JAN 20 1994

ENGINEERING DATA TRANSMITTAL

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1	WHC-SD-EN-TI-219		0	Data Validation Report for the 100-HR-3 Operable Unit, 3rd Quarter 1993	3Q	1/2	1	

16. KEY					
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1/2	1	Cog. Mgr. R. P. Henckel	<i>R. P. Henckel</i>	1/2/94	H6-02	IRA Clearance (3)			H4-17	3	
1/2	1	ESQ/QA G. S. Corrigan	<i>G. S. Corrigan</i>	1/14/94	H4-16	Central Files (3) (2)			L8-04	3	

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Title: Data Validation Report for the 100-HR-3 Operable Unit, Fifth Round Groundwater Samples		Unclassified Category UC- N/A	Impact Level 3Q
New or novel (patentable) subject matter? ☒ No ☐ Yes If "Yes", has disclosure been submitted by WHC or other company? ☐ No ☐ Yes Disclosure No(s).		Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? ☒ No ☐ Yes (Identify)	
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SUPPORTING DOCUMENT		1. Total Pages 197
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MASTER

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
DBC	Dibutylchloredate
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
ICB	Initial Calibration Blank
ICP	Inductively coupled plasma emission spectrometry
ICS	ICP interference check sample
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
PBS	Preparation blank soil
PBW	Preparation blank water
PCB	Polychlorinated biphenyl
PEM	Performance evaluation mixture
QA	Quality assurance
QC	Quality control
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
TCL	Target compound list
TIC	Tentatively identified compounds
TOC	Total organic carbon
TOX	Total organic halides
V	Validated
VOC	Volatile organic compounds

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1.0 INTRODUCTION

The following samples were obtained from the 100-HR-3 Operable Unit Third Quarter 1993 sampling event:

B091L1	B091N2	B091Q3	B091S4	B091V5
B091L2	B091N3	B091Q4	B091S5	B091V6
B091L3	B091N4	B091Q5	B091S6	B091V7
B091L4	B091N5	B091Q6	B091S7	B091V8
B091L5	B091N6	B091Q7	B091S8	B091V9
B091L6	B091N7	B091Q8	B091S9	B091W0
B091L7	B091N8	B091Q9	B091T0	B091W1
B091L8	B091N9	B091R0	B091T1	B091W2
B091L9	B091P0	B091R1	B091T2	B091W3
B091M0	B091P1	B091R2	B091T3	B091W4
B091M1	B091P2	B091R3	B091T4	B091W5
B091M2	B091P3	B091R4	B091T5	B091W6
B091M3	B091P4	B091R5	B091T6	B091W7
B091M4	B091P5	B091R6	B091T7	B091W8
B091M5	B091P6	B091R7	B091T8	B091W9
B091M6	B091P7	B091R8	B091T9	B091X0
B091M7	B091P8	B091R9	B091V0	B091X1
B091M8	B091P9	B091S0	B091V1	B091X2
B091M9	B091Q0	B091S1	B091V2	B09BB2
B091N0	B091Q1	B091S2	B091V3	B09BB3
B091N1	B091Q2	B091S3	B091V4	

Westinghouse-Hanford has requested that a minimum of 20%, including all QA/QC samples, of the Sample Delivery Groups be validated for the 100-HR-3 Operable Unit Third Quarter 1993 Groundwater Sampling Investigation. Therefore, the data from the chemical analysis of 68 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
- General chemical parameters.

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.

SDG No.	Matrix	No. of Samples Analyzed	Parameters
B091L5	W	3	Inorganics, Wet Chem
B091L6	W	3	Inorganics
B091M5	W	2	Inorganics, Wet Chem
B091M6	W	2	Inorganics
B091M9	W	4	Inorganics, Wet Chem
B091N0	W	4	Inorganics
B091N1	W	11	Inorganics, Wet Chem
B091N2	W	11	Inorganics
B091P9	W	4	Inorganics, Wet Chem
B091Q0	W	4	Inorganics
B091R3	W	2	Inorganics, Wet Chem
B091R4	W	2	Inorganics
B091T1	W	4	Inorganics, Wet Chem
B091T2	W	4	Inorganics
B091T3	W	2	Inorganics, Wet Chem
B091T4	W	2	Inorganics
B091V3	W	2	Inorganics
B091V3	W	1	Wet Chem
B091V5	W	2	Inorganics
B091V5	W	1	Wet Chem

Fifty-three samples were validated for radiochemical parameters by TMA. 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
- Strontium-90
- Tritium.

At the request of Westinghouse-Hanford, several radiochemical samples were not validated. In SDG No. B091L3,

sample numbers B091L3, B091L5 and B091M1 were not validated and in SDG No. B091L7, sample numbers B091L7 and B091L9 were not validated.

SDG No.	Matrix	No. of Samples Analyzed	Parameters
B091L3	W	2	Radiochemistry
B091L7	W	2	Radiochemistry
B091M5	W	7	Radiochemistry
B091M9	W	13	Radiochemistry
B091N1	W	19	Radiochemistry
B091V3	W	1	Radiochemistry
B091V5	W	1	Radiochemistry
B091W9	W	1	Radiochemistry

The radiochemical data summary tables can be found following Section 6.8.

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 Roy F. Weston Laboratories as shown below:

Set 1:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
B091Q3	B091V3	199-D8-54B
B091Q4	B091V4	199-D8-54B

Set 2:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
B091P3	B091V5	199-H4-15A
B091P4	B091V6	199-H4-15A

The samples 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 split. All results for the well locations appear in the summary tables within this report. The results for the following compounds did not meet QC limits:

- Chromium results in sample number B091Q3 and its split sample B091V3 in well location 199-D8-54B.
- Zinc results in sample number B091P4 and its split sample B091V6 in well location 199-H4-15A.

All other split sample results were within the required control limits.

Four 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>
B091Q3	B091V7	199-D8-54B
B091Q4	B091V8	199-D8-54B

Set 2:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
B091T5	B091V9	699-96-49
B091T6	B091W0	699-96-49

Set 3:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
B091T1	B091W1	699-97-51A
B091T2	B091W2	699-97-51A

Set 4:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
B091P3	B091W3	199-H4-15A
B091P4	B091W4	199-H4-15A

The duplicate sample results for all 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. The results for the following compounds did not meet QC limits.

- Nickel results in sample number B091T5 and its duplicate sample B091V9 in well location 699-96-49.
- Lead results in sample number B091T2 and its duplicate sample B091W2 in well location 699-97-51A.

All other results fell within the required control limit. All results for the well location appear in the summary tables within this report.

Four sets of equipment blanks were submitted to TMA as shown in the table below. The sets of equipment blanks were collected on 8/26/93, 9/20/93, 8/31/93 and 9/20/93, and designated EB-1, EB-2, EB-3 and EB-4, respectively.

Set 1:

Sample Number

B091W5
B091W6

Set 2:

Sample Number

B091W7
B091W8

Set 3:

Sample Number

B091W9
B091X0

Set 4:

Sample Number

B091X1
B091X2

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 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 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.

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-HR-3 Operable Unit Third Quarter 1993 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, field split RPD results outside of QC, analytical spike recoveries below the QC limit and laboratory duplicate %D results outside of QC limits. Approximately 5 percent of the metals results were flagged "J" due to these factors.
- Positive and negative laboratory blank contamination were noted in the inorganics analysis. Associated results were flagged accordingly.
- The holding times for phosphate, nitrite and nitrate analyses grossly exceeded the QC requirements in several data packages. All associated results were rejected.
- The holding times for phosphate, nitrite and nitrate analyses exceeded the QC requirements in one data package. All associated results were qualified as estimates and flagged "J".
- Due to low LCS recovery results, gross alpha and gross beta results for all samples in one data package were qualified as estimates and flagged "J".
- Due to high matrix spike recovery, all tritium results in one data package were rejected and flagged "R".
- Due to calibration problems, several gross alpha, gross beta, strontium-90 and tritium results were rejected and flagged "R".

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.

WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
153-1	B091L1	W	09/15/93	NV	2-14
	B091L2	W	09/15/93	NV	2-15
205-1	B091L3	W	09/22/93	NV	2-16
	B091L4	W	09/22/93	NV	2-17
145-2	B091L5	W	09/20/93	V	2-18
	B091L6	W	09/20/93	V	2-22
189-1	B091L7	W	09/28/93	NV	2-26
	B091L8	W	09/28/93	NV	2-27
077-1	B091L9	W	09/28/93	NV	2-26
	B091M0	W	09/28/93	NV	2-27
037-1	B091M1	W	09/22/93	NV	2-16
	B091M2	W	09/22/93	NV	2-17
110-1	B091M3	W	09/15/93	NV	2-14
	B091M4	W	09/15/93	NV	2-15
199-H6-1	B091M5	W	08/17/93	V	2-28
	B091M6	W	08/17/93	V	2-32
199-H5-1	B091M7	W	08/17/93	V	2-28
	B091M8	W	08/17/93	V	2-32
199-H4-49	B091M9	W	08/26/93	V	2-37
	B091N0	W	08/26/93	V	2-41
199-H4-48	B091N1	W	08/21/93	V	2-46
	B091N2	W	08/21/93	V	2-51
199-H4-47	B091N3	W	08/21/93	V	2-46
	B091N4	W	08/21/93	V	2-51
199-H4-46	B091N5	W	08/21/93	V	2-46
	B091N6	W	08/21/93	V	2-51
199-H4-45	B091N7	W	08/21/93	V	2-46
	B091N8	W	08/21/93	V	2-51
199-H4-17	B091N9	W	08/24/93	NV	2-55
	B091P0	W	08/24/93	NV	2-56
199-H4-16	B091P1	W	08/21/93	V	2-46
	B091P2	W	08/21/93	V	2-51

WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
199-H4-15A	B091P3	W	08/26/93	V	2-37
	B091P4	W	08/26/93	V	2-41
	B091V5	W	08/26/93	V	2-98
	B091V6	W	08/26/93	V	2-98
	B091W3	W	08/26/93	V	2-37
	B091W4	W	08/26/93	V	2-41
199-H4-13	B091P5	W	08/24/93	NV	2-55
	B091P6	W	08/24/93	NV	2-56
199-H4-10	B091P7	W	08/24/93	NV	2-55
	B091P8	W	08/24/93	NV	2-56
199-H3-1	B091P9	W	08/30/93	V	2-57
	B091Q0	W	08/30/93	V	2-60
199-D8-55	B091Q1	W	08/24/93	NV	2-55
	B091Q2	W	08/24/93	NV	2-56
199-D8-54B	B091Q3	W	08/22/93	V	2-46
	B091Q4	W	08/22/93	V	2-51
	B091V3	W	08/22/93	V	2-93
	B091V4	W	08/22/93	V	2-93
	B091V7	W	08/22/93	V	2-47
	B091V8	W	08/22/93	V	2-52
199-D8-54A	B091Q5	W	08/22/93	V	2-46
	B091Q6	W	08/22/93	V	2-51
199-D8-53	B091Q7	W	08/24/93	NV	2-55
	B091Q8	W	08/24/93	NV	2-56
199-D8-3	B091Q9	W	08/22/93	V	2-46
	B091R0	W	08/22/93	V	2-51
199-D5-20	B091R1	W	08/24/93	NV	2-55
	B091R2	W	08/24/93	NV	2-56
199-D5-19	B091R3	W	08/23/93	V	2-63
	B091R4	W	08/23/93	V	2-67
199-D5-18	B091R5	W	08/18/93	NV	2-70
	B091R6	W	08/18/93	NV	2-71
199-D5-17	B091R7	W	08/20/93	V	2-46
	B091R8	W	08/20/93	V	2-51
199-D5-16	B091R9	W	08/19/93	NV	2-72
	B091S0	W	08/19/93	NV	2-73

WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
199-D5-15	B091S1	W	08/23/93	V	2-63
	B091S2	W	08/23/93	V	2-67
199-D5-14	B091S3	W	08/18/93	NV	2-70
	B091S4	W	08/18/93	NV	2-71
199-D5-12	B091S5	W	08/18/93	NV	2-70
	B091S6	W	08/18/93	NV	2-71
199-D2-6	B091S7	W	08/20/93	V	2-46
	B091S8	W	08/20/93	V	2-51
199-D2-5	B091S9	W	08/19/93	NV	2-72
	B091T0	W	08/19/93	NV	2-73
699-97-51A	B091T1	W	08/25/93	V	2-74
	B091T2	W	08/25/93	V	2-79
	B091W1	W	08/25/93	V	2-74
	B091W2	W	08/25/93	V	2-79
699-97-43	B091T3	W	08/27/93	V	2-84
	B091T4	W	08/27/93	V	2-88
699-96-49	B091T5	W	08/25/93	V	2-74
	B091T6	W	08/25/93	V	2-79
	B091V9	W	08/25/93	V	2-74
	B091W0	W	08/25/93	V	2-79
699-93-48	B091T7	W	08/27/93	V	2-84
	B091T8	W	08/27/93	V	2-88
699-91-46	B091T9	W	08/30/93	V	2-57
	B091V0	W	08/30/93	V	2-60
699-96-43	B091V1	W	08/30/93	V	2-57
	B091V2	W	08/30/93	V	2-60
EB-1	B091W5	W	08/26/93	V	2-37
	B091W6	W	08/26/93	V	2-41
EB-2	B091W7	W	09/20/93	V	2-18
	B091W8	W	09/20/93	V	2-22
EB-3	B091W9	W	08/31/93	V	2-57
	B091X0	W	08/31/93	V	2-60
EB-4	B091X1	W	09/20/93	V	2-18
	B091X2	W	09/20/93	V	2-22

2.0 INORGANIC DATA VALIDATION

2.1 DATA PACKAGE COMPLETENESS

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

B091L5	B091M9	B091P9	B091T1	B091V3
B091L6	B091N0	B091Q0	B091T2	B091V5
B091M5	B091N1	B091R3	B091T3	
B091M6	B091N2	B091R4	B091T4	

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, 14 days for cyanide and within six months for all other metals.

All 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.

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.

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

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 B091W7 and B091X1 in SDG No. B091L5.
- All samples in SDG No. B091L6.

- Sample numbers B091N2, B091N4, B091N6, B091N8, B091P2 and B091Q4 in SDG No. B091N2.
- Sample numbers B091R3 and B091S1 in SDG No. B091R3.
- Sample number B091W2 in SDG No. B091T2.
- Sample number B091V3 in SDG No. B091V3.

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

- Sample numbers B091M6 and B091M8 in SDG No. B091M6.
- Sample numbers B091N0, B091P4 and B091W4 in SDG No. B091N0.
- Sample numbers B091N2, B091N4, B091N6, B091N8, B091P2, B091Q4 and B091V8 in SDG No. B091N2.
- Sample number B091R4 in SDG No. B091R4.

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

- Sample numbers B091V3 and B091V4 in SDG No. B091V3.
- All samples in SDG No. B091V5.

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

- Sample number B091N0 in SDG No. B091N0.
- Sample numbers B091N1, B091N3, B091N5, B091N7, B091P1, B091Q3 and B091V7 in SDG No. B091N1.
- Sample numbers B091N2, B091N4, B091N8, B091P2, B091Q4 and B091V8 in SDG No. B091N2.

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

- All samples in SDG No. B091M9.
- Sample number B091V3 in SDG No. B091V3.

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

- All samples in SDG No. B091L5.
- Sample numbers B091L6 and B091W8 in SDG No. B091L6.
- Sample number B091M9 in SDG No. B091M9.

- Sample number B091T1 in SDG No. B091T1.
- Sample number B091V3 in SDG No. B091V3.

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

- Sample numbers B091W7 and B091X1 in SDG No. B091L5.
- All samples in SDG No. B091L6.
- Sample number B091M5 in SDG No. B091M5.
- All samples in SDG No. B091N0.
- Sample numbers B091R4 and B091S2 in SDG No. B091R4.
- All samples in SDG No. B091T1.
- All samples in SDG No. B091T3.
- All samples in SDG No. B091T4.
- Sample numbers B091V3 and B091V4 in SDG No. B091V3.
- All samples in SDG No. B091V5.

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

- Sample numbers B091M9, B091P3 and B091W5 in SDG No. B091M9.
- Sample numbers B091N0, B091P4 and B091W6 in SDG No. B091N0.
- Sample numbers B091V9 and B091W1 in SDG No. B091T1.

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

- Sample numbers B091W7 and B091X1 in SDG No. B091L5.

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

- Sample numbers B091W7 and B091X1 in SDG No. B091L5.
- All samples in SDG No. B091L6.
- Sample numbers B091M5 and B091M7 in SDG No. B091M5.
- All samples in SDG No. B091M9.
- All samples in SDG No. B091N0.
- Sample numbers B091R3 and B091S1 in SDG No. B091R3.

- Sample numbers B091R4 and B091S2 in SDG No. B091R4.
- Sample numbers B091T5 and B091V9 in SDG No. B091T1.

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

- Sample number B091R4 in SDG No. B091R4.

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

- All samples in SDG No. B091V5.

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

- Sample number B091R3 in SDG No. B091R3.

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

- All samples in SDG No. B091L5.
- Sample numbers B091L6 and B091W8 in SDG No. B091L6.
- Sample number B091W3 in SDG No. B091M9.
- Sample number B091Q6 in SDG No. B091N2.
- Sample number B091R4 in SDG No. B091R4.

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

- Sample numbers B091N0, B091P4 and B091W4 in SDG No. B091N0.
- Sample numbers B091N1, B091N3, B091N5, B091N7, B091P1, B091Q5, B091Q9, B091R7 and B091S7 in SDG No. B091N1.
- Sample numbers B091N2, B091N4, B091N6, B091N8, B091P2, B091Q6, B091R0, B091R8 and B091S8 in SDG No. B091N2.
- Sample numbers B091V3 and B091V4 in SDG No. B091V3.
- Sample number B091V6 in SDG No. B091V5.

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

- Sample number B091X1 in SDG No. B091L5.
- Sample numbers B091L6 and B091W8 in SDG No. B091L6.
- Sample numbers B091M5 and B091M7 in SDG No. B091M5.

- All samples in SDG No. B091T2.
- Sample numbers B091V3 and B091V4 in SDG No. B091V3.

All other laboratory blank results were acceptable.

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 "J", 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 blank contamination, the following samples were flagged "J" for antimony:

- All samples in SDG No. B091N0.

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

- Sample numbers B091L5 and B091W7 in SDG No. B091L5.
- Sample numbers B091L6 and B091W8 in SDG No. B091L6.
- All samples in SDG No. B091V5.

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

- Sample number B091W5 in SDG No. B091M9.
- Sample number B091W6 in SDG No. B091N0.
- Sample number B091W9 in SDG No. B091P9.
- Sample number B091X0 in SDG No. B091Q0.

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

- Sample numbers B091M5 and B091M7 in SDG No. B091M5.
- Sample numbers B091P9, B091T9 and B091W9 in SDG No. B091P9.
- Sample numbers B091Q0, B091V0 and B091X0 in SDG No. B091Q0.

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

- Sample numbers B091M6 and B091M8 in SDG No. B091M6.

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

- Sample numbers B091P3 and B091W5 in SDG No. B091M9.
- Sample numbers B091T9, B091V1 and B091W9 in SDG No. B091P9.
- All samples in SDG No. B091Q0.
- Sample numbers B091T6, B091W0 and B091W2 in SDG No. B091T2.

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

- All samples in SDG No. B091V5.

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

- Sample number B091W9 in SDG No. B091P9.
- Sample number B091X0 in SDG No. B091Q0.

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

- All samples in SDG No. B091P9.
- All samples in SDG No. B091Q0.

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

- Sample numbers B091M5 and B091M7 in SDG No. B091M5.
- Sample numbers B091M6 and B091M8 in SDG No. B091M6.

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

- Sample numbers B091M5 and B091M7 in SDG No. B091M5.
- Sample numbers B091M6 and B091M8 in SDG No. B091M6.
- All samples in SDG No. B091P9.
- All samples in SDG No. B091Q0.
- All samples in SDG No. B091T1.

- All samples in SDG No. B091T3.
- All samples in SDG No. B091T4.

All other negative blank results were acceptable.

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 "R". 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 lead in the following samples:

- Sample numbers B091V5 and B091V6 in SDG No. B091V5.

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

- Sample numbers B091R3 and B091S1 in SDG No. B091R3.

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

- Sample numbers B091V3 and B091V4 in SDG No. B091V3.

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 aqueous LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier). All reported results were reviewed against the raw data. LCS aqueous recoveries must generally fall within the range of 80 to 120 percent. Sample recoveries less than 50% were rejected and flagged "R". All other samples with LCS recovery outside of QC limits are qualified as estimates and flagged "J".

All LCS 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".

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

- Sample numbers B091M5 and B091M7 in SDG No. B091M5.

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

- All samples in SDG No. B091T4.

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 result fell outside the QC limits and the associated results were flagged "J" for calcium in the following samples:

- All samples in SDG No. B091V3.

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

- All samples in SDG No. B091V3.
- All samples in SDG No. B091V5.

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

- All samples in SDG No. B091V3.

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

- All samples in SDG No. B091V3.
- All samples in SDG No. B091V5.

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.

Since Westinghouse-Hanford data 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 dissolved samples which were validated.

<u>Total</u>	<u>Dissolved</u>
B091M5	B091M6
B091M7	B091M8
B091N1	B091N2
B091N3	B091N4
B091N5	B091N6
B091N7	B091N8
B091P1	B091P2
B091Q3	B091Q4
B091Q5	B091Q6
B091Q9	B091R0
B091R3	B091R4
B091R7	B091R8
B091S1	B091S2
B091S7	B091S8
B091V7	B091V8
B091T1	B091T2
B091T5	B091T6
B091V9	B091W0
B091W1	B091W2
B091T3	B091T4
B091T7	B091T8
B091V5	B091V6
B091V3	B091V4
B091M9	B091N0

<u>Total</u>	<u>Dissolved</u>
B091P3	B091P4
B091P9	B091Q0
B091T9	B091V0
B091V1	B091V2
B091W3	B091W4
B091W5	B091W6
B091W9	B091X0
B091L5	B091L6
B091W7	B091W8
B091X1	B091X2

2.7 FURNACE AA QUALITY CONTROL

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". In cases where the analytical spike recovery was 0.0 percent, the results were rejected and flagged "R".

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

- Sample numbers B091V5 and B091V6 in SDG No. B091V5.

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

- Sample number B091V5 in SDG No. B091V5.

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

- Sample number B091V6 in SDG No. B091V5.

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.

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). Several inconsistencies and deviations from the protocol were observed. They are as follows:

A CCV and CCB must be analyzed immediately after the ICV and ICB. ICAP and Mercury do not follow this protocol. For ICAP analysis a CCV and CCB were run after the initial interference checks and CRI. This is incorrect because the ICSA/AB and CRII are considered analytical samples and according to the CLP protocol a CCV and CCB must be run prior to any analytical samples. For mercury, the CCV and CCB were analyzed for after

the first ten samples. Refer to Sections E-11 paragraph 5b and E-15 paragraph 4a of the EPA CLP SOW 3/90 protocol.

Internal Chains of Custody lacked sufficient information such as interdepartmental transfers, i.e., from the sample custodian to the technician responsible for sample preparation and the dates these transfers took place plus the EPA sample ID number. Without this information Internal Chains of Custody can not be verified as those belonging to samples in this report. Refer to Sections F-5, paragraph 1.5 and F-3, paragraph 1.4 of the EPA CLP SOW 3/90 protocol.

For samples analyzed by Roy F. Weston, incorrect ICP instrument detection limits (IDL's) are being used to report results down to the IDL. Two sets of IDL's (Form 10) are included in the data package for ICAP analysis, one for instrument IC1 and one for instrument IC3. According to the case narrative addendum, Roy F. Weston states that the highest IDL of the two instruments is used, as per Exhibit E, Section V, Item 10 (pg. E-53) of the EPA Statement of Work for Inorganics Analysis, Document Number ILM01.0. This is correct only when two instruments are being used to determine sample results within a data package. However, in this data package Roy F. Weston used only one ICP instrument to determine the sample results and therefore it is that instrument's IDL's which should be used to calculate results. According to the raw data and the Form XIV information IC3 is the instrument being used for analysis while some of the IDL's of IC1 are the ones reported on Forms 1-9. This can effect results flagged "U" or results which may be flagged "U" because of laboratory blank contamination. Results have been changed, where necessary, to reflect results based on IDLs from instrument IC3.

All raw data associated with Roy F. Weston has not been labeled with the client (EPA) ID number. Results labeled with only the laboratory sample ID number is insufficient. Refer to Section B-10 of the EPA CLP SOW 3/90.

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

WHC-SD-EN-TI-219, Rev. 0

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WHC-SD-EN-TI-219, Rev. 0

Project: WESTINGHOUSE-HANFORD

[illegible]

NV - Not Validated, FIL - Filtered, N/A - Not Applicable

WHC-SD-EN-TI-219, Rev. 0

BLANK AND SAMPLE DATA SUMMARY

[illegible]

BLANK AND SAMPLE DATA SUMMARY

[illegible]

WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

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WHC-SD-EN-TI-219, Rev. 0

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

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WHC-SD-EN-TI-219, Rev. 0

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PRECISION DATA SUMMARY

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

[illegible]

2-32

BLANK AND SAMPLE DATA SUMMARY

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ACCURACY DATA SUMMARY

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Page__1__ of__1__

WHC-SD-EN-TI-219, Rev. 0

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

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2-41

1 IL = Filtered, DUP = Duplicate, EB = Equipment Blank, N/A = Not Applicable

BLANK AND SAMPLE DATA SUMMARY

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PRECISION DATA SUMMARY

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

[illegible]

Project: WESTINGHOUSE-HANFORD

Laboratory: TMA

Case:

SIX: B091N1

Sample Number		B091N1		B091N3		B091N5		B091N7		B091P1		B091Q3		B091Q5		B091Q9		B091R7		B091S7	
Location		199-H4-48		199-H4-47		199-H4-46		199-H4-45		199-H4-16		199-D8-54B		199-D8-54A		199-D8-3		199-D5-17		199-D2-6	
Remarks																					
Sample Date		08/21/93		08/21/93		08/21/93		08/21/93		08/21/93		08/22/93		08/22/93		08/22/93		08/20/93		08/20/93	
Inorganic Analysis	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	82.0		49.4		20.9	U	22.2		24.4		20.9	U	46.0		37.0		60.8		30.1	
Antimony	60	15.7	U	18.7	U	15.7	U	15.7	U	15.7	U	15.7	U	15.7	U	15.7	U	15.7	U	15.7	U
Arsenic	10	3.2		2.9		3.6		2.4		3.6		2.9		1.7	U	1.7	U	1.7	U	1.8	
Barium	200	19.0		12.2		1.9		17.7		15.0		103		77.6		131		83.0		55.8	
Beryllium	5	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Cadmium	5	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Calcium	5000	34100		34100		11000		41800		39800		40800		82500		114000		77300		79000	
Chromium	10	23.8	U	12.3	U	25.3	U	12.3	U	25.3	U	16.8	U	404		147		64.4		191	
Cobalt	50	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Copper	25	4.0	U	4.0	U	4.7		4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Iron	100	147		10.8		101		158		145		163		171		138		187			
Lead	3	2.5		2.5		2.7		2.7		2.0		1.8		2.9		4.6		3.2			
Magnesium	5000	7010		6000		10000		5160		5080		15300		14600		10700		24600		18100	
Manganese	15	2.9		1.8	U	1.8		2.5		2.5		184		2.0		2.3		74.2		8.1	
Mercury	0.2	0.20	U	0.17	U	0.37		0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Nickel	40	4.7	U	4.7	U	7.6		4.7	U	17.8		5.3		4.7	U	4.7	U	4.7	U	36.3	
Potassium	5000	3590		1570		5000		2400		2800		9800		5240		8300		6360		4970	
Selenium	5	2.6		2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	4.0		2.3	U	3.3		5.4	
Silver	10	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Sodium	5000	8190		5530		16700		4560		4930		33800		13200		7770		17900		12700	
Thallium	10	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
Vanadium	50	7.7	U	4.9	U	7.2	U	3.8	U	5.0	U	32.4		12.9	U	7.2	U	5.7	U	10.2	U
Zinc	20	10.2		3.7	U	3.7	U	3.7	U	3.7	U	14.3		3.7	U	3.7	U	3.7	U	13.3	
Cyanide	10	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B091N1																			
Sample Number		B091V7																			
Location		199-D8-54B																			
Remarks		DUP																			
Sample Date		08/22/93																			
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	22.2																			
Antimony	60	15.7	U																		
Arsenic	10	3.8																			
Barium	200	102																			
Beryllium	5	1.2	U																		
Cadmium	5	1.5	U																		
Calcium	5000	40200																			
Chromium	10	24.5	U																		
Cobalt	50	2.5	U																		
Copper	25	4.7																			
Iron	100	160																			
Lead	3	3.1																			
Magnesium	5000	15300																			
Manganese	15	180																			
Mercury	0.2	0.20	U																		
Nickel	40	8.2																			
Potassium	5000	9710																			
Selenium	5	2.3	U																		
Silver	10	5.0	U																		
Sodium	5000	33400																			
Thallium	10	2.2	U																		
Vanadium	50	32.4																			
Zinc	20	3.7	U																		
Cyanide	10	NA																			

NA = Not Analyzed, DUP = Duplicate

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PRECISION DATA SUMMARY

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

[illegible]

Project: WESTINGHOUSE-HANFORD
Laboratory: TMA

FIL - Filtered, DUP - Duplicate, N/A - Not Applicable

Project: WESTINGHOUSE-HANFORD	
Laboratory: TMA	
Case	SDG: B091N2
Sample Number	B091V8
Location	199-D8-54B
Remarks	DUP, FIL
Sample Date	08/22/93
Inorganic Analytes	CRDL Result Q
Aluminum	200 20.9 U
Antimony	60 15.7 U
Arsenic	10 4.0 U
Barium	200 94.2
Beryllium	5 1.2 U
Cadmium	5 1.5 U
Calcium	5000 39900
Chromium	10 7.0 U
Cobalt	50 2.5 U
Copper	25 4.0 U
Iron	100 75.9
Lead	3 1.9
Magnesium	5000 15300
Manganese	15 171
Mercury	0.2 0.20 U
Nickel	40 4.7 U
Potassium	5000 9530
Selenium	5 2.7
Silver	10 5.0 U
Sodium	5000 32700
Thallium	10 2.2 U
Vanadium	50 34.0
Zinc	20 3.7 U
Cyanide	10 N/A

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BLANK AND SAMPLE DATA SUMMARY

SDG: B091N2		REVIEWER: LM			DATE: 12/8/93			PAGE <u>1</u> OF <u>1</u>	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB1	Aluminum	26.9			ug/L	134.5	269.0	B091N2, B091N4, B091N6, B091N8, B091P2, B091Q4	U
CCB3	Arsenic	2.1			ug/L	10.5	21.0	B091N2, B091N4, B091N6, B091N8, B091P2, B091Q4, B091V8	U
CCB1	Chromium	5.5			ug/L	27.5	55.0	B091N2, B091N4, B091N8, B091P2, B091Q4, B091V8	U
ICB	Thallium	2.9			ug/L	14.5	29.0	B091Q6	U
CCB4	Vanadium	3.9			ug/L	19.5	39.0	B091N2, B091N4, B091N6, B091N8, B091P2, B091Q6, B091R0, B091R8, B091S8	U

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DATA QUALIFICATION SUMMARY

[illegible]

Project: WESTINGHOUSE-HANFORD
Laboratory: TMA

NV = Not Validated, NA = Not Analyzed

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B091P0																			
Sample Number		B091P0		B091P6		B091P8		B091Q2		B091Q8		B091R2									
Location		199-H4-17		199-H4-13		199-H4-10		199-D8-55		199-D8-53		199-D5-20									
Remarks		NV, FIL		NV, FIL		NV, FIL		NV, FIL		NV, FIL		NV, FIL									
Sample Date		08/24/93		08/24/93		08/24/93		08/24/93		08/24/93		08/24/93									
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	28.8		22.8	U	22.8	U	30.6		23.0		22.8	U								
Antimony	60	17.9	U	17.9	U	17.9	U	17.9	U	17.9	U	17.9	U								
Arsenic	10	2.8		2.6		2.7		1.8		1.7	U	2.2									
Barium	200	57.2		25.0		54.1		52.3		80.6		69.8									
Beryllium	5	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U								
Cadmium	5	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U								
Calcium	5000	66100		46000		36600		34100		83400		48200									
Chromium	10	91.7		41.4		53.5		17.1		333		153									
Cobalt	50	1.5	U	1.5	U	2.4		1.7		1.6		1.5	U								
Copper	25	3.1		2.2	U	2.2	U	2.2	U	2.8		2.2	U								
Iron	100	30.9		30.5		27.8		15.0		29.5		19.5									
Lead	3	3.5		1.3		2.0		1.6		3.2		1.7									
Magnesium	5000	12700		7750		8460		5310		11400		14900									
Manganese	15	2.2		0.60	U	0.81		0.95		1.1		1.1									
Mercury	0.2	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U								
Nickel	40	3.7	U	3.7	U	3.7	U	3.7	U	7.6		9.2									
Potassium	5000	6430		2270		4080		3140		4670		4620									
Selenium	5	2.6		2.3	U	2.3	U	2.3	U	4.2		2.9									
Silver	10	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U								
Sodium	5000	16200		6720		12000		5560		9080		13800									
Thallium	10	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U								
Vanadium	50	8.3		3.5		8.8		5.6		8.3		16.5									
Zinc	20	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U								
Cyanide	10	N/A		N/A		N/A		N/A		N/A		N/A									

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DATA QUALIFICATION SUMMARY

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L = Filtered, EB = Equipment Blank, N/A = Not Applicable

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

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NA – Not Analyzed

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ACCURACY DATA SUMMARY

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

[illegible]

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B091R4																			
Sample Number		B091R4		B091S2																	
Location		199-D5-19		199-D5-15																	
Remarks		FIL		FIL																	
Sample Date		08/23/93		08/23/93																	
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	22.8	U	22.8	U																
Antimony	60	17.9	U	17.9	U																
Arsenic	10	3.8	U	1.7	U																
Barium	200	82.4		85.4																	
Beryllium	5	0.40	U	0.40	U																
Cadmium	5	1.5	U	1.5	U																
Calcium	5000	82700		63400																	
Chromium	10	66.4		1820																	
Cobalt	50	1.5	U	1.5	U																
Copper	25	2.2	U	2.2	U																
Iron	100	64.7	U	53.9	U																
Lead	3	2.6		1.8																	
Magnesium	5000	25900		16000																	
Manganese	15	1.2	U	1.1	U																
Mercury	0.2	0.20	U	0.20	U																
Nickel	40	4.6	U	3.7	U																
Potassium	5000	5250		4720																	
Selenium	5	5.1		2.6																	
Silver	10	3.4	U	3.4	U																
Sodium	5000	14300		16500																	
Thallium	10	2.3	U	2.2	U																
Vanadium	50	10.7		8.8																	
Zinc	20	4.1	U	4.8																	
Cyanide	10	N/A		N/A																	

FIL = Filtered, N/A = Not Applicable

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

[illegible]

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B091R5																			
Sample Number		B091R5		B091S3		B091S5															
Location		199-D5-18		199-D5-14		199-D5-12															
Remarks		NV		NV		NV															
Sample Date		08/18/93		08/18/93		08/18/93															
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	21.5		20.9	U	20.9	U														
Antimony	60	15.7	U	15.7	U	15.7	U														
Arsenic	10	3.5		1.7	U	1.9															
Barium	200	95.3		85.4		132															
Beryllium	5	1.2	U	1.2	U	1.2	U														
Cadmium	5	1.5	U	1.5	U	1.5	U														
Calcium	5000	83000		59000		123000															
Chromium	10	69.8		1080		253															
Cobalt	50	2.5	U	2.5	U	2.5	U														
Copper	25	4.0	U	4.0	U	4.0	U														
Iron	100	54.6		15.5	U	68.0															
Lead	3	4.8		2.6		2.0															
Magnesium	5000	25700		16900		25600															
Manganese	15	5.8		2.1		4.2															
Mercury	0.2	0.20	U	0.20	U	0.20	U														
Nickel	40	4.7	U	5.6		4.7	U														
Potassium	5000	4990		5770		5570															
Selenium	5	4.9		2.3	U	3.3															
Silver	10	5.0	U	5.0	U	5.0	U														
Sodium	5000	11500		16800		13700															
Thallium	10	1.1	U	1.1	U	1.1	U														
Vanadium	50	7.0		21.6		8.5															
Zinc	20	3.7	U	3.7	U	3.7	U														
Cyanide	10	NA		NA		NA															

Project: WESTINGHOUSE-HANFORD				
Laboratory: TMA				
Case	SDG: B091R6			
Sample Number			B091R6	
Location			199-D5-18	
Remarks			NV, FIL	
Sample Date			08/18/93	
Inorganic Analytes	CRDL	Result	Q	
Aluminum	200	20.9	U	
Antimony	60	15.7	U	
Arsenic	10	1.7	U	
Barium	200	95.3		
Beryllium	5	1.2	U	
Cadmium	5	1.5	U	
Calcium	5000	84200		
Chromium	10	62.6		
Cobalt	50	2.5	U	
Copper	25	4.0	U	
Iron	100	15.5	U	
Lead	3	5.9		
Magnesium	5000	26000		
Manganese	15	1.6	U	
Mercury	0.2	0.20	U	
Nickel	40	4.7	U	
Potassium	5000	5350		
Selenium	5	3.1		
Silver	10	5.0	U	
Sodium	5000	12000		
Thallium	10	1.1	U	
Vanadium	50	6.4		
Zinc	20	3.7	U	
Cyanide	10	N/A		

IV = Not Validated, NA = Not Analyzed

WHC-SD-EN-TI-219, Rev. 0

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DUP = Duplicate, NA = Not Analyzed

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PRECISION DATA SUMMARY

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DATA QUALIFICATION SUMMARY

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WHC-SD-EN-TI-2119, Rev. 0

FIL = Filtered, DUP = Duplicate, N/A = Not Applicable

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PRECISION DATA SUMMARY

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

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WHC-SD-EN-TI-219, Rev. 0

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WHC-SD-EN-TI-219, Rev. 0

DATA QUALIFICATION SUMMARY

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L = Filtered. N/A = Not Applicable

WHC-SD-EN-TI-219, Rev. 0

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PRECISION DATA SUMMARY

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DATA QUALIFICATION SUMMARY

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WHC-SD-EN-TI-219, Rev. 0

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ACCURACY DATA SUMMARY

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PRECISION DATA SUMMARY

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WHC-SD-EN-TI-219, Rev. 0
DATA QUALIFICATION SUMMARY

[illegible]

WHC-SD-EN-TI-219, Rev. 0

BLANK AND SAMPLE DATA SUMMARY

[illegible]

BLANK AND SAMPLE DATA SUMMARY

[illegible]

ACCURACY DATA SUMMARY

[illegible]

WHC-SD-EN-TI-219, Rev. 0

2-101

PRECISION DATA SUMMARY

[illegible]

2-10-

WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	WET CHEMISTRY
153-1	B091L1	W	09/15/93	NV	3-4, 3-5
205-1	B091L3	W	09/22/93	NV	3-6, 3-7
145-2	B091L5	W	09/20/93	V	3-8, 3-11
189-1	B091L7	W	09/28/93	NV	3-12, 3-13
077-1	B091L9	W	09/28/93	NV	3-12, 3-13
037-1	B091M1	W	09/22/93	NV	3-6, 3-7
110-1	B091M3	W	09/15/93	NV	3-4, 3-5
199-H6-1	B091M5	W	08/17/93	V	3-14, 3-17
199-H5-1	B091M7	W	08/17/93	V	3-14, 3-17
199-H4-49	B091M9	W	08/26/93	V	3-18, 3-21
199-H4-48	B091N1	W	08/21/93	V	3-22, 3-28
199-H4-47	B091N3	W	08/21/93	V	3-22, 3-28
199-H4-46	B091N5	W	08/21/93	V	3-22, 3-28
199-H4-45	B091N7	W	08/21/93	V	3-22, 3-28
199-H4-17	B091N9	W	08/24/93	NV	3-30, 3-31
199-H4-16	B091P1	W	08/21/93	V	3-22, 3-28
199-H4-15A	B091P3	W	08/26/93	V	3-18, 3-21
	B091V5	W	08/26/93	V	3-55, 3-56
	B091W3	W	08/26/93	V	3-18, 3-21
199-H4-13	B091P5	W	08/24/93	NV	3-30, 3-31
199-H4-10	B091P7	W	8/24/93	NV	3-30, 3-31
199-H3-1	B091P9	W	08/30/93	V	3-32, 3-35
199-D8-55	B091Q1	W	08/24/93	NV	3-30, 3-31
199-D8-54B	B091Q3	W	08/22/93	V	3-22, 3-28
	B091V3	W	08/22/93	V	3-52
	B091V7	W	08/22/93	V	3-23, 3-29
199-D8-54A	B091Q5	W	08/22/93	V	3-22, 3-28
199-D8-53	B091Q7	W	08/24/93	NV	3-30, 3-31
199-D8-3	B091Q9	W	08/22/93	V	3-22, 3-28

WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	WET CHEMISTRY
199-D5-20	B091R1	W	08/24/93	NV	3-30, 3-31
199-D5-19	B091R3	W	08/23/93	V	3-36, 3-39
199-D5-18	B091R5	W	08/18/93	NV	3-40, 3-41
199-D5-17	B091R7	W	08/20/93	V	3-22, 3-28
199-D5-16	B091R9	W	08/19/93	NV	3-42, 3-43
199-D5-15	B091S1	W	08/23/93	V	3-36, 3-39
199-D5-14	B091S3	W	8/18/93	NV	3-40, 3-41
199-D5-12	B091S5	W	08/18/93	NV	3-40, 3-41
199-D2-6	B091S7	W	08/20/93	V	3-23, 3-29
199-D2-5	B091S9	W	08/19/93	NV	3-42, 3-43
699-97-51A	B091T1	W	08/25/93	V	3-44, 3-47
	B091W1	W	08/25/93	V	3-44, 3-47
699-97-43	B091T3	W	08/27/93	V	3-48, 3-51
699-96-49	B091T5	W	08/25/93	V	3-44, 3-47
	B091V9	W	08/25/93	V	3-44, 3-47
699-93-48	B091T7	W	08/27/93	V	3-48, 3-51
699-91-46	B091T9	W	08/30/93	V	3-32, 3-35
699-96-43	B091V1	W	08/30/93	V	3-32, 3-35
EB-1	B091W5	W	08/26/93	V	3-18, 3-21
EB-2	B091W7	W	09/20/93	V	3-8, 3-11
EB-3	B091W9	W	08/31/93	V	3-32, 3-35
EB-4	B091X1	W	09/20/93	V	3-8, 3-11

3.0 WET CHEMISTRY DATA VALIDATION

3.1 DATA PACKAGE COMPLETENESS

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

B091L5	B091M9	B091P9	B091T1	B091V3
B091M5	B091N1	B091R3	B091T3	B091V5

3.2 HOLDING TIMES

Analytical holding times for ammonia-nitrogen, nitrate-nitrogen, nitrite-nitrogen, chloride, fluoride, NO₃NO₂, pH, phosphate, sulfate and sulfide were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: 28 days for chloride, fluoride, sulfate, ammonia-nitrogen and NO₃NO₂; 7 days for sulfide; 2 days for phosphate, nitrate-nitrogen and nitrite-nitrogen.

Holding times were exceeded for phosphate in SDG No. B091V3. All associated sample results were qualified as estimates and flagged "J".

Holding times were exceeded for nitrate in SDG No. B091V3. All associated sample results were qualified as estimates and flagged "J".

Holding times were exceeded for nitrite in SDG No. B091V3. All associated sample results were qualified as estimates and flagged "J".

Holding times were grossly exceeded for phosphate in SDG Nos. B091L5, B091M5, B091M9, B091N1, B091P9, B091R3, B091T1 and B091T3. All associated sample results were rejected and flagged "R".

Holding times were grossly exceeded for nitrate in SDG Nos. B091L5, B091M5, B091M9, B091N1, B091P9, B091R3, B091T1 and B091T3. All associated sample results were rejected and flagged "R".

Holding times were grossly exceeded for nitrite in SDG Nos. B091L5, B091M5, B091M9, B091N1, B091P9, B091R3, B091T1 and B091T3. All associated sample results were rejected and flagged "R".

Holding times for all other analytes reviewed met QC requirements.

3.3 CALIBRATIONS

3.3.1 Initial Calibration

The following calibration procedures must be conducted:

- At least a blank and three standards were used to establish the ion chromatography, ion selective electrode, spectrophotometer, calibrations prior to sample analysis and the correlation was ≥ 0.995 .

All initial calibration results were acceptable.

3.3.2 Continuing Calibration Verification

All CCV standards must be analyzed with the required frequency or every 20 samples. The percent recoveries must fall within the 90-110% acceptance windows.

All continuing calibration results were acceptable.

3.4 BLANKS

One laboratory preparation blank is analyzed at a frequency of one every 20 samples. All blank results must fall below the CRQL and if not, all associated data < 5 times the amount found in the blank is qualified as non-detected and flagged "U".

All laboratory blank results were acceptable.

3.5 ACCURACY

3.5.1 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.

All matrix spike results were acceptable.

3.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of

samples which have been prepared together. The performance criteria for aqueous LCS percent recovery is 80 to 120 percent. 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).

All LCS results were found to be acceptable.

3.6 PRECISION

Analytical duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Field duplicate analyses are used to measure both the laboratory and the field sampling procedure precision.

All duplicate analyses results were acceptable for this data.

3.7 ANALYTE QUANTITATION AND DETECTION LIMITS

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. In addition, the reviewer verified that the results fell within the linear range of the instrument.

3.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicate that instrument performance was adequate for all analyses. The holding times for phosphate, nitrate and nitrite for all samples in eight data packages were grossly exceeded and all associated results were rejected and flagged "R". Rejected results are unusable for all purposes. The holding times were exceeded for phosphate, nitrate and nitrite in one data package. All associated sample results were qualified as estimates and flagged "J". All other QC results are considered accurate within the standard error associated with the methods.

WET CHEMISTRY/ANIONS ANALYSIS, WATER MATRIX, (mg/L)

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WET CHEMISTRY/ANIONS ANALYSIS, WATER MATRIX, (mg/L)

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HOLDING TIME SUMMARY

SDG: B091L5		REVIEWER: SC			DATE: 12/9/93		PAGE 1 OF 1	
COMMENTS:								
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER	
B091L5	Phosphate	9/20/93		10/13/93		2	R	
B091W7	Phosphate	9/20/93		10/13/93		2	R	
B091X1	Phosphate	9/20/93		10/13/93		2	R	
B091L5	Nitrate	9/20/93		10/13/93		2	R	
B091W7	Nitrate	9/20/93		10/13/93		2	R	
B091X1	Nitrate	9/20/93		10/13/93		2	R	
B091L5	Nitrite	9/20/93		10/13/93		2	R	
B091W7	Nitrite	9/20/93		10/13/93		2	R	
B091X1	Nitrite	9/20/93		10/13/93		2	R	

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HOLDING TIME SUMMARY

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HOLDING TIME SUMMARY

SDG: B091M9		REVIEWER: SC			DATE: 11/16/93		PAGE <u>1</u> OF <u>1</u>	
COMMENTS:								
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER	
B091M9	Phosphate	8/26/93		9/10/93		2	R	
B091P3	Phosphate	8/26/93		9/10/93		2	R	
B091W3	Phosphate	8/26/93		9/10/93		2	R	
B091W5	Phosphate	8/26/93		9/10/93		2	R	
B091M9	Nitrate	8/26/93		9/10/93		2	R	
B091P3	Nitrate	8/26/93		9/10/93		2	R	
B091W3	Nitrate	8/26/93		9/10/93		2	R	
B091W5	Nitrate	8/26/93		9/10/93		2	R	
B091M9	Nitrite	8/26/93		9/10/93		2	R	
B091P3	Nitrite	8/26/93		9/10/93		2	R	
B091W3	Nitrite	8/26/93		9/10/93		2	R	
B091W5	Nitrite	8/26/93		9/10/93		2	R	

DATA QUALIFICATION SUMMARY

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WET CHEMISTRY/ANIONS ANALYSIS, WATER MATRIX, (mg N/L)

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DUP = Duplicate

DUP = Duplicate

HOLDING TIME SUMMARY

SDG: B091N1		REVIEWER: LM		DATE: 12/9/93		PAGE <u>1</u> OF <u>3</u>	
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B091R7	Phosphate	8/20/93		9/07/93		2	R
B091S7	Phosphate	8/20/93		9/07/93		2	R
B091N1	Phosphate	8/21/93		9/07/93		2	R
B091N3	Phosphate	8/21/93		9/07/93		2	R
B091N5	Phosphate	8/21/93		9/07/93		2	R
B091N7	Phosphate	8/21/93		9/07/93		2	R
B091P1	Phosphate	8/21/93		9/07/93		2	R
B091Q3	Phosphate	8/22/93		9/07/93		2	R
B091Q5	Phosphate	8/22/93		9/07/93		2	R
B091Q9	Phosphate	8/22/93		9/07/93		2	R
B091V7	Phosphate	8/22/93		9/07/93		2	R
B091R7	Nitrate	8/20/93		9/07/93		2	R
B091S7	Nitrate	8/20/93		9/07/93		2	R
B091N1	Nitrate	8/21/93		9/07/93		2	R
B091N3	Nitrate	8/21/93		9/07/93		2	R
B091N5	Nitrate	8/21/93		9/07/93		2	R

HOLDING TIME SUMMARY

SDG: B091N1		REVIEWER: LM			DATE: 12/9/93		PAGE <u>2</u> OF <u>3</u>	
COMMENTS:								
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME,	ANALYSIS HOLDING TIME,	QUALIFIER	
B091N7	Nitrate	8/21/93		9/07/93		2	R	
B091P1	Nitrate	8/21/93		9/07/93		2	R	
B091Q3	Nitrate	8/22/93		9/07/93		2	R	
B091Q5	Nitrate	8/22/93		9/07/93		2	R	
B091Q9	Nitrate	8/22/93		9/07/93		2	R	
B091V7	Nitrate	8/22/93		9/07/93		2	R	
B091R7	Nitrite	8/20/93		9/07/93		2	R	
B091S7	Nitrite	8/20/93		9/07/93		2	R	
B091N1	Nitrite	8/21/93		9/07/93		2	R	
B091N3	Nitrite	8/21/93		9/07/93		2	R	
B091N5	Nitrite	8/21/93		9/07/93		2	R	
B091N7	Nitrite	8/21/93		9/07/93		2	R	
B091P1	Nitrite	8/21/93		9/07/93		2	R	
B091Q3	Nitrite	8/22/93		9/07/93		2	R	
B091Q5	Nitrite	8/22/93		9/07/93		2	R	
B091Q9	Nitrite	8/22/93		9/07/93		2	R	

HOLDING TIME SUMMARY

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HOLDING TIME SUMMARY

SDG: B091P9		REVIEWER: SC			DATE: 11/16/93		PAGE <u>1</u> OF <u>1</u>	
COMMENTS:								
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER	
B091P9	Phosphate	8/30/93		9/15/93		2	R	
B091T9	Phosphate	8/30/93		9/15/93		2	R	
B091V1	Phosphate	8/30/93		9/15/93		2	R	
B091W9	Phosphate	8/31/93		9/15/93		2	R	
B091P9	Nitrate	8/30/93		9/15/93		2	R	
B091T9	Nitrate	8/30/93		9/15/93		2	R	
B091V1	Nitrate	8/30/93		9/15/93		2	R	
B091W9	Nitrate	8/31/93		9/15/93		2	R	
B091P9	Nitrite	8/30/93		9/15/93		2	R	
B091T9	Nitrite	8/30/93		9/15/93		2	R	
B091V1	Nitrite	8/30/93		9/15/93		2	R	
B091W9	Nitrite	8/31/93		9/15/93		2	R	

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HOLDING TIME SUMMARY

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DATA QUALIFICATION SUMMARY

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WET CHEMISTRY/ANIONS ANALYSIS, WATER MATRIX, (mg/L)

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HOLDING TIME SUMMARY

SDG: B091T1		REVIEWER: SC		DATE: 11/10/93		PAGE <u>1</u> OF <u>1</u>	
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B091T1	Phosphate	8/25/93		9/10/93		2	R
B091T5	Phosphate	8/24/93		9/10/93		2	R
B091V9	Phosphate	8/25/93		9/10/93		2	R
B091W1	Phosphate	8/25/93		9/10/93		2	R
B091T1	Nitrate	8/25/93		9/10/93		2	R
B091T5	Nitrate	8/24/93		9/10/93		2	R
B091V9	Nitrate	8/25/93		9/10/93		2	R
B091W1	Nitrate	8/25/93		9/10/93		2	R
B091T1	Nitrite	8/25/93		9/10/93		2	R
B091T5	Nitrite	8/24/93		9/10/93		2	R
B091V9	Nitrite	8/25/93		9/10/93		2	R
B091W1	Nitrite	8/25/93		9/10/93		2	R

3-46

DUP = Duplicate

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HOLDING TIME SUMMARY

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DATA QUALIFICATION SUMMARY

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Laboratory: TMA

Case	SDG: B091T3
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Sample Number	B091T
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Location	699-97-43
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Remarks	
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Sample Date	08/27/93
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Analytes	Method	Result	Q
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N03N02	353.2	3.23	
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WHC-SD-EN-TI-219, Rev. 0

WET CHEMISTRY/ANIONS ANALYSIS, WATER MATRIX, (mg/L)

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HOLDING TIME SUMMARY

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DATA QUALIFICATION SUMMARY

3-54

Project: WESTINGHOUSE-HANFORD	
Laboratory: Roy F. Weston	
Case	SDG: B091V5
Sample Number	B091V5
Location	199-H4-15A
Remarks	Split
Sample Date	08/26/93
Analytes	Method
Chloride	300.0
Fluoride	300.0
Nitrite Nitrogen	300.0
Nitrate Nitrogen	300.0
Phosphate	300.0
Sulfate	300.0
Ammonia Nitrogen	350.3
Sulfide	376.2

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WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIOCHEMISTRY
153-1	B091L1	W	09/15/93	NV	6-4
205-1	B091L3	W	09/22/93	NV	6-5
145-2	B091L5	W	09/20/93	V	6-5
189-1	B091L7	W	09/28/93	NV	6-6
077-1	B091L9	W	09/28/93	NV	6-6
037-1	B091M1	W	09/22/93	NV	6-5
110-1	B091M3	W	09/15/93	NV	6-4
199-H6-1	B091M5	W	08/17/93	V	6-7
199-H5-1	B091M7	W	08/17/93	V	6-7
199-H4-49	B091M9	W	08/26/93	V	6-8
199-H4-48	B091N1	W	08/21/93	V	6-10
199-H4-47	B091N3	W	08/21/93	V	6-10
199-H4-46	B091N5	W	08/21/93	V	6-10
199-H4-45	B091N7	W	08/21/93	V	6-10
199-H4-17	B091N9	W	08/24/93	NV	6-10
199-H4-16	B091P1	W	08/21/93	V	6-10
199-H4-15A	B091P3	W	08/26/93	V	6-8
	B091V5	W	08/26/93	V	6-13
	B091W3	W	08/26/93	V	6-9
199-H4-13	B091P5	W	08/24/93	NV	6-10
199-H4-10	B091P7	W	8/24/93	NV	6-10
199-H3-1	B091P9	W	08/30/93	V	6-8
199-D8-55	B091Q1	W	08/24/93	NV	6-10
199-D8-54B	B091Q3	W	08/22/93	V	6-10
	B091V3	W	08/22/93	V	6-12
	B091V7	W	08/22/93	V	6-11
199-D8-54A	B091Q5	W	08/22/93	V	6-11
199-D8-53	B091Q7	W	08/24/93	NV	6-11
199-D8-3	B091Q9	W	08/22/93	V	6-11

WELL AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIOCHEMISTRY
199-D5-20	B091R1	W	08/24/93	NV	6-11
199-D5-19	B091R3	W	08/23/93	V	6-11
199-D5-18	B091R5	W	08/18/93	NV	6-7
199-D5-17	B091R7	W	08/20/93	V	6-11
199-D5-16	B091R9	W	08/19/93	NV	6-7
199-D5-15	B091S1	W	08/23/93	V	6-11
199-D5-14	B091S3	W	8/18/93	NV	6-7
199-D5-12	B091S5	W	08/18/93	NV	6-7
199-D2-6	B091S7	W	08/20/93	V	6-11
199-D2-5	B091S9	W	08/19/93	NV	6-7
699-97-51A	B091T1	W	08/25/93	V	6-8
	B091W1	W	08/25/93	V	6-9
699-97-43	B091T3		08/27/93	V	6-8
699-96-49	B091T5		08/25/93	V	6-8
	B091V9		08/25/93	V	6-8
699-93-48	B091T7	W	08/27/93	V	6-8
699-91-46	B091T9	W	08/30/93	V	6-8
699-96-43	B091V1	W	08/30/93	V	6-8
EB-1	B091W5	W	08/26/93	V	6-9
EB-2	B091W7	W	09/20/93	V	6-5
EB-3	B091W9	W	08/31/93	V	6-14
EB-4	B091X1	W	09/20/93	V	6-5
152-2	B09BB2	W	10/05/93	NV	6-6
	B09BB3	W	10/05/93	NV	6-6

4.0 GROSS ALPHA AND GROSS BETA DETERMINATION DATA VALIDATION

4.1 DATA PACKAGE COMPLETENESS

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

B091L3	B091M5	B091N1	B091V5
B091L7	B091M9	B091V3	B091W9

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 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 on a day-to-day basis.

Calibration certificates provided for detectors used for gross alpha and beta analysis for all data packages, except SDG Nos. B091V3 and B091V5, were dated March 1990. The current Westinghouse-Hanford requirement is for an annual calibration for each detector. Continuing calibration data for all data packages, except SDG Nos. B091V3 and B091V5, did not include daily check source counts or weekly background counts before and after sample analysis. Due to these deficiencies, all gross alpha and beta results in the affected SDGs were rejected and flagged "R".

The check sources used for continuing calibration in all data packages were not identified by nuclide and activity, therefore, all associated gross alpha and beta results in all data packages were qualified as estimates and flagged "J".

All missing data were requested but were not available.

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

4.4 ACCURACY

Accuracy was evaluated by analyzing soil or 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 80 to 120 percent. If spiked sample results were outside this range, the associated data were qualified as estimated detects and flagged "J" or estimated non-detects and flagged "UJ".

Due to low LCS percent recovery, gross alpha and beta results for sample number B091V3 in SDG No. B091V3 were qualified as estimates and flagged "J".

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. Replicates with activities greater than five times the LLD and with an RPD less than 35 percent are acceptable. If one or both duplicate activities are $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects and flagged "J" or estimated non-detects and flagged "UJ".

All 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.

All blank results were acceptable.

4.7 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.

4.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was adequate for these analyses. All gross alpha and beta results, except SDG Nos. B091V3 and B091V5, were rejected and flagged "R" due to a lack of calibration documentation. Rejected data are invalid and cannot be used for any purpose. Due to low LCS percent recovery, all gross alpha and beta results for all samples in SDG No. B091V3 were qualified as estimates and flagged "J". All results were qualified as estimated due to the check source not being identified by nuclide and activity. Data qualified as estimated and flagged "J" are valid and usable for limited purposes only. All other QC data are considered to be acceptable and usable for all purposes.

5.0 STRONTIUM-90 DETERMINATION DATA VALIDATION

5.1 DATA PACKAGE COMPLETENESS

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

B091L3	B091M5	B091N1	B091V5
B091L7	B091M9	B091V3	B091W9

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 detection efficiency determination. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Calibration of the instruments used for strontium-90 analysis for all data packages, except SDG Nos. B091V3 and B091V5, were not detector-specific. The current requirement is for all annual calibration for each detector used. Continuing calibration data for all data packages, except SDG Nos. B091V3 and B091V5, did not include daily check source counts or weekly background counts before and after sample analysis. Due to these deficiencies, all strontium-90 results in the affected SDGs were rejected and flagged "R".

Due to continuing calibration check source results outside laboratory control limits, the strontium-90 result in sample number B091W7 in SDG No. B091L3 was rejected and flagged "R". Due to a continuing calibration background count outside laboratory control limits, the strontium-90 result in sample number B091X1 in SDG No. B091L3 was rejected and flagged "R".

The check sources used for continuing calibration in all data packages were not identified by nuclide and activity, therefore, all results were qualified as estimates and flagged "J".

All missing data were requested but were not available.

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

5.4 ACCURACY

All spike recoveries should be within the specified QC range of 80 to 120 percent, while all radiotraced samples should show a radiometric yield or recovery between 30 and 105%. Spiked sample results outside the above ranges resulted in qualification of the associated data as estimated.

All 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. Replicates with an RPD less than 35 percent are acceptable. If one or both duplicate activities are $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects and flagged "J" or estimated non-detects and flagged "UJ".

All precision results were acceptable.

5.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results may be due to laboratory reagent, sample container, or detector contamination.

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.

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. Problems with continuing and annual calibration data resulted in all strontium-90 results in all data packages, except SDG Nos. B091V3 and B091V5, were rejected and flagged "R". Rejected data are unusable and should not be reported. Strontium-90 results in all data packages were qualified as estimates and flagged "J" due to continuing calibration check source was not being identified by nuclide and activity. Data qualified as estimated are valid and usable for limited purposes only. All other QC data are considered to be valid and usable for all purposes.

6.0 TRITIUM DETERMINATION DATA VALIDATION

6.1 DATA PACKAGE COMPLETENESS

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

B091L3	B091M5	B091N1	B091V5
B091L7	B091M9	B091V3	B091W9

6.2 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.

6.3 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. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Initial calibration data for all data packages, except SDG Nos. B091V3 and B091V5, were not detector-specific and were rejected and flagged "R". Continuing calibration data for all data packages, except SDG Nos. B091V3 and B091V5, did not include daily check source counts or weekly background counts before and after sample analyses. Due to these deficiencies, all associated tritium results were rejected and flagged "R".

The continuing calibration check source was not identified by activity or nuclide. Therefore, all results in all data packages, except SDG Nos. B091V3 and B091V5, were qualified as estimates and flagged "J".

All missing data were requested but were not available.

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

6.4 ACCURACY

All spike recoveries should be within the specified QC range of 80 to 120 percent, while all radiometric yields should fall within the range of 30 to 105%. Spiked sample results outside the above ranges resulted in qualification of the associated data as estimated detects and flagged "J" or estimated non-detects and flagged "UJ".

Due to high matrix spike percent recovery (124%), the tritium result in SDG No. B091V5 was rejected and flagged "R".

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. Replicates with a RPD less than 35 percent are acceptable. If one or both duplicate activities are $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects and flagged "J" or estimated non-detects and flagged "UJ".

All precision results were acceptable.

6.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results may be due to laboratory reagent, sample container, or detector contamination.

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.

All analyte quantitation and reported detection limits and sample results 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 initial and continuing calibration deficiencies, tritium results in all data packages, except SDG Nos. B091V3 and B091V5, were rejected and flagged "R". Rejected data are unusable and should not be reported. Due to the continuing calibration check source not being identified by activity or nuclide, results in all data packages, except SDG Nos. B091V3 and B091V5, were qualified as estimates and flagged "J". Due to high matrix spike percent recovery, the tritium result in SDG No. B091V5 was rejected and flagged "R". Rejected data are unusable and should not be reported. Estimated data are considered usable for limited purposes only. All other QC data are considered to be acceptable and usable for all purposes.

WHC-SD-EN-TI-219, Rev. 0

NV = Not Validated, EB = Equipment Blank

WHC-SD-EN-TI-219, Rev. 0

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WHC-SD-EN-TI-219, Rev. 0

WHC-SD-EN-TI-219, Rev. 0

DUP = Duplicate, EB = Equipment Blank

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