301/587-8202

Resolution Test Chart Labels:

- 1.0
- 1.1
- 1.25
- 1.4
- 1.6
- 1.8
- 2.0
- 2.2
- 2.5
- 2.8
- 3.2
- 3.6
- 4.0

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1 of 2

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7. Abstract

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10.

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9. Impact Level Q

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
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

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-HR-3 Operable Unit First Quarter 1994 Groundwater Sampling event:

B09DK5	B09WW0	B09WX8	B09WZ6	B09X14
B09M28	B09WW1	B09WX9	B09WZ7	B09X15
B09M29	B09WW2	B09WY0	B09WZ8	B09X16
B09WT5	B09WW3	B09WY1	B09WZ9	B09X17
B09WT6	B09WW4	B09WY2	B09X00	B09X18
B09WT7	B09WW5	B09WY3	B09X01	B09X19
B09WT8	B09WW6	B09WY4	B09X02	B09X20
B09WT9	B09WW7	B09WY5	B09X03	B09X21
B09WV0	B09WW8	B09WY6	B09X04	B09X22
B09WV1	B09WW9	B09WY7	B09X05	B09X23
B09WV2	B09WX0	B09WY8	B09X06	B09X24
B09WV3	B09WX1	B09WY9	B09X07	B09X25
B09WV4	B09WX2	B09WZ0	B09X08	B09X26
B09WV5	B09WX3	B09WZ1	B09X09	B09X27
B09WV6	B09WX4	B09WZ2	B09X10	B09X28
B09WV7	B09WX5	B09WZ3	B09X11	
B09WV8	B09WX6	B09WZ4	B09X12	
B09WV9	B09WX7	B09WZ5	B09X13	

Westinghouse-Hanford has requested that a minimum of 20% of the total number of Sample Delivery Groups be validated for the 100-HR-3 Operable Unit First Quarter 1994 Groundwater Sampling Investigation. Therefore, the data from the chemical analysis of twenty-four 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 Validated	Parameters
B09WT7	W	8	Inorganics
B09WT7	W	4	Wet Chem
B09WY3	W	6	Inorganics
B09WY3	W	3	Wet Chem
B09X01	W	6	Inorganics
B09X01	W	3	Wet Chem
9402L569	W	4	Inorganics
9402L569	W	2	Wet Chem

Forty-two 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
- Strontium-90
- Tritium.

SDG No.	Matrix	No. of Samples Validated	Parameters
B09WT5	W	12	Radiochemistry
B09WT7	W	16	Radiochemistry
B09WY3	W	9	Radiochemistry
B09X01	W	3	Radiochemistry
42173	W	2	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>
B09WZ3	B09X25	1-H4-48
B09WZ4	B09X26	1-H4-48

Set 2:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
B09WV7	B09X27	1-D5-17
B09WV8	B09X28	1-D5-17

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>
B09XZ3	B09X21	1-H4-48
B09WZ4	B09X22	1-H4-48

Set 2:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
B09WV7	B09X23	1-D5-17
B09WV8	B09X24	1-D5-17

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.

Four sets of equipment blanks were submitted to TMA and Weston as shown in the table below. The four sets were collected on 2/2/94, 2/5/94, 2/5/94 and 2/11/94 and designated EB-1, EB-2, EB-3 and EB-4, respectively.

Set 1:

Sample Number

B09X13
B09X14

Set 2:

Sample Number

B09X15
B09X16

Set 3:

Sample Number

B09X17
B09X18

Set 4:

Sample Number

B09X19
B09X20

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 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-HR-3 Operable Unit First Quarter 1994 Groundwater 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. Approximately 5% of the metals results were flagged due to these factors.
- Both positive and negative lab 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.

- Several phosphate, nitrate nitrogen and nitrite nitrogen results exceeded holding time limits. All associated results were flagged accordingly.
- Due to accuracy recoveries outside QC limits, several gross alpha results were qualified as estimates.
- The reported MDA value for one gross alpha result was above the RDL.
- Due to the lack of a matrix spike sample, several tritium results 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.

WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
1-D2-5	B09WT5	W	01/29/94	NV	2-12
	B09WT6	W	01/29/94	NV	2-14
1-D2-6	B09WT7	W	02/07/94	NV	2-16
	B09WT8	W	02/07/94	NV	2-20
1-D5-12	B09WT9	W	01/29/94	NV	2-12
	B09WV0	W	01/29/94	NV	2-14
1-D5-14	B09WV1	W	01/29/94	NV	2-12
	B09WV2	W	01/29/94	NV	2-14
1-D5-15	B09WV3	W	02/10/94	NV	2-25
	B09WV4	W	02/10/94	NV	2-26
1-D5-16	B09WV5	W	01/29/94	NV	2-12
	B09WV6	W	01/29/94	NV	2-14
1-D5-17	B09WV7	W	02/08/94	V	2-16
	B09WV8	W	02/08/94	V	2-20
	B09X23	W	02/08/94	V	2-17
	B09X24	W	02/08/94	V	2-21
	B09X27	W	02/08/94	V	2-53
	B09X28	W	02/08/94	V	2-53
1-D5-18	B09WV9	W	01/29/94	NV	2-12
	B09WW0	W	01/29/94	NV	2-14
1-D5-19	B09WW1	W	01/29/94	NV	2-12
	B09WW2	W	01/29/94	NV	2-14
1-D5-20	B09WW3	W	02/06/94	NV	2-16
	B09WW4	W	02/06/94	NV	2-20
1-D8-3	B09WW5	W	01/30/94	NV	2-12
	B09WW6	W	01/30/94	NV	2-14
1-D8-53	B09WW7	W	01/30/94	NV	2-12
	B09WW8	W	01/30/94	NV	2-14
1-D8-54A	B09WW9	W	01/30/94	NV	2-12
	B09WX0	W	01/30/94	NV	2-14
1-D9-54B	B09WX1	W	02/06/94	NV	2-16
	B09WX2	W	02/06/94	NV	2-20
1-D8-55	B09WX3	W	01/30/94	NV	2-12
	B09WX4	W	01/30/94	NV	2-14

WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
1-H3-1	B09WX5	W	02/09/94	NV	2-25
	B09WX6	W	02/09/94	NV	2-26
1-H4-10	B09WX7	W	02/10/94	NV	2-25
	B09WX8	W	02/10/94	NV	2-26
1-H4-13	B09WX9	W	02/10/94	NV	2-25
	B09WY0	W	02/10/94	NV	2-26
1-H4-15A	B09WY1	W	02/06/94	NV	2-16
	B09WY2	W	02/06/94	NV	2-20
1-H4-16	B09WY3	W	02/01/94	NV	2-27
	B09WY4	W	02/01/94	NV	2-32
1-H4-17	B09WY5	W	02/05/94	NV	2-35
	B09WY6	W	02/05/94	NV	2-40
1-H4-45	B09WY7	W	02/05/94	NV	2-35
	B09WY8	W	02/05/94	NV	2-40
1-H4-46	B09WY9	W	02/05/94	NV	2-35
	B09WZ0	W	02/05/94	NV	2-40
1-H4-47	B09WZ1	W	02/03/94	NV	2-16
	B09WZ2	W	02/03/94	NV	2-20
1-H4-48	B09WZ3	W	02/03/94	V	2-16
	B09WZ4	W	02/03/94	V	2-20
	B09X21	W	02/03/94	V	2-17
	B09X22	W	02/03/94	V	2-21
	B09X25	W	02/03/94	V	2-53
	B09X26	W	02/03/94	V	2-53
1-H4-49	B09WZ5	W	02/08/94	NV	2-16
	B09WZ6	W	02/08/94	NV	2-20
1-H5-1	B09WZ7	W	01/31/94	NV	2-13
	B09WZ8	W	01/31/94	NV	2-15
1-H6-1	B09WZ9	W	01/31/94	NV	2-13
	B09X00	W	01/31/94	NV	2-15
6-96-43	B09X01	W	02/11/94	V	2-44
	B09X02	W	02/11/94	V	2-47
6-91-46	B09X03	W	02/11/94	V	2-44
	B09X04	W	02/11/94	V	2-47

WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
6-93-48	B09X05	W	02/06/94	NV	2-16
	B09X06	W	02/06/94	NV	2-20
6-96-49	B09X07	W	02/07/94	NV	2-16
	B09X08	W	02/07/94	NV	2-20
6-97-43	B09X09	W	02/01/94	NV	2-27
	B09X10	W	02/01/94	NV	2-32
6-97-51A	B09X11	W	02/05/94	NV	2-35
	B09X12	W	02/05/94	NV	2-40
EB-1	B09X13	W	02/02/94	V	2-27
	B09X14	W	02/02/94	V	2-32
EB-2	B09X15	W	02/05/94	V	2-35
	B09X16	W	02/05/94	V	2-40
EB-3	B09X17	W	02/05/94	V	2-35
	B09X18	W	02/05/94	V	2-40
EB-4	B09X19	W	02/11/94	V	2-44
	B09X20	W	02/11/94	V	2-47
152-3	B09M28	W	11/15/93	NV	2-59
	B09M29	W	11/15/93	NV	2-60

2.0 INORGANIC DATA VALIDATION

2.1 DATA PACKAGE COMPLETENESS

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

B09WT5	B09WY3	9402L569
B09WT7	B09X01	

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.

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. 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 B09WZ3, B09X21 and B09X22 in SDG No. B09WT7.
- Sample numbers B09X02 and B09X04 in SDG No. B09X01.
- Sample number B09X28 in SDG No. 9402L569.

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

- Sample number B09X17 in SDG No. B09WY3.
- Sample number B09X26 in SDG No. 9402L569.

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

- Sample numbers B09X13 and B09X16 in SDG No. B09WY3.
- Sample number B09X20 in SDG No. B09X01.

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

- Sample number B09X27 in SDG No. 9402L569.

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

- Sample numbers B09WV7, B09WZ3, B09X21 and B09X23 in SDG No. B09WT7.
- Sample number B09X13 in SDG No. B09WY3.
- Sample numbers B09X02, B09X03, B09X04, B09X19 and B09X20 in SDG No. B09X01.
- Sample numbers B09X27 and B09X28 in SDG No. 9402L569.

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

- Sample numbers B09WV8, B09WZ4, B09X21, B09X22 and B09X24 in SDG No. B09WT7.
- Sample numbers B09X13, B09X15 and B09X17 in SDG No. B09WY3.
- Sample numbers B09X01, B09X02 and B09X03 in SDG No. B09X01.
- Sample numbers B09X25, B09X26 and B09X28 in SDG No. 9402L569.

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

- Sample number B09X13 in SDG No. B09WY3.
- Sample number B09X17 in SDG No. B09WY3.
- Sample numbers B09X19 and B09X20 in SDG No. B09X01.

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

- Sample numbers B09WZ3 and B09X21 in SDG No. B09WT7.
- Sample numbers B09X14 and B09X15 in SDG No. B09WY3.
- Sample numbers B09X01 and B09X03 in SDG No. B09X01.

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

- Sample number B09X15 in SDG No. B09WY3.

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

- Sample number B09X13 in SDG No. B09WY3.

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

- Sample number B09X14 in SDG No. B09WY3.
- Sample numbers B09X03 and B09X20 in SDG No. B09X01.

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

- Sample numbers B09X13, B09X15, B09X16, B09X17 and B09X18 in SDG No. B09WY3.
- Sample number B09X19 in SDG No. B09X01.

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

- Sample numbers B09X25, B09X26, B09X27 and B09X28 in SDG No. 9402L569.

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

- Sample number B09X24 in SDG No. B09WT7.
- Sample numbers B09X13, B09X14, B09X15, B09X16, B09X17 and B09X18 in SDG No. B09WY3.
- Sample numbers B09X01, B09X02, B09X03, B09X04, B09X19 and B09X20 in SDG No. B09X01.
- Sample numbers B09X25, B09X26 and B09X28 in SDG No. 9402L569.

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 "UR" 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 B09X15, B09X16 and B09X18 in SDG No. B09WY3.

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

- Sample numbers B09X19 and B09X20 in SDG No. B09X01.

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

- Sample numbers B09X16 and B09X18 in SDG No. B09WY3.

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

- Sample number B09X16 in SDG No. B09XY3.

- Sample number B09X20 in SDG No. B09X01.

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

- Sample number B09X18 in SDG No. B09WY3.
- Sample numbers B09X25, B09X26, B09X27 and B09X28 in SDG No. 9402L569.

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

- Sample number B09X25 in SDG No. 9402L569.

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 aluminum in the following samples:

- Sample numbers B09X13 and B09X17 in SDG No. B09WY3.

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

- Sample number B09X15 in SDG No. B09WY3.

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

- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

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

- Sample numbers B09X26 and B09X28 in SDG No. 9402L569.

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

- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

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

- Sample numbers B09X26 and B09X28 in SDG No. 9402L569.

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".

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

- Sample numbers B09X13 and B09X17 in SDG No. B09WY3.

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

- Sample number B09X15 in SDG No. B09WY3.

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

- Sample number B09X02 in SDG No. B09X01.

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

- Sample numbers B09X04 and B09X20 in SDG No. B09X01.

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

- Sample number B09X13 in SDG No. B09WY3.

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

- Sample numbers B09X15 and B09X17 in SDG No. B09WY3.

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 manganese:

- Sample numbers B09WV8, B09WZ4, B09X22 and B09X24 in SDG No. B09WT7.

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

- Sample numbers B09X25, B09X26, B09X27 and B09X28 in SDG No. 9402L569.

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

- Sample numbers B09X25, B09X26, B09X27 and B09X28 in SDG No. 9402L569.

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 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>
B09WV7	B09WV8
B09WZ3	B09WZ4
B09X01	B09X02
B09X03	B09X04
B09X13	B09X14
B09X15	B09X16
B09X17	B09X18
B09X19	B09X20
B09X21	B09X22
B09X23	B09X24
B09X25	B09X26
B09X27	B09X28

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 positive results were flagged "J" and the non-detects were rejected and flagged "UR".

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

- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

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

- Sample numbers B09X26 and B09X28 in SDG No. 9402L569.

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

- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

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

- Sample numbers B09X26 and B09X28 in SDG No. 9402L569.

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

Positive and negative blank contamination was noted in several samples. Associated sample results were flagged accordingly. Contamination, however, was not sufficiently high to affect the usability of the data. Minor matrix spike accuracy problems, analytical spike problems, lab duplicate precision and ICP serial dilution problems were noted for several samples. All results were flagged accordingly. Data flagged "J" are usable for limited purposes only. Except as noted in the preceding sections, all other validated data are usable for all purposes.

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[illegible]

1996, 1997.

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B09WT5																			
Sample Number		B09WT6		B09WV0		B09WV2		B09WV6		B09WW0		B09WW2		B09WW6		B09WW8		B09WX0		B09WX4	
Location		1-D2-5		1-D5-12		1-D5-14		1-D5-16		1-D5-18		1-D5-19		1-D8-3		1-D8-53		1-D8-54A		1-D8-55	
Remarks		NV,FIL		NV,FIL		NV,FIL		NV,FIL		NV,FIL		NV,FIL		NV,FIL		NV,FIL		NV,FIL		NV,FIL	
Sample Date		01/29/94		01/29/94		01/29/94		01/29/94		01/29/94		01/29/94		01/30/94		01/30/94		01/30/94		01/30/94	
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	U	37.60		15.00	U	15.00	U	15.00	U	15.00	U	15.00	U	15.00	U	15.00	U	24.20	
Antimony	60	12.20	U	12.20	U	12.20	U	12.20	U	18.90		12.20	U	12.20	U	12.20	U	12.20	U	16.00	
Arsenic	10	3.00	U	3.00	U	3.40		3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Barium	200	60.40		124.00		77.60		96.60		87.60		79.10		146.00		81.50		79.30		48.70	
Beryllium	5	0.43		0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.41		0.30	U	0.30	U
Cadmium	5	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U
Calcium	5000	65100		116000		57800		59900		81700		78600		125000		86200		86700		31500	
Chromium	10	40.20		173.00		1160		847.00		57.90		59.80		102.00		344.00		451.00		13.70	
Cobalt	50	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U
Copper	25	6.40		2.00		3.00		3.00		2.00		2.00		2.40		2.00		1.60	U	3.90	
Iron	100	13.40	U	13.40	U	13.40	U	13.40	U	13.40	U	13.40	U	13.40	U	13.40	U	13.40	U	13.40	U
Lead	3	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Magnesium	5000	18800		23600		16500		22800		24800		24500		9570		11700		15000		4870	
Manganese	15	1.60		2.90		1.80		10.00		1.80		1.60		1.30		1.60		1.80		1.60	
Mercury	0.2	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Nickel	40	4.40	U	4.40	U	4.40	U	25.20		4.40	U	10.40		4.40	U	4.40	U	6.10		4.40	U
Potassium	5000	5080		5450		5600		6230		4970		5250		9250		4450		5050		2820	
Selenium	5	3.30		4.60		2.80	U	2.80	U	3.70		3.10		2.80	U	3.40		5.50		2.80	U
Silver	10	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U
Sodium	5000	13400		12600		15800		14000		11500		14100		8320		8710		12800		5090	
Thallium	10	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U
Vanadium	50	12.20		7.20		18.40		6.90		4.40		12.80		3.20		3.20		7.80		2.80	
Zinc	20	4.60	U	15.60		4.60	U	4.60	U	4.60	U	4.60	U	4.60	U	4.60	U	4.60	U	4.60	U
Cyanide	10	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	

 

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Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B09WT7																			
Sample Number		B09WT7		B09WV7		B09WW3		B09WX1		B09WY1		B09WZ1		B09WZ3		B09WZ5		B09X05		B09X07	
Location:		1-D2-6		1-D5-17		1-D5-20		1-D9-54B		1-H4-15A		1-H4-47		1-H4-48		1-H4-49		6-93-48		6-96-49	
Remarks		NV				NV		NV		NV		NV				NV		NV		NV	
Sample Date		02/07/94		02/08/94		02/06/94		02/06/94		02/06/94		02/03/94		02/03/94		02/08/94		02/06/94		02/07/94	
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	38.60		637.00		29.20		55.00		26.60		41.60		71.00	U	51.20		42.40		39.80	
Antimony	60	12.20	U	12.20	U	12.20	U	12.20	U	13.80		12.20	U	12.20	U	12.20	U	12.20	U	12.20	U
Arsenic	10	3.00	U	3.00	U	3.00	U	3.00	U	4.50		3.00	U	3.00	U	3.00	U	5.70		3.90	
Barium	200	57.90		73.30		65.00		99.30		66.40		13.40		15.80		35.80		37.10		73.10	
Beryllium	5	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
Cadmium	5	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U	1.70	U
Calcium	5000	76800		68500		44800		39200		40700		30800		28800		40800		28500		44000	
Chromium	10	135.00		54.30		191.00		44.50		66.50		6.10		7.90		26.60		29.80		42.10	
Cobalt	50	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U	2.90	U
Copper	25	7.30		3.50	U	4.50		6.60		2.40		4.10		3.30	U	4.10		2.50		2.00	
Iron	100	101.00		999.00		146.00		252.00		51.60		70.60		99.40		124.00		118.00		94.60	
Lead	3	2.10		2.00		1.80	U	1.80	U	2.00		1.80	U	1.80	U	3.00		2.20		2.00	
Magnesium	5000	17000		21000		13900		14600		8270		5150		5350		9410		9060		9560	
Manganese	15	5.20		66.90		5.70		143.00		1.30		2.10		2.80	U	4.60		4.70		3.10	
Mercury	0.2	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Nickel	40	27.20		6.40		13.80		23.40		4.40	U	4.50		4.40	U	4.40	U	5.10		4.40	U
Potassium	5000	4810		5800		4400		9240		4800		2330		3180		4810		4120		4830	
Selenium	5	4.10		3.30		2.80	U	2.80	U	2.80	U	2.80	U	2.80	U	2.80	U	2.80	U	2.80	U
Silver	10	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U	2.10	U
Sodium	5000	12000		14700		12800		30500		10000		5080		5380		14800		17100		12100	
Thallium	10	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U	3.70	U
Vanadium	50	8.50		4.40		15.60		28.00		6.50		5.60		4.90		2.90		5.70		11.30	
Zinc	20	21.50		18.30		15.30		17.30		10.10		5.20		16.00		78.00		17.80		5.60	
Cyanide	10	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

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2-16

2004.8.5

BLANK AND SAMPLE DATA SUMMARY

[illegible]

WHC-SD-EN-TI-267, Rev. C

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

BLANK AND SAMPLE DATA SUMMARY

[illegible]

PRECISION DATA SUMMARY

[illegible]

NV = Not Validated, NA = Not Analyzed

NV = Not Validated, NA = Not Analyzed

NV = Not Validated, EB = Equipment Blank, NA = Not Analyzed

BLANK AND SAMPLE DATA SUMMARY

SDG: B09WY3		REVIEWER: HMS			DATE: 5/5/94			PAGE 1 OF 1	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Calcium	695			ug/L	3475.0	6950.0	B09X13	U
CCB1	Copper	20.6			ug/L	103.0	206.0	B09X13	U
CCB1	Iron	45.8			ug/L	229.0	458.0	B09X13	U
PB	Magnesium	156.39			ug/L	781.9	1563.9	B09X13	U
CCB1	Magnesium	51.0			ug/L	255.0	510.0	B09X13	U
PB	Potassium	154.79			ug/L	773.9	1547.9	B09X13	U
PB	Sodium	1606.1			ug/L	8030.5	16061.0	B09X13	U
PB	Zinc	4.84			ug/L	24.2	48.4	B09X13	U
CCB1	Zinc	7.4			ug/L	37.0	74.0	B09X13	U

ACCURACY DATA SUMMARY

[illegible]

2-30

2-31

[illegible]

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BLANK AND SAMPLE DATA SUMMARY

[illegible]

2-34

NV = Not Validated, EB = Equipment Blank, NA = Not Analyzed

BLANK AND SAMPLE DATA SUMMARY

SDG: B09WY3		REVIEWER: HMS			DATE: 5/5/94			PAGE 1 OF 1	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Aluminum	-25.3			ug/L	126.5	253.0	B09X15	UJ
PB	Barium	.87			ug/L	4.4	8.7	B09X17	U
CCB1	Barium	2.0			ug/L	10.0	20.0	B09X17	U
CCB1	Iron	24.5			ug/L	122.5	245.0	B09X15, B09X17	U
CCB1	Magnesium	62.3			ug/L	311.5	623.0	B09X17	U
CCB1	Manganese	.90			ug/L	4.5	9.0	B09X15	U
CCB1	Nickel	6.6			ug/L	33.0	66.0	B09X15	U
PB	Sodium	187.36			ug/L	936.8	1873.6	B09X15, B09X17	U
CCB1	Sodium	146.8			ug/L	734.0	1468.0	B09X15, B09X17	U
CCB1	Zinc	7.5			ug/L	37.5	75.0	B09X15, B09X17	U

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ACCURACY DATA SUMMARY

[illegible]

PRECISION DATA SUMMARY

[illegible]

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2-39

[illegible]

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BLANK AND SAMPLE DATA SUMMARY

[illegible]

2-42

2-43

[illegible]

EB = Equipment Blank, NA = Not Analyzed

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BLANK AND SAMPLE DATA SUMMARY

SDG: B09X01		REVIEWER: RJS			DATE: 5/10/94			PAGE <u>1</u> OF <u>1</u>	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Barium	-0.82			ug/L	4.1	8.2	B09X19	UJ
PB	Copper	2.91			ug/L	14.55	29.1	B09X03, B09X19	U
CCB4	Copper	13.3			ug/L	66.5	133.0	B09X03, B09X19	U
PB	Iron	21.86			ug/L	109.3	218.6	B09X01, B09X03	U
CCB4	Magnesium	96.3			ug/L	481.5	963.0	B09X19	U
CCB4	Manganese	1.6			ug/L	8.0	16.0	B09X01, B09X03	U
PB	Silver	2.1			ug/L	10.5	21.0	B09X03	U
CCB4	Silver	2.3			ug/L	11.5	23.0	B09X03	U
CCB4	Sodium	635.9			ug/L	3179.5	6359.0	B09X19	U
PB	Zinc	16.96			ug/L	84.8	169.6	B09X01, B09X03, B09X19	U
CCB4	Zinc	9.2			ug/L	46.0	92.0	B09X01, B09X03, B09X19	U

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BLANK AND SAMPLE DATA SUMMARY

SDG: B09X01		REVIEWER: RJS			DATE: 5/09/94			PAGE 1 OF 3	
COMMENTS:									
SAMPLE.ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
PB	Aluminum	31.06			ug/L	155.3	310.6	B09X02, B09X04	U
CCB1	Aluminum	25.09			ug/L	129.5	250.9	B09X02, B09X04	U
PB	Barium	-0.82			ug/L	4.1	8.2	B09X20	UJ
PB	Calcium	712.9			ug/L	3564.5	7129.0	B09X20	U
PB	Copper	7.07			ug/L	35.4	70.7	B09X02, B09X04, B09X20	U
CCB1	Copper	22.0			ug/L	110.0	220.0	B09X02, B09X04, B09X20	U
PB	Iron	25.55			ug/L	127.8	255.5	B09X02	U
CCB1	Iron	56.6			ug/L	283.0	566.0	B09X02	U
PB	Magnesium	57.38			ug/L	286.9	573.8	B09X20	U
CCB1	Magnesium	57.4			ug/L	287.0	574.0	B09X20	U
PB	Potassium	-82.7			ug/L	413.5	827.0	B09X20	UJ
PB	Silver	2.26			ug/L	11.3	22.6	B09X20	U
CCB1	Silver	3.1			ug/L	15.5	31.0	B09X20	U
PB	Zinc	11.54			ug/L	57.7	115.4	B09X02, B09X04, B09X20	U

BLANK AND SAMPLE DATA SUMMARY

[illegible]

BLANK AND SAMPLE DATA SUMMARY

[illegible]

PRECISION DATA SUMMARY

[illegible]

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FIL = Filtered, N/A = Not Applicable NA = Not Analyzed

BLANK AND SAMPLE DATA SUMMARY

SDG: 9402L569		REVIEWER: RJS			DATE: 5/4/94			PAGE <u>1</u> OF <u>2</u>	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB3	Aluminum	25.6			ug/L	128.0	256.0	B09X28	U
CCB3	Barium	5.4			ug/L	27.0	54.0	B09X26	U
CCB3	Cobalt	4.9			ug/L	24.5	49.0	B09X27	U
CCB3	Copper	5.4			ug/L	27.0	54.0	B09X27, B09X28	U
PB	Iron	13.9			ug/L	69.5	139.0	B09X25, B09X26, B09X28	U
CCB3	Iron	6.0			ug/L	30.0	60.0	B09X26, B09X28	U
PB	Potassium	-800			ug/L	4000	8000	B09X25, B09X26, B09X27, B09X28	J
PB	Vanadium	19.4			ug/L	97.0	194.0	B09X25, B09X26, B09X27, B09X28	U
CCB2	Zinc	3.3			ug/L	16.5	33.0	B09X25	U
CCB3	Zinc	3.3			ug/L	16.5	33.0	B09X26, B09X28	U

BLANK AND SAMPLE DATA SUMMARY

[illegible]

ACCURACY DATA SUMMARY

SDG: 9402L569	REVIEWER: RJS	DATE: 5/4/94	PAGE <u>1</u> OF <u>1</u>	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B09X25S	Lead	69.5	B09X25, B09X27	J
B09X25S	Lead	69.5	B09X26, B09X28	UJ
B09X25S	Selenium	65.0	B09X25, B09X27	J
B09X25S	Selenium	65.0	B09X26, B09X28	UJ
B09X25A	Lead	66.0	B09X25	J
B09X26A	Lead	81.5	B09X26	UJ
B09X27A	Lead	81.0	B09X27	J
B09X28A	Lead	77.5	B09X28	UJ
B09X25A	Selenium	72.0	B09X25	J
B09X26A	Selenium	83.0	B09X26	UJ
B09X27A	Selenium	60.0	B09X27	J
B09X28A	Selenium	70.0	B09X28	UJ

PRECISION DATA SUMMARY

[illegible]

DATA QUALIFICATION SUMMARY

SDG: 9402L569	REVIEWER: RJS	DATE: 5/4/94	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Aluminum	U	B09X28	Lab Blank Contamination
Barium	U	B09X26	Lab Blank Contamination
Cobalt	U	B09X27	Lab Blank Contamination
Copper	U	B09X27, B09X28	Lab Blank Contamination
Iron	U	B09X25, B09X26, B09X28	Lab Blank Contamination
Vanadium	U	B09X25, B09X26, B09X27, B09X28	Lab Blank Contamination
Zinc	U	B09X25, B09X26, B09X28	Lab Blank Contamination
Potassium	J	B09X25, B09X26, B09X27, B09X28	Negative Blank Contamination
Silver	UJ	B09X25	Negative Blank Contamination
Lead	J	B09X25, B09X27	Matrix Spike
Lead	UJ	B09X26, B09X28	Matrix Spike
Selenium	J	B09X25, B09X27	Matrix Spike
Selenium	UJ	B09X26, B09X28	Matrix Spike
Magnesium	J	B09X25, B09X25, B09X27, B09X28	ICP Serial Dilution
Sodium	J	B09X25, B09X25, B09X27, B09X28	ICP Serial Dilution
Lead	J	B09X25, B09X27	GFAA Analytical Spike
Lead	UJ	B09X26, B09X28	GFAA Analytical Spike
Selenium	J	B09X25, B09X27	GFAA Analytical Spike
Selenium	UJ	B09X26, B09X28	GFAA Analytical Spike

[illegible]

NV = Not Validated, NA = Not Analyzed

[illegible]

WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	WET CHEMISTRY
1-D2-5	B09WT5	W	01/29/94	NV	3-5, 3-7
1-D2-6	B09WT7	W	02/07/94	NV	3-9, 3-13
1-D5-12	B09WT9	W	01/29/94	NV	3-5, 3-7
1-D5-14	B09WV1	W	01/29/94	NV	3-5, 3-7
1-D5-15	B09WV3	W	02/10/94	NV	3-15
1-D5-16	B09WV5	W	01/29/94	NV	3-5, 3-7
1-D5-17	B09WV7	W	02/08/94	V	3-9, 3-13
	B09X23	W	02/08/94	V	3-10, 3-14
	B09X27	W	02/08/94	V	3-28
1-D5-18	B09WV9	W	01/29/94	NV	3-5, 3-7
1-D5-19	B09WW1	W	01/29/94	NV	3-5, 3-7
1-D5-20	B09WW3	W	02/06/94	NV	3-9, 3-13
1-D8-3	B09WW5	W	01/30/94	NV	3-5, 3-7
1-D8-53	B09WW7	W	01/30/94	NV	3-5, 3-7
1-D8-54A	B09WW9	W	01/30/94	NV	3-5, 3-7
1-D9-54B	B09WX1	W	02/06/94	NV	3-9, 3-13
1-D8-55	B09WX3	W	01/30/94	NV	3-6, 3-8
1-H3-1	B09WX5	W	02/09/94	NV	3-15
1-H4-10	B09WX7	W	02/10/94	NV	3-15
1-H4-13	B09WX9	W	02/10/94	NV	3-15
1-H4-15A	B09WY1	W	02/06/94	NV	3-9, 3-13
1-H4-16	B09WY3	W	02/01/94	NV	3-16, 3-19
1-H4-17	B09WY5	W	02/05/94	NV	3-20, 3-23
1-H4-45	B09WY7	W	02/05/94	NV	3-20, 3-23
1-H4-46	B09WY9	W	02/05/94	NV	3-20, 3-23
1-H4-47	B09WZ1	W	02/03/94	NV	3-9, 3-13
1-H4-48	B09WZ3	W	02/03/94	V	3-9, 3-13
	B09X21	W	02/03/94	V	3-10, 3-14
	B09X25	W	02/03/94	V	3-28

WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	WET CHEMISTRY
1-H4-49	B09WZ5	W	02/08/94	NV	3-9, 3-13
1-H5-1	B09WZ7	W	01/31/94	NV	3-6, 3-8
1-H6-1	B09WZ9	W	01/31/94	NV	3-6, 3-8
6-96-43	B09X01	W	02/11/94	V	3-24, 3-27
6-91-46	B09X03	W	02/11/94	V	3-24, 3-27
6-93-48	B09X05	W	02/06/94	NV	3-9, 3-13
6-96-49	B09X07	W	02/07/94	NV	3-10, 3-14
6-97-43	B09X09	W	02/01/94	NV	3-16, 3-19
6-97-51A	B09X11	W	02/05/94	NV	3-20, 3-23
EB-1	B09X13	W	02/02/94	V	3-16, 3-19
EB-2	B09X15	W	02/05/94	V	3-20, 3-23
EB-3	B09X17	W	02/05/94	V	3-20, 3-23
EB-4	B09X19	W	02/11/94	V	3-24, 3-27
152-3	B09M28	W	11/15/93	NV	3-31, 3-32

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:

B09WT5	B09WY3	9402L569
B09WT7	B09X01	

3.2 HOLDING TIMES

Analytical holding times for ammonia, nitrate-nitrogen, nitrite-nitrogen, chloride, fluoride, nitrate-nitrite, 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 ammonia-nitrogen, chloride, fluoride, NO₃NO₂ and sulfate and TOC; seven days for sulfide; and 48 hours for phosphate, nitrate-nitrogen and nitrite-nitrogen.

The 48-hour holding time for phosphate was grossly exceeded and the associated results were flagged "UR" in the following samples:

- Sample numbers B09WV7, B09WZ3, B09X21 and B09X23 in SDG No. B09WT7.
- Sample numbers B09X13, B09X15 and B09X17 in SDG No. B09WY3.
- Sample numbers B09X01, B09X03 and B09X19 in SDG No. B09X01.
- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

The 48-hour holding time for nitrate-nitrogen was grossly exceeded and the associated results were flagged "J" in the following samples:

- Sample numbers B09WV7, B09WZ3, B09X21 and B09X23 in SDG No. B09WT7.
- Sample numbers B09X01, B09X03 and B09X19 in SDG No. B09X01.
- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

The 48-hour holding time for nitrate-nitrogen was grossly exceeded and the associated results were flagged "UR" in the following samples:

- Sample numbers B09X13, B09X15 and B09X17 in SDG No. B09WY3.

The 48-hour holding time for nitrite-nitrogen was grossly exceeded and the associated results were flagged "J" in the following samples:

- Sample numbers B09WV7 and B09X23 in SDG No. B09WT7.
- Sample number B09X27 in SDG No. 9402L569.

The 48-hour holding time for nitrite-nitrogen was grossly exceeded and the associated results were flagged "UR" in the following samples:

- Sample numbers B09WZ3 and B09X21 in SDG No. B09WT7.
- Sample numbers B09X13, B09X15 and B09X17 in SDG No. B09WY3.
- Sample numbers B09X01, B09X03 and B09X19 in SDG No. B09X01.
- Sample number B09X25 in SDG No. 9402L569.

The seven-day holding time for sulfide was exceeded and the associated results were flagged "UJ" in the following samples:

- Sample numbers B09WZ3 and B09X21 in SDG No. B09WT7.

The seven-day holding time for sulfide was grossly exceeded and the associated results were flagged "UR" in the following samples:

- Sample numbers B09X25 and B09X27 in SDG No. 9402L569.

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, and 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 are qualified as non-detected "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).

ICV results obtained from the raw data were used to calculate LCS results. 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 most analyses. Holding times were exceeded for phosphate, nitrate-nitrogen, nitrite-nitrogen and sulfide in several samples. All associated results were flagged accordingly. Rejected results are not usable for any purpose and should not be reported. Estimated results are usable for limited purposes. All other validated results are considered accurate within the standard error associated with the methods.

NV = Not Validated

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

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NV - Not Validated

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NV = Not Validated

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NV = Not Validated

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NV = Not Validated, DUP = Duplicate

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

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HOLDING TIME SUMMARY

SDG: B09WT7		REVIEWER: LM			DATE: 05/04/94		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	
B09WV7	Nitrate Nitrogen	02/08/94		02/25/94		2	J	
B09WZ3	Nitrate Nitrogen	02/03/94		02/25/94		2	J	
B09X21	Nitrate Nitrogen	02/03/94		02/25/94		2	J	
B09X23	Nitrate Nitrogen	02/08/94		02/25/94		2	J	
B09WV7	Nitrite Nitrogen	02/08/94		02/25/94		2	J	
B09WZ3	Nitrite Nitrogen	02/03/94		02/25/94		2	UR	
B09X21	Nitrite Nitrogen	02/03/94		02/25/94		2	UR	
B09X23	Nitrite Nitrogen	02/08/94		02/25/94		2	J	
B09WV7	Phosphate	02/08/94		02/25/94		2	UR	
B09WZ3	Phosphate	02/03/94		02/25/94		2	UR	
B09X21	Phosphate	02/03/94		02/25/94		2	UR	
B09X23	Phosphate	02/08/94		02/25/94		2	UR	
B09WZ3	Sulfide	02/03/94		02/11/94		7	UJ	
B09X21	Sulfide	02/03/94		02/11/94		7	UJ	

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[illegible]

3-14

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NV = Not Validated, DUP = Duplicate

[illegible]

NV - Not Validated

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HOLDING TIME SUMMARY

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

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NV = Not Validated, EB = Equipment Blank

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NV = Not Validated, EB = Equipment Blank

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HOLDING TIME SUMMARY

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

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NV = Not Validated, EB = Equipment Blank

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EB = Equipment Blank

HOLDING TIME SUMMARY

SDG: B09X01	REVIEWER: SC	DATE: 5/09/94	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
B09X01	Phosphate	02/11/94		03/09/94		2	UR
B09X03	Phosphate	02/11/94		03/09/94		2	UR
B09X19	Phosphate	02/11/94		03/09/94		2	UR
B09X01	Nitrate Nitrogen	02/11/94		03/09/94		2	J
B09X03	Nitrate Nitrogen	02/11/94		03/09/94		2	J
B09X19	Nitrate Nitrogen	02/11/94		03/09/94		2	J
B09X01	Nitrite Nitrogen	02/11/94		03/09/94		2	UR
B09X03	Nitrite Nitrogen	02/11/94		03/09/94		2	UR
B09X19	Nitrite Nitrogen	02/11/94		03/09/94		2	UR

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EB = Equipment Blank

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HOLDING TIME SUMMARY

SDG: 9402L569		REVIEWER: SC		DATE: 5/9/94		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
B09X25	Phosphate	02/03/94		02/19/94		2	UR
B09X27	Phosphate	02/08/94		02/22/94		2	UR
B09X25	Sulfide	02/03/94		02/23/94		7	UR
B09X27	Sulfide	02/08/94		02/23/94		7	UR
B09X25	Nitrate Nitrogen	02/03/94		02/19/94		2	J
B09X27	Nitrate Nitrogen	02/08/94		02/19/94		2	J
B09X25	Nitrite Nitrogen	02/03/94		02/19/94		2	UR
B09X27	Nitrite Nitrogen	02/08/94		02/22/94		2	J

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NV = Not Validated

[illegible]**NV – Not Validated**

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WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIO-CHEMISTRY
152-3	B09DK5	W	10/26/93	NV	6-11
	B09M28	W	11/15/93	NV	6-12
1-D2-5	B09WT5	W	01/29/94	V	6-4
1-D2-6	B09WT7	W	02/07/94	V	6-6
1-D5-12	B09WT9	W	01/29/94	V	6-4
1-D5-14	B09WV1	W	01/29/94	V	6-4
1-D5-15	B09WV3	W	02/10/94	V	6-6
1-D5-16	B09WV5	W	01/29/94	V	6-4
1-D5-17	B09WV7	W	02/08/94	V	6-6
	B09X23	W	02/08/94	V	6-7
	B09X27	W	02/08/94	V	6-10
1-D5-18	B09WV9	W	01/29/94	V	6-4
1-D5-19	B09WW1	W	01/29/94	V	6-4
1-D5-20	B09WW3	W	02/06/94	V	6-6
1-D8-3	B09WW5	W	01/30/94	V	6-4
1-D8-53	B09WW7	W	01/30/94	V	6-4
1-D8-54A	B09WW9	W	01/30/94	V	6-4
1-D9-54B	B09WX1	W	02/06/94	V	6-6
1-D8-55	B09WX3	W	01/30/94	V	6-4
1-H3-1	B09WX5	W	02/09/94	V	6-6
1-H4-10	B09WX7	W	02/10/94	V	6-6
1-H4-13	B09WX9	W	02/10/94	V	6-6
1-H4-15A	B09WY1	W	02/06/94	V	6-6
1-H4-16	B09WY3	W	02/01/94	V	6-8
1-H4-17	B09WY5	W	02/05/94	V	6-8
1-H4-45	B09WY7	W	02/05/94	V	6-8
1-H4-46	B09WY9	W	02/05/94	V	6-8
1-H4-47	B09WZ1	W	02/03/94	V	6-6

WELL AND SAMPLE INFORMATION					SAMPLE INFORMATION LOCATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIO- CHEMISTRY
1-H4-48	B09WZ3	W	02/03/94	V	6-7
	B09X21	W	02/03/94	V	6-7
	B09X25	W	02/03/94	V	6-10
1-H4-49	B09WZ5	W	02/08/94	V	6-7
1-H5-1	B09WZ7	W	01/31/94	V	6-5
1-H6-1	B09WZ9	W	01/31/94	V	6-5
6-96-43	B09X01	W	02/11/94	V	6-9
6-91-46	B09X03	W	02/11/94	V	6-9
6-93-48	B09X05	W	02/06/94	V	6-7
6-96-49	B09X07	W	02/07/94	V	6-7
6-97-43	B09X09	W	02/01/94	V	6-8
6-97-51A	B09X11	W	02/05/94	V	6-8
EB-1	B09X13	W	02/02/94	V	6-8
EB-2	B09X15	W	02/05/94	V	6-8
EB-3	B09X17	W	02/05/94	V	6-8
EB-4	B09X19	W	02/11/94	V	6-9

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:

B09WT5	B09WY3	42173
B09WT7	B09X01	

4.2 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.

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.

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 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.

Due to a LCS percent recovery of 132%, the gross alpha results for sample numbers B09WT7, B09WX1, B09WV7, B09WX7,

B09WW3, B09WZ1 and B09WZ5 in SDG No. B09WT7 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. 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.

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.

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.

The reported MDA value for the following sample was above the RDL:

- Gross alpha in sample number B09X27 in SDG No. 42173.

All other 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. Due to a high LCS percent recovery, the gross alpha result in sample numbers B09WT7, B09WX1, B09WV7, B09WX7, B09WW3, B09WZ1 and B09WZ5 in SDG No. B09WT7 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.

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:

B09WT5	B09WY3	42173
B09WT7	B09X01	

5.2 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.

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

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

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. 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.

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. All results are 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:

B09WT5	B09WY3	42173
B09WT7	B09X01	

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.

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. 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.

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 remaining unchanged, depending on the activity of the individual sample.

Due to the lack of a matrix spike sample, all tritium results (except blanks, splits or duplicates) in all data packages, except SDG No. 42173, were qualified as estimates and flagged "J".

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.

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.

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 the lack of a matrix spike analysis, all tritium results (except blanks, splits, or duplicates) in all data packages, except SDG No. 42173, were qualified as estimates and flagged "J". Estimated data are considered usable for limited purposes only. All other QC results were acceptable and usable for all purposes.

[illegible]

[illegible]

[illegible]

WHC-SD-EN-TI-267, Rev. 0

DUP = Duplicate

DUP = Duplicate

[illegible]

EB = Equipment Blank

[illegible]

EB = Equipment Blank

[illegible]

[illegible]

6-11

NV = Not Validated

6-12

7.0 REFERENCES

- EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.
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- WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.
- WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.
- ATK, Letter from J.W. Goode to K.N. Pool, re: Revision to Radiochemical Data Validation Procedures, March 17, 1994.

DATE

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8/24/94

END