

**C-746-S&T Landfills
Third Quarter Calendar Year 2019
(July–September)
Compliance Monitoring Report,
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**



This document is approved for public release per review by:

David Hayden
FRNP Classification Support

11-21-19
Date

**C-746-S&T Landfills
Third Quarter Calendar Year 2019
(July–September)
Compliance Monitoring Report,
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**

Date Issued—November 2019

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

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

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

FIGURES.....	v
TABLES	v
ACRONYMS.....	vii
1. INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 MONITORING PERIOD ACTIVITIES	1
1.2.1 Groundwater Monitoring.....	1
1.2.2 Methane Monitoring	3
1.2.3 Surface Water Monitoring	3
1.3 KEY RESULTS.....	5
2. DATA EVALUATION/STATISTICAL SYNOPSIS.....	11
2.1 STATISTICAL ANALYSIS OF GROUNDWATER DATA.....	12
2.1.1 Upper Continental Recharge System.....	12
2.1.2 Upper Regional Gravel Aquifer.....	12
2.1.3 Lower Regional Gravel Aquifer	13
2.2 DATA VERIFICATION AND VALIDATION.....	13
3. PROFESSIONAL GEOLOGIST AUTHORIZATION.....	15
4. REFERENCES.....	17
APPENDIX A: GROUNDWATER, SURFACE WATER, LEACHATE, AND METHANE MONITORING SAMPLE DATA REPORTING FORM	A-1
APPENDIX B: FACILITY INFORMATION SHEET.....	B-1
APPENDIX C: GROUNDWATER SAMPLE ANALYSES AND WRITTEN COMMENTS	C-1
APPENDIX D: STATISTICAL ANALYSES AND QUALIFICATION STATEMENT.....	D-1
APPENDIX E: GROUNDWATER FLOW RATE AND DIRECTION	E-1
APPENDIX F: NOTIFICATIONS.....	F-1
APPENDIX G: CHART OF MCL AND UTL EXCEEDANCES.....	G-1
APPENDIX H: METHANE MONITORING DATA.....	H-1
APPENDIX I: SURFACE WATER ANALYSES AND WRITTEN COMMENTS	I-1
APPENDIX J: ANALYTICAL LABORATORY CERTIFICATION	J-1
APPENDIX K: LABORATORY ANALYTICAL METHODS.....	K-1

APPENDIX L: MICRO-PURGING STABILITY PARAMETERS	L-1
--	-----

FIGURES

1. C-746-S&T Landfills Groundwater Monitoring Well Network.....	2
2. C-746-S&T Landfills Surface Water Monitoring Locations.....	4

TABLES

1. Summary of MCL Exceedances.....	6
2. Exceedances of Statistically Derived Historical Background Concentrations	6
3. Exceedances of Current Background UTL in Downgradient Wells	7
4. C-746-S&T Landfills Downgradient Wells Trend Summary Utilizing the Previous Eight Quarters	7
5. Exceedances of Current Background UTL in Downgradient UCRS Wells	9
6. Monitoring Wells Included in Statistical Analysis.....	12

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS

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

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

This report, *C-746-S&T Landfills Third Quarter Calendar Year 2019 (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), or both UTL and lower tolerance limit (LTL) for pH, as established at a 95% confidence]. Appendix G provides a chart of exceedances of the MCL and historical UTL that have occurred since the fourth quarter calendar year (CY) 2002. Methane monitoring results are documented on the approved C-746-S&T Landfills Methane Monitoring Report form provided in Appendix H. The form includes pertinent remarks/observations as required by 401 KAR 48:090 § 5. Surface water results are provided in Appendix I. Analytical laboratory certification is provided in Appendix J. Laboratory analytical methods used to analyze the included data set are provided in Appendix K. Micro-purging stability parameter results are provided in Appendix L.

1.1 BACKGROUND

The C-746-S&T Landfills are closed, solid waste landfills located north of the Paducah Site and south of the C-746-U Landfill. Construction and operation of the C-746-S Residential Landfill were permitted in April 1981 under Solid Waste Landfill Permit Number 073-00014. The permitted C-746-S Landfill area covers about 16 acres and contains a clay liner with a final cover of compacted soil. The C-746-S Landfill was a sanitary landfill for the Paducah Gaseous Diffusion Plant operations. The C-746-S Landfill is closed and has been inactive since July 1995.

Construction and operation of the C-746-T Inert Landfill were permitted in February 1985 under Solid Waste Landfill Permit Number 073-00015. The permitted C-746-T Landfill area covers about 20 acres and contains a clay liner with a final cover of compacted soil. The C-746-T Landfill was used to dispose of construction debris (e.g., concrete, wood, and rock) and steam plant fly ash from the Paducah Gaseous Diffusion Plant operations. The C-746-T Landfill is closed and has been inactive since June 1992.

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 23 monitoring wells (MWs) under permit for the C-746-S&T Landfills: 5 UCRS wells, 11 URGA wells, and 7 LRGA wells. A map of the MW locations is presented in Figure 1. All MWs listed on the permit were

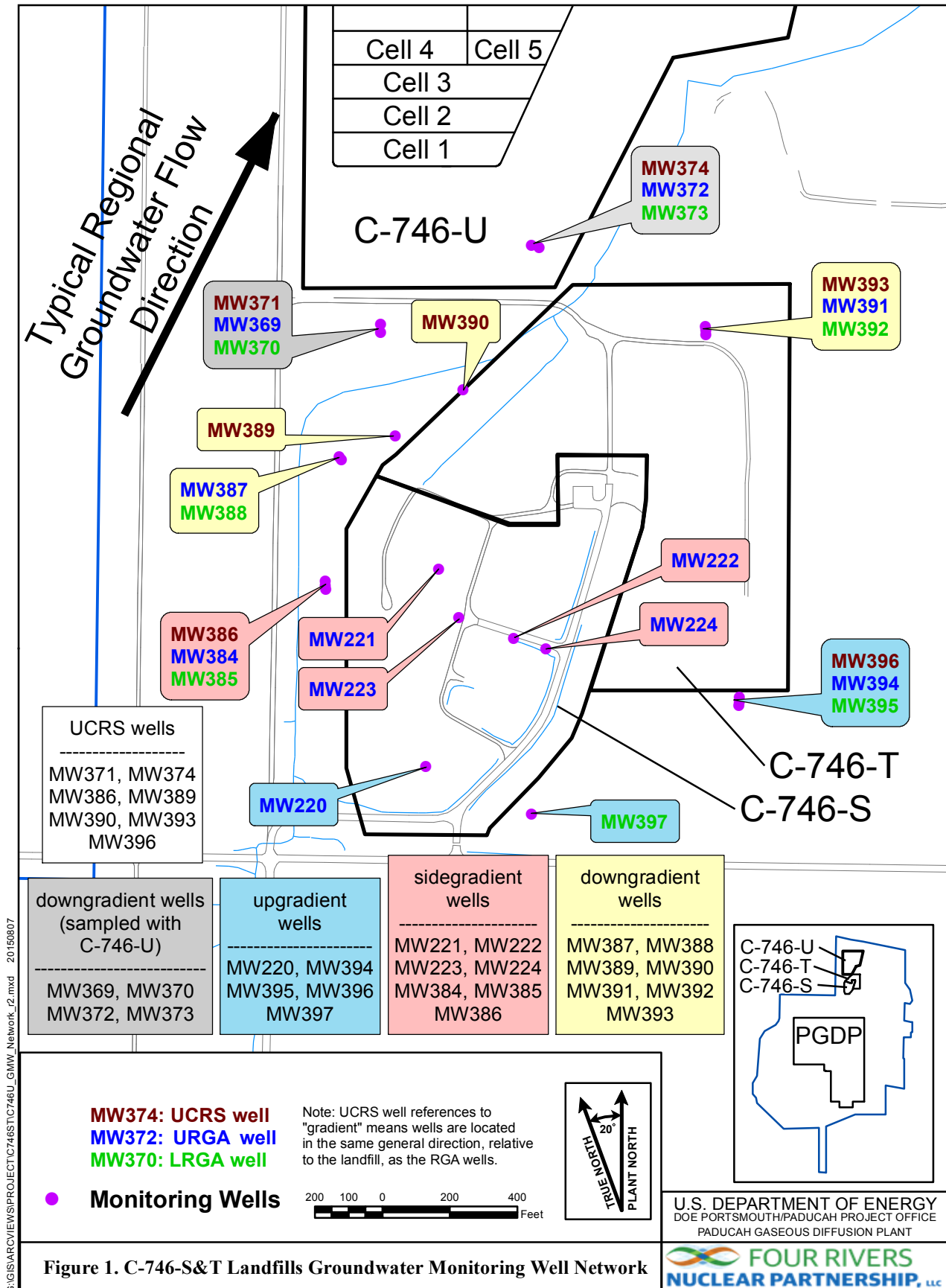


Figure 1. C-746-S&T Landfills Groundwater Monitoring Well Network

sampled this quarter except MW389 (screened in the UCRS), which had an insufficient amount of water to obtain a water level measurement or sample; therefore, there are no analytical results for this location.

Consistent with the approved *Groundwater Monitoring Plan for the Solid Waste Permitted Landfills (C-746-S Residential Landfill, C-746-T Inert Landfill, and C-746-U Contained Landfill) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PAD-PROJ-0139, (Groundwater Monitoring Plan) (LATA Kentucky 2014), UCRS wells are included in the monitoring program. Groundwater flow gradients are downward through the UCRS, but the underlying Regional Gravel Aquifer (RGA) flows laterally. Groundwater flow in the RGA is typically in a north-northeasterly direction in the vicinity of the C-746-S&T Landfills. The Ohio River and lower reaches of Little Bayou Creek are the discharge areas for the RGA flow system from the vicinity of the landfills. Consistent with the conceptual site model, the constituent concentrations in UCRS wells are considered to be representative only of the conditions local to the well or sourced from overlying soils; thus, no discussion of potential “upgradient” sources is relevant to the discussion for the UCRS. Nevertheless, a UTL for background also has been calculated for UCRS wells using concentrations from UCRS wells located in the same direction (relative to the landfill) as those RGA wells identified as upgradient. The results from these wells are considered to represent historical “background” for UCRS water quality. Similarly, other gradient references for UCRS wells are identified using the same gradient references (relative to the landfill) that are attributed to nearby RGA wells. Results from UCRS wells are compared to this UTL, and exceedances of these values are reported in the quarterly report.

Groundwater sampling was conducted within the third quarter 2019 in accordance with the Groundwater Monitoring Plan (LATA Kentucky 2014) using the Deactivation and Remediation Contractor, procedure CP4-ES-2101, *Groundwater Sampling*. Appropriate sample containers and preservatives were utilized. The laboratory also used U.S. Environmental Protection Agency-approved methods, as applicable. The parameters specified in Permit Condition GSTR0003, Special Condition 3, 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 29, 2019, in MWs of the C-746-S&T Landfills (see Table E.1); in MWs of the C-746-U Landfill; and in MWs of the surrounding region (shown on Figure E.3). Water level measurements in 39 vicinity wells define the potentiometric surface for the RGA. Typical regional flow in the RGA is northeastward, toward the Ohio River. During July, RGA groundwater flow in the area of the landfill varied from northwest to northeast. The hydraulic gradient for the RGA in the vicinity of the C-746-S&T Landfills in July was 4.99×10^{-4} ft/ft, while the gradient beneath the C-746-S&T Landfills was 4.45×10^{-4} ft/ft. Calculated groundwater flow rates (average linear velocities) for the RGA at the C-746-S&T Landfills range from 0.76 to 1.29 ft/day (see Table E.3).

1.2.2 Methane Monitoring

Methane monitoring was conducted in accordance with 401 KAR 48:090 § 5 and the Solid Waste Landfill Permit. Landfill operations staff monitored for the occurrence of methane in one on-site building location, four locations along the landfill boundary, and 27 passive-gas vents located in Cells 1, 2, and 3 of the C-746-S Landfill on September 9, 2019. See Appendix H for a map (Figure H.1) of the monitoring locations. Monitoring identified all locations to be compliant with the regulatory requirement of < 100% lower explosive limit (LEL) at boundary locations and < 25% LEL at all other locations. The results are documented on the C-746-S&T Landfills Methane Log provided in Appendix H.

1.2.3 Surface Water Monitoring

Surface water sampling was performed at the three locations (see Figure 2) monitored for the C-746-S&T Landfills: (1) upstream location L135; (2) downstream location, L154; and (3) L136, a location capturing

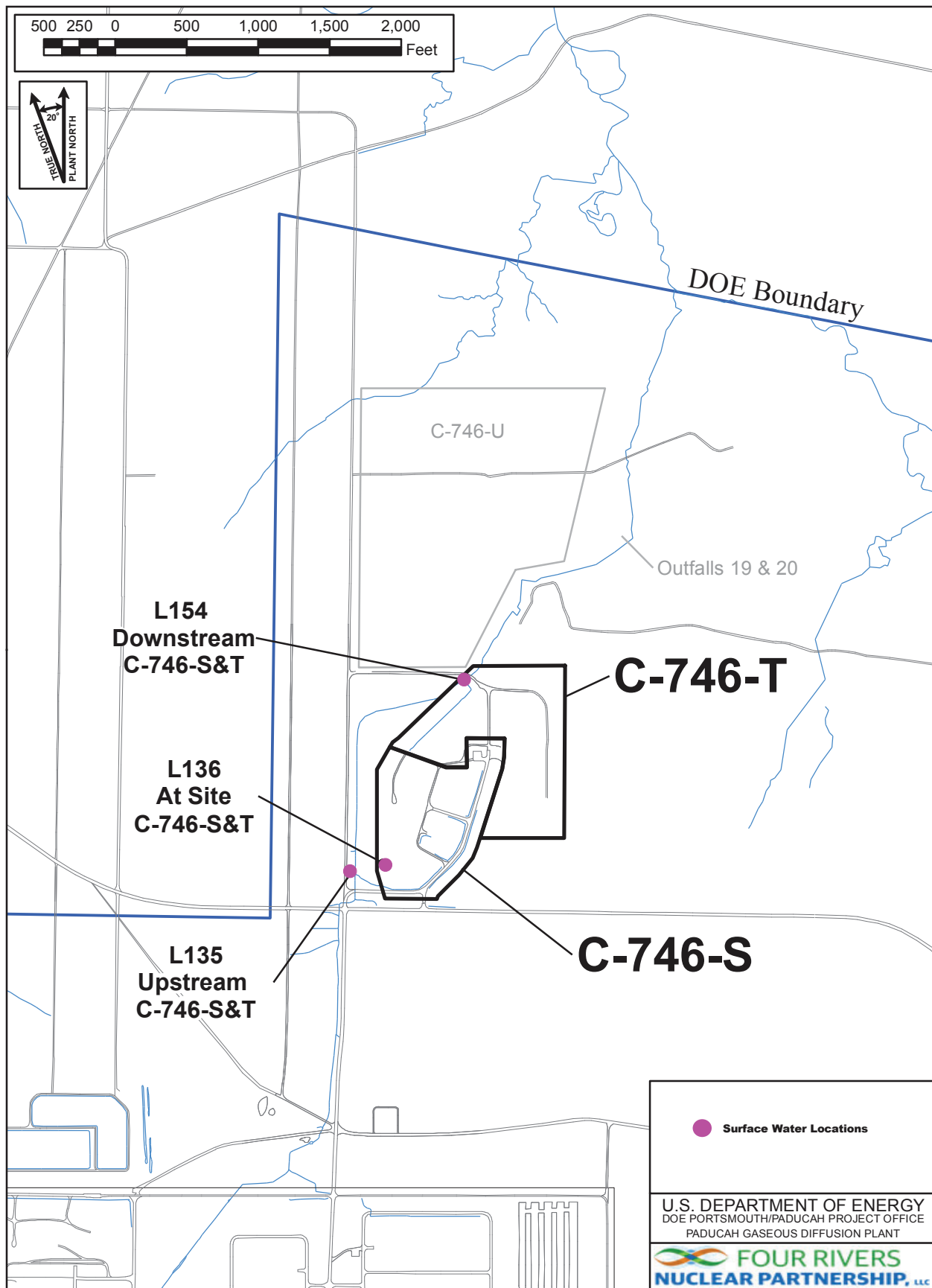


Figure 2. C-746-S&T Landfills Surface Water Monitoring Locations

runoff from the landfill surface. Surface water was monitored, as specified in 401 KAR 48:300 § 2, and the approved *Surface Water Monitoring Plan for C-746-S and C-746-T Landfills Permit Numbers KY-073-00014 and 073-00015, Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (PRS 2008), which is Technical Application Attachment 24 of the Solid Waste Landfill Permit. Surface water results are provided in Appendix I.

1.3 KEY RESULTS

Groundwater data were evaluated in accordance with the approved Groundwater Monitoring Plan (LATA Kentucky 2014) which is Technical Application, Attachment 25, of the Solid Waste Permit. Parameters that had concentrations that exceeded their respective MCL are listed in Table 1. Those constituents that exceeded their respective MCL were further evaluated against their historical background UTL. Table 2 identifies parameters (that do not have MCLs) with concentrations that exceeded the statistically derived historical background UTL¹ during the third quarter 2019, 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).

The notification of parameters that exceeded the MCL has been submitted electronically to 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 MW391 and MW392 (downgradient wells) do not exceed the historical background concentration and are considered to be a Type 1 exceedance—not attributable to the C-746-S&T Landfills.

The MCL exceedances for beta activity in MW369, MW370, MW372, and MW387 (downgradient wells) were shown to exceed both the historical background UTL and the current background UTL; therefore, preliminarily they were considered to be Type 2 exceedances. To evaluate these preliminary Type 2 exceedances further, the parameter was subjected to the Mann-Kendall statistical test for trend using the most recent eight quarters of data. The results are summarized in Table 4. All of these wells had no increasing Mann-Kendall trend for beta activity and are considered to be a Type 1 exceedance—not attributable to the C-746-S&T Landfills.

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 5, and 401 KAR 48:300 § 7.

The constituents listed in Table 2 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, to identify 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

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

Table 1. Summary of MCL Exceedances

UCRS	URGA	LRGA
None	MW369: Beta activity	MW370: Beta activity
	MW372: Beta activity	MW385: Beta activity
	MW384: Beta activity	MW392: Trichloroethene
	MW387: Beta activity	
	MW391: Trichloroethene	

Table 2. Exceedances of Statistically Derived Historical Background Concentrations

UCRS*	URGA	LRGA
MW386: Oxidation-reduction potential	MW220: Oxidation-reduction potential, sulfate	MW370: Beta activity, oxidation-reduction potential, sulfate, technetium-99
MW390: Oxidation-reduction potential, sulfate, technetium-99	MW221: Oxidation-reduction potential	MW373: Calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, oxidation-reduction potential, sulfate
MW393: Oxidation-reduction potential	MW222: Oxidation-reduction potential	MW385: Beta activity, oxidation-reduction potential, sulfate, technetium-99
MW396: Oxidation-reduction potential	MW223: Oxidation-reduction potential, sulfate	MW388: Oxidation-reduction potential, sulfate, technetium-99
	MW224: Oxidation-reduction potential	MW392: Oxidation-reduction potential, sulfate
	MW369: Beta activity, oxidation-reduction potential, technetium-99	MW395: Chemical oxygen demand (COD), oxidation-reduction potential
	MW372: Beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, sulfate, technetium-99	MW397: Chemical oxygen demand (COD), oxidation-reduction potential
	MW384: Beta activity, oxidation-reduction potential, sulfate, technetium-99	
	MW387: Beta activity, chemical oxygen demand (COD), dissolved solids, magnesium, oxidation-reduction potential, sulfate, technetium-99	
	MW391: Oxidation-reduction potential, sulfate	
	MW394: Oxidation-reduction potential	

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

Sidegradient wells: MW221, MW222, MW223, MW224, MW384, MW385, MW386

Downgradient wells: MW369, MW370, MW372, MW373, MW387, MW388, MW389, MW390, MW391, MW392, MW393

Upgradient wells: MW220, MW394, MW395, MW396, MW397

Table 3. Exceedances of Current Background UTL in Downgradient Wells

URGA	LRGA
MW369: Beta activity, technetium-99	MW370: Beta activity, sulfate, technetium-99
MW372: Beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, sulfate, technetium-99	MW373: Calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, sulfate
MW387: Beta activity, chemical oxygen demand (COD), magnesium, sulfate, technetium-99	MW388: Sulfate, technetium-99
MW391: Sulfate	MW392: Sulfate

Table 4. C-746-S&T Landfills Downgradient Wells Trend Summary Utilizing the Previous Eight Quarters

Location	Well ID	Parameter	Sample Size	Alpha ¹	p-Value ²	S ³	Decision ⁴
C-746-S&T Landfill	MW369	Beta activity	8	0.05	0.355	4	No Trend
		Technetium-99	8	0.05	0.500	1	No Trend
	MW370	Beta activity	8	0.05	0.355	-4	No Trend
		Sulfate	8	0.05	0.548	0	No Trend
		Technetium-99	8	0.05	0.227	7	No Trend
	MW372	Beta activity	8	0.05	0.193	8	No Trend
		Calcium	8	0.05	0.222	7	No Trend
		Chemical oxygen demand (COD)	8	0.05	0.087	12	No Trend
		Dissolved solids	8	0.05	0.087	12	No Trend
		Magnesium	8	0.05	0.268	6	No Trend
		Sulfate	8	0.05	0.451	-2	No Trend
		Technetium-99	8	0.05	0.355	4	No Trend
	MW373	Calcium	8	0.05	0.087	12	No Trend
		Chemical oxygen demand (COD)	8	0.05	0.133	10	No Trend
		Conductivity	8	0.05	0.133	10	No Trend
		Dissolved solids	8	0.05	0.159	9	No Trend
		Magnesium	8	0.05	0.133	10	No Trend
		Sulfate	8	0.05	0.054	14	No Trend
	MW387	Beta activity	8	0.05	0.087	-12	No Trend
		Chemical oxygen demand (COD)	8	0.05	0.193	8	No Trend
		Magnesium	8	0.05	0.402	3	No Trend

**Table 4. C-746-S&T Landfills Downgradient Wells Trend Summary
Utilizing the Previous Eight Quarters (Continued)**

Location	Well ID	Parameter	Sample Size	Alpha ¹	p-Value ²	S ³	Decision ⁴
C-746-S&T Landfill	MW387	Sulfate	8	0.05	0.451	-2	No Trend
		Technetium-99	8	0.05	0.355	4	No Trend
	MW388	Sulfate	8	0.05	0.309	-5	No Trend
		Technetium-99	8	0.05	0.548	0	No Trend
	MW391	Sulfate	8	0.05	0.355	-4	No Trend
	MW392	Sulfate	8	0.05	0.009	20	Increasing Trend

Footnotes:

¹ An alpha of 0.05 represents a 95% confidence interval.

² The p-value represents the risk of acceptance the H_a hypothesis of a trend, in terms of a percentage.

³ 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.

⁴ The Mann-Kendall decision operates on two hypotheses, the H_0 and H_a . H_0 assumes there is no trend in the data, whereas H_a assumes either a positive or negative trend.

Note: Statistics generated using ProUCL.

Monitoring Plan, constituents in downgradient wells that exceed the historical UTL, but do not exceed the current UTL, are considered not to have a C-746-S&T Landfills sources; therefore, they are a Type 1 exceedance—not attributable to the C-746-S&T Landfills.

The constituents listed in Table 3 that exceed both the historical UTL and the current UTL 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. All but one of these preliminary Type 2 exceedances in downgradient wells—sulfate in MW392—did not have an increasing trend and are considered to be a Type 1 exceedance—not attributable to the C-746-S&T Landfills.

The Mann-Kendall statistical test indicates that there is an increasing trend of sulfate in MW392 over the past eight quarters. In accordance with the Groundwater Monitoring Plan, this is considered a Type 2 exceedance (source unknown). The source of the trend is believed to be unrelated to the C-746-S&T Landfills because the shallower collocated URGA well, MW391, does not indicate an increasing trend for sulfate (Table 4.)

In accordance with Permit Condition GSTR0003, Special Condition 2, of the Solid Waste Landfill Permit, the groundwater assessment and corrective action requirements of 401 KAR 48:300 § 8 shall not apply to the C-746-S Residential Landfill and the C-746-T Inert Landfill. This variance in the permit provides that groundwater assessment and corrective actions for these landfills will be conducted in accordance with the corrective action requirements of 401 KAR 34:060 § 12.

The statistical evaluation of current UCRS concentrations against the current UCRS background UTL identified UCRS well MW390 with a technetium-99 value that exceeds both the historical and current backgrounds (Table 5). Because UCRS wells are not hydrogeologically downgradient of the C-746-S&T Landfills, this exceedance is not attributable to C-746-S&T Landfills sources and is considered to be a Type 1 exceedance—not attributable to the C-746-S&T Landfills.

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

UCRS
MW390: Technetium-99

*In the same direction (relative to the landfill) as RGA wells.

All MCL and UTL exceedances, except for sulfate in MW392, reported for this quarter were evaluated and considered to be Type 1 exceedances—not attributable to the C-746-S&T Landfills. The increasing trend for sulfate in MW392 does not appear to be landfill-related.

THIS PAGE INTENTIONALLY LEFT BLANK

2. DATA EVALUATION/STATISTICAL SYNOPSIS

The statistical analyses conducted on the third quarter 2019 groundwater data collected from the C-746-S&T Landfills MWs were performed in accordance with the Groundwater Monitoring Plan (LATA Kentucky 2014). The statistical analyses for this report utilize data from the first eight quarters that were sampled for each parameter, beginning with the first two baseline sampling events in 2002, when available. The sampling dates associated with background data are listed next to the result in the statistical analysis sheets in Appendix D (Attachments D1 and D2).

For those parameters that exceed the MCL for Kentucky solid waste facilities found in 401 KAR 47:030 § 6, these exceedances were documented and evaluated further as follows. Exceedances were reviewed against historical background results (UTL). If the MCL exceedance was found not to exceed the historical UTL, the exceedance was noted as a Type 1 exceedance—an exceedance not attributable to the landfills. 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 further evaluated using the Mann-Kendall test for trend. If there was not a statistically significant increasing trend for a constituent in a downgradient well, the exceedance was reclassified as a Type 1 exceedance (not attributable to the landfills).

For those parameters that do not have a Kentucky solid waste facility MCL, the same process was used. If a constituent without an MCL exceeded its historical background UTL and its current background UTL, it was evaluated further to identify the source of the exceedance, if possible. If the source of the exceedance could not be identified, it was reported as a Type 2 exceedance—source undetermined. Type 2 exceedances (undetermined source) were further evaluated using the Mann-Kendall test for trend. If there was not a statistically significant increasing trend for a constituent in a downgradient well, the exceedance was reclassified as a Type 1 exceedance (not attributable to the landfills).

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

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

A stepwise list of the one-sided tolerance interval statistical procedures applied to the data is provided in Appendix D under Statistical Analysis Process. The statistical analysis was conducted separately for each parameter in each well. The MWs included historically in the statistical analyses are listed in Table 6.

Table 6. Monitoring Wells Included in Statistical Analysis*

UCRS	URGA	LRGA
MW386	MW220 (upgradient)	MW370
MW389**	MW221	MW373
MW390	MW222	MW385
MW393	MW223	MW388
MW396***	MW224	MW392
	MW369	MW395 (upgradient)
	MW372	MW397 (upgradient)
	MW384	
	MW387	
	MW391	
	MW394 (upgradient)	

*A map showing the MW locations is shown on Figure 1.

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

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

2.1 STATISTICAL ANALYSIS OF GROUNDWATER DATA

Parameters requiring statistical analysis are summarized in Appendix D for each hydrological 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. Table 3 summarizes the constituents present in downgradient wells with historical UTL exceedances that are above the current UTL. Those constituents that have exceeded both the historical and current background UTLs in downgradient wells were further evaluated for increasing trends and are listed in Table 4.

2.1.1 Upper Continental Recharge System

In this quarter, 27 parameters, including those with MCLs, required statistical analysis in the UCRS. During the third quarter, oxidation-reduction potential, sulfate, and technetium-99 displayed concentrations that exceeded their respective historical UTLs and are listed in Table 2. Technetium-99 exceeded the current background UTL and is included in Table 5.

2.1.2 Upper Regional Gravel Aquifer

In this quarter, 29 parameters, including those with MCLs, required statistical analysis in the URGA. During the third quarter, beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, oxidation-reduction potential, sulfate, and technetium-99 displayed concentrations that exceeded their respective historical UTLs and are listed in Table 2. Beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, sulfate, and technetium-99 exceeded the current background UTL in downgradient wells and are included in Table 3.

2.1.3 Lower Regional Gravel Aquifer

In this quarter, 28 parameters, including those with MCLs, required statistical analysis in the LRGA. During the third quarter, beta activity, calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, oxidation-reduction potential, sulfate, and technetium-99 displayed concentrations that exceeded their respective historical UTL and are listed in Table 2. Beta activity, calcium, COD, conductivity, dissolved solids, magnesium, sulfate, and technetium-99 exceeded the current background UTL in downgradient wells and are included in Table 3.

2.2 DATA VERIFICATION AND VALIDATION

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

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

THIS PAGE INTENTIONALLY LEFT BLANK

3. PROFESSIONAL GEOLOGIST AUTHORIZATION

DOCUMENT IDENTIFICATION: *C-746-S&T Landfills
Third Quarter Calendar Year 2019 (July–September)
Compliance Monitoring Report,
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky (FRNP-RPT-0088/V3)*

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



PG 113927
K Davis
11-18-19

Kenneth R. Davis
Kenneth R. Davis

PG113927

November 18, 2019
Date

THIS PAGE INTENTIONALLY LEFT BLANK

4. REFERENCES

- 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-S and C-746-T Landfills Permit Numbers KY-073-00014 and 073-00015, 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.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

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

THIS PAGE INTENTIONALLY LEFT BLANK

**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-S&T Landfills
(As officially shown on DWM Permit Face)

Permit No: SW07300014, Finds/Unit No: _____ Quarter & Year 3rd Qtr. CY 2019
SW07300015,
SW07300045

Please check the following as applicable:

_____ Characterization ☒ Quarterly _____ Semiannual _____ Annual _____ Assessment

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

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

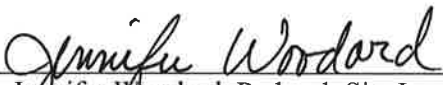
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible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



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

11/25/19

Date



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

11/25/19

Date

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B
FACILITY INFORMATION SHEET

THIS PAGE INTENTIONALLY LEFT BLANK

FACILITY INFORMATION SHEET

Sampling Date:	Groundwater: July 2019 Surface water: July 2019 Methane: September 2019	County:	McCracken	Permit Nos.	SW07300014, SW07300015, SW07300045
Facility Name:	U.S. DOE—Paducah Gaseous Diffusion Plant (As officially shown on DWM Permit Face)				
Site Address:	5600 Hobbs Road Street	Kevil, Kentucky City/State	42053 Zip		
Phone No:	(270) 441-6800	Latitude:	N 37° 07' 37.70"	Longitude:	W 88° 47' 55.41"

OWNER INFORMATION

Facility Owner:	U.S. DOE, Robert E. Edwards III, Manager		Phone No:	(859) 227-5020	
Contact Person:	David Hutchison		Phone No:	(270) 441-5929	
Contact Person Title:	Director, Environmental Services, Four Rivers Nuclear Partnership, LLC				
Mailing Address:	5511 Hobbs Road Street	Kevil, Kentucky City/State	42053 Zip		

SAMPLING PERSONNEL (IF OTHER THAN LANDFILL OR LABORATORY)

Company:	GEO Consultants, LLC				
Contact Person:	Jason Boulton		Phone No:	(270) 816-3415	
Mailing Address:	199 Kentucky Avenue Street	Kevil, Kentucky City/State	42053 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 Street	Charleston, South Carolina City/State	29407 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		

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

**GROUNDWATER SAMPLE ANALYSES
AND WRITTEN COMMENTS**

THIS PAGE INTENTIONALLY LEFT BLANK

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

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

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

GROUNDWATER SAMPLE ANALYSIS_(S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5201	8000-5202	8000-5242	8000-5243					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					220	221	222	223					
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)					7/16/2019 13:14	7/17/2019 07:29	7/17/2019 08:15	7/16/2019 13:58					
Duplicate ("Y" or "N") ²					N	N	N	N					
Split ("Y" or "N") ³					N	N	N	N					
Facility Sample ID Number (if applicable)					MW220SG4-19	MW221SG4-19	MW222SG4-19	MW223SG4-19					
Laboratory Sample ID Number (if applicable)					484877003	485011001	485011003	484877005					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/23/2019	7/25/2019	7/25/2019	7/23/2019					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					UP	SIDE	SIDE	SIDE					
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
24959-67-9		Bromide	T	mg/L	9056	0.204	*	0.437	*	0.41	*	0.373	*
16887-00-6		Chloride(s)	T	mg/L	9056	18.8	*	31.9	*	30.3	*	27.5	*
16984-48-8		Fluoride	T	mg/L	9056	0.2		0.204	*	0.264	*	0.244	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.27	*	1.11	*	0.834		0.928	
14808-79-8		Sulfate	T	mg/L	9056	18.5		14.1		12.8		17.5	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.93		29.97		29.99		29.93	
S0145- -		Specific Conductance	T	µMH0/cm	Field	377		380		362		390	

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

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

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5201		8000-5202		8000-5242		8000-5243		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					220		221		222		223		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	331.73		331.56		331.72		331.8	
N238		Dissolved Oxygen	T	mg/L	Field	4.69		3.96		3.61		3.13	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	176		196		207		171	
S0296- -		pH	T	Units	Field	6.53		6.15		6.17		6.51	
NS215		Eh	T	mV	Field	407		422		438		402	
S0907 - -		Temperature	T	°C	Field	17.89		17.5		17.78		18.28	
7429-90-5		Aluminum	T	mg/L	6020	<0.05		<0.05		<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		<0.005		<0.005		<0.005	
7440-39-3		Barium	T	mg/L	6020	0.216		0.229	*	0.287	*	0.244	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.00865	J	0.0136	J	0.00865	J	0.00907	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	25.4		23.3	*	19.6	*	23.2	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		0.00971	J
7440-48-4		Cobalt	T	mg/L	6020	<0.001		<0.001		0.000369	J	0.000358	J
7440-50-8		Copper	T	mg/L	6020	0.000714	J	0.00065	J	0.000367	J	0.000685	J
7439-89-6		Iron	T	mg/L	6020	0.0349	J	<0.1		<0.1		<0.1	
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		10.4	*	8.76	*	9.75	
7439-96-5		Manganese	T	mg/L	6020	0.00142	J	<0.005		0.00335	J	0.00548	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		0.000103	BJ	0.000125	BJ	<0.0002	

C4

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5201		8000-5202		8000-5242		8000-5243		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					220		221		222		223		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	0.000643	J	0.00197		0.000344	J	0.00459	
7440-02-0		Nickel	T	mg/L	6020	0.0125		0.0212		0.0496		0.129	
7440-09-7		Potassium	T	mg/L	6020	1.3		1.32		0.747		2.19	
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	43.4		47.9	*	46.3	*	47.7	
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		<0.0002		<0.0002	
7440-62-2		Vanadium	T	mg/L	6020	<0.02		<0.02		<0.02		<0.02	
7440-66-6		Zinc	T	mg/L	6020	0.00537	J	0.00484	J	0.00404	J	0.00483	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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5201		8000-5202		8000-5242		8000-5243	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					220		221		222		223	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	*	<0.001	*	<0.001	*	<0.001	*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number						8000-5201		8000-5202		8000-5242		8000-5243	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						220		221		222		223	
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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		<0.0000191		<0.000019		<0.0000191	
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		*		*		*		*
12674-11-2		PCB-1016	T	ug/L	8082		*		*		*		*
11104-28-2		PCB-1221	T	ug/L	8082		*		*		*		*
11141-16-5		PCB-1232	T	ug/L	8082		*		*		*		*
53469-21-9		PCB-1242	T	ug/L	8082		*		*		*		*
12672-29-6		PCB-1248	T	ug/L	8082		*		*		*		*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5201		8000-5202		8000-5242		8000-5243	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					220		221		222		223	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082		*		*		*		*
11096-82-5	PCB-1260	T	ug/L	8082		*		*		*		*
11100-14-4	PCB-1268	T	ug/L	8082		*		*		*		*
12587-46-1	Gross Alpha	T	pCi/L	9310	-0.214	*	-0.692	*	3.42	*	4.78	*
12587-47-2	Gross Beta	T	pCi/L	9310	12.7	*	-0.797	*	3.18	*	-2	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.215	*	0.541	*	0.72	*	0.189	*
10098-97-2	Strontium-90	T	pCi/L	905.0	2.04	*	-2.27	*	-0.447	*	0.749	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	27.8	*	15.9	*	9.95	*	-4.01	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	0.135	*	-0.187	*	1.23	*	0.439	*
10028-17-8	Tritium	T	pCi/L	906.0	-74.7	*	-42.1	*	4.89	*	-168	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	15.9	*J	23.2	*	20.7	*	11	*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	0.945	J	0.999	J	0.975	J	0.91	J
S0586- -	Total Organic Halides	T	mg/L	9020	0.00406	J	0.00856	J	<0.01		<0.01	

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

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

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

GROUNDWATER SAMPLE ANALYSIS_(S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244	8004-4820	8004-4818	8004-4808					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224	369	370	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)					7/17/2019 08:57	7/15/2019 07:12	7/15/2019 07:58	7/11/2019 09:36					
Duplicate ("Y" or "N") ²					N	N	N	N					
Split ("Y" or "N") ³					N	N	N	N					
Facility Sample ID Number (if applicable)					MW224SG4-19	MW369UG4-19	MW370UG4-19	MW372UG4-19					
Laboratory Sample ID Number (if applicable)					485011007	484743001	484743003	484578007					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/25/2019	7/20/2019	7/20/2019	7/19/2019					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					SIDE	DOWN	DOWN	DOWN					
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
24959-67-9		Bromide	T	mg/L	9056	0.419	*	0.366		0.394		0.576	
16887-00-6		Chloride(s)	T	mg/L	9056	33.1	*	31.6		34.2		44.8	*
16984-48-8		Fluoride	T	mg/L	9056	0.28	*	0.21		0.175		0.177	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	0.831		0.655		0.707		1.53	*
14808-79-8		Sulfate	T	mg/L	9056	13.4		8.91		20.2		70.5	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.99		30.07		30.07		29.95	
S0145- -		Specific Conductance	T	µMH0/cm	Field	425		373		421		640	

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

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

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244		8004-4820		8004-4818		8004-4808		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					224		369		370		372		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	331.79		331.78		331.74		332.25	
N238		Dissolved Oxygen	T	mg/L	Field	2.98		3.09		4.09		3.63	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	170		194	B	241	B	616	
S0296- -		pH	T	Units	Field	6.22		6.25		6.15		6.08	
NS215		Eh	T	mV	Field	444		410		421		390	
S0907 - -		Temperature	T	°C	Field	17.83		17.06		17.22		18.44	
7429-90-5		Aluminum	T	mg/L	6020	<0.05		0.0609		<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		<0.005		0.00271	J	0.0021	J
7440-39-3		Barium	T	mg/L	6020	0.216	*	0.381		0.23		0.0582	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.0142	J	0.0168		0.0299		0.889	
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	*	17.7		27.7		49.7	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4		Cobalt	T	mg/L	6020	<0.001		0.00539		<0.001		<0.001	
7440-50-8		Copper	T	mg/L	6020	<0.002		0.00121	J	0.0005	J	0.00064	J
7439-89-6		Iron	T	mg/L	6020	<0.1		0.136		<0.1		0.0634	J
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4		Magnesium	T	mg/L	6020	10.2	*	7.51		12.1		19.2	*
7439-96-5		Manganese	T	mg/L	6020	0.00271	J	0.00693		0.00111	J	0.00159	J
7439-97-6		Mercury	T	mg/L	7470	0.00013	BJ	<0.0002		<0.0002		<0.0002	

C-10

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244		8004-4820		8004-4818		8004-4808		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224		369		370		372		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	0.00028	J	<0.001		<0.001		<0.001	
7440-02-0		Nickel	T	mg/L	6020	0.0177		0.00474		<0.002		0.00064	J
7440-09-7		Potassium	T	mg/L	6020	0.771		0.57		2.46		1.95	
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		0.00207	J	<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	53.2	*	49.3		42.3		54.4	
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		<0.0002		<0.0002	
7440-62-2		Vanadium	T	mg/L	6020	<0.02		<0.02		<0.02		<0.02	
7440-66-6		Zinc	T	mg/L	6020	0.00386	J	0.00487	BJ	0.00444	BJ	0.00509	BJ
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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244		8004-4820		8004-4818		8004-4808	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224		369		370		372	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	*	0.00099	J	0.00057	J	0.00256	*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244		8004-4820		8004-4818		8004-4808		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224		369		370		372		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	<0.000019		<0.0000196		<0.0000197		<0.0000199	
78-87-5		Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
10061-02-6		trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
10061-01-5		cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
156-60-5		trans-1,2-Dichloroethene	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
75-69-4		Trichlorofluoromethane	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
96-18-4		1,2,3-Trichloropropane	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
95-50-1		Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
106-46-7		Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*	<0.001		<0.001		<0.001	*
1336-36-3		PCB, Total	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
12674-11-2		PCB-1016	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
11104-28-2		PCB-1221	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
11141-16-5		PCB-1232	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
53469-21-9		PCB-1242	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
12672-29-6		PCB-1248	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244		8004-4820		8004-4818		8004-4808	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224		369		370		372	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
11096-82-5	PCB-1260	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
11100-14-4	PCB-1268	T	ug/L	8082		*	<0.1		<0.0986		<0.0998	
12587-46-1	Gross Alpha	T	pCi/L	9310	-1.79	*	2.87	*	10.4	*	-1.85	*
12587-47-2	Gross Beta	T	pCi/L	9310	-1.95	*	120	*	52.7	*	141	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.729	*	0.451	*	0.104	*	0.629	*
10098-97-2	Strontium-90	T	pCi/L	905.0	-3.86	*	0.0294	*	-1.35	*	-0.0276	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	11.4	*	55.8	*	107	*	183	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	0.196	*	0.045	*	-0.233	*	0.0604	*
10028-17-8	Tritium	T	pCi/L	906.0	-21.1	*	65.8	*	-40.2	*	-112	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	11	*J	<20	*	36.7	*	69.4	
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	1.06	J	1.11	J	0.988	J	1.27	J
S0586- -	Total Organic Halides	T	mg/L	9020	<0.01		0.0092	J	0.007	J	0.00828	J

C-14

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

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

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

GROUNDWATER SAMPLE ANALYSIS_(S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4792	8004-4809	8004-4810	8004-4804					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373	384	385	386					
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)					7/11/2019 10:21	7/16/2019 08:40	7/16/2019 09:21	7/16/2019 09:58					
Duplicate ("Y" or "N") ²					N	N	N	N					
Split ("Y" or "N") ³					N	N	N	N					
Facility Sample ID Number (if applicable)					MW373UG4-19	MW384SG4-19	MW385SG4-19	MW386SG4-19					
Laboratory Sample ID Number (if applicable)					484578009	484877007	484877009	484877011					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/18/2019	7/23/2019	7/23/2019	7/23/2019					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					DOWN	SIDE	SIDE	SIDE					
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S		
24959-67-9		Bromide	T	mg/L	9056	0.532		0.316	*	0.318	*	0.158	*J
16887-00-6		Chloride(s)	T	mg/L	9056	40.5	*	32.1	*	29.7	*	14.3	*
16984-48-8		Fluoride	T	mg/L	9056	0.2		0.171		0.148		0.645	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.06	*	0.698		0.868	*	0.0653	J
14808-79-8		Sulfate	T	mg/L	9056	148		23.8		21.1		45.9	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.95		29.95		29.96		29.96	
S0145- -		Specific Conductance	T	µMH0/cm	Field	785		447		426		562	

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

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

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4792		8004-4809		8004-4810		8004-4804		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					373		384		385		386		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	332.24		331.48		331.52		343.98	
N238		Dissolved Oxygen	T	mg/L	Field	2.36		3.67		4.01		3.66	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	481		276		284		324	
S0296- -		pH	T	Units	Field	6.03		6.26		6.26		6.95	
NS215		Eh	T	mV	Field	417		421		420		411	
S0907 - -		Temperature	T	°C	Field	19.11		17.39		17.44		17.78	
7429-90-5		Aluminum	T	mg/L	6020	<0.05		<0.05		<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	0.00262	J	0.00262	J	0.00237	J	<0.005	
7440-39-3		Barium	T	mg/L	6020	0.0393		0.22		0.241		0.147	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	1.52		0.075		0.0527		0.0069	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	67.9		25.8		24.7		21.1	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4		Cobalt	T	mg/L	6020	0.00097	J	<0.001		<0.001		<0.001	
7440-50-8		Copper	T	mg/L	6020	0.00065	J	0.000608	J	0.000758	J	0.000452	J
7439-89-6		Iron	T	mg/L	6020	0.103		0.0571	J	<0.1		0.0341	J
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4		Magnesium	T	mg/L	6020	27.2	*	10.9		10.3		9.21	
7439-96-5		Manganese	T	mg/L	6020	0.0499		0.00517		<0.005		0.00957	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		<0.0002	

C-16

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4792		8004-4809		8004-4810		8004-4804		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373		384		385		386		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	<0.001		<0.001		<0.001		0.000391	J
7440-02-0		Nickel	T	mg/L	6020	0.00217		0.000738	J	<0.002		<0.002	
7440-09-7		Potassium	T	mg/L	6020	2.6		1.53		1.58		0.251	J
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	58.6		49.6		47.6		87.5	
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	0.000076	J	<0.0002		<0.0002		0.000067	J
7440-62-2		Vanadium	T	mg/L	6020	<0.02		<0.02		<0.02		<0.02	
7440-66-6		Zinc	T	mg/L	6020	0.00565	BJ	0.00526	J	0.00573	J	0.00358	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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4792		8004-4809		8004-4810		8004-4804	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373		384		385		386	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	0.00069	J	0.0006	J*	0.00056	J*	<0.001	*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number						8004-4792		8004-4809		8004-4810		8004-4804	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						373		384		385		386	
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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		<0.0000189		<0.0000188		<0.0000189	
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	<0.101			*		*		*
12674-11-2		PCB-1016	T	ug/L	8082	<0.101			*		*		*
11104-28-2		PCB-1221	T	ug/L	8082	<0.101			*		*		*
11141-16-5		PCB-1232	T	ug/L	8082	<0.101			*		*		*
53469-21-9		PCB-1242	T	ug/L	8082	<0.101			*		*		*
12672-29-6		PCB-1248	T	ug/L	8082	<0.101			*		*		*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4792		8004-4809		8004-4810		8004-4804	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					373		384		385		386	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082	<0.101			*		*		*
11096-82-5	PCB-1260	T	ug/L	8082	<0.101			*		*		*
11100-14-4	PCB-1268	T	ug/L	8082	<0.101			*		*		*
12587-46-1	Gross Alpha	T	pCi/L	9310	0.123	*	5.8	*	1.51	*	3.66	*
12587-47-2	Gross Beta	T	pCi/L	9310	21.9	*	83.6	*	55.5	*	-0.0961	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.26	*	0.812	*	0.481	*	0.174	*
10098-97-2	Strontium-90	T	pCi/L	905.0	-0.556	*	-0.0942	*	-0.0527	*	3.4	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	28.3	*	122	*	125	*	-2.04	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	-0.0756	*	-0.147	*	0.392	*	0.157	*
10028-17-8	Tritium	T	pCi/L	906.0	-146	*	-88.7	*	-151	*	-115	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	107		18.3	*J	11	*J	20.7	*
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	1.28	J	1.14	J	1.25	J	3.93	
S0586- -	Total Organic Halides	T	mg/L	9020	0.00652	J	0.00852	J	0.013		0.104	

C-20

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

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

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

GROUNDWATER SAMPLE ANALYSIS_(S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4815	8004-4816	8004-4812	8004-4811					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					387	388	389	390					
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)					7/16/2019 07:22	7/16/2019 08:00	NA	7/16/2019 06:47					
Duplicate ("Y" or "N") ²					N	N	N	N					
Split ("Y" or "N") ³					N	N	N	N					
Facility Sample ID Number (if applicable)					MW387SG4-19	MW388SG4-19	NA	MW390SG4-19					
Laboratory Sample ID Number (if applicable)					484877013	484877015	NA	484877001					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/23/2019	7/23/2019	NA	7/23/2019					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					DOWN	DOWN	DOWN	DOWN					
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
24959-67-9		Bromide	T	mg/L	9056	0.525	*	0.387	*		*	<0.2	*
16887-00-6		Chloride(s)	T	mg/L	9056	40.5	*	30.5	*		*	34.1	*
16984-48-8		Fluoride	T	mg/L	9056	0.56		0.203			*	0.313	
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.2		0.822			*	1.93	*
14808-79-8		Sulfate	T	mg/L	9056	30.7		25.2			*	51.3	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	29.96		29.96			*	29.94	
S0145- -		Specific Conductance	T	µMH0/cm	Field	539		472			*	674	

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

⁷Flags 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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4815		8004-4816		8004-4812		8004-4811		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					387		388		389		390		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	331.53		331.46			*	331.69	
N238		Dissolved Oxygen	T	mg/L	Field	4.06		3.59			*	4.39	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	320		219			*	354	
S0296- -		pH	T	Units	Field	6.35		6.29			*	6.55	
NS215		Eh	T	mV	Field	442		412			*	481	
S0907 - -		Temperature	T	°C	Field	18		17.61			*	16.44	
7429-90-5		Aluminum	T	mg/L	6020	<0.05		<0.05			*	0.0484	J
7440-36-0		Antimony	T	mg/L	6020	0.00126	J	0.00143	J		*	<0.003	
7440-38-2		Arsenic	T	mg/L	6020	0.00449	J	0.0026	J		*	<0.005	
7440-39-3		Barium	T	mg/L	6020	0.145		0.302			*	0.22	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005			*	<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.0361		0.0401			*	0.0208	
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001			*	<0.001	
7440-70-2		Calcium	T	mg/L	6020	37.3		38.8			*	30.7	
7440-47-3		Chromium	T	mg/L	6020	0.00473	J	<0.01			*	<0.01	
7440-48-4		Cobalt	T	mg/L	6020	<0.001		<0.001			*	<0.001	
7440-50-8		Copper	T	mg/L	6020	0.000593	J	0.000721	J		*	0.00104	J
7439-89-6		Iron	T	mg/L	6020	0.0342	J	0.0722	J		*	0.0513	J
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002			*	<0.002	
7439-95-4		Magnesium	T	mg/L	6020	16		17.4			*	13.1	
7439-96-5		Manganese	T	mg/L	6020	0.00516		0.00176	J		*	<0.005	
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002			*	<0.0002	

C-22

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4815		8004-4816		8004-4812		8004-4811		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					387		388		389		390		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	<0.001		<0.001			*	0.000499	J
7440-02-0		Nickel	T	mg/L	6020	<0.002		0.000758	J		*	0.00123	J
7440-09-7		Potassium	T	mg/L	6020	1.73		2.48			*	0.309	
7440-16-6		Rhodium	T	mg/L	6020	<0.005		<0.005			*	<0.005	
7782-49-2		Selenium	T	mg/L	6020	<0.005		<0.005			*	<0.005	
7440-22-4		Silver	T	mg/L	6020	<0.001		<0.001			*	<0.001	
7440-23-5		Sodium	T	mg/L	6020	54.2		41.1			*	98.5	
7440-25-7		Tantalum	T	mg/L	6020	<0.005		<0.005			*	<0.005	
7440-28-0		Thallium	T	mg/L	6020	<0.002		<0.002			*	<0.002	
7440-61-1		Uranium	T	mg/L	6020	<0.0002		<0.0002			*	0.000215	
7440-62-2		Vanadium	T	mg/L	6020	<0.02		<0.02			*	<0.02	
7440-66-6		Zinc	T	mg/L	6020	0.00455	J	0.00653	J		*	0.00497	J
108-05-4		Vinyl acetate	T	mg/L	8260	<0.005		<0.005			*	<0.005	
67-64-1		Acetone	T	mg/L	8260	<0.005		<0.005			*	<0.005	
107-02-8		Acrolein	T	mg/L	8260	<0.005		<0.005			*	<0.005	
107-13-1		Acrylonitrile	T	mg/L	8260	<0.005		<0.005			*	<0.005	
71-43-2		Benzene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
108-90-7		Chlorobenzene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
1330-20-7		Xylenes	T	mg/L	8260	<0.003		<0.003			*	<0.003	
100-42-5		Styrene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
108-88-3		Toluene	T	mg/L	8260	<0.001		<0.001			*	<0.001	
74-97-5		Chlorobromomethane	T	mg/L	8260	<0.001		<0.001			*	<0.001	

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4815		8004-4816		8004-4812		8004-4811	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					387		388		389		390	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	0.00102	*	0.00045	J		*	<0.001	

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4815		8004-4816		8004-4812		8004-4811		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					387		388		389		390		
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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			*	<0.000019	
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		*		*		*		*
12674-11-2		PCB-1016	T	ug/L	8082		*		*		*		*
11104-28-2		PCB-1221	T	ug/L	8082		*		*		*		*
11141-16-5		PCB-1232	T	ug/L	8082		*		*		*		*
53469-21-9		PCB-1242	T	ug/L	8082		*		*		*		*
12672-29-6		PCB-1248	T	ug/L	8082		*		*		*		*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4815		8004-4816		8004-4812		8004-4811	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					387		388		389		390	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082		*		*		*		*
11096-82-5	PCB-1260	T	ug/L	8082		*		*		*		*
11100-14-4	PCB-1268	T	ug/L	8082		*		*		*		*
12587-46-1	Gross Alpha	T	pCi/L	9310	8.43	*	-0.326	*		*	2.31	*
12587-47-2	Gross Beta	T	pCi/L	9310	145	*	37.5	*		*	46.3	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.138	*	0.347	*		*	0.537	*
10098-97-2	Strontium-90	T	pCi/L	905.0	-0.438	*	1.99	*		*	-2.05	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	378	*	90.9	*		*	55.6	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	-0.654	*	-0.283	*		*	0.476	*
10028-17-8	Tritium	T	pCi/L	906.0	-74.4	*	-49	*		*	130	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	52.4	*	28	*		*	18.3	*J
57-12-5	Cyanide	T	mg/L	9012	<0.2		<0.2			*	<0.2	
20461-54-5	Iodide	T	mg/L	300.0	<0.5		<0.5			*	<0.5	
S0268- -	Total Organic Carbon	T	mg/L	9060	1.25	J	1.11	J		*	2.65	
S0586- -	Total Organic Halides	T	mg/L	9020	0.0083	J	0.00732	J		*	0.028	

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

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

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

GROUNDWATER SAMPLE ANALYSIS_(S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4805	8004-4806	8004-4807	8004-4802					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					391	392	393	394					
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)					7/15/2019 10:20	7/15/2019 11:03	7/15/2019 11:38	7/17/2019 09:37					
Duplicate ("Y" or "N") ²					N	N	N	N					
Split ("Y" or "N") ³					N	N	N	N					
Facility Sample ID Number (if applicable)					MW391SG4-19	MW392SG4-19	MW393SG4-19	MW394SG4-19					
Laboratory Sample ID Number (if applicable)					484742001	484742003	484742005	485011009					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/22/2019	7/19/2019	7/19/2019	7/25/2019					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					DOWN	DOWN	DOWN	UP					
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
24959-67-9		Bromide	T	mg/L	9056	0.576		0.588		<0.2		0.567	*
16887-00-6		Chloride(s)	T	mg/L	9056	42.9		44.5		11.8		42.5	*
16984-48-8		Fluoride	T	mg/L	9056	0.186		0.212		0.185		0.157	*
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.3		0.402		0.0981	J	1.13	
14808-79-8		Sulfate	T	mg/L	9056	30.6		23.4		19.3		11.1	
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	30.06		30.06		30.08		30.01	
S0145- -		Specific Conductance	T	µMH0/cm	Field	468		438		430		370	

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

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

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4805		8004-4806		8004-4807		8004-4802		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					391		392		393		394		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	331.55		331.5		341.99		331.96	
N238		Dissolved Oxygen	T	mg/L	Field	3.63		3.2		1.74		4.27	
S0266- -		Total Dissolved Solids	T	mg/L	160.1	257	B	207	B	193	B	167	
S0296- -		pH	T	Units	Field	6.17		6.31		6.45		6.13	
NS215		Eh	T	mV	Field	440		432		430		435	
S0907 - -		Temperature	T	°C	Field	17.33		16.94		17.61		18.06	
7429-90-5		Aluminum	T	mg/L	6020	0.0233	J	<0.05		0.025	J	<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		<0.005		0.00308	J	<0.005	
7440-39-3		Barium	T	mg/L	6020	0.156		0.202		0.113		0.233	*
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.118		0.0317		0.02		0.0188	
7440-43-9		Cadmium	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-70-2		Calcium	T	mg/L	6020	31.3		31.2		13.9		25.4	*
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4		Cobalt	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-50-8		Copper	T	mg/L	6020	0.00048	J	0.00057	J	0.00066	J	0.000338	J
7439-89-6		Iron	T	mg/L	6020	0.0968	J	0.228		0.84		0.0431	J
7439-92-1		Lead	T	mg/L	6020	<0.002		<0.002		<0.002		<0.002	
7439-95-4		Magnesium	T	mg/L	6020	13.2		11.8		3.57		10.8	*
7439-96-5		Manganese	T	mg/L	6020	0.00178	J	0.0273		0.0183		0.00214	J
7439-97-6		Mercury	T	mg/L	7470	<0.0002		<0.0002		<0.0002		0.00015	BJ

C-28

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4805		8004-4806		8004-4807		8004-4802		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					391		392		393		394		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	<0.001		<0.001		<0.001		<0.001	
7440-02-0		Nickel	T	mg/L	6020	<0.002		<0.002		<0.002		0.00491	
7440-09-7		Potassium	T	mg/L	6020	1.5		1.73		0.394		1.15	
7440-16-6		Rhodium	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7782-49-2		Selenium	T	mg/L	6020	<0.005		<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	35.1		38.5		77.1		31.9	*
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		<0.0002		<0.0002	
7440-62-2		Vanadium	T	mg/L	6020	<0.02		<0.02		<0.02		<0.02	
7440-66-6		Zinc	T	mg/L	6020	0.0049	BJ	0.00449	BJ	0.0044	BJ	0.00474	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		0.0018	*
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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4805		8004-4806		8004-4807		8004-4802	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					391		392		393		394	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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		0.00116		<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	0.012		0.0103		<0.001		0.00371	*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4805		8004-4806		8004-4807		8004-4802		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					391		392		393		394		
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	<0.0000196		<0.0000199		<0.00002		<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		*		*		*		*
12674-11-2		PCB-1016	T	ug/L	8082		*		*		*		*
11104-28-2		PCB-1221	T	ug/L	8082		*		*		*		*
11141-16-5		PCB-1232	T	ug/L	8082		*		*		*		*
53469-21-9		PCB-1242	T	ug/L	8082		*		*		*		*
12672-29-6		PCB-1248	T	ug/L	8082		*		*		*		*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4805		8004-4806		8004-4807		8004-4802	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					391		392		393		394	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082		*		*		*		*
11096-82-5	PCB-1260	T	ug/L	8082		*		*		*		*
11100-14-4	PCB-1268	T	ug/L	8082		*		*		*		*
12587-46-1	Gross Alpha	T	pCi/L	9310	8.61	*	0.563	*	10.4	*	0.57	*
12587-47-2	Gross Beta	T	pCi/L	9310	4.97	*	0.397	*	-0.122	*	10.3	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.217	*	0.364	*	0.524	*	0.606	*
10098-97-2	Strontium-90	T	pCi/L	905.0	-1.28	*	-0.795	*	0.544	*	3.27	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	9.38	*	8.7	*	0.305	*	4.74	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	-0.192	*	0.31	*	-0.485	*	-0.00202	*
10028-17-8	Tritium	T	pCi/L	906.0	-54.4	*	13.4	*	-2.07	*	93.1	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	31	*	<20	*	<20	*	18.3	*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	0.895	J	1.15	J	2.42		0.884	J
S0586- -	Total Organic Halides	T	mg/L	9020	0.01		0.0188		0.013		0.00586	J

C-32

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

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

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

GROUNDWATER SAMPLE ANALYSIS_(S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4801	8004-4803	8004-4817	0000-0000					
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					395	396	397	E. BLANK					
Sample Sequence #					1	1	1	1					
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment					NA	NA	NA	E					
Sample Date and Time (Month/Day/Year hour: minutes)					7/17/2019 10:14	7/17/2019 10:38	7/16/2019 12:30	7/15/2019 09:42					
Duplicate ("Y" or "N") ²					N	N	N	N					
Split ("Y" or "N") ³					N	N	N	N					
Facility Sample ID Number (if applicable)					MW395SG4-19	MW396SG4-19	MW397SG4-19	RI1SG4-19					
Laboratory Sample ID Number (if applicable)					485011011	485011013	484877017	484742008					
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/25/2019	7/25/2019	7/23/2019	7/19/2019					
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					UP	UP	UP	NA					
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
24959-67-9		Bromide	T	mg/L	9056	0.47	*	0.921	*	0.43	*		*
16887-00-6		Chloride(s)	T	mg/L	9056	40.3	*	57.1	*	35.3	*		*
16984-48-8		Fluoride	T	mg/L	9056	0.135	*	0.624	*	0.148			*
S0595- -		Nitrate & Nitrite	T	mg/L	9056	1.37		0.0833	J	1.32			*
14808-79-8		Sulfate	T	mg/L	9056	10.9		27.7		10.7			*
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field	30.01		30.01		29.96			*
S0145- -		Specific Conductance	T	µMH0/cm	Field	344		706		316			*

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4801		8004-4803		8004-4817		0000-0000		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					395		396		397		E. BLANK		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
S0906 - -		Static Water Level Elevation	T	Ft. MSL	Field	332.38		369.95		332.02			*
N238		Dissolved Oxygen	T	mg/L	Field	4.55		1.16		4.92			*
S0266- -		Total Dissolved Solids	T	mg/L	160.1	184		409		176			*
S0296- -		pH	T	Units	Field	6.1		6.61		6.4			*
NS215		Eh	T	mV	Field	449		415		395			*
S0907 - -		Temperature	T	°C	Field	17.72		17.83		17.94			*
7429-90-5		Aluminum	T	mg/L	6020	<0.05		<0.05		0.0407	J	<0.05	
7440-36-0		Antimony	T	mg/L	6020	<0.003		0.00126	J	0.00121	J	0.00106	J
7440-38-2		Arsenic	T	mg/L	6020	<0.005		<0.005		<0.005		<0.005	
7440-39-3		Barium	T	mg/L	6020	0.231	*	0.382	*	0.138		<0.004	
7440-41-7		Beryllium	T	mg/L	6020	<0.0005		<0.0005		<0.0005		<0.0005	
7440-42-8		Boron	T	mg/L	6020	0.0191		0.00765	J	0.0111	J	<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	24.2	*	33.4	*	19.7		<0.2	
7440-47-3		Chromium	T	mg/L	6020	<0.01		<0.01		<0.01		<0.01	
7440-48-4		Cobalt	T	mg/L	6020	<0.001		0.000371	J	<0.001		<0.001	
7440-50-8		Copper	T	mg/L	6020	0.000327	J	0.00152	J	0.000757	J	0.00032	J
7439-89-6		Iron	T	mg/L	6020	<0.1		0.183		0.0545	J	<0.1	
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	*	15	*	8.63		<0.03	
7439-96-5		Manganese	T	mg/L	6020	<0.005		0.167		0.00287	J	<0.005	
7439-97-6		Mercury	T	mg/L	7470	0.000168	BJ	<0.0002		<0.0002		<0.0002	

C-34

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4801		8004-4803		8004-4817		0000-0000		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					395		396		397		E. BLANK		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	<0.001		0.000394	J	<0.001		<0.001	
7440-02-0		Nickel	T	mg/L	6020	<0.002		0.00105	J	<0.002		<0.002	
7440-09-7		Potassium	T	mg/L	6020	1.36		0.813		1.76		<0.3	
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	28.3	*	100	*	33.8		<0.25	
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		0.000081	J	<0.0002		<0.0002	
7440-62-2		Vanadium	T	mg/L	6020	<0.02		<0.02		<0.02		<0.02	
7440-66-6		Zinc	T	mg/L	6020	0.00435	J	0.00689	J	0.00579	J	0.00383	BJ
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		0.00748	
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		0.00087	J
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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4801		8004-4803		8004-4817		0000-0000	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					395		396		397		E. BLANK	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	0.00255	*	<0.001	*	<0.001		<0.001	

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number						8004-4801		8004-4803		8004-4817		0000-0000	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						395		396		397		E. BLANK	
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	<0.0000191		<0.0000195		<0.0000189		<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		*		*		*		*
12674-11-2		PCB-1016	T	ug/L	8082		*		*		*		*
11104-28-2		PCB-1221	T	ug/L	8082		*		*		*		*
11141-16-5		PCB-1232	T	ug/L	8082		*		*		*		*
53469-21-9		PCB-1242	T	ug/L	8082		*		*		*		*
12672-29-6		PCB-1248	T	ug/L	8082		*		*		*		*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8004-4801		8004-4803		8004-4817		0000-0000	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					395		396		397		E. BLANK	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1	PCB-1254	T	ug/L	8082		*		*		*		*
11096-82-5	PCB-1260	T	ug/L	8082		*		*		*		*
11100-14-4	PCB-1268	T	ug/L	8082		*		*		*		*
12587-46-1	Gross Alpha	T	pCi/L	9310	2.89	*	0.469	*	5.3	*	4.17	*
12587-47-2	Gross Beta	T	pCi/L	9310	6.42	*	4.9	*	6.74	*	-0.978	*
10043-66-0	Iodine-131	T	pCi/L			*		*		*		*
13982-63-3	Radium-226	T	pCi/L	AN-1418	0.744	*	0.251	*	-0.215	*	0.0066	*
10098-97-2	Strontium-90	T	pCi/L	905.0	0.496	*	-1.33	*	-1.22	*	-0.831	*
14133-76-7	Technetium-99	T	pCi/L	Tc-02-RC	4.92	*	-0.714	*	5.83	*	-3.47	*
14269-63-7	Thorium-230	T	pCi/L	Th-01-RC	-0.133	*	0.507	*	0.407	*	0.0582	*
10028-17-8	Tritium	T	pCi/L	906.0	-3.33	*	-43.8	*	62.6	*	24.1	*
S0130- -	Chemical Oxygen Demand	T	mg/L	410.4	47.6	*	25.6	*	59.8	*		*
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		0.471	J	<0.5		<0.5	
S0268- -	Total Organic Carbon	T	mg/L	9060	0.863	J	4.45		0.847	J		*
S0586- -	Total Organic Halides	T	mg/L	9020	0.00374	J	0.0555		0.0071	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: SW07300014, SW07300015, SW07300045

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

GROUNDWATER SAMPLE ANALYSIS (S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					0000-0000	0000-0000	0000-0000	0000-0000				
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					F. BLANK	T. BLANK 1	T. BLANK 2	T. BLANK 3				
Sample Sequence #					1	1	1	1				
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment					F	T	T	T				
Sample Date and Time (Month/Day/Year hour: minutes)					7/15/2019 10:31	7/15/2019 09:35	7/16/2019 06:00	7/17/2019 05:40				
Duplicate ("Y" or "N") ²					N	N	N	N				
Split ("Y" or "N") ³					N	N	N	N				
Facility Sample ID Number (if applicable)					FB1SG4-19	TB1SG4-19	TB2SG4-19	TB3SG4-19				
Laboratory Sample ID Number (if applicable)					484742007	484742009	484877019	485011015				
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/19/2019	7/19/2019	7/23/2019	7/25/2019				
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					NA	NA	NA	NA				
CAS RN ⁴	CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
24959-67-9	Bromide	T	mg/L	9056		*		*		*		*
16887-00-6	Chloride(s)	T	mg/L	9056		*		*		*		*
16984-48-8	Fluoride	T	mg/L	9056		*		*		*		*
S0595- -	Nitrate & Nitrite	T	mg/L	9056		*		*		*		*
14808-79-8	Sulfate	T	mg/L	9056		*		*		*		*
NS1894	Barometric Pressure Reading	T	Inches/Hg	Field		*		*		*		*
S0145- -	Specific Conductance	T	µMH0/cm	Field		*		*		*		*

STANDARD FLAGS:

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

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

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					0000-0000		0000-0000		0000-0000		0000-0000		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					F. BLANK		T. BLANK 1		T. BLANK 2		T. BLANK 3		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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			*		*		*
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	<0.004			*		*		*
7440-41-7		Beryllium	T	mg/L	6020	<0.0005			*		*		*
7440-42-8		Boron	T	mg/L	6020	<0.015			*		*		*
7440-43-9		Cadmium	T	mg/L	6020	<0.001			*		*		*
7440-70-2		Calcium	T	mg/L	6020	<0.2			*		*		*
7440-47-3		Chromium	T	mg/L	6020	<0.01			*		*		*
7440-48-4		Cobalt	T	mg/L	6020	<0.001			*		*		*
7440-50-8		Copper	T	mg/L	6020	0.00033	J		*		*		*
7439-89-6		Iron	T	mg/L	6020	<0.1			*		*		*
7439-92-1		Lead	T	mg/L	6020	<0.002			*		*		*
7439-95-4		Magnesium	T	mg/L	6020	<0.03			*		*		*
7439-96-5		Manganese	T	mg/L	6020	<0.005			*		*		*
7439-97-6		Mercury	T	mg/L	7470	<0.0002			*		*		*

C-40

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					0000-0000		0000-0000		0000-0000		0000-0000		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					F. BLANK		T. BLANK 1		T. BLANK 2		T. BLANK 3		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	<0.001			*		*		*
7440-02-0		Nickel	T	mg/L	6020	<0.002			*		*		*
7440-09-7		Potassium	T	mg/L	6020	<0.3			*		*		*
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	<0.25			*		*		*
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	<0.02			*		*		*
7440-66-6		Zinc	T	mg/L	6020	0.00334	BJ		*		*		*
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	0.00276	J	0.00723		0.0117		0.00934	*
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		0.00085	J	0.00091	J	0.00084	*
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/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					0000-0000		0000-0000		0000-0000		0000-0000	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					F. BLANK		T. BLANK 1		T. BLANK 2		T. BLANK 3	
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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		<0.001		<0.001	*	<0.001	*

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number						0000-0000		0000-0000		0000-0000		0000-0000	
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						F. BLANK		T. BLANK 1		T. BLANK 2		T. BLANK 3	
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
100-41-4		Ethylbenzene	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	*
591-78-6		2-Hexanone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	*
74-88-4		Iodomethane	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	*
124-48-1		Methane, Dibromochloro-	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	*
56-23-5		Carbon Tetrachloride	T	mg/L	8260	<0.001		<0.001		<0.001		<0.001	*
75-09-2		Dichloromethane	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	*
108-10-1		Methyl isobutyl ketone	T	mg/L	8260	<0.005		<0.005		<0.005		<0.005	*
96-12-8		Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000197		<0.0000198		<0.0000189		<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		*		*		*		*
12674-11-2		PCB-1016	T	ug/L	8082		*		*		*		*
11104-28-2		PCB-1221	T	ug/L	8082		*		*		*		*
11141-16-5		PCB-1232	T	ug/L	8082		*		*		*		*
53469-21-9		PCB-1242	T	ug/L	8082		*		*		*		*
12672-29-6		PCB-1248	T	ug/L	8082		*		*		*		*

C-43

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					0000-0000		0000-0000		0000-0000		0000-0000		
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					F. BLANK		T. BLANK 1		T. BLANK 2		T. BLANK 3		
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1		PCB-1254	T	ug/L	8082		*		*		*		*
11096-82-5		PCB-1260	T	ug/L	8082		*		*		*		*
11100-14-4		PCB-1268	T	ug/L	8082		*		*		*		*
12587-46-1		Gross Alpha	T	pCi/L	9310	-4.1	*		*		*		*
12587-47-2		Gross Beta	T	pCi/L	9310	5.26	*		*		*		*
10043-66-0		Iodine-131	T	pCi/L			*		*		*		*
13982-63-3		Radium-226	T	pCi/L	AN-1418	-0.239	*		*		*		*
10098-97-2		Strontium-90	T	pCi/L	905.0	-0.32	*		*		*		*
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	0.298	*		*		*		*
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	-0.074	*		*		*		*
10028-17-8		Tritium	T	pCi/L	906.0	-102	*		*		*		*
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			*		*		*
S0268- -		Total Organic Carbon	T	mg/L	9060		*		*		*		*
S0586- -		Total Organic Halides	T	mg/L	9020		*		*		*		*

C-44

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: 073-00014 & 073-00015 FINDS/UNIT: KY8-890-008-982 / 1

LAB ID: None
For Official Use Only

GROUNDWATER SAMPLE ANALYSIS (S)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244									
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224									
Sample Sequence #					2									
If sample is a Blank, specify Type: (F)ield, (T)rip, (M)ethod, or (E)quipment					NA									
Sample Date and Time (Month/Day/Year hour: minutes)					7/17/2019 08:57									
Duplicate ("Y" or "N") ²					Y									
Split ("Y" or "N") ³					N									
Facility Sample ID Number (if applicable)					MW224DSG4-19									
Laboratory Sample ID Number (if applicable)					485011005									
Date of Analysis (Month/Day/Year) For <u>Volatile Organics</u> Analysis					7/25/2019									
Gradient with respect to Monitored Unit (UP, DOWN, SIDE, UNKNOWN)					SIDE									
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S ⁷	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	
24959-67-9		Bromide	T	mg/L	9056	0.432	*							
16887-00-6		Chloride(s)	T	mg/L	9056	33.3	*							
16984-48-8		Fluoride	T	mg/L	9056	0.276	*							
S0595- -		Nitrate & Nitrite	T	mg/L	9056	0.983	*							
14808-79-8		Sulfate	T	mg/L	9056	13.4								
NS1894		Barometric Pressure Reading	T	Inches/Hg	Field		*							
S0145- -		Specific Conductance	T	µMH0/cm	Field		*							

STANDARD FLAGS:

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

¹AKGWA # is 0000-0000 for any type of blank.

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

³Respond "Y" if the sample was split and analyzed by separate laboratories.

⁴Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁵"T" = Total; "D" = Dissolved

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

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

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

Permit Number: SW07300014, SW07300015, SW07300045

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

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, BLANK-F, etc.)					224								
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	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	217							
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							
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	0.252	*						
7440-41-7		Beryllium	T	mg/L	6020	<0.0005							
7440-42-8		Boron	T	mg/L	6020	0.0158							
7440-43-9		Cadmium	T	mg/L	6020	<0.001							
7440-70-2		Calcium	T	mg/L	6020	26.9	*						
7440-47-3		Chromium	T	mg/L	6020	<0.01							
7440-48-4		Cobalt	T	mg/L	6020	<0.001							
7440-50-8		Copper	T	mg/L	6020	<0.002							
7439-89-6		Iron	T	mg/L	6020	<0.1							
7439-92-1		Lead	T	mg/L	6020	<0.002							
7439-95-4		Magnesium	T	mg/L	6020	11.9	*						
7439-96-5		Manganese	T	mg/L	6020	0.00321	J						
7439-97-6		Mercury	T	mg/L	7470	0.00009	BJ						

C-46

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224								
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
7439-98-7		Molybdenum	T	mg/L	6020	0.000327	J						
7440-02-0		Nickel	T	mg/L	6020	0.0212							
7440-09-7		Potassium	T	mg/L	6020	0.887							
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	48.1	*						
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	<0.02							
7440-66-6		Zinc	T	mg/L	6020	0.0041	J						
108-05-4		Vinyl acetate	T	mg/L	8260	<0.005	*						
67-64-1		Acetone	T	mg/L	8260	0.00279	*						
107-02-8		Acrolein	T	mg/L	8260	<0.005	*						
107-13-1		Acrylonitrile	T	mg/L	8260	<0.005	*						
71-43-2		Benzene	T	mg/L	8260	<0.001	*						
108-90-7		Chlorobenzene	T	mg/L	8260	<0.001	*						
1330-20-7		Xylenes	T	mg/L	8260	<0.003	*						
100-42-5		Styrene	T	mg/L	8260	<0.001	*						
108-88-3		Toluene	T	mg/L	8260	<0.001	*						
74-97-5		Chlorobromomethane	T	mg/L	8260	<0.001	*						

C-47

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244							
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224							
CAS RN ⁴	CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
75-27-4	Bromodichloromethane	T	mg/L	8260	<0.001	*						
75-25-2	Tribromomethane	T	mg/L	8260	<0.001	*						
74-83-9	Methyl bromide	T	mg/L	8260	<0.001	*						
78-93-3	Methyl ethyl ketone	T	mg/L	8260	<0.005	*						
110-57-6	trans-1,4-Dichloro-2-butene	T	mg/L	8260	<0.005	*						
75-15-0	Carbon disulfide	T	mg/L	8260	<0.005	*						
75-00-3	Chloroethane	T	mg/L	8260	<0.001	*						
67-66-3	Chloroform	T	mg/L	8260	<0.001	*						
74-87-3	Methyl chloride	T	mg/L	8260	<0.001	*						
156-59-2	cis-1,2-Dichloroethene	T	mg/L	8260	<0.001	*						
74-95-3	Methylene bromide	T	mg/L	8260	<0.001	*						
75-34-3	1,1-Dichloroethane	T	mg/L	8260	<0.001	*						
107-06-2	1,2-Dichloroethane	T	mg/L	8260	<0.001	*						
75-35-4	1,1-Dichloroethylene	T	mg/L	8260	<0.001	*						
106-93-4	Ethane, 1,2-dibromo	T	mg/L	8260	<0.001	*						
79-34-5	Ethane, 1,1,2,2-Tetrachloro	T	mg/L	8260	<0.001	*						
71-55-6	Ethane, 1,1,1-Trichloro-	T	mg/L	8260	<0.001	*						
79-00-5	Ethane, 1,1,2-Trichloro	T	mg/L	8260	<0.001	*						
630-20-6	Ethane, 1,1,1,2-Tetrachloro	T	mg/L	8260	<0.001	*						
75-01-4	Vinyl chloride	T	mg/L	8260	<0.001	*						
127-18-4	Ethene, Tetrachloro-	T	mg/L	8260	<0.001	*						
79-01-6	Ethene, Trichloro-	T	mg/L	8260	<0.001	*						

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number						8000-5244							
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)						224							
CAS RN ⁴		CONSTITUENT	T D ⁵	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
100-41-4		Ethylbenzene	T	mg/L	8260	<0.001	*						
591-78-6		2-Hexanone	T	mg/L	8260	<0.005	*						
74-88-4		Iodomethane	T	mg/L	8260	<0.005	*						
124-48-1		Methane, Dibromochloro-	T	mg/L	8260	<0.001	*						
56-23-5		Carbon Tetrachloride	T	mg/L	8260	<0.001	*						
75-09-2		Dichloromethane	T	mg/L	8260	<0.005	*						
108-10-1		Methyl isobutyl ketone	T	mg/L	8260	<0.005	*						
96-12-8		Propane, 1,2-Dibromo-3-chloro	T	mg/L	8011	<0.0000191							
78-87-5		Propane, 1,2-Dichloro-	T	mg/L	8260	<0.001	*						
10061-02-6		trans-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001	*						
10061-01-5		cis-1,3-Dichloro-1-propene	T	mg/L	8260	<0.001	*						
156-60-5		trans-1,2-Dichloroethene	T	mg/L	8260	<0.001	*						
75-69-4		Trichlorofluoromethane	T	mg/L	8260	<0.001	*						
96-18-4		1,2,3-Trichloropropane	T	mg/L	8260	<0.001	*						
95-50-1		Benzene, 1,2-Dichloro-	T	mg/L	8260	<0.001	*						
106-46-7		Benzene, 1,4-Dichloro-	T	mg/L	8260	<0.001	*						
1336-36-3		PCB, Total	T	ug/L	8082		*						
12674-11-2		PCB-1016	T	ug/L	8082		*						
11104-28-2		PCB-1221	T	ug/L	8082		*						
11141-16-5		PCB-1232	T	ug/L	8082		*						
53469-21-9		PCB-1242	T	ug/L	8082		*						
12672-29-6		PCB-1248	T	ug/L	8082		*						

RESIDENTIAL/INERT-QUARTERLY

Facility: US DOE - Paducah Gaseous Diffusion Plant

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

Permit Number: SW07300014, SW07300015, SW07300045

LAB ID: None

For Official Use Only

GROUNDWATER SAMPLE ANALYSIS - (Cont.)

AKGWA NUMBER ¹ , Facility Well/Spring Number					8000-5244								
Facility's Local Well or Spring Number (e.g., MW-1, MW-2, etc.)					224								
CAS RN ⁴		CONSTITUENT	T D 5	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S	DETECTED VALUE OR PQL ⁶	F L A G S
11097-69-1		PCB-1254	T	ug/L	8082		*						
11096-82-5		PCB-1260	T	ug/L	8082		*						
11100-14-4		PCB-1268	T	ug/L	8082		*						
12587-46-1		Gross Alpha	T	pCi/L	9310	-4.36	*						
12587-47-2		Gross Beta	T	pCi/L	9310	9.14	*						
10043-66-0		Iodine-131	T	pCi/L			*						
13982-63-3		Radium-226	T	pCi/L	AN-1418	0.228	*						
10098-97-2		Strontium-90	T	pCi/L	905.0	-0.401	*						
14133-76-7		Technetium-99	T	pCi/L	Tc-02-RC	0.545	*						
14269-63-7		Thorium-230	T	pCi/L	Th-01-RC	-0.308	*						
10028-17-8		Tritium	T	pCi/L	906.0	-6.72	*						
S0130- -		Chemical Oxygen Demand	T	mg/L	410.4	<20	*						
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	<0.01							

C-50

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5201 MW220	MW220SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		Trichloroethene	Y1	MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.53. Rad error is 3.53.
		Gross beta		TPU is 6.89. Rad error is 6.57.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.6. Rad error is 0.6.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.7. Rad error is 2.68.
		Technetium-99		TPU is 12.8. Rad error is 12.4.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.672. Rad error is 0.67.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 166. Rad error is 166.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5202 MW221	MW221SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5202 MW221	MW221SG4-19	Tetrachloroethene	H	Analysis performed outside holding time requirement
		Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.23. Rad error is 2.23.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.42. Rad error is 7.42.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.51. Rad error is 1.51.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.45. Rad error is 2.45.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.7. Rad error is 11.6.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.716. Rad error is 0.715.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 104. Rad error is 104.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5242 MW222	MW222SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5242 MW222	MW222SG4-19	Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.4. Rad error is 4.37.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.25. Rad error is 6.23.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.19. Rad error is 1.19.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.51. Rad error is 3.51.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.9. Rad error is 12.9.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.78. Rad error is 1.76.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 110. Rad error is 110.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5243 MW223	MW223SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Trichloroethene	Y1	MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.01. Rad error is 6.96.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.05. Rad error is 7.05.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.635. Rad error is 0.635.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.56. Rad error is 2.56.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.4. Rad error is 11.4.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.766. Rad error is 0.759.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 159. Rad error is 159.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5244 MW224	MW224SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5244 MW224	MW224SG4-19	Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.02. Rad error is 2.01.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.52. Rad error is 5.52.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.917. Rad error is 0.915.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.09. Rad error is 3.09.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.7. Rad error is 11.6.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.701. Rad error is 0.698.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 109. Rad error is 109.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4820 MW369	MW369UG4-19	Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.03. Rad error is 5.01.
		Gross beta		TPU is 24.3. Rad error is 14.7.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.722. Rad error is 0.717.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.67. Rad error is 1.67.
		Technetium-99		TPU is 14.8. Rad error is 13.3.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.565. Rad error is 0.564.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 157. Rad error is 156.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits
8004-4818 MW370	MW370UG4-19	Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 9.31. Rad error is 9.15.
		Gross beta		TPU is 13.6. Rad error is 10.4.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.649. Rad error is 0.647.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.05. Rad error is 1.05.
		Technetium-99		TPU is 19.9. Rad error is 15.6.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.324. Rad error is 0.323.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 153. Rad error is 153.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4808 MW372	MW372UG4-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		Magnesium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement
		Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4808 MW372	MW372UG4-19	Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.72. Rad error is 3.72.
		Gross beta		TPU is 26.9. Rad error is 14.3.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.792. Rad error is 0.79.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.93. Rad error is 1.93.
		Technetium-99		TPU is 25.9. Rad error is 16.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.925. Rad error is 0.924.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 145. Rad error is 145.
8004-4792 MW373	MW373UG4-19	Chloride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		Magnesium	E	Result estimated due to matrix interferences.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.27. Rad error is 6.26.
		Gross beta		TPU is 8.81. Rad error is 8.06.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.67. Rad error is 0.669.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.89. Rad error is 2.89.
		Technetium-99		TPU is 12.5. Rad error is 12.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.545. Rad error is 0.544.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 137. Rad error is 137.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4809 MW384	MW384SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Trichloroethene	Y1	MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.25. Rad error is 6.16.
		Gross beta		TPU is 18.2. Rad error is 11.8.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.881. Rad error is 0.878.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.68. Rad error is 1.68.
		Technetium-99		TPU is 19.9. Rad error is 14.6.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.59. Rad error is 0.59.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 165. Rad error is 165.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4810 MW385	MW385SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		Trichloroethene	Y1	MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.49. Rad error is 5.48.
		Gross beta		TPU is 13.6. Rad error is 10.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.84. Rad error is 0.838.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.39. Rad error is 2.39.
		Technetium-99		TPU is 20.4. Rad error is 14.9.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.759. Rad error is 0.754.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 161. Rad error is 161.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4804 MW386	MW386SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Trichloroethene	Y1	MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.83. Rad error is 6.81.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.82. Rad error is 5.82.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.582. Rad error is 0.582.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.27. Rad error is 3.22.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.8. Rad error is 11.8.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.73. Rad error is 0.727.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 162. Rad error is 162.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4815 MW387	MW387SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Trichloroethene	Y1	MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 8.33. Rad error is 8.1.
		Gross beta		TPU is 28.2. Rad error is 15.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.602. Rad error is 0.602.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.37. Rad error is 2.37.
		Technetium-99		TPU is 46.6. Rad error is 20.2.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.565. Rad error is 0.563.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 160. Rad error is 160.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4816 MW388	MW388SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.42. Rad error is 6.42.
		Gross beta		TPU is 11.1. Rad error is 9.16.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.68. Rad error is 0.677.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.43. Rad error is 3.42.
		Technetium-99		TPU is 17. Rad error is 13.7.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.559. Rad error is 0.558.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 164. Rad error is 164.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4812 MW389		Bromide		During sampling, the well was dry; therefore, no sample was collected.
		Chloride		During sampling, the well was dry; therefore, no sample was collected.
		Fluoride		During sampling, the well was dry; therefore, no sample was collected.
		Nitrate & Nitrite		During sampling, the well was dry; therefore, no sample was collected.
		Sulfate		During sampling, the well was dry; therefore, no sample was collected.
		Barometric Pressure Reading		During sampling, the well was dry; therefore, no sample was collected.
		Specific Conductance		During sampling, the well was dry; therefore, no sample was collected.
		Static Water Level Elevation		During sampling, the well was dry; therefore, no sample was collected.
		Dissolved Oxygen		During sampling, the well was dry; therefore, no sample was collected.
		Total Dissolved Solids		During sampling, the well was dry; therefore, no sample was collected.
		pH		During sampling, the well was dry; therefore, no sample was collected.
		Eh		During sampling, the well was dry; therefore, no sample was collected.
		Temperature		During sampling, the well was dry; therefore, no sample was collected.
		Aluminum		During sampling, the well was dry; therefore, no sample was collected.
		Antimony		During sampling, the well was dry; therefore, no sample was collected.
		Arsenic		During sampling, the well was dry; therefore, no sample was collected.
		Barium		During sampling, the well was dry; therefore, no sample was collected.
		Beryllium		During sampling, the well was dry; therefore, no sample was collected.
		Boron		During sampling, the well was dry; therefore, no sample was collected.
		Cadmium		During sampling, the well was dry; therefore, no sample was collected.
		Calcium		During sampling, the well was dry; therefore, no sample was collected.
		Chromium		During sampling, the well was dry; therefore, no sample was collected.
		Cobalt		During sampling, the well was dry; therefore, no sample was collected.
		Copper		During sampling, the well was dry; therefore, no sample was collected.
		Iron		During sampling, the well was dry; therefore, no sample was collected.
		Lead		During sampling, the well was dry; therefore, no sample was collected.
		Magnesium		During sampling, the well was dry; therefore, no sample was collected.
		Manganese		During sampling, the well was dry; therefore, no sample was collected.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4812 MW389		Mercury		During sampling, the well was dry; therefore, no sample was collected.
		Molybdenum		During sampling, the well was dry; therefore, no sample was collected.
		Nickel		During sampling, the well was dry; therefore, no sample was collected.
		Potassium		During sampling, the well was dry; therefore, no sample was collected.
		Rhodium		During sampling, the well was dry; therefore, no sample was collected.
		Selenium		During sampling, the well was dry; therefore, no sample was collected.
		Silver		During sampling, the well was dry; therefore, no sample was collected.
		Sodium		During sampling, the well was dry; therefore, no sample was collected.
		Tantalum		During sampling, the well was dry; therefore, no sample was collected.
		Thallium		During sampling, the well was dry; therefore, no sample was collected.
		Uranium		During sampling, the well was dry; therefore, no sample was collected.
		Vanadium		During sampling, the well was dry; therefore, no sample was collected.
		Zinc		During sampling, the well was dry; therefore, no sample was collected.
		Vinyl acetate		During sampling, the well was dry; therefore, no sample was collected.
		Acetone		During sampling, the well was dry; therefore, no sample was collected.
		Acrolein		During sampling, the well was dry; therefore, no sample was collected.
		Acrylonitrile		During sampling, the well was dry; therefore, no sample was collected.
		Benzene		During sampling, the well was dry; therefore, no sample was collected.
		Chlorobenzene		During sampling, the well was dry; therefore, no sample was collected.
		Xylenes		During sampling, the well was dry; therefore, no sample was collected.
		Styrene		During sampling, the well was dry; therefore, no sample was collected.
		Toluene		During sampling, the well was dry; therefore, no sample was collected.
		Chlorobromomethane		During sampling, the well was dry; therefore, no sample was collected.
		Bromodichloromethane		During sampling, the well was dry; therefore, no sample was collected.
		Tribromomethane		During sampling, the well was dry; therefore, no sample was collected.
		Methyl bromide		During sampling, the well was dry; therefore, no sample was collected.
		Methyl Ethyl Ketone		During sampling, the well was dry; therefore, no sample was collected.
		trans-1,4-Dichloro-2-butene		During sampling, the well was dry; therefore, no sample was collected.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4812 MW389		Carbon disulfide		During sampling, the well was dry; therefore, no sample was collected.
		Chloroethane		During sampling, the well was dry; therefore, no sample was collected.
		Chloroform		During sampling, the well was dry; therefore, no sample was collected.
		Methyl chloride		During sampling, the well was dry; therefore, no sample was collected.
		cis-1,2-Dichloroethene		During sampling, the well was dry; therefore, no sample was collected.
		Methylene bromide		During sampling, the well was dry; therefore, no sample was collected.
		1,1-Dichloroethane		During sampling, the well was dry; therefore, no sample was collected.
		1,2-Dichloroethane		During sampling, the well was dry; therefore, no sample was collected.
		1,1-Dichloroethylene		During sampling, the well was dry; therefore, no sample was collected.
		1,2-Dibromoethane		During sampling, the well was dry; therefore, no sample was collected.
		1,1,2,2-Tetrachloroethane		During sampling, the well was dry; therefore, no sample was collected.
		1,1,1-Trichloroethane		During sampling, the well was dry; therefore, no sample was collected.
		1,1,2-Trichloroethane		During sampling, the well was dry; therefore, no sample was collected.
		1,1,1,2-Tetrachloroethane		During sampling, the well was dry; therefore, no sample was collected.
		Vinyl chloride		During sampling, the well was dry; therefore, no sample was collected.
		Tetrachloroethene		During sampling, the well was dry; therefore, no sample was collected.
		Trichloroethene		During sampling, the well was dry; therefore, no sample was collected.
		Ethylbenzene		During sampling, the well was dry; therefore, no sample was collected.
		2-Hexanone		During sampling, the well was dry; therefore, no sample was collected.
		Iodomethane		During sampling, the well was dry; therefore, no sample was collected.
		Dibromochloromethane		During sampling, the well was dry; therefore, no sample was collected.
		Carbon tetrachloride		During sampling, the well was dry; therefore, no sample was collected.
		Dichloromethane		During sampling, the well was dry; therefore, no sample was collected.
		Methyl Isobutyl Ketone		During sampling, the well was dry; therefore, no sample was collected.
		1,2-Dibromo-3-chloropropane		During sampling, the well was dry; therefore, no sample was collected.
		1,2-Dichloropropane		During sampling, the well was dry; therefore, no sample was collected.
		trans-1,3-Dichloropropene		During sampling, the well was dry; therefore, no sample was collected.
		cis-1,3-Dichloropropene		During sampling, the well was dry; therefore, no sample was collected.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4812 MW389		trans-1,2-Dichloroethene		During sampling, the well was dry; therefore, no sample was collected.
		Trichlorofluoromethane		During sampling, the well was dry; therefore, no sample was collected.
		1,2,3-Trichloropropane		During sampling, the well was dry; therefore, no sample was collected.
		1,2-Dichlorobenzene		During sampling, the well was dry; therefore, no sample was collected.
		1,4-Dichlorobenzene		During sampling, the well was dry; therefore, no sample was collected.
		PCB, Total		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1016		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1221		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1232		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1242		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1248		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1254		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1260		During sampling, the well was dry; therefore, no sample was collected.
		PCB-1268		During sampling, the well was dry; therefore, no sample was collected.
		Gross alpha		During sampling, the well was dry; therefore, no sample was collected.
		Gross beta		During sampling, the well was dry; therefore, no sample was collected.
		Iodine-131		During sampling, the well was dry; therefore, no sample was collected.
		Radium-226		During sampling, the well was dry; therefore, no sample was collected.
		Strontium-90		During sampling, the well was dry; therefore, no sample was collected.
		Technetium-99		During sampling, the well was dry; therefore, no sample was collected.
		Thorium-230		During sampling, the well was dry; therefore, no sample was collected.
		Tritium		During sampling, the well was dry; therefore, no sample was collected.
		Chemical Oxygen Demand		During sampling, the well was dry; therefore, no sample was collected.
		Cyanide		During sampling, the well was dry; therefore, no sample was collected.
		Iodide		During sampling, the well was dry; therefore, no sample was collected.
		Total Organic Carbon		During sampling, the well was dry; therefore, no sample was collected.
		Total Organic Halides		During sampling, the well was dry; therefore, no sample was collected.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4811 MW390	MW390SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.51. Rad error is 7.5.
		Gross beta		TPU is 11.4. Rad error is 8.52.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.699. Rad error is 0.699.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.79. Rad error is 1.79.
		Technetium-99		TPU is 15.5. Rad error is 14.3.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.758. Rad error is 0.75.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 150. Rad error is 148.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4805 MW391	MW391SG4-19	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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 8.23. Rad error is 8.11.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.03. Rad error is 6.96.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.607. Rad error is 0.607.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.04. Rad error is 3.04.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.2. Rad error is 12.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.753. Rad error is 0.752.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 146. Rad error is 146.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4806 MW392	MW392SG4-19	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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.19. Rad error is 5.19.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.83. Rad error is 5.82.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.742. Rad error is 0.741.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.48. Rad error is 1.48.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.8. Rad error is 12.7.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.682. Rad error is 0.677.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 146. Rad error is 146.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4807 MW393	MW393SG4-19	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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 9.7. Rad error is 9.53.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.94. Rad error is 6.94.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.803. Rad error is 0.801.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.51. Rad error is 1.51.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.2. Rad error is 12.2.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.619. Rad error is 0.616.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 144. Rad error is 144.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4802 MW394	MW394SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4802 MW394	MW394SG4-19	Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.2. Rad error is 6.19.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.17. Rad error is 6.96.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.895. Rad error is 0.892.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.65. Rad error is 2.6.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.2. Rad error is 11.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.624. Rad error is 0.623.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 122. Rad error is 121.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4801 MW395	MW395SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4801	MW395 MW395SG4-19	Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.75. Rad error is 4.73.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.74. Rad error is 6.66.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.913. Rad error is 0.906.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.12. Rad error is 3.12.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.4. Rad error is 11.4.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.623. Rad error is 0.623.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 108. Rad error is 108.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4803 MW396	MW396SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4803 MW396	MW396SG4-19	Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.56. Rad error is 6.56.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.63. Rad error is 7.58.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.62. Rad error is 0.618.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 3.54. Rad error is 3.54.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11. Rad error is 11.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.01. Rad error is 1.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 95. Rad error is 95.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8004-4817 MW397	MW397SG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.21. Rad error is 6.15.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.59. Rad error is 5.46.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.419. Rad error is 0.417.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.59. Rad error is 2.59.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.1. Rad error is 12.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.545. Rad error is 0.54.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 143. Rad error is 143.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	RI1SG4-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.46. Rad error is 5.42.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.25. Rad error is 4.25.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.473. Rad error is 0.472.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1. Rad error is 1.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.6. Rad error is 11.6.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.842. Rad error is 0.841.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 158. Rad error is 158.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
		Total Organic Halides		Analysis of constituent not required and not performed.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	FB1SG4-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		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	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.99. Rad error is 4.99.
		Gross beta	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 6.72. Rad error is 6.66.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.354. Rad error is 0.354.
		Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 1.13. Rad error is 1.13.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 12.1. Rad error is 12.1.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.477. Rad error is 0.477.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 133. Rad error is 133.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
		Total Organic Halides		Analysis of constituent not required and not performed.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB1SG4-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Aluminum		Analysis of constituent not required and not performed.
		Antimony		Analysis of constituent not required and not performed.
		Arsenic		Analysis of constituent not required and not performed.
		Barium		Analysis of constituent not required and not performed.
		Beryllium		Analysis of constituent not required and not performed.
		Boron		Analysis of constituent not required and not performed.
		Cadmium		Analysis of constituent not required and not performed.
		Calcium		Analysis of constituent not required and not performed.
		Chromium		Analysis of constituent not required and not performed.
		Cobalt		Analysis of constituent not required and not performed.
		Copper		Analysis of constituent not required and not performed.
		Iron		Analysis of constituent not required and not performed.
		Lead		Analysis of constituent not required and not performed.
		Magnesium		Analysis of constituent not required and not performed.
		Manganese		Analysis of constituent not required and not performed.
		Mercury		Analysis of constituent not required and not performed.
		Molybdenum		Analysis of constituent not required and not performed.
		Nickel		Analysis of constituent not required and not performed.
		Potassium		Analysis of constituent not required and not performed.
		Rhodium		Analysis of constituent not required and not performed.
		Selenium		Analysis of constituent not required and not performed.
		Silver		Analysis of constituent not required and not performed.
		Sodium		Analysis of constituent not required and not performed.
		Tantalum		Analysis of constituent not required and not performed.
		Thallium		Analysis of constituent not required and not performed.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB1SG4-19	Uranium		Analysis of constituent not required and not performed.
		Vanadium		Analysis of constituent not required and not performed.
		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/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB2SG4-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Aluminum		Analysis of constituent not required and not performed.
		Antimony		Analysis of constituent not required and not performed.
		Arsenic		Analysis of constituent not required and not performed.
		Barium		Analysis of constituent not required and not performed.
		Beryllium		Analysis of constituent not required and not performed.
		Boron		Analysis of constituent not required and not performed.
		Cadmium		Analysis of constituent not required and not performed.
		Calcium		Analysis of constituent not required and not performed.
		Chromium		Analysis of constituent not required and not performed.
		Cobalt		Analysis of constituent not required and not performed.
		Copper		Analysis of constituent not required and not performed.
		Iron		Analysis of constituent not required and not performed.
		Lead		Analysis of constituent not required and not performed.
		Magnesium		Analysis of constituent not required and not performed.
		Manganese		Analysis of constituent not required and not performed.
		Mercury		Analysis of constituent not required and not performed.
		Molybdenum		Analysis of constituent not required and not performed.
		Nickel		Analysis of constituent not required and not performed.
		Potassium		Analysis of constituent not required and not performed.
		Rhodium		Analysis of constituent not required and not performed.
		Selenium		Analysis of constituent not required and not performed.
		Silver		Analysis of constituent not required and not performed.
		Sodium		Analysis of constituent not required and not performed.
		Tantalum		Analysis of constituent not required and not performed.
		Thallium		Analysis of constituent not required and not performed.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB2SG4-19	Uranium	Y1	Analysis of constituent not required and not performed.
		Vanadium		Analysis of constituent not required and not performed.
		Zinc		Analysis of constituent not required and not performed.
		Trichloroethene		MS/MSD recovery outside acceptance criteria
		PCB, Total		Analysis of constituent not required and not performed.
		PCB-1016		Analysis of constituent not required and not performed.
		PCB-1221		Analysis of constituent not required and not performed.
		PCB-1232		Analysis of constituent not required and not performed.
		PCB-1242		Analysis of constituent not required and not performed.
		PCB-1248		Analysis of constituent not required and not performed.
		PCB-1254		Analysis of constituent not required and not performed.
		PCB-1260		Analysis of constituent not required and not performed.
		PCB-1268		Analysis of constituent not required and not performed.
		Gross alpha		Analysis of constituent not required and not performed.
		Gross beta		Analysis of constituent not required and not performed.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226		Analysis of constituent not required and not performed.
		Strontium-90		Analysis of constituent not required and not performed.
		Technetium-99		Analysis of constituent not required and not performed.
		Thorium-230		Analysis of constituent not required and not performed.
		Tritium		Analysis of constituent not required and not performed.
		Chemical Oxygen Demand		Analysis of constituent not required and not performed.
		Cyanide		Analysis of constituent not required and not performed.
		Iodide		Analysis of constituent not required and not performed.
		Total Organic Carbon		Analysis of constituent not required and not performed.
		Total Organic Halides		Analysis of constituent not required and not performed.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB3SG4-19	Bromide		Analysis of constituent not required and not performed.
		Chloride		Analysis of constituent not required and not performed.
		Fluoride		Analysis of constituent not required and not performed.
		Nitrate & Nitrite		Analysis of constituent not required and not performed.
		Sulfate		Analysis of constituent not required and not performed.
		Barometric Pressure Reading		Analysis of constituent not required and not performed.
		Specific Conductance		Analysis of constituent not required and not performed.
		Static Water Level Elevation		Analysis of constituent not required and not performed.
		Dissolved Oxygen		Analysis of constituent not required and not performed.
		Total Dissolved Solids		Analysis of constituent not required and not performed.
		pH		Analysis of constituent not required and not performed.
		Eh		Analysis of constituent not required and not performed.
		Temperature		Analysis of constituent not required and not performed.
		Aluminum		Analysis of constituent not required and not performed.
		Antimony		Analysis of constituent not required and not performed.
		Arsenic		Analysis of constituent not required and not performed.
		Barium		Analysis of constituent not required and not performed.
		Beryllium		Analysis of constituent not required and not performed.
		Boron		Analysis of constituent not required and not performed.
		Cadmium		Analysis of constituent not required and not performed.
		Calcium		Analysis of constituent not required and not performed.
		Chromium		Analysis of constituent not required and not performed.
		Cobalt		Analysis of constituent not required and not performed.
		Copper		Analysis of constituent not required and not performed.
		Iron		Analysis of constituent not required and not performed.
		Lead		Analysis of constituent not required and not performed.
		Magnesium		Analysis of constituent not required and not performed.
		Manganese		Analysis of constituent not required and not performed.
		Mercury		Analysis of constituent not required and not performed.
		Molybdenum		Analysis of constituent not required and not performed.
		Nickel		Analysis of constituent not required and not performed.
		Potassium		Analysis of constituent not required and not performed.
		Rhodium		Analysis of constituent not required and not performed.
		Selenium		Analysis of constituent not required and not performed.
		Silver		Analysis of constituent not required and not performed.
		Sodium		Analysis of constituent not required and not performed.
		Tantalum		Analysis of constituent not required and not performed.
		Thallium		Analysis of constituent not required and not performed.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB3SG4-19	Uranium		Analysis of constituent not required and not performed.
		Vanadium		Analysis of constituent not required and not performed.
		Zinc		Analysis of constituent not required and not performed.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement
		1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement
		Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
0000-0000 QC	TB3SG4-19	Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5244 MW224	MW224DSG4-19	Bromide	W	Post-digestion spike recovery out of control limits.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Fluoride	W	Post-digestion spike recovery out of control limits.
		Nitrate & Nitrite	H	Analysis performed outside holding time requirement
		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.
		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.
		Barium	E	Result estimated due to matrix interferences.
		Calcium	E	Result estimated due to matrix interferences.
		Magnesium	E	Result estimated due to matrix interferences.
		Sodium	E	Result estimated due to matrix interferences.
		Vinyl acetate	H	Analysis performed outside holding time requirement
		Acetone	H	Analysis performed outside holding time requirement
		Acrolein	H	Analysis performed outside holding time requirement
		Acrylonitrile	H	Analysis performed outside holding time requirement
		Benzene	H	Analysis performed outside holding time requirement
		Chlorobenzene	H	Analysis performed outside holding time requirement
		Xylenes	H	Analysis performed outside holding time requirement
		Styrene	H	Analysis performed outside holding time requirement
		Toluene	H	Analysis performed outside holding time requirement
		Chlorobromomethane	H	Analysis performed outside holding time requirement
		Bromodichloromethane	H	Analysis performed outside holding time requirement
		Tribromomethane	H	Analysis performed outside holding time requirement
		Methyl bromide	H	Analysis performed outside holding time requirement
		Methyl Ethyl Ketone	H	Analysis performed outside holding time requirement
		trans-1,4-Dichloro-2-butene	H	Analysis performed outside holding time requirement
		Carbon disulfide	H	Analysis performed outside holding time requirement
		Chloroethane	H	Analysis performed outside holding time requirement
		Chloroform	H	Analysis performed outside holding time requirement
		Methyl chloride	H	Analysis performed outside holding time requirement
		cis-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Methylene bromide	H	Analysis performed outside holding time requirement
		1,1-Dichloroethane	H	Analysis performed outside holding time requirement
		1,2-Dichloroethane	H	Analysis performed outside holding time requirement

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5244 MW224	MW224DSG4-19	1,1-Dichloroethylene	H	Analysis performed outside holding time requirement
		1,2-Dibromoethane	H	Analysis performed outside holding time requirement
		1,1,2,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		1,1,1-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,2-Trichloroethane	H	Analysis performed outside holding time requirement
		1,1,1,2-Tetrachloroethane	H	Analysis performed outside holding time requirement
		Vinyl chloride	H	Analysis performed outside holding time requirement
		Tetrachloroethene	H	Analysis performed outside holding time requirement
		Trichloroethene	H	Analysis performed outside holding time requirement
		Ethylbenzene	H	Analysis performed outside holding time requirement
		2-Hexanone	H	Analysis performed outside holding time requirement
		Iodomethane	H	Analysis performed outside holding time requirement
		Dibromochloromethane	H	Analysis performed outside holding time requirement
		Carbon tetrachloride	H	Analysis performed outside holding time requirement
		Dichloromethane	H	Analysis performed outside holding time requirement
		Methyl Isobutyl Ketone	H	Analysis performed outside holding time requirement
		1,2-Dichloropropane	H	Analysis performed outside holding time requirement
		trans-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		cis-1,3-Dichloropropene	H	Analysis performed outside holding time requirement
		trans-1,2-Dichloroethene	H	Analysis performed outside holding time requirement
		Trichlorofluoromethane	H	Analysis performed outside holding time requirement
		1,2,3-Trichloropropane	H	Analysis performed outside holding time requirement
		1,2-Dichlorobenzene	H	Analysis performed outside holding time requirement
		1,4-Dichlorobenzene	H	Analysis performed outside holding time requirement
		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	U	Indicates analyte/nucleide was analyzed for, but not detected. TPU is 3.47. Rad error is 3.47.
		Gross beta	U	Indicates analyte/nucleide was analyzed for, but not detected. TPU is 7.25. Rad error is 7.1.
		Iodine-131		Analysis of constituent not required and not performed.
		Radium-226	U	Indicates analyte/nucleide was analyzed for, but not detected. TPU is 0.695. Rad error is 0.695.

RESIDENTIAL/INERT – QUARTERLY

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

Facility: US DOE - Paducah Gaseous Diffusion Plant

LAB ID: None

Permit Number: SW07300014, SW07300015, SW07300045

For Official Use Only

GROUNDWATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
8000-5244 MW224	MW224DSG4-19	Strontium-90	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 2.52. Rad error is 2.52.
		Technetium-99	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 11.9. Rad error is 11.9.
		Thorium-230	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 0.537. Rad error is 0.537.
		Tritium	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 111. Rad error is 111.
		Chemical Oxygen Demand	N	Sample spike (MS/MSD) recovery not within control limits

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

**STATISTICAL ANALYSES AND
QUALIFICATION STATEMENT**

THIS PAGE INTENTIONALLY LEFT BLANK

GROUNDWATER STATISTICAL COMMENTS

Introduction

The statistical analyses conducted on the third quarter 2019 groundwater data collected from the C-746-S&T Landfills monitoring wells (MWs) were performed in accordance with Permit GSTR0003, 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 2019 data used to conduct the statistical analyses were collected in July 2019. 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, using the last eight quarters, was run on analytes that had at least one downgradient well that exceeded the historical background. 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 for 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 for pH. The test well results are compared to both an upper and lower tolerance limit (TL) to determine if statistically significant deviations in concentrations exist with respect to upgradient (background) well data from the first eight quarters. The tolerance interval statistical analysis is conducted separately for each parameter in each well (no pooling of downgradient data).

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

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

Station	Type	Groundwater Unit
MW220	BG	URGA
MW221	SG	URGA
MW222	SG	URGA
MW223	SG	URGA
MW224	SG	URGA
MW369	TW	URGA
MW370	TW	LRGA
MW372	TW	URGA
MW373	TW	LRGA
MW384	SG	URGA
MW385	SG	LRGA
MW386 ¹	SG	UCRS
MW387	TW	URGA
MW388	TW	LRGA
MW389 ^{1*}	TW	UCRS
MW390 ¹	TW	UCRS
MW391	TW	URGA
MW392	TW	LRGA
MW393 ¹	TW	UCRS
MW394	BG	URGA
MW395	BG	LRGA
MW396 ¹	BG	UCRS
MW397	BG	LRGA

¹**NOTE:** The gradients in UCRS wells are downward. The UCRS wells identified as up-, side- or downgradient are those wells located in the same general direction as the RGA wells considered to be up-, side-, or downgradient.

BG: upgradient or background wells

TW: downgradient or test wells

SG: sidegradient wells

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

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

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. 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 a statistically significant difference in concentration compared to the current background concentration.

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

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

Type of Data Used

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

Exhibits D.3, D.4, and D.5 list the number of analyses (observations), nondetects (censored observations), and detects (uncensored observations) by parameter in the UCRS, the URGAs, 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 2019. The observations are representative of the current quarter data. Historical background data are presented in Attachment D1. The sampling dates associated with background data are listed next to the result in Attachment D1. 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. A result has been considered a nondetect if it has a “U” validation code.

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

$$\text{upper TL} = X + (K \times S)$$

$$\text{lower TL} = X - (K \times S)$$

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

Parameters
Acetone
Aluminum
Antimony
Beta Activity
Boron
Bromide
Calcium
Chemical Oxygen Demand (COD)
Chloride
<i>cis</i> -1,2-Dichloroethene
Cobalt
Conductivity
Copper
Dissolved Oxygen
Dissolved Solids
Iodide
Iron
Magnesium
Manganese
Molybdenum
Nickel
Oxidation-Reduction Potential
pH*
Potassium
Sodium
Sulfate
Technetium-99
Total Organic Carbon (TOC)
Total Organic Halides (TOX)
Trichloroethene
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

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

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

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
Iodomethane	4	4	0	No
Iron	4	0	4	Yes
Magnesium	4	0	4	Yes
Manganese	4	1	3	Yes
Methylene chloride	4	4	0	No
Molybdenum	4	2	2	Yes
Nickel	4	2	2	Yes
Oxidation-Reduction Potential	4	0	4	Yes
pH	4	0	4	Yes
Potassium	4	0	4	Yes
Radium-226	4	4	0	No
Rhodium	4	4	0	No
Sodium	4	0	4	Yes
Styrene	4	4	0	No
Sulfate	4	0	4	Yes
Tantalum	4	4	0	No
Technetium-99	4	3	1	Yes
Tetrachloroethene	4	4	0	No
Thallium	4	4	0	No
Thorium-230	4	4	0	No
Toluene	4	4	0	No
Total Organic Carbon (TOC)	4	0	4	Yes
Total Organic Halides (TOX)	4	0	4	Yes
trans-1,2-Dichloroethene	4	4	0	No
trans-1,3-Dichloropropene	4	4	0	No
trans-1,4-Dichloro-2-Butene	4	4	0	No
Trichlorofluoromethane	4	4	0	No
Vanadium	4	4	0	No
Vinyl Acetate	4	4	0	No
Zinc	4	1	3	Yes

Bold denotes parameters with at least one uncensored observation.

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

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
1,1,1,2-Tetrachloroethane	11	11	0	No
1,1,2,2-Tetrachloroethane	11	11	0	No
1,1,2-Trichloroethane	11	11	0	No
1,1-Dichloroethane	11	11	0	No
1,2,3-Trichloropropane	11	11	0	No
1,2-Dibromo-3-chloropropane	11	11	0	No
1,2-Dibromoethane	11	11	0	No
1,2-Dichlorobenzene	11	11	0	No
1,2-Dichloropropane	11	11	0	No
2-Butanone	11	11	0	No
2-Hexanone	11	11	0	No
4-Methyl-2-pentanone	11	11	0	No
Acetone	11	9	2	Yes
Acrolein	11	11	0	No
Acrylonitrile	11	11	0	No
Aluminum	11	9	2	Yes
Antimony	11	10	1	Yes
Beryllium	11	11	0	No
Beta activity	11	6	5	Yes
Boron	11	0	11	Yes
Bromide	11	0	11	Yes
Bromochloromethane	11	11	0	No
Bromodichloromethane	11	11	0	No
Bromoform	11	11	0	No
Bromomethane	11	11	0	No
Calcium	11	0	11	Yes
Carbon disulfide	11	11	0	No
Chemical Oxygen Demand (COD)	11	1	10	Yes
Chloride	11	0	11	Yes
Chlorobenzene	11	11	0	No
Chloroethane	11	11	0	No
Chloroform	11	11	0	No
Chloromethane	11	11	0	No
cis-1,2-Dichloroethene	11	11	0	No
cis-1,3-Dichloropropene	11	11	0	No
Cobalt	11	8	3	Yes
Conductivity	11	0	11	Yes
Copper	11	1	10	Yes
Cyanide	11	11	0	No
Dibromochloromethane	11	11	0	No
Dibromomethane	11	11	0	No
Dimethylbenzene, Total	11	11	0	No
Dissolved Oxygen	11	0	11	Yes
Dissolved Solids	11	0	11	Yes
Ethylbenzene	11	11	0	No

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

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
Iodide	11	11	0	No
Iodomethane	11	11	0	No
Iron	11	4	7	Yes
Magnesium	11	0	11	Yes
Manganese	11	1	10	Yes
Methylene chloride	11	11	0	No
Molybdenum	11	6	5	Yes
Nickel	11	2	9	Yes
Oxidation-Reduction Potential	11	0	11	Yes
pH	11	0	11	Yes
Potassium	11	0	11	Yes
Radium-226	11	11	0	No
Rhodium	11	11	0	No
Sodium	11	0	11	Yes
Styrene	11	11	0	No
Sulfate	11	0	11	Yes
Tantalum	11	11	0	No
Technetium-99	11	6	5	Yes
Tetrachloroethene	11	11	0	No
Thallium	11	11	0	No
Thorium-230	11	11	0	No
Toluene	11	11	0	No
Total Organic Carbon (TOC)	11	0	11	Yes
Total Organic Halides (TOX)	11	3	8	Yes
<i>trans</i> -1,2-Dichloroethene	11	11	0	No
<i>trans</i> -1,3-Dichloropropene	11	11	0	No
<i>trans</i> -1,4-Dichloro-2-Butene	11	11	0	No
Trichloroethene	11	5	6	Yes
Trichlorofluoromethane	11	11	0	No
Vanadium	11	11	0	No
Vinyl Acetate	11	11	0	No
Zinc	11	3	8	Yes

Bold denotes parameters with at least one uncensored observation.

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

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
1,1,1,2-Tetrachloroethane	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
Aluminum	7	6	1	Yes
Antimony	7	5	2	Yes
Beryllium	7	7	0	No
Beta activity	7	3	4	Yes
Boron	7	0	7	Yes
Bromide	7	0	7	Yes
Bromochloromethane	7	7	0	No
Bromodichloromethane	7	7	0	No
Bromoform	7	7	0	No
Bromomethane	7	7	0	No
Calcium	7	0	7	Yes
Carbon disulfide	7	7	0	No
Chemical Oxygen Demand (COD)	7	1	6	Yes
Chloride	7	0	7	Yes
Chlorobenzene	7	7	0	No
Chloroethane	7	7	0	No
Chloroform	7	7	0	No
Chloromethane	7	7	0	No
cis-1,2-Dichloroethene	7	6	1	Yes
cis-1,3-Dichloropropene	7	7	0	No
Cobalt	7	6	1	Yes
Conductivity	7	0	7	Yes
Copper	7	0	7	Yes
Cyanide	7	7	0	No
Dibromochloromethane	7	7	0	No
Dibromomethane	7	7	0	No
Dimethylbenzene, Total	7	7	0	No
Dissolved Oxygen	7	0	7	Yes
Dissolved Solids	7	0	7	Yes
Ethylbenzene	7	7	0	No
Iodide	7	7	0	No
Iodomethane	7	7	0	No
Iron	7	3	4	Yes

Exhibit D.5. Summary of Censored and Uncensored Data—LRGA (Continued)

Parameters	Observations	Censored Observation	Uncensored Observation	Statistical Analysis?
Magnesium	7	0	7	Yes
Manganese	7	2	5	Yes
Methylene chloride	7	7	0	No
Molybdenum	7	7	0	No
Nickel	7	5	2	Yes
Oxidation-Reduction Potential	7	0	7	Yes
pH	7	0	7	Yes
Potassium	7	0	7	Yes
Radium-226	7	7	0	No
Rhodium	7	7	0	No
Sodium	7	0	7	Yes
Styrene	7	7	0	No
Sulfate	7	0	7	Yes
Tantalum	7	7	0	No
Technetium-99	7	3	4	Yes
Tetrachloroethene	7	7	0	No
Thallium	7	7	0	No
Thorium-230	7	7	0	No
Toluene	7	7	0	No
Total Organic Carbon (TOC)	7	0	7	Yes
Total Organic Halides (TOX)	7	0	7	Yes
<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
Trichloroethene	7	1	6	Yes
Trichlorofluoromethane	7	7	0	No
Vanadium	7	7	0	No
Vinyl Acetate	7	7	0	No
Zinc	7	3	4	Yes

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 tolerance interval tests that were calculated using historical background and presented in Attachment D1. The statistician qualification statement is presented in Attachment D3. For the UCRS, URGAs, and LRGA, the test was applied to 27, 29, and 28 parameters, respectively, including those listed in bold print in Exhibits D.3, D.4, and D.5, which includes those constituents (beta activity and trichloroethene) that exceeded their MCL. A summary of exceedances when compared to statistically derived historical upgradient background by well number is shown in Exhibit D.6.

UCRS

This quarter's results identified exceedances of historical background UTL for oxidation-reduction potential, sulfate, and technetium-99.

URGA

This quarter's results identified exceedances of historical background UTL for beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, oxidation-reduction potential, sulfate, and technetium-99.

LRGA

This quarter's results identified exceedances of historical background UTL for beta activity, calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, oxidation-reduction potential, sulfate, 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 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
MW386: Oxidation-reduction potential	MW220: Oxidation-reduction potential, sulfate	MW370: Beta activity, oxidation-reduction potential, sulfate, technetium-99
MW390: Oxidation-reduction potential, sulfate, technetium-99	MW221: Oxidation-reduction potential	MW373: Calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, oxidation-reduction potential, sulfate
MW393: Oxidation-reduction potential	MW222: Oxidation-reduction potential	MW385: Beta activity, oxidation-reduction potential, sulfate, technetium-99
MW396: Oxidation-reduction potential	MW223: Oxidation-reduction potential, sulfate	MW388: Oxidation-reduction potential, sulfate, technetium-99
	MW224: Oxidation-reduction potential	MW392: Oxidation-reduction potential, sulfate
	MW369: Beta activity, oxidation-reduction potential, technetium-99	MW395: Chemical oxygen demand (COD), oxidation-reduction potential
	MW372: Beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, sulfate, technetium-99	MW397: Chemical oxygen demand (COD), oxidation-reduction potential
	MW384: Beta activity, oxidation-reduction potential, sulfate, technetium-99	
	MW387: Beta activity, chemical oxygen demand (COD), dissolved solids, magnesium, oxidation-reduction potential, sulfate, technetium-99	
	MW391: Oxidation-reduction potential, sulfate	
	MW394: Oxidation-reduction potential	

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

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Aluminum	Tolerance Interval	0.57	No exceedance of statistically derived historical background concentration.
Antimony	Tolerance Interval	1.68	No exceedance of statistically derived historical background concentration.
Boron	Tolerance Interval	1.28	No exceedance of statistically derived historical background concentration.
Bromide	Tolerance Interval	0.24	No exceedance of statistically derived historical background concentration.
Calcium	Tolerance Interval	0.20	No exceedance of statistically derived historical background concentration.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.02	No exceedance of statistically derived historical background concentration.
Chloride	Tolerance Interval	0.05	No exceedance of statistically derived historical background concentration.
Cobalt	Tolerance Interval	1.34	No exceedance of statistically derived historical background concentration.
Conductivity	Tolerance Interval	0.12	No exceedance of statistically derived historical background concentration.
Copper	Tolerance Interval	0.48	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	1.20	No exceedance of statistically derived historical background concentration.
Dissolved Solids	Tolerance Interval	0.19	No exceedance of statistically derived historical background concentration.
Iodide	Tolerance Interval	0.13	No exceedance of statistically derived historical background concentration.
Iron	Tolerance Interval	0.48	No exceedance of statistically derived historical background concentration.
Magnesium	Tolerance Interval	0.20	No exceedance of statistically derived historical background concentration.

Exhibit D.7. Test Summaries for Qualified Parameters for Historical Background—UCRS (Continued)

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Manganese	Tolerance Interval	0.46	No exceedance of statistically derived historical background concentration.
Molybdenum	Tolerance Interval	1.51	No exceedance of statistically derived historical background concentration.
Nickel	Tolerance Interval	1.27	No exceedance of statistically derived historical background concentration.
Oxidation-Reduction Potential	Tolerance Interval	4.77	Current results exceed statistically derived historical background concentration in MW386, MW390, MW393, and MW396.
pH	Tolerance Interval	0.05	No exceedance of statistically derived historical background concentration.
Potassium	Tolerance Interval	0.28	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.30	No exceedance of statistically derived historical background concentration.
Sulfate	Tolerance Interval	0.40	Current results exceed statistically derived historical background concentration in MW390.
Technetium-99	Tolerance Interval	0.86	Current results exceed statistically derived historical background concentration in MW390.
Total Organic Carbon (TOC)	Tolerance Interval	0.47	No exceedance of statistically derived historical background concentration.
Total Organic Halides (TOX)	Tolerance Interval	0.38	No exceedance of statistically derived historical background concentration.
Zinc	Tolerance Interval	0.79	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

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Acetone	Tolerance Interval	0.10	No exceedance of statistically derived historical background concentration.
Aluminum	Tolerance Interval	0.28	No exceedance of statistically derived historical background concentration.
Antimony	Tolerance Interval	2.27	No exceedance of statistically derived historical background concentration.
Beta Activity ¹	Tolerance Interval	0.97	Current results exceed statistically derived historical background concentrations in MW369, MW372, MW384, and MW387.
Boron	Tolerance Interval	1.45	No exceedance of statistically derived historical background concentration.
Bromide	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Calcium	Tolerance Interval	0.17	Current results exceed statistically derived historical background concentrations in MW372.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.00	Current results exceed statistically derived historical background concentrations in MW372 and MW387.
Chloride	Tolerance Interval	0.23	No exceedance of statistically derived historical background concentration.
Cobalt	Tolerance Interval	2.44	No exceedance of statistically derived historical background concentration.
Conductivity	Tolerance Interval	0.28	No exceedance of statistically derived historical background concentration.
Copper	Tolerance Interval	0.43	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.50	No exceedance of statistically derived historical background concentration.
Dissolved Solids	Tolerance Interval	0.12	Current results exceed statistically derived historical background concentration in MW372 and MW387.
Iron	Tolerance Interval	1.17	No exceedance of statistically derived historical background concentration.
Magnesium	Tolerance Interval	0.16	Current results exceed statistically derived historical background concentration in MW372 and MW387.

Exhibit D.8. Test Summaries for Qualified Parameters for Historical Background—URGA (Continued)

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Manganese	Tolerance Interval	2.16	No exceedance of statistically derived historical background concentration.
Molybdenum	Tolerance Interval	1.26	No exceedance of statistically derived historical background concentration.
Nickel	Tolerance Interval	1.79	No exceedance of statistically derived historical background concentration.
Oxidation-Reduction Potential	Tolerance Interval	0.48	Current results exceed statistically derived historical background concentration in MW220, MW221, MW222, MW223, MW224, MW369, MW384, MW387, MW391, and MW394.
pH	Tolerance Interval	0.05	No exceedance of statistically derived historical background concentration.
Potassium	Tolerance Interval	1.40	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.24	No exceedance of statistically derived historical background concentration.
Sulfate	Tolerance Interval	0.25	Current results exceed statistically derived historical background concentration in MW220, MW223, MW372, MW384, MW387, and MW391.
Technetium-99	Tolerance Interval	0.99	Current results exceed statistically derived historical background concentration in MW369, MW372, MW384, and MW387.
Total Organic Carbon (TOC)	Tolerance Interval	0.49	No exceedance of statistically derived historical background concentration.
Total Organic Halides (TOX)	Tolerance Interval	2.57	No exceedance of statistically derived historical background concentration.
Trichloroethene ¹	Tolerance Interval	0.95	No exceedance of statistically derived historical background concentration.
Zinc	Tolerance Interval	0.72	No exceedance of statistically derived historical background concentration.

CV: coefficient of variation

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

¹ Tolerance interval was calculated based on an MCL exceedance.

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

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Aluminum	Tolerance Interval	0.86	No exceedance of statistically derived historical background concentration.
Antimony	Tolerance Interval	1.62	No exceedance of statistically derived historical background concentration.
Beta Activity ¹	Tolerance Interval	0.36	Current results exceed statistically derived historical background concentration in MW370 and MW385.
Boron	Tolerance Interval	1.24	No exceedance of statistically derived historical background concentration.
Bromide	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Calcium	Tolerance Interval	0.50	Current results exceed statistically derived historical background concentration in MW373.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.04	Current results exceed statistically derived historical background concentration in MW373, MW395, and MW397.
Chloride	Tolerance Interval	0.23	No exceedance of statistically derived historical background concentration.
<i>cis</i> -1,2-Dichloroethene	Tolerance Interval	0.00	No exceedance of statistically derived historical background concentration.
Cobalt	Tolerance Interval	1.52	No exceedance of statistically derived historical background concentration.
Conductivity	Tolerance Interval	0.14	Current results exceed statistically derived historical background concentration in MW373.
Copper	Tolerance Interval	0.47	No exceedance of statistically derived historical background concentration.
Dissolved Oxygen	Tolerance Interval	0.52	No exceedance of statistically derived historical background concentration.
Dissolved Solids	Tolerance Interval	0.16	Current results exceed statistically derived historical background concentration in MW373.
Iron	Tolerance Interval	1.29	No exceedance of statistically derived historical background concentration.

Exhibit D.9. Test Summaries for Qualified Parameters for Historical Background—LRGA (Continued)

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Magnesium	Tolerance Interval	0.52	Current results exceed statistically derived historical background concentration in MW373.
Manganese	Tolerance Interval	1.49	No exceedance of statistically derived historical background concentration.
Nickel	Tolerance Interval	1.09	No exceedance of statistically derived historical background concentration.
Oxidation-Reduction Potential	Tolerance Interval	0.33	Current results exceed statistically derived historical background concentration in MW370, MW373, MW385, MW388, MW392, MW395, and MW397.
pH	Tolerance Interval	0.04	No exceedance of statistically derived historical background concentration.
Potassium	Tolerance Interval	0.40	No exceedance of statistically derived historical background concentration.
Sodium	Tolerance Interval	0.47	No exceedance of statistically derived historical background concentration.
Sulfate	Tolerance Interval	0.20	Current results exceed statistically derived historical background concentration in MW370, MW373, MW385, MW388, and MW392.
Technetium-99	Tolerance Interval	0.81	Current results exceed statistically derived historical background concentration in MW370, MW385, and MW388.
Total Organic Carbon (TOC)	Tolerance Interval	0.55	No exceedance of statistically derived historical background concentration.
Total Organic Halides (TOX)	Tolerance Interval	0.59	No exceedance of statistically derived historical background concentration.
Trichloroethene ¹	Tolerance Interval	0.78	No exceedance of statistically derived historical background concentration.
Zinc	Tolerance Interval	0.76	No exceedance of statistically derived historical background concentration.

CV: coefficient of variation

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

¹ Tolerance interval was calculated based on an MCL exceedance.

Discussion of Results from Current Background Comparison

For concentrations in wells in the UCRS, URGAs, and LRGA that exceeded the TL test using historical background, the concentrations were compared to the one-sided TL calculated using the most recent eight quarters of data and are presented in Attachment D2. The statistician qualification statement is presented in Attachment D3. For the UCRS, URGAs, and LRGA, the test was applied to 3, 8, and 9 parameters, respectively, because these parameter concentrations exceeded the historical background TL.

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

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

URGA	LRGA
MW369: Beta activity, technetium-99	MW370: Beta activity, sulfate, technetium-99
MW372: Beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, sulfate, technetium-99	MW373: Calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, sulfate
MW387: Beta activity, chemical oxygen demand (COD), magnesium, sulfate, technetium-99	MW388: Sulfate, technetium-99
MW391: Sulfate	MW392: Sulfate

UCRS

Because gradients in the UCRS are downward (vertical), there are no hydrogeologically downgradient UCRS wells. It should be noted; however, that the technetium-99 concentration in one UCRS well (i.e., MW390) exceeded the current TL this quarter.

URGA

This quarter's results identified current background exceedances in downgradient wells for beta activity, calcium, chemical oxygen demand (COD), dissolved solids, magnesium, sulfate, and technetium-99.

LRGA

This quarter's results identified current background exceedances in downgradient wells for beta activity, calcium, chemical oxygen demand (COD), conductivity, dissolved solids, magnesium, sulfate, and technetium-99.

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

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Oxidation-Reduction Potential	Tolerance Interval	0.29	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	0.77	None of the test wells exceeded the upper TL, which is evidence that concentrations in these wells are not different from current background concentrations to a statistically significant level.
Technetium-99	Tolerance Interval	-13.21	Because gradients in UCRS wells are downward, there are no UCRS wells that are hydrogeologically downgradient of the landfill; however, MW390 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.

CV: coefficient of variation

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

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

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Beta Activity	Tolerance Interval	0.80	MW369, MW372, MW384, and MW387 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Calcium	Tolerance Interval	0.16	MW372 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.41	MW372 and MW387 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Dissolved Solids	Tolerance Interval	0.32	MW372 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Magnesium	Tolerance Interval	0.12	MW372 and MW387 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Oxidation-Reduction Potential	Tolerance Interval	0.18	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	0.36	MW372, MW387, and MW391 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Technetium-99	Tolerance Interval	0.59	MW369, MW372, MW384, and MW387 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.

CV: coefficient of variation

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

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

Parameter	Performed Test	CV Normality Test*	Results of Tolerance Interval Test Conducted
Beta Activity	Tolerance Interval	0.40	MW370 and MW385 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Calcium	Tolerance Interval	0.19	MW373 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Chemical Oxygen Demand (COD)	Tolerance Interval	0.56	MW373 and MW397 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Conductivity	Tolerance Interval	0.09	MW373 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Dissolved Solids	Tolerance Interval	0.22	MW373 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Magnesium	Tolerance Interval	0.19	MW373 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Oxidation-Reduction Potential	Tolerance Interval	0.21	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	0.05	MW370, MW373, MW385, MW388, and MW392 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.
Technetium-99	Tolerance Interval	0.50	MW370, MW385, and MW388 exceeded the upper TL, which is evidence of elevated concentration with respect to current background data.

CV: coefficient of variation

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

ATTACHMENT D1

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

THIS PAGE INTENTIONALLY LEFT BLANK

C-746-S/T Third Quarter 2019 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**= 0.320 **S**= 0.182 **CV(1)**=0.567 **K factor****= 3.188 **TL(1)**= 0.900 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= -1.259 **S**= 0.503 **CV(2)**=-0.400 **K factor****= 3.188 **TL(2)**= 0.345 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	0.393	-0.934
9/16/2002	0.2	-1.609
10/16/2002	0.2	-1.609
1/13/2003	0.501	-0.691
4/8/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/14/2004	0.668	-0.403

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	No	0.05	N/A	-2.996	N/A
MW390	Downgradient	Yes	0.0484	NO	-3.028	N/A
MW393	Downgradient	Yes	0.025	NO	-3.689	N/A
MW396	Upgradient	No	0.05	N/A	-2.996	N/A

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

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-S/T Third Quarter 2019 Statistical Analysis
Antimony

Historical Background Comparison
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= 0.054	S= 0.090	CV(1)= 1.679	K factor**= 3.188	TL(1)= 0.342	LL(1)=N/A
Statistics-Transformed Background Data	X= -4.376	S= 1.708	CV(2)= -0.390	K factor**= 3.188	TL(2)= 1.068	LL(2)=N/A

Historical Background Data from
Upgradient Wells with Transformed Result

Well Number: MW396		
Date Collected	Result	LN(Result)
8/13/2002	0.2	-1.609
9/16/2002	0.2	-1.609
10/16/2002	0.005	-5.298
1/13/2003	0.005	-5.298
4/8/2003	0.005	-5.298
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/14/2004	0.005	-5.298

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	No	0.003	N/A	-5.809	N/A
MW390	Downgradient	No	0.003	N/A	-5.809	N/A
MW393	Downgradient	No	0.003	N/A	-5.809	N/A
MW396	Upgradient	Yes	0.00126	N/A	-6.677	NO

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-4

C-746-S/T Third Quarter 2019 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= 0.833	CV(1)= 1.282	K factor**= 3.188	TL(1)= 3.306	LL(1)=N/A
Statistics-Transformed Background Data	X= -1.034	S= 1.066	CV(2)=-1.031	K factor**= 3.188	TL(2)= 2.364	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396

Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	0.2	-1.609
1/13/2003	0.2	-1.609
4/8/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/14/2004	0.2	-1.609

Dry/Partially Dry Wells

Well No. Gradient

MW389 Downgradient

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW386	Sidegradient	Yes	0.0069	N/A	-4.976	NO
MW390	Downgradient	Yes	0.0208	N/A	-3.873	NO
MW393	Downgradient	Yes	0.02	N/A	-3.912	NO
MW396	Upgradient	Yes	0.00765	N/A	-4.873	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.

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-5

C-746-S/T Third Quarter 2019 Statistical Analysis	Historical Background Comparison
Bromide	UNITS: mg/L
	UCRS

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

Statistics-Background Data	X= 1.388	S= 0.327	CV(1)=0.236	K factor**= 3.188	TL(1)= 2.430	LL(1)=N/A
Statistics-Transformed Background Data	X= 0.301	S= 0.252	CV(2)=0.838	K factor**= 3.188	TL(2)= 1.105	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	1.5	0.405
9/16/2002	1.6	0.470
10/16/2002	1.6	0.470
1/13/2003	1	0.000
4/8/2003	1	0.000
7/16/2003	1	0.000
10/14/2003	1.7	0.531
1/14/2004	1.7	0.531

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.158	NO	-1.845	N/A
MW390	Downgradient	No	0.2	N/A	-1.609	N/A
MW393	Downgradient	No	0.2	N/A	-1.609	N/A
MW396	Upgradient	Yes	0.921	NO	-0.082	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-S/T Third Quarter 2019 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= 41.825	S= 8.445	CV(1)=0.202	K factor**= 3.188	TL(1)= 68.748	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.711	S= 0.241	CV(2)=0.065	K factor**= 3.188	TL(2)= 4.479	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	38.4	3.648
9/16/2002	42.9	3.759
10/16/2002	40.2	3.694
1/13/2003	46.7	3.844
4/8/2003	49.8	3.908
7/16/2003	43.3	3.768
10/14/2003	49.7	3.906
1/14/2004	23.6	3.161

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	21.1	NO	3.049	N/A
MW390	Downgradient	Yes	30.7	NO	3.424	N/A
MW393	Downgradient	Yes	13.9	NO	2.632	N/A
MW396	Upgradient	Yes	33.4	NO	3.509	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.

D1-7

C-746-S/T Third Quarter 2019 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	X= 35.375	S= 0.744	CV(1)=0.021	K factor**= 3.188	TL(1)= 37.747	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.566	S= 0.021	CV(2)=0.006	K factor**= 3.188	TL(2)= 3.632	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	36	3.584
9/16/2002	35	3.555
10/16/2002	37	3.611
1/13/2003	35	3.555
4/8/2003	35	3.555
7/16/2003	35	3.555
10/14/2003	35	3.555
1/14/2004	35	3.555

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	20.7	NO	3.030	N/A
MW390	Downgradient	Yes	18.3	NO	2.907	N/A
MW393	Downgradient	No	20	N/A	2.996	N/A
MW396	Upgradient	Yes	25.6	NO	3.243	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-S/T Third Quarter 2019 Statistical Analysis	Historical Background Comparison
Chloride	UNITS: mg/L
	UCRS

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

Statistics-Background Data	X= 101.725	S= 5.245	CV(1)=0.052	K factor**= 3.188	TL(1)= 118.447	LL(1)=N/A
Statistics-Transformed Background Data	X= 4.621	S= 0.053	CV(2)=0.011	K factor**= 3.188	TL(2)= 4.789	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	91.6	4.517
9/16/2002	98.3	4.588
10/16/2002	101.4	4.619
1/13/2003	108.3	4.685
4/8/2003	100.5	4.610
7/16/2003	102.5	4.630
10/14/2003	106.8	4.671
1/14/2004	104.4	4.648

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	14.3	NO	2.660	N/A
MW390	Downgradient	Yes	34.1	NO	3.529	N/A
MW393	Downgradient	Yes	11.8	NO	2.468	N/A
MW396	Upgradient	Yes	57.1	NO	4.045	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-S/T Third Quarter 2019 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= 0.008	S= 0.011	CV(1)= 1.340	K factor**= 3.188	TL(1)= 0.042	LL(1)=N/A
Statistics-Transformed Background Data	X= -5.645	S= 1.339	CV(2)=-0.237	K factor**= 3.188	TL(2)= -1.377	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396		
Date Collected	Result	LN(Result)
8/13/2002	0.025	-3.689
9/16/2002	0.025	-3.689
10/16/2002	0.001	-6.908
1/13/2003	0.00324	-5.732
4/8/2003	0.00436	-5.435
7/16/2003	0.00276	-5.893
10/14/2003	0.001	-6.908
1/14/2004	0.001	-6.908

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	No	0.001	N/A	-6.908	N/A
MW390	Downgradient	No	0.001	N/A	-6.908	N/A
MW393	Downgradient	No	0.001	N/A	-6.908	N/A
MW396	Upgradient	Yes	0.000371	N/A	-7.899	NO

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-10

C-746-S/T Third Quarter 2019 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= 922.500
S= 107.616
CV(1)=0.117
K factor**= 3.188
TL(1)= 1265.579
LL(1)=N/A

Statistics-Transformed Background Data

X= 6.822
S= 0.111
CV(2)=0.016
K factor**= 3.188
TL(2)= 7.175
LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396

Date Collected	Result	LN(Result)
8/13/2002	784	6.664
9/30/2002	871	6.770
10/16/2002	868	6.766
1/13/2003	912	6.816
4/8/2003	942	6.848
7/16/2003	910	6.813
10/14/2003	935	6.841
1/14/2004	1158	7.054

Dry/Partially Dry Wells

Well No. Gradient

MW389 Downgradient

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW386	Sidegradient	Yes	562	NO	6.332	N/A
MW390	Downgradient	Yes	674	NO	6.513	N/A
MW393	Downgradient	Yes	430	NO	6.064	N/A
MW396	Upgradient	Yes	706	NO	6.560	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.

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-11

C-746-S/T Third Quarter 2019 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= 0.028	S= 0.014	CV(1)=0.481	K factor**= 3.188	TL(1)= 0.072	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.650	S= 0.414	CV(2)=-0.113	K factor**= 3.188	TL(2)= -2.331	LL(2)=N/A

Historical Background Data from
Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/16/2002	0.026	-3.650
1/13/2003	0.02	-3.912
4/8/2003	0.02	-3.912
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/14/2004	0.02	-3.912

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.000452	NO	-7.702	N/A
MW390	Downgradient	Yes	0.00104	NO	-6.869	N/A
MW393	Downgradient	Yes	0.00066	NO	-7.323	N/A
MW396	Upgradient	Yes	0.00152	NO	-6.489	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-12

C-746-S/T Third Quarter 2019 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= 1.395	S= 1.677	CV(1)= 1.202	K factor**= 3.188	TL(1)= 6.743	LL(1)=N/A
Statistics-Transformed Background Data	X= -0.043	S= 0.814	CV(2)=-18.867	K factor**= 3.188	TL(2)= 2.553	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	5.45	1.696
9/16/2002	0.4	-0.916
10/16/2002	0.54	-0.616
1/13/2003	0.72	-0.329
4/8/2003	0.69	-0.371
7/16/2003	1.1	0.095
10/14/2003	0.71	-0.342
1/14/2004	1.55	0.438

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	3.66	N/A	1.297	NO
MW390	Downgradient	Yes	4.39	N/A	1.479	NO
MW393	Downgradient	Yes	1.74	N/A	0.554	NO
MW396	Upgradient	Yes	1.16	N/A	0.148	NO

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-13

C-746-S/T Third Quarter 2019 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**= 550.375 **S**= 104.330 **CV(1)**=0.190 **K factor****= 3.188 **TL(1)**= 882.980 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 6.298 **S**= 0.162 **CV(2)**=0.026 **K factor****= 3.188 **TL(2)**= 6.815 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396

Date Collected	Result	LN(Result)
8/13/2002	502	6.219
9/16/2002	506	6.227
10/16/2002	543	6.297
1/13/2003	521	6.256
4/8/2003	504	6.223
7/16/2003	532	6.277
10/14/2003	490	6.194
1/14/2004	805	6.691

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	324	NO	5.781	N/A
MW390	Downgradient	Yes	354	NO	5.869	N/A
MW393	Downgradient	Yes	193	NO	5.263	N/A
MW396	Upgradient	Yes	409	NO	6.014	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-S/T Third Quarter 2019 Statistical Analysis Historical Background Comparison

Iodide

UNITS: mg/L

UCRS

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

Statistics-Background Data **X**= 2.150 **S**= 0.283 **CV(1)**=0.132 **K factor****= 3.188 **TL(1)**= 3.052 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 0.759 **S**= 0.123 **CV(2)**=0.162 **K factor****= 3.188 **TL(2)**= 1.150 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Dry/Partially Dry Wells

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

Well Number: MW396

Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	2	0.693
1/13/2003	2	0.693
4/8/2003	2	0.693
7/16/2003	2.7	0.993
10/14/2003	2.5	0.916
1/14/2004	2	0.693

Well No.	Gradient
MW389	Downgradient

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW386	Sidegradient	No	0.5	N/A	-0.693	N/A
MW390	Downgradient	No	0.5	N/A	-0.693	N/A
MW393	Downgradient	No	0.5	N/A	-0.693	N/A
MW396	Upgradient	Yes	0.471	NO	-0.753	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-S/T Third Quarter 2019 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= 7.796 S= 3.723 CV(1)=0.478 K factor**= 3.188 TL(1)= 19.666 LL(1)=N/A

Statistics-Transformed Background Data X= 1.880 S= 0.723 CV(2)=0.384 K factor**= 3.188 TL(2)= 4.184 LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	1.8	0.588
9/16/2002	9.53	2.254
10/16/2002	7.43	2.006
1/13/2003	9.93	2.296
4/8/2003	10.2	2.322
7/16/2003	9.16	2.215
10/14/2003	11.9	2.477
1/14/2004	2.42	0.884

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.0341	NO	-3.378	N/A
MW390	Downgradient	Yes	0.0513	NO	-2.970	N/A
MW393	Downgradient	Yes	0.84	NO	-0.174	N/A
MW396	Upgradient	Yes	0.183	NO	-1.698	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-S/T Third Quarter 2019 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= 16.876	S= 3.313	CV(1)=0.196	K factor**= 3.188	TL(1)= 27.438	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.804	S= 0.240	CV(2)=0.086	K factor**= 3.188	TL(2)= 3.569	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Dry/Partially Dry Wells

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

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	15.5	2.741
9/16/2002	17.3	2.851
10/16/2002	17.8	2.879
1/13/2003	19.2	2.955
4/8/2003	17.8	2.879
7/16/2003	17.8	2.879
10/14/2003	20.2	3.006
1/14/2004	9.41	2.242

Well No.	Gradient
MW389	Downgradient

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW386	Sidegradient	Yes	9.21	NO	2.220	N/A
MW390	Downgradient	Yes	13.1	NO	2.573	N/A
MW393	Downgradient	Yes	3.57	NO	1.273	N/A
MW396	Upgradient	Yes	15	NO	2.708	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-S/T Third Quarter 2019 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**= 0.774 **S**= 0.353 **CV(1)**=0.456 **K factor****= 3.188 **TL(1)**= 1.900 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= -0.566 **S**= 1.192 **CV(2)**=-2.105 **K factor****= 3.188 **TL(2)**= 3.235 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	0.57	-0.562
9/16/2002	0.647	-0.435
10/16/2002	0.88	-0.128
1/13/2003	1.132	0.124
4/8/2003	0.965	-0.036
7/16/2003	0.983	-0.017
10/14/2003	0.984	-0.016
1/14/2004	0.0314	-3.461

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.00957	NO	-4.649	N/A
MW390	Downgradient	No	0.005	N/A	-5.298	N/A
MW393	Downgradient	Yes	0.0183	NO	-4.001	N/A
MW396	Upgradient	Yes	0.167	NO	-1.790	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-S/T Third Quarter 2019 Statistical Analysis
Molybdenum

Historical Background Comparison
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= 0.011	CV(1)= 1.507	K factor**= 3.188	TL(1)= 0.042	LL(1)=N/A
Statistics-Transformed Background Data	X= -5.928	S= 1.420	CV(2)= -0.240	K factor**= 3.188	TL(2)= -1.400	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	0.025	-3.689
9/16/2002	0.025	-3.689
10/16/2002	0.001	-6.908
1/13/2003	0.00128	-6.661
4/8/2003	0.00271	-5.911
7/16/2003	0.00117	-6.751
10/14/2003	0.001	-6.908
1/14/2004	0.001	-6.908

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.000391	N/A	-7.847	NO
MW390	Downgradient	No	0.000499	N/A	-7.603	N/A
MW393	Downgradient	No	0.001	N/A	-6.908	N/A
MW396	Upgradient	Yes	0.000394	N/A	-7.839	NO

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-19

C-746-S/T Third Quarter 2019 Statistical Analysis Historical Background Comparison

Nickel

UNITS: mg/L

UCRS

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

Statistics-Background Data X= 0.016 S= 0.021 CV(1)= 1.272 K factor**= 3.188 TL(1)= 0.083 LL(1)=N/A

Statistics-Transformed Background Data X= -4.706 S= 1.057 CV(2)= -0.225 K factor**= 3.188 TL(2)= -1.338 LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/16/2002	0.005	-5.298
1/13/2003	0.005	-5.298
4/8/2003	0.00571	-5.166
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/14/2004	0.005	-5.298

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	No	0.002	N/A	-6.215	N/A
MW390	Downgradient	Yes	0.00123	N/A	-6.701	NO
MW393	Downgradient	No	0.002	N/A	-6.215	N/A
MW396	Upgradient	Yes	0.00105	N/A	-6.859	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-S/T Third Quarter 2019 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= 13.000	S= 61.952	CV(1)=4.766	K factor**= 3.188	TL(1)= 210.502	LL(1)=N/A
Statistics-Transformed Background Data	X= 4.364	S= 0.333	CV(2)=0.076	K factor**= 3.188	TL(2)= 4.736	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396		
Date Collected	Result	LN(Result)
8/13/2002	60	4.094
4/8/2003	71	4.263
7/16/2003	-56	#Func!
10/14/2003	-54	#Func!
1/14/2004	-22	#Func!
4/12/2004	-6	#Func!
7/20/2004	-3	#Func!
10/12/2004	114	4.736

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	411	N/A	6.019	YES
MW390	Downgradient	Yes	481	N/A	6.176	YES
MW393	Downgradient	Yes	430	N/A	6.064	YES
MW396	Upgradient	Yes	415	N/A	6.028	YES

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

Conclusion of Statistical Analysis on Historical Data

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

Wells with Exceedances

MW386
MW390
MW393
MW396

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-S/T Third Quarter 2019 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= 6.460	S= 0.350	CV(1)=0.054	K factor**= 3.736	TL(1)= 7.766	LL(1)=5.1541
Statistics-Transformed Background Data	X= 1.864	S= 0.054	CV(2)=0.029	K factor**= 3.736	TL(2)= 2.067	LL(2)=1.6621

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396		
Date Collected	Result	LN(Result)
8/13/2002	6.17	1.820
9/16/2002	6.4	1.856
10/16/2002	5.9	1.775
1/13/2003	6.4	1.856
4/8/2003	6.65	1.895
7/16/2003	6.4	1.856
10/14/2003	6.71	1.904
1/14/2004	7.05	1.953

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)?
MW386	Sidegradient	Yes	6.95	NO	1.939	N/A
MW390	Downgradient	Yes	6.55	NO	1.879	N/A
MW393	Downgradient	Yes	6.45	NO	1.864	N/A
MW396	Upgradient	Yes	6.61	NO	1.889	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-22

C-746-S/T Third Quarter 2019 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= 1.411	S= 0.399	CV(1)=0.282	K factor**= 3.188	TL(1)= 2.682	LL(1)=N/A
Statistics-Transformed Background Data	X= 0.311	S= 0.271	CV(2)=0.870	K factor**= 3.188	TL(2)= 1.175	LL(2)=N/A

Historical Background Data from
Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	0.978	-0.022
1/13/2003	1.08	0.077
4/8/2003	1.12	0.113
7/16/2003	1.38	0.322
10/14/2003	1.24	0.215
1/14/2004	1.49	0.399

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.251	NO	-1.382	N/A
MW390	Downgradient	Yes	0.309	NO	-1.174	N/A
MW393	Downgradient	Yes	0.394	NO	-0.931	N/A
MW396	Upgradient	Yes	0.813	NO	-0.207	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-S/T Third Quarter 2019 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**= 106.825 **S**= 32.041 **CV(1)**=0.300 **K factor****= 3.188 **TL(1)**= 208.973 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 4.595 **S**= 0.492 **CV(2)**=0.107 **K factor****= 3.188 **TL(2)**= 6.163 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	115	4.745
9/16/2002	116	4.754
10/16/2002	117	4.762
1/13/2003	122	4.804
4/8/2003	106	4.663
7/16/2003	117	4.762
10/14/2003	132	4.883
1/14/2004	29.6	3.388

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	87.5	NO	4.472	N/A
MW390	Downgradient	Yes	98.5	NO	4.590	N/A
MW393	Downgradient	Yes	77.1	NO	4.345	N/A
MW396	Upgradient	Yes	100	NO	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. D1-24

C-746-S/T Third Quarter 2019 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= 22.463	S= 8.876	CV(1)=0.395	K factor**= 3.188	TL(1)= 50.759	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.054	S= 0.351	CV(2)=0.115	K factor**= 3.188	TL(2)= 4.173	LL(2)=N/A

Historical Background Data from
Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	41.9	3.735
9/16/2002	26.3	3.270
10/16/2002	20.6	3.025
1/13/2003	16.6	2.809
4/8/2003	23.9	3.174
7/16/2003	18.8	2.934
10/14/2003	12.9	2.557
1/14/2004	18.7	2.929

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	45.9	NO	3.826	N/A
MW390	Downgradient	Yes	51.3	YES	3.938	N/A
MW393	Downgradient	Yes	19.3	NO	2.960	N/A
MW396	Upgradient	Yes	27.7	NO	3.321	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

MW390

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.

D1-25

C-746-S/T Third Quarter 2019 Statistical Analysis
Historical Background Comparison

Technetium-99
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 = 7.624	S = 6.558	CV(1) =0.860	K factor** = 3.188	TL(1) = 28.531	LL(1) =N/A
Statistics-Transformed Background Data	X = 1.498	S = 1.321	CV(2) =0.882	K factor** = 3.188	TL(2) = 5.710	LL(2) =N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW396		
Date Collected	Result	LN(Result)
8/13/2002	16.7	2.815
9/16/2002	6.39	1.855
10/16/2002	4.55	1.515
1/13/2003	16.5	2.803
4/8/2003	3.04	1.112
7/16/2003	0.354	-1.038
10/14/2003	11.9	2.477
1/14/2004	1.56	0.445

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	No	-2.04	N/A	#Error	N/A
MW390	Downgradient	Yes	55.6	YES	4.018	N/A
MW393	Downgradient	No	0.305	N/A	-1.187	N/A
MW396	Upgradient	No	-0.714	N/A	#Error	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
 MW390

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.**

D1-26

C-746-S/T Third Quarter 2019 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= 9.988	S= 4.696	CV(1)=0.470	K factor**= 3.188	TL(1)= 24.959	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.210	S= 0.454	CV(2)=0.205	K factor**= 3.188	TL(2)= 3.657	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	19	2.944
9/16/2002	14.6	2.681
10/16/2002	10.4	2.342
1/13/2003	4.4	1.482
4/8/2003	7	1.946
7/16/2003	7.3	1.988
10/14/2003	9.1	2.208
1/14/2004	8.1	2.092

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	3.93	NO	1.369	N/A
MW390	Downgradient	Yes	2.65	NO	0.975	N/A
MW393	Downgradient	Yes	2.42	NO	0.884	N/A
MW396	Upgradient	Yes	4.45	NO	1.493	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.

D1-27

C-746-S/T Third Quarter 2019 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**= 142.650 **S**= 53.533 **CV(1)**=0.375 **K factor****= 3.188 **TL(1)**= 313.314 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 4.896 **S**= 0.390 **CV(2)**=0.080 **K factor****= 3.188 **TL(2)**= 6.138 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	193	5.263
9/16/2002	190	5.247
10/16/2002	221	5.398
1/13/2003	106	4.663
4/8/2003	77.8	4.354
7/16/2003	122	4.804
10/14/2003	86.4	4.459
1/14/2004	145	4.977

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	104	NO	4.644	N/A
MW390	Downgradient	Yes	28	NO	3.332	N/A
MW393	Downgradient	Yes	13	NO	2.565	N/A
MW396	Upgradient	Yes	55.5	NO	4.016	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-S/T Third Quarter 2019 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= 0.044	S= 0.035	CV(1)=0.786	K factor**= 3.188	TL(1)= 0.156	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.342	S= 0.682	CV(2)=-0.204	K factor**= 3.188	TL(2)= -1.168	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number:	MW396	
Date Collected	Result	LN(Result)
8/13/2002	0.1	-2.303
9/16/2002	0.1	-2.303
10/16/2002	0.025	-3.689
1/13/2003	0.035	-3.352
4/8/2003	0.035	-3.352
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/14/2004	0.02	-3.912

Dry/Partially Dry Wells

Well No.	Gradient
MW389	Downgradient

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)
MW386	Sidegradient	Yes	0.00358	NO	-5.632	N/A
MW390	Downgradient	Yes	0.00497	NO	-5.304	N/A
MW393	Downgradient	No	0.0044	N/A	-5.426	N/A
MW396	Upgradient	Yes	0.00689	NO	-4.978	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, http://www.itl.nist.gov/div898/handbook/,2009.
D1-29

C-746-S/T Third Quarter 2019 Statistical Analysis Historical Background Comparison**Acetone****UNITS: ug/L****URGA**

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

Statistics-Background Data **X**= 10.250 **S**= 1.000 **CV(1)**=0.098 **K factor****= 2.523 **TL(1)**= 12.773 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 2.324 **S**= 0.084 **CV(2)**=0.036 **K factor****= 2.523 **TL(2)**= 2.536 **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: MW220

Date Collected	Result	LN(Result)
10/14/2002	10	2.303
1/15/2003	10	2.303
4/10/2003	10	2.303
7/14/2003	10	2.303
10/13/2003	10	2.303
4/13/2004	10	2.303
7/21/2004	10	2.303
10/11/2004	10	2.303

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	10	2.303
9/30/2002	10	2.303
10/16/2002	10	2.303
1/13/2003	10	2.303
4/10/2003	10	2.303
7/16/2003	10	2.303
10/14/2003	14	2.639
4/12/2004	10	2.303

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	No	5	N/A	1.609	N/A
MW221	Sidegradient	No	5	N/A	1.609	N/A
MW222	Sidegradient	No	5	N/A	1.609	N/A
MW223	Sidegradient	No	5	N/A	1.609	N/A
MW224	Sidegradient	Yes	2.79	NO	1.026	N/A
MW369	Downgradient	No	5	N/A	1.609	N/A
MW372	Downgradient	No	5	N/A	1.609	N/A
MW384	Sidegradient	No	5	N/A	1.609	N/A
MW387	Downgradient	No	5	N/A	1.609	N/A
MW391	Downgradient	No	5	N/A	1.609	N/A
MW394	Upgradient	Yes	1.8	NO	0.588	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-S/T Third Quarter 2019 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= 0.221 S= 0.061 CV(1)=0.277 K factor**= 2.523 TL(1)= 0.376 LL(1)=N/A

Statistics-Transformed Background Data X= -1.534 S= 0.212 CV(2)=-0.138 K factor**= 2.523 TL(2)= -0.999 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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.2	-1.609
1/15/2003	0.2	-1.609
4/10/2003	0.2	-1.609
7/14/2003	0.2	-1.609
10/13/2003	0.427	-0.851
1/13/2004	0.309	-1.174
4/13/2004	0.2	-1.609
7/21/2004	0.202	-1.599

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	0.2	-1.609
9/16/2002	0.2	-1.609
10/16/2002	0.2	-1.609
1/13/2003	0.2	-1.609
4/10/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/13/2004	0.2	-1.609

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	No	0.05	N/A	-2.996	N/A
MW221	Sidegradient	No	0.05	N/A	-2.996	N/A
MW222	Sidegradient	No	0.05	N/A	-2.996	N/A
MW223	Sidegradient	No	0.05	N/A	-2.996	N/A
MW224	Sidegradient	No	0.05	N/A	-2.996	N/A
MW369	Downgradient	Yes	0.0609	NO	-2.799	N/A
MW372	Downgradient	No	0.05	N/A	-2.996	N/A
MW384	Sidegradient	No	0.05	N/A	-2.996	N/A
MW387	Downgradient	No	0.05	N/A	-2.996	N/A
MW391	Downgradient	Yes	0.0233	NO	-3.759	N/A
MW394	Upgradient	No	0.05	N/A	-2.996	N/A

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

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-S/T Third Quarter 2019 Statistical Analysis

Historical Background Comparison

Antimony

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= 0.029	S= 0.067	CV(1)=2.267	K factor**= 2.523	TL(1)= 0.197	LL(1)=N/A
Statistics-Transformed Background Data	X= -4.837	S= 1.260	CV(2)=-0.260	K factor**= 2.523	TL(2)= -1.658	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.005	-5.298
1/15/2003	0.005	-5.298
4/10/2003	0.005	-5.298
7/14/2003	0.005	-5.298
10/13/2003	0.005	-5.298
1/13/2004	0.005	-5.298
4/13/2004	0.005	-5.298
7/21/2004	0.005	-5.298

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	0.2	-1.609
9/16/2002	0.2	-1.609
10/16/2002	0.005	-5.298
1/13/2003	0.005	-5.298
4/10/2003	0.005	-5.298
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/13/2004	0.005	-5.298

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	No	0.003	N/A	-5.809	N/A
MW221	Sidegradient	No	0.003	N/A	-5.809	N/A
MW222	Sidegradient	No	0.003	N/A	-5.809	N/A
MW223	Sidegradient	No	0.003	N/A	-5.809	N/A
MW224	Sidegradient	No	0.003	N/A	-5.809	N/A
MW369	Downgradient	No	0.003	N/A	-5.809	N/A
MW372	Downgradient	No	0.003	N/A	-5.809	N/A
MW384	Sidegradient	No	0.003	N/A	-5.809	N/A
MW387	Downgradient	Yes	0.00126	N/A	-6.677	NO
MW391	Downgradient	No	0.003	N/A	-5.809	N/A
MW394	Upgradient	No	0.003	N/A	-5.809	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-32

C-746-S/T Third Quarter 2019 Statistical Analysis Historical Background Comparison

Beta activity

UNITS: pCi/L

URGA

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

Statistics-Background Data **X=** 14.273 **S=** 13.883 **CV(1)=**0.973 **K factor**=** 2.523 **TL(1)=** 49.300 **LL(1)=**N/A

Statistics-Transformed Background Data **X=** 2.213 **S=** 1.033 **CV(2)=**0.467 **K factor**=** 2.523 **TL(2)=** 4.819 **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: MW220

Date Collected	Result	LN(Result)
10/14/2002	15.2	2.721
1/15/2003	42.5	3.750
4/10/2003	45.4	3.816
7/14/2003	8.53	2.144
10/13/2003	11.7	2.460
1/13/2004	13.5	2.603
4/13/2004	33.5	3.512
7/21/2004	13.7	2.617

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	5.03	1.615
9/16/2002	5.57	1.717
10/16/2002	12.8	2.549
1/13/2003	4.3	1.459
4/10/2003	9.52	2.253
7/16/2003	3.92	1.366
10/14/2003	1.06	0.058
1/13/2004	2.14	0.761

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	12.7	N/A	2.542	N/A
MW221	Sidegradient	No	-0.797	N/A	#Error	N/A
MW222	Sidegradient	No	3.18	N/A	1.157	N/A
MW223	Sidegradient	No	-2	N/A	#Error	N/A
MW224	Sidegradient	No	9.14	N/A	2.213	N/A
MW369	Downgradient	Yes	120	YES	4.787	N/A
MW372	Downgradient	Yes	141	YES	4.949	N/A
MW384	Sidegradient	Yes	83.6	YES	4.426	N/A
MW387	Downgradient	Yes	145	YES	4.977	N/A
MW391	Downgradient	No	4.97	N/A	1.603	N/A
MW394	Upgradient	No	10.3	N/A	2.332	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

MW369
MW372
MW384
MW387

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-S/T Third Quarter 2019 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= 0.425	S= 0.615	CV(1)= 1.447	K factor**= 2.523	TL(1)= 1.976	LL(1)=N/A
Statistics-Transformed Background Data	X= -1.322	S= 0.786	CV(2)= -0.595	K factor**= 2.523	TL(2)= 0.663	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.2	-1.609
1/15/2003	0.2	-1.609
4/10/2003	0.2	-1.609
7/14/2003	0.2	-1.609
10/13/2003	0.2	-1.609
1/13/2004	0.2	-1.609
4/13/2004	0.2	-1.609
7/21/2004	0.2	-1.609

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	0.2	-1.609
1/13/2003	0.2	-1.609
4/10/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/13/2004	0.2	-1.609

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.00865	N/A	-4.750	NO
MW221	Sidegradient	Yes	0.0136	N/A	-4.298	NO
MW222	Sidegradient	Yes	0.00865	N/A	-4.750	NO
MW223	Sidegradient	Yes	0.00907	N/A	-4.703	NO
MW224	Sidegradient	Yes	0.0158	N/A	-4.148	NO
MW369	Downgradient	Yes	0.0168	N/A	-4.086	NO
MW372	Downgradient	Yes	0.889	N/A	-0.118	NO
MW384	Sidegradient	Yes	0.075	N/A	-2.590	NO
MW387	Downgradient	Yes	0.0361	N/A	-3.321	NO
MW391	Downgradient	Yes	0.118	N/A	-2.137	NO
MW394	Upgradient	Yes	0.0188	N/A	-3.974	NO

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-34

C-746-S/T Third Quarter 2019 Statistical Analysis

Historical Background Comparison

Bromide

UNITS: mg/L

URGA

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

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

Historical Background Data from Upgradient Wells with Transformed Result

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

Well Number: MW220

Date Collected	Result	LN(Result)
10/14/2002	1	0.000
1/15/2003	1	0.000
4/10/2003	1	0.000
7/14/2003	1	0.000
10/13/2003	1	0.000
1/13/2004	1	0.000
4/13/2004	1	0.000
7/21/2004	1	0.000

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	1	0.000
9/16/2002	1	0.000
10/16/2002	1	0.000
1/13/2003	1	0.000
4/10/2003	1	0.000
7/16/2003	1	0.000
10/14/2003	1	0.000
1/13/2004	1	0.000

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.204	NO	-1.590	N/A
MW221	Sidegradient	Yes	0.437	NO	-0.828	N/A
MW222	Sidegradient	Yes	0.41	NO	-0.892	N/A
MW223	Sidegradient	Yes	0.373	NO	-0.986	N/A
MW224	Sidegradient	Yes	0.432	NO	-0.839	N/A
MW369	Downgradient	Yes	0.366	NO	-1.005	N/A
MW372	Downgradient	Yes	0.576	NO	-0.552	N/A
MW384	Sidegradient	Yes	0.316	NO	-1.152	N/A
MW387	Downgradient	Yes	0.525	NO	-0.644	N/A
MW391	Downgradient	Yes	0.576	NO	-0.552	N/A
MW394	Upgradient	Yes	0.567	NO	-0.567	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 = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

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

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

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

C-746-S/T Third Quarter 2019 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= 27.638	S= 4.743	CV(1)=0.172	K factor**= 2.523	TL(1)= 39.604	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.304	S= 0.183	CV(2)=0.055	K factor**= 2.523	TL(2)= 3.765	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
10/14/2002	23.6	3.161
1/15/2003	25.9	3.254
4/10/2003	30.4	3.414
7/14/2003	33.9	3.523
10/13/2003	21.3	3.059
1/13/2004	20.3	3.011
4/13/2004	23.8	3.170
7/21/2004	19	2.944

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	29.5	3.384
9/16/2002	29.9	3.398
10/16/2002	31.2	3.440
1/13/2003	30.7	3.424
4/10/2003	34.4	3.538
7/16/2003	29.6	3.388
10/14/2003	30.3	3.411
1/13/2004	28.4	3.346

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	25.4	NO	3.235	N/A
MW221	Sidegradient	Yes	23.3	NO	3.148	N/A
MW222	Sidegradient	Yes	19.6	NO	2.976	N/A
MW223	Sidegradient	Yes	23.2	NO	3.144	N/A
MW224	Sidegradient	Yes	26.9	NO	3.292	N/A
MW369	Downgradient	Yes	17.7	NO	2.874	N/A
MW372	Downgradient	Yes	49.7	YES	3.906	N/A
MW384	Sidegradient	Yes	25.8	NO	3.250	N/A
MW387	Downgradient	Yes	37.3	NO	3.619	N/A
MW391	Downgradient	Yes	31.3	NO	3.444	N/A
MW394	Upgradient	Yes	25.4	NO	3.235	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

Wells with Exceedances
MW372

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

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

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

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.

D1-36

C-746-S/T Third Quarter 2019 Statistical Analysis
Chemical Oxygen Demand (COD)

Historical Background Comparison
UNITS: mg/L
URGA

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

Statistics-Background Data	X= 35.000	S= 0.000	CV(1)=0.000	K factor**= 2.523	TL(1)= 35.000	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.555	S= 0.000	CV(2)=0.000	K factor**= 2.523	TL(2)= 3.555	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
10/14/2002	35	3.555
1/15/2003	35	3.555
4/10/2003	35	3.555
7/14/2003	35	3.555
10/13/2003	35	3.555
1/13/2004	35	3.555
4/13/2004	35	3.555
7/21/2004	35	3.555

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	35	3.555
9/16/2002	35	3.555
10/16/2002	35	3.555
1/13/2003	35	3.555
4/10/2003	35	3.555
7/16/2003	35	3.555
10/14/2003	35	3.555
1/13/2004	35	3.555

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	15.9	NO	2.766	N/A
MW221	Sidegradient	Yes	23.2	NO	3.144	N/A
MW222	Sidegradient	Yes	20.7	NO	3.030	N/A
MW223	Sidegradient	Yes	11	NO	2.398	N/A
MW224	Sidegradient	Yes	11	NO	2.398	N/A
MW369	Downgradient	No	20	N/A	2.996	N/A
MW372	Downgradient	Yes	69.4	YES	4.240	N/A
MW384	Sidegradient	Yes	18.3	NO	2.907	N/A
MW387	Downgradient	Yes	52.4	YES	3.959	N/A
MW391	Downgradient	Yes	31	NO	3.434	N/A
MW394	Upgradient	Yes	18.3	NO	2.907	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
MW387

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-37

C-746-S/T Third Quarter 2019 Statistical Analysis	Historical Background Comparison
Chloride	UNITS: mg/L
	URGA

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

Statistics-Background Data	X= 49.044	S= 11.278	CV(1)=0.230	K factor**= 2.523	TL(1)= 77.499	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.866	S= 0.244	CV(2)=0.063	K factor**= 2.523	TL(2)= 4.482	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	44.6	3.798
1/15/2003	43.2	3.766
4/10/2003	31.5	3.450
7/14/2003	30.8	3.428
10/13/2003	40.9	3.711
1/13/2004	40.8	3.709
4/13/2004	37.5	3.624
7/21/2004	40.8	3.709

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	60.4	4.101
9/16/2002	60.3	4.099
10/16/2002	58	4.060
1/13/2003	60.7	4.106
4/10/2003	62.9	4.142
7/16/2003	58.1	4.062
10/14/2003	58.2	4.064
1/13/2004	56	4.025

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	18.8	NO	2.934	N/A
MW221	Sidegradient	Yes	31.9	NO	3.463	N/A
MW222	Sidegradient	Yes	30.3	NO	3.411	N/A
MW223	Sidegradient	Yes	27.5	NO	3.314	N/A
MW224	Sidegradient	Yes	33.3	NO	3.506	N/A
MW369	Downgradient	Yes	31.6	NO	3.453	N/A
MW372	Downgradient	Yes	44.8	NO	3.802	N/A
MW384	Sidegradient	Yes	32.1	NO	3.469	N/A
MW387	Downgradient	Yes	40.5	NO	3.701	N/A
MW391	Downgradient	Yes	42.9	NO	3.759	N/A
MW394	Upgradient	Yes	42.5	NO	3.750	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-S/T Third Quarter 2019 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= 0.016	S= 0.040	CV(1)=2.440	K factor**= 2.523	TL(1)= 0.116	LL(1)=N/A
Statistics-Transformed Background Data	X= -5.582	S= 1.573	CV(2)=-0.282	K factor**= 2.523	TL(2)= -1.613	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.0041	-5.497
1/15/2003	0.00496	-5.306
4/10/2003	0.00289	-5.846
7/14/2003	0.161	-1.826
10/13/2003	0.0226	-3.790
1/13/2004	0.00464	-5.373
4/13/2004	0.001	-6.908
7/21/2004	0.00264	-5.937

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	0.025	-3.689
9/16/2002	0.025	-3.689
10/16/2002	0.001	-6.908
1/13/2003	0.001	-6.908
4/10/2003	0.001	-6.908
7/16/2003	0.001	-6.908
10/14/2003	0.001	-6.908
1/13/2004	0.001	-6.908

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result > TL(1)?	LN(Result)	LN(Result) > TL(2)
MW220	Upgradient	No	0.001	N/A	-6.908	N/A
MW221	Sidegradient	No	0.001	N/A	-6.908	N/A
MW222	Sidegradient	Yes	0.000369	N/A	-7.905	NO
MW223	Sidegradient	Yes	0.000358	N/A	-7.935	NO
MW224	Sidegradient	No	0.001	N/A	-6.908	N/A
MW369	Downgradient	Yes	0.00539	N/A	-5.223	NO
MW372	Downgradient	No	0.001	N/A	-6.908	N/A
MW384	Sidegradient	No	0.001	N/A	-6.908	N/A
MW387	Downgradient	No	0.001	N/A	-6.908	N/A
MW391	Downgradient	No	0.001	N/A	-6.908	N/A
MW394	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.

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-S/T Third Quarter 2019 Statistical Analysis
Historical Background Comparison

Conductivity
UNITS: umho/cm
URGA

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

Statistics-Background Data	X= 382.132	S= 107.134	CV(1)= 0.280	K factor**= 2.523	TL(1)= 652.432	LL(1)= N/A
Statistics-Transformed Background Data	X= 5.716	S= 1.164	CV(2)= 0.204	K factor**= 2.523	TL(2)= 8.652	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	368	5.908
1/15/2003	433.2	6.071
4/10/2003	489	6.192
7/14/2003	430	6.064
10/13/2003	346	5.846
1/13/2004	365	5.900
4/13/2004	416	6.031
7/21/2004	353	5.866

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	406	6.006
9/16/2002	418	6.035
10/16/2002	411	6.019
1/13/2003	422	6.045
4/10/2003	420	6.040
7/16/2003	438	6.082
10/14/2003	3.91	1.364
1/13/2004	395	5.979

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	377	NO	5.932	N/A
MW221	Sidegradient	Yes	380	NO	5.940	N/A
MW222	Sidegradient	Yes	362	NO	5.892	N/A
MW223	Sidegradient	Yes	390	NO	5.966	N/A
MW224	Sidegradient	Yes	425	NO	6.052	N/A
MW369	Downgradient	Yes	373	NO	5.922	N/A
MW372	Downgradient	Yes	640	NO	6.461	N/A
MW384	Sidegradient	Yes	447	NO	6.103	N/A
MW387	Downgradient	Yes	539	NO	6.290	N/A
MW391	Downgradient	Yes	468	NO	6.148	N/A
MW394	Upgradient	Yes	370	NO	5.914	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-40

C-746-S/T Third Quarter 2019 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= 0.024	S= 0.010	CV(1)=0.429	K factor**= 2.523	TL(1)= 0.050	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.794	S= 0.312	CV(2)=-0.082	K factor**= 2.523	TL(2)= -3.007	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.0211	-3.858
1/15/2003	0.02	-3.912
4/10/2003	0.02	-3.912
7/14/2003	0.02	-3.912
10/13/2003	0.02	-3.912
1/13/2004	0.02	-3.912
4/13/2004	0.02	-3.912
7/21/2004	0.02	-3.912

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/16/2002	0.02	-3.912
1/13/2003	0.02	-3.912
4/10/2003	0.02	-3.912
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/13/2004	0.02	-3.912

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.000714	NO	-7.245	N/A
MW221	Sidegradient	Yes	0.00065	NO	-7.339	N/A
MW222	Sidegradient	Yes	0.000367	NO	-7.910	N/A
MW223	Sidegradient	Yes	0.000685	NO	-7.286	N/A
MW224	Sidegradient	No	0.002	N/A	-6.215	N/A
MW369	Downgradient	Yes	0.00121	NO	-6.717	N/A
MW372	Downgradient	Yes	0.00064	NO	-7.354	N/A
MW384	Sidegradient	Yes	0.000608	NO	-7.405	N/A
MW387	Downgradient	Yes	0.000593	NO	-7.430	N/A
MW391	Downgradient	Yes	0.00048	NO	-7.642	N/A
MW394	Upgradient	Yes	0.000338	NO	-7.992	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-S/T Third Quarter 2019 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= 3.784	S= 1.887	CV(1)=0.499	K factor**= 2.523	TL(1)= 8.545	LL(1)=N/A
Statistics-Transformed Background Data	X= 1.182	S= 0.612	CV(2)=0.518	K factor**= 2.523	TL(2)= 2.727	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	6.79	1.915
1/15/2003	7.25	1.981
4/10/2003	3.6	1.281
7/14/2003	0.94	-0.062
10/13/2003	1.65	0.501
1/13/2004	3.48	1.247
4/13/2004	1.05	0.049
7/21/2004	4.46	1.495

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	6.09	1.807
9/16/2002	3.85	1.348
10/16/2002	5.11	1.631
1/13/2003	3.83	1.343
4/10/2003	4.15	1.423
7/16/2003	1.83	0.604
10/14/2003	3.33	1.203
1/13/2004	3.14	1.144

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	4.69	NO	1.545	N/A
MW221	Sidegradient	Yes	3.96	NO	1.376	N/A
MW222	Sidegradient	Yes	3.61	NO	1.284	N/A
MW223	Sidegradient	Yes	3.13	NO	1.141	N/A
MW224	Sidegradient	Yes	2.98	NO	1.092	N/A
MW369	Downgradient	Yes	3.09	NO	1.128	N/A
MW372	Downgradient	Yes	3.63	NO	1.289	N/A
MW384	Sidegradient	Yes	3.67	NO	1.300	N/A
MW387	Downgradient	Yes	4.06	NO	1.401	N/A
MW391	Downgradient	Yes	3.63	NO	1.289	N/A
MW394	Upgradient	Yes	4.27	NO	1.452	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

C-746-S/T Third Quarter 2019 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= 232.688	S= 27.490	CV(1)=0.118	K factor**= 2.523	TL(1)= 302.045	LL(1)=N/A
Statistics-Transformed Background Data	X= 5.443	S= 0.118	CV(2)=0.022	K factor**= 2.523	TL(2)= 5.740	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

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

Well Number: MW220

Date Collected	Result	LN(Result)
10/14/2002	208	5.338
1/15/2003	257	5.549
4/10/2003	288	5.663
7/14/2003	262	5.568
10/13/2003	197	5.283
1/13/2004	198	5.288
4/13/2004	245	5.501
7/21/2004	204	5.318

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	247	5.509
9/16/2002	259	5.557
10/16/2002	201	5.303
1/13/2003	228	5.429
4/10/2003	249	5.517
7/16/2003	240	5.481
10/14/2003	230	5.438
1/13/2004	210	5.347

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	176	NO	5.170	N/A
MW221	Sidegradient	Yes	196	NO	5.278	N/A
MW222	Sidegradient	Yes	207	NO	5.333	N/A
MW223	Sidegradient	Yes	171	NO	5.142	N/A
MW224	Sidegradient	Yes	217	NO	5.380	N/A
MW369	Downgradient	Yes	194	NO	5.268	N/A
MW372	Downgradient	Yes	616	YES	6.423	N/A
MW384	Sidegradient	Yes	276	NO	5.620	N/A
MW387	Downgradient	Yes	320	YES	5.768	N/A
MW391	Downgradient	Yes	257	NO	5.549	N/A
MW394	Upgradient	Yes	167	NO	5.118	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
MW387

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-43

C-746-S/T Third Quarter 2019 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= 0.897	S= 1.050	CV(1)= 1.170	K factor**= 2.523	TL(1)= 3.545	LL(1)=N/A
Statistics-Transformed Background Data	X= -0.565	S= 0.951	CV(2)= -1.683	K factor**= 2.523	TL(2)= 1.834	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: MW220		
Date Collected	Result	LN(Result)
10/14/2002	0.2	-1.609
1/15/2003	0.2	-1.609
4/10/2003	0.429	-0.846
7/14/2003	4.33	1.466
10/13/2003	1.81	0.593
1/13/2004	0.793	-0.232
4/13/2004	0.13	-2.040
7/21/2004	0.382	-0.962
Well Number: MW394		
Date Collected	Result	LN(Result)
8/13/2002	1.34	0.293
9/16/2002	0.328	-1.115
10/16/2002	1.38	0.322
1/13/2003	1.3	0.262
4/10/2003	0.494	-0.705
7/16/2003	0.62	-0.478
10/14/2003	0.37	-0.994
1/13/2004	0.251	-1.382

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.0349	N/A	-3.355	NO
MW221	Sidegradient	No	0.1	N/A	-2.303	N/A
MW222	Sidegradient	No	0.1	N/A	-2.303	N/A
MW223	Sidegradient	No	0.1	N/A	-2.303	N/A
MW224	Sidegradient	No	0.1	N/A	-2.303	N/A
MW369	Downgradient	Yes	0.136	N/A	-1.995	NO
MW372	Downgradient	Yes	0.0634	N/A	-2.758	NO
MW384	Sidegradient	Yes	0.0571	N/A	-2.863	NO
MW387	Downgradient	Yes	0.0342	N/A	-3.376	NO
MW391	Downgradient	Yes	0.0968	N/A	-2.335	NO
MW394	Upgradient	Yes	0.0431	N/A	-3.144	NO

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-44

C-746-S/T Third Quarter 2019 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= 10.796	S= 1.703	CV(1)=0.158	K factor**= 2.523	TL(1)= 15.092	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.368	S= 0.158	CV(2)=0.067	K factor**= 2.523	TL(2)= 2.766	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	9.16	2.215
1/15/2003	10	2.303
4/10/2003	10.8	2.380
7/14/2003	14.7	2.688
10/13/2003	9.03	2.201
1/13/2004	8.49	2.139
4/13/2004	9.7	2.272
7/21/2004	8.06	2.087

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	11.8	2.468
9/16/2002	12.1	2.493
10/16/2002	11.3	2.425
1/13/2003	10.3	2.332
4/10/2003	11.7	2.460
7/16/2003	12	2.485
10/14/2003	12.2	2.501
1/13/2004	11.4	2.434

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	10	NO	2.303	N/A
MW221	Sidegradient	Yes	10.4	NO	2.342	N/A
MW222	Sidegradient	Yes	8.76	NO	2.170	N/A
MW223	Sidegradient	Yes	9.75	NO	2.277	N/A
MW224	Sidegradient	Yes	11.9	NO	2.477	N/A
MW369	Downgradient	Yes	7.51	NO	2.016	N/A
MW372	Downgradient	Yes	19.2	YES	2.955	N/A
MW384	Sidegradient	Yes	10.9	NO	2.389	N/A
MW387	Downgradient	Yes	16	YES	2.773	N/A
MW391	Downgradient	Yes	13.2	NO	2.580	N/A
MW394	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

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
MW387

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-45

C-746-S/T Third Quarter 2019 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= 0.287	S= 0.619	CV(1)=2.156	K factor**= 2.523	TL(1)= 1.848	LL(1)=N/A
Statistics-Transformed Background Data	X= -2.455	S= 1.619	CV(2)=-0.659	K factor**= 2.523	TL(2)= 1.630	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW220		
Date Collected	Result	LN(Result)
10/14/2002	0.0306	-3.487
1/15/2003	0.0291	-3.537
4/10/2003	0.0137	-4.290
7/14/2003	2.54	0.932
10/13/2003	0.378	-0.973
1/13/2004	0.159	-1.839
4/13/2004	0.00707	-4.952
7/21/2004	0.0841	-2.476
Well Number: MW394		
Date Collected	Result	LN(Result)
8/13/2002	0.542	-0.612
9/16/2002	0.155	-1.864
10/16/2002	0.103	-2.273
1/13/2003	0.128	-2.056
4/10/2003	0.005	-5.298
7/16/2003	0.272	-1.302
10/14/2003	0.0795	-2.532
1/13/2004	0.0658	-2.721

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)
MW220	Upgradient	Yes	0.00142	N/A	-6.557	NO
MW221	Sidegradient	No	0.005	N/A	-5.298	N/A
MW222	Sidegradient	Yes	0.00335	N/A	-5.699	NO
MW223	Sidegradient	Yes	0.00548	N/A	-5.207	NO
MW224	Sidegradient	Yes	0.00321	N/A	-5.741	NO
MW369	Downgradient	Yes	0.00693	N/A	-4.972	NO
MW372	Downgradient	Yes	0.00159	N/A	-6.444	NO
MW384	Sidegradient	Yes	0.00517	N/A	-5.265	NO
MW387	Downgradient	Yes	0.00516	N/A	-5.267	NO
MW391	Downgradient	Yes	0.00178	N/A	-6.331	NO
MW394	Upgradient	Yes	0.00214	N/A	-6.147	NO

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-46

C-746-S/T Third Quarter 2019 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= 0.006	S= 0.008	CV(1)= 1.261	K factor**= 2.523	TL(1)= 0.026	LL(1)=N/A
Statistics-Transformed Background Data	X= -5.747	S= 1.205	CV(2)= -0.210	K factor**= 2.523	TL(2)= -2.708	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: MW220		
Date Collected	Result	LN(Result)
10/14/2002	0.00558	-5.189
1/15/2003	0.00983	-4.622
4/10/2003	0.0109	-4.519
7/14/2003	0.00245	-6.012
10/13/2003	0.00566	-5.174
1/13/2004	0.00572	-5.164
4/13/2004	0.001	-6.908
7/21/2004	0.00392	-5.542
Well Number: MW394		
Date Collected	Result	LN(Result)
8/13/2002	0.025	-3.689
9/16/2002	0.025	-3.689
10/16/2002	0.001	-6.908
1/13/2003	0.001	-6.908
4/10/2003	0.001	-6.908
7/16/2003	0.001	-6.908
10/14/2003	0.001	-6.908
1/13/2004	0.001	-6.908

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.000643	N/A	-7.349	NO
MW221	Sidegradient	Yes	0.00197	N/A	-6.230	NO
MW222	Sidegradient	Yes	0.000344	N/A	-7.975	NO
MW223	Sidegradient	Yes	0.00459	N/A	-5.384	NO
MW224	Sidegradient	Yes	0.000327	N/A	-8.026	NO
MW369	Downgradient	No	0.001	N/A	-6.908	N/A
MW372	Downgradient	No	0.001	N/A	-6.908	N/A
MW384	Sidegradient	No	0.001	N/A	-6.908	N/A
MW387	Downgradient	No	0.001	N/A	-6.908	N/A
MW391	Downgradient	No	0.001	N/A	-6.908	N/A
MW394	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.

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-47

C-746-S/T Third Quarter 2019 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**= 0.127 **S**= 0.228 **CV(1)**= 1.790 **K factor****= 2.523 **TL(1)**= 0.701 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= -3.617 **S**= 1.837 **CV(2)**= -0.508 **K factor****= 2.523 **TL(2)**= 1.019 **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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.418	-0.872
1/15/2003	0.738	-0.304
4/10/2003	0.544	-0.609
7/14/2003	0.106	-2.244
10/13/2003	0.0529	-2.939
1/13/2004	0.0209	-3.868
4/13/2004	0.005	-5.298
7/21/2004	0.0192	-3.953

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/16/2002	0.005	-5.298
1/13/2003	0.005	-5.298
4/10/2003	0.005	-5.298
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/13/2004	0.005	-5.298

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result > TL(1)?	LN(Result)	LN(Result) > TL(2)
MW220	Upgradient	Yes	0.0125	N/A	-4.382	NO
MW221	Sidegradient	Yes	0.0212	N/A	-3.854	NO
MW222	Sidegradient	Yes	0.0496	N/A	-3.004	NO
MW223	Sidegradient	Yes	0.129	N/A	-2.048	NO
MW224	Sidegradient	Yes	0.0212	N/A	-3.854	NO
MW369	Downgradient	Yes	0.00474	N/A	-5.352	NO
MW372	Downgradient	Yes	0.00064	N/A	-7.354	NO
MW384	Sidegradient	Yes	0.000738	N/A	-7.212	NO
MW387	Downgradient	No	0.002	N/A	-6.215	N/A
MW391	Downgradient	No	0.002	N/A	-6.215	N/A
MW394	Upgradient	Yes	0.00491	N/A	-5.316	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. D1-48

C-746-S/T Third Quarter 2019 Statistical Analysis	Historical Background Comparison
Oxidation-Reduction Potential	UNITS: mV
URGA	

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

Statistics-Background Data	X= 179.872	S= 86.318	CV(1)=0.480	K factor**= 2.523	TL(1)= 397.652	LL(1)=N/A
Statistics-Transformed Background Data	X= 4.861	S= 1.252	CV(2)=0.258	K factor**= 2.523	TL(2)= 8.021	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	205	5.323
1/15/2003	1.95	0.668
4/10/2003	203	5.313
7/14/2003	30	3.401
10/13/2003	107	4.673
1/13/2004	295	5.687
4/13/2004	190	5.247
7/21/2004	319	5.765

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	90	4.500
9/16/2002	240	5.481
10/16/2002	185	5.220
1/13/2003	220	5.394
4/10/2003	196	5.278
7/16/2003	172	5.147
10/14/2003	175	5.165
1/13/2004	249	5.517

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	407	YES	6.009	N/A
MW221	Sidegradient	Yes	422	YES	6.045	N/A
MW222	Sidegradient	Yes	438	YES	6.082	N/A
MW223	Sidegradient	Yes	402	YES	5.996	N/A
MW224	Sidegradient	Yes	444	YES	6.096	N/A
MW369	Downgradient	Yes	410	YES	6.016	N/A
MW372	Downgradient	Yes	390	NO	5.966	N/A
MW384	Sidegradient	Yes	421	YES	6.043	N/A
MW387	Downgradient	Yes	442	YES	6.091	N/A
MW391	Downgradient	Yes	440	YES	6.087	N/A
MW394	Upgradient	Yes	435	YES	6.075	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.

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.

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

MW220
MW221
MW222
MW223
MW224
MW369
MW384
MW387
MW391
MW394

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. D1-50

C-746-S/T Third Quarter 2019 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= 6.138	S= 0.282	CV(1)=0.046	K factor**= 2.904	TL(1)= 6.957	LL(1)=5.3179
Statistics-Transformed Background Data	X= 1.813	S= 0.047	CV(2)=0.026	K factor**= 2.904	TL(2)= 1.950	LL(2)=1.6765

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: MW220

Date Collected	Result	LN(Result)
10/14/2002	6.04	1.798
1/15/2003	6.31	1.842
4/10/2003	6.5	1.872
7/14/2003	6.3	1.841
10/13/2003	6.34	1.847
1/13/2004	6.33	1.845
4/13/2004	6.3	1.841
7/21/2004	5.9	1.775

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	5.8	1.758
9/30/2002	5.93	1.780
10/16/2002	5.42	1.690
1/13/2003	6	1.792
4/10/2003	6.04	1.798
7/16/2003	6.2	1.825
10/14/2003	6.4	1.856
1/13/2004	6.39	1.855

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)? Result <LL(1)?	LN(Result)	LN(Result) >TL(2)? LN(Result) <LL(2)?
MW220	Upgradient	Yes	6.53	NO	1.876	N/A
MW221	Sidegradient	Yes	6.15	NO	1.816	N/A
MW222	Sidegradient	Yes	6.17	NO	1.820	N/A
MW223	Sidegradient	Yes	6.51	NO	1.873	N/A
MW224	Sidegradient	Yes	6.22	NO	1.828	N/A
MW369	Downgradient	Yes	6.25	NO	1.833	N/A
MW372	Downgradient	Yes	6.08	NO	1.805	N/A
MW384	Sidegradient	Yes	6.26	NO	1.834	N/A
MW387	Downgradient	Yes	6.35	NO	1.848	N/A
MW391	Downgradient	Yes	6.17	NO	1.820	N/A
MW394	Upgradient	Yes	6.13	NO	1.813	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-51

C-746-S/T Third Quarter 2019 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=** 6.654 **S=** 9.310 **CV(1)=** 1.399 **K factor**=** 2.523 **TL(1)=** 30.144 **LL(1)=**N/A

Statistics-Transformed Background Data **X=** 1.130 **S=** 1.208 **CV(2)=** 1.069 **K factor**=** 2.523 **TL(2)=** 4.178 **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: MW220

Date Collected	Result	LN(Result)
10/14/2002	6.7	1.902
1/15/2003	29.7	3.391
4/10/2003	24.9	3.215
7/14/2003	1.13	0.122
10/13/2003	3.43	1.233
1/13/2004	6.71	1.904
4/13/2004	19.3	2.960
7/21/2004	3.97	1.379

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	1.03	0.030
1/13/2003	1.1	0.095
4/10/2003	1.24	0.215
7/16/2003	1.14	0.131
10/14/2003	1.05	0.049
1/13/2004	1.07	0.068

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	1.3	N/A	0.262	NO
MW221	Sidegradient	Yes	1.32	N/A	0.278	NO
MW222	Sidegradient	Yes	0.747	N/A	-0.292	NO
MW223	Sidegradient	Yes	2.19	N/A	0.784	NO
MW224	Sidegradient	Yes	0.887	N/A	-0.120	NO
MW369	Downgradient	Yes	0.57	N/A	-0.562	NO
MW372	Downgradient	Yes	1.95	N/A	0.668	NO
MW384	Sidegradient	Yes	1.53	N/A	0.425	NO
MW387	Downgradient	Yes	1.73	N/A	0.548	NO
MW391	Downgradient	Yes	1.5	N/A	0.405	NO
MW394	Upgradient	Yes	1.15	N/A	0.140	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-S/T Third Quarter 2019 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= 36.363	S= 8.666	CV(1)=0.238	K factor**= 2.523	TL(1)= 58.227	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.570	S= 0.222	CV(2)=0.062	K factor**= 2.523	TL(2)= 4.129	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	35.4	3.567
1/15/2003	40.6	3.704
4/10/2003	51	3.932
7/14/2003	58.2	4.064
10/13/2003	38.1	3.640
1/13/2004	37	3.611
4/13/2004	43.2	3.766
7/21/2004	33.8	3.520

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	32.9	3.493
9/16/2002	29.9	3.398
10/16/2002	29	3.367
1/13/2003	27.1	3.300
4/10/2003	24.8	3.211
7/16/2003	35.6	3.572
10/14/2003	33.9	3.523
1/13/2004	31.3	3.444

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	43.4	NO	3.770	N/A
MW221	Sidegradient	Yes	47.9	NO	3.869	N/A
MW222	Sidegradient	Yes	46.3	NO	3.835	N/A
MW223	Sidegradient	Yes	47.7	NO	3.865	N/A
MW224	Sidegradient	Yes	53.2	NO	3.974	N/A
MW369	Downgradient	Yes	49.3	NO	3.898	N/A
MW372	Downgradient	Yes	54.4	NO	3.996	N/A
MW384	Sidegradient	Yes	49.6	NO	3.904	N/A
MW387	Downgradient	Yes	54.2	NO	3.993	N/A
MW391	Downgradient	Yes	35.1	NO	3.558	N/A
MW394	Upgradient	Yes	31.9	NO	3.463	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.

D1-53

C-746-S/T Third Quarter 2019 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= 10.481	S= 2.648	CV(1)=0.253	K factor**= 2.523	TL(1)= 17.161	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.322	S= 0.239	CV(2)=0.103	K factor**= 2.523	TL(2)= 2.925	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: MW220		
Date Collected	Result	LN(Result)
10/14/2002	10.4	2.342
1/15/2003	9.8	2.282
4/10/2003	15.4	2.734
7/14/2003	14.9	2.701
10/13/2003	13.5	2.603
1/13/2004	10.3	2.332
4/13/2004	14.3	2.660
7/21/2004	10.5	2.351
Well Number: MW394		
Date Collected	Result	LN(Result)
8/13/2002	11.2	2.416
9/16/2002	8.3	2.116
10/16/2002	8	2.079
1/13/2003	8.5	2.140
4/10/2003	7.9	2.067
7/16/2003	8.4	2.128
10/14/2003	8.2	2.104
1/13/2004	8.1	2.092

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	18.5	YES	2.918	N/A
MW221	Sidegradient	Yes	14.1	NO	2.646	N/A
MW222	Sidegradient	Yes	12.8	NO	2.549	N/A
MW223	Sidegradient	Yes	17.5	YES	2.862	N/A
MW224	Sidegradient	Yes	13.4	NO	2.595	N/A
MW369	Downgradient	Yes	8.91	NO	2.187	N/A
MW372	Downgradient	Yes	70.5	YES	4.256	N/A
MW384	Sidegradient	Yes	23.8	YES	3.170	N/A
MW387	Downgradient	Yes	30.7	YES	3.424	N/A
MW391	Downgradient	Yes	30.6	YES	3.421	N/A
MW394	Upgradient	Yes	11.1	NO	2.407	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

MW220
MW223
MW372
MW384
MW387
MW391

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-54

C-746-S/T Third Quarter 2019 Statistical Analysis
Historical Background Comparison

Technetium-99
UNITS: pCi/L
URGA

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

Statistics-Background Data	X = 9.354	S = 9.280	CV(1) =0.992	K factor **= 2.523	TL(1) = 32.768	LL(1) =N/A
Statistics-Transformed Background Data	X = 2.270	S = 0.849	CV(2) =0.374	K factor **= 2.523	TL(2) = 3.262	LL(2) =N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
10/14/2002	19.7	2.981
1/15/2003	26.1	3.262
4/10/2003	3.56	1.270
7/14/2003	0	#Func!
10/13/2003	21	3.045
1/13/2004	6.32	1.844
4/13/2004	3	1.099
7/21/2004	14.6	2.681

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	14	2.639
9/16/2002	5.45	1.696
10/16/2002	2.49	0.912
1/13/2003	18.3	2.907
4/10/2003	-1.45	#Func!
7/16/2003	-1.71	#Func!
10/14/2003	18.3	2.907
1/13/2004	0	#Func!

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

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

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	27.8	NO	3.325	N/A
MW221	Sidegradient	No	15.9	N/A	2.766	N/A
MW222	Sidegradient	No	9.95	N/A	2.298	N/A
MW223	Sidegradient	No	-4.01	N/A	#Error	N/A
MW224	Sidegradient	No	11.4	N/A	2.434	N/A
MW369	Downgradient	Yes	55.8	YES	4.022	N/A
MW372	Downgradient	Yes	183	YES	5.209	N/A
MW384	Sidegradient	Yes	122	YES	4.804	N/A
MW387	Downgradient	Yes	378	YES	5.935	N/A
MW391	Downgradient	No	9.38	N/A	2.239	N/A
MW394	Upgradient	No	4.74	N/A	1.556	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

MW369
MW372
MW384
MW387

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

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

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

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

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

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

C-746-S/T Third Quarter 2019 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= 1.494	S= 0.737	CV(1)=0.493	K factor**= 2.523	TL(1)= 3.353	LL(1)=N/A
Statistics-Transformed Background Data	X= 0.315	S= 0.402	CV(2)=1.279	K factor**= 2.523	TL(2)= 1.330	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: MW220		
Date Collected	Result	LN(Result)
10/14/2002	1	0.000
1/15/2003	1.1	0.095
4/10/2003	1	0.000
7/14/2003	3.3	1.194
10/13/2003	1.8	0.588
1/13/2004	1	0.000
4/13/2004	2	0.693
7/21/2004	3.1	1.131
Well Number: MW394		
Date Collected	Result	LN(Result)
8/13/2002	1.3	0.262
9/16/2002	1	0.000
10/16/2002	1	0.000
1/13/2003	1.6	0.470
4/10/2003	1	0.000
7/16/2003	1.4	0.336
10/14/2003	1.3	0.262
1/13/2004	1	0.000

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.945	NO	-0.057	N/A
MW221	Sidegradient	Yes	0.999	NO	-0.001	N/A
MW222	Sidegradient	Yes	0.975	NO	-0.025	N/A
MW223	Sidegradient	Yes	0.91	NO	-0.094	N/A
MW224	Sidegradient	Yes	1.06	NO	0.058	N/A
MW369	Downgradient	Yes	1.11	NO	0.104	N/A
MW372	Downgradient	Yes	1.27	NO	0.239	N/A
MW384	Sidegradient	Yes	1.14	NO	0.131	N/A
MW387	Downgradient	Yes	1.25	NO	0.223	N/A
MW391	Downgradient	Yes	0.895	NO	-0.111	N/A
MW394	Upgradient	Yes	0.884	NO	-0.123	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-56

C-746-S/T Third Quarter 2019 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= 63.475	S= 163.135	CV(1)=2.570	K factor**= 2.523	TL(1)= 475.063	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.103	S= 1.145	CV(2)=0.369	K factor**= 2.523	TL(2)= 5.992	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	50	3.912
1/15/2003	10	2.303
4/10/2003	10	2.303
7/14/2003	10	2.303
10/13/2003	10	2.303
1/13/2004	10	2.303
4/13/2004	10	2.303
7/21/2004	10	2.303

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	50	3.912
9/16/2002	672	6.510
10/16/2002	50	3.912
1/13/2003	36.1	3.586
4/10/2003	10	2.303
7/16/2003	42.7	3.754
10/14/2003	22	3.091
1/13/2004	12.8	2.549

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result > TL(1)?	LN(Result)	LN(Result) > TL(2)
MW220	Upgradient	Yes	4.06	N/A	1.401	NO
MW221	Sidegradient	Yes	8.56	N/A	2.147	NO
MW222	Sidegradient	No	10	N/A	2.303	N/A
MW223	Sidegradient	No	10	N/A	2.303	N/A
MW224	Sidegradient	No	10	N/A	2.303	N/A
MW369	Downgradient	Yes	9.2	N/A	2.219	NO
MW372	Downgradient	Yes	8.28	N/A	2.114	NO
MW384	Sidegradient	Yes	8.52	N/A	2.142	NO
MW387	Downgradient	Yes	8.3	N/A	2.116	NO
MW391	Downgradient	Yes	10	N/A	2.303	NO
MW394	Upgradient	Yes	5.86	N/A	1.768	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. D1-57

C-746-S/T Third Quarter 2019 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= 8.813	S= 8.376	CV(1)=0.951	K factor**= 2.523	TL(1)= 29.946	LL(1)=N/A
Statistics-Transformed Background Data	X= 1.395	S= 1.449	CV(2)=1.039	K factor**= 2.523	TL(2)= 5.052	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	1	0.000
1/15/2003	1	0.000
4/10/2003	1	0.000
7/14/2003	1	0.000
10/13/2003	1	0.000
1/13/2004	1	0.000
4/13/2004	1	0.000
7/21/2004	1	0.000

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	16	2.773
9/30/2002	20	2.996
10/16/2002	17	2.833
1/13/2003	15	2.708
4/10/2003	10	2.303
7/16/2003	19	2.944
10/14/2003	20	2.996
1/13/2004	16	2.773

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	No	1	N/A	0.000	N/A
MW221	Sidegradient	No	1	N/A	0.000	N/A
MW222	Sidegradient	No	1	N/A	0.000	N/A
MW223	Sidegradient	No	1	N/A	0.000	N/A
MW224	Sidegradient	No	1	N/A	0.000	N/A
MW369	Downgradient	Yes	0.99	N/A	-0.010	N/A
MW372	Downgradient	Yes	2.56	N/A	0.940	N/A
MW384	Sidegradient	Yes	0.6	N/A	-0.511	N/A
MW387	Downgradient	Yes	1.02	N/A	0.020	N/A
MW391	Downgradient	Yes	12	NO	2.485	N/A
MW394	Upgradient	Yes	3.71	N/A	1.311	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. D1-58

C-746-S/T Third Quarter 2019 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= 0.036	S= 0.026	CV(1)=0.722	K factor**= 2.523	TL(1)= 0.101	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.485	S= 0.525	CV(2)=-0.151	K factor**= 2.523	TL(2)= -2.162	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: MW220

Date Collected	Result	LN(Result)
10/14/2002	0.025	-3.689
1/15/2003	0.035	-3.352
4/10/2003	0.035	-3.352
7/14/2003	0.0389	-3.247
10/13/2003	0.026	-3.650
1/13/2004	0.02	-3.912
4/13/2004	0.02	-3.912
7/21/2004	0.02	-3.912

Well Number: MW394

Date Collected	Result	LN(Result)
8/13/2002	0.1	-2.303
9/16/2002	0.1	-2.303
10/16/2002	0.025	-3.689
1/13/2003	0.035	-3.352
4/10/2003	0.035	-3.352
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/13/2004	0.02	-3.912

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	0.00537	NO	-5.227	N/A
MW221	Sidegradient	Yes	0.00484	NO	-5.331	N/A
MW222	Sidegradient	Yes	0.00404	NO	-5.512	N/A
MW223	Sidegradient	Yes	0.00483	NO	-5.333	N/A
MW224	Sidegradient	Yes	0.0041	NO	-5.497	N/A
MW369	Downgradient	No	0.00487	N/A	-5.325	N/A
MW372	Downgradient	No	0.00509	N/A	-5.280	N/A
MW384	Sidegradient	Yes	0.00526	NO	-5.248	N/A
MW387	Downgradient	Yes	0.00455	NO	-5.393	N/A
MW391	Downgradient	No	0.0049	N/A	-5.319	N/A
MW394	Upgradient	Yes	0.00474	NO	-5.352	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 = [Sum (((background result-X)^2)/[count of background results -1])]^0.5

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

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

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

D1-59

C-746-S/T Third Quarter 2019 Statistical Analysis Historical Background Comparison

Aluminum

UNITS: mg/L

LRGA

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

Statistics-Background Data **X**= 0.258 **S**= 0.221 **CV(1)**=0.856 **K factor****= 2.523 **TL(1)**= 0.815 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= -2.266 **S**= 2.485 **CV(2)**=-1.097 **K factor****= 2.523 **TL(2)**= 4.003 **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: MW395

Date Collected	Result	LN(Result)
8/13/2002	0.2	-1.609
9/16/2002	0.2	-1.609
10/16/2002	0.0002	-8.517
1/13/2003	0.737	-0.305
4/10/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/13/2004	0.2	-1.609

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	0.824	-0.194
9/16/2002	0.2	-1.609
10/17/2002	0.0002	-8.517
1/13/2003	0.363	-1.013
4/8/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/13/2004	0.2	-1.609

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	0.05	N/A	-2.996	N/A
MW373	Downgradient	No	0.05	N/A	-2.996	N/A
MW385	Sidegradient	No	0.05	N/A	-2.996	N/A
MW388	Downgradient	No	0.05	N/A	-2.996	N/A
MW392	Downgradient	No	0.05	N/A	-2.996	N/A
MW395	Upgradient	No	0.05	N/A	-2.996	N/A
MW397	Upgradient	Yes	0.0407	NO	-3.202	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-S/T Third Quarter 2019 Statistical Analysis	Historical Background Comparison
Antimony	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= 0.054	S= 0.087	CV(1)= 1.622	K factor**= 2.523	TL(1)= 0.274	LL(1)=N/A
Statistics-Transformed Background Data	X= -4.376	S= 1.650	CV(2)= -0.377	K factor**= 2.523	TL(2)= -0.214	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	0.2	-1.609
9/16/2002	0.2	-1.609
10/16/2002	0.005	-5.298
1/13/2003	0.005	-5.298
4/10/2003	0.005	-5.298
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/13/2004	0.005	-5.298

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	0.2	-1.609
9/16/2002	0.2	-1.609
10/17/2002	0.005	-5.298
1/13/2003	0.005	-5.298
4/8/2003	0.005	-5.298
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/13/2004	0.005	-5.298

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	0.003	N/A	-5.809	N/A
MW373	Downgradient	No	0.003	N/A	-5.809	N/A
MW385	Sidegradient	No	0.003	N/A	-5.809	N/A
MW388	Downgradient	Yes	0.00143	N/A	-6.550	NO
MW392	Downgradient	No	0.003	N/A	-5.809	N/A
MW395	Upgradient	No	0.003	N/A	-5.809	N/A
MW397	Upgradient	Yes	0.00121	N/A	-6.717	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-S/T Third Quarter 2019 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**= 7.183 **S**= 2.612 **CV(1)**=0.364 **K factor****= 2.523 **TL(1)**= 13.773 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 1.870 **S**= 0.552 **CV(2)**=0.295 **K factor****= 2.523 **TL(2)**= 3.261 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
8/13/2002	1.09	0.086
9/16/2002	5.79	1.756
10/16/2002	6.82	1.920
1/13/2003	5.01	1.611
4/10/2003	6.1	1.808
7/16/2003	8.51	2.141
10/14/2003	4.99	1.607
1/13/2004	6.58	1.884

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	9.57	2.259
9/16/2002	11	2.398
10/17/2002	9.3	2.230
1/13/2003	8.63	2.155
4/8/2003	10	2.303
7/16/2003	6.89	1.930
10/14/2003	10.1	2.313
1/13/2004	4.55	1.515

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)
MW370	Downgradient	Yes	52.7	YES	3.965	N/A
MW373	Downgradient	Yes	21.9	N/A	3.086	N/A
MW385	Sidegradient	Yes	55.5	YES	4.016	N/A
MW388	Downgradient	Yes	37.5	N/A	3.624	N/A
MW392	Downgradient	No	0.397	N/A	-0.924	N/A
MW395	Upgradient	No	6.42	N/A	1.859	N/A
MW397	Upgradient	No	6.74	N/A	1.908	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.

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
MW385

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-S/T Third Quarter 2019 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**= 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

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: MW395

Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	0.2	-1.609
1/13/2003	0.2	-1.609
4/10/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/13/2004	0.2	-1.609

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/17/2002	0.2	-1.609
1/13/2003	0.2	-1.609
4/8/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.2	-1.609
1/13/2004	0.2	-1.609

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	0.0299	N/A	-3.510	NO
MW373	Downgradient	Yes	1.52	N/A	0.419	NO
MW385	Sidegradient	Yes	0.0527	N/A	-2.943	NO
MW388	Downgradient	Yes	0.0401	N/A	-3.216	NO
MW392	Downgradient	Yes	0.0317	N/A	-3.451	NO
MW395	Upgradient	Yes	0.0191	N/A	-3.958	NO
MW397	Upgradient	Yes	0.0111	N/A	-4.501	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-S/T Third Quarter 2019 Statistical Analysis

Historical Background Comparison

Bromide

UNITS: mg/L

LRGA

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

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

Historical Background Data from Upgradient Wells with Transformed Result

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

Well Number: MW395		
Date Collected	Result	LN(Result)
8/13/2002	1	0.000
9/16/2002	1	0.000
10/16/2002	1	0.000
1/13/2003	1	0.000
4/10/2003	1	0.000
7/16/2003	1	0.000
10/14/2003	1	0.000
1/13/2004	1	0.000
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	1	0.000
9/16/2002	1	0.000
10/17/2002	1	0.000
1/13/2003	1	0.000
4/8/2003	1	0.000
7/16/2003	1	0.000
10/14/2003	1	0.000
1/13/2004	1	0.000

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	0.394	NO	-0.931	N/A
MW373	Downgradient	Yes	0.532	NO	-0.631	N/A
MW385	Sidegradient	Yes	0.318	NO	-1.146	N/A
MW388	Downgradient	Yes	0.387	NO	-0.949	N/A
MW392	Downgradient	Yes	0.588	NO	-0.531	N/A
MW395	Upgradient	Yes	0.47	NO	-0.755	N/A
MW397	Upgradient	Yes	0.43	NO	-0.844	N/A
N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.						

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-64

C-746-S/T Third Quarter 2019 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= 23.103	S= 11.538	CV(1)=0.499	K factor**= 2.523	TL(1)= 52.213	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.357	S= 2.411	CV(2)=1.023	K factor**= 2.523	TL(2)= 8.439	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	32.2	3.472
9/16/2002	33	3.497
10/16/2002	0.0295	-3.523
1/13/2003	32.1	3.469
4/10/2003	40.2	3.694
7/16/2003	32.4	3.478
10/14/2003	33.9	3.523
1/13/2004	31.2	3.440
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	19.4	2.965
9/16/2002	19	2.944
10/17/2002	0.0179	-4.023
1/13/2003	17.8	2.879
4/8/2003	20.3	3.011
7/16/2003	19.4	2.965
10/14/2003	19.9	2.991
1/13/2004	18.8	2.934

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	27.7	NO	3.321	N/A
MW373	Downgradient	Yes	67.9	YES	4.218	N/A
MW385	Sidegradient	Yes	24.7	NO	3.207	N/A
MW388	Downgradient	Yes	38.8	NO	3.658	N/A
MW392	Downgradient	Yes	31.2	NO	3.440	N/A
MW395	Upgradient	Yes	24.2	NO	3.186	N/A
MW397	Upgradient	Yes	19.7	NO	2.981	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

MW373

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

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

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

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

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

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

D1-65

C-746-S/T Third Quarter 2019 Statistical Analysis
Chemical Oxygen Demand (COD)

Historical Background Comparison
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= 35.313	S= 1.250	CV(1)=0.035	K factor**= 2.523	TL(1)= 38.466	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.564	S= 0.033	CV(2)=0.009	K factor**= 2.523	TL(2)= 3.648	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	35	3.555
9/16/2002	35	3.555
10/16/2002	35	3.555
1/13/2003	35	3.555
4/10/2003	35	3.555
7/16/2003	35	3.555
10/14/2003	35	3.555
1/13/2004	35	3.555

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	40	3.689
9/16/2002	35	3.555
10/17/2002	35	3.555
1/13/2003	35	3.555
4/8/2003	35	3.555
7/16/2003	35	3.555
10/14/2003	35	3.555
1/13/2004	35	3.555

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	36.7	NO	3.603	N/A
MW373	Downgradient	Yes	107	YES	4.673	N/A
MW385	Sidegradient	Yes	11	NO	2.398	N/A
MW388	Downgradient	Yes	28	NO	3.332	N/A
MW392	Downgradient	No	20	N/A	2.996	N/A
MW395	Upgradient	Yes	47.6	YES	3.863	N/A
MW397	Upgradient	Yes	59.8	YES	4.091	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

MW373
MW395
MW397

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-66

C-746-S/T Third Quarter 2019 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= 51.844	S= 11.652	CV(1)=0.225	K factor**= 2.523	TL(1)= 81.242	LL(1)=N/A
Statistics-Transformed Background Data	X= 3.924	S= 0.229	CV(2)=0.058	K factor**= 2.523	TL(2)= 4.501	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	62.2	4.130
9/16/2002	64.7	4.170
10/16/2002	62.2	4.130
1/13/2003	63.5	4.151
4/10/2003	64.1	4.160
7/16/2003	64	4.159
10/14/2003	63.2	4.146
1/13/2004	60.6	4.104
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	38.9	3.661
9/16/2002	39.8	3.684
10/17/2002	39.3	3.671
1/13/2003	40.5	3.701
4/8/2003	42.1	3.740
7/16/2003	42	3.738
10/14/2003	40.8	3.709
1/13/2004	41.6	3.728

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	34.2	NO	3.532	N/A
MW373	Downgradient	Yes	40.5	NO	3.701	N/A
MW385	Sidegradient	Yes	29.7	NO	3.391	N/A
MW388	Downgradient	Yes	30.5	NO	3.418	N/A
MW392	Downgradient	Yes	44.5	NO	3.795	N/A
MW395	Upgradient	Yes	40.3	NO	3.696	N/A
MW397	Upgradient	Yes	35.3	NO	3.564	N/A
N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.						

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-67

C-746-S/T Third Quarter 2019 Statistical Analysis

Historical Background Comparison

cis-1,2-Dichloroethene

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= 5.000	S= 0.000	CV(1)=0.000	K factor**= 2.523	TL(1)= 5.000	LL(1)=N/A
Statistics-Transformed Background Data	X= 1.609	S= 0.000	CV(2)=0.000	K factor**= 2.523	TL(2)= 1.609	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	5	1.609
9/30/2002	5	1.609
10/16/2002	5	1.609
1/13/2003	5	1.609
4/10/2003	5	1.609
7/16/2003	5	1.609
10/14/2003	5	1.609
1/13/2004	5	1.609
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	5	1.609
9/30/2002	5	1.609
10/17/2002	5	1.609
1/13/2003	5	1.609
4/8/2003	5	1.609
7/16/2003	5	1.609
10/14/2003	5	1.609
1/13/2004	5	1.609

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	1	N/A	0.000	N/A
MW373	Downgradient	No	1	N/A	0.000	N/A
MW385	Sidegradient	No	1	N/A	0.000	N/A
MW388	Downgradient	No	1	N/A	0.000	N/A
MW392	Downgradient	Yes	1.16	NO	0.148	N/A
MW395	Upgradient	No	1	N/A	0.000	N/A
MW397	Upgradient	No	1	N/A	0.000	N/A
N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.						

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-68

C-746-S/T Third Quarter 2019 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= 0.007	S= 0.011	CV(1)= 1.515	K factor**= 2.523	TL(1)= 0.034	LL(1)=N/A
Statistics-Transformed Background Data	X= -6.053	S= 1.416	CV(2)= -0.234	K factor**= 2.523	TL(2)= -2.480	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	0.025	-3.689
9/16/2002	0.025	-3.689
10/16/2002	0.001	-6.908
1/13/2003	0.00148	-6.516
4/10/2003	0.00151	-6.496
7/16/2003	0.001	-6.908
10/14/2003	0.001	-6.908
1/13/2004	0.001	-6.908

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	0.025	-3.689
9/16/2002	0.025	-3.689
10/17/2002	0.001	-6.908
1/13/2003	0.001	-6.908
4/8/2003	0.001	-6.908
7/16/2003	0.001	-6.908
10/14/2003	0.001	-6.908
1/13/2004	0.001	-6.908

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	0.001	N/A	-6.908	N/A
MW373	Downgradient	Yes	0.00097	N/A	-6.938	NO
MW385	Sidegradient	No	0.001	N/A	-6.908	N/A
MW388	Downgradient	No	0.001	N/A	-6.908	N/A
MW392	Downgradient	No	0.001	N/A	-6.908	N/A
MW395	Upgradient	No	0.001	N/A	-6.908	N/A
MW397	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.

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-69

C-746-S/T Third Quarter 2019 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= 377.875	S= 52.101	CV(1)=0.138	K factor**= 2.523	TL(1)= 509.326	LL(1)=N/A
Statistics-Transformed Background Data	X= 5.926	S= 0.136	CV(2)=0.023	K factor**= 2.523	TL(2)= 6.270	LL(2)=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
8/13/2002	405	6.004
9/16/2002	401	5.994
10/16/2002	392	5.971
1/13/2003	404	6.001
4/10/2003	488	6.190
7/16/2003	450	6.109
10/14/2003	410	6.016
1/13/2004	413	6.023

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	322	5.775
9/16/2002	315	5.753
10/17/2002	317	5.759
1/13/2003	320	5.768
4/8/2003	390	5.966
7/16/2003	354	5.869
10/14/2003	331	5.802
1/13/2004	334	5.811

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	421	NO	6.043	N/A
MW373	Downgradient	Yes	785	YES	6.666	N/A
MW385	Sidegradient	Yes	426	NO	6.054	N/A
MW388	Downgradient	Yes	472	NO	6.157	N/A
MW392	Downgradient	Yes	438	NO	6.082	N/A
MW395	Upgradient	Yes	344	NO	5.841	N/A
MW397	Upgradient	Yes	316	NO	5.756	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

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.

D1-70

C-746-S/T Third Quarter 2019 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= 0.028	S= 0.013	CV(1)=0.474	K factor**= 2.523	TL(1)=0.061	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.662	S= 0.406	CV(2)=-0.111	K factor**= 2.523	TL(2)= -2.638	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/16/2002	0.0281	-3.572
1/13/2003	0.02	-3.912
4/10/2003	0.02	-3.912
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/13/2004	0.02	-3.912

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/17/2002	0.02	-3.912
1/13/2003	0.02	-3.912
4/8/2003	0.02	-3.912
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/13/2004	0.02	-3.912

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	0.0005	NO	-7.601	N/A
MW373	Downgradient	Yes	0.00065	NO	-7.339	N/A
MW385	Sidegradient	Yes	0.000758	NO	-7.185	N/A
MW388	Downgradient	Yes	0.000721	NO	-7.235	N/A
MW392	Downgradient	Yes	0.00057	NO	-7.470	N/A
MW395	Upgradient	Yes	0.000327	NO	-8.026	N/A
MW397	Upgradient	Yes	0.000757	NO	-7.186	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

C-746-S/T Third Quarter 2019 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= 4.678	S= 2.431	CV(1)=0.520	K factor**= 2.523	TL(1)= 10.812	LL(1)=N/A
Statistics-Transformed Background Data	X= 1.414	S= 0.550	CV(2)=0.389	K factor**= 2.523	TL(2)= 2.802	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	7.29	1.987
9/30/2002	4.03	1.394
10/16/2002	3.85	1.348
1/13/2003	2.36	0.859
4/10/2003	1.14	0.131
7/16/2003	1.76	0.565
10/14/2003	4.05	1.399
1/13/2004	4.26	1.449

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	11.56	2.448
9/16/2002	5.86	1.768
10/17/2002	5.94	1.782
1/13/2003	4.66	1.539
4/8/2003	3.77	1.327
7/16/2003	3.47	1.244
10/14/2003	5.34	1.675
1/13/2004	5.51	1.707

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	4.09	NO	1.409	N/A
MW373	Downgradient	Yes	2.36	NO	0.859	N/A
MW385	Sidegradient	Yes	4.01	NO	1.389	N/A
MW388	Downgradient	Yes	3.59	NO	1.278	N/A
MW392	Downgradient	Yes	3.2	NO	1.163	N/A
MW395	Upgradient	Yes	4.55	NO	1.515	N/A
MW397	Upgradient	Yes	4.92	NO	1.593	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, $S = [\text{Sum } ((\text{background result}-X)^2)/[\text{count of background results } -1]]^{0.5}$

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.

D1-72

C-746-S/T Third Quarter 2019 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**= 219.250 **S**= 34.107 **CV(1)**=0.156 **K factor****= 2.523 **TL(1)**= 305.301 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.379 **S**= 0.152 **CV(2)**=0.028 **K factor****= 2.523 **TL(2)**= 5.762 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
8/13/2002	249	5.517
9/16/2002	272	5.606
10/16/2002	255	5.541
1/13/2003	211	5.352
4/10/2003	289	5.666
7/16/2003	236	5.464
10/14/2003	224	5.412
1/13/2004	235	5.460

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	187	5.231
9/16/2002	197	5.283
10/17/2002	183	5.209
1/13/2003	182	5.204
4/8/2003	217	5.380
7/16/2003	196	5.278
10/14/2003	198	5.288
1/13/2004	177	5.176

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)
MW370	Downgradient	Yes	241	NO	5.485	N/A
MW373	Downgradient	Yes	481	YES	6.176	N/A
MW385	Sidegradient	Yes	284	NO	5.649	N/A
MW388	Downgradient	Yes	219	NO	5.389	N/A
MW392	Downgradient	Yes	207	NO	5.333	N/A
MW395	Upgradient	Yes	184	NO	5.215	N/A
MW397	Upgradient	Yes	176	NO	5.170	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

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-S/T Third Quarter 2019 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= 0.400	S= 0.514	CV(1)= 1.286	K factor**= 2.523	TL(1)= 1.698	LL(1)=N/A
Statistics-Transformed Background Data	X= -2.197	S= 2.634	CV(2)=-1.199	K factor**= 2.523	TL(2)= 4.449	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	0.294	-1.224
9/16/2002	0.2	-1.609
10/16/2002	0.0002	-8.517
1/13/2003	1.33	0.285
4/10/2003	1.31	0.270
7/16/2003	0.2	-1.609
10/14/2003	0.1	-2.303
1/13/2004	0.1	-2.303
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	1.58	0.457
9/16/2002	0.232	-1.461
10/17/2002	0.0002	-8.517
1/13/2003	0.453	-0.792
4/8/2003	0.2	-1.609
7/16/2003	0.2	-1.609
10/14/2003	0.1	-2.303
1/13/2004	0.1	-2.303

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	0.1	N/A	-2.303	N/A
MW373	Downgradient	Yes	0.103	N/A	-2.273	NO
MW385	Sidegradient	No	0.1	N/A	-2.303	N/A
MW388	Downgradient	Yes	0.0722	N/A	-2.628	NO
MW392	Downgradient	Yes	0.228	N/A	-1.478	NO
MW395	Upgradient	No	0.1	N/A	-2.303	N/A
MW397	Upgradient	Yes	0.0545	N/A	-2.910	NO
N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.						

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-74

C-746-S/T Third Quarter 2019 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 = 9.102	S = 4.685	CV(1) =0.515	K factor **= 2.523	TL(1) = 20.922	LL(1) =N/A
Statistics-Transformed Background Data	X = 1.423	S = 2.408	CV(2) =1.692	K factor **= 2.523	TL(2) = 7.500	LL(2) =N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW395		
Date Collected	Result	LN(Result)
8/13/2002	12.5	2.526
9/16/2002	13	2.565
10/16/2002	0.0127	-4.366
1/13/2003	11.2	2.416
4/10/2003	17.5	2.862
7/16/2003	12.9	2.557
10/14/2003	13.4	2.595
1/13/2004	12.4	2.518

Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	7.83	2.058
9/16/2002	7.64	2.033
10/17/2002	0.00658	-5.024
1/13/2003	6.69	1.901
4/8/2003	7.28	1.985
7/16/2003	7.82	2.057
10/14/2003	7.94	2.072
1/13/2004	7.51	2.016

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	12.1	NO	2.493	N/A
MW373	Downgradient	Yes	27.2	YES	3.303	N/A
MW385	Sidegradient	Yes	10.3	NO	2.332	N/A
MW388	Downgradient	Yes	17.4	NO	2.856	N/A
MW392	Downgradient	Yes	11.8	NO	2.468	N/A
MW395	Upgradient	Yes	10.6	NO	2.361	N/A
MW397	Upgradient	Yes	8.63	NO	2.155	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

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-S/T Third Quarter 2019 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= 0.131	S= 0.195	CV(1)= 1.487	K factor**= 2.523	TL(1)= 0.624	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.104	S= 1.529	CV(2)= -0.493	K factor**= 2.523	TL(2)= 0.755	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	0.361	-1.019
9/16/2002	0.028	-3.576
10/16/2002	0.026	-3.650
1/13/2003	0.0713	-2.641
4/10/2003	0.629	-0.464
7/16/2003	0.297	-1.214
10/14/2003	0.0198	-3.922
1/13/2004	0.0126	-4.374

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	0.466	-0.764
9/16/2002	0.077	-2.564
10/17/2002	0.028	-3.576
1/13/2003	0.0164	-4.110
4/8/2003	0.0407	-3.202
7/16/2003	0.0167	-4.092
10/14/2003	0.00555	-5.194
1/13/2004	0.005	-5.298

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	0.00111	N/A	-6.803	NO
MW373	Downgradient	Yes	0.0499	N/A	-2.998	NO
MW385	Sidegradient	No	0.005	N/A	-5.298	N/A
MW388	Downgradient	Yes	0.00176	N/A	-6.342	NO
MW392	Downgradient	Yes	0.0273	N/A	-3.601	NO
MW395	Upgradient	No	0.005	N/A	-5.298	N/A
MW397	Upgradient	Yes	0.00287	N/A	-5.853	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-S/T Third Quarter 2019 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= 0.018	S= 0.020	CV(1)= 1.089	K factor**= 2.523	TL(1)= 0.068	LL(1)=N/A
Statistics-Transformed Background Data	X= -4.540	S= 1.020	CV(2)= -0.225	K factor**= 2.523	TL(2)= -1.965	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/16/2002	0.00702	-4.959
1/13/2003	0.029	-3.540
4/10/2003	0.0091	-4.699
7/16/2003	0.00627	-5.072
10/14/2003	0.005	-5.298
1/13/2004	0.005	-5.298
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	0.05	-2.996
9/16/2002	0.05	-2.996
10/17/2002	0.005	-5.298
1/13/2003	0.00502	-5.294
4/8/2003	0.005	-5.298
7/16/2003	0.005	-5.298
10/14/2003	0.005	-5.298
1/13/2004	0.005	-5.298

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	0.002	N/A	-6.215	N/A
MW373	Downgradient	Yes	0.00217	N/A	-6.133	NO
MW385	Sidegradient	No	0.002	N/A	-6.215	N/A
MW388	Downgradient	Yes	0.000758	N/A	-7.185	NO
MW392	Downgradient	No	0.002	N/A	-6.215	N/A
MW395	Upgradient	No	0.002	N/A	-6.215	N/A
MW397	Upgradient	No	0.002	N/A	-6.215	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 = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-77

C-746-S/T Third Quarter 2019 Statistical Analysis
Oxidation-Reduction Potential

Historical Background Comparison
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= 157.250	S= 52.376	CV(1)=0.333	K factor**= 2.523	TL(1)= 289.395	LL(1)=N/A
Statistics-Transformed Background Data	X= 5.003	S= 0.348	CV(2)=0.069	K factor**= 2.523	TL(2)= 5.880	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	80	4.382
9/16/2002	145	4.977
10/16/2002	125	4.828
1/13/2003	85	4.443
4/10/2003	159	5.069
7/16/2003	98	4.585
10/14/2003	138	4.927
1/13/2004	233	5.451
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	115	4.745
9/30/2002	140	4.942
10/17/2002	185	5.220
1/13/2003	230	5.438
4/8/2003	155	5.043
7/16/2003	188	5.236
10/14/2003	187	5.231
1/13/2004	253	5.533

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	421	YES	6.043	N/A
MW373	Downgradient	Yes	417	YES	6.033	N/A
MW385	Sidegradient	Yes	420	YES	6.040	N/A
MW388	Downgradient	Yes	412	YES	6.021	N/A
MW392	Downgradient	Yes	432	YES	6.068	N/A
MW395	Upgradient	Yes	449	YES	6.107	N/A
MW397	Upgradient	Yes	395	YES	5.979	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
 MW373
 MW385
 MW388
 MW392
 MW395
 MW397

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

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

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

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

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

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

D1-78

C-746-S/T Third Quarter 2019 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= 6.048	S= 0.248	CV(1)=0.041	K factor**= 2.904	TL(1)= 6.767	LL(1)=5.3289
Statistics-Transformed Background Data	X= 1.799	S= 0.042	CV(2)=0.023	K factor**= 2.904	TL(2)= 1.920	LL(2)=1.6782

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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	5.8	1.758
9/16/2002	6	1.792
10/16/2002	5.47	1.699
1/13/2003	6	1.792
4/10/2003	6.18	1.821
7/16/2003	6	1.792
10/14/2003	6.31	1.842
1/13/2004	6.24	1.831
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	5.84	1.765
9/30/2002	6	1.792
10/17/2002	5.75	1.749
1/13/2003	6	1.792
4/8/2003	6.3	1.841
7/16/2003	6.2	1.825
10/14/2003	6.36	1.850
1/13/2004	6.32	1.844

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)? Result <LL(1)?	LN(Result)	LN(Result) >TL(2)? LN(Result) <LL(2)?
MW370	Downgradient	Yes	6.15	NO	1.816	N/A
MW373	Downgradient	Yes	6.03	NO	1.797	N/A
MW385	Sidegradient	Yes	6.26	NO	1.834	N/A
MW388	Downgradient	Yes	6.29	NO	1.839	N/A
MW392	Downgradient	Yes	6.31	NO	1.842	N/A
MW395	Upgradient	Yes	6.1	NO	1.808	N/A
MW397	Upgradient	Yes	6.4	NO	1.856	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-79

C-746-S/T Third Quarter 2019 Statistical Analysis

Potassium

Historical Background Comparison

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= 1.590	S= 0.642	CV(1)=0.404	K factor**= 2.523	TL(1)= 3.208	LL(1)=N/A
Statistics-Transformed Background Data	X= -0.306	S= 2.457	CV(2)=-8.028	K factor**= 2.523	TL(2)= 5.892	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	2	0.693
9/16/2002	2	0.693
10/16/2002	0.00129	-6.653
1/13/2003	1.51	0.412
4/10/2003	1.67	0.513
7/16/2003	1.73	0.548
10/14/2003	1.7	0.531
1/13/2004	1.58	0.457
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	2.03	0.708
9/16/2002	2	0.693
10/17/2002	0.00145	-6.536
1/13/2003	1.69	0.525
4/8/2003	1.73	0.548
7/16/2003	2	0.693
10/14/2003	1.92	0.652
1/13/2004	1.87	0.626

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	2.46	NO	0.900	N/A
MW373	Downgradient	Yes	2.6	NO	0.956	N/A
MW385	Sidegradient	Yes	1.58	NO	0.457	N/A
MW388	Downgradient	Yes	2.48	NO	0.908	N/A
MW392	Downgradient	Yes	1.73	NO	0.548	N/A
MW395	Upgradient	Yes	1.36	NO	0.307	N/A
MW397	Upgradient	Yes	1.76	NO	0.565	N/A
N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.						

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-80

C-746-S/T Third Quarter 2019 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**= 29.560 **S**= 13.894 **CV(1)**=0.470 **K factor****= 2.523 **TL(1)**= 64.616 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 2.615 **S**= 2.411 **CV(2)**=0.922 **K factor****= 2.523 **TL(2)**= 8.699 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
8/13/2002	27	3.296
9/16/2002	27.2	3.303
10/16/2002	0.0253	-3.677
1/13/2003	22.6	3.118
4/10/2003	53.9	3.987
7/16/2003	30	3.401
10/14/2003	29.1	3.371
1/13/2004	26.4	3.273

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	35.2	3.561
9/16/2002	34.3	3.535
10/17/2002	0.0336	-3.393
1/13/2003	31.3	3.444
4/8/2003	46.1	3.831
7/16/2003	38.4	3.648
10/14/2003	37.1	3.614
1/13/2004	34.3	3.535

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)
MW370	Downgradient	Yes	42.3	NO	3.745	N/A
MW373	Downgradient	Yes	58.6	NO	4.071	N/A
MW385	Sidegradient	Yes	47.6	NO	3.863	N/A
MW388	Downgradient	Yes	41.1	NO	3.716	N/A
MW392	Downgradient	Yes	38.5	NO	3.651	N/A
MW395	Upgradient	Yes	28.3	NO	3.343	N/A
MW397	Upgradient	Yes	33.8	NO	3.520	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. D1-81

C-746-S/T Third Quarter 2019 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**= 10.756 **S**= 2.147 **CV(1)**=0.200 **K factor****= 2.523 **TL(1)**= 16.173 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 2.356 **S**= 0.203 **CV(2)**=0.086 **K factor****= 2.523 **TL(2)**= 2.869 **LL(2)**=N/A

Historical Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
8/13/2002	10.3	2.332
9/16/2002	9.1	2.208
10/16/2002	8.8	2.175
1/13/2003	9	2.197
4/10/2003	8.3	2.116
7/16/2003	8.2	2.104
10/14/2003	8.3	2.116
1/13/2004	8.2	2.104

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	14	2.639
9/16/2002	12.8	2.549
10/17/2002	12.3	2.510
1/13/2003	12.7	2.542
4/8/2003	12.8	2.549
7/16/2003	13.1	2.573
10/14/2003	12.1	2.493
1/13/2004	12.1	2.493

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)
MW370	Downgradient	Yes	20.2	YES	3.006	N/A
MW373	Downgradient	Yes	148	YES	4.997	N/A
MW385	Sidegradient	Yes	21.1	YES	3.049	N/A
MW388	Downgradient	Yes	25.2	YES	3.227	N/A
MW392	Downgradient	Yes	23.4	YES	3.153	N/A
MW395	Upgradient	Yes	10.9	NO	2.389	N/A
MW397	Upgradient	Yes	10.7	NO	2.370	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
MW373
MW385
MW388
MW392

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-S/T Third Quarter 2019 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= 11.359	S= 9.138	CV(1)=0.805	K factor**= 2.523	TL(1)= 34.414	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.398	S= 0.859	CV(2)=0.358	K factor**= 2.523	TL(2)= 3.246	LL(2)=N/A

Historical Background Data from
Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
8/13/2002	20.8	3.035
9/16/2002	16.2	2.785
10/16/2002	8.28	2.114
1/13/2003	13	2.565
4/10/2003	-9.37	#Func!
7/16/2003	0.826	-0.191
10/14/2003	14.1	2.646
1/13/2004	0	#Func!

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	6.06	1.802
9/16/2002	17.3	2.851
10/17/2002	25.7	3.246
1/13/2003	20.9	3.040
4/8/2003	20.1	3.001
7/16/2003	9.2	2.219
10/14/2003	10.1	2.313
1/13/2004	8.54	2.145

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)
MW370	Downgradient	Yes	107	YES	4.673	N/A
MW373	Downgradient	Yes	28.3	NO	3.343	N/A
MW385	Sidegradient	Yes	125	YES	4.828	N/A
MW388	Downgradient	Yes	90.9	YES	4.510	N/A
MW392	Downgradient	No	8.7	N/A	2.163	N/A
MW395	Upgradient	No	4.92	N/A	1.593	N/A
MW397	Upgradient	No	5.83	N/A	1.763	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
MW385
MW388

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

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

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

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

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

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

C-746-S/T Third Quarter 2019 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= 1.544	S= 0.856	CV(1)=0.554	K factor**= 2.523	TL(1)= 3.702	LL(1)=N/A
Statistics-Transformed Background Data	X= 0.325	S= 0.452	CV(2)=1.393	K factor**= 2.523	TL(2)= 1.465	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	1.6	0.470
9/16/2002	1.1	0.095
10/16/2002	1	0.000
1/13/2003	2	0.693
4/10/2003	3.4	1.224
7/16/2003	2	0.693
10/14/2003	1	0.000
1/13/2004	1	0.000

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	1	0.000
9/16/2002	1	0.000
10/17/2002	1	0.000
1/13/2003	3.6	1.281
4/8/2003	1.9	0.642
7/16/2003	1.1	0.095
10/14/2003	1	0.000
1/13/2004	1	0.000

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	0.988	NO	-0.012	N/A
MW373	Downgradient	Yes	1.28	NO	0.247	N/A
MW385	Sidegradient	Yes	1.25	NO	0.223	N/A
MW388	Downgradient	Yes	1.11	NO	0.104	N/A
MW392	Downgradient	Yes	1.15	NO	0.140	N/A
MW395	Upgradient	Yes	0.863	NO	-0.147	N/A
MW397	Upgradient	Yes	0.847	NO	-0.166	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-84

C-746-S/T Third Quarter 2019 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 = 31.513	S = 18.609	CV(1) =0.591	K factor** = 2.523	TL(1) = 78.462	LL(1) =N/A
Statistics-Transformed Background Data	X = 3.240	S = 0.707	CV(2) =0.218	K factor** = 2.523	TL(2) = 5.024	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	50	3.912
9/16/2002	50	3.912
10/16/2002	50	3.912
1/13/2003	18.3	2.907
4/10/2003	51.2	3.936
7/16/2003	42.6	3.752
10/14/2003	12.3	2.510
1/13/2004	10	2.303
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	50	3.912
9/16/2002	50	3.912
10/17/2002	50	3.912
1/13/2003	12	2.485
4/8/2003	19.9	2.991
7/16/2003	17.9	2.885
10/14/2003	10	2.303
1/13/2004	10	2.303

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	7	NO	1.946	N/A
MW373	Downgradient	Yes	6.52	NO	1.875	N/A
MW385	Sidegradient	Yes	13	NO	2.565	N/A
MW388	Downgradient	Yes	7.32	NO	1.991	N/A
MW392	Downgradient	Yes	18.8	NO	2.934	N/A
MW395	Upgradient	Yes	3.74	NO	1.319	N/A
MW397	Upgradient	Yes	7.1	NO	1.960	N/A

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

Conclusion of Statistical Analysis on Historical Data

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

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

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

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

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

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

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

D1-85

C-746-S/T Third Quarter 2019 Statistical Analysis

Trichloroethene

Historical Background Comparison

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= 7.313	S= 5.701	CV(1)=0.780	K factor**= 2.523	TL(1)= 21.695	LL(1)=N/A
Statistics-Transformed Background Data	X= 1.467	S= 1.213	CV(2)=0.827	K factor**= 2.523	TL(2)= 4.528	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: MW395

Date Collected	Result	LN(Result)
8/13/2002	11	2.398
9/30/2002	14	2.639
10/16/2002	12	2.485
1/13/2003	14	2.639
4/10/2003	14	2.639
7/16/2003	13	2.565
10/14/2003	12	2.485
1/13/2004	11	2.398

Well Number: MW397

Date Collected	Result	LN(Result)
8/13/2002	5	1.609
9/30/2002	5	1.609
10/17/2002	1	0.000
1/13/2003	1	0.000
4/8/2003	1	0.000
7/16/2003	1	0.000
10/14/2003	1	0.000
1/13/2004	1	0.000

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	0.57	N/A	-0.562	N/A
MW373	Downgradient	Yes	0.69	N/A	-0.371	N/A
MW385	Sidegradient	Yes	0.56	N/A	-0.580	N/A
MW388	Downgradient	Yes	0.45	N/A	-0.799	N/A
MW392	Downgradient	Yes	10.3	NO	2.332	N/A
MW395	Upgradient	Yes	2.55	N/A	0.936	N/A
MW397	Upgradient	No	1	N/A	0.000	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-S/T Third Quarter 2019 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= 0.044	S= 0.034	CV(1)=0.760	K factor**= 2.523	TL(1)= 0.129	LL(1)=N/A
Statistics-Transformed Background Data	X= -3.342	S= 0.659	CV(2)=-0.197	K factor**= 2.523	TL(2)= -1.679	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: MW395		
Date Collected	Result	LN(Result)
8/13/2002	0.1	-2.303
9/16/2002	0.1	-2.303
10/16/2002	0.025	-3.689
1/13/2003	0.035	-3.352
4/10/2003	0.035	-3.352
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/13/2004	0.02	-3.912
Well Number: MW397		
Date Collected	Result	LN(Result)
8/13/2002	0.1	-2.303
9/16/2002	0.1	-2.303
10/17/2002	0.025	-3.689
1/13/2003	0.035	-3.352
4/8/2003	0.035	-3.352
7/16/2003	0.02	-3.912
10/14/2003	0.02	-3.912
1/13/2004	0.02	-3.912

Current Quarter Data						
Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	No	0.00444	N/A	-5.417	N/A
MW373	Downgradient	No	0.00565	N/A	-5.176	N/A
MW385	Sidegradient	Yes	0.00573	NO	-5.162	N/A
MW388	Downgradient	Yes	0.00653	NO	-5.031	N/A
MW392	Downgradient	No	0.00449	N/A	-5.406	N/A
MW395	Upgradient	Yes	0.00435	NO	-5.438	N/A
MW397	Upgradient	Yes	0.00579	NO	-5.152	N/A
N/A - Results identified as Non-Detects during laboratory analysis or data validation and were not included in the statistical evaluation. Additionally for parameters that have MCLs, where the result for a well did not exceed the MCL value, that well was not included in the statistical evaluation.						

Conclusion of Statistical Analysis on Historical Data

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

NOTE: For UCRS wells, background ("upgradient") wells are those located in the same direction as RGA wells located upgradient from the landfill.
CV Coefficient-of-Variation, CV = S/X If CV is less than or equal to 1 assume normal distribution.
S Standard Deviation, S = [Sum (((background result-X)^2)/[count of background results -1])]^0.5
TL Upper Tolerance Limit, TL = X + (K * S), LL Lower Tolerance Limit, LL = X - (K * S)
X Mean, X = (sum of background results)/(count of background results)
** Read from Table 5, Appendix B of Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,Interim Guidance, EPA, 1989, based on total number of background results - The K-factor for pH to account for a two-sided tolerance interval instead of a one-sided tolerance limit. The K-factor for pH was computed using a formula from NIST/SEMATECH e-Handbook of Statistical Methods, <http://www.itl.nist.gov/div898/handbook/>,2009.

D1-87

THIS PAGE INTENTIONALLY LEFT BLANK

ATTACHMENT D2

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

THIS PAGE INTENTIONALLY LEFT BLANK

C-746-S/T Third Quarter 2019 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**= 276.375 **S**= 80.507 **CV(1)**=0.291 **K factor****= 3.188 **TL(1)**= 533.032 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.588 **S**= 0.271 **CV(2)**=0.048 **K factor****= 3.188 **TL(2)**= 6.451 **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: MW396

Date Collected	Result	LN(Result)
7/19/2017	291	5.673
10/9/2017	217	5.380
1/23/2018	203	5.313
4/19/2018	275	5.617
7/19/2018	353	5.866
10/22/2018	210	5.347
1/23/2019	231	5.442
4/22/2019	431	6.066

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW386	Sidegradient	Yes	411	NO	6.019	N/A
MW390	Downgradient	Yes	481	NO	6.176	N/A
MW393	Downgradient	Yes	430	NO	6.064	N/A
MW396	Upgradient	Yes	415	NO	6.028	N/A

Conclusion of Statistical Analysis on Current Data

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

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

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

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

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-S/T Third Quarter 2019 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**= 33.850 **S**= 26.140 **CV(1)**=0.772 **K factor****= 3.188 **TL(1)**= 117.186 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 3.375 **S**= 0.496 **CV(2)**=0.147 **K factor****= 3.188 **TL(2)**= 4.955 **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: MW396

Date Collected	Result	LN(Result)
7/19/2017	24.4	3.195
10/9/2017	23.5	3.157
1/23/2018	21.5	3.068
4/19/2018	98.4	4.589
7/19/2018	27.6	3.318
10/22/2018	24.5	3.199
1/23/2019	25.4	3.235
4/22/2019	25.5	3.239

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW390	Downgradient	Yes	51.3	NO	3.938	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-S/T Third Quarter 2019 Statistical Analysis**Current Background Comparison****Technetium-99****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 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**= -0.541 **S**= 7.148 **CV(1)**=-13.207 **K factor****= 3.188 **TL(1)**= 22.247 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 1.230 **S**= 0.781 **CV(2)**=0.635 **K factor****= 3.188 **TL(2)**= 1.828 **LL(2)**=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW396

Date Collected	Result	LN(Result)
7/19/2017	1.19	0.174
10/9/2017	-11.3	#Func!
1/23/2018	5.85	1.766
4/19/2018	-10.3	#Func!
7/19/2018	1.84	0.610
10/22/2018	-3.72	#Func!
1/23/2019	6.22	1.828
4/22/2019	5.89	1.773

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)
MW390	Downgradient	Yes	55.6	YES	4.018	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

MW390

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-S/T Third Quarter 2019 Statistical Analysis

Current Background Comparison

Beta activity

UNITS: pCi/L

URGA

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

Statistics-Background Data X= 9.155 S= 7.311 CV(1)=0.799 K factor**= 2.523 TL(1)= 27.602 LL(1)=N/A

Statistics-Transformed Background Data X= 2.193 S= 0.659 CV(2)=0.300 K factor**= 2.523 TL(2)= 3.135 LL(2)=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
7/19/2017	22.5	3.114
10/9/2017	13.1	2.573
1/23/2018	12.8	2.549
4/17/2018	14.4	2.667
7/19/2018	8.64	2.156
10/15/2018	12.2	2.501
1/22/2019	23	3.135
4/16/2019	8.19	2.103

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	6.29	1.839
10/9/2017	-0.603	#Func!
1/23/2018	-3.27	#Func!
4/19/2018	8.1	2.092
7/19/2018	2.94	1.078
10/22/2018	11.1	2.407
1/23/2019	4.28	1.454
4/22/2019	2.82	1.037

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)
MW369	Downgradient	Yes	120	YES	4.787	N/A
MW372	Downgradient	Yes	141	YES	4.949	N/A
MW384	Sidegradient	Yes	83.6	YES	4.426	N/A
MW387	Downgradient	Yes	145	YES	4.977	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

MW369
MW372
MW384
MW387

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-S/T Third Quarter 2019 Statistical Analysis**Current 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 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**= 25.063 **S**= 3.938 **CV(1)**=0.157 **K factor****= 2.523 **TL(1)**= 34.998 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 3.210 **S**= 0.153 **CV(2)**=0.048 **K factor****= 2.523 **TL(2)**= 3.595 **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: MW220

Date Collected	Result	LN(Result)
7/19/2017	22.7	3.122
10/9/2017	19.9	2.991
1/23/2018	18.8	2.934
4/17/2018	22.6	3.118
7/19/2018	25.5	3.239
10/15/2018	20.6	3.025
1/22/2019	26	3.258
4/16/2019	35.8	3.578

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW372	Downgradient	Yes	49.7	YES	3.906	N/A

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	26.1	3.262
10/9/2017	25.7	3.246
1/23/2018	26	3.258
4/19/2018	25.4	3.235
7/19/2018	27.9	3.329
10/22/2018	25.4	3.235
1/23/2019	27.9	3.329
4/22/2019	24.7	3.207

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

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-S/T Third Quarter 2019 Statistical Analysis**Current Background Comparison****Chemical Oxygen Demand (COD)****UNITS: mg/L****URGA**

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is 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**= 20.944 **S**= 8.628 **CV(1)**=0.412 **K factor****= 2.523 **TL(1)**= 42.712 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 2.977 **S**= 0.358 **CV(2)**=0.120 **K factor****= 2.523 **TL(2)**= 3.880 **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: MW220

Date Collected	Result	LN(Result)
7/19/2017	46.8	3.846
10/9/2017	14.2	2.653
1/23/2018	18.9	2.939
4/17/2018	26.3	3.270
7/19/2018	29.3	3.378
10/15/2018	20	2.996
1/22/2019	20	2.996
4/16/2019	16.4	2.797

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	20	2.996
10/9/2017	12.5	2.526
1/23/2018	12.6	2.534
4/19/2018	18.4	2.912
7/19/2018	27.6	3.318
10/22/2018	11.8	2.468
1/23/2019	20	2.996
4/22/2019	20.3	3.011

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW372	Downgradient	Yes	69.4	YES	4.240	N/A
MW387	Downgradient	Yes	52.4	YES	3.959	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

MW372
MW387

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

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-S/T Third Quarter 2019 Statistical Analysis**Current 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 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**= 219.563 **S**= 70.198 **CV(1)**=0.320 **K factor****= 2.523 **TL(1)**= 396.672 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.356 **S**= 0.258 **CV(2)**=0.048 **K factor****= 2.523 **TL(2)**= 6.007 **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: MW220

Date Collected	Result	LN(Result)
7/19/2017	451	6.111
10/9/2017	147	4.990
1/23/2018	163	5.094
4/17/2018	183	5.209
7/19/2018	207	5.333
10/15/2018	226	5.421
1/22/2019	209	5.342
4/16/2019	273	5.609

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	203	5.313
10/9/2017	170	5.136
1/23/2018	187	5.231
4/19/2018	271	5.602
7/19/2018	204	5.318
10/22/2018	206	5.328
1/23/2019	197	5.283
4/22/2019	216	5.375

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW372	Downgradient	Yes	616	YES	6.423	N/A
MW387	Downgradient	Yes	320	NO	5.768	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

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-S/T Third Quarter 2019 Statistical Analysis

Current 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 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= 10.525 S= 1.234 CV(1)=0.117 K factor**= 2.523 TL(1)= 13.638 LL(1)=N/A

Statistics-Transformed Background Data X= 2.347 S= 0.124 CV(2)=0.053 K factor**= 2.523 TL(2)= 2.659 LL(2)=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
7/19/2017	9.36	2.236
10/9/2017	8.67	2.160
1/23/2018	8.04	2.084
4/17/2018	9.63	2.265
7/19/2018	11.1	2.407
10/15/2018	8.8	2.175
1/22/2019	10.8	2.380
4/16/2019	10.3	2.332

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	11.4	2.434
10/9/2017	11.4	2.434
1/23/2018	11.5	2.442
4/19/2018	11.7	2.460
7/19/2018	12	2.485
10/22/2018	11.3	2.425
1/23/2019	11.4	2.434
4/22/2019	11	2.398

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)
MW372	Downgradient	Yes	19.2	YES	2.955	N/A
MW387	Downgradient	Yes	16	YES	2.773	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

MW372
MW387

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. D2-10

C-746-S/T Third Quarter 2019 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**= 370.438 **S**= 65.216 **CV(1)**=0.176 **K factor****= 2.523 **TL(1)**= 534.976 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.901 **S**= 0.172 **CV(2)**=0.029 **K factor****= 2.523 **TL(2)**= 6.334 **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: MW220

Date Collected	Result	LN(Result)
7/19/2017	350	5.858
10/9/2017	436	6.078
1/23/2018	362	5.892
4/17/2018	305	5.720
7/19/2018	390	5.966
10/15/2018	413	6.023
1/22/2019	361	5.889
5/30/2019	523	6.260

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	338	5.823
10/9/2017	337	5.820
1/23/2018	264	5.576
4/19/2018	310	5.737
7/19/2018	375	5.927
10/22/2018	386	5.956
1/23/2019	314	5.749
5/29/2019	463	6.138

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW220	Upgradient	Yes	407	NO	6.009	N/A
MW221	Sidegradient	Yes	422	NO	6.045	N/A
MW222	Sidegradient	Yes	438	NO	6.082	N/A
MW223	Sidegradient	Yes	402	NO	5.996	N/A
MW224	Sidegradient	Yes	444	NO	6.096	N/A
MW369	Downgradient	Yes	410	NO	6.016	N/A
MW384	Sidegradient	Yes	421	NO	6.043	N/A
MW387	Downgradient	Yes	442	NO	6.091	N/A
MW391	Downgradient	Yes	440	NO	6.087	N/A
MW394	Upgradient	Yes	435	NO	6.075	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-S/T Third Quarter 2019 Statistical Analysis

Current 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 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= 15.575 S= 5.663 CV(1)=0.364 K factor**= 2.523 TL(1)= 29.864 LL(1)=N/A

Statistics-Transformed Background Data X= 2.685 S= 0.359 CV(2)=0.134 K factor**= 2.523 TL(2)= 3.589 LL(2)=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
7/19/2017	22.7	3.122
10/9/2017	17.6	2.868
1/23/2018	16.4	2.797
4/17/2018	21.1	3.049
7/19/2018	24.7	3.207
10/15/2018	16.9	2.827
1/22/2019	21.4	3.063
4/16/2019	24.1	3.182

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	10.2	2.322
10/9/2017	10.5	2.351
1/23/2018	10.4	2.342
4/19/2018	10.4	2.342
7/19/2018	10.5	2.351
10/22/2018	10.6	2.361
1/23/2019	11	2.398
4/22/2019	10.7	2.370

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)
MW220	Upgradient	Yes	18.5	NO	2.918	N/A
MW223	Sidegradient	Yes	17.5	NO	2.862	N/A
MW372	Downgradient	Yes	70.5	YES	4.256	N/A
MW384	Sidegradient	Yes	23.8	NO	3.170	N/A
MW387	Downgradient	Yes	30.7	YES	3.424	N/A
MW391	Downgradient	Yes	30.6	YES	3.421	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

MW372
MW387
MW391

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

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-S/T Third Quarter 2019 Statistical Analysis

Current Background Comparison

Technetium-99

UNITS: pCi/L

URGA

The CV is calculated to determine if background data are normally distributed. If so, the current test well results are compared to the TL. If not, a transformation is performed on the background and test well results, then each transformed test well result is compared to the transformed TL. If the test well result exceeds the TL, that is 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= 13.566 S= 7.940 CV(1)=0.585 K factor**= 2.523 TL(1)= 33.598 LL(1)=N/A

Statistics-Transformed Background Data X= 2.201 S= 1.311 CV(2)=0.596 K factor**= 2.523 TL(2)= 5.508 LL(2)=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW220

Date Collected	Result	LN(Result)
7/19/2017	22.7	3.122
10/9/2017	18.3	2.907
1/23/2018	27.4	3.311
4/17/2018	19.9	2.991
7/19/2018	14	2.639
10/15/2018	20.8	3.035
1/22/2019	19.4	2.965
4/16/2019	17.1	2.839

Well Number: MW394

Date Collected	Result	LN(Result)
7/19/2017	11.1	2.407
10/9/2017	1.99	0.688
1/23/2018	6.15	1.816
4/19/2018	0.158	-1.845
7/19/2018	10.6	2.361
10/22/2018	13.4	2.595
1/23/2019	11.5	2.442
4/22/2019	2.55	0.936

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)
MW369	Downgradient	Yes	55.8	YES	4.022	N/A
MW372	Downgradient	Yes	183	YES	5.209	N/A
MW384	Sidegradient	Yes	122	YES	4.804	N/A
MW387	Downgradient	Yes	378	YES	5.935	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

MW369
MW372
MW384
MW387

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

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-S/T Third Quarter 2019 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= 7.304	S= 2.928	CV(1)=0.401	K factor**= 2.523	TL(1)= 14.691	LL(1)=N/A
-----------------------------------	-----------------	-----------------	--------------------	--------------------------	----------------------	------------------

Statistics-Transformed Background Data	X= 1.909	S= 0.422	CV(2)=0.221	K factor**= 2.523	TL(2)= 2.975	LL(2)=N/A
---	-----------------	-----------------	--------------------	--------------------------	---------------------	------------------

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
7/19/2017	5.16	1.641
10/9/2017	8.17	2.100
1/23/2018	7.59	2.027
4/19/2018	5.4	1.686
7/19/2018	7.89	2.066
10/22/2018	9.41	2.242
1/23/2019	5.24	1.656
4/22/2019	3.8	1.335

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	9.5	2.251
10/9/2017	11.9	2.477
1/23/2018	2.66	0.978
4/17/2018	5.57	1.717
7/19/2018	13.8	2.625
10/15/2018	5.14	1.637
1/23/2019	8.19	2.103
4/16/2019	7.45	2.008

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)
MW370	Downgradient	Yes	52.7	YES	3.965	N/A
MW385	Sidegradient	Yes	55.5	YES	4.016	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
MW385

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

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-S/T Third Quarter 2019 Statistical Analysis

Current 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 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= 21.806 S= 4.065 CV(1)=0.186 K factor**= 2.523 TL(1)= 32.063 LL(1)=N/A

Statistics-Transformed Background Data X= 3.066 S= 0.189 CV(2)=0.062 K factor**= 2.523 TL(2)= 3.543 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: MW395

Date Collected	Result	LN(Result)
7/19/2017	26.2	3.266
10/9/2017	25.3	3.231
1/23/2018	24.5	3.199
4/19/2018	24.5	3.199
7/19/2018	27.1	3.300
10/22/2018	24.4	3.195
1/23/2019	27.3	3.307
4/22/2019	25.4	3.235

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW373	Downgradient	Yes	67.9	YES	4.218	N/A

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	17.2	2.845
10/9/2017	18.7	2.929
1/23/2018	19.4	2.965
4/17/2018	16.8	2.821
7/19/2018	16.9	2.827
10/15/2018	19.3	2.960
1/23/2019	19	2.944
4/16/2019	16.9	2.827

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

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

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. D2-15

C-746-S/T Third Quarter 2019 Statistical Analysis**Current 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 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**= 23.386 **S**= 13.139 **CV(1)**=0.562 **K factor****= 2.523 **TL(1)**= 56.536 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 3.038 **S**= 0.470 **CV(2)**=0.155 **K factor****= 2.523 **TL(2)**= 4.224 **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: MW395

Date Collected	Result	LN(Result)
7/19/2017	12.7	2.542
10/9/2017	14.2	2.653
1/23/2018	18.9	2.939
4/19/2018	42.2	3.742
7/19/2018	24.3	3.190
10/22/2018	9.87	2.289
1/23/2019	20	2.996
4/22/2019	26.2	3.266

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	20	2.996
10/9/2017	14.2	2.653
1/23/2018	18.9	2.939
4/17/2018	37.4	3.622
7/19/2018	14.5	2.674
10/15/2018	60.8	4.108
1/23/2019	20	2.996
4/16/2019	20	2.996

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW373	Downgradient	Yes	107	YES	4.673	N/A
MW395	Upgradient	Yes	47.6	NO	3.863	N/A
MW397	Upgradient	Yes	59.8	YES	4.091	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

MW373
MW397

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-S/T Third Quarter 2019 Statistical Analysis**Current 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 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**= 349.500 **S**= 31.018 **CV(1)**=0.089 **K factor****= 2.523 **TL(1)**= 427.759 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.853 **S**= 0.089 **CV(2)**=0.015 **K factor****= 2.523 **TL(2)**= 6.076 **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: MW395

Date Collected	Result	LN(Result)
7/19/2017	392	5.971
10/9/2017	378	5.935
1/23/2018	384	5.951
4/19/2018	372	5.919
7/19/2018	396	5.981
10/22/2018	375	5.927
1/23/2019	359	5.883
5/29/2019	367	5.905

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW373	Downgradient	Yes	785	YES	6.666	N/A

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	315	5.753
10/9/2017	333	5.808
1/23/2018	326	5.787
4/17/2018	307	5.727
8/21/2018	326	5.787
10/15/2018	321	5.771
1/23/2019	316	5.756
4/16/2019	325	5.784

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

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

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. D2-17

C-746-S/T Third Quarter 2019 Statistical Analysis**Current 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 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**= 187.813 **S**= 40.479 **CV(1)**=0.216 **K factor****= 2.523 **TL(1)**= 289.941 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.215 **S**= 0.204 **CV(2)**=0.039 **K factor****= 2.523 **TL(2)**= 5.731 **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: MW395

Date Collected	Result	LN(Result)
7/19/2017	210	5.347
10/9/2017	163	5.094
1/23/2018	176	5.170
4/19/2018	257	5.549
7/19/2018	203	5.313
10/22/2018	176	5.170
1/23/2019	284	5.649
4/22/2019	173	5.153

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW373	Downgradient	Yes	481	YES	6.176	N/A

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	171	5.142
10/9/2017	156	5.050
1/23/2018	179	5.187
4/17/2018	124	4.820
7/19/2018	160	5.075
10/15/2018	184	5.215
1/23/2019	160	5.075
4/16/2019	229	5.434

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

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-S/T Third Quarter 2019 Statistical Analysis

Current 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 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= 9.489	S= 1.782	CV(1)=0.188	K factor**= 2.523	TL(1)= 13.986	LL(1)=N/A
Statistics-Transformed Background Data	X= 2.233	S= 0.193	CV(2)=0.086	K factor**= 2.523	TL(2)= 2.720	LL(2)=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
7/19/2017	10.9	2.389
10/9/2017	11.4	2.434
1/23/2018	10.8	2.380
4/19/2018	11.4	2.434
7/19/2018	11.7	2.460
10/22/2018	10.7	2.370
1/23/2019	11.2	2.416
4/22/2019	11.1	2.407

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	7.37	1.997
10/9/2017	8.41	2.129
1/23/2018	8.61	2.153
4/17/2018	6.89	1.930
7/19/2018	7.38	1.999
10/15/2018	8.48	2.138
1/23/2019	7.84	2.059
4/16/2019	7.65	2.035

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)
MW373	Downgradient	Yes	27.2	YES	3.303	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

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

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-S/T Third Quarter 2019 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**= 370.375 **S**= 77.460 **CV(1)**=0.209 **K factor****= 2.523 **TL(1)**= 565.805 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 5.890 **S**= 0.238 **CV(2)**=0.040 **K factor****= 2.523 **TL(2)**= 6.490 **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: MW395

Date Collected	Result	LN(Result)
7/19/2017	392	5.971
10/9/2017	385	5.953
1/23/2018	195	5.273
4/19/2018	367	5.905
7/19/2018	336	5.817
10/22/2018	237	5.468
1/23/2019	433	6.071
5/29/2019	477	6.168

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	352	5.864
10/9/2017	362	5.892
1/23/2018	361	5.889
4/17/2018	319	5.765
8/21/2018	404	6.001
10/15/2018	407	6.009
1/23/2019	394	5.976
4/16/2019	505	6.225

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	421	NO	6.043	N/A
MW373	Downgradient	Yes	417	NO	6.033	N/A
MW385	Sidegradient	Yes	420	NO	6.040	N/A
MW388	Downgradient	Yes	412	NO	6.021	N/A
MW392	Downgradient	Yes	432	NO	6.068	N/A
MW395	Upgradient	Yes	449	NO	6.107	N/A
MW397	Upgradient	Yes	395	NO	5.979	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, $S = \sqrt{[\text{Sum} ((\text{background result}-X)^2)/[\text{count of background results} -1]]}^{0.5}$

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-S/T Third Quarter 2019 Statistical Analysis

Current 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 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**= 10.309 **S**= 0.495 **CV(1)**=0.048 **K factor****= 2.523 **TL(1)**= 11.558 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 2.332 **S**= 0.048 **CV(2)**=0.021 **K factor****= 2.523 **TL(2)**= 2.453 **LL(2)**=N/A

Current Background Data from Upgradient Wells with Transformed Result

Well Number: MW395

Date Collected	Result	LN(Result)
7/19/2017	10	2.303
10/9/2017	10.1	2.313
1/23/2018	10.4	2.342
4/19/2018	10.5	2.351
7/19/2018	10.4	2.342
10/22/2018	10.2	2.322
1/23/2019	10.6	2.361
4/22/2019	10.5	2.351

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	10.1	2.313
10/9/2017	11.1	2.407
1/23/2018	11.4	2.434
4/17/2018	9.21	2.220
7/19/2018	9.94	2.297
10/15/2018	10.4	2.342
1/23/2019	10.1	2.313
4/16/2019	10	2.303

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)
MW370	Downgradient	Yes	20.2	YES	3.006	N/A
MW373	Downgradient	Yes	148	YES	4.997	N/A
MW385	Sidegradient	Yes	21.1	YES	3.049	N/A
MW388	Downgradient	Yes	25.2	YES	3.227	N/A
MW392	Downgradient	Yes	23.4	YES	3.153	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
MW373
MW385
MW388
MW392

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

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-S/T Third Quarter 2019 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**= 15.404 **S**= 7.747 **CV(1)**=0.503 **K factor****= 2.523 **TL(1)**= 34.950 **LL(1)**=N/A

Statistics-Transformed Background Data **X**= 2.608 **S**= 0.544 **CV(2)**=0.209 **K factor****= 2.523 **TL(2)**= 3.981 **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: MW395

Date Collected	Result	LN(Result)
7/19/2017	19.2	2.955
10/9/2017	3.67	1.300
1/23/2018	15.7	2.754
4/19/2018	9.83	2.285
7/19/2018	9.05	2.203
10/22/2018	13.2	2.580
1/23/2019	10.3	2.332
4/22/2019	11.2	2.416

Well Number: MW397

Date Collected	Result	LN(Result)
7/19/2017	29.8	3.395
10/9/2017	13	2.565
1/23/2018	13.2	2.580
4/17/2018	18.9	2.939
7/19/2018	21.9	3.086
10/15/2018	18.3	2.907
1/23/2019	7.12	1.963
4/16/2019	32.1	3.469

Current Quarter Data

Well No.	Gradient	Detected?	Result	Result >TL(1)?	LN(Result)	LN(Result) >TL(2)
MW370	Downgradient	Yes	107	YES	4.673	N/A
MW385	Sidegradient	Yes	125	YES	4.828	N/A
MW388	Downgradient	Yes	90.9	YES	4.510	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
MW385
MW388

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.

ATTACHMENT D3

STATISTICIAN QUALIFICATION STATEMENT

THIS PAGE INTENTIONALLY LEFT BLANK



Four Rivers Nuclear Partnership, LLC
5511 Hobbs Road
Kevil, KY 42053
www.fourriversnuclearpartnership.com

October 17, 2019

Ms. Kelly Layne
Four Rivers Nuclear Partnership, LLC
5511 Hobbs Road
Kevil, KY 42053

Dear Ms. Layne:

This statement is submitted in response to your request that it be included with the completed statistical analysis that I have performed on the groundwater data for the C-746-S&T and C-746-U Landfills at the Paducah Site.

As an Environmental Scientist, with a bachelor's degree in science, I have over 20 years of experience in reviewing and assessing laboratory analytical results associated with environmental sampling and investigation activities. For the generation of these statistical analyses, my work was observed and reviewed by a senior chemist with Four Rivers Nuclear Partnership, LLC.

For this project, the statistical analyses conducted on the third quarter 2019 monitoring well data collected from the C-746-S&T and C-746-U Landfills were performed in accordance with guidance provided in the U.S. Environmental Protection Agency guidance document, *EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance* (1989).

Sincerely,

A handwritten signature in black ink, appearing to read "Jennifer R. Watson".

Jennifer R. Watson

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

GROUNDWATER FLOW RATE AND DIRECTION

THIS PAGE INTENTIONALLY LEFT BLANK

GROUNDWATER FLOW RATE AND DIRECTION

Whenever monitoring wells (MWs) are sampled, 401 KAR 48:300, Section 11, requires determination of groundwater flow rate and direction of flow in the uppermost aquifer. The uppermost aquifer below the C-746-S&T Landfills 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 2019 and to determine the groundwater flow rate and direction.

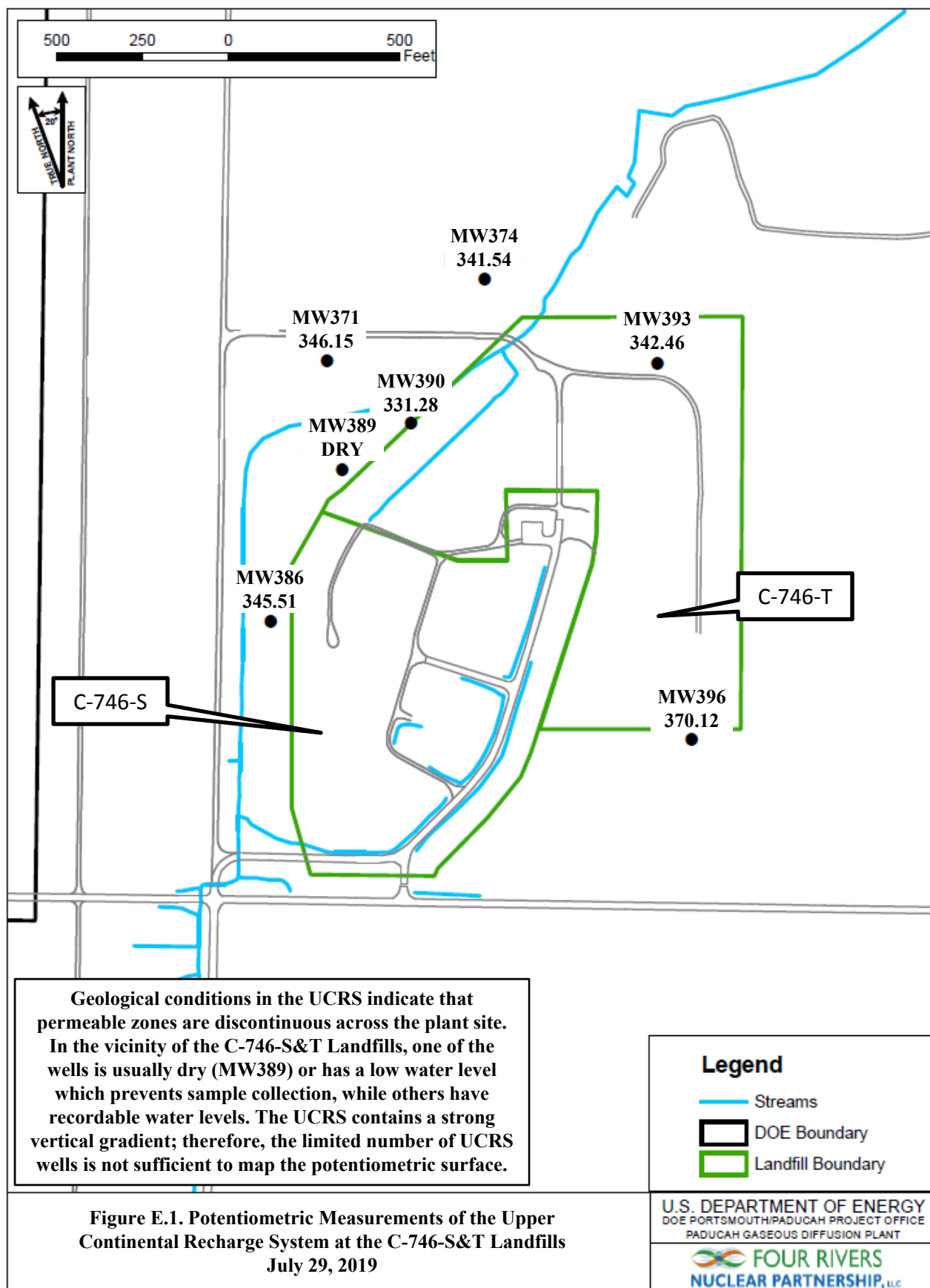
Water levels during this reporting period were measured on July 29, 2019. As shown on Figure E.1, MW389, screened in the Upper Continental Recharge System (UCRS), is usually dry, while other UCRS wells have recordable water levels. During this reporting period, MW389 had insufficient water for both measurement of the water level and for sampling.

The UCRS has a strong vertical hydraulic gradient; therefore, the limited number of available UCRS wells, screened over different elevations, is not sufficient for mapping the potentiometric surface. Figure E.1 shows the location of UCRS MWs. The Upper Regional Gravel Aquifer (URGA) and Lower Regional Gravel Aquifer (LRGA) data were corrected for barometric pressure, if necessary, and converted to elevations to plot the potentiometric surface of the RGA, as a whole, as shown on Table E.1. Figure E.2 is a composite or average map of the URGA and LRGA elevations where well clusters exist. The contour lines are placed based on the average water level elevations of the clusters.¹ Based on the site potentiometric map (Figure E.2), the hydraulic gradient beneath the landfill, as measured along the defined groundwater flow directions, is 4.45×10^{-4} ft/ft. Additional water level measurements in July (Figure E.3) document the vicinity groundwater hydraulic gradient for the RGA to be 4.99×10^{-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. 073-00045NWC1 and range from 425 to 725 ft/day (0.150 to 0.256 cm/s). RGA effective porosity is assumed to be 25%. Vicinity and site flow velocities were calculated using the low and high values for hydraulic conductivity, as shown in Table E.3.

Regional groundwater flow near the C-746-S&T Landfills typically trends northeastward toward the Ohio River. As demonstrated on the potentiometric map for July 2019, the groundwater flow direction in the immediate area of the landfill varied from northwest to northeast.

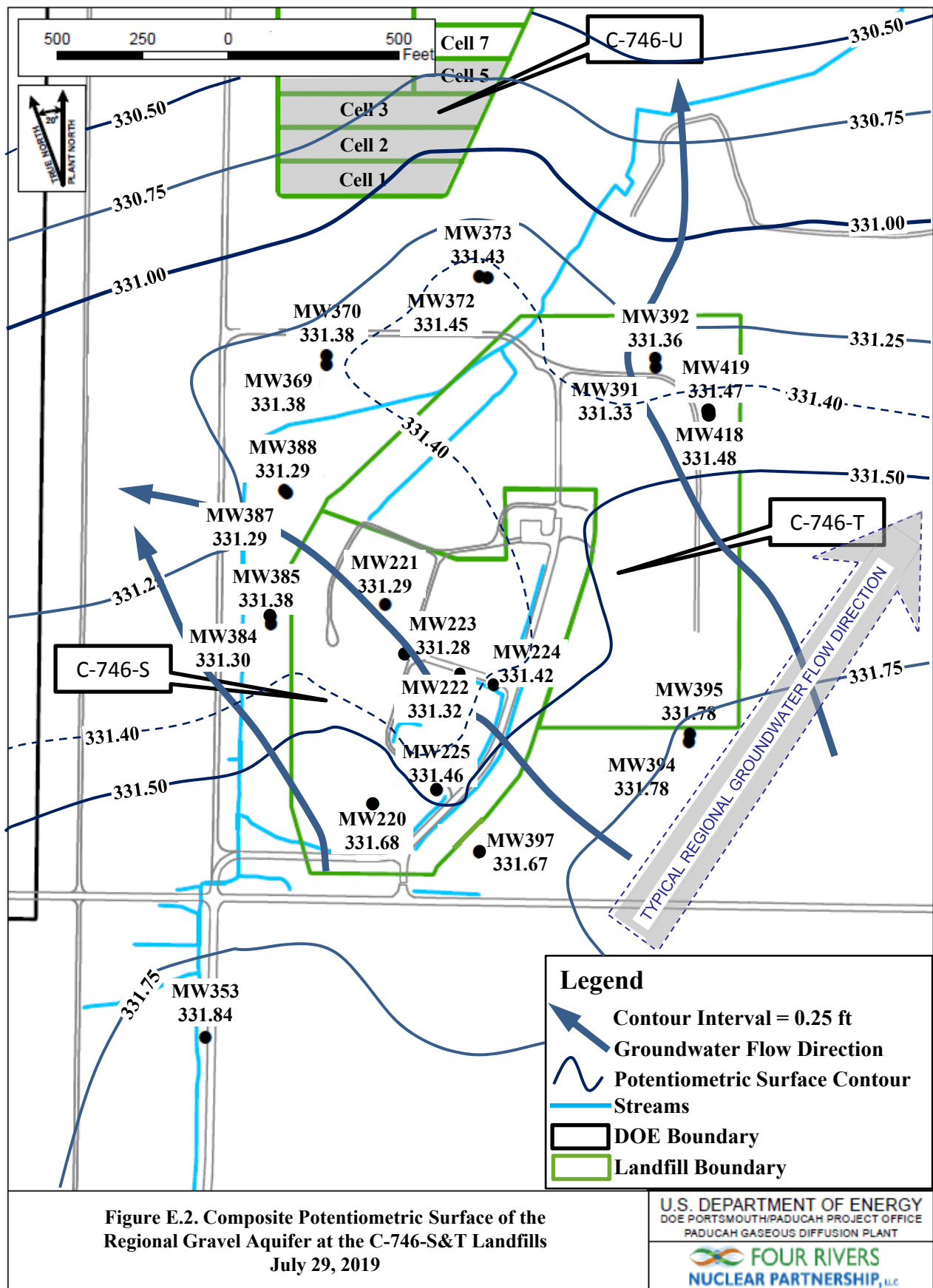
¹ Additional water level measurements, in wells at the C-746-U Landfill and in wells of the surrounding region (MW98, MW100, MW125, MW139, MW165A, MW173, MW193, MW197, and MW200), were used to contour the RGA potentiometric surface.



G:\GIS\ARCVIEW\PROJECTS\Quarterly Landfill Reports\Basemap Template.mxd
11/29/2018

Table E.1. C-746-S&T Landfills Third Quarter 2019 (July) Water Levels

C-746-S&T Landfills (July 2019) Water Levels										
Date	Time	Well	Formation	Datum Elev (ft amsl)	BP (in Hg)	Delta BP (ft H2O)	Raw Data		*Corrected Data	
							DTW (ft)	Elev (ft amsl)	DTW (ft)	Elev (ft amsl)
7/29/2019	16:12	MW220	URGA	382.27	29.98	0.02	50.57	331.70	50.59	331.68
7/29/2019	16:20	MW221	URGA	391.51	29.98	0.02	60.20	331.31	60.22	331.29
7/29/2019	16:17	MW222	URGA	395.39	29.98	0.02	64.05	331.34	64.07	331.32
7/29/2019	16:18	MW223	URGA	394.49	29.98	0.02	63.19	331.30	63.21	331.28
7/29/2019	16:15	MW224	URGA	395.82	29.98	0.02	64.38	331.44	64.40	331.42
7/29/2019	16:14	MW225	URGA	385.88	29.98	0.02	54.40	331.48	54.42	331.46
7/29/2019	14:46	MW353	LRGA	375.12	30.00	0.00	43.28	331.84	43.28	331.84
7/29/2019	16:10	MW384	URGA	365.42	29.98	0.02	34.10	331.32	34.12	331.30
7/29/2019	16:08	MW385	LRGA	365.86	29.98	0.02	34.46	331.40	34.48	331.38
7/29/2019	16:09	MW386	UCRS	365.47	29.98	0.02	19.94	345.53	19.96	345.51
7/29/2019	16:07	MW387	URGA	363.65	29.98	0.02	32.34	331.31	32.36	331.29
7/29/2019	16:06	MW388	LRGA	363.64	29.98	0.02	32.33	331.31	32.35	331.29
7/29/2019	16:05	MW389	UCRS	364.26	--	--	--	--	DRY	--
7/29/2019	16:04	MW390	UCRS	360.60	29.98	0.02	29.30	331.30	29.32	331.28
7/29/2019	15:50	MW391	URGA	366.83	29.98	0.02	35.48	331.35	35.50	331.33
7/29/2019	15:52	MW392	LRGA	366.07	29.98	0.02	34.69	331.38	34.71	331.36
7/29/2019	15:51	MW393	UCRS	366.81	29.98	0.02	24.33	342.48	24.35	342.46
7/29/2019	15:56	MW394	URGA	378.64	29.98	0.02	46.84	331.80	46.86	331.78
7/29/2019	15:58	MW395	LRGA	379.34	29.98	0.02	47.54	331.80	47.56	331.78
7/29/2019	15:57	MW396	UCRS	378.84	29.98	0.02	8.70	370.14	8.72	370.12
7/29/2019	16:00	MW397	LRGA	387.12	29.98	0.02	55.43	331.69	55.45	331.67
7/29/2019	15:53	MW418	URGA	367.37	29.98	0.02	35.87	331.50	35.89	331.48
7/29/2019	15:54	MW419	LRGA	367.22	29.98	0.02	35.73	331.49	35.75	331.47
Reference Barometric Pressure			30.00							
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										
*Assumes a barometric efficiency of 1.0										



G:\GIS\ARCVIEW\PROJECTS\Quarterly Landfill Reports\Basemap Template.mxd
11/29/2018

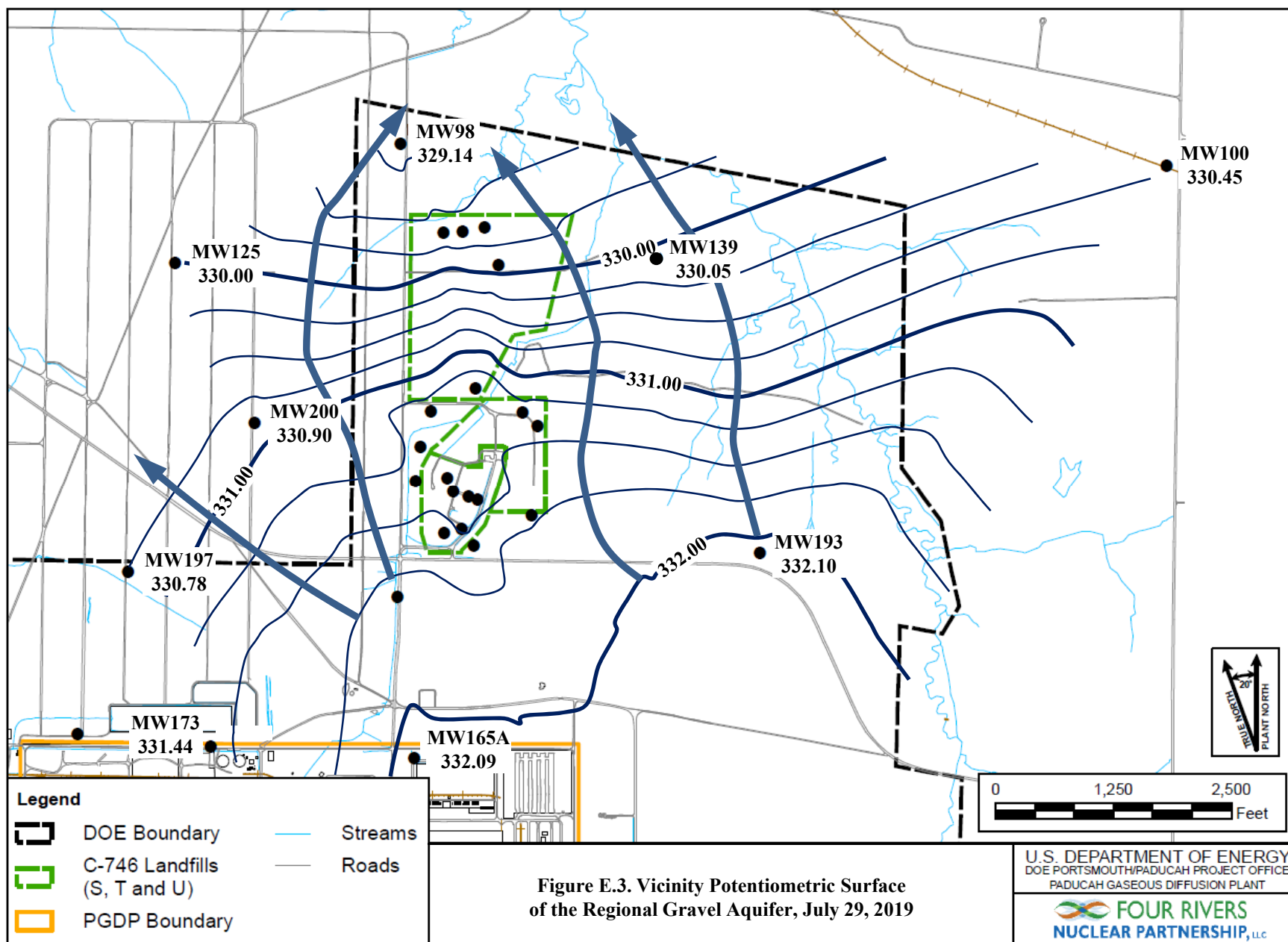


Table E.2. C-746-S&T Landfills Hydraulic Gradients

	ft/ft
Beneath Landfill Mound	4.45×10^{-4}
Vicinity	4.99×10^{-4}

Table E.3. C-746-S&T Landfills 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>Beneath Landfill Mound</u>					
725	0.256	0.323	1.14×10^{-4}	1.29	4.56×10^{-4}
425	0.150	0.189	6.68×10^{-5}	0.757	2.67×10^{-4}
<u>Vicinity</u>					
725	0.256	0.362	1.28×10^{-4}	1.45	5.11×10^{-4}
425	0.150	0.212	7.48×10^{-5}	0.848	2.99×10^{-4}

APPENDIX F
NOTIFICATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

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 are listed on the 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 2019 groundwater data collected from the C-746-S&T Landfills 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>
Upper Continental Recharge System	Technetium-99	MW390
Upper Regional Gravel Aquifer	Technetium-99	MW369, MW372, MW384, MW387
Lower Regional Gravel Aquifer	Technetium-99	MW370, MW385, MW388

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.

8/19/2019

**Four Rivers Nuclear Partnership, LLC
PROJECT ENVIRONMENTAL MEASUREMENTS SYSTEM
C-746-S&T LANDFILLS
SOLID WASTE PERMIT NUMBER SW07300014, SW07300015, SW07300045
MAXIMUM CONTAMINANT LEVEL (MCL) EXCEEDANCE REPORT
Quarterly Groundwater Sampling**

AKGWA	Station	Analysis	Method	Results	Units	MCL
8004-4820	MW369	Beta activity	9310	120	pCi/L	50
8004-4818	MW370	Beta activity	9310	52.7	pCi/L	50
8004-4808	MW372	Beta activity	9310	141	pCi/L	50
8004-4809	MW384	Beta activity	9310	83.6	pCi/L	50
8004-4810	MW385	Beta activity	9310	55.5	pCi/L	50
8004-4815	MW387	Beta activity	9310	145	pCi/L	50
8004-4805	MW391	Trichloroethene	8260B	12	ug/L	5
8004-4806	MW392	Trichloroethene	8260B	10.3	ug/L	5

NOTE 1: MCLs are defined in 401 KAR 47:030.

NOTE 2: MW369, MW370, MW372, and MW373 are down-gradient wells for the C-746-S and C-746-T Landfills and upgradient for the C-746-U Landfill. These wells are sampled with the C-746-U Landfill monitoring well network. These wells are reported on the exceedance reports for C-746-S, C-746-T, and C-746-U.

APPENDIX G

CHART OF MCL AND UTL EXCEEDANCES

THIS PAGE INTENTIONALLY LEFT BLANK

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
ACETONE																							
Quarter 3, 2003							*					*											
Quarter 4, 2003											*								*				
Quarter 1, 2005									*														
ALPHA ACTIVITY																							
Quarter 4, 2002				■	■								■										
Quarter 4, 2008										■													
Quarter 4, 2010										■													
ALUMINUM																							
Quarter 1, 2003			*				*					*	*	*									
Quarter 2, 2003			*				*					*	*	*									
Quarter 3, 2003			*				*	*				*	*	*									
Quarter 4, 2003							*	*			*			*									
Quarter 1, 2004			*				*	*			*												
Quarter 2, 2004							*							*									
Quarter 3, 2004							*							*									
Quarter 4, 2004			*																				
Quarter 1, 2005			*																				
Quarter 2, 2005			*				*																
Quarter 3, 2005			*				*			*											*		
Quarter 4, 2005			*				*			*													
Quarter 1, 2006							*						*										
Quarter 2, 2006			*				*																
Quarter 3, 2006							*																
Quarter 4, 2006			*				*																
Quarter 1, 2007			*				*										*						
Quarter 2, 2007							*										*						
Quarter 3, 2007							*																
Quarter 4, 2007							*																
Quarter 1, 2008							*							*									
Quarter 2, 2008											*												
Quarter 4, 2008							*																
Quarter 1, 2009			*				*				*												
Quarter 1, 2010			*				*				*												
Quarter 2, 2010			*								*												
Quarter 3, 2010			*								*			*			*		*				
Quarter 1, 2011							*				*												
Quarter 2, 2011			*								*												
Quarter 2, 2012			*																				
Quarter 3, 2012							*																
Quarter 1, 2013							*				*												
Quarter 3, 2013			*																				
Quarter 1, 2014							*																
Quarter 2, 2014											*												
Quarter 4, 2014			*																				
Quarter 1, 2016							*																
Quarter 2, 2016														*									
Quarter 1, 2017							*																
Quarter 4, 2017																						*	
Quarter 1, 2018							*																
BARIUM																							
Quarter 3, 2003							■	■															
Quarter 4, 2003							■	■															
BETA ACTIVITY																							
Quarter 4, 2002													■										
Quarter 1, 2003													■				■						

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA											LRGA						
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
BETA ACTIVITY																							
Quarter 2, 2003			■	■													■			■			
Quarter 3, 2003			■										■				■						
Quarter 4, 2003			■							■							■						
Quarter 1, 2004			■										■				■						
Quarter 2, 2004			■									■	■				■		■	■			
Quarter 3, 2004			■									■	■				■						
Quarter 4, 2004			■									■	■				■						
Quarter 1, 2005			■							■			■				■						
Quarter 2, 2005			■										■				■			■			
Quarter 3, 2005										■			■				■						
Quarter 4, 2005										■		■	■				■						
Quarter 1, 2006										■		■	■				■		■	■			
Quarter 2, 2006			■							■		■	■				■		■	■			
Quarter 3, 2006										■		■	■				■		■	■			
Quarter 4, 2006	■		■							■		■	■				■		■	■			
Quarter 1, 2007			■							■		■	■				■		■	■			
Quarter 2, 2007			■							■		■	■				■		■	■			
Quarter 3, 2007										■		■	■				■						
Quarter 4, 2007			■							■		■	■				■		■	■			
Quarter 1, 2008			■							■		■	■				■			■			
Quarter 2, 2008			■							■	■		■				■			■			
Quarter 3, 2008										■		■	■				■			■			
Quarter 4, 2008										■		■	■				■						
Quarter 1, 2009			■							■		■	■				■						
Quarter 2, 2009										■		■	■				■						
Quarter 3, 2009										■		■	■				■			■			
Quarter 4, 2009										■		■	■				■						
Quarter 1, 2010												■	■				■						
Quarter 2, 2010			■							■			■				■						
Quarter 3, 2010										■		■	■				■						
Quarter 4, 2010										■		■	■				■						
Quarter 1, 2011										■			■				■						
Quarter 2, 2011			■							■			■				■						
Quarter 3, 2011										■		■	■				■			■			
Quarter 4, 2011										■		■	■				■						
Quarter 1, 2012			■							■			■				■			■			
Quarter 2, 2012			■							■			■				■			■			
Quarter 3, 2012										■		■	■				■						
Quarter 4, 2012										■		■	■				■		■	■			
Quarter 1, 2013										■		■	■				■		■	■			
Quarter 2, 2013										■		■	■				■			■			
Quarter 3, 2013										■		■	■				■		■	■			
Quarter 4, 2013										■		■	■				■			■			
Quarter 1, 2014			■							■		■	■				■						
Quarter 2, 2014										■		■	■				■			■			
Quarter 3, 2014										■			■				■			■			
Quarter 4, 2014										■		■	■				■			■			
Quarter 1, 2015										■		■	■				■			■			
Quarter 2, 2015										■		■	■				■			■			
Quarter 3, 2015										■			■				■			■			
Quarter 4, 2015										■		■	■				■			■			
Quarter 1, 2016			■							■			■				■			■			
Quarter 2, 2016										■			■				■			■			
Quarter 3, 2016										■			■				■	■		■			
Quarter 4, 2016										■	■		■				■			■			
Quarter 1, 2017										■			■				■			■			
Quarter 2, 2017										■			■				■	■		■			
Quarter 3, 2017										■			■				■	■		■			

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
BETA ACTIVITY																							
Quarter 4, 2017										■		■	■				■	■		■			
Quarter 1, 2018			■							■			■				■	■		■			
Quarter 2, 2018			■							■	■						■						
Quarter 3, 2018			■							■			■				■	■		■			
Quarter 4, 2018										■		■	■					■		■			
Quarter 1, 2019										■			■				■	■		■			
Quarter 2, 2019										■	■		■				■	■		■			
Quarter 3, 2019										■	■	■	■				■	■					
BROMIDE																							
Quarter 1, 2003			*																				
Quarter 4, 2003			*																				
Quarter 1, 2004			*																				
Quarter 2, 2004			*																				
Quarter 3, 2004			*																				
Quarter 4, 2004			*																				
Quarter 1, 2005			*																				
Quarter 3, 2006			*																				
CALCIUM																							
Quarter 1, 2003			*																				
Quarter 2, 2003			*									*											
Quarter 3, 2003			*																				
Quarter 4, 2003			*									*							*				
Quarter 1, 2004			*									*		*					*				
Quarter 2, 2004			*									*							*				
Quarter 3, 2004			*									*							*				
Quarter 4, 2004			*									*							*				
Quarter 1, 2005												*							*				
Quarter 2, 2005												*							*				
Quarter 3, 2005												*							*				
Quarter 4, 2005												*							*				
Quarter 1, 2006												*							*				
Quarter 2, 2006												*							*				
Quarter 3, 2006												*							*				
Quarter 4, 2006												*							*				
Quarter 1, 2007												*							*				
Quarter 2, 2007												*							*				
Quarter 3, 2007												*							*				
Quarter 4, 2007												*							*				
Quarter 1, 2008												*							*				
Quarter 2, 2008												*							*				
Quarter 3, 2008												*							*				
Quarter 4, 2008												*							*				
Quarter 1, 2009												*							*				
Quarter 2, 2009												*							*				
Quarter 3, 2009												*							*				
Quarter 4, 2009												*							*				
Quarter 1, 2010												*							*				
Quarter 2, 2010												*							*				
Quarter 3, 2010												*							*				
Quarter 4, 2010												*							*				
Quarter 1, 2011												*							*				
Quarter 2, 2011												*	*						*				
Quarter 3, 2011												*							*				
Quarter 4, 2011												*							*				
Quarter 1, 2012												*							*				
Quarter 2, 2012												*							*				
Quarter 3, 2012												*							*				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
CALCIUM																							
Quarter 4, 2012												*							*				
Quarter 1, 2013												*							*				
Quarter 2, 2013												*							*				
Quarter 3, 2013												*							*				
Quarter 4, 2013												*							*				
Quarter 1, 2014																		*	*				
Quarter 2, 2014												*							*				
Quarter 3, 2014												*						*	*				
Quarter 4, 2014												*							*				
Quarter 1, 2015												*	*						*				
Quarter 2, 2015												*							*				
Quarter 3, 2015												*							*				
Quarter 4, 2015												*							*				
Quarter 1, 2016												*							*				
Quarter 2, 2016												*		*					*				
Quarter 3, 2016												*							*				
Quarter 4, 2016												*							*				
Quarter 1, 2017												*							*				
Quarter 2, 2017												*							*				
Quarter 3, 2017												*							*				
Quarter 4, 2017												*							*				
Quarter 1, 2018												*							*				
Quarter 2, 2018												*							*				
Quarter 4, 2018												*							*				
Quarter 1, 2019												*							*				
Quarter 2, 2019												*							*				
Quarter 3, 2019												*							*				
CARBON DISULFIDE																							
Quarter 4, 2010											*												
Quarter 1, 2011												*									*		
Quarter 2, 2017													*										
CHEMICAL OXYGEN DEMAND																							
Quarter 1, 2003				*																			
Quarter 2, 2003				*																			
Quarter 3, 2003				*		*			*														
Quarter 4, 2003				*																			
Quarter 1, 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	*																						

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
CHEMICAL OXYGEN DEMAND																							
Quarter 4, 2009	*																						
Quarter 1, 2010	*																						
Quarter 2, 2010	*																						
Quarter 3, 2010	*																						
Quarter 4, 2010	*																						
Quarter 3, 2011	*																						
Quarter 4, 2011	*																						
Quarter 1, 2012	*																						
Quarter 1, 2013	*																						
Quarter 3, 2013	*																						
Quarter 3, 2014	*								*				*					*					
Quarter 4, 2014							*																
Quarter 2, 2015																*							
Quarter 3, 2015															*								
Quarter 3, 2016			*								*												
Quarter 4, 2016																	*						
Quarter 2, 2017							*																
Quarter 3, 2017	*														*								
Quarter 4, 2017						*																	
Quarter 2, 2018													*		*							*	
Quarter 3, 2018												*											*
Quarter 4, 2018																							*
Quarter 2, 2019					*							*		*				*					
Quarter 3, 2019												*	*	*				*			*	*	*
CHLORIDE																							
Quarter 1, 2003			*																				
Quarter 2, 2003			*																				
Quarter 3, 2003			*																				
Quarter 4, 2003			*																				
Quarter 1, 2004			*																				
Quarter 2, 2004			*																				
Quarter 3, 2004			*																				
Quarter 4, 2004			*																				
Quarter 1, 2005			*																				
Quarter 2, 2005			*																				
Quarter 3, 2005			*																				
Quarter 4, 2005			*																				
Quarter 1, 2006																		*					
Quarter 2, 2006			*																				
Quarter 3, 2006			*																				
Quarter 4, 2006			*																				
Quarter 1, 2007			*																				
Quarter 2, 2007			*																				
Quarter 3, 2007			*																				
Quarter 4, 2007			*																				
Quarter 1, 2008			*																				
Quarter 2, 2008			*																				
Quarter 3, 2008			*																				
Quarter 4, 2008			*																				
Quarter 1, 2009			*																				
Quarter 2, 2009			*																				
Quarter 3, 2009			*																				
Quarter 4, 2009			*																				
Quarter 1, 2010			*																				
Quarter 2, 2010			*																				
Quarter 3, 2010			*																				
Quarter 4, 2010			*																				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
CHLORIDE																							
Quarter 2, 2011			*																				
Quarter 3, 2011			*																				
Quarter 4, 2011			*																				
Quarter 3, 2012			*																				
Quarter 3, 2013			*																				
Quarter 4, 2013			*																				
Quarter 4, 2014			*																				
Quarter 2, 2019																					*		
CHROMIUM																							
Quarter 4, 2002									■														
Quarter 1, 2003									■													■	
Quarter 2, 2003								■	■														
Quarter 3, 2009						■																	
Quarter 1, 2019						■																	
COBALT																							
Quarter 3, 2003							*																
CONDUCTIVITY																							
Quarter 4, 2002										*									*				
Quarter 1, 2003			*							*									*				
Quarter 2, 2003			*							*									*				
Quarter 3, 2003			*					*		*									*				
Quarter 4, 2003			*							*									*				
Quarter 1, 2004																			*				
Quarter 2, 2004										*									*				
Quarter 3, 2004										*									*				
Quarter 4, 2004			*							*									*				
Quarter 1, 2005										*		*							*				
Quarter 2, 2005												*							*				
Quarter 3, 2005																			*				
Quarter 4, 2005										*		*							*				
Quarter 1, 2006												*							*				
Quarter 2, 2006												*							*				
Quarter 3, 2006												*							*				
Quarter 4, 2006												*					*		*				
Quarter 1, 2007												*					*		*				
Quarter 2, 2007																	*		*				
Quarter 3, 2007																	*		*				
Quarter 4, 2007												*					*		*				
Quarter 1, 2008												*							*				
Quarter 2, 2008												*							*				
Quarter 3, 2008												*					*		*				
Quarter 4, 2008												*							*				
Quarter 1, 2009												*							*				
Quarter 2, 2009												*							*				
Quarter 3, 2009												*							*				
Quarter 4, 2009												*					*		*				
Quarter 1, 2010												*							*				
Quarter 2, 2010												*							*				
Quarter 3, 2010												*							*				
Quarter 4, 2010												*							*				
Quarter 1, 2011										*		*							*				
Quarter 2, 2011												*							*				
Quarter 3, 2011												*							*				
Quarter 4, 2011												*							*				
Quarter 1, 2012											*	*							*				
Quarter 2, 2012												*							*				
Quarter 3, 2012												*							*				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
CONDUCTIVITY																							
Quarter 4, 2012												*							*				
Quarter 1, 2013												*							*				
Quarter 2, 2013												*							*				
Quarter 3, 2013												*							*				
Quarter 4, 2013												*							*				
Quarter 1, 2014												*							*				
Quarter 2, 2014												*							*				
Quarter 3, 2014												*							*				
Quarter 4, 2014												*							*				
Quarter 1, 2015												*							*				
Quarter 2, 2015												*							*				
Quarter 3, 2015												*							*				
Quarter 4, 2015												*							*				
Quarter 1, 2016												*							*				
Quarter 2, 2016												*							*				
Quarter 3, 2016												*							*				
Quarter 4, 2016												*							*				
Quarter 1, 2017												*							*				
Quarter 2, 2017												*							*				
Quarter 3, 2017												*							*				
Quarter 4, 2017												*							*				
Quarter 1, 2018												*							*				
Quarter 2, 2018												*							*				
Quarter 3, 2018												*							*				
Quarter 4, 2018												*							*				
Quarter 1, 2019												*							*				
Quarter 2, 2019												*							*				
Quarter 3, 2019												*							*				
DISSOLVED OXYGEN																							
Quarter 3, 2006			*					*															
DISSOLVED SOLIDS																							
Quarter 4, 2002										*									*				
Quarter 1, 2003			*							*									*				
Quarter 2, 2003			*							*									*				
Quarter 3, 2003			*				*	*		*		*							*				
Quarter 4, 2003			*				*		*	*		*							*				
Quarter 1, 2004			*									*							*				
Quarter 2, 2004										*		*							*				
Quarter 3, 2004										*		*							*				
Quarter 4, 2004										*		*							*				
Quarter 1, 2005												*							*				
Quarter 2, 2005																			*				
Quarter 3, 2005																	*	*	*	*	*		
Quarter 4, 2005																	*	*	*	*	*		
Quarter 1, 2006																	*	*	*	*	*		
Quarter 2, 2006																	*	*	*	*	*		
Quarter 3, 2006																	*	*	*	*	*		
Quarter 4, 2006										*		*					*		*				
Quarter 1, 2007																			*				
Quarter 2, 2007										*		*							*				
Quarter 3, 2007										*		*							*				
Quarter 4, 2007												*							*				
Quarter 1, 2008												*							*				
Quarter 2, 2008												*							*				
Quarter 3, 2008												*							*				
Quarter 4, 2008										*		*							*				
Quarter 1, 2009												*							*				
Quarter 2, 2009												*	*						*				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
DISSOLVED SOLIDS																							
Quarter 3, 2009												*	*						*				
Quarter 4, 2009												*	*						*				
Quarter 1, 2010												*	*						*				
Quarter 2, 2010										*		*	*						*				
Quarter 3, 2010										*		*							*				
Quarter 4, 2010										*		*							*				
Quarter 1, 2011										*		*							*				
Quarter 2, 2011												*	*						*				
Quarter 3, 2011												*							*				
Quarter 4, 2011												*							*				
Quarter 1, 2012											*	*	*						*				
Quarter 2, 2012												*							*				
Quarter 3, 2012										*		*	*						*				
Quarter 4, 2012												*	*						*				
Quarter 1, 2013										*		*							*				
Quarter 2, 2013												*							*				
Quarter 3, 2013												*							*				
Quarter 4, 2013												*							*				
Quarter 1, 2014												*	*						*				
Quarter 2, 2014												*							*				
Quarter 3, 2014									*			*	*						*				
Quarter 4, 2014												*	*						*				
Quarter 1, 2015												*							*				
Quarter 2, 2015												*							*				
Quarter 3, 2015												*							*				
Quarter 4, 2015									*			*					*		*				
Quarter 1, 2016												*							*				
Quarter 2, 2016												*	*	*					*				
Quarter 3, 2016												*							*				
Quarter 4, 2016												*							*				
Quarter 1, 2017												*							*				
Quarter 2, 2017												*							*				
Quarter 3, 2017												*		*	*				*				
Quarter 4, 2017												*							*				
Quarter 1, 2018												*							*				
Quarter 2, 2018												*							*				
Quarter 3, 2018												*		*					*				
Quarter 4, 2018												*							*				
Quarter 1, 2019												*							*				
Quarter 2, 2019												*							*				
Quarter 3, 2019												*	*						*				
IODIDE																							
Quarter 4, 2002																					*		
Quarter 2, 2003						*																	
Quarter 3, 2003													*										
Quarter 1, 2004				*																			
Quarter 3, 2010																					*		
Quarter 2, 2013										*													
IRON																							
Quarter 1, 2003						*				*	*			*									
Quarter 2, 2003										*	*	*	*										
Quarter 3, 2003						*	*	*	*	*	*												
Quarter 4, 2003										*													
Quarter 1, 2004										*													
Quarter 2, 2004										*	*												
Quarter 3, 2004										*													
Quarter 4, 2004										*													

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
IRON																							
Quarter 1, 2005												*											
Quarter 2, 2005											*	*											
Quarter 1, 2006							*																
Quarter 2, 2006												*											
Quarter 3, 2006											*												
Quarter 1, 2007											*	*											
Quarter 2, 2007											*												
Quarter 2, 2008												*											
Quarter 3, 2008												*											
MAGNESIUM																							
Quarter 1, 2003			*																				
Quarter 2, 2003			*									*							*				
Quarter 3, 2003			*				*					*											
Quarter 4, 2003			*									*							*				
Quarter 1, 2004			*									*		*					*				
Quarter 2, 2004			*									*							*				
Quarter 3, 2004			*									*							*				
Quarter 4, 2004			*									*							*				
Quarter 1, 2005												*							*				
Quarter 2, 2005												*							*				
Quarter 3, 2005												*							*				
Quarter 4, 2005												*							*				
Quarter 1, 2006												*							*				
Quarter 2, 2006												*							*				
Quarter 3, 2006												*							*				
Quarter 4, 2006												*							*				
Quarter 1, 2007												*							*				
Quarter 2, 2007												*							*				
Quarter 3, 2007												*							*				
Quarter 4, 2007												*							*				
Quarter 1, 2008												*							*				
Quarter 2, 2008												*							*				
Quarter 3, 2008												*							*				
Quarter 4, 2008												*							*				
Quarter 1, 2009												*							*				
Quarter 2, 2009												*							*				
Quarter 3, 2009												*	*						*				
Quarter 4, 2009												*							*				
Quarter 1, 2010												*							*				
Quarter 2, 2010												*	*						*				
Quarter 3, 2010												*							*				
Quarter 4, 2010												*							*				
Quarter 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																		*	*				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
MAGNESIUM																							
Quarter 2, 2014												*	*						*				
Quarter 3, 2014												*							*				
Quarter 4, 2014												*	*						*				
Quarter 1, 2015												*	*						*				
Quarter 2, 2015												*							*				
Quarter 3, 2015												*							*				
Quarter 4, 2015												*							*				
Quarter 1, 2016												*							*				
Quarter 2, 2016												*		*					*				
Quarter 3, 2016												*							*				
Quarter 4, 2016												*		*					*				
Quarter 1, 2017												*		*					*				
Quarter 2, 2017												*							*				
Quarter 3, 2017												*		*					*				
Quarter 4, 2017												*							*				
Quarter 1, 2018												*	*						*				
Quarter 2, 2018												*							*				
Quarter 3, 2018												*							*				
Quarter 4, 2018												*	*	*					*				
Quarter 1, 2019												*		*					*				
Quarter 2, 2019												*							*				
Quarter 3, 2019												*	*						*				
MANGANESE																							
Quarter 4, 2002																					*		
Quarter 3, 2003							*	*															
Quarter 4, 2003							*	*															
Quarter 1, 2004							*																
Quarter 2, 2004							*																
Quarter 4, 2004							*	*															
Quarter 1, 2005							*																
Quarter 3, 2005																					*		
Quarter 3, 2009	*																						
OXIDATION-REDUCTION POTENTIAL																							
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 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 3, 2009			*	*	*	*											*	*	*	*			
Quarter 4, 2009			*			*			*									*		*			
Quarter 1, 2010	*		*															*		*			
Quarter 2, 2010	*		*	*					*				*				*	*		*			
Quarter 3, 2010	*		*	*		*											*	*	*	*			

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS										URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U					
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397					
OXIDATION-REDUCTION POTENTIAL																												
Quarter 4, 2010			*					*			*			*			*	*	*	*								
Quarter 1, 2011	*			*		*	*	*	*		*		*	*			*	*		*	*							
Quarter 2, 2011	*		*	*		*	*	*	*	*	*		*	*			*	*	*	*	*							
Quarter 3, 2011	*		*	*			*	*	*	*			*		*		*	*	*	*	*							
Quarter 4, 2011	*		*	*			*				*						*	*		*								
Quarter 1, 2012	*	*	*	*		*	*	*	*	*			*	*			*	*	*	*	*	*						
Quarter 2, 2012	*	*	*	*		*	*	*	*	*	*		*	*			*	*	*	*	*	*						
Quarter 3, 2012	*		*			*	*	*	*	*			*	*			*	*	*	*	*	*						
Quarter 4, 2012				*		*		*	*	*	*		*	*			*	*	*	*	*	*						
Quarter 1, 2013				*		*		*	*	*		*	*	*				*	*	*	*	*						
Quarter 2, 2013	*			*			*		*	*	*		*				*	*	*	*	*	*						
Quarter 3, 2013	*		*	*		*	*	*	*	*			*				*	*	*	*	*							
Quarter 4, 2013			*	*		*	*	*	*	*	*	*	*	*			*	*	*	*	*	*						
Quarter 1, 2014	*		*	*	*	*	*	*	*	*	*	*	*	*			*	*	*	*	*	*						
Quarter 2, 2014	*		*	*		*	*		*		*		*				*	*	*	*	*	*						
Quarter 3, 2014	*		*	*		*											*	*	*	*	*							
Quarter 4, 2014	*		*	*							*		*				*	*	*	*	*	*						
Quarter 1, 2015	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
Quarter 2, 2015	*		*	*	*	*	*				*			*	*	*	*	*	*	*	*	*	*					
Quarter 3, 2015	*		*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*					
Quarter 4, 2015	*		*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*					
Quarter 1, 2016	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*		*	*	*	*					
Quarter 2, 2016	*		*	*	*	*	*	*	*	*			*	*	*	*	*	*		*	*	*	*					
Quarter 3, 2016	*		*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	*					
Quarter 4, 2016	*		*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	*					
Quarter 1, 2017	*		*	*	*		*	*	*						*		*	*	*	*	*	*	*					
Quarter 2, 2017	*		*	*	*												*		*	*	*	*						
Quarter 3, 2017	*		*	*	*												*	*	*	*	*	*	*					
Quarter 4, 2017	*		*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*					
Quarter 1, 2018	*		*	*	*	*											*	*	*	*	*	*	*					
Quarter 2, 2018	*		*	*	*												*	*	*	*	*	*	*					
Quarter 3, 2018	*		*	*	*	*	*	*	*	*							*	*	*	*	*	*	*					
Quarter 4, 2018	*		*	*	*	*				*			*		*		*	*	*	*	*	*	*					
Quarter 1, 2019	*		*	*	*	*	*	*	*		*						*	*	*	*	*	*	*					
Quarter 2, 2019	*		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*					
Quarter 3, 2019	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
PCB-1016																												
Quarter 4, 2003							*	*	*		*							*										
Quarter 3, 2004											*																	
Quarter 3, 2005							*				*																	
Quarter 1, 2006											*																	
Quarter 2, 2006											*																	
Quarter 4, 2006											*																	
Quarter 1, 2007											*	*																
Quarter 2, 2007												*																
Quarter 3, 2007											*																	
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											*																	

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA												LRGA						
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U		S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394		385	370	373	388	392	395	397
PCB-1232																								
Quarter 1, 2011											*													
PCB-1248																								
Quarter 2, 2008												*												
PCB-1260																								
Quarter 2, 2006																			*					
pH																								
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 4, 2005											*								*					
Quarter 1, 2006																			*					
Quarter 2, 2006																			*					
Quarter 3, 2006																			*					
Quarter 3, 2007																			*					
Quarter 4, 2007																			*					
Quarter 4, 2008																			*					
Quarter 1, 2009																			*					
Quarter 1, 2011																			*					
Quarter 2, 2011											*													
Quarter 3, 2011											*													
Quarter 1, 2012														*										
Quarter 1, 2013										*			*		*				*					
Quarter 4, 2014																						*		
Quarter 2, 2016																			*	*				
POTASSIUM																								
Quarter 4, 2002																			*	*				
Quarter 3, 2004																				*				
Quarter 2, 2005																				*				
Quarter 3, 2005																				*				
Quarter 4, 2005																				*				
Quarter 2, 2006																				*				
Quarter 3, 2006																				*				
Quarter 4, 2006																				*				
Quarter 4, 2008																				*				
Quarter 3, 2012																				*				
Quarter 1, 2013																				*				
Quarter 2, 2013																				*				
Quarter 3, 2013																				*				
RADIUM-226																								
Quarter 4, 2002			*										*	*								*		
Quarter 2, 2004																				*				
Quarter 2, 2005									*															
Quarter 1, 2009											*													
Quarter 3, 2014									*			*												
Quarter 4, 2014			*								*								*					
Quarter 1, 2015			*				*			*		*							*					
Quarter 2, 2015			*				*			*		*							*					
Quarter 3, 2015			*																*					

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
RADIUM-226																							
Quarter 4, 2015					*	*									*		*				*	*	
Quarter 2, 2016			*						*		*	*	*	*	*	*		*					
Quarter 3, 2016																		*					
Quarter 4, 2016	*		*			*			*				*		*					*		*	
Quarter 1, 2017			*						*	*								*					
Quarter 2, 2017																	*	*		*	*		
Quarter 3, 2017					*				*	*	*									*			
Quarter 4, 2017																		*		*			
Quarter 1, 2018												*						*		*			
Quarter 4, 2018													*				*			*			
RADIUM-228																							
Quarter 2, 2005							■				■												
Quarter 3, 2005			■																				
Quarter 4, 2005							■		■														
Quarter 1, 2006					■																		
SELENIUM																							
Quarter 4, 2002			■		■																		
Quarter 1, 2003					■																	■	
Quarter 2, 2003			■																				
Quarter 3, 2003			■		■																		
Quarter 4, 2003			■																				
SODIUM																							
Quarter 4, 2002																			*		*		
Quarter 1, 2003				*					*	*	*												
Quarter 2, 2003				*					*	*	*		*										
Quarter 3, 2003						*	*		*				*										
Quarter 4, 2003						*			*	*													
Quarter 1, 2004									*	*				*									
Quarter 2, 2004										*													
Quarter 3, 2004										*													
Quarter 4, 2004									*	*													
Quarter 1, 2005										*									*				
Quarter 2, 2005										*									*				
Quarter 3, 2005									*	*									*				
Quarter 4, 2005									*	*													
Quarter 1, 2006									*	*													
Quarter 2, 2006									*														
Quarter 3, 2006									*	*		*							*				
Quarter 4, 2006									*	*							*						
Quarter 1, 2007									*			*											
Quarter 2, 2007									*	*													
Quarter 3, 2007									*														
Quarter 4, 2007									*														
Quarter 1, 2008									*														
Quarter 3, 2008												*											
Quarter 4, 2008									*	*													
Quarter 1, 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 4, 2011																			*				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
SODIUM																							
Quarter 1, 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 2, 2016											*												
Quarter 3, 2016											*												*
Quarter 1, 2017										*	*		*					*					
Quarter 2, 2017									*	*	*												
Quarter 2, 2018													*										
Quarter 3, 2018														*									
Quarter 1, 2019													*										
Quarter 2, 2019													*										
STRONTIUM-90																							
Quarter 2, 2003										■													
Quarter 1, 2004										■													
SULFATE																							
Quarter 4, 2002																			*				
Quarter 1, 2003												*	*				*		*				
Quarter 2, 2003										*		*	*					*	*				
Quarter 3, 2003										*		*	*						*				
Quarter 4, 2003										*		*	*						*				
Quarter 1, 2004										*		*	*					*	*				
Quarter 2, 2004										*		*	*				*	*	*	*			
Quarter 3, 2004									*	*		*	*					*	*				
Quarter 4, 2004										*		*	*					*	*				
Quarter 1, 2005										*		*	*				*	*	*				
Quarter 2, 2005										*		*	*					*	*				
Quarter 3, 2005										*		*	*				*	*	*				
Quarter 4, 2005										*		*	*					*	*	*	*		
Quarter 1, 2006										*		*	*				*	*	*	*			
Quarter 2, 2006									*	*		*	*				*	*	*	*			
Quarter 3, 2006									*	*		*	*				*		*	*			
Quarter 4, 2006									*	*		*	*				*		*				
Quarter 1, 2007									*	*		*	*				*		*	*			
Quarter 2, 2007									*	*		*	*				*		*	*			
Quarter 3, 2007									*	*		*	*				*		*	*			
Quarter 4, 2007										*		*	*				*	*	*	*			
Quarter 1, 2008										*		*	*				*	*	*	*			
Quarter 2, 2008							*		*	*	*	*	*	*			*	*	*	*			
Quarter 3, 2008									*	*		*	*				*	*	*	*			
Quarter 4, 2008									*	*		*	*				*		*				
Quarter 1, 2009									*	*		*	*				*	*	*				
Quarter 2, 2009									*	*		*	*				*	*	*	*			
Quarter 3, 2009									*	*		*	*				*	*	*	*			
Quarter 4, 2009	*								*	*		*	*				*	*	*				
Quarter 1, 2010	*								*	*		*	*				*		*				

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA												LRGA						
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U		S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394		385	370	373	388	392	395	397
SULFATE																								
Quarter 2, 2010									*	*		*	*					*	*	*	*			
Quarter 3, 2010										*		*	*					*	*	*	*			
Quarter 4, 2010	*									*		*	*					*	*	*	*			
Quarter 1, 2011	*									*		*	*					*	*	*	*			
Quarter 2, 2011	*									*		*	*	*				*	*	*	*			
Quarter 3, 2011	*									*		*	*	*				*	*	*	*			
Quarter 4, 2011	*									*		*	*					*	*	*	*			
Quarter 1, 2012	*									*		*	*	*				*	*	*	*			
Quarter 2, 2012	*									*		*	*	*				*	*	*	*			
Quarter 3, 2012	*									*		*	*	*				*	*	*	*			
Quarter 4, 2012										*		*	*	*				*	*	*	*			
Quarter 1, 2013										*		*	*	*				*	*	*	*			
Quarter 2, 2013										*		*	*	*	*			*	*	*	*			
Quarter 3, 2013										*		*	*	*	*			*	*	*	*			
Quarter 4, 2013										*		*	*	*	*			*	*	*	*			
Quarter 1, 2014								*		*		*	*	*	*			*	*	*	*			
Quarter 2, 2014										*		*	*	*	*			*	*	*	*			
Quarter 3, 2014										*		*	*	*	*			*	*	*	*			
Quarter 4, 2014										*		*	*	*	*			*	*	*	*			
Quarter 1, 2015										*		*	*	*	*			*	*	*	*			
Quarter 2, 2015										*	*	*	*	*	*	*		*	*	*	*			
Quarter 3, 2015								*		*	*	*	*	*	*	*		*	*	*	*			
Quarter 4, 2015										*		*	*	*	*	*		*	*	*	*			
Quarter 1, 2016								*		*		*	*	*	*	*		*	*	*	*			
Quarter 2, 2016								*		*		*	*	*	*	*		*	*	*	*			
Quarter 3, 2016								*		*		*	*	*	*	*		*	*	*	*			
Quarter 4, 2016										*		*	*	*	*	*		*	*	*	*			
Quarter 1, 2017										*		*	*	*	*	*		*	*	*	*			
Quarter 2, 2017								*		*		*	*	*	*	*		*	*	*	*			
Quarter 3, 2017								*		*		*	*	*	*	*		*	*	*	*			
Quarter 4, 2017										*		*	*	*	*	*		*	*	*	*			
Quarter 1, 2018										*		*	*	*	*	*		*	*	*	*			
Quarter 2, 2018								*		*	*	*	*	*	*	*		*	*	*	*			
Quarter 3, 2018								*		*	*	*	*	*	*	*		*	*	*	*			
Quarter 4, 2018										*		*	*	*	*	*		*	*	*	*			
Quarter 1, 2019								*		*		*	*	*	*	*		*	*	*	*			
Quarter 2, 2019								*		*		*	*	*	*	*		*	*	*	*			
Quarter 3, 2019			*					*		*		*	*	*	*	*		*	*	*	*	*		
TECHNETIUM-99																								
Quarter 4, 2002																				*				
Quarter 1, 2003													*					*		*				
Quarter 2, 2003	*		*							*			*					*		*				
Quarter 3, 2003			*										*					*		*				
Quarter 4, 2003			*							*		*	*					*		*	*			
Quarter 1, 2004			*							*		*	*					*		*	*			
Quarter 2, 2004			*									*	*					*		*	*			
Quarter 3, 2004			*									*						*		*				
Quarter 4, 2004			*							*		*	*					*	*	*				
Quarter 1, 2005			*							*		*	*					*		*	*			
Quarter 2, 2005			*							*		*	*					*	*	*	*			
Quarter 3, 2005			*							*		*	*					*	*	*	*			
Quarter 4, 2005			*							*		*	*					*		*	*			
Quarter 1, 2006										*		*	*					*		*	*			
Quarter 2, 2006			*							*		*	*					*	*	*	*			
Quarter 3, 2006			*							*		*	*					*	*	*	*			
Quarter 4, 2006	*									*		*	*					*		*	*			
Quarter 1, 2007			*							*		*	*					*		*	*			

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA												LRGA						
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U		S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394		385	370	373	388	392	395	397
TECHNETIUM-99																								
Quarter 2, 2007			*							*		*	*					*	*		*			
Quarter 3, 2007			*							*	*	*	*					*		*	*			
Quarter 4, 2007			*							*		*	*					*		*	*			
Quarter 1, 2008			*							*		*	*					*	*	*	*			
Quarter 2, 2008			*							*	*		*					*		*	*			
Quarter 3, 2008										*		*	*					*			*			
Quarter 4, 2008			*							*		*	*					*	*	*	*			
Quarter 1, 2009			*							*		*	*					*						
Quarter 2, 2009			*							*		*	*					*	*		*			
Quarter 3, 2009			*							*	*	*	*					*			*			
Quarter 4, 2009			*							*		*	*					*						
Quarter 1, 2010			*							*		*	*					*						
Quarter 2, 2010			*							*		*	*					*	*		*			
Quarter 3, 2010			*							*	*	*	*					*						
Quarter 4, 2010			*							*		*	*					*						
Quarter 1, 2011										*			*					*						
Quarter 2, 2011			*							*			*					*			*			
Quarter 3, 2011			*							*		*	*					*			*			
Quarter 4, 2011			*							*	*	*	*					*						
Quarter 1, 2012			*							*			*					*			*			
Quarter 2, 2012			*							*			*					*		*	*			
Quarter 3, 2012			*							*		*	*					*						
Quarter 4, 2012										*		*	*					*		*	*			
Quarter 1, 2013										*			*					*		*	*			
Quarter 2, 2013										*		*	*					*		*	*			
Quarter 3, 2013			*							*		*	*					*		*	*			
Quarter 4, 2013			*							*		*	*					*		*	*			
Quarter 1, 2014			*							*	*	*	*					*		*	*			
Quarter 2, 2014			*							*	*		*	*				*		*	*			
Quarter 3, 2014			*							*			*					*			*			
Quarter 4, 2014			*							*	*	*	*					*		*	*			
Quarter 1, 2015			*							*	*	*	*					*			*			
Quarter 2, 2015			*							*	*	*	*					*			*			
Quarter 3, 2015			*							*	*	*	*					*	*	*	*			
Quarter 4, 2015			*							*	*	*	*					*	*		*			
Quarter 1, 2016			*							*	*		*					*		*	*			
Quarter 2, 2016			*			*				*			*					*	*		*			
Quarter 3, 2016			*							*		*	*					*	*		*			
Quarter 4, 2016			*							*	*		*					*			*			
Quarter 1, 2017			*							*			*					*	*		*			
Quarter 2, 2017			*							*			*					*	*		*			
Quarter 3, 2017			*							*	*		*					*	*		*			
Quarter 4, 2017			*							*		*	*					*		*	*			
Quarter 1, 2018			*							*	*		*					*	*		*			
Quarter 2, 2018			*							*	*	*	*					*	*		*			
Quarter 3, 2018			*							*		*	*					*	*		*			
Quarter 4, 2018			*							*	*	*	*					*	*		*			
Quarter 1, 2019			*							*	*	*	*					*	*		*			
Quarter 2, 2019			*							*	*	*	*					*	*		*			
Quarter 3, 2019			*							*	*	*	*					*	*		*			
THORIUM-230																								
Quarter 1, 2012	*									*					*									
Quarter 4, 2014	*		*																					
Quarter 3, 2015	*									*	*			*	*									
Quarter 1, 2017			*							*								*						
THORIUM-234																								
Quarter 2, 2003						*				*				*										
Quarter 4, 2007										*														

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
TOLUENE																							
Quarter 2, 2014										*	*		*										
TOTAL ORGANIC CARBON																							
Quarter 4, 2002																						*	
Quarter 1, 2003				*						*	*							*	*		*		
Quarter 2, 2003										*	*		*								*		
Quarter 3, 2003								*	*	*	*	*	*										
Quarter 4, 2003								*		*													
Quarter 1, 2004										*													
Quarter 2, 2004										*	*												
Quarter 3, 2004										*													
Quarter 4, 2004										*													
Quarter 1, 2005										*													
Quarter 2, 2005										*												*	
Quarter 3, 2005										*		*									*		
Quarter 4, 2005										*											*		
Quarter 1, 2006										*													
Quarter 2, 2006										*		*											
Quarter 4, 2006																	*						
Quarter 1, 2007	*									*													
Quarter 3, 2007	*					*	*	*	*	*			*	*			*						
Quarter 2, 2011											*												
Quarter 3, 2012	*																						
Quarter 3, 2016																			*				
TOTAL ORGANIC HALIDES																							
Quarter 4, 2002																		*	*		*		
Quarter 1, 2003				*														*			*		
Quarter 3, 2003				*																	*		
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 4, 2006																	*						
Quarter 1, 2007	*																						
Quarter 2, 2007	*																						
Quarter 3, 2007	*																						
Quarter 4, 2007	*																				*		
Quarter 1, 2008	*																						
Quarter 4, 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 3, 2013																					*		

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)

Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
TRICHLOROETHENE																							
Quarter 4, 2002																							
Quarter 1, 2003																							
Quarter 2, 2003																							
Quarter 3, 2003																							
Quarter 4, 2003																							
Quarter 1, 2004																							
Quarter 2, 2004																							
Quarter 3, 2004																							
Quarter 4, 2004																							
Quarter 1, 2005																							
Quarter 2, 2005																							
Quarter 3, 2005																							
Quarter 4, 2005																							
Quarter 1, 2006																							
Quarter 2, 2006																							
Quarter 2, 2007																							
Quarter 3, 2007																							
Quarter 4, 2007																							
Quarter 1, 2008																							
Quarter 2, 2008																							
Quarter 3, 2008																							
Quarter 4, 2008																							
Quarter 1, 2009																							
Quarter 2, 2009																							
Quarter 3, 2009																							
Quarter 4, 2009																							
Quarter 1, 2010																							
Quarter 2, 2010																							
Quarter 3, 2010																							
Quarter 4, 2010																							
Quarter 1, 2011																							
Quarter 2, 2011																							
Quarter 3, 2011																							
Quarter 4, 2011																							
Quarter 1, 2012																							
Quarter 2, 2012																							
Quarter 3, 2012																							
Quarter 4, 2012																							
Quarter 1, 2013																							
Quarter 2, 2013																							
Quarter 3, 2013																							
Quarter 4, 2013																							
Quarter 1, 2014																							
Quarter 2, 2014																							
Quarter 3, 2014																							
Quarter 4, 2014																							
Quarter 1, 2015																							
Quarter 2, 2015																							
Quarter 3, 2015																							
Quarter 4, 2015																							
Quarter 1, 2016																							
Quarter 2, 2016																							
Quarter 3, 2016																							
Quarter 4, 2016																							
Quarter 1, 2017																							
Quarter 2, 2017																							
Quarter 3, 2017																							
Quarter 4, 2017																							

Chart of MCL and Historical UTL Exceedances for the C-746-S&T Landfills (Continued)


Groundwater Flow System	UCRS					URGA										LRGA							
Gradient	S	D	D	D	U	S	S	S	S	S	D	D	D	D	U	U	S	D	D	D	D	U	U
Monitoring Well	386	389	390	393	396	221	222	223	224	384	369	372	387	391	220	394	385	370	373	388	392	395	397
TRICHLOROETHENE																							
Quarter 1, 2018												■		■		■			■		■		
Quarter 2, 2018												■	■	■					■		■		
Quarter 3, 2018												■		■					■		■		
Quarter 4, 2018												■		■					■		■		
Quarter 1, 2019												■		■							■		
Quarter 2, 2019														■					■		■		
Quarter 3, 2019														■							■		
TURBIDITY																							
Quarter 4, 2002																						*	
Quarter 1, 2003							*					*		*									
URANIUM																							
Quarter 4, 2002																		*	*				
Quarter 1, 2003																			*				
Quarter 4, 2003							*																
Quarter 1, 2004							*	*	*					*			*						
Quarter 4, 2004																	*						
Quarter 4, 2006																			*		*		
ZINC																							
Quarter 3, 2003												*											
Quarter 4, 2003							*		*			*											
Quarter 4, 2004							*																
Quarter 4, 2007							*	*	*														
* Statistical test results indicate an elevated concentration (i.e., a statistically significant increase).																							
■ MCL Exceedance																							
■ Previously reported as an MCL exceedance; however, result was equal to MCL.																							
UCRS = Upper Continental Recharge System																							
URGA = Upper Regional Gravel Aquifer																							
LRGA = Lower Regional Gravel Aquifer																							
S = Sidegradient; D = Downgradient; U = Upgradient																							

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX H
METHANE MONITORING DATA

THIS PAGE INTENTIONALLY LEFT BLANK

CP3-WM-0017-F03 - C-746-S & T LANDFILL METHANE MONITORING REPORT

Date:	09/03/19		Time:	0930		Monitor:	Robert Kirby												
Weather Conditions: Sunny, Warm, Slight Wind and 80 Degrees																			
Monitoring Equipment:: RAE Systems, Multi-RAE Serial # 7970																			
Monitoring Location								Reading (% LEL)											
Ogden Landing Road Entrance	Checked at ground level							0											
North Landfill Gate	Checked at ground level							0											
West Side of Landfill: North 37° 07.652' West 88° 48.029'	Checked at ground level							0											
East Side of Landfill: North 37° 07.628' West 88° 47.798'	Checked at ground level							0											
Cell 1 Gas Vent (17)	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	0	
Cell 2 Gas Vent (3)	1 0	2 0	3 0																0
Cell 3 Gas Vent (7)	1 0	2 0	3 0	4 0	5 0	6 0	7 0											0	
Landfill Office	Checked at floor level																	0	
Suspect or Problem Areas	No areas noted																	NA	
Remarks: <p align="center">ALL VENTS CHECKED 1" FROM THE MOUTH OF VENT</p>																			
Performed by: <i>Robert Kirby</i> 																			
																	<i>09/03/19</i>		
																	Signature	Date	

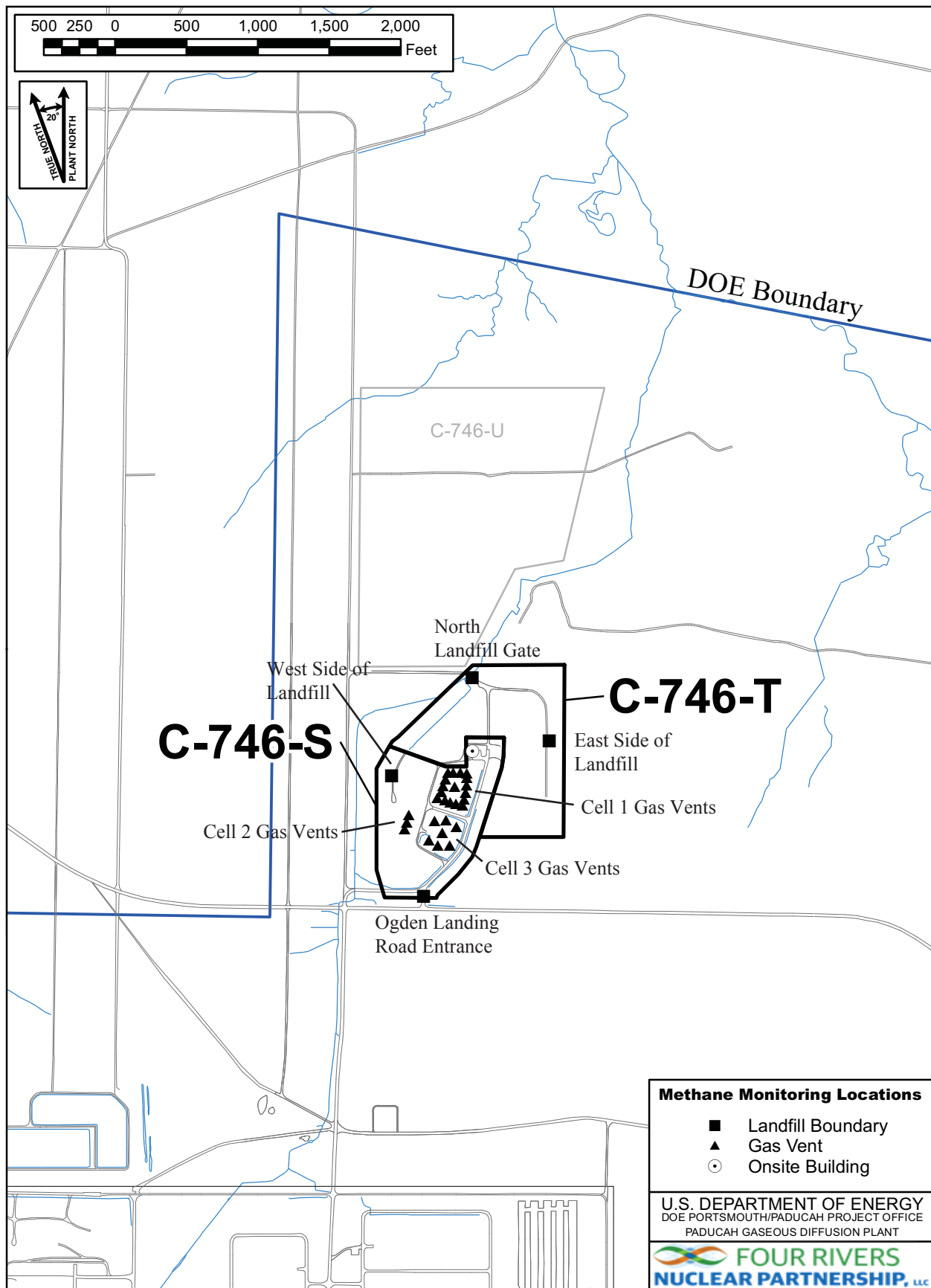


Figure H.1. C-746-S&T Methane Monitoring Locations

APPENDIX I

SURFACE WATER ANALYSES AND WRITTEN COMMENTS

THIS PAGE INTENTIONALLY LEFT BLANK

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

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

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

SURFACE WATER SAMPLE ANALYSIS (S)

Monitoring Point (KPDES Discharge Number, or "UPSTREAM", or "DOWNSTREAM")						L135 UPSTREAM		L154 DOWNSTREAM		L136 AT SITE			
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)						7/22/2019 15:13		7/22/2019 14:53		7/22/2019 15:30			
Duplicate ("Y" or "N") ¹						N		N		N			
Split ('Y' or "N") ²						N		N		N			
Facility Sample ID Number (if applicable)						L135SS4-19		L154US4-19		L136SS4-19			
Laboratory Sample ID Number (if applicable)						485493001		485497002		485493002			
Date of Analysis (Month/Day/Year)						8/16/2019		8/16/2019		8/16/2019			
CAS RN ³		CONSTITUENT	T D 4	Unit OF MEASURE	METHOD	DETECTED VALUE OR PQL ⁵	F L A G S ⁷	DETECTED VALUE OR PQL ⁵	F L A G S ⁷	DETECTED VALUE OR PQL ⁵	F L A G S ⁷	DETECTED VALUE OR PQL ⁵	F L A G S ⁷
A200-00-0	0	Flow	T	MGD	Field		*		*		*		
16887-00-6	2	Chloride(s)	T	MG/L	300.0	4.37	*	6.91	*	1.7	*		
14808-79-8	0	Sulfate	T	MG/L	300.0	7.19		2.87		6.48			
7439-89-6	0	Iron	T	MG/L	200.8	0.837		1.5		0.109			
7440-23-5	0	Sodium	T	MG/L	200.8	3.75		1.75		1.79			
S0268- -	0	Organic Carbon ⁶	T	MG/L	9060	18		20.9		21.4			
S0097- -	0	BOD ⁶	T	MG/L	not applicable		*		*		*		
S0130- -	0	Chemical Oxygen Demand	T	MG/L	410.4	41.9		114		61.9			

3-1

¹Respond "Y" if the sample was a duplicate of another sample in this report

²Respond "Y" if the sample was split and analyzed by separate laboratories.

³Chemical Abstracts Service Registry Number or unique identifier number assigned by agency.

⁴"T" = Total; "D" = Dissolved

⁵"<" indicates a non-detect; do not use "ND" or "BDL". Value then shown is Practical Quantification Limit

⁶Facility has either/or option on Organic Carbon and (BOD) Biochemical Oxygen Demand - both are not required

⁷Flags 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

I-4

RESIDENTIAL/INERT – QUARTERLY**Facility: US DOE - Paducah Gaseous Diffusion Plant****Permit Number: SW07300014, SW07300015, SW07300045****Finds/Unit: KY8-890-008-982 / 1****LAB ID: None****For Official Use Only**

SURFACE WATER WRITTEN COMMENTS

Monitoring Point	Facility Sample ID	Constituent	Flag	Description
L135	L135SS4-19	Flow Rate		Analysis of constituent not required and not performed.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Total Solids	*	Duplicate analysis not within control limits.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.67. Rad error is 5.57.
		Beta activity		TPU is 8.26. Rad error is 7.76.
L154	L154US4-19	Flow Rate		Analysis of constituent not required and not performed.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Total Solids	*	Duplicate analysis not within control limits.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 5.19. Rad error is 5.17.
		Beta activity		TPU is 7.73. Rad error is 7.4.
L136	L136SS4-19	Flow Rate		Analysis of constituent not required and not performed.
		Chloride	W	Post-digestion spike recovery out of control limits.
		Biochemical Oxygen Demand (BOD)		Analysis of constituent not required and not performed.
		Total Solids	*	Duplicate analysis not within control limits.
		Alpha activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 4.38. Rad error is 4.37.
		Beta activity	U	Indicates analyte/nuclide was analyzed for, but not detected. TPU is 7.02. Rad error is 6.98.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX J

ANALYTICAL LABORATORY CERTIFICATION

THIS PAGE INTENTIONALLY LEFT BLANK

From: [Valerie Davis](#)
To: [Crabtree, Lisa](#)
Subject: Fwd: Fwd: Extension of A2LA Certificate 2567.01
Date: Tuesday, November 19, 2019 2:16:52 PM

Hi Lisa,

I am forwarding the email notification we received regarding our A2LA extension.

Thanks,

Valerie

----- Forwarded Message -----

Subject: Extension of A2LA Certificate 2567.01
Date: Thu, 27 Jun 2019 15:43:33 -0400 (EDT)
From: srippeon@A2LA.org
To: rlp@gel.com, srippeon@A2LA.org

The certificate listed below has been extended. An extended certificate has been placed on our website. Please feel free to print a copy of the certificate and scope directly from the [website](#). Please contact your assigned Accreditation Officer (AcO) if you need further clarification.

Name: Pullano, Robert
Company: GEL Laboratories, LLC
Email: rlp@gel.com
Certificate Number: 2567.01
Expires: 06/30/2019
Field: Environmental
Extended Until: 07/31/2019
AcO: Rippeon, Stephanie
AcO Email: srippeon@A2LA.org

CONFIDENTIALITY NOTICE: This e-mail and any files transmitted with it are the property of The GEL Group, Inc. and its affiliates. All rights, including without limitation copyright, are reserved. The proprietary information contained in this e-mail message, and any files transmitted with it, is intended for the use of the recipient(s) named above. If the reader of this e-mail is not the intended recipient, you are hereby notified that you have received this e-mail in error and that any review, distribution or copying of this e-mail or any files transmitted with it is strictly prohibited. If you have received this e-mail in error, please notify the sender immediately and delete the original message and any files transmitted. The unauthorized use of this e-mail or any files transmitted with it is prohibited and disclaimed by The GEL Group, Inc. and its affiliates.

<http://www.gellaboratories.com>



Accredited Laboratory

A2LA has accredited

GEL LABORATORIES, LLC

Charleston, SC

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2017, the 2009 TNI Environmental Testing Laboratory Standard, the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP), and the requirements of the Department of Energy Consolidated Audit Program (DOECAP) as detailed in Version 5.3 of the DoD/DOE Quality System Manual for Environmental Laboratories (QSM), accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 15th day of July 2019.

A blue ink signature of a person, likely the Vice President of Accreditation Services, written over a horizontal line.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2567.01
Valid to June 30, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

APPENDIX K

LABORATORY ANALYTICAL METHODS

THIS PAGE INTENTIONALLY LEFT BLANK

LABORATORY ANALYTICAL METHODS

Analytical Method	Preparation Method	Product
SW846 8260B		Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
SW846 8011	SW846 8011 PREP	Analysis of 1,2-Dibromoethane (EDB), 1,2-Dibromo-3-Chloropropane (DBCP) and 1,2,3-Trichloropropane in Water by GC/ECD Using Methods 504.1 or 8011
SW846 3535A/8082	SW846 3535A	Analysis of The Analysis of Polychlorinated Biphenyls by GC/ECD by ECD
SW846 6020	SW846 3005A	Determination of Metals by ICP-MS
SW846 7470A	SW846 7470A Prep	Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer
SW846 9060A		Carbon, Total Organic
SW846 9012B	SW846 9010C Distillation	Cyanide, Total
EPA 300.0		Ion Chromatography Iodide
SW846 9056		Ion Chromatography
EPA 160.1		Solids, Total Dissolved
EPA 410.4		COD
Eichrom Industries, AN-1418		AlphaSpec Ra226, Liquid
DOE EML HASL-300, Th-01-RC Modified		Th-01-RC M, Th Isotopes, Liquid
EPA 904.0/SW846 9320 Modified		904.0Mod, Ra228, Liquid
EPA 900.0/SW846 9310		9310, Alpha/Beta Activity, liquid
EPA 905.0 Modified/DOE RP501 Rev. 1 Modified		905.0Mod, Sr90, liquid
DOE EML HASL-300, Tc-02-RC Modified		Tc-02-RC-MOD, Tc99, Liquid
EPA 906.0 Modified		906.0M, Tritium Dist, Liquid

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX L

MICRO-PURGING STABILITY PARAMETERS

THIS PAGE INTENTIONALLY LEFT BLANK

**Micro-Purge Stability Parameters
for the C-746-S&T Landfills**

	Temperature (°C)	Conductivity (umho/cm)	pH (Std. Unit)	Dissolved oxygen (mg/L)	Turbidity (NTU)		Temperature (°C)	Conductivity (umho/cm)	pH (Std. Unit)	Dissolved oxygen (mg/L)	Turbidity (NTU)
MW220						MW221					
Date Collected: 7/16/2019						Date Collected: 7/17/2019					
1307	62.6	381	6.55	4.69	0.0	0722	62.7	381	6.14	4.09	0.6
1310	63.2	378	6.53	4.82	0.5	0725	63.2	381	6.13	4.02	1.0
1313	64.2	377	6.53	4.69	1.0	0728	63.5	380	6.15	3.96	1.1
MW222						MW223					
Date Collected: 7/17/2019						Date Collected: 7/16/2019					
0808	63.0	361	6.19	4.09	0.0	1351	63.6	387	6.52	3.36	1.4
0811	63.6	362	6.17	3.75	0.2	1354	64.3	389	6.51	3.22	2.3
0814	64.0	362	6.17	3.61	0.0	1357	64.9	390	6.51	3.13	2.8
MW224						MW369					
Date Collected: 7/17/2019						Date Collected: 7/15/2019					
0850	63.3	427	6.25	3.45	0.0	0705	62.6	374	6.26	3.20	4.0
0853	63.8	425	6.23	3.06	0.0	0708	62.7	373	6.26	3.11	2.8
0856	64.1	425	6.22	2.98	0.1	0711	62.7	373	6.25	3.09	2.6
MW370						MW372					
Date Collected: 7/15/2019						Date Collected: 7/11/2019					
0752	62.5	420	6.16	4.50	0.1	0929	64.2	641	6.13	3.97	0.8
0755	62.8	419	6.15	4.21	0.7	0932	64.9	641	6.09	3.76	2.1
0758	63.0	421	6.15	4.09	0.8	0935	65.2	640	6.08	3.63	1.6
MW373						MW384					
Date Collected: 7/11/2019						Date Collected: 7/16/2019					
1014	65.6	780	6.06	2.75	1.4	0833	62.2	447	6.28	4.07	0.1
1017	65.9	782	6.04	2.54	1.3	0836	62.8	446	6.27	3.86	0.3
1020	66.4	785	6.03	2.36	0.8	0839	63.3	447	6.26	3.67	0.5
MW385						MW386					
Date Collected: 7/16/2019						Date Collected: 7/16/2019					
0913	62.5	428	6.27	4.21	0.1	0951	63.6	561	6.90	4.36	0.0
0916	63.1	426	6.25	4.06	0.7	0954	63.8	562	6.94	3.87	0.0
0919	63.4	426	6.26	4.01	0.5	0957	64.0	562	6.95	3.66	0.0
MW387						MW388					
Date Collected: 7/16/2019						Date Collected: 7/16/2019					
0715	63.4	534	6.36	4.21	0.0	0753	63.4	471	6.33	3.90	4.9
0718	64.0	540	6.35	4.10	0.1	0756	63.6	471	6.30	3.62	4.1
0721	64.4	539	6.35	4.06	0.4	0759	63.7	472	6.29	3.59	3.1
MW390						MW391					
Date Collected: 7/16/2019						Date Collected: 7/15/2019					
0640	60.8	672	6.54	4.38	10.4	1013	62.6	467	6.17	3.80	1.5
0643	61.3	672	6.56	4.45	6.7	1016	63.0	469	6.17	3.71	2.4
0646	61.6	674	6.55	4.39	5.8	1019	63.2	468	6.17	3.63	2.7
MW392						MW393					
Date Collected: 7/15/2019						Date Collected: 7/15/2019					
1056	61.6	440	6.32	3.57	2.8	1131	63.0	433	6.47	2.33	8.6
1059	62.1	439	6.32	3.33	5.4	1134	63.3	431	6.45	1.87	9.8
1102	62.5	438	6.31	3.20	6.6	1137	63.7	430	6.45	1.74	9.5
MW394						MW395					
Date Collected: 7/17/2019						Date Collected: 7/17/2019					
0930	64.0	370	6.15	4.54	0.0	1007	62.9	347	6.10	4.69	0.0
0933	64.2	369	6.12	4.37	0.0	1010	63.3	345	6.11	4.53	0.0
0936	64.5	370	6.13	4.27	0.0	1013	63.9	344	6.10	4.55	0.0
MW396						MW397					
Date Collected: 7/17/2019						Date Collected: 7/16/2019					
1031	62.7	705	6.62	1.72	0.0	1223	63.6	317	6.38	5.04	0.1
1034	63.3	705	6.61	1.27	0.0	1226	64.0	316	6.40	5.00	0.7
1037	64.1	706	6.61	1.16	0.1	1229	64.3	316	6.40	4.92	0.5

THIS PAGE INTENTIONALLY LEFT BLANK