

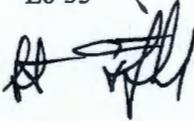
RECEIVED SEPTEMBER 2, 2008

Fluor Hanford  
 WSCF Analytical Lab  
 P.O. Box 1000  
 Richland, WA 99352  
 Telephone 373-7495  
 Telefax 372-0456

**FLUOR****Memorandum**

M4W41-SLF-08-934

To: H. Hampt E6-35 Date: September 2, 2008

From: S. L. Fitzgerald, Manager  
 WSCF Analytical Lab 

cc: w/Attachments

T. F. Dale	S3-30	P. D. Mix	S3-30
D. Felmy (PNNL)	K6-75	J. E. Trechter	S3-30
A. J. Kopriva	S3-30	S. J. Trent	E6-35
H. K. Meznarich	S3-30	File/LB	

Subject: FINAL RESULTS FOR SAMPLE DELIVERY GROUP WSCF20081572

Reference: 1) Letter of Instruction for Analytical Services for the Groundwater Performance Assessment Project and Analytical Laboratory Transition Plan, FH-0602422, September 19, 2006

2) HNF-SD-CD-QAPP-017, Rev. 9, Waste Sampling & Characterization Facility Quality Assurance Plan

This transmittal contains the following information for sample delivery group WSCF20081572:

- Cover Sheet (Attachment 1)
- Narrative (Attachment 2)
- Analytical Results (Attachment 3)
- Sample Receipt Information (Attachment 4)

SLF/grf

Attachments 4

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M4W41-SLF-08-934

ATTACHMENT 1

**COVER SHEET**

Consisting of 2 pages  
Including cover page

# WSCF SAF NUMBER CROSS REFERENCE

Group#: WSCF20081572  
Data Deliverable Date: 27-aug-2008  
Data Deliverable: Cover Sheet

SAF#	Sample ID	WSCF#	Matrix
I08-040	B1VK56	W08P003582	WATER
	B1VK57	W08P003586	WATER
	B1VK59	W08P003585	WATER
	B1VK60	W08P003589	WATER
	B1VK62	W08P003583	WATER
	B1VK63	W08P003587	WATER
	B1VK70	W08P003584	WATER
	B1VK71	W08P003588	WATER

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ATTACHMENT 2

**NARRATIVE**

Consisting of 3 pages  
Including cover page

### **Introduction**

Eight groundwater samples were received at the WSCF Laboratory on July 28, 2008. Samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 4) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 5.

It should be noted that the attached chain of custody was stamped “ICED” by the WSCF Laboratory Sample Custodian during sample receiving, indicating the presence of ice in the sample container.

### **Analytical Methodology for Requested Analyses**

Refer to *WSCF Method References Report*, pages 11 through 12, for a complete listing of approved analytical methods.

### **Inorganic Comments**

**Anions** – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group per GRP Letter of Instruction. See pages 25 through 26 for QC details. Analytical Note(s):

- Duplicate, Matrix Spike and Matrix Spike Duplicate were analyzed on sample# B1VK33 (SDG# 20081570).
- Sample results were D flagged if dilution(s) were required.
- Sample results that were less than the reportable limit, however greater than the method detection limit were B flagged.

All QC controls are within the established limits.

**ICP-AES Metals** – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group per the GRP Letter of Instruction. See pages 27 through 30 for QC details. Analytical Note(s):

- Matrix Spike and Matrix Spike Duplicate were analyzed on sample# B1VK38 (SDG# 20081570).

- Iron contamination detected in the Blank was evaluated and affected sample result was C flagged.
- Calcium, Magnesium and Sodium sample concentration exceeded spiking levels by a factor of 4. Spike recoveries are not valid. Check and high standards were analyzed to ensure Sodium and Calcium linearity because sample results are greater than the calibration standard. No flags issued.

All other QC controls are within the established limits.

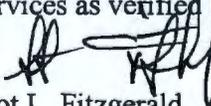
**Radiochemistry Comments**

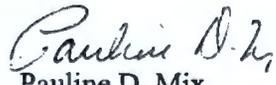
**Rad Chem** – There are no hold times associated with WSCF’s radiochemical methods. A Duplicate, Matrix Spike, Blank and Laboratory Control Sample were analyzed with this delivery group. See pages 36 through 38 for QC details. Analytical Note(s):

- Gross Alpha/Gross Beta – Duplicate QC was analyzed on sample# B1W238 (SDG# 20081513).
- Tritium – Duplicates and Matrix Spikes were analyzed on samples B1V8X1 (SDG# 20081487) and B1VK71 of this SDG.

All QC controls are within the established limits.

I certify that this data package is in compliance with the LOI, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager and Client Services as verified by the following signatures.

  
Scot L. Fitzgerald  
WSCF Analytical Laboratory Manager

  
Pauline D. Mix  
WSCF Client Services

M4W41-SLF-08-934

ATTACHMENT 3

**ANALYTICAL RESULTS**

Consisting of 32 pages  
Including cover page

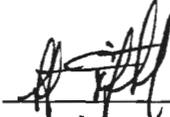
**WSCF**  
**ANALYTICAL RESULTS REPORT**

for

**GPAP**  
**Richland, WA 99352**

**Attention: Steve Trent E6-35**

Analytical:

 S. Fitzgerald 9/2/08

Client Services:

 P.D. Mix 9/2/2008

*All results are reported on an "as received" basis unless otherwise noted in the comment section.*

This information is intended for the use of the addressee only. If the reader of this report is not the intended recipient or is not authorized by the recipient to receive the report, you are hereby notified that any dissemination, distribution or copying of this report is strictly prohibited. If you have received this report in error, please notify WSCF Laboratory immediately by telephone at (509) 373-7020 or (509) 531-8004. Information designation of this report is the responsibility of the customer.

Report#: WSCF20081572  
Report Date: 2-sep-2008  
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GPAP

Page 1

Department: Inorganic

## W13q Worklist/Batch/QC Report for Group# WSCF20081572

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
37327	2	37755	42099	BLANK		Anions by Ion Chromatography
37327	16	37755	42099	BLANK		Anions by Ion Chromatography
37327	3	37755	42099	LCS		Anions by Ion Chromatography
37327	5	37755	42099	DUP	W08P003577	Anions by Ion Chromatography
37327	6	37755	42099	MS	W08P003577	Anions by Ion Chromatography
37327	7	37755	42099	MSD	W08P003577	Anions by Ion Chromatography
37327	7	37755	42099	SPK-RPD	W08P003577	Anions by Ion Chromatography
37327	12	37755	42099	SAMPLE	W08P003586	Anions by Ion Chromatography
37327	13	37755	42099	SAMPLE	W08P003587	Anions by Ion Chromatography
37327	14	37755	42099	SAMPLE	W08P003588	Anions by Ion Chromatography
37327	15	37755	42099	SAMPLE	W08P003589	Anions by Ion Chromatography
37786	1	38111	42637	BLANK		ICP Metals Analysis, Grd H20 P
37786	2	38111	42637	LCS		ICP Metals Analysis, Grd H20 P
37786	4	38111	42637	MS	W08P003572	ICP Metals Analysis, Grd H20 P
37786	5	38111	42637	MSD	W08P003572	ICP Metals Analysis, Grd H20 P
37786	5	38111	42637	SPK-RPD	W08P003572	ICP Metals Analysis, Grd H20 P
37786	11	38111	42637	SAMPLE	W08P003582	ICP Metals Analysis, Grd H20 P
37786	12	38111	42637	SAMPLE	W08P003583	ICP Metals Analysis, Grd H20 P
37786	13	38111	42637	SAMPLE	W08P003584	ICP Metals Analysis, Grd H20 P
37786	14	38111	42637	SAMPLE	W08P003585	ICP Metals Analysis, Grd H20 P
37786	15	38111	42637	SAMPLE	W08P003586	ICP Metals Analysis, Grd H20 P
37786	16	38111	42637	SAMPLE	W08P003587	ICP Metals Analysis, Grd H20 P
37786	17	38111	42637	SAMPLE	W08P003588	ICP Metals Analysis, Grd H20 P
37786	18	38111	42637	SAMPLE	W08P003589	ICP Metals Analysis, Grd H20 P

Department: Radiochemistry

## W13q Worklist/Batch/QC Report for Group# WSCF20081572

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
37364	1	37791	42176	BLANK		Tritium by Liq Sct column prep
37364	2	37791	42176	LCS		Tritium by Liq Sct column prep
37364	4	37791	42176	DUP	W08P003588	Tritium by Liq Sct column prep
37364	3	37791	42176	MS	W08P003588	Tritium by Liq Sct column prep
37364	5	37791	42176	SAMPLE	W08P003588	Tritium by Liq Sct column prep
37364	6	37791	42176	SAMPLE	W08P003589	Tritium by Liq Sct column prep
37363	1	37790	42250	BLANK		Tritium by Liq Sct column prep
37363	2	37790	42250	LCS		Tritium by Liq Sct column prep
37363	3	37790	42250	DUP	W08P003543	Tritium by Liq Sct column prep
37363	4	37790	42250	MS	W08P003543	Tritium by Liq Sct column prep
37363	15	37790	42250	SAMPLE	W08P003586	Tritium by Liq Sct column prep
37363	16	37790	42250	SAMPLE	W08P003587	Tritium by Liq Sct column prep
37649	1	38080	42555	BLANK		Gross Alpha/Gross Beta (AB32)
37649	2	38080	42555	LCS		Gross Alpha/Gross Beta (AB32)
37649	3	38080	42555	DUP	W08P003551	Gross Alpha/Gross Beta (AB32)
37649	15	38080	42555	SAMPLE	W08P003586	Gross Alpha/Gross Beta (AB32)
37649	16	38080	42555	SAMPLE	W08P003587	Gross Alpha/Gross Beta (AB32)
37649	17	38080	42555	SAMPLE	W08P003588	Gross Alpha/Gross Beta (AB32)
37649	18	38080	42555	SAMPLE	W08P003589	Gross Alpha/Gross Beta (AB32)
37729	1	38163	42556	BLANK		Gross Alpha on Alpha Plateau
37729	2	38163	42556	LCS		Gross Alpha on Alpha Plateau
37729	3	38163	42556	DUP	W08P003551	Gross Alpha on Alpha Plateau
37729	15	38163	42556	SAMPLE	W08P003586	Gross Alpha on Alpha Plateau
37729	16	38163	42556	SAMPLE	W08P003587	Gross Alpha on Alpha Plateau
37729	17	38163	42556	SAMPLE	W08P003588	Gross Alpha on Alpha Plateau
37729	18	38163	42556	SAMPLE	W08P003589	Gross Alpha on Alpha Plateau

# WSCF

## METHOD REFERENCES REPORT

Department: Inorganic

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory or industry methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though the WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

<b>LA-505-411</b>	<b>LA-505-411: ELEMENTAL ANALYSIS BY INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPE</b> <b>HEIS 6010_METALS_ICP</b> Inductively Coupled Plasma-Atomic Emmission Spectrometry
<b>LA-533-410</b>	<b>LA-533-410: ANION ANALYSIS BY ION CHROMATOGRAPHY</b> <b>EPA-600/R-94-111 300.0</b> DETERMINATION OF INORGANIC ANIONS BY ION CHROMATOGRAPHY <b>HEIS 300.0_ANIONS_IC</b> Determination of Inorganic Anions by Ion Chromatography

Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at <http://www2.rl.gov/phmc/as-dol>.

Report Date: 2-sep-2008  
Report#: WSCF20081572  
Report WGPPM/5.2

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# WSCF

## METHOD REFERENCES REPORT

Department: Radiochemistry

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory or industry methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though the WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

<b>LA-508-415</b>	<b>LA-508-415: OPERATION OF THE PROTEAN 2-INCH ALPHA/BETA COUNTING SYSTEM FOR GROSS</b>
<b>HEIS ALPHA_GPC</b>	<b>GROSS ALPHA GPC</b>
<b>HEIS BETA_GPC</b>	<b>GROSS BETA GPC</b>
<b>HEIS SRTOT_SEP_PRECIP_GPC</b>	<b>Strontium 89/90</b>
<b>LA-508-421</b>	<b>LA-508-421: OPERATION OF THE TRI-CARB MODEL 2500TR LIQUID SCINTILLATION ANALYZER</b>
<b>HEIS ALPHA_LSC</b>	<b>A/B Liquid Scintillation</b>
<b>HEIS BETA_LSC</b>	<b>A/B Liquid Scintillation</b>
<b>HEIS TC99_3MDSK_LSC</b>	<b>TC99 by Liquid Scintillation</b>
<b>HEIS TRITIUM_EIE_LSC</b>	<b>Tritium Liquid Scintillation</b>

Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at <http://www2.rl.gov/phmc/as-dol>.

Report Date: 2-sep-2008  
Report#: WSCF20081572  
Report WGPPM/5.2

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-040  
**Sample #** W08P003582  
**Client ID:** B1VK56

PNNL-GPP  
 WSCF

**Matrix:** WATER

**Group #:** WSCF20081572  
**Department:** Inorganic  
**Sampled:** 07/28/08  
**Received:** 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
ICP Metals Analysis, Grd H2O P Prep											08/24/08
ICP Metals Analysis, Grd H2O P											
Iron	7439-89-6	LA-505-411	U	< 25.0	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		1.25e + 04	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		5.70e + 03	ug/L			1.00	1.7e + 02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		1.27e + 04	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		38.0	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411		41.6	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		6.48e + 04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		399	ug/L			1.00	4.0		08/28/08
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

GPAP

130144

# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-040  
**Sample #** W08P003583  
**Client ID:** B1VK62

**PNNL-GPP**  
**WSCF**

**Matrix:** WATER

**Group #:** WSCF20081572  
**Department:** Inorganic  
**Sampled:** 07/28/08  
**Received:** 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
ICP Metals Analysis, Grd H20 P Prep											
ICP Metals Analysis, Grd H20 P											
Iron	7439-89-8	LA-505-411	C	63.4	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		1.13e+04	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		5.50e+03	ug/L			1.00	1.7e+02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		2.02e+04	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		31.4	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411		59.9	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		4.94e+04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		320	ug/L			1.00	4.0		08/28/08
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

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C - The Analyte was found in the Associated Blank.(inorg)

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+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

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140144

# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-040  
**Sample #** W08P003584  
**Client ID:** B1VK70

**Group #:** WSCF20081572  
**Department:** Inorganic  
**Sampled:** 07/28/08  
**Received:** 07/28/08

PNNL-GPP  
WSCF

**Matrix:** WATER

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
ICP Metals Analysis, Grd H20 P Prep											
ICP Metals Analysis, Grd H20 P											
Iron	7439-89-6	LA-505-411	C	969	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		9.53e+03	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411		322	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		4.86e+03	ug/L			1.00	1.7e+02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		8.31e+03	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		79.9	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411	U	< 13.0	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		3.30e+04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		238	ug/L			1.00	4.0		08/28/08
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

† - Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

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+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

GPAP

150144

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003585

Client ID: B1VK59

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Inorganic

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
ICP Metals Analysis, Grd H2O P Prep											08/24/08
ICP Metals Analysis, Grd H2O P											
Iron	7439-89-6	LA-505-411	U	< 25.0	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		7.69e +03	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		4.15e +03	ug/L			1.00	1.7e +02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		6.49e +03	ug/L			1.00	51		08/28/08
Antimony	7440-38-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		44.2	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411		52.2	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		5.15e +04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		289	ug/L			1.00	4.0		08/28/08
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

MDL=Minimum Detection Limit

RQ=Result Qualifier

TP Err=Total Propagated Error

DF=Dilution Factor

\* - Indicates results that have NOT been validated;

B - The analyte < the RDL but >= the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

+ - Indicates more than six qualifier symbols

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# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003586

Client ID: B1VK57

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Inorganic

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Anions by Ion Chromatography</b>											
Fluoride	16984-48-8	LA-533-410	BD	0.120	mg/L			2.00	0.046		07/29/08
Chloride	16887-00-6	LA-533-410	D	24.6	mg/L			2.00	0.094		07/29/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		07/29/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	5.92	mg/L			2.00	0.024		07/29/08
Sulfate	14808-79-8	LA-533-410	D	92.9	mg/L			10.00	1.3		07/29/08
<b>ICP Metals Analysis, Grd H20 P Prep</b>											<b>08/24/08</b>
<b>ICP Metals Analysis, Grd H20 P</b>											
Iron	7439-89-6	LA-505-411	C	140	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		1.22e+04	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		5.50e+03	ug/L			1.00	1.7e+02		08/28/08
Silver	7440-22-4	LA-505-411		11.8	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		1.21e+04	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		39.1	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411		39.9	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		6.70e+04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		400	ug/L			1.00	4.0		08/28/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

- Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor (inorg)

C - The Analyte was found in the Associated Blank. (inorg)

U - Analyzed for but not detected above limiting criteria (inorg)

+ - Indicates more than six qualifier symbols

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GPAP

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0  
44

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003586

Client ID: B1VK57

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Inorganic

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

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# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003587

Client ID: B1VK63

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Inorganic

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Anions by Ion Chromatography</b>											
Fluoride	16984-48-8	LA-533-410	D	0.194	mg/L			2.00	0.046		07/29/08
Chloride	16887-00-6	LA-533-410	D	13.0	mg/L			2.00	0.094		07/29/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		07/29/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	5.81	mg/L			2.00	0.024		07/29/08
Sulfate	14808-79-8	LA-533-410	D	51.7	mg/L			2.00	0.26		07/29/08
<b>ICP Metals Analysis, Grd H20 P Prep</b>											<b>08/24/08</b>
<b>ICP Metals Analysis, Grd H20 P</b>											
Iron	7439-89-6	LA-505-411	C	103	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		1.14e+04	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411		7.00	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		5.69e+03	ug/L			1.00	1.7e+02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		2.12e+04	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		31.8	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411		53.1	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		4.65e+04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		314	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

+ - Indicates more than six qualifier symbols

190144

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GPAP

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003587

Client ID: B1VK63 PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Inorganic

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MIDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

GPAP

200744

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003588

Client ID: B1VK71

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Inorganic

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Anions by Ion Chromatography</b>											
Fluoride	16984-48-8	LA-533-410	D	0.282	mg/L			2.00	0.046		07/29/08
Chloride	16887-00-6	LA-533-410	D	4.03	mg/L			2.00	0.094		07/29/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		07/29/08
Nitrogen in Nitrate	NO3-N	LA-533-410	BD	0.0984	mg/L			2.00	0.024		07/29/08
Sulfate	14808-79-8	LA-533-410	D	33.5	mg/L			2.00	0.26		07/29/08
<b>ICP Metals Analysis, Grd H20 P Prep</b>											<b>08/24/08</b>
<b>ICP Metals Analysis, Grd H20 P</b>											
Iron	7439-89-8	LA-505-411		1.57e+03	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		1.02e+04	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411		351	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		5.38e+03	ug/L			1.00	1.7e+02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		9.26e+03	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		87.6	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411	U	< 13.0	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411	U	< 9.00	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		3.50e+04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		258	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

+ - Indicates more than six qualifier symbols

B - The analyte < the RDL but >= the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

Report WGPP/ver. 5.2

GPAP

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# WSCF ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-040  
**Sample #** W08P003588  
**Client ID:** B1VK71

PNNL-GPP  
 WSCF

**Matrix:** WATER

**Group #:** WSCF20081572  
**Department:** Inorganic  
**Sampled:** 07/28/08  
**Received:** 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated; + - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

GPAP

B - The analyte < the RDL but >= the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-040  
**Sample #** W08P003589  
**Client ID:** B1VK60

**Group #:** WSCF20081572  
**Department:** Inorganic  
**Sampled:** 07/28/08  
**Received:** 07/28/08

PNNL-GPP  
WSCF

**Matrix:** WATER

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Anions by Ion Chromatography</b>											
Fluoride	16984-48-8	LA-533-410	BD	0.0696	mg/L			2.00	0.046		07/29/08
Chloride	16887-00-6	LA-533-410	D	13.1	mg/L			2.00	0.094		07/29/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		07/29/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	4.08	mg/L			2.00	0.024		07/29/08
Sulfate	14808-79-8	LA-533-410	D	50.2	mg/L			2.00	0.26		07/29/08
<b>ICP Metals Analysis, Grd H20 P Prep</b>											08/24/08
<b>ICP Metals Analysis, Grd H20 P</b>											
Iron	7439-89-8	LA-505-411	U	< 25.0	ug/L			1.00	25		08/28/08
Magnesium	7439-95-4	LA-505-411		7.48e+03	ug/L			1.00	50		08/28/08
Manganese	7439-96-5	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Nickel	7440-02-0	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Potassium	7440-09-7	LA-505-411		4.30e+03	ug/L			1.00	1.7e+02		08/28/08
Silver	7440-22-4	LA-505-411	U	< 5.00	ug/L			1.00	5.0		08/28/08
Sodium	7440-23-5	LA-505-411		6.71e+03	ug/L			1.00	51		08/28/08
Antimony	7440-36-0	LA-505-411	U	< 56.0	ug/L			1.00	56		08/28/08
Barium	7440-39-3	LA-505-411		43.4	ug/L			1.00	4.0		08/28/08
Cadmium	7440-43-9	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Chromium	7440-47-3	LA-505-411		47.6	ug/L			1.00	13		08/28/08
Cobalt	7440-48-4	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08
Copper	7440-50-8	LA-505-411	U	< 6.00	ug/L			1.00	6.0		08/28/08
Vanadium	7440-62-2	LA-505-411	U	< 12.0	ug/L			1.00	12		08/28/08
Zinc	7440-66-6	LA-505-411		11.3	ug/L			1.00	9.0		08/28/08
Calcium	7440-70-2	LA-505-411		4.85e+04	ug/L			1.00	73		08/28/08
Strontium	7440-24-6	LA-505-411		286	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

+ - Indicates more than six qualifier symbols

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank. (inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

Report WGPP/ver. 5.2

GPAP

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35

**SAF Number:** I08-040

**Sample #** W08P003589

**Client ID:** B1VK60

PNNL-GPP  
WSCF

**Matrix:** WATER

**Group #:** WSCF20081572

**Department:** Inorganic

**Sampled:** 07/28/08

**Received:** 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Beryllium	7440-41-7	LA-505-411	U	< 4.00	ug/L			1.00	4.0		08/28/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

GPAP

240144

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: Anions by Ion Chromatography

Sample Date: 07/28/08  
 Receive Date: 07/28/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P003577</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Chloride	16887-00-6	4.9129		RPD			0.302	20.000		07/29/08
DUP	Fluoride	16984-48-8	4.69e-2		RPD			n/a	20.000		07/29/08
DUP	Nitrogen in Nitrite	NO2-N	<2.56e-2		RPD			n/a	20.000	U	07/29/08
DUP	Nitrogen in Nitrate	NO3-N	1.6172		RPD			0.770	20.000		07/29/08
DUP	Sulfate	14808-79-8	24.9032		RPD			0.459	20.000		07/29/08
MS	Chloride	16887-00-6	0.92705	93.171	% Recov	80.000	120.000				07/29/08
MS	Fluoride	16984-48-8	0.48935	99.260	% Recov	80.000	120.000				07/29/08
MS	Nitrogen in Nitrite	NO2-N	0.4456	90.569	% Recov	80.000	120.000				07/29/08
MS	Nitrogen in Nitrate	NO3-N	0.42465	95.213	% Recov	80.000	120.000				07/29/08
MS	Sulfate	14808-79-8	1.9045	97.168	% Recov	80.000	120.000				07/29/08
MSD	Chloride	16887-00-6	1.0253	103.045	% Recov	80.000	120.000				07/29/08
MSD	Fluoride	16984-48-8	0.5009	101.602	% Recov	80.000	120.000				07/29/08
MSD	Nitrogen in Nitrite	NO2-N	0.47455	96.453	% Recov	80.000	120.000				07/29/08
MSD	Nitrogen in Nitrate	NO3-N	0.4635	103.924	% Recov	80.000	120.000				07/29/08
MSD	Sulfate	14808-79-8	2.02955	103.548	% Recov	80.000	120.000				07/29/08
SPK-RPD	Chloride	16887-00-6	103.045		RPD			10.084	20.000		07/29/08
SPK-RPD	Fluoride	16984-48-8	101.602		RPD			2.332	20.000		07/29/08
SPK-RPD	Nitrogen in Nitrite	NO2-N	96.453		RPD			6.292	20.000		07/29/08
SPK-RPD	Nitrogen in Nitrate	NO3-N	103.924		RPD			8.749	20.000		07/29/08
SPK-RPD	Sulfate	14808-79-8	103.548		RPD			6.357	20.000		07/29/08
<b>BATCH QC</b>											
BLANK	Chloride	16887-00-6	<4.69e-2	n/a	mg/L	0.000	0.030			U	07/29/08
BLANK	Chloride	16887-00-6	<4.69e-2	n/a	mg/L	0.000	0.030			U	07/29/08
BLANK	Fluoride	16984-48-8	<2.32e-2	n/a	mg/L	0.000	0.030			U	07/29/08
BLANK	Fluoride	16984-48-8	<2.32e-2	n/a	mg/L	0.000	0.030			U	07/29/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: Anions by Ion Chromatography

Sample Date:  
 Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
BLANK	Nitrogen in Nitrite	NO2-N	<1.28e-2	n/a	mg/L	0.000	0.020			U	07/29/08
BLANK	Nitrogen in Nitrite	NO2-N	<1.28e-2	n/a	mg/L	0.000	0.020			U	07/29/08
BLANK	Nitrogen in Nitrate	NO3-N	<1.21e-2	n/a	mg/L	0.000	0.040			U	07/29/08
BLANK	Nitrogen in Nitrate	NO3-N	<1.21e-2	n/a	mg/L	0.000	0.040			U	07/29/08
BLANK	Sulfate	14808-79-8	<0.132	n/a	mg/L	0.000	0.200			U	07/29/08
BLANK	Sulfate	14808-79-8	<0.132	n/a	mg/L	0.000	0.200			U	07/29/08
LCS	Chloride	16887-00-6	198.2942	98.654	% Recov	80.000	120.000				07/29/08
LCS	Fluoride	16984-48-8	103.5292	103.945	% Recov	80.000	120.000				07/29/08
LCS	Nitrogen in Nitrite	NO2-N	100.9598	101.569	% Recov	80.000	120.000				07/29/08
LCS	Nitrogen in Nitrate	NO3-N	94.2158	104.568	% Recov	80.000	120.000				07/29/08
LCS	Sulfate	14808-79-8	392.4012	99.091	% Recov	80.000	120.000				07/29/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: ICP Metals Analysis, Grd H2O P

Sample Date: 07/28/08  
 Receive Date: 07/28/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P003572</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
MS	Silver	7440-22-4	998.2	99.820	% Recov	75.000	125.000				08/28/08
MS	Barium	7440-39-3	498	99.600	% Recov	75.000	125.000				08/28/08
MS	Beryllium	7440-41-7	524.1	104.820	% Recov	75.000	125.000				08/28/08
MS	Calcium	7440-70-2	-1000	-100.000	% Recov	75.000	125.000				08/28/08
MS	Cadmium	7440-43-9	1026	102.600	% Recov	75.000	125.000				08/28/08
MS	Cobalt	7440-48-4	1007	100.700	% Recov	75.000	125.000				08/28/08
MS	Chromium	7440-47-3	1014	101.400	% Recov	75.000	125.000				08/28/08
MS	Copper	7440-50-8	1002	100.200	% Recov	75.000	125.000				08/28/08
MS	Iron	7439-89-6	1012	101.200	% Recov	75.000	125.000				08/28/08
MS	Potassium	7440-09-7	10286	102.860	% Recov	75.000	125.000				08/28/08
MS	Magnesium	7439-95-4	460	46.000	% Recov	75.000	125.000				08/28/08
MS	Manganese	7439-96-5	1015	101.500	% Recov	75.000	125.000				08/28/08
MS	Sodium	7440-23-5	80	8.000	% Recov	75.000	125.000				08/28/08
MS	Nickel	7440-02-0	1006	100.600	% Recov	75.000	125.000				08/28/08
MS	Antimony	7440-36-0	1055	105.500	% Recov	75.000	125.000				08/28/08
MS	Strontium	7440-24-6	486.9	97.380	% Recov	75.000	125.000				08/28/08
MS	Vanadium	7440-62-2	1010	101.000	% Recov	75.000	125.000				08/28/08
MS	Zinc	7440-66-6	1015	101.500	% Recov	75.000	125.000				08/28/08
MSD	Silver	7440-22-4	970.1	97.010	% Recov	75.000	125.000				08/28/08
MSD	Barium	7440-39-3	480.4	96.080	% Recov	75.000	125.000				08/28/08
MSD	Beryllium	7440-41-7	513.6	102.720	% Recov	75.000	125.000				08/28/08
MSD	Calcium	7440-70-2	-800	-80.000	% Recov	75.000	125.000				08/28/08
MSD	Cadmium	7440-43-9	1006	100.600	% Recov	75.000	125.000				08/28/08
MSD	Cobalt	7440-48-4	1007	100.700	% Recov	75.000	125.000				08/28/08
MSD	Chromium	7440-47-3	1020	102.000	% Recov	75.000	125.000				08/28/08
MSD	Copper	7440-50-8	946.8	94.680	% Recov	75.000	125.000				08/28/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: ICP Metals Analysis, Grd H2O P

Sample Date: 07/28/08  
 Receive Date: 07/28/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
MSD	Iron	7439-89-6	994.7	99.470	% Recov	75.000	125.000				08/28/08
MSD	Potassium	7440-09-7	9296	92.960	% Recov	75.000	125.000				08/28/08
MSD	Magnesium	7439-95-4	-360	-36.000	% Recov	75.000	125.000				08/28/08
MSD	Manganese	7439-96-5	1013	101.300	% Recov	75.000	125.000				08/28/08
MSD	Sodium	7440-23-5	-2240	-224.000	% Recov	75.000	125.000				08/28/08
MSD	Nickel	7440-02-0	1004	100.400	% Recov	75.000	125.000				08/28/08
MSD	Antimony	7440-36-0	1001	100.100	% Recov	75.000	125.000				08/28/08
MSD	Strontium	7440-24-6	465	93.000	% Recov	75.000	125.000				08/28/08
MSD	Vanadium	7440-62-2	998.8	99.880	% Recov	75.000	125.000				08/28/08
MSD	Zinc	7440-66-6	988.2	98.820	% Recov	75.000	125.000				08/28/08
SPK-RPD	Silver	7440-22-4	97.010		RPD			2.855	20.000		08/28/08
SPK-RPD	Barium	7440-39-3	96.080		RPD			3.598	20.000		08/28/08
SPK-RPD	Beryllium	7440-41-7	102.720		RPD			2.024	20.000		08/28/08
SPK-RPD	Calcium	7440-70-2	-80.000		RPD			-22.222	20.000		08/28/08
SPK-RPD	Cadmium	7440-43-9	100.600		RPD			1.969	20.000		08/28/08
SPK-RPD	Cobalt	7440-48-4	100.700		RPD			0.000	20.000		08/28/08
SPK-RPD	Chromium	7440-47-3	102.000		RPD			0.590	20.000		08/28/08
SPK-RPD	Copper	7440-50-8	94.680		RPD			5.665	20.000		08/28/08
SPK-RPD	Iron	7439-89-6	99.470		RPD			1.724	20.000		08/28/08
SPK-RPD	Potassium	7440-09-7	92.960		RPD			10.111	20.000		08/28/08
SPK-RPD	Magnesium	7439-95-4	-36.000		RPD			1640.000	20.000		08/28/08
SPK-RPD	Manganese	7439-96-5	101.300		RPD			0.197	20.000		08/28/08
SPK-RPD	Sodium	7440-23-5	-224.000		RPD			-214.815	20.000		08/28/08
SPK-RPD	Nickel	7440-02-0	100.400		RPD			0.199	20.000		08/28/08
SPK-RPD	Antimony	7440-36-0	100.100		RPD			5.253	20.000		08/28/08
SPK-RPD	Strontium	7440-24-6	93.000		RPD			4.601	20.000		08/28/08
SPK-RPD	Vanadium	7440-62-2	99.880		RPD			1.115	20.000		08/28/08
SPK-RPD	Zinc	7440-66-6	98.820		RPD			2.676	20.000		08/28/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: ICP Metals Analysis, Grd H2O P

Sample Date:  
 Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>BATCH QC</b>											
BLANK	Silver	7440-22-4	<5	n/a	ug/L					U	08/28/08
BLANK	Barium	7440-39-3	<4	n/a	ug/L					U	08/28/08
BLANK	Beryllium	7440-41-7	<4	n/a	ug/L					U	08/28/08
BLANK	Calcium	7440-70-2	<73	n/a	ug/L					U	08/28/08
BLANK	Cadmium	7440-43-9	<4	n/a	ug/L					U	08/28/08
BLANK	Cobalt	7440-48-4	<4	n/a	ug/L					U	08/28/08
BLANK	Chromium	7440-47-3	<13	n/a	ug/L					U	08/28/08
BLANK	Copper	7440-50-8	<6	n/a	ug/L					U	08/28/08
BLANK	Iron	7439-89-6	66.5	66.500	ug/L						08/28/08
BLANK	Potassium	7440-09-7	<170	n/a	ug/L					U	08/28/08
BLANK	Magnesium	7439-95-4	<50	n/a	ug/L					U	08/28/08
BLANK	Manganese	7439-96-5	<4	n/a	ug/L					U	08/28/08
BLANK	Sodium	7440-23-5	<51	n/a	ug/L					U	08/28/08
BLANK	Nickel	7440-02-0	<4	n/a	ug/L					U	08/28/08
BLANK	Antimony	7440-36-0	<56	n/a	ug/L					U	08/28/08
BLANK	Strontium	7440-24-6	<4	n/a	ug/L					U	08/28/08
BLANK	Vanadium	7440-62-2	<12	n/a	ug/L					U	08/28/08
BLANK	Zinc	7440-66-6	<9	n/a	ug/L					U	08/28/08
LCS	Silver	7440-22-4	987.1	98.710	% Recov	80.000	120.000				08/28/08
LCS	Barium	7440-39-3	480.6	96.120	% Recov	80.000	120.000				08/28/08
LCS	Beryllium	7440-41-7	535.5	107.100	% Recov	80.000	120.000				08/28/08
LCS	Calcium	7440-70-2	1037	103.700	% Recov	80.000	120.000				08/28/08
LCS	Cadmium	7440-43-9	1045	104.500	% Recov	80.000	120.000				08/28/08
LCS	Cobalt	7440-48-4	1043	104.300	% Recov	80.000	120.000				08/28/08
LCS	Chromium	7440-47-3	1029	102.900	% Recov	80.000	120.000				08/28/08
LCS	Copper	7440-50-8	982.1	98.210	% Recov	80.000	120.000				08/28/08
LCS	Iron	7439-89-6	1019	101.900	% Recov	80.000	120.000				08/28/08
LCS	Potassium	7440-09-7	10160	101.600	% Recov	80.000	120.000				08/28/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: ICP Metals Analysis, Grd H2O P

Sample Date:  
 Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
LCS	Magnesium	7439-95-4	971.1	97.110	% Recov	80.000	120.000				08/28/08
LCS	Manganese	7439-96-5	1024	102.400	% Recov	80.000	120.000				08/28/08
LCS	Sodium	7440-23-5	995.9	99.590	% Recov	80.000	120.000				08/28/08
LCS	Nickel	7440-02-0	1050	105.000	% Recov	80.000	120.000				08/28/08
LCS	Antimony	7440-36-0	1082	108.200	% Recov	80.000	120.000				08/28/08
LCS	Strontium	7440-24-6	485.1	97.020	% Recov	80.000	120.000				08/28/08
LCS	Vanadium	7440-62-2	1011	101.100	% Recov	80.000	120.000				08/28/08
LCS	Zinc	7440-66-6	1025	102.500	% Recov	80.000	120.000				08/28/08

# WSCF ANALYTICAL COMMENT REPORT

Attention: Steve Trent E6-35

Group #: WSCF20081572  
Department: Inorganic

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		ICP-AES: [Samples W08P3582-3589] High iron preparation blank result; "C" flag if applicable. No zirconium present in the LCS standard. Magnesium, sodium, and calcium sample results exceed spiking level by a factor of 4 so spike recoveries are not valid. Check standard used to ensure magnesium, sodium, and calcium linearity because sample results are greater than the calibration standard.

Lab Areas: VALGROUP - Group Validation  
LOGSAMP - Login for Sample

VALTEST - Test Validation  
LOGTEST - Login for Tests

TESTDATA - Test Data Entry

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# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003586

Client ID: B1VK57 PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Radiochemistry

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha on Alpha Plateau</b>											
Gross alpha on alpha plateau	12587-46-1	LA-508-415	U	0.850	pCi/L	+ -1.05	pCi/L	1.00	1.7		08/22/08
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		6.50	pCi/L	+ -1.50	pCi/L	1.00	1.7		08/19/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		2.10e +03	pCi/L	+ -482	pCi/L	1.00	2.2e +02		08/04/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor (inorg)

C - The Analyte was found in the Associated Blank. (inorg)

U - Analyzed for but not detected above limiting criteria (inorg)

32 - Indicates results that have NOT been validated; + - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

GPAP

44

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003587

Client ID: B1VK63

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Radiochemistry

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha on Alpha Plateau</b>											
Gross alpha on alpha plateau	12587-46-1	LA-508-415		2.00	pCi/L	+ -1.26	pCi/L	1.00	1.7		08/22/08
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		8.90	pCi/L	+ -1.69	pCi/L	1.00	1.7		08/19/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		2.60e +03	pCi/L	+ -572	pCi/L	1.00	2.2e +02		08/04/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

\* - Indicates results that have NOT been validated;

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor (inorg)

C - The Analyte was found in the Associated Blank. (inorg)

U - Analyzed for but not detected above limiting criteria (inorg)

+ - Indicates more than six qualifier symbols

330144

Report WGPP/ver. 5.2

GPAP

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003588

Client ID: B1VK71

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Radiochemistry

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha on Alpha Plateau</b>											
Gross alpha on alpha plateau	12587-46-1	LA-508-415	U	1.00	pCi/L	+ -0.860	pCi/L	1.00	1.4		08/22/08
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		7.60	pCi/L	+ -1.52	pCi/L	1.00	1.6		08/19/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421	U	-240	pCi/L	+ -240	pCi/L	1.00	2.4e +02		08/01/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

- Indicates results that have NOT been validated;

+ - Indicates more than six qualifier symbols

B - The analyte < the RDL but >= the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

C - The Analyte was found in the Associated Blank.(inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

Report WGPP/ver. 5.2

GPAP

340144

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-040

Sample # W08P003589

Client ID: B1VK60

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081572

Department: Radiochemistry

Sampled: 07/28/08

Received: 07/28/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha on Alpha Plateau</b>											
Gross alpha on alpha plateau	12587-48-1	LA-508-415	U	0.910	pCi/L	+ -0.956	pCi/L	1.00	1.5		08/22/08
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		4.80	pCi/L	+ -1.30	pCi/L	1.00	1.8		08/19/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		1.30e +03	pCi/L	+ -312	pCi/L	1.00	2.4e +02		08/01/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

35 - Indicates results that have NOT been validated;

01 - Report WGPP/ver. 5.2

44 - GPAP

B - The analyte < the RDL but > = the IDL/MDL (inorg)

D - Analyte was identified at a secondary dilution factor (inorg)

+ - Indicates more than six qualifier symbols

C - The Analyte was found in the Associated Blank. (inorg)

U - Analyzed for but not detected above limiting criteria (inorg)

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: Gross Alpha on Alpha Plateau

Sample Date: 07/21/08  
 Receive Date: 07/21/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P003551</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Gross alpha on alpha plateau	12587-46-1	1.8		RPD			0.000	20.000		08/22/08
<b>BATCH QC</b>											
BLANK	Gross alpha on alpha plateau	12587-46-1-ap	U-2.7E-01	n/a	pCi/L	-100.000	100.000				08/22/08
LCS	Gross alpha on alpha plateau	12587-46-1-ap	32.4	83.634	% Recov	80.000	120.000				08/22/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: Gross Alpha/Gross Beta (AB32)

Sample Date: 07/21/08  
 Receive Date: 07/21/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
Lab ID: W08P003551 BATCH QC ASSOCIATED WITH SAMPLE											
DUP	Gross beta	12587-47-2	1.3e +01		RPD			16.667	20.000		08/19/08
BATCH QC											
BLANK	Gross beta	12587-47-2	U2.7E-02	n/a	pCi/L	-10.000	10.000				08/19/08
LCS	Gross beta	12587-47-2	122	108.734	% Recov	80.000	120.000				08/19/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081572  
 Matrix: WATER  
 Test: Tritium by Liq Sct column prep

Sample Date: 07/28/08  
 Receive Date: 07/28/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P003588</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Tritium	10028-17-8	U-3.0E+02		RPD			n/a	20.000		08/01/08
MS	Tritium	10028-17-8	23838.0	92.718	% Recov	75.000	125.000				08/01/08
<b>BATCH QC</b>											
BLANK	Tritium	10028-17-8	U-2.4E+02	n/a	pCi/L	-10.000	1000.000				08/01/08
LCS	Tritium	10028-17-8	3130.0	91.845	% Recov	80.000	120.000				08/01/08
<b>Lab ID: W08P003543</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Tritium	10028-17-8	2.0E+03		RPD			0.000	20.000		08/04/08
MS	Tritium	10028-17-8	24510	95.318	% Recov	75.000	125.000				08/04/08
<b>BATCH QC</b>											
BLANK	Tritium	10028-17-8	U-2.7E+01	n/a	pCi/L	-10.000	1000.000				08/04/08
LCS	Tritium	10028-17-8	2870.0	84.204	% Recov	80.000	120.000				08/04/08

M4W41-SLF-08-934

ATTACHMENT 4

**SAMPLE RECEIPT INFORMATION**

Consisting of 6 pages  
Including cover page

**Waste Sampling and Characterization Facility**  
P.O. BOX 1970 S3-30, Richland, WA 99352  
PHONE: (509) 373-7004/FAX: (509) 373-7134

*File*

ACKNOWLEDGMENT OF SAMPLES RECEIVED

*08/27/08*  
*[Signature]*

GPAP

Richland, WA 99352  
Attn: Steve Trent E6-35

Customer Code: PNNL-GPP  
PO#: 122543  
Group#: 20081572

The following samples were received from you on 07/28/08. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Waste Sampling and Characterization Facility.

Sample#	Sample Id	Tests Scheduled	Matrix	Sample Date
W08P003582	B1VK56	PNNL-GPP @GPP6010	Water	07/28/08
W08P003583	B1VK62	PNNL-GPP @GPP6010	Water	07/28/08
W08P003584	B1VK70	PNNL-GPP @GPP6010	Water	07/28/08
W08P003585	B1VK59	PNNL-GPP @GPP6010	Water	07/28/08
W08P003586	B1VK57	PNNL-GPP @AB-32 @ALPHA	Water	07/28/08
W08P003587	B1VK63	PNNL-GPP @AB-32 @ALPHA @GPP6010 @H3-33 @IC-30	Water	07/28/08
W08P003588	B1VK71	PNNL-GPP @AB-32 @ALPHA @GPP6010 @H3-33 @IC-30	Water	07/28/08
W08P003589	B1VK60	PNNL-GPP @AB-32 @ALPHA @GPP6010 @H3-33 @IC-30	Water	07/28/08

Test Acronym Description

Test Acronym	Description
@AB-32	Gross Alpha/Gross Beta (AB32)
@ALPHA	Gross Alpha on Alpha Plateau
@GPP6010	ICP Metals Analysis, Grd H2O P
@H3-33	Tritium by Liq Sct column prep
@IC-30	Anions by Ion Chromatography







