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5TH # 4

# ENGINEERING DATA TRANSMITTAL



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| K Basin, SFBWL/Waste Management/PPC/WML | Franciska H. Steen | N/A |
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**15. DATA TRANSMITTED**

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**16. KEY**

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# K Basin Sandfilter Backwash Line Characterization Project, Analytical Results for Campaign 20

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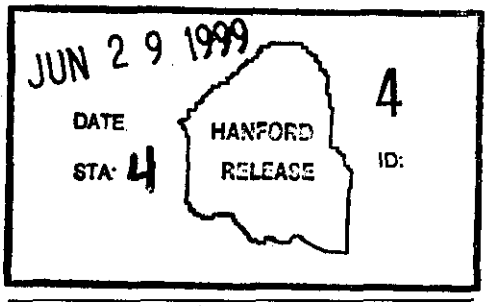


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WASTE MANAGEMENT LABORATORY

# K BASIN SANDFILTER BACKWASH LINE CHARACTERIZATION PROJECT, ANALTYICAL RESULTS FOR CAMPAIGN 20

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

by

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HNF-1673, REV. 0

# WASTE MANAGEMENT LABORATORY

# K BASIN SANDFILTER BACKWASH LINE CHARACTERIZATION PROJECT, ANALYTICAL RESULTS FOR CAMPAIGN 20

## Summary

Sample 112KWBMF was taken from the K West Sandfilter Backwash Pit on June 1, 1999, and received by 222-S Laboratory on June 2, 1999. Analyses were performed on sample 112KWBMF 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 112KWBMF consisted of approximately 280 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 (MRAD/HR) |
|---|---|---|---|---|---|---|
| 112KWBMF | S99K000019 | 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 112KWBMF) illustrates the digestion process. Furthermore, this reference relates K West Basin identification numbers to their corresponding 222-S Laboratory Information Management System sample numbers.

Sample 112KWBMF was entered into the 222-S Laboratory Information Management System (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 4A, 4B, 4C, 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 (S99K000019). 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 $\mu$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, precision, and accuracy were all within acceptable limits.

## 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-0 |
| U | LA-505-162 Rev. C-0 | LA-925-009 Rev. B-0 |

## 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-0)

| Step | Labcore Name | Parameter Description | Units | Datum |
|---|---|---|---|---|
| 9.1.2.1 | | Labcore Sample Number | n/a | S99K000019 |
| 9.1.2.2 | ESTVOL01 | Estimated total volume of sample | mL | 275.8 |
| 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 | 309.843 |
| 9.1.7 | TAREWT01 | Tare weight of PTFE drying/digesting vessel | grams | 168.187 |
| 9.2.5 | TAREWT02 | Tare weight of empty dried sample bottle | grams | 33.5309 |
| 9.2.8 | REFBTLWT | Weight of bottle refilled to initial liquid level | grams | 308.742 |
| 9.2.10 | DRYWT-01 | Gross weight of drying vessel, 1st drying | grams | 168.194 |
| 9.2.12 | DRYWT-02 | Gross weight of drying vessel, 2nd drying | grams | 168.195 |
| 9.2.13.1 | AVENETWT | Average of net weight of dried sludge | grams | 0.0075 |
| 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 | 0.0075 |
| 9.2.16.2 | TAREWT03 | Tare weight of bottle for sludge storage | grams | 0.0000 |
| 9.2.16.4 | GROSSWT2 | Gross weight of excess dry sludge + storage container | grams | 0.0000 |
| 9.2.16.5 | NETWT-02 | Net weight of excess dried sludge | grams | 0.0000 |
| 9.2.16.6 | GROSSWT3 | Gross weight of remaining dried sludge to be digested plus drying vessel | grams | 168.195 |
| 9.2.16.7 | NETWT-03 | Net weight of remaining dried sludge to be digested | grams | 0.0075 |
| 9.2.17 | NETWT-04 | Net weight of dried sludge to be digested | grams | 0.0075 |
| 8.2.31.3 | VOLDIG01 | Volume of diluted digestate (same as volume of volumetric flask) | mL | 100 |
| 9.2.31.5 | KDIG-01 | Digestion Factor | | 0.3612 |
| 9.2.35 | GROSSWT4 | Gross weight of dry digesting vessel plus residue | grams | 168.195 |
| 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 20

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 | Column 9 * |
|---|---|---|---|---|---|---|---|---|
| Customer Sample Number | Labcore Parent Sample Number | Sample Bottle Gross Weight grams | Bottle Tare Weight grams | Density Factor | Initial Sample Volume (converted by density) milliliters | Weight of Digested Sludge grams | Volume of Digestate (Vol flask volume) milliliters | Digestion Factor Volume (mL) and weight (g) |
| *112KWBMF* | *S99K0000019* | *309.843* | *33.5309* | *0.998* | *276.866* | 0.0075 | 100.0 | 3.612E-01 |

Column 3. Derived from step 8.2.8 of LA-505-162, Rev. C-0.
Column 4. Derived from step 8.2.5 of LA-505-162, Rev. C-0.
Column 5. Density of reagent grade water at room temperature.
Column 6. Calculation: (column 3 - column 4) ÷ column 5 .
Column 7. Derived from step 8.2.17 of LA-505-162, Rev. C-0.
Column 8. Derived from step 8.2.31.3 of LA-505-162, Rev. C-0.
Column 9. Calculation: (column 8 / column 6). Digestion factor to correct to total volume and weight fo 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 20
**Digestate Results Not Corrected for Digestion Factors or 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 | 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 % |
| 112KWBMF | S99K000019 | 20 | <3.83E-03 | <3.71E-03 | <3.77E-03 | N/A | <3.37E-03 | N/A | N/A | 3.37E-03 | 7.8 |

## Table 4B. Analytical Results for Digestates
## K Basin Sand Filter Backwash Line
## Campaign 20
**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 % |
| 112KWBMF | S99K000019 | 20 | 8.07E-03 | 8.34E-03 | 8.21E-03 | 100.8 | <3.37E-03 | 3.3 | 94.5 | 3.83E-03 | 4.9 |

## Table 4C. Analytical Results for Digestates
## K Basin Sand Filter Backwash Line
## Campaign 20
**Digestate Results Not Corrected for Digestion Factors or Dilution Factors**

### 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 |
| 112KWBMF | S99K000019 | 20 | <3.70E+00 | <3.70E+00 | <3.70E+00 | 92.6 | <3.70E+0 | N/A | 98.4 | 3.70E+00 | N/A |

**Table 5. Analytical Results Corrected to Original Sample Volume: Pu-238 by TRU-SPEC Resin**
**K Basin Sand Filter Backwash Line**
**Campaign 20**
**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 |
| 112KWBMF | S99K000019 | 20 | 3.61E-01 | <3.83E-03 | <1.38E-06 | <3.71E-03 | <1.34E-06 | <3.77E-03 | <1.36E-06 | <3.37E-03 | <3.37E-03 | N/A | 3.37E-03 | 1.22E-06 | 1.22E-05 | 7.8 |

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 20**
**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 |
| 112KWBMF | S99K000019 | 20 | 3.612E-01 | 8.07E-03 | 2.91E-06 | 8.34E-03 | 3.01E-06 | 8.21E-03 | 2.96E-06 | 100.8 | <3.37E-03 | <3.37E-06 | 3.3 | 94.5 | 3.83E-03 | 1.38E-06 | 1.38E-05 | 4.9 |

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.

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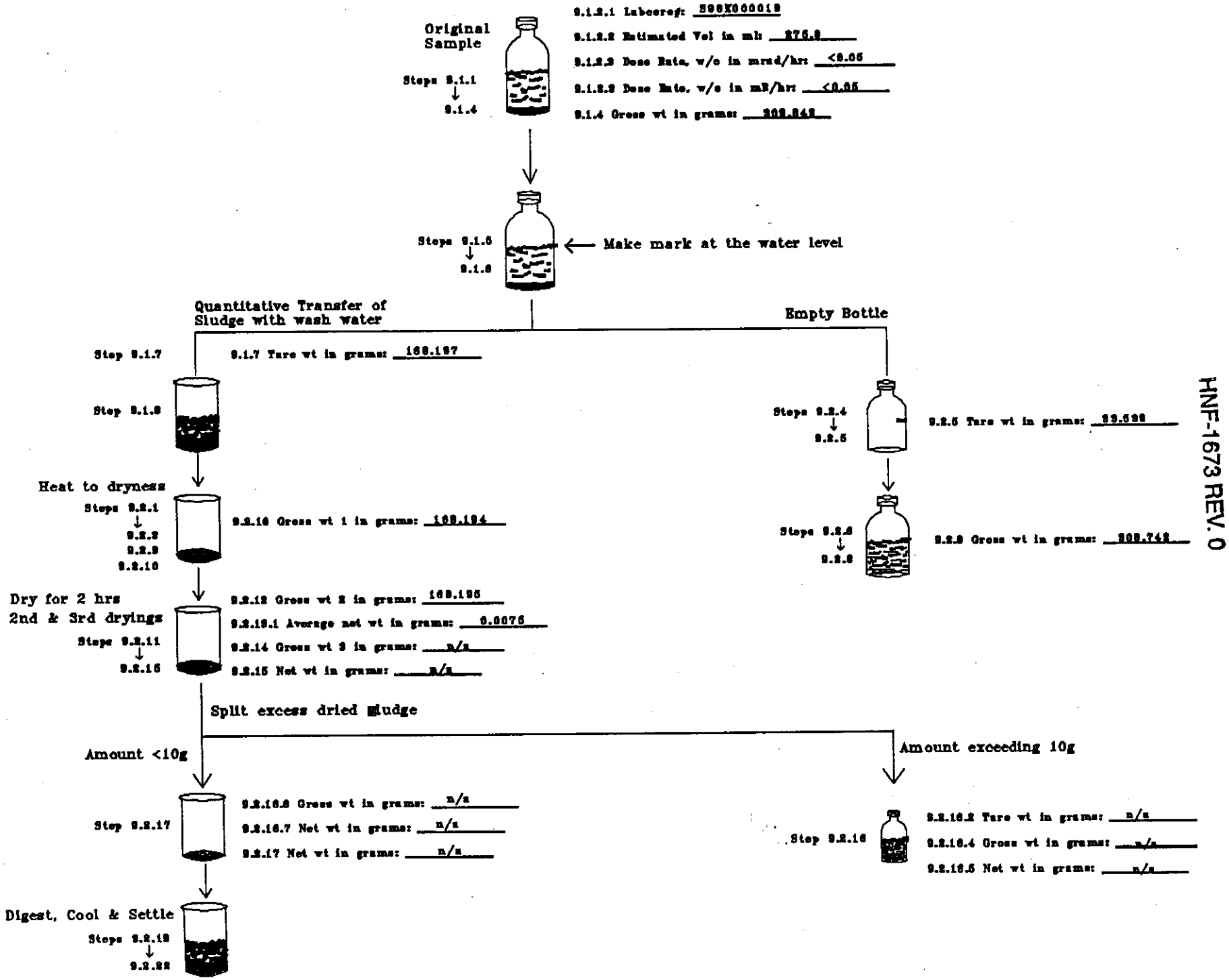
**Table 7. Analytical Results Corrected to Original Sample Volume: Uranium by Phosphorescence**
**K Basin Sand Filter Backwash Line**
**Campaign 20**
**Data are Corrected for Digestion Factors and Dilution Factors**

**Uranium by Phosphorescence**
**LA-925-009**

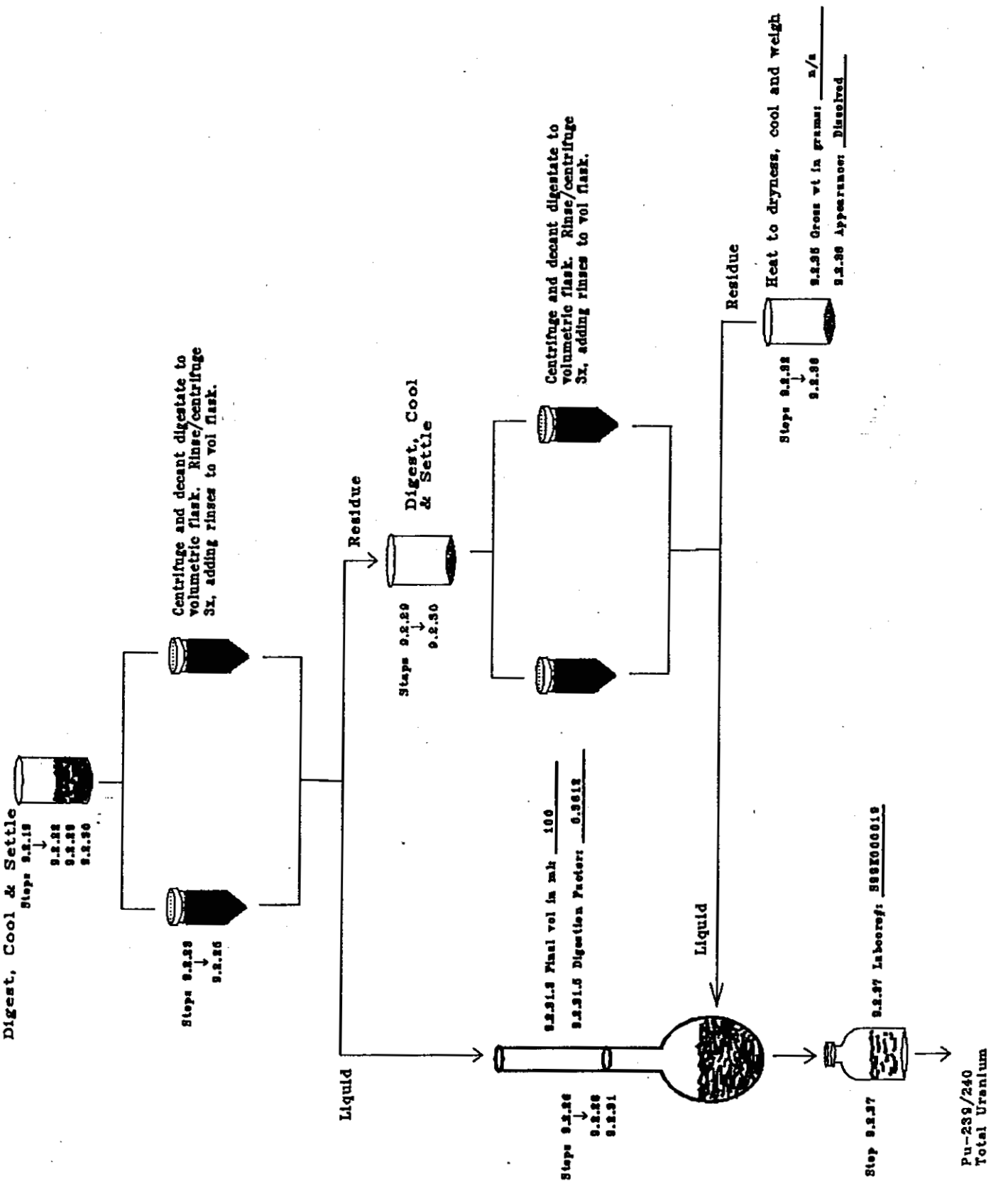
| SAMPLE IDENTIFICATION | | | SAMPLE RESULTS | | | | | | | QUALITY CONTROL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Customer Sample Number | Laboratory Sample Number | Campaign Number | Conversion Factor | Digestate Sample Result ug/L | Final 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 |
| 112KWBMF | S99K000019 | 20 | 3.61E-01 | <3.70E+00 | <1.34E-03 | <3.70E+00 | <1.34E-03 | <3.70E+00 | <1.34E-03 | 92.6 | <3.70E+00 | <3.70E-03 | N/A | 98.4 | 3.70E+00 | 1.34E-03 | 1.34E-02 | N/A |

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..

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



Sample Processing Scheme for K-E Basin SFBWL Sludge per LA-505-162, continued



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