

RECEIVED OCTOBER 13, 2008

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**FLUOR****Memorandum**

M4W41-SLF-08-1139

To: H. Hampt E6-35 Date: October 10, 2008

From: S. L. Fitzgerald, Manager  
 WSCF Analytical Lab *Robin Hampt for SLF*

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 WSCF20081971

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 WSCF20081971:

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

SLF/cmj

Attachments 4

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**EDMC**

M4W41-SLF-08-1139

ATTACHMENT 1

**COVER SHEET**

Consisting of 2 pages  
Including cover page

# WSCF SAF NUMBER CROSS REFERENCE

Group#: WSCF20081971  
Data Deliverable Date: 10-oct-2008  
Data Deliverable: Cover Sheet

SAF#	Sample ID	WSCF#	Matrix
G08-009	B1WRH5	W08P004383	WATER
	B1WRK6	W08P004384	WATER
	B1WRK7	W08P004385	WATER
	B1WRL0	W08P004386	WATER
I08-058	B1WTJ1	W08P004387	WATER
	B1WTJ3	W08P004388	WATER
	B1WTK2	W08P004389	WATER
W08-009	B1X0D7	W08P004390	WATER
	B1X0D8	W08P004391	WATER
	B1X0D9	W08P004392	WATER
	B1X0F0	W08P004393	WATER
	B1X1X5	W08P004394	WATER
	B1X1X6	W08P004395	WATER
	B1X1X7	W08P004396	WATER
	B1X1X8	W08P004397	WATER

M4W41-SLF-08-1139

ATTACHMENT 2

**NARRATIVE**

Consisting of 3 pages  
Including cover page

### **Introduction**

Fifteen (15) groundwater samples were received at the WSCF Laboratory on September 11, 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 12-14 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 27-28 for QC details. Analytical Note(s):

- Sample results were D flagged if dilution(s) were required.

All QC controls are within the established limits.

**Total Alkalinity** – The hold time requirement for this analysis was met. A Duplicate and Laboratory Control Sample were analyzed with this delivery group per GRP Letter of Instruction. See page 29 for QC details. Analytical Note(s):

- Duplicates were analyzed on samples B1WPV2 (SDG# 20081927, SAF# F08-154) and B1WTK2 of this SDG.

All QC controls are within the established limits.

**Total Organic Carbon** – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Method Spike were analyzed with this delivery group per the GRP Letter of Instruction. See page 30 for QC details.

All QC controls are within the established limits.

**Total Organic Halides** – The hold time requirement for this analysis was 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 page 31 for QC details.

All QC controls are within the established limits.

**Organic Comments**

**TPHD-WA** – 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. See page 33 for QC details.

All 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 page 41-44 for QC details. Analytical Note(s):

- Gross Alpha/Gross Beta – Duplicate QC was analyzed on sample# B1W215 (SDG# 20081832). The Duplicate Relative Percent Difference (RPD) for Gross Alpha exceeded established laboratory limits due to low sample activity. No flag issued.
- Gross Beta – Duplicate QC was also analyzed on sample# B1WTJ1 of this SDG.
- Strontium-89/90 and 85 (tracer) – Due to spiking error the Blank (Sr-85) result and LCS recoveries are not valid. The Blank and LCS in this batch were inadvertently double spiked with the Sr-85 tracer. No flags issued.
- Tritium – Duplicate and Matrix Spike were analyzed on sample# B1WF00 (SDG# 20081816).

All other 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-08-1139

ATTACHMENT 3

**ANALYTICAL RESULTS**

Consisting of 39 pages  
Including cover page

**WSCF  
ANALYTICAL RESULTS REPORT**

for

**GPAP  
Richland, WA 99352**

**Attention: Steve Trent E6-35**

Analytical: M. Stauffer M. Stauffer 10/13/08  
Client Services: GPAP P.O. Mix 10/9/2008

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

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Report#: WSCF20081971  
Report Date: 8-oct-2008  
Report WGPP/ver. 5.2  
GPAP

Page 1

Department: Inorganic

## W13q Worklist/Batch/QC Report for Group# WSCF20081971

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
37975	2	38398	42804	BLANK		Anions by Ion Chromatography
37975	11	38398	42804	BLANK		Anions by Ion Chromatography
37975	3	38398	42804	LCS		Anions by Ion Chromatography
37975	5	38398	42804	DUP	W08P004383	Anions by Ion Chromatography
37975	6	38398	42804	MS	W08P004383	Anions by Ion Chromatography
37975	7	38398	42804	MSD	W08P004383	Anions by Ion Chromatography
37975	4	38398	42804	SAMPLE	W08P004383	Anions by Ion Chromatography
37975	7	38398	42804	SPK-RPD	W08P004383	Anions by Ion Chromatography
37975	9	38398	42804	SAMPLE	W08P004387	Anions by Ion Chromatography
37975	8	38398	42804	SAMPLE	W08P004388	Anions by Ion Chromatography
37975	10	38398	42804	SAMPLE	W08P004389	Anions by Ion Chromatography
38055	1	38475	42892	BLANK		Total Organic Halides
38055	3	38475	42892	LCS		Total Organic Halides
38055	6	38475	42892	MS	W08P004390	Total Organic Halides
38055	7	38475	42892	MSD	W08P004390	Total Organic Halides
38055	5	38475	42892	SAMPLE	W08P004390	Total Organic Halides
38055	7	38475	42892	SPK-RPD	W08P004390	Total Organic Halides
38055	8	38475	42892	SAMPLE	W08P004391	Total Organic Halides
38055	9	38475	42892	SAMPLE	W08P004392	Total Organic Halides
38055	10	38475	42892	SAMPLE	W08P004393	Total Organic Halides
38070	1	38491	42908	LCS		Total Alkalinity as mg/L CaCO3
38070	13	38491	42908	LCS		Total Alkalinity as mg/L CaCO3
38070	25	38491	42908	LCS		Total Alkalinity as mg/L CaCO3
38070	32	38491	42908	LCS		Total Alkalinity as mg/L CaCO3
38070	3	38491	42908	DUP	W08GR03628	Total Alkalinity as mg/L CaCO3
38070	10	38491	42908	SAMPLE	W08P004383	Total Alkalinity as mg/L CaCO3
38070	11	38491	42908	SAMPLE	W08P004387	Total Alkalinity as mg/L CaCO3
38070	12	38491	42908	SAMPLE	W08P004388	Total Alkalinity as mg/L CaCO3
38070	15	38491	42908	DUP	W08P004389	Total Alkalinity as mg/L CaCO3
38070	14	38491	42908	SAMPLE	W08P004389	Total Alkalinity as mg/L CaCO3
38176	1	38600	43027	BLANK		Total Organic Carbon
38176	2	38600	43027	METHSPIKE		Total Organic Carbon
38176	3	38600	43027	SPK-RSD		Total Organic Carbon
38176	8	38600	43027	SAMPLE	W08P004394	Total Organic Carbon
38176	9	38600	43027	SAMPLE	W08P004395	Total Organic Carbon
38176	10	38600	43027	SAMPLE	W08P004396	Total Organic Carbon
38176	4	38600	43027	MS	W08P004397	Total Organic Carbon
38176	5	38600	43027	MSD	W08P004397	Total Organic Carbon
38176	7	38600	43027	SAMPLE	W08P004397	Total Organic Carbon
38176	5	38600	43027	SPK-RPD	W08P004397	Total Organic Carbon

Department: Organic

W13q Worklist/Batch/QC Report for Group# WSCF20081971

WL#	S#	Batch	QC#	Tray	Type	Sample#	Test
			43050	BLANK			NWTPH-D TPH Diesel Range (Wa)
			43050	LCS			NWTPH-D TPH Diesel Range (Wa)
			43050	MS		W08P004389	NWTPH-D TPH Diesel Range (Wa)
			43050	MSD		W08P004389	NWTPH-D TPH Diesel Range (Wa)
			43050	SAMPLE		W08P004389	NWTPH-D TPH Diesel Range (Wa)
			43050	SPK-RPD		W08P004389	NWTPH-D TPH Diesel Range (Wa)
			43050	SURR		W08P004389	NWTPH-D TPH Diesel Range (Wa)

Department: Radiochemistry

## W13q Worklist/Batch/QC Report for Group# WSCF20081971

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
38113	1	38534	42951	BLANK		Tritium by Liq Sct column prep
38113	4	38534	42951	LCS		Tritium by Liq Sct column prep
38113	3	38534	42951	DUP	W08P004188	Tritium by Liq Sct column prep
38113	2	38534	42951	MS	W08P004188	Tritium by Liq Sct column prep
38113	8	38534	42951	SAMPLE	W08P004383	Tritium by Liq Sct column prep
38113	9	38534	42951	SAMPLE	W08P004387	Tritium by Liq Sct column prep
38113	10	38534	42951	SAMPLE	W08P004388	Tritium by Liq Sct column prep
38113	11	38534	42951	SAMPLE	W08P004389	Tritium by Liq Sct column prep
38106	1	38527	43025	BLANK		Strontium 89/90
38106	2	38527	43025	LCS		Strontium 89/90
38106	3	38527	43025	DUP	W08P004383	Strontium 89/90
38106	4	38527	43025	SAMPLE	W08P004383	Strontium 89/90
38106	5	38527	43025	SURR	W08P004383	Strontium 89/90
38106	6	38527	43025	SAMPLE	W08P004384	Strontium 89/90
38106	7	38527	43025	SURR	W08P004384	Strontium 89/90
38106	8	38527	43025	SAMPLE	W08P004385	Strontium 89/90
38106	9	38527	43025	SURR	W08P004385	Strontium 89/90
38106	10	38527	43025	SAMPLE	W08P004386	Strontium 89/90
38106	11	38527	43025	SURR	W08P004386	Strontium 89/90
38229	1	38652	43069	BLANK		Gross Alpha on Alpha Plateau
38229	2	38652	43069	LCS		Gross Alpha on Alpha Plateau
38229	3	38652	43069	DUP	W08P004205	Gross Alpha on Alpha Plateau
38229	7	38652	43069	SAMPLE	W08P004383	Gross Alpha on Alpha Plateau
38250	1	38671	43096	BLANK		Gross Alpha/Gross Beta (AB32)
38250	2	38671	43096	LCS		Gross Alpha/Gross Beta (AB32)
38250	3	38671	43096	DUP	W08P004205	Gross Alpha/Gross Beta (AB32)
38250	6	38671	43096	SAMPLE	W08P004383	Gross Alpha/Gross Beta (AB32)
38313	1	38734	43191	BLANK		Gross Alpha/Gross Beta (AB32)
38313	2	38734	43191	LCS		Gross Alpha/Gross Beta (AB32)
38313	3	38734	43191	DUP	W08P004387	Gross Alpha/Gross Beta (AB32)
38313	4	38734	43191	SAMPLE	W08P004387	Gross Alpha/Gross Beta (AB32)
38313	5	38734	43191	SAMPLE	W08P004388	Gross Alpha/Gross Beta (AB32)
38313	6	38734	43191	SAMPLE	W08P004389	Gross Alpha/Gross Beta (AB32)

# 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-344-406</b>	<b>LA-344-406: TOTAL ORGANIC CARBON (TOC) BASED ON SW-846</b> EPA SW-846 9060 HEIS 9060_TOC	<b>TOTAL ORGANIC CARBON</b> Total Organic Carbon
<b>LA-523-444</b>	<b>LA-523-444: TOTAL ORGANIC HALIDES BASED ON SW-846 METHOD 9020B</b> EPA SW-846 9020B HEIS 9020_TOX	<b>TOTAL ORGANIC HALIDES (TOX)</b> Total Organic Halides based on SW846 Method 9020B
<b>LA-531-411</b>	<b>LA-531-411: ALKALINITY (TITRIMETRIC)</b> HEIS 2320B Standard Methods 2320B	<b>Alkalinity</b> Alkalinity
<b>LA-533-410</b>	<b>LA-533-410: ANION ANALYSIS BY ION CHROMATOGRAPHY</b> EPA-600/R-94-111 300.0 HEIS 300.0_ANIONS_IC	<b>DETERMINATION OF INORGANIC ANIONS BY ION CHROMATOGRAPHY</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>.

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# WSCF

## METHOD REFERENCES REPORT

Department: Organic

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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.

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<b>LA-523-493</b>	NWTPH-Diesel and/or Gasoline
<b>HEIS WTPH_DIESEL (HEIS)</b>	Total Petroleum Hydrocarbons in Diesel
<b>WDOE TPHD</b>	Total Petroleum Hydrocarbons in Diesel

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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>.

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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>	GROSS ALPHA GPC
<b>HEIS BETA_GPC</b>	GROSS BETA GPC
<b>HEIS SRTOT_SEP_PRECIP_GPC</b>	Protactinium 89/90
<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>	A/B Liquid Scintillation
<b>HEIS BETA_LSC</b>	A/B Liquid Scintillation
<b>HEIS TC99_3MDSK_LSC</b>	TC99 by Liquid Scintillation
<b>HEIS TRITIUM_EIE_LSC</b>	Tritium Liquid Scintillation

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>.

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# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: G08-009

Sample # W08P004383

Client ID: B1WRH5

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

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	DU	< 0.0464	mg/L			2.00	0.046		09/11/08
Chloride	16887-00-6	LA-533-410	D	13.7	mg/L			2.00	0.094		09/11/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		09/11/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	23.1	mg/L			10.00	0.12		09/11/08
Phosphate (P) by IC	PO4-P	LA-533-410	DU	< 0.121	mg/L			2.00	0.12		09/11/08
Sulfate	14808-79-8	LA-533-410	D	77.1	mg/L			10.00	1.3		09/11/08
<b>Total Alkalinity as mg/L CaCO3</b>											
Total Alkalinity as mg/L CaCO3	ALKALINITY	LA-531-411		66.0	mg/L			1.00	1.0		09/17/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

\* - Indicates results that have NOT been validated;

+ - Indicates more than six qualifier symbols

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# WSCF ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-058  
**Sample #** W08P004387  
**Client ID:** B1WTJ1

PNNL-GPP  
 WSCF

**Matrix:** WATER

**Group #:** WSCF20081971  
**Department:** Inorganic  
**Sampled:** 09/11/08  
**Received:** 09/11/08

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	DU	< 0.0464	mg/L			2.00	0.046		09/11/08
Chloride	16887-00-6	LA-533-410	D	9.32	mg/L			2.00	0.094		09/11/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		09/11/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	22.0	mg/L			10.00	0.12		09/11/08
Sulfate	14808-79-8	LA-533-410	D	62.4	mg/L			2.00	0.26		09/11/08
<b>Total Alkalinity as mg/L CaCO3</b>											
Total Alkalinity as mg/L CaCO3	ALKALINITY	LA-531-411		89.0	mg/L			1.00	1.0		09/17/08

**MDL=Minimum Detection Limit**  
**RQ=Result Qualifier**  
**TP Err=Total Propagated Error**  
**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor  
 U - Analyzed for but not detected above limiting criteria.(inorg)  
 U - Analyzed for but not detected above limiting criteria.(org)

D - Analyte was identified at a secondary dilution factor(inorg)  
 U - Analyzed for but not detected above limiting criteria.

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

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# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: I08-058

Sample # W08P004388

Client ID: B1WTJ3

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

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	DU	< 0.0464	mg/L			2.00	0.046		09/11/08
Chloride	16887-00-6	LA-533-410	D	9.43	mg/L			2.00	0.094		09/11/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		09/11/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	21.9	mg/L			10.00	0.12		09/11/08
Sulfate	14808-79-8	LA-533-410	D	63.1	mg/L			2.00	0.26		09/11/08
<b>Total Alkalinity as mg/L CaCO3</b>											
Total Alkalinity as mg/L CaCO3	ALKALINITY	LA-531-411		90.0	mg/L			1.00	1.0		09/17/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

\* - Indicates results that have NOT been validated;

+ - 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: I08-058

Sample # W08P004389

Client ID: B1WTK2

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

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	DU	< 0.0464	mg/L			2.00	0.046		09/11/08
Chloride	16887-00-6	LA-533-410	D	36.5	mg/L			2.00	0.094		09/11/08
Nitrogen in Nitrite	NO2-N	LA-533-410	DU	< 0.0256	mg/L			2.00	0.026		09/11/08
Nitrogen in Nitrate	NO3-N	LA-533-410	D	18.1	mg/L			10.00	0.12		09/11/08
Sulfate	14808-79-8	LA-533-410	D	152	mg/L			10.00	1.3		09/11/08
<b>Total Alkalinity as mg/L CaCO3</b>											
Total Alkalinity as mg/L CaCO3	ALKALINITY	LA-531-411		480	mg/L			1.00	1.0		09/17/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

\* - Indicates results that have NOT been validated;

+ - 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: W08-009

Sample # W08P004390

Client ID: B1X0D7 PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Total Organic Halides Prep											09/16/08
Total Organic Halides											
Total Organic Halides	59473-04-0	LA-523-444	U	< 5.00	ug/L			1.00	5.0		09/17/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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Report WGPP/ver. 5.2

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# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: W08-009

Sample # W08P004391

Client ID: B1X0D8 PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Total Organic Halides Prep											09/16/08
Total Organic Halides	59473-04-0	LA-523-444	U	< 5.00	ug/L			1.00	5.0		09/17/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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Report WGPP/ver. 5.2

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# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: W08-009

Sample # W08P004392

Client ID: B1X0D9

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Total Organic Halides Prep											09/16/08
Total Organic Halides											
Total Organic Halides	59473-04-0	LA-523-444	U	< 5.00	ug/L			1.00	5.0		09/17/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35

**SAF Number:** W08-009

**Sample #** W08P004393

**Client ID:** B1X0F0 PNNL-GPP  
WSCF

**Matrix:** WATER

**Group #:** WSCF20081971

**Department:** Inorganic

**Sampled:** 09/11/08

**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Total Organic Halides Prep											09/16/08
Total Organic Halides											
Total Organic Halides	59473-04-0	LA-523-444	U	< 5.00	ug/L			1.00	5.0		09/17/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

\* - Indicates results that have NOT been validated; + - 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:** W08-009  
**Sample #** W08P004394  
**Client ID:** B1X1X5 PNNL-GPP  
 WSCF

**Matrix:** WATER

**Group #:** WSCF20081971  
**Department:** Inorganic  
**Sampled:** 09/11/08  
**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Total organic carbon											
Total organic carbon	TOC	LA-344-406		1.56	mg/L			1.00	0.30		09/18/08

**MDL = Minimum Detection Limit**  
**RQ = Result Qualifier**  
**TP Err = Total Propagated Error**  
**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor  
 U - Analyzed for but not detected above limiting criteria.(inorg)  
 U - Analyzed for but not detected above limiting criteria.(org)

D - Analyte was identified at a secondary dilution factor(inorg)  
 U - Analyzed for but not detected above limiting criteria.

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

Report WGPP/ver. 5.2  
 GPAP

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: W08-009

Sample # W08P004395

Client ID: B1X1X6

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Inorganic

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
Total organic carbon											
Total organic carbon	TOC	LA-344-408		2.18	mg/L			1.00	0.30		09/18/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

\* - Indicates results that have NOT been validated; + - 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:** W08-009

**Sample #** W08P004396

**Client ID:** B1X1X7 PNNL-GPP  
WSCF

**Matrix:** WATER

**Group #:** WSCF20081971

**Department:** Inorganic

**Sampled:** 09/11/08

**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Total organic carbon</b>											
Total organic carbon	TOC	LA-344-406		1.89	mg/L			1.00	0.30		09/18/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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+ - Indicates more than six qualifier symbols

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** W08-009  
**Sample #** W08P004397  
**Client ID:** B1X1X8 PNNL-GPP  
 WSCF

**Matrix:** WATER

**Group #:** WSCF20081971  
**Department:** Inorganic  
**Sampled:** 09/11/08  
**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Total organic carbon</b>											
Total organic carbon	TOC	LA-344-406		1.75	mg/L			1.00	0.30		09/18/08

**MDL=Minimum Detection Limit**  
**RQ=Result Qualifier**  
**TP Err=Total Propagated Error**  
**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor  
 U - Analyzed for but not detected above limiting criteria.(inorg)  
 U - Analyzed for but not detected above limiting criteria.(org)

D - Analyte was identified at a secondary dilution factor(inorg)  
 U - Analyzed for but not detected above limiting criteria.

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

Report WGPP/ver. 5.2  
 GPAP

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Anions by Ion Chromatography

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004383</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Chloride	16887-00-6	13.7221		RPD			0.238	20.000		09/11/08
DUP	Fluoride	16984-48-8	< 4.64e-2		RPD			n/a	20.000	U	09/11/08
DUP	Nitrogen in Nitrite	NO2-N	< 2.56e-2		RPD			n/a	20.000	U	09/11/08
DUP	Nitrogen in Nitrate	NO3-N	23.0607		RPD			0.317	20.000		09/11/08
DUP	Phosphate (P) by IC	PO4-P	< 0.1212		RPD			n/a	20.000	U	09/11/08
DUP	Sulfate	14808-79-8	76.5373		RPD			0.775	20.000		09/11/08
MS	Chloride	16887-00-6	0.8544	85.869	% Recov	80.000	120.000				09/11/08
MS	Fluoride	16984-48-8	0.44605	90.477	% Recov	80.000	120.000				09/11/08
MS	Nitrogen in Nitrite	NO2-N	0.4897	99.533	% Recov	80.000	120.000				09/11/08
MS	Nitrogen in Nitrate	NO3-N	0.44799	100.446	% Recov	80.000	120.000				09/11/08
MS	Phosphate (P) by IC	PO4-P	0.9071	94.786	% Recov	80.000	120.000				09/11/08
MS	Sulfate	14808-79-8	2.04932	104.557	% Recov	80.000	120.000				09/11/08
MSD	Chloride	16887-00-6	0.82795	83.211	% Recov	80.000	120.000				09/11/08
MSD	Fluoride	16984-48-8	0.41065	83.296	% Recov	80.000	120.000				09/11/08
MSD	Nitrogen in Nitrite	NO2-N	0.4791	97.378	% Recov	80.000	120.000				09/11/08
MSD	Nitrogen in Nitrate	NO3-N	0.43716	98.018	% Recov	80.000	120.000				09/11/08
MSD	Phosphate (P) by IC	PO4-P	0.9089	94.974	% Recov	80.000	120.000				09/11/08
MSD	Sulfate	14808-79-8	1.96628	100.320	% Recov	80.000	120.000				09/11/08
SPK-RPD	Chloride	16887-00-6	83.211		RPD			3.144	20.000		09/11/08
SPK-RPD	Fluoride	16984-48-8	83.296		RPD			8.265	20.000		09/11/08
SPK-RPD	Nitrogen in Nitrite	NO2-N	97.378		RPD			2.189	20.000		09/11/08
SPK-RPD	Nitrogen in Nitrate	NO3-N	98.018		RPD			2.447	20.000		09/11/08
SPK-RPD	Phosphate (P) by IC	PO4-P	94.974		RPD			0.198	20.000		09/11/08
SPK-RPD	Sulfate	14808-79-8	100.320		RPD			4.136	20.000		09/11/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081971  
 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
<b>BATCH QC</b>											
BLANK	Chloride	16887-00-6	<4.69e-2	n/a	mg/L	0.000	0.030			U	09/11/08
BLANK	Chloride	16887-00-6	<4.69e-2	n/a	mg/L	0.000	0.030			U	09/11/08
BLANK	Fluoride	16984-48-8	<2.32e-2	n/e	mg/L	0.000	0.030			U	09/11/08
BLANK	Fluoride	16984-48-8	<2.32e-2	n/a	mg/L	0.000	0.030			U	09/11/08
BLANK	Nitrogen in Nitrite	NO2-N	<1.28e-2	n/a	mg/L	0.000	0.020			U	09/11/08
BLANK	Nitrogen in Nitrite	NO2-N	<1.28e-2	n/a	mg/L	0.000	0.020			U	09/11/08
BLANK	Nitrogen in Nitrate	NO3-N	<1.21e-2	n/a	mg/L	0.000	0.040			U	09/11/08
BLANK	Nitrogen in Nitrate	NO3-N	<1.21e-2	n/a	mg/L	0.000	0.040			U	09/11/08
BLANK	Phosphate (P) by IC	PO4-P	<6.06e-2	n/a	mg/L	0.000	0.200			U	09/11/08
BLANK	Phosphate (P) by IC	PO4-P	<6.06e-2	n/a	mg/L	0.000	0.200			U	09/11/08
BLANK	Sulfate	14808-79-8	<0.132	n/a	mg/L	0.000	0.200			U	09/11/08
BLANK	Sulfate	14808-79-8	<0.132	n/a	mg/L	0.000	0.200			U	09/11/08
LCS	Chloride	16887-00-6	198.6601	98.836	% Recov	80.000	120.000				09/11/08
LCS	Fluoride	16984-48-8	104.3248	104.744	% Recov	80.000	120.000				09/11/08
LCS	Nitrogen in Nitrite	NO2-N	97.8577	98.448	% Recov	80.000	120.000				09/11/08
LCS	Nitrogen in Nitrate	NO3-N	93.7385	104.038	% Recov	80.000	120.000				09/11/08
LCS	Phosphate (P) by IC	PO4-P	201.4745	104.175	% Recov	80.000	120.000				09/11/08
LCS	Sulfate	14808-79-8	407.2863	102.850	% Recov	80.000	120.000				09/11/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Total Alkalinity as mg/L CaCO3

Sample Date: 09/08/08  
 Receive Date: 09/08/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03628</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Total Alkalinity as mg/L CaCO3	ALKALINITY	<1		RPD			n/a	20.000	U	09/17/08
<b>Lab ID: W08P004389</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Total Alkalinity as mg/L CaCO3	ALKALINITY	471.8		RPD			0.844	20.000		09/17/08
<b>BATCH QC</b>											
LCS	Total Alkalinity as mg/L CaCO3	ALKALINITY	30.69	102.987	%Recover	80.000	120.000				09/17/08
LCS	Total Alkalinity as mg/L CaCO3	ALKALINITY	31.39	105.336	%Recover	80.000	120.000				09/17/08
LCS	Total Alkalinity as mg/L CaCO3	ALKALINITY	31.53	105.805	%Recover	80.000	120.000				09/17/08
LCS	Total Alkalinity as mg/L CaCO3	ALKALINITY	31.33	105.134	%Recover	80.000	120.000				09/17/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Total Organic Carbon

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004397</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
MS	Total Organic Carbon	TOC	2.088	104.400	% Recov	75.000	125.000				09/18/08
MSD	Total Organic Carbon	TOC	2.202	110.100	% Recov	75.000	125.000				09/18/08
SPK-RPD	Total Organic Carbon	TOC	110.100		RPD			5.315	20.000		09/18/08
<b>BATCH QC</b>											
BLANK	Total Organic Carbon	TOC	<0.045	n/a	mg/L	0.000	300.000			U	09/18/08
METHSPIKE	Total Organic Carbon	TOC	1.045	104.500	% Recov	80.000	120.000				09/18/08
SPK-RSD	Total Organic Carbon	TOC	0.5330	0.533	% RSD	0.000	20.000				09/18/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Total Organic Halides

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004390</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
MS	Total Organic Halides	TOX	44.0	110.000	% Recov	50.000	150.000				09/17/08
MSD	Total Organic Halides	TOX	43.5	108.750	% Recov	50.000	150.000				09/17/08
SPK-RPD	Total Organic Halides	TOX	108.750		RPD			1.143	20.000		09/17/08
<b>BATCH QC</b>											
BLANK	Total Organic Halides	TOX	<5	n/a	ug/L	0.000	300.000			U	09/17/08
LCS	Total Organic Halides	TOX	423	105.750	%rec	80.000	120.000				09/17/08

# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35

**SAF Number:** I08-058

**Sample #** W08P004389

**Client ID:** B1WTK2 PNNL-GPP  
WSCF

**Matrix:** WATER

**Group #:** WSCF20081971

**Department:** Organic

**Sampled:** 09/11/08

**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
NWTPH-D TPH Diesel Range (Wa) Prep											09/17/08
NWTPH-D TPH Diesel Range (Wa)											
Total Pet. Hydrocarbons Diesel	TPHDIESEL	LA-523-493	U	< 71.0	ug/L			1.00	71		09/25/08
Kerosene	TPHKEROSENE	LA-523-493	U	< 95.0	ug/L			1.00	95		09/25/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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# WSCF ANALYTICAL LABORATORY QC REPORT

Department: **Organic**

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: NWTPH-D TPH Diesel Range (Wa)

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004389</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
MS	ortho-Terphenyl	Surr	84-15-1	444.08	93.300	% Recov	70.000	130.000			09/25/08
MS	Total Pet. Hydrocarbons	Diesel	TPHDIESEL	2154.9	90.500	% Recov	75.000	125.000			09/25/08
MSD	ortho-Terphenyl	Surr	84-15-1	195.04	102.000	% Recov	70.000	130.000			09/25/08
MSD	Total Pet. Hydrocarbons	Diesel	TPHDIESEL	837.12	87.900	% Recov	75.000	125.000			09/25/08
SPK-RPD	ortho-Terphenyl	Surr	84-15-1	102.000		RPD			8.909	20.000	09/25/08
SPK-RPD	Total Pet. Hydrocarbons	Diesel	TPHDIESEL	87.900		RPD			2.915	20.000	09/25/08
SURR	ortho-Terphenyl	Surr	84-15-1	336.76	70.700	% Recov	70.000	130.000			09/25/08
<b>BATCH QC</b>											
BLANK	Kerosene		TPHKEROSENE	< 100	n/a	ug/L				U	09/25/08
BLANK	ortho-Terphenyl	Surr	84-15-1	411.46	82.300	% Recov	70.000	130.000			09/25/08
BLANK	Total Pet. Hydrocarbons	Diesel	TPHDIESEL	< 75	n/a	ug/L				U	09/25/08
LCS	ortho-Terphenyl	Surr	84-15-1	839.38	83.900	% Recov	70.000	130.000			09/25/08
LCS	Total Pet. Hydrocarbons	Diesel	TPHDIESEL	2007.8	80.300	% Recov	80.000	120.000			09/25/08

# WSCF ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** G08-009  
**Sample #** W08P004383  
**Client ID:** B1WRH5

**Group #:** WSCF20081971  
**Department:** Radiochemistry  
**Sampled:** 09/11/08  
**Received:** 09/11/08

**PNNL-GPP  
WSCF**

**Matrix: WATER**

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	0.970	pCi/L	+ -0.737	pCi/L	1.00	1.0		09/26/08
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		4.20e +03	pCi/L	+ -420	pCi/L	1.00	2.2		09/29/08
<b>Strontium 89/90</b>											
Strontium-89/90	SR-RAD	LA-508-415		1.90e +03	pCi/L	+ -228	pCi/L	1.00	1.0		09/22/08
Sr-85 Tracer by Beta Counting	SR85	LA-508-415		81.9	Percent			1.00	0.0		09/22/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		1.50e +04	pCi/L	+ -3.00e +03	pCi/L	1.00	2.4e +02		09/19/08

**MDL = Minimum Detection Limit**  
**RQ = Result Qualifier**  
**TP Err = Total Propagated Error**  
**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor  
 U - Analyzed for but not detected above limiting criteria.(inorg)  
 U - Analyzed for but not detected above limiting criteria.(org)

D - Analyte was identified at a secondary dilution factor(inorg)  
 U - Analyzed for but not detected above limiting criteria.

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

Report WGPP/ver. 5.2  
 GPAP

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# WSCF ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35

**SAF Number:** G08-009

**Sample #** W08P004384

**Client ID:** B1WRK6 PNNL-GPP  
WSCF

**Matrix:** WATER

**Group #:** WSCF20081971

**Department:** Radiochemistry

**Sampled:** 09/11/08

**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Strontium 89/90</b>											
Strontium-89/90	SR-RAD	LA-508-415		1.10e +03	pCi/L	+ -132	pCi/L	1.00	0.93		09/22/08
Sr-85 Tracer by Beta Counting	SR85	LA-508-415		92.4	Percent			1.00	0.0		09/22/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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

Report WGPP/ver. 5.2

GPAP

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# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent E6-35

SAF Number: G08-009

Sample # W08P004385

Client ID: B1WRK7

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Radiochemistry

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Strontium 89/90</b>											
Strontium-89/90	SR-RAD	LA-508-415		990	pCi/L	+ -119	pCi/L	1.00	0.94		09/22/08
Sr-85 Tracer by Beta Counting	SR85	LA-508-415		91.3	Percent			1.00	0.0		09/22/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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+ - 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: G08-009

Sample # W08P004386

Client ID: B1WRL0

PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Radiochemistry

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Strontium 89/90</b>											
Strontium-89/90	SR-RAD	LA-508-415		1.20e+03	pCi/L	+ -144	pCi/L	1.00	0.90		09/22/08
Sr-85 Tracer by Beta Counting	SR85	LA-508-415		96.2	Percent			1.00	0.0		09/22/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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+ - 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: I08-058

Sample # W08P004387

Client ID: B1WTJ1 PNNL-GPP  
WSCF

Matrix: WATER

Group #: WSCF20081971

Department: Radiochemistry

Sampled: 09/11/08

Received: 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		2.60e+03	pCi/L	+ -260	pCi/L	1.00	9.0		10/06/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		1.60e+04	pCi/L	+ -3.20e+03	pCi/L	1.00	2.4e+02		09/19/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35  
**SAF Number:** I08-058  
**Sample #** W08P004388  
**Client ID:** B1WTJ3

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

**Matrix:** WATER

**Group #:** WSCF20081971  
**Department:** Radiochemistry  
**Sampled:** 09/11/08  
**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		2.50e+03	pCi/L	+ -250	pCi/L	1.00	8.6		10/06/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		1.50e+04	pCi/L	+ -3.00e+03	pCi/L	1.00	2.4e+02		09/19/08

**MDL = Minimum Detection Limit**  
**RQ = Result Qualifier**  
**TP Err = Total Propagated Error**  
**DF = Dilution Factor**

D - Analyte was identified at a secondary dilution factor  
 U - Analyzed for but not detected above limiting criteria.(inorg)  
 U - Analyzed for but not detected above limiting criteria.(org)

D - Analyte was identified at a secondary dilution factor(inorg)  
 U - Analyzed for but not detected above limiting criteria.

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

Report WGPP/ver. 5.2  
 GPAP

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent E6-35

**SAF Number:** I08-058

**Sample #** W08P004389

**Client ID:** B1WTK2 PNNL-GPP  
WSCF

**Matrix:** WATER

**Group #:** WSCF20081971

**Department:** Radiochemistry

**Sampled:** 09/11/08

**Received:** 09/11/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Gross Alpha/Gross Beta (AB32)</b>											
Gross beta	12587-47-2	LA-508-415		2.30e +03	pCi/L	+ -230	pCi/L	1.00	16		10/06/08
<b>Tritium by Liq Sct column prep</b>											
Tritium	10028-17-8	LA-508-421		2.00e +03	pCi/L	+ -460	pCi/L	1.00	2.4e +02		09/19/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

D - Analyte was identified at a secondary dilution factor

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

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

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

U - Analyzed for but not detected above limiting criteria.

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+ - Indicates more than six qualifier symbols

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# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Gross Alpha on Alpha Plateau

Sample Date: 08/25/08  
 Receive Date: 08/25/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004205</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Gross alpha on alpha plateau	12587-46-1	5.2		RPD			44.706	20.000 •		09/26/08
<b>BATCH QC</b>											
BLANK	Gross alpha on alpha plateau	12587-46-1-ap	U-1.3E-01	n/a	pCi/L	-100.000	100.000				09/26/08
LCS	Gross alpha on alpha plateau	12587-46-1-ap	35.3	91.120	% Recov	80.000	120.000				09/26/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Gross Alpha/Gross Beta (AB32)

Sample Date: 08/25/08  
 Receive Date: 08/25/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004205</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Gross beta	12587-47-2	U2.4		RPD			n/a	20.000		09/29/08
<b>BATCH QC</b>											
BLANK	Gross beta	12587-47-2	U-1.7	n/a	pCi/L	-10.000	10.000				09/29/08
LCS	Gross beta	12587-47-2	121	107.843	% Recov	80.000	120.000				09/29/08
<b>Lab ID: W08P004387</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Gross beta	12587-47-2	2.7E+03		RPD			3.774	20.000		10/06/08
<b>BATCH QC</b>											
BLANK	Gross beta	12587-47-2	U8.7E-01	n/a	pCi/L	-10.000	10.000				10/06/08
LCS	Gross beta	12587-47-2	124	110.517	% Recov	80.000	120.000				10/06/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Strontium 89/90

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004383</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Sr-85 Tracer by Beta Counting	SR85	92.3	92.300	% Recov	30.000	105.000				09/22/08
DUP	Strontium-89/90	SR-RAD	2.0E+03		RPD			5.128	20.000		09/22/08
SURR	Sr-85 Tracer by Beta Counting	SR85	81.9	81.900	% Recov	30.000	105.000				09/22/08
<b>Lab ID: W08P004384</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
SURR	Sr-85 Tracer by Beta Counting	SR85	92.4	92.400	% Recov	30.000	105.000				09/22/08
<b>Lab ID: W08P004385</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
SURR	Sr-85 Tracer by Beta Counting	SR85	91.3	91.300	% Recov	30.000	105.000				09/22/08
<b>Lab ID: W08P004386</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
SURR	Sr-85 Tracer by Beta Counting	SR85	N/A	n/a	% Recov	30.000	105.000				09/22/08
<b>BATCH QC</b>											
BLANK	Sr-85 Tracer by Beta Counting	SR85	190.4	190.400	% Recov	30.000	105.000			*	09/22/08
BLANK	Strontium-89/90	10098-97-2	U-2.8	n/a	pCi/L	-10.000	100.000				09/22/08
LCS	Sr-85 Tracer by Beta Counting	SR85	178.5	178.500	% Recov	30.000	105.000			*	09/22/08
LCS	Strontium-89/90	10098-97-2	71.5	51.513	% Recov	80.000	120.000			*	09/22/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20081971  
 Matrix: WATER  
 Test: Tritium by Liq Sct column prep

Sample Date: 08/22/08  
 Receive Date: 08/25/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08P004188</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Tritium	10028-17-8	2.3E+04		RPD			0.000	20.000		09/19/08
MS	Tritium	10028-17-8	19600.0	87.300	% Recov	75.000	125.000				09/19/08
<b>BATCH QC</b>											
BLANK	Tritium	10028-17-8	U2.4E+01	n/a	pCi/L	-10.000	1000.000				09/19/08
LCS	Tritium	10028-17-8	2920.0	86.339	% Recov	80.000	120.000				09/19/08

# WSCF ANALYTICAL COMMENT REPORT

Attention: Steve Trent E6-35

Group #: WSCF20081971  
Department: Radiochemistry

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		<p>W08P004383/Sr89/90 LCS recovery is low due to the double spiking of the tracer Sr-85. The blank and LCS of this batch were double spiked with the Sr-85 tracer. Since all the other QC checks came out fine, this batch has been approved. Imh</p> <p>The duplicate is flagged for poor RPD but the sample activity is low level. RPD does not apply to low level samples. Imh</p>

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

VALTEST - Test Validation  
LOGTEST - Login for Tests

TESTDATA - Test Data Entry

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wgppc/5.2 Report#: WSCF20081971

Report Date: 8-oct-2008

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M4W41-SLF-08-1139

ATTACHMENT 4

**SAMPLE RECEIPT INFORMATION**

Consisting of 12 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*  
10/10/08  
*[Signature]*

ACKNOWLEDGMENT OF SAMPLES RECEIVED

GPAP

Richland, WA 99352  
Attn: Steve Trent E6-35

Customer Code: PNNL-GPP  
PO#: 122543  
Group#: 20081971

The following samples were received from you on 09/11/08. 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
W08P004383	B1WRH5	PNNL-GPP @AB-32 @ALPHA ALKALI	Water @H3-33 @IC-30 @SR89_90	09/11/08
W08P004384	B1WRK6	PNNL-GPP @SR89_90	Water	09/11/08
W08P004385	B1WRK7	PNNL-GPP @SR89_90	Water	09/11/08
W08P004386	B1WRL0	PNNL-GPP @SR89_90	Water	09/11/08
W08P004387	B1WTJ1	PNNL-GPP @AB-32 @H3-33	Water @IC-30	09/11/08
W08P004388	B1WTJ3	PNNL-GPP @AB-32 @H3-33	Water @IC-30	09/11/08
W08P004389	B1WTK2	PNNL-GPP @AB-32 @H3-33	Water @IC-30	09/11/08
W08P004390	B1X0D7	PNNL-GPP TOX	Water	09/11/08
W08P004391	B1X0D8	PNNL-GPP TOX	Water	09/11/08
W08P004392	B1X0D9	PNNL-GPP TOX	Water	09/11/08
W08P004393	B1X0F0	PNNL-GPP TOX	Water	09/11/08
W08P004394	B1X1X5	PNNL-GPP TOC-30	Water	09/11/08
W08P004395	B1X1X6	PNNL-GPP TOC-30	Water	09/11/08
W08P004396	B1X1X7	PNNL-GPP TOC-30	Water	09/11/08
W08P004397	B1X1X8	PNNL-GPP TOC-30	Water	09/11/08

Test Acronym Description

Test Acronym	Description
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GPAP

Richland, WA 99352  
Attn: Steve Trent E6-35

Customer Code: PNNL-GPP  
PO#: 122543  
Group#: 20081971

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Test Acronym Description

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Test Acronym	Description
@AB-32	Gross Alpha/Gross Beta (AB32)
@ALPHA	Gross Alpha on Alpha Plateau
@H3-33	Tritium by Liq Sct column prep
@IC-30	Anions by Ion Chromatography
@SR89_90	Strontium 89/90
@TPHD-WA	NWTPH-D TPH Diesel Range (Wa)
ALKALI	Total Alkalinity as mg/L CaCO3
TOC-30	Total Organic Carbon
TOX	Total Organic Halides

















FLUOR HANFORD

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

W08-009-435

Page 1 of 1

Collector <b>D. Woehle</b>	Contact/Requester Mike Neely	Telephone No. 509-373-0654	MSIN FAX
SAF No. W08-009	Sampling Origin Hanford Site	Purchase Order/Charge Code	
Project Title RCRA, SEPTEMBER 2008	<b>HNF N 506 19</b>	Ice Chest No. <b>609</b>	Temp.
Shipped To (Lab) Waste Sampling & Characterization	Method of Shipment Govt. Vehicle	Bill of Lading/Air Bill No.	
Protocol RCRA	Priority: 30 Days	<b>PRIORITY</b>	Offsite Property No.

**POSSIBLE SAMPLE HAZARDS/REMARKS**  
 \*\* \*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)

**SPECIAL INSTRUCTIONS** Hold Time  
 Site-Wide Generator Knowledge Form applies. Total Activity Exemption: Yes  No

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B1X1X5	4394	W	9-11-08	1024	1x250-mL aGs*	9060_TOC: TOC (1)	28 Days	HCl or H2SO4 to pH <2 Cool-4C
B1X1X6	4395	W	↓	↓	1x250-mL aGs*	9060_TOC: TOC (1)	28 Days	HCl or H2SO4 to pH <2 Cool-4C
B1X1X7	4396	W	↓	↓	1x250-mL aGs*	9060_TOC: TOC (1)	28 Days	HCl or H2SO4 to pH <2 Cool-4C
B1X1X8	4397	W	↓	↓	1x250-mL aGs*	9060_TOC: TOC (1)	28 Days	HCl or H2SO4 to pH <2 Cool-4C

Relinquished By <b>D. Woehle</b>	Print <i>D. Woehle</i>	Sign <i>D. Woehle</i>	Date/Time <b>SEP 11 2008 1433</b>	Received By <i>CA Hurdon</i>	Print <i>CA Hurdon</i>	Sign <i>CA Hurdon</i>	Date/Time <b>SEP 11 2008 1433</b>	<b>Matrix *</b> S = Soil DS = Drum Solid SF = Sediment DL = Drum Liquid SO = Solid T = Tissue SL = Sludge WI = Wine W = Water L = Liquid O = Oil V = Vegetation A = Air X = Other
Relinquished By	Date/Time	Received By	Date/Time	Received By	Date/Time	Date/Time		
Relinquished By	Date/Time	Received By	Date/Time	Received By	Date/Time	Date/Time		
Relinquished By	Date/Time	Received By	Date/Time	Received By	Date/Time	Date/Time		
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method (e.g., Return to customer, per lab procedure, used in process)			Disposed By			Date/Time	

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