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Dear Ms. Green, Mr. Hendricks, and Mr. Shingleton:

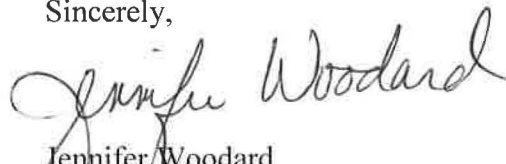
**C-746-U CONTAINED LANDFILL THIRD QUARTER CALENDAR YEAR 2016  
(JULY–SEPTEMBER) COMPLIANCE MONITORING REPORT, PADUCAH  
GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, FPD-PPT-0025/V3,  
PERMIT NUMBER SW07300014, SW07300015, SW07300045**

Enclosed is the subject report for the third quarter of calendar year 2016. This report is required in accordance with Condition ACTV0006, Special Condition Number 3, of C-746-U Contained Solid Waste Landfill Permit Number SW07300014, SW07300015, SW07300045. The report includes groundwater and surface water analytical data, validation summary, groundwater flow rate and direction determination, figures depicting well locations, and methane monitoring results.

The statistical analyses on the third quarter 2016 monitoring well data collected from the C-746-U Landfill were performed in accordance with Condition GSTR0001, Standard Requirement 3, using the U.S. Environmental Protection Agency guidance document, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance* (1989). This report also serves as the statistical exceedance notification for the third quarter calendar year 2016, in accordance with Condition GSTR0001, Standard Requirement 8, of the C-746-U Solid Waste Landfill Permit Number SW07300014, SW07300015, SW07300045.

If you have any questions or require additional information, please contact David Dollins at (270) 441-6819.

Sincerely,



Jennifer Woodard  
Paducah Site Lead  
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Enclosure:

C-746-U Contained Landfill Third Qtr CY 2016 Compliance Monitoring Report

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**C-746-U Contained Landfill  
Third Quarter Calendar Year 2016  
(July–September)  
Compliance Monitoring Report  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**

***FLUOR***<sup>®</sup>

This document is approved for public release per  
review by:

*R.H. Watson*

FPDP Classification Support

*11-21-16*

Date



**C-746-U Contained Landfill  
Third Quarter Calendar Year 2016  
(July–September)  
Compliance Monitoring Report  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**

Date Issued—November 2016

U.S. DEPARTMENT OF ENERGY  
Office of Environmental Management

Prepared by  
FLUOR FEDERAL SERVICES, INC.,  
Paducah Deactivation Project  
managing the  
Deactivation Project at the  
Paducah Gaseous Diffusion Plant  
under Task Order DE-DT0007774

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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
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 Third Quarter Calendar Year 2016 (July–September) 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), 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 § 4. 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 Gaseous Diffusion Plant 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 3, 4, and 5. Phases 1, 2, and most of Phase 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 MW376 and MW377 (both screened in the UCRS), which had an insufficient amount of water to obtain samples; therefore, there are no analytical results for these locations.

Consistent with the approved Groundwater Monitoring Plan (LATA Kentucky 2014), UCRS wells are included in the monitoring program. Groundwater flow gradients are downward through the UCRS, but flow in the underlying RGA is lateral. Groundwater flow in the RGA typically is in a north-northeasterly

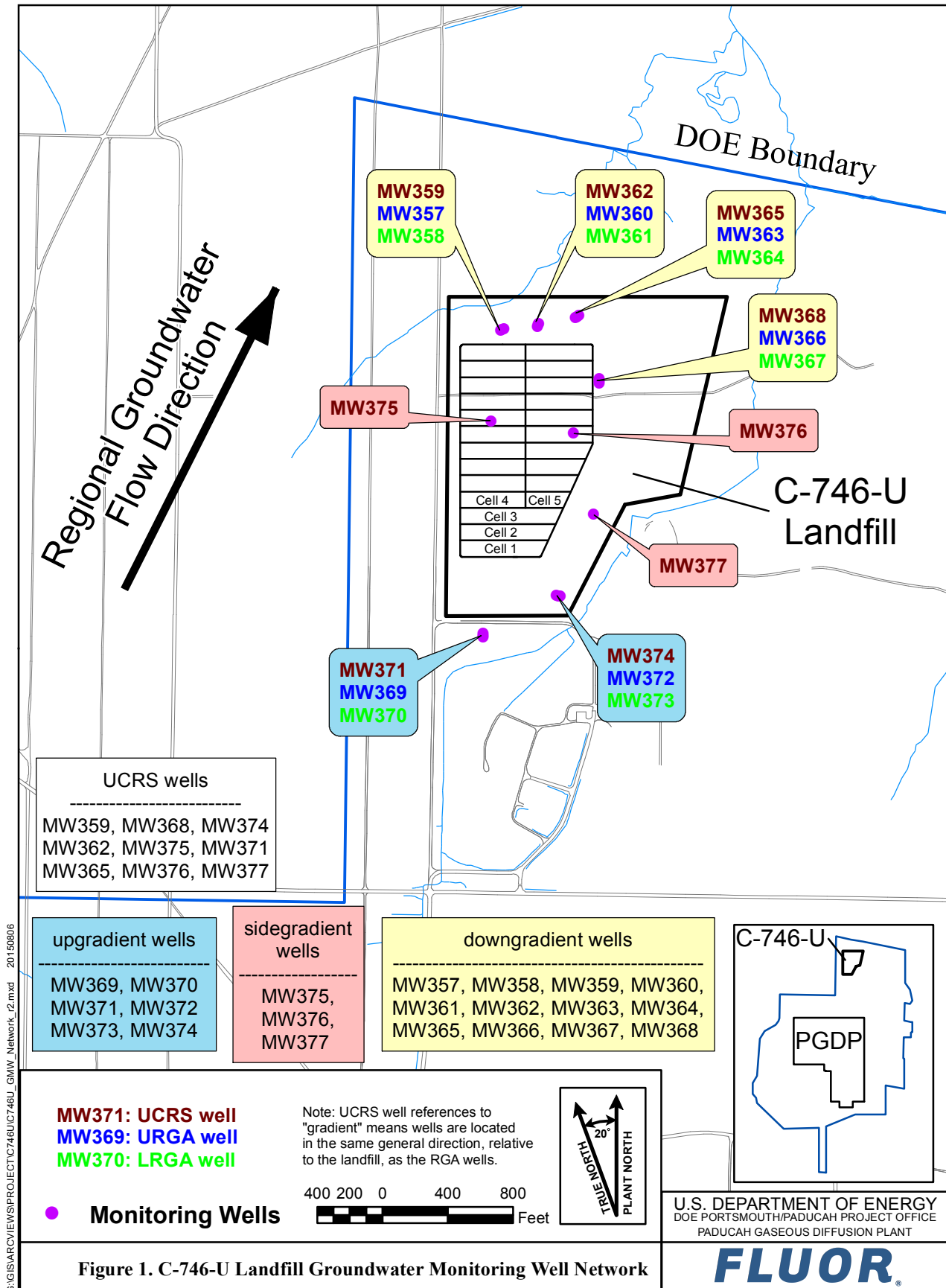


Figure 1. C-746-U Landfill Groundwater Monitoring Well Network

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 the UCRS water quality. Similarly, other gradient references for UCRS wells are identified using the RGA wells located in the same direction (relative to the landfill) as nearby UCRS 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 third quarter 2016 in accordance with the Groundwater Monitoring Plan (LATA Kentucky 2014) using Fluor Federal Services, Inc., 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 July 26 and 27, 2016, 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. Normal regional flow in the RGA is northeastward, toward the Ohio River. During July, RGA groundwater flow in the area of the landfill was oriented northeast to north. The hydraulic gradient for the RGA in the vicinity of the C-746-U Landfill in July was  $3.88 \times 10^{-4}$  ft/ft. The hydraulic gradient for the URGA and LRGA at the C-746-U Landfill were  $7.79 \times 10^{-4}$  ft/ft and  $7.88 \times 10^{-4}$  ft/ft, respectively. Calculated groundwater flow rates (average linear velocity) at the C-746-U Landfill range from 1.32 to 2.26 ft/day for the URGA and 1.34 to 2.28 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 § 4 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 September 20, 2016. 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; and a location capturing runoff from the landfill surface, L150. The parameters identified in the Solid Waste Landfill Permit were analyzed for the three locations sampled, in report only format, pursuant to Permit Condition GMNP0001, Standard Requirement 1. Surface water results are provided in Appendix I.

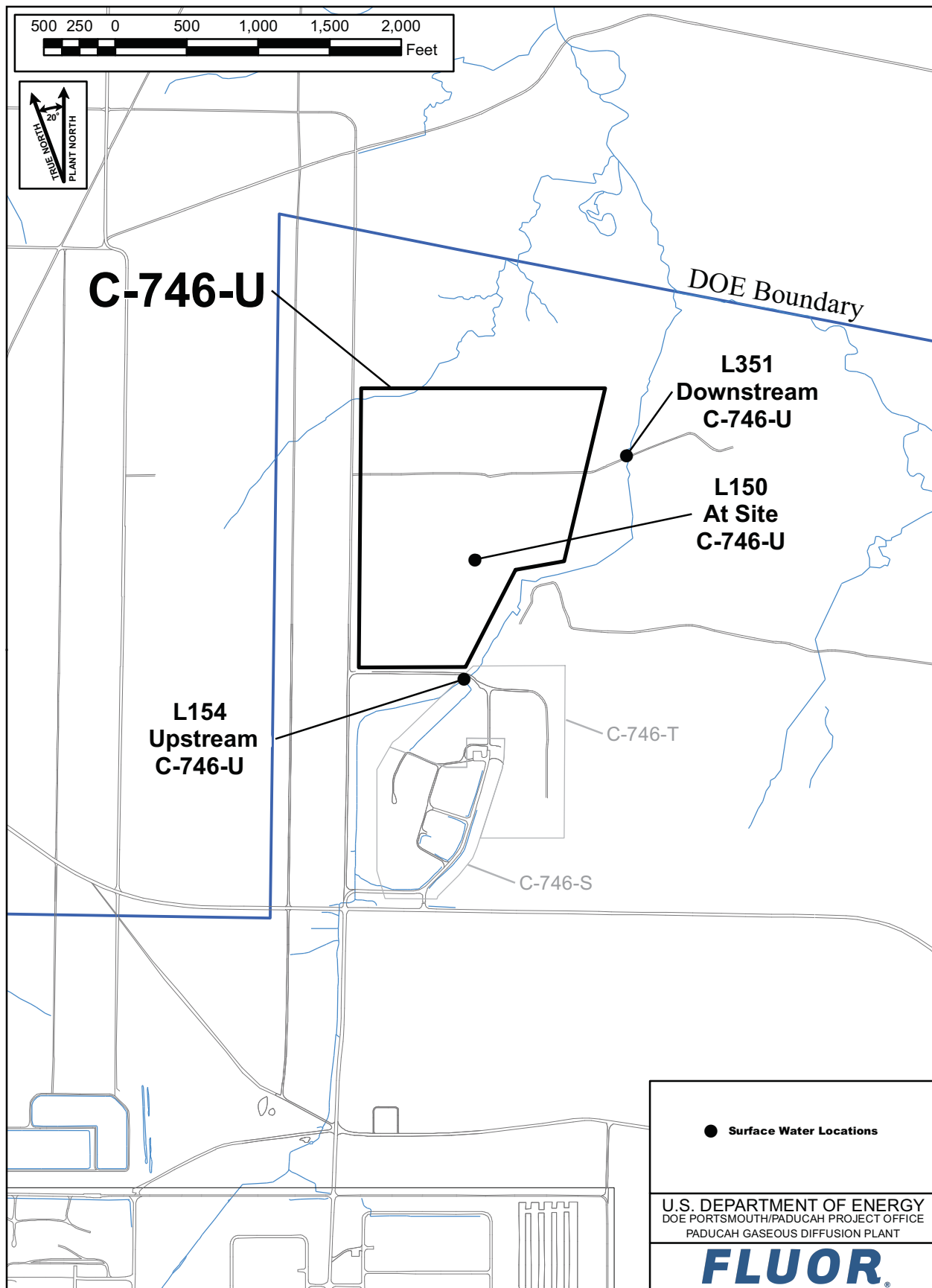


Figure 2. C-746-U Landfill Surface Water Monitoring Locations



### 1.3 KEY RESULTS

Groundwater data were evaluated in accordance 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 (LATA Kentucky 2014), which is Technical Application, Attachment 25, of the Solid Waste Landfill permit. Parameters that had concentrations that exceeded the 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 (without MCLs) with concentrations that exceeded the statistically derived historical background UTL concentrations<sup>1</sup> during the second quarter 2016, 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	MW364: Trichloroethene
	MW372: Trichloroethene	MW370: Beta activity
		MW373: Trichloroethene

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

UCRS*	URGA	LRGA
MW359: Dissolved oxygen, oxidation-reduction potential, sulfate	MW357: Dissolved oxygen, Oxidation-reduction potential	MW358: Oxidation-reduction potential, technetium-99
MW362: Dissolved oxygen, oxidation-reduction potential, sulfate	MW360: Oxidation-reduction potential, sodium	MW361: Oxidation-reduction potential, technetium-99
MW365: Dissolved oxygen, oxidation-reduction potential, sulfate	MW363: Oxidation-reduction potential	MW364: Oxidation-reduction potential
MW368: Magnesium, oxidation-reduction potential, sulfate	MW366: Oxidation-reduction potential	MW367: Oxidation-reduction potential
MW371: Dissolved oxygen, oxidation-reduction potential, sulfate	MW369: Oxidation-reduction potential	MW370: Beta activity, oxidation-reduction potential, pH, technetium-99
MW374: Manganese, oxidation-reduction potential	MW372: Conductivity, oxidation-reduction potential	MW373: Oxidation-reduction potential
MW375: Oxidation-reduction potential, sulfate		

\*Gradients in the UCRS are downward. UCRS gradient designations refer to the locations of wells in the same direction, relative to the landfill as the RGA wells.

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

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

URGA	LRGA
MW357: Dissolved Oxygen	None
MW360: Sodium	

<sup>1</sup> The term “concentration” may refer to a field measurement result such as pH or oxidation-reduction potential or an analytical parameter such as trichloroethene or polychlorinated biphenyls.

The notification of parameters that exceeded the MCL has been 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 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 and MW364 (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 GSTR0003, Standard Requirement 8; 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 UTL 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.

Those constituents listed in Table 3 that exceed both the historical UTL and the current UTL, sodium in MW360 and dissolved oxygen in MW357, do not have an identified source and are considered preliminarily to be a Type 2 exceedance, per the approved Groundwater Monitoring Plan. To evaluate these 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 trend and are considered to be Type 1 exceedances (not attributable to the landfills).

The statistical evaluation of current UCRS wells (downgradient) against the current UCRS background UTL identified UCRS wells with magnesium and sulfate values that exceed both the historical and current backgrounds (Table 5). Because these wells are not hydrogeologically downgradient of the C-746-U Landfill, these exceedances are not attributable to C-746-U sources and are considered to be Type 1 exceedances.

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

Location	Well ID	Parameter	Sample Size	Alpha <sup>1</sup>	p-Value <sup>2</sup>	S <sup>3</sup>	Var(S) <sup>4</sup>	Sen's Slope <sup>5</sup>	Kendall Correlation <sup>6</sup>	Decision <sup>7</sup>
C-746-U Landfills Downgradient Wells	MW357	Dissolved Oxygen	8	0.05	0.402	-3.000	64.33	-0.048	-0.109	No Trend
	MW360	Sodium	8	0.05	0.360	4.000	0.000	0.883	0.143	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>VAR(S) represents the variance of S in the sample set and takes into account statistical ties.

<sup>5</sup>The magnitude of trend is predicted by the Sen's Slope. Here, the slope is described as the median of all  $(x_j - x_k)/(j - k)$ , where x is a data point and j and k are values of time.

<sup>6</sup>Kendall's correlation is described as the difference of concordant pairs and discordant pairs, also taking sample size and statistical ties into account. When the Kendall's correlation is positive, it indicates an increasing trend and when it is negative, it indicates a decreasing trend.

<sup>7</sup>The Mann-Kendall decision operates on two hypothesis, 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. Two different tests were ran to test for positive or negative trends. This table reports the test with the lowest p-value.

**Note:** Statistics generated using XLSTAT Version 2016

**Table 5. Exceedances of Current Background  
UTL in Downgradient UCRS Wells**

<b>UCRS</b>
MW359: Sulfate
MW362: Sulfate
MW365: Sulfate
MW368: Magnesium, Sulfate

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.

## 2. DATA EVALUATION/STATISTICAL SYNOPSIS

The statistical analyses conducted on the third quarter 2016 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 respective Kentucky solid waste facility MCL 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.

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 was conducted. The test well results were compared to both an upper and lower tolerance limit 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 6.

**Table 6. 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.

\*\*\*MW376 and MW377 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 third quarter, dissolved oxygen, magnesium, manganese, oxidation-reduction potential, and sulfate displayed concentrations that exceeded their respective historical UTL and are listed in Table 2. Magnesium and sulfate exceeded the current background UTL and are included in Table 5.

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

In this quarter, 30 parameters, including those with MCLs, required statistical analysis in the URGA. During the third quarter, conductivity, dissolved oxygen, oxidation-reduction potential, and sodium displayed concentrations that exceeded their respective historical UTL and are listed in Table 2. Dissolved oxygen and sodium exceeded the current background UTL and are included in Table 3.

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

In this quarter, 26 parameters, including those with MCLs, required statistical analysis in the LRGA. During the third quarter, beta activity, oxidation-reduction potential, pH, 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 LRGA downgradient wells as summarized 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 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  
Third Quarter Calendar Year 2016 (July–September)  
Compliance Monitoring Report,  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky (FPDP-RPT-0025/V3)*

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



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K.R. Davis  
11-21-16

Kenneth R. Davis  
Kenneth R. Davis

PG113927

November 21, 2016  
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, Finds/Unit No: \_\_\_\_\_ Quarter & Year 3rd Qtr. CY 2016  
SW07300045

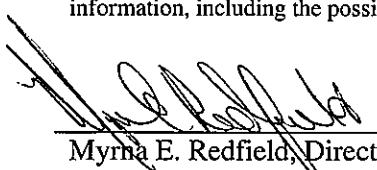
*Please check the following as applicable:*

\_\_\_\_\_ Characterization X Quarterly \_\_\_\_\_ Semiannual \_\_\_\_\_ Annual \_\_\_\_\_ Assessment

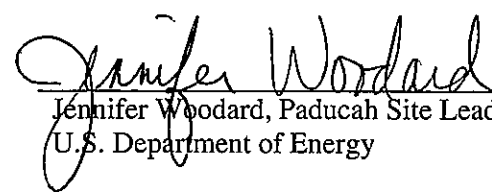
*Please check applicable submittal(s):* X Groundwater X Surface Water  
\_\_\_\_\_ Leachate X Methane Monitoring

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 the 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 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, Director  
Environmental Management  
Fluor Federal Services, Inc.

11/29/16  
\_\_\_\_\_  
Date

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

11/29/2016  
\_\_\_\_\_  
Date

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

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## FACILITY INFORMATION SHEET

Groundwater: July 2016  
Surface Water: July 2016  
Methane: September 2016

County: McCracken

Permit Nos. SW07300014,  
SW07300015,  
SW07300045

Sampling Date: \_\_\_\_\_

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

Site Address: 5501 Hobbs Road Kevil, Kentucky 42053  
Street City/State Zip

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

### OWNER INFORMATION

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

Contact Person: Myrna E. Redfield Phone No: (270) 441-5113

Contact Person Title: Director, Environmental Management, Fluor Federal Services, Inc.

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

### 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

### 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

### 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

### 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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

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)					7/14/2016 07:07	7/14/2016 07:58	7/12/2016 10:28	7/12/2016 09:47					
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)					MW357UG4-16	MW358UG4-16	MW359UG4-16	MW360UG4-16					
Laboratory Sample ID Number (if applicable)					401712001	401712005	401437001	401437003					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/18/2016	7/18/2016	7/14/2016	7/14/2016					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					DOWN	DOWN	DOWN	DOWN					
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 <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	0.432		0.479		<0.2		0.165	J
16887-00-6		Chloride(s)	T	mg/L	9056	34.2		38.4		1.16		9.41	
16984-48-8		Fluoride	T	mg/L	9056	0.178		0.183		0.0524	J	0.27	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.27		0.912		1.74		0.198	J
14808-79-8		Sulfate	T	mg/L	9056	49.9		76		52.6		19.9	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.94		29.94		29.97		29.97	
S0145- -		Specific Conductance	T	µMH0/cm	Field	433		490		260		539	

### 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: 073-00045**

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					8004-4798		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	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	326.02		325.99		336.72		325.9	
N238		Dissolved Oxygen	T	mg/L	Field	5.64		1.93		4.91		2.39	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	260		296		186		303	
S0296- -		pH	T	Units	Field	6.3		6.2		6.2		6.36	
NS215		Eh	T	mV	Field	414		370		250		218	
S0907 - -		Temperature	T	°C	Field	19.28		19.39		17.61		17.06	
7429-90-5		Aluminum	T	mg/L	6020	<0.05		<0.05		0.128		0.0177	J
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		0.005	J	<0.005		0.00253	J
7440-39-3		Barium	T	mg/L	6020	0.0615		0.0474		0.0277		0.148	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.449		0.453		<0.015		0.0302	
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2		Calcium	T	mg/L	6020	27.8		34		6.64		25.2	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4		Cobalt	T	mg/L	6020	0.000109	J	0.000225	J	0.000233	J	0.0121	
7440-50-8		Copper	T	mg/L	6020	<0.001		<0.001		0.000919	J	0.000428	J
7439-89-6		Iron	T	mg/L	6020	<0.1		0.0951	J	0.15		3.28	
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4		Magnesium	T	mg/L	6020	11.9		15		4.09		10.1	
7439-96-5		Manganese	T	mg/L	6020	0.00265	J	0.0317		0.0018	J	0.192	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		<0.0002	

C-4



## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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						8004-4798		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
7439-98-7		Molybdenum	T	mg/L	6020	0.000186	BJ	<0.0005		<0.0005		0.000511	B
7440-02-0		Nickel	T	mg/L	6020	0.000613	J	0.00235		0.000995	J	0.00139	J
7440-09-7		Potassium	T	mg/L	6020	1.71		2.14		0.133	J	0.697	
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	45.5		42.3		40.1		79.9	
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		0.000101	J	0.000207	
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		0.00467	J	<0.01		<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	<0.005		<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	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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					8004-4798		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	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	0.00566		0.0041		<0.001		<0.001	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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						8004-4798		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
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	<0.0000189		<0.0000185		<0.0000198		<0.0000197	
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	<0.1		<0.099		<0.099		0.0561	J
12674-11-2		PCB-1016	T	ug/L	8082	<0.1		<0.099		<0.099		<0.0943	
11104-28-2		PCB-1221	T	ug/L	8082	<0.1		<0.099		<0.099		<0.0943	
11141-16-5		PCB-1232	T	ug/L	8082	<0.1		<0.099		<0.099		<0.0943	
53469-21-9		PCB-1242	T	ug/L	8082	<0.1		<0.099		<0.099		0.0561	J
12672-29-6		PCB-1248	T	ug/L	8082	<0.1		<0.099		<0.099		<0.0943	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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					8004-4798		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	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	<0.1		<0.099		<0.099		<0.0943	
11096-82-5		PCB-1260	T	ug/L	8082	<0.1		<0.099		<0.099		<0.0943	
11100-14-4		PCB-1268	T	ug/L	8082	<0.1		<0.099		<0.099		<0.0943	
12587-46-1		Gross Alpha	T	pCi/L	9310	4.85	*	3.62	*	-0.582	*	4.33	*
12587-47-2		Gross Beta	T	pCi/L	9310	30.3	*	37.8	*	5.98	*	8.35	*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300	0.107	*	0.623	*	0.113	*	0.536	*
10098-97-2		Strontium-90	T	pCi/L	905.0	0.5	*	0.0714	*	-0.55	*	-0.714	*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	40	*	47.9	*	-6.19	*	2.55	*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	0.00809	*	-0.00675	*	0.198	*	-0.198	*
10028-17-8		Tritium	T	pCi/L	906.0	59	*	8.32	*	-3.9	*	62.9	*
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4	18.5	J	16.2	J	12.3	J	10	J
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	J	1.04	J	1.13	J	2.95	
S0586- -		Total Organic Halides	T	mg/L	9020	0.00992	J	0.00778	J	0.0088	J	0.0176	

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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

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)					7/12/2016 08:25	7/12/2016 09:06	7/14/2016 09:10	7/14/2016 10:40					
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)					MW361UG4-16	MW362UG4-16	MW363UG4-16	MW364UG4-16					
Laboratory Sample ID Number (if applicable)					401437005	401437008	401712007	401712009					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/14/2016	7/15/2016	7/18/2016	7/18/2016					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					DOWN	DOWN	DOWN	DOWN					
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 <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	0.424		0.169	J	0.127	J	0.417	
16887-00-6		Chloride(s)	T	mg/L	9056	32.9		7.58		21.5		32.9	
16984-48-8		Fluoride	T	mg/L	9056	0.119		0.354		0.192		0.169	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	0.999		0.544		4.37		0.912	
14808-79-8		Sulfate	T	mg/L	9056	76.5		37.7		36.3		70.1	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.97		29.97		29.97		29.98	
S0145- -		Specific Conductance	T	µMH0/cm	Field	472		759		399		458	

<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."

### 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

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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, 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	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	325.94		338.22		325.88		324.85	
N238		Dissolved Oxygen	T	mg/L	Field	3.08		5.57		1.75		2.84	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	270		481		249		264	
S0296- -		pH	T	Units	Field	5.99		6.75		6.32		6.18	
NS215		Eh	T	mV	Field	464		440		356		388	
S0907 - -		Temperature	T	°C	Field	18.33		17		17.94		18.44	
7429-90-5		Aluminum	T	mg/L	6020	<0.05		0.866		<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	<0.005		0.00185	J	<0.005		<0.005	
7440-39-3		Barium	T	mg/L	6020	0.0528		0.109		0.18		0.0668	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.228		0.0195		0.0108	J	0.00968	J
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2		Calcium	T	mg/L	6020	29.2		22.4		27.5		29.5	
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		0.000485	J	0.00121		0.000652	J
7440-50-8		Copper	T	mg/L	6020	0.000377	J	0.00316		<0.001		<0.001	
7439-89-6		Iron	T	mg/L	6020	<0.1		0.518		0.0456	J	0.0861	J
7439-92-1		Lead	T	mg/L	6020	<0.002		0.000678	J	<0.002		<0.002	
7439-95-4		Magnesium	T	mg/L	6020	13.4		10.4		10.5		12.5	
7439-96-5		Manganese	T	mg/L	6020	0.00534		0.00464	J	0.271		0.0147	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		<0.0002	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 <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
7439-98-7		Molybdenum	T	mg/L	6020	<0.0005		0.00104	B	<0.0005		0.000254	BJ
7440-02-0		Nickel	T	mg/L	6020	<0.002		0.00155	J	0.000765	J	0.0269	
7440-09-7		Potassium	T	mg/L	6020	1.8		0.399		1.23		1.92	
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	40.1		147		40.5		45.1	
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		0.00617		<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		0.0423	
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	<0.005		<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	

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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 <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	0.00519		<0.001		0.00498		0.00526	



## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 S	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
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	<0.0000195		<0.0000195		<0.0000185		<0.0000188	
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		<0.11		0.0543	J	<0.101	
12674-11-2			PCB-1016	T	ug/L	8082	<0.0971		<0.11		<0.0971		<0.101	
11104-28-2			PCB-1221	T	ug/L	8082	<0.0971		<0.11		<0.0971		<0.101	
11141-16-5			PCB-1232	T	ug/L	8082	<0.0971		<0.11		<0.0971		<0.101	
53469-21-9			PCB-1242	T	ug/L	8082	<0.0971		<0.11		0.0543	J	<0.101	
12672-29-6			PCB-1248	T	ug/L	8082	<0.0971		<0.11		<0.0971		<0.101	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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	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	<0.0971		<0.11		<0.0971		<0.101	
11096-82-5		PCB-1260	T	ug/L	8082	<0.0971		<0.11		<0.0971		<0.101	
11100-14-4		PCB-1268	T	ug/L	8082	<0.0971		<0.11		<0.0971		<0.101	
12587-46-1		Gross Alpha	T	pCi/L	9310	-0.103	*	7.27	*	-0.38	*	0.408	*
12587-47-2		Gross Beta	T	pCi/L	9310	30.5	*	5.88	*	22.9	*	35.2	*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300	0.147	*	0.176	*	0.181	*	0.457	*
10098-97-2		Strontium-90	T	pCi/L	905.0	1.07	*	-1.5	*	1.1	*	-2.29	*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	53.2	*	5.24	*	6.92	*	36.7	*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	-0.0119	*	0.333	*	0.0812	*	0.34	*
10028-17-8		Tritium	T	pCi/L	906.0	8.42	*	34.8	*	83.2	*	8.59	*
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4	21.6		28.6		23.2		25.5	
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	0.873	J	2.82		1.18	J	0.95	J
S0586- -		Total Organic Halides	T	mg/L	9020	0.00972	J	0.0162		0.0153		0.00766	J

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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

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)					7/14/2016 09:54		7/14/2016 09:22		7/14/2016 07:39		7/14/2016 08:39		
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)					MW365UG4-16		MW366UG4-16		MW367UG4-16		MW368UG4-16		
Laboratory Sample ID Number (if applicable)					401712011		401712013		401712015		401712017		
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/19/2016		7/19/2016		7/19/2016		7/19/2016		
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	<0.2		0.493		0.148	J	<0.2	
16887-00-6		Chloride(s)	T	mg/L	9056	3.99		39.6		10.8		6.92	
16984-48-8		Fluoride	T	mg/L	9056	0.203		0.188		0.0591	J	0.267	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	0.446		0.938		0.0537	J	1.45	
14808-79-8		Sulfate	T	mg/L	9056	65		62.7		26.2		36.4	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.97		29.96		29.94		29.97	
S0145- -		Specific Conductance	T	µMH0/cm	Field	428		485		273		534	

<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."

### 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

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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, 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	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	334.25		325.98		325.95		345.56	
N238		Dissolved Oxygen	T	mg/L	Field	5.11		1.53		0.89		0.54	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	284		276		164		320	
S0296- -		pH	T	Units	Field	6.33		6.31		6.14		6.63	
NS215		Eh	T	mV	Field	365		318		172		211	
S0907 - -		Temperature	T	°C	Field	18.06		19.17		18.83		18.33	
7429-90-5		Aluminum	T	mg/L	6020	0.0221	J	<0.05		<0.05		0.296	
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		<0.005		0.00214	J	0.00418	J
7440-39-3		Barium	T	mg/L	6020	0.123		0.134		0.163		0.0219	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	<0.015		<0.015		<0.015		<0.015	
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2		Calcium	T	mg/L	6020	23.6		32.1		16		68.3	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4		Cobalt	T	mg/L	6020	0.00277		0.000291	J	0.00571		0.000114	J
7440-50-8		Copper	T	mg/L	6020	0.00169		0.000402	J	0.000352	J	0.00191	
7439-89-6		Iron	T	mg/L	6020	0.0359	J	0.125		9.89		0.188	
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4		Magnesium	T	mg/L	6020	10.6		13.3		8.29		20.7	
7439-96-5		Manganese	T	mg/L	6020	0.0854		0.0203		1.56		0.0227	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		<0.0002	

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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 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	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
7439-98-7			Molybdenum	T	mg/L	6020	<0.0005		0.00018	BJ	<0.0005		0.00118	B
7440-02-0			Nickel	T	mg/L	6020	0.006		0.000861	J	0.00246		0.00112	J
7440-09-7			Potassium	T	mg/L	6020	0.254	J	1.86		2.76		0.866	
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	57.5		45		20.3		25.9	
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	0.000206		<0.0002		<0.0002		0.000377	
7440-62-2			Vanadium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-66-6			Zinc	T	mg/L	6020	0.011		0.0039	J	0.00637	J	0.00413	J
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	<0.005		<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	

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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 <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	<0.001		0.0043		0.00044	J	<0.001	

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## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 S	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
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	<0.0000185		<0.0000189		<0.0000189		<0.0000187	
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	0.167		<0.098		<0.0952		0.0482	J
12674-11-2			PCB-1016	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	
11104-28-2			PCB-1221	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	
11141-16-5			PCB-1232	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	
53469-21-9			PCB-1242	T	ug/L	8082	0.167		<0.098		<0.0952		0.0482	J
12672-29-6			PCB-1248	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 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	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
11097-69-1		PCB-1254	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	
11096-82-5		PCB-1260	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	
11100-14-4		PCB-1268	T	ug/L	8082	<0.0962		<0.098		<0.0952		<0.0971	
12587-46-1		Gross Alpha	T	pCi/L	9310	2.17	*	1.61	*	-0.801	*	4.72	*
12587-47-2		Gross Beta	T	pCi/L	9310	6.63	*	41.6	*	3.99	*	9.28	*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300	0.451	*	0.882	*	1.27	*	0.593	*
10098-97-2		Strontium-90	T	pCi/L	905.0	-1.11	*	-0.774	*	1.49	*	0.677	*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	-0.76	*	57.2	*	0.349	*	7.62	*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	-0.129	*	0.0511	*	0.243	*	2.26	*
10028-17-8		Tritium	T	pCi/L	906.0	91.1	*	12.4	*	54.7	*	101	*
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4	23.2		13.9	J	13.9	J	23.2	
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	1.91	J	1.12	J	0.781	J	2.94	
S0586- -		Total Organic Halides	T	mg/L	9020	0.0428		0.0052	J	<0.01		0.601	



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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

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)					7/14/2016 10:06	7/18/2016 12:42	7/18/2016 11:58	7/18/2016 08:29					
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)					MW369UG4-16	MW370UG4-16	MW371UG4-16	MW372UG4-16					
Laboratory Sample ID Number (if applicable)					401712019	401905003	401905005	401905007					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/19/2016	7/21/2016	7/21/2016	7/21/2016					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					UP	UP	UP	UP					
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 <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	0.406		0.4		<0.2		0.623	
16887-00-6		Chloride(s)	T	mg/L	9056	35.4		36		2.81		46.5	
16984-48-8		Fluoride	T	mg/L	9056	0.168		0.131		0.246		0.141	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	0.318		1.1		0.299	J	0.0776	J
14808-79-8		Sulfate	T	mg/L	9056	5.64		19.9		27.6		102	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.97		30.21		30.21		30.2	
S0145- -		Specific Conductance	T	µMH0/cm	Field	391		423		616		694	

<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."

### 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

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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, 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	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	327.22		326.9		343.23		326.9	
N238		Dissolved Oxygen	T	mg/L	Field	2.4		3.48		3.65		1.13	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	213		217	B	347	B	381	B
S0296- -		pH	T	Units	Field	6.42		5.8		6.45		6.64	
NS215		Eh	T	mV	Field	323		483		441		248	
S0907 - -		Temperature	T	°C	Field	19.94		22.83		23.83		21.61	
7429-90-5		Aluminum	T	mg/L	6020	0.054		<0.05		1.83		0.112	
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		0.00218	BJ	0.00381	BJ	0.00238	BJ
7440-39-3		Barium	T	mg/L	6020	0.386		0.213		0.126		0.0498	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.115		0.0311		0.00847	J	1.08	
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2		Calcium	T	mg/L	6020	16.9		26.7		42.2		51.6	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		0.00236	J	0.00261	J
7440-48-4		Cobalt	T	mg/L	6020	0.0064		0.000578	J	0.000414	J	0.000515	J
7440-50-8		Copper	T	mg/L	6020	0.00178		0.000438	J	0.00155		<0.001	
7439-89-6		Iron	T	mg/L	6020	0.213		0.0808	J	1.33		2.14	
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		0.000676	J	<0.002	
7439-95-4		Magnesium	T	mg/L	6020	7.18		11.8		13.4		20.9	
7439-96-5		Manganese	T	mg/L	6020	0.0321		0.00668		0.0118		0.0287	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		<0.0002	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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	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
7439-98-7		Molybdenum	T	mg/L	6020	0.000168	BJ	<0.0005		0.00097		0.000373	J
7440-02-0		Nickel	T	mg/L	6020	0.00887		0.000765	J	0.00205		0.00124	J
7440-09-7		Potassium	T	mg/L	6020	0.468		2.39		0.725		2.38	
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	58.9		41.8		75.5		48.5	
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		0.000901		<0.0002	
7440-62-2		Vanadium	T	mg/L	6020	<0.01		<0.01		0.0092	J	<0.01	
7440-66-6		Zinc	T	mg/L	6020	0.00377	J	<0.01		0.00491	J	0.00589	J
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	<0.005		<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	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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	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	0.00041	J	0.00251		<0.001		0.0108	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 S	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
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	<0.0000189		<0.0000199		<0.00002		<0.0000196	
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	0.0579	J	<0.0952		<0.0952		<0.0952	
12674-11-2			PCB-1016	T	ug/L	8082	<0.0952		<0.0952		<0.0952		<0.0952	
11104-28-2			PCB-1221	T	ug/L	8082	<0.0952		<0.0952		<0.0952		<0.0952	
11141-16-5			PCB-1232	T	ug/L	8082	<0.0952		<0.0952		<0.0952		<0.0952	
53469-21-9			PCB-1242	T	ug/L	8082	0.0579	J	<0.0952		<0.0952		<0.0952	
12672-29-6			PCB-1248	T	ug/L	8082	<0.0952		<0.0952		<0.0952		<0.0952	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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

LAB ID: None

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## 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	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		<0.0952		<0.0952	
11096-82-5		PCB-1260	T	ug/L	8082	<0.0952		<0.0952		<0.0952		<0.0952	
11100-14-4		PCB-1268	T	ug/L	8082	<0.0952		<0.0952		<0.0952		<0.0952	
12587-46-1		Gross Alpha	T	pCi/L	9310	-0.441	*	-0.661	*	3.75	*	0.179	*
12587-47-2		Gross Beta	T	pCi/L	9310	22.3	*	58	*	4.5	*	21.5	*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300	0.499	*	0.887	*	0.432	*	0.108	*
10098-97-2		Strontium-90	T	pCi/L	905.0	-1.25	*	2.26	*	0.435	*	0.184	*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	10.7	*	93.2	*	-8.07	*	35.4	*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	0.151	*	-0.124	*	-0.15	*	-0.025	*
10028-17-8		Tritium	T	pCi/L	906.0	-37.9	*	18.7	*	21	*	70	*
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4	37.1		50.9	B	25.9	B	75.9	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	*	<0.5	*	<0.5	*	<0.5	*
S0268- -		Total Organic Carbon	T	mg/L	9060	1.47	J	1.16	J	1.28	J	3.13	
S0586- -		Total Organic Halides	T	mg/L	9020	0.0301		0.00612	J	0.0042	J	0.0114	

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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

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)					7/18/2016 09:57	7/18/2016 09:14	7/18/2016 07:27	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)					MW373UG4-16	MW374UG4-16	MW375UG4-16	NA					
Laboratory Sample ID Number (if applicable)					401905009	401905011	401905001	NA					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/21/2016	7/21/2016	7/21/2016	NA					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					UP	UP	SIDE	SIDE					
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 <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	0.607		0.718		<0.2			*
16887-00-6		Chloride(s)	T	mg/L	9056	48.5		60.2		4.54			*
16984-48-8		Fluoride	T	mg/L	9056	0.157		0.155		0.259			*
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.13		<0.1		1.32			*
14808-79-8		Sulfate	T	mg/L	9056	113		6.25		26.8			*
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	30.21		30.2		30.18			*
S0145- -		Specific Conductance	T	µMH0/cm	Field	703		695		363			*

<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."

### 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

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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, BLANK-F, 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
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	326.91		337.83		340.69			*
N238		Dissolved Oxygen	T	mg/L	Field	2.39		1		1.92			*
S0266- -		Total Dissolved Solids	T	mg/L	160.1	399	B	351	B	184	B		*
S0296- -		pH	T	Units	Field	6.5		7.26		6.36			*
NS215		Eh	T	mV	Field	337		193		472			*
S0907 - -		Temperature	T	°C	Field	20.5		19.83		20.39			*
7429-90-5		Aluminum	T	mg/L	6020	<0.05		<0.05		0.0326	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		0.00229	BJ	0.00187	BJ		*
7440-39-3		Barium	T	mg/L	6020	0.0307		0.163		0.186			*
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005			*
7440-42-8		Boron	T	mg/L	6020	1.34		0.0823		0.00941	J		*
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001			*
7440-70-2		Calcium	T	mg/L	6020	57.2		21		14.2			*
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01			*
7440-48-4		Cobalt	T	mg/L	6020	<0.001		0.00641		0.000166	J		*
7440-50-8		Copper	T	mg/L	6020	<0.001		0.00072	J	0.000484	J		*
7439-89-6		Iron	T	mg/L	6020	<0.1		1.99		0.0936	J		*
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		<0.002			*
7439-95-4		Magnesium	T	mg/L	6020	21.2		5.33		6.04			*
7439-96-5		Manganese	T	mg/L	6020	<0.005		0.831		0.00471	J		*
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002			*



## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 <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
7439-98-7		Molybdenum	T	mg/L	6020	<0.0005		0.000272	J	0.000241	J		*
7440-02-0		Nickel	T	mg/L	6020	0.00057	J	0.00262		0.00201			*
7440-09-7		Potassium	T	mg/L	6020	2.52		0.491		0.271	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		0.00254	J		*
7440-22-4		Silver	T	mg/L	6020	<0.001		<0.001		<0.001			*
7440-23-5		Sodium	T	mg/L	6020	49.4		128		55.7			*
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		0.000091	J	<0.0002			*
7440-62-2		Vanadium	T	mg/L	6020	<0.01		<0.01		<0.01			*
7440-66-6		Zinc	T	mg/L	6020	<0.01		<0.01		<0.01			*
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			*

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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	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	0.00787		<0.001		<0.001			*

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 <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
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		<0.00002		<0.0000202			*
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		<0.0952			*
12674-11-2		PCB-1016	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*
11104-28-2		PCB-1221	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*
11141-16-5		PCB-1232	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*
53469-21-9		PCB-1242	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*
12672-29-6		PCB-1248	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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 <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		<0.0952			*
11096-82-5		PCB-1260	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*
11100-14-4		PCB-1268	T	ug/L	8082	<0.0962		<0.0962		<0.0952			*
12587-46-1		Gross Alpha	T	pCi/L	9310	-0.899	*	-1.76	*	1.49	*		*
12587-47-2		Gross Beta	T	pCi/L	9310	18.1	*	-0.0582	*	1.55	*		*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300	0.564	*	0.869	*	0.439	*		*
10098-97-2		Strontium-90	T	pCi/L	905.0	0.335	*	-1.51	*	-0.225	*		*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	23.7	*	-9.77	*	-7.93	*		*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	0.0659	*	-0.256	*	0.549	*		*
10028-17-8		Tritium	T	pCi/L	906.0	68.9	*	45.2	*	51	*		*
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4	49.1	B	63.4	B	47.4	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	4.88		2.54		1.22	J		*
S0586- -		Total Organic Halides	T	mg/L	9020	0.0134		0.0207		0.0118			*

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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

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	7/14/2016 06:40		7/14/2016 08:05		7/12/2016 07:30			
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	RI1UG4-16		FB1UG4-16		TB1UG4-16			
Laboratory Sample ID Number (if applicable)					NA	401712022		401712021		401437007			
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					NA	7/19/2016		7/19/2016		7/15/2016			
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					SIDE	NA		NA		NA			
CAS RN <sup>4</sup>		CONSTITUENT	T D <sup>5</sup>	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		*		*		*		*

<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."

### 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

**RESIDENTIAL/CONTAINED-QUARTERLY**

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

**Permit Number: 073-00045**

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	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		*		*		*		*
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		*	0.00511	J	0.00897	J		*
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			*

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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, 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
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		*	<0.01		<0.01			*
7440-66-6		Zinc	T	mg/L	6020		*	<0.01		<0.01			*
108-05-4		Vinyl acetate	T	mg/L	8260		*	<0.005		<0.005		<0.005	
67-64-1		Acetone	T	mg/L	8260		*	0.00177	J	0.00166	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	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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, 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		*	0.00249		0.00211		0.00252	
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	



## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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, 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	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
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		*	<0.000019		<0.000019		<0.0000201	
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		*	<0.099		<0.098			*
12674-11-2			PCB-1016	T	ug/L	8082		*	<0.099		<0.098			*
11104-28-2			PCB-1221	T	ug/L	8082		*	<0.099		<0.098			*
11141-16-5			PCB-1232	T	ug/L	8082		*	<0.099		<0.098			*
53469-21-9			PCB-1242	T	ug/L	8082		*	<0.099		<0.098			*
12672-29-6			PCB-1248	T	ug/L	8082		*	<0.099		<0.098			*

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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, 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		*	<0.099		<0.098			*
11096-82-5		PCB-1260	T	ug/L	8082		*	<0.099		<0.098			*
11100-14-4		PCB-1268	T	ug/L	8082		*	<0.099		<0.098			*
12587-46-1		Gross Alpha	T	pCi/L	9310		*	-0.28	*	0.994	*		*
12587-47-2		Gross Beta	T	pCi/L	9310		*	-1.3	*	2.5	*		*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300		*	0.273	*	0.408	*		*
10098-97-2		Strontium-90	T	pCi/L	905.0		*	-0.564	*	-0.612	*		*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC		*	-2.01	*	-3.43	*		*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC		*	-0.0604	*	0.208	*		*
10028-17-8		Tritium	T	pCi/L	906.0		*	37	*	-23	*		*
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		*		*		*		*

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: 073-00045

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

LAB ID: None  
For Official Use Only

## GROUNDWATER SAMPLE ANALYSIS<sub>(S)</sub>

AKGWA NUMBER <sup>1</sup> , Facility Well/Spring Number					0000-0000	0000-0000	0000-0000	8004-4799					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2	T. BLANK 3	T. BLANK 4	358					
Sample Sequence #					1	1	1	2					
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment					T	T	T	NA					
Sample Date and Time (Month/Day/Year hour:minutes)					7/14/2016 06:35	7/14/2016 07:00	7/18/2016 06:50	7/14/2016 07:58					
Duplicate ("Y" or "N") <sup>2</sup>					N	N	N	Y					
Split ("Y" or "N") <sup>3</sup>					N	N	N	N					
Facility Sample ID Number (if applicable)					TB2UG4-16	TB3UG4-16	TB4UG4-16	MW358DUG4-16					
Laboratory Sample ID Number (if applicable)					401712023	401712024	401905013	401712003					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/19/2016	7/19/2016	7/21/2016	7/18/2016					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					NA	NA	NA	DOWN					
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 <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		
24959-67-9		Bromide	T	mg/L	9056		*		*		*	0.47	
16887-00-6		Chloride(s)	T	mg/L	9056		*		*		*	38	
16984-48-8		Fluoride	T	mg/L	9056		*		*		*	0.151	
S0595- -		Nitrate & Nitrite	T	mg/L	9056		*		*		*	0.942	
14808-79-8		Sulfate	T	mg/L	9056		*		*		*	76	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field		*		*		*	29.94	
S0145- -		Specific Conductance	T	µMH0/cm	Field		*		*		*	490	

### 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: 073-00045**

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					0000-0000		0000-0000		0000-0000		8004-4799		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					T. BLANK 2		T. BLANK 3		T. BLANK 4		358		
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	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field		*		*		*	325.99	
N238		Dissolved Oxygen	T	mg/L	Field		*		*		*	1.93	
S0266- -		Total Dissolved Solids	T	mg/L	160.1		*		*		*	297	
S0296- -		pH	T	Units	Field		*		*		*	6.2	
NS215		Eh	T	mV	Field		*		*		*	370	
S0907 - -		Temperature	T	°C	Field		*		*		*	19.39	
7429-90-5		Aluminum	T	mg/L	6020		*		*		*	<0.05	
7440-36-0		Antimony	T	mg/L	6020		*		*		*	<0.003	
7440-38-2		Arsenic	T	mg/L	6020		*		*		*	<0.005	
7440-39-3		Barium	T	mg/L	6020		*		*		*	0.0467	
7440-41-7		Beryllium	T	mg/L	6020		*		*		*	<0.0005	
7440-42-8		Boron	T	mg/L	6020		*		*		*	0.478	
7440-43-9		Cadmium	T	mg/L	6020		*		*		*	<0.001	
7440-70-2		Calcium	T	mg/L	6020		*		*		*	33.4	
7440-47-3		Chromium	T	mg/L	6020		*		*		*	<0.01	
7440-48-4		Cobalt	T	mg/L	6020		*		*		*	0.000237	J
7440-50-8		Copper	T	mg/L	6020		*		*		*	<0.001	
7439-89-6		Iron	T	mg/L	6020		*		*		*	0.0802	J
7439-92-1		Lead	T	mg/L	6020		*		*		*	<0.002	
7439-95-4		Magnesium	T	mg/L	6020		*		*		*	14.5	
7439-96-5		Manganese	T	mg/L	6020		*		*		*	0.0299	
7439-97-6		Mercury	T	mg/L	7470		*		*		*	<0.0002	

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## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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						0000-0000		0000-0000		0000-0000		8004-4799		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						T. BLANK 2		T. BLANK 3		T. BLANK 4		358		
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	DETECTED VALUE OR PQL <sup>6</sup>	F L A G S
7439-98-7			Molybdenum	T	mg/L	6020		*		*		*	0.000167	BJ
7440-02-0			Nickel	T	mg/L	6020		*		*		*	0.00235	
7440-09-7			Potassium	T	mg/L	6020		*		*		*	2.28	
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		*		*		*	42.3	
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		*		*		*	<0.01	
7440-66-6			Zinc	T	mg/L	6020		*		*		*	0.00409	J
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	0.002	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	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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					0000-0000		0000-0000		0000-0000		8004-4799		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2		T. BLANK 3		T. BLANK 4		358		
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	0.00256		0.00244		0.00227		<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	<0.001		<0.001		<0.001		0.00408	

## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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						0000-0000		0000-0000		0000-0000		8004-4799	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						T. BLANK 2		T. BLANK 3		T. BLANK 4		358	
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
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	<0.0000188		<0.0000188		<0.00002		<0.0000187	
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		*		*		*	<0.0962	
12674-11-2		PCB-1016	T	ug/L	8082		*		*		*	<0.0962	
11104-28-2		PCB-1221	T	ug/L	8082		*		*		*	<0.0962	
11141-16-5		PCB-1232	T	ug/L	8082		*		*		*	<0.0962	
53469-21-9		PCB-1242	T	ug/L	8082		*		*		*	<0.0962	
12672-29-6		PCB-1248	T	ug/L	8082		*		*		*	<0.0962	

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## RESIDENTIAL/CONTAINED-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00045

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					0000-0000		0000-0000		0000-0000		8004-4799		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					T. BLANK 2		T. BLANK 3		T. BLANK 4		358		
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	
11096-82-5		PCB-1260	T	ug/L	8082		*		*		*	<0.0962	
11100-14-4		PCB-1268	T	ug/L	8082		*		*		*	<0.0962	
12587-46-1		Gross Alpha	T	pCi/L	9310		*		*		*	3.95	*
12587-47-2		Gross Beta	T	pCi/L	9310		*		*		*	35.7	*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	HASL 300		*		*		*	0.38	*
10098-97-2		Strontium-90	T	pCi/L	905.0		*		*		*	-0.375	*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC		*		*		*	46.8	*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC		*		*		*	0.0692	*
10028-17-8		Tritium	T	pCi/L	906.0		*		*		*	93.2	*
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4		*		*		*	16.2	J
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		*		*		*	1.04	J
S0586- -		Total Organic Halides	T	mg/L	9020		*		*		*	0.00712	J



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

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4798 MW357	MW357UG4-16	Gross alpha		TPU is 3.5. Rad error is 3.34.
		Gross beta		TPU is 6.51. Rad error is 4.24.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.243. Rad error is 0.243.
		Strontium-90		TPU is 4.37. Rad error is 4.37.
		Technetium-99		TPU is 12.4. Rad error is 11.6.
		Thorium-230		TPU is 0.26. Rad error is 0.26.
		Tritium		TPU is 116. Rad error is 115.
		Iodide	H	Analysis performed outside holding time requirement
8004-4799 MW358	MW358UG4-16	Gross alpha		TPU is 3.26. Rad error is 3.2.
		Gross beta		TPU is 8.05. Rad error is 5.21.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.486. Rad error is 0.485.
		Strontium-90		TPU is 2.17. Rad error is 2.17.
		Technetium-99		TPU is 13.5. Rad error is 12.4.
		Thorium-230		TPU is 0.229. Rad error is 0.229.
		Tritium		TPU is 113. Rad error is 113.
		Iodide	H	Analysis performed outside holding time requirement
8004-0981 MW359	MW359UG4-16	Gross alpha		TPU is 2.51. Rad error is 2.51.
		Gross beta		TPU is 2.93. Rad error is 2.75.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.26. Rad error is 0.26.
		Strontium-90		TPU is 2.1. Rad error is 2.1.
		Technetium-99		TPU is 11. Rad error is 11.
		Thorium-230		TPU is 0.756. Rad error is 0.751.
		Tritium		TPU is 109. Rad error is 109.
		Iodide	H	Analysis performed outside holding time requirement
8004-4800 MW360	MW360UG4-16	Gross alpha		TPU is 3.18. Rad error is 3.09.
		Gross beta		TPU is 3.3. Rad error is 3.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.427. Rad error is 0.426.
		Strontium-90		TPU is 2.06. Rad error is 2.06.
		Technetium-99		TPU is 11.2. Rad error is 11.2.
		Thorium-230		TPU is 0.775. Rad error is 0.774.
		Tritium		TPU is 114. Rad error is 114.
		Iodide	H	Analysis performed outside holding time requirement

RESIDENTIAL/CONTAINED – QUARTERLY  
 Facility: US DOE - Paducah Gaseous Diffusion Plant  
 Permit Numbers: 073-00045

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
8004-4795 MW361	MW361UG4-16	Gross alpha		TPU is 2.33. Rad error is 2.33.
		Gross beta		TPU is 6.44. Rad error is 3.94.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.253. Rad error is 0.252.
		Strontium-90		TPU is 1.75. Rad error is 1.74.
		Technetium-99		TPU is 14.3. Rad error is 13.
		Thorium-230		TPU is 0.67. Rad error is 0.669.
		Tritium		TPU is 113. Rad error is 113.
		Iodide	H	Analysis performed outside holding time requirement
8004-0986 MW362	MW362UG4-16	Gross alpha		TPU is 4.24. Rad error is 4.06.
		Gross beta		TPU is 2.96. Rad error is 2.79.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.348. Rad error is 0.348.
		Strontium-90		TPU is 1.26. Rad error is 1.26.
		Technetium-99		TPU is 11.2. Rad error is 11.2.
		Thorium-230		TPU is 0.785. Rad error is 0.778.
		Tritium		TPU is 113. Rad error is 113.
		Iodide	H	Analysis performed outside holding time requirement
8004-4796 MW363	MW363UG4-16	Gross alpha		TPU is 2.49. Rad error is 2.49.
		Gross beta		TPU is 5.38. Rad error is 3.74.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.289. Rad error is 0.289.
		Strontium-90		TPU is 1.53. Rad error is 1.52.
		Technetium-99		TPU is 11. Rad error is 11.
		Thorium-230		TPU is 0.333. Rad error is 0.331.
		Tritium		TPU is 117. Rad error is 116.
		Iodide	H	Analysis performed outside holding time requirement
8004-4797 MW364	MW364UG4-16	Gross alpha		TPU is 2.64. Rad error is 2.64.
		Gross beta		TPU is 6.99. Rad error is 3.9.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.397. Rad error is 0.396.
		Strontium-90		TPU is 1.66. Rad error is 1.66.
		Technetium-99		TPU is 12.8. Rad error is 12.1.
		Thorium-230		TPU is 0.349. Rad error is 0.34.
		Tritium		TPU is 112. Rad error is 112.
		Iodide	H	Analysis performed outside holding time requirement

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

## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0984 MW365	MW365UG4-16	Gross alpha		TPU is 2.82. Rad error is 2.8.
		Gross beta		TPU is 2.45. Rad error is 2.18.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.375. Rad error is 0.374.
		Strontium-90		TPU is 1.13. Rad error is 1.13.
		Technetium-99		TPU is 12.5. Rad error is 12.5.
		Thorium-230		TPU is 0.342. Rad error is 0.341.
		Tritium		TPU is 117. Rad error is 115.
		Iodide	H	Analysis performed outside holding time requirement
8004-0982 MW366	MW366UG4-16	Gross alpha		TPU is 2.85. Rad error is 2.83.
		Gross beta		TPU is 7.97. Rad error is 4.23.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.497. Rad error is 0.496.
		Strontium-90		TPU is 2.18. Rad error is 2.18.
		Technetium-99		TPU is 12.7. Rad error is 11.
		Thorium-230		TPU is 0.28. Rad error is 0.278.
		Tritium		TPU is 113. Rad error is 113.
		Iodide	H	Analysis performed outside holding time requirement
8004-4793 MW367	MW367UG4-16	Gross alpha		TPU is 2.38. Rad error is 2.38.
		Gross beta		TPU is 2.02. Rad error is 1.86.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.609. Rad error is 0.607.
		Strontium-90		TPU is 1.95. Rad error is 1.93.
		Technetium-99		TPU is 10.5. Rad error is 10.5.
		Thorium-230		TPU is 0.338. Rad error is 0.332.
		Tritium		TPU is 111. Rad error is 111.
		Iodide	H	Analysis performed outside holding time requirement
8004-0983 MW368	MW368UG4-16	Gross alpha		TPU is 3.49. Rad error is 3.4.
		Gross beta		TPU is 3.54. Rad error is 3.17.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.471. Rad error is 0.47.
		Strontium-90		TPU is 2.06. Rad error is 2.06.
		Technetium-99		TPU is 11.5. Rad error is 11.4.
		Thorium-230		TPU is 2.16. Rad error is 2.1.
		Tritium		TPU is 118. Rad error is 116.
		Iodide	H	Analysis performed outside holding time requirement

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## GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4820 MW369	MW369UG4-16	Gross alpha		TPU is 2.45. Rad error is 2.45.
		Gross beta		TPU is 4.97. Rad error is 3.25.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.369. Rad error is 0.369.
		Strontium-90		TPU is 1.17. Rad error is 1.17.
		Technetium-99		TPU is 9.84. Rad error is 9.77.
		Thorium-230		TPU is 0.343. Rad error is 0.339.
		Tritium		TPU is 111. Rad error is 111.
		Iodide	H	Analysis performed outside holding time requirement
8004-4818 MW370	MW370UG4-16	Tantalum	N	Sample spike recovery not within control limits.
		Thallium	N	Sample spike recovery not within control limits.
		Gross alpha		TPU is 1.98. Rad error is 1.98.
		Gross beta		TPU is 10.9. Rad error is 5.5.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.519. Rad error is 0.518.
		Strontium-90		TPU is 2.01. Rad error is 1.98.
		Technetium-99		TPU is 16.5. Rad error is 12.9.
		Thorium-230		TPU is 0.151. Rad error is 0.15.
8004-4819 MW371	MW371UG4-16	Tritium		TPU is 135. Rad error is 135.
		Iodide	H	Analysis performed outside holding time requirement
		Tantalum	N	Sample spike recovery not within control limits.
		Thallium	N	Sample spike recovery not within control limits.
		Gross alpha		TPU is 3.32. Rad error is 3.26.
		Gross beta		TPU is 2.75. Rad error is 2.64.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.391. Rad error is 0.39.
		Strontium-90		TPU is 2.09. Rad error is 2.09.
		Technetium-99		TPU is 9.99. Rad error is 9.99.
		Thorium-230		TPU is 0.385. Rad error is 0.381.
		Tritium		TPU is 137. Rad error is 136.
		Iodide	H	Analysis performed outside holding time requirement

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Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4808 MW372	MW372UG4-16	Tantalum	N	Sample spike recovery not within control limits.
		Thallium	N	Sample spike recovery not within control limits.
		Gross alpha		TPU is 2.53. Rad error is 2.53.
		Gross beta		TPU is 4.59. Rad error is 2.85.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.395. Rad error is 0.395.
		Strontium-90		TPU is 1.39. Rad error is 1.39.
		Technetium-99		TPU is 12.5. Rad error is 11.9.
		Thorium-230		TPU is 0.306. Rad error is 0.305.
		Tritium		TPU is 146. Rad error is 146.
		Iodide	H	Analysis performed outside holding time requirement
8004-4792 MW373	MW373UG4-16	Tantalum	N	Sample spike recovery not within control limits.
		Thallium	N	Sample spike recovery not within control limits.
		Gross alpha		TPU is 1.5. Rad error is 1.49.
		Gross beta		TPU is 4.16. Rad error is 2.95.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.489. Rad error is 0.489.
		Strontium-90		TPU is 3.08. Rad error is 3.08.
		Technetium-99		TPU is 11.4. Rad error is 11.1.
		Thorium-230		TPU is 0.415. Rad error is 0.414.
		Tritium		TPU is 146. Rad error is 145.
		Iodide	H	Analysis performed outside holding time requirement
8004-0990 MW374	MW374UG4-16	Tantalum	N	Sample spike recovery not within control limits.
		Thallium	N	Sample spike recovery not within control limits.
		Gross alpha		TPU is 1.61. Rad error is 1.6.
		Gross beta		TPU is 1.87. Rad error is 1.87.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.675. Rad error is 0.674.
		Strontium-90		TPU is 1.87. Rad error is 1.87.
		Technetium-99		TPU is 9.97. Rad error is 9.97.
		Thorium-230		TPU is 0.427. Rad error is 0.426.
		Tritium		TPU is 141. Rad error is 140.
		Iodide	H	Analysis performed outside holding time requirement

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Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-0985 MW375	MW375UG4-16	Tantalum	N	Sample spike recovery not within control limits.
		Thallium	N	Sample spike recovery not within control limits.
		Gross alpha		TPU is 2.63. Rad error is 2.62.
		Gross beta		TPU is 2.08. Rad error is 2.06.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.425. Rad error is 0.425.
		Strontium-90		TPU is 3.1. Rad error is 3.1.
		Technetium-99		TPU is 11.4. Rad error is 11.4.
		Thorium-230		TPU is 0.5. Rad error is 0.483.
		Tritium		TPU is 144. Rad error is 143.
		Iodide	H	Analysis performed outside holding time requirement

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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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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.



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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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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.

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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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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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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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## 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: 073-00045

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	RI1UG4-16	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.
		Gross alpha		TPU is 2.08. Rad error is 2.08.
		Gross beta		TPU is 1.91. Rad error is 1.91.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.317. Rad error is 0.316.
		Strontium-90		TPU is 1.72. Rad error is 1.72.
		Technetium-99		TPU is 9.94. Rad error is 9.94.
		Thorium-230		TPU is 0.255. Rad error is 0.254.
		Tritium		TPU is 111. Rad error is 111.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Iodide	H	Analysis performed outside holding time requirement
		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: 073-00045

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	FB1UG4-16	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.
		Gross alpha		TPU is 2.68. Rad error is 2.67.
		Gross beta		TPU is 2.57. Rad error is 2.53.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.377. Rad error is 0.377.
		Strontium-90		TPU is 1.2. Rad error is 1.2.
		Technetium-99		TPU is 11.4. Rad error is 11.4.
		Thorium-230		TPU is 0.403. Rad error is 0.398.
		Tritium		TPU is 110. Rad error is 110.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Iodide	H	Analysis performed outside holding time requirement
		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: 073-00045

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	TB1UG4-16	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: 073-00045

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	TB1UG4-16	Zinc		Analysis of constituent not required and not performed.
		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: 073-00045

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	TB2UG4-16	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: 073-00045

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	TB2UG4-16	Zinc		Analysis of constituent not required and not performed.
		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: 073-00045

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	TB3UG4-16	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: 073-00045

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	TB3UG4-16	Zinc		Analysis of constituent not required and not performed.
		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: 073-00045

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	TB4UG4-16	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: 073-00045

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	TB4UG4-16	Zinc		Analysis of constituent not required and not performed.
		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.
8004-4799 MW358	MW358DUG4-16	Gross alpha		TPU is 3.4. Rad error is 3.28.
		Gross beta		TPU is 7.1. Rad error is 4.08.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		TPU is 0.397. Rad error is 0.396.
		Strontium-90		TPU is 1.82. Rad error is 1.82.
		Technetium-99		TPU is 13.2. Rad error is 12.1.
		Thorium-230		TPU is 0.281. Rad error is 0.279.
		Tritium		TPU is 117. Rad error is 116.
		Iodide	H	Analysis performed outside holding time requirement



**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 third quarter 2016 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 third quarter 2016 data used to conduct the statistical analyses were collected in July 2016. 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.

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.

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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:  
upper TL =  $X + (K \times S)$   
lower TL =  $X - (K \times S)$

## 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), 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, third quarter 2016. 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.

**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.

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

<b>Parameters</b>
Aluminum
Beta Activity
Boron
Bromide
Calcium
Chemical Oxygen Demand (COD)
Chloride
Cobalt
Conductivity
Copper
Dissolved Oxygen
Dissolved Solids
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
Uranium
Vanadium
Zinc

\*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	7	7	0	No
1,1,2,2-Tetrachloroethane	7	7	0	No
1,1,2-Trichloroethane	7	7	0	No
1,1-Dichloroethane	7	7	0	No
1,2,3-Trichloropropane	7	7	0	No
1,2-Dibromo-3-chloropropane	7	7	0	No
1,2-Dibromoethane	7	7	0	No
1,2-Dichlorobenzene	7	7	0	No
1,2-Dichloropropane	7	7	0	No
2-Butanone	7	7	0	No
2-Hexanone	7	7	0	No
4-Methyl-2-pentanone	7	7	0	No
Acetone	7	7	0	No
Acrolein	7	7	0	No
Acrylonitrile	7	7	0	No
<b>Aluminum</b>	<b>7</b>	<b>1</b>	<b>6</b>	<b>Yes</b>
Antimony	7	7	0	No
Aroclor-1268	7	7	0	No
Beryllium	7	7	0	No
<b>Boron</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>Yes</b>
<b>Bromide</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>Yes</b>
Bromochloromethane	7	7	0	No
Bromodichloromethane	7	7	0	No
Bromoform	7	7	0	No
Bromomethane	7	7	0	No
<b>Calcium</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Carbon disulfide	7	7	0	No
<b>Chemical Oxygen Demand (COD)</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>Yes</b>
<b>Chloride</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Chlorobenzene	7	7	0	No
Chloroethane	7	7	0	No
Chloroform	7	7	0	No
Chloromethane	7	7	0	No
<i>cis</i> -1,2-Dichloroethene	7	7	0	No
<i>cis</i> -1,3-Dichloropropene	7	7	0	No
<b>Cobalt</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Conductivity</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Copper</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Cyanide	7	7	0	No
Dibromochloromethane	7	7	0	No
Dibromomethane	7	7	0	No
Dimethylbenzene, Total	7	7	0	No
<b>Dissolved Oxygen</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Dissolved Solids</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Ethylbenzene	7	7	0	No
Iodide	7	7	0	No
Iodomethane	7	7	0	No
<b>Iron</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Magnesium</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Manganese</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Methylene chloride	7	7	0	No

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

<b>Parameters</b>	<b>Observations</b>	<b>Censored Observation</b>	<b>Uncensored Observation</b>	<b>Statistical Analysis?</b>
<b>Molybdenum</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>Yes</b>
<b>Nickel</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Oxidation-Reduction Potential</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>PCB, Total</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>Yes</b>
PCB-1016	7	7	0	No
PCB-1221	7	7	0	No
PCB-1232	7	7	0	No
<b>PCB-1242</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>Yes</b>
PCB-1248	7	7	0	No
PCB-1254	7	7	0	No
PCB-1260	7	7	0	No
<b>pH</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Potassium</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Radium-226</b>	<b>7</b>	<b>4</b>	<b>3</b>	<b>Yes</b>
Rhodium	7	7	0	No
<b>Sodium</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Styrene	7	7	0	No
<b>Sulfate</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
Tantalum	7	7	0	No
Technetium-99	7	7	0	No
Tetrachloroethene	7	7	0	No
Thallium	7	7	0	No
Thorium-230	7	7	0	No
Toluene	7	7	0	No
<b>Total Organic Carbon (TOC)</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<b>Total Organic Halides (TOX)</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>Yes</b>
<i>trans</i> -1,2-Dichloroethene	7	7	0	No
<i>trans</i> -1,3-Dichloropropene	7	7	0	No
<i>trans</i> -1,4-Dichloro-2-Butene	7	7	0	No
Trichlorofluoromethane	7	7	0	No
<b>Uranium</b>	<b>7</b>	<b>2</b>	<b>5</b>	<b>Yes</b>
<b>Vanadium</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>Yes</b>
Vinyl Acetate	7	7	0	No
<b>Zinc</b>	<b>7</b>	<b>4</b>	<b>3</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
Acetone	6	6	0	No
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
Aroclor-1268	6	6	0	No
Beryllium	6	6	0	No
<b>Boron</b>	<b>6</b>	<b>1</b>	<b>5</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>1</b>	<b>5</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
<i>cis</i> -1,2-Dichloroethene	6	6	0	No
<i>cis</i> -1,3-Dichloropropene	6	6	0	No
<b>Cobalt</b>	<b>6</b>	<b>0</b>	<b>6</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>3</b>	<b>3</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>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)

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
<b>Molybdenum</b>	<b>6</b>	<b>5</b>	<b>1</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>3</b>	<b>3</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>3</b>	<b>3</b>	<b>Yes</b>
PCB-1248	6	6	0	No
PCB-1254	6	6	0	No
PCB-1260	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>
<b>Radium-226</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>Yes</b>
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>3</b>	<b>3</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>
<i>trans</i> -1,2-Dichloroethene	6	6	0	No
<i>trans</i> -1,3-Dichloropropene	6	6	0	No
<i>trans</i> -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>Uranium</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>Yes</b>
Vanadium	6	6	0	No
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**

<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
Acetone	6	6	0	No
Acrolein	6	6	0	No
Acrylonitrile	6	6	0	No
Aluminum	6	6	0	No
Antimony	6	6	0	No
Aroclor-1268	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>1</b>	<b>5</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>3</b>	<b>3</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>

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

<b>Parameters</b>	<b>Observations</b>	<b>Censored Observation</b>	<b>Uncensored Observation</b>	<b>Statistical Analysis?</b>
Methylene chloride	6	6	0	No
Molybdenum	6	6	0	No
<b>Nickel</b>	<b>6</b>	<b>1</b>	<b>5</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
<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>
<b>Radium-226</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>Yes</b>
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>1</b>	<b>5</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>
<i>trans</i> -1,2-Dichloroethene	6	6	0	No
<i>trans</i> -1,3-Dichloropropene	6	6	0	No
<i>trans</i> -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
Uranium	6	6	0	No
Vanadium	6	6	0	No
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.

## Discussion of Results from Historical Background Comparison

For the UCRS, URGAs, and LRGA, the concentrations of this quarter were compared to the results of the one-sided upper 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, URGAs, and LRGA, the test was applied to 29, 30, and 26 parameters, respectively, including those listed in bold print in Exhibits D.3, D.4, and D.5, which includes two constituents (i.e., beta activity and trichloroethene) that exceeded MCLs in one and two wells, respectively. 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, magnesium, manganese, oxidation-reduction potential, and sulfate.

### URGA

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

### 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 URGAs, 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**

UCRS	URGA	LRGA
<b>MW359:</b> Dissolved Oxygen, Oxidation-Reduction Potential, Sulfate	<b>MW357:</b> Dissolved Oxygen, Oxidation-Reduction Potential	<b>MW358:</b> Oxidation-Reduction Potential, Technetium-99
<b>MW362:</b> Dissolved Oxygen, Oxidation-Reduction Potential, Sulfate	<b>MW360:</b> Oxidation-Reduction Potential, Sodium	<b>MW361:</b> Oxidation-Reduction Potential, Technetium-99
<b>MW365:</b> Dissolved Oxygen, Oxidation-Reduction Potential, Sulfate	<b>MW363:</b> Oxidation-Reduction Potential	<b>MW364:</b> Oxidation-Reduction Potential
<b>MW368:</b> Magnesium, Oxidation-Reduction Potential, Sulfate	<b>MW366:</b> Oxidation-Reduction Potential	<b>MW367:</b> Oxidation-Reduction Potential
<b>MW371:</b> Dissolved Oxygen, Oxidation-Reduction Potential, Sulfate	<b>MW369:</b> Oxidation-Reduction Potential	<b>MW370:</b> Beta Activity, Oxidation-Reduction Potential, pH, Technetium-99
<b>MW374:</b> Manganese, Oxidation-Reduction Potential	<b>MW372:</b> Conductivity, Oxidation-Reduction Potential	<b>MW373:</b> Oxidation-Reduction Potential
<b>MW375:</b> Oxidation-Reduction Potential, Sulfate		

**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	1.28	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.55	Current results exceed statistically derived historical background concentration in MW359, MW362, MW365, and MW371.
Dissolved Solids	Tolerance Interval	0.42	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	Current results exceed statistically derived historical background concentration in MW368.
Manganese	Tolerance Interval	0.89	Current results exceed statistically derived historical background concentration in MW374.
Molybdenum	Tolerance Interval	1.65	No exceedance of statistically derived historical background concentration.
Nickel	Tolerance Interval	0.98	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>
Oxidation-Reduction Potential	Tolerance Interval	3.54	Current results exceed statistically derived historical background concentration in MW359, MW362, MW365, MW368, 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 MW359, MW362, MW365, MW368, 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.
Uranium	Tolerance Interval	1.68	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>
Aluminum	Tolerance Interval	1.24	No exceedance of statistically derived historical background concentration.
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	Current results exceed statistically derived historical background concentration in MW372.
Copper	Tolerance Interval	0.40	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.76	Current results exceed statistically derived historical background concentration in MW357.
Dissolved Solids	Tolerance Interval	0.16	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.
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.



**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>
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.
Radium-226	Tolerance Interval	2.61	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.26	Current results exceed statistically derived historical background concentration in MW360.
Sulfate	Tolerance Interval	0.75	No exceedance of statistically derived historical background concentration.
Technetium-99	Tolerance Interval	0.87	No exceedance of statistically derived historical background concentration.
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.
Uranium	Tolerance Interval	0.92	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>
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	1.17	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.
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.

**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>
pH	Tolerance Interval	0.03	Current results exceed statistically derived historical background concentration in MW370.
Potassium	Tolerance Interval	0.19	No exceedance of statistically derived historical background concentration.
Radium-226	Tolerance Interval	2.66	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, 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.
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.

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

## Discussion of Results from Current Background Comparison

For the UCRS, URGAs, and LRGA, the concentrations from downgradient wells were compared to the results of the one-sided upper tolerance interval test compared to current background, and are presented in Attachment D2 and the statistician qualification statement is presented in Attachment D3. For the UCRS, URGAs, and LRGA, the test was applied to 5, 4, and 4 parameters, respectively, because these parameter concentrations exceeded the historical background TL. A summary of instances where downgradient well concentrations exceeded the TL calculated using current background data is shown in Exhibit D.10, presented by well number.

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

URGA	LRGA
Dissolved Oxygen in MW357 Sodium in MW360	None

### UCRS

Because gradients in the UCRS are downward (vertical), there are no hydrogeologically downgradient UCRS wells. It should be noted, however, that magnesium in one UCRS well (i.e., MW368) and sulfate concentrations in four UCRS wells (i.e., MW359, MW362, MW365, and MW368) were higher than the current TL this quarter.

### URGA

This quarter's results showed exceedances of dissolved oxygen (i.e., MW357) and sodium (i.e., MW360) in wells located downgradient of the landfill.

### LRGA

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

## Statistical Summary

Summaries of the statistical tests conducted on data obtained from wells in the UCRS, the URGAs, 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.
Magnesium	Tolerance Interval	0.42	Because gradients in the UCRS are downward (vertical), there are no hydrogeologically downgradient UCRS wells. However, MW368 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Manganese	Tolerance Interval	1.19	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	0.41	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	0.53	Because gradients in the UCRS are downward (vertical), there are no hydrogeologically downgradient UCRS wells. However, MW359, MW362, MW365, MW368, MW371, and MW375 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.

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>
Conductivity	Tolerance Interval	0.33	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.
Dissolved Oxygen	Tolerance Interval	0.57	MW357 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Oxidation-Reduction Potential	Tolerance Interval	0.50	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.
Sodium	Tolerance Interval	0.10	MW360 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.

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	0.43	MW370 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
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.
pH	Tolerance Interval	0.04	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	0.54	MW370 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.

CV: coefficient of variation

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**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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	0.128	N/A	-2.056	NO
MW362	Downgradient	Yes	0.866	N/A	-0.144	NO
MW365	Downgradient	Yes	0.0221	N/A	-3.812	NO
MW368	Downgradient	Yes	0.296	N/A	-1.217	NO
MW371	Upgradient	Yes	1.83	N/A	0.604	NO
MW374	Upgradient	No	0.05	N/A	-2.996	N/A
MW375	Sidegradient	Yes	0.0326	N/A	-3.423	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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**

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 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

**Dry/Partially Dry Wells**

Well No. Gradient

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)
MW359	Downgradient	No	0.015	N/A	-4.200	N/A
MW362	Downgradient	Yes	0.0195	N/A	-3.937	NO
MW365	Downgradient	No	0.015	N/A	-4.200	N/A
MW368	Downgradient	No	0.015	N/A	-4.200	N/A
MW371	Upgradient	No	0.00847	N/A	-4.771	N/A
MW374	Upgradient	Yes	0.0823	N/A	-2.497	NO
MW375	Sidegradient	No	0.00941	N/A	-4.666	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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>Bromide</b>	<b>UNITS: mg/L</b>
	<b>UCRS</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 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.

<b>Statistics-Background Data</b>	X= 1.394	S= 0.474	CV(1)=0.340	K factor**= 2.523	TL(1)= 2.590	LL(1)=N/A
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<b>Statistics-Transformed Background Data</b>	X= 0.279	S= 0.332	CV(2)=1.190	K factor**= 2.523	TL(2)= 1.118	LL(2)=N/A
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**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
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)
MW359	Downgradient	No	0.2	N/A	-1.609	N/A
MW362	Downgradient	Yes	0.169	NO	-1.778	N/A
MW365	Downgradient	No	0.2	N/A	-1.609	N/A
MW368	Downgradient	No	0.2	N/A	-1.609	N/A
MW371	Upgradient	No	0.2	N/A	-1.609	N/A
MW374	Upgradient	Yes	0.718	NO	-0.331	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	6.64	NO	1.893	N/A
MW362	Downgradient	Yes	22.4	NO	3.109	N/A
MW365	Downgradient	Yes	23.6	NO	3.161	N/A
MW368	Downgradient	Yes	68.3	NO	4.224	N/A
MW371	Upgradient	Yes	42.2	NO	3.742	N/A
MW374	Upgradient	Yes	21	NO	3.045	N/A
MW375	Sidegradient	Yes	14.2	NO	2.653	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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

## Chemical Oxygen Demand (COD)      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**       $\bar{X}$ = 72.938    S= 70.749    CV(1)=0.970    **K factor\*\***= 2.523    **TL(1)**= 251.437    **LL(1)**=N/A

**Statistics-Transformed Background Data**       $\bar{X}$ = 4.000    S= 0.702    CV(2)=0.175    **K factor\*\***= 2.523    **TL(2)**= 5.770    **LL(2)**=N/A

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

Well Number:	MW371	
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	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:	MW374	
Date Collected	Result	LN(Result)
10/8/2002	260	5.561
1/7/2003	214	5.366
4/2/2003	147	4.990
7/9/2003	72	4.277
10/7/2003	56	4.025
1/6/2004	68	4.220
4/7/2004	35	3.555
7/14/2004	35	3.555

### Dry/Partially Dry Wells

Well No.	Gradient
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)
MW359	Downgradient	Yes	12.3	NO	2.510	N/A
MW362	Downgradient	Yes	28.6	NO	3.353	N/A
MW365	Downgradient	Yes	23.2	NO	3.144	N/A
MW368	Downgradient	Yes	23.2	NO	3.144	N/A
MW371	Upgradient	No	25.9	N/A	3.254	N/A
MW374	Upgradient	No	63.4	N/A	4.149	N/A
MW375	Sidegradient	No	47.4	N/A	3.859	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,  $CV = S/\bar{X}$  If CV is less than or equal to 1 assume normal distribution.

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

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

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

\*\* 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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>Chloride</b>	<b>UNITS: mg/L</b>
<b>UCRS</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 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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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

<b>Dry/Partially Dry Wells</b>
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Well No.	Gradient
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).**

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW359	Downgradient	Yes	1.16	NO	0.148	N/A
MW362	Downgradient	Yes	7.58	NO	2.026	N/A
MW365	Downgradient	Yes	3.99	NO	1.384	N/A
MW368	Downgradient	Yes	6.92	NO	1.934	N/A
MW371	Upgradient	Yes	2.81	NO	1.033	N/A
MW374	Upgradient	Yes	60.2	NO	4.098	N/A
MW375	Sidegradient	Yes	4.54	NO	1.513	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	0.000233	N/A	-8.364	NO
MW362	Downgradient	Yes	0.000485	N/A	-7.631	NO
MW365	Downgradient	Yes	0.00277	N/A	-5.889	NO
MW368	Downgradient	Yes	0.000114	N/A	-9.079	NO
MW371	Upgradient	Yes	0.000414	N/A	-7.790	NO
MW374	Upgradient	Yes	0.00641	N/A	-5.050	NO
MW375	Sidegradient	Yes	0.000166	N/A	-8.704	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	260	NO	5.561	N/A
MW362	Downgradient	Yes	759	NO	6.632	N/A
MW365	Downgradient	Yes	428	NO	6.059	N/A
MW368	Downgradient	Yes	534	NO	6.280	N/A
MW371	Upgradient	Yes	616	NO	6.423	N/A
MW374	Upgradient	Yes	695	NO	6.544	N/A
MW375	Sidegradient	Yes	363	NO	5.894	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	0.000919	N/A	-6.992	NO
MW362	Downgradient	Yes	0.00316	N/A	-5.757	NO
MW365	Downgradient	Yes	0.00169	N/A	-6.383	NO
MW368	Downgradient	Yes	0.00191	N/A	-6.261	NO
MW371	Upgradient	Yes	0.00155	N/A	-6.470	NO
MW374	Upgradient	Yes	0.00072	N/A	-7.236	NO
MW375	Sidegradient	Yes	0.000484	N/A	-7.633	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	4.91	YES	1.591	N/A
MW362	Downgradient	Yes	5.57	YES	1.717	N/A
MW365	Downgradient	Yes	5.11	YES	1.631	N/A
MW368	Downgradient	Yes	0.54	NO	-0.616	N/A
MW371	Upgradient	Yes	3.65	YES	1.295	N/A
MW374	Upgradient	Yes	1	NO	0.000	N/A
MW375	Sidegradient	Yes	1.92	NO	0.652	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**

MW359  
MW362  
MW365  
MW371

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	186	NO	5.226	N/A
MW362	Downgradient	Yes	481	NO	6.176	N/A
MW365	Downgradient	Yes	284	NO	5.649	N/A
MW368	Downgradient	Yes	320	NO	5.768	N/A
MW371	Upgradient	Yes	347	NO	5.849	N/A
MW374	Upgradient	Yes	351	NO	5.861	N/A
MW375	Sidegradient	Yes	184	NO	5.215	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.

**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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	0.15	NO	-1.897	N/A
MW362	Downgradient	Yes	0.518	NO	-0.658	N/A
MW365	Downgradient	Yes	0.0359	NO	-3.327	N/A
MW368	Downgradient	Yes	0.188	NO	-1.671	N/A
MW371	Upgradient	Yes	1.33	NO	0.285	N/A
MW374	Upgradient	Yes	1.99	NO	0.688	N/A
MW375	Sidegradient	Yes	0.0936	NO	-2.369	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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	4.09	NO	1.409	N/A
MW362	Downgradient	Yes	10.4	NO	2.342	N/A
MW365	Downgradient	Yes	10.6	NO	2.361	N/A
MW368	Downgradient	Yes	20.7	YES	3.030	N/A
MW371	Upgradient	Yes	13.4	NO	2.595	N/A
MW374	Upgradient	Yes	5.33	NO	1.673	N/A
MW375	Sidegradient	Yes	6.04	NO	1.798	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**

MW368

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	0.0018	NO	-6.320	N/A
MW362	Downgradient	Yes	0.00464	NO	-5.373	N/A
MW365	Downgradient	Yes	0.0854	NO	-2.460	N/A
MW368	Downgradient	Yes	0.0227	NO	-3.785	N/A
MW371	Upgradient	Yes	0.0118	NO	-4.440	N/A
MW374	Upgradient	Yes	0.831	YES	-0.185	N/A
MW375	Sidegradient	Yes	0.00471	NO	-5.358	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

MW374

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 Third Quarter 2016 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

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)
MW359	Downgradient	No	0.0005	N/A	-7.601	N/A
MW362	Downgradient	No	0.00104	N/A	-6.869	N/A
MW365	Downgradient	No	0.0005	N/A	-7.601	N/A
MW368	Downgradient	No	0.00118	N/A	-6.742	N/A
MW371	Upgradient	No	0.00097	N/A	-6.938	N/A
MW374	Upgradient	Yes	0.000272	N/A	-8.210	NO
MW375	Sidegradient	No	0.000241	N/A	-8.331	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 Third Quarter 2016 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**       $\bar{X}$ = 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**       $\bar{X}$ = -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

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)
MW359	Downgradient	Yes	0.000995	NO	-6.913	N/A
MW362	Downgradient	Yes	0.00155	NO	-6.470	N/A
MW365	Downgradient	Yes	0.006	NO	-5.116	N/A
MW368	Downgradient	Yes	0.00112	NO	-6.794	N/A
MW371	Upgradient	Yes	0.00205	NO	-6.190	N/A
MW374	Upgradient	Yes	0.00262	NO	-5.945	N/A
MW375	Sidegradient	Yes	0.00201	NO	-6.210	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,  $CV = S/\bar{X}$  If CV is less than or equal to 1 assume normal distribution.

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

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

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

\*\* 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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	250	N/A	5.521	YES
MW362	Downgradient	Yes	440	N/A	6.087	YES
MW365	Downgradient	Yes	365	N/A	5.900	YES
MW368	Downgradient	Yes	211	N/A	5.352	YES
MW371	Upgradient	Yes	441	N/A	6.089	YES
MW374	Upgradient	Yes	193	N/A	5.263	YES
MW375	Sidegradient	Yes	472	N/A	6.157	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

MW359  
MW362  
MW365  
MW368  
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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>PCB, Total</b>	<b>UNITS: UG/L</b>
	<b>UCRS</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 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.

<b>Statistics-Background Data</b>	<b>X</b> = 0.224	<b>S</b> = 0.207	<b>CV(1)</b> =0.922	<b>K factor**</b> = 2.523	<b>TL(1)</b> = 0.746	<b>LL(1)</b> =N/A
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<b>Statistics-Transformed Background Data</b>	<b>X</b> = -1.647	<b>S</b> = 0.440	<b>CV(2)</b> =-0.267	<b>K factor**</b> = 2.523	<b>TL(2)</b> = -0.537	<b>LL(2)</b> =N/A
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**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
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)
MW359	Downgradient	No	0.099	N/A	-2.313	N/A
MW362	Downgradient	No	0.11	N/A	-2.207	N/A
MW365	Downgradient	Yes	0.167	NO	-1.790	N/A
MW368	Downgradient	Yes	0.0482	NO	-3.032	N/A
MW371	Upgradient	No	0.0952	N/A	-2.352	N/A
MW374	Upgradient	No	0.0962	N/A	-2.341	N/A
MW375	Sidegradient	No	0.0952	N/A	-2.352	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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b> <b>PCB-1242</b>	<b>Historical Background Comparison</b> <b>UNITS: UG/L</b> <b>UCRS</b>
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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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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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

<b>Dry/Partially Dry Wells</b>
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Well No.	Gradient
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.**

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW359	Downgradient	No	0.099	N/A	-2.313	N/A
MW362	Downgradient	No	0.11	N/A	-2.207	N/A
MW365	Downgradient	Yes	0.167	N/A	-1.790	NO
MW368	Downgradient	Yes	0.0482	N/A	-3.032	NO
MW371	Upgradient	No	0.0952	N/A	-2.352	N/A
MW374	Upgradient	No	0.0962	N/A	-2.341	N/A
MW375	Sidegradient	No	0.0952	N/A	-2.352	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

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)?
MW359	Downgradient	Yes	6.2	NO	1.825	N/A
MW362	Downgradient	Yes	6.75	NO	1.910	N/A
MW365	Downgradient	Yes	6.33	NO	1.845	N/A
MW368	Downgradient	Yes	6.63	NO	1.892	N/A
MW371	Upgradient	Yes	6.45	NO	1.864	N/A
MW374	Upgradient	Yes	7.26	NO	1.982	N/A
MW375	Sidegradient	Yes	6.36	NO	1.850	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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	0.133	NO	-2.017	N/A
MW362	Downgradient	Yes	0.399	NO	-0.919	N/A
MW365	Downgradient	Yes	0.254	NO	-1.370	N/A
MW368	Downgradient	Yes	0.866	NO	-0.144	N/A
MW371	Upgradient	Yes	0.725	NO	-0.322	N/A
MW374	Upgradient	Yes	0.491	NO	-0.711	N/A
MW375	Sidegradient	Yes	0.271	NO	-1.306	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 Third Quarter 2016 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

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)
MW359	Downgradient	No	0.113	N/A	-2.180	N/A
MW362	Downgradient	No	0.176	N/A	-1.737	N/A
MW365	Downgradient	Yes	0.451	N/A	-0.796	NO
MW368	Downgradient	Yes	0.593	N/A	-0.523	NO
MW371	Upgradient	No	0.432	N/A	-0.839	N/A
MW374	Upgradient	Yes	0.869	N/A	-0.140	NO
MW375	Sidegradient	No	0.439	N/A	-0.823	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.

### 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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	40.1	NO	3.691	N/A
MW362	Downgradient	Yes	147	NO	4.990	N/A
MW365	Downgradient	Yes	57.5	NO	4.052	N/A
MW368	Downgradient	Yes	25.9	NO	3.254	N/A
MW371	Upgradient	Yes	75.5	NO	4.324	N/A
MW374	Upgradient	Yes	128	NO	4.852	N/A
MW375	Sidegradient	Yes	55.7	NO	4.020	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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	52.6	YES	3.963	N/A
MW362	Downgradient	Yes	37.7	YES	3.630	N/A
MW365	Downgradient	Yes	65	YES	4.174	N/A
MW368	Downgradient	Yes	36.4	YES	3.595	N/A
MW371	Upgradient	Yes	27.6	YES	3.318	N/A
MW374	Upgradient	Yes	6.25	NO	1.833	N/A
MW375	Sidegradient	Yes	26.8	YES	3.288	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

MW359  
MW362  
MW365  
MW368  
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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	1.13	N/A	0.122	NO
MW362	Downgradient	Yes	2.82	N/A	1.037	NO
MW365	Downgradient	Yes	1.91	N/A	0.647	NO
MW368	Downgradient	Yes	2.94	N/A	1.078	NO
MW371	Upgradient	Yes	1.28	N/A	0.247	NO
MW374	Upgradient	Yes	2.54	N/A	0.932	NO
MW375	Sidegradient	Yes	1.22	N/A	0.199	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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)
MW359	Downgradient	Yes	8.8	N/A	2.175	NO
MW362	Downgradient	Yes	16.2	N/A	2.785	NO
MW365	Downgradient	Yes	42.8	N/A	3.757	NO
MW368	Downgradient	Yes	601	N/A	6.399	NO
MW371	Upgradient	Yes	4.2	N/A	1.435	NO
MW374	Upgradient	Yes	20.7	N/A	3.030	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

## Uranium      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**       $X=0.007$        $S=0.012$        $CV(1)=1.678$        $K\text{ factor}^{**}=2.523$        $TL(1)=0.037$        $LL(1)=N/A$

**Statistics-Transformed Background Data**       $X=-5.884$        $S=1.299$        $CV(2)=-0.221$        $K\text{ factor}^{**}=2.523$        $TL(2)=-2.607$        $LL(2)=N/A$

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

Well Number: MW371

Date Collected	Result	LN(Result)
3/18/2002	0.001	-6.908
4/22/2002	0.001	-6.908
7/15/2002	0.001	-6.908
10/8/2002	0.027	-3.612
1/8/2003	0.001	-6.908
4/3/2003	0.001	-6.908
7/9/2003	0.00109	-6.822
10/6/2003	0.001	-6.908

Well Number: MW374

Date Collected	Result	LN(Result)
10/8/2002	0.0438	-3.128
1/7/2003	0.011	-4.510
4/2/2003	0.00905	-4.705
7/9/2003	0.00694	-4.970
10/7/2003	0.001	-6.908
1/6/2004	0.00315	-5.760
4/7/2004	0.00258	-5.960
7/14/2004	0.0018	-6.320

### Dry/Partially Dry Wells

Well No. Gradient

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)
MW359	Downgradient	Yes	0.000101	N/A	-9.200	NO
MW362	Downgradient	Yes	0.00617	N/A	-5.088	NO
MW365	Downgradient	Yes	0.000206	N/A	-8.488	NO
MW368	Downgradient	Yes	0.000377	N/A	-7.883	NO
MW371	Upgradient	Yes	0.000901	N/A	-7.012	NO
MW374	Upgradient	No	0.000091	N/A	-9.305	N/A
MW375	Sidegradient	No	0.0002	N/A	-8.517	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 Third Quarter 2016 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**       $X = 0.055$      $S = 0.072$      $CV(1) = 1.319$      $K \text{ factor}^{**} = 2.523$      $TL(1) = 0.237$      $LL(1) = N/A$

**Statistics-Transformed Background Data**       $X = -3.438$      $S = 0.912$      $CV(2) = -0.265$      $K \text{ factor}^{**} = 2.523$      $TL(2) = -1.138$      $LL(2) = N/A$

### 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

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)
MW359	Downgradient	No	0.01	N/A	-4.605	N/A
MW362	Downgradient	No	0.01	N/A	-4.605	N/A
MW365	Downgradient	No	0.01	N/A	-4.605	N/A
MW368	Downgradient	No	0.01	N/A	-4.605	N/A
MW371	Upgradient	Yes	0.0092	N/A	-4.689	NO
MW374	Upgradient	No	0.01	N/A	-4.605	N/A
MW375	Sidegradient	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.

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

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 Third Quarter 2016 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

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)
MW359	Downgradient	No	0.01	N/A	-4.605	N/A
MW362	Downgradient	No	0.01	N/A	-4.605	N/A
MW365	Downgradient	Yes	0.011	N/A	-4.510	NO
MW368	Downgradient	Yes	0.00413	N/A	-5.489	NO
MW371	Upgradient	Yes	0.00491	N/A	-5.316	NO
MW374	Upgradient	No	0.01	N/A	-4.605	N/A
MW375	Sidegradient	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.

## 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 Third Quarter 2016 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

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

## Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.05	N/A	-2.996	N/A
MW360	Downgradient	Yes	0.0177	N/A	-4.034	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	0.054	N/A	-2.919	NO
MW372	Upgradient	Yes	0.112	N/A	-2.189	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.449	NO	-0.801	N/A
MW360	Downgradient	Yes	0.0302	NO	-3.500	N/A
MW363	Downgradient	Yes	0.0108	NO	-4.528	N/A
MW366	Downgradient	No	0.015	N/A	-4.200	N/A
MW369	Upgradient	Yes	0.115	NO	-2.163	N/A
MW372	Upgradient	Yes	1.08	NO	0.077	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>Bromide</b>	<b>UNITS: mg/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 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.

<b>Statistics-Background Data</b>	X= 1.000	S= 0.000	CV(1)=0.000	K factor**= 2.523	TL(1)= 1.000	LL(1)=N/A
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<b>Statistics-Transformed Background Data</b>	X= 0.000	S= 0.000	CV(2)= #Num!	K factor**= 2.523	TL(2)= 0.000	LL(2)=N/A
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**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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.432	NO	-0.839	N/A
MW360	Downgradient	Yes	0.165	NO	-1.802	N/A
MW363	Downgradient	Yes	0.127	NO	-2.064	N/A
MW366	Downgradient	Yes	0.493	NO	-0.707	N/A
MW369	Upgradient	Yes	0.406	NO	-0.901	N/A
MW372	Upgradient	Yes	0.623	NO	-0.473	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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	27.8	NO	3.325	N/A
MW360	Downgradient	Yes	25.2	NO	3.227	N/A
MW363	Downgradient	Yes	27.5	NO	3.314	N/A
MW366	Downgradient	Yes	32.1	NO	3.469	N/A
MW369	Upgradient	Yes	16.9	NO	2.827	N/A
MW372	Upgradient	Yes	51.6	NO	3.944	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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

## Chemical Oxygen Demand (COD)      UNITS: mg/L      URG

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

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

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	18.5	NO	2.918	N/A
MW360	Downgradient	Yes	10	NO	2.303	N/A
MW363	Downgradient	Yes	23.2	NO	3.144	N/A
MW366	Downgradient	Yes	13.9	NO	2.632	N/A
MW369	Upgradient	Yes	37.1	NO	3.614	N/A
MW372	Upgradient	No	75.9	N/A	4.329	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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

## Chloride      UNITS: mg/L      URG

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

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

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	34.2	NO	3.532	N/A
MW360	Downgradient	Yes	9.41	NO	2.242	N/A
MW363	Downgradient	Yes	21.5	NO	3.068	N/A
MW366	Downgradient	Yes	39.6	NO	3.679	N/A
MW369	Upgradient	Yes	35.4	NO	3.567	N/A
MW372	Upgradient	Yes	46.5	NO	3.839	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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.000109	NO	-9.124	N/A
MW360	Downgradient	Yes	0.0121	NO	-4.415	N/A
MW363	Downgradient	Yes	0.00121	NO	-6.717	N/A
MW366	Downgradient	Yes	0.000291	NO	-8.142	N/A
MW369	Upgradient	Yes	0.0064	NO	-5.051	N/A
MW372	Upgradient	Yes	0.000515	NO	-7.571	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

## Conductivity      UNITS: umho/cm      URG

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**       $\bar{X}$ = 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**       $\bar{X}$ = 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

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

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	433	NO	6.071	N/A
MW360	Downgradient	Yes	539	NO	6.290	N/A
MW363	Downgradient	Yes	399	NO	5.989	N/A
MW366	Downgradient	Yes	485	NO	6.184	N/A
MW369	Upgradient	Yes	391	NO	5.969	N/A
MW372	Upgradient	Yes	694	YES	6.542	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,  $CV = S/\bar{X}$  If CV is less than or equal to 1 assume normal distribution.

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

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

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

\*\* 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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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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	0.000428	NO	-7.756	N/A
MW363	Downgradient	No	0.001	N/A	-6.908	N/A
MW366	Downgradient	Yes	0.000402	NO	-7.819	N/A
MW369	Upgradient	Yes	0.00178	NO	-6.331	N/A
MW372	Upgradient	No	0.001	N/A	-6.908	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	5.64	YES	1.730	N/A
MW360	Downgradient	Yes	2.39	NO	0.871	N/A
MW363	Downgradient	Yes	1.75	NO	0.560	N/A
MW366	Downgradient	Yes	1.53	NO	0.425	N/A
MW369	Upgradient	Yes	2.4	NO	0.875	N/A
MW372	Upgradient	Yes	1.13	NO	0.122	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**

MW357

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	260	NO	5.561	N/A
MW360	Downgradient	Yes	303	NO	5.714	N/A
MW363	Downgradient	Yes	249	NO	5.517	N/A
MW366	Downgradient	Yes	276	NO	5.620	N/A
MW369	Upgradient	Yes	213	NO	5.361	N/A
MW372	Upgradient	Yes	381	NO	5.943	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 Third Quarter 2016 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

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

## 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	3.28	NO	1.188	N/A
MW363	Downgradient	Yes	0.0456	NO	-3.088	N/A
MW366	Downgradient	Yes	0.125	NO	-2.079	N/A
MW369	Upgradient	Yes	0.213	NO	-1.546	N/A
MW372	Upgradient	Yes	2.14	NO	0.761	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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	11.9	NO	2.477	N/A
MW360	Downgradient	Yes	10.1	NO	2.313	N/A
MW363	Downgradient	Yes	10.5	NO	2.351	N/A
MW366	Downgradient	Yes	13.3	NO	2.588	N/A
MW369	Upgradient	Yes	7.18	NO	1.971	N/A
MW372	Upgradient	Yes	20.9	NO	3.040	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 Third Quarter 2016 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

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

## Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.00265	NO	-5.933	N/A
MW360	Downgradient	Yes	0.192	NO	-1.650	N/A
MW363	Downgradient	Yes	0.271	NO	-1.306	N/A
MW366	Downgradient	Yes	0.0203	NO	-3.897	N/A
MW369	Upgradient	Yes	0.0321	NO	-3.439	N/A
MW372	Upgradient	Yes	0.0287	NO	-3.551	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 Third Quarter 2016 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	0.000186	N/A	-8.590	N/A
MW360	Downgradient	No	0.000511	N/A	-7.579	N/A
MW363	Downgradient	No	0.0005	N/A	-7.601	N/A
MW366	Downgradient	No	0.00018	N/A	-8.623	N/A
MW369	Upgradient	No	0.000168	N/A	-8.692	N/A
MW372	Upgradient	Yes	0.000373	N/A	-7.894	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	0.000613	NO	-7.397	N/A
MW360	Downgradient	Yes	0.00139	NO	-6.578	N/A
MW363	Downgradient	Yes	0.000765	NO	-7.176	N/A
MW366	Downgradient	Yes	0.000861	NO	-7.057	N/A
MW369	Upgradient	Yes	0.00887	NO	-4.725	N/A
MW372	Upgradient	Yes	0.00124	NO	-6.693	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

## Oxidation-Reduction Potential      UNITS: mV      URG

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	414	N/A	6.026	YES
MW360	Downgradient	Yes	218	N/A	5.384	YES
MW363	Downgradient	Yes	356	N/A	5.875	YES
MW366	Downgradient	Yes	318	N/A	5.762	YES
MW369	Upgradient	Yes	323	N/A	5.778	YES
MW372	Upgradient	Yes	248	N/A	5.513	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

**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	0.0561	NO	-2.881	N/A
MW363	Downgradient	Yes	0.0543	NO	-2.913	N/A
MW366	Downgradient	No	0.098	N/A	-2.323	N/A
MW369	Upgradient	Yes	0.0579	NO	-2.849	N/A
MW372	Upgradient	No	0.0952	N/A	-2.352	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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>PCB-1242</b>	<b>UNITS: UG/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 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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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	0.0561	N/A	-2.881	NO
MW363	Downgradient	Yes	0.0543	N/A	-2.913	NO
MW366	Downgradient	No	0.098	N/A	-2.323	N/A
MW369	Upgradient	Yes	0.0579	N/A	-2.849	NO
MW372	Upgradient	No	0.0952	N/A	-2.352	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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	6.3	NO	1.841	N/A
MW360	Downgradient	Yes	6.36	NO	1.850	N/A
MW363	Downgradient	Yes	6.32	NO	1.844	N/A
MW366	Downgradient	Yes	6.31	NO	1.842	N/A
MW369	Upgradient	Yes	6.42	NO	1.859	N/A
MW372	Upgradient	Yes	6.64	NO	1.893	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

## Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	1.71	NO	0.536	N/A
MW360	Downgradient	Yes	0.697	NO	-0.361	N/A
MW363	Downgradient	Yes	1.23	NO	0.207	N/A
MW366	Downgradient	Yes	1.86	NO	0.621	N/A
MW369	Upgradient	Yes	0.468	NO	-0.759	N/A
MW372	Upgradient	Yes	2.38	NO	0.867	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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison

**Radium-226**

**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**= 3.398    **S**= 8.854    **CV(1)**=2.605    **K factor\*\***= 2.523    **TL(1)**= 25.736    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= -0.836    **S**= 1.704    **CV(2)**=-2.039    **K factor\*\***= 2.523    **TL(2)**= 3.346    **LL(2)**=N/A

## Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW369

Date Collected	Result	LN(Result)
7/15/2002	28.4	3.346
10/8/2002	0.167	-1.790
1/8/2003	0.173	-1.754
10/6/2003	0.168	-1.784
1/7/2004	0.702	-0.354
4/7/2004	0.195	-1.635
7/13/2004	0.256	-1.363
10/7/2004	0.228	-1.478

Well Number: MW372

Date Collected	Result	LN(Result)
7/16/2002	23.5	3.157
10/8/2002	0.195	-1.635
1/7/2003	-0.844	#Func!
10/7/2003	0.349	-1.053
1/5/2004	0.239	-1.431
4/5/2004	0.308	-1.178
7/14/2004	0.147	-1.917
10/7/2004	0.188	-1.671

**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	No	0.107	N/A	-2.235	N/A
MW360	Downgradient	Yes	0.536	N/A	-0.624	NO
MW363	Downgradient	No	0.181	N/A	-1.709	N/A
MW366	Downgradient	Yes	0.882	N/A	-0.126	NO
MW369	Upgradient	Yes	0.499	N/A	-0.695	NO
MW372	Upgradient	No	0.108	N/A	-2.226	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 Third Quarter 2016 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

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

## Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	45.5	NO	3.818	N/A
MW360	Downgradient	Yes	79.9	YES	4.381	N/A
MW363	Downgradient	Yes	40.5	NO	3.701	N/A
MW366	Downgradient	Yes	45	NO	3.807	N/A
MW369	Upgradient	Yes	58.9	NO	4.076	N/A
MW372	Upgradient	Yes	48.5	NO	3.882	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

MW360

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 Third Quarter 2016 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

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

## Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	49.9	NO	3.910	N/A
MW360	Downgradient	Yes	19.9	NO	2.991	N/A
MW363	Downgradient	Yes	36.3	NO	3.592	N/A
MW366	Downgradient	Yes	62.7	NO	4.138	N/A
MW369	Upgradient	Yes	5.64	NO	1.730	N/A
MW372	Upgradient	Yes	102	NO	4.625	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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical 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 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.

<b>Statistics-Background Data</b>	X= 20.821	S= 18.044	CV(1)=0.867	K factor**= 2.523	TL(1)= 66.344	LL(1)=N/A
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<b>Statistics-Transformed Background Data</b>	X= 2.770	S= 1.150	CV(2)=0.415	K factor**= 2.523	TL(2)= 3.972	LL(2)=N/A
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**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	40	NO	3.689	N/A
MW360	Downgradient	No	2.55	N/A	0.936	N/A
MW363	Downgradient	No	6.92	N/A	1.934	N/A
MW366	Downgradient	Yes	57.2	NO	4.047	N/A
MW369	Upgradient	No	10.7	N/A	2.370	N/A
MW372	Upgradient	Yes	35.4	NO	3.567	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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	1	N/A	0.000	NO
MW360	Downgradient	Yes	2.95	N/A	1.082	NO
MW363	Downgradient	Yes	1.18	N/A	0.166	NO
MW366	Downgradient	Yes	1.12	N/A	0.113	NO
MW369	Upgradient	Yes	1.47	N/A	0.385	NO
MW372	Upgradient	Yes	3.13	N/A	1.141	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	9.92	NO	2.295	N/A
MW360	Downgradient	Yes	17.6	NO	2.868	N/A
MW363	Downgradient	Yes	15.3	NO	2.728	N/A
MW366	Downgradient	Yes	5.2	NO	1.649	N/A
MW369	Upgradient	Yes	30.1	NO	3.405	N/A
MW372	Upgradient	Yes	11.4	NO	2.434	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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	5.66	NO	1.733	N/A
MW360	Downgradient	No	1	N/A	0.000	N/A
MW363	Downgradient	Yes	4.98	N/A	1.605	N/A
MW366	Downgradient	Yes	4.3	N/A	1.459	N/A
MW369	Upgradient	Yes	0.41	N/A	-0.892	N/A
MW372	Upgradient	Yes	10.8	NO	2.380	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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>Uranium</b>	<b>UNITS: mg/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 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.

<b>Statistics-Background Data</b>	X= 0.001	S= 0.001	CV(1)=0.917	K factor**= 2.523	TL(1)= 0.005	LL(1)=N/A
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<b>Statistics-Transformed Background Data</b>	X= -6.718	S= 0.528	CV(2)=-0.079	K factor**= 2.523	TL(2)= -5.385	LL(2)=N/A
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**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	0.001	-6.908
4/22/2002	0.001	-6.908
7/15/2002	0.001	-6.908
10/8/2002	0.00355	-5.641
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	0.001	-6.908
4/23/2002	0.001	-6.908
7/16/2002	0.001	-6.908
10/8/2002	0.00591	-5.131
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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	No	0.0002	N/A	-8.517	N/A
MW360	Downgradient	Yes	0.000207	NO	-8.483	N/A
MW363	Downgradient	No	0.0002	N/A	-8.517	N/A
MW366	Downgradient	No	0.0002	N/A	-8.517	N/A
MW369	Upgradient	No	0.0002	N/A	-8.517	N/A
MW372	Upgradient	No	0.0002	N/A	-8.517	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 Third Quarter 2016 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

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

**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	No	0.01	N/A	-4.605	N/A
MW363	Downgradient	No	0.01	N/A	-4.605	N/A
MW366	Downgradient	Yes	0.0039	N/A	-5.547	NO
MW369	Upgradient	Yes	0.00377	N/A	-5.581	NO
MW372	Upgradient	Yes	0.00589	N/A	-5.134	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	37.8	N/A	3.632	N/A
MW361	Downgradient	Yes	30.5	N/A	3.418	N/A
MW364	Downgradient	Yes	35.2	N/A	3.561	N/A
MW367	Downgradient	Yes	3.99	N/A	1.384	N/A
MW370	Upgradient	Yes	58	YES	4.060	N/A
MW373	Upgradient	Yes	18.1	N/A	2.896	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**

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

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.478	NO	-0.738	N/A
MW361	Downgradient	Yes	0.228	NO	-1.478	N/A
MW364	Downgradient	Yes	0.00968	NO	-4.638	N/A
MW367	Downgradient	No	0.015	N/A	-4.200	N/A
MW370	Upgradient	Yes	0.0311	NO	-3.471	N/A
MW373	Upgradient	Yes	1.34	NO	0.293	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.

<b>C-746-U Third Quarter 2016 Statistical Analysis</b>	<b>Historical Background Comparison</b>
<b>Bromide</b>	<b>UNITS: mg/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 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.

<b>Statistics-Background Data</b>	X= 1.000	S= 0.000	CV(1)=0.000	K factor**= 2.523	TL(1)= 1.000	LL(1)=N/A
<b>Statistics-Transformed Background Data</b>	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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.479	NO	-0.736	N/A
MW361	Downgradient	Yes	0.424	NO	-0.858	N/A
MW364	Downgradient	Yes	0.417	NO	-0.875	N/A
MW367	Downgradient	Yes	0.148	NO	-1.911	N/A
MW370	Upgradient	Yes	0.4	NO	-0.916	N/A
MW373	Upgradient	Yes	0.607	NO	-0.499	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 Third Quarter 2016 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

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

## Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	34	NO	3.526	N/A
MW361	Downgradient	Yes	29.2	NO	3.374	N/A
MW364	Downgradient	Yes	29.5	NO	3.384	N/A
MW367	Downgradient	Yes	16	NO	2.773	N/A
MW370	Upgradient	Yes	26.7	NO	3.285	N/A
MW373	Upgradient	Yes	57.2	NO	4.047	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 Third Quarter 2016 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

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

**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)
MW358	Downgradient	Yes	16.2	NO	2.785	N/A
MW361	Downgradient	Yes	21.6	NO	3.073	N/A
MW364	Downgradient	Yes	25.5	NO	3.239	N/A
MW367	Downgradient	Yes	13.9	NO	2.632	N/A
MW370	Upgradient	No	50.9	N/A	3.930	N/A
MW373	Upgradient	No	49.1	N/A	3.894	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

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

**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)
MW358	Downgradient	Yes	38.4	NO	3.648	N/A
MW361	Downgradient	Yes	32.9	NO	3.493	N/A
MW364	Downgradient	Yes	32.9	NO	3.493	N/A
MW367	Downgradient	Yes	10.8	NO	2.380	N/A
MW370	Upgradient	Yes	36	NO	3.584	N/A
MW373	Upgradient	Yes	48.5	NO	3.882	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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.000237	N/A	-8.347	NO
MW361	Downgradient	No	0.001	N/A	-6.908	N/A
MW364	Downgradient	Yes	0.000652	N/A	-7.335	NO
MW367	Downgradient	Yes	0.00571	N/A	-5.166	NO
MW370	Upgradient	Yes	0.000578	N/A	-7.456	NO
MW373	Upgradient	No	0.001	N/A	-6.908	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

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

### Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	490	NO	6.194	N/A
MW361	Downgradient	Yes	472	NO	6.157	N/A
MW364	Downgradient	Yes	458	NO	6.127	N/A
MW367	Downgradient	Yes	273	NO	5.609	N/A
MW370	Upgradient	Yes	423	NO	6.047	N/A
MW373	Upgradient	Yes	703	NO	6.555	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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	No	0.001	N/A	-6.908	N/A
MW361	Downgradient	Yes	0.000377	NO	-7.883	N/A
MW364	Downgradient	No	0.001	N/A	-6.908	N/A
MW367	Downgradient	Yes	0.000352	NO	-7.952	N/A
MW370	Upgradient	Yes	0.000438	NO	-7.733	N/A
MW373	Upgradient	No	0.001	N/A	-6.908	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	1.93	NO	0.658	N/A
MW361	Downgradient	Yes	3.08	NO	1.125	N/A
MW364	Downgradient	Yes	2.84	NO	1.044	N/A
MW367	Downgradient	Yes	0.89	NO	-0.117	N/A
MW370	Upgradient	Yes	3.48	NO	1.247	N/A
MW373	Upgradient	Yes	2.39	NO	0.871	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	297	NO	5.694	N/A
MW361	Downgradient	Yes	270	NO	5.598	N/A
MW364	Downgradient	Yes	264	NO	5.576	N/A
MW367	Downgradient	Yes	164	NO	5.100	N/A
MW370	Upgradient	Yes	217	NO	5.380	N/A
MW373	Upgradient	Yes	399	NO	5.989	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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.0951	NO	-2.353	N/A
MW361	Downgradient	No	0.1	N/A	-2.303	N/A
MW364	Downgradient	Yes	0.0861	NO	-2.452	N/A
MW367	Downgradient	Yes	9.89	NO	2.292	N/A
MW370	Upgradient	Yes	0.0808	NO	-2.516	N/A
MW373	Upgradient	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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	15	NO	2.708	N/A
MW361	Downgradient	Yes	13.4	NO	2.595	N/A
MW364	Downgradient	Yes	12.5	NO	2.526	N/A
MW367	Downgradient	Yes	8.29	NO	2.115	N/A
MW370	Upgradient	Yes	11.8	NO	2.468	N/A
MW373	Upgradient	Yes	21.2	NO	3.054	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 Third Quarter 2016 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	0.0317	NO	-3.451	N/A
MW361	Downgradient	Yes	0.00534	NO	-5.233	N/A
MW364	Downgradient	Yes	0.0147	NO	-4.220	N/A
MW367	Downgradient	Yes	1.56	NO	0.445	N/A
MW370	Upgradient	Yes	0.00668	NO	-5.009	N/A
MW373	Upgradient	No	0.005	N/A	-5.298	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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.00235	NO	-6.053	N/A
MW361	Downgradient	No	0.002	N/A	-6.215	N/A
MW364	Downgradient	Yes	0.0269	NO	-3.616	N/A
MW367	Downgradient	Yes	0.00246	NO	-6.008	N/A
MW370	Upgradient	Yes	0.000765	NO	-7.176	N/A
MW373	Upgradient	Yes	0.00057	NO	-7.470	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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	370	N/A	5.914	YES
MW361	Downgradient	Yes	464	N/A	6.140	YES
MW364	Downgradient	Yes	388	N/A	5.961	YES
MW367	Downgradient	Yes	172	N/A	5.147	YES
MW370	Upgradient	Yes	483	N/A	6.180	YES
MW373	Upgradient	Yes	337	N/A	5.820	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

## 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	6.2	NO	1.825	N/A
MW361	Downgradient	Yes	5.99	NO	1.790	N/A
MW364	Downgradient	Yes	6.18	NO	1.821	N/A
MW367	Downgradient	Yes	6.14	NO	1.815	N/A
MW370	Upgradient	Yes	5.8	YES	1.758	N/A
MW373	Upgradient	Yes	6.5	NO	1.872	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

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

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	2.28	NO	0.824	N/A
MW361	Downgradient	Yes	1.8	NO	0.588	N/A
MW364	Downgradient	Yes	1.92	NO	0.652	N/A
MW367	Downgradient	Yes	2.76	NO	1.015	N/A
MW370	Upgradient	Yes	2.39	NO	0.871	N/A
MW373	Upgradient	Yes	2.52	NO	0.924	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 Third Quarter 2016 Statistical Analysis      Historical Background Comparison****Radium-226****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**= 2.158    **S**= 5.739    **CV(1)**= 2.660    **K factor\*\***= 2.523    **TL(1)**= 16.637    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= -0.670    **S**= 1.833    **CV(2)**= -2.736    **K factor\*\***= 2.523    **TL(2)**= 3.068    **LL(2)**=N/A

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

Well Number: MW370

Date Collected	Result	LN(Result)
7/15/2002	10.1	2.313
10/8/2002	-0.825	#Func!
1/8/2003	0.415	-0.879
10/6/2003	0.52	-0.654
1/7/2004	1.03	0.030
4/7/2004	0.434	-0.835
7/13/2004	0.532	-0.631
10/7/2004	0.299	-1.207

Well Number: MW373

Date Collected	Result	LN(Result)
7/16/2002	21.5	3.068
10/8/2002	0.0327	-3.420
1/7/2003	-0.844	#Func!
10/7/2003	0	#Func!
1/6/2004	0.177	-1.732
4/7/2004	0.792	-0.233
7/14/2004	0.327	-1.118
10/7/2004	0.033	-3.411

**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	0.623	N/A	-0.473	NO
MW361	Downgradient	No	0.147	N/A	-1.917	N/A
MW364	Downgradient	Yes	0.457	N/A	-0.783	NO
MW367	Downgradient	Yes	1.27	N/A	0.239	NO
MW370	Upgradient	Yes	0.887	N/A	-0.120	NO
MW373	Upgradient	Yes	0.564	N/A	-0.573	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	42.3	NO	3.745	N/A
MW361	Downgradient	Yes	40.1	NO	3.691	N/A
MW364	Downgradient	Yes	45.1	NO	3.809	N/A
MW367	Downgradient	Yes	20.3	NO	3.011	N/A
MW370	Upgradient	Yes	41.8	NO	3.733	N/A
MW373	Upgradient	Yes	49.4	NO	3.900	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 Third Quarter 2016 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

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

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	76	N/A	4.331	NO
MW361	Downgradient	Yes	76.5	N/A	4.337	NO
MW364	Downgradient	Yes	70.1	N/A	4.250	NO
MW367	Downgradient	Yes	26.2	N/A	3.266	NO
MW370	Upgradient	Yes	19.9	N/A	2.991	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.

**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 Third Quarter 2016 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	47.9	N/A	3.869	YES
MW361	Downgradient	Yes	53.2	N/A	3.974	YES
MW364	Downgradient	Yes	36.7	N/A	3.603	NO
MW367	Downgradient	No	0.349	N/A	-1.053	N/A
MW370	Upgradient	Yes	93.2	N/A	4.535	YES
MW373	Upgradient	Yes	23.7	N/A	3.165	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

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

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 Third Quarter 2016 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	1.04	N/A	0.039	NO
MW361	Downgradient	Yes	0.873	N/A	-0.136	NO
MW364	Downgradient	Yes	0.95	N/A	-0.051	NO
MW367	Downgradient	Yes	0.781	N/A	-0.247	NO
MW370	Upgradient	Yes	1.16	N/A	0.148	NO
MW373	Upgradient	Yes	4.88	N/A	1.585	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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	7.78	NO	2.052	N/A
MW361	Downgradient	Yes	9.72	NO	2.274	N/A
MW364	Downgradient	Yes	7.66	NO	2.036	N/A
MW367	Downgradient	No	10	N/A	2.303	N/A
MW370	Upgradient	Yes	6.12	NO	1.812	N/A
MW373	Upgradient	Yes	13.4	NO	2.595	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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	4.1	N/A	1.411	N/A
MW361	Downgradient	Yes	5.19	NO	1.647	N/A
MW364	Downgradient	Yes	5.26	NO	1.660	N/A
MW367	Downgradient	Yes	0.44	N/A	-0.821	N/A
MW370	Upgradient	Yes	2.51	N/A	0.920	N/A
MW373	Upgradient	Yes	7.87	NO	2.063	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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 Third Quarter 2016 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

<b>Historical Background Data from Upgradient Wells with Transformed Result</b>
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**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

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

<b>Current Quarter Data</b>						
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	0.00467	NO	-5.367	N/A
MW361	Downgradient	No	0.01	N/A	-4.605	N/A
MW364	Downgradient	Yes	0.0423	NO	-3.163	N/A
MW367	Downgradient	Yes	0.00637	NO	-5.056	N/A
MW370	Upgradient	No	0.01	N/A	-4.605	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.

<b>Conclusion of Statistical Analysis on Historical Data</b>
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**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.

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**ATTACHMENT D2**

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

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**C-746-U Third Quarter 2016 Statistical Analysis****Current 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 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**= 2.130    **S**= 1.439    **CV(1)**=0.676    **K factor\*\***= 2.523    **TL(1)**= 5.761    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 0.554    **S**= 0.655    **CV(2)**= 1.181    **K factor\*\***= 2.523    **TL(2)**= 2.206    **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)
7/8/2014	2.64	0.971
10/20/2014	0.98	-0.020
1/21/2015	1.79	0.582
4/13/2015	4.44	1.491
7/14/2015	2.73	1.004
10/13/2015	1.78	0.577
1/21/2016	2.03	0.708
4/7/2016	4.79	1.567

Well Number: MW374

Date Collected	Result	LN(Result)
7/7/2014	1.76	0.565
10/16/2014	0.86	-0.151
1/21/2015	0.66	-0.416
4/9/2015	1.59	0.464
7/13/2015	0.67	-0.400
10/14/2015	1.1	0.095
1/21/2016	1.25	0.223
4/7/2016	5.01	1.611

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW359	Downgradient	Yes	4.91	NO	1.591	N/A
MW362	Downgradient	Yes	5.57	NO	1.717	N/A
MW365	Downgradient	Yes	5.11	NO	1.631	N/A
MW371	Upgradient	Yes	3.65	NO	1.295	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 9.633    **S**= 4.017    **CV(1)**=0.417    **K factor\*\***= 2.523    **TL(1)**= 19.768    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 2.180    **S**= 0.428    **CV(2)**=0.197    **K factor\*\***= 2.523    **TL(2)**= 3.261    **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)
7/8/2014	9.84	2.286
10/20/2014	13.3	2.588
1/21/2015	14.5	2.674
4/13/2015	12.8	2.549
7/14/2015	13.3	2.588
10/13/2015	14.5	2.674
1/21/2016	15.7	2.754
4/7/2016	12.8	2.549

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW368	Downgradient	Yes	20.7	YES	3.030	N/A

Well Number: MW374

Date Collected	Result	LN(Result)
7/7/2014	5.64	1.730
10/16/2014	6.27	1.836
1/21/2015	5.97	1.787
4/9/2015	5.97	1.787
7/13/2015	6	1.792
10/14/2015	6.4	1.856
1/21/2016	5.75	1.749
4/7/2016	5.38	1.683

**Conclusion of Statistical Analysis on Current Data**

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

**Wells with Exceedances**

MW368

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 0.116    **S**= 0.137    **CV(1)**= 1.187    **K factor\*\***= 2.523    **TL(1)**= 0.463    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= -3.471    **S**= 2.011    **CV(2)**= -0.579    **K factor\*\***= 2.523    **TL(2)**= 1.604    **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)
7/8/2014	0.00333	-5.705
10/20/2014	0.00145	-6.536
1/21/2015	0.0093	-4.678
4/13/2015	0.0149	-4.206
7/14/2015	0.0109	-4.519
10/13/2015	0.00182	-6.309
1/21/2016	0.119	-2.129
4/7/2016	0.00361	-5.624

Well Number: MW374

Date Collected	Result	LN(Result)
7/7/2014	0.188	-1.671
10/16/2014	0.334	-1.097
1/21/2015	0.268	-1.317
4/9/2015	0.0135	-4.305
7/13/2015	0.398	-0.921
10/14/2015	0.224	-1.496
1/21/2016	0.235	-1.448
4/7/2016	0.0279	-3.579

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW374	Upgradient	Yes	0.831	N/A	-0.185	NO

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

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 Third Quarter 2016 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**= 356.875 **S**= 145.445 **CV(1)**=0.408      **K factor\*\***= 2.523      **TL(1)**= 723.834      **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 5.808      **S**= 0.385      **CV(2)**=0.066      **K factor\*\***= 2.523      **TL(2)**= 6.778      **LL(2)**=N/A

<b>Current Background Data from Upgradient Wells with Transformed Result</b>
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**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)
7/8/2014	335	5.814
10/20/2014	360	5.886
1/21/2015	774	6.652
4/13/2015	384	5.951
7/14/2015	368	5.908
10/13/2015	393	5.974
1/21/2016	254	5.537
4/7/2016	295	5.687

Well Number: MW374

Date Collected	Result	LN(Result)
7/7/2014	259	5.557
10/16/2014	257	5.549
1/21/2015	530	6.273
4/9/2015	395	5.979
7/13/2015	268	5.591
10/14/2015	449	6.107
1/21/2016	139	4.934
4/7/2016	250	5.521

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW359	Downgradient	Yes	250	NO	5.521	N/A
MW362	Downgradient	Yes	440	NO	6.087	N/A
MW365	Downgradient	Yes	365	NO	5.900	N/A
MW368	Downgradient	Yes	211	NO	5.352	N/A
MW371	Upgradient	Yes	441	NO	6.089	N/A
MW374	Upgradient	Yes	193	NO	5.263	N/A
MW375	Sidegradient	Yes	472	NO	6.157	N/A

<b>Conclusion of Statistical Analysis on Current Data</b>
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**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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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= 9.819    S= 5.159    CV(1)=0.525    K factor\*\*= 2.523    TL(1)= 22.835    LL(1)=N/A

Statistics-Transformed Background Data      X= 2.169    S= 0.483    CV(2)=0.223    K factor\*\*= 2.523    TL(2)= 3.388    LL(2)=N/A

## Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW371

Date Collected	Result	LN(Result)
7/8/2014	18.6	2.923
10/20/2014	10.5	2.351
1/21/2015	9.23	2.222
4/13/2015	13.2	2.580
7/14/2015	18.9	2.939
10/13/2015	19.5	2.970
1/21/2016	10.2	2.322
4/7/2016	10.9	2.389

Well Number: MW374

Date Collected	Result	LN(Result)
7/7/2014	5.64	1.730
10/16/2014	5.73	1.746
1/21/2015	5.39	1.685
4/9/2015	5.7	1.740
7/13/2015	5.93	1.780
10/14/2015	6.31	1.842
1/21/2016	5.63	1.728
4/7/2016	5.74	1.747

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)
MW359	Downgradient	Yes	52.6	YES	3.963	N/A
MW362	Downgradient	Yes	37.7	YES	3.630	N/A
MW365	Downgradient	Yes	65	YES	4.174	N/A
MW368	Downgradient	Yes	36.4	YES	3.595	N/A
MW371	Upgradient	Yes	27.6	YES	3.318	N/A
MW375	Sidegradient	Yes	26.8	YES	3.288	N/A

## Conclusion of Statistical Analysis on Current Data

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

## Wells with Exceedances

MW359  
MW362  
MW365  
MW368  
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,  $S = [\text{Sum}([(background\ result-X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 565.063   **S**= 186.179   **CV(1)**=0.329      **K factor\*\***= 2.523      **TL(1)**= 1034.791   **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 6.284      **S**= 0.338      **CV(2)**=0.054      **K factor\*\***= 2.523      **TL(2)**= 7.136      **LL(2)**=N/A

<b>Current Background Data from Upgradient Wells with Transformed Result</b>
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**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)
9/22/2014	370	5.914
10/20/2014	371	5.916
1/13/2015	374	5.924
4/13/2015	434	6.073
7/14/2015	390	5.966
10/13/2015	370	5.914
1/12/2016	387	5.958
4/7/2016	425	6.052

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW372	Upgradient	Yes	694	NO	6.542	N/A

Well Number: MW372

Date Collected	Result	LN(Result)
7/7/2014	839	6.732
10/16/2014	766	6.641
1/21/2015	701	6.553
4/9/2015	769	6.645
7/13/2015	758	6.631
10/13/2015	751	6.621
1/21/2016	700	6.551
4/7/2016	636	6.455

<b>Conclusion of Statistical Analysis on Current Data</b>
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**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,  $S = [\text{Sum}([(background\ result-X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 1.854    **S**= 1.050    **CV(1)**=0.566    **K factor\*\***= 2.523    **TL(1)**= 4.502    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 0.464    **S**= 0.581    **CV(2)**= 1.251    **K factor\*\***= 2.523    **TL(2)**= 1.930    **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)
9/22/2014	2.29	0.829
10/20/2014	2.1	0.742
1/13/2015	1.15	0.140
4/13/2015	3.38	1.218
7/14/2015	3.28	1.188
10/13/2015	1.73	0.548
1/12/2016	0.94	-0.062
4/7/2016	2.87	1.054

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	5.64	YES	1.730	N/A

Well Number: MW372

Date Collected	Result	LN(Result)
7/7/2014	1.26	0.231
10/16/2014	0.98	-0.020
1/21/2015	1.44	0.365
4/9/2015	1.18	0.166
7/13/2015	0.76	-0.274
10/13/2015	1.72	0.542
1/21/2016	0.53	-0.635
4/7/2016	4.05	1.399

**Conclusion of Statistical Analysis on Current Data**

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

**Wells with Exceedances**

MW357

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 Third Quarter 2016 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**= 356.125 **S**= 179.292 **CV(1)**=0.503      **K factor\*\***= 2.523      **TL(1)**= 808.479      **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 5.748      **S**= 0.548      **CV(2)**=0.095      **K factor\*\***= 2.523      **TL(2)**= 7.132      **LL(2)**=N/A

<b>Current Background Data from Upgradient Wells with Transformed Result</b>
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**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)
7/8/2014	409	6.014
10/20/2014	405	6.004
1/13/2015	779	6.658
4/13/2015	404	6.001
7/14/2015	410	6.016
10/13/2015	382	5.945
1/12/2016	398	5.986
4/7/2016	302	5.710

Well Number: MW372

Date Collected	Result	LN(Result)
7/7/2014	126	4.836
10/16/2014	88	4.477
1/21/2015	693	6.541
4/9/2015	283	5.645
7/13/2015	220	5.394
10/13/2015	294	5.684
1/21/2016	246	5.505
4/7/2016	259	5.557

<b>Current Quarter Data</b>
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Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW357	Downgradient	Yes	414	NO	6.026	N/A
MW360	Downgradient	Yes	218	NO	5.384	N/A
MW363	Downgradient	Yes	356	NO	5.875	N/A
MW366	Downgradient	Yes	318	NO	5.762	N/A
MW369	Upgradient	Yes	323	NO	5.778	N/A
MW372	Upgradient	Yes	248	NO	5.513	N/A

<b>Conclusion of Statistical Analysis on Current Data</b>
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**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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 56.469    **S**= 5.590    **CV(1)**=0.099    **K factor\*\***= 2.523    **TL(1)**= 70.573    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 4.029    **S**= 0.101    **CV(2)**=0.025    **K factor\*\***= 2.523    **TL(2)**= 4.284    **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)
7/8/2014	48.8	3.888
10/20/2014	53.4	3.978
1/13/2015	52.2	3.955
4/13/2015	46.2	3.833
7/14/2015	57.7	4.055
10/13/2015	48.3	3.877
1/12/2016	55.7	4.020
4/7/2016	66.8	4.202

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW360	Downgradient	Yes	79.9	YES	4.381	N/A

Well Number: MW372

Date Collected	Result	LN(Result)
7/7/2014	60.7	4.106
10/16/2014	59.7	4.089
1/21/2015	55.7	4.020
4/9/2015	60.5	4.103
7/13/2015	63.3	4.148
10/13/2015	58.9	4.076
1/21/2016	57.7	4.055
4/7/2016	57.9	4.059

**Conclusion of Statistical Analysis on Current Data**

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

**Wells with Exceedances**

MW360

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 Third Quarter 2016 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**= 24.094    **S**= 10.316    **CV(1)**=0.428    **K factor\*\***= 2.523    **TL(1)**= 50.122    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 3.099    **S**= 0.421    **CV(2)**=0.136    **K factor\*\***= 2.523    **TL(2)**= 4.162    **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)
7/8/2014	19.2	2.955
10/20/2014	14.5	2.674
1/13/2015	16	2.773
4/13/2015	14.5	2.674
7/14/2015	36.1	3.586
10/13/2015	33.1	3.500
1/12/2016	35.4	3.567
4/7/2016	48.6	3.884

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Upgradient	Yes	58	YES	4.060	N/A

Well Number: MW373

Date Collected	Result	LN(Result)
7/7/2014	16.7	2.815
10/16/2014	24.9	3.215
1/21/2015	14.1	2.646
4/9/2015	25.1	3.223
7/13/2015	21.8	3.082
10/13/2015	10.7	2.370
1/21/2016	25.6	3.243
4/7/2016	29.2	3.374

**Conclusion of Statistical Analysis on Current Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to current 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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 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**= 387.875 **S**= 109.287 **CV(1)**=0.282      **K factor\*\***= 2.523      **TL(1)**= 663.605      **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 5.925      **S**= 0.277      **CV(2)**=0.047      **K factor\*\***= 2.523      **TL(2)**= 6.623      **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: MW370

Date Collected	Result	LN(Result)
7/8/2014	363	5.894
10/20/2014	363	5.894
1/13/2015	691	6.538
4/13/2015	380	5.940
7/14/2015	388	5.961
10/13/2015	416	6.031
1/12/2016	415	6.028
4/7/2016	318	5.762

Well Number: MW373

Date Collected	Result	LN(Result)
7/7/2014	374	5.924
10/16/2014	404	6.001
1/21/2015	336	5.817
4/9/2015	507	6.229
7/13/2015	468	6.148
10/13/2015	312	5.743
1/21/2016	193	5.263
4/7/2016	278	5.628

<b>Current Quarter Data</b>
-----------------------------

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	370	NO	5.914	N/A
MW361	Downgradient	Yes	464	NO	6.140	N/A
MW364	Downgradient	Yes	388	NO	5.961	N/A
MW367	Downgradient	Yes	172	NO	5.147	N/A
MW370	Upgradient	Yes	483	NO	6.180	N/A
MW373	Upgradient	Yes	337	NO	5.820	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 6.217    **S**= 0.245    **CV(1)**=0.039    **K factor\*\***= 2.904    **TL(1)**= 6.927    **LL(1)**=5.5066

**Statistics-Transformed Background Data**      **X**= 1.827    **S**= 0.038    **CV(2)**=0.021    **K factor\*\***= 2.904    **TL(2)**= 1.938    **LL(2)**=1.7156

<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: MW370

Date Collected	Result	LN(Result)
7/8/2014	6.12	1.812
10/20/2014	6.03	1.797
1/13/2015	6.23	1.829
4/13/2015	6.1	1.808
7/14/2015	6.05	1.800
10/13/2015	6.19	1.823
1/12/2016	6.17	1.820
4/7/2016	6.78	1.914

Well Number: MW373

Date Collected	Result	LN(Result)
7/7/2014	6.08	1.805
10/16/2014	6.22	1.828
1/21/2015	5.99	1.790
4/9/2015	6.02	1.795
7/13/2015	6.11	1.810
10/13/2015	6.19	1.823
1/21/2016	6.39	1.855
4/7/2016	6.8	1.917

<b>Current Quarter Data</b>
-----------------------------

Well No.	Gradient	Detected?	Result	Result >TL(1)? Result <LL(1)?	LN(Result)	LN(Result) >TL(2) LN(Result) <LL(2)
MW370	Upgradient	Yes	5.8	NO	1.758	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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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 Third Quarter 2016 Statistical Analysis****Current 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 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**= 36.200    **S**= 19.639    **CV(1)**=0.543    **K factor\*\***= 2.523    **TL(1)**= 85.749    **LL(1)**=N/A

**Statistics-Transformed Background Data**      **X**= 3.472    **S**= 0.490    **CV(2)**=0.141    **K factor\*\***= 2.523    **TL(2)**= 4.708    **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)
7/8/2014	30.8	3.428
10/20/2014	22.5	3.114
1/13/2015	14.8	2.695
4/13/2015	20.9	3.040
7/14/2015	60.3	4.099
10/13/2015	50.5	3.922
1/12/2016	32.1	3.469
4/7/2016	92	4.522

Well Number: MW373

Date Collected	Result	LN(Result)
7/7/2014	20.1	3.001
10/16/2014	38	3.638
1/21/2015	28.8	3.360
4/9/2015	33.7	3.517
7/13/2015	37.3	3.619
10/13/2015	15.9	2.766
1/21/2016	50.3	3.918
4/7/2016	31.2	3.440

**Current Quarter Data**

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW358	Downgradient	Yes	47.9	NO	3.869	N/A
MW361	Downgradient	Yes	53.2	NO	3.974	N/A
MW370	Upgradient	Yes	93.2	YES	4.535	N/A

**Conclusion of Statistical Analysis on Current Data**

**The test well(s) listed exceeded the Upper Tolerance Limit, which is evidence of elevated concentration with respect to current 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,  $S = [\text{Sum}([(background\ result - X)^2]/[\text{count of background results} - 1])]^{0.5}$

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.

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**ATTACHMENT D3**

**STATISTICIAN QUALIFICATION STATEMENT**

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October 19, 2016

Mr. John Morgan  
Fluor Federal Services, Inc.  
5511 Hobbs Road  
Kevil, KY 42053

Dear Mr. Morgan:

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 a Chemist, with a Bachelor of Science degree in chemistry and a minor in biology, 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 Fluor Federal Services, Inc.

For this project, the statistical analyses conducted on the third quarter 2016 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,



Jennifer R. Blewett

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**APPENDIX E**

**GROUNDWATER FLOW RATE AND DIRECTION**

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## **GROUNDWATER FLOW RATE AND DIRECTION**

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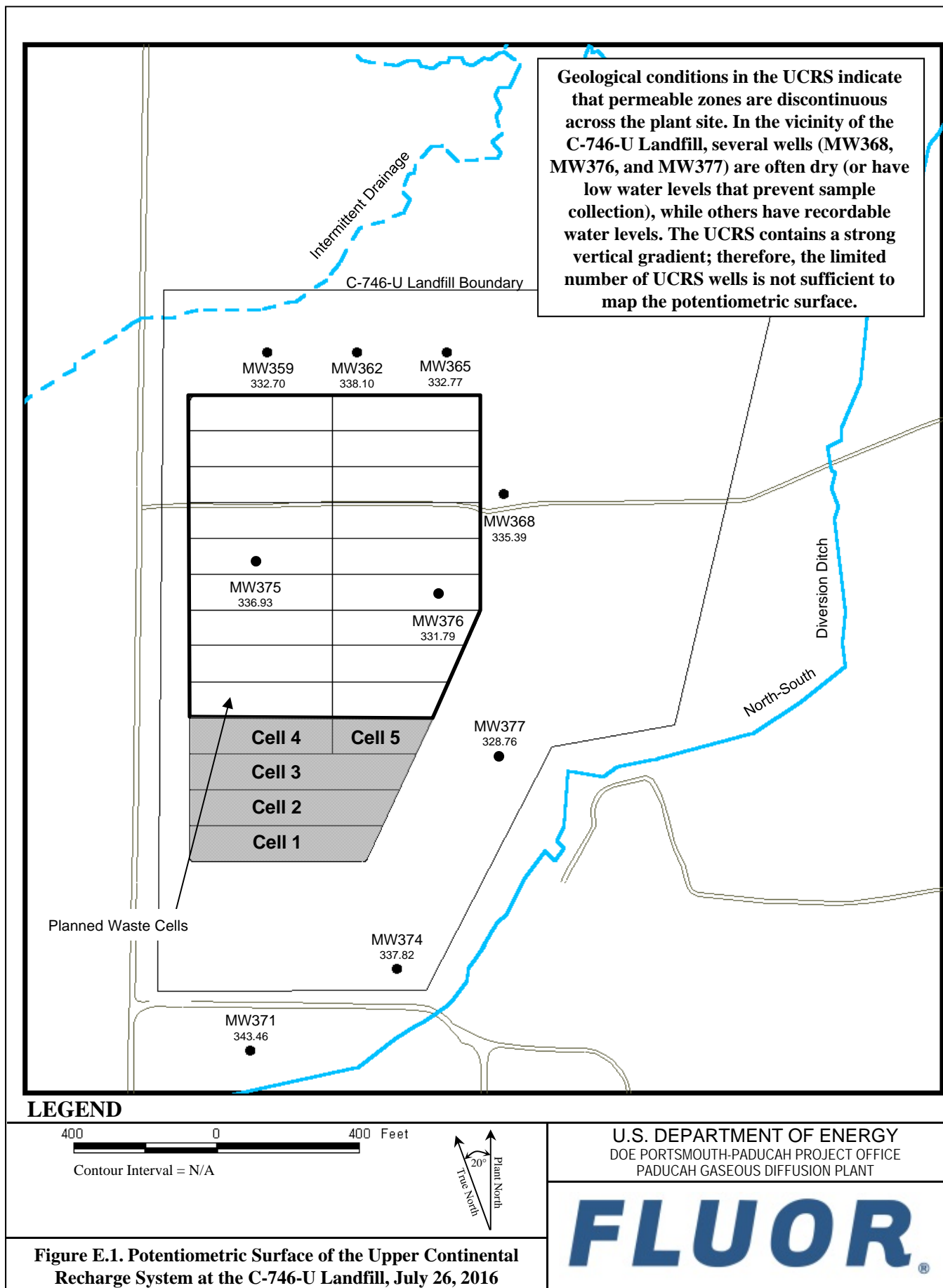
Determination of groundwater flow rate and direction of flow in the uppermost aquifer whenever the monitoring wells (MWs) are sampled is a requirement of 401 KAR 48.300, Section 11. The uppermost aquifer below the C-746-U Landfill is the Regional Gravel Aquifer (RGA). Water level measurements currently 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 third quarter 2016 and determine groundwater flow rate and direction.

Water levels during this reporting period were measured on July 26 and 27, 2016. 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 MW376 and MW377 had insufficient water to permit sampling.

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 were  $7.79 \times 10^{-4}$  ft/ft and  $7.88 \times 10^{-4}$  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  $3.88 \times 10^{-4}$  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.

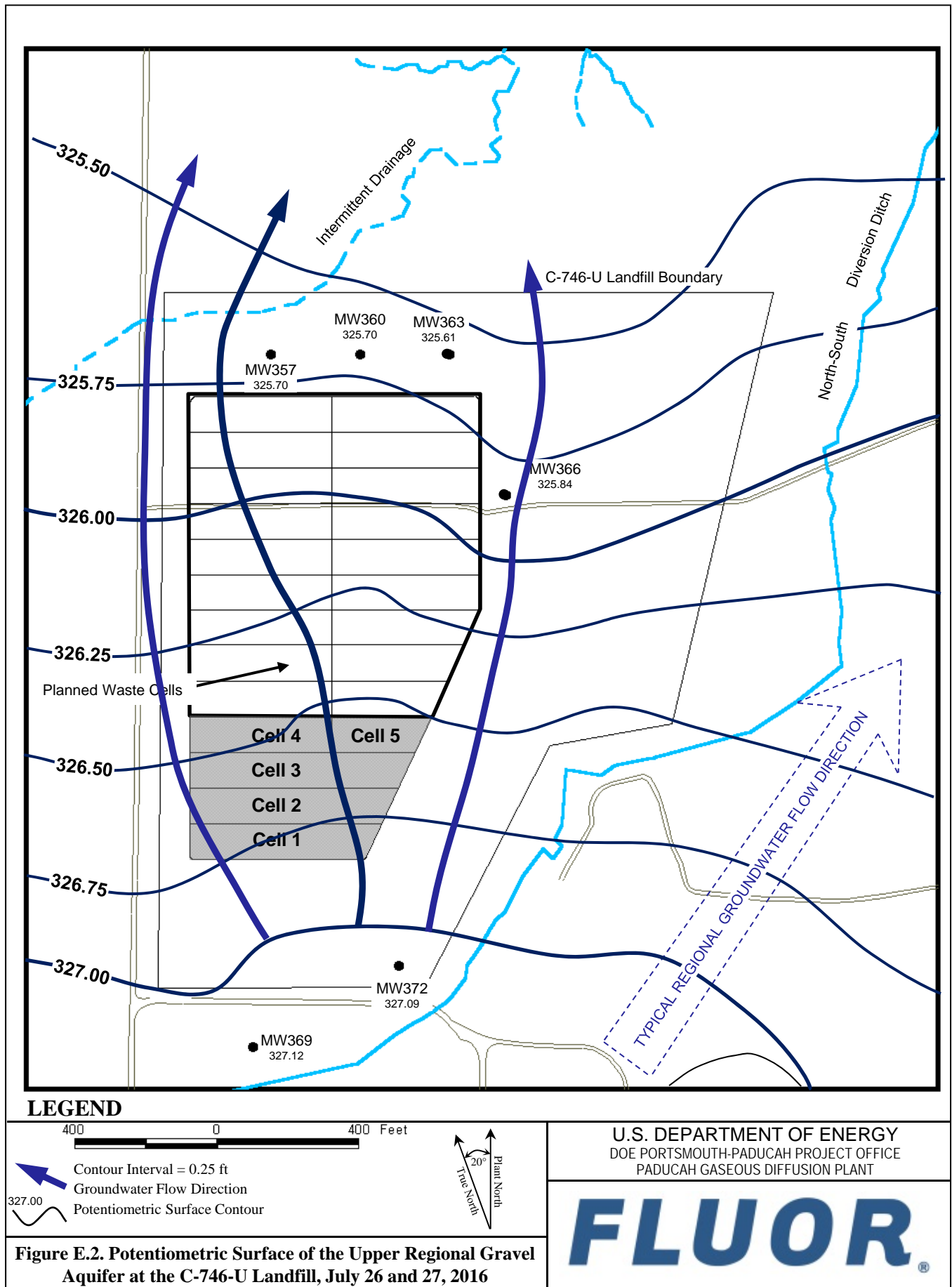
Groundwater flow beneath the C-746-U Landfill typically trends northeastward toward the Ohio River. As demonstrated on the potentiometric map for July 2016, the groundwater flow direction in the immediate area of the landfill is northeast to north.

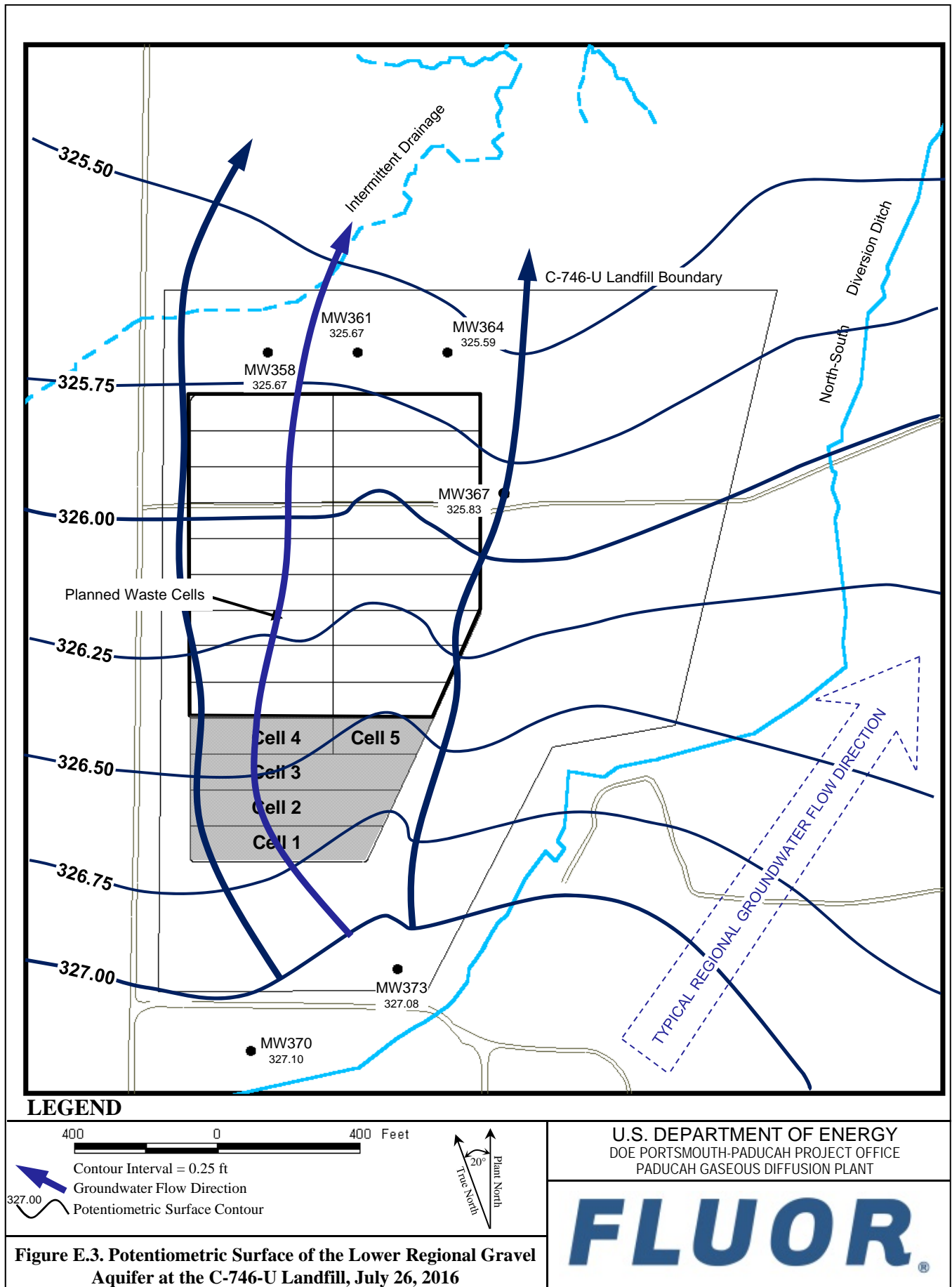


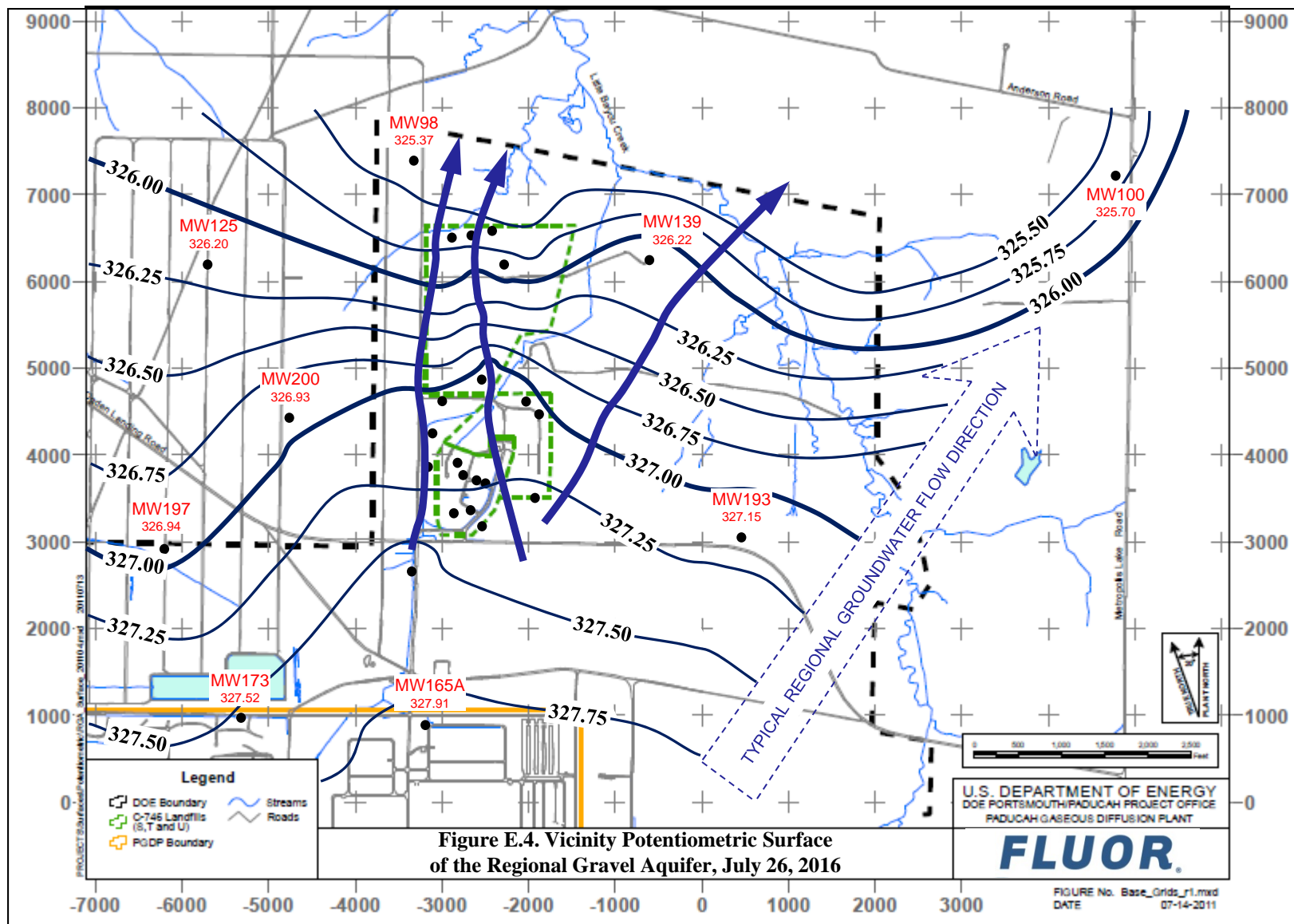


**Table E.1. C-746-U Landfill Third Quarter 2016 (July) Water Levels**

<b>C-746-U Landfill (July 2016) Water Levels</b>										
<b>Date</b>	<b>Time</b>	<b>Well</b>	<b>Aquifer</b>	<b>Datum</b>	<b>BP</b>	<b>Delta BP</b>	<b>Raw Data</b>		<b>*Corrected Data</b>	
				<b>Elev (ft amsl)</b>			<b>DTW</b>	<b>Elev</b>	<b>DTW</b>	<b>Elev</b>
					<b>(in Hg)</b>	<b>(ft H2O)</b>	<b>(ft)</b>	<b>(ft amsl)</b>	<b>(ft)</b>	<b>(ft amsl)</b>
7/26/2016	8:16	MW357	URGA	368.99	30.02	0.00	43.29	325.70	43.29	325.70
7/26/2016	8:20	MW358	LRGA	369.13	30.02	0.00	43.46	325.67	43.46	325.67
7/26/2016	8:18	MW359	UCRS	369.11	30.02	0.00	36.41	332.70	36.41	332.70
7/26/2016	8:10	MW360	URGA	362.30	30.02	0.00	36.60	325.70	36.60	325.70
7/26/2016	15:05	MW361	LRGA	361.54	29.95	0.08	35.79	325.75	35.87	325.67
7/26/2016	8:11	MW362	UCRS	362.04	30.02	0.00	23.94	338.10	23.94	338.10
7/27/2016	9:25	MW363	URGA	368.83	29.97	0.06	43.16	325.67	43.22	325.61
7/26/2016	8:32	MW364	LRGA	367.75	30.02	0.00	42.16	325.59	42.16	325.59
7/26/2016	8:33	MW365	UCRS	368.37	30.02	0.00	35.60	332.77	35.60	332.77
7/26/2016	8:41	MW366	URGA	369.27	30.02	0.00	43.43	325.84	43.43	325.84
7/26/2016	8:37	MW367	LRGA	369.66	30.02	0.00	43.83	325.83	43.83	325.83
7/26/2016	8:39	MW368	UCRS	369.27	30.02	0.00	33.88	335.39	33.88	335.39
7/26/2016	9:04	MW369	URGA	364.48	30.02	0.00	37.36	327.12	37.36	327.12
7/26/2016	9:07	MW370	LRGA	365.35	30.02	0.00	38.25	327.10	38.25	327.10
7/26/2016	9:06	MW371	UCRS	364.88	30.02	0.00	21.42	343.46	21.42	343.46
7/26/2016	8:57	MW372	URGA	359.66	30.02	0.00	32.57	327.09	32.57	327.09
7/26/2016	9:00	MW373	LRGA	359.95	30.02	0.00	32.87	327.08	32.87	327.08
7/26/2016	8:59	MW374	UCRS	359.71	30.02	0.00	21.89	337.82	21.89	337.82
7/26/2016	8:52	MW375	UCRS	370.53	30.02	0.00	33.60	336.93	33.60	336.93
7/26/2016	8:49	MW376	UCRS	370.61	30.02	0.00	38.82	331.79	38.82	331.79
7/26/2016	8:46	MW377	UCRS	365.92	30.02	0.00	37.16	328.76	37.16	328.76
Initial Barometric Pressure      30.02 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										







**Table E.2. C-746-U Landfill Hydraulic Gradients**

	ft/ft
Beneath Landfill—Upper RGA	$7.79 \times 10^{-4}$
Beneath Landfill—Lower RGA	$7.88 \times 10^{-4}$
Vicinity	$3.88 \times 10^{-4}$

**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	0.565	$1.99 \times 10^{-4}$	2.26	$7.98 \times 10^{-4}$
425	0.150	0.331	$1.17 \times 10^{-4}$	1.32	$4.67 \times 10^{-4}$
<u>Lower RGA</u>					
725	0.256	0.571	$2.02 \times 10^{-4}$	2.28	$8.07 \times 10^{-4}$
425	0.150	0.335	$1.18 \times 10^{-4}$	1.34	$4.73 \times 10^{-4}$

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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 third quarter 2016 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>	Sodium	MW360
<b>Lower Regional Gravel Aquifer</b>	Technetium-99	MW358, MW361, MW370

**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.

8/25/2016

**Fluor Federal Services  
PROJECT ENVIRONMENTAL MEASUREMENTS SYSTEM  
C-746-U LANDFILL  
PERMIT NUMBER 073-00045  
MAXIMUM CONTAMINANT LIMIT (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	5.66	ug/L	5
8004-4797	MW364	Trichloroethene	8260B	5.26	ug/L	5
8004-4818	MW370	Beta activity	9310	58	pCi/L	50
8004-4808	MW372	Trichloroethene	8260B	10.8	ug/L	5
8004-4792	MW373	Trichloroethene	8260B	7.87	ug/L	5

NOTE 1: These limits are defined in 401 KAR 47:030.

NOTE 2: MW370, MW372, and MW373 are down-gradient wells for the C-746-S and C-746-T Landfills and upgradient for the 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																					■	
<b>BROMIDE</b>																						
Quarter 2, 2004														*								
<b>CALCIUM</b>																						
Quarter 3, 2003											*											
Quarter 2, 2005																						*
Quarter 3, 2006																*						
Quarter 2, 2008																*						
Quarter 3, 2009																*						
Quarter 4, 2009																*						

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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>CALCIUM</b>																						
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															*							
<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										*	*	*	*	*	*				*	*		
<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										*												
Quarter 3, 2004										*												
Quarter 1, 2005															*							
Quarter 2, 2005															*							
Quarter 3, 2005						*													*			
Quarter 4, 2005															*			*				
Quarter 1, 2006															*			*				

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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	
CONDUCTIVITY																						
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															*							
DISSOLVED OXYGEN																						
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					
Gradient	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>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					*	*	*	*					*									
<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																			■			
<b>IODOMETHANE</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					
Gradient	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	
IRON																						
Quarter 4, 2002						*																
Quarter 3, 2003																*						
Quarter 4, 2003										*						*						
Quarter 1, 2004										*						*						
Quarter 2, 2004										*												
Quarter 3, 2004										*												
Quarter 3, 2005																*						
MAGNESIUM																						
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	*																					
MANGANESE																						
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						*						*										
Quarter 3, 2009						*						*										
Quarter 3, 2011						*						*										
Quarter 2, 2016														*								
Quarter 3, 2016									*													

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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>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	*	*			*	*	*	*	*	*		*	*	*	*	*		*	*	*	*	*
<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								*														

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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>PCB, TOTAL</b>																						
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																				*	*	
<b>POTASSIUM</b>																						
Quarter 1, 2014																	*					
<b>RADIUM-228</b>																						
Quarter 2, 2005																						
Quarter 4, 2005							■						■						■			
<b>SELENIUM</b>																						
Quarter 4, 2003									■													
<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											*											

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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	
STRONTIUM-90																						
Quarter 4, 2008							■															
SULFATE																						
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		*																				
Quarter 2, 2015	*	*			*		*								*							
Quarter 3, 2015		*			*	*	*	*	*						*							
Quarter 4, 2015	*	*			*	*	*	*	*													
Quarter 1, 2016	*	*			*	*	*	*														
Quarter 2, 2016	*	*			*	*	*	*														
Quarter 3, 2016	*	*			*	*	*	*	*													
TECHNETIUM-99																						
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																					*	

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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>TECHNETIUM-99</b>																						
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																	*	*	*	*	*	*
<b>THORIUM-230</b>																						
Quarter 4, 2015																	*					
Quarter 2, 2016										*												
<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															■						■	■

Chart of MCL and Historical UTL Exceedances for the C-746-U Contained Landfill (Continued)

Groundwater Flow System	UCRS										URGA						LRGA					
Gradient	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>TRICHLOROETHENE</b>																						
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																■		■		■	■	■
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>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																						
UCRS Upper Continental Recharge System																						
URGA Upper Regional Gravel Aquifer																						
LRGA Lower Regional Gravel Aquifer																						

**APPENDIX H**  
**METHANE MONITORING DATA**

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# C-746-U LANDFILL METHANE MONITORING REPORT

## PADUCAH GASEOUS DIFFUSION PLANT

Permit #: 073-00045

## McCracken County, Kentucky

[illegible]

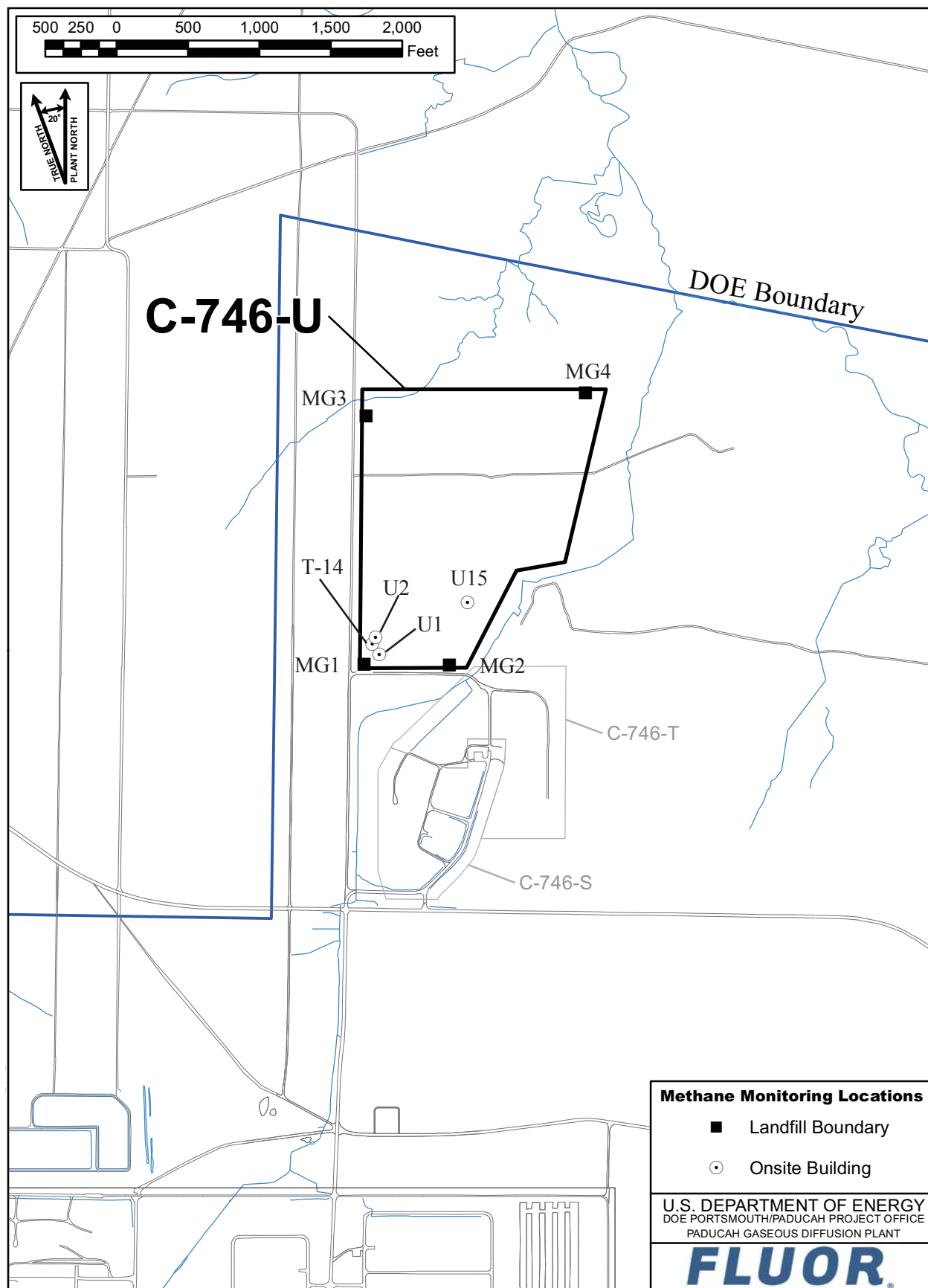


Figure H.1. C-746-U Methane Monitoring Locations

## **APPENDIX I**

### **SURFACE WATER SAMPLE ANALYSIS 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: 073-00045

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		L154 UPSTREAM		L351 DOWNSTREAM				
Sample Sequence #					1		1		1				
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment					NA		NA		NA				
Sample Date and Time (Month/Day/Year hour: minutes)					7/7/2016 08:17		7/7/2016 08:32		7/7/2016 08:00				
Duplicate ("Y" or "N") <sup>1</sup>					N		N		N				
Split ('Y' or "N") <sup>2</sup>					N		N		N				
Facility Sample ID Number (if applicable)					L150US4-16		L154US4-16		L351US4-16				
Laboratory Sample ID Number (if applicable)					401153001		401153002		401153003				
Date of Analysis (Month/Day/Year)					7/29/2016		7/28/2016		7/28/2016				
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>	DETECTED VALUE OR PQL <sup>5</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>5</sup>	F L A G S <sup>7</sup>	DETECTED VALUE OR PQL <sup>5</sup>	F L A G S <sup>7</sup>
A200-00-0	0	Flow	T	MGD	Field	0.08		2.04		6.04			
16887-00-6	2	Chloride(s)	T	mg/L	300.0	1.42		0.878		0.924			
14808-79-8	0	Sulfate	T	mg/L	300.0	14.3		2.33		2.41			
7439-89-6	0	Iron	T	mg/L	200.8	0.338		1.04		1.24			
7440-23-5	0	Sodium	T	mg/L	200.8	2.33		1.24		1.24			
S0268- -	0	Organic Carbon <sup>6</sup>	T	mg/L	9060	15.5		13.6		14			
S0097- -	0	BOD <sup>6</sup>	T	mg/L	not applicable		*		*		*		
S0130- -	0	Chemical Oxygen Demand	T	mg/L	410.4	185	B	120	B	109	B		

3-1

<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

For Official Use Only

I-4

**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	L150US4-16	Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Alpha activity		TPU is 7.6. Rad error is 7.51.
		Beta activity		TPU is 6.96. Rad error is 6.76.
L154	L154US4-16	Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Alpha activity		TPU is 4.42. Rad error is 4.42.
		Beta activity		TPU is 5.82. Rad error is 5.78.
L351	L351US4-16	Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Alpha activity		TPU is 4.16. Rad error is 4.14.
		Beta activity		TPU is 6.57. Rad error is 6.25.

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