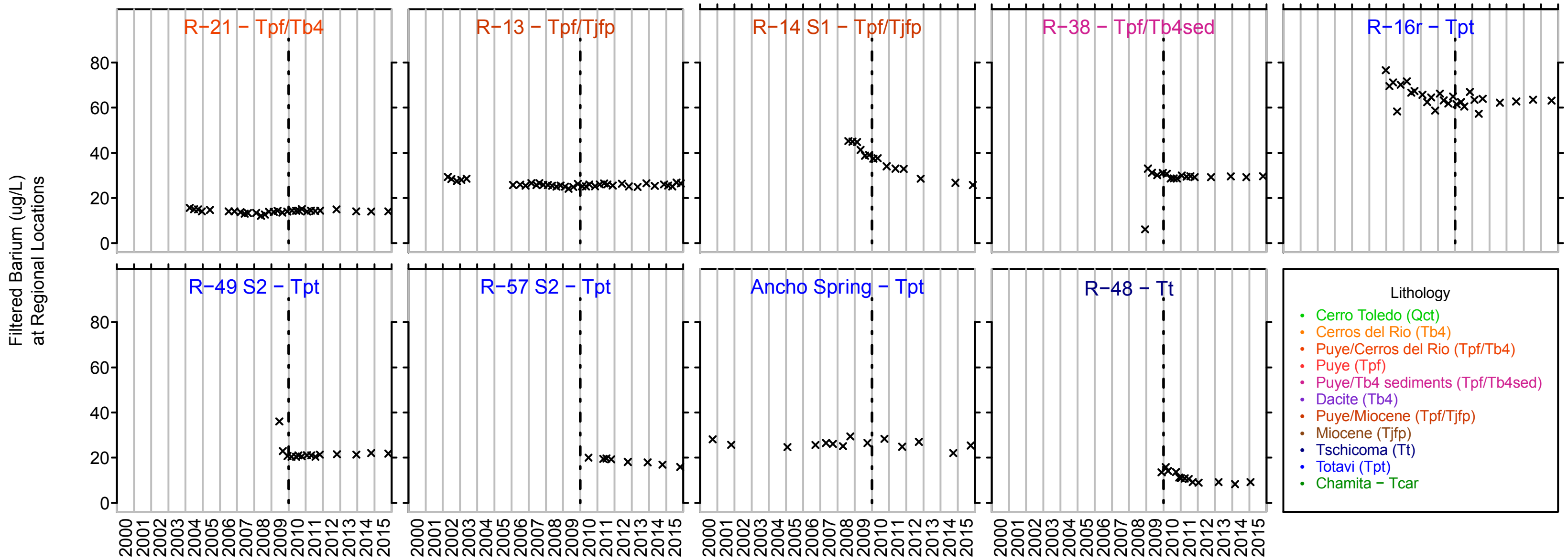



**Figure C-21 (continued) Time-series plots for filtered barium**

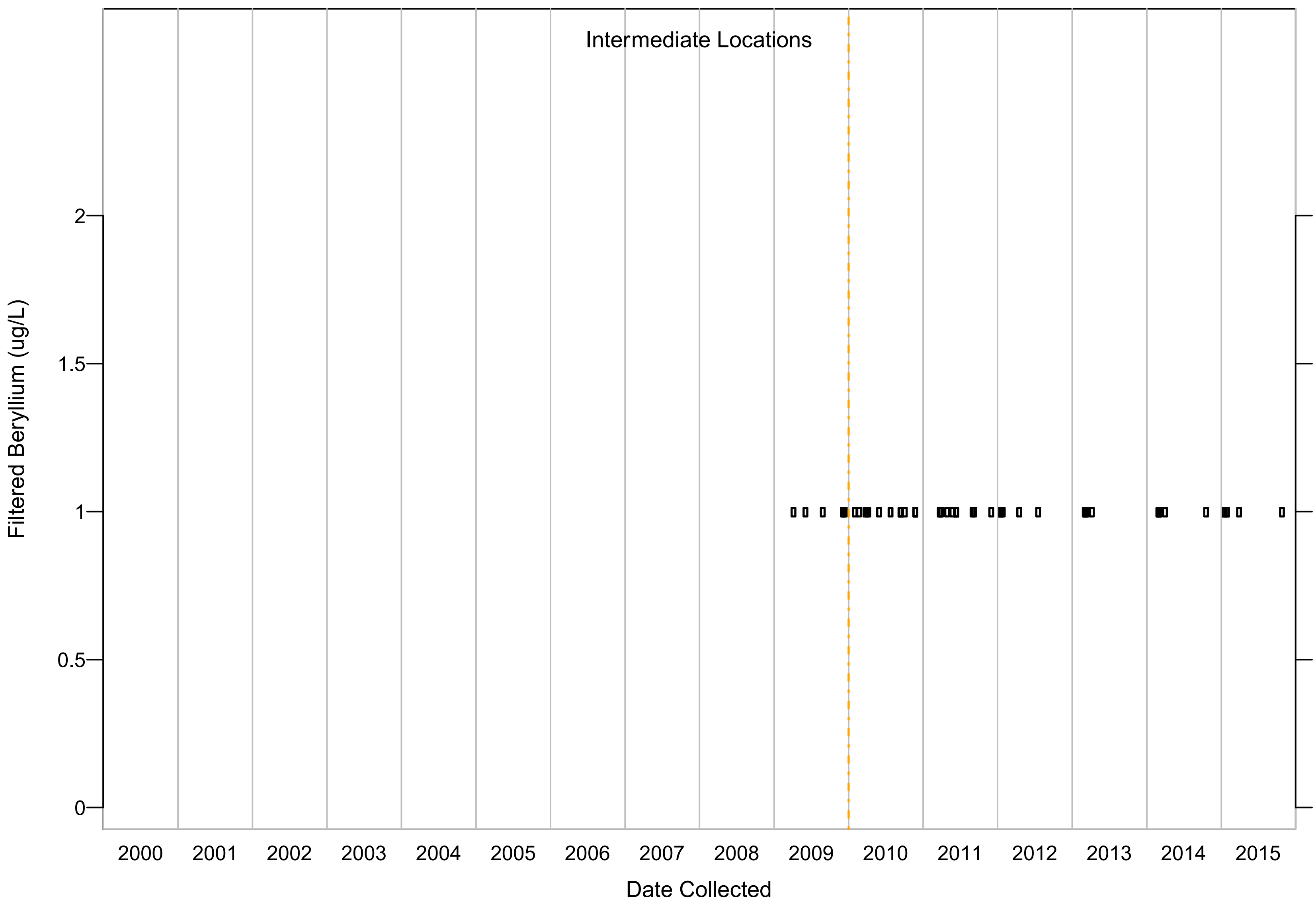



**Figure C-22 Filtered beryllium results for perched-intermediate groundwater**

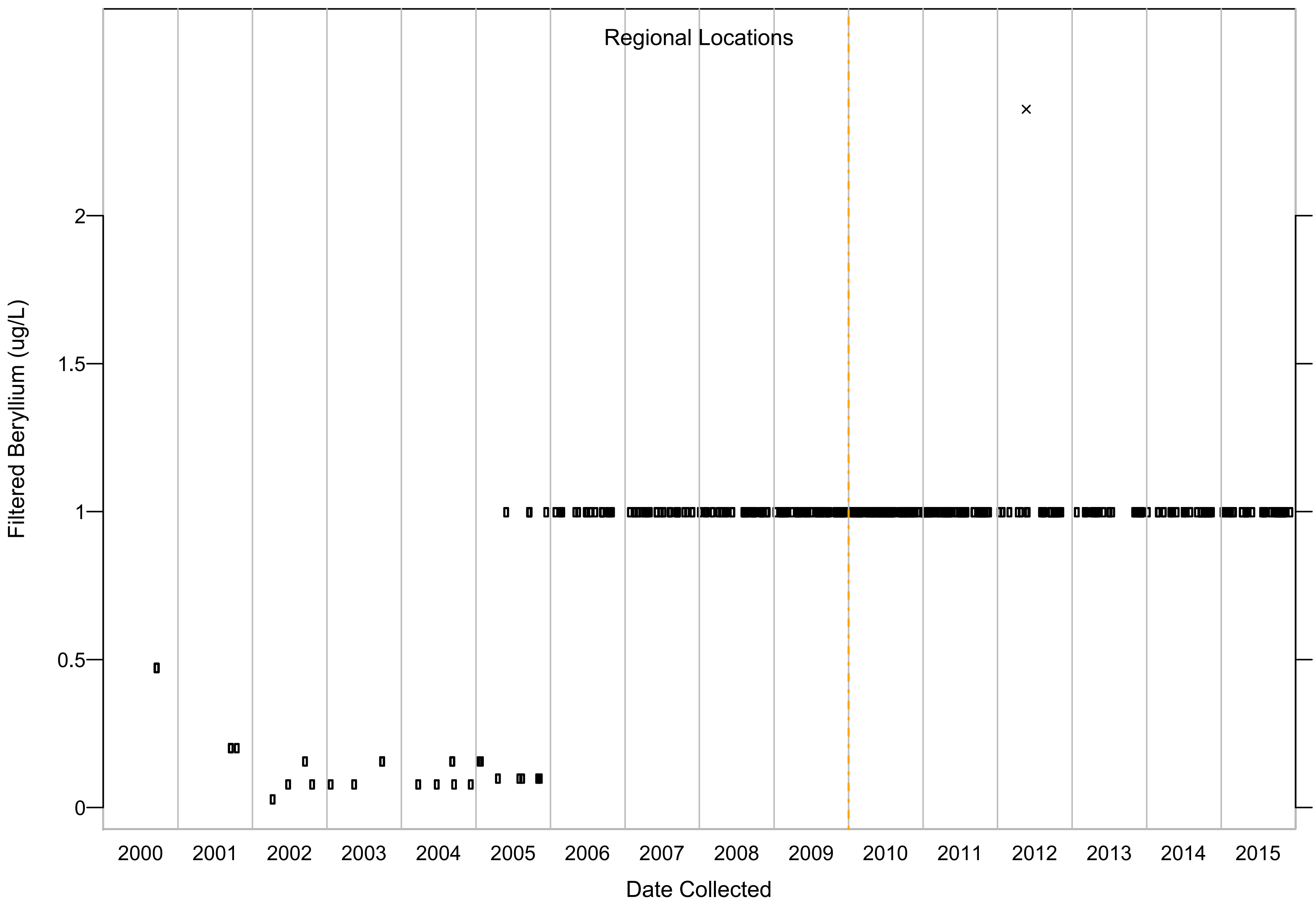



**Figure C-23** **Filtered beryllium results for regional aquifer**

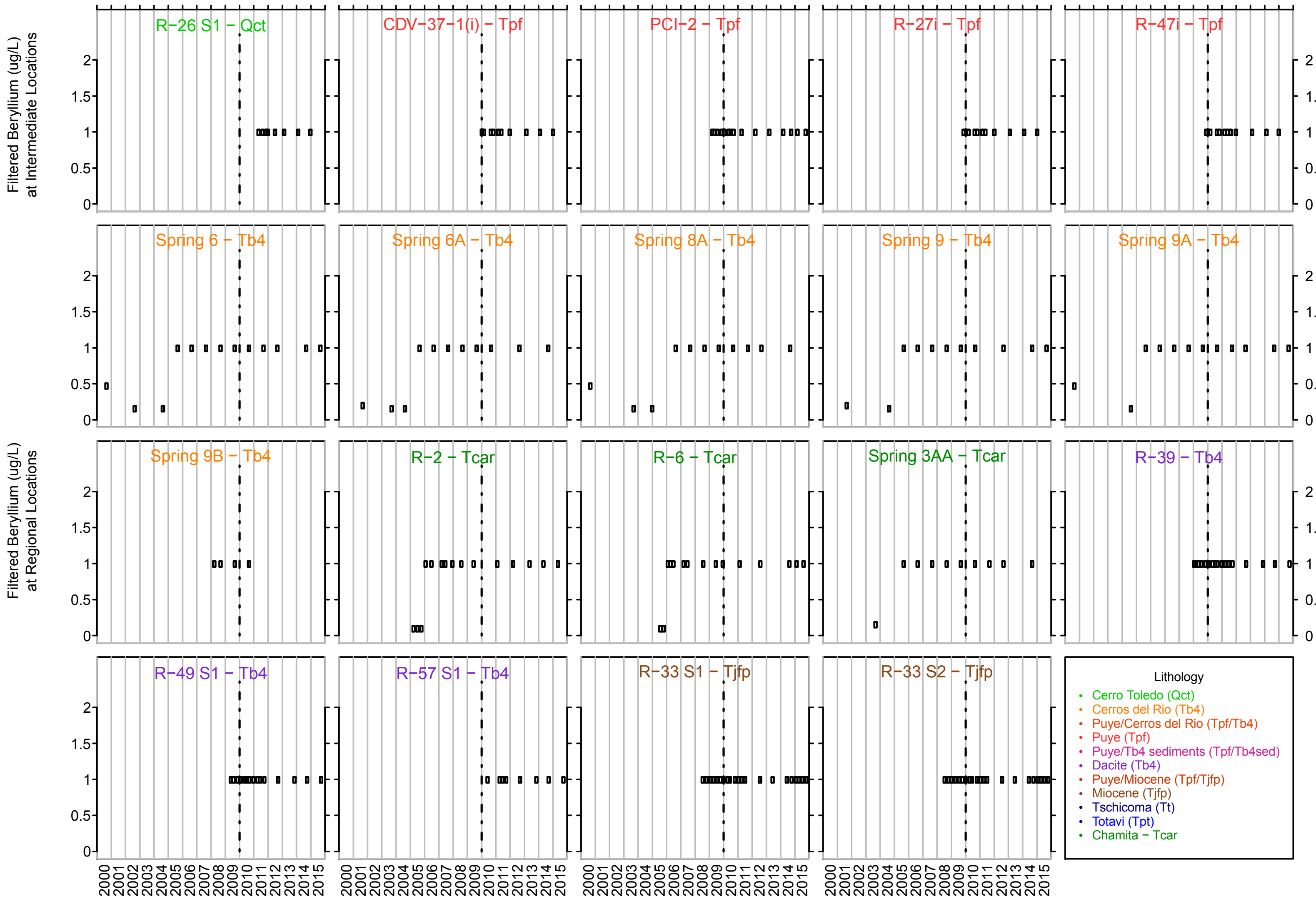



**Figure C-24 Time-series plots for filtered beryllium**

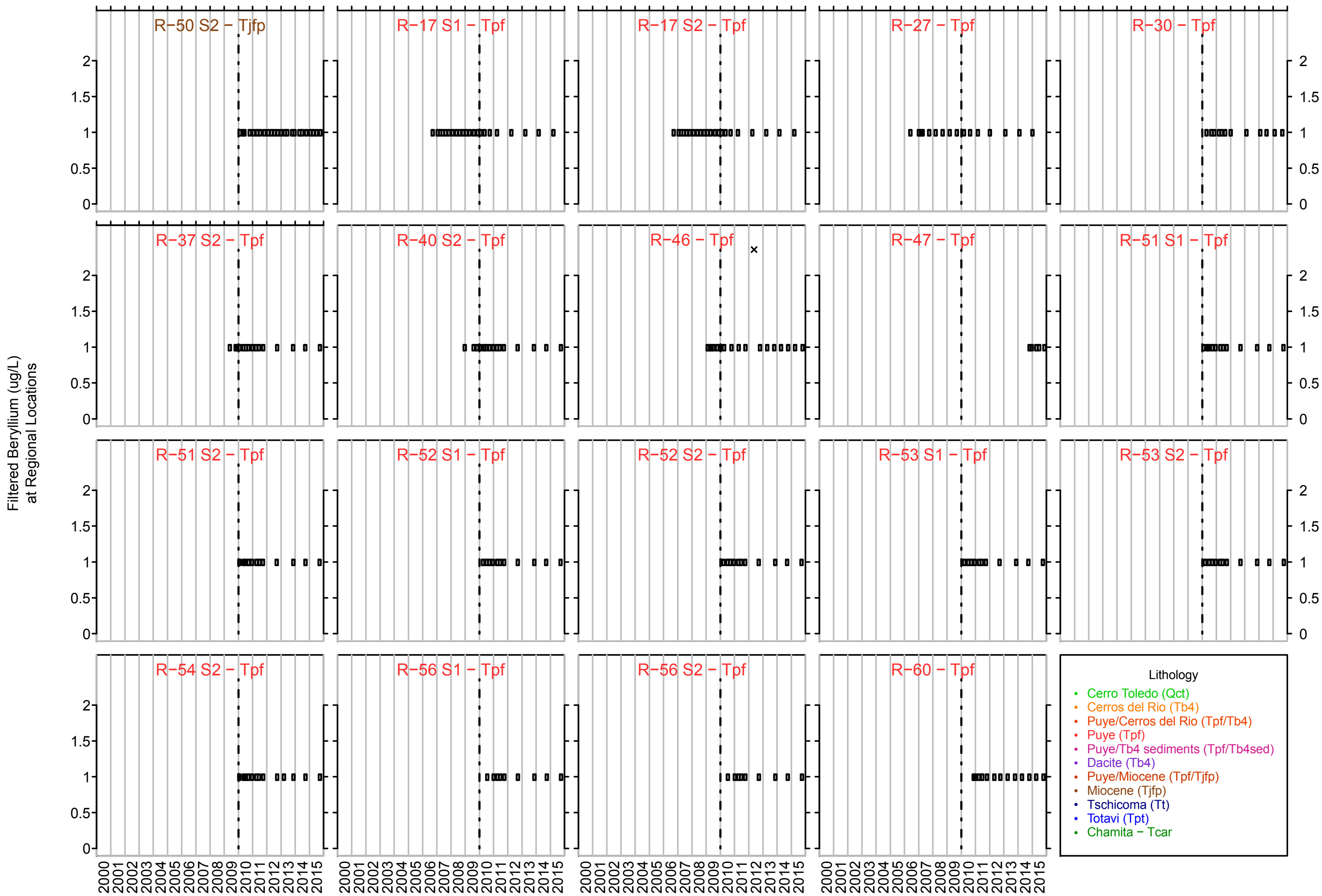



**Figure C-24 (continued) Time-series plots for filtered beryllium**

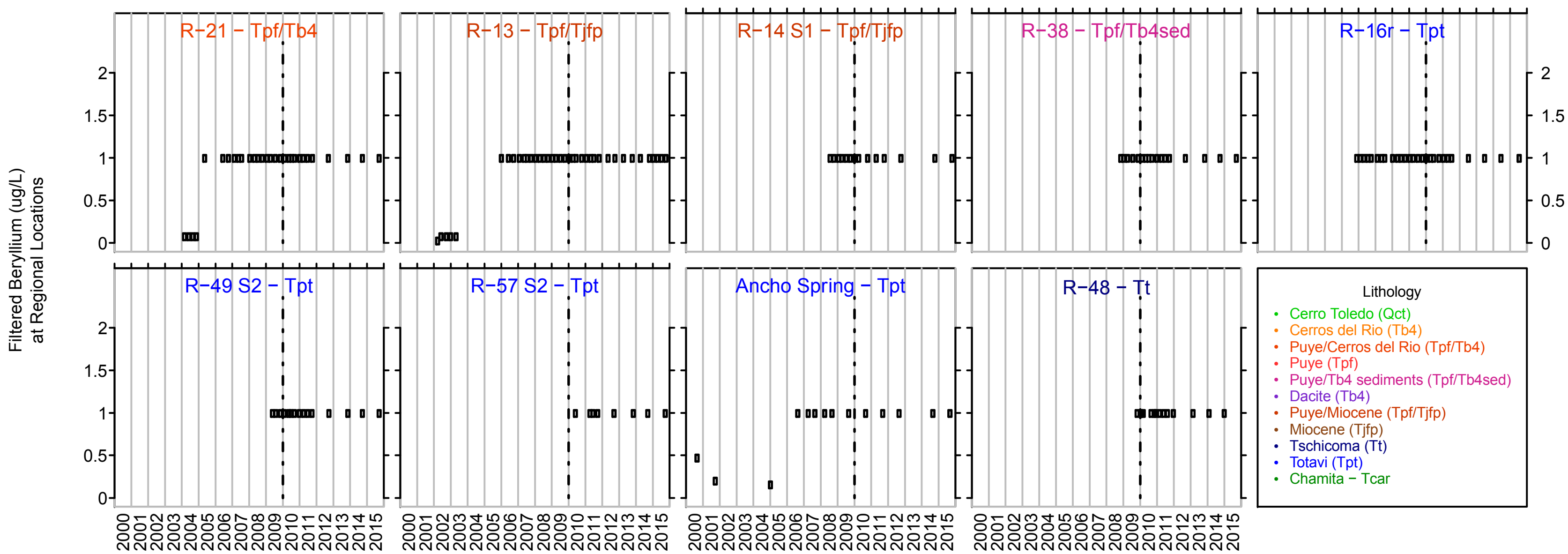



**Figure C-24 (continued)	Time-series plots for filtered beryllium**

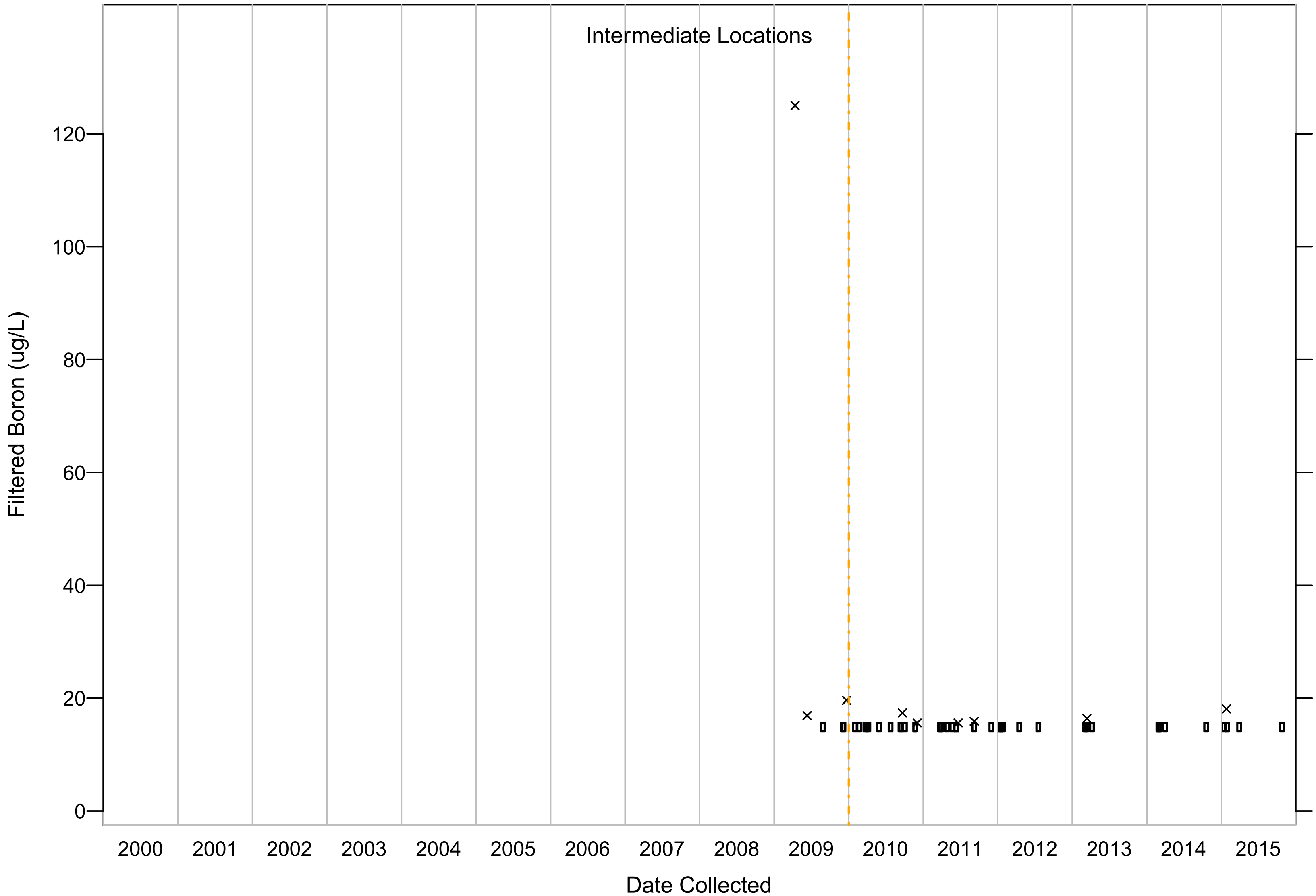



**Figure C-25 Filtered boron results for perched-intermediate groundwater**

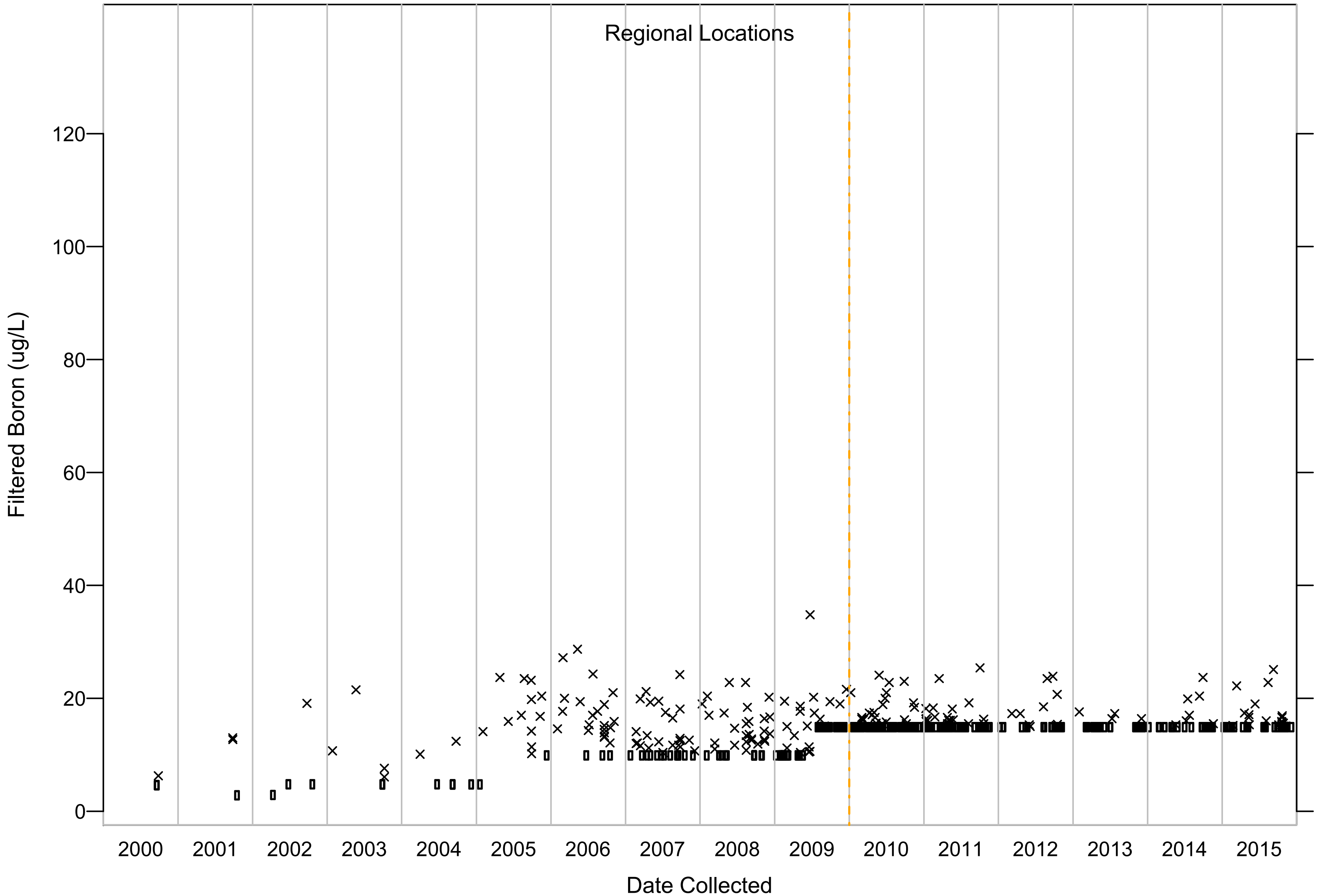



**Figure C-26** **Filtered boron results for regional aquifer**

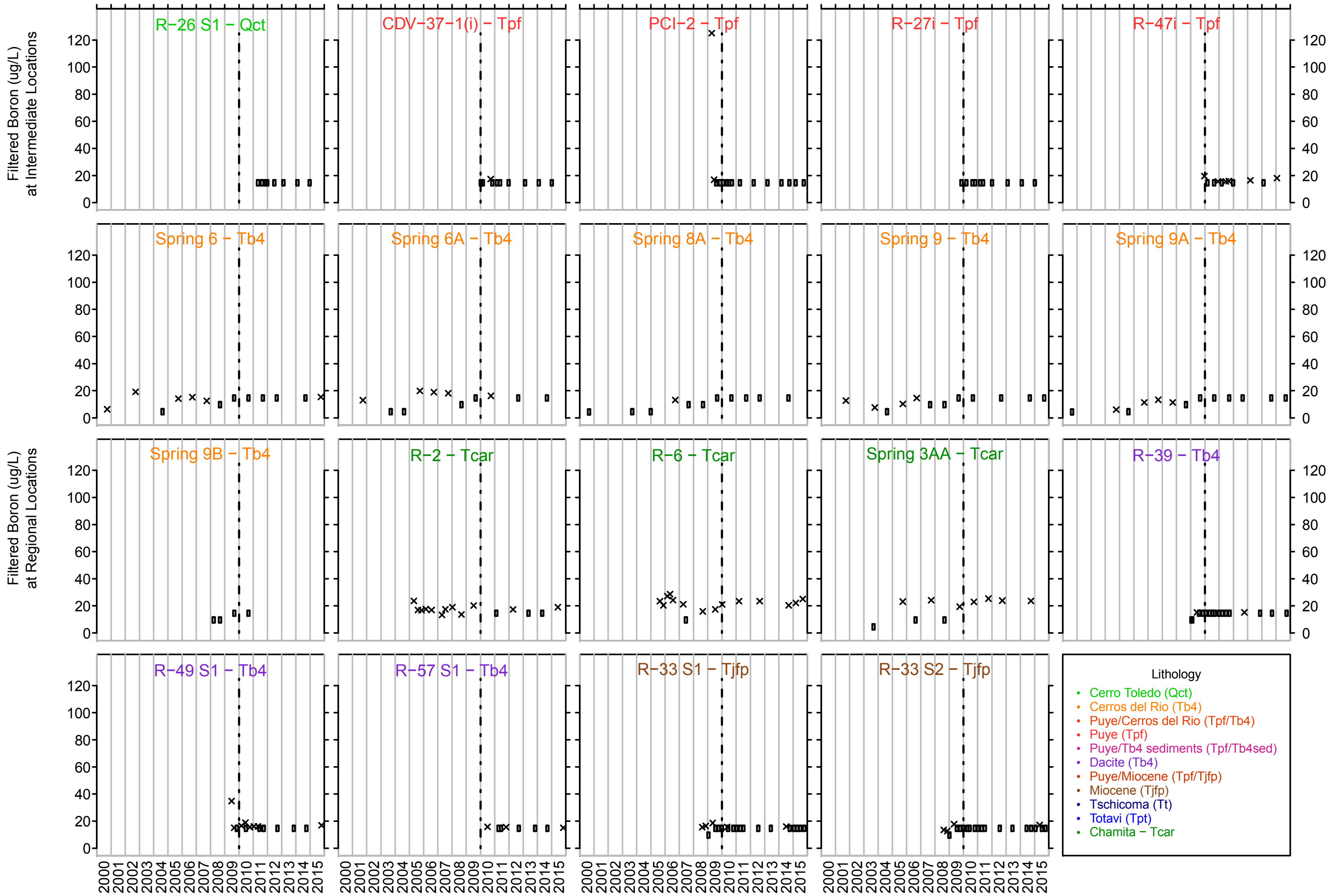



**Figure C-27 Time-series plots for filtered boron**

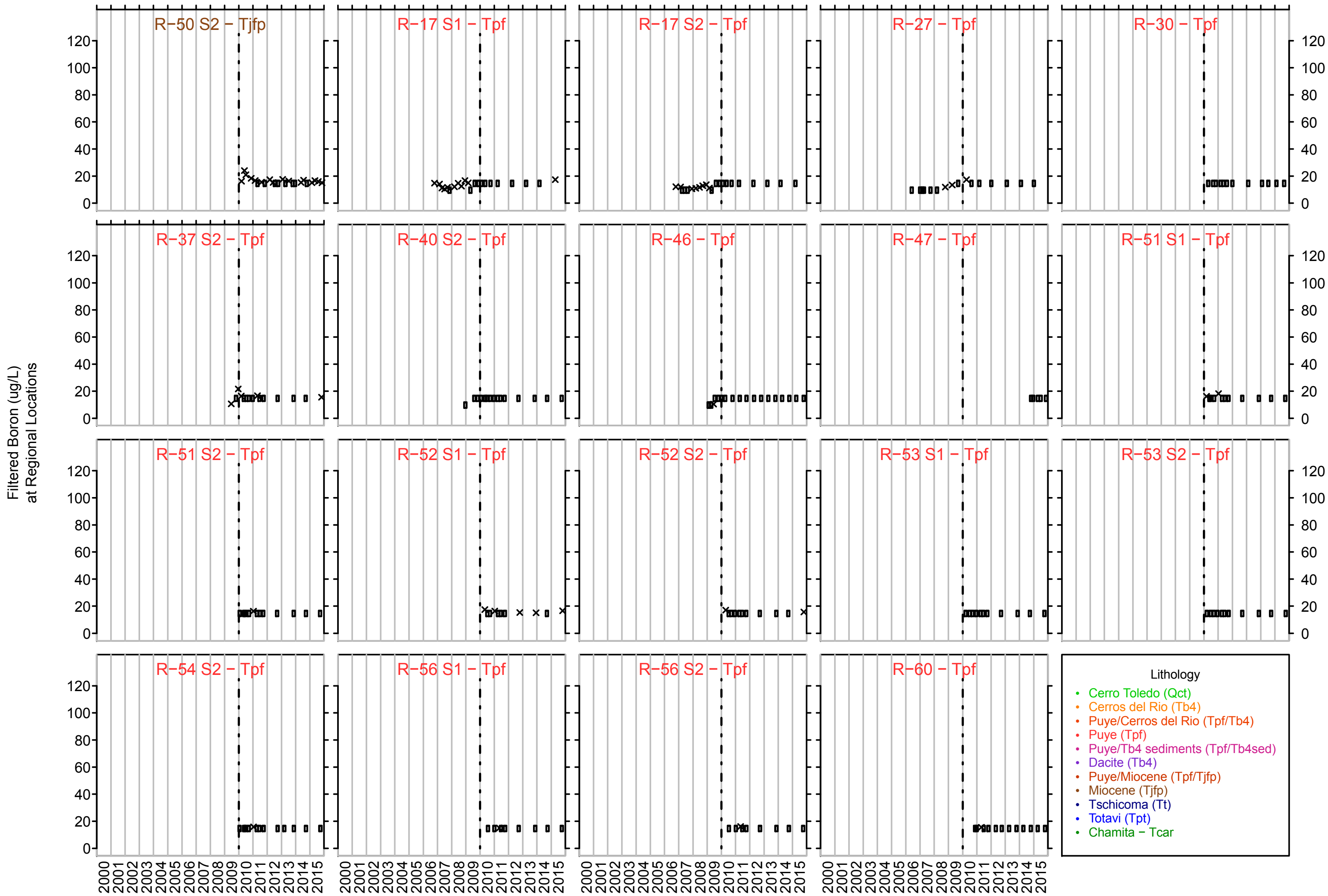



**Figure C-27 (continued) Time-series plots for filtered boron**

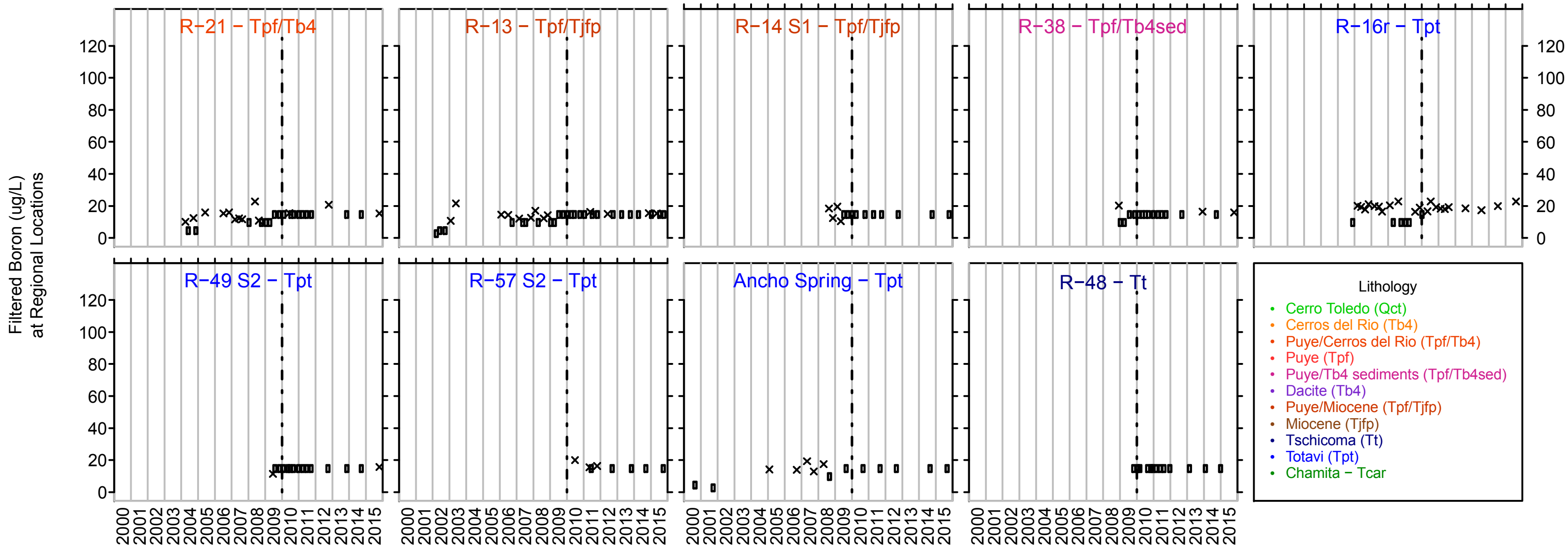



**Figure C-27 (continued)** **Time-series plots for filtered boron**

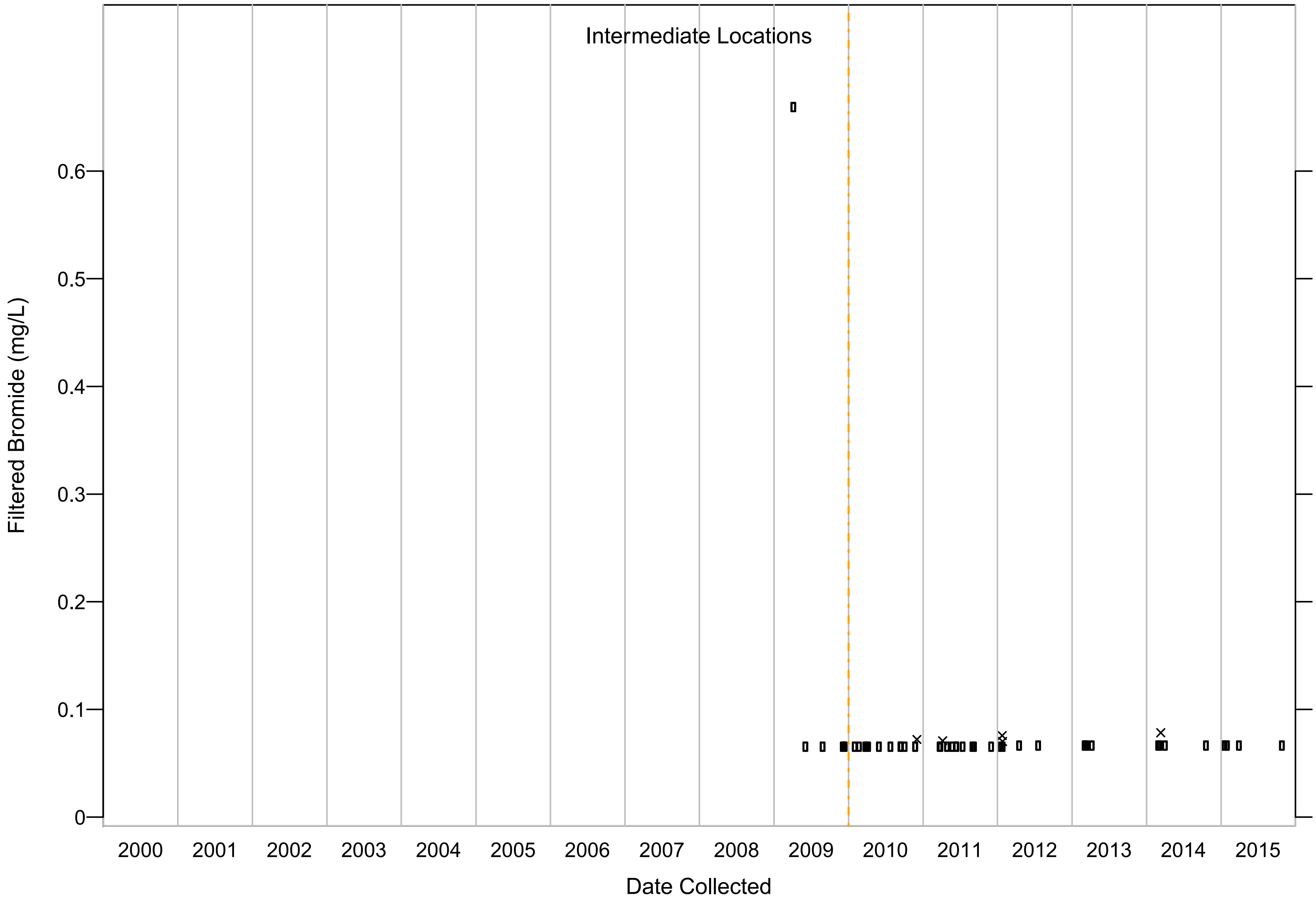



**Figure C-28 Filtered bromide results for perched-intermediate groundwater**

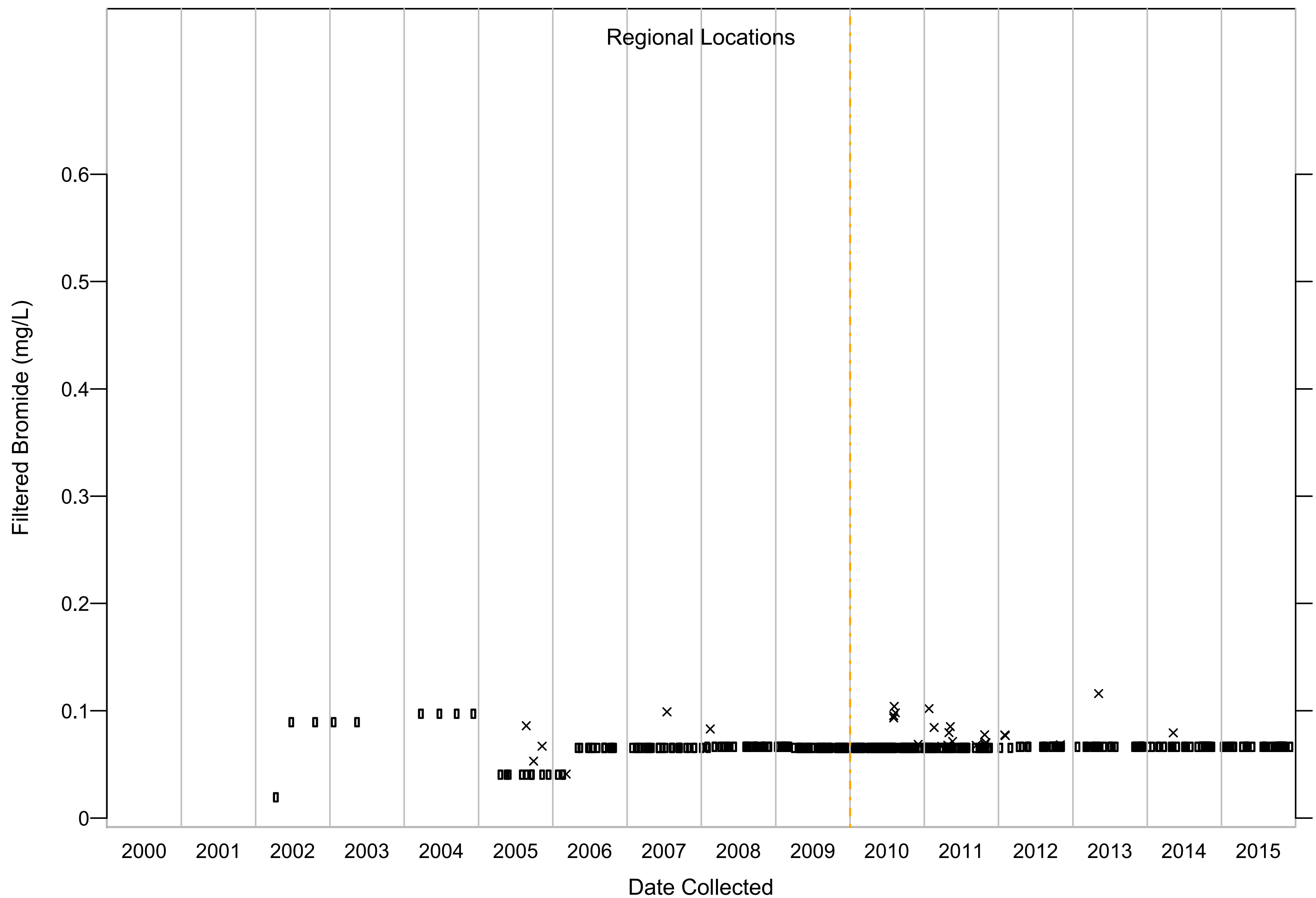



**Figure C-29 Filtered bromide results for regional aquifer**

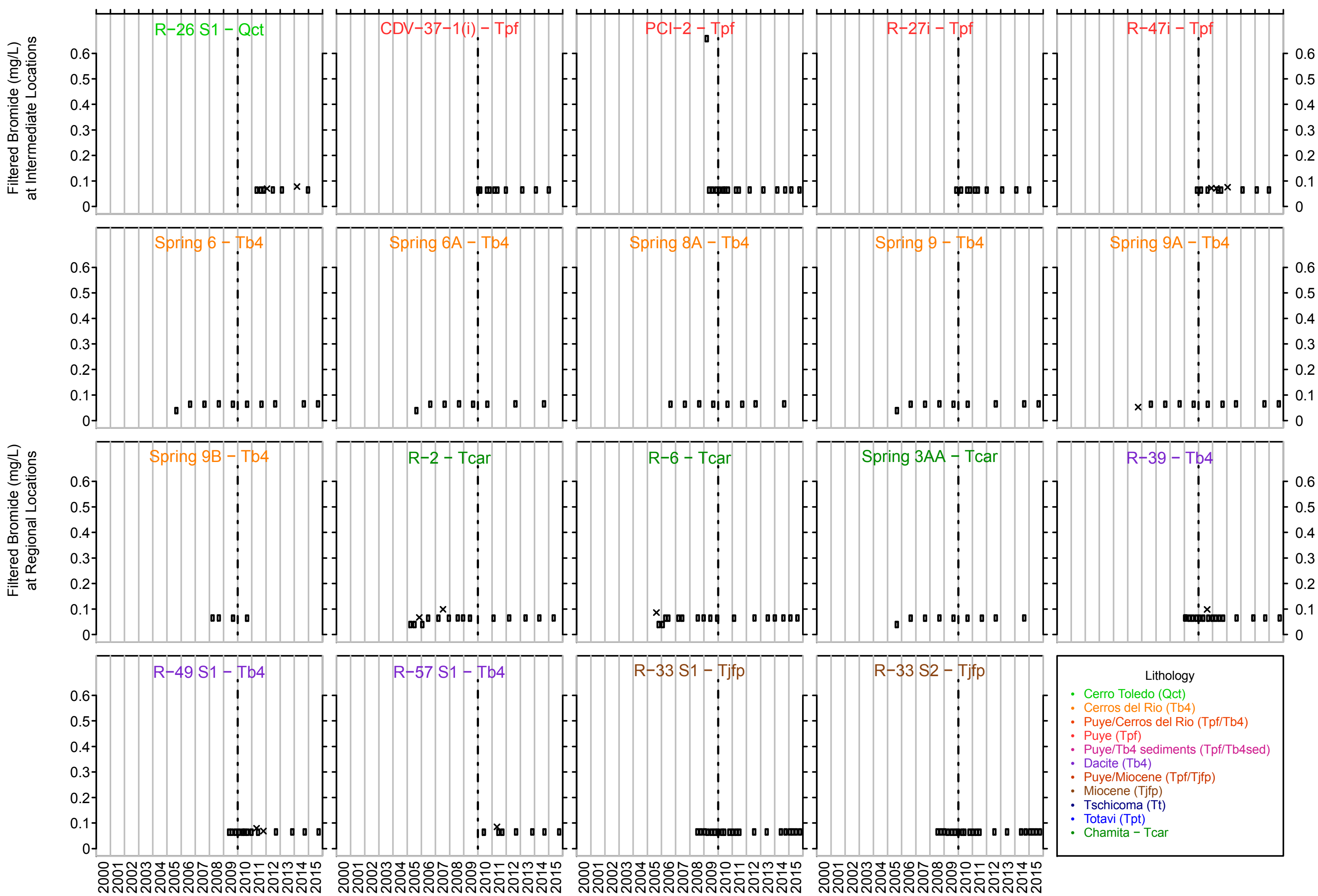



**Figure C-30 Time-series plots for filtered bromide**

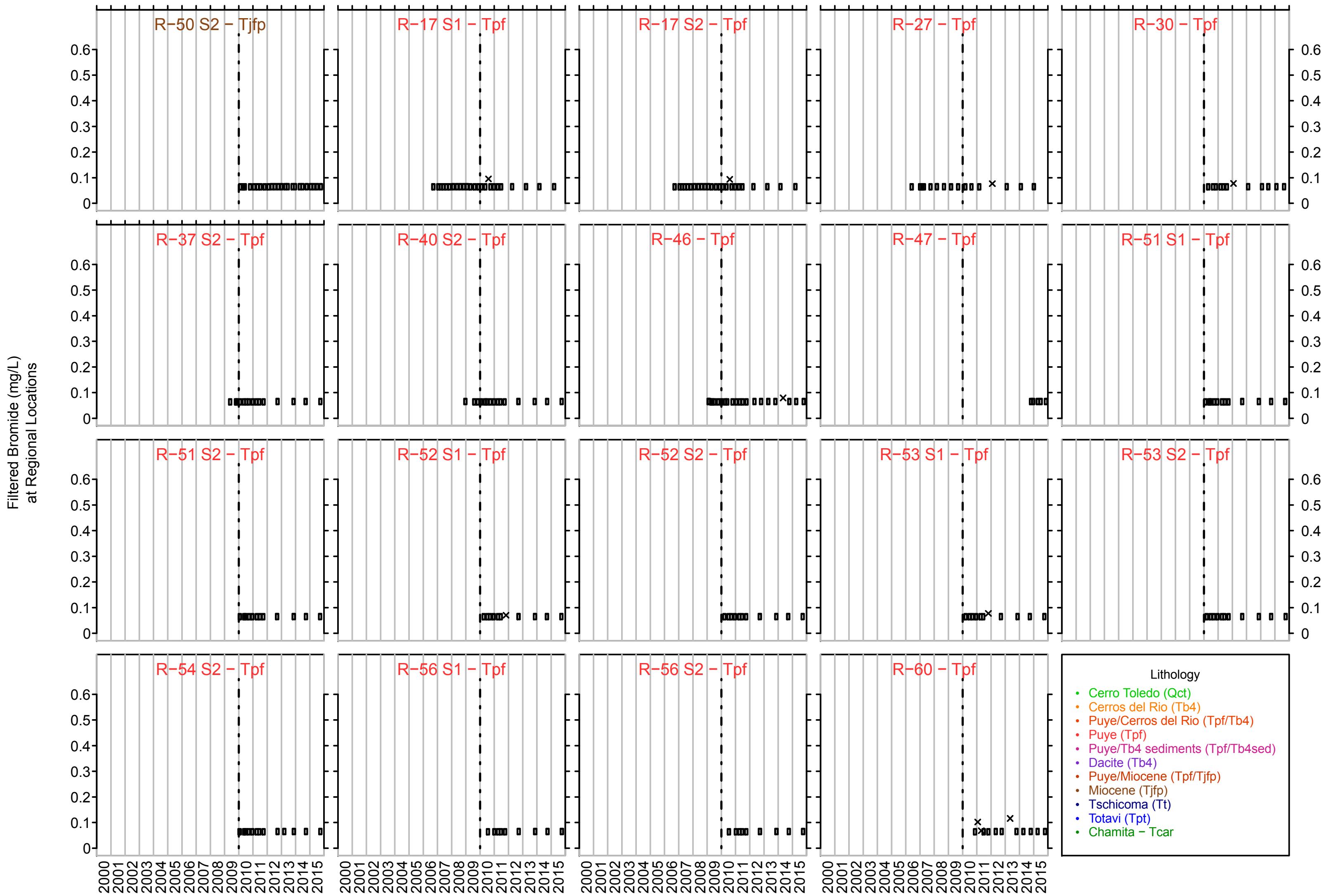



**Figure C-30 (continued) Time-series plots for filtered bromide**

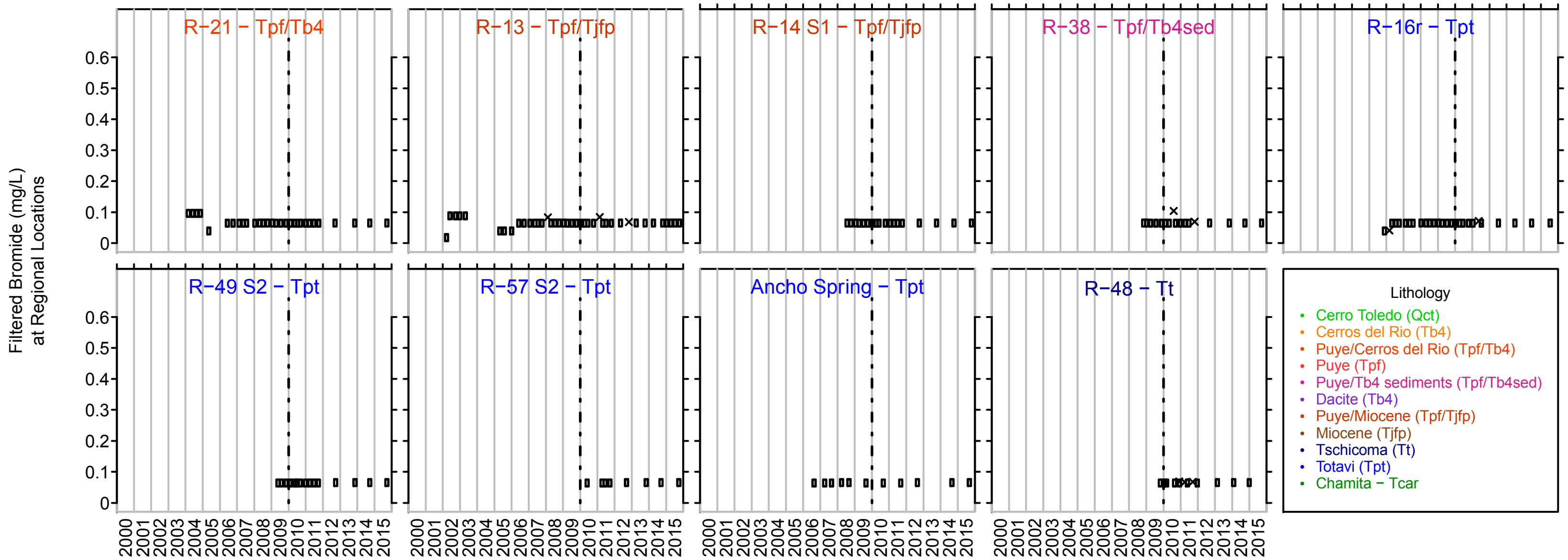



**Figure C-30 (continued) Time-series plots for filtered bromide**

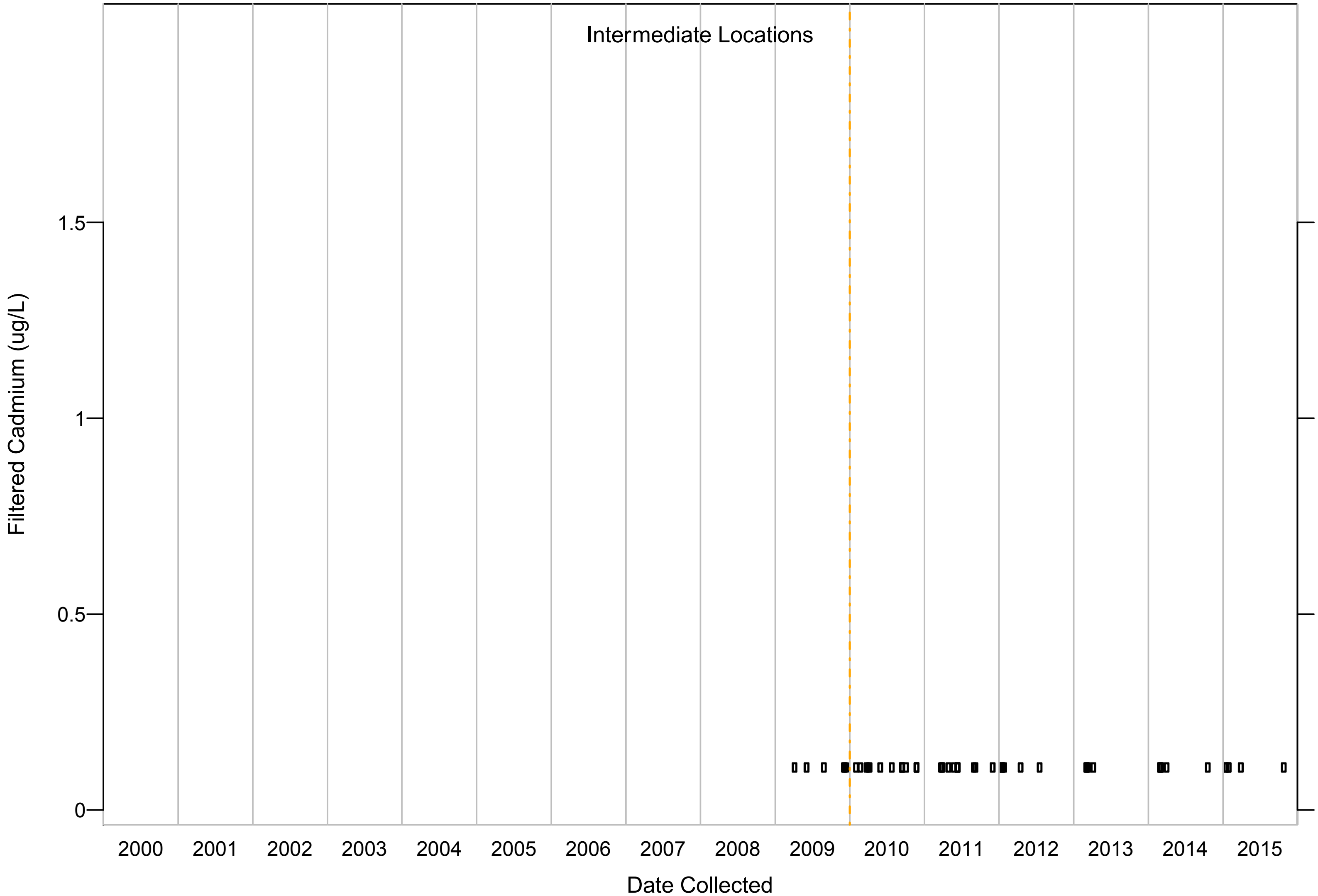



**Figure C-31 Filtered cadmium results for perched-intermediate groundwater**

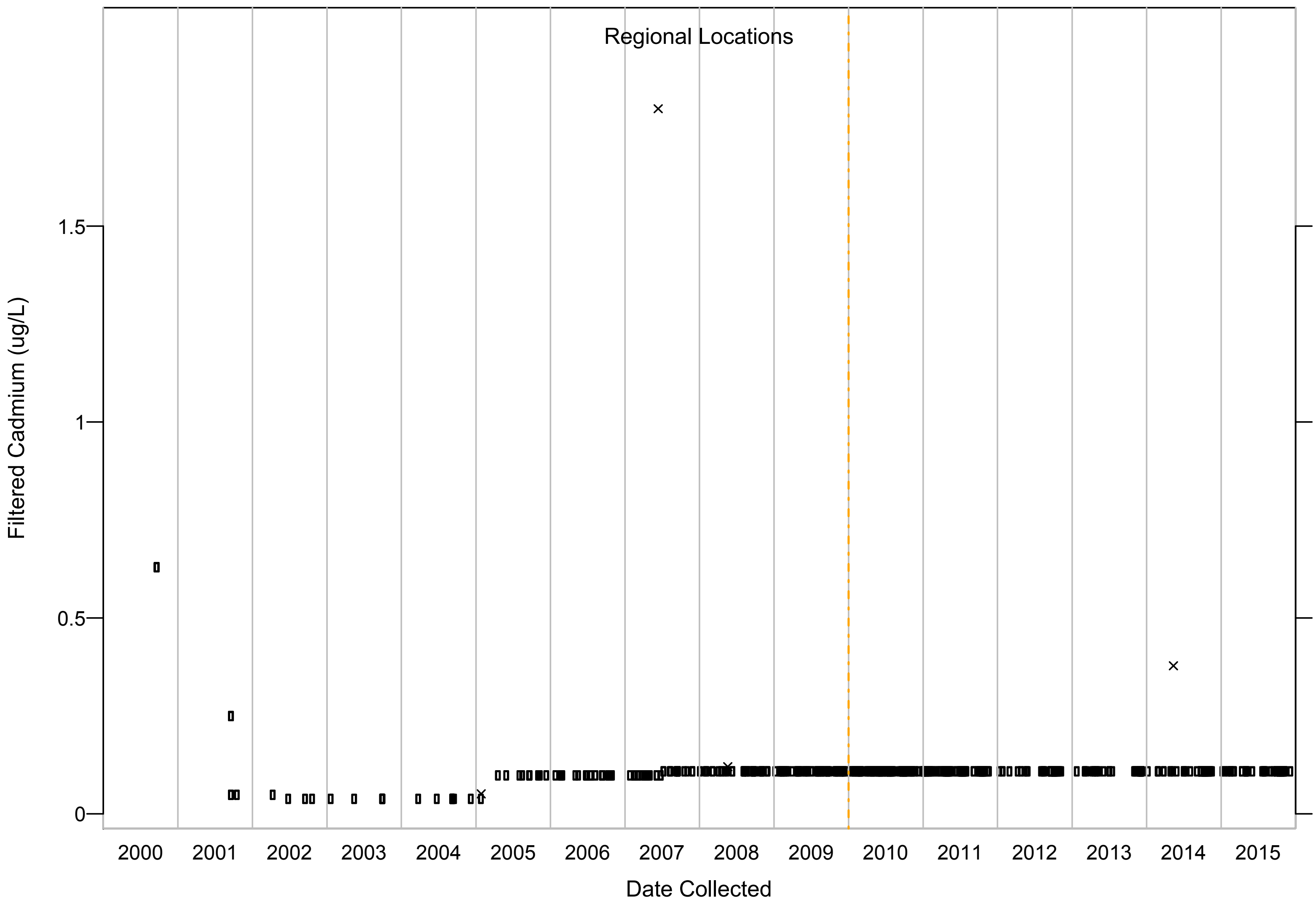



**Figure C-32 Filtered cadmium results for regional aquifer**

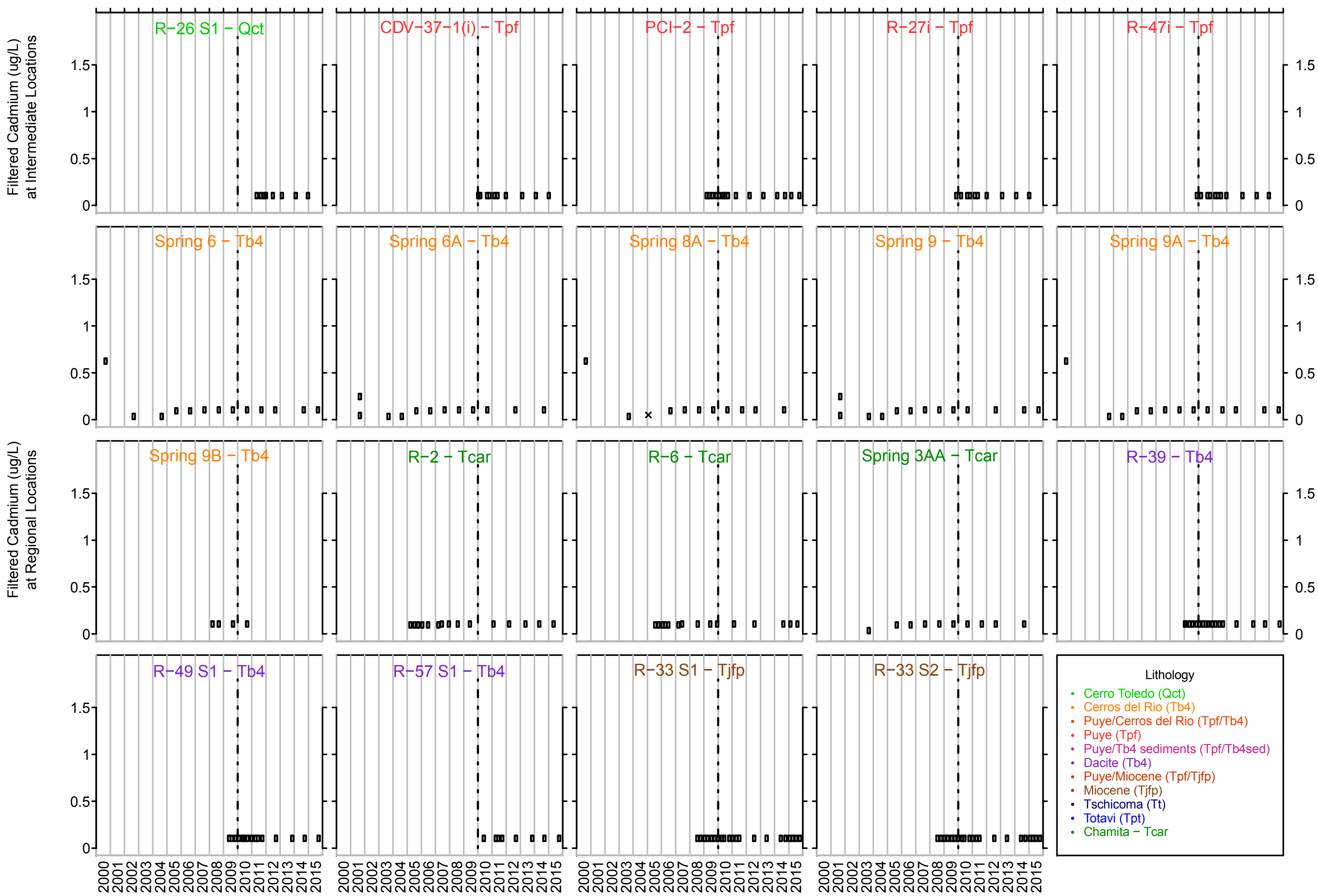



**Figure C-33 Time-series plots for filtered cadmium**

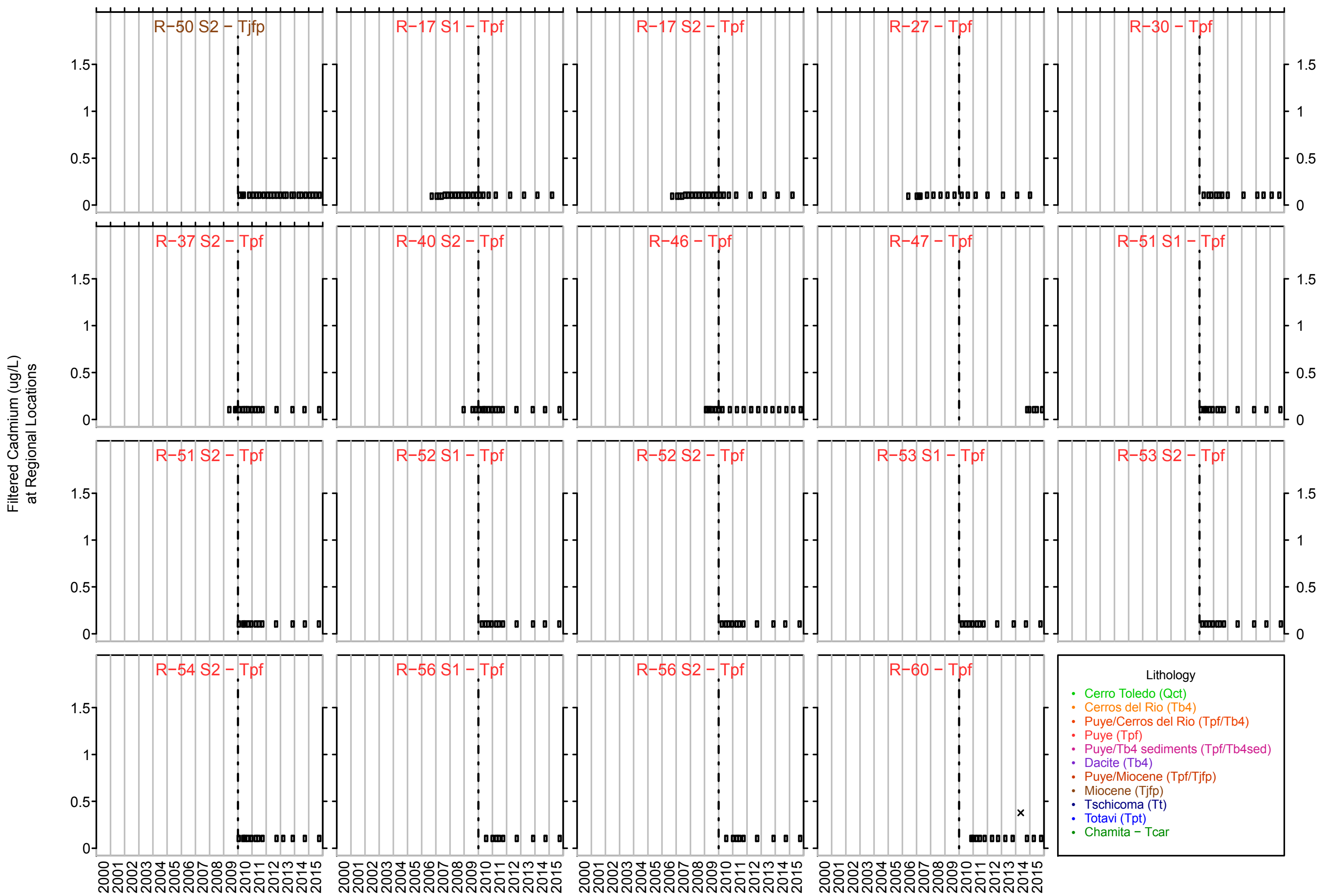



**Figure C-33 (continued)** **Time-series plots for filtered cadmium**

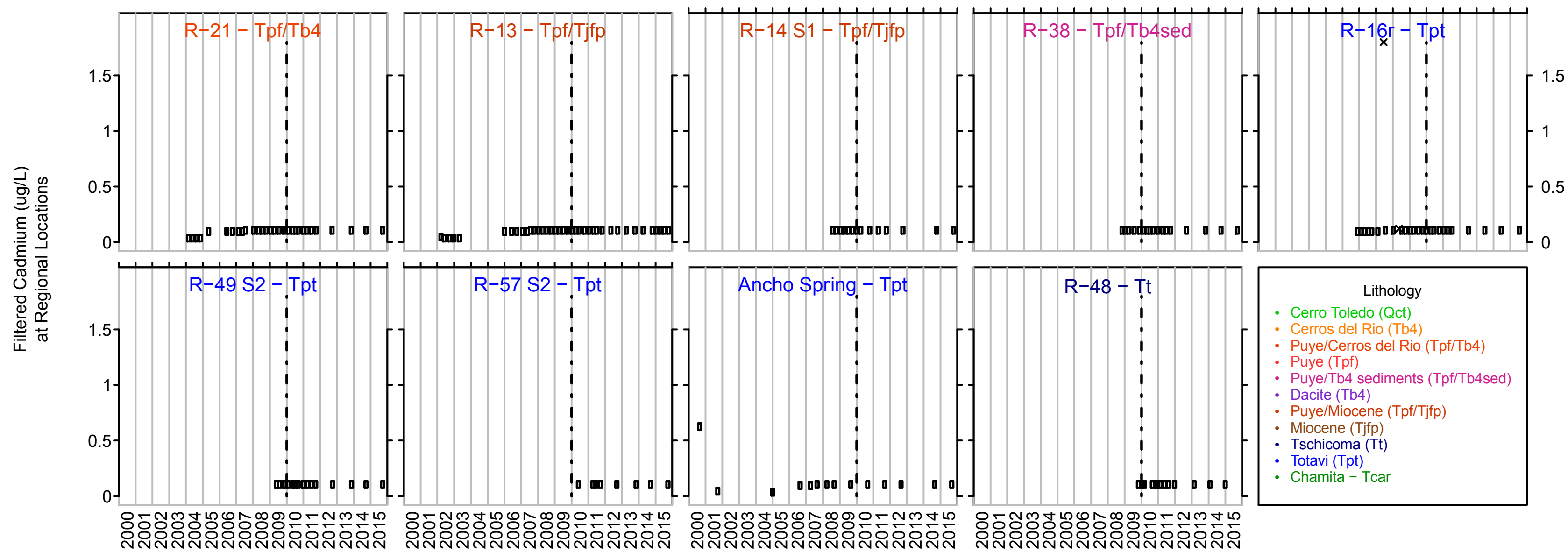



**Figure C-33 (continued) Time-series plots for filtered cadmium**

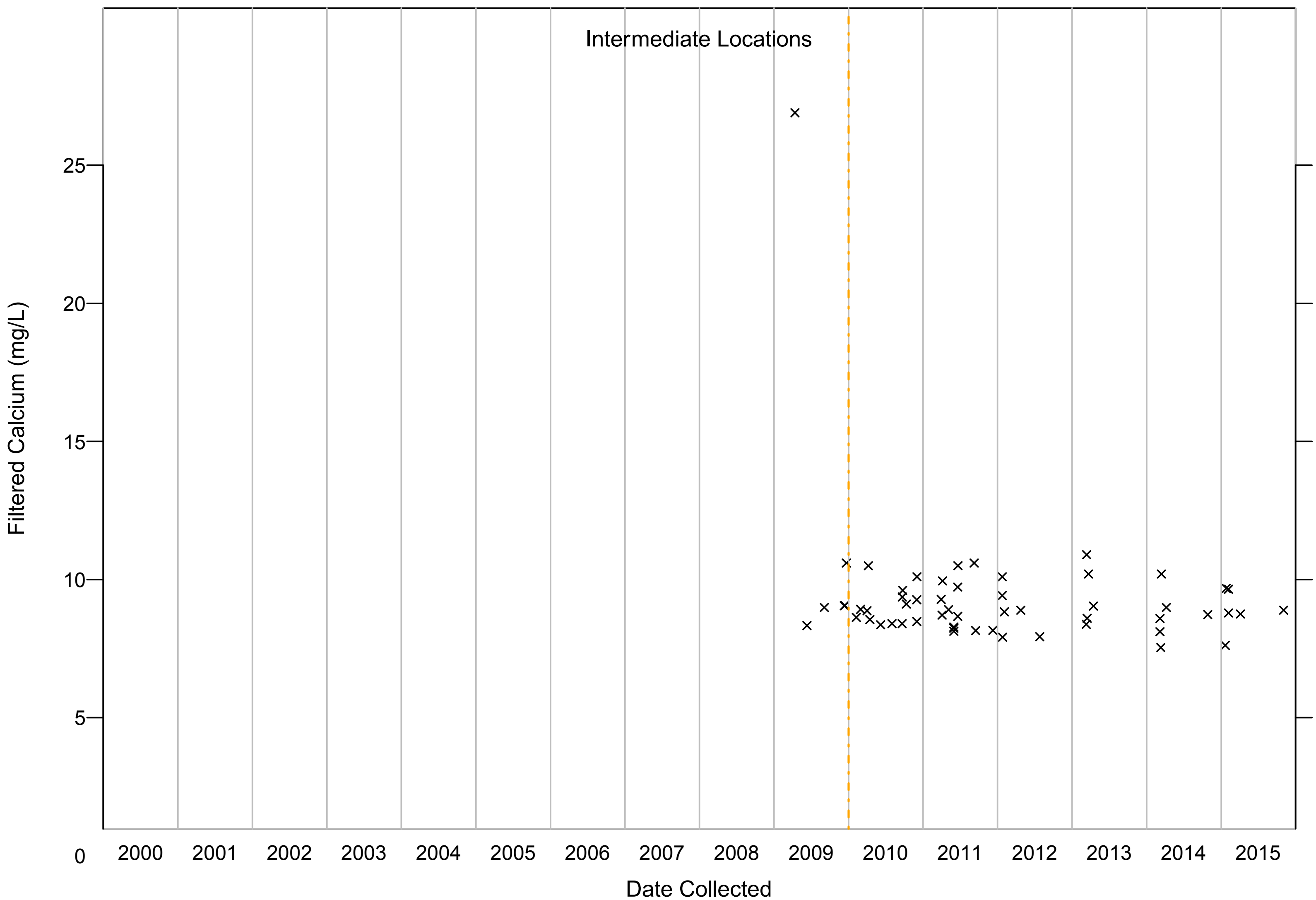



**Figure C-34 Filtered cadmium results for perched-intermediate groundwater**

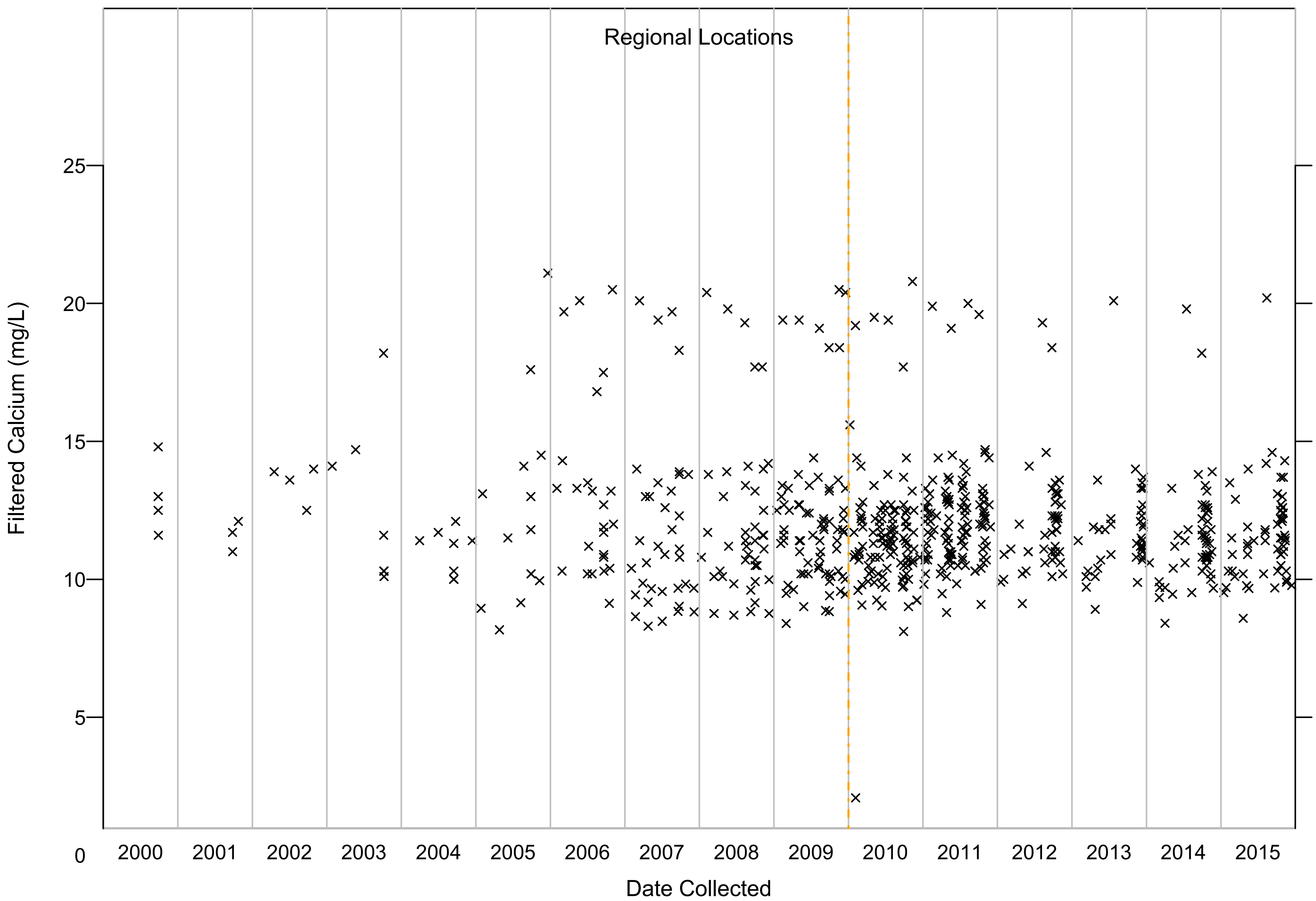



**Figure C-35 Filtered cadmium results for regional aquifer**

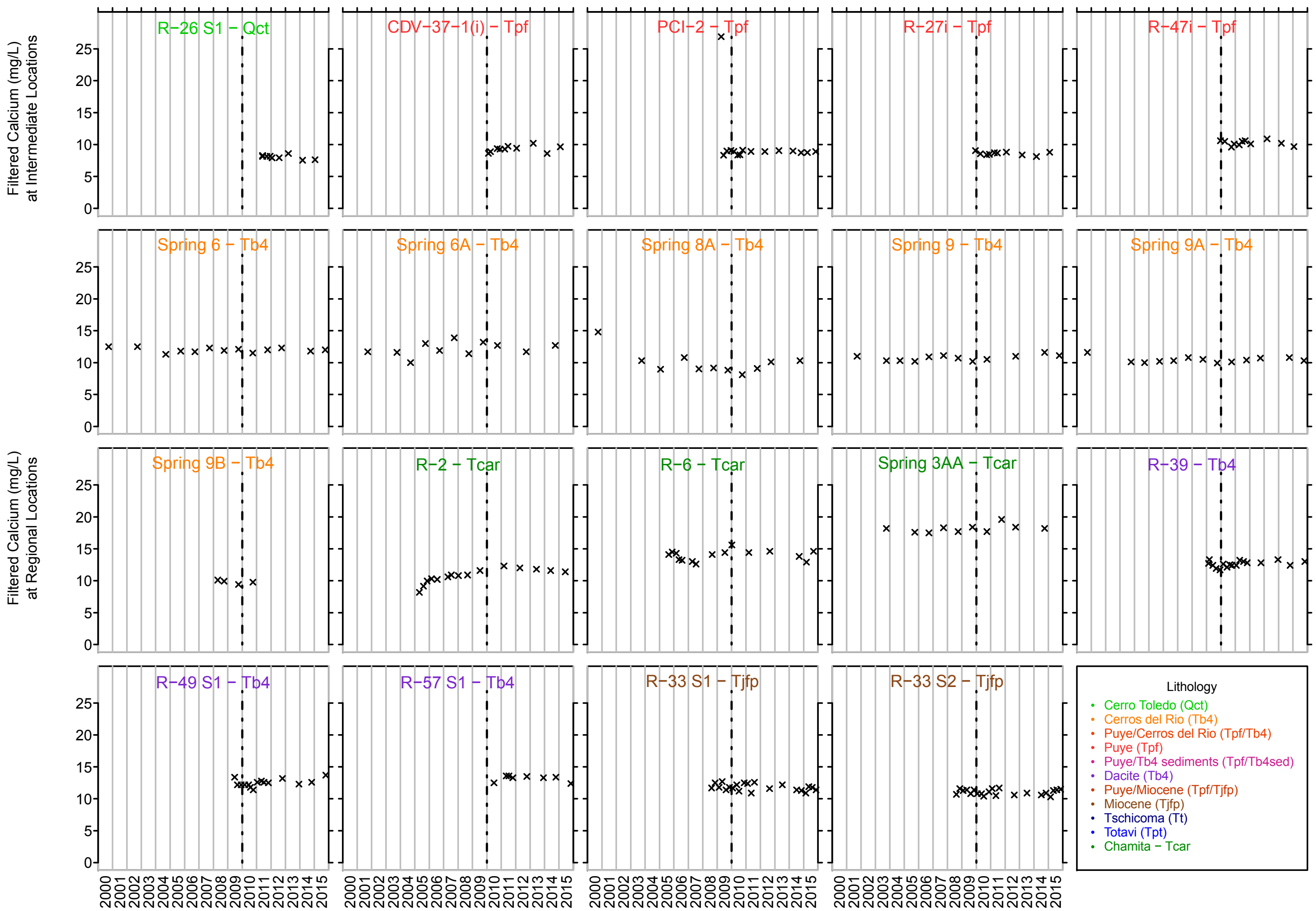



**Figure C-36 Time-series plots for filtered cadmium**

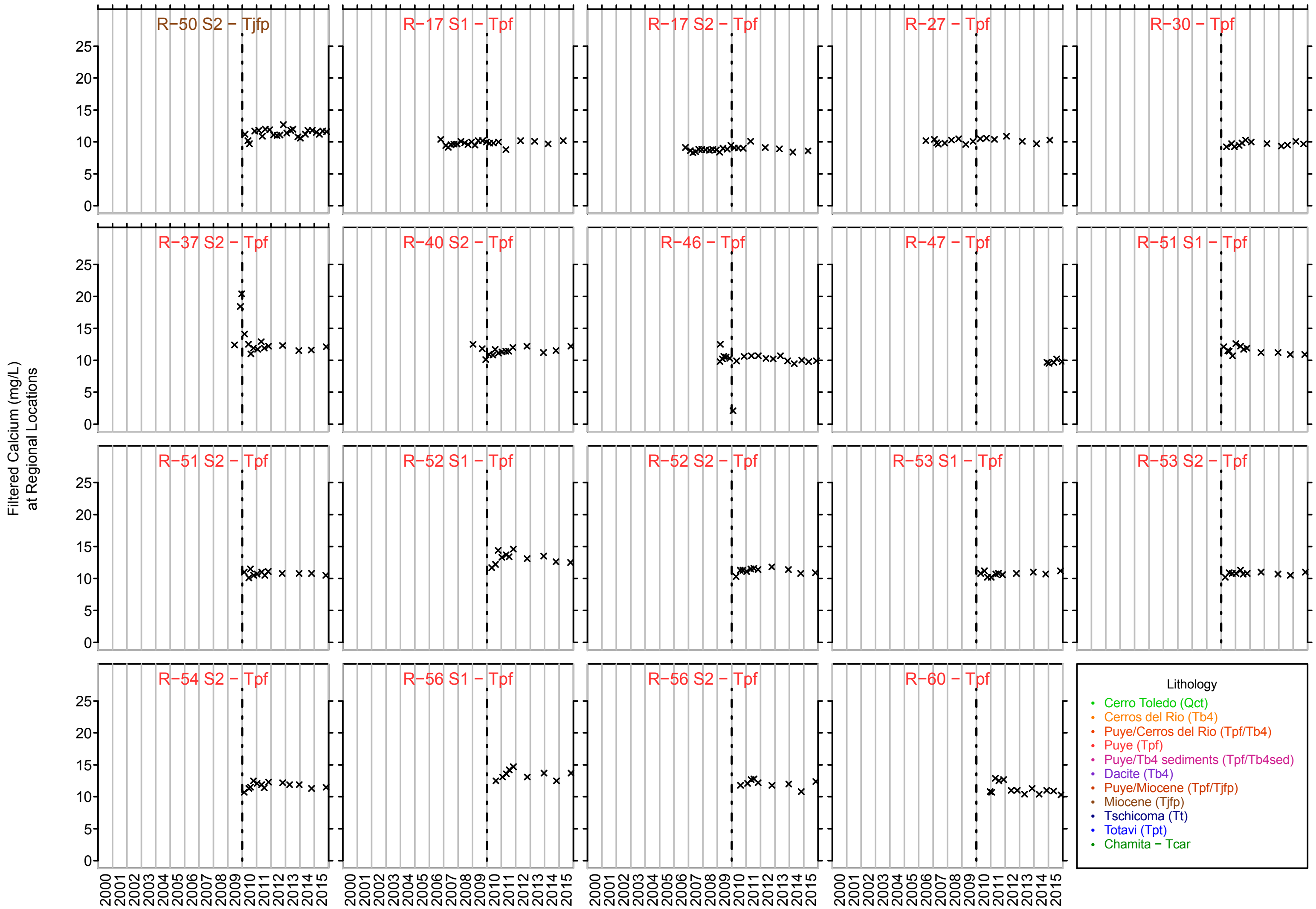



**Figure C-36 (continued) Time-series plots for filtered cadmium**

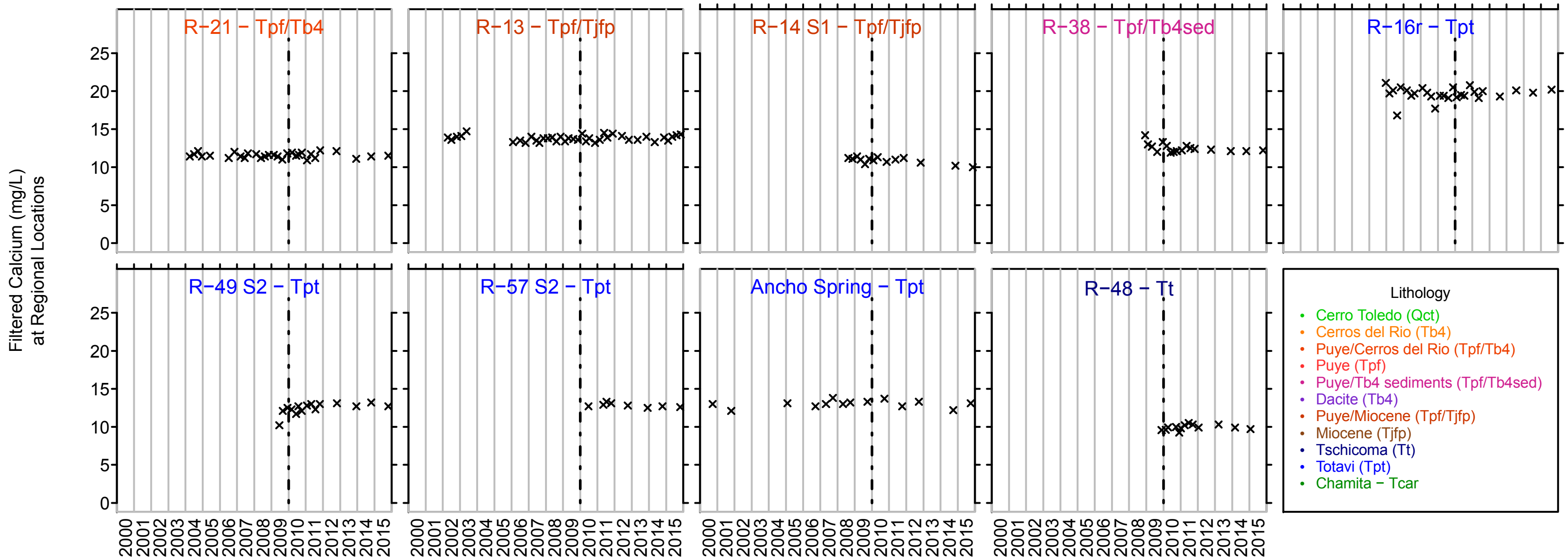



**Figure C-36 (continued) Time-series plots for filtered cadmium**

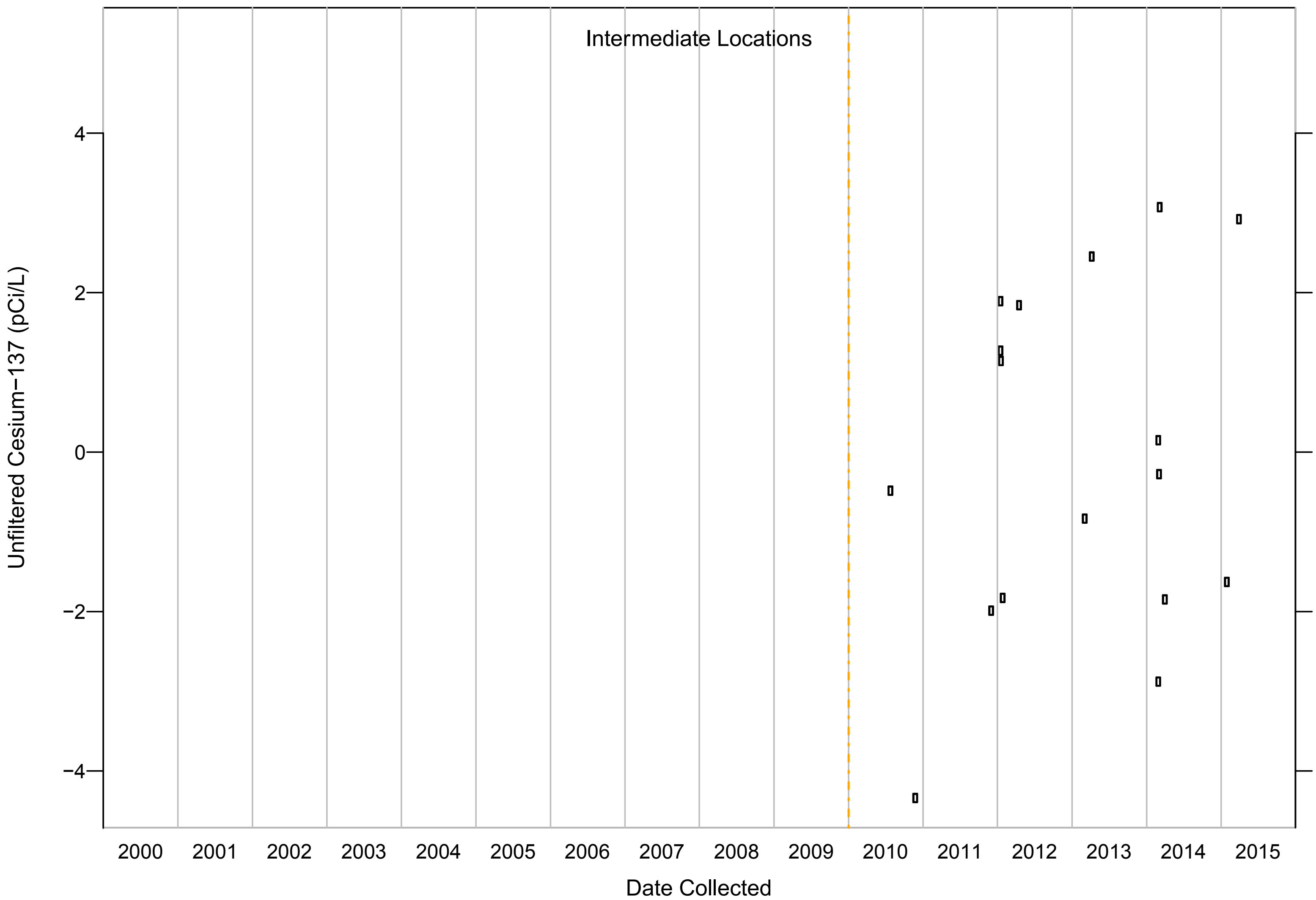



**Figure C-37 Unfiltered cesium-137 results for perched-intermediate groundwater**

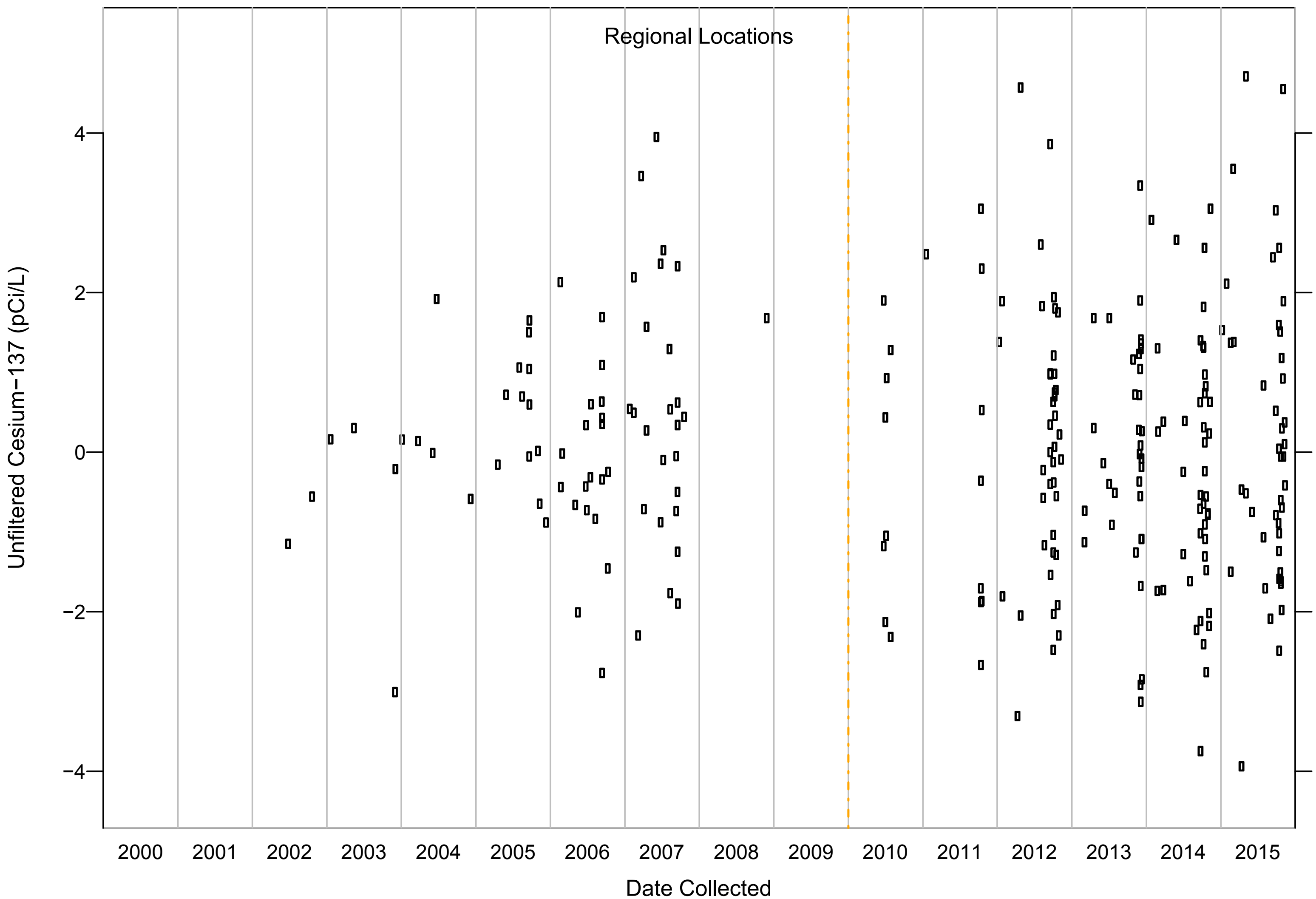



**Figure C-38 Unfiltered cesium-137 results for regional aquifer**

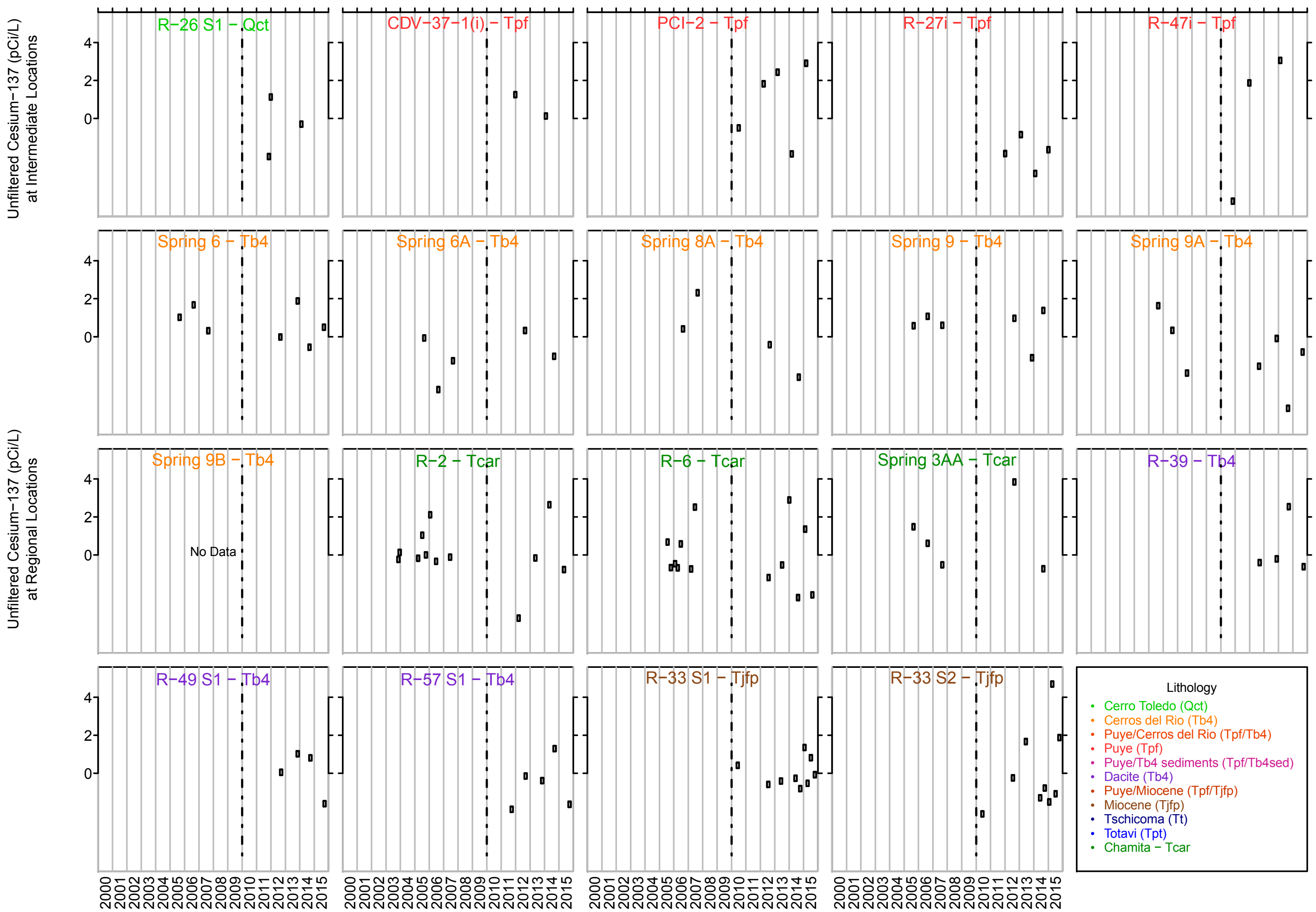



**Figure C-39 Time-series plots for unfiltered cesium-137**

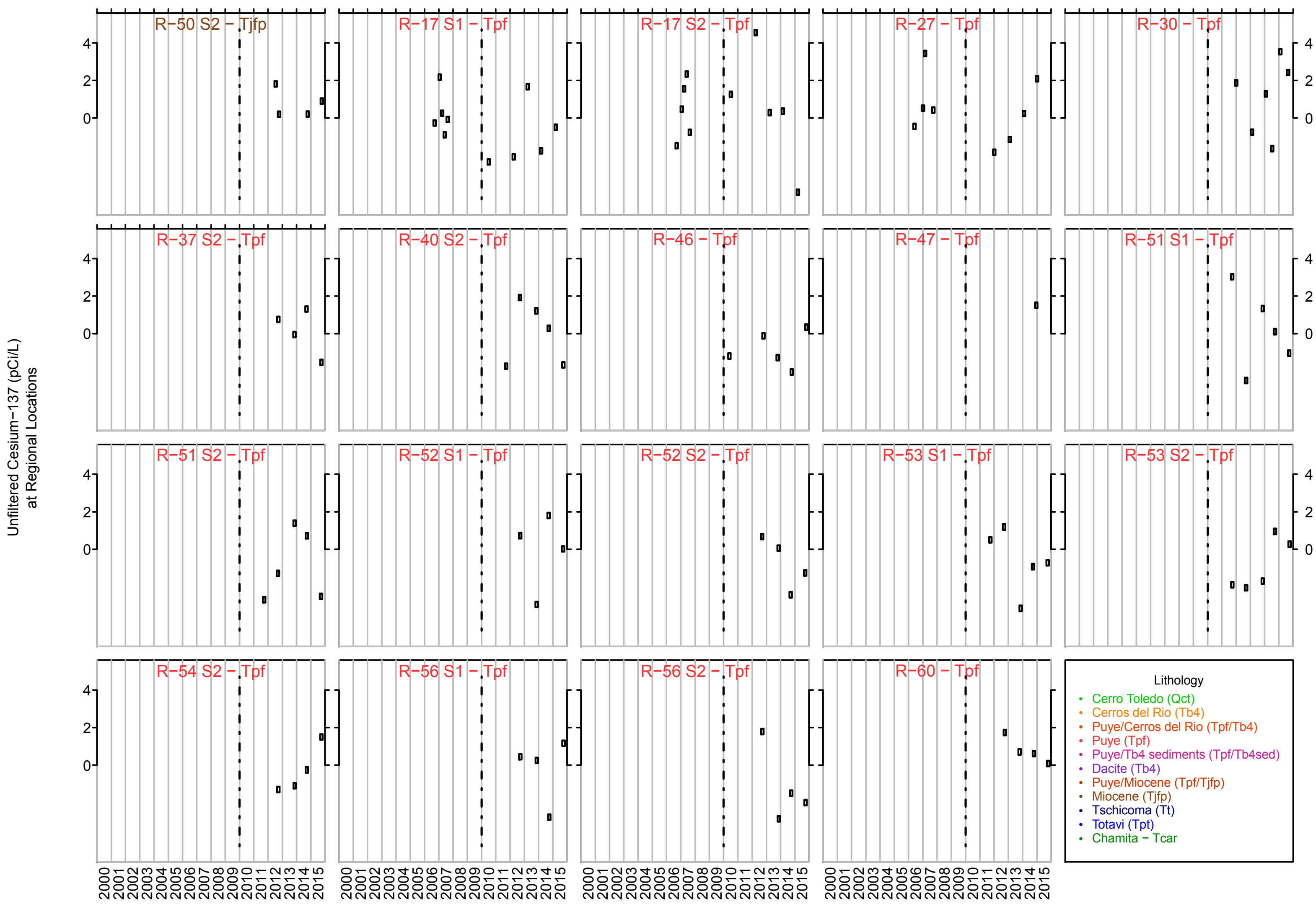



**Figure C-39 (continued)** **Time-series plots for unfiltered cesium-137**

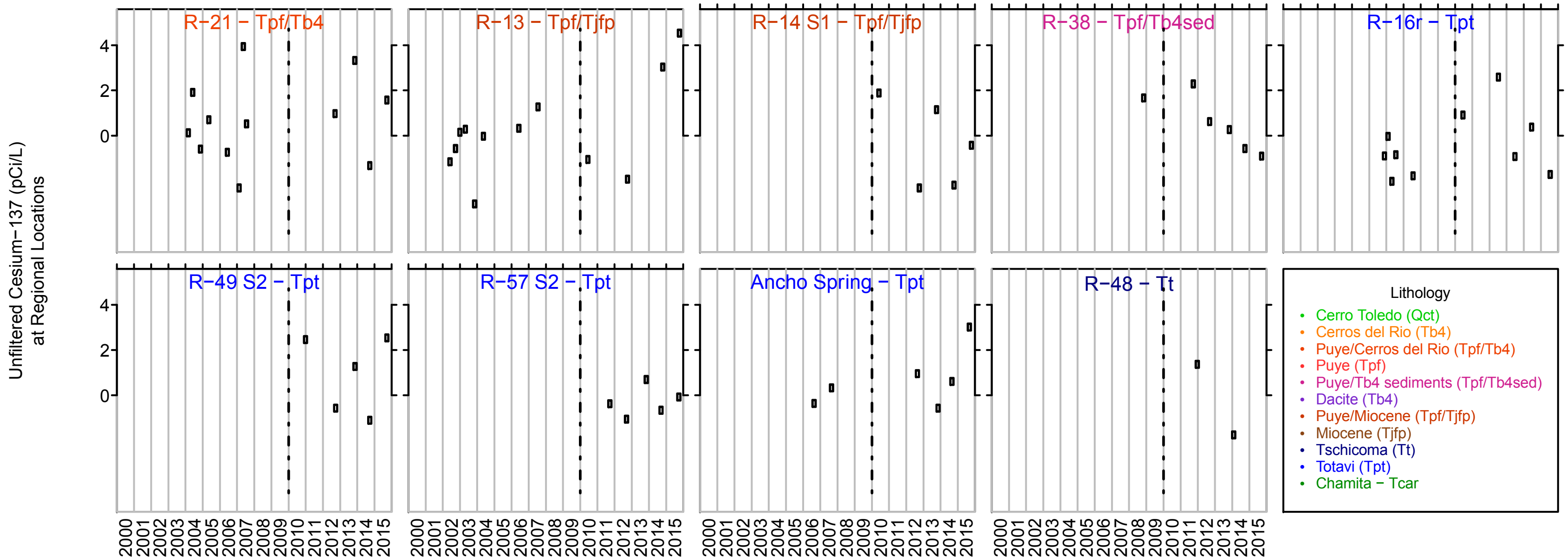



**Figure C-39 (continued)  Time-series plots for unfiltered cesium-137**

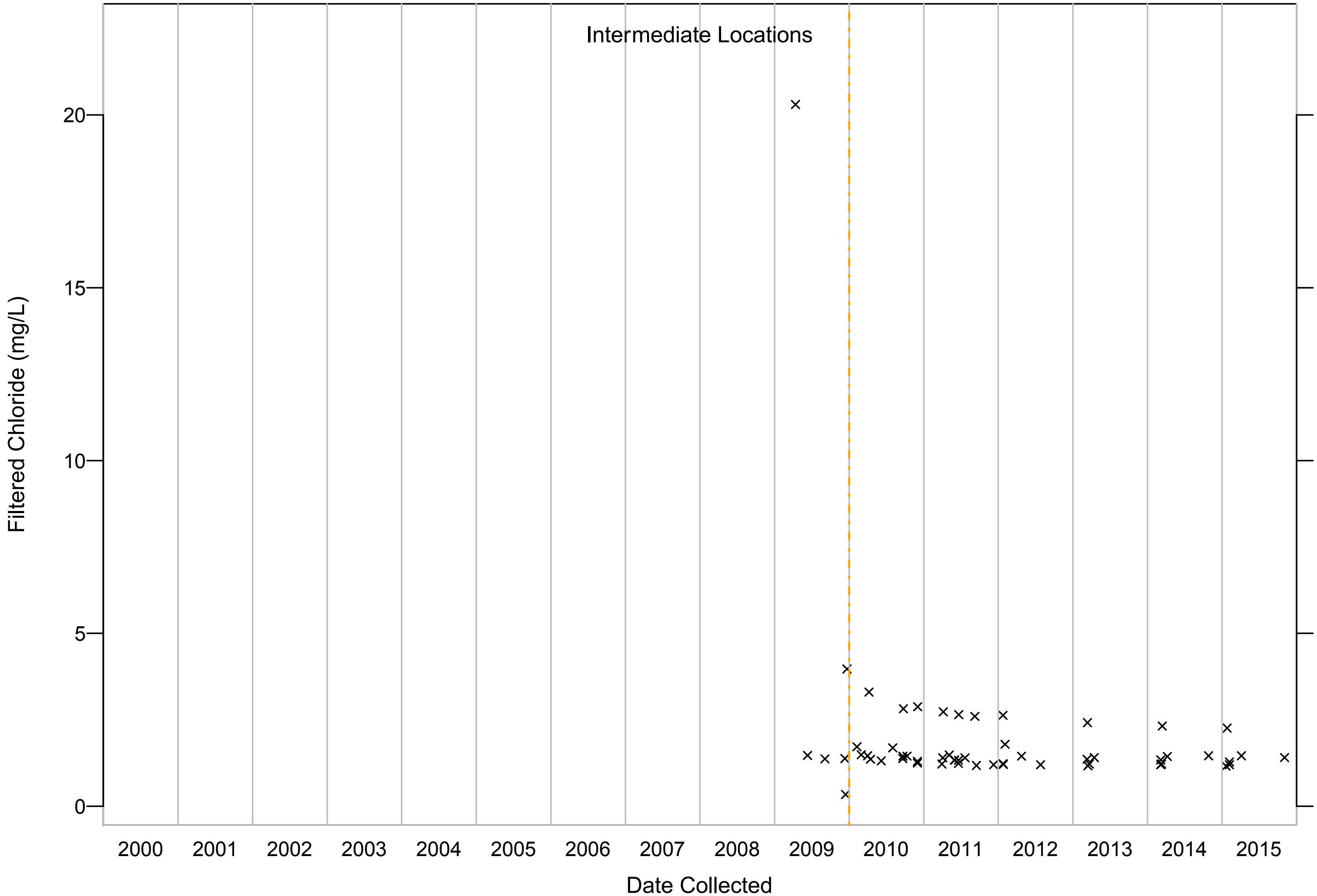



**Figure C-40 Filtered chloride results for perched-intermediate groundwater**

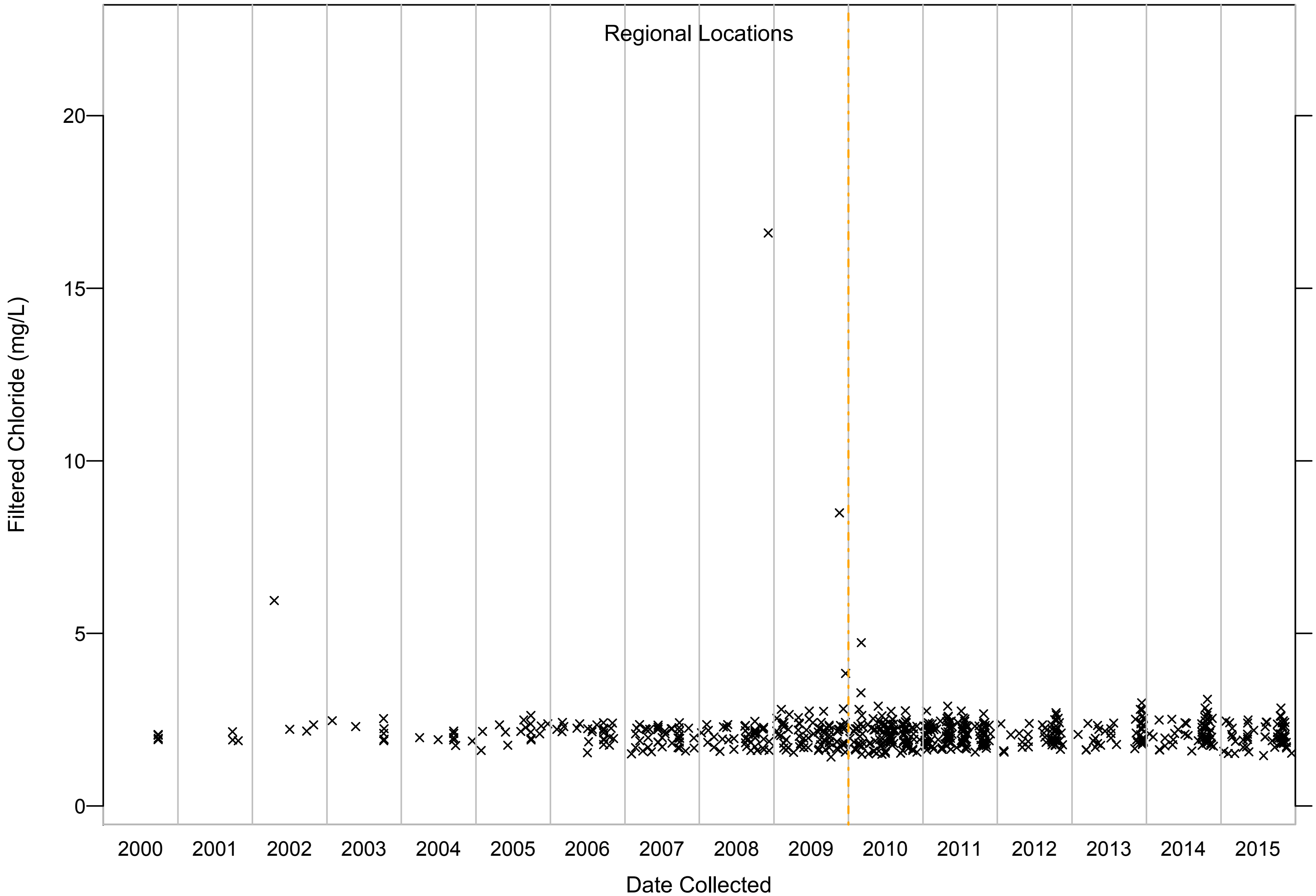



**Figure C-41 Filtered chloride results for regional aquifer**

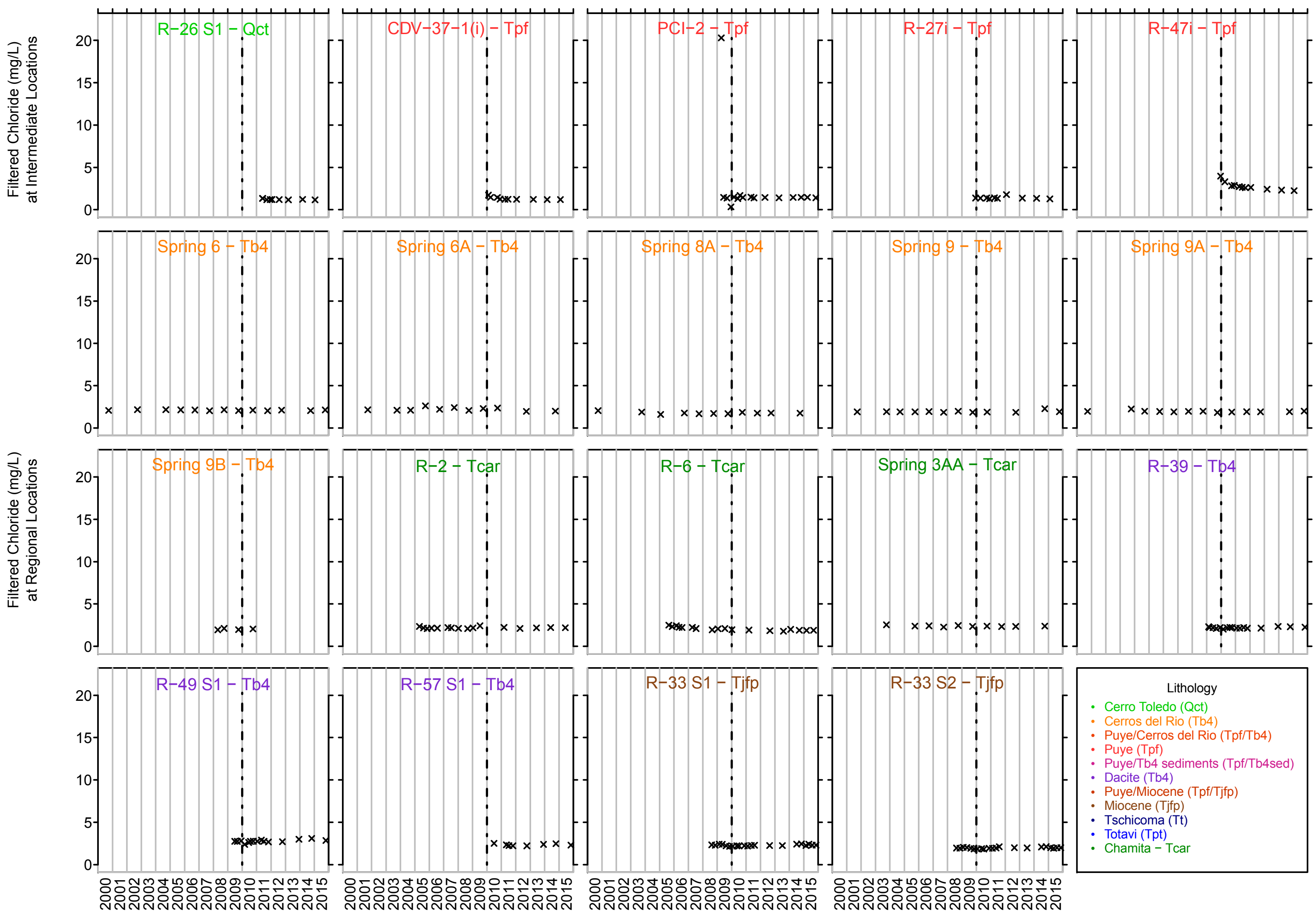



**Figure C-42 Time-series plots for filtered chloride**

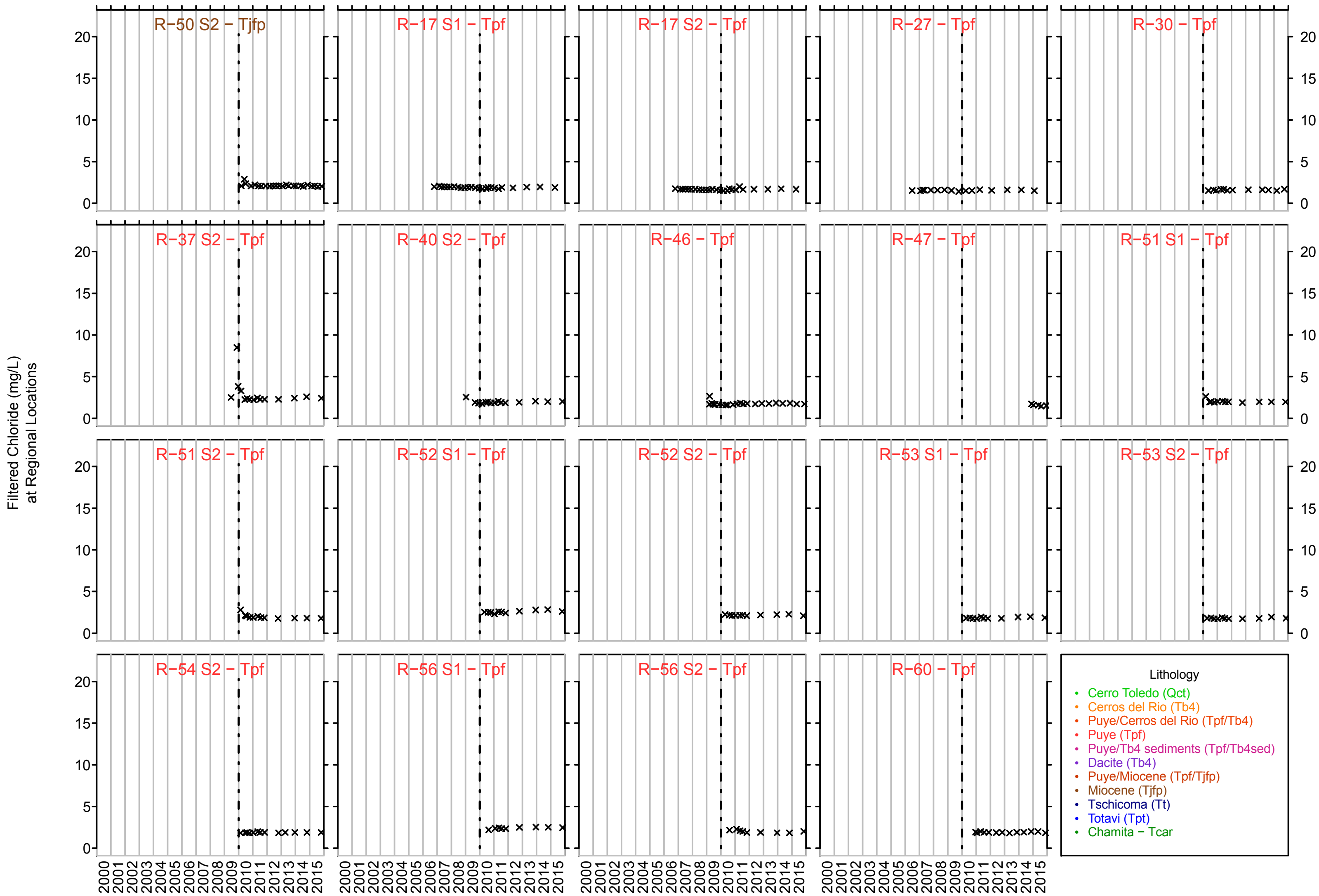



**Figure C-42 (continued)** **Time-series plots for filtered chloride**

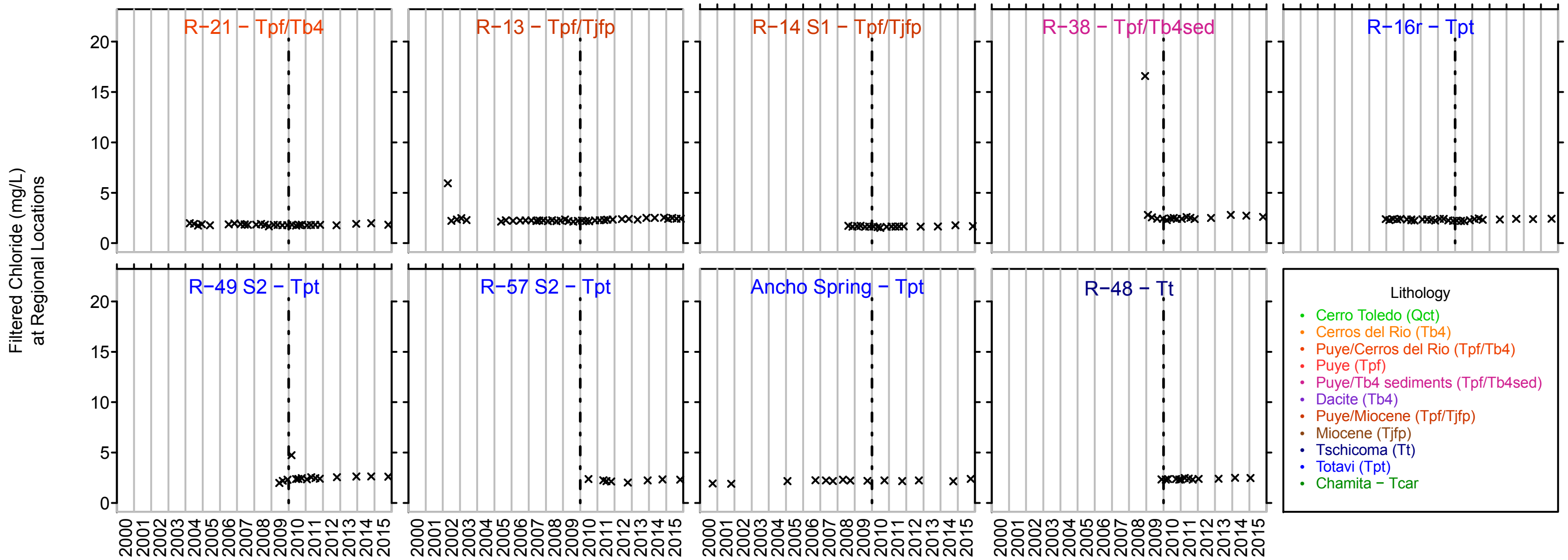



**Figure C-42 (continued) Time-series plots for filtered chloride**

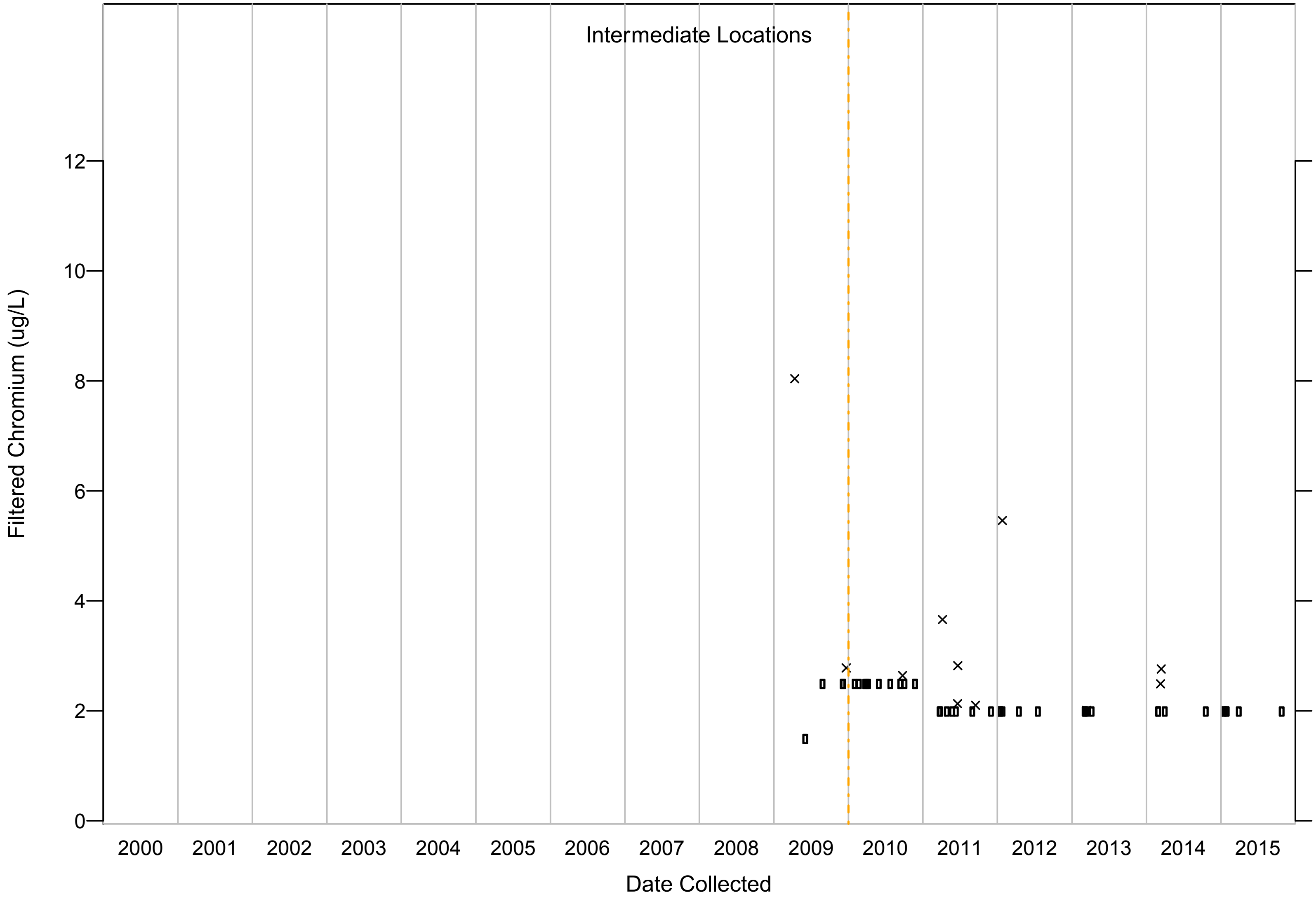



**Figure C-43 Filtered chromium results for perched-intermediate groundwater**

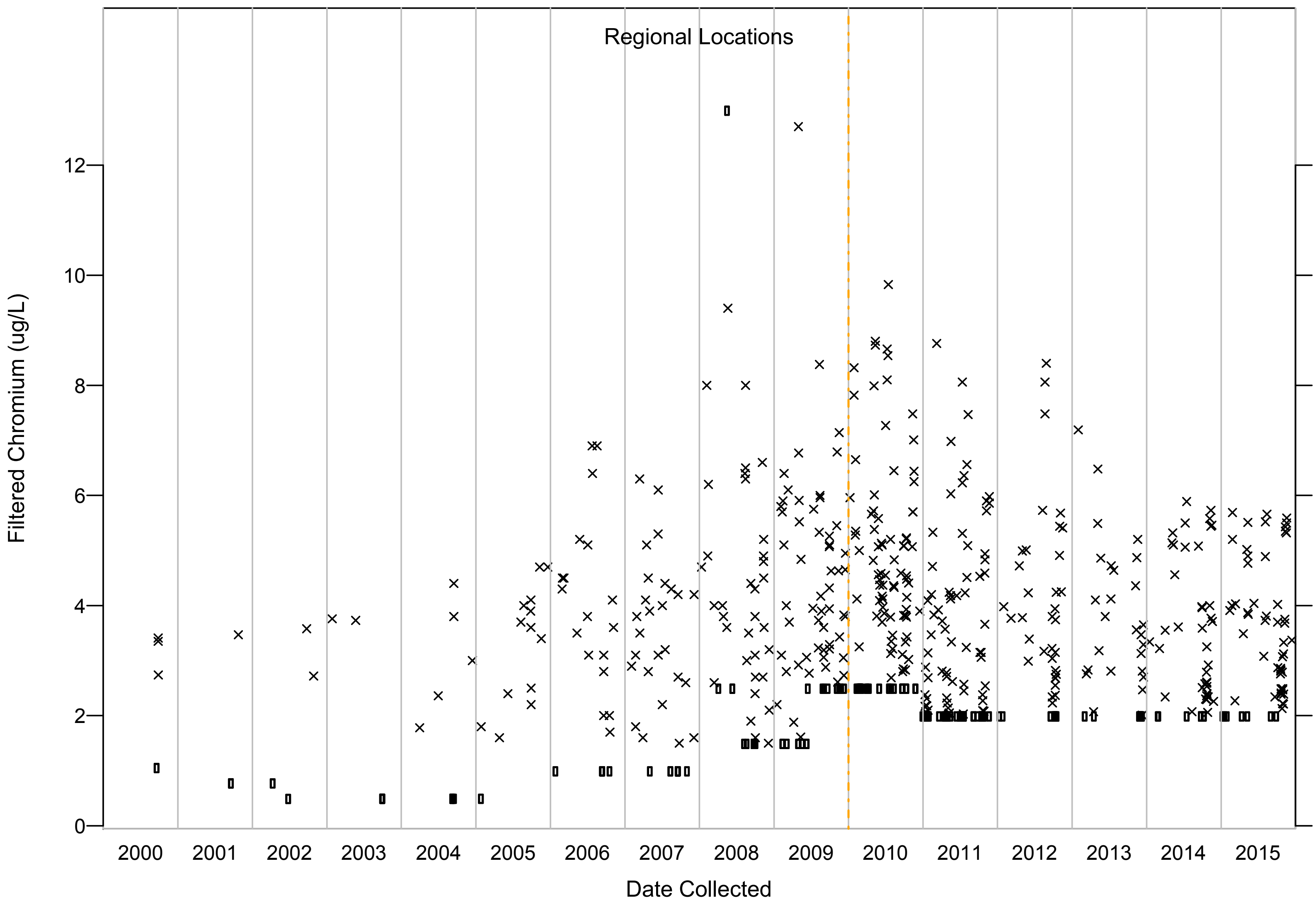



**Figure C-44 Filtered chromium results for regional aquifer**

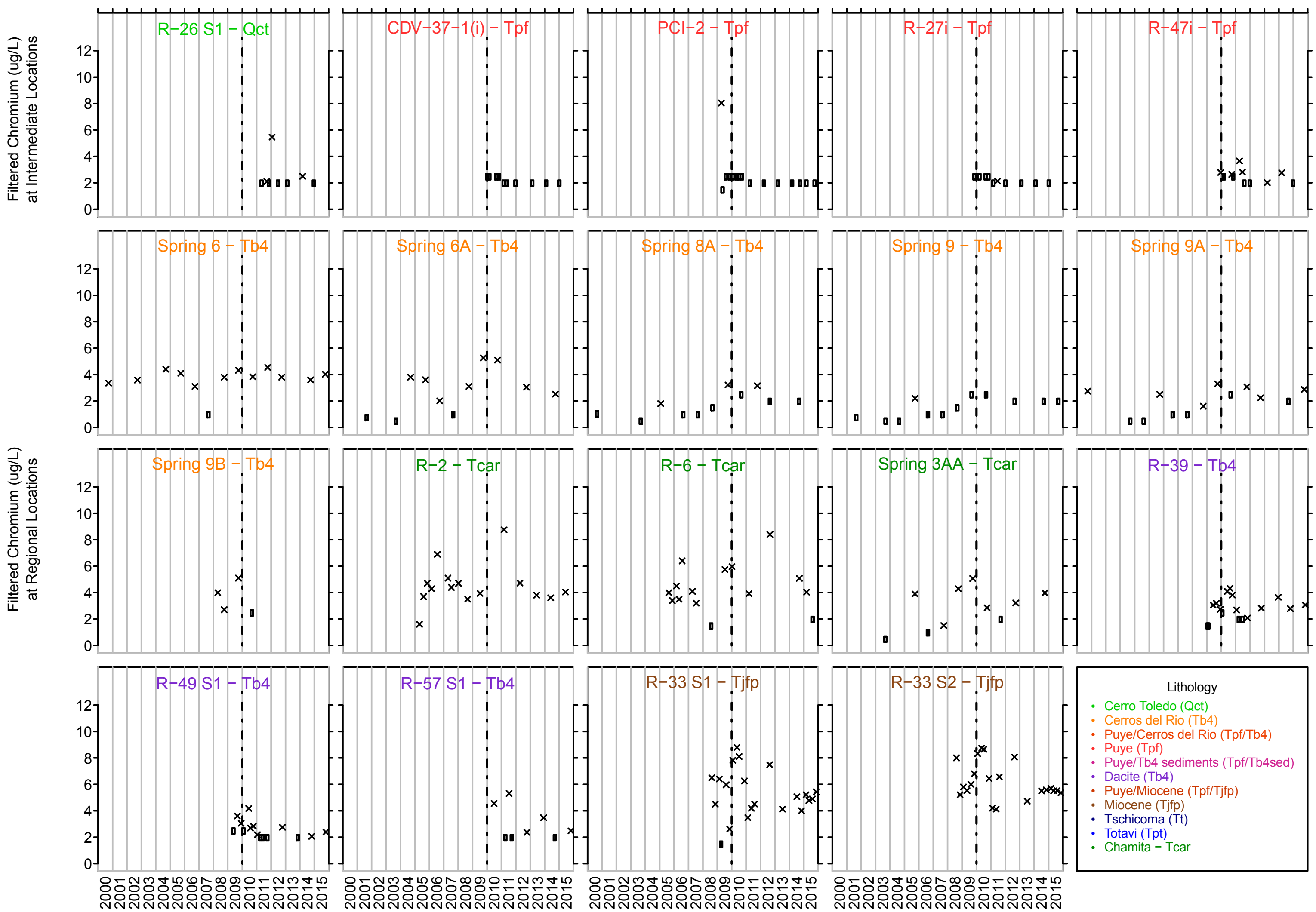



**Figure C-45 Time-series plots for filtered chromium**

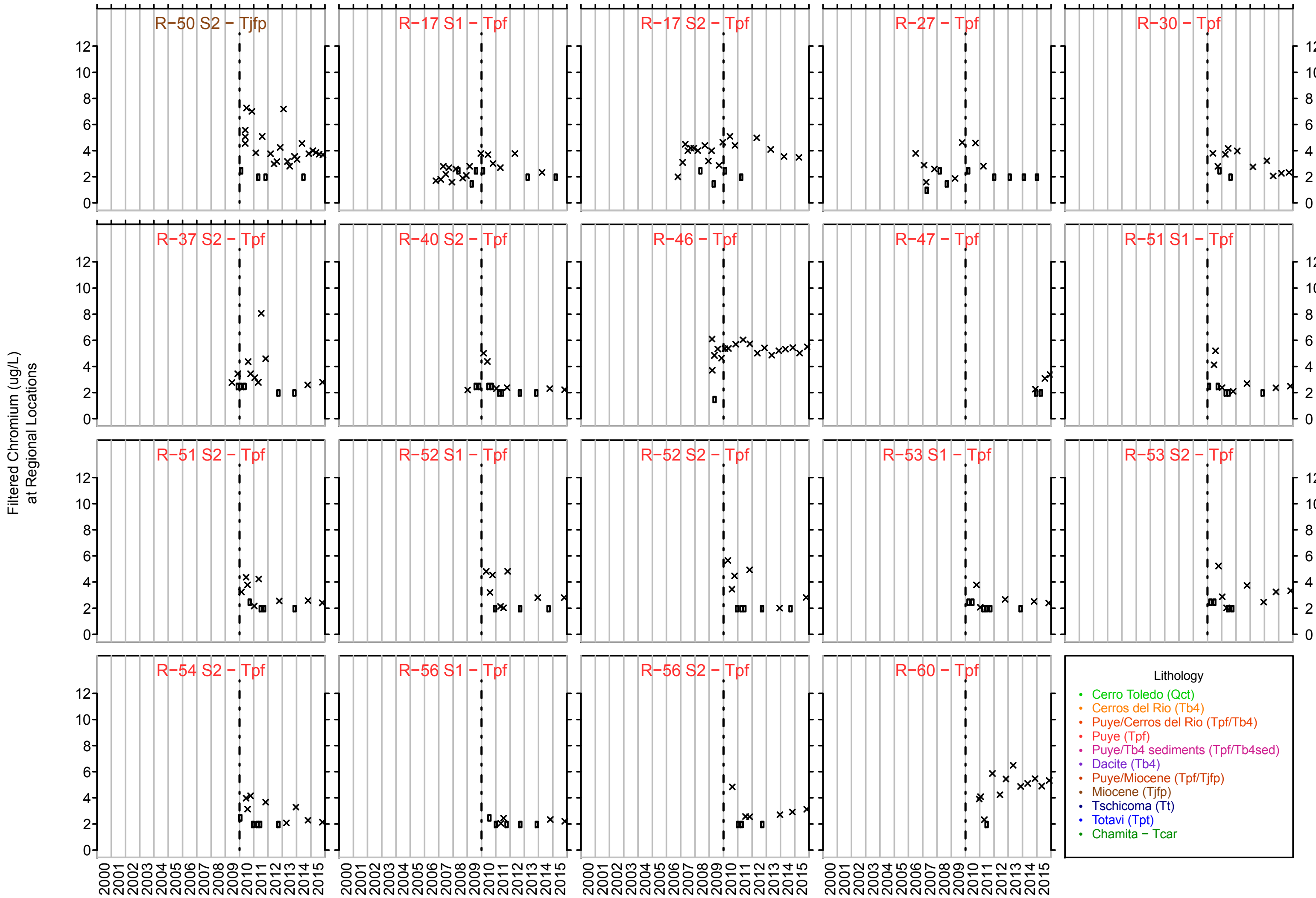



**Figure C-45 (continued) Time-series plots for filtered chromium**

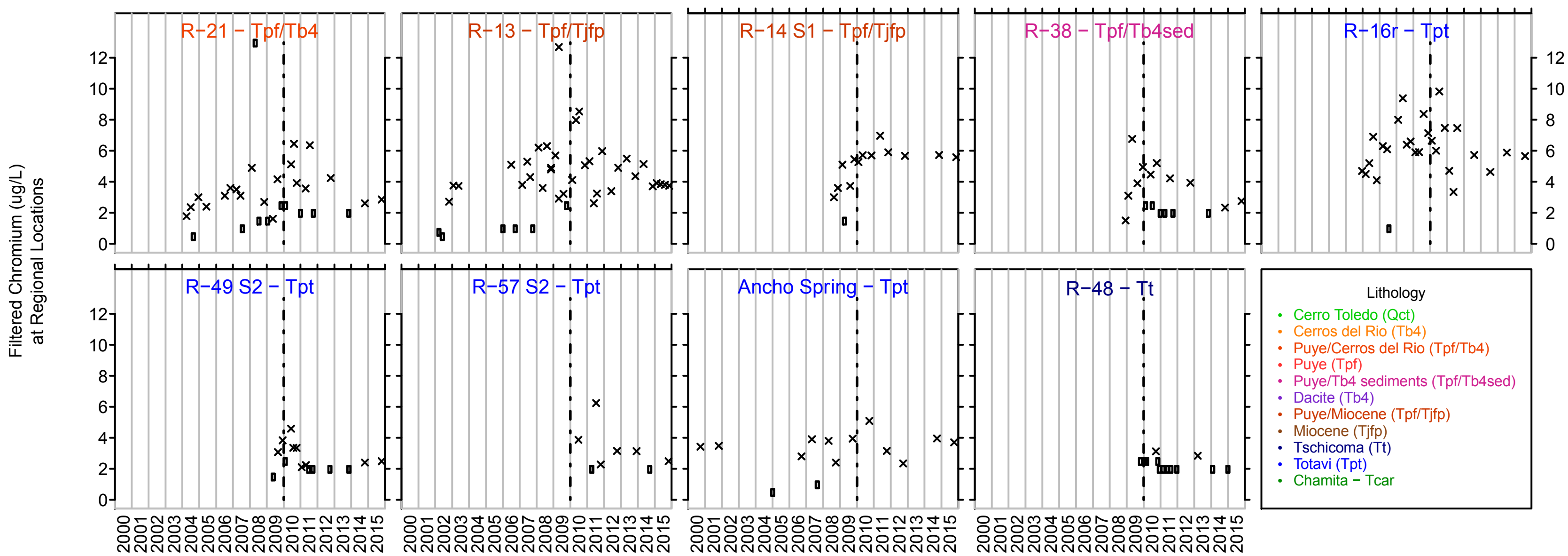



**Figure C-45 (continued) Time-series plots for filtered chromium**

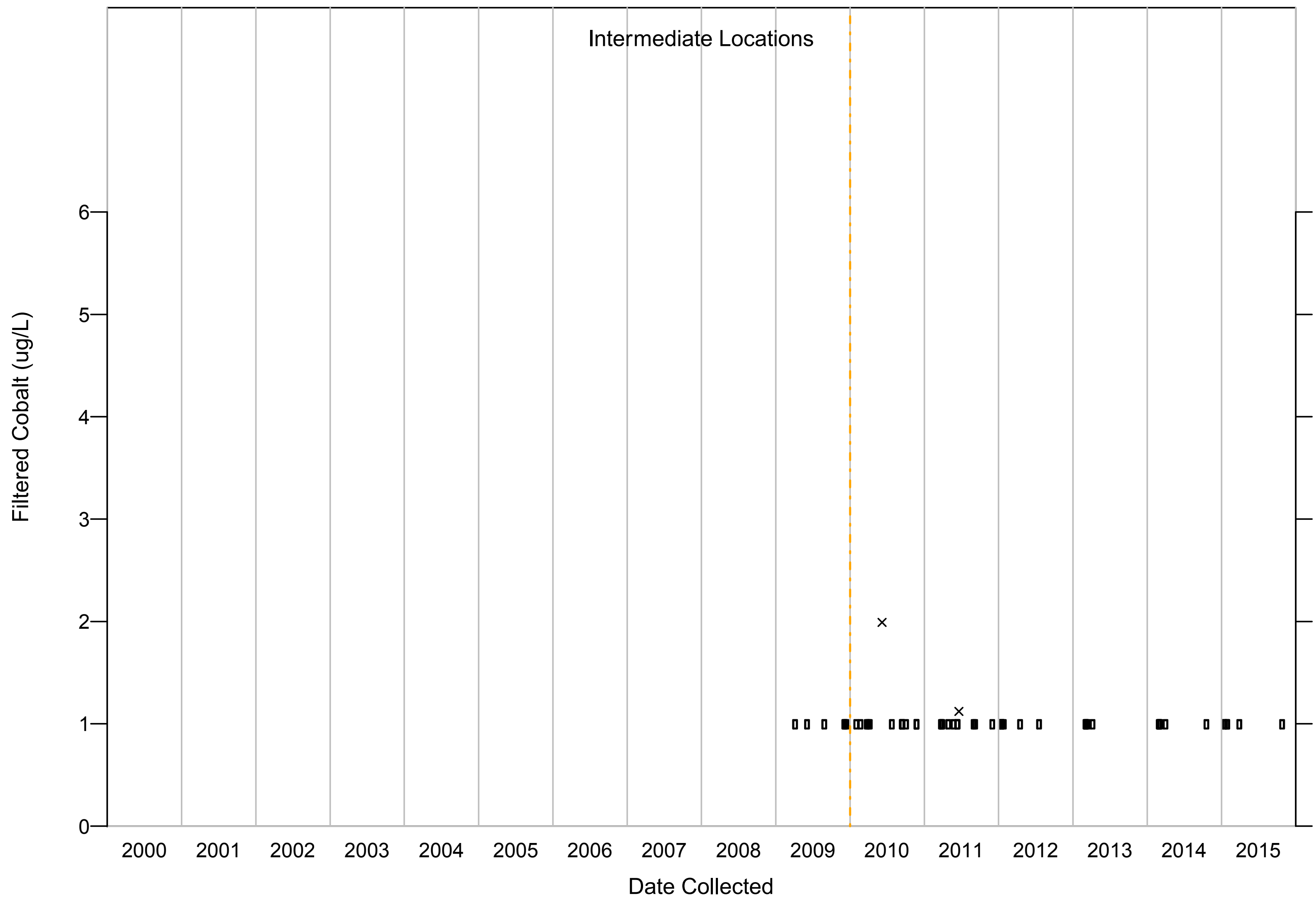



**Figure C-46 Filtered cobalt results for perched-intermediate groundwater**

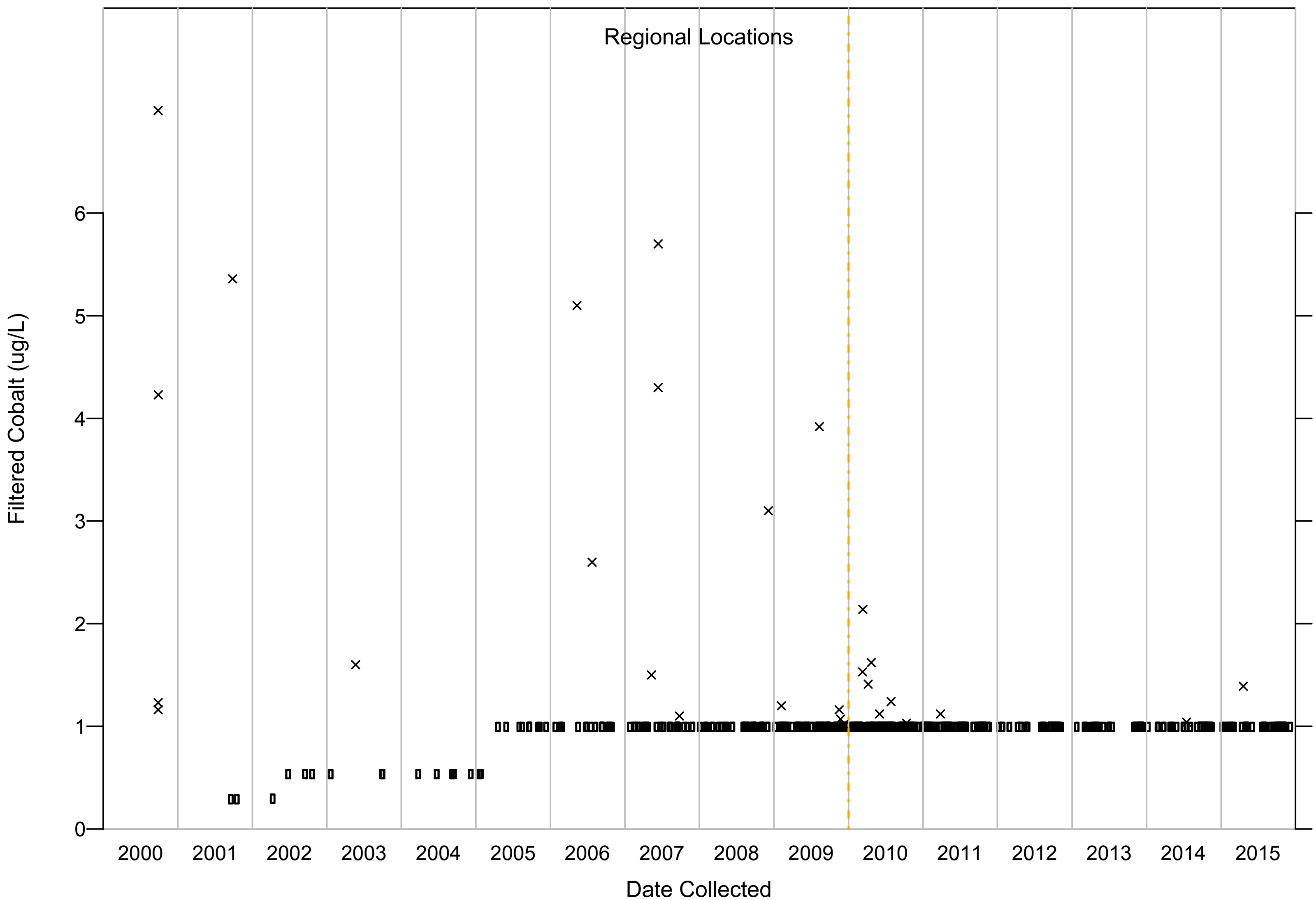



**Figure C-47	Filtered cobalt results for regional aquifer**

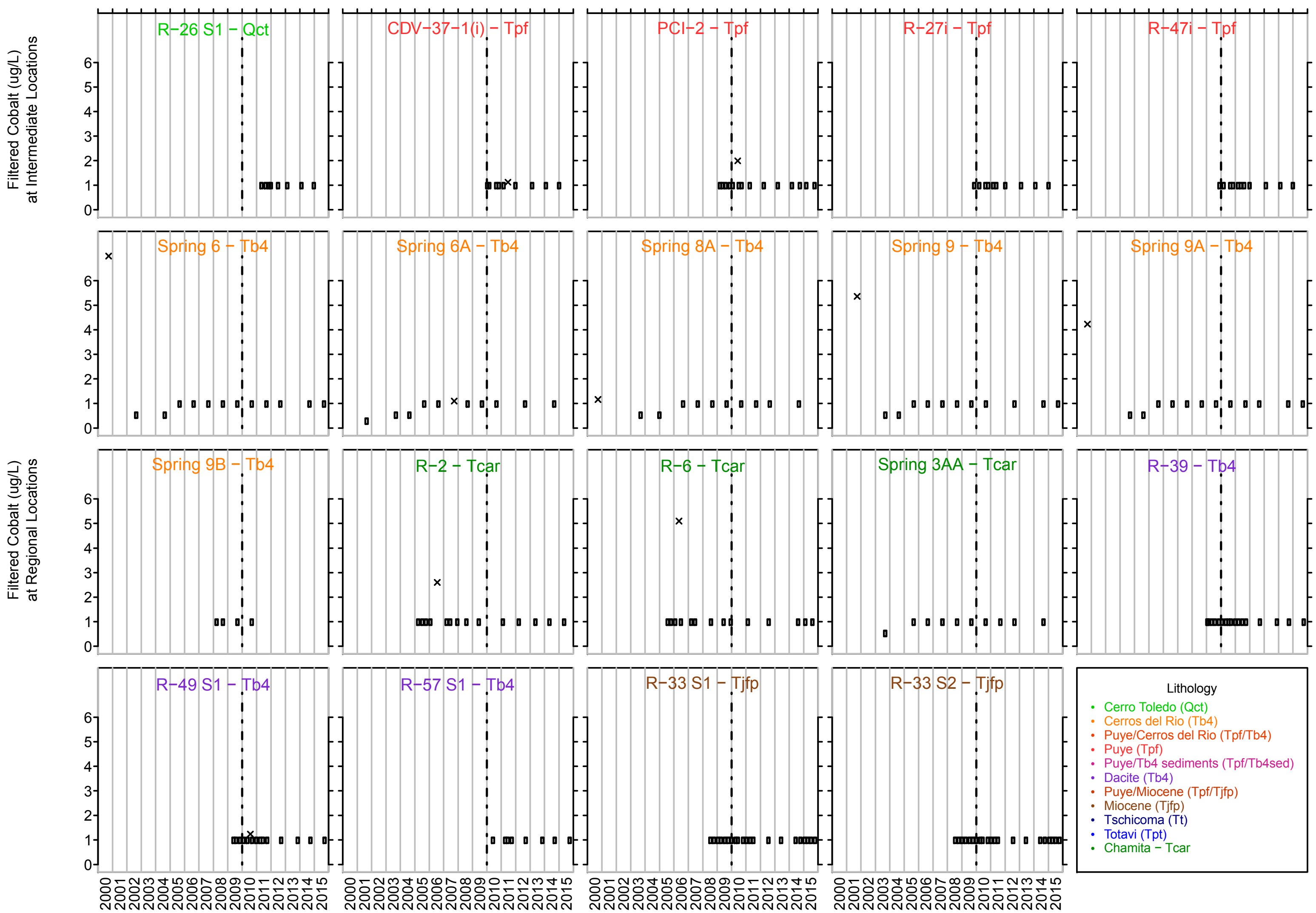



**Figure C-48 Time-series plots for filtered cobalt**

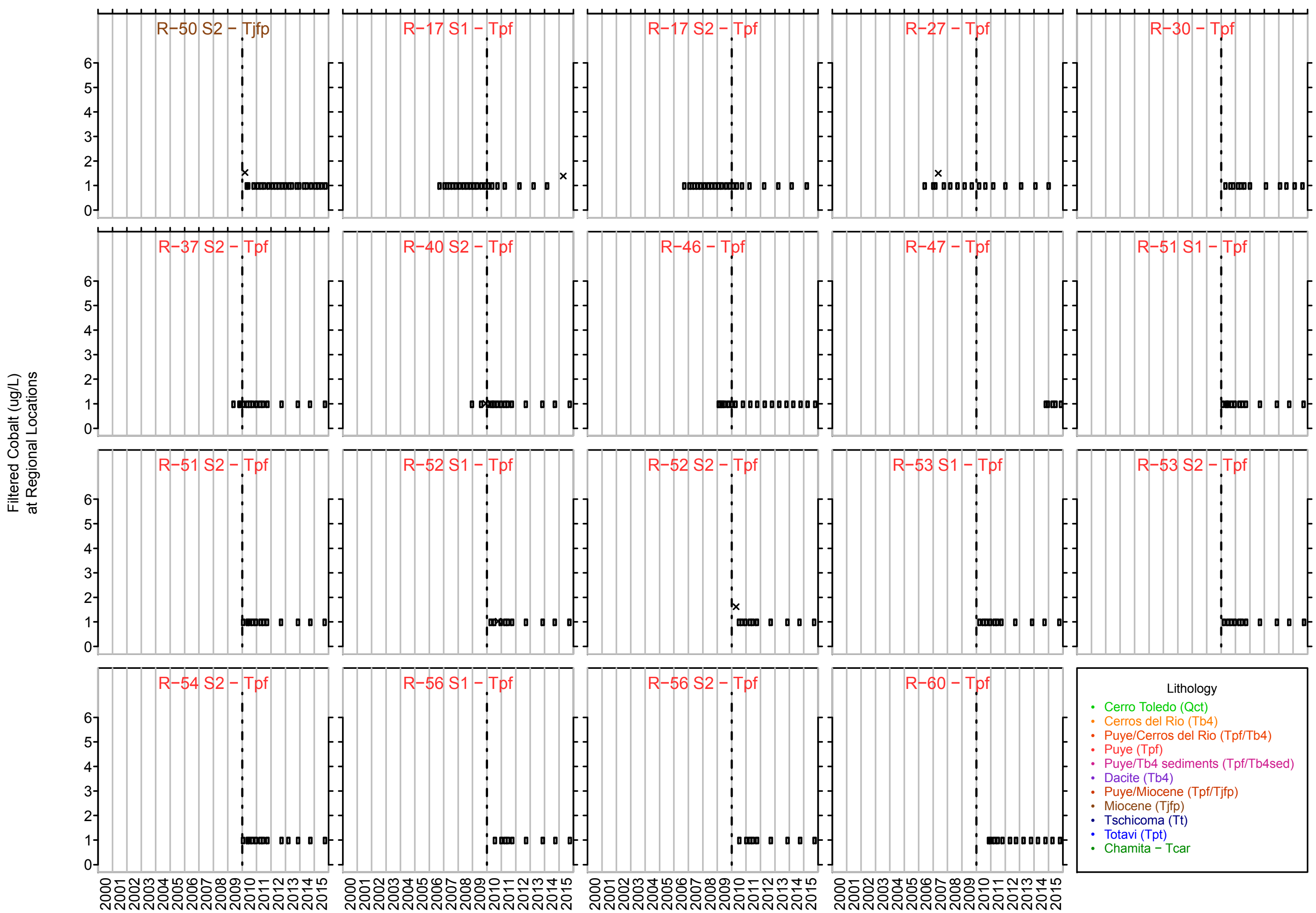



**Figure C-48 (continued) Time-series plots for filtered cobalt**

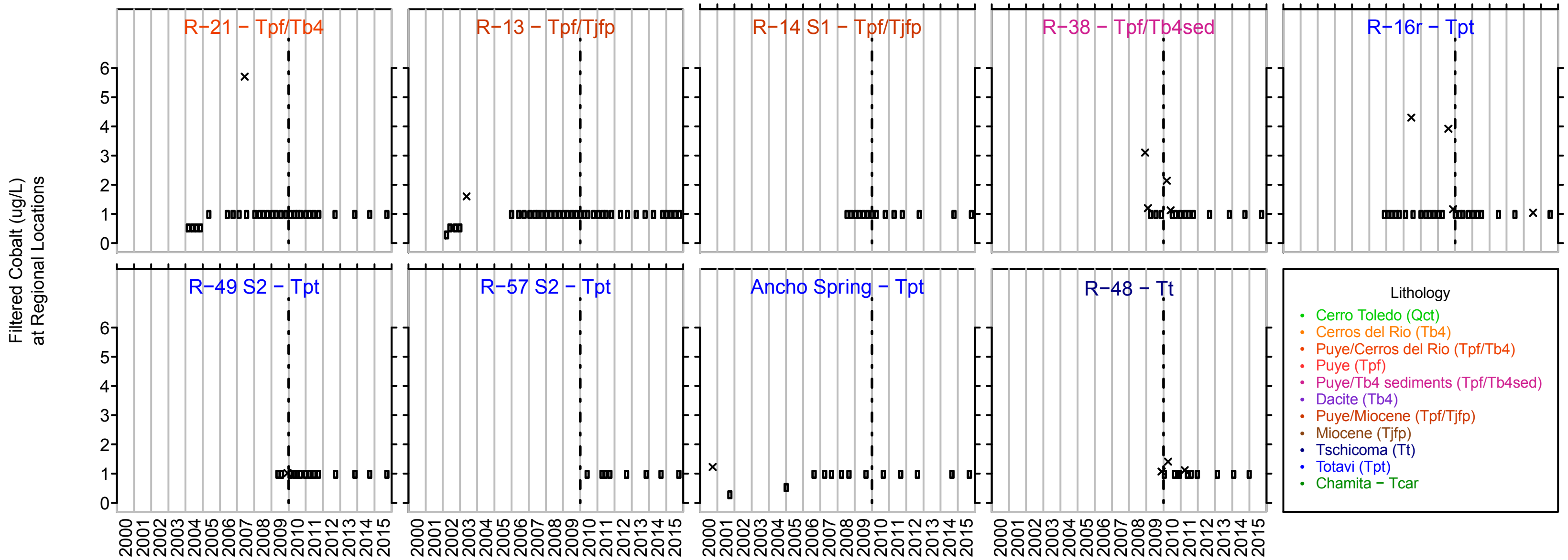



**Figure C-48 (continued) Time-series plots for filtered cobalt**

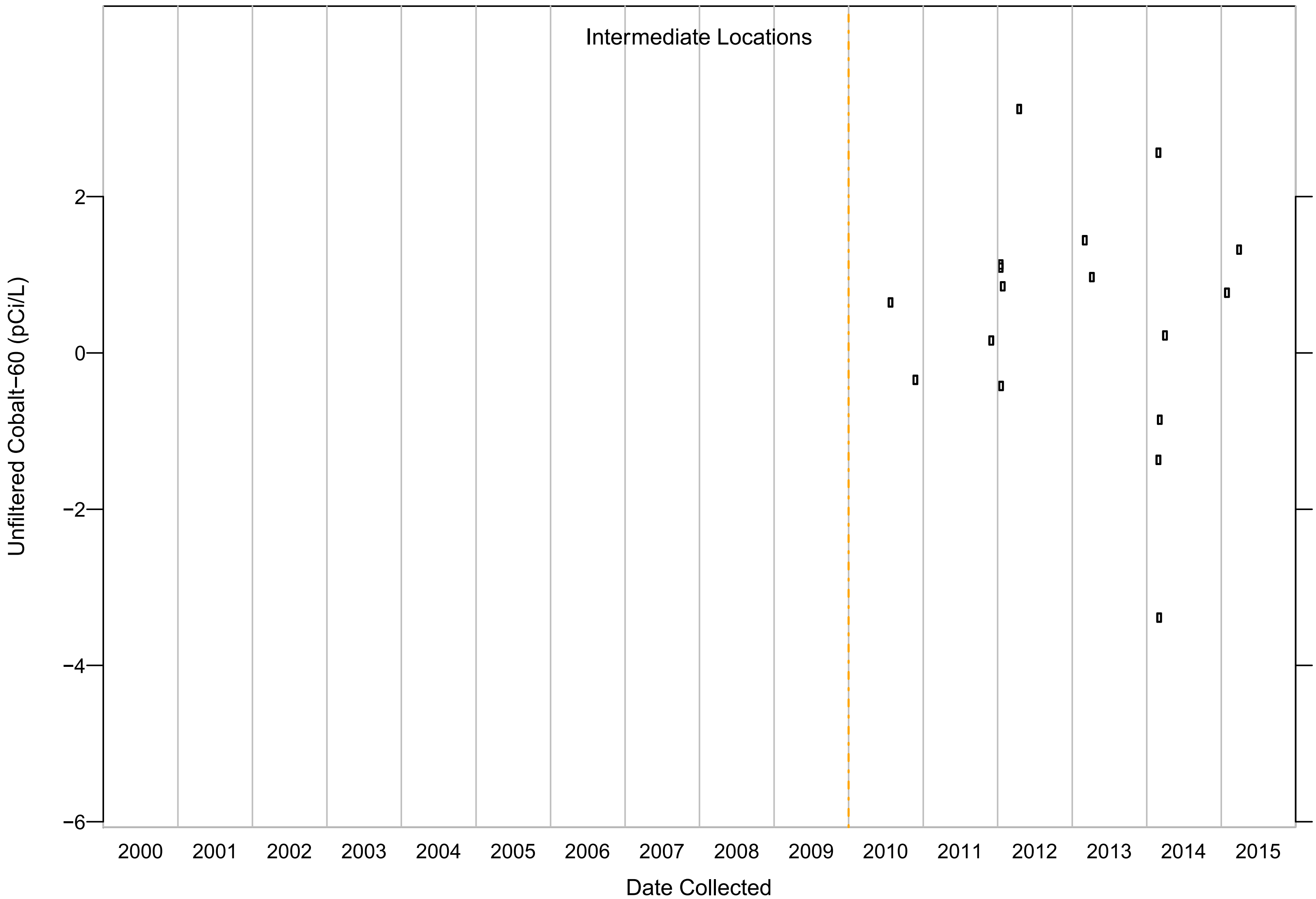



**Figure C-49 Unfiltered cobalt-60 results for perched-intermediate groundwater**

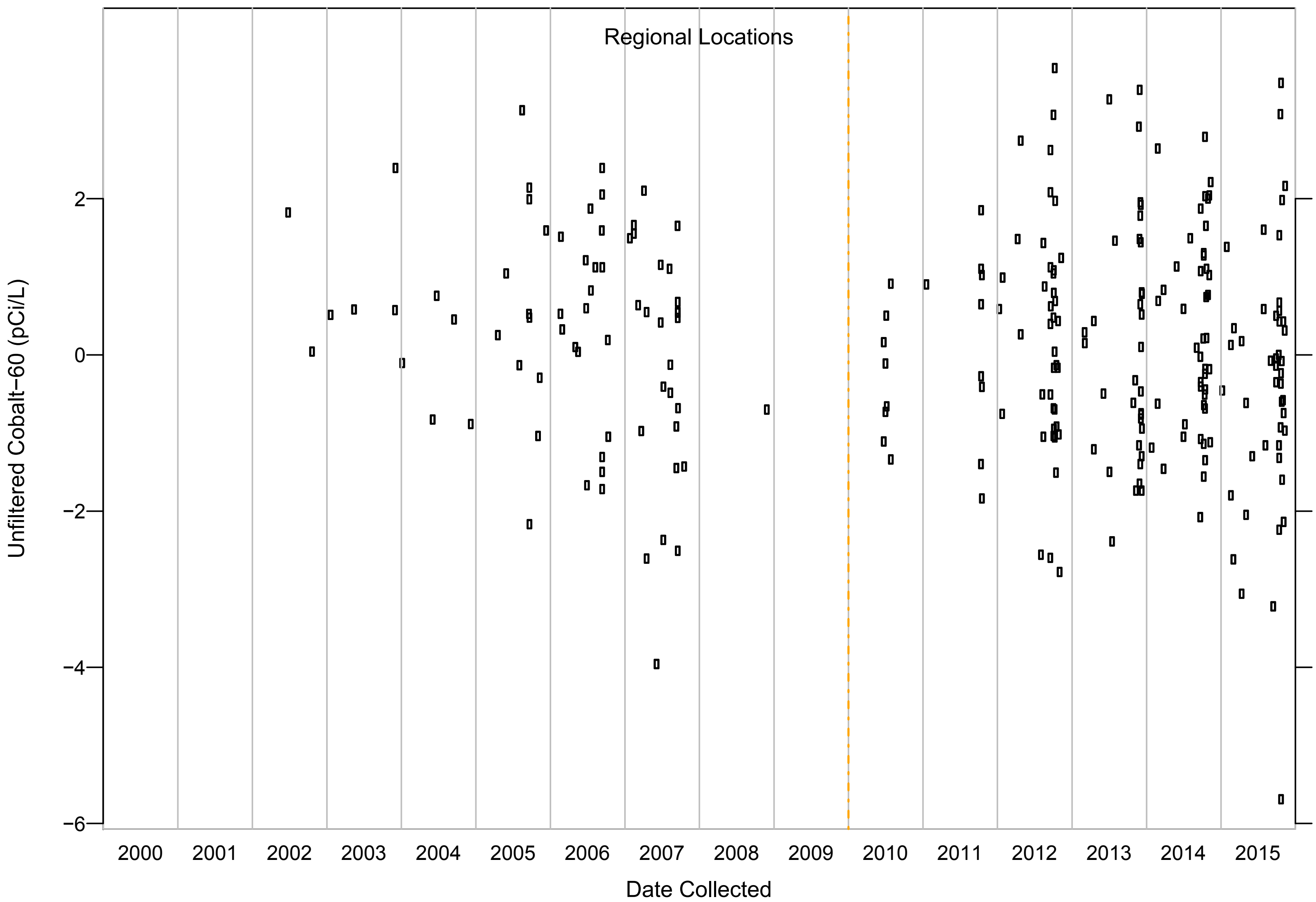



**Figure C-50 Unfiltered cobalt-60 results for regional aquifer**

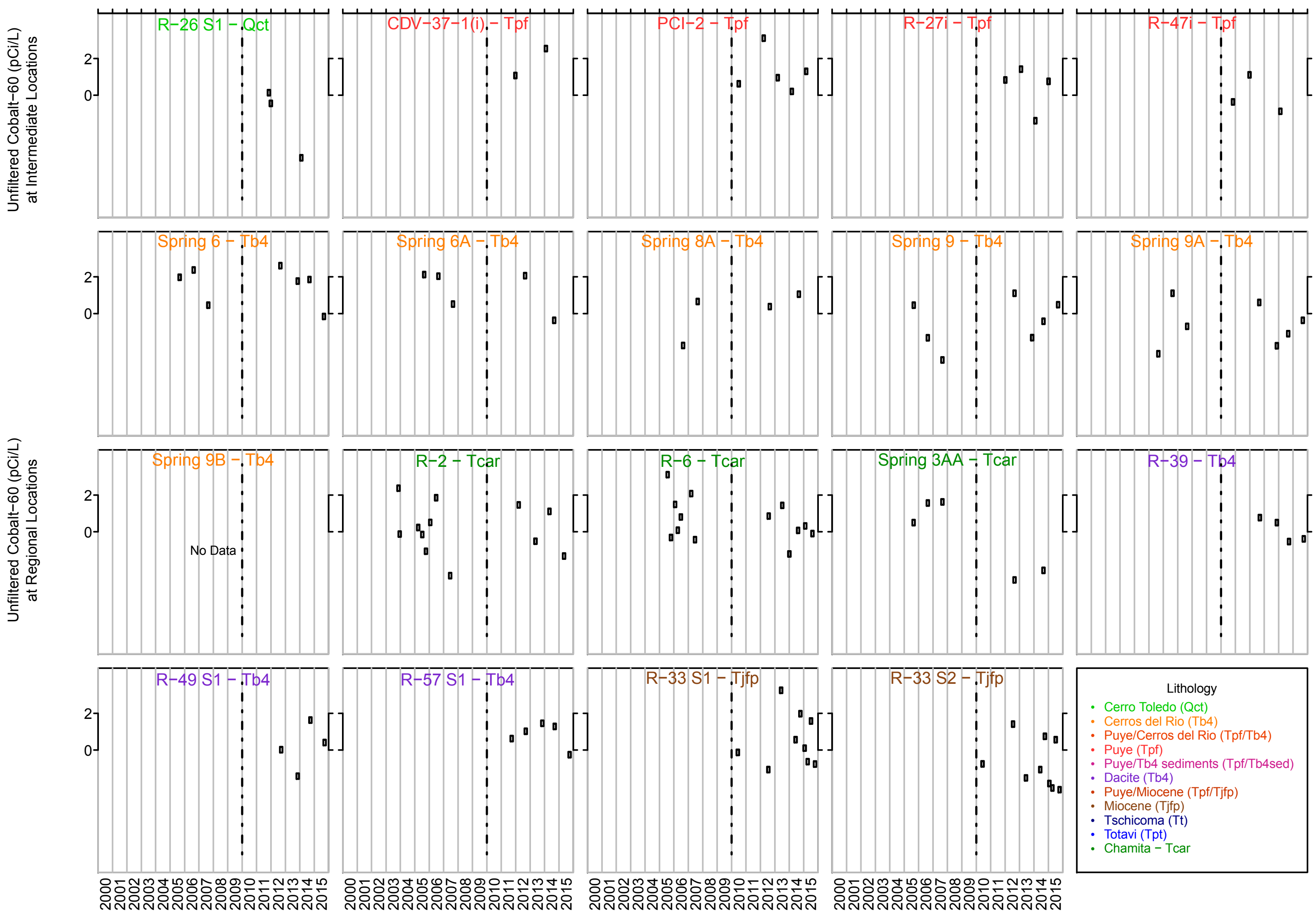



**Figure C-51 Time-series plots for unfiltered cobalt-60**

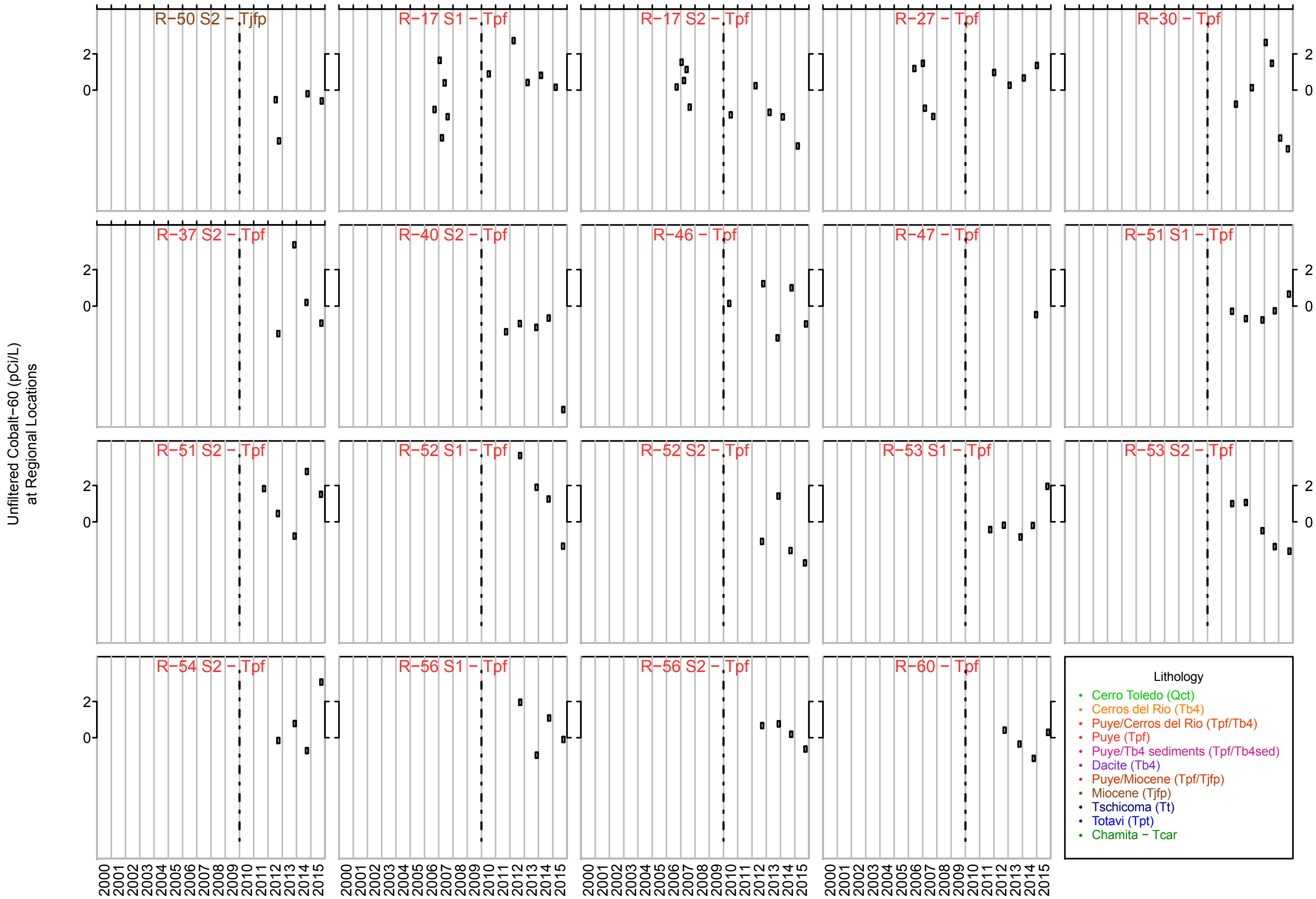



**Figure C-51 (continued)** **Time-series plots for unfiltered cobalt-60**

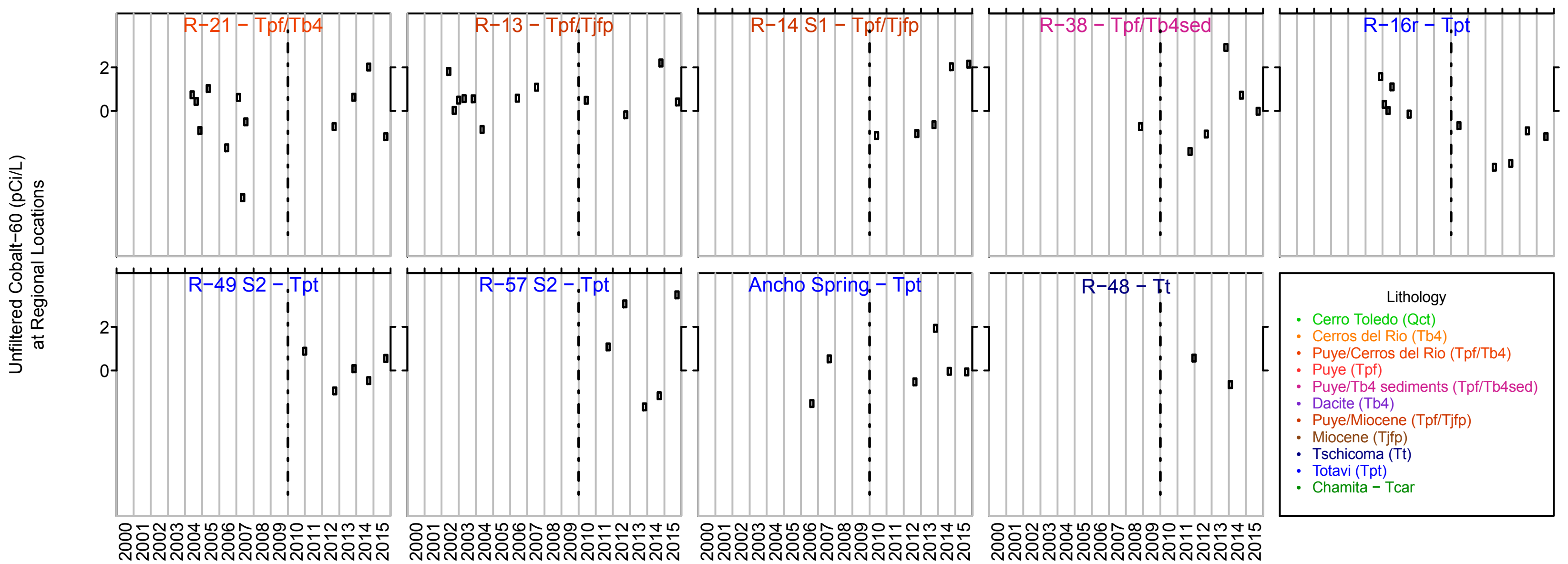



**Figure C-51 (continued) Time-series plots for unfiltered cobalt-60**

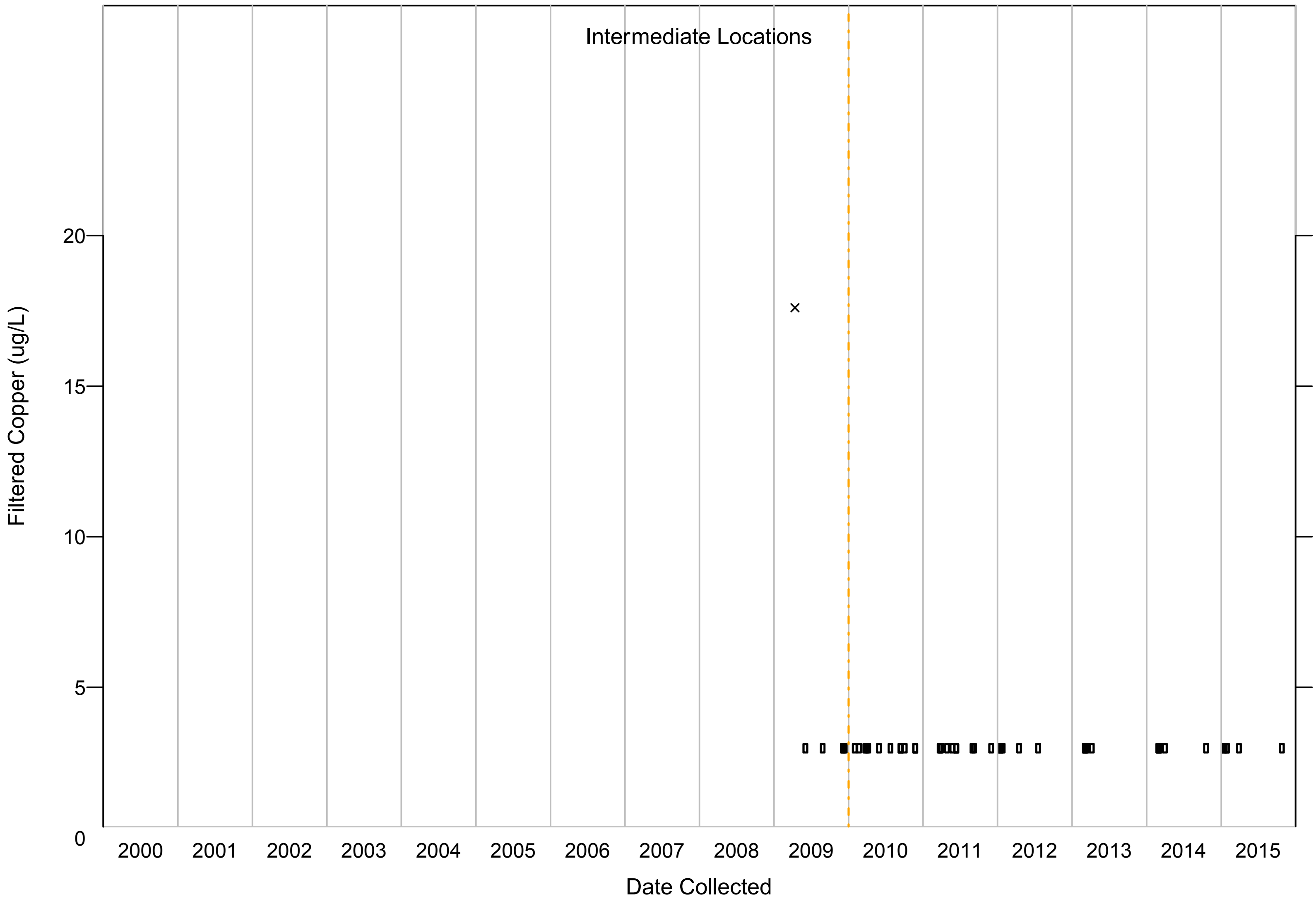



**Figure C-52 Filtered copper results for perched-intermediate groundwater**

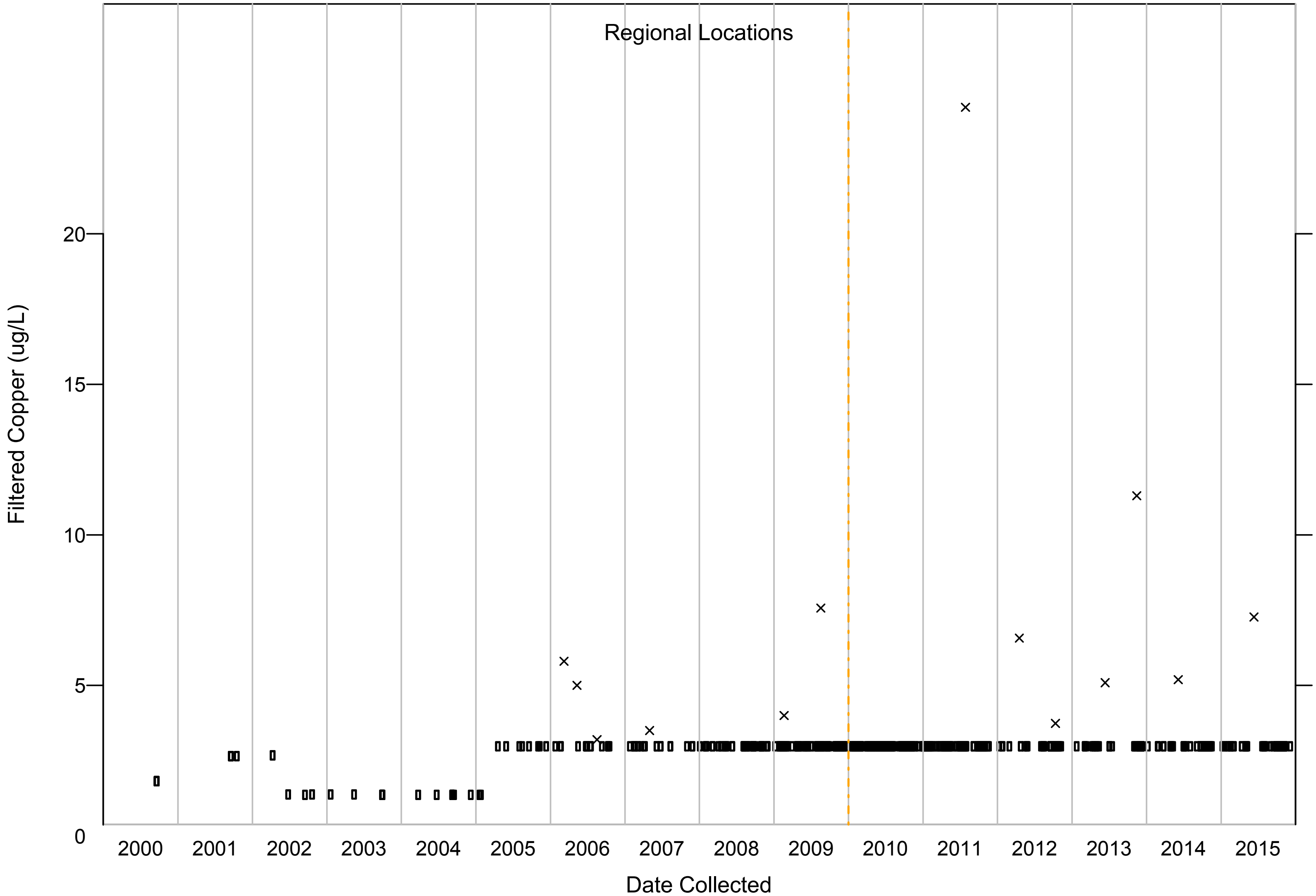



**Figure C-53 Filtered copper results for regional aquifer**

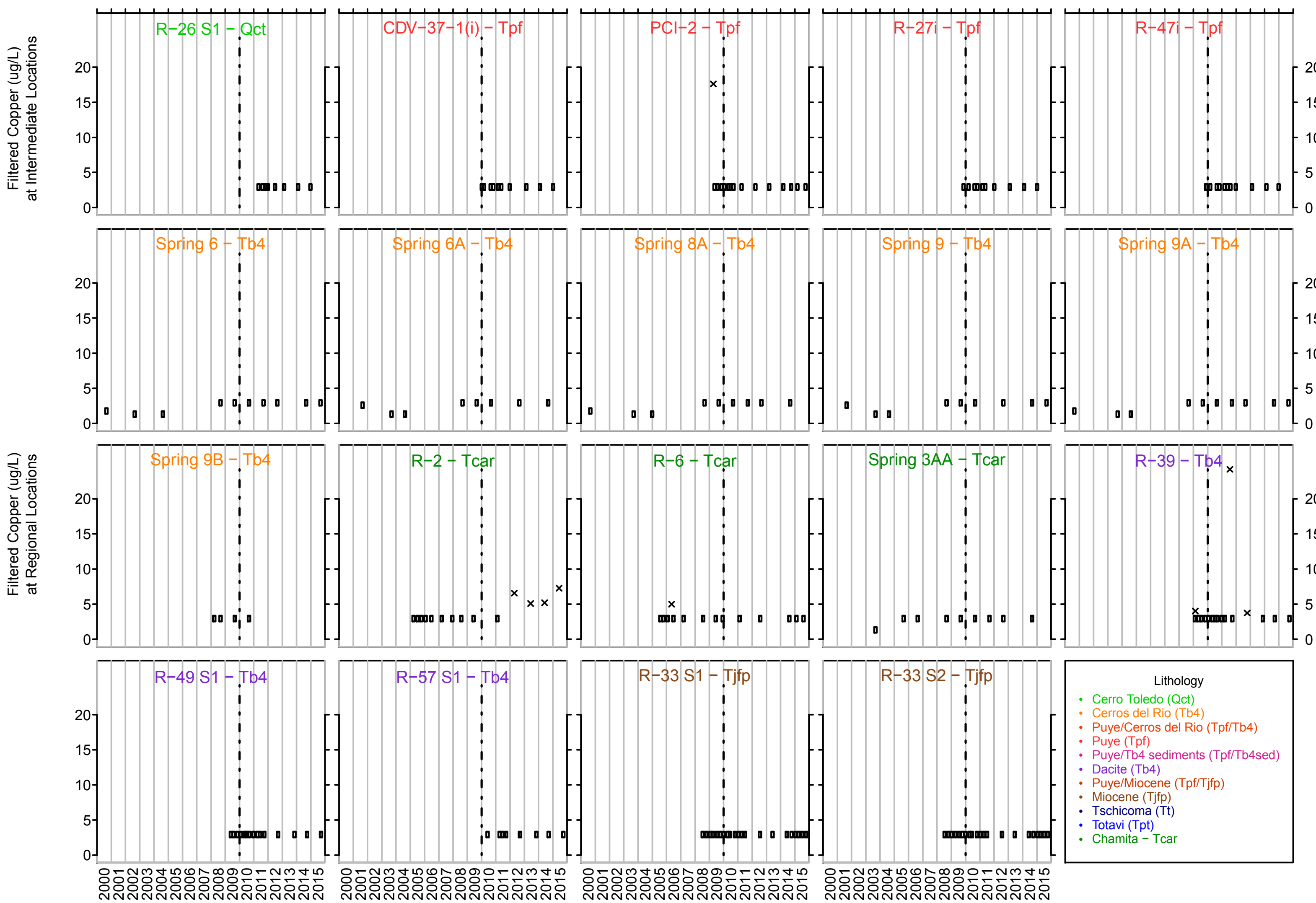



**Figure C-54 Time-series plots for filtered copper**

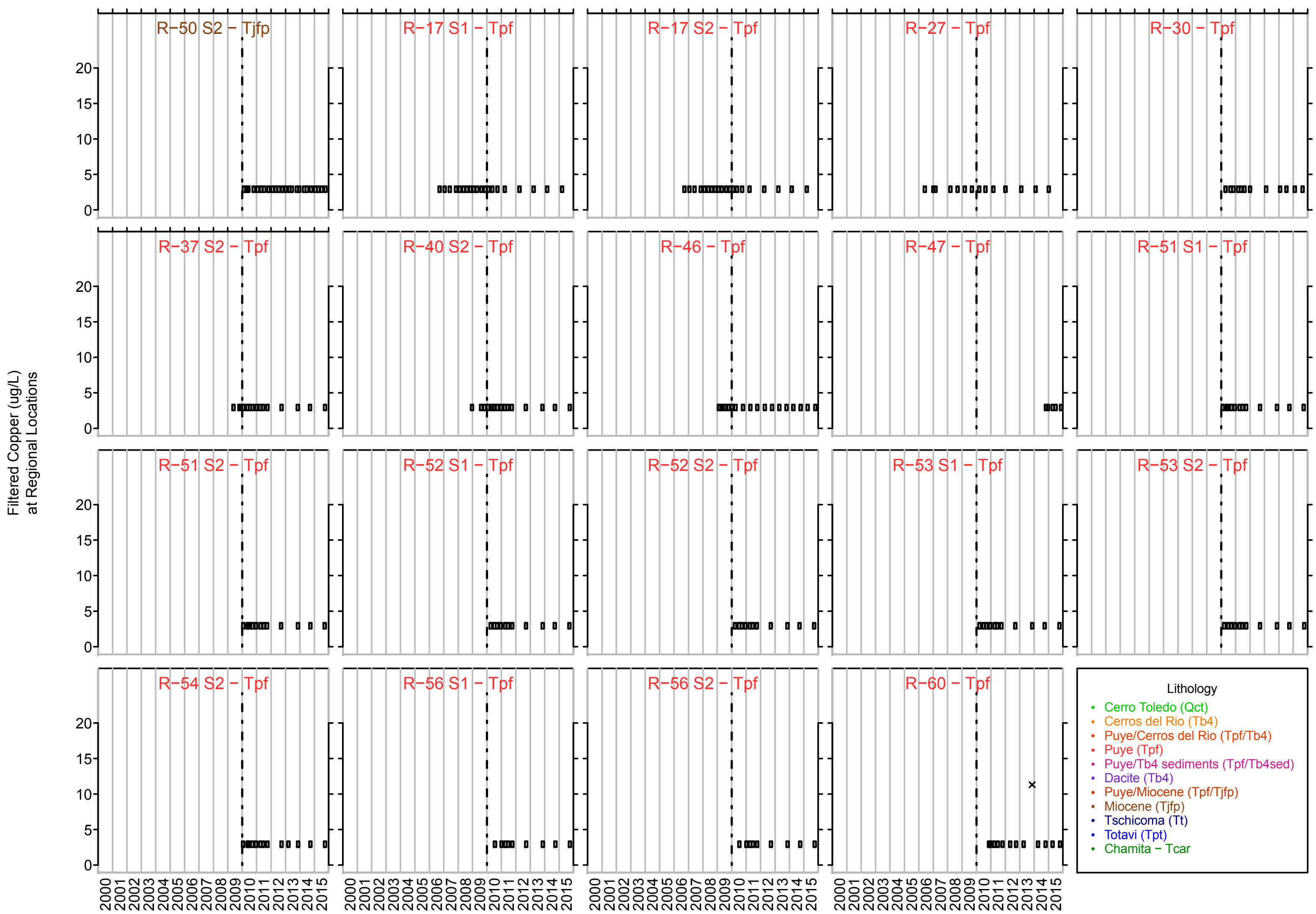



**Figure C-54 (continued) Time-series plots for filtered copper**

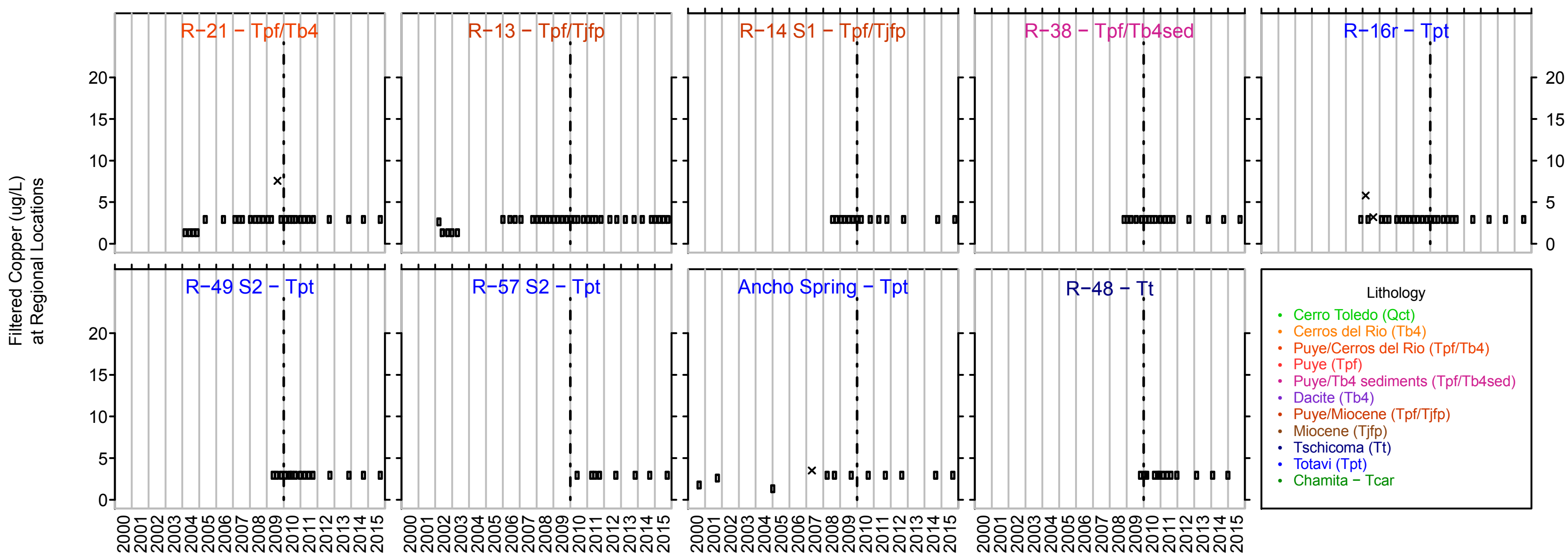



**Figure C-54 (continued) Time-series plots for filtered copper**

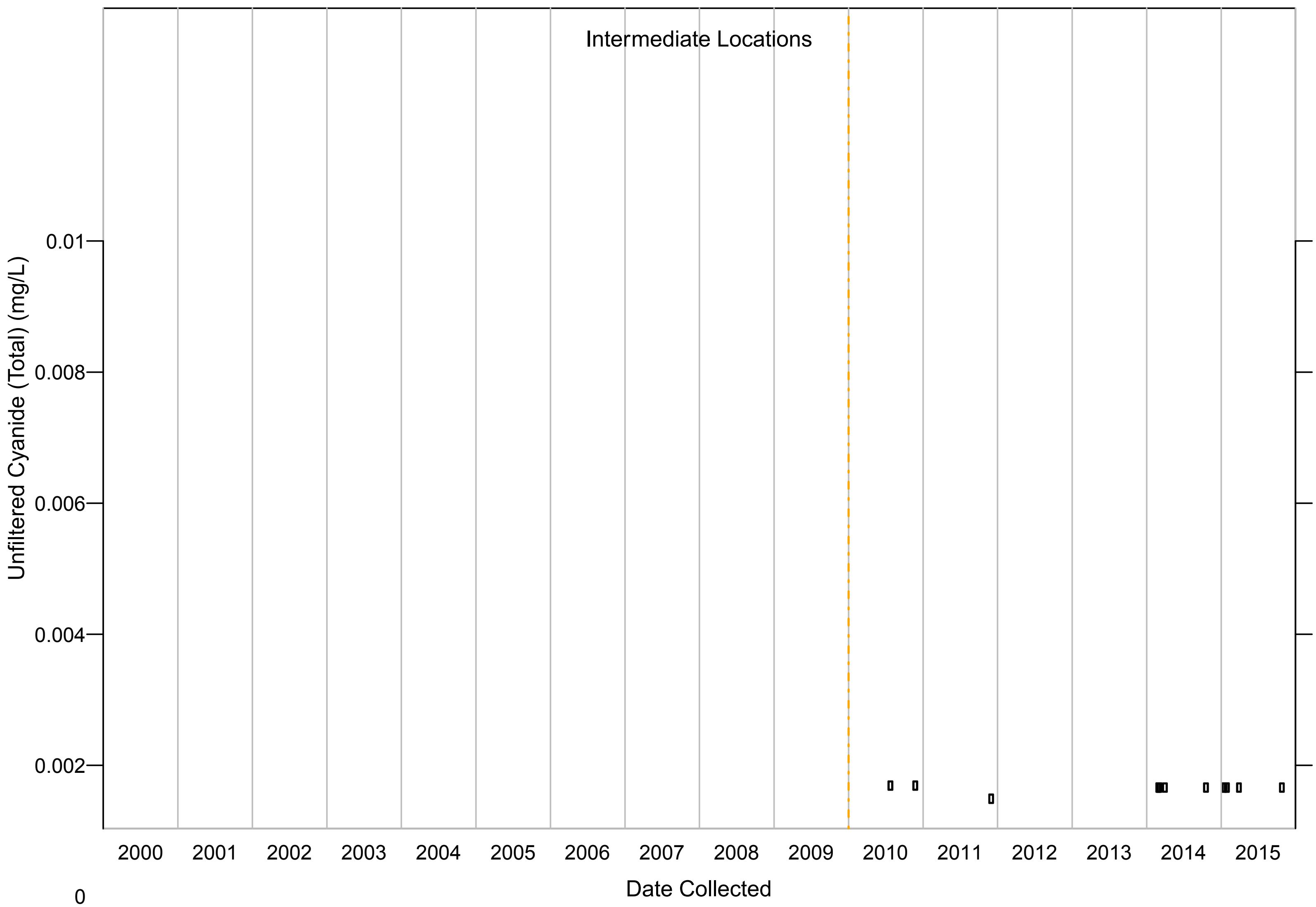



**Figure C-55 Unfiltered cyanide results for perched-intermediate groundwater**

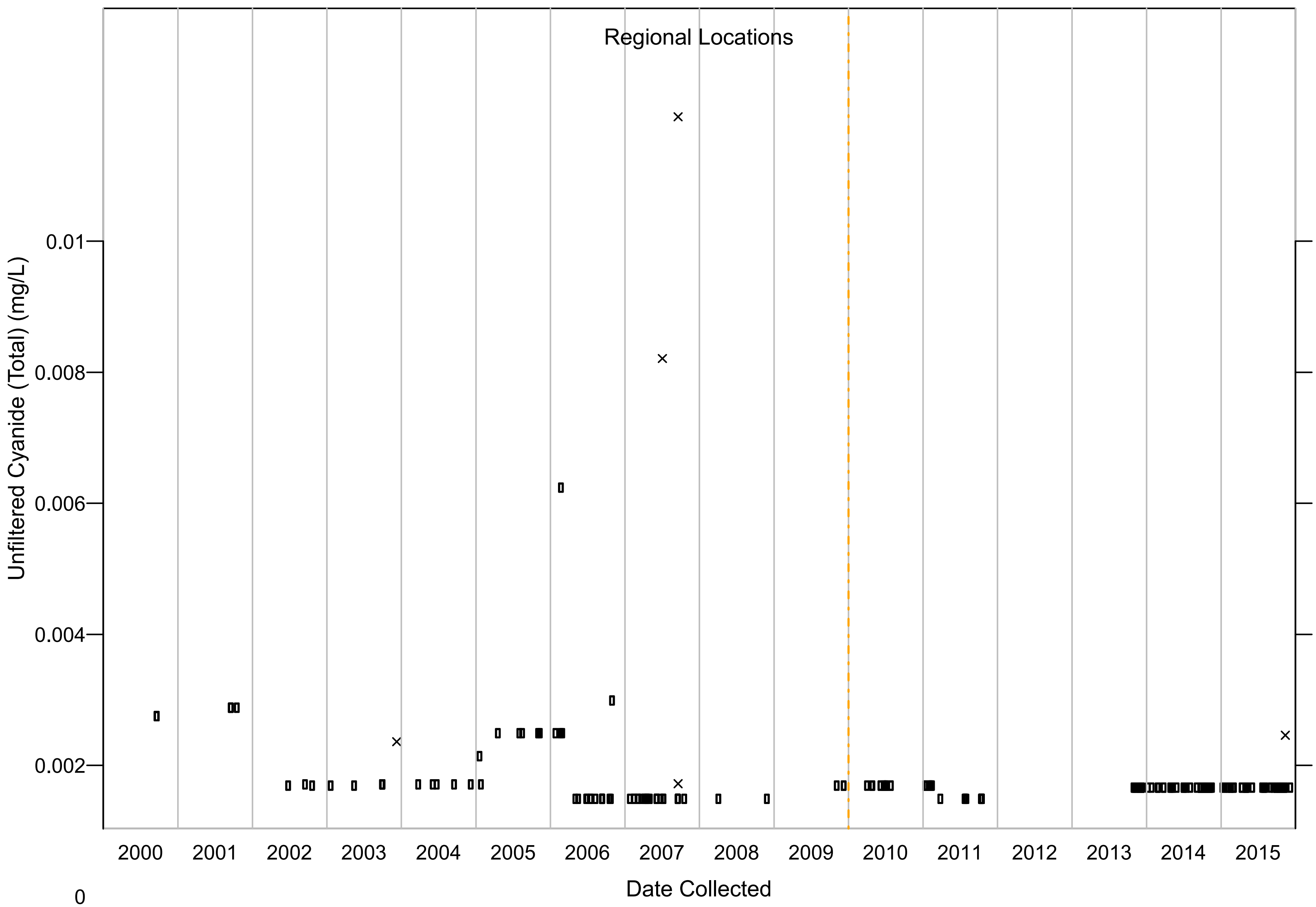



**Figure C-56 Unfiltered cyanide results for regional aquifer**

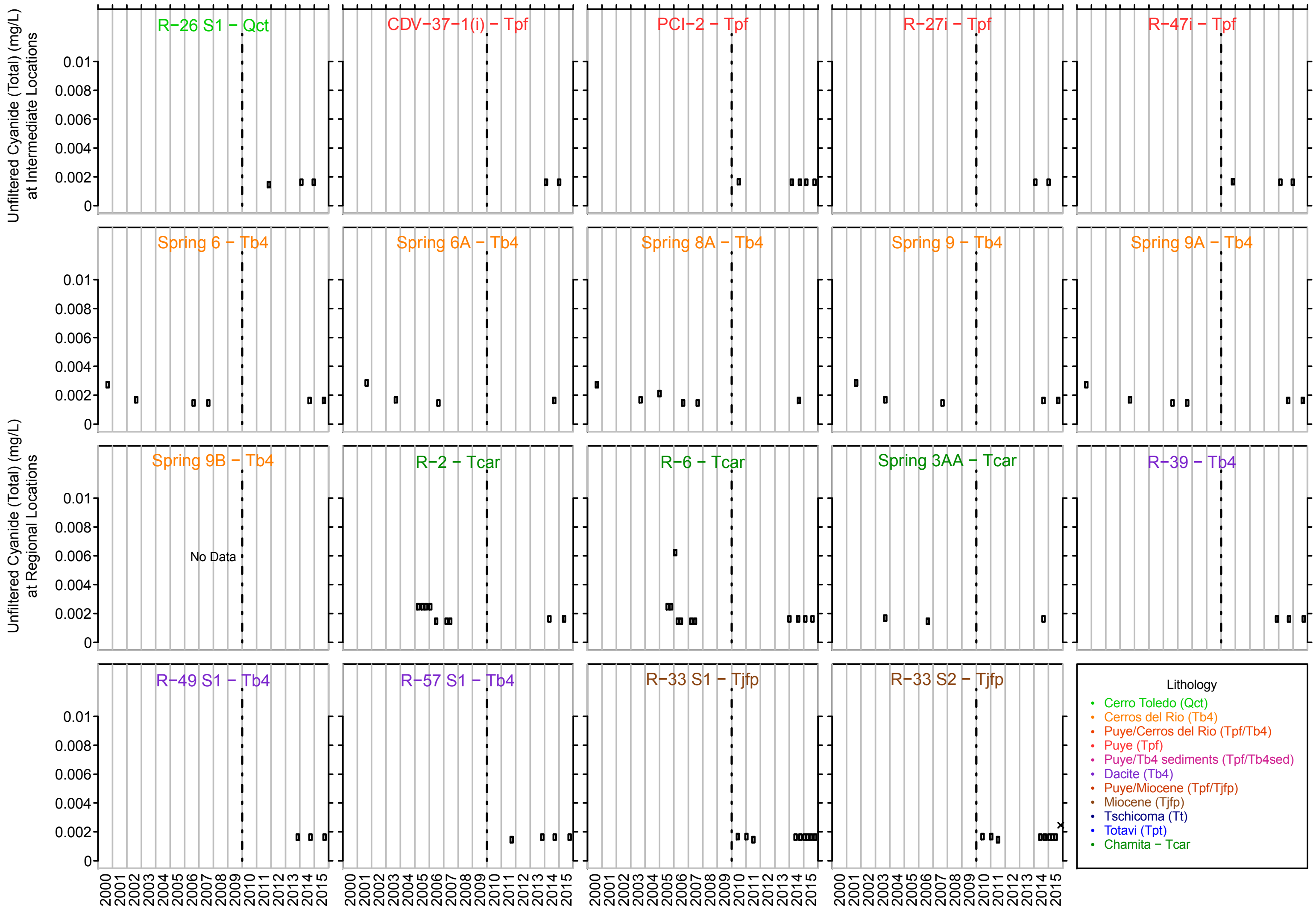



**Figure C-57 Time-series plots for unfiltered cyanide**

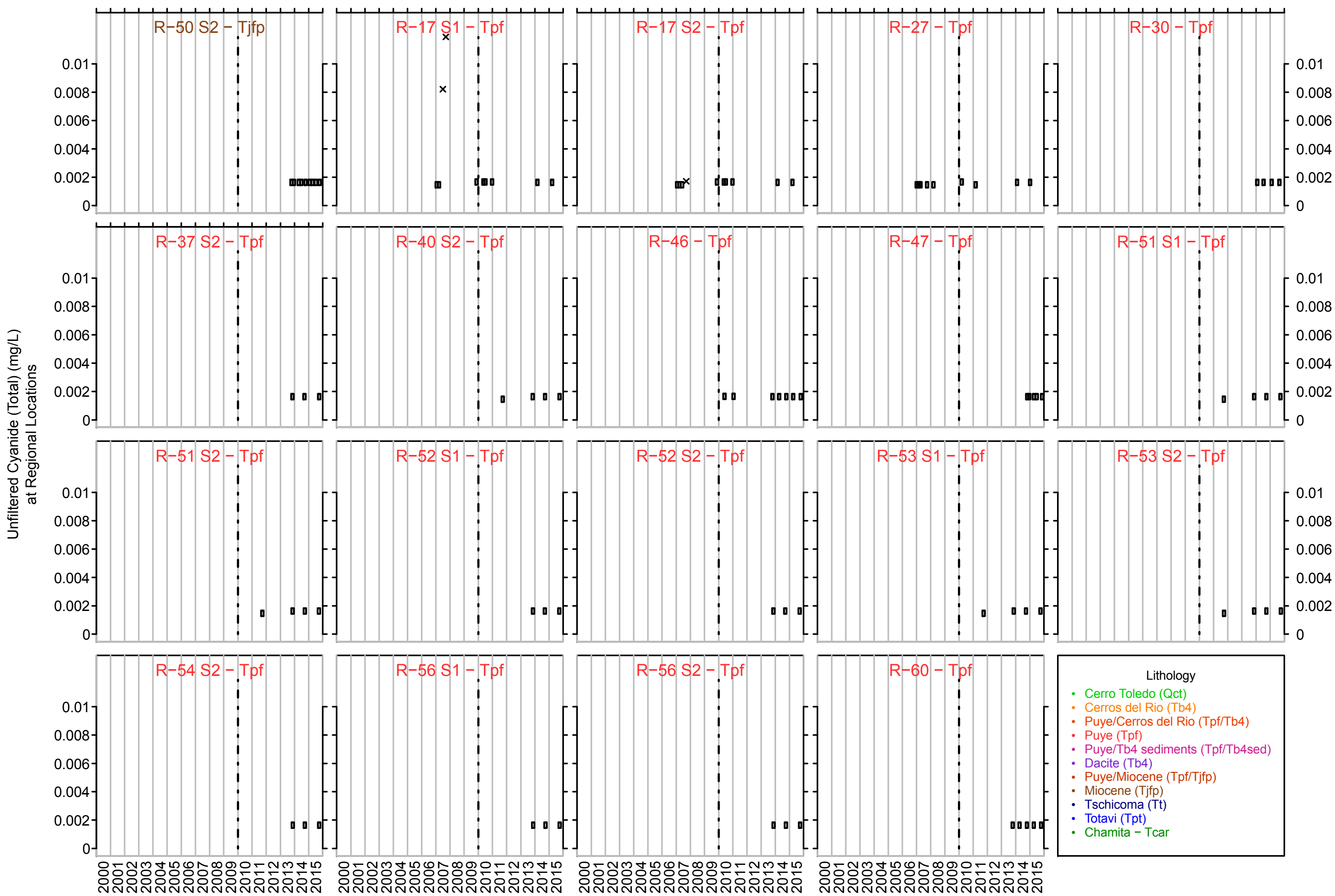



**Figure C-57 (continued)** **Time-series plots for unfiltered cyanide**

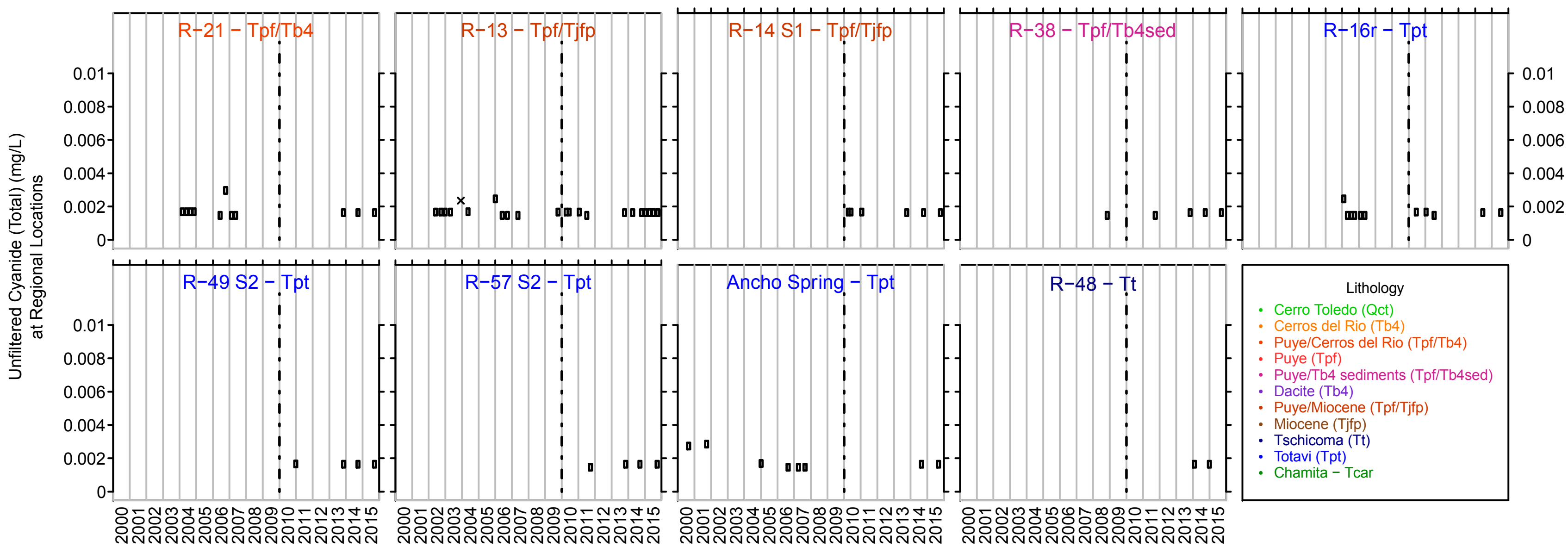



**Figure C-57 (continued) Time-series plots for unfiltered cyanide**

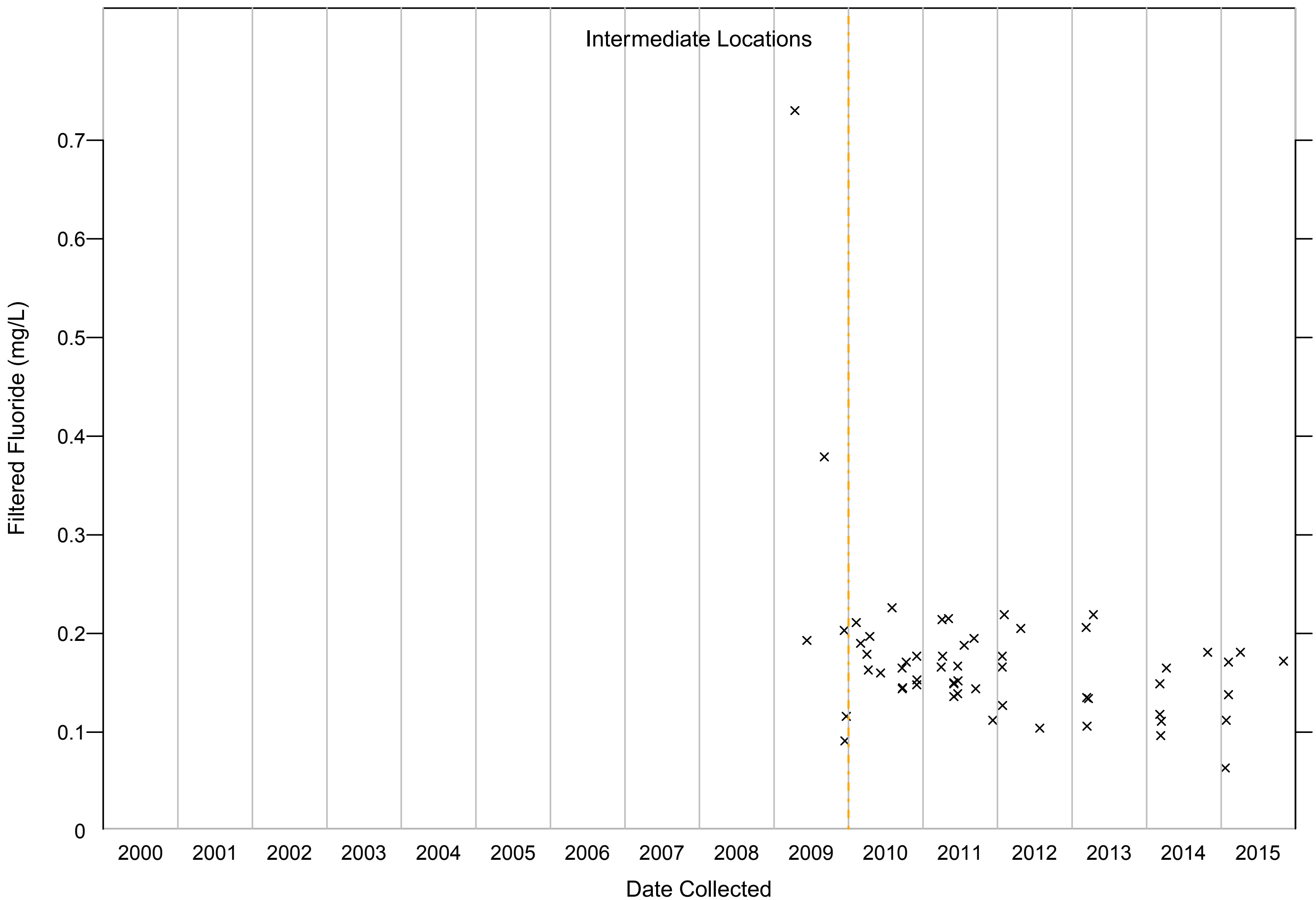



**Figure C-58 Filtered fluoride results for perched-intermediate groundwater**

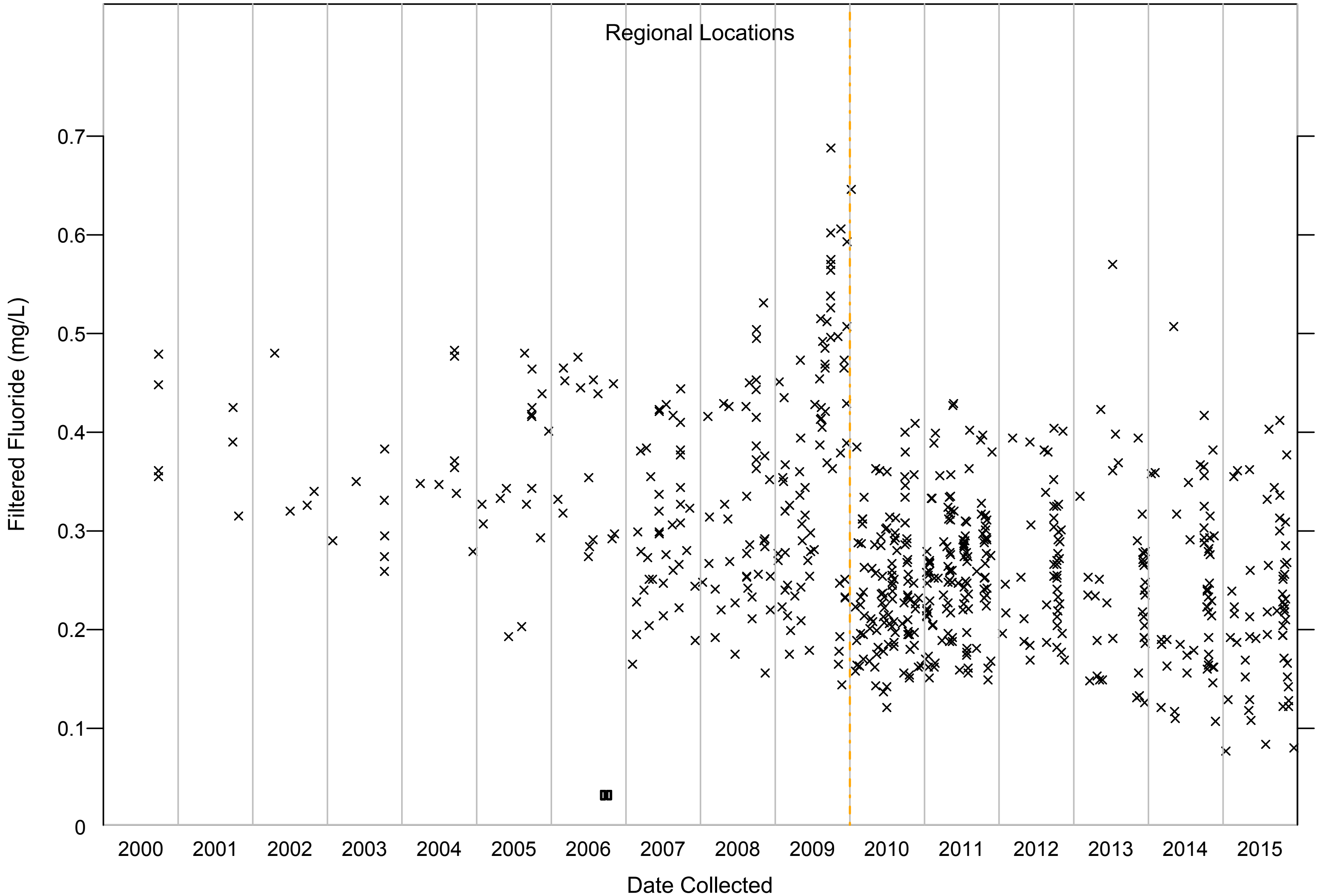



**Figure C-59 Filtered fluoride results for regional aquifer**

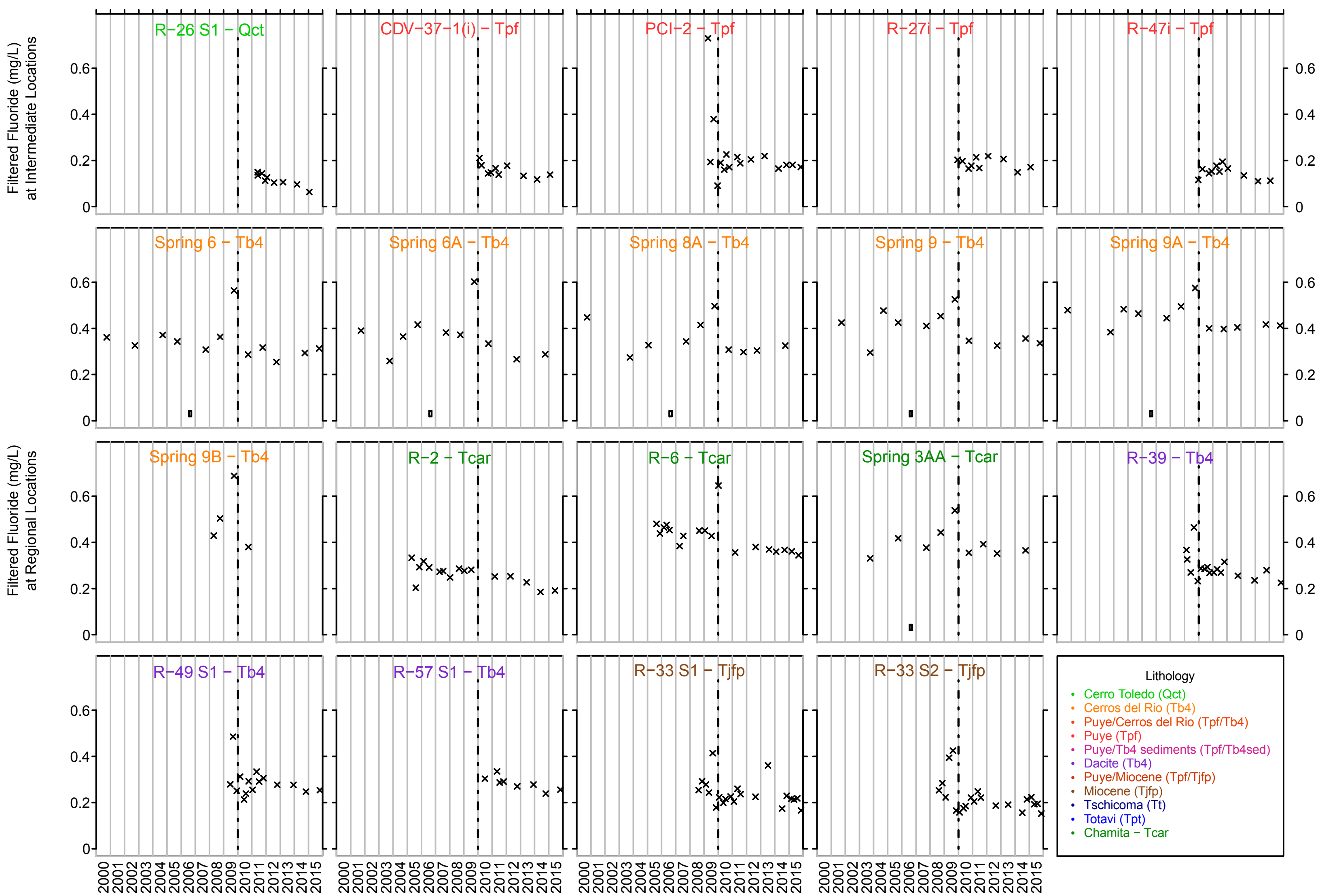



**Figure C-60 Time-series plots for filtered fluoride**

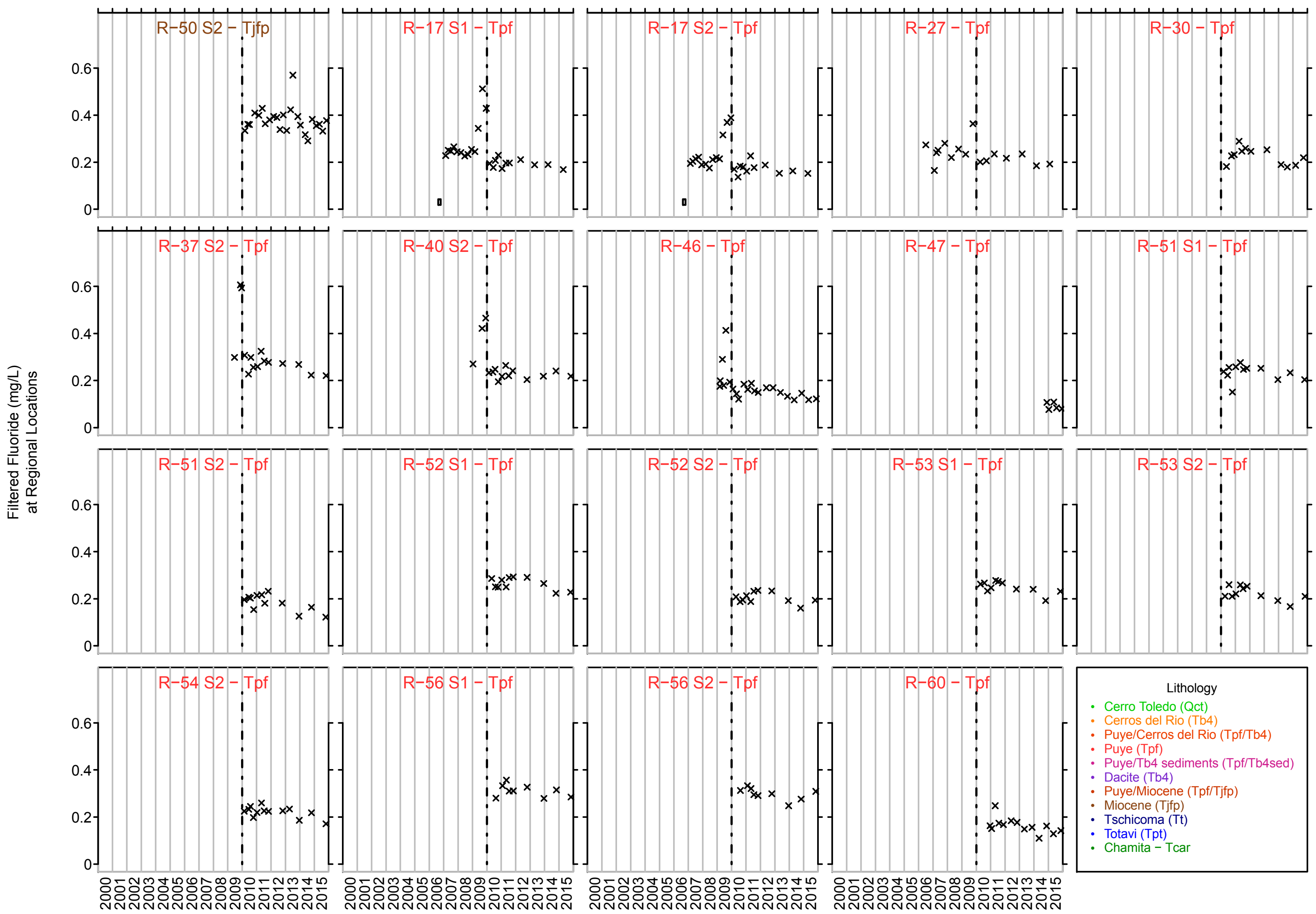



**Figure C-60 (continued) Time-series plots for filtered fluoride**

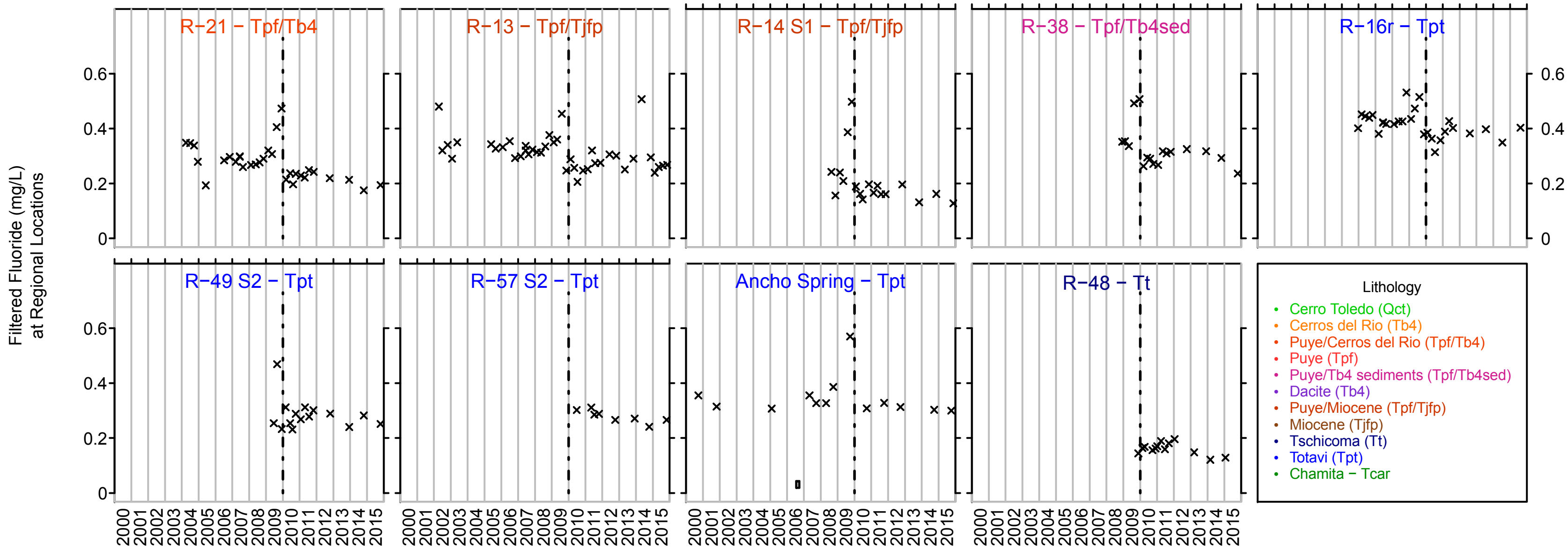



**Figure C-60 (continued) Time-series plots for filtered fluoride**

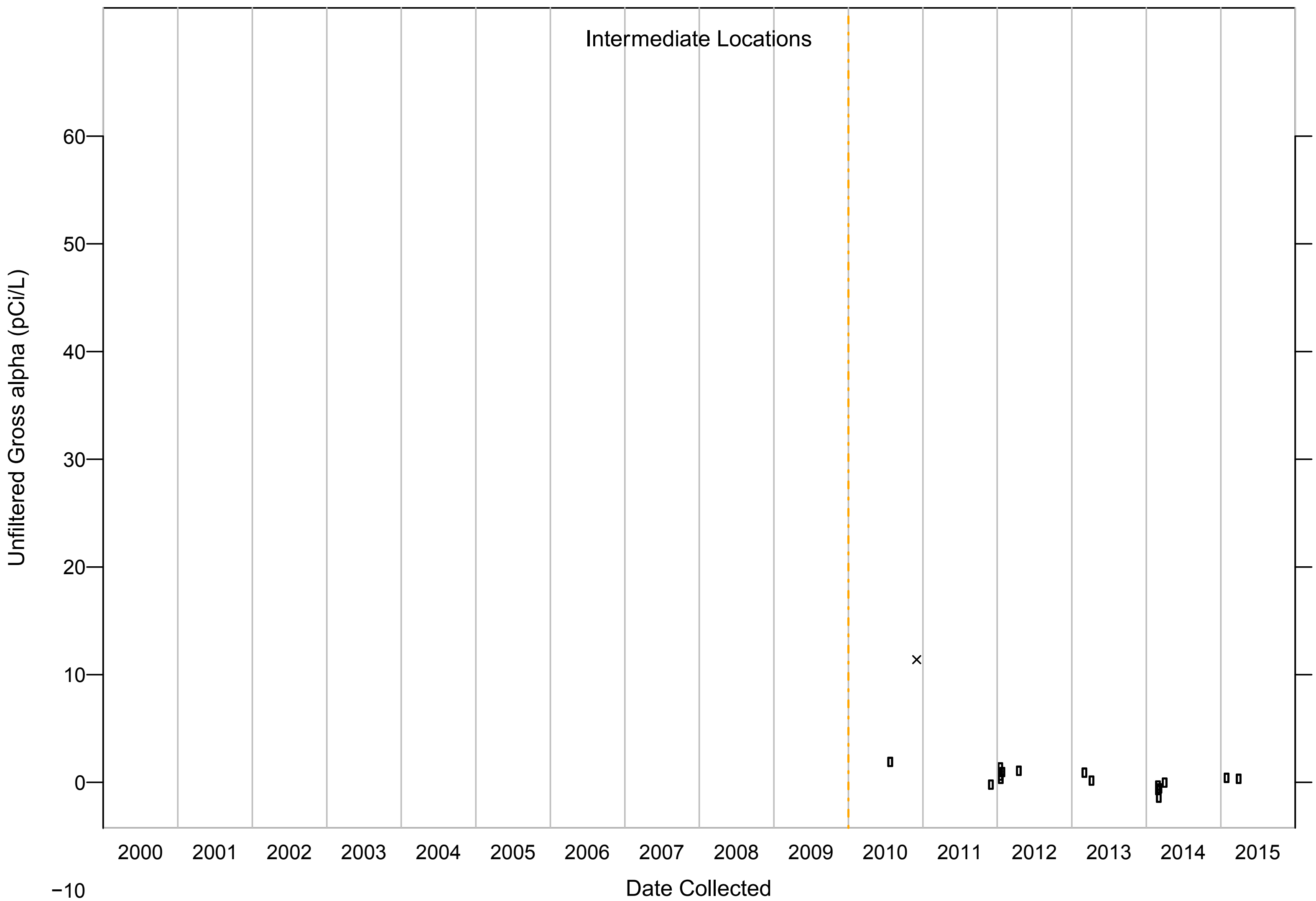



**Figure C-61 Unfiltered gross-alpha radioactivity results for perched-intermediate groundwater**

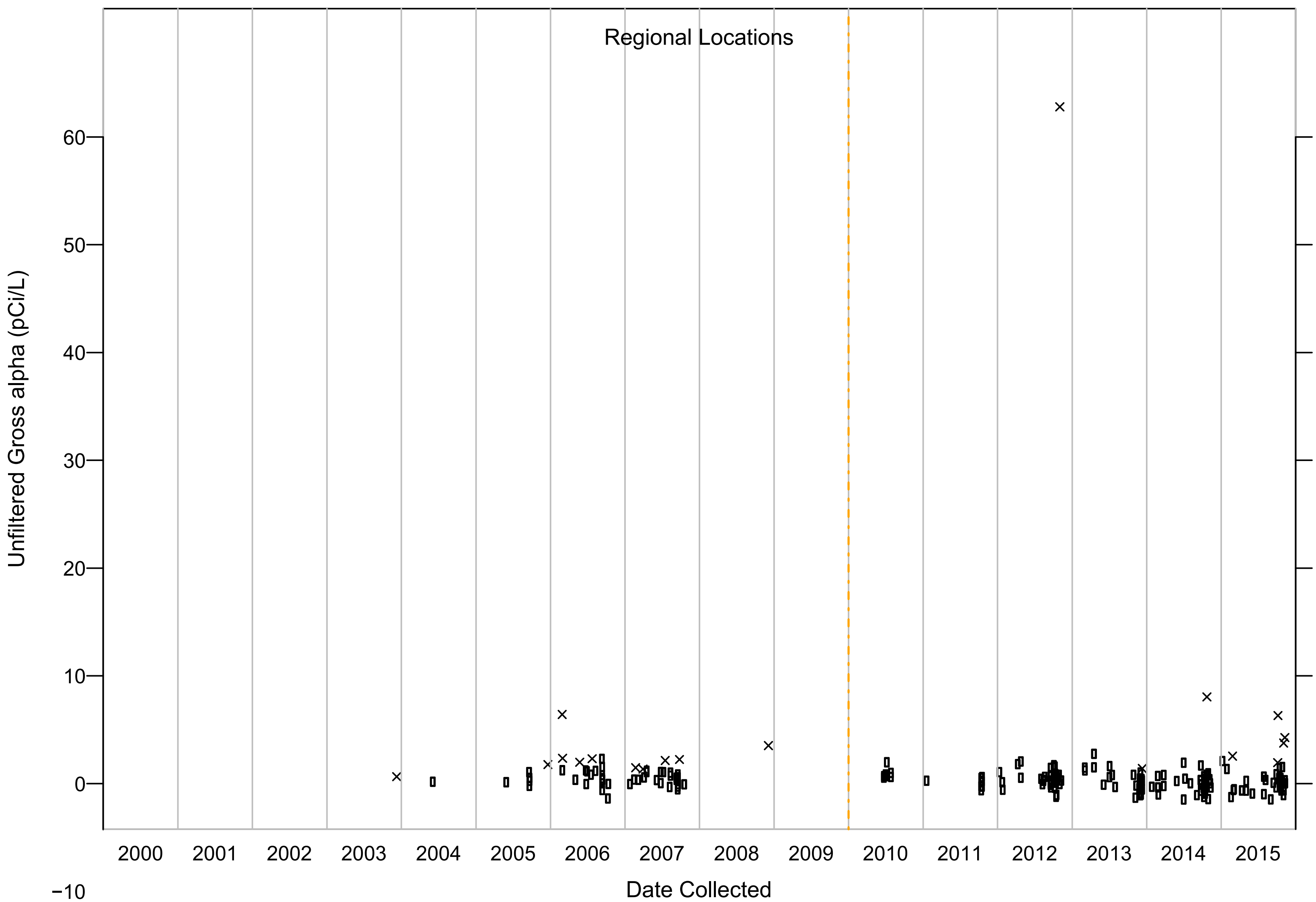



**Figure C-62 Unfiltered gross-alpha radioactivity results for regional aquifer**

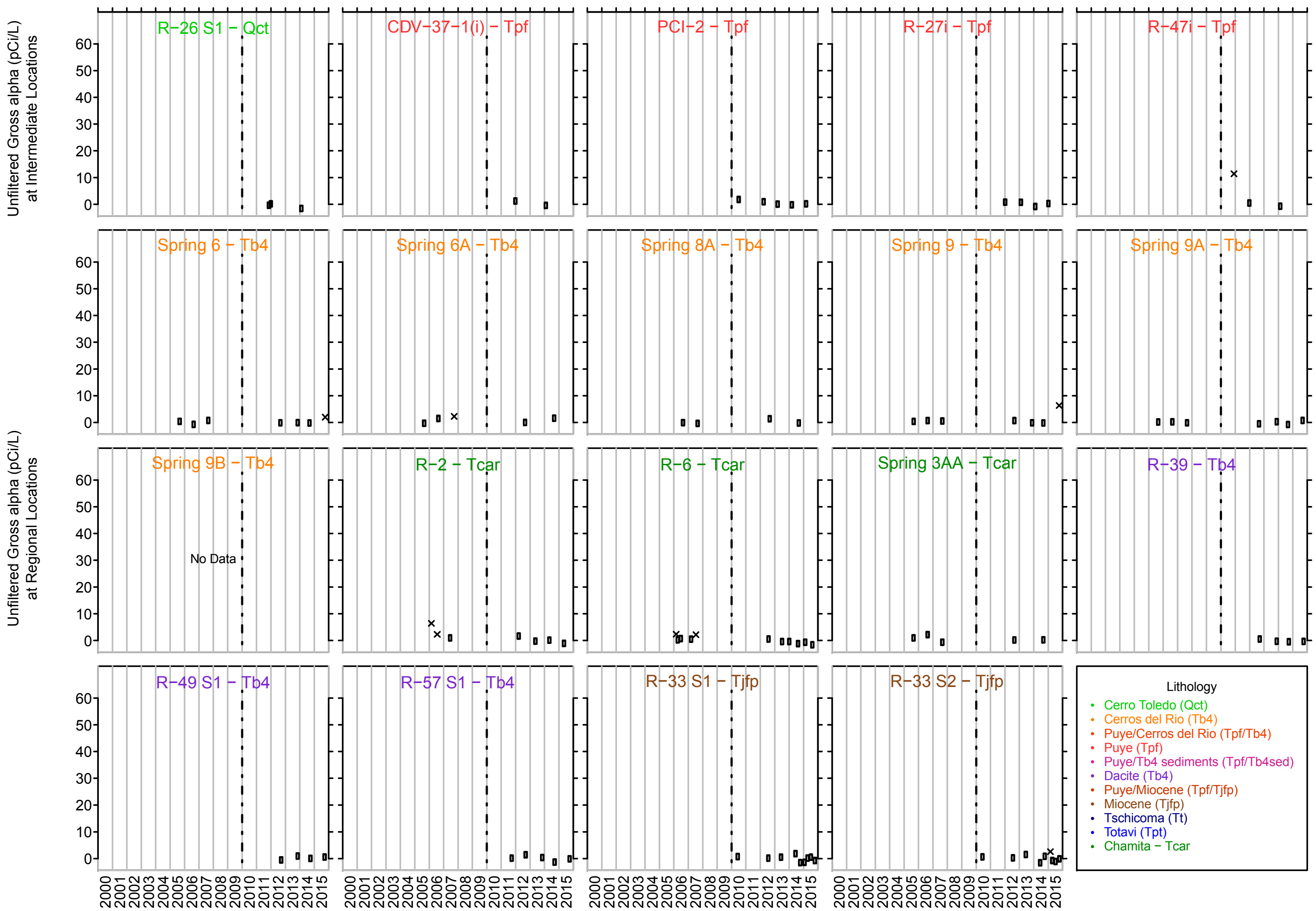



**Figure C-63 Time-series plots for unfiltered gross-alpha radioactivity**

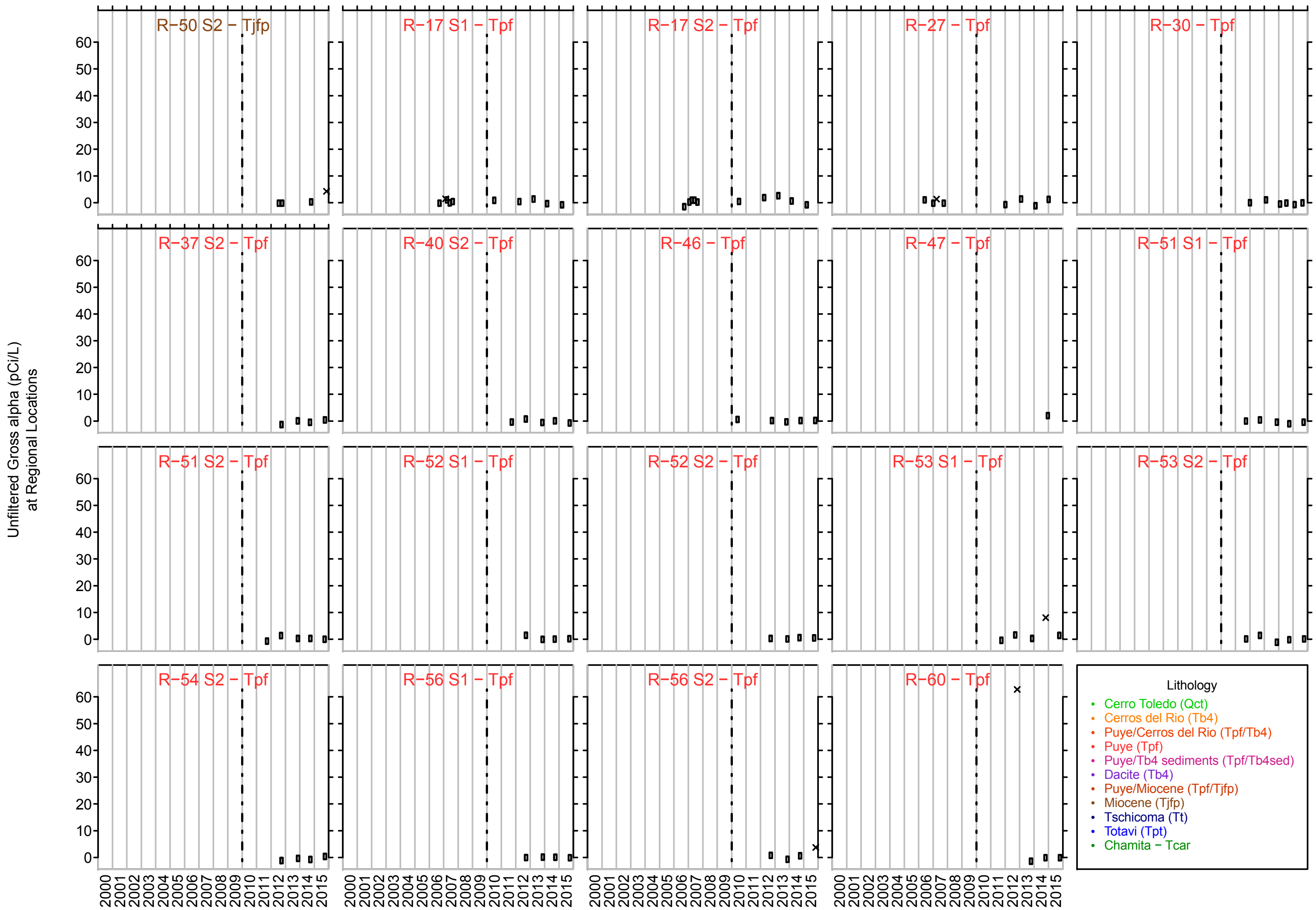



**Figure C-63 (continued)  Time-series plots for unfiltered gross-alpha radioactivity**

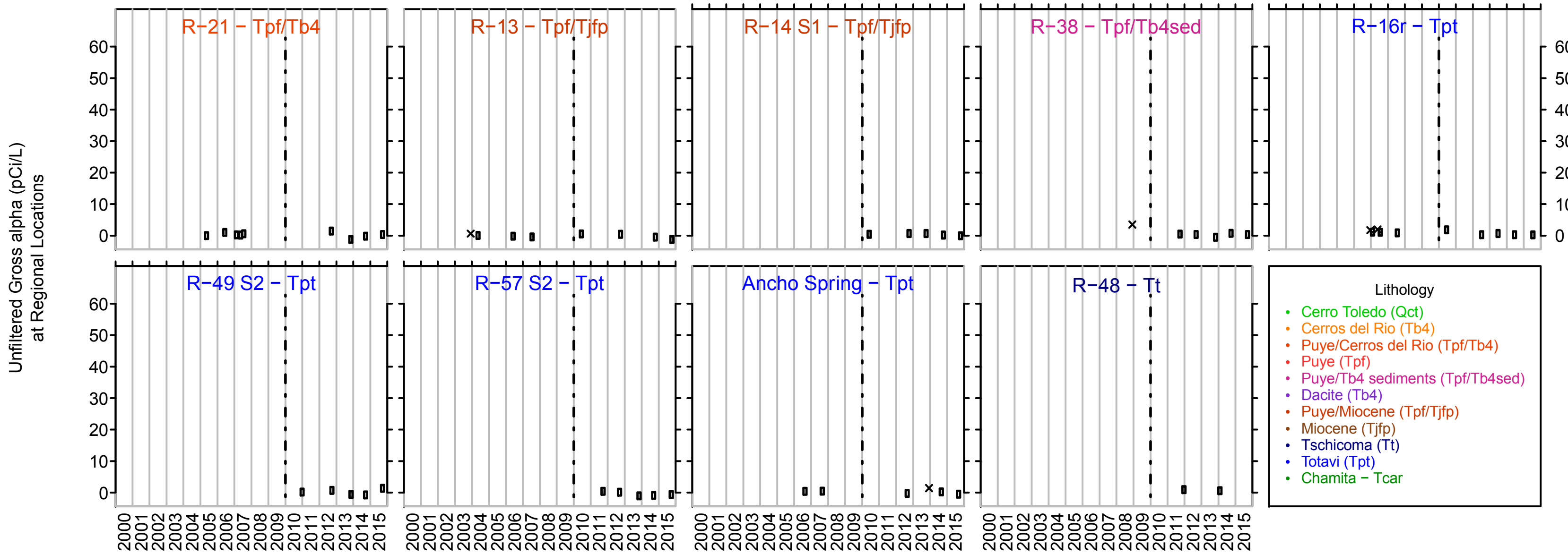



**Figure C-63 (continued)** **Time-series plots for unfiltered gross-alpha radioactivity**

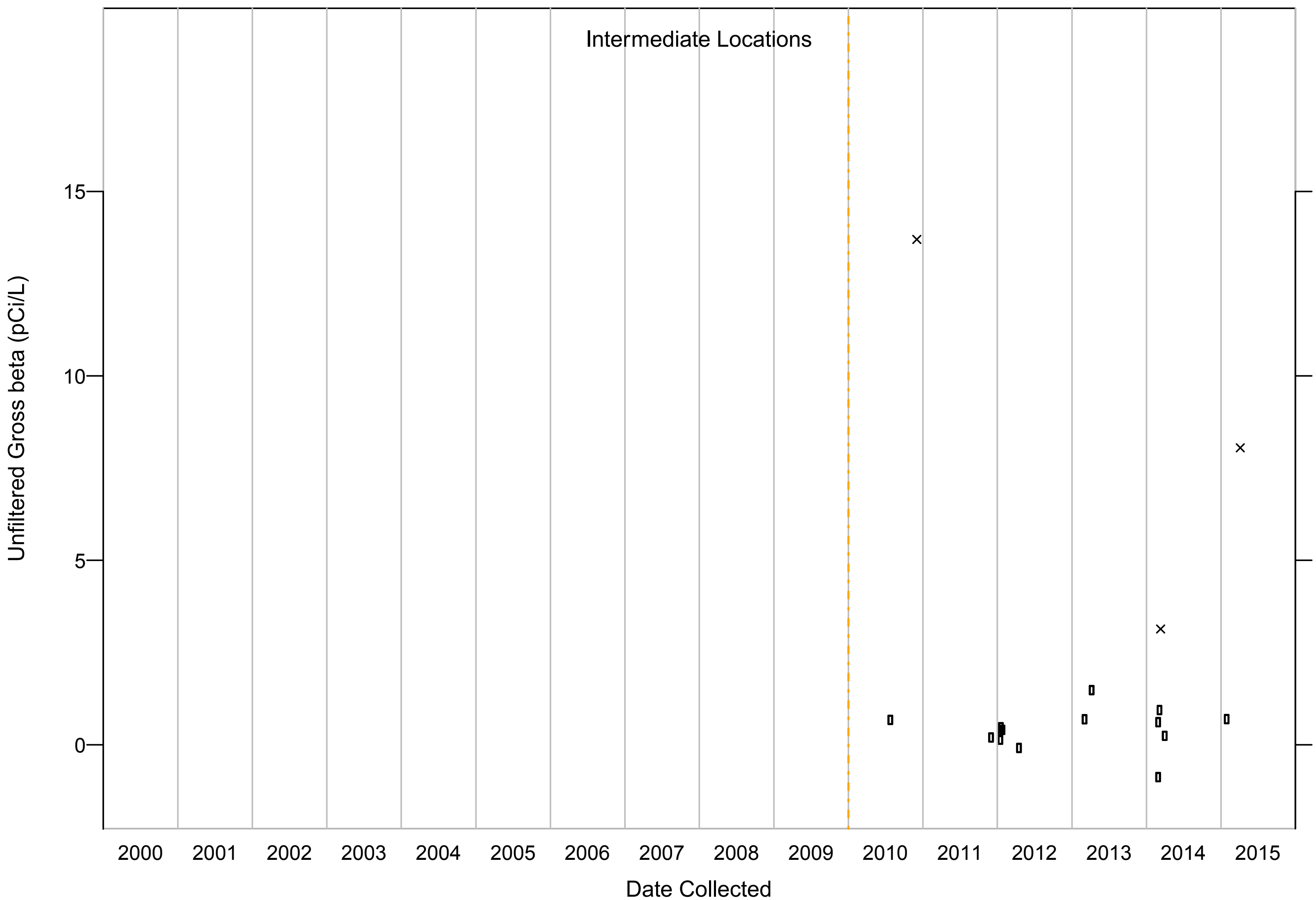



**Figure C-64 Unfiltered gross-beta radioactivity results for perched-intermediate groundwater**

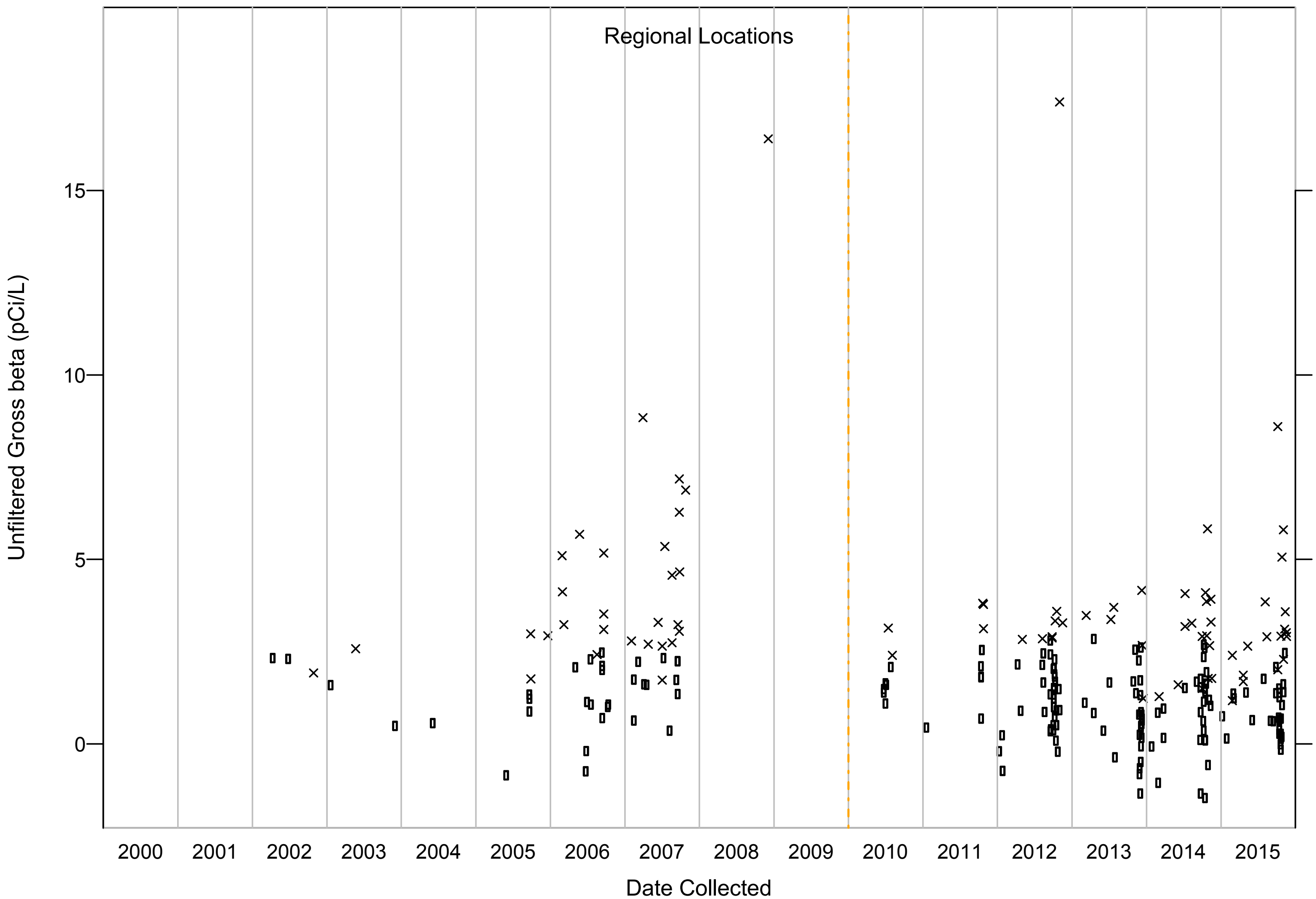



**Figure C-65 Unfiltered gross-beta radioactivity results for regional aquifer**

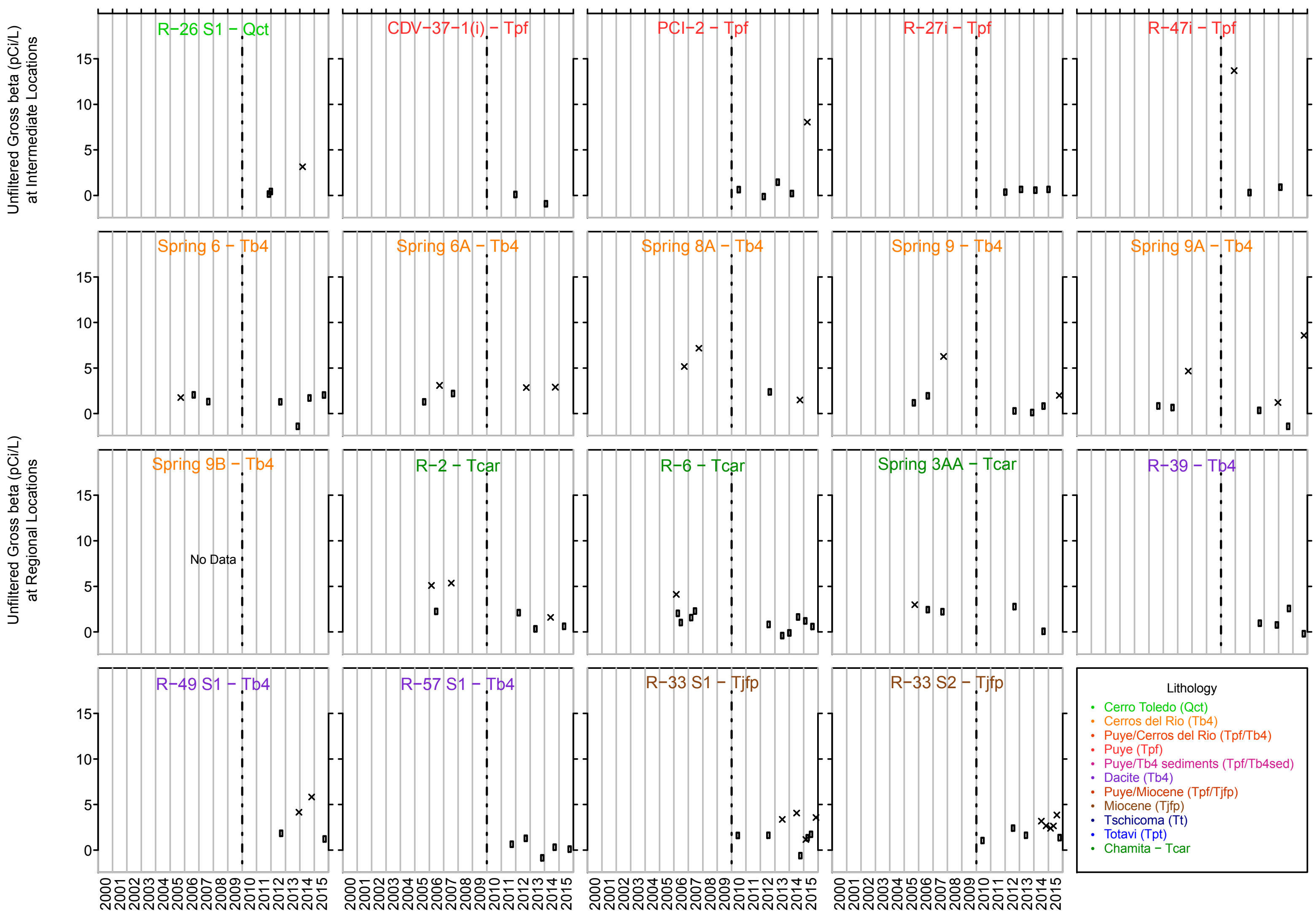



**Figure C-66 Time-series plots for unfiltered gross-beta radioactivity**

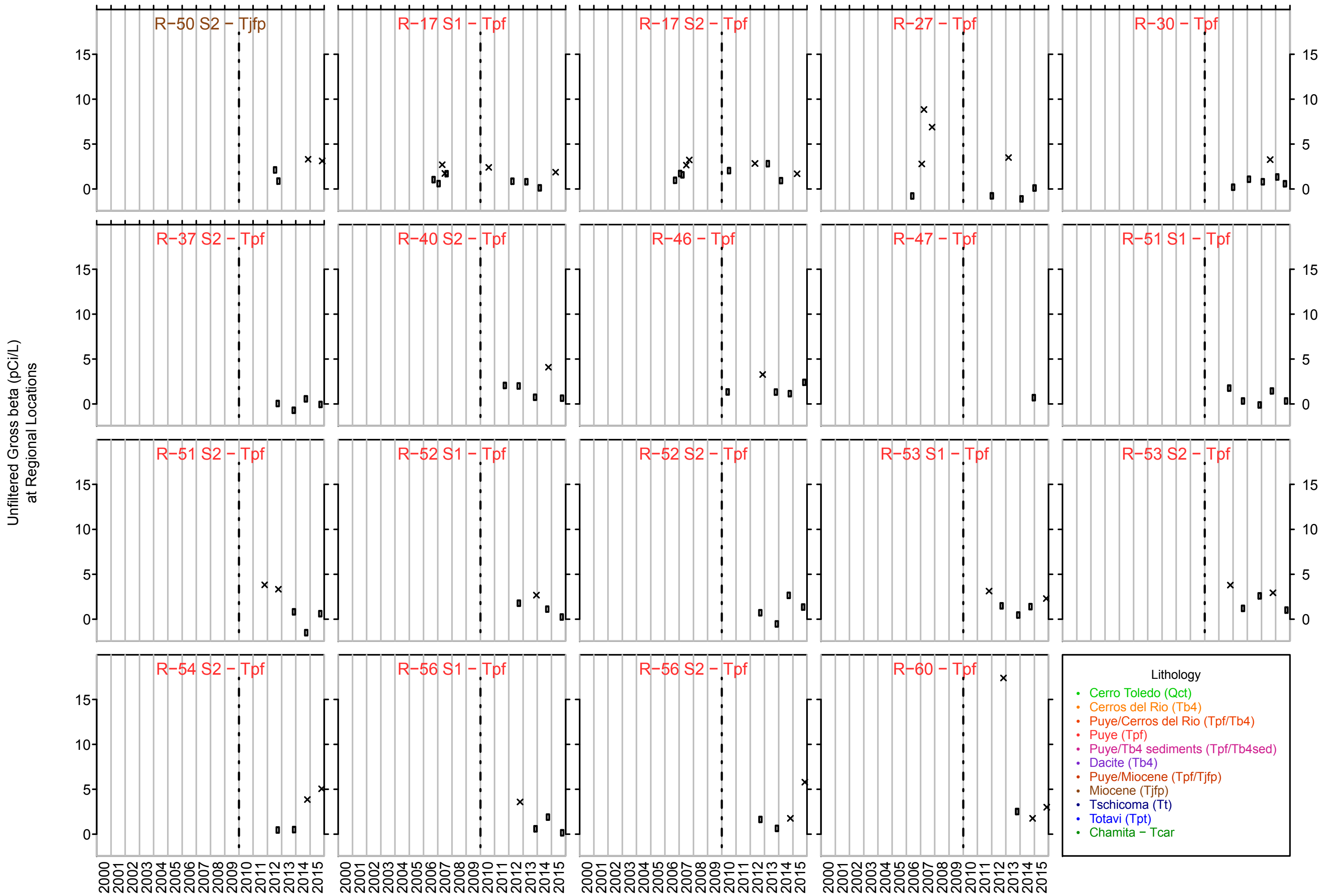



**Figure C-66 (continued)** **Time-series plots for unfiltered gross-beta radioactivity**

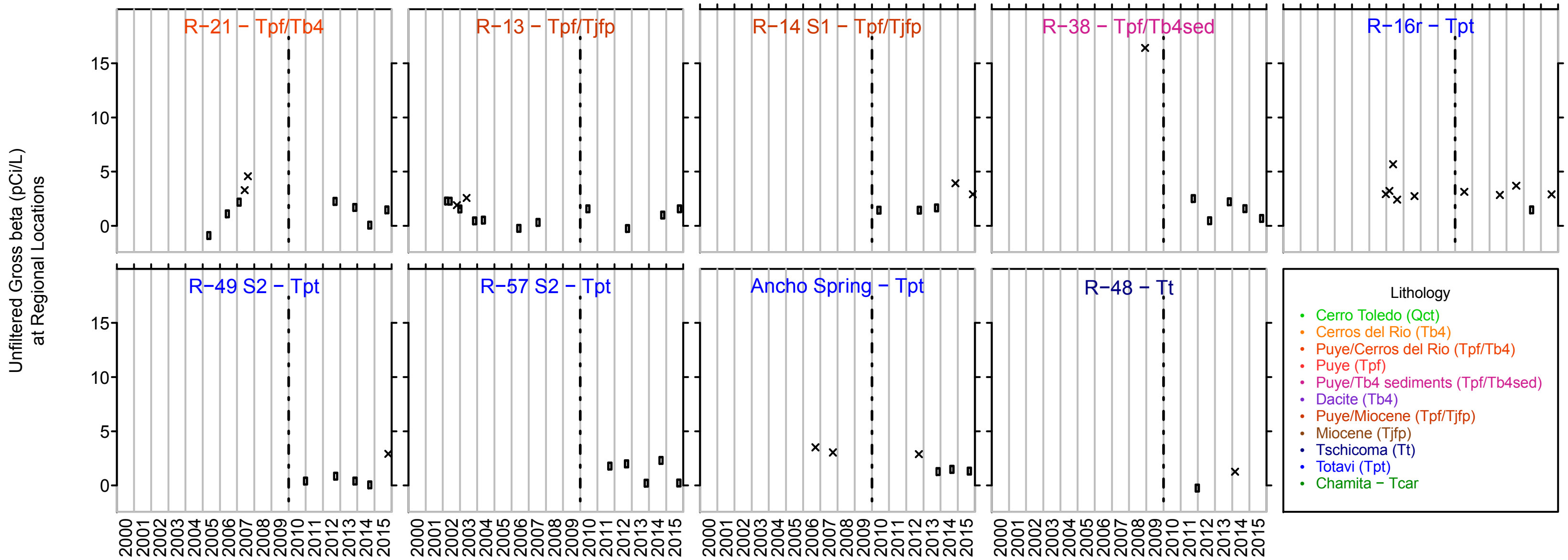



**Figure C-66 (continued)** **Time-series plots for unfiltered gross-beta radioactivity**

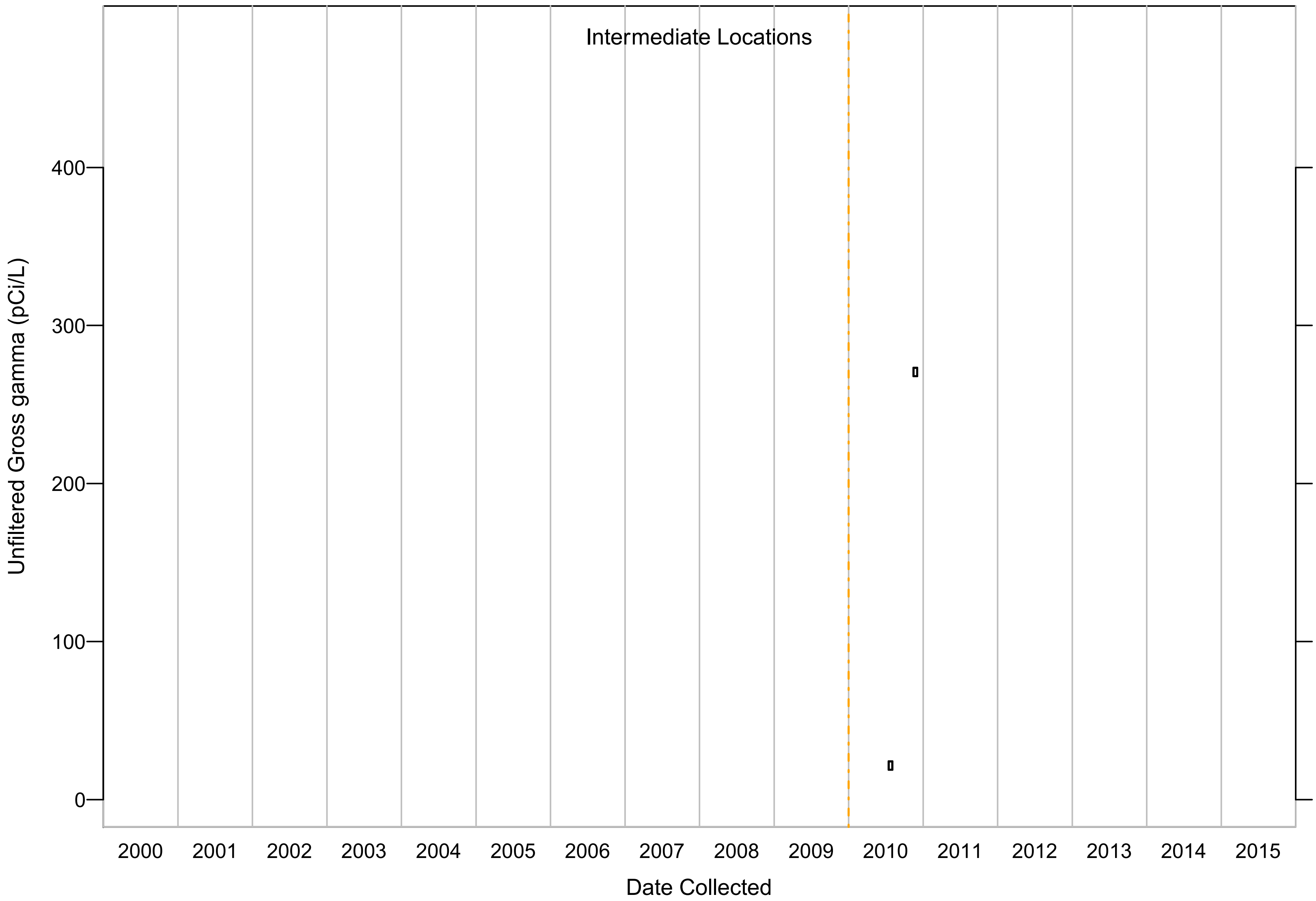



**Figure C-67 Unfiltered gross-gamma radioactivity results for perched-intermediate groundwater**

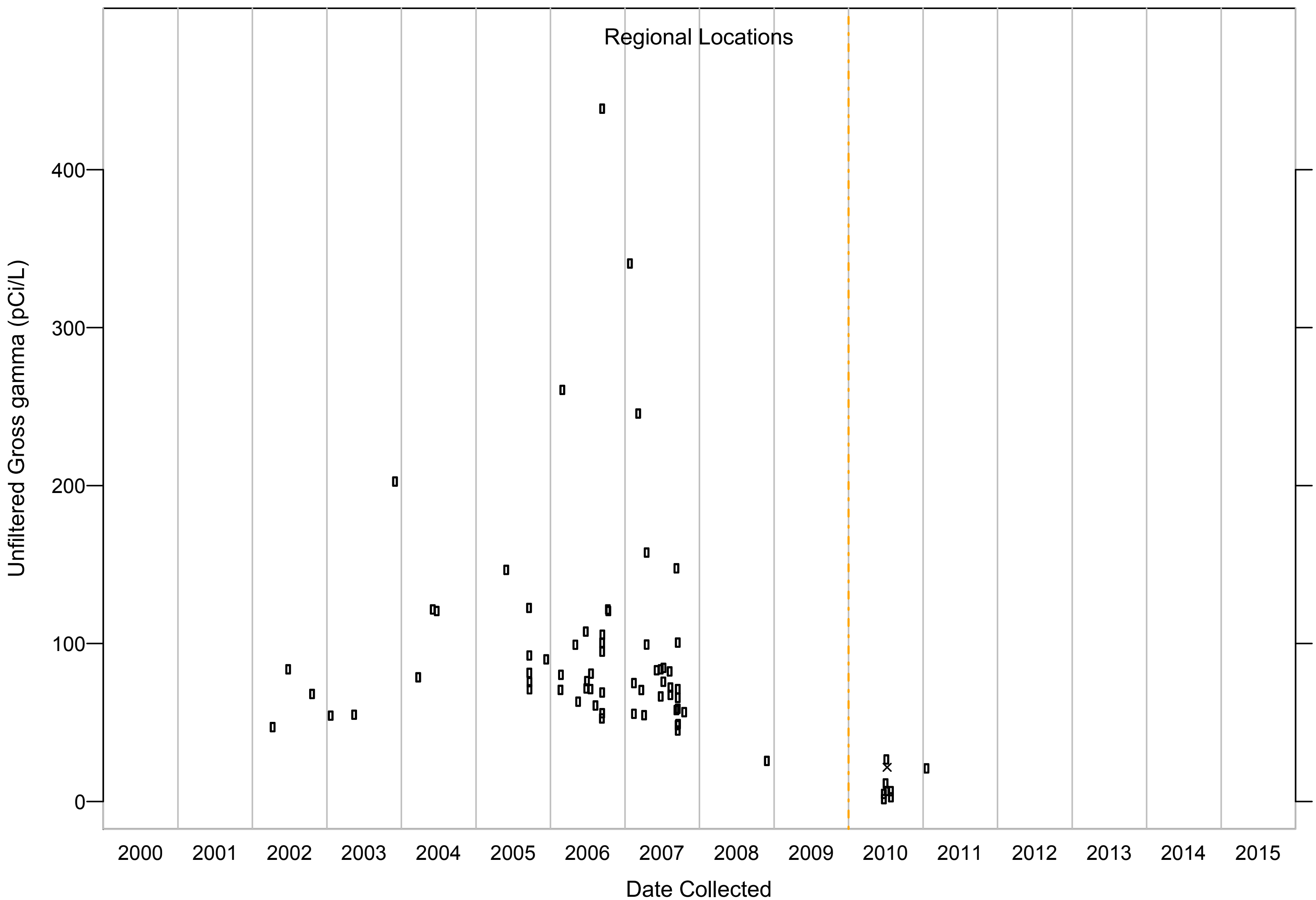



**Figure C-68 Unfiltered gross-gamma radioactivity results for regional aquifer**

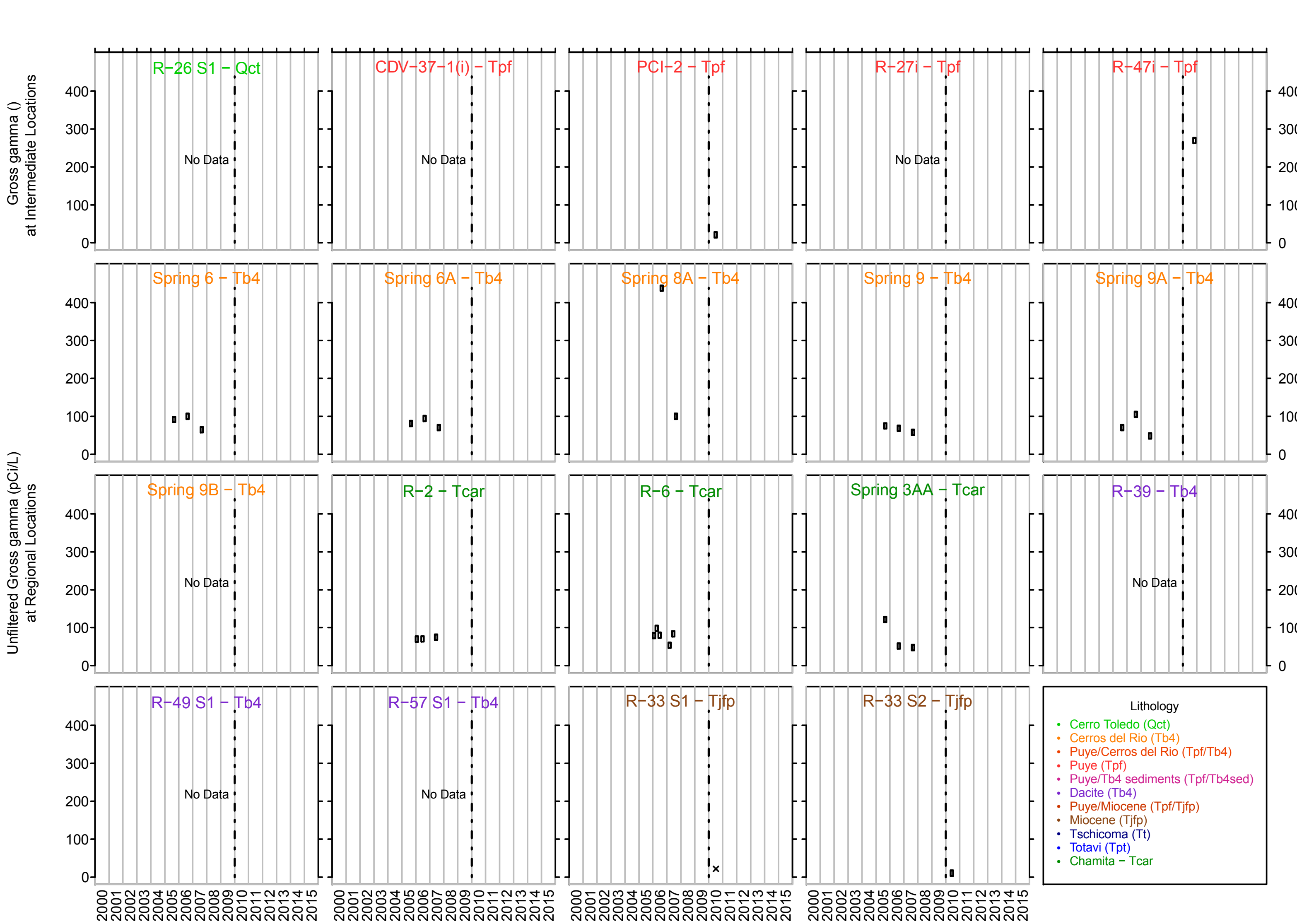



**Figure C-69 Time-series plots for unfiltered gross-gamma radioactivity**

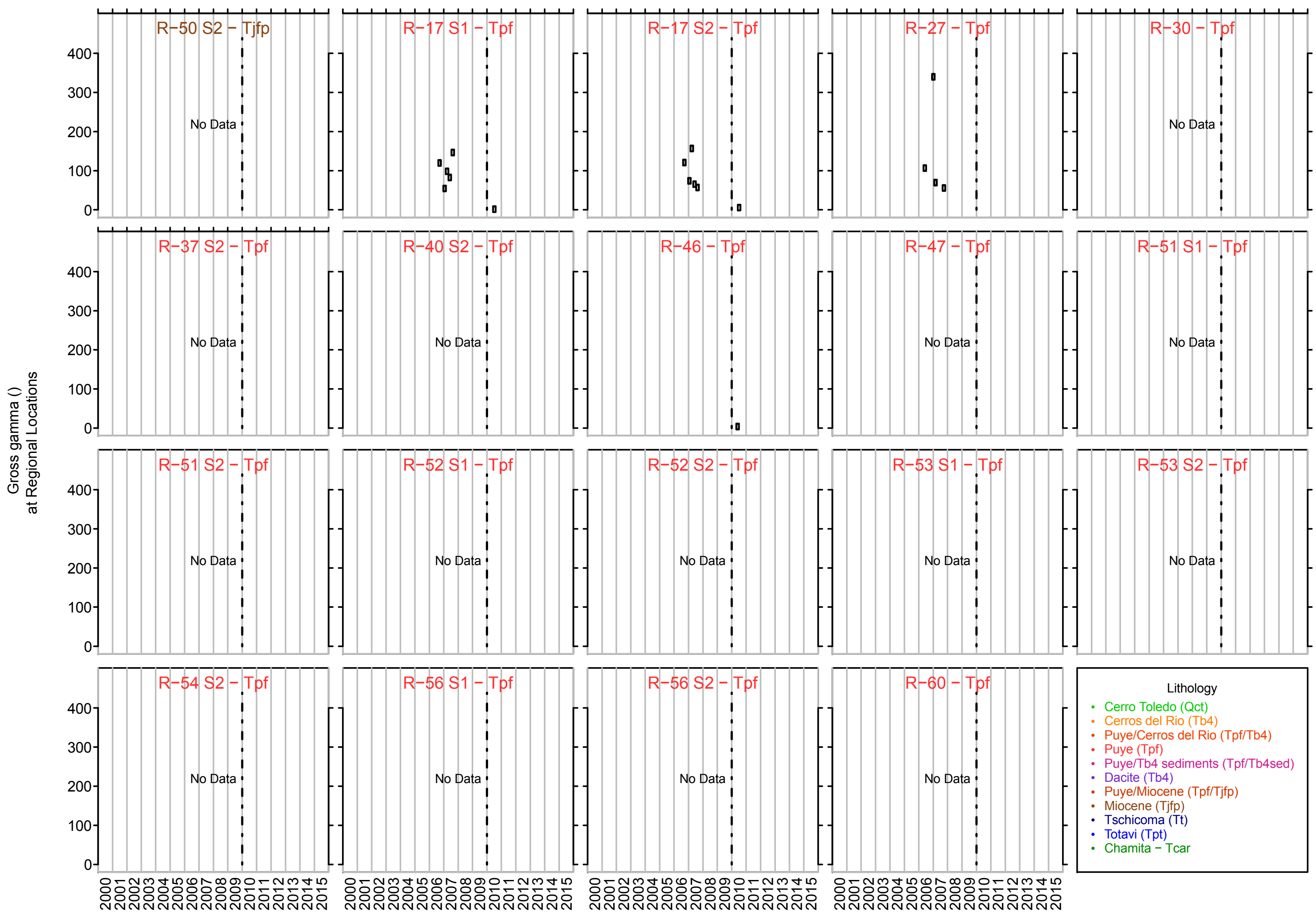



**Figure C-69 (continued)** **Time-series plots for unfiltered gross-gamma radioactivity**

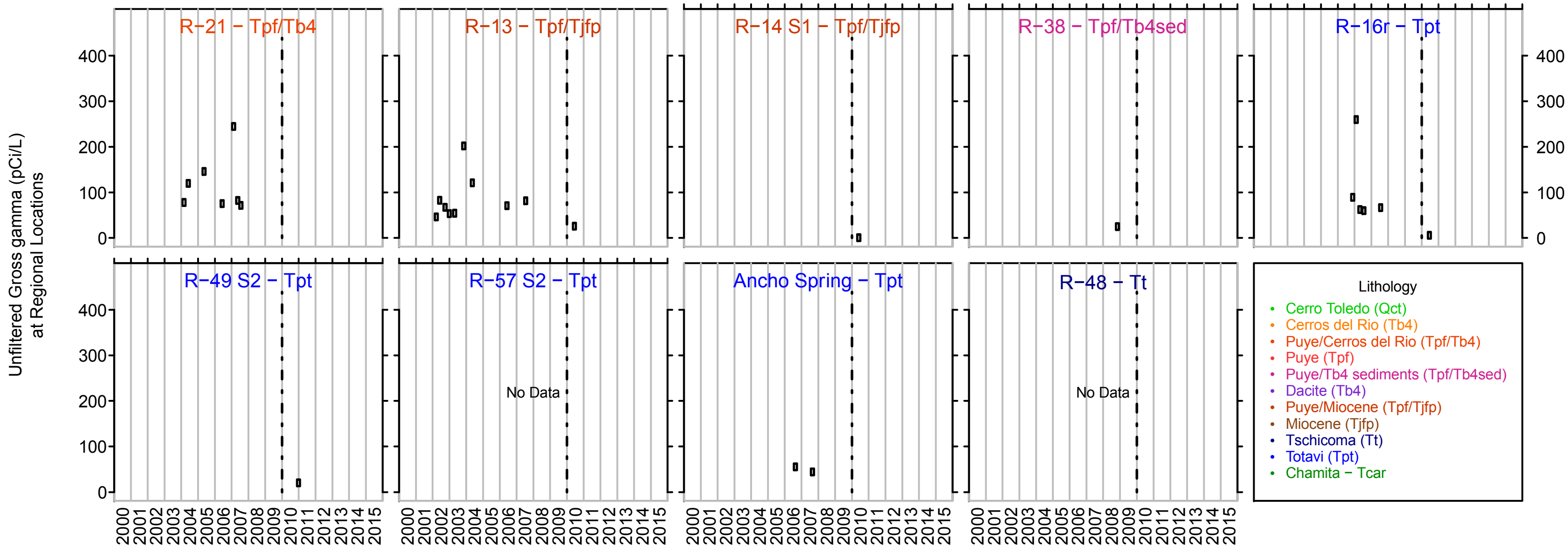



**Figure C-69 (continued) Time-series plots for unfiltered gross-gamma radioactivity**

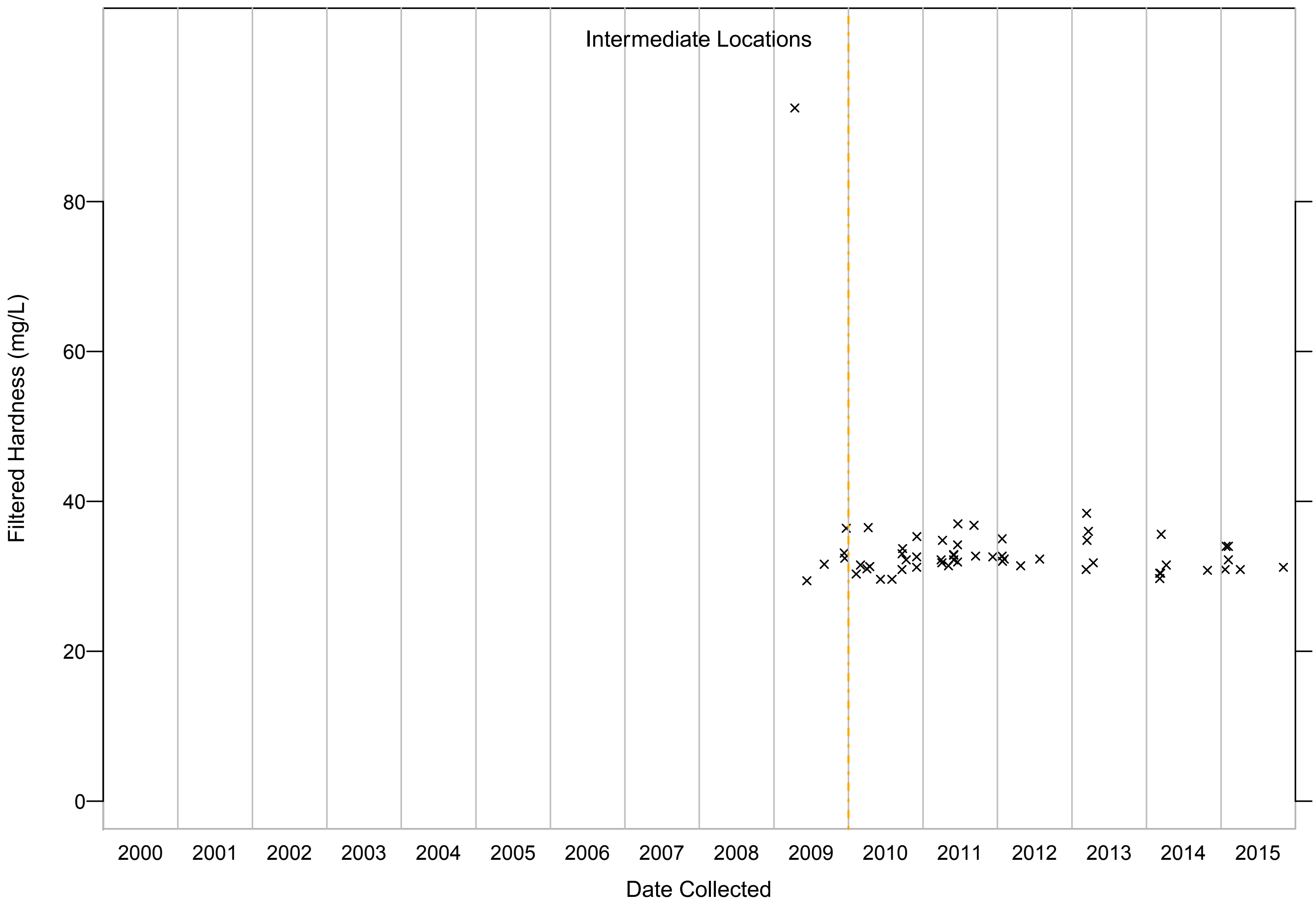



**Figure C-70** **Filtered hardness results for perched-intermediate groundwater**

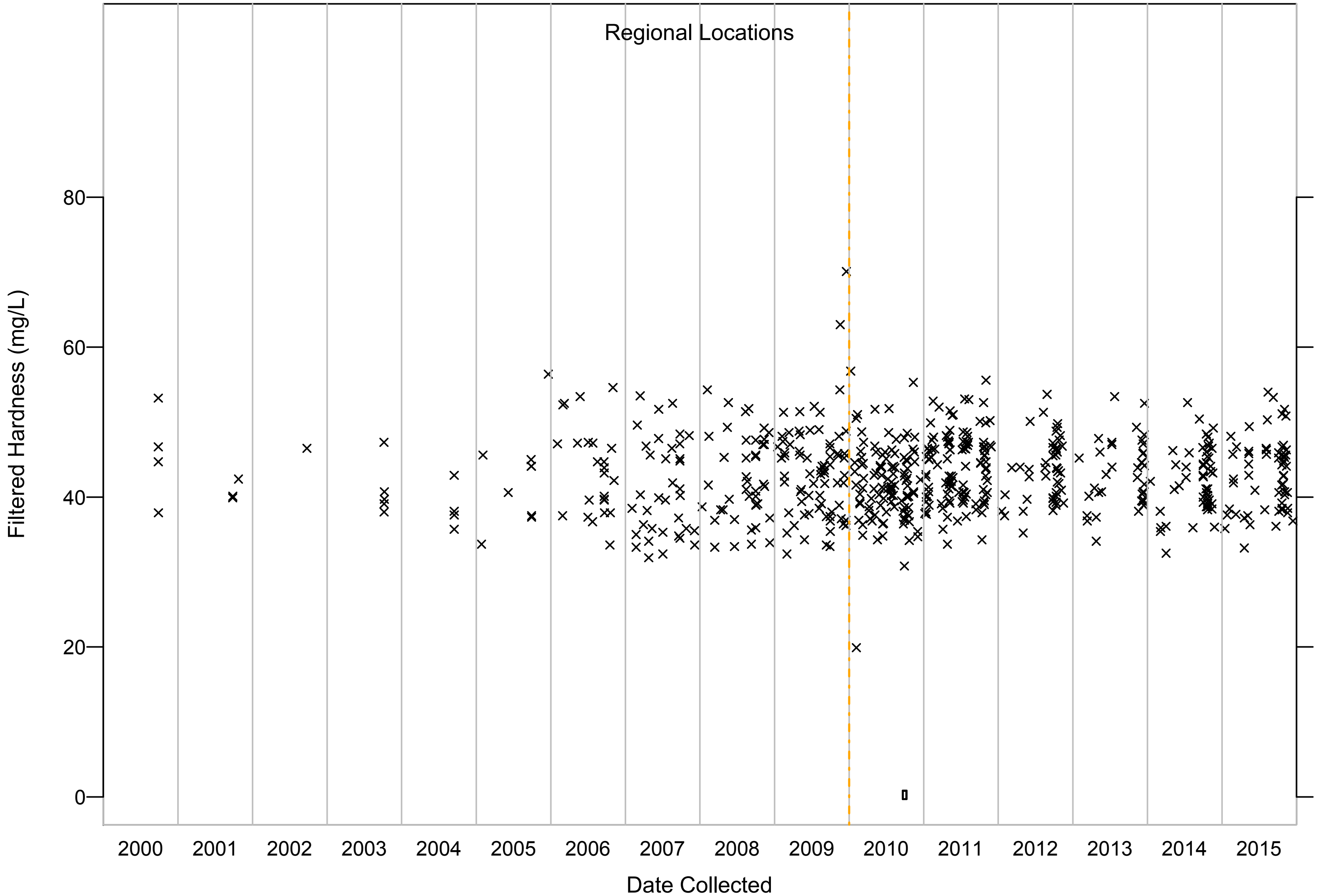



**Figure C-71 Filtered hardness results for regional aquifer**

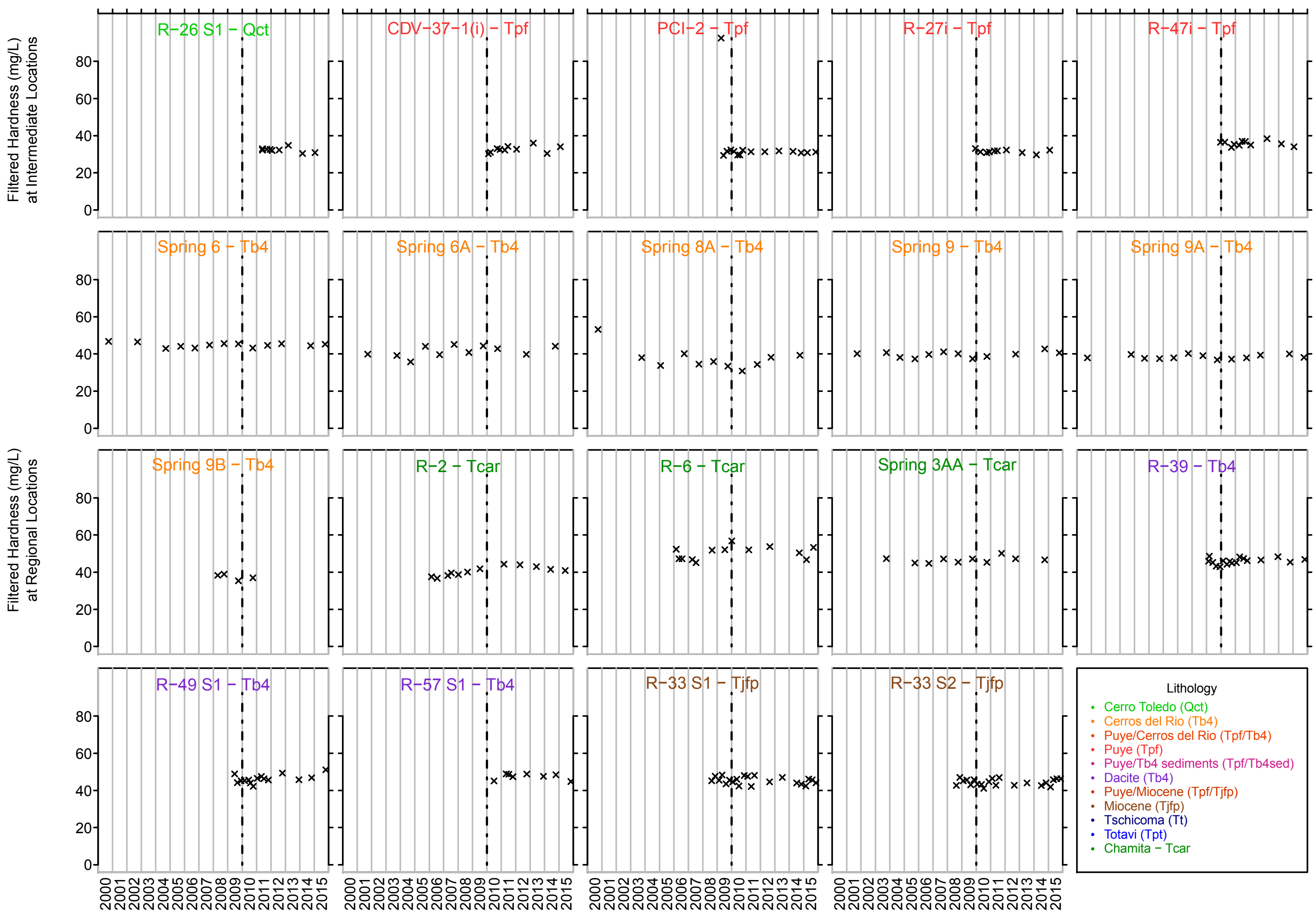



**Figure C-72 Time-series plots for filtered hardness**

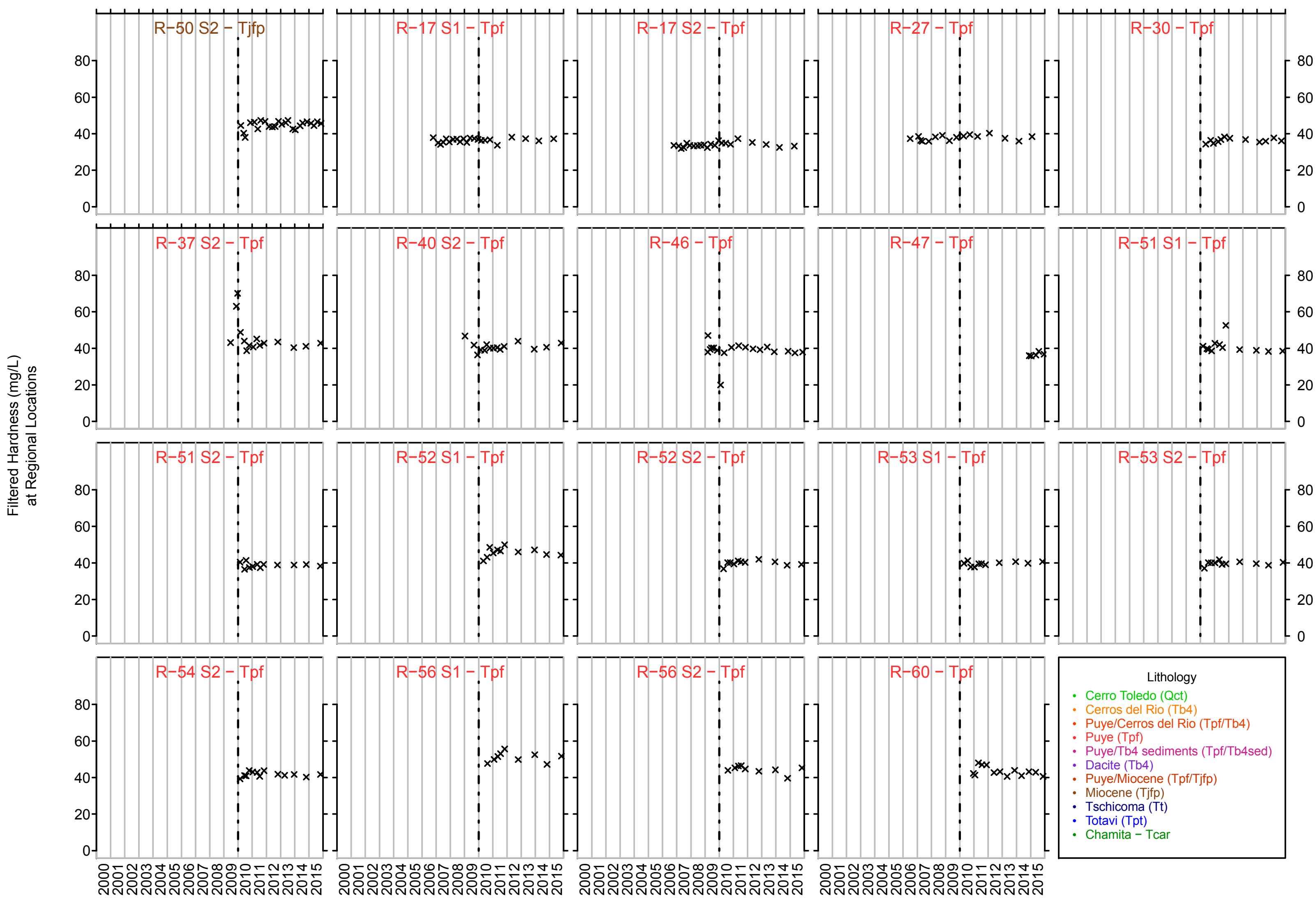



**Figure C-72 (continued) Time-series plots for filtered hardness**

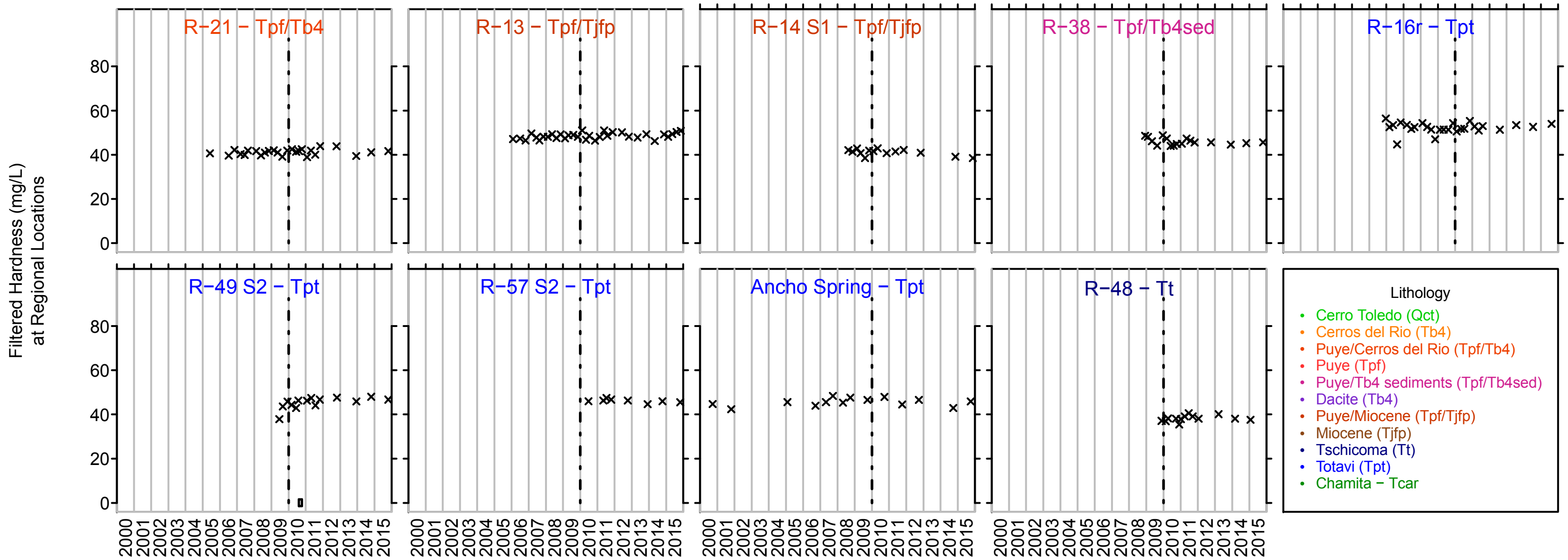



**Figure C-72 (continued) Time-series plots for filtered hardness**

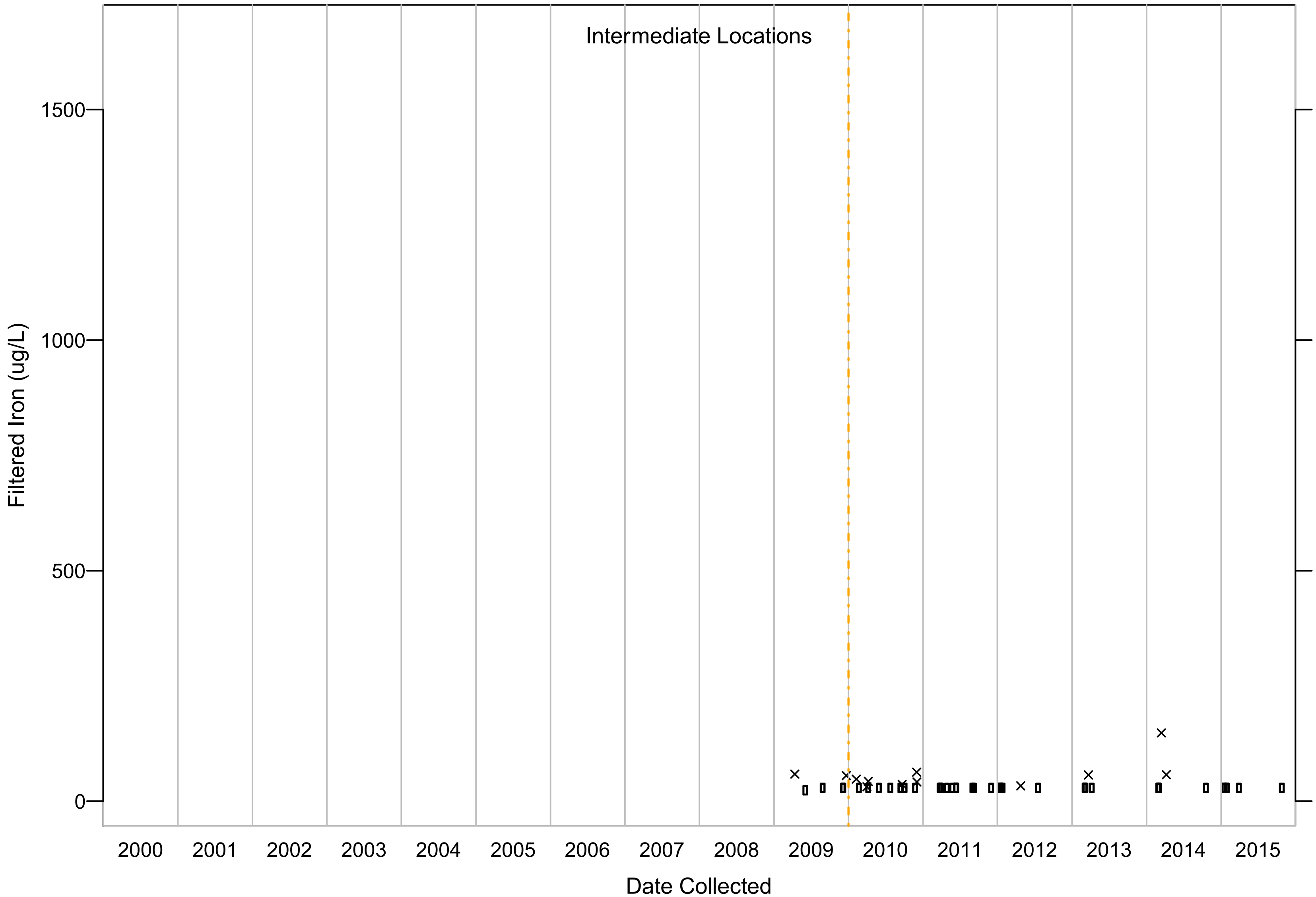



**Figure C-73 Filtered iron results for perched-intermediate groundwater**

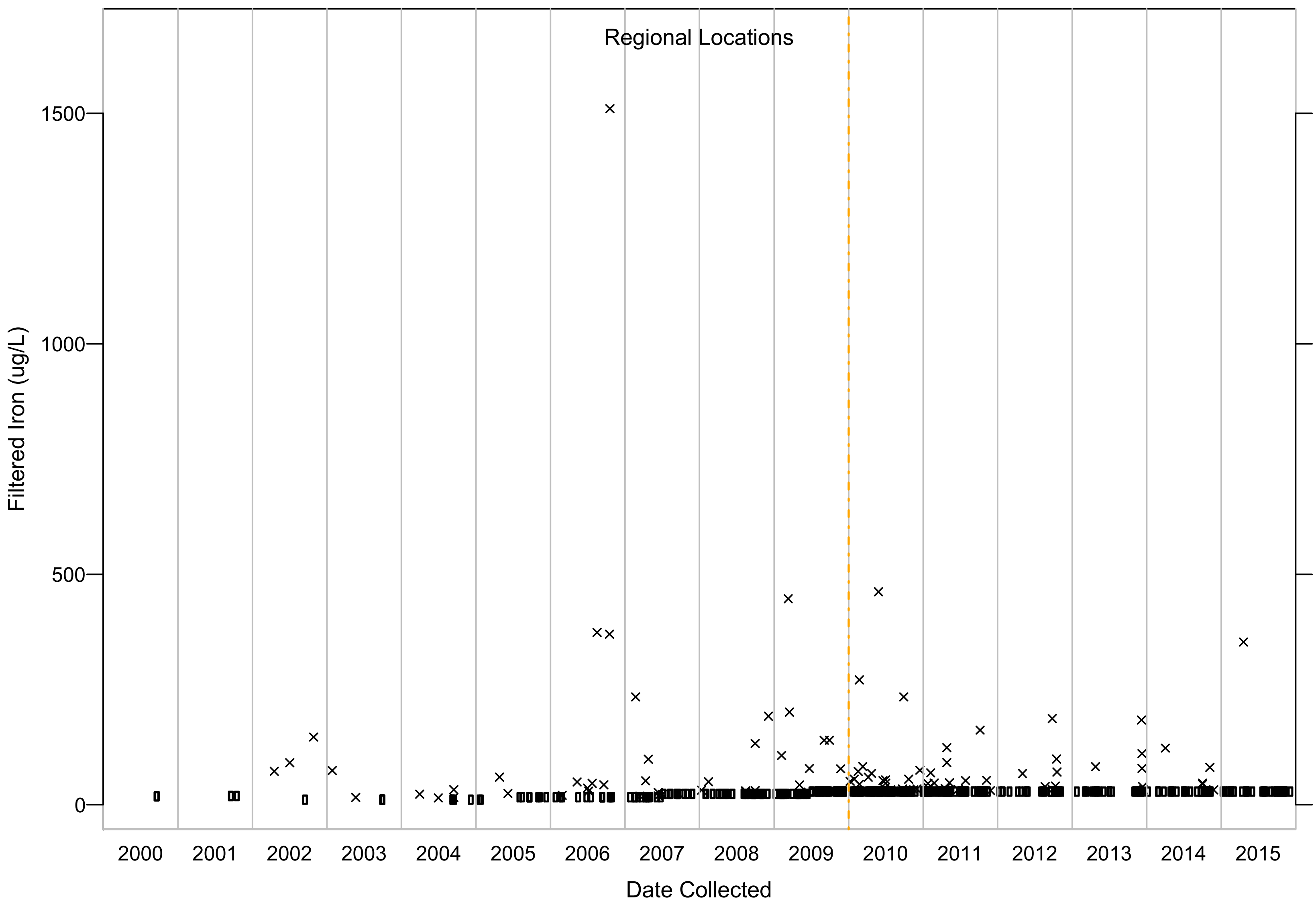



**Figure C-74** **Filtered iron results for regional aquifer**

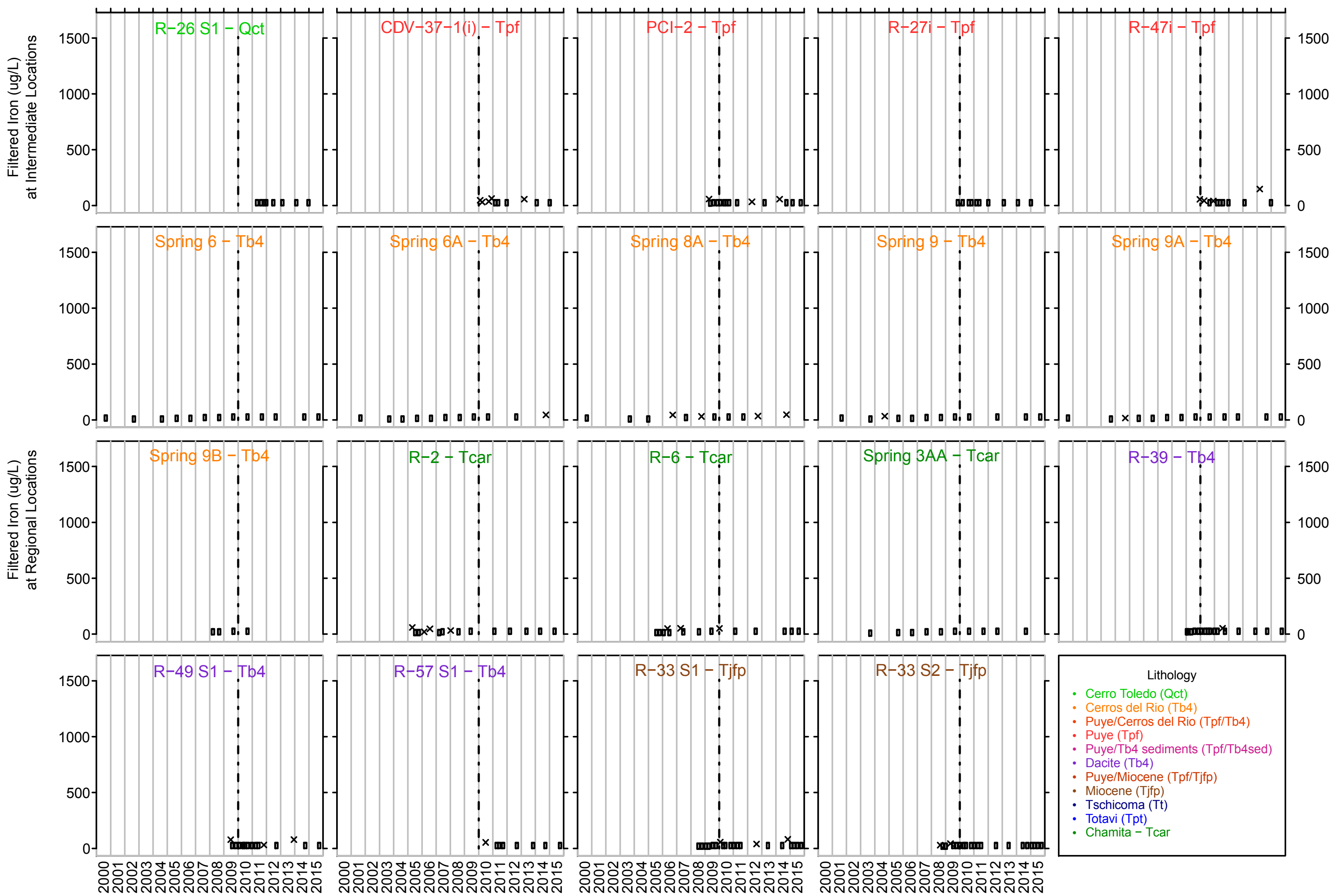



**Figure C-75 Time-series plots for filtered iron**

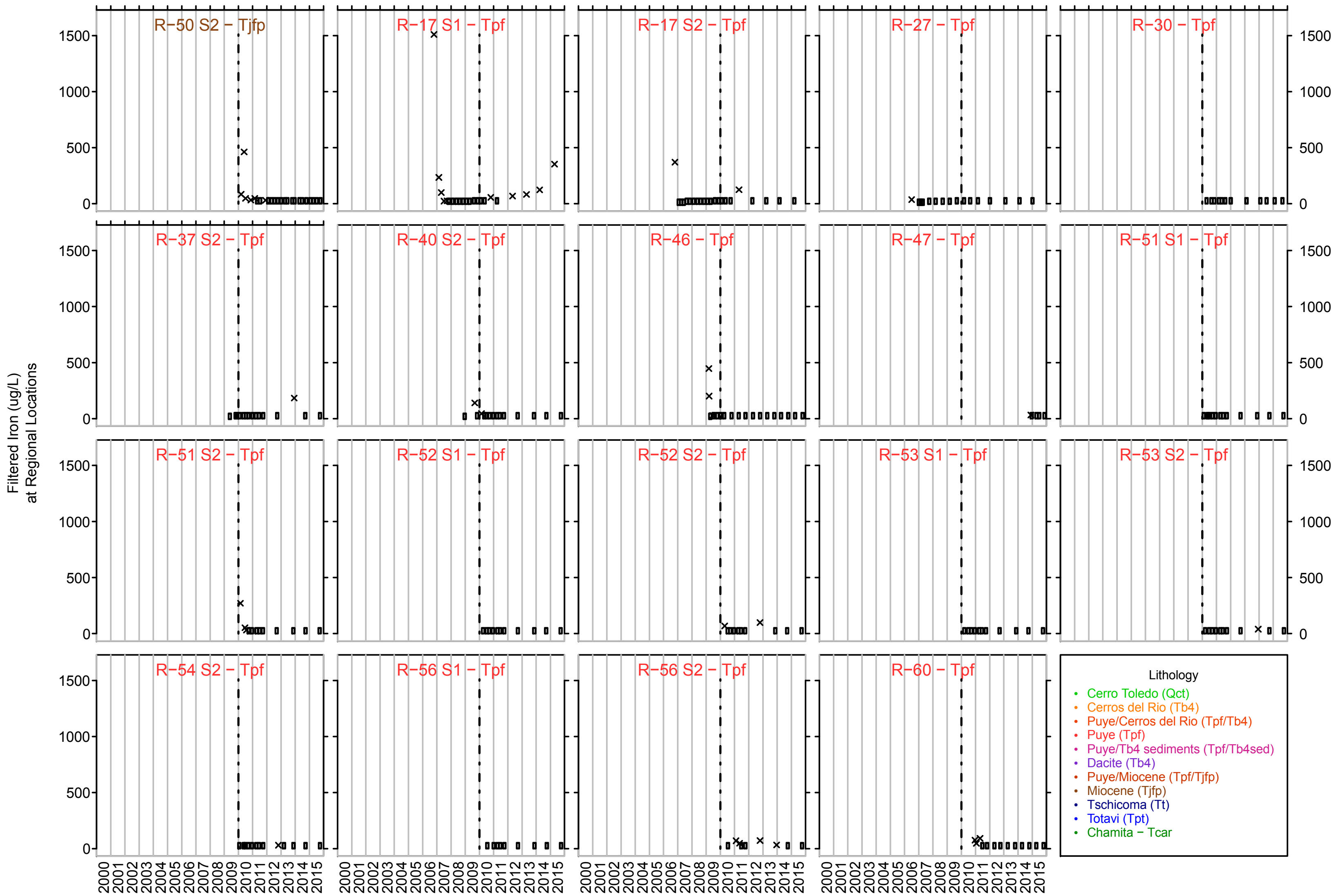



**Figure C-75 (continued) Time-series plots for filtered iron**

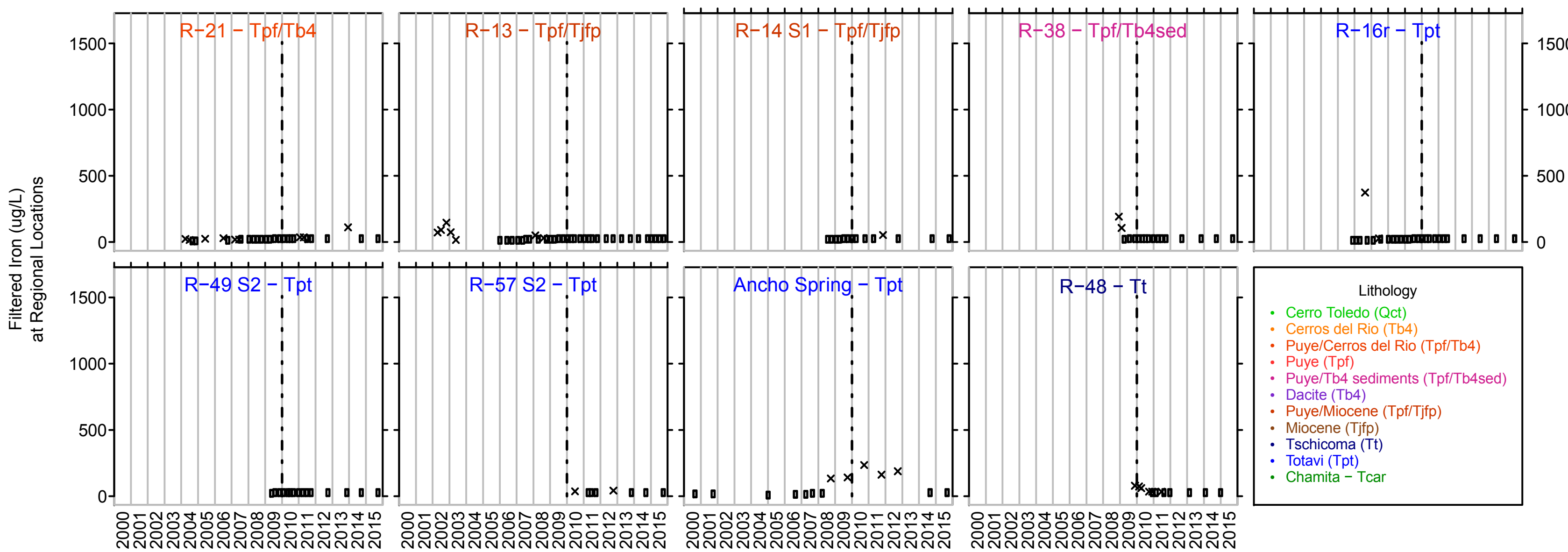



**Figure C-75 (continued)** **Time-series plots for filtered iron**

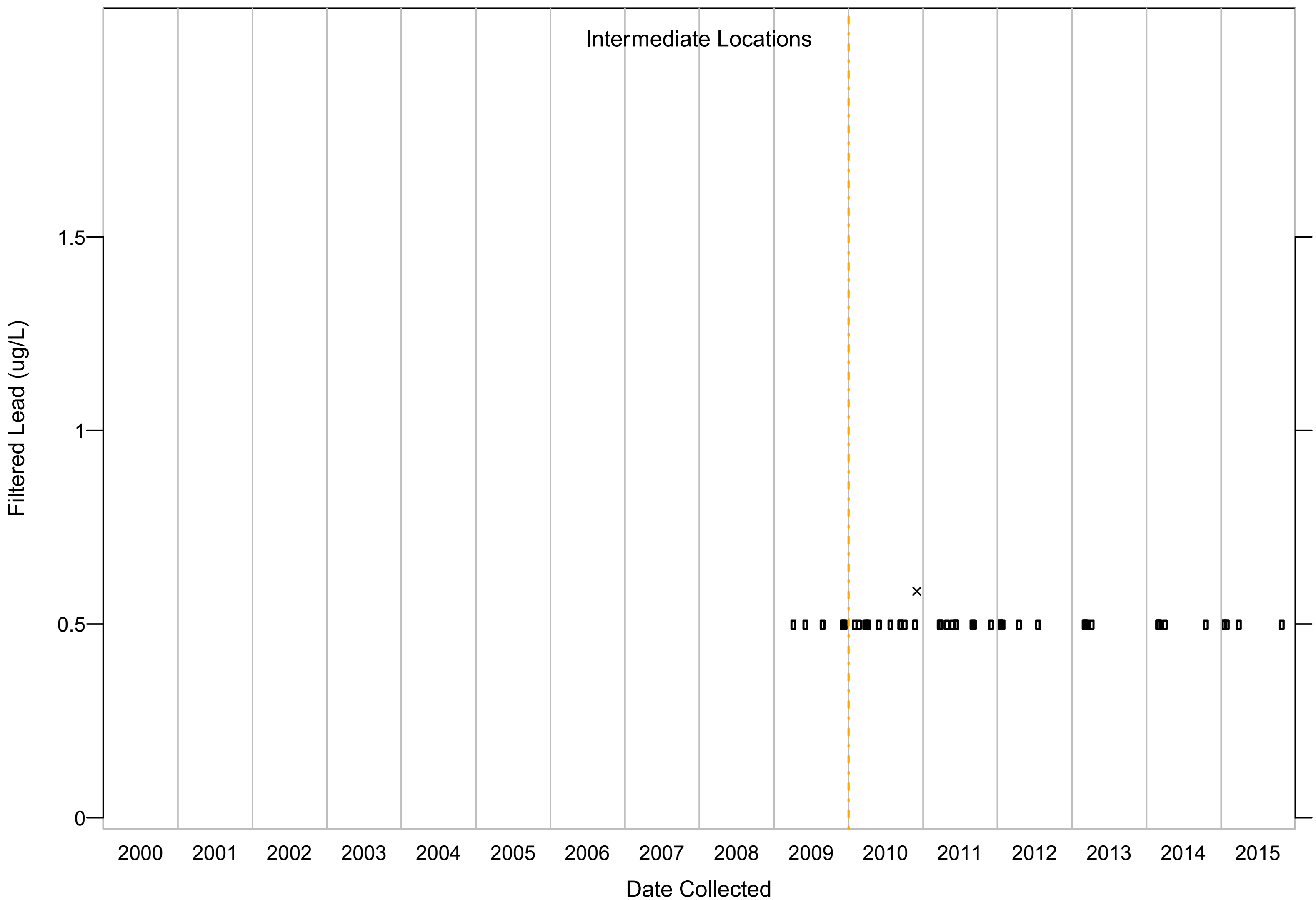



**Figure C-76 Filtered lead results for perched-intermediate groundwater**

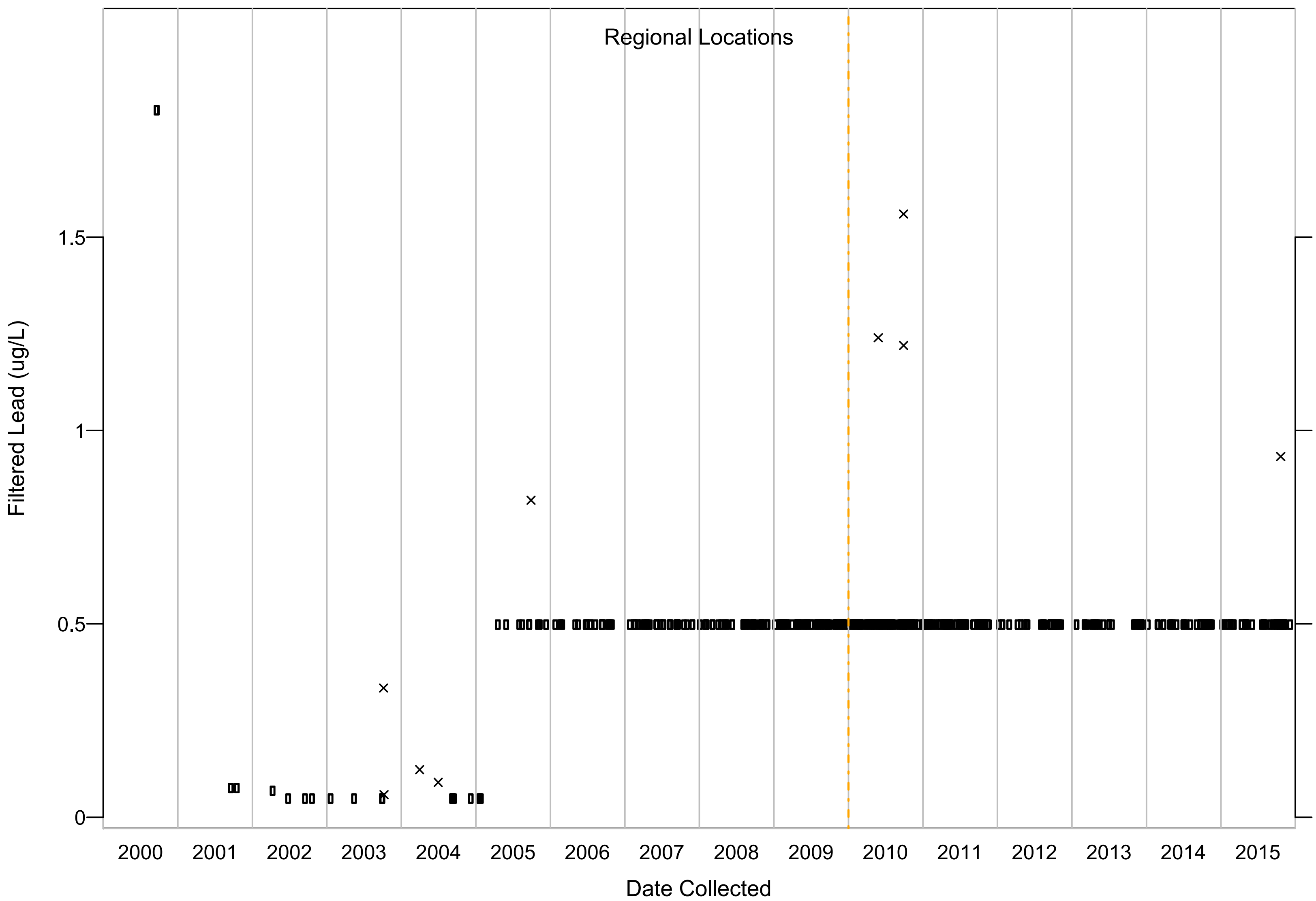



**Figure C-77 Filtered lead results for regional aquifer**

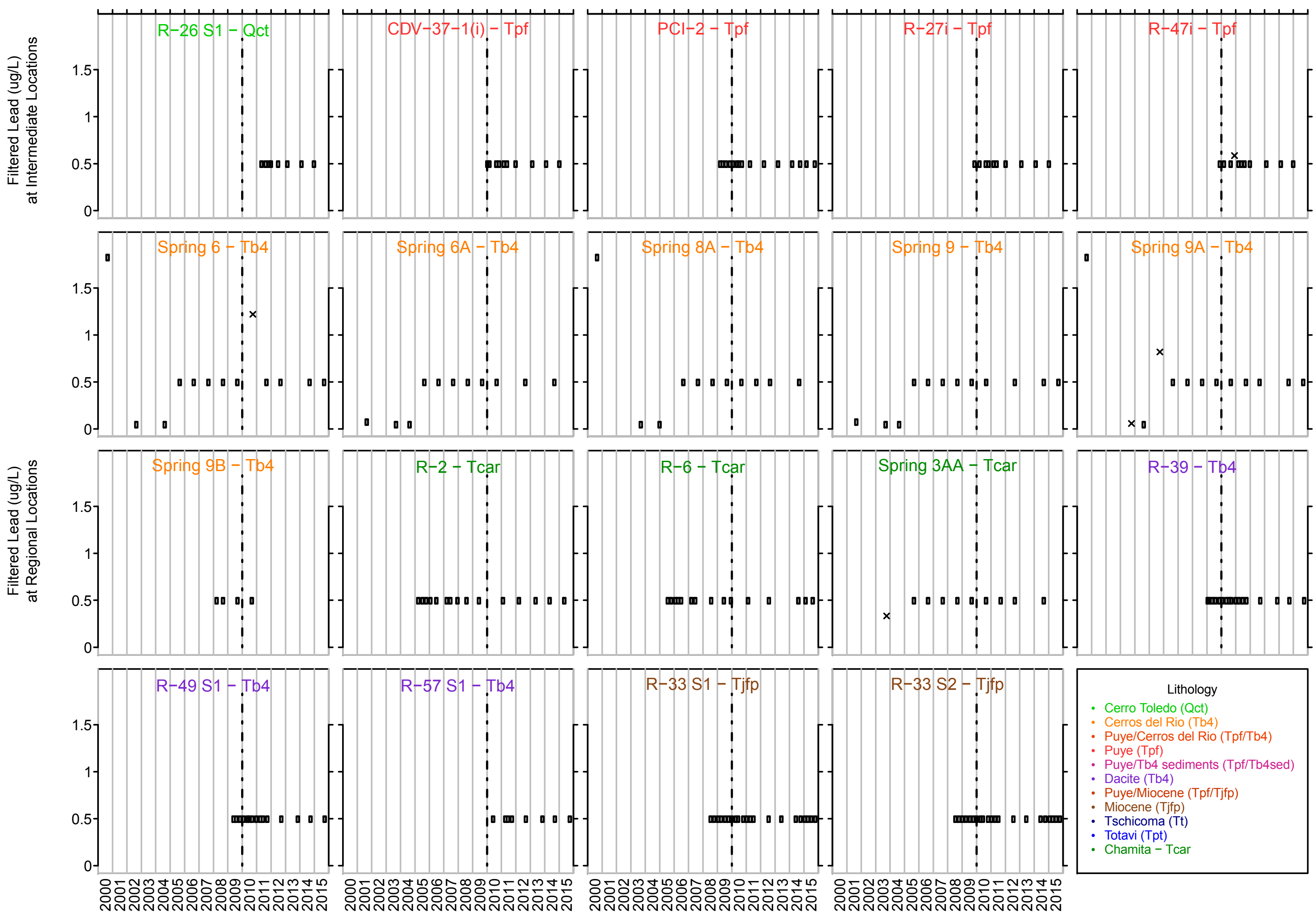



**Figure C-78 Time-series plots for filtered lead**

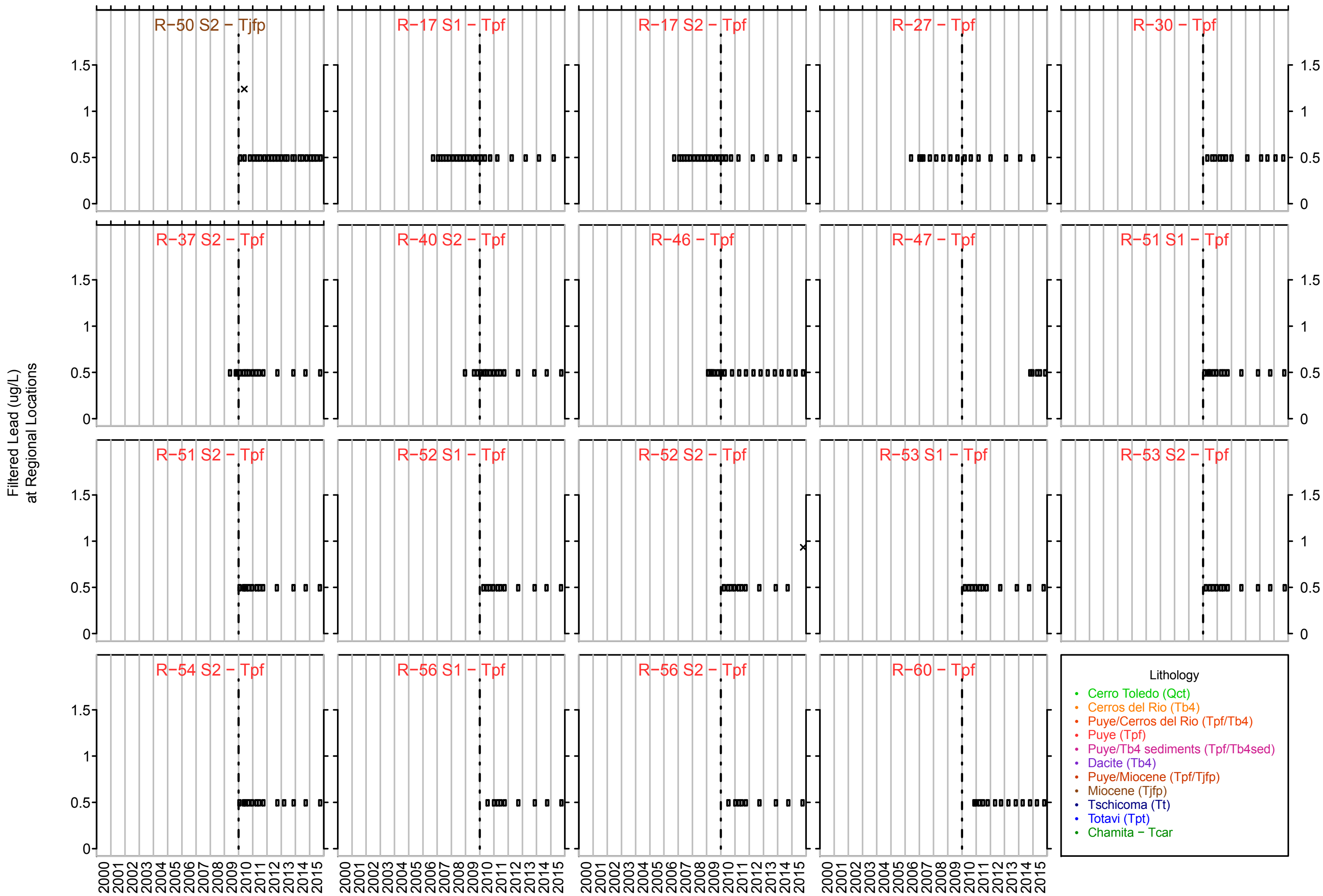



**Figure C-78 (continued)** **Time-series plots for filtered lead**

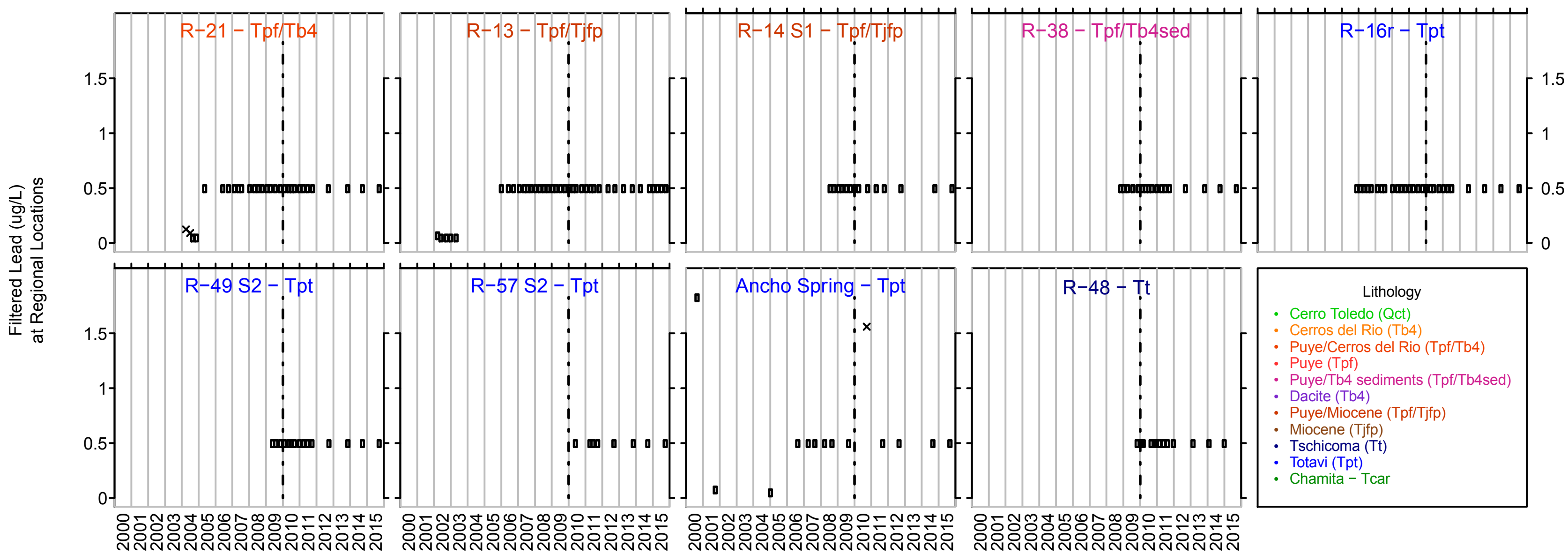



**Figure C-78 (continued)** **Time-series plots for filtered lead**

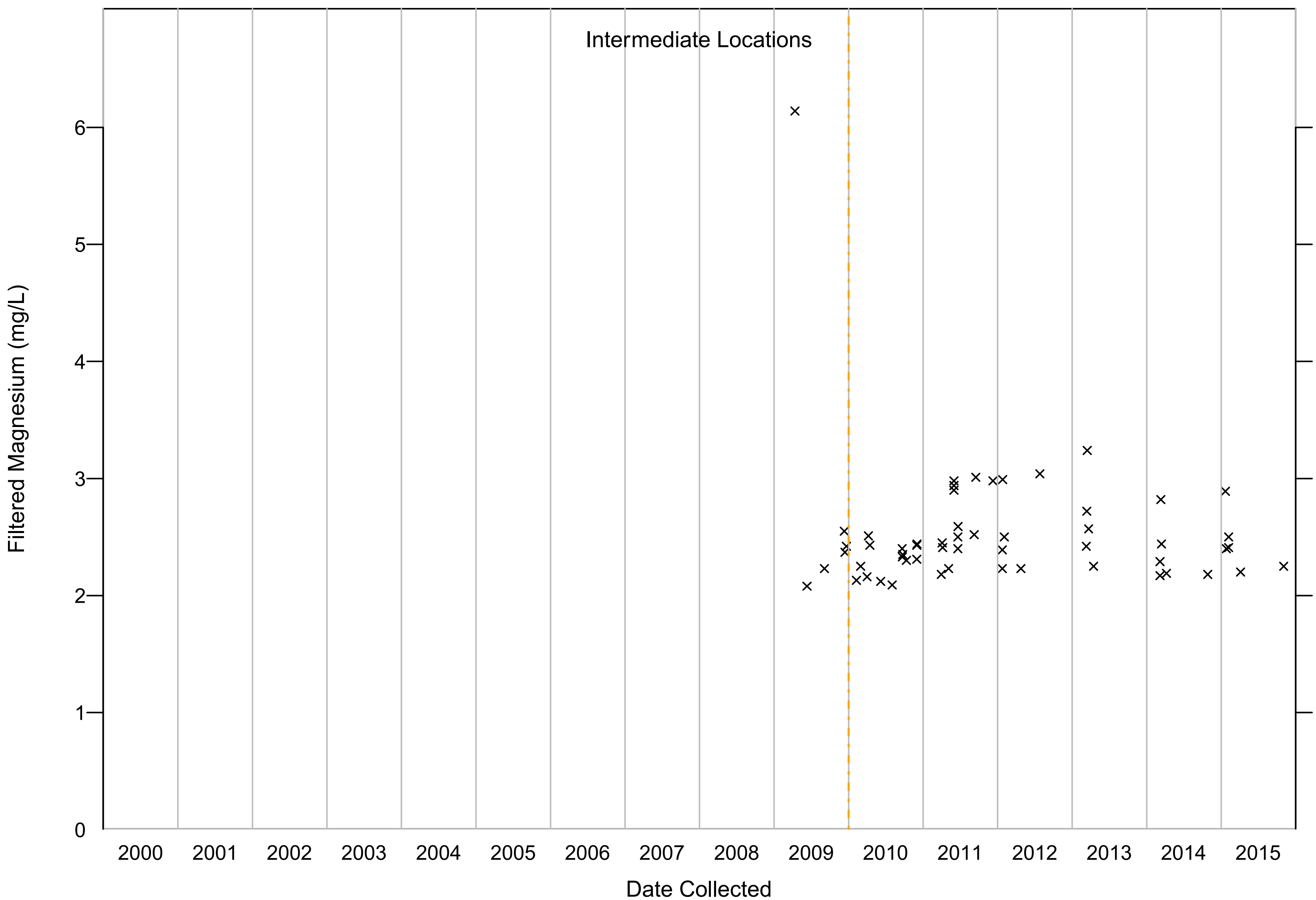



**Figure C-79  Filtered magnesium results for perched-intermediate groundwater**

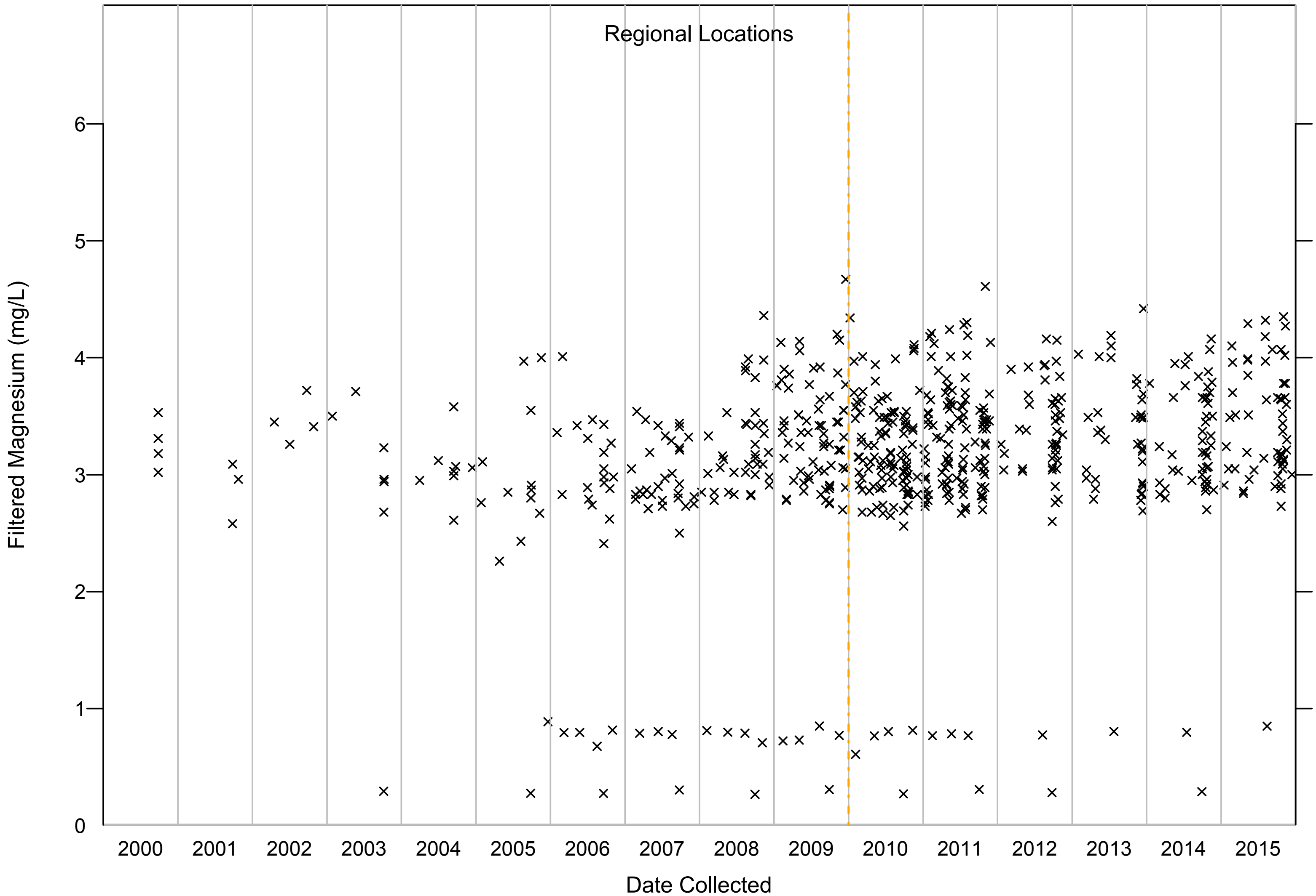



**Figure C-80 Filtered magnesium results for regional aquifer**

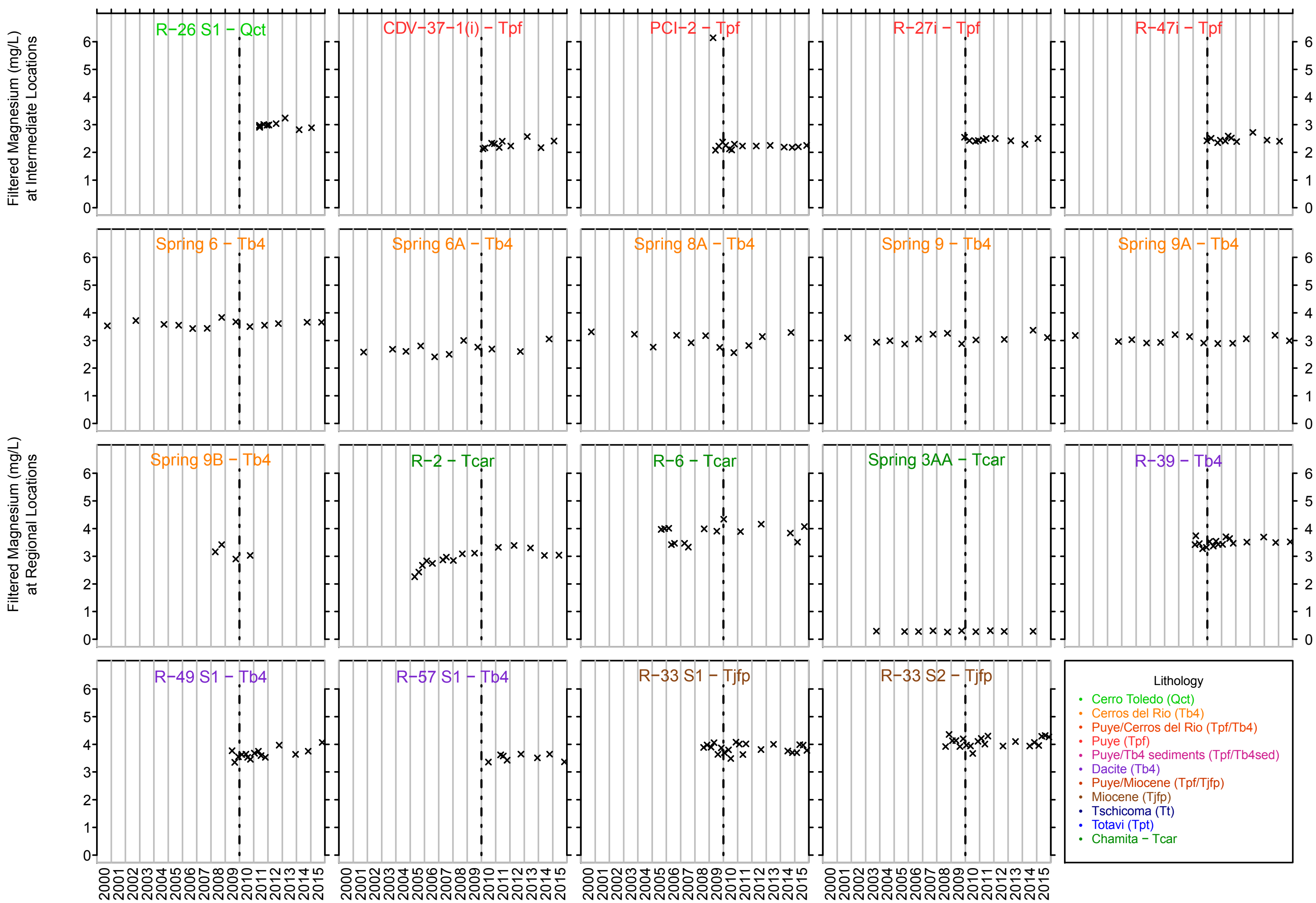



**Figure C-81 Time-series plots for filtered magnesium**

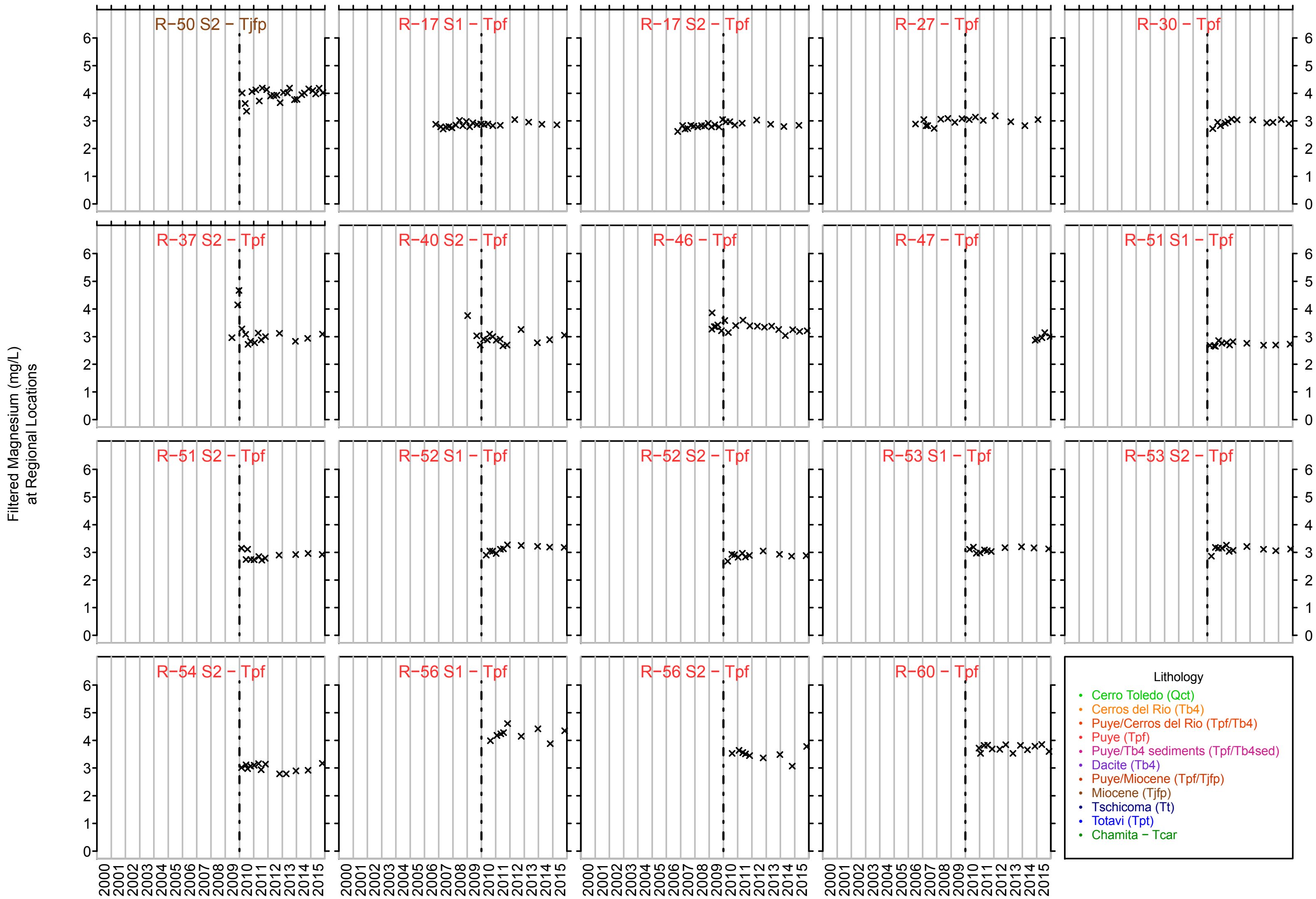



**Figure C-81 (continued)** **Time-series plots for filtered magnesium**

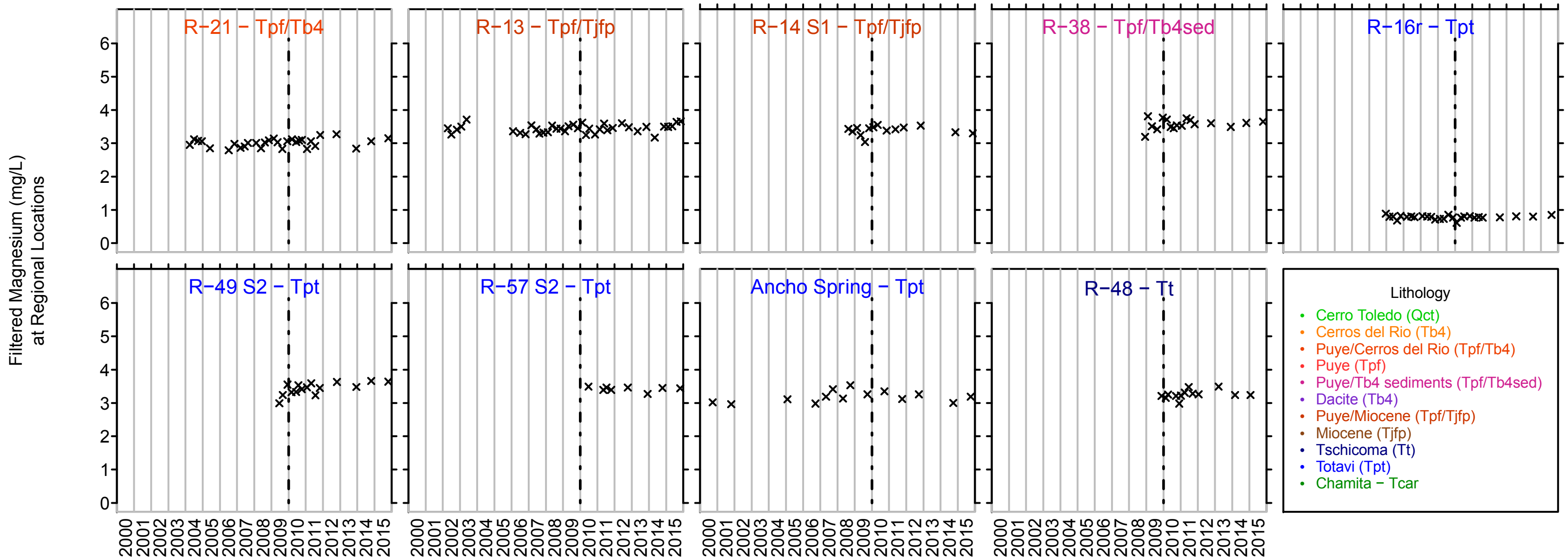



**Figure C-81 (continued)** **Time-series plots for filtered magnesium**

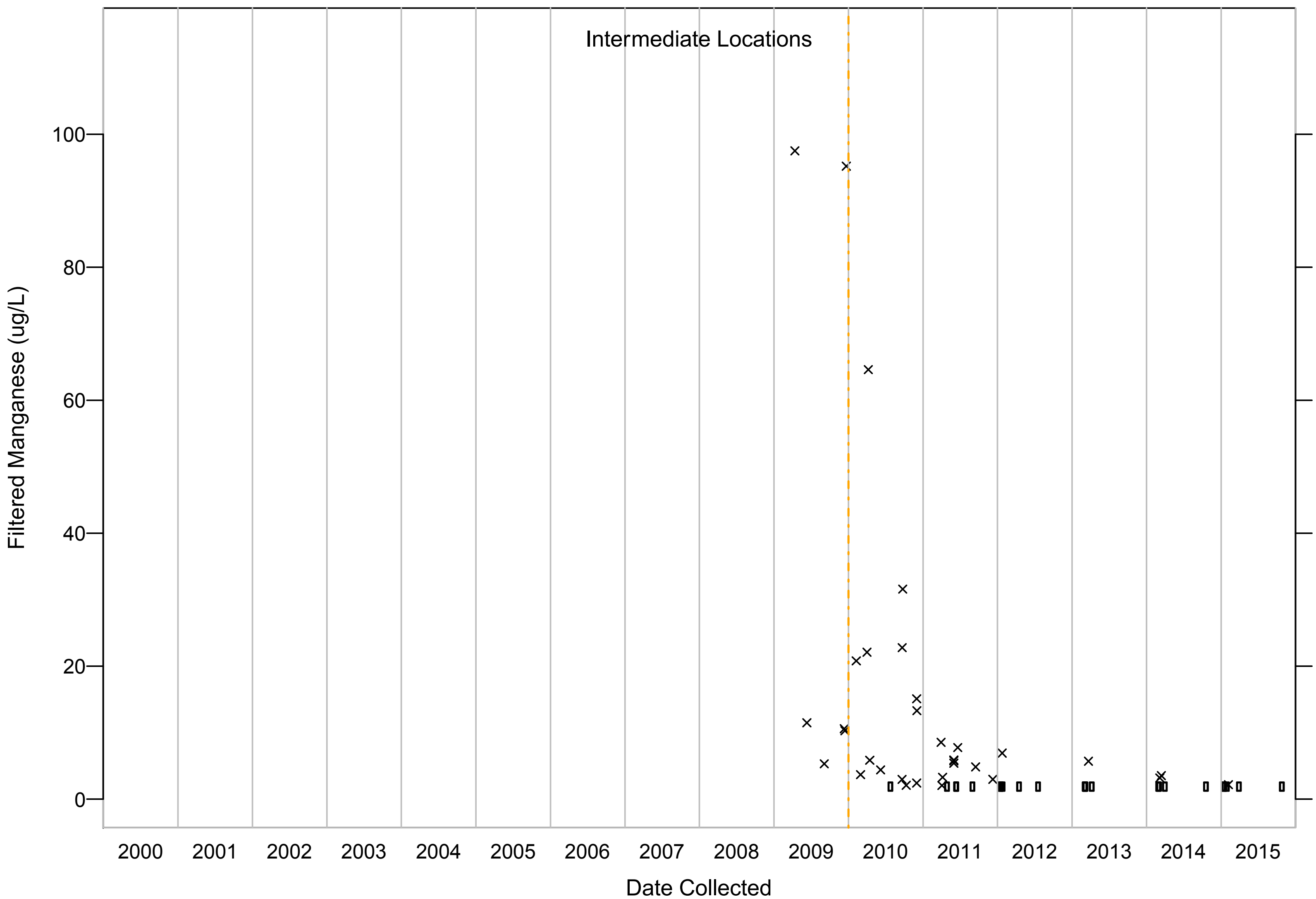



**Figure C-82 Filtered manganese results for perched-intermediate groundwater**

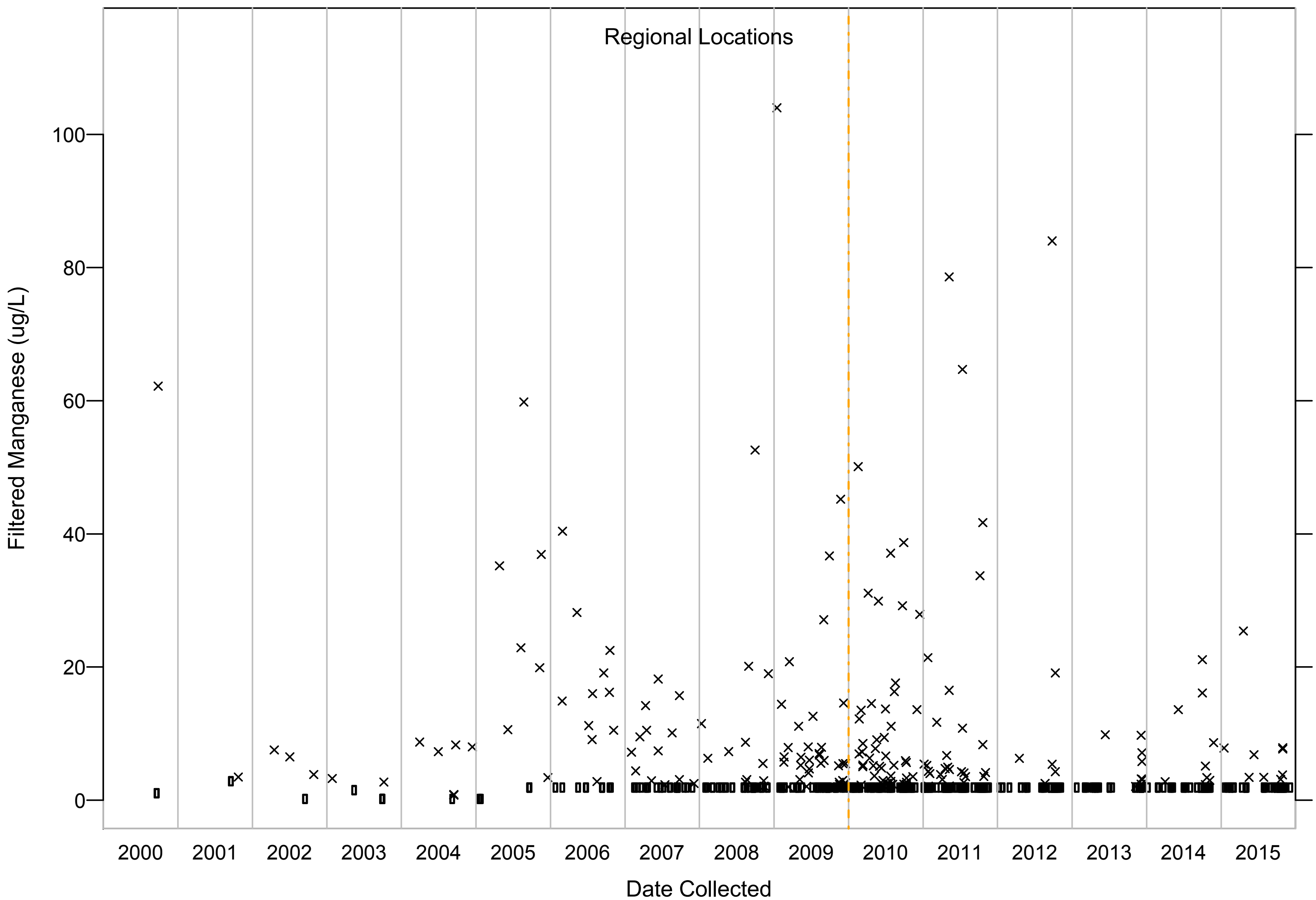



**Figure C-83 Filtered manganese results for regional aquifer**

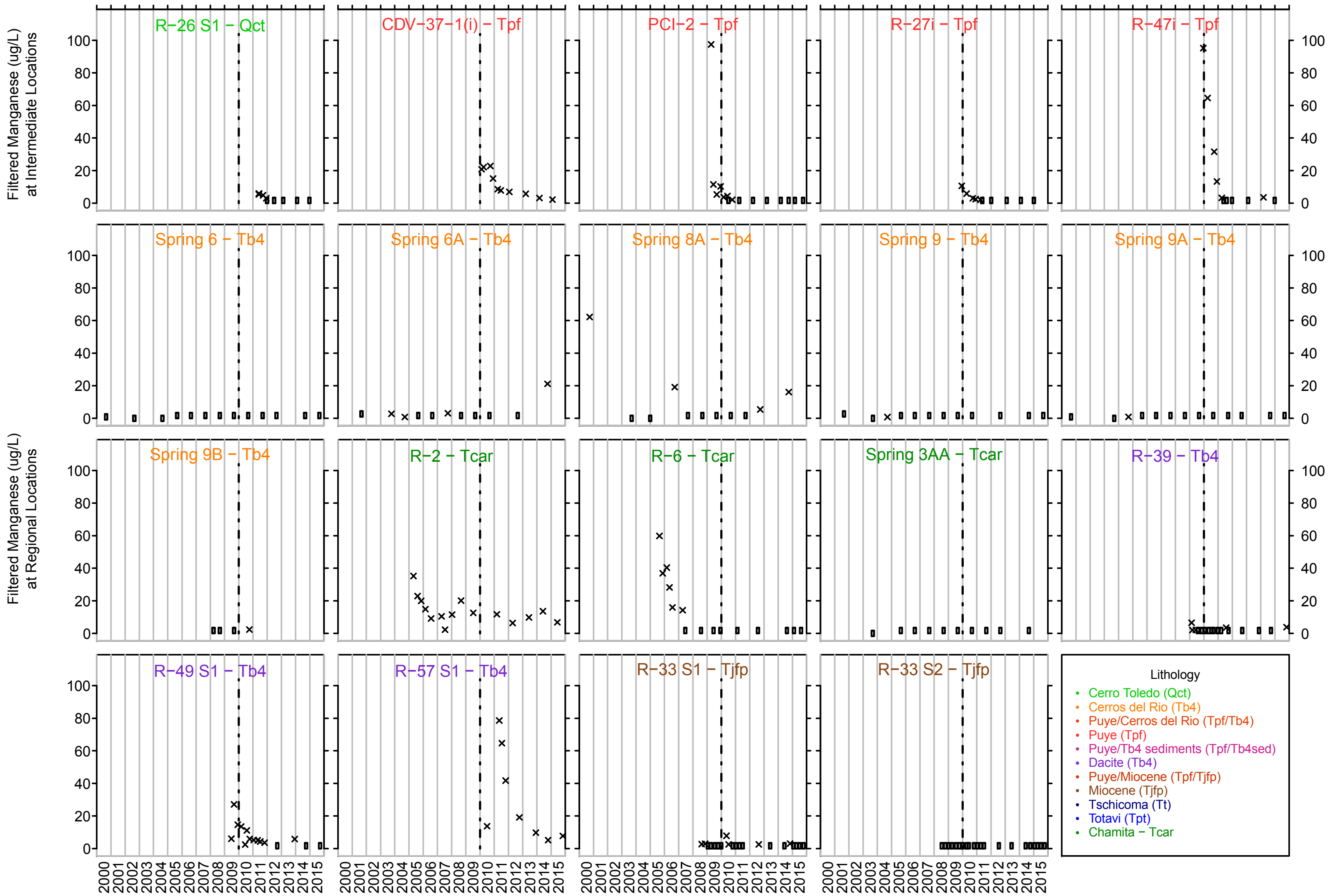



**Figure C-84 Time-series plots for filtered manganese**

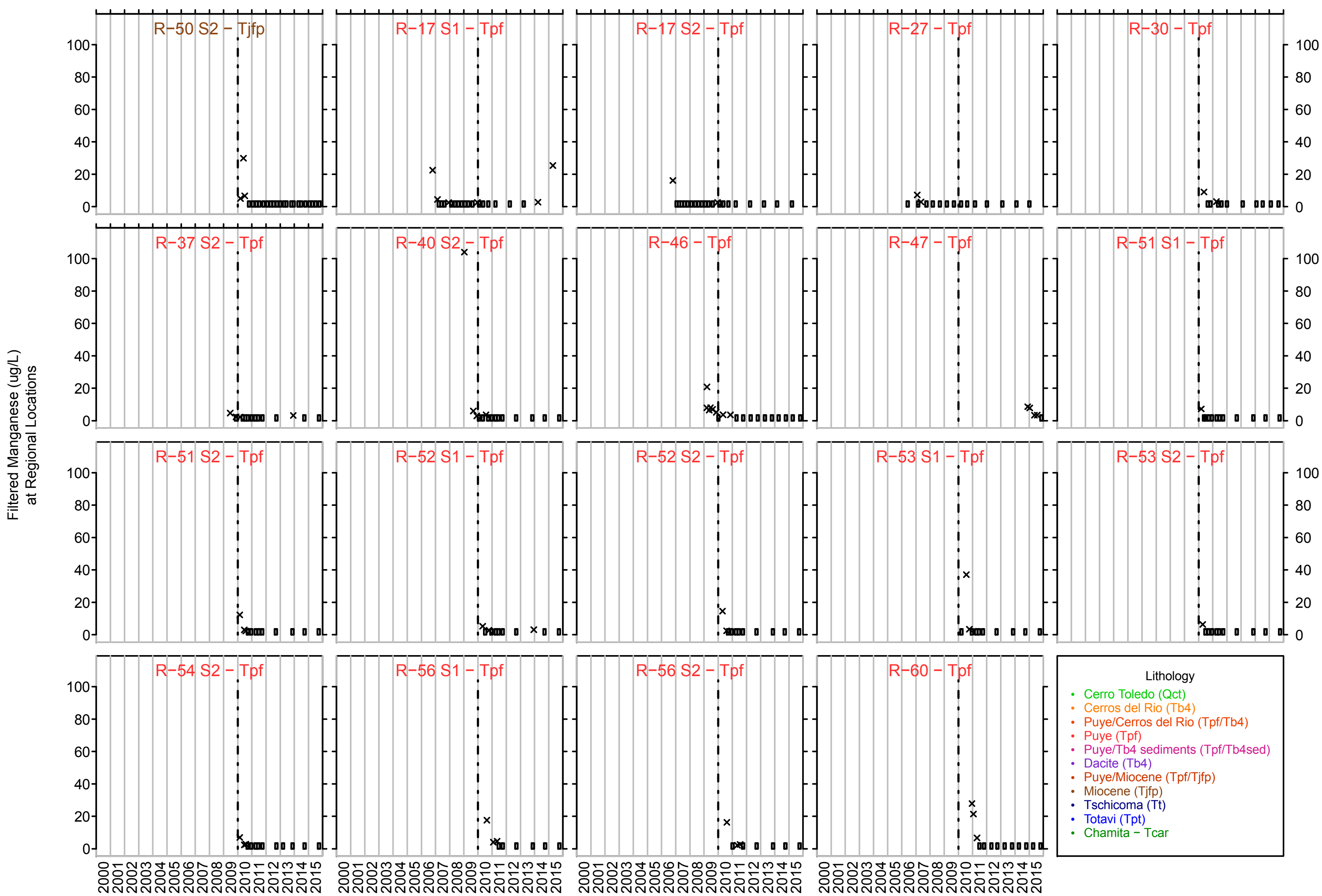



**Figure C-84 (continued)** **Time-series plots for filtered manganese**

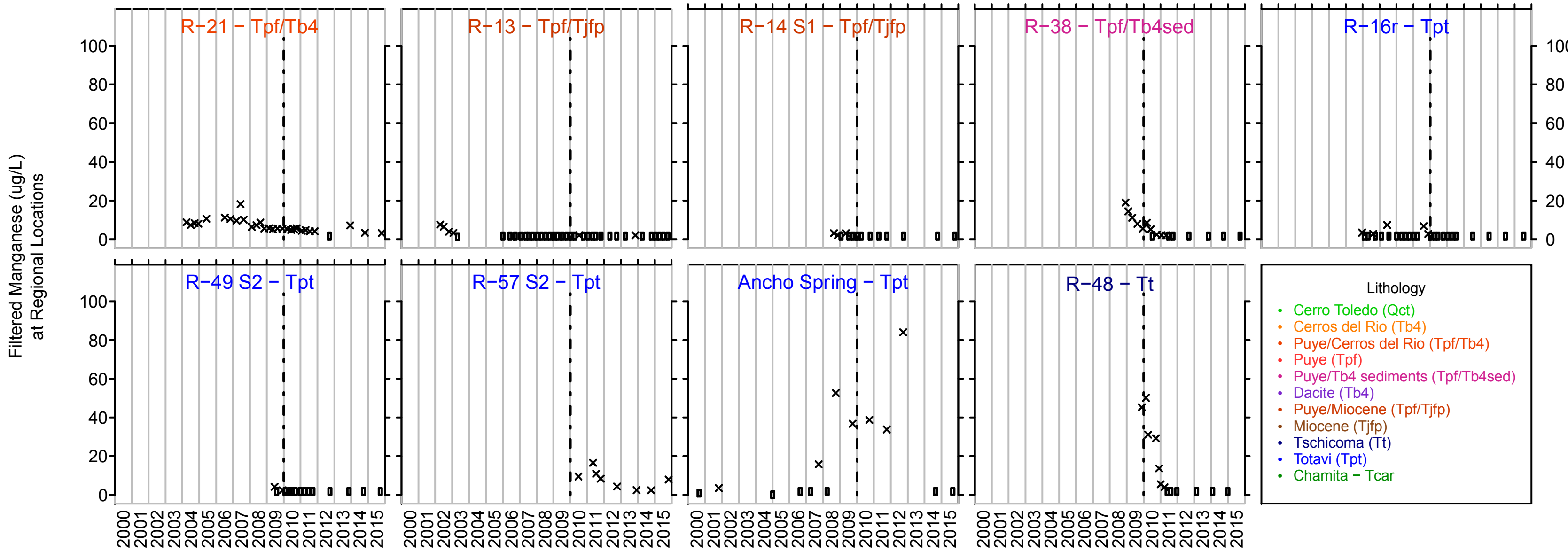



**Figure C-84 (continued) Time-series plots for filtered manganese**

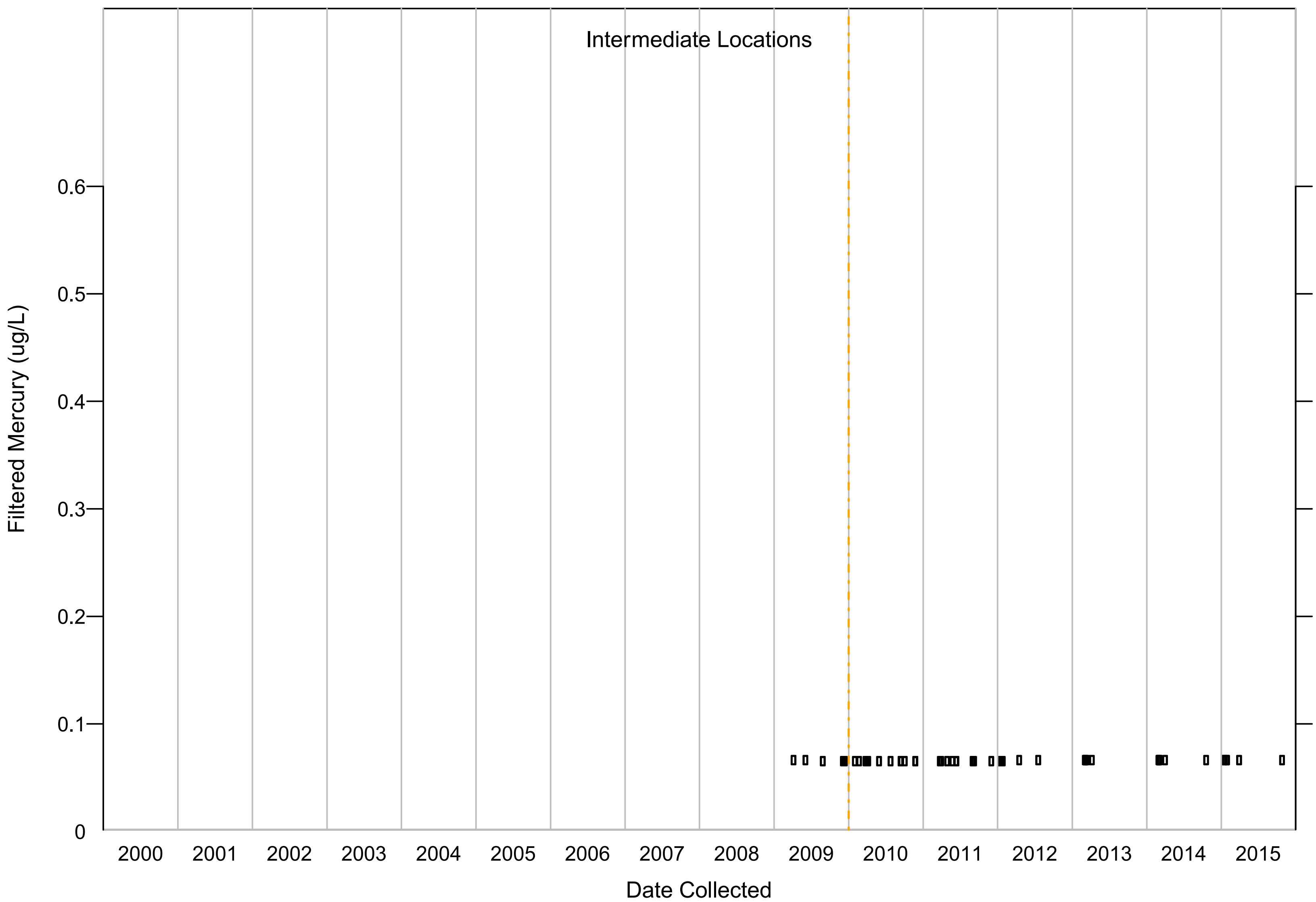



**Figure C-85 Filtered mercury results for perched-intermediate groundwater**

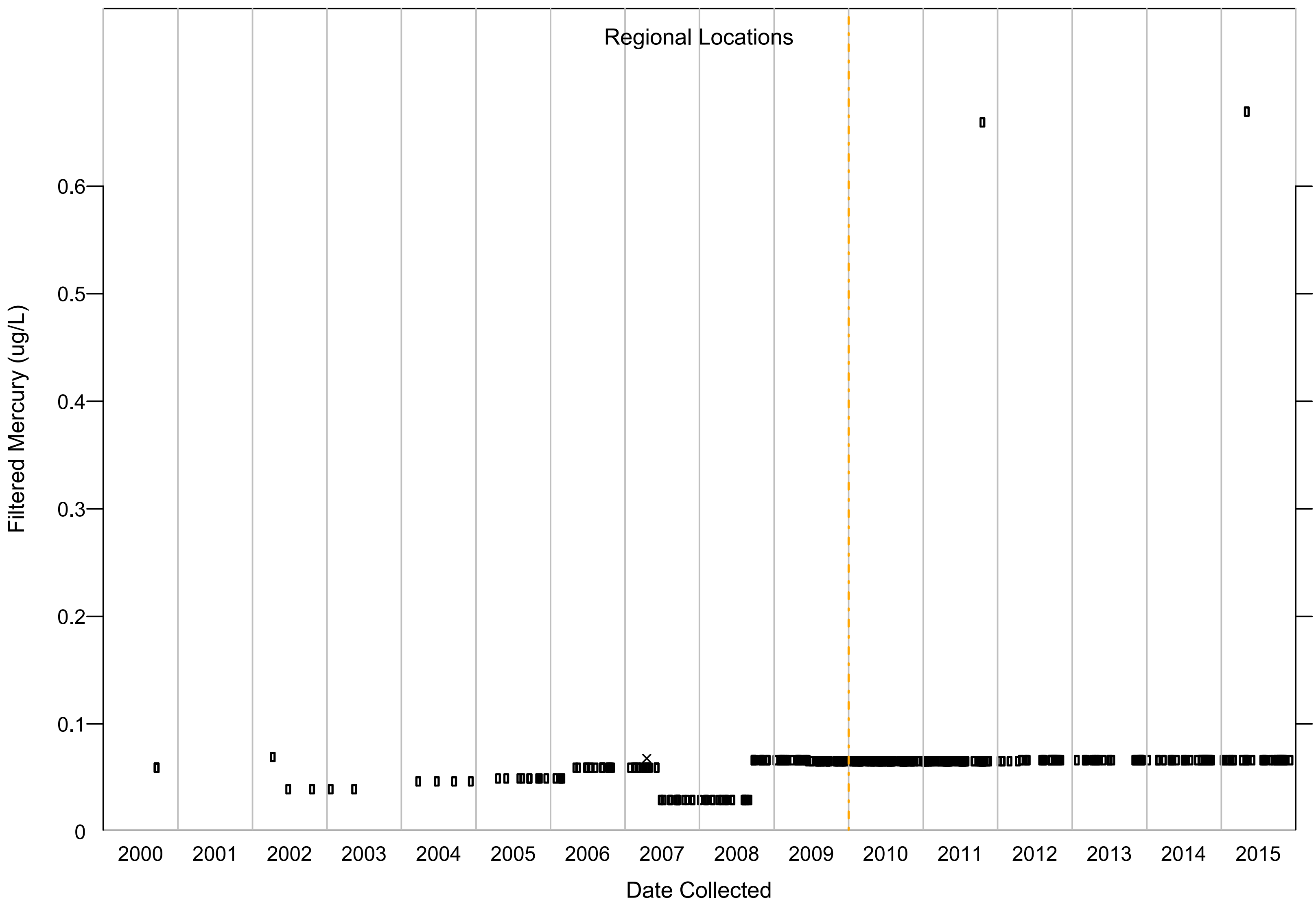



**Figure C-86 Filtered mercury results for regional aquifer**

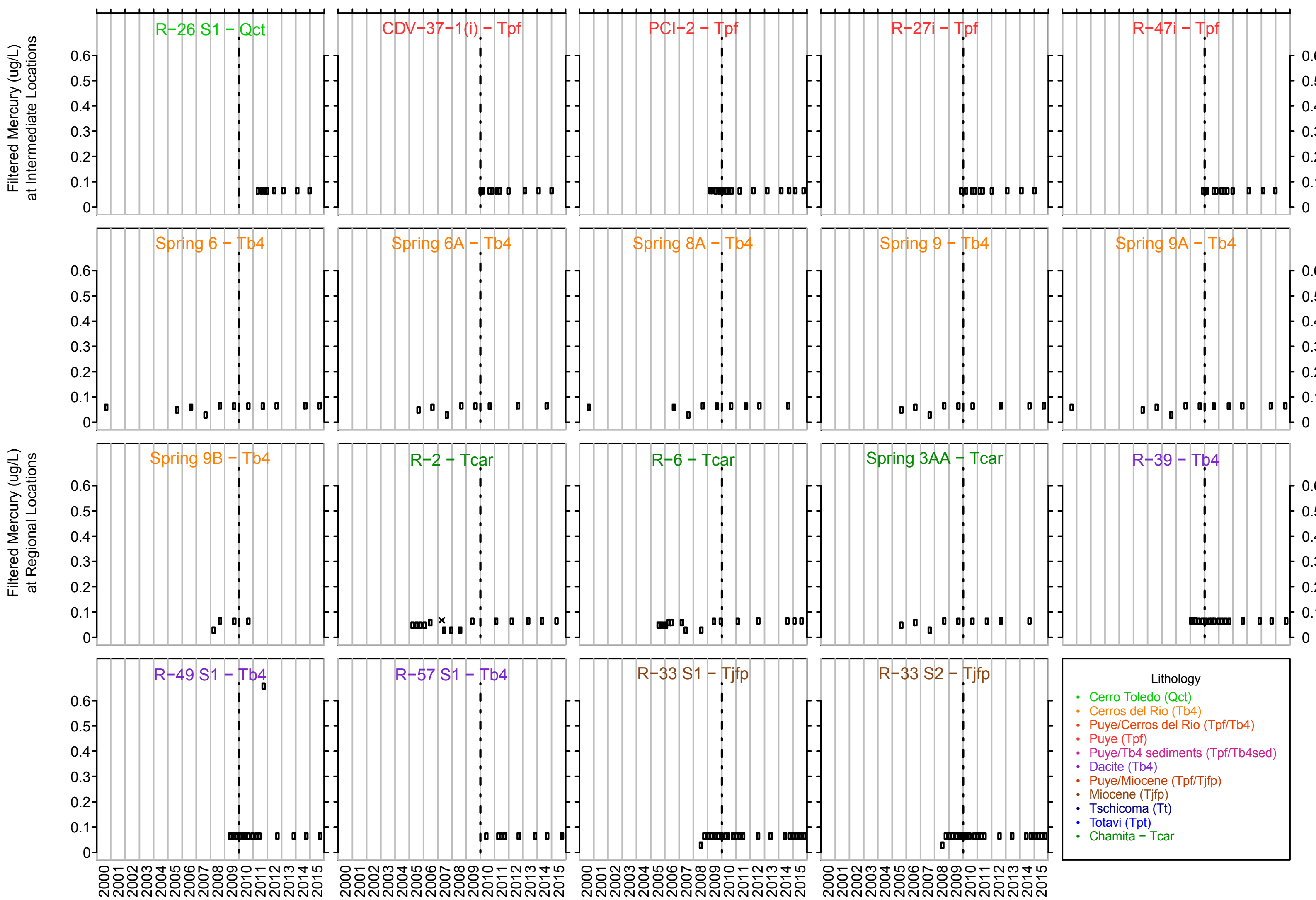



**Figure C-87 Time-series plots for filtered mercury**

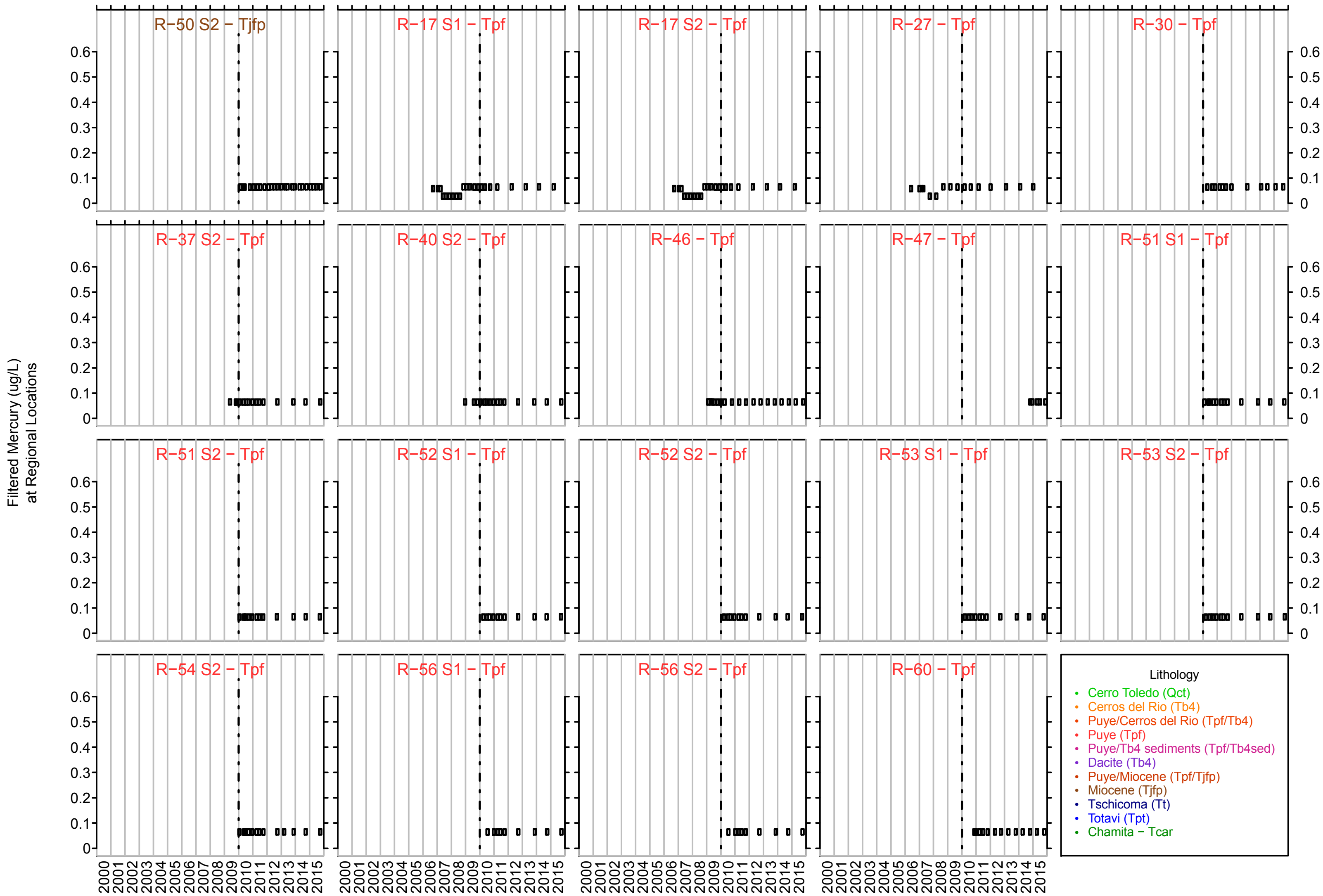



**Figure C-87 (continued) Time-series plots for filtered mercury**

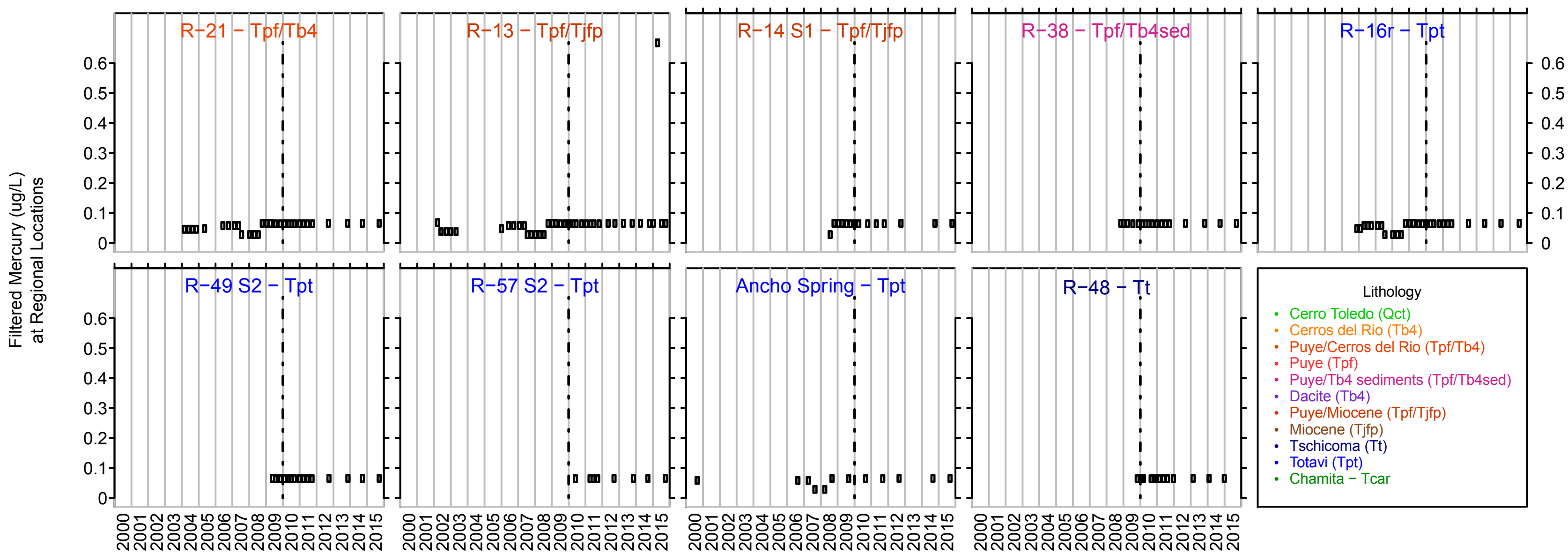



**Figure C-87 (continued) Time-series plots for filtered mercury**

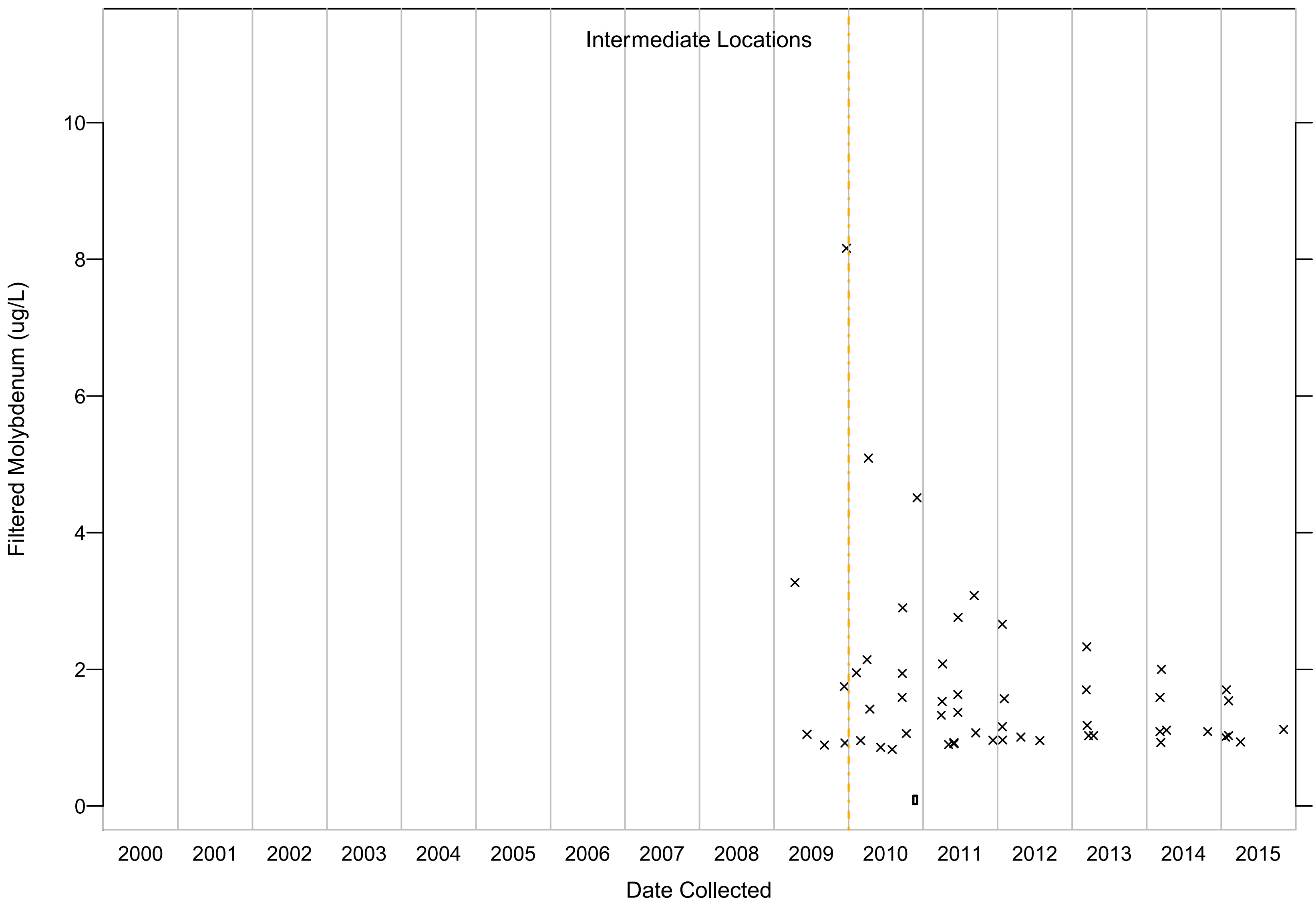



**Figure C-88 Filtered molybdenum results for perched-intermediate groundwater**

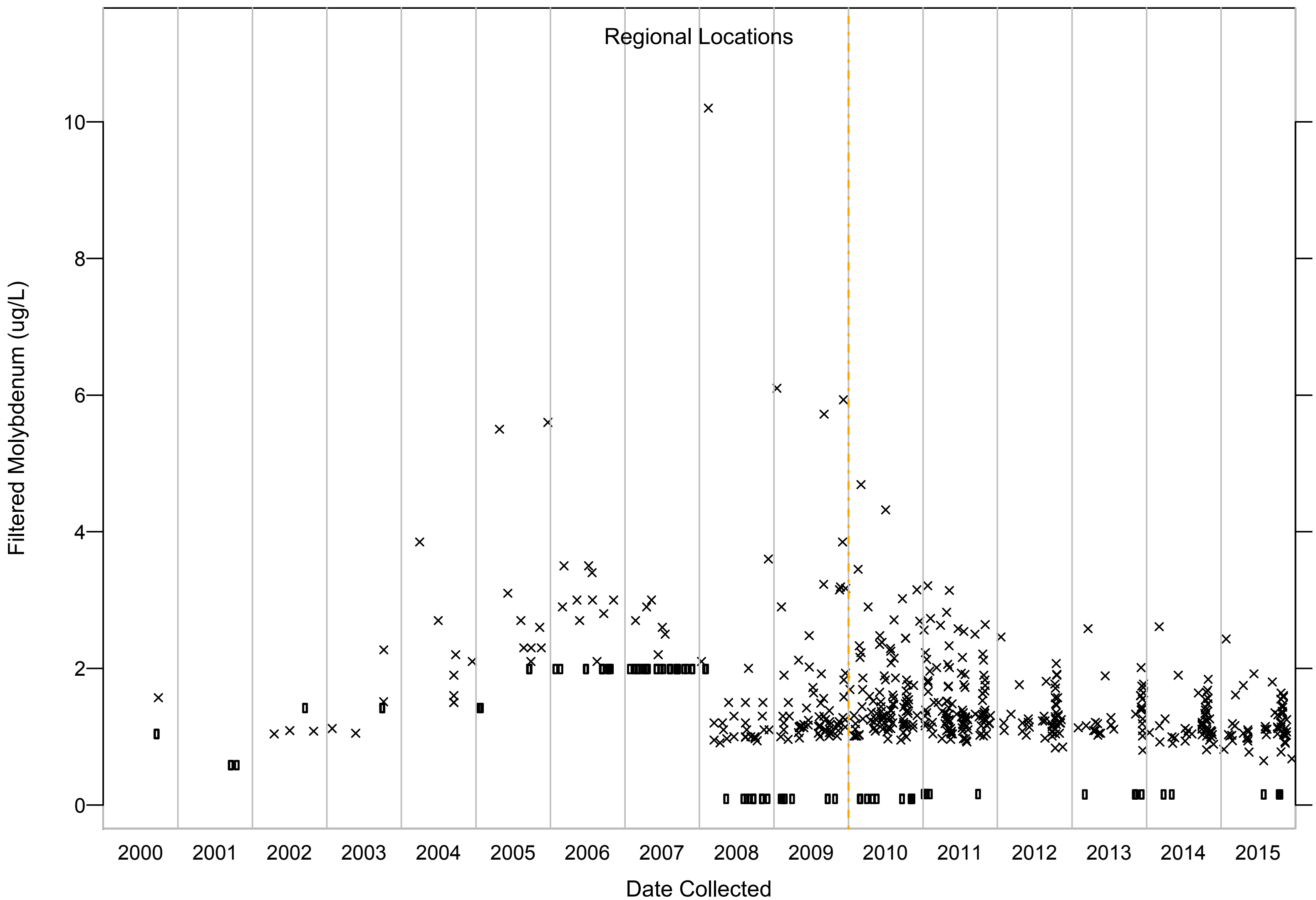



**Figure C-89 Filtered molybdenum results for regional aquifer**

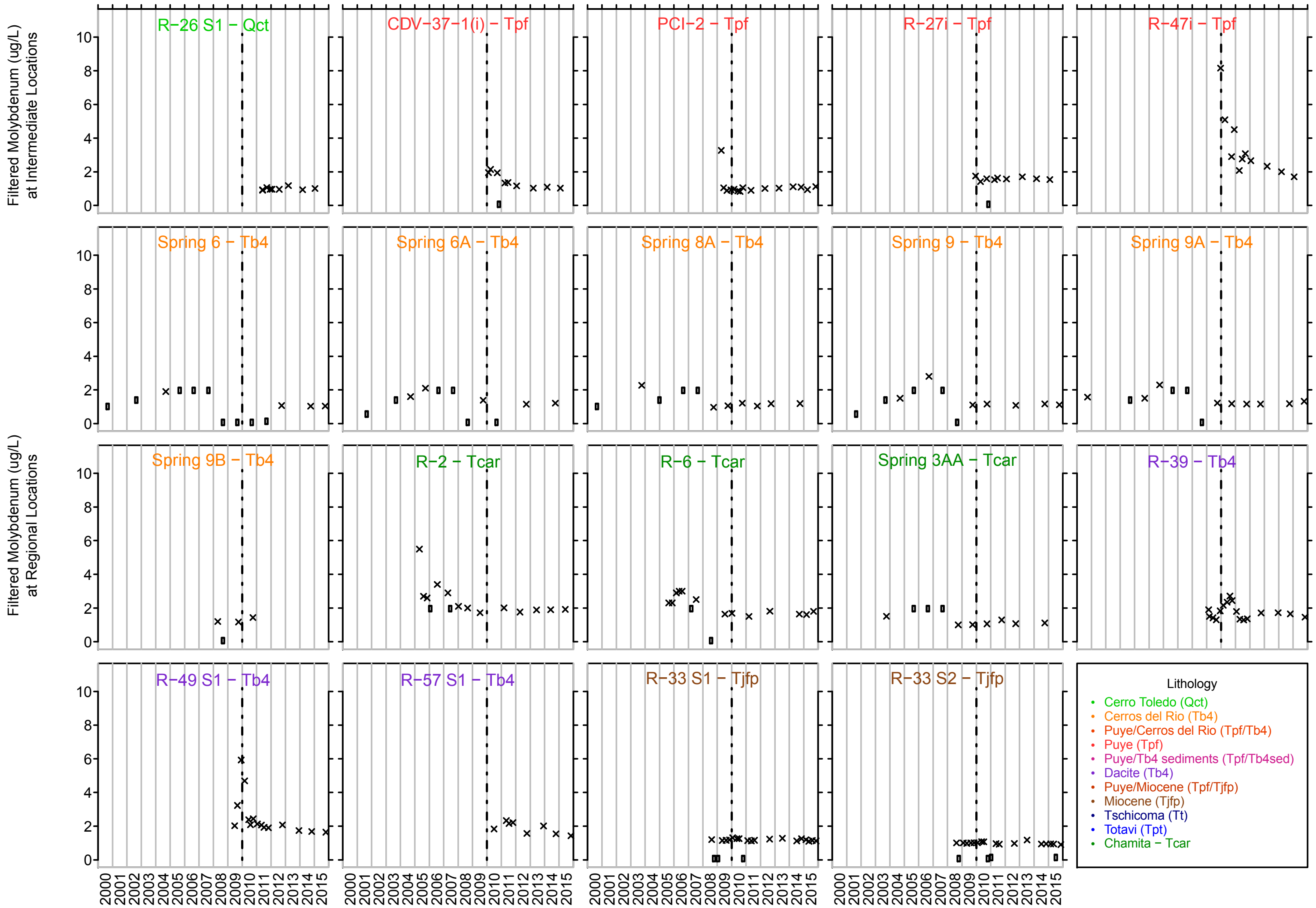



**Figure C-90 Time-series plots for filtered molybdenum**

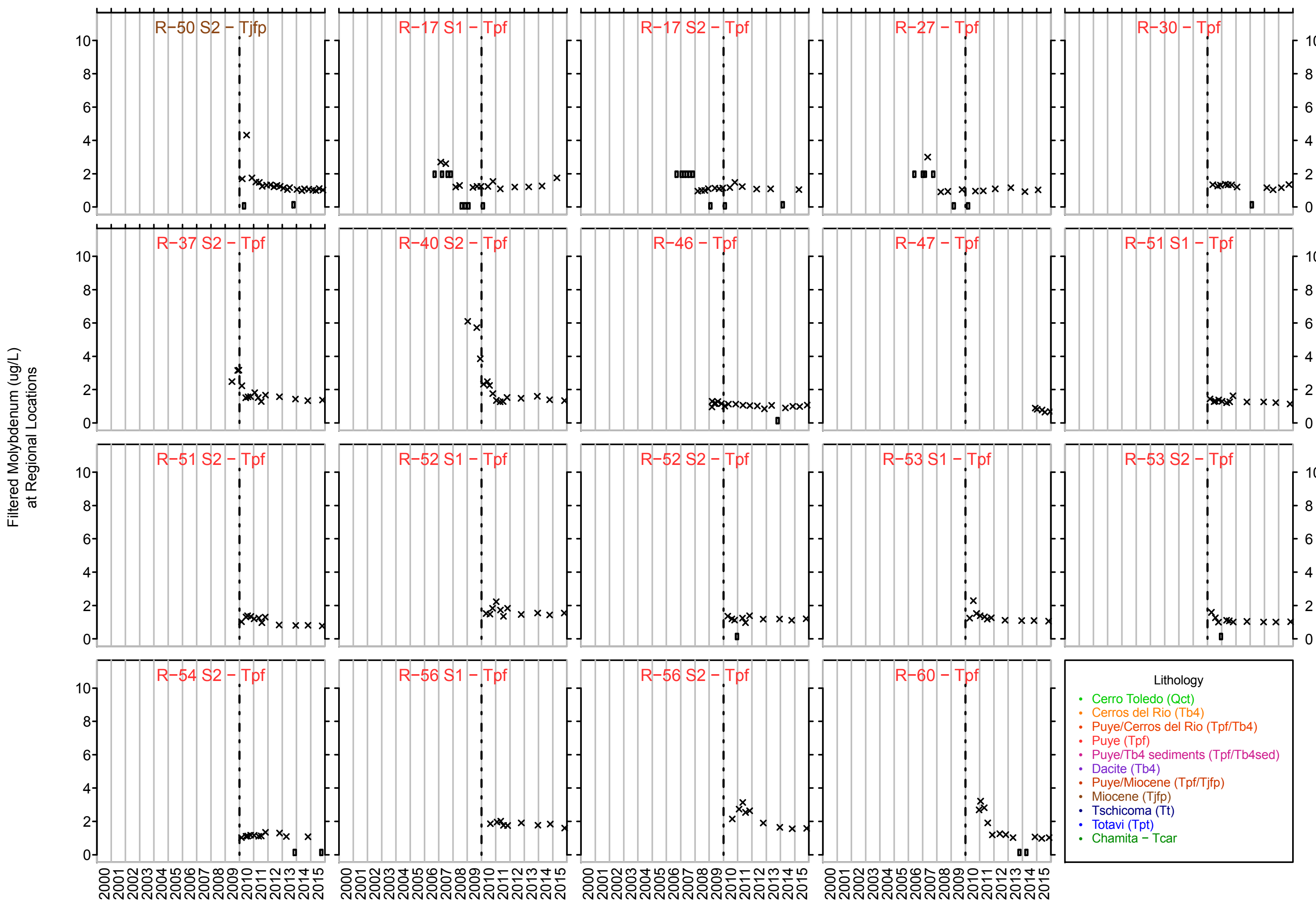



**Figure C-90 (continued) Time-series plots for filtered molybdenum**

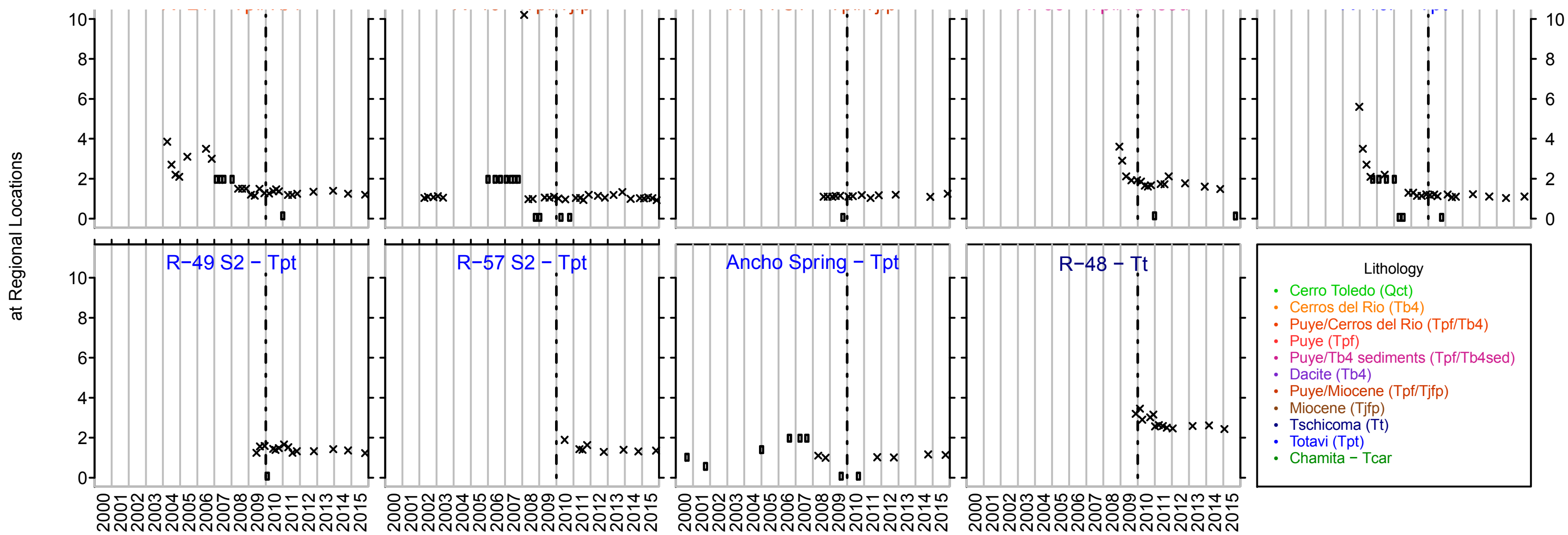



**Figure C-90 (continued) Time-series plots for filtered molybdenum**

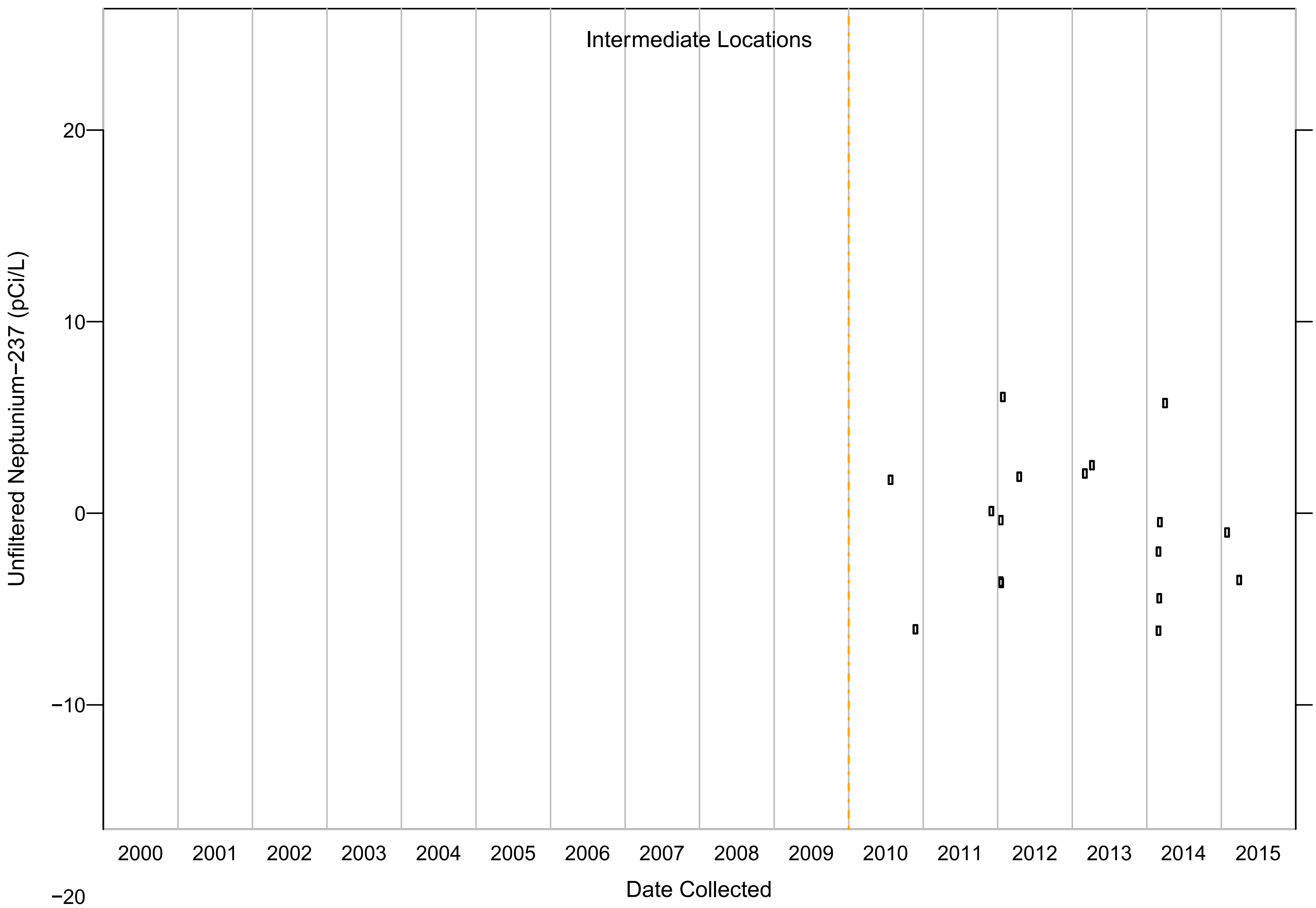



**Figure C-91 Unfiltered neptunium-237 results for perched-intermediate groundwater**

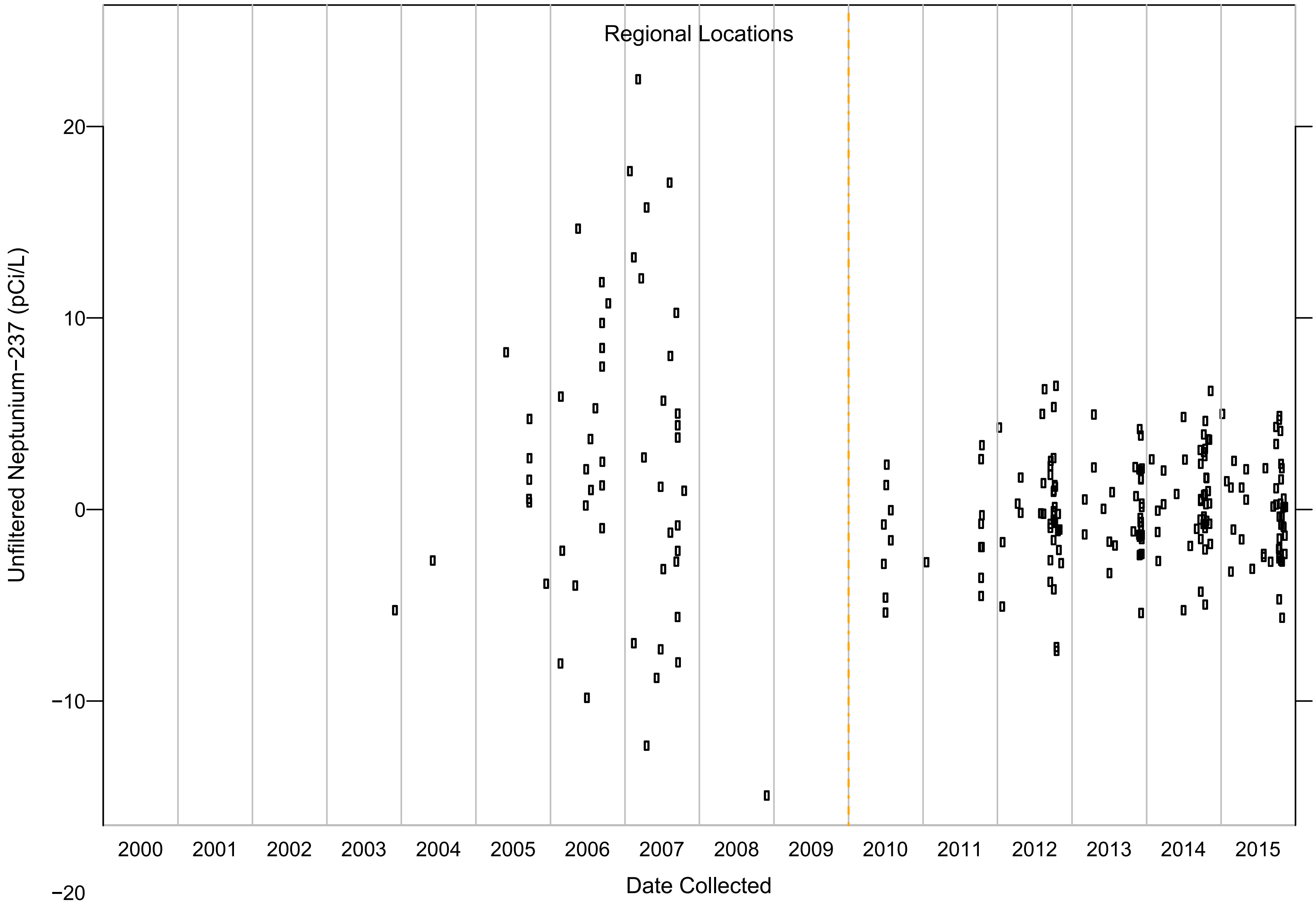



**Figure C-92** **Unfiltered neptunium-237 results for regional aquifer**

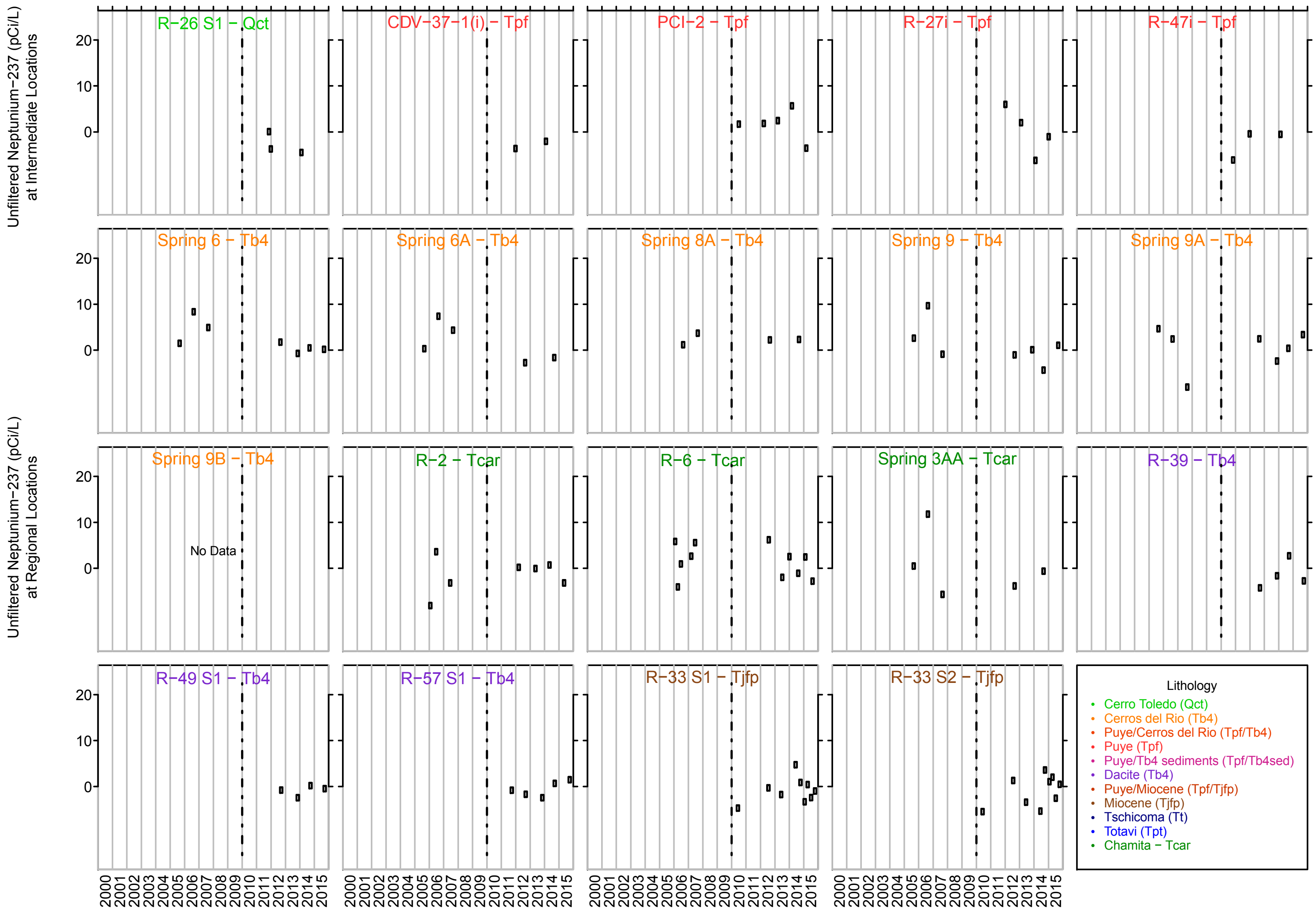



**Figure C-93 Time-series plots for unfiltered neptunium-237**

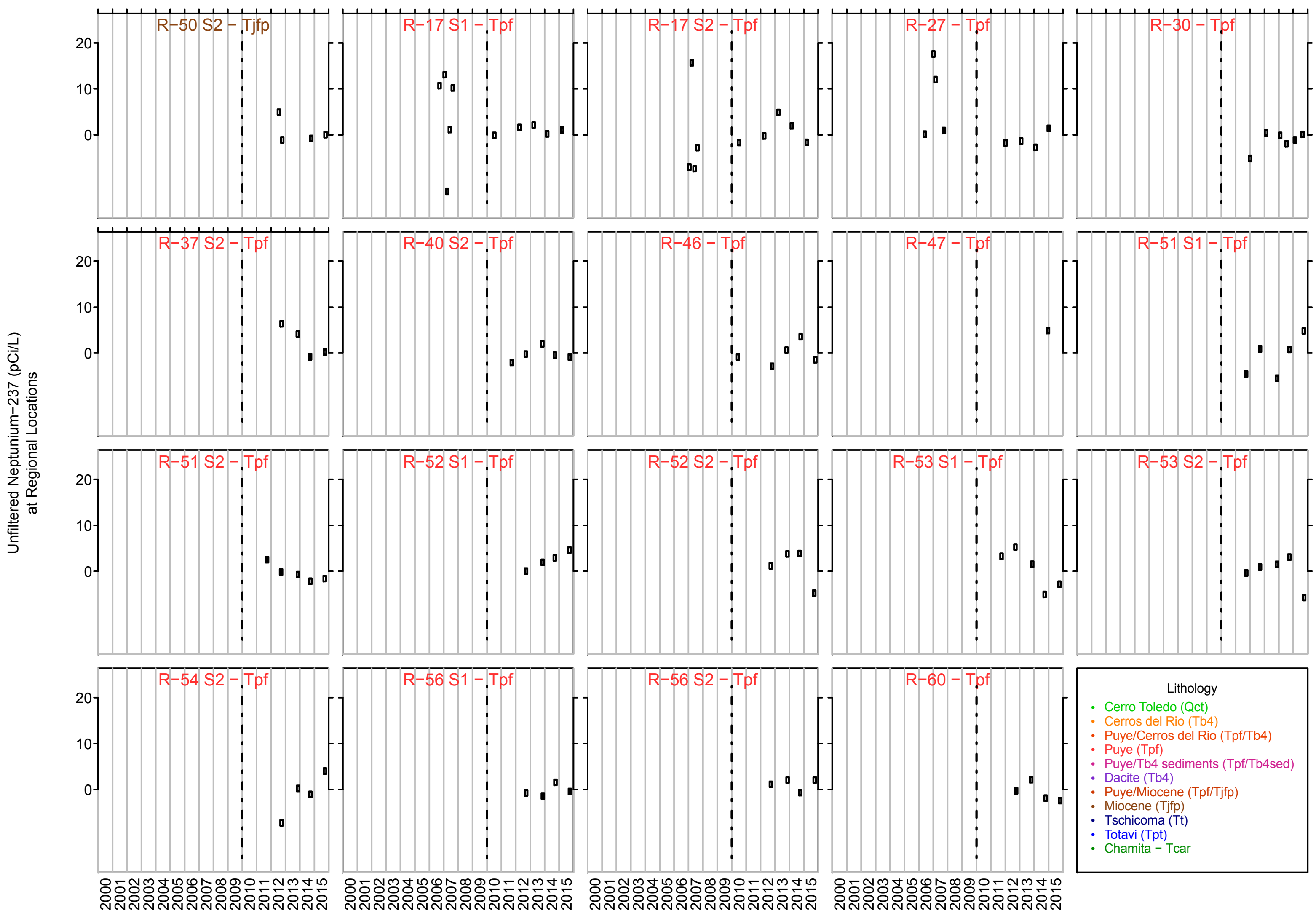



**Figure C-93 (continued)** **Time-series plots for unfiltered neptunium-237**

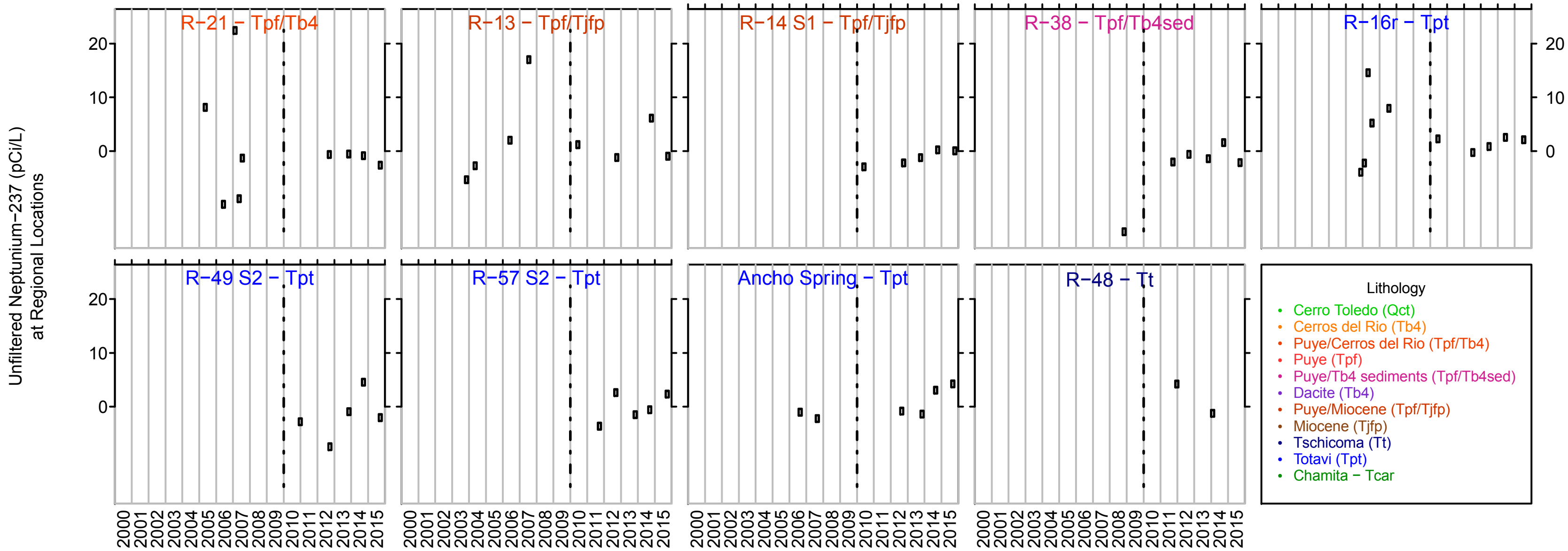



**Figure C-93 (continued) Time-series plots for unfiltered neptunium-237**

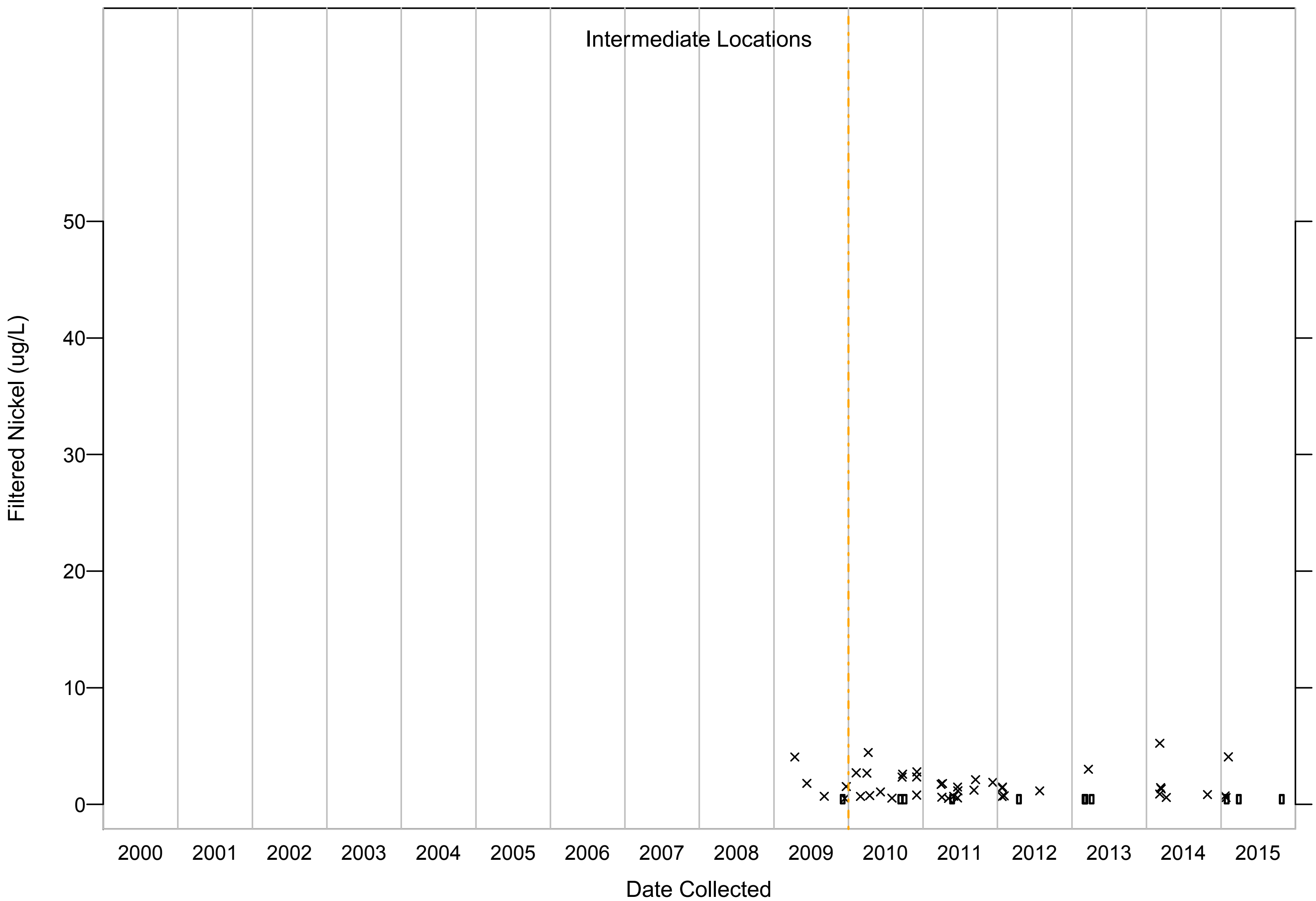



**Figure C-94 Filtered nickel results for perched-intermediate groundwater**

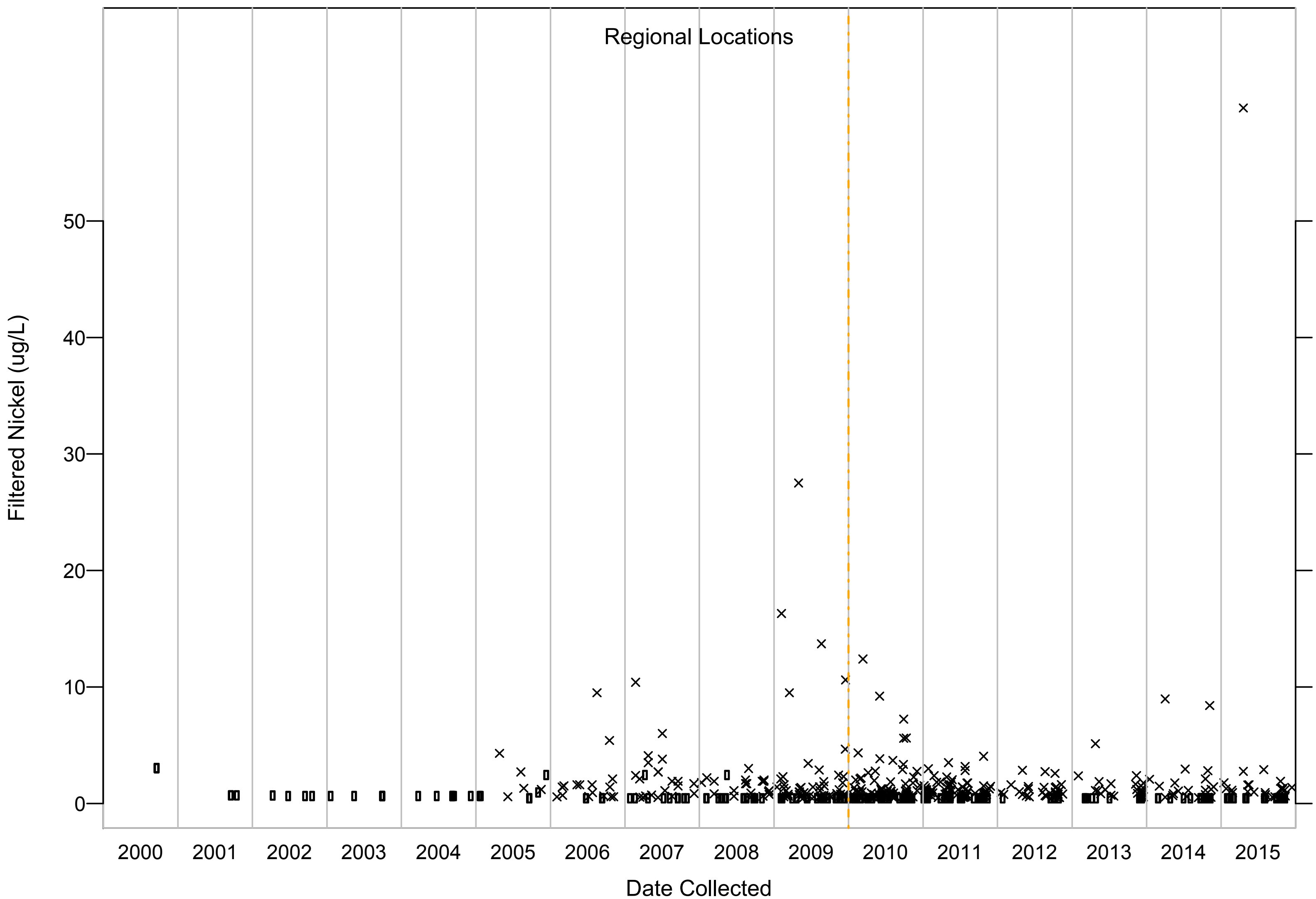



**Figure C-95 Filtered nickel results for regional aquifer**

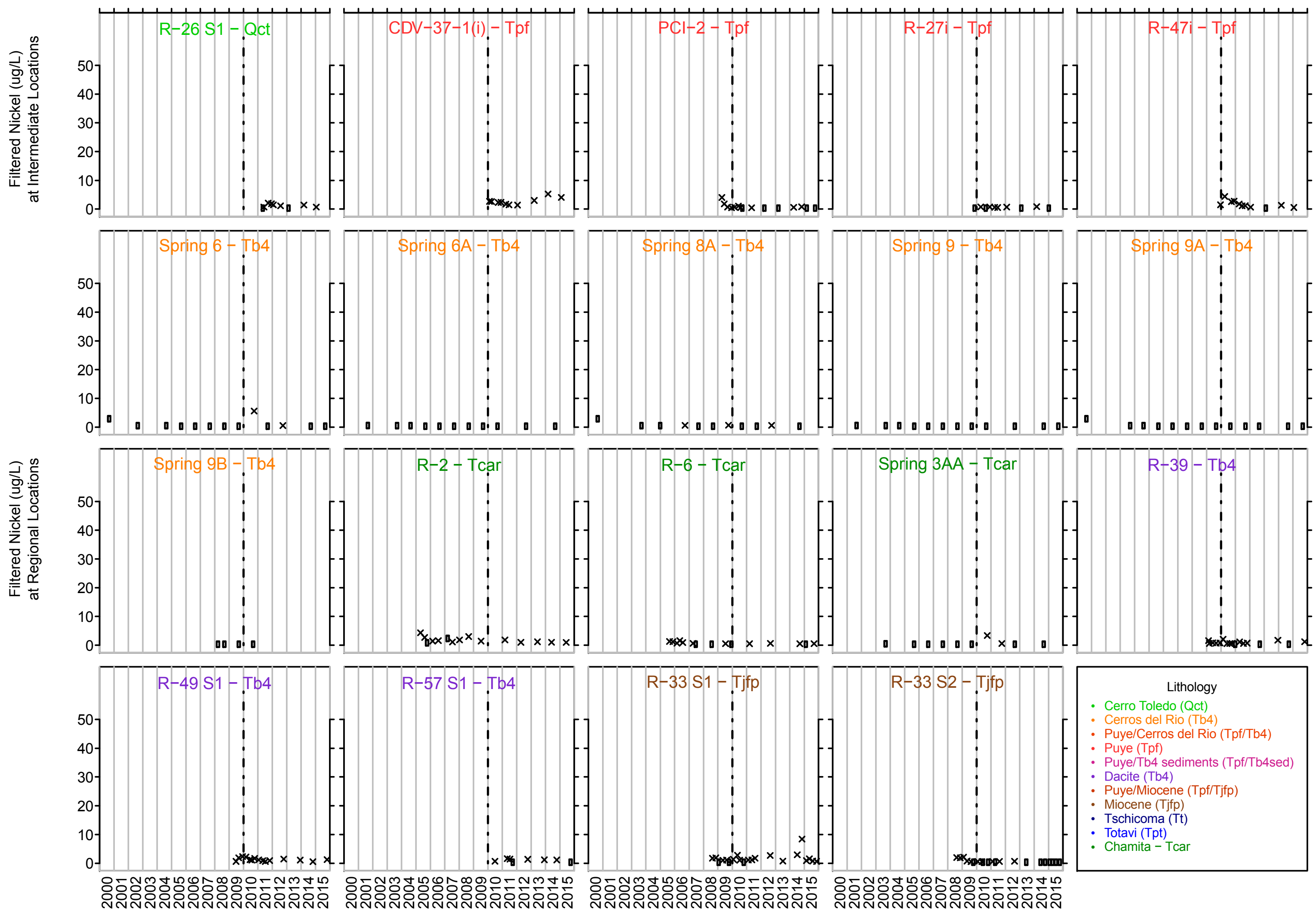



**Figure C-96 Time-series plots for filtered nickel**

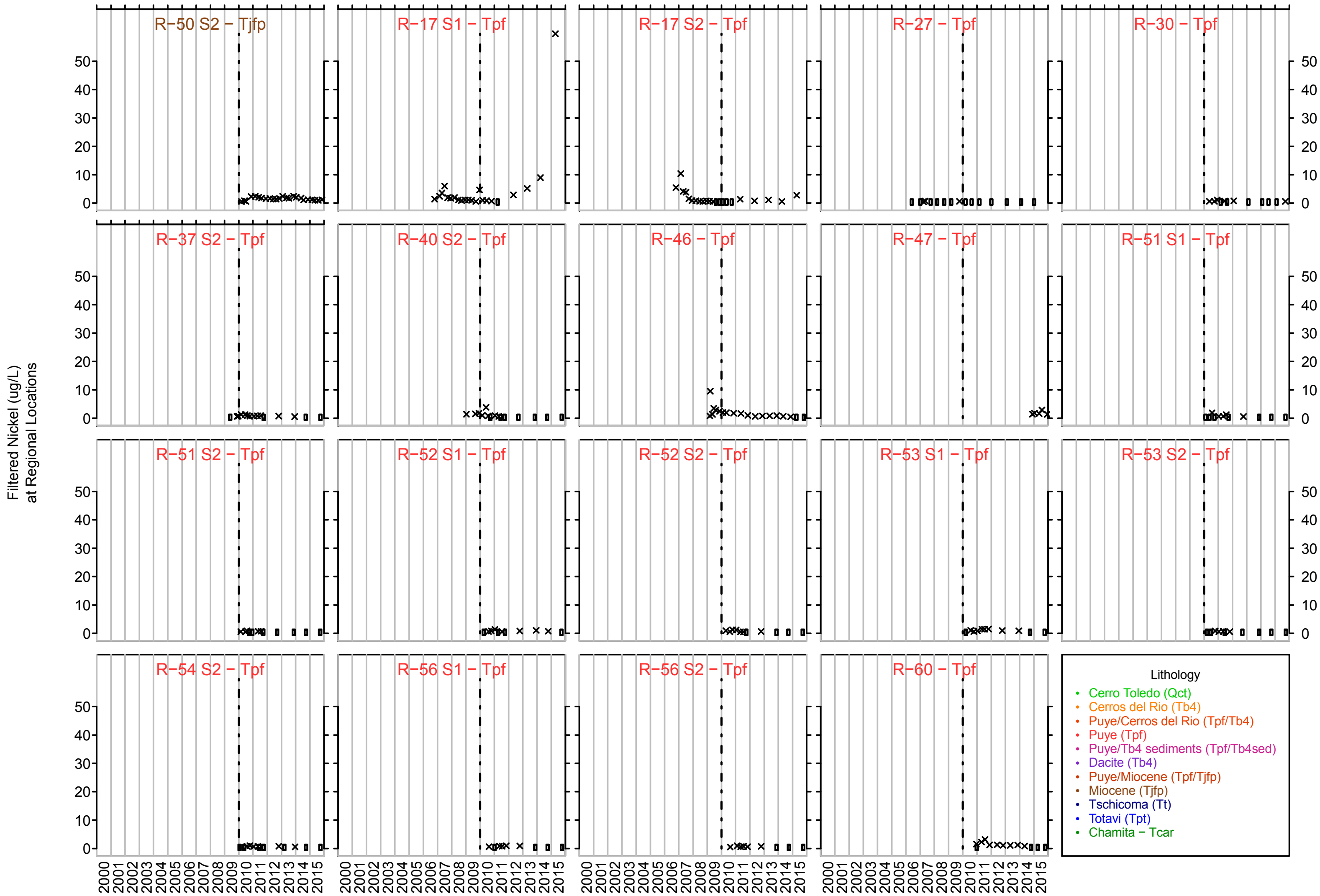



**Figure C-96 (continued)** **Time-series plots for filtered nickel**

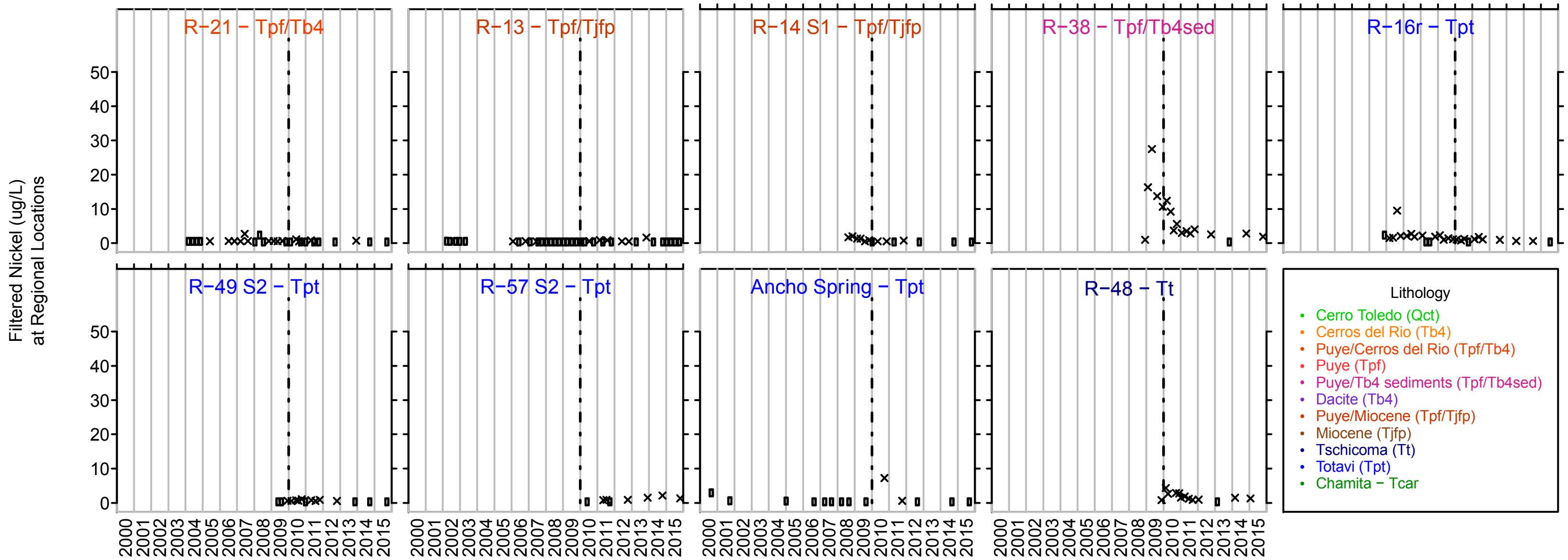



**Figure C-96 (continued)** **Time-series plots for filtered nickel**

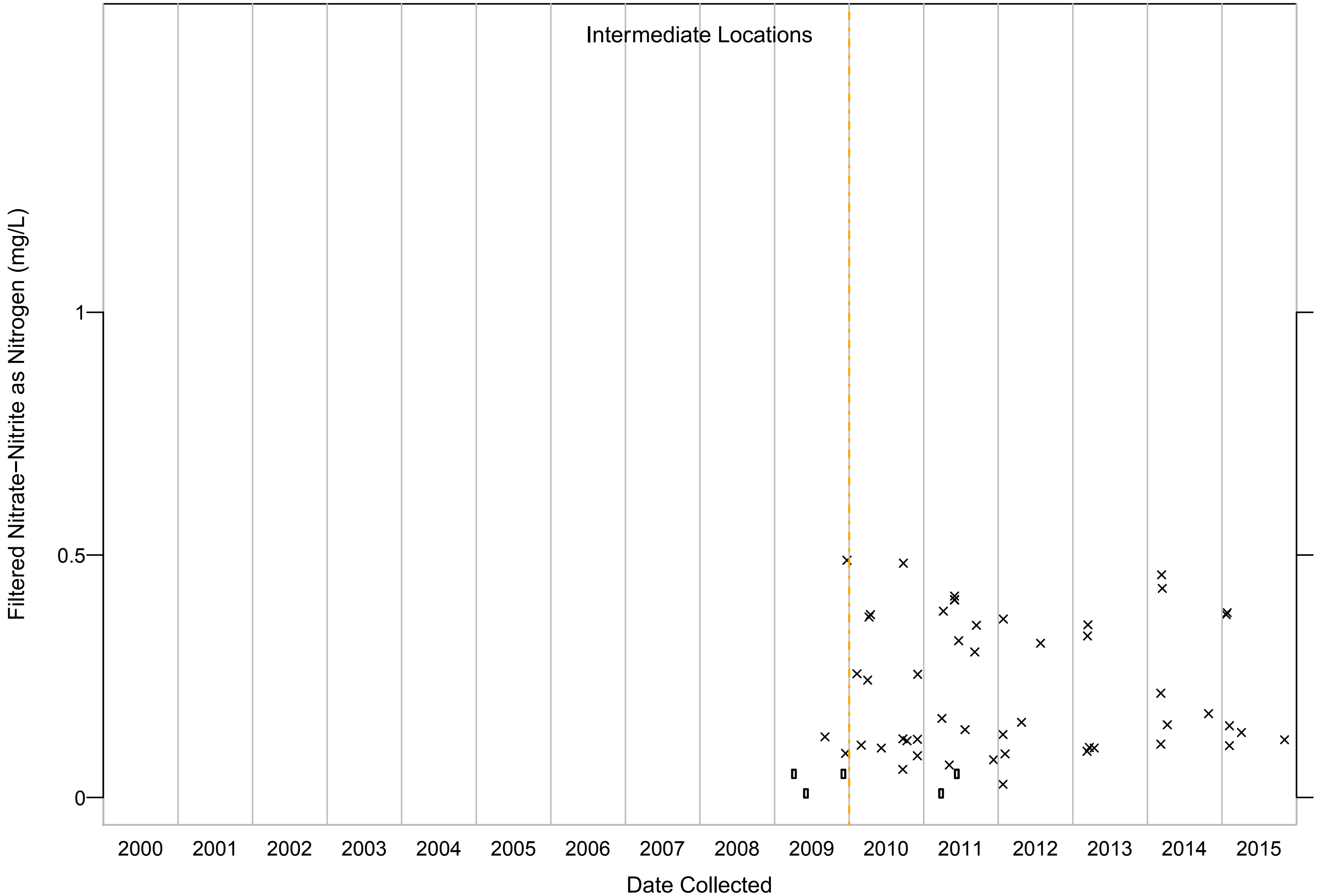



**Figure C-97 Filtered nitrate-nitrite results for perched-intermediate groundwater**

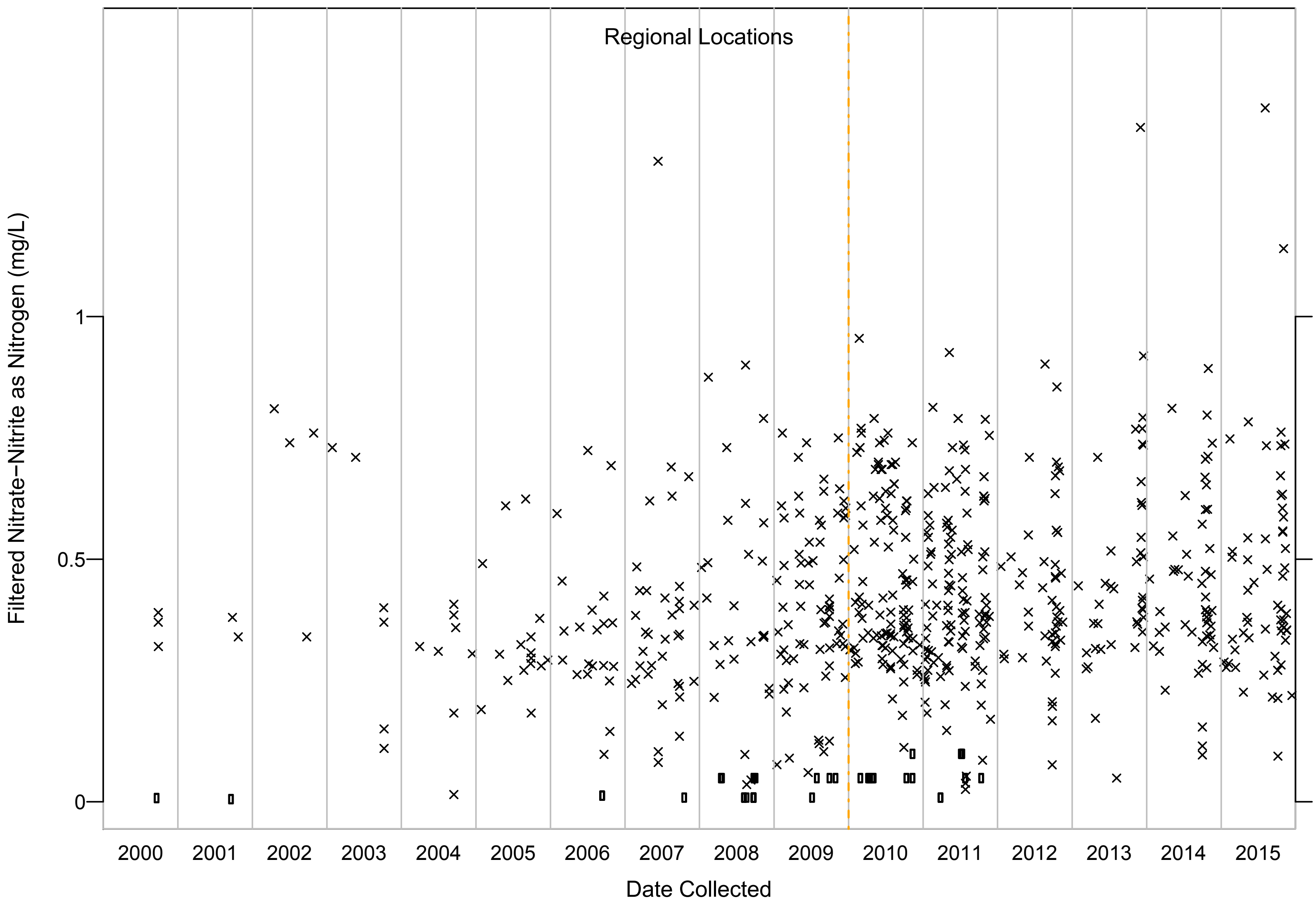



**Figure C-98 Filtered nitrate-nitrite results for regional aquifer**

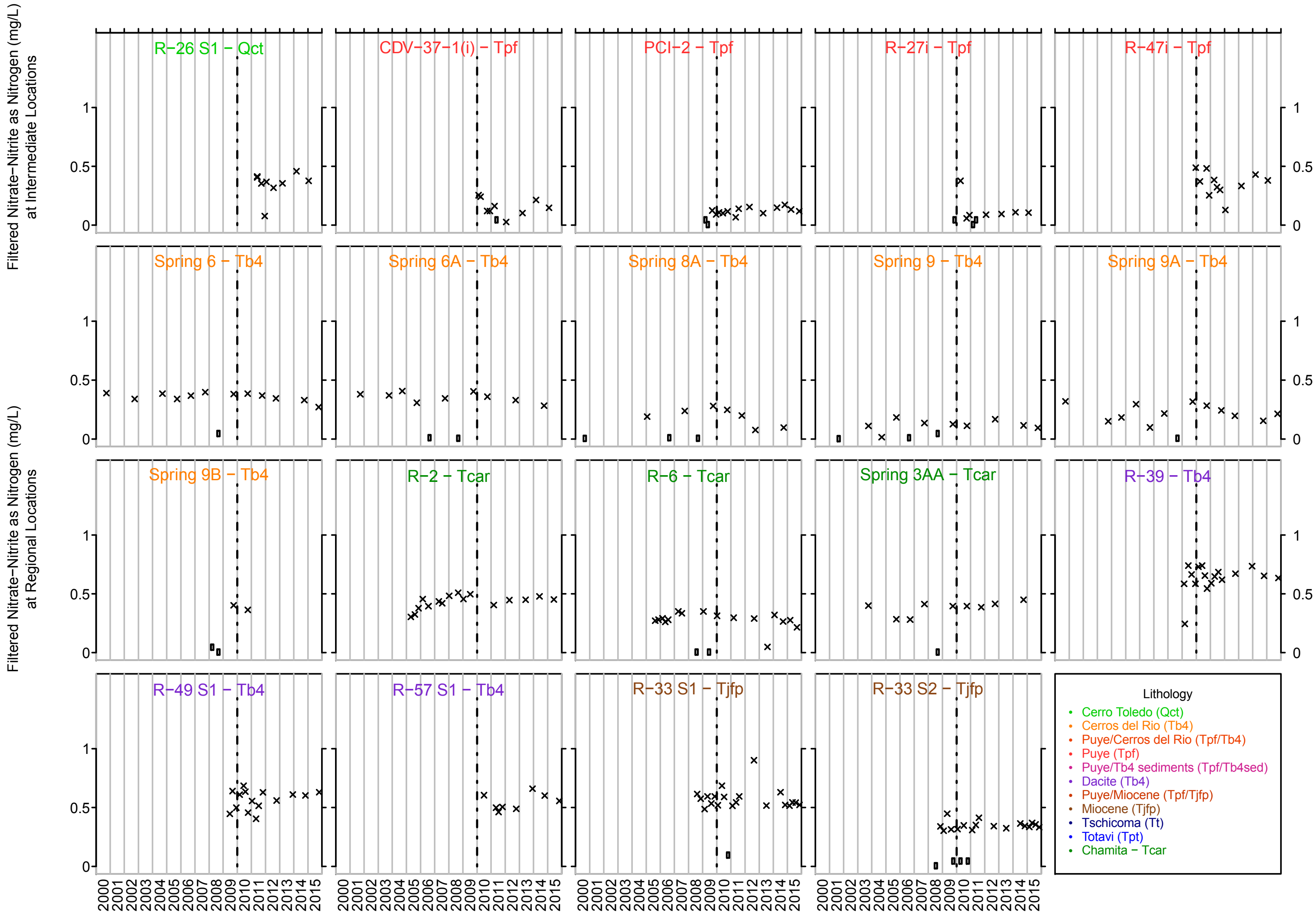



**Figure C-99 Time-series plots for filtered nitrate-nitrite**

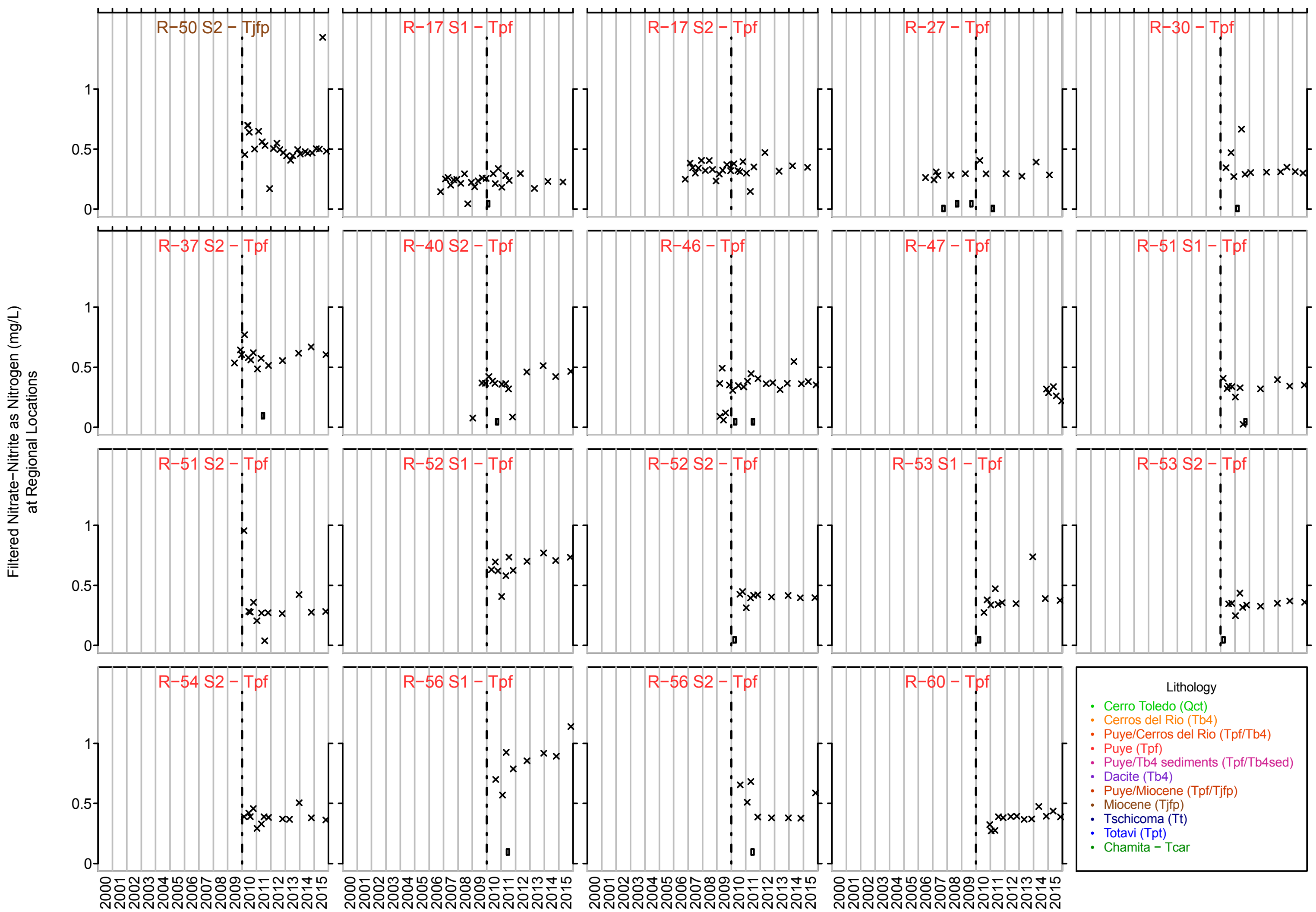



**Figure C-99 (continued)** **Time-series plots for filtered nitrate-nitrite**

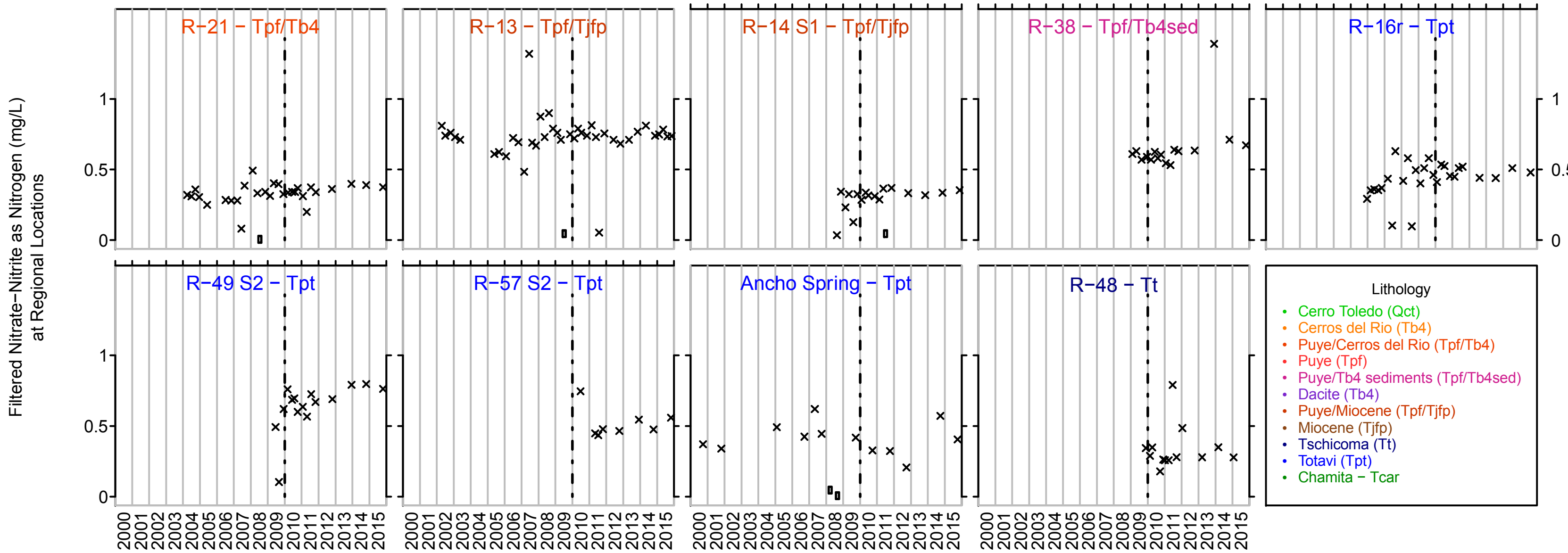



**Figure C-99 (continued) Time-series plots for filtered nitrate-nitrite**

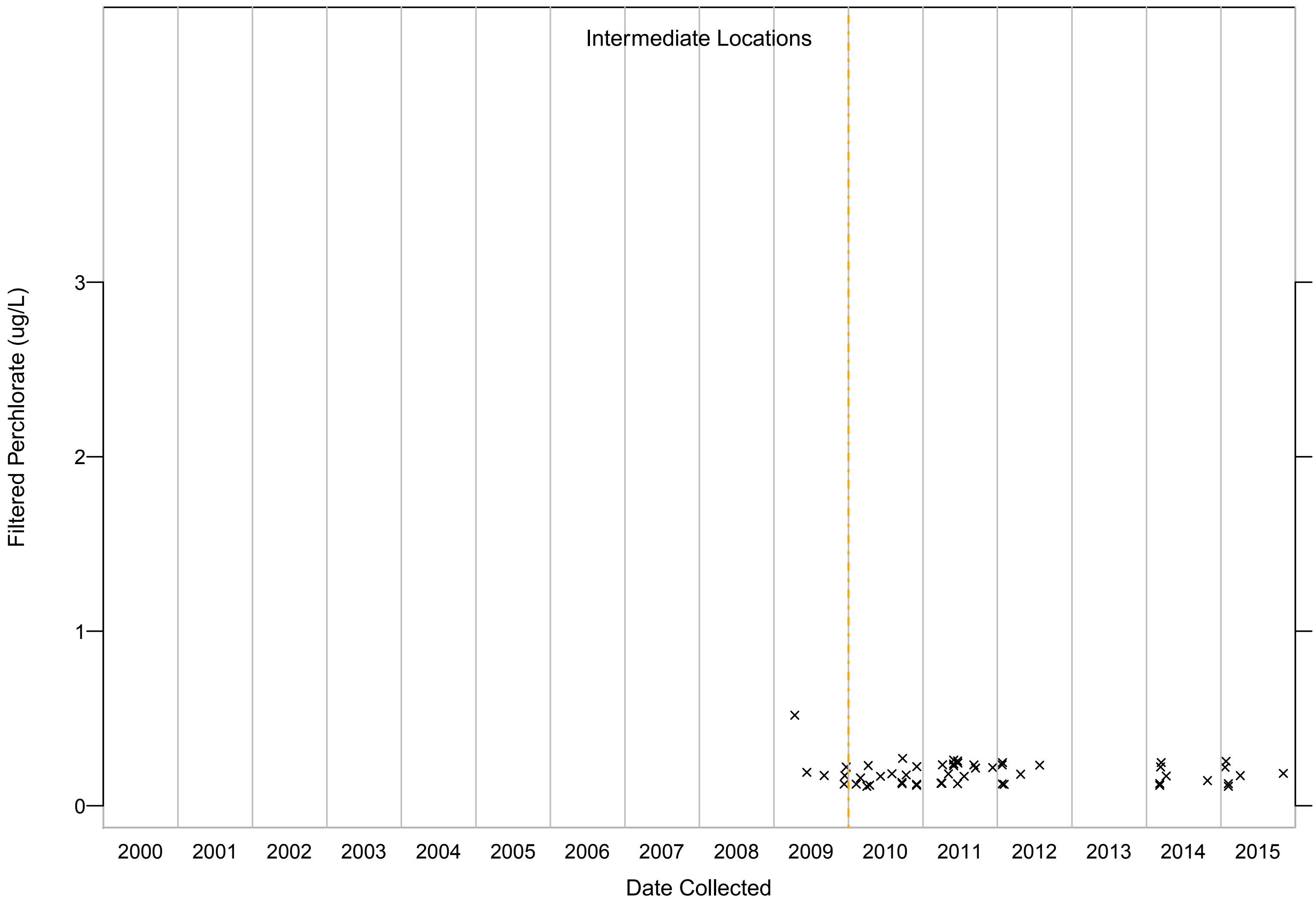



**Figure C-100 Filtered perchlorate results for perched-intermediate groundwater**

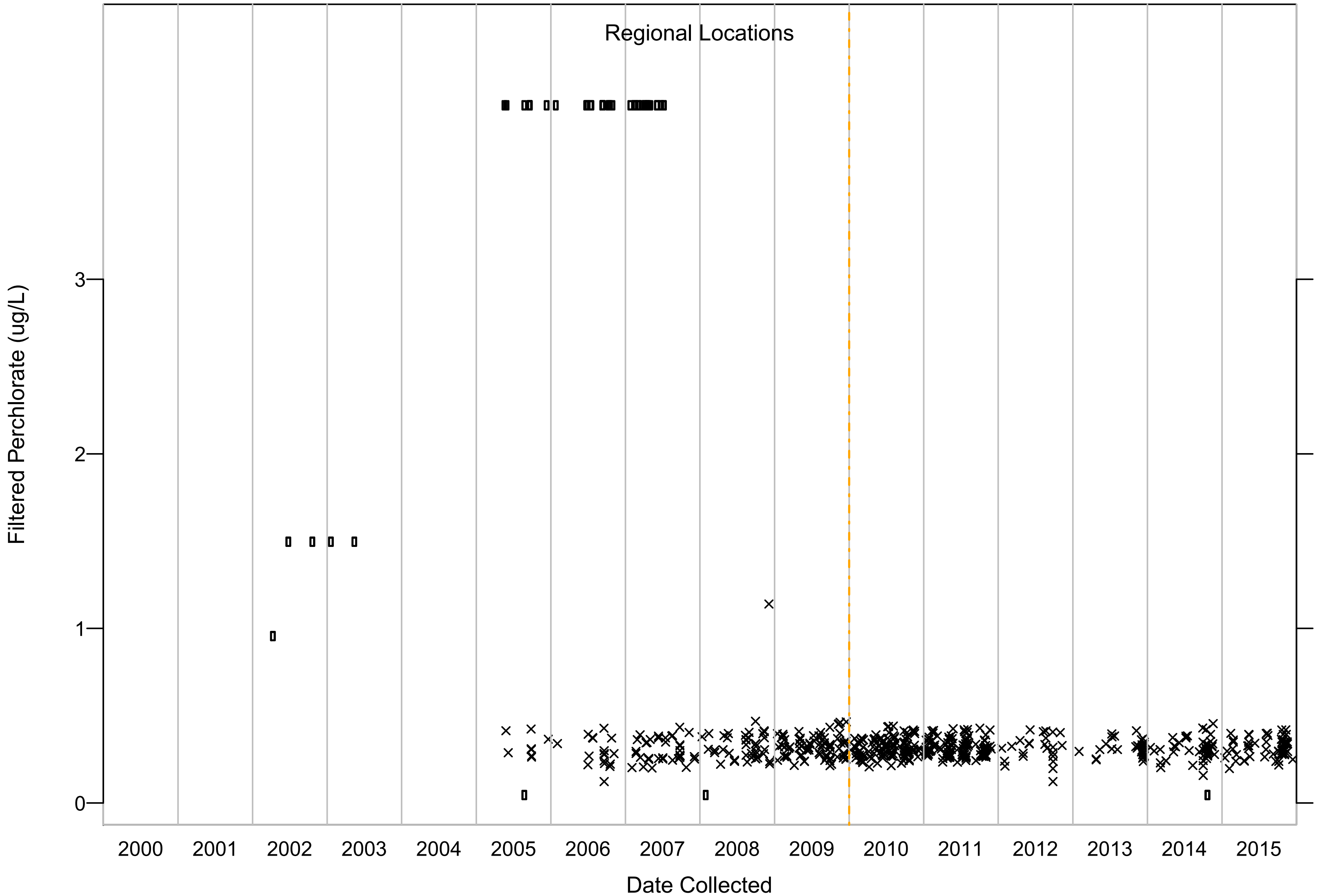



**Figure C-101 Filtered perchlorate results for regional aquifer**

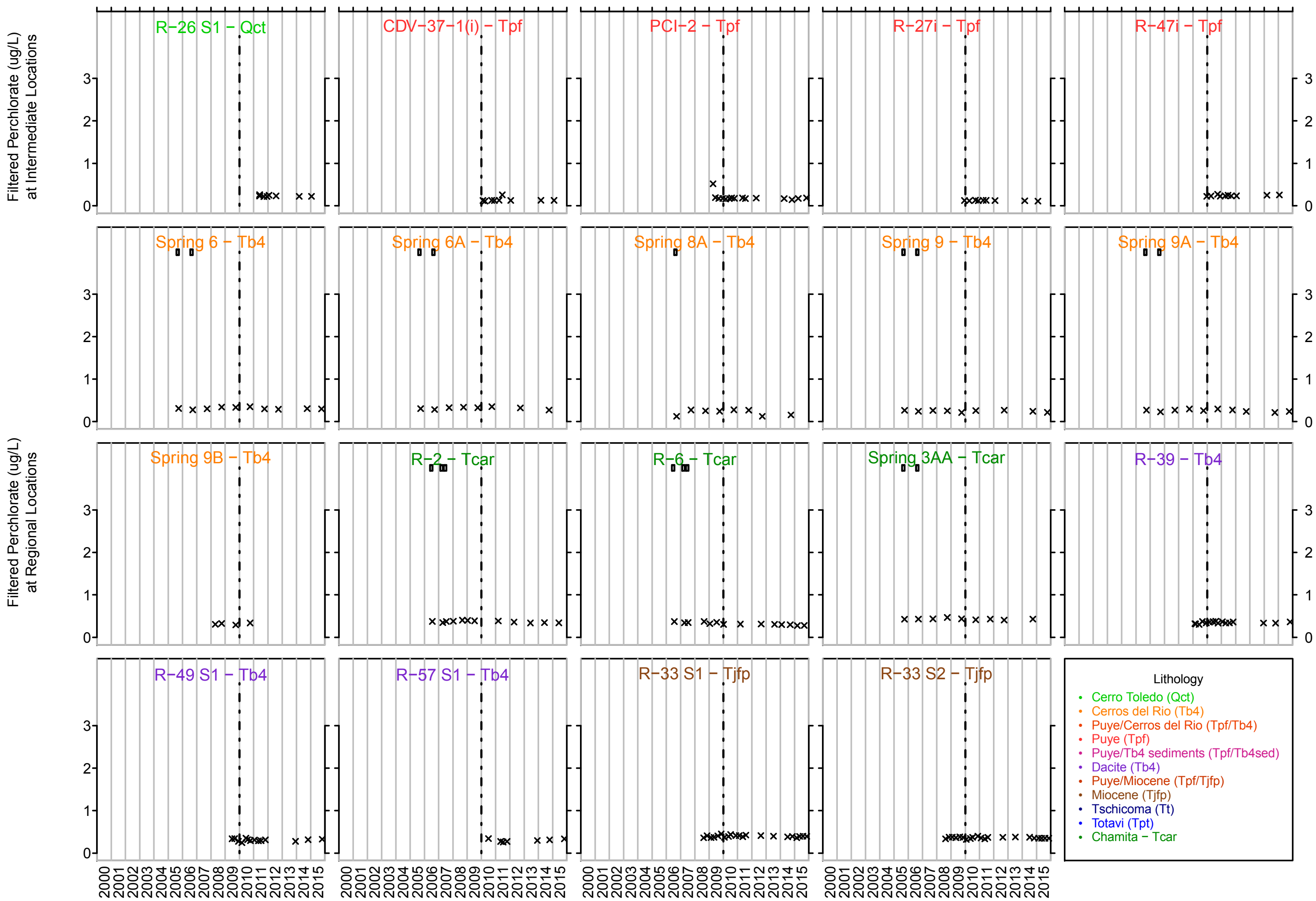



**Figure C-102 Time-series plots for filtered perchlorate**

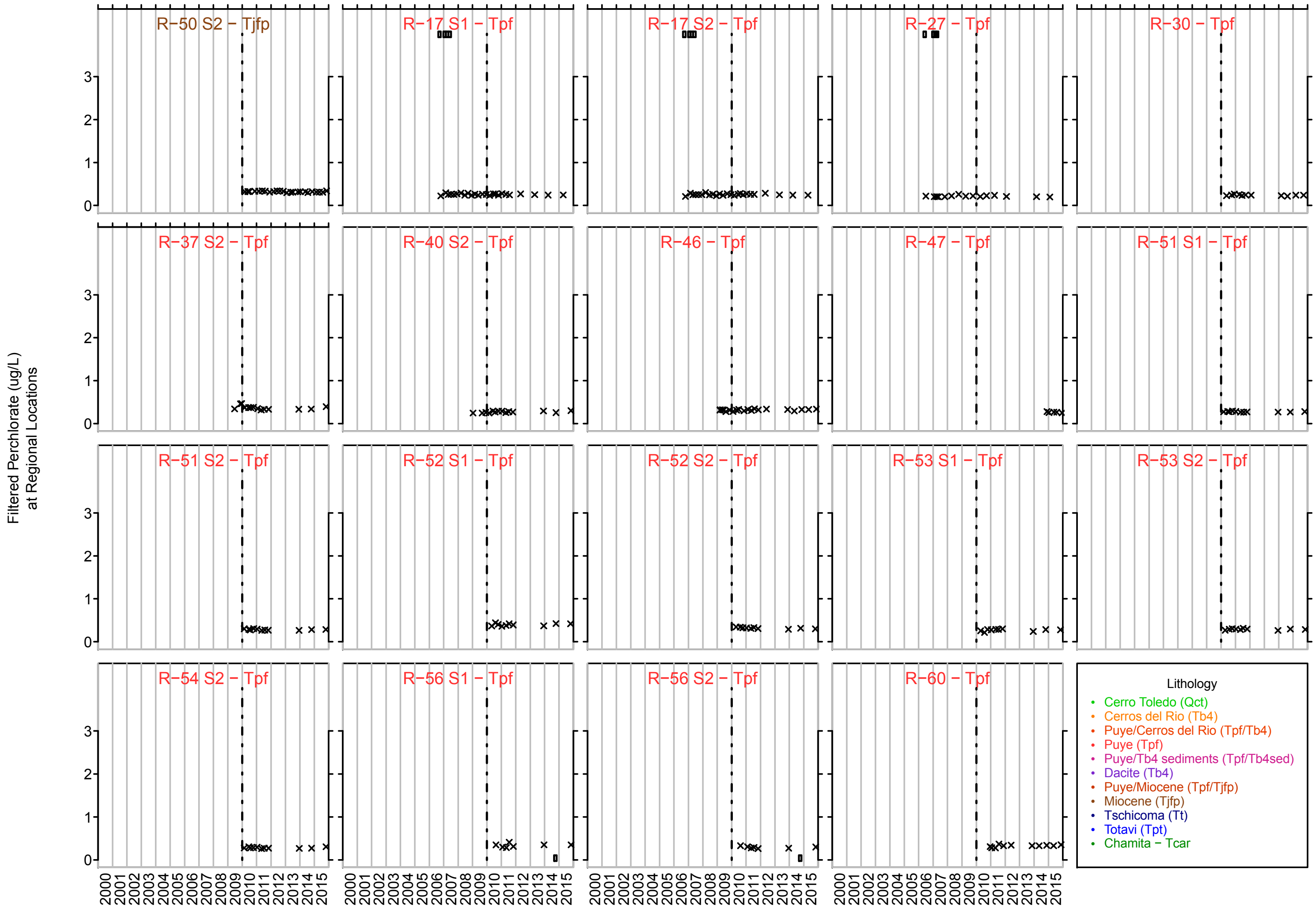



**Figure C-102 (continued) Time-series plots for filtered perchlorate**

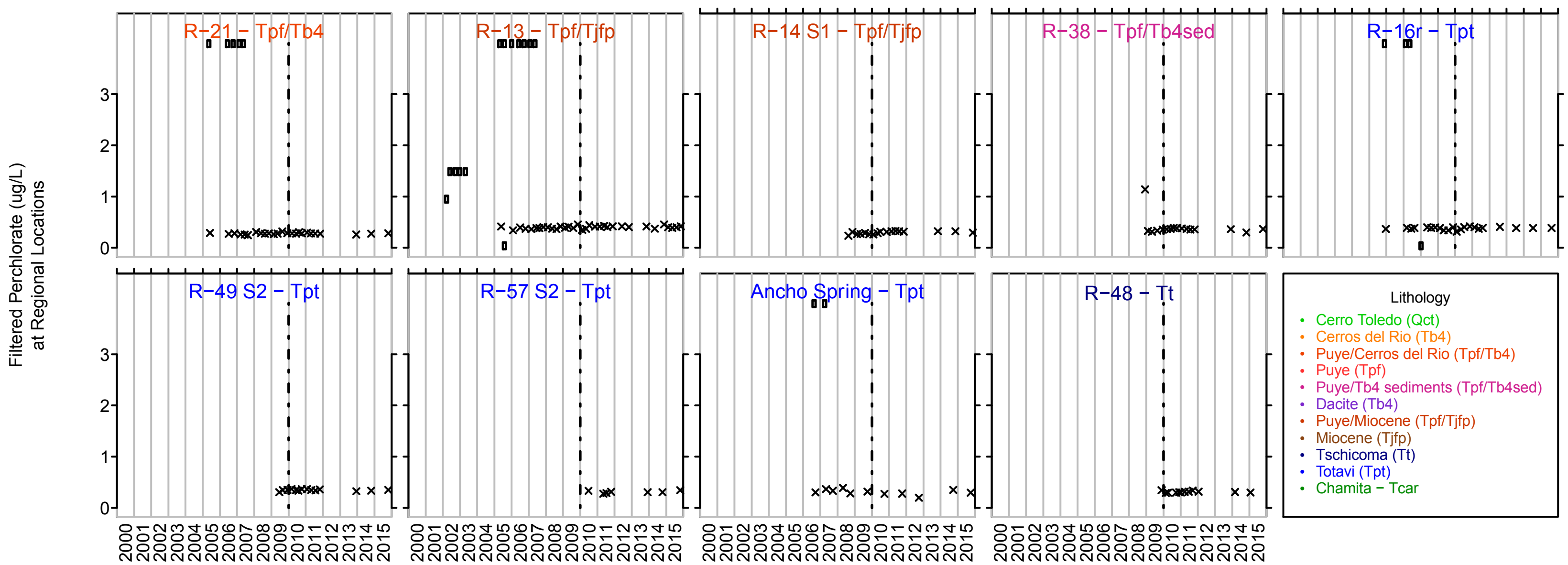



**Figure C-102 (continued) Time-series plots for filtered perchlorate**

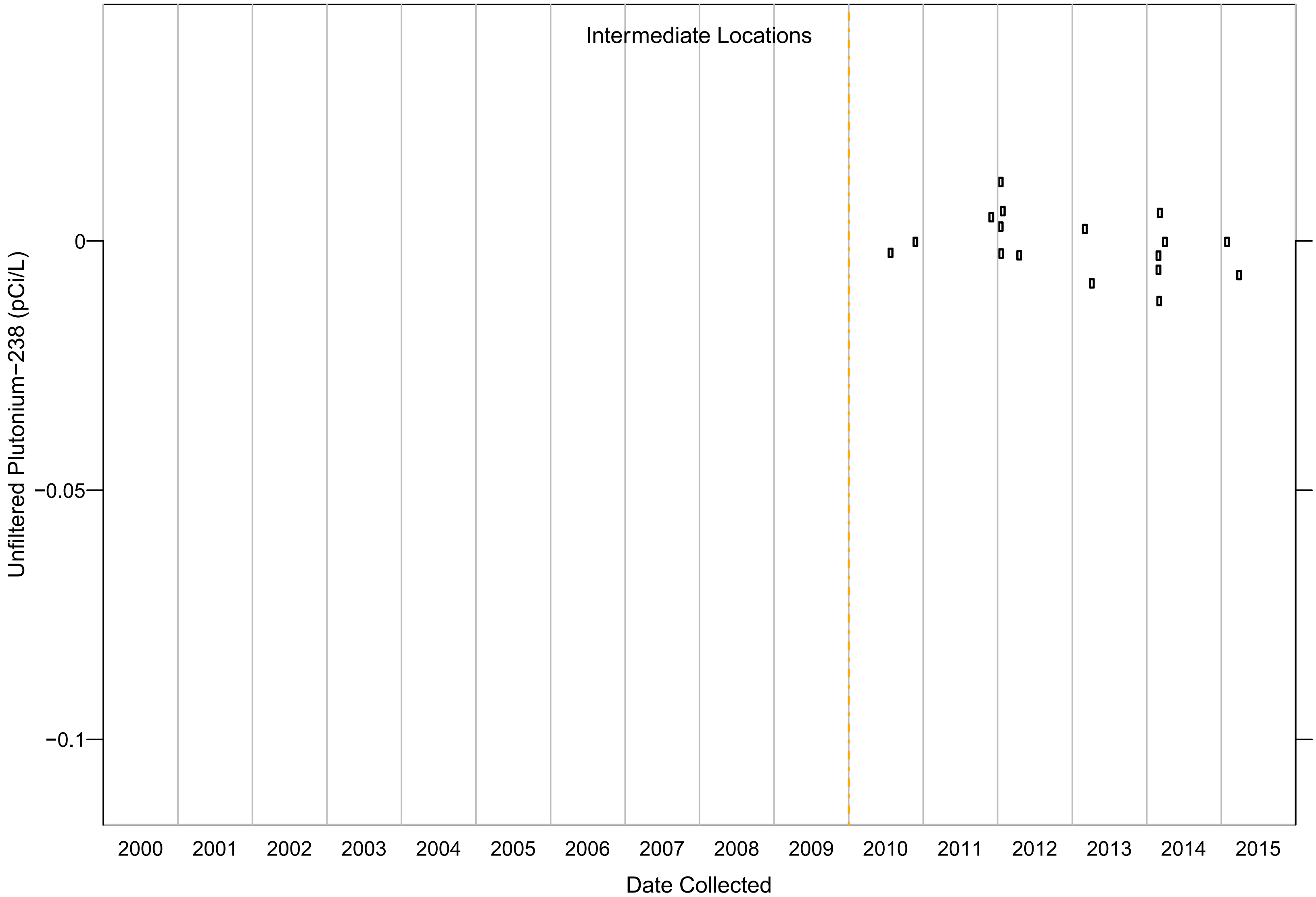



**Figure C-103 Unfiltered plutonium-238 results for perched-intermediate groundwater**

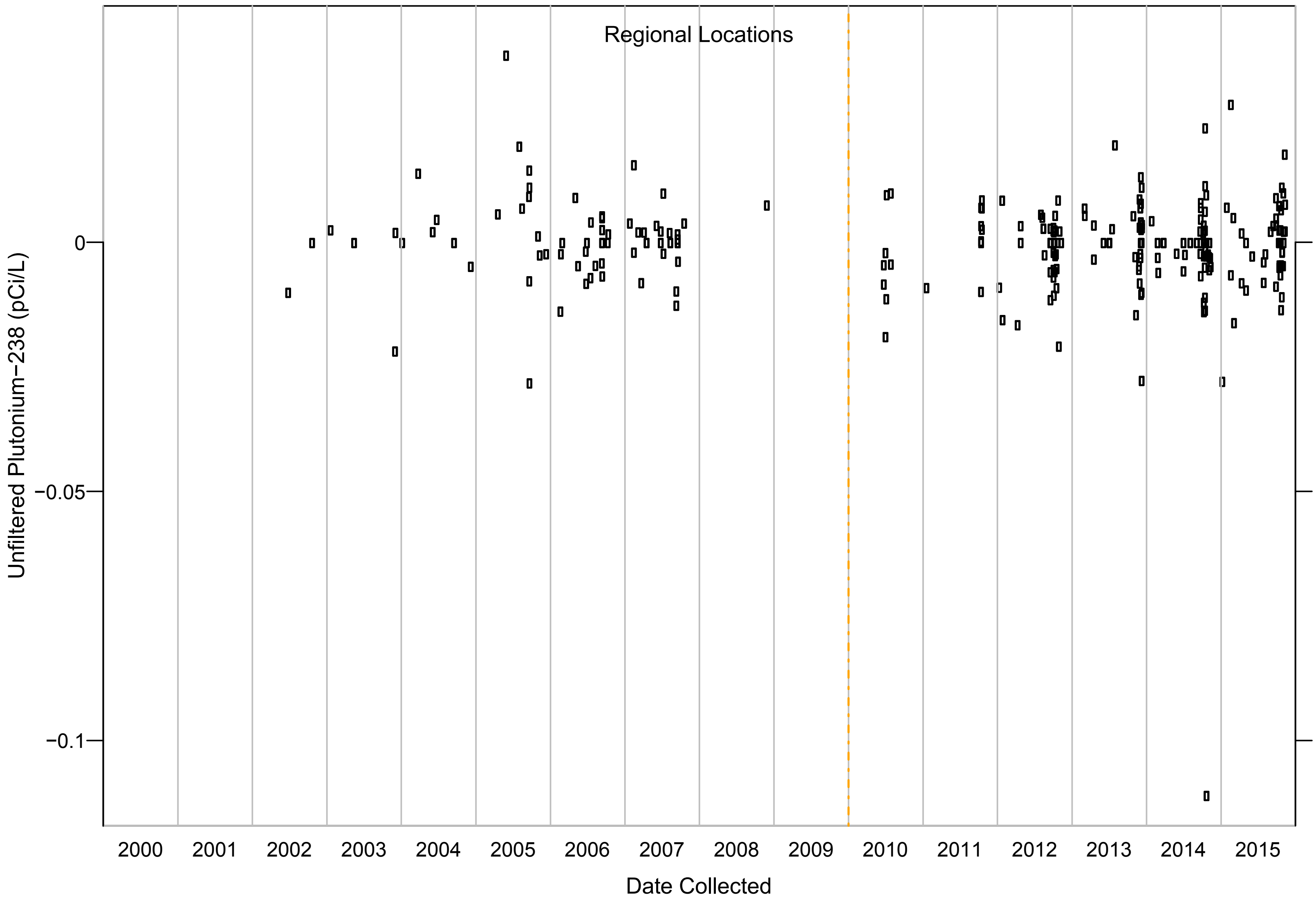



**Figure C-104 Unfiltered plutonium-238 results for regional aquifer**

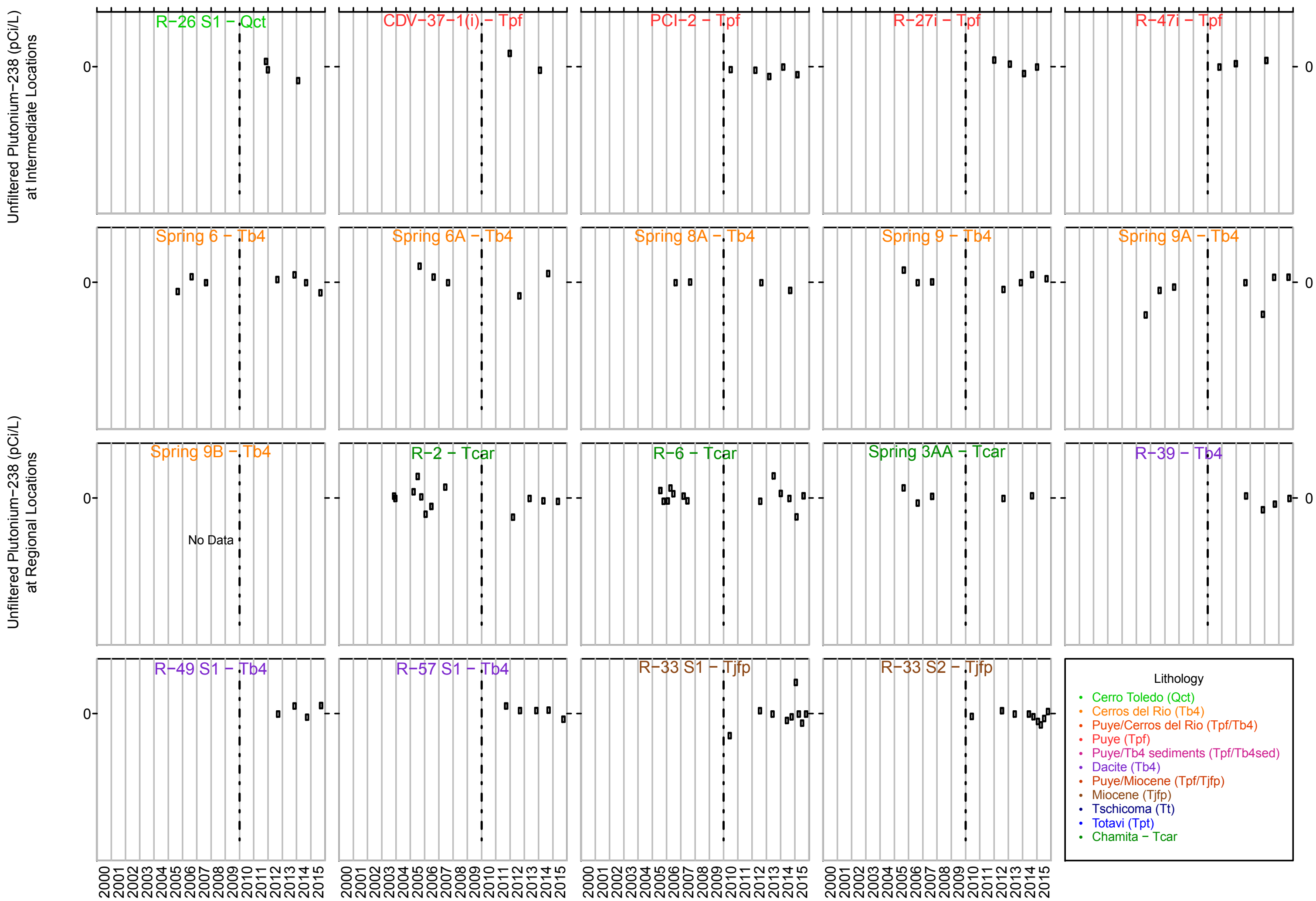



**Figure C-105 Time-series plots for unfiltered plutonium-238**

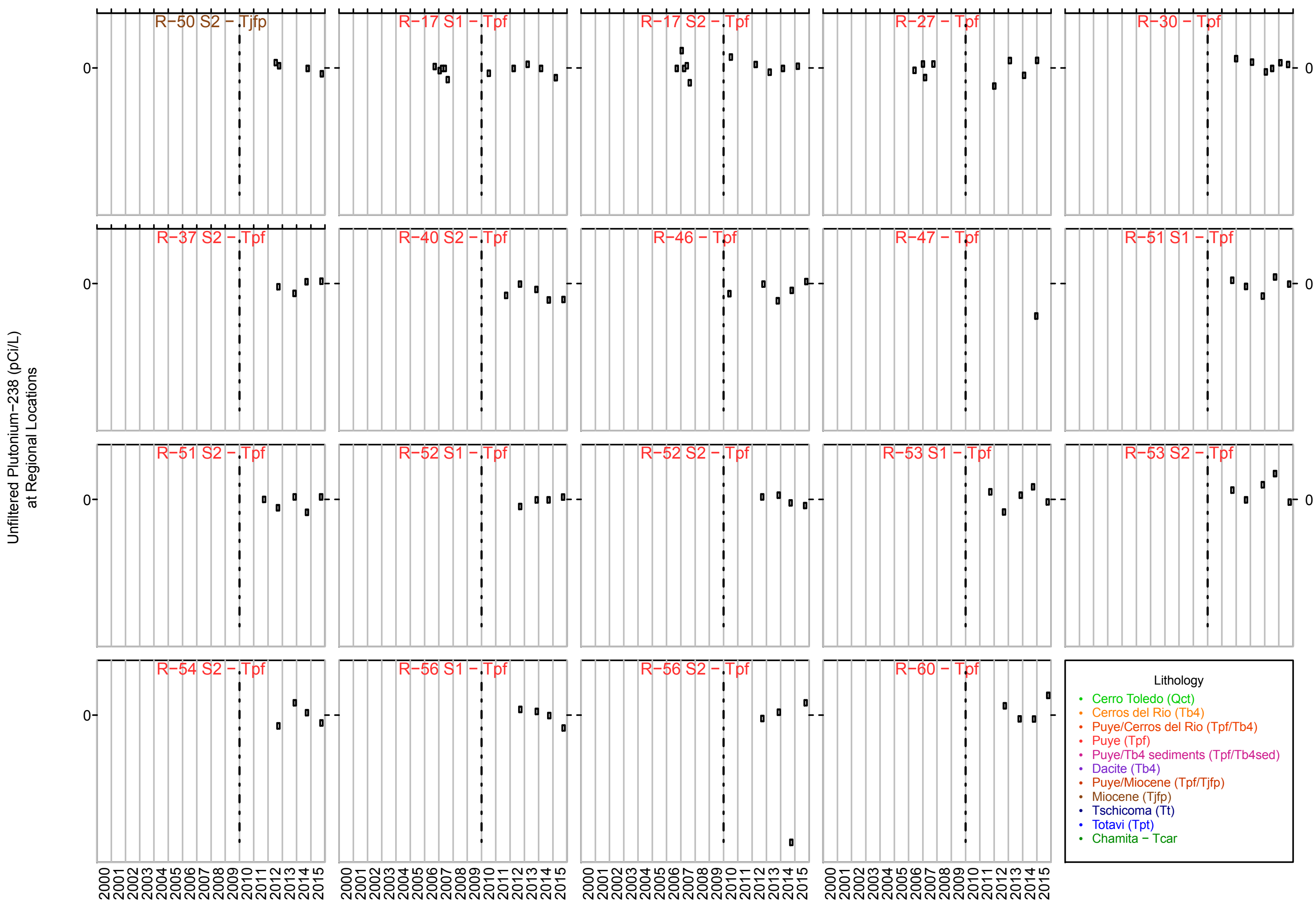



**Figure C-105 (continued) Time-series plots for unfiltered plutonium-238**

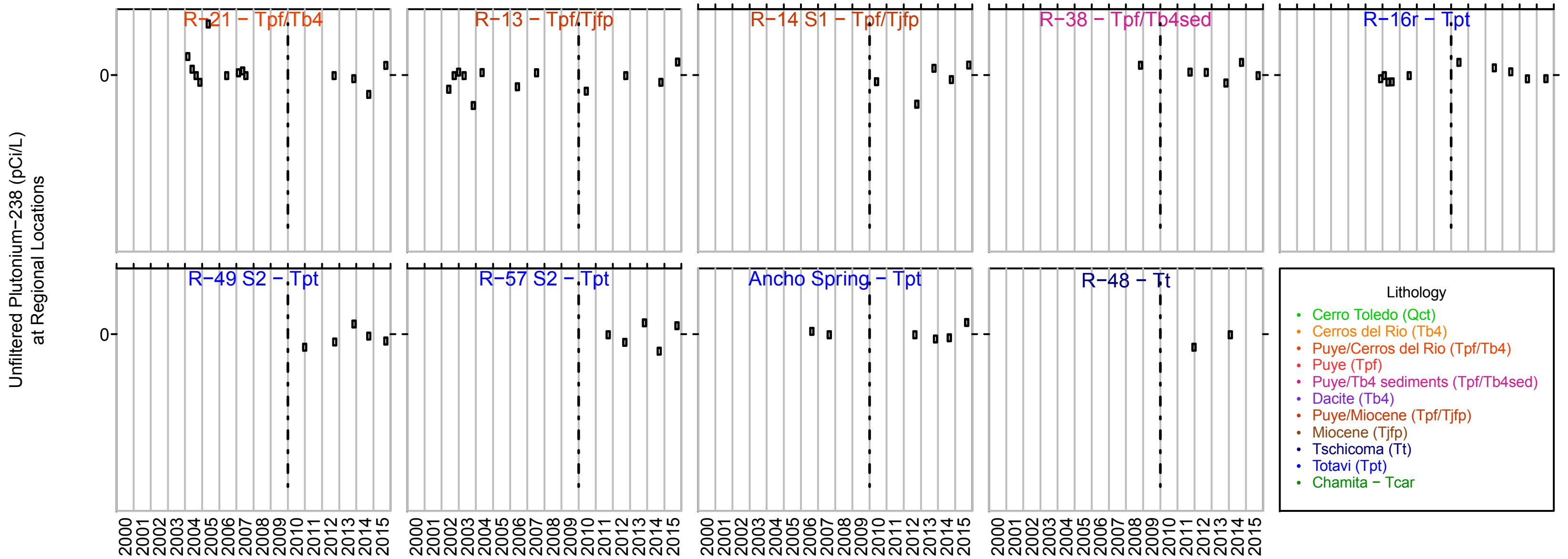



**Figure C-105 (continued)   Time-series plots for unfiltered plutonium-238**

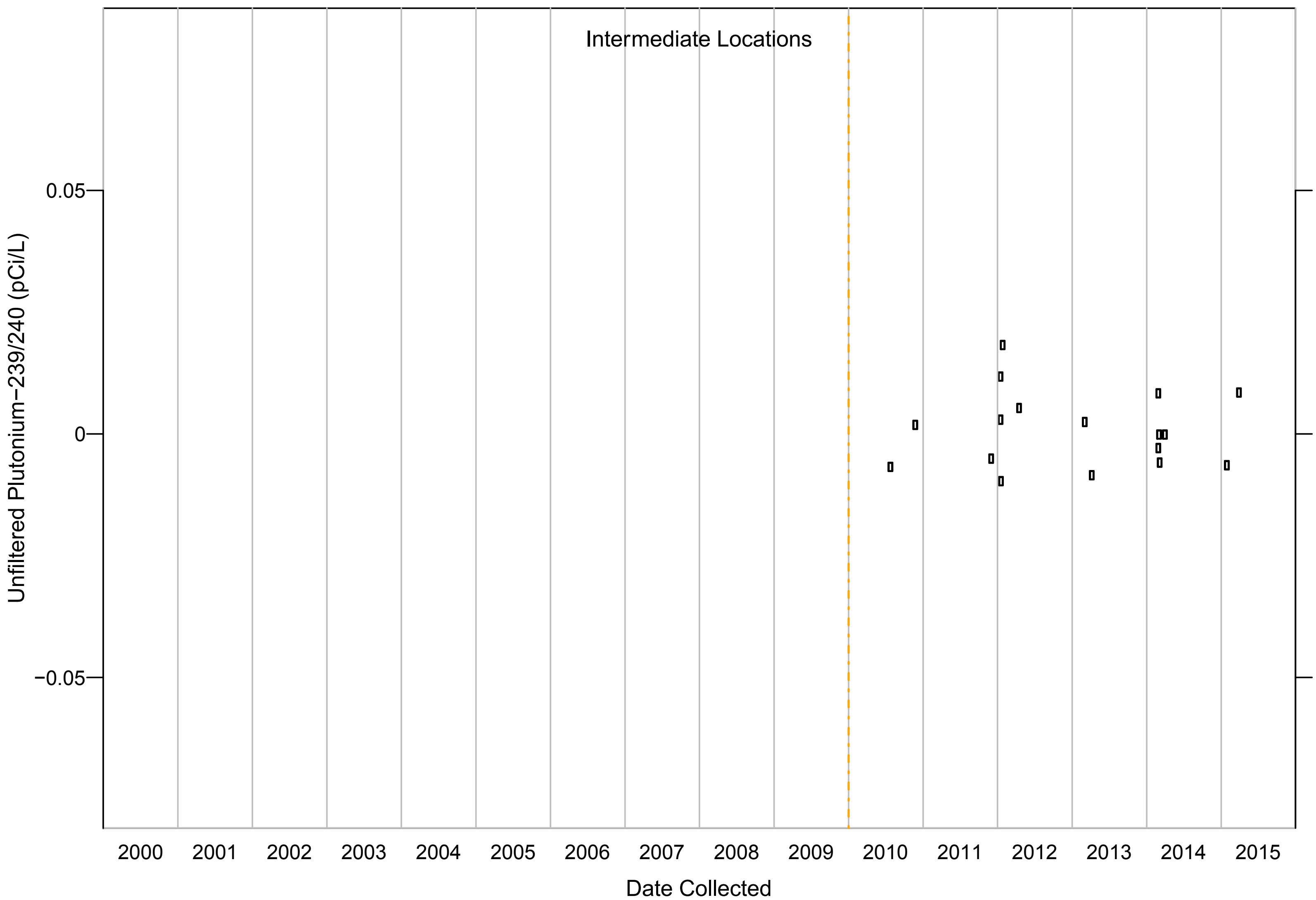



**Figure C-106 Unfiltered plutonium-239/240 results for perched-intermediate groundwater**

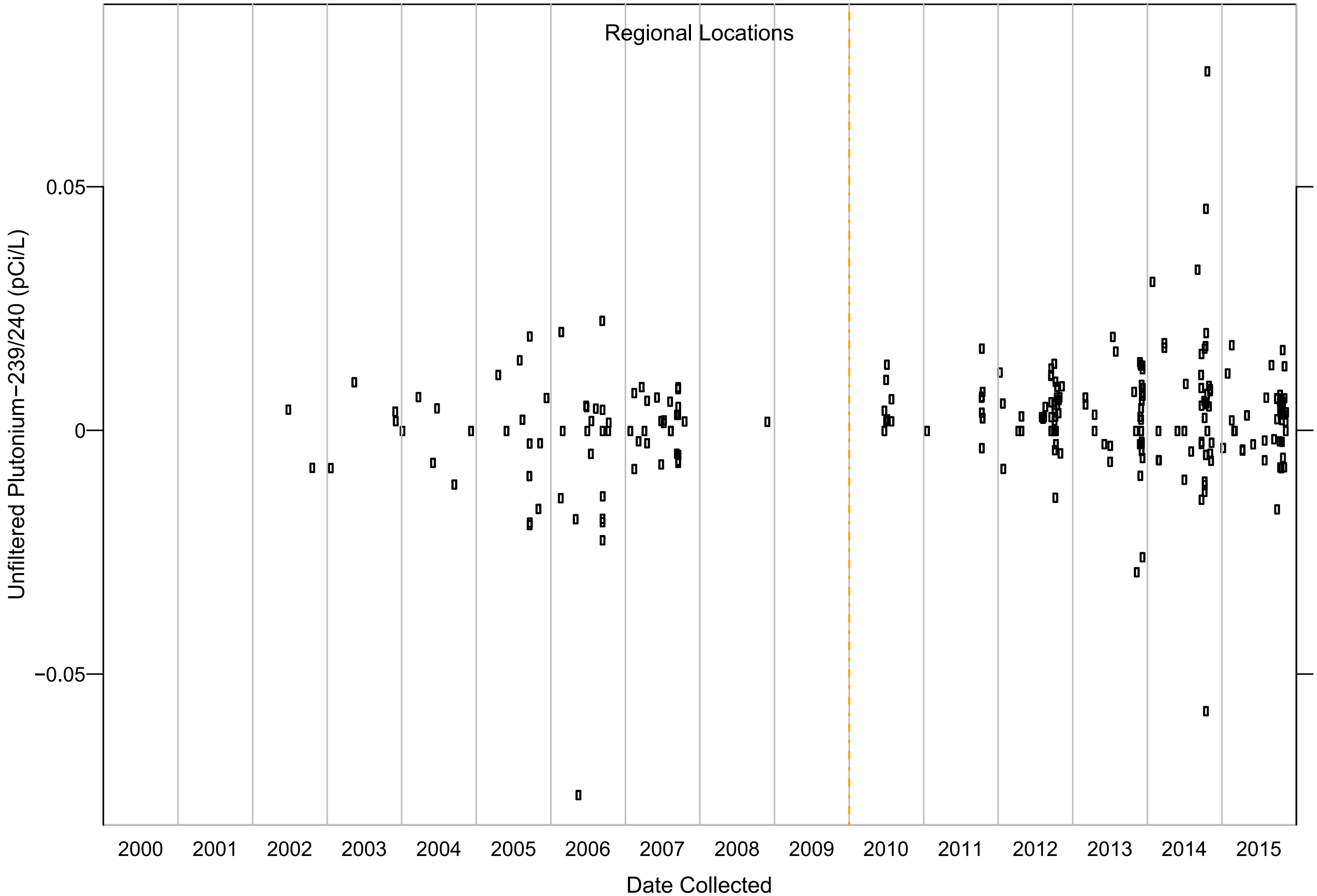



**Figure C-107 Unfiltered plutonium-239/240 results for regional aquifer**

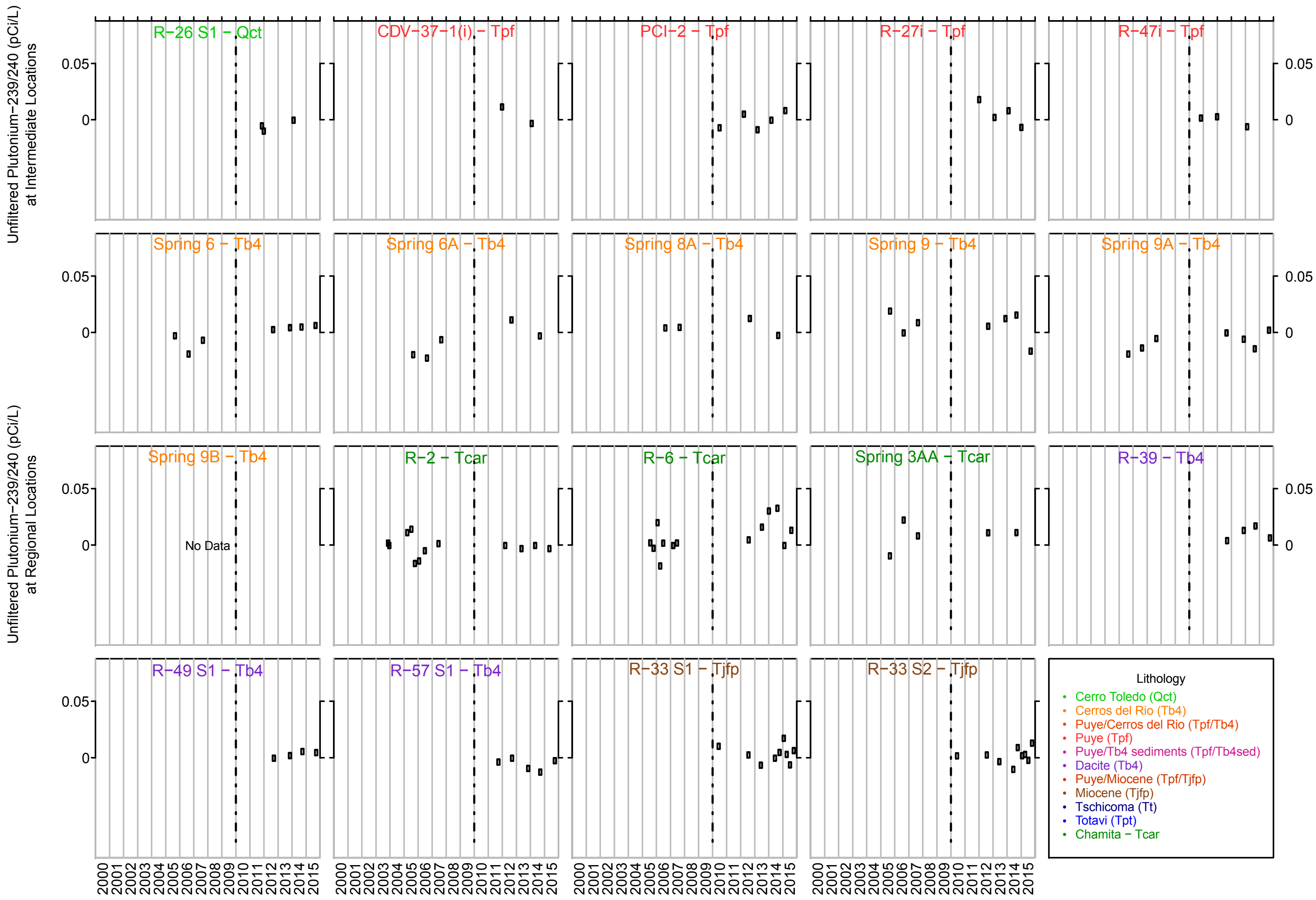



**Figure C-108 Time-series plots for unfiltered plutonium-239/240**

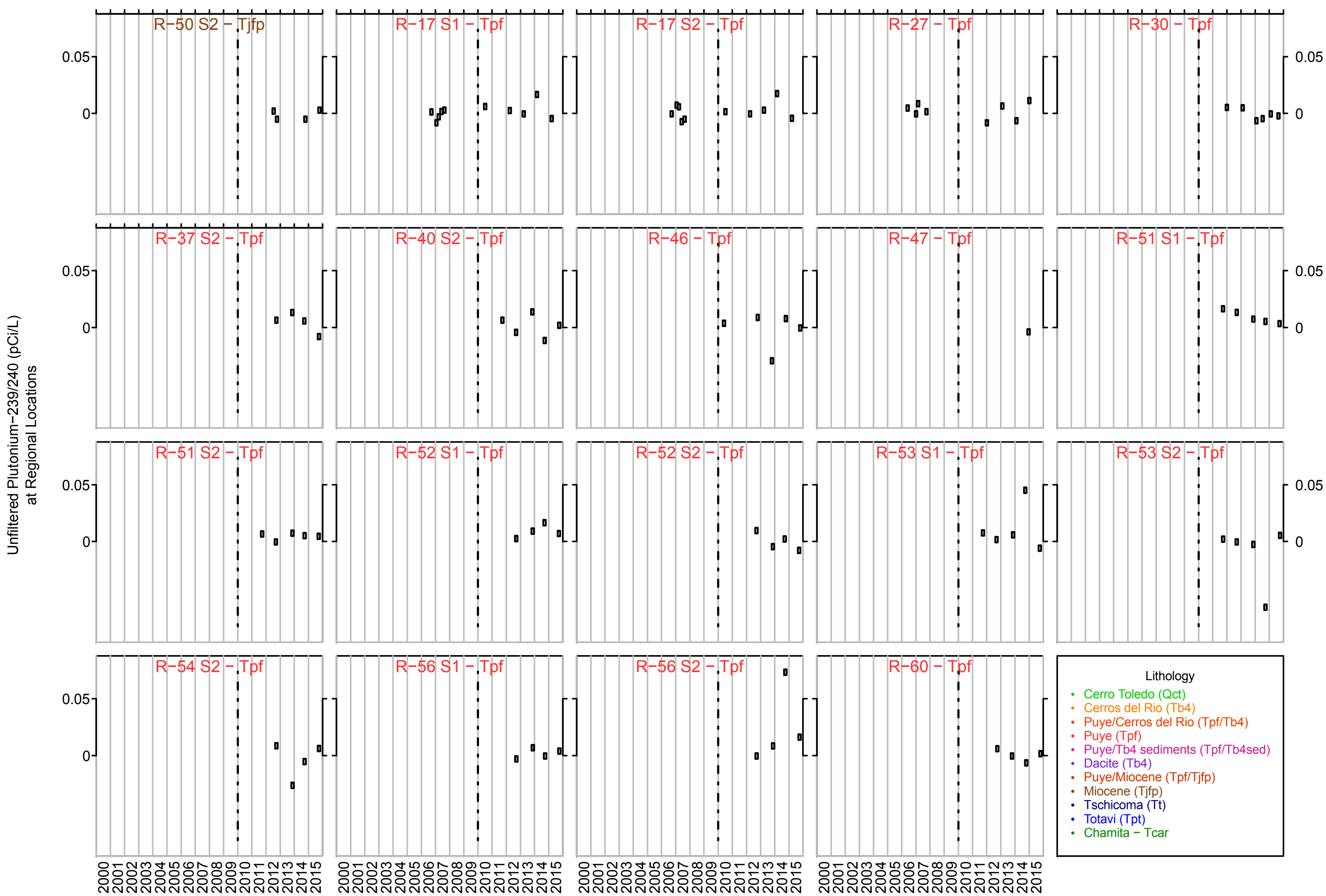



**Figure C-108 (continued)** **Time-series plots for unfiltered plutonium-239/240**

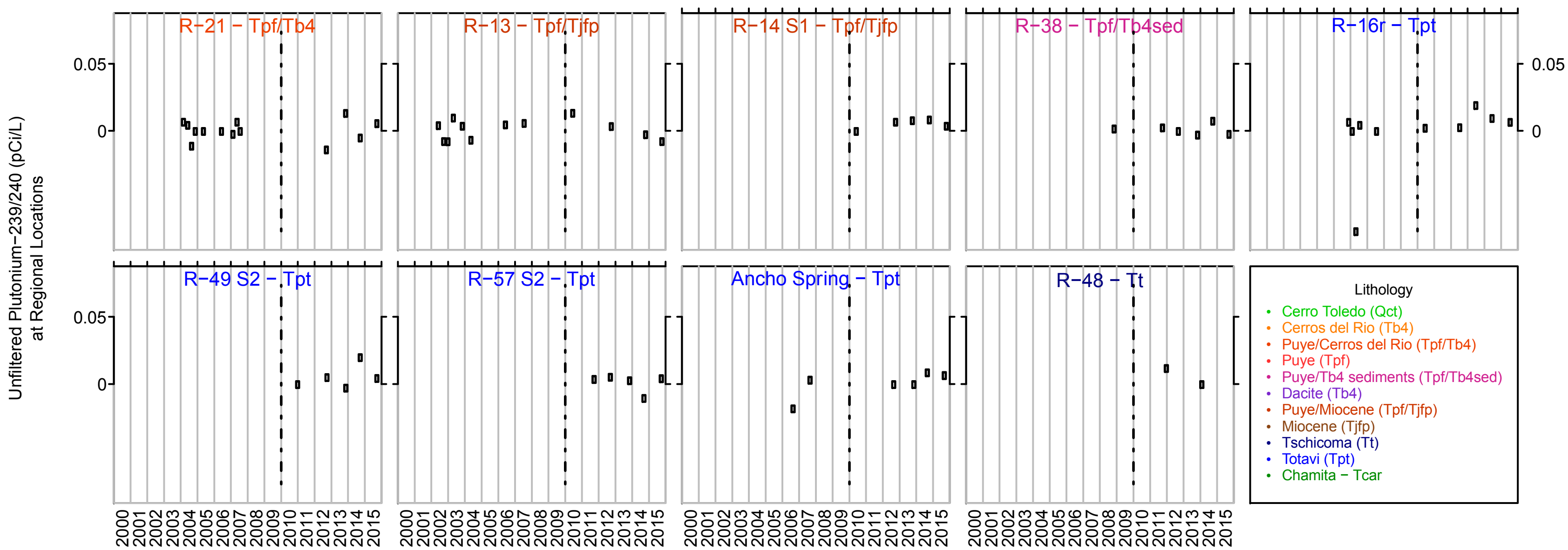



**Figure C-108 (continued) Time-series plots for unfiltered plutonium-239/240**

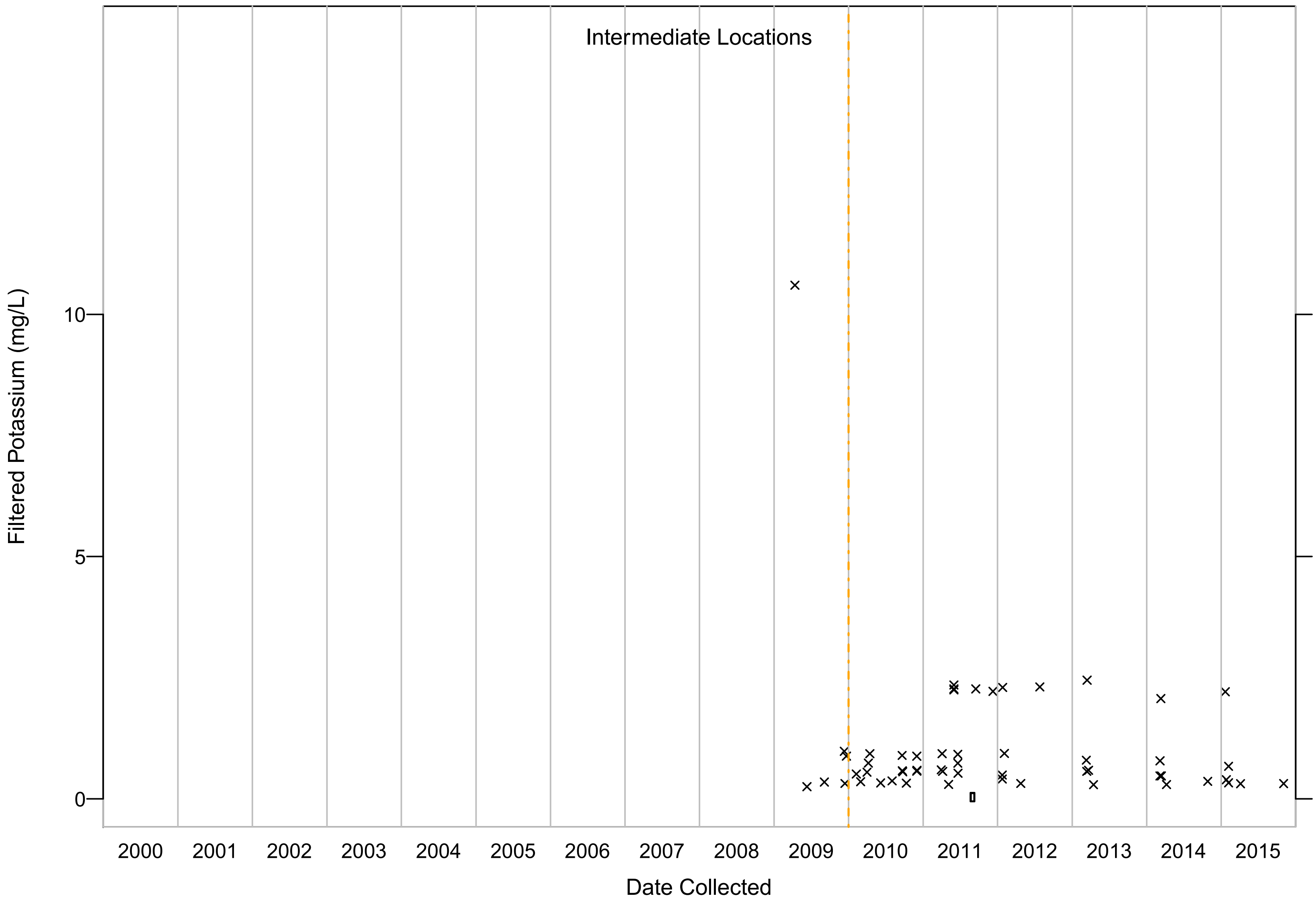



**Figure C-109 Filtered potassium results for perched-intermediate groundwater**

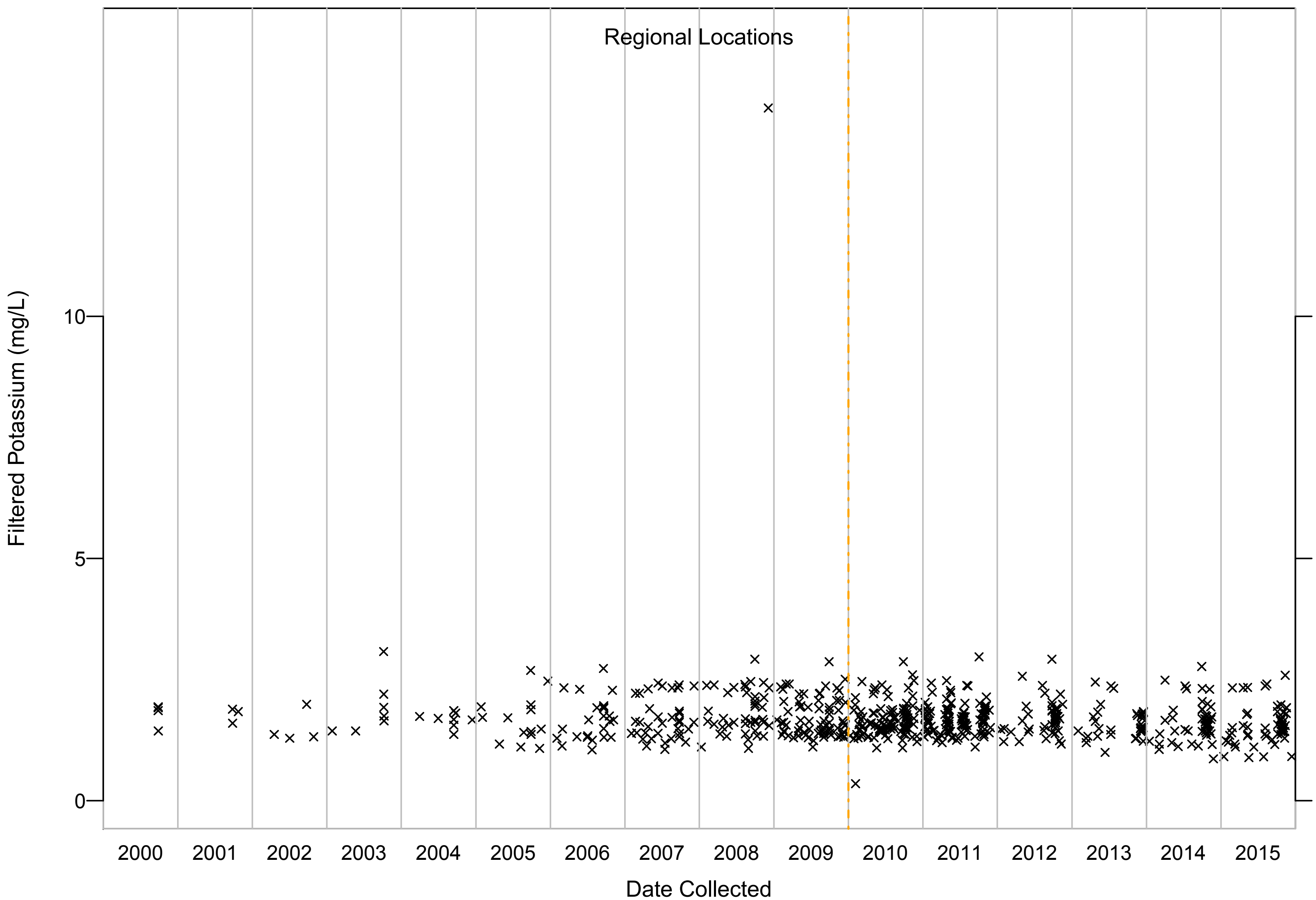



**Figure C-110 Filtered potassium results for regional aquifer**

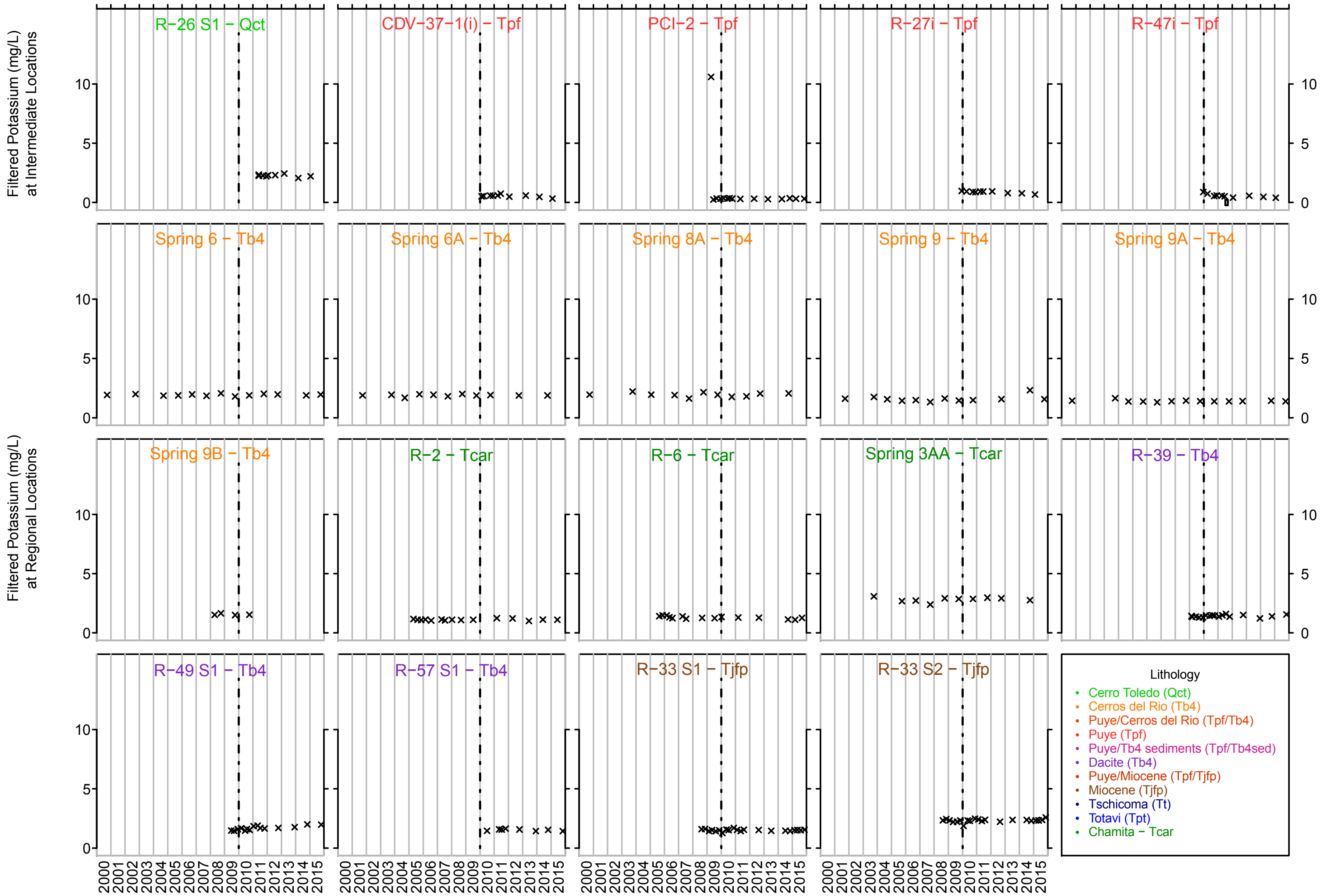



**Figure C-111 Time-series plots for filtered potassium**

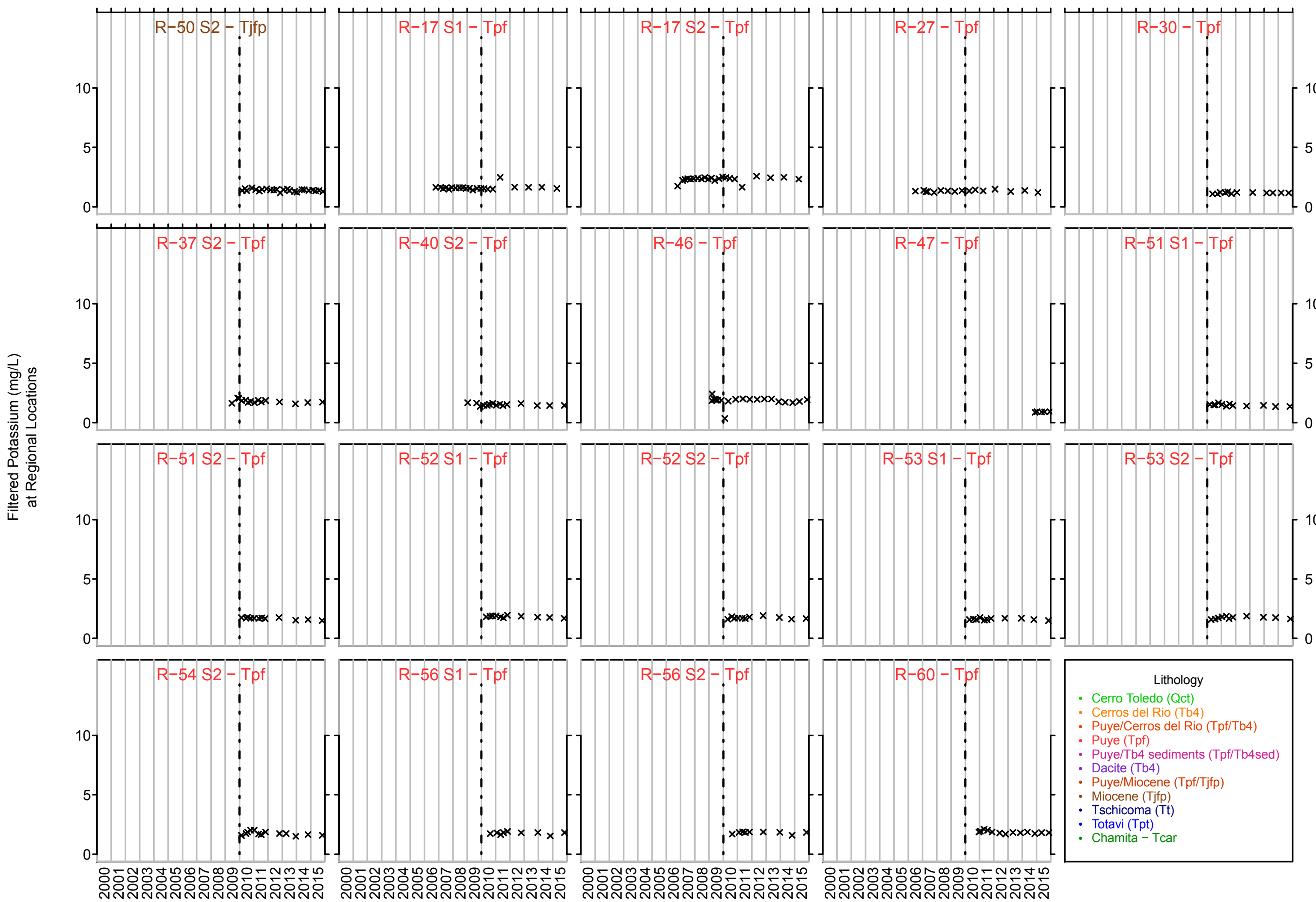



**Figure C-111 (continued) Time-series plots for filtered potassium**

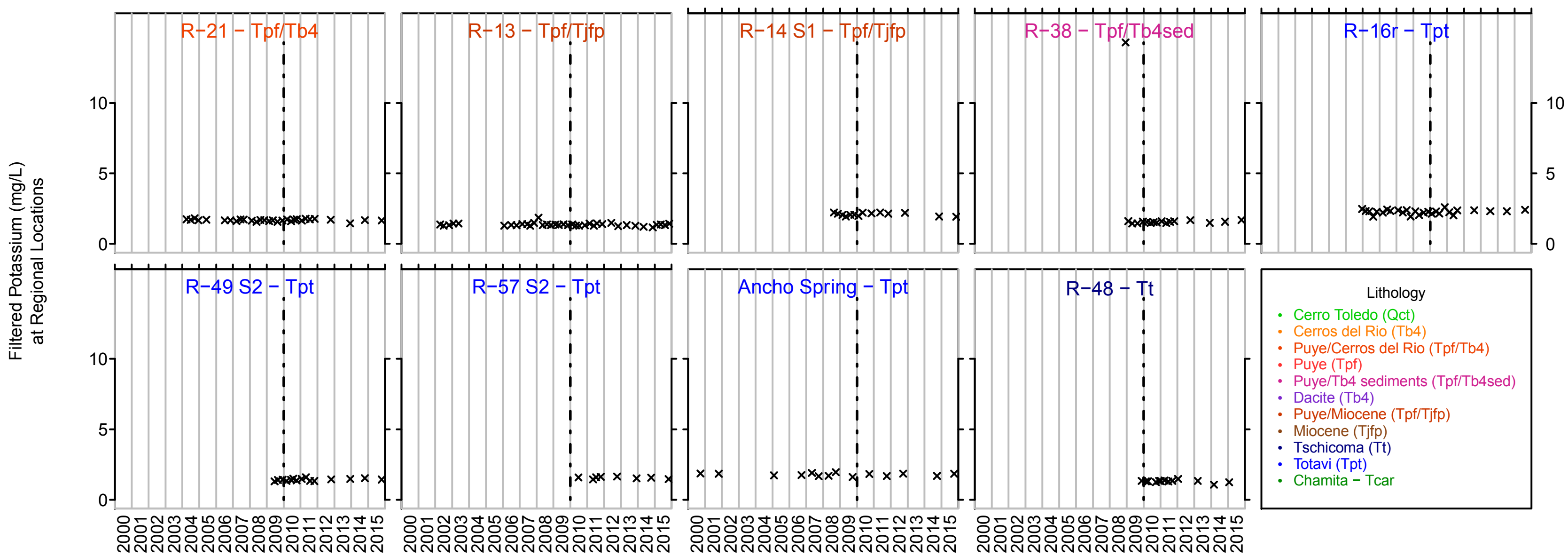



**Figure C-111 (continued)   Time-series plots for filtered potassium**

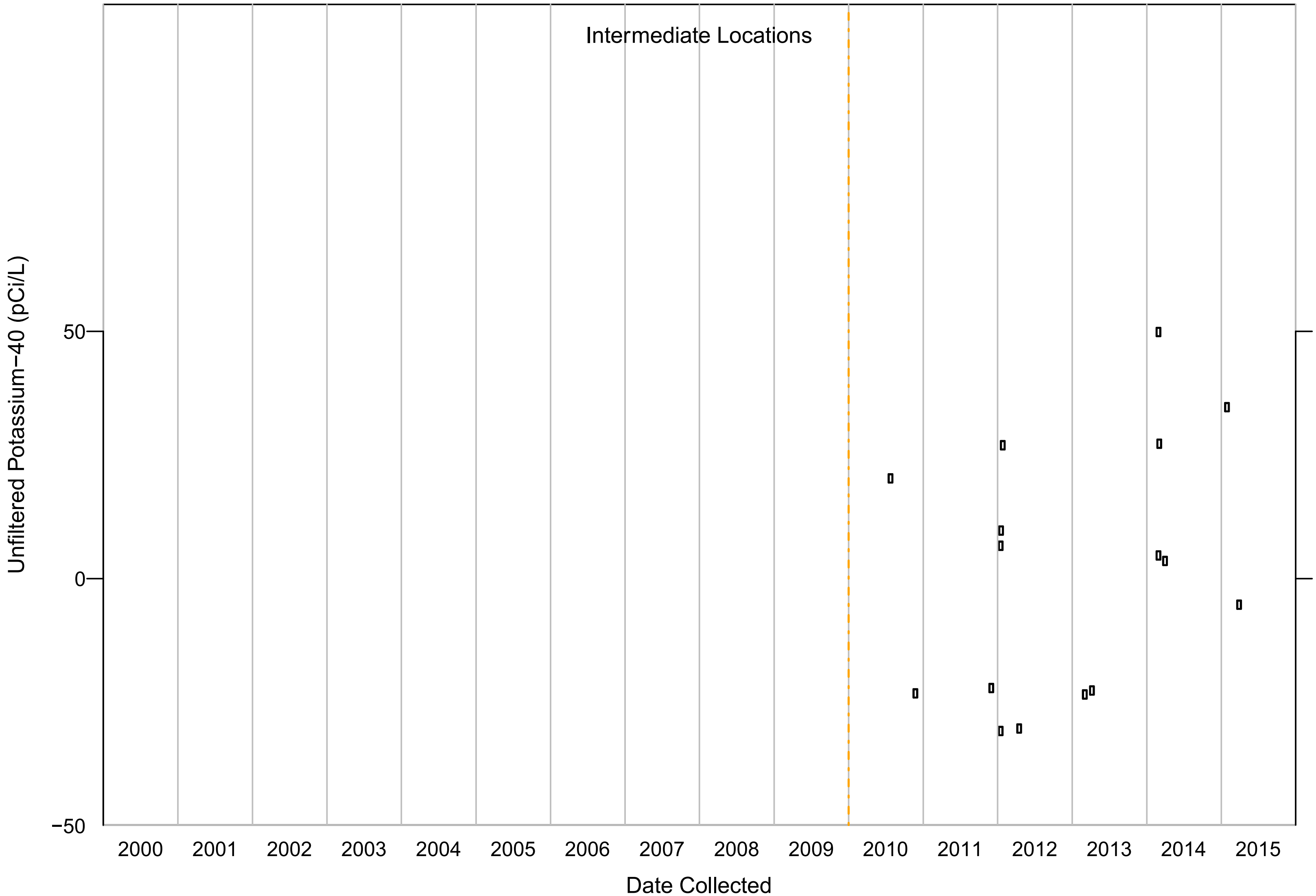



**Figure C-112    Unfiltered potassium-40 results for perched-intermediate groundwater**

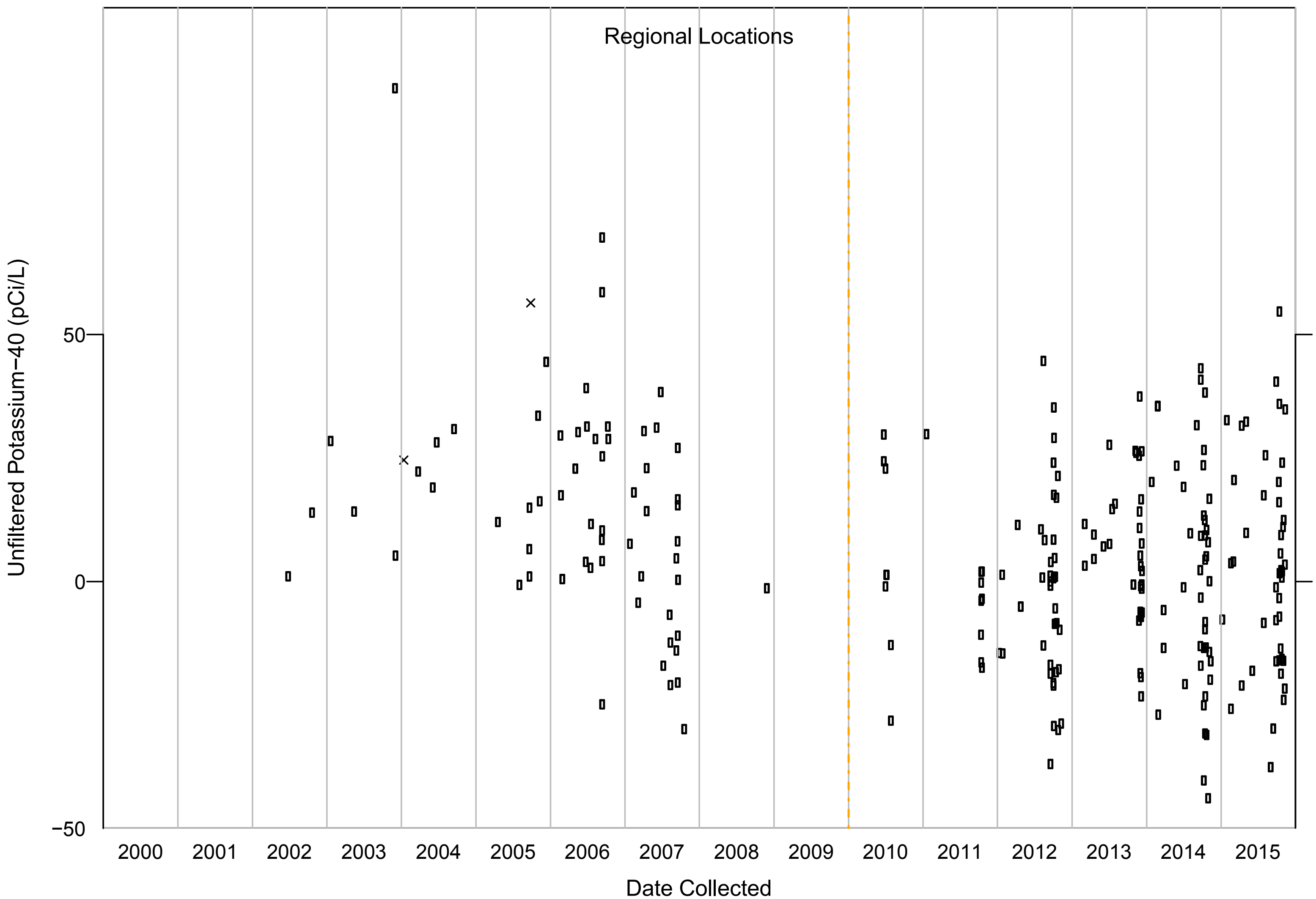



**Figure C-113  Unfiltered potassium-40 results for regional aquifer**

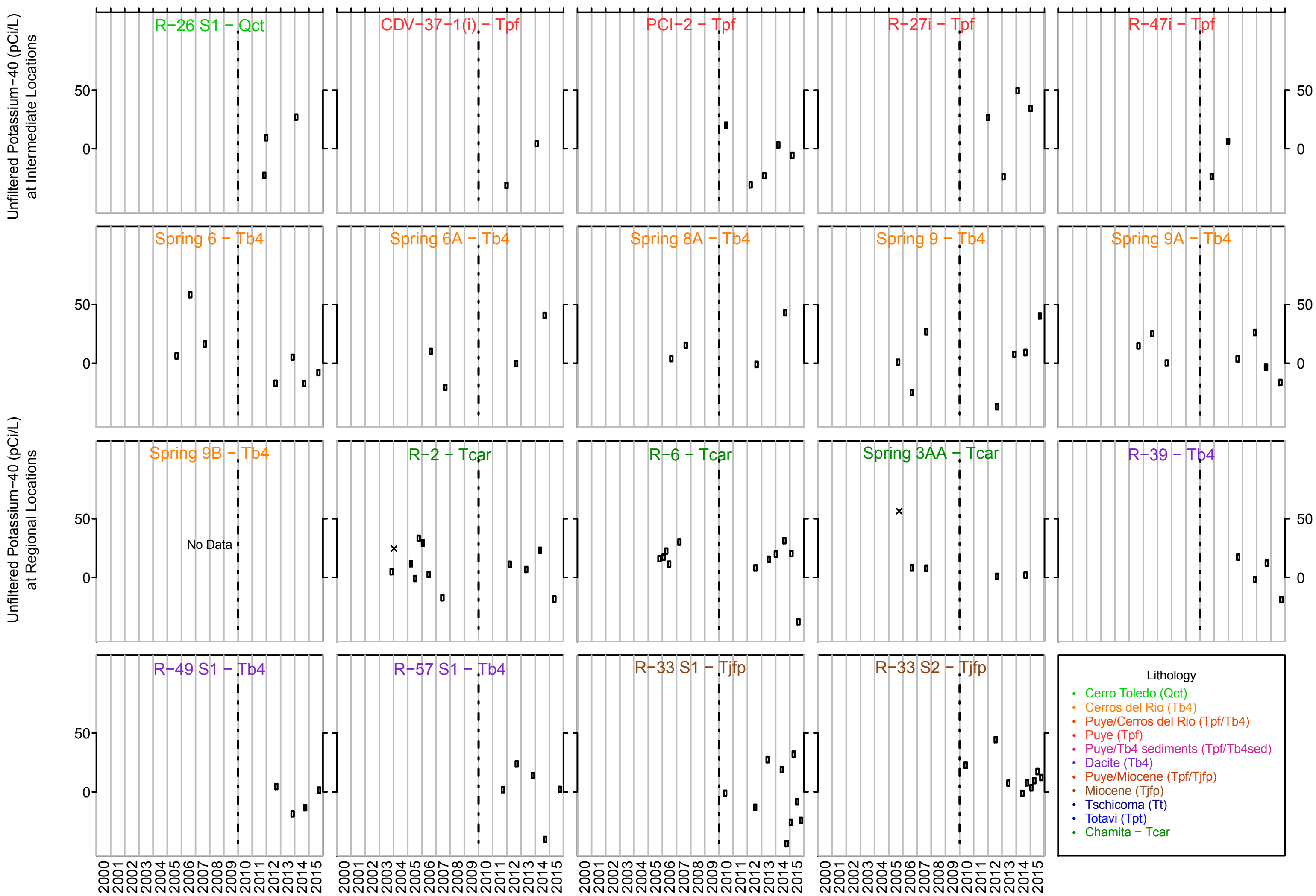



**Figure C-114 Time-series plots for unfiltered potassium-40**

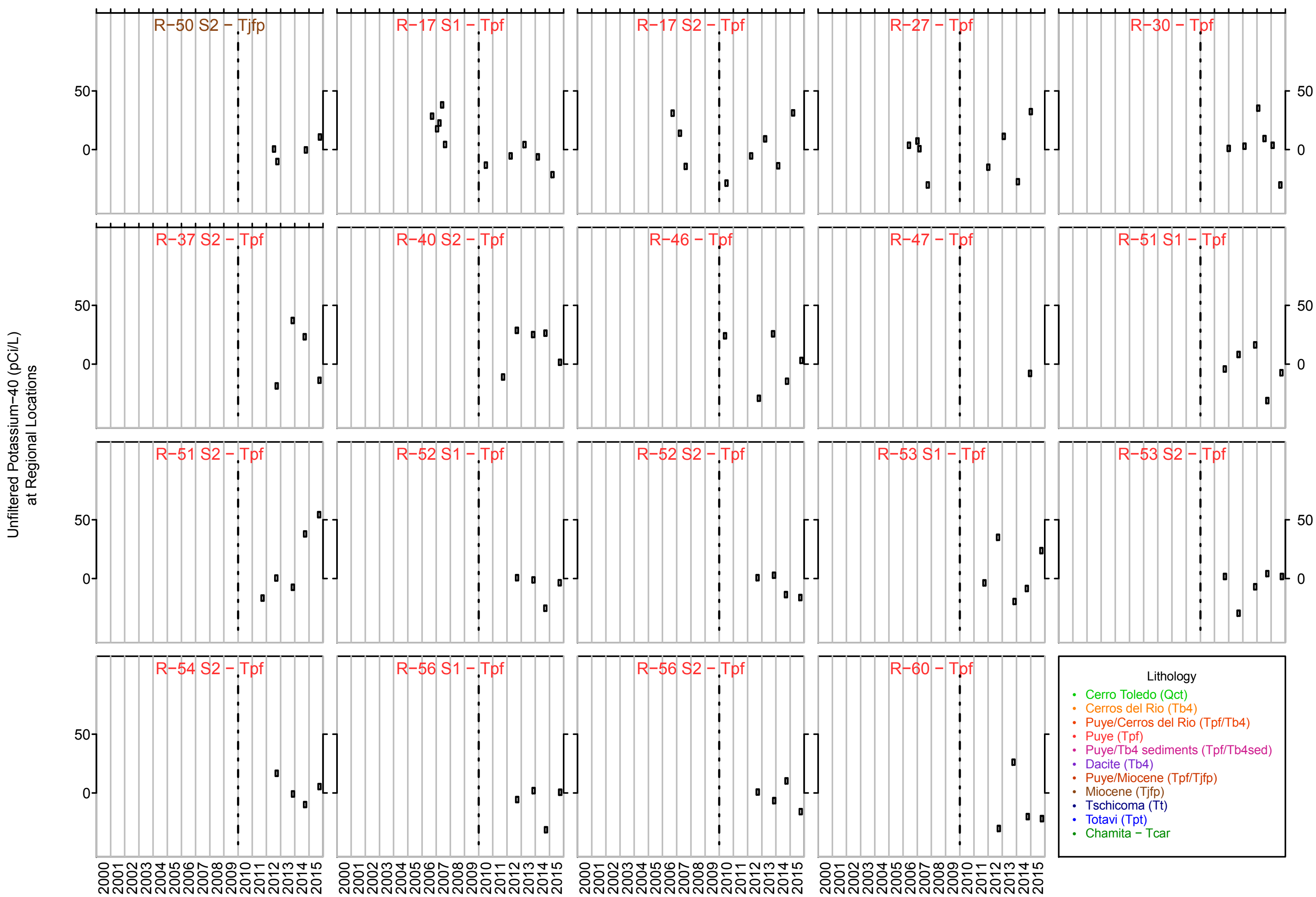



**Figure C-114 (continued)   Time-series plots for unfiltered potassium-40**

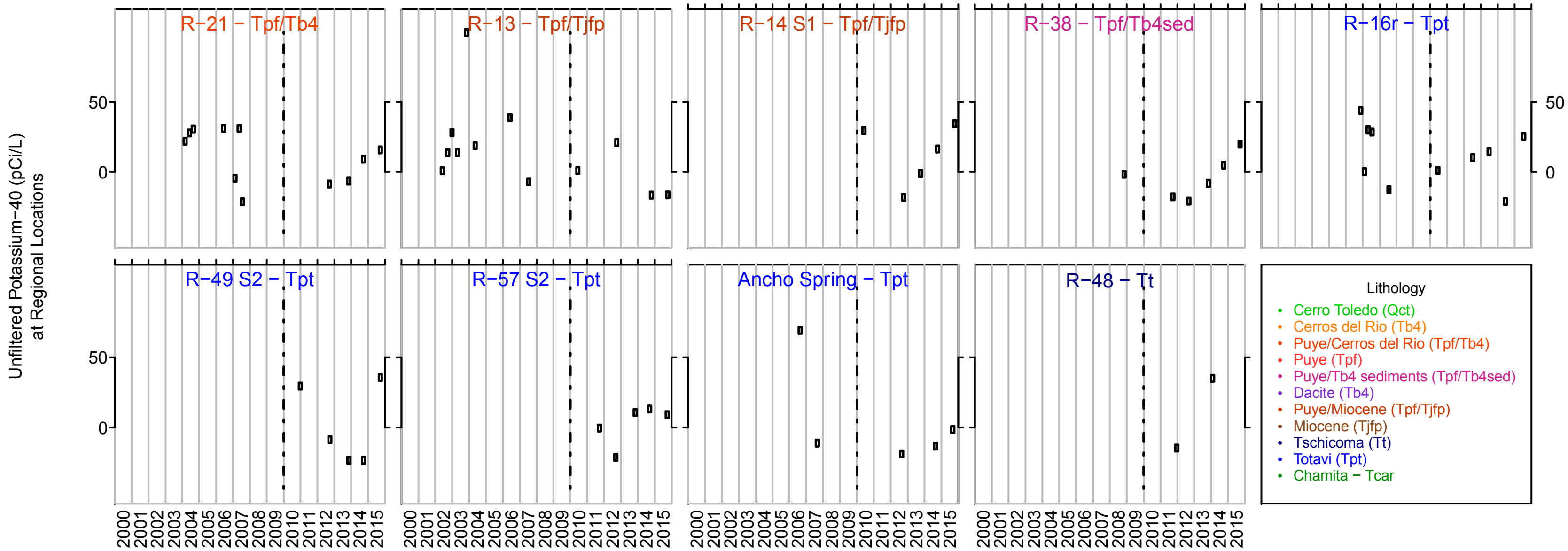



**Figure C-114 (continued) Time-series plots for unfiltered potassium-40**

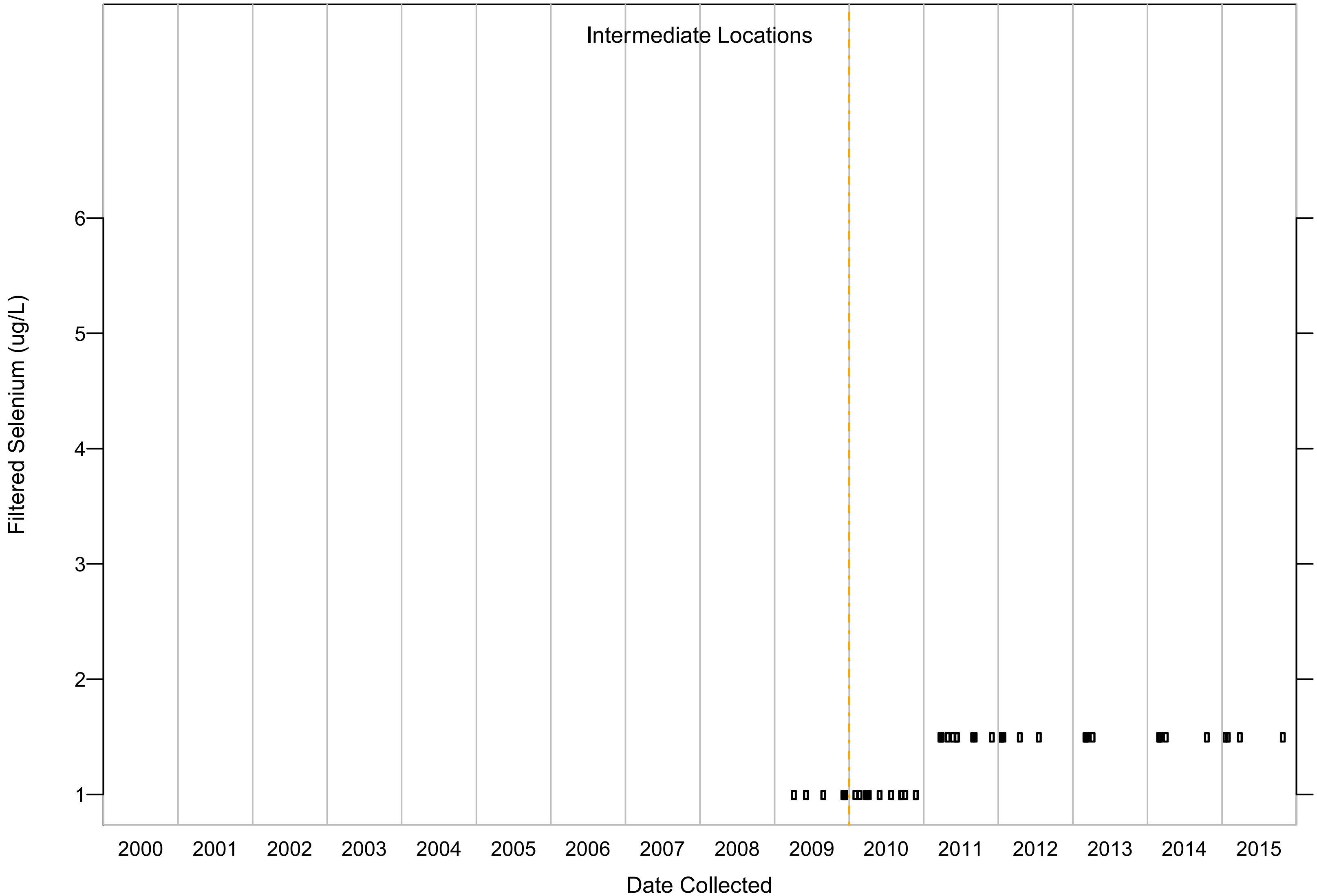



**Figure C-115 Filtered selenium results for perched-intermediate groundwater**

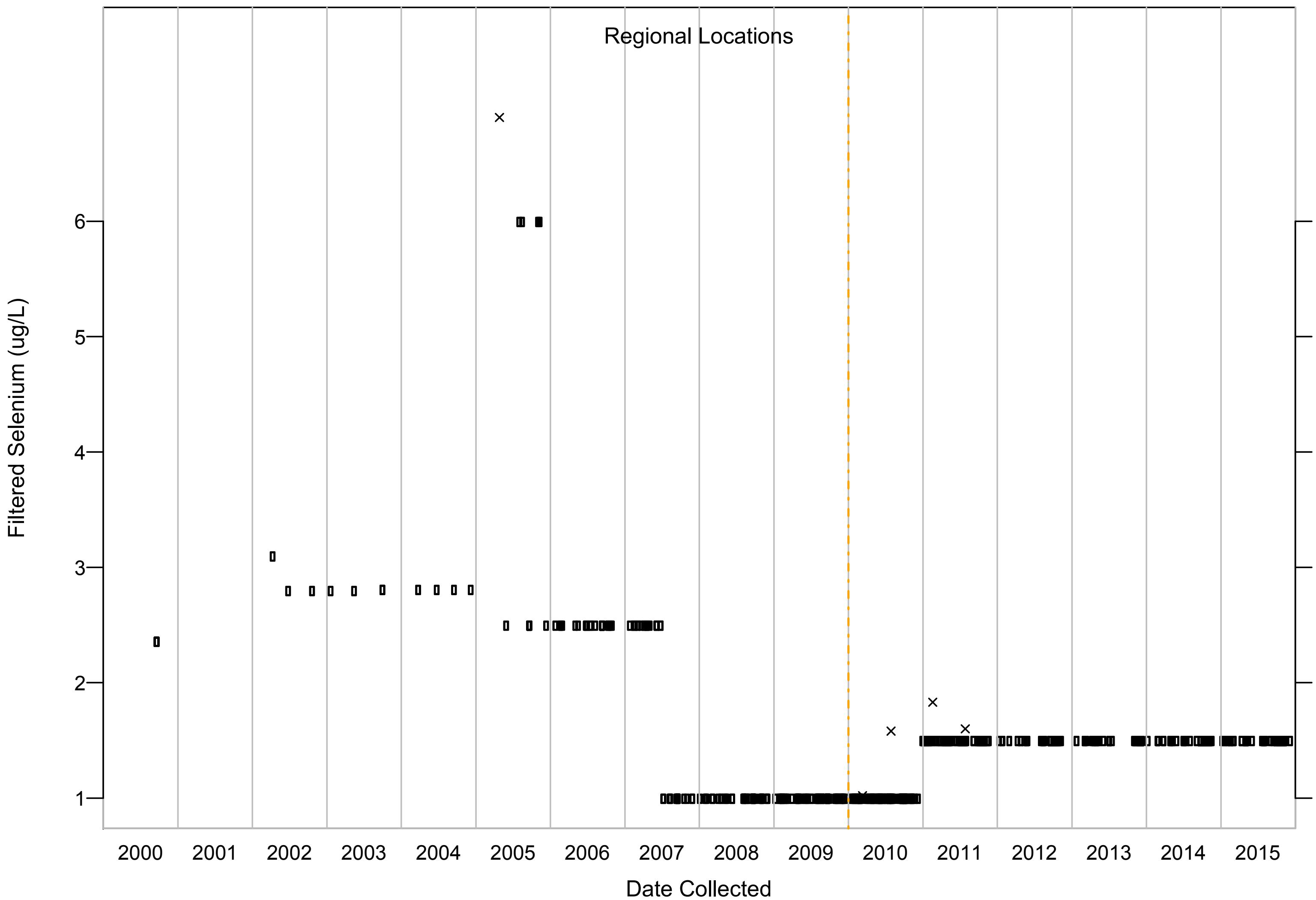



**Figure C-116 Filtered selenium results for regional aquifer**

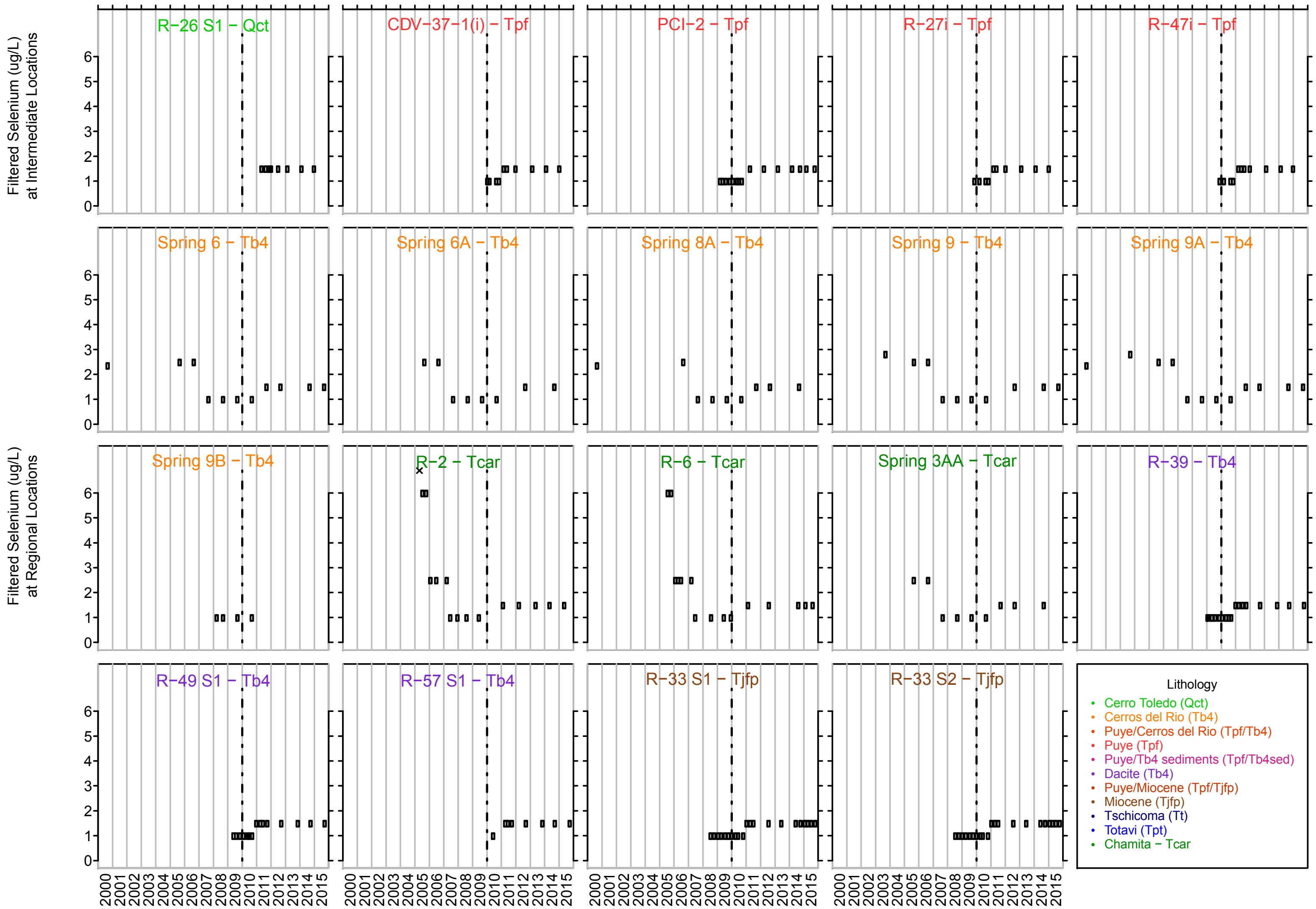



**Figure C-117 Time-series plots for filtered selenium**

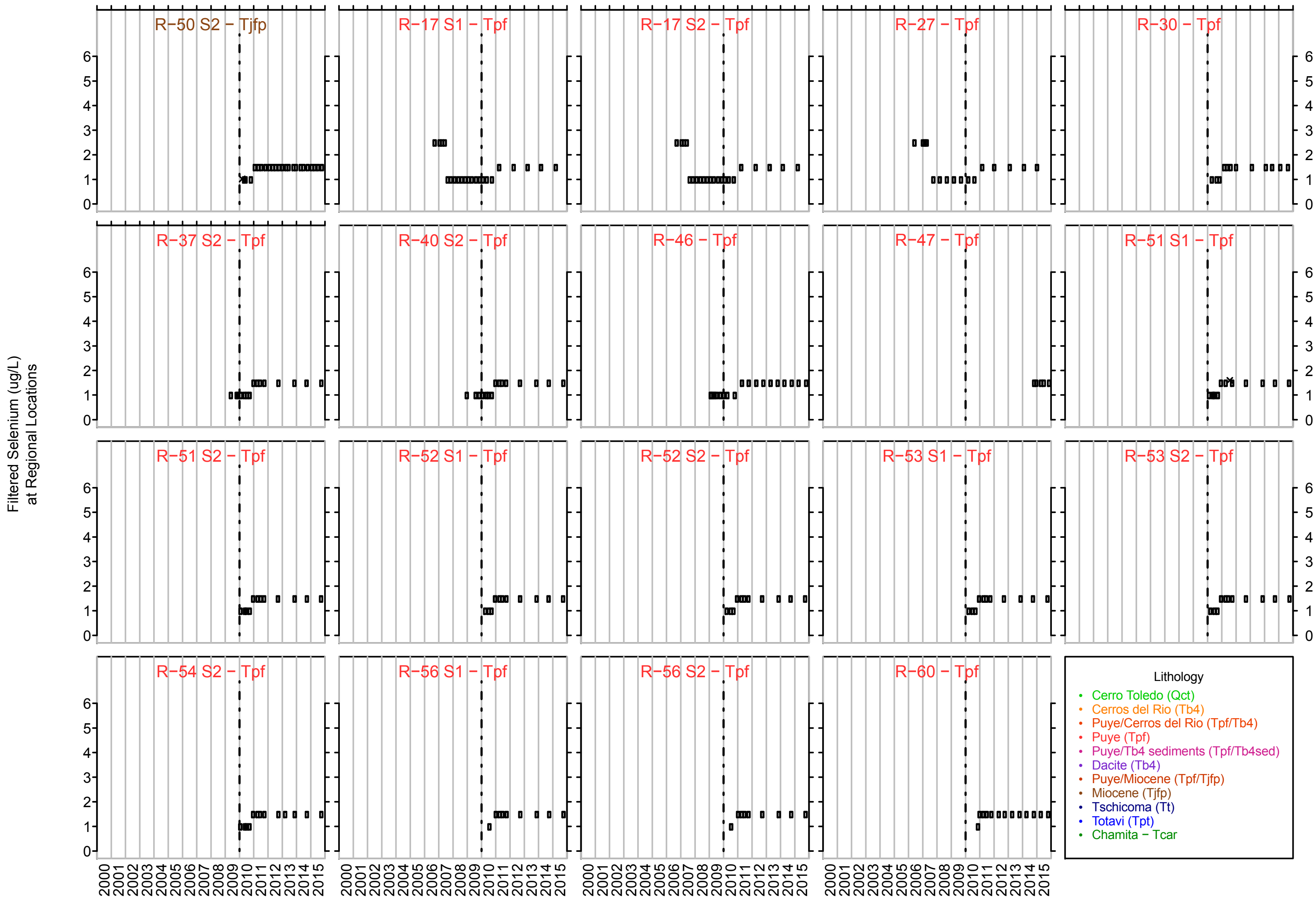



**Figure C-117 (continued) Time-series plots for filtered selenium**

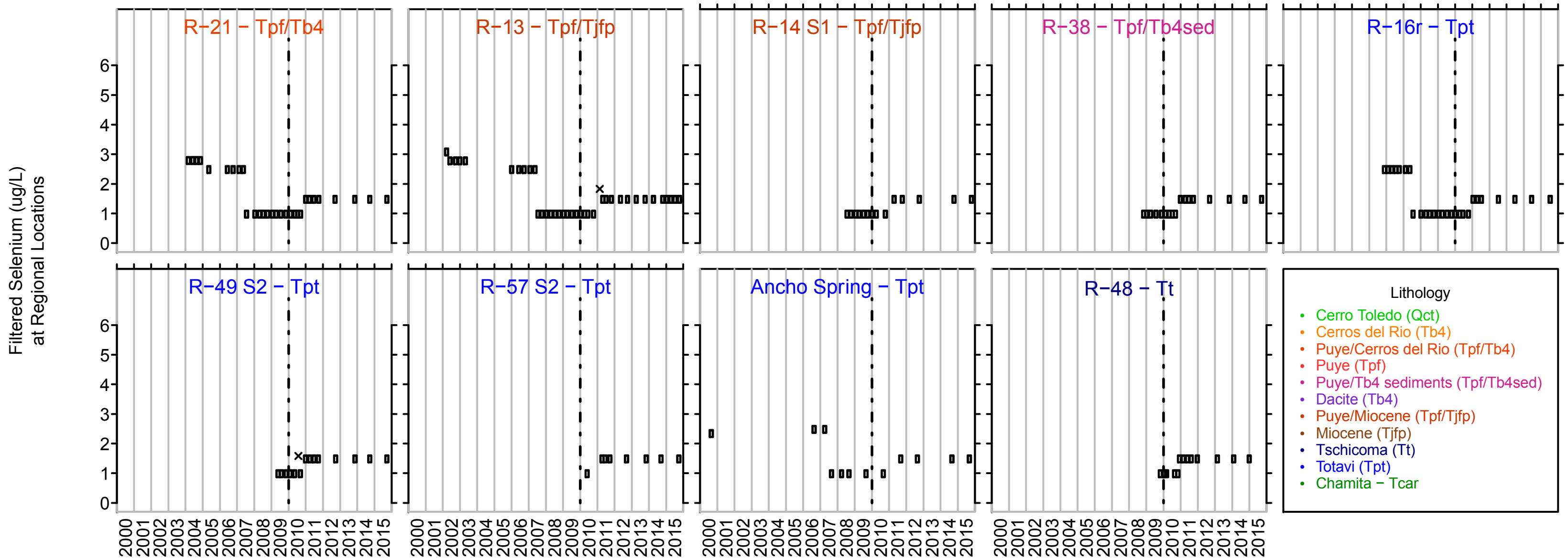



**Figure C-117 (continued) Time-series plots for filtered selenium**

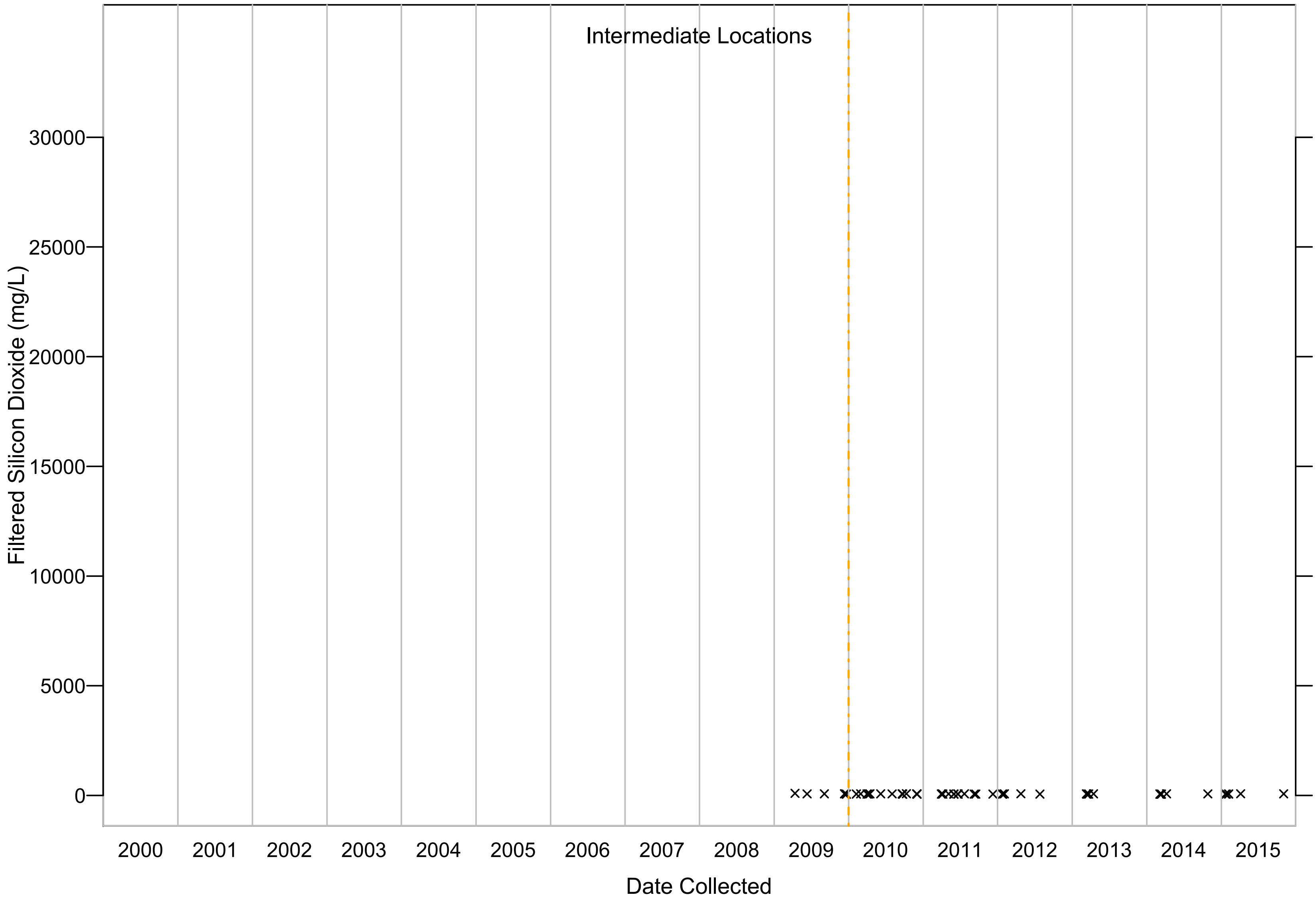



**Figure C-118 Filtered silicon dioxide results for perched-intermediate groundwater**

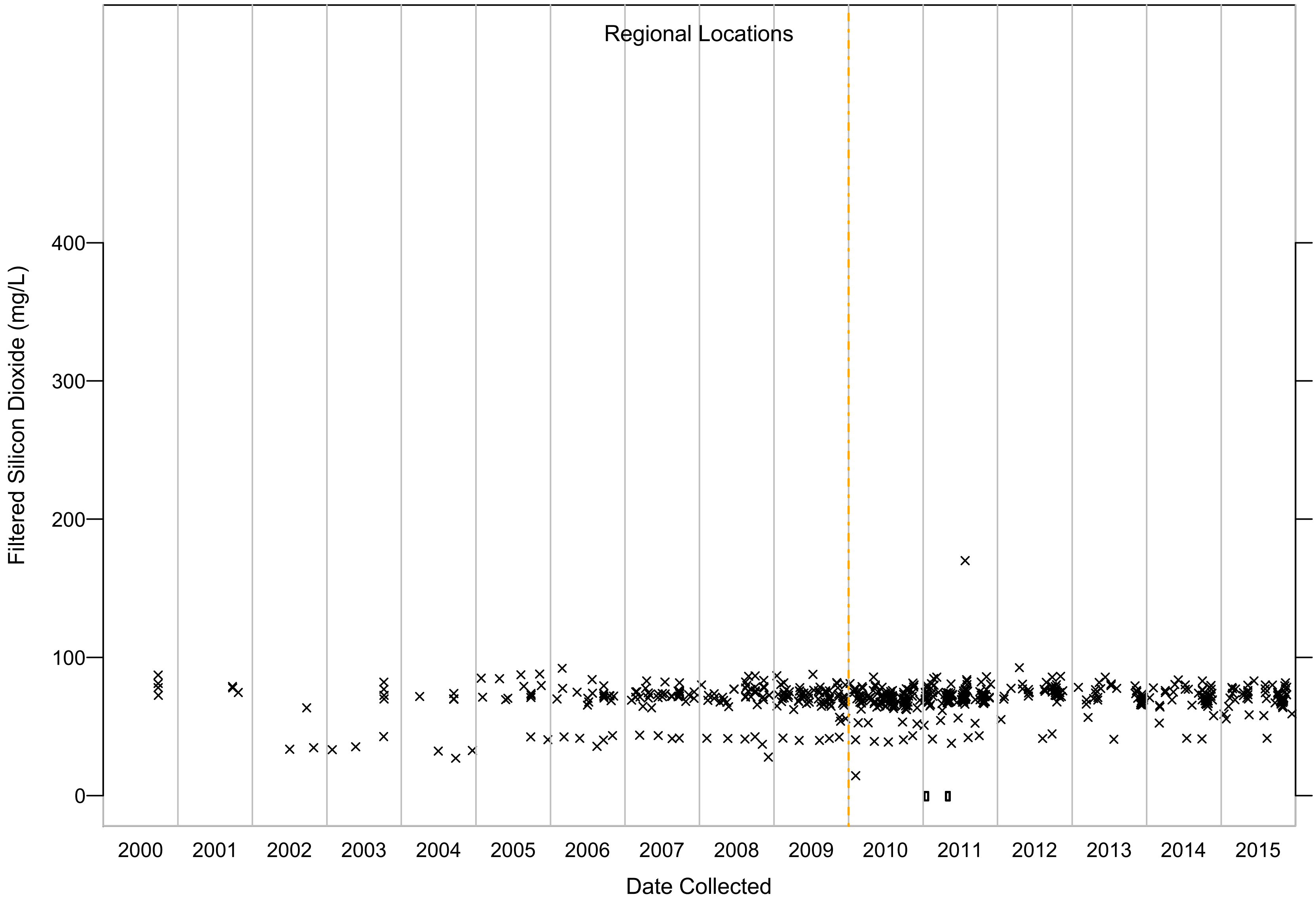



**Figure C-119    Filtered silicon dioxide results for regional aquifer**

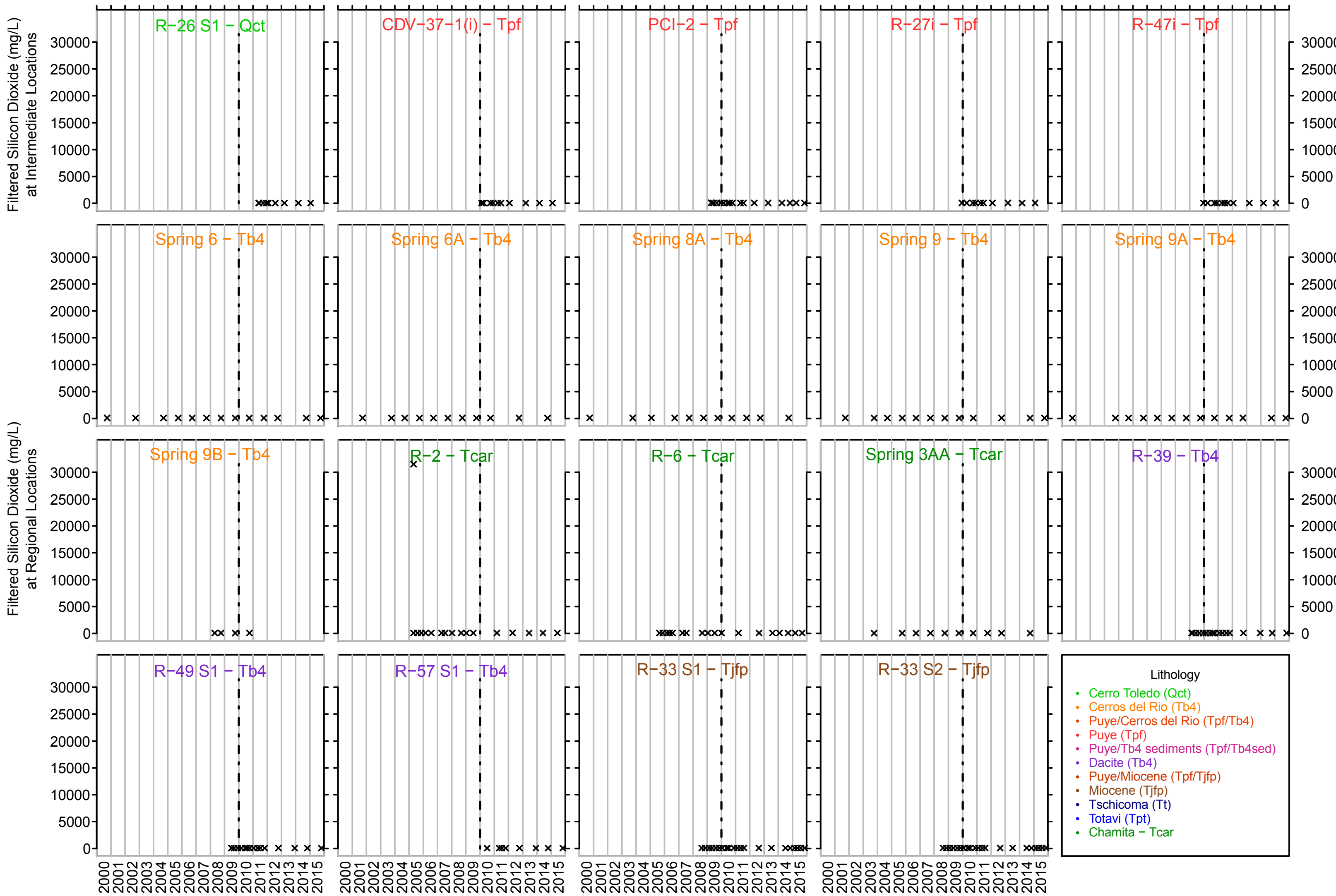



**Figure C-120 Time-series plots for filtered silicon dioxide**

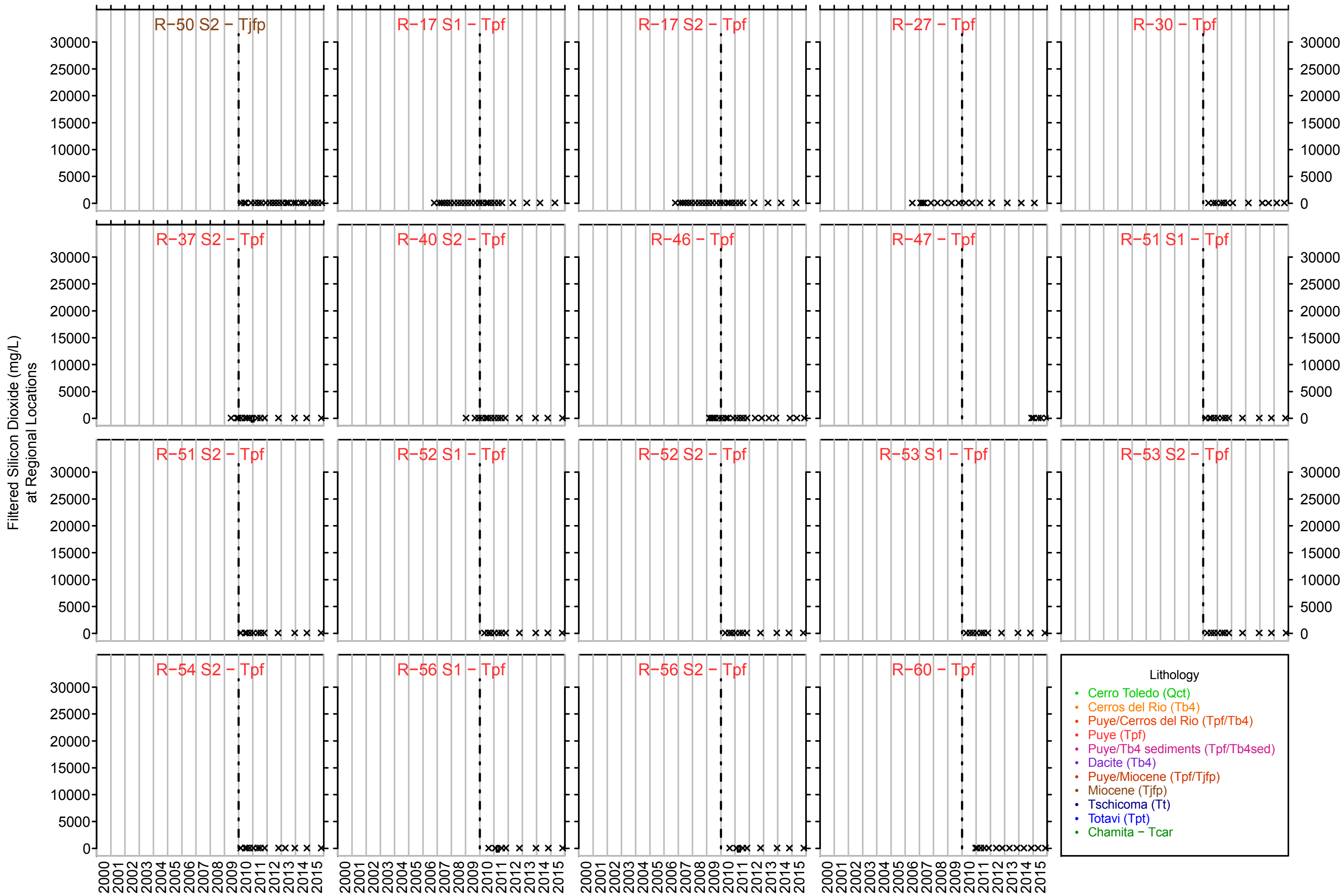



**Figure C-120 (continued) Time-series plots for filtered silicon dioxide**

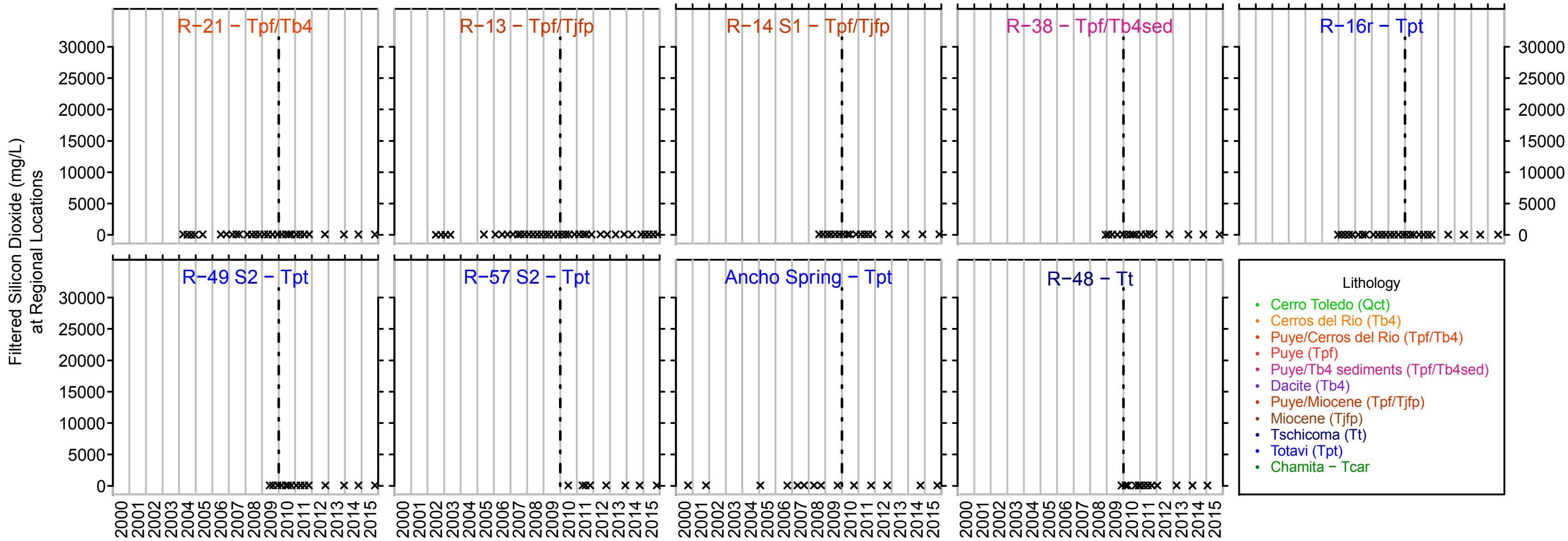



**Figure C-120 (continued) Time-series plots for filtered silicon dioxide**

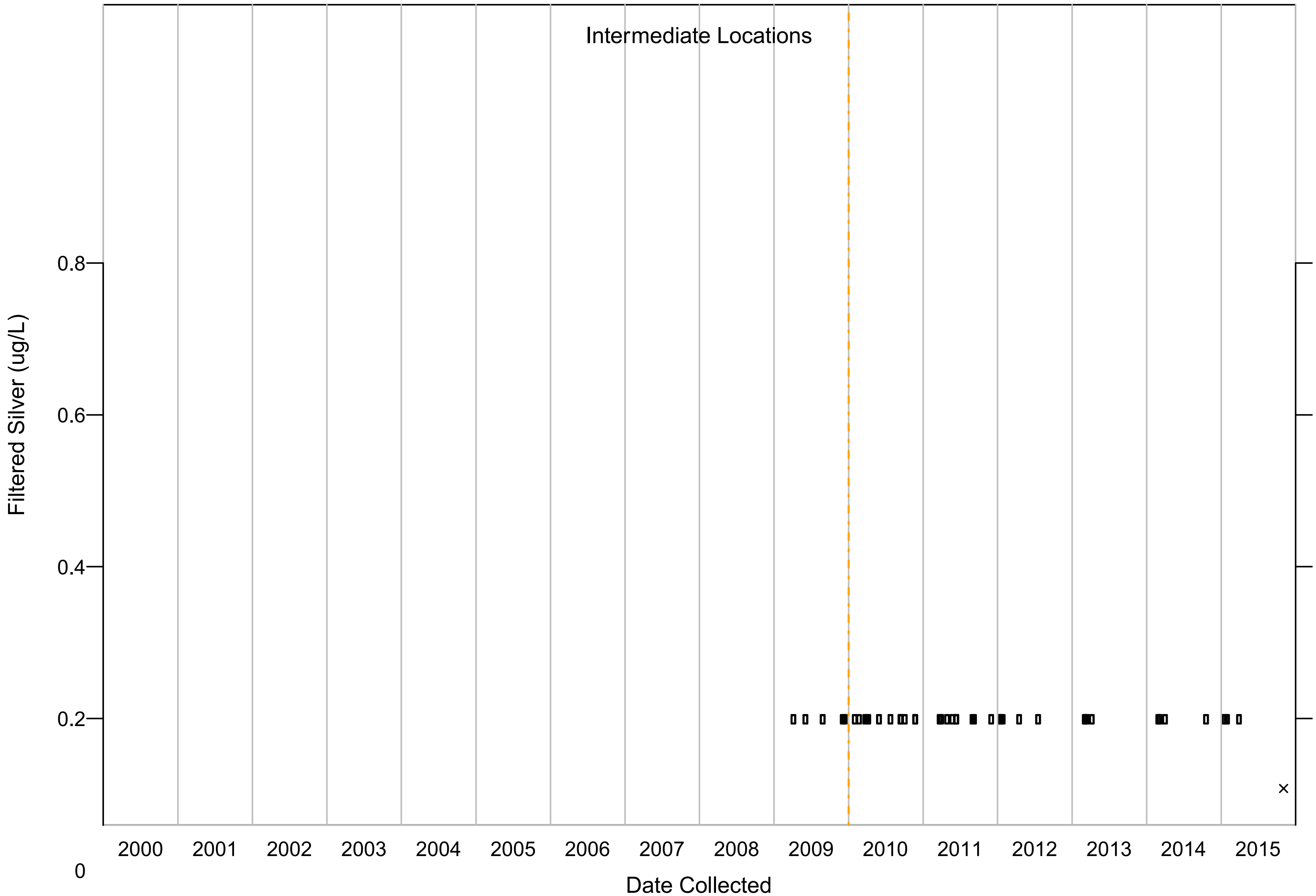



**Figure C-121 Filtered silver results for perched-intermediate groundwater**

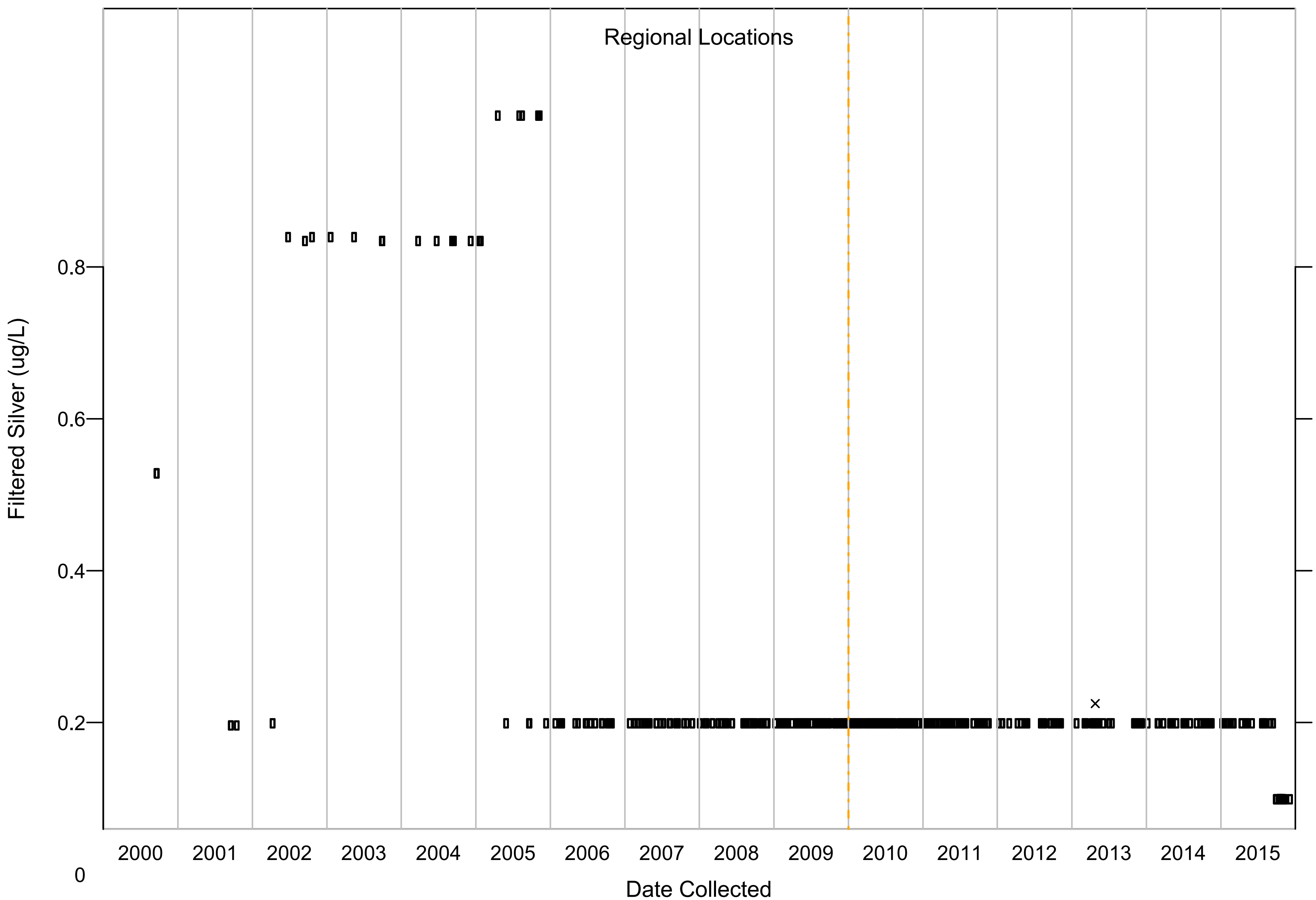



**Figure C-122 Filtered silver results for regional aquifer**

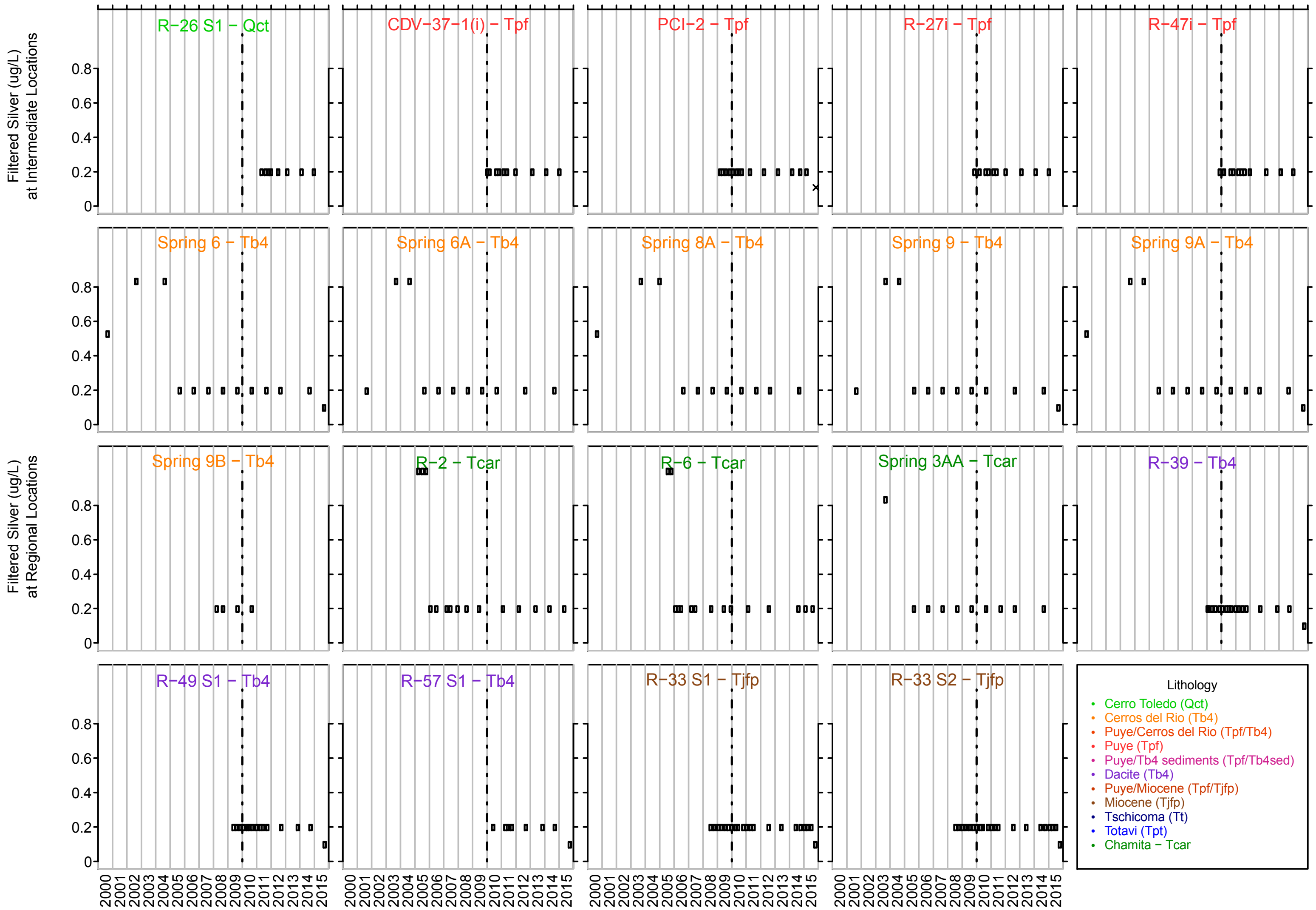



**Figure C-123    Time-series plots for filtered silver**

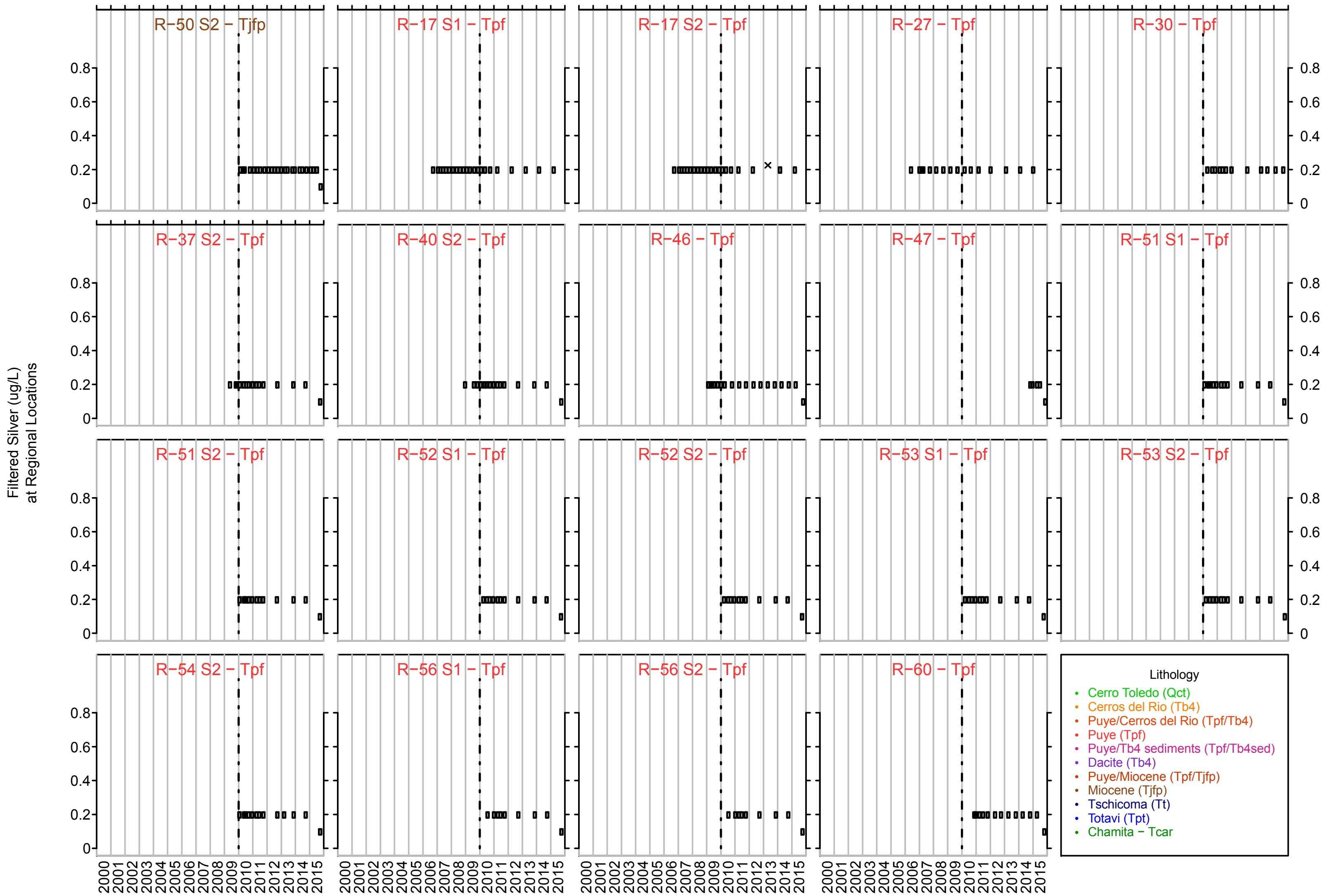



**Figure C-123 (continued)   Time-series plots for filtered silver**

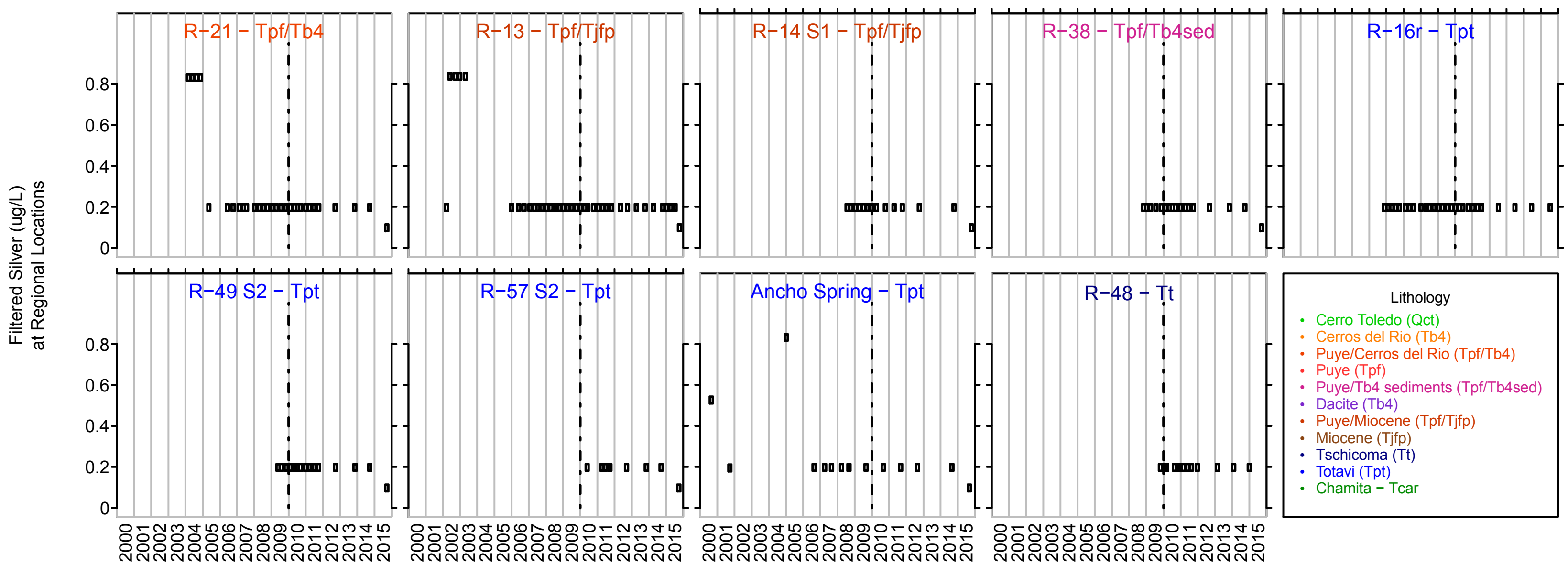



**Figure C-123 (continued) Time-series plots for filtered silver**

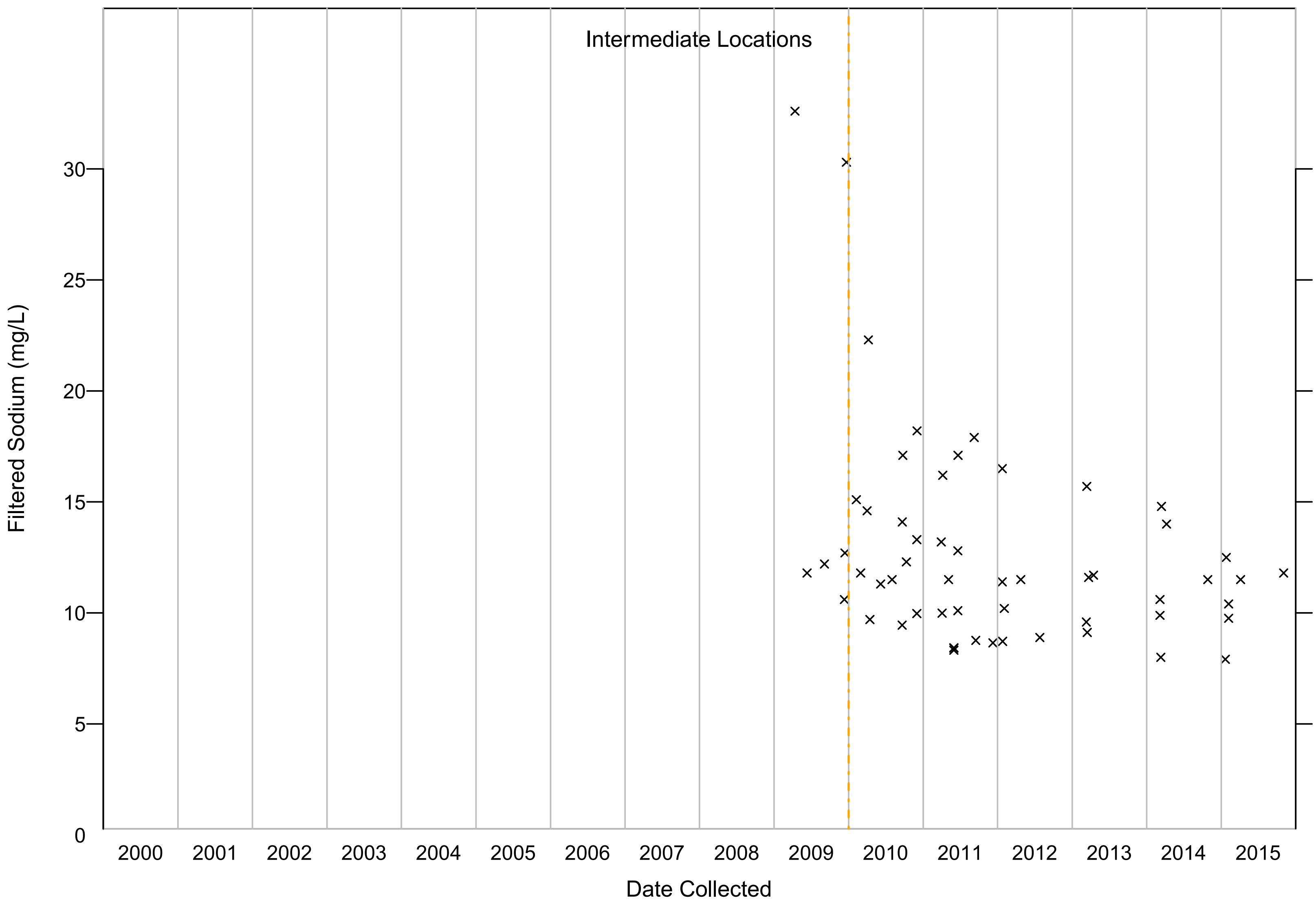



**Figure C-124 Filtered sodium results for perched-intermediate groundwater**

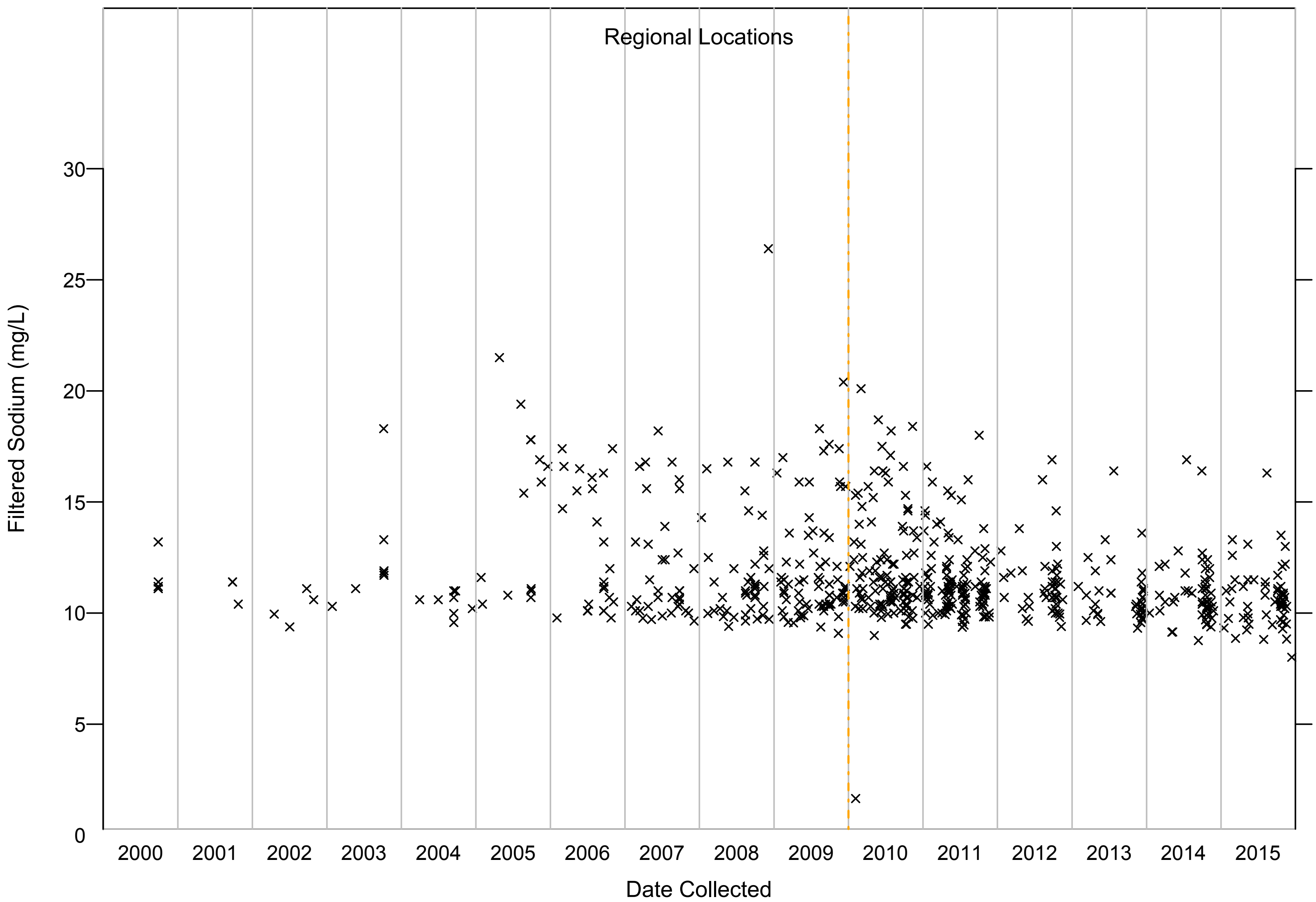



**Figure C-125 Filtered sodium results for regional aquifer**

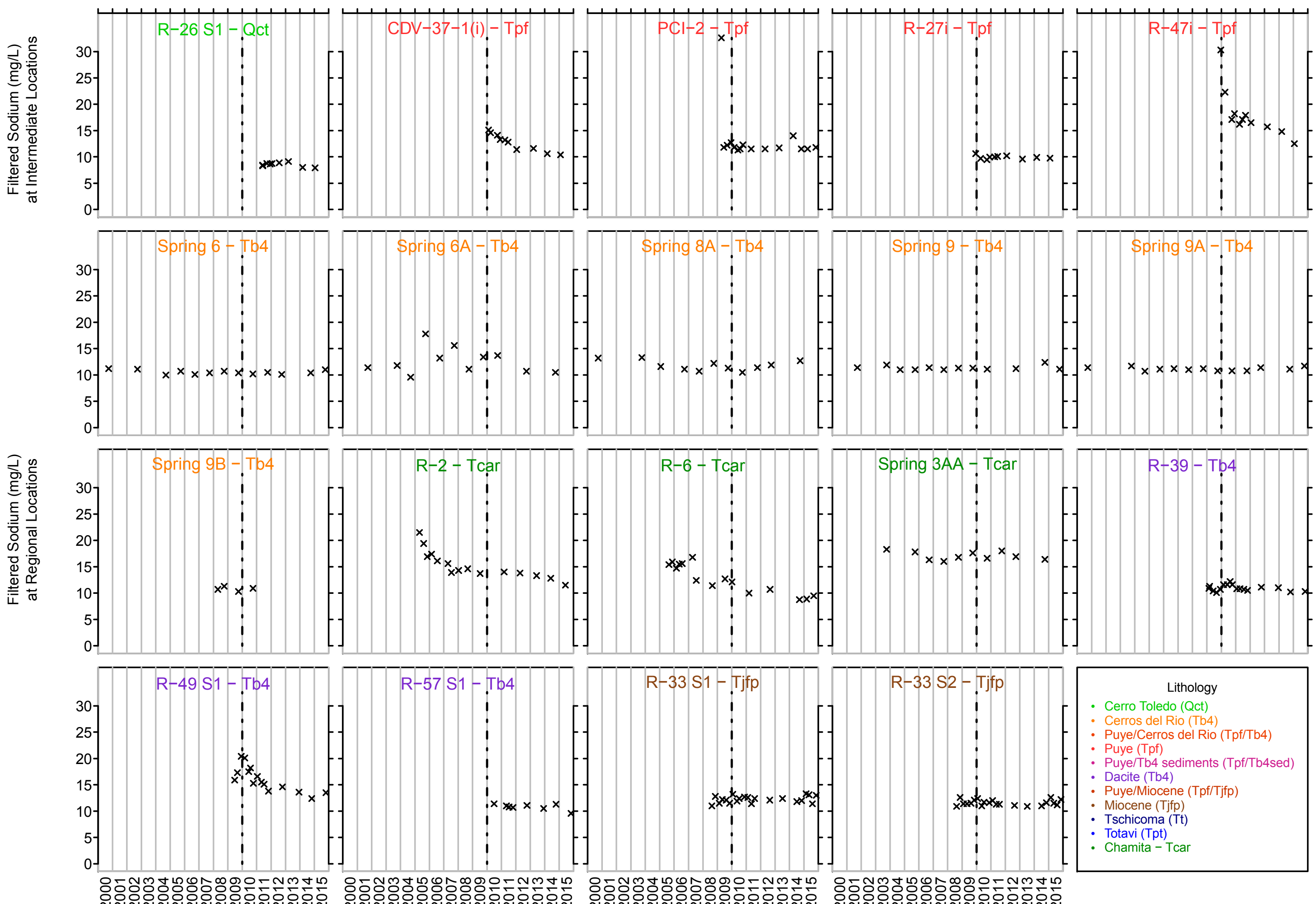



**Figure C-126 Time-series plots for filtered sodium**

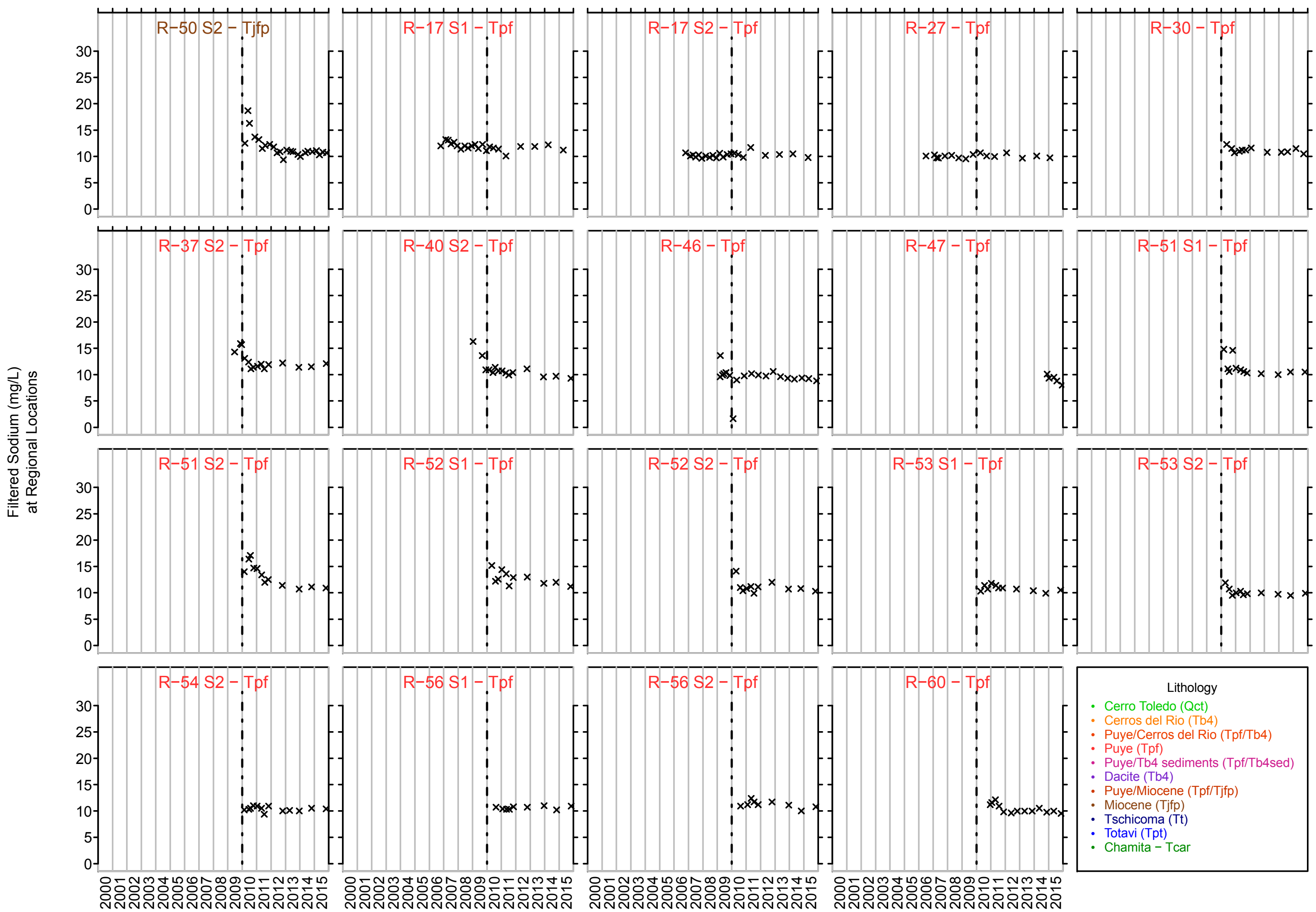



**Figure C-126 (continued)   Time-series plots for filtered sodium**

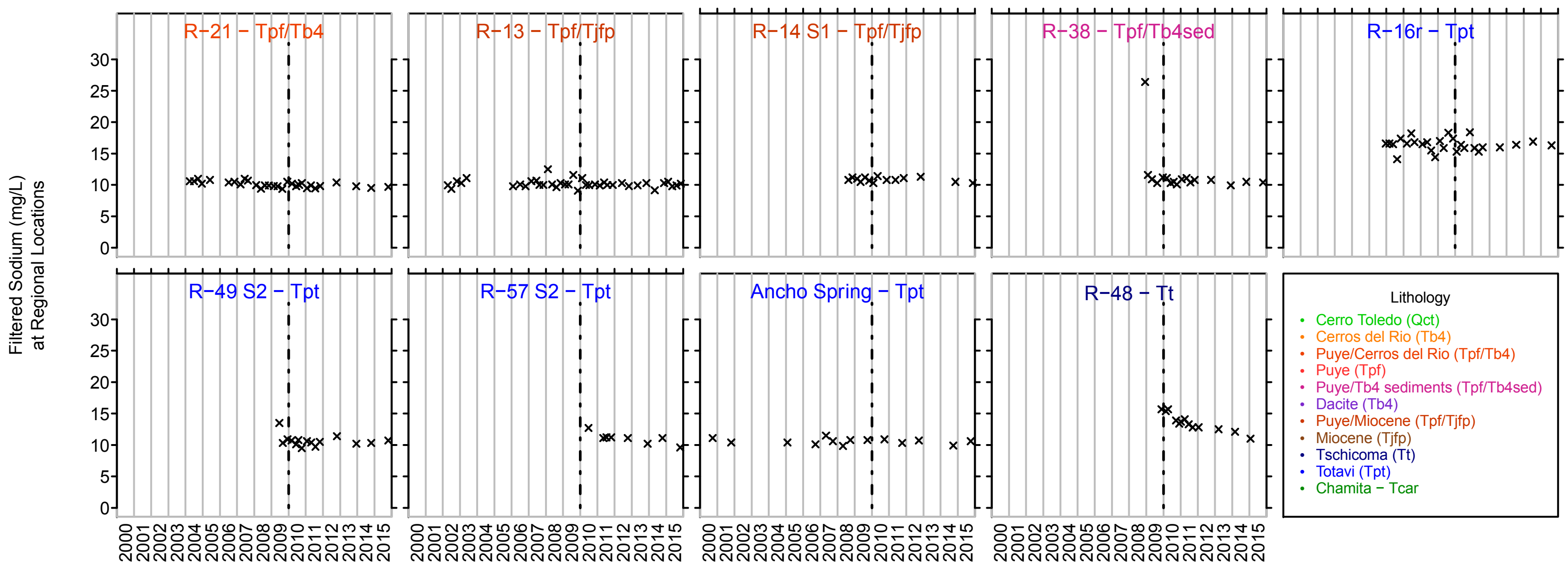



**Figure C-126 (continued) Time-series plots for filtered sodium**

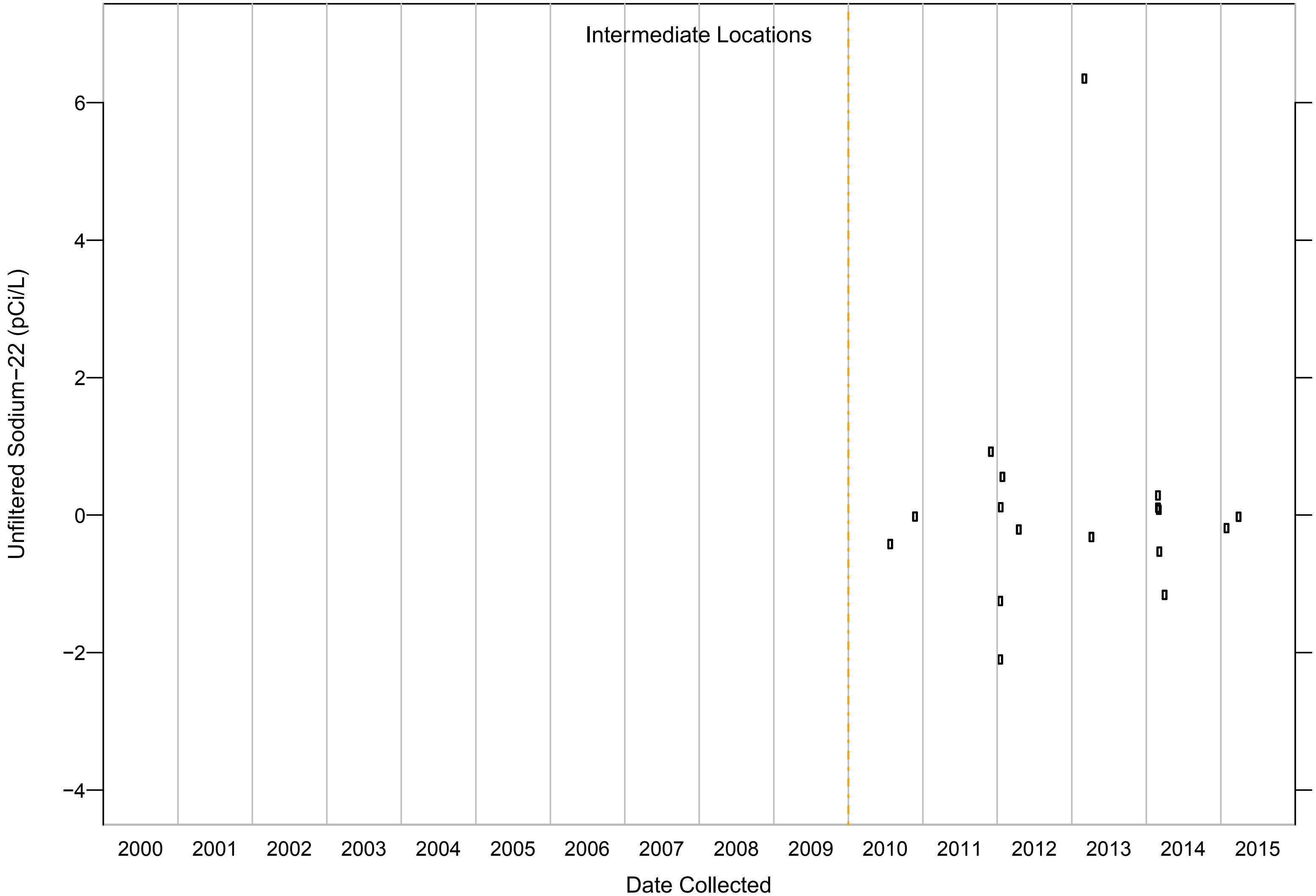



**Figure C-127 Unfiltered sodium-22 results for perched-intermediate groundwater**

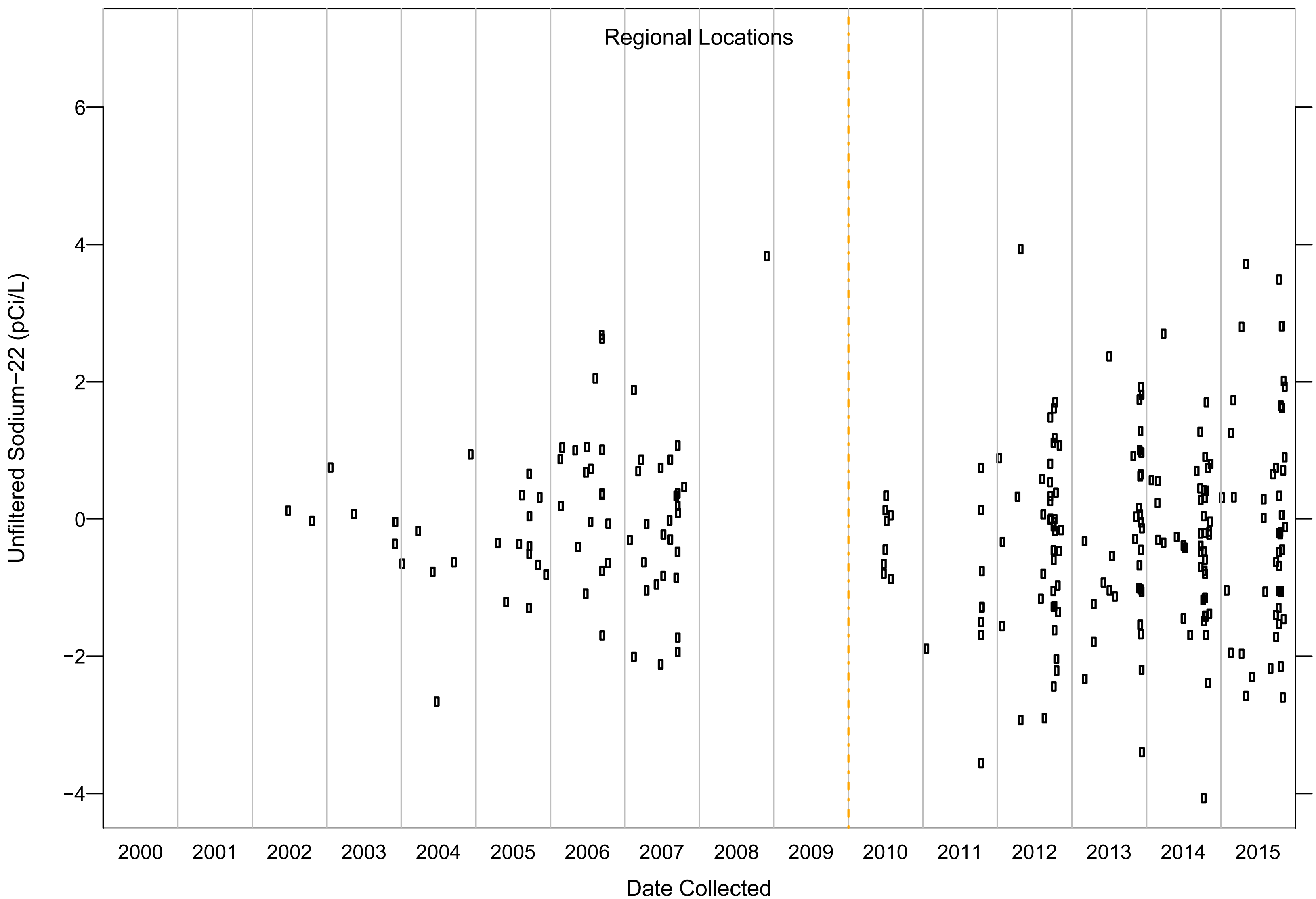



**Figure C-128 Unfiltered sodium-22 results for regional aquifer**

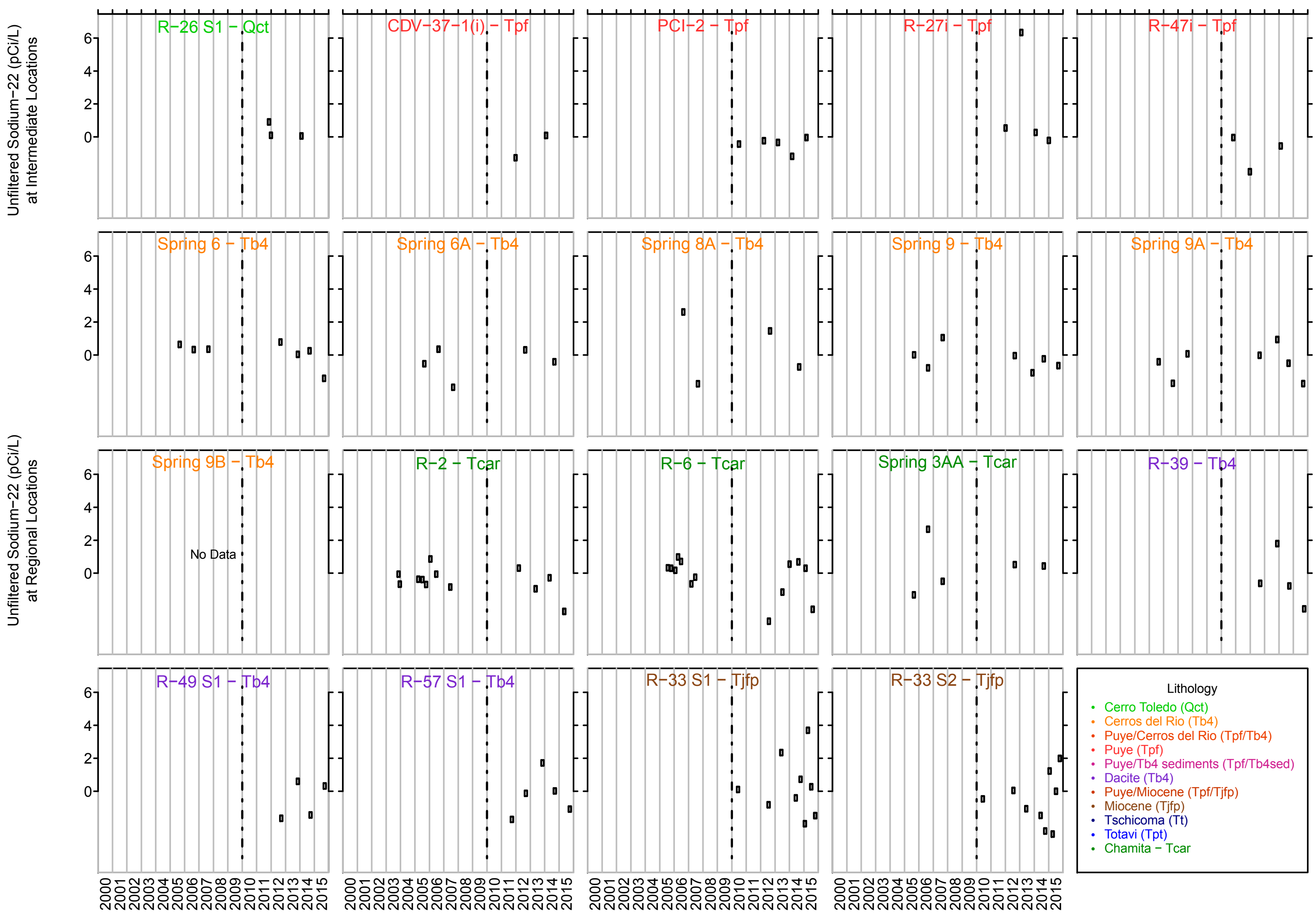



**Figure C-129 Time-series results for unfiltered sodium-22**

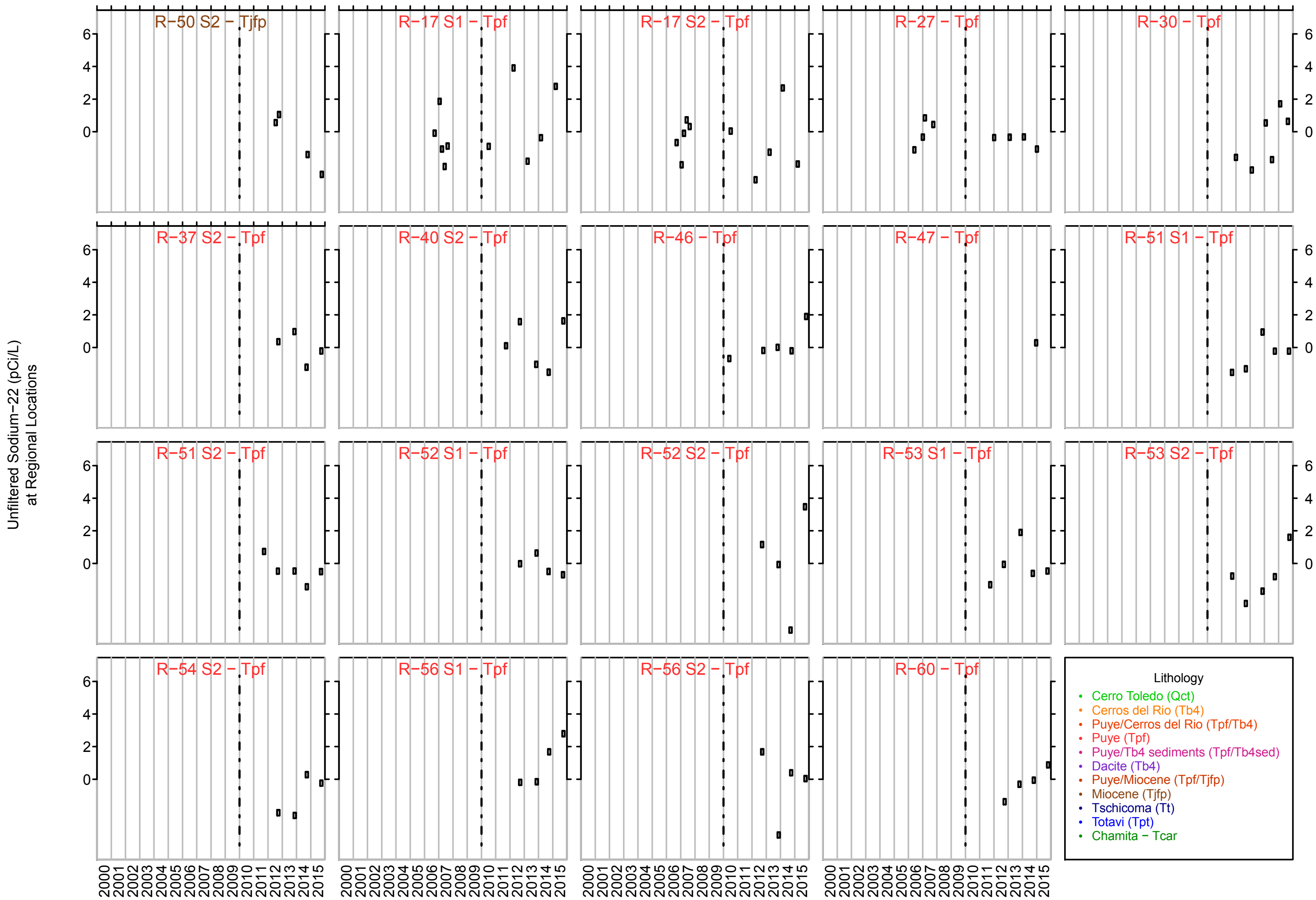



**Figure C-129 (continued)   Time-series results for unfiltered sodium-22**

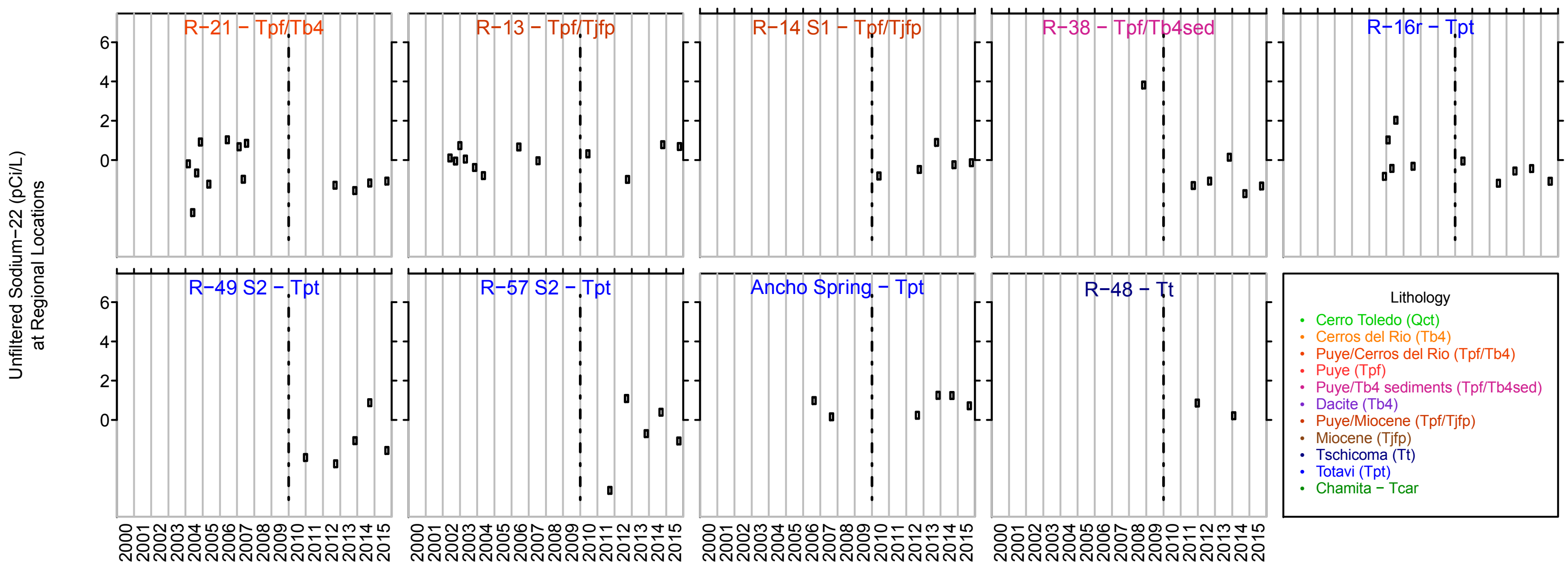



**Figure C-129 (continued) Time-series results for unfiltered sodium-22**

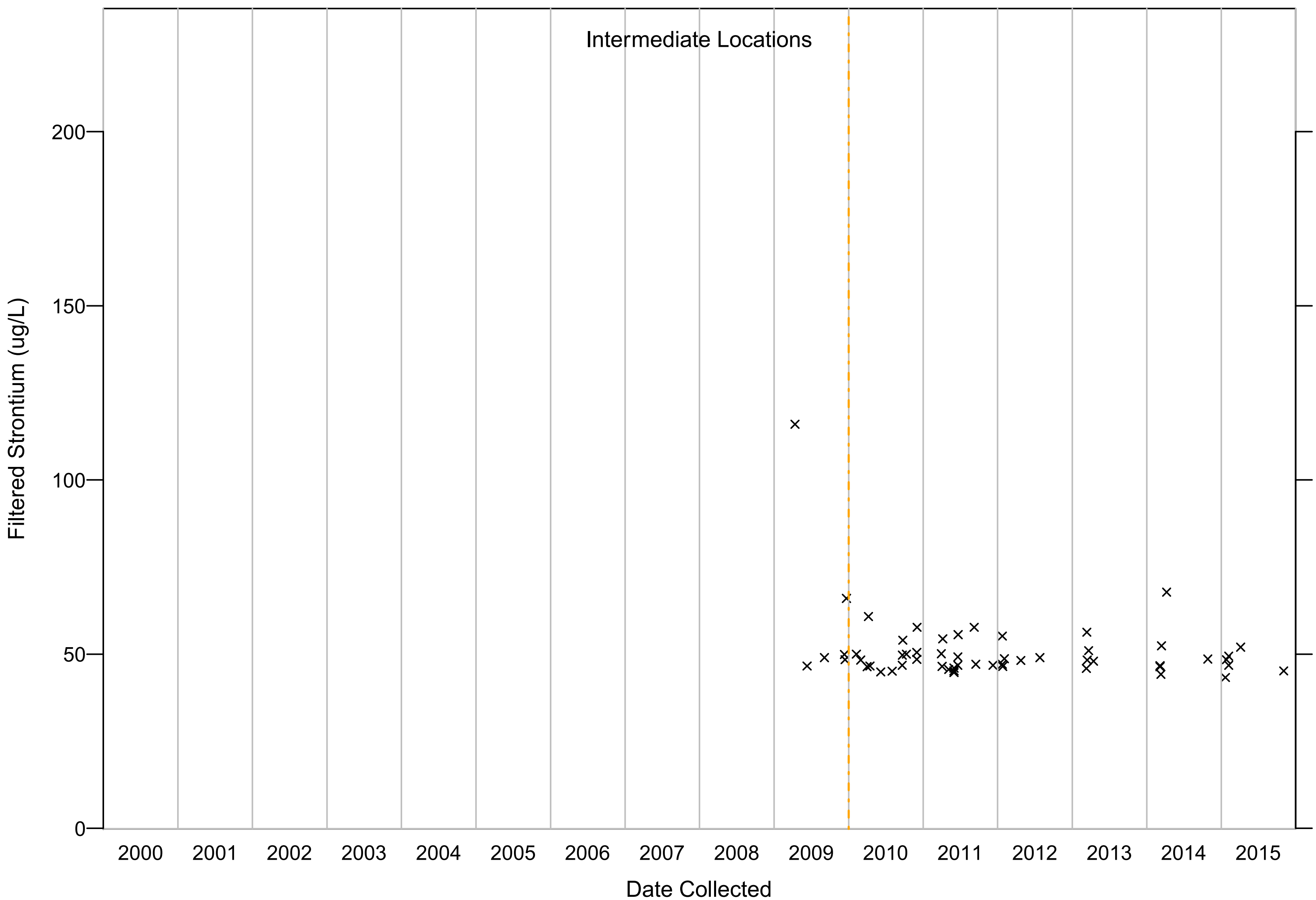



**Figure C-130 Filtered strontium results for perched-intermediate groundwater**

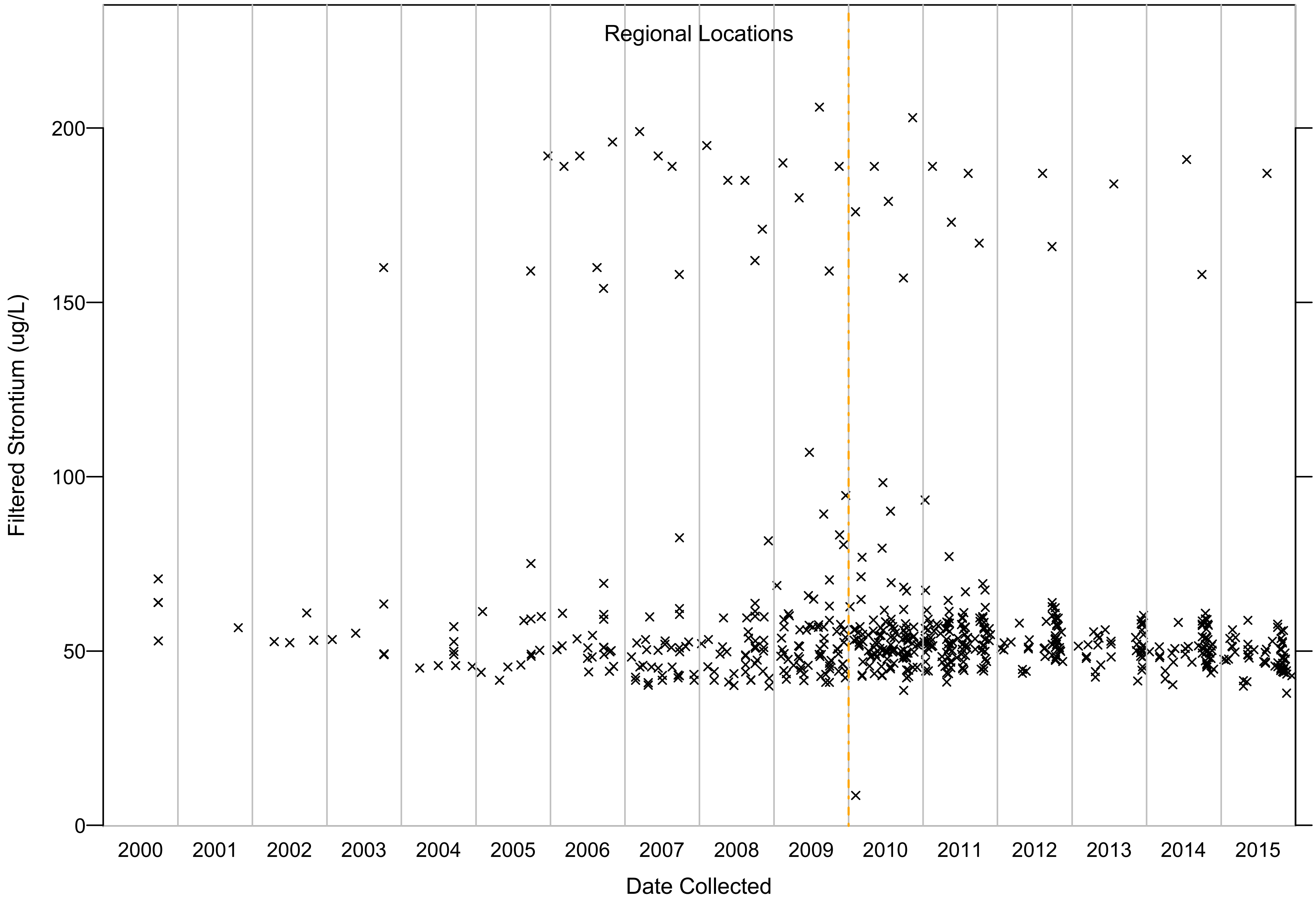



**Figure C-131 Filtered strontium results for regional aquifer**

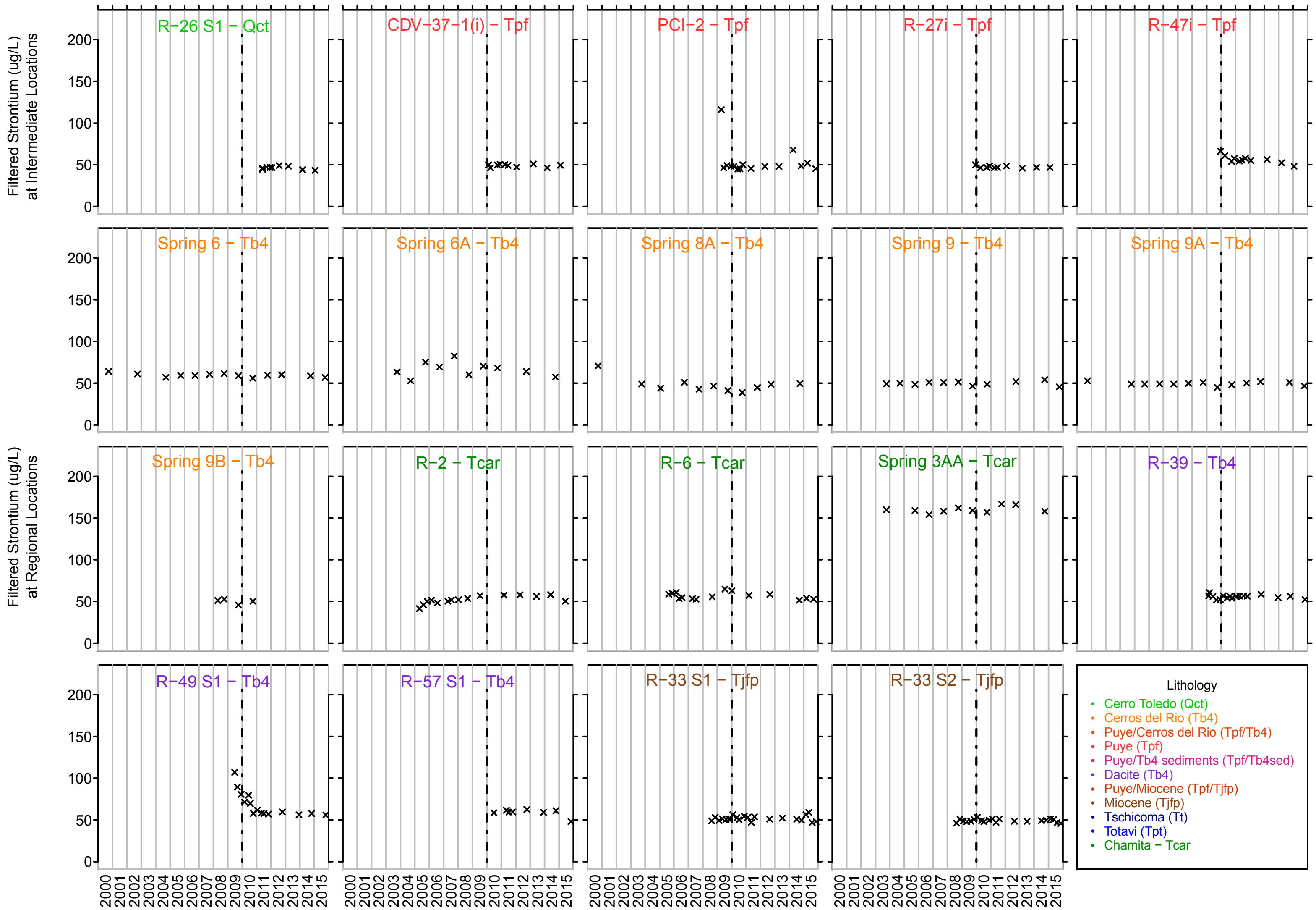



**Figure C-132 Time-series plots for filtered strontium**

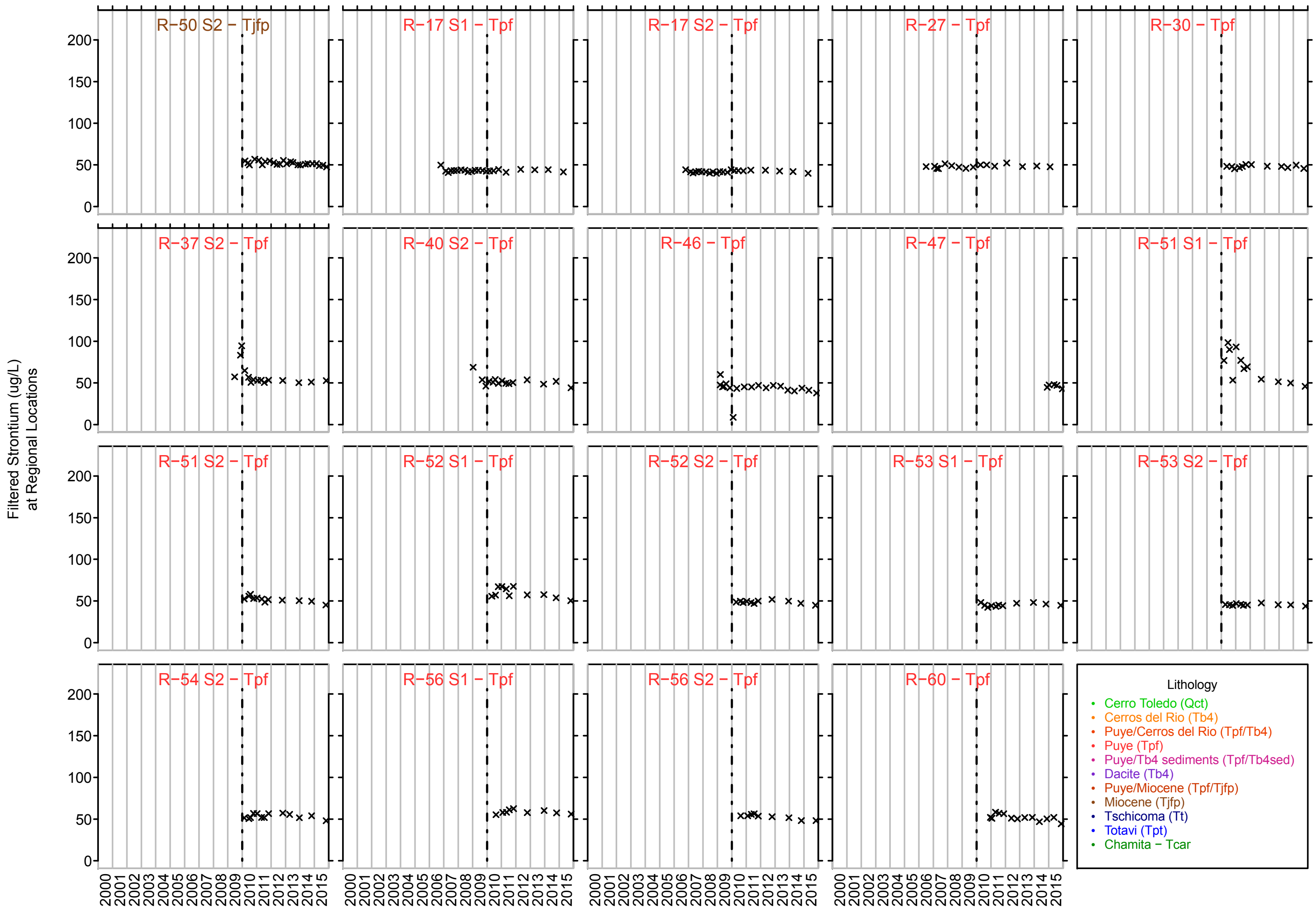



**Figure C-132 (continued)   Time-series plots for filtered strontium**

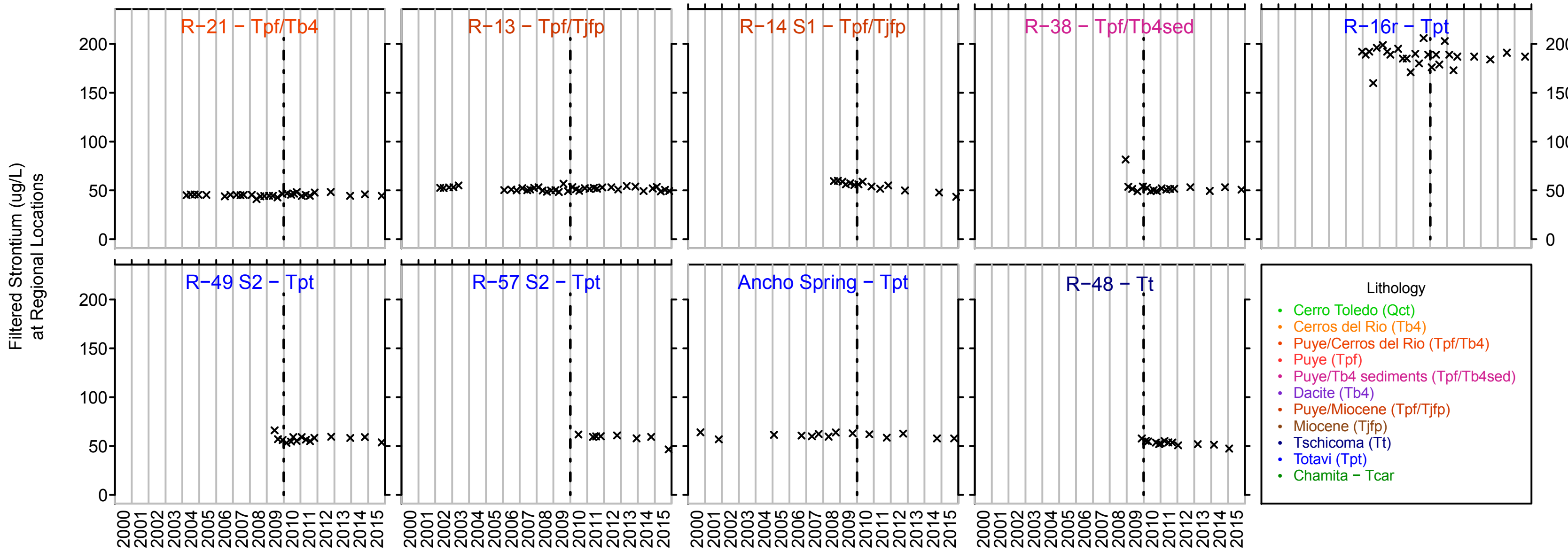



**Figure C-132 (continued) Time-series plots for filtered strontium**

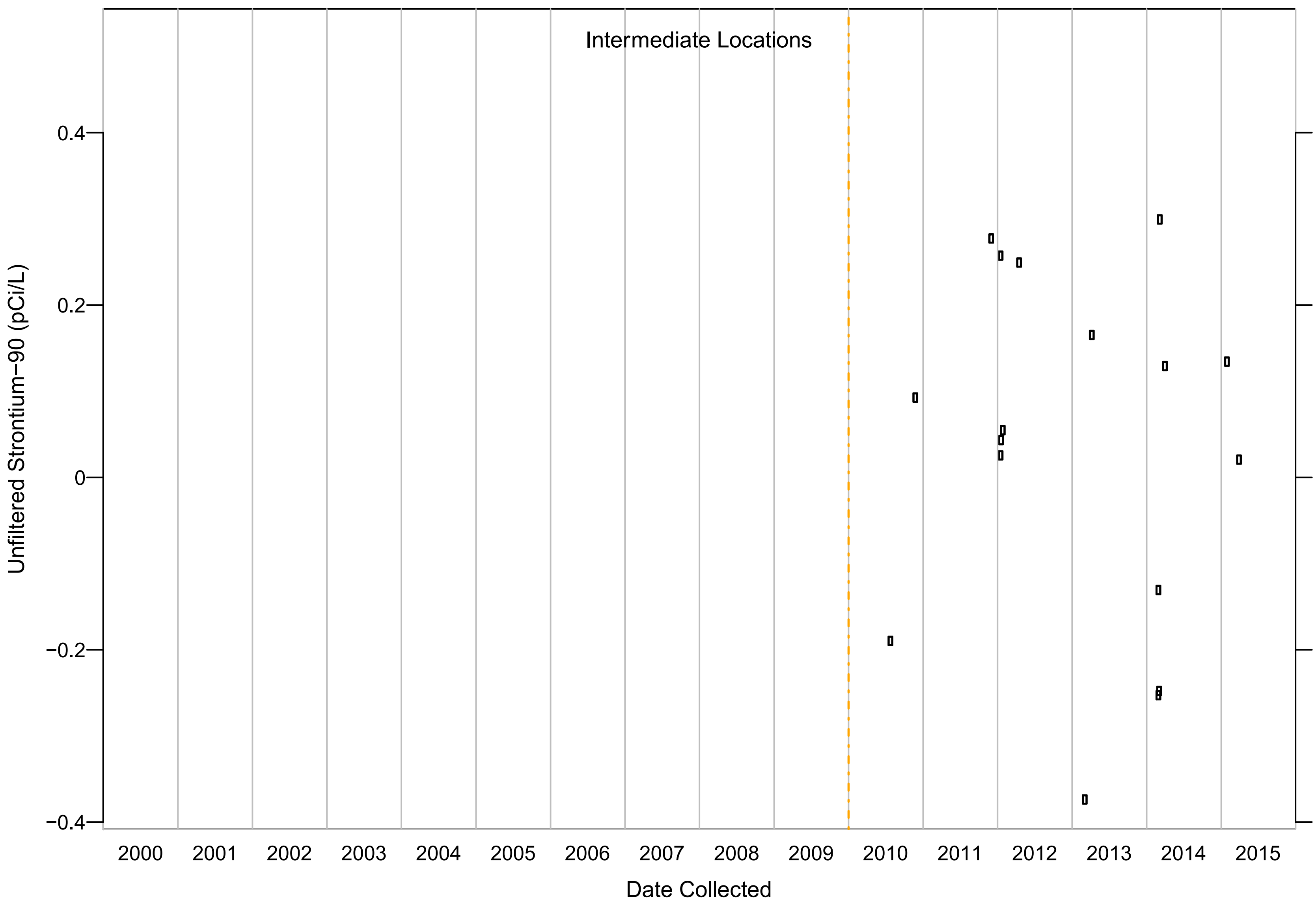



**Figure C-133 Unfiltered strontium-90 results for perched-intermediate groundwater**

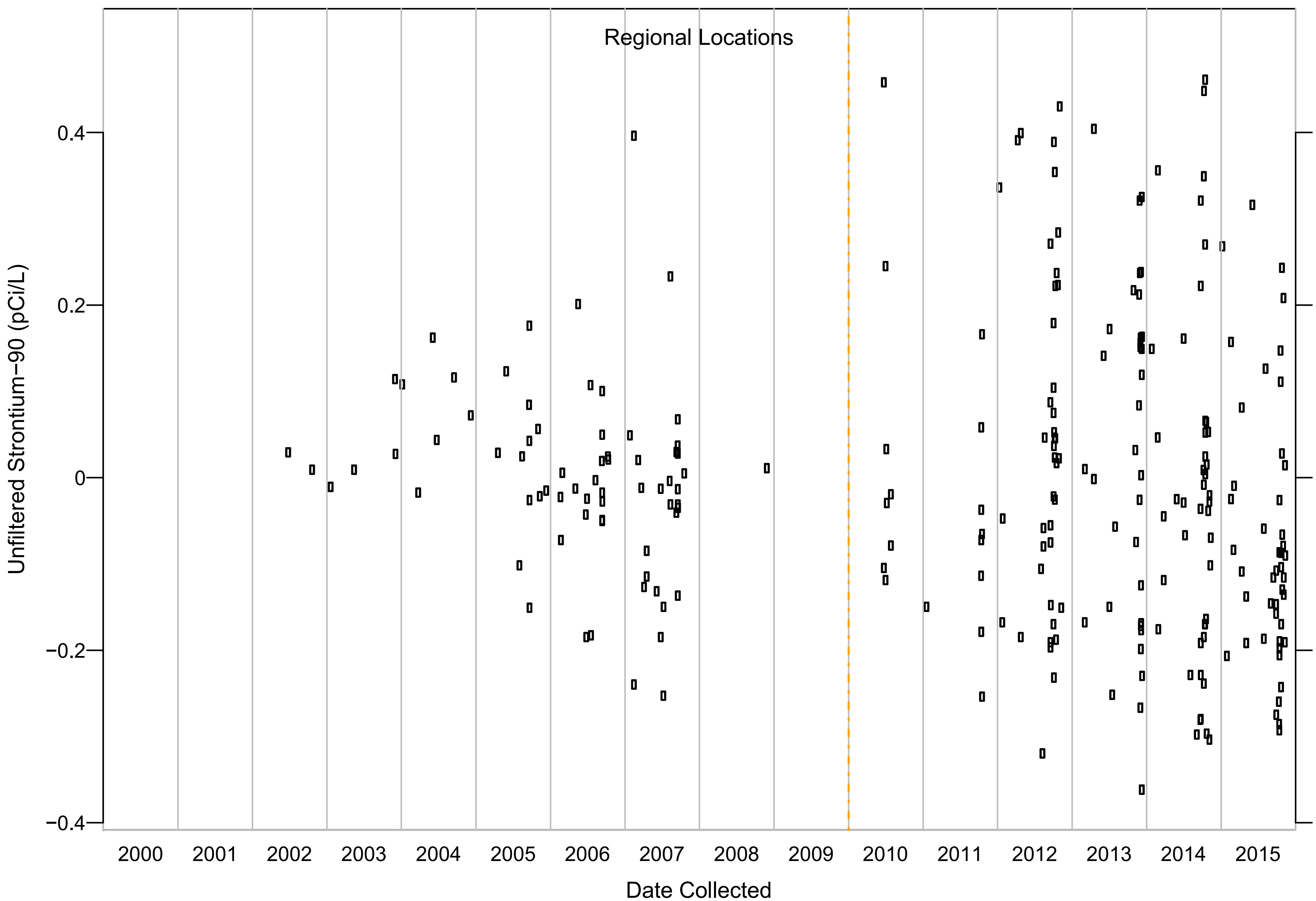



**Figure C-134 Unfiltered strontium-90 results for regional aquifer**

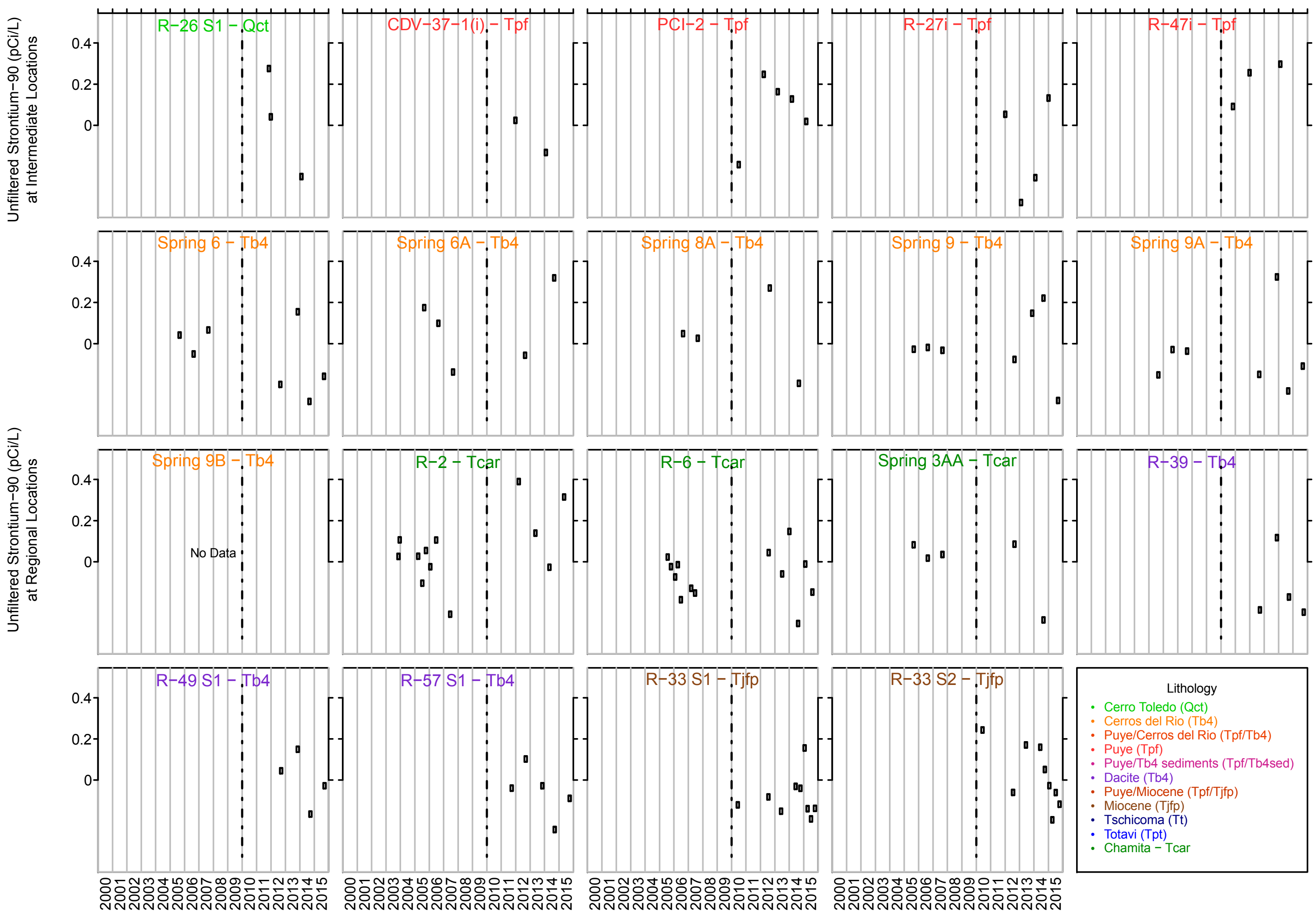



**Figure C-135 Time-series plots for unfiltered strontium-90**

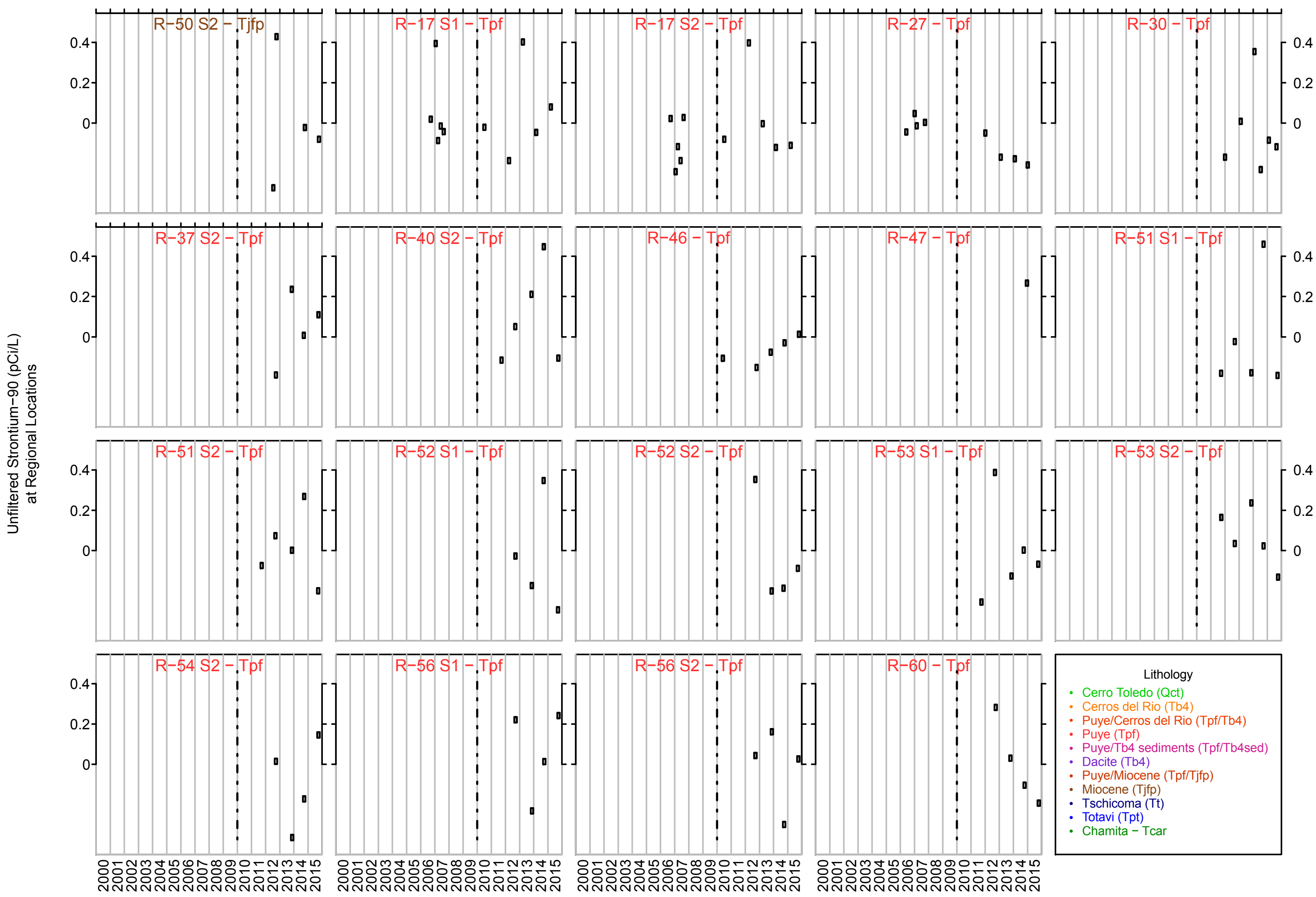



**Figure C-135 (continued) Time-series plots for unfiltered strontium-90**

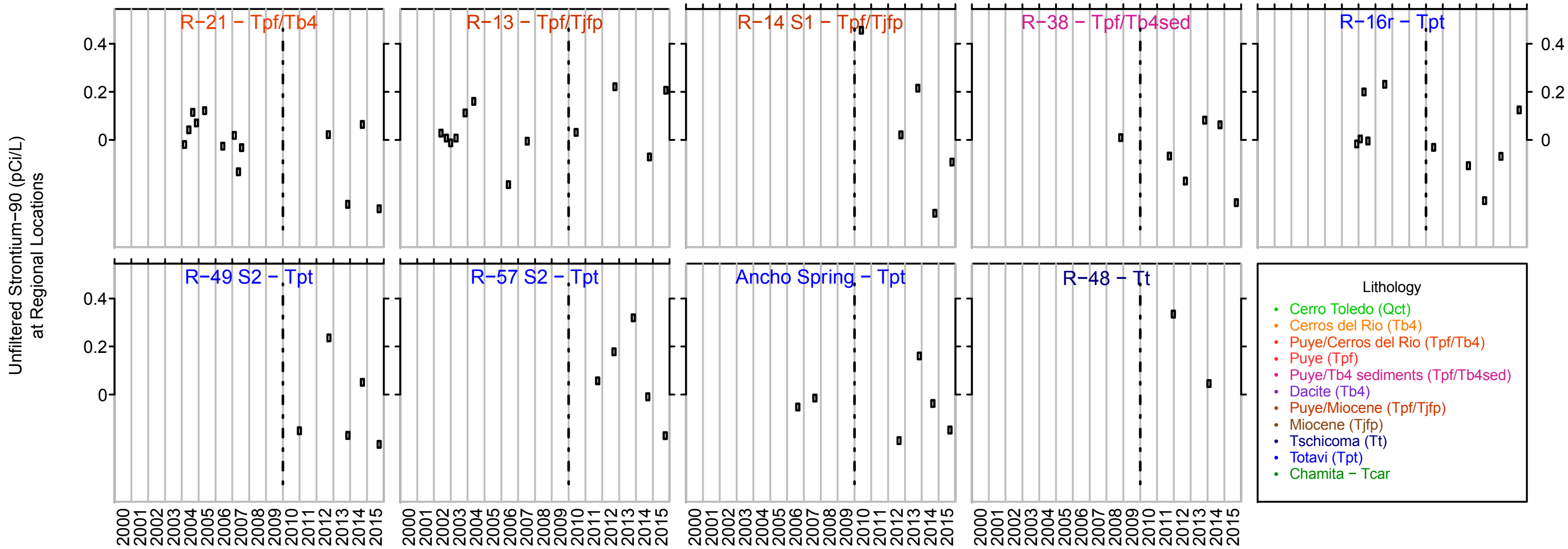



**Figure C-135 (continued) Time-series plots for unfiltered strontium-90**

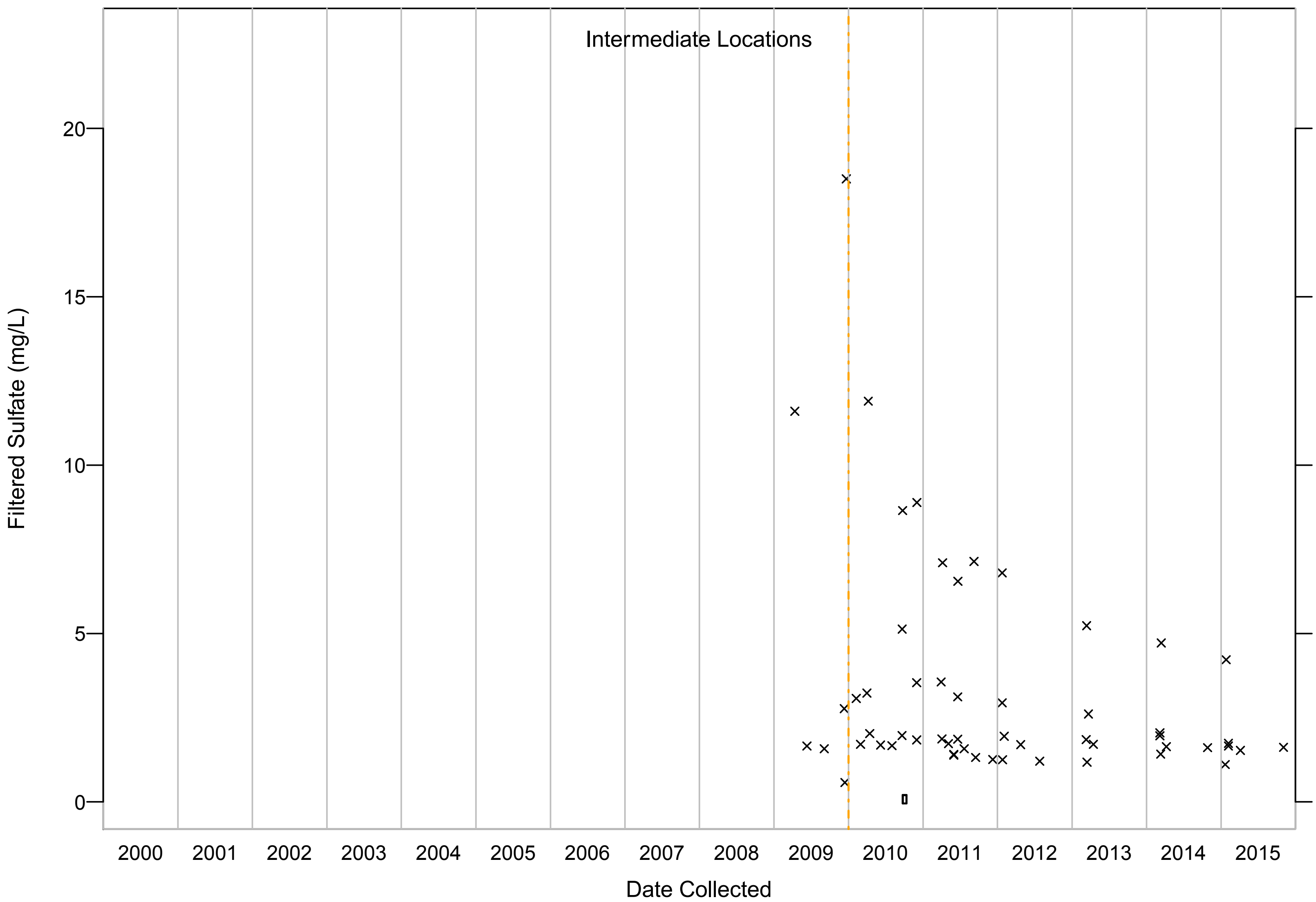



**Figure C-136 Filtered sulfate results for perched-intermediate groundwater**

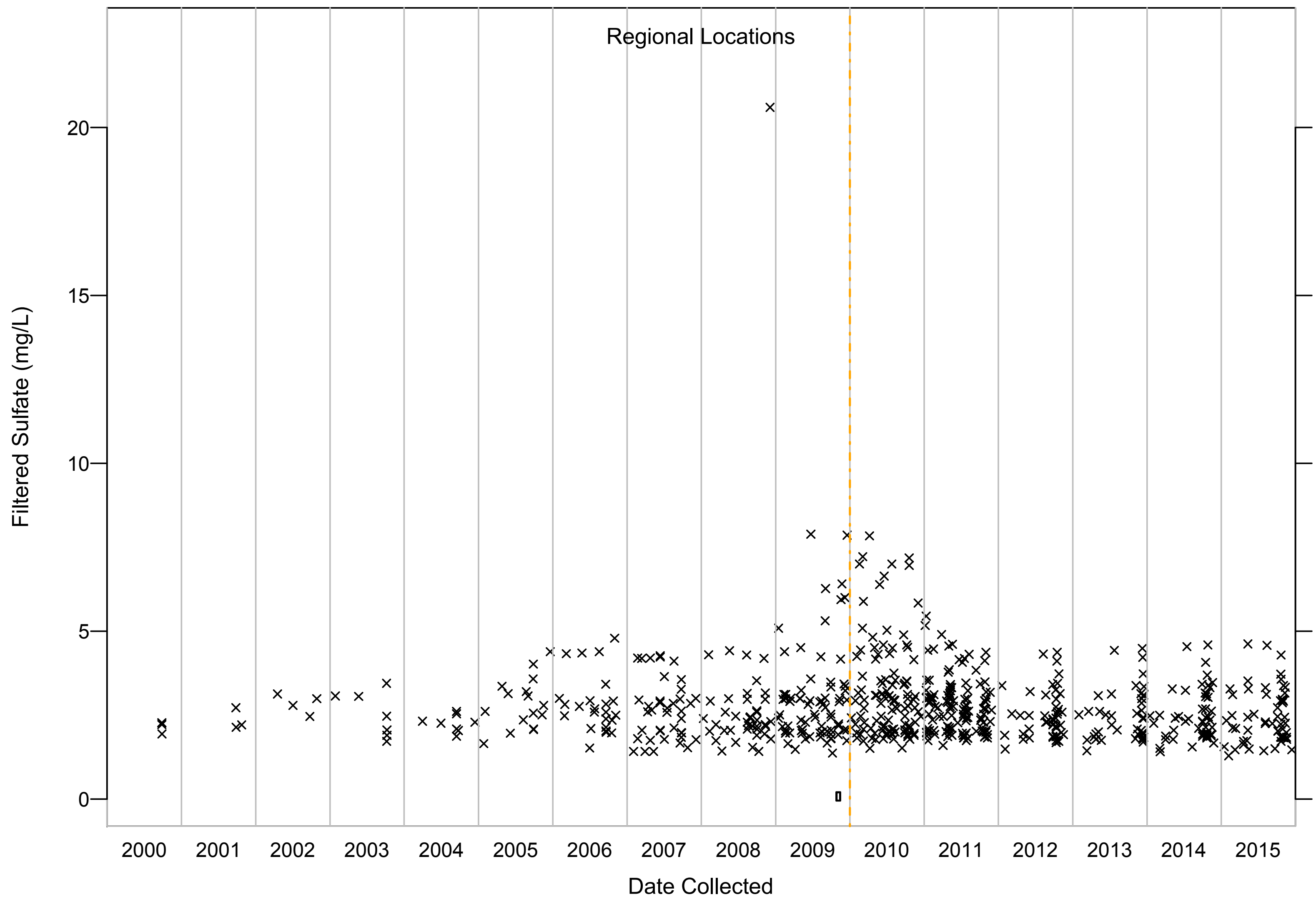



**Figure C-137 Filtered sulfate results for regional aquifer**

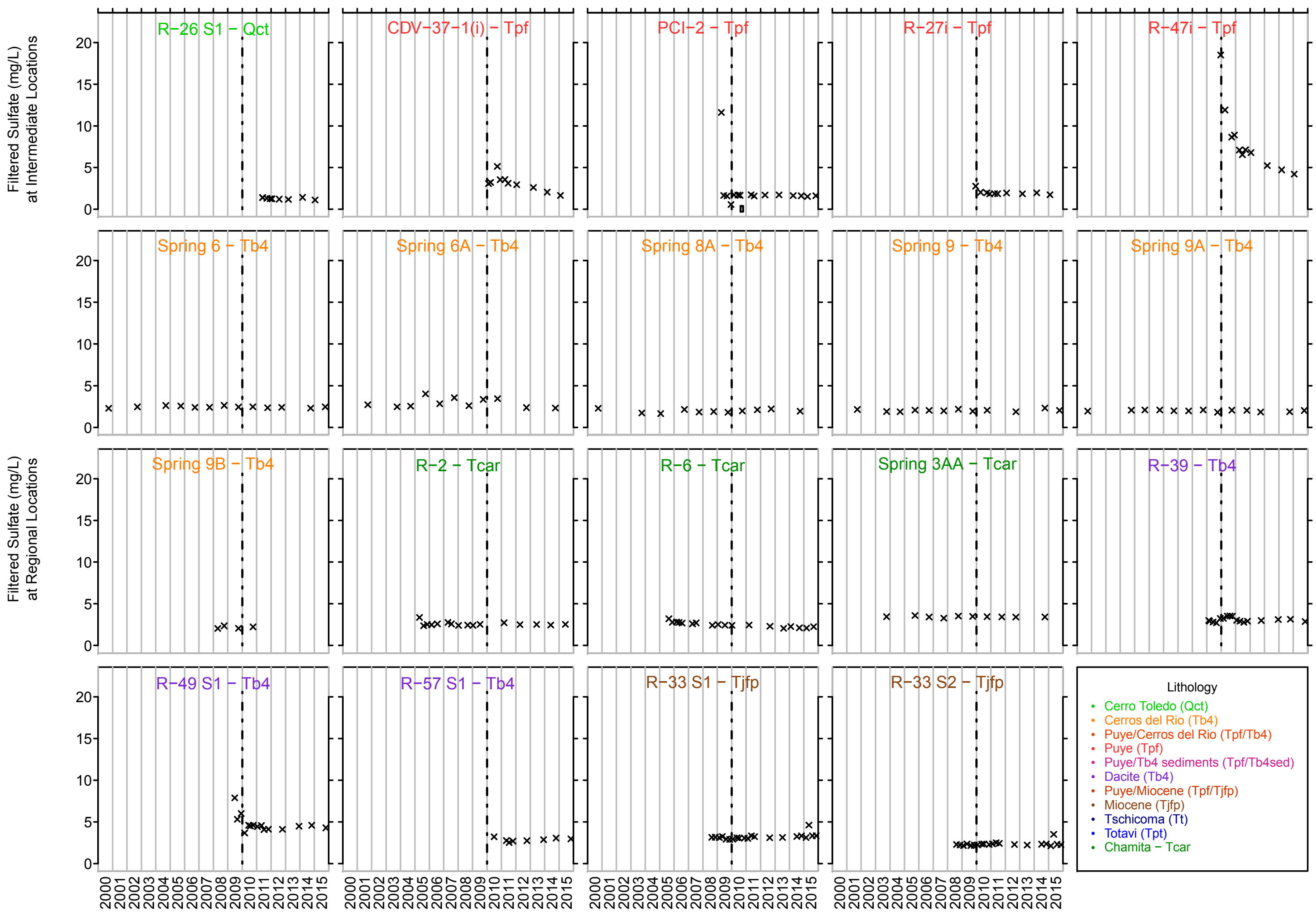



**Figure C-138 Time-series plots for filtered sulfate**

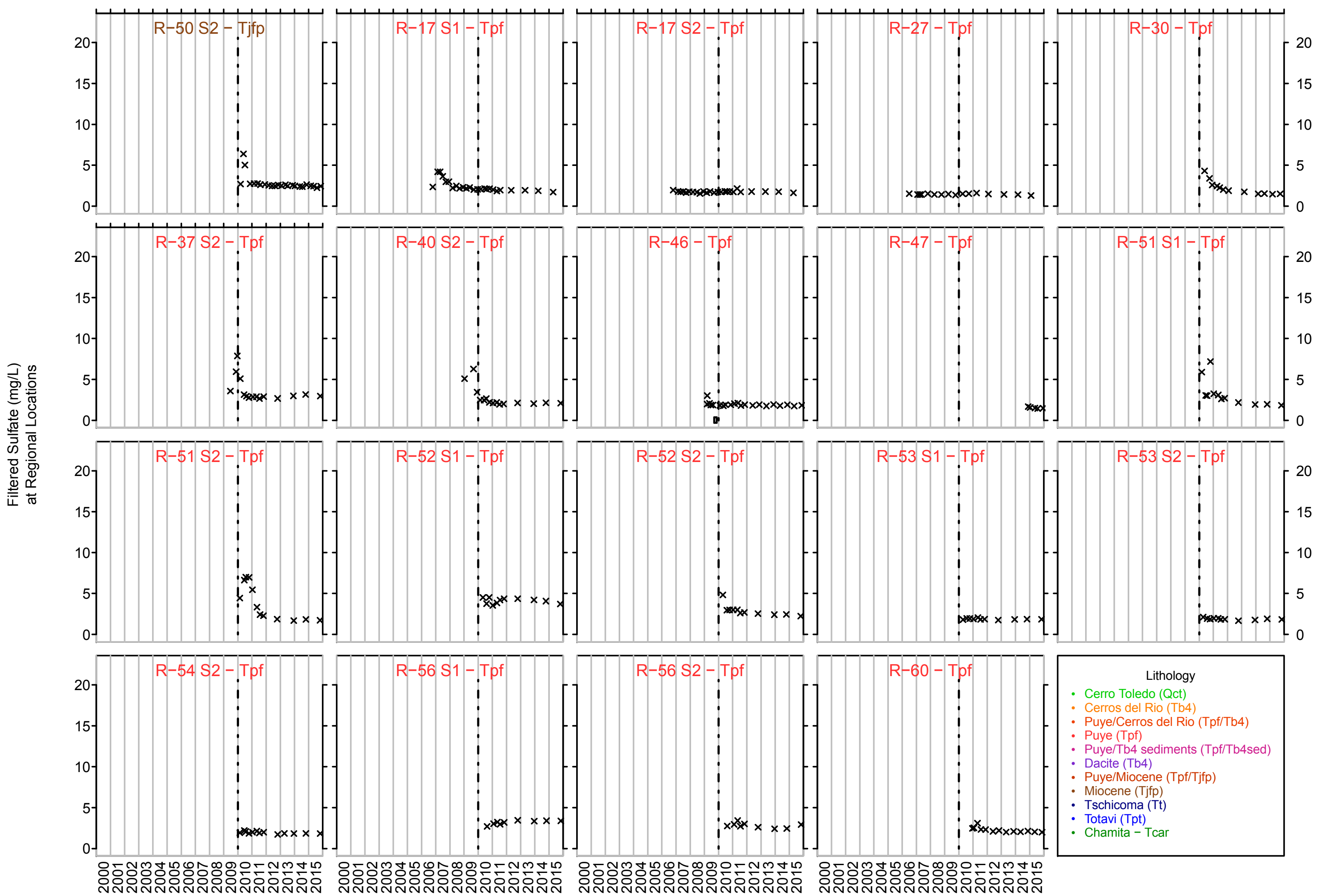



**Figure C-138 (continued)   Time-series plots for filtered sulfate**

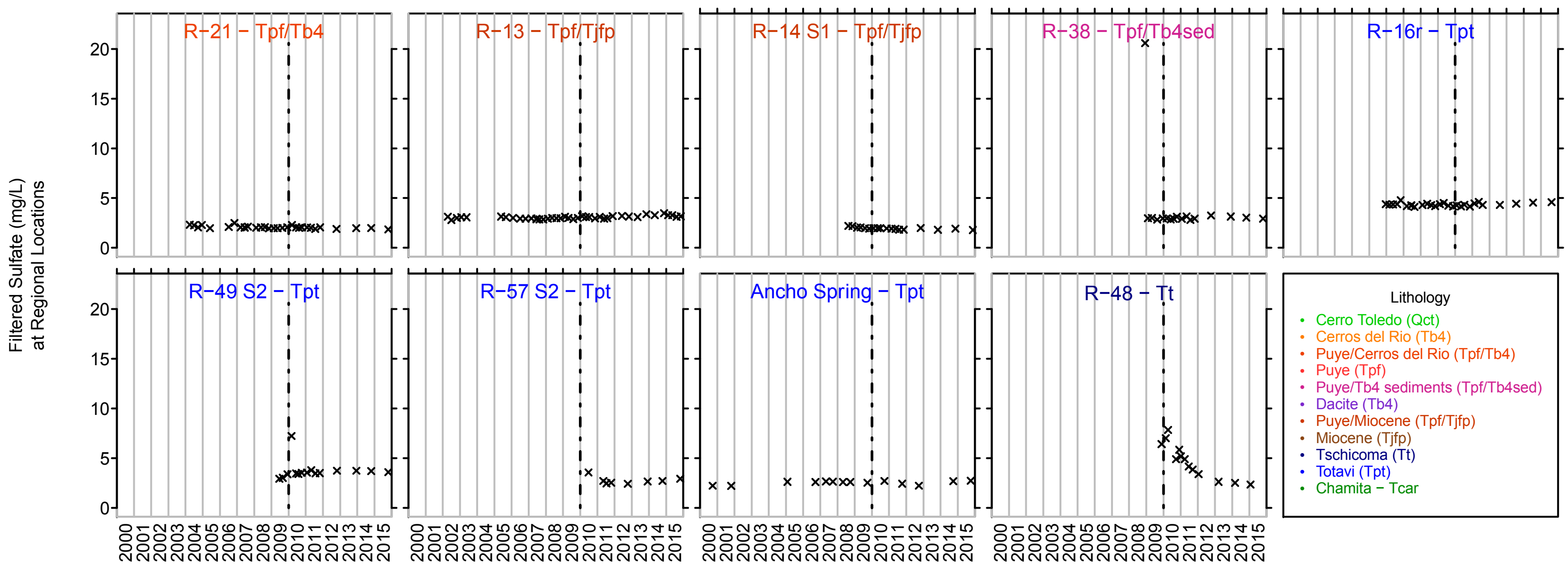



**Figure C-138 (continued) Time-series plots for filtered sulfate**

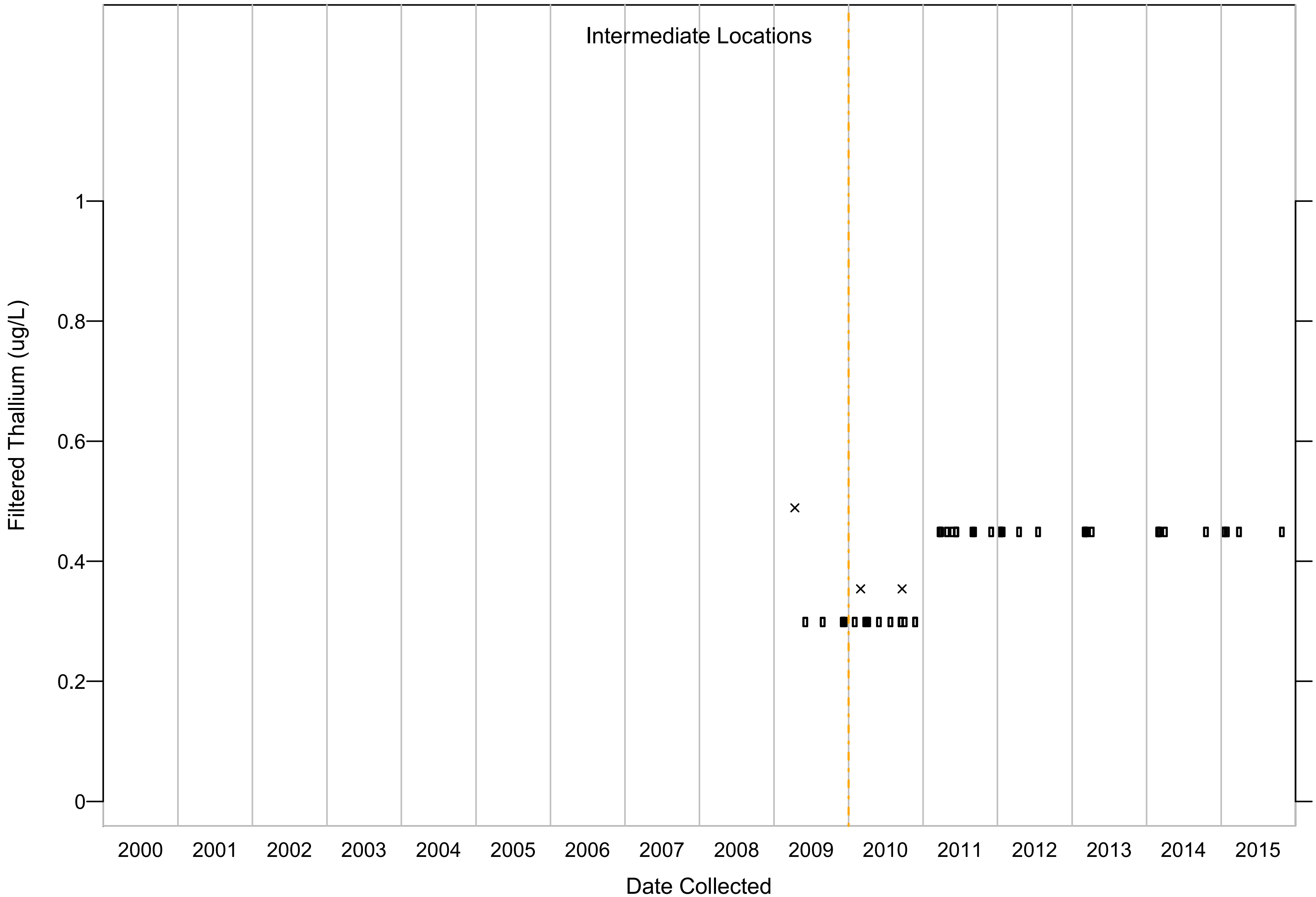



**Figure C-139 Filtered thallium results for perched-intermediate groundwater**

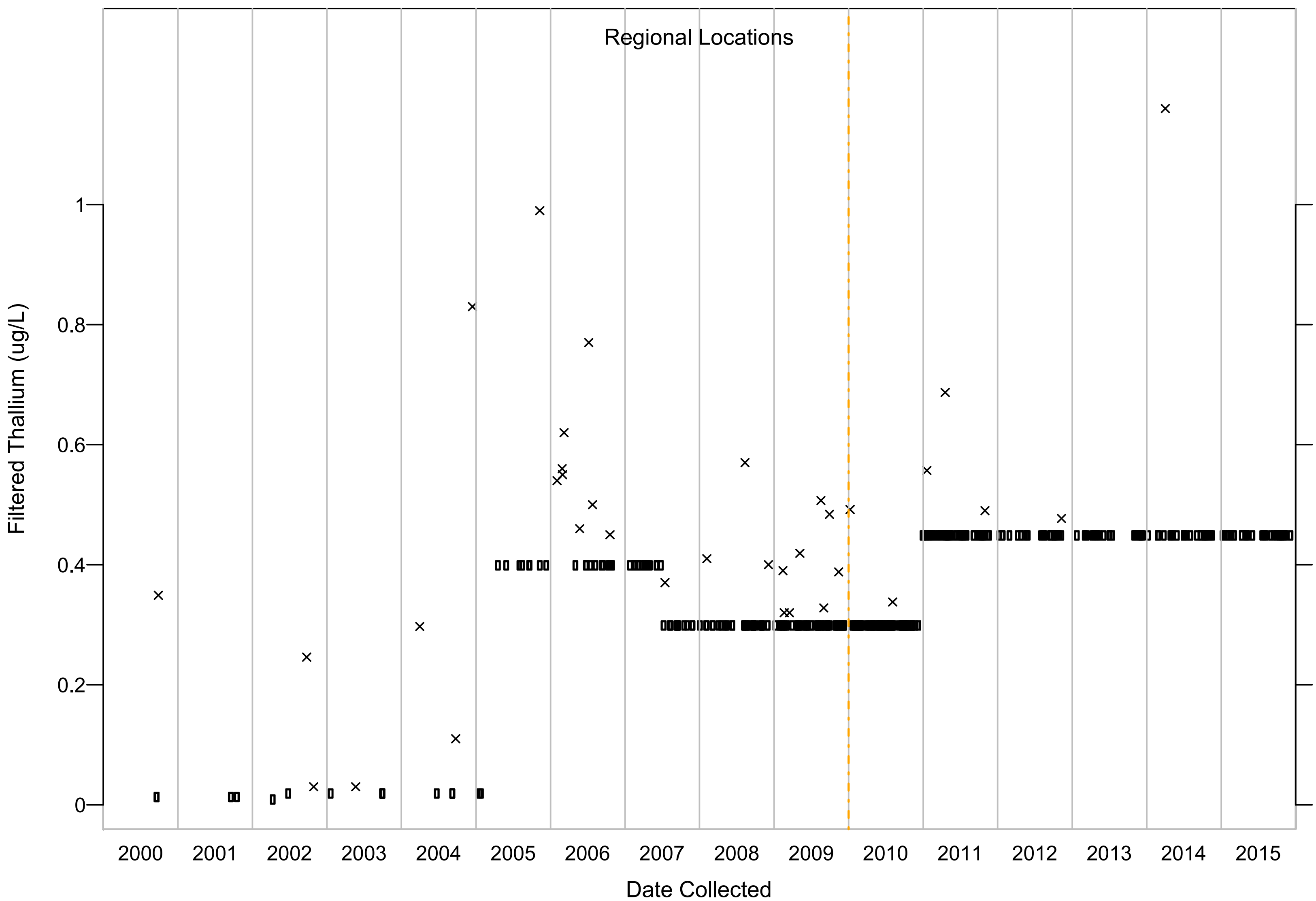



**Figure C-140 Filtered thallium results for regional aquifer**

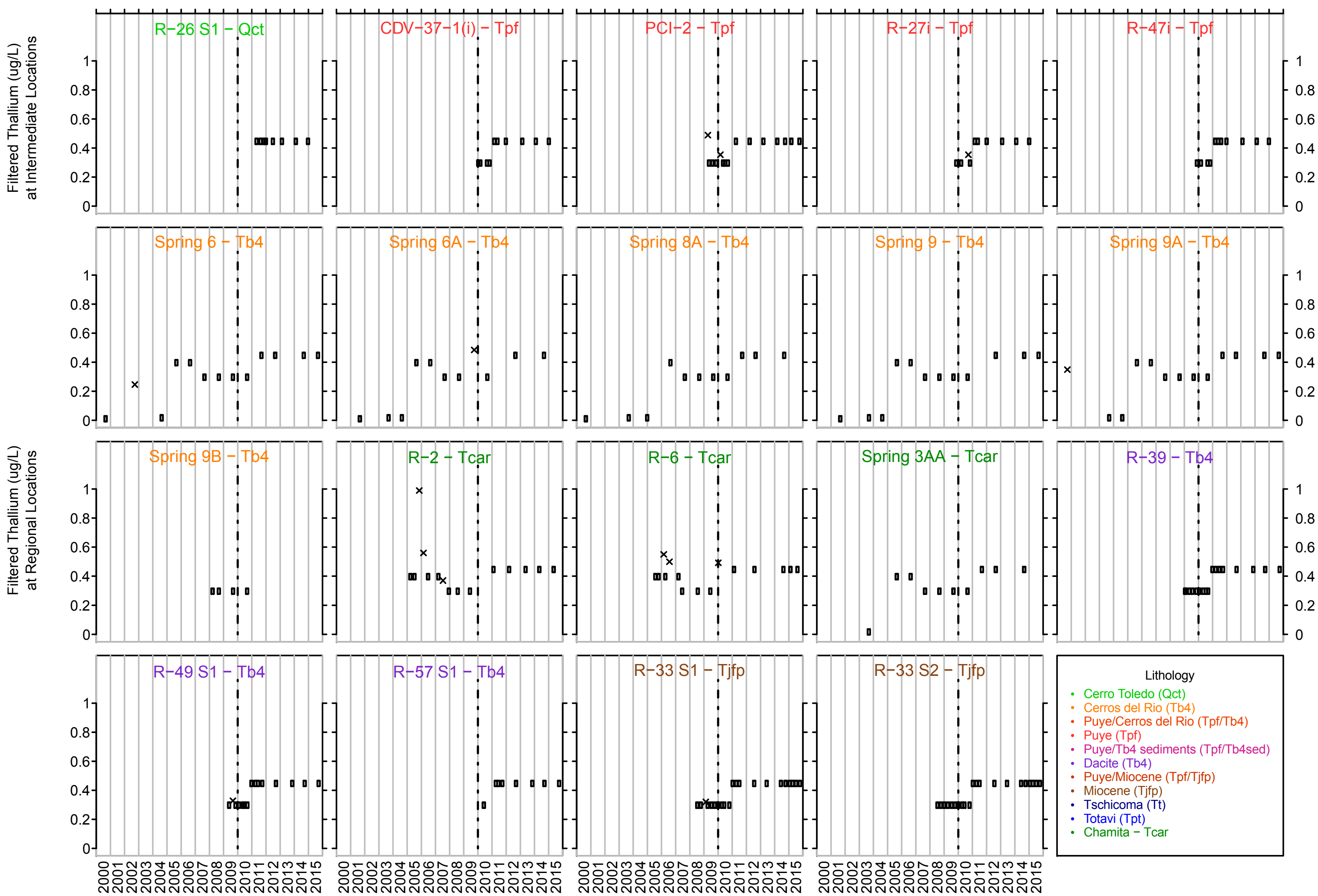



**Figure C-141 Time-series plots for filtered thallium**

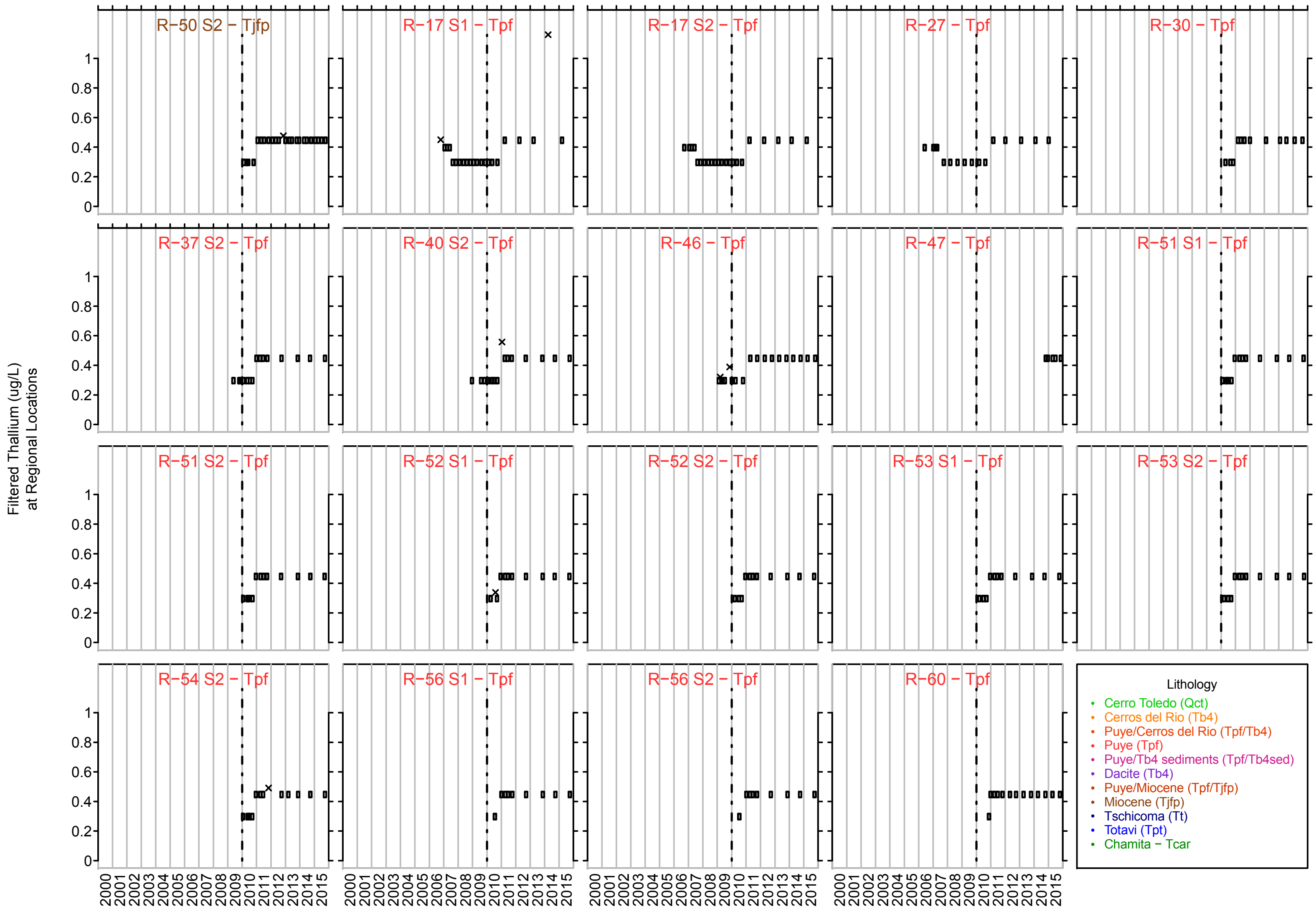



**Figure C-141 (continued)   Time-series plots for filtered thallium**

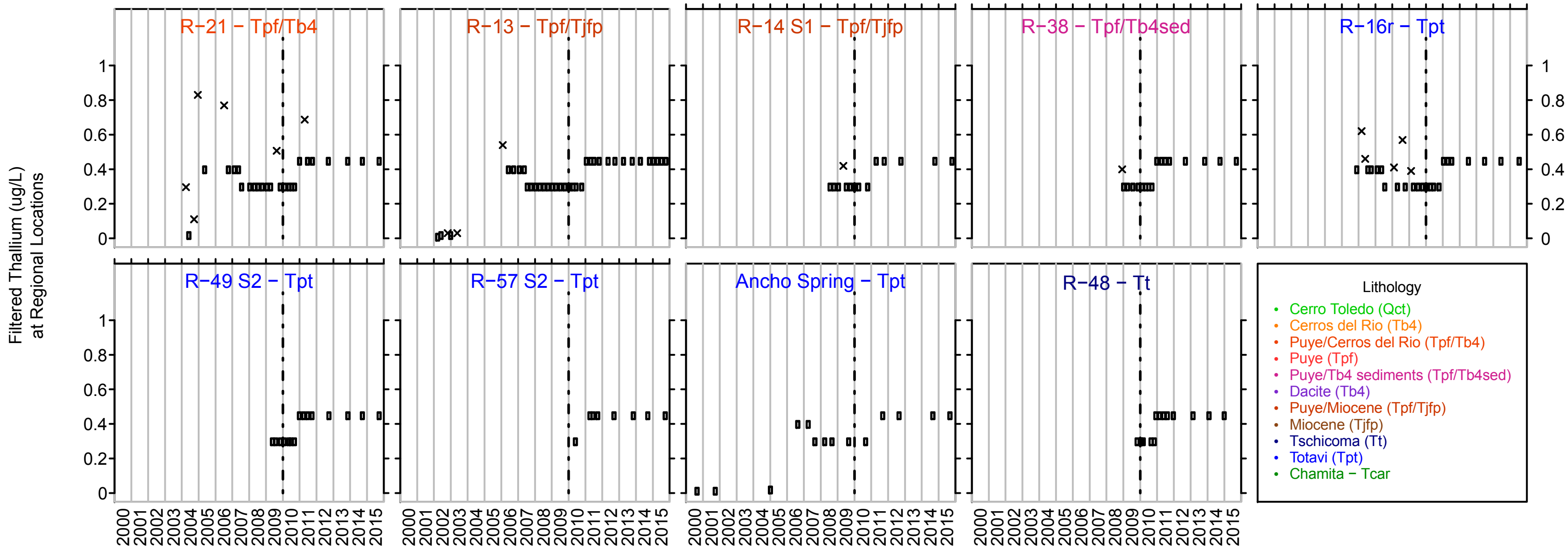



**Figure C-141 (continued) Time-series plots for filtered thallium**

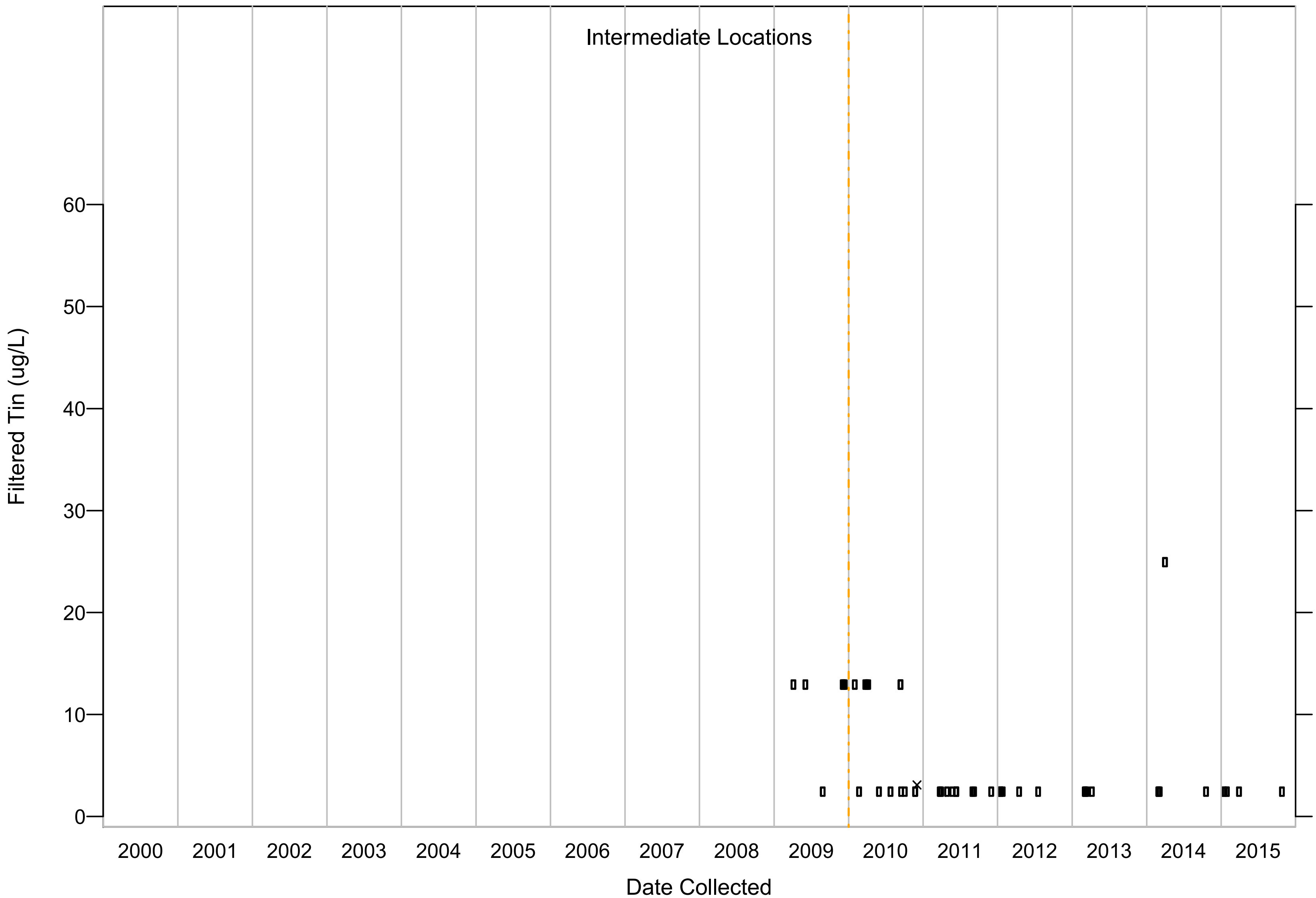



**Figure C-142 Filtered tin results for perched-intermediate groundwater**

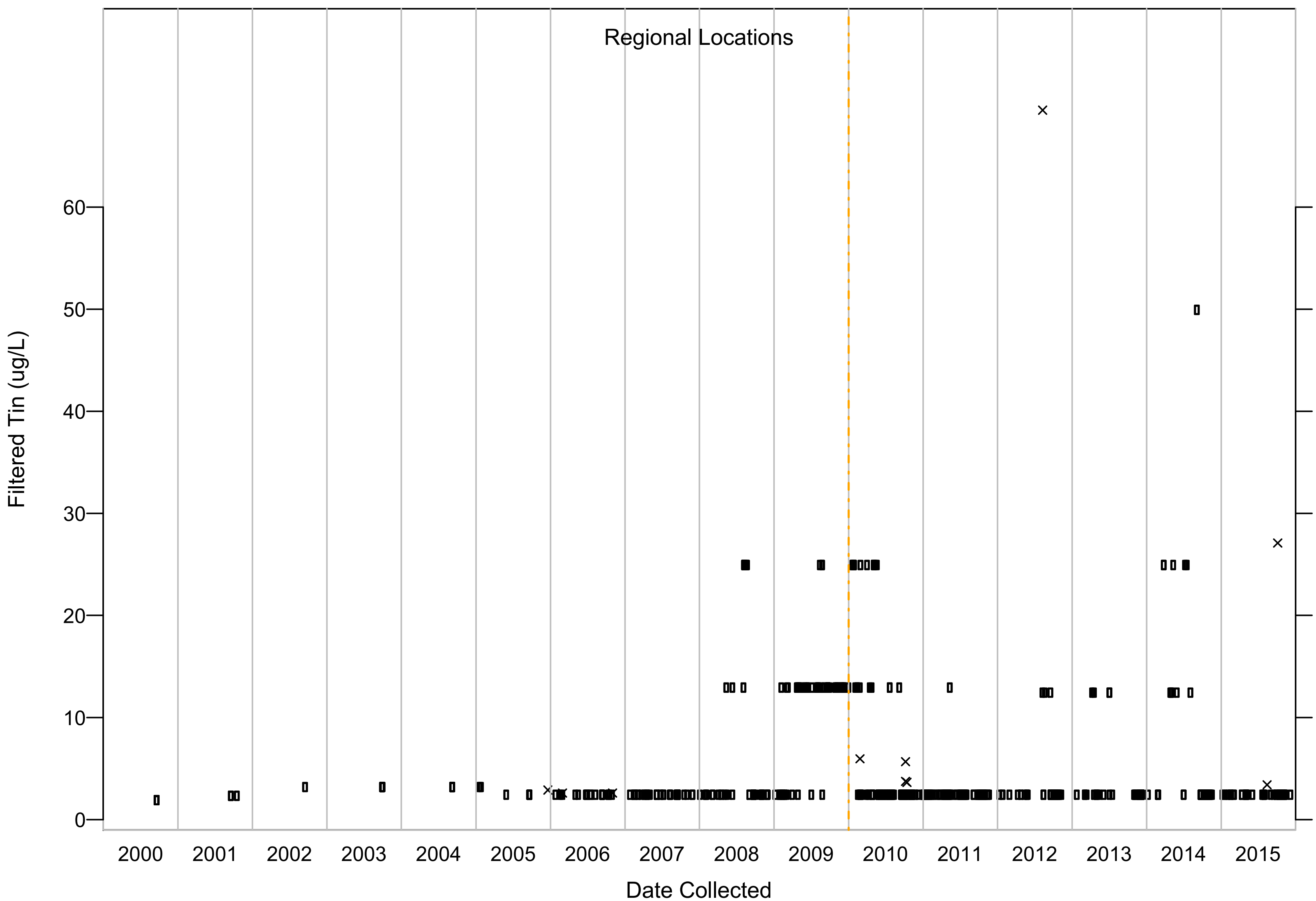



**Figure C-143 Filtered tin results for regional aquifer**

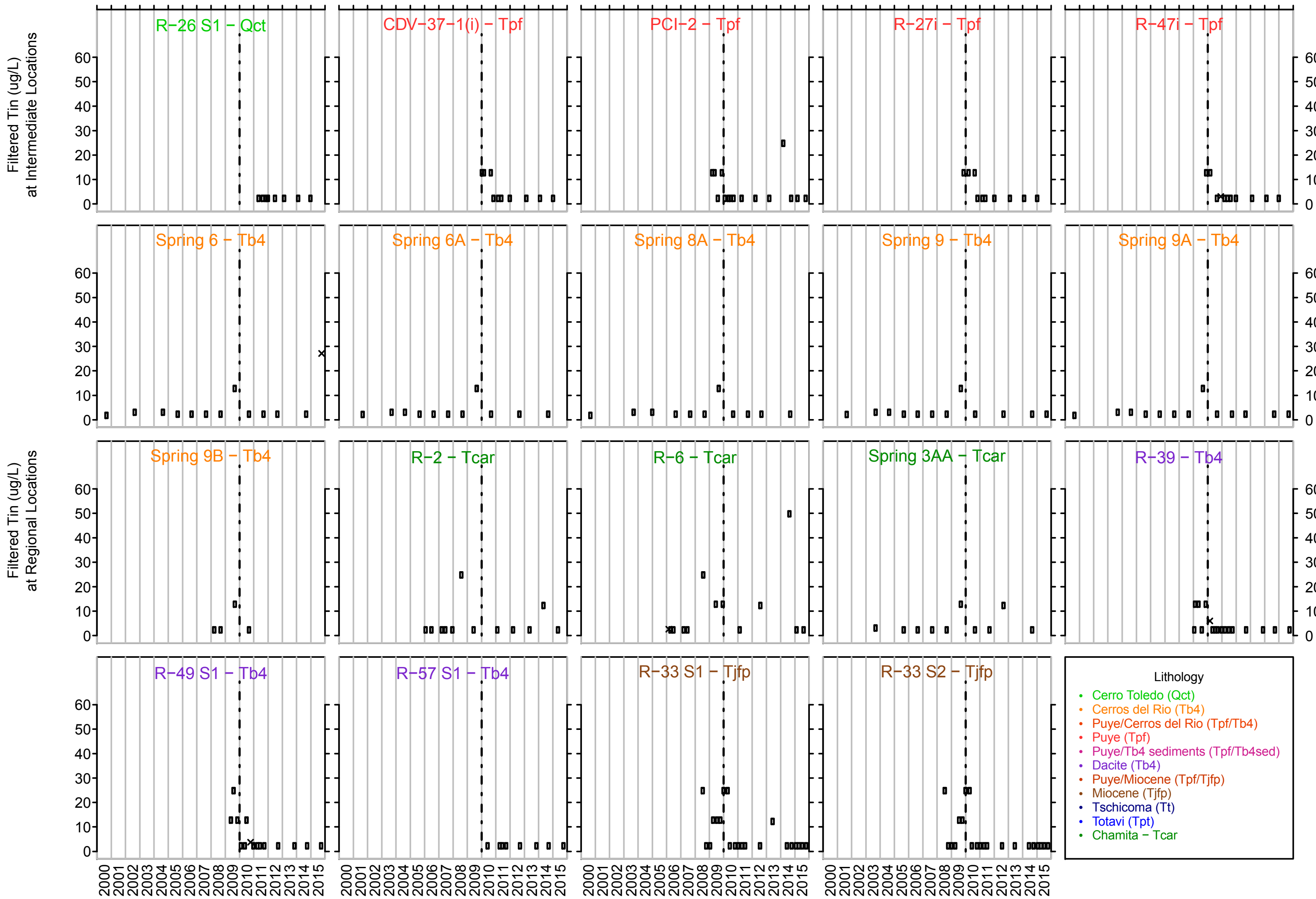



**Figure C-144 Time-series plots for filtered tin**

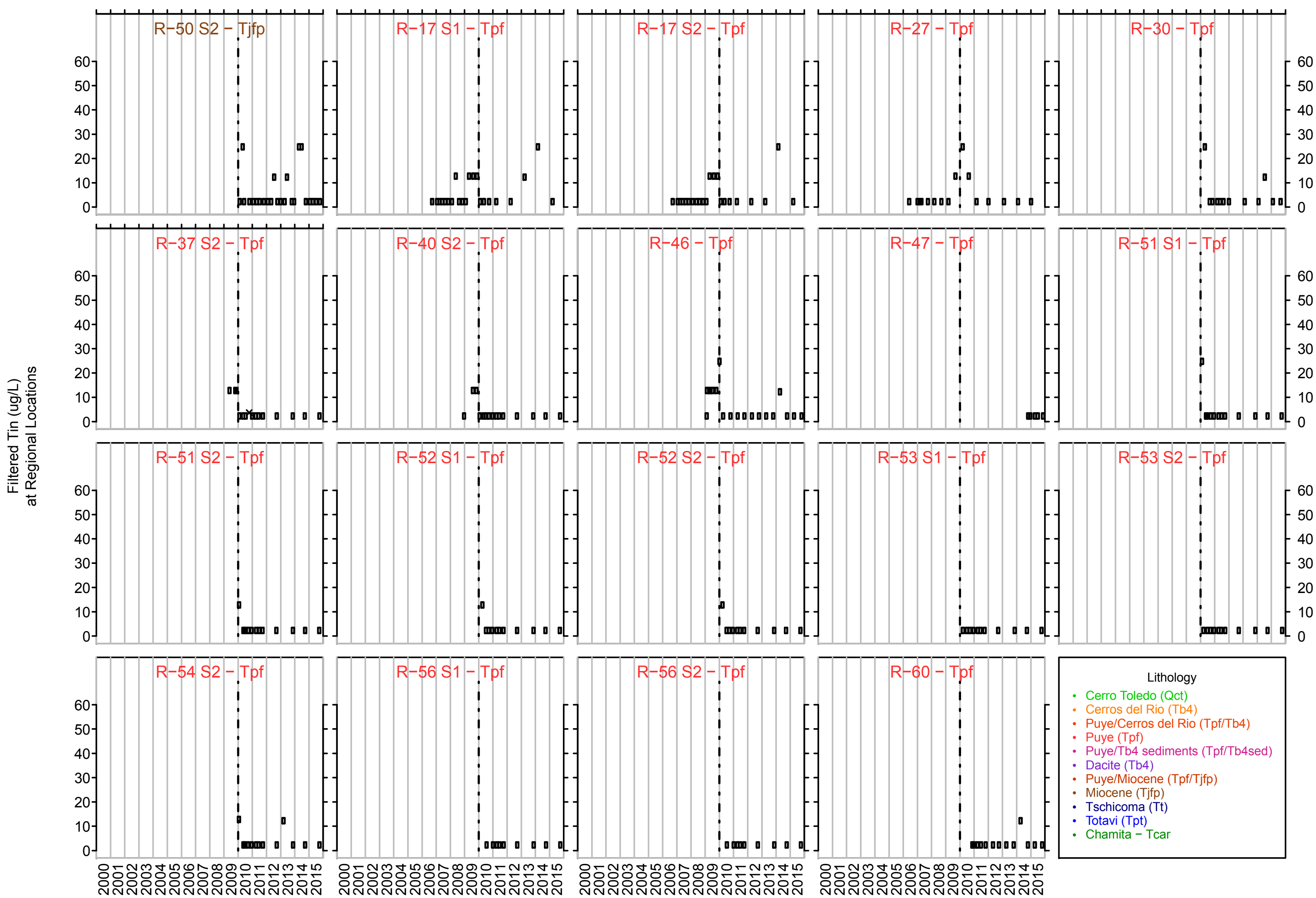



**Figure C-144 (continued)   Time-series plots for filtered tin**

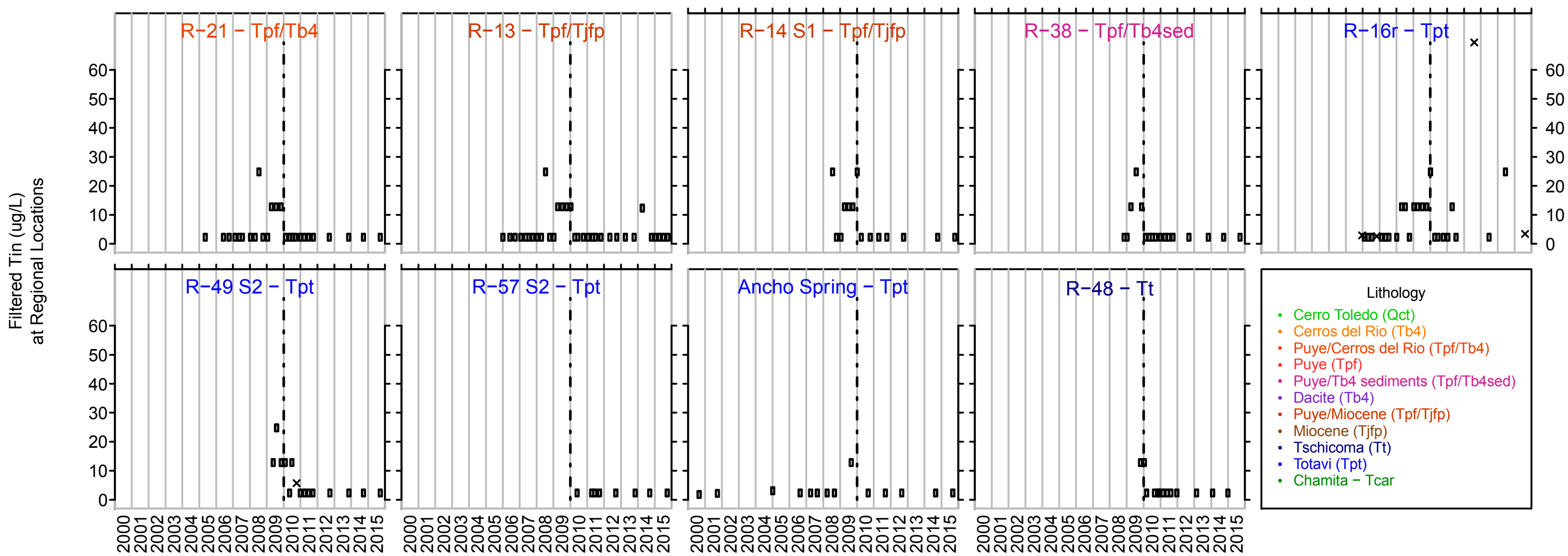



**Figure C-144 (continued)** **Time series plots for filtered tin**

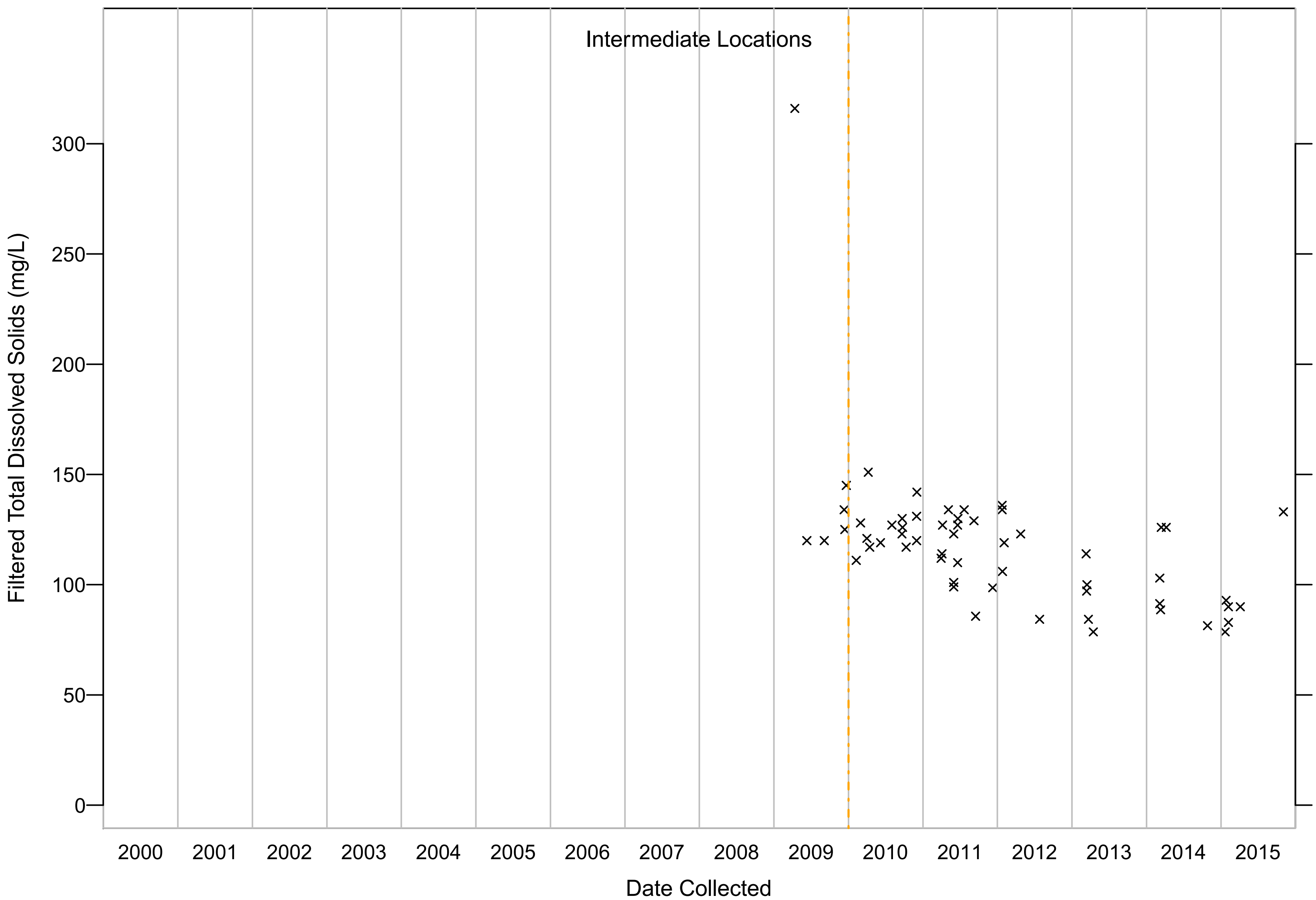



**Figure C-145 Filtered total dissolved solids results for perched-intermediate groundwater**

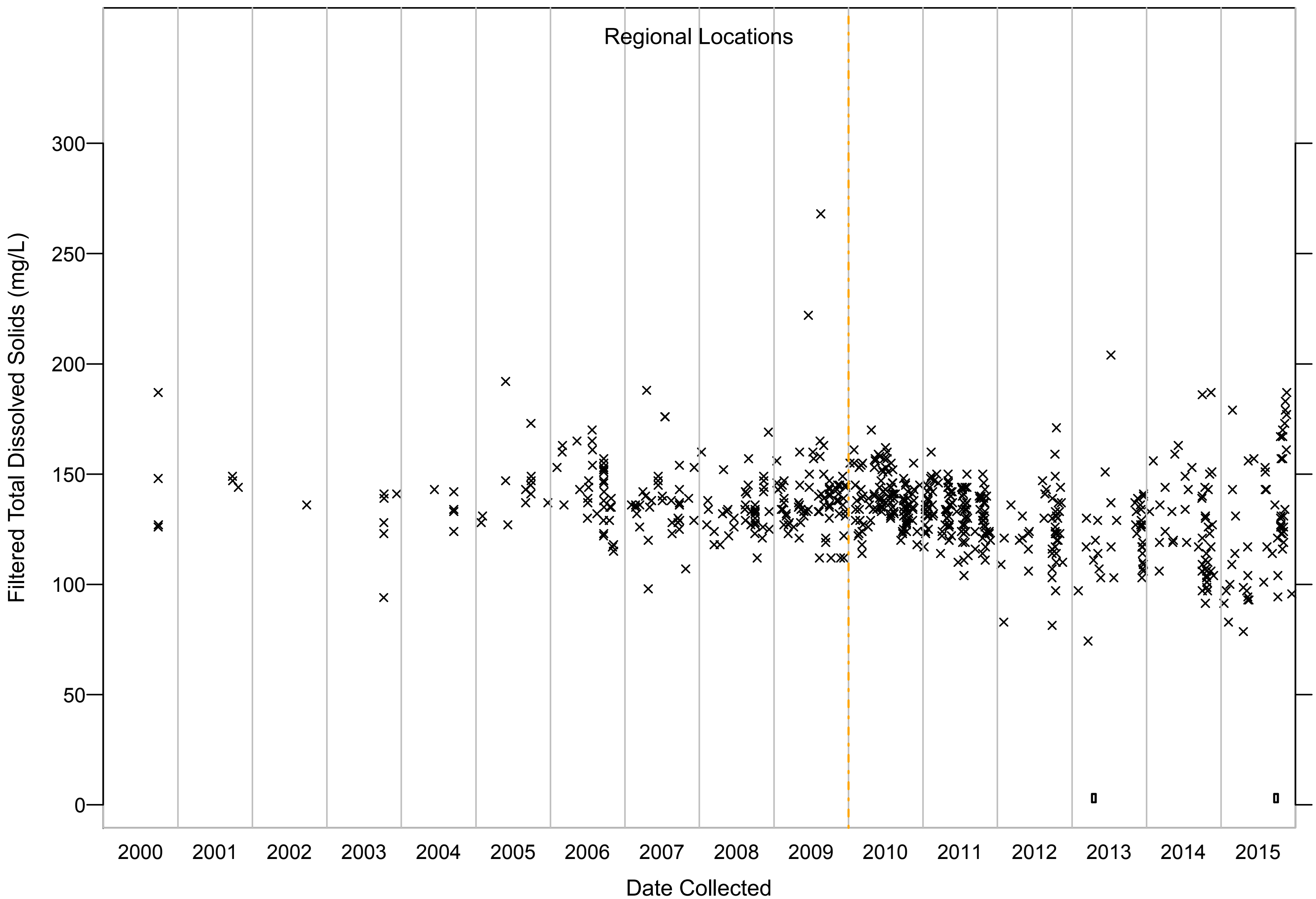



**Figure C-146 Filtered total dissolved solids results for regional aquifer**

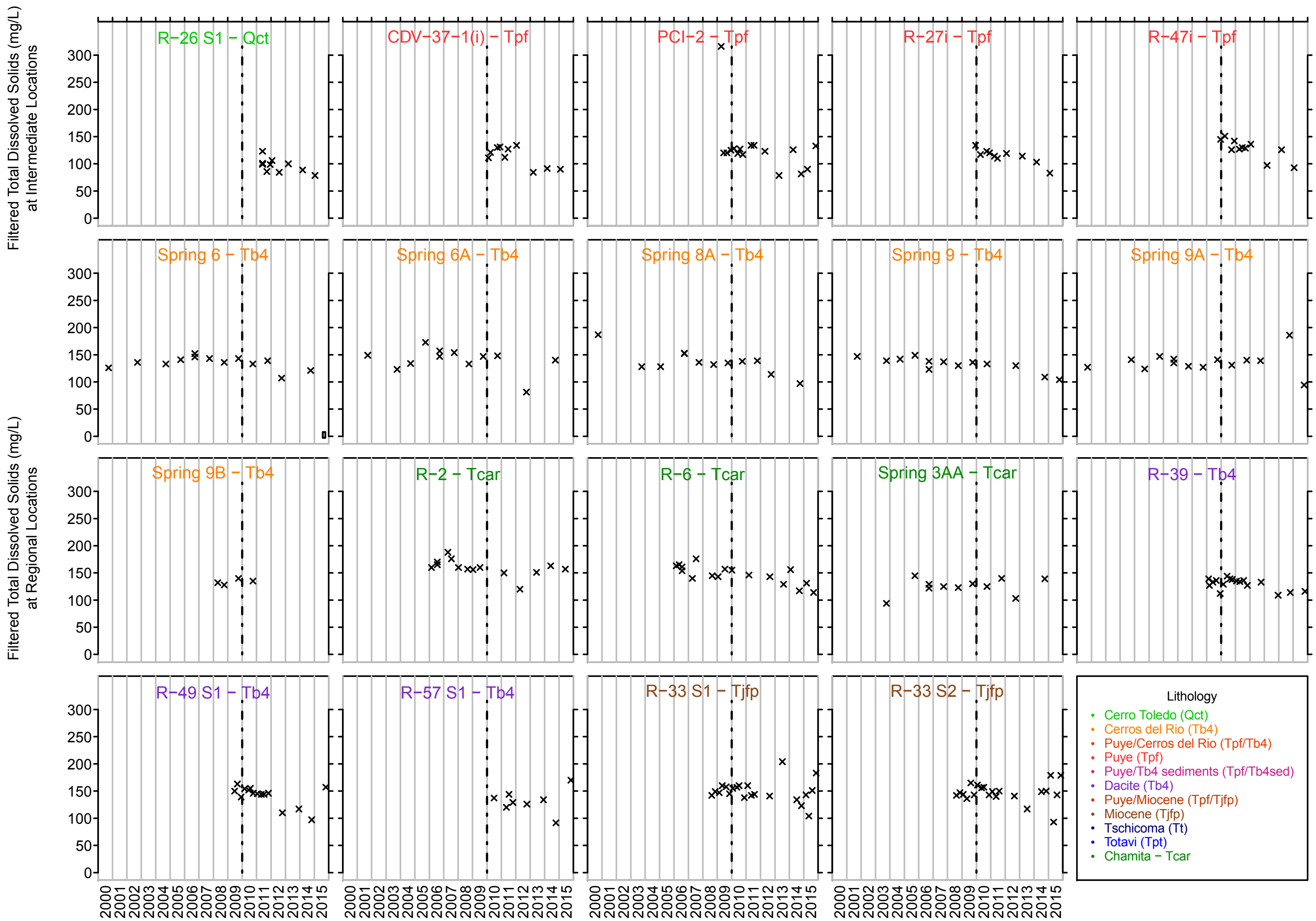



**Figure C-147 Time-series plots for filtered total dissolved solids**

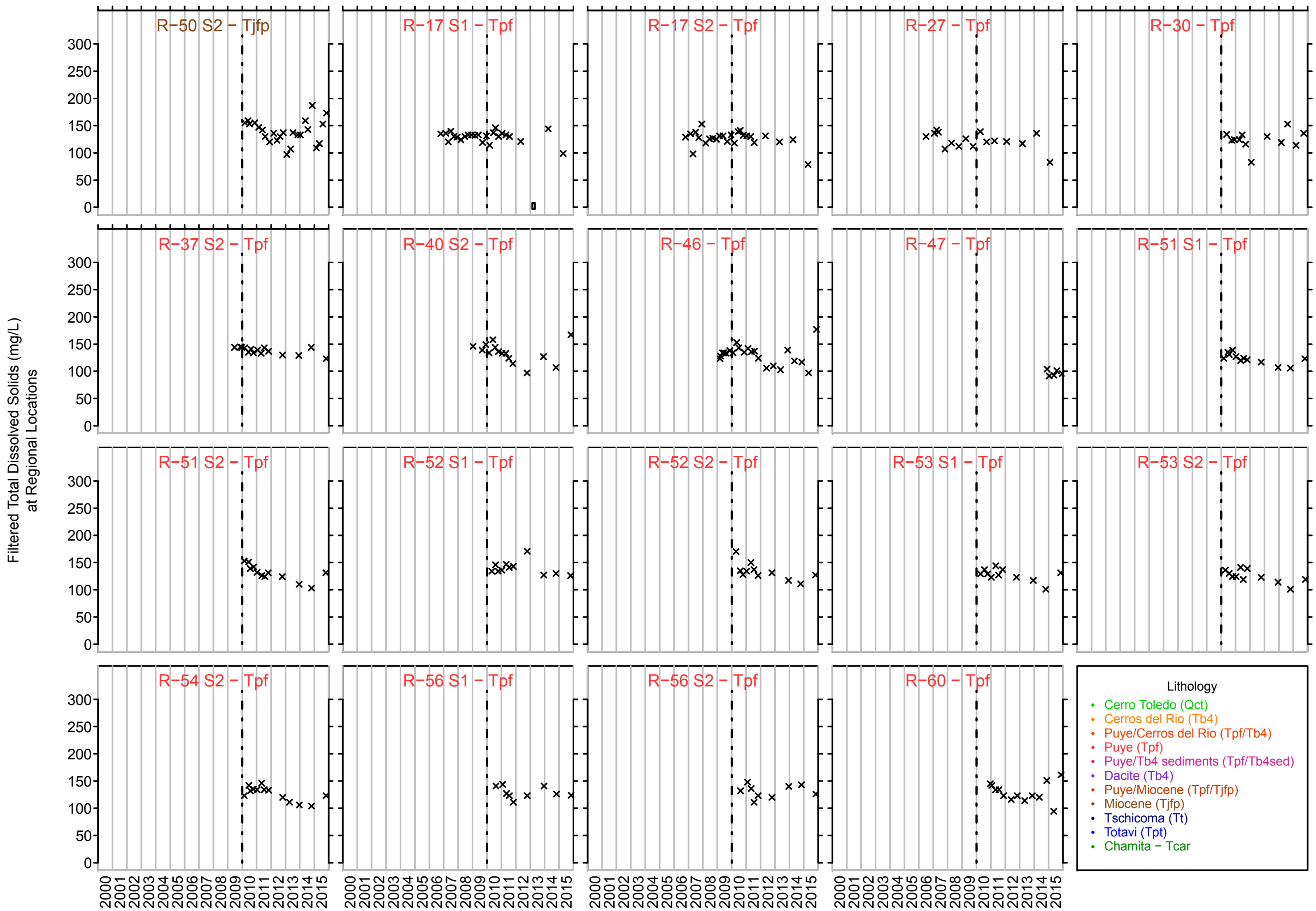



**Figure C-147 (continued) Time-series plots for filtered total dissolved solids**

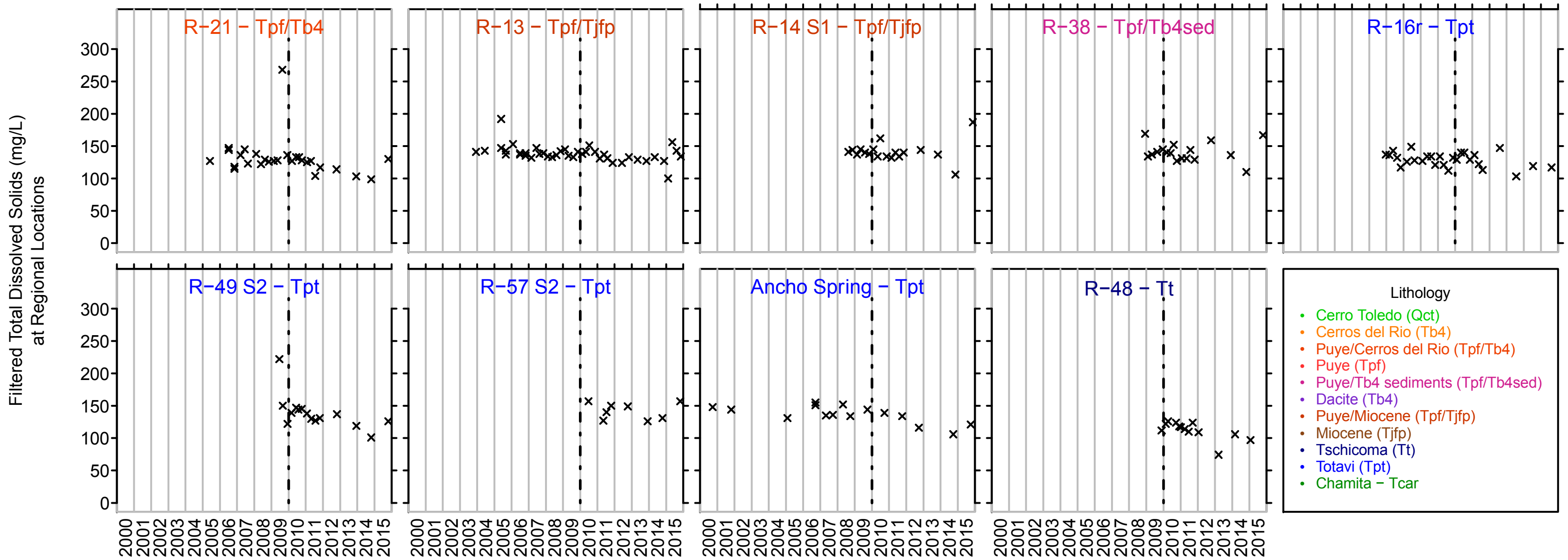



**Figure C-147 (continued) Time-series plots for filtered total dissolved solids**

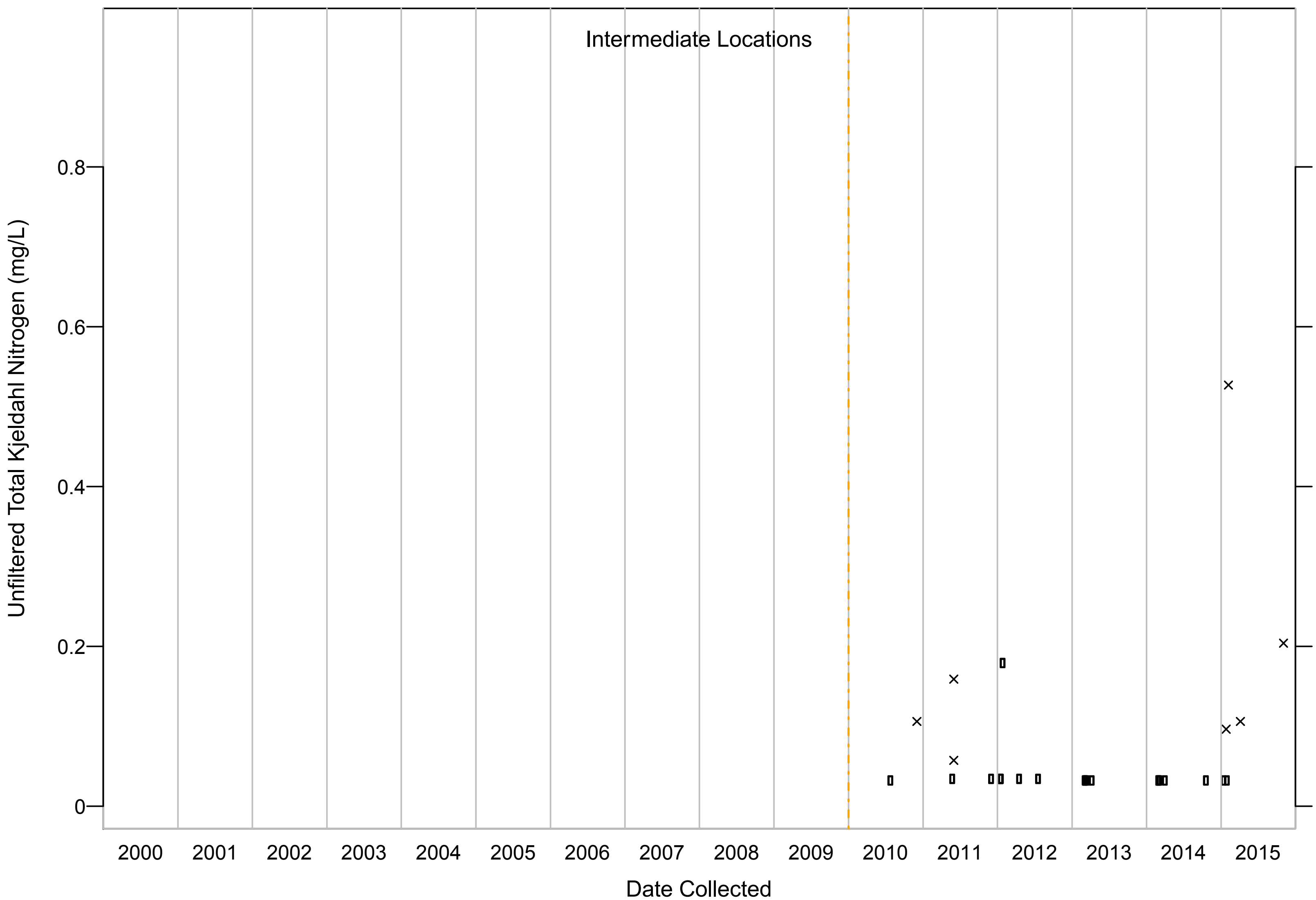



**Figure C-148 Unfiltered total Kjeldahl nitrogen results for perched-intermediate groundwater**

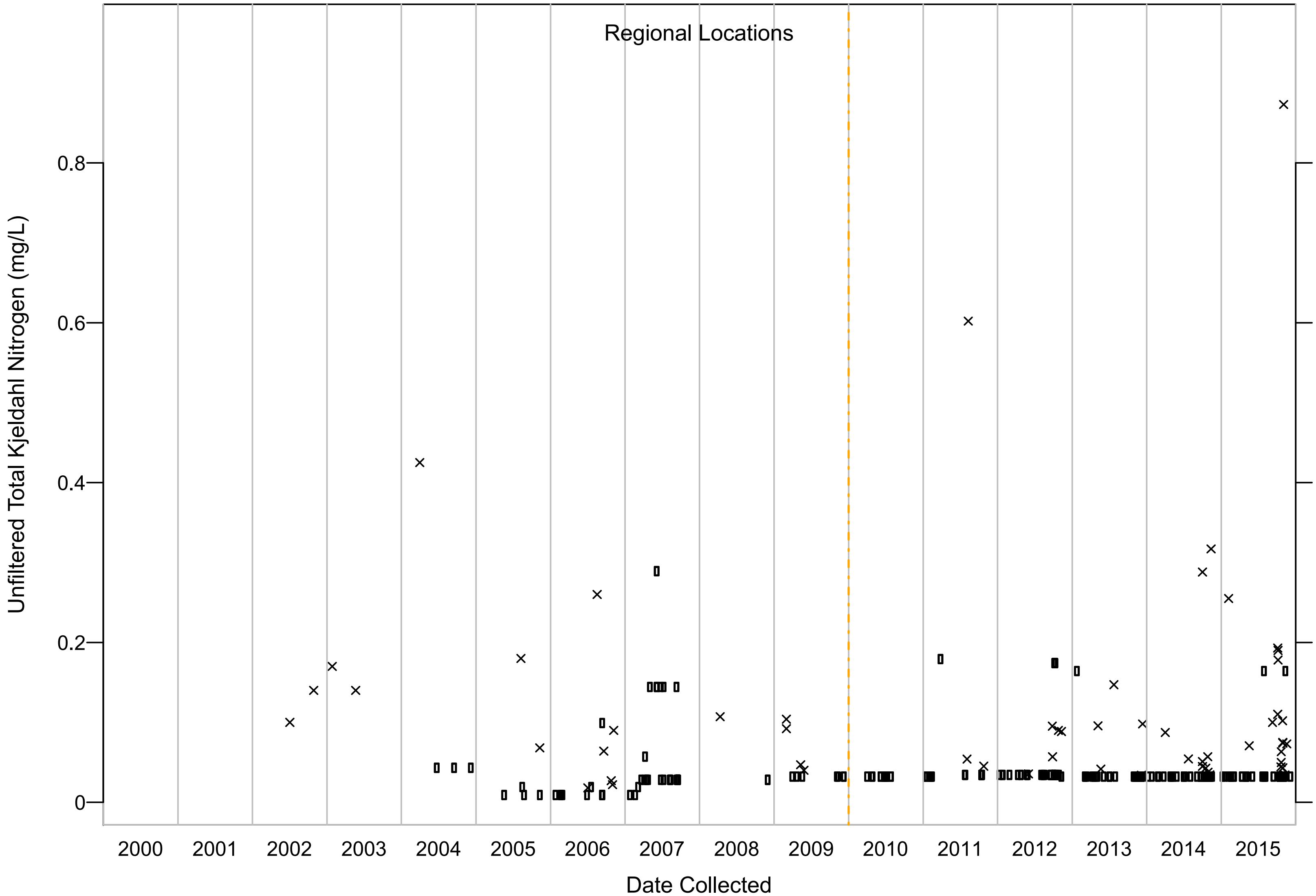



**Figure C-149 Unfiltered total Kjeldahl nitrogen results for regional aquifer**

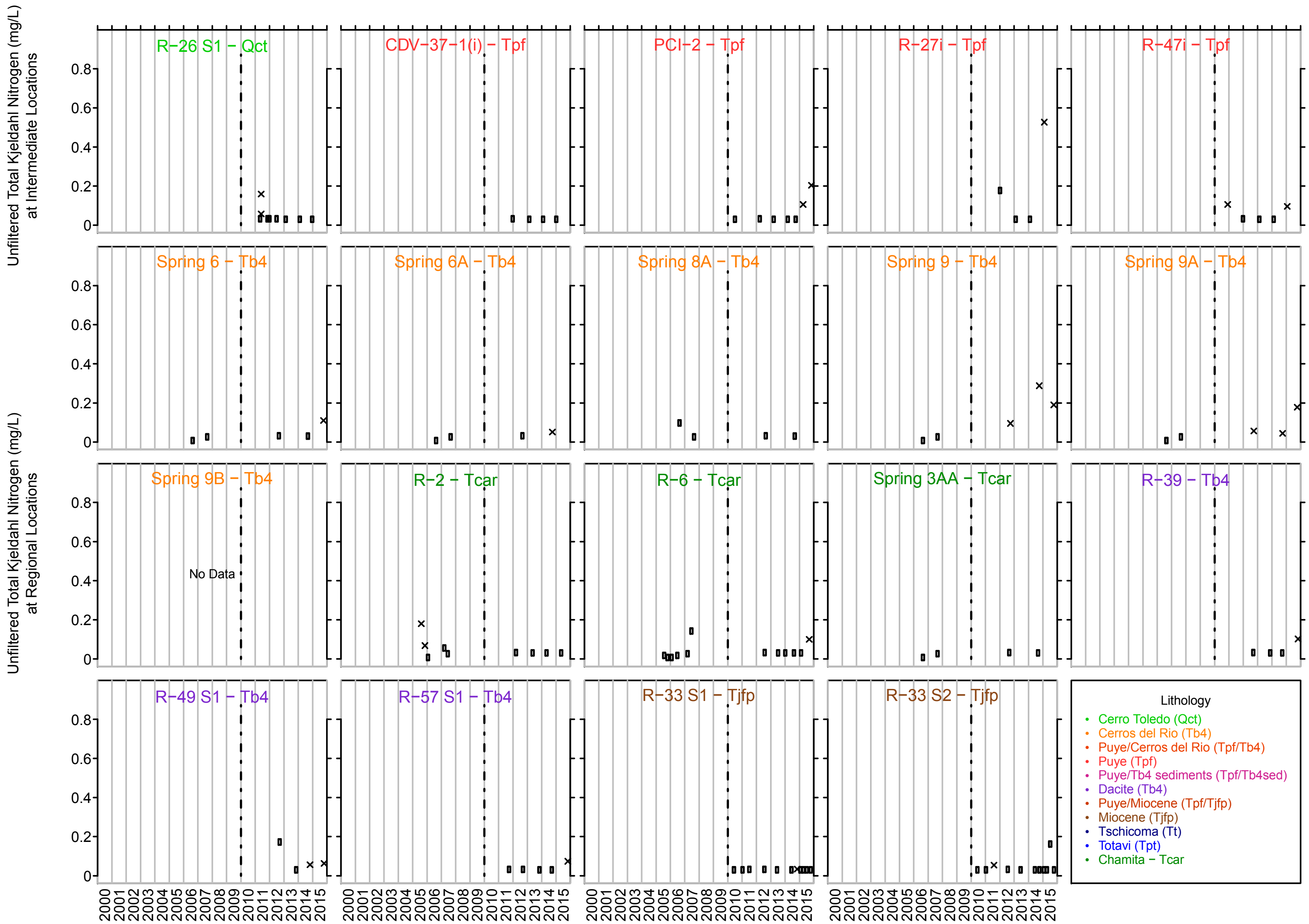



**Figure C-150 Time-series plots for unfiltered total Kjeldahl nitrogen**

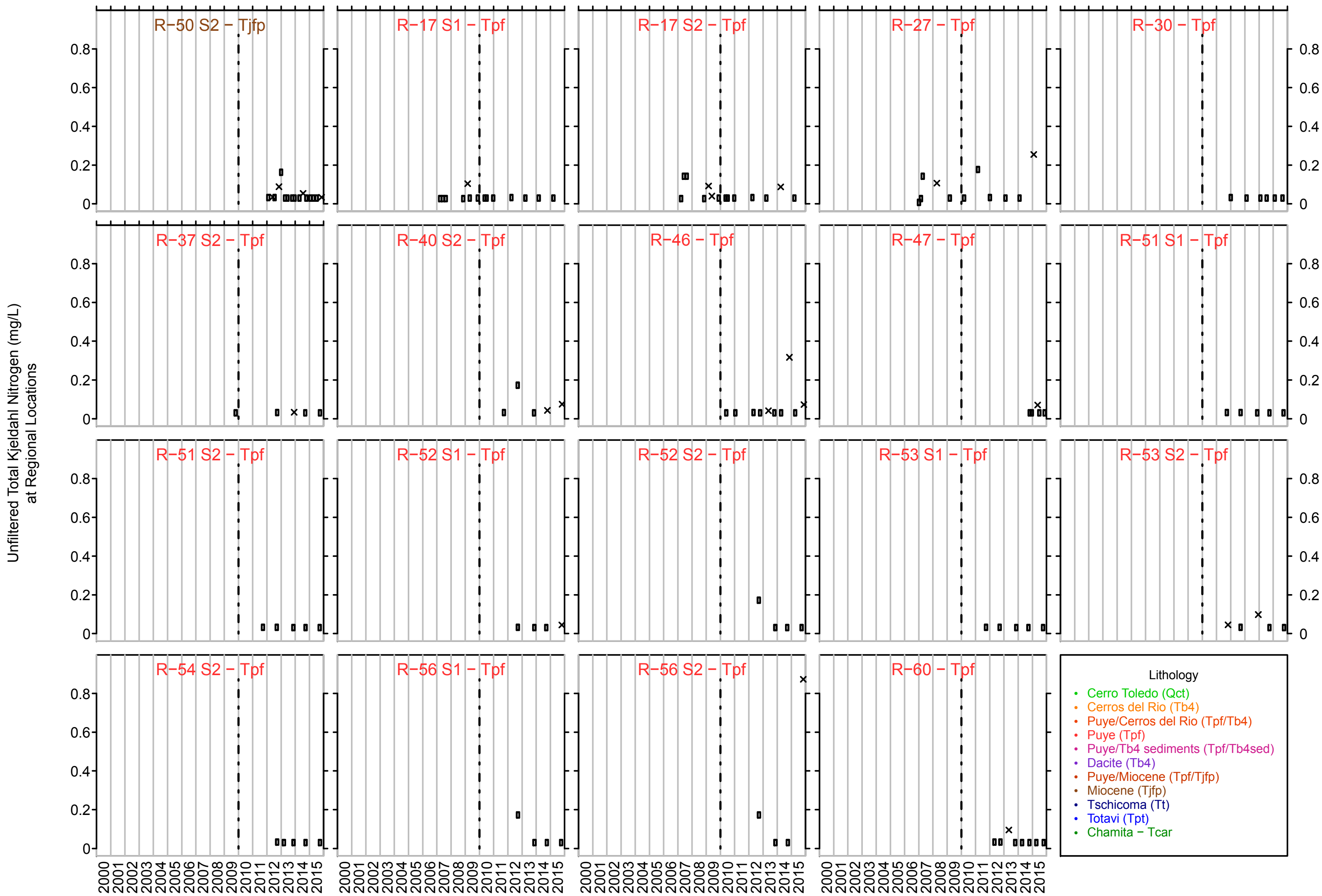



**Figure C-150 (continued) Time-series plots for unfiltered total Kjeldahl nitrogen**

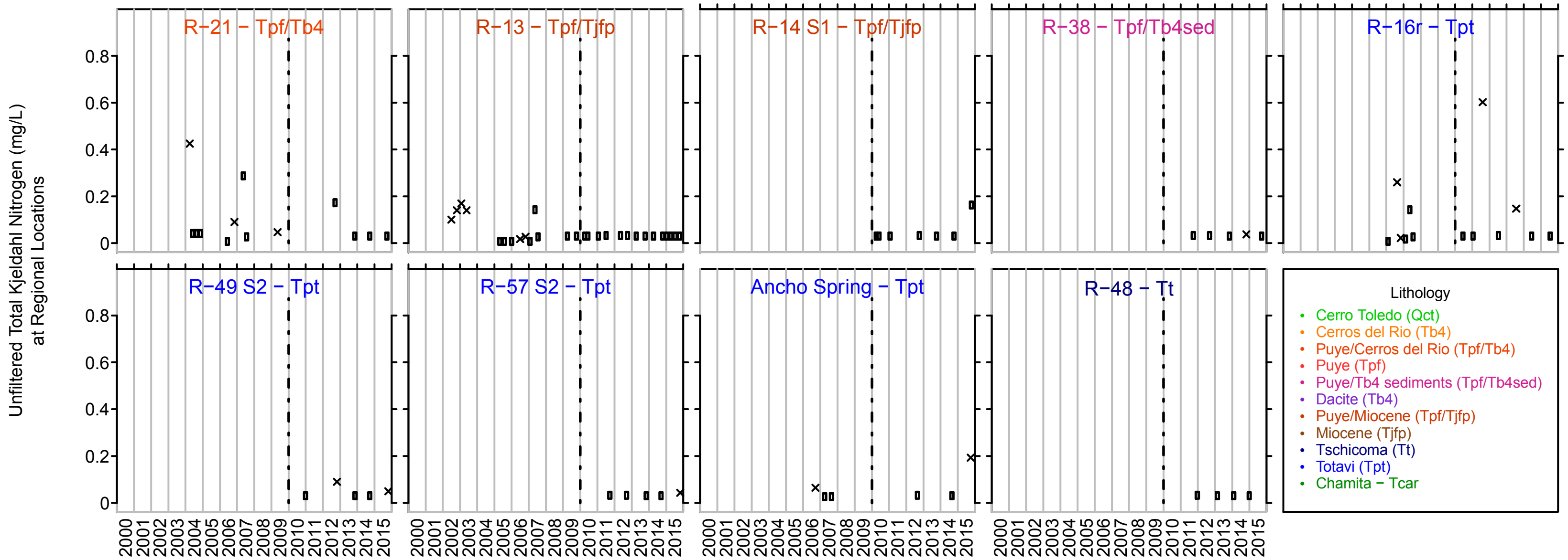



**Figure C-150 (continued)   Time-series plots for unfiltered total Kjeldahl nitrogen**

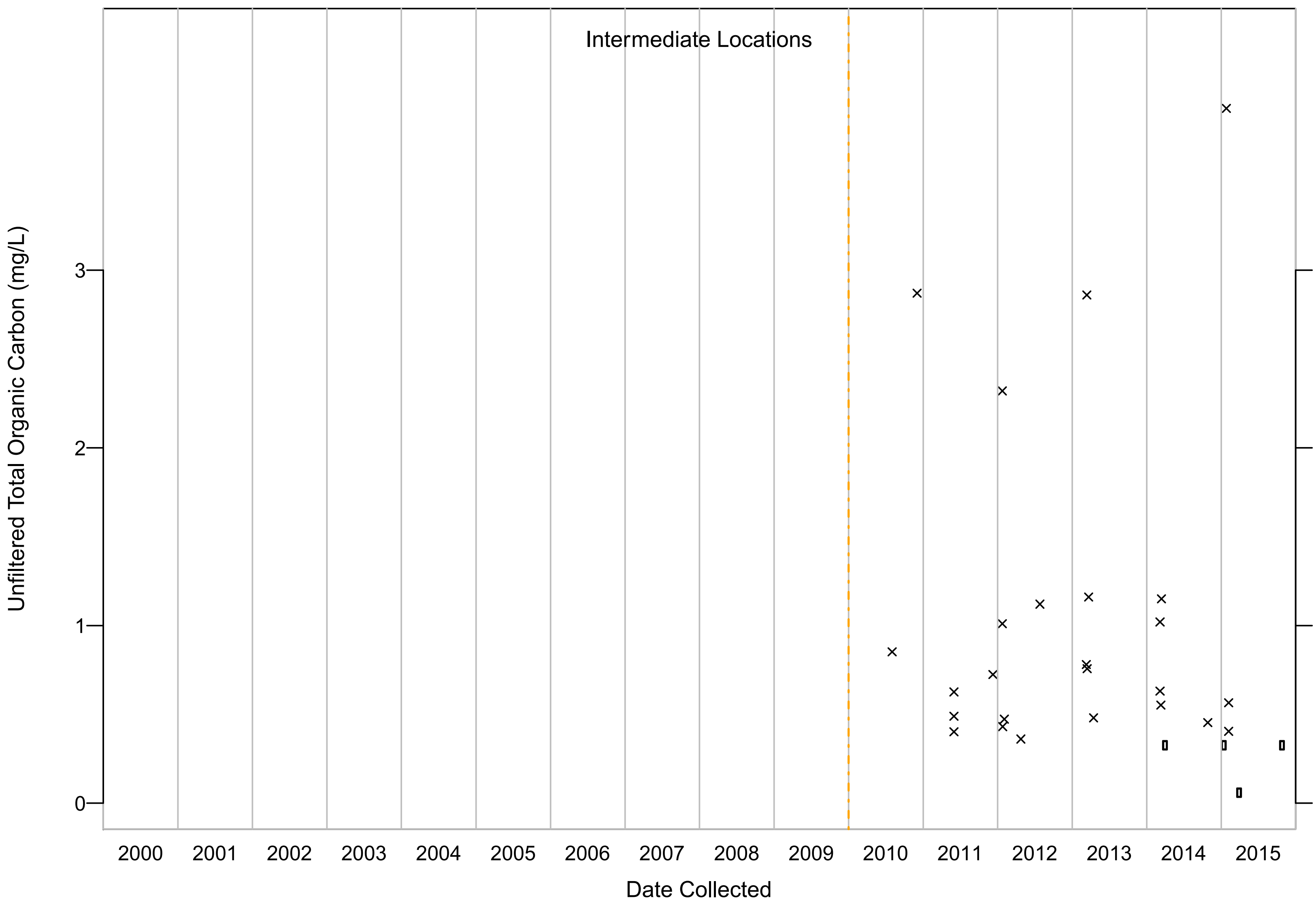



**Figure C-151 Unfiltered total organic carbon results for perched-intermediate groundwater**

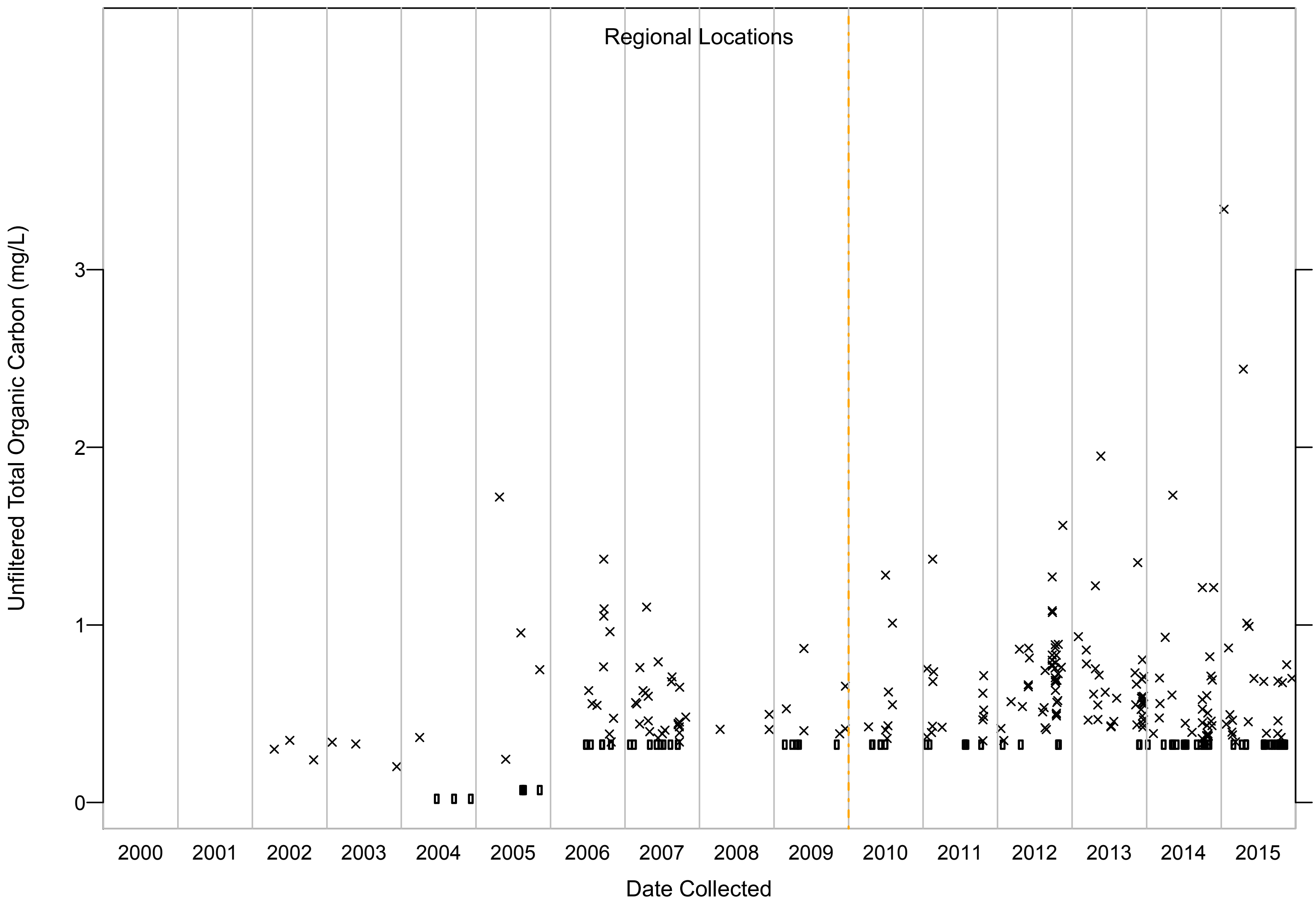



**Figure C-152 Unfiltered total organic carbon results for regional aquifer**

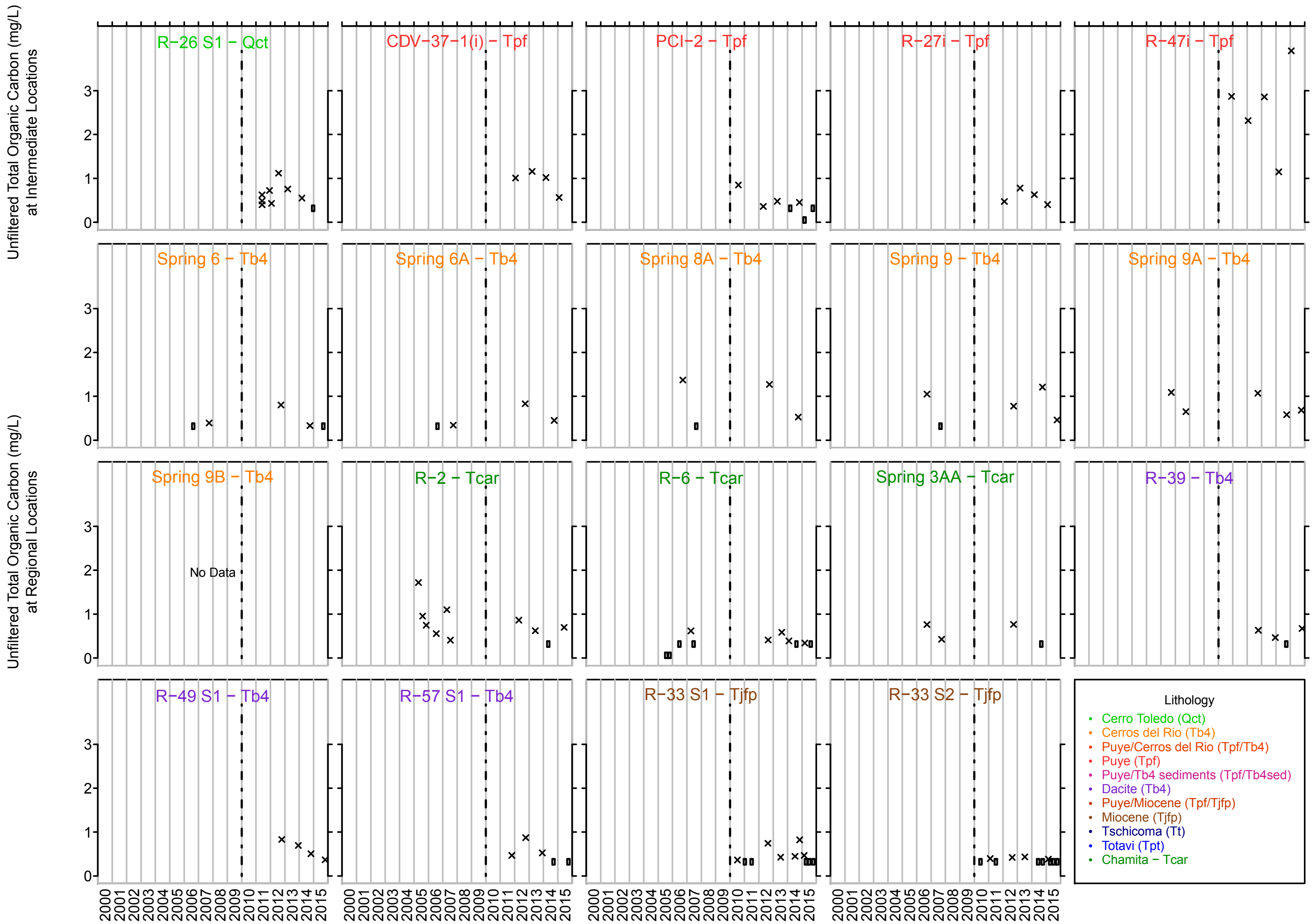



**Figure C-153 Time-series plots for unfiltered total organic carbon**

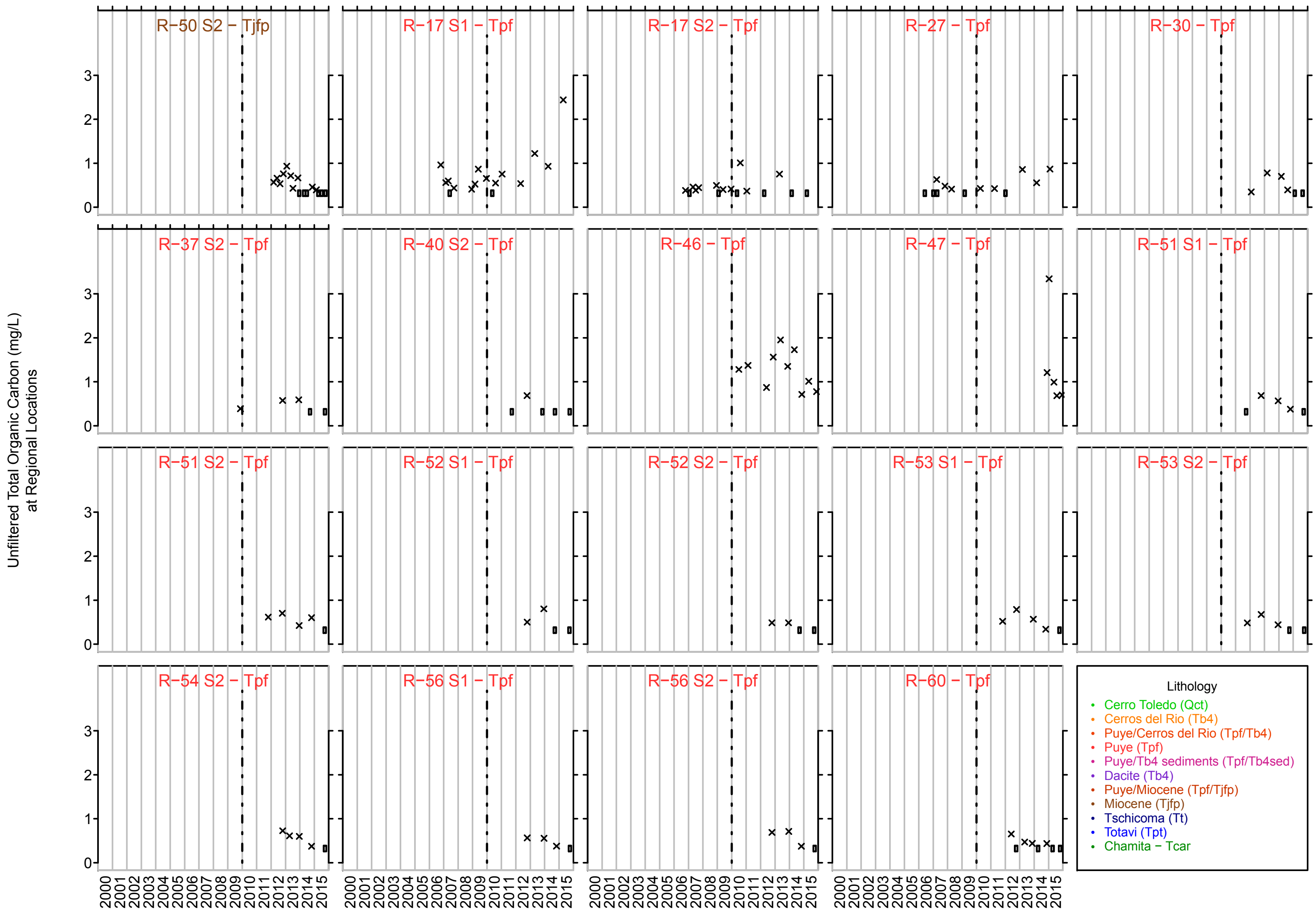



**Figure C-153 (continued) Time-series plots for unfiltered total organic carbon**

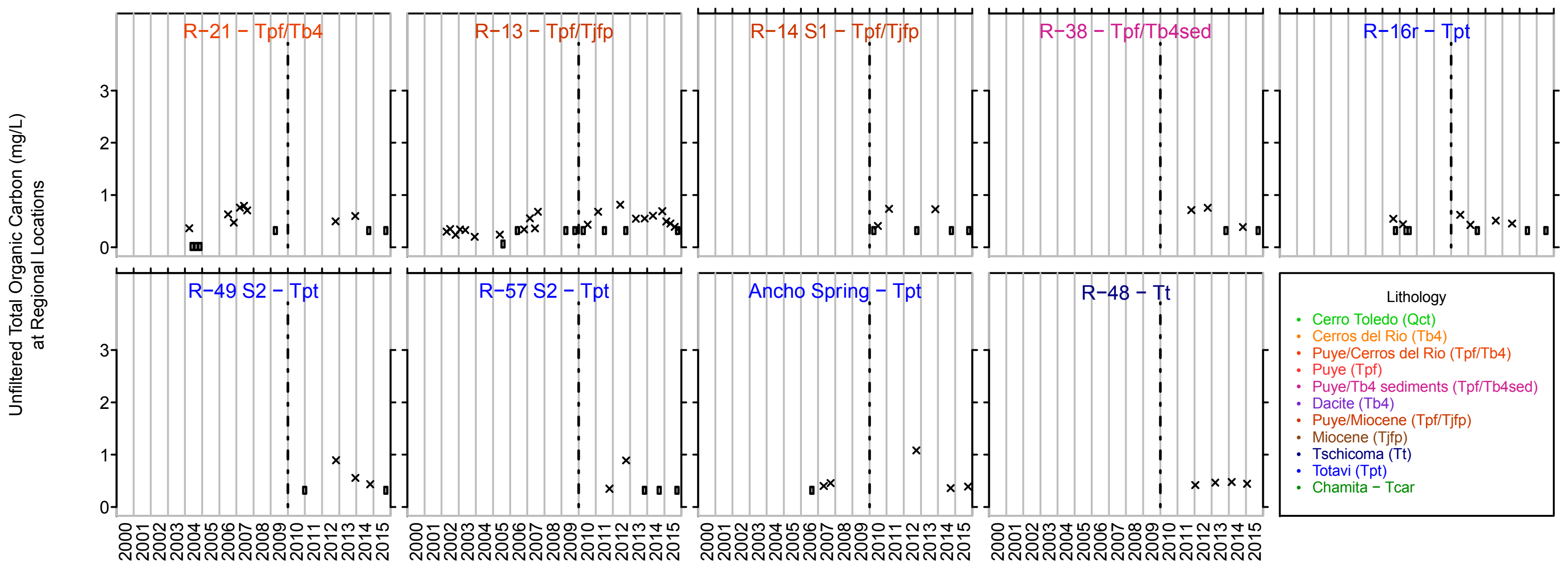



**Figure C-153 (continued) Time-series plots for unfiltered total organic carbon**

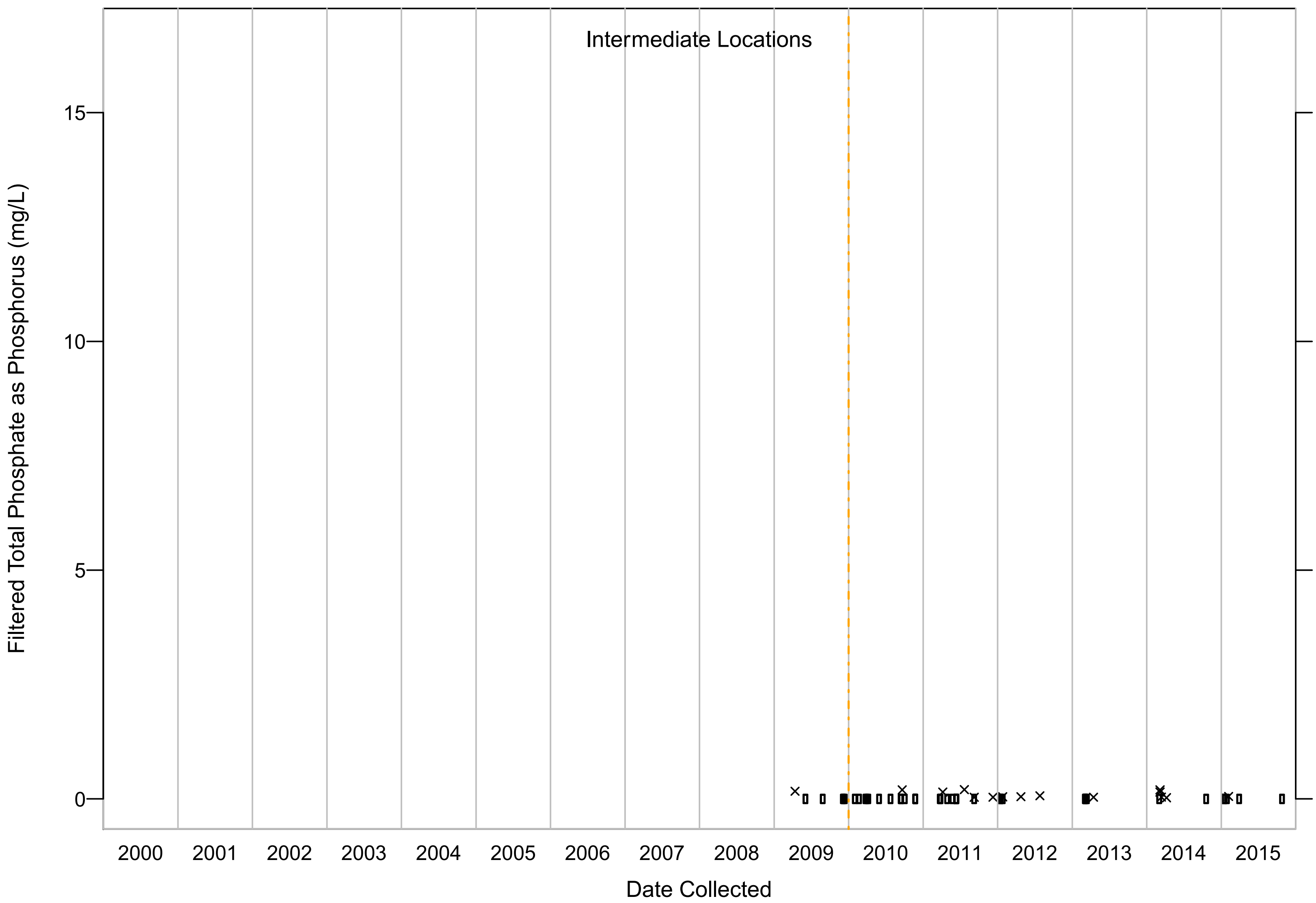



**Figure C-154    Filtered total phosphate results for perched-intermediate groundwater**

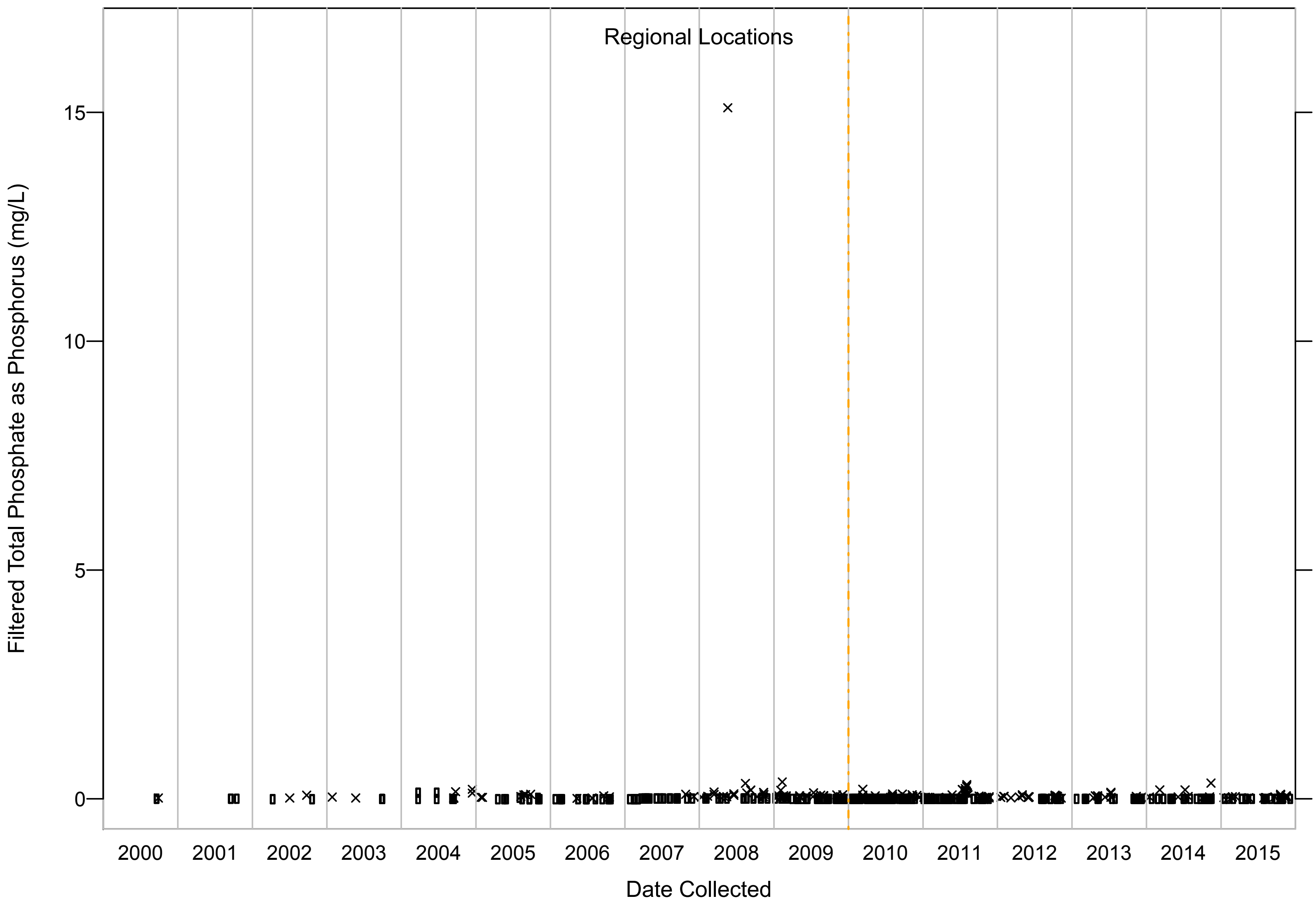



**Figure C-155 Filtered total phosphate results for regional aquifer**

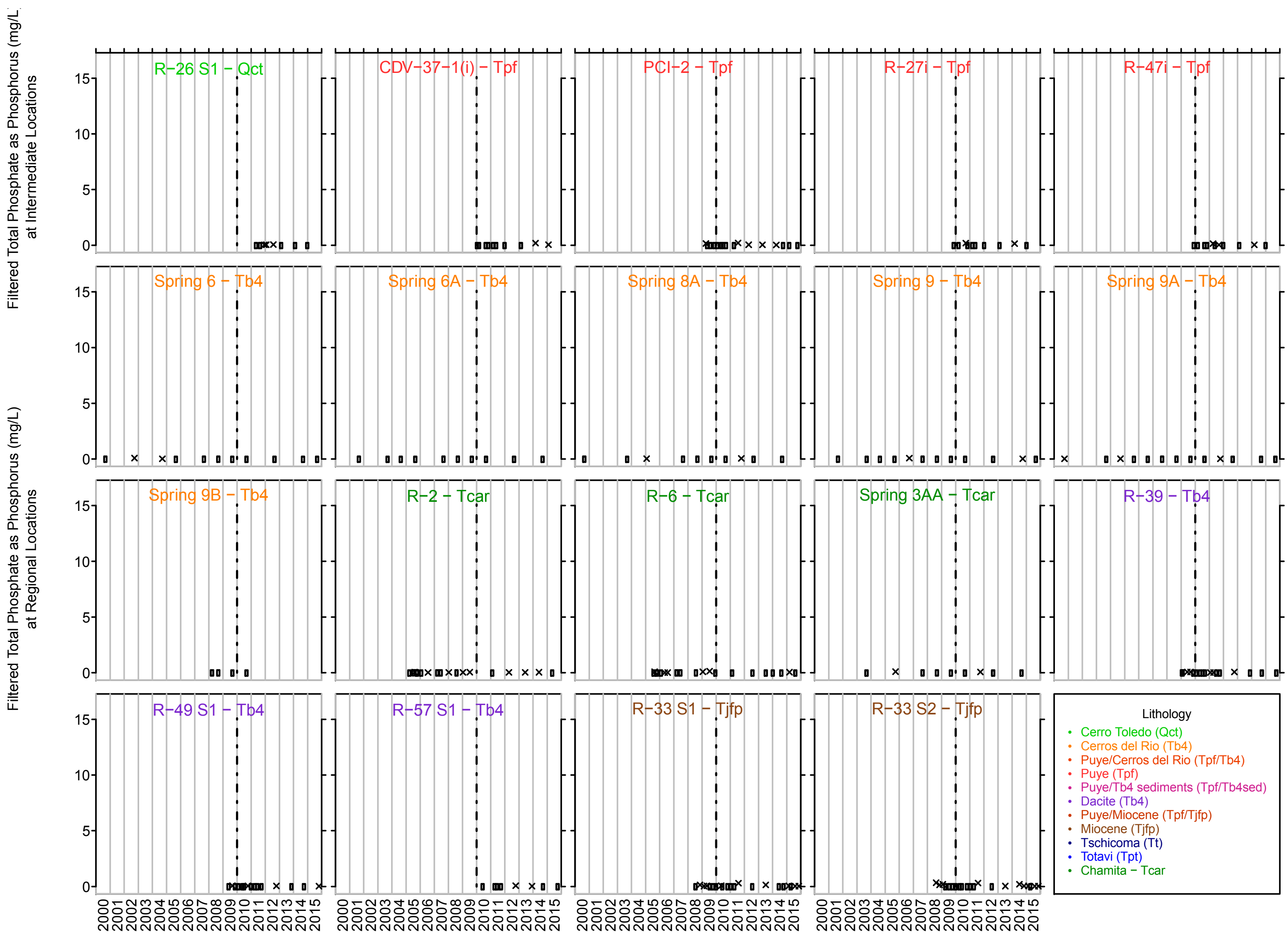



**Figure C-156 Time-series plots for filtered total phosphate**

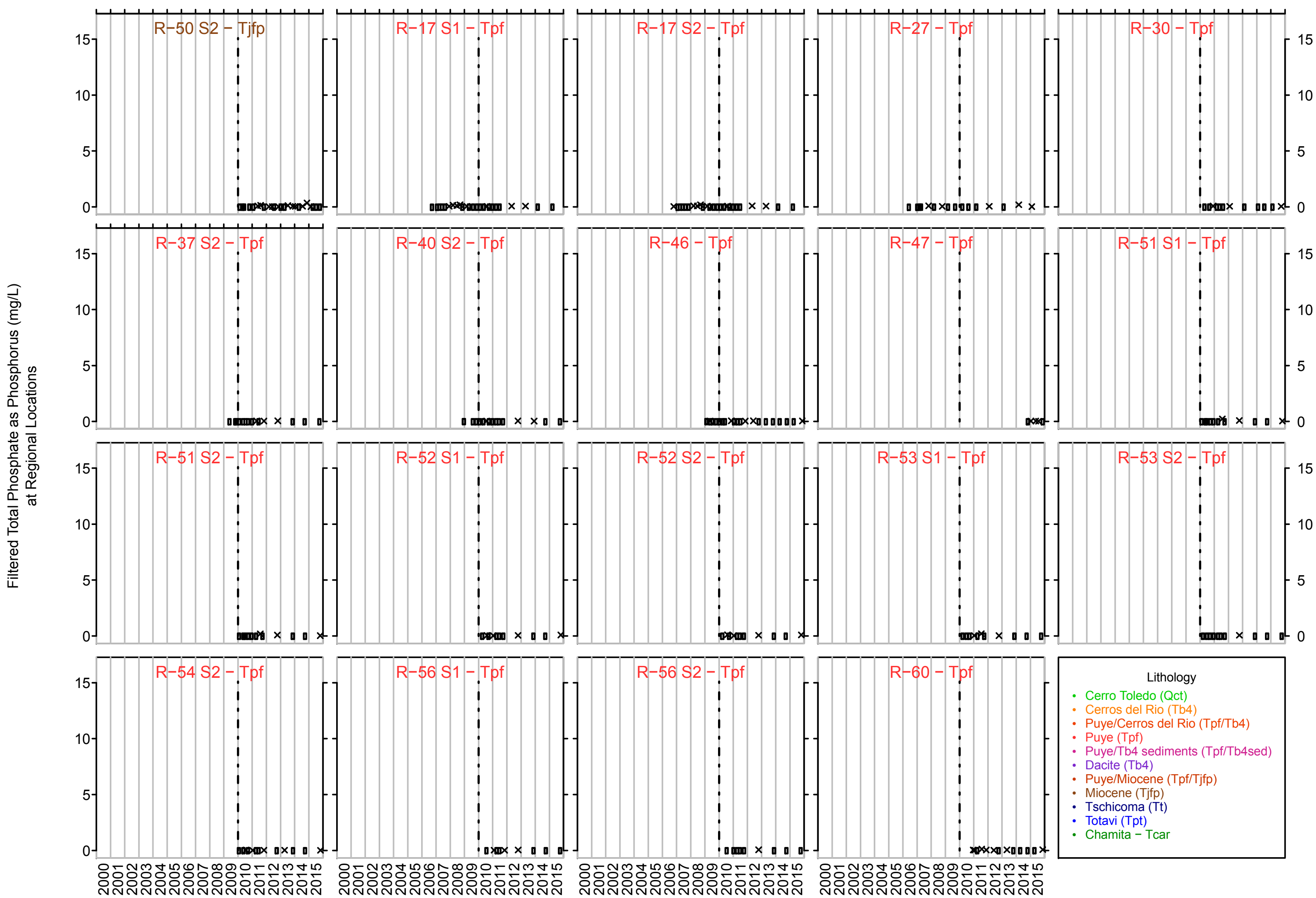



**Figure C-156 (continued)  Time-series plots for filtered total phosphate**

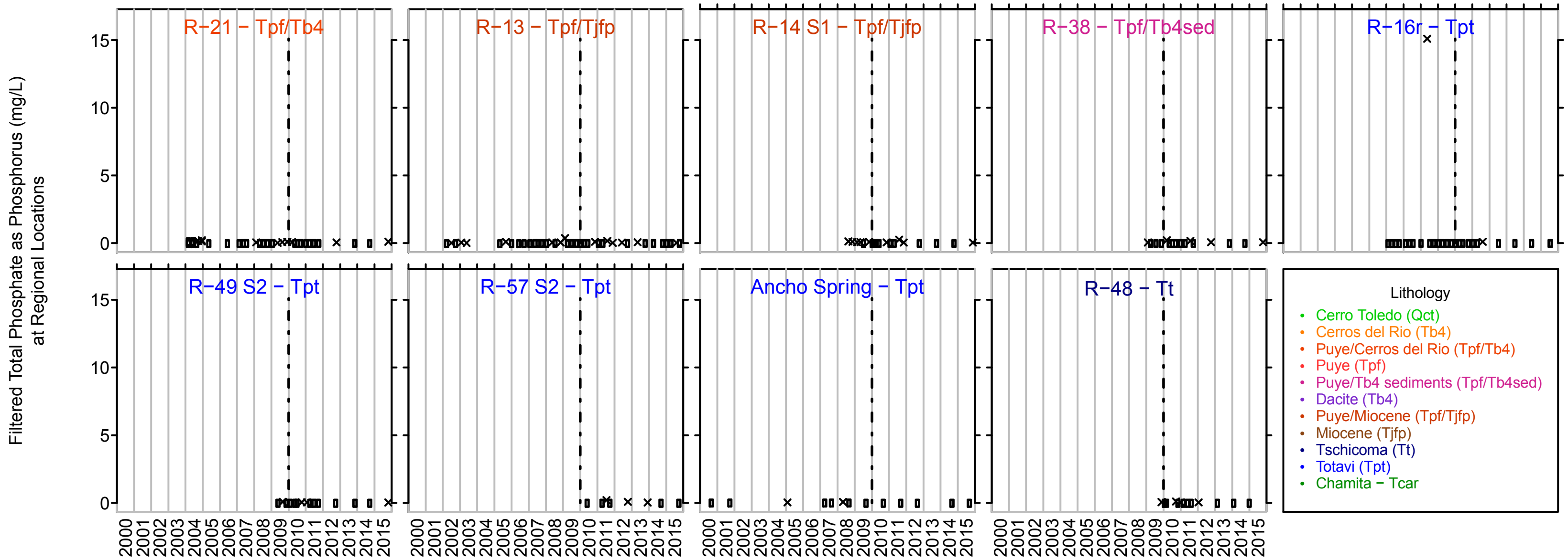



**Figure C-156 (continued) Time-series plots for filtered total phosphate**

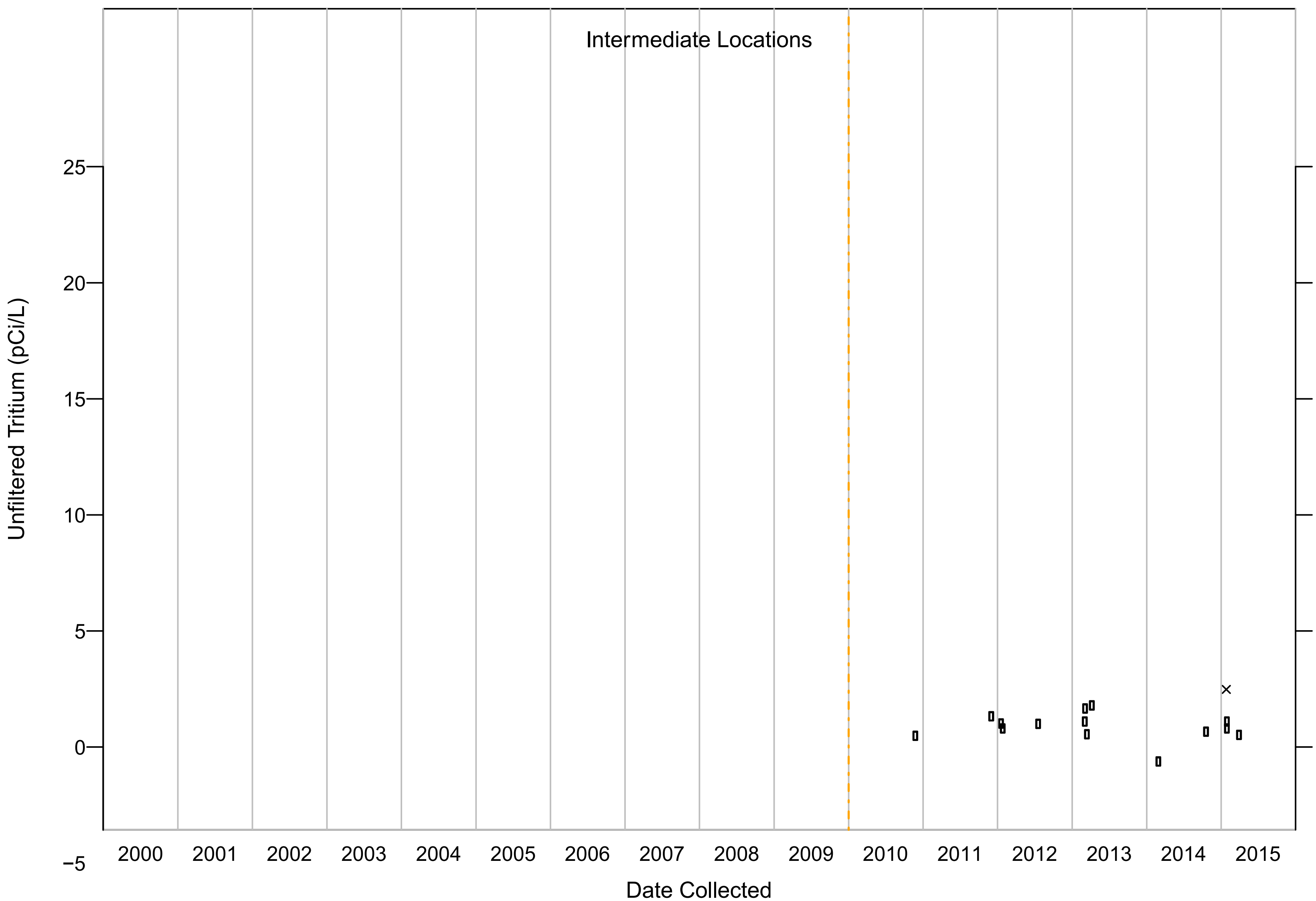



**Figure C-157 Unfiltered tritium results for perched-intermediate groundwater**

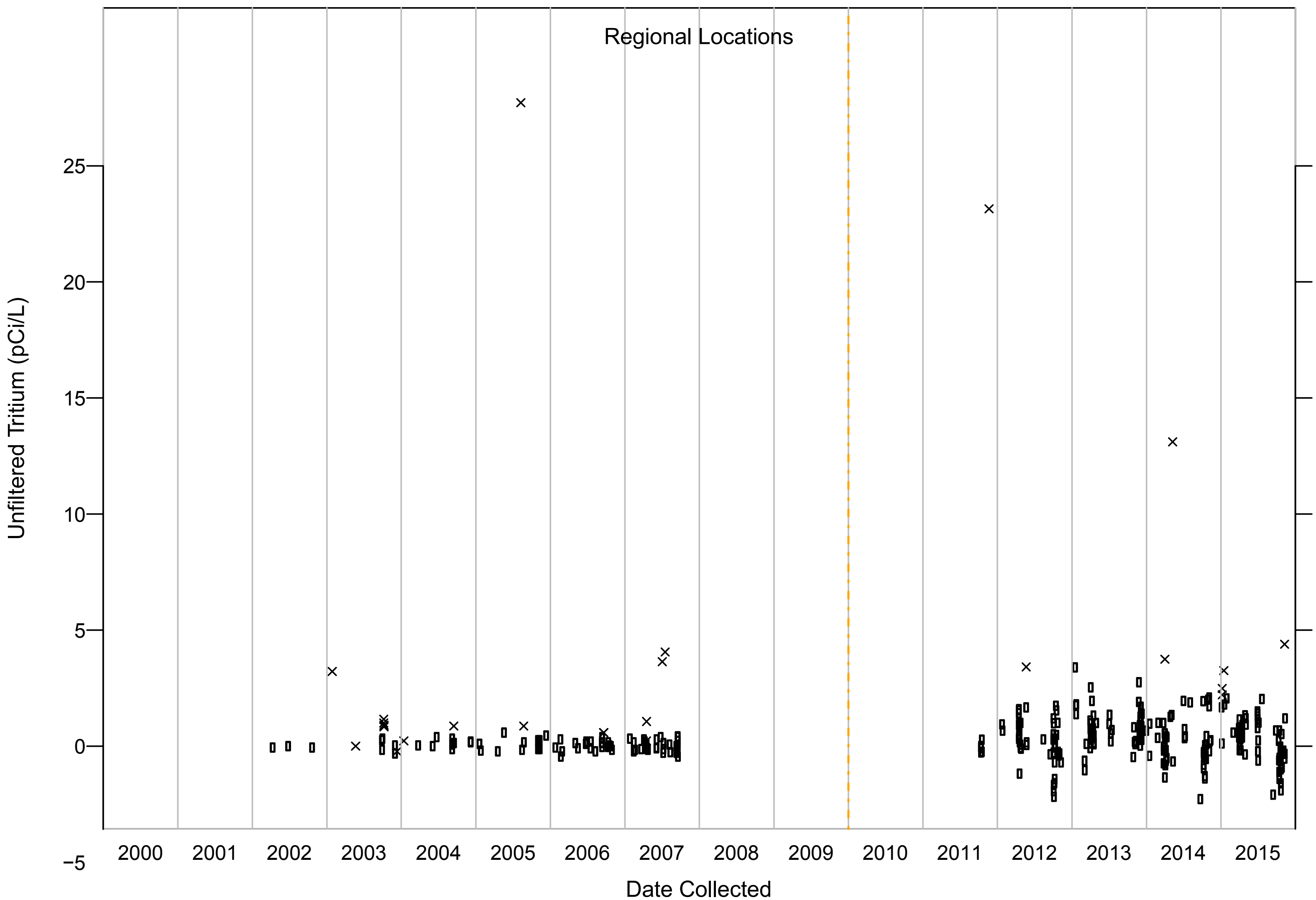



**Figure C-158 Unfiltered tritium results for regional aquifer**

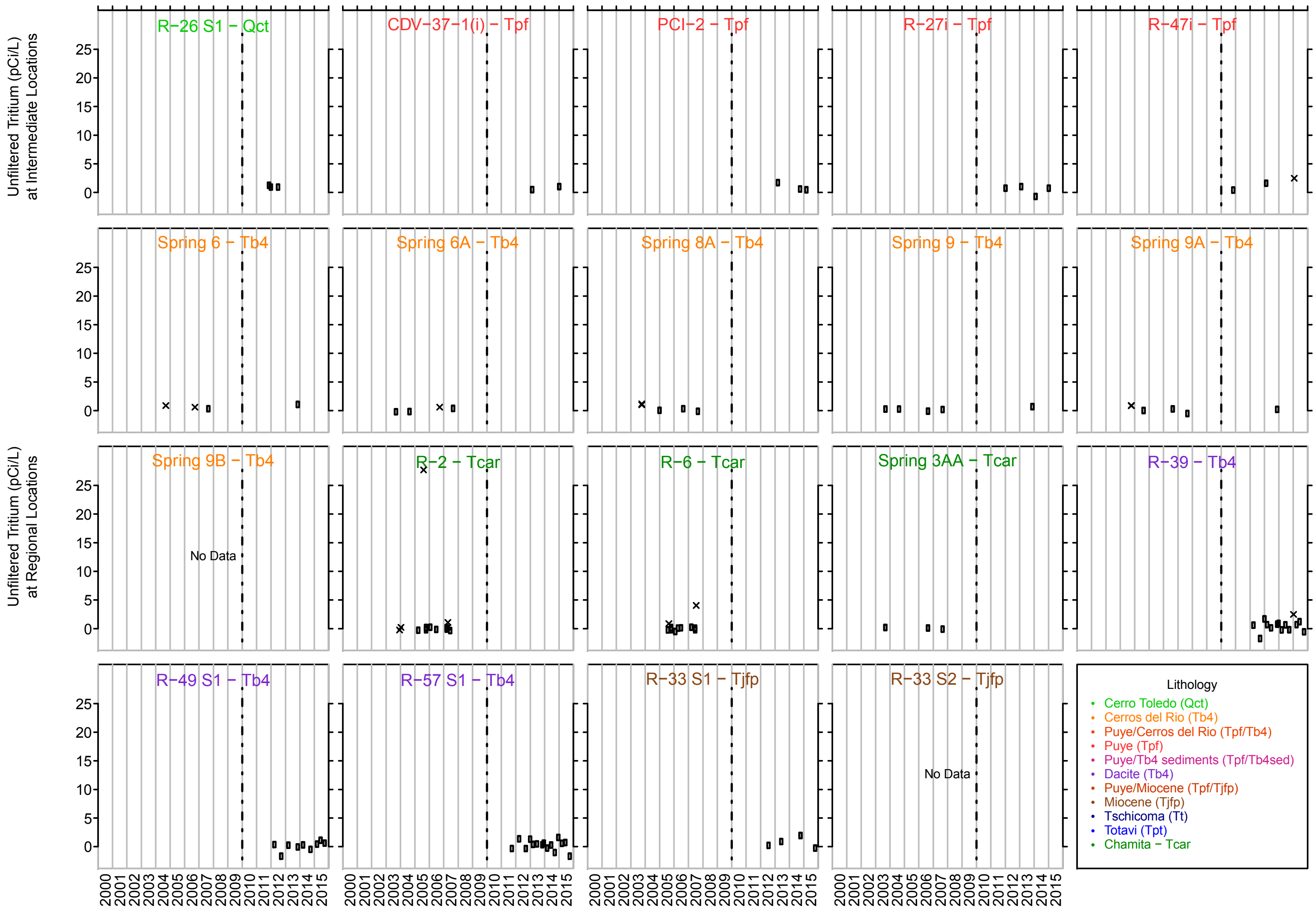



**Figure C-159 Time-series plots for unfiltered tritium**

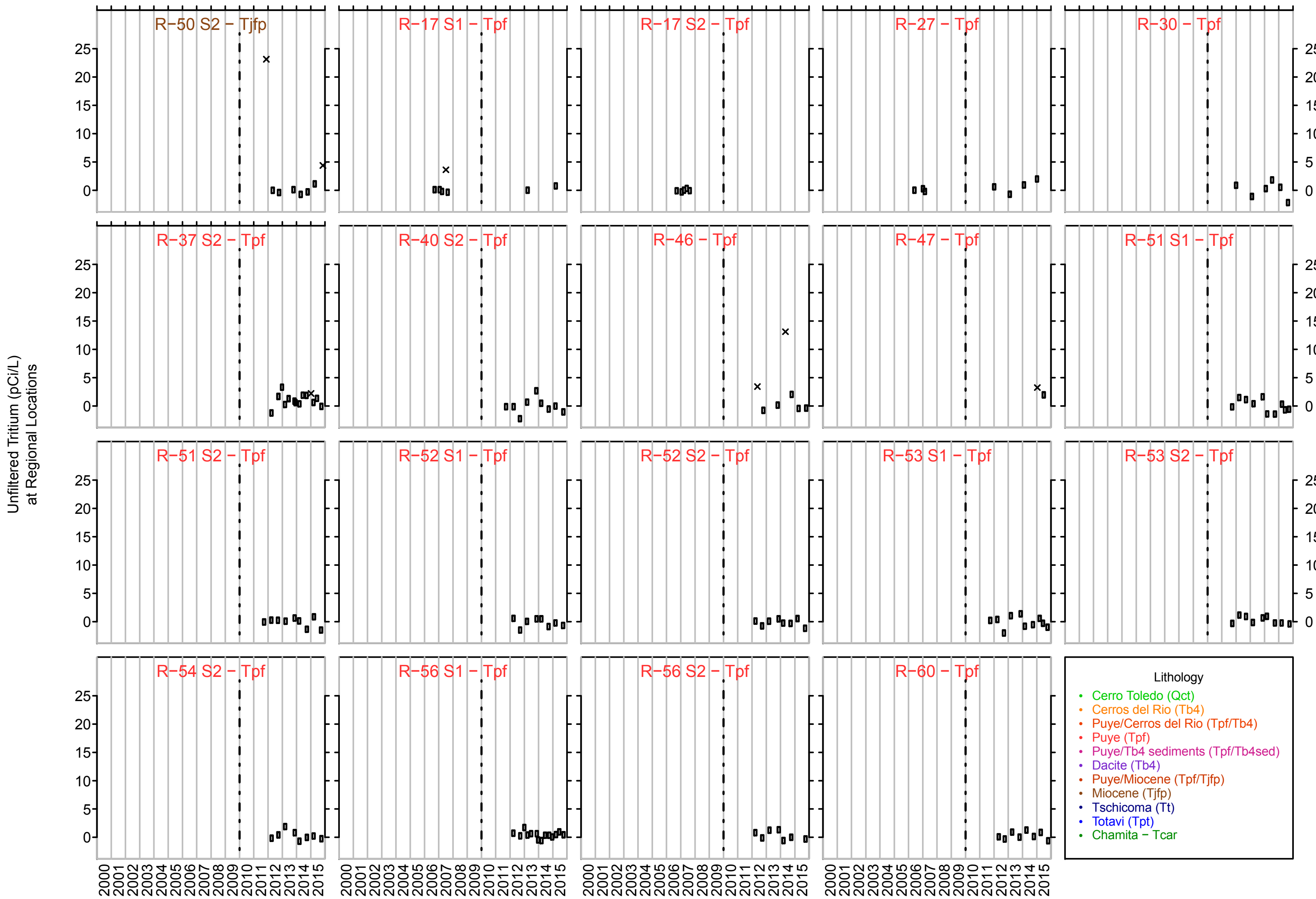



**Figure C-159 (continued) Time-series plots for unfiltered tritium**

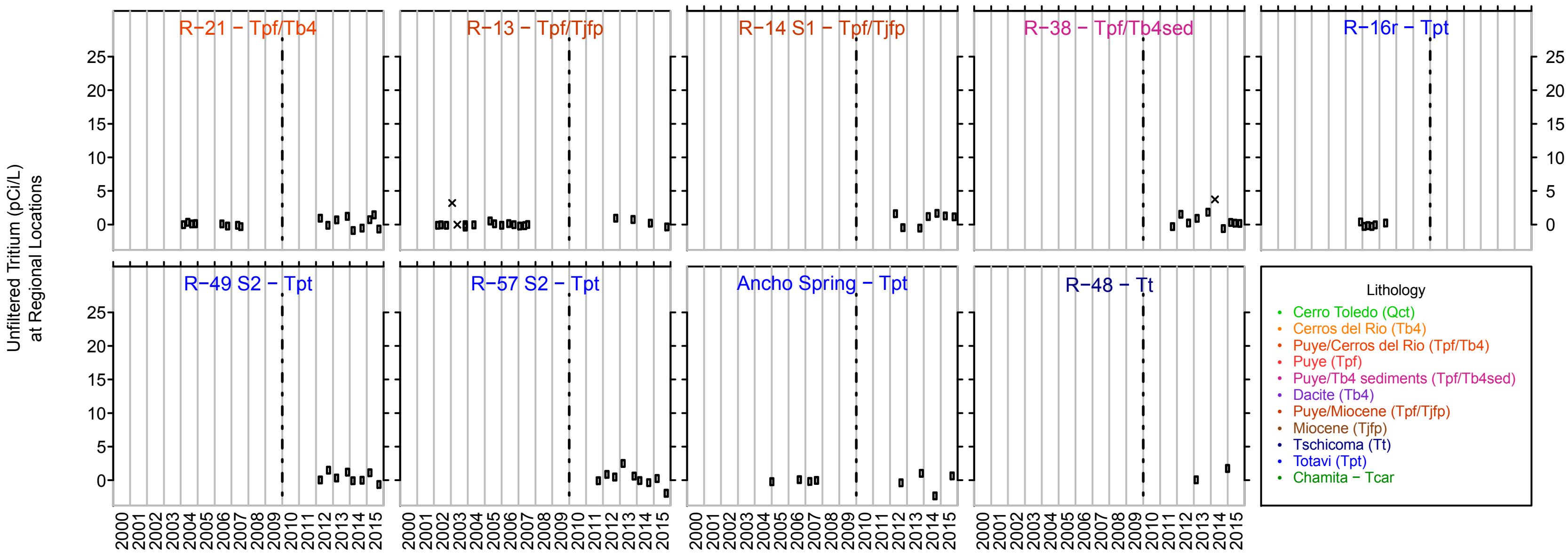



**Figure C-159 (continued)   Time-series plots for unfiltered tritium**

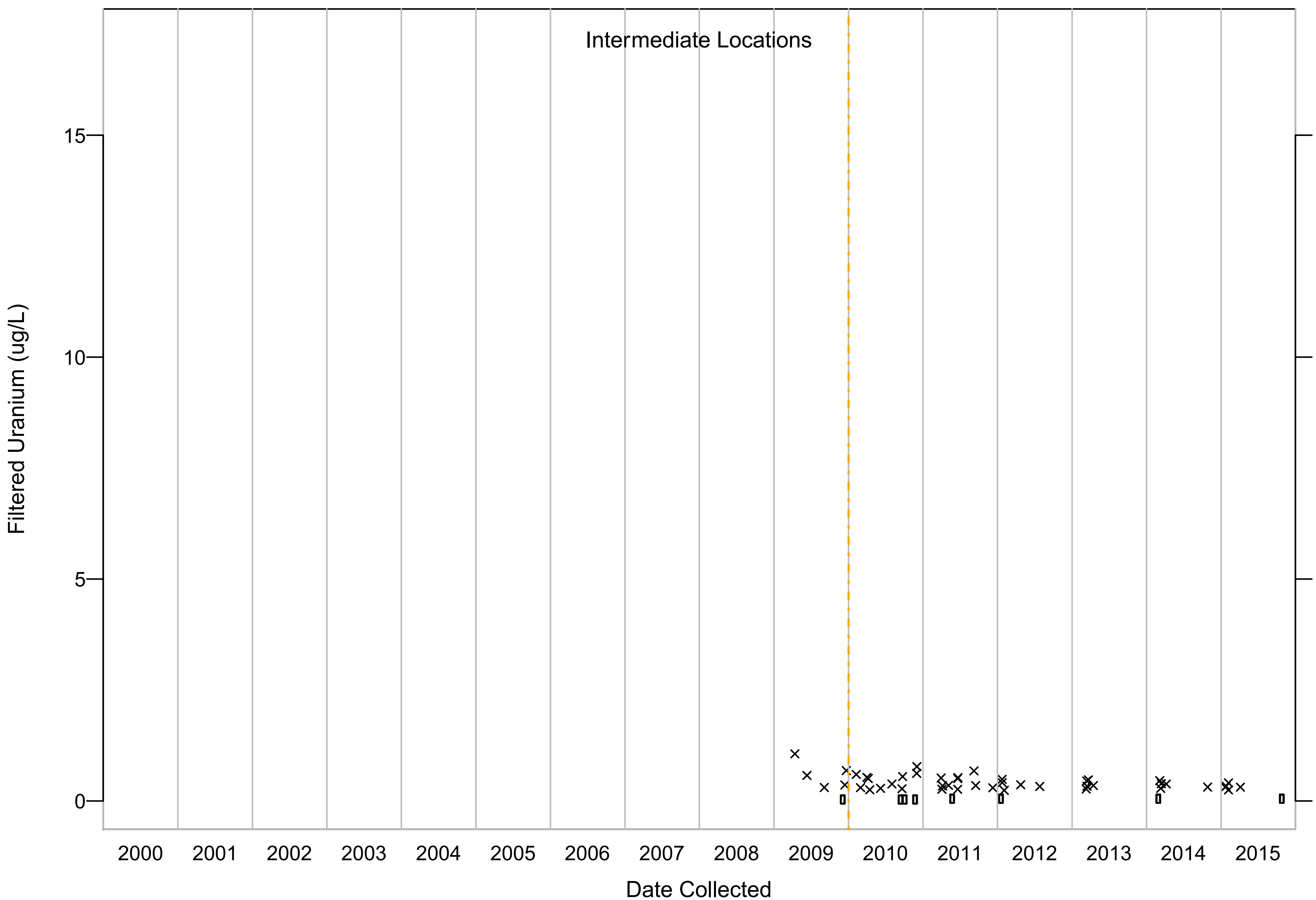



**Figure C-160 Filtered uranium results for perched-intermediate groundwater**

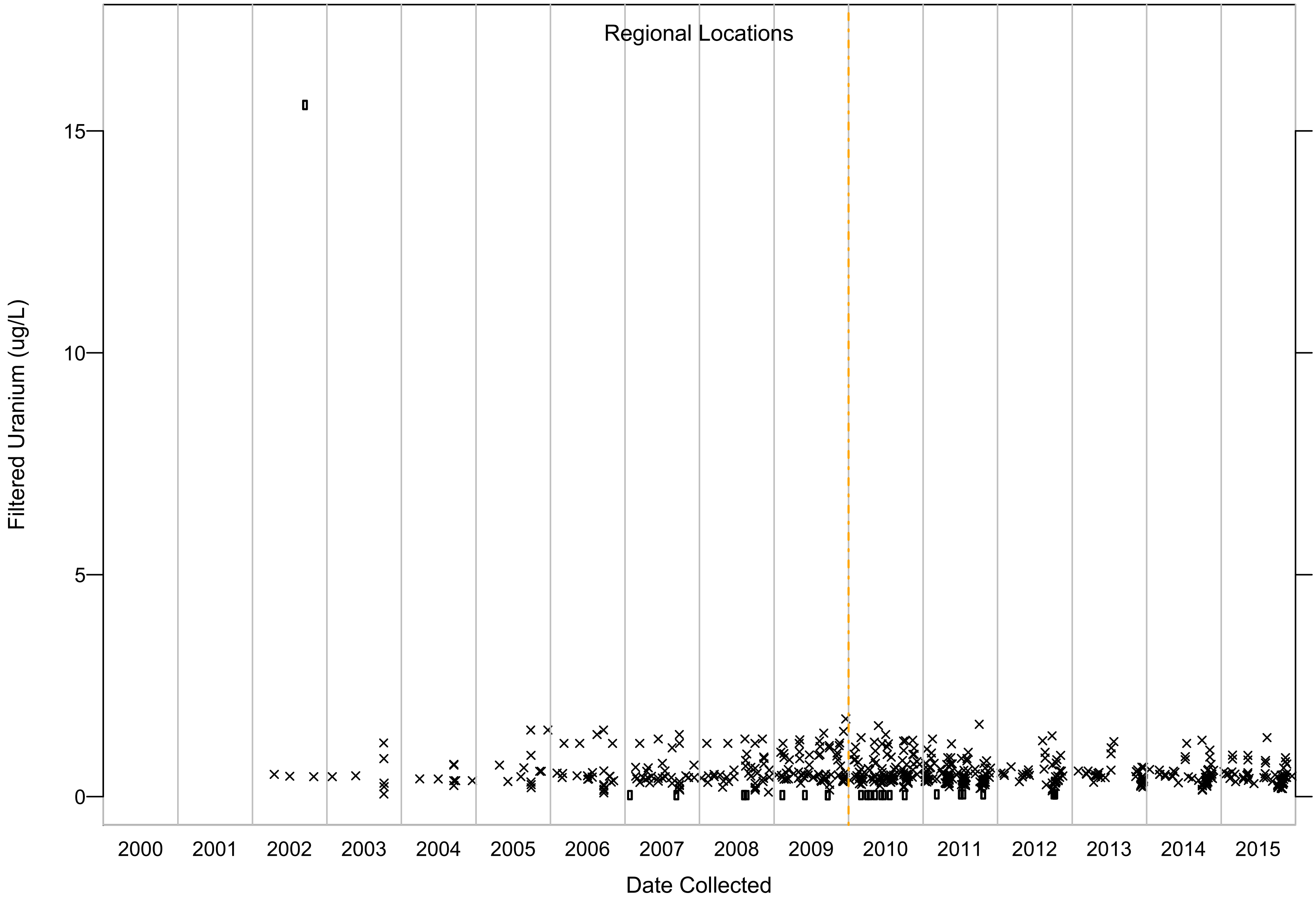



**Figure C-161 Filtered uranium results for regional aquifer**

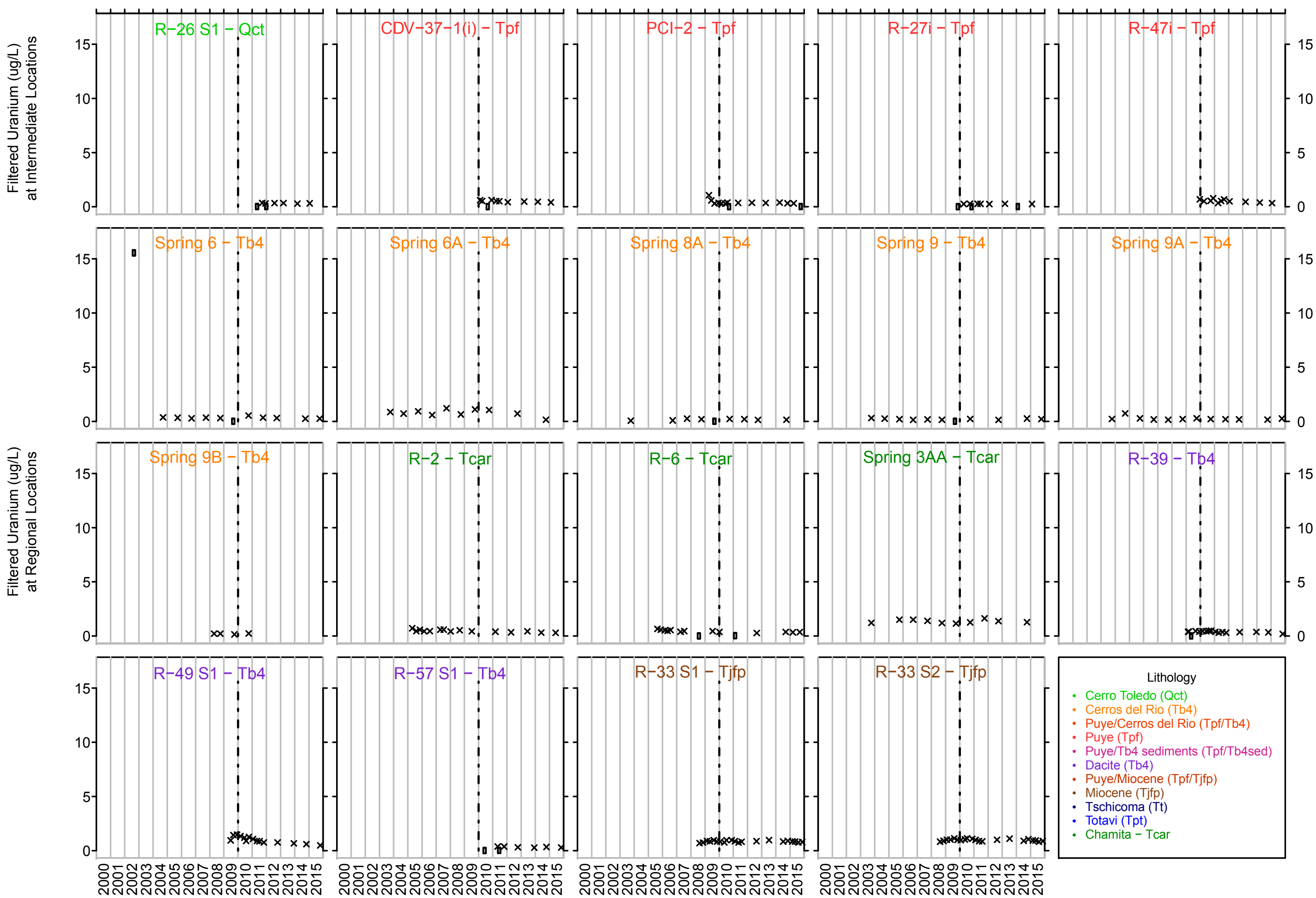



**Figure C-162 Time-series plots for filtered uranium**

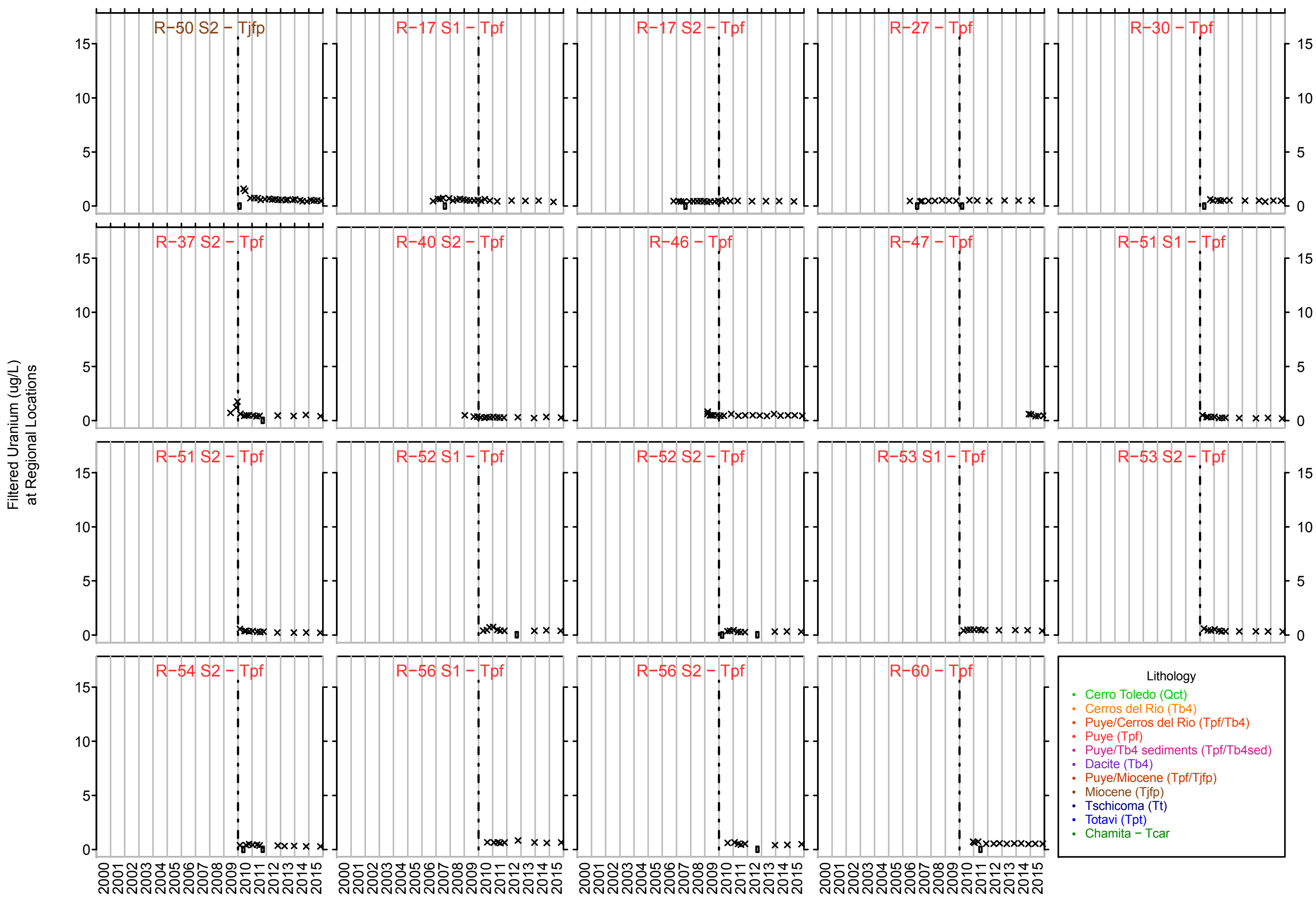



**Figure C-162 (continued) Time-series plots for filtered uranium**

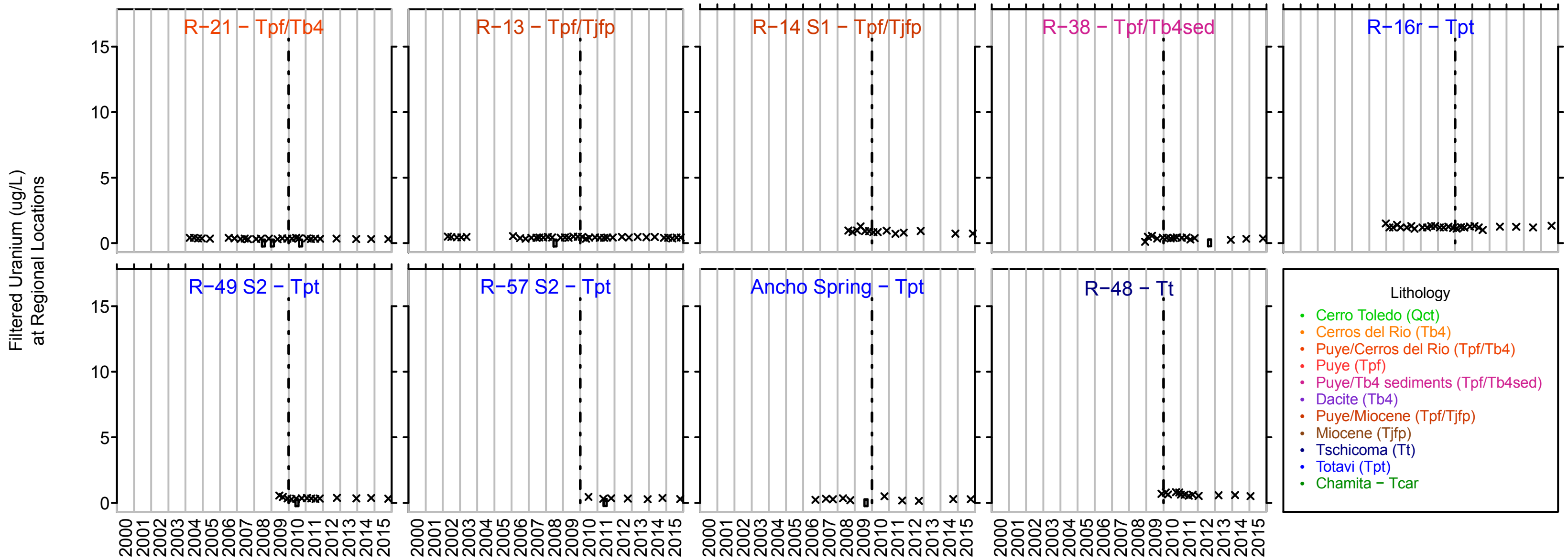



**Figure C-162 (continued) Time-series plots for filtered uranium**

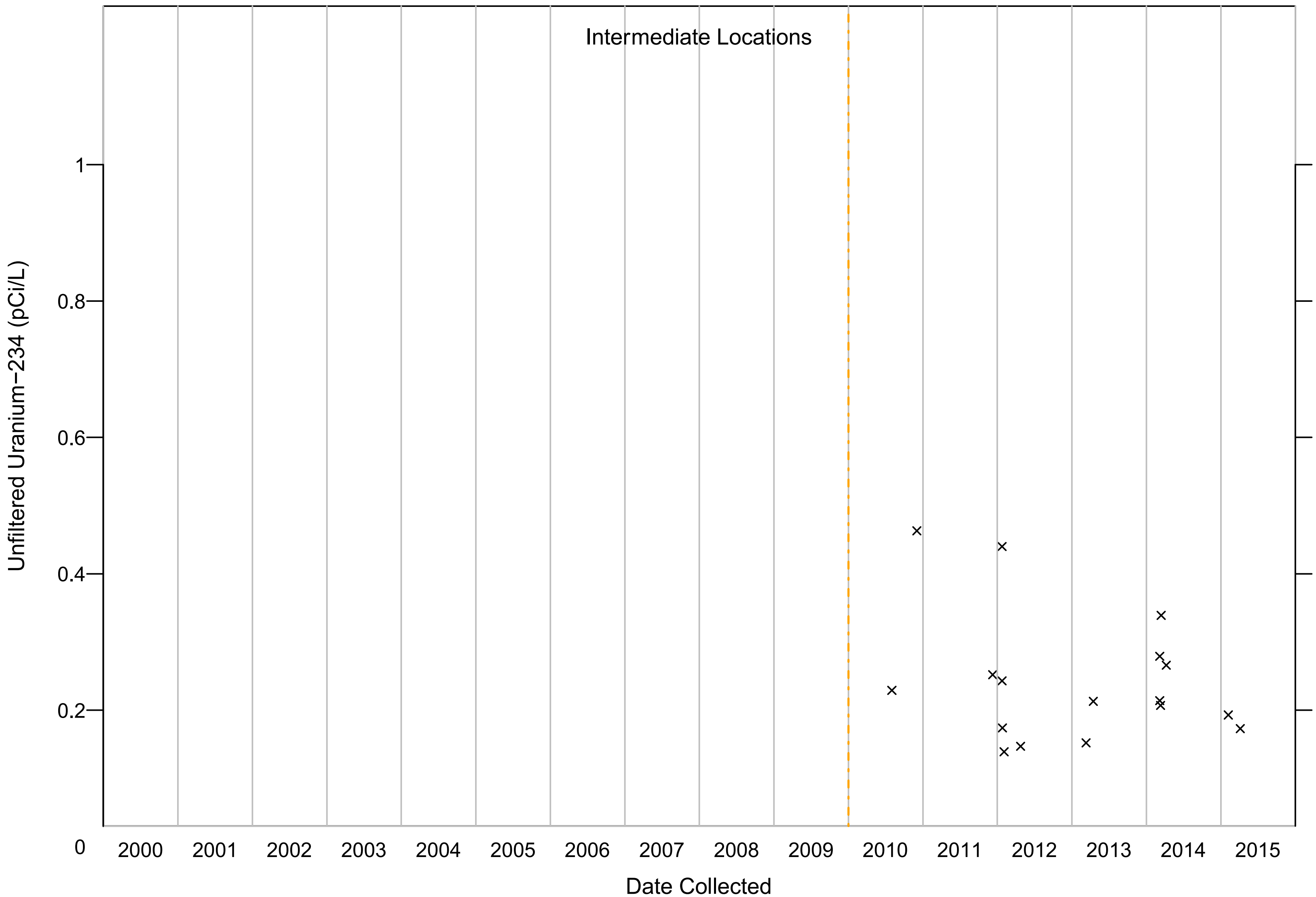



**Figure C-163 Unfiltered uranium-234 results for perched-intermediate groundwater**

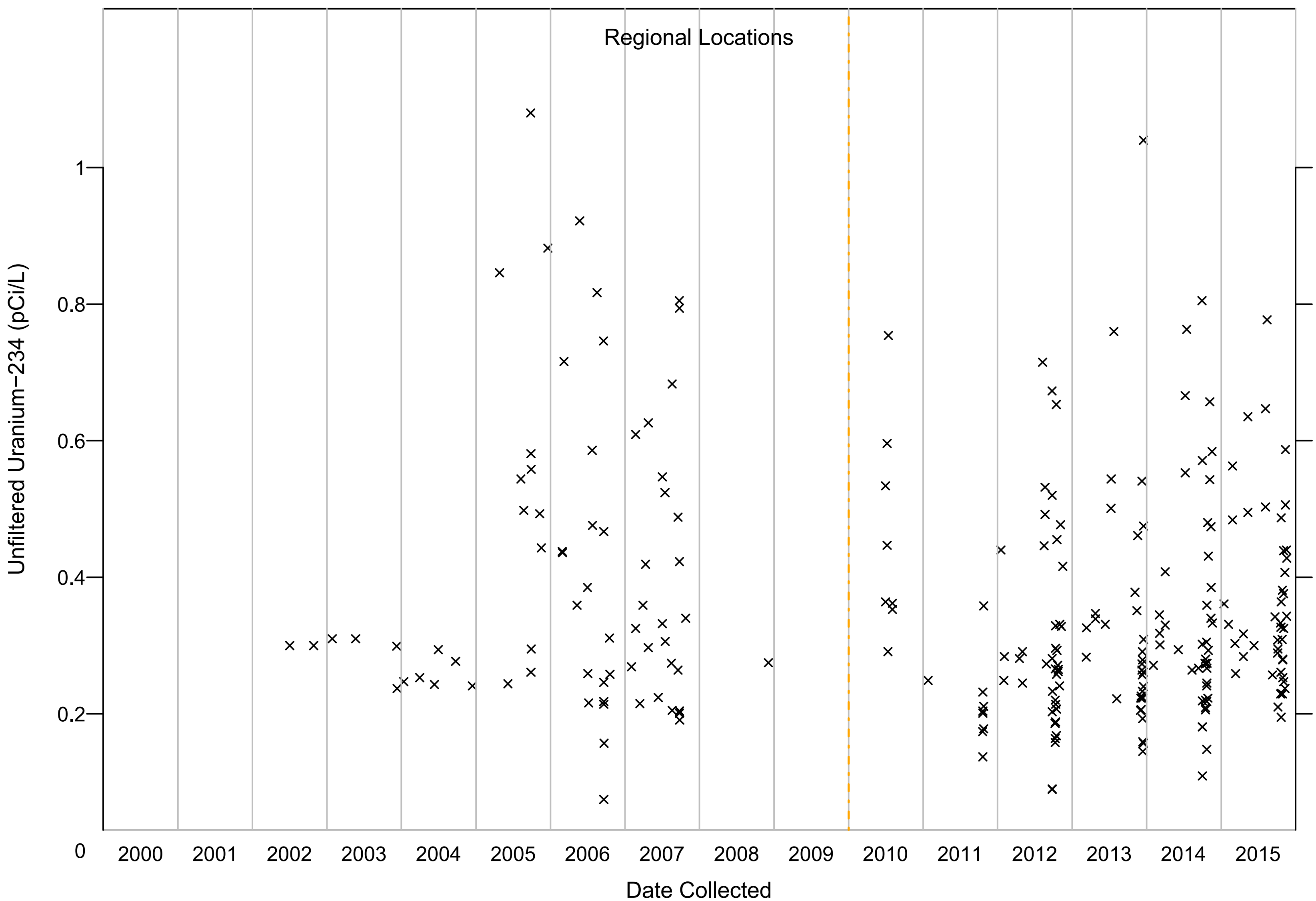



**Figure C-164 Unfiltered uranium-234 results for regional aquifer**

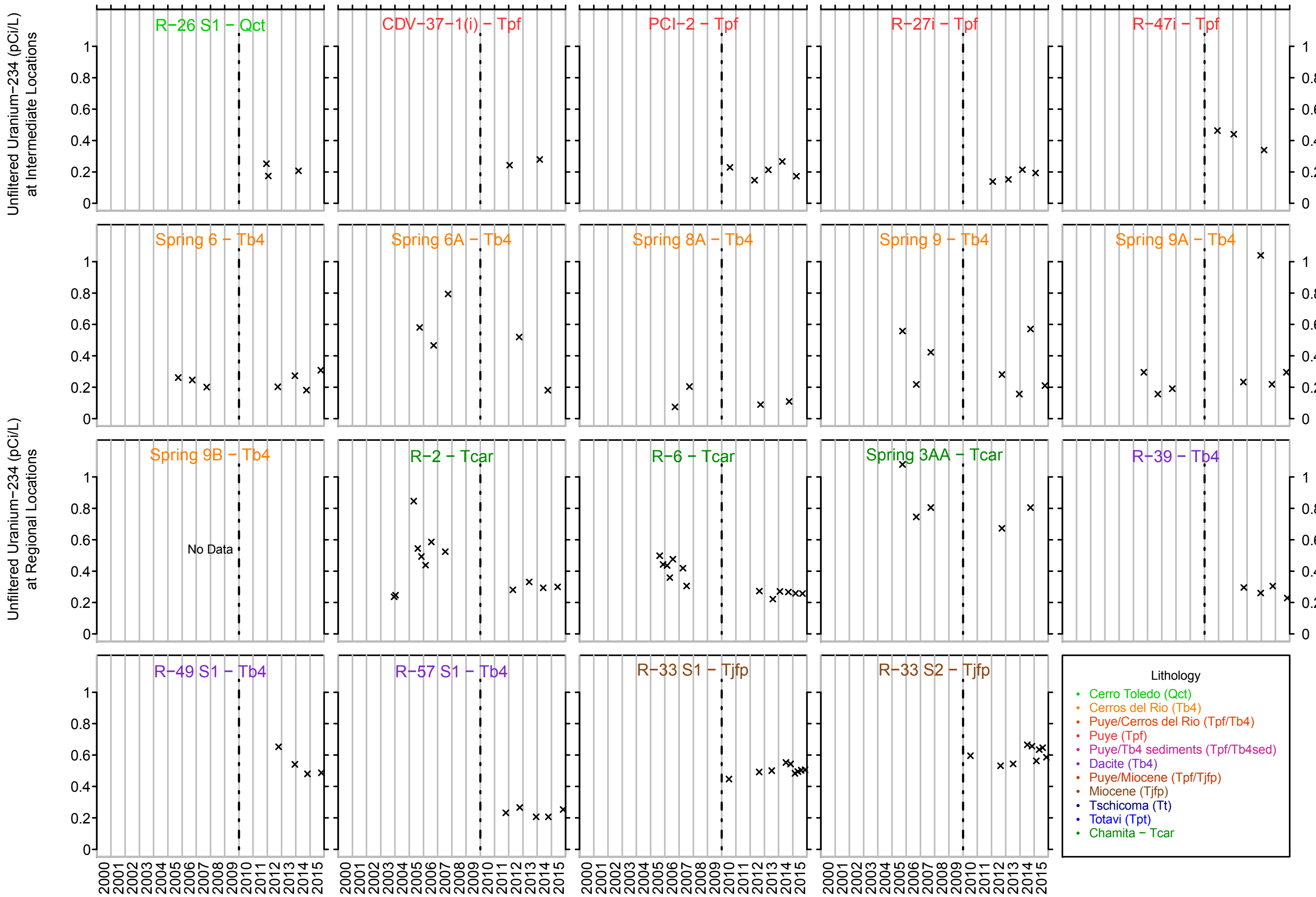



**Figure C-165 Time-series plots for unfiltered uranium-234**

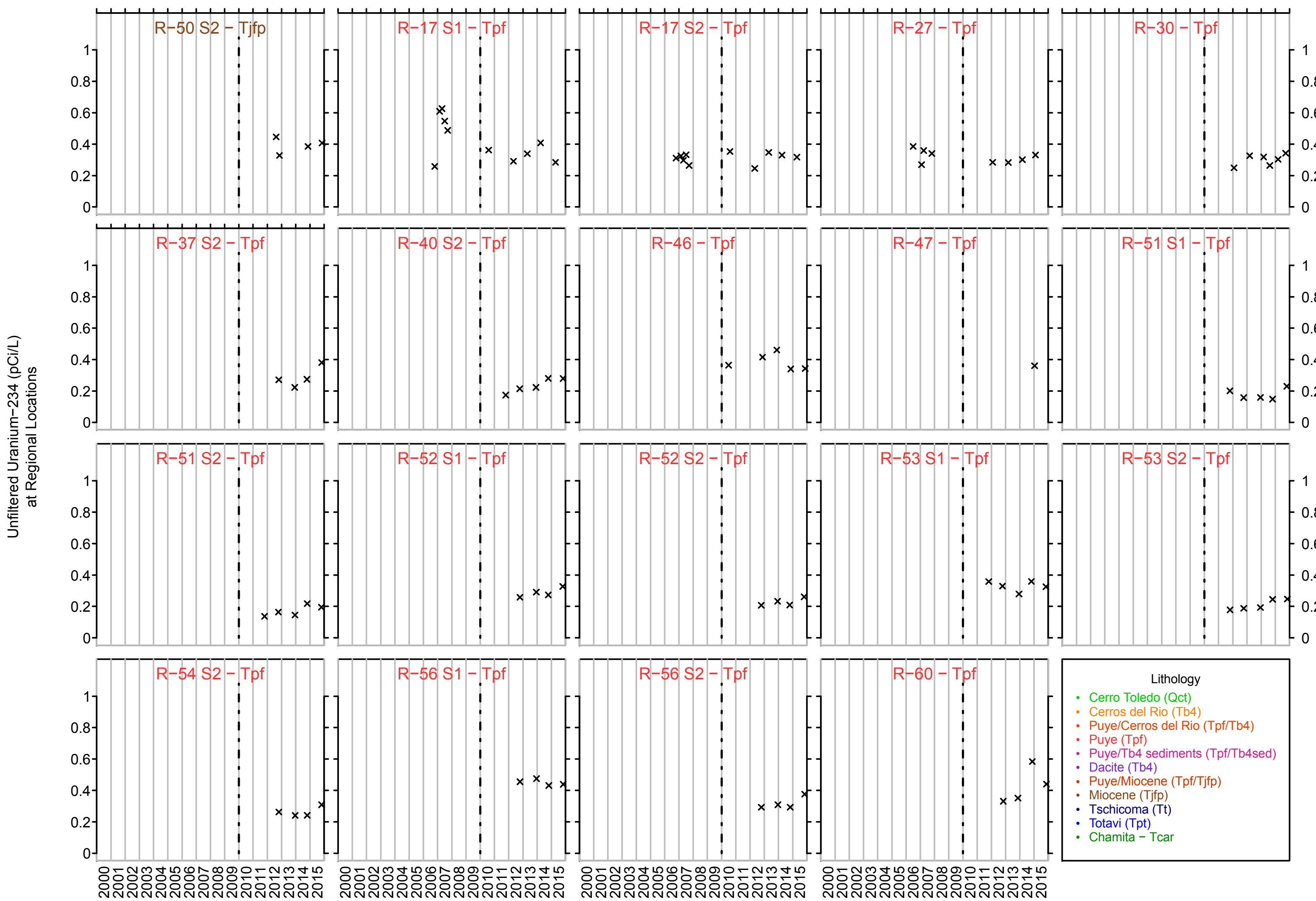



**Figure C-165 (continued) Time-series plots for unfiltered uranium-234**

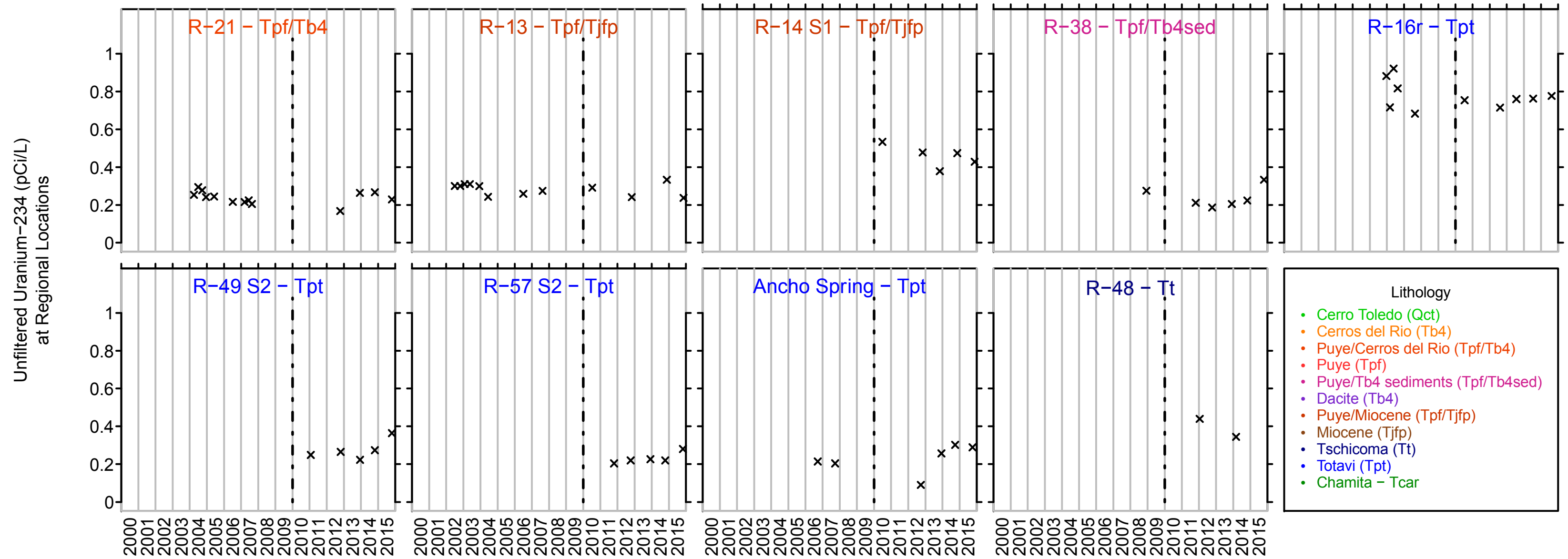



**Figure C-165 (continued)   Time-series plots for unfiltered uranium-234**

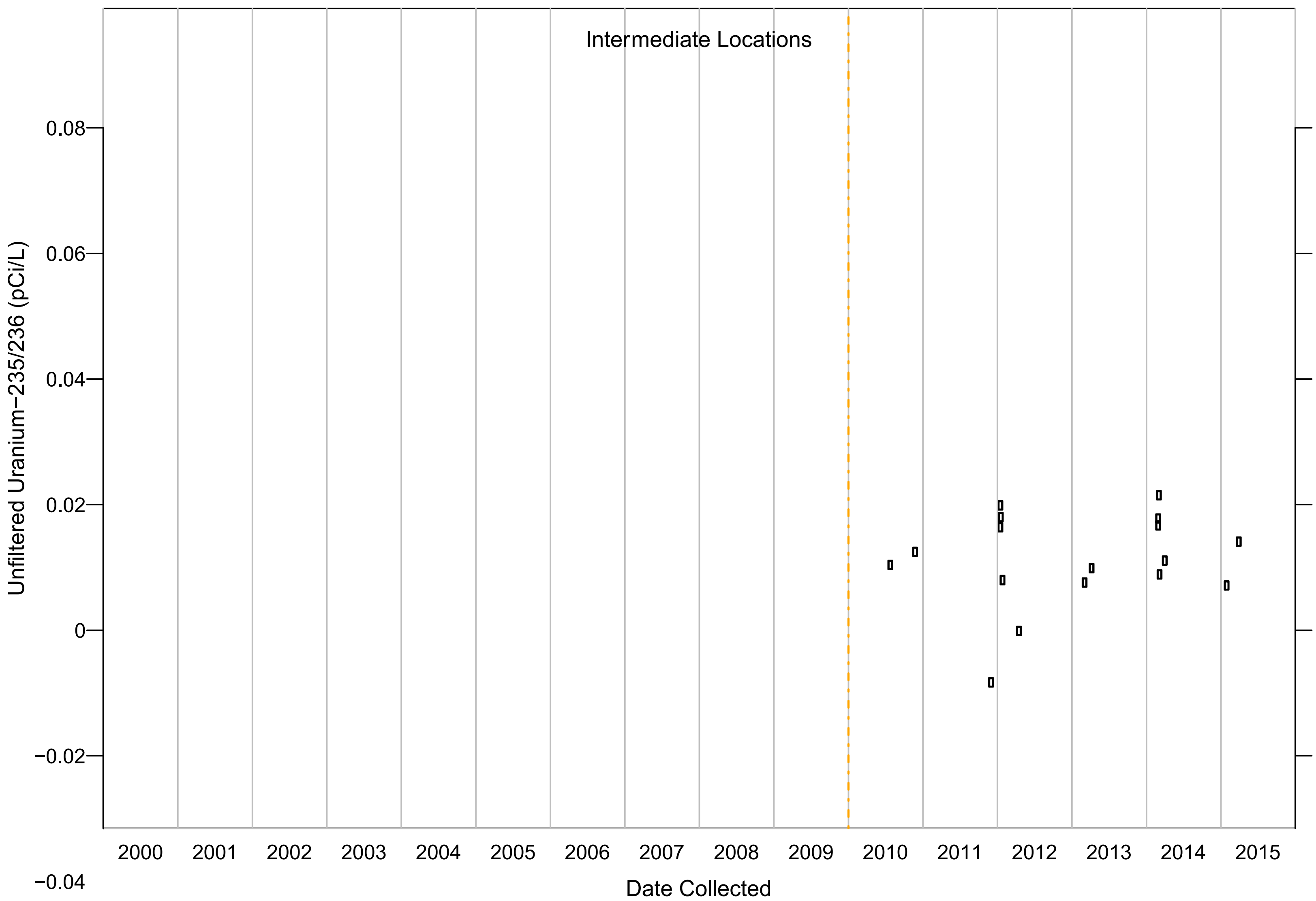



**Figure C-166 Unfiltered uranium-235/236 results for perched-intermediate groundwater**

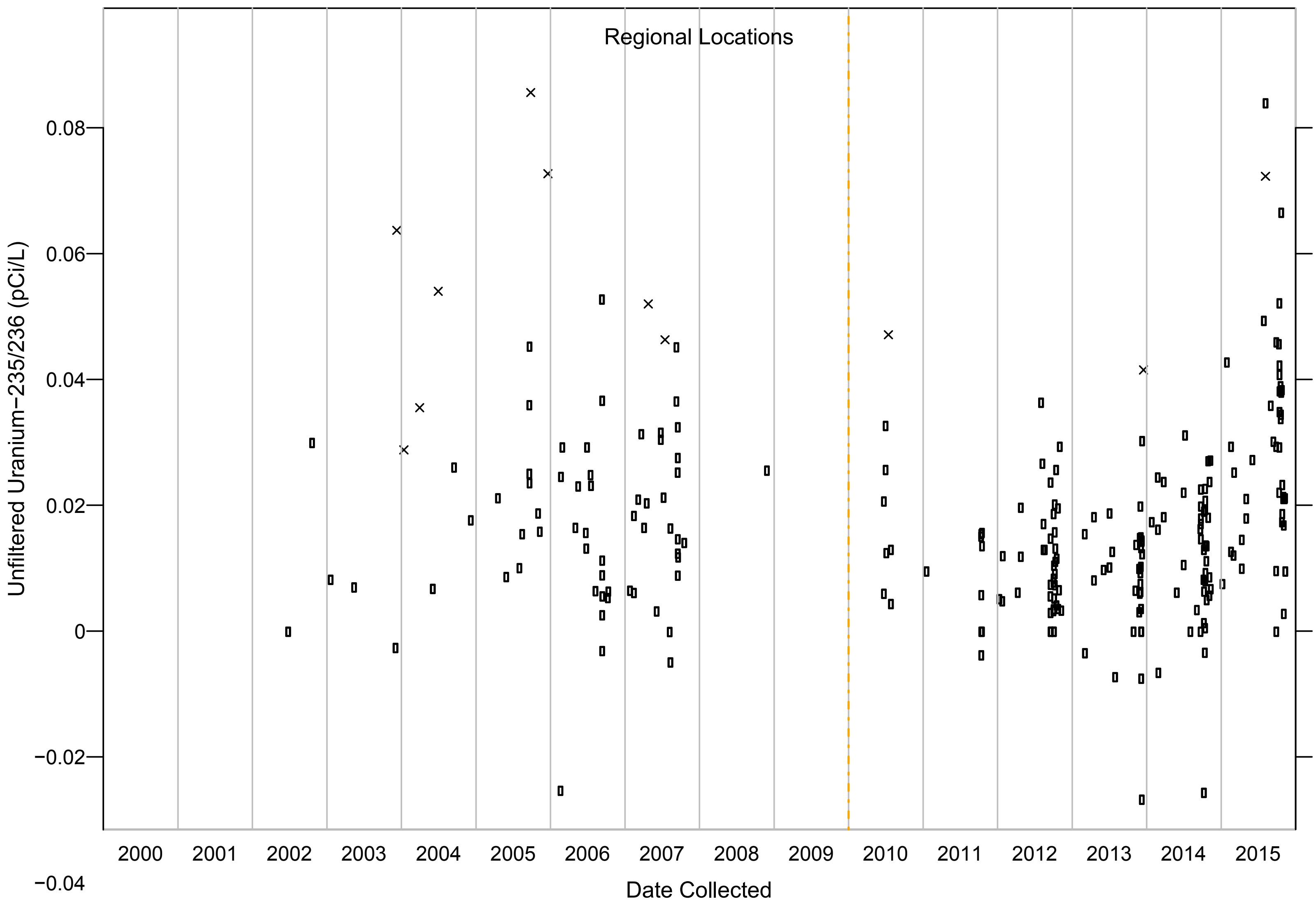



**Figure C-167 Unfiltered uranium-235/236 results for regional aquifer**

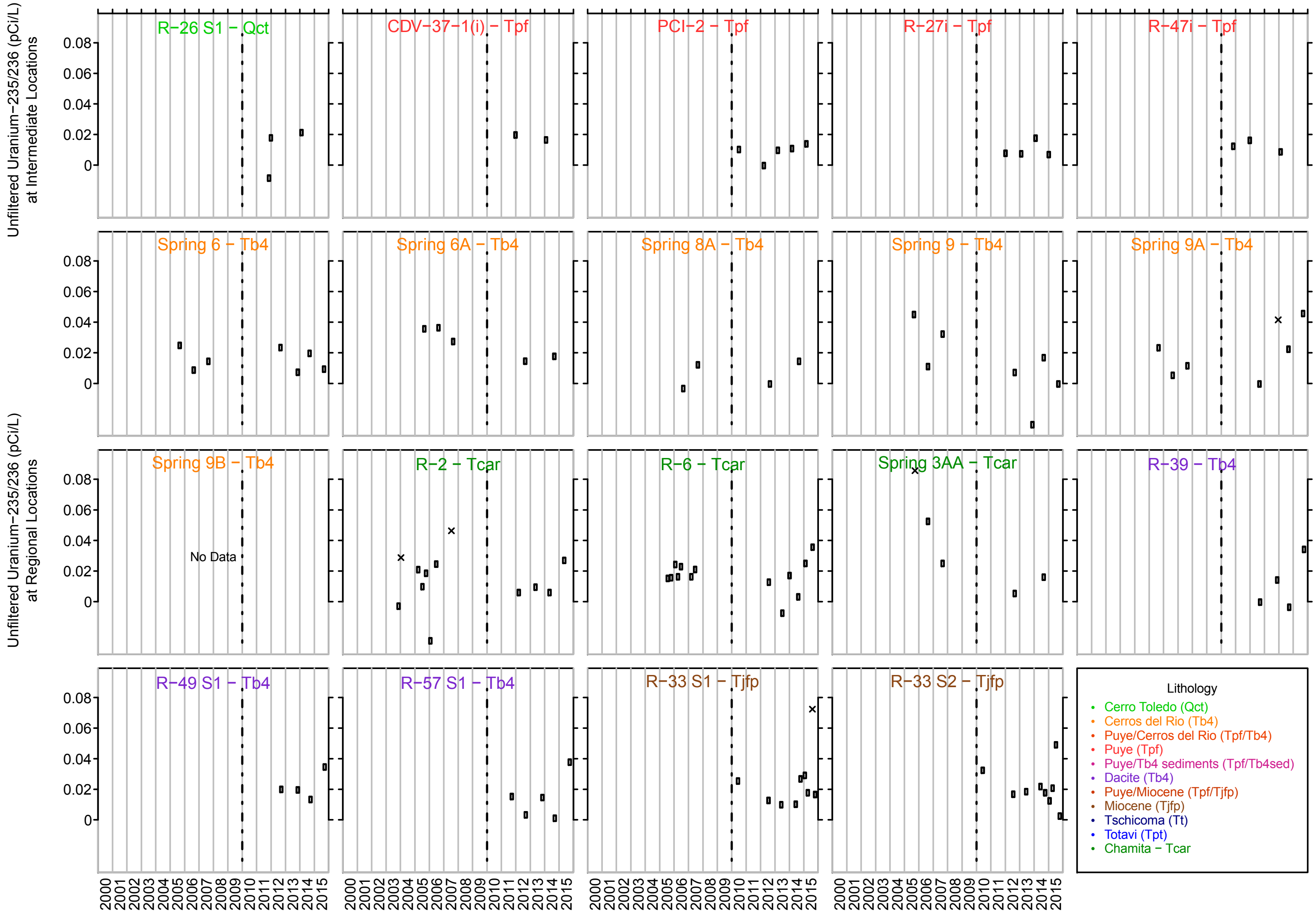



**Figure C-168 Time-series plots for unfiltered uranium-235/236**

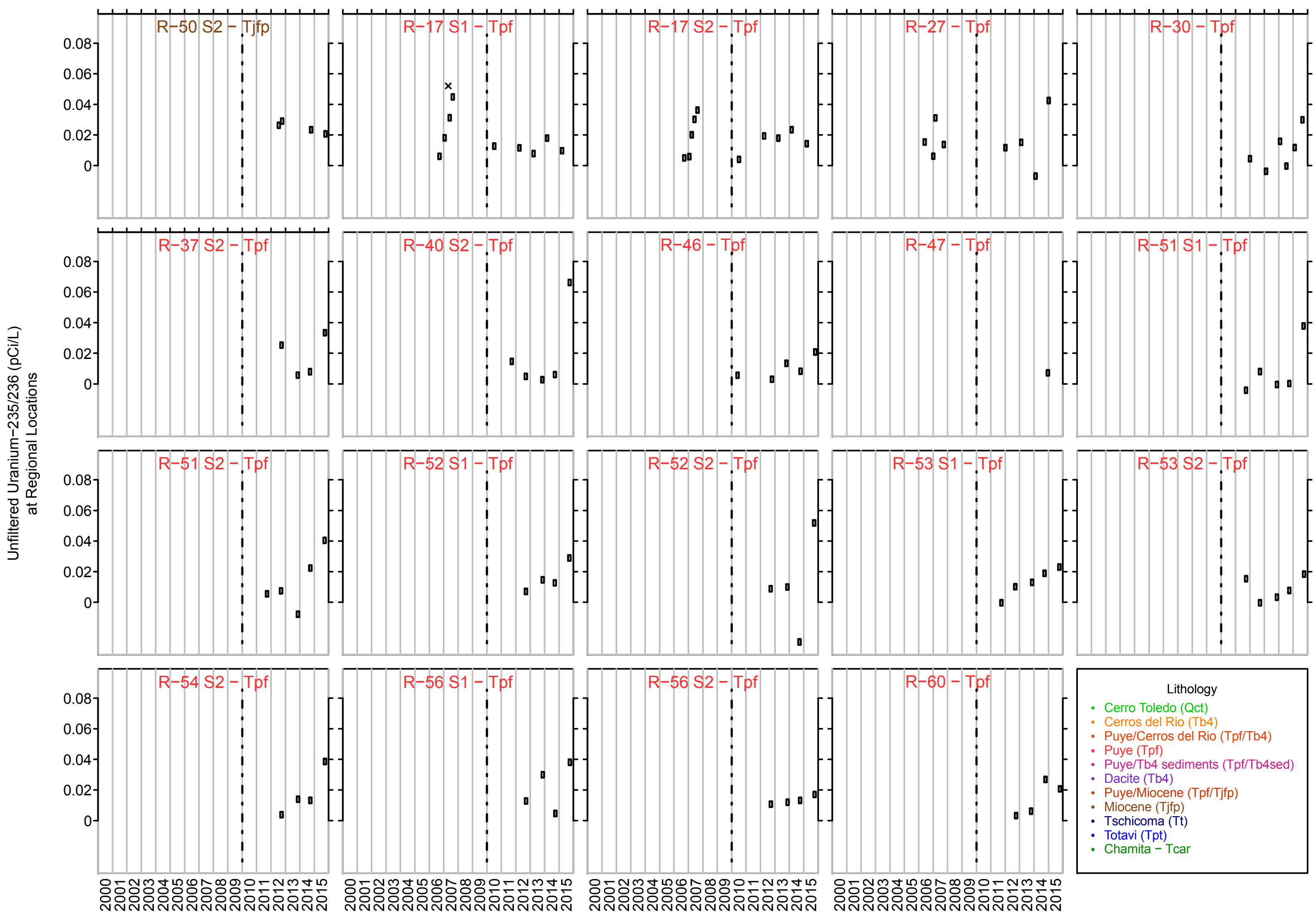



**Figure C-168 (continued) Time-series plots for unfiltered uranium-235/236**

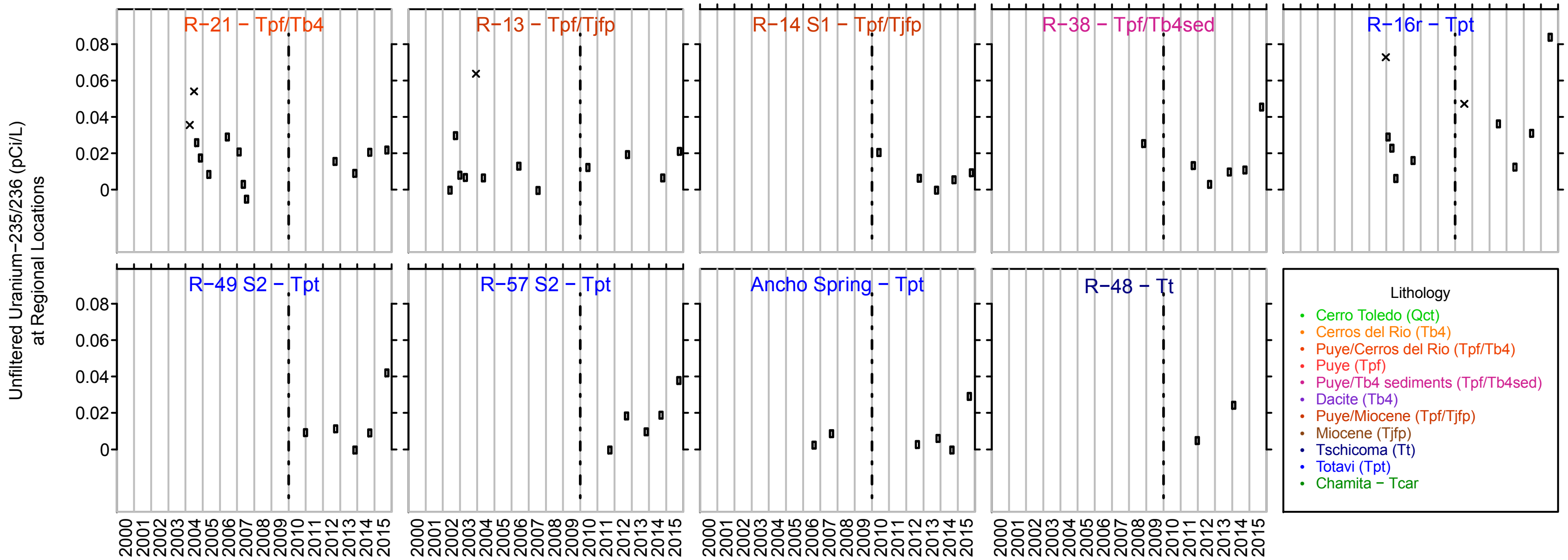



**Figure C-168 (continued) Time-series plots for unfiltered uranium-235/236**

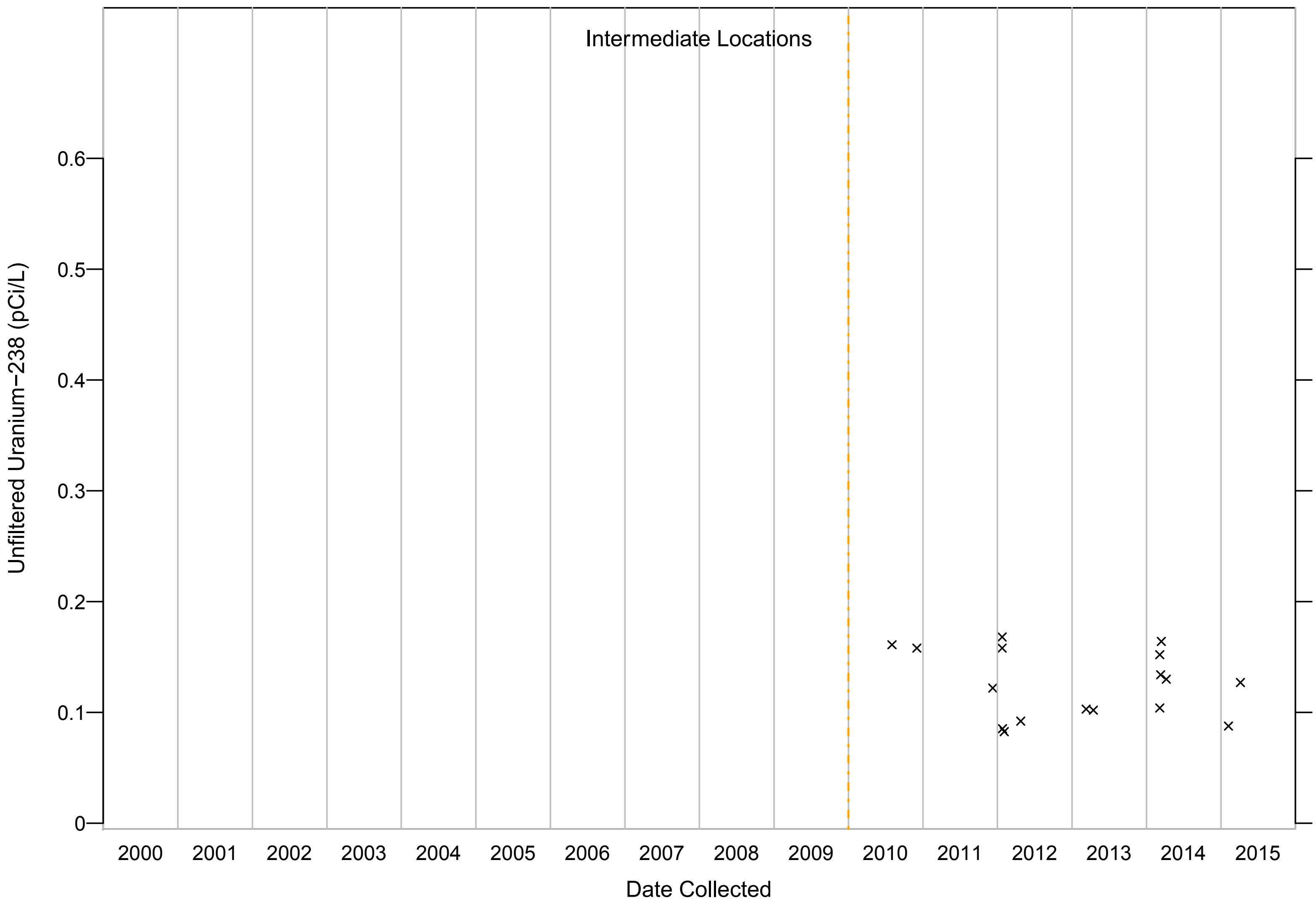



**Figure C-169 Unfiltered uranium-238 results for perched-intermediate groundwater**

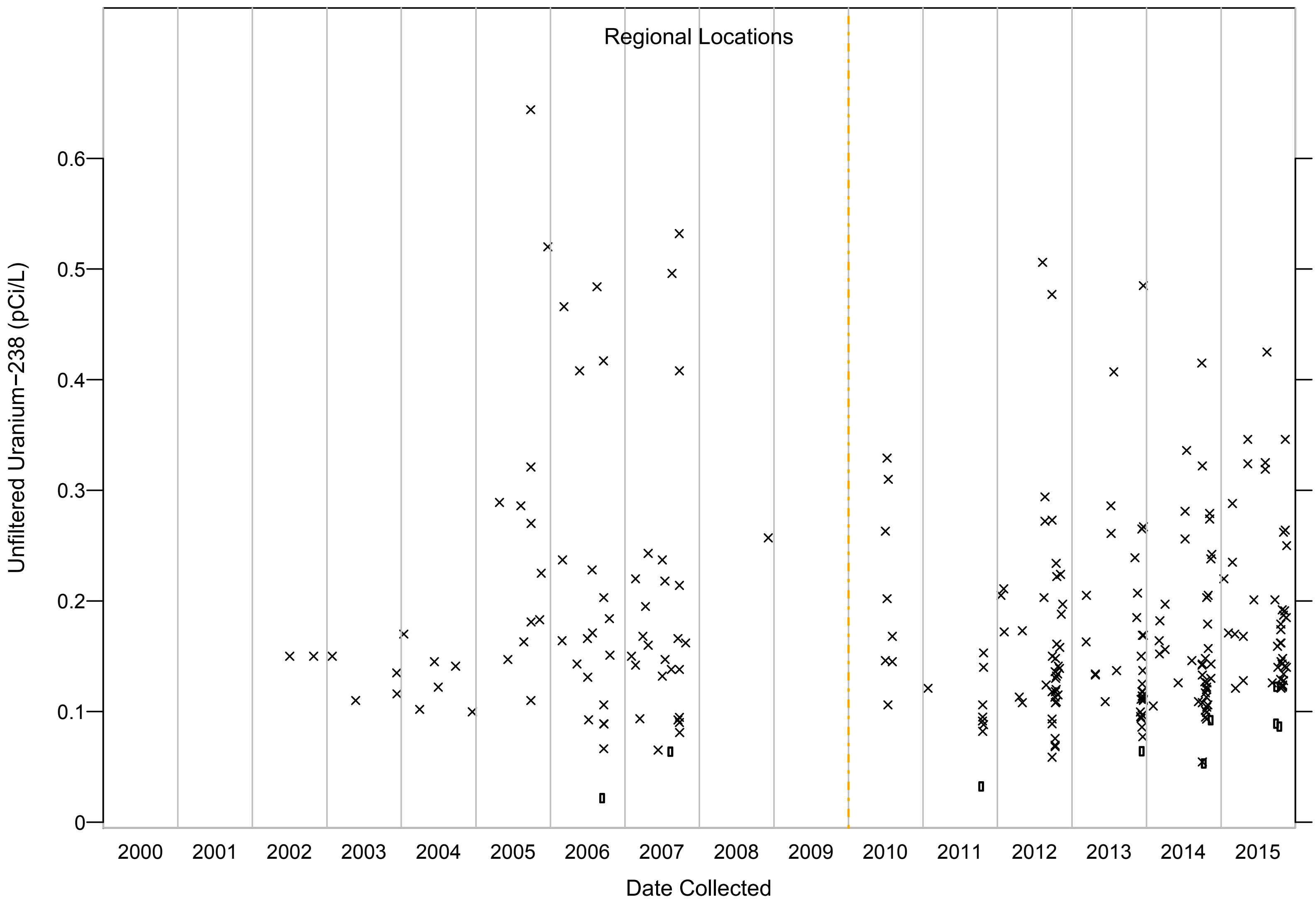



**Figure C-170 Unfiltered uranium-238 results for regional aquifer**

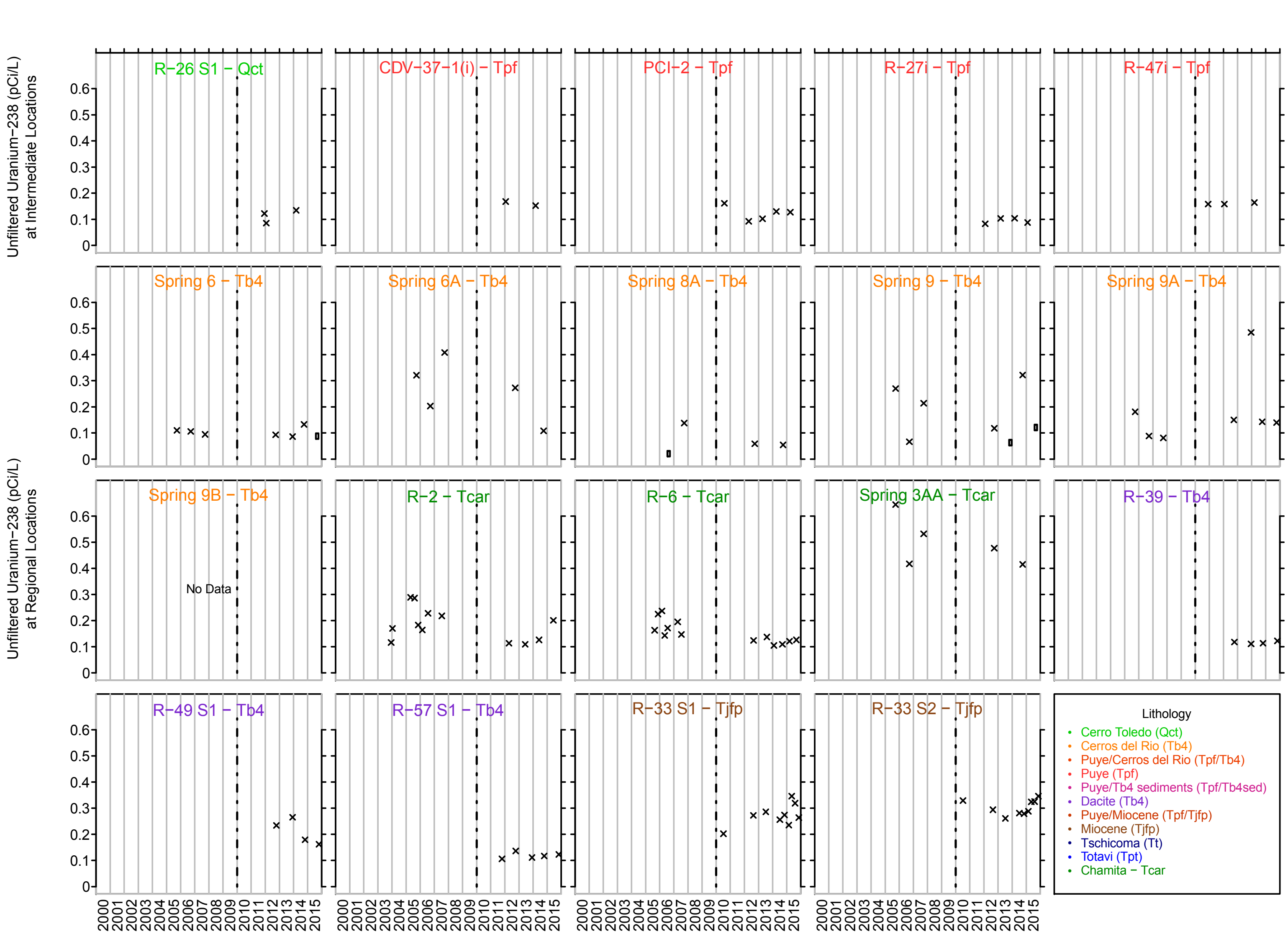



**Figure C-171 Time-series plots for unfiltered uranium-238**

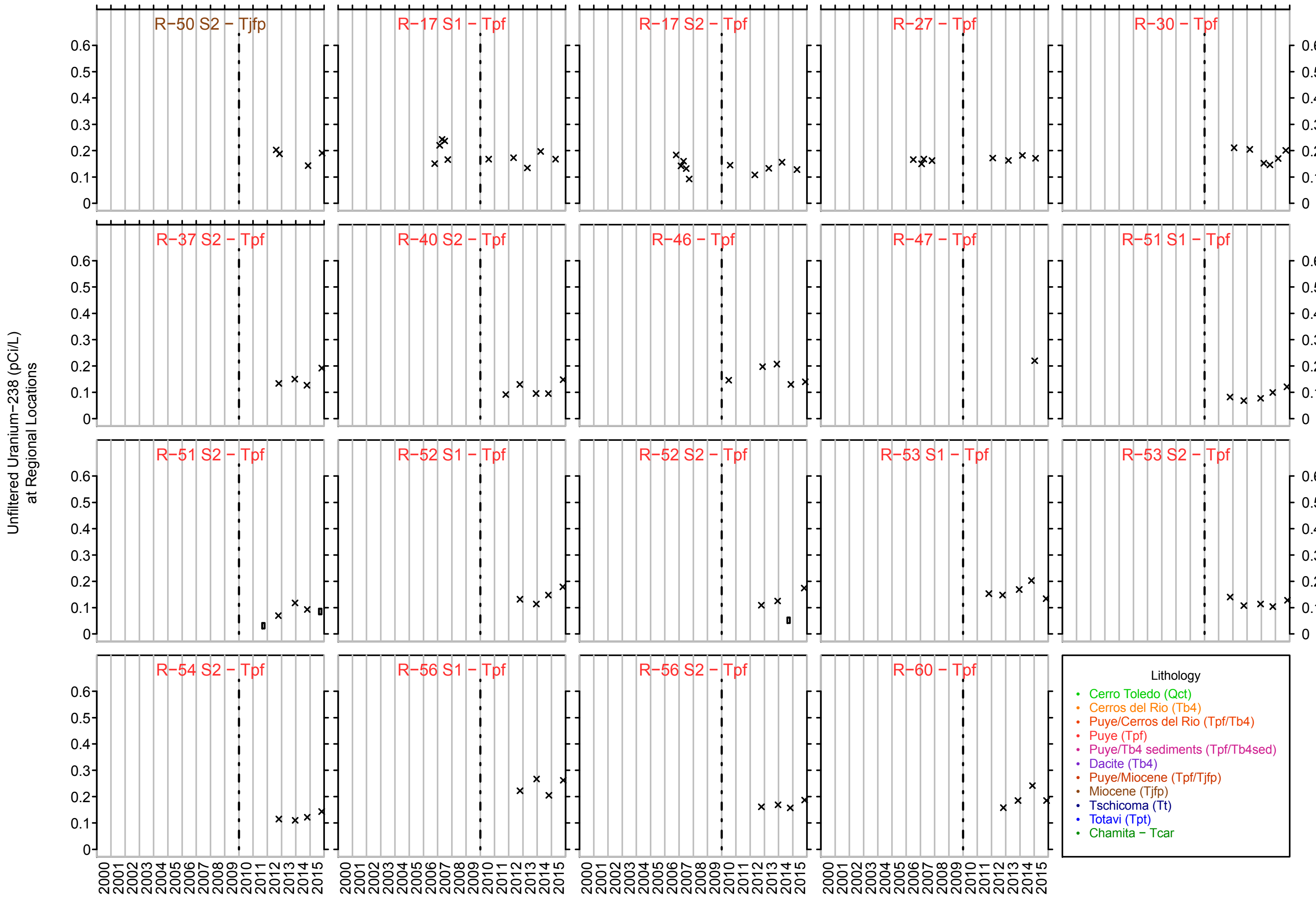



**Figure C-171 (continued) Time-series plots for unfiltered uranium-238**

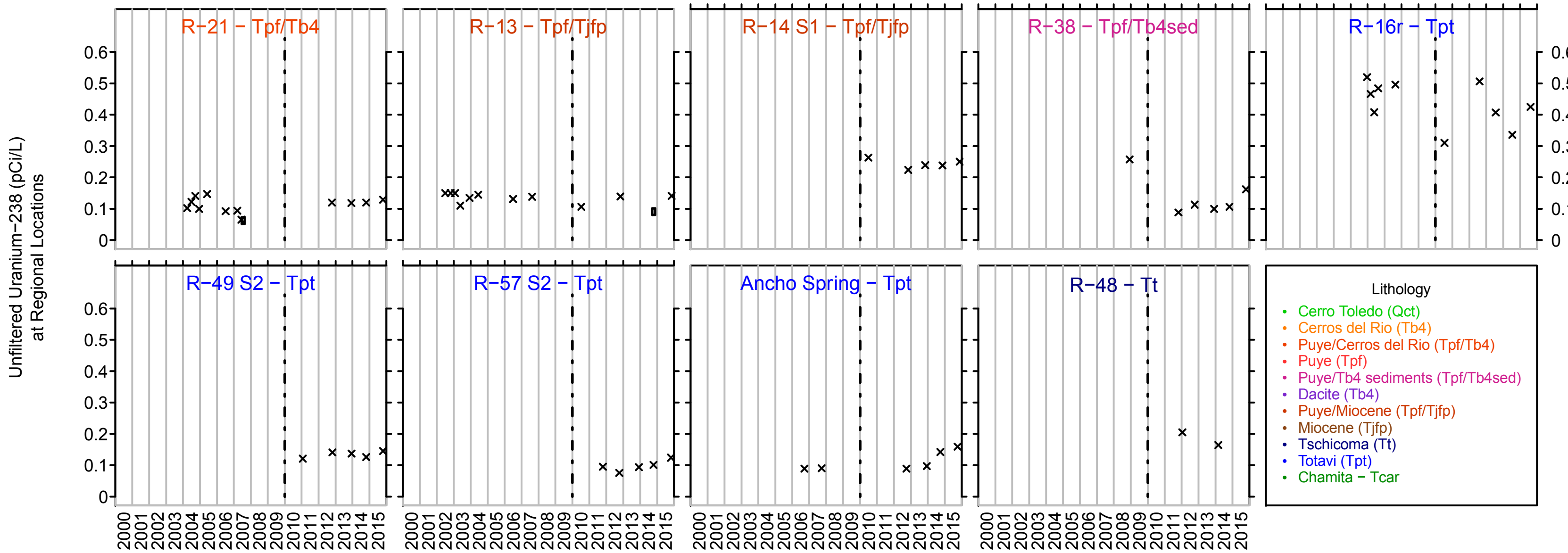



**Figure C-171 (continued) Time-series plots for unfiltered uranium-238**

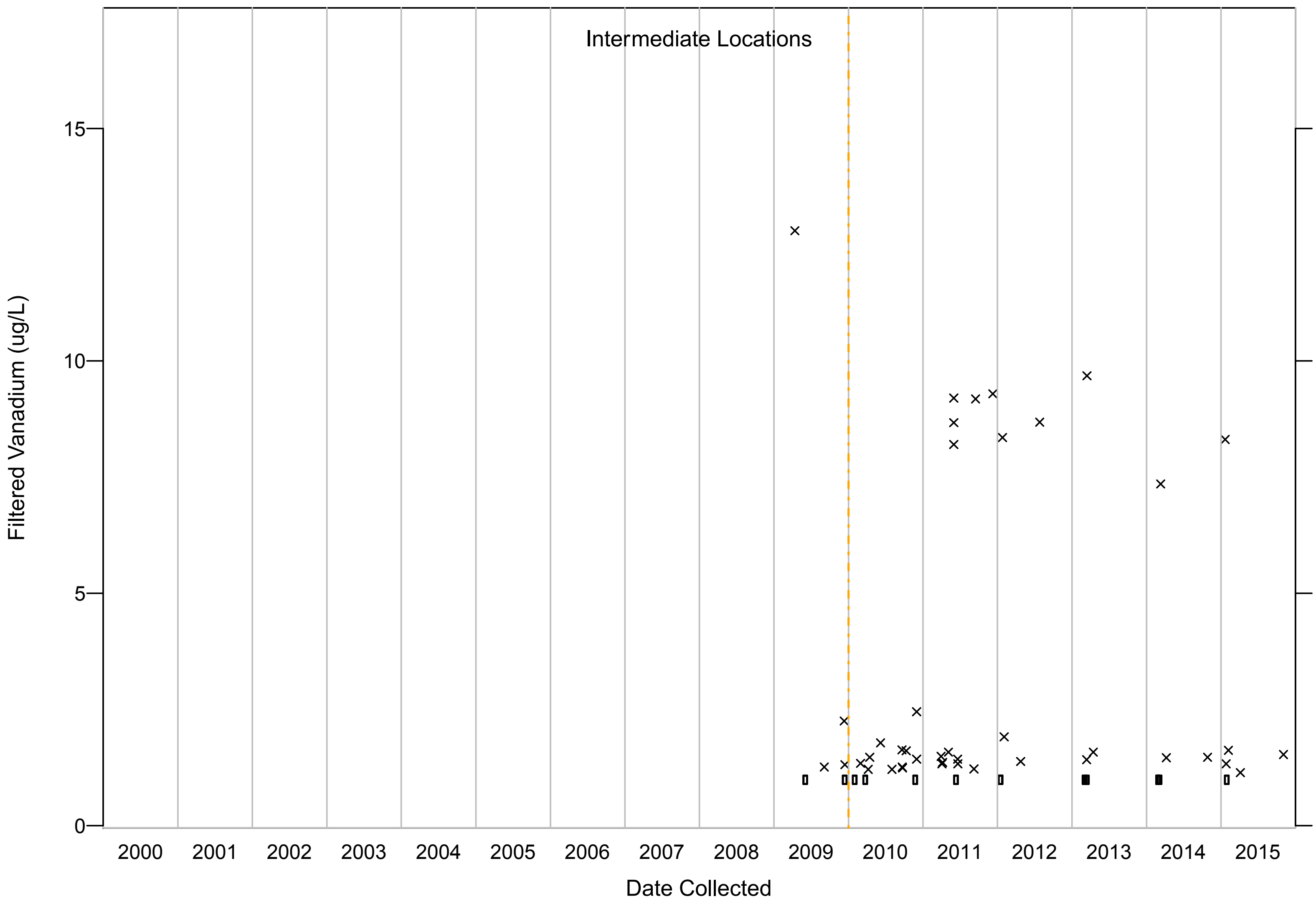



**Figure C-172 Filtered vanadium results for perched-intermediate groundwater**

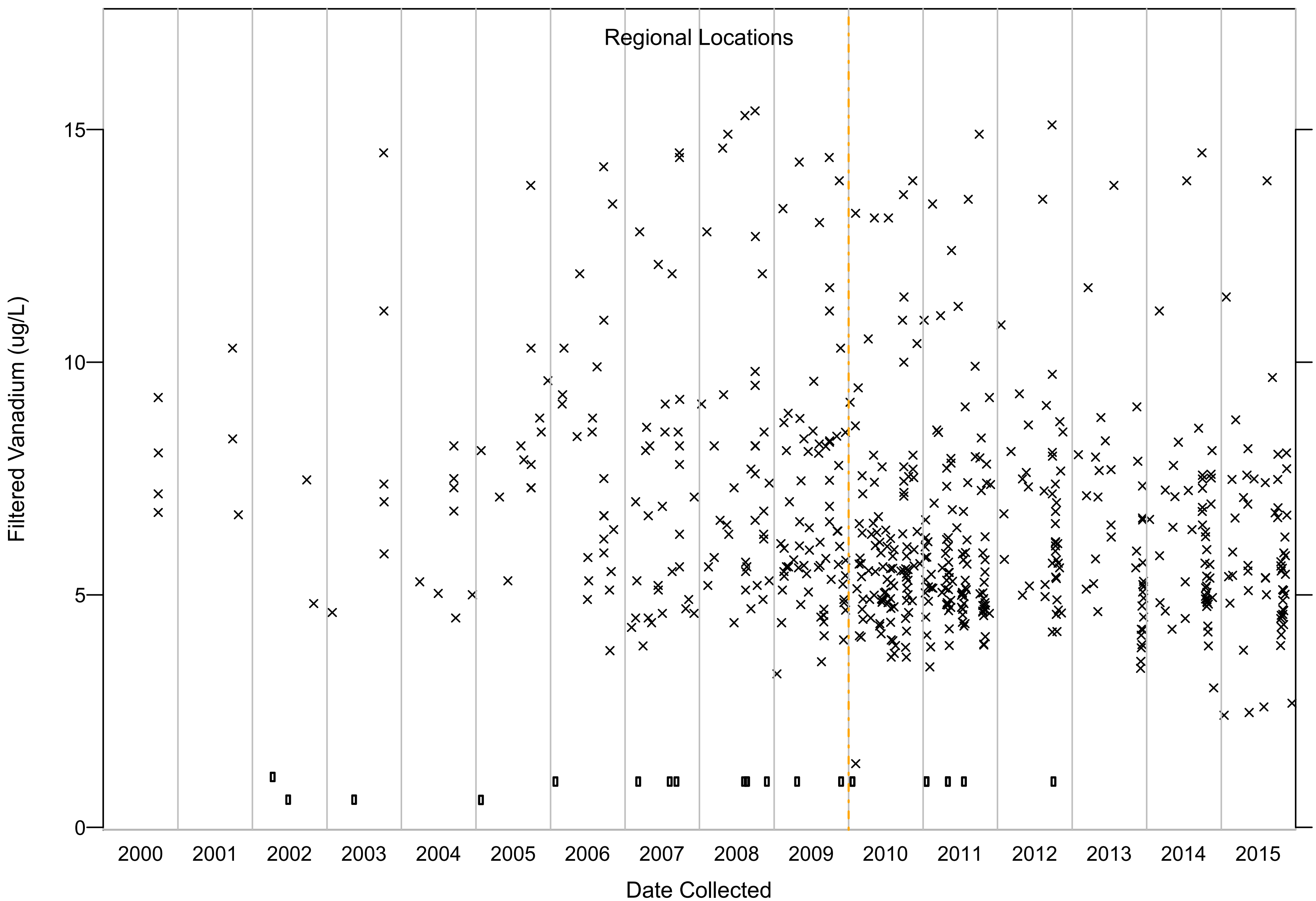



**Figure C-173 Filtered vanadium results for regional aquifer**

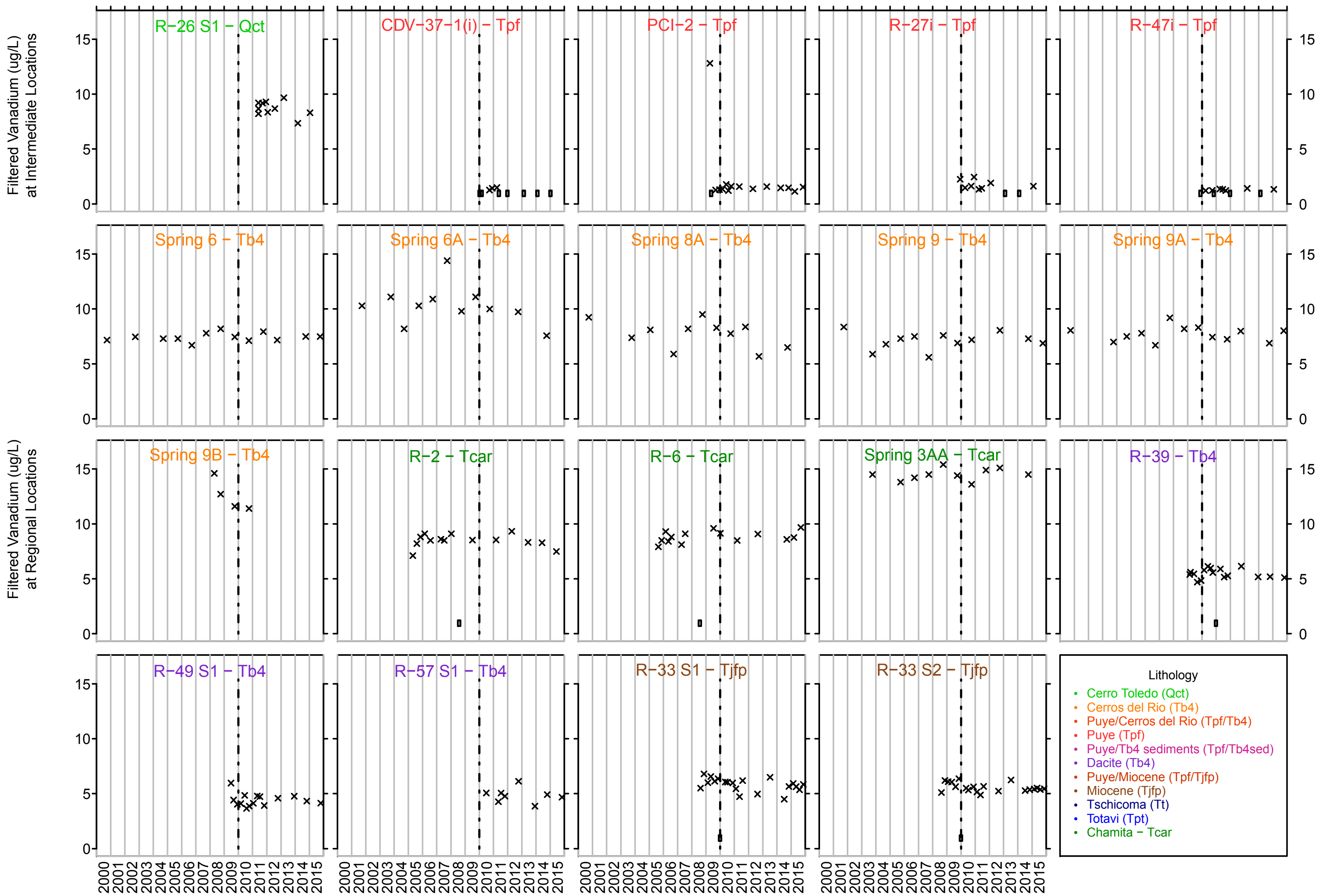



**Figure C-174 Time-series plots for filtered vanadium**

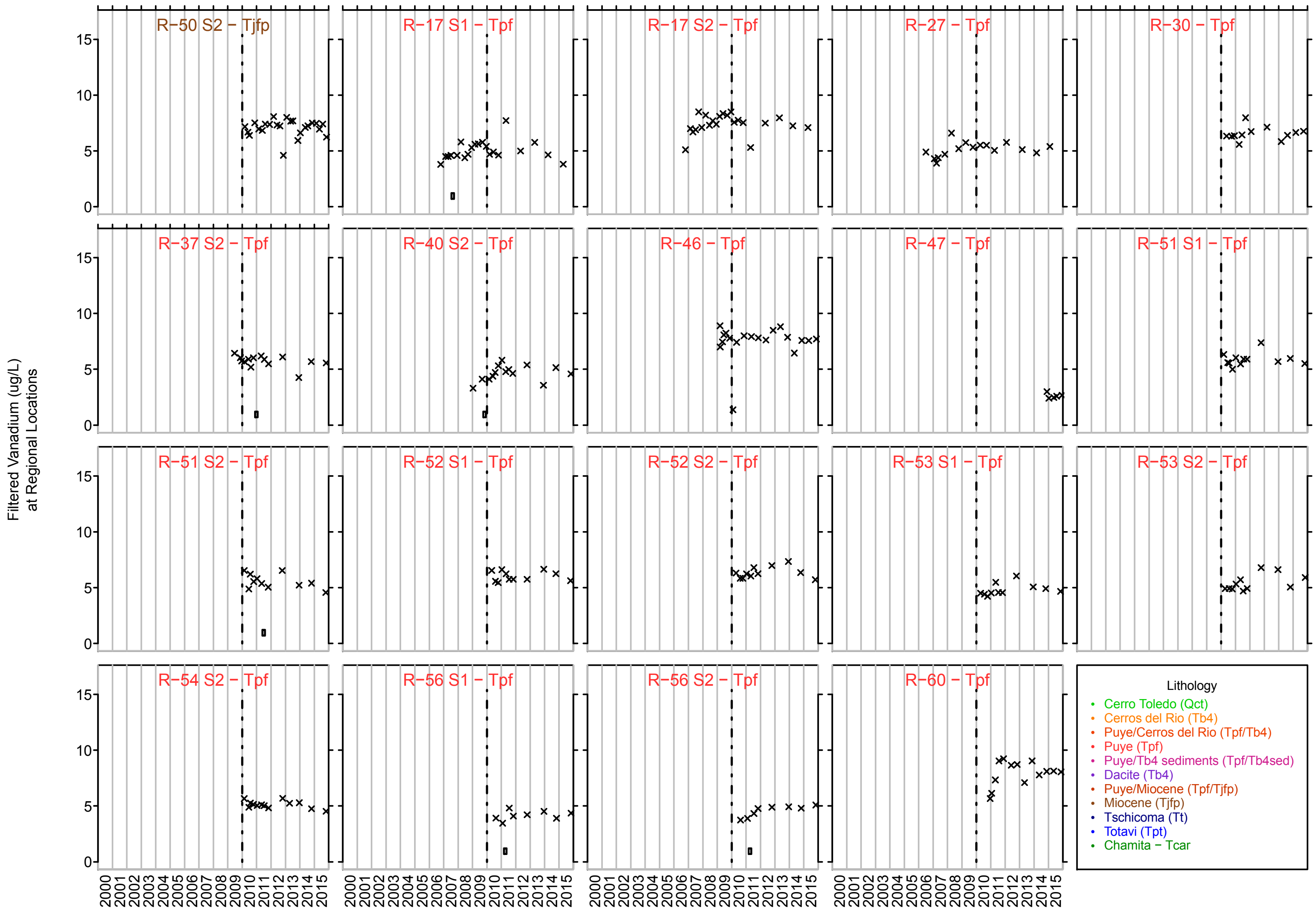



**Figure C-174 (continued) Time-series plots for filtered vanadium**

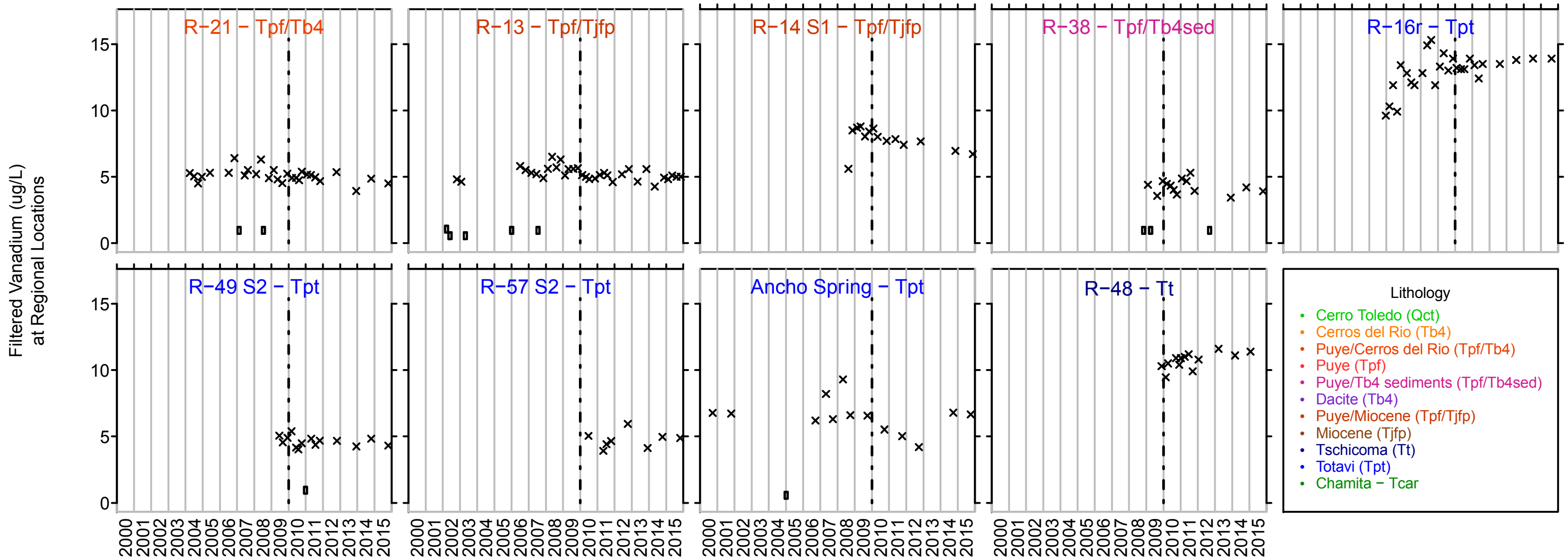



**Figure C-174 (continued) Time-series plots for filtered vanadium**

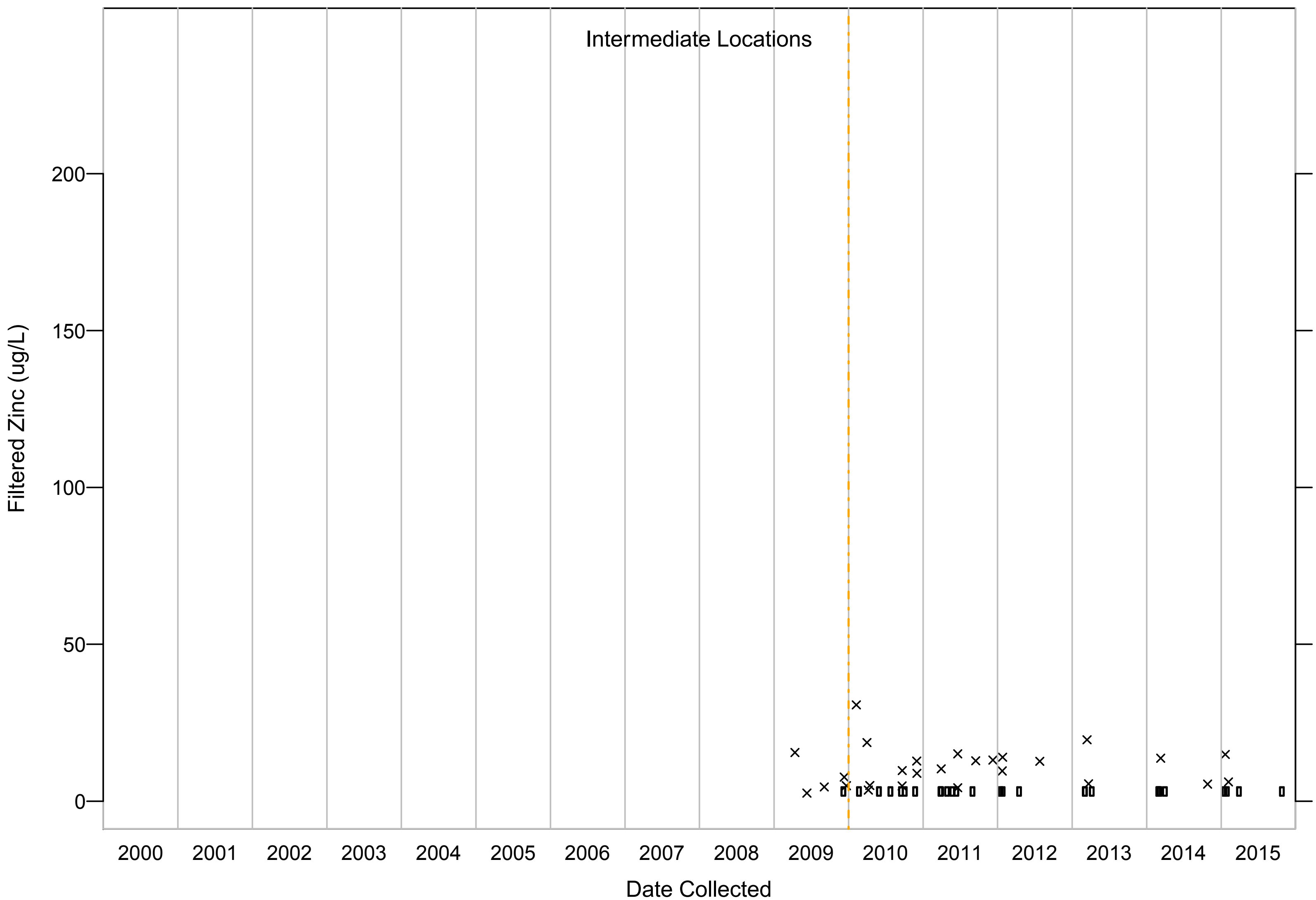



**Figure C-175 Filtered zinc results for perched-intermediate groundwater**

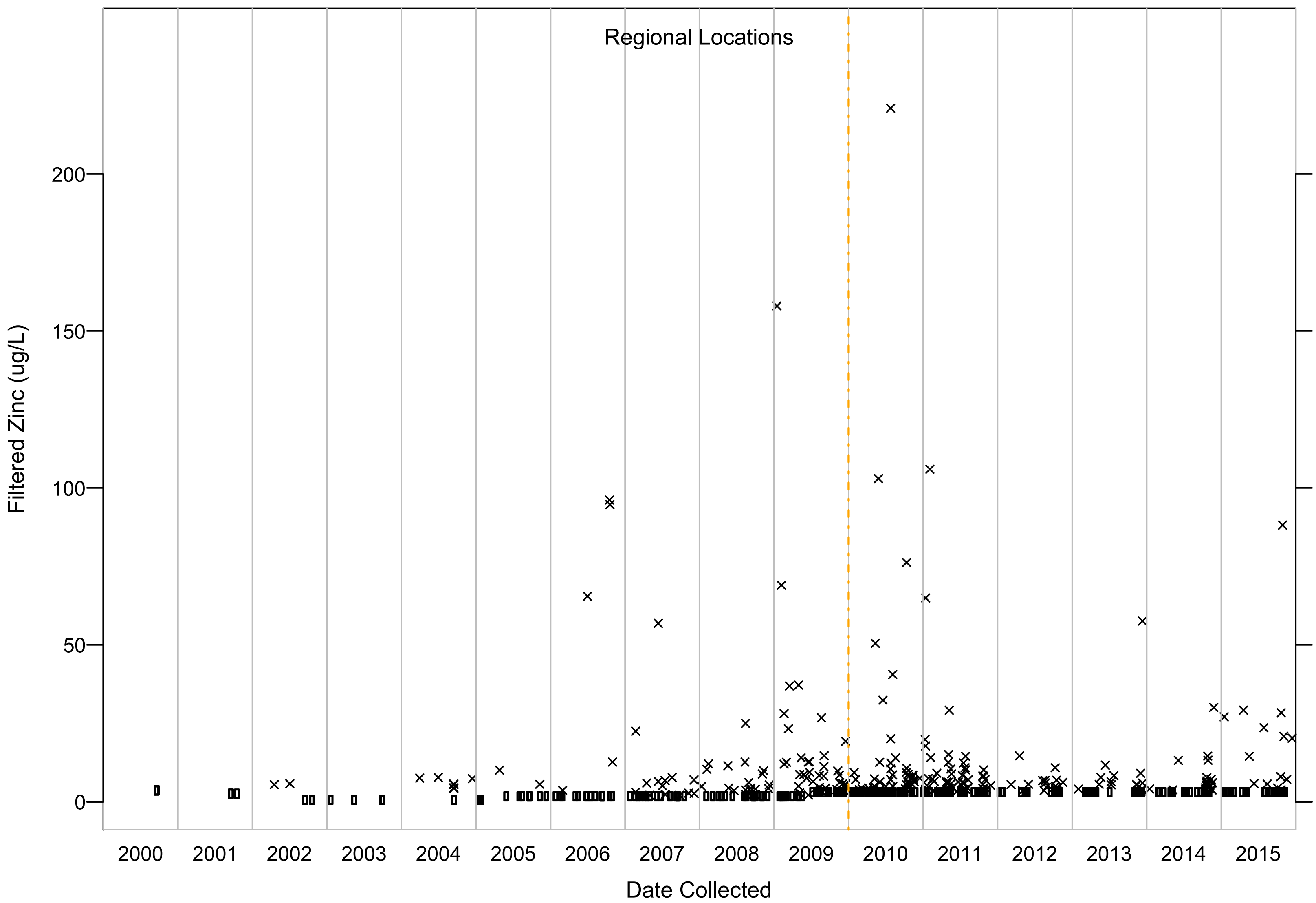



**Figure C-176 Filtered zinc results for regional aquifer**

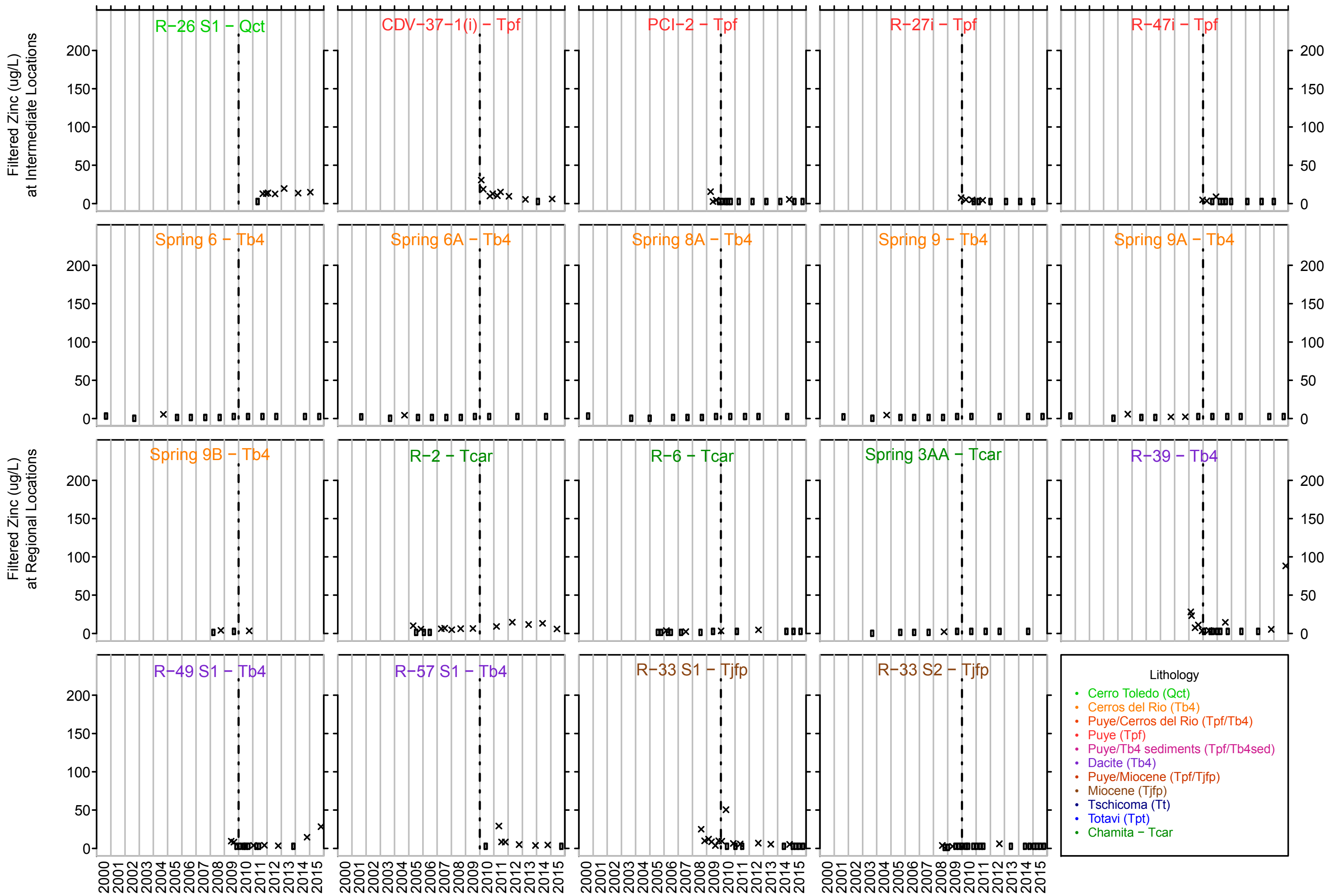



**Figure C-177 Time-series plots for filtered zinc**

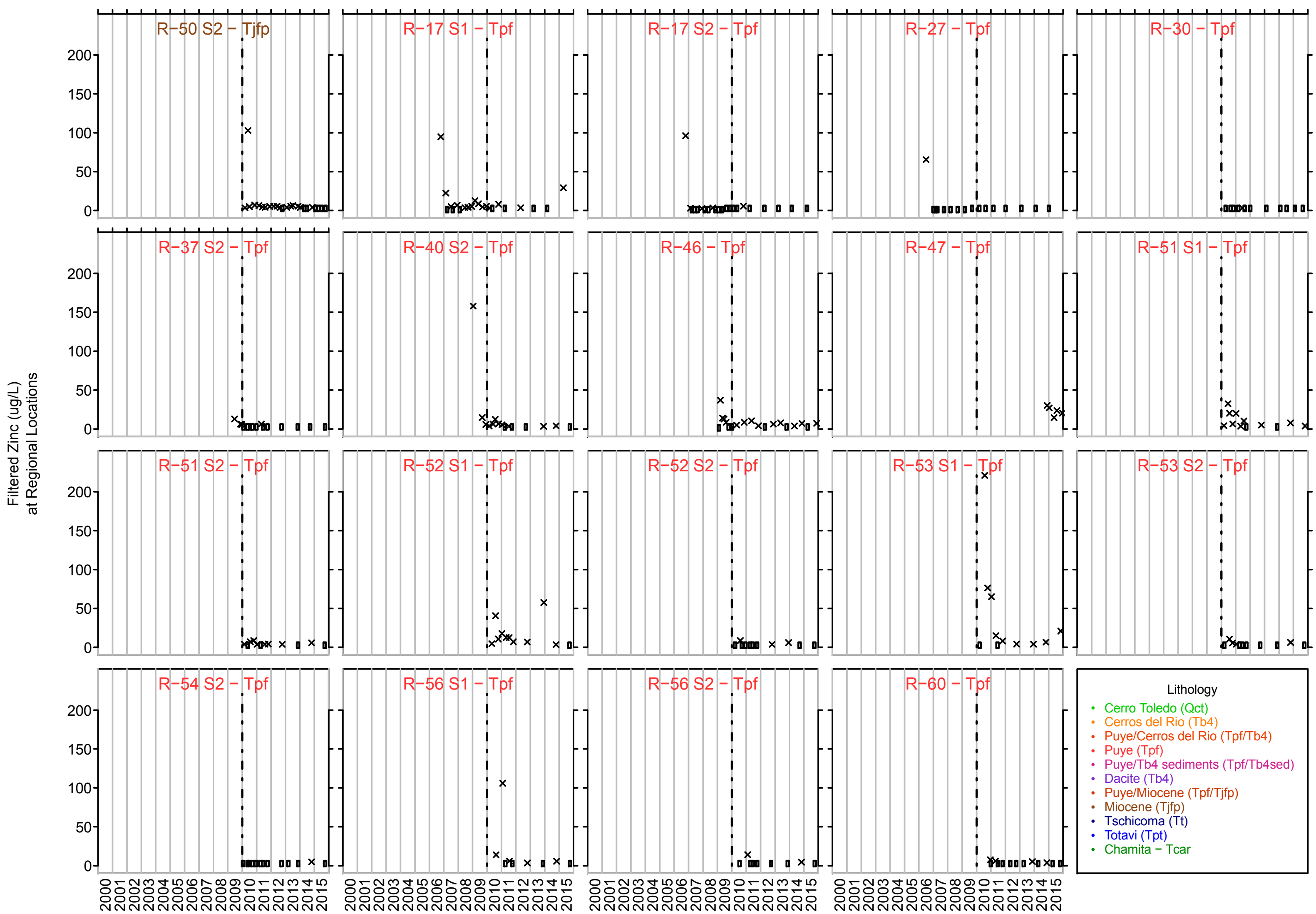



**Figure C-177 (continued) Time-series plots for filtered zinc**

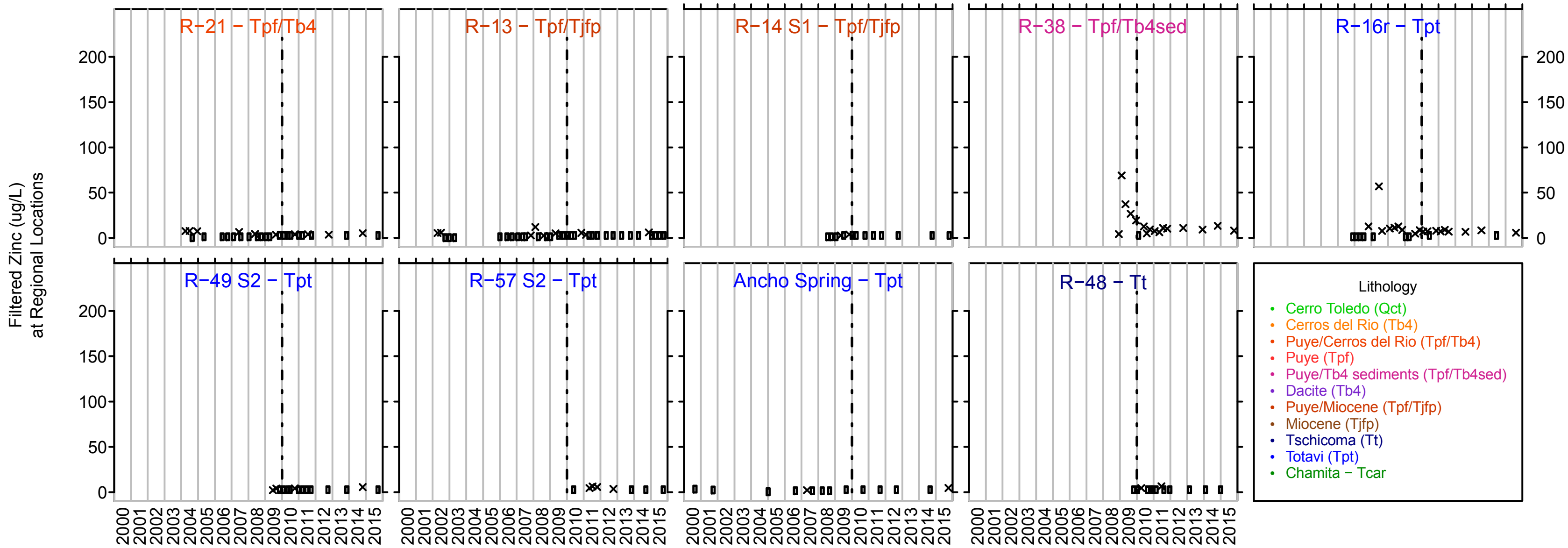



**Figure C-177 (continued) Time-series plots for filtered zinc**

# Appendix D

*ProUCL Files*
*(on CD included with this document)*