Data Validation Package

April 2016
Groundwater Sampling at the
Falls City, Texas, Disposal Site

September 2016

This report was revised to correct errors in the time-concentration graphs in Attachment 2.

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Contents

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Sampling Event Summary

Site: Falls City, Texas, Disposal Site

Sampling Period: April 8, 2016

Nine 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* (DOE-LM/1602-2008).

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 during this sampling event. These wells are completed above the saturated interval in the formation.

Notable observations for time-concentration graphs in this report include: (1) uranium concentrations in well 0891 continue to increase; (2) the uranium concentration in well 0880 is higher than the 2015 value and lower than the 2014 value, and it remains within the range of historical values; and (3) uranium concentrations in the other sampled wells are below 2 mg/L and consistent with previous results.

Mike Widdop, Site Lead
Navarro Research and Engineering, Inc.

9/29/2016
Date

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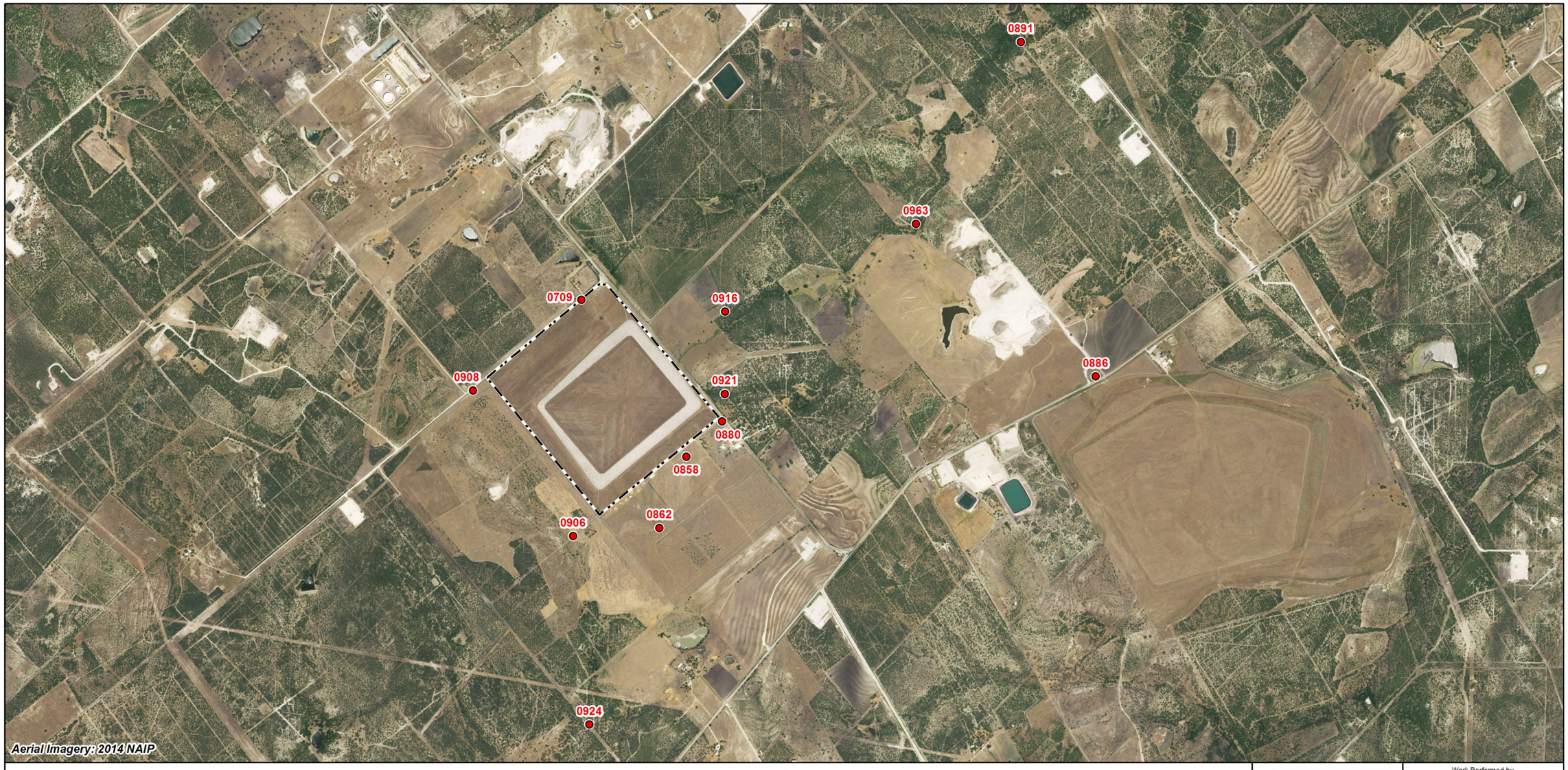

Falls City, Texas, Disposal Site Groundwater Sample Location Map

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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**	April 8, 2016
Date(s) of Verification	June 8, 2016	**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 March 17, 2016.
2. Were the sampling locations specified in the planning documents sampled?	No	Locations 0908 and 0916 were confirmed dry.
3. Were field equipment calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on 03/29/2016.
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 from 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

Task ID:	FCT03-16040001
Sample Event:	April 8, 2018
Site(s):	Falls City, Texas
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1604174
Analysis:	Uranium
Validator:	Stephen Donivan
Review Date:	June 8, 2016

This validation was performed according to "Standard Practice for Validation of Environmental Data" found in Appendix A of *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated, http://energy.gov/lm/downloads/sampling-and-analysis-plan-us-department-energy-office-legacy-management-sites). The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see Data Validation Worksheets, Figure 1 and Figure 2). The DQIs comparability, completeness, and sensitivity are also evaluated in the sections to follow.

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

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1604174-5	0891	Uranium	J	Serial dilution result
1604174-11	0891 Duplicate	Uranium	J	Serial dilution result

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado received 11 water samples on April 22, 2016, accompanied by a Chain of Custody (COC) form. The COC 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

A method detection limit (MDL) is defined in 40 CFR 136 as 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 MDLs reported by the laboratory were compared to the required MDLs to assess the sensitivity of the analyses and were in compliance with contractual requirements.

The practical quantitation limit (PQL) for an analyte, defined as 5 times the MDL, is the lowest concentration that can be quantitatively measured, and is used when evaluating laboratory method performance in the sections below.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method SW-846 6020A, Uranium
Calibrations were performed on April 19 and 22, 2016, using two calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met 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-blank and calibration-blank results associated with the samples were below the PQL for all analytes. In cases where the blank concentration exceeds the MDL, associated sample results that are greater than the MDL but less than 5 times the blank concentration are qualified with a "U" flag as not detected.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples are analyzed to verify the instrumental interelement and background correction factors and assess any bias due to interelement interferences. Interference check samples were analyzed at the required frequency with all results meeting the acceptance criteria.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. For this task, the MS/MSD data were 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 5 times the PQL, the range should be no greater than the PQL. All replicate results met these criteria, demonstrating acceptable precision.

Laboratory Control Samples

Laboratory control samples (LCS) were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The LCS results were acceptable for all analysis.

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated to assess bias when the concentration of the undiluted sample is greater than 50 times the MDL. The uranium serial dilution result was above the acceptance limit. The associated sample uranium result is qualified with a "J" flag as an estimated value.

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 June 2, 2016. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared 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.

General Data Validation Report

Page 1 of 1

Task Code: FCT03-16040001 **Lab Code:** PAR **Validator:** **Validation Date:** 06-03-2016

Project: Falls City Monitoring **# Samples:** 13

Analysis Type: [X] General Chemistry [X] Metals [ ] Organics [ ] Radiochemistry

Chain of Custody	***Sample***
Present: OK Signed: OK Dated: OK	Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Duplicates:	There was 1 duplicate evaluated.

Figure 1. General Validation Worksheet

Metals Data Validation Worksheet

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06-Jun-2016

Project: Falls City Monitoring **Task Code:** FCT03-16040001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Uranium	SW-846 6020	04-19-2016	LCS	105.00		80	120		20				
Uranium	SW-846 6020	04-19-2016	MB										Blank concentration < MDL
Uranium	SW-846 6020	04-22-2016	MS	1026.00		75	125		20				Sample concentration > 4 times spike concentration
Uranium	SW-846 6020	04-22-2016	MSD		669.00	75	125	1	20				Sample concentration > 4 times spike concentration
Uranium	SW-846 6020	04-22-2016	R					3	20	103	48	130	

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Figure 2. Metals Validation Worksheet

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, 0880, 0886, and 0906 were qualified with a "Q" flag in the database indicating the data are considered qualitative because the wells were sampled using Category II criteria.

Equipment Blank Assessment

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

Field Duplicate Analysis

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 (Figure 3), demonstrating acceptable overall precision for all analytes.

Validation Report: Field Duplicates

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06-Jun-2016

Project: Falls City Monitoring **Task Code:** FCT03-16040001 Lab Code: PAR

	Duplicate: FCT03-16040001-013				Sample: FCT03-16040001-007 0891						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Uranium	3.20			100	3.60			100	11.8		mg/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Figure 3. Field Duplicates Worksheet

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the environmental 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 — Date: 9-29-2016

Data Validation Lead: Stephen Donivan — Date: 9-24-2016

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Attachment 1

Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values that indicate more variability in the population than was expected. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values, and data that fall outside the historical data range are listed in the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA. The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

There were three uranium results that were above the historical maximum values for those locations. These results are not statistical outliers as determined using ProUCL. The data for this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters **Report Date: 06/07/2016**

Comparison to Historical Data Since: 6/7/2006 12:00:00 AM Fraction: Any

Task: FCT03-16040001

Analyte	Location	Analysis Location	Units	Fraction	Result	Type	HistMIN	HistMAX	HistSetSize
Uranium	0963	LB	mg/L	T	0.12	> HistMAX	0.065	0.100	18
Uranium	0891	LB	mg/L	T	3.60	> HistMAX	0.033	3.2	26
Uranium	0862	LB	mg/L	T	5.4e-03	> HistMAX	0.0016	0.0038	22

FRACTION:
D = Dissolved N = NA T = Total

Results of ProUCL Dixon's Outlier Test						
Location	**Analyte**	**Observation Value**	**# Observations**	**5% critical value**	**Test Statistic**	**Test Result**
0963	Uranium	0.12	13	0.521	0.435	For 5% significance level, 0.12 is not an outlier.
0891	Uranium	3.6	15	0.525	0.159	For 5% significance level, 3.6 is not an outlier.
0862	Uranium	0.0054	12	0.546	0.421	For 5% significance level, 0.0054 is not an outlier.

Attachment 2

Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0709 inside fence.

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
DO	mg/L	04/08/2016	F	N	7.95				F	Y
ORP	mV	04/08/2016	F	N	143				F	Y
pH	s.u.	04/08/2016	F	N	6.51				F	Y
SC	umhos/cm	04/08/2016	F	N	8879				F	Y
Temp	deg C	04/08/2016	F	N	23.35				F	Y
Turb	NTU	04/08/2016	F	N	0.96				F	Y
Uranium	mg/L	04/08/2016	F	T	0.43		0.000012		F	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0858

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
DO	mg/L	04/08/2016	F	N	6.59				FQ	Y
ORP	mV	04/08/2016	F	N	-249				FQ	Y
pH	s.u.	04/08/2016	F	N	6.70				FQ	Y
SC	umhos/cm	04/08/2016	F	N	10470				FQ	Y
Temp	deg C	04/08/2016	F	N	22.60				FQ	Y
Turb	NTU	04/08/2016	F	N	26.7				FQ	Y
Uranium	mg/L	04/08/2016	F	D	0.063		0.000012		FQ	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0862

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
DO	mg/L	04/08/2016	F	N	5.96				FQ	Y
ORP	mV	04/08/2016	F	N	-127				FQ	Y
pH	s.u.	04/08/2016	F	N	7.10				FQ	Y
SC	umhos/cm	04/08/2016	F	N	4316				FQ	Y
Temp	deg C	04/08/2016	F	N	23.18				FQ	Y
Turb	NTU	04/08/2016	F	N	3.98				FQ	Y
Uranium	mg/L	04/08/2016	F	T	0.0054		0.000012		FQ	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0880

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
DO	mg/L	04/08/2016	F	N	9.19				FQ	Y
ORP	mV	04/08/2016	F	N	203				FQ	Y
pH	s.u.	04/08/2016	F	N	4.40				FQ	Y
SC	umhos/cm	04/08/2016	F	N	19520				FQ	Y
Temp	deg C	04/08/2016	F	N	22.82				FQ	Y
Turb	NTU	04/08/2016	F	N	78.4				FQ	Y
Uranium	mg/L	04/08/2016	F	D	5.80		0.00012		FQ	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0886

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
ORP	mV	04/08/2016	F	N	183				FQ	Y
pH	s.u.	04/08/2016	F	N	5.21				FQ	Y
SC	umhos/cm	04/08/2016	F	N	6655				FQ	Y
Temp	deg C	04/08/2016	F	N	23.52				FQ	Y
Turb	NTU	04/08/2016	F	N	77.0				FQ	Y
Uranium	mg/L	04/08/2016	F	D	0.015		0.000012		FQ	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0891

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
ORP	mV	04/08/2016	F	N	31				F	Y
pH	s.u.	04/08/2016	F	N	6.74				F	Y
SC	umhos/cm	04/08/2016	F	N	24860				F	Y
Temp	deg C	04/08/2016	F	N	23.28				F	Y
Turb	NTU	04/08/2016	F	N	6.12				F	Y
Uranium	mg/L	04/08/2016	F	T	3.60		0.00012		FJ	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0906

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
DO	mg/L	04/08/2016	F	N	8.92				FQ	Y
ORP	mV	04/08/2016	F	N	35				FQ	Y
pH	s.u.	04/08/2016	F	N	5.91				FQ	Y
SC	umhos/cm	04/08/2016	F	N	11156				FQ	Y
Temp	deg C	04/08/2016	F	N	23.24				FQ	Y
Turb	NTU	04/08/2016	F	N	6.40				FQ	Y
Uranium	mg/L	04/08/2016	F	T	0.079		0.000012		FQ	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0921

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
ORP	mV	04/08/2016	F	N	124				F	Y
pH	s.u.	04/08/2016	F	N	6.19				F	Y
SC	umhos/cm	04/08/2016	F	N	10295				F	Y
Temp	deg C	04/08/2016	F	N	24.11				F	Y
Turb	NTU	04/08/2016	F	N	2.96				F	Y
Uranium	mg/L	04/08/2016	F	T	2.60		0.00012		F	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0924

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
ORP	mV	04/08/2016	F	N	61				F	Y
pH	s.u.	04/08/2016	F	N	6.46				F	Y
SC	umhos/cm	04/08/2016	F	N	11566				F	Y
Temp	deg C	04/08/2016	F	N	25.34				F	Y
Turb	NTU	04/08/2016	F	N	2.90				F	Y
Uranium	mg/L	04/08/2016	F	T	0.49		0.000012		F	Y

Groundwater Quality Data by Location For Site FCT03, Falls City Disposal Site

Location: 0963

Report Date: 06/15/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
DO	mg/L	04/08/2016	F	N	6.18				F	Y
ORP	mV	04/08/2016	F	N	341				F	Y
pH	s.u.	04/08/2016	F	N	3.43				F	Y
SC	umhos/cm	04/08/2016	F	N	9074				F	Y
Temp	deg C	04/08/2016	F	N	21.98				F	Y
Turb	NTU	04/08/2016	F	N	7.80				F	Y
Uranium	mg/L	04/08/2016	F	T	0.12		0.000012		F	Y

SAMPLE TYPE:
D = Duplicate E = Equipment Blank F = Field Sample FB = Field Blank TB = Trip Blank

FRACTION:
D = Dissolved N = NA T = Total

MDC / MDL:
MDC = Radiochemical minimum detectable concentration MDL = Non-radiochemical minimum detection limit

LAB QUALIFIERS (details can be found in laboratory report):
* = One or more quality control criteria failed (e.g., laboratory control sample, surrogate spike, or calibration verification recovery).
B = Blank contamination. The reported result is associated with a contaminated blank.
D = Result is from the analysis of a diluted sample.
H = Holding time was exceeded.
J = The reported result is an estimated value (e.g., matrix interference was observed or the analyte was detected at a concentration outside the quantitation range).
U = Analytical result is below the MDC or MDL.
Z = Laboratory defined qualifier, see case narrative.

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

QA QUALIFIER: Yes = Validated, acceptable as qualified.

Static Water Level Data

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Static Water Levels For Site FCT03, Falls City Disposal Site

Measurement Date Between : 04/08/2016 and 04/08/2016

Report Date: 06/16/2016

Location Code	Measurement Date	Top of Casing Elevation	Water Elevation	Water Level Depth	Units	Dry (y/n)
0709	04/08/2016	451.58	418.28	33.3	ft	
0858	04/08/2016	441.03	410.51	30.52	ft	
0862	04/08/2016	428.67	361.37	67.3	ft	
0880	04/08/2016	446.84	418.61	28.23	ft	
0886	04/08/2016	403.52	368.44	35.08	ft	
0891	04/08/2016	349.63	336.81	12.82	ft	
0906	04/08/2016	420.17	405.57	14.6	ft	
0908	04/08/2016	495.67			ft	Y
0916	04/08/2016	420.39			ft	Y
0921	04/08/2016	435.75	401.74	34.01	ft	
0924	04/08/2016	396.44	379.01	17.43	ft	
0963	04/08/2016	373.23	363.73	9.5	ft	

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Hydrographs

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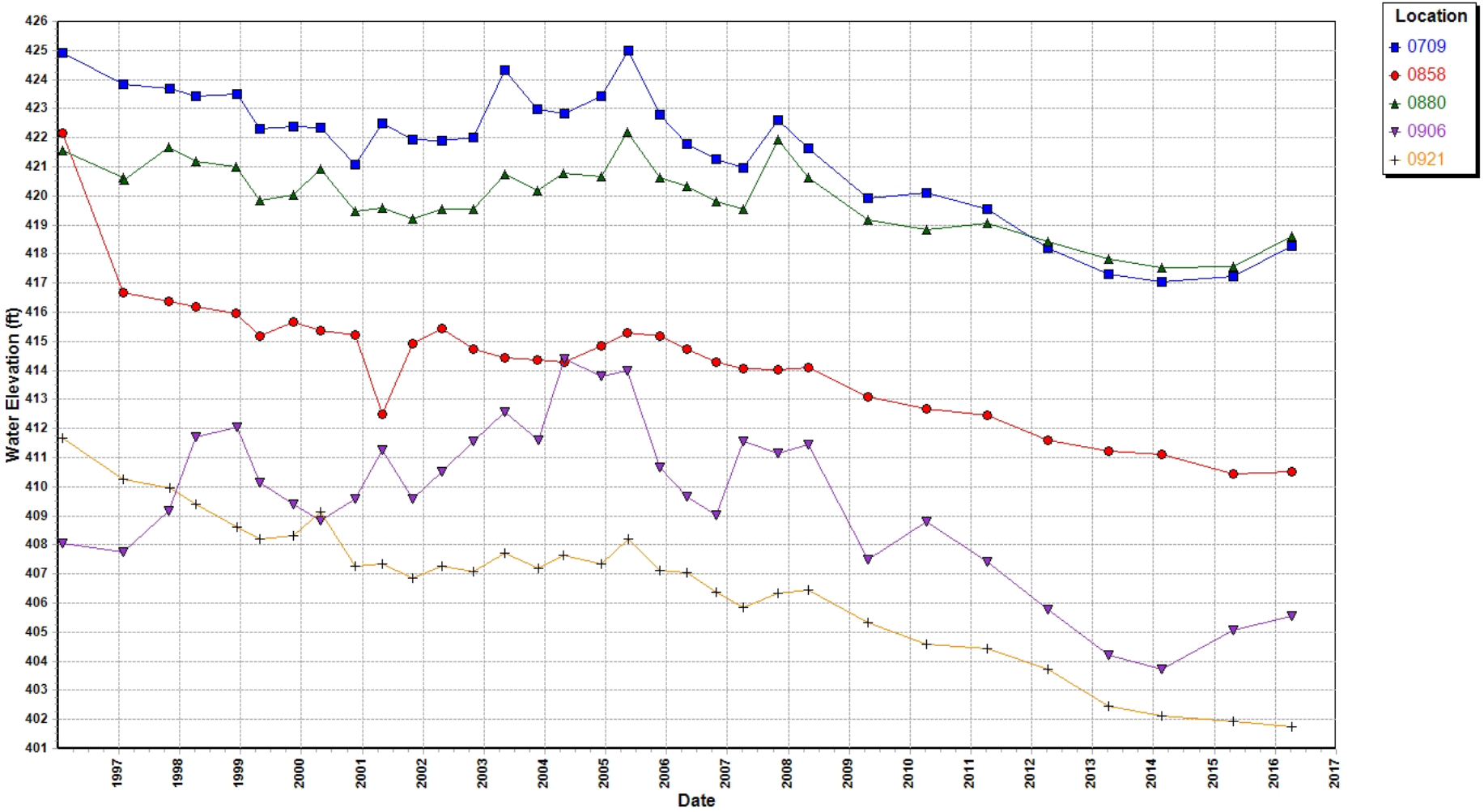
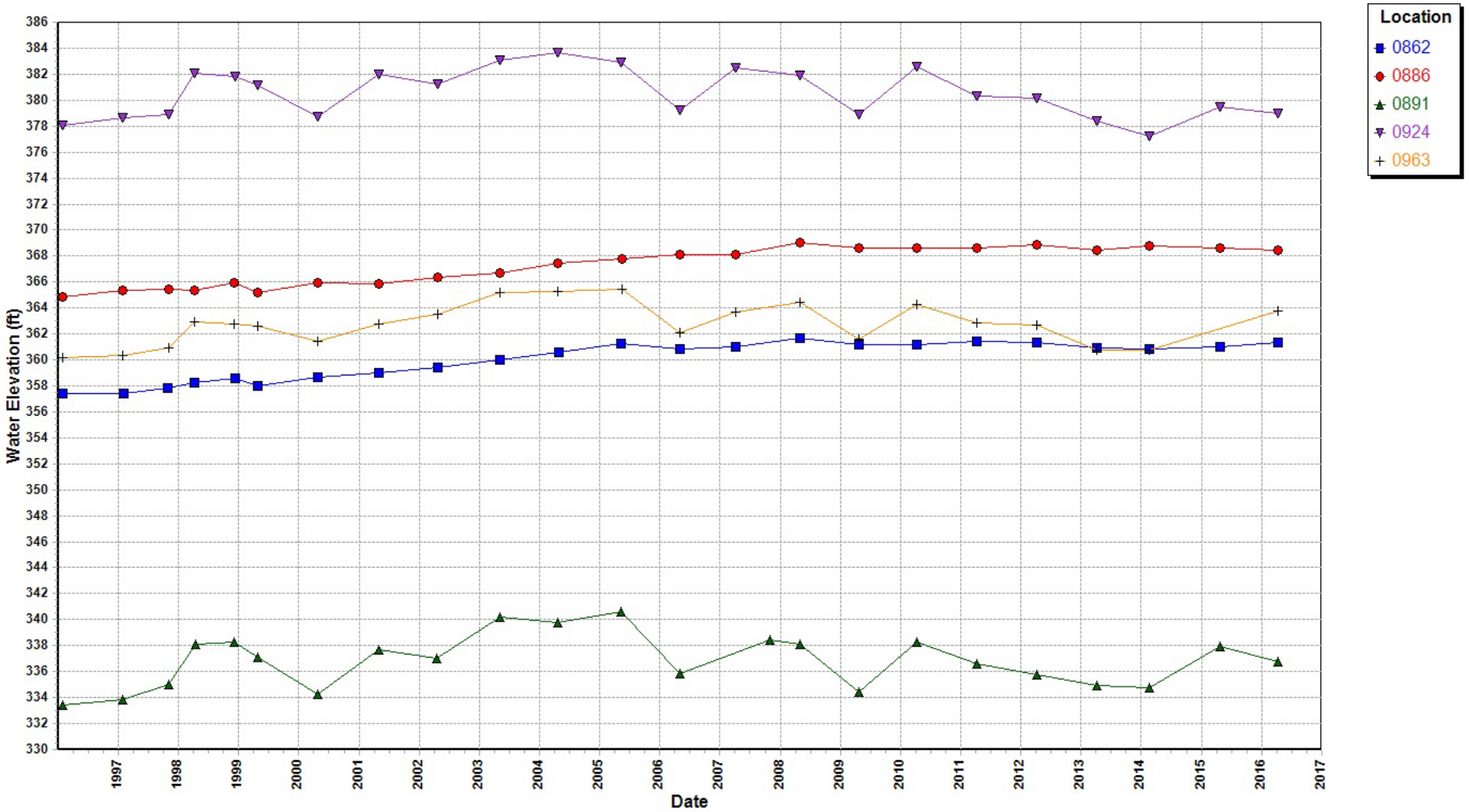
Falls City Disposal Site
Cell Performance Monitoring Wells
Hydrograph



Falls City Disposal Site
Groundwater Compliance Monitoring Wells
Hydrograph



Time-Concentration Graphs

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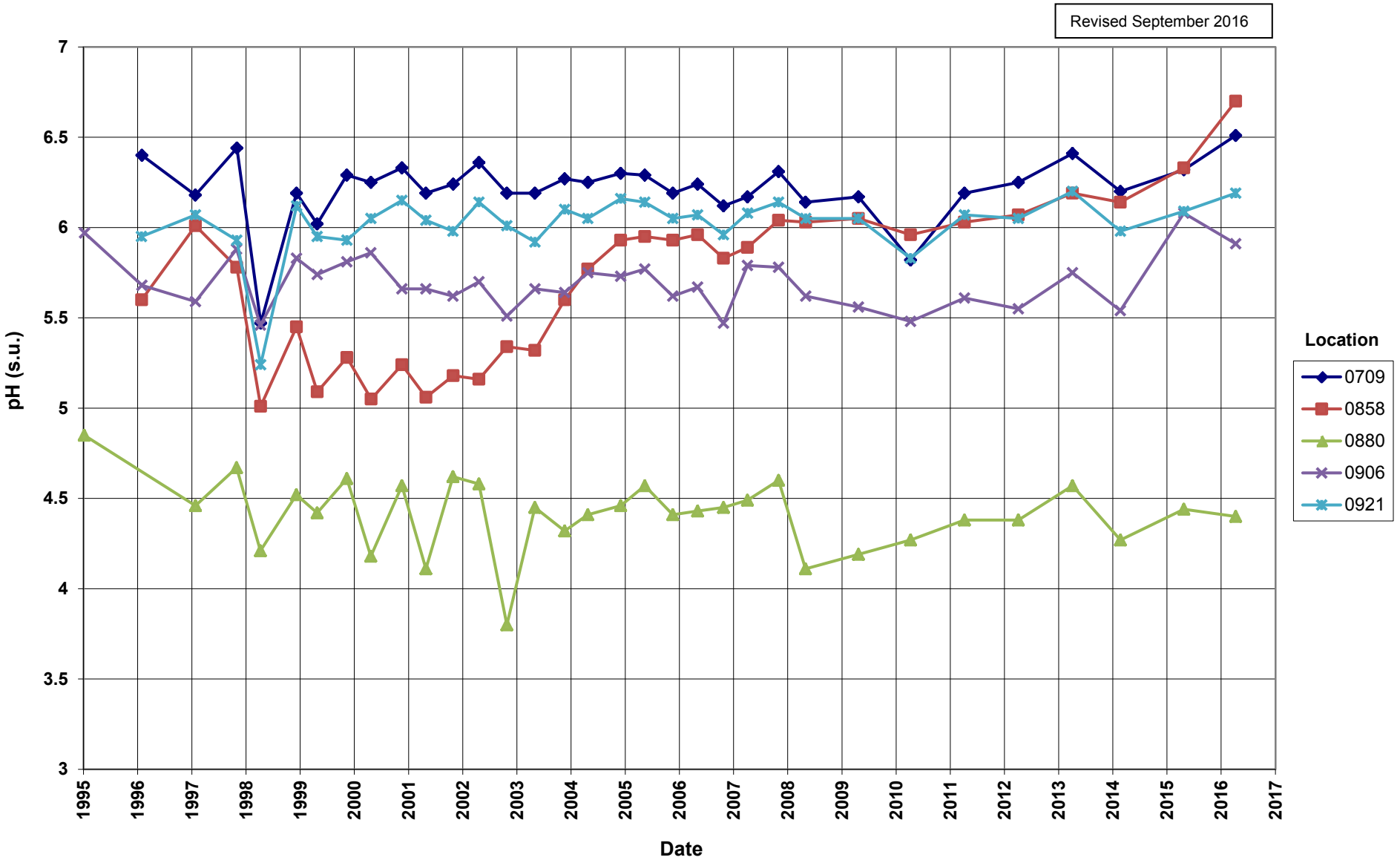
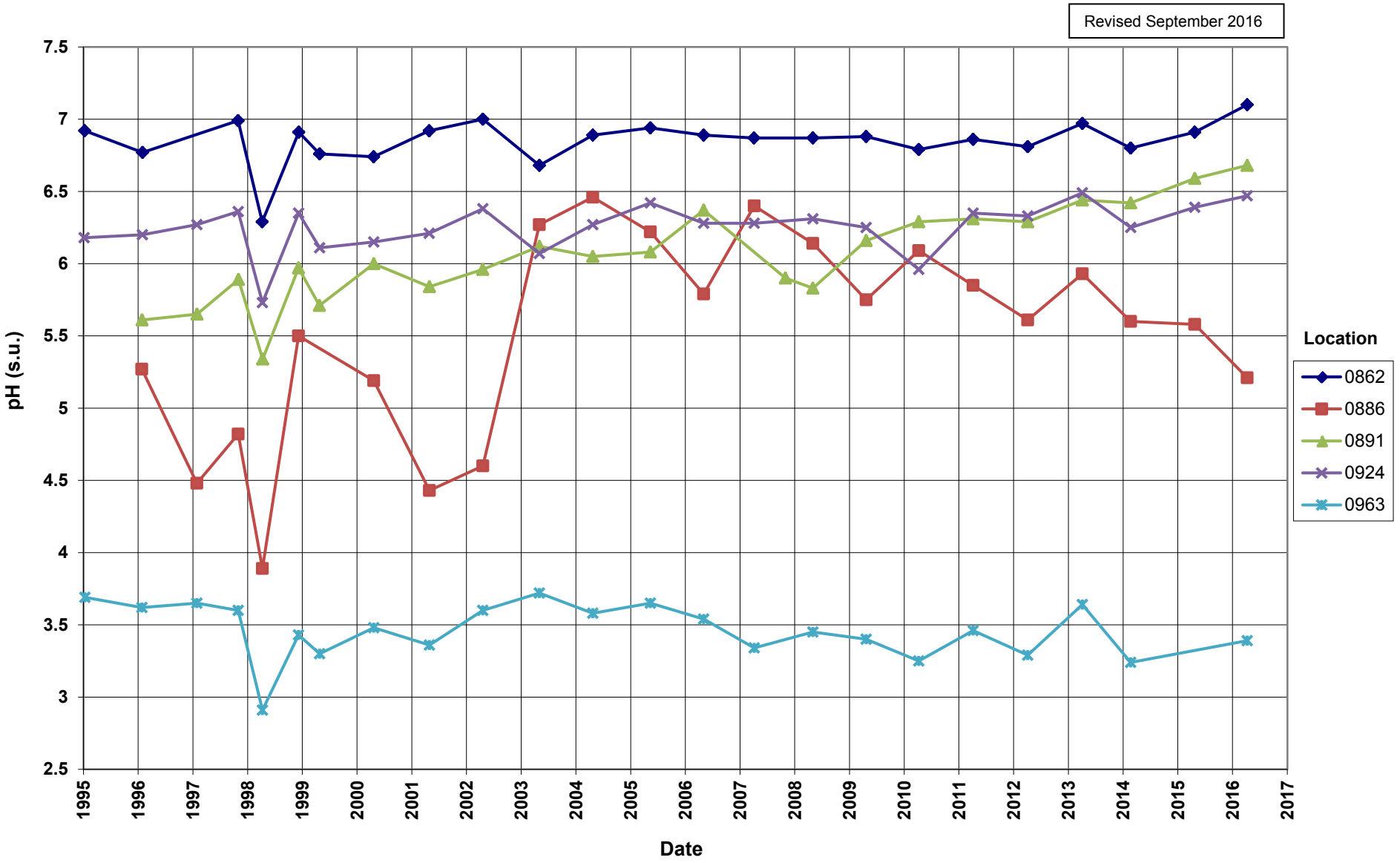
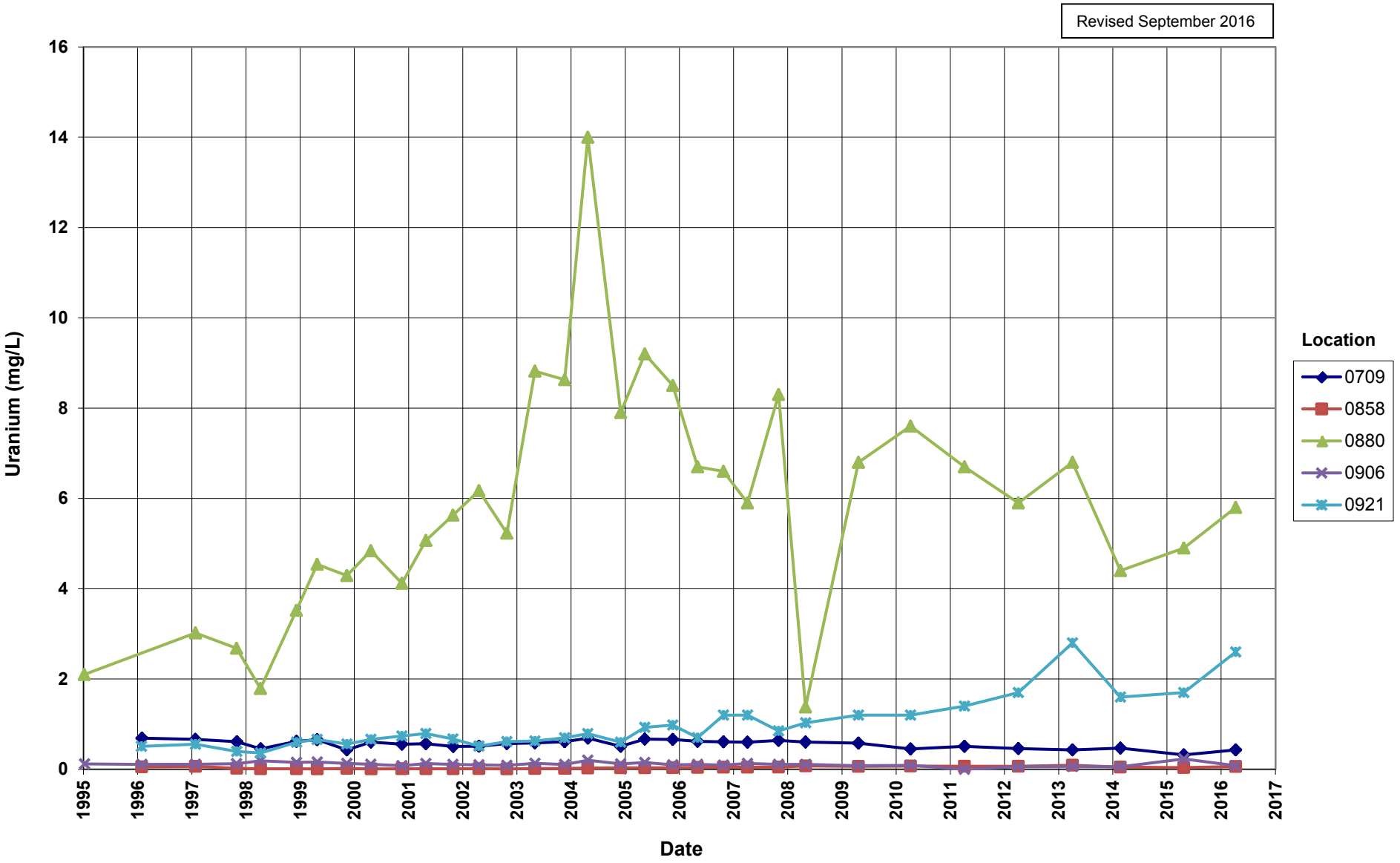
Falls City Disposal Site
Cell Performance Monitoring Wells
pH Value



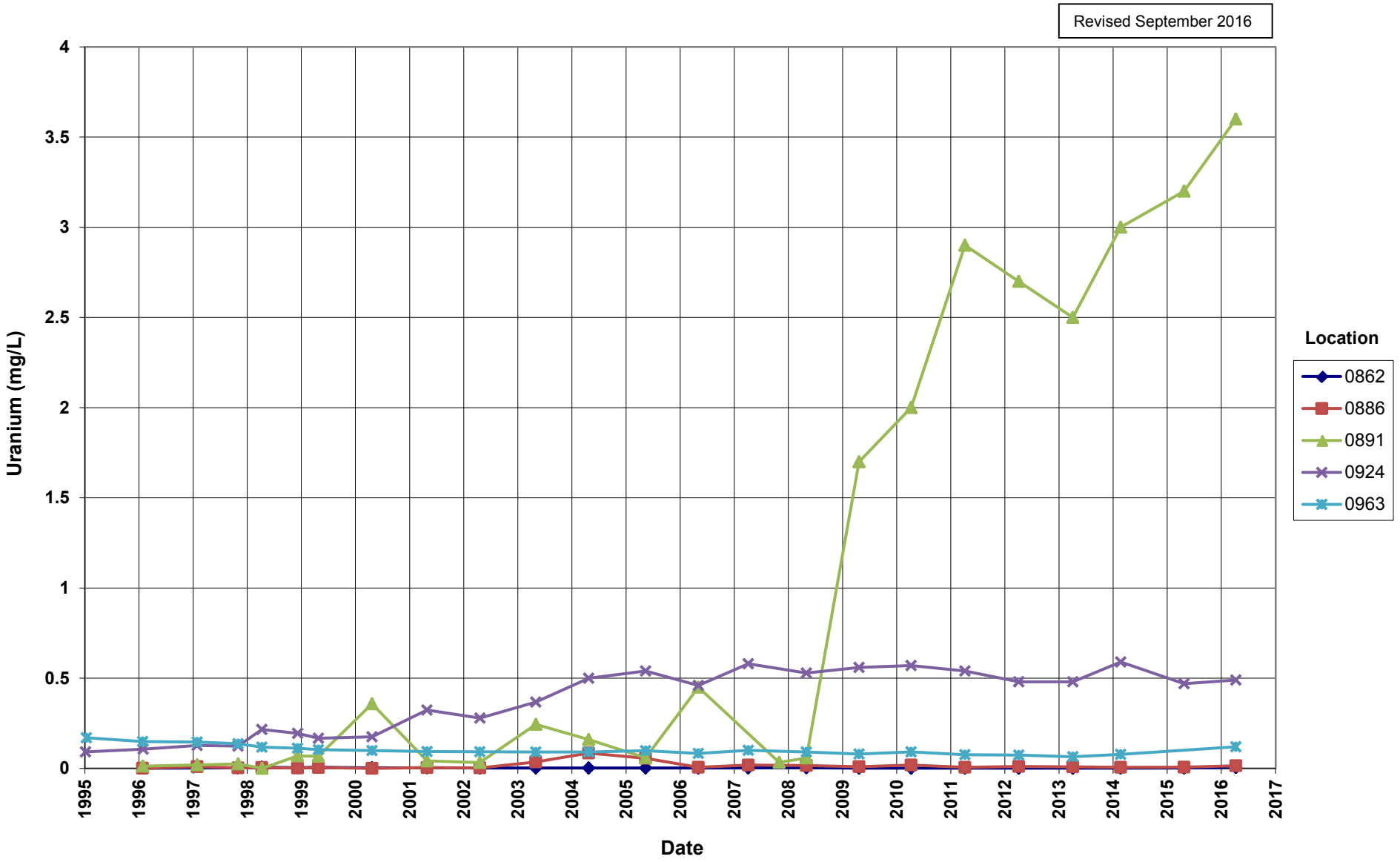
Falls City Disposal Site
Groundwater Compliance Monitoring Wells
pH Value



Falls City Disposal Site
Cell Performance Monitoring Wells
Uranium Concentration



Falls City Disposal Site
Groundwater Compliance Monitoring Wells
Uranium Concentration



Attachment 3

Sampling and Analysis Work Order

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March 17, 2016

Task Assignment 103
Control Number 16-0410

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-LM0000421, Navarro Research & Engineering, Inc. (Navarro)
Task Assignment 103 LTS&M-UMTRCA TI & TII Sites, D&D Sites, Other Sites, and Other
April 2016 Environmental Sampling at the Falls City, Texas, Disposal Site

REFERENCE: Task Assignment 103, 1-103-1-02-105, Falls City, Texas, Disposal Site

Dear Mr. Kleinrath:

The purpose of this letter is to inform you of the upcoming sampling event at the Falls City, Texas, disposal site. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of April 4, 2016.

The following list shows the monitoring wells (along with associated zone of completion) scheduled for sampling during this event.

Monitoring Wells*

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

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

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 contact me at (970) 248-6793 if you have any questions.

Sincerely,

Michael Widdop
2016.03.07
10:27:47 -07'00'

Michael Widdop
Site Lead

MW/lcg/bkb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Jeff Carman, Navarro
Bev Cook, Navarro
Steve Donivan, Navarro
Lauren Goodknight, Navarro
Diana Osborne, Navarro
Sam Marutzky, Navarro
Michael Widdop, Navarro
EDD Delivery
rc-grand.junction
File: FCT 400.02

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

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					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nitrate + Nitrite as N (NO3+NO2)-N					
Potassium					
Selenium					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
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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memo

Navarro Research and Engineering

To: Mike Widdop

From: Gretchen Baer

CC: (electronic)
Art Kleinrath, DOE
Steve Donivan, Navarro
Mike Widdop, Navarro
EDD Delivery

Date: 4/15/2016

Re: Sampling Trip Report

Site: Falls City, Texas

Date of Sampling Event: April 8, 2016

Team Members: Jeff Price and Gretchen Baer

Number of Locations Sampled: Samples were collected from 10 of the 12 locations identified on the sampling notification letter.

Locations Not Sampled/Reason: Monitoring wells 0908 and 0916 were not sampled because they were dry.

Location Specific Information:

- Well 0891 was co-sampled with Kan Tu of the Texas Commission on Environmental Quality.
- Well 0886 was co-sampled with Pee Wee King (Conoco representative) and Kan Tu.
- Wells 0858, 0862, 0880, 0886, and 0906 were identified as Category II for this event.
- A field duplicate sample was collected from well 0891, as instructed by the "Sampling Frequencies for Locations at Falls City, Texas" table in the SAP.

Quality Control Sample Cross Reference: The following are the false identifications assigned to the quality control sample.

False ID	Sample ID	True ID	Sample Type	Associated Matrix
2580	FCT03-16040001-013	0891	Duplicate	Groundwater

Task Code: Samples were assigned to Task Code FCT03-16040001.

Sample Shipment: Samples were shipped overnight via FedEx from Grand Junction, CO, to ALS Laboratory Group, Ft. Collins, CO, on April 11, 2016.

Water Level Measurements: Water levels were measured in all sampled wells.

Sampling Method: Samples were collected according to the *Sampling and Analysis Plan (SAP) for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated).

Field Variance: The dissolved oxygen readings at all locations were higher than the previous event and were higher than readings typically observed in groundwater. At locations 0886, 0891, 0921, and 0924, the readings were greater than 100%, so the readings were not recorded in the field notes. The dissolved oxygen sensor was calibrated on April 8, 2016, before sampling and all acceptance criteria were met. Operational checks of the sensor were conducted before sampling and at the end of the event and all acceptance criteria were met.

Equipment:

- All equipment functioned properly. Despite unusually high readings for dissolved oxygen, the sensor performance checks were within acceptable limits.
- The field data were recorded with EDGE, version 6.4.

Institutional Controls:

Fences, Gates, and Locks: The gate at the disposal cell was locked and in good condition. All landowner gates accessed during the event were closed and locked.
Signs: No issues were observed.
Trespassing/Site Disturbances: None were observed.
Disposal Cell/Drainage Structure Integrity: No issues were observed.

Safety Issues: None.

Access Issues:

- A side-by-side off road vehicle was used to access most locations.
- Overgrowth of brush is causing access problems to wells 0891 and 0921.

General Information: Nothing to note.

Immediate Actions Taken: None.

Future Actions Required or Suggested: Paths to the wells should be cleared before the next sampling event.