

JUN 23 1994 **START**

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ENGINEERING DATA TRANSMITTAL

2. To (Receiving Organization)		3. From (Originating Organization)		4. Related EDI No. 603833	
Distribution		Env. Restoration Engineering		N/A	
5. Proj./Prog./Dept./Div.: 85900		6. Cog. Engr.: A. D. Krug		7. Purchase Order No.: N/A	
B. Originator Remarks: Release				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: N/A	
				11. Receiver Remarks:	
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				13. Permit/Permit Application No.: N/A	
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15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-EN-TI-266		0	Data Validation Report for the 100-KR-4 Operable Unit First Quarter, 1994	Q	1/2	1	

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
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2	1	Cog. Eng. A.D. Krug	<i>[Signature]</i>	6/14/94	H6-02	Central Files (2)			L8-04	3	
2	1	Cog. Mgr. R.P. Henckel	<i>[Signature]</i>	6/14/94	H6-02	IRA Clearance (2)			H4-17	3	
2	1	QA D.G. Farwick	<i>[Signature]</i>	6/14/94	H4-16	HASM: K.N. Pool	<i>[Signature]</i>	6/14/94	H4-23		2
		Safety				EPIC (2) (1)			H6-08	3	
		Env.									
3		EPIC									
3		EDMC (2)									

18. <i>[Signature]</i> A. D. Krug Signature of EDT Originator Date: 6-14-94	19. _____ Authorized Representative for Receiving Organization Date: _____	20. <i>[Signature]</i> Cognizant Manager Date: 6-14-94	21. DOE APPROVAL (if required) Ctrl No. _____ <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
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(20)*	Cognizant Manager	● Enter the signature and date of the cognizant manager. (This signature is authorization for release.)
(21)*	DOE Approval	● Enter DOE approval (if required) by letter number and indicate DOE action.

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Title: Data Validation Report for the 100-KR-4 Operable Unit First Quarter, 1994	Unclassified Category UC-630	Impact Level Q
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New or novel (patentable) subject matter? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has disclosure been submitted by WHC or other company? <input type="checkbox"/> No <input type="checkbox"/> Yes Disclosure No(s).	Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)
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SUPPORTING DOCUMENT

1. Total Pages 138

2. Title
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A. P. Krug 6/14/94
Signature

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85900/P711A

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PUBLIC RELEASE

7. Abstract
6/22/94 W. Jole

WHC, 1994, Data Validation Report for the 100-KR-4 Operable Unit First Quarter, 1994, WHC-SD-EN-TI-266, Rev. 0, prepared by A. T. Kearney, Inc. for Westinghouse Hanford Company, Richland, Washington.

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9. Impact Level Q

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DISCLAIMER

This report is designated as Revision 0. The report covers a specific site for a specific sampling time frame. The report addresses only those samples that have been provided for data validation review.

All related quality assurance samples, including all field quality control samples, were reviewed and validated to verify that reported sample results were of sufficient quality to meet quality control objectives.

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ACRONYMS

%D	Percent difference
AA	Atomic absorption
BFB	Bromofluorobenzene
BNA	Base/neutral and acid (equivalent to semivolatiles)
CCB	Continuing calibration blank
CCV	Continuing calibration verification
CLP	Contract Laboratory Program
CRA	CRDL standard for AA
CRDL	Contract required detection limit
CRI	CRDL standard for ICP
CRII	CRDL standard for ICP initial
CRIF	CRDL standard for ICP final
CRQL	Contract required quantitation limit
CV	Coefficient of variation
CVAA	Cold vapor atomic absorption
DBC	Dibutylchloroendate
DFTPP	Decafluorotriphenylphosphine
DQO	Data quality objectives
EPA	U.S. Environmental Protection Agency
GC/MS	Gas chromatography/mass spectrometry
GC	Gas chromatography
GFAA	Graphite furnace atomic absorption
GPC	Gel permeation chromatography
ICB	Initial Calibration Blank
ICP	Inductively coupled plasma emission spectrometry
ICS	ICP interference check sample
ICSAB	Interference check sample solution AB
ICV	Initial calibration verification
IDL	Instrument detection limit
LCS	Laboratory control sample
LCSS	Laboratory control sample soil
LCSW	Laboratory control sample water
MSA	Method of standard addition
MS/MSD	Matrix spike/matrix spike duplicate
NV	Not Validated
PB	Preparation blank
PCB	Polychlorinated biphenyl
PEM	Performance evaluation mixture
QA	Quality assurance
QC	Quality control
RDL	Required Detection Limit
RF	Response factor
RIC	Reconstructed ion chromatogram
RPD	Relative percent difference
RRF	Relative response factor
RRT	Relative retention time
RSD	Relative standard deviation
RT	Retention time
SDG	Sample delivery group
SOW	Statement of work
TAL	Target analyte list

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TCL Target compound list
TIC Tentatively identified compounds
TOC Total organic carbon
TOX Total organic halides
TPH/DRO Total petroleum hydrocarbons/diesel range organics
V Validated
VOC Volatile organic compounds

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1.0 INTRODUCTION

The following samples were obtained from the 100-KR-4 Operable Unit First Quarter 1994 Groundwater Sampling event:

B09W42	B09W57	B09W72	B09W87
B09W43	B09W58	B09W73	B09W88
B09W44	B09W59	B09W74	B09W89
B09W45	B09W60	B09W75	B09W90
B09W46	B09W61	B09W76	B09W91
B09W47	B09W62	B09W77	B09W92
B09W48	B09W63	B09W78	B09W93
B09W49	B09W64	B09W79	B09W94
B09W50	B09W65	B09W80	B09W95
B09W51	B09W66	B09W81	B09W96
B09W52	B09W67	B09W82	B09W97
B09W53	B09W68	B09W83	B09WF1
B09W54	B09W69	B09W84	B09WF2
B09W55	B09W70	B09W85	
B09W56	B09W71	B09W86	

The data from the chemical analysis of fifty-eight samples from this sampling event and their related quality assurance samples were reviewed and validated to verify that reported sample results were of sufficient quality to support decisions regarding remedial actions performed at this site. The samples were analyzed by Thermo-Analytic Laboratories (TMA) and Roy F. Weston Laboratories (WESTON) using U.S. Environmental Protection Agency (EPA) CLP protocols.

Sample analyses included:

- Inorganics.

The table below lists the Sample Delivery Groups (SDGs) that were validated for this sampling event. The validated data and the non-validated results for the remaining samples are included in this report.

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SDG No.	Matrix	No. of Samples Analyzed	Parameters
B09W92	W	4	Inorganics
9401L298	W	6	Inorganics
9401L299	W	6	Inorganics
9401L314	W	18	Inorganics
9401L347	W	6	Inorganics
9401L365	W	6	Inorganics
9401L391	W	4	Inorganics
9401L441	W	2	Inorganics
9402L458	W	4	Inorganics
9402L462	W	2	Inorganics

Twenty-five samples were validated for radiochemical parameters by TMA and Teledyne. Analytical protocols specified in the *Westinghouse Hanford Company Statement of Work for Nonradioactive Inorganic/Organic and Radiochemical Analytical Services* were used. Sample analyses included the following:

- Gross alpha and gross beta determination
- Alpha spectroscopy
- Strontium-90
- Carbon-14
- Tritium.

SDG No.	Matrix	No. of Samples Analyzed	Parameters
B09W92	W	2	Radiochemistry
40023	W	3	Radiochemistry
40031	W	3	Radiochemistry
40039	W	9	Radiochemistry
40053	W	3	Radiochemistry
40521	W	3	Radiochemistry
40529	W	2	Radiochemistry
40971	W	1	Radiochemistry
40977	W	2	Radiochemistry
40984	W	1	Radiochemistry

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The radiochemical data summary tables can be found following Section 7.8.

Data quality was reviewed and analytical results validated using Westinghouse-Hanford procedures and related EPA CLP protocols and guidelines. Data were qualified based upon their quality and the guidance provided by these sources. In instances where the two protocols differed, the Westinghouse-Hanford guidance was followed.

Two sets of split samples were submitted to TMA and Roy F. Weston Laboratories as shown below:

Set 1:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
B09W72	B09W92	199-K-35
B09W73	B09W93	199-K-35

Set 2:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
B09W76	B09W94	199-K-37
B09W77	B09W95	199-K-37

The sample and split samples for both well locations were included in the validated data. The results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limit. All results for both well locations appear in the summary tables within this report.

Two sets of field duplicate samples were submitted to TMA as shown below.

Set 1:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
B09W72	B09W88	199-K-35
B09W73	B09W89	199-K-35

Set 2:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
B09W76	B09W90	199-K-37
B09W77	B09W91	199-K-37

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The duplicate sample results for both well locations were included in the validated data. The results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limit. All results for both well locations appear in the summary tables within this report.

Two sets of equipment blanks were submitted to Weston as shown in the table below. Both sets were collected on 1/17/94 and 1/25/94, and designated EB-1 and EB-2, respectively.

Set 1:

Set 2:

<u>Sample Number</u>	<u>Sample Number</u>
B09W84	B09W86
B09W85	B09W87

Under EPA protocol, equipment blanks are water samples used to indicate whether or not decontamination procedures were adequate or that contamination was not inherent in the equipment used. The equipment blank information provided was inadequate to determine what contamination, if any, was a result of the equipment used. Equipment blanks require well number locations and associated sample numbers in order to make such a determination.

The report is broken down into sections for each chemical analysis and radiochemical analysis type. Each section addresses the data package completeness, holding time adherence, instrument calibration and tuning acceptability, blank results, accuracy, precision, system performance, as well as the compound identification and quantitation. In addition, each section has an overall assessment and summary for the data packages reviewed for the particular chemical/radiochemical analyses. Detailed backup information is provided to the reader by SDG No. and sample number. For each data package, a matrix of chemical analyses per sample number is presented, as well as data qualification summaries.

Laboratory and data validation personnel added qualifiers to the reported data based on specified data quality objectives. The data reporting qualifiers are summarized as follows:

- U - Indicates the analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for dilutions and moisture content. It should be noted that the sample quantitation limit may be higher or lower than the contract or method required detection limit, depending on instrumentation, matrix and concentration factors.
- J - Indicates the analyte was analyzed for and detected. However, the associated value is considered to be an

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estimate due to identified QC deficiencies. Data flagged with a "J" may be usable for decision making purposes, depending upon the DQOs of the project. Laboratories qualify all reported organic detects below CRQL with a "J" per the CLP procedures.

UJ - Indicates the analyte was analyzed for and not detected. However, the associated detection limit is considered to be an estimate due to identified QC deficiencies. Detection limits flagged with a "UJ" may be usable for decision making purposes, depending upon the DQOs of the project.

JN - Indicates the analyte was analyzed for and that there is presumptive evidence of the presence of the compound. The concentration reported is considered an estimate which should be used for informational purposes only.

R - Indicates the analyte was analyzed for and detected, however due to a significant QC deficiency, the data are deemed unusable. Analytic results flagged "R" are invalid and provide no information as to whether or not the analyte is present.

UR - Indicates the analyte was analyzed for and not detected, however due to a significant QC deficiency, the data are deemed unusable. Analytic results flagged "UR" are invalid and provide no information as to whether or not the analyte is present.

It should be noted that, frequently, results will bear two qualifiers - one given by the laboratory and one given during the validation process. For example, a "U" qualifier is given by the laboratory when the compound has not been detected during the analysis, and a "J" qualifier may be added during the validation to qualify the result due to minor quality problems. Therefore, the resulting qualification is "UJ", where the "U" qualifier has been given by the laboratory and the "J" qualifier given by the validator.

The results of data validation performed for the 100-KR-4 Operable Unit First Quarter 1994 Sampling Investigation are contained in the tables following each of the chapters in this report.

Several general quality trends which resulted in data qualification were observed. These included:

- The metals analysis showed minor matrix spike accuracy problems; analytical spike problems, lab duplicate precision problems and ICP serial dilution problems were below the QC limit. Approximately 20 percent of the metals results were flagged "J" due to these factors.

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- Both positive and negative laboratory blank contamination was noted in the inorganics analysis. Associated results were flagged accordingly. Contamination, however, was not sufficiently high to affect the usability of the data.
- Due to precision results outside of QC limits, Uranium-234 results in one SDG and Uranium-238 and Uranium-234 in another SDG were qualified as estimates.
- Due to low LCS recoveries, several Uranium-235 results in two data packages were rejected.
- Due to low LCS recoveries, Uranium-235 results in several data packages were qualified as estimates.
- Due to high radiochemical yields, Carbon-14 results in several data packages were qualified as estimates.
- Reported MDA values for two alpha spectroscopy results and one carbon-14 result were above the RDL.
- Due to the blank and/or LCS not being run with the SDG, several radiochemistry results in one data package were qualified as estimates.

In general, the protocol-specific QA/QC requirements were met for the samples analyzed in this investigation with the exceptions noted above and discussed in detail in the chapters to follow. All requested analyses were performed.

With the exceptions noted above, the protocol-specific data quality objectives in terms of precision, accuracy, completeness, representativeness, and comparability have been met.

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WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
199-K-11	B09W42	W	01/11/94	V	2-39
	B09W43	W	01/11/94	V	2-39
199-K-13	B09W44	W	01/12/94	V	2-50
	B09W45	W	01/12/94	V	2-50
199-K-18	B09W46	W	01/11/94	V	2-39
	B09W47	W	01/11/94	V	2-39
199-K-19	B09W48	W	01/11/94	V	2-39
	B09W49	W	01/11/94	V	2-39
199-K-20	B09W50	W	01/13/94	V	2-50
	B09W51	W	01/13/94	V	2-50
199-K-21	B09W52	W	01/13/94	V	2-50
	B09W53	W	01/13/94	V	2-50
199-K-22	B09W54	W	01/13/94	V	2-50
	B09W55	W	01/13/94	V	2-50
199-K-23	B09W56	W	01/13/94	V	2-50
	B09W57	W	01/13/94	V	2-50
199-K-27	B09W58	W	01/25/94	V	2-92
	B09W59	W	01/25/94	V	2-92
199-K-30	B09W60	W	01/20/94	V	2-84
	B09W61	W	01/20/94	V	2-84
199-K-31	B09W62	W	01/24/94	V	2-78
	B09W63	W	01/24/94	V	2-78
199-K-32A	B09W64	W	01/18/94	V	2-67
	B09W65	W	01/18/94	V	2-67
199-K-32B	B09W66	W	01/18/94	V	2-67
	B09W67	W	01/18/94	V	2-67
199-K-33	B09W68	W	01/20/94	V	2-73
	B09W69	W	01/20/94	V	2-73
199-K-34	B09W70	W	01/13/94	V	2-51
	B09W71	W	01/13/94	V	2-51

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WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
199-K-35	B09W72	W	01/14/94	V	2-51
	B09W73	W	01/14/94	V	2-51
	B09W88	W	01/14/94	V	2-51
	B09W89	W	01/14/94	V	2-51
	B09W92	W	01/14/94	V	2-20
	B09W93	W	01/14/94	V	2-25
199-K-36	B09W74	W	01/14/94	V	2-51
	B09W75	W	01/14/94	V	2-51
199-K-37	B09W76	W	01/17/94	V	2-60
	B09W77	W	01/17/94	V	2-60
	B09W90	W	01/17/94	V	2-60
	B09W91	W	01/17/94	V	2-60
	B09W94	W	01/17/94	V	2-29
	B09W95	W	01/17/94	V	2-34
699-70-68	B09W78	W	01/12/94	V	2-45
	B09W79	W	01/12/94	V	2-45
699-73-61	B09W80	W	01/12/94	V	2-45
	B09W81	W	01/12/94	V	2-45
699-78-62	B09W82	W	01/12/94	V	2-45
	B09W83	W	01/12/94	V	2-45
EB-1	B09W84	W	01/17/94	V	2-60
	B09W85	W	01/17/94	V	2-60
EB-2	B09W86	W	01/25/94	V	2-84
	B09W87	W	01/25/94	V	2-84
TB-1	B09W96	W	01/18/94	V	2-67
	B09W97	W	01/18/94	V	2-67
TB-2	B09WF1	W	01/21/94	V	2-73
	B09WF2	W	01/21/94	V	2-73

2.0 INORGANIC DATA VALIDATION

2.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and checked for completeness:

B09W92	9401L314	9401L391	9401L462
9401L298	9401L347	9401L441	
9401L299	9401L365	9401L458	

A nonconformance report was included with the verification documentation for SDG No. 9402L462. The report stated that sample numbers B09W58 and B09W59 in SDG No. 9402L462 were received at the laboratory with the Chain-of-Custodies (COCs) for sample numbers B09W86 and B09W87 in SDG No. 9402L458 and vice versa. The COCs were broken and the response by Westinghouse-Hanford was to continue with the requested analyses and use the results for informational purposes.

2.2 HOLDING TIMES

Analytical holding times for ICP metals, GFAA metals and CVAA mercury analyses were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: samples must be analyzed within 28 days for mercury, and within six months for all other metals.

The 28-day holding time requirement was exceeded and the associated results were flagged "UJ" for mercury:

- Sample numbers B09W42, B09W43, B09W46, B09W47, B09W48 and B09W49 in SDG No. 9401L298.
- Sample numbers B09W44, B09W45, B09W50, B09W51, B09W52, B09W53, B09W54, B09W55, B09W56, B09W57, B09W70, B09W71, B09W72, B09W73, B09W74, B09W75, B09W88 and B09W89 in SDG No. 9401L314.
- Sample numbers B09W64, B09W65, B09W66, B09W67, B09W96 and B09W97 in SDG No. 9401L365.
- Sample numbers B09W60, B09W61, B09W86 and B09W87 in SDG No. 9402L458.
- Sample numbers B09W58 and B09W59 in SDG No. 9402L462.

All other holding time requirements for all analytes in all data packages reviewed were met.

2.3 INSTRUMENT PERFORMANCE AND CALIBRATIONS

Performance of specific instrument quality assurance and quality control procedures, including deficiencies noted during the quality assurance review, are outlined below.

Three calibration standards and a blank were analyzed for arsenic, lead, selenium and thallium by GFAA. The correlation coefficient of a least squares linear regression met the requirements for calibration in all cases.

Up to five calibration standards and a blank were analyzed for mercury by CVAA. The correlation coefficient of a least squares linear regression met the requirements for calibration.

At least one standard and a blank were analyzed by ICP for all other elements.

The above calibrations were each immediately verified with an ICV standard and a calibration blank. The ICV was prepared from a source independent of the calibration standards, at a mid-calibration range concentration. The ICV percent recovery must fall within the control limits of 90 to 110 percent for metals analyzed by ICP and GFAA, and 80 to 120 percent for mercury. Calibration linearity near the detection limit was verified with a standard prepared at a concentration near the CRDL.

The ICVs met the recommended control limits in all cases.

The calibrations were subsequently verified at regular intervals using a CCV standard. The control windows for percent recovery of CCV standards are the same as the ICV windows described above.

CCV checks were not performed at the proper frequency for mercury in SDG No. 9402L462. CCV1 was run after the analysis of the first ten samples. Under Inorganics CLP-SOW protocol, a CCV check is required at the beginning and end of each run in addition to the 10% (2-hour) frequency.

The CCVs met the recommended control limits in all cases.

2.3.1 ICP Calibration

An ICS was analyzed at the beginning and end of each ICP sample run to verify the laboratory interelement and background correction factors. Results for the ICS solution must fall within the control limit of ± 20 percent of the true value. Arsenic, lead, selenium and thallium were analyzed using a

Thermo-Jarrell Ash ICP61E. Under USEPA CLP protocol, this is acceptable provided the ICP is able to meet the required detection limits and the analytical run follows the USEPA CLP protocol for ICP analysis. Under the ICP method, an ICS is required for lead at a concentration of 1.0 mg/L. Refer to Table 2, page E-14, of the USEPA CLP ILM01.0.

A five-fold serial dilution is required for all elements analyzed by ICP. The subsequent concentrations of the reanalysis are compared with the original analysis. If the analyte concentration is sufficiently high (a minimum factor of 50 above the IDL) then the serial dilution must agree within 10% of the original determination after correction for dilution.

The ICS has been analyzed at the proper frequency and all ICSAB solution percent recovery values fell within the control limit.

2.3.2 Atomic Absorption Calibrations

Duplicate injections are required for all GFAA analyses. The duplicate injections establish the precision of the individual analytical determinations. For sample concentrations greater than the CRDL, duplicate injections must agree within ±20 percent RSD or CV. The AA calibration results are discussed further in Section 2.7 of this report.

2.4 BLANKS

2.4.1 Positive Blank Results

In the case of positive blank results, samples with digestate concentrations (in ug/L) of less than five times (<5x) the highest amount found in any of the associated blanks have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times (>5x) the highest amount found in any of the associated blanks do not require qualification.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for aluminum:

- Sample numbers B09W93, B09W94 and B09W95 in SDG No. B09W92.
- Sample number B09W62 in SDG No. 9401L441.
- Sample number B09W60 in SDG No. 9402L458.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for antimony:

- Sample number B09W47 in SDG No. 9401L298.

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Due to the presence of laboratory blank contamination, the following samples were flagged "U" for arsenic:

- Sample numbers B09W60 and B09W61 in SDG No. 9402L458.
- Sample number B09W58 in SDG No. 9402L462.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for barium:

- Sample numbers B09W78 and B09W79 in SDG No. 9401L299.
- Sample numbers B09W52 and B09W53 in SDG No. 9401L314.
- Sample numbers B09W76, B09W77, B09W85, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W64 and B09W65 in SDG No. 9401L365.
- Sample number B09WF2 in SDG No. 9401L391.
- Sample number B09W59 in SDG No. 9402L462.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for calcium:

- Sample number B09W84 in SDG No. 9401L347.
- Sample numbers B09W96 and B09W97 in SDG No. 9401L365.
- Sample numbers B09W69 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for cobalt:

- Sample numbers B09W46 and B09W47 in SDG No. 9401L298.
- Sample number B09W76 in SDG No. 9401L347.
- Sample number B09W67 in SDG No. 9401L365.
- Sample number B09WF1 in SDG No. 9401L391.
- Sample number B09W62 in SDG No. 9401L441.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for copper:

- Sample numbers B09W54, B09W55, B09W57 and B09W71 in SDG No. 9401L314.
- Sample numbers B09W64, B09W65 and B09W67 in SDG No. 9401L365.

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Due to the presence of laboratory blank contamination, the following samples were flagged "U" for iron:

- Sample numbers B09W94 and B09W95 in SDG No. B09W92.
- Sample numbers B09W43 and B09W49 in SDG No. 9401L298.
- Sample numbers B09W79, B09W80, B09W81, B09W82 and B09W83 in SDG No. 9401L299.
- Sample numbers B09W45, B09W51, B09W53, B09W56, B09W57, B09W71, B09W73, B09W75 and B09W89 in SDG No. 9401L314.
- All samples in SDG No. 9401L347.
- Sample numbers B09W60, B09W61, B09W86 and B09W87 in SDG No. 9402L458.
- Sample number B09W59 in SDG No. 9402L462.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for magnesium:

- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for sodium:

- Sample numbers B09W84 and B09W85 in SDG No. 9401L347.
- Sample numbers B09W69 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for vanadium:

- ~~Sample numbers B09W42, B09W43, B09W46, B09W47, B09W48 and B09W49 in SDG No. 9401L298.~~
- ~~Sample numbers B09W78, B09W79, B09W80, B09W81, B09W82 and B09W83 in SDG No. 9401L299.~~
- Sample numbers B09W44, B09W45, B09W50, B09W51, B09W57, B09W70, B09W72, B09W73, B09W75, B09W88 and B09W89 in SDG No. 9401L314.
- Sample numbers B09W76, B09W77, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W68 and B09WF1 in SDG No. 9401L391.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.

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- Sample numbers B09W60, B09W61, B09W86 and B09W87 in SDG No. 9402L458.
- Sample numbers B09W58 and B09W59 in SDG No. 9402L462.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for zinc:

- Sample numbers B09W92 and B09W94 in SDG No. B09W92.
- Sample numbers B09W42, B09W43, B09W46 and B09W49 in SDG No. 9401L298.
- Sample numbers B09W78, B09W79, B09W81 and B09W83 in SDG No. 9401L299.
- Sample numbers B09W45, B09W50, B09W51, B09W52, B09W53, B09W56, B09W57, B09W71, B09W72, B09W73, B09W75, B09W88 and B09W89 in SDG No. 9401L314.
- Sample numbers B09W76, B09W77, B09W84, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W64, B09W65, B09W66 and B09W67 in SDG No. 9401L365.
- Sample numbers B09W68, B09W69, B09WF1 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.
- Sample numbers B09W60, B09W61, B09W86 and B09W87 in SDG No. 9402L458.
- Sample number B09W59 in SDG No. 9402L462.

All other laboratory blank results were acceptable.

Sample numbers B09W96, B09W97, B09WF1 and B09WF2 were designated as trip blanks by Westinghouse-Hanford. The following trip blank results were above the IDL:

- Calcium, iron, nickel and zinc results in sample number B09W96 in SDG No. 9401L365.
- Calcium and iron results in sample number B09W97 in SDG No. 9401L365.
- Barium, calcium, chromium, iron, magnesium, potassium, sodium, vanadium and zinc results in sample number B09WF1 in SDG No. 9401L391.
- Aluminum, barium, calcium, iron, sodium and zinc results in sample number B09WF2 in SDG No. 9401L391.

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As per Westinghouse-Hanford guidelines, qualifications of sample results is not required based on trip blank results.

2.4.2 Negative Blank Results

In the case of negative blank results, if the absolute value of any calibration blank exceeds the Instrument Detection Limit (IDL), all non-detects are qualified as estimates and flagged "UJ", and all positive results within two times the absolute value of the blank result are qualified as estimates and flagged "J". In the case of preparation blanks, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all non-detects are rejected and flagged "R" and all detected that are less than ten times the absolute value of the preparation blank result are qualified as estimates and flagged "J".

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for aluminum:

- Sample numbers B09W42, B09W43, B09W46 and B09W49 in SDG No. 9401L298.
- All samples in SDG No. 9401L299.
- Sample numbers B09W64, B09W65, B09W66, B09W96 and B09W97 in SDG No. 9401L365.
- Sample number B09W59 in SDG No. 9402L462.

Due to the presence of negative laboratory contamination, the following samples were flagged "J" for aluminum:

- Sample numbers B09W47 and B09W48 in SDG No. 9401L298.
- Sample number B09W67 in SDG No. 9401L365.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for antimony:

- Sample numbers B09W50, B09W54, B09W55, B09W56, B09W57, B09W71, B09W72, B09W73 and B09W75 in SDG No. 9401L314.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for cobalt:

- All samples in SDG No. 9401L299.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for copper:

- Sample number B09W93 in SDG No. B09W92.
- All samples in SDG No. 9401L299.

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Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for lead:

- Sample numbers B09W85, B09W90 and B09W91 in SDG No. 9401L347.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for magnesium:

- Sample numbers B09W96 and B09W97 in SDG No. 9401L365.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for manganese:

- Sample numbers B09W94 and B09W95 in SDG No. B09W92.

Due to the presence of negative laboratory contamination, the following sample was flagged "UJ" for nickel:

- Sample number B09W60 in SDG No. 9402L458.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for potassium:

- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

Due to the presence of negative laboratory contamination, the following samples were flagged "J" for potassium:

- All samples in SDG No. 9401L299.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.
- Sample numbers B09W60 and B09W61 in SDG No. 9402L458.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for sodium:

- Sample numbers B09W96 and B09W97 in SDG No. 9401L365.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for selenium:

- All samples in SDG No. 9401L314.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for thallium:

- All samples in SDG No. 9401L314.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.

Due to the presence of negative laboratory contamination, the following samples were flagged "UJ" for vanadium:

- All samples in SDG No. 9401L299.
- All samples in SDG No. 9401L314.
- All samples in SDG No. 9401L347.
- All samples in SDG No. 9401L365.

Due to the presence of negative laboratory contamination, the following samples were flagged "J" for zinc:

- Sample number B09W95 in SDG No. B09W92

2.5 ACCURACY

2.5.1 Matrix Spike Recovery

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must generally fall within the range of 75 to 125 percent. Samples with a spike recovery of less than 30% and a sample value below the IDL were rejected and flagged "UR". All other samples with a spike recovery outside the QC limits are qualified as estimates and flagged "J".

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for arsenic in the following samples:

- All samples in SDG No. 9401L299.

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for lead in the following sample:

- Sample number B09W80 in SDG No. 9401L299.

The matrix spike recovery fell outside the QC limits and the associated results flagged "UJ" for lead in the following samples:

- All samples in SDG No. 9401L298.
- Sample numbers B09W78, B09W79, B09W81, B09W82 and B09W83 in SDG No. 9401L299.
- Sample numbers B09W76, B09W77, B09W84, B09W85, B09W90 and B09W91 in SDG No. 9401L347.

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~~The matrix spike recovery fell outside the QC limits and the associated results flagged "UJ" for mercury in the following sample:~~

- Sample number B09W92 in SDG No. B09W92.

The matrix spike recovery fell outside the QC limits and the associated results flagged "UJ" for selenium in the following samples:

- Sample numbers B09W58 and B09W59 in SDG No. 9402L462.

~~The matrix spike recovery fell outside the QC limits and the associated results flagged "UJ" for thallium in the following samples:~~

- Sample numbers B09W68, B09W69, B09WF1 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.

All other matrix spike recovery results were acceptable.

2.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

One liquid LCS was digested and analyzed for each of the cases in this report that contained water samples. The results were compared against the control limit of 80-120% as required by the EPA CLP SOW 3/90 protocol and found to be acceptable.

All LCSW results were found to be acceptable.

2.6 PRECISION

2.6.1 Laboratory Duplicate Samples

The laboratory duplicate results measures the precision of the method by measuring a second aliquot of the sample that is treated the same way as the original. Samples whose precision fell outside the quality control requirements were flagged as estimates "J".

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The laboratory duplicate results fell outside the QC limits and the associated results flagged "J" for calcium in the following samples:

- Sample numbers B09W76, B09W77, B09W85, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.

The laboratory duplicate results fell outside the QC limits and the associated results flagged "UJ" for calcium in the following sample:

- Sample number B09W84 in SDG No. 9401L347.

The laboratory duplicate results fell outside the QC limits and the associated results flagged "J" for chromium in the following samples:

- All samples in SDG No. 9401L314.
- Sample numbers B09W76, B09W77, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.

The laboratory duplicate results fell outside the QC limits and the associated results flagged "UJ" for chromium in the following samples:

- Sample numbers B09W84 and B09W85 in SDG No. 9401L347.

All other laboratory duplicate recovery results were acceptable.

2.6.2 ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to sample matrix. If sample concentration is ≥ 50 times the IDL for an analyte and the %D is outside the control limits the associated data must be qualified as estimates "J".

The ICP serial dilution results fell outside the QC limits and the associated results flagged "J" for calcium in the following samples:

- Sample numbers B09W92 and B09W93 in SDG No. B09W92.
- All samples in SDG No. 9401L298.
- All samples in SDG No. 9401L314.

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- Sample numbers B09W64, B09W65, B09W66 and B09W67 in SDG No. 9401L365.
- Sample numbers B09W68 and B09WF1 in SDG No. 9401L391.
- Sample numbers B09W60 and B09W61 in SDG No. 9402L458.
- Sample numbers B09W58 and B09W59 in SDG No. 9402L462.

The ICP serial dilution results fell outside the QC limits and the associated results flagged "UJ" for calcium in the following samples:

- Sample numbers B09W96 and B09W97 in SDG No. 9401L365.
- Sample numbers B09W69 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

The ICP serial dilution results fell outside the QC limits and the associated results flagged "J" for chromium in the following samples:

- Sample number B09W95 in SDG No. B09W92.
- ~~Sample numbers B09W62 and B09W63 in SDG No. 9401L441.~~

The ICP serial dilution results fell outside the QC limits and the associated results flagged "UJ" for iron in the following sample:

- Sample number B09W59 in SDG No. 9402L462.

The ICP serial dilution results fell outside the QC limits and the associated results flagged "J" for iron in the following sample:

- Sample number B09W58 in SDG No. 9402L462.

The ICP serial dilution results fell outside the QC limits and the associated results flagged "J" for magnesium in the following samples:

- Sample numbers B09W68 and B09WF1 in SDG No. 9401L391.
- All samples in SDG No. 9401L298.
- ~~All samples in SDG No. 9401L314.~~
- Sample numbers B09W64, B09W65, B09W66 and B09W67 in SDG No. 9401L365.
- Sample numbers B09W68 and B09WF1 in SDG No. 9401L391.
- Sample numbers B09W60 and B09W61 in SDG No. 9402L458.

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- Sample numbers B09W58 and B09W59 in SDG No. 9402L462.

The ICP serial dilution results fell outside the QC limits and the associated results flagged "UJ" for magnesium in the following samples:

- Sample numbers B09W96 and B09W97 in SDG No. 9401L365.
- Sample numbers B09W69 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

~~The ICP serial dilution results fell outside the QC limits and the associated results flagged "J" for sodium in the following samples:~~

- ~~All samples in SDG No. 9401L298.~~
- ~~All samples in SDG No. 9401L314.~~
- ~~Sample numbers B09W64, B09W65, B09W66 and B09W67 in SDG No. 9401L365.~~
- ~~Sample numbers B09W68 and B09WF1 in SDG No. 9401L391.~~
- ~~Sample numbers B09W62 and B09W63 in SDG No. 9401L441.~~
- ~~Sample numbers B09W60 and B09W61 in SDG No. 9402L458.~~
- ~~Sample numbers B09W58 and B09W59 in SDG No. 9402L462.~~

The ICP serial dilution results fell outside the QC limits and the associated results flagged "UJ" for sodium in the following samples:

- Sample numbers B09W96 and B09W97 in SDG No. 9401L365.
- Sample numbers B09W69 and B09WF2 in SDG No. 9401L391.
- Sample numbers B09W86 and B09W87 in SDG No. 9402L458.

All other ICP serial dilution results were acceptable.

2.6.3 Total and Dissolved Sample Analysis

Inorganics parameters included the analysis of the total as well as dissolved samples. Total samples include particulate and dissolved fractions while dissolved samples are first filtered prior to preparation. The purpose of the analysis is to determine what metals are inherent in the particulate matter found in the aqueous sample.

9401L365

Since Westinghouse Validation Guidelines do not address this issue, the total and dissolved samples are presented in the report, but no judgement on the data was made.

Below is a table of the total and filtered samples which were validated.

<u>Total</u>	<u>Filtered</u>
B09W42	B09W43
B09W44	B09W45
B09W46	B09W47
B09W48	B09W49
B09W50	B09W51
B09W52	B09W53
B09W54	B09W55
B09W56	B09W57
B09W58	B09W59
B09W60	B09W61
B09W62	B09W63
B09W64	B09W65
B09W66	B09W67
B09W68	B09W69
B09W70	B09W71
B09W72	B09W73
B09W74	B09W75
B09W76	B09W77
B09W78	B09W79
B09W80	B09W81
B09W82	B09W83
B09W84	B09W85
B09W86	B09W87
B09W88	B09W89
B09W90	B09W91
B09W92	B09W93
B09W94	B09W95
B09W96	B09W97
B09WF1	B09WF2

The following filtered results exceeded the total results with a percent difference greater than 50.0:

- Chromium, magnesium and sodium in sample numbers B09W56 and B09W57 in SDG No. 9401L314.
- Iron in sample numbers B09W66 and B09W67 in SDG No. 9401L365.

No qualification of the samples was made as per Westinghouse-Hanford data validation guidelines.

2.7 FURNACE AA QUALITY CONTROL

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The post-digestion analytical spike is analyzed to determine the extent of interference in the digestate matrix. When the results of the analytical spike analyses exceeds the control window of 85 to 115 percent recovery and the absorbance of the sample is greater than fifty percent of the analytical spike absorbance, then the sample must be reanalyzed using the MSA. The duplicate injections and the analytical spike recoveries establish the precision and accuracy of the individual GFAA determinations.

2.7.1 Duplicate Injections

Each furnace analysis requires a minimum of two injections (burns), except for full Method of Standard Addition (MSA). For concentrations greater than CRDL, the duplicate injection readings must agree within 20% relative standard deviation (RSD) or coefficient of variation (CV). If these requirements are not met, the analytical sample must be rerun once (i.e., two additional burns). If the readings are then still outside the QC limits, the result is qualified as an estimate and flagged "J".

All duplicate injection quality control requirements were met.

2.7.2 Analytical Spike Recoveries

For all samples whose analytical spike results are outside the 85 to 115 percent control limit, but whose absorbances are less than 50 percent of the analytical spike absorbance, the samples were flagged as estimates "J".

The analytical spike recovery fell outside the established QC limits and the associated results flagged "UJ" for arsenic in the following sample:

- Sample number B09W71 in SDG No. 9401L314.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "J" for arsenic in the following samples:

- Sample numbers B09W81, B09W82 and B09W83 in SDG No. 9401L299.
- Sample numbers B09W54 and B09W70 in SDG No. 9401L314.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "UJ" for lead in the following samples:

- Sample numbers B09W43, B09W46, B09W47, B09W48 and B09W49 in SDG No. 9401L298.

9401L298-0820

- Sample numbers B09W78, B09W79, B09W81, B09W82 and B09W83 in SDG No. 9401L299.
- Sample numbers B09W76, B09W77, B09W84, B09W85, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W68 and B09WF1 in SDG No. 9401L391.
- Sample numbers B09W60 and B09W61 in SDG No. 9402L458.
- Sample number B09W59 in SDG No. 9402L462.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "J" for lead in the following sample:

- Sample number B09W80 in SDG No. 9401L299.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "UJ" for selenium in the following samples:

- Sample numbers B09W43, B09W46, B09W48 and B09W49 in SDG No. 9401L298.
- Sample numbers B09W76, B09W77, B09W90 and B09W91 in SDG No. 9401L347.
- Sample numbers B09W60 and B09W61 in SDG No. 9402L458.
- Sample numbers B09W58 and B09W59 in SDG No. 9402L462.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "J" for selenium in the following samples:

- Sample numbers B09W80 and B09W81 in SDG No. 9401L299.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "UJ" for thallium in the following samples:

- Sample number B09W79 in SDG No. 9401L299.
- Sample numbers B09W45, B09W51, B09W52, B09W70, B09W88 and B09W89 in SDG No. 9401L314.
- Sample number B09W68 in SDG No. 9401L391.
- Sample numbers B09W62 and B09W63 in SDG No. 9401L441.
- Sample number B09W58 in SDG No. 9402L462.
- Sample number B09W60 in SDG No. 9402L458.

9403278.0821

control (85-115%), the spiking solution must be verified by rerunning the preparation blank once. If the preparation blank analytical spike recovery is still out of control, correct the problem and reanalyze all analytical samples associated with the blank." In order to be consistent and accurate, this preparation blank must be analyzed within the same run. To recalibrate the instrument and reanalyze the preparation blank (on a different day) without analyzing all associated samples does not accurately verify the spiking solution results.

For thallium in SDG No. 9402L462, the laboratory ran two separate analyses. The first run included the preparation blank and all associated samples. The preparation blank recovery was 76%. The laboratory then recalibrated the instrument and ran the preparation blank (2X) with recoveries of 74.0% and 94.0%, respectively. The second run included only sample numbers B09W58D and B09W59.

The laboratory failed to verify the analytical spike solution for the preparation blank by not reanalyzing it within the first calibration. This affects sample number B09W58, which was reported from results in the first analyses. As a result, the thallium result for sample number B09W58 has been qualified as estimated and flagged "UJ" due to the preparation blank analytical spike out of control.

All other analytical spike recovery results were acceptable.

2.7.3 Method of Standard Addition (MSA) Results

For all samples whose analytical spike results are outside the 85 to 115 percent control limit and whose absorbances are greater than 50 percent of the analytical spike absorbance an MSA is required. In cases where the MSA correlation coefficient was less than 0.995 the MSA analysis was repeated once. If the correlation coefficient was still less than 0.995, samples were flagged as estimates "J".

All MSA results were acceptable.

2.8 ANALYTE QUANTITATION AND DETECTION LIMITS

Twenty percent of sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors.

Thallium results for sample number B09W59 in SDG No. 9402L462 were run at a 10X dilution because the %RSD for the analytical spike was at 105%. The 10X dilution increased the IDL from 2 ug/L to 20 ug/L. The CRDL is 10 ug/L. The laboratory should have analyzed the sample at an initial dilution of 5X to

280-826-146
944278-0822

from 2 ug/L to 20 ug/L. The CRDL is 10 ug/L. The laboratory should have analyzed the sample at an initial dilution of 5X to try and keep the IDL at the CRDL. However, this did not affect the usability of the data.

The reviewer verified that the results and detection limits fell within the linear range of the instrument.

2.9 OVERALL ASSESSMENT AND SUMMARY

All samples were analyzed and reported under the 1990 CLP protocol (EPA 1990). The metals analysis showed minor matrix spike accuracy problems, analytical spike problems, lab duplicate precision problems and ICP serial dilution problems were below the QC limit. Approximately 20 percent of the metals results were flagged "J" due to these factors. Both positive and negative laboratory blank contamination was noted in the inorganics analysis. Associated results were flagged accordingly. Contamination, however, was not sufficiently high to affect the usability of the data. Data qualified as estimated "J" are usable for limited purposes only. Except as noted above and in the preceding sections, all other validated data are usable for all purposes.

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Except as noted in the preceding sections, all other validated data are usable for all purposes.

4280-8/28/16

Project: WESTINGHOUSE-HANFORD																			
Laboratory: TMA																			
Case	SDG: B09W92																		
Sample Number	B09W92																		
Location	199-K-35																		
Remarks	Split																		
Sample Date	01/14/94																		
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	206.00																	
Antimony	60	13.50	U																
Arsenic	10	4.40																	
Barium	200	24.80																	
Beryllium	5	0.10	U																
Cadmium	5	1.00	U																
Calcium	5000	33900	J																
Chromium	10	24.40																	
Cobalt	50	2.00	U																
Copper	25	5.00	U																
Iron	100	74.90																	
Lead	3	2.00																	
Magnesium	5000	9170																	
Manganese	15	8.20																	
Mercury	0.2	0.20	UJ																
Nickel	40	6.40																	
Potassium	5000	4800																	
Selenium	5	2.80	U																
Silver	10	4.10	U																
Sodium	5000	12400																	
Thallium	10	3.70	U																
Vanadium	50	13.50																	
Zinc	20	10.60	U																
Cyanide	10	NA																	

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NA = Not Analyzed

Project: WESTINGHOUSE-HANFORD																			
Laboratory: TMA																			
Case		SDG: B09W92																	
Sample Number		B09W93																	
Location		199-K-35																	
Remarks		Split, FIL																	
Sample Date		01/14/94																	
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	48.10	U																
Antimony	60	13.50	U																
Arsenic	10	5.70																	
Barium	200	25.90																	
Beryllium	5	0.10	U																
Cadmium	5	1.00	U																
Calcium	5000	35300	J																
Chromium	10	15.40																	
Cobalt	50	2.00	U																
Copper	25	5.00	UJ																
Iron	100	26.60																	
Lead	3	1.80	U																
Magnesium	5000	9690																	
Manganese	15	1.50																	
Mercury	0.2	0.20	U																
Nickel	40	4.70	U																
Potassium	5000	5010																	
Selenium	5	2.80	U																
Silver	10	4.10	U																
Sodium	5000	13100																	
Thallium	10	3.70	U																
Vanadium	50	14.00																	
Zinc	20	2.00	U																
Cyanide	10	NA																	

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NA = Not Analyzed, FIL = Filtered

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Project: WESTINGHOUSE-HANFORD																			
Laboratory: TMA																			
Case		SDG: B09W92																	
Sample Number		B09W95																	
Location		199-K-37																	
Remarks		Spilt, FIL																	
Sample Date		01/17/94																	
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	36.10	U																
Antimony	60	13.50	U																
Arsenic	10	3.00	U																
Barium	200	24.20																	
Beryllium	5	0.10	U																
Cadmium	5	1.00	U																
Calcium	5000	35200																	
Chromium	10	104.00	J																
Cobalt	50	2.00	U																
Copper	25	5.00	U																
Iron	100	7.00	U																
Lead	3	1.90																	
Magnesium	5000	7410																	
Manganese	15	1.20	UJ																
Mercury	0.2	0.20	U																
Nickel	40	4.70	U																
Potassium	5000	3500																	
Selenium	5	2.80	U																
Silver	10	4.10	U																
Sodium	5000	8380																	
Thallium	10	3.70	U																
Vanadium	50	12.20																	
Zinc	20	14.90	J																
Cyanide	10	NA																	

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9413278.0844

INORGANIC ANALYSIS, WATER MATRIX, (µg/L)

Project: WESTINGHOUSE-HANFORD																			
Laboratory: Roy F. Weston																			
Case		SDG: 9401L298																	
Sample Number		B09W42	B09W43	B09W46	B09W47	B09W48	B09W49												
Location		199-K-11	199-K-11	199-K-18	199-K-18	199-K-19	199-K-19												
Remarks			FIL		FIL		FIL												
Sample Date		01/11/94	01/11/94	01/11/94	01/11/94	01/11/94	01/11/94												
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	15.00	UJ	15.00	UJ	15.00	UJ	16.40	J	117.00	J	15.00	UJ						
Antimony	60	27.00	U	27.00	U	27.00	U	96.90	U	27.00	U	27.00	U						
Arsenic	10	13.10		13.80		2.00		2.00	U	2.00	U	2.00	U						
Barium	200	26.60		25.90		40.70		38.40		25.50		21.70							
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U						
Cadmium	5	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U						
Calcium	5000	30600	J	31900	J	60000	J	64300	J	48100	J	43400	J						
Chromium	10	3.00	U	3.00	U	35.70		27.20		106.00		92.90							
Cobalt	50	2.00	U	2.00	U	4.10	U	2.60	U	2.00	U	2.00	U						
Copper	25	2.30		2.00	U	2.00	U	12.50		2.00	U	2.00	U						
Iron	100	82.40		10.60	U	6610		86.80		395.00		9.30	U						
Lead	3	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ						
Magnesium	5000	8510	J	8940	J	9840	J	10600	J	7080	J	6360	J						
Manganese	15	3.00	U	3.00	U	48.50		5.80		5.80		3.00	U						
Mercury	0.2	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ						
Nickel	40	9.00	U	9.00	U	9.00	U	9.00	U	9.00	U	9.00	U						
Potassium	5000	5200		4740		4160		4340		2140		1900							
Selenium	5	2.00	U	2.00	UJ	2.00	UJ	2.00	U	2.00	UJ	2.00	UJ						
Silver	10	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U						
Sodium	5000	29900	J	31600	J	4350	J	4720	J	5430	J	4900	J						
Thallium	10	2.00	U	2.00	U	20.00	U	20.00	U	2.00	U	2.00	U						
Vanadium	50	24.40	U	22.90	U	9.30	U	16.80	U	5.80	U	9.40	U						
Zinc	20	9.90	U	16.90	U	12.10	U	36.40		294.00		10.40	U						
Cyanide	10	NA		NA		NA		NA		NA		NA							

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NA = Not Analyzed FIL = Filtered

941327R.0846

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L298		REVIEWER: HMS			DATE: 4/18/94			PAGE 1 OF 1		
COMMENTS:										
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER	
PB	Aluminum	-18			ug/L	90.0	180.0	B09W42, B09W43, B09W46, B09W49	UJ	
PB	Aluminum	-18			ug/L	90.0	180.0	B09W47, B09W48	J	
CCB2	Antimony	29.1			ug/L	145.5	291.0	B09W47	U	
CCB2	Cobalt	2.2			ug/L	11.0	22.0	B09W46, B09W47	U	
CCB1	Iron	7.5			ug/L	37.5	75.0	B09W43	U	
PB	Iron	7.0			ug/L	35.0	70.0	B09W49	U	
CCB1	Vanadium	7.9			ug/L	39.5	79.0	B09W42, B09W43	U	
CCB2	Vanadium	12.5			ug/L	62.5	125.0	B09W46, B09W47, B09W48, B09W49	U	
PB	Zinc	5.2			ug/L	26.0	52.0	B09W42, B09W43, B09W46, B09W49	U	

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ACCURACY DATA SUMMARY

SDG: 9401L298	REVIEWER: HMS	DATE: 4/18/94	PAGE 1 OF 1	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B09W42S	Lead	67.5	All	UJ
B09W43A	Lead	79.1	B09W43	UJ
B09W46A	Lead	77.1	B09W46	UJ
B09W47A	Lead	74.9	B09W47	UJ
B09W48A	Lead	76.7	B09W48	UJ
B09W49A	Lead	71.7	B09W49	UJ
B09W43A	Selenium	79.8	B09W43	UJ
B09W46A	Selenium	77.4	B09W46	UJ
B09W48A	Selenium	82.1	B09W48	UJ
B09W49A	Selenium	84.1	B09W49	UJ

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DATA QUALIFICATION SUMMARY

SDG: 9401L298	REVIEWER: HMS	DATE: 4/18/94	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Aluminum	UJ	B09W42, B09W43, B09W46, B09W49	Negative Blank Contamination
Aluminum	J	B09W47, B09W48	Negative Blank Contamination
Antimony	U	B09W47	Lab Blank Contamination
Cobalt	U	B09W46, B09W47	Lab Blank Contamination
Iron	U	B09W43, B09W49	Lab Blank Contamination
Vanadium	U	B09W42, B09W43, B09W46, B09W47, B09W48, B09W49	Lab Blank Contamination
Zinc	U	B09W42, B09W43, B09W46, B09W49	Lab Blank Contamination
Mercury	UJ	All	Holding Times Exceeded
Lead	UJ	B09W43, B09W46, B09W47, B09W48, B09W49	GFAA Analytical Spike
Selenium	UJ	B09W43, B09W46, B09W48, B09W49	GFAA Analytical Spike
Calcium	J	All	ICP Serial Dilution
Magnesium	J	All	ICP Serial Dilution
Sodium	J	All	ICP Serial Dilution
Lead	UJ	All	Matrix Spike

9113275-0019

9413278.0850

INORGANIC ANALYSIS, WATER MATRIX, (µg/L)

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: 9401L299																			
Sample Number		B09W78		B09W79		B09W80		B09W81		B09W82		B09W83									
Location		699-70-68		699-70-68		699-73-61		699-73-61		699-78-62		699-78-62									
Remarks				FIL				FIL				FIL									
Sample Date		01/12/94		01/12/94		01/12/94		01/12/94		01/12/94		01/12/94									
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	15.00	UJ	15.00	UJ	15.00	UJ	15.00	UJ	15.00	UJ	20.10	UJ								
Antimony	60	27.00	U	27.00	U	27.00	U	27.00	U	27.00	U	27.00	U								
Arsenic	10	8.70	J	5.90	J	2.70	J	3.60	J	5.30	J	5.00	J								
Barium	200	17.90	U	10.80	U	23.10		23.10		26.70		27.10									
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U								
Cadmium	5	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U								
Calcium	5000	34300		34500		36900		38200		41000		43000									
Chromium	10	3.00	U	3.70		10.40		8.90		40.40		41.50									
Cobalt	50	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ								
Copper	25	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ								
Iron	100	122.00		15.20	U	33.20	U	8.50	U	10.90	U	17.30	U								
Lead	3	2.00	UJ	2.00	UJ	2.10	J	2.00	UJ	2.00	UJ	2.00	UJ								
Magnesium	5000	9600		9330		9550		9820		11600		11900									
Manganese	15	3.00	U	3.00	U	6.90		6.90		3.00	U	3.00	U								
Mercury	0.2	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U								
Nickel	40	9.00	U	9.00	U	9.00	U	9.00	U	9.00	U	9.00	U								
Potassium	5000	4960	J	4840	J	4860	J	4840	J	4930	J	4730	J								
Selenium	5	2.60		2.00	U	3.00	J	2.60	J	2.80		2.20									
Silver	10	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U								
Sodium	5000	14700		14500		20100		20700		17700		17000									
Thallium	10	2.00	U	2.00	UJ	2.00	U	2.00	U	2.00	U	2.00	U								
Vanadium	50	17.20	UJ	12.70	UJ	9.80	UJ	11.50	UJ	18.80	UJ	23.60	UJ								
Zinc	20	12.00	U	7.20	U	146.00		21.10	U	93.40		6.40	U								
Cyanide	10	NA		NA		NA		NA		NA		NA									

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NA = Not Analyzed FIL = Filtered

9413278.0851

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L299		REVIEWER: SC			DATE: 4/15/94			PAGE 1 OF 2	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Aluminum	-16.0			ug/L	80.0	160.0	All	UJ
CCB1	Barium	4.0			ug/L	20.0	40.0	B09W78, B09W79	U
PB	Cobalt	-5.5			ug/L	27.5	55.0	All	UJ
PB	Copper	-2.0			ug/L	10.0	20.0	All	UJ
CCB1	Iron	14.2			ug/L	71.0	142.0	B09W79	U
CCB2	Iron	10.4			ug/L	52.0	104.0	B09W80, B09W81, B09W82	U
CCB3	Iron	12.8			ug/L	64.0	128.0	B09W83	U
PB	Potassium	-830			ug/L	4150	8300	All	J
CCB1	Vanadium	9.6			ug/L	48.0	96.0	B09W78, B09W79	U
CCB2	Vanadium	10.3			ug/L	51.5	103.0	B09W80, B09W81, B09W82	U
CCB	Vanadium	14.2			ug/L	71.0	142.0	B09W83	U
PB	Vanadium	-5.5			ug/L	27.5	55.0	All	UJ
PB	Zinc	7.9			ug/L	39.5	79.0	B09W78, B09W79, B09W81, B09W83	U

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ACCURACY DATA SUMMARY

SDG: 9401L299		REVIEWER: SC	DATE: 4/15/94	PAGE 1 OF 1	
COMMENTS:					
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED	
B09W78S	Arsenic	65.2	All	J	
B09W78S	Lead	62.5	B09W80	J	
B09W78S	Lead	62.5	B09W78, B09W79, B09W81, B09W82, B09W83	UJ	
B09W81A	Arsenic	81.2	B09W81	J	
B09W82A	Arsenic	81.3	B09W82	J	
B09W83A	Arsenic	82.7	B09W83	J	
B09W78A	Lead	84.5	B09W78	UJ	
B09W79A	Lead	72.8	B09W79	UJ	
B09W80A	Lead	77.1	B09W80	J	
B09W81A	Lead	80.2	B09W81	UJ	
B09W82A	Lead	73.3	B09W82	UJ	
B09W83A	Lead	67.9	B09W83	UJ	
B09W80A	Selenium	83.3	B09W80	J	
B09W81A	Selenium	78.8	B09W81	J	
B09W79A	Thallium	81.6	B09W79	UJ	

DATA QUALIFICATION SUMMARY

SDG: 9401L299	REVIEWER: SC	DATE: 4/15/94	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Barium	U	B09W78, B09W79	Lab Blank Contamination
Iron	U	B09W79, B09W80, B09W81, B09W82, B09W83	Lab Blank Contamination
Vanadium	U	All	Lab Blank Contamination
Zinc	U	B09W78, B09W79, B09W81, B09W83	Lab Blank Contamination
Aluminum	UJ	All	Negative Blank Contamination
Cobalt	UJ	All	Negative Blank Contamination
Copper	UJ	All	Negative Blank Contamination
Potassium	J	All	Negative Blank Contamination
Vanadium	UJ	All	Negative Blank Contamination
Arsenic	J	All	Matrix Spike
Lead	J	B09W80	Matrix Spike
Lead	UJ	B09W78, B09W79, B09W81, B09W82, B09W83	Matrix Spike
Arsenic	J	B09W81, B09W82, B09W83	GFAA Analytical Spike
Lead	UJ	B09W78, B09W79, B09W81, B09W82, B09W83	GFAA Analytical Spike
Lead	J	B09W80	GFAA Analytical Spike
Selenium	J	B09W80, B09W81	GFAA Analytical Spike
Thallium	UJ	B09W79	GFAA Analytical Spike

9401L299.0054

9413278.0855

INORGANIC ANALYSIS, WATER MATRIX, (µg/L)

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: 9401L314																			
Sample Number		B09W44		B09W45		B09W50		B09W51		B09W52		B09W53		B09W54		B09W55		B09W56		B09W57	
Location		199-K-13		199-K-13		199-K-20		199-K-20		199-K-21		199-K-21		199-K-22		199-K-22		199-K-23		199-K-23	
Remarks		FIL		FIL		FIL		FIL		FIL		FIL		FIL		FIL		FIL		FIL	
Sample Date		01/12/94		01/12/94		01/13/94		01/13/94		01/13/94		01/13/94		01/13/94		01/13/94		01/13/94		01/13/94	
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	18.50		15.00	U	19.70		15.00	U	55.50		15.00	U	23.10		20.00		19.40		15.00	U
Antimony	60	27.00	U	27.00	U	27.00	UJ	27.00	U	27.00	U	27.00	U	27.00	UJ	27.00	UJ	27.00	UJ	27.00	UJ
Arsenic	10	6.10		5.60		3.40		3.30		2.00	U	2.00	U	2.00	J	2.00	U	2.00	U	5.10	
Barium	200	24.70		23.90		25.10		24.30		18.40	U	17.20	U	19.60	U	19.60	U	32.50		37.20	
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Cadmium	5	3.00	U	3.00	U	3.00	UJ	3.00	U												
Calcium	5000	39600	J	38500	J	41300	J	40500	J	42200	J	41800	J	37000	J	37500	J	49800	J	60600	J
Chromium	10	19.40	J	17.50	J	157.00	J	147.00	J	105.00	J	88.60	J	148.00	J	131.00	J	15.30	J	40.00	J
Cobalt	50	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U
Copper	25	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	6.10	U	4.50	U	2.00	U	4.10	U
Iron	100	64.50		10.20	U	139.00		12.90	U	304.00		12.90	U	144.00		77.30		57.50	U	22.60	U
Lead	3	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U
Magnesium	5000	9950	J	9670	J	8530	J	8290	J	8090	J	7980	J	6710	J	6700	J	9420	J	15700	J
Manganese	15	3.00	U	3.00	U	3.10		3.00	U	9.20		3.00	U	4.10		3.00	U	3.10		3.10	
Mercury	0.2	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
Nickel	40	12.00		9.00	U	11.10		9.00	U	13.30		12.40		12.40		16.40		9.00	U	9.00	U
Potassium	5000	5840		5150		3900		3710		1870		1630		2230		2660		3370		10200	
Selenium	5	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ
Silver	10	3.00	U	3.00	U	6.90		3.00	U												
Sodium	5000	18000	J	17500	J	5000	J	4850	J	3520	J	3500	J	6290	J	6050	J	15500	J	24400	J
Thallium	10	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ
Vanadium	50	12.70	UJ	13.00	UJ	6.10	UJ	5.70	UJ	4.00	UJ	17.60	UJ								
Zinc	20	25.60		8.40	U	9.70	U	7.10	U	20.30	U	19.90	U	351.00		74.70		11.00	U	8.80	U
Cyanide	10	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

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9415278.0856

INORGANIC ANALYSIS, WATER MATRIX, (ug/L)

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: 9401L314																			
Sample Number		B09W70		B09W71		B09W72		B09W73		B09W74		B09W75		B09W88		B09W89					
Location		199-K-34		199-K-34		199-K-35		199-K-35		199-K-36		199-K-36		199-K-35		199-K-35					
Remarks				FIL				FIL				FIL		DUP		DUP,FIL					
Sample Date		01/13/94		01/13/94		01/14/94		01/14/94		01/14/94		01/14/94		01/14/94		01/14/94					
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	677.00		15.90		21.40		15.00	U	39.30		15.00	U	48.90		15.00	U				
Antimony	60	27.00	U	27.00	UJ	27.00	UJ	27.00	UJ	27.00	U	27.00	UJ	27.00	U	27.00	U				
Arsenic	10	5.60	J	2.00	UJ	3.60		5.00		4.20		4.40		4.10		4.70					
Barium	200	43.50		32.90		33.30		32.50		44.30	U	46.60	U	37.20	U	31.30	U				
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U				
Cadmium	5	3.00	UJ	3.00	U																
Calcium	5000	54100	J	48900	J	36900	J	35800	J	41800	J	44800	J	36900	J	35100	J				
Chromium	10	89.80	J	15.10	J	24.40	J	16.00	J	112.00	J	116.00	J	46.70	J	10.80	J				
Cobalt	50	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.70	U	2.00	U				
Copper	25	18.40		2.00	U	2.00	U	2.00	U	2.00		2.00	U	4.50		2.00	U				
Iron	100	4920		23.40	U	88.10		18.30	U	90.20		10.50	U	230.00		20.90	U				
Lead	3	2.20		2.00	U	2.60															
Magnesium	5000	14000	J	9240	J	10100	J	9750	J	10200	J	10900	J	10000	J	9510	J				
Manganese	15	72.80		3.00	U	3.10		3.00	U	3.10		3.00	U	10.30		3.00	U				
Mercury	0.2	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ				
Nickel	40	19.10		10.20		11.60		9.00	U	12.40		12.00		24.90		9.00	U				
Potassium	5000	9050		3540		5410		5480		5190		5910		5580		5430					
Selenium	5	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ				
Silver	10	3.00	U	3.00	U	3.00	U	5.30		13.40		3.00	U	3.00	U	3.00	U				
Sodium	5000	21800	J	14700	J	13800	J	13300	J	13400	J	14200	J	13800	J	13100	J				
Thallium	10	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ				
Vanadium	50	12.00	UJ	4.00	UJ	10.80	UJ	12.40	UJ	4.00	UJ	4.60	UJ	8.70	UJ	7.80	UJ				
Zinc	20	132.00		5.70	U	13.70	U	9.70	U	26.90		9.70	U	9.60	U	13.70	U				
Cyanide	10	NA		NA		NA		NA		NA		NA		NA		NA					

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DUP = Duplicate, NA = Not Analyzed, FIL = Filtered

HOLDING TIME SUMMARY

SDG: 9401L314		REVIEWER: SC		DATE: 4/13/94		PAGE 1 OF 2	
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B09W44	Mercury	1/12/94	2/14/94	2/15/94		28	UJ
B09W45	Mercury	1/12/94	2/14/94	2/15/94		28	UJ
B09W50	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W51	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W52	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W53	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W54	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W55	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W56	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W57	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W70	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W71	Mercury	1/13/94	2/14/94	2/15/94		28	UJ
B09W72	Mercury	1/14/94	2/14/94	2/15/94		28	UJ
B09W73	Mercury	1/14/94	2/14/94	2/15/94		28	UJ
B09W74	Mercury	1/14/94	2/14/94	2/15/94		28	UJ
B09W75	Mercury	1/14/94	2/14/94	2/15/94		28	UJ

9413278.0859

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L314		REVIEWER: SC			DATE: 4/13/94			PAGE 1 OF 3		
COMMENTS:										
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER	
CCB3	Barium	3.9			ug/L	19.5	39.0	B09W52, B09W53	U	
CCB2	Copper	2.0			ug/L	10.0	20.0	B09W54, B09W55, B09W57, B09W71	U	
CCB1	Iron	7.3			ug/L	36.5	73.0	B09W89	U	
CCB3	Iron	6.7			ug/L	33.5	67.0	B09W57, B09W71, B09W73, B09W75	U	
PB	Iron	12.9			ug/L	64.5	129.0	B09W45, B09W51, B09W53, B09W56, B09W57, B09W71, B09W73, B09W75, B09W89	U	
PB	Selenium				ug/L	13.5	27.0	All	UJ	
PB	Thallium	-2.8			ug/L	14.0	28.0	All	UJ	
CCB1	Vanadium	5.4			ug/L	27.0	54.0	B09W88, B09W89	U	
CCB2	Vanadium	5.9			ug/L	29.5	59.0	B09W50, B09W57, B09W70, B09W72, B09W73, B09W75	U	

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BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L314		REVIEWER: SC			DATE: 4/13/94			PAGE 2 OF 3	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB3	Vanadium	10.0			ug/L	50.0	100.0	B09W44, B09W45, B09W51	U
PB	Vanadium	-12.0			ug/L	60.0	120.0	All	UJ
PB	Zinc	4.8			ug/L	24.0	48.0	B09W45, B09W50, B09W51, B09W52, B09W53, B09W56, B09W57, B09W71, B09W72, B09W73, B09W75, B09W88, B09W89	U

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BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L314		REVIEWER: SC			DATE: 4/13/94			PAGE 3 OF 3	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	2X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB2	Antimony	-28.0			ug/L	56.0	280.0	B09W50, B09W54, B09W55, B09W56, B09W57, B09W71, B09W72, B09W73, B09W75	UJ
CCB1	Selenium	-2.6			ug/L	5.2	26.0	B09W88	UJ
CCB2	Selenium	-2.2			ug/L	4.4	22.0	B09W72, B09W74, B09W75, B09W89	UJ
CCB3	Selenium	-2.3			ug/L	4.6	23.0	B09W56, B09W57, B09W70, B09W71, B09W73	UJ
CCB4	Selenium	-2.0			ug/L	4.0	20.0	B09W53	UJ
CCE1	Thallium	-2.4			ug/L	4.8	24.0	B09W51, B09W57, B09W73	UJ

941327B.0862

ACCURACY DATA SUMMARY

SDG: 9401L314	REVIEWER: SC	DATE: 4/13/94	PAGE 1 OF 1	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B09W54A	Arsenic	81%	B09W54	J
B09W70A	Arsenic	119.5%	B09W70	J
B09W71A	Arsenic	122%	B09W71	UJ
B09W45A	Thallium	84.4%	B09W45	UJ
B09W51A	Thallium	80.1%	B09W51	UJ
B09W52A	Thallium	66%	B09W52	UJ
B09W70A	Thallium	80.3%	B09W70	UJ
B09W88A	Thallium	76%	B09W88	UJ
B09W89A	Thallium	81.2%	B09W89	UJ

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DATA QUALIFICATION SUMMARY

SDG: 9401L314	REVIEWER: SC	DATE: 4/14/94	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Mercury	UJ	All	Holding Times Exceeded
Barium	U	B09W52, B09W53	Lab Blank Contamination
Copper	U	B09W54, B09W55, B09W57, B09W71	Lab Blank Contamination
Iron	U	B09W45, B09W51, B09W53, B09W56, B09W57, B09W71, B09W73, B09W75, B09W89	Lab Blank Contamination
Vanadium	U	B09W44, B09W45, B09W50, B09W51, B09W57, B09W70, B09W72, B09W73, B09W75, B09W88, B09W89	Lab Blank Contamination
Zinc	U	B09W45, B09W50, B09W51, B09W52, B09W53, B09W56, B09W57, B09W71, B09W72, B09W73, B09W75, B09W88, B09W89	Lab Blank Contamination
Antimony	UJ	B09W50, B09W54, B09W55, B09W56, B09W57, B09W71, B09W72, B09W73, B09W75	Negative Blank Contamination
Selenium	UJ	All	Negative Blank Contamination
Thallium	UJ	All	Negative Blank Contamination
Vanadium	UJ	All	Negative Blank Contamination
Arsenic	J	B09W54, B09W70	GFAA Analytical Spike
Arsenic	UJ	B09W71	GFAA Analytical Spike
Thallium	UJ	B09W45, B09W51, B09W52, B09W70, B09W88, B09W89	GFAA Analytical Spike
Chromium	J	All	Lab Duplicate
Calcium	J	All	ICP Serial Dilution
Magnesium	J	All	ICP Serial Dilution
Sodium	J	All	ICP Serial Dilution

4980 0228/16

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Project: WESTINGHOUSE-HANFORD																			
Laboratory: Roy F. Weston																			
Case		SDG: 9401L347																	
Sample Number		B09W76		B09W77		B09W84		B09W85		B09W90		B09W91							
Location		199-K-37		199-K-37		EB-1		EB-1		199-K-37		199-K-37							
Remarks				FIL		EB		EB,FIL		DUP		DUP,FIL							
Sample Date		01/17/94		01/17/94		01/17/94		01/17/94		01/17/94		01/17/94							
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	32.90		22.80		20.50		23.80		43.00		27.00							
Antimony	60	27.00	U	27.00	U	27.00	U	27.00	U	27.00	U	27.00	U						
Arsenic	10	2.90		2.80		2.00	U	2.00	U	3.00		4.00							
Barium	200	32.40	U	27.70	U	3.00	U	3.10	U	27.30	U	26.90	U						
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U						
Cadmium	5	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U						
Calcium	5000	37300	J	36100	J	88.10	UJ	212.00	J	35200	J	35800	J						
Chromium	10	115.00	J	111.00	J	3.00	UJ	3.00	UJ	111.00	J	104.00	J						
Cobalt	50	3.40	U	2.00	U														
Copper	25	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	4.20							
Iron	100	27.00	U	10.90	U	9.80	U	10.70	U	32.70	U	28.40	U						
Lead	3	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ						
Magnesium	5000	7850		7600		47.00	U	47.00	U	7470		7540							
Manganese	15	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U						
Mercury	0.2	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.17							
Nickel	40	9.00	U	9.00	U	9.00	U	9.00	U	9.00	U	9.00	U						
Potassium	5000	4150		3340		666.00	U	666.00	U	3710		2790							
Selenium	5	2.00	UJ	2.00	UJ	2.00	U	2.00	U	2.00	UJ	2.00	UJ						
Silver	10	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U						
Sodium	5000	9140		8840		46.70	U	40.90	U	8720		8820							
Thallium	10	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U						
Vanadium	50	10.50	UJ	10.30	UJ	4.00	UJ	4.00	UJ	8.90	UJ	15.70	UJ						
Zinc	20	13.90	U	8.60	U	15.70	U	68.40		11.40	U	26.30	U						
Cyanide	10	NA		NA		NA		NA		NA		NA							

EB = Equipment Blank, DUP = Duplicate, NA = Not Analyzed

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L347		REVIEWER: RJS			DATE: 4/19/94			PAGE 1 OF 3	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB2	Barium	7.0			ug/L	35.0	70.0	B09W76, B09W77	U
CCB3	Barium	7.4			ug/L	37.0	74.0	B09W85, B09W90, B09W91	U
CCB2	Calcium	38.1			ug/L	190.5	381.0	B09W84	U
PB	Calcium	33.3			ug/L	166.5	333.0	B09W84	U
CCB2	Cobalt	4.5			ug/L	22.5	45.0	B09W76	U
CCB2	Iron	14.8			ug/L	74.0	148.0	B09W76, B09W77, B09W84	U
CCB3	Iron	13.6			ug/L	68.0	136.0	B09W85, B09W90, B09W91	U
PB	Iron	22.9			ug/L	114.5	229.0	All	U
CCB2	Sodium	95.7			ug/L	478.5	957.0	B09W84	U
CCB3	Sodium	132.1			ug/L	660.5	1321	B09W85	U
CCB2	Vanadium	9.6			ug/L	48.0	96.0	B09W76, B09W77	U
CCB3	Vanadium	12.8			ug/L	64.0	128.0	B09W90, B09W91	U
PB	Vanadium	4.7			ug/L	23.5	47.0	All	UJ
CCB2	Zinc	3.2			ug/L	16.0	32.0	B09W76, B09W77, B09W84	U

ACCURACY DATA SUMMARY

SDG: 9401L347	REVIEWER: RJS	DATE: 4/19/94	PAGE 1 OF 1	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B09W76A	Lead	71.2	B09W76	UJ
B09W77A	Lead	72.2	B09W77	UJ
B09W84A	Lead	122.3	B09W84	UJ
B09W85A	Lead	122.9	B09W85	UJ
B09W90A	Lead	69.6	B09W90	UJ
B09W91A	Lead	66.4	B09W91	UJ
B09W76A	Selenium	76.5	B09W76	UJ
B09W77A	Selenium	74.0	B09W77	UJ
B09W90A	Selenium	73.3	B09W90	UJ
B09W91A	Selenium	79.0	B09W91	UJ
B09W76S	Lead	59.0	B09W76, B09W77, B09W84, B09W85, B09W90, B09W91	UJ

DATA QUALIFICATION SUMMARY

911327B-0871

SDG: 9401L347	REVIEWER: RJS	DATE: 4/19/94	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Barium	U	B09W76, B09W77, B09W85, B09W90, B09W91	Lab Blank Contamination
Calcium	U	B09W84	Lab Blank Contamination
Cobalt	U	B09W76	Lab Blank Contamination
Iron	U	All	Lab Blank Contamination
Sodium	U	B09W84, B09W85	Lab Blank Contamination
Vanadium	U	B09W76, B09W77, B09W90, B09W91	Lab Blank Contamination
Zinc	U	B09W76, B09W77, B09W84, B09W90, B09W91	Lab Blank Contamination
Lead	UJ	B09W85, B09W90, B09W91	Negative Blank Contamination
Vanadium	UJ	All	Negative Blank Contamination
Lead	UJ	B09W76, B09W77, B09W84, B09W85, B09W90, B09W91	GFAA Analytical Spike
Selenium	UJ	B09W76, B09W77, B09W90, B09W91	GFAA Analytical Spike
Lead	UJ	All	Matrix Spike
Calcium	J	B09W76, B09W77, B09W85, B09W90, B09W91	Lab Duplicate
Calcium	UJ	B09W84	Lab Duplicate
Chromium	J	B09W76, B09W77, B09W90, B09W91	Lab Duplicate
Chromium	UJ	B09W84, B09W85	Lab Duplicate

944327E.0872

INORGANIC ANALYSIS, WATER MATRIX, (ug/L)

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: 9401L365																			
Sample Number		B09W64		B09W65		B09W66		B09W67		B09W96		B09W97									
Location		199-K-32A		199-K-32A		199-K-32B		199-K-32B		TB-1		TB-1									
Remarks				FIL				FIL		TB		TB, FIL									
Sample Date		01/18/94		01/18/94		01/18/94		01/18/94		01/18/94		01/18/94									
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	15.00	UJ	15.00	UJ	15.00	UJ	24.40	J	15.00	UJ	15.00	UJ								
Antimony	60	27.00	U	27.00	U	27.00	U	27.00	U	27.00	U	27.00	U								
Arsenic	10	2.20		2.00		2.00	U	2.90		2.00	U	2.00	U								
Barium	200	23.50	U	27.60	U	65.10		79.10		3.00	U	3.00	U								
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U								
Cadmium	5	3.00	U	3.00	U	3.00	U	3.60		3.00	U	3.00	U								
Calcium	5000	39300	J	43200	J	23500	J	27500	J	77.90	UJ	36.20	UJ								
Chromium	10	22.90		22.90		9.00		16.10		3.00	U	3.00	U								
Cobalt	50	2.00	U	2.00	U	2.00	U	6.70	U	2.00	U	2.00	U								
Copper	25	3.00	U	2.60	U	2.00	U	8.20	U	2.00	U	2.00	U								
Iron	100	39.30		8.30		43.90		123.00		11.60		7.60									
Lead	3	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U								
Magnesium	5000	4570	J	4980	J	13700	J	15900	J	47.00	UJ	47.00	UJ								
Manganese	15	3.00	U	3.00	U	3.00	U	22.90		3.00	U	3.00	U								
Mercury	0.2	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ								
Nickel	40	9.00	U	9.00	U	9.00	U	17.90		10.20		9.00	U								
Potassium	5000	2070		2370		4710		5540		666.00	U	666.00	U								
Selenium	5	2.00	U	2.00	U	2.40		2.00	U	2.00	U	2.00	U								
Silver	10	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U								
Sodium	5000	5930	J	6540	J	26300	J	31500	J	27.00	UJ	27.00	UJ								
Thallium	10	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U								
Vanadium	50	4.00	UJ	4.00	UJ	4.00	UJ	4.00	UJ	4.00	UJ	4.00	UJ								
Zinc	20	14.20	U	14.20	U	14.20	U	11.50	U	17.70		3.00	U								
Cyanide	10	NA		NA		NA		NA		NA		NA									

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WHC-SD-EN-TI-266, Rev. 0

TB = Trip Blank, NA = Not Analyzed, FIL = Filtered

9413278.0874

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L365		REVIEWER: LM			DATE: 4/25/94			PAGE 1 OF 2	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Aluminum	-19.0			ug/L	80.0	190.0	B09W64, B09W65, B09W66, B09W96, B09W97	UJ
PB	Aluminum	-19.0			ug/L	80.0	190.0	B09W67	J
CCB1	Barium	8.2			ug/L	41.0	82.0	B09W64	U
CCB2	Barium	7.8			ug/L	39.0	78.0	B09W65	U
CCB2	Calcium	44.4			ug/L	222.0	444.0	B09W96, B09W97	U
CCB1	Cobalt	4.0			ug/L	20.0	40.0	B09W67	U
CCB1	Copper	2.1			ug/L	10.5	21.0	B09W64, B09W67	U
CCB2	Copper	3.0			ug/L	15.0	30.0	B09W65	U
PB	Magnesium	-64.0			ug/L	320.0	640.0	B09W96, B09W97	UJ
PB	Sodium	-90.0			ug/L	450.0	900.0	B09W96, B09W97	UJ
PB	Vanadium	-11.0			ug/L	55.0	110.0	All	UJ
PB	Zinc	3.5			ug/L	17.5	35.0	B09W64, B09W65, B09W66, B09W67	U

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WHC-SD-EN-TI-266, Rev. 0

9413278.0876

PRECISION DATA SUMMARY

SDG: 9401L365		REVIEWER: LM		DATE: 4/25/94		PAGE 1 OF 1	
COMMENTS:							
COMPOUND	SAMPLE ID:	SAMPLE ID:	RPD	SAMPLES AFFECTED	QUALIFIER		
Calcium	B09W66	B09W66L	12.4	B09W64, B09W65, B09W66, B09W67	J		
Calcium	B09W66	B09W66L	12.4	B09W96, B09W97	UJ		
Magnesium	B09W66	B09W66L	12.2	B09W64, B09W65, B09W66, B09W67,	J		
Magnesium	B09W66	B09W66L	12.2	B09W96, B09W97	UJ		
Sodium	B09W66	B09W66L	14.0	B09W64, B09W65, B09W66, B09W67	J		
Sodium	B09W66	B09W66L	14.0	B09W96, B09W97	UJ		

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DATA QUALIFICATION SUMMARY

SDG: 9401L365	REVIEWER: LM	DATE: 4/25/94	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Mercury	UJ	All	Holding Times Exceeded
Barium	U	B09W64, B09W65	Lab Blank Contamination
Calcium	U	B09W96, B09W97	Lab Blank Contamination
Cobalt	U	B09W67	Lab Blank Contamination
Copper	U	B09W64, B09W65, B09W67	Lab Blank Contamination
Zinc	U	B09W64, B09W65, B09W66, B09W67	Lab Blank Contamination
Aluminum	J	B09W67	Negative Blank Contamination
Aluminum	UJ	B09W64, B09W65, B09W66, B09W96, B09W97	Negative Blank Contamination
Magnesium	UJ	B09W96, B09W97	Negative Blank Contamination
Sodium	UJ	B09W96, B09W97	Negative Blank Contamination
Vanadium	UJ	All	Negative Blank Contamination
Calcium	J	B09W64, B09W65, B09W66, B09W67	ICP Serial Dilution
Calcium	UJ	B09W96, B09W97	ICP Serial Dilution
Magnesium	J	B09W64, B09W65, B09W66, B09W67	ICP Serial Dilution
Magnesium	UJ	B09W96, B09W97	ICP Serial Dilution
Sodium	J	B09W64, B09W65, B09W66, B09W67	ICP Serial Dilution
Sodium	UJ	B09W96, B09W97	ICP Serial Dilution

4/27/94 11:46

9413278.0878

INORGANIC ANALYSIS, WATER MATRIX, (ug/L)

Project: WESTINGHOUSE-HANFORD																							
Laboratory: Roy F. Weston																							
Case		SDG: 9401L391																					
Sample Number			B09W68			B09W69			B09WF1			B09WF2											
Location			199-K-33			199-K-33			TB-2			TB-2											
Remarks						FIL			TB			TB,FIL											
Sample Date			01/20/94			01/20/94			01/21/94			01/21/94											
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Aluminum	200	53.10		15.00	U	15.00	U	31.20															
Antimony	60	27.00	U	27.00	U	27.00	U	27.00	U														
Arsenic	10	2.00	U	2.00	U	2.00	U	2.00	U														
Barium	200	39.10		3.00	U	42.10		4.10	U														
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U														
Cadmium	5	3.00	U	3.00	U	3.00	U	3.00	U														
Calcium	5000	81500	J	123.00	UJ	78700	J	137.00	UJ														
Chromium	10	22.60		3.30		17.80		3.00	U														
Cobalt	50	2.00	U	2.00	U	3.70	U	2.00	U														
Copper	25	2.00	U	2.00	U	3.50		2.00	U														
Iron	100	159.00		25.00		55.50		64.20															
Lead	3	2.00	UJ	2.00	U	2.00	UJ	2.00	U														
Magnesium	5000	9980	J	47.00	UJ	9640	J	47.00	UJ														
Manganese	15	3.00	U	3.00	U	3.00	U	3.00	U														
Mercury	0.2	0.10	U	0.10	U	0.10	U	0.10	U														
Nickel	40	9.00	U	9.00	U	9.00	U	9.00	U														
Potassium	5000	3400		666.00	U	3480		666.00	U														
Selenium	5	2.00	U	2.00	U	2.00	U	2.00	U														
Silver	10	3.00	U	3.00	U	3.00	U	3.00	U														
Sodium	5000	14200	J	84.70	UJ	13800	J	75.00	UJ														
Thallium	10	2.00	UJ	2.00	UJ	2.00	UJ	2.00	UJ														
Vanadium	50	13.90	U	4.00	U	10.40	U	4.00	U														
Zinc	20	26.50	U	12.90	U	12.50	U	8.90	U														
Cyanide	10	NA		NA		NA		NA															

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WHC-SD-EN-TI-266, Rev. 0

TB = Trip Blank, NA = Not Analyzed, FIL = Filtered

9413278.0879

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L391		REVIEWER: RJS			DATE: 4/14/94			PAGE 1 OF 1	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB1	Barium	6.7			ug/L	33.5	67.0	B09WF2	U
CCB1	Calcium	33.9			ug/L	169.5	339.0	B09W69, B09WF2	U
PB	Calcium	35.5			ug/L	177.5	355.0	B09W69, B09WF2	U
CCB1	Cobalt	2.3			ug/L	11.5	23.0	B09WF1	U
CCB1	Sodium	94.8			ug/L	474.0	948.0	B09W69, B09WF2	U
PB	Sodium	34.8			ug/L	174.0	348.0	B09W69, B09WF2	U
CCB1	Vanadium	11.0			ug/L	55.0	110.0	B09W68, B09WF1	U
PB	Zinc	8.9			ug/L	44.5	89.0	B09W68, B09W69, B09WF1, B09WF2	U

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WHC-SD-EN-TI-266, Rev. 0

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case	SDG: 9401L441																				
Sample Number	B09W62		B09W63																		
Location	199-K-31		199-K-31																		
Remarks			FIL																		
Sample Date	01/24/94		01/24/94																		
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	26.20	U	15.00	U																
Antimony	60	27.00	U	27.00	U																
Arsenic	10	3.40		2.30																	
Barium	200	34.40		29.80																	
Beryllium	5	1.00	U	1.00	U																
Cadmium	5	3.00	U	3.00	U																
Calcium	5000	38100	J	37700	J																
Chromium	10	13.20	J	12.10	J																
Cobalt	50	2.90	U	2.00	U																
Copper	25	2.70		2.00	U																
Iron	100	78.40		9.30																	
Lead	3	2.00	U	2.00	U																
Magnesium	5000	8690		8560																	
Manganese	15	3.00	U	3.00	U																
Mercury	0.2	0.10	U	0.10	U																
Nickel	40	9.00	U	9.00	U																
Potassium	5000	4870	J	4370	J																
Selenium	5	2.00	U	2.00	U																
Silver	10	3.00	U	3.00	U																
Sodium	5000	14100	J	13900	J																
Thallium	10	20.00	UJ	2.00	UJ																
Vanadium	50	34.80	U	30.60	U																
Zinc	20	11.10	U	12.20	U																
Cyanide	10	NA		NA																	

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WHC-SD-EN-TI-266, Rev. 0

NA = Not Analyzed, FIL = Filtered

9413278.0884

BLANK AND SAMPLE DATA SUMMARY

SDG: 9401L441		REVIEWER: RJS			DATE: 4/13/94			PAGE 1 OF 2	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB1	Aluminum	18.7			ug/L	93.5	187.0	B09W62	U
CCB1	Cobalt	2.3			ug/L	11.5	23.0	B09W62	U
PB	Potassium	-930			ug/L	4650	9300	B09W62, B09W63	J
PB	Thallium	-2.5			ug/L	12.5	25.0	B09W62, B09W63	UJ
CCB1	Vanadium	9.9			ug/L	49.5	99.0	B09W62, B09W63	U
PB	Vanadium	26.6			ug/L	133.0	266.0	B09W62, B09W63	U
CCB1	Zinc	3.3			ug/L	16.5	33.0	B09W62, B09W63	U
PB	Zinc	6.3			ug/L	31.5	63.0	B09W62, B09W63	U

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WHC-SD-EN-TI-266, Rev. 0

INORGANIC ANALYSIS, WATER MATRIX, (µg/L)

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: 9402L458																			
Sample Number		B09W60			B09W61			B09W86			B09W87										
Location		199-K-30			199-K-30			EB-2			EB-2										
Remarks		FIL			EB			EB,FIL													
Sample Date		01/20/94			01/20/94			01/25/94			01/25/94										
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Aluminum	200	28.80	U	15.00	U	15.00	U	15.00	U												
Antimony	60	27.00	U	27.00	U	27.00	U	33.70													
Arsenic	10	3.90	U	2.40	U	2.00	U	2.00	U												
Barium	200	36.60		34.00		3.00	U	3.00	U												
Beryllium	5	1.00	U	1.00	U	1.00	U	1.00	U												
Cadmium	5	3.00	U	3.00	U	3.00	U	3.00	U												
Calcium	5000	54400	J	58700	J	60.00	UJ	31.60	UJ												
Chromium	10	3.70		4.80		3.00	U	3.00	U												
Cobalt	50	3.70		2.00	U	2.00	U	2.00	U												
Copper	25	2.00	U	2.00	U	2.00	U	2.00	U												
Iron	100	41.90	U	19.60	U	13.30	U	6.50	U												
Lead	3	2.00	UJ	2.00	UJ	2.00	U	2.00	U												
Magnesium	5000	12100	J	13000	J	174.00	UJ	182.00	UJ												
Manganese	15	3.00	U	3.00	U	3.00	U	3.00	U												
Mercury	0.2	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ												
Nickel	40	9.00	UJ	9.00	U	9.00	U	9.00	U												
Potassium	5000	4710	J	5110	J	666.00	UJ	666.00	UJ												
Selenium	5	2.00	UJ	2.00	UJ	2.00	U	2.00	U												
Silver	10	3.00	U	3.00	U	3.00	U	3.00	U												
Sodium	5000	10900	J	11900	J	239.00	UJ	335.00	UJ												
Thallium	10	2.00	UJ	2.00	U	2.00	U	2.00	U												
Vanadium	50	36.50	U	40.80	U	22.30	U	23.70	U												
Zinc	20	31.00	U	14.20	U	7.10	U	13.10	U												
Cyanide	10	NA		NA		NA		NA													

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WHC-SD-EN-TI-266, Rev. 0

EB = Equipment Blank, NA = Not Analyzed, FIL = Filtered

941327E.0891

BLANK AND SAMPLE DATA SUMMARY

SDG: 9402L458		REVIEWER: RJS			DATE: 4/15/94			PAGE 1 OF 3	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB1	Aluminum	23.9			ug/L	119.5	239.0	B09W60	U
CCB1	Arsenic	2.1			ug/L	10.5	21.0	B09W60	U
CCB2	Arsenic	2.6			ug/L	13.0	26.0	B09W61	U
CCB2	Calcium	39.4			ug/L	197.0	394.0	B09W86, B09W87	U
CCB1	Iron	8.7			ug/L	43.5	87.0	B09W60	U
CCB2	Iron	6.5			ug/L	32.5	65.0	B09W61, B09W86, B09W87	U
PB	Iron	9.2			ug/L	46.0	92.0	B09W60, B09W61, B09W86, B09W87	U
CCB2	Magnesium	88.9			ug/L	444.5	889.0	B09W86, B09W87	U
PB	Magnesium	210.9			ug/L	1054.5	2109.0	B09W86, B09W87	U
PB	Potassium	-890			ug/L	4450.0	8900.0	B09W60, B09W61	J
PB	Potassium	-890			ug/L	4450.0	8900.0	B09W86, B09W87	UJ
CCB2	Sodium	91.2			ug/L	456.0	912.0	B09W86, B09W87	U
PB	Sodium	254.8			ug/L	1274.0	2548.0	B09W86, B09W87	U
CCB1	Vanadium	8.4			ug/L	42.0	84.0	B09W60	U
CCB2	Vanadium	10.1			ug/L	50.5	101.0	B09W61, B09W86, B09W87	U

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DATA QUALIFICATION SUMMARY

SDG: 9402L458	REVIEWER: RJS	DATE: 4/15/94	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Mercury	UJ	B09W60, B09W61, B09W86, B09W87	Holding Times Exceeded
Aluminum	U	B09W60	Lab Blank Contamination
Arsenic	U	B09W60, B09W61	Lab Blank Contamination
Calcium	U	B09W86, B09W87	Lab Blank Contamination
Iron	U	B09W60, B09W61, B09W86, B09W87	Lab Blank Contamination
Magnesium	U	B09W86, B09W87	Lab Blank Contamination
Sodium	U	B09W86, B09W87	Lab Blank Contamination
Vanadium	U	B09W60, B09W61, B09W86, B09W87	Lab Blank Contamination
Zinc	U	B09W60, B09W61, B09W86, B09W87	Lab Blank Contamination
Nickel	UJ	B09W60	Negative Blank Contamination
Potassium	J	B09W60, B09W61	Negative Blank Contamination
Potassium	UJ	B09W86, B09W87	Negative Blank Contamination
Lead	UJ	B09W60, BC - 51	GFAA Analytical Spike
Selenium	UJ	B09W60, B09W61	GFAA Analytical Spike
Thallium	UJ	B09W60	GFAA Analytical Spike
Calcium	J	B09W60, B09W61	ICP Serial Dilution
Calcium	UJ	B09W86, B09W87	ICP Serial Dilution
Magnesium	J	B09W60, B09W61	ICP Serial Dilution
Magnesium	UJ	B09W86, B09W87	ICP Serial Dilution
Sodium	J	B09W60, B09W61	ICP Serial Dilution
Sodium	UJ	B09W86, B09W87	ICP Serial Dilution

9680-2725-116

Project: WESTINGHOUSE-HANFORD																			
Laboratory: Roy F. Weston																			
Case		SDG: 9402L462																	
Sample Number		B09W58				B09W59													
Location		199-K-27				199-K-27													
Remarks		FIL																	
Sample Date		01/25/94				01/25/94													
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	199.00		15.00	UJ														
Antimony	60	27.00	U	27.00	U														
Arsenic	10	2.50	U	2.80															
Barium	200	35.90		26.10	U														
Beryllium	5	1.00	U	1.00	U														
Cadmium	5	3.00	U	3.00	U														
Calcium	5000	51400	J	46400	J														
Chromium	10	28.50		3.00	U														
Cobalt	50	2.00	U	2.00	U														
Copper	25	3.90		2.00	U														
Iron	100	592.00	J	16.10	UJ														
Lead	3	2.00	U	2.00	UJ														
Magnesium	5000	11100	J	10200	J														
Manganese	15	18.00		3.00	U														
Mercury	0.2	0.10	UJ	0.10	UJ														
Nickel	40	21.90		9.00	U														
Potassium	5000	5120		4560															
Selenium	5	2.00	UJ	2.00	UJ														
Silver	10	3.00	U	3.00	U														
Sodium	5000	7250	J	6710	J														
Thallium	10	2.00	UJ	20.00	U														
Vanadium	50	25.60	U	25.60	U														
Zinc	20	25.50		5.00	U														
Cyanide	10	NA		NA															

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NA = Not Analyzed, FIL = Filtered

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BLANK AND SAMPLE DATA SUMMARY

SDG: 9402L462	REVIEWER: LM	DATE: 4/26/94	PAGE 1 OF 1						
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Aluminum	-17.0			ug/L	85.0	170.0	B09W59	UJ
CCB2	Arsenic	2.4			ug/L	12.0	24.0	B09W58	U
CCB1	Barium	6.1			ug/L	30.5	61.0	B09W59	U
CCB1	Iron	7.5			ug/L	37.5	75.0	B09W59	U
PB	Vanadium	20.5			ug/L	102.5	205.0	B09W58, B09W59	U
PB	Zinc	5.0			ug/L	25.0	50.0	B09W59	U

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WHC-SD-EN-TI-266, Rev. 0

DATA QUALIFICATION SUMMARY

SDG: 9402L462	REVIEWER: LM	DATE: 4/26/94	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Mercury	UJ	B09W58, B09W59	Holding Times Exceeded
Aluminum	UJ	B09W59	Negative Blank Contamination
Arsenic	U	B09W58	Lab Blank Contamination
Barium	U	B09W59	Lab Blank Contamination
Iron	U	B09W59	Lab Blank Contamination
Vanadium	U	B09W58, B09W59	Lab Blank Contamination
Zinc	U	B09W59	Lab Blank Contamination
Lead	UJ	B09W59	GFAA Analytical Spike
Selenium	UJ	B09W58, B09W59	GFAA Analytical Spike
Thallium	UJ	B09W58	GFAA Analytical Spike
Thallium	UJ	B09W58	PB Analytical Spike
Selenium	UJ	B09W58, B09W59	Matrix Spike
Calcium	J	B09W58, B09W59	ICP Serial Dilution
Iron	J	B09W58	ICP Serial Dilution
Iron	UJ	B09W59	ICP Serial Dilution
Magnesium	J	B09W58, B09W59	ICP Serial Dilution
Sodium	J	B09W58, B09W59	ICP Serial Dilution

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WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIOCHEMISTRY
199-K-11	B09W42	W	01/11/94	V	7-5
199-K-13	B09W44	W	01/12/94	V	7-7
199-K-18	B09W46	W	01/11/94	V	7-5
199-K-19	B09W48	W	01/11/94	V	7-5
199-K-20	B09W50	W	01/13/94	V	7-7
199-K-21	B09W52	W	01/13/94	V	7-7
199-K-22	B09W54	W	01/13/94	V	7-7
199-K-23	B09W56	W	01/13/94	V	7-7
199-K-27	B09W58	W	01/25/94	V	7-12
199-K-30	B09W60	W	01/20/94	V	7-11
199-K-31	B09W62	W	01/24/94	V	7-10
199-K-33	B09W68	W	01/20/94	V	7-9
199-K-34	B09W70	W	01/13/94	V	7-7
199-K-35	B09W72	W	01/14/94	V	7-7
	B09W88	W	01/14/94	V	7-7
	B09W92	W	01/14/94	V	7-4
199-K-36	B09W74	W	01/14/94	V	7-7
199-K-37	B09W76	W	01/17/94	V	7-8
	B09W90	W	01/17/94	V	7-8
	B09W94	W	01/17/94	V	7-4
699-70-68	B09W78	W	01/12/94	V	7-6
699-73-61	B09W80	W	01/12/94	V	7-6
699-78-62	B09W82	W	01/12/94	V	7-6
EB-1	B09W84	W	01/17/94	V	7-8
EB-2	B09W86	W	01/25/94	V	7-11
TB-2	B09WF1	W	01/21/94	V	7-9

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3.0 GROSS ALPHA AND GROSS BETA DATA VALIDATION

3.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B09W92	40039	40529	40984
40023	40053	40971	
40031	40521	40977	

3.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

3.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the gas proportional counter used for gross alpha and gross beta determination is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination as a function of alpha or beta particle energy, and as a function of the mass of material submitted for counting. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

All calibration results, including efficiency checks and background counts, were acceptable.

3.4 ACCURACY

Accuracy was evaluated by analyzing distilled water samples spiked with known amounts of alpha or beta emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. Acceptable accuracy of spiked sample data must fall within a range of 70 to 130 percent. If spiked sample results were outside this range, associated sample data were qualified as estimated, rejected or not qualified, depending on the individual sample activity.

4060-275-146

Due to a LCS percent recovery of 133%, the gross alpha result for sample number B09W66 in SDG No. 40521 was qualified as an estimate and flagged "J".

Due to an LCS analyzed 30 days after the sample analysis, the gross alpha and gross beta results for sample number B09W68 in SDG No. 40529 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

3.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the RDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are $<5 \times \text{RDL}$, a control limit of $\leq 2 \times \text{RDL}$ is used for soil samples and $\leq \text{RDL}$ for water samples. If either the original or replicate value is below the RDL, the applicable control limits are $\leq \text{RDL}$ for water samples and $\leq 2 \times \text{RDL}$ for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All precision results were acceptable.

3.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicated the presence of an analyte above both the MDA and the statistical uncertainty associated with that MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

All blank results were acceptable.

3.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

5000-02744

3.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was adequate for these analyses. Due to a high LCS percent recovery, the gross alpha result in sample number B09W66 in SDG No. 40521 was qualified as an estimate and flagged "J". Due to an LCS analyzed 30 days after the sample analysis, the gross alpha and gross beta results for sample number B09W68 in SDG No. 40529 were qualified as estimates and flagged "J". Data qualified as estimated are valid and usable for limited purposes only. All other QC data are valid and usable for all purposes.

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4.0 ALPHA SPECTROSCOPY DATA VALIDATION

4.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B09W92	40039	40529	40984
40023	40053	40971	
40031	40521	40977	

4.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

4.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the alpha spectroscopy system used is capable of producing acceptable and reliable analytical data. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible. The calibration consists of an instrument efficiency determination for each alpha radionuclide region of interest, and a system resolution assessment as measured by the full-width at half maximum for each peak.

All calibration results, including efficiency checks and background counts, were acceptable.

4.4 ACCURACY

Accuracy was evaluated by analyzing distilled water samples spiked with known amounts of alpha emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70 to 130 percent, while that for a matrix spike is 60 to 140 percent. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimated, rejected, or not qualified, depending on the activity of the individual sample. A chemical tracer is used to determine the efficiency of the analytical method, with tracer yield limits of 20 to 105 percent. Sample

2060-8720-116

results with chemical yields outside the above stated limits were qualified as estimated or rejected depending on sample activity.

Due to sample analysis occurring several days before and after LCS analysis, alpha spectroscopy results for samples B09W54, B09W52 and B09W50 in SDG No. 400339 were qualified as estimates and flagged "J".

Due to a LCS percent recovery of 32%, the Uranium-235 results for all samples in SDG No. 40039, except sample number B09W88, were qualified as estimates and flagged "J".

Due to a LCS percent recovery of 50%, all Uranium-235 results in SDG No. 40031 were qualified as estimates and flagged "J".

Due to a LCS percent recovery of 51%, the Uranium-235 result for sample number B09W76 in SDG No. 40053 was qualified as an estimate and flagged "J".

Due to a LCS percent recovery of 62%, the Uranium-235 results for sample numbers B09W64 and B09W66 in SDG No. 40521 were qualified as estimates and flagged "J".

Due to a LCS percent recovery of 24%, the Uranium-235 result for sample number B09W68 in SDG No. 40529 was rejected and flagged "UR".

Due to a LCS percent recovery of 67%, the Uranium-235 result for sample number B09W60 in SDG No. 40977 was qualified as an estimate and flagged "J".

Due to a LCS percent recovery of 67%, all Uranium-235 results in SDG No. 40984 were qualified as estimates and flagged "J".

Due to a LCS percent recovery of 3%, all Uranium-235 results in SDG No. 40023 were rejected and flagged "R" or "UR".

All other accuracy results were acceptable.

4.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the RDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are $<5 \times \text{RDL}$, a control limit of $<2 \times \text{RDL}$ is used for soil samples and $< \text{RDL}$ for water samples. If either the original or replicate value is below the RDL, the applicable control limits are $< \text{RDL}$ for water

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samples and $\leq 2 \times \text{RDL}$ for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to a RPD outside QC limits, all Uranium-238 results in SDG No. 40031 were qualified as estimates and flagged "J".

Due to a RPD outside QC limits, all Uranium-234 results in SDG No. 40039, except sample number B09W88, were qualified as estimates and flagged "J".

Due to a RPD outside QC limits, the Uranium-238 result for sample number B09W76 in SDG No. 40053 was qualified as an estimate and flagged "J".

Due to a RPD outside QC limits, the Uranium-234 result for sample number B09W60 in SDG No. 40977 was qualified as an estimate and flagged "J".

Due to RPDs outside QC limits, all Uranium-234 and Uranium-238 results in SDG No. 40984 were qualified as estimates and flagged "J".

All other precision results were acceptable.

4.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicated the presence of an analyte above both the MDA and the statistical uncertainty associated with that MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

Due to the blank not being analyzed with the SDG, all alpha spectroscopy results in SDG No. 40039 except B09W88 were qualified as estimates and flagged "J".

All other blank results were acceptable

4.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitations and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

Reported MDA values for the following samples were above the RDL:

6060-8726716

- Uranium-238 in sample number B09W62 in SDG No. 40971.
- Uranium-234 in sample number B09W86 in SDG No. 40977.

All other analyte quantitation and reported detection limits were acceptable.

4.8 OVERALL ASSESSMENT AND SUMMARY

A complete review of all QC and calibration data indicates that overall system performance was adequate. Due to sample analysis occurring several days before and after LCS analysis, alpha spectroscopy results (except blank, split or duplicate samples) for samples B09W54, B09W52 and B09W50 in SDG No. 40039 were qualified as estimates and flagged "J". Due to low LCS percent recoveries, all Uranium-235 results (except blank, split or duplicate samples) in SDG Nos. 40984, 40977, 40521, 40053, 40031 and 40039 were qualified as estimates and flagged "J". Due to low LCS percent recoveries, the Uranium-235 result for sample number B09W68 in SDG No. 40529, and all Uranium-235 results in SDG No. 40023 were rejected and flagged "R" or "UR". Due to RPDs outside QC limits, all Uranium-238 results (except blank, split or duplicate samples) in SDG Nos. 40984, 40053 and 40031 were qualified as estimates and flagged "J". Due to the blank not being analyzed with the SDG, all alpha spectroscopy results in SDG No. 40039 except sample B09W88 were qualified as estimates and flagged "J". Due to RPDs outside QC limits, all Uranium-234 results in SDG Nos. 40984, 40977 and 40039 (except blank, split or duplicate samples) were qualified as estimates and flagged "J". Reported MDA values for the Uranium-238 result in sample number B09W62 in SDG No. 40971 and the Uranium-234 result in sample number B09W86 in SDG No. 40977 were above the RDL. Data qualified as estimates are valid and usable for limited purposes only. Rejected data are unusable for all purposes and should not be reported. All other QC data are valid and usable for all purposes.

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5.0 STRONTIUM-90 DATA VALIDATION

5.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B09W92	40039	40529	40984
40023	40053	40971	
40031	40521	40977	

5.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

5.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the low background counting system used for Strontium-90 determination is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument counting system efficiency determination. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

All calibration results, including efficiency checks and background counts, were acceptable.

5.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of beta emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70 to 130 percent, while that for a matrix spike is 60 to 140 percent. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimated, rejected, or not qualified, depending on the activity of the individual sample. A chemical tracer is used to determine the efficiency of the analytical method, with tracer yield limits of 30 to 105 percent. Sample

160-828-116

results above the MDA with chemical yields outside the above stated limits were qualified as estimated or rejected.

Due to a LCS not being run with the entire SDG, samples B09W74, B09W72, B09W54, and B09W70 in SDG No. 40039 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

5.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the RDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are $<5 \times \text{RDL}$, a control limit of $\leq 2 \times \text{RDL}$ is used for soil samples and $\leq \text{RDL}$ for water samples. If either the original or replicate value is below the RDL, the applicable control limits are $\leq \text{RDL}$ for water samples and $\leq 2 \times \text{RDL}$ for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All precision results were acceptable.

5.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicated the presence of an analyte above both the MDA and the statistical uncertainty associated with that MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

Due to a blank not being run with the entire SDG, samples B09W74, B09W72, B09W54, and B09W70 in SDG No. 40039 were qualified as estimates and flagged "J".

All blank results were acceptable.

5.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

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All analyte quantitation and reported detection limits were acceptable.

5.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was adequate for these analyses. Due to a LCS and blank not being run with the entire SDG, samples B09W74, B09W72, B09W54, and B09W70 in SDG No. 40039 were qualified as estimates and flagged "J". Data qualified as estimate is valid and usable for limited purposes only. All other data are valid and usable for all purposes.

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6.0 CARBON-14 DATA VALIDATION

6.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B09W92	40039	40529	40984
40023	40053	40971	
40031	40521	40977	

Due to a lack of distillation log information, Carbon-14 results for sample numbers B09W44 and B09W52 in SDG No. 40039 were qualified as estimates and flagged "J". This information was requested, however, the data were not submitted.

6.2 HOLDING TIMES AND SAMPLE PREPARATION

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

The following samples were not analyzed within seven days of distillation and were therefore rejected and flagged "R" or "UR":

- Sample numbers B09W50, B09W54 and B09W72 in SDG No. 40039.

All other holding time requirements were met.

6.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the low background liquid scintillation counting system used for Carbon-14 determination is capable of producing acceptable and reliable analytical data. Each counting system must be factory calibrated at installation and after any maintenance or repair. Calibration consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

All calibration results, including efficiency checks and background counts, were acceptable.

417278-0911

6.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of beta emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70 to 130 percent, while that for a matrix spike is 60 to 140 percent. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimated, rejected, or not qualified, depending on the activity of the individual sample. A chemical tracer is used to determine the efficiency of the analytical method, with tracer yield limits of 30 to 105 percent. Sample results above the MDA with chemical yields outside the above stated limits were qualified as estimated or rejected.

Due to the LCS not being analyzed with the SDG, all samples results except B09W88 in SDG No. 40039 were qualified as estimates and flagged "J".

The following samples were qualified as estimates and flagged "J" due to high radiochemical yields:

- Sample number B09W42 in SDG No. 40023.
- Sample numbers B09W44, B09W56, B09W70, B09W72 and B09W74 in SDG No. 40039.
- Sample number B09W64 in SDG No. 40521.
- Sample number B09W62 in SDG No. 40971.
- Sample number B09W58 in SDG No. 40984.

All other accuracy results were acceptable.

6.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the RDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are $<5 \times \text{RDL}$, a control limit of $\leq 2 \times \text{RDL}$ is used for soil samples and $\leq \text{RDL}$ for water samples. If either the original or replicate value is below the RDL, the applicable control limits are $\leq \text{RDL}$ for water samples and $\leq 2 \times \text{RDL}$ for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All precision results were acceptable.

9413278.0915

6.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicated the presence of an analyte above both the MDA and the statistical uncertainty associated with that MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

Due to the blank not being analyzed with the SDG, all samples results except B09W88 in SDG No. 40039 were qualified as estimates and flagged "J".

All blank results were acceptable.

6.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

Reported MDA values for the following samples were above the RDL:

- Carbon-14 in sample number B09W60 in SDG No. 40977.

All other analyte quantitation and reported detection limits were acceptable.

6.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument performance and calibration indicates that the overall system performance is adequate. Due to the LCS and blank not being analyzed with the SDG, all samples results except B09W88 in SDG No. 40039 were qualified as estimates and flagged "J". Due to high radiochemical yields, data for numerous samples were qualified as estimates and flagged "J". Due to a lack of distillation log information, Carbon-14 results in sample numbers B09W44 and B09W52 in SDG No. 40039 were qualified as estimates and flagged "J". Sample numbers B09W50, B09W54 and B09W72 in SDG No. 40039 were not analyzed within seven days of distillation, therefore, all associated sample results were rejected and flagged "R" or "UR". Data qualified as estimated are valid and usable for limited purposes only. Rejected data are unusable for all purposes and should not be reported. All other QC data are acceptable for all purposes.

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7.0 TRITIUM DATA VALIDATION

7.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B09W92	40039	40529	40984
40023	40053	40971	
40031	40521	40977	

9403278.0917

7.2 HOLDING TIMES AND SAMPLE PREPARATION

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

7.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the low background liquid scintillation counting system used for Tritium determination is capable of producing acceptable and reliable analytical data. Each counting system must be factory calibrated at installation and after any maintenance or repair. Calibration consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

All calibration results, including efficiency checks and background counts, were acceptable.

7.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of beta emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70 to 130 percent, while that for a matrix spike is 60 to 140 percent. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimated, rejected, or remaining unchanged, depending on the activity of the individual sample.

All accuracy results were acceptable.

7.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the RDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are $<5 \times \text{RDL}$, a control limit of $\leq 2 \times \text{RDL}$ is used for soil samples and $\leq \text{RDL}$ for water samples. If either the original or replicate value is below the RDL, the applicable control limits are $\leq \text{RDL}$ for water samples and $\leq 2 \times \text{RDL}$ for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All precision results were acceptable.

7.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicated the presence of an analyte above both the MDA and the statistical uncertainty associated with that MDA, the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

Due to the blank not being analyzed with the entire SDG, all tritium results except B09W88, B09W44 and B09W52 in SDG No. 40039 were qualified as estimates and flagged "J".

Due to the presence of laboratory blank contamination, the following sample was qualified as an estimate and flagged "J":

- Sample number B09W76 in SDG No. 40053.

All other blank results were acceptable.

7.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

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All analyte quantitation and reported detection limits and sample results were acceptable.

7.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument performance and calibration indicates that the overall system performance is adequate. Due to the blank not being analyzed with the entire SDG, all tritium results except B09W88, B09W44 and B09W52 in SDG No. 40039 were qualified as estimates and flagged "J". Due to minor laboratory blank contamination, the Tritium result for sample number B09W76 in SDG No. 40053 was qualified as an estimate and flagged "J". Estimated data are considered usable for limited purposes only. All other QC results were acceptable and usable for all purposes.

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8.0 REFERENCES

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