

**C-746-U Contained Landfill  
Fourth Quarter Calendar Year 2018  
(October–December)  
Compliance Monitoring Report  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**



This document is approved for public release per review by:

David Hayden  
FRNP Classification Support

2-11-19  
Date



**C-746-U Contained Landfill  
Fourth Quarter Calendar Year 2018  
(October–December)  
Compliance Monitoring Report  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**

Date Issued—February 2019

U.S. DEPARTMENT OF ENERGY  
Office of Environmental Management

Prepared by  
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,  
managing the  
Deactivation and Remediation Project at the  
Paducah Gaseous Diffusion Plant  
under Contract DE-EM0004895

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## ACRONYMS

<i>CFR</i>	<i>Code of Federal Regulations</i>
CY	calendar year
<i>KAR</i>	<i>Kentucky Administrative Regulations</i>
KDWM	Kentucky Division of Waste Management
<i>KRS</i>	<i>Kentucky Revised Statutes</i>
LEL	lower explosive limit
LRGA	Lower Regional Gravel Aquifer
LTL	lower tolerance limit
MCL	maximum contaminant level
MW	monitoring well
RGA	Regional Gravel Aquifer
UCRS	Upper Continental Recharge System
URGA	Upper Regional Gravel Aquifer
UTL	upper tolerance limit

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# 1. INTRODUCTION

This report, *C-746-U Contained Landfill Fourth Quarter Calendar Year 2018 (October–December) Compliance Monitoring Report, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, is being submitted in accordance with Solid Waste Landfill Permit Number SW07300014, SW07300015, SW07300045.

The Groundwater, Surface Water, Leachate, and Methane Monitoring Sample Data Reporting Form is provided in Appendix A. The facility information sheet is provided in Appendix B. Groundwater analytical results are recorded on the Kentucky Division of Waste Management (KDWM) Groundwater Sample Analyses forms, which are presented in Appendix C. The statistical analyses and qualification statement are provided in Appendix D. The groundwater flow rate and direction determinations are provided in Appendix E. Appendix F contains the notifications for all permit required parameters whose concentrations exceed the maximum contaminant level (MCL) for Kentucky solid waste facilities provided in 401 KAR 47:030 § 6 and for all permit required parameters listed in 40 CFR § 302.4, Appendix A, that do not have an MCL and whose concentrations exceed the historical background concentrations [upper tolerance limit (UTL), or both UTL and lower tolerance limit (LTL) for pH, as established at a 95% confidence]. Appendix G provides a chart of MCL exceedances and exceedances of the historical background UTL that have occurred, beginning in the fourth quarter calendar year (CY) 2002. Methane monitoring results are documented on the approved C-746-U Landfill Methane Monitoring Report form provided in Appendix H. The form includes pertinent remarks/observations as required by 401 KAR 48:090 § 5. Surface water results are provided in Appendix I.

## 1.1 BACKGROUND

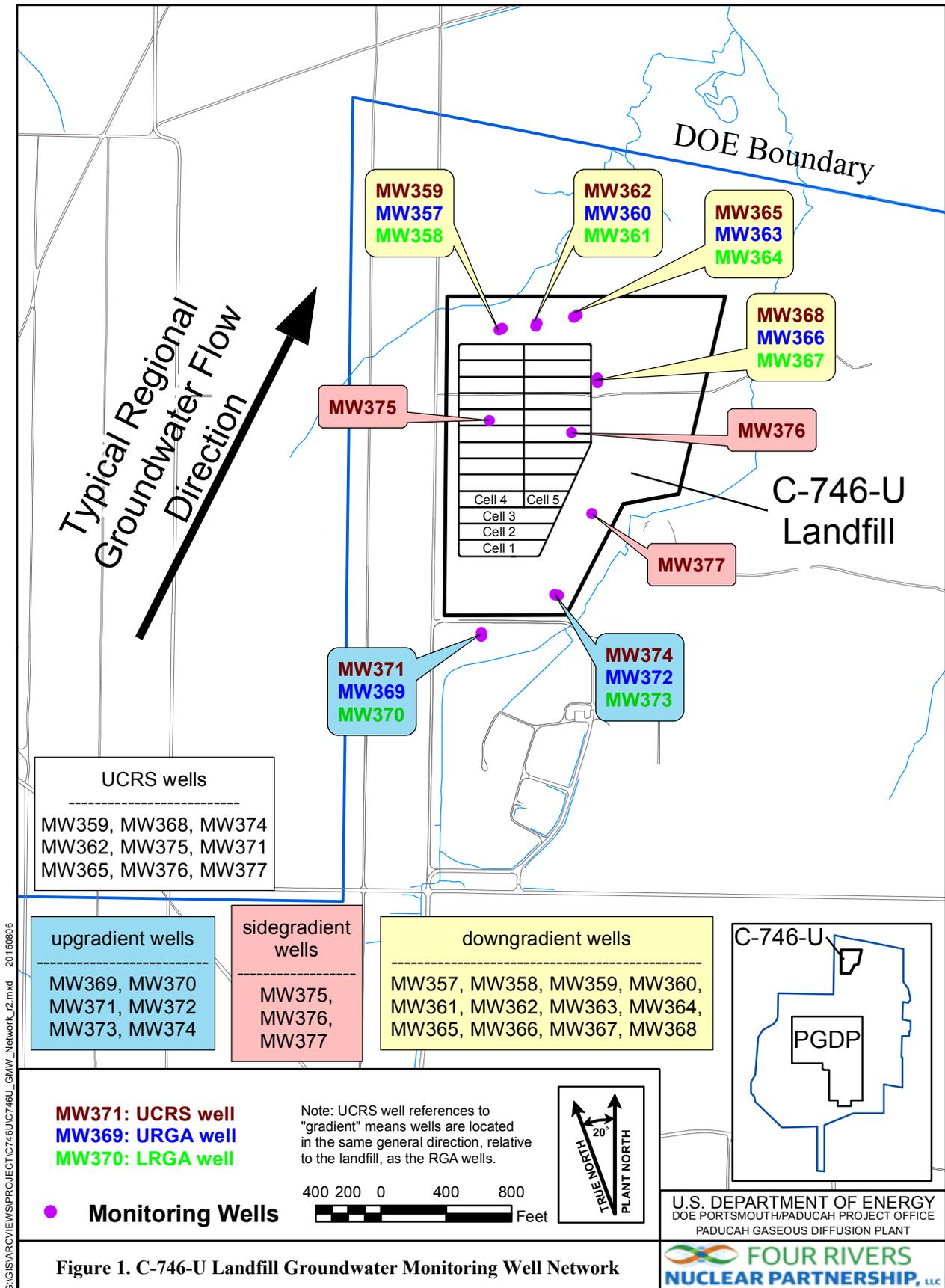
The C-746-U Landfill is an operating solid waste landfill located north of the Paducah Site and north of the C-746-S&T Landfills. Construction and operation of the C-746-U Landfill were permitted in November 1996. The operation is regulated under Solid Waste Landfill Permit Number SW07300014, SW07300015, SW07300045. The permitted C-746-U Landfill area covers about 60 acres and includes a liner and leachate collection system. C-746-U Landfill currently is operating in Phases 4 and 5. Phases 1, 2, and 3 have long-term cover. Phases 6 through 23 have not been constructed.

## 1.2 MONITORING PERIOD ACTIVITIES

### 1.2.1 Groundwater Monitoring

Three zones are monitored at the site: the Upper Continental Recharge System (UCRS), the Upper Regional Gravel Aquifer (URGA), and the Lower Regional Gravel Aquifer (LRGA). There are 21 monitoring wells (MWs) under permit for the C-746-U Landfill: 9 UCRS wells, 6 URGA wells, and 6 LRGA wells. A map of the MW locations is presented in Figure 1. All MWs were sampled this quarter except MW359, MW368, MW376, and MW377 (all screened in the UCRS), which had an insufficient amount of water to obtain samples; therefore, there are no laboratory analysis results for these locations.

Consistent with the approved *Groundwater Monitoring Plan for the Solid Waste Permitted Landfills (C-746-S Residential Landfill, C-746-T Inert Landfill, and C-746-U Contained Landfill) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, (Groundwater Monitoring Plan) UCRS wells are included in the monitoring program (LATA Kentucky 2014). Groundwater flow gradients are downward through the UCRS, but flow in the underlying Regional Gravel Aquifer (RGA) is lateral. Groundwater flow in the



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RGA typically is in a northeasterly direction in the vicinity of the C-746-U Landfill. The Ohio River and lower reaches of Little Bayou Creek are the discharge areas for the RGA flow system from the vicinity of the landfills.

Consistent with the conceptual site model, the constituent concentrations in UCRS wells are considered to be representative only of the conditions local to the well or sourced from overlying soils; thus, no discussion of potential “upgradient” sources is relevant to the discussion for the UCRS. Nevertheless, a UTL for background also has been calculated for UCRS wells using concentrations from UCRS wells located in the same direction (relative to the landfill) as those RGA wells identified as upgradient. The results from these wells are considered to represent historical “background” for UCRS water quality. Similarly, other gradient references for UCRS wells are identified using the same gradient references (relative to the landfill) that are attributed to nearby RGA wells. Results from UCRS wells are compared to this UTL and exceedances of these values are reported in the quarterly report.

Groundwater sampling was conducted within the fourth quarter 2018 in accordance with the Groundwater Monitoring Plan (LATA Kentucky 2014) using the Deactivation and Remediation Contractor, procedure CP4-ES-2101, *Groundwater Sampling*. The analytical laboratory used U.S. Environmental Protection Agency-approved methods, as applicable. Appropriate sample containers and preservatives were used. The parameters specified in Permit Condition GSTR0001, Special Condition 1, were analyzed for all locations sampled.

The groundwater flow rate and direction determination are provided in Appendix E. Depth-to-water was measured on October 24, 2018, in MWs of the C-746-U Landfill (see Table E.1), in MWs of the C-746-S&T Landfills, and in MWs of the surrounding region (shown on Figure E.4). Water level measurements in 39 vicinity wells define the potentiometric surface for the RGA. Typical regional flow in the RGA is northeastward, toward the Ohio River. During October, RGA groundwater flow in the area of the landfill was oriented north to northeastward. The hydraulic gradient for the RGA in the vicinity of the C-746-U Landfill in October was  $5.58 \times 10^{-4}$  ft/ft. The hydraulic gradients for the URGA and LRGA at the C-746-U Landfill were  $6.41 \times 10^{-4}$  ft/ft and  $6.70 \times 10^{-4}$  ft/ft, respectively. Calculated groundwater flow rates (average linear velocity) at the C-746-U Landfill range from 1.09 to 1.86 ft/day for the URGA and 1.14 to 1.94 ft/day for the LRGA (see Table E.3).

### **1.2.2 Methane Monitoring**

Methane monitoring was conducted in accordance with 401 KAR 48:090 § 5 and the approved Explosive Gas Monitoring Program (KEEC 2011), which is Technical Application Attachment 12, of the Solid Waste Landfill permit. Landfill operations staff monitored for the occurrence of methane in four on-site building locations and four locations along the landfill boundary on November 14, 2018. See Appendix H for a map (Figure H.1) of the monitoring locations. Monitoring identified 0% of the lower explosive limit (LEL) of methane at all locations, which is compliant with the regulatory requirement of < 100% LEL at boundary locations and < 25% LEL at all other locations. The results are documented on the C-746-U Landfill Methane Log provided in Appendix H.

### **1.2.3 Surface Water Monitoring**

Surface water was monitored, as specified in 401 KAR 48:300 § 2, and the approved *Surface Water Monitoring Plan for C-746-U Contained Landfill Permit Number KY-073-00045, Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (PRS 2008), which is Technical Application Attachment 24, of the Solid Waste Landfill Permit. Sampling was performed at three locations (see Figure 2) monitored for the C-746-U Landfill. The C-746-U Landfill has an upstream location, L154; a downstream location, L351;

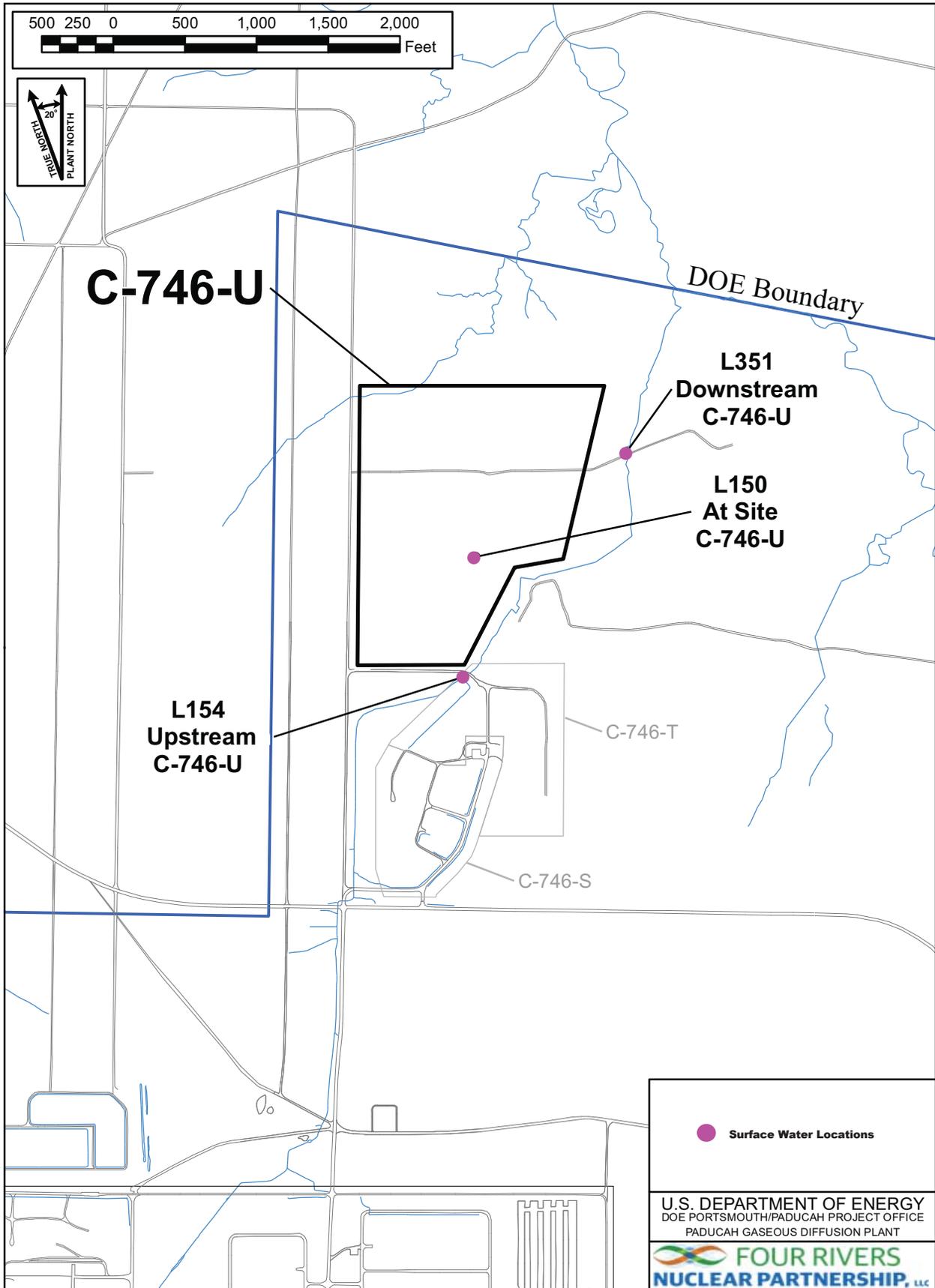


Figure 2. C-746-U Landfill Surface Water Monitoring Locations

and a location capturing runoff from the landfill surface, L150. Surface water results are provided in Appendix I.

### 1.3 KEY RESULTS

Groundwater data were evaluated in accordance with the approved Groundwater Monitoring Plan (LATA Kentucky 2014), which is Technical Application, Attachment 25, of the Solid Waste Landfill Permit. Parameters that had concentrations that exceeded their respective MCL are listed in Table 1. Those constituents that exceeded their respective MCL were evaluated further against their historical background UTL. Table 2 identifies parameters (that do not have MCLs) with concentrations that exceeded the statistically derived historical background UTL<sup>1</sup> during the fourth quarter 2018, as well as parameters that exceeded their MCL and also exceeded their historical background UTL. Those constituents (present in downgradient wells) that exceed their historical background UTL were evaluated against their current UTL-derived background using the most recent eight quarters of data from wells considered to be upgradient (Table 3).

**Table 1. Summary of MCL Exceedances**

UCRS	URGA	LRGA
None	MW357: Trichloroethene	MW358: Trichloroethene
	MW366: Trichloroethene	MW361: Trichloroethene
	MW372: Beta activity, trichloroethene	MW364: Trichloroethene
		MW370: Beta activity
		MW373: Trichloroethene

**Table 2. Exceedances of Statistically Derived Historical Background Concentrations**

UCRS*	URGA	LRGA
MW362: Dissolved oxygen, oxidation-reduction potential, sulfate	MW357: Oxidation-reduction potential	MW358: Oxidation-reduction potential, technetium-99
MW365: Oxidation-reduction potential, sulfate	MW360: Oxidation-reduction potential	MW361: Oxidation-reduction potential, technetium-99
MW371: Oxidation-reduction potential, sulfate	MW363: Oxidation-reduction potential	MW364: Oxidation-reduction potential, pH <sup>**</sup> , technetium-99
MW374: Oxidation-reduction potential	MW366: Oxidation-reduction potential	MW367: Oxidation-reduction potential, pH <sup>**</sup>
MW375: Oxidation-reduction potential, sulfate	MW369: Oxidation-reduction potential	MW370: Beta activity, oxidation-reduction potential, technetium-99
	MW372: Beta activity, oxidation-reduction potential, technetium-99	MW373: Oxidation-reduction potential

\*Gradients in the UCRS are downward. UCRS gradient designations are identified using the same gradient reference (relative to the landfill) that is attributed to nearby RGA wells.

\*\*pH concentration is less than the LTL.

Sidegradient wells: MW375, MW376, MW377

Downgradient wells: MW357, MW358, MW359, MW360, MW361, MW362, MW363, MW364, MW365, MW366, MW367, MW368

Upgradient wells: MW369, MW370, MW371, MW372, MW373, MW374

<sup>1</sup> The UTL comparison for pH uses a two-sided test, for both UTLs and LTLs. For the purposes of this report, the reference to “UTL exceedances” also includes the LTL for pH.

**Table 3. Exceedances of Current Background UTL in Downgradient Wells**

URGA	LRGA
None	MW364: pH*
	MW367: pH*

\*pH concentration is less than the LTL.

The notification of parameters that exceeded the MCL was submitted electronically to the KDWM, in accordance with 401 KAR 48:300 § 7, prior to the submittal of this report.

The constituents that exceeded their MCL in a downgradient well were subjected to a comparison against the UTL concentrations calculated using historical concentrations from wells identified as background. In accordance with the approved Groundwater Monitoring Plan, the MCL exceedances for trichloroethene in MW357, MW358, MW361, MW364, and MW366 (downgradient wells) do not exceed the historical background concentration and are considered to be a Type 1 exceedance—not attributable to the C-746-U Landfill.

This report serves as the notification of parameters that had statistically significant increased concentrations relative to historical background concentrations, as required by Permit Number SW07300014, SW07300015, SW07300045, Condition GSTR0001, Standard Requirement 5; and 401 KAR 48:300 § 7.

The constituents that had exceedances of the statistically derived historical background UTL underwent additional statistical evaluation. The current-quarter concentrations were compared to the current background UTLs that were developed using the most recent eight quarters of data from wells identified as upgradient in order to determine if the current downgradient concentrations are consistent with current background values. Table 3 summarizes the evaluation against current background UTL for those constituents present in downgradient wells with historical UTL exceedances. In accordance with the approved Groundwater Monitoring Plan, constituents in downgradient wells that exceed the historical UTL, but do not exceed the current UTL, are considered not to have a landfill source; therefore, they are a Type 1 exceedance.

The constituents listed in Table 3 that exceed both the historical UTL and the current UTL, pH in MW364 and MW367, do not have an identified source and are considered preliminarily to be a Type 2 exceedance, per the approved Groundwater Monitoring Plan. To evaluate the preliminary Type 2 exceedances further, the parameters were subjected to the Mann-Kendall statistical test for trend using the most recent eight quarters of data. The results are summarized in Table 4. Both of these preliminary Type 2 exceedances in downgradient wells did not have an increasing or decreasing trend and are considered to be Type 1 exceedances (not attributable to the landfills).

The statistical evaluation of current UCRS concentrations against the current UCRS background UTL identified no UCRS well values that exceeded both the historical and current backgrounds.

All MCL and UTL exceedances reported for this quarter were evaluated and considered to be Type 1 exceedances—not attributable to the C-746-U Landfill.

**Table 4. C-746-U Landfill Downgradient Wells Trend Summary  
Utilizing the Previous Eight Quarters**

<b>Location</b>	<b>Well ID</b>	<b>Parameter</b>	<b>Sample Size</b>	<b>Alpha<sup>1</sup></b>	<b>p-Value<sup>2</sup></b>	<b>S<sup>3</sup></b>	<b>Decision<sup>4</sup></b>
C-746-U Landfill	MW364	pH <sup>5</sup>	8	0.05	0.402	-3	No Trend
	MW367	pH <sup>5</sup>	8	0.05	0.548	0	No Trend

Footnotes:

<sup>1</sup> An alpha of 0.05 represents a 95% confidence interval.

<sup>2</sup> The p-value represents the risk of acceptance the H<sub>a</sub> hypothesis of a trend, in terms of a percentage.

<sup>3</sup> The initial value of the Mann-Kendall statistic, S, is assumed to be 0 (e.g., no trend). If a data value from a later time period is higher than a data value from an earlier time period, S is incremented by 1. On the other hand, if the data value from a later time period is lower than a data value sampled earlier, S is decremented by 1. The net result of all such increments and decrements yields the final value of S. A very high positive value of S is an indicator of an increasing trend, and a very low negative value indicates a decreasing trend.

<sup>4</sup> The Mann-Kendall decision operates on two hypotheses, the H<sub>0</sub> and H<sub>a</sub>. H<sub>0</sub> assumes there is no trend in the data, whereas H<sub>a</sub> assumes either a positive or negative trend.

<sup>5</sup> pH concentration is less than the LTL.

Note: Statistics generated using ProUCL.

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## 2. DATA EVALUATION/STATISTICAL SYNOPSIS

The statistical analyses conducted on the fourth quarter 2018 groundwater data collected from the C-746-U Landfill MWs were performed in accordance with the Groundwater Monitoring Plan (LATA Kentucky 2014). The statistical analyses for this report use data from the first eight quarters that were sampled for each parameter, beginning with the baseline sampling events in 2002, when available. The sampling dates associated with background data are listed next to the result in the statistical analysis sheets in Appendix D (Attachments D1 and D2).

For those parameters that exceed the MCL for Kentucky solid waste facilities found in 401 KAR 47:030 § 6, these exceedances were documented and evaluated further as follows. Exceedances were reviewed against historical background results (UTL). If the MCL exceedance was found not to exceed the historical UTL, the exceedance was noted as a Type 1 exceedance—an exceedance not attributable to the landfill. If there was an exceedance of the MCL in a downgradient well and this constituent also exceeded the historical background, the quarterly result was compared to the current background UTL (developed using the most recent eight quarters of data from wells identified as upgradient) to identify if this exceedance is attributable to upgradient/non-landfill sources. If the downgradient concentration was less than the current background, the exceedance was noted as a Type 1 exceedance. If a constituent exceeds its Kentucky solid waste facility MCL, historical background UTL, and current background UTL, it was reported as a Type 2 exceedance—source undetermined. Type 2 exceedances (undetermined source) were evaluated further using the Mann-Kendall test for trend. If there was no statistically significant increasing trend for a constituent in a downgradient well, the exceedance was reclassified as a Type 1 exceedance (not attributable to the landfill).

For those parameters that do not have a Kentucky solid waste facility MCL, the same process was used. If a constituent without an MCL exceeded its historical background UTL and its current background UTL, it was evaluated further to identify the source of the exceedance, if possible. If the source of the exceedance could not be identified, it was reported as a Type 2 exceedance—source undetermined. Type 2 exceedances (undetermined source) were evaluated further using the Mann-Kendall test for trend. If there was no statistically significant increasing trend for a constituent in a downgradient well, the exceedance was reclassified as a Type 1 exceedance (not attributable to the landfill).

To calculate the UTL, the data are divided into censored (nondetects) and uncensored (detected) observations. The one-sided tolerance interval statistical test is conducted only on parameters that have at least one uncensored observation. Results of the one-sided tolerance interval statistical test are used to determine whether the data show a statistical exceedance in concentrations with respect to historical background concentrations (UTL).

For the statistical analysis of pH, a two-sided tolerance interval statistical test is conducted. The test well results are compared to both a UTL and LTL to determine if statistically significant deviations in concentrations exist with respect to upgradient (background) well data.

A stepwise list of the one-sided tolerance interval statistical procedures applied to the data is provided in Appendix D under Statistical Analysis Process. The statistical analysis was conducted separately for each parameter in each well. The MWs included historically in the statistical analyses are listed in Table 5.

**Table 5. Monitoring Wells Included in Statistical Analysis\***

<b>UCRS</b>	<b>URGA</b>	<b>LRGA</b>
MW359***	MW357	MW358
MW362	MW360	MW361
MW365	MW363	MW364
MW368***	MW366	MW367
MW371**	MW369 (upgradient)	MW370 (upgradient)
MW374**	MW372 (upgradient)	MW373 (upgradient)
MW375		
MW376***		
MW377***		

\*A map showing the monitoring well locations is shown on Figure 1.

\*\*In the same direction (relative to the landfill) as RGA wells considered to be upgradient.

\*\*\*Well had insufficient water to permit a water sample for laboratory analysis.

## **2.1 STATISTICAL ANALYSIS OF GROUNDWATER DATA**

Parameters requiring statistical analysis are summarized in Appendix D for each hydrogeological unit. A stepwise list for determining exceedances of statistically derived historical background concentrations is provided in Appendix D under Statistical Analysis Process. A comparison of the current quarter's results to the statistically derived historical background was conducted for parameters that do not have MCLs and also for those parameters whose concentrations exceed MCLs. Appendix G summarizes the occurrences (by well and by quarter) of exceedances of historical UTLs and MCL exceedances. The constituents that had exceedances of the statistically derived historical background UTL underwent additional statistical evaluation. The current-quarter concentrations were compared to the current background UTL developed using the most recent eight quarters of data from wells identified as upgradient in order to determine if the current downgradient concentrations are consistent with current background values.

### **2.1.1 Upper Continental Recharge System**

In this quarter, 29 parameters, including those with MCLs, required statistical analysis in the UCRS. During the fourth quarter, dissolved oxygen, oxidation-reduction potential, and sulfate displayed concentrations that exceeded their respective historical UTL and are listed in Table 2. There were no exceedances of the current background UTL.

### **2.1.2 Upper Regional Gravel Aquifer**

In this quarter, 32 parameters, including those with MCLs, required statistical analysis in the URGA. During the fourth quarter, beta activity, oxidation-reduction potential, and technetium-99 displayed concentrations that exceeded their respective historical UTL and are listed in Table 2. There were no exceedances of the current background UTL for any downgradient wells as summarized in Table 3.

### **2.1.3 Lower Regional Gravel Aquifer**

In this quarter, 29 parameters, including those with MCLs, required statistical analysis in the LRGA. During the fourth quarter, beta activity, oxidation-reduction potential, pH, and technetium-99 displayed concentrations that exceeded their respective historical UTL and are listed in Table 2. The pH exceeded the current background UTL and is included in Table 3.

## **2.2 DATA VERIFICATION AND VALIDATION**

Data verification is the process of comparing a data set against a set standard or contractual requirements. In accordance with the approved Groundwater Monitoring Plan (LATA Kentucky 2014), data verification is performed for 100% of the data. Data are flagged as necessary.

Data validation was performed on 100% of the organic, inorganic, and radiochemical analytical data by a qualified individual independent from sampling, laboratory, project management, or other decision-making personnel. Data validation evaluates the laboratory adherence to analytical method requirements. Validation qualifiers are added by the independent validator and not the laboratory. Validation qualifiers are not requested on the groundwater reporting forms.

Field quality control samples are collected each sampling event. Field blanks, rinseate blanks, and trip blanks are obtained to ensure quality of field and laboratory practices and data are reported in the Groundwater Sample Analysis forms in Appendix C. Laboratory quality control samples, such as matrix spikes, matrix spike duplicates, and method blanks, are performed by the laboratory. Both field and laboratory quality control sample results are reviewed as part of the data verification/validation process.

Data verification and validation results for this data set indicated that all data were considered usable.

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### 3. PROFESSIONAL GEOLOGIST AUTHORIZATION

**DOCUMENT IDENTIFICATION:** *C-746-U Contained Landfill  
Fourth Quarter Calendar Year 2018 (October–December)  
Compliance Monitoring Report,  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky (FRNP-RPT-0027/V4)*

Stamped and signed pursuant to my authority as a duly registered geologist under the provisions of KRS Chapter 322A.



*PG 113927  
K.R. Davis  
2-7-19*

*Kenneth R. Davis*  
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Kenneth R. Davis

\_\_\_\_\_  
PG113927

*February 7, 2019*  
\_\_\_\_\_  
Date

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#### 4. REFERENCES

- KEEC (Kentucky Energy and Environment Cabinet) 2011. Solid Waste Landfill Permit, Number SW07300014, SW07300015, SW07300045, Division of Waste Management, Solid Waste Branch, Technical Application Attachment 12, “Explosive Gas Monitoring Program,” January 21.
- LATA Kentucky (LATA Environmental Services of Kentucky, LLC) 2014. *Groundwater Monitoring Plan for the Solid Waste Permitted Landfills (C-746-S Residential Landfill, C-746-T Inert Landfill, and C-746-U Contained Landfill) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PAD-PROJ-0139, Solid Waste Landfill Permit, Number SW07300014, SW07300015, SW07300045, Technical Application Attachment 25, LATA Environmental Services of Kentucky, LLC, Kevil, KY, June.
- PRS (Paducah Remediation Services, LLC) 2008. *Surface Water Monitoring Plan for C-746-U Contained Landfill Permit Number KY-073-00045, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, Solid Waste Landfill Permit, Number SW07300014, SW07300015, SW07300045, Technical Application Attachment 24, Paducah Remediation Services, LLC, Kevil, KY, June.

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**APPENDIX A**

**GROUNDWATER, SURFACE WATER,  
LEACHATE, AND METHANE MONITORING  
SAMPLE DATA REPORTING FORM**

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**GROUNDWATER, SURFACE WATER, LEACHATE,  
AND METHANE MONITORING  
SAMPLE DATA REPORTING FORM**

**NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WASTE MANAGEMENT  
SOLID WASTE BRANCH  
14 REILLY ROAD  
FRANKFORT, KY 40601**

Facility Name: U.S. DOE–Paducah Gaseous Diffusion Plant Activity: C-746-U Contained Landfill  
(As officially shown on DWM Permit Face)

Permit No: SW07300014,  
SW07300015,  
SW07300045 Finds/Unit No: \_\_\_\_\_ Quarter & Year 4th Qtr. CY 2018

*Please check the following as applicable:*

Characterization  Quarterly  Semiannual  Annual  Assessment

*Please check applicable submittal(s):*  Groundwater  Surface Water  
 Leachate  Methane Monitoring

This form is to be utilized by those sites required by regulation (Kentucky Waste Management Regulations-401 KAR 48:300 and 45:160) or by statute (Kentucky Revised Statutes Chapter 224) to conduct groundwater and surface water monitoring under the jurisdiction of the Division of Waste Management. **You must report any indication of contamination within forty-eight (48) hours of making the determination using statistical analyses, direct comparison, or other similar techniques. Submitting the lab report is NOT considered notification.** Instructions for completing the form are attached. Do not submit the instruction pages.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for such violations.

  
\_\_\_\_\_  
Myrna E. Redfield, Deputy Program Manager  
Four Rivers Nuclear Partnership, LLC

2/27/19  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Jennifer Woodard, Paducah Site Lead  
U.S. Department of Energy

2/27/19  
\_\_\_\_\_  
Date

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**APPENDIX B**  
**FACILITY INFORMATION SHEET**

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# FACILITY INFORMATION SHEET

Groundwater: October 2018  
Surface water: October 2018  
Methane: November 2018

County: McCracken

Permit Nos. SW07300014,  
SW07300015,  
SW07300045

Facility Name: U.S. DOE—Paducah Gaseous Diffusion Plant  
(As officially shown on DWM Permit Face)

Site Address: 5600 Hobbs Road Kevil, Kentucky 42053  
Street City/State Zip

Phone No: (270) 441-6800 Latitude: N 37° 07' 45" Longitude: W 88° 47' 55"

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## OWNER INFORMATION

Facility Owner: U.S. DOE, Robert E. Edwards III, Manager Phone No: (859) 227-5020

Contact Person: David Hutchison Phone No: (270) 441-5929  
Director, Environmental Services

Contact Person Title: Four Rivers Nuclear Partnership, LLC

Mailing Address: 5511 Hobbs Road Kevil, Kentucky 42053  
Street City/State Zip

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## SAMPLING PERSONNEL (IF OTHER THAN LANDFILL OR LABORATORY)

Company: GEO Consultants, LLC

Contact Person: Sam Martin Phone No: (270) 441-6755

Mailing Address: 199 Kentucky Avenue Kevil, Kentucky 42053  
Street City/State Zip

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## LABORATORY RECORD #1

Laboratory GEL Laboratories, LLC Lab ID No: KY90129

Contact Person: Valerie Davis Phone No: (843) 769-7391

Mailing Address: 2040 Savage Road Charleston, South Carolina 29407  
Street City/State Zip

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## LABORATORY RECORD #2

Laboratory: N/A Lab ID No: N/A

Contact Person: N/A Phone No: N/A

Mailing Address: N/A  
Street City/State Zip

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## LABORATORY RECORD #3

Laboratory: N/A Lab ID No: N/A

Contact Person: N/A Phone No: N/A

Mailing Address: N/A  
Street City/State Zip

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**APPENDIX C**  
**GROUNDWATER SAMPLE ANALYSES**  
**AND WRITTEN COMMENTS**

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Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

**RESIDENTIAL/CONTAINED-QUARTERLY**  
**Facility: US DOE - Paducah Gaseous Diffusion Plant**  
**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None  
 For Official Use Only

# GROUNDWATER SAMPLE ANALYSIS (S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	8004-4798	8004-4799	8004-0981	8004-4800								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	357	358	359	360								
Sample Sequence #	1	1	1	1								
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	NA	NA	NA	NA								
Sample Date and Time (Month/Day/Year hour: minutes)	10/8/2018 12:12	10/8/2018 12:57	NA	10/9/2018 11:45								
Duplicate ("Y" or "N") <sup>2</sup>	N	N	N	N								
Split ("Y" or "N") <sup>3</sup>	N	N	N	N								
Facility Sample ID Number (if applicable)	MW357UG1-19	MW358UG1-19	NA	MW360UG1-19								
Laboratory Sample ID Number (if applicable)	461252003	461252005	NA	461323003								
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis	10/12/2018	10/12/2018	NA	10/14/18								
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	DOWN	DOWN	DOWN	DOWN								
CAS RN <sup>4</sup>	CONSTITUENT	T D S <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056	0.414		0.438		*		0.129	J
16887-00-6	Chloride(s)	T	mg/L	9056	33	*	36.2	*	*		9.05	*
16984-48-8	Fluoride	T	mg/L	9056	0.203		0.221		*		0.295	
S0595- -	Nitrate & Nitrite	T	mg/L	9056	1.37		0.778		*		0.685	
14808-79-8	Sulfate	T	mg/L	9056	46.5	*	68.6	*	*		10.8	*
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field	30.1		30.09		*		30.01	
S0145- -	Specific Conductance	T	µMH0/cm	Field	430		501		*		404	

STANDARD FLAGS:  
 \* = See Comments  
 J = Estimated Value  
 B = Analyte found in blank  
 A = Average value  
 N = Presumptive ID  
 D = Concentration from analysis  
 of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4798	8004-4799	8004-0981	8004-4800			
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					357	358	359	360			
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field	323.3		323.32		*	323.35	
N238	Dissolved Oxygen	T	mg/L	Field	3.19		0.95		*	1.17	
S0266- -	Total Dissolved Solids	T	mg/L	160.1	227		274		*	207	
S0296- -	pH	T	Units	Field	5.81		5.88		*	6.14	
NS215	Eh	T	mV	Field	418		237		*	321	
S0907 - -	Temperature	T	°C	Field	23.17		22.17		*	19.33	
7429-90-5	Aluminum	T	mg/L	6020	0.0382	J	0.0288	J	*	0.0491	J
7440-36-0	Antimony	T	mg/L	6020	<0.003		<0.003		*	<0.003	
7440-38-2	Arsenic	T	mg/L	6020	<0.005		0.00332	J	*	0.00215	J
7440-39-3	Barium	T	mg/L	6020	0.0713		0.0581		*	0.176	
7440-41-7	Beryllium	T	mg/L	6020	<0.0005		<0.0005		*	<0.0005	
7440-42-8	Boron	T	mg/L	6020	0.385		0.401		*	0.0228	*
7440-43-9	Cadmium	T	mg/L	6020	<0.001		<0.001		*	<0.001	
7440-70-2	Calcium	T	mg/L	6020	30		37.1		*	18	
7440-47-3	Chromium	T	mg/L	6020	<0.01		<0.01		*	<0.01	
7440-48-4	Cobalt	T	mg/L	6020	<0.001		0.00557		*	0.00506	
7440-50-8	Copper	T	mg/L	6020	0.00258		0.000668	J	*	0.000598	J
7439-89-6	Iron	T	mg/L	6020	<0.1		2.24		*	0.429	
7439-92-1	Lead	T	mg/L	6020	<0.002		<0.002		*	<0.002	
7439-95-4	Magnesium	T	mg/L	6020	12.5		16.6		*	7.63	
7439-96-5	Manganese	T	mg/L	6020	0.013		0.416		*	0.08	
7439-97-6	Mercury	T	mg/L	7470	<0.0002		<0.0002		*	<0.0002	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4798	8004-4799	8004-0981	8004-4800				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					357	358	359	360				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020	<0.0005		0.000454	J		*	0.000262	J
7440-02-0	Nickel	T	mg/L	6020	0.0015	J	0.0216			*	0.00129	J
7440-09-7	Potassium	T	mg/L	6020	1.68		2.64			*	0.615	
7440-16-6	Rhodium	T	mg/L	6020	<0.005		<0.005			*	<0.005	
7782-49-2	Selenium	T	mg/L	6020	<0.005		<0.005			*	<0.005	
7440-22-4	Silver	T	mg/L	6020	<0.001		<0.001			*	<0.001	
7440-23-5	Sodium	T	mg/L	6020	46.5		44.1			*	59.2	
7440-25-7	Tantalum	T	mg/L	6020	<0.005		<0.005			*	<0.005	
7440-28-0	Thallium	T	mg/L	6020	<0.002		<0.002			*	<0.002	
7440-61-1	Uranium	T	mg/L	6020	<0.0002		<0.0002			*	0.000136	BJ
7440-62-2	Vanadium	T	mg/L	6010	<0.01		<0.01			*	0.00381	J
7440-66-6	Zinc	T	mg/L	6020	0.00515	J	0.00675	J		*	0.00517	J
108-05-4	Vinyl acetate	T	mg/L	8260	<0.005		<0.005			*	<0.005	
67-64-1	Acetone	T	mg/L	8260	<0.005		<0.005			*	<0.005	
107-02-8	Acrolein	T	mg/L	8260	<0.005		<0.005			*	<0.005	
107-13-1	Acrylonitrile	T	mg/L	8260	<0.005		<0.005			*	<0.005	
71-43-2	Benzene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
108-90-7	Chlorobenzene	T	mg/L	8260	<0.001	*	<0.001	*		*	<0.001	*
1330-20-7	Xylenes	T	mg/L	8260	<0.003	*	<0.003	*		*	<0.003	*
100-42-5	Styrene	T	mg/L	8260	<0.001	*	<0.001	*		*	<0.001	*
108-88-3	Toluene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
74-97-5	Chlorobromomethane	T	mg/L	8260	<0.001		<0.001			*	<0.001	

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

FINDS/UNIT: KY8-890-008-982 / 1

**Permit Number: SW07300014, SW07300015, SW07300045**

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4798	8004-4799	8004-0981	8004-4800				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					357	358	359	360				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001		<0.001		*	<0.001		
75-25-2	Tribromomethane	T	mg/L	8260	<0.001		<0.001		*	<0.001		
74-83-9	Methyl bromide	T	mg/L	8260	<0.001		<0.001		*	<0.001		
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005		<0.005		*	<0.005		
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005		<0.005		*	<0.005		
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005		<0.005		*	<0.005		
75-00-3	Chloroethane	T	mg/L	8260	<0.001		<0.001		*	<0.001		
67-66-3	Chloroform	T	mg/L	8260	<0.001		<0.001		*	<0.001		
74-87-3	Methyl chloride	T	mg/L	8260	<0.001		<0.001		*	<0.001		
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		*	<0.001		
74-95-3	Methylene bromide	T	mg/L	8260	<0.001		<0.001		*	<0.001		
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001		<0.001		*	<0.001		
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001		<0.001		*	<0.001		
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001		<0.001		*	<0.001		
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001		<0.001		*	<0.001		
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		*	<0.001		
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001		<0.001		*	<0.001		
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001		<0.001		*	<0.001		
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		*	<0.001		
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001		<0.001		*	<0.001		
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*	<0.001	*	*	<0.001	*	
79-01-6	Ethene, Trichloro-	T	mg/L	8260	0.00685		0.00518		*	<0.001		

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4798	8004-4799	8004-0981	8004-4800				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					357	358	359	360				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260	<0.001	*	<0.001	*		*	<0.001	*
591-78-6	2-Hexanone	T	mg/L	8260	<0.005		<0.005			*	<0.005	
74-88-4	Iodomethane	T	mg/L	8260	<0.005		<0.005			*	<0.005	
124-48-1	Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001			*	<0.001	
56-23-5	Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001			*	<0.001	
75-09-2	Dichloromethane	T	mg/L	8260	<0.005		<0.005			*	<0.005	
108-10-1	Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005			*	<0.005	
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000197		<0.0000192			*	<0.0000196	
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001		<0.001			*	<0.001	
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
75-69-4	Trichlorofluoromethane	T	mg/L	8260	<0.001		<0.001			*	<0.001	
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260	<0.001		<0.001			*	<0.001	
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*		*	<0.001	*
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*		*	<0.001	*
1336-36-3	PCB, Total	T	ug/L	8082	<0.0952		<0.0962			*	0.04	J
12674-11-2	PCB-1016	T	ug/L	8082	<0.0952		<0.0962			*	<0.0952	
11104-28-2	PCB-1221	T	ug/L	8082	<0.0952		<0.0962			*	<0.0952	
11141-16-5	PCB-1232	T	ug/L	8082	<0.0952		<0.0962			*	<0.0952	
53469-21-9	PCB-1242	T	ug/L	8082	<0.0952		<0.0962			*	0.04	J
12672-29-6	PCB-1248	T	ug/L	8082	<0.0952		<0.0962			*	<0.0952	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4798	8004-4799	8004-0981	8004-4800				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					357	358	359	360				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
11097-69-1	PCB-1254	T	ug/L	8082	<0.0952		<0.0962		*	<0.0952		
11096-82-5	PCB-1260	T	ug/L	8082	<0.0952		<0.0962		*	<0.0952		
11100-14-4	PCB-1268	T	ug/L	8082	<0.0952		<0.0962		*	<0.0952		
12587-46-1	Gross Alpha	T	pCi/L	9310	3.37	*	5	*	*	3.73	*	
12587-47-2	Gross Beta	T	pCi/L	9310	17.2	*	25.4	*	*	9.94	*	
10043-66-0	Iodine-131	T	pCi/L			*		*	*		*	
13982-63-3	Radium-226	T	pCi/L	AN-1418	-0.115	*	1.01	*	*	0.446	*	
10098-97-2	Strontium-90	T	pCi/L	905.0	-1.22	*	-3.25	*	*	-1.15	*	
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	42.5	*	46.5	*	*	-2.92	*	
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	0.105	*	-0.0775	*	*	0.685	*	
10028-17-8	Tritium	T	pCi/L	906.0	-59.8	*	-29.3	*	*	-2.42	*	
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	21.4	B	43.1	B	*	19.7	BJ	
57-12-5	Cyanide	T	mg/L	9012	<0.2		<0.2		*	<0.2		
20461-54-5	Iodide	T	mg/L	300.0	<0.5		<0.5		*	<0.5		
S0268- -	Total Organic Carbon	T	mg/L	9060	0.875	J	1.81	J	*	1.27	J	
S0586- -	Total Organic Halides	T	mg/L	9020	0.00744	J	0.00916	J	*	0.00612	J	

C-8

Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

RESIDENTIAL/CONTAINED-QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS(S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	8004-4795	8004-0986	8004-4796	8004-4797								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	361	362	363	364								
Sample Sequence #	1	1	1	1								
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	NA	NA	NA	NA								
Sample Date and Time (Month/Day/Year hour: minutes)	10/8/2018 09:31	10/8/2018 10:12	10/8/2018 08:42	10/8/2018 07:35								
Duplicate ("Y" or "N") <sup>2</sup>	N	N	N	N								
Split ("Y" or "N") <sup>3</sup>	N	N	N	N								
Facility Sample ID Number (if applicable)	MW361UG1-19	MW362UG1-19	MW363UG1-19	MW364UG1-19								
Laboratory Sample ID Number (if applicable)	461252007	461252009	461252011	461252001								
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis	10/12/2018	10/12/2018	10/12/2018	10/12/2018								
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	DOWN	DOWN	DOWN	DOWN								
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056	0.458		0.12	J	0.132	J	0.436	
16887-00-6	Chloride(s)	T	mg/L	9056	34.2	*	5.73	*	25.8	*	35.4	*
16984-48-8	Fluoride	T	mg/L	9056	0.21		0.381		0.262		0.194	
S0595- -	Nitrate & Nitrite	T	mg/L	9056	1.17		0.673		5.67		1.08	
14808-79-8	Sulfate	T	mg/L	9056	74.5	*	26.7	*	34	*	74.6	*
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field	30.11		30.12		30.1		30.1	
S0145- -	Specific Conductance	T	µMHO/cm	Field	481		731		410		473	

STANDARD FLAGS:  
 \* = See Comments  
 J = Estimated Value  
 B = Analyte found in blank  
 A = Average value  
 N = Presumptive ID  
 D = Concentration from analysis  
 of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4795	8004-0986	8004-4796	8004-4797				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					361	362	363	364				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field	323.25		336.05		323.18		322.42	
N238	Dissolved Oxygen	T	mg/L	Field	3.19		3.56		0.94		2.17	
S0266- -	Total Dissolved Solids	T	mg/L	160.1	261		379		250		256	
S0296- -	pH	T	Units	Field	6.03		6.69		6.04		5.7	
NS215	Eh	T	mV	Field	413		410		391		408	
S0907 - -	Temperature	T	°C	Field	18.5		18.28		19.61		17.78	
7429-90-5	Aluminum	T	mg/L	6020	<0.05		0.101		<0.05		<0.05	
7440-36-0	Antimony	T	mg/L	6020	<0.003		<0.003		<0.003		<0.003	
7440-38-2	Arsenic	T	mg/L	6020	0.00214	J	0.00228	J	0.00207	J	0.00212	J
7440-39-3	Barium	T	mg/L	6020	0.0555		0.119		0.164		0.0638	
7440-41-7	Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8	Boron	T	mg/L	6020	0.213		0.0242		0.0302		0.0179	
7440-43-9	Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2	Calcium	T	mg/L	6020	33.8		24.6		28.3		34.5	
7440-47-3	Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4	Cobalt	T	mg/L	6020	<0.001		<0.001		0.000818	J	0.000344	J
7440-50-8	Copper	T	mg/L	6020	0.00122		0.00103		<0.001		0.000336	J
7439-89-6	Iron	T	mg/L	6020	<0.1		0.0919	J	0.0409	J	0.0471	J
7439-92-1	Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4	Magnesium	T	mg/L	6020	14.2		10.7		11.1		14.5	
7439-96-5	Manganese	T	mg/L	6020	0.00242	J	0.00125	J	0.154		0.0183	
7439-97-6	Mercury	T	mg/L	7470	<0.0002		<0.0002		0.000077	J	<0.0002	

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4795	8004-0986	8004-4796	8004-4797				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					361	362	363	364				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020	<0.0005		0.000588		<0.0005		0.000284	J
7440-02-0	Nickel	T	mg/L	6020	<0.002		0.00103	J	0.00211		<0.002	
7440-09-7	Potassium	T	mg/L	6020	2.08		0.333		1.34		1.96	
7440-16-6	Rhodium	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7782-49-2	Selenium	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7440-22-4	Silver	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-23-5	Sodium	T	mg/L	6020	46.8		154		45		47.3	
7440-25-7	Tantalum	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7440-28-0	Thallium	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7440-61-1	Uranium	T	mg/L	6020	<0.0002		0.00357		<0.0002		<0.0002	
7440-62-2	Vanadium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-66-6	Zinc	T	mg/L	6020	<0.01		<0.01		<0.01		0.0285	
108-05-4	Vinyl acetate	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
67-64-1	Acetone	T	mg/L	8260	0.00179	J	<0.005		<0.005		<0.005	
107-02-8	Acrolein	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
107-13-1	Acrylonitrile	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
71-43-2	Benzene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
108-90-7	Chlorobenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
1330-20-7	Xylenes	T	mg/L	8260	<0.003	*	<0.003	*	<0.003	*	<0.003	*
100-42-5	Styrene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
108-88-3	Toluene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-97-5	Chlorobromomethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4795	8004-0986	8004-4796	8004-4797				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					361	362	363	364				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-25-2	Tribromomethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-83-9	Methyl bromide	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
75-00-3	Chloroethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
67-66-3	Chloroform	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-87-3	Methyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-95-3	Methylene bromide	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
79-01-6	Ethene, Trichloro-	T	mg/L	8260	0.0073		0.0015		0.00383		0.0123	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4795		8004-0986		8004-4796		8004-4797	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					361		362		363		364	
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
591-78-6	2-Hexanone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
74-88-4	Iodomethane	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
124-48-1	Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
56-23-5	Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-09-2	Dichloromethane	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
108-10-1	Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000198		<0.0000196		<0.0000196		<0.0000199	
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-69-4	Trichlorofluoromethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
1336-36-3	PCB, Total	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
12674-11-2	PCB-1016	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
11104-28-2	PCB-1221	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
11141-16-5	PCB-1232	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
53469-21-9	PCB-1242	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
12672-29-6	PCB-1248	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4795	8004-0986	8004-4796	8004-4797				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					361	362	363	364				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
11097-69-1	PCB-1254	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
11096-82-5	PCB-1260	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
11100-14-4	PCB-1268	T	ug/L	8082	<0.0952		<0.0943		<0.0962		<0.1	
12587-46-1	Gross Alpha	T	pCi/L	9310	8.6	*	6.59	*	-2.22	*	-6.16	*
12587-47-2	Gross Beta	T	pCi/L	9310	27.8	*	2.69	*	-9.93	*	32.3	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.59	*	0.424	*	0.187	*	0.275	*
10098-97-2	Strontium-90	T	pCi/L	905.0	-0.769	*	2.53	*	0.064	*	0.0538	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	48.6	*	-7.06	*	-1.97	*	56.9	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	0.0993	*	-0.0661	*	-0.249	*	0.271	*
10028-17-8	Tritium	T	pCi/L	906.0	26.1	*	4.61	*	64.7	*	-89.8	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	16.4	BJ	26.4	B	24.7	B	29.7	B
57-12-5	Cyanide	T	mg/L	9012	<0.2		<0.2		<0.2		<0.2	
20461-54-5	Iodide	T	mg/L	300.0	<0.5		0.171	J	0.17	J	<0.5	
S0268- -	Total Organic Carbon	T	mg/L	9060	0.8	J	2.35		1.1	J	0.836	J
S0586- -	Total Organic Halides	T	mg/L	9020	0.00992	J	0.0189		0.0122		0.0076	J

C-14

Division of Waste Management  
Solid Waste Branch  
14 Reilly Road  
Frankfort, KY 40601 (502)564-6716

**RESIDENTIAL/CONTAINED-QUARTERLY**  
**Facility: US DOE - Paducah Gaseous Diffusion Plant**  
**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

# GROUNDWATER SAMPLE ANALYSIS (S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	8004-0984	8004-0982	8004-4793	8004-0983								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	365	366	367	368								
Sample Sequence #	1	1	1	1								
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	NA	NA	NA	NA								
Sample Date and Time (Month/Day/Year hour: minutes)	10/9/2018 07:27	10/9/2018 09:29	10/9/2018 08:16	NA								
Duplicate ("Y" or "N") <sup>2</sup>	N	N	N	N								
Split ("Y" or "N") <sup>3</sup>	N	N	N	N								
Facility Sample ID Number (if applicable)	MW365UG1-19	MW366UG1-19	MW367UG1-19	NA								
Laboratory Sample ID Number (if applicable)	461323005	461323001	461323009	NA								
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis	10/14/2018	10/14/2018	10/15/2018	NA								
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	DOWN	DOWN	DOWN	SIDE								
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056	<0.2		0.49		0.155	J		*
16887-00-6	Chloride(s)	T	mg/L	9056	3.58	*	40.2	*	9.98	*		*
16984-48-8	Fluoride	T	mg/L	9214	0.331		0.228		0.165			*
S0595- -	Nitrate & Nitrite	T	mg/L	9056	0.794		1.13		<0.2			*
14808-79-8	Sulfate	T	mg/L	9056	63.6	*	61.2	*	24.8	*		*
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field	30.02		30.03		30.02			*
S0145- -	Specific Conductance	T	µMH0/cm	Field	427		491		250			*

**STANDARD FLAGS:**

- \* = See Comments
- J = Estimated Value
- B = Analyte found in blank
- A = Average value
- N = Presumptive ID
- D = Concentration from analysis of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0984	8004-0982	8004-4793	8004-0983				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					365	366	367	368				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field	328.34		323.38		323.35			*
N238	Dissolved Oxygen	T	mg/L	Field	2.4		3.06		0.71			*
S0266- -	Total Dissolved Solids	T	mg/L	160.1	231		271		130			*
S0296- -	pH	T	Units	Field	5.89		6.07		5.79			*
NS215	Eh	T	mV	Field	415		260		294			*
S0907 - -	Temperature	T	°C	Field	17.83		18.17		17.78			*
7429-90-5	Aluminum	T	mg/L	6020	<0.05		<0.05		0.0198	J		*
7440-36-0	Antimony	T	mg/L	6020	<0.003		<0.003		<0.003			*
7440-38-2	Arsenic	T	mg/L	6020	<0.005		<0.005		0.00365	J		*
7440-39-3	Barium	T	mg/L	6020	0.111		0.111		0.145			*
7440-41-7	Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005			*
7440-42-8	Boron	T	mg/L	6020	0.00787	*J	0.174	*	0.0196	*		*
7440-43-9	Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001			*
7440-70-2	Calcium	T	mg/L	6020	19.5		30.3		13.1			*
7440-47-3	Chromium	T	mg/L	6020	<0.01		<0.01		<0.01			*
7440-48-4	Cobalt	T	mg/L	6020	0.00156		<0.001		0.00738			*
7440-50-8	Copper	T	mg/L	6020	0.00653		0.000598	J	0.000303	J		*
7439-89-6	Iron	T	mg/L	6020	<0.1		0.0442	J	6.91			*
7439-92-1	Lead	T	mg/L	6020	<0.002		<0.002		<0.002			*
7439-95-4	Magnesium	T	mg/L	6020	9.47		13.6		7.11			*
7439-96-5	Manganese	T	mg/L	6020	0.0118		0.00934		1.34			*
7439-97-6	Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002			*

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0984	8004-0982	8004-4793	8004-0983				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					365	366	367	368				
CAS RN <sup>4</sup>	CONSTITUENT	T D D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020	0.000215	J	<0.0005		<0.0005			*
7440-02-0	Nickel	T	mg/L	6020	0.00622		0.000627	J	0.00302			*
7440-09-7	Potassium	T	mg/L	6020	0.215	J	1.71		2.47			*
7440-16-6	Rhodium	T	mg/L	6020	<0.005		<0.005		<0.005			*
7782-49-2	Selenium	T	mg/L	6020	<0.005		<0.005		<0.005			*
7440-22-4	Silver	T	mg/L	6020	<0.001		<0.001		<0.001			*
7440-23-5	Sodium	T	mg/L	6020	49		42.5		17.4			*
7440-25-7	Tantalum	T	mg/L	6020	<0.005		<0.005		<0.005			*
7440-28-0	Thallium	T	mg/L	6020	<0.002		<0.002		<0.002			*
7440-61-1	Uranium	T	mg/L	6020	0.000111	BJ	<0.0002		<0.0002			*
7440-62-2	Vanadium	T	mg/L	6020	0.00474	J	<0.01		0.00353	J		*
7440-66-6	Zinc	T	mg/L	6020	0.0233		<0.01		0.0146			*
108-05-4	Vinyl acetate	T	mg/L	8260	<0.005		<0.005		<0.005			*
67-64-1	Acetone	T	mg/L	8260	<0.005		<0.005		<0.005			*
107-02-8	Acrolein	T	mg/L	8260	<0.005		<0.005		<0.005			*
107-13-1	Acrylonitrile	T	mg/L	8260	<0.005		<0.005		<0.005			*
71-43-2	Benzene	T	mg/L	8260	<0.001		<0.001		<0.001			*
108-90-7	Chlorobenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
1330-20-7	Xylenes	T	mg/L	8260	<0.003	*	<0.003	*	<0.003	*		*
100-42-5	Styrene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
108-88-3	Toluene	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-97-5	Chlorobromomethane	T	mg/L	8260	<0.001		<0.001		<0.001			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0984	8004-0982	8004-4793	8004-0983				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					365	366	367	368				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-25-2	Tribromomethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-83-9	Methyl bromide	T	mg/L	8260	<0.001		<0.001		<0.001			*
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005			*
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005		<0.005		<0.005			*
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005		<0.005		<0.005			*
75-00-3	Chloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
67-66-3	Chloroform	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-87-3	Methyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001			*
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-95-3	Methylene bromide	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001		<0.001		<0.001			*
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001		<0.001		<0.001			*
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001			*
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001		<0.001		<0.001			*
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001		<0.001		<0.001			*
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001			*
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
79-01-6	Ethene, Trichloro-	T	mg/L	8260	<0.001		0.00504		0.00046	J		*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0984	8004-0982	8004-4793	8004-0983				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					365	366	367	368				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
591-78-6	2-Hexanone	T	mg/L	8260	<0.005		<0.005		<0.005			*
74-88-4	Iodomethane	T	mg/L	8260	<0.005		<0.005		<0.005			*
124-48-1	Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001		<0.001			*
56-23-5	Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-09-2	Dichloromethane	T	mg/L	8260	<0.005		<0.005		<0.005			*
108-10-1	Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005			*
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000198		<0.0000197		<0.0000195			*
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001		<0.001		<0.001			*
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001			*
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001			*
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-69-4	Trichlorofluoromethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260	<0.001		<0.001		<0.001			*
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
1336-36-3	PCB, Total	T	ug/L	8082	0.129		<0.0962		<0.0943			*
12674-11-2	PCB-1016	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*
11104-28-2	PCB-1221	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*
11141-16-5	PCB-1232	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*
53469-21-9	PCB-1242	T	ug/L	8082	0.129		<0.0962		<0.0943			*
12672-29-6	PCB-1248	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0984	8004-0982	8004-4793	8004-0983				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					365	366	367	368				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
11097-69-1	PCB-1254	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*
11096-82-5	PCB-1260	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*
11100-14-4	PCB-1268	T	ug/L	8082	<0.0943		<0.0962		<0.0943			*
12587-46-1	Gross Alpha	T	pCi/L	9310	-1.69	*	-4.18	*	7.23	*		*
12587-47-2	Gross Beta	T	pCi/L	9310	4.82	*	47.5	*	0.169	*		*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.263	*	0.394	*	0.645	*		*
10098-97-2	Strontium-90	T	pCi/L	905.0	-0.813	*	-1.46	*	-1.74	*		*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	-9.7	*	55.9	*	-3.27	*		*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	0.464	*	0.234	*	0.11	*		*
10028-17-8	Tritium	T	pCi/L	906.0	13.3	*	-57	*	-10.7	*		*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	24.7	B	14.7	BJ	26.4	B		*
57-12-5	Cyanide	T	mg/L	9012	<0.2		<0.2		<0.2			*
20461-54-5	Iodide	T	mg/L	300.0	<0.5		<0.5		<0.5			*
S0268- -	Total Organic Carbon	T	mg/L	9060	1.66	J	0.877	J	0.668	J		*
S0586- -	Total Organic Halides	T	mg/L	9020	0.0143		0.0048	J	<0.01			*

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Division of Waste Management  
Solid Waste Branch  
14 Reilly Road  
Frankfort, KY 40601 (502)564-6716

RESIDENTIAL/CONTAINED-QUARTERLY  
Facility: US DOE - Paducah Gaseous Diffusion Plant  
Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1  
LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS(S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	8004-4820	8004-4818	8004-4819	8004-4808								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	369	370	371	372								
Sample Sequence #	1	1	1	1								
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	NA	NA	NA	NA								
Sample Date and Time (Month/Day/Year hour: minutes)	10/9/2018 13:24	10/9/2018 12:37	10/10/2018 10:55	10/10/2018 10:10								
Duplicate ("Y" or "N") <sup>2</sup>	N	N	N	N								
Split ("Y" or "N") <sup>3</sup>	N	N	N	N								
Facility Sample ID Number (if applicable)	MW369UG1-19	MW370UG1-19	MW371UG1-19	MW372UG1-19								
Laboratory Sample ID Number (if applicable)	461323011	461323013	461432003	461432005								
Date of Analysis (Month/Day/Year) For <u>Volatiles Organics</u> Analysis	10/15/2018	10/15/2018	10/15/2018	10/15/2018								
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	UP	UP	UP	UP								
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056	0.391		0.419		<0.2		0.573	
16887-00-6	Chloride(s)	T	mg/L	9056	33.6	*	35.8	*	4.27		47.9	
16984-48-8	Fluoride	T	mg/L	9056	0.261		0.218		0.25		0.189	
S0595- -	Nitrate & Nitrite	T	mg/L	9056	0.769		1.19		0.221	J	0.957	
14808-79-8	Sulfate	T	mg/L	9056	9.41	*	21.7	*	21.9		66.9	
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field	29.96		29.98		29.8		29.78	
S0145- -	Specific Conductance	T	µMHO/cm	Field	374		442		712		618	

STANDARD FLAGS:  
\* = See Comments  
J = Estimated Value  
B = Analyte found in blank  
A = Average value  
N = Presumptive ID  
D = Concentration from analysis of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4820	8004-4818	8004-4819	8004-4808				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					369	370	371	372				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field	324.59		324.56		341.73		324.77	
N238	Dissolved Oxygen	T	mg/L	Field	1.36		3.31		0.96		0.79	
S0266- -	Total Dissolved Solids	T	mg/L	160.1	196		223		414		336	
S0296- -	pH	T	Units	Field	6.05		6.01		6.55		6.14	
NS215	Eh	T	mV	Field	341		346		328		295	
S0907 - -	Temperature	T	°C	Field	21.39		19.83		18.67		19.11	
7429-90-5	Aluminum	T	mg/L	6020	0.0812		<0.05		0.327		<0.05	
7440-36-0	Antimony	T	mg/L	6020	<0.003		<0.003		<0.003		<0.003	
7440-38-2	Arsenic	T	mg/L	6020	<0.005		0.00254	J	0.00214	J	0.00241	J
7440-39-3	Barium	T	mg/L	6020	0.405		0.229		0.0826		0.0549	
7440-41-7	Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005	*	<0.0005	*
7440-42-8	Boron	T	mg/L	6020	0.0175	*	0.0326	*	0.00575	J	0.899	
7440-43-9	Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2	Calcium	T	mg/L	6020	16.3		26.1		48		49.7	
7440-47-3	Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4	Cobalt	T	mg/L	6020	0.00626		<0.001		<0.001		0.00116	
7440-50-8	Copper	T	mg/L	6020	0.00123		0.000653	J	0.000927	J	0.000787	J
7439-89-6	Iron	T	mg/L	6020	0.16		<0.1		0.188		0.0592	J
7439-92-1	Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4	Magnesium	T	mg/L	6020	7.02		11.5		16.1		19.1	
7439-96-5	Manganese	T	mg/L	6020	0.0166		<0.005		0.00475	J	0.00402	J
7439-97-6	Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		<0.0002	

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4820	8004-4818	8004-4819	8004-4808				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					369	370	371	372				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020	<0.0005		<0.0005		0.000415	J	0.000255	J
7440-02-0	Nickel	T	mg/L	6020	0.00681		0.000706	J	0.00142	J	0.00158	J
7440-09-7	Potassium	T	mg/L	6020	0.551		2.24		0.483		2.15	
7440-16-6	Rhodium	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7782-49-2	Selenium	T	mg/L	6020	0.00208	J	<0.005		<0.005		<0.005	
7440-22-4	Silver	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-23-5	Sodium	T	mg/L	6020	49.3		40.4		99.1		49.8	
7440-25-7	Tantalum	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7440-28-0	Thallium	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7440-61-1	Uranium	T	mg/L	6020	<0.0002		<0.0002		0.002	B	<0.0002	
7440-62-2	Vanadium	T	mg/L	6020	0.0039	J	0.00376	J	0.00487	J	<0.01	
7440-66-6	Zinc	T	mg/L	6020	0.00497	J	0.00576	J	0.00425	J	<0.01	
108-05-4	Vinyl acetate	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
67-64-1	Acetone	T	mg/L	8260	0.00247	J	<0.005		<0.005		<0.005	
107-02-8	Acrolein	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
107-13-1	Acrylonitrile	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
71-43-2	Benzene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
108-90-7	Chlorobenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
1330-20-7	Xylenes	T	mg/L	8260	<0.003	*	<0.003	*	<0.003	*	<0.003	*
100-42-5	Styrene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
108-88-3	Toluene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-97-5	Chlorobromomethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

FINDS/UNIT: KY8-890-008-982 / 1

**Permit Number: SW07300014, SW07300015, SW07300045**

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4820	8004-4818	8004-4819	8004-4808				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					369	370	371	372				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-25-2	Tribromomethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-83-9	Methyl bromide	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
75-00-3	Chloroethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
67-66-3	Chloroform	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-87-3	Methyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
74-95-3	Methylene bromide	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
79-01-6	Ethene, Trichloro-	T	mg/L	8260	0.00103		0.00067	J	<0.001		0.00572	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4820	8004-4818	8004-4819	8004-4808				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					369	370	371	372				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
591-78-6	2-Hexanone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
74-88-4	Iodomethane	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
124-48-1	Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
56-23-5	Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-09-2	Dichloromethane	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
108-10-1	Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000197		<0.0000199		<0.0000195		<0.0000195	
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
75-69-4	Trichlorofluoromethane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*	<0.001	*
1336-36-3	PCB, Total	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
12674-11-2	PCB-1016	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
11104-28-2	PCB-1221	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
11141-16-5	PCB-1232	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
53469-21-9	PCB-1242	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
12672-29-6	PCB-1248	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

FINDS/UNIT: KY8-890-008-982 / 1

**Permit Number: SW07300014, SW07300015, SW07300045**

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4820	8004-4818	8004-4819	8004-4808				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					369	370	371	372				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
11097-69-1	PCB-1254	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
11096-82-5	PCB-1260	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
11100-14-4	PCB-1268	T	ug/L	8082	<0.0971		<0.0962		<0.0962		<0.0962	
12587-46-1	Gross Alpha	T	pCi/L	9310	1.2	*	6.45	*	6.03	*	-0.885	*
12587-47-2	Gross Beta	T	pCi/L	9310	23.2	*	81.7	*	-2.83	*	123	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.475	*	0.24	*	0.522	*	0.219	*
10098-97-2	Strontium-90	T	pCi/L	905.0	1.94	*	-1.98	*	-1.43	*	2.11	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	55	*	114	*	-5.75	*	158	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	1.22	*	1.21	*	0.449	*	1.07	*
10028-17-8	Tritium	T	pCi/L	906.0	50.9	*	16.8	*	92	*	43.4	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	21.4	B	31.4	B	14.7	BJ	16.4	BJ
57-12-5	Cyanide	T	mg/L	9012	<0.2		<0.2		<0.2		<0.2	
20461-54-5	Iodide	T	mg/L	300.0	<0.5		<0.5		<0.5		<0.5	
S0268- -	Total Organic Carbon	T	mg/L	9060	1.2	J	1.02	J	1.87	J	1	J
S0586- -	Total Organic Halides	T	mg/L	9020	0.0157		0.00616	J	0.00522	J	0.0143	

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Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

RESIDENTIAL/CONTAINED-QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS(S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	8004-4792	8004-0990	8004-0985	8004-0988								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	373	374	375	376								
Sample Sequence #	1	1	1	1								
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	NA	NA	NA	NA								
Sample Date and Time (Month/Day/Year hour: minutes)	10/10/2018 08:42	10/10/2018 09:25	10/10/2018 07:32	NA								
Duplicate ("Y" or "N") <sup>2</sup>	N	N	N	N								
Split ("Y" or "N") <sup>3</sup>	N	N	N	N								
Facility Sample ID Number (if applicable)	MW373UG1-19	MW374UG1-19	MW375UG1-19	NA								
Laboratory Sample ID Number (if applicable)	461432007	461432009	461432001	NA								
Date of Analysis (Month/Day/Year) For <u>Volatiles Organics</u> Analysis	10/15/2018	10/15/2018	10/15/2018	NA								
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	UP	UP	SIDE	SIDE								
CAS RN <sup>4</sup>	CONSTITUENT	T D S <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056	0.572		0.786		<0.2			*
16887-00-6	Chloride(s)	T	mg/L	9056	44.8		62.1		4.44			*
16984-48-8	Fluoride	T	mg/L	9056	0.188		0.185		0.306			*
S0595- -	Nitrate & Nitrite	T	mg/L	9056	0.952		0.166	J	1.29			*
14808-79-8	Sulfate	T	mg/L	9056	113		6.6		24.5			*
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field	29.78		29.78		29.78			*
S0145- -	Specific Conductance	T	µMHO/cm	Field	725		678		340			*

STANDARD FLAGS:  
 \* = See Comments  
 J = Estimated Value  
 B = Analyte found in blank  
 A = Average value  
 N = Presumptive ID  
 D = Concentration from analysis  
 of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4792	8004-0990	8004-0985	8004-0988				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					373	374	375	376				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field	322.76		335.13		332.63			*
N238	Dissolved Oxygen	T	mg/L	Field	1.79		0.88		1.1			*
S0266- -	Total Dissolved Solids	T	mg/L	160.1	393		340		203			*
S0296- -	pH	T	Units	Field	6.19		6.7		6.2			*
NS215	Eh	T	mV	Field	438		218		415			*
S0907 - -	Temperature	T	°C	Field	19.39		19.28		18.67			*
7429-90-5	Aluminum	T	mg/L	6020	<0.05		<0.05		0.0355	J		*
7440-36-0	Antimony	T	mg/L	6020	<0.003		<0.003		<0.003			*
7440-38-2	Arsenic	T	mg/L	6020	0.00219	J	0.00275	J	<0.005			*
7440-39-3	Barium	T	mg/L	6020	0.0357		0.135		0.169			*
7440-41-7	Beryllium	T	mg/L	6020	<0.0005	*	<0.0005	*	<0.0005	*		*
7440-42-8	Boron	T	mg/L	6020	1.24		0.0127	J	0.0075	J		*
7440-43-9	Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001			*
7440-70-2	Calcium	T	mg/L	6020	57.4		20.4		13.2			*
7440-47-3	Chromium	T	mg/L	6020	<0.01		<0.01		<0.01			*
7440-48-4	Cobalt	T	mg/L	6020	0.00119		0.000994	J	0.000317	J		*
7440-50-8	Copper	T	mg/L	6020	0.000373	J	<0.001		0.000489	J		*
7439-89-6	Iron	T	mg/L	6020	0.0428	J	1.07		0.0538	J		*
7439-92-1	Lead	T	mg/L	6020	<0.002		<0.002		<0.002			*
7439-95-4	Magnesium	T	mg/L	6020	23.2		5.62		6.49			*
7439-96-5	Manganese	T	mg/L	6020	0.0258		0.171		0.00438	J		*
7439-97-6	Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4792	8004-0990	8004-0985	8004-0988				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373	374	375	376				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020	<0.0005		0.000271	J	<0.0005			*
7440-02-0	Nickel	T	mg/L	6020	0.00176	J	<0.002		0.000953	J		*
7440-09-7	Potassium	T	mg/L	6020	2.5		0.398		0.289	J		*
7440-16-6	Rhodium	T	mg/L	6020	<0.005		<0.005		<0.005			*
7782-49-2	Selenium	T	mg/L	6020	<0.005		<0.005		0.00262	J		*
7440-22-4	Silver	T	mg/L	6020	<0.001		<0.001		<0.001			*
7440-23-5	Sodium	T	mg/L	6020	50.2		123		55.3			*
7440-25-7	Tantalum	T	mg/L	6020	<0.005		<0.005		<0.005			*
7440-28-0	Thallium	T	mg/L	6020	<0.002		<0.002		<0.002			*
7440-61-1	Uranium	T	mg/L	6020	<0.0002		0.000169	BJ	0.000101	BJ		*
7440-62-2	Vanadium	T	mg/L	6020	<0.01		<0.01		0.00391	J		*
7440-66-6	Zinc	T	mg/L	6020	<0.01		0.00792	J	0.00343	J		*
108-05-4	Vinyl acetate	T	mg/L	8260	<0.005		<0.005		<0.005			*
67-64-1	Acetone	T	mg/L	8260	<0.005		<0.005		<0.005			*
107-02-8	Acrolein	T	mg/L	8260	<0.005		<0.005		<0.005			*
107-13-1	Acrylonitrile	T	mg/L	8260	<0.005		<0.005		<0.005			*
71-43-2	Benzene	T	mg/L	8260	<0.001		<0.001		<0.001			*
108-90-7	Chlorobenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
1330-20-7	Xylenes	T	mg/L	8260	<0.003	*	<0.003	*	<0.003	*		*
100-42-5	Styrene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
108-88-3	Toluene	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-97-5	Chlorobromomethane	T	mg/L	8260	<0.001		<0.001		<0.001			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4792	8004-0990	8004-0985	8004-0988				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373	374	375	376				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-25-2	Tribromomethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-83-9	Methyl bromide	T	mg/L	8260	<0.001		<0.001		<0.001			*
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005			*
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005		<0.005		<0.005			*
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005		<0.005		<0.005			*
75-00-3	Chloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
67-66-3	Chloroform	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-87-3	Methyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001			*
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001			*
74-95-3	Methylene bromide	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001		<0.001		<0.001			*
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001		<0.001		<0.001			*
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001			*
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001		<0.001		<0.001			*
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001		<0.001		<0.001			*
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001			*
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
79-01-6	Ethene, Trichloro-	T	mg/L	8260	0.00791		0.00207		<0.001			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4792	8004-0990	8004-0985	8004-0988				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373	374	375	376				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
591-78-6	2-Hexanone	T	mg/L	8260	<0.005		<0.005		<0.005			*
74-88-4	Iodomethane	T	mg/L	8260	<0.005		<0.005		<0.005			*
124-48-1	Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001		<0.001			*
56-23-5	Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-09-2	Dichloromethane	T	mg/L	8260	<0.005		<0.005		<0.005			*
108-10-1	Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005			*
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000195		<0.0000192		<0.0000195			*
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001		<0.001		<0.001			*
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001			*
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001			*
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001			*
75-69-4	Trichlorofluoromethane	T	mg/L	8260	<0.001		<0.001		<0.001			*
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260	<0.001		<0.001		<0.001			*
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		*
1336-36-3	PCB, Total	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
12674-11-2	PCB-1016	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
11104-28-2	PCB-1221	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
11141-16-5	PCB-1232	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
53469-21-9	PCB-1242	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
12672-29-6	PCB-1248	T	ug/L	8082	<0.0952		<0.0952		<0.1			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-4792	8004-0990	8004-0985	8004-0988				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373	374	375	376				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
11096-82-5	PCB-1260	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
11100-14-4	PCB-1268	T	ug/L	8082	<0.0952		<0.0952		<0.1			*
12587-46-1	Gross Alpha	T	pCi/L	9310	2.25	*	-0.811	*	3.17	*		*
12587-47-2	Gross Beta	T	pCi/L	9310	22.8	*	-6.09	*	-0.137	*		*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.416	*	0.587	*	1.05	*		*
10098-97-2	Strontium-90	T	pCi/L	905.0	-1.24	*	-1.14	*	-1.49	*		*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	20.3	*	1.31	*	-4.03	*		*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	0.317	*	-0.0385	*	-0.238	*		*
10028-17-8	Tritium	T	pCi/L	906.0	63.2	*	74.6	*	83.3	*		*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	14.7	BJ	18.1	BJ	16.4	BJ		*
57-12-5	Cyanide	T	mg/L	9012	<0.2		<0.2		<0.2			*
20461-54-5	Iodide	T	mg/L	300.0	<0.5		<0.5		<0.5			*
S0268- -	Total Organic Carbon	T	mg/L	9060	1.2	J	2.49		0.883	J		*
S0586- -	Total Organic Halides	T	mg/L	9020	0.0116		0.0215		0.0118			*

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Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

RESIDENTIAL/CONTAINED-QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS(S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	8004-0989	0000-0000	0000-0000	0000-0000								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	377	E. BLANK	F. BLANK	T. BLANK 1								
Sample Sequence #	1	1	1	1								
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	NA	E	F	T								
Sample Date and Time (Month/Day/Year hour: minutes)	NA	10/9/2018 06:55	10/9/2018 08:18	10/8/2018 06:30								
Duplicate ("Y" or "N") <sup>2</sup>	N	N	N	N								
Split ("Y" or "N") <sup>3</sup>	N	N	N	N								
Facility Sample ID Number (if applicable)	NA	RI1UG1-19	FB1UG1-19	TB1UG1-19								
Laboratory Sample ID Number (if applicable)	NA	461323016	461323015	461252013								
Date of Analysis (Month/Day/Year) For <u>Volatiles Organics</u> Analysis	NA	10/15/2018	10/15/2018	10/12/2018								
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	SIDE	NA	NA	NA								
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHO D	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056		*		*		*		*
16887-00-6	Chloride(s)	T	mg/L	9056		*		*		*		*
16984-48-8	Fluoride	T	mg/L	9056		*		*		*		*
S0595- -	Nitrate & Nitrite	T	mg/L	9056		*		*		*		*
14808-79-8	Sulfate	T	mg/L	9056		*		*		*		*
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field		*		*		*		*
S0145- -	Specific Conductance	T	µMH0/cm	Field		*		*		*		*

STANDARD FLAGS:  
 \* = See Comments  
 J = Estimated Value  
 B = Analyte found in blank  
 A = Average value  
 N = Presumptive ID  
 D = Concentration from analysis  
 of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0989	0000-0000	0000-0000	0000-0000				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					377	E. BLANK	F. BLANK	T. BLANK 1				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field		*		*		*		*
N238	Dissolved Oxygen	T	mg/L	Field		*		*		*		*
S0266- -	Total Dissolved Solids	T	mg/L	160.1		*		*		*		*
S0296- -	pH	T	Units	Field		*		*		*		*
NS215	Eh	T	mV	Field		*		*		*		*
S0907 - -	Temperature	T	°C	Field		*		*		*		*
7429-90-5	Aluminum	T	mg/L	6020		*	<0.05		<0.05			*
7440-36-0	Antimony	T	mg/L	6020		*	<0.003		<0.003			*
7440-38-2	Arsenic	T	mg/L	6020		*	<0.005		<0.005			*
7440-39-3	Barium	T	mg/L	6020		*	<0.002		<0.002			*
7440-41-7	Beryllium	T	mg/L	6020		*	<0.0005		<0.0005			*
7440-42-8	Boron	T	mg/L	6020		*	<0.015	*	<0.015	*		*
7440-43-9	Cadmium	T	mg/L	6020		*	<0.001		<0.001			*
7440-70-2	Calcium	T	mg/L	6020		*	<0.2		<0.2			*
7440-47-3	Chromium	T	mg/L	6020		*	<0.01		<0.01			*
7440-48-4	Cobalt	T	mg/L	6020		*	<0.001		<0.001			*
7440-50-8	Copper	T	mg/L	6020		*	<0.001		<0.001			*
7439-89-6	Iron	T	mg/L	6020		*	<0.1		<0.1			*
7439-92-1	Lead	T	mg/L	6020		*	<0.002		<0.002			*
7439-95-4	Magnesium	T	mg/L	6020		*	<0.03		<0.03			*
7439-96-5	Manganese	T	mg/L	6020		*	<0.005		<0.005			*
7439-97-6	Mercury	T	mg/L	7470		*	<0.0002		<0.0002			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0989	0000-0000	0000-0000	0000-0000				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					377	E. BLANK	F. BLANK	T. BLANK 1				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020		*	<0.0005		<0.0005			*
7440-02-0	Nickel	T	mg/L	6020		*	<0.002		<0.002			*
7440-09-7	Potassium	T	mg/L	6020		*	<0.3		<0.3			*
7440-16-6	Rhodium	T	mg/L	6020		*	<0.005		<0.005			*
7782-49-2	Selenium	T	mg/L	6020		*	<0.005		<0.005			*
7440-22-4	Silver	T	mg/L	6020		*	<0.001		<0.001			*
7440-23-5	Sodium	T	mg/L	6020		*	<0.25		<0.25			*
7440-25-7	Tantalum	T	mg/L	6020		*	<0.005		<0.005			*
7440-28-0	Thallium	T	mg/L	6020		*	<0.002		<0.002			*
7440-61-1	Uranium	T	mg/L	6020		*	<0.0002		<0.0002			*
7440-62-2	Vanadium	T	mg/L	6020		*	0.00467	J	0.00436	J		*
7440-66-6	Zinc	T	mg/L	6020		*	<0.01		0.00352	J		*
108-05-4	Vinyl acetate	T	mg/L	8260		*	<0.005		<0.005		<0.005	
67-64-1	Acetone	T	mg/L	8260		*	0.00504		0.00474	J	0.00455	J
107-02-8	Acrolein	T	mg/L	8260		*	<0.005		<0.005		<0.005	
107-13-1	Acrylonitrile	T	mg/L	8260		*	<0.005		<0.005		<0.005	
71-43-2	Benzene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
108-90-7	Chlorobenzene	T	mg/L	8260		*	<0.001	*	<0.001	*	<0.001	*
1330-20-7	Xylenes	T	mg/L	8260		*	<0.003	*	<0.003	*	<0.003	*
100-42-5	Styrene	T	mg/L	8260		*	<0.001	*	<0.001	*	<0.001	*
108-88-3	Toluene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
74-97-5	Chlorobromomethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0989	0000-0000	0000-0000	0000-0000				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					377	E. BLANK	F. BLANK	T. BLANK 1				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
75-25-2	Tribromomethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
74-83-9	Methyl bromide	T	mg/L	8260		*	<0.001		<0.001		<0.001	
78-93-3	Methyl ethyl ketone	T	mg/L	8260		*	<0.005		<0.005		<0.005	
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260		*	<0.005		<0.005		<0.005	
75-15-0	Carbon disulfide	T	mg/L	8260		*	<0.005		<0.005		<0.005	
75-00-3	Chloroethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
67-66-3	Chloroform	T	mg/L	8260		*	<0.001		<0.001		<0.001	
74-87-3	Methyl chloride	T	mg/L	8260		*	<0.001		<0.001		<0.001	
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
74-95-3	Methylene bromide	T	mg/L	8260		*	<0.001		<0.001		<0.001	
75-34-3	1,1-Dichloroethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
107-06-2	1,2-Dichloroethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
75-35-4	1,1-Dichloroethylene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260		*	<0.001		<0.001		<0.001	
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260		*	<0.001		<0.001		<0.001	
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260		*	<0.001		<0.001		<0.001	
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260		*	<0.001		<0.001		<0.001	
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260		*	<0.001		<0.001		<0.001	
75-01-4	Vinyl chloride	T	mg/L	8260		*	<0.001		<0.001		<0.001	
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260		*	<0.001	*	<0.001	*	<0.001	*
79-01-6	Ethene, Trichloro-	T	mg/L	8260		*	<0.001		<0.001		<0.001	

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0989	0000-0000	0000-0000	0000-0000				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					377	E. BLANK	F. BLANK	T. BLANK 1				
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260		*	<0.001	*	<0.001	*	<0.001	*
591-78-6	2-Hexanone	T	mg/L	8260		*	<0.005		<0.005		<0.005	
74-88-4	Iodomethane	T	mg/L	8260		*	<0.005		<0.005		<0.005	
124-48-1	Methane, Dibromochloro-	T	mg/L	8260		*	<0.001		<0.001		<0.001	
56-23-5	Carbon Tetrachloride	T	mg/L	8260		*	<0.001		<0.001		<0.001	
75-09-2	Dichloromethane	T	mg/L	8260		*	<0.005		<0.005		<0.005	
108-10-1	Methyl isobutyl ketone	T	mg/L	8260		*	<0.005		<0.005		<0.005	
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011		*	<0.0000197		<0.0000194		<0.0000195	
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260		*	<0.001		<0.001		<0.001	
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260		*	<0.001		<0.001		<0.001	
75-69-4	Trichlorofluoromethane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260		*	<0.001		<0.001		<0.001	
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260		*	<0.001	*	<0.001	*	<0.001	*
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260		*	<0.001	*	<0.001	*	<0.001	*
1336-36-3	PCB, Total	T	ug/L	8082		*	<0.0962		<0.0962			*
12674-11-2	PCB-1016	T	ug/L	8082		*	<0.0962		<0.0962			*
11104-28-2	PCB-1221	T	ug/L	8082		*	<0.0962		<0.0962			*
11141-16-5	PCB-1232	T	ug/L	8082		*	<0.0962		<0.0962			*
53469-21-9	PCB-1242	T	ug/L	8082		*	<0.0962		<0.0962			*
12672-29-6	PCB-1248	T	ug/L	8082		*	<0.0962		<0.0962			*

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					8004-0989	0000-0000	0000-0000	0000-0000				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					377	E. BLANK	F. BLANK	T. BLANK 1				
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082		*	<0.0962		<0.0962			*
11096-82-5	PCB-1260	T	ug/L	8082		*	<0.0962		<0.0962			*
11100-14-4	PCB-1268	T	ug/L	8082		*	<0.0962		<0.0962			*
12587-46-1	Gross Alpha	T	pCi/L	9310		*	-0.316	*	-1	*		*
12587-47-2	Gross Beta	T	pCi/L	9310		*	0.966	*	-3.53	*		*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418		*	0	*	0.432	*		*
10098-97-2	Strontium-90	T	pCi/L	905.0		*	-0.298	*	-0.592	*		*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC		*	-4.72	*	-9.32	*		*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC		*	0.202	*	-0.284	*		*
10028-17-8	Tritium	T	pCi/L	906.0		*	91	*	92.9	*		*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4		*		*		*		*
57-12-5	Cyanide	T	mg/L	9012		*		*		*		*
20461-54-5	Iodide	T	mg/L	300.0		*	<0.5		<0.5			*
S0268- -	Total Organic Carbon	T	mg/L	9060		*		*		*		*
S0586- -	Total Organic Halides	T	mg/L	9020		*		*		*		*

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Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

RESIDENTIAL/CONTAINED-QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS(S)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number	0000-0000	0000-0000	8004-4793									
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)	T. BLANK 2	T. BLANK 3	367									
Sample Sequence #	1	1	2									
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment	T	T	NA									
Sample Date and Time (Month/Day/Year hour: minutes)	10/9/2018 06:50	10/10/2018 06:45	10/9/2018 08:16									
Duplicate ("Y" or "N") <sup>2</sup>	N	N	Y									
Split ("Y" or "N") <sup>3</sup>	N	N	N									
Facility Sample ID Number (if applicable)	TB2UG1-19	TB3UG1-19	MW367DUG1-19									
Laboratory Sample ID Number (if applicable)	461323017	461432011	461323007									
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis	10/15/2018	10/15/2018	10/14/2018									
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)	NA	NA	DOWN									
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
24959-67-9	Bromide	T	mg/L	9056		*		*	0.156	J		
16887-00-6	Chloride(s)	T	mg/L	9056		*		*	9.57	*		
16984-48-8	Fluoride	T	mg/L	9056		*		*	0.163			
S0595- -	Nitrate & Nitrite	T	mg/L	9056		*		*	<0.2			
14808-79-8	Sulfate	T	mg/L	9056		*		*	25.1	*		
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field		*		*	30.02			
S0145- -	Specific Conductance	T	µMH0/cm	Field		*		*	250			

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STANDARD FLAGS:  
 \* = See Comments  
 J = Estimated Value  
 B = Analyte found in blank  
 A = Average value  
 N = Presumptive ID  
 D = Concentration from analysis  
 of a secondary dilution

<sup>1</sup>AKGWA # is 0000-0000 for any type of blank.

<sup>2</sup>Respond "Y" if the sample was a duplicate of another sample in this report.

<sup>3</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>4</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>5</sup>"T" = Total; "D" = Dissolved

<sup>6</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value shown is Practical Quantification Limit.

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", then describe on "Written Comments Page."

RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					0000-0000	0000-0000	8004-4793					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					T. BLANK 2	T. BLANK 3	367					
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
S0906 - -	Static Water Level Elevation	T	Ft. MSL	Field		*		*	323.35			
N238	Dissolved Oxygen	T	mg/L	Field		*		*	0.71			
S0266- -	Total Dissolved Solids	T	mg/L	160.1		*		*	140			
S0296- -	pH	T	Units	Field		*		*	5.79			
NS215	Eh	T	mV	Field		*		*	294			
S0907 - -	Temperature	T	°C	Field		*		*	17.78			
7429-90-5	Aluminum	T	mg/L	6020		*		*	0.0211	J		
7440-36-0	Antimony	T	mg/L	6020		*		*	<0.003			
7440-38-2	Arsenic	T	mg/L	6020		*		*	0.00356	J		
7440-39-3	Barium	T	mg/L	6020		*		*	0.149			
7440-41-7	Beryllium	T	mg/L	6020		*		*	<0.0005			
7440-42-8	Boron	T	mg/L	6020		*		*	0.0208	*		
7440-43-9	Cadmium	T	mg/L	6020		*		*	<0.001			
7440-70-2	Calcium	T	mg/L	6020		*		*	13.2			
7440-47-3	Chromium	T	mg/L	6020		*		*	<0.01			
7440-48-4	Cobalt	T	mg/L	6020		*		*	0.00761			
7440-50-8	Copper	T	mg/L	6020		*		*	0.000424	J		
7439-89-6	Iron	T	mg/L	6020		*		*	7.09			
7439-92-1	Lead	T	mg/L	6020		*		*	<0.002			
7439-95-4	Magnesium	T	mg/L	6020		*		*	7.56			
7439-96-5	Manganese	T	mg/L	6020		*		*	1.31			
7439-97-6	Mercury	T	mg/L	7470		*		*	<0.0002			

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					0000-0000	0000-0000	8004-4793					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2	T. BLANK 3	367					
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
7439-98-7	Molybdenum	T	mg/L	6020		*		*	<0.0005			
7440-02-0	Nickel	T	mg/L	6020		*		*	0.003			
7440-09-7	Potassium	T	mg/L	6020		*		*	2.58			
7440-16-6	Rhodium	T	mg/L	6020		*		*	<0.005			
7782-49-2	Selenium	T	mg/L	6020		*		*	<0.005			
7440-22-4	Silver	T	mg/L	6020		*		*	<0.001			
7440-23-5	Sodium	T	mg/L	6020		*		*	18.7			
7440-25-7	Tantalum	T	mg/L	6020		*		*	<0.005			
7440-28-0	Thallium	T	mg/L	6020		*		*	<0.002			
7440-61-1	Uranium	T	mg/L	6020		*		*	<0.0002			
7440-62-2	Vanadium	T	mg/L	6020		*		*	0.00468	J		
7440-66-6	Zinc	T	mg/L	6020		*		*	0.0129			
108-05-4	Vinyl acetate	T	mg/L	8260	<0.005		<0.005		<0.005			
67-64-1	Acetone	T	mg/L	8260	0.00481	J	0.00481	J	<0.005			
107-02-8	Acrolein	T	mg/L	8260	<0.005		<0.005		<0.005			
107-13-1	Acrylonitrile	T	mg/L	8260	<0.005		<0.005		<0.005			
71-43-2	Benzene	T	mg/L	8260	<0.001		<0.001		<0.001			
108-90-7	Chlorobenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		
1330-20-7	Xylenes	T	mg/L	8260	<0.003	*	<0.003	*	<0.003	*		
100-42-5	Styrene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		
108-88-3	Toluene	T	mg/L	8260	<0.001		<0.001		<0.001			
74-97-5	Chlorobromomethane	T	mg/L	8260	<0.001		<0.001		<0.001			

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**RESIDENTIAL/CONTAINED-QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

FINDS/UNIT: KY8-890-008-982 / 1

**Permit Number: SW07300014, SW07300015, SW07300045**

LAB ID: None

For Official Use Only

**GROUNDWATER SAMPLE ANALYSIS - (Cont.)**

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					0000-0000	0000-0000	8004-4793					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2	T. BLANK 3	367					
CAS RN <sup>4</sup>	CONSTITUENT	T D <sup>5</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001		<0.001		<0.001			
75-25-2	Tribromomethane	T	mg/L	8260	<0.001		<0.001		<0.001			
74-83-9	Methyl bromide	T	mg/L	8260	<0.001		<0.001		<0.001			
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005			
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005		<0.005		<0.005			
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005		<0.005		<0.005			
75-00-3	Chloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			
67-66-3	Chloroform	T	mg/L	8260	<0.001		<0.001		<0.001			
74-87-3	Methyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001			
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001			
74-95-3	Methylene bromide	T	mg/L	8260	<0.001		<0.001		<0.001			
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001		<0.001		<0.001			
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001		<0.001		<0.001			
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001		<0.001		<0.001			
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001			
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001		<0.001		<0.001			
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001		<0.001		<0.001			
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001		<0.001		<0.001			
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001		<0.001		<0.001			
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		
79-01-6	Ethene, Trichloro-	T	mg/L	8260	<0.001		<0.001		0.00057	J		

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					0000-0000	0000-0000	8004-4793					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2	T. BLANK 3	367					
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
100-41-4	Ethylbenzene	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		
591-78-6	2-Hexanone	T	mg/L	8260	<0.005		<0.005		<0.005			
74-88-4	Iodomethane	T	mg/L	8260	<0.005		<0.005		<0.005			
124-48-1	Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001		<0.001			
56-23-5	Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001		<0.001			
75-09-2	Dichloromethane	T	mg/L	8260	<0.005		<0.005		<0.005			
108-10-1	Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005			
96-12-8	Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000199		<0.0000196		<0.0000197			
78-87-5	Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001		<0.001		<0.001			
10061-02-6	trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001			
10061-01-5	cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001		<0.001		<0.001			
156-60-5	trans-1,2-Dichloroethene	T	mg/L	8260	<0.001		<0.001		<0.001			
75-69-4	Trichlorofluoromethane	T	mg/L	8260	<0.001		<0.001		<0.001			
96-18-4	1,2,3-Trichloropropane	T	mg/L	8260	<0.001		<0.001		<0.001			
95-50-1	Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		
106-46-7	Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001	*	<0.001	*		
1336-36-3	PCB, Total	T	ug/L	8082		*		*	<0.0952			
12674-11-2	PCB-1016	T	ug/L	8082		*		*	<0.0952			
11104-28-2	PCB-1221	T	ug/L	8082		*		*	<0.0952			
11141-16-5	PCB-1232	T	ug/L	8082		*		*	<0.0952			
53469-21-9	PCB-1242	T	ug/L	8082		*		*	<0.0952			
12672-29-6	PCB-1248	T	ug/L	8082		*		*	<0.0952			

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RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

FINDS/UNIT: KY8-890-008-982 / 1

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					0000-0000	0000-0000	8004-4793					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2	T. BLANK 3	367					
CAS RN <sup>4</sup>	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S						
11097-69-1	PCB-1254	T	ug/L	8082		*		*	<0.0952			
11096-82-5	PCB-1260	T	ug/L	8082		*		*	<0.0952			
11100-14-4	PCB-1268	T	ug/L	8082		*		*	<0.0952			
12587-46-1	Gross Alpha	T	pCi/L	9310		*		*	0.484	*		
12587-47-2	Gross Beta	T	pCi/L	9310		*		*	9.45	*		
10043-66-0	Iodine-131	T	pCi/L			*		*		*		
13982-63-3	Radium-226	T	pCi/L	AN-1418		*		*	0.997	*		
10098-97-2	Strontium-90	T	pCi/L	905.0		*		*	-1.71	*		
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC		*		*	0.449	*		
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC		*		*	0.31	*		
10028-17-8	Tritium	T	pCi/L	906.0		*		*	11.8	*		
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4		*		*	21.4	B		
57-12-5	Cyanide	T	mg/L	9012		*		*	<0.2			
20461-54-5	Iodide	T	mg/L	300.0		*		*	<0.5			
S0268- -	Total Organic Carbon	T	mg/L	9060		*		*	0.679	J		
S0586- -	Total Organic Halides	T	mg/L	9020		*		*	<0.01			

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RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4798 MW357	MW357UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.05. Rad error is 6.03.
		Gross beta		TPU is 8.43. Rad error is 7.94.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.261. Rad error is 0.261.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.21. Rad error is 2.21.
		Technetium-99		TPU is 8.47. Rad error is 7.04.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.701. Rad error is 0.699.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 99.3. Rad error is 99.3.

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Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4799 MW358	MW358UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.55. Rad error is 6.5.
		Gross beta		TPU is 8.45. Rad error is 7.32.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.01. Rad error is 1.01.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.7. Rad error is 2.7.
		Technetium-99		TPU is 8.79. Rad error is 7.14.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.532. Rad error is 0.531.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 102. Rad error is 102.

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Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0981	MW359	Bromide		During sampling, the well went dry; therefore, no sample was collected.
		Chloride		During sampling, the well went dry; therefore, no sample was collected.
		Fluoride		During sampling, the well went dry; therefore, no sample was collected.
		Nitrate & Nitrite		During sampling, the well went dry; therefore, no sample was collected.
		Sulfate		During sampling, the well went dry; therefore, no sample was collected.
		Barometric Pressure Reading		During sampling, the well went dry; therefore, no sample was collected.
		Specific Conductance		During sampling, the well went dry; therefore, no sample was collected.
		Static Water Level Elevation		During sampling, the well went dry; therefore, no sample was collected.
		Dissolved Oxygen		During sampling, the well went dry; therefore, no sample was collected.
		Total Dissolved Solids		During sampling, the well went dry; therefore, no sample was collected.
		pH		During sampling, the well went dry; therefore, no sample was collected.
		Eh		During sampling, the well went dry; therefore, no sample was collected.
		Temperature		During sampling, the well went dry; therefore, no sample was collected.
		Aluminum		During sampling, the well went dry; therefore, no sample was collected.
		Antimony		During sampling, the well went dry; therefore, no sample was collected.
		Arsenic		During sampling, the well went dry; therefore, no sample was collected.
		Barium		During sampling, the well went dry; therefore, no sample was collected.
		Beryllium		During sampling, the well went dry; therefore, no sample was collected.
		Boron		During sampling, the well went dry; therefore, no sample was collected.
		Cadmium		During sampling, the well went dry; therefore, no sample was collected.
		Calcium		During sampling, the well went dry; therefore, no sample was collected.
		Chromium		During sampling, the well went dry; therefore, no sample was collected.
		Cobalt		During sampling, the well went dry; therefore, no sample was collected.
		Copper		During sampling, the well went dry; therefore, no sample was collected.
		Iron		During sampling, the well went dry; therefore, no sample was collected.
		Lead		During sampling, the well went dry; therefore, no sample was collected.
		Magnesium		During sampling, the well went dry; therefore, no sample was collected.
		Manganese		During sampling, the well went dry; therefore, no sample was collected.
		Mercury		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0981	MW359	Molybdenum		During sampling, the well went dry; therefore, no sample was collected.
		Nickel		During sampling, the well went dry; therefore, no sample was collected.
		Potassium		During sampling, the well went dry; therefore, no sample was collected.
		Rhodium		During sampling, the well went dry; therefore, no sample was collected.
		Selenium		During sampling, the well went dry; therefore, no sample was collected.
		Silver		During sampling, the well went dry; therefore, no sample was collected.
		Sodium		During sampling, the well went dry; therefore, no sample was collected.
		Tantalum		During sampling, the well went dry; therefore, no sample was collected.
		Thallium		During sampling, the well went dry; therefore, no sample was collected.
		Uranium		During sampling, the well went dry; therefore, no sample was collected.
		Vanadium		During sampling, the well went dry; therefore, no sample was collected.
		Zinc		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl acetate		During sampling, the well went dry; therefore, no sample was collected.
		Acetone		During sampling, the well went dry; therefore, no sample was collected.
		Acrolein		During sampling, the well went dry; therefore, no sample was collected.
		Acrylonitrile		During sampling, the well went dry; therefore, no sample was collected.
		Benzene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		Xylenes		During sampling, the well went dry; therefore, no sample was collected.
		Styrene		During sampling, the well went dry; therefore, no sample was collected.
		Toluene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Bromodichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Tribromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl bromide		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Ethyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,4-Dichloro-2-butene		During sampling, the well went dry; therefore, no sample was collected.
		Carbon disulfide		During sampling, the well went dry; therefore, no sample was collected.
		Chloroethane		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0981	MW359	Chloroform		During sampling, the well went dry; therefore, no sample was collected.
		Methyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		cis-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Methylene bromide		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethylene		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromoethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		Tetrachloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Trichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Ethylbenzene		During sampling, the well went dry; therefore, no sample was collected.
		2-Hexanone		During sampling, the well went dry; therefore, no sample was collected.
		Iodomethane		During sampling, the well went dry; therefore, no sample was collected.
		Dibromochloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Carbon tetrachloride		During sampling, the well went dry; therefore, no sample was collected.
		Dichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Isobutyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromo-3-chloropropane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloropropane		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.
		cis-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Trichlorofluoromethane		During sampling, the well went dry; therefore, no sample was collected.
		1,2,3-Trichloropropane		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0981	MW359	1,2-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		1,4-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		PCB, Total		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1016		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1221		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1232		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1242		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1248		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1254		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1260		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1268		During sampling, the well went dry; therefore, no sample was collected.
		Gross alpha		During sampling, the well went dry; therefore, no sample was collected.
		Gross beta		During sampling, the well went dry; therefore, no sample was collected.
		Iodine-131		During sampling, the well went dry; therefore, no sample was collected.
		Radium-226		During sampling, the well went dry; therefore, no sample was collected.
		Strontium-90		During sampling, the well went dry; therefore, no sample was collected.
		Technetium-99		During sampling, the well went dry; therefore, no sample was collected.
		Thorium-230		During sampling, the well went dry; therefore, no sample was collected.
		Tritium		During sampling, the well went dry; therefore, no sample was collected.
		Chemical Oxygen Demand		During sampling, the well went dry; therefore, no sample was collected.
		Cyanide		During sampling, the well went dry; therefore, no sample was collected.
		Iodide		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Carbon		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Halides		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4800 MW360	MW360UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.54. Rad error is 6.51.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.97. Rad error is 7.8.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.709. Rad error is 0.708.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.09. Rad error is 2.09.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 10.1. Rad error is 10.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.874. Rad error is 0.864.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 120. Rad error is 120.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4795 MW361	MW361UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.31. Rad error is 7.18.
		Gross beta		TPU is 9.15. Rad error is 7.88.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.76. Rad error is 0.755.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.2. Rad error is 2.2.
		Technetium-99		TPU is 9.36. Rad error is 7.66.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.814. Rad error is 0.813.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 110. Rad error is 109.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0986 MW362	MW362UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 8.52. Rad error is 8.45.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.73. Rad error is 6.7.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.67. Rad error is 0.665.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.76. Rad error is 2.73.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.63. Rad error is 6.63.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.606. Rad error is 0.605.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 106. Rad error is 106.

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4796 MW363	MW363UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.62. Rad error is 4.62.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.72. Rad error is 6.72.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.416. Rad error is 0.414.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.26. Rad error is 2.26.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.27. Rad error is 7.27.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.618. Rad error is 0.617.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 113. Rad error is 112.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4797 MW364	MW364UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.19. Rad error is 4.19.
		Gross beta		TPU is 9.77. Rad error is 8.21.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.586. Rad error is 0.586.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.25. Rad error is 3.25.
		Technetium-99		TPU is 9.7. Rad error is 7.39.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.77. Rad error is 0.767.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 94.8. Rad error is 94.8.

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Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0984 MW365	MW365UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.12. Rad error is 5.12.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.2. Rad error is 6.15.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.648. Rad error is 0.647.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.62. Rad error is 1.62.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 10.1. Rad error is 10.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.943. Rad error is 0.937.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 132. Rad error is 132.

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Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0982 MW366	MW366UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.79. Rad error is 4.79.
		Gross beta		TPU is 12.8. Rad error is 10.2.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.796. Rad error is 0.796.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.27. Rad error is 2.27.
		Technetium-99		TPU is 15.2. Rad error is 13.9.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.781. Rad error is 0.778.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 119. Rad error is 119.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4793 MW367	MW367UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.29. Rad error is 6.17.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.79. Rad error is 4.79.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.809. Rad error is 0.799.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.27. Rad error is 2.27.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 10.1. Rad error is 10.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.712. Rad error is 0.71.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 125. Rad error is 125.

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Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0983 MW368		Bromide		During sampling, the well went dry; therefore, no sample was collected.
		Chloride		During sampling, the well went dry; therefore, no sample was collected.
		Fluoride		During sampling, the well went dry; therefore, no sample was collected.
		Nitrate & Nitrite		During sampling, the well went dry; therefore, no sample was collected.
		Sulfate		During sampling, the well went dry; therefore, no sample was collected.
		Barometric Pressure Reading		During sampling, the well went dry; therefore, no sample was collected.
		Specific Conductance		During sampling, the well went dry; therefore, no sample was collected.
		Static Water Level Elevation		During sampling, the well went dry; therefore, no sample was collected.
		Dissolved Oxygen		During sampling, the well went dry; therefore, no sample was collected.
		Total Dissolved Solids		During sampling, the well went dry; therefore, no sample was collected.
		pH		During sampling, the well went dry; therefore, no sample was collected.
		Eh		During sampling, the well went dry; therefore, no sample was collected.
		Temperature		During sampling, the well went dry; therefore, no sample was collected.
		Aluminum		During sampling, the well went dry; therefore, no sample was collected.
		Antimony		During sampling, the well went dry; therefore, no sample was collected.
		Arsenic		During sampling, the well went dry; therefore, no sample was collected.
		Barium		During sampling, the well went dry; therefore, no sample was collected.
		Beryllium		During sampling, the well went dry; therefore, no sample was collected.
		Boron		During sampling, the well went dry; therefore, no sample was collected.
		Cadmium		During sampling, the well went dry; therefore, no sample was collected.
		Calcium		During sampling, the well went dry; therefore, no sample was collected.
	Chromium		During sampling, the well went dry; therefore, no sample was collected.	
	Cobalt		During sampling, the well went dry; therefore, no sample was collected.	
	Copper		During sampling, the well went dry; therefore, no sample was collected.	
	Iron		During sampling, the well went dry; therefore, no sample was collected.	
	Lead		During sampling, the well went dry; therefore, no sample was collected.	
	Magnesium		During sampling, the well went dry; therefore, no sample was collected.	
	Manganese		During sampling, the well went dry; therefore, no sample was collected.	
	Mercury		During sampling, the well went dry; therefore, no sample was collected.	

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0983	MW368	Molybdenum		During sampling, the well went dry; therefore, no sample was collected.
		Nickel		During sampling, the well went dry; therefore, no sample was collected.
		Potassium		During sampling, the well went dry; therefore, no sample was collected.
		Rhodium		During sampling, the well went dry; therefore, no sample was collected.
		Selenium		During sampling, the well went dry; therefore, no sample was collected.
		Silver		During sampling, the well went dry; therefore, no sample was collected.
		Sodium		During sampling, the well went dry; therefore, no sample was collected.
		Tantalum		During sampling, the well went dry; therefore, no sample was collected.
		Thallium		During sampling, the well went dry; therefore, no sample was collected.
		Uranium		During sampling, the well went dry; therefore, no sample was collected.
		Vanadium		During sampling, the well went dry; therefore, no sample was collected.
		Zinc		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl acetate		During sampling, the well went dry; therefore, no sample was collected.
		Acetone		During sampling, the well went dry; therefore, no sample was collected.
		Acrolein		During sampling, the well went dry; therefore, no sample was collected.
		Acrylonitrile		During sampling, the well went dry; therefore, no sample was collected.
		Benzene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		Xylenes		During sampling, the well went dry; therefore, no sample was collected.
		Styrene		During sampling, the well went dry; therefore, no sample was collected.
		Toluene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Bromodichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Tribromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl bromide		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Ethyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,4-Dichloro-2-butene		During sampling, the well went dry; therefore, no sample was collected.
		Carbon disulfide		During sampling, the well went dry; therefore, no sample was collected.
		Chloroethane		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0983 MW368		Chloroform		During sampling, the well went dry; therefore, no sample was collected.
		Methyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		cis-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Methylene bromide		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethylene		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromoethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		Tetrachloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Trichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Ethylbenzene		During sampling, the well went dry; therefore, no sample was collected.
		2-Hexanone		During sampling, the well went dry; therefore, no sample was collected.
		Iodomethane		During sampling, the well went dry; therefore, no sample was collected.
		Dibromochloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Carbon tetrachloride		During sampling, the well went dry; therefore, no sample was collected.
		Dichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Isobutyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromo-3-chloropropane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloropropane		During sampling, the well went dry; therefore, no sample was collected.
trans-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.		
cis-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.		
trans-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.		
Trichlorofluoromethane		During sampling, the well went dry; therefore, no sample was collected.		
1,2,3-Trichloropropane		During sampling, the well went dry; therefore, no sample was collected.		

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0983	MW368	1,2-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		1,4-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		PCB, Total		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1016		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1221		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1232		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1242		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1248		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1254		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1260		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1268		During sampling, the well went dry; therefore, no sample was collected.
		Gross alpha		During sampling, the well went dry; therefore, no sample was collected.
		Gross beta		During sampling, the well went dry; therefore, no sample was collected.
		Iodine-131		During sampling, the well went dry; therefore, no sample was collected.
		Radium-226		During sampling, the well went dry; therefore, no sample was collected.
		Strontium-90		During sampling, the well went dry; therefore, no sample was collected.
		Technetium-99		During sampling, the well went dry; therefore, no sample was collected.
		Thorium-230		During sampling, the well went dry; therefore, no sample was collected.
		Tritium		During sampling, the well went dry; therefore, no sample was collected.
		Chemical Oxygen Demand		During sampling, the well went dry; therefore, no sample was collected.
		Cyanide		During sampling, the well went dry; therefore, no sample was collected.
		Iodide		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Carbon		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Halides		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4820 MW369	MW369UG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.47. Rad error is 5.47.
		Gross beta		TPU is 8.56. Rad error is 7.68.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.702. Rad error is 0.693.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.35. Rad error is 2.33.
		Technetium-99		TPU is 13.9. Rad error is 12.5.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.48. Rad error is 1.45.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 131. Rad error is 130.
		8004-4818 MW370	MW370UG1-19	Chloride
Sulfate	W			Post-digestion spike recovery out of control limits.
Boron	N			Sample spike (MS/MSD) recovery not within control limits
Chlorobenzene	Y2			MS/MSD RPD outside acceptance criteria
Xylenes	Y2			MS/MSD RPD outside acceptance criteria
Styrene	Y2			MS/MSD RPD outside acceptance criteria
Tetrachloroethene	Y2			MS/MSD RPD outside acceptance criteria
Ethylbenzene	Y2			MS/MSD RPD outside acceptance criteria
1,2-Dichlorobenzene	Y2			MS/MSD RPD outside acceptance criteria
1,4-Dichlorobenzene	Y2			MS/MSD RPD outside acceptance criteria
Gross alpha	U			Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.64. Rad error is 6.53.
Gross beta				TPU is 18.2. Rad error is 12.5.
Iodine-131				Analysis of constituent not required and not performed.
Radium-226	U			Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.593. Rad error is 0.589.
Strontium-90	U			Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.76. Rad error is 1.76.
Technetium-99				TPU is 18.9. Rad error is 14.1.
Thorium-230	U			Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.6. Rad error is 1.57.
Tritium	U			Indicates analyte/nuclide was analyzed for, but not detected. TPU is 129. Rad error is 129.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4819 MW371	MW371UG1-19	Beryllium	LN	LCS or LCSD recovery outside of control limits and Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.41. Rad error is 6.34.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.9. Rad error is 4.9.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 4.3. Rad error is 0.449.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.73. Rad error is 1.73.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.5. Rad error is 12.5.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.909. Rad error is 0.902.
Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 132. Rad error is 131.		
8004-4808 MW372	MW372UG1-19	Beryllium	LN	LCS or LCSD recovery outside of control limits and Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.37. Rad error is 4.37.
		Gross beta		TPU is 24.1. Rad error is 13.9.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.83. Rad error is 0.432.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.14. Rad error is 4.13.
		Technetium-99		TPU is 23.8. Rad error is 16.2.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.65. Rad error is 1.63.
Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 127. Rad error is 127.		

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Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4792 MW373	MW373UG1-19	Beryllium	LN	LCS or LCSD recovery outside of control limits and Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.65. Rad error is 5.63.
		Gross beta		TPU is 9.81. Rad error is 9.08.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.41. Rad error is 0.437.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.71. Rad error is 1.71.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 13.5. Rad error is 13.3.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.719. Rad error is 0.716.
Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 134. Rad error is 133.		
8004-0990 MW374	MW374UG1-19	Beryllium	LN	LCS or LCSD recovery outside of control limits and Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.03. Rad error is 4.03.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.31. Rad error is 6.31.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 4.75. Rad error is 0.463.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.62. Rad error is 3.62.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.1. Rad error is 12.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.854. Rad error is 0.853.
Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 134. Rad error is 133.		

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0985 MW375	MW375UG1-19	Beryllium	LN	LCS or LCSD recovery outside of control limits and Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.36. Rad error is 6.34.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.33. Rad error is 4.33.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 8.63. Rad error is 0.617.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.16. Rad error is 2.16.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.3. Rad error is 11.3.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.543. Rad error is 0.542.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 137. Rad error is 136.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0988	MW376	Bromide		During sampling, the well went dry; therefore, no sample was collected.
		Chloride		During sampling, the well went dry; therefore, no sample was collected.
		Fluoride		During sampling, the well went dry; therefore, no sample was collected.
		Nitrate & Nitrite		During sampling, the well went dry; therefore, no sample was collected.
		Sulfate		During sampling, the well went dry; therefore, no sample was collected.
		Barometric Pressure Reading		During sampling, the well went dry; therefore, no sample was collected.
		Specific Conductance		During sampling, the well went dry; therefore, no sample was collected.
		Static Water Level Elevation		During sampling, the well went dry; therefore, no sample was collected.
		Dissolved Oxygen		During sampling, the well went dry; therefore, no sample was collected.
		Total Dissolved Solids		During sampling, the well went dry; therefore, no sample was collected.
		pH		During sampling, the well went dry; therefore, no sample was collected.
		Eh		During sampling, the well went dry; therefore, no sample was collected.
		Temperature		During sampling, the well went dry; therefore, no sample was collected.
		Aluminum		During sampling, the well went dry; therefore, no sample was collected.
		Antimony		During sampling, the well went dry; therefore, no sample was collected.
		Arsenic		During sampling, the well went dry; therefore, no sample was collected.
		Barium		During sampling, the well went dry; therefore, no sample was collected.
		Beryllium		During sampling, the well went dry; therefore, no sample was collected.
		Boron		During sampling, the well went dry; therefore, no sample was collected.
		Cadmium		During sampling, the well went dry; therefore, no sample was collected.
		Calcium		During sampling, the well went dry; therefore, no sample was collected.
		Chromium		During sampling, the well went dry; therefore, no sample was collected.
		Cobalt		During sampling, the well went dry; therefore, no sample was collected.
		Copper		During sampling, the well went dry; therefore, no sample was collected.
		Iron		During sampling, the well went dry; therefore, no sample was collected.
		Lead		During sampling, the well went dry; therefore, no sample was collected.
		Magnesium		During sampling, the well went dry; therefore, no sample was collected.
		Manganese		During sampling, the well went dry; therefore, no sample was collected.
		Mercury		During sampling, the well went dry; therefore, no sample was collected.

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Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

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LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0988	MW376	Molybdenum		During sampling, the well went dry; therefore, no sample was collected.
		Nickel		During sampling, the well went dry; therefore, no sample was collected.
		Potassium		During sampling, the well went dry; therefore, no sample was collected.
		Rhodium		During sampling, the well went dry; therefore, no sample was collected.
		Selenium		During sampling, the well went dry; therefore, no sample was collected.
		Silver		During sampling, the well went dry; therefore, no sample was collected.
		Sodium		During sampling, the well went dry; therefore, no sample was collected.
		Tantalum		During sampling, the well went dry; therefore, no sample was collected.
		Thallium		During sampling, the well went dry; therefore, no sample was collected.
		Uranium		During sampling, the well went dry; therefore, no sample was collected.
		Vanadium		During sampling, the well went dry; therefore, no sample was collected.
		Zinc		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl acetate		During sampling, the well went dry; therefore, no sample was collected.
		Acetone		During sampling, the well went dry; therefore, no sample was collected.
		Acrolein		During sampling, the well went dry; therefore, no sample was collected.
		Acrylonitrile		During sampling, the well went dry; therefore, no sample was collected.
		Benzene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		Xylenes		During sampling, the well went dry; therefore, no sample was collected.
		Styrene		During sampling, the well went dry; therefore, no sample was collected.
		Toluene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Bromodichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Tribromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl bromide		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Ethyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,4-Dichloro-2-butene		During sampling, the well went dry; therefore, no sample was collected.
		Carbon disulfide		During sampling, the well went dry; therefore, no sample was collected.
		Chloroethane		During sampling, the well went dry; therefore, no sample was collected.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0988 MW376		Chloroform		During sampling, the well went dry; therefore, no sample was collected.
		Methyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		cis-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Methylene bromide		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethylene		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromoethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		Tetrachloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Trichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Ethylbenzene		During sampling, the well went dry; therefore, no sample was collected.
		2-Hexanone		During sampling, the well went dry; therefore, no sample was collected.
		Iodomethane		During sampling, the well went dry; therefore, no sample was collected.
		Dibromochloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Carbon tetrachloride		During sampling, the well went dry; therefore, no sample was collected.
		Dichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Isobutyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromo-3-chloropropane		During sampling, the well went dry; therefore, no sample was collected.
	1,2-Dichloropropane		During sampling, the well went dry; therefore, no sample was collected.	
	trans-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.	
	cis-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.	
	trans-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.	
	Trichlorofluoromethane		During sampling, the well went dry; therefore, no sample was collected.	
	1,2,3-Trichloropropane		During sampling, the well went dry; therefore, no sample was collected.	

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Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0988	MW376	1,2-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		1,4-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		PCB, Total		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1016		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1221		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1232		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1242		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1248		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1254		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1260		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1268		During sampling, the well went dry; therefore, no sample was collected.
		Gross alpha		During sampling, the well went dry; therefore, no sample was collected.
		Gross beta		During sampling, the well went dry; therefore, no sample was collected.
		Iodine-131		During sampling, the well went dry; therefore, no sample was collected.
		Radium-226		During sampling, the well went dry; therefore, no sample was collected.
		Strontium-90		During sampling, the well went dry; therefore, no sample was collected.
		Technetium-99		During sampling, the well went dry; therefore, no sample was collected.
		Thorium-230		During sampling, the well went dry; therefore, no sample was collected.
		Tritium		During sampling, the well went dry; therefore, no sample was collected.
		Chemical Oxygen Demand		During sampling, the well went dry; therefore, no sample was collected.
		Cyanide		During sampling, the well went dry; therefore, no sample was collected.
		Iodide		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Carbon		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Halides		During sampling, the well went dry; therefore, no sample was collected.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0989	MW377	Bromide		During sampling, the well went dry; therefore, no sample was collected.
		Chloride		During sampling, the well went dry; therefore, no sample was collected.
		Fluoride		During sampling, the well went dry; therefore, no sample was collected.
		Nitrate & Nitrite		During sampling, the well went dry; therefore, no sample was collected.
		Sulfate		During sampling, the well went dry; therefore, no sample was collected.
		Barometric Pressure Reading		During sampling, the well went dry; therefore, no sample was collected.
		Specific Conductance		During sampling, the well went dry; therefore, no sample was collected.
		Static Water Level Elevation		During sampling, the well went dry; therefore, no sample was collected.
		Dissolved Oxygen		During sampling, the well went dry; therefore, no sample was collected.
		Total Dissolved Solids		During sampling, the well went dry; therefore, no sample was collected.
		pH		During sampling, the well went dry; therefore, no sample was collected.
		Eh		During sampling, the well went dry; therefore, no sample was collected.
		Temperature		During sampling, the well went dry; therefore, no sample was collected.
		Aluminum		During sampling, the well went dry; therefore, no sample was collected.
		Antimony		During sampling, the well went dry; therefore, no sample was collected.
		Arsenic		During sampling, the well went dry; therefore, no sample was collected.
		Barium		During sampling, the well went dry; therefore, no sample was collected.
		Beryllium		During sampling, the well went dry; therefore, no sample was collected.
		Boron		During sampling, the well went dry; therefore, no sample was collected.
		Cadmium		During sampling, the well went dry; therefore, no sample was collected.
		Calcium		During sampling, the well went dry; therefore, no sample was collected.
		Chromium		During sampling, the well went dry; therefore, no sample was collected.
		Cobalt		During sampling, the well went dry; therefore, no sample was collected.
		Copper		During sampling, the well went dry; therefore, no sample was collected.
		Iron		During sampling, the well went dry; therefore, no sample was collected.
		Lead		During sampling, the well went dry; therefore, no sample was collected.
		Magnesium		During sampling, the well went dry; therefore, no sample was collected.
		Manganese		During sampling, the well went dry; therefore, no sample was collected.
		Mercury		During sampling, the well went dry; therefore, no sample was collected.

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Permit Numbers: SW07300014, SW07300015, SW07300045

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0989	MW377	Molybdenum		During sampling, the well went dry; therefore, no sample was collected.
		Nickel		During sampling, the well went dry; therefore, no sample was collected.
		Potassium		During sampling, the well went dry; therefore, no sample was collected.
		Rhodium		During sampling, the well went dry; therefore, no sample was collected.
		Selenium		During sampling, the well went dry; therefore, no sample was collected.
		Silver		During sampling, the well went dry; therefore, no sample was collected.
		Sodium		During sampling, the well went dry; therefore, no sample was collected.
		Tantalum		During sampling, the well went dry; therefore, no sample was collected.
		Thallium		During sampling, the well went dry; therefore, no sample was collected.
		Uranium		During sampling, the well went dry; therefore, no sample was collected.
		Vanadium		During sampling, the well went dry; therefore, no sample was collected.
		Zinc		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl acetate		During sampling, the well went dry; therefore, no sample was collected.
		Acetone		During sampling, the well went dry; therefore, no sample was collected.
		Acrolein		During sampling, the well went dry; therefore, no sample was collected.
		Acrylonitrile		During sampling, the well went dry; therefore, no sample was collected.
		Benzene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		Xylenes		During sampling, the well went dry; therefore, no sample was collected.
		Styrene		During sampling, the well went dry; therefore, no sample was collected.
		Toluene		During sampling, the well went dry; therefore, no sample was collected.
		Chlorobromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Bromodichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Tribromomethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl bromide		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Ethyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,4-Dichloro-2-butene		During sampling, the well went dry; therefore, no sample was collected.
		Carbon disulfide		During sampling, the well went dry; therefore, no sample was collected.
		Chloroethane		During sampling, the well went dry; therefore, no sample was collected.

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LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0989	MW377	Chloroform		During sampling, the well went dry; therefore, no sample was collected.
		Methyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		cis-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Methylene bromide		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1-Dichloroethylene		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromoethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,2-Trichloroethane		During sampling, the well went dry; therefore, no sample was collected.
		1,1,1,2-Tetrachloroethane		During sampling, the well went dry; therefore, no sample was collected.
		Vinyl chloride		During sampling, the well went dry; therefore, no sample was collected.
		Tetrachloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Trichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Ethylbenzene		During sampling, the well went dry; therefore, no sample was collected.
		2-Hexanone		During sampling, the well went dry; therefore, no sample was collected.
		Iodomethane		During sampling, the well went dry; therefore, no sample was collected.
		Dibromochloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Carbon tetrachloride		During sampling, the well went dry; therefore, no sample was collected.
		Dichloromethane		During sampling, the well went dry; therefore, no sample was collected.
		Methyl Isobutyl Ketone		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dibromo-3-chloropropane		During sampling, the well went dry; therefore, no sample was collected.
		1,2-Dichloropropane		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.
		cis-1,3-Dichloropropene		During sampling, the well went dry; therefore, no sample was collected.
		trans-1,2-Dichloroethene		During sampling, the well went dry; therefore, no sample was collected.
		Trichlorofluoromethane		During sampling, the well went dry; therefore, no sample was collected.
		1,2,3-Trichloropropane		During sampling, the well went dry; therefore, no sample was collected.

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Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0989	MW377	1,2-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		1,4-Dichlorobenzene		During sampling, the well went dry; therefore, no sample was collected.
		PCB, Total		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1016		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1221		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1232		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1242		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1248		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1254		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1260		During sampling, the well went dry; therefore, no sample was collected.
		PCB-1268		During sampling, the well went dry; therefore, no sample was collected.
		Gross alpha		During sampling, the well went dry; therefore, no sample was collected.
		Gross beta		During sampling, the well went dry; therefore, no sample was collected.
		Iodine-131		During sampling, the well went dry; therefore, no sample was collected.
		Radium-226		During sampling, the well went dry; therefore, no sample was collected.
		Strontium-90		During sampling, the well went dry; therefore, no sample was collected.
		Technetium-99		During sampling, the well went dry; therefore, no sample was collected.
		Thorium-230		During sampling, the well went dry; therefore, no sample was collected.
		Tritium		During sampling, the well went dry; therefore, no sample was collected.
		Chemical Oxygen Demand		During sampling, the well went dry; therefore, no sample was collected.
		Cyanide		During sampling, the well went dry; therefore, no sample was collected.
		Iodide		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Carbon		During sampling, the well went dry; therefore, no sample was collected.
		Total Organic Halides		During sampling, the well went dry; therefore, no sample was collected.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description	
0000-0000 QC	RI1UG1-19	Bromide		Analysis of constituent not required and not performed.	
		Chloride		Analysis of constituent not required and not performed.	
		Fluoride		Analysis of constituent not required and not performed.	
		Nitrate & Nitrite		Analysis of constituent not required and not performed.	
		Sulfate		Analysis of constituent not required and not performed.	
		Barometric Pressure Reading		Analysis of constituent not required and not performed.	
		Specific Conductance		Analysis of constituent not required and not performed.	
		Static Water Level Elevation		Analysis of constituent not required and not performed.	
		Dissolved Oxygen		Analysis of constituent not required and not performed.	
		Total Dissolved Solids		Analysis of constituent not required and not performed.	
		pH		Analysis of constituent not required and not performed.	
		Eh		Analysis of constituent not required and not performed.	
		Temperature		Analysis of constituent not required and not performed.	
		Boron	N		Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2		MS/MSD RPD outside acceptance criteria
		Xylenes	Y2		MS/MSD RPD outside acceptance criteria
		Styrene	Y2		MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2		MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2		MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2		MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2		MS/MSD RPD outside acceptance criteria
		Gross alpha	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.28. Rad error is 2.28.
		Gross beta	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.79. Rad error is 4.79.
		Iodine-131			Analysis of constituent not required and not performed.
		Radium-226	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.292. Rad error is 0.288.
		Strontium-90	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.76. Rad error is 1.76.
		Technetium-99	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 10.2. Rad error is 10.2.
		Thorium-230	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.06. Rad error is 1.05.
		Tritium	U		Indicates analyte/nuclide was analyzed for, but not detected. TPU is 146. Rad error is 145.
		Chemical Oxygen Demand			Analysis of constituent not required and not performed.
		Cyanide			Analysis of constituent not required and not performed.
		Total Organic Carbon			Analysis of constituent not required and not performed.
Total Organic Halides			Analysis of constituent not required and not performed.		

RESIDENTIAL/CONTAINED – QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	FB1UG1-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.07. Rad error is 4.07.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.94. Rad error is 3.94.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.699. Rad error is 0.687.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.64. Rad error is 1.64.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 9.92. Rad error is 9.92.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.564. Rad error is 0.563.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 131. Rad error is 130.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
Total Organic Halides		Analysis of constituent not required and not performed.		

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB1UG1-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Aluminum		Analysis of constituent not required and not performed.
		Antimony		Analysis of constituent not required and not performed.
		Arsenic		Analysis of constituent not required and not performed.
		Barium		Analysis of constituent not required and not performed.
		Beryllium		Analysis of constituent not required and not performed.
		Boron		Analysis of constituent not required and not performed.
		Cadmium		Analysis of constituent not required and not performed.
		Calcium		Analysis of constituent not required and not performed.
		Chromium		Analysis of constituent not required and not performed.
		Cobalt		Analysis of constituent not required and not performed.
		Copper		Analysis of constituent not required and not performed.
		Iron		Analysis of constituent not required and not performed.
		Lead		Analysis of constituent not required and not performed.
		Magnesium		Analysis of constituent not required and not performed.
		Manganese		Analysis of constituent not required and not performed.
		Mercury		Analysis of constituent not required and not performed.
		Molybdenum		Analysis of constituent not required and not performed.
		Nickel		Analysis of constituent not required and not performed.
		Potassium		Analysis of constituent not required and not performed.
		Rhodium		Analysis of constituent not required and not performed.
		Selenium		Analysis of constituent not required and not performed.
		Silver		Analysis of constituent not required and not performed.
		Sodium		Analysis of constituent not required and not performed.
		Tantalum		Analysis of constituent not required and not performed.
		Thallium		Analysis of constituent not required and not performed.
		Uranium		Analysis of constituent not required and not performed.
		Vanadium		Analysis of constituent not required and not performed.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB1UG1-19	Zinc		Analysis of constituent not required and not performed.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y1Y2	MS/MSD recovery outside acceptance criteria and MS/MSD RPD outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha		Analysis of constituent not required and not performed.
		Gross beta		Analysis of constituent not required and not performed.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		Analysis of constituent not required and not performed.
		Strontium-90		Analysis of constituent not required and not performed.
		Technetium-99		Analysis of constituent not required and not performed.
		Thorium-230		Analysis of constituent not required and not performed.
		Tritium		Analysis of constituent not required and not performed.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Iodide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
		Total Organic Halides		Analysis of constituent not required and not performed.

RESIDENTIAL/CONTAINED – QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB2UG1-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Aluminum		Analysis of constituent not required and not performed.
		Antimony		Analysis of constituent not required and not performed.
		Arsenic		Analysis of constituent not required and not performed.
		Barium		Analysis of constituent not required and not performed.
		Beryllium		Analysis of constituent not required and not performed.
		Boron		Analysis of constituent not required and not performed.
		Cadmium		Analysis of constituent not required and not performed.
		Calcium		Analysis of constituent not required and not performed.
		Chromium		Analysis of constituent not required and not performed.
		Cobalt		Analysis of constituent not required and not performed.
		Copper		Analysis of constituent not required and not performed.
		Iron		Analysis of constituent not required and not performed.
		Lead		Analysis of constituent not required and not performed.
		Magnesium		Analysis of constituent not required and not performed.
		Manganese		Analysis of constituent not required and not performed.
		Mercury		Analysis of constituent not required and not performed.
		Molybdenum		Analysis of constituent not required and not performed.
Nickel		Analysis of constituent not required and not performed.		
Potassium		Analysis of constituent not required and not performed.		
Rhodium		Analysis of constituent not required and not performed.		
Selenium		Analysis of constituent not required and not performed.		
Silver		Analysis of constituent not required and not performed.		
Sodium		Analysis of constituent not required and not performed.		
Tantalum		Analysis of constituent not required and not performed.		
Thallium		Analysis of constituent not required and not performed.		
Uranium		Analysis of constituent not required and not performed.		
Vanadium		Analysis of constituent not required and not performed.		

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB2UG1-19	Zinc		Analysis of constituent not required and not performed.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha		Analysis of constituent not required and not performed.
		Gross beta		Analysis of constituent not required and not performed.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		Analysis of constituent not required and not performed.
		Strontium-90		Analysis of constituent not required and not performed.
		Technetium-99		Analysis of constituent not required and not performed.
		Thorium-230		Analysis of constituent not required and not performed.
		Tritium		Analysis of constituent not required and not performed.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Iodide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
		Total Organic Halides		Analysis of constituent not required and not performed.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB3UG1-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Aluminum		Analysis of constituent not required and not performed.
		Antimony		Analysis of constituent not required and not performed.
		Arsenic		Analysis of constituent not required and not performed.
		Barium		Analysis of constituent not required and not performed.
		Beryllium		Analysis of constituent not required and not performed.
		Boron		Analysis of constituent not required and not performed.
		Cadmium		Analysis of constituent not required and not performed.
		Calcium		Analysis of constituent not required and not performed.
		Chromium		Analysis of constituent not required and not performed.
		Cobalt		Analysis of constituent not required and not performed.
		Copper		Analysis of constituent not required and not performed.
		Iron		Analysis of constituent not required and not performed.
		Lead		Analysis of constituent not required and not performed.
		Magnesium		Analysis of constituent not required and not performed.
		Manganese		Analysis of constituent not required and not performed.
		Mercury		Analysis of constituent not required and not performed.
		Molybdenum		Analysis of constituent not required and not performed.
		Nickel		Analysis of constituent not required and not performed.
		Potassium		Analysis of constituent not required and not performed.
		Rhodium		Analysis of constituent not required and not performed.
		Selenium		Analysis of constituent not required and not performed.
		Silver		Analysis of constituent not required and not performed.
		Sodium		Analysis of constituent not required and not performed.
		Tantalum		Analysis of constituent not required and not performed.
		Thallium		Analysis of constituent not required and not performed.
		Uranium		Analysis of constituent not required and not performed.
		Vanadium		Analysis of constituent not required and not performed.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB3UG1-19	Zinc		Analysis of constituent not required and not performed.
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha		Analysis of constituent not required and not performed.
		Gross beta		Analysis of constituent not required and not performed.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		Analysis of constituent not required and not performed.
		Strontium-90		Analysis of constituent not required and not performed.
		Technetium-99		Analysis of constituent not required and not performed.
		Thorium-230		Analysis of constituent not required and not performed.
		Tritium		Analysis of constituent not required and not performed.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Iodide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
		Total Organic Halides		Analysis of constituent not required and not performed.

RESIDENTIAL/CONTAINED – QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Numbers: SW07300014, SW07300015, SW07300045

Finds/Unit: KY8-890-008-982 / 1

LAB ID: None

For Official Use Only

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4793 MW367	MW367DUG1-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Sulfate	W	Post-digestion spike recovery out of control limits.
		Boron	N	Sample spike (MS/MSD) recovery not within control limits
		Chlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Xylenes	Y2	MS/MSD RPD outside acceptance criteria
		Styrene	Y2	MS/MSD RPD outside acceptance criteria
		Tetrachloroethene	Y2	MS/MSD RPD outside acceptance criteria
		Ethylbenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,2-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		1,4-Dichlorobenzene	Y2	MS/MSD RPD outside acceptance criteria
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.27. Rad error is 5.26.
		Gross beta		TPU is 5.84. Rad error is 5.62.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.01. Rad error is 0.997.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.66. Rad error is 1.66.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 10.6. Rad error is 10.6.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.84. Rad error is 0.836.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 130. Rad error is 130.

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**APPENDIX D**  
**STATISTICAL ANALYSES AND**  
**QUALIFICATION STATEMENT**

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# GROUNDWATER STATISTICAL COMMENTS

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## Introduction

The statistical analyses conducted on the fourth quarter 2018 groundwater data collected from the C-746-U Landfill monitoring wells (MWs) were performed in accordance with Permit GSTR0001, Standard Requirement 3, using the U.S. Environmental Protection Agency (EPA) guidance document, *EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance* (1989).

The statistical evaluation was conducted separately for the three groundwater systems: the Upper Continental Recharge System (UCRS), the Upper Regional Gravel Aquifer (URGA), and the Lower Regional Gravel Aquifer (LRGA). For each groundwater system, data from wells considered to represent background conditions were compared with test wells (downgradient or sidegradient wells) (Exhibit D.1). The fourth quarter 2018 data used to conduct the statistical analyses were collected in October 2018. The statistical analyses for this report first used data from the first eight quarters that had been sampled for each parameter to develop the historical background value, beginning with the first two baseline sampling events in 2002, when available. Then a second set of statistical analyses was run on analytes that had at least one downgradient well that had exceeded the historical background (using the last eight quarters). The sampling dates associated with both the historical and the current background data are listed next to the result in the statistical analysis sheets of this appendix.

## Statistical Analysis Process

Constituents of concern that have Kentucky maximum contaminant levels (MCLs) and results that do not exceed their respective MCL are not included in the statistical evaluation. Parameters that have MCLs can be found in 401 *KAR* 47:030 § 6. For parameters with no established MCL and those parameters that exceed their MCLs, the most recent results are compared to historical background concentrations, as follows: the data are divided into censored and uncensored observations. The one-sided tolerance interval statistical test is conducted only on parameters that have at least one uncensored (detected) observation. The current result is compared to the results of the one-sided tolerance interval statistical test to determine if the current data exceed the historical background concentration calculated using the first eight quarters of data.

For the statistical analysis of pH, a two-sided tolerance interval statistical test is conducted. The test well results are compared to both an upper and lower tolerance limit (TL) to determine if statistically significant deviations in concentrations exist with respect to upgradient (background) well data from the first eight quarters. The tolerance interval statistical analysis is conducted separately for each parameter in each well (no pooling of downgradient data).

Statistical analyses are performed on the first eight quarters of historical background data, not on the data for the current quarter. Once a statistical result is obtained using the background data, the result for the current quarter is compared to that value. If the value is exceeded, the well is considered to have an exceedance of the statistically derived historical background concentration.

**Exhibit D.1. Station Identification for Monitoring  
Wells Analyzed**

<b>Station</b>	<b>Type</b>	<b>Groundwater Unit</b>
MW357	TW	URGA
MW358	TW	LRGA
MW359 <sup>a*</sup>	TW	UCRS
MW360	TW	URGA
MW361	TW	LRGA
MW362 <sup>a</sup>	TW	UCRS
MW363	TW	URGA
MW364	TW	LRGA
MW365 <sup>a</sup>	TW	UCRS
MW366	TW	URGA
MW367	TW	LRGA
MW368 <sup>a*</sup>	TW	UCRS
MW369	BG	URGA
MW370	BG	LRGA
MW371 <sup>a</sup>	BG	UCRS
MW372	BG	URGA
MW373	BG	LRGA
MW374 <sup>a</sup>	BG	UCRS
MW375 <sup>a</sup>	SG	UCRS
MW376 <sup>a*</sup>	SG	UCRS
MW377 <sup>a*</sup>	SG	UCRS

<sup>a</sup> **NOTE:** The gradients in UCRS wells are downward and, hydrogeologically, UCRS wells are not considered upgradient, downgradient, or sidegradient from the C-746-U Landfill. The UCRS wells identified as upgradient, sidegradient, or downgradient are those wells located in the same general direction as the RGA wells considered to be upgradient, sidegradient, or downgradient.

**BG:** upgradient or background wells

**TW:** downgradient or test wells

**SG:** sidegradient wells

\*Well was dry this quarter, and a groundwater sample could not be collected

For those parameters that are determined to exceed the historical background concentration, a second one-sided tolerance interval statistical test, or a two-sided tolerance interval statistical test in the case of pH, is conducted. The second one-sided tolerance interval statistical test is conducted to determine whether the current concentration in downgradient wells exceeds the current background, as determined by a comparison against the statistically derived upper TL using the most recent eight quarters of data for the relevant background wells. For the statistical analysis of pH, a two-sided tolerance interval statistical test is conducted, if required. The test well pH results are compared to both an upper and lower TL to determine if the current pH is different from the current background level to a statistically significant level. The tolerance interval statistical analysis is conducted separately for each parameter in each well (no pooling of downgradient data).

Statistical analyses are performed on the last eight quarters of current background data, not on the data for the current quarter. Once a statistical result is obtained using the background data, the result for the current quarter is compared to that value. If the value is exceeded, the well has an exceedance of the statistically derived current background concentration.

A stepwise list of the one-sided tolerance interval statistical procedure applied to the data is summarized below.<sup>1</sup>

1. The TL is calculated for the background data (first using the first eight quarters, then using the last eight quarters, if required).
  - For each parameter, the background data are used to establish a baseline. On this data set, the mean (X) and the standard deviation (S) are computed.
  - The data set is checked for normality using coefficient of variation (CV). If  $CV \leq 1.0$ , then the data are assumed to be normally distributed. Data sets with  $CV > 1.0$  are assumed to be log-normally distributed; for data sets with  $CV > 1.0$ , the data are log-transformed and analyzed.
  - The factor (K) for one-sided upper TL with 95% minimum coverage is determined (Table 5, Appendix B, *EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance*, 1989) based on the number of background data points.
  - The one-sided upper TL is calculated using the following equation:  
$$TL = X + (K \times S)$$
2. Each observation from downgradient wells is compared to the calculated one-sided upper TL in Step 1. If an observation value exceeds the TL, then there is statistically significant evidence that the well concentration exceeds the historical background.

### Type of Data Used

Exhibit D.1 presents the upgradient or background wells (identified as “BG”), the downgradient or test wells (identified as “TW”), and the sidegradient wells (identified as “SG”) for the C-746-U Contained Landfill. Exhibit D.2 presents the parameters from the available data set for which a statistical test was performed using the one-sided tolerance interval.

Exhibits D.3, D.4, and D.5 list the number of analyses (observations), nondetects (censored observations), and detects (uncensored observations), by parameter in the UCRS, the URGA, and the LRGA, respectively. Those parameters displayed with bold-face type indicate the one-sided tolerance interval statistical test was performed. The data presented in Exhibits D.3, D.4, and D.5 were collected during the current quarter, fourth quarter 2018. The observations are representative of the current quarter data. Background data are presented in Attachments D1 and D2. The sampling dates associated with background data are listed next to the result in Attachments D1 and D2. When field duplicate data are available, the higher of the two readings is retained for further evaluation. When a data point has been rejected following data validation, this result is not used, and the next available data point is used for the background or current quarter data.

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<sup>1</sup> For pH, two-sided TLs (upper and lower) were calculated with an adjusted K factor using the following equations:

$$\begin{aligned} \text{upper TL} &= X + (K \times S) \\ \text{lower TL} &= X - (K \times S) \end{aligned}$$

**Exhibit D.2. List of Parameters Tested Using the One-Sided Upper Tolerance Level Test with Historical Background**

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<b>Parameters</b>
Acetone
Aluminum
Beta Activity
Boron
Bromide
Calcium
Chemical Oxygen Demand (COD)
Chloride
Cobalt
Conductivity
Copper
Dissolved Oxygen
Dissolved Solids
Iodide
Iron
Magnesium
Manganese
Molybdenum
Nickel
Oxidation-Reduction Potential
PCB, Total
PCB-1242
pH*
Potassium
Radium-226
Sodium
Sulfate
Technetium-99
Total Organic Carbon (TOC)
Total Organic Halides (TOX)
Trichloroethene
Vanadium
Zinc

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\*For pH, the test well results were compared to both an upper and lower TL to determine if the current result differs to a statistically significant degree from the historical background values.

**Exhibit D.3. Summary of Censored, and Uncensored Data—UCRS**

<b>Parameters</b>	<b>Observations</b>	<b>Censored Observation</b>	<b>Uncensored Observation</b>	<b>Statistical Analysis?</b>
1,1,1,2-Tetrachloroethane	5	5	0	No
1,1,2,2-Tetrachloroethane	5	5	0	No
1,1,2-Trichloroethane	5	5	0	No
1,1-Dichloroethane	5	5	0	No
1,2,3-Trichloropropane	5	5	0	No
1,2-Dibromo-3-chloropropane	5	5	0	No
1,2-Dibromoethane	5	5	0	No
1,2-Dichlorobenzene	5	5	0	No
1,2-Dichloropropane	5	5	0	No
2-Butanone	5	5	0	No
2-Hexanone	5	5	0	No
4-Methyl-2-pentanone	5	5	0	No
Acetone	5	5	0	No
Acrolein	5	5	0	No
Acrylonitrile	5	5	0	No
<b>Aluminum</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>Yes</b>
Antimony	5	5	0	No
Beryllium	5	5	0	No
<b>Boron</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Bromide</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>Yes</b>
Bromochloromethane	5	5	0	No
Bromodichloromethane	5	5	0	No
Bromoform	5	5	0	No
Bromomethane	5	5	0	No
<b>Calcium</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
Carbon disulfide	5	5	0	No
<b>Chemical Oxygen Demand (COD)</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>Yes</b>
<b>Chloride</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
Chlorobenzene	5	5	0	No
Chloroethane	5	5	0	No
Chloroform	5	5	0	No
Chloromethane	5	5	0	No
cis-1,2-Dichloroethene	5	5	0	No
cis-1,3-Dichloropropene	5	5	0	No
<b>Cobalt</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>Yes</b>
<b>Conductivity</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Copper</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>Yes</b>
Cyanide	5	5	0	No
Dibromochloromethane	5	5	0	No
Dibromomethane	5	5	0	No
Dimethylbenzene, Total	5	5	0	No
<b>Dissolved Oxygen</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Dissolved Solids</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
Ethylbenzene	5	5	0	No
<b>Iodide</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>Yes</b>
Iodomethane	5	5	0	No
<b>Iron</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>Yes</b>
<b>Magnesium</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Manganese</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
Methylene chloride	5	5	0	No
<b>Molybdenum</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>Yes</b>

Exhibit D.3. Summary of Censored, and Uncensored Data—UCRS (Continued)

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
<b>Nickel</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>Yes</b>
<b>Oxidation-Reduction Potential</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>PCB, Total</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>Yes</b>
PCB-1016	5	5	0	No
PCB-1221	5	5	0	No
PCB-1232	5	5	0	No
<b>PCB-1242</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>Yes</b>
PCB-1248	5	5	0	No
PCB-1254	5	5	0	No
PCB-1260	5	5	0	No
PCB-1268	5	5	0	No
<b>pH</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Potassium</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Radium-226</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>Yes</b>
Rhodium	5	5	0	No
<b>Sodium</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
Styrene	5	5	0	No
<b>Sulfate</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
Tantalum	5	5	0	No
Technetium-99	5	5	0	No
Tetrachloroethene	5	5	0	No
Thallium	5	5	0	No
Thorium-230	5	5	0	No
Toluene	5	5	0	No
<b>Total Organic Carbon (TOC)</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
<b>Total Organic Halides (TOX)</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>Yes</b>
trans-1,2-Dichloroethene	5	5	0	No
trans-1,3-Dichloropropene	5	5	0	No
trans-1,4-Dichloro-2-Butene	5	5	0	No
Trichlorofluoromethane	5	5	0	No
<b>Vanadium</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>Yes</b>
Vinyl Acetate	5	5	0	No
<b>Zinc</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>Yes</b>

**Bold** denotes parameters with at least one uncensored observation.

**Exhibit D.4. Summary of Censored, and Uncensored Data—URGA**

<b>Parameters</b>	<b>Observations</b>	<b>Censored Observation</b>	<b>Uncensored Observation</b>	<b>Statistical Analysis?</b>
1,1,1,2-Tetrachloroethane	6	6	0	No
1,1,2,2-Tetrachloroethane	6	6	0	No
1,1,2-Trichloroethane	6	6	0	No
1,1-Dichloroethane	6	6	0	No
1,2,3-Trichloropropane	6	6	0	No
1,2-Dibromo-3-chloropropane	6	6	0	No
1,2-Dibromoethane	6	6	0	No
1,2-Dichlorobenzene	6	6	0	No
1,2-Dichloropropane	6	6	0	No
2-Butanone	6	6	0	No
2-Hexanone	6	6	0	No
4-Methyl-2-pentanone	6	6	0	No
<b>Acetone</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>Yes</b>
Acrolein	6	6	0	No
Acrylonitrile	6	6	0	No
<b>Aluminum</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>Yes</b>
Antimony	6	6	0	No
Beryllium	6	6	0	No
<b>Beta activity</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
<b>Boron</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Bromide</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Bromochloromethane	6	6	0	No
Bromodichloromethane	6	6	0	No
Bromoform	6	6	0	No
Bromomethane	6	6	0	No
<b>Calcium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Carbon disulfide	6	6	0	No
<b>Chemical Oxygen Demand (COD)</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>Yes</b>
<b>Chloride</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Chlorobenzene	6	6	0	No
Chloroethane	6	6	0	No
Chloroform	6	6	0	No
Chloromethane	6	6	0	No
cis-1,2-Dichloroethene	6	6	0	No
cis-1,3-Dichloropropene	6	6	0	No
<b>Cobalt</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
<b>Conductivity</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Copper</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>Yes</b>
Cyanide	6	6	0	No
Dibromochloromethane	6	6	0	No
Dibromomethane	6	6	0	No
Dimethylbenzene, Total	6	6	0	No
<b>Dissolved Oxygen</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Dissolved Solids</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Ethylbenzene	6	6	0	No
<b>Iodide</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>Yes</b>
Iodomethane	6	6	0	No
<b>Iron</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>Yes</b>
<b>Magnesium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Manganese</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Methylene chloride	6	6	0	No

**Exhibit D.4. Summary of Censored, and Uncensored Data—URGA (Continued)**

<b>Parameters</b>	<b>Observations</b>	<b>Censored Observation</b>	<b>Uncensored Observation</b>	<b>Statistical Analysis?</b>
<b>Molybdenum</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>Yes</b>
<b>Nickel</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Oxidation-Reduction Potential</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>PCB, Total</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>Yes</b>
PCB-1016	6	6	0	No
PCB-1221	6	6	0	No
PCB-1232	6	6	0	No
<b>PCB-1242</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>Yes</b>
PCB-1248	6	6	0	No
PCB-1254	6	6	0	No
PCB-1260	6	6	0	No
PCB-1268	6	6	0	No
<b>pH</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Potassium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Radium-226	6	6	0	No
Rhodium	6	6	0	No
<b>Sodium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Styrene	6	6	0	No
<b>Sulfate</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Tantalum	6	6	0	No
<b>Technetium-99</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
Tetrachloroethene	6	6	0	No
Thallium	6	6	0	No
Thorium-230	6	6	0	No
Toluene	6	6	0	No
<b>Total Organic Carbon (TOC)</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Total Organic Halides (TOX)</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
trans-1,2-Dichloroethene	6	6	0	No
trans-1,3-Dichloropropene	6	6	0	No
trans-1,4-Dichloro-2-Butene	6	6	0	No
<b>Trichloroethene</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>Yes</b>
Trichlorofluoromethane	6	6	0	No
<b>Vanadium</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>Yes</b>
Vinyl Acetate	6	6	0	No
<b>Zinc</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>Yes</b>

**Bold** denotes parameters with at least one uncensored observation.

**Exhibit D.5. Summary of Censored, and Uncensored Data—LRGA**

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
1,1,1,2-Tetrachloroethane	6	6	0	No
1,1,2,2-Tetrachloroethane	6	6	0	No
1,1,2-Trichloroethane	6	6	0	No
1,1-Dichloroethane	6	6	0	No
1,2,3-Trichloropropane	6	6	0	No
1,2-Dibromo-3-chloropropane	6	6	0	No
1,2-Dibromoethane	6	6	0	No
1,2-Dichlorobenzene	6	6	0	No
1,2-Dichloropropane	6	6	0	No
2-Butanone	6	6	0	No
2-Hexanone	6	6	0	No
4-Methyl-2-pentanone	6	6	0	No
<b>Acetone</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>Yes</b>
Acrolein	6	6	0	No
Acrylonitrile	6	6	0	No
<b>Aluminum</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>Yes</b>
Antimony	6	6	0	No
Beryllium	6	6	0	No
<b>Beta activity</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Boron</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Bromide</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Bromochloromethane	6	6	0	No
Bromodichloromethane	6	6	0	No
Bromoform	6	6	0	No
Bromomethane	6	6	0	No
<b>Calcium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Carbon disulfide	6	6	0	No
<b>Chemical Oxygen Demand (COD)</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
<b>Chloride</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Chlorobenzene	6	6	0	No
Chloroethane	6	6	0	No
Chloroform	6	6	0	No
Chloromethane	6	6	0	No
cis-1,2-Dichloroethene	6	6	0	No
cis-1,3-Dichloropropene	6	6	0	No
<b>Cobalt</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
<b>Conductivity</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Copper</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Cyanide	6	6	0	No
Dibromochloromethane	6	6	0	No
Dibromomethane	6	6	0	No
Dimethylbenzene, Total	6	6	0	No
<b>Dissolved Oxygen</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Dissolved Solids</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Ethylbenzene	6	6	0	No
Iodide	6	6	0	No
Iodomethane	6	6	0	No
<b>Iron</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
<b>Magnesium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Manganese</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>Yes</b>
Methylene chloride	6	6	0	No

**Exhibit D.5. Tests Summary for Qualified Parameters—LRGA (Continued)**

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
<b>Molybdenum</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>Yes</b>
<b>Nickel</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
<b>Oxidation-Reduction Potential</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
PCB, Total	6	6	0	No
PCB-1016	6	6	0	No
PCB-1221	6	6	0	No
PCB-1232	6	6	0	No
PCB-1242	6	6	0	No
PCB-1248	6	6	0	No
PCB-1254	6	6	0	No
PCB-1260	6	6	0	No
PCB-1268	6	6	0	No
<b>pH</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Potassium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Radium-226	6	6	0	No
Rhodium	6	6	0	No
<b>Sodium</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Styrene	6	6	0	No
<b>Sulfate</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Tantalum	6	6	0	No
<b>Technetium-99</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>
Tetrachloroethene	6	6	0	No
Thallium	6	6	0	No
Thorium-230	6	6	0	No
Toluene	6	6	0	No
<b>Total Organic Carbon (TOC)</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
<b>Total Organic Halides (TOX)</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>Yes</b>
trans-1,2-Dichloroethene	6	6	0	No
trans-1,3-Dichloropropene	6	6	0	No
trans-1,4-Dichloro-2-Butene	6	6	0	No
<b>Trichloroethene</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>Yes</b>
Trichlorofluoromethane	6	6	0	No
<b>Vanadium</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>Yes</b>
Vinyl Acetate	6	6	0	No
<b>Zinc</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>Yes</b>

**Bold** denotes parameters with at least one uncensored observation.

## **Discussion of Results from Historical Background Comparison**

For the UCRS, URGA, and LRGA, the concentrations of this quarter were compared to the results of the one-sided tolerance interval test calculated using historical background and are presented in Attachment D1. The statistician qualification statement is presented in Attachment D3. For the UCRS, URGA, and LRGA, the test was applied to 29, 32, and 29 parameters, respectively, including those listed in bold print in Exhibits D.3, D.4, and D.5, which includes those constituents (beta activity and trichloroethene) that exceeded their MCL. A summary of exceedances when compared to statistically derived historical upgradient background by well number is shown in Exhibit D.6.

### **UCRS**

This quarter's results identified historical background exceedances for dissolved oxygen, oxidation-reduction potential, and sulfate.

### **URGA**

This quarter's results identified historical background exceedances for beta activity, oxidation-reduction potential, and technetium-99.

### **LRGA**

This quarter's results identified historical background exceedances for beta activity, oxidation-reduction potential, pH, and technetium-99.

## **Statistical Summary**

Summaries of the results of the statistical tests conducted on data obtained from wells in the UCRS, the URGA, and in the LRGA in comparison to historical data are presented in Exhibit D.7, Exhibit D.8, and Exhibit D.9, respectively.

**Exhibit D.6. Summary of Exceedances of Statistically Derived Historical Background Concentrations**

<b>UCRS</b>	<b>URGA</b>	<b>LRGA</b>
<b>MW362:</b> Dissolved Oxygen, Oxidation-Reduction Potential, Sulfate	<b>MW357:</b> Oxidation-Reduction Potential	<b>MW358:</b> Oxidation-Reduction Potential, Technetium-99
<b>MW365:</b> Oxidation-Reduction Potential, Sulfate	<b>MW360:</b> Oxidation-Reduction Potential	<b>MW361:</b> Oxidation-Reduction Potential, Technetium-99
<b>MW371:</b> Oxidation-Reduction Potential, Sulfate	<b>MW363:</b> Oxidation-Reduction Potential	<b>MW364:</b> Oxidation-Reduction Potential, pH*, Technetium-99
<b>MW374:</b> Oxidation-Reduction Potential	<b>MW366:</b> Oxidation-Reduction Potential	<b>MW367:</b> Oxidation-Reduction Potential, pH*
<b>MW375:</b> Oxidation-Reduction Potential, Sulfate	<b>MW369:</b> Oxidation-Reduction Potential	<b>MW370:</b> Beta activity, Oxidation-Reduction Potential, Technetium-99
	<b>MW372:</b> Beta Activity, Oxidation-Reduction Potential, Technetium-99	<b>MW373:</b> Oxidation-Reduction Potential

\*pH concentration is less than the LTL.

**Exhibit D.7. Test Summaries for Qualified Parameters for Historical Background—UCRS**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test*</b>	<b>Results of Tolerance Interval Test Conducted</b>
Aluminum	Tolerance Interval	2.08	No exceedance of statistically derived historical background concentration.
Boron	Tolerance Interval	1.24	No exceedance of statistically derived historical background concentration.
Bromide	Tolerance Interval	0.34	No exceedance of statistically derived historical background concentration.
Calcium	Tolerance Interval	0.40	No exceedance of statistically derived historical background concentration.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.97	No exceedance of statistically derived historical background concentration.
Chloride	Tolerance Interval	0.95	No exceedance of statistically derived historical background concentration.
Cobalt	Tolerance Interval	1.31	No exceedance of statistically derived historical background concentration.
Conductivity	Tolerance Interval	0.45	No exceedance of statistically derived historical background concentration.
Copper	Tolerance Interval	1.27	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.55	Current results exceed statistically derived historical background concentration in MW362.
Dissolved Solids	Tolerance Interval	0.42	No exceedance of statistically derived historical background concentration.
Iodide	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Iron	Tolerance Interval	0.98	No exceedance of statistically derived historical background concentration.
Magnesium	Tolerance Interval	0.27	No exceedance of statistically derived historical background concentration.
Manganese	Tolerance Interval	0.89	No exceedance of statistically derived historical background concentration.
Molybdenum	Tolerance Interval	1.65	No exceedance of statistically derived historical background concentration.

**Exhibit D.7. Tests Summary for Qualified Parameters for Historical Background—UCRS (Continued)**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test*</b>	<b>Results of Tolerance Interval Test Conducted</b>
Nickel	Tolerance Interval	0.98	No exceedance of statistically derived historical background concentration.
Oxidation-Reduction Potential	Tolerance Interval	3.54	Current results exceed statistically derived historical background concentration in MW362, MW365, MW371, MW374, and MW375.
PCB, Total	Tolerance Interval	0.92	No exceedance of statistically derived historical background concentration.
PCB-1242	Tolerance Interval	1.41	No exceedance of statistically derived historical background concentration.
pH	Tolerance Interval	0.04	No exceedance of statistically derived historical background concentration.
Potassium	Tolerance Interval	0.72	No exceedance of statistically derived historical background concentration.
Radium-226	Tolerance Interval	3.79	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.40	No exceedance of statistically derived historical background concentration.
Sulfate	Tolerance Interval	0.49	Current results exceed statistically derived historical background concentration in MW362, MW365, MW371, and MW375.
Total Organic Carbon (TOC)	Tolerance Interval	1.38	No exceedance of statistically derived historical background concentration.
Total Organic Halides (TOX)	Tolerance Interval	1.08	No exceedance of statistically derived historical background concentration.
Vanadium	Tolerance Interval	1.32	No exceedance of statistically derived historical background concentration.
Zinc	Tolerance Interval	1.38	No exceedance of statistically derived historical background concentration.

CV: coefficient of variation

\*If CV > 1.0, used log-transformed data.

**Exhibit D.8. Test Summaries for Qualified Parameters for Historical Background—URGA**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test*</b>	<b>Results of Tolerance Interval Test Conducted</b>
Acetone	Tolerance Interval	3.88	No exceedance of statistically derived historical background concentration.
Aluminum	Tolerance Interval	1.24	No exceedance of statistically derived historical background concentration.
Beta Activity <sup>1</sup>	Tolerance Interval	0.74	Current results exceed statistically derived historical background concentration in MW372.
Boron	Tolerance Interval	0.84	No exceedance of statistically derived historical background concentration.
Bromide	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Calcium	Tolerance Interval	0.29	No exceedance of statistically derived historical background concentration.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.10	No exceedance of statistically derived historical background concentration.
Chloride	Tolerance Interval	0.10	No exceedance of statistically derived historical background concentration.
Cobalt	Tolerance Interval	0.84	No exceedance of statistically derived historical background concentration.
Conductivity	Tolerance Interval	0.12	No exceedance of statistically derived historical background concentration.
Copper	Tolerance Interval	0.40	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.76	No exceedance of statistically derived historical background concentration.
Dissolved Solids	Tolerance Interval	0.16	No exceedance of statistically derived historical background concentration.
Iodide	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Iron	Tolerance Interval	0.95	No exceedance of statistically derived historical background concentration.
Magnesium	Tolerance Interval	0.27	No exceedance of statistically derived historical background concentration.
Manganese	Tolerance Interval	0.66	No exceedance of statistically derived historical background concentration.

**Exhibit D.8. Tests Summary for Qualified Parameters for Historical Background—URGA (Continued)**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test*</b>	<b>Results of Tolerance Interval Test Conducted</b>
Molybdenum	Tolerance Interval	1.20	No exceedance of statistically derived historical background concentration.
Nickel	Tolerance Interval	0.91	No exceedance of statistically derived historical background concentration.
Oxidation-Reduction Potential	Tolerance Interval	1.26	Current results exceed statistically derived historical background concentration in MW357, MW360, MW363, MW366, MW369, and MW372.
PCB, Total	Tolerance Interval	0.90	No exceedance of statistically derived historical background concentration.
PCB-1242	Tolerance Interval	1.36	No exceedance of statistically derived historical background concentration.
pH	Tolerance Interval	0.03	No exceedance of statistically derived historical background concentration.
Potassium	Tolerance Interval	0.29	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.26	No exceedance of statistically derived historical background concentration.
Sulfate	Tolerance Interval	0.75	No exceedance of statistically derived historical background concentration.
Technetium-99	Tolerance Interval	0.87	Current results exceed statistically derived historical background concentration in MW372.
Total Organic Carbon (TOC)	Tolerance Interval	1.23	No exceedance of statistically derived historical background concentration.
Total Organic Halides (TOX)	Tolerance Interval	0.95	No exceedance of statistically derived historical background concentration.
Trichloroethene <sup>1</sup>	Tolerance Interval	0.64	No exceedance of statistically derived historical background concentration.
Vanadium	Tolerance Interval	0.26	No exceedance of statistically derived historical background concentration.
Zinc	Tolerance Interval	1.49	No exceedance of statistically derived historical background concentration.

CV: coefficient of variation

\*If CV > 1.0, used log-transformed data.

<sup>1</sup> A tolerance interval was calculated based on an MCL exceedance.

**Exhibit D.9. Test Summaries for Qualified Parameters for Historical Background—LRGA**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test*</b>	<b>Results of Tolerance Interval Test Conducted</b>
Acetone	Tolerance Interval	2.67	No exceedance of statistically derived historical background concentration.
Aluminum	Tolerance Interval	2.78	No exceedance of statistically derived historical background concentration.
Beta activity <sup>1</sup>	Tolerance Interval	0.80	Current results exceed statistically derived historical background concentration in MW370.
Boron	Tolerance Interval	0.68	No exceedance of statistically derived historical background concentration.
Bromide	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Calcium	Tolerance Interval	0.31	No exceedance of statistically derived historical background concentration.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.59	No exceedance of statistically derived historical background concentration.
Chloride	Tolerance Interval	0.16	No exceedance of statistically derived historical background concentration.
Cobalt	Tolerance Interval	1.16	No exceedance of statistically derived historical background concentration.
Conductivity	Tolerance Interval	0.26	No exceedance of statistically derived historical background concentration.
Copper	Tolerance Interval	0.40	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.83	No exceedance of statistically derived historical background concentration.
Dissolved Solids	Tolerance Interval	0.30	No exceedance of statistically derived historical background concentration.
Iron	Tolerance Interval	0.96	No exceedance of statistically derived historical background concentration.
Magnesium	Tolerance Interval	0.34	No exceedance of statistically derived historical background concentration.
Manganese	Tolerance Interval	0.62	No exceedance of statistically derived historical background concentration.
Molybdenum	Tolerance Interval	1.20	No exceedance of statistically derived historical background concentration.

**Exhibit D.9. Tests Summary for Qualified Parameters for Historical Background—LRGA (Continued)**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test*</b>	<b>Results of Tolerance Interval Test Conducted</b>
Nickel	Tolerance Interval	0.90	No exceedance of statistically derived historical background concentration.
Oxidation-Reduction Potential	Tolerance Interval	1.31	Current results exceed statistically derived historical background concentration in MW358, MW361, MW364, MW367, MW370, and MW373.
pH**	Tolerance Interval	0.03	Current results exceed statistically derived historical background concentration in MW364 and MW367.
Potassium	Tolerance Interval	0.18	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.30	No exceedance of statistically derived historical background concentration.
Sulfate	Tolerance Interval	1.59	No exceedance of statistically derived historical background concentration.
Technetium-99	Tolerance Interval	1.73	Current results exceed statistically derived historical background concentration in MW358, MW361, MW364, and MW370.
Total Organic Carbon (TOC)	Tolerance Interval	1.96	No exceedance of statistically derived historical background concentration.
Total Organic Halides (TOX)	Tolerance Interval	0.98	No exceedance of statistically derived historical background concentration.
Trichloroethene <sup>1</sup>	Tolerance Interval	0.57	No exceedance of statistically derived historical background concentration.
Vanadium	Tolerance Interval	0.32	No exceedance of statistically derived historical background concentration.
Zinc	Tolerance Interval	0.67	No exceedance of statistically derived historical background concentration.

CV: coefficient of variation

\*If CV > 1.0, used log-transformed data.

\*\*pH concentration is less than the LTL.

<sup>1</sup> A tolerance interval was calculated based on an MCL exceedance.

## Discussion of Results from Current Background Comparison

For concentrations in wells in the UCRS, URGA, and LRGA that exceeded the TL test using historical background, the concentrations were compared to the results of the one-sided tolerance interval test compared to current background, and are presented in Attachment D2. The statistician qualification statement is presented in Attachment D3. For the UCRS, URGA, and LRGA, the test was applied to 3, 3, and 4 parameters, respectively, because these parameter concentrations exceeded the historical background TL.

For downgradient wells only, a summary of instances where concentrations exceeded the TL calculated using current background data is shown in Exhibit D.10.

**Exhibit D.10. Summary of Exceedances (in Downgradient Wells) of the TL Calculated Using Current Background Concentrations**

URGA	LRGA
None	MW364: pH*
	MW367: pH*

\*pH concentration is less than the LTL.

### UCRS

Because gradients in the UCRS are downward (vertical), there are no hydrogeologically downgradient UCRS wells. It should be noted; however, that this quarter's results showed no exceedances in these wells.

### URGA

This quarter's results showed no exceedances in wells located downgradient of the landfill.

### LRGA

This quarter's results showed an exceedance of pH in MW364 and MW367; these wells are located downgradient of the landfill.

### **Statistical Summary**

Summaries of the statistical tests conducted on data obtained from wells in the UCRS, the URGA, and the LRGA are presented in Exhibit D.11, Exhibit D.12, and Exhibit D.13, respectively.

**Exhibit D.11. Test Summaries for Qualified Parameters for Current Background—UCRS**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test</b>	<b>Results of Tolerance Interval Test Conducted</b>
Dissolved Oxygen	Tolerance Interval	0.68	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
Oxidation-Reduction Potential	Tolerance Interval	0.28	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
Sulfate	Tolerance Interval	1.34	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.

CV: coefficient of variation

**Exhibit D.12. Test Summaries for Qualified Parameters for Current Background—URGA**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test</b>	<b>Results of Tolerance Interval Test Conducted</b>
Beta Activity	Tolerance Interval	1.03	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
Oxidation-Reduction Potential	Tolerance Interval	0.16	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
Technetium-99	Tolerance Interval	0.99	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.

CV: coefficient of variation

**Exhibit D.13. Test Summaries for Qualified Parameters for Current Background—LRGA**

<b>Parameter</b>	<b>Performed Test</b>	<b>CV Normality Test</b>	<b>Results of Tolerance Interval Test Conducted</b>
Beta activity	Tolerance Interval	0.73	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
Oxidation-Reduction Potential	Tolerance Interval	0.13	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
pH	Tolerance Interval	0.01	MW364 and MW367 exceeded the lower TL, which is evidence of a difference in concentration with respect to current background data.
Technetium-99	Tolerance Interval	0.77	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.

CV: coefficient of variation

**ATTACHMENT D1**

**COMPARISON OF CURRENT DATA TO  
ONE-SIDED UPPER TOLERANCE INTERVAL TEST  
CALCULATED USING  
HISTORICAL BACKGROUND DATA**

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# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Aluminum**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 3.300    S= 6.859    CV(1)=2.078    K factor\*\*= 2.523    TL(1)= 20.604    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.371    S= 1.678    CV(2)=-4.521    K factor\*\*= 2.523    TL(2)= 3.863    LL(2)=N/A

### Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	2.24	0.806
4/22/2002	0.2	-1.609
7/15/2002	0.2	-1.609
10/8/2002	0.2	-1.609
1/8/2003	0.2	-1.609
4/3/2003	0.2	-1.609
7/9/2003	0.2	-1.609
10/6/2003	0.2	-1.609

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	21.3	3.059
1/7/2003	20	2.996
4/2/2003	4.11	1.413
7/9/2003	1.41	0.344
10/7/2003	1.09	0.086
1/6/2004	0.854	-0.158
4/7/2004	0.2	-1.609
7/14/2004	0.2	-1.609

### Dry/Partially Dry Wells

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.101	N/A	-2.293	NO
MW365	Downgradient	No	0.05	N/A	-2.996	N/A
MW371	Upgradient	Yes	0.327	N/A	-1.118	NO
MW374	Upgradient	No	0.05	N/A	-2.996	N/A
MW375	Sidegradient	Yes	0.0355	N/A	-3.338	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

### Conclusion of Statistical Analysis on Historical Data

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.*

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Boron**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.650    S= 0.805    CV(1)= 1.238    K factor\*\*= 2.523    TL(1)= 2.681    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -1.034    S= 1.030    CV(2)=-0.996    K factor\*\*= 2.523    TL(2)= 1.564    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Dry/Partially Dry Wells**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW371

Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/22/2002	2	0.693
7/15/2002	2	0.693
10/8/2002	0.2	-1.609
1/8/2003	0.2	-1.609
4/3/2003	0.2	-1.609
7/9/2003	0.2	-1.609
10/6/2003	0.2	-1.609

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.0242	N/A	-3.721	NO
MW365	Downgradient	Yes	0.00787	N/A	-4.845	NO
MW371	Upgradient	Yes	0.00575	N/A	-5.159	NO
MW374	Upgradient	Yes	0.0127	N/A	-4.366	NO
MW375	Sidegradient	Yes	0.0075	N/A	-4.893	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW374

Date Collected	Result	LN(Result)
10/8/2002	2	0.693
1/7/2003	0.2	-1.609
4/2/2003	0.2	-1.609
7/9/2003	0.2	-1.609
10/7/2003	0.2	-1.609
1/6/2004	0.2	-1.609
4/7/2004	0.2	-1.609
7/14/2004	0.2	-1.609

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Bromide**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.394    S= 0.474    CV(1)=0.340    K factor\*\*= 2.523    TL(1)= 2.590    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 0.279    S= 0.332    CV(2)=1.190    K factor\*\*= 2.523    TL(2)= 1.118    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/22/2002	1	0.000
7/15/2002	1	0.000
10/8/2002	1	0.000
1/8/2003	1	0.000
4/3/2003	1	0.000
7/9/2003	1	0.000
10/6/2003	1	0.000

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	2.1	0.742
1/7/2003	2.1	0.742
4/2/2003	1.9	0.642
7/9/2003	1	0.000
10/7/2003	1.9	0.642
1/6/2004	1.9	0.642
4/7/2004	1.8	0.588
7/14/2004	1.6	0.470

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.12	NO	-2.120	N/A
MW365	Downgradient	No	0.2	N/A	-1.609	N/A
MW371	Upgradient	No	0.2	N/A	-1.609	N/A
MW374	Upgradient	Yes	0.786	NO	-0.241	N/A
MW375	Sidegradient	No	0.2	N/A	-1.609	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Calcium**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 34.100    S= 13.637    CV(1)=0.400      **K factor\*\*= 2.523**    TL(1)= 68.505    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.466    S= 0.356    CV(2)=0.103      **K factor\*\*= 2.523**    TL(2)= 4.364    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	17.2	2.845
4/22/2002	22.4	3.109
7/15/2002	25.5	3.239
10/8/2002	26.4	3.273
1/8/2003	27.2	3.303
4/3/2003	30.3	3.411
7/9/2003	25.9	3.254
10/6/2003	27	3.296

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	67.3	4.209
1/7/2003	60.6	4.104
4/2/2003	47.2	3.854
7/9/2003	34.7	3.547
10/7/2003	37.1	3.614
1/6/2004	37.7	3.630
4/7/2004	32.2	3.472
7/14/2004	26.9	3.292

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	24.6	NO	3.203	N/A
MW365	Downgradient	Yes	19.5	NO	2.970	N/A
MW371	Upgradient	Yes	48	NO	3.871	N/A
MW374	Upgradient	Yes	20.4	NO	3.016	N/A
MW375	Sidegradient	Yes	13.2	NO	2.580	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.



# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Chloride**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 91.300    S= 86.959    CV(1)=0.952      K factor\*\*= 2.523    TL(1)= 310.697    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.620    S= 1.590    CV(2)=0.439      K factor\*\*= 2.523    TL(2)= 7.631    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW371		
Date Collected	Result	LN(Result)
7/15/2002	8.3	2.116
10/8/2002	7.6	2.028
1/8/2003	7.7	2.041
4/3/2003	8.8	2.175
7/9/2003	8.1	2.092
10/6/2003	8.6	2.152
1/7/2004	7.6	2.028
4/6/2004	7.6	2.028

Well Number: MW374		
Date Collected	Result	LN(Result)
10/8/2002	199.2	5.294
1/7/2003	199.7	5.297
4/2/2003	171.8	5.146
7/9/2003	178.7	5.186
10/7/2003	175.6	5.168
1/6/2004	170.4	5.138
4/7/2004	156.4	5.052
7/14/2004	144.7	4.975

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	5.73	NO	1.746	N/A
MW365	Downgradient	Yes	3.58	NO	1.275	N/A
MW371	Upgradient	Yes	4.27	NO	1.452	N/A
MW374	Upgradient	Yes	62.1	NO	4.129	N/A
MW375	Sidegradient	Yes	4.44	NO	1.491	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Cobalt**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.007    S= 0.009    CV(1)= 1.314    K factor\*\*= 2.523    TL(1)= 0.031    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -5.843    S= 1.392    CV(2)=-0.238    K factor\*\*= 2.523    TL(2)= -2.331    LL(2)=N/A

### Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.001	-6.908
1/8/2003	0.001	-6.908
4/3/2003	0.001	-6.908
7/9/2003	0.001	-6.908
10/6/2003	0.001	-6.908

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.01	-4.605
1/7/2003	0.01	-4.605
4/2/2003	0.01	-4.605
7/9/2003	0.00161	-6.432
10/7/2003	0.001	-6.908
1/6/2004	0.001	-6.908
4/7/2004	0.001	-6.908
7/14/2004	0.001	-6.908

### Dry/Partially Dry Wells

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	No	0.001	N/A	-6.908	N/A
MW365	Downgradient	Yes	0.00156	N/A	-6.463	NO
MW371	Upgradient	No	0.001	N/A	-6.908	N/A
MW374	Upgradient	Yes	0.000994	N/A	-6.914	NO
MW375	Sidegradient	Yes	0.000317	N/A	-8.057	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

### Conclusion of Statistical Analysis on Historical Data

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

## Conductivity

**UNITS: umho/cm**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**       $X=918.744$     $S=417.257$     $CV(1)=0.454$        $K\ factor^{**}=2.523$        $TL(1)=1971.483$     $LL(1)=N/A$

**Statistics-Transformed Background Data**       $X=6.705$     $S=0.550$     $CV(2)=0.082$        $K\ factor^{**}=2.523$        $TL(2)=8.092$        $LL(2)=N/A$

### Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	541	6.293
4/22/2002	643	6.466
7/15/2002	632	6.449
10/8/2002	631	6.447
1/8/2003	680	6.522
4/3/2003	749	6.619
7/9/2003	734	6.599
10/6/2003	753	6.624

Well Number:	MW374	
Date Collected	Result	LN(Result)
3/18/2002	1007	6.915
10/8/2002	1680	7.427
1/7/2003	1715.9	7.448
4/2/2003	172	5.147
7/9/2003	1231	7.116
10/7/2003	1214	7.102
1/6/2004	1172	7.066
4/7/2004	1145	7.043

### Dry/Partially Dry Wells

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	731	NO	6.594	N/A
MW365	Downgradient	Yes	427	NO	6.057	N/A
MW371	Upgradient	Yes	712	NO	6.568	N/A
MW374	Upgradient	Yes	678	NO	6.519	N/A
MW375	Sidegradient	Yes	340	NO	5.829	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

### Conclusion of Statistical Analysis on Historical Data

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation,  $CV = S/X$     If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation,  $S = [\text{Sum}([(background\ result-X)^2]/[\text{count of background results} - 1])]^{0.5}$

TL    Upper Tolerance Limit,  $TL = X + (K * S)$ ,      LL    Lower Tolerance Limit,  $LL = X - (K * S)$

X    Mean,  $X = (\text{sum of background results})/(\text{count of background results})$

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance*, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Copper**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.056    S= 0.072    CV(1)= 1.275    K factor\*\*= 2.523    TL(1)= 0.237    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -3.395    S= 0.915    CV(2)=-0.270    K factor\*\*= 2.523    TL(2)= -1.086    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.05	-2.996
10/8/2002	0.02	-3.912
1/8/2003	0.02	-3.912
4/3/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/6/2003	0.02	-3.912

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.2	-1.609
1/7/2003	0.2	-1.609
4/2/2003	0.2	-1.609
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912
1/6/2004	0.02	-3.912
4/7/2004	0.02	-3.912
7/14/2004	0.02	-3.912

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.00103	N/A	-6.878	NO
MW365	Downgradient	Yes	0.00653	N/A	-5.031	NO
MW371	Upgradient	Yes	0.000927	N/A	-6.984	NO
MW374	Upgradient	No	0.001	N/A	-6.908	N/A
MW375	Sidegradient	Yes	0.000489	N/A	-7.623	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

## Dissolved Oxygen

UNITS: mg/L

UCRS

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.138    S= 0.621    CV(1)=0.546    K factor\*\*= 2.523    TL(1)= 2.704    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -0.013    S= 0.577    CV(2)=-43.069    K factor\*\*= 2.523    TL(2)= 1.441    LL(2)=N/A

### Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	2.26	0.815
4/22/2002	1.15	0.140
7/15/2002	0.94	-0.062
10/8/2002	0.74	-0.301
1/8/2003	2.62	0.963
4/3/2003	1.5	0.405
7/9/2003	1.66	0.507
10/6/2003	1.28	0.247

Well Number:	MW374	
Date Collected	Result	LN(Result)
3/18/2002	0.6	-0.511
10/8/2002	0.67	-0.400
1/7/2003	0.23	-1.470
4/2/2003	0.65	-0.431
7/9/2003	0.92	-0.083
10/7/2003	0.99	-0.010
1/6/2004	1.11	0.104
4/7/2004	0.88	-0.128

### Dry/Partially Dry Wells

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	3.56	YES	1.270	N/A
MW365	Downgradient	Yes	2.4	NO	0.875	N/A
MW371	Upgradient	Yes	0.96	NO	-0.041	N/A
MW374	Upgradient	Yes	0.88	NO	-0.128	N/A
MW375	Sidegradient	Yes	1.1	NO	0.095	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

### Conclusion of Statistical Analysis on Historical Data

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

### Wells with Exceedances

MW362

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

## Dissolved Solids

UNITS: mg/L

UCRS

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 590.000    S= 248.068    CV(1)=0.420      **K factor\*\*= 2.523**      TL(1)= 1215.876    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 6.308    S= 0.383    CV(2)=0.061      **K factor\*\*= 2.523**      TL(2)= 7.274      LL(2)=N/A

### Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	274	5.613
4/22/2002	409	6.014
7/15/2002	418	6.035
10/8/2002	424	6.050
1/8/2003	431	6.066
4/3/2003	444	6.096
7/9/2003	445	6.098
10/6/2003	438	6.082

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	1136	7.035
1/7/2003	1101	7.004
4/2/2003	863	6.760
7/9/2003	682	6.525
10/7/2003	589	6.378
1/6/2004	603	6.402
4/7/2004	601	6.399
7/14/2004	582	6.366

### Dry/Partially Dry Wells

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	379	NO	5.938	N/A
MW365	Downgradient	Yes	231	NO	5.442	N/A
MW371	Upgradient	Yes	414	NO	6.026	N/A
MW374	Upgradient	Yes	340	NO	5.829	N/A
MW375	Sidegradient	Yes	203	NO	5.313	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

### Conclusion of Statistical Analysis on Historical Data

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.*

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Iodide**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 2.000    S= 0.000    CV(1)=0.000    K factor\*\*= 2.523    TL(1)= 2.000    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 0.693    S= 0.000    CV(2)=0.000    K factor\*\*= 2.523    TL(2)= 0.693    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/22/2002	2	0.693
7/15/2002	2	0.693
10/8/2002	2	0.693
1/8/2003	2	0.693
4/3/2003	2	0.693
7/9/2003	2	0.693
10/6/2003	2	0.693

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	2	0.693
1/7/2003	2	0.693
4/2/2003	2	0.693
7/9/2003	2	0.693
10/7/2003	2	0.693
1/6/2004	2	0.693
4/7/2004	2	0.693
7/14/2004	2	0.693

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.171	NO	-1.766	N/A
MW365	Downgradient	No	0.5	N/A	-0.693	N/A
MW371	Upgradient	No	0.5	N/A	-0.693	N/A
MW374	Upgradient	No	0.5	N/A	-0.693	N/A
MW375	Sidegradient	No	0.5	N/A	-0.693	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Iron**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 6.612    S= 6.487    CV(1)=0.981    K factor\*\*= 2.523    TL(1)= 22.979    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 1.363    S= 1.147    CV(2)=0.841    K factor\*\*= 2.523    TL(2)= 4.256    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	1.31	0.270
4/22/2002	0.913	-0.091
7/15/2002	0.881	-0.127
10/8/2002	3.86	1.351
1/8/2003	1.88	0.631
4/3/2003	3.18	1.157
7/9/2003	0.484	-0.726
10/6/2003	2.72	1.001

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	23	3.135
1/7/2003	13.9	2.632
4/2/2003	14	2.639
7/9/2003	14.2	2.653
10/7/2003	7.92	2.069
1/6/2004	7.86	2.062
4/7/2004	4.82	1.573
7/14/2004	4.87	1.583

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.0919	NO	-2.387	N/A
MW365	Downgradient	No	0.1	N/A	-2.303	N/A
MW371	Upgradient	Yes	0.188	NO	-1.671	N/A
MW374	Upgradient	Yes	1.07	NO	0.068	N/A
MW375	Sidegradient	Yes	0.0538	NO	-2.922	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Magnesium**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 11.347    S= 3.019    CV(1)=0.266    K factor\*\*= 2.523    TL(1)= 18.963    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.401    S= 0.237    CV(2)=0.099    K factor\*\*= 2.523    TL(2)= 2.999    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	7.1	1.960
4/22/2002	9.77	2.279
7/15/2002	10.4	2.342
10/8/2002	10.2	2.322
1/8/2003	10.7	2.370
4/3/2003	11.9	2.477
7/9/2003	10.8	2.380
10/6/2003	10.9	2.389

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	20	2.996
1/7/2003	16.1	2.779
4/2/2003	13.1	2.573
7/9/2003	10.3	2.332
10/7/2003	11.1	2.407
1/6/2004	11	2.398
4/7/2004	9.69	2.271
7/14/2004	8.49	2.139

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	10.7	NO	2.370	N/A
MW365	Downgradient	Yes	9.47	NO	2.248	N/A
MW371	Upgradient	Yes	16.1	NO	2.779	N/A
MW374	Upgradient	Yes	5.62	NO	1.726	N/A
MW375	Sidegradient	Yes	6.49	NO	1.870	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Manganese**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.248    S= 0.222    CV(1)=0.894    K factor\*\*= 2.523    TL(1)= 0.809    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -1.873    S= 1.068    CV(2)=-0.570    K factor\*\*= 2.523    TL(2)= 0.821    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	0.063	-2.765
4/22/2002	0.067	-2.703
7/15/2002	0.074	-2.604
10/8/2002	0.0521	-2.955
1/8/2003	0.0385	-3.257
4/3/2003	0.0551	-2.899
7/9/2003	0.0546	-2.908
10/6/2003	0.0543	-2.913
Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.596	-0.518
1/7/2003	0.565	-0.571
4/2/2003	0.675	-0.393
7/9/2003	0.397	-0.924
10/7/2003	0.312	-1.165
1/6/2004	0.299	-1.207
4/7/2004	0.329	-1.112
7/14/2004	0.342	-1.073

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.00125	NO	-6.685	N/A
MW365	Downgradient	Yes	0.0118	NO	-4.440	N/A
MW371	Upgradient	Yes	0.00475	NO	-5.350	N/A
MW374	Upgradient	Yes	0.171	NO	-1.766	N/A
MW375	Sidegradient	Yes	0.00438	NO	-5.431	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Molybdenum**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.006    S= 0.010    CV(1)= 1.650    K factor\*\*= 2.523    TL(1)= 0.030    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -6.108    S= 1.239    CV(2)=-0.203    K factor\*\*= 2.523    TL(2)= -2.983    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW371		
Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.001	-6.908
1/8/2003	0.00121	-6.717
4/3/2003	0.001	-6.908
7/9/2003	0.00111	-6.803
10/6/2003	0.001	-6.908
Well Number: MW374		
Date Collected	Result	LN(Result)
10/8/2002	0.00222	-6.110
1/7/2003	0.00201	-6.210
4/2/2003	0.00159	-6.444
7/9/2003	0.00242	-6.024
10/7/2003	0.001	-6.908
1/6/2004	0.001	-6.908
4/7/2004	0.001	-6.908
7/14/2004	0.001	-6.908

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.000588	N/A	-7.439	NO
MW365	Downgradient	Yes	0.000215	N/A	-8.445	NO
MW371	Upgradient	Yes	0.000415	N/A	-7.787	NO
MW374	Upgradient	Yes	0.000271	N/A	-8.213	NO
MW375	Sidegradient	No	0.0005	N/A	-7.601	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Nickel**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.023    S= 0.022    CV(1)=0.980    K factor\*\*= 2.523    TL(1)= 0.078    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -4.349    S= 1.109    CV(2)=-0.255    K factor\*\*= 2.523    TL(2)= -1.552    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	0.05	-2.996
4/22/2002	0.05	-2.996
7/15/2002	0.05	-2.996
10/8/2002	0.0124	-4.390
1/8/2003	0.005	-5.298
4/3/2003	0.005	-5.298
7/9/2003	0.005	-5.298
10/6/2003	0.005	-5.298

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.05	-2.996
1/7/2003	0.05	-2.996
4/2/2003	0.05	-2.996
7/9/2003	0.00794	-4.836
10/7/2003	0.005	-5.298
1/6/2004	0.005	-5.298
4/7/2004	0.005	-5.298
7/14/2004	0.005	-5.298

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.00103	NO	-6.878	N/A
MW365	Downgradient	Yes	0.00622	NO	-5.080	N/A
MW371	Upgradient	Yes	0.00142	NO	-6.557	N/A
MW374	Upgradient	No	0.002	N/A	-6.215	N/A
MW375	Sidegradient	Yes	0.000953	NO	-6.956	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

## Oxidation-Reduction Potential

UNITS: mV

UCRS

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 22.281    S= 78.889    CV(1)=3.541      **K factor\*\*= 2.523**    TL(1)= 221.319    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.642    S= 1.729    CV(2)=0.475      **K factor\*\*= 2.523**    TL(2)= 5.106    LL(2)=N/A

### Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	75	4.317
4/22/2002	165	5.106
7/15/2002	65	4.174
4/3/2003	-19	#Func!
7/9/2003	114	4.736
10/6/2003	-22	#Func!
1/7/2004	20.5	3.020
4/6/2004	113	4.727

Well Number:	MW374	
Date Collected	Result	LN(Result)
3/18/2002	135	4.905
4/2/2003	-56	#Func!
7/9/2003	-68	#Func!
10/7/2003	-50	#Func!
1/6/2004	-85	#Func!
4/7/2004	6	1.792
7/14/2004	-38	#Func!
10/7/2004	1	0.000

### Dry/Partially Dry Wells

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	410	N/A	6.016	YES
MW365	Downgradient	Yes	415	N/A	6.028	YES
MW371	Upgradient	Yes	328	N/A	5.793	YES
MW374	Upgradient	Yes	218	N/A	5.384	YES
MW375	Sidegradient	Yes	415	N/A	6.028	YES

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

### Conclusion of Statistical Analysis on Historical Data

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

### Wells with Exceedances

- MW362
- MW365
- MW371
- MW374
- MW375

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989*, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**PCB, Total**

**UNITS: UG/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.224    S= 0.207    CV(1)=0.922    K factor\*\*= 2.523    TL(1)= 0.746    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -1.647    S= 0.440    CV(2)=-0.267    K factor\*\*= 2.523    TL(2)= -0.537    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/22/2002	0.17	-1.772
7/15/2002	0.17	-1.772
7/9/2003	0.17	-1.772
10/6/2003	0.17	-1.772
7/13/2004	0.18	-1.715
7/25/2005	0.17	-1.772
4/5/2006	0.18	-1.715

Well Number:	MW374	
Date Collected	Result	LN(Result)
7/9/2003	0.17	-1.772
10/7/2003	0.17	-1.772
7/14/2004	0.18	-1.715
7/26/2005	0.17	-1.772
4/6/2006	0.18	-1.715
7/10/2006	0.17	-1.772
10/12/2006	0.17	-1.772
1/8/2007	0.17	-1.772

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	No	0.0943	N/A	-2.361	N/A
MW365	Downgradient	Yes	0.129	NO	-2.048	N/A
MW371	Upgradient	No	0.0962	N/A	-2.341	N/A
MW374	Upgradient	No	0.0952	N/A	-2.352	N/A
MW375	Sidegradient	No	0.1	N/A	-2.303	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**PCB-1242**

**UNITS: UG/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.159    S= 0.224    CV(1)= 1.409    K factor\*\*= 2.523    TL(1)= 0.726    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -2.134    S= 0.579    CV(2)=-0.272    K factor\*\*= 2.523    TL(2)= -0.672    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/22/2002	0.11	-2.207
7/15/2002	0.11	-2.207
7/9/2003	0.13	-2.040
10/6/2003	0.09	-2.408
7/13/2004	0.1	-2.303
7/25/2005	0.09	-2.408
4/5/2006	0.1	-2.303

Well Number:	MW374	
Date Collected	Result	LN(Result)
7/9/2003	0.13	-2.040
10/7/2003	0.09	-2.408
7/14/2004	0.1	-2.303
7/26/2005	0.1	-2.303
4/6/2006	0.1	-2.303
7/10/2006	0.1	-2.303
10/12/2006	0.1	-2.303
1/8/2007	0.1	-2.303

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	No	0.0943	N/A	-2.361	N/A
MW365	Downgradient	Yes	0.129	N/A	-2.048	NO
MW371	Upgradient	No	0.0962	N/A	-2.341	N/A
MW374	Upgradient	No	0.0952	N/A	-2.352	N/A
MW375	Sidegradient	No	0.1	N/A	-2.303	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**pH**

**UNITS: Std Unit**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 6.619    S= 0.295    CV(1)=0.045    **K factor\*\*= 2.904**    TL(1)= 7.475    LL(1)=5.7635

**Statistics-Transformed Background Data**      X= 1.889    S= 0.046    CV(2)=0.024    **K factor\*\*= 2.904**    TL(2)= 2.023    LL(2)=1.7548

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW371

Date Collected	Result	LN(Result)
3/18/2002	6.3	1.841
4/22/2002	6.5	1.872
7/15/2002	6.5	1.872
10/8/2002	6.6	1.887
1/8/2003	6.6	1.887
4/3/2003	6.9	1.932
7/9/2003	6.7	1.902
10/6/2003	7	1.946

Well Number: MW374

Date Collected	Result	LN(Result)
3/18/2002	5.75	1.749
10/8/2002	6.6	1.887
1/7/2003	6.82	1.920
4/2/2003	6.86	1.926
7/9/2003	6.7	1.902
10/7/2003	6.6	1.887
1/6/2004	6.9	1.932
4/7/2004	6.58	1.884

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)? Result <LL(1)?	LN(Result)	LN(Result) >TL(2)? LN(Result) <LL(2)?
MW362	Downgradient	Yes	6.69	NO	1.901	N/A
MW365	Downgradient	Yes	5.89	NO	1.773	N/A
MW371	Upgradient	Yes	6.55	NO	1.879	N/A
MW374	Upgradient	Yes	6.7	NO	1.902	N/A
MW375	Sidegradient	Yes	6.2	NO	1.825	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Potassium**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.262    S= 0.907    CV(1)=0.718    K factor\*\*= 2.523    TL(1)= 3.549    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.023    S= 0.752    CV(2)=-32.218    K factor\*\*= 2.523    TL(2)= 1.874    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW371		
Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/22/2002	2	0.693
7/15/2002	2	0.693
10/8/2002	0.408	-0.896
1/8/2003	0.384	-0.957
4/3/2003	0.368	-1.000
7/9/2003	0.587	-0.533
10/6/2003	0.382	-0.962
Well Number: MW374		
Date Collected	Result	LN(Result)
10/8/2002	3.04	1.112
1/7/2003	2.83	1.040
4/2/2003	2	0.693
7/9/2003	1.09	0.086
10/7/2003	0.802	-0.221
1/6/2004	0.897	-0.109
4/7/2004	0.689	-0.373
7/14/2004	0.716	-0.334

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	0.333	NO	-1.100	N/A
MW365	Downgradient	Yes	0.215	NO	-1.537	N/A
MW371	Upgradient	Yes	0.483	NO	-0.728	N/A
MW374	Upgradient	Yes	0.398	NO	-0.921	N/A
MW375	Sidegradient	Yes	0.289	NO	-1.241	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Radium-226**

**UNITS: pCi/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 3.560    S= 13.483    CV(1)=3.787    K factor\*\*= 2.523    TL(1)= 37.577    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -1.189    S= 1.742    CV(2)=-1.465    K factor\*\*= 2.523    TL(2)= 3.991    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
7/15/2002	54.1	3.991
10/8/2002	0.0937	-2.368
1/8/2003	0.378	-0.973
10/6/2003	0.179	-1.720
1/7/2004	0.898	-0.108
4/6/2004	0.108	-2.226
7/13/2004	-0.149	#Func!
10/7/2004	0.154	-1.871

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.298	-1.211
1/7/2003	-0.844	#Func!
10/7/2003	0.806	-0.216
1/6/2004	0.0306	-3.487
4/7/2004	0.35	-1.050
7/14/2004	0.273	-1.298
10/7/2004	0.205	-1.585
1/11/2005	0.0799	-2.527

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	No	0.424	N/A	-0.858	N/A
MW365	Downgradient	No	0.263	N/A	-1.336	N/A
MW371	Upgradient	Yes	0.522	N/A	-0.650	NO
MW374	Upgradient	Yes	0.587	N/A	-0.533	NO
MW375	Sidegradient	Yes	1.05	N/A	0.049	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Sodium**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 183.063    S= 73.222    CV(1)=0.400      K factor\*\*= 2.523    TL(1)= 367.800    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 5.146    S= 0.356    CV(2)=0.069      K factor\*\*= 2.523    TL(2)= 6.044    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	129	4.860
4/22/2002	131	4.875
7/15/2002	127	4.844
10/8/2002	123	4.812
1/8/2003	128	4.852
4/3/2003	144	4.970
7/9/2003	126	4.836
10/6/2003	120	4.787
Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	336	5.817
1/7/2003	329	5.796
4/2/2003	287	5.659
7/9/2003	181	5.198
10/7/2003	182	5.204
1/6/2004	206	5.328
4/7/2004	182	5.204
7/14/2004	198	5.288

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	154	NO	5.037	N/A
MW365	Downgradient	Yes	49	NO	3.892	N/A
MW371	Upgradient	Yes	99.1	NO	4.596	N/A
MW374	Upgradient	Yes	123	NO	4.812	N/A
MW375	Sidegradient	Yes	55.3	NO	4.013	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Sulfate**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 6.469    S= 3.153    CV(1)=0.487    K factor\*\*= 2.523    TL(1)= 14.423    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 1.794    S= 0.357    CV(2)=0.199    K factor\*\*= 2.523    TL(2)= 2.694    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	16.3	2.791
4/22/2002	8.6	2.152
7/15/2002	6.7	1.902
10/8/2002	5	1.609
1/8/2003	5	1.609
4/3/2003	5	1.609
7/9/2003	5	1.609
10/6/2003	5	1.609

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	5	1.609
1/7/2003	5	1.609
4/2/2003	5	1.609
7/9/2003	5.6	1.723
10/7/2003	5	1.609
1/6/2004	5	1.609
4/7/2004	11.3	2.425
7/14/2004	5	1.609

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	26.7	YES	3.285	N/A
MW365	Downgradient	Yes	63.6	YES	4.153	N/A
MW371	Upgradient	Yes	21.9	YES	3.086	N/A
MW374	Upgradient	Yes	6.6	NO	1.887	N/A
MW375	Sidegradient	Yes	24.5	YES	3.199	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

- MW362
- MW365
- MW371
- MW375

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Total Organic Carbon (TOC)**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 17.631    S= 24.314    CV(1)=1.379      K factor\*\*= 2.523    TL(1)= 78.977    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.318    S= 0.979    CV(2)=0.422      K factor\*\*= 2.523    TL(2)= 4.788    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	11.1	2.407
4/22/2002	7	1.946
7/15/2002	4.1	1.411
10/8/2002	6	1.792
1/8/2003	5.3	1.668
4/3/2003	5.3	1.668
7/9/2003	2.9	1.065
10/6/2003	3.2	1.163

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	90	4.500
1/7/2003	64	4.159
4/2/2003	25	3.219
7/9/2003	16	2.773
10/7/2003	13	2.565
1/6/2004	10	2.303
4/7/2004	7.2	1.974
7/14/2004	12	2.485

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	2.35	N/A	0.854	NO
MW365	Downgradient	Yes	1.66	N/A	0.507	NO
MW371	Upgradient	Yes	1.87	N/A	0.626	NO
MW374	Upgradient	Yes	2.49	N/A	0.912	NO
MW375	Sidegradient	Yes	0.883	N/A	-0.124	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Total Organic Halides (TOX)**

**UNITS: ug/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 214.094    S= 231.089    CV(1)= 1.079      **K factor\*\*= 2.523**    TL(1)= 797.131    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 4.867    S= 1.065    CV(2)= 0.219      **K factor\*\*= 2.523**    TL(2)= 7.554    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	50	3.912
4/22/2002	105	4.654
7/15/2002	70	4.248
10/8/2002	52	3.951
1/8/2003	20.2	3.006
4/3/2003	104	4.644
7/9/2003	34.2	3.532
10/6/2003	46.1	3.831

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	903	6.806
1/7/2003	539	6.290
4/2/2003	295	5.687
7/9/2003	272	5.606
10/7/2003	197	5.283
1/6/2004	330	5.799
4/7/2004	183	5.209
7/14/2004	225	5.416

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	18.9	N/A	2.939	NO
MW365	Downgradient	Yes	14.3	N/A	2.660	NO
MW371	Upgradient	Yes	5.22	N/A	1.652	NO
MW374	Upgradient	Yes	21.5	N/A	3.068	NO
MW375	Sidegradient	Yes	11.8	N/A	2.468	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.*

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Vanadium**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.055    S= 0.072    CV(1)= 1.319    K factor\*\*= 2.523    TL(1)= 0.237    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -3.438    S= 0.912    CV(2)=-0.265    K factor\*\*= 2.523    TL(2)= -1.138    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.02	-3.912
1/8/2003	0.02	-3.912
4/3/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/6/2003	0.02	-3.912

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.2	-1.609
1/7/2003	0.2	-1.609
4/2/2003	0.2	-1.609
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912
1/6/2004	0.02	-3.912
4/7/2004	0.02	-3.912
7/14/2004	0.02	-3.912

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	No	0.01	N/A	-4.605	N/A
MW365	Downgradient	Yes	0.00474	N/A	-5.352	NO
MW371	Upgradient	Yes	0.00487	N/A	-5.325	NO
MW374	Upgradient	No	0.01	N/A	-4.605	N/A
MW375	Sidegradient	Yes	0.00391	N/A	-5.544	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Zinc**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.060    S= 0.083    CV(1)= 1.380    K factor\*\*= 2.523    TL(1)= 0.270    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -3.259    S= 0.840    CV(2)=-0.258    K factor\*\*= 2.523    TL(2)= -1.140    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number:	MW371	
Date Collected	Result	LN(Result)
3/18/2002	0.1	-2.303
4/22/2002	0.1	-2.303
7/15/2002	0.1	-2.303
10/8/2002	0.025	-3.689
1/8/2003	0.035	-3.352
4/3/2003	0.035	-3.352
7/9/2003	0.0376	-3.281
10/6/2003	0.02	-3.912

Well Number:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	0.025	-3.689
1/7/2003	0.35	-1.050
4/2/2003	0.035	-3.352
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912
1/6/2004	0.02	-3.912
4/7/2004	0.02	-3.912
7/14/2004	0.02	-3.912

**Dry/Partially Dry Wells**

Well No.	Gradient
MW359	Downgradient
MW368	Downgradient
MW376	Sidegradient
MW377	Sidegradient

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	No	0.01	N/A	-4.605	N/A
MW365	Downgradient	Yes	0.0233	N/A	-3.759	NO
MW371	Upgradient	Yes	0.00425	N/A	-5.461	NO
MW374	Upgradient	Yes	0.00792	N/A	-4.838	NO
MW375	Sidegradient	Yes	0.00343	N/A	-5.675	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Acetone**

**UNITS: ug/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 372.563    S= 1447.319    CV(1)=3.885      **K factor\*\*= 2.523**      TL(1)= 4024.149    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.736    S= 1.603    CV(2)=0.586      **K factor\*\*= 2.523**      TL(2)= 6.780      LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	5	1.609
4/22/2002	10	2.303
7/15/2002	14	2.639
10/8/2002	10	2.303
1/8/2003	10	2.303
4/3/2003	10	2.303
7/8/2003	10	2.303
10/6/2003	5800	8.666

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	5	N/A	1.609	N/A
MW360	Downgradient	No	5	N/A	1.609	N/A
MW363	Downgradient	No	5	N/A	1.609	N/A
MW366	Downgradient	No	5	N/A	1.609	N/A
MW369	Upgradient	Yes	2.47	N/A	0.904	NO
MW372	Upgradient	No	5	N/A	1.609	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	14	2.639
4/23/2002	10	2.303
7/16/2002	10	2.303
10/8/2002	10	2.303
1/7/2003	10	2.303
4/2/2003	10	2.303
7/9/2003	18	2.890
10/7/2003	10	2.303

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Aluminum**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.625    S= 0.774    CV(1)= 1.239    K factor\*\*= 2.523    TL(1)= 2.578    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.973    S= 0.935    CV(2)=-0.961    K factor\*\*= 2.523    TL(2)= 1.386    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.255	-1.366
4/22/2002	0.2	-1.609
7/15/2002	0.322	-1.133
10/8/2002	0.2	-1.609
1/8/2003	0.2	-1.609
4/3/2003	0.2	-1.609
7/8/2003	0.2	-1.609
10/6/2003	0.689	-0.373

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.0382	N/A	-3.265	NO
MW360	Downgradient	Yes	0.0491	N/A	-3.014	NO
MW363	Downgradient	No	0.05	N/A	-2.996	N/A
MW366	Downgradient	No	0.05	N/A	-2.996	N/A
MW369	Upgradient	Yes	0.0812	N/A	-2.511	NO
MW372	Upgradient	No	0.05	N/A	-2.996	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	2.61	0.959
4/23/2002	0.2	-1.609
7/16/2002	1.14	0.131
10/8/2002	0.862	-0.149
1/7/2003	2.32	0.842
4/2/2003	0.2	-1.609
7/9/2003	0.2	-1.609
10/7/2003	0.2	-1.609

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Beta activity**

**UNITS: pCi/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 15.996    S= 11.899    CV(1)=0.744      K factor\*\*= 2.523    TL(1)= 46.017    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.497    S= 0.783    CV(2)=0.314      K factor\*\*= 2.523    TL(2)= 4.473    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	32.5	3.481
4/22/2002	35.4	3.567
7/15/2002	12.9	2.557
10/8/2002	7.59	2.027
1/8/2003	9.58	2.260
4/3/2003	6.69	1.901
7/8/2003	9.1	2.208
10/6/2003	7.31	1.989

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	17.2	N/A	2.845	N/A
MW360	Downgradient	No	9.94	N/A	2.297	N/A
MW363	Downgradient	No	-9.93	N/A	#Error	N/A
MW366	Downgradient	Yes	47.5	N/A	3.861	N/A
MW369	Upgradient	Yes	23.2	N/A	3.144	N/A
MW372	Upgradient	Yes	123	YES	4.812	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	28.5	3.350
4/23/2002	5.37	1.681
7/16/2002	19.9	2.991
10/8/2002	38.7	3.656
1/7/2003	13	2.565
4/2/2003	3.94	1.371
7/9/2003	3.56	1.270
10/7/2003	21.9	3.086

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

MW372

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Boron**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.985    S= 0.825    CV(1)=0.838    K factor\*\*= 2.523    TL(1)= 3.067    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.430    S= 0.990    CV(2)=-2.302    K factor\*\*= 2.523    TL(2)= 2.068    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/22/2002	2	0.693
7/15/2002	2	0.693
10/8/2002	0.2	-1.609
1/8/2003	0.2	-1.609
4/3/2003	0.2	-1.609
7/8/2003	0.2	-1.609
10/6/2003	0.2	-1.609

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.385	NO	-0.955	N/A
MW360	Downgradient	Yes	0.0228	NO	-3.781	N/A
MW363	Downgradient	Yes	0.0302	NO	-3.500	N/A
MW366	Downgradient	Yes	0.174	NO	-1.749	N/A
MW369	Upgradient	Yes	0.0175	NO	-4.046	N/A
MW372	Upgradient	Yes	0.899	NO	-0.106	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	2	0.693
4/23/2002	2	0.693
7/16/2002	2	0.693
10/8/2002	0.492	-0.709
1/7/2003	0.492	-0.709
4/2/2003	0.6	-0.511
7/9/2003	0.57	-0.562
10/7/2003	0.604	-0.504

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Bromide**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.000    S= 0.000    CV(1)=0.000    K factor\*\*= 2.523    TL(1)= 1.000    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 0.000    S= 0.000    CV(2)=#Num!    K factor\*\*= 2.523    TL(2)= 0.000    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/22/2002	1	0.000
7/15/2002	1	0.000
10/8/2002	1	0.000
1/8/2003	1	0.000
4/3/2003	1	0.000
7/8/2003	1	0.000
10/6/2003	1	0.000

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.414	NO	-0.882	N/A
MW360	Downgradient	Yes	0.129	NO	-2.048	N/A
MW363	Downgradient	Yes	0.132	NO	-2.025	N/A
MW366	Downgradient	Yes	0.49	NO	-0.713	N/A
MW369	Upgradient	Yes	0.391	NO	-0.939	N/A
MW372	Upgradient	Yes	0.573	NO	-0.557	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	1	0.000
4/23/2002	1	0.000
7/16/2002	1	0.000
10/8/2002	1	0.000
1/7/2003	1	0.000
4/2/2003	1	0.000
7/9/2003	1	0.000
10/7/2003	1	0.000

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Calcium**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 32.763    S= 9.391    CV(1)=0.287    K factor\*\*= 2.523    TL(1)= 56.456    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.449    S= 0.299    CV(2)=0.087    K factor\*\*= 2.523    TL(2)= 4.202    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	29.5	3.384
4/22/2002	29.8	3.395
7/15/2002	25.3	3.231
10/8/2002	21.9	3.086
1/8/2003	20.9	3.040
4/3/2003	22.2	3.100
7/8/2003	22.9	3.131
10/6/2003	21.7	3.077

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	30	NO	3.401	N/A
MW360	Downgradient	Yes	18	NO	2.890	N/A
MW363	Downgradient	Yes	28.3	NO	3.343	N/A
MW366	Downgradient	Yes	30.3	NO	3.411	N/A
MW369	Upgradient	Yes	16.3	NO	2.791	N/A
MW372	Upgradient	Yes	49.7	NO	3.906	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	41.5	3.726
4/23/2002	43.6	3.775
7/16/2002	40.4	3.699
10/8/2002	38.8	3.658
1/7/2003	41.1	3.716
4/2/2003	42.9	3.759
7/9/2003	35.1	3.558
10/7/2003	46.6	3.842

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis Historical Background Comparison**  
**Chemical Oxygen Demand (COD) UNITS: mg/L URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data** X= 35.938 S= 3.750 CV(1)=0.104 K factor\*\*= 2.523 TL(1)= 45.399 LL(1)=N/A

**Statistics-Transformed Background Data** X= 3.578 S= 0.089 CV(2)=0.025 K factor\*\*= 2.523 TL(2)= 3.803 LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	35	3.555
4/22/2002	35	3.555
7/15/2002	35	3.555
10/8/2002	50	3.912
1/8/2003	35	3.555
4/3/2003	35	3.555
7/8/2003	35	3.555
10/6/2003	35	3.555

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	21.4	NO	3.063	N/A
MW360	Downgradient	No	19.7	N/A	2.981	N/A
MW363	Downgradient	Yes	24.7	NO	3.207	N/A
MW366	Downgradient	No	14.7	N/A	2.688	N/A
MW369	Upgradient	Yes	21.4	NO	3.063	N/A
MW372	Upgradient	No	16.4	N/A	2.797	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	35	3.555
4/23/2002	35	3.555
7/16/2002	35	3.555
10/8/2002	35	3.555
1/7/2003	35	3.555
4/2/2003	35	3.555
7/9/2003	35	3.555
10/7/2003	35	3.555

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Chloride**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 44.119    S= 4.554    CV(1)=0.103    K factor\*\*= 2.523    TL(1)= 55.607    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.782    S= 0.099    CV(2)=0.026    K factor\*\*= 2.523    TL(2)= 4.033    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
7/15/2002	48.3	3.877
10/8/2002	47.7	3.865
1/8/2003	45.7	3.822
4/3/2003	47.4	3.859
7/8/2003	55.9	4.024
10/6/2003	47.4	3.859
1/7/2004	45.5	3.818
4/7/2004	43.4	3.770

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	33	NO	3.497	N/A
MW360	Downgradient	Yes	9.05	NO	2.203	N/A
MW363	Downgradient	Yes	25.8	NO	3.250	N/A
MW366	Downgradient	Yes	40.2	NO	3.694	N/A
MW369	Upgradient	Yes	33.6	NO	3.515	N/A
MW372	Upgradient	Yes	47.9	NO	3.869	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
7/16/2002	39.8	3.684
10/8/2002	41	3.714
1/7/2003	39.4	3.674
4/2/2003	39.2	3.669
7/9/2003	39.8	3.684
10/7/2003	40	3.689
1/5/2004	43.4	3.770
4/5/2004	42	3.738

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Cobalt**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.025    S= 0.021    CV(1)=0.845    K factor\*\*= 2.523    TL(1)= 0.077    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -4.090    S= 1.006    CV(2)=-0.246    K factor\*\*= 2.523    TL(2)= -1.553    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.00938	-4.669
1/8/2003	0.00548	-5.207
4/3/2003	0.00587	-5.138
7/8/2003	0.0541	-2.917
10/6/2003	0.0689	-2.675

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/16/2002	0.025	-3.689
10/8/2002	0.00158	-6.450
1/7/2003	0.0147	-4.220
4/2/2003	0.0116	-4.457
7/9/2003	0.0653	-2.729
10/7/2003	0.00788	-4.843

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.001	N/A	-6.908	N/A
MW360	Downgradient	Yes	0.00506	NO	-5.286	N/A
MW363	Downgradient	Yes	0.000818	NO	-7.109	N/A
MW366	Downgradient	No	0.001	N/A	-6.908	N/A
MW369	Upgradient	Yes	0.00626	NO	-5.074	N/A
MW372	Upgradient	Yes	0.00116	NO	-6.759	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Conductivity**

**UNITS: umho/cm**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 482.856   S= 57.603   CV(1)=0.119    **K factor\*\*= 2.523**    TL(1)= 628.189   LL(1)=N/A

**Statistics-Transformed Background Data**      X= 6.173    S= 0.123    CV(2)=0.020    **K factor\*\*= 2.523**    TL(2)= 6.484    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	388	5.961
4/22/2002	404	6.001
7/15/2002	394	5.976
10/8/2002	403	5.999
1/8/2003	520	6.254
4/3/2003	487	6.188
7/8/2003	478	6.170
10/6/2003	476	6.165

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	430	NO	6.064	N/A
MW360	Downgradient	Yes	404	NO	6.001	N/A
MW363	Downgradient	Yes	410	NO	6.016	N/A
MW366	Downgradient	Yes	491	NO	6.196	N/A
MW369	Upgradient	Yes	374	NO	5.924	N/A
MW372	Upgradient	Yes	618	NO	6.426	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	508	6.230
4/23/2002	501	6.217
7/16/2002	507	6.229
10/8/2002	495	6.205
1/7/2003	508.7	6.232
4/2/2003	515	6.244
7/9/2003	576	6.356
10/7/2003	565	6.337

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Copper**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.025    S= 0.010    CV(1)=0.400    K factor\*\*= 2.523    TL(1)= 0.050    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -3.742    S= 0.307    CV(2)=-0.082    K factor\*\*= 2.523    TL(2)= -2.967    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.05	-2.996
10/8/2002	0.02	-3.912
1/8/2003	0.02	-3.912
4/3/2003	0.02	-3.912
7/8/2003	0.02	-3.912
10/6/2003	0.02	-3.912

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.00258	NO	-5.960	N/A
MW360	Downgradient	Yes	0.000598	NO	-7.422	N/A
MW363	Downgradient	No	0.001	N/A	-6.908	N/A
MW366	Downgradient	Yes	0.000598	NO	-7.422	N/A
MW369	Upgradient	Yes	0.00123	NO	-6.701	N/A
MW372	Upgradient	Yes	0.000787	NO	-7.147	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/16/2002	0.05	-2.996
10/8/2002	0.02	-3.912
1/7/2003	0.02	-3.912
4/2/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Dissolved Oxygen**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.781    S= 1.351    CV(1)=0.759    K factor\*\*= 2.523    TL(1)= 5.190    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 0.228    S= 1.065    CV(2)=4.665    K factor\*\*= 2.523    TL(2)= 2.915    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	5.41	1.688
4/22/2002	1.57	0.451
7/15/2002	0.8	-0.223
10/8/2002	1.09	0.086
1/8/2003	2.69	0.990
4/3/2003	2.04	0.713
7/8/2003	1.19	0.174
10/6/2003	1.78	0.577

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	3.19	NO	1.160	N/A
MW360	Downgradient	Yes	1.17	NO	0.157	N/A
MW363	Downgradient	Yes	0.94	NO	-0.062	N/A
MW366	Downgradient	Yes	3.06	NO	1.118	N/A
MW369	Upgradient	Yes	1.36	NO	0.307	N/A
MW372	Upgradient	Yes	0.79	NO	-0.236	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	3.89	1.358
4/23/2002	0.05	-2.996
7/16/2002	1.33	0.285
10/8/2002	2.66	0.978
1/7/2003	0.4	-0.916
4/2/2003	0.91	-0.094
7/9/2003	1.42	0.351
10/7/2003	1.26	0.231

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Dissolved Solids**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 285.188    S= 44.908    CV(1)=0.157      K factor\*\*= 2.523    TL(1)= 398.489    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 5.640    S= 0.175    CV(2)=0.031      K factor\*\*= 2.523    TL(2)= 6.080    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	173	5.153
4/22/2002	246	5.505
7/15/2002	232	5.447
10/8/2002	275	5.617
1/8/2003	269	5.595
4/3/2003	250	5.521
7/8/2003	295	5.687
10/6/2003	276	5.620

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	227	NO	5.425	N/A
MW360	Downgradient	Yes	207	NO	5.333	N/A
MW363	Downgradient	Yes	250	NO	5.521	N/A
MW366	Downgradient	Yes	271	NO	5.602	N/A
MW369	Upgradient	Yes	196	NO	5.278	N/A
MW372	Upgradient	Yes	336	NO	5.817	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	295	5.687
4/23/2002	322	5.775
7/16/2002	329	5.796
10/8/2002	290	5.670
1/7/2003	316	5.756
4/2/2003	311	5.740
7/9/2003	347	5.849
10/7/2003	337	5.820

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Iodide**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 2.000    S= 0.000    CV(1)=0.000    K factor\*\*= 2.523    TL(1)= 2.000    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 0.693    S= 0.000    CV(2)=0.000    K factor\*\*= 2.523    TL(2)= 0.693    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/22/2002	2	0.693
7/15/2002	2	0.693
10/8/2002	2	0.693
1/8/2003	2	0.693
4/3/2003	2	0.693
7/8/2003	2	0.693
10/6/2003	2	0.693

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.5	N/A	-0.693	N/A
MW360	Downgradient	No	0.5	N/A	-0.693	N/A
MW363	Downgradient	Yes	0.17	NO	-1.772	N/A
MW366	Downgradient	No	0.5	N/A	-0.693	N/A
MW369	Upgradient	No	0.5	N/A	-0.693	N/A
MW372	Upgradient	No	0.5	N/A	-0.693	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	2	0.693
4/23/2002	2	0.693
7/16/2002	2	0.693
10/8/2002	2	0.693
1/7/2003	2	0.693
4/2/2003	2	0.693
7/9/2003	2	0.693
10/7/2003	2	0.693

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Iron**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 7.385    S= 6.991    CV(1)=0.947    K factor\*\*= 2.523    TL(1)= 25.024    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 1.358    S= 1.323    CV(2)=0.974    K factor\*\*= 2.523    TL(2)= 4.697    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.656	-0.422
4/22/2002	0.695	-0.364
7/15/2002	7.1	1.960
10/8/2002	21.5	3.068
1/8/2003	18.5	2.918
4/3/2003	14.9	2.701
7/8/2003	11.3	2.425
10/6/2003	14.9	2.701

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.1	N/A	-2.303	N/A
MW360	Downgradient	Yes	0.429	NO	-0.846	N/A
MW363	Downgradient	Yes	0.0409	NO	-3.197	N/A
MW366	Downgradient	Yes	0.0442	NO	-3.119	N/A
MW369	Upgradient	Yes	0.16	NO	-1.833	N/A
MW372	Upgradient	Yes	0.0592	NO	-2.827	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	5.95	1.783
4/23/2002	0.792	-0.233
7/16/2002	1.78	0.577
10/8/2002	0.776	-0.254
1/7/2003	3.55	1.267
4/2/2003	5.02	1.613
7/9/2003	10	2.303
10/7/2003	0.733	-0.311

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.*

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Magnesium**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 12.864    S= 3.505    CV(1)=0.272    K factor\*\*= 2.523    TL(1)= 21.707    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.517    S= 0.290    CV(2)=0.115    K factor\*\*= 2.523    TL(2)= 3.248    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	11.4	2.434
4/22/2002	12	2.485
7/15/2002	10	2.303
10/8/2002	8.62	2.154
1/8/2003	7.89	2.066
4/3/2003	7.97	2.076
7/8/2003	10.3	2.332
10/6/2003	9.14	2.213

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	12.5	NO	2.526	N/A
MW360	Downgradient	Yes	7.63	NO	2.032	N/A
MW363	Downgradient	Yes	11.1	NO	2.407	N/A
MW366	Downgradient	Yes	13.6	NO	2.610	N/A
MW369	Upgradient	Yes	7.02	NO	1.949	N/A
MW372	Upgradient	Yes	19.1	NO	2.950	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	15.7	2.754
4/23/2002	16.6	2.809
7/16/2002	15.4	2.734
10/8/2002	15.8	2.760
1/7/2003	15.8	2.760
4/2/2003	16.4	2.797
7/9/2003	15.2	2.721
10/7/2003	17.6	2.868

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Manganese**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X=0.413    S= 0.274    CV(1)=0.664    K factor\*\*= 2.523    TL(1)= 1.105    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -1.226    S= 1.008    CV(2)=-0.822    K factor\*\*= 2.523    TL(2)= 1.317    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.034	-3.381
4/22/2002	0.062	-2.781
7/15/2002	0.436	-0.830
10/8/2002	0.867	-0.143
1/8/2003	0.828	-0.189
4/3/2003	0.672	-0.397
7/8/2003	0.321	-1.136
10/6/2003	0.714	-0.337

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.013	NO	-4.343	N/A
MW360	Downgradient	Yes	0.08	NO	-2.526	N/A
MW363	Downgradient	Yes	0.154	NO	-1.871	N/A
MW366	Downgradient	Yes	0.00934	NO	-4.673	N/A
MW369	Upgradient	Yes	0.0166	NO	-4.098	N/A
MW372	Upgradient	Yes	0.00402	NO	-5.516	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.205	-1.585
4/23/2002	0.345	-1.064
7/16/2002	0.21	-1.561
10/8/2002	0.0539	-2.921
1/7/2003	0.537	-0.622
4/2/2003	0.415	-0.879
7/9/2003	0.654	-0.425
10/7/2003	0.254	-1.370

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Molybdenum**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.010    S= 0.012    CV(1)= 1.199    K factor\*\*= 2.523    TL(1)= 0.040    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -5.698    S= 1.607    CV(2)=-0.282    K factor\*\*= 2.523    TL(2)= -1.643    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.001	-6.908
1/8/2003	0.001	-6.908
4/3/2003	0.001	-6.908
7/8/2003	0.001	-6.908
10/6/2003	0.001	-6.908

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/16/2002	0.025	-3.689
10/8/2002	0.001	-6.908
1/7/2003	0.001	-6.908
4/2/2003	0.001	-6.908
7/9/2003	0.00105	-6.859
10/7/2003	0.001	-6.908

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.0005	N/A	-7.601	N/A
MW360	Downgradient	Yes	0.000262	N/A	-8.247	NO
MW363	Downgradient	No	0.0005	N/A	-7.601	N/A
MW366	Downgradient	No	0.0005	N/A	-7.601	N/A
MW369	Upgradient	No	0.0005	N/A	-7.601	N/A
MW372	Upgradient	Yes	0.000255	N/A	-8.274	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Nickel**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.024    S= 0.021    CV(1)=0.910    K factor\*\*= 2.523    TL(1)= 0.078    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -4.246    S= 1.075    CV(2)=-0.253    K factor\*\*= 2.523    TL(2)= -1.535    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.05	-2.996
4/22/2002	0.05	-2.996
7/15/2002	0.05	-2.996
10/8/2002	0.005	-5.298
1/8/2003	0.005	-5.298
4/3/2003	0.005	-5.298
7/8/2003	0.013	-4.343
10/6/2003	0.0104	-4.566

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.0015	NO	-6.502	N/A
MW360	Downgradient	Yes	0.00129	NO	-6.653	N/A
MW363	Downgradient	Yes	0.00211	NO	-6.161	N/A
MW366	Downgradient	Yes	0.000627	NO	-7.375	N/A
MW369	Upgradient	Yes	0.00681	NO	-4.989	N/A
MW372	Upgradient	Yes	0.00158	NO	-6.450	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.05	-2.996
4/23/2002	0.05	-2.996
7/16/2002	0.05	-2.996
10/8/2002	0.005	-5.298
1/7/2003	0.005	-5.298
4/2/2003	0.005	-5.298
7/9/2003	0.019	-3.963
10/7/2003	0.005	-5.298

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

## Oxidation-Reduction Potential

UNITS: mV

URGA

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 74.563    S= 94.243    CV(1)=1.264      K factor\*\*= 2.523    TL(1)= 312.337    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 4.554    S= 0.784    CV(2)=0.172      K factor\*\*= 2.523    TL(2)= 5.371    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	215	5.371
4/22/2002	110	4.700
7/15/2002	20	2.996
1/8/2003	-5	#Func!
4/3/2003	-18	#Func!
7/8/2003	-67	#Func!
10/6/2003	-1	#Func!
1/7/2004	55	4.007

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	210	5.347
4/23/2002	65	4.174
7/16/2002	215	5.371
10/8/2002	185	5.220
1/7/2003	45	3.807
4/2/2003	65	4.174
7/9/2003	-39	#Func!
10/7/2003	138	4.927

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	418	N/A	6.035	YES
MW360	Downgradient	Yes	321	N/A	5.771	YES
MW363	Downgradient	Yes	391	N/A	5.969	YES
MW366	Downgradient	Yes	260	N/A	5.561	YES
MW369	Upgradient	Yes	341	N/A	5.832	YES
MW372	Upgradient	Yes	295	N/A	5.687	YES

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

- MW357
- MW360
- MW363
- MW366
- MW369
- MW372

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**PCB, Total**

**UNITS: UG/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.390    S= 0.350    CV(1)=0.897    K factor\*\*= 2.523    TL(1)= 1.272    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -1.238    S= 0.737    CV(2)=-0.595    K factor\*\*= 2.523    TL(2)= 0.622    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/22/2002	0.17	-1.772
7/15/2002	0.17	-1.772
7/8/2003	1.15	0.140
10/6/2003	0.605	-0.503
7/13/2004	0.42	-0.868
7/20/2005	0.28	-1.273
4/4/2006	0.23	-1.470

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.0952	N/A	-2.352	N/A
MW360	Downgradient	Yes	0.04	NO	-3.219	N/A
MW363	Downgradient	No	0.0962	N/A	-2.341	N/A
MW366	Downgradient	No	0.0962	N/A	-2.341	N/A
MW369	Upgradient	No	0.0971	N/A	-2.332	N/A
MW372	Upgradient	No	0.0962	N/A	-2.341	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	1	0.000
4/23/2002	0.17	-1.772
7/16/2002	0.17	-1.772
7/9/2003	0.17	-1.772
10/7/2003	0.17	-1.772
7/14/2004	0.18	-1.715
7/21/2005	0.17	-1.772
4/5/2006	0.18	-1.715

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**PCB-1242**

**UNITS: UG/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.281    S= 0.383    CV(1)= 1.361    K factor\*\*= 2.523    TL(1)= 1.247    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -1.835    S= 0.938    CV(2)=-0.511    K factor\*\*= 2.523    TL(2)= 0.532    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/22/2002	0.11	-2.207
7/15/2002	0.11	-2.207
7/8/2003	1.15	0.140
10/6/2003	0.09	-2.408
7/13/2004	0.1	-2.303
7/20/2005	0.1	-2.303
4/4/2006	0.1	-2.303

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.0952	N/A	-2.352	N/A
MW360	Downgradient	Yes	0.04	N/A	-3.219	NO
MW363	Downgradient	No	0.0962	N/A	-2.341	N/A
MW366	Downgradient	No	0.0962	N/A	-2.341	N/A
MW369	Upgradient	No	0.0971	N/A	-2.332	N/A
MW372	Upgradient	No	0.0962	N/A	-2.341	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	1	0.000
4/23/2002	0.11	-2.207
7/16/2002	0.11	-2.207
7/9/2003	0.13	-2.040
10/7/2003	0.09	-2.408
7/14/2004	0.1	-2.303
7/21/2005	0.1	-2.303
4/5/2006	0.1	-2.303

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**pH**

**UNITS: Std Unit**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 6.274    S= 0.194    CV(1)=0.031    K factor\*\*= 2.904    TL(1)= 6.837    LL(1)=5.7114

**Statistics-Transformed Background Data**      X= 1.836    S= 0.031    CV(2)=0.017    K factor\*\*= 2.904    TL(2)= 1.925    LL(2)=1.7467

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	6.1	1.808
4/22/2002	6.1	1.808
7/15/2002	6.1	1.808
10/8/2002	6.5	1.872
1/8/2003	6.5	1.872
4/3/2003	6.6	1.887
7/8/2003	6.5	1.872
10/6/2003	6.5	1.872

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)? Result <LL(1)?	LN(Result)	LN(Result) >TL(2)? LN(Result) <LL(2)?
MW357	Downgradient	Yes	5.81	NO	1.760	N/A
MW360	Downgradient	Yes	6.14	NO	1.815	N/A
MW363	Downgradient	Yes	6.04	NO	1.798	N/A
MW366	Downgradient	Yes	6.07	NO	1.803	N/A
MW369	Upgradient	Yes	6.05	NO	1.800	N/A
MW372	Upgradient	Yes	6.14	NO	1.815	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	6.1	1.808
4/23/2002	6.12	1.812
7/16/2002	6.1	1.808
10/8/2002	6.06	1.802
1/7/2003	6.26	1.834
4/2/2003	6.15	1.816
7/9/2003	6.3	1.841
10/7/2003	6.4	1.856

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Potassium**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.663    S= 0.488    CV(1)=0.293    K factor\*\*= 2.523    TL(1)= 2.895    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 0.456    S= 0.362    CV(2)=0.794    K factor\*\*= 2.523    TL(2)= 1.368    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/22/2002	2.21	0.793
7/15/2002	2	0.693
10/8/2002	0.966	-0.035
1/8/2003	0.727	-0.319
4/3/2003	0.8	-0.223
7/8/2003	1.62	0.482
10/6/2003	1.14	0.131

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	1.68	NO	0.519	N/A
MW360	Downgradient	Yes	0.615	NO	-0.486	N/A
MW363	Downgradient	Yes	1.34	NO	0.293	N/A
MW366	Downgradient	Yes	1.71	NO	0.536	N/A
MW369	Upgradient	Yes	0.551	NO	-0.596	N/A
MW372	Upgradient	Yes	2.15	NO	0.765	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	2.04	0.713
4/23/2002	2.03	0.708
7/16/2002	2	0.693
10/8/2002	1.54	0.432
1/7/2003	1.88	0.631
4/2/2003	2.09	0.737
7/9/2003	1.78	0.577
10/7/2003	1.79	0.582

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Sodium**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 45.100    S= 11.875    CV(1)=0.263      K factor\*\*= 2.523    TL(1)= 75.061    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.780    S= 0.242    CV(2)=0.064      K factor\*\*= 2.523    TL(2)= 4.390    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	35.7	3.575
4/22/2002	37.6	3.627
7/15/2002	42.4	3.747
10/8/2002	66.9	4.203
1/8/2003	67.9	4.218
4/3/2003	61.8	4.124
7/8/2003	45.6	3.820
10/6/2003	59.1	4.079

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	46.5	NO	3.839	N/A
MW360	Downgradient	Yes	59.2	NO	4.081	N/A
MW363	Downgradient	Yes	45	NO	3.807	N/A
MW366	Downgradient	Yes	42.5	NO	3.750	N/A
MW369	Upgradient	Yes	49.3	NO	3.898	N/A
MW372	Upgradient	Yes	49.8	NO	3.908	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	37.2	3.616
4/23/2002	38.6	3.653
7/16/2002	35.6	3.572
10/8/2002	37.5	3.624
1/7/2003	34.1	3.529
4/2/2003	34.4	3.538
7/9/2003	44.1	3.786
10/7/2003	43.1	3.764

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Sulfate**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 45.031    S= 33.919    CV(1)=0.753      K factor\*\*= 2.523    TL(1)= 130.609    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.420    S= 0.981    CV(2)=0.287      K factor\*\*= 2.523    TL(2)= 5.894    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	15.5	2.741
4/22/2002	15.8	2.760
7/15/2002	13.8	2.625
10/8/2002	6.9	1.932
1/8/2003	10.5	2.351
4/3/2003	10.5	2.351
7/8/2003	10.9	2.389
10/6/2003	16.3	2.791

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	46.5	NO	3.839	N/A
MW360	Downgradient	Yes	10.8	NO	2.380	N/A
MW363	Downgradient	Yes	34	NO	3.526	N/A
MW366	Downgradient	Yes	61.2	NO	4.114	N/A
MW369	Upgradient	Yes	9.41	NO	2.242	N/A
MW372	Upgradient	Yes	66.9	NO	4.203	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	71.7	4.272
4/23/2002	74.7	4.313
7/16/2002	74.1	4.305
10/8/2002	70.5	4.256
1/7/2003	75.8	4.328
4/2/2003	81.8	4.404
7/9/2003	83.6	4.426
10/7/2003	88.1	4.478

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S      Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X      Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Technetium-99**

**UNITS: pCi/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 20.821    S= 18.044    CV(1)=0.867      K factor\*\*= 2.523    TL(1)= 66.344    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.770    S= 1.150    CV(2)=0.415      K factor\*\*= 2.523    TL(2)= 3.972    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	41.7	3.731
4/22/2002	53.1	3.972
7/15/2002	18.1	2.896
10/8/2002	16.4	2.797
1/8/2003	3.49	1.250
4/3/2003	9.34	2.234
7/8/2003	17.5	2.862
10/6/2003	17	2.833

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	44.8	3.802
4/23/2002	0.802	-0.221
7/16/2002	19.8	2.986
10/8/2002	46.1	3.831
1/7/2003	-0.973	#Func!
4/2/2003	9.07	2.205
7/9/2003	0	#Func!
10/7/2003	36.9	3.608

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	42.5	NO	3.750	N/A
MW360	Downgradient	No	-2.92	N/A	#Error	N/A
MW363	Downgradient	No	-1.97	N/A	#Error	N/A
MW366	Downgradient	Yes	55.9	NO	4.024	N/A
MW369	Upgradient	Yes	55	NO	4.007	N/A
MW372	Upgradient	Yes	158	YES	5.063	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

MW372

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Total Organic Carbon (TOC)**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 3.513    S= 4.307    CV(1)=1.226    K factor\*\*= 2.523    TL(1)= 14.378    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 0.851    S= 0.828    CV(2)=0.973    K factor\*\*= 2.523    TL(2)= 2.940    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	1.7	0.531
4/22/2002	1.6	0.470
7/15/2002	3.1	1.131
10/8/2002	17.7	2.874
1/8/2003	9	2.197
4/3/2003	4	1.386
7/8/2003	4.9	1.589
10/6/2003	2.4	0.875

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.875	N/A	-0.134	NO
MW360	Downgradient	Yes	1.27	N/A	0.239	NO
MW363	Downgradient	Yes	1.1	N/A	0.095	NO
MW366	Downgradient	Yes	0.877	N/A	-0.131	NO
MW369	Upgradient	Yes	1.2	N/A	0.182	NO
MW372	Upgradient	Yes	1	N/A	0.000	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	1	0.000
4/23/2002	1.2	0.182
7/16/2002	1	0.000
10/8/2002	1	0.000
1/7/2003	1.6	0.470
4/2/2003	1.5	0.405
7/9/2003	3	1.099
10/7/2003	1.5	0.405

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Total Organic Halides (TOX)**

**UNITS: ug/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 67.963    S= 64.316    CV(1)=0.946      K factor\*\*= 2.523    TL(1)= 230.231    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.772    S= 1.023    CV(2)=0.271      K factor\*\*= 2.523    TL(2)= 6.353    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	50	3.912
4/22/2002	50	3.912
7/15/2002	81	4.394
10/8/2002	202	5.308
1/8/2003	177	5.176
4/3/2003	93.1	4.534
7/8/2003	17.5	2.862
10/6/2003	37.5	3.624

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	7.44	NO	2.007	N/A
MW360	Downgradient	Yes	6.12	NO	1.812	N/A
MW363	Downgradient	Yes	12.2	NO	2.501	N/A
MW366	Downgradient	Yes	4.8	NO	1.569	N/A
MW369	Upgradient	Yes	15.7	NO	2.754	N/A
MW372	Upgradient	Yes	14.3	NO	2.660	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	184	5.215
4/23/2002	50	3.912
7/16/2002	50	3.912
10/8/2002	50	3.912
1/7/2003	10	2.303
4/2/2003	12.7	2.542
7/9/2003	10	2.303
10/7/2003	12.6	2.534

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Trichloroethene**

**UNITS: ug/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 5.625    S= 3.594    CV(1)=0.639    K factor\*\*= 2.523    TL(1)= 14.693    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 1.571    S= 0.565    CV(2)=0.360    K factor\*\*= 2.523    TL(2)= 2.995    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	11	2.398
4/22/2002	16	2.773
7/15/2002	8	2.079
10/8/2002	3	1.099
1/8/2003	2	0.693
4/3/2003	3	1.099
7/8/2003	3	1.099
10/6/2003	2	0.693

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	6.85	NO	1.924	N/A
MW360	Downgradient	No	1	N/A	0.000	N/A
MW363	Downgradient	Yes	3.83	N/A	1.343	N/A
MW366	Downgradient	Yes	5.04	NO	1.617	N/A
MW369	Upgradient	Yes	1.03	N/A	0.030	N/A
MW372	Upgradient	Yes	5.72	NO	1.744	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	5	1.609
4/23/2002	5	1.609
7/16/2002	4	1.386
10/8/2002	6	1.792
1/7/2003	5	1.609
4/2/2003	6	1.792
7/9/2003	5	1.609
10/7/2003	6	1.792

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Vanadium**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.024    S= 0.006    CV(1)=0.259    K factor\*\*= 2.523    TL(1)= 0.039    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -3.771    S= 0.223    CV(2)=-0.059    K factor\*\*= 2.523    TL(2)= -3.208    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/22/2002	0.027	-3.612
7/15/2002	0.025	-3.689
10/8/2002	0.02	-3.912
1/8/2003	0.02	-3.912
4/3/2003	0.02	-3.912
7/8/2003	0.02	-3.912
10/6/2003	0.02	-3.912

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.01	N/A	-4.605	N/A
MW360	Downgradient	Yes	0.00381	NO	-5.570	N/A
MW363	Downgradient	No	0.01	N/A	-4.605	N/A
MW366	Downgradient	No	0.01	N/A	-4.605	N/A
MW369	Upgradient	Yes	0.0039	NO	-5.547	N/A
MW372	Upgradient	No	0.01	N/A	-4.605	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.039	-3.244
4/23/2002	0.037	-3.297
7/16/2002	0.025	-3.689
10/8/2002	0.02	-3.912
1/7/2003	0.02	-3.912
4/2/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Zinc**

**UNITS: mg/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.116    S= 0.173    CV(1)= 1.490    K factor\*\*= 2.523    TL(1)= 0.552    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -2.729    S= 1.014    CV(2)=-0.371    K factor\*\*= 2.523    TL(2)= -0.172    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
3/18/2002	0.1	-2.303
4/22/2002	0.1	-2.303
7/15/2002	0.1	-2.303
10/8/2002	0.025	-3.689
1/8/2003	0.035	-3.352
4/3/2003	0.035	-3.352
7/8/2003	0.02	-3.912
10/6/2003	0.02	-3.912

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.00515	N/A	-5.269	NO
MW360	Downgradient	Yes	0.00517	N/A	-5.265	NO
MW363	Downgradient	No	0.01	N/A	-4.605	N/A
MW366	Downgradient	No	0.01	N/A	-4.605	N/A
MW369	Upgradient	Yes	0.00497	N/A	-5.304	NO
MW372	Upgradient	No	0.01	N/A	-4.605	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW372

Date Collected	Result	LN(Result)
3/19/2002	0.725	-0.322
4/23/2002	0.1	-2.303
7/16/2002	0.1	-2.303
10/8/2002	0.025	-3.689
1/7/2003	0.035	-3.352
4/2/2003	0.035	-3.352
7/9/2003	0.2	-1.609
10/7/2003	0.2	-1.609

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Acetone**

**UNITS: ug/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 51.625    S= 137.818    CV(1)=2.670      **K factor\*\*= 2.523**    TL(1)= 399.340    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.777    S= 1.127    CV(2)=0.406      **K factor\*\*= 2.523**    TL(2)= 5.621    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	18	2.890
4/23/2002	110	4.700
7/15/2002	10	2.303
10/8/2002	18	2.890
1/8/2003	10	2.303
4/3/2003	10	2.303
7/9/2003	10	2.303
10/6/2003	10	2.303

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	9	2.197
4/23/2002	560	6.328
7/16/2002	10	2.303
10/8/2002	10	2.303
1/7/2003	10	2.303
4/2/2003	10	2.303
7/9/2003	10	2.303
10/7/2003	11	2.398

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	No	5	N/A	1.609	N/A
MW361	Downgradient	Yes	1.79	N/A	0.582	NO
MW364	Downgradient	No	5	N/A	1.609	N/A
MW367	Downgradient	No	5	N/A	1.609	N/A
MW370	Upgradient	No	5	N/A	1.609	N/A
MW373	Upgradient	No	5	N/A	1.609	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Aluminum**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 2.026    S= 5.626    CV(1)=2.777    K factor\*\*= 2.523    TL(1)= 16.219    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.803    S= 1.380    CV(2)=-1.718    K factor\*\*= 2.523    TL(2)= 2.678    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	4.66	1.539
4/23/2002	0.2	-1.609
7/15/2002	0.2	-1.609
10/8/2002	0.2	-1.609
1/8/2003	0.2	-1.609
4/3/2003	0.2	-1.609
7/9/2003	0.2	-1.609
10/6/2003	0.2	-1.609

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.0288	N/A	-3.547	NO
MW361	Downgradient	No	0.05	N/A	-2.996	N/A
MW364	Downgradient	No	0.05	N/A	-2.996	N/A
MW367	Downgradient	Yes	0.0211	N/A	-3.858	NO
MW370	Upgradient	No	0.05	N/A	-2.996	N/A
MW373	Upgradient	No	0.05	N/A	-2.996	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	22.7	3.122
4/23/2002	1.46	0.378
7/16/2002	0.253	-1.374
10/8/2002	0.482	-0.730
1/7/2003	0.608	-0.498
4/2/2003	0.446	-0.807
7/9/2003	0.2	-1.609
10/7/2003	0.2	-1.609

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Beta activity**

**UNITS: pCi/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X=9.815    S= 7.838    CV(1)=0.799    K factor\*\*= 2.523    TL(1)= 29.591    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.072    S= 0.630    CV(2)=0.304    K factor\*\*= 2.523    TL(2)= 3.662    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	10.1	2.313
4/23/2002	4.46	1.495
7/15/2002	6.58	1.884
10/8/2002	4.9	1.589
1/8/2003	4.47	1.497
4/3/2003	8.65	2.158
7/9/2003	3.66	1.297
10/6/2003	5.38	1.683

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	25.4	N/A	3.235	N/A
MW361	Downgradient	Yes	27.8	N/A	3.325	N/A
MW364	Downgradient	Yes	32.3	N/A	3.475	N/A
MW367	Downgradient	Yes	9.45	N/A	2.246	N/A
MW370	Upgradient	Yes	81.7	YES	4.403	N/A
MW373	Upgradient	Yes	22.8	N/A	3.127	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	15.1	2.715
4/23/2002	6.26	1.834
7/16/2002	6.22	1.828
10/8/2002	4.06	1.401
1/7/2003	11.2	2.416
4/2/2003	18.5	2.918
7/9/2003	13.3	2.588
10/7/2003	34.2	3.532

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

MW370

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Boron**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.140    S= 0.780    CV(1)=0.684    K factor\*\*= 2.523    TL(1)= 3.108    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.235    S= 1.006    CV(2)=-4.287    K factor\*\*= 2.523    TL(2)= 2.303    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	2	0.693
4/23/2002	2	0.693
7/15/2002	2	0.693
10/8/2002	0.2	-1.609
1/8/2003	0.2	-1.609
4/3/2003	0.2	-1.609
7/9/2003	0.2	-1.609
10/6/2003	0.2	-1.609

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.401	NO	-0.914	N/A
MW361	Downgradient	Yes	0.213	NO	-1.546	N/A
MW364	Downgradient	Yes	0.0179	NO	-4.023	N/A
MW367	Downgradient	Yes	0.0208	NO	-3.873	N/A
MW370	Upgradient	Yes	0.0326	NO	-3.423	N/A
MW373	Upgradient	Yes	1.24	NO	0.215	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	2	0.693
4/23/2002	2	0.693
7/16/2002	2	0.693
10/8/2002	0.79	-0.236
1/7/2003	0.807	-0.214
4/2/2003	1.13	0.122
7/9/2003	1.28	0.247
10/7/2003	1.24	0.215

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Bromide**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.000    S= 0.000    CV(1)=0.000    K factor\*\*= 2.523    TL(1)= 1.000    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 0.000    S= 0.000    CV(2)=#Num!    K factor\*\*= 2.523    TL(2)= 0.000    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	1	0.000
4/23/2002	1	0.000
7/15/2002	1	0.000
10/8/2002	1	0.000
1/8/2003	1	0.000
4/3/2003	1	0.000
7/9/2003	1	0.000
10/6/2003	1	0.000

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.438	NO	-0.826	N/A
MW361	Downgradient	Yes	0.458	NO	-0.781	N/A
MW364	Downgradient	Yes	0.436	NO	-0.830	N/A
MW367	Downgradient	Yes	0.156	NO	-1.858	N/A
MW370	Upgradient	Yes	0.419	NO	-0.870	N/A
MW373	Upgradient	Yes	0.572	NO	-0.559	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	1	0.000
4/23/2002	1	0.000
7/16/2002	1	0.000
10/8/2002	1	0.000
1/7/2003	1	0.000
4/2/2003	1	0.000
7/9/2003	1	0.000
10/7/2003	1	0.000

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Calcium**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 43.413    S= 13.444    CV(1)=0.310      K factor\*\*= 2.523    TL(1)= 77.331    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.723    S= 0.323    CV(2)=0.087      K factor\*\*= 2.523    TL(2)= 4.539    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	34.8	3.550
4/23/2002	43.4	3.770
7/15/2002	33.2	3.503
10/8/2002	29.2	3.374
1/8/2003	31.3	3.444
4/3/2003	32.4	3.478
7/9/2003	22.9	3.131
10/6/2003	28	3.332

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	37.1	NO	3.614	N/A
MW361	Downgradient	Yes	33.8	NO	3.520	N/A
MW364	Downgradient	Yes	34.5	NO	3.541	N/A
MW367	Downgradient	Yes	13.2	NO	2.580	N/A
MW370	Upgradient	Yes	26.1	NO	3.262	N/A
MW373	Upgradient	Yes	57.4	NO	4.050	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	61.9	4.126
4/23/2002	59.2	4.081
7/16/2002	47.6	3.863
10/8/2002	46.1	3.831
1/7/2003	49.2	3.896
4/2/2003	57.8	4.057
7/9/2003	52.7	3.965
10/7/2003	64.9	4.173

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis Historical Background Comparison**  
**Chemical Oxygen Demand (COD) UNITS: mg/L LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data** X= 41.938 S= 24.732 CV(1)=0.590 K factor\*\*= 2.523 TL(1)= 104.336 LL(1)=N/A

**Statistics-Transformed Background Data** X= 3.658 S= 0.339 CV(2)=0.093 K factor\*\*= 2.523 TL(2)= 4.512 LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	35	3.555
4/23/2002	134	4.898
7/15/2002	35	3.555
10/8/2002	35	3.555
1/8/2003	35	3.555
4/3/2003	35	3.555
7/9/2003	35	3.555
10/6/2003	35	3.555

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	35	3.555
4/23/2002	47	3.850
7/16/2002	35	3.555
10/8/2002	35	3.555
1/7/2003	35	3.555
4/2/2003	35	3.555
7/9/2003	35	3.555
10/7/2003	35	3.555

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	43.1	NO	3.764	N/A
MW361	Downgradient	No	16.4	N/A	2.797	N/A
MW364	Downgradient	Yes	29.7	NO	3.391	N/A
MW367	Downgradient	Yes	26.4	NO	3.273	N/A
MW370	Upgradient	Yes	31.4	NO	3.447	N/A
MW373	Upgradient	No	14.7	N/A	2.688	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Chloride**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 45.919    S= 7.524    CV(1)=0.164    K factor\*\*= 2.523    TL(1)= 64.901    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.814    S= 0.165    CV(2)=0.043    K factor\*\*= 2.523    TL(2)= 4.231    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
7/15/2002	55.5	4.016
10/8/2002	53.6	3.982
1/8/2003	52.9	3.968
4/3/2003	53.6	3.982
7/9/2003	51.9	3.949
10/6/2003	53	3.970
1/7/2004	53	3.970
4/7/2004	51.6	3.944

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	36.2	NO	3.589	N/A
MW361	Downgradient	Yes	34.2	NO	3.532	N/A
MW364	Downgradient	Yes	35.4	NO	3.567	N/A
MW367	Downgradient	Yes	9.98	NO	2.301	N/A
MW370	Upgradient	Yes	35.8	NO	3.578	N/A
MW373	Upgradient	Yes	44.8	NO	3.802	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
7/16/2002	40.6	3.704
10/8/2002	38.8	3.658
1/7/2003	39	3.664
4/2/2003	38.4	3.648
7/9/2003	38.1	3.640
10/7/2003	38	3.638
1/6/2004	37.9	3.635
4/7/2004	38.8	3.658

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Cobalt**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.027    S= 0.032    CV(1)= 1.165    K factor\*\*= 2.523    TL(1)= 0.108    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -4.058    S= 1.011    CV(2)=-0.249    K factor\*\*= 2.523    TL(2)= -1.507    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.0174	-4.051
1/8/2003	0.0105	-4.556
4/3/2003	0.00931	-4.677
7/9/2003	0.137	-1.988
10/6/2003	0.0463	-3.073

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.00557	N/A	-5.190	NO
MW361	Downgradient	No	0.001	N/A	-6.908	N/A
MW364	Downgradient	Yes	0.000344	N/A	-7.975	NO
MW367	Downgradient	Yes	0.00761	N/A	-4.878	NO
MW370	Upgradient	No	0.001	N/A	-6.908	N/A
MW373	Upgradient	Yes	0.00119	N/A	-6.734	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/23/2002	0.034	-3.381
7/16/2002	0.025	-3.689
10/8/2002	0.00411	-5.494
1/7/2003	0.00344	-5.672
4/2/2003	0.00368	-5.605
7/9/2003	0.0405	-3.206
10/7/2003	0.00843	-4.776

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Conductivity**

**UNITS: umho/cm**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 608.719   S= 156.157   CV(1)=0.257      **K factor\*\*= 2.523**      TL(1)= 1002.702   LL(1)=N/A

**Statistics-Transformed Background Data**      X= 6.380   S= 0.260   CV(2)=0.041      **K factor\*\*= 2.523**      TL(2)= 7.036      LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	406	6.006
4/23/2002	543	6.297
7/15/2002	476	6.165
10/8/2002	441	6.089
1/8/2003	486	6.186
4/3/2003	466	6.144
7/9/2003	479	6.172
10/6/2003	435	6.075

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	501	NO	6.217	N/A
MW361	Downgradient	Yes	481	NO	6.176	N/A
MW364	Downgradient	Yes	473	NO	6.159	N/A
MW367	Downgradient	Yes	250	NO	5.521	N/A
MW370	Upgradient	Yes	442	NO	6.091	N/A
MW373	Upgradient	Yes	725	NO	6.586	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	661	6.494
4/23/2002	801	6.686
7/16/2002	774	6.652
10/8/2002	680	6.522
1/7/2003	686.5	6.532
4/2/2003	763	6.637
7/9/2003	828	6.719
10/7/2003	814	6.702

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Copper**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.025    S= 0.010    CV(1)=0.399    K factor\*\*= 2.523    TL(1)= 0.050    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -3.739    S= 0.308    CV(2)=-0.082    K factor\*\*= 2.523    TL(2)= -2.963    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/15/2002	0.05	-2.996
10/8/2002	0.02	-3.912
1/8/2003	0.02	-3.912
4/3/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/6/2003	0.02	-3.912

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.026	-3.650
4/23/2002	0.025	-3.689
7/16/2002	0.05	-2.996
10/8/2002	0.02	-3.912
1/7/2003	0.02	-3.912
4/2/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.000668	NO	-7.311	N/A
MW361	Downgradient	Yes	0.00122	NO	-6.709	N/A
MW364	Downgradient	Yes	0.000336	NO	-7.998	N/A
MW367	Downgradient	Yes	0.000424	NO	-7.766	N/A
MW370	Upgradient	Yes	0.000653	NO	-7.334	N/A
MW373	Upgradient	Yes	0.000373	NO	-7.894	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Dissolved Oxygen**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.387    S= 1.153    CV(1)=0.831    K factor\*\*= 2.523    TL(1)= 4.295    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.115    S= 1.207    CV(2)=-10.514    K factor\*\*= 2.523    TL(2)= 2.930    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	4.32	1.463
4/23/2002	1.24	0.215
7/15/2002	0.75	-0.288
10/8/2002	0.94	-0.062
1/8/2003	3.08	1.125
4/3/2003	1.45	0.372
7/9/2003	1.22	0.199
10/6/2003	1.07	0.068

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.95	NO	-0.051	N/A
MW361	Downgradient	Yes	3.19	NO	1.160	N/A
MW364	Downgradient	Yes	2.17	NO	0.775	N/A
MW367	Downgradient	Yes	0.71	NO	-0.342	N/A
MW370	Upgradient	Yes	3.31	NO	1.197	N/A
MW373	Upgradient	Yes	1.79	NO	0.582	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	3.04	1.112
4/23/2002	0.03	-3.507
7/16/2002	0.23	-1.470
10/8/2002	0.86	-0.151
1/7/2003	0.21	-1.561
4/2/2003	1.19	0.174
7/9/2003	1.1	0.095
10/7/2003	1.46	0.378

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Dissolved Solids**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 356.188    S= 106.752    CV(1)=0.300      **K factor\*\*= 2.523**    TL(1)= 625.523    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 5.831    S= 0.311    CV(2)=0.053      **K factor\*\*= 2.523**    TL(2)= 6.616    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	236	5.464
4/23/2002	337	5.820
7/15/2002	266	5.583
10/8/2002	240	5.481
1/8/2003	282	5.642
4/3/2003	238	5.472
7/9/2003	248	5.513
10/6/2003	224	5.412

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	274	NO	5.613	N/A
MW361	Downgradient	Yes	261	NO	5.565	N/A
MW364	Downgradient	Yes	256	NO	5.545	N/A
MW367	Downgradient	Yes	140	NO	4.942	N/A
MW370	Upgradient	Yes	223	NO	5.407	N/A
MW373	Upgradient	Yes	393	NO	5.974	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	427	6.057
4/23/2002	507	6.229
7/16/2002	464	6.140
10/8/2002	408	6.011
1/7/2003	404	6.001
4/2/2003	450	6.109
7/9/2003	487	6.188
10/7/2003	481	6.176

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Iron**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 9.230    S= 8.841    CV(1)=0.958    K factor\*\*= 2.523    TL(1)= 31.535    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 1.942    S= 0.713    CV(2)=0.367    K factor\*\*= 2.523    TL(2)= 3.740    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	9.34	2.234
4/23/2002	4.33	1.466
7/15/2002	3.52	1.258
10/8/2002	7.45	2.008
1/8/2003	7.04	1.952
4/3/2003	4.64	1.535
7/9/2003	15.8	2.760
10/6/2003	6.49	1.870

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	2.24	NO	0.806	N/A
MW361	Downgradient	No	0.1	N/A	-2.303	N/A
MW364	Downgradient	Yes	0.0471	NO	-3.055	N/A
MW367	Downgradient	Yes	7.09	NO	1.959	N/A
MW370	Upgradient	No	0.1	N/A	-2.303	N/A
MW373	Upgradient	Yes	0.0428	NO	-3.151	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	37.6	3.627
4/23/2002	19	2.944
7/16/2002	10.7	2.370
10/8/2002	3.75	1.322
1/7/2003	3.87	1.353
4/2/2003	3.5	1.253
7/9/2003	7.72	2.044
10/7/2003	2.93	1.075

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Magnesium**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 17.544    S= 5.911    CV(1)=0.337    K factor\*\*= 2.523    TL(1)= 32.458    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.810    S= 0.343    CV(2)=0.122    K factor\*\*= 2.523    TL(2)= 3.676    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	12.1	2.493
4/23/2002	15.1	2.715
7/15/2002	12.4	2.518
10/8/2002	12.2	2.501
1/8/2003	11.5	2.442
4/3/2003	12.3	2.510
7/9/2003	10	2.303
10/6/2003	12.1	2.493

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	24.8	3.211
4/23/2002	22.7	3.122
7/16/2002	18.8	2.934
10/8/2002	21.1	3.049
1/7/2003	19.9	2.991
4/2/2003	25.5	3.239
7/9/2003	23.3	3.148
10/7/2003	26.9	3.292

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	16.6	NO	2.809	N/A
MW361	Downgradient	Yes	14.2	NO	2.653	N/A
MW364	Downgradient	Yes	14.5	NO	2.674	N/A
MW367	Downgradient	Yes	7.56	NO	2.023	N/A
MW370	Upgradient	Yes	11.5	NO	2.442	N/A
MW373	Upgradient	Yes	23.2	NO	3.144	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Manganese**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 1.080    S= 0.674    CV(1)=0.624    K factor\*\*= 2.523    TL(1)= 2.780    LL(1)=N/A

**Statistics-Transformed Background Data**      X= -0.114    S= 0.658    CV(2)=-5.762    K factor\*\*= 2.523    TL(2)= 1.547    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.244	-1.411
4/23/2002	1.82	0.599
7/15/2002	1.22	0.199
10/8/2002	0.988	-0.012
1/8/2003	0.729	-0.316
4/3/2003	0.637	-0.451
7/9/2003	2.51	0.920
10/6/2003	1.05	0.049

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.355	-1.036
4/23/2002	2.16	0.770
7/16/2002	1.39	0.329
10/8/2002	0.717	-0.333
1/7/2003	0.587	-0.533
4/2/2003	0.545	-0.607
7/9/2003	1.76	0.565
10/7/2003	0.57	-0.562

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.416	NO	-0.877	N/A
MW361	Downgradient	Yes	0.00242	NO	-6.024	N/A
MW364	Downgradient	Yes	0.0183	NO	-4.001	N/A
MW367	Downgradient	Yes	1.34	NO	0.293	N/A
MW370	Upgradient	No	0.005	N/A	-5.298	N/A
MW373	Upgradient	Yes	0.0258	NO	-3.657	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Molybdenum**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.010    S= 0.012    CV(1)= 1.198    K factor\*\*= 2.523    TL(1)= 0.040    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -5.693    S= 1.604    CV(2)=-0.282    K factor\*\*= 2.523    TL(2)= -1.647    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/15/2002	0.025	-3.689
10/8/2002	0.00113	-6.786
1/8/2003	0.001	-6.908
4/3/2003	0.001	-6.908
7/9/2003	0.001	-6.908
10/6/2003	0.001	-6.908

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.000454	N/A	-7.697	NO
MW361	Downgradient	No	0.0005	N/A	-7.601	N/A
MW364	Downgradient	Yes	0.000284	N/A	-8.167	NO
MW367	Downgradient	No	0.0005	N/A	-7.601	N/A
MW370	Upgradient	No	0.0005	N/A	-7.601	N/A
MW373	Upgradient	No	0.0005	N/A	-7.601	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.025	-3.689
4/23/2002	0.025	-3.689
7/16/2002	0.025	-3.689
10/8/2002	0.001	-6.908
1/7/2003	0.001	-6.908
4/2/2003	0.001	-6.908
7/9/2003	0.001	-6.908
10/7/2003	0.001	-6.908

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Nickel**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.024    S= 0.022    CV(1)=0.901    K factor\*\*= 2.523    TL(1)= 0.078    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -4.239    S= 1.087    CV(2)=-0.256    K factor\*\*= 2.523    TL(2)= -1.497    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.05	-2.996
4/23/2002	0.05	-2.996
7/15/2002	0.05	-2.996
10/8/2002	0.005	-5.298
1/8/2003	0.005	-5.298
4/3/2003	0.005	-5.298
7/9/2003	0.0264	-3.634
10/6/2003	0.00971	-4.635

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.0216	NO	-3.835	N/A
MW361	Downgradient	No	0.002	N/A	-6.215	N/A
MW364	Downgradient	No	0.002	N/A	-6.215	N/A
MW367	Downgradient	Yes	0.00302	NO	-5.802	N/A
MW370	Upgradient	Yes	0.000706	NO	-7.256	N/A
MW373	Upgradient	Yes	0.00176	NO	-6.342	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.05	-2.996
4/23/2002	0.05	-2.996
7/16/2002	0.05	-2.996
10/8/2002	0.005	-5.298
1/7/2003	0.005	-5.298
4/2/2003	0.005	-5.298
7/9/2003	0.0112	-4.492
10/7/2003	0.005	-5.298

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

## Oxidation-Reduction Potential

UNITS: mV

LRGA

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 46.688    S= 60.986    CV(1)=1.306      K factor\*\*= 2.523    TL(1)= 200.555    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.829    S= 1.151    CV(2)=0.301      K factor\*\*= 2.523    TL(2)= 4.942    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	140	4.942
4/23/2002	-15	#Func!
7/15/2002	5	1.609
4/3/2003	49	3.892
7/9/2003	-35	#Func!
10/6/2003	40	3.689
1/7/2004	101	4.615
4/7/2004	105	4.654

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	140	4.942
4/23/2002	-20	#Func!
10/8/2002	10	2.303
1/7/2003	10	2.303
4/2/2003	67	4.205
7/9/2003	-29	#Func!
10/7/2003	127	4.844
1/6/2004	52	3.951

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	237	N/A	5.468	YES
MW361	Downgradient	Yes	413	N/A	6.023	YES
MW364	Downgradient	Yes	408	N/A	6.011	YES
MW367	Downgradient	Yes	294	N/A	5.684	YES
MW370	Upgradient	Yes	346	N/A	5.846	YES
MW373	Upgradient	Yes	438	N/A	6.082	YES

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

- MW358
- MW361
- MW364
- MW367
- MW370
- MW373

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**pH**

**UNITS: Std Unit**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 6.283    S= 0.159    CV(1)=0.025    K factor\*\*= 2.904    TL(1)= 6.745    LL(1)=5.8202

**Statistics-Transformed Background Data**      X= 1.837    S= 0.025    CV(2)=0.014    K factor\*\*= 2.904    TL(2)= 1.911    LL(2)=1.7634

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	6.3	1.841
4/23/2002	6.4	1.856
7/15/2002	6.3	1.841
10/8/2002	6.3	1.841
1/8/2003	6.4	1.856
4/3/2003	6.5	1.872
7/9/2003	6.3	1.841
10/6/2003	6.5	1.872

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)? Result <LL(1)?	LN(Result)	LN(Result) >TL(2)? LN(Result) <LL(2)?
MW358	Downgradient	Yes	5.88	NO	1.772	N/A
MW361	Downgradient	Yes	6.03	NO	1.797	N/A
MW364	Downgradient	Yes	5.7	YES	1.740	N/A
MW367	Downgradient	Yes	5.79	YES	1.756	N/A
MW370	Upgradient	Yes	6.01	NO	1.793	N/A
MW373	Upgradient	Yes	6.19	NO	1.823	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	6	1.792
4/23/2002	6.3	1.841
7/16/2002	6.45	1.864
10/8/2002	6.18	1.821
1/7/2003	6.35	1.848
4/2/2003	6.14	1.815
7/9/2003	6.1	1.808
10/7/2003	6	1.792

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

MW364  
MW367

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Potassium**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 2.823    S= 0.522    CV(1)=0.185    K factor\*\*= 2.523    TL(1)= 4.139    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 1.024    S= 0.167    CV(2)=0.163    K factor\*\*= 2.523    TL(2)= 1.445    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	3.22	1.169
4/23/2002	3.43	1.233
7/15/2002	2.98	1.092
10/8/2002	2.46	0.900
1/8/2003	2.41	0.880
4/3/2003	2.43	0.888
7/9/2003	2.44	0.892
10/6/2003	2.48	0.908

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	2.64	NO	0.971	N/A
MW361	Downgradient	Yes	2.08	NO	0.732	N/A
MW364	Downgradient	Yes	1.96	NO	0.673	N/A
MW367	Downgradient	Yes	2.58	NO	0.948	N/A
MW370	Upgradient	Yes	2.24	NO	0.806	N/A
MW373	Upgradient	Yes	2.5	NO	0.916	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	4.34	1.468
4/23/2002	3.04	1.112
7/16/2002	2.93	1.075
10/8/2002	2.3	0.833
1/7/2003	2.45	0.896
4/2/2003	2.7	0.993
7/9/2003	2.68	0.986
10/7/2003	2.88	1.058

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Sodium**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 51.544    S= 15.227    CV(1)=0.295      K factor\*\*= 2.523    TL(1)= 89.962    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.906    S= 0.272    CV(2)=0.070      K factor\*\*= 2.523    TL(2)= 4.592    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	31.8	3.459
4/23/2002	50	3.912
7/15/2002	44.7	3.800
10/8/2002	40	3.689
1/8/2003	44.6	3.798
4/3/2003	41.9	3.735
7/9/2003	40	3.689
10/6/2003	38.1	3.640

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	44.1	NO	3.786	N/A
MW361	Downgradient	Yes	46.8	NO	3.846	N/A
MW364	Downgradient	Yes	47.3	NO	3.857	N/A
MW367	Downgradient	Yes	18.7	NO	2.929	N/A
MW370	Upgradient	Yes	40.4	NO	3.699	N/A
MW373	Upgradient	Yes	50.2	NO	3.916	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	43.4	3.770
4/23/2002	79.8	4.380
7/16/2002	87.7	4.474
10/8/2002	61.6	4.121
1/7/2003	59.3	4.083
4/2/2003	62.1	4.129
7/9/2003	50.1	3.914
10/7/2003	49.6	3.904

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Sulfate**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 122.381    S= 195.095    CV(1)=1.594      **K factor\*\*= 2.523**    TL(1)= 614.606    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.985    S= 1.323    CV(2)=0.332      **K factor\*\*= 2.523**    TL(2)= 7.322    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	17.4	2.856
4/23/2002	37.9	3.635
7/15/2002	15.7	2.754
10/8/2002	13.4	2.595
1/8/2003	14.4	2.667
4/3/2003	18.1	2.896
7/9/2003	9.6	2.262
10/6/2003	16.5	2.803

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	68.6	N/A	4.228	NO
MW361	Downgradient	Yes	74.5	N/A	4.311	NO
MW364	Downgradient	Yes	74.6	N/A	4.312	NO
MW367	Downgradient	Yes	25.1	N/A	3.223	NO
MW370	Upgradient	Yes	21.7	N/A	3.077	NO
MW373	Upgradient	Yes	113	N/A	4.727	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	163.3	5.096
4/23/2002	809.6	6.697
7/16/2002	109.4	4.695
10/8/2002	110.6	4.706
1/7/2003	113.7	4.734
4/2/2003	133	4.890
7/9/2003	182.1	5.205
10/7/2003	193.4	5.265

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.*

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Technetium-99**

**UNITS: pCi/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 7.655    S= 13.274    CV(1)=1.734    **K factor\*\*= 2.523**    TL(1)= 41.146    LL(1)=N/A

**Statistics-Transformed Background Data**    X= 1.946    S= 0.939    CV(2)=0.483    **K factor\*\*= 2.523**    TL(2)= 3.833    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	10.8	2.380
4/23/2002	8.53	2.144
7/15/2002	5.09	1.627
10/8/2002	4.78	1.564
1/8/2003	-5.12	#Func!
4/3/2003	5.11	1.631
7/9/2003	4.25	1.447
10/6/2003	6.54	1.878

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	16.5	2.803
4/23/2002	3.49	1.250
7/16/2002	1.42	0.351
10/8/2002	-6.06	#Func!
1/7/2003	-8.41	#Func!
4/2/2003	26.3	3.270
7/9/2003	3.06	1.118
10/7/2003	46.2	3.833

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	46.5	N/A	3.839	YES
MW361	Downgradient	Yes	48.6	N/A	3.884	YES
MW364	Downgradient	Yes	56.9	N/A	4.041	YES
MW367	Downgradient	No	0.449	N/A	-0.801	N/A
MW370	Upgradient	Yes	114	N/A	4.736	YES
MW373	Upgradient	No	20.3	N/A	3.011	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to historical background data.**

**Wells with Exceedances**

- MW358
- MW361
- MW364
- MW370

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Total Organic Carbon (TOC)**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 6.169    S= 12.072    CV(1)=1.957    **K factor\*\*= 2.523**    TL(1)= 36.626    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 1.069    S= 1.014    CV(2)=0.948    **K factor\*\*= 2.523**    TL(2)= 3.626    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	1.2	0.182
4/23/2002	4.3	1.459
7/15/2002	2.6	0.956
10/8/2002	2.3	0.833
1/8/2003	3	1.099
4/3/2003	1.2	0.182
7/9/2003	2.6	0.956
10/6/2003	1.7	0.531

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	1.1	0.095
4/23/2002	17.5	2.862
7/16/2002	49	3.892
10/8/2002	2.9	1.065
1/7/2003	3.9	1.361
4/2/2003	2.5	0.916
7/9/2003	1.7	0.531
10/7/2003	1.2	0.182

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	1.81	N/A	0.593	NO
MW361	Downgradient	Yes	0.8	N/A	-0.223	NO
MW364	Downgradient	Yes	0.836	N/A	-0.179	NO
MW367	Downgradient	Yes	0.679	N/A	-0.387	NO
MW370	Upgradient	Yes	1.02	N/A	0.020	NO
MW373	Upgradient	Yes	1.2	N/A	0.182	NO

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Total Organic Halides (TOX)**

**UNITS: ug/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 79.819    S= 78.470    CV(1)=0.983      K factor\*\*= 2.523    TL(1)= 277.798    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.971    S= 0.950    CV(2)=0.239      K factor\*\*= 2.523    TL(2)= 6.368    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	50	3.912
4/23/2002	228	5.429
7/15/2002	88	4.477
10/8/2002	58	4.060
1/8/2003	72.4	4.282
4/3/2003	26.6	3.281
7/9/2003	16.4	2.797
10/6/2003	31.1	3.437

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	50	3.912
4/23/2002	276	5.620
7/16/2002	177	5.176
10/8/2002	76	4.331
1/7/2003	45.9	3.826
4/2/2003	57.8	4.057
7/9/2003	10	2.303
10/7/2003	13.9	2.632

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	9.16	NO	2.215	N/A
MW361	Downgradient	Yes	9.92	NO	2.295	N/A
MW364	Downgradient	Yes	7.6	NO	2.028	N/A
MW367	Downgradient	No	10	N/A	2.303	N/A
MW370	Upgradient	Yes	6.16	NO	1.818	N/A
MW373	Upgradient	Yes	11.6	NO	2.451	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Trichloroethene**

**UNITS: ug/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 12.188    S= 6.950    CV(1)=0.570    K factor\*\*= 2.523    TL(1)= 29.721    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.305    S= 0.687    CV(2)=0.298    K factor\*\*= 2.523    TL(2)= 4.039    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	19	2.944
4/23/2002	17	2.833
7/15/2002	15	2.708
10/8/2002	18	2.890
1/8/2003	17	2.833
4/3/2003	18	2.890
7/9/2003	15	2.708
10/6/2003	16	2.773

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	5.18	NO	1.645	N/A
MW361	Downgradient	Yes	7.3	NO	1.988	N/A
MW364	Downgradient	Yes	12.3	NO	2.510	N/A
MW367	Downgradient	Yes	0.57	N/A	-0.562	N/A
MW370	Upgradient	Yes	0.67	N/A	-0.400	N/A
MW373	Upgradient	Yes	7.91	NO	2.068	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	5	1.609
4/23/2002	25	3.219
7/16/2002	3	1.099
10/8/2002	4	1.386
1/7/2003	6	1.792
4/2/2003	5	1.609
7/9/2003	6	1.792
10/7/2003	6	1.792

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Vanadium**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.024    S= 0.008    CV(1)=0.324    K factor\*\*= 2.523    TL(1)= 0.044    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -3.749    S= 0.265    CV(2)=-0.071    K factor\*\*= 2.523    TL(2)= -3.080    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.035	-3.352
4/23/2002	0.033	-3.411
7/15/2002	0.025	-3.689
10/8/2002	0.02	-3.912
1/8/2003	0.02	-3.912
4/3/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/6/2003	0.02	-3.912

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	No	0.01	N/A	-4.605	N/A
MW361	Downgradient	No	0.01	N/A	-4.605	N/A
MW364	Downgradient	No	0.01	N/A	-4.605	N/A
MW367	Downgradient	Yes	0.00468	NO	-5.364	N/A
MW370	Upgradient	Yes	0.00376	NO	-5.583	N/A
MW373	Upgradient	No	0.01	N/A	-4.605	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.048	-3.037
4/23/2002	0.025	-3.689
7/16/2002	0.025	-3.689
10/8/2002	0.02	-3.912
1/7/2003	0.02	-3.912
4/2/2003	0.02	-3.912
7/9/2003	0.02	-3.912
10/7/2003	0.02	-3.912

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

# C-746-U Fourth Quarter 2018 Statistical Analysis    Historical Background Comparison

**Zinc**

**UNITS: mg/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is evidence of an exceedance of the statistically-derived historical background concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 0.055    S= 0.037    CV(1)=0.673    K factor\*\*= 2.523    TL(1)= 0.147    LL(1)=N/A

**Statistics-Transformed Background Data**    X= -3.131    S= 0.691    CV(2)=-0.221    K factor\*\*= 2.523    TL(2)= -1.388    LL(2)=N/A

**Historical Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
3/17/2002	0.1	-2.303
4/23/2002	0.1	-2.303
7/15/2002	0.1	-2.303
10/8/2002	0.025	-3.689
1/8/2003	0.035	-3.352
4/3/2003	0.035	-3.352
7/9/2003	0.02	-3.912
10/6/2003	0.02	-3.912

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.00675	NO	-4.998	N/A
MW361	Downgradient	No	0.01	N/A	-4.605	N/A
MW364	Downgradient	Yes	0.0285	NO	-3.558	N/A
MW367	Downgradient	Yes	0.0146	NO	-4.227	N/A
MW370	Upgradient	Yes	0.00576	NO	-5.157	N/A
MW373	Upgradient	No	0.01	N/A	-4.605	N/A

N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.

Well Number: MW373

Date Collected	Result	LN(Result)
3/18/2002	0.1	-2.303
4/23/2002	0.1	-2.303
7/16/2002	0.1	-2.303
10/8/2002	0.025	-3.689
1/7/2003	0.035	-3.352
4/2/2003	0.035	-3.352
7/9/2003	0.0234	-3.755
10/7/2003	0.02	-3.912

**Conclusion of Statistical Analysis on Historical Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from historical background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV    Coefficient-of-Variation, CV = S/X    If CV is less than or equal to 1 assume normal distribution.

S    Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results - 1])]^0.5

TL    Upper Tolerance Limit, TL = X + (K \* S),      LL    Lower Tolerance Limit, LL = X - (K \* S)

X    Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**ATTACHMENT D2**

**COMPARISON OF CURRENT DATA TO  
ONE-SIDED UPPER TOLERANCE INTERVAL TEST  
CALCULATED USING  
CURRENT BACKGROUND DATA**

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**Dissolved Oxygen**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

<b>Statistics-Background Data</b>	<b>X</b> = 2.619	<b>S</b> = 1.781	<b>CV(1)</b> =0.680	<b>K factor</b> **= 2.523	<b>TL(1)</b> = 7.113	<b>LL(1)</b> =N/A
<b>Statistics-Transformed Background Data</b>	<b>X</b> = 0.775	<b>S</b> = 0.639	<b>CV(2)</b> =0.824	<b>K factor</b> **= 2.523	<b>TL(2)</b> = 2.386	<b>LL(2)</b> =N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW371

Date Collected	Result	LN(Result)
10/19/2016	2.2	0.788
1/18/2017	2.41	0.880
4/18/2017	3.43	1.233
7/20/2017	3.51	1.256
10/3/2017	1.82	0.599
1/22/2018	2.8	1.030
4/12/2018	7.85	2.061
7/18/2018	4.89	1.587

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	3.56	NO	1.270	N/A

Well Number: MW374

Date Collected	Result	LN(Result)
10/19/2016	3.39	1.221
1/19/2017	1.43	0.358
4/18/2017	1.52	0.419
7/20/2017	1.95	0.668
10/3/2017	1.12	0.113
1/22/2018	1.39	0.329
4/12/2018	1.67	0.513
7/18/2018	0.52	-0.654

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis**

**Current Background Comparison**

**Oxidation-Reduction Potential**

**UNITS: mV**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 289.438   S= 80.221   CV(1)=0.277      **K factor\*\*= 2.523**      TL(1)= 491.836   LL(1)=N/A

**Statistics-Transformed Background Data**      X= 5.629   S= 0.291   CV(2)=0.052      **K factor\*\*= 2.523**      TL(2)= 6.364      LL(2)=N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW371

Date Collected	Result	LN(Result)
10/19/2016	370	5.914
1/18/2017	410	6.016
4/18/2017	257	5.549
7/20/2017	364	5.897
10/3/2017	375	5.927
1/22/2018	339	5.826
4/12/2018	365	5.900
7/18/2018	342	5.835

Well Number: MW374

Date Collected	Result	LN(Result)
10/19/2016	241	5.485
1/19/2017	187	5.231
4/18/2017	193	5.263
7/20/2017	188	5.236
10/3/2017	194	5.268
1/22/2018	206	5.328
4/12/2018	331	5.802
7/18/2018	269	5.595

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	410	NO	6.016	N/A
MW365	Downgradient	Yes	415	NO	6.028	N/A
MW371	Upgradient	Yes	328	NO	5.793	N/A
MW374	Upgradient	Yes	218	NO	5.384	N/A
MW375	Sidegradient	Yes	415	NO	6.028	N/A

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis      Current Background Comparison**

**Sulfate**

**UNITS: mg/L**

**UCRS**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 16.699   S= 22.415   CV(1)=1.342   **K factor\*\*= 2.523**   TL(1)= 73.253   LL(1)=N/A

**Statistics-Transformed Background Data**      X= 2.399   S= 0.795   CV(2)=0.331   **K factor\*\*= 2.523**   TL(2)= 4.404   LL(2)=N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW371

Date Collected	Result	LN(Result)
10/19/2016	14.8	2.695
1/18/2017	13.1	2.573
4/18/2017	13.9	2.632
7/20/2017	14	2.639
10/3/2017	10	2.303
1/22/2018	11	2.398
4/12/2018	91.6	4.517
7/18/2018	47.7	3.865

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW362	Downgradient	Yes	26.7	N/A	3.285	NO
MW365	Downgradient	Yes	63.6	N/A	4.153	NO
MW371	Upgradient	Yes	21.9	N/A	3.086	NO
MW375	Sidegradient	Yes	24.5	N/A	3.199	NO

Well Number: MW374

Date Collected	Result	LN(Result)
10/19/2016	6.18	1.821
1/19/2017	4.83	1.575
4/18/2017	5.71	1.742
7/20/2017	6.31	1.842
10/3/2017	6.78	1.914
1/22/2018	6.34	1.847
4/12/2018	7.24	1.980
7/18/2018	7.69	2.040

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis      Current Background Comparison**

**Beta activity**

**UNITS: pCi/L**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 34.171    S= 35.249    CV(1)=1.032      **K factor\*\*= 2.523**    TL(1)= 123.104    LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.166    S= 0.836    CV(2)=0.264      **K factor\*\*= 2.523**    TL(2)= 5.275    LL(2)=N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is greater than 1, the natural logarithm of background and test well results were calculated utilizing TL(2) for comparison.**

Well Number: MW369

Date Collected	Result	LN(Result)
10/19/2016	57	4.043
1/18/2017	8.82	2.177
4/18/2017	9.12	2.210
7/20/2017	26.1	3.262
10/3/2017	40.7	3.706
1/22/2018	32	3.466
4/11/2018	102	4.625
7/18/2018	14.9	2.701

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW372	Upgradient	Yes	123	N/A	4.812	NO

Well Number: MW372

Date Collected	Result	LN(Result)
10/19/2016	9.61	2.263
1/19/2017	14.2	2.653
4/18/2017	8.69	2.162
7/20/2017	21.3	3.059
10/3/2017	132	4.883
1/22/2018	21.7	3.077
4/12/2018	20.9	3.040
7/18/2018	27.7	3.321

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis**

**Current Background Comparison**

**Oxidation-Reduction Potential**

**UNITS: mV**

**URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 330.375   S= 53.798   CV(1)=0.163      **K factor\*\*= 2.523**      TL(1)= 466.108      LL(1)=N/A

**Statistics-Transformed Background Data**      X= 5.787      S= 0.170      CV(2)=0.029      **K factor\*\*= 2.523**      TL(2)= 6.217      LL(2)=N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
10/19/2016	365	5.900
1/18/2017	381	5.943
4/18/2017	271	5.602
7/20/2017	376	5.930
10/3/2017	399	5.989
1/22/2018	346	5.846
4/11/2018	397	5.984
7/18/2018	338	5.823

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	418	NO	6.035	N/A
MW360	Downgradient	Yes	321	NO	5.771	N/A
MW363	Downgradient	Yes	391	NO	5.969	N/A
MW366	Downgradient	Yes	260	NO	5.561	N/A
MW369	Upgradient	Yes	341	NO	5.832	N/A
MW372	Upgradient	Yes	295	NO	5.687	N/A

Well Number: MW372

Date Collected	Result	LN(Result)
10/19/2016	242	5.489
1/19/2017	263	5.572
4/18/2017	256	5.545
7/20/2017	300	5.704
10/3/2017	358	5.881
1/22/2018	275	5.617
4/12/2018	348	5.852
7/18/2018	371	5.916

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

<b>C-746-U Fourth Quarter 2018 Statistical Analysis</b>	<b>Current Background Comparison</b>
<b>Technetium-99</b>	<b>UNITS: pCi/L</b>
	<b>URGA</b>

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

<b>Statistics-Background Data</b>	X= 51.954	S= 51.519	CV(1)=0.992	K factor***= 2.523	TL(1)= 181.936	LL(1)=N/A
<b>Statistics-Transformed Background Data</b>	X= 3.561	S= 0.907	CV(2)=0.255	K factor***= 2.523	TL(2)= 5.851	LL(2)=N/A

<b>Current Background Data from Upgradient Wells with Transformed Result</b>
--

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW369

Date Collected	Result	LN(Result)
10/19/2016	83.3	4.422
1/18/2017	27	3.296
4/18/2017	9.22	2.221
7/20/2017	34.2	3.532
10/3/2017	70.8	4.260
1/22/2018	38.8	3.658
4/11/2018	142	4.956
7/18/2018	31.4	3.447

<b>Current Quarter Data</b>
-----------------------------

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW372	Upgradient	Yes	158	NO	5.063	N/A

Well Number: MW372

Date Collected	Result	LN(Result)
10/19/2016	10.3	2.332
1/19/2017	24.7	3.207
4/18/2017	9.55	2.257
7/20/2017	30.2	3.408
10/3/2017	195	5.273
1/22/2018	17.3	2.851
4/12/2018	36.6	3.600
7/18/2018	70.9	4.261

<b>Conclusion of Statistical Analysis on Current Data</b>
---

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis**

**Current Background Comparison**

**Beta activity**

**UNITS: pCi/L**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 40.718   S= 29.600   CV(1)=0.727      **K factor\*\*= 2.523**      TL(1)= 115.400   LL(1)=N/A

**Statistics-Transformed Background Data**      X= 3.422   S= 0.826   CV(2)=0.241      **K factor\*\*= 2.523**      TL(2)= 5.507      LL(2)=N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
10/19/2016	19.1	2.950
1/18/2017	44.8	3.802
4/18/2017	65.7	4.185
7/20/2017	84.6	4.438
10/3/2017	69	4.234
1/22/2018	71.9	4.275
4/11/2018	50	3.912
7/18/2018	102	4.625

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Upgradient	Yes	81.7	NO	4.403	N/A

Well Number: MW373

Date Collected	Result	LN(Result)
10/19/2016	17.8	2.879
1/19/2017	15.6	2.747
4/18/2017	14.6	2.681
7/20/2017	16.7	2.815
10/3/2017	20.6	3.025
1/22/2018	23.5	3.157
4/12/2018	4.99	1.607
7/18/2018	30.6	3.421

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**C-746-U Fourth Quarter 2018 Statistical Analysis**

**Current Background Comparison**

**Oxidation-Reduction Potential**

**UNITS: mV**

**LRGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

**Statistics-Background Data**      X= 342.250   S= 46.197   CV(1)=0.135      **K factor\*\*= 2.523**      TL(1)= 458.806      LL(1)=N/A

**Statistics-Transformed Background Data**      X= 5.827      S= 0.139      CV(2)=0.024      **K factor\*\*= 2.523**      TL(2)= 6.177      LL(2)=N/A

**Current Background Data from Upgradient Wells with Transformed Result**

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

Well Number: MW370

Date Collected	Result	LN(Result)
10/19/2016	402	5.996
1/18/2017	412	6.021
4/18/2017	278	5.628
7/20/2017	343	5.838
10/3/2017	392	5.971
1/22/2018	334	5.811
4/11/2018	368	5.908
7/18/2018	369	5.911

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	237	NO	5.468	N/A
MW361	Downgradient	Yes	413	NO	6.023	N/A
MW364	Downgradient	Yes	408	NO	6.011	N/A
MW367	Downgradient	Yes	294	NO	5.684	N/A
MW370	Upgradient	Yes	346	NO	5.846	N/A
MW373	Upgradient	Yes	438	NO	6.082	N/A

Well Number: MW373

Date Collected	Result	LN(Result)
10/19/2016	322	5.775
1/19/2017	279	5.631
4/18/2017	260	5.561
7/20/2017	309	5.733
10/3/2017	347	5.849
1/22/2018	393	5.974
4/12/2018	350	5.858
7/18/2018	318	5.762

**Conclusion of Statistical Analysis on Current Data**

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.



<b>C-746-U Fourth Quarter 2018 Statistical Analysis</b>	<b>Current Background Comparison</b>
<b>Technetium-99</b>	<b>UNITS: pCi/L</b>
	<b>LRGA</b>

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is statistically significant evidence of elevated concentration in that well. For pH only, the current test well results are compared to the TL and LL. If the test well result for pH exceeds the TL or is less than the LL, that is statistically significant evidence of elevated or lowered concentration in that well.

<b>Statistics-Background Data</b>	X= 54.458	S= 41.916	CV(1)=0.770	K factor**= 2.523	TL(1)= 160.212	LL(1)=N/A
<b>Statistics-Transformed Background Data</b>	X= 3.829	S= 0.784	CV(2)=0.205	K factor**= 2.523	TL(2)= 4.787	LL(2)=N/A

<b>Current Background Data from Upgradient Wells with Transformed Result</b>
--

Well Number: MW370

Date Collected	Result	LN(Result)
10/19/2016	31.7	3.456
1/18/2017	82.8	4.416
4/18/2017	99.1	4.596
7/20/2017	120	4.787
10/3/2017	103	4.635
1/22/2018	73.9	4.303
4/11/2018	107	4.673
7/18/2018	96.2	4.566

Well Number: MW373

Date Collected	Result	LN(Result)
10/19/2016	19.9	2.991
1/19/2017	33.1	3.500
4/18/2017	26.8	3.288
7/20/2017	9.12	2.210
10/3/2017	29.6	3.388
1/22/2018	24.8	3.211
4/12/2018	30.2	3.408
7/18/2018	-15.9	#Func!

**Because CV(1) is less than or equal to 1, assume normal distribution and continue with statistical analysis utilizing TL(1).**

**#Because the natural log was not possible for all background values, the TL was considered equal to the maximum background value.**

<b>Current Quarter Data</b>
-----------------------------

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	46.5	NO	3.839	N/A
MW361	Downgradient	Yes	48.6	NO	3.884	N/A
MW364	Downgradient	Yes	56.9	NO	4.041	N/A
MW370	Upgradient	Yes	114	NO	4.736	N/A

<b>Conclusion of Statistical Analysis on Current Data</b>
---

**None of the test wells exceeded the Upper Tolerance Limit, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically-significant level.**

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.

CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.

S Standard Deviation, S = [Sum ((background result-X)^2)/[count of background results -1]]^0.5

TL Upper Tolerance Limit, TL = X + (K \* S), LL Lower Tolerance Limit, LL = X - (K \* S)

X Mean, X = (sum of background results)/(count of background results)

\*\* Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>, 2009.

**ATTACHMENT D3**

**STATISTICIAN QUALIFICATION STATEMENT**

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Four Rivers Nuclear Partnership, LLC  
5511 Hobbs Road  
Kevil, KY 42053  
www.fourriversnuclearpartnership.com

January 3, 2019

Ms. Kelly Layne  
Four Rivers Nuclear Partnership, LLC  
5511 Hobbs Road  
Kevil, KY 42053

Dear Ms. Layne:

This statement is submitted in response to your request that it be included with the completed statistical analysis that I have performed on the groundwater data for the C-746-S&T and C-746-U Landfills at the Paducah Gaseous Diffusion Plant.

As an Environmental Scientist, with a bachelor's degree in science, I have over 20 years of experience in reviewing and assessing laboratory analytical results associated with environmental sampling and investigation activities. For the generation of these statistical analyses, my work was observed and reviewed by a senior chemist and geologist with Four Rivers Nuclear Partnership, LLC.

For this project, the statistical analyses conducted on the fourth quarter 2018 monitoring well data collected from the C-746-S&T and C-746-U Landfills were performed in accordance with guidance provided in the U.S. Environmental Protection Agency guidance document, *EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance* (1989).

Sincerely,

A handwritten signature in black ink, appearing to read "Jennifer R. Watson".

Jennifer R. Watson

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**APPENDIX E**  
**GROUNDWATER FLOW RATE AND DIRECTION**

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## **GROUNDWATER FLOW RATE AND DIRECTION**

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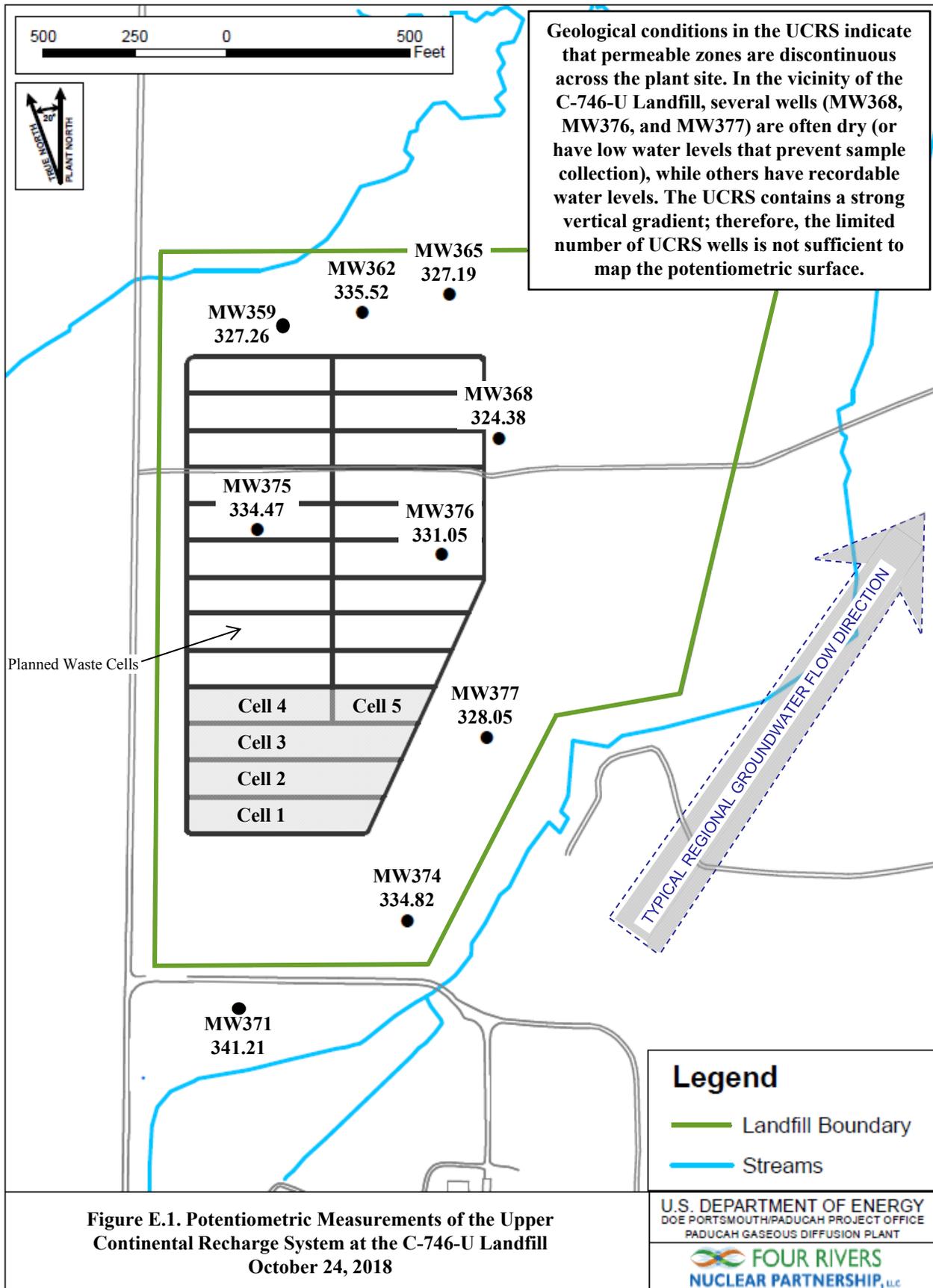
Determination of groundwater flow rate and direction of flow in the uppermost aquifer whenever the monitoring wells (MWs) are sampled is a requirement of 401 KAR 48.300, Section 11. The uppermost aquifer below the C-746-U Landfill is the Regional Gravel Aquifer (RGA). Water level measurements currently are recorded in several wells at the landfill on a quarterly basis. These measurements were used to plot the potentiometric surface of the RGA for the fourth quarter 2018 and determine groundwater flow rate and direction.

Water levels during this reporting period were measured on October 24, 2018. As shown on Figure E.1, all Upper Continental Recharge System (UCRS) wells had sufficient water to permit water level measurement during this reporting period. UCRS wells MW359, MW368, MW376, and MW377 had insufficient water to permit sampling for laboratory analysis.

The UCRS has a strong vertical hydraulic gradient; therefore, the available UCRS wells screened over different elevations are not sufficient for mapping the potentiometric surface. As shown in Table E.1, the RGA data were converted to elevations to plot the potentiometric surfaces within the Upper Regional Gravel Aquifer (URGA) and Lower Regional Gravel Aquifer (LRGA). (At the request of the Commonwealth of Kentucky, the RGA is differentiated into two zones, the URGA and LRGA.) Based on the potentiometric maps (Figures E.2 and E.3), the hydraulic gradients for the URGA and LRGA at the C-746-U Landfill, as measured along the defined groundwater flow directions, were  $6.41 \times 10^{-4}$  ft/ft and  $6.70 \times 10^{-4}$  ft/ft, respectively. Water level measurements in wells at the C-746-U Landfill and in wells of the surrounding region (MW98, MW100, MW125, MW139, MW165A, MW173, MW193, MW197, and MW200), along with the C-746-S&T Landfill wells, were used to contour the general RGA potentiometric surface (Figure E.4). The hydraulic gradient for the RGA, as a whole, in the vicinity of the C-746-U Landfill was  $5.58 \times 10^{-4}$  ft/ft. The hydraulic gradients are shown in Table E.2.

The average linear groundwater flow velocity ( $v$ ) is determined by multiplying the hydraulic gradient ( $i$ ) by the hydraulic conductivity ( $K$ ) [resulting in the specific discharge ( $q$ )] and dividing by the effective porosity ( $n_e$ ). The RGA hydraulic conductivity values used are reported in the Administrative Application for the New Solid Waste Landfill Permit No. SW07300045NWC1 and range from 425 to 725 ft/day (0.150 to 0.256 cm/s). RGA (both URGA and LRGA) effective porosity is assumed to be 25%. Flow velocities were calculated for the URGA and LRGA using the low and high values for hydraulic conductivity, as shown in the Table E.3.

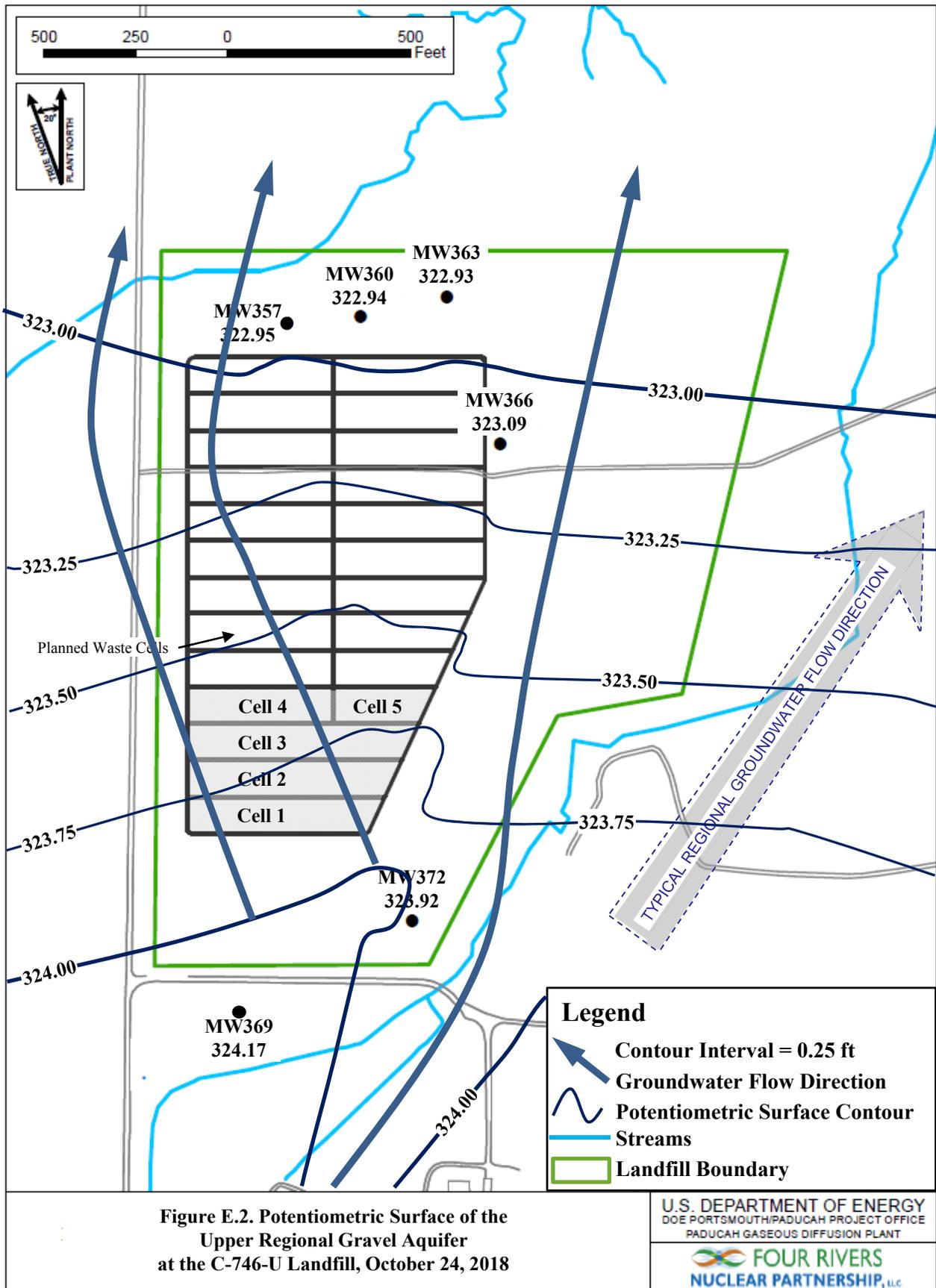
Groundwater flow beneath the C-746-U Landfill typically trends northeastward toward the Ohio River. As demonstrated on the potentiometric maps for October 2018, the groundwater flow direction in the immediate area of the landfill ranges from north to northeastward.



**Figure E.1. Potentiometric Measurements of the Upper Continental Recharge System at the C-746-U Landfill  
October 24, 2018**

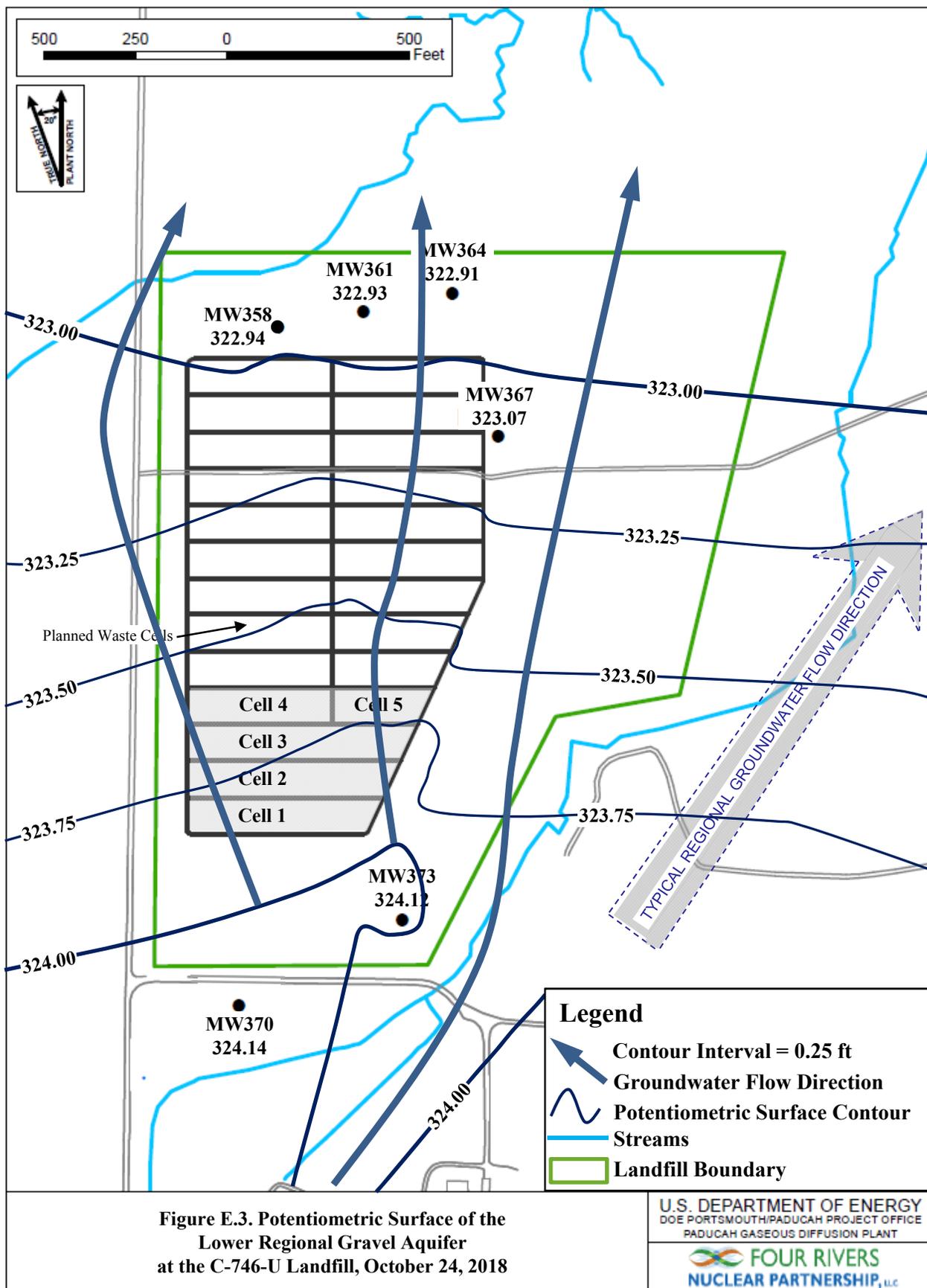
**Table E.1. C-746-U Landfill Fourth Quarter 2018 (October) Water Levels**

<b>C-746-U Landfill (October 2018) Water Levels</b>										
<b>Date</b>	<b>Time</b>	<b>Well</b>	<b>Aquifer</b>	<b>Datum Elev (ft amsl)</b>	<b>BP (in Hg)</b>	<b>Delta BP (ft H2O)</b>	<b>Raw Data</b>		<b>*Corrected Data</b>	
							<b>DTW (ft)</b>	<b>Elev (ft amsl)</b>	<b>DTW (ft)</b>	<b>Elev (ft amsl)</b>
10/24/2018	8:05	MW357	URGA	368.99	30.31	0.00	46.04	322.95	46.04	322.95
10/24/2018	8:06	MW358	LRGA	369.13	30.31	0.00	46.19	322.94	46.19	322.94
10/24/2018	8:08	MW359	UCRS	369.11	30.31	0.00	41.85	327.26	41.85	327.26
10/24/2018	7:59	MW360	URGA	362.30	30.31	0.00	39.36	322.94	39.36	322.94
10/24/2018	8:01	MW361	LRGA	361.54	30.31	0.00	38.61	322.93	38.61	322.93
10/24/2018	8:03	MW362	UCRS	362.04	30.31	0.00	26.52	335.52	26.52	335.52
10/24/2018	8:10	MW363	URGA	368.84	30.31	0.00	45.91	322.93	45.91	322.93
10/24/2018	8:11	MW364	LRGA	368.45	30.31	0.00	45.54	322.91	45.54	322.91
10/24/2018	8:12	MW365	UCRS	368.37	30.31	0.00	41.18	327.19	41.18	327.19
10/24/2018	8:17	MW366	URGA	369.27	30.31	0.00	46.18	323.09	46.18	323.09
10/24/2018	8:18	MW367	LRGA	369.66	30.31	0.00	46.59	323.07	46.59	323.07
10/24/2018	8:20	MW368	UCRS	369.27	30.31	0.00	44.89	324.38	44.89	324.38
10/24/2018	8:44	MW369	URGA	364.48	30.31	0.00	40.31	324.17	40.31	324.17
10/24/2018	8:45	MW370	LRGA	365.35	30.31	0.00	41.21	324.14	41.21	324.14
10/24/2018	8:46	MW371	UCRS	364.88	30.31	0.00	23.67	341.21	23.67	341.21
10/24/2018	15:03	MW372	URGA	359.66	30.25	0.07	35.67	323.99	35.74	323.92
10/24/2018	15:05	MW373	LRGA	359.95	30.25	0.07	35.76	324.19	35.83	324.12
10/24/2018	8:41	MW374	UCRS	359.71	30.31	0.00	24.89	334.82	24.89	334.82
10/24/2018	8:33	MW375	UCRS	370.53	30.31	0.00	36.06	334.47	36.06	334.47
10/24/2018	8:31	MW376	UCRS	370.61	30.31	0.00	39.56	331.05	39.56	331.05
10/24/2018	8:35	MW377	UCRS	365.92	30.31	0.00	37.87	328.05	37.87	328.05
Initial Barometric Pressure			<b>30.31</b>							
Elev = elevation										
amsl = above mean sea level										
BP = barometric pressure										
DTW = depth to water in feet below datum										
URGA = Upper Regional Gravel Aquifer										
LRGA = Lower Regional Gravel Aquifer										
UCRS = Upper Continental Recharge System										
ND = No Data acquired										
*Assumes a barometric efficiency of 1.0										



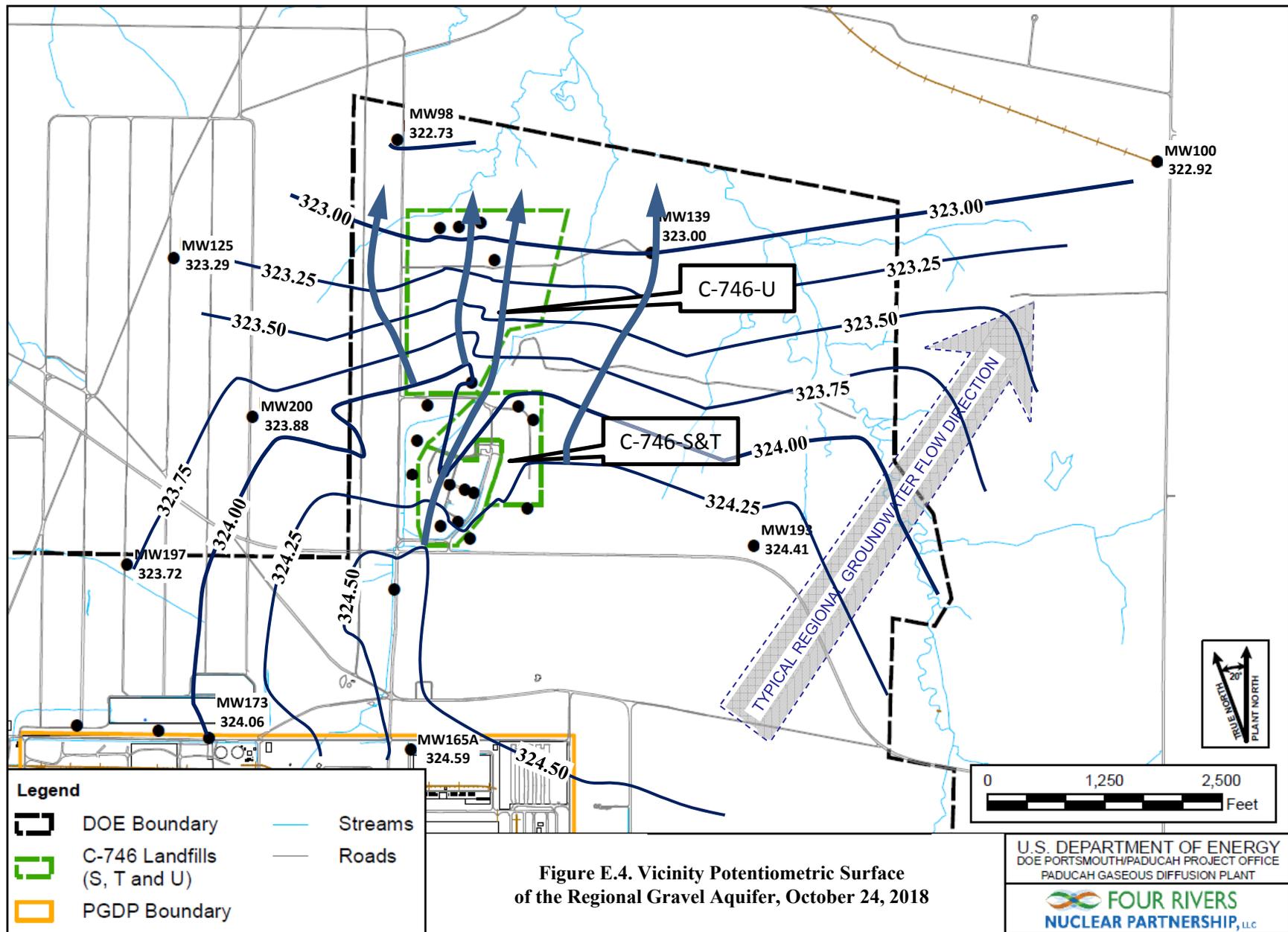
U.S. DEPARTMENT OF ENERGY  
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE  
PADUCAH GASEOUS DIFFUSION PLANT

**FOUR RIVERS**  
NUCLEAR PARTNERSHIP, LLC



U.S. DEPARTMENT OF ENERGY  
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE  
PADUCAH GASEOUS DIFFUSION PLANT

**FOUR RIVERS**  
NUCLEAR PARTNERSHIP, LLC



**Table E.2. C-746-U Landfill Hydraulic Gradients**

	ft/ft
Beneath Landfill—Upper RGA	$6.41 \times 10^{-4}$
Beneath Landfill—Lower RGA	$6.70 \times 10^{-4}$
Vicinity	$5.58 \times 10^{-4}$

**Table E.3. C-746-U Landfill Groundwater Flow Rate**

Hydraulic Conductivity (K)		Specific Discharge (q)		Average Linear Velocity (v)	
ft/day	cm/s	ft/day	cm/s	ft/day	cm/s
<u>Upper RGA</u>					
725	0.256	0.465	$1.64 \times 10^{-4}$	1.86	$6.57 \times 10^{-4}$
425	0.150	0.273	$9.62 \times 10^{-4}$	1.09	$3.85 \times 10^{-4}$
<u>Lower RGA</u>					
725	0.256	0.486	$1.72 \times 10^{-4}$	1.94	$6.86 \times 10^{-4}$
425	0.150	0.285	$1.00 \times 10^{-5}$	1.14	$4.02 \times 10^{-4}$

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**APPENDIX F**  
**NOTIFICATIONS**

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## NOTIFICATIONS

In accordance with 401 KAR 48:300 § 7, the notification for parameters that exceed the maximum contaminant level (MCL) has been submitted to the Kentucky Division of Waste Management. The parameters submitted are listed on page F-4. The notification for parameters that do not have MCLs, but had statistically significant increased concentrations relative to historical background concentrations, is provided below.

### Statistical Analysis of Parameters Notification

The statistical analyses conducted on the fourth quarter 2018 groundwater data collected from the C-746-U Landfill monitoring wells were performed in accordance with *Groundwater Monitoring Plan for the Solid Waste Permitted Landfills (C-746-S Residential Landfill, C-746-T Inert Landfill, and C-746-U Contained Landfill) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (LATA Kentucky 2014).

The following are the permit required parameters in 40 CFR § 302.4, Appendix A, which had statistically significant increased concentrations relative to historical background concentrations.

---

	<u>Parameter</u>	<u>Monitoring Well</u>
<b>Upper Continental Recharge System</b>	None	
<b>Upper Regional Gravel Aquifer</b>	Technetium-99	MW372
<b>Lower Regional Gravel Aquifer</b>	Technetium-99	MW358, MW361, MW364, MW370

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**NOTE:** Although technetium-99 is not cited in 40 CFR § 302.4, Appendix A, this radionuclide is being reported along with the parameters of this regulation.

11/26/2018

**Four Rivers Nuclear Partnership, LLC  
PROJECT ENVIRONMENTAL MEASUREMENTS SYSTEM  
C-746-U LANDFILL  
SOLID WASTE PERMIT NUMBER SW07300014, SW07300015, SW07300045  
MAXIMUM CONTAMINANT LEVEL (MCL) EXCEEDANCE REPORT  
Quarterly Groundwater Sampling**

<b>AKGWA</b>	<b>Station</b>	<b>Analysis</b>	<b>Method</b>	<b>Results</b>	<b>Units</b>	<b>MCL</b>
8004-4798	MW357	Trichloroethene	8260B	6.85	ug/L	5
8004-4799	MW358	Trichloroethene	8260B	5.18	ug/L	5
8004-4795	MW361	Trichloroethene	8260B	7.3	ug/L	5
8004-4797	MW364	Trichloroethene	8260B	12.3	ug/L	5
8004-0982	MW366	Trichloroethene	8260B	5.04	ug/L	5
8004-4818	MW370	Beta activity	9310	81.7	pCi/L	50
8004-4808	MW372	Beta activity	9310	123	pCi/L	50
		Trichloroethene	8260B	5.72	ug/L	5
8004-4792	MW373	Trichloroethene	8260B	7.91	ug/L	5

NOTE 1: MCLs are defined in 401 KAR 47:030.

NOTE 2: MW369, MW370, MW372, and MW373 are down-gradient wells for the C-746-S and C-746-T Landfills and upgradient for the C-746-U Landfill. These wells are sampled with the C-746-U Landfill monitoring well network. These wells are reported on the exceedance reports for C-746-S, C-746-T, and C-746-U.

**APPENDIX G**  
**CHART OF MCL AND UTL EXCEEDANCES**

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**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill**

Groundwater Flow System	UCRS								URGA						LRGA						
	D	S	S	S	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U	
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>ACETONE</b>																					
Quarter 3, 2002										*	*	*									
Quarter 4, 2002										*	*	*									
Quarter 1, 2003											*	*									
Quarter 2, 2003											*	*									
Quarter 3, 2003	*						*			*	*	*		*				*			
Quarter 4, 2003						*	*				*			*							
Quarter 3, 2004						*										*					
Quarter 3, 2005						*															
Quarter 4, 2005						*															
<b>ALPHA ACTIVITY</b>																					
Quarter 1, 2004																					■
Quarter 2, 2004						■															
Quarter 3, 2009						■															
<b>ALUMINUM</b>																					
Quarter 3, 2003											*										
<b>BETA ACTIVITY</b>																					
Quarter 1, 2004															■						
Quarter 2, 2004															■						■
Quarter 3, 2004															■						
Quarter 4, 2004															■						
Quarter 4, 2005															■						
Quarter 1, 2006															■						■
Quarter 2, 2006															■						■
Quarter 3, 2006															■						■
Quarter 4, 2006															■						■
Quarter 1, 2007									■						■						■
Quarter 2, 2007									■						■						■
Quarter 3, 2007									■						■						■
Quarter 4, 2007									■						■						■
Quarter 1, 2008									■						■						
Quarter 2, 2008														■							
Quarter 3, 2008									■						■				■		
Quarter 4, 2008									■						■				■		
Quarter 1, 2009									■						■						
Quarter 2, 2009									■						■		■	■			
Quarter 3, 2009									■						■						
Quarter 4, 2009									■						■						
Quarter 1, 2010									■						■						
Quarter 2, 2010									■						■						
Quarter 3, 2010									■						■						
Quarter 4, 2010									■						■						
Quarter 2, 2011									■						■						
Quarter 4, 2011									■						■						
Quarter 1, 2012									■						■						
Quarter 2, 2012									■						■				■		
Quarter 3, 2012									■						■				■		
Quarter 4, 2012									■						■						■
Quarter 1, 2013									■						■						■
Quarter 3, 2013									■						■						■
Quarter 4, 2013									■						■						
Quarter 1, 2014									■						■						
Quarter 4, 2014									■						■						
Quarter 1, 2015									■						■						
Quarter 2, 2015									■						■						
Quarter 4, 2015									■						■						
Quarter 3, 2016									■						■						■
Quarter 4, 2016									■						■						
Quarter 2, 2017									■						■						■
Quarter 3, 2017									■						■						■
Quarter 4, 2017									■						■						■
Quarter 1, 2018									■						■						■
Quarter 2, 2018									■						■						■
Quarter 3, 2018									■						■						■
Quarter 4, 2018									■						■						■
<b>BROMIDE</b>																					
Quarter 2, 2004														*							

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS								URGA						LRGA						
	D	S	S	S	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U	
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>CALCIUM</b>																					
Quarter 3, 2003										*											
Quarter 2, 2005																					*
Quarter 3, 2006															*						
Quarter 2, 2008															*						
Quarter 3, 2009															*						
Quarter 4, 2009															*						
Quarter 1, 2010															*						
Quarter 2, 2010															*						
Quarter 3, 2010															*						
Quarter 1, 2011															*						
Quarter 2, 2011															*						
Quarter 3, 2011															*						*
Quarter 4, 2011															*						*
Quarter 1, 2012															*						*
Quarter 2, 2012															*						*
Quarter 3, 2012															*						*
Quarter 4, 2012															*						*
Quarter 1, 2013															*						*
Quarter 2, 2013															*						*
Quarter 3, 2013															*						*
Quarter 4, 2013															*						*
Quarter 2, 2014															*						*
Quarter 3, 2014															*						*
Quarter 4, 2014															*						*
Quarter 2, 2015															*						*
Quarter 3, 2015															*						*
Quarter 4, 2015															*						*
Quarter 1, 2016															*						*
Quarter 2, 2016															*						*
Quarter 2, 2017	*																				
Quarter 1, 2018	*																				
Quarter 3, 2018	*																				
<b>CARBON DISULFIDE</b>																					
Quarter 3, 2003											*										
Quarter 2, 2005							*														
Quarter 3, 2005						*															
Quarter 4, 2005						*															
Quarter 1, 2006						*															
Quarter 2, 2006						*															
Quarter 3, 2010	*										*										
Quarter 4, 2010													*								
Quarter 1, 2011														*							
<b>CHEMICAL OXYGEN DEMAND</b>																					
Quarter 3, 2002										*	*	*	*	*	*						
Quarter 4, 2002										*	*										
Quarter 1, 2003										*	*										
Quarter 2, 2003										*	*	*									
Quarter 3, 2003	*									*	*					*					
Quarter 4, 2003						*				*	*										
Quarter 3, 2004										*											
Quarter 3, 2005						*				*				*	*				*	*	
Quarter 4, 2005						*											*		*	*	
Quarter 1, 2006																	*		*	*	
Quarter 4, 2016																	*				
Quarter 1, 2017										*											
<b>CHLORIDE</b>																					
Quarter 1, 2006																					*
Quarter 2, 2014														*							
<b>COBALT</b>																					
Quarter 3, 2003	*						*			*	*		*	*	*	*	*	*	*	*	*
Quarter 1, 2004													*	*							
Quarter 2, 2016													*								
<b>CONDUCTIVITY</b>																					
Quarter 4, 2002										*											
Quarter 1, 2003										*											
Quarter 2, 2003										*	*										
Quarter 4, 2003										*											
Quarter 1, 2004										*											
Quarter 2, 2004										*											

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS								URGA						LRGA						
	D	S	S	S	D	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>CONDUCTIVITY</b>																					
Quarter 3, 2004										*											
Quarter 1, 2005														*							
Quarter 2, 2005														*							
Quarter 3, 2005					*													*			
Quarter 4, 2005														*			*				
Quarter 1, 2006														*							
Quarter 2, 2006														*							
Quarter 3, 2006														*							
Quarter 1, 2007														*							
Quarter 2, 2007														*							
Quarter 3, 2007														*							
Quarter 4, 2007														*							
Quarter 1, 2008														*							
Quarter 2, 2008														*							
Quarter 3, 2008														*							
Quarter 4, 2008														*							
Quarter 1, 2009														*							
Quarter 2, 2009														*							
Quarter 3, 2009														*							
Quarter 4, 2009														*							
Quarter 1, 2010														*							
Quarter 2, 2010														*							
Quarter 3, 2010														*							
Quarter 4, 2010														*							
Quarter 1, 2011														*							
Quarter 2, 2011														*							
Quarter 3, 2011														*							
Quarter 4, 2011														*							
Quarter 1, 2012													*	*							
Quarter 2, 2012													*	*							
Quarter 3, 2012													*	*							
Quarter 4, 2012													*	*							
Quarter 1, 2013													*	*							
Quarter 2, 2013													*	*							
Quarter 3, 2013													*	*							
Quarter 4, 2013													*	*							
Quarter 1, 2014													*	*							
Quarter 2, 2014													*	*							
Quarter 3, 2014													*	*							
Quarter 4, 2014													*	*							
Quarter 1, 2015													*	*							
Quarter 2, 2015													*	*							
Quarter 3, 2015													*	*							
Quarter 4, 2015													*	*							
Quarter 1, 2016													*	*							
Quarter 2, 2016													*	*							
Quarter 3, 2016													*	*							
<b>DISSOLVED OXYGEN</b>																					
Quarter 1, 2003					*	*				*											
Quarter 3, 2003					*					*											
Quarter 4, 2003					*																
Quarter 1, 2004					*																
Quarter 2, 2004								*							*						
Quarter 1, 2005					*																
Quarter 2, 2005								*													
Quarter 1, 2006					*																
Quarter 2, 2006					*			*													
Quarter 3, 2006					*			*													
Quarter 4, 2006					*			*		*											
Quarter 2, 2007					*			*		*											
Quarter 3, 2007					*			*	*	*											
Quarter 1, 2008					*														*		
Quarter 2, 2008								*	*												
Quarter 3, 2008								*													
Quarter 1, 2009							*														
Quarter 2, 2009					*			*	*												
Quarter 3, 2009					*		*	*	*												
Quarter 1, 2010					*		*														
Quarter 2, 2010					*	*		*	*										*	*	
Quarter 3, 2010					*	*															
Quarter 4, 2010					*	*		*		*									*		
Quarter 1, 2011					*																
Quarter 2, 2011					*	*	*	*	*				*								

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS								URGA						LRGA						
	D	S	S	S	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U	
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>DISSOLVED OXYGEN</b>																					
Quarter 3, 2011					*				*												
Quarter 1, 2012							*		*												
Quarter 2, 2012	*			*	*	*		*	*												
Quarter 3, 2012					*				*												
Quarter 4, 2012									*												
Quarter 1, 2013					*				*												
Quarter 2, 2013							*		*												
Quarter 3, 2013	*			*			*	*	*												
Quarter 4, 2013									*											*	
Quarter 2, 2014	*			*	*	*	*	*	*								*				
Quarter 3, 2014	*			*	*	*															
Quarter 4, 2014					*																
Quarter 2, 2015				*	*	*	*														
Quarter 3, 2015				*	*	*	*														
Quarter 4, 2015	*				*	*															
Quarter 1, 2016	*			*	*	*															
Quarter 2, 2016	*	*		*	*	*	*	*	*										*	*	
Quarter 3, 2016				*	*	*	*					*									
Quarter 4, 2016					*			*													
Quarter 1, 2017						*						*									
Quarter 2, 2017	*			*	*	*	*														
Quarter 3, 2017	*	*		*	*	*	*										*				
Quarter 4, 2017					*	*	*										*				
Quarter 1, 2018				*	*	*	*												*		
Quarter 2, 2018				*	*	*	*														
Quarter 3, 2018	*			*	*	*	*														
Quarter 4, 2018				*																	
<b>DISSOLVED SOLIDS</b>																					
Quarter 4, 2002										*											
Quarter 1, 2003										*											
Quarter 2, 2003										*											
Quarter 3, 2003							*			*	*										
Quarter 4, 2003										*											
Quarter 3, 2005					*																
Quarter 4, 2006														*							
Quarter 1, 2007														*							
Quarter 2, 2007														*							
Quarter 4, 2008														*							
Quarter 1, 2009														*							
Quarter 2, 2009														*							
Quarter 3, 2009														*							
Quarter 4, 2009														*							
Quarter 1, 2010														*							
Quarter 2, 2010														*							
Quarter 3, 2010														*							
Quarter 4, 2010														*							
Quarter 1, 2011														*							
Quarter 2, 2011														*							
Quarter 3, 2011														*							
Quarter 4, 2011														*							
Quarter 1, 2012													*	*							
Quarter 2, 2012														*						*	
Quarter 3, 2012														*						*	
Quarter 4, 2012														*							
Quarter 1, 2013														*							
Quarter 2, 2013														*							
Quarter 3, 2013														*							
Quarter 4, 2013														*							
Quarter 1, 2014														*							
Quarter 2, 2014														*							
Quarter 4, 2014														*							
Quarter 2, 2015														*							
Quarter 3, 2015														*							
Quarter 4, 2015														*							
Quarter 1, 2016														*							
<b>IODIDE</b>																					
Quarter 2, 2003																*					
Quarter 3, 2003	*									*											
Quarter 4, 2003						*		*													
Quarter 3, 2010					*		*				*					*					
<b>IODINE-131</b>																					
Quarter 3, 2010																					

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS										URGA					LRGA					
	D	S	S	S	D	D	U	U	D	D	D	U	U	D	D	D	U	U			
<b>Gradient</b>	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>Monitoring Well</b>																					
<b>IODOMETHANE</b>																					
Quarter 4, 2003						*															
<b>IRON</b>																					
Quarter 4, 2002						*															
Quarter 3, 2003																*					
Quarter 4, 2003										*						*					
Quarter 1, 2004										*						*					
Quarter 2, 2004										*											
Quarter 3, 2004										*											
Quarter 3, 2005																*					
<b>MAGNESIUM</b>																					
Quarter 2, 2005														*							*
Quarter 3, 2005						*															*
Quarter 2, 2006														*							*
Quarter 3, 2006														*							
Quarter 1, 2007														*							
Quarter 2, 2008														*							
Quarter 2, 2009														*							
Quarter 3, 2009														*							
Quarter 4, 2009														*							
Quarter 1, 2010														*							
Quarter 2, 2010														*							
Quarter 3, 2010														*							
Quarter 1, 2011														*							
Quarter 2, 2011														*							
Quarter 3, 2011														*							
Quarter 4, 2011														*							
Quarter 1, 2012														*							
Quarter 2, 2012														*							
Quarter 3, 2012														*							
Quarter 4, 2012														*							
Quarter 1, 2013														*							
Quarter 2, 2013														*							
Quarter 3, 2013														*							
Quarter 4, 2013														*							
Quarter 2, 2014														*							
Quarter 4, 2014														*							
Quarter 2, 2015														*							
Quarter 3, 2015														*							
Quarter 4, 2015														*							
Quarter 1, 2016														*							
Quarter 2, 2016														*							
Quarter 3, 2016	*													*							
Quarter 4, 2016	*													*							
Quarter 2, 2017	*													*							
Quarter 3, 2017	*													*							
Quarter 1, 2018	*													*							
Quarter 3, 2018	*													*							
<b>MANGANESE</b>																					
Quarter 3, 2002										*		*									
Quarter 4, 2002		*				*	*			*		*		*							
Quarter 2, 2003										*		*				*	*	*	*		
Quarter 3, 2003										*		*	*			*	*	*	*		
Quarter 4, 2003										*	*	*	*			*	*	*	*		
Quarter 1, 2004										*	*	*				*	*	*	*		
Quarter 2, 2004							*			*	*	*				*		*	*		
Quarter 3, 2004							*			*	*	*				*		*	*		
Quarter 4, 2004										*		*				*		*	*		
Quarter 1, 2005										*		*									
Quarter 2, 2005										*		*									
Quarter 3, 2005										*		*				*		*	*		
Quarter 4, 2005										*		*				*		*	*		
Quarter 1, 2006										*		*									
Quarter 2, 2006							*			*		*				*		*	*		
Quarter 3, 2006										*		*				*		*	*		
Quarter 4, 2006										*		*									
Quarter 1, 2007										*		*									
Quarter 2, 2007							*			*		*									
Quarter 3, 2007							*			*		*									
Quarter 3, 2008							*			*		*									
Quarter 4, 2008							*			*		*									

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS								URGA						LRGA						
	D	S	S	S	D	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>MANGANESE</b>																					
Quarter 3, 2009							*														
Quarter 3, 2011							*														
Quarter 2, 2016														*							
Quarter 3, 2016									*												
<b>NICKEL</b>																					
Quarter 3, 2003										*											
<b>OXIDATION-REDUCTION POTENTIAL</b>																					
Quarter 4, 2002																	*		*		
Quarter 1, 2003																	*		*		
Quarter 2, 2003																			*		
Quarter 3, 2003	*																				
Quarter 4, 2003					*																
Quarter 2, 2004													*				*				*
Quarter 3, 2004					*			*					*	*	*		*			*	*
Quarter 4, 2004												*									*
Quarter 1, 2005																	*			*	*
Quarter 2, 2005								*					*				*			*	*
Quarter 3, 2005					*	*		*		*	*	*	*	*	*		*		*	*	*
Quarter 4, 2005		*						*					*				*			*	*
Quarter 1, 2006					*			*	*								*			*	*
Quarter 2, 2006					*		*	*					*				*			*	*
Quarter 3, 2006					*		*	*					*				*			*	*
Quarter 4, 2006					*		*	*		*	*	*	*	*	*		*			*	*
Quarter 1, 2007		*			*		*	*					*				*			*	*
Quarter 2, 2007					*		*	*					*				*			*	*
Quarter 3, 2007					*		*	*					*				*			*	*
Quarter 4, 2007					*		*	*					*				*			*	*
Quarter 1, 2008					*		*	*				*	*	*	*				*	*	*
Quarter 2, 2008					*		*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 3, 2008					*		*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 4, 2008					*		*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 1, 2009					*		*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 2, 2009					*		*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 3, 2009		*			*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 4, 2009		*			*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
Quarter 1, 2010		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2010					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2010		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2010		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2011					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2011		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2011		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2011		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2012		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2012	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2012	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2012	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2013	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2013	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2013	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2013	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2014	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2014	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2014	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2014	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2015	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2015	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2015	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2015	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2016	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2016	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2016	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2016	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2017	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2017	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2017	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2017	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 1, 2018	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 2, 2018	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 3, 2018	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Quarter 4, 2018	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS								URGA					LRGA							
	D	S	S	S	D	D	U	U	D	D	D	U	U	D	D	D	U	U			
<b>Monitoring Well</b>	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>PCB, TOTAL</b>																					
Quarter 4, 2003																	*				
Quarter 3, 2004												*									
Quarter 3, 2005							*														
Quarter 2, 2006							*														
Quarter 3, 2006							*														
Quarter 1, 2007							*														
Quarter 2, 2007							*														
Quarter 3, 2007							*														
Quarter 1, 2008							*														
Quarter 2, 2008							*														
Quarter 4, 2008							*														
Quarter 3, 2009							*														
Quarter 1, 2010							*														
Quarter 2, 2010							*														
Quarter 4, 2010							*														
<b>PCB-1016</b>																					
Quarter 3, 2004												*									
Quarter 2, 2006							*				*										
Quarter 1, 2007							*														
Quarter 2, 2007							*														
Quarter 3, 2007							*														
Quarter 2, 2008							*														
Quarter 4, 2008							*														
Quarter 3, 2009							*														
Quarter 1, 2010							*														
Quarter 2, 2010							*														
Quarter 4, 2010							*														
<b>PCB-1242</b>																					
Quarter 3, 2006							*					*									
Quarter 4, 2006										*											
Quarter 1, 2008							*														
Quarter 2, 2012							*														
<b>PCB-1248</b>																					
Quarter 2, 2008							*														
<b>PCB-1260</b>																					
Quarter 2, 2006							*														
<b>pH</b>																					
Quarter 3, 2002										*											
Quarter 4, 2002										*											
Quarter 1, 2003										*											
Quarter 2, 2003										*											
Quarter 3, 2003	*						*			*											
Quarter 4, 2003							*									*					
Quarter 1, 2004							*									*					
Quarter 3, 2005							*											*	*		
Quarter 4, 2005							*											*	*		
Quarter 3, 2006																*					
Quarter 2, 2011														*							
Quarter 3, 2011														*							
Quarter 4, 2011														*							
Quarter 1, 2012																*	*				
Quarter 2, 2012												*									
Quarter 1, 2013										*	*					*					
Quarter 3, 2015																*					
Quarter 2, 2016																			*	*	
Quarter 3, 2016																			*	*	
Quarter 2, 2017																*	*	*			
Quarter 3, 2018					*					*	*					*	*	*			
Quarter 4, 2018																*	*	*			
<b>POTASSIUM</b>																					
Quarter 1, 2014																*					
<b>RADIUM-228</b>																					
Quarter 2, 2005																					
Quarter 4, 2005							■							■				■			
<b>SELENIUM</b>																					
Quarter 4, 2003																					

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS									URGA						LRGA					
	D	S	S	S	D	D	D	U	U	D	D	D	D	U	U	D	D	D	U	U	
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>SODIUM</b>																					
Quarter 3, 2002										*	*		*								
Quarter 4, 2002										*	*			*							
Quarter 1, 2003										*											
Quarter 2, 2003										*	*										
Quarter 3, 2003										*	*										
Quarter 1, 2007										*											
Quarter 1, 2012														*							
Quarter 1, 2014															*						
Quarter 3, 2014										*											
Quarter 4, 2014										*											
Quarter 4, 2015										*											
Quarter 1, 2016										*											
Quarter 2, 2016										*											
Quarter 3, 2016										*											
Quarter 4, 2016										*											
Quarter 1, 2017										*											
Quarter 2, 2017										*											
Quarter 3, 2017										*											
Quarter 4, 2017										*											
Quarter 1, 2018										*											
Quarter 3, 2018										*											
<b>STRONTIUM-90</b>																					
Quarter 4, 2008									■												
<b>SULFATE</b>																					
Quarter 1, 2003									*												
Quarter 2, 2003								*	*												
Quarter 3, 2003	*							*													
Quarter 4, 2003					*			*													
Quarter 1, 2004					*	*	*	*													
Quarter 2, 2004					*	*	*	*													
Quarter 3, 2004					*	*	*	*													
Quarter 1, 2005					*	*	*	*	*												
Quarter 2, 2005					*	*	*	*	*						*						
Quarter 3, 2005					*	*	*	*													
Quarter 4, 2005																			*		
Quarter 1, 2006					*				*												
Quarter 2, 2006						*	*	*	*										*		
Quarter 3, 2006								*	*												
Quarter 1, 2007								*	*												
Quarter 2, 2007								*	*												
Quarter 3, 2007								*	*												
Quarter 4, 2007		*																			
Quarter 1, 2008		*			*		*	*	*												
Quarter 2, 2008		*			*	*	*	*	*												
Quarter 3, 2008		*			*	*	*	*	*												
Quarter 4, 2008		*			*	*	*	*	*												
Quarter 1, 2009		*			*	*	*	*	*												
Quarter 2, 2009		*			*	*	*	*	*												
Quarter 3, 2009		*			*	*	*	*	*										*		
Quarter 4, 2009		*			*	*	*	*	*										*		
Quarter 1, 2010		*			*	*	*	*	*										*		
Quarter 2, 2010		*			*	*	*	*	*										*		
Quarter 3, 2010		*			*	*	*	*	*										*		
Quarter 4, 2010		*			*	*	*	*	*										*		
Quarter 1, 2011		*			*	*	*	*	*										*		
Quarter 2, 2011		*			*	*	*	*	*										*		
Quarter 3, 2011		*			*	*	*	*	*										*		
Quarter 4, 2011		*			*	*	*	*	*										*		
Quarter 1, 2012		*			*	*	*	*	*										*		
Quarter 2, 2012	*	*		*	*	*	*	*	*										*		
Quarter 3, 2012		*			*	*	*	*	*										*		
Quarter 4, 2012		*			*	*	*	*	*										*		
Quarter 1, 2013		*			*	*	*	*	*										*		
Quarter 2, 2013		*			*	*	*	*	*										*		
Quarter 3, 2013	*	*		*	*	*	*	*	*										*		
Quarter 4, 2013		*			*	*	*	*	*										*		
Quarter 1, 2014		*			*	*	*	*	*										*		
Quarter 2, 2014	*	*		*	*	*	*	*	*										*		
Quarter 3, 2014	*	*		*	*	*	*	*	*										*		
Quarter 4, 2014		*			*	*	*	*	*										*		
Quarter 1, 2015		*			*	*	*	*	*										*		

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS								URGA						LRGA						
	D	S	S	S	D	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U
<b>Monitoring Well</b>	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>SULFATE</b>																					
Quarter 2, 2015	*	*			*		*								*						
Quarter 3, 2015		*			*	*		*							*						
Quarter 4, 2015	*	*			*	*	*	*													
Quarter 1, 2016	*	*			*	*	*														
Quarter 2, 2016	*	*			*	*	*														
Quarter 3, 2016	*	*			*	*	*	*													
Quarter 4, 2016	*	*			*	*	*	*													
Quarter 1, 2017	*	*			*	*	*														
Quarter 2, 2017	*	*			*	*	*														
Quarter 3, 2017	*	*			*	*	*														
Quarter 4, 2017		*			*	*	*														
Quarter 1, 2018	*	*			*	*	*														
Quarter 2, 2018	*	*			*	*	*	*													
Quarter 3, 2018	*	*			*	*	*	*													
Quarter 4, 2018		*			*	*	*	*													
<b>TECHNETIUM-99</b>																					
Quarter 4, 2002																	*	*	*		
Quarter 2, 2003							*						*			*	*	*	*		*
Quarter 3, 2003																	*				
Quarter 4, 2003																	*				*
Quarter 1, 2004														*			*				*
Quarter 2, 2004														*			*				*
Quarter 3, 2004														*			*				*
Quarter 4, 2004														*			*				*
Quarter 3, 2005														*			*				*
Quarter 1, 2006														*			*				*
Quarter 2, 2006		*						*													*
Quarter 3, 2006																					*
Quarter 4, 2006														*							*
Quarter 1, 2007																					*
Quarter 2, 2007													*	*			*	*			*
Quarter 3, 2007													*	*			*	*			*
Quarter 4, 2007									*				*	*			*	*	*		*
Quarter 1, 2008													*	*			*	*	*		*
Quarter 2, 2008						*	*						*	*			*	*	*		*
Quarter 3, 2008													*	*			*	*	*		*
Quarter 4, 2008									*				*	*			*	*	*		*
Quarter 1, 2009									*				*	*			*	*	*		*
Quarter 2, 2009													*	*			*	*	*		*
Quarter 3, 2009							*						*	*			*	*	*		*
Quarter 4, 2009								*					*	*			*	*	*		*
Quarter 2, 2010									*				*	*		*	*	*	*		*
Quarter 3, 2010									*				*	*		*	*	*	*		*
Quarter 4, 2010									*				*	*		*	*	*	*		*
Quarter 1, 2011		*							*				*	*		*	*	*	*		*
Quarter 2, 2011									*				*	*		*	*	*	*		*
Quarter 1, 2012								*					*	*		*	*	*	*		*
Quarter 2, 2012							*						*	*		*	*	*	*		*
Quarter 3, 2012													*	*		*	*	*	*		*
Quarter 4, 2012													*	*		*	*	*	*		*
Quarter 1, 2013													*	*		*	*	*	*		*
Quarter 2, 2013													*	*		*	*	*	*		*
Quarter 3, 2013									*				*	*		*	*	*	*		*
Quarter 4, 2013									*				*	*		*	*	*	*		*
Quarter 1, 2014									*				*	*		*	*	*	*		*
Quarter 2, 2014									*				*	*		*	*	*	*		*
Quarter 3, 2014									*				*	*		*	*	*	*		*
Quarter 4, 2014									*				*	*		*	*	*	*		*
Quarter 1, 2015									*				*	*		*	*	*	*		*
Quarter 2, 2015									*				*	*		*	*	*	*		*
Quarter 3, 2015									*				*	*		*	*	*	*		*
Quarter 4, 2015									*				*	*		*	*	*	*		*
Quarter 1, 2016									*				*	*		*	*	*	*		*
Quarter 2, 2016									*				*	*		*	*	*	*		*
Quarter 3, 2016									*				*	*		*	*	*	*		*
Quarter 4, 2016									*				*	*		*	*	*	*		*
Quarter 1, 2017									*				*	*		*	*	*	*		*
Quarter 2, 2017									*				*	*		*	*	*	*		*
Quarter 3, 2017									*				*	*		*	*	*	*		*
Quarter 4, 2017									*				*	*		*	*	*	*		*
Quarter 1, 2018									*				*	*		*	*	*	*		*
Quarter 2, 2018									*				*	*		*	*	*	*		*
Quarter 3, 2018									*				*	*		*	*	*	*		*
Quarter 4, 2018									*				*	*		*	*	*	*		*

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS									URGA						LRGA					
	D	S	S	S	D	D	U	U	U	D	D	D	U	U	D	D	D	D	U	U	
Monitoring Well	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>THORIUM-230</b>																					
Quarter 4, 2015																*					
Quarter 2, 2016										*											
Quarter 4, 2016	*											*				*			*		
Quarter 4, 2017													*								
Quarter 2, 2018										*			*								
<b>TOLUENE</b>																					
Quarter 2, 2014										*				*							
<b>TOTAL ORGANIC CARBON</b>																					
Quarter 3, 2002										*	*	*		*							*
Quarter 4, 2002										*	*			*							
Quarter 1, 2003										*	*										
Quarter 3, 2003	*									*	*					*					
Quarter 4, 2003										*	*										
Quarter 1, 2004										*	*										
Quarter 3, 2005						*				*				*	*	*			*		
Quarter 4, 2005						*												*	*		
Quarter 1, 2006																			*		*
<b>TOTAL ORGANIC HALIDES</b>																					
Quarter 4, 2002										*											
Quarter 1, 2003										*											
Quarter 2, 2003										*											
Quarter 1, 2004																*					
<b>TRICHLOROETHENE</b>																					
Quarter 3, 2002														■							■
Quarter 4, 2002															■						■
Quarter 1, 2003																					■
Quarter 2, 2003															■						■
Quarter 3, 2003							■														■
Quarter 4, 2003															■						■
Quarter 1, 2004															■						■
Quarter 2, 2004															■						■
Quarter 3, 2004															■						■
Quarter 4, 2004															■						■
Quarter 1, 2005															■						■
Quarter 2, 2005															■						■
Quarter 3, 2005															■						■
Quarter 4, 2005															■						■
Quarter 1, 2006															■						■
Quarter 2, 2006															■						■
Quarter 3, 2006															■						■
Quarter 4, 2006															■						■
Quarter 1, 2007															■						■
Quarter 2, 2007															■						■
Quarter 3, 2007															■						■
Quarter 4, 2007															■						■
Quarter 1, 2008															■						■
Quarter 2, 2008															■				■		■
Quarter 3, 2008															■						■
Quarter 4, 2008															■						■
Quarter 1, 2009															■						■
Quarter 2, 2009															■						■
Quarter 3, 2009															■						■
Quarter 4, 2009						■	■				■		■	■	■	■					■
Quarter 1, 2010															■						■
Quarter 2, 2010															■						■
Quarter 3, 2010															■						■
Quarter 4, 2010															■						■
Quarter 2, 2011															■					■	■
Quarter 3, 2011															■					■	■
Quarter 4, 2011															■					■	■
Quarter 1, 2012															■				■	■	■
Quarter 2, 2012															■						■
Quarter 3, 2012															■						■
Quarter 4, 2012															■						■
Quarter 1, 2013															■						■
Quarter 2, 2013															■						■
Quarter 3, 2013															■						■
Quarter 4, 2013															■						■
Quarter 1, 2014															■						■
Quarter 2, 2014															■						■

**Chart of MCL and Historical UTL Exceedances  
for the C-746-U Contained Landfill (Continued)**

Groundwater Flow System	UCRS									URGA						LRGA					
	D	S	S	S	D	D	D	U	U	D	D	D	D	U	U	D	D	D	D	U	U
<b>Gradient</b>	368	375	376	377	359	362	365	371	374	366	360	363	357	369	372	367	361	364	358	370	373
<b>TRICHLOROETHENE</b>																					
Quarter 3, 2014													■		■					■	■
Quarter 4, 2014													■		■					■	■
Quarter 1, 2015													■		■						■
Quarter 2, 2015					■								■		■					■	
Quarter 3, 2015													■		■			■			■
Quarter 4, 2015													■		■						■
Quarter 1, 2016													■		■			■	■		■
Quarter 2, 2016												■	■		■			■		■	■
Quarter 3, 2016													■		■			■	■		■
Quarter 4, 2016													■		■			■	■		■
Quarter 1, 2017													■		■					■	■
Quarter 2, 2017															■			■	■		■
Quarter 3, 2017															■						■
Quarter 4, 2017										■			■	■	■			■	■		■
Quarter 1, 2018															■			■	■		■
Quarter 2, 2018													■		■			■	■		■
Quarter 3, 2018										■					■			■	■		■
Quarter 4, 2018										■			■		■			■	■		■
<b>TURBIDITY</b>																					
Quarter 1, 2003										*											
<b>URANIUM</b>																					
Quarter 4, 2002		*			*	*	*			*	*	*	*	*	*	*		*	*	*	*
Quarter 4, 2006																					*
<b>ZINC</b>																					
Quarter 3, 2005																				*	
* Statistical test results indicate an elevated concentration (i.e., a statistical exceedance).																					
■ MCL Exceedance																					
■ Previously reported as an MCL exceedance; however, result was equal to MCL																					
UCRS Upper Continental Recharge System																					
URGA Upper Regional Gravel Aquifer																					
LRGA Lower Regional Gravel Aquifer																					

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**APPENDIX H**  
**METHANE MONITORING DATA**

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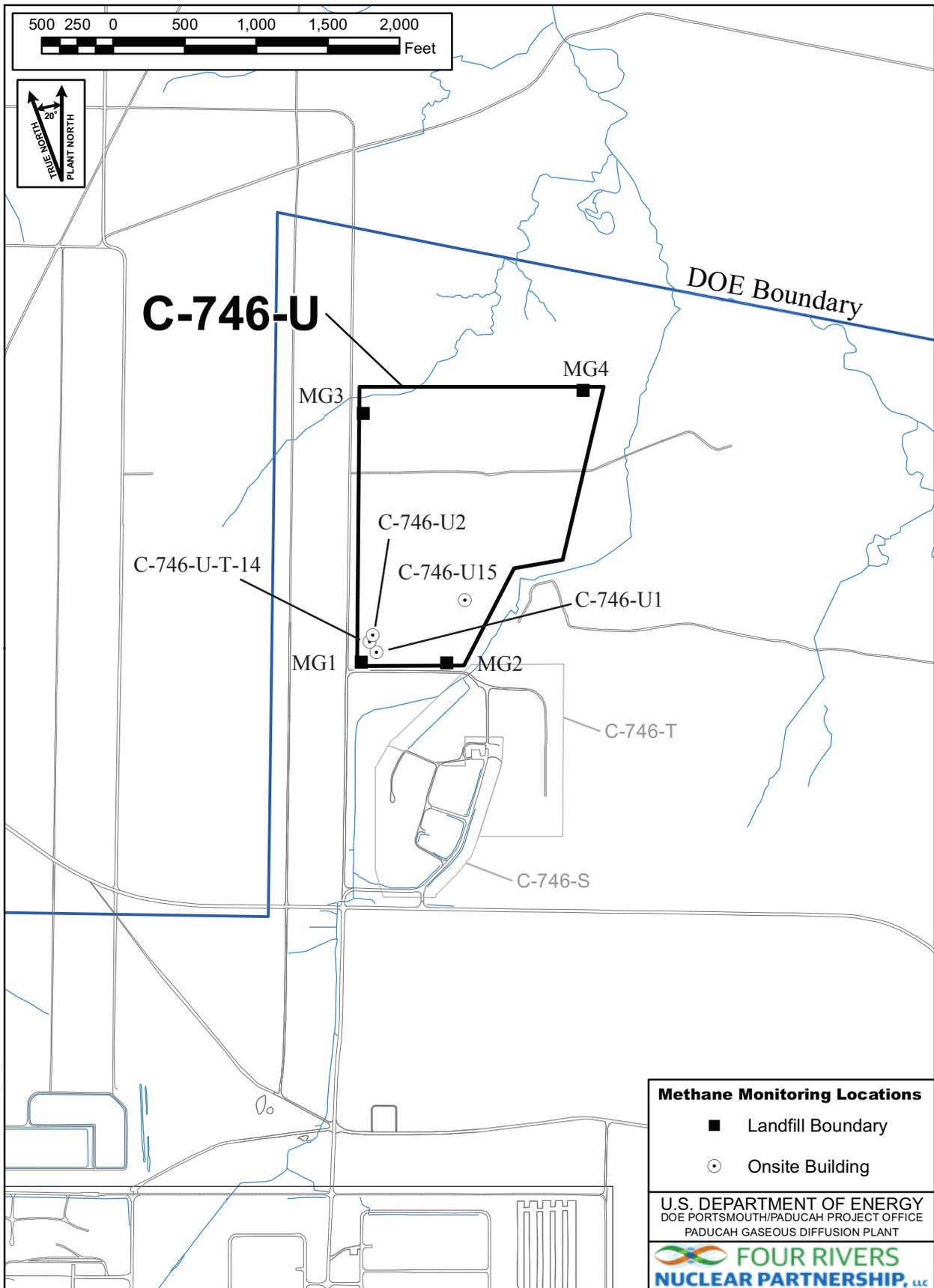


Figure H.1. C-746-U Methane Monitoring Locations

**APPENDIX I**

**SURFACE WATER ANALYSES AND WRITTEN COMMENTS**

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Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

RESIDENTIAL/CONTAINED-QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Number: SW07300014, SW07300015, SW07300045

FINDS/UNIT: KY8-890-008-982,  
 LAB ID: None  
 For Official Use Only

## SURFACE WATER SAMPLE ANALYSIS (S)

Monitoring Point (KPDES Discharge Number, or "UPSTREAM", or "DOWNSTREAM")				L150 AT SITE	L154 UPSTREAM	L351 DOWNSTREAM	F. BLANK						
Sample Sequence #				1	1	1	1						
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment				NA	NA	NA	F						
Sample Date and Time (Month/Day/Year hour:minutes)				10/31/2018 14:07	10/31/2018 14:22	10/14/2018 10:02	10/31/2018 14:10						
Duplicate ("Y" or "N") <sup>1</sup>				N	N	N	N						
Split ('Y' or "N") <sup>2</sup>				N	N	N	N						
Facility Sample ID Number (if applicable)				L150US1-19	L154US1-19	L351US1-19	FB1US1-19						
Laboratory Sample ID Number (if applicable)				463254002	463254003	461937001	463254004						
Date of Analysis (Month/Day/Year)				11/17/2018	11/17/2018	11/2/2018	11/13/2018						
CAS RN <sup>3</sup>		CONSTITUENT	T D 4	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>5</sup>	F L A G S <sup>7</sup>						
A200-00-0	0	Flow	T	MGD	Field		*		*		*		*
16887-00-6	2	Chloride(s)	T	mg/L	300.0	3.35		6.98		2.32		1.11	
14808-79-8	0	Sulfate	T	mg/L	300.0	59.1		10		5.87		2.74	
7439-89-6	0	Iron	T	mg/L	200.8	4.86		1.03		0.984		<0.1	
7440-23-5	0	Sodium	T	mg/L	200.8	8.3		3.55		2.3		<0.25	
S0268- -	0	Organic Carbon <sup>6</sup>	T	mg/L	9060	9.65		19.5		11.4			*
S0097- -	0	BOD <sup>6</sup>	T	mg/L	not applicable		*		*		*		*
S0130- -	0	Chemical Oxygen Demand	T	mg/L	410.4	34.7	B	70.2	B	505			*

<sup>1</sup>Respond "Y" if the sample was a duplicate of another sample in this report

<sup>2</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>3</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>4</sup>"T" = Total; "D" = Dissolved

<sup>5</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value then shown is Practical Quantification Limit

<sup>6</sup>Facility has either/or option on Organic Carbon and (BOD) Biochemical Oxygen Demand - both are not required

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", " then describe on "Written Comments" page.

### STANDARD FLAGS:

\* = See Comments

J = Estimated Value

B = Analyte found in blank

A = Average value

N = Presumptive ID

D = Concentration from analysis of  
 a secondary dilution factor



Division of Waste Management  
 Solid Waste Branch  
 14 Reilly Road  
 Frankfort, KY 40601 (502)564-6716

**RESIDENTIAL/CONTAINED-QUARTERLY**  
**Facility: US DOE - Paducah Gaseous Diffusion Plant**  
**Permit Number: SW07300014, SW07300015, SW07300045**

FINDS/UNIT: KY8-890-008-982 / 1  
 LAB ID: None  
 For Official Use Only

# SURFACE WATER SAMPLE ANALYSIS (S)

Monitoring Point (KPDES Discharge Number, or "UPSTREAM", or "DOWNSTREAM")		L150 AT SITE											
Sample Sequence #		1											
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment		NA											
Sample Date and Time (Month/Day/Year hour:minutes)		10/31/2018 14:07											
Duplicate ("Y" or "N") <sup>1</sup>		N											
Split ('Y' or "N") <sup>2</sup>		N											
Facility Sample ID Number (if applicable)		L150DUS1-19											
Laboratory Sample ID Number (if applicable)		463254001											
Date of Analysis (Month/Day/Year)		11/17/2018											
CAS RN <sup>3</sup>		CONSTITUENT	T D <sup>4</sup>	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL <sup>5</sup>	F L A G S <sup>7</sup>						
A200-00-0	0	Flow	T	MGD	Field		*						
16887-00-6	2	Chloride(s)	T	MG/L	300.0	3.34							
14808-79-8	0	Sulfate	T	MG/L	300.0	59.5							
7439-89-6	0	Iron	T	MG/L	200.8	4.81							
7440-23-5	0	Sodium	T	MG/L	200.8	8.69							
S0268- -	0	Organic Carbon <sup>6</sup>	T	MG/L	9060	10.2							
S0097- -	0	BOD <sup>6</sup>	T	MG/L	not applicable		*						
S0130- -	0	Chemical Oxygen Demand	T	MG/L	410.4	42.8	B						

1-5

<sup>1</sup>Respond "Y" if the sample was a duplicate of another sample in this report

<sup>2</sup>Respond "Y" if the sample was split and analyzed by separate laboratories.

<sup>3</sup>Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

<sup>4</sup>"T" = Total; "D" = Dissolved

<sup>5</sup>"<" indicates a non-detect; do not use "ND" or "BDL". Value then shown is Practical Quantification Limit

<sup>6</sup>Facility has either/or option on Organic Carbon and (BOD) Biochemical Oxygen Demand - both are not required

<sup>7</sup>Flags are as designated, do not use any other type. Use "\*", " then describe on "Written Comments" page.

**STANDARD FLAGS:**

\* = See Comments

J = Estimated Value

B = Analyte found in blank

A = Average value

N = Presumptive ID

D = Concentration from analysis of a secondary dilution factor



**RESIDENTIAL/CONTAINED – QUARTERLY Facility: Finds/Unit: KY8-890-008-982 / 1**  
**US DOE - Paducah Gaseous Diffusion Plant Permit LAB ID: None**  
**Number: SW07300014, SW07300015, SW07300045 For Official Use Only**

## SURFACE WATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
L150	L150US1-19	Flow Rate		Analysis of constituent not required and not performed.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.01. Rad error is 5.94.
		Beta activity		TPU is 10.6. Rad error is 9.
L154	L154US1-19	Flow Rate		Analysis of constituent not required and not performed.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.17. Rad error is 4.15.
		Beta activity		TPU is 8.27. Rad error is 7.87.
L351	L351US1-19	Flow Rate		Analysis of constituent not required and not performed.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Suspended Solids	*	Duplicate analysis not within control limits.
		Dissolved Solids	*	Duplicate analysis not within control limits.
		Alpha activity		TPU is 6.84. Rad error is 6.55.
		Beta activity		TPU is 10.2. Rad error is 9.28.
QC	FB1US1-19	Flow Rate		Analysis of constituent not required and not performed.
		Total Organic Carbon (TOC)		Analysis of constituent not required and not performed.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Chemical Oxygen Demand (COD)		Analysis of constituent not required and not performed.
		Conductivity		Analysis of constituent not required and not performed.
		Suspended Solids		Analysis of constituent not required and not performed.
		Dissolved Solids		Analysis of constituent not required and not performed.
		Total Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.07. Rad error is 4.05.
Beta activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.78. Rad error is 7.64.		

**RESIDENTIAL/CONTAINED – QUARTERLY**

**Facility: US DOE - Paducah Gaseous Diffusion Plant**

**Permit Numbers: 073-00045**

**Finds/Unit: KY8-890-008-982 / 1**

**LAB ID: None**

**For Official Use Only**

## SURFACE WATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
L150	L150DUS1-19	Flow Rate		Analysis of constituent not required and not performed.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.84. Rad error is 5.82.
		Beta activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 10.1. Rad error is 9.96.