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ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 628062

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) 222-S Laboratory	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: K Basin, SFBWL/Waste Management/PPC/WML	6. Design Authority/ Design Agent/Cog. Engr.: Franciska H. Steen	7. Purchase Order No.: N/A
8. Originator Remarks: This document is being released into the supporting document system for retrievability purposes.		9. Equip./Component No.: N/A
		10. System/BLdg./Facility: K Basin
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No For release.		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 03/21/00

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	HNF-1693	N/A	0	K Basin Sandfilter Backwash Line Characterization Project, Analytical Results for Campaign 25	Q	2	1	1

16. KEY		
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K Basin Sandfilter Backwash Line Characterization Project, Analytical Results for Campaign 25

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford

P.O. Box 1000
Richland, Washington

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Total Pages: 16

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222-LABORATORY

**K BASIN SANDFILTER BACKWASH LINE
CHARACTERIZATION PROJECT,
ANALYTICAL RESULTS FOR CAMPAIGN 25**

Project Coordinator: Franciska H. Steen

**Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management**

by

**222-S Laboratory
Fluor-Hanford, Inc.
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222-S LABORATORY

**K BASIN SANDFILTER BACKWASH LINE
CHARACTERIZATION PROJECT,
ANALYTICAL RESULTS FOR CAMPAIGN 25**

Summary

Sample 023KWBMF was taken from the K West Sandfilter Backwash Pit on February 10, 2000 and received by 222-S Laboratory on February 11, 2000. Analyses were performed on sample 023KWBMF in accordance with *Letter of Instruction for K Basins Sandfilter Backwash Line Samples* (LOI) in support of the K Basin Sandfilter Backwash Line Characterization Project.

Appearance and Sample Handling

Sample 023KWBMF consisted of approximately 250 milliliters of clear liquid with a small amount of black solids on the bottom of the container. Table 1 summarizes appearance information and over-the-top (OTR) dose readings performed on the sample.

Table 1. Appearance and OTR for K W Basin Sandfilter Backwash Sample

Customer ID	Lab ID	Color	Clarity	Organic Layer	Solids	OTR (MREM/HR)
023KWBMF	S00K000001	None	Clear	None	Black	<0.5

Sample Preparation

There were no anomalies observed nor exceptions to the data precision and accuracy requirements stated in LOI for the digestion of the sample. The K Basin Sample Digestion Data Sheet (Table 2) compiles analytical results associated with the digestion process. Determination of Data Correction Digestion/Dilution Factors (Table 3) presents the data used to determine the digestion/dilution conversion factor and the final calculated value.

Attachment 1 (Sample Processing Scheme for K West Basin Sandfilter Backwash Line Sample (023KWBMF)) illustrates the digestion process. Furthermore, this reference relates K West Basin identification numbers to their corresponding 222-S Laboratory Information Management System (LABCORE) sample numbers.

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Sample 023KWBMF was entered into the LABCORE as a solid sample. In order to satisfy the LABCORE upload of the raw data, a digest factor of 1g/L was used to convert the units for the results from uCi/L to uCi/g. Therefore, the uCi/g data results are equal to the uCi/L data results. The uCi/L results were converted to uCi/mL on Tables 5, 6 and 7. The volume and weight correction factors were also applied in order to correct the data results to the original sample.

Analytical Results

The data summary tables included in this report compile analytical results associated with each sample. Results are reported as activity of the digestate (S00K000001). These results were corrected for volume and weight of the entire sample. Analytical results for the digestate are presented in Tables 4A, 4B and 4C. Analytical results corrected to the original sample volume are presented in Tables 5, 6 and 7. These tables present an estimated quantification limit (EQL) for each analysis. An EQL is equivalent to a practical quantification limit (as required by LOI) and is calculated as the method detection limit multiplied by any dilution factor and by a factor of ten.

Plutonium (238 Pu and 239/240Pu)

There were no anomalies observed during sample analysis. The detection limit was much less than the customer specified detection limit of 4.2 $\mu\text{Ci/L}$. The preparation blank did not show contamination. Standard recovery, precision and accuracy were all within acceptable limits.

Uranium (U)

There were no anomalies observed during sample analysis. The detection limit was much less than the customer specified detection limit of 23 mg/L. The preparation blank did not show contamination. Standard recovery and accuracy were all within acceptable limits.

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Procedures

Table 8 lists the analytical procedures used for performing sample analyses.

Table 8. Analytical Procedures

Analysis	Preparation Procedure	Analysis Procedure
Pu 238 and Pu239/240	LA-505-162 Rev. C-0	*LA-953-104 Rev. B-2
U	LA-505-162 Rev. C-0	LA-925-009 Rev. D-1

* LOI requires Pu239 to be analyzed by LA-943-128. However, this procedure was taken out of service and an equivalent procedure was used LA-953-104.

References

DeFigh-Price, C., October 1996, *Letter of Instruction for K Basins Sandfilter Backwash Line Samples*, Revision 3, Internal Memorandum 2A100-96.018.

Markel, L.P., 1999, *222-S Laboratory Quality Assurance Plan*, HNF-SD-CP-QAPP-016, Rev. 3C, Waste Management Federal Services of Hanford, Inc., Richland, WA 99352.

Table 2. Sample Digestion Data Sheet (LA-505-162, Revision C-2)

Step	Labcore Name	Parameter Description	Units	Datum
9.1.2.1		Labcore Sample Number	n/a	S00K000001
9.1.2.2	ESTVOL01	Estimated total volume of sample	mL	250.0
9.1.2.3	DOSE-02	Dose rate window closed	mR/hr	<0.5
9.1.2.3	WODOSE02	Dose rate window open	mrad/hr	<0.5
9.1.4	GROSSWT1	Gross weight of sample bottle and contents	grams	319.558
9.1.7	TAREWT01	Tare weight of PTFE drying/digesting vessel	grams	N/A
9.2.5	TAREWT02	Tare weight of empty dried sample bottle	grams	32.311
9.2.8	REFBTLWT	Weight of bottle refilled to initial liquid level	grams	321.727
9.2.10	DRYWT-01	Gross weight of drying vessel, 1st drying	grams	216.668
9.2.12	DRYWT-02	Gross weight of drying vessel, 2nd drying	grams	216.684
9.2.13.1	AVENETWT	Average of net weight of dried sludge	grams	0.053
9.2.14	DRYWT-03	Gross weight of drying vessel, 3rd drying	grams	N/A
9.2.15	NETWT-01	Net weight of dried sludge	grams	0.053
9.2.16.2	TAREWT03	Tare weight of bottle for sludge storage	grams	N/A
9.2.16.4	GROSSWT2	Gross weight of excess dry sludge + storage container	grams	N/A
9.2.16.5	NETWT-02	Net weight of excess dried sludge	grams	N/A
9.2.16.6	GROSSWT3	Gross weight of remaining dried sludge to be digested plus drying vessel	grams	216.721
9.2.16.7	NETWT-03	Net weight of remaining dried sludge to be digested	grams	0.053
9.2.17	NETWT-04	Net weight of dried sludge to be digested	grams	0.053
9.2.31.3	VOLDIG01	Volume of diluted digestate (same as volume of volumetric flask)	mL	250
9.2.31.5	KDIG-01	Digestion Factor		0.8621
9.2.35	GROSSWT4	Gross weight of dry digesting vessel plus residue	grams	216.668
9.2.36	APPEAR02	Appearance of dried residue	n/a	Dissolved
9.2.37	CHILD-01	LABCORE number of digestate	n/a	N/A

Table 3. Determination of Data Correction Digestion/Dilution Factors
K Basin Sand Filter Backwash Line
Campaign 25

Column 1 Customer Sample Number	Column 2 Labore Parent Sample Number	Column 3 Sample Bottle Refilled Weight grams	Column 4 Bottle Tare Weight grams	Column 5 Density Factor	Column 6 Initial Sample Volume (converted by density) milliliters	Column 7 Weight of Digested Sludge grams	Column 8 Volume of Digestate (Vol flask volume) milliliters	Column 9* Digestion Factor Volume (mL) and weight (g)
023KWBMF	S00K000001	321.727	32.311	0.998	289.996	0.0530	250.0	8.621E-01

Column 3. Derived from step 9.2.8 of LA-505-162, Rev. C-2.

Column 4. Derived from step 9.2.5 of LA-505-162, Rev. C-2.

Column 5. Density of reagent grade water at room temperature.

Column 6. Calculation: (column 3 - column 4) + column 5.

Column 7. Derived from step 9.2.17 of LA-505-162, Rev. C-2.

Column 8. Derived from step 9.2.31.3 of LA-505-162, Rev. C-2.

Column 9. Calculation: (column 8 / column 6). Digestion factor to correct to total volume and weight of solids in original sample.

Note: Since all solids were digested, Column 7 is both the weight of solids digested and the original weight of the dried solids. Thus, the ratio is 1.

Table 4A. Analytical Results for Digestates
K Basin Sand Filter Backwash Line
Campaign 25

Digestate Results Not Corrected for Digestion Factors or Dilution Factors

6

Pu-238 by TRU-SPEC Resin
LA-953-104

SAMPLE IDENTIFICATION			SAMPLE RESULTS			QUALITY CONTROL DATA					
Customer Sample Number	Laboratory Sample Number	Campaign Number	Sample Result uCi/L	Duplicate Result uCi/L	Mean Result uCi/L	Standard % Recovery	Preparation Blank uCi/L	Precision of Duplicate RPD	Accuracy of Spike % Recovery	Detection Limit uCi/L	Counting Error, Relative %
023KWBMF	S00K000001	25	<3.37E-03	<3.50E-03	<3.44E-03	n/a	<3.18E-03	n/a	n/a	3.37E-03	12.1

**Table 4B. Analytical Results for Digestates
K Basin Sand Filter Backwash Line
Campaign 25**

Digestate Results Not Corrected for Digestion Factors or Dilution Factors

**Pu-239/240 by TRU-SPEC Resin
LA-953-104**

SAMPLE IDENTIFICATION				SAMPLE RESULTS			QUALITY CONTROL DATA				
Customer Sample Number	Laboratory Sample Number	Campaign Number	Sample Result uCi/L	Duplicate Result uCi/L	Mean Result uCi/L	Standard % Recovery	Preparation Blank uCi/L	Precision of Duplicate RPD	Accuracy of Spike % Recovery	Detection Limit uCi/L	Counting Error, Relative %
023KWBMF	S00K000001	25	3.59E-03	<3.50E-03	n/a	98.4	<3.18E-03	n/a	93.9	3.37E-03	6.9

Table 4C. Analytical Results for Digestates
K Basin Sand Filter Backwash Line
Campaign 25

Digestate Results Not Corrected for Digestion Factors or Dilution Factors

00

Uranium by Phosphorescence
LA-925-009

SAMPLE IDENTIFICATION			SAMPLE RESULTS			QUALITY CONTROL DATA					
Customer Sample Number	Laboratory Sample Number	Campaign Number	Sample Result ug/L	Duplicate Result ug/L	Mean Result ug/L	Standard % Recovery	Preparation Blank ug/L	Precision of Duplicate RPD	Accuracy of Spike % Recovery	Detection Limit ug/L	Relative Percent Uncertainty
023KWBMF	S00K000001	25	3.25E-03	2.93E-03	3.09E-03	89.2	<1.88E-03	10.4	99.4	1.88E-03	2.1

Table 5. Analytical Results Corrected to Original Sample Volume: Pu-238 by TRU-SPEC Resin
K Basin Sand Filter Backwash Line
Campaign 25

Data are Corrected for Digestion Factors and Dilution Factors

Pu-238 by TRU-SPEC Resin
LA-953-104

SAMPLE IDENTIFICATION			SAMPLE RESULTS								QUALITY CONTROL DATA					
Customer Sample Number	Laboratory Sample Number	Campaign Number	Conversion Factor to uCi/mL	Digestate Sample Result uCi/L	Final Sample Result uCi/mL	Digestate Duplicate Result uCi/L	Final Duplicate Result uCi/mL	Digestate Mean Result uCi/L	Final Mean Result uCi/mL	Digestate Preparation Blank uCi/L	Final Preparation Blank uCi/mL	Precision of Duplicate RPD	Digestate Detection Limit uCi/L	Final Detection Limit uCi/mL	Estimated Quantitation Limit uCi/mL	Relative Percent Counting Error
023KWBMF	S00K000001	25	8.621E-01	<3.37E-03	<2.91E-06	<3.50E-03	<3.02E-06	<3.44E-03	<2.96E-06	<3.18E-03	<3.18E-06	N/A	3.37E-03	2.91E-06	2.91E-06	12.1

Notes: The detection limit and relative percent counting error are based on the sample results.

"Final" refers to the result as it pertains to the original sample volume, calculated by multiplying the digestate results by the conversion factor and dividing this number by 1000 to convert uCi/L to uCi/mL.

Table 6. Analytical Results Corrected to Original Sample Volume: Pu-239/240 by TRU-SPEC Resin
K Basin Sand Filter Backwash Line
Campaign 25

Data are Corrected for Digestion Factors and Dilution Factors

Pu-239/240 by TRU-SPEC Resin
LA-953-104

SAMPLE IDENTIFICATION			SAMPLE RESULTS								QUALITY CONTROL DATA							
Customer Sample Number	Laboratory Sample Number	Campaign Number	Conversion Factor to uCi/mL	Digestate Sample Result uCi/L	Final Sample Result uCi/mL	Digestate Duplicate Result uCi/L	Final Duplicate Result uCi/mL	Digestate Mean Result uCi/L	Final Mean Result uCi/mL	Standard % Recovery	Digestate Preparation Blank uCi/L	Final Preparation Blank uCi/mL	Precision of Duplicate RPD	Accuracy of Spike % Recovery	Digestate Detection Limit uCi/L	Final Detection Limit uCi/mL	Estimated Quantitation Limit uCi/mL	Relative Percent Counting Error
023KWBWF	S00K000001	25	8.621E-01	3.59E-03	3.09E-06	<3.50E-03	<3.02E-06	n/a	n/a	98.4	<3.18E-03	<3.18E-06	n/a	93.9	3.37E-03	2.91E-06	2.91E-06	6.9

Notes: The detection limit and relative percent counting error are based on the sample results.

"Final" refers to the result as it pertains to the original sample volume, calculated by multiplying the digestate results by the conversion factor and dividing this number by 1000 to convert uCi/L to uCi/mL.

Table 7. Analytical Results Corrected to Original Sample Volume: Uranium by Phosphorescence
K Basin Sand Filter Backwash Line
Campaign 25
Data are Corrected for Digestion Factors and Dilution Factors

Uranium by Phosphorescence
LA-925-009

SAMPLE IDENTIFICATION			SAMPLE RESULTS								QUALITY CONTROL DATA							
Customer Sample Number	Laboratory Sample Number	Campaign Number	Conversion Factor	Digestate Sample Result ug/L	Final Sample Result ug/mL	Digestate Duplicate Result ug/L	Final Duplicate Result ug/mL	Digestate Mean Result ug/L	Final Mean Result ug/mL	Standard % Recovery	Digestate Preparation Blank ug/L	Final Preparation Blank ug/mL	Precision of Duplicate RPD	Accuracy of Spike % Recovery	Digestate Detection Limit ug/L	Final Detection Limit ug/mL	Estimated Quantitation Limit uCi/mL	Relative Percent Uncertainty
023KWBMF	S00K000001	25	8.621E-01	3.25E-03	2.80E-06	2.93E-03	2.53E-06	3.09E-03	2.66E-06	89.2	<1.88E-03	<1.88E-06	10.4	99.4	1.88E-03	1.62E-06	1.62E-05	2.1

Notes: The detection limit and relative percent uncertainty are based on the sample results.
 "Final" refers to the result as it pertains to the original sample volume, calculated by multiplying the digestate results by the conversion factor and dividing by 1000 to convert uCi/L to uCi/mL.

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Attachment 1. Sample Processing Scheme for K-E Basin SFBWL Sludge per LA-505-162

HNF-1693 REV. 0

9.1.2.1 Laboref: 900X000001

9.1.2.2 Estimated Vol in ml: 250

9.1.2.3 Dose Rate, w/o in ml/hr: <0.05

9.1.2.4 Dose Rate, w/o in ml/hr: <0.05

9.1.4 Gross wt in grams: 319.558

Original Sample

Steps 9.1.1
↓
9.1.4

Steps 9.1.5
↓
9.1.6

← Make mark at the water level

Quantitative Transfer of
Sludge with wash water

Empty Bottle

9.1.7 Tare wt in grams: n/a

Step 9.1.7

Step 9.1.8

Heat to dryness

Steps 9.2.1
↓
9.2.3
9.2.9
9.2.10

9.2.10 Gross wt 1 in grams: 108.195

Dry for 2 hrs

2nd & 3rd dryings

Steps 9.2.11
↓
9.2.15

9.2.12 Gross wt 2 in grams: 216.884

9.2.13.1 Average net wt in grams: 0.053

9.2.14 Gross wt 3 in grams: n/a

9.2.15 Net wt in grams: n/a

Split excess dried sludge

Amount <10g

Step 9.2.17

Digest, Cool & Settle

Steps 9.2.19
↓
9.2.22

9.2.16.6 Gross wt in grams: n/a

9.2.16.7 Net wt in grams: n/a

9.2.17 Net wt in grams: n/a

Amount exceeding 10g

Step 9.2.16

9.2.16.2 Tare wt in grams: n/a

9.2.16.4 Gross wt in grams: n/a

9.2.16.5 Net wt in grams: n/a

Attachment 1. Sample Processing Scheme for K-E Basin SFBWL Sludge per LA-505-162

HNF-1693 REV. 0

9.1.2.1 Labcoreg: 300K000001

9.1.2.2 Estimated Vol in ml: 250

9.1.2.3 Dose Rate, w/o in mrad/hr: <0.05

9.1.2.3 Dose Rate, w/o in mrad/hr: <0.05

9.1.4 Gross wt in grams: 312.558

Original Sample

Steps 9.1.1
↓
9.1.4

Steps 9.1.5
↓
9.1.6

← Make mark at the water level

Quantitative Transfer of Sludge with wash water

Empty Bottle

Step 9.1.7
↓
Step 9.1.8
↓
Steps 9.2.1
↓
9.2.3
↓
9.2.9
↓
9.2.10

9.1.7 Tare wt in grams: n/a

Heat to dryness

9.2.10 Gross wt 1 in grams: 216.888

Dry for 2 hrs
2nd & 3rd dryings

9.2.12 Gross wt 2 in grams: 216.884

9.2.13.1 Average net wt in grams: 0.059

9.2.14 Gross wt 3 in grams: n/a

9.2.15 Net wt in grams: n/a

Split excess dried sludge

Amount <10g

Step 9.2.17
↓
Steps 9.2.19
↓
9.2.22

9.2.16.6 Gross wt in grams: n/a

9.2.16.7 Net wt in grams: n/a

9.2.17 Net wt in grams: n/a

Amount exceeding 10g

Step 9.2.18
↓
Steps 9.2.20
↓
9.2.22

9.2.18.2 Tare wt in grams: n/a

9.2.18.4 Gross wt in grams: n/a

9.2.18.5 Net wt in grams: n/a

9.2.5 Tare wt in grams: 32.911

9.2.8 Gross wt in grams: 321.727

DISTRIBUTION SHEET

To Distribution	From Production Planning & Control	Page 1 of 1
		Date: 03/21/00

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