

Tennessee Valley Authority Kingston Fossil Plant Ash Processing Area

GROUNDWATER MONITORING REPORT

SEPTEMBER 2015 QUARTERLY MONITORING EVENT

Prepared by

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Chattanooga, Tennessee November 5, 2015

DOCUMENT CERTIFICATION

I certify under penalty of law that this document was prepared by me or under my supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Amos L. Smith

Professional Geologist

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INTRODUCTION

This report contains groundwater monitoring results for samples collected during September 21-23, 2015, from the three designated compliance monitoring wells (AD-1, AD-2, AD-3) located at the Kingston Fossil Plant (KIF) Ash Processing Area (also referred to as the Ball Field area). Sample collection and laboratory analyses were performed in accordance with TVA KIF groundwater sampling protocols designed to satisfy the US Environmental Protection Agency (US EPA) Region 4 Groundwater Sampling Operating Procedure as detailed in US EPA Document Number SESDPROC-301-R3 (US EPA, 2013) and Tennessee Department of Environment and Conservation (TDEC) Rule 0400-11-01-.04 (TDEC, 2013), except where noted in the groundwater sampling methods section. Groundwater samples were analyzed by Test America (located in Nashville, TN).

FACILITY DESCRIPTION

Construction of the Ash Processing Area was initiated in March 2009 to process recovered ash material from the December 22, 2008 failure of a containment dike of the KIF Dredge Cell Class II Landfill. The current facility overlies a portion of the abandoned Ash Disposal Area which ceased operations in 1972, and the Metal Cleaning Pond which was placed into interim closure in March 2009. Since 2011, the Ash Processing Area facility has been used to receive and store fly ash from daily KIF production. In 2012, wet sluicing operations were ceased, and the site began receiving only dry fly ash. Fly ash was transported by truck from the plant hoppers to the Ash Processing Area, where it was placed and compacted. This activity ceased in September 2015.

MONITORING NETWORK DESCRIPTION

The Ash Processing Area groundwater monitoring network consists of three ASTM Type II monitoring wells installed in March, April, and May 2009. The Ash Processing Area Construction and Operation Plan completed by TVA and submitted to TDEC in February 2009, identified two existing wells (10, 12A) to be utilized for facility monitoring that were later discovered to be abandoned, so new wells were installed. Each new well was constructed of two-inch diameter schedule 40 PVC with threaded/flush-joint casing and screen with 0.010-inch screen slots. Wells were screened in the first water bearing strata encountered in each borehole, with upgradient well AD-1 and downgradient well

AD-2 having approximately 3-meter (10-foot) screens set in residuum, and downgradient well AD-3 having approximately 1.5-meter (5-foot) screen set in residuum. Well construction details are presented in Table 1 below. Wells and wellhead protection features were in good condition during the September 2015 sampling event.

Table 1. Well Construction Details

Well No.	Well Diameter (cm)	Depth to Top of Screen (m)	Depth to Bottom of Screen (m)	Total Well Depth (m)	Material Screened
AD-1	5.1	6.5	9.6	9.8	Soil/Residuum
AD-2	5.1	4.2	7.3	7.5	Soil/Residuum
AD-3	5.1	2.8	4.4	4.6	Soil/Residuum

Depths given are measured below the respective grade surface elevation; m - meters, cm - centimeters.

The Ash Processing Area facility sampling frequency was changed to monthly beginning October 2009 to monitor potential releases to groundwater and to establish a baseline of natural background constituent concentrations, per the request of US EPA and TVA personnel onsite involved in recovery operations. During July 2010, the monthly sampling frequency was changed to quarterly by US EPA.

GROUNDWATER SAMPLING METHODS

Groundwater sampling operations were performed from September 21-23, 2015. Sampling was performed in general accordance with KIF site groundwater sampling protocol (TVA-KIF-SOP-02). Depths to water and total well depths were measured and recorded prior to sampling of individual wells. A bladder pump was used to purge and sample groundwater at each monitoring well. Each well was purged according to US EPA Low Stress (low-flow) purging procedures (EPA, 2010) to reduce the likelihood of elevated sample turbidity and produce samples more representative of the groundwater conditions in the aquifer. Sampling collection protocols are based on stabilization of target field parameters, including a turbidity goal of 5 NTUs or less. Stabilization criteria were met for all parameters. Drawdown levels for all three wells exceeded the ideal target of 0.1 meters per TVA-KIF-SOP-02, dropping between 0.4 and 0.2 meters each before reaching stability. Duplicate groundwater samples were collected from AD-2. Field-measured groundwater quality indicator parameters (i.e., temperature, specific conductance, pH, dissolved oxygen, oxidation-reduction potential, and turbidity) were

monitored during well purging using a flow-through cell and instruments (Hydrolab multiprobe and handheld Hach turbidimeter) that were standardized daily to ensure calibration. Field data sheets for the September 2015 event are included in Appendix A.

After purging, unfiltered groundwater samples were collected directly from the pump discharge tubing into laboratory-supplied, pre-preserved (as appropriate) bottles. The bottleware was certified-clean by the manufacturer, to designated specifications that are acceptable to the analytical laboratory. Samples were sealed, labeled, recorded on a Chain-of-Custody form, and placed in an iced cooler for transport (per TVA-KIF-SOP-07). Samples were delivered to Test America in Nashville, Tennessee for analysis. Copies of the Chain-of-Custody forms for the September 2015 sampling event are attached in Appendix B.

New sample tubing and in-line filters were used for each well. All non-disposable sampling equipment that came into contact with sampled media was decontaminated prior to use, between uses, and after sampling activities had been completed. Decontamination included immersion in, scrubbing with, and pumping decontamination fluids prior to air-drying/wiping and re-use/storage. These fluids include, in order of process: detergent solutions, potable water, organic desorbing agent, potable water, and a de-ionized water rinse. Fluids, disposable decontamination material, and disposable PPE were containerized onsite near the well or in centralized waste storage areas. These decontamination activities were carried out in accordance with the site standard equipment decontamination procedure (TVA-KIF-SOP-08).

SAMPLE ANALYSIS AND RESULTS

Groundwater samples were analyzed for wet chemistry parameters and total (unfiltered) metals, including the 17 required inorganic constituents specified by Appendix I of TDEC Rule 0400-11-01-.04 per commitments made in the Ash Processing Area Construction and Operation Plan (TVA, 2009). Only total (unfiltered) metals results are presented herein, which is consistent with established groundwater reporting at the site. Laboratory analytical results for unfiltered samples associated with the September 2015 groundwater sampling event are summarized in Table 2. The laboratory reports presented in Appendix B include analytical methods and detection limits for each constituent. Reporting limits presented in Table 2 occasionally vary for each parameter by well and by event, due to dilutions required because of matrix interferences or parameters that exceed the calibration range of the instrument; these are explicitly noted by data qualifiers on the laboratory reports in Appendix B. Maximum contaminants levels (MCLs) listed for the constituents of concern are promulgated by either TDEC Solid Waste Processing Rule 0400-11-01-.04 Appendix III levels (TDEC, 2013) or by US EPA National Primary Drinking Water Regulations (EPA, 2009) primary MCLs as indicated on the laboratory results table (see Table 2). A not applicable (N/A) designation is shown for cobalt and vanadium in Table 2 since there is no EPA or TDEC MCL for these constituents.

Constituent concentrations reported for all samples were below US EPA primary MCLs and TDEC MCLs. Time series graphs of the 17 required inorganic constituents specified in Appendix I of TDEC Rule 0400-11-01-.04 are presented in Appendix C of this report; circled values of data presented indicate a value less than the reporting limit. All constituent concentrations appear to be stable or declining, except for cobalt. While concentrations have remained low (<11 ug/l) cobalt concentrations in wells AD-2 and AD-3 trended upward from 2009 to 2012. This corresponds to the time period immediately following intense construction activity at the site and concentrations have been declining since 2012. There is no promulgated federal or TDEC MCL for cobalt.

Table 2. Summary of September 2015 Unfiltered Groundwater Sample Results

Parameter	Units	KIF-AD1	KIF-AD1Dup	KIF-AD2	KIF-AD3	MCL	MCL Source
Antimony	μg/L	<2	<2	<2	<2	6	TDEC/EPA
Arsenic	μg/L	<2	1.04	0.859	0.721	10	TDEC/EPA
Barium	μg/L	51.6	25.1	24.9	38	2,000	TDEC/EPA
Beryllium	μg/L	<2	<2	<2	<2	4	TDEC/EPA
Cadmium	μg/L	<1	<1	<1	<1	5	TDEC/EPA
Chromium	μg/L	<2	<2	<2	<2	100	TDEC/EPA
Cobalt	μg/L	<2	5.11	5.04	6.44		N/A
Copper	μg/L	<2	<2	<2	<2	1,300	EPA
Fluoride	mg/L	0.242	<0.1	<0.1	0.145	4	TDEC/EPA
Lead	μg/L	<2	<2	<2	<2	15	TDEC/EPA
Mercury	μg/L	<0.2	<0.2	<0.2	<0.2	2	TDEC/EPA
Nickel	μg/L	<2	2.9	5.73	11.1	100	TDEC
Selenium	μg/L	<2	<2	<2	<2	50	TDEC/EPA
Silver	μg/L	<2	<2	<2	<2	100	TDEC
Thallium	μg/L	<2	<2	<2	<2	2	TDEC/EPA
Vanadium	μg/L	0.217	0.203	0.224	0.205	-	N/A
Zinc	μg/L	<25	<25	<25	<25	5,000	EPA
Turbidity	NTU	3.2	2.9		1.5		N/A
TSS	mg/L	<1	3.5	<1	<1	5,000	EPA

DUP - Well Sample Duplicate

MCL – Maximum Contaminant Level

TDEC - Maximum contaminant level (MCL) from Rule 0400-11-01-.04, Appendix III (March 2013)

EPA – US Environmental Protection Agency National Primary Drinking Water Regulations

The September 2015 equipment rinsate blank samples contain less than detectable concentrations for all total-fraction constituents. All analytical testing was performed within recommended sample holding times. Analytical data underwent automated data verification to review the laboratory-reported QA/QC results against project-specific QC limits to determine data usability against the project-specific and data validation guidelines.

HYDROGEOLOGIC CONDITIONS

The KIF plant site is located in the Valley and Ridge physiographic province of the Appalachian Highlands region. This region is characterized by a sequence of long narrow ridges and valleys trending northeast-southwest. In general, ridges are formed by relatively resistant sandstone, limestone, and dolomite units while the valleys are underlain by soluble limestone and easily weathered shale. The controlling structural feature of the site is a series of northeast-striking thrust faults which have forced older Cambrian and Ordovician rocks over younger units. Bedrock dips southeast at angles ranging from a few degrees to about 90 degrees.

The Ash Processing Area is immediately underlain by an ash-fill layer of varying thickness, ranging from 7.4 m to 16.2 m, generally increasing from the northwest perimeter to southeast. In some areas, a thin stratum of clayey soil-fill overlies the ash, typically less than 2 m in thickness. Quaternary alluvium underlies the ash, ranging in thickness from about 3.7 m to 12.0 m. The alluvial deposits are unconsolidated and lenticular, and consist of clay, silt, and sand with occasional gravel. A thin layer of residuum is occasionally present directly above bedrock. The residuum is typically composed of clay and silt with weathered fissile shale fragments.

Bedrock underlying alluvium is primarily represented by the Conasauga Group (middle to upper Cambrian age). The only exception is a small area along the northern margin of the site underlain by the Rome formation (lower Cambrian age). Specific geologic units within the Conasauga Group represented at the site include the Nolichucky, Maryville, Rogersville, Rutledge, and Pumpkin Valley formations. These formations are locally of low water-producing capacity, and predominantly consist of shale with interbedded siltstone, limestone, and conglomerate. Total thickness of the Conasauga Group beneath the site is unknown but is estimated to be approximately 450 meters.

The Rome formation is generally composed of interbedded shale, sandstone, and siltstone. The elevation of the top of rock in the Ash Processing Area is relatively uniform, varying from approximately 213 to 217 m-MSL, based on borings conducted in January and February of 2009. Outside this area, the bedrock surface rises steeply to the west and southwest. The lower bedrock terrace corresponding to the processing area represents an erosional surface associated with the ancestral Emory River.

Groundwater movement at the plant site generally follows topography with groundwater flowing eastward and southeastward from Pine Ridge toward the Emory River. Groundwater originating on, or flowing beneath, the Ash Processing Area ultimately discharges to the KIF Intake Channel.

Groundwater levels measured in site monitoring wells on September 21-23, 2015, before sample collections are presented in Table 3. The shallow groundwater potentiometric surface derived from these measurements is shown on Figure 1; groundwater flow shown is inferred to move generally southeastward across the Ash Processing Area toward the plant Intake Channel. An average hydraulic gradient estimated between the northwestern and southeastern boundaries of the disposal area, the mean horizontal hydraulic conductivity of the alluvial aquifer underlying the Ash Processing Area, and the local Darcy flux are presented in Table 3.

Table 3. Groundwater Levels and Conditions September 21-23, 2015

Well No.	Top of Casing Elevation (m)	Depth to Water (m)	Water Elevation (m-msl)*	Well Bottom Depth (m)	Average Hydraulic Gradient	Mean Horizontal Hydraulic Conductivity of Underlying Alluvial Aquifer (m/day)**	Estimated Local Darcy Flux (m/day)***
KIF- AD-1	237.74	2.54	235.20	10.85			
KIF- AD-2	230.63	2.69	227.94	8.02	0.0095	0.006	5.7E-05
KIF- AD-3	229.13	2.43	226.70	5.64			

^{*}msl - Mean Sea Level.

^{**}Cell fluxes modeled in *Kingston Ash Recovery Project, Groundwater Flow and Transport Model Report,*Document No. EPA-RPT-1002, range from 3.0E-05 to 2.4E-02 m/day, with an average of 8.5E-04 m/day.

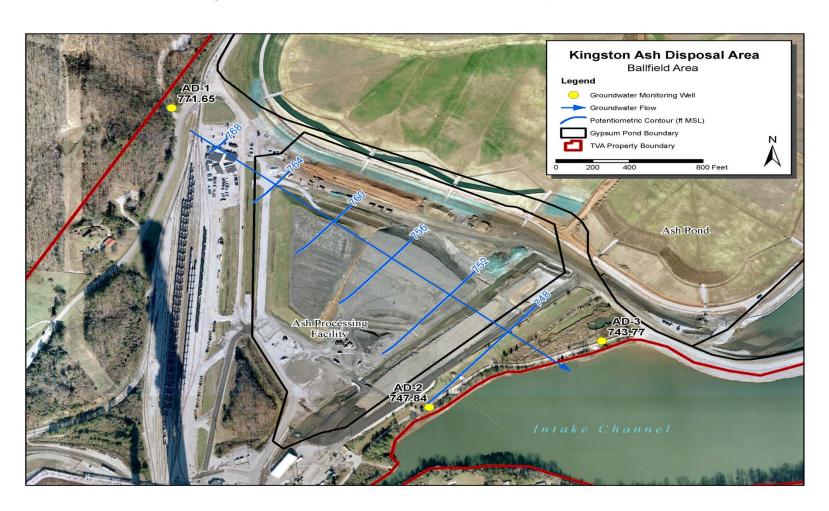


Figure 1. Groundwater Potentiometric Surface September 21-23, 2015

CONCLUSIONS

Groundwater analytical data for the June 2015 monitoring event showed all constituent concentrations were below TDEC MCLs and US EPA primary MCLs. While the concentrations remained low (<12 ug/l), cobalt had displayed an increasing trend at wells AD-2 and AD-3 which corresponds to the time of intense construction activity at the site. Since 2012 cobalt, and all sample constituents, show a stable or declining trend. Cobalt, which does not have an associated US EPA or TDEC promulgated MCL. The facility groundwater monitoring network will be sampled again during December 2015 and results will be reported once the data is available.

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- US EPA, National Primary Drinking Water Standards, Revision May 2009. EPA 816-F-09-004. May 2009.

APPENDIX A FIELD DATA SHEETS

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	1020	150	2.84	5.5	20.9	6.	3 /		295	312	6.3
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Notes and WQ	Time	Pump Rate	Water	Dep	2000	Temp	pН	100000000000000000000000000000000000000	0	COND	(+/-) ORP	Turbidity
Observations	CET CT	m/(L/min)	(m)	(m)	°C	(s.u.)	(mg	g/L) (u	ımhos/cm)	(mV)	(NTU)
Begin Purge ->	0940	350	2.43	4.5	2	0.5	6.5	1.	0	1899	455	33.3
98	0945	350	2.70	4.5	2	0.1	6.5	0	21	1954	432	10.2
77	0950	356	2.75	4.5		20,0	6.5	0		2004	408	5.5
	0955	350	2.76	4.5		9,9	6,5	0,		2032	386	3,7
	1000	350	2.79	4.5		9.9	6.6	0,		2040	371	2.7
	1005	350	2.78		- 1	19,9	6.6		1	2018	358	2.1
		350	2.78	-	- 1	9,9	- 18 - 5 sv	0		1992	354	2.3
	10/0		2.79				6.6	0.	,			. 7
	1015	350				0.0	6,6	01	-	1911	349	-
	1020	350	2.79			20.0	6.6	0		1843	346	1.6
	1015	350	2.80		2	0,1	6.6	0		1776	342	1.6
	1030	350	2.81		- 2	20.1	6,6	0	1 1	755	342	1,4
	1035	350	2.81		2	0.1	6.6	0	11	750	339	1.4
	1040	350	2.82		2	20,1	6.6	0,	11	748	336	1.5
Remarks:												
Nomana.							. /		2 .			
Reviewed By: 2	1:00 /	21.11	,	15/1	-		Air	. 4			11/0	die
Reviewed By: 202			10	15//	>_	() -	And		uni	4	10/8	Date
	Survey L	_eader		Date			_		Leader		/	Date
Sample Collector: WFN	/	AWRIGHT			Name of Street	San	nple Read	dings		Part of the Part		
Sample Date	Time	1045 3	50		4.5	12	0.1 6.	6	0,1	1748	33/	1.5
Year Month Day	1045		4193		4192			00	300	94	90	
15 9 230			Pump		Pump			Н	DO	COND	(+/-) ORP	Turbidity
Pump	min		Rate		Depth			.u.)	(mg/L)	(umhos/cm)	(mv)	(NTU)
Duration:	72004	EP CT	Ľ/min)		(m)			PA 0.1	EPA 360.1	EPA 120.1	SM 2580B	EPA 180.1
"999	3" = 2 days			MAN			10.1		000.1		2	
			Add	ditiona	l Sampl	le Dat	a					
Analyst: WH	/		/ 3	327				10	8	Well Dia (mn		Vol. Factor (L/m)
Date Analyze		415 /		431		436		43	37		(0.5 in)	0.127
Year Month	Day 23	Phenol Alkalir	nity Tot	al Alk.	Mi	neral A			cidity	51	(2 in)	2.027
		mg/L		ng/L		mg/l		mg			(3 in)	4.560
Turbidity 1350 A		(EPA 310.1) Time:		4 310.1)		EPA/30		(EPA			(4 in)	8.107
∐ Sli	ghtly Turbid L	Initial:		145g	Initi			ime: /_ nitial: /			(5 in) (6 in)	12.668 18.228
	ghly Turbid	Bottles Requir		Ferro	-		lineral		Phenol	Others (li		IJILLU
Color: Mone	, , , , , , ,	□ BOD [☐ TOC □	Metals	3		is. Mineral		Filt TIC		/-	
Odor: none		□ COD □	TIC [Dis. M		\boxtimes N	utrient		TSS/TDS			

APPENDIX B

LABORATORY DATA SHEETS AND CHAIN-OF-CUSTODY RECORD

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Nashville 2960 Foster Creighton Drive Nashville, TN 37204 Tel: (615)726-0177

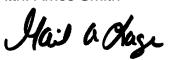
TestAmerica Job ID: 490-88132-1

Client Project/Site: TVA-KIF Groundwater

For:

Tennessee Valley Authority PO BOX 15500 Knoxville, Tennessee 37901

Attn: Amos Smith



Authorized for release by: 10/27/2015 6:01:40 PM

Gail Lage, Senior Project Manager (615)301-5741 gail.lage@testamericainc.com

·····LINKS ······

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

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Sample Summary

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-88132-1	KIF-AD1-GW-092215	Water	09/22/15 10:10	09/25/15 10:15
490-88132-2	KIF-AD2-GW-092115	Water	09/22/15 10:50	09/25/15 10:15
490-88132-3	KIF-AD2-AW-092115	Water	09/22/15 10:50	09/25/15 10:15
490-88132-4	KIF-AD3-GW-092315	Water	09/22/15 10:45	09/25/15 10:15
490-88132-5	KIF-GW01-GW-092215	Water	09/22/15 12:10	09/25/15 10:15
490-88132-6	KIF-6AR-GW-092315	Water	09/22/15 12:10	09/25/15 10:15

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4 4

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Case Narrative

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Job ID: 490-88132-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative 490-88132-1

Comments

No additional comments.

Receipt

The samples were received on 9/25/2015 10:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 0.1° C and 2.1° C.

RAD

Method(s) 903.0: Radium-226 prep batch 160-213602

The barium carrier recovery is outside the upper control limit (100%) at 132% for 490-88132-6 associated with the following samples: KIF-AD1-GW-092215 (490-88132-1), KIF-AD3-GW-092315 (490-88132-4), KIF-GW01-GW-092215 (490-88132-5), KIF-6AR-GW-092315 (490-88132-6), (LCS 160-213602/2-A), (LCSD 160-213602/3-A) and (MB 160-213602/1-A). There was physical evidence of matrix interference apparent during the initial preparation of the sample noted in N.C.M. 160-70353. The QC samples associated with the batch have acceptable carrier recovery indicating the presence of matrix interference.

Method(s) 904.0: Radium-228 Prep Batch 160-213421:

The following sample has a barium carrier recovery above the 110% QC limit: (490-88132-C-6-A: 137%). The LCS and LCSD (laboratory control sample/laboratory control sample duplicate) have acceptable spike recoveries demonstrating acceptable sample preparation and instrument performance. The samples associated with the batch have been truncated to 100% to reduce any potential bias a high carrier recovery may have. The data have been qualified and reported.

KIF-AD1-GW-092215 (490-88132-1), KIF-AD3-GW-092315 (490-88132-4), KIF-GW01-GW-092215 (490-88132-5), KIF-6AR-GW-092315 (490-88132-6), (LCS 160-213421/2-A), (LCSD 160-213421/3-A) and (MB 160-213421/1-A)

Method(s) 904.0: Radium-228 Prep Batch 160-213421:

The absolute value of the negative result for the following sample is outside the three sigma uncertainty: KIF-GW01-GW-092215 (490-88132-5). A recount was not possible due to the passing of a full decay cycle of actinium-228. The data has been qualified and reported.

Method(s) PrecSep-21: Radium-226 Prep Batch 213602 and Radium-228 batch 213421:

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: KIF-AD1-GW-092215 (490-88132-1), KIF-AD3-GW-092315 (490-88132-4), KIF-GW01-GW-092215 (490-88132-5) and KIF-6AR-GW-092315 (490-88132-6). A laboratory control sample and laboratory control sample duplicate were used instead.

Method(s) PrecSep-21: Radium-228 prep bath 213421 and radium-226 prep batch 213602:

The Barium carrier recovery is outside the upper control limit (110%) for the following sample: KIF-6AR-GW-092315 (490-88132-6). There was physical evidence of matrix interference apparent during the initial preparation of the sample. The QC samples associated with the batch have acceptable carrier recovery indicating the presence of matrix interference.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Narrative

HPLC/IC

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Method(s) 200.8, 6020A: The initial calibration blank (ICB) had detects above the reporting limit (RL) for Nickel and Manganese. The low-level calibration verification check recovered within acceptable limits. The vial that contained the blank standard was re-poured and was reanalyzed with acceptable results. (ICB 490-285877/14)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Case Narrative

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

Job ID: 490-88132-1 (Continued)

Laboratory: TestAmerica Nashville (Continued)

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Definitions/Glossary

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Qualifiers

HPLC/IC

F1 MS and/or MSD Recovery is outside acceptance limits.

Metals

Qualifier **Qualifier Description**

Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. J

В Compound was found in the blank and sample.

General Chemistry

Qualifier	Qualifier Description
-----------	-----------------------

F3 Duplicate RPD exceeds the control limit

Rad

Qualifier **Qualifier Description**

Result is less than the sample detection limit.

Χ Carrier is outside acceptance limits.

Glossary

Abbreviation These commonly used abbreviations may or may not be present in this report.

Listed under the "D" column to designate that the result is reported on a dry weight basis

%R Percent Recovery CFL Contains Free Liquid **CNF** Contains no Free Liquid

DER Duplicate error ratio (normalized absolute difference)

Dil Fac Dilution Factor

DL, RA, RE, IN Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample

DLC Decision level concentration MDA Minimum detectable activity **EDL Estimated Detection Limit**

MDC Minimum detectable concentration

Method Detection Limit MDL Minimum Level (Dioxin) ML

NC Not Calculated

ND Not detected at the reporting limit (or MDL or EDL if shown)

PQL Practical Quantitation Limit

QC **Quality Control RER** Relative error ratio

Reporting Limit or Requested Limit (Radiochemistry) RL

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin) Toxicity Equivalent Quotient (Dioxin) **TEQ**

RL

0.100

MDL Unit

0.0600 mg/L

0.0100 mg/L

D

Prepared

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Lab Sample ID: 490-88132-1

Client Sample ID: KIF-AD1-GW-092215

Method: 300.0 - Anions, Ion Chromatography

Result Qualifier

0.242

ND

Date Collected: 09/22/15 10:10 Date Received: 09/25/15 10:15

Analyte

Fluoride

Matrix: Water

09/28/15 13:09 09/29/15 20:23

Analyzed

Dil Fac 10/07/15 19:59

_			
Method:	200.8 -	Metals	(ICP/MS)

Metriou. 200.0 - Meta	is (ioi /ivio)								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:23	1
Arsenic	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:23	1
Barium	0.0516		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:23	1
Beryllium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:33	1
Cadmium	ND		0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 20:23	1
Chromium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:23	1
Cobalt	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:23	1
Copper	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:33	1
Lead	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:23	1
Nickel	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:33	1
Selenium	ND		0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 20:23	1
Silver	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:23	1
Thallium	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:23	1
Vanadium	0.000217	J	0.00200	0.000100	mg/L		09/28/15 13:09	09/29/15 20:23	1

Method: 245.1 - Mercury (CVAA)	Method:	245.1 -	Mercury	(CVAA)
--------------------------------	---------	---------	---------	--------

Analyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND ND	0.000200	0.000150	mg/L		09/28/15 16:31	09/30/15 16:20	1

0.0250

General	Chemistry

Zinc

Analyte	Result Qualifier	RL	MDL Unit	D	Prepared	Analyzed	Dil Fac	
Total Suspended Solids	ND —	1.00	0.700 mg/L			09/26/15 13:30	1	

Method:	903.0	- Radium-226	(GFPC)
---------	-------	--------------	--------

metriou. 300.0 - Re		-,	Count Uncert.	Total Uncert.				
Analyte Radium-226	0.0676	Qualifier	(2σ+/-) 0.0699	(2σ+/-) 0.0702	MDC 0.113	 Prepared 09/29/15 13:55	Analyzed 10/23/15 06:15	Dil Fac
Carrier Ra Carrier	%Yield Qualif	ier Limits				Prepared	Analyzed	Dil Fac

			Uncert.	Uncert.					
Analyte	Result (Qualifier	(2σ+/-)	(2σ+/-)	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.104	U	0.193	0.193	0.367	pCi/L	09/29/15 13:37	10/16/15 11:11	1
Carrier	%Yield Qualific	er Limits					Prepared	Analyzed	Dil Fac
Carrier Ba Carrier		Limits 40 - 110	-					Analyzed 10/16/15 11:11	Dil Fac

Total

Count

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

Lab Sample ID: 490-88132-2

Matrix: Water

Client Sample ID: KIF-AD2-GW-092115

Date Collected: 09/22/15 10:50 Date Received: 09/25/15 10:15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	F1	0.100	0.0600	mg/L			10/07/15 20:23	1
Method: 200.8 - Metals (ICF	P/MS)								
Analyte	•	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:55	1
Arsenic	0.00104	J	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:55	1
Barium	0.0251		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:55	1
Beryllium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:06	1
Cadmium	ND		0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 19:55	1
Chromium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:55	1
Cobalt	0.00511		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:55	1
Copper	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:06	1
Lead	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 19:55	1
Nickel	0.00290		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:06	1
Selenium	ND		0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 19:55	1
Silver	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:55	1
Thallium	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 19:55	1
Vanadium	0.000203	J	0.00200	0.000100	mg/L		09/28/15 13:09	09/29/15 19:55	1
Zinc	ND		0.0250	0.0100	mg/L		09/28/15 13:09	09/29/15 19:55	1
Method: 245.1 - Mercury (C	VAA)								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000150	mg/L		09/28/15 16:31	09/30/15 16:13	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	3.50		1.00	0.700	mg/L			09/26/15 13:30	1

10/27/2015

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13

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

Lab Sample ID: 490-88132-3

Matrix: Water

Client Sample ID: KIF-AD2-AW-092115

Date Collected: 09/22/15 10:50 Date Received: 09/25/15 10:15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.100	0.0600	mg/L			10/07/15 21:35	1
Method: 200.8 - Metals (IC	P/MS)								
Analyte	•	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:29	1
Arsenic	0.000859	J	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:29	1
Barium	0.0249		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:29	1
Beryllium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:39	1
Cadmium	ND		0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 20:29	1
Chromium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:29	1
Cobalt	0.00504		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:29	1
Copper	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:39	1
Lead	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:29	1
Nickel	0.00573		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:39	1
Selenium	ND		0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 20:29	1
Silver	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:29	1
Thallium	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:29	1
Vanadium	0.000224	J	0.00200	0.000100	mg/L		09/28/15 13:09	09/29/15 20:29	1
Zinc	ND		0.0250	0.0100	mg/L		09/28/15 13:09	09/29/15 20:29	1
Method: 245.1 - Mercury (CVAA)								
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000150	mg/L		09/28/15 16:31	09/30/15 16:22	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	ND		1.00	0.700	mg/L			09/26/15 13:30	

10/27/2015

RL

0.100

MDL Unit

0.0600 mg/L

0.000100 mg/L

0.0100 mg/L

D

Prepared

09/28/15 13:09

Prepared

09/28/15 13:09 09/29/15 20:35

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Dil Fac

Prepared Analyzed Dil Fac 09/29/15 13:55 10/23/15 06:15

10/16/15 11:11

Analyzed Dil Fac 09/29/15 13:37 10/16/15 11:11 09/29/15 13:37 10/16/15 11:11

Lab Sample ID: 490-88132-4 **Matrix: Water**

Analyzed

10/07/15 21:59

09/29/15 20:35

Client Sample ID: KIF-AD3-GW-092315

Date Collected: 09/22/15 10:45 Date Received: 09/25/15 10:15

Method: 300.0 - Anions, Ion Chromatography Result Qualifier Analyte

Fluoride 0.145

Method: 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:35	1
Arsenic	0.000721	J	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:35	1
Barium	0.0380		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:35	1
Beryllium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:44	1
Cadmium	ND		0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 20:35	1
Chromium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:35	1
Cobalt	0.00644		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:35	1
Copper	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:44	1
Lead	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:35	1
Nickel	0.0111		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 19:44	1
Selenium	ND		0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 20:35	1
Silver	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:35	1
Thallium	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:35	1

Method: 245.1 - Mercury (CVAA)

Result Qualifier RL **MDL** Unit D **Analyte** Prepared Analyzed Dil Fac 0.000200 09/28/15 16:31 09/30/15 16:25 Mercury $\overline{\mathsf{ND}}$ 0.000150 mg/L

0.00200

0.0250

General Chemistry

Vanadium

Zinc

Analyte Result Qualifier RL **MDL** Unit D Prepared Dil Fac Analyzed **Total Suspended Solids** ND 1.00 0.700 mg/L 09/26/15 13:30

Method: 903.0 - Radium-226 (GFPC)

Count Total Uncert. Uncert. Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$

0.000205 J

ND

Analyte MDC Unit Prepared Analyzed Dil Fac Radium-226 0.0636 U 0.0526 0.0529 0.0784 pCi/L 09/29/15 13:55 10/23/15 06:15

Limits Carrier **%Yield Qualifier** 82.3 40 - 110 Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Count Total Uncert. Uncert.

MDC Unit **Analyte** Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$ Prepared Analyzed Dil Fac Radium-228 0.126 U 0.237 0.237 0.405 pCi/L 09/29/15 13:37

Carrier **%Yield Qualifier** Limits Ba Carrier 82.3 40 - 110 Y Carrier 83.4 40 - 110

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Client Sample ID: KIF-GW01-GW-092215 Lab Sample ID: 490-88132-5

Date Collected: 09/22/15 12:10 Date Received: 09/25/15 10:15

Method: 904.0 - Radium-228 (GFPC)

Analyte

Carrier

Ba Carrier

Y Carrier

Radium-228

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.893		0.100	0.0600	mg/L			10/07/15 22:23	1
Method: 200.8 - Metal	s (ICP/MS)								
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:52	1
Arsenic	0.00123	J	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:52	1
Barium	0.0649		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:52	1
Beryllium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 20:01	1
Cadmium	ND		0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 20:52	1
Chromium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:52	1
Cobalt	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:52	1
Copper	0.00222		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 20:01	1
Lead	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:52	1
Nickel	0.00360		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 20:01	1
Selenium	ND		0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 20:52	1
Silver	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:52	1
Thallium	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:52	1
Vanadium	0.000407	J	0.00200	0.000100	mg/L		09/28/15 13:09	09/29/15 20:52	1
Zinc	ND		0.0250	0.0100	mg/L		09/28/15 13:09	09/29/15 20:52	1
Method: 245.1 - Merci	ury (CVAA)								
Analyte	- ·	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND ND		0.000200	0.000150	mg/L		09/28/15 16:31	09/30/15 16:27	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	1.40		1.00	0.700	mg/L			09/29/15 16:30	1
Method: 903.0 - Radiι	ım-226 (GFPC)								
	•	Count	Total						
		Uncert.	Uncert.						
Analyte	Result Qualifier	(2σ+/-)	(2σ+/-)	MI	OC Unit		Prepared	Analyzed	Dil Fac
Radium-226	0.0682	0.0447	0.0451	0.05	80 pCi/L		09/29/15 13:55	10/23/15 06:14	1
Carrier	%Yield Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	97.1	40 - 110					09/29/15 13:55	10/23/15 06:14	

TestAmerica Nashville

Analyzed

Analyzed

09/29/15 13:37 10/16/15 11:11

09/29/15 13:37 10/16/15 11:11

09/29/15 13:37 10/16/15 11:11

Dil Fac

Dil Fac

Count

Uncert.

(2σ+/-)

Limits

40 - 110

40 - 110

0.201

Result Qualifier

-0.306 U

%Yield Qualifier

97.1

80.0

Total

Uncert.

(2σ+/-)

0.203

MDC Unit

0.419 pCi/L

Prepared

Prepared

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Lab Sample ID: 490-88132-6

Matrix: Water

Client Sample ID: KIF-6AR-GW-092315
Date Collected: 09/22/15 12:10

Date Received: 09/25/15 10:15

Analyte	ns, Ion Chromatogr Resul	t Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Fluoride	NE	<u> </u>	0.100	0.0600	mg/L			10/07/15 22:47	
Method: 200.8 - Metal	Is (ICP/MS)								
Analyte	•	t Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Antimony	NI)	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:57	
Arsenic	0.00075	J	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:57	
Barium	0.0220)	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:57	
Beryllium	0.000718	J	0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 20:07	
Cadmium	0.00264	ļ.	0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 20:57	
Chromium	NE)	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:57	
Cobalt	0.119)	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:57	
Copper	NE)	0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 20:07	
Lead	NE)	0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:57	
Nickel	0.047	,	0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 20:07	
Selenium	NE)	0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 20:57	
Silver	NE)	0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 20:57	
Thallium	NI)	0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 20:57	
Vanadium	0.000234	IJ	0.00200	0.000100	mg/L		09/28/15 13:09	09/29/15 20:57	
Zinc	0.037	ВВ	0.0250	0.0100	mg/L		09/28/15 13:09	09/29/15 20:57	
Analyte	• • •	Qualifier	RL 0.000200	MDL 0.000150	Unit mg/L	D	Prepared 09/28/15 16:31	Analyzed 09/30/15 16:34	Dil F
Analyte Mercury	Resul					<u>D</u>	<u> </u>		Dil Fa
Analyte Mercury General Chemistry Analyte	Resul	t Qualifier	0.000200 RL	0.000150 MDL	mg/L Unit	D_	<u> </u>	09/30/15 16:34 Analyzed	
Analyte Mercury General Chemistry Analyte	Resul	t Qualifier	0.000200	0.000150	mg/L Unit		09/28/15 16:31	09/30/15 16:34	
Analyte Mercury General Chemistry Analyte Total Suspended Solids	Resul Resul 1.40	Qualifier	0.000200 RL 1.00	0.000150 MDL 0.700	mg/L Unit		09/28/15 16:31	09/30/15 16:34 Analyzed	
Analyte Mercury General Chemistry Analyte Total Suspended Solids	Resul Resul 1.40	Qualifier Co	0.000200 RL 1.00	0.000150 MDL 0.700	mg/L Unit		09/28/15 16:31	09/30/15 16:34 Analyzed	
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu	Resul NE Resul 1.40 um-226 (GFPC)	Qualifier Co	O.000200 RL 1.00 Dunt Totacert. Uncer	0.000150 MDL 0.700	mg/L Unit mg/L		09/28/15 16:31 Prepared	09/30/15 16:34 Analyzed 09/29/15 16:30	Dil Fa
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu	Result Qualific	t Qualifier Co	0.000200 RL 1.00 Dunt Totacert. Uncerty-/-) (2σ+/-)	0.000150 MDL 0.700 al t) Mi	mg/L Unit mg/L DC Unit		Prepared Prepared	09/30/15 16:34 Analyzed 09/29/15 16:30 Analyzed	
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu	Resul NE Resul 1.40 um-226 (GFPC)	t Qualifier Co	O.000200 RL 1.00 Dunt Totacert. Uncer	0.000150 MDL 0.700 al t) Mi	mg/L Unit mg/L		09/28/15 16:31 Prepared	09/30/15 16:34 Analyzed 09/29/15 16:30	Dil Fa
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226	Result Qualific	t Qualifier Co	0.000200 RL 1.00 Dunt Totacert. Uncerty-/-) (2σ+/-)	0.000150 MDL 0.700 al t) Mi	mg/L Unit mg/L DC Unit		Prepared Prepared	09/30/15 16:34 Analyzed 09/29/15 16:30 Analyzed	Dil Fa
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier	Result Result	Qualifier Co Une er (20	0.000200 RL 1.00 Dunt Totacert. Uncerty-/-) (2σ+/-)	0.000150 MDL 0.700 al t) Mi	mg/L Unit mg/L DC Unit		Prepared Prepared 09/29/15 13:55	Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed	Dil Fa
Analyte Mercury General Chemistry Analyte Fotal Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier	Result Qualifier	Qualifier Co Uner (20 0.0	0.000200 RL 1.00 Dunt Totacert. Uncerty-/-) (2σ+/-)	0.000150 MDL 0.700 al t) Mi	mg/L Unit mg/L DC Unit		Prepared Prepared 09/29/15 13:55 Prepared	Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed	Dil F
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier	Result Qualifier	Country (20 Countr	0.000200 RL 1.00 Dunt Totacert. Uncerty-/-) (2σ+/-)	0.000150 MDL 0.700 al t) 0.06	mg/L Unit mg/L DC Unit		Prepared Prepared 09/29/15 13:55 Prepared	Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed	Dil F
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier	Result Qualifier	Control (20	0.000200 RL 1.00 Dunt Tota Cert. Uncer 5+/-) (25+/ 0477 0.048	0.000150 MDL 0.700 al t. 0.06	mg/L Unit mg/L DC Unit		Prepared Prepared 09/29/15 13:55 Prepared	Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed	Dil Fa
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Radiu	Result 1.40 Wind Control of the con	Control (20 Contro	RL 1.00	0.000150 MDL 0.700 al t. 0.06	mg/L Unit mg/L DC Unit 335 pCi/L		Prepared 09/29/15 13:55 Prepared 09/29/15 13:55 Prepared 09/29/15 13:55	Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed 10/23/15 06:14	Dil Fa
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Radiu Analyte	Result Qualifier	Control Contro	0.000200 RL 1.00 Dunt Tota cert. Uncer 0.477 0.048	0.000150 MDL 0.700 al t. 0.06	mg/L Unit mg/L DC Unit		Prepared Prepared 09/29/15 13:55 Prepared	Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed	Dil F
Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Radiu Analyte Radium-228	Result 1.40 Wield Qualifier 132 X Um-228 (GFPC) Result Qualifier Qualifie	Control Contro	0.000200 RL 1.00 Dunt Tota cert. Uncer 0477 0.048 Dunt Tota cert. Uncer 0477 (2σ+/-) 0477 0.048	0.000150 MDL 0.700 al t. 0.06	mg/L Unit mg/L DC Unit 335 pCi/L		Prepared 09/29/15 13:55 Prepared 09/29/15 13:55 Prepared 09/29/15 13:55	Analyzed 09/30/15 16:34 Analyzed 09/29/15 16:30 Analyzed 10/23/15 06:14 Analyzed 10/23/15 06:14 Analyzed 10/16/15 11:11	Dil Fa
Method: 245.1 - Merce Analyte Mercury General Chemistry Analyte Total Suspended Solids Method: 903.0 - Radiu Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Radiu Analyte Radium-228 Carrier Ba Carrier Ba Carrier	Result 1.40 Im-226 (GFPC) Result Qualifier 0.0722 %Yield Qualifier 132 X um-228 (GFPC) Result Qualifier Qualifier	Control Contro	0.000200 RL 1.00 Dunt Tota cert. Uncer 0477 0.048 Dunt Tota cert. Uncer 0477 (2σ+/-) 0477 0.048	0.000150 MDL 0.700 al t. 0.06	mg/L Unit mg/L DC Unit 335 pCi/L		Prepared 09/29/15 13:55 Prepared 09/29/15 13:55 Prepared 09/29/15 13:55 Prepared 09/29/15 13:37 Prepared	Analyzed Analyzed 10/23/15 16:30 Analyzed 10/23/15 06:14 Analyzed 10/23/15 06:14	Dil Fa

Client Sample ID: Method Blank

Client Sample ID: Lab Control Sample

Client Sample ID: KIF-AD2-GW-092115

Client Sample ID: KIF-AD2-GW-092115

80 - 120

Client Sample ID: Method Blank

124

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Prep Type: Total/NA

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 490-287987/6

Matrix: Water

Analysis Batch: 287987

MB MB

ND F1

Analyte Result Qualifier RL **MDL** Unit D Analyzed Dil Fac Prepared 0.100 10/07/15 19:11 Fluoride $\overline{\mathsf{ND}}$ 0.0600 mg/L

Lab Sample ID: LCS 490-287987/7

Matrix: Water

Analysis Batch: 287987

Spike LCS LCS %Rec. Limits Added Analyte Result Qualifier Unit %Rec Fluoride 10.0 10.76 mg/L 108 90 - 110

Lab Sample ID: 490-88132-2 MS

Matrix: Water

Analysis Batch: 287987

Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Limits Analyte Unit D %Rec

10.0

Lab Sample ID: 490-88132-2 MSD

Matrix: Water

Fluoride

Analysis Batch: 287987

Sample Sample Spike MSD MSD %Rec. RPD Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits **RPD** Limit Fluoride ND F1 10.0 11.44 114 80 - 120 20 mg/L

12.44 F1

mg/L

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 490-285058/1-A

Matrix: Water

Analysis Batch: 285487								Prep Batch:	
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:44	1
Arsenic	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:44	1
Barium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:44	1
Cadmium	ND		0.00100	0.000400	mg/L		09/28/15 13:09	09/29/15 19:44	1
Chromium	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:44	1
Cobalt	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:44	1
Lead	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 19:44	1
Selenium	ND		0.00200	0.000600	mg/L		09/28/15 13:09	09/29/15 19:44	1
Silver	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/29/15 19:44	1
Thallium	ND		0.00200	0.000200	mg/L		09/28/15 13:09	09/29/15 19:44	1
Vanadium	ND		0.00200	0.000100	mg/L		09/28/15 13:09	09/29/15 19:44	1
Zinc	0.01342	J	0.0250	0.0100	mg/L		09/28/15 13:09	09/29/15 19:44	1

Lab Sample ID: MB 490-285058/1-A

Matrix: Water

Analysis Batch: 285877

MB MB Result Qualifier Dil Fac Analyte RL MDL Unit Prepared Analyzed Beryllium $\overline{\mathsf{ND}}$ 0.00200 0.000500 mg/L 09/28/15 13:09 09/30/15 18:54

TestAmerica Nashville

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Client Sample ID: Method Blank

10/27/2015

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Method: 200.8 - Metals (ICP/MS) (Continued)

MB MB

Lab Sample ID: MB 490-285058/1-A

Lab Sample ID: LCS 490-285058/2-A

Matrix: Water

Matrix: Water

Analysis Batch: 285877

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 285058

Analyte	Result C	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 18:54	1
Nickel	ND		0.00200	0.000500	mg/L		09/28/15 13:09	09/30/15 18:54	1

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 285058

Analysis Batch: 285487	Spike	LCS	LCS				Prep Batch: 285058 %Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.1028		mg/L		103	85 - 115
Arsenic	0.100	0.09778		mg/L		98	85 - 115
Barium	0.100	0.09640		mg/L		96	85 - 115
Cadmium	0.100	0.09861		mg/L		99	85 - 115
Chromium	0.100	0.09572		mg/L		96	85 - 115
Cobalt	0.100	0.09408		mg/L		94	85 - 115
Lead	0.100	0.09647		mg/L		96	85 - 115
Selenium	0.100	0.1002		mg/L		100	85 - 115
Silver	0.100	0.09211		mg/L		92	85 - 115
Thallium	0.100	0.09828		mg/L		98	85 - 115
Vanadium	0.100	0.09694		mg/L		97	85 - 115
Zinc	0.100	0.09376		mg/L		94	85 - 115

Lab Sample ID: LCS 490-285058/2-A **Client Sample ID: Lab Control Sample**

Matrix: Water

Analysis Batch: 285877

Prep Type: Total/NA Prep Batch: 285058

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Beryllium	0.100	0.09878		mg/L		99	85 - 115	
Copper	0.100	0.09964		mg/L		100	85 - 115	
Nickel	0.100	0.09975		mg/L		100	85 - 115	

Lab Sample ID: 490-88132-2 MS

Matrix: Water

Analysis Ratch: 285487

Client Sample ID: KIF-AD2-GW-092115

Prep Type: Total/NA

Analysis Batch: 285487	Sample	Sample	Spike	MS	MS				%Rec. 285058
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.1054		mg/L		105	70 - 130
Arsenic	0.00104	J	0.100	0.1002		mg/L		99	70 - 130
Barium	0.0251		0.100	0.1197		mg/L		95	70 - 130
Cadmium	ND		0.100	0.09997		mg/L		100	70 - 130
Chromium	ND		0.100	0.09582		mg/L		96	70 - 130
Cobalt	0.00511		0.100	0.09783		mg/L		93	70 - 130
Lead	ND		0.100	0.09497		mg/L		95	70 - 130
Selenium	ND		0.100	0.09380		mg/L		94	70 - 130
Silver	ND		0.100	0.08950		mg/L		90	70 - 130
Thallium	ND		0.100	0.09668		mg/L		97	70 - 130
Vanadium	0.000203	J	0.100	0.09804		mg/L		98	70 - 130
Zinc	ND		0.100	0.09203		mg/L		92	70 - 130

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-88132-2 MS Client Sample ID: KIF-AD2-GW-092115 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 285877 Prep Batch: 285058 Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Unit D %Rec Limits

Analyte Beryllium ND 0.100 mg/L 98 70 - 130 0.09816 ND 0.100 0.09778 Copper mg/L 98 70 - 130 Nickel 0.00290 0.100 0.1008 mg/L 98 70 - 130

Lab Sample ID: 490-88132-2 MSD Client Sample ID: KIF-AD2-GW-092115

Matrix: Water Prep Type: Total/NA

Analysis Batch: 285487 Prep Batch: 285058 Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier Unit %Rec l imits RPD Limit **Analyte** D 2 Antimony ND 0.100 0.1079 mg/L 108 70 - 130 20 Arsenic 0.00104 J 0.100 0.1011 mg/L 100 70 - 130 20 1 0.0251 20 Barium 0.100 0.1218 mg/L 97 70 - 130 2 Cadmium ND 0.100 0.09968 100 70 - 130 0 20 mg/L 70 - 130 ND 20 Chromium 0.100 0.09786 mg/L 98 2 20 Cobalt 0.00511 0.100 0.09994 mg/L 95 70 - 1302 Lead 0.100 0.09604 96 70 - 130 20 ND mg/L Selenium 0.09592 96 70 - 130 2 20 NΩ 0.100 mg/L Silver ND 0.100 0.09083 mg/L 91 70 - 130 20 Thallium ND 0.100 0.09814 98 70 - 130 20 mg/L 0.000203 J 0.100 0.1006 100 20 Vanadium mg/L 70 - 1303

Lab Sample ID: 490-88132-2 MSD Client Sample ID: KIF-AD2-GW-092115

0.100

Matrix: Water

Zinc

Analysis Batch: 285877

Prep Batch: 285058 MSD MSD Sample Sample Spike %Rec. **RPD** Result Qualifier RPD Analyte Added Result Qualifier Unit %Rec Limits Limit Beryllium ND 0.100 0.1002 mg/L 100 70 - 130 2 20 ND 0.100 0.09982 70 - 130 Copper mg/L 100 2 20 Nickel 0.00290 0.100 0.1030 mg/L 100 70 - 130 20

0.09232

mg/L

92

70 - 130

Prep Type: Total/NA

Prep Batch: 285105

Prep Type: Total/NA

20

Method: 245.1 - Mercury (CVAA)

Lab Sample ID: MB 490-285105/1-A **Client Sample ID: Method Blank** Prep Type: Total/NA

Matrix: Water Analysis Batch: 285821

MR MR

ND

Analyte Result Qualifier RL MDL Unit Prepared Analyzed Dil Fac $\overline{\mathsf{ND}}$ 0.000200 0.000150 mg/L 09/28/15 16:31 09/30/15 16:05 Mercury

Lab Sample ID: LCS 490-285105/2-A Client Sample ID: Lab Control Sample

Matrix: Water

Analysis Batch: 285821

Prep Batch: 285105 LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit %Rec Limits 0.0009237 0.00100 mg/L 92 85 - 115 Mercury

Client Sample ID: Method Blank

09/26/15 13:30

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Method: 245.1 - Mercury (CVAA) (Continued)

Lab Sample ID: LCSD 490-285105/3-A		Client Sample ID: Lab Control Sample Dup									
Matrix: Water							Prep Typ	e: Tot	al/NA		
Analysis Batch: 285821	Prep Batch: 285										
	Spike	LCSD	LCSD				%Rec.		RPD		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit		
Mercury	0.00100	0.0008779		mg/L		88	85 - 115	5	25		

Lab Sample ID: 490-88132			Client Sample ID: KIF-AD2							
Matrix: Water									Prep Ty	pe: Total/NA
Analysis Batch: 285821									Prep Ba	atch: 285105
_	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Mercury	ND		0.00100	0.0009345		mg/L		93	70 - 130	

Lab Sample ID: 490-88132-			Clier	nt San	nple ID	: KIF-AD2	-GW-09	2115			
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 285821									Prep Ba	tch: 28	35105
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Mercury	ND	-	0.00100	0.0008357		mg/L		84	70 - 130	11	25

Method: SM 2540D - Solids, Total Suspended (TSS)

ND

Lab Sample ID: MB 490-284742/1

Total Suspended Solids

Total Suspended Solids

Matrix: Water							Pr	ep Type: To	tal/NA
Analysis Batch: 284742									
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac

Lab Sample ID: LCS 490-284742/2 Matrix: Water		Client Sample ID: Lab Control Sample Prep Type: Total/NA
Analysis Batch: 284742		

1.00

0.700 mg/L

	Spike	LCS	LCS			%Rec.	
Analyte	Added	Result	Qualifier U	Jnit D	%Rec	Limits	
Total Suspended Solids	100	106.5	m	na/L	107	90 - 110	

Lab Sample ID: 490-87990-B-2 DU Matrix: Water					Client Sample ID: Duplicate Prep Type: Total/NA					
Analysis Batch: 284742							- P - 21			
•		Sample	DU	DU				RPD		
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit		
Total Suspended Solids	11.0		3.333	F3	mg/L		107	20		
_ Lab Sample ID: 490-8810	01-C-1 DU					Clie	nt Sample ID: Dup	licate		
Matrix: Water							Prep Type: Tot	al/NA		
Analysis Batch: 284742										
-	Sample	Sample	DU	DU				RPD		
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit		

12.80

mg/L

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: MB 490-285141/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 285350

MB MB Analyte Result Qualifier RL **MDL** Unit D Analyzed Dil Fac Prepared 1.00 09/29/15 16:30 Total Suspended Solids $\overline{\mathsf{ND}}$ 0.700 mg/L

Lab Sample ID: MB 490-285350/1 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 285350

MB MB **MDL** Unit Analyte Result Qualifier RL Analyzed Dil Fac Prepared 1.00 **Total Suspended Solids** $\overline{\mathsf{ND}}$ 0.700 mg/L 09/29/15 16:30

Lab Sample ID: LCS 490-285350/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 285350

Spike LCS LCS %Rec. Added Result Qualifier %Rec Limits Analyte Unit D **Total Suspended Solids** 100 99.40 mg/L 99 90 - 110

Lab Sample ID: 490-88191-B-3 DU **Client Sample ID: Duplicate** Prep Type: Total/NA

Matrix: Water

Analysis Batch: 285350

DU DU Sample Sample RPD Result Qualifier Result Qualifier Unit **RPD** Limit **Total Suspended Solids** 1.60 1.700 20 mg/L 6

Lab Sample ID: 490-88209-F-1 DU **Client Sample ID: Duplicate Matrix: Water** Prep Type: Total/NA

Analysis Batch: 285350

DU DU RPD Sample Sample Analyte Result Qualifier Result Qualifier Unit RPD Limit **Total Suspended Solids** 5.000 4.83 mg/L 20

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-213602/1-A **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA **Analysis Batch: 218112 Prep Batch: 213602**

Count Total MB MB Uncert. Uncert. Analyte Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$ MDC Unit Prepared Analyzed Dil Fac Radium-226 0.01918 U 0.0457 0.0457 0.0813 pCi/L 09/29/15 13:55 10/23/15 06:16

MB MB

%Yield Qualifier Carrier I imits Prepared Dil Fac Analyzed 100 40 - 110 09/29/15 13:55 10/23/15 06:16 Ba Carrier

QC Sample Results

Client: Tennessee Valley Authority TestAmerica Job ID: 490-88132-1 Project/Site: TVA-KIF Groundwater

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 213602

Method: 903.0 - Radium-226	(GFPC)	(Continued)
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Lab Sample ID: LCS 160-213602/2-A Client Sample ID: Lab Control Sample **Matrix: Water** Prep Type: Total/NA Analysis Batch: 218112 **Prep Batch: 213602** Total

Spike LCS LCS Uncert. %Rec. Analyte Added MDC Unit Result Qual $(2\sigma + / -)$ %Rec Limits Radium-226 11.2 11.06 1.08 0.0741 pCi/L 68 - 137

LCS LCS Carrier %Yield Qualifier Limits Ba Carrier 101 40 - 110

Lab Sample ID: LCSD 160-213602/3-A **Matrix: Water**

Analysis Batch: 218112

				Total						
	Spike	LCSD	LCSD	Uncert.				%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	MDC	Unit	%Rec	Limits	RER	Limit
Radium-226	11.2	13.31		1.29	 0.0836	pCi/L	119	68 - 137	0.95	1
1005 100	\n_									

LCSD LCSD Carrier %Yield Qualifier Limits Ba Carrier 95.6 40 - 110

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

HPLC/IC

Analysis Batch: 287987

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	300.0	
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	300.0	
490-88132-2 MS	KIF-AD2-GW-092115	Total/NA	Water	300.0	
490-88132-2 MSD	KIF-AD2-GW-092115	Total/NA	Water	300.0	
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	300.0	
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	300.0	
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	300.0	
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	300.0	
LCS 490-287987/7	Lab Control Sample	Total/NA	Water	300.0	
MB 490-287987/6	Method Blank	Total/NA	Water	300.0	

Metals

Prep Batch: 285058

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	200.8	_
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	200.8	
490-88132-2 MS	KIF-AD2-GW-092115	Total/NA	Water	200.8	
490-88132-2 MSD	KIF-AD2-GW-092115	Total/NA	Water	200.8	
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	200.8	
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	200.8	
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	200.8	
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	200.8	
LCS 490-285058/2-A	Lab Control Sample	Total/NA	Water	200.8	
MB 490-285058/1-A	Method Blank	Total/NA	Water	200.8	

Prep Batch: 285105

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	245.1	
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	245.1	
490-88132-2 MS	KIF-AD2-GW-092115	Total/NA	Water	245.1	
490-88132-2 MSD	KIF-AD2-GW-092115	Total/NA	Water	245.1	
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	245.1	
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	245.1	
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	245.1	
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	245.1	
LCS 490-285105/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 490-285105/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
MB 490-285105/1-A	Method Blank	Total/NA	Water	245.1	

Analysis Batch: 285487

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	200.8	285058
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	200.8	285058
490-88132-2 MS	KIF-AD2-GW-092115	Total/NA	Water	200.8	285058
490-88132-2 MSD	KIF-AD2-GW-092115	Total/NA	Water	200.8	285058
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	200.8	285058
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	200.8	285058
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	200.8	285058
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	200.8	285058

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Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Metals (Continued)

Analysis Batch: 285487 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 490-285058/2-A	Lab Control Sample	Total/NA	Water	200.8	285058
MB 490-285058/1-A	Method Blank	Total/NA	Water	200.8	285058

Analysis Batch: 285821

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	245.1	285105
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	245.1	285105
490-88132-2 MS	KIF-AD2-GW-092115	Total/NA	Water	245.1	285105
490-88132-2 MSD	KIF-AD2-GW-092115	Total/NA	Water	245.1	285105
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	245.1	285105
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	245.1	285105
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	245.1	285105
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	245.1	285105
LCS 490-285105/2-A	Lab Control Sample	Total/NA	Water	245.1	285105
LCSD 490-285105/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	285105
MB 490-285105/1-A	Method Blank	Total/NA	Water	245.1	285105

Analysis Batch: 285877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	200.8	285058
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	200.8	285058
490-88132-2 MS	KIF-AD2-GW-092115	Total/NA	Water	200.8	285058
490-88132-2 MSD	KIF-AD2-GW-092115	Total/NA	Water	200.8	285058
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	200.8	285058
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	200.8	285058
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	200.8	285058
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	200.8	285058
LCS 490-285058/2-A	Lab Control Sample	Total/NA	Water	200.8	285058
MB 490-285058/1-A	Method Blank	Total/NA	Water	200.8	285058

General Chemistry

Analysis Batch: 284742

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87990-B-2 DU	Duplicate	Total/NA	Water	SM 2540D	
490-88101-C-1 DU	Duplicate	Total/NA	Water	SM 2540D	
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	SM 2540D	
490-88132-2	KIF-AD2-GW-092115	Total/NA	Water	SM 2540D	
490-88132-3	KIF-AD2-AW-092115	Total/NA	Water	SM 2540D	
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	SM 2540D	
LCS 490-284742/2	Lab Control Sample	Total/NA	Water	SM 2540D	
MB 490-284742/1	Method Blank	Total/NA	Water	SM 2540D	

Leach Batch: 285141

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 490-285141/1-A	Method Blank	Total/NA	Water	D3987-85	

Analysis Batch: 285350

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	SM 2540D	

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QC Association Summary

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

General Chemistry (Continued)

Analysis Batch: 285350 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	SM 2540D	
490-88191-B-3 DU	Duplicate	Total/NA	Water	SM 2540D	
490-88209-F-1 DU	Duplicate	Total/NA	Water	SM 2540D	
LCS 490-285350/2	Lab Control Sample	Total/NA	Water	SM 2540D	
MB 490-285141/1-A	Method Blank	Total/NA	Water	SM 2540D	285141
MB 490-285350/1	Method Blank	Total/NA	Water	SM 2540D	

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Prep Batch: 213421

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	PrecSep_0	
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	PrecSep_0	
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	PrecSep_0	
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	PrecSep_0	

Prep Batch: 213602

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-88132-1	KIF-AD1-GW-092215	Total/NA	Water	PrecSep-21	
490-88132-4	KIF-AD3-GW-092315	Total/NA	Water	PrecSep-21	
490-88132-5	KIF-GW01-GW-092215	Total/NA	Water	PrecSep-21	
490-88132-6	KIF-6AR-GW-092315	Total/NA	Water	PrecSep-21	
LCS 160-213602/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-213602/3-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	
MB 160-213602/1-A	Method Blank	Total/NA	Water	PrecSep-21	

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Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Lab Sample ID: 490-88132-1 Client Sample ID: KIF-AD1-GW-092215

Date Collected: 09/22/15 10:10

Matrix: Water

Date Received: 09/25/15 10:15

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	10 mL		287987	10/07/15 19:59	CLN	TAL NSH
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Total/NA	Analysis	200.8		1	50 mL	50 mL	285487	09/29/15 20:23	KKK	TAL NSH
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Total/NA	Analysis	200.8		1	50 mL	50 mL	285877	09/30/15 19:33	KKK	TAL NSH
Total/NA	Prep	245.1			30 mL	30 mL	285105	09/28/15 16:31	RDF	TAL NSH
Total/NA	Analysis	245.1		1	30 mL	30 mL	285821	09/30/15 16:20	RDF	TAL NSH
Total/NA	Analysis	SM 2540D		1	1000 mL	1000 mL	284742	09/26/15 13:30	SMB	TAL NSH
Total/NA	Prep	PrecSep-21			948.54 mL	1.0 g	213602	09/29/15 13:55	CMC	TAL SL
Total/NA	Analysis	903.0		1	948.54 mL		218112	10/23/15 06:15	MFM	TAL SL
Total/NA	Prep	PrecSep_0			948.55 mL	1.0 g	213421	09/29/15 13:37	JAC	TAL SL
Total/NA	Analysis	904.0		1	948.55 mL		216760	10/16/15 11:11	MFM	TAL SL

Client Sample ID: KIF-AD2-GW-092115 Lab Sample ID: 490-88132-2

Date Collected: 09/22/15 10:50 **Matrix: Water**

Date Received: 09/25/15 10:15

_	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	10 mL		287987	10/07/15 20:23	CLN	TAL NSI
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NS
Total/NA	Analysis	200.8		1	50 mL	50 mL	285487	09/29/15 19:55	KKK	TAL NS
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NS
Total/NA	Analysis	200.8		1	50 mL	50 mL	285877	09/30/15 19:06	KKK	TAL NSI
Total/NA	Prep	245.1			30 mL	30 mL	285105	09/28/15 16:31	RDF	TAL NS
Total/NA	Analysis	245.1		1	30 mL	30 mL	285821	09/30/15 16:13	RDF	TAL NSI
Total/NA	Analysis	SM 2540D		1	1000 mL	1000 mL	284742	09/26/15 13:30	SMB	TAL NS

Client Sample ID: KIF-AD2-AW-092115 Lab Sample ID: 490-88132-3 Date Collected: 09/22/15 10:50

Date Received: 09/25/15 10:15

Prep Type Total/NA	Batch Type Analysis	Batch Method 300.0	Run	Pactor 1	Initial Amount 10 mL	Final Amount	Batch Number 287987	Prepared or Analyzed 10/07/15 21:35	Analyst CLN	Lab TAL NSH
Total/NA Total/NA	Prep Analysis	200.8 200.8		1	50 mL 50 mL	50 mL 50 mL	285058 285487	09/28/15 13:09 09/29/15 20:29		TAL NSH TAL NSH
Total/NA Total/NA	Prep Analysis	200.8 200.8		1	50 mL 50 mL	50 mL 50 mL	285058 285877			TAL NSH TAL NSH
Total/NA Total/NA	Prep Analysis	245.1 245.1		1	30 mL 30 mL	30 mL 30 mL	285105 285821	09/28/15 16:31 09/30/15 16:22	RDF RDF	TAL NSH TAL NSH
Total/NA	Analysis	SM 2540D		1	1000 mL	1000 mL	284742	09/26/15 13:30	SMB	TAL NSH

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Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Client Sample ID: KIF-AD3-GW-092315

Lab Sample ID: 490-88132-4 Date Collected: 09/22/15 10:45 **Matrix: Water**

Date Received: 09/25/15 10:15

Γ	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	10 mL		287987	10/07/15 21:59	CLN	TAL NSH
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Total/NA	Analysis	200.8		1	50 mL	50 mL	285487	09/29/15 20:35	KKK	TAL NSH
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Total/NA	Analysis	200.8		1	50 mL	50 mL	285877	09/30/15 19:44	KKK	TAL NSH
Total/NA	Prep	245.1			30 mL	30 mL	285105	09/28/15 16:31	RDF	TAL NSH
Total/NA	Analysis	245.1		1	30 mL	30 mL	285821	09/30/15 16:25	RDF	TAL NSH
Total/NA	Analysis	SM 2540D		1	1000 mL	1000 mL	284742	09/26/15 13:30	SMB	TAL NSH
Total/NA	Prep	PrecSep-21			920.99 mL	1.0 g	213602	09/29/15 13:55	CMC	TAL SL
Total/NA	Analysis	903.0		1	920.99 mL		218112	10/23/15 06:15	MFM	TAL SL
Total/NA	Prep	PrecSep_0			920.99 mL	1.0 g	213421	09/29/15 13:37	JAC	TAL SL
Total/NA	Analysis	904.0		1	920.99 mL	-	216760	10/16/15 11:11	MFM	TAL SL

Client Sample ID: KIF-GW01-GW-092215 Lab Sample ID: 490-88132-5

Matrix: Water Date Collected: 09/22/15 12:10 Date Received: 09/25/15 10:15

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	10 mL		287987	10/07/15 22:23	CLN	TAL NSH
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Total/NA	Analysis	200.8		1	50 mL	50 mL	285487	09/29/15 20:52	KKK	TAL NSH
Total/NA	Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Total/NA	Analysis	200.8		1	50 mL	50 mL	285877	09/30/15 20:01	KKK	TAL NSH
Total/NA	Prep	245.1			30 mL	30 mL	285105	09/28/15 16:31	RDF	TAL NSH
Total/NA	Analysis	245.1		1	30 mL	30 mL	285821	09/30/15 16:27	RDF	TAL NSH
Total/NA	Analysis	SM 2540D		1	1000 mL	1000 mL	285350	09/29/15 16:30	SMB	TAL NSH
Total/NA	Prep	PrecSep-21			905.14 mL	1.0 g	213602	09/29/15 13:55	CMC	TAL SL
Total/NA	Analysis	903.0		1	905.14 mL		218112	10/23/15 06:14	MFM	TAL SL
Total/NA	Prep	PrecSep_0			905.14 mL	1.0 g	213421	09/29/15 13:37	JAC	TAL SL
Total/NA	Analysis	904.0		1	905.14 mL		216760	10/16/15 11:11	MFM	TAL SL

Lab Sample ID: 490-88132-6 Client Sample ID: KIF-6AR-GW-092315

Date Collected: 09/22/15 12:10 Date Received: 09/25/15 10:15

Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Analysis	300.0		1	10 mL		287987	10/07/15 22:47	CLN	TAL NSH
Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Analysis	200.8		1	50 mL	50 mL	285487	09/29/15 20:57	KKK	TAL NSH
Prep	200.8			50 mL	50 mL	285058	09/28/15 13:09	ZLN	TAL NSH
Analysis	200.8		1	50 mL	50 mL	285877	09/30/15 20:07	KKK	TAL NSH
Prep	245.1			30 mL	30 mL	285105	09/28/15 16:31	RDF	TAL NSH
Analysis	245.1		1	30 mL	30 mL	285821	09/30/15 16:34	RDF	TAL NSH
	Type Analysis Prep Analysis Prep Analysis Prep Analysis	Type Method Analysis 300.0 Prep 200.8 Analysis 200.8 Prep 200.8 Analysis 200.8 Prep 245.1	Type Method Run Analysis 300.0 Prep 200.8 Analysis 200.8 Prep 200.8 Analysis 200.8 Prep 245.1	Type Method Run Factor Analysis 300.0 1 Prep 200.8 1 Analysis 200.8 1 Prep 200.8 1 Analysis 200.8 1 Prep 245.1 1	Type Method Run Factor Amount Analysis 300.0 1 10 mL Prep 200.8 50 mL Analysis 200.8 1 50 mL Prep 200.8 50 mL Analysis 200.8 1 50 mL Prep 245.1 30 mL	Type Method Run Factor Amount Amount Analysis 300.0 1 10 mL Prep 200.8 50 mL 50 mL Analysis 200.8 1 50 mL 50 mL Prep 200.8 50 mL 50 mL 50 mL Analysis 200.8 1 50 mL 50 mL Prep 245.1 30 mL 30 mL 30 mL	Type Method Run Factor Amount Amount Number Analysis 300.0 1 10 mL 287987 Prep 200.8 50 mL 50 mL 285058 Analysis 200.8 1 50 mL 50 mL 285487 Prep 200.8 50 mL 50 mL 285058 Analysis 200.8 1 50 mL 50 mL 285877 Prep 245.1 30 mL 30 mL 285105	Type Method Run Factor Amount Amount Number or Analyzed Analysis 300.0 1 10 mL 287987 10/07/15 22:47 Prep 200.8 50 mL 50 mL 285058 09/28/15 13:09 Analysis 200.8 1 50 mL 50 mL 285487 09/29/15 20:57 Prep 200.8 50 mL 50 mL 285058 09/28/15 13:09 Analysis 200.8 1 50 mL 50 mL 285877 09/30/15 20:07 Prep 245.1 30 mL 30 mL 285105 09/28/15 16:31	Type Method Run Factor Amount Amount Number or Analyzed Analyst Analysis 300.0 1 10 mL 287987 10/07/15 22:47 CLN Prep 200.8 50 mL 50 mL 285058 09/28/15 13:09 ZLN Analysis 200.8 1 50 mL 50 mL 285058 09/29/15 20:57 KKK Prep 200.8 50 mL 50 mL 285058 09/28/15 13:09 ZLN Analysis 200.8 1 50 mL 50 mL 285058 09/28/15 13:09 ZLN Prep 200.8 1 50 mL 50 mL 285058 09/28/15 13:09 ZLN Analysis 200.8 1 50 mL 285058 09/28/15 13:09 ZLN Prep 245.1 30 mL 30 mL 285105 09/28/15 16:31 RDF

TestAmerica Nashville

Matrix: Water

Lab Chronicle

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Lab Sample ID: 490-88132-6

Client Sample ID: KIF-6AR-GW-092315 Date Collected: 09/22/15 12:10 **Matrix: Water**

Date Received: 09/25/15 10:15

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540D		1	1000 mL	1000 mL	285350	09/29/15 16:30	SMB	TAL NSH
Total/NA	Prep	PrecSep-21			949.25 mL	1.0 g	213602	09/29/15 13:55	CMC	TAL SL
Total/NA	Analysis	903.0		1	949.25 mL		218112	10/23/15 06:14	MFM	TAL SL
Total/NA	Prep	PrecSep_0			949.25 mL	1.0 g	213421	09/29/15 13:37	JAC	TAL SL
Total/NA	Analysis	904.0		1	949.25 mL		216760	10/16/15 11:11	MFM	TAL SL

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177 TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Method Summary

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL NSH
200.8	Metals (ICP/MS)	EPA	TAL NSH
245.1	Mercury (CVAA)	EPA	TAL NSH
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL NSH
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions. SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177 TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	07-24-16
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-16
Georgia	State Program	4	N/A	06-30-16
Illinois	NELAP	5	200010	12-09-15 *
lowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	10-31-15 *
Kentucky (UST)	State Program	4	19	06-30-16
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-16
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-16
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-16
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-16
New Hampshire	NELAP	1	2963	10-09-16
New Jersey	NELAP	2	TN965	10-30-15 *
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	07-10-17
Oklahoma	State Program	6	9412	08-31-16
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-16
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (Do Not Use - DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-16
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-16
Virginia	NELAP	3	460152	06-14-16
Washington	State Program	10	C789	07-19-16
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-16
Wyoming (UST)	A2LA	8	453.07	12-31-15

Laboratory: TestAmerica St. Louis

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority Alaska	Program State Program	EPA Region	Certification ID MO00054	Expiration Date 06-30-16
California	ELAP	9	2886	03-31-16
Connecticut	State Program	1	PH-0241	03-31-17

^{*} Certification renewal pending - certification considered valid.

TestAmerica Nashville

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Certification Summary

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater

TestAmerica Job ID: 490-88132-1

4

Laboratory: TestAmerica St. Louis (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Florida NELAP 4 E87689 Illinois NELAP 5 200023 Iowa State Program 7 373 Kansas NELAP 7 E-10236 Kentucky (DW) State Program 4 90125 L-A-B DoD ELAP L2305 Louisiana NELAP 6 04080	06-30-16 11-30-15 12-01-16 10-31-15 * 12-31-15 01-10-16 06-30-16
Iowa State Program 7 373 Kansas NELAP 7 E-10236 Kentucky (DW) State Program 4 90125 L-A-B DoD ELAP L2305	12-01-16 10-31-15 * 12-31-15 01-10-16
Kansas NELAP 7 E-10236 Kentucky (DW) State Program 4 90125 L-A-B DoD ELAP L2305	10-31-15 * 12-31-15 01-10-16
Kentucky (DW) State Program 4 90125 L-A-B DoD ELAP L2305	12-31-15 01-10-16
L-A-B DoD ELAP L2305	01-10-16
Louisiana NELAD 6 04090	06-30-16
LOUISIANA NELAP 6 04000	00 00 10
Louisiana (DW) NELAP 6 LA150017	7 12-31-16
Maryland State Program 3 310	09-30-16
Missouri State Program 7 780	06-30-15 *
Nevada State Program 9 MO00054	2016-1 07-31-16
New Jersey NELAP 2 MO002	09-30-15 *
New York NELAP 2 11616	03-31-16
North Dakota State Program 8 R207	06-30-16
NRC NRC 24-24817-	-01 12-31-22
Oklahoma State Program 6 9997	08-31-16
Pennsylvania NELAP 3 68-00540	02-28-16
South Carolina State Program 4 85002001	06-30-15 *
Texas NELAP 6 T1047041	93-15-9 07-31-16
USDA Federal P330-07-0	01-09-17
Utah NELAP 8 MO00054	2015-7 07-31-16
Virginia NELAP 3 460230	06-14-16
Washington State Program 10 C592	08-30-16
West Virginia DEP State Program 3 381	08-31-16

TestAmerica Nashville

^{*} Certification renewal pending - certification considered valid.



COOLER RECEIPT FORM



Cooler Received/Opened On: 9/25/2015 @1015	
1. Tracking #(last 4 digits, FedEx)	90-88132 Chain of Cust
Courier: Fed-Ex	
2. Temperature of rep. sample or temp blank when opened:	
3. If Item #2 temperature is 0° C or less, was the representative sample or temp blank frozen	en? YES NO. NA
4. Were custody seals on outside of cooler?	YESNONA
If yes, how many and where:	
5. Were the seals intact, signed, and dated correctly?	YES NO NA
6. Were custody papers inside cooler?	YESNONA
I certify that I opened the cooler and answered questions 1-6 (intial)	D
7. Were custody seals on containers: YES and Intact	YESNONA
Were these signed and dated correctly?	YESNONA
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Pa	aper Other None
9. Cooling process: Ice-pack Ice (direct contact) Dry	ice Other None
10. Did all containers arrive in good condition (unbroken)?	YÉSNONA
11. Were all container labels complete (#, date, signed, pres., etc)?	ESNONA
12. Did all container labels and tags agree with custody papers?	YESNONA
13a. Were VOA vials received?	YES. NONA
b. Was there any observable headspace present in any VOA vial?	YESNO. NA
14. Was there a Trip Blank in this cooler? YESNONA If multiple coolers, sequ	ience #
I certify that I unloaded the cooler and answered questions 7-14 (intial)	ELA
15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH lev	el? YESNO
b. Did the bottle labels indicate that the correct preservatives were used	YESNONA
16. Was residual chlorine present?	YESNO(NA
Lertify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intigeness)	al) Elf
17. Were custody papers properly filled out (ink, signed, etc)?	ESNONA
18. Did you sign the custody papers in the appropriate place?	ESNONA
19. Were correct containers used for the analysis requested?	ESNONA
20. Was sufficient amount of sample sent in each container?	PESNONA
I certify that I entered this project into LIMS and answered questions 17-20 (intial)	1A
I certify that I attached a label with the unique LIMS number to each container (intial)	TA
21. Were there Non-Conformance issues at login? YES. NO Was a NCM generated? YES	s.(.No#

LF-1



COOLER RECEIPT FORM

Loc: 490 88132

Cooler Received/Opened On 9/25/2015 @1015	
1. Tracking #(last 4 digits, FedEx)	
Courier: FedEx IR Gun ID 97310166	
2. Temperature of rep. sample or temp blank when opened: <u>Ů· </u>	
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen?	YES NO. NA
4. Were custody seals on outside of cooler?	YES NO NA
If yes, how many and where: 2 front	
5. Were the seals intact, signed, and dated correctly?	YES NONA
6. Were custody papers inside cooler?	ESNONA
certify that I opened the cooler and answered questions 1-6 (intial)	
7. Were custody seals on containers: YES NO and Intact	YESNO.
Were these signed and dated correctly?	YESNO(NA)
3. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper	Other None
O. Cooling process: (ICE) Ice-pack Ice (direct contact) Dry Ice	Other None
10. Did all containers arrive in good condition (unbroken)?	VESNONA
11. Were all container labels complete (#, date, signed, pres., etc)?	YESNONA
12. Did all container labels and tags agree with custody papers?	ESNONA
3a. Were VOA vials received?	YESNA
b. Was there any observable headspace present in any VOA vial?	YESNONA
الله. Was there a Trip Blank in this cooler? YESالله. NA If multiple coolers, sequenc	ce # <u>M</u>
certify that I unloaded the cooler and answered questions 7-14 (intial)	Coff -
15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level?	\sim
b. Did the bottle labels indicate that the correct preservatives were used	YESNONA
6. Was residual chlorine present?	YESNO. NA
certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial)	E94
7. Were custody papers properly filled out (ink, signed, etc)?	ESNONA
8. Did you sign the custody papers in the appropriate place?	(E9NONA
9. Were correct containers used for the analysis requested?	ESNONA
20. Was sufficient amount of sample sent in each container?	ESNONA
certify that I entered this project into LIMS and answered questions 17-20 (intial)	4
certify that I attached a label with the unique LIMS number to each container (intial)	K)
21. Were there Non-Conformance issues at login? YES. (NO) Was a NCM generated? YES.(1	N9#

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TestAmerica Nashville

2960 Foster Creighton Drive Nashville, TN 37204 Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

<u>TestAmerica</u>

THE LEADER IN ENVIRONMENTAL TESTING

s: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5 Z - other (specify)
M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
P - Na2O4S Q - Na2SO3 R - Na2S2SO3 S - I-2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
R - Na2S2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
T - TSP Dodecahydrate U - Acetone V - MCAA W - ph 4-5
V - MCAA W - ph 4-5
tructions/Note:
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onth)
Months
Company
Company
Company

TestAmerica Nashville

2960 Foster Creighton Drive Nashville, TN 37204

Chain of Custody Record





THE LEADER IN ENVIRONMENTAL TESTING

Phone (615) 726-0177 Fax (615) 726-3404																				THE LEADER IN EN	HRONMENTAL T	ESTING
Client Information (Sub Contract Lab)	Sampler.				PM: ge, Ga								Carrier Tracking No(s):							COC Na: 490-36902.1		
Client Contact: Shipping/Receiving	Phone:					@testamericainc.com												Page: Page 1 of 1				
Company: TestAmerica Laboratories, Inc.						6 W W			Α	naly	sis I	Requ	ıest	ed						Job#: 490-88132-1		
Address: 13715 Rider Trail North, ,	Due Date Requested 10/27/2015	:																	Preservation Codes: A - HCL M - Hexane			
City: Earth City State, Zip:	TAT Requested (day	TAT Requested (days):																		B - NaOH C - Zn Acetate	N - None O - AsNaO2	
MO. 63045													0							E - NaHSO4	P - Na2O4S Q - Na2SO3 R - Na2S2SO3	
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:	PO #:			(6)		FISE	ist												G - Amchlor	S - H2SO4 T - TSP Dodecah	ovdrate
Email:	WO#:	WO#.				or No)	Standard Target List	Standard Target List												I - Ice J - DI Water	U - Acetone V - MCAA	
Project Name: KIF Groundwater	Project #: 49001314	49001314				65.01	ndard	dard T											containers		W - ph 4-5 Z - other (specify)
Site: TVA KIF Groundwater	SSOW#:	SSOW#:																		Other:		
Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil BT=Tissue, A=/	ur) ii	X Perform MS/MS	903.0/PrecSep_21	904.0/PrecSep_0											X Total Number of	Special Ins	tructions/No	te:
KIF-AD1-GW-092215	9/22/15	10:10		Water	Ĥ		Х	Х							199558		3,85%	3900	2			
KIF-AD3-GW-092315	9/22/15	Eastern 10:45	2:	Water	\parallel	-	-	x	-				+	\dashv					2.			
KIF-GW01-GW-092215	9/22/15	Eastern 12:10 Eastern		Water	\Box		Х	X					\neg	1					2		·	
KIF-6AR-GW-092315	9/22/15	12:10 Eastern		Water			X	Х											2		,	
							_							_								
							\perp	\perp					_	_	_							
0.1700					+			\perp	_	-						\perp						
							-	-	-	+	- 45		_	-								
							-			-			-									
Possible Hazard Identification						Sam	ple L	Dispo	sal (A	l fee i	may	be as	sess	ed if	san	nples	are	reta	ine	d longer than 1 n	ionth)	
Unconfirmed							Ret	turn T	o Clier	nt		Dis	sposa	al By						e For	Months	
Deliverable Requested: I, II, III, IV, Other (specify)		49.0				<u>L</u>	ial In	nstruc	tions/C	QC R∈	equire	ment		0					-			
Empty Kit Relinquished by:		Date:		Codecony		me:) o co in	od by						Metho		Shipme					Company	
Relinguished by:	Date/Time: 9 28 15	- 16	1.15	Company Company	mu	Received by:									Date/		105	_	0925	Company Company	حرال	
Relinquished by:	Date/Time;			Company				red by:								Date/					Company	
Custody Seals Intact: Custody Seal No.:			*						erature(s	s) °C a	nd Ott	er Ren	narks				g.					
Δ Yes Δ No	2											191										100

Login Sample Receipt Checklist

Client: Tennessee Valley Authority

Job Number: 490-88132-1

Login Number: 88132 List Source: TestAmerica Nashville

List Number: 1

Creator: Abernathy, Eric

Creator: Apernatny, Eric		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Login Sample Receipt Checklist

Client: Tennessee Valley Authority

Job Number: 490-88132-1

Login Number: 88132 List Source: TestAmerica St. Louis
List Number: 2 List Creation: 09/29/15 10:39 AM

Creator: Daniels, Brian J

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	5.1
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
s the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is 66mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

10/27/2015

TestAmerica Nashville

Tracer/Carrier Summary

Client: Tennessee Valley Authority Project/Site: TVA-KIF Groundwater TestAmerica Job ID: 490-88132-1

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
490-88132-1	KIF-AD1-GW-092215	105	
490-88132-4	KIF-AD3-GW-092315	82.3	
490-88132-5	KIF-GW01-GW-092215	97.1	
490-88132-6	KIF-6AR-GW-092315	132 X	
LCS 160-213602/2-A	Lab Control Sample	101	
LCSD 160-213602/3-A	Lab Control Sample Dup	95.6	
MB 160-213602/1-A	Method Blank	100	
Tracer/Carrier Legenc	l		

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water Prep Type: Total/NA

				Percent Yield (Acceptance Limits)
		Ва	Υ	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
490-88132-1	KIF-AD1-GW-092215	105	82.2	
490-88132-4	KIF-AD3-GW-092315	82.3	83.4	
490-88132-5	KIF-GW01-GW-092215	97.1	80.0	
490-88132-6	KIF-6AR-GW-092315	137 X	65.8	

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

TestAmerica Nashville

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10/27/2015

APPENDIX C

TIME SERIES GRAPHS FOR APPENDIX I CONSTITUENTS

