

RPP-RPT-58297, Rev. 0

Screening-Level Evaluation of Groundwater Monitoring Data Collected in Vicinity of WMA C

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Abstract: This report provides a screening-level evaluation of groundwater data from 12 wells that monitor contaminants in the unconfined aquifer in the vicinity of Waste Management Area (WMA) C. The evaluation is based on sampling and analysis data collected over the 10-year period from January 2004 through December 2013. The primary objective of the evaluation is to identify a set of groundwater analytes of interest that report concentrations greater than comparison values developed for protection of human health (Maximum Contaminant Levels and risk-based standards) in the vicinity of WMA C. The analytes of interest have the potential to be cancer risk or noncancer hazard drivers.

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APPROVED
By Julia Raymer at 2:48 pm, Nov 17, 2014

Release Approval

Date



Release Stamp

Approved For Public Release

Mesford, Timothy B

From: Eberlein, Susan J
Sent: Thursday, November 06, 2014 3:51 PM
To: Mesford, Timothy B; Bergeron, Marcel P; Singleton, Kristin M
Subject: RE: Emailing: RPP-RPT-58297 - Shortcut

I think the new graphic looks excellent. I approve releasing the document.
The link appears to have been attached.

Susan Eberlein
372-1689
Closure & Corrective Measures
Washington River Protection Solutions,
contractor to the United States Department of Energy

-----Original Message-----

From: Mesford, Timothy B
Sent: Thursday, November 06, 2014 3:49 PM
To: Bergeron, Marcel P; Singleton, Kristin M; Eberlein, Susan J
Subject: RE: Emailing: RPP-RPT-58297 - Shortcut

Marcel/Kristin/Susan,

New graphic incorporated; resending link to updated file. I tried a new method for attaching the link, so let me know if doesn't work.

Thanks,
Tim

-----Original Message-----

From: Douglas Evans [<mailto:devans@intera.com>]
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Cc: Mesford, Timothy B; Jeff McTighe
Subject: RE: Emailing: RPP-RPT-58297 - Shortcut

Hi All,

Here's a revised graphic (PNG) using a light teal blue highlighting. If this doesn't hit the mark please holler and we'll tweak some more.

Doug

-----Original Message-----

From: Bergeron, Marcel P [mailto:Marcel_P_Bergeron@rl.gov]
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Mesford, Timothy B

From: Bergeron, Marcel P
Sent: Tuesday, November 11, 2014 9:48 AM
To: Mesford, Timothy B
Cc: Tabor, Cynthia L
Subject: RE: Emailing: RPP-RPT-58297 - Shortcut

Hi Tim

I approve this document. Please proceed with its final release.

Marcel

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CONTRACTOR TO THE UNITED STATES DEPARTMENT OF ENERGY

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To: Bergeron, Marcel P
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Marcel,

Susan has approved the below for release; where are we with other reviews/approvals?

Thanks,
Tim

-----Original Message-----

From: Bergeron, Marcel P
Sent: Friday, November 07, 2014 8:39 AM
To: Douglas Evans; Singleton, Kristin M; Randy Dockter; Eberlein, Susan J; Aly, Alaa H
Cc: Mesford, Timothy B; Jeff McTighe
Subject: RE: Emailing: RPP-RPT-58297 - Shortcut

Much better thanks, Doug

-----Original Message-----

From: Douglas Evans [<mailto:devans@intera.com>]

RPP-RPT-58297

Revision 0

Screening-Level Evaluation of Groundwater Monitoring Data Collected in Vicinity of WMA C

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EXECUTIVE SUMMARY

This report provides a screening-level evaluation of groundwater data from 12 wells that monitor contaminants in the unconfined aquifer in the vicinity of Waste Management Area (WMA) C. The evaluation is based on sampling and analysis data collected over the 10-year period from January 2004 through December 2013. The primary objective of the evaluation is to identify a set of groundwater analytes of interest that report concentrations greater than comparison values developed for protection of human health (Maximum Contaminant Levels and risk-based standards) in the vicinity of WMA C. The analytes of interest have the potential to be cancer risk or noncancer hazard drivers.

The evaluation was performed using the following sequence of steps:

- Extracting the groundwater analytical data from the Hanford Environmental Information System database
- Processing the extracted data to obtain a single set of results per sampling location and time of collection
- Evaluating the processed data set to select analytes that qualify for use in screening against human health-protective comparison values
- Deriving human health-protective comparison values from chemical-specific applicable or relevant and appropriate requirements and/or risk-based concentrations calculated using default exposure assumptions
- Comparing maximum detected analyte concentrations to comparison values to develop a WMA C-wide list of analytes of interest
- Identifying analytes of interest at each monitoring well.

The primary purpose of this evaluation is to provide supplemental information to support the WMA C *Resource Conservation and Recovery Act of 1976* (RCRA) facility investigation/corrective measures study process and the ongoing investigations into potential contributions to current and future groundwater contamination from sources in the vadose zone at WMA C. This evaluation is considered a high-level evaluation that is intended to provide an initial base of information that can be used in conjunction with additional groundwater evaluations that may be completed as a part of the WMA C RCRA facility investigation/corrective measures study process as well as the Baseline Risk Assessment for the groundwater aquifer conducted to support the 200-BP-5 groundwater operable unit. It should be noted that the analytes of interest identified herein are not necessarily those that will be identified as risk drivers in the baseline risk assessment for the 200-BP-5 groundwater operable unit.

A total of 40,505 records were obtained from the Hanford Environmental Information System database, and a total of 310 analytes were included in the data set prior to data processing and reduction. After data processing and reduction, the data set contained 9,524 records and

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55 analytes. Evaluation of these 55 analytes resulted in the identification of 31 analytes with maximum detected concentrations less than their respective comparison values. These 31 analytes were not retained as analytes of interest. The remaining 24 analytes report maximum detected concentrations greater than their respective comparison values and were carried forward into an analyte-specific evaluation. The analyte-specific evaluation considered natural background concentrations as well as spatial and temporal variations in analyte concentrations. Analytes with results indicative of natural background conditions, or those analytes reported on a nonrecurring basis (concentrations that are not reproducible or consistent with the remainder of the data set), were not retained as analytes of interest.

Based on the analyte-specific evaluation, 17 of the 24 analytes with maximum detected concentrations greater than their respective comparison values were not carried forward. The remaining seven analytes were considered likely to be of interest for assessing the potential for cancer risks or noncancer hazards or investigating potential groundwater contamination sources at WMA C and were carried forward into a well-specific evaluation. The seven analytes of interest for the WMA C data set are ^{129}I , ^{99}Tc , nickel, vanadium, cyanide, nitrate, and sulfate. Of these, ^{129}I , nickel, and vanadium do not appear to be correlated with releases from WMA C. Cyanide, nitrate, sulfate, and ^{99}Tc appear to be correlated with a release from WMA C, with declining concentrations.

As a final step, a well-specific evaluation was performed to identify analytes of interest in the individual monitoring wells. Analytical results for the seven area-wide analytes of interest were further screened against comparison values using the well-specific data sets. A summary table identifying the analytes detected at concentrations above their respective comparison values in each of the 12 unconfined aquifer monitoring wells is provided in Table ES-1. A location map depicting each well's analytes of interest is provided in Figure ES-1.

Table ES-1. Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C Reported with Analyte Concentrations Greater Than Comparison Values (2004 through 2013)

Well Name	Analyte of Interest (Comparison Value)						
	Iodine-129 (1 pCi/L) ^a	Technetium-99 (900 pCi/L) ^a	Nickel (32 µg/L) ^b	Vanadium (8.0 µg/L) ^b	Cyanide (0.48 µg/L) ^b	Nitrate (11,360 µg/L) ^b	Sulfate (250,000 µg/L) ^a
299-E27-12	•			•	•	•	
299-E27-13	•	•		•	•	•	
299-E27-14	•	•		•	•	•	•
299-E27-15	•		•	•	•	•	
299-E27-155	•	•		•	•	•	
299-E27-21	•	•		•	•	•	
299-E27-22	•			•	•	•	
299-E27-23	•	•	•	•	•	•	
299-E27-24	•	•		•	•	•	•
299-E27-25	•		•	•		•	•
299-E27-4	•	•	•	•	•	•	
299-E27-7	•			•	•	•	•

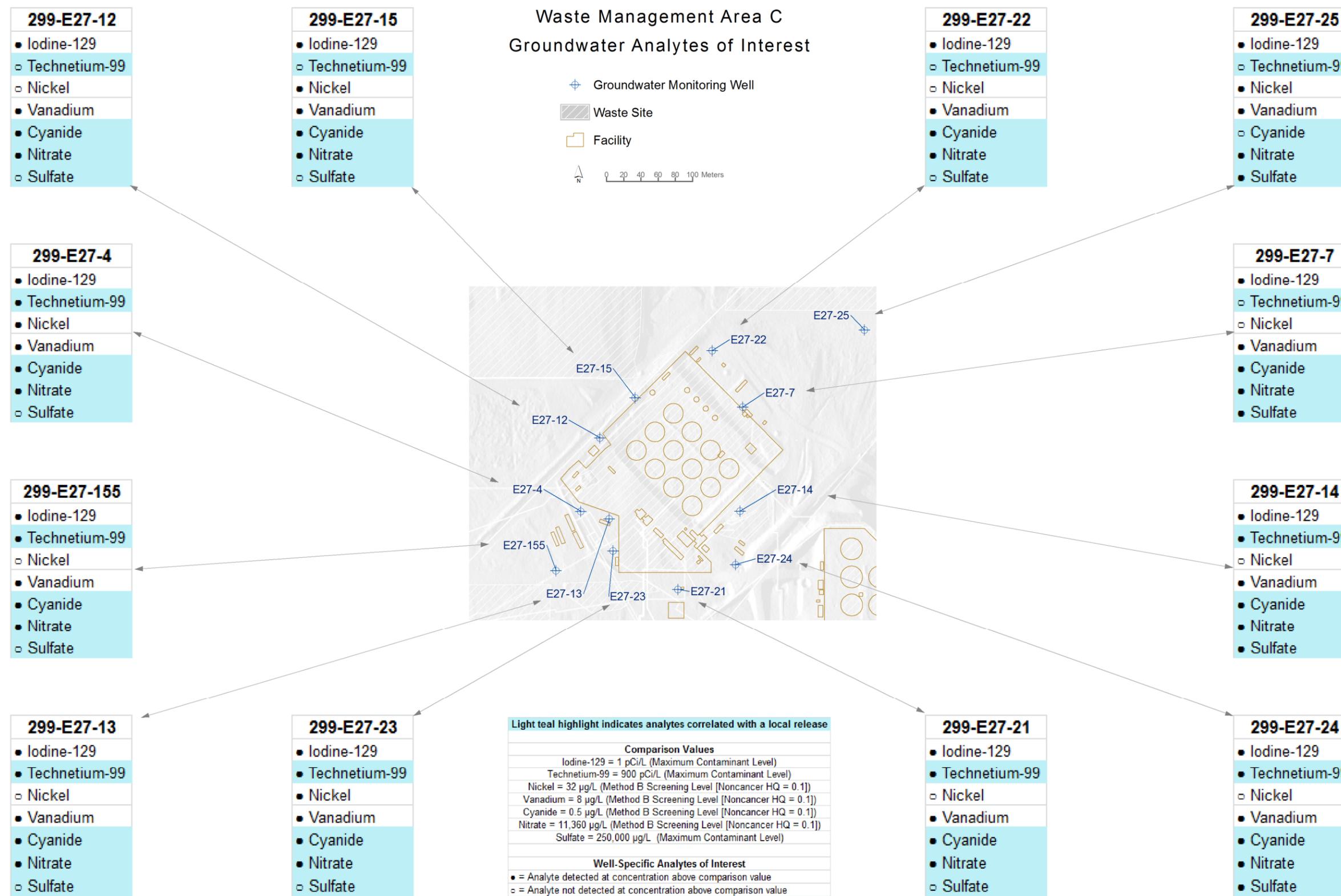
^a Federal maximum contaminant level (sulfate value is a secondary standard).

^b Method B groundwater screening level (hazard quotient = 0.1 noncancer hazard value).

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Figure ES-1. Well-Specific Analytes of Interest in the Vicinity of Waste Management Area C (2004 through 2013)



Date: 11/6/2014 AnalyteTextBox11x17

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LIST OF TERMS**Abbreviations and Acronyms**

AEA	<i>Atomic Energy Act of 1954</i>
ARAR	applicable or relevant and appropriate requirement
CAS	Chemical Abstracts Service
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CFR	<i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HEIS	Hanford Environmental Information System
HQ	hazard quotient
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDL	method detection limit
MRDL	maximum residual disinfectant level
NTU	Nephelometric turbidity unit
OU	operable unit
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RFI/CMS	RCRA facility investigation/corrective measures study
SVOC	semi-volatile organic compound
VOC	volatile organic compound
WAC	<i>Washington Administrative Code</i>
WMA	Waste Management Area

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1.0 INTRODUCTION

This report provides a screening-level evaluation of groundwater data from 12 wells that monitor contaminants in the unconfined aquifer in the vicinity of Waste Management Area (WMA) C. The evaluation is based on sampling and analysis data collected over the 10-year period from January 2004 through December 2013. The primary objective of the evaluation is to identify a set of groundwater analytes of interest that have the potential to contribute to cancer risks or noncancer hazards in the vicinity of WMA C.

It should be noted that contamination in the groundwater underlying WMA C is being addressed under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). Waste Management Area C, a *Resource Conservation and Recovery Act of 1976* (RCRA)-regulated facility, is identified as an area of interest within the CERCLA 200-BP-5 groundwater operable unit (OU). A quantitative baseline risk assessment and evaluation of remedial alternatives for groundwater in the WMA C area of interest are scheduled to be completed as part of the 200-BP-5 groundwater OU remedial investigation/feasibility study (DOE/RL-2009-127, *Remedial Investigation Report for the 200-BP-5 Groundwater Operable Unit*).

The primary purpose of this evaluation is to provide supplemental information to support the WMA C RCRA facility investigation/corrective measures study (RFI/CMS) process and the ongoing investigations into potential contributions to current and future groundwater contamination from sources in the vadose zone at WMA C. This evaluation is considered a high-level evaluation that is intended to provide an initial base of information that can be used in conjunction with additional groundwater evaluations that may be completed as a part of the WMA C RFI/CMS process. It should be noted that the analytes of interest identified herein are not necessarily those that will be identified as cancer risk and noncancer hazard drivers in the baseline risk assessment for the 200-BP-5 groundwater OU.

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2.0 METHODOLOGY

This section describes the evaluation methodology. Section 2.1 describes the steps used to process the analytical data obtained from the Hanford Environmental Information System (HEIS), Section 2.2 describes the selection of groundwater comparison values and background concentrations, and Section 2.3 describes the process used to screen the data and identify analytes of interest.

2.1 ANALYTICAL DATA PROCESSING

The data set obtained from HEIS included the following types of information:

- Analytical results from both unfiltered and filtered samples
- Data qualification and data validation flags, including rejected results
- Results for a given analyte reported by more than one analytical method
- Parent and field duplicate sample results.

The analytical data were processed to remove unusable results and identify one set of results per sampling location and date of sample collection. The data processing steps and the numbers of records associated with each step are presented in Figure 2-1. Descriptions of the data processing steps are provided in the following sections.

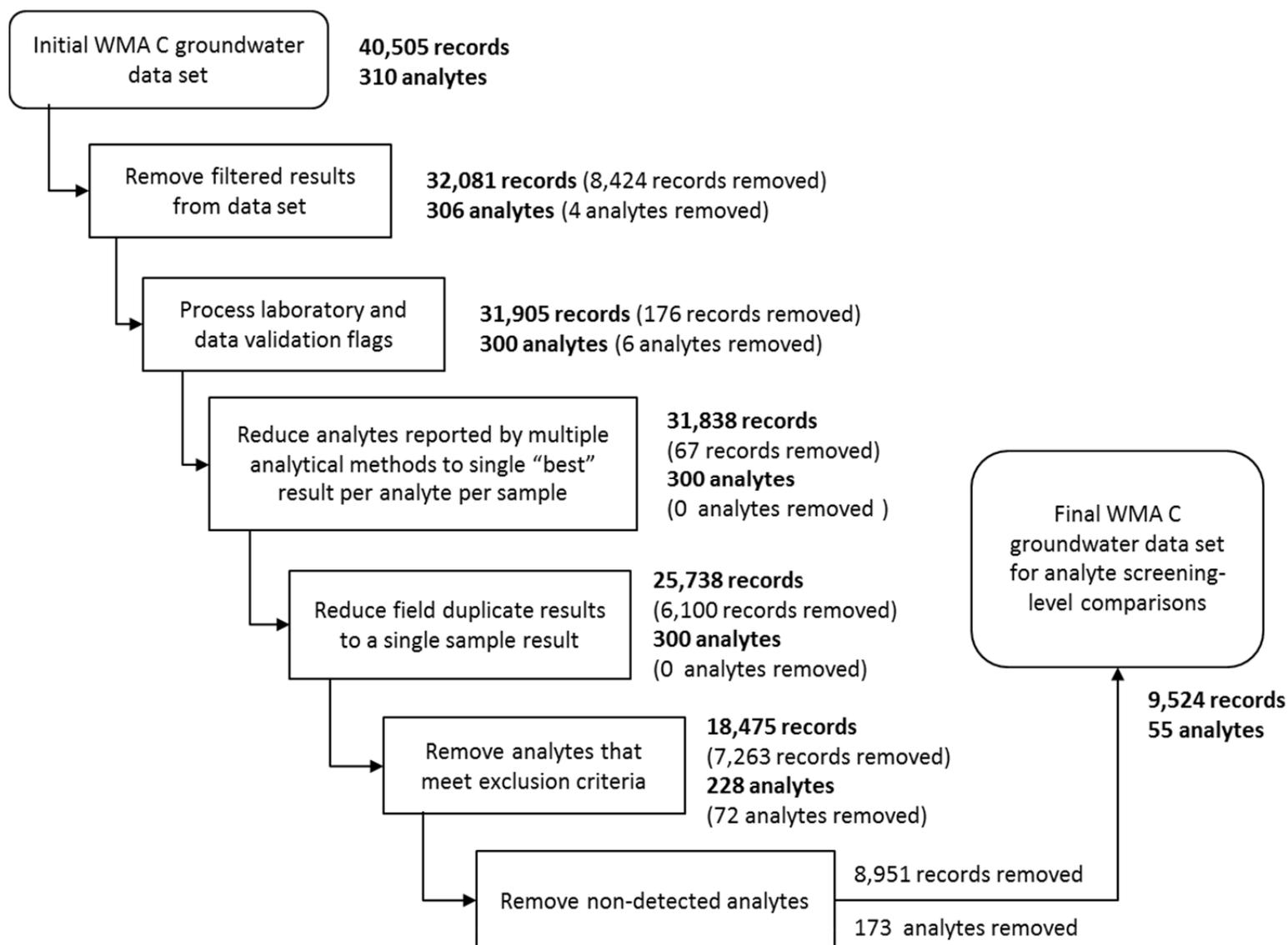
2.1.1 Sample Results

Only analytical results from unfiltered samples are used in this evaluation; results from filtered samples that may have been collected in support of different monitoring or compliance programs are excluded. Unfiltered sample results represent total concentrations of the analytes, while filtered sample results represent only dissolved concentrations. Use of filtered sampling results might lead to underestimation of chemical and radiological concentrations (for example, in water from an unfiltered tap).

EPA/540/1-89/002, *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)* addresses this issue in providing guidance on estimating exposure concentrations in groundwater:

While filtration of ground-water samples provides useful information for understanding chemical transport within an aquifer..., the use of filtered samples for estimating exposure is very controversial because these data may underestimate chemical concentrations in water from an unfiltered tap. Therefore, data from unfiltered samples should be used to estimate exposure concentrations.

Figure 2-1. Analytical Data Processing and Reduction for the Waste Management Area C Groundwater Data Set



WMA = Waste Management Area

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2.1.2 Laboratory and Data Validation Flags

Analytical data are received from the laboratory with data qualification flags. Validation qualifiers are assigned during the data validation process. The following rules determine how flagged and/or qualified sample results are used in the evaluation.

- Sample results flagged with a “U” data qualifier or combinations of qualifiers that include a “U,” such as a “UJ,” are considered non-detected results.
- Sample results without a “U” data qualifier are considered detected concentrations, including results with no qualifier or with a “J” data qualifier.
- Sample results that are rejected and flagged with an “R” validation qualifier are not used.

Where:

U = Analyzed for but not detected above limiting criteria

J = Estimated value

R = Do not use. Further review indicates the result is not valid.

2.1.3 Analytes Reported by Numerous Analytical Methods

Often analytes are reported by more than one analytical method. Therefore, multiple results for an analyte at the same location and sample date are possible. Because multiple sets of analytical results cannot be used to quantify risk (as this would result in multiple counting of a chemical), the set of data that best represents the actual concentration is retained. The results are processed to select the method that provides the most reliable results. Considerations for determining data to be retained include method-associated sample size, detection frequency, and detection limits. The most conservative (i.e., health-protective) use of these types of data is the goal. Larger sample size, higher detection frequencies, and lower detection limits are given higher priority for method selection.

For example, lead may be analyzed using U.S. Environmental Protection Agency (EPA) Method 200.8, “Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry” (EPA 1994) with an estimated quantitation limit of 2 µg/L or EPA Method 6010, “Method 6010C. Inductively Coupled Plasma-Atomic Emission Spectrometry” (EPA 2007) with an estimated quantitation limit of 50 µg/L. For a sample with lead concentrations reported using both methods, the results reported by EPA Method 200.8 are selected over EPA Method 6010 because of the more sensitive detection limit.

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2.1.4 Field Duplicate Results

Field quality control samples (field duplicates) are collected in the field and analyzed by the laboratory as unique samples. The parent sample and quality control samples are collected from the same location (i.e., monitoring well) on the same date, resulting in more than one sample per location and date. The following criteria are used to reduce multiple sample results for an individual location and date to a single result:

- If two or more detections exist, the maximum concentration is used
- If at least one detection and one or more non-detected results exist, the detected concentration is used
- If only (two or more) non-detected results exist, the lowest detection limit is used.

2.2 IDENTIFY GROUNDWATER COMPARISON VALUES AND BACKGROUND CONCENTRATIONS

The following subsections describe the derivation of the human health-protective groundwater comparison values and background concentrations used in the evaluation.

2.2.1 Groundwater Comparison Values

For purposes of this evaluation, comparison values are screening levels derived from chemical-specific applicable or relevant and appropriate requirements (ARARs) and/or risk-based concentrations calculated using default exposure assumptions.

Following are the sources of groundwater comparison values from Federal regulations:

- Title 40 *Code of Federal Regulations*, Part 141, “National Primary Drinking Water Regulations” (40 CFR 141), maximum contaminant levels (MCLs), secondary MCLs, and nonzero MCL goals established under the *Safe Drinking Water Act of 1974*.

Following are the sources of groundwater comparison values from Washington State regulations:

- *Washington Administrative Code* (WAC) 173-340-720, “Groundwater Cleanup Standards”
- WAC 246-290-310, “Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs).”

Derivation of groundwater cleanup levels in accordance with the 2007 Washington State Model Toxics Control Act (*Revised Code of Washington* 70.105D, “Hazardous Waste Cleanup — Model Toxics Control Act”) cleanup regulations (WAC 173-340-720) is provided in ECF-100NPL-10-0462, *Calculation of Standard Method B Groundwater Cleanup Levels for Potable Groundwater for the 100 Areas, 200 Areas, and 300 Area Remedial Investigation/*

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Feasibility Study Reports. For this evaluation, Method B groundwater screening levels that represent the more stringent of the 1×10^{-6} target cancer risk value and a hazard quotient (HQ) of 0.1 are used. Method B noncancer values calculated using standard formula parameters and an HQ of both 1 and 0.1 are presented in ECF-100NPL-10-0462. The noncancer HQ of 0.1 values are used for this evaluation because multiple analytes are present and this approach identifies analytes that may have a common mechanism of action and target organ.

Surface water and ambient water quality criteria standards are not considered for the identification of comparison values because these standards only apply for groundwater where it enters the Columbia River. For upland groundwater areas such as WMA C, only the drinking water standards are applicable.

Selection of the groundwater comparison values is presented in Section 3.2.1.

2.2.2 Groundwater Background Concentrations

For certain analytes (e.g., arsenic), measured background concentrations in the Hanford Site unconfined aquifer are greater than the risk-based comparison value. In such cases, detected concentrations above the comparison value do not necessarily indicate the presence of site-related contamination. This evaluation therefore uses comparisons to both background concentrations and comparison values to distinguish between probable site-related contamination and natural background conditions.

The background composition of groundwater in the unconfined aquifer at the Hanford Site has been determined for a range of major and trace constituents. The evaluation of background composition was done on a sitewide basis to provide a consistent, technically defensible definition of background, as opposed to determining local background compositions at each waste management unit. Hanford Site groundwater background concentrations are presented in Section 3.2.2.

The program of sampling, analysis, screening, and statistical interpretation used to establish Hanford Site background concentrations is presented in DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*. In this study, historical Hanford Site groundwater data (and new data collected specifically for the study) were screened to eliminate samples and/or constituents that may have been affected by Hanford Site activities.

The screening process was conducted in two steps: using thresholds based on an upper range of background compositions to eliminate any data that show obvious signs of contamination, and evaluating the location of each well with respect to known groundwater contamination and area activities. The background sampling program involved collection of both unfiltered and filtered (0.4 micron port size) samples. In general, background values were established using filtered samples for metals and radionuclides and unfiltered samples for anions. It should be noted that use of filtered results can underestimate natural background concentrations and only unfiltered (total concentration) WMA C sample results are used in this evaluation. The background comparisons presented in this evaluation are therefore conservative and contain an element of uncertainty.

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2.3 GROUNDWATER DATA SCREENING PROCESS

After extracting and processing the groundwater analytical data as described in Section 2.1, and then identifying comparison values and background concentrations as described in Section 2.2, a multi-step screening process is performed. The process involves the following steps:

- Apply exclusion criteria
- Identify non-detected analytes
- Identify analytes with maximum detected concentrations less than comparison values
- Identify analytes with maximum detected concentrations greater than comparison values.

These four steps are performed using the combined (12-well) data set and result in the identification of analytes of interest for the entire data set. As a final step, the data sets for the individual monitoring wells are evaluated to determine which wells have detections of these analytes at concentrations greater than their respective comparison values.

Descriptions of each step in the process follow.

2.3.1 Apply Exclusion Criteria

The first step is to apply exclusion criteria. Analytes that meet one or more exclusion criteria are eliminated from further consideration. Analytes that do not meet exclusion criteria are carried forward to the next step of the process. The exclusion criteria are as follows:

- Water quality parameters
- Essential nutrients (minerals)
- Naturally occurring radionuclides associated with background radiation
- Radionuclides that have half-lives of less than three years and that are not significant daughter products
- Analytes without known toxicity information.

2.3.2 Identify Non-Detected Analytes

The next step in the process is to identify non-detected analytes. Chemicals and radionuclides that were not detected in any groundwater samples in the 12-well data set are eliminated from further consideration. All analytes detected at least once are carried forward to the next step of the process.

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2.3.3 Identify Analytes with Maximum Detected Concentrations Less than Comparison Values

In this step, the maximum concentration of each analyte detected in the combined (12-well) groundwater data set is compared to its comparison value to identify analytes not likely to be a cancer risk or noncancer hazard driver. If the maximum detected concentration of an analyte is less than its comparison value, the analyte is eliminated from further consideration.

To reduce the potential for eliminating analytes that have a common mechanism of action and target organ, comparison values for analytes with noncarcinogenic effects are based on an HQ of 0.1. Additionally, method detection limits (MDLs) are evaluated to determine if the limits were adequate for confirming the absence of an analyte.

2.3.4 Identify Analytes with Maximum Detected Concentrations Greater than Comparison Values

This step identifies analytes with maximum detected concentrations in the combined (12-well) groundwater data set that are greater than their respective comparison values. For purposes of this evaluation, such analytes are considered the most likely to be a cancer risk or noncancer hazard driver and are identified as analytes of interest, unless an analyte-specific evaluation indicates otherwise. An analyte-specific evaluation is performed to distinguish analytes with results that are indicative of natural groundwater background conditions or those analytes that are reported on a nonrecurring basis (concentrations that are not reproducible or consistent with the remainder of the data set). Such analytes are not retained as analytes of interest. Analytes retained are carried forward to the final step of the process.

2.3.5 Identify Analytes of Interest in Individual Monitoring Wells

This final step evaluates the well-specific data sets for each of the 12 monitoring wells to determine which wells report detected concentrations of analytes of interest greater than their respective comparison values. Based on this evaluation, a summary of the analytes of interest that exceed comparison values in each well is provided.

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3.0 ASSUMPTIONS AND INPUTS

This section describes the assumptions and inputs associated with the process used to identify analytes of interest in the vicinity of WMA C.

3.1 GROUNDWATER DATA SET

The groundwater data set used for this evaluation consists of sampling and analysis data collected over a 10-year period, between January 2004 and December 2013, from 12 monitoring wells located in the vicinity of WMA C. A list of the wells is provided in Table 3-1. The location of the wells is shown in Figure 3-1. All of the wells are screened in the unconfined aquifer and are sampled to fulfill requirements of RCRA and the *Atomic Energy Act of 1954*. The wells listed in Table 3-1 are the same as the wells identified in the 200-BP-5 groundwater OU remedial investigation/feasibility study for evaluation of the WMA C area of interest (DOE/RL-2009-127).

Table 3-1. Groundwater Monitoring Wells Used for Screening-Level Evaluation at Waste Management Area C

Well Name			
299-E27-12	299-E27-15	299-E27-22	299-E27-25
299-E27-13	299-E27-155	299-E27-23	299-E27-4
299-E27-14	299-E27-21	299-E27-24	299-E27-7

The analytical data for these 12 wells reside in, and were downloaded for this evaluation from, the HEIS database. A total of 40,505 records were obtained from HEIS, and a total of 310 analytes were included in the data set prior to analytical data processing. After analytical data processing using the steps described in Section 2.1, the data set contained 25,738 records and 300 analytes.

3.2 GROUNDWATER COMPARISON VALUES AND BACKGROUND CONCENTRATIONS

This section provides the groundwater comparison values and background concentrations derived from the sources discussed in Section 2.2.

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3.2.1 Groundwater Comparison Values

As discussed in Section 2.2.1, groundwater comparison values are screening levels derived from chemical-specific ARARs and/or risk-based concentrations calculated using default exposure assumptions. The risk-based concentrations are derived from the 2007 Model Toxics Control Act Method B groundwater cleanup level formulas in WAC 173-340-720. Method B groundwater screening levels are based on a target cancer risk of 1×10^{-6} or a noncancer HQ of 0.1. For analytes with both cancer and noncancer effects, the lower of the two Method B values is used.

The sources of the comparison values used for each of the 300 analytes reported in the processed 12-well data set are identified in Table 3-2. For purposes of screening the data set, the comparison value is the lowest of the available chemical-specific ARARs or the risk-based concentrations described above.

3.2.2 Groundwater Background Concentrations

As discussed in Section 2.2.2, the background composition of groundwater in the unconfined aquifer at the Hanford Site has been determined for a range of constituents and is presented in DOE/RL-96-61. Summary statistics computed from the groundwater background sampling data include geometric means, standard deviation, the range of measured concentrations, and the 90th and 95th percentiles computed for lognormal distributions (DOE/RL-96-61). These different statistics were computed to facilitate the use of background information for different needs. For purposes of this evaluation, comparisons are made to the lognormal 90th percentile groundwater background values. These values are presented in Table 3-3. As noted in Section 2.2.2, background concentrations for most metals and radionuclides were established using filtered samples, which can lead to underestimation of natural background concentrations. This has the potential to introduce uncertainty into the background comparisons for metals and radionuclides since only unfiltered (total concentration) sample results are used in this evaluation. The sample type (unfiltered or filtered) used to establish the background value for each analyte is noted in Table 3-3.

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Table 3-2. Summary of Federal and State Groundwater Comparison Values (Sheet 1 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
1,1,1,2-Tetrachloroethane	630-20-6	µg/L	--	--	--	--	1.7	1.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,1,1-Trichloroethane	71-55-6	µg/L	200	200	--	--	1,600	200	Federal MCL
1,1,2,2-Tetrachloroethane	79-34-5	µg/L	--	--	--	--	0.22	0.22	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,1,2-Trichloroethane	79-00-5	µg/L	5.0	3.0	--	--	0.77	0.77	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,1-Dichloroethane	75-34-3	µg/L	--	--	--	--	7.7	7.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,1-Dichloroethene	75-35-4	µg/L	7.0	7.0	--	--	40	7.0	Federal MCL
1,2,3-Trichloropropane	96-18-4	µg/L	--	--	--	--	0.0015	0.0015	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2,4,5-Tetrachlorobenzene	95-94-3	µg/L	--	--	--	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2,4-Trichlorobenzene	120-82-1	µg/L	70	70	--	--	1.5	1.5	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2-Dibromo-3-chloropropane	96-12-8	µg/L	0.20	--	--	--	0.055	0.055	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2-Dibromoethane	106-93-4	µg/L	0.050	--	--	--	0.022	0.022	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2-Dichlorobenzene	95-50-1	µg/L	600	600	--	--	72	72	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2-Dichloroethane	107-06-2	µg/L	5.0	--	--	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2-Dichloroethene (Total)	540-59-0	µg/L	--	--	--	--	7.2	7.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,2-Dichloropropane	78-87-5	µg/L	5.0	--	--	--	1.2	1.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,3-Dichlorobenzene	541-73-1	µg/L	--	--	--	--	--	--	--
1,4-Dichlorobenzene	106-46-7	µg/L	75	75	--	--	8.1	8.1	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,4-Dioxane	123-91-1	µg/L	--	--	--	--	0.44	0.44	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1,4-Naphthoquinone	130-15-4	µg/L	--	--	--	--	--	--	--

Table 3-3. Summary of Federal and State Groundwater Comparison Values (Sheet 2 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310 State MCL	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG		Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
1-Butanol	71-36-3	µg/L	--	--	--	--	80	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
1-Naphthylamine	134-32-7	µg/L	--	--	--	--	--	--	--
2-(2-methyl-4-chlorophenoxy) propionic acid	93-65-2	µg/L	--	--	--	--	1.6	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,3,4,6-Tetrachlorophenol	58-90-2	µg/L	--	--	--	--	48	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	93-76-5	µg/L	--	--	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	93-72-1	µg/L	50	50	--	--	13	13	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4,5-Trichlorophenol	95-95-4	µg/L	--	--	--	--	80	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4,6-Trichlorophenol	88-06-2	µg/L	--	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4-D(2,4-Dichlorophenoxyacetic acid)	94-75-7	µg/L	70	70	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	94-82-6	µg/L	--	--	--	--	13	13	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4-Dichlorophenol	120-83-2	µg/L	--	--	--	--	2.4	2.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4-Dimethylphenol	105-67-9	µg/L	--	--	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4-Dinitrophenol	51-28-5	µg/L	--	--	--	--	3.2	3.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,4-Dinitrotoluene	121-14-2	µg/L	--	--	--	--	0.28	0.28	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2,6-Dichlorophenol	87-65-0	µg/L	--	--	--	--	--	--	--
2,6-Dinitrotoluene	606-20-2	µg/L	--	--	--	--	1.6	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Acetylaminofluorene	53-96-3	µg/L	--	--	--	--	0.023	0.023	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Butanone	78-93-3	µg/L	--	--	--	--	480	480	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-4. Summary of Federal and State Groundwater Comparison Values (Sheet 3 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
2-Chloronaphthalene	91-58-7	µg/L	--	--	--	--	64	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Chlorophenol	95-57-8	µg/L	--	--	--	--	4.0	4.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Hexanone	591-78-6	µg/L	--	--	--	--	4.0	4.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Methyl-4 chlorophenoxyacetic acid	94-74-6	µg/L	--	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Methylnaphthalene	91-57-6	µg/L	--	--	--	--	3.2	3.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Methylphenol (cresol, o-)	95-48-7	µg/L	--	--	--	--	40	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Naphthylamine	91-59-8	µg/L	--	--	--	--	0.049	0.049	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Nitroaniline	88-74-4	µg/L	--	--	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Nitrophenol	88-75-5	µg/L	--	--	--	--	--	--	--
2-Picoline	109-06-8	µg/L	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	91-94-1	µg/L	--	--	--	--	0.19	0.19	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
3,3'-Dimethylbenzidine	119-93-7	µg/L	--	--	--	--	0.0080	0.0080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
3+4 Methylphenol (cresol, m+p)	65794-96-9	µg/L	--	--	--	--	--	--	--
3-Methylcholanthrene	56-49-5	µg/L	--	--	--	--	0.0040	0.0040	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
3-Nitroaniline	99-09-2	µg/L	--	--	--	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4,4'-DDD (Dichlorodipenyldichloroethane)	72-54-8	µg/L	--	--	--	--	0.36	0.36	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4,4'-DDE (Dichlorodipenyldichloroethylene)	72-55-9	µg/L	--	--	--	--	0.26	0.26	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4,4'-DDT (Dichlorodipenyltrichloroethane)	50-29-3	µg/L	--	--	--	--	0.26	0.26	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-5. Summary of Federal and State Groundwater Comparison Values (Sheet 4 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
4,6-Dinitro-2-methylphenol	534-52-1	µg/L	--	--	--	--	0.13	0.13	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Aminobiphenyl	92-67-1	µg/L	--	--	--	--	0.0042	0.0042	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Bromophenylphenyl ether	101-55-3	µg/L	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	59-50-7	µg/L	--	--	--	--	160	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Chloroaniline	106-47-8	µg/L	--	--	--	--	0.22	0.22	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Chlorophenylphenyl ether	7005-72-3	µg/L	--	--	--	--	--	--	--
4-Methyl-2-pentanone	108-10-1	µg/L	--	--	--	--	64	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Methylphenol (cresol, p-)	106-44-5	µg/L	--	--	--	--	80	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Nitroaniline	100-01-6	µg/L	--	--	--	--	4.4	4.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Nitrophenol	100-02-7	µg/L	--	--	--	--	--	--	--
4-Nitroquinoline-1-oxide	56-57-5	µg/L	--	--	--	--	--	--	--
5-Nitro-o-toluidine	99-55-8	µg/L	--	--	--	--	9.7	9.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
7,12-Dimethylbenz[a]anthracene	57-97-6	µg/L	--	--	--	--	3.50E-04	3.50E-04	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Acenaphthene	83-32-9	µg/L	--	--	--	--	96	96	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Acenaphthylene	208-96-8	µg/L	--	--	--	--	--	--	--
Acetone	67-64-1	µg/L	--	--	--	--	720	720	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Acetonitrile	75-05-8	µg/L	--	--	--	--	--	--	--
Acetophenone	98-86-2	µg/L	--	--	--	--	80	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Acrolein	107-02-8	µg/L	--	--	--	--	0.40	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-6. Summary of Federal and State Groundwater Comparison Values (Sheet 5 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Acrylonitrile	107-13-1	µg/L	--	--	--	--	0.081	0.081	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Aldrin	309-00-2	µg/L	--	--	--	--	0.0026	0.0026	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Alkalinity	ALKALINITY	µg/L	--	--	--	--	--	--	--
Allyl chloride	107-05-1	µg/L	--	--	--	--	2.1	2.1	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Alpha,alpha-Dimethylphenethylamine	122-09-8	µg/L	--	--	--	--	--	--	--
Alpha-BHC	319-84-6	µg/L	--	--	--	--	0.014	0.014	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Aluminum	7429-90-5	µg/L	--	--	--	--	1,600	1,600	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Americium-241	14596-10-2	pCi/L	15	--	--	--	--	15	Federal MCL
Ammonium ion	14798-03-9	µg/L	--	--	--	--	--	--	--
Aniline	62-53-3	µg/L	--	--	--	--	5.6	5.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Anthracene	120-12-7	µg/L	--	--	--	--	480	480	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Antimony	7440-36-0	µg/L	6.0	6.0	6.0	--	0.64	0.64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Antimony-125	14234-35-6	pCi/L	300	--	--	--	--	300	Federal MCL
Aramite	140-57-8	µg/L	--	--	--	--	3.5	3.5	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Arsenic	7440-38-2	µg/L	10	--	10	--	0.058	0.058	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Azobenzene	103-33-3	µg/L	--	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Barium	7440-39-3	µg/L	2,000	2,000	2,000	--	320	320	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Benzene	71-43-2	µg/L	5.0	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Benzo(a)anthracene	56-55-3	µg/L	--	--	--	--	0.12	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-7. Summary of Federal and State Groundwater Comparison Values (Sheet 6 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Benzo(a)pyrene	50-32-8	µg/L	0.20	--	--	--	0.012	0.012	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Benzo(b)fluoranthene	205-99-2	µg/L	--	--	--	--	0.12	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Benzo(ghi)perylene	191-24-2	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	207-08-9	µg/L	--	--	--	--	0.12	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Benzothiazole	95-16-9	µg/L	--	--	--	--	--	--	--
Benzyl alcohol	100-51-6	µg/L	--	--	--	--	80	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Beryllium	7440-41-7	µg/L	4.0	4.0	4.0	--	3.2	3.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Beryllium-7	13966-02-4	pCi/L	--	--	--	--	--	--	--
beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	319-85-7	µg/L	--	--	--	--	0.049	0.049	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bicarbonate	71-52-3	µg/L	--	--	--	--	--	--	--
Bis(2-chloro-1-methylethyl)ether	108-60-1	µg/L	--	--	--	--	0.63	0.63	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bis(2-Chloroethoxy)methane	111-91-1	µg/L	--	--	--	--	4.8	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bis(2-chloroethyl) ether	111-44-4	µg/L	--	--	--	--	0.040	0.040	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bis(2-ethylhexyl) phthalate	117-81-7	µg/L	6.0	--	--	--	6.3	6.0	Federal MCL
Boron	7440-42-8	µg/L	--	--	--	--	320	320	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bromide	24959-67-9	µg/L	--	--	--	--	--	--	--
Bromodichloromethane	75-27-4	µg/L	80	--	80	--	0.71	0.71	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bromoform	75-25-2	µg/L	80	--	80	--	5.5	5.5	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bromomethane	74-83-9	µg/L	--	--	--	--	1.1	1.1	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-8. Summary of Federal and State Groundwater Comparison Values (Sheet 7 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Butylbenzylphthalate	85-68-7	µg/L	--	--	--	--	46	46	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Cadmium	7440-43-9	µg/L	5.0	5.0	5.0	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--
Carbazole	86-74-8	µg/L	--	--	--	--	4.4	4.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Carbon disulfide	75-15-0	µg/L	--	--	--	--	80	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Carbon tetrachloride	56-23-5	µg/L	5.0	--	--	--	0.63	0.63	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Carbon-14	14762-75-5	pCi/L	2,000	--	--	--	--	2,000	Federal MCL
Carbonate alkalinity	CO3ALKALINITY	µg/L	--	--	--	--	--	--	--
Cesium-134	13967-70-9	pCi/L	80	--	--	--	--	80	Federal MCL
Cesium-137	10045-97-3	pCi/L	200	--	--	--	--	200	Federal MCL
Chlordane	57-74-9	µg/L	2.0	--	--	--	0.25	0.25	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Chloride	16887-00-6	µg/L	250,000	--	250,000	--	--	250,000	Federal Secondary MCL
Chlorobenzene	108-90-7	µg/L	100	100	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Chlorobenzilate	510-15-6	µg/L	--	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Chloroethane	75-00-3	µg/L	--	--	--	--	--	--	--
Chloroform	67-66-3	µg/L	80	70	80	--	1.4	1.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Chloromethane	74-87-3	µg/L	--	--	--	--	--	--	--
Chloroprene	126-99-8	µg/L	--	--	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Chromium	7440-47-3	µg/L	100	100	100	--	2,400	100	Federal MCL
Chrysene	218-01-9	µg/L	--	--	--	--	1.2	1.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
cis-1,2-Dichloroethylene	156-59-2	µg/L	70	70	--	--	1.6	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-9. Summary of Federal and State Groundwater Comparison Values (Sheet 8 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
cis-1,3-Dichloropropene	10061-01-5	µg/L	--	--	--	--	0.44	0.44	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Cobalt	7440-48-4	µg/L	--	--	--	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Cobalt-60	10198-40-0	pCi/L	100	--	--	--	--	100	Federal MCL
Coliform Bacteria	COLIFORM	Col/100mL	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	1,300	1,300	1,300	--	64	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Cyanide	57-12-5	µg/L	200	200	200	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dalapon	75-99-0	µg/L	200	200	--	--	24	24	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Delta-BHC	319-86-8	µg/L	--	--	--	--	--	--	--
Diallate	2303-16-4	µg/L	--	--	--	--	1.4	1.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dibenz[a,h]anthracene	53-70-3	µg/L	--	--	--	--	0.12	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dibenzofuran	132-64-9	µg/L	--	--	--	--	1.6	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dibromochloromethane	124-48-1	µg/L	80	60	80	--	0.52	0.52	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dibromomethane	74-95-3	µg/L	--	--	--	--	8.0	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dicamba	1918-00-9	µg/L	--	--	--	--	48	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dichlorodifluoromethane	75-71-8	µg/L	--	--	--	--	160	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dichloroprop	120-36-5	µg/L	--	--	--	--	--	--	--
Dieldrin	60-57-1	µg/L	--	--	--	--	0.0055	0.0055	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Diethylphthalate	84-66-2	µg/L	--	--	--	--	1,280	1,280	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dimethoate	60-51-5	µg/L	--	--	--	--	0.32	0.32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-10. Summary of Federal and State Groundwater Comparison Values (Sheet 9 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310 State MCL	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG		Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Dimethyl phthalate	131-11-3	µg/L	--	--	--	--	--	--	--
Di-n-butylphthalate	84-74-2	µg/L	--	--	--	--	160	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Di-n-octylphthalate	117-84-0	µg/L	--	--	--	--	19	19	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dinoseb(2-secButyl-4,6-dinitrophenol)	88-85-7	µg/L	7.0	7.0	--	--	1.6	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Diphenylamine	122-39-4	µg/L	--	--	--	--	40	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Dissolved oxygen	DO	µg/L	--	--	--	--	--	--	--
Disulfoton	298-04-4	µg/L	--	--	--	--	0.064	0.064	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Endosulfan I	959-98-8	µg/L	--	--	--	--	9.6	9.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Endosulfan II	33213-65-9	µg/L	--	--	--	--	9.6	9.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Endosulfan sulfate	1031-07-8	µg/L	--	--	--	--	--	--	--
Endrin	72-20-8	µg/L	2.0	2.0	--	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Endrin aldehyde	7421-93-4	µg/L	--	--	--	--	--	--	--
Ethyl cyanide	107-12-0	µg/L	--	--	--	--	--	--	--
Ethyl methacrylate	97-63-2	µg/L	--	--	--	--	72	72	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Ethyl methanesulfonate	62-50-0	µg/L	--	--	--	--	--	--	--
Ethylbenzene	100-41-4	µg/L	700	700	--	--	4.0	4.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Europium-152	14683-23-9	pCi/L	200	--	--	--	--	200	Federal MCL
Europium-154	15585-10-1	pCi/L	60	--	--	--	--	60	Federal MCL
Europium-155	14391-16-3	pCi/L	600	--	--	--	--	600	Federal MCL
Famphur	52-85-7	µg/L	--	--	--	--	--	--	--
Fluoranthene	206-44-0	µg/L	--	--	--	--	64	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-11. Summary of Federal and State Groundwater Comparison Values (Sheet 10 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Fluorene	86-73-7	µg/L	--	--	--	--	32	32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Fluoride	16984-48-8	µg/L	4,000	4,000	4,000	--	96	96	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Gamma-BHC (Lindane)	58-89-9	µg/L	0.20	0.20	--	--	0.080	0.080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Gross alpha	12587-46-1	pCi/L	15	--	--	--	--	15	Federal MCL
Gross beta	12587-47-2	mrem/year	4.0	--	--	--	--	4.0	Federal MCL
Gross beta	12587-47-2	pCi/L	--	--	--	--	--	--	--
Heptachlor	76-44-8	µg/L	0.40	--	--	--	0.019	0.019	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Heptachlor epoxide	1024-57-3	µg/L	0.20	--	--	--	0.0048	0.0048	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hexachlorobenzene	118-74-1	µg/L	1.0	--	--	--	0.055	0.055	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hexachlorobutadiene	87-68-3	µg/L	--	--	--	--	0.56	0.56	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hexachlorocyclopentadiene	77-47-4	µg/L	50	50	--	--	4.8	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hexachloroethane	67-72-1	µg/L	--	--	--	--	0.56	0.56	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hexachlorophene	70-30-4	µg/L	--	--	--	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hexachloropropene	1888-71-7	µg/L	--	--	--	--	--	--	--
Hexavalent Chromium	18540-29-9	µg/L	--	--	--	--	4.8	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Hydroxylion	84625-61-6	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	193-39-5	µg/L	--	--	--	--	0.12	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Iodine-129	15046-84-1	pCi/L	1.0	--	--	--	--	1.0	Federal MCL
Iodomethane	74-88-4	µg/L	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	--	--	--	1,120	1,120	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-12. Summary of Federal and State Groundwater Comparison Values (Sheet 11 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Isobutyl alcohol	78-83-1	µg/L	--	--	--	--	240	240	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Isodrin	465-73-6	µg/L	--	--	--	--	--	--	--
Isophorone	78-59-1	µg/L	--	--	--	--	46	46	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Isosafrole	120-58-1	µg/L	--	--	--	--	--	--	--
Kepone	143-50-0	µg/L	--	--	--	--	0.0088	0.0088	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Lead	7439-92-1	µg/L	15	--	15	15	--	15	Federal MCL
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	38	38	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
m-Dinitrobenzene	99-65-0	µg/L	--	--	--	--	0.16	0.16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Mercury	7439-97-6	µg/L	2.0	2.0	2.0	--	0.48	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methacrylonitrile	126-98-7	µg/L	--	--	--	--	0.080	0.080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methapyrilene	91-80-5	µg/L	--	--	--	--	--	--	--
Methoxychlor	72-43-5	µg/L	40	40	--	--	8.0	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methyl methacrylate	80-62-6	µg/L	--	--	--	--	1,120	1,120	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methyl methanesulfonate	66-27-3	µg/L	--	--	--	--	0.88	0.88	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methyl parathion	298-00-0	µg/L	--	--	--	--	0.40	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methylene chloride	75-09-2	µg/L	5.0	--	--	--	4.8	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Molybdenum	7439-98-7	µg/L	--	--	--	--	8.0	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Naphthalene	91-20-3	µg/L	--	--	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-13. Summary of Federal and State Groundwater Comparison Values (Sheet 12 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
n-Butylbenzene	104-51-8	µg/L	--	--	--	--	40	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Neptunium-237	13994-20-2	pCi/L	15	--	--	--	--	15	Federal MCL
Nickel	7440-02-0	µg/L	--	--	100	--	32	32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Niobium-94	14681-63-1	pCi/L	--	--	--	--	--	--	--
Nitrate	14797-55-8	µg/L	45,000	45,000	45,000	--	11,360	11,360	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Nitrite	14797-65-0	µg/L	3,300	3,300	3,300	--	480	480	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Nitrobenzene	98-95-3	µg/L	--	--	--	--	1.6	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Nitrogen in Nitrite and Nitrate	NO2+NO3-N	µg/L	10,000	10,000	10,000	--	2,560	2,560	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Nitrosopyrrolidine	930-55-2	µg/L	--	--	--	--	0.021	0.021	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosodiethylamine	55-18-5	µg/L	--	--	--	--	2.92E-04	2.92E-04	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosodimethylamine	62-75-9	µg/L	--	--	--	--	8.58E-04	8.58E-04	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosodi-n-butylamine	924-16-3	µg/L	--	--	--	--	0.0081	0.0081	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosodi-n-dipropylamine	621-64-7	µg/L	--	--	--	--	0.013	0.013	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosodiphenylamine	86-30-6	µg/L	--	--	--	--	18	18	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosomethylethylamine	10595-95-6	µg/L	--	--	--	--	0.0040	0.0040	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosomorpholine	59-89-2	µg/L	--	--	--	--	0.013	0.013	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
n-Nitrosopiperidine	100-75-4	µg/L	--	--	--	--	0.0093	0.0093	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
O,O,O-Triethyl phosphorothioate	126-68-1	µg/L	--	--	--	--	--	--	--
O,O-Diethyl O-2-pyrazinyl phosphorothioate	297-97-2	µg/L	--	--	--	--	--	--	--

Table 3-14. Summary of Federal and State Groundwater Comparison Values (Sheet 13 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310 State MCL	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG		Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
o-Toluidine	95-53-4	µg/L	--	--	--	--	--	--	--
Oxidation Reduction Potential	EH	mV	--	--	--	--	--	--	--
Parathion	56-38-2	µg/L	--	--	--	--	9.6	9.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
p-Dimethylaminoazobenzene	60-11-7	µg/L	--	--	--	--	0.019	0.019	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Pentachlorobenzene	608-93-5	µg/L	--	--	--	--	1.3	1.3	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Pentachloroethane	76-01-7	µg/L	--	--	--	--	0.97	0.97	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Pentachloronitrobenzene (PCNB)	82-68-8	µg/L	--	--	--	--	0.34	0.34	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Pentachlorophenol	87-86-5	µg/L	1.0	--	--	--	0.22	0.22	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
pH Measurement	PH	unitless	--	--	--	--	--	--	--
Phenacetin	62-44-2	µg/L	--	--	--	--	40	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Phenanthrene	85-01-8	µg/L	--	--	--	--	--	--	--
Phenol	108-95-2	µg/L	--	--	--	--	240	240	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Phorate	298-02-2	µg/L	--	--	--	--	0.32	0.32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Phosphate	14265-44-2	µg/L	--	--	--	--	--	--	--
Plutonium-238	13981-16-3	pCi/L	15	--	--	--	--	15	Federal MCL
Plutonium-239/240	PU-239/240	pCi/L	15	--	--	--	--	15	Federal MCL
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--
Potassium-40	13966-00-2	pCi/L	--	--	--	--	--	--	--
p-Phenylenediamine	106-50-3	µg/L	--	--	--	--	304	304	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Pronamide	23950-58-5	µg/L	--	--	--	--	120	120	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Pyrene	129-00-0	µg/L	--	--	--	--	48	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 3-15. Summary of Federal and State Groundwater Comparison Values (Sheet 14 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Pyridine	110-86-1	µg/L	--	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Radium	7440-14-4	pCi/L	5.0	--	--	--	--	5.0	Federal MCL
Ruthenium-106	13967-48-1	pCi/L	--	--	--	--	--	--	--
Safrol	94-59-7	µg/L	--	--	--	--	0.40	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Selenium	7782-49-2	µg/L	50	50	50	--	8.0	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Silver	7440-22-4	µg/L	100	--	100	--	8.0	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Silver-108 metastable	14391-65-2	pCi/L	--	--	--	--	--	6.6	EPA 2013
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--
Specific Conductance	CONDUCT	uS/cm	--	--	--	--	--	--	--
Strontium	7440-24-6	µg/L	--	--	--	--	960	960	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Strontium-90	10098-97-2	pCi/L	8.0	--	--	--	--	8.0	Federal MCL
Styrene	100-42-5	µg/L	100	100	--	--	160	100	Federal MCL
Sulfate	14808-79-8	µg/L	250,000	--	250,000	--	--	250,000	Federal Secondary MCL
Sulfide	18496-25-8	µg/L	--	--	--	--	--	--	--
sym-Trinitrobenzene	99-35-4	µg/L	--	--	--	--	48	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Technetium-99	14133-76-7	pCi/L	900	--	--	--	--	900	Federal MCL
Temperature	TEMPERATURE	Deg C	--	--	--	--	--	--	--
Tetrachloroethene	127-18-4	µg/L	5.0	--	--	--	4.8	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Tetraethyl dithiopyrophosphate (Sulfotepp)	3689-24-5	µg/L	--	--	--	--	0.80	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Tetrahydrofuran	109-99-9	µg/L	--	--	--	--	720	720	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Thallium	7440-28-0	µg/L	2.0	0.50	2.0	--	--	0.50	Federal MCLG
Thorium	7440-29-1	µg/L	--	--	--	--	--	--	--

Table 3-16. Summary of Federal and State Groundwater Comparison Values (Sheet 15 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Thorium-228	14274-82-9	pCi/L	15	--	--	--	--	15	Federal MCL
Thorium-230	14269-63-7	pCi/L	15	--	--	--	--	15	Federal MCL
Thorium-232	TH-232	pCi/L	15	--	--	--	--	15	Federal MCL
Tin	7440-31-5	µg/L	--	--	--	--	960	960	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Toluene	108-88-3	µg/L	1,000	1,000	--	--	64	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Total cresols	1319-77-3	µg/L	--	--	--	--	160	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Total organic carbon	TOC	µg/L	--	--	--	--	--	--	--
Total Organic Halides	59473-04-0	µg/L	--	--	--	--	--	--	--
Toxaphene	8001-35-2	µg/L	3.0	--	--	--	0.080	0.080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
trans-1,2-Dichloroethylene	156-60-5	µg/L	100	100	--	--	16	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
trans-1,3-Dichloropropene	10061-02-6	µg/L	--	--	--	--	0.44	0.44	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
trans-1,4-Dichloro-2-butene	110-57-6	µg/L	--	--	--	--	--	--	--
Tributyl phosphate	126-73-8	µg/L	--	--	--	--	9.7	9.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Trichloroethene	79-01-6	µg/L	5.0	--	--	5.0	0.40	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Trichloromono-fluoromethane	75-69-4	µg/L	--	--	--	--	240	240	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Tris-2-chloroethyl phosphate	115-96-8	µg/L	--	--	--	--	4.4	4.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Tritium	10028-17-8	pCi/L	20,000	--	--	--	--	20,000	Federal MCL
Turbidity	TURBIDITY	NTU	--	--	--	--	--	--	--
Uranium	7440-61-1	µg/L	30	--	--	--	4.8	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Uranium-233/234	U-233/234	pCi/L	--	--	--	--	--	--	--
Uranium-235	15117-96-1	pCi/L	--	--	--	--	--	--	--

Table 3-17. Summary of Federal and State Groundwater Comparison Values (Sheet 16 of 16)

Analyte Name	Chemical Abstracts Service Number	Units	40 CFR 141		WAC 246-290-310	WAC 173-340-720		Comparison Value	Comparison Value Basis
			Federal MCL	Federal MCLG	State MCL	Groundwater Method A Cleanup Level	Groundwater Method B Screening Level		
Uranium-238	U-238	pCi/L	--	--	--	--	--	--	--
Vanadium	7440-62-2	µg/L	--	--	--	--	8.0	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Vinyl acetate	108-05-4	µg/L	--	--	--	--	800	800	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Vinyl chloride	75-01-4	µg/L	2.0	--	--	--	0.061	0.061	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Xylenes (total)	1330-20-7	µg/L	10,000	10,000	--	--	160	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Zinc	7440-66-6	µg/L	5,000	--	5,000	--	480	480	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

HQ = hazard quotient

MCL = maximum contaminant level

MCLG = maximum contaminant level goal

NTU = Nephelometric turbidity unit

References:

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations*, as amended.EPA 2013, U.S. Environmental Protection Agency Preliminary Remediation Goals for Radionuclides, Queried 11/01/2013, <http://epa-prgs.ornl.gov/radionuclides/download.html>.WAC 173-340-720, "Groundwater Cleanup Standards," subsection (4) "Method B Cleanup Levels for Potable Groundwater," *Washington Administrative Code*, as amended.WAC 246-290-310, "Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs)," *Washington Administrative Code*, as amended.

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Table 3-3. Background Concentrations in Hanford Site Groundwater (2 Sheets)

Analyte Name	Units	Lognormal 90 th Percentile	Reference
Radionuclides			
Americium-241*	pCi/L	7.70E-05	DOE/RL-96-61 Rev.0, Table ES-1
Beryllium-7	pCi/L	8.64	DOE/RL-96-61 Rev.0, Table ES-1
Cesium-134	pCi/L	1.13	DOE/RL-96-61 Rev.0, Table ES-1
Cesium-137*	pCi/L	8.576	DOE/RL-96-61 Rev.0, Table ES-1
Cobalt-60*	pCi/L	2.25E-02	DOE/RL-96-61 Rev.0, Table ES-1
Europium-152*	pCi/L	222.128	DOE/RL-96-61 Rev.0, Table ES-1
Europium-154*	pCi/L	69.517	DOE/RL-96-61 Rev.0, Table ES-1
Europium-155*	pCi/L	5.932	DOE/RL-96-61 Rev.0, Table ES-1
Gross beta*	pCi/L	3.1	DOE/RL-96-61 Rev.0, Table ES-1
Iodine-129*	pCi/L	9.00E-07	DOE/RL-96-61 Rev.0, Table ES-1
Plutonium-238*	pCi/L	4.99E-04	DOE/RL-96-61 Rev.0, Table ES-1
Potassium-40	pCi/L	203	DOE/RL-96-61 Rev.0, Table ES-1
Radium-226*	pCi/L	1.063	DOE/RL-96-61 Rev.0, Table ES-1
Ruthenium-106*	pCi/L	128.447	DOE/RL-96-61 Rev.0, Table ES-1
Strontium-90*	pCi/L	1.03E-03	DOE/RL-96-61 Rev.0, Table ES-1
Technetium-99	pCi/L	0.83	DOE/RL-96-61 Rev.0, Table ES-1
Tritium	pCi/L	119	DOE/RL-96-61 Rev.0, Table ES-1
Uranium-234	pCi/L	0.849	DOE/RL-96-61 Rev.0, Table ES-1
Nonradionuclides			
Aluminum*	µg/L	7.11	DOE/RL-96-61 Rev.0, Table ES-1
Antimony*	µg/L	55.1	DOE/RL-96-61 Rev.0, Table ES-1
Arsenic*	µg/L	7.85	DOE/RL-96-61 Rev.0, Table ES-1
Barium*	µg/L	105	DOE/RL-96-61 Rev.0, Table ES-1
Beryllium*	µg/L	2.29	DOE/RL-96-61 Rev.0, Table ES-1
Boron*	µg/L	36	DOE/RL-96-61 Rev.0, Table ES-1
Bromide	µg/L	124	DOE/RL-96-61 Rev.0, Table ES-1
Cadmium*	µg/L	0.916	DOE/RL-96-61 Rev.0, Table ES-1
Calcium	µg/L	52,644	DOE/RL-96-61 Rev.0, Table ES-1
Chloride	µg/L	15,630	DOE/RL-96-61 Rev.0, Table ES-1
Chromium*	µg/L	2.4	DOE/RL-96-61 Rev.0, Table ES-1
Cobalt*	µg/L	0.916	DOE/RL-96-61 Rev.0, Table ES-1
Copper*	µg/L	0.81	DOE/RL-96-61 Rev.0, Table ES-1

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Table 3-3. Background Concentrations in Hanford Site Groundwater (2 Sheets)

Analyte Name	Units	Lognormal 90 th Percentile	Reference
Cyanide	µg/L	8.41	DOE/RL-96-61 Rev.0, Table ES-1
Fluoride	µg/L	1,047	DOE/RL-96-61 Rev.0, Table ES-1
Iodine	µg/L	250	DOE/RL-96-61 Rev.0, Table ES-1
Iron*	µg/L	570	DOE/RL-96-61 Rev.0, Table ES-1
Lead*	µg/L	0.917	DOE/RL-96-61 Rev.0, Table ES-1
Lithium	µg/L	11.321	DOE/RL-96-61 Rev.0, Table 5-2 (Table ES-1 off by 1E+03 for lithium)
Magnesium*	µg/L	24,816	DOE/RL-96-61 Rev.0, Table ES-1
Manganese*	µg/L	38.5	DOE/RL-96-61 Rev.0, Table ES-1
Mercury*	µg/L	0.003	DOE/RL-96-61 Rev.0, Table ES-1
Molybdenum*	µg/L	3.21	DOE/RL-96-61 Rev.0, Table ES-1
Nickel*	µg/L	1.56	DOE/RL-96-61 Rev.0, Table ES-1
Nitrate	µg/L	26,871	DOE/RL-96-61 Rev.0, Table ES-1
Nitrite	µg/L	93.7	DOE/RL-96-61 Rev.0, Table ES-1
Oxalate	µg/L	287	DOE/RL-96-61 Rev.0, Table ES-1
Phosphate	µg/L	162	DOE/RL-96-61 Rev.0, Table ES-1
Plutonium*	µg/L	0.01	DOE/RL-96-61 Rev.0, Table ES-1
Potassium	µg/L	9,122	DOE/RL-96-61 Rev.0, Table ES-1
Selenium*	µg/L	10.5	DOE/RL-96-61 Rev.0, Table ES-1
Silicon*	µg/L	33,949	DOE/RL-96-61 Rev.0, Table ES-1
Sodium	µg/L	26,998	DOE/RL-96-61 Rev.0, Table ES-1
Strontium*	µg/L	323	DOE/RL-96-61 Rev.0, Table ES-1
Sulfate	µg/L	47,014	DOE/RL-96-61 Rev.0, Table ES-1
Sulfide*	µg/L	2.19	DOE/RL-96-61 Rev.0, Table ES-1
Thallium*	µg/L	1.67	DOE/RL-96-61 Rev.0, Table ES-1
Thorium*	µg/L	0.5	DOE/RL-96-61 Rev.0, Table ES-1
Tin*	µg/L	21.6	DOE/RL-96-61 Rev.0, Table ES-1
Titanium*	µg/L	30	DOE/RL-96-61 Rev.0, Table ES-1
Uranium*	µg/L	9.85	DOE/RL-96-61 Rev.0, Table ES-1
Vanadium*	µg/L	11.5	DOE/RL-96-61 Rev.0, Table ES-1
Zinc*	µg/L	21.8	DOE/RL-96-61 Rev.0, Table ES-1
Zirconium*	µg/L	25	DOE/RL-96-61 Rev.0, Table ES-1

* = Indicates reported background value established using filtered sample data.

Reference: DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*.

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4.0 SOFTWARE APPLICATIONS

Software used for this evaluation includes HEIS, Microsoft Access^{®1} database software, and Microsoft Excel^{®2}. Hanford Environmental Information System is a central repository for storing and maintaining access to environmental data collected for the Hanford Site. Microsoft Access[®] is used to query and sort the data downloaded from HEIS. Microsoft Excel[®] is used to present the groundwater data and other information in spreadsheets.

¹ Access[®] is a registered trademark of Microsoft Corporation, Redmond, Washington.

² Excel[®] is a registered trademark of Microsoft Corporation, Redmond, Washington.

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5.0 RESULTS

This section summarizes the results for each step in the screening process. A total of 40,505 records and 310 analytes were reported in the 10-year, 12-well groundwater data set downloaded from HEIS (Figure 2-1). Following the analytical data processing and reduction steps described in Section 2.1, the data set contained 25,738 records and 300 analytes. This data set was carried forward into the screening process summarized below.

5.1 APPLY EXCLUSION CRITERIA

Of the 300 analytes in the processed data set, a total of 72 analytes met an exclusion criterion and were eliminated from further consideration. The excluded analytes are listed in Table 5-1. The table provides sampling dates, minimum and maximum detected concentrations, minimum and maximum MDLs, and the basis for exclusion for each analyte. Following are summaries of each exclusion criterion.

5.1.1 Essential Nutrients

Essential nutrients are those analytes considered essential for human nutrition. The essential nutrients (minerals) calcium, magnesium, potassium, and sodium were excluded from further consideration.

5.1.2 Background Radionuclides

Background radionuclides are those radionuclides considered to be naturally occurring and not directly related to Hanford Site operations or processes. The background radionuclides ^{40}K , radium (total), ^{228}Th , ^{230}Th , and ^{232}Th were excluded from further consideration.

5.1.3 Radionuclides with Half-Lives of Less than Three Years

Radionuclides that have half-lives of less than 3 years and that are not significant daughter products were eliminated from further consideration, because only a small fraction of their original activity remains after 30 years of decay. The radionuclides ^{125}Sb , ^7Be , ^{134}Cs , and ^{106}Ru met this exclusion criterion and were eliminated from further consideration. These isotopes are not significant daughter products associated with a decay chain. All analytical results for these isotopes were reported as non-detects.

5.1.4 Analytes Without Comparison Values

Because the focus of the screening process is on comparing measured analyte concentrations to comparison values, analytes that lack a promulgated chemical-specific ARAR and/or a risk-based concentration were eliminated from further consideration. A total of 59 analytes were eliminated based on this criterion. This total included 5 radionuclides (including gross beta), 1 metal, 21 semi-volatile organic compounds (SVOCs), 10 volatile organic compounds (VOCs),

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6 pesticides, 12 general chemistry/water quality parameters (including coliform bacteria), 3 anions, and 1 cation.

The MCL for gross beta is 4 mrem/yr annual dose and is used to indicate the presence of a group of beta-emitters. Although an MCL for gross beta is available, gross beta is reported by the laboratory in units of activity (pCi/L) and would require a conversion from activity to an annual dose rate (mrem/yr) to support a direct comparison to the MCL. Beta-emitting radioisotopes such as ⁹⁰Sr and ⁹⁹Tc are detected in the data set and are compared to their isotope-specific standards; additionally, their presence is consistent with gross beta. This type of comparison will identify analytes that are greater than their individual MCL but does not consider cumulative effects from multiple gamma- and beta-emitting isotopes.

5.2 IDENTIFY NON-DETECTED ANALYTES

A total of 173 analytes were not detected in any groundwater samples in the 10-year, 12-well data set and were eliminated from further consideration. The non-detected analytes are listed in Table 5-2. The table provides sampling dates, minimum and maximum MDLs, the comparison value and its basis, and the ratio of the minimum MDL to the comparison value.

The minimum MDL/comparison value ratio was used to identify analytes with MDLs that did not achieve the comparison value (ratio > 1). A total of 57 analytes were not detected and were reported with all MDLs greater than their respective screening levels, indicating the analytical method used was unable to detect the analyte at or below the comparison value. These analytes included 2 herbicides, 12 pesticides, 24 SVOCs, and 19 VOCs.

5.3 IDENTIFY ANALYTES WITH MAXIMUM DETECTED CONCENTRATIONS LESS THAN COMPARISON VALUES

A total of 31 analytes were detected at least once and had maximum detected concentrations less than their respective comparison values. These analytes were eliminated from further consideration. A list of these analytes is provided in Table 5-3. The table provides sampling dates, minimum and maximum MDLs, minimum and maximum detected concentrations, the comparison value and its basis, and number of detections that exceed the comparison value. Also provided are the 90th percentile Hanford Site groundwater background concentration and the number of detections that exceed the background value.

All MDLs for these analytes were at or below their respective comparison values, indicating the detection or reporting limits were adequate for confirming the presence or absence of these analytes at their comparison values. One or more detected concentrations for seven analytes exceeded the background level; these analytes consist of three radionuclides (²⁴¹Am, ⁹⁰Sr, and tritium) and four metals (aluminum, iron, mercury, and strontium). However, all detected concentrations for these seven analytes were below their respective comparison values.

Table 5-1. Groundwater Analytes Excluded from Further Consideration (Sheet 1 of 3)

Analyte Name	Analyte Class	Chemical Abstracts Service Number	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	Basis for Exclusion
Antimony-125	RAD	14234-35-6	pCi/L	1/14/2004	12/23/2013	321	0	0	-7.50E+00	19	--	--	Half-Life Less Than 3 Years
Beryllium-7	RAD	13966-02-4	pCi/L	1/14/2004	12/23/2013	320	0	0	-7.80E+01	40	--	--	Half-Life Less Than 3 Years
Cesium-134	RAD	13967-70-9	pCi/L	1/14/2004	12/23/2013	321	0	0	-4.90E+01	33	--	--	Half-Life Less Than 3 Years
Gross beta	RAD	12587-47-2	pCi/L	1/14/2004	12/23/2013	388	387	99.7	8.2	8.2	8.0	16,000	No Comparison Value/No Toxicity Value
Niobium-94	RAD	14681-63-1	pCi/L	9/15/2011	9/15/2011	1	0	0	0.78	0.78	--	--	No Comparison Value/No Toxicity Value
Potassium-40	RAD	13966-00-2	pCi/L	1/14/2004	12/23/2013	321	11	3.4	-1.60E+02	71	30	250	Background Radionuclide
Radium	RAD	7440-14-4	pCi/L	1/14/2004	9/8/2004	4	0	0	0.057	0.31	--	--	Background Radionuclide
Ruthenium-106	RAD	13967-48-1	pCi/L	1/14/2004	12/23/2013	320	0	0	-4.70E+01	63	--	--	Half-Life Less Than 3 Years
Thorium-228	RAD	14274-82-9	pCi/L	10/16/2007	12/10/2013	12	2	17	-4.40E-02	0.19	0.17	0.36	Background Radionuclide
Thorium-230	RAD	14269-63-7	pCi/L	10/16/2007	12/10/2013	12	2	17	-4.20E-02	0.058	0.096	0.82	Background Radionuclide
Thorium-232	RAD	TH-232	pCi/L	10/16/2007	12/10/2013	12	0	0	-2.00E-02	0.015	--	--	Background Radionuclide
Uranium-233/234	RAD	U-233/234	pCi/L	10/16/2007	10/26/2007	4	4	100	--	--	0.85	1.8	No Comparison Value/Toxicity Value Available
Uranium-235	RAD	15117-96-1	pCi/L	10/16/2007	10/26/2007	4	4	100	--	--	0.040	0.098	No Comparison Value/Toxicity Value Available
Uranium-238	RAD	U-238	pCi/L	10/16/2007	10/26/2007	4	4	100	--	--	0.78	1.5	No Comparison Value/Toxicity Value Available
Calcium	METAL	7440-70-2	µg/L	12/22/2006	12/23/2013	298	298	100	--	--	21,500	141,000	Essential Nutrient
Magnesium	METAL	7439-95-4	µg/L	12/22/2006	12/23/2013	298	298	100	--	--	4,450	42,700	Essential Nutrient
Potassium	METAL	7440-09-7	µg/L	12/22/2006	12/23/2013	298	298	100	--	--	3,120	12,400	Essential Nutrient
Sodium	METAL	7440-23-5	µg/L	12/22/2006	12/23/2013	298	298	100	--	--	10,700	36,800	Essential Nutrient
Thorium	METAL	7440-29-1	µg/L	12/17/2010	12/10/2013	2	0	0	0.20	0.20	--	--	No Comparison Value/No Toxicity Value
1,4-Naphthoquinone	SVOC	130-15-4	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	--	--	No Comparison Value/No Toxicity Value
1-Naphthylamine	SVOC	134-32-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	--	--	No Comparison Value/No Toxicity Value
2-Nitrophenol	SVOC	88-75-5	µg/L	1/14/2004	12/10/2013	83	0	0	0.47	3.3	--	--	No Comparison Value/No Toxicity Value
2-Picoline	SVOC	109-06-8	µg/L	1/9/2008	12/17/2010	28	0	0	1.0	4.8	--	--	No Comparison Value/No Toxicity Value
3+4 Methylphenol (cresol, m+p)	SVOC	65794-96-9	µg/L	1/14/2004	12/17/2009	70	0	0	0.47	2.9	--	--	No Comparison Value/No Toxicity Value
4-Bromophenylphenyl ether	SVOC	101-55-3	µg/L	10/16/2007	12/17/2010	20	0	0	0.86	1.0	--	--	No Comparison Value/No Toxicity Value
4-Chlorophenylphenyl ether	SVOC	7005-72-3	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	1.7	--	--	No Comparison Value/No Toxicity Value
4-Nitroquinoline-1-oxide	SVOC	56-57-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	5.0	--	--	No Comparison Value/No Toxicity Value
Acenaphthylene	SVOC	208-96-8	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	2.4	--	--	No Comparison Value/No Toxicity Value

Table 5-1. Groundwater Analytes Excluded from Further Consideration (Sheet 2 of 3)

Analyte Name	Analyte Class	Chemical Abstracts Service Number	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	Basis for Exclusion
alpha,alpha-Dimethylphenethylamine	SVOC	122-09-8	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	22	--	--	No Comparison Value/No Toxicity Value
Benzo(ghi)perylene	SVOC	191-24-2	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	--	--	No Comparison Value/No Toxicity Value
Dimethyl phthalate	SVOC	131-11-3	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	--	--	No Comparison Value/No Toxicity Value
Ethyl cyanide	SVOC	107-12-0	µg/L	1/9/2008	9/6/2012	111	0	0	1.2	2.0	--	--	No Comparison Value/No Toxicity Value
Ethyl methanesulfonate	SVOC	62-50-0	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	--	--	No Comparison Value/No Toxicity Value
Hexachloropropene	SVOC	1888-71-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	--	--	No Comparison Value/No Toxicity Value
Isosafrole	SVOC	120-58-1	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.3	--	--	No Comparison Value/No Toxicity Value
Methapyrilene	SVOC	91-80-5	µg/L	3/26/2010	12/17/2010	12	0	0	1.3	1.3	--	--	No Comparison Value/No Toxicity Value
O,O,O-Triethyl phosphorothioate	SVOC	126-68-1	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	--	--	No Comparison Value/No Toxicity Value
O,O-Diethyl O-2-pyrazinyl phosphorothioate	SVOC	297-97-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	--	--	No Comparison Value/No Toxicity Value
o-Toluidine	SVOC	95-53-4	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	--	--	No Comparison Value/No Toxicity Value
Phenanthrene	SVOC	85-01-8	µg/L	10/16/2007	12/17/2010	20	0	0	0.62	1.0	--	--	No Comparison Value/No Toxicity Value
1,3-Dichlorobenzene	VOC	541-73-1	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	1.5	--	--	No Comparison Value/No Toxicity Value
2,6-Dichlorophenol	VOC	87-65-0	µg/L	1/14/2004	12/17/2010	67	0	0	1.0	3.3	--	--	No Comparison Value/No Toxicity Value
4-Nitrophenol	VOC	100-02-7	µg/L	1/14/2004	12/17/2010	82	0	0	0.60	3.1	--	--	No Comparison Value/No Toxicity Value
Acetonitrile	VOC	75-05-8	µg/L	12/17/2009	9/6/2012	99	0	0	2.0	2.0	--	--	No Comparison Value/Toxicity Value Available
Benzothiazole	VOC	95-16-9	µg/L	1/9/2008	12/17/2009	16	0	0	0.50	0.57	--	--	No Comparison Value/No Toxicity Value
Chloroethane	VOC	75-00-3	µg/L	10/16/2007	9/6/2012	103	0	0	0.085	1.0	--	--	No Comparison Value/Toxicity Value Available
Chloromethane	VOC	74-87-3	µg/L	10/16/2007	9/6/2012	103	23	22	0.077	1.0	0.078	0.40	No Comparison Value/Toxicity Value Available
Iodomethane	VOC	74-88-4	µg/L	3/26/2010	9/6/2012	95	3	3.2	0.090	0.092	0.46	0.85	No Comparison Value/No Toxicity Value
Total organic halides	VOC	59473-04-0	µg/L	1/14/2004	5/14/2010	106	73	69	2.2	5.0	2.7	99	No Comparison Value/No Toxicity Value
trans-1,4-Dichloro-2-butene	VOC	110-57-6	µg/L	3/26/2010	9/6/2012	95	0	0	0.29	0.29	--	--	No Comparison Value/Toxicity Value Available
Delta-BHC	PESTICIDE	319-86-8	µg/L	1/14/2004	12/17/2010	26	0	0	0.010	0.030	--	--	No Comparison Value/No Toxicity Value
Dichloroprop	PESTICIDE	120-36-5	µg/L	1/14/2004	9/8/2004	4	0	0	0.93	0.93	--	--	No Comparison Value/No Toxicity Value
Endosulfan sulfate	PESTICIDE	1031-07-8	µg/L	1/14/2004	12/17/2010	26	0	0	0.0060	0.030	--	--	No Comparison Value/No Toxicity Value
Endrin aldehyde	PESTICIDE	7421-93-4	µg/L	1/14/2004	12/17/2010	26	0	0	0.0070	0.030	--	--	No Comparison Value/No Toxicity Value
Famphur	PESTICIDE	52-85-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.7	--	--	No Comparison Value/No Toxicity Value

Table 5-1. Groundwater Analytes Excluded from Further Consideration (Sheet 3 of 3)

Analyte Name	Analyte Class	Chemical Abstracts Service Number	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	Basis for Exclusion
Isodrin	PESTICIDE	465-73-6	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	--	--	No Comparison Value/No Toxicity Value
Coliform Bacteria	COLIFORM	COLIFORM	Col/100mL	1/14/2004	9/22/2005	22	6	27	0	1.0	2.0	39	No Comparison Value/No Toxicity Value
Alkalinity	GEN CHEM	ALKALINITY	µg/L	1/14/2004	12/23/2013	423	423	100	--	--	70,000	201,000	Water Quality
Bicarbonate	GEN CHEM	71-52-3	µg/L	4/6/2010	12/23/2013	16	16	100	--	--	77,000	200,000	No Comparison Value/No Toxicity Value
Carbonate alkalinity	GEN CHEM	CO3ALKALINITY	µg/L	4/6/2010	12/23/2013	16	0	0	1,000	1,000	--	--	No Comparison Value/No Toxicity Value
Dissolved oxygen	GEN CHEM	DO	µg/L	12/7/2004	12/23/2013	96	96	100	--	--	1,440	304,200	Water Quality
Hydroxylion	GEN CHEM	84625-61-6	µg/L	4/6/2010	12/23/2013	16	0	0	1,000	1,000	--	--	No Comparison Value/No Toxicity Value
Oxidation Reduction Potential	GEN CHEM	EH	mV	12/7/2004	12/23/2013	54	54	100	--	--	7.4	423	Water Quality
pH Measurement	GEN CHEM	PH	unitless	1/14/2004	12/23/2013	437	437	100	--	--	7.4	8.6	Water Quality
Specific Conductance	GEN CHEM	CONDUCT	µS/cm	1/14/2004	12/23/2013	437	437	100	--	--	2.2	1,157	Water Quality
Temperature	GEN CHEM	TEMPERATURE	Deg C	1/14/2004	12/23/2013	434	434	100	--	--	12	28	Water Quality
Total organic carbon	GEN CHEM	TOC	µg/L	1/14/2004	5/14/2010	106	76	72	300	760	307	2,400	Water Quality
Turbidity	GEN CHEM	TURBIDITY	NTU	1/14/2004	12/23/2013	434	434	100	--	--	0.16	606	Water Quality
Bromide	ANION	24959-67-9	µg/L	9/3/2008	6/1/2011	10	2	20	250	250	186	261	No Comparison Value/No Toxicity Value
Phosphate	ANION	14265-44-2	µg/L	10/16/2007	6/1/2011	14	0	0	250	15,000	--	--	No Comparison Value/No Toxicity Value
Sulfide	ANION	18496-25-8	µg/L	12/3/2009	12/17/2010	22	1	4.6	83	83	400	400	No Comparison Value/No Toxicity Value
Ammonium ion	CATION	14798-03-9	µg/L	10/16/2007	10/26/2007	4	4	100	--	--	7.7	55	No Comparison Value/No Toxicity Value

NTU = Nephelometric turbidity unit

SVOC = semi-volatile organic compound

VOC = volatile organic compound

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 1 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Cobalt-60	RAD	10198-40-0	pCi/L	1/14/2004	12/23/2013	337	0	0	-4.10E+00	8.7	100	Federal MCL	-4.10E-02
Europium-152	RAD	14683-23-9	pCi/L	1/14/2004	12/23/2013	333	0	0	-1.90E+01	24	200	Federal MCL	-9.50E-02
Europium-154	RAD	15585-10-1	pCi/L	1/14/2004	12/23/2013	333	0	0	-1.80E+01	25	60	Federal MCL	-3.00E-01
Europium-155	RAD	14391-16-3	pCi/L	1/14/2004	12/23/2013	333	0	0	-3.00E+01	58	600	Federal MCL	-5.00E-02
Neptunium-237	RAD	13994-20-2	pCi/L	10/16/2007	12/10/2013	12	0	0	-4.56E-02	0.042	15	Federal MCL	-3.04E-03
Plutonium-238	RAD	13981-16-3	pCi/L	10/16/2007	12/10/2013	12	0	0	-5.80E-02	0.087	15	Federal MCL	-3.87E-03
Silver-108 metastable	RAD	14391-65-2	pCi/L	9/15/2011	9/15/2011	1	0	0	-7.05E-01	-7.05E-01	6.6	EPA 2013	-1.07E-01
Beryllium	METAL	7440-41-7	µg/L	12/22/2006	12/23/2013	294	0	0	0.10	4.1	3.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.031
2,3,4,6-Tetrachlorophenol	SVOC	58-90-2	µg/L	1/14/2004	12/17/2010	67	0	0	1.0	4.8	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.021
2,4-Dinitrotoluene	SVOC	121-14-2	µg/L	10/16/2007	12/17/2010	32	0	0	0.47	1.0	0.28	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.7
2,6-Dinitrotoluene	SVOC	606-20-2	µg/L	10/16/2007	12/17/2010	20	0	0	0.57	2.2	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.36
2-Acetylaminofluorene	SVOC	53-96-3	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.023	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	43
2-Chloronaphthalene	SVOC	91-58-7	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	3.6	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.016
2-Methylnaphthalene	SVOC	91-57-6	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	3.1	3.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.31
2-Methylphenol (cresol, o-)	SVOC	95-48-7	µg/L	1/14/2004	12/10/2013	83	0	0	0.47	4.0	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.012
2-Nitroaniline	SVOC	88-74-4	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.030
3,3'-Dichlorobenzidine	SVOC	91-94-1	µg/L	10/16/2007	12/17/2010	20	0	0	0.67	1.0	0.19	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	3.5

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 2 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
3-Methylcholanthrene	SVOC	56-49-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.0040	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	250
3-Nitroaniline	SVOC	99-09-2	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.0
5-Nitro-o-toluidine	SVOC	99-55-8	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	9.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.10
7,12-Dimethylbenz[a]anthracene	SVOC	57-97-6	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	3.50E-04	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2,857
Acenaphthene	SVOC	83-32-9	µg/L	10/16/2007	12/17/2010	32	0	0	0.50	2.8	96	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0052
Acetophenone	SVOC	98-86-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.013
Anthracene	SVOC	120-12-7	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	480	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0010
Benzo(a)anthracene	SVOC	56-55-3	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.0
Benzo(a)pyrene	SVOC	50-32-8	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.012	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	40
Benzo(b)fluoranthene	SVOC	205-99-2	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.0
Benzo(k)fluoranthene	SVOC	207-08-9	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.0
Butylbenzylphthalate	SVOC	85-68-7	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	46	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.010
Carbazole	SVOC	86-74-8	µg/L	10/16/2007	12/17/2010	10	0	0	0.48	1.0	4.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.11

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 3 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Chrysene	SVOC	218-01-9	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	1.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.40
Dibenz[a,h]anthracene	SVOC	53-70-3	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.0
Dibenzofuran	SVOC	132-64-9	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	2.0	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.63
Diethylphthalate	SVOC	84-66-2	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	2.0	1,280	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	7.81E-04
Di-n-butylphthalate	SVOC	84-74-2	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	2.6	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0063
Fluoranthene	SVOC	206-44-0	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	64	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0075
Fluorene	SVOC	86-73-7	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	1.5	32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.031
Heptachlor epoxide	SVOC	1024-57-3	µg/L	1/14/2004	12/17/2010	26	0	0	0.0060	0.020	0.0048	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.3
Hexachlorobutadiene	SVOC	87-68-3	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	2.0	0.56	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.8
Hexachloroethane	SVOC	67-72-1	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	1.6	0.56	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.8
Indeno(1,2,3-cd)pyrene	SVOC	193-39-5	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.12	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.0
Isophorone	SVOC	78-59-1	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	46	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.010
m-Dinitrobenzene	SVOC	99-65-0	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	6.3

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 4 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Methyl methanesulfonate	SVOC	66-27-3	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.88	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.1
Nitrosopyrrolidine	SVOC	930-55-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	0.021	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	48
n-Nitrosodiethylamine	SVOC	55-18-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	2.90E-04	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	3,448
n-Nitrosodimethylamine	SVOC	62-75-9	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	8.60E-04	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1,163
n-Nitrosodi-n-dipropylamine	SVOC	621-64-7	µg/L	10/16/2007	12/17/2010	32	0	0	0.50	1.0	0.013	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	38
n-Nitrosodiphenylamine	SVOC	86-30-6	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	18	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.027
n-Nitrosomorpholine	SVOC	59-89-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.013	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	77
n-Nitrosopiperidine	SVOC	100-75-4	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.0093	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	108
p-Dimethylaminoazobenzene	SVOC	60-11-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.019	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	53
Pentachlorobenzene	SVOC	608-93-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	1.3	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.77
Phenacetin	SVOC	62-44-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.025
Pyrene	SVOC	129-00-0	µg/L	10/16/2007	12/17/2010	32	0	0	0.47	1.0	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0098
Safrol	SVOC	94-59-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.5

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 5 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
sym-Trinitrobenzene	SVOC	99-35-4	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.021
Tris-2-chloroethyl phosphate	SVOC	115-96-8	µg/L	1/9/2008	12/17/2009	16	0	0	0.50	0.62	4.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.11
1,1,1,2-Tetrachloroethane	VOC	630-20-6	µg/L	3/26/2010	9/6/2012	95	0	0	0.090	0.090	1.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.053
1,1,1-Trichloroethane	VOC	71-55-6	µg/L	10/16/2007	12/10/2013	116	0	0	0.067	1.0	200	Federal MCL	3.35E-04
1,1,2,2-Tetrachloroethane	VOC	79-34-5	µg/L	10/16/2007	9/6/2012	103	0	0	0.098	1.0	0.22	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.45
1,1,2-Trichloroethane	VOC	79-00-5	µg/L	10/16/2007	12/10/2013	116	0	0	0.063	1.0	0.77	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.082
1,1-Dichloroethane	VOC	75-34-3	µg/L	10/16/2007	12/10/2013	116	0	0	0.068	1.0	7.7	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0088
1,1-Dichloroethene	VOC	75-35-4	µg/L	10/16/2007	12/10/2013	116	0	0	0.051	1.0	7.0	Federal MCL	0.0073
1,2,3-Trichloropropane	VOC	96-18-4	µg/L	3/26/2010	9/6/2012	95	0	0	0.15	0.15	0.0015	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	100
1,2,4,5-Tetrachlorobenzene	VOC	95-94-3	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.1
1,2,4-Trichlorobenzene	VOC	120-82-1	µg/L	10/16/2007	12/17/2010	32	0	0	0.70	2.1	1.5	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.47
1,2-Dibromo-3-chloropropane	VOC	96-12-8	µg/L	3/26/2010	9/6/2012	95	0	0	0.41	0.41	0.055	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	7.5
1,2-Dibromoethane	VOC	106-93-4	µg/L	3/26/2010	9/6/2012	95	0	0	0.13	0.13	0.022	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	5.9
1,2-Dichlorobenzene	VOC	95-50-1	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	1.6	72	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.014
1,2-Dichloroethane	VOC	107-06-2	µg/L	10/16/2007	12/10/2013	116	0	0	0.10	1.0	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.21

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 6 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
1,2-Dichloroethene (Total)	VOC	540-59-0	µg/L	10/16/2007	9/6/2012	103	0	0	0.13	1.0	7.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.018
1,2-Dichloropropane	VOC	78-87-5	µg/L	10/16/2007	9/6/2012	103	0	0	0.097	1.0	1.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.081
1,4-Dichlorobenzene	VOC	106-46-7	µg/L	10/16/2007	12/10/2013	116	0	0	0.12	1.6	8.1	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.015
1,4-Dioxane	VOC	123-91-1	µg/L	6/26/2008	9/6/2012	101	0	0	2.0	10	0.44	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.5
1-Butanol	VOC	71-36-3	µg/L	10/16/2007	9/6/2012	112	0	0	12	100	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.15
2,4,5-Trichlorophenol	VOC	95-95-4	µg/L	1/14/2004	12/17/2010	71	0	0	0.48	4.6	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0060
2,4,6-Trichlorophenol	VOC	88-06-2	µg/L	1/14/2004	12/17/2010	71	0	0	0.67	4.1	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.84
2,4-Dichlorophenol	VOC	120-83-2	µg/L	1/14/2004	12/10/2013	83	0	0	0.47	3.1	2.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.20
2,4-Dimethylphenol	VOC	105-67-9	µg/L	1/14/2004	12/17/2010	71	0	0	0.81	2.9	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.051
2,4-Dinitrophenol	VOC	51-28-5	µg/L	1/14/2004	12/17/2010	71	0	0	1.0	5.1	3.2	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.31
2-Butanone	VOC	78-93-3	µg/L	10/16/2007	12/10/2013	116	0	0	0.52	1.0	480	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0011
2-Chlorophenol	VOC	95-57-8	µg/L	1/14/2004	12/17/2010	82	0	0	0.47	3.2	4.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.12
2-Naphthylamine	VOC	91-59-8	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.049	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	20

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 7 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
3,3'-Dimethylbenzidine	VOC	119-93-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.6	0.0080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	125
4,6-Dinitro-2-methylphenol	VOC	534-52-1	µg/L	1/14/2004	12/17/2010	71	0	0	0.95	4.0	0.13	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	7.3
4-Aminobiphenyl	VOC	92-67-1	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	0.0042	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	238
4-Chloro-3-methylphenol	VOC	59-50-7	µg/L	1/14/2004	12/17/2010	82	0	0	0.47	3.2	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0029
4-Chloroaniline	VOC	106-47-8	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	0.22	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.2
4-Methylphenol (cresol, p-)	VOC	106-44-5	µg/L	3/9/2009	12/17/2010	17	0	0	0.10	10	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0013
4-Nitroaniline	VOC	100-01-6	µg/L	10/16/2007	12/17/2010	20	0	0	0.95	1.0	4.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.22
Acrolein	VOC	107-02-8	µg/L	3/26/2010	9/6/2012	95	0	0	2.8	2.8	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	7.0
Acrylonitrile	VOC	107-13-1	µg/L	3/26/2010	9/6/2012	95	0	0	0.58	0.58	0.081	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	7.2
Allyl chloride	VOC	107-05-1	µg/L	3/26/2010	9/6/2012	95	0	0	0.091	0.11	2.1	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.043
Aniline	VOC	62-53-3	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	5.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.18
Azobenzene	VOC	103-33-3	µg/L	9/13/2010	12/17/2010	2	0	0	1.0	1.0	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.3
Benzene	VOC	71-43-2	µg/L	10/16/2007	12/10/2013	116	0	0	0.045	1.0	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.056

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 8 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Benzyl alcohol	VOC	100-51-6	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.013
Bis(2-chloro-1-methylethyl)ether	VOC	108-60-1	µg/L	10/16/2007	12/17/2010	20	0	0	0.87	1.0	0.63	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.4
Bis(2-Chloroethoxy)methane	VOC	111-91-1	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.10
Bis(2-chloroethyl) ether	VOC	111-44-4	µg/L	10/16/2007	12/17/2010	20	0	0	0.57	1.0	0.040	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	14
Bromodichloromethane	VOC	75-27-4	µg/L	10/16/2007	9/6/2012	103	0	0	0.082	1.0	0.71	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.12
Bromoform	VOC	75-25-2	µg/L	10/16/2007	9/6/2012	103	0	0	0.094	1.0	5.5	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.017
Chlorobenzene	VOC	108-90-7	µg/L	10/16/2007	12/10/2013	116	0	0	0.15	1.0	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0094
Chloroprene	VOC	126-99-8	µg/L	3/26/2010	9/6/2012	95	0	0	0.086	0.10	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0054
cis-1,2-Dichloroethylene	VOC	156-59-2	µg/L	10/16/2007	9/6/2012	112	0	0	0.083	1.0	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.052
cis-1,3-Dichloropropene	VOC	10061-01-5	µg/L	10/16/2007	9/6/2012	103	0	0	0.070	1.0	0.44	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.16
Dibromochloromethane	VOC	124-48-1	µg/L	10/16/2007	9/6/2012	103	0	0	0.057	1.0	0.52	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.11
Dibromomethane	VOC	74-95-3	µg/L	3/26/2010	9/6/2012	95	0	0	0.21	0.21	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.026
Dichlorodifluoromethane	VOC	75-71-8	µg/L	3/26/2010	9/6/2012	95	0	0	0.070	0.084	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	4.38E-04

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 9 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Diphenylamine	VOC	122-39-4	µg/L	12/17/2009	12/17/2009	3	0	0	1.0	1.0	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.025
Ethyl methacrylate	VOC	97-63-2	µg/L	3/26/2010	9/6/2012	95	0	0	0.11	0.11	72	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0015
Ethylbenzene	VOC	100-41-4	µg/L	10/16/2007	12/10/2013	116	0	0	0.086	1.0	4.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.022
Hexachlorobenzene	VOC	118-74-1	µg/L	10/16/2007	12/17/2010	20	0	0	0.52	1.0	0.055	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	9.5
Hexachlorocyclopentadiene	VOC	77-47-4	µg/L	10/16/2007	12/17/2010	20	0	0	1.0	5.1	4.8	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.21
Isobutyl alcohol	VOC	78-83-1	µg/L	3/26/2010	9/6/2012	95	0	0	8.7	8.7	240	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.036
Methacrylonitrile	VOC	126-98-7	µg/L	3/26/2010	9/6/2012	95	0	0	0.050	0.50	0.080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.63
Naphthalene	VOC	91-20-3	µg/L	10/16/2007	12/10/2013	33	0	0	0.50	2.0	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.031
n-Butylbenzene	VOC	104-51-8	µg/L	10/16/2007	10/16/2007	1	0	0	1.0	1.0	40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.025
Nitrobenzene	VOC	98-95-3	µg/L	10/16/2007	12/17/2010	20	0	0	0.48	1.0	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.30
n-Nitrosodi-n-butylamine	VOC	924-16-3	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.0081	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	123
n-Nitrosomethylethylamine	VOC	10595-95-6	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	0.0040	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	250
Pentachloroethane	VOC	76-01-7	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	1.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.0

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 10 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Phenol	VOC	108-95-2	µg/L	1/14/2004	12/10/2013	83	0	0	0.47	3.0	240	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0020
p-Phenylenediamine	VOC	106-50-3	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	304	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0033
Pyridine	VOC	110-86-1	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.3
Styrene	VOC	100-42-5	µg/L	10/16/2007	9/6/2012	103	0	0	0.036	1.0	100	Federal MCL	3.60E-04
Tetrahydrofuran	VOC	109-99-9	µg/L	1/9/2008	9/6/2012	111	0	0	1.1	2.0	720	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0015
Total cresols	VOC	1319-77-3	µg/L	3/9/2009	12/17/2009	12	0	0	0.50	0.50	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0031
trans-1,2-Dichloroethylene	VOC	156-60-5	µg/L	10/16/2007	9/6/2012	112	0	0	0.080	1.0	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0050
trans-1,3-Dichloropropene	VOC	10061-02-6	µg/L	10/16/2007	9/6/2012	103	0	0	0.080	1.0	0.44	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.18
Trichloromonofluoromethane	VOC	75-69-4	µg/L	10/16/2007	9/6/2012	100	0	0	0.041	1.0	240	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.71E-04
Vinyl acetate	VOC	108-05-4	µg/L	3/26/2010	9/6/2012	95	0	0	0.17	0.18	800	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.13E-04
Vinyl chloride	VOC	75-01-4	µg/L	10/16/2007	12/10/2013	116	0	0	0.032	1.0	0.061	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.52
Xylenes (total)	VOC	1330-20-7	µg/L	10/16/2007	12/10/2013	116	0	0	0.11	1.0	160	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	6.88E-04
4,4'-DDD (Dichlorodiphenyldichloroethane)	PESTICIDE	72-54-8	µg/L	1/14/2004	12/17/2010	26	0	0	0.0060	0.030	0.36	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.017
4,4'-DDE (Dichlorodiphenyldichloroethylene)	PESTICIDE	72-55-9	µg/L	1/14/2004	12/17/2010	26	0	0	0.0060	0.020	0.26	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.023

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 11 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
4,4'-DDT (Dichlorodiphenyltrichloroethane)	PESTICIDE	50-29-3	µg/L	1/14/2004	12/17/2010	26	0	0	0.010	0.030	0.26	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.038
Aldrin	PESTICIDE	309-00-2	µg/L	1/14/2004	12/17/2010	26	0	0	0.010	0.020	0.0026	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	3.8
Alpha-BHC	PESTICIDE	319-84-6	µg/L	1/14/2004	12/17/2010	26	0	0	0.0050	0.030	0.014	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.36
Aramite	PESTICIDE	140-57-8	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	20	3.5	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.29
beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	PESTICIDE	319-85-7	µg/L	1/14/2004	12/17/2010	26	0	0	0.010	0.030	0.049	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.20
Chlordane	PESTICIDE	57-74-9	µg/L	1/14/2004	12/17/2010	26	0	0	0.040	0.24	0.25	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.16
Chlorobenzilate	PESTICIDE	510-15-6	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.3
Diallate	PESTICIDE	2303-16-4	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	1.4	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.71
Dieldrin	PESTICIDE	60-57-1	µg/L	1/14/2004	12/17/2010	26	0	0	0.0050	0.030	0.0055	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.91
Dimethoate	PESTICIDE	60-51-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	3.1
Dinoseb(2-secButyl-4,6-dinitrophenol)	PESTICIDE	88-85-7	µg/L	1/14/2004	12/17/2010	67	0	0	0.43	4.2	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.27
Disulfoton	PESTICIDE	298-04-4	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	3.0	0.064	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	16
Endosulfan I	PESTICIDE	959-98-8	µg/L	1/14/2004	12/17/2010	26	0	0	0.0099	0.030	9.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0010

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 12 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Endosulfan II	PESTICIDE	33213-65-9	µg/L	1/14/2004	12/17/2010	26	0	0	0.0060	0.043	9.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	6.25E-04
Endrin	PESTICIDE	72-20-8	µg/L	1/14/2004	12/17/2010	26	0	0	0.0090	0.030	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.019
Gamma-BHC (Lindane)	PESTICIDE	58-89-9	µg/L	1/14/2004	12/17/2010	26	0	0	0.0030	0.030	0.080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.038
Heptachlor	PESTICIDE	76-44-8	µg/L	1/14/2004	12/17/2010	26	0	0	0.0030	0.020	0.019	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.16
Hexachlorophene	PESTICIDE	70-30-4	µg/L	3/26/2010	12/17/2010	12	0	0	10	10	0.48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	21
Kepone	PESTICIDE	143-50-0	µg/L	12/17/2009	12/17/2010	16	0	0	2.0	20	0.0088	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	227
Methoxychlor	PESTICIDE	72-43-5	µg/L	1/14/2004	12/17/2010	26	0	0	0.0010	0.053	8.0	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.25E-04
Methyl parathion	PESTICIDE	298-00-0	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.40	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.5
Parathion	PESTICIDE	56-38-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	9.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.10
Pentachloronitrobenzene (PCNB)	PESTICIDE	82-68-8	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	2.0	0.34	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.9
Pentachlorophenol	PESTICIDE	87-86-5	µg/L	1/14/2004	12/10/2013	83	0	0	0.50	4.3	0.22	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	2.3
Phorate	PESTICIDE	298-02-2	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.32	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	3.1
Pronamide	PESTICIDE	23950-58-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	120	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0083

Table 5-2. Analytes Not Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 13 of 13)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Comparison Value	Comparison Value Basis	Minimum MDL/ Comparison Value
Tetraethyl dithiopyrophosphate (Sulfotepp)	PESTICIDE	3689-24-5	µg/L	12/17/2009	12/17/2010	16	0	0	1.0	1.0	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	1.3
Toxaphene	PESTICIDE	8001-35-2	µg/L	1/14/2004	12/17/2010	26	0	0	0.27	1.9	0.080	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	3.4
2-(2-methyl-4-chlorophenoxy) propionic acid	HERBICIDE	93-65-2	µg/L	1/14/2004	9/8/2004	4	0	0	59	59	1.6	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	37
2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	HERBICIDE	93-76-5	µg/L	1/14/2004	9/8/2004	4	0	0	0.15	0.15	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0094
2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	HERBICIDE	93-72-1	µg/L	1/14/2004	9/8/2004	4	0	0	0.085	0.085	13	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0066
2,4-D(2,4-Dichlorophenoxyacetic acid)	HERBICIDE	94-75-7	µg/L	1/14/2004	9/8/2004	4	0	0	0.97	0.97	16	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.061
2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	HERBICIDE	94-82-6	µg/L	1/14/2004	9/8/2004	4	0	0	1.2	1.2	13	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.094
2-Methyl-4 chlorophenoxyacetic acid	HERBICIDE	94-74-6	µg/L	1/14/2004	9/8/2004	4	0	0	84	84	0.80	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	105
Dalapon	HERBICIDE	75-99-0	µg/L	1/14/2004	9/8/2004	4	0	0	2.6	2.6	24	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.11
Dicamba	HERBICIDE	1918-00-9	µg/L	1/14/2004	9/8/2004	4	0	0	0.17	0.17	48	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)	0.0035

CAS = Chemical Abstracts Service

HQ = hazard quotient

MCL = maximum contaminant level

MDL = method detection limit

SVOC = semi-volatile organic compound

VOC = volatile organic compound

Reference: EPA 2013, U.S. Environmental Protection Agency Preliminary Remediation Goals for Radionuclides, Queried 11/01/2013, <http://epa-prgs.ornl.gov/radionuclides/download.html>.

Table 5-3. Analytes Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C at Concentrations That Do Not Exceed Comparison Values (2004 through 2013) (Sheet 1 of 3)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Background	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
Americium-241	RAD	14596-10-2	pCi/L	10/16/2007	12/10/2013	12	1	8.3	0.0080	0.058	0.14	0.14	7.70E-05	1	15	--	Federal MCL
Carbon-14	RAD	14762-75-5	pCi/L	10/16/2007	12/10/2013	12	1	8.3	-1.36E+01	11	61	61	--	--	2,000	--	Federal MCL
Cesium-137	RAD	10045-97-3	pCi/L	1/14/2004	12/23/2013	336	1	0.30	-7.90E+00	20	4.0	4.0	8.6	--	200	--	Federal MCL
Gross alpha	RAD	12587-46-1	pCi/L	1/14/2004	9/18/2013	88	26	30	-2.60E+00	2.9	1.5	5.5	--	--	15	--	Federal MCL
Plutonium-239/240	RAD	PU-239/240	pCi/L	10/16/2007	12/10/2013	12	3	25	0.0060	0.045	0.026	0.11	--	--	15	--	Federal MCL
Strontium-90	RAD	10098-97-2	pCi/L	10/16/2007	12/10/2013	12	1	8.3	-6.60E+00	0.25	2.1	2.1	0.0010	1	8.0	--	Federal MCL
Tritium	RAD	10028-17-8	pCi/L	3/4/2004	12/23/2013	99	97	98	210	250	286	2,900	119	97	20,000	--	Federal MCL
Aluminum	METAL	7429-90-5	µg/L	10/16/2007	12/10/2013	13	3	23	5.0	30	12	26	7.1	3	1,600	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Barium	METAL	7440-39-3	µg/L	12/22/2006	12/23/2013	294	294	100	--	--	25	98	105	--	320	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Boron	METAL	7440-42-8	µg/L	12/10/2013	12/10/2013	1	1	100	--	--	23	23	36.0	--	320	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Iron	METAL	7439-89-6	µg/L	12/22/2006	12/23/2013	298	204	68	9.0	64	10	603	570	1	1,120	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Lead	METAL	7439-92-1	µg/L	6/26/2008	12/10/2013	24	2	8.3	0.10	0.20	0.29	0.37	0.92	--	15	--	Federal MCL
Mercury	METAL	7439-97-6	µg/L	10/16/2007	12/10/2013	33	5	15	0.050	0.10	0.054	0.20	0.0030	5	0.48	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Molybdenum	METAL	7439-98-7	µg/L	12/17/2010	12/10/2013	2	2	100	--	--	1.2	2.9	3.2	--	8.0	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Strontium	METAL	7440-24-6	µg/L	12/22/2006	12/23/2013	290	290	100	--	--	113	739	323	192	960	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Thallium	METAL	7440-28-0	µg/L	10/16/2007	12/10/2013	33	2	6.1	0.050	0.10	0.30	0.32	1.7	--	0.50	--	Federal MCLG
Tin	METAL	7440-31-5	µg/L	12/3/2009	12/10/2013	27	4	15	0.10	39	0.14	0.42	21.6	--	960	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 5-3. Analytes Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C at Concentrations That Do Not Exceed Comparison Values (2004 through 2013) (Sheet 2 of 3)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Background	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
Bis(2-ethylhexyl) phthalate	SVOC	117-81-7	µg/L	10/16/2007	12/10/2013	33	2	6.1	0.52	1.0	0.73	0.77	--	--	6.0	--	Federal MCL
Di-n-octylphthalate	SVOC	117-84-0	µg/L	10/16/2007	12/17/2010	20	1	5.0	0.48	1.0	3.3	3.3	--	--	19	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Tributyl phosphate	SVOC	126-73-8	µg/L	1/9/2008	12/17/2010	28	1	3.6	0.47	1.0	1.0	1.0	--	--	9.7	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
2-Hexanone	VOC	591-78-6	µg/L	10/16/2007	9/6/2012	103	1	0.97	0.22	1.0	2.0	2.0	--	--	4.0	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
4-Methyl-2-pentanone	VOC	108-10-1	µg/L	10/16/2007	12/10/2013	116	1	0.86	0.12	1.0	4.4	4.4	--	--	64	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Acetone	VOC	67-64-1	µg/L	10/16/2007	12/10/2013	116	4	3.5	0.34	5.0	0.75	5.6	--	--	720	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Bromomethane	VOC	74-83-9	µg/L	10/16/2007	9/6/2012	103	11	11	0.084	1.0	0.33	0.69	--	--	1.1	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Carbon disulfide	VOC	75-15-0	µg/L	10/16/2007	12/10/2013	116	3	2.6	0.050	1.0	0.065	0.12	--	--	80	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Chloroform	VOC	67-66-3	µg/L	10/16/2007	12/10/2013	116	21	18	0.10	1.0	0.11	0.27	--	--	1.4	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methyl methacrylate	VOC	80-62-6	µg/L	3/26/2010	9/6/2012	95	1	1.1	0.26	0.26	1.4	1.4	--	--	1,120	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Methylene chloride	VOC	75-09-2	µg/L	10/16/2007	12/10/2013	116	13	11	0.11	1.0	0.29	3.6	--	--	4.8	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

Table 5-3. Analytes Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C at Concentrations That Do Not Exceed Comparison Values (2004 through 2013) (Sheet 3 of 3)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Background	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
Tetrachloroethene	VOC	127-18-4	µg/L	10/16/2007	12/10/2013	116	6	5.2	0.088	1.0	0.19	0.67	--	--	4.8	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Toluene	VOC	108-88-3	µg/L	10/16/2007	12/10/2013	116	1	0.86	0.062	1.0	0.17	0.17	--	--	64	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)
Trichloroethene	VOC	79-01-6	µg/L	10/16/2007	12/10/2013	116	1	0.86	0.21	1.0	0.40	0.40	--	--	0.40	--	Method B Groundwater Screening Level (Lower of 10 ⁻⁶ Cancer and HQ=0.1 Noncancer Values)

CAS = Chemical Abstracts Service

HQ = hazard quotient

MCL = maximum contaminant level

MCLG = maximum contaminant level goal

SVOC = semi-volatile organic compound

VOC = volatile organic compound

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5.4 IDENTIFY ANALYTES WITH MAXIMUM DETECTED CONCENTRATIONS GREATER THAN COMPARISON VALUES

A total of 24 analytes were detected at least once and had maximum detected concentrations greater than their respective comparison values. A list of these analytes is provided in Table 5-4. The table provides sampling dates, minimum and maximum MDLs, minimum and maximum detected concentrations, the comparison value and its basis, and the number of detections that exceed the comparison value. Also provided are the 90th percentile Hanford Site groundwater background concentration and the number of detections that exceed the background value.

The analytes listed in Table 5-4 are those with the potential to contribute to overall cancer risks and noncancer hazards. To provide an indication of the analytes that are associated with site releases and have the potential to be risk drivers, and to support investigations into potential contributions to groundwater contamination from sources in WMA C, an analyte-specific evaluation is performed. The evaluation involves consideration of natural background concentrations as well as spatial and temporal variations in analyte concentrations. Analytes with results indicative of natural background conditions, or those analytes reported on a nonrecurring basis (concentrations that are not reproducible or consistent with the remainder of the data set), are not carried forward for identification of analytes of interest in the individual monitoring wells.

Based on the analyte-specific evaluation, 17 of the 24 analytes with maximum detected concentrations greater than their respective comparison values were not carried forward. The remaining seven analytes have the potential to be cancer risk or noncancer hazard drivers and are carried forward into a well-specific evaluation. The seven analytes of interest for the entire WMA C data set are ¹²⁹I, ⁹⁹Tc, nickel, vanadium, cyanide, nitrate, and sulfate.

Results of the analyte-specific evaluation are summarized in the following subsections.

5.4.1 Radionuclides

Iodine-129 was detected in all 108 groundwater samples (100% frequency) with concentrations ranging between 1.3 and 7.5 pCi/L. Iodine-129 concentrations above the Federal MCL of 1 pCi/L were reported for all 108 detections and in all 12 wells. Based on these results, ¹²⁹I is carried forward into the well-specific data evaluation.

Technetium-99 was detected in 392 of 408 groundwater samples (96% frequency) with concentrations ranging between 7 and 26,000 pCi/L. Technetium-99 concentrations above the Federal MCL of 900 pCi/L were reported for 220 of the 392 detections and in 7 of the 12 wells. Based on these results, ⁹⁹Tc is carried forward into the well-specific evaluation.

5.4.2 Metals

Antimony was detected in 11 of 294 groundwater samples (4% frequency) with concentrations ranging between 0.35 and 74 µg/L. Antimony concentrations above the Method B groundwater screening level of 0.64 µg/L (HQ of 0.1 noncancer hazard value) were reported for 9 of the

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11 detections and in 7 of the 12 wells. However, background concentrations of antimony in Hanford Site groundwater are elevated and exceed the Federal MCL of 6 µg/L. Only 3 antimony detections were reported with concentrations above the 90th percentile background concentration (55 µg/L) and all 3 detections (with concentrations of 62, 65, and 74 µg/L) are considered to be within the range of natural background conditions. Based on these results, antimony is not carried forward into the well-specific evaluation.

Arsenic was detected in 65 of 76 groundwater samples (86% frequency) with concentrations ranging between 3 and 16 µg/L. Arsenic concentrations above the Method B groundwater screening level of 0.058 µg/L (10⁻⁶ cancer risk value) were reported for all 65 detections and in all 12 wells. However, background concentrations of arsenic in Hanford Site groundwater are elevated and are close to the Federal MCL of 10 µg/L. Only 7 arsenic detections were reported with concentrations above the 90th percentile background concentration (8 µg/L) and all 7 detections, with concentrations ranging between 9 and 16 µg/L, are considered to be within the range of natural background conditions. Based on these results, arsenic is not carried forward into the well-specific evaluation.

Cadmium was detected in 2 of 298 groundwater samples (1% frequency) with concentrations of 4 and 7.5 µg/L. Both detections were above the Method B groundwater screening level of 0.8 µg/L (HQ of 0.1 noncancer hazard value) but only one, a value of 7.5 µg/L measured in well 299-E27-24 in 2010, was above the Federal MCL of 5 µg/L. Based on these results, cadmium is not carried forward into the well-specific evaluation.

Chromium was detected in 163 of 298 groundwater samples (55% frequency) with concentrations ranging between 0.79 and 106 µg/L. Chromium concentrations above the Federal MCL of 100 µg/L were reported for only 1 of the 163 detections, a value of 106 µg/L measured in well 299-E27-25 in 2013. Based on these results, chromium is not carried forward into the well-specific evaluation.

Cobalt was detected in 9 of 294 groundwater samples (3% frequency) with concentrations ranging between 1.8 and 9.4 µg/L. All 9 detections were above the Method B groundwater screening level of 0.48 µg/L (HQ of 0.1 noncancer hazard value). Although cobalt detections above the screening level were reported in 8 of the 12 wells, such detections were reported only once in 7 of those 8 wells and twice in the eighth well. Based on these results, the low frequency of detection, and the lack of any consistent temporal or spatial trends, cobalt is not carried forward into the well-specific evaluation.

Copper was detected in 31 of 294 groundwater samples (11% frequency) with concentrations ranging between 0.37 and 1,720 µg/L. Copper concentrations above the Method B groundwater screening level of 64 µg/L (HQ of 0.1 noncancer hazard value) were reported for 2 of the 31 detections, values of 1,720 µg/L measured in well 299-E27-14 in 2009 and 634 µg/L measured in well 299-E27-25 in 2010. All reported copper detections were below the Federal MCL of 1,300 µg/L. Based on these results, copper is not carried forward into the well-specific evaluation.

Table 5-4. Analytes Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C at Concentrations That Exceed Comparison Values (2004 through 2013) (Sheet 1 of 3)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Background	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
Iodine-129	RAD	15046-84-1	pCi/L	3/4/2004	12/23/2013	108	108	100	--	--	1.3	7.5	9.00E-07	108	1.0	108	Federal MCL
Technetium-99	RAD	14133-76-7	pCi/L	1/14/2004	12/23/2013	408	392	96	-8.90E+00	4.9	7.0	26,000	0.83	392	900	220	Federal MCL
Antimony	METAL	7440-36-0	µg/L	12/22/2006	12/23/2013	294	11	3.7	0.30	56	0.35	74	55.1	3	0.64	9	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Arsenic	METAL	7440-38-2	µg/L	10/16/2007	12/23/2013	76	65	86	5.0	25	3.0	16	7.9	7	0.058	65	Method B Groundwater Screening Level (10 ⁻⁶ Cancer Risk Value)
Cadmium	METAL	7440-43-9	µg/L	12/22/2006	12/23/2013	298	2	0.67	0.10	4.1	4.0	7.5	0.92	2	0.80	2	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Chromium	METAL	7440-47-3	µg/L	12/22/2006	12/23/2013	298	163	55	3.1	14	0.79	106	2.4	159	100	1	Federal MCL
Cobalt	METAL	7440-48-4	µg/L	12/22/2006	12/23/2013	294	9	3.1	0.10	5.0	1.8	9.4	0.92	9	0.48	9	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Copper	METAL	7440-50-8	µg/L	12/22/2006	12/23/2013	294	31	11	0.20	6.0	0.37	1,720	0.81	29	64	2	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Hexavalent Chromium	METAL	18540-29-9	µg/L	10/16/2007	12/10/2013	14	11	79	2.0	2.0	2.4	6.9	--	--	4.8	5	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Manganese	METAL	7439-96-5	µg/L	12/22/2006	12/23/2013	298	40	13	0.20	6.0	0.80	76	38.5	5	38	5	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)

Table 5-4. Analytes Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C at Concentrations That Exceed Comparison Values (2004 through 2013) (Sheet 2 of 3)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Background	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
Nickel	METAL	7440-02-0	µg/L	12/22/2006	12/23/2013	294	132	45	1.5	13	0.23	293	1.6	130	32	13	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Selenium	METAL	7782-49-2	µg/L	10/16/2007	12/10/2013	49	47	96	5.9	5.9	3.4	17	10.5	18	8.0	33	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Silver	METAL	7440-22-4	µg/L	12/22/2006	12/23/2013	294	19	6.5	0.10	7.0	4.0	13	5.3	17	8.0	11	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Uranium	METAL	7440-61-1	µg/L	1/14/2004	12/23/2013	357	350	98	0.10	2.1	0.51	38	9.9	3	4.8	32	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Vanadium	METAL	7440-62-2	µg/L	12/22/2006	12/23/2013	294	263	89	7.0	17	7.6	48	11.5	248	8.0	261	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Zinc	METAL	7440-66-6	µg/L	12/22/2006	12/23/2013	294	74	25	3.3	9.0	4.0	494	21.8	11	480	1	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Carbon tetrachloride	VOC	56-23-5	µg/L	10/16/2007	12/10/2013	116	3	2.6	0.063	1.0	0.22	1.3	--	--	0.63	1	Method B Groundwater Screening Level (10 ⁻⁶ Cancer Risk Value)
Chloride	ANION	16887-00-6	µg/L	1/14/2004	12/23/2013	429	429	100	--	--	7,600	297,000	15,630	309	250,000	1	Federal Secondary MCL
Cyanide	ANION	57-12-5	µg/L	1/14/2004	12/23/2013	421	133	32	1.7	12	2.8	45	8.4	71	0.48	133	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)

Table 5-4. Analytes Detected in the Unconfined Aquifer in the Vicinity of Waste Management Area C at Concentrations That Exceed Comparison Values (2004 through 2013) (Sheet 3 of 3)

Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Background	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
Fluoride	ANION	16984-48-8	µg/L	1/14/2004	12/23/2013	425	351	83	30	2,000	56	329	1,047	--	96	333	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Nitrate	ANION	14797-55-8	µg/L	1/14/2004	12/23/2013	429	429	100	--	--	8,280	118,000	26,871	247	11,360	392	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Nitrite	ANION	14797-65-0	µg/L	1/14/2004	12/23/2013	411	48	12	9.9	10,000	118	2,300	93.7	48	480	2	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Nitrogen in Nitrite and Nitrate	ANION	NO2+NO3-N	µg/L	10/16/2007	10/26/2007	4	4	100	--	--	4,200	10,100	--	--	2,560	4	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
Sulfate	ANION	14808-79-8	µg/L	1/14/2004	12/23/2013	429	429	100	--	--	46,100	345,000	47,014	427	250,000	56	Federal Secondary MCL

CAS = Chemical Abstracts Service

HQ = hazard quotient

MCL = maximum contaminant level

VOC = volatile organic compound

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Hexavalent chromium was detected in 11 of 14 groundwater samples (79% frequency) with concentrations ranging between 2.4 and 6.9 $\mu\text{g/L}$. All 14 samples were from well 299-E27-155; no other wells reported any hexavalent chromium results. Hexavalent chromium concentrations above the Method B groundwater screening level of 4.8 $\mu\text{g/L}$ (HQ of 0.1 noncancer hazard value) were reported for 5 of the 11 detections; however, all 5 exceedances were reported in 2008 and 2009. Three subsequent sampling rounds at well 299-E27-155, two in 2010 and one in 2013, resulted in no detections above the 4.8 $\mu\text{g/L}$ screening level. Based on these results, hexavalent chromium is not carried forward into the well-specific evaluation. It should be noted that older measurements of total chromium from filtered groundwater samples have reported over 10 detections of total chromium (which could be conservatively assumed equivalent to hexavalent chromium) above the screening level (4.8 $\mu\text{g/L}$) at 3 wells (299-E27-14, 299-E27-23, and 299-E27-4). However, none of these older total chromium measurements were above the Model Toxics Control Act Method B level (48 $\mu\text{g/L}$). This does not change the conclusion of not moving hexavalent chromium forward into the well-specific evaluation.

Manganese was detected in 40 of 298 groundwater samples (13% frequency) with concentrations ranging between 0.8 and 76 $\mu\text{g/L}$. Manganese concentrations above the Method B groundwater screening level of 38 $\mu\text{g/L}$ (HQ of 0.1 noncancer hazard value) were reported for 5 of the 40 detections and in 2 of the 12 wells, wells 299-E27-4 (1 result in 2009) and 299-E27-155 (4 results in 2007 and 2008). Subsequent sampling (2009 to 2013) at these two wells resulted in no detections above the 38 $\mu\text{g/L}$ screening level, which is approximately equal to the 90th percentile Hanford Site background concentration of 39 $\mu\text{g/L}$. Based on these results, manganese is not carried forward into the well-specific evaluation.

Nickel was detected in 132 of 294 groundwater samples (45% frequency) with concentrations ranging between 0.23 and 293 $\mu\text{g/L}$. Nickel concentrations above the Method B groundwater screening level of 32 $\mu\text{g/L}$ (HQ of 0.1 noncancer hazard value) were reported for 13 of the 132 detections and in 4 of the 12 wells. Wells 299-E27-23 and 299-E27-25 were reported with 1 detection each above the 32 $\mu\text{g/L}$ screening level. Wells 299-E27-4 and 299-E27-15 were reported with 6 and 5 detections, respectively, above the screening level, and 2 of the 6 detections in well 299-E27-4 also exceeded the State MCL of 100 $\mu\text{g/L}$ (values of 293 and 174 $\mu\text{g/L}$ measured in 2009 and 2013, respectively). Based on these results, nickel is carried forward into the well-specific evaluations because of a potential to contribute locally to cumulative noncancer effects.

Selenium was detected in 47 of 49 groundwater samples (96% frequency) with concentrations ranging between 3.4 and 17 $\mu\text{g/L}$. Selenium concentrations above the Method B groundwater screening level of 8 $\mu\text{g/L}$ (HQ of 0.1 noncancer hazard value) were reported for 33 of the 47 detections and in 11 of the 12 wells. Fifteen of the 33 detections were below the 90th percentile Hanford Site background concentration of 10.5 $\mu\text{g/L}$ and the other 18 detections had concentrations ranging from 11 to 17 $\mu\text{g/L}$, which are considered to be within the range of natural background conditions. All reported selenium detections were below the Federal MCL of 50 $\mu\text{g/L}$. Based on these results, selenium is not carried forward into the analyte-specific evaluation.

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Silver was detected in 19 of 294 groundwater samples (7% frequency) with concentrations ranging between 4 and 13 µg/L. Silver concentrations above the Method B groundwater screening level of 8 µg/L (HQ of 0.1 noncancer hazard value) were reported for 11 of the 19 detections and in 9 of the 12 wells. Detections above the screening level were reported only once in 7 of the 9 wells and twice in the other 2 wells, mostly in 2007 and 2008. All reported silver detections were below the Federal MCL of 100 µg/L. Based on these results, silver is not carried forward into the well-specific evaluation.

Uranium was detected in 350 of 357 groundwater samples (96% frequency) with concentrations ranging between 0.51 and 38 µg/L. Uranium concentrations above the Method B groundwater screening level of 4.8 µg/L (HQ of 0.1 noncancer hazard value) were reported for 32 of the 350 detections and in 6 of the 12 wells. However, all but 3 of the 32 detections were below the 90th percentile Hanford Site background concentration of 9.9 µg/L, a value of 10.8 µg/L measured in well 299-E27-14 in 2012 and 2013, and a value of 38 µg/L measured in well 299-E27-15 in 2008. The latter detection in well 299-E27-15 was the only detection above the MCL of 30 µg/L. Based on these results, uranium is not carried forward into the well-specific evaluation.

Vanadium was detected in 263 of 294 groundwater samples (89% frequency) with concentrations ranging between 7.6 and 48 µg/L. Vanadium concentrations above the Method B groundwater screening level of 8.0 µg/L (HQ of 0.1 noncancer hazard value) were reported for 261 of the 263 detections and in all 12 wells (there is no MCL value for vanadium). Based on these results, vanadium is carried forward into the well-specific evaluations because of a potential to contribute to cumulative noncancer effect.

Zinc was detected in 74 of 494 groundwater samples (25% frequency) with concentrations ranging between 4.0 and 494 µg/L. Zinc concentrations above the Method B groundwater screening level of 480 µg/L (HQ of 0.1 noncancer hazard value) were reported for 1 of the 74 detections, a value of 494 µg/L measured in well 299-E27-25 in 2010. All reported zinc detections were below the Federal MCL of 5,000 µg/L. Based on these results, zinc is not carried forward into the well-specific evaluation.

5.4.3 Volatile Organic Compounds

Carbon tetrachloride was detected in 3 of 116 groundwater samples (3% frequency) with concentrations ranging between 0.22 and 1.3 µg/L. Carbon tetrachloride concentrations above the Method B groundwater screening level of 0.63 µg/L (10^{-6} cancer risk value) were reported for only 1 of the 3 detections, a value of 1.3 µg/L measured in well 299-E27-155 in 2009. Based on these results, carbon tetrachloride is carried forward into the well-specific evaluation.

5.4.4 Anions

Chloride was detected in 429 of 429 groundwater samples (100% frequency) with concentrations ranging between 7,600 and 297,000 µg/L. Chloride concentrations above the secondary Federal MCL of 250,000 µg/L were reported for only 1 of the 429 detections, a value of 297,000 µg/L

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measured in well 299-E27-7 in 2010. Based on these results, chloride is not carried forward into the well-specific evaluation.

Cyanide was detected in 133 of 421 groundwater samples (32% frequency) with concentrations ranging between 2.8 and 45 µg/L. Cyanide concentrations above the Method B groundwater screening level of 0.48 µg/L (HQ of 0.1 noncancer hazard value) were reported for all 133 detections and in 11 of the 12 wells (all except well 299-E27-25, where all results were reported as non-detects). Although background concentrations of cyanide in Hanford Site groundwater exceed the comparison value, 71 cyanide detections were reported with concentrations above the 8.4 µg/L 90th percentile background concentration. Cyanide concentrations greater than background were detected in 9 of the 12 wells. Based on these results, cyanide is carried forward into the well-specific evaluation.

Fluoride was detected in 351 of 425 groundwater samples (83% frequency) with concentrations ranging between 56 and 329 µg/L. Fluoride concentrations above the Method B groundwater screening level of 96 µg/L (HQ of 0.1 noncancer hazard value) were reported for 333 of the 351 detections and in all 12 wells. However, all reported fluoride detections were below the 90th percentile Hanford Site background concentration of 1,047 µg/L as well as the Federal MCL of 4,000 µg/L. Based on these results, fluoride is not carried forward into the well-specific evaluations.

Nitrate was detected in all 429 groundwater samples (100% frequency) with concentrations ranging between 8,280 and 118,000 µg/L. Nitrate concentrations above the Method B groundwater screening level of 11,360 µg/L (HQ of 0.1 noncancer hazard value) were reported for 392 of the 429 detections and in all 12 wells. Based on these results, nitrate is carried forward into the well-specific evaluation.

Nitrite was detected in 48 of 411 groundwater samples (12% frequency) with concentrations ranging between 118 and 2,300 µg/L. Nitrite concentrations above the Method B groundwater screening level of 480 µg/L (HQ of 0.1 noncancer hazard value) were reported for 2 of the 48 detections, values of 532 µg/L measured in well 299-E27-155 in 2008 and 2,300 µg/L measured in well 299-E27-24 in 2010. All reported nitrite detections were below the Federal MCL of 3,300 µg/L. Based on these results, nitrite is not carried forward into the well-specific evaluation.

Nitrogen in nitrite and nitrate was detected in 4 of 4 groundwater samples (100% frequency) with concentrations ranging between 4,200 and 10,100 µg/L. All 4 samples were from well 299-E27-155; no other wells reported nitrite or nitrate results as the nitrogen equivalent. Nitrogen in nitrite and nitrate concentrations above the Method B groundwater screening level of 2,560 µg/L (HQ of 0.1 noncancer hazard value) were reported for all 4 detections, all of which were measured in 2007. Because of the limited nature of these results, and because nitrate reported as the anion is carried forward into the well-specific evaluations, nitrogen in nitrite and nitrate is not carried forward into the well-specific evaluation.

Sulfate was detected in 429 of 429 groundwater samples (100% frequency) with concentrations ranging between 46,100 and 345,000 µg/L. Sulfate concentrations above the secondary Federal

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MCL of 250,000 µg/L were reported for 56 of the 429 detections and in 4 of the 12 wells. Sulfate detections above the 90th percentile Hanford Site background concentration of 47,014 µg/L were reported in all 12 wells. Based on these results, sulfate is carried forward into the analyte-specific evaluation.

5.5 IDENTIFY ANALYTES OF INTEREST IN INDIVIDUAL MONITORING WELLS

As a final step, analytical results for the seven area-wide analytes of interest identified in Section 5.4 (¹²⁹I, ⁹⁹Tc, nickel, vanadium, cyanide, nitrate, and sulfate) were evaluated in the well-specific data sets to identify analytes of interest in the individual monitoring wells. Results are provided in Tables 5-5 and 5-6. Table 5-5 provides sampling dates, minimum and maximum MDLs, minimum and maximum detected concentrations, the comparison value and its basis, and the number of detections that exceed the comparison value. Also provided are the 90th percentile Hanford Site groundwater background concentration and the number of detections that exceed the background value. Table 5-6 provides a summary identifying the analytes detected at concentrations above their respective comparison values in each of the 12 unconfined aquifer monitoring wells. A location map depicting each well's analytes of interest is provided in Figure 5-1. Well-specific concentration trend plots for each of the seven analytes of interest are provided in Figures 5-2 through 5-8.

Iodine-129 is pervasive and persistent in the unconfined aquifer in the vicinity of WMA C (Figure 5-2). Concentrations were above the 1 pCi/L Federal MCL in all 12 wells over the entire 10-year period. Concentration fluctuations were observed in all of the wells but there does not appear to be a discernable decline in overall ¹²⁹I concentrations in this area. Comparison of upgradient and downgradient trends does not indicate any local releases of ¹²⁹I in the WMA C vicinity.

Technetium-99 concentrations above the 900 pCi/L Federal MCL were observed in seven wells located along the south perimeter of WMA C (Figure 5-3). Since 2012, concentrations have declined in four of these wells (299-E27-4, 299-E27-155, 299-E27-13, and 299-E27-23) but have increased in the other three wells (299-E27-21, 299-E27-24, and 299-E27-14). Well 299-E27-23 has had the highest ⁹⁹Tc concentrations historically, reaching a peak of 26,000 pCi/L in 2012, but the concentrations in this well have steadily declined in recent years, reaching 4,400 pCi/L in December 2013. The trends in ⁹⁹Tc concentration show apparent plume movement toward the east beginning in 2012, as evidenced by a sharp increase in concentration in well 299-E27-21. At the end of 2013, the ⁹⁹Tc concentration in well 299-E27-21 was 21,000 pCi/L. Less sharp increases in concentration were also observed beginning in 2012 in wells 299-E27-14 and 299-E27-24, which are located to the east of well 299-E27-12, and in December 2013 the concentrations in these two wells were 7,300 pCi/L and 4,800 pCi/L, respectively. Comparison of upgradient and downgradient trends indicates that there was a local release of ⁹⁹Tc from WMA C.

Table 5-5. Analytical Results for Groundwater Analytes of Interest at Twelve Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 1 of 5)

Well Name	Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Groundwater Background Level	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
299-E27-12	Iodine-129	RAD	15046-84-1	pCi/L	12/13/2011	12/13/2013	6	6	100	--	--	1.5	7.5	9.00E-07	6	1.0	6	Federal MCL
299-E27-12	Technetium-99	RAD	14133-76-7	pCi/L	3/8/2004	12/13/2013	36	35	97	4.9	4.9	7.0	213	0.83	35	900	--	Federal MCL
299-E27-12	Nickel	METAL	7440-02-0	µg/L	12/22/2006	12/13/2013	26	7	27	4.0	13	4.0	10	1.6	7	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-12	Vanadium	METAL	7440-62-2	µg/L	12/22/2006	12/13/2013	26	25	96	12	12	7.6	39	12	24	8.0	24	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-12	Cyanide	ANION	57-12-5	µg/L	3/8/2004	12/13/2013	39	3	7.7	2.0	4.7	8.2	18	8.4	2	0.48	3	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-12	Nitrate	ANION	14797-55-8	µg/L	3/8/2004	12/13/2013	39	39	100	--	--	8,280	12,800	26,871	--	11,360	5	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-12	Sulfate	ANION	14808-79-8	µg/L	3/8/2004	12/13/2013	39	39	100	--	--	46,100	73,000	47,014	37	250,000	--	Federal Secondary MCL
299-E27-13	Iodine-129	RAD	15046-84-1	pCi/L	12/15/2010	12/10/2013	7	7	100	--	--	1.5	6.3	9.00E-07	7	1.0	7	Federal MCL
299-E27-13	Technetium-99	RAD	14133-76-7	pCi/L	3/4/2004	12/10/2013	38	38	100	--	--	1,500	12,000	0.83	38	900	38	Federal MCL
299-E27-13	Nickel	METAL	7440-02-0	µg/L	9/9/2007	12/10/2013	27	16	59	4.0	13	4.0	20	1.6	16	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-13	Vanadium	METAL	7440-62-2	µg/L	9/9/2007	12/10/2013	27	24	89	17	17	14	47	12	24	8.0	24	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-13	Cyanide	ANION	57-12-5	µg/L	3/4/2004	12/10/2013	41	2	4.9	2.0	4.7	7.5	23	8.4	1	0.48	2	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-13	Nitrate	ANION	14797-55-8	µg/L	3/4/2004	12/10/2013	41	41	100	--	--	10,600	27,900	26,871	4	11,360	38	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-13	Sulfate	ANION	14808-79-8	µg/L	3/4/2004	12/10/2013	41	41	100	--	--	52,500	124,000	47,014	41	250,000	--	Federal Secondary MCL
299-E27-14	Iodine-129	RAD	15046-84-1	pCi/L	3/4/2004	12/23/2013	14	14	100	--	--	1.6	5.8	9.00E-07	14	1.0	14	Federal MCL
299-E27-14	Technetium-99	RAD	14133-76-7	pCi/L	3/4/2004	12/23/2013	40	40	100	--	--	1,500	10,700	0.83	40	900	40	Federal MCL
299-E27-14	Nickel	METAL	7440-02-0	µg/L	9/16/2007	12/23/2013	27	23	85	4.0	13	5.5	26	1.6	23	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-14	Vanadium	METAL	7440-62-2	µg/L	9/16/2007	12/23/2013	27	22	81	7.0	17	14	31	12	22	8.0	22	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)

Table 5-5. Analytical Results for Groundwater Analytes of Interest at Twelve Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 2 of 5)

Well Name	Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Groundwater Background Level	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
299-E27-14	Cyanide	ANION	57-12-5	µg/L	3/4/2004	12/23/2013	40	29	73	2.0	12	5.2	22	8.4	24	0.48	29	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-14	Nitrate	ANION	14797-55-8	µg/L	3/4/2004	12/23/2013	40	40	100	--	--	42,500	118,000	26,871	40	11,360	40	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-14	Sulfate	ANION	14808-79-8	µg/L	3/4/2004	12/23/2013	40	40	100	--	--	179,000	333,000	47,014	40	250,000	28	Federal Secondary MCL
299-E27-15	Iodine-129	RAD	15046-84-1	pCi/L	12/9/2011	12/10/2013	6	6	100	--	--	1.5	6.4	9.00E-07	6	1.0	6	Federal MCL
299-E27-15	Technetium-99	RAD	14133-76-7	pCi/L	3/4/2004	12/10/2013	40	40	100	--	--	17	348	0.83	40	900	--	Federal MCL
299-E27-15	Nickel	METAL	7440-02-0	µg/L	9/9/2007	12/10/2013	26	26	100	--	--	8.3	59	1.6	26	32	5	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-15	Vanadium	METAL	7440-62-2	µg/L	9/9/2007	12/10/2013	26	23	88	7.0	17	9.6	35	12	22	8.0	23	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-15	Cyanide	ANION	57-12-5	µg/L	3/4/2004	12/10/2013	40	2	5.0	2.0	4.7	5.6	7.1	8.4	--	0.48	2	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-15	Nitrate	ANION	14797-55-8	µg/L	3/4/2004	12/10/2013	40	40	100	--	--	14,400	21,293	26,871	--	11,360	40	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-15	Sulfate	ANION	14808-79-8	µg/L	3/4/2004	12/10/2013	40	40	100	--	--	80,100	115,000	47,014	40	250,000	--	Federal Secondary MCL
299-E27-155	Iodine-129	RAD	15046-84-1	pCi/L	10/16/2007	12/10/2013	20	20	100	--	--	1.4	6.2	9.00E-07	20	1.0	20	Federal MCL
299-E27-155	Technetium-99	RAD	14133-76-7	pCi/L	10/16/2007	12/10/2013	27	27	100	--	--	890	8,600	0.83	27	900	26	Federal MCL
299-E27-155	Nickel	METAL	7440-02-0	µg/L	1/9/2008	12/10/2013	26	1	3.9	4.0	13	0.23	0.23	1.6	--	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-155	Vanadium	METAL	7440-62-2	µg/L	1/9/2008	12/10/2013	26	23	88	17	17	10	27	12	21	8.0	23	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-155	Cyanide	ANION	57-12-5	µg/L	10/16/2007	12/10/2013	30	18	60	4.0	5.7	5.2	12	8.4	2	0.48	18	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-155	Nitrate	ANION	14797-55-8	µg/L	10/16/2007	12/10/2013	31	31	100	--	--	20,300	57,500	26,871	28	11,360	31	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-155	Sulfate	ANION	14808-79-8	µg/L	10/16/2007	12/10/2013	31	31	100	--	--	85,000	240,000	47,014	31	250,000	--	Federal Secondary MCL
299-E27-21	Iodine-129	RAD	15046-84-1	pCi/L	12/14/2011	12/13/2013	6	6	100	--	--	1.6	5.0	9.00E-07	6	1.0	6	Federal MCL
299-E27-21	Technetium-99	RAD	14133-76-7	pCi/L	3/4/2004	12/13/2013	39	39	100	--	--	323	21,000	0.83	39	900	24	Federal MCL

Table 5-5. Analytical Results for Groundwater Analytes of Interest at Twelve Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 3 of 5)

Well Name	Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Groundwater Background Level	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
299-E27-21	Nickel	METAL	7440-02-0	µg/L	9/9/2007	12/13/2013	25	1	4.0	1.5	10	11	11	1.6	1	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-21	Vanadium	METAL	7440-62-2	µg/L	9/9/2007	12/13/2013	25	25	100	--	--	7.7	39	12	24	8.0	24	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-21	Cyanide	ANION	57-12-5	µg/L	3/4/2004	12/13/2013	38	9	24	1.7	4.7	4.4	35	8.4	1	0.48	9	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-21	Nitrate	ANION	14797-55-8	µg/L	3/4/2004	12/13/2013	41	41	100	--	--	17,300	49,100	26,871	25	11,360	41	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-21	Sulfate	ANION	14808-79-8	µg/L	3/4/2004	12/13/2013	41	41	100	--	--	53,200	184,000	47,014	41	250,000	--	Federal Secondary MCL
299-E27-22	Iodine-129	RAD	15046-84-1	pCi/L	12/16/2010	12/13/2013	7	7	100	--	--	1.3	7.5	9.00E-07	7	1.0	7	Federal MCL
299-E27-22	Technetium-99	RAD	14133-76-7	pCi/L	1/14/2004	12/13/2013	41	39	95	4.10E+00	-4.00E-01	7.7	89	0.83	39	900	--	Federal MCL
299-E27-22	Nickel	METAL	7440-02-0	µg/L	12/22/2006	12/13/2013	27	7	26	4.0	13	4.2	12	1.6	7	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-22	Vanadium	METAL	7440-62-2	µg/L	12/22/2006	12/13/2013	27	24	89	12	17	10	44	12	23	8.0	24	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-22	Cyanide	ANION	57-12-5	µg/L	1/14/2004	12/13/2013	41	3	7.3	1.7	4.7	2.8	8.1	8.4	--	0.48	3	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-22	Nitrate	ANION	14797-55-8	µg/L	1/14/2004	12/13/2013	41	41	100	--	--	15,900	39,700	26,871	29	11,360	41	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-22	Sulfate	ANION	14808-79-8	µg/L	1/14/2004	12/13/2013	41	41	100	--	--	94,400	203,000	47,014	41	250,000	--	Federal Secondary MCL
299-E27-23	Iodine-129	RAD	15046-84-1	pCi/L	12/16/2010	12/10/2013	7	7	100	--	--	1.7	5.6	9.00E-07	7	1.0	7	Federal MCL
299-E27-23	Technetium-99	RAD	14133-76-7	pCi/L	1/23/2004	12/10/2013	42	42	100	--	--	1,300	26,000	0.83	42	900	42	Federal MCL
299-E27-23	Nickel	METAL	7440-02-0	µg/L	9/9/2007	12/10/2013	27	6	22	1.5	13	7.4	42	1.6	6	32	1	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-23	Vanadium	METAL	7440-62-2	µg/L	9/9/2007	12/10/2013	27	26	96	17	17	12	43	12	26	8.0	26	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-23	Cyanide	ANION	57-12-5	µg/L	1/23/2004	12/10/2013	41	11	27	2.0	4.7	3.3	9.4	8.4	1	0.48	11	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)

Table 5-5. Analytical Results for Groundwater Analytes of Interest at Twelve Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 4 of 5)

Well Name	Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Groundwater Background Level	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
299-E27-23	Nitrate	ANION	14797-55-8	µg/L	1/23/2004	12/10/2013	43	43	100	--	--	20,400	47,400	26,871	35	11,360	43	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-23	Sulfate	ANION	14808-79-8	µg/L	1/23/2004	12/10/2013	43	43	100	--	--	69,900	179,000	47,014	43	250,000	--	Federal Secondary MCL
299-E27-24	Iodine-129	RAD	15046-84-1	pCi/L	5/13/2010	12/13/2013	8	8	100	--	--	2.1	5.4	9.00E-07	8	1.0	8	Federal MCL
299-E27-24	Technetium-99	RAD	14133-76-7	pCi/L	5/13/2010	12/13/2013	13	13	100	--	--	2,400	5,100	0.83	13	900	13	Federal MCL
299-E27-24	Nickel	METAL	7440-02-0	µg/L	5/13/2010	12/13/2013	15	7	47	4.0	10	0.46	8.7	1.6	6	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-24	Vanadium	METAL	7440-62-2	µg/L	5/13/2010	12/13/2013	15	14	93	17	17	8.1	30	12	12	8.0	14	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-24	Cyanide	ANION	57-12-5	µg/L	5/13/2010	12/13/2013	15	15	100	--	--	8.6	15	8.4	15	0.48	15	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-24	Nitrate	ANION	14797-55-8	µg/L	5/13/2010	12/13/2013	15	15	100	--	--	59,300	73,000	26,871	15	11,360	15	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-24	Sulfate	ANION	14808-79-8	µg/L	5/13/2010	12/13/2013	15	15	100	--	--	248,000	345,000	47,014	15	250,000	14	Federal Secondary MCL
299-E27-25	Iodine-129	RAD	15046-84-1	pCi/L	4/6/2010	12/13/2013	9	9	100	--	--	1.6	4.2	9.00E-07	9	1.0	9	Federal MCL
299-E27-25	Technetium-99	RAD	14133-76-7	pCi/L	4/6/2010	12/13/2013	13	0	0	8.90E+00	2.5	--	--	0.83	--	900	--	Federal MCL
299-E27-25	Nickel	METAL	7440-02-0	µg/L	4/6/2010	12/13/2013	16	12	75	4.0	4.0	4.6	79	1.6	12	32	1	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-25	Vanadium	METAL	7440-62-2	µg/L	4/6/2010	12/13/2013	16	14	88	10	12	10	21	12	12	8.0	14	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-25	Cyanide	ANION	57-12-5	µg/L	4/6/2010	12/13/2013	16	0	0	1.7	4.0	--	--	8.4	--	0.48	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-25	Nitrate	ANION	14797-55-8	µg/L	4/6/2010	12/13/2013	16	16	100	--	--	36,700	48,700	26,871	16	11,360	16	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-25	Sulfate	ANION	14808-79-8	µg/L	4/6/2010	12/13/2013	16	16	100	--	--	227,000	292,000	47,014	16	250,000	13	Federal Secondary MCL
299-E27-4	Iodine-129	RAD	15046-84-1	pCi/L	12/12/2011	12/10/2013	6	6	100	--	--	2.9	5.4	9.00E-07	6	1.0	6	Federal MCL
299-E27-4	Technetium-99	RAD	14133-76-7	pCi/L	3/4/2004	12/10/2013	38	38	100	--	--	690	8,370	0.83	38	900	37	Federal MCL
299-E27-4	Nickel	METAL	7440-02-0	µg/L	9/9/2007	12/10/2013	26	18	69	4.0	13	4.2	293	1.6	18	32	6	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)

Table 5-5. Analytical Results for Groundwater Analytes of Interest at Twelve Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C (2004 through 2013) (Sheet 5 of 5)

Well Name	Analyte Name	Analyte Class	CAS #	Units	First Sample Date	Last Sample Date	Total Samples	Total Detects	Frequency of Detects (%)	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Result	Maximum Detected Result	90th Percentile Groundwater Background	Number of Detects > Groundwater Background Level	Comparison Value	Number of Detects > Comparison Value	Comparison Value Basis
299-E27-4	Vanadium	METAL	7440-62-2	µg/L	9/9/2007	12/10/2013	26	23	88	12	17	11	48	12	22	8.0	23	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-4	Cyanide	ANION	57-12-5	µg/L	3/4/2004	12/10/2013	40	15	38	2.0	4.7	4.0	10	8.4	2	0.48	15	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-4	Nitrate	ANION	14797-55-8	µg/L	3/4/2004	12/10/2013	41	41	100	--	--	16,400	46,900	26,871	20	11,360	41	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-4	Sulfate	ANION	14808-79-8	µg/L	3/4/2004	12/10/2013	41	41	100	--	--	65,500	181,000	47,014	41	250,000	--	Federal Secondary MCL
299-E27-7	Iodine-129	RAD	15046-84-1	pCi/L	12/7/2004	12/13/2013	12	12	100	--	--	3.8	7.4	9.00E-07	12	1.0	12	Federal MCL
299-E27-7	Technetium-99	RAD	14133-76-7	pCi/L	3/4/2004	12/13/2013	41	41	100	--	--	12	198	0.83	41	900	--	Federal MCL
299-E27-7	Nickel	METAL	7440-02-0	µg/L	9/9/2007	12/13/2013	26	8	31	4.0	13	4.0	14	1.6	8	32	--	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-7	Vanadium	METAL	7440-62-2	µg/L	9/9/2007	12/13/2013	26	20	77	7.0	17	9.5	35	12	16	8.0	20	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-7	Cyanide	ANION	57-12-5	µg/L	3/4/2004	12/13/2013	40	26	65	2.4	4.7	3.8	45	8.4	23	0.48	26	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-7	Nitrate	ANION	14797-55-8	µg/L	3/4/2004	12/13/2013	41	41	100	--	--	23,500	43,100	26,871	35	11,360	41	Method B Groundwater Screening Level (HQ = 0.1 Noncancer Hazard Value)
299-E27-7	Sulfate	ANION	14808-79-8	µg/L	3/4/2004	12/13/2013	41	41	100	--	--	144,000	286,000	47,014	41	250,000	1	Federal Secondary MCL

CAS = Chemical Abstracts Service

HQ = hazard quotient

MCL = maximum contaminant level

Table 5-6. Unconfined Aquifer Monitoring Wells in the Vicinity of Waste Management Area C Reported with Analyte Concentrations Greater Than Comparison Values (2004 through 2013)

Well Name	Analyte of Interest (Comparison Value)						
	Iodine-129 (1 pCi/L) ^a	Technetium-99 (900 pCi/L) ^a	Nickel (32 µg/L) ^b	Vanadium (8.0 µg/L) ^b	Cyanide (0.48 µg/L) ^b	Nitrate (11,360 µg/L) ^b	Sulfate (250,000 µg/L) ^a
299-E27-12	•			•	•	•	
299-E27-13	•	•		•	•	•	
299-E27-14	•	•		•	•	•	•
299-E27-15	•		•	•	•	•	
299-E27-155	•	•		•	•	•	
299-E27-21	•	•		•	•	•	
299-E27-22	•			•	•	•	
299-E27-23	•	•	•	•	•	•	
299-E27-24	•	•		•	•	•	•
299-E27-25	•		•	•		•	•
299-E27-4	•	•	•	•	•	•	
299-E27-7	•			•	•	•	•

^a Federal maximum contaminant level (sulfate value is a secondary standard).

^b Method B groundwater screening level (hazard quotient = 0.1 noncancer hazard value).

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Nickel concentrations above the 32 µg/L Method B noncancer HQ of 0.1 screening level were measured in four wells in the vicinity of WMA C (299-E27-4, 299-E27-15, 299-E27-23, and 299-E27-25). Nickel concentrations in these wells have generally fluctuated around the screening level value over the 10-year period (Figure 5-4). The highest nickel concentrations were observed in well 299-E27-4, where concentrations spiked to levels above the 100 µg/L State MCL in 2009 and 2013. This well is located upgradient from WMA C (groundwater flow in the area is to the south and east). Nickel concentrations shown in Figure 5-4 do not display any spatial or temporal trend.

Vanadium appears to be pervasive and persistent in the unconfined aquifer in the vicinity of WMA C (Figure 5-5). Vanadium concentrations above the 8 µg/L Method B noncancer HQ of 0.1 screening level were measured in all 12 wells. Concentration fluctuations were observed in all of the wells but there does not appear to be a discernable trend in overall vanadium concentrations in this area. Comparison of upgradient and downgradient trends does not indicate any local releases of vanadium in the WMA C vicinity.

Cyanide concentrations above the 0.48 µg/L Method B noncancer HQ of 0.1 screening level were measured in 11 of the 12 wells in the vicinity of WMA C; however, in most of these wells concentrations were predominantly below the 90th percentile background level of 8.4 µg/L (Figure 5-6). Comparison of upgradient and downgradient trends indicates that there was a local release of cyanide from WMA C. Persistent cyanide detections above background were observed only at three wells along the east perimeter of WMA C (299-E27-7, 299-E27-14, and 299-E27-24). In recent years concentrations in these wells have generally been declining.

Nitrate concentrations above the 11,360 µg/L Method B noncancer HQ of 0.1 screening level were measured in all 12 wells in the vicinity of WMA C (Figure 5-7); however, in recent years persistent detections above the 90th percentile background value of 26,871 µg/L were reported predominantly in six wells located along the south and east perimeters of the area (299-E27-23, 299-E27-21, 299-E27-24, 299-E27-14, 299-E27-7, and 299-E27-25). Nitrate concentrations in these wells appear to be steady or gradually increasing. Comparison of upgradient and downgradient trends indicates that there was a local release of nitrate from WMA C. The highest concentrations were consistently reported in well 299-E27-14, where the concentration at the end of 2013 was 110,000 µg/L.

Sulfate concentrations near or above the 250,000 µg/L secondary MCL were persistently observed in four wells located along the east perimeter of WMA C (299-E27-24, 299-E27-14, 299-E27-7, and 299-E27-25) (Figure 5-8). Sulfate concentrations in these wells appear to be steady or slightly declining. Comparison of upgradient and downgradient trends indicates that there was a local release of sulfate from WMA C. The highest concentrations at the end of 2013 were 296,000 µg/L and 282,000 µg/L in wells 299-E27-24 and 299-E27-25, respectively.

Figure 5-1. Well-Specific Analytes of Interest in the Vicinity of Waste Management Area C (2004 through 2013)

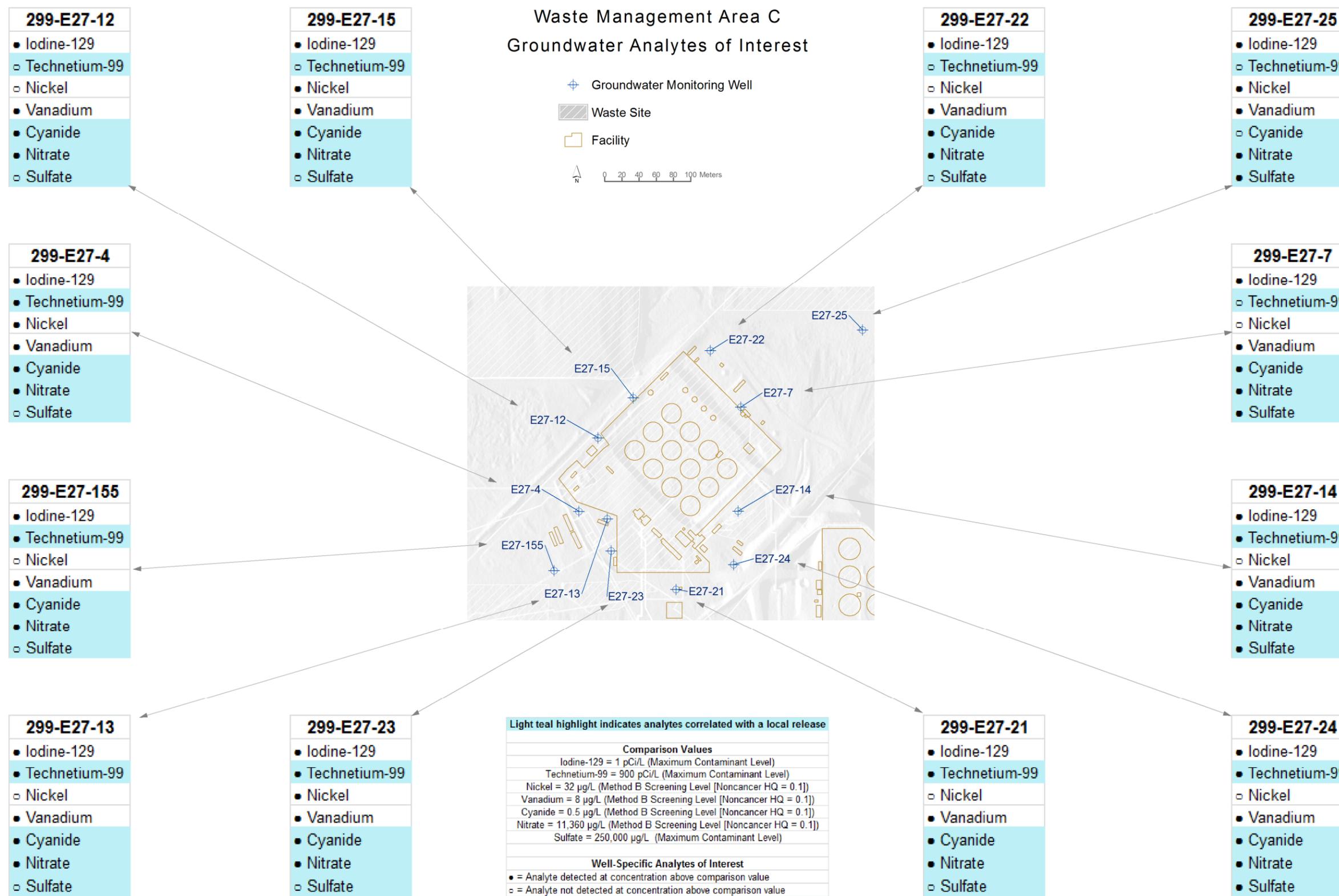


Figure 5-2. Iodine-129 Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)

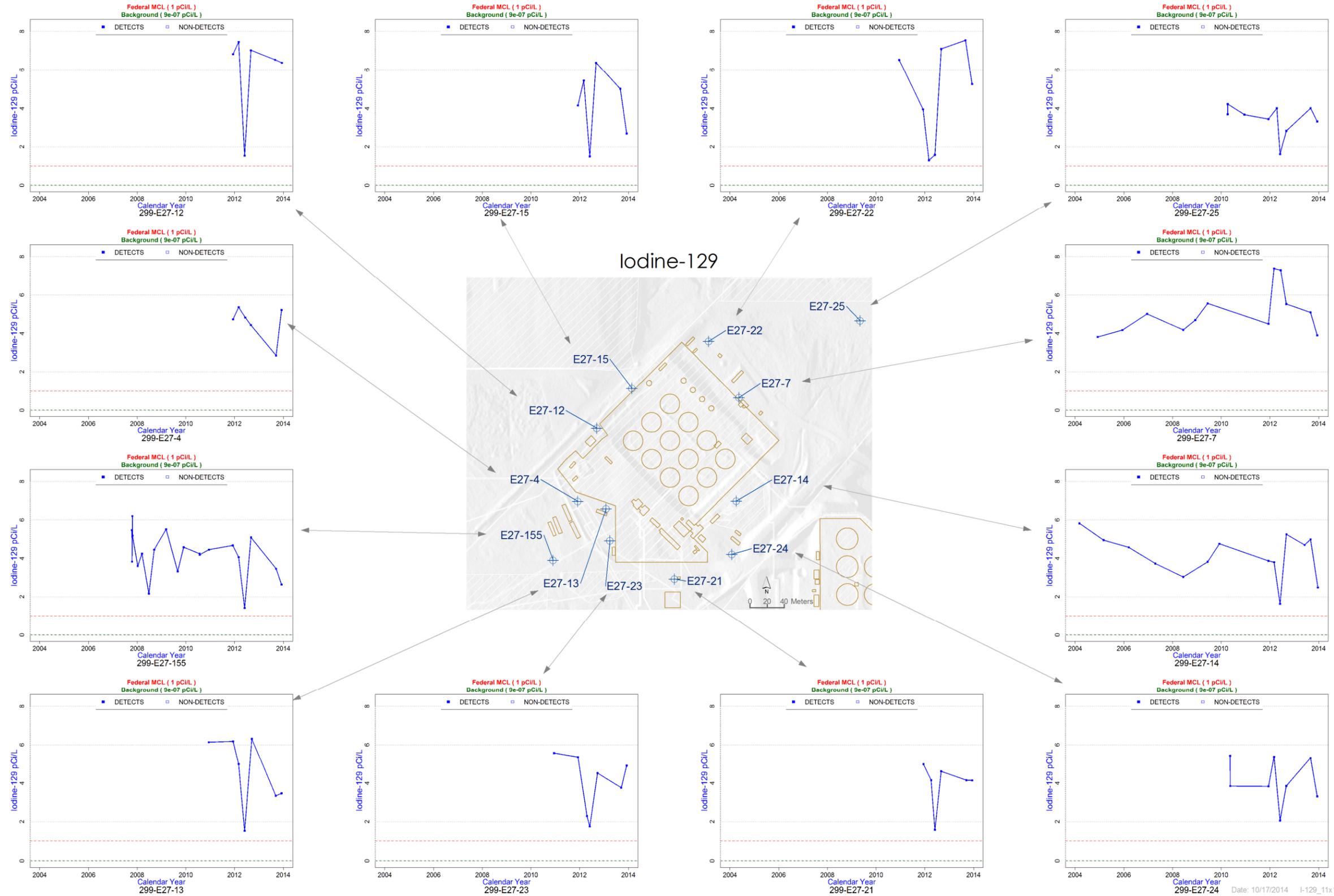


Figure 5-3. Technetium-99 Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)

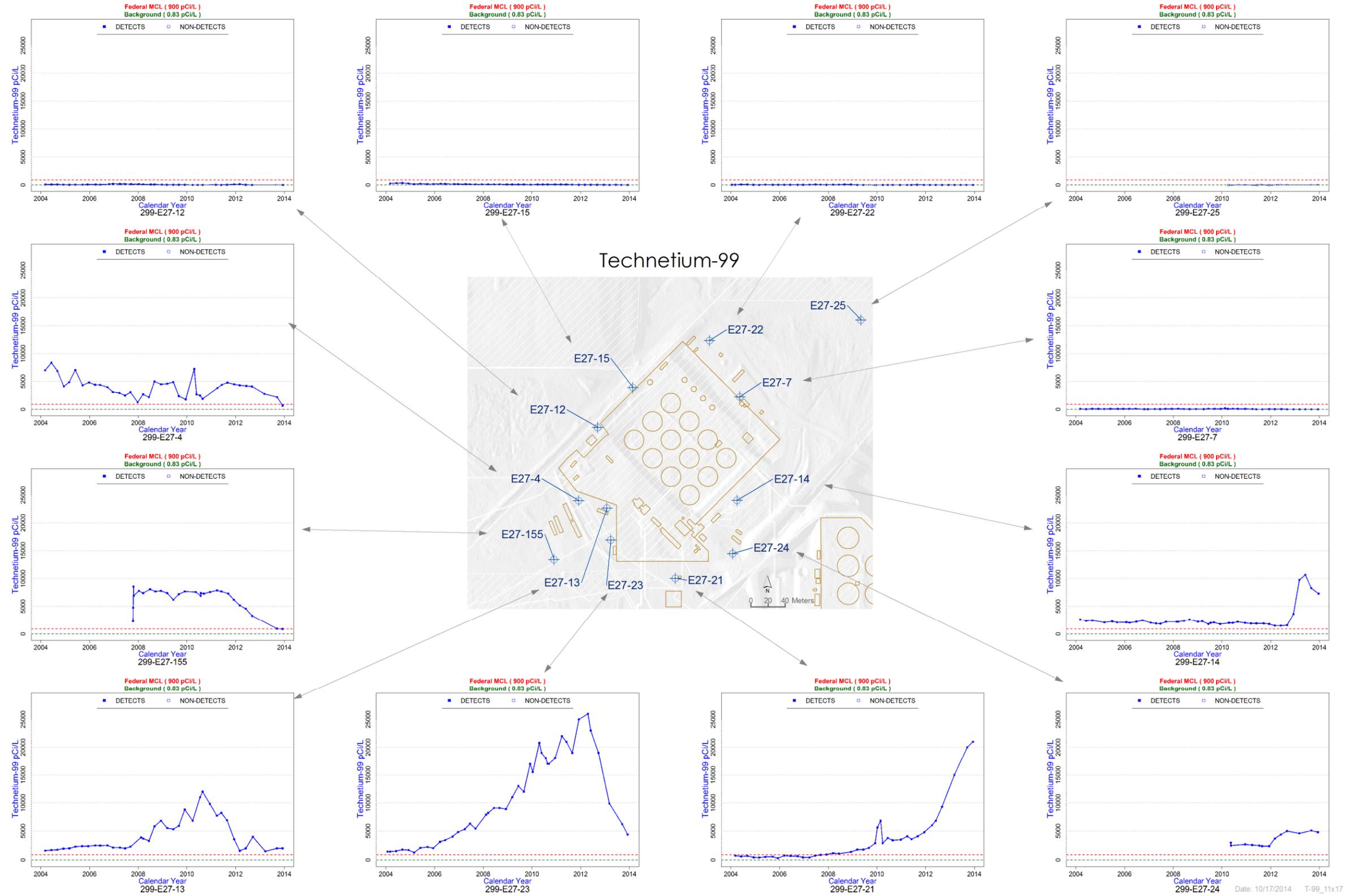
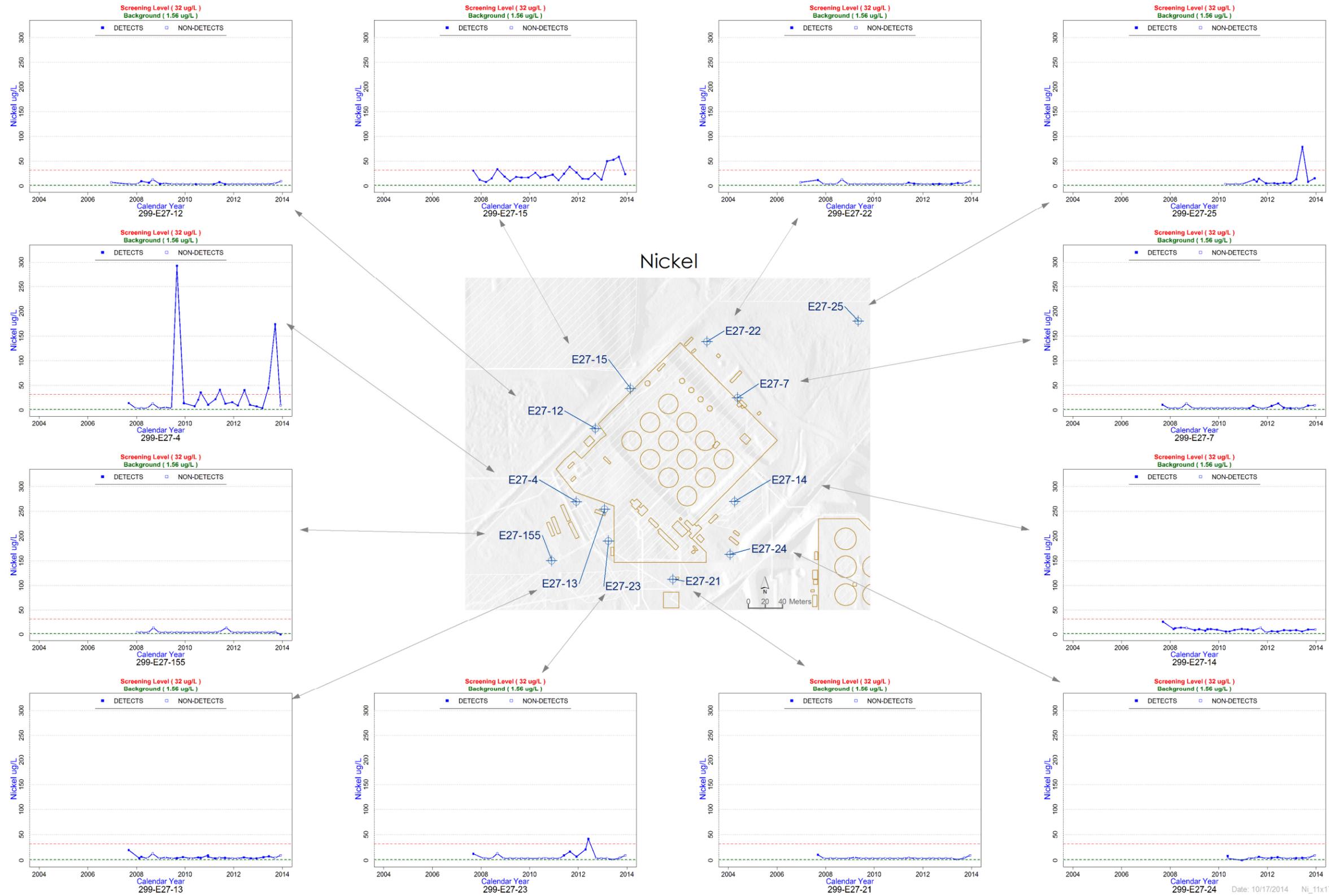


Figure 5-4. Nickel Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)



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Figure 5-5. Vanadium Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)

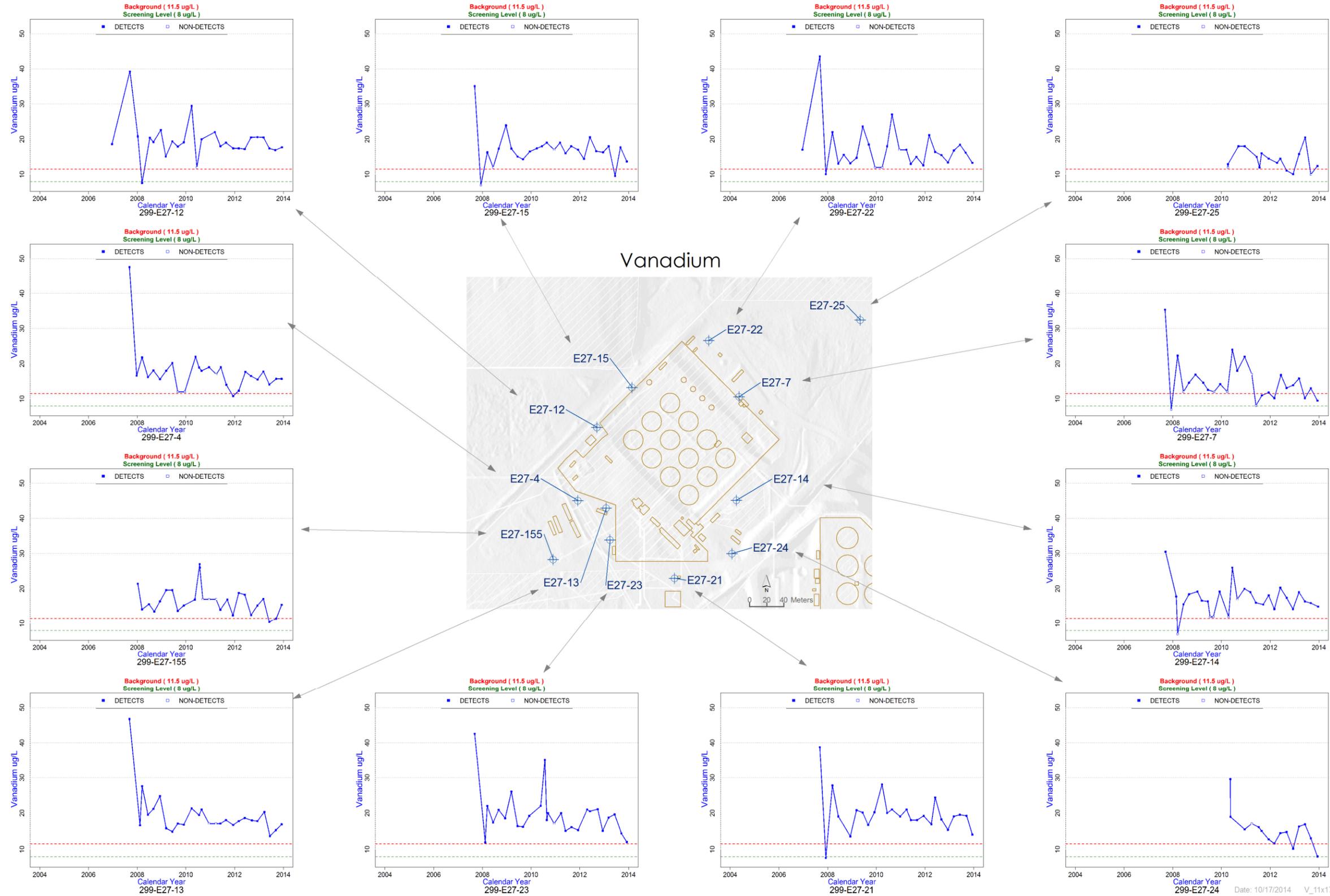
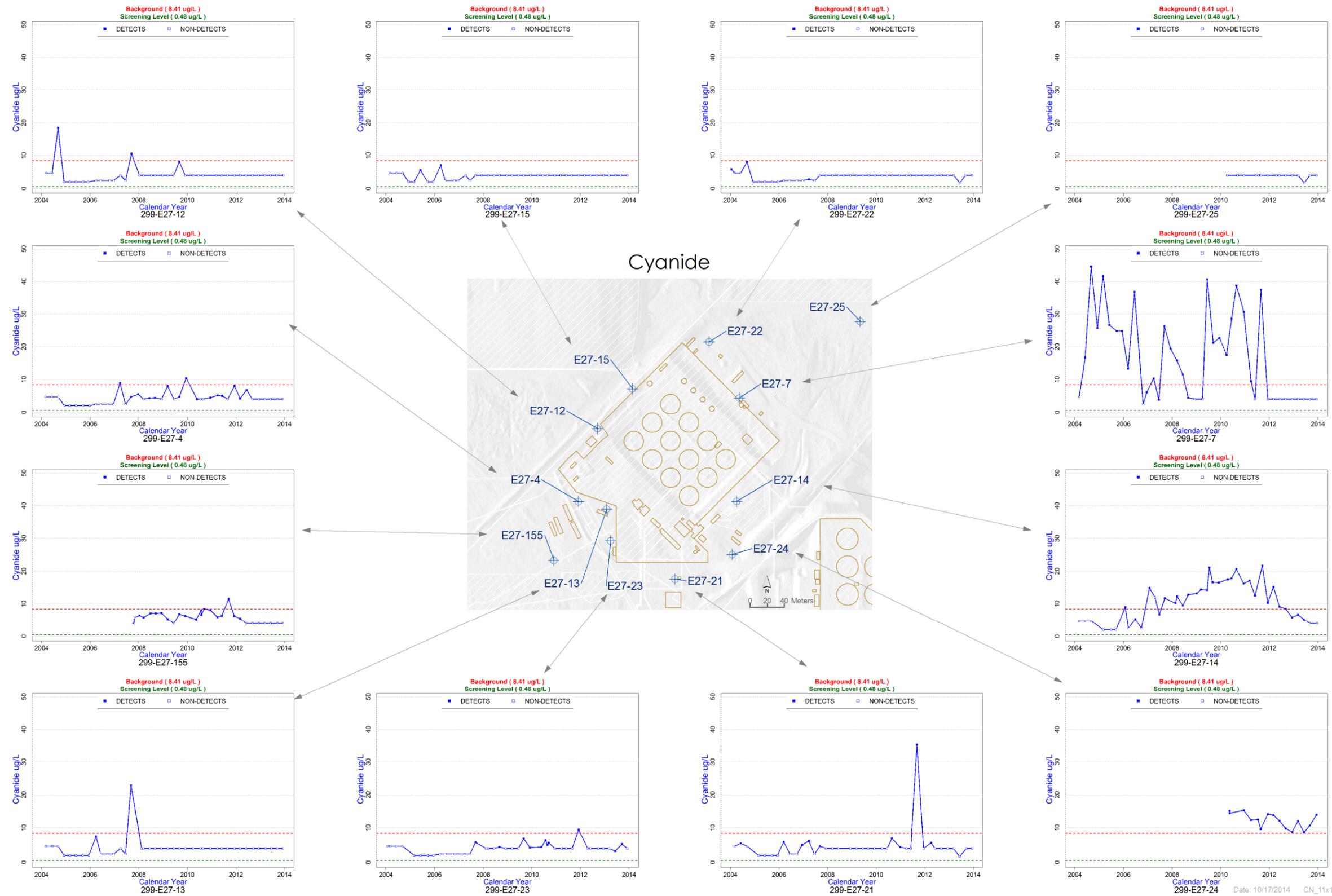
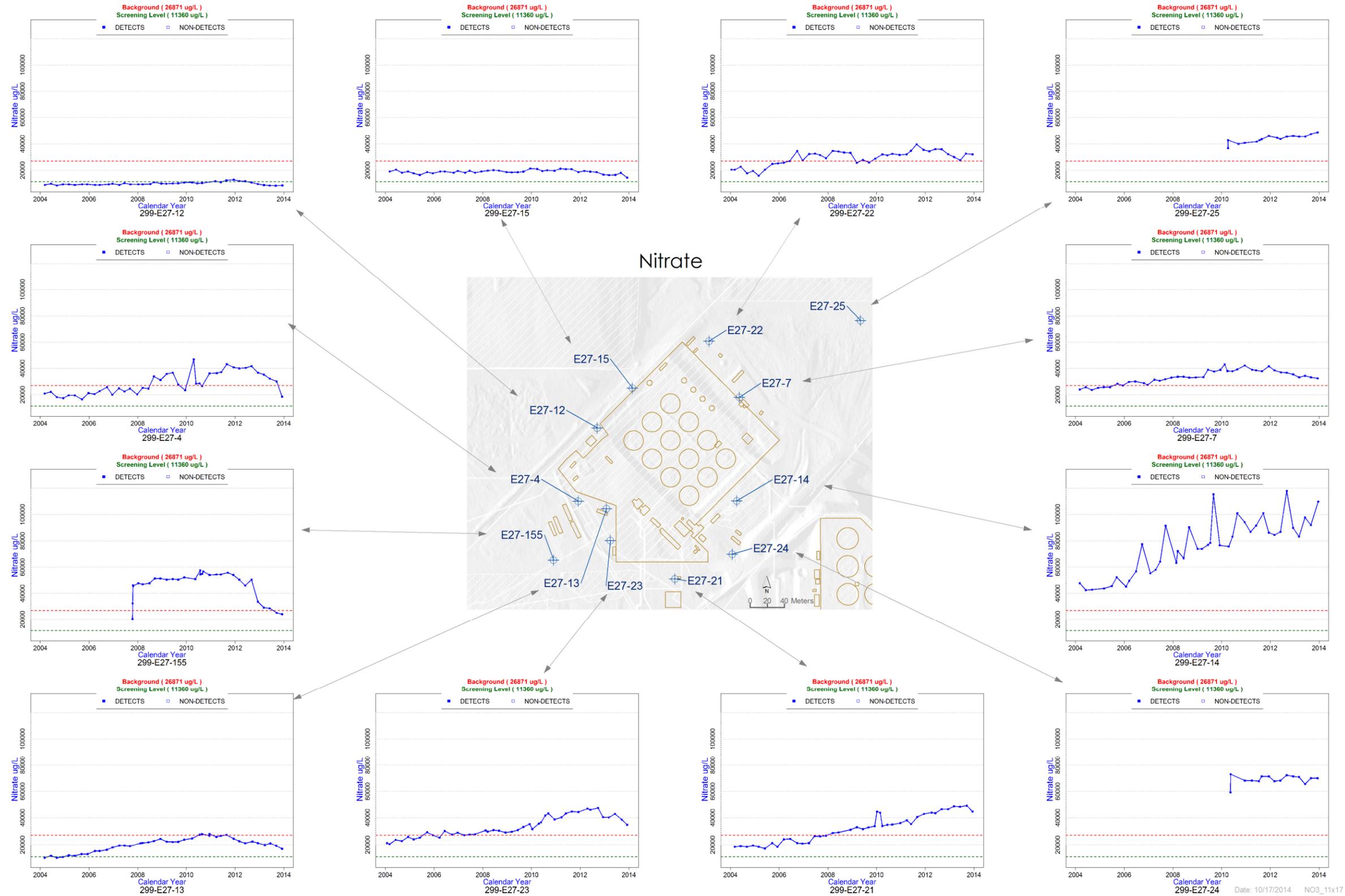


Figure 5-6. Cyanide Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)



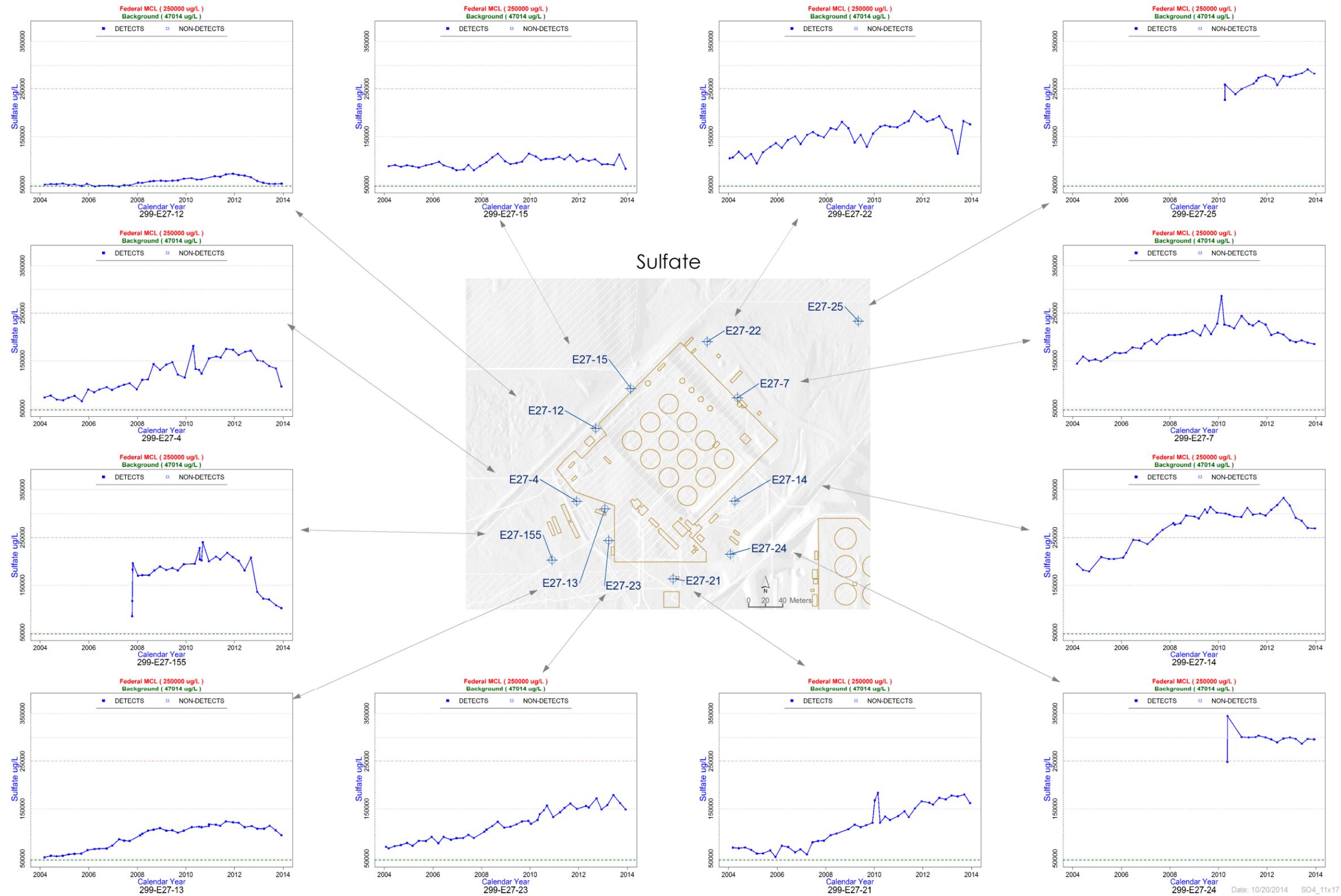
Date: 10/17/2014 CN_11x17

Figure 5-7. Nitrate Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)



Date: 10/17/2014 NO3_11x17

Figure 5-8. Sulfate Trends in Wells Monitoring the Unconfined Aquifer in the Vicinity of Waste Management Area C (2004 through 2013)



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6.0 SUMMARY AND CONCLUSIONS

This report describes a data evaluation process performed to identify a set of groundwater analytes of interest in the vicinity of WMA C that have the potential to be cancer risk or noncancer hazard drivers. The evaluation was based on sampling results collected over a 10-year period from 12 groundwater monitoring wells that monitor contaminants in the unconfined aquifer in the vicinity of WMA C. A total of 40,505 records were obtained from the HEIS database, and a total of 310 analytes were included in the data set prior to analytical data evaluations. After data processing and reduction, the data set contained 9,524 records and 55 analytes. These 55 analytes were carried forward for screening against human health-protective comparison values.

Evaluation of the 55 analytes resulted in the identification of 31 analytes with maximum detected concentrations less than their respective comparison values. These 31 analytes were not retained as analytes of interest. The remaining 24 analytes reported maximum detected concentrations greater than their respective comparison values and were carried forward into an analyte-specific evaluation. The analyte-specific evaluation considered natural background concentrations as well as spatial and temporal variations in analyte concentrations. Analytes with results indicative of natural background conditions or those analytes reported on a nonrecurring basis (concentrations that are not reproducible or consistent with the remainder of the data set), were not retained as analytes of interest.

Based on the analyte-specific evaluation, 17 of the 24 analytes with maximum detected concentrations greater than their respective comparison values were not carried forward. The remaining seven analytes were considered likely to be of interest for assessing the potential for cancer risk or noncancer hazards or investigating potential groundwater contamination sources at WMA C, and were carried forward into a well-specific evaluation. The seven analytes of interest for the WMA C data set are ^{129}I , ^{99}Tc , nickel, vanadium, cyanide, nitrate, and sulfate. Of these, ^{129}I , nickel and vanadium do not appear to be correlated with releases from WMA C. Cyanide, nitrate, sulfate, and ^{99}Tc appear to be correlated with a release from WMA C, with declining concentrations.

As a final step, a well-specific evaluation was performed to identify analytes of interest in the individual monitoring wells. Analytical results for the seven area-wide analytes of interest were further screened against comparison values using the well-specific data sets. Section 5.5 of this report provides results of the well-specific evaluation, including tables with analytical results for analytes of interest identified in each well and concentration trend plots for each analyte of interest in each well.

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