LMS/FCT/S00409

Data Validation Package

April 2009
Groundwater Sampling at the Falls City, Texas, Disposal Site

June 2009

U.S. DEPARTMENT OF ENERGY Legacy Management

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Sampling Event Summary

Site: Falls City, Texas, Disposal Site

Sampling Period: April 22, 2009

Ten groundwater samples were collected at the Falls City, Texas, Disposal Site to demonstrate that legacy contamination is not affecting downgradient groundwater quality, as specified in the *Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site Falls City, Texas* (DOE 2006, Revision 3).

Sampling and analysis were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (DOE 2006, Revision 2). Duplicate samples were collected from locations 0858 and 0880. The duplicate sample results were acceptable.

The wells sampled included the cell performance monitor wells (0709, 0858, 0880, 0906 and 0921) and the groundwater compliance monitor wells (0862, 0886, 0891, 0924, and 0963).

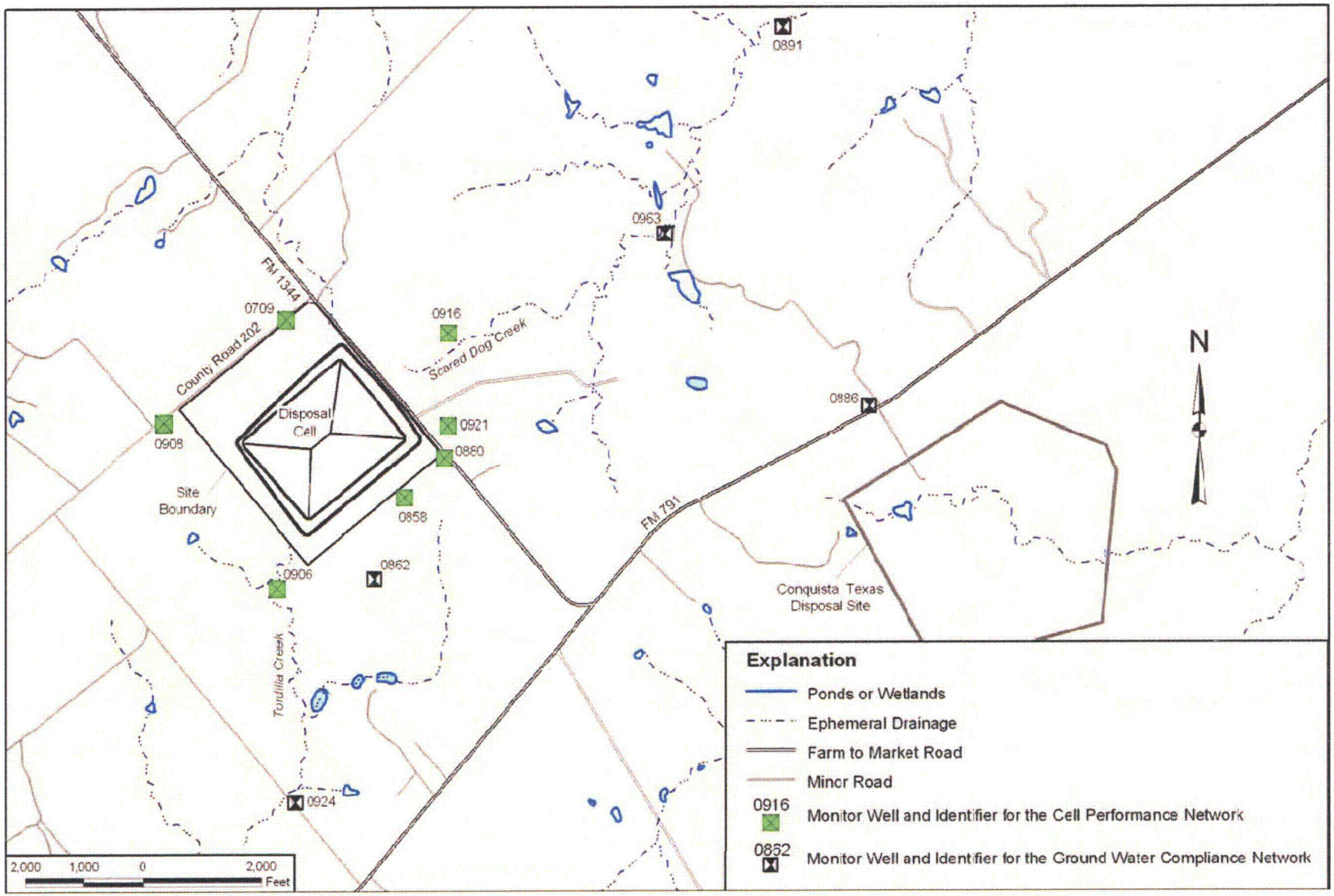
Water levels were measured at each sampled well. Historically, wells 0908 and 0916 have not produced water and were confirmed as dry. These wells are completed above the saturated interval in the formation. Water levels in the remaining wells decreased since the 2008 sampling event. The water level has been trending lower at four wells (0709, 0858, 0880, 0921) adjacent to the cell since 1996.

The time-concentration graphs included in this report show that the uranium concentration in well 0891 is anomalously high. The specific conductance measured in this well has been trending upward since 2005 indicating changing groundwater conditions. The concentration of uranium in well 0880 returned to a concentration greater than 6 mg/L after a historical low concentration was observed in 2008. No other significant changes in uranium concentration were noted.

Digitally signed by Michele L. Miller
DN: cn=Michele L. Miller, c=us, o=u.s. government, ou=department of energy, public cas, people
Date: 2009.07.30 17:22:31 -04'00'

Michele Miller
Site Lead, S.M. Stoller

Date



Falls City, Texas, Monitor Well Location Map

Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Falls City, Texas	**Date(s) of Water Sampling**	April 22, 2009
Date(s) of Verification	May 14, 2009	**Name of Verifier**	Steve Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Work Order Letter dated March 18, 2009.
2. Were the sampling locations specified in the planning documents sampled?	No	Wells 0908 and 0916 were dry.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on April 17, 2009.
4. Was an operational check of the field equipment conducted daily?	Yes	Operational check was performed on April 22, 2009.
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. Was the category of the well documented?	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?	No	Water level did not stabilize in well 0886.
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	

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	Duplicate samples were collected from wells 0858 and 0880.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	No	Equipment blanks were not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	Locations IDs 2596 and 2743 were used for QC samples.
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	The sample from well 0886 was filtered.
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. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample cooling was not required.
20. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 09032198
Sample Event: April 22, 2009
Site(s): Falls City, Texas
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 0904224
Analysis: Metals
Validator: Steve Donivan
Review Date: May 14, 2009

This validation was performed according to the *Environmental Procedures Catalog*, "Standard Practice for Validation of Laboratory Data," GT-9(P) (DOE 2006, Revision 1). 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

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 12 water samples on April 28, 2009, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all samples were listed on the form and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the COC form, and the sample tickets had no errors or omissions. Copies of the air waybill labels were included with the receiving documentation.

Preservation and Holding Times

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

Data Qualifier Summary

None of the analytical results required qualification.

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.

Method SW-846 6020A, Uranium

Calibration was performed for uranium on May 4, 2009. The initial calibration was performed using seven calibration standards resulting in a calibration curve with a correlation coefficient value greater than 0.995. The absolute value of the curve intercept was less than 3 times the method detection limit (MDL). Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in seven calibration checks. All initial and continuing calibration verification results were within the acceptance range. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curves near the practical quantitation limit. All check results were within the acceptance range. The mass calibration and resolution were checked at the beginning of each analytical run in accordance with the procedure. Internal standard recoveries were stable and within acceptance 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 initial and continuing calibration blank results were below the practical quantitation limits.

Inductively Coupled Plasma Interference Check Sample (ICS) Analysis

Inductively coupled plasma interference check samples ICSA and ICSAB were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate samples are used to measure method performance in the sample matrix. The matrix spike and matrix spike duplicate data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The spike recoveries met the recovery and precision criteria for all analytes evaluated.

Laboratory Replicate Analysis

The relative percent difference values for the laboratory replicate sample results for all analytes were less than twenty percent, indicating 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. The laboratory control sample results were acceptable for all analysis.

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 uranium. The acceptance criteria were met.

Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of uranium to reduce interferences. The required detection limits were achieved for uranium.

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 May 13, 2009. 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 that 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: 09032198 **Lab Code:** PAR **Validator:** Steve Donivan **Validation Date:** 5/14/2009

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

# of Samples: 12 **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 were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 09032198 **Lab Code:** PAR **Date Due:** 5/26/2009

Matrix: Water **Site Code:** FCT **Date Completed:** 5/12/2009

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB								
URANIUM	05/04/2009	0.0000	1.0000	OK	OK	OK	OK	OK	102.0	116.0	108.0	2.0	108.0	5.0	79.0
URANIUM	05/04/2009											1.0			

Sampling Quality Control Assessment

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

Sampling Protocol

Sample results for all monitor 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 and 0862 were qualified with a "Q" flag in the database indicating the data are considered qualitative because the wells were sampled using Category II criteria.

The data from well 0886 were qualified with a "Q" flag in the database indicating the data are considered qualitative because the water level did not stabilize.

Equipment Blank Assessment

Collection and analysis of an equipment blank was not performed because all samples were collected with dedicated bladder pumps.

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. Duplicate samples were collected from locations 0858 and 0880. The duplicate results were acceptable, meeting the Environmental Protection Agency recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than 5 times the practical quantitation limit.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 09032198 Lab Code: PAR Project: Falls City Validation Date: 5/14/2009

Duplicate: 2596 Sample: 0880

Analyte	Sample Result	Sample Flag	Sample Error	Duplicate Result	Duplicate Flag	Duplicate Error	RPD	RER	Units
URANIUM	6800			7300			7.09		UG/L

Duplicate: 2743 Sample: 0858

Analyte	Sample Result	Sample Flag	Sample Error	Duplicate Result	Duplicate Flag	Duplicate Error	RPD	RER	Units
URANIUM	65			65			0		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:	Steve Donivan	6-24-2009
	Steve Donivan	Date
Data Validation Lead:	Steve Donivan	6-24-2009
	Steve Donivan	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 SEEPro database. The application compares the new data set 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 uranium concentration in well 0891 is anomalously high and is listed on the Anomalous Data Review Checksheet for further review. There were no errors identified with this result.

The data from five field measurements were identified as potentially anomalous. Further review of these data does not indicate any errors and the following are noted concerning these data. Most of the oxidation reduction potential values are below the historical minimum. The specific conductance measured in well 0891 has been trending upward since 2005. Dissolved oxygen has not been measured in these wells since 1996. The data from this sampling event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters
Laboratory: PARAGON (Fort Collins, CO)
RIN: 09032198
Comparison: All Historical Data
Report Date: 6/16/2009

Site Code	Location Code	Sample Date	Analyte	Current Result	Current Qualifiers Lab	Current Qualifiers Data	Historical Maximum Result	Historical Maximum Qualifiers Lab	Historical Maximum Qualifiers Data	Historical Minimum Result	Historical Minimum Qualifiers Lab	Historical Minimum Qualifiers Data	Number of Data Points N	Number of Data Points N Below Detect	Normally Distributed	Statistical Outlier
FCT03	0891	04/22/2009	Uranium	1.7		F	0.45		F	0.013			19	0	Yes (log)	Yes
FCT03	0963	04/22/2009	Uranium	0.08		F	0.367			0.083		F	27	0	No	No

Data Validation Outliers Report - Field Parameters Only
Laboratory: Field Measurements
RIN: 09032198
Comparison: All Historical Data
Report Date: 6/16/2009

Site Code	Location Code	Sample Date	Analyte	Current Result	Current Qualifiers Lab	Current Qualifiers Data	Historical Maximum Result	Historical Maximum Qualifiers Lab	Historical Maximum Qualifiers Data	Historical Minimum Result	Historical Minimum Qualifiers Lab	Historical Minimum Qualifiers Data	Number of Data Points N	Number of Data Points N Below Detect	Normally Distributed	Statistical Outlier
FCT03	0709	04/22/2009	Oxidation Reduction Potential	-28.5		F	498.2			57			25	0	Yes (log)	Yes
FCT03	0858	04/22/2009	Oxidation Reduction Potential	-13		FQ	449			3		FQ	26	0	No	No
FCT03	0862	04/22/2009	Oxidation Reduction Potential	-124		FQ	435		F	-110		FQ	19	0	No	No
FCT03	0886	04/22/2009	Temperature	26.87		FQ	26.4		F	23.44		FQ	15	0	No	No
FCT03	0891	04/22/2009	Oxidation Reduction Potential	-107		F	390			34		F	15	0	Yes (log)	Yes
FCT03	0891	04/22/2009	Specific Conductance	23160		F	13251		F	6623		F	15	0	Yes	Yes
FCT03	0921	04/22/2009	Dissolved Oxygen	4.26		F	2.1		F	0.06			6	0	Yes (log)	No
FCT03	0921	04/22/2009	Oxidation Reduction Potential	-52.3		F	466.2			41		L	32	0	Yes (log)	No
FCT03	0924	04/22/2009	Dissolved Oxygen	3.29		F	0.6	U		0			6	1	Yes	Yes
FCT03	0924	04/22/2009	Oxidation Reduction Potential	-154.2		F	444.7			-136			23	0	Yes	No

Data Validation Outliers Report - Field Parameters Only
Laboratory: Field Measurements
RIN: 09032198
Comparison: All Historical Data
Report Date: 6/16/2009

Site Code	Location Code	Sample Date	Analyte	Current Result	Current Qualifiers Lab	Current Qualifiers Data	Historical Maximum Result	Historical Maximum Qualifiers Lab	Historical Maximum Qualifiers Data	Historical Minimum Result	Historical Minimum Qualifiers Lab	Historical Minimum Qualifiers Data	Number of Data Points N	Number of Data Points N Below Detect	Normally Distributed	Statistical Outlier
FCT03	0963	04/22/2009	Dissolved Oxygen	4.15		F	0.1			0			5	2	Yes (log)	Yes
FCT03	0963	04/22/2009	Specific Conductance	8209		F	8062		FQ	696		F	26	0	No	No
FCT03	0963	04/22/2009	Turbidity	3.7		F	55			5.21		F	18	0	No	No

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.		

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.

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Anomalous Data Review Checksheet

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Anomalous Data Review Checksheet

Site: Falls City, Texas, Disposal Site **Sampling Data:** Groundwater

Reviewer:	Steve Donivan	Steve Donivan	6-24-2009
	Name (print)	Signature	Date
Site Lead:	Michele Miller	[signature]	Digitally signed by Michele L. Miller DN: cn=Michele L. Miller, c=us, o=u.s. government, ou=department of energy, public cas, people Date: 2009.08.03 10:41:11 -04'00'
	Name (print)	Signature	Date

Date of Review: June 17, 2009

Loc. No.	Analyte	Type of Anomaly	Disposition
0891	Uranium	High	Compare to future results

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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: 6/16/2009
Location: 0709 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	12.65	-	32.65	3.38		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	12.65	-	32.65	-28.5		F	#		
pH	s.u.	04/22/2009	N001	12.65	-	32.65	6.17		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	12.65	-	32.65	8998		F	#		
Temperature	C	04/22/2009	N001	12.65	-	32.65	24.88		F	#		
Turbidity	NTU	04/22/2009	N001	12.65	-	32.65	0.85		F	#		
Uranium	mg/L	04/22/2009	N001	12.65	-	32.65	0.58		F	#	0.000045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0858 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	39.42	-	49.42	2.65		FQ	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	39.42	-	49.42	-13		FQ	#		
pH	s.u.	04/22/2009	N001	39.42	-	49.42	6.05		FQ	#		
Specific Conductance	umhos /cm	04/22/2009	N001	39.42	-	49.42	11205		FQ	#		
Temperature	C	04/22/2009	N001	39.42	-	49.42	23.48		FQ	#		
Turbidity	NTU	04/22/2009	N001	39.42	-	49.42	3.36		FQ	#		
Uranium	mg/L	04/22/2009	N001	39.42	-	49.42	0.065		FQ	#	0.0000045	
Uranium	mg/L	04/22/2009	N002	39.42	-	49.42	0.065		FQ	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0862 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	117.77	-	127.77	2.23		FQ	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	117.77	-	127.77	-124		FQ	#		
pH	s.u.	04/22/2009	N001	117.77	-	127.77	6.88		FQ	#		
Specific Conductance	umhos /cm	04/22/2009	N001	117.77	-	127.77	4379		FQ	#		
Temperature	C	04/22/2009	N001	117.77	-	127.77	23.97		FQ	#		
Turbidity	NTU	04/22/2009	N001	117.77	-	127.77	0.86		FQ	#		
Uranium	mg/L	04/22/2009	N001	117.77	-	127.77	0.0019		FQ	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0880 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Data	QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	32.3	-	42.3	2.45		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	32.3	-	42.3	177.3		F	#		
pH	s.u.	04/22/2009	N001	32.3	-	42.3	4.19		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	32.3	-	42.3	18104		F	#		
Temperature	C	04/22/2009	N001	32.3	-	42.3	24.36		F	#		
Turbidity	NTU	04/22/2009	N001	32.3	-	42.3	6.18		F	#		
Uranium	mg/L	04/22/2009	0002	32.3	-	42.3	7.3		F	#	0.00045	
Uranium	mg/L	04/22/2009	N001	32.3	-	42.3	6.8		F	#	0.00045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0886 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	19.17	-	49.17	2.87		FQ	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	19.17	-	49.17	8.8		FQ	#		
pH	s.u.	04/22/2009	N001	19.17	-	49.17	5.75		FQ	#		
Specific Conductance	umhos /cm	04/22/2009	N001	19.17	-	49.17	3285		FQ	#		
Temperature	C	04/22/2009	N001	19.17	-	49.17	26.87		FQ	#		
Turbidity	NTU	04/22/2009	N001	19.17	-	49.17	43.1		FQ	#		
Uranium	mg/L	04/22/2009	0001	19.17	-	49.17	0.0093		FQ	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0891 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	10.74	-	20.74	3.58		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	10.74	-	20.74	-107		F	#		
pH	s.u.	04/22/2009	N001	10.74	-	20.74	6.16		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	10.74	-	20.74	23160		F	#		
Temperature	C	04/22/2009	N001	10.74	-	20.74	23.95		F	#		
Turbidity	NTU	04/22/2009	N001	10.74	-	20.74	7.41		F	#		
Uranium	mg/L	04/22/2009	N001	10.74	-	20.74	1.7		F	#	0.00022	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0906 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	12.49	-	27.49	2.66		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	12.49	-	27.49	35		F	#		
pH	s.u.	04/22/2009	N001	12.49	-	27.49	5.56		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	12.49	-	27.49	11214		F	#		
Temperature	C	04/22/2009	N001	12.49	-	27.49	23.24		F	#		
Turbidity	NTU	04/22/2009	N001	12.49	-	27.49	3.27		F	#		
Uranium	mg/L	04/22/2009	N001	12.49	-	27.49	0.08		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0921 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	44.55	-	54.55	4.26		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	44.55	-	54.55	-52.3		F	#		
pH	s.u.	04/22/2009	N001	44.55	-	54.55	6.05		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	44.55	-	54.55	10553		F	#		
Temperature	C	04/22/2009	N001	44.55	-	54.55	25.15		F	#		
Turbidity	NTU	04/22/2009	N001	44.55	-	54.55	0.74		F	#		
Uranium	mg/L	04/22/2009	N001	44.55	-	54.55	1.2		F	#	0.00022	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0924 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	19.7	-	29.7	3.29		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	19.7	-	29.7	-154.2		F	#		
pH	s.u.	04/22/2009	N001	19.7	-	29.7	6.25		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	19.7	-	29.7	11454		F	#		
Temperature	C	04/22/2009	N001	19.7	-	29.7	25.62		F	#		
Turbidity	NTU	04/22/2009	N001	19.7	-	29.7	1.29		F	#		
Uranium	mg/L	04/22/2009	N001	19.7	-	29.7	0.56		F	#	0.000045	

Groundwater Quality Data by Location (USEE100) FOR SITE FCT03, Falls City Disposal Site
REPORT DATE: 6/16/2009
Location: 0963 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	04/22/2009	N001	4.38	-	14.38	4.15		F	#		
Oxidation Reduction Potential	mV	04/22/2009	N001	4.38	-	14.38	272.9		F	#		
pH	s.u.	04/22/2009	N001	4.38	-	14.38	3.4		F	#		
Specific Conductance	umhos /cm	04/22/2009	N001	4.38	-	14.38	8209		F	#		
Temperature	C	04/22/2009	N001	4.38	-	14.38	23.98		F	#		
Turbidity	NTU	04/22/2009	N001	4.38	-	14.38	3.7		F	#		
Uranium	mg/L	04/22/2009	N001	4.38	-	14.38	0.08		F	#	0.0000045	

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

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: 6/16/2009

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	04/22/2009	16:45:13	31.65	419.93	
0858	O	441.03	04/22/2009	09:10:57	27.95	413.08	
0862	O	428.67	04/22/2009	08:45:46	67.47	361.2	
0880	O	446.84	04/22/2009	09:45:04	27.65	419.19	
0886	D	403.52	04/22/2009	11:50:07	34.89	368.63	
0891	D	349.63	04/22/2009	18:20:49	15.2	334.43	
0906	D	420.17	04/22/2009	08:05:42	12.69	407.48	
0921	D	435.75	04/22/2009	17:25:36	30.43	405.32	
0924	D	396.44	04/22/2009	15:40:14	17.54	378.9	
0963	D	373.23	04/22/2009	12:45:14	11.6	361.63	

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFF SITE
N UNKNOWN O ON SITE U UPGRADIENT

WATER LEVEL FLAGS: D Dry F FLOWING

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Hydrographs

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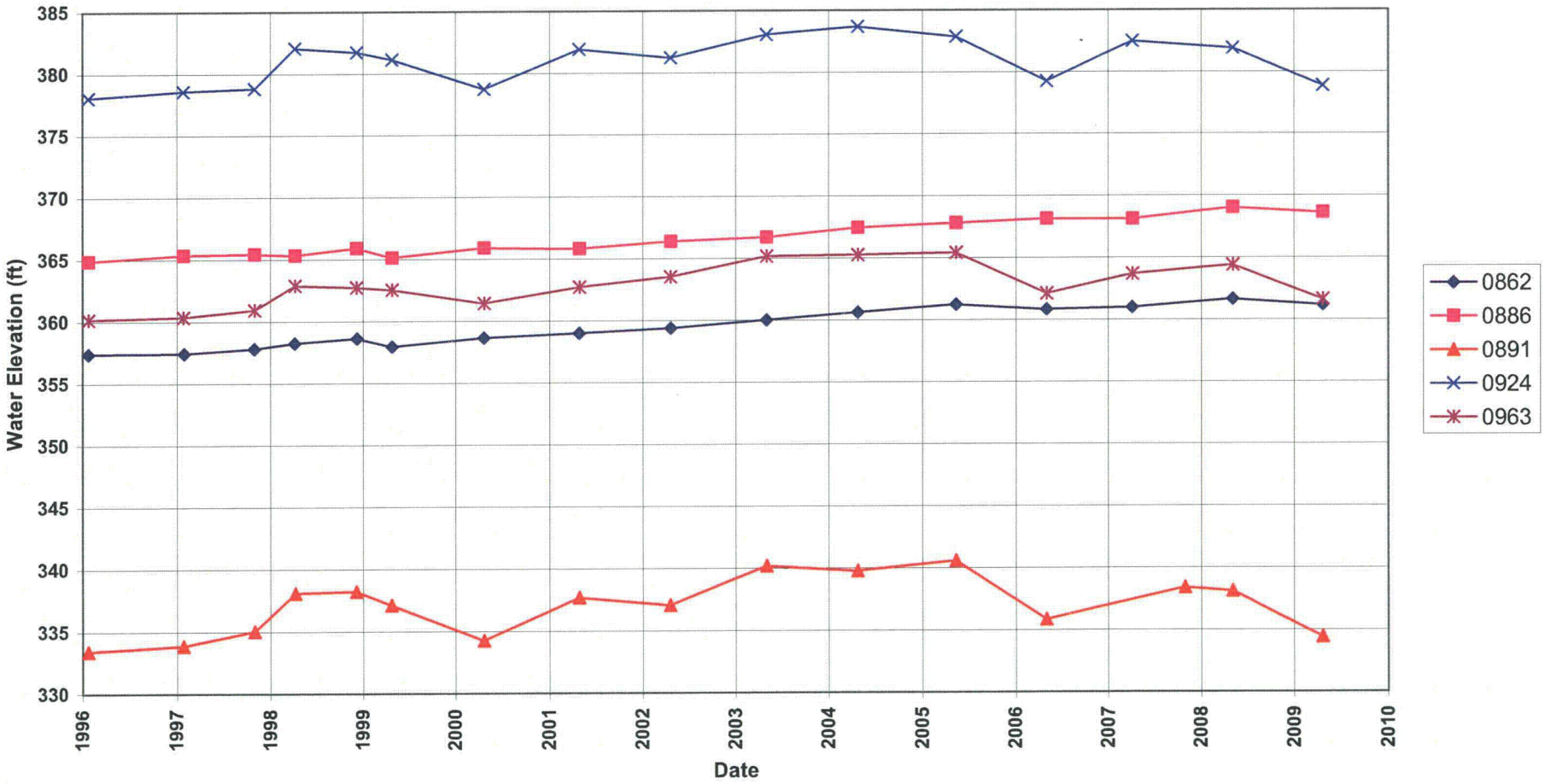
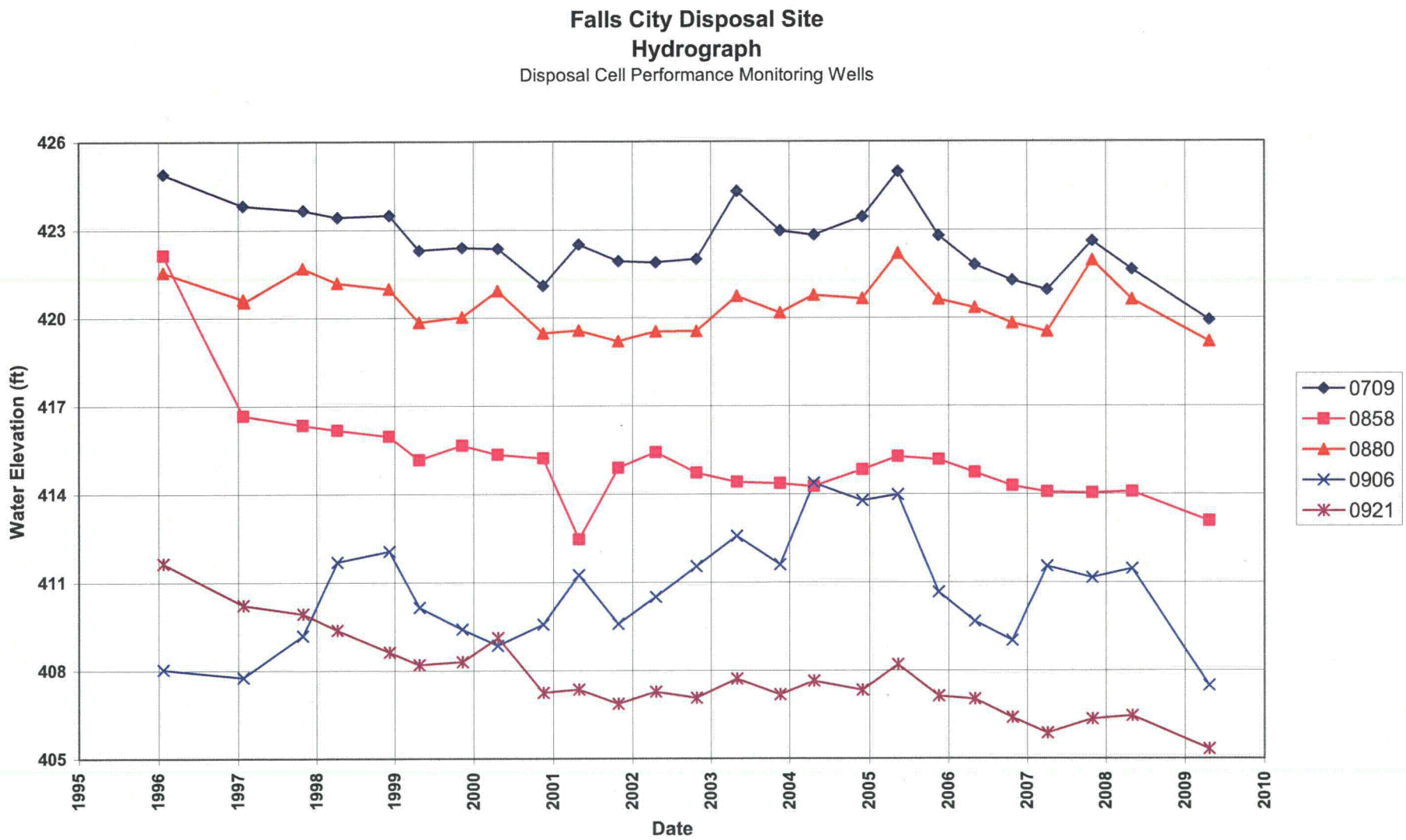
Falls City Disposal Site
Hydrograph
Groundwater Compliance Monitoring Wells




Falls City Disposal Site
Hydrograph
Disposal Cell Performance Monitoring Wells
Water Elevation (ft)
426
423
420
417
414
411
408
405
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Date
0709
0858
0880
0906
0921

Time-Concentration Graphs

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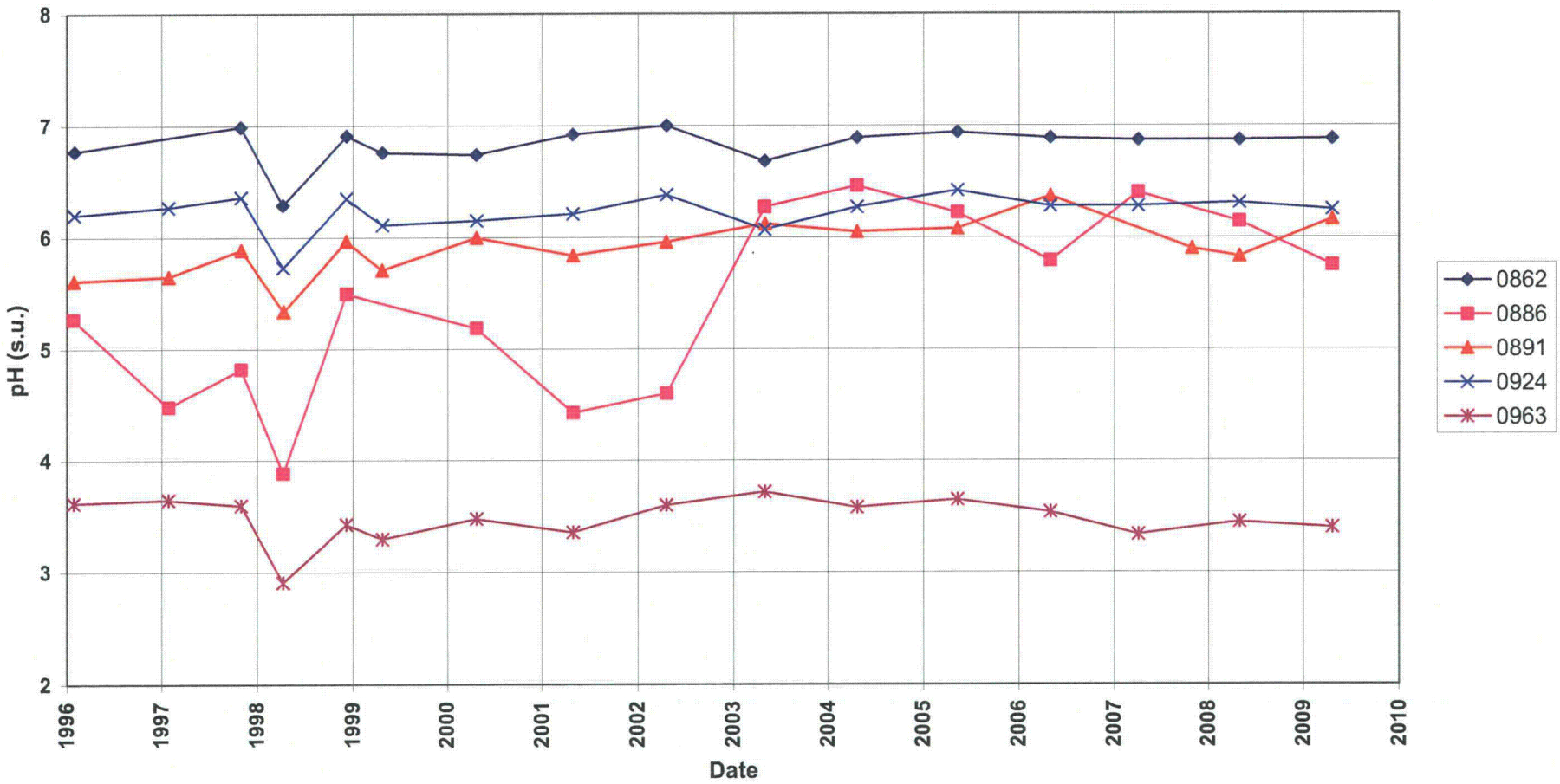
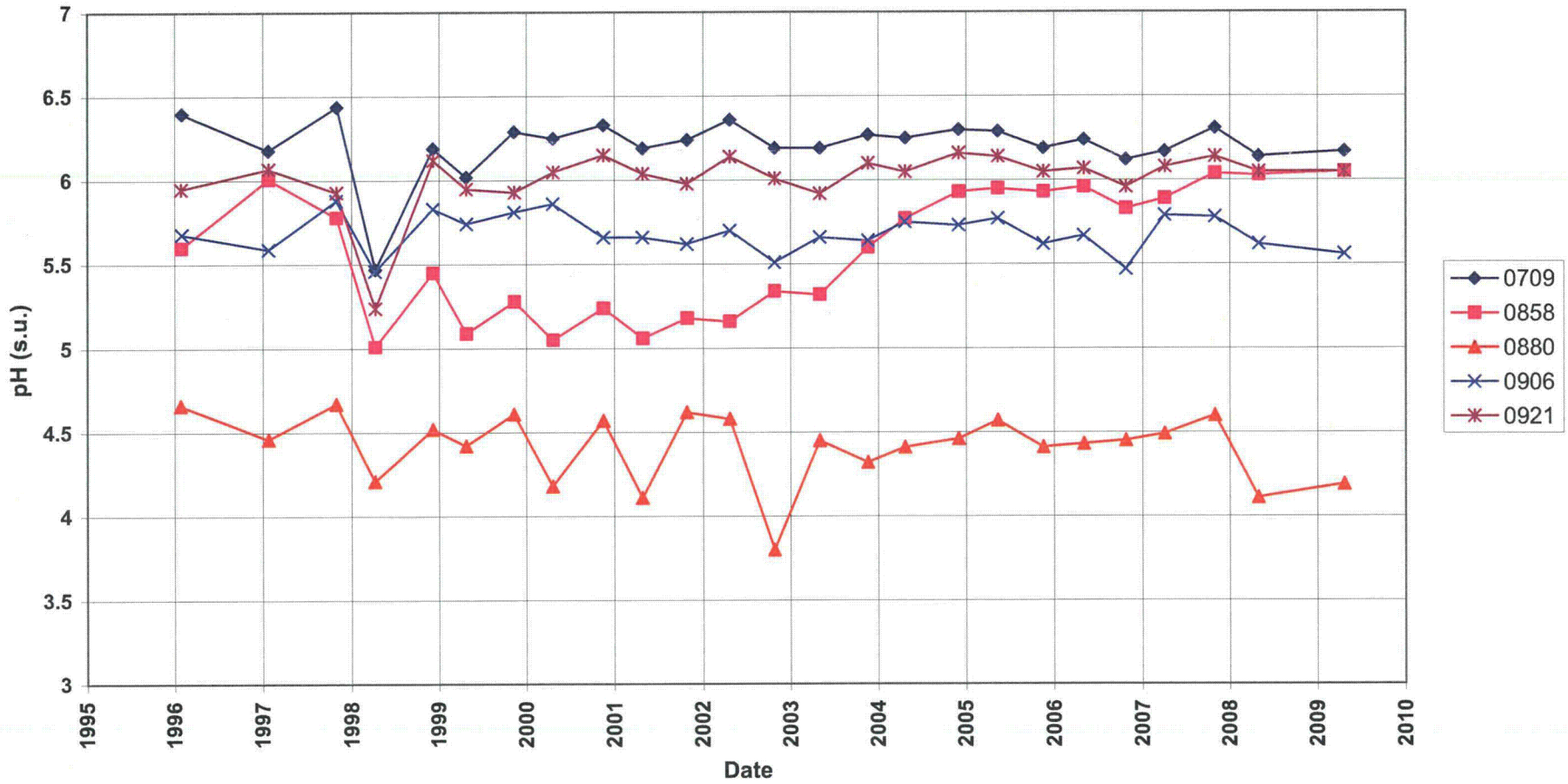
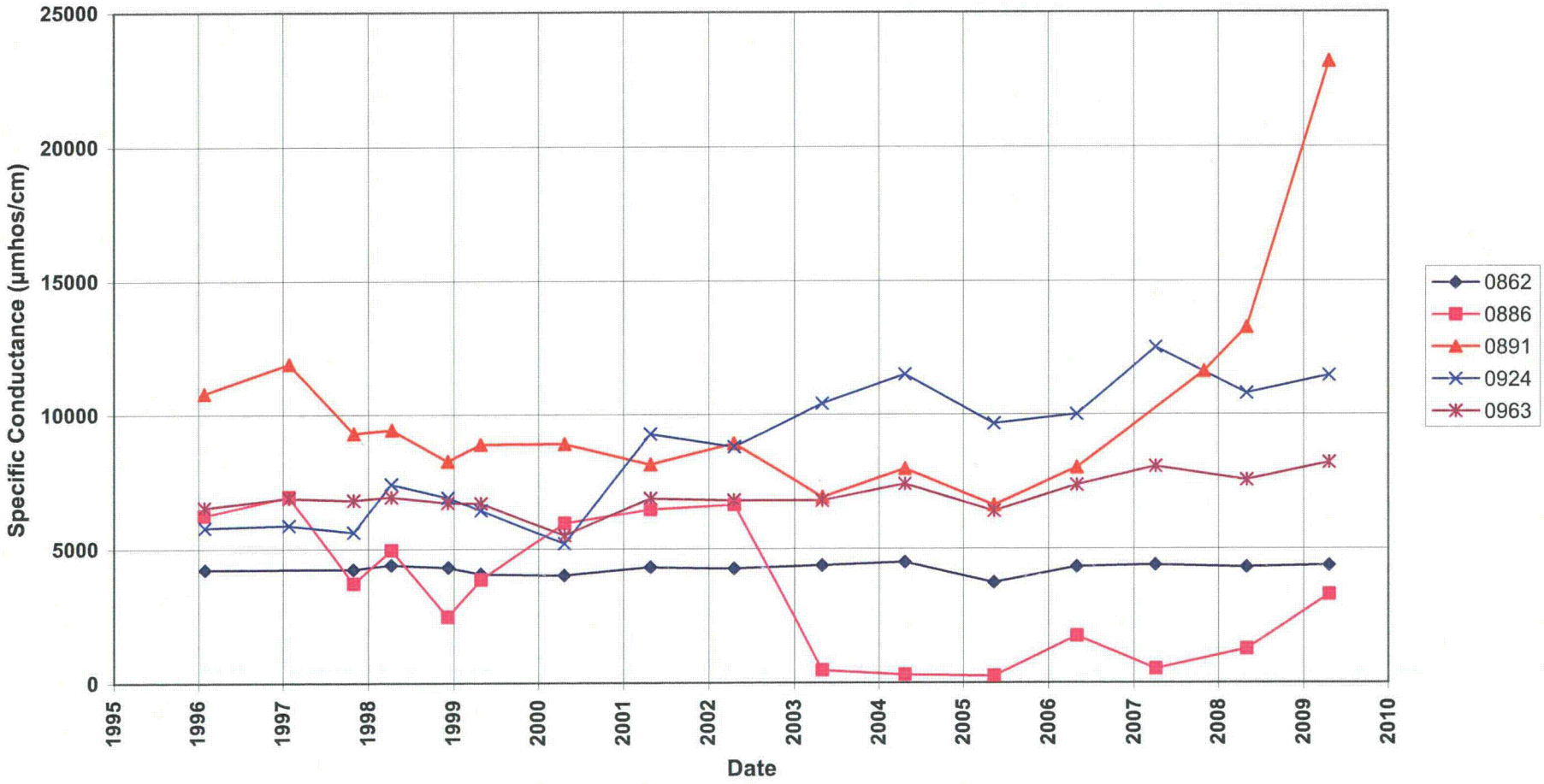
Falls City Disposal Site
Measured pH
Groundwater Compliance Monitoring Wells

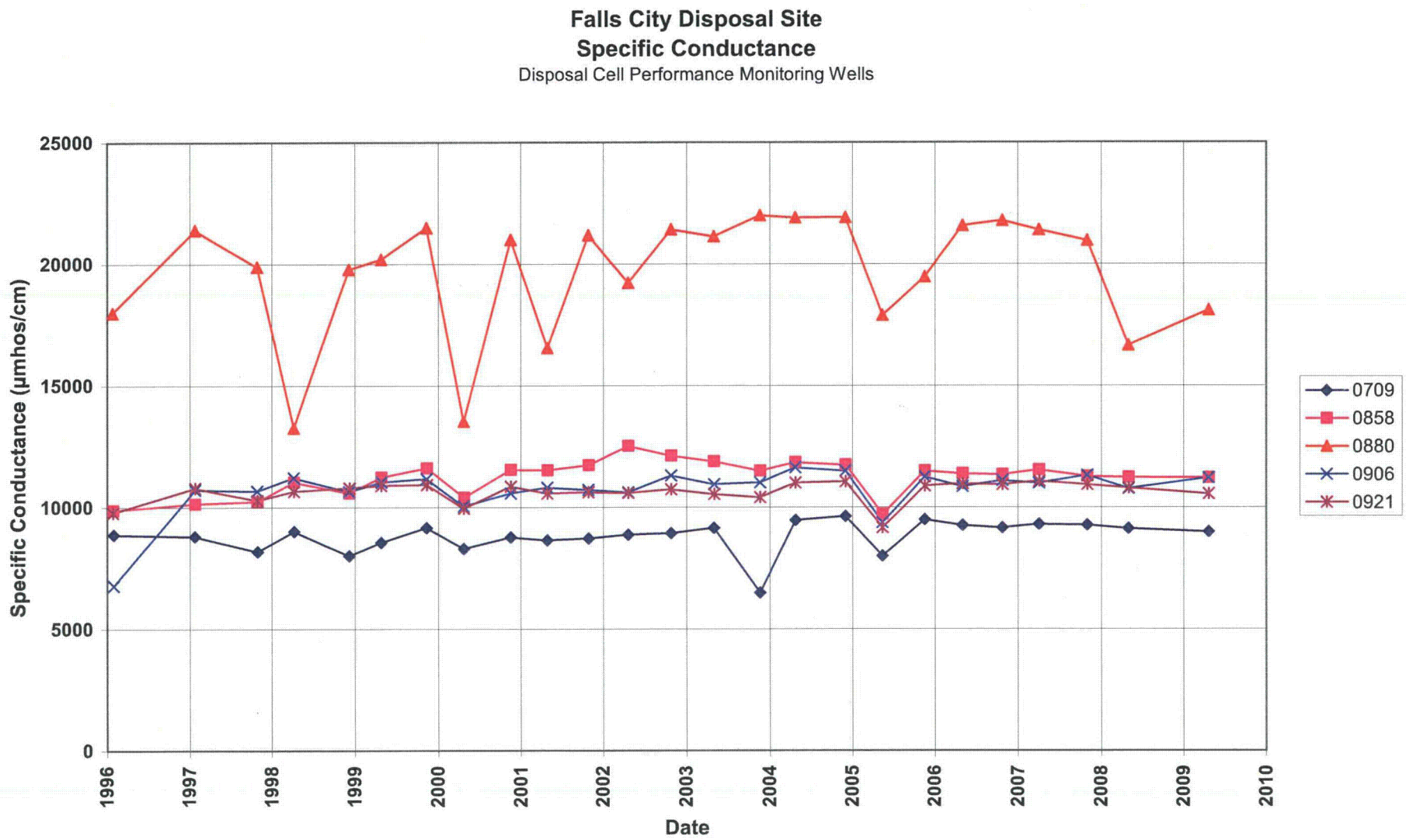


Falls City Disposal Site
Measured pH
Disposal Cell Performance Monitoring Wells

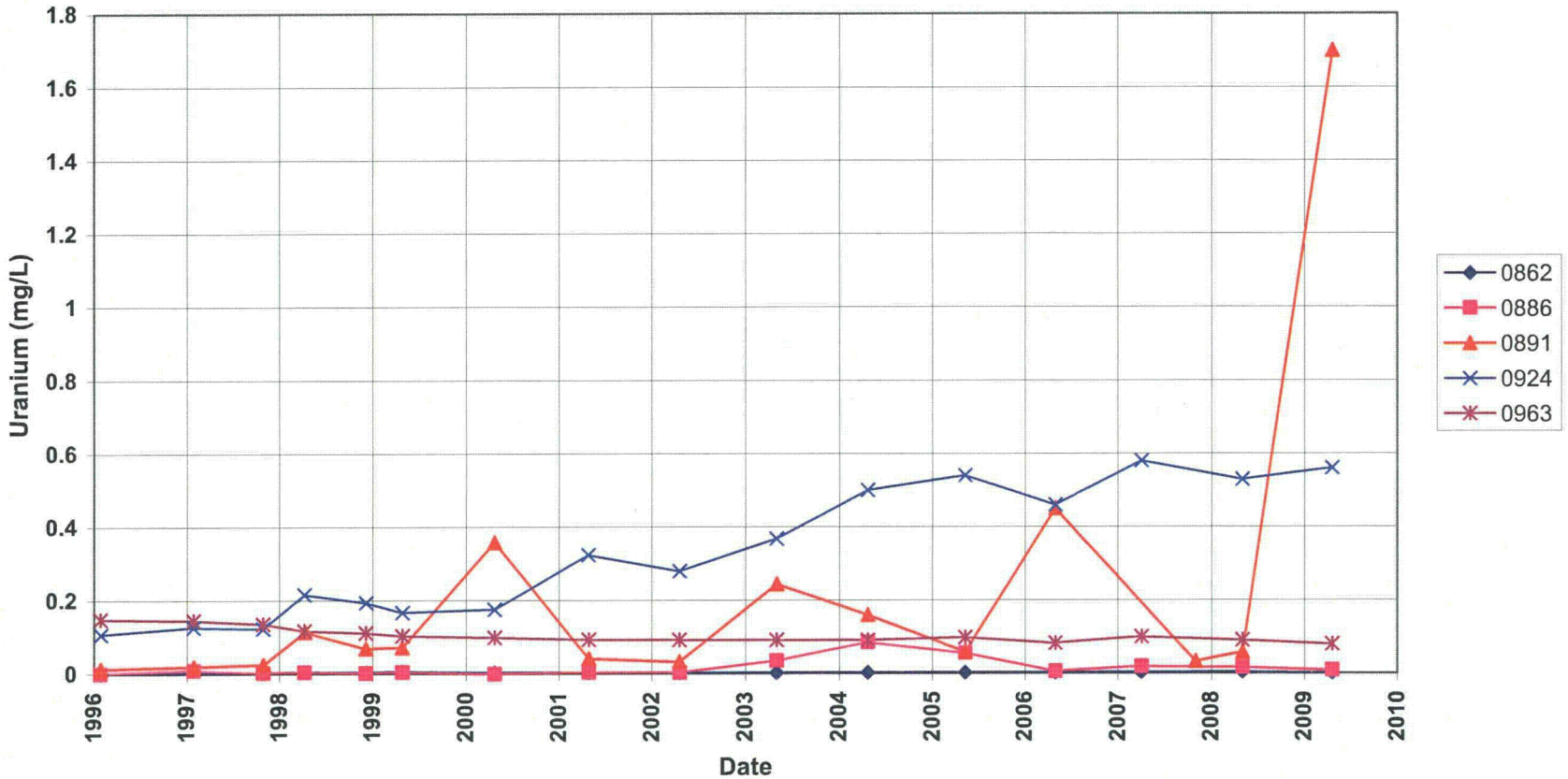


Falls City Disposal Site
Specific Conductance
Groundwater Compliance Monitoring Wells

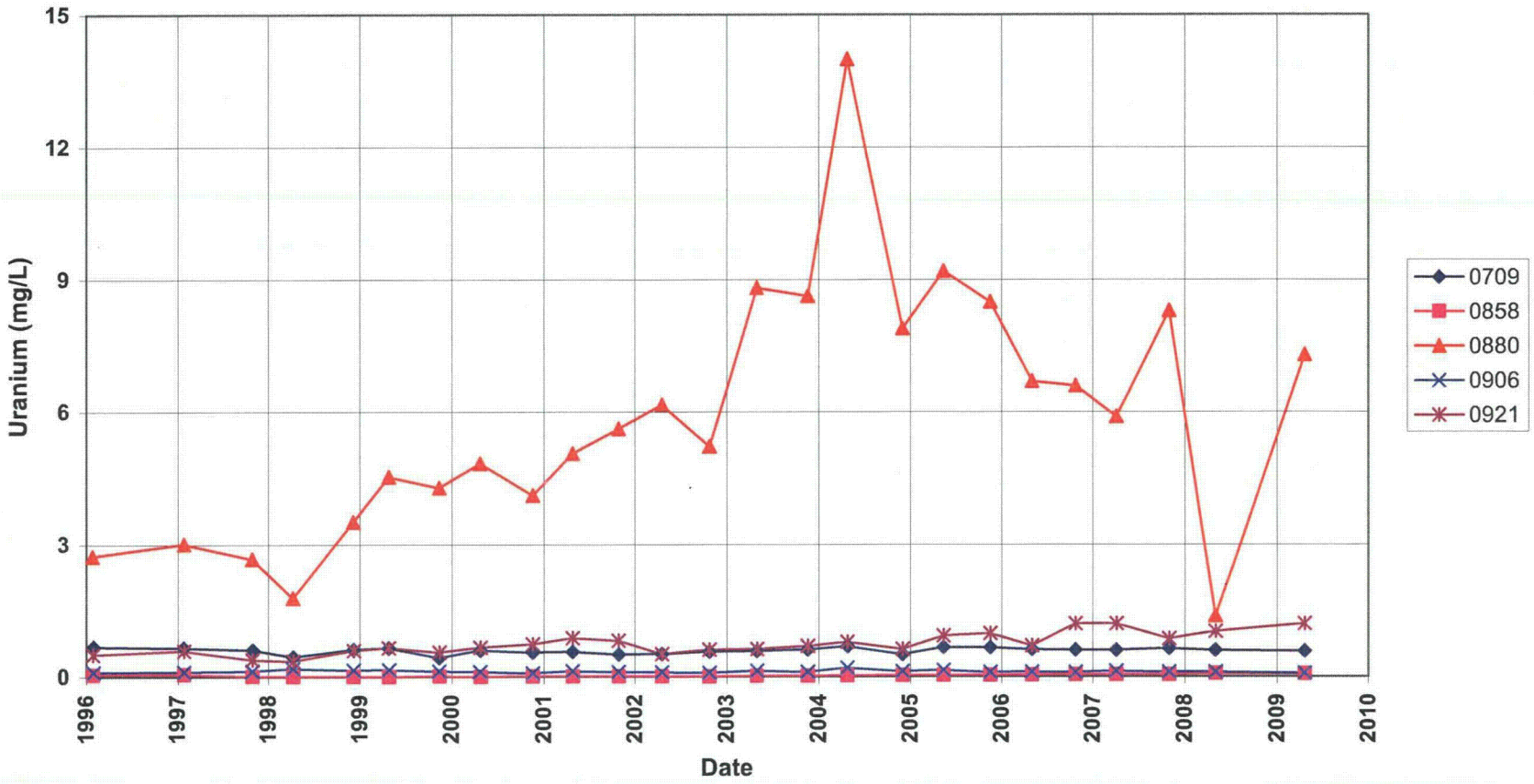



Falls City Disposal Site
Specific Conductance
Disposal Cell Performance Monitoring Wells
Specific Conductance (µmhos/cm)
25000
20000
15000
10000
5000
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Date
0709
0858
0880
0906
0921

Falls City Disposal Site
Uranium Concentration
Groundwater Compliance Monitoring Wells



Falls City Disposal Site
Uranium Concentration
Disposal Cell Performance Monitoring Wells



Attachment 3
Sampling and Analysis Work Order

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Stoller established 1959

Task Order LM00-501
Control Number 09-0621

March 18, 2009

U.S. Department of Energy
Office of Legacy Management
ATTN: Jalena Dayvault
Site Manager
2597 B ¾ Road
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller
April 2009 Environmental Sampling at Falls City, Texas

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

Dear Ms. Dayvault:

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 routine monitoring at Falls City, Texas. Water quality data will be collected from monitor wells at this site as part of the routine environmental sampling currently scheduled to begin the week of April 7, 2009.

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

Monitor 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

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.

If you have any questions, please call me at (412) 818-7015.

Sincerely,

Digitally signed by Michele L. Miller
DN: cn=Michele L. Miller, o=u.s. government, ou=department of energy, public cas, people
Date: 2009.03.18 19:54:14-04'00'

Michele Miller
Project Manager

The S.M. Stoller Corporation 2597 B ¾ Road Grand Junction, CO 81503 (970) 248-6000 Fax: (970) 248-6040

MM/lcg/lb

Enclosures (3)

cc: (electronic)
Cheri Bahrke, Stoller
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand junction

The S.M. Stoller Corporation 2597 B ¾ Road Grand Junction, CO 81503 (970) 248-6000 Fax: (970) 248-6040

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 (NO3+NO2)-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 analyte samples are considered unfiltered unless stated otherwise. All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

Sampling Frequencies for Locations at Falls City, Texas

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitor Wells						
709			X			
858			X			
862			X			
880			X			Ken B. wants a duplicate of this well.
886			X			
891			X			Download data logger
906			X			Download data logger
908			X			
916			X			
921			X			
924			X			Download data logger
963			X			Download data logger

Annual sampling conducted in April
Based on LTSP dated March 2008

Attachment 4
Trip Report

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Stoller
Grand Junction Office
established 1959

Memorandum

Control Number N/A

DATE: April 28, 2009

TO: Michele Miller

FROM: Kent Moe

SUBJECT: Sampling Trip Report

Site: Falls City, Texas

Dates of Sampling Event: April 20-24, 2009

Team Members: Joe Trevino and Kent Moe.

Number of Locations Sampled: 10 monitor wells, and 2 duplicate samples, for a total of 12 samples. No equipment blanks were required.

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

Location Specific Information:

Ticket Number	Location	Sample Date	Description
HEU 957	0709	4/22/2009	Cat I
HEU 958	0858	4/22/2009	Cat II
HEU 967	0862	4/22/2009	Cat II
HEU 959	0880	4/22/2009	Cat I
HEU 960	0886	4/22/2009	Cat I
HEU 965	0891	4/22/2009	Cat I
HEU 961	0906	4/22/2009	Cat I
-	0908	-	Well Dry
-	0916	-	Well Dry
HEU 962	0921	4/22/2009	Cat I
HEU 963	0924	4/22/2009	Cat I
HEU 964	0963	4/22/2009	Cat I (May need Cat II status)

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2596	0880	Duplicate	Groundwater	HEU 966
2743	0858	Duplicate	Groundwater	HEU 970

Field Variance: Turbidity did not stabilize or drop below 10 NTU's at well 0886; the sample was filtered. Also, well 0886 may need Category II status because the water level would not stabilize. Duplicate on well 0880 was also filtered.

Requisition Numbers Assigned: All samples were assigned to RIN 09032198.

Sample Shipment: Samples were shipped to ALS Paragon in Fort Collins, CO, from Grand Junction on April 27, 2009.

Water Level Measurements: Water level measurements were collected at all sampled wells. Water level data are provided in the table below. These data represent depth to water (ft btoc) measurements:

Well	Date	Depth to water (ft.)
0709	4/22/2009	31.65
0858	4/22/2009	27.95
0862	4/22/2009	67.47
0880	4/22/2009	27.65
0886	4/22/2009	34.89
0891	4/22/2009	15.20
0906	4/22/2009	12.69
0908	4/22/2009	Dry
0916	4/22/2009	Dry
0921	4/22/2009	30.43
0924	4/22/2009	17.54
0963	4/22/2009	11.60

Well Inspection Summary: Well inspections were conducted at all sampled wells; all wells were in good condition.

Equipment: The ten wells sampled were equipped with dedicated submersible pumps. Each well was sampled using low-flow techniques.

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

Fences, Gates, Locks: OK
Signs: OK
Trespassing/Site Disturbances: None observed.

Site Issues

Disposal Cell/Drainage Structure Integrity: Looked OK
Vegetation/Noxious Weed Concerns: N/A
Maintenance Requirements: None

Corrective Action Taken: None.

(KLM/lcg)

cc: (electronic)
Jalena Dayvault, DOE
Cheri Bahrke, Stoller
Steve Donivan, Stoller
EDD Delivery

V:\09032198\09032198_DVP.doc