Data Validation Package

February 2014
Groundwater Sampling at the
Falls City, Texas, Disposal Site

April 2014

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Falls City, Texas, Disposal Site

Sampling Period: February 20–21, 2014

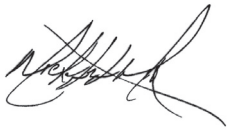
Ten groundwater samples were collected at the Falls City, Texas, Disposal Site as specified in the March 2008 *Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site Falls City, Texas*.

Sampling and analyses were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated).

The wells sampled included the cell performance monitoring wells (0709, 0858, 0880, 0906, and 0921) and the groundwater monitoring wells (0862, 0886, 0891, 0924, and 0963). A duplicate sample was collected from location 0891.

Water levels were measured at each sampled well. Historically, cell performance monitoring wells 0908 and 0916 have not produced water and were confirmed as dry. These wells are completed above the saturated interval in the formation. Since 1996, the water level has been trending lower at five wells adjacent to the cell (0709, 0858, 0880, 0906, and 0921).

The time-concentration graphs included in this report show fluctuations in the uranium concentrations, mostly notable in wells 0880, 0891, and 0921.



Michele L. Miller
2014.04.15 11:00:34 -04'00'

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Michele Miller Date
Site Lead
The S.M. Stoller Corporation,
a wholly owned subsidiary of Huntington Ingalls Industries

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Falls City, Texas, Disposal Site, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Falls City, Texas	**Date(s) of Water Sampling**	February 20–21, 2014
Date(s) of Verification	March 18, 2014	**Name of Verifier**	Stephen Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List any Program Directives or other documents, SOPs, instructions.		Work Order letter dated February 6, 2014.
2. Were the sampling locations specified in the planning documents sampled?	Yes	Locations 0908 and 0916 were confirmed dry.
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on February 14, 2014.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected at location 0891.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample cooling was not required.
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 14025923
Sample Event: February 20–21, 2014
Site(s): Falls City, Texas
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1402381
Analysis: Uranium
Validator: Stephen Donivan
Review Date: March 18, 2014

This validation was performed according to the *Environmental Procedures Catalog* (LMS/POL/S04325), "Standard Practice for Validation of Environmental Data." The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Uranium	LMM-02	SW-846 3005A	SW-846 6020A

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado received 11 water samples on February 25, 2014, accompanied by a Chain of Custody form. The Chain of Custody form was checked to confirm that the samples were listed on the form and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents had no errors or omissions. Copies of the air waybill labels were included with the receiving documentation.

Preservation and Holding Times

The sample shipment was received intact at ambient temperature which complies with requirements. The samples were received in the correct container types and had been preserved correctly for the requested analyses and all samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for this analyte is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL. The reported MDLs demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Method SW-846 6020A, Uranium
Calibrations were performed on February 27, 2014, using four calibration standards resulting in a calibration curve with a correlation coefficient (r^2) value greater than 0.995. The absolute value of the curve intercept was less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency with all calibration checks meeting the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method, initial, and continuing calibration blank results were below the applicable MDL.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples A and AB were analyzed at the required frequency to verify the interelement and background correction factors for all inductively coupled plasma instruments. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix. The MS/MSD data are not evaluated because the concentration of the unspiked sample was greater than 4 times the spike concentration.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than the PQL, the range should be no greater than the PQL. The replicate results met these criteria demonstrating acceptable laboratory precision.

Laboratory Control Samples

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. Results for the laboratory control samples were acceptable for all analyses.

Metals Serial Dilution

Serial dilutions were performed during the metals analysis to monitor physical or chemical interferences that may exist in the sample matrix. Serial dilutions were prepared and analyzed for all metals. The acceptance criteria were met for all analytes.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Electronic Data Deliverable (EDD) File

The EDD file arrived on March 3, 2014. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 14025923 **Lab Code:** PAR **Validator:** Stephen Donivan **Validation Date:** 03/18/2014

Project: Falls City **Analysis Type:** ☑ Metals ☐ General Chem ☐ Rad ☐ Organics

# of Samples: 11 **Matrix:** WATER **Requested Analysis Completed:** Yes

Chain of Custody

Present: OK **Signed:** OK **Dated:** OK

Sample

Integrity: OK **Preservation:** OK **Temperature:** OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	The reported detection limits are equal to or below contract requirements.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 14025923 **Lab Code:** PAR **Date Due:** 03/25/2014

Matrix: Water **Site Code:** FCT01 **Date Completed:** 03/04/2014

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Uranium	ICP/MS	02/27/2014	0.0000	1.0000	OK	OK	OK	118.0			5.0	103.0	5.0	90.0

Sampling Quality Control Assessment

The following information summarizes and assesses quality control for this sampling event.

Sampling Protocol

Sample results for all monitoring wells met the Category I or II low-flow sampling criteria and were qualified with an "F" flag in the database, indicating the wells were purged and sampled using the low-flow sampling method.

The groundwater sample results for wells 0858, 0862, and 0886 were qualified with a "Q" flag in the database indicating the data are considered qualitative because the wells were sampled using Category II criteria. Well 0886 had a turbidity value greater than ten NTUs and the sample from this well was filtered.

Equipment Blank Assessment

Dedicated sampling equipment was used at all locations and an equipment blank was not required.

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location 0891. The duplicate results met these criteria, demonstrating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 14025923 **Lab Code:** PAR **Project:** Falls City **Validation Date:** 03/18/2014

Duplicate: 2580 **Sample:** 0891

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Uranium	3000			200	3100			100	3.28		UG/L

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator: Stephen Donivan — Stephen E. Donivan 2014.04.14 13:49:54 -06'00' — Date

Data Validation Lead: Stephen Donivan — Stephen E. Donivan 2014.04.14 13:50:17 -06'00' — Date

Attachment 1
Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. Potential outliers may result from transcription errors, data-coding errors, or measurement system problems. However, outliers may also represent true extreme values of a distribution and indicate more variability in the population than was expected.

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

There are three steps involved in identifying extreme values or outliers:

1. Identify extreme values that may be potential outliers by generating the Outliers Report using the Sample Management System from data in the environmental database. The application compares the new data set (in standard environmental database units) with historical data and lists the new data that fall outside the historical data range. A determination is also made if the data are normally distributed using the Shapiro-Wilk Test.
2. Apply the appropriate statistical test. Dixon's Extreme Value test is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. Scientifically review statistical outliers and decide on their disposition. The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

There were no potential outliers identified, and the data for this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters
Comparison: All historical Data Beginning 01/01/2004
Laboratory: ALS Laboratory Group
RIN: 14025923
Report Date: 03/18/2014

					Current	Qualifiers		Historical Maximum	Qualifiers		Historical Minimum	Qualifiers		Number of Data Points		Statistical Outlier
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	*Lab*	*Data*	Result	*Lab*	*Data*	Result	*Lab*	*Data*	N	N Below Detect	
FCT03	0891	N001	02/20/2014	Uranium	3		F	2.9		F	0.033		F	14	0	No
FCT03	0924	N001	02/21/2014	Uranium	0.59		F	0.58		F	0.45			12	0	No

STATISTICAL TESTS:
The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test
Outliers are identified using Dixon's Test when there are 25 or fewer data points.
Outliers are identified using Rosner's Test when there are 26 or more data points.
See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

Attachment 2
Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0709 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/21/2014	N001	12.65 - 32.65	218		F	#		
Dissolved Oxygen	mg/L	02/21/2014	N001	12.65 - 32.65	8.36		F	#		
Oxidation Reduction Potential	mV	02/21/2014	N001	12.65 - 32.65	115		F	#		
pH	s.u.	02/21/2014	N001	12.65 - 32.65	6.2		F	#		
Specific Conductance	umhos /cm	02/21/2014	N001	12.65 - 32.65	8560		F	#		
Temperature	C	02/21/2014	N001	12.65 - 32.65	18.7		F	#		
Turbidity	NTU	02/21/2014	N001	12.65 - 32.65	2		F	#		
Uranium	mg/L	02/21/2014	N001	12.65 - 32.65	0.47		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0858 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/20/2014	N001	39.42	-	49.42	490		FQ	#		
Dissolved Oxygen	mg/L	02/20/2014	N001	39.42	-	49.42	5.37		FQ	#		
Oxidation Reduction Potential	mV	02/20/2014	N001	39.42	-	49.42	-3		FQ	#		
pH	s.u.	02/20/2014	N001	39.42	-	49.42	6.14		FQ	#		
Specific Conductance	umhos /cm	02/20/2014	N001	39.42	-	49.42	10180		FQ	#		
Temperature	C	02/20/2014	N001	39.42	-	49.42	24.4		FQ	#		
Turbidity	NTU	02/20/2014	N001	39.42	-	49.42	3.28		FQ	#		
Uranium	mg/L	02/20/2014	N001	39.42	-	49.42	0.048		FQ	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0862 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/20/2014	N001	117.77 - 127.77	300		FQ	#		
Dissolved Oxygen	mg/L	02/20/2014	N001	117.77 - 127.77	2.76		FQ	#		
Oxidation Reduction Potential	mV	02/20/2014	N001	117.77 - 127.77	15		FQ	#		
pH	s.u.	02/20/2014	N001	117.77 - 127.77	6.8		FQ	#		
Specific Conductance	umhos /cm	02/20/2014	N001	117.77 - 127.77	4185		FQ	#		
Temperature	C	02/20/2014	N001	117.77 - 127.77	25.1		FQ	#		
Turbidity	NTU	02/20/2014	N001	117.77 - 127.77	3.15		FQ	#		
Uranium	mg/L	02/20/2014	N001	117.77 - 127.77	0.0017		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0880 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/21/2014	N001	32.3 - 42.3	0		F	#		
Dissolved Oxygen	mg/L	02/21/2014	N001	32.3 - 42.3	4.74		F	#		
Oxidation Reduction Potential	mV	02/21/2014	N001	32.3 - 42.3	180		F	#		
pH	s.u.	02/21/2014	N001	32.3 - 42.3	4.27		F	#		
Specific Conductance	umhos /cm	02/21/2014	N001	32.3 - 42.3	18590		F	#		
Temperature	C	02/21/2014	N001	32.3 - 42.3	20.3		F	#		
Turbidity	NTU	02/21/2014	N001	32.3 - 42.3	7.98		F	#		
Uranium	mg/L	02/21/2014	N001	32.3 - 42.3	4.4		F	#	0.0029	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0886 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/20/2014	0001	19.17	-	49.17	46		FQ	#		
Dissolved Oxygen	mg/L	02/20/2014	N001	19.17	-	49.17	2.55		FQ	#		
Oxidation Reduction Potential	mV	02/20/2014	N001	19.17	-	49.17	62		FQ	#		
pH	s.u.	02/20/2014	N001	19.17	-	49.17	5.6		FQ	#		
Specific Conductance	umhos /cm	02/20/2014	N001	19.17	-	49.17	3325		FQ	#		
Temperature	C	02/20/2014	N001	19.17	-	49.17	24.3		FQ	#		
Turbidity	NTU	02/20/2014	N001	19.17	-	49.17	61		FQ	#		
Uranium	mg/L	02/20/2014	0001	19.17	-	49.17	0.0062		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0891 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/20/2014	N001	10.74 - 20.74	486		F	#		
Dissolved Oxygen	mg/L	02/20/2014	N001	10.74 - 20.74	2.69		F	#		
Oxidation Reduction Potential	mV	02/20/2014	N001	10.74 - 20.74	185		F	#		
pH	s.u.	02/20/2014	N001	10.74 - 20.74	6.42		F	#		
Specific Conductance	umhos /cm	02/20/2014	N001	10.74 - 20.74	21755		F	#		
Temperature	C	02/20/2014	N001	10.74 - 20.74	23.4		F	#		
Turbidity	NTU	02/20/2014	N001	10.74 - 20.74	8.38		F	#		
Uranium	mg/L	02/20/2014	N001	10.74 - 20.74	3		F	#	0.00058	
Uranium	mg/L	02/20/2014	N002	10.74 - 20.74	3.1		F	#	0.00029	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0906 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/20/2014	N001	12.49 - 27.49	98		F	#		
Dissolved Oxygen	mg/L	02/20/2014	N001	12.49 - 27.49	4.15		F	#		
Oxidation Reduction Potential	mV	02/20/2014	N001	12.49 - 27.49	115		F	#		
pH	s.u.	02/20/2014	N001	12.49 - 27.49	5.54		F	#		
Specific Conductance	umhos /cm	02/20/2014	N001	12.49 - 27.49	9500		F	#		
Temperature	C	02/20/2014	N001	12.49 - 27.49	25.1		F	#		
Turbidity	NTU	02/20/2014	N001	12.49 - 27.49	9.99		F	#		
Uranium	mg/L	02/20/2014	N001	12.49 - 27.49	0.057		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0921 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/21/2014	N001	44.55 - 54.55	490		F	#		
Dissolved Oxygen	mg/L	02/21/2014	N001	44.55 - 54.55	3.77		F	#		
Oxidation Reduction Potential	mV	02/21/2014	N001	44.55 - 54.55	150		F	#		
pH	s.u.	02/21/2014	N001	44.55 - 54.55	5.98		F	#		
Specific Conductance	umhos /cm	02/21/2014	N001	44.55 - 54.55	10000		F	#		
Temperature	C	02/21/2014	N001	44.55 - 54.55	23.2		F	#		
Turbidity	NTU	02/21/2014	N001	44.55 - 54.55	0.88		F	#		
Uranium	mg/L	02/21/2014	N001	44.55 - 54.55	1.6		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014
Location: 0924 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/21/2014	N001	19.7	-	29.7	398		F	#		
Dissolved Oxygen	mg/L	02/21/2014	N001	19.7	-	29.7	3.7		F	#		
Oxidation Reduction Potential	mV	02/21/2014	N001	19.7	-	29.7	145		F	#		
pH	s.u.	02/21/2014	N001	19.7	-	29.7	6.25		F	#		
Specific Conductance	umhos /cm	02/21/2014	N001	19.7	-	29.7	10210		F	#		
Temperature	C	02/21/2014	N001	19.7	-	29.7	24.2		F	#		
Turbidity	NTU	02/21/2014	N001	19.7	-	29.7	0.59		F	#		
Uranium	mg/L	02/21/2014	N001	19.7	-	29.7	0.59		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site

REPORT DATE: 03/18/2014

Location: 0963 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	02/20/2014	N001	4.38	-	14.38	0		F	#		
Dissolved Oxygen	mg/L	02/20/2014	N001	4.38	-	14.38	3.56		F	#		
Oxidation Reduction Potential	mV	02/20/2014	N001	4.38	-	14.38	360		F	#		
pH	s.u.	02/20/2014	N001	4.38	-	14.38	3.24		F	#		
Specific Conductance	umhos /cm	02/20/2014	N001	4.38	-	14.38	8570		F	#		
Temperature	C	02/20/2014	N001	4.38	-	14.38	23.4		F	#		
Turbidity	NTU	02/20/2014	N001	4.38	-	14.38	7.12		F	#		
Uranium	mg/L	02/20/2014	N001	4.38	-	14.38	0.078		F	#	0.00015	

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
>	Result above upper detection limit.
A	TIC is a suspected aldol-condensation product.
B	Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
C	Pesticide result confirmed by GC-MS.
D	Analyte determined in diluted sample.
E	Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
H	Holding time expired, value suspect.
I	Increased detection limit due to required dilution.
J	Estimated
N	Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
P	> 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
U	Analytical result below detection limit.
W	Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
X,Y,Z	Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

F	Low flow sampling method used.	G	Possible grout contamination, pH > 9.	J	Estimated value.
L	Less than 3 bore volumes purged prior to sampling.	Q	Qualitative result due to sampling technique.	R	Unusable result.
U	Parameter analyzed for but was not detected.	X	Location is undefined.		

QA QUALIFIER:

#	Validated according to quality assurance guidelines.

Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 03/18/2014

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0709	D	451.58	02/21/2014	07:35:31	34.52	417.06	
0858	O	441.03	02/20/2014	12:45:19	29.9	411.13	
0862	O	428.67	02/20/2014	13:45:58	67.81	360.86	
0880	O	446.84	02/21/2014	07:05:05	29.32	417.52	
0886	D	403.52	02/20/2014	14:15:40	34.7	368.82	
0891	D	349.63	02/20/2014	16:05:36	14.85	334.78	
0906	D	420.17	02/20/2014	13:20:28	16.43	403.74	
0908	N	495.67	02/21/2014	15:00:00			D
0916	D	420.39	02/21/2014	15:15:00			D
0921	D	435.75	02/21/2014	08:05:08	33.63	402.12	
0924	D	396.44	02/21/2014	08:50:46	19.23	377.21	
0963	D	373.23	02/20/2014	15:05:24	12.45	360.78	

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFFSITE
N UNKNOWN O ONSITE U UPGRADIENT

WATER LEVEL FLAGS: D Dry F Flowing B Below top of pump

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Hydrographs

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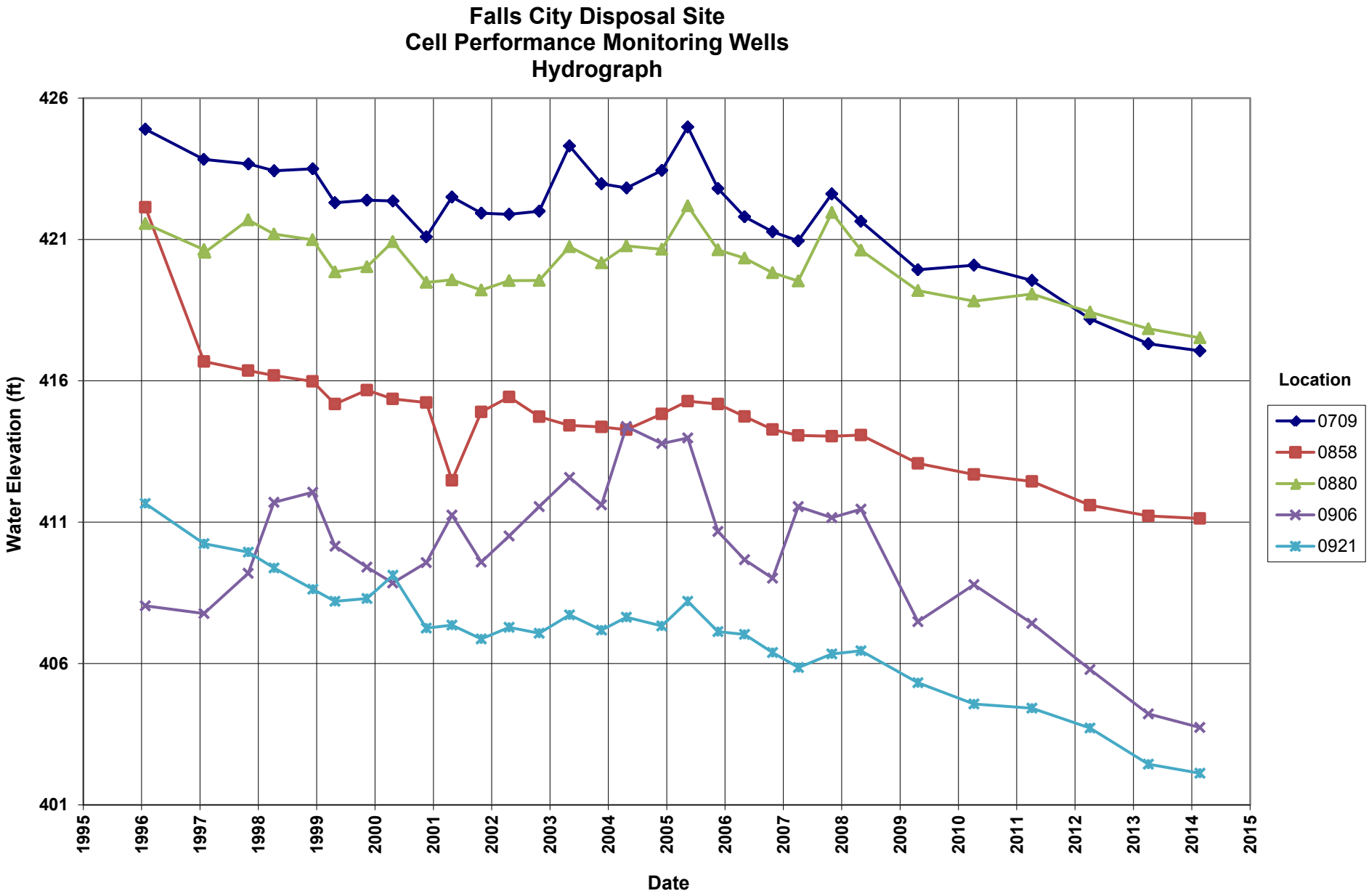
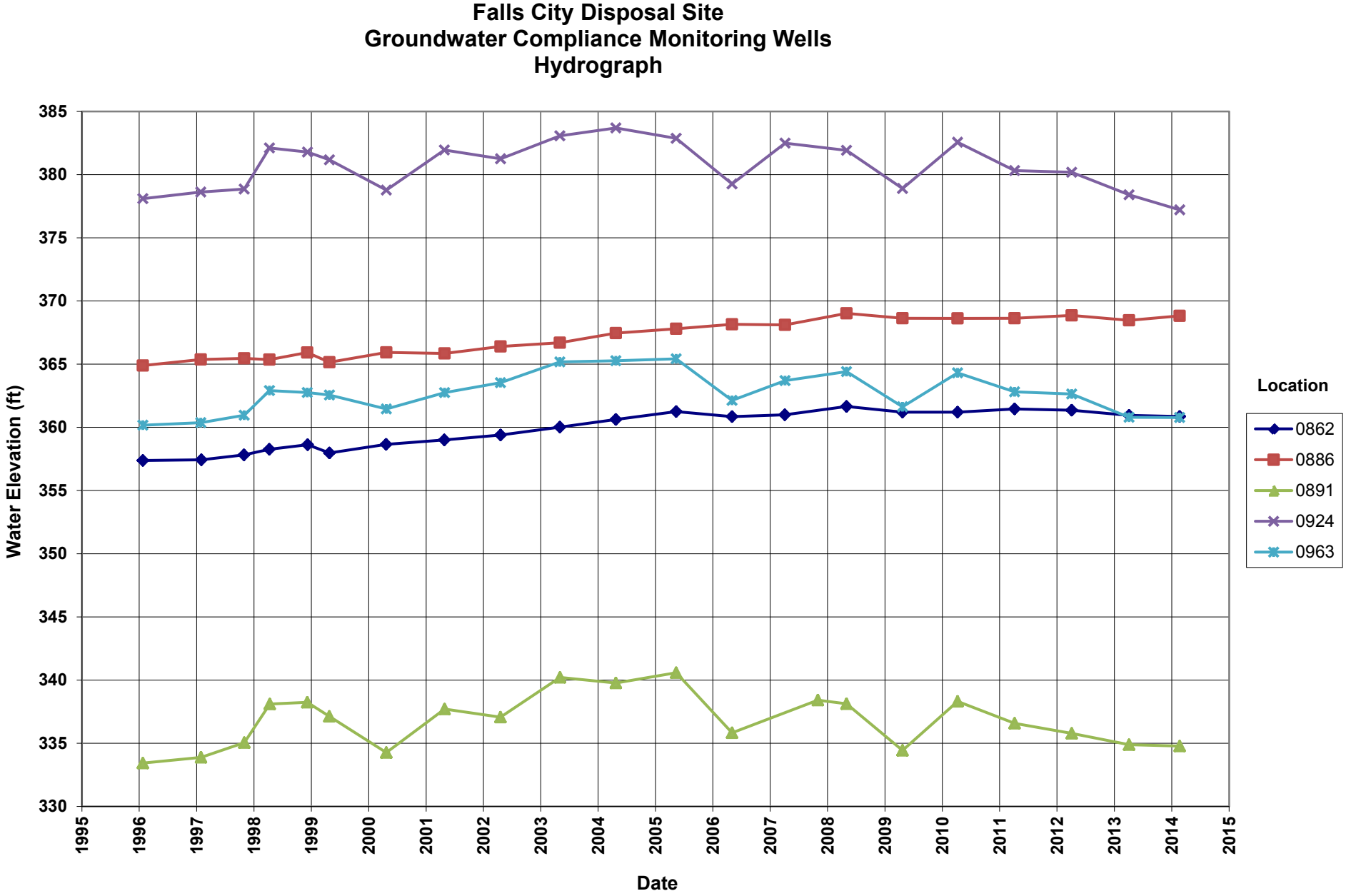

Falls City Disposal Site
Cell Performance Monitoring Wells
Hydrograph
Water Elevation (ft)
426
421
416
411
406
401
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
0709
0858
0880
0906
0921


Falls City Disposal Site
Groundwater Compliance Monitoring Wells
Hydrograph
Water Elevation (ft)
385
380
375
370
365
360
355
350
345
340
335
330
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
0862
0886
0891
0924
0963

Time-Concentration Graphs

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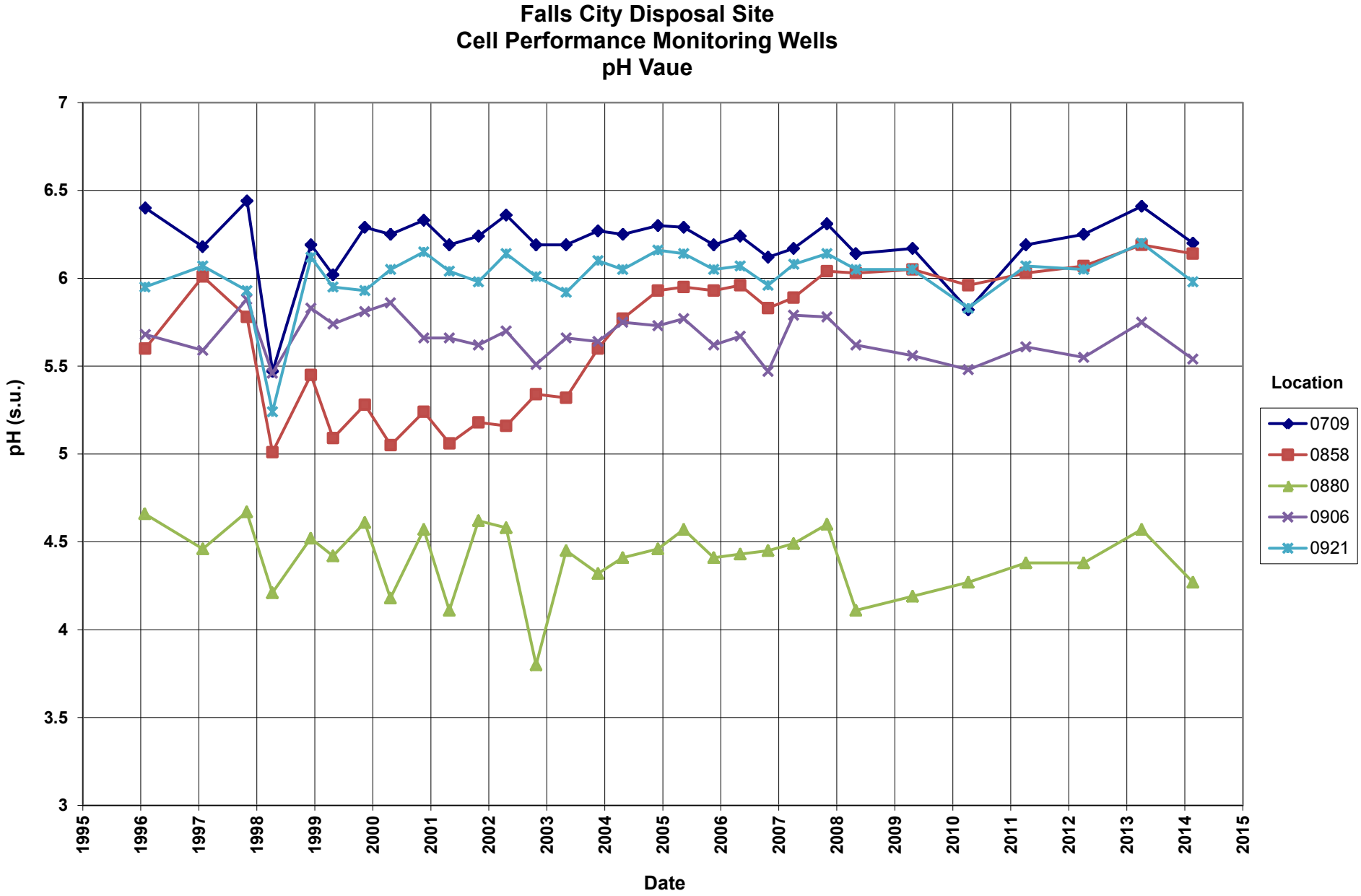
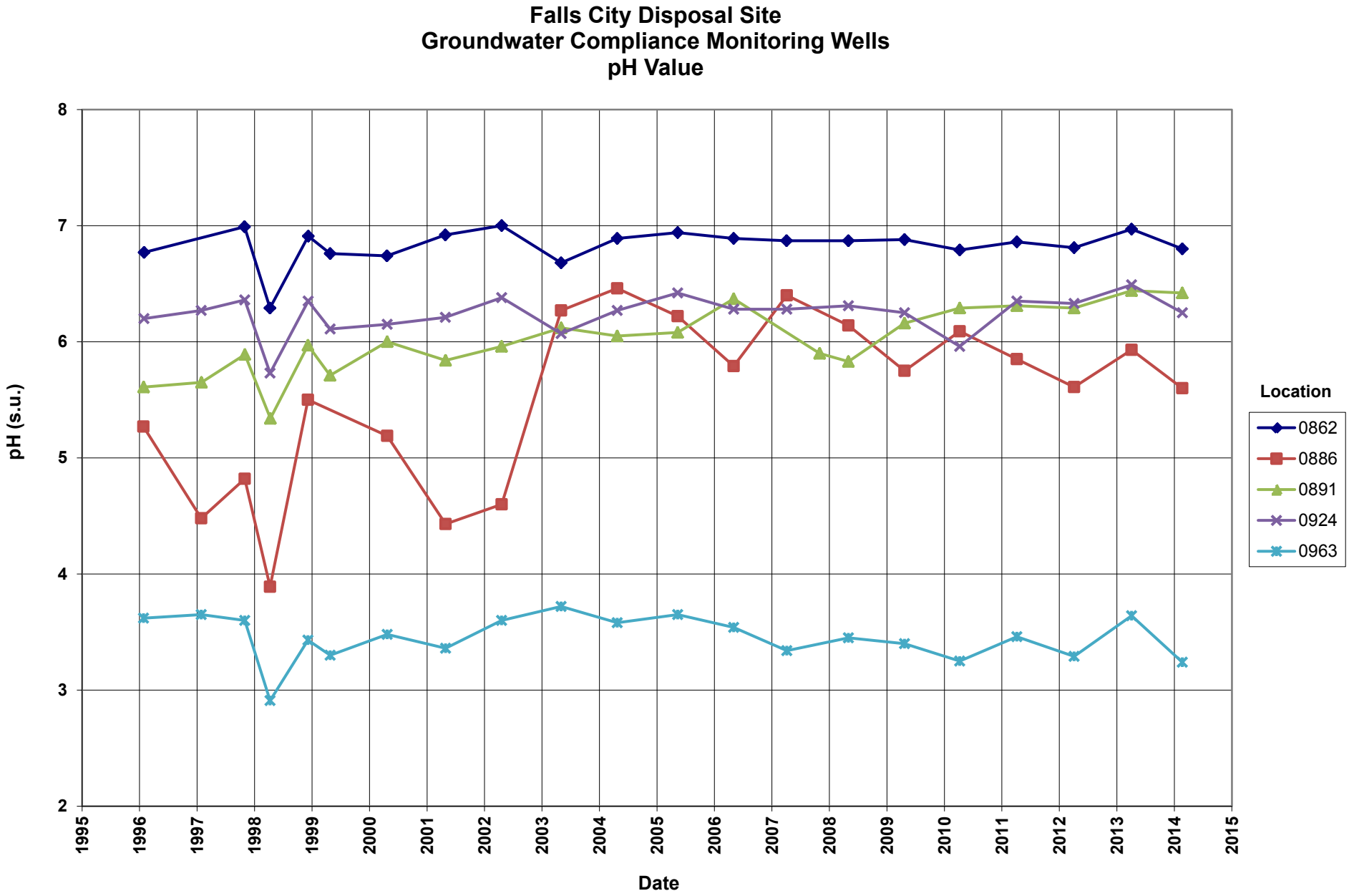
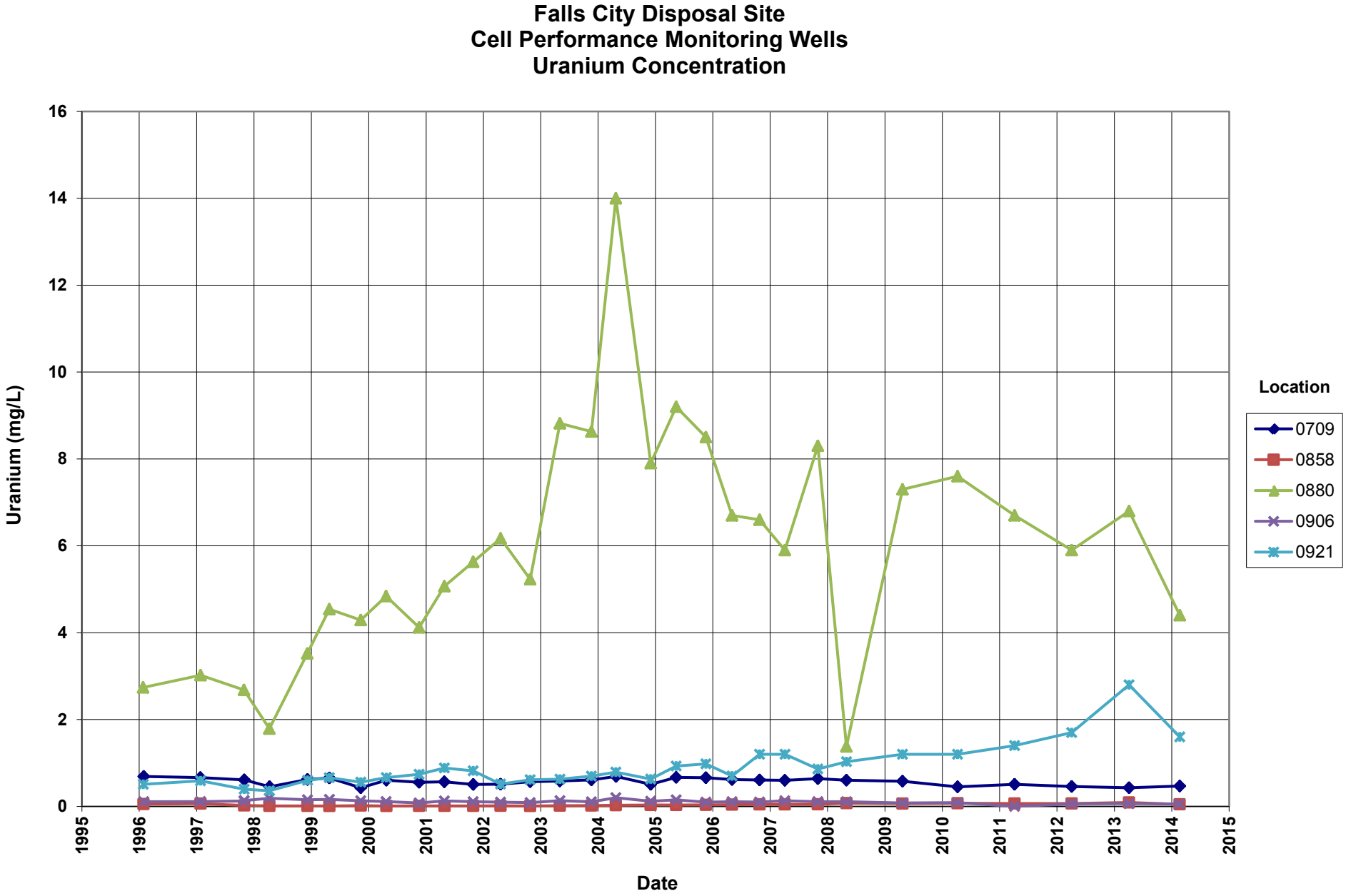
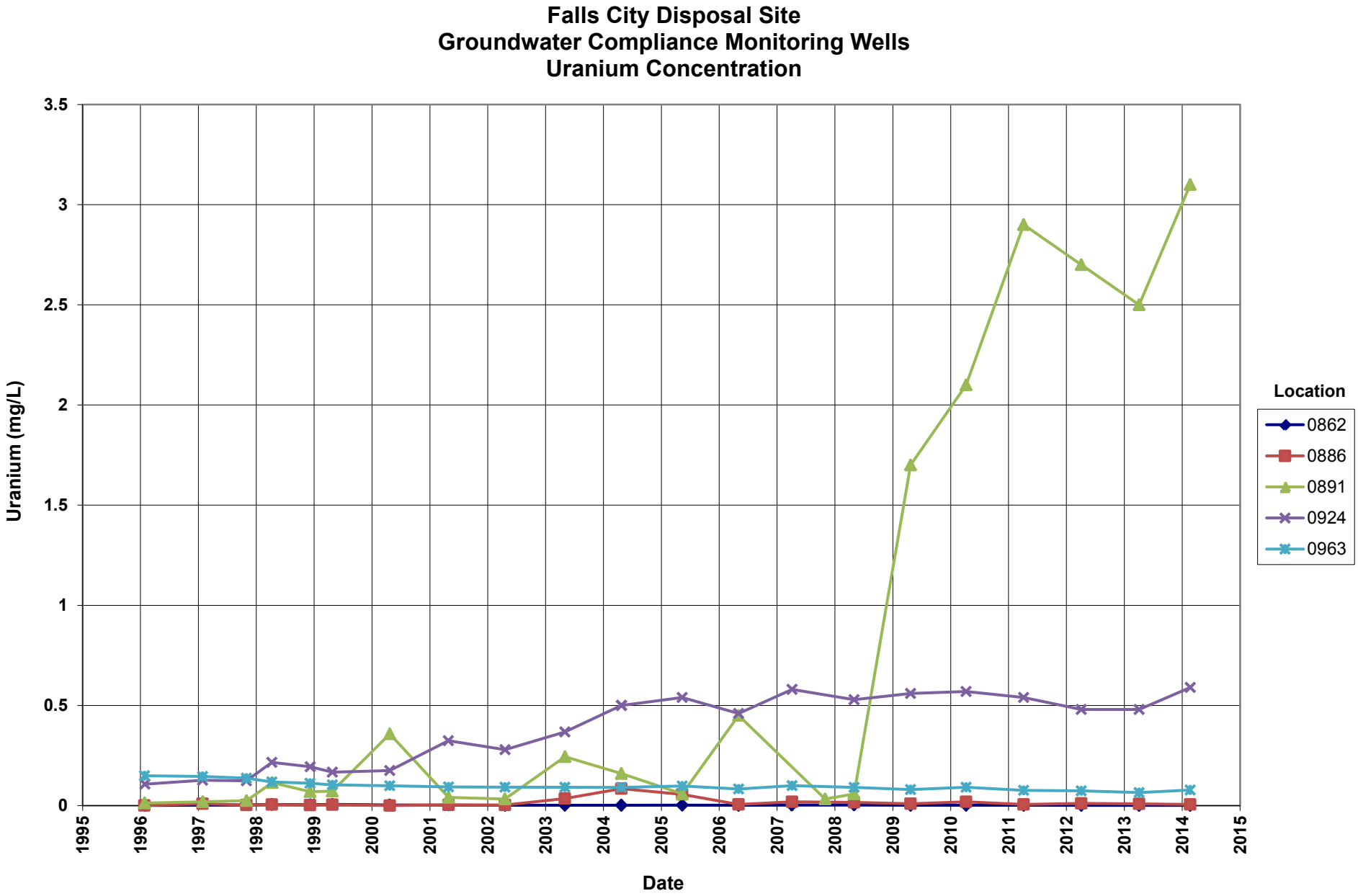

Falls City Disposal Site
Cell Performance Monitoring Wells
pH Vaue
pH (s.u.)
7
6.5
6
5.5
5
4.5
4
3.5
3
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
0709
0858
0880
0906
0921


Falls City Disposal Site
Groundwater Compliance Monitoring Wells
pH Value
pH (s.u.)
8
7
6
5
4
3
2
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
0862
0886
0891
0924
0963


Falls City Disposal Site
Cell Performance Monitoring Wells
Uranium Concentration
Uranium (mg/L)
16
14
12
10
8
6
4
2
0
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
0709
0858
0880
0906
0921


Falls City Disposal Site
Groundwater Compliance Monitoring Wells
Uranium Concentration
Uranium (mg/L)
3.5
3
2.5
2
1.5
1
0.5
0
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
0862
0886
0891
0924
0963

Attachment 3
Sampling and Analysis Work Order

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Stoller

established 1959

Task Order LM00-501
Control Number 14-0340

February 6, 2014

U.S. Department of Energy
Office of Legacy Management
ATTN: Art Kleinrath
Site Manager
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporations (Stoller)
February 2014 Environmental Sampling at the Falls City, Texas, Disposal Site

REFERENCE: Task Order LM00-501-02-105-402, Falls City, Texas, Disposal Site

Dear Mr. Kleinrath:

The purpose of this letter is to inform you of the upcoming sampling at Falls City, Texas. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Falls City site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of February 17, 2014.

The following list shows the monitoring wells (with associated zone of completion) scheduled to be sampled during this event.

Monitoring Wells*

709 Cq/Ct	862 Dl	886 De	906 Cq	916 Cq	924 Cq	963 Cq
858 Cq	880 De	891 Dl	908 Cq	921 Cq		

*NOTE: Cq = Conquista Clay – Whitsett Formation; Ct = Claystone; De = DeWeesville Sand – Whitsett Formation; Dl = Dilworth Sand – Whitsett Formation

Samplers will collect a split sample at well 886 for Conquista.

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork.

Please call me at (412) 818-7015 if you have any questions.

Sincerely,

Michele L. Miller
2014.02.06 09:10:37
-05'00'

Michele Miller
Project Manager

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248–6000 Fax: (970) 248–6040

MM/lcg/lb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Michele Miller, Stoller
EDD Delivery
rc-grand.junction
File: FCT 410.02(A)

Sampling Frequencies for Locations at Falls City, Texas

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
709			X			
858			X			
862			X			
880			X			
886			X			
891			X			**Collect duplicate from this well**
906			X			
908			X			
916			X			
921			X			
924			X			
963			X			

Annual sampling conducted in April

Note: Based on LTSP dated March 2008

Constituent Sampling Breakdown

Site	Falls City				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	12	0			
Field Measurements					
Alkalinity					
Dissolved Oxygen	X				
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO_3+NO_2)-N					
Potassium					
Radium-226					
Radium-228					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	1	0			

Note: All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

Attachment 4
Trip Report

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Stoller established 1959
Grand Junction Office

Memorandum

Control Number N/A

DATE: February 26, 2014

TO: Michele Miller

FROM: Jeff Price

SUBJECT: Sampling Trip Report

Site: Falls City, Texas

Dates of Sampling Event: February 20-21, 2014

Team Members: Joe Treviño and Jeff Price

Number of Locations Sampled: 10 monitoring wells.

Locations Not Sampled/Reason: Monitoring wells 0908 and 0916 were dry.

Location Specific Information: All wells were sampled for uranium only. A representative from Conoco also collected a sample from well 0886.

Quality Control Sample Cross Reference: The following is the false identification assigned to the quality control sample:

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2580	0891	Duplicate	Groundwater	MDR 124

Field Variance: None.

Requisition Numbers Assigned: All samples were assigned to RIN 14025923.

Sample Shipment: Samples were shipped overnight FedEx from Grand Junction, Colorado, to ALS Labs in Ft. Collins, CO, on February 24, 2014.

Water Level Measurements: Water level measurements were collected in all sampled wells.

Site Specific Information: Property ownership was gathered for well 880 and will be forwarded to the proper group.

Institutional Controls: All gates accessed during the sampling event were closed and locked.

Fences, Gates, Locks: All OK
Signs: No issues observed.
Trespassing/Site Disturbances: None Observed.

Site Issues

Disposal Cell/Drainage Structure Integrity: Looked OK.
Vegetation/Noxious Weed Concerns: N/A
Maintenance Requirements: N/A

Corrective Action Taken: Vegetation was trimmed at various wells.

(DLS/lcg)

cc: (electronic)
Art Kleinrath, DOE
Steve Donivan, Stoller
Michele Miller, Stoller
EDD Delivery