

Environmental
Restoration
Contractor

ERC Team

Interoffice Memorandum



037170

0052017

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: 300-FF-2
TSD: N/A
ERA: N/A
Subject Code: 8630

TO: L. C. Hulstrom, H9-11

DATE: October 4, 1996

A. Lerch, BT-35

COPIES: See Below

FROM: Duane Jacques
Analytical Services/Field Services
H9-10/372-9400

SUBJECT: **MONITORING OF WELL 699-S6-E4A UPGRADE, TOTAL URANIUM RESULTS, REV 0**

46826

REFERENCES:

1. BHI, 1996, *On-Site Measurements Quality Assurance Plan*, BHI-00852, REV 0, Bechtel Hanford, Inc., Richland, Washington.
2. BHI, 1995, *Field Screening Procedures*, BHI-EE-05, Bechtel Hanford, Inc., Richland, Washington.

This data package contains field screening results for groundwater samples analyzed to support the upgrade of well 699-S6-E4A. The Quality Assurance level for this work corresponds to QA-1 as specified in Reference 1 (BHI 1996). The samples were managed under SAF B96-187.

The groundwater sample sets (each containing 3 duplicate samples in 20 mL plastic vials) were transported to the 200-UP-1 pump and treat site for total uranium analysis using a ChemChek KPA-11a Kinetic Phosphorescence Analyzer operated in accordance with Field Screening Procedure (FSP) 1.22, *Kinetic Phosphorescence Analysis of Total Uranium in Water* (BHI 1995). Information concerning operation and calibration of the ChemChek KPA-11a is contained in field logbook EL-1277.

Attachment 1 shows the results in $\mu\text{g/L}$ (parts per billion) for each of the samples collected to support the referenced project. Each sample set contains 3 duplicate samples and are indicated with the same HEIS number. In addition, the third sample of each set was spiked with a total-uranium standard of known concentration to determine sample recovery and potential matrix interference conditions. The table also shows the results of two method blank samples and two laboratory control standards (LCS) analyzed with the samples to ensure the equipment was operating as expected. The results of the laboratory control standards are within acceptable limits ($\pm 20\%$ recovery).

The ChemChek KPA-11a uses a pulsed nitrogen laser to measure total-uranium concentrations in liquid samples. The samples and standards are mixed with equal parts of a complexing agent (Uraplex solution) and introduced into the analysis chamber using an autosampler. The laser pulses excite the complexed uranium ions causing them to phosphoresce. After each pulsed excitation, the rapidly

L. C. Hulstrom, H9-11

Page 2

decaying phosphorescence is measured using photo multiplier tubes and used to calculate a decay curve using a least-squares regression. The sample decay curves are compared with similar decay curves generated from analysis of standards and used to determine the total-uranium concentration.

In addition to the calculated uranium concentration, the instrument displays two parameters that help the analyst monitor the efficiency of the measurement process. The R^2 values for each measurement indicate the linearity of the decay curves. Reliable measurements are produced when the R^2 values are 0.96 or above. The lifetime values (measured in μsec) indicate the ability of the complexed uranium to phosphorescence. Reliable measurements are obtained when lifetime values are greater than 100 μsec . Best results are obtained when lifetime values exceed 200 μsec . Contaminants in the samples (acids and organic materials for example) can quench the phosphorescence of the complexed uranium which is noted by decreased lifetime values. Deionized water blanks may also show low lifetime and R^2 values due to the absence of phosphorescent material.

The data indicate the instrument operation parameters (lifetime and R^2 values) were within acceptable limits for samples B0J295, B0J296, B0J297, and the quality control samples. Also, the operating parameters for samples B0J2B0 bottle #2 and B0J2B2 bottle #3 were within acceptable limits. However, the operation parameters for the remainder of samples B0J298, B0J299, B0J2B0, B0J2B1, and B0J2B2 were not within acceptable limits. Based on this information the resulting total-uranium results are not reliable. This trend is also confirmed with the matrix spike data. The percent spike recovery values for the first three sets of samples ranged from 95% to 102%. The percent spike recovery values for the later five sets of samples ranged from 83% to 90%.

The low operating parameters and matrix spike recovery values could indicate the presence of a contaminant in the later samples which interfered with the analysis. Two contaminants suspected in the sampling region, diesel fuel and EDTA (a complexing agent with properties similar to the Uraplex solution used in the test) could be potential sources of interference. In addition, the analyst noted an unidentified sulfur-like odor in several of the samples, especially the later samples.

Please contact me if you have any questions on this information.



Duane Jacques, Scientist

IDJ:idj

L. C. Hulstrom, H9-11

Page 3

Attachments:

Attachment 1. Monitoring of Well 699-S6-E4A Upgrade, Total Uranium Results

Attachment 2. Sample Chain of Custody Sheets

Copies:

R. T. Coffman, H9-11, w/attachment 1 only

M. J. Galgoul, H9-12, w/attachment 1 only

C. R. Johnson, H0-17, w/attachment 1 only

T. D. LeFrancois, H9-03, w/attachment 1 only

R. G. McCain, H9-10, w/attachment 1 only

D. A. St John, N1-28, w/attachment 1 only

W. S. Thompson, N1-28, w/attachment 1 only

BHI Document Control, H4-79, w/original attachments

Monitoring of Well 699-S6-E4A Upgrade
Total Uranium Results (µg/L)

HEIS Number	Bottle Number	Sample Date	Sample Time	Total Uranium (ug/L)	Lifetime (usec)	R2 Value	Percent Recovery
B0J202	1	9/19/96	17:35	27.8	NA	NA	NA
B0J202	2	9/19/96	17:35	27.3	269	0.9999	NA
B0J202	3	9/19/96	17:35	27.2	NA	NA	NA
B0J202	Spike	NA	NA	110	281	0.9997	96%
B0J295	1	9/27/96	9:16	47.6	271	0.9999	NA
B0J295	2	9/27/96	9:16	48.3	257	0.9996	NA
B0J295	3	9/27/96	9:16	47.3	255	0.9997	NA
B0J295	Spike	NA	NA	121	267	0.9997	98%
B0J296	1	9/27/96	9:36	20.0	187	0.9999	NA
B0J296	2	9/27/96	9:36	19.4	196	0.9999	NA
B0J296	3	9/27/96	9:36	19.2	197	0.9999	NA
B0J296	Spike	NA	NA	105	245	0.9998	95%
B0J297	1	9/27/96	9:50	10.5	120	0.9947	NA
B0J297	2	9/27/96	9:50	10.0	122	0.9938	NA
B0J297	3	9/27/96	9:50	11.3	122	0.9949	NA
B0J297	Spike	NA	NA	107	208	0.9997	102%
B0J298	1	9/27/96	10:05	12.0	73	0.9327	NA
B0J298	2	9/27/96	10:05	10.4	78	0.9523	NA
B0J298	3	9/27/96	10:05	4.0	144	0.6321	NA
B0J298	Spike	NA	NA	45.9	179	0.9984	88%
B0J299	1	9/27/96	10:35	12.8	66	0.9431	NA
B0J299	2	9/27/96	10:35	13.8	62	0.8971	NA
B0J299	3	9/27/96	10:35	11.3	69	0.9554	NA
B0J299	Spike	NA	NA	49.3	166	0.9997	89%
B0J2B0	1	9/27/96	11:05	13.3	66	0.9330	NA
B0J2B0	2	9/27/96	11:05	8.6	130	0.9938	NA
B0J2B0	3	9/27/96	11:05	14.9	60	0.8940	NA
B0J2B0	Spike	NA	NA	48.0	167	0.9995	83%
B0J2B1	1	9/27/96	11:35	21.0	74	0.9391	NA
B0J2B1	2	9/27/96	11:35	19.5	81	0.9729	NA
B0J2B1	3	9/27/96	11:35	17.3	73	0.9706	NA
B0J2B1	Spike	NA	NA	52.2	170	0.9987	90%
B0J2B2	1	9/27/96	12:05	13.7	93	0.9230	NA
B0J2B2	2	9/27/96	12:05	16.0	94	0.9974	NA
B0J2B2	3	9/27/96	12:05	8.5	99	0.9967	NA
B0J2B2	Spike	NA	NA	54.7	174	0.9996	85%
QA sample	50 ug/L LCS	NA	NA	41.9	307	0.9990	84%
QA sample	DI water	NA	NA	<1.0	67	0.9862	NA
QA sample	200 ug/L LCS	NA	NA	197	292	0.9997	99%
QA sample	DI water	NA	NA	<1.0	145	0.9927	NA

NA - Not Applicable

Analyst:

I. D. Jacques
I. D. Jacques 10/4/96

Uranium Instrument: ChemChek KPA-11a, Serial # 944505006

Method: Kinetic Phosphorescence

Logbook: 200-UP-1 Project Log, EL-1277, pgs 147 to 148

Director Doug Bryant/Doug Bowers	Company Contact Larry Hulstrom	Telephone No. 372-9685	Project Coordinator Koerner, CC	Data Turnaround 0 Field
Object Designation Monitoring of Well 699-S6-E4A Upgrade	Sampling Location 600 Area	SAF No. B96-187		
Chest No. N/A	Field Logbook No. EL-1301	Method of Shipment Hand Delivered		
Shipped To Mobile Laboratory	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A		
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	
	Type of Container	G	GP	
	No. of Container(s)	1	3	
Special Handling and/or Storage	Volume	40ml	20ml	

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	VOA Equil Headspace	URANIUM TOTAL										
BO295	water	9-27-96	0916		X										
BO296	water	9-27-96	0936		X										
BO297	water	9-27-96	0950		X										

CHAIN OF POSSESSION	Sign/Print Names		SPECIAL INSTRUCTIONS										Matrix * S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue WI - Wipe L - Liquid V - Vegetation X - Other
	Relinquished By Doug Bryant Date/Time 1005	Received By D. Jacques Date/Time 1005											
	Relinquished By Doug Bryant Date/Time 9-27-96	Received By Duane Jacques Date/Time 9/27/96											
	Relinquished By	Received By											
Relinquished By	Date/Time	Received By	Date/Time										
Relinquished By	Date/Time	Received By	Date/Time										

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Director Doug Bryant/Doug Bowers		Company Contact Larry Hulstrom		Telephone No. 372-9685		Project Coordinator Koerner, CC		Data Turnaround 0 Field	
Project Designation Monitoring of Well 699-S6-E4A Upgrade		Sampling Location 600 Area				SAF No. B96-187			
Chest No. N/A		Field Logbook No. EL-1301				Method of Shipment HAND Delivered			
Shipped To Mobile Laboratory		Offsite Property No. N/A				Bill of Lading/Air Bill No. N/A			
POSSIBLE SAMPLE HAZARDS/REMARKS		Preservation		None	None				
		Type of Container		G	G/P				
		No. of Container(s)		1	3				
Special Handling and/or Storage		Volume		40ml	20ml				

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	VOA Equil Headspace	URANIUM TOTAL								
B0J298	Water	9-27-96	1005		X								
B0J299	Water	9-27-96	1035		X								
B0J2B0	Water	9-27-96	1105		X								
B0J2B1	Water	9-27-96	1135		X								
B0J2B2	Water	9-27-96	1205		X								

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS						Matrix *	
Relinquished By Doug Bryant Date/Time 1215		Received By R.G. Melan Date/Time 1215								S - Soil	
Relinquished By [Signature] Date/Time 9/27/96		Received By [Signature] Date/Time 9/27/96								SE - Sediment	
Relinquished By R.G. Melan Date/Time 1320		Received By R.G. Melan Date/Time 1320								SO - Solid	
Relinquished By R.G. Melan Date/Time 1320		Received By IP Jacques Date/Time 1320								SL - Sludge	
Relinquished By [Signature] Date/Time 9/27/96		Received By Neume Jacques ERC Date/Time 9/27/96								W - Water	
Relinquished By [Signature] Date/Time		Received By [Signature] Date/Time								O - Oil	
										A - Air	
										DS - Drum Solids	
										DL - Drum Liquids	
										T - Tissue	
										WI - Wipe	
										L - Liquid	
										V - Vegetation	
										X - Other	

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time