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DATA COMPILATION REPORT FOR K WEST BASIN FUEL
STORAGE CANISTER LIQUID SAMPLES

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Page 1 of 1

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DATA COMPILATION REPORT: K WEST BASIN FUEL STORAGE CANISTER LIQUID SAMPLES

D. J. Trimble

Westinghouse Hanford Co., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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Abstract: Sample analysis data from the 222-S Laboratory are reported. The data are for liquid samples taken from spent fuel storage canisters in the 105 K West Basin during March 1995. An analysis and data report from the Special Analytical Studies group of Westinghouse Hanford Company regarding these samples is also included. Data analysis is not included herein.

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	APPENDIX B PAGES I THROUGH IV AND 1 THROUGH 53 OF WHC-SD-WM-SP-138, REV. 0, "ANALYSIS OF K WEST BASIN CANISTER LIQUID SAMPLES," G. L. MILLER, 1995, WESTINGHOUSE HANFORD COMPANY, RICHLAND, WASHINGTON	70

DATA COMPILATION REPORT: K WEST BASIN FUEL STORAGE CANISTER LIQUID SAMPLES**1.0 INTRODUCTION**

Liquid and gas samples were taken from ten fuel storage canisters in the K West Basin in March 1995. The samples were taken in support of the fuel characterization program and in accordance with the sampling and analysis plan (Harris 1995, SAP). The samples were analyzed for radionuclides, transuranic elements, corrosion inhibitor chemicals, and gas species. Samples analyses were performed in a mobile laboratory setting at the K West Basin as well as at the 222-S Laboratory and the 325 Building Laboratory. A description of the sampling process was previously reported with analysis data from the mobile laboratory and the 325 Building (Trimble 1995a). This report documents sample analysis descriptions and data from the 222-S Laboratory. A report of the mobile laboratory analyses by the Westinghouse Hanford Company Special Analytical Studies (SAS) group is also included.

A partial analysis of the gas and liquid data has been documented (Trimble 1995b). A more complete analysis including the 222-S Laboratory data will follow.

2.0 SAMPLE ANALYSIS DATA

A report of the mobile laboratory analysis methods and data by SAS (Riedel 1995) is attached in Appendix A. A report of the 222-S Laboratory analysis methods and data has been issued (Miller 1995). The narrative and sample data summary portions of this report are included in Appendix B.

Summaries of the 222-S Laboratory analysis data are provided in Tables 1 and 2. Canister 0000 was an empty canister containing only deionized water from which "blank" samples were obtained.

A summary of the mobile laboratory and gas analysis data previously reported (Trimble 1995a) is provided for reference (Table 3). Table 3 does not include data from obviously bad samples.

The net weights of the samples were used to calculate Cs-137 activity per gram of sample in Table 3. In (Trimble 1995a), the specific activity was calculated per gram of net sample weight (NSW). NSW was defined as net weight minus 1 gram, to account for non-canister water taken into the sample.

Table 1. K West Canister Liquid Sample Data Results from 222-S Laboratory. (Sorted by Sample Number)

[illegible]

NOTES: (1) Net weight (NSW+1 from Trimble 1985a)
(2) Analyte by gamma energy analyte
(3) Analyte by wet extraction
ND = no data
> = below indicated detection limit

Table 2. K West Canister Liquid Sample Analysis Results
from 222-S Laboratory. (Sorted by Canister)

RADIONUCLIDES				TRANSURANIC				INHIBITOR			
Canister	Sample	Activity	Concentration	Canister	Sample	Activity	Concentration	Canister	Sample	Activity	Concentration
119	000143	10.7	ND	0.000401	0.000018	<3.7e-4	<0.0013	ND	<0.0027	<30	<1
120	000144	11.5	ND	0.0209	ND	ND	ND	ND	ND	<30	0.91
121	000145	13.9	ND	1.23	0.0166	0.943	<0.0007	ND	<0.0024	<30	2.14
122	000146	10.2	10.5	1.16	ND	ND	ND	ND	ND	<30	2.6
123	000147	5.0	ND	ND	ND	ND	ND	ND	ND	<30	0.772
124	000148	15.9	14.5	1.13	ND	ND	ND	ND	ND	<30	<16.8
125	000149	15.0	ND	0.000258	ND	ND	ND	ND	ND	<30	<1
126	000150	15.0	ND	0.365	0.00617	1.39	<0.0031	ND	<0.0024	<30	<1
127	000151	16.1	15.5	0.78	ND	ND	ND	ND	ND	60.93	<16.8
128	000152	11.8	21.5	0.172	0.0214	4.40	<2.2e-4	<2.2e-4	<0.0024	<30	<16.8
129	000153	16.3	0.409	0.314	ND	ND	ND	ND	ND	43.49	<16.8
130	000154	16.3	33.4	2.58	0.0237	1.57	<3e-4	<3e-4	<0.0034	<30	<16.8
131	000155	16.0	1.28	0.509	ND	ND	ND	ND	ND	35.00	<16.8
132	000156	14.9	2.89	1.08	ND	ND	ND	ND	ND	57.22	<16.8
133	000157	14.7	13.7	1.08	ND	ND	ND	ND	ND	34.81	<2
134	000158	15.9	14.3	1.51	ND	ND	ND	ND	ND	34.81	<2
135	000159	16.1	12.0	1.09	ND	ND	ND	ND	ND	<30	<2
136	000160	9.5	ND	0.844	ND	ND	ND	ND	ND	<30	3.09
137	000161	4.9	ND	ND	ND	ND	ND	ND	ND	<30	<1
138	000162	16.0	8.01	1.13	ND	ND	ND	ND	ND	<30	<2
139	000163	16.0	15.7	0.31	0.0172	0.336	<0.0013	<0.0013	<0.003	31.9	<16.8
140	000164	13.3	18.2	0.582	ND	ND	ND	ND	ND	38.17	<16.8
141	000165	15.4	13.4	0.422	0.0198	0.792	<7.51e-4	0.00084	<0.0025	35.23	<16.8
142	000166	5.9	ND	ND	ND	ND	ND	ND	ND	ND	ND
143	000167	15.6	29.9	0.314	0.0314	1.51	<3e-4	<3e-4	<0.0039	82.6	<16.8
144	000168	17.1	ND	0.479	ND	ND	ND	ND	ND	<30	3.3
145	000169	17.1	ND	0.479	ND	ND	ND	ND	ND	<30	3.3

NOTES: (1) Sample net weight (NSW - 1 g from Trimble 1900a)

(2) Analysis by gamma energy analysis

(3) Analysis by wet extraction

ND = no data

< = below indicated detection limit

Table 3. GEA and Gas Analysis Data for K West Basin Canister Samples.

SAMPLE FC--	CANISTER NO.-LID	VALUE (1)	FLOODED BARREL	net wt. g	Cs-137 uCi	Cs-137 uCi/g.(2)	Cs-134 uCi	Kr-85 uCi	GAS %H2
B02	1990-M	C	NO	11.54	79	6.85	0.506		
B03	1990-M	S	NO	0.73				53	72.0
B10	1990-M	C	YES	13.95	183.0	13.12	1.2		
B19(4)	1990-M	C	YES	10.22	130	12.72	0.84		
B13(3)	1990-U	S	NO	1.77				<.05	0.0
B18(4)	1990-U	C	YES	5.04	4.3	0.86	0.026		
B33	4990-M	C	YES	15.90	270	16.96	1.5		
	4990-U			1.00	reliable	data			
B04	4990-M	C	NO	0.97				27	65.7
B14(4)	4990-M	C	YES	14.98	0.016	0.001	0.00013		
B05(3)	4990-U	C	NO	4.57	2.9	0.63	0.016	<.35	7.7
B08(3)	4990-U	S	NO	0.63				3.8	72.7
B16(4)	4990-U	C	YES	15.01	95	6.33	0.53		
B33	4990-M	S	NO	2.00				19	86.4
B39	4990-M	C	YES	16.09	263	16.35	1.48		
B34	4990-U	S	NO	2.16				25	96.6
B40	4990-U	C	YES	11.81	302	25.57	1.40		
B29	4970-M	C	YES	16.23	7.5	0.46	0.039		
B30	4970-U	C	YES	15.61	600	37.95	3		
B25	4432-M	C	YES	15.03	20	1.33	0.11		
B26	4432-U	C	YES	14.91	45	3.02	0.27		
B31	4666-M	S	NO	1.03				45	94.5
B41	4666-M	C	YES	14.74	230	15.60	1.3		
B43	4666-M	C	YES	15.92	250	15.70	1.4		
B42	4666-U	C	YES	16.07	190	11.82	1.3		
B16(4)	4673-M	C	YES	9.45	47	4.97	0.31		
B17(4)	4673-U	C	YES	4.68	34	6.97	0.19		
B37	4676-M	C	YES	15.00	140	8.75	1		
B33	4676-U	C	YES	15.90	270	16.90	1.5		
B44	4676-U	S	YES	15.27	270	20.35	1.5		
B46	4676-U	C	YES	15.37	330	21.47	1.9		
B54	4696-M	C	YES	15.57	520	33.40	3		
B23	4696-U	C	YES	17.13	16.35	0.95	0.12		

NOTES: (1)C = CENTER, S = SIDE VALVE
(2)Activity per net wt.
(3)Low pressure gas sample
(4)Suspect or incomplete liquid sample

3.0 REFERENCES

- Harris, R. A., 1995, "Sampling and Analysis Plan for Canister Liquid and Gas Sampling at 105-K West Fuel Storage Basin," WHC-SD-SNF-PLN-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Miller, G. L., 1995, "Analysis of K West Basin Canister Liquid Samples," WHC-SD-WM-DP-138, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Riedel, E. F., 1995, "Radionuclide Characterization of 105-K West Spent Fuel Storage Canister Samples," Special Analytical Studies, OM631-95-0717-1, Westinghouse Hanford Company, Richland, Washington.
- Trimble, D. J., 1995a, "Data Compilation Report: Gas and Liquid Samples from K West Basin Fuel Storage Canisters," WHC-SD-SNF-DP-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Trimble, D. J., 1995b, "K West Basin Liquid/Gas Sample Data Analysis," WHC-SD-SNF-ANAL-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

A P P E N D I X A

LETTER, E. F. RIEDEL TO D. J. TRIMBLE,
"RADIONUCLIDE CHARACTERIZATION OF 105-K WEST SPENT FUEL STORAGE
CANISTER SAMPLES," SPECIAL ANALYTICAL STUDIES, JULY 17, 1995,
OM631-95-0717-1, WESTINGHOUSE HANFORD COMPANY, RICHLAND, WASHINGTON

**Westinghouse
Hanford Company****Internal
Memo**

From: Special Analytical Studies OM631-95-0717-1
Phone: 373-2190 S3-90
Date: July 17, 1995
Subject: RADIONUCLIDE CHARACTERIZATION OF 105-KW SPENT FUEL STORAGE
CANISTER SAMPLES

To: D. J. Trimble L5-01

cc: G. R. Blewett S3-90
R. A. Harris L5-01
L. L. Lockrem S3-90
R. P. Omberg R3-85
EFR:LLL File/LB

Attached is the report "Radionuclide Characterization of 105-KW Spent Fuel Storage Canister Samples," requested in work order number E47663.

Special Analytical Studies look forward to performing future work for your group.

Fe-

Dr. E. F. Riedel
Principal Scientist

mai

Attachment

ATTACHMENT

**RADIONUCLIDE CHARACTERIZATION OF 105-KW
SPENT FUEL STORAGE CANISTER SAMPLES**

Prepared by Special Analytical Studies
Hanford Technical Services

July 17, 1995

Consisting of 54 pages,
including cover sheet

SUMMARY

Gamma-ray energy measurements have been made on a number of samples taken from the underwater spent fuel storage canisters in the 100-KW Basin. The measurements were undertaken to characterize the nature of the radioisotopes present in the aqueous samples. In addition, gas samples were analyzed for the presence of krypton-85. The data show that the most common isotope found in the canisters is ^{137}Cs . Krypton-85 was found to be present in some of the gas samples. Specific results are presented and discussed in the main body of this report.

1.0 BACKGROUND

The 105-KW Fuel Storage Basins were constructed as a part of the 100-K Production Reactor project between 1952 and 1954. The KW Basin is used for the storage of encapsulated spent fuel primarily from the 100-N reactor. At the east side of the basin pool is the Weasel Pit where the fuel canisters were sampled. Each canister consists of two barrels, and each barrel contains up to seven N-Reactor fuel assemblies. Canisters are of two designs, the MK I and the MK II.

Fuel was loaded into the canisters at 100-N, the lid installed, potassium nitrite added, and nitrogen gas added before the canisters were sealed. Currently, canisters are moved to the Weasel Pit before sampling. All sampling is being performed underwater. Separate liquid and gas samples are taken from different ports on each canister. All work other than the sample analyses was performed by Operations Personnel. Samples were analyzed by Special Analytical Studies (SAS) personnel.

Normal radiation work practices were used to meet Westinghouse Hanford Company (WHC) requirements. All sampling requirements were directed by the letter of instruction (LOI) (Reference 1) from Spent Nuclear Fuel Evaluation (SNFE) and the Sampling and Analysis Plan (SAP) (Reference 2). Work was performed under work order #E47663 issued by SNFE to SAS.

2.0 INSTRUMENTATION AND MEASUREMENT METHODOLOGY

The gamma-ray spectroscopy system consisted of a detector and a nuclear spectroscopy system. The detector used was a shielded 30% P-type hyper pure intrinsic germanium (HPGe) detector. Bias power was supplied to the detector through the use of an NOMAD-Plus¹ portable spectroscopic system. The NOMAD-Plus unit also contained the signal amplifier that was used, as well as the multichannel analyzer (MCA). The MCA converts analog input signals from the amplifier to digital output signals to form a spectrum whose photopeaks and other counting distributions correspond to signals of specific gamma-ray energies recorded by the detector. Final results; the gamma energy analysis (GEA), were obtained using a combination of the software packages MAESTRO² and OSQ³ along with EXCEL⁴.

An integrated spectrometer, the NOMAD-Plus portable spectroscopic system with a 486-66 computer was used for data collection and data reduction. An IT Hanford-supplied batch file was used to

automate and speed data reduction and reporting. WINBATCH⁵ software was used for this purpose. The program MAESTRO was used for all data collection. The program OSQ* was used for all data reduction. Final spectral results for each sample were tabulated and reported in the form of an EXCEL spreadsheet immediately after each sample was analyzed.

A set of standard geometries were established for data collection. Because high activity samples were a possibility, parameters were established for lead shielding. Results were modeled using the program Microshield, and compared with actual laboratory measurements for parameters such as lead shielding, distance, and the steel sleeve. Results of these comparisons proved to be within the standard errors of the measurements.

2.1 GAMMA-RAY ASSAY

All data were collected using an detector approximately 2 inches in diameter. The detector was cooled with liquid nitrogen, and was contained in a PopTop⁶ capsule with an all-attitude cryostat. The detector was shielded around its sides by wrapping approximately 2 inches of lead sheeting with an internal single turn each of copper and cadmium sheeting. The detector was uncollimated. Lead bricks were placed around the detector to further shield it from as much background radiation as possible. 30% hyper-pure germanium

2.2 CALIBRATION METHODOLOGY

Aqueous radiological standards produced by Amersham Corporation were measured, and the spectral data collected were used to determine the efficiency of the detector and counting electronics used for the KW-Basin measurements. Three different standards were measured, each of which contained several different isotopes. Thirteen separate spectral photopeak energy values were obtained from these isotopes. The total energy range of these isotopes were representative of the total energy range of the isotopes actually measured at KW Basin. All results from these data agreed within a total error of less than 4%. All these data were fitted to a fifth order log-log polynomial equation by the method of least squares. The efficiency file created from the summation of these spectral measurements was used in the calculation of total activity for all sample tubes measured at KW-Basin. The standards were measured at a distance of eight inches from the detector.

Two other aqueous test tube standards were prepared by the 222-SA Standards Laboratory for calibration purposes. Both tubes contained aliquots of the certified ¹³⁷Cs standard solution. One tube was housed in a stainless steel sleeve (prototypic of the sample tubes used for actual sampling) and was supplied by SNFE. The other matching glass test tube had no outer stainless steel sleeve. Both test tubes were measured individually, at the same distance from the detector. The difference in ¹³⁷Cs values obtained for the two standards yielded the attenuation value caused by the stainless steel sleeving. This value was 9%, and was factored into all measurements at the

basin to negate the effects of sample attenuation caused by the stainless steel sleeving. This value also agreed with Microshield⁷ computer modeling that was performed as a cross-check for this value.

The ¹³⁷Cs test tube standards were also measured at various distances away from the detector to determine the correct distance-to-count-rate correction factor that was used for samples that were too active or inactive to be properly measured at the eight inch initial calibration distance. These correction factors were applied as appropriate to normalize all reported results back to the initial eight inch calibration distance. Samples were counted at one of the following distances from the detector: 2-, 4-, 8-, 16-, or 48-inches. The percent correction factors are included in all the results shown in Table 1 and on the data sheets contained in Appendix A.

Varying amounts of lead attenuation was placed between the detector and a ¹³⁷Cs source to determine attenuation values before beginning basin sample measurements. These attenuation values were to be taken into account in the event that samples supplied to the MLT that were too active to be properly measured at the 48-inch maximum standoff distance without using lead attenuation. Microshield calculations also agreed exactly with these determined attenuation values. In actuality, no lead attenuation was required to make any of the necessary measurements throughout the project.

A filter paper check-source was counted on the end cap of the detector at least once a day to measure any possible shift in detector efficiency. Measurement of the check-source was also done in conjunction with all calibration measurements for the same reason. Measured values throughout the project agreed very closely and showed no significant changes in detector efficiency (see Table 2).

2.3 BALANCE

Sample tubes were weighed on a top loading balance capable of weighing to the nearest 0.01 gram. All test tubes were first tared with their associated plastic sleeves and tie straps, and then, weighed with the sample when delivered by K Basin operations personnel. Calibration of the balance was checked daily using a set of calibrated standardized weights.

All samples weighed between 100 and 120 grams. The applied calibration range was from 100 grams to 115 grams in 5 gram intervals. Calibration of the balance was normally checked in the morning, but never less than once a day. The error never exceeded 0.02 grams. Results were reported to the nearest 0.01 gram. By direction from SNFE, the corrected net weight is the net weight minus 1.00 gram.

DATA RESULTS FROM SAMPLE TUBE MEASUREMENTS

ALL ISOTOPIC RESULTS LISTED ARE IN UNITS OF MC/CORRECTED NET SAMPLE MASS
 ALL RESULTS CORRECTED FOR 9% ATTENUATION OF STAINLESS STEEL SAMPLE HOUSING
 RESULTS THAT WERE LESS THAN DETECTABLE ARE LISTED AS < D

SAMPLE I.D.	CORRECTED NET WEIGHT (grams)	DISTANCE CORRECTION FACTOR (%)	Kr-85 (MCV/Total)	Cs-134 (MCV/Total)	Cs-137 (MCV/Total)
FCB01	11.36	12.5	< D	< D	< D
FCB01a	10.54	340	< D	5.0E-04	7.9E-02
FCB04G	0	12.5	5.3E-02	1.0E-07	1.7E-05
FCB04G	0	12.5	2.7E-02	1.2E-07	< D
FCB04LO	3.57	31.2	< D	1.6E-05	2.9E-03
FCB04G	0	12.5	3.8E-03	7.9E-07	1.5E-04
FCB07LO	9.71	12.5	< D	< D	< D
FCB06G	0	12.5	< D	3.6E-07	6.2E-05
FCB06G	0	12.5	< D	7.1E-07	1.3E-04
FCB10LO	12.99	340	< D	1.2E-03	1.848E-01
FCB10LOA	12.99	340	< D	1.2E-03	1.820E-01
FCB10LOB	12.99	340	< D	1.2E-03	1.823E-01
FCB12GAS	0.45	12.5	< D	< D	< D
FCB12GAS	0.77	12.5	< D	3.4E-07	6.1E-05
FCB14LO	13.96	12.5	< D	1.3E-07	1.6E-05
FCB14LO	14.01	340	< D	5.3E-04	9.5E-02
FCB16LO	8.45	340	< D	3.1E-04	4.7E-02
FCB17LO	3.88	100	< D	1.9E-04	3.4E-02
FCB18LO	4.04	100	< D	2.6E-05	4.3E-03
FCB19LO	9.22	340	< D	8.4E-04	1.3E-01
FCB20LO	4.83	12.5	< D	1.5E-06	2.6E-04
FCB21INT	4.76	100	< D	3.9E-05	8.0E-03
FCB21INT	1.55	12.5	< D	3.3E-06	6.6E-04
FCB23LO	16.13	100	< D	1.2E-04	1.635E-02
FCB23LOA	16.13	100	< D	8.1E-05	1.612E-02
FCB23LOB	16.13	100	< D	9.8E-05	1.633E-02
FCB24LO	14.57	3070	< D	3.0E-03	5.2E-01
FCB25LO	14.08	340	< D	1.1E-04	2.0E-02
FCB26LO	13.91	340	< D	2.7E-04	4.5E-02
FCB27LO	8.78	12.5	< D	5.4E-07	6.9E-05
FCB28LO	8.41	12.5	< D	< D	4.7E-05
FCB29LO	15.26	100	< D	3.9E-05	7.5E-03
FCB30LO	14.81	3070	< D	3.0E-03	6.0E-01
FCB31G	0	12.5	4.5E-02	< D	4.2E-05
FCB32LO	14.17	12.5	< D	4.1E-07	8.1E-05
FCB33G	1	12.5	1.9E-02	8.4E-07	1.7E-04
FCB34G	1.16	12.5	2.5E-02	< D	7.2E-06
FCB35LO	14.9	3070	< D	1.5E-03	2.7E-01
FCB36GAS	1.01	12.5	< D	3.9E-06	6.3E-04
FCB37LO	15	3070	< D	1.0E-03	1.4E-01
FCB38LO	14.98	3070	< D	1.5E-03	2.7E-01
FCB39LO	15.09	3070	< D	1.4E-03	2.62E-01
FCB39XUF	15.09	3070	< D	1.5E-03	2.63E-01
FCB40LO	10.81	3070	< D	1.5E-03	3.010E-01
FCB40XUF	10.81	3070	< D	1.5E-03	3.027E-01
FCB41LO	13.74	3070	< D	1.3E-03	2.3E-01
FCB42LO	15.07	3070	< D	1.3E-03	1.9E-01
FCB43LO	14.92	3070	< D	1.4E-03	2.5E-01
FCB44LO	12.27	3070	< D	1.5E-03	2.7E-01
FCB45LO	14.57	3070	< D	1.9E-03	3.3E-01

Kr-85 Error (%)	Cs-134 Error (%)	Cs-137 Error (%)
N/A	N/A	N/A
N/A	6	3
7	60	9
7	46	N/A
N/A	8	7
9	17	10
N/A	N/A	N/A
N/A	26	10
N/A	20	10
N/A	8	7
N/A	8	7
N/A	8	7
N/A	N/A	N/A
N/A	23	9
N/A	50	7
N/A	8	7
N/A	11	7
N/A	8	7
N/A	9	7
N/A	9	7
N/A	12	7
N/A	11	7
N/A	14	7
N/A	25	7
N/A	12	7
N/A	11	7
N/A	31	7
N/A	19	7
N/A	11	7
N/A	30	7
N/A	N/A	7
N/A	12	7
N/A	11	7
7	N/A	8
N/A	25	7
7	19	7
7	N/A	8
N/A	10	7
N/A	9	7
N/A	12	7
N/A	10	7
N/A	11	7
N/A	11	7
N/A	11	7
N/A	15	7
N/A	11	7
N/A	11	7
N/A	11	7
N/A	11	7
N/A	10	7

Table 2. Quality Assurance Data from Daily QA Source Check.

ALL ISOTOPIC QA VALUES ARE EXPRESSED IN UNITS OF nCi/TOTAL SOURCE
 FILENAMES EXPRESS THE DATE ON WHICH THE RUN WAS MADE

QA FILENAME	Am-241	Cs-137	Co-60
QA021695.S0	2892	2674	1655
QA021795.S0	2857	2695	1632
QA022395.S0	3016	2701	1635
QA030395.S0	2846	2684	1631
QA30595.S0	2953	2684	1636
QA30795.S0	3058	2755	1618
QA30995.S0	2738	2695	1659
QA31395.S0	2759	2712	1633
QA31495.S0	3011	2783	1612
QA31595.S0	3068	2702	1585
QA31695.S0	3040	2741	1607
QA31695A.S0	2748	2711	1627
QA31795.S0	3023	2711	1603
QA31895.S0	2898	2688	1584
QA32095.S0	2838	2639	1613
QA32095A.S0	2855	2666	1618
QA32095B.S0	2863	2691	1614
QA32195A.S0	2785	2673	1593
QA32395.S0	3123	2714	1646
QA32495.S0	2970	2611	1574
QA32495B.S0	3092	2702	1640
QA32495C.S0	2922	2687	1618
QA32595.S0	2910	2578	1557
QA32695A.S0	2943	2580	1536
QA32795.S0	2977	2641	1555

SUMMARY

Maximum values	3123	2783	1659
Minimum values	2738	2578	1536
Average	2927	2685	1611
Standard deviation			

2.4 STANDARD GEOMETRIES

All samples were received in rubber stoppered test tubes that were jacketed with a stainless steel sleeve. The tubes were capable of holding slightly over 16 milliliters of sample solution. After basin operations filled the tubes with either solution or gas, they were double bagged in plastic sleeving and each bag was individually sealed.

For counting purposes inside the Special Analytical Studies-nondestructive analysis SAS-NDA truck, a holder was constructed for gripping the test tubes. This holder was used for both reproducibility and to hold the test tubes securely in an upright position for analyses. A slot existed in each of the stainless steel tube sleeves and this slot was always positioned so that it faced away from the detector during analysis.

Corrections for lead shielding were established using actual measurements and also using calculations. Lead thicknesses of 0.5-, 1-, and 2-inches were used. For this group of samples, no lead shielding was required for any measurements.

Standard distances of 2 inches, 8 inches, 16 inches and 48 inches were established for measurement of samples. All analyses were performed at one of these distances. The distance used was selected so as to minimize the counting dead time. Since none of the samples were too active to be counted at the maximum distance of 48 inches, no lead shielding was required to limit the dead time. The 8 inch distance was selected as the standard distance and all other measurements were corrected to this distance.

Correction for absorption of the steel was determined experimentally and this attenuation was verified by modeling using the program Microshield. The attenuation due to the sleeving was calculated to be 9%. All results were corrected for this factor.

All samples were centered in front of the detector face both horizontally and vertically. Allowances for differences in sample volumes were taken into account by centering sample tubes in front of the detector relative to the amount of sample present. A number of shims were made and used for this centering activity. A reference table of sample volume (weight) verses shim heights was constructed and used for all measurements.

3.0 RESULTS

The results obtained are summarized in Table 1 and presented in detail in Appendix A. Results are presented in the units of millicuries of activity per total sample (mCi/total). Errors are given at the two sigma level for all analytes found. The analyte list presented represent those commonly found around the Hanford Site. All spectra were examined to determine if any other analytes were present (none were). Corrected net sample weights (in grams) are also presented. Net sample weight is defined as gross tube weight with sample, minus tube weight without sample, minus one gram.

The individual report sheets also list the distance from the detector in inches with the factor used to correct that distance back to the standard distance of eight inches. The customer identification is also listed on the sheet. In Table 2, the sample identification is by the customer identification with a two or three letter adder that identifies whether the sample is liquid, gas, or duplicate. For example, FCB23 has three adders; namely LQ for liquid, LQA for duplicate recounting, and LQB for a third duplicate recount.

Check standard results are summarized in Table 2. This check standard contained americium, cesium, and cobalt. The quality assurance check is identified by a QA followed by the six number date (two numbers each for the month, day, and year). Since sometimes, more than one QA measurement was made on a given day, only one number was used for the month and a letter was added for differentiation.

Results showed that the tubes containing gas were usually active with krypton-85 while the liquid samples were usually active with ^{137}Cs , as was expected.

3.1 ERRORS

All errors are reported at the two sigma level. This means that the correct (or true) value should be within the reported limits 95.5% of the time.

The reported errors come from three sources. Two of these are mathematically calculated and the third is scientifically estimated, in other words, a scientific best guess.

The first source of error is derived from counting statistics. This number is the square root of the total peak counts (that is peak area plus background) plus the background counts. (Background is actually added in twice, but it is also measured twice.) Thus, this number is always dependent on the total number of counts observed in the photopeak.

The second source of error is associated with the least squares fit of the efficiency calibration. Data is collected on a number of standards and is fit using the least squares technique to a fifth order polynomial. This type of error is dependent on the photopeak energy, since this error is not a constant. In this case the error associated with the ^{137}Cs photopeak is 1.62% while that associated with the ^{85}Kr photopeak is 1.65%.

The third source of error is all the other uncertainties associated with the data collection activities. This error is estimated by the scientist, in other words it is a best scientific guess. In general the factors which contribute to this error include the following:

- Geometry--how repeatable is the measurement, due to factors such as positioning and distance.
- Reported uncertainties in the standards used for calibration.

- Errors associated with the sampling process.
- Estimate of the overall uncertainties in the reported nuclear properties such as the branching ratio and the actual energy of the gamma ray that is emitted. This information is available in the literature.

For this specific example, the principle contributions are from the geometric effects and the uncertainties in the standards used for calibration.

Errors one and two are calculated by the software. For these data measurements a value of 3% was used for the third type of error.

4.0 CONCLUSION

The techniques used in this project resulted in rapid presentation of analyte activities to SNFE at K-Basin. This methodology should be useful in similar future operations involving the fuel casks.

A number of the samples were analyzed by the 222-S Laboratory. Field results should be compared to the laboratory results.

From a data collecting perspective a few improvements can be made. The software was rather slow and often represented the largest portion of the time required to present the results to the client. This can be improved by replacing the WINBATCH driver with a program written in Visual Basic.⁸ The sample holder was also cumbersome and should be redesigned for easier operation.

Some of the samples were very low in activity and it is possible that basin liquid was collected rather than the desired material. If a radioactive tracer were added to a single container it would be possible to determine if the sampling device was working correctly. It is suggested that this be done for future operations. Measurement of this test container could be done every fifth or tenth measurement and would confirm that the sampler was working correctly.

We would like to acknowledge the help and assistance provided by Mr. Brian Keele. He developed the WINBATCH program and provided other invaluable assistance.

5.0 REFERENCES

1. LOI: INSTRUCTIONS FOR GAMMA ENERGY ANALYSIS OF K WEST BASIN CANISTER SAMPLES, D. J. Trimble, March 6, 1995.
2. SAP: "Sampling and Analysis Plan for Canister Liquid and Gas Sampling at 105-K West Fuel Storage Basin," WHC-SD-SNF-PLN-004, Rev 0, Westinghouse Hanford Company, Richland, Washington, Harris, R. A.
3. "Desk Instructions for KW-Basin On-site Sample Analysis", OM630-95-008.

APPENDIX A

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

115.61 = Sample Gross (g)

-103.05 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

11.56 = SAMPLE NET (g)

Customer ID Number: basin H₂O @ 2 inches

Laboratory ID Number: FCB01

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	1.4e-06	
K40	<	2.1e-06	
Co57	<	1.3e-06	
Co60	<	1.5e-07	
Kr85	<	3.5e-05	
RuRh106	<	1.4e-06	
Sb125	<	6.0e-07	
I129	<	3.5e-05	
Cs134	<	1.2e-07	
Cs137	<	2.7e-06	
Ce144	<	1.2e-06	
Eu152	<	3.6e-07	
Eu154	<	3.4e-07	
Eu155	<	7.0e-07	
Th32dau	<	3.3e-07	
U235	<	1.3e-06	
U238	<	1.6e-05	
U238dau	<	4.3e-07	
Np237	<	3.9e-07	
Pu239	<	2.2e-03	
Pu240	<	3.0e-02	
Am241	<	9.2e-07	

Activity (mCi) at

Errors and MDA reported at 2 sigma

3-14-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.00 = Sample Gross (g)
 -105.46 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 10.54 = SAMPLE NET (g)

Customer ID Number: 16 inch recount

Laboratory ID Number: FCB02AAA

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 7.5e-04	
K40	< 2.4e-04	
Co57	< 4.8e-04	
Co60	< 1.0e-05	
Kr85	< 1.8e-02	
RuRh106	< 4.8e-04	
Sb125	< 3.0e-04	
I129	< 1.5e-02	
Cs134	5.0e-04	6%
Cs137	7.9e-02	3%
Cs144	< 4.4e-04	
Eu152	< 2.8e-05	
Eu154	< 2.3e-05	
Eu155	< 2.3e-04	
Th32dau	< 1.4e-04	
U235	< 4.7e-04	
U238	< 1.0e-03	
U238dau	< 1.9e-04	
Np237	< 1.9e-04	
Pu239	< 7.9e-01	
Pu240	< 1.2e+01	
Am241	< 3.4e-04	

Errors and MDA reported at 2 sigma

3-15-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

106.50 = Sample Gross (g)

-105.77 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

-0.27 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/gas/2 inches

Laboratory ID Number: FCB03GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Ba7	<	2.6e-06	
K40	<	9.3e-07	
Co57	<	3.2e-06	
Co60		1.9e-07	43%
Co60		1.4e-07	40%
Weighted Av		1.6e-07	41%
Kr85		5.3e-02 +/-	7%
RuRh106	<	1.2e-06	
Sb125	<	8.7e-07	
I129	<	9.8e-05	
Cs134		1.0e-07	60%
Cs137		1.7e-05	9%
Ce144	<	3.1e-06	
Eu152	<	2.4e-07	
Eu154	<	1.7e-07	
Eu155	<	1.9e-06	
Th32dau	<	7.5e-07	
U235	<	3.1e-06	
U238	<	9.4e-06	
U238dau	<	8.7e-07	
Np237	<	1.1e-06	
Pu239	<	5.6e-03	
Pu240	<	7.6e-02	
Am241	<	2.5e-06	

Errors and MDA reported at 2 sigma

3-16-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

105.34 = Sample Gross (g)

-104.37 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

-0.03 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/gas/2 inches

Laboratory ID Number: FCB04GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	2.3e-06	
K40		9.3e-06	15%
Co57	<	3.1e-06	
Co60		7.0e-07	18%
Co60		3.8e-07	26%
Weighted Av		5.4e-07	22%
Kr85		2.7e-02	7%
RuRh106	<	1.2e-06	
Sb125	<	8.2e-07	
I129	<	8.9e-05	
Cs134		1.2e-07	46%
Cs137	<	5.3e-06	
Ce144	<	3.0e-06	
Eu152	<	6.2e-07	
Eu154	<	2.8e-07	
Eu155	<	1.8e-06	
Th32dau	<	7.4e-07	
U235	<	3.1e-06	
U238	<	1.4e-05	
U238dau	<	8.2e-07	
Np237	<	9.9e-07	
Pu239	<	5.5e-03	
Pu240	<	7.5e-02	
Am241	<	2.4e-06	

Errors and MDA reported at 2 sigma

3-17-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

108.48 = Sample Gross (g)

-103.91 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

3.57 = SAMPLE NET (g)

Customer ID Number: 0.5 mr/liq/4 inches

Laboratory ID Number: FCB05LQ

31.20% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	2.1e-05	
K40		1.7e-05	19%
Co57	<	9.8e-06	
Co60		2.4e-06	17%
Co60		3.0e-06	14%
Weighted Av		2.7e-06	16%
Kr85	<	3.8e-04	
RuRh106	<	1.2e-05	
Sb125	<	7.3e-06	
I129	<	3.0e-04	
Cs134		1.6e-05	8%
Cs137		2.9e-03	7%
Ce144	<	9.3e-06	
Eu152		1.2e-06	43%
Eu154	<	7.2e-07	
Eu155	<	4.9e-06	
Th32dau	<	3.3e-06	
U235	<	9.9e-06	
U238	<	3.7e-05	
U238dau	<	4.4e-06	
Np237	<	4.3e-06	
Pu239	<	1.7e-02	
Pu240	<	2.6e-01	
Am241	<	7.2e-06	

Errors and MDA reported at 2 sigma

3-17-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

106.13 = Sample Gross (g)

-105.50 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

-0.37 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/gas/2 inches

Laboratory ID Number: FCB06GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	3.3e-08	
K40		8.5e-06	16%
Co57	<	2.0e-06	
Co60		5.5e-07	19%
Co60		2.4e-07	26%
Weighted Av		3.9e-07	23%
Kr85		3.8e-03	9%
RuRh106	<	1.9e-06	
Sb125	<	1.1e-06	
I129	<	5.7e-05	
Cs134		7.9e-07	17%
Cs137		1.5e-04	10%
Ce144	<	1.9e-06	
Eu152	<	4.2e-07	
Eu154	<	2.7e-07	
Eu155	<	1.1e-06	
Th32dau	<	5.6e-07	
U235	<	2.0e-06	
U238	<	9.8e-06	
U238dau	<	7.1e-07	
Np237	<	6.9e-07	
Pu239	<	3.5e-03	
Pu240	<	5.0e-02	
Am241	<	1.5e-06	

Errors and MDA reported at 2 sigma

3-17-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.26 = Sample Gross (g)

-106.55 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

9.71 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/lq/2 inches

Laboratory ID Number: FCB07LQ

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	1.2e-06	
K40		7.6e-06	17%
Co57	<	1.4e-06	
Co60		2.8e-07	29%
Co60	<	1.2e-07	
Kr85	<	2.8e-05	
RuRh106	<	1.1e-06	
Sb125	<	4.0e-07	
I129	<	3.5e-05	
Cs134	<	1.0e-07	
Cs137	<	7.0e-06	
Cs144	<	1.3e-06	
Eu152	<	4.4e-07	
Eu154	<	2.5e-07	
Eu155	<	7.5e-07	
Th32dau	<	3.4e-07	
U235	<	1.4e-06	
U238	<	1.2e-05	
U238dau	<	3.1e-07	
Np237	<	3.4e-07	
Pu239	<	2.4e-03	
Pu240	<	3.4e-02	
Am241	<	8.7e-07	

Errors and MDA reported at 2 sigma

3-17-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

105.88 = Sample Gross (g)
 -105.39 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 -0.51 = SAMPLE NET (g)

Customer ID Number: <0.5/gas/2 inches

Laboratory ID Number: FCB08GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 2.2e-06	
K40	7.2e-06	18%
Co57	< 1.5e-06	
Co60	3.0e-07	29%
Co60	1.5e-07	28%
Weighted Av	2.3e-07	29%
Kr85	< 4.5e-05	
RuRh106	< 1.5e-06	
Sb125	< 7.3e-07	
I129	< 4.3e-05	
Cs134	3.6e-07	26%
Cs137	6.2e-05	10%
Ce144	< 1.5e-06	
Eu152	4.2e-07	51%
Eu154	< 2.0e-07	
Eu155	< 8.5e-07	
Th32dau	< 4.1e-07	
U235	< 1.6e-06	
U238	< 1.3e-05	
U238dau	< 4.9e-07	
Np237	< 4.9e-07	
Pu239	< 2.7e-03	
Pu240	< 3.8e-02	
Am241	< 1.0e-06	

Errors and MDA reported at 2 sigma

3-17-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

105.77 = Sample Gross (g)

-104.81 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

-0.04 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/gas/2 inches

Laboratory ID Number: FCB09GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	3.7e-06	
K40		8.1e-06	20%
Co57	<	2.2e-06	
Co60		1.7e-06	14%
Co60		1.5e-06	23%
Weighted Av		1.6e-06	19%
Kr85	<	7.3e-05	
RuRh106	<	2.4e-06	
Sb125	<	1.3e-06	
I129	<	6.2e-05	
Cs134		7.1e-07	20%
Cs137		1.3e-04	10%
Ce144	<	2.1e-06	
Eu152	<	7.3e-07	
Eu154		3.1e-07	54%
Eu155	<	1.1e-06	
Th32dau	<	6.5e-07	
U235	<	2.2e-06	
U238	<	1.5e-05	
U238dau	<	8.0e-07	
Np237	<	8.0e-07	
Pu239	<	3.7e-03	
Pu240	<	5.6e-02	
Am241	<	1.6e-06	

Errors and MDA reported at 2 sigma

3-17-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.52 = Sample Gross (g)
 -103.57 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 12.95 = SAMPLE NET (g)

Customer ID Number: 13 mr/liq/16 inch

Laboratory ID Number: FCB10LQ

340.00% Distance correction factor [100% means no correction]
 9.00% Attenuation (Sample tube)
 0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Ba7	< 1.0e-03	
K40	1.9e-04	29%
Co57	< 4.7e-04	
Co60	< 1.4e-05	
Kr85	< 1.9e-02	
RuRh106	< 6.0e-04	
Sb125	< 3.5e-04	
I129	< 1.5e-02	
Cs134	1.2e-03	8%
Cs137	1.8e-01	7%
Cs144	< 4.5e-04	
Eu152	< 2.7e-05	
Eu154	< 4.3e-05	
Eu155	< 2.4e-04	
Th32dau	< 1.6e-04	
U235	< 4.8e-04	
U238	< 1.9e-03	
U238dau	< 2.2e-04	
Np237	< 2.1e-04	
Pu239	< 8.0e-01	
Pu240	< 1.2e+01	
Am241	< 3.5e-04	

Errors and MDA reported at 2 sigma

3-18-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.52 = Sample Gross (g)
 -103.57 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 12.95 = SAMPLE NET (g)

Customer ID Number: recount of FCB10

Laboratory ID Number: FCB10LQA

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	1.0e-03	
K40		9.7e-05	51%
Co57	<	4.6e-04	
Co60	<	1.7e-05	
Kr85	<	1.9e-02	
RuRh106	<	5.9e-04	
Sb125	<	3.5e-04	
I129	<	1.5e-02	
Cs134		1.2e-03	8%
Cs137		1.8e-01	7%
Ce144	<	4.5e-04	
Eu152	<	2.1e-05	
Eu154	<	3.8e-05	
Eu155	<	2.3e-04	
Th32dau	<	1.6e-04	
U235	<	4.8e-04	
U238	<	1.7e-03	
U238dau	<	2.1e-04	
Np237	<	2.1e-04	
Pu239	<	8.0e-01	
Pu240	<	1.2e+01	
Am241	<	3.5e-04	

Errors and MDA reported at 2 sigma

3-18-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.52 = Sample Gross (g)

-103.57 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

12.95 = SAMPLE NET (g)

Customer ID Number: 2nd recount of FCB10

Laboratory ID Number: FCB10LQB

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	1.0e-03	
K40		1.2e-04	45%
Co57	<	4.7e-04	
Co60	<	1.4e-05	
Kr85	<	1.9e-02	
Ru/Rh106	<	5.9e-04	
Sb125	<	3.5e-04	
I129	<	1.5e-02	
Cs134		1.2e-03	8%
Cs137		1.8e-01	7%
Cs144	<	4.5e-04	
Eu152	<	2.7e-05	
Eu154		4.7e-05	45%
Eu155	<	2.4e-04	
Th32dau	<	1.6e-04	
U235	<	4.8e-04	
U238	<	1.8e-03	
U238dau	<	2.1e-04	
Np237	<	2.1e-04	
Pu239	<	8.0e-01	
Pu240	<	1.2e+01	
Am241	<	3.5e-04	

Errors and MDA reported at 2 sigma

3-18-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

109.20 = Sample Gross (g)
 -107.75 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 0.45 = SAMPLE NET (g)

Customer ID Number: 3-20fcb12 gas-2 inch

Laboratory ID Number: fcb12gas

12.50% Distance correction factor [100% means no correction]
 9.00% Attenuation (Sample tube)
 0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	9.9e-07	
K40		6.1e-06	20%
Co57	<	1.4e-06	
Co60	<	1.3e-07	
Kr85	<	2.3e-05	
RuRh106	<	8.9e-07	
Sb125	<	3.7e-07	
I129	<	3.5e-05	
Ce134	<	1.0e-07	
Ce137	<	1.8e-06	
Ce144	<	1.3e-06	
Eu152	<	3.6e-07	
Eu154	<	2.8e-07	
Eu155	<	7.4e-07	
Th32dau	<	3.1e-07	
U235	<	1.4e-06	
U238	<	1.2e-05	
U238dau	<	3.0e-07	
Np237	<	3.1e-07	
Pu239	<	2.5e-03	
Pu240	<	3.3e-02	
Am241	<	8.8e-07	

Errors and MDA reported at 2 sigma

3-20-95
 Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

106.72 = Sample Gross (g)

-104.95 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

0.77 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/gas/2 inches

Laboratory ID Number: FCB13GAS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Ba7	<	2.6e-06	
K40		4.8e-06	22%
Co57	<	1.6e-06	
Co60		4.5e-07	24%
Co60		2.3e-07	62%
Weighted Av		3.4e-07	43%
Kr85	<	5.2e-05	
RuRh106	<	1.6e-06	
Sb125	<	8.8e-07	
I129	<	4.7e-05	
Cs134		3.4e-07	23%
Cs137		6.1e-05	9%
Ce144	<	1.6e-06	
Eu152	<	5.6e-07	
Eu154	<	3.3e-07	
Eu155	<	8.8e-07	
Th32dau	<	4.6e-07	
U235	<	1.7e-06	
U238	<	1.3e-05	
U238dau	<	5.7e-07	
Np237	<	5.5e-07	
Pu239	<	2.8e-03	
Pu240	<	4.1e-02	
Am241		1.1e-06	51%

Errors and MDA reported at 2 sigma

3-20-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

119.78 = Sample Gross (g)

-104.82 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

13.96 = SAMPLE NET (g)

Customer ID Number: 3-20fcb14liq@2 inch

Laboratory ID Number: fcb14liq

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	1.5e-06	
K40		5.9e-06	20%
Co57	<	1.5e-06	
Co60		1.7e-07	42%
Co60		2.0e-07	34%
Weighted Av		1.8e-07	38%
Kr85	<	3.5e-05	
RuRh106	<	1.2e-06	
Sb125	<	5.4e-07	
I129	<	3.9e-05	
Cs134		1.3e-07	50%
Cs137		1.6e-05	7%
Ce144	<	1.4e-06	
Eu152	<	4.7e-07	
Eu154	<	2.6e-07	
Eu155	<	7.8e-07	
Th32dau	<	3.7e-07	
U235	<	1.5e-06	
U238	<	1.3e-05	
U238dau	<	3.8e-07	
Np237	<	4.0e-07	
Pu239	<	2.5e-03	
Pu240	<	3.7e-02	
Am241	<	9.6e-07	

Errors and MDA reported at 2 sigma

3-20-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

120.52 = Sample Gross (g)

-105.51 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.01 = SAMPLE NET (g)

Customer ID Number: fcb15-5mr@16inch

Laboratory ID Number: fcb15liq

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	7.3e-04	
K40	<	1.0e-04	
Co57	<	4.0e-04	
Co60	<	1.4e-05	
Kr85	<	1.6e-02	
RuRh106	<	4.9e-04	
Sb125	<	3.0e-04	
I129	<	1.2e-02	
Cs134		5.3e-04	8%
Cs137		9.5e-02	7%
Ce144	<	3.8e-04	
Eu152	<	2.0e-05	
Eu154	<	3.4e-05	
Eu155	<	2.0e-04	
Th32dau	<	1.3e-04	
U235	<	4.1e-04	
U238	<	1.5e-03	
U238dau	<	1.8e-04	
Np237	<	1.8e-04	
Pu239	<	6.9e-01	
Pu240	<	1.1e+01	
Am241	<	3.0e-04	

Errors and MDA reported at 2 sigma

3-20-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

114.39 = Sample Gross (g)

-104.94 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

8.45 = SAMPLE NET (g)

Customer ID Number: 4.4 mr/lq/16 inches

Laboratory ID Number: FCB16LQ

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 8.7e-04	
K40	< 1.8e-04	
Co57	< 4.1e-04	
Co60	< 1.4e-05	
Kr85	< 1.6e-02	
RuRh106	< 4.8e-04	
Sb125	< 3.0e-04	
I129	< 1.2e-02	
Cs134	3.1e-04	11%
Cs137	4.7e-02	7%
Ce144	< 3.9e-04	
Eu152	< 4.0e-05	
Eu154	< 2.7e-05	
Eu155	< 2.1e-04	
Th32dau	< 1.4e-04	
U235	< 4.1e-04	
U238	< 1.5e-03	
U238dau	< 1.8e-04	
Np237	< 1.8e-04	
Pu239	< 6.9e-01	
Pu240	< 1.1e+01	
Am241	< 3.0e-04	

Errors and MDA reported at 2 sigma

3-21-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

110.80 = Sample Gross (g)

-105.92 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

3.88 = SAMPLE NET (g)

Customer ID Number: 1.1 mr/liq/8 inches

Laboratory ID Number: FCB17LQ

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	2.8e-04	
K40		4.7e-05	34%
Co57	<	1.3e-04	
Co60	<	4.5e-06	
K85	<	4.9e-03	
RuRh106	<	1.6e-04	
Sb125	<	9.7e-05	
I129	<	3.9e-03	
Cs134		1.9e-04	8%
Cs137		3.4e-02	7%
Ce144	<	1.2e-04	
Eu152	<	7.8e-06	
Eu154	<	1.1e-05	
Eu155	<	6.5e-05	
Th32dau	<	4.5e-05	
U235	<	1.3e-04	
U238	<	4.3e-04	
U238dau	<	5.9e-05	
Np237	<	5.7e-05	
Pu239	<	2.2e-01	
Pu240	<	3.4e+00	
Am241	<	9.5e-05	

Errors and MDA reported at 2 sigma

3-21-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

109.29 = Sample Gross (g)

-104.25 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

4.04 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/liq/8 inches

Laboratory ID Number: FCB18LQ

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	5.7e-05	
K40		5.4e-05	17%
Co57	<	2.8e-05	
Co60	<	1.1e-06	
Co60		1.3e-06	38%
Kr85	<	1.0e-03	
RuRh106	<	3.3e-05	
Sb125	<	1.9e-05	
I129	<	8.3e-04	
Cs134		2.6e-05	9%
Cs137		4.3e-03	7%
Ce144	<	2.7e-05	
Eu152	<	4.7e-06	
Eu154	<	2.6e-06	
Eu155	<	1.4e-05	
Th32dau	<	9.3e-06	
U235	<	2.8e-05	
U238	<	1.1e-04	
U238dau	<	1.2e-05	
Np237	<	1.2e-05	
Pu239	<	4.7e-02	
Pu240	<	7.3e-01	
Am241	<	2.1e-05	

Errors and MDA reported at 2 sigma

3-21-85

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

115.15 = Sample Gross (g)

-104.93 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

9.22 = SAMPLE NET (g)

Customer ID Number: 12 mr/lq/16 inches

Laboratory ID Number: FCB19LQ

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 1.5e-03	
K40	1.6e-04	51%
Co57	< 6.8e-04	
Co60	< 2.5e-05	
Kr85	< 2.7e-02	
RuRh106	< 8.5e-04	
Sb125	< 5.1e-04	
I129	< 2.1e-02	
Cs134	8.4e-04	9%
Cs137	1.3e-01	7%
Ce144	< 6.6e-04	
Eu152	< 4.1e-05	
Eu154	< 5.2e-05	
Eu155	< 3.5e-04	
Ra226	0.0e+00	
Th32dau	< 2.3e-04	
U235	< 7.0e-04	
U238	< 2.3e-03	
U238dau	< 3.2e-04	
Np237	< 3.1e-04	
Pu239	< 1.2e+00	
Pu240	< 1.8e+01	
Am241	< 5.1e-04	

Errors and MDA reported at 2 sigma

3-21-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

110.06 = Sample Gross (g)

-104.23 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

4.83 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/liq/2 inches

Laboratory ID Number: FCB20LQ

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	5.0e-08	
K40	<	8.8e-07	
Co57	<	2.4e-06	
Co60	<	1.7e-07	38%
Kr85	<	9.1e-05	
RuRh106	<	2.9e-06	
Sb125	<	1.6e-06	
I129	<	7.5e-05	
Cs134	<	1.5e-06	12%
Cs137	<	2.6e-04	7%
Ce144	<	2.3e-06	
Eu152	<	4.4e-07	
Eu154	<	3.1e-07	
Eu155	<	1.3e-06	
Th32dau	<	7.8e-07	
U235	<	2.5e-06	
U238	<	1.2e-05	
U238dau	<	1.0e-06	
Np237	<	9.9e-07	
Pu239	<	4.2e-03	
Pu240	<	6.1e-02	
Am241	<	1.8e-06	

Errors and MDA reported at 2 sigma

3-21-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

113.88 = Sample Gross (g)

-107.92 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

4.76 = SAMPLE NET (g)

Customer ID Number: fcb21int at 8inch

Laboratory ID Number: FCB21INT

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 1.3e-04	
K40	6.4e-05	28%
Co57	< 6.2e-05	
Co60	< 2.7e-06	
Kr85	< 2.4e-03	
RuRh106	< 7.5e-05	
Sb125	< 4.6e-05	
I129	< 1.9e-03	
Cs134	3.9e-05	11%
Cs137	8.0e-03	7%
Ce144	< 5.9e-05	
Eu152	< 8.5e-06	
Eu154	< 3.8e-06	
Eu155	< 3.2e-05	
Th32dau	< 2.1e-05	
U235	< 6.3e-05	
U238	< 2.6e-04	
U238dau	< 2.7e-05	
Np237	< 2.7e-05	
Pu239	< 1.1e-01	
Pu240	< 1.6e+00	
Am241	< 4.6e-05	

Errors and MDA reported at 2 sigma

3-24-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

105.46 = Sample Gross (g)

-102.91 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

1.55 = SAMPLE NET (g)

Customer ID Number: fcb22 324 at 2Inch

Laboratory ID Number: FCB22INT

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

isotope		Corrected mCi/total	Error
Be7	<	1.4e-05	
K40		5.7e-06	30%
Co57	<	6.0e-06	
Co60		4.5e-06	13%
Co60		4.7e-06	13%
Weighted Av		4.6e-06	13%
Kr85	<	2.5e-04	
RuRh106	<	8.4e-06	
Sb125	<	4.5e-06	
I129	<	2.0e-04	
Cs134		3.3e-06	14%
Cs137		6.6e-04	7%
Ce144	<	5.8e-06	
Eu152	<	7.0e-07	
Eu154	<	6.9e-07	
Eu155	<	3.1e-06	
Th32dau	<	2.1e-06	
U235	<	6.2e-06	
U238	<	2.9e-05	
U238dau	<	2.8e-06	
Np237	<	2.6e-06	
Pu239	<	1.0e-02	
Pu240	<	1.8e-01	
Am241	<	4.5e-06	

Errors and MDA reported at 2 sigma

3-24-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

Customer ID Number: 1 mri/q/8 in.

Laboratory ID Number: FCB23LQ

122.76 = Sample Gross (g)
 -105.63 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 16.13 = SAMPLE NET (g)

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	8.9e-04	
K40	<	7.5e-05	
Co57	<	4.2e-04	
Co60		1.4e-04	23%
Co60		1.3e-04	27%
Weighted Av		1.3e-04	25%
Kr85	<	1.6e-02	
RuRh106	<	5.6e-04	
Sb125	<	3.0e-04	
I129	<	1.3e-02	
Ce134		1.2e-04	25%
Ce137		1.6e-02	7%
Ce144	<	4.0e-04	
Eu152	<	3.7e-05	
Eu154	<	6.5e-05	
Eu155	<	2.1e-04	
Th32dau	<	1.4e-04	
U235	<	4.2e-04	
U238	<	4.2e-03	
U238dau	<	1.8e-04	
Np237	<	1.8e-04	
Pu239	<	7.2e-01	
Pu240	<	1.1e+01	
Am241	<	3.1e-04	

Errors and MDA reported at 2 sigma

3-24-95

Ed Sells

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Weedinghouse Hanford Company

Customer ID Number: 1 mri/q/8 in.

Laboratory ID Number: FCB23LQA

122.76 = Sample Gross (g)

-105.63 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

16.13 = SAMPLE NET (g)

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

isotope		Corrected mCi/total	Error
Ba7	<	2.6e-04	
K40	<	3.9e-05	
Co57	<	1.2e-04	
Co60		1.1e-04	11%
Co60		1.1e-04	11%
Weighted Av		1.1e-04	11%
Kr85	<	4.7e-03	
RuRh106	<	1.6e-04	
Sb125	<	9.2e-05	
I129	<	3.8e-03	
Cs134		8.1e-05	12%
Cs137		1.6e-02	7%
Ce144	<	1.2e-04	
Eu152	<	1.1e-05	
Eu154	<	8.9e-06	
Eu155	<	6.3e-05	
Th32daU	<	4.2e-05	
U235	<	1.2e-04	
U238	<	6.7e-04	
U238daU	<	5.6e-05	
Np237	<	5.4e-05	
Pu239	<	2.1e-01	
Pu240	<	3.2e+00	
Am241	<	9.1e-05	

Errors and MDA reported at 2 sigma

3-24-95

Ed Sells

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

Customer ID Number: 1 mrlq/8 in

Laboratory ID Number: FCB23LQB

122.76 = Sample Gross (g)

-105.63 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

16.13 = SAMPLE NET (g)

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	2.7e-04	
K40		4.7e-05	49%
Co57	<	1.2e-04	
Co60		1.1e-04	11%
Co60		1.1e-04	11%
Weighted Av		1.1e-04	11%
Kr85	<	4.9e-03	
RuRh106	<	1.6e-04	
Sb125	<	9.3e-05	
I129	<	3.7e-03	
Cs134		9.8e-05	11%
Cs137		1.7e-02	7%
Cs144	<	1.2e-04	
Eu152		5.2e-06	82%
Eu154	<	1.2e-05	
Eu155	<	6.2e-05	
Th32dau	<	4.2e-05	
U235	<	1.2e-04	
U238	<	7.5e-04	
U238dau	<	5.6e-05	
Np237	<	5.3e-05	
Pu239	<	2.1e-01	
Pu240	<	3.2e+00	
Am241	<	9.3e-05	

Errors and MDA reported at 2 sigma

3-24-95
Ed Sells

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

121.01 = Sample Gross (g)

-105.44 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.57 = SAMPLE NET (g)

Customer ID Number: 20 mr/lq/48 inches

Laboratory ID Number: FCB24LQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 3.6e-02	
K40	< 3.1e-03	
Co57	< 1.8e-02	
Co60	< 8.8e-04	
Kr85	< 6.8e-01	
Ru/Rh106	< 2.1e-02	
Sb125	< 1.2e-02	
I129	< 5.0e-01	
Cs134	3.0e-03	31%
Cs137	5.2e-01	7%
Cs144	< 1.7e-02	
Eu152	< 1.5e-03	
Eu154	< 8.3e-04	
Eu155	< 8.7e-03	
Th32dau	< 5.3e-03	
U235	< 1.8e-02	
U238	< 2.9e-02	
U238dau	< 7.4e-03	
Np237	< 7.1e-03	
Pu239	< 3.1e+01	
Pu240	< 4.7e+02	
Am241	< 1.2e-02	

Errors and MDA reported at 2 sigma

3-24-86

Gordon Stewart

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

120.46 = Sample Gross (g)

-105.43 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.03 = SAMPLE NET (g)

Customer ID Number: 1.5 mri/q/16 inches

Laboratory ID Number: FCB25LQ

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	6.6e-04	
K40		1.6e-04	56%
Co57	<	3.1e-04	
Co60		9.0e-05	21%
Co60		1.0e-04	20%
Weighted Av		9.7e-05	21%
Kr85	<	1.3e-02	
RuRh106	<	3.9e-04	
Sb125	<	2.2e-04	
I129	<	9.7e-03	
Cs134		1.1e-04	19%
Cs137		2.0e-02	7%
Ce144	<	3.0e-04	
Eu152	<	1.6e-05	
Eu154	<	2.6e-05	
Eu155	<	1.6e-04	
Th32dau	<	1.0e-04	
U235	<	3.1e-04	
U238	<	1.6e-03	
U238dau	<	1.4e-04	
Np237	<	1.3e-04	
Pu239	<	5.4e-01	
Pu240	<	8.1e+00	
Am241	<	2.3e-04	

Errors and MDA reported at 2 sigma

3-24-85

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

122.51 = Sample Gross (g)

-107.60 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

13.91 = SAMPLE NET (g)

Customer ID Number: 3 mri/q/16 inches

Laboratory ID Number: FCB26LQ

340.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Ba7	<	8.3e-04	
K40		1.6e-04	45%
Co57	<	3.9e-04	
Co60		6.0e-05	24%
Co60		5.4e-05	24%
Weighted Av		5.7e-05	24%
Kr85	<	1.5e-02	
RuRh106	<	5.1e-04	
Sb125	<	2.8e-04	
I129	<	1.2e-02	
Cs134		2.7e-04	11%
Cs137		4.5e-02	7%
Ce144	<	3.8e-04	
Eu152	<	4.8e-05	
Eu154	<	3.0e-05	
Eu155	<	2.0e-04	
Th32dau	<	1.3e-04	
U235	<	4.0e-04	
U238	<	8.6e-04	
U238dau	<	1.8e-04	
Np237	<	1.7e-04	
Pu239	<	6.8e-01	
Pu240	<	1.0e+01	
Am241	<	2.9e-04	

Errors and MDA reported at 2 sigma

3-24-85

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

114.85 = Sample Gross (g)
 -105.07 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 8.78 = SAMPLE NET (g)

Customer ID Number: fcb27@2 inch liq

Laboratory ID Number: FCB27LIQ

12.50% Distance correction factor [100% means no correction]
 9.00% Attenuation (Sample tube)
 0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.7e-06	
K40	<	5.1e-06	
Co57	<	3.1e-06	
Co60		5.6e-07	35%
Co60		5.8e-07	36%
Weighted Av		5.7e-07	35%
Kr85	<	9.6e-05	
RuRh106	<	3.2e-06	
Sb125	<	1.6e-06	
I129	<	9.0e-05	
Cs134		5.4e-07	30%
Cs137		6.9e-05	7%
Ce144	<	3.0e-06	
Eu152	<	2.7e-07	
Eu154	<	6.8e-07	
Eu155	<	1.6e-06	
Th32dau	<	8.3e-07	
U235	<	3.1e-06	
U238	<	2.0e-05	
U238dau	<	1.0e-06	
Np237	<	1.0e-06	
Pu239	<	5.5e-03	
Pu240	<	7.7e-02	
Am241	<	2.1e-06	

Errors and MDA reported at 2 sigma

3-25-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

113.90 = Sample Gross (g)

-104.49 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

8.41 = SAMPLE NET (g)

Customer ID Number: fcb28@2in <.5mr liq

Laboratory ID Number: FCB28LIQ

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	7.5e-06	
K40		8.5e-06	24%
Co57	<	2.8e-06	
Co60	<	2.6e-07	
Co60		2.2e-07	53%
Kr85	<	8.0e-05	
RuRh106	<	2.7e-06	
Sb125	<	1.3e-06	
I129	<	8.2e-05	
Cs134	<	2.2e-07	
Cs137		4.7e-05	7%
Ce144	<	2.7e-06	
Eu152	<	9.1e-07	
Eu154	<	6.8e-07	
Eu155	<	1.5e-06	
Th32dau	<	8.1e-07	
U235	<	2.9e-06	
U238	<	1.8e-05	
U238dau	<	8.8e-07	
Np237	<	8.6e-07	
Pu239	<	4.9e-03	
Pu240	<	7.6e-02	
Am241	<	2.0e-06	

Errors and MDA reported at 2 sigma

3-25-85

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

119.79 = Sample Gross (g)

-103.53 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

15.26 = SAMPLE NET (g)

Customer ID Number: fcb29%q@8ln,.7mr

Laboratory ID Number: FCB29LIQ

100.00% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	1.3e-04	
K40		4.6e-05	36%
Co57	<	6.1e-05	
Co60		4.8e-05	12%
Co60		5.0e-05	11%
Weighted Av		4.9e-05	11%
Kr85	<	2.4e-03	
RuRh106	<	7.3e-05	
Sb125	<	4.5e-05	
I129	<	1.8e-03	
Cs134		3.9e-05	12%
Cs137		7.5e-03	7%
Ce144	<	5.8e-05	
Eu152	<	5.6e-06	
Eu154	<	4.5e-06	
Eu155	<	3.0e-05	
Th32dau	<	2.1e-05	
U235	<	6.2e-05	
U238	<	3.4e-04	
U238dau	<	2.7e-05	
Np237	<	2.7e-05	
Pu239	<	1.0e-01	
Pu240	<	1.6e+00	
Am241	<	4.5e-05	

Errors and MDA reported at 2 sigma

3-25-85

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

121.77 = Sample Gross (g)

-105.96 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.81 = SAMPLE NET (g)

Customer ID Number: fcb30@4ft-40MR

Laboratory ID Number: FCB30LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	9.9e-03	
K40		1.5e-03	39%
Co57	<	4.9e-03	
Co60	<	1.4e-04	
Kr85	<	1.9e-01	
RuRh106	<	5.9e-03	
Sb125	<	3.4e-03	
I129	<	1.5e-01	
Cs134		3.0e-03	11%
Cs137		6.0e-01	7%
Ce144	<	4.7e-03	
Eu152	<	1.1e-04	
Eu154	<	3.7e-04	
Eu155	<	2.5e-03	
Th32dau	<	1.6e-03	
U235	<	5.0e-03	
U238	<	1.2e-02	
U238dau	<	2.1e-03	
Np237	<	2.1e-03	
Pu239	<	8.4e+00	
Pu240	<	1.3e+02	
Am241	<	3.6e-03	

Errors and MDA reported at 2 sigma

3-25-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

107.41 = Sample Gross (g)

-106.38 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

0.03 = SAMPLE NET (g)

Customer ID Number: <0.5mr / gas / 2 in.

Laboratory ID Number: FCB31GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	8.3e-06	
K40	<	5.7e-06	
Co57	<	8.9e-06	
Co60	<	2.3e-07	
Kr85		4.5e-02	7%
RuRh106	<	3.9e-06	
Sb125	<	2.7e-06	
I129	<	2.6e-04	
Cs134	<	3.6e-07	
Cs137		4.2e-05	8%
Ce144	<	8.7e-06	
Eu152	<	1.7e-06	
Eu154	<	8.8e-07	
Eu155	<	5.3e-06	
Th32dau	<	2.2e-06	
U235	<	9.0e-06	
U238	<	2.3e-05	
U238dau	<	2.5e-06	
Np237	<	2.9e-06	
Pu239	<	1.6e-02	
Pu240	<	2.1e-01	
Am241	<	6.7e-06	

Errors and MDA reported at 2 sigma

3-25-95

Ed Selle

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

122.75 = Sample Gross (g)
 -107.58 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 14.17 = SAMPLE NET (g)

Customer ID Number: <0.5 mr / liq / 2 in.

Laboratory ID Number: FCB32LQ

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	2.9e-06	
K40		1.5e-06	23%
Co57	<	1.8e-06	
Co60		2.2e-07	33%
Co60		1.6e-07	44%
Weighted Av		1.9e-07	38%
Kr85	<	6.7e-05	
RuRh106	<	1.9e-06	
Sb125	<	9.8e-07	
I129	<	5.2e-05	
Cs134		4.1e-07	23%
Cs137		8.1e-05	7%
Ce144	<	1.7e-06	
Eu152	<	5.1e-07	
Eu154	<	2.3e-07	
Eu155	<	9.8e-07	
Th32dau	<	5.0e-07	
U235	<	1.8e-06	
U238	<	1.4e-05	
U238dau	<	6.2e-07	
Np237	<	5.9e-07	
Pu239	<	3.0e-03	
Pu240	<	4.5e-02	
Am241	<	1.3e-06	

Errors and MDA reported at 2 sigma

3-25-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

107.21 = Sample Gross (g)

-105.21 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

1.00 = SAMPLE NET (g)

Customer ID Number: <0.5 mr/gas/2 inches

Laboratory ID Number: FCB33GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	5.5e-06	
K40	<	1.3e-06	
Co57	<	3.9e-06	
Co60		1.5e-07	.57%
Co60	<	1.7e-07	
Kr85		1.9e-02	7%
RuRh106	<	3.0e-06	
Sb125	<	1.9e-06	
I129	<	1.2e-04	
Cs134		8.4e-07	19%
Cs137		1.7e-04	7%
Ce144	<	3.7e-06	
Eu152	<	5.5e-07	
Eu154	<	2.9e-07	
Eu155	<	2.2e-06	
Th32dau	<	1.1e-06	
U235	<	3.9e-06	
U238	<	1.3e-05	
U238dau	<	1.3e-06	
Np237	<	1.4e-06	
Pu239	<	6.8e-03	
Pu240	<	9.8e-02	
Am241	<	3.0e-06	

Errors and MDA reported at 2 sigma

3-25-95

Gordon Blewett

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

108.75 = Sample Gross (g)

-106.59 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

1.16 = SAMPLE NET (g)

Customer ID Number: <0.5mr / gas / 2 in.

Laboratory ID Number: FCB34GS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	2.1e-06	
K40		4.9e-06	21%
Co57	<	2.9e-06	
Co60		7.4e-07	17%
Co60		4.4e-07	39%
Weighted Av		5.9e-07	28%
Kr85		2.5e-02	7%
RuRh106	<	1.1e-06	
Sb125	<	7.5e-07	
I129	<	8.9e-05	
Cs134	<	1.2e-07	
Cs137		7.2e-06	8%
Ce144	<	2.9e-06	
Eu152	<	5.6e-07	
Eu154	<	2.6e-07	
Eu155	<	1.7e-06	
Th32dau	<	7.2e-07	
U235	<	2.9e-06	
U238	<	1.1e-05	
U238dau	<	7.6e-07	
Np237	<	9.3e-07	
Pu239	<	5.2e-03	
Pu240	<	7.0e-02	
Am241	<	2.2e-06	

Errors and MDA reported at 2 sigma

3-25-95

Ed Sells

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

119.34 = Sample Gross (g)

-103.44 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.90 = SAMPLE NET (g)

Customer ID Number: fca35 @4ft-20mR-10mn

Laboratory ID Number: FCB3SLIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.5e-03	
K40		1.4e-03	33%
Co57	<	2.3e-03	
Co60	<	8.3e-05	
Kr85	<	8.6e-02	
RuRh106	<	2.6e-03	
Sb125	<	1.6e-03	
I129	<	6.9e-02	
Cs134		1.5e-03	10%
Cs137		2.7e-01	7%
Ce144	<	2.2e-03	
Eu152	<	1.8e-04	
Eu154	<	2.1e-04	
Eu155	<	1.2e-03	
Th32dau	<	7.3e-04	
U235	<	2.4e-03	
U238	<	5.2e-03	
U238dau	<	9.8e-04	
Np237	<	9.5e-04	
Pu239	<	4.0e+00	
Pu240	<	6.1e+01	
Am241	<	1.7e-03	

Errors and MDA reported at 2 sigma

3-28-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

120.11 = Sample Gross (g)

-104.11 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

15.00 = SAMPLE NET (g)

Customer ID Number: fcb37liq @4ft-10mr

Laboratory ID Number: FCB37LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

isotope		Corrected mCi/total	Error
Be7	<	3.4e-03	
K40		1.1e-03	43%
Co57	<	1.7e-03	
Co60	<	5.2e-05	
Co60		5.6e-05	49%
Kr85	<	6.3e-02	
RuRh106	<	1.9e-03	
Sb125	<	1.2e-03	
I129	<	5.3e-02	
Cs134		1.0e-03	12%
Cs137		1.4e-01	7%
Ce144	<	1.7e-03	
Eu152	<	2.3e-04	
Eu154	<	1.5e-04	
Eu155	<	9.3e-04	
Th32dau	<	5.5e-04	
U235	<	1.8e-03	
U238	<	5.1e-03	
U238dau	<	7.2e-04	
Np237	<	7.1e-04	
Pu239	<	3.0e+00	
Pu240	<	4.7e+01	
Am241	<	1.3e-03	

Errors and MDA reported at 2 sigma

3-28-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

119.53 = Sample Gross (g)

-103.55 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.98 = SAMPLE NET (g)

Customer ID Number: fcb38@4ft 20mr

Laboratory ID Number: FCB38LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 4.7e-03	
K40	9.9e-04	49%
Co57	< 2.4e-03	
Co60	< 6.2e-05	
K85	< 8.6e-02	
RuRh106	< 2.7e-03	
Sb125	< 1.6e-03	
I129	< 1.0e-01	
Cs134	1.5e-03	10%
Cs137	2.7e-01	7%
Ce144	< 2.3e-03	
Eu152	< 1.7e-04	
Eu154	< 1.2e-04	
Eu155	< 1.2e-03	
Th32dau	< 7.4e-04	
U235	< 2.4e-03	
U238	< 5.1e-03	
U238dau	< 9.8e-04	
Np237	< 9.6e-04	
Pu239	< 4.1e+00	
Pu240	< 6.2e+01	
Am241	< 1.9e-03	

Errors and MDA reported at 2 sigma

3-28-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

121.02 = Sample Gross (g)

-104.93 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

15.09 = SAMPLE NET (g)

Customer ID Number: fcb39 duplicate

Laboratory ID Number: FCB39DUP

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.6e-03	
K40		2.0e-03	25%
Co57	<	2.3e-03	
Co60	<	7.4e-05	
Kr85	<	8.5e-02	
RuRh106	<	2.7e-03	
Sb125	<	1.6e-03	
I129	<	6.9e-02	
Cs134		1.5e-03	10%
Cs137		2.6e-01	7%
Ce144	<	2.2e-03	
Eu152	<	3.0e-04	
Eu154	<	1.2e-04	
Eu155	<	1.2e-03	
Th32dau	<	7.3e-04	
U235	<	2.4e-03	
U238	<	5.7e-03	
U238dau	<	9.6e-04	
Np237	<	9.5e-04	
Pu239	<	4.0e+00	
Pu240	<	6.1e+01	
Am241	<	1.7e-03	

Errors and MDA reported at 2 sigma

3-26-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

121.02 = Sample Gross (g)

-104.93 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

15.09 = SAMPLE NET (g)

Customer ID Number: fcb39@4ft-liq

Laboratory ID Number: FCB39LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.6e-03	
K40		1.4e-03	35%
Co57	<	2.3e-03	
Co60	<	7.3e-05	
Kr85	<	8.6e-02	
RuRh106	<	2.6e-03	
Sb125	<	1.5e-03	
I129	<	6.8e-02	
Cs134		1.4e-03	11%
Cs137		2.6e-01	7%
Ce144	<	2.2e-03	
Eu152	<	3.3e-04	
Eu154	<	1.4e-04	
Eu155	<	1.2e-03	
Th32dau	<	7.4e-04	
U235	<	2.4e-03	
U238	<	8.2e-03	
U238dau	<	9.6e-04	
Np237	<	9.4e-04	
Pu239	<	4.0e+00	
Pu240	<	6.2e+01	
Am241	<	1.7e-03	

Errors and MDA reported at 2 sigma

3-26-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.70 = Sample Gross (g)

-105.89 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

10.81 = SAMPLE NET (g)

Customer ID Number: fcb40-duplicate-5min

Laboratory ID Number: FCB40DUP

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 7.0e-03	
K40	< 1.3e-03	
Co57	< 3.6e-03	
Co60	< 6.1e-05	
Kr85	< 1.3e-01	
RuRh106	< 3.9e-03	
Sb125	< 2.4e-03	
I129	< 1.1e-01	
Cs134	1.3e-03	15%
Cs137	3.0e-01	7%
Ce144	< 3.5e-03	
Eu152	< 4.6e-04	
Eu154	< 2.8e-04	
Eu155	< 1.8e-03	
Th32dau	< 1.1e-03	
U235	< 3.6e-03	
U238	< 1.2e-02	
U238dau	< 1.5e-03	
Np237	< 1.4e-03	
Pu239	< 6.2e+00	
Pu240	< 9.4e+01	
Am241	< 2.6e-03	

Errors and MDA reported at 2 sigma

3-26-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

119.91 = Sample Gross (g)

-105.89 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

13.02 = SAMPLE NET (g)

Customer ID Number: fcb40@4ft-28mR

Laboratory ID Number: FCB40LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.9e-03	
K40		1.3e-03	32%
Co57	<	2.5e-03	
Co60	<	7.4e-05	
Kr85	<	9.3e-02	
RuRh106	<	2.8e-03	
Sb125	<	1.7e-03	
I129	<	7.4e-02	
Cs134		1.5e-03	11%
Cs137		3.0e-01	7%
Ce144	<	2.4e-03	
Eu152	<	1.8e-04	
Eu154	<	1.7e-04	
Eu155	<	1.3e-03	
Th32dau	<	7.8e-04	
U235	<	2.5e-03	
U238	<	7.3e-03	
U238dau	<	1.0e-03	
Np237	<	1.0e-03	
Pu239	<	4.3e+00	
Pu240	<	6.4e+01	
Am241	<	1.8e-03	

Errors and MDA reported at 2 sigma

3-28-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

120.20 = Sample Gross (g)

-105.48 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

13.74 = SAMPLE NET (g)

Customer ID Number: fcb41@4ft-20mR

Laboratory ID Number: FCB41LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 4.2e-03	
K40	1.2e-03	43%
Co57	< 2.2e-03	
Co60	< 5.9e-05	
Kr85	< 8.0e-02	
RuRh106	< 2.5e-03	
Sb125	< 1.5e-03	
I129	< 6.4e-02	
Cs134	1.3e-03	11%
Cs137	2.3e-01	7%
Ce144	< 2.1e-03	
Eu152	< 5.4e-05	
Eu154	< 1.4e-04	
Eu155	< 1.1e-03	
Th32dau	< 6.9e-04	
U235	< 2.3e-03	
U238	< 6.0e-03	
U238dau	< 9.1e-04	
Np237	< 8.9e-04	
Pu239	< 3.8e+00	
Pu240	< 5.8e+01	
Am241	< 1.6e-03	

Errors and MDA reported at 2 sigma

3-26-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

120.19 = Sample Gross (g)
 -104.12 = Sample Tare (g)
 -1.00 = Sample Entrapped H₂O (g)
 15.07 = SAMPLE NET (g)

Customer ID Number: fcb42-4ft-17mr

Laboratory ID Number: FCB42LIQ

Distance correction factor [100% means no correction]
 9.00% Attenuation (Sample tube)
 0.00% Attenuation (Shield)

Isotope	Corrected mCi/total	Error
Be7	< 3.9e-03	
K40	1.7e-03	30%
Co57	< 2.0e-03	
Co60	< 6.9e-05	
Kr85	< 7.4e-02	
RuRh106	< 2.3e-03	
Sb125	< 1.3e-03	
I129	< 5.8e-02	
Cs134	1.3e-03	11%
Cs137	1.9e-01	7%
Ce144	< 1.9e-03	
Eu152	< 1.7e-04	
Eu154	< 1.7e-04	
Eu155	< 1.0e-03	
Th32dau	< 6.3e-04	
U235	< 2.1e-03	
U238	< 8.4e-03	
U238dau	< 8.3e-04	
Np237	< 8.2e-04	
Pu239	< 3.5e+00	
Pu240	< 5.4e+01	
Am241	< 1.5e-03	

Errors and MDA reported at 2 sigma

3-26-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

121.64 = Sample Gross (g)

-105.72 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.92 = SAMPLE NET (g)

Customer ID Number: fcb43@4ft-20mR

Laboratory ID Number: FCB43LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.4e-03	
K40		1.3e-03	38%
Co57	<	2.3e-03	
Co60	<	9.4e-05	
Kr85	<	8.3e-02	
RuRh106	<	2.6e-03	
Sb125	<	1.5e-03	
I129	<	9.8e-02	
Cs134		1.4e-03	11%
Cs137		2.5e-01	7%
Ce144	<	2.2e-03	
Eu152	<	2.3e-04	
Eu154	<	9.1e-05	
Eu155	<	1.2e-03	
Th32dau	<	7.0e-04	
U235	<	2.3e-03	
U238	<	6.5e-03	
U238dau	<	9.6e-04	
Np237	<	9.3e-04	
Pu239	<	3.8e+00	
Pu240	<	6.0e+01	
Am241	<	1.8e-03	

Errors and MDA reported at 2 sigma

3-26-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

106.05 = Sample Gross (g)

-104.04 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

1.01 = SAMPLE NET (g)

Customer ID Number: fcb36@2in,<.5mR

Laboratory ID Number: FCB36GAS

12.50% Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	7.7e-06	
K40		4.8e-06	22%
Co57	<	3.4e-06	
Co60		3.7e-07	27%
Co60		3.2e-07	28%
Weighted Av		3.5e-07	28%
Kr85	<	1.4e-04	
RuRh106	<	4.5e-06	
Sb125	<	2.6e-06	
I129	<	1.1e-04	
Cs134		3.9e-06	9%
Cs137		6.3e-04	7%
Ce144	<	3.2e-06	
Eu152	<	4.7e-07	
Eu154	<	2.5e-07	
Eu155	<	1.8e-06	
Th32dau	<	1.2e-06	
U235	<	3.5e-06	
U238	<	1.4e-05	
U238dau	<	1.5e-06	
Np237	<	1.5e-06	
Pu239	<	5.8e-03	
Pu240	<	8.9e-02	
Am241	<	2.6e-06	

Errors and MDA reported at 2 sigma

3-27-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

118.08 = Sample Gross (g)

-104.81 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

12.27 = SAMPLE NET (g)

Customer ID Number: fcb44@2ft-10mR

Laboratory ID Number: FCB44LIQ

Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	4.6e-03	
K40		1.1e-03	42%
Co57	<	2.3e-03	
Co60	<	8.6e-05	
Kr85	<	8.6e-02	
RuRh106	<	2.8e-03	
Sb125	<	1.6e-03	
I129	<	9.9e-02	
Cs134		1.5e-03	11%
Cs137		2.7e-01	7%
Ce144	<	2.2e-03	
Eu152	<	2.3e-04	
Eu154	<	1.2e-04	
Eu155	<	1.2e-03	
Th32dau	<	7.3e-04	
U235	<	2.4e-03	
U238	<	5.2e-03	
U238dau	<	9.9e-04	
Np237	<	9.5e-04	
Pu239	<	4.0e+00	
Pu240	<	6.2e+01	
Am241	<	1.8e-03	

Errors and MDA reported at 2 sigma

3-27-95

Dr. E. Fred Riedel

GAMMA-RAY ENERGY ANALYSIS REPORT

Special Analytical Studies

Westinghouse Hanford Company

117.87 = Sample Gross (g)

-102.50 = Sample Tare (g)

-1.00 = Sample Entrapped H₂O (g)

14.37 = SAMPLE NET (g)

Customer ID Number: fcb45@4ft 13mR

Laboratory ID Number: FCB45LIQ

***** Distance correction factor [100% means no correction]

9.00% Attenuation (Sample tube)

0.00% Attenuation (Shield)

Isotope		Corrected mCi/total	Error
Be7	<	5.0e-03	
K40		9.4e-04	46%
Co57	<	2.5e-03	
Co60	<	6.6e-05	
Kr85	<	9.6e-02	
RuRh106	<	3.1e-03	
Sb125	<	1.8e-03	
I129	<	1.1e-01	
Cs134		1.9e-03	10%
Cs137		3.3e-01	7%
Ce144	<	2.4e-03	
Eu152	<	2.7e-04	
Eu154	<	1.7e-04	
Eu155	<	1.3e-03	
Th32dau	<	8.1e-04	
U235	<	2.6e-03	
U238	<	6.6e-03	
U238dau	<	1.1e-03	
Np237	<	1.0e-03	
Pu239	<	4.3e+00	
Pu240	<	6.6e+01	
Am241	<	2.0e-03	

Errors and MDA reported at 2 sigma

3-27-95

Dr. E. Fred Riedel

A P P E N D I X B

PAGES I THROUGH IV AND 1 THROUGH 53 OF
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NARRATIVE

ref
WHC-SD-WM-DP-138, REV. 0

ANALYSIS OF K WEST BASIN CANISTER LIQUID SAMPLES

CASE NARRATIVE

INTRODUCTION

Project Documentation and Direction

Analytical direction for this project was provided in the following references.

1. Harris, R. A., et al., WHC-SD-SNF-PLN-004, Rev. 0, released February 28, 1995, Westinghouse Hanford Company, Richland, Washington, "Sampling and Analysis Plan for Canister Liquid and Gas Sampling at 105-K West Fuel Storage Basin".
2. Trimble, D. J., WHC-SD-SNF-PLN-004, Rev. 0-A, ECN 168171, released April 14, 1995, Westinghouse Hanford Company, Richland, Washington, "Sampling and Analysis Plan for Canister Liquid and Gas Sampling at 105-K West Fuel Storage Basin".
3. Trimble, D. J., Internal Memo to G. L. Miller, April 11, 1995, Westinghouse Hanford Company, "Instructions for Analysis of K West Basin Canister Liquid Samples".
4. Trimble, D. J., Internal Memo to G. L. Miller, April 18, 1995, Westinghouse Hanford Company, "Revised Instructions for Analysis of K West Basin Canister Liquid Samples".
5. Trimble, D. J., cc:Mail message to G. L. Miller, May 5, 1995, Westinghouse Hanford Company, "K Basin Sample Priorities".

Sample Collection

Twenty-six water samples were collected from 105-K West Basin fuel canisters between March 15 and March 27, 1995. A document furnished by the program indicated that the samples ranged in weight (approximate volume in milliliters) from 4.88 to 17.13 grams.

Sample Receipt

The samples were received in two shipments by the 222-S Laboratory on April 20 and May 4, 1995, for inorganic and radiochemical analyses. All samples were logged into the laboratory using the LABCORE laboratory information management system (LIMS).

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Quality Control

The program specified that no less than 10 percent of the samples should be evaluated for precision and accuracy, wherever possible. Control limits for precision or accuracy were specified by the program in Reference 2. To determine analytical precision, analyses were performed in triplicate for all analytes on three samples except for visual appearance. To determine analytical accuracy, three samples were spiked for the following analytes:

- $^{239/240}\text{Pu}$
- ^{241}Am
- ^{90}Sr
- tritium
- total uranium
- potassium
- ammonia
- nitrate
- nitrite.

Samples which were spiked were the same as those for which replicate precision determinations were performed.

No criteria were specified by the program for maximum sample holding time.

Acid digestions were performed on the samples prior to analysis of $^{239/240}\text{Pu}$, ^{241}Am and potassium.

Because of the small original volume of each of the samples, it was necessary to use less than the optimum analytical aliquot for many analyses, conserving sufficient sample to analyze for all of the specified analytes. Despite this effort to conserve sample, two samples were unable to be analyzed for ^{90}Sr due to insufficient sample. A second issue related to using less than the optimum analytical aliquot was that reported values for potassium, ammonia, nitrate, nitrite and ^{241}Am by gamma energy analysis were raised significantly and, in many cases, were greater than the program's required practical quantitation limit (PQL).

SAMPLE IDENTIFICATION

Upon receipt of samples at 222-S Laboratory, new sample numbers were assigned to the samples. Using LABCORE to log in the samples, original program sample numbers were converted to laboratory sample numbers. Additional laboratory sample numbers were assigned to the acid digestion subsets of samples. Table 1 relates the sample identifications assigned by the laboratory to those of the program.

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Table 1. Sample Identification

Program Sample Identification	Lab Sample ID (direct analysis)	Lab Sample ID (acid digestion)	Sample Collection Date/Time	Lab Receipt of Sample Date/Time
FC-B02	S95K000033	S95K000040	3/15/95, 1945	5/4/95, 1025
FC-B07	S95K000034	S95K000041	3/17/95, 1855	5/4/95, 1025
FC-B10	S95K000035	S95K000042	3/18/95, 1058	5/4/95, 1025
FC-B14	S95K000047	S95K000049	3/20/95, 2110	5/4/95, 1025
FC-B15	S95K000036	S95K000043	3/20/95, 2145	5/4/95, 1025
FC-B16	S95K000037	S95K000044	3/21/95, 1020	5/4/95, 1025
FC-B17	S95K000038	S95K000045	3/21/95, 1050	5/4/95, 1025
FC-B18	S95K000039	S95K000046	3/21/95, 1315	5/4/95, 1025
FC-B19	S95K000001	S95K000002	3/21/95, 1335	4/20/95, 1400
FC-B21	S95K000051	n/a	3/24/95, 1048	5/4/95, 1025
FC-B23	S95K000048	S95K000050	3/24/95, 1918	5/4/95, 1025
FC-B24	S95K000025	S95K000030	3/24/95, 2108	4/20/95, 1400
FC-B25	S95K000005	S95K000007	3/24/95, 2200	4/20/95, 1400
FC-B26	S95K000009	S95K000016	3/24/95, 2230	4/20/95, 1400
FC-B29	S95K000010	S95K000017	3/25/95, 1315	4/20/95, 1400
FC-B30	S95K000026	S95K000031	3/25/95, 1331	4/20/95, 1400
FC-B35	S95K000011	S95K000018	3/25/95, 2150	4/20/95, 1400
FC-B37	S95K000012	S95K000019	3/26/95, 1128	4/20/95, 1400
FC-B38	S95K000027	S95K000032	3/26/95, 1145	4/20/95, 1400
FC-B39	S95K000013	S95K000020	3/26/95, 1220	4/20/95, 1400
FC-B40	S95K000023	S95K000028	3/26/95, 1215	4/20/95, 1400
FC-B41	S95K000014	S95K000021	3/26/95, 1416	4/20/95, 1400
FC-B42	S95K000015	S95K000022	3/26/95, 1440	4/20/95, 1400
FC-B43	S95K000003	S95K000004	3/26/95, 1450	4/20/95, 1400
FC-B44	S95K000006	S95K000008	3/27/95, 1322	4/20/95, 1400
FC-B45	S95K000024	S95K000029	3/27/95, 1349	4/20/95, 1400

RESULTS OF ANALYSIS

Report Format

Interim data were provided to the program each week during sample analyses. These data were tentative and subject to change pending review of data correctness, completeness and pending possible reruns to satisfy program quality control requirements. These reports were generated using a standard report format from the LABCORE system. LABCORE, a new computerized laboratory information management system, is in the process of being implemented in the laboratory, and still has many bugs to be fixed. Consequently, the reports generated by LABCORE omitted some data and reported some erroneous values. LABCORE's reported values are slightly different than the originally derived data for several parameters because it rounds the values, makes additional computations, and then rounds the data again. Although these systematic errors are known and understood, they are not currently able to be fixed because they are part of the software developer's proprietary source code.

For this final report, two report formats were used to provide summary data tables: standard LABCORE printouts and Excel™ spreadsheets.

Final LABCORE reports were generated, pages 14 through 39, where all of the analytes were displayed by sample location. For the final report, data in the LABCORE database were corrected or data were added to generate a report as complete as possible. The standard LABCORE format does not include results of triplicate analyses and does not include triplicate results in the calculated "average" value. The standard LABCORE format reports sample precision as relative percent difference (RPD) between the sample and its duplicate rather than as two times the relative standard deviation (2 RSD) of the sample, duplicate and triplicate, as specified for this project. The LABCORE report format does not display information on sample appearance, but only states that the analysis was "complete."

A second set of report tables was generated as Excel™ spreadsheets, where the data for all samples were displayed by each analyte. Because there was control over the format and contents of these tables, they accurately represent the true and complete analytical data. These tables are shown on pages 40 through 53.

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Discussion of Results

Sample Appearance and Dose Rate

All samples were observed visually at the time of sample breakdown on April 26 and May 10, 1995. Each was determined to be colorless, clear and to not have solids present. The chemist's comment for several samples included, "no organic layer," but this observation was not recorded for several other samples. The geometry-corrected contact dose rates for the samples, measured at the time of visual inspection, ranged from 15 to 150 mRad/hour. No quality control analyses are required for visual inspections.

pH Analysis by Ion Selective Electrode

Samples were analyzed for pH using procedure LA-212-102, revision C-5, on May 12, 23 and June 7, 1995. No procedural anomalies occurred during the analyses of pH, and there were no technical difficulties. All sample pH values were greater than 7, except for sample FC-B02, which had a result of 3.81.

Analytical accuracy was determined on the basis of a control standard. The percent recoveries of the control standard ranged from 99.7 to 100.5, and were within the program's specified control limits of 100 ± 10 percent recovery. The spiking of samples for pH is technically not possible, consequently no spiked analyses were performed.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 times the relative standard deviation of the three replicate values for a sample. The precision results ranged from 0.00 to 0.39 RSD, which were within the program's specified control limits of ± 10 RSD.

Ammonia by Distillation/Ion Selective Electrode

Samples were analyzed for ammonia using procedure LA-631-001, revision A-0, on May 9, 10, 31 and June 1, 1995. No procedural anomalies occurred during the analyses, and there were no technical difficulties. All samples were less than the detection limit except for sample FC-B39, which had a result only slightly greater than the detection limit.

Analytical accuracy was determined on the basis of a spiked sample. The spike percent recoveries ranged from 95.6 to 100.0, and were within the program's specified control limits of 100 ± 20 percent recovery. Ammonia control standards performed well, with results ranging from 92.0 to 105.0 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three

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replicate values for a sample. Precision results were unable to be calculated because all analytical results were less than the detection limit.

Reagent blanks were analyzed in each batch of samples. No contamination was detected in any of the blanks. Many of the blank results were reported as values less than the detection limit for the sample. This is possible because blanks are run undiluted and the samples were diluted. The dilution factor is multiplied times the instrument detection limit when calculating the final sample detection limit.

Nitrate by Ion Chromatography

Samples were analyzed for nitrate using procedure LA-533-105, revision C-2, on May 9, 10 and June 6, and 7, 1995. No procedural anomalies occurred during the analyses, and there were no technical difficulties. Samples results ranged from less than the detection limit to 69.3 $\mu\text{g/ml}$.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 94.0 to 113.2, and were within the program's specified control limits of 100 ± 20 percent recovery. Nitrate control standards performed well, with results ranging from 95.7 to 101.2 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three replicate values for a sample. The calculable precision results ranged from 1.5 to 8.4 RSD, which were within the program's specified control limits of ± 20 RSD. Precision RSD was not able to be calculated for sample FC-B35 because all results were less than the detection limit.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Nitrite by Ion Chromatography

Samples were analyzed for nitrite using procedure LA-533-105, revision C-2, on May 9, 10 and June 6, and 7, 1995. No procedural anomalies occurred during the analyses, and there were no technical difficulties. Sample results ranged from less than the detection limit to 4.28 $\mu\text{g/ml}$.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 89.7 to 100.5, and were within the program's specified control limits of 100 ± 20 percent recovery. Nitrite control standards performed well, with results ranging from 95.6 to 100.0 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three

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replicate values for a sample. The calculable precision result for FC-B23 was 3.7 RSD, and was within the program's specified control limits of ± 20 RSD. Precision RSD was not able to be calculated for samples FC-B29 and FC-B35 because all results were less than the detection limit.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Potassium by Inductively Coupled Plasma/Optical Emission Spectroscopy

Samples were acid digested on May 2, 5, 10 and 22, 1995, using procedure LA-505-158, revision A-4, and then analyzed for potassium using procedure LA-505-151, revision D-2, on May 19 and 24, 1995. No procedural anomalies occurred during the preparations or analyses, and there were no technical difficulties. Sample results ranged from less than the detection limit to 60.9 $\mu\text{g/ml}$. As discussed above in Quality Control, the program's required PQL of 1 $\mu\text{g/ml}$ was not able to be met. The reported detection limit was 30 times greater than the required PQL with a value of 30 $\mu\text{g/ml}$.

Analytical accuracy was determined on the basis of five spiked samples. The spike percent recoveries ranged from 98.2 to 124.4. Four of the five spiked results were within the program's specified control limits of 100 ± 20 percent recovery. Nitrate control standards performed well, with results ranging from 94.8 to 103.3 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three replicate values for a sample. The calculable precision result for sample FC-B24 was 6.0 RSD, which was within the program's specified control limits of ± 20 RSD. Precision RSD was not able to be calculated for samples FC-B30 and FC-B38 because one or more of the results for each sample was less than the detection limit.

No contamination was observed in any of the preparation blanks. One blank was analyzed in each batch of samples.

Uranium by Laser-Induced Kinetic Phosphorescence

Samples were analyzed for uranium using procedure LA-925-009, revision A-0, on May 8, 12 and June 13, 1995. No procedural anomalies occurred during the analyses, and there were no technical difficulties. Sample results ranged from less than the detection limit to 4.40 $\mu\text{g/ml}$.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 132.0 to 161.0, where none were within the program's specified control limits of 100 ± 20 percent recovery. The consistency of the positive spike bias tended to indicate that background interference was present in the samples. No attempt was made to determine or

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resolve the interference. Uranium control standards performed well, with results ranging from 92.7 to 103.1 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three replicate values for a sample. The precision results ranged from 1.5 to 11.4 RSD, which were within the program's specified control limits of ± 20 RSD.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Strontium-89/90 by Separation/Proportional Counting

Samples were analyzed for ^{89/90}Sr using procedure LA-220-101, revision D-1, on May 8, 11, 19 and June 12, 1995. No procedural anomalies occurred during the analyses. There were no technical difficulties other than that two samples could not be analyzed for this analyte because of insufficient sample volume. Sample results ranged from 0.000258 to 2.36 $\mu\text{Ci/ml}$.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 93.0 to 122.3, where two of the three spikes were within the program's specified control limits of 100 ± 20 percent recovery. Strontium-89/90 control standards performed well, with results ranging from 93.6 to 99.4 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three replicate values for a sample. The precision results ranged from 3.7 to 29.1 RSD, where two of three were within the program's specified control limits of ± 20 RSD.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Tritium by Lachat Micro-Distillation/Liquid Scintillation Counting

Samples were analyzed for tritium using procedure LA-218-114, revision A-4, on May 5, 7 and June 12, 1995. No procedural anomalies occurred during the analyses. There were no technical difficulties. Sample results ranged from 0.0000177 to 0.0307 $\mu\text{Ci/ml}$.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 86.2 to 209.1, where only one of the three spikes was within the program's specified control limits of 100 ± 20 percent recovery. From a literature review of the background radiochemical quantities sufficient to create significant bias in accuracy, the likely source of interference was indeterminable. The actual concentrations of all other radiochemicals found in samples for this project were determined to be

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insufficient to cause significant accuracy bias. Tritium control standards performed well, with results ranging from 97.3 to 113.7 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three replicate values for a sample. The precision results ranged from 1.4 to 4.2 RSD, which were all within the program's specified control limits of ± 20 RSD.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Cesium-137 by Gamma Energy Analysis (GEA)

Samples were analyzed for ^{137}Cs using procedure LA-548-121, revision D-1, on May 4 and 11, 1995. One batch of data was rejected and rerun because the ^{137}Cs control standard failed to meet laboratory operational control limits. Other than the one rejected batch, no procedural anomalies occurred during the analyses. There were no technical difficulties. Sample results ranged from 0.409 to 32.7 $\mu\text{Ci/ml}$.

Analytical accuracy was determined on the basis of a ^{137}Cs control standard. The percent recoveries of the control standard ranged from 100.0 to 101.9, and were within the program's specified control limits of 100 ± 10 percent recovery. The spiking of samples for GEA analytes is technically not possible, consequently no spiked analyses were performed.

Analytical precision was evaluated on five samples, where the analyses were performed in triplicate. Precision was calculated as 2 RSD of the three replicate values for a sample. The precision results ranged from 0.1 to 3.5 RSD, which were within the program's specified control limits of ± 10 RSD.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Americium-241 by GEA

Samples were analyzed for ^{241}Am using procedure LA-548-121, revision D-1, on May 4 and 11, 1995. No procedural anomalies occurred during the analyses. There were no technical difficulties. All sample results were less than the detection limit, which were greater for this procedure than for analysis of ^{241}Am by extraction/alpha energy analysis.

Analytical accuracy was determined on the basis of a surrogate (^{137}Cs) control standard. The percent recoveries of the control standard ranged from 101.5 to 101.9, and were within the program's specified control limits of 100 ± 10 percent recovery. The spiking of samples for GEA analytes is technically not possible, consequently no spiked analyses were performed.

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Analytical precision was evaluated on two samples, where the analyses were performed in triplicate. Precision is typically calculated as 2 RSD of the three replicate values for a sample; however, the RSD values for both of the samples was incalculable because all analytical values were less than the detection limit.

No contamination was observed in any of the reagent blanks. One reagent blank was analyzed in each batch of samples.

Americium-241 by Extraction/Alpha Energy Analysis (AEA)

Samples were acid digested on May 2, 5, 10 and 22, 1995, using procedure LA-505-158, revision A-4, and then analyzed for ²⁴¹Am using procedure LA-953-103, revision A-3, on May 15 and 16 and June 2, 1995. No procedural anomalies occurred during the analyses. There were no technical difficulties. All sample results were less than the detection limit.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 82.0 to 94.3, and were within the program's specified control limits of 100 $\pm$ 20 percent recovery. Americium-241 control standards performed within laboratory acceptance, with results ranging from 86.6 to 96.1 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision is typically calculated as 2 RSD of the three replicate values for a sample; however, the RSD values for each of the three samples was incalculable because all analytical values were less than the detection limit.

No contamination was observed in any of the preparation blanks. One preparation blank was analyzed in each batch of samples.

Plutonium-239/240 by Ion Exchange/AEA

Samples were acid digested on May 2, 5, 10 and 22, 1995, using procedure LA-505-158, revision A-4. The analysis of ^{239/240}Pu was performed using two procedures: LA-503-156, revision A-0, and LA-943-127, revision A-0, on May 17, 24 and 25 and June 5, 1995. The program specified the use of the former procedure; however the laboratory discontinued its use midway through the project and replaced it with the latter procedure. Sample FC-B40 was rerun because its AEA resolution was poor. Other than the one sample which was rerun, no procedural anomalies occurred during the analyses. There were no technical difficulties. Except for sample FC-B45, which had a result slightly greater than the detection limit, all sample results were less than the detection limit.

Analytical accuracy was determined on the basis of spiked samples. The spike percent recoveries ranged from 75.6 to 96.9. Two of the three spikes were

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within the program's specified control limits of 100 ± 20 percent recovery. For those data cited in this report, the performance of $^{239/240}\text{Pu}$ control standards was within laboratory acceptance limits, with results ranging from 83.6 to 100.0 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision is typically calculated as 2 RSD of the three replicate values for a sample; however, the RSD values for each of the three samples was incalculable because two or more of the analytical values for each sample were less than the detection limit.

No contamination was observed in any of the preparation blanks. One preparation blank was analyzed in each batch of samples.

Plutonium-238 by Ion Exchange/AEA

Samples were acid digested on May 2, 5, 10 and 22, 1995, using procedure LA-505-158, revision A-4. The analysis of ^{238}Pu was performed using two procedures: LA-503-156, revision A-0, and LA-943-127, revision A-0, on May 17, 24 and 25 and June 5, 1995. The program specified the use of the former procedure; however the laboratory discontinued its use midway through the project and replaced it with the latter procedure. Sample FC-840 was rerun because its AEA resolution was poor. Other than the one sample which was rerun, no procedural anomalies occurred during the analyses. There were no technical difficulties. All sample results were less than the detection limit.

No control standard exists for ^{238}Pu , consequently it was not possible to spike samples to evaluate analytical accuracy. Because ^{238}Pu is a byproduct of $^{239/240}\text{Pu}$ analysis, it is possible to use the ^{239}Pu control standard as a surrogate for evaluation of ^{238}Pu accuracy. The performance of ^{239}Pu control standards was within laboratory acceptance limits, with results ranging from 83.6 to 100.0 percent recovery.

Analytical precision was evaluated on three samples, where the analyses were performed in triplicate. Precision is typically calculated as 2 RSD of the three replicate values for a sample; however, the RSD values for each of the three samples was incalculable because all of the analytical values for each sample were less than the detection limit.

No contamination was observed in any of the preparation blanks. One preparation blank was analyzed in each batch of samples.

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SAMPLE DATA SUMMARY

Final Report of K West Basin Canister Water Sample Analyses
KU-105 CISTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-802
CUSTOMER SAMPLE NUMBER: FC-802

Sample #	Anal. Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
SP5K000013	pH Direct	pH	100.5	n/a	3.810	n/a	n/a	n/a	n/a	1.00e-02	n/a
SP5K000013	Ammonia by ISF-Std Additions	ug/mL	105.0	<2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.00	n/a
SP5K000013	Strontium-89/90 High Level	uCi/mL	95.45	<3.05e-05	2.09e-02	n/a	n/a	n/a	n/a	3.22e-05	1.2
SP5K000013	Nitrate by IC - Dionex 4000	ug/mL	95.97	<1.00e-01	8.910	n/a	n/a	n/a	n/a	1.100	n/a
SP5K000013	Nitrite by IC - Dionex 4000	ug/mL	95.64	<1.00e-01	4.280	n/a	n/a	n/a	n/a	1.100	n/a
SP5K000013	Dose Rate in mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.09e-02	n/a
SP5K000013	Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
SP5K000040	B Potassium -ICP-Acid Adjust	ug/mL	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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KU-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B07

CUSTOMER SAMPLE NUMBER: FC-B07

Sample #	AS	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	BPP %	Sub Rec %	Det Limit	Count Err%
5950000034		Uranium by Phosphorescence	ug/mL	102.4	< 3.70e-04	< 3.7e-4	n/a	n/a	n/a	n/a	3.70e-04	n/a
5950000034		pH Direct	ml	100.5	n/a	7.500	n/a	n/a	n/a	n/a	1.00e-02	n/a
5950000034		Ammonia by ISE-Std Additions	ug/mL	105.0	< 2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.000	n/a
5950000034		Strontium-90/94 High Level	uCi/mL	95.45	< 3.05e-05	4.01e-04	n/a	n/a	n/a	n/a	3.20e-05	n/a
5950000034		Nitrate by IC - Dionex 4000	ug/mL	95.97	< 1.00e-01	< .1	n/a	n/a	n/a	n/a	1.00e-01	11.9
5950000034		Nitrite by IC - Dionex 4000	ug/mL	95.64	< 1.00e-01	< .1	n/a	n/a	n/a	n/a	1.00e-01	n/a
5950000034		Iridium by Lachat	uCi/mL	97.30	< 3.30e-06	1.77e-05	n/a	n/a	n/a	n/a	3.30e-06	4.35
5950000034		Flow Rate in mL/hour	grams/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.92e-02	n/a
5950000034		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
5950000034		Ag-251 by Extraction	uCi/mL	86.64	< 3.51e-03	< 2.74e-3	n/a	n/a	n/a	n/a	2.74e-03	4.2
5950000034		Potassium - ICP-Acid Adjust	ug/mL	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a
5950000034		Pu-239 by Ion Exchange	uCi/mL	n/a	< 1.44e-03	< 1.31e-3	n/a	n/a	n/a	n/a	1.31e-03	100.0
5950000034		Pu-239/240 by Ion Exchange	uCi/mL	85.16	< 1.44e-03	< 1.31e-3	n/a	n/a	n/a	n/a	1.31e-03	100.0

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Final Report of K West Basin Canister Water Sample Analyses
KV-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-010

CUSTOMER SAMPLE NUMBER: FC-010

Sampled	RA#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spt Rec %	Det Limit	Count Err%
572000035		Uranium by Phosphorescence	ug/mL	102.4	< 3.70e-04	9.43e-01	n/a	n/a	n/a	n/a	3.70e-04	n/a
572000035		cd Direct	dL	100.5	n/a	0.390	n/a	n/a	n/a	n/a	1.00e-02	n/a
572000035		Ammonia by ISE-Btd Additions	ug/mL	105.0	< 2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.000	n/a
572000035		Strontium-90/90 High Level	uCi/mL	95.45	< 3.00e-05	1.230	n/a	n/a	n/a	n/a	3.20e-05	0.2
572000035		Nitrate by IC - Dionex 4000	ug/mL	95.97	< 1.00e-01	3.150	n/a	n/a	n/a	n/a	1.00e-01	n/a
572000035		Nitrite by IC - Dionex 4000	ug/mL	95.64	< 1.00e-01	2.140	n/a	n/a	n/a	n/a	1.00e-01	n/a
572000035		Itrium by Lechat	uCi/mL	97.30	< 3.30e-06	1.64e-02	n/a	n/a	n/a	n/a	3.30e-06	0.22
572000035		Dose Rate In mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
572000035		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
572000042	B	As-241 by Extraction	uCi/mL	86.64	< 3.51e-03	< 2.41e-3	n/a	n/a	n/a	n/a	2.41e-03	100.0
572000042	B	Potassium - ICP-Acid Adjust	ug/mL	96.97	< 4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a
572000042	B	Pu-239 by Ion Exchange	uCi/mL	n/a	< 1.44e-03	< 7.03e-4	n/a	n/a	n/a	n/a	7.03e-04	100.0
572000042	B	Pu-239/240 by Ion Exchange	uCi/mL	85.16	< 1.44e-03	< 7.03e-4	n/a	n/a	n/a	n/a	7.03e-04	100.0

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KW-105 CNSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-014

CUSTOMER SAMPLE NUMBER: FC-014

Sample ID	RAW Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
SP5K000047	IC Direct	µM	100.2	N/A	8.110	8.100	8.105	0.12	N/A	1.00e-02	N/A
SP5K000047	Ammonia by IC - Std Additions	µM	105.0	<2.00e-01	< 3.00	N/A	N/A	N/A	N/A	5.00	N/A
SP5K000047	Strontium-90 by High Level	µCi/mL	96.36	3.34e-05	2.50e-04	N/A	N/A	N/A	N/A	2.67e-05	14.5
SP5K000047	Nitrate by IC - Dionex 4000	µM/mL	95.97	<1.00e-01	< 0.1	N/A	N/A	N/A	N/A	1.00e-01	N/A
SP5K000047	Nitrite by IC - Dionex 4000	µM/mL	95.64	<1.00e-01	< 0.1	N/A	N/A	N/A	N/A	1.00e-01	N/A
SP5K000047	Dose Rate in mrad/hour	mrad/hour	N/A	N/A	15.00	N/A	N/A	N/A	N/A	9.99e-02	N/A
SP5K000047	Appearance of Sample		N/A	N/A	complete	N/A	N/A	N/A	N/A	N/A	N/A
SP5K000047	Potassium - TCP-Acid Adjust	µg/mL	96.97	4.90e-03	< 30.00	N/A	N/A	N/A	N/A	30.00	N/A

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Final Report of K West Basin Canister Water Sample Analyses
KU-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B15

CUSTOMER SAMPLE NUMBER: FC-B15

Sample#	R/A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	BPO %	Sok Rec %	Det Limit	Count Err%
S95K000036		Uranium by Phosphorescence	ug/mL	102.4	<3.70e-04	1.990	n/a	n/a	n/a	n/a	3.70e-04	n/a
S95K000036		U Direct	ug/mL	100.5	n/a	8.950	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000036		Ammonia by ISE Std Additions	ug/mL	105.0	<2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.000	n/a
S95K000036		Strontium-89/90 High Level	uCi/mL	95.45	<3.00e-05	3.55e-01	n/a	n/a	n/a	n/a	3.21e-05	0.4
S95K000036		Nitrate by IC - Dionex 4000	ug/mL	95.97	<1.00e-01	< .1	n/a	n/a	n/a	n/a	1.00e-01	n/a
S95K000036		Nitrite by IC - Dionex 4000	ug/mL	95.64	<1.00e-01	< .1	n/a	n/a	n/a	n/a	1.00e-01	n/a
S95K000036		Iridium by Lechat	uCi/mL	97.30	<3.30e-06	6.17e-03	n/a	n/a	n/a	n/a	3.30e-06	0.36
S95K000036		Dose Rate in mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000036		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000043	B	Am-241 by Extraction	uCi/mL	86.64	<3.51e-03	< 2.41e-3	n/a	n/a	n/a	n/a	2.41e-03	100.0
S95K000043	B	Potassium -ICP-Acid Adjust	ug/mL	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	39.00	n/a
S95K000043	B	Pu-238 by Ion Exchange	uCi/mL	n/a	<1.44e-03	< 3.09e-3	n/a	n/a	n/a	n/a	3.09e-03	100.0
S95K000043	B	Pu-239/240 by Ion Exchange	uCi/mL	85.16	<1.44e-03	< 3.09e-3	n/a	n/a	n/a	n/a	3.09e-03	100.0

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WHC-SD-WM-DP-138, REV. 0

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Final Report of K West Basin Canister Water Sample Analyses
KW-105 CWSIR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-816
CUSTOMER SAMPLE NUMBER: FC-816

Sample#	R	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Isok Rec %	Det Limit	Count	Err%
595K000037		pH	100.5	n/a	9.340	n/a	n/a	n/a	n/a	1.00e-02	n/a	n/a
595K000037		Ascorbic by 105-31d Additions	105.0	<2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.000	n/a	n/a
595K000037		Strontium-89/90 M/L Level	96.36	3.34e-05	8.44e-01	n/a	n/a	n/a	n/a	2.71e-05	n/a	n/a
595K000037		Nitrate by IC - Dionex 4000	95.97	<1.00e-01	17.40	n/a	n/a	n/a	n/a	1.00e-01	n/a	n/a
595K000037		Nitrite by IC - Dionex 4000	95.64	<1.00e-01	3.000	n/a	n/a	n/a	n/a	1.00e-01	n/a	n/a
595K000037		Base Rate in mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a	n/a
595K000037		Appearance of Sample	n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a	n/a
595K000044	B	Potassium - ICP-Acid Adjust	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a	n/a

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CMSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B17

CUSTOMER SAMPLE NUMBER: FC-B17

Sampled	R	Ad	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000038			pH Direct	pH	100.5	n/a	8.230	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000038			Ammonia by ISE-Std Additions	um/ml	105.0	<2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.000	n/a
S95K000038			Strontium-89/90 High Level	uCi/ml	96.36	3.34e-05	ins.sam	n/a	n/a	n/a	n/a	1.00e-04	n/a
S95K000038			Nitrate by IC - Dionex 4000i	ug/ml	95.97	<1.00e-01	2.71e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S95K000038			Nitrite by IC - Dionex 4000i	ug/ml	95.64	<1.00e-01	< 0.1	n/a	n/a	n/a	n/a	1.00e-01	n/a
S95K000038			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000038			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000045	B		Potassium -ICP-Acid Adjust	ug/ml	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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KW-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B18

CUSTOMER SAMPLE NUMBER: FC-B18

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000039			pH Direct	pH	100.5	n/a	9.160	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000039			Ammonia by ISE-Std Additions	ug/mL	105.0	<2.00e-01	< 5.00	n/a	n/a	n/a	n/a	5.000	n/a
S95K000039			Strontium-89/90 High Level	uCi/mL	96.36	3.34e-05	ins.sam.	n/a	n/a	n/a	n/a	1.00e-04	n/a
S95K000039			Nitrate by IC - Dionex 4000i	ug/mL	95.97	<1.00e-01	26.80	n/a	n/a	n/a	n/a	1.00e-01	n/a
S95K000039			Nitrite by IC - Dionex 4000i	ug/mL	95.64	<1.00e-01	7.72e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S95K000039			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000039			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000046	B		Potassium -ICP-Acid Adjust	ug/mL	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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Final Report of K West Basin Canister Water Sample Analyses
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SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B19

CUSTOMER SAMPLE NUMBER: FC-B19

Sample#	R	AS	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000001			pH Direct	pH	99.67	n/a	8.010	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000001			Ammonia by ISE-Std Additions	µM/ml	92.01	9.48e-02	< 1.00e-01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000001			Strontium-89/90 High Level	µCi/ml	98.18	<3.68e-03	1.160	n/a	n/a	n/a	n/a	5.00e-03	1.96E+00
S95K000001			Nitrate by IC - Dionex 4000i	µg/ml	98.28	<1.000	3.540	n/a	n/a	n/a	n/a	2.000	n/a
S95K000001			Nitrite by IC - Dionex 4000i	µg/ml	98.12	<1.000	2.600	n/a	n/a	n/a	n/a	2.000	n/a
S95K000001			Cesium-137 by GEA	µCi/ml	100.0	<6.75e-05	10.50	n/a	n/a	n/a	n/a	6.75e-05	0.24
S95K000001			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	125.0	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000001			Appearance of Sample		n/a	n/a	COMPLETE	n/a	n/a	n/a	n/a	n/a	n/a
S95K000002	B		Potassium -ICP-Acid Adjust	ug/ml	95.40	4.48e-02	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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Final Report of K West Basin Canister Water Sample Analyses
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SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B21

CUSTOMER SAMPLE NUMBER: FC-B21

Sample#	R	AI	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Count Err%
S95K000051			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000051			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a

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SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B23

CUSTOMER SAMPLE NUMBER: FC-B23

Sample#	R	AN	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPP %	Spk Rec %	Det Limit	Count Err%
S95K000048			pH Direct	ml	100.2	n/a	7.340	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000048			Ammonia by ISE-Std Additions	mg/ml	105.0	<2.00e-01	< 5.00	<5	n/a	n/a	100.0	5.000	n/a
S95K000048			Strontium-87/90 High Level	uCi/ml	96.36	3.34e-05	4.79e-01	n/a	n/a	n/a	n/a	2.69e-05	0.3
S95K000048			Nitrate by IC - Bismar 4000	mg/ml	95.75	<1.00e-01	39.30	39.60	39.45	0.76	96.00	1.100	n/a
S95K000048			Nitrite by IC - Bismar 4000	mg/ml	96.09	<1.00e-01	3.300	3.400	3.350	2.99	89.70	1.100	n/a
S95K000048			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	15.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000048			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000050	B		Potassium -ICP-Acid Adjust	ug/ml	96.97	4.90e-03	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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Final Report of K West Basin Canister Water Sample Analyses
KV-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B24
CUSTOMER SAMPLE NUMBER: FC-B24

Sample #	AS Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RP %	Sok Rec %	Det Limit	Count Err%
5757000025	Uranium by Phosphorescence	ug/mL	103.1	7.92e-04	1.400	1.430	1.515	11.2	161.0	3.70e-05	n/a
5757000025	Uranium by Phosphorescence	ug/mL	99.67	7.92e-04	7.690	n/a	n/a	n/a	n/a	1.00e-02	n/a
5757000025	Ammonia by SE-Sid Additions	ug/mL	103.4	7.92e-04	< 1.00E-01	n/a	n/a	n/a	n/a	10.00	n/a
5757000025	Strontium by IC - Blank Level	ug/mL	93.66	4.57e-03	3.14e-01	n/a	n/a	n/a	n/a	3.12e-03	3.6
5757000025	Nitrate by IC - Blank Level	ug/mL	97.96	< 1.00E-01	< 21	n/a	n/a	n/a	n/a	16.00	n/a
5757000025	Nitrate by IC - Blank Level	ug/mL	98.31	< 1.00E-01	< 16.4	n/a	n/a	n/a	n/a	16.00	n/a
5757000025	Nitrate by IC - Blank Level	ug/mL	113.7	< 1.00E-01	3.07e-02	3.17e-02	3.12e-02	3.21	209.1	3.02e-04	61
5757000025	Iridium by Lachet	ug/mL	101.9	< 1.00E-01	29.90	n/a	n/a	n/a	n/a	6.51e-04	0.27
5757000025	Cadmium by Lachet	ug/mL	101.9	< 1.00E-01	< 1.7e-1	n/a	n/a	n/a	n/a	1.74e-03	n/a
5757000025	Amplifier 251 by SEA	ug/mL	n/a	< 1.00E-01	< 1.7e-1	n/a	n/a	n/a	n/a	9.99e-02	n/a
5757000025	Base Rate in ug/hour	ug/hour	n/a	n/a	125.0	n/a	n/a	n/a	n/a	n/a	n/a
5757000025	Appearance of Sample	ug/hour	n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
5757000030	Am-241 by Extraction	ug/mL	96.09	< 1.00e-02	< 3.90e-3	< 6.83e-3	n/a	n/a	94.10	3.90e-03	100.0
5757000030	Potassium - ICP-Acid Adjust	ug/mL	98.44	5.23e-02	53.83	50.84	52.33	5.71	98.18	30.00	n/a
5757000030	Pu-239 by Ion Exchange	ug/mL	n/a	< 2.00e-04	< 2.05e-4	< 5.10e-4	n/a	n/a	n/a	2.95e-04	100.0
5757000030	Pu-239/240 by Ion Exchange	ug/mL	91.41	< 2.00e-04	< 2.95e-4	< 5.10e-4	n/a	n/a	81.00	2.95e-04	9.5

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Final Report of K West Basin Canister Water Sample Analyses
KW-105 CMSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B25

CUSTOMER SAMPLE NUMBER: FC-B25

Sample#	R	AN#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000005			pH Direct	pH	99.67	n/a	7.830	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000005			Ammonia by ISE-Std Additions	ug/ml	92.01	9.48e-02	< 1.00e-01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000005			Strontium-89/90 High Level	uCi/ml	98.18	<3.68e-03	5.09e-01	n/a	n/a	n/a	n/a	4.10e-03	2.70E+00
S95K000005			Nitrate by IC - Dionex 40001	ug/ml	101.2	<1.000	45.40	n/a	n/a	n/a	n/a	21.00	n/a
S95K000005			Nitrite by IC - Dionex 40001	ug/ml	100.0	<8.00e-01	< 16.8	n/a	n/a	n/a	n/a	16.80	n/a
S95K000005			Cesium-137 by GEA	uCi/ml	100.0	<6.75e-05	1.260	n/a	n/a	n/a	n/a	6.75e-05	0.68
S95K000005			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	40.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000005			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000007	B		Potassium -ICP-Acid Adjust	ug/ml	95.40	4.48e-02	35.09	n/a	n/a	n/a	124.4	30.00	n/a

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KU-105 CISTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B26
CUSTOMER SAMPLE NUMBER: FC-B26

Sampled	RA#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	APP %	Std. Rec. %	Det. Limit	Count Err%
S95K000009		pH Direct	pH	99.67	n/a	7.870	7.840	7.855	0.38	n/a	1.00e-02	n/a
S95K000009		Ammonia by ISE Std Additions	mg/L	92.01	9.48e-03	< 1.00e-01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000009		Strontium-90/90 High Level	uCi/mL	95.45	4.38e-03	1.060	n/a	n/a	n/a	n/a	3.03e-03	2.0
S95K000009		Nitrate by IC - Dionex 4000	mg/L	101.2	< 1.000	60.30	n/a	n/a	n/a	n/a	21.00	n/a
S95K000009		Nitrite by IC - Dionex 4000	mg/L	100.0	< 0.00e-01	< 16.8	n/a	n/a	n/a	n/a	16.80	n/a
S95K000009		Cesium-137 by GEA	uCi/mL	100.0	< 6.61e-04	2.090	n/a	n/a	n/a	n/a	6.61e-04	.45
S95K000009		Dose Rate in mrad/hour	mrad/hour	n/a	n/a	75.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000009		Appearance of Sample		n/a	n/a	COMPLETE	n/a	n/a	n/a	n/a	n/a	n/a
S95K000016	8	Potassium -ICP-Acid Adjust	ug/mL	95.40	4.48e-02	57.22	n/a	n/a	n/a	n/a	30.00	n/a

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WHC-SD-WM-DP-138, REV. C

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B29
CUSTOMER SAMPLE NUMBER: FC-B29

Sample/	R	Ad	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000010			pH Direct	pH	99.67	n/a	7.710	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000010			Ammonia by 15C-Std Additions	ug/ml	92.01	9.48e-02	< 1.00e-01	< 1.00e-01	n/a	n/a	95.40	10.00	n/a
S95K000010			Strontium-89/90 High Level	uCi/ml	95.45	4.34e-03	3.14e-01	n/a	n/a	n/a	n/a	3.04e-03	3.8
S95K000010			Nitrate by IC - Dionex 4000	ug/ml	101.2	< 1.00e-01	61.50	64.10	63.00	7.21	113.2	21.00	n/a
S95K000010			Nitrite by IC - Dionex 4000	ug/ml	100.0	< 8.00e-01	< 16.8	< 16.8	n/a	n/a	100.5	16.80	n/a
S95K000010			Caesium-137 by GEA	uCi/ml	100.0	< 6.61e-04	4.09e-01	n/a	n/a	n/a	n/a	6.61e-04	1.2
S95K000010			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	40.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000010			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000017	B		Potassium -ICP-Acid Adjust	ug/ml	95.40	4.48e-02	43.49	n/a	n/a	n/a	n/a	30.00	n/a

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Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-830
CUSTOMER SAMPLE NUMBER: FC-830

Sample#	RA#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
892K000026		Uranium by Phosphorescence	uM/ml	92.73	<3.70e-05	1.580	1.580	1.580	0.00	133.0	3.70e-05	n/a
892K000026		pH Direct	pH	99.67	n/a	7.490	n/a	n/a	n/a	n/a	1.00e-02	n/a
892K000026		Ammonia by ISE-Std Additions	uM/ml	103.4	7.05e-02	< 1.00E01	n/a	n/a	n/a	n/a	10.00	n/a
892K000026		Strontium-90/90 High Level	uCi/ml	93.64	4.57e-03	2.360	n/a	n/a	n/a	n/a	2.91e-03	1.3
892K000026		Nitrate by IC - Bionex 4000i	uM/ml	97.94	<1.000	< 21	n/a	n/a	n/a	n/a	21.00	n/a
892K000026		Nitrite by IC - Bionex 4000i	uM/ml	98.31	<8.00e-01	< 16.8	n/a	n/a	n/a	n/a	16.80	n/a
892K000026		Tritium by Lachot	uCi/ml	103.7	<3.51e-06	2.89e-02	2.85e-02	2.87e-02	1.39	172.5	3.51e-06	.70
892K000026		Cesium-137 by GEA	uCi/ml	101.9	<6.51e-04	32.70	33.60	33.15	2.71	n/a	6.51e-04	0.26
892K000026		Americium-241 by GEA	uCi/ml	n/a	<1.76e-03	< 1.24e-1	<1.25e-1	n/a	n/a	n/a	1.76e-03	n/a
892K000026		Dose Rate in uRad/hour	uRad/hour	n/a	n/a	150.0	n/a	n/a	n/a	n/a	9.99e-02	n/a
892K000026		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
892K000031	B	Am-241 by Extraction	uCi/ml	91.53	<5.41e-03	< 3.35e-3	<9.54e-3	n/a	n/a	82.00	3.35e-03	100.0
892K000031	B	Potassium -ICP-Acid Adjust	uM/ml	98.44	5.23e-02	< 30	<30.0000	n/a	n/a	101.8	30.00	n/a
892K000031	B	Pu-238 by Ion Exchange	uCi/ml	n/a	<8.36e-04	< 9.35e-4	<7.11e-4	n/a	n/a	n/a	9.35e-04	100.0
892K000031	B	Pu-239/240 by Ion Exchange	uCi/ml	100.0	<8.36e-04	< 9.35e-4	<7.11e-4	n/a	n/a	96.90	9.35e-04	100.0

WHCSD-WM-DP-138, REV. 0

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-B35

CUSTOMER SAMPLE NUMBER: FC-B35

Sample#	R#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000011		pH Direct	pH	99.67	n/a	7.400	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000011		Ammonia by 18E-Std Additions	mg/ml	103.4	7.05e-02	< 1.00E01	<1.00E01	n/a	n/a	96.20	10.00	n/a
S95K000011		Strontium-90/90 High Level	uCi/ml	99.40	2.86e-03	1.130	n/a	n/a	n/a	n/a	4.51e-03	2.0
S95K000011		Nitrate by IC - Dionex 4000	mg/ml	97.94	<1.000	< 21	<21	n/a	n/a	100.4	21.00	n/a
S95K000011		Nitrite by IC - Dionex 4000	mg/ml	98.31	<8.00e-01	< 16.8	<16.8	n/a	n/a	97.40	16.80	n/a
S95K000011		Cesium-137 by GEA	uCi/ml	100.0	<6.61e-04	14.50	n/a	n/a	n/a	n/a	6.61e-04	.2
S95K000011		Base Rate in mrad/hour	mrad/hour	n/a	n/a	75.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000011		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000018	B	Potassium -ICP-Acid Adjust	ug/ml	94.60	3.92e-02	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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ref.
WMC-SD-WM-DP-138, REV. 0

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CMSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-837

CUSTOMER SAMPLE NUMBER: FC-837

Sample#	R	AS	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
695K000012			pH Direct	nH	99.67	n/a	7.519	n/a	n/a	n/a	n/a	1.00e-02	n/a
695K000012			Ammonia by ISE-Std Additions	ug/ml	92.01	9.48e-02	< 1.00e-01	n/a	n/a	n/a	n/a	10.00	n/a
695K000012			Strontium-89/90 High Level	uCi/ml	95.45	4.38e-03	9.46e-01	1.260	1.103	28.5	122.3	2.98e-03	2.1
695K000012			Nitrate by IC - Dionex 4000	ug/ml	98.28	<1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
695K000012			Nitrite by IC - Dionex 4000	ug/ml	98.12	<1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
695K000012			Cesium-137 by GEA	uCi/ml	100.0	<6.61e-04	8.010	8.010	8.010	0.00	n/a	6.61e-04	.27
695K000012			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	100.0	n/a	n/a	n/a	n/a	9.99e-02	n/a
695K000012			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
695K000019	B		Potassium - ICP-Acid Adjust	ug/ml	94.80	3.92e-02	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

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ref.
WHC-SD-WM-DP-138, REV. 0

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-838

CUSTOMER SAMPLE NUMBER: FC-838

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000027			Uranium by Phosphorescence	ug/ml	92.73	<3.70e-05	3.38e-01	3.32e-01	3.35e-01	1.79	132.0	3.70e-05	n/a
S95K000027			oil Direct	oil	99.67	n/a	7.420	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000027			Ammonia by ISE-Std Additions	ug/ml	103.4	7.05e-02	< 1.00E01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000027			Strontium-89/90 High Level	uCi/ml	93.64	4.57e-03	3.10e-01	n/a	n/a	n/a	n/a	2.97e-03	3.8
S95K000027			Nitrate by IC - Dionex 4000	ug/ml	97.94	<1.000	< 21	n/a	n/a	n/a	n/a	21.00	n/a
S95K000027			Nitrite by IC - Dionex 4000	ug/ml	98.31	<8.00e-01	< 16.8	n/a	n/a	n/a	n/a	16.80	n/a
S95K000027			Tritium By Lechat	uCi/ml	103.7	<3.51e-06	1.76e-02	1.71e-02	1.74e-02	2.88	86.20	3.51e-06	.90
S95K000027			Cesium-137 by GEA	uCi/ml	101.9	<6.51e-04	15.70	15.70	15.70	0.00	n/a	6.51e-04	0.37
S95K000027			Americium-241 by GEA	uCi/ml	n/a	<1.76e-03	< 8.54e-2	<8.56e-2	n/a	n/a	n/a	1.76e-03	n/a
S95K000027			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	125.0	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000027			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000032	8		Am-241 by Extraction	uCi/ml	93.16	<9.64e-03	< 2.55e-2	<3.06e-3	n/a	n/a	94.30	2.55e-02	100.0
S95K000032	8		Potassium -ICP-Acid Adjust	ug/ml	98.44	5.23e-02	< 30	31.94	n/a	n/a	111.9	30.00	n/a
S95K000032	8		Pu-238 by Ion Exchange	uCi/ml	n/a	<3.77e-04	< 1.25e-3	<1.70e-3	n/a	n/a	n/a	1.25e-03	11.3
S95K000032	8		Pu-239/240 by Ion Exchange	uCi/ml	83.59	<3.77e-04	< 1.25e-3	<1.70e-3	n/a	n/a	75.60	1.25e-03	100.0

ref.
WHCSD-WM-DP-138, REV. C

Final Report of K West Basin Canister Water Sample Analyses
KU-105 CISTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-839
CUSTOMER SAMPLE NUMBER: FC-839

Sample#	B	A	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	SPD %	Spk Rec %	Det Limit	Count Err
SP5K000013			pH Direct	pH	99.67	n/a	8.260	n/a	n/a	n/a	n/a	1.00e-02	n/a
SP5K000013			Ammonia by ISE-Std Additions	ug/mL	92.01	9.49e-02	13.30	n/a	n/a	n/a	n/a	10.00	n/a
SP5K000013			Strontium-89/90 High Level	uCi/mL	99.40	2.86e-03	7.94e-01	7.60e-01	7.78e-01	4.63	97.40	4.63e-03	2.4
SP5K000013			Nitrate by IC - Dionex 4000i	ug/mL	101.2	<1.000	34.80	n/a	n/a	n/a	n/a	21.00	n/a
SP5K000013			Nitrite by IC - Dionex 4000i	ug/mL	100.0	<0.00e-01	< 16.0	n/a	n/a	n/a	n/a	16.00	n/a
SP5K000013			Cesium-137 by GC	uCi/mL	101.5	<5.15e-04	15.40	15.60	15.50	1.29	n/a	5.65e-04	.18
SP5K000013			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	125.0	n/a	n/a	n/a	n/a	9.99e-02	n/a
SP5K000013			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
SP5K000020	B		Potassium - ICP-Acid Adjust	ug/mL	94.80	3.92e-02	60.93	n/a	n/a	n/a	n/a	30.00	n/a

ref.
WHC-SD-WM-DP-138, REV. 6

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B40

CUSTOMER SAMPLE NUMBER: FC-B40

Sample#	R AS	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
595K000023		Uranium by Phosphorescence	ug/ml	103.1	7.92e-04	4.488	n/a	n/a	n/a	n/a	3.70e-05	n/a
595K000023		pH Direct	pH	99.67	n/a	7.830	n/a	n/a	n/a	n/a	1.00e-02	n/a
595K000023		Ammonia by ISE-Std Additions	ug/ml	103.4	7.05e-02	< 1.00E01	n/a	n/a	n/a	n/a	10.00	n/a
595K000023		Strontium-90/90 High Level	uCi/ml	94.55	7.04e-03	1.72e-01	n/a	n/a	n/a	n/a	2.94e-03	5.1
595K000023		Nitrate by IC - Dionex 4000i	ug/ml	97.94	< 1.000	< 21	n/a	n/a	n/a	n/a	21.00	n/a
595K000023		Nitrite by IC - Dionex 4000i	ug/ml	98.31	< 0.00e-01	< 16.8	n/a	n/a	n/a	n/a	16.80	n/a
595K000023		Tritium by Lachat	uCi/ml	113.7	< 3.04e-06	2.14e-02	n/a	n/a	n/a	n/a	3.04e-06	.45
595K000023		Cesium-137 by GEA	uCi/ml	101.5	< 5.45e-04	21.50	n/a	n/a	n/a	n/a	5.45e-04	.15
595K000023		Americium-241 by GEA	uCi/ml	n/a	< 1.49e-03	< 4.04e-2	n/a	n/a	n/a	n/a	1.49e-03	n/a
595K000023		Dose Rate in mrad/hour	mrad/hour	n/a	n/a	75.00	n/a	n/a	n/a	n/a	9.94e-02	n/a
595K000023		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
595K000028	B	Am-241 by Extraction	uCi/ml	87.30	< 2.41e-03	< 2.44e-3	n/a	n/a	n/a	n/a	2.44e-03	100.0
595K000028	B	Potassium - ICP-Acid Adjust	ug/ml	94.60	3.92e-02	< 30.00	n/a	n/a	n/a	103.1	30.00	n/a
595K000028	B	Pu-238 by Ion Exchange	uCi/ml	n/a	< 3.39e-04	< 2.22e-4	n/a	n/a	n/a	n/a	2.22e-04	100.0
595K000028	B	Pu-239/240 by Ion Exchange	uCi/ml	89.06	< 3.39e-04	< 2.22e-4	n/a	n/a	n/a	n/a	2.22e-04	100.0

ref.
WMC-SD-WM-DP-138, REV. C

Final Report of K West Basin Canister Water Sample Analyses
KU-105 CNSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B41

CUSTOMER SAMPLE NUMBER: FC-B41

Sample#	R/M	Analyte	Unit	Standard Z	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000014		pH Direct	pH	99.67	n/a	7.750	7.750	7.750	0.00	n/a	1.00e-02	n/a
S95K000014		Ammonia by ISF-Sig Additions	ug/mL	103.4	7.05e-02	< 1.00E01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000014		Strontium-89/90 High Level	uCi/mL	99.40	2.86e-03	1.000	n/a	n/a	n/a	n/a	4.50e-03	2.0
S95K000014		Nitrate by IC - Dionex 4000	ug/mL	98.28	< 1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
S95K000014		Nitrite by IC - Dionex 4000	ug/mL	98.12	< 1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
S95K000014		Cesium-137 by GEA	uCi/mL	101.5	< 5.45e-04	13.70	n/a	n/a	n/a	n/a	5.45e-04	.19
S95K000014		Dose Rate in mrad/hour	mrad/hour	n/a	n/a	50.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000014		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000021	B	Potassium - ICP-Acid Adjust	ug/mL	94.80	3.92e-02	34.81	n/a	n/a	n/a	n/a	30.00	n/a

ref.

WHC-SD-WM-DP-138, REV. C

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-842

CUSTOMER SAMPLE NUMBER: FC-842

Sample#	R	AM	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000015			pH Direct	pH	99.67	n/a	7.800	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000015			Ammonia by ISE-Std Additions	ug/mL	103.4	7.05e-02	< 1.00E01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000015			Strontium-89/90 High Level	uCi/mL	94.53	7.05e-03	1.080	1.100	1.090	1.83	93.00	2.97e-03	2.0
S95K000015			Nitrate by IC - Dionex 4000i	ug/mL	98.28	<1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
S95K000015			Nitrite by IC - Dionex 4000i	ug/mL	98.12	<1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
S95K000015			Cesium-137 by GEA	uCi/mL	101.5	<5.45e-04	12.20	11.00	12.00	3.33	n/a	5.45e-04	.2
S95K000015			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	125.0	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000015			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000022	8		Potassium -ICP-Acid Adjust	ug/mL	94.80	3.92e-02	< 30.00	n/a	n/a	n/a	n/a	30.00	n/a

ref.
WMCSD-WM-DP-138, REV. 0

Final Report of K West Basin Canister Water Sample Analyses
KW-105 CNSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B43

CUSTOMER SAMPLE NUMBER: FC-B43

Sample#	R	AN	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000003			pH Direct	pH	99.67	n/a	7.710	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000003			Ammonia by ISE-Std Additions	ug/mL	92.01	9.48e-02	< 1.00e01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000003			Strontium-89/90 High Level	uCi/mL	98.18	<3.68e-03	1.510	n/a	n/a	n/a	n/a	5.00e-03	1.72e+00
S95K000003			Nitrate by IC - Dionex 4000i	ug/mL	98.28	<1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
S95K000003			Nitrite by IC - Dionex 4000i	ug/mL	98.12	<1.000	< 2	n/a	n/a	n/a	n/a	2.000	n/a
S95K000003			Cesium-137 by GEA	uCi/mL	100.0	<6.75e-05	14.30	n/a	n/a	n/a	n/a	6.75e-05	0.20
S95K000003			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	60.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000003			Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000004	B		Potassium -ICP-Acid Adjust	ug/mL	95.40	4.48e-02	34.81	n/a	n/a	n/a	n/a	30.00	n/a

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ref.
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Final Report of K West Basin Canister Water Sample Analyses
KM-105 CMSTR

SAMPLING EVENT: 1

CUSTOMER SAMPLE NUMBER: FC-B44

CUSTOMER SAMPLE NUMBER: FC-B44

Sample#	R AD	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95K000006		pH Direct	pH	99.67	n/a	7.300	n/a	n/a	n/a	n/a	1.00e-02	n/a
S95K000006		Ammonia by ISE-Std Additions	ug/ml	92.01	9.48e-02	< 1.00e-01	n/a	n/a	n/a	n/a	10.00	n/a
S95K000006		Strontium-89/90 High Level	uCi/ml	98.18	<3.68e-03	5.32e-01	n/a	n/a	n/a	n/a	5.10e-03	2.95E+00
S95K000006		Nitrate by IC - Dionex 4000i	ug/ml	101.2	<1.000	< 21	n/a	n/a	n/a	n/a	21.00	n/a
S95K000006		Nitrite by IC - Dionex 4000i	ug/ml	100.0	<8.00e-01	< 16.8	n/a	n/a	n/a	n/a	16.80	n/a
S95K000006		Cesium-137 by GEA	uCi/ml	100.0	<6.75e-05	18.20	n/a	n/a	n/a	n/a	6.75e-05	0.18
S95K000006		Dose Rate in mrad/hour	mrad/hour	n/a	n/a	75.00	n/a	n/a	n/a	n/a	9.99e-02	n/a
S95K000006		Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
S95K000008	B	Potassium -ICP-Acid Adjust	ug/ml	95.40	4.48e-02	38.17	n/a	n/a	n/a	n/a	30.00	n/a

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WHC-SD-WM-DP-138, REV. 0

Final Report of K West Basin Canister Water Sample Analyses
KU-105 CNSTR

SAMPLING EVENT: 1
CUSTOMER SAMPLE NUMBER: FC-045
CUSTOMER SAMPLE NUMBER: FC-045

Sample #	Analysate	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Std. Rec. %	Det. Limit	Count Err%
595000029	Uranium by Phosphorescence	µg/mL	92.73	<3.70e-05	7.92e-01	n/a	n/a	n/a	n/a	3.70e-05	n/a
595000029	Lead Direct	µg/mL	99.67	n/a	7.00	n/a	n/a	n/a	n/a	1.00e-02	n/a
595000029	Ammonia by ISE std Addition	µg/mL	103.4	7.05e-02	<1.00E-01	n/a	n/a	n/a	n/a	10.00	n/a
595000029	Strontium 87/86 Ratio Level	µCi/mL	94.55	7.05e-01	4.22e-01	n/a	n/a	n/a	n/a	2.94e-03	3.2
595000029	Nitrate by IC - Dionex 2000	µg/mL	97.94	<1.00e-01	<21	n/a	n/a	n/a	n/a	21.00	n/a
595000029	Ultrite by IC - Dionex 2000	µg/mL	98.31	4.00e-01	<16.0	n/a	n/a	n/a	n/a	14.00	n/a
595000029	Ultrite by Lambert	µCi/mL	103.7	<3.51e-04	1.90e-02	n/a	n/a	n/a	n/a	3.51e-06	.52
595000029	Cesium-137 by GEA	µCi/mL	101.9	4.51e-04	19.40	n/a	n/a	n/a	n/a	6.51e-04	0.34
595000029	Barium-137 by GEA	µCi/mL	n/a	<1.70e-03	<9.37e-2	n/a	n/a	n/a	n/a	1.70e-03	n/a
595000029	Flow Rate in mL/hour	mL/hour	n/a	n/a	7.00	n/a	n/a	n/a	n/a	9.90e-02	n/a
595000029	Appearance of Sample		n/a	n/a	complete	n/a	n/a	n/a	n/a	n/a	n/a
595000029	Am-241 by Extraction	µCi/mL	87.30	<2.41e-03	<2.52E-3	n/a	n/a	n/a	n/a	2.52e-03	100.0
595000029	Potassium -ICP-Acid Adjust	µg/mL	94.80	3.92e-02	35.23	n/a	n/a	n/a	n/a	30.00	n/a
595000029	Pu-238 by Ion Exchange	µCi/mL	n/a	<3.46e-04	<7.51e-4	n/a	n/a	n/a	n/a	7.51e-04	11.5
595000029	Pu-239/240 by Ion Exchange	µCi/mL	85.94	<3.46e-04	9.35e-04	n/a	n/a	n/a	n/a	7.51e-04	7.8

ref.
WHC-SD-WM-DP-138, REV. C

ref.
WHC-SD-WM-DP-138, REV. 0

Appearance of Sample
Direct
LA-519-151/E-2

SAMPLE IDENTIFICATION		APPEARANCE			DESCRIPTION	DOSE RATE
Customer Number	Laboratory Number	Color	Clarity	Solids	Organic Layer	mRad/hour
FC-B02	S95K000033	colorless	clear	none	none	15
FC-B07	S95K000034	colorless	clear	none	none	15
FC-B10	S95K000035	colorless	clear	none	none	15
FC-B14	S95K000047	colorless	clear	none	none	15
FC-B15	S95K000036	colorless	clear	none	none	15
FC-B16	S95K000037	colorless	clear	none	none	15
FC-B17	S95K000038	colorless	clear	none	none	15
FC-B18	S95K000039	colorless	clear	none	none	15
FC-B19	S95K000001	colorless	clear	none	not observed	125
FC-B21	S95K000051	colorless	clear	none	none	15
FC-B23	S95K000048	colorless	clear	none	none	15
FC-B24	S95K000025	colorless	clear	none	not observed	125
FC-B25	S95K000005	colorless	clear	none	not observed	40
FC-B26	S95K000009	colorless	clear	none	not observed	75
FC-B29	S95K000010	colorless	clear	none	not observed	40
FC-B30	S95K000026	colorless	clear	none	not observed	150
FC-B35	S95K000011	colorless	clear	none	not observed	75
FC-B37	S95K000012	colorless	clear	none	not observed	100
FC-B38	S95K000027	colorless	clear	none	not observed	125
FC-B39	S95K000013	colorless	clear	none	not observed	125
FC-B40	S95K000023	colorless	clear	none	not observed	75
FC-B41	S95K000014	colorless	clear	none	not observed	50
FC-B42	S95K000015	colorless	clear	none	not observed	125
FC-B43	S95K000003	colorless	clear	none	not observed	60
FC-B44	S95K000006	colorless	clear	none	not observed	75
FC-B45	S95K000024	colorless	clear	none	not observed	75

ref.
WMC-SD-WM-DP-138, REV. 0

pH Analyte Direct LA-212-102C-5										ANALYTICAL QUALITY CONTROL									
SAMPLE ANALYSIS RESULTS																			
SAMPLE IDENTIFICATION																			
Customer Number	Laboratory Number	Initial Result	Duplicate Result	Triplicate Result	Sample Mean	Sample Precision	Standard Recovery	Spike Recovery	Blank	Detection Limit	Counting Error								
FC-B02	S95K000033	3.81	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B45	S95K000024	7.09	n/a	n/a	n/a	n/a	n/a
FC-B07	S95K000034	7.59	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B44	S95K000006	7.30	n/a	n/a	n/a	n/a	n/a
FC-B10	S95K000035	8.39	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B43	S95K000003	7.71	n/a	n/a	n/a	n/a	n/a
FC-B14	S95K000047	8.11	8.10	8.10	8.10	0.14	100.2	n/a	n/a	1.00E-02	n/a	FC-B42	S95K000015	7.80	n/a	n/a	n/a	n/a	n/a
FC-B15	S95K000036	8.95	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B41	S95K000014	7.75	n/a	n/a	n/a	n/a	n/a
FC-B16	S95K000037	9.34	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B40	S95K000023	7.83	n/a	n/a	n/a	n/a	n/a
FC-B17	S95K000038	8.23	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B39	S95K000013	8.26	n/a	n/a	n/a	n/a	n/a
FC-B18	S95K000039	9.16	n/a	n/a	n/a	n/a	100.5	n/a	n/a	1.00E-02	n/a	FC-B38	S95K000027	7.42	n/a	n/a	n/a	n/a	n/a
FC-B19	S95K000001	8.01	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B37	S95K000012	7.51	n/a	n/a	n/a	n/a	n/a
FC-B23	S95K000048	7.34	n/a	n/a	n/a	n/a	100.2	n/a	n/a	1.00E-02	n/a	FC-B35	S95K000011	7.40	n/a	n/a	n/a	n/a	n/a
FC-B24	S95K000025	7.68	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B30	S95K000026	7.49	n/a	n/a	n/a	n/a	n/a
FC-B25	S95K000005	7.83	7.84	7.85	7.85	0.39	99.7	n/a	n/a	1.00E-02	n/a	FC-B29	S95K000010	7.71	n/a	n/a	n/a	n/a	n/a
FC-B26	S95K000009	7.87	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B28	S95K000011	7.40	n/a	n/a	n/a	n/a	n/a
FC-B29	S95K000010	7.71	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B27	S95K000023	7.83	n/a	n/a	n/a	n/a	n/a
FC-B30	S95K000026	7.49	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B26	S95K000014	7.75	n/a	n/a	n/a	n/a	n/a
FC-B35	S95K000011	7.40	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B25	S95K000015	7.80	n/a	n/a	n/a	n/a	n/a
FC-B37	S95K000012	7.51	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B24	S95K000006	7.30	n/a	n/a	n/a	n/a	n/a
FC-B38	S95K000027	7.42	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B23	S95K000003	7.71	n/a	n/a	n/a	n/a	n/a
FC-B39	S95K000013	8.26	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B22	S95K000015	7.80	n/a	n/a	n/a	n/a	n/a
FC-B40	S95K000023	7.83	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B21	S95K000014	7.75	n/a	n/a	n/a	n/a	n/a
FC-B41	S95K000014	7.75	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B20	S95K000023	7.83	n/a	n/a	n/a	n/a	n/a
FC-B42	S95K000015	7.80	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B19	S95K000003	7.71	n/a	n/a	n/a	n/a	n/a
FC-B43	S95K000003	7.71	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B18	S95K000006	7.30	n/a	n/a	n/a	n/a	n/a
FC-B44	S95K000006	7.30	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B17	S95K000014	7.75	n/a	n/a	n/a	n/a	n/a
FC-B45	S95K000024	7.09	n/a	n/a	n/a	n/a	99.7	n/a	n/a	1.00E-02	n/a	FC-B16	S95K000015	7.80	n/a	n/a	n/a	n/a	n/a

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Ammonia by ISE-Sid Additions

Direct

LA-631-001/A-0

SAMPLE IDENTIFICATION			SAMPLE ANALYSIS RESULTS										ANALYTICAL QUALITY CONTROL										
Customer Number	Laboratory Number	Initial Result µg/ml	Duplicate Result µg/ml	Triplicate Result µg/ml	Sample Mean µg/ml	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank µg/ml	Detection Limit µg/ml	Counting Error %	Customer Number	Laboratory Number	Initial Result µg/ml	Duplicate Result µg/ml	Triplicate Result µg/ml	Sample Mean µg/ml	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank µg/ml	Detection Limit µg/ml	Counting Error %
FC-B02	S95K000033	< 5.00E+00	n/a	n/a	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	FC-B07	S95K000034	< 5.00E+00	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	< 2.00E-01	5.00E+00
FC-B10	S95K000035	< 5.00E+00	n/a	n/a	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	FC-B08	S95K000036	< 5.00E+00	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	< 2.00E-01	5.00E+00
FC-B14	S95K000047	< 5.00E+00	n/a	n/a	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	FC-B15	S95K000037	< 5.00E+00	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	< 2.00E-01	5.00E+00
FC-B16	S95K000038	< 5.00E+00	n/a	n/a	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	FC-B17	S95K000039	< 5.00E+00	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	< 2.00E-01	5.00E+00
FC-B18	S95K000040	< 5.00E+00	n/a	n/a	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	FC-B19	S95K000041	< 5.00E+00	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	< 2.00E-01	5.00E+00
FC-B23	S95K000048	< 5.00E+00	< 5.00E+00	< 5.00E+00	n/a	n/a	105.0	n/a	< 2.00E-01	5.00E+00	n/a	FC-B24	S95K000005	< 1.00E+01	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	9.48E-02	1.00E+01
FC-B25	S95K000005	< 1.00E+01	n/a	n/a	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	FC-B26	S95K000009	< 1.00E+01	n/a	n/a	95.6	n/a	9.48E-02	1.00E+01	n/a	9.48E-02	1.00E+01
FC-B29	S95K000010	< 1.00E+01	< 1.00E+01	< 1.00E+01	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	FC-B30	S95K000026	< 1.00E+01	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	7.05E-02	1.00E+01
FC-B35	S95K000011	< 1.00E+01	< 1.00E+01	< 1.00E+01	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	FC-B37	S95K000012	< 1.00E+01	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	9.48E-02	1.00E+01
FC-B37	S95K000012	< 1.00E+01	n/a	n/a	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	FC-B38	S95K000027	< 1.00E+01	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	7.05E-02	1.00E+01
FC-B38	S95K000027	< 1.00E+01	n/a	n/a	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	FC-B39	S95K000013	1.33E+01	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	9.48E-02	1.00E+01
FC-B40	S95K000023	< 1.00E+01	n/a	n/a	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	FC-B41	S95K000014	< 1.00E+01	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	7.05E-02	1.00E+01
FC-B42	S95K000016	< 1.00E+01	n/a	n/a	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	FC-B43	S95K000003	< 1.00E+01	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	9.48E-02	1.00E+01
FC-B43	S95K000003	< 1.00E+01	n/a	n/a	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	FC-B44	S95K000006	< 1.00E+01	n/a	n/a	92.0	n/a	9.48E-02	1.00E+01	n/a	9.48E-02	1.00E+01
FC-B45	S95K000024	< 1.00E+01	n/a	n/a	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	FC-B45	S95K000024	< 1.00E+01	n/a	n/a	103.4	n/a	7.05E-02	1.00E+01	n/a	7.05E-02	1.00E+01

ref.
WHC-SD-WM-DP-138, REV. 0

Nitrate by IC - Dionex 4000i

Direct

LA-533-105/C-2

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{g}/\text{ml}$	Duplicate Result $\mu\text{g}/\text{ml}$	Triplicate Result $\mu\text{g}/\text{ml}$	Sample Mean $\mu\text{g}/\text{ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank $\mu\text{g}/\text{ml}$	Detection Limit $\mu\text{g}/\text{ml}$	Counting Error %
FC-B02	S95K000033	8.91E+00	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.1	n/a
FC-B07	S95K000034	<1.00E-01	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B10	S95K000035	3.15E+00	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B14	S95K000047	<1.00E-01	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B15	S95K000036	<1.00E-01	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B16	S95K000037	1.74E+01	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B17	S95K000038	2.71E-01	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B18	S95K000039	2.68E+01	n/a	n/a	n/a	n/a	96.0	n/a	<1.00E-01	1.00E-01	n/a
FC-B19	S95K000001	3.54E+00	n/a	n/a	n/a	n/a	98.3	n/a	<1.00E+00	2.00E+00	n/a
FC-B23	S95K000048	3.93E+01	3.96E+01	3.99E+01	3.96E+01	1.5	95.7	94.0	<1.00E-01	1.10E+00	n/a
FC-B24	S95K000025	<2.10E+01	n/a	n/a	n/a	n/a	97.9	n/a	<1.00E+00	1.68E+01	n/a
FC-B25	S95K000005	4.54E+01	n/a	n/a	n/a	n/a	101.2	n/a	<1.00E+00	2.10E+01	n/a
FC-B26	S95K000009	6.93E+01	n/a	n/a	n/a	n/a	101.2	n/a	<1.00E+00	2.10E+01	n/a
FC-B29	S95K000010	6.15E+01	6.61E+01	6.63E+01	6.46E+01	8.4	101.2	113.2	<1.00E+00	2.10E+01	n/a
FC-B30	S95K000026	<2.10E+01	n/a	n/a	n/a	n/a	97.9	n/a	<1.00E+00	2.10E+01	n/a
FC-B35	S95K000011	<2.10E+01	<2.10E+01	<2.10E+01	n/a	n/a	97.9	100.4	<1.00E+00	2.10E+01	n/a
FC-B37	S95K000012	<2.00E+00	n/a	n/a	n/a	n/a	98.3	n/a	<1.00E+00	2.00E+00	n/a
FC-B38	S95K000027	<2.10E+01	n/a	n/a	n/a	n/a	97.9	n/a	<1.00E+00	2.10E+01	n/a
FC-B39	S95K000013	3.48E+01	n/a	n/a	n/a	n/a	101.2	n/a	<1.00E+00	2.10E+01	n/a
FC-B40	S95K000023	<2.10E+01	n/a	n/a	n/a	n/a	97.9	n/a	<1.00E+00	2.10E+01	n/a
FC-B41	S95K000014	<2.00E+00	n/a	n/a	n/a	n/a	98.3	n/a	<1.00E+00	2.00E+00	n/a
FC-B42	S95K000015	<2.00E+00	n/a	n/a	n/a	n/a	98.3	n/a	<1.00E+00	2.00E+00	n/a
FC-B43	S95K000003	<2.00E+00	n/a	n/a	n/a	n/a	98.3	n/a	<1.00E+00	2.00E+00	n/a
FC-B44	S95K000006	<2.10E+01	n/a	n/a	n/a	n/a	101.2	n/a	<1.00E+00	2.10E+01	n/a
FC-B45	S95K000024	<2.10E+01	n/a	n/a	n/a	n/a	97.9	n/a	<1.00E+00	2.10E+01	n/a

WHC-SD-WM-DP-138, REV. 0

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS						ANALYTICAL QUALITY CONTROL				
Customer Number	Laboratory Number	Result $\mu\text{g}/\text{mL}$	Duplicate Result $\mu\text{g}/\text{mL}$	TriPLICATE Result $\mu\text{g}/\text{mL}$	Sample Mean $\mu\text{g}/\text{mL}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank $\mu\text{g}/\text{mL}$	Detection Limit $\mu\text{g}/\text{mL}$	Counting Error %	
FC-802	S95K000033	4.28E+00	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.10E+00	n/a	
FC-807	S95K000034	< 1.00E-01	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-810	S95K000035	2.14E+00	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-814	S95K000047	< 1.00E-01	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-815	S95K000036	< 1.00E-01	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-816	S95K000037	3.09E+00	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-817	S95K000038	< 1.00E-01	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-818	S95K000039	7.72E-01	n/a	n/a	n/a	95.6	95.6	n/a	< 1.00E-01	1.00E-01	n/a	
FC-819	S95K000001	2.60E+00	n/a	n/a	n/a	98.1	98.1	n/a	< 1.00E+00	2.00E+00	n/a	
FC-823	S95K000048	3.30E+00	3.40E+00	3.28E+00	3.33E+00	3.7	96.1	89.7	< 1.00E-01	1.10E+00	n/a	
FC-824	S95K000025	< 1.68E+01	n/a	n/a	n/a	98.3	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-825	S95K000005	< 1.68E+01	n/a	n/a	n/a	100.0	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-826	S95K000009	< 1.68E+01	n/a	n/a	n/a	100.0	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-829	S95K000010	< 1.68E+01	< 1.68E+01	< 1.68E+01	n/a	n/a	100.0	100.5	< 8.00E-01	1.68E+01	n/a	
FC-830	S95K000026	< 1.68E+01	n/a	n/a	n/a	98.3	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-835	S95K000011	< 1.68E+01	< 1.68E+01	< 1.68E+01	n/a	n/a	98.3	97.4	< 8.00E-01	1.68E+01	n/a	
FC-837	S95K000012	< 2.00E+00	n/a	n/a	n/a	98.1	n/a	n/a	< 1.00E+00	2.00E+00	n/a	
FC-838	S95K000027	< 1.68E+01	n/a	n/a	n/a	98.3	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-839	S95K000013	< 1.68E+01	n/a	n/a	n/a	100.0	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-840	S95K000023	< 1.68E+01	n/a	n/a	n/a	98.3	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-841	S95K000014	< 2.00E+00	n/a	n/a	n/a	98.1	n/a	n/a	< 1.00E+00	2.00E+00	n/a	
FC-842	S95K000015	< 2.00E+00	n/a	n/a	n/a	98.1	n/a	n/a	< 1.00E+00	2.00E+00	n/a	
FC-843	S95K000003	< 2.00E+00	n/a	n/a	n/a	98.1	n/a	n/a	< 1.00E+00	2.00E+00	n/a	
FC-844	S95K000006	< 1.68E+01	n/a	n/a	n/a	100.0	n/a	n/a	< 8.00E-01	1.68E+01	n/a	
FC-845	S95K000024	< 1.68E+01	n/a	n/a	n/a	98.3	n/a	n/a	< 8.00E-01	1.68E+01	n/a	

Nitrite by IC - Dionex 4000i
Direct
LA-533-105/C.2

f-f

ref.

WHC-SD-WM-DP-138, REV. 0

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS										ANALYTICAL QUALITY CONTROL			
Customer Number	Laboratory Number	Initial Result µg/ml	Duplicate Result µg/ml	Triplicate Result µg/ml	Sample Mean µg/ml	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank Preparation µg/ml	Detection Limit µg/ml	Counting Error %				
FC-802	S95K000040	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-807	S95K000041	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-810	S95K000042	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-814	S95K000049	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-815	S95K000043	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-816	S95K000044	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-817	S95K000045	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-818	S95K000046	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-819	S95K000002	< 3.00E + 01	n/a	n/a	n/a	n/a	95.4	n/a	4.48E-02	3.00E + 01	n/a				
FC-823	S95K000050	< 3.00E + 01	n/a	n/a	n/a	n/a	97.0	n/a	4.85E-03	3.00E + 01	n/a				
FC-824	S95K000030	5.38E + 01	5.08E + 01	5.32E + 01	5.26E + 01	6.0	98.4	98.2	5.23E-02	3.00E + 01	n/a				
FC-825	S95K000007	3.51E + 01	n/a	n/a	n/a	n/a	95.4	124.4	4.48E-02	3.00E + 01	n/a				
FC-826	S95K000016	5.72E + 01	n/a	n/a	n/a	n/a	95.4	n/a	4.48E-02	3.00E + 01	n/a				
FC-829	S95K000017	4.35E + 01	n/a	n/a	n/a	n/a	95.4	n/a	4.48E-02	3.00E + 01	n/a				
FC-830	S95K000031	< 3.00E + 01	< 3.00E + 01	< 3.00E + 01	n/a	n/a	98.4	101.8	5.23E-02	3.00E + 01	n/a				
FC-835	S95K000018	< 3.00E + 01	n/a	n/a	n/a	n/a	94.8	n/a	3.92E-02	3.00E + 01	n/a				
FC-837	S95K000019	< 3.00E + 01	n/a	n/a	n/a	n/a	94.8	n/a	3.92E-02	3.00E + 01	n/a				
FC-838	S95K000032	< 3.00E + 01	3.19E + 01	6.54E + 01	n/a	n/a	98.4	111.9	5.23E-02	3.00E + 01	n/a				
FC-839	S95K000020	6.09E + 01	n/a	n/a	n/a	n/a	94.8	n/a	3.92E-02	3.00E + 01	n/a				
FC-840	S95K000028	< 3.00E + 01	n/a	n/a	n/a	n/a	94.8	103.1	3.92E-02	3.00E + 01	n/a				
FC-841	S95K000021	3.48E + 01	n/a	n/a	n/a	n/a	94.8	n/a	3.92E-02	3.00E + 01	n/a				
FC-842	S95K000022	< 3.00E + 01	n/a	n/a	n/a	n/a	94.8	n/a	3.92E-02	3.00E + 01	n/a				
FC-843	S95K000004	3.48E + 01	n/a	n/a	n/a	n/a	95.4	n/a	4.48E-02	3.00E + 01	n/a				
FC-844	S95K000008	3.82E + 01	n/a	n/a	n/a	n/a	95.4	n/a	4.48E-02	3.00E + 01	n/a				
FC-845	S95K000029	3.52E + 01	n/a	n/a	n/a	n/a	94.8	n/a	3.92E-02	3.00E + 01	n/a				

Potassium -ICP-Acid Adjust
Acid Digestion
LA-505 151/D-2

Uranium by Phosphorescence
Direct
LA-925-009/A-0

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{g/ml}$	Duplicate Result $\mu\text{g/ml}$	Triplicate Result $\mu\text{g/ml}$	Sample Mean $\mu\text{g/ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank $\mu\text{g/ml}$	Detection Limit $\mu\text{g/ml}$	Counting Error %
FC-B07	S95K000034	< 3.70E-04	n/a	n/a	n/a	n/a	102.4	n/a	<3.70E-04	3.70E-04	n/a
FC-B10	S95K000035	9.43E-01	n/a	n/a	n/a	n/a	102.4	n/a	<3.70E-04	3.70E-04	n/a
FC-B15	S95K000036	1.39E+00	n/a	n/a	n/a	n/a	102.4	n/a	<3.70E-04	3.70E-04	n/a
FC-B24	S95K000025	1.60E+00	1.43E+00	1.49E+00	1.51E+00	11.4	103.1	161.0	7.92E-04	3.70E-05	n/a
FC-B30	S95K000026	1.58E+00	1.58E+00	1.56E+00	1.57E+00	1.5	92.7	133.0	<3.70E-05	3.70E-05	n/a
FC-B38	S95K000027	3.38E-01	3.32E-01	3.38E-01	3.36E-01	2.1	92.7	132.0	<3.70E-05	3.70E-05	n/a
FC-B40	S95K000023	4.40E+00	n/a	n/a	n/a	n/a	103.1	n/a	7.92E-04	3.70E-05	n/a
FC-B45	S95K000024	7.92E-01	n/a	n/a	n/a	n/a	92.7	n/a	<3.70E-05	3.70E-05	n/a

WHC-SD-WM-DP-138, REV. 0

WHC-SD-SNF-DP-003, Rev. 0

Strontium-89/90 High Level
Direct
LA-220-101/D-1

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
FC-B02	S95K000033	2.99E-02	n/a	n/a	n/a	n/a	95.5	n/a	<3.05E-05	3.22E-05	1.2
FC-B07	S95K000034	4.01E-04	n/a	n/a	n/a	n/a	95.5	n/a	<3.05E-05	3.20E-05	11.9
FC-B10	S95K000035	1.23E+00	n/a	n/a	n/a	n/a	95.5	n/a	<3.05E-05	3.20E-05	0.2
FC-B14	S95K000047	2.58E-04	n/a	n/a	n/a	n/a	96.4	n/a	3.34E-05	2.67E-05	14.5
FC-B15	S95K000036	3.55E-01	n/a	n/a	n/a	n/a	95.5	n/a	<3.05E-05	3.21E-05	0.4
FC-B16	S95K000037	8.44E-01	n/a	n/a	n/a	n/a	96.4	n/a	3.34E-05	2.71E-05	0.2
FC-B17	S95K000038	insuffic samp	n/a	n/a	n/a	n/a	96.4	n/a	3.34E-05	1.00E-04	n/a
FC-B18	S95K000039	insuffic samp	n/a	n/a	n/a	n/a	96.4	n/a	3.34E-05	1.00E-04	n/a
FC-B19	S95K000001	1.16E+00	n/a	n/a	n/a	n/a	98.2	n/a	<3.68E-03	5.00E-03	2.0
FC-B23	S95K000048	4.79E-01	n/a	n/a	n/a	n/a	96.4	n/a	3.34E-05	2.69E-05	0.3
FC-B24	S95K000025	3.14E-01	n/a	n/a	n/a	n/a	93.6	n/a	4.57E-03	3.12E-03	3.8
FC-B25	S95K000005	5.09E-01	n/a	n/a	n/a	n/a	98.2	n/a	<3.68E-03	4.10E-03	2.7
FC-B26	S95K000009	1.06E+00	n/a	n/a	n/a	n/a	95.5	n/a	4.38E-03	3.03E-03	2.0
FC-B29	S95K000010	3.14E-01	n/a	n/a	n/a	n/a	95.5	n/a	4.38E-03	3.04E-03	3.8
FC-B30	S95K000026	2.36E+00	n/a	n/a	n/a	n/a	93.6	n/a	4.57E-03	2.91E-03	1.3
FC-B35	S95K000011	1.13E+00	n/a	n/a	n/a	n/a	99.4	n/a	2.86E-03	4.51E-03	2.0
FC-B37	S95K000012	9.46E-01	1.26E+00	1.19E+00	1.13E+00	29.1	95.5	122.3	4.38E-03	2.98E-03	2.1
FC-B38	S95K000027	3.10E-01	n/a	n/a	n/a	n/a	93.6	n/a	4.57E-03	2.97E-03	3.8
FC-B39	S95K000013	7.96E-01	7.60E-01	7.68E-01	7.75E-01	4.9	99.4	97.4	2.86E-03	4.63E-03	2.4
FC-B40	S95K000023	1.72E-01	n/a	n/a	n/a	n/a	94.6	n/a	7.03E-03	2.69E-03	5.1
FC-B41	S95K000014	1.08E+00	n/a	n/a	n/a	n/a	99.4	n/a	2.86E-03	4.50E-03	2.0
FC-B42	S95K000015	1.08E+00	1.10E+00	1.06E+00	1.08E+00	3.7	94.6	93.0	7.03E-03	2.97E-03	2.0
FC-B43	S95K000003	1.51E+00	n/a	n/a	n/a	n/a	98.2	n/a	<3.68E-03	5.00E-03	1.7
FC-B44	S95K000006	5.32E-01	n/a	n/a	n/a	n/a	98.2	n/a	<3.68E-03	5.10E-03	3.0
FC-B45	S95K000024	4.22E-01	n/a	n/a	n/a	n/a	94.6	n/a	7.03E-03	2.94E-03	3.2

Note: Due to differences in rounding in the laboratory information management system over which there is no control, there are small differences between the reported values for standard recovery and the actual values shown on the chemist's worksheets.

ref.
WMC-SD-WM-DP-138, REV. 0

WMC-SD-SNF-DP-003, Rev. 0

ref.
WHC-SD-WM-DP-138, REV. 0

Tritium By Lechat
Direct

LA-218-114/A-4

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
FC-B07	S95K000034	1.77E-05	n/a	n/a	n/a	n/a	97.3	n/a	<3.30E-06	3.30E-06	4.4
FC-B10	S95K000035	1.66E-02	n/a	n/a	n/a	n/a	97.3	n/a	<3.30E-06	3.30E-06	0.2
FC-B15	S95K000036	6.17E-03	n/a	n/a	n/a	n/a	97.3	n/a	<3.30E-06	3.30E-06	0.4
FC-B24	S95K000025	3.07E-02	3.17E-02	3.18E-02	3.14E-02	3.9	113.7	209.1	<3.06E-06	3.06E-06	0.6
FC-B30	S95K000026	2.89E-02	2.85E-02	2.88E-02	2.87E-02	1.4	103.7	172.5	<3.51E-06	3.51E-06	0.7
FC-B38	S95K000027	1.76E-02	1.71E-02	1.69E-02	1.72E-02	4.2	103.7	86.2	<3.51E-06	3.51E-06	0.9
FC-B40	S95K000023	2.14E-02	n/a	n/a	n/a	n/a	113.7	n/a	<3.06E-06	3.06E-06	0.5
FC-B45	S95K000024	1.98E-02	n/a	n/a	n/a	n/a	103.7	n/a	<3.51E-06	3.51E-06	0.5

Cesium-137 by GEA
Direct
LA-548-121/D-1

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
FC-B19	S95K000001	1.05E+01	n/a	n/a	n/a	n/a	100.0	n/a	<6.75E-05	6.75E-05	0.24
FC-B24	S95K000025	2.98E+01	n/a	n/a	n/a	n/a	101.9	n/a	<6.51E-04	6.51E-04	0.27
FC-B25	S95K000005	1.26E+00	n/a	n/a	n/a	n/a	100.0	n/a	<6.75E-05	6.75E-05	0.68
FC-B26	S95K000009	2.89E+00	n/a	n/a	n/a	n/a	100.0	n/a	<6.81E-04	6.61E-04	0.45
FC-B29	S95K000010	4.09E-01	n/a	n/a	n/a	n/a	100.0	n/a	<6.61E-04	6.61E-04	1.2
FC-B30	S95K000026	3.27E+01	3.36E+01	3.38E+01	3.34E+01	3.5	101.9	n/a	<6.51E-04	6.51E-04	0.26
FC-B35	S95K000011	1.45E+01	n/a	n/a	n/a	n/a	100.0	n/a	<6.61E-04	6.61E-04	0.20
FC-B37	S95K000012	8.01E+00	8.01E+00	8.00E+00	8.01E+00	0.1	100.0	n/a	<6.61E-04	6.61E-04	0.27
FC-B38	S95K000027	1.57E+01	1.57E+01	1.58E+01	1.57E+01	0.7	101.9	n/a	<6.51E-04	6.51E-04	0.37
FC-B39	S95K000013	1.54E+01	1.56E+01	1.56E+01	1.55E+01	1.5	101.5	n/a	<5.45E-04	5.45E-04	0.18
FC-B40	S95K000023	2.15E+01	n/a	n/a	n/a	n/a	101.5	n/a	<5.45E-04	5.45E-04	0.15
FC-B41	S95K000014	1.37E+01	n/a	n/a	n/a	n/a	101.5	n/a	<5.45E-04	5.45E-04	0.19
FC-B42	S95K000015	1.22E+01	1.18E+01	1.20E+01	1.20E+01	3.3	101.5	n/a	<5.45E-04	5.45E-04	0.20
FC-B43	S95K000003	1.43E+01	n/a	n/a	n/a	n/a	100.0	n/a	<6.75E-05	6.75E-05	0.20
FC-B44	S95K000006	1.82E+01	n/a	n/a	n/a	n/a	100.0	n/a	<6.75E-05	6.75E-05	0.18
FC-B45	S95K000024	1.94E+01	n/a	n/a	n/a	n/a	101.9	n/a	<6.51E-04	6.51E-04	0.34

ref.
WHC-SD-WM-DP-138, REV. 0

WHC-SD-SNF-DP-003, Rev. 0

Americium-241 by GEA
Direct
LA-548-121/D-1

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Cs-137 Standard % Recovery	Spike Recovery %	Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
FC-B24	S95K000025	< 1.17E-01	n/a	n/a	n/a	n/a	101.9	n/a	< 1.76E-03	1.76E-03	n/a
FC-B30	S95K000026	< 1.24E-01	< 1.25E-01	< 1.25E-01	n/a	n/a	101.9	n/a	< 1.76E-03	1.76E-03	n/a
FC-B38	S95K000027	< 8.54E-02	< 8.56E-02	< 8.49E-02	n/a	n/a	101.9	n/a	< 1.76E-03	1.76E-03	n/a
FC-B40	S95K000023	< 4.06E-02	n/a	n/a	n/a	n/a	101.5	n/a	< 1.49E-03	1.49E-03	n/a
FC-B45	S95K000024	< 9.37E-02	n/a	n/a	n/a	n/a	101.9	n/a	< 1.76E-03	1.76E-03	n/a

WHC-SD-WM-DP-138, REV. 0

WHC-SD-SNF-DP-003, Rev. 0

Am-241 by Extraction
Acid Digestion
LA-953-103/A-3

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Preparation Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
							86.6	n/a	<3.51E-03	2.74E-03	4.2
FC-B07	S95K000041	< 2.74E-03	n/a	n/a	n/a	n/a	86.6	n/a	<3.51E-03	2.41E-03	100.0
FC-B10	S95K000042	< 2.41E-03	n/a	n/a	n/a	n/a	86.6	n/a	<3.51E-03	2.41E-03	100.0
FC-B15	S95K000043	< 2.41E-03	n/a	n/a	n/a	n/a	86.6	n/a	<3.51E-03	2.41E-03	100.0
FC-B24	S95K000030	< 3.90E-03	<6.83E-03	< 2.83E-03	n/a	n/a	96.1	94.0	<1.04E-02	3.90E-03	100.0
FC-B30	S95K000031	< 3.35E-03	<9.54E-03	<9.45E-03	n/a	n/a	91.5	82.0	<5.41E-03	3.35E-03	100.0
FC-B38	S95K000032	< 2.55E-02	<3.06E-03	< 6.18E-03	n/a	n/a	93.2	94.3	<9.64E-03	2.55E-02	100.0
FC-B40	S95K000028	< 2.44E-03	n/a	n/a	n/a	n/a	87.3	n/a	<2.41E-03	2.44E-03	100.0
FC-B45	S95K000029	< 2.52E-03	n/a	n/a	n/a	n/a	87.3	n/a	<2.41E-03	2.52E-03	100.0

WMC-SD-WM-DP-138, REV. 0

WMC-SD-SNF-DP-003, Rev. 0

Pu-239/240 by Ion Exchange
Acid Digestion
LA-943-127/A-0 and LA-503-156/A-0

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Standard Recovery %	Spike Recovery %	Preparation Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
FC-807	S95K000041	< 1.31E-03	n/a	n/a	n/a	n/a	85.2	n/a	<1.44E-03	1.31E-03	100.0
FC-810	S95K000042	< 7.03E-04	n/a	n/a	n/a	n/a	85.2	n/a	<1.44E-03	7.03E-04	100.0
FC-815	S95K000043	< 3.09E-03	n/a	n/a	n/a	n/a	85.2	n/a	<1.44E-03	3.09E-03	100.0
FC-824	S95K000030	< 2.95E-04	<5.10E-04	4.15E-04	n/a	n/a	91.4	81.0	<2.80E-04	2.95E-04	9.5
FC-830	S95K000031	< 9.35E-04	<7.11E-04	<1.32E-03	n/a	n/a	100.0	96.9	<8.38E-04	9.35E-04	100.0
FC-838	S95K000032	< 1.25E-03	<1.70E-03	<3.28E-03	n/a	n/a	83.6	75.6	<3.77E-04	1.25E-03	100.0
FC-840	S95K000028	< 2.22E-04	n/a	n/a	n/a	n/a	89.1	n/a	<3.39E-04	2.22E-04	100.0
FC-845	S95K000029	9.35E-04	n/a	n/a	n/a	n/a	85.9	n/a	<3.46E-04	7.51E-04	7.8

WHE-SD-MM-DP-128, REV. 0

WHE-SD-SNF-DP-003, Rev. 0

Pu-238 by Ion Exchange
Acid Digestion
LA-943-127/A-0 and LA-503-156/A-0

SAMPLE IDENTIFICATION		SAMPLE ANALYSIS RESULTS				ANALYTICAL QUALITY CONTROL					
Customer Number	Laboratory Number	Initial Result $\mu\text{Ci/ml}$	Duplicate Result $\mu\text{Ci/ml}$	Triplicate Result $\mu\text{Ci/ml}$	Sample Mean $\mu\text{Ci/ml}$	Sample Precision 2RSD	Pu-239 Standard % Recovery	Spike Recovery %	Preparation Blank $\mu\text{Ci/ml}$	Detection Limit $\mu\text{Ci/ml}$	Counting Error %
FC-B07	S95K000041	< 1.31E-03	n/a	n/a	n/a	n/a	85.2	n/a	< 1.44E-03	1.31E-03	100.0
FC-B10	S95K000042	< 7.03E-04	n/a	n/a	n/a	n/a	85.2	n/a	< 1.44E-03	7.03E-04	100.0
FC-B16	S95K000043	< 3.09E-03	n/a	n/a	n/a	n/a	85.2	n/a	< 1.44E-03	3.09E-03	100.0
FC-B24	S95K000030	< 2.95E-04	< 5.10E-04	< 3.05E-04	n/a	n/a	91.4	n/a	< 2.80E-04	2.95E-04	100.0
FC-B30	S95K000031	< 9.35E-04	< 7.11E-04	< 1.32E-03	n/a	n/a	100.0	n/a	< 8.36E-04	9.35E-04	100.0
FC-B38	S95K000032	< 1.25E-03	< 1.70E-03	< 3.28E-03	n/a	n/a	83.6	n/a	< 3.77E-04	1.25E-03	11.3
FC-B40	S95K000028	< 2.22E-04	n/a	n/a	n/a	n/a	89.1	n/a	< 3.39E-04	2.22E-04	100.0
FC-B45	S95K000029	< 7.51E-04	n/a	n/a	n/a	n/a	85.9	n/a	< 3.46E-04	7.51E-04	11.5

ref.
WHC-SD-MM-DP-138, REV. 0

WHC-SD-SNF-DP-003, Rev. 0

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