Appendix C

Data Validation Reports

August 8, 2006

Organic and Inorganic Data Verification Report

Skykomish

Site-Wide Periodic GW Sampling
2nd Quarter 2006

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Overview

The samples analyzed for the Skykomish site-wide periodic groundwater sampling event in May 2006 are listed in the Table of Samples Analyzed (pages 2-3). Data validation was performed on seventy-three groundwater samples.

The samples were analyzed by Test America Analytical Testing Corporation of Bothell, WA. The validated analyses were Semivolatile Petroleum Products (Diesel Range Hydrocarbons (DRO) and Lube Oil Range Hydrocarbons) by Method NWTPH-Dx, Total and Dissolved Metals Arsenic and Lead by EPA Method 6020, and Polynuclear Aromatic Hydrocarbons by EPA Method 8270C-HVI (high volume injection) or 8270C-SIM (selected ion monitoring).

The RETEC Analytical Data Validation Checklist is presented as pages 8-13. Data were evaluated based on validation criteria set forth in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review*, document number USEPA-540-R-04-009, January 2005, and *USEPA CLP National Functional Guidelines for Inorganic Data Review*, document number EPA540/R-04/004 of October 2004 as they applied to the reported methodology. Field duplicate RPD control limits were taken from the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, February 1988, upheld in DRAFT 1993.

The following data components were reviewed during the data validation procedure:

Submitted Deliverables
Case Narratives
Chain-of-Custody form(s) and sample integrity
Sample results, reporting limits, dilution factors
Holding times
Method blank results
LCS/LCSD (blank spike) results
MS/MSD (matrix spike) results
Field and laboratory duplicate results
Organic surrogate recoveries
Electronic data deliverables (EDDs)

Data Verification Qualifiers Assigned During this Review

J – estimated concentration

UJ – undetected, reporting limit is estimated

Assigned qualifiers are detailed in the RETEC Analytical Data Validation Checklist and are summarized in the Table of Qualified Analytical Results (pages 4-7).

Overall Data Assessment

Precision, accuracy, method compliance, and completeness of the data set have been determined to be acceptable. All of the data are suitable for their intended use with the qualifications noted.

Table of Samples Analyzed
Skykomish Site-Wide Periodic Groundwater Sampling
May 2006
Test America Analytical Testing Corporation, Bothell, WA
Laboratory Reports BPE0769, BPE0789, and BPE0824

Matrix	Sample ID	Parent Sample	Sample Date and Time		SDG
Water	1A-W-1-0506		05/22/2006	10:25 AM	BPE0769
Water	MW-11-0506		05/22/2006	1:10 PM	BPE0769
Water	MW-28-0506		05/22/2006	1:40 PM	BPE0769
Water	1A-W-3-0506		05/22/2006	3:00 PM	BPE0769
Water	2A-W-3-0506		05/22/2006	3:20 PM	BPE0769
Water	2A-W-4-0506		05/22/2006	3:55 PM	BPE0769
Water	MW-7-0506		05/22/2006	4:10 PM	BPE0769
Water	MW-6-0506		05/22/2006	5:10 PM	BPE0769
Water	1A-W-30-0506	1A-W-3-0506	05/22/2006	3:30 PM	BPE0769
Water	MW-15-0506		05/22/2006	5:12 PM	BPE0769
Water	1A-W-4-05-6		05/22/2006	3:50 PM	BPE0769
Water	1B-W-3-0506		05/22/2006	5:10 PM	BPE0769
Water	1C-W-2-0506		05/22/2006	5:55 PM	BPE0769
Water	MW-31-0506		05/23/2006	5:45 PM	BPE0789
Water	MW-18-0506		05/23/2006	4:25 PM	BPE0789
Water	MW-10-0506		05/23/2006	3:13 PM	BPE0789
Water	MW-9-0506		05/23/2006	1:50 PM	BPE0789
Water	MW-90-0506	MW-9-0506	05/23/2006	12:30 PM	BPE0789
Water	MW-37-0506		05/23/2006	12:38 PM	BPE0789
Water	MW-19-0506		05/23/2006	11:43 AM	BPE0789
Water	MW-38-0506		05/23/2006	10:59 AM	BPE0789
Water	MW-32-0506		05/23/2006	10:02 AM	BPE0789
Water	MW-26-0506		05/23/2006	8:55 AM	BPE0789
Water	1A-W-5-0506		05/23/2006	9:05 AM	BPE0789
Water	1B-W-2-0506		05/23/2006	10:10 AM	BPE0789
Water	1C-W-1-0506		05/23/2006	1:35 PM	BPE0789
Water	1C-W-3-0506		05/23/2006	11:35 AM	BPE0789
Water	1C-W-4-0506		05/23/2006	12:35 PM	BPE0789
Water	2A-W-1-0506		05/23/2006	2:50 PM	BPE0789
Water	2A-W-100-0506	2A-W-1-0506	05/23/2006	3:15 PM	BPE0789
Water	2A-W-2-0506		05/23/2006	4:15 PM	BPE0789
Water	2A-W-6-0506		05/23/2006	5:10 PM	BPE0789
Water	1B-W-1-0506		05/23/2006	2:50 PM	BPE0789
Water	1A-W-2-0506		05/23/2006	3:30 PM	BPE0789
Water	MW-22-0506		05/23/2006	4:25 PM	BPE0789
Water	5-W-3-0506		05/23/2006	5:00 PM	BPE0789
Water	5-W-2-0506		05/23/2006	5:40 PM	BPE0789
Water	MW-43-0506		05/24/2006	7:50 AM	BPE0789
Water	2A-W-10-0506		05/24/2006	2:15 PM	BPE0789
Water	MW-40-0506		05/24/2006	12:30 PM	BPE0789
Water	MW-16-0506		05/24/2006	11:50 AM	BPE0789
Water	MW-34-0506		05/24/2006	10:00 AM	BPE0789
Water	MW-29-0506		05/24/2006	10:53 AM	BPE0789
Water	MW-290-0506	MW-29-0506	05/24/2006	9:00 AM	BPE0789
Water	MW-35-0506		05/24/2006	8:52 AM	BPE0789
Water	2A-W-9-0506		05/24/2006	1:25 PM	BPE0789
Water	5-W-1-0506		05/24/2006	8:45 AM	BPE0789
Water	5-W-10-0506	5-W-1-0506	05/24/2006	8:55 AM	BPE0789
Water	MW-36-0506		05/24/2006	9:25 AM	BPE0789

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May 2006
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Laboratory Reports BPE0769, BPE0789, and BPE0824

Matrix	Sample ID	Parent Sample	Sample Date and Time		SDG
Water	MW-500-0506		05/24/2006	9:55 AM	BPE0789
Water	MW-27-0506		05/24/2006	10:45 AM	BPE0789
Water	MW-270-0506	MW-27-0506	05/24/2006	10:55 AM	BPE0789
Water	MW-39-0506		05/24/2006	11:55 AM	BPE0789
Water	MW-20-0506		05/24/2006	1:45 PM	BPE0789
Water	MW-21-0506		05/24/2006	2:25 PM	BPE0789
Water	MW-1-0506		05/24/2006	11:15 AM	BPE0789
Water	MW-100-0506	MW-1-0506	05/24/2006	11:40 AM	BPE0789
Water	2A-W-8-0506		05/24/2006	12:05 PM	BPE0789
Water	5-W-4-0506		05/24/2006	1:20 PM	BPE0789
Water	5-W-40-0506	5-W-4-0506	05/24/2006	1:45 PM	BPE0789
Water	MW-13-0506		05/24/2006	2:40 PM	BPE0789
Water	MW-14-0506		05/24/2006	3:15 PM	BPE0789
Water	2A-W-5-0506		05/24/2006	10:20 AM	BPE0789
Water	2A-W-7-0506		05/24/2006	9:35 AM	BPE0789
Water	2A-2-70-0506	2A-W-7-0506	05/24/2006	10:00 AM	BPE0789
Water	MW-8-0506		05/24/2006	4:45 PM	BPE0824
Water	MW-4-0506		05/24/2006	4:30 PM	BPE0824
Water	MW-12-0506		05/25/2006	8:45 AM	BPE0824
Water	2A-W-11-0506		05/25/2006	9:05 AM	BPE0824
Water	MW-17-0506		05/25/2006	9:40 AM	BPE0824
Water	2B-W-4-0506		05/25/2006	8:20 AM	BPE0824
Water	MW-2-0506		05/25/2006	9:30 AM	BPE0824
Water	MW-3-0506		05/25/2006	10:25 AM	BPE0824

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Laboratory Reports BPE0769, BPE0789, and BPE0824

Sample ID	SDG	Method	Analyte	Concentration		Qualifier	Reason Code
1A-W-1-0506	BPE0769	NWTPH-Dx	DRO	0.576	mg/l	J	CHR
1A-W-4-0506	BPE0769	6020	Dissolved Arsenic	0.00009	mg/l	J	BRL
2A-W-3-0506	BPE0769	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.509	mg/l	J	HFOR
		NWTPH-Dx	DRO	1.08	mg/l	J	HFOR
2A-W-4-0506	BPE0769	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.646	mg/l	J	HFOR
		NWTPH-Dx	DRO	1.33	mg/l	J	HFOR
MW-11-0506	BPE0769	8270C-HVI	Fluoranthene	0.0553	ug/l	J	BRL
		8270C-HVI	Pyrene	0.084	ug/l	J	BRL
		NWTPH-Dx	DRO	1.38	mg/l	J	CHR
MW-28-0506	BPE0769	8270C-HVI	1-Methylnaphthalene	0.779	ug/l	J	BRL
		8270C-HVI	Acenaphthene	0.205	ug/l	J	BRL
		8270C-HVI	Anthracene	0.2	ug/l	J	BRL
		8270C-HVI	Naphthalene	0.175	ug/l	J	BRL
		8270C-HVI	Phenanthrene	0.213	ug/l	J	BRL
		NWTPH-Dx	Lube Oil Range Hydrocarbons	1.64	mg/l	J	HFOR
		NWTPH-Dx	DRO	2.42	mg/l	J	HFOR
		6020	Lead	0.00076	mg/l	J	BRL
MW-6-0506	BPE0769	NWTPH-Dx	Lube Oil Range Hydrocarbons	2.84	mg/l	J	HFOR
		NWTPH-Dx	DRO	5.79	mg/l	J	HFOR
MW-7-0506	BPE0769	NWTPH-Dx	DRO	0.62	mg/l	J	HFOR
1A-W-2-0506	BPE0789	6020	Dissolved Arsenic	0.00025	mg/l	J	BRL
		6020	Total Arsenic	0.0004	mg/l	J	BRL
		8270C-HVI	Fluorene	0.707	ug/l	J	BRL
		NWTPH-Dx	Lube Oil Range Hydrocarbons	2.85	mg/l	J	HFOR
		NWTPH-Dx	DRO	3.58	mg/l	J	HFOR
		6020	Dissolved Lead	0.00011	mg/l	J	BRL
		6020	Total Lead	0.00019	mg/l	J	BRL
1B-W-1-0506	BPE0789	8270C-HVI	Pyrene	0.0794	ug/l	J	BRL
		NWTPH-Dx	DRO	0.942	mg/l	J	HFOR
1B-W-2-0506	BPE0789	NWTPH-Dx	DRO	0.287	mg/l	J	HFOR
1C-W-4-0506	BPE0789	6020	Dissolved Arsenic	0.00027	mg/l	J	BRL
		6020	Total Arsenic	0.00044	mg/l	J	BRL
		NWTPH-Dx	DRO	0.992	mg/l	J	HFOR
2A-W-100-0506	BPE0789	NWTPH-Dx	DRO	1.41	mg/l	J	HFOR
2A-W-1-0506	BPE0789	NWTPH-Dx	DRO	1.34	mg/l	J	HFOR
2A-W-2-0506	BPE0789	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.556	mg/l	J	HFOR
		NWTPH-Dx	DRO	2.76	mg/l	J	HFOR
2A-W-5-0506	BPE0789	NWTPH-Dx	DRO	0.259	mg/l	J	CHR
2A-W-6-0506	BPE0789	8270C-HVI	Naphthalene	0.19	ug/l	J	BRL
2A-W-9-0506	BPE0789	8270C-HVI	Acenaphthene	0.276	ug/l	J	BRL
		8270C-HVI	Anthracene	0.102	ug/l	J	BRL
		8270C-HVI	Fluorene	0.427	ug/l	J	BRL
		8270C-HVI	Phenanthrene	0.128	ug/l	J	BRL
		NWTPH-Dx	DRO	0.873	mg/l	J	HFOR
5-W-10-0506	BPE0789	NWTPH-Dx	Lube Oil Range Hydrocarbons	2.72	mg/l	J	HFOR/FD
		NWTPH-Dx	DRO	4.05	mg/l	J	HFOR/FD
		6020	Dissolved Lead	0.00033	mg/l	J	BRL
		6020	Total Lead	0.00076	mg/l	J	BRL

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Laboratory Reports BPE0769, BPE0789, and BPE0824

Sample ID	SDG	Method	Analyte	Concentration		Qualifier	Reason Code
5-W-1-0506	BPE0789	NWTPH-Dx	Lube Oil Range Hydrocarbons	3.81	mg/l	J	HFOR/FD
		NWTPH-Dx	DRO	6.23	mg/l	J	HFOR/FD
		6020	Dissolved Lead	0.00033	mg/l	J	BRL
		6020	Total Lead	0.00077	mg/l	J	BRL
5-W-2-0506	BPE0789	6020	Dissolved Arsenic	0.00037	mg/l	J	BRL
		6020	Total Arsenic	0.00052	mg/l	J	BRL
		8270C-HVI	Fluorene	0.562	ug/l	J	BRL
		NWTPH-Dx	Lube Oil Range Hydrocarbons	1.85	mg/l	J	HFOR
		NWTPH-Dx	DRO	3.08	mg/l	J	HFOR
5-W-3-0506	BPE0789	NWTPH-Dx	Lube Oil Range Hydrocarbons	60.4	mg/l	J	HFOR/SS
		NWTPH-Dx	DRO	71.1	mg/l	J	HFOR/SS
5-W-40-0506	BPE0789	NWTPH-Dx	DRO	0.323	mg/l	J	CHR
5-W-4-0506	BPE0789	NWTPH-Dx	DRO	0.287	mg/l	J	CHR
MW-100-0506	BPE0789	NWTPH-Dx	DRO	< 0.236	mg/l	UJ	FD
MW-1-0506	BPE0789	NWTPH-Dx	DRO	1.18	mg/l	J	FD
MW-14-0506	BPE0789	6020	Total Arsenic	0.00017	mg/l	J	BRL
MW-18-0506	BPE0789	8270C-HVI	1-Methylnaphthalene	0.0277	ug/l	J	BRL
		8270C-HVI	Acenaphthene	0.0299	ug/l	J	BRL
		8270C-HVI	Fluorene	0.0351	ug/l	J	BRL
MW-20-0506	BPE0789	8270C-HVI	Acenaphthene	0.386	ug/l	J	BRL
		NWTPH-Dx	Lube Oil Range Hydrocarbons	2	mg/l	J	HFOR
		NWTPH-Dx	DRO	2.69	mg/l	J	HFOR
MW-21-0506	BPE0789	6020	Dissolved Arsenic	0.00079	mg/l	J	BRL
		NWTPH-Dx	Lube Oil Range Hydrocarbons	0.807	mg/l	J	HFOR
		NWTPH-Dx	DRO	1.18	mg/l	J	HFOR
		6020	Total Lead	0.00012	mg/l	J	BRL
MW-22-0506	BPE0789	NWTPH-Dx	Lube Oil Range Hydrocarbons	14.4	mg/l	J	HFOR
		NWTPH-Dx	DRO	13.6	mg/l	J	HFOR
MW-26-0506	BPE0789	NWTPH-Dx	DRO	2.05	mg/l	J	HFOR
MW-270-0506	BPE0789	NWTPH-Dx	DRO	1.41	mg/l	J	HFOR
MW-27-0506	BPE0789	NWTPH-Dx	DRO	1.34	mg/l	J	HFOR
MW-29-0506	BPE0789	6020	Total Lead	0.00009	mg/l	J	BRL
MW-31-0506	BPE0789	6020	Total Arsenic	0.00015	mg/l	J	BRL
MW-32-0506	BPE0789	6020	Dissolved Lead	0.00051	mg/l	J	BRL
		6020	Total Lead	0.00029	mg/l	J	BRL
MW-34-0506	BPE0789	6020	Total Arsenic	0.00027	mg/l	J	BRL
		6020	Total Lead	0.00008	mg/l	J	BRL
MW-35-0506	BPE0789	NWTPH-Dx	DRO	0.485	mg/l	J	CHR
MW-36-0506	BPE0789	8270C-HVI	Acenaphthene	0.458	ug/l	J	BRL
		NWTPH-Dx	Lube Oil Range Hydrocarbons	5.93	mg/l	J	HFOR
		NWTPH-Dx	DRO	9.67	mg/l	J	HFOR
MW-37-0506	BPE0789	NWTPH-Dx	DRO	1.09	mg/l	J	HFOR
MW-39-0506	BPE0789	8270C-HVI	Naphthalene	0.072	ug/l	J	BRL
		8270C-HVI	Phenanthrene	0.0873	ug/l	J	BRL
		NWTPH-Dx	DRO	0.716	mg/l	J	HFOR
MW-43-0506	BPE0789	6020	Total Lead	0.00012	mg/l	J	BRL
MW-500-0506	BPE0789	8270C-HVI	Naphthalene	0.0167	ug/l	J	BRL
		6020	Total Lead	0.00015	mg/l	J	BRL

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Sample ID	SDG	Method	Analyte	Concentration			Qualifier	Reason Code
MW-90-0506	BPE0789	NWTPH-Dx	DRO		0.318	mg/l	J	HFOR
MW-9-0506	BPE0789	NWTPH-Dx	DRO		0.31	mg/l	J	HFOR
2A-W-11-0506	BPE0824	8270C-HVI	1-Methylnaphthalene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	2-Methylnaphthalene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Acenaphthene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Acenaphthylene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Anthracene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Benzo(a)anthracene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Benzo(a)pyrene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Benzo(b)fluoranthene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Benzo(g,h,i)perylene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Benzo(k)fluoranthene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Chrysene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Dibenz(a,h)anthracene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Fluoranthene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Fluorene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Indeno(1,2,3-cd)pyrene	<	0.00952	ug/l	UJ	HT
		8270C-HVI	Naphthalene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Phenanthrene	<	0.0952	ug/l	UJ	HT
		8270C-HVI	Pyrene		0.0268	ug/l	J	BRL/HT
MW-12-0506	BPE0824	8270C-HVI	1-Methylnaphthalene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	2-Methylnaphthalene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Acenaphthene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Acenaphthylene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Anthracene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Benzo(a)anthracene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Benzo(a)pyrene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Benzo(b)fluoranthene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Benzo(g,h,i)perylene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Benzo(k)fluoranthene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Chrysene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Dibenz(a,h)anthracene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Fluoranthene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Fluorene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Indeno(1,2,3-cd)pyrene	<	0.00943	ug/l	UJ	HT
		8270C-HVI	Naphthalene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Phenanthrene	<	0.0943	ug/l	UJ	HT
		8270C-HVI	Pyrene	<	0.0943	ug/l	UJ	HT

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Sample ID	SDG	Method	Analyte	Concentration			Qualifier	Reason Code
MW-17-0506	BPE0824	8270C-HVI	1-Methylnaphthalene	<	1.9	ug/l	UJ	HT
		8270C-HVI	2-Methylnaphthalene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Acenaphthene		0.283	ug/l	J	HT
		8270C-HVI	Acenaphthylene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Anthracene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Benzo(a)anthracene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Benzo(a)pyrene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Benzo(b)fluoranthene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Benzo(g,h,i)perylene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Benzo(k)fluoranthene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Chrysene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Dibenz(a,h)anthracene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Fluoranthene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Fluorene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Indeno(1,2,3-cd)pyrene	<	0.19	ug/l	UJ	HT
		8270C-HVI	Naphthalene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Phenanthrene	<	1.9	ug/l	UJ	HT
		8270C-HVI	Pyrene		0.281	ug/l	J	HT

Qualifiers:
J – Estimated concentration.
UJ – Undetected, reporting limit is estimated.

Reason Codes:
BRL – Result is greater than the method detection limit, but less than the reporting limit.
CHR – Chromatographic pattern does not resemble the fuel standard used for quantitation.
FD – Field duplicate outside limits.
HFOR – Chromatographic pattern most closely resembles a heavy fuel oil range hydrocarbon product.
HT – Holding time exceeded.
SS – Surrogate standard outside limits.

ANALYTICAL DATA VERIFICATION CHECKLIST

Project Name: Skykomish	Laboratory: Test America Analytical Testing Corporation of Bothell, WA
Project Reference: Site-Wide Periodic Groundwater Sampling	Sample Matrix: Groundwater with Water QC
RETEC Project: BN050-16423-710	Sample Start Date: 05/22/2006
Verified By/Date Verified: Leslie Hill 08/08/2006	Sample End Date: 05/25/2006

Samples Analyzed: Refer to the Table of Samples Analyzed (page 2).

Parameters Verified: Semivolatile Petroleum Products (Diesel Range Hydrocarbons (DRO) and Lube Oil Range Hydrocarbons) by Method NWTPH-Dx, Total and Dissolved Metals Arsenic and Lead by EPA Method 6020, and Polynuclear Aromatic Hydrocarbons by EPA Method 8270C-HVI (high volume injection) or 8270C-SIM (selected ion monitoring).

Laboratory SDGs: BPE0769, BPE0789, and BPE0824

PRECISION, ACCURACY, METHOD COMPLIANCE, AND COMPLETENESS ASSESSMENT

Precision:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Precision is the measure of variability of individual sample measurements. Field precision was determined by comparison of field duplicate sample results. Laboratory precision was determined by examination of laboratory duplicate results. Evaluation of both field and laboratory duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD QC limits were set at 0-30% for water samples. Laboratory RPD limits referenced EPA published QC limits. Although some data require qualification based on field duplicate RPDs, overall field and laboratory precision is acceptable. Precision measurements are reviewed in items 17, 20, and 21.

Accuracy:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Field accuracy, a measure of the sampling bias, could not be determined as no trip blank, field blank, or equipment rinse blank samples were collected. Laboratory accuracy is a measure of the system bias, and was measured by evaluating laboratory control sample/laboratory control sample duplicate (LCS/LCSD), matrix spike/matrix spike duplicate (MS/MSD), and organic system monitoring compounds (surrogate) percent recoveries (%Rs). LCS/LCSD %Rs, which demonstrated the overall performance of the analysis, were compared to EPA published QC limits. MS/MSD %Rs, which provided information on sample matrix interferences, were compared to EPA published QC limits or laboratory control charted limits. System monitoring compound or surrogate recoveries, which measured system performance and efficiency during organic analysis, were compared to EPA published QC limits. Although some data require qualification based on surrogate %Rs, overall laboratory accuracy is acceptable. Accuracy measurements are reviewed in items 12, 14, 15, and 16.

Method Compliance:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Method compliance was determined by evaluating sample integrity, holding time, and laboratory blanks against method specified requirements, while applying EPA data validation guidelines. Although some data require qualification based on detections below the reporting limits, chromatographic matches, or holding times, overall method compliance is acceptable based on the supplied data. Method compliance measurements are reviewed in items 4, 8, 11, 13, 18, 19, 20, and 22.

Completeness:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Completeness is the overall ratio of the number of samples planned versus the number of samples with valid analyses. Completeness goals are set at 90-100%. Determination of completeness included a review of chain of custody records, laboratory analytical methods and detection limits, laboratory case narratives, and project requirements. Completeness also included 100% review of the laboratory sample data results, QC summary reports, and electronic data deliverables (EDDs). All of the data received from the laboratory are useable with qualification. Completeness of the data is calculated to be 100% and is acceptable.

ANALYTICAL DATA VERIFICATION CHECKLIST

VALIDATION CRITERIA CHECK						
Data validation flags used in this review: J – estimated concentration UJ – undetected, reporting limit is estimated The following comments requiring qualification are in bold type. The other comments are of interest, but qualification of the samples was not necessary. Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).						
1. Did the laboratory identify any non-conformances related to the analytical results?	**X**	Yes		No	LH	Initials
Explanation: BPE0824: Sample 2B-W-4-0506 had a sampled time of 08:40 on the label and 08:20 on the COC. The sample was logged in per the COC. Data qualification, if any, related to the laboratory observations are discussed in the following sections.						
2. Were sample Chain-of-Custody forms complete?	**X**	Yes		No	LH	Initials
Comments: COC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt.						
3. Were all the analyses requested for the samples on the COCs completed by the laboratory?	**X**	Yes		No	LH	Initials
Comments: All requested analyses were completed.						
4. Were samples received in good condition and at the appropriate temperature?		Yes	**X**	No	LH	Initials
Comments: Samples were received on ice, intact, and in good condition with cooler temperatures both within and outside the 4°C ± 2°C acceptance range at 6.3°C, 8.2°C, and 4.8°C as noted in the case narratives. Cooler temperatures that were greater than 6°C are judged acceptable as samples were well below room temperature (~25ºC).						
5. Were the requested analytical methods in compliance with WP/QAPP, permit, or COC?	**X**	Yes		No	LH	Initials
Comments: Reported methods and target analyte lists were in compliance with COC records.						
6. Were detection limits in accordance with WP/QAPP, permit, or method?	**X**	Yes		No	LH	Initials
Comments: Reported detection limits are achievable by the quoted methods. **Analytes reported below the laboratory reporting limits but above the laboratory MDLs were qualified as J to indicate that the concentrations are estimated.** Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).						
7. Do the laboratory reports include only those constituents requested to be reported for a specific analytical method?	**X**	Yes		No	LH	Initials
Comments: Only the requested target analytes were reported.						

8. Were sample holding times met?		Yes	**X**	No	LH	Initials
Comments: Extraction and analytical holding times were met for all samples and analyses, with the following exceptions. **BPE0824: <u>8270C-HVI</u>: The reanalysis of samples MW-12-0506, 2A-W-11-0506, and MW-17-0506 was preformed two days outside the seven-day holding time. All PAH analytes in these samples were qualified as J or UJ to indicate estimated concentrations or reporting limits.** Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).						
9. Were correct concentration units reported?	**X**	Yes		No	LH	Initials
Comments: Correct concentration units were reported.						
10. Were the reporting requirements for flagged data met?	**X**	Yes		No	LH	Initials
Comments: Data validation qualifiers override any assigned laboratory flags.						
11. Were laboratory blank samples free of target analyte contamination?		Yes	**X**	No	LH	Initials
Comments: All laboratory blanks were free of target analyte contamination, with the following exception. BPE0824: <u>8270C-SIM</u>: Benzo (a) pyrene was detected in the method blank extracted on 06/03/2006 at 0.0920 µg/L. As this analyte was not detected in any of the associated samples, no qualification of data was required.						
12. Were trip blank, field blank, and/or equipment rinse blank samples free of target analyte contamination?	NA	Yes	NA	No	LH	Initials
Comments: There were no trip blank, field blank, or equipment rinse blank samples associated with this sample set. Field accuracy could not be evaluated.						
13. Were instrument calibrations within method or data validation control limits?		Yes	**X**	No	LH	Initials
Comments: Instrument calibration information is not required for this level of data review and was not evaluated as part of this data verification, with the following exceptions noted by the laboratory. BPE0789: <u>NWTPH-DX</u>: The laboratory noted that DRO had a high bias in the calibration standard associated with samples 2A-W-8-0506, MW-13-0506, MW-14-0506, 2A-W-7-0506, and 2A-W-70-0506. As the bias was noted as high, and DRO was not detected in any of the samples, no qualification of data was required.						
14. Were surrogate recoveries within control limits?		Yes	**X**	No	LH	Initials
Comments: Surrogate percent recoveries (%Rs) for organic analyses were within data validation QC criteria for all samples, with the following exceptions. **BPE0789: <u>NWTPH-Dx</u>: In sample 5-W-3-0506 the recovery of the surrogate 2-FBP was outside laboratory QC limits of 50-150% at 155%. Detected analytes, DRO and lube oil range hydrocarbons were qualified as J to indicate estimated concentrations in this sample.** Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).						
15. Were laboratory control sample recoveries within control limits?	**X**	Yes		No	LH	Initials
Comments: LCS and LCSD (blank spike) recoveries were within data validation or laboratory control-charted QC limits for all target analytes.						

ANALYTICAL DATA VERIFICATION CHECKLIST

16. Were matrix spike recoveries within control limits?	**X**	Yes		No	LH	Initials
Comments: Project specific MS and MSD recoveries for target analytes were within data validation QC limits. MS and MSD spike recoveries for non-project samples were not considered since matrix similarity to project samples could not be guaranteed.						
17. Were duplicate RPDs and/or serial dilution %Ds within control limits?	**X**	Yes		No	LH	Initials
Comments: Laboratory RPDs for target analytes in LCS/LCSD and project-specific MS/MSD samples were within data validation control limits. Serial dilution information is not required for this level of data review and was not evaluated as part of this data verification.						
18. Were organic system performance criteria met?	NA	Yes	NA	No	LH	Initials
Comments: System performance data is not required for this level of data review and was not evaluated as part of this data verification.						
19. Were internal standards within method criteria for GC/MS sample analyses?	NA	Yes	NA	No	LH	Initials
Comments: Internal standard information is not required for this level of data review and was not evaluated as part of this data verification.						
20. Were inorganic system performance criteria met?	NA	Yes	NA	No	LH	Initials
Comments: System performance data is not required for this level of data review and was not evaluated as part of this data verification.						
21. Were blind field duplicates collected? If so, discuss the precision (RPD) of the results.	**X**	Yes		No	LH	Initials

Duplicate Sample No.	1A-W-30-0506		Primary Sample No.	1A-W-3-0506
Duplicate Sample No.	2A-W-100-0506		Primary Sample No.	2A-W-1-0506
Duplicate Sample No.	2A-W-70-0506		Primary Sample No.	2A-W-7-0506
Duplicate Sample No.	5-W-10-0506		Primary Sample No.	5-W-1-0506
Duplicate Sample No.	5-W-40-0506		Primary Sample No.	5-W-4-0506
Duplicate Sample No.	MW-100-0506		Primary Sample No.	MW-1-0506
Duplicate Sample No.	MW-270-0506		Primary Sample No.	MW-27-0506
Duplicate Sample No.	MW-290-0506		Primary Sample No.	MW-29-0506
Duplicate Sample No.	MW-90-0506		Primary Sample No.	MW-9-0506

Comments: (continued on the next page)

ANALYTICAL DATA VERIFICATION CHECKLIST

Comments (continued): The RPDs for the duplicates were within the 0-30% data verification QC limits for water samples, or RPDs were no applicable due to results that were + the detection limit, or were undetected in both samples, with the exceptions noted in bold type in the tables below. Field duplicate and native sample concentrations that were both undetected are not reflected in the tables since RPDs are not applicable.

The following RPDs were calculated:

Method	Analyte	2A-W-100-0506	2A-W-1-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
MTCA HV PAHs	Acenaphthene	0.55	0.522	5		0.0943	0.0943	ug/l
MTCA HV PAHs	Fluorene	2.25	2.09	7		0.0943	0.0943	ug/l
NWTPH-Dx	DRO	1.41	1.34	5		0.238	0.238	mg/l

Method	Analyte	5-W-10-0506	5-W-1-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
6020	Dissolved Arsenic	0.00441	0.00444	1		0.001	0.001	mg/l
6020	Total Arsenic	0.00505	0.00501	1		0.001	0.001	mg/l
NWTPH-Dx	**Lube Oil**	**2.72**	**3.81**	**33**	**J**	**0.476**	**0.476**	**mg/l**
NWTPH-Dx	**DRO**	**4.05**	**6.23**	**42**	**J**	**0.238**	**1.19**	**mg/l**
6020	Dissolved Lead	0.00033	0.00033	0		0.001	0.001	mg/l
6020	Total Lead	0.00076	0.00077	1		0.001	0.001	mg/l

Method	Analyte	5-W-40-0506	5-W-4-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
NWTPH-Dx	DRO	0.323	0.287	12		0.243	0.238	mg/l

Method	Analyte	MW-100-0506	MW-1-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
NWTPH-Dx	Lube Oil	ND	0.807	+/- RL		0.472	0.472	mg/l
NWTPH-Dx	**DRO**	**ND**	**1.18**	**200**	**J/UJ**	**0.236**	**0.236**	**mg/l**

Method	Analyte	MW-270-0506	MW-27-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
NWTPH-Dx	DRO	1.41	1.34	5		0.238	0.236	mg/l

Method	Analyte	MW-290-0506	MW-29-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
6020	Total Lead	ND	0.00009	+/- RL		0.001	0.001	mg/l

Method	Analyte	MW-90-0506	MW-9-0506	RPD	Qualifier	Duplicate RL	Sample RL	Units
MTCA HV PAHs	Acenaphthene	0.189	0.175	8		0.0943	0.0952	ug/l
MTCA HV PAHs	Fluorene	0.192	0.175	9		0.0943	0.0952	ug/l
NWTPH-Dx	DRO	0.318	0.31	3		0.24	0.238	mg/l

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

22. Were qualitative criteria for organic target analyte identification met?		Yes	**X**	No	LH	Initials

Comments: Trained laboratory personnel reviewed retention times and chromatography in accordance with the laboratory's internal QA/QC program. Laboratory personnel noted the following data outliers.

BPE0769 and BPE0789: <u>NWTPH-DX</u>: DRO was noted by the laboratory to have sample chromatographic patterns that did not resemble the fuel standard used for quantitation in samples 1A-W-1-0506, MW-11-0506, MW-35-0506, 5-W-4-0506, 5-W-40-0506, and 2A-W-5-0506. DRO was qualified as J in these samples to indicate estimated concentrations.

DRO in samples 2A-W-3-0506, 2A-W-4-0506, MW-28-0506, MW-6-0506, MW-7-0506, 1A-W-2-0506, 1B-W-1-0506, 1B-W-2-0506, 1C-W-4-0506, 2A-W-100-0506, 2A-W-1-0506, 2A-W-2-0506, 2A-W-9-0506, 5-W-10-0506, 5-W-1-0506, 5-W-2-0506, 5-W-3-0506, MW-20-0506, MW-21-0506, MW-22-0506, MW-26-0506, MW-270-0506, MW-27-0506, MW-36-0506, MW-37-0506, MW-39-0506, MW-90-0506, and MW-9-0506, and lube oil range hydrocarbons in samples 2A-W-3-0506, 2A-W-4-0506, MW-28-0506, MW-6-0506, 1A-W-2-0506, 2A-W-2-0506, 5-W-10-0506, 5-W-1-0506, 5-W-2-0506, 5-W-3-0506, MW-20-0506, MW-21-0506, MW-22-0506, and MW-36-0506 were noted by the laboratory to have hydrocarbon patterns that most closely resembled a heavy fuel oil range hydrocarbon product. These analytes were qualified as J in these samples to indicate estimated concentrations.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

23. Were 100% of the EDD concentrations and reporting limits compared to the hardcopy data reports?	**X**	Yes		No	LH	Initials

Comments: There were no discrepancies between the EDD concentrations and reporting limits and the hardcopy data reports.

Duplicate results from reanalysis were evaluated by the data validator who determined the most reliable results based on data validation rules, method knowledge, and professional judgment. Duplicate results, determined to be less reliable, were designated as not reportable in the database.

24. General Comments: Data were evaluated based on validation criteria set forth in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review*, document number USEPA-540-R-04-009, January 2005, and *USEPA CLP National Functional Guidelines for Inorganic Data Review*, document number EPA540/R-04/004 of October 2004 as they applied to the reported methodology. Field duplicate RPD control limits were taken from the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, February 1988, upheld in DRAFT 1993.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

February 7, 2007

Organic and Inorganic Data Verification Report

Skykomish
Site-Wide Periodic GW Sampling
4th Quarter 2006

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Overview

The samples analyzed for the Skykomish site-wide periodic groundwater sampling event in November 2006 are listed in the Table of Samples Analyzed (pages 2-3). Data verification was performed on seventy-one groundwater samples.

The samples were analyzed by Test America Analytical Testing Corporation of Bothell, WA. The validated analyses were Semivolatile Petroleum Products (Diesel Range Hydrocarbons (DRO) and Lube Oil Range Hydrocarbons or Diesel Range Organics (DRO) and Heavy Oil Range Hydrocarbons) by Method NWTPH-Dx, Total and Dissolved Metals Arsenic and Lead by EPA Method 6020, and Polynuclear Aromatic Hydrocarbons by EPA Method 8270C-HVI (high volume injection) or 8270C-SIM (selected ion monitoring).

The RETEC Analytical Data Verification Checklist is presented as pages 8-14. Data were evaluated based on validation criteria set forth in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review*, document number USEPA-540-R-04-009, January 2005, and *USEPA CLP National Functional Guidelines for Inorganic Data Review*, document number EPA540/R-04/004 of October 2004 as they applied to the reported methodology. Field duplicate RPD control limits were taken from the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, February 1988, upheld in DRAFT 1993.

The following data components were reviewed during the data verification procedure:

Submitted Deliverables
Case Narratives
Chain-of-Custody form(s) and sample integrity
Sample results, reporting limits, dilution factors
Holding times
Method blank results
LCS/LCSD (blank spike) results
MS/MSD (matrix spike) results
Field and laboratory duplicate results
Organic surrogate recoveries
Electronic data deliverables (EDDs)

Data Verification Qualifiers Assigned During this Review

J – estimated concentration

U – evaluated to be undetected at the reported concentration; result is considered to be a false positive

Assigned qualifiers are detailed in the RETEC Analytical Data Verification Checklist and are summarized in the Table of Qualified Analytical Results (pages 4-7).

Overall Data Assessment

Precision, accuracy, method compliance, and completeness of the data set have been determined to be acceptable. All of the data are suitable for their intended use with the qualifications noted.

Table of Samples Analyzed
Skykomish Site-Wide Periodic Groundwater Sampling
November 2006
Test America Analytical Testing Corporation, Bothell, WA
Laboratory Reports BPK0738 and BPL0058

Matrix	Sample ID	Parent Sample	Sample Date and Time		SDG
Groundwater	2A-W-4-1106		11/28/2006	10:00 AM	BPK0738
Groundwater	2A-W-3-11-6		11/28/2006	10:45 AM	BPK0738
Groundwater	1A-W-3-1106		11/28/2006	11:30 AM	BPK0738
Groundwater	5-W-1-1106		11/28/2006	12:10 PM	BPK0738
Groundwater	5-W-10-1106	5-W-1-1106	11/28/2006	12:20 PM	BPK0738
Groundwater	MW-22-1106		11/28/2006	12:45 PM	BPK0738
Groundwater	5-W-3-1106		11/28/2006	1:45 PM	BPK0738
Groundwater	MW-20-1106		11/28/2006	2:50 PM	BPK0738
Groundwater	MW-36-1106		11/28/2006	3:30 PM	BPK0738
Groundwater	2A-W-7-1106		11/28/2006	9:55 AM	BPK0738
Groundwater	2A-W-70-1106	2A-W-7-1106	11/28/2006	9:30 AM	BPK0738
Groundwater	MW-29-1106		11/28/2006	10:45 AM	BPK0738
Groundwater	MW-11-1106		11/28/2006	11:40 AM	BPK0738
Groundwater	MW-10-1106		11/28/2006	1:15 PM	BPK0738
Groundwater	MW-16-1106		11/28/2006	4:40 PM	BPK0738
Groundwater	MW-9-1106		11/28/2006	2:15 PM	BPK0738
Groundwater	MW-90-1106	MW-9-1106	11/28/2006	1:30 PM	BPK0738
Groundwater	MW-31-1106		11/28/2006	3:55 PM	BPK0738
Groundwater	MW-310-1106	MW-31-1106	11/28/2006	3:30 PM	BPK0738
Groundwater	1A-W-4-1106		11/28/2006	10:00 AM	BPK0738
Groundwater	1A-W-1-1106		11/28/2006	11:07 AM	BPK0738
Groundwater	1A-W-10-1106	1A-W-1-1106	11/28/2006	12:00 PM	BPK0738
Groundwater	2A-W-6-1106		11/28/2006	12:37 PM	BPK0738
Groundwater	1A-W-5-1106		11/28/2006	1:56 PM	BPK0738
Groundwater	2A-W-2-1106		11/28/2006	3:00 PM	BPK0738
Groundwater	2A-W-20-1106	2A-W-2-1106	11/28/2006	4:00 PM	BPK0738
Groundwater	5-W-4-1106		11/28/2006	3:45 PM	BPK0738
Groundwater	5-W-2-1106		11/29/2006	9:15 AM	BPK0738
Groundwater	1B-W-1-1106		11/29/2006	10:50 AM	BPK0738
Groundwater	MW-35-1106		11/29/2006	12:00 PM	BPK0738
Groundwater	MW-27-1106		11/29/2006	12:10 PM	BPK0738
Groundwater	MW-270-1106	MW-27-1106	11/29/2006	12:20 PM	BPK0738
Groundwater	MW-34-1106		11/29/2006	11:15 AM	BPK0738
Groundwater	MW-37-1106		11/29/2006	10:30 AM	BPK0738
Groundwater	MW-26-1106		11/29/2006	9:40 AM	BPK0738
Groundwater	1C-W-1-1106		11/29/2006	12:25 PM	BPK0738
Groundwater	1C-W-4-1106		11/29/2006	11:30 AM	BPK0738
Groundwater	1C-W-3-1106		11/29/2006	9:25 AM	BPK0738

Table of Samples Analyzed
Skykomish Site-Wide Periodic Groundwater Sampling
November 2006
Test America Analytical Testing Corporation, Bothell, WA
Laboratory Reports BPK0738 and BPL0058

Matrix	Sample ID	Parent Sample	Sample Date and Time		SDG
Groundwater	MW-15-1106		11/29/2006	4:00 PM	BPL0058
Groundwater	MW-150-1106	MW-15-1106	11/29/2006	3:30 PM	BPL0058
Groundwater	MW-14-1106		11/29/2006	4:40 PM	BPL0058
Groundwater	MW-40-1106		11/29/2006	3:10 PM	BPL0058
Groundwater	MW-19-1106		11/29/2006	2:35 PM	BPL0058
Groundwater	MW-32-1106		11/29/2006	1:45 PM	BPL0058
Groundwater	2A-W-8-1106		11/29/2006	4:03 PM	BPL0058
Groundwater	1B-W-3-1106		11/29/2006	2:44 PM	BPL0058
Groundwater	1C-W-2-1106		11/29/2006	1:38 PM	BPL0058
Groundwater	MW-6-1106		11/30/2006	4:44 PM	BPL0058
Groundwater	MW-1-1106		11/30/2006	3:57 PM	BPL0058
Groundwater	MW-2-1106		11/30/2006	3:00 PM	BPL0058
Groundwater	2A-W-9-1106		11/30/2006	1:43 PM	BPL0058
Groundwater	2A-W-5-1106		11/30/2006	12:42 PM	BPL0058
Groundwater	2B-W-4-1106		11/30/2006	11:00 AM	BPL0058
Groundwater	1B-W-2-1106		11/30/2006	9:39 AM	BPL0058
Groundwater	MW-21-1106		11/30/2006	3:55 PM	BPL0058
Groundwater	MW-28-1106		11/30/2006	2:35 PM	BPL0058
Groundwater	MW-8-1106		11/30/2006	1:40 PM	BPL0058
Groundwater	MW-39-1106		11/30/2006	12:50 PM	BPL0058
Groundwater	2A-W-1-1106		11/30/2006	9:40 AM	BPL0058
Groundwater	1A-W-2-1106		11/30/2006	10:25 AM	BPL0058
Groundwater	MW-17-1106		11/30/2006	4:50 PM	BPL0058
Groundwater	MW-7-1106		11/30/2006	3:15 PM	BPL0058
Groundwater	MW-3-1106		11/30/2006	3:40 PM	BPL0058
Groundwater	MW-4-1106		11/30/2006	2:55 PM	BPL0058
Groundwater	MW-400-1106	MW-4-1106	11/30/2006	2:30 PM	BPL0058
Groundwater	2A-W-10-1106		11/30/2006	2:10 PM	BPL0058
Groundwater	2A-W-11-1106		11/30/2006	12:40 PM	BPL0058
Groundwater	MW-12-1106		11/30/2006	12:00 PM	BPL0058
Groundwater	MW-18-1106		11/30/2006	10:30 AM	BPL0058
Groundwater	MW-13-1106		11/30/2006	9:15 AM	BPL0058
Groundwater	MW-500-1106		11/30/2006	4:30 PM	BPL0058

Table of Qualified Analytical Results
Skykomish Site-Wide Periodic Groundwater Sampling
November 2006
Test America Analytical Testing Corporation, Bothell, WA
Laboratory Reports BPK0738 and BPL0058

Sample ID	SDG	Method	Analyte	Concentration		Qualifier	Reason Code
1A-W-10-1106	BPK0738	NWTPH-Dx	Lube Oil	0.198	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	1.02	mg/l	J	CHR
1A-W-1-1106	BPK0738	NWTPH-Dx	Lube Oil	0.196	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	0.996	mg/l	J	CHR
1A-W-3-1106	BPK0738	NWTPH-Dx	Lube Oil	0.319	mg/l	J	BRL
1A-W-4-1106	BPK0738	As Diss ICPMS 6020	Arsenic	0.00019	mg/l	J	BRL
1B-W-1-1106	BPK0738	MTCA PAHs	Chrysene	0.0377	ug/l	J	BRL
	BPK0738	MTCA PAHs	Pyrene	0.0868	ug/l	J	BRL
	BPK0738	NWTPH-Dx	Lube Oil	0.812	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	3.57	mg/l	J	CHR
1C-W-1-1106	BPK0738	NWTPH-Dx	Lube Oil	0.464	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	1.48	mg/l	J	CHR
1C-W-4-1106	BPK0738	As Diss ICPMS 6020	Arsenic	0.00016	mg/l	J	BRL
	BPK0738	As Total ICPMS 6020	Arsenic	0.00014	mg/l	J	BRL
	BPK0738	NWTPH-Dx	Lube Oil	0.313	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	0.777	mg/l	J	CHR
	BPK0738	Pb Diss ICPMS 6020	Lead	0.00006	mg/l	J	BRL
2A-W-20-1106	BPK0738	NWTPH-Dx	Lube Oil	0.853	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	1.58	mg/l	J	CHR
2A-W-2-1106	BPK0738	NWTPH-Dx	Lube Oil	0.711	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	1.53	mg/l	J	CHR
2A-W-3-1106	BPK0738	MTCA PAHs	Pyrene	0.0491	ug/l	J	BRL
	BPK0738	NWTPH-Dx	Lube Oil	0.421	mg/l	J	BRL
2A-W-4-1106	BPK0738	NWTPH-Dx	Lube Oil	4.21	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	6.22	mg/l	J	CHR
	BPK0738	Pb Diss ICPMS 6020	Lead	0.00003	mg/l	J	BRL
	BPK0738	Pb Total ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00017)
2A-W-6-1106	BPK0738	NWTPH-Dx	Lube Oil	0.654	mg/l	J	SS/CHR
	BPK0738	NWTPH-Dx	DRO	4.21	mg/l	J	SS/CHR
5-W-10-1106	BPK0738	Pb Diss ICPMS 6020	Lead	0.00023	mg/l	J	BRL
	BPK0738	Pb Total ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00052)
5-W-1-1106	BPK0738	NWTPH-Dx	Lube Oil	12.1	mg/l	J	SS
	BPK0738	NWTPH-Dx	DRO	13.7	mg/l	J	SS
	BPK0738	Pb Diss ICPMS 6020	Lead	0.00029	mg/l	J	BRL
	BPK0738	Pb Total ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00051)
5-W-2-1106	BPK0738	NWTPH-Dx	Lube Oil	17.6	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	17.2	mg/l	J	CHR
	BPK0738	Pb Diss ICPMS 6020	Lead	0.00007	mg/l	J	BRL
	BPK0738	Pb Total ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00016)
5-W-4-1106	BPK0738	NWTPH-Dx	Lube Oil	0.341	mg/l	J	BRL
MW-10-1106	BPK0738	NWTPH-Dx	Lube Oil	0.157	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	0.59	mg/l	J	CHR
MW-11-1106	BPK0738	MTCA PAHs	Benzo(a)anthracene	0.0623	ug/l	J	BRL
	BPK0738	MTCA PAHs	Chrysene	0.0528	ug/l	J	BRL
	BPK0738	MTCA PAHs	Fluoranthene	0.083	ug/l	J	BRL
	BPK0738	NWTPH-Dx	Lube Oil	0.339	mg/l	J	BRL
MW-16-1106	BPK0738	NWTPH-Dx	Lube Oil	0.0976	mg/l	J	BRL

Table of Qualified Analytical Results
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Sample ID	SDG	Method	Analyte	Concentration		Qualifier	Reason Code
MW-20-1106	BPK0738	NWTPH-Dx	Lube Oil	4.14	mg/l	J	SS/CHR
	BPK0738	NWTPH-Dx	DRO	5.1	mg/l	J	SS/CHR
MW-22-1106	BPK0738	NWTPH-Dx	DRO	6.65	mg/l	J	SS/CHR
MW-26-1106	BPK0738	NWTPH-Dx	Lube Oil	0.837	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	1.5	mg/l	J	CHR
MW-270-1106	BPK0738	MTCA PAHs	Chrysene	0.492	ug/l	J	FD
	BPK0738	NWTPH-Dx	Lube Oil	3.3	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	3.78	mg/l	J	CHR
MW-27-1106	BPK0738	MTCA PAHs	Chrysene	0.717	ug/l	J	FD
	BPK0738	NWTPH-Dx	Lube Oil	3.94	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	4.31	mg/l	J	CHR
MW-310-1106	BPK0738	As Diss ICPMS 6020	Arsenic	0.0002	mg/l	J	BRL
	BPK0738	As Total ICPMS 6020	Arsenic	0.00032	mg/l	J	BRL
	BPK0738	Pb Total ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00012)
MW-31-1106	BPK0738	As Diss ICPMS 6020	Arsenic	0.00018	mg/l	J	BRL
	BPK0738	As Total ICPMS 6020	Arsenic	0.00027	mg/l	J	BRL
	BPK0738	Pb Total ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00012)
MW-34-1106	BPK0738	As Diss ICPMS 6020	Arsenic	0.00009	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	0.0931	mg/l	J	BRL
MW-35-1106	BPK0738	NWTPH-Dx	Lube Oil	0.257	mg/l	J	BRL/CHR
	BPK0738	NWTPH-Dx	DRO	1.46	mg/l	J	CHR
MW-36-1106	BPK0738	NWTPH-Dx	Lube Oil	1.72	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	2.64	mg/l	J	CHR
MW-37-1106	BPK0738	MTCA PAHs	Pyrene	0.0377	ug/l	J	BRL
	BPK0738	NWTPH-Dx	Lube Oil	0.497	mg/l	J	CHR
	BPK0738	NWTPH-Dx	DRO	1.15	mg/l	J	CHR
MW-90-1106	BPK0738	NWTPH-Dx	Lube Oil	0.187	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	0.584	mg/l	J	CHR
MW-9-1106	BPK0738	NWTPH-Dx	Lube Oil	0.194	mg/l	J	BRL
	BPK0738	NWTPH-Dx	DRO	0.622	mg/l	J	CHR
1A-W-2-1106	BPL0058	As Diss ICPMS 6020	Arsenic	0.00052	mg/l	J	BRL
	BPL0058	As Total ICPMS 6020	Arsenic	0.001	mg/l	U	MB (ORIG RESULT 0.00065)
	BPL0058	NWTPH-Dx	DRO	5.73	mg/l	J	CHR
	BPL0058	Pb Diss ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00003)
	BPL0058	Pb Total ICPMS 6020	Lead	0.00012	mg/l	J	BRL
1B-W-2-1106	BPL0058	NWTPH-Dx	DRO	0.397	mg/l	J	CHR
1B-W-3-1106	BPL0058	NWTPH-Dx	DRO	0.104	mg/l	U	MB
1C-W-2-1106	BPL0058	NWTPH-Dx	DRO	0.0173	mg/l	U	MB
2A-W-10-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.212	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.446	mg/l	J	CHR
2A-W-1-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.316	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	1.15	mg/l	J	CHR
2A-W-11-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.312	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.434	mg/l	J	CHR
2A-W-5-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.131	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.274	mg/l	U	MB

Table of Qualified Analytical Results
Skykomish Site-Wide Periodic Groundwater Sampling
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Test America Analytical Testing Corporation, Bothell, WA
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Sample ID	SDG	Method	Analyte	Concentration		Qualifier	Reason Code
2A-W-8-1106	BPL0058	NWTPH-Dx	DRO	0.081	mg/l	U	MB
2A-W-9-1106	BPL0058	MTCA PAHs	Pyrene	0.0811	ug/l	J	BRL
	BPL0058	NWTPH-Dx	Heavy Oil	0.277	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.999	mg/l	J	CHR
2B-W-4-1106	BPL0058	As Diss ICPMS 6020	Arsenic	0.00012	mg/l	J	BRL
	BPL0058	As Total ICPMS 6020	Arsenic	0.001	mg/l	U	MB (ORIG RESULT 0.0003)
	BPL0058	NWTPH-Dx	DRO	0.0115	mg/l	U	MB
	BPL0058	Pb Total ICPMS 6020	Lead	0.0001	mg/l	J	BRL
MW-1-1106	BPL0058	NWTPH-Dx	DRO	0.0334	mg/l	U	MB
MW-12-1106	BPL0058	NWTPH-Dx	DRO	0.148	mg/l	J	BRL
MW-14-1106	BPL0058	As Diss ICPMS 6020	Arsenic	0.00023	mg/l	J	BRL
	BPL0058	As Total ICPMS 6020	Arsenic	0.001	mg/l	U	MB (ORIG RESULT 0.00034)
	BPL0058	NWTPH-Dx	DRO	0.0418	mg/l	U	MB
	BPL0058	Pb Diss ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00007)
	BPL0058	Pb Total ICPMS 6020	Lead	0.00016	mg/l	J	BRL
MW-150-1106	BPL0058	NWTPH-Dx	DRO	0.139	mg/l	U	MB
MW-15-1106	BPL0058	NWTPH-Dx	DRO	0.117	mg/l	U	MB
MW-17-1106	BPL0058	NWTPH-Dx	DRO	3.76	mg/l	J	CHR
MW-18-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.0961	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.84	mg/l	J	CHR
MW-19-1106	BPL0058	NWTPH-Dx	DRO	0.058	mg/l	U	MB
MW-2-1106	BPL0058	As Diss ICPMS 6020	Arsenic	0.00033	mg/l	J	BRL
	BPL0058	As Total ICPMS 6020	Arsenic	0.001	mg/l	U	MB (ORIG RESULT 0.00035)
	BPL0058	Pb Diss ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00004)
	BPL0058	Pb Total ICPMS 6020	Lead	0.00012	mg/l	J	BRL
MW-21-1106	BPL0058	As Total ICPMS 6020	Arsenic	0.00184	mg/l	U	MB
	BPL0058	NWTPH-Dx	Heavy Oil	0.593	mg/l	J	CHR
	BPL0058	NWTPH-Dx	DRO	1.14	mg/l	J	CHR
	BPL0058	Pb Total ICPMS 6020	Lead	0.00018	mg/l	J	BRL
MW-28-1106	BPL0058	MTCA PAHs	Pyrene	0.0396	ug/l	J	BRL
	BPL0058	NWTPH-Dx	Heavy Oil	1.49	mg/l	J	CHR
	BPL0058	NWTPH-Dx	DRO	1.9	mg/l	J	CHR
	BPL0058	Pb Total ICPMS 6020	Lead	0.00047	mg/l	J	BRL
MW-3-1106	BPL0058	NWTPH-Dx	DRO	0.257	mg/l	J	CHR
MW-32-1106	BPL0058	Pb Diss ICPMS 6020	Lead	0.001	mg/l	U	MB (ORIG RESULT 0.00006)
MW-39-1106	BPL0058	MTCA PAHs	Chrysene	0.066	ug/l	J	BRL
	BPL0058	NWTPH-Dx	Heavy Oil	0.24	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.566	mg/l	J	CHR
MW-400-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.104	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.096	mg/l	J	BRL
MW-40-1106	BPL0058	NWTPH-Dx	DRO	0.0735	mg/l	U	MB
MW-4-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.139	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.0972	mg/l	J	BRL
MW-6-1106	BPL0058	NWTPH-Dx	Heavy Oil	3.18	mg/l	J	CHR
	BPL0058	NWTPH-Dx	DRO	5.67	mg/l	J	CHR
MW-7-1106	BPL0058	NWTPH-Dx	Heavy Oil	0.346	mg/l	J	BRL
	BPL0058	NWTPH-Dx	DRO	0.381	mg/l	J	CHR

Table of Qualified Analytical Results
Skykomish Site-Wide Periodic Groundwater Sampling
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Laboratory Reports BPK0738 and BPL0058

Sample ID	SDG	Method	Analyte	Concentration		Qualifier	Reason Code
MW-8-1106	BPL0058	NWTPH-Dx	Heavy Oil	57.1	mg/l	J	CHR
	BPL0058	NWTPH-Dx	DRO	70.1	mg/l	J	CHR

Qualifiers:

J – Estimated concentration.

U – Evaluated to be undetected at the reported concentration; result is considered to be a false positive.

Reason Codes:

BRL – Result is greater than the method detection limit, but less than the reporting limit.

CHR – The chromatographic pattern is not consistent with the standard used.

FD – Field duplicate outside limits.

MB – Method blank contamination.

SS – Surrogate standard outside limits.

ANALYTICAL DATA VERIFICATION CHECKLIST

Project Name: Skykomish	Laboratory: Test America Analytical Testing Corporation of Bothell, WA
Project Reference: Site-Wide Periodic Groundwater Sampling	Sample Matrix: Groundwater
RETEC Project: BN050-16423-710	Sample Start Date: 11/28/2006
Verified By/Date Verified: Leslie Hill 02/07/2007	Sample End Date: 11/30/2006

Samples Analyzed: Refer to the Table of Samples Analyzed (page 2).

Parameters Verified: Semivolatile Petroleum Products (Diesel Range Hydrocarbons (DRO) and Lube Oil Range Hydrocarbons or Diesel Range Organics (DRO) and Heavy Oil Range Hydrocarbons) by Method NWTPH-Dx, Total and Dissolved Metals Arsenic and Lead by EPA Method 6020, and Polynuclear Aromatic Hydrocarbons by EPA Method 8270C-HVI (high volume injection) or 8270C-SIM (selected ion monitoring).

Laboratory SDGs: BPK0738 and BPL0058

PRECISION, ACCURACY, METHOD COMPLIANCE, AND COMPLETENESS ASSESSMENT

Precision:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Precision is the measure of variability of individual sample measurements. Field precision was determined by comparison of field duplicate sample results. Laboratory precision was determined by examination of laboratory duplicate results. Evaluation of both field and laboratory duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD QC limits were set at 0-30% for water samples. Laboratory RPD limits referenced EPA published QC limits. Although some data require qualification based on field duplicate RPDs, overall field and laboratory precision is acceptable. Precision measurements are reviewed in items 17, 20, and 21.

Accuracy:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Field accuracy, a measure of the sampling bias, could not be determined as no trip blank, field blank, or equipment rinse blank samples were collected. Laboratory accuracy is a measure of the system bias, and was measured by evaluating laboratory control sample/laboratory control sample duplicate (LCS/LCSD), matrix spike/matrix spike duplicate (MS/MSD), and organic system monitoring compounds (surrogate) percent recoveries (%Rs). LCS/LCSD %Rs, which demonstrated the overall performance of the analysis, were compared to EPA published QC limits. MS/MSD %Rs, which provided information on sample matrix interferences, were compared to EPA published QC limits or laboratory control charted limits. System monitoring compound or surrogate recoveries, which measured system performance and efficiency during organic analysis, were compared to EPA published QC limits. Although some data require qualification based on surrogate %Rs, overall laboratory accuracy is acceptable. Accuracy measurements are reviewed in items 12, 14, 15, and 16.

Method Compliance:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Method compliance was determined by evaluating sample integrity, holding time, and laboratory blanks against method specified requirements, while applying EPA data validation guidelines. Although some data require qualification based on detections below the reporting limits, chromatographic matches, or laboratory blank contamination, overall method compliance is acceptable based on the supplied data. Method compliance measurements are reviewed in items 4, 8, 11, 13, 18, 19, 20, and 22.

Completeness:	**X**	Acceptable		Unacceptable	LH	Initials

Comments: Completeness is the overall ratio of the number of samples planned versus the number of samples with valid analyses. Completeness goals are set at 90-100%. Determination of completeness included a review of chain of custody records, laboratory analytical methods and detection limits, laboratory case narratives, and project requirements. Completeness also included 100% review of the laboratory sample data results, QC summary reports, and electronic data deliverables (EDDs). All of the data received from the laboratory are useable with qualification. Completeness of the data is calculated to be 100% and is acceptable.

ANALYTICAL DATA VERIFICATION CHECKLIST

VERIFICATION CRITERIA CHECK						
Data verification flags used in this review: J – estimated concentration U – evaluated to be undetected at the reported concentration; result is considered to be a false positive The following comments requiring qualification are in bold type. The other comments are of interest, but qualification of the samples was not necessary. Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).						
1. Did the laboratory identify any non-conformances related to the analytical results?	**X**	Yes		No	LH	Initials
Laboratory comments: BPL0058: The wind storm that impacted most of our region, causing wide-spread damage and power outages, has affected the operations of TestAmerica-Seattle. Emergency measures were taken immediately following the storm by laboratory staff to help safeguard the storage temperatures of your samples. Measures included procuring wet and dry ice for placement into our sample storage units, the use of generator power and the rental of a mobile refrigeration unit. However, despite the best efforts of the laboratory, we were unable to maintain your samples below the recommended temperature of 6ºC for the entire 36-hour power outage. During this time the refrigeration units that house samples slated for volatile analyses never exceeded a temperature of 9 ºC and the refrigeration units that store samples slated for semivolatile analyses never exceeded a temperature of 16 ºC. The samples and analyses affected have been qualified in the report. Please note that in an e-mail dated 02/08/2007 the laboratory clarified that lube oil range hydrocarbons and heavy oil range hydrocarbons are both defined as the C25-C36 range and are, therefore, equal. Data qualification, if any, related to the laboratory observations are discussed in the following sections.						
2. Were sample Chain-of-Custody forms complete?	**X**	Yes		No	LH	Initials
Comments: COC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt.						
3. Were all the analyses requested for the samples on the COCs completed by the laboratory?	**X**	Yes		No	LH	Initials
Comments: All requested analyses were completed.						
4. Were samples received in good condition and at the appropriate temperature?	**X**	Yes		No	LH	Initials
Comments: Samples were received on ice, intact, and in good condition with cooler temperatures both within and outside the 4°C ± 2°C acceptance range at 1.9°C to 5.9°C as noted in the case narratives. As noted by the laboratory, samples associated with report BPL0058 were not maintained within the 4°C ± 2°C acceptance range while they were stored at the laboratory. Samples slated for semivolatile analyses reached temperatures up to 16°C. Cooler temperatures that were greater than 6°C are judged acceptable as samples were well below room temperature (~25ºC).						
5. Were the requested analytical methods in compliance with WP/QAPP, permit, or COC?	**X**	Yes		No	LH	Initials
Comments: Reported methods and target analyte lists were in compliance with COC records.						

6. Were detection limits in accordance with WP/QAPP, permit, or method?	**X**	Yes		No	LH	Initials

Comments: Reported detection limits are achievable by the quoted methods.

Analytes reported below the laboratory reporting limits but above the laboratory MDLs were qualified as J to indicate that the concentrations are estimated.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

7. Do the laboratory reports include only those constituents requested to be reported for a specific analytical method?	**X**	Yes		No	LH	Initials

Comments: Only the requested target analytes were reported.

8. Were sample holding times met?	**X**	Yes		No	LH	Initials

Comments: Extraction and analytical holding times were met for all samples and analyses.

9. Were correct concentration units reported?	**X**	Yes		No	LH	Initials

Comments: Correct concentration units were reported.

10. Were the reporting requirements for flagged data met?	**X**	Yes		No	LH	Initials

Comments: Data verification qualifiers override any assigned laboratory flags.

11. Were laboratory blank samples free of target analyte contamination?		Yes	**X**	No	LH	Initials

Comments: All laboratory blanks were free of target analyte contamination, with the following exceptions.

BPK0738: <u>6020</u>: Total lead was detected in the method blank extracted on 12/01/2006 at 0.0000900 mg/L. As total lead was detected at less than ten times the blank amount and at less than the reporting limit in associated samples 2A-W-4-1106, 5-W-10-1106, 5-W-1-1106, 5-W-2-1106, MW-310-1106, and MW-31-1106, it was qualified as U at the reporting limit to indicate that it was evaluated to be undetected at the reporting limit and that the results are considered to be false positives.

BPL0058: <u>6020</u>: Total arsenic was detected in the method blank extracted on 12/05/2006 at 0.000220 mg/L. As total arsenic was detected at less than ten times the blank amount and at less than the reporting limit in associated samples 1A-W-2-1106, 2B-W-4-1106, MW-14-1106, and MW-2-1106, it was qualified as U at the reporting limit to indicate that it was evaluated to be undetected at the reporting limit and that the results are considered to be false positives. As total arsenic was detected at less than ten times the blank amount in associated sample MW-21-1106, it was qualified as U at the reported amount to indicate that it was evaluated to be undetected at the reported concentration and that the result is considered to be a false positive.

Dissolved lead was detected in the method blank extracted on 12/04/2006 at 0.0000300 mg/L. As dissolved lead was detected at less than ten times the blank amount and at less than the reporting limit in associated samples 1A-W-2-1106, MW-14-1106, MW-2-1106, and MW-32-1106, it was qualified as U at the reporting limit to indicate that it was evaluated to be undetected at the reporting limit and that the results are considered to be false positives.

<u>NWTHP-Dx</u>: DRO was detected in the method blanks extracted on 12/11/2006 and 12/12/2006 at 0.0599 mg/L and 0.0103 mg/L, respectively. As DRO was detected at less than five times the blank amounts in associated samples 1B-W-3-1106, 1C-W-2-1106, 2A-W-5-1106, 2A-W-8-1106, 2B-W-4-1106, MW-1-1106, MW-14-1106, MW-150-1106, MW-15-1106, MW-19-1106, and MW-40-1106, it was qualified as U at the reported concentrations to indicate that it was evaluated to be undetected at the reported concentrations and that the results are considered to be false positives.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

12. Were trip blank, field blank, and/or equipment rinse blank samples free of target analyte contamination?	NA	Yes	NA	No	LH	Initials
Comments: There were no trip blank, field blank, or equipment rinse blank samples associated with this sample set. Field accuracy could not be evaluated.						
13. Were instrument calibrations within method or data verification control limits?	NA	Yes	NA	No	LH	Initials
Comments: Instrument calibration information is not required for this level of data review and was not evaluated as part of this data verification.						
14. Were surrogate recoveries within control limits?		Yes	**X**	No	LH	Initials
Comments: Surrogate percent recoveries (%Rs) for organic analyses were within data verification QC criteria for all samples or were diluted beyond the ability to quantitate recoveries, with the following exceptions. **BPK0738: <u>NWTPH-Dx</u>: In sample 5-W-1-1106 the recovery of the surrogate, 2-FBP, was outside laboratory QC limits of 53-125% at 134% and the recovery of the surrogate, octacosane was outside laboratory QC limits of 68-125% at 160%. Detected analytes, DRO and lube oil range hydrocarbons were qualified as J to indicate estimated concentrations in this sample.** **In sample MW-22-1106 the recovery of the surrogate, 2-FBP, was outside laboratory QC limits of 53-125% at 143% and the recovery of the surrogate, octacosane was outside laboratory QC limits of 68-125% at 141%. The detected analyte, DRO, was qualified as J to indicate an estimated concentration in this sample.** **In sample MW-20-1106 the recovery of the surrogate, 2-FBP, was outside laboratory QC limits of 53-125% at 141% and the recovery of the surrogate, octacosane was outside laboratory QC limits of 68-125% at 129%. Detected analytes, DRO and lube oil range hydrocarbons were qualified as J to indicate estimated concentrations in this sample.** **In sample 2A-W-6-1106 the recovery of the surrogate, 2-FBP, was outside laboratory QC limits of 53-125% at 126%. Detected analytes, DRO and lube oil range hydrocarbons were qualified as J to indicate estimated concentrations in this sample.** Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).						
15. Were laboratory control sample recoveries within control limits?	**X**	Yes		No	LH	Initials
Comments: LCS and LCSD (blank spike) recoveries were within data verification or laboratory control-charted QC limits for all target analytes.						
16. Were matrix spike recoveries within control limits?		Yes	**X**	No	LH	Initials
Comments: Project specific MS and MSD recoveries for target analytes were within data verification QC limits, with the following exception. MS and MSD spike recoveries for non-project samples were not considered since matrix similarity to project samples could not be guaranteed. BPL0058: <u>NWTPH-Dx</u>: In sample 1A-W-2-1106 MSD the recovery of DRO was outside laboratory QC limits of 50-150% at 44.2% and the recovery of heavy oil range hydrocarbons was outside laboratory QC limits of 50-150% at 0.690%. As the MS %Rs were within QC limits and the MS/MSD RPDs were also within QC limits, professional judgment determined that no qualification of data was necessary.						
17. Were duplicate RPDs and/or serial dilution %Ds within control limits?	**X**	Yes		No	LH	Initials
Comments: Laboratory RPDs for target analytes in LCS/LCSD and project-specific MS/MSD samples were within data verification control limits. Serial dilution information is not required for this level of data review and was not evaluated as part of this data verification.						

ANALYTICAL DATA VERIFICATION CHECKLIST

18. Were organic system performance criteria met?	NA	Yes	NA	No	LH	Initials
Comments: System performance data is not required for this level of data review and was not evaluated as part of this data verification.						
19. Were internal standards within method criteria for GC/MS sample analyses?	NA	Yes	NA	No	LH	Initials
Comments: Internal standard information is not required for this level of data review and was not evaluated as part of this data verification.						
20. Were inorganic system performance criteria met?	NA	Yes	NA	No	LH	Initials
Comments: System performance data is not required for this level of data review and was not evaluated as part of this data verification.						
21. Were blind field duplicates collected? If so, discuss the precision (RPD) of the results.	**X**	Yes		No	LH	Initials

Duplicate Sample No.	5-W-10-1106		Primary Sample No.	5-W-1-1106
Duplicate Sample No.	2A-W-70-1106		Primary Sample No.	2A-W-7-1106
Duplicate Sample No.	MW-90-1106		Primary Sample No.	MW-9-1106
Duplicate Sample No.	MW-310-1106		Primary Sample No.	MW-31-1106
Duplicate Sample No.	1A-W-10-1106		Primary Sample No.	1A-W-1-1106
Duplicate Sample No.	2A-W-20-1106		Primary Sample No.	2A-W-2-1106
Duplicate Sample No.	MW-270-1106		Primary Sample No.	MW-27-1106
Duplicate Sample No.	MW-150-1106		Primary Sample No.	MW-15-1106
Duplicate Sample No.	MW-400-1106		Primary Sample No.	MW-4-1106

Comments: The RPDs for the duplicates were within the 0-30% data verification QC limits for water samples, or RPDs were no applicable due to results that were + the detection limit, or were undetected in both samples, with the exceptions noted in bold type in the tables below. Field duplicate and native sample concentrations that were both undetected are not reflected in the tables since RPDs are not applicable.

The following RPDs were calculated:

Method	Analyte	1A-W-10-1106	1A-W-1-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
MTCA PAHs	Fluorene	0.132	0.121	9		0.0943	0.0943	ug/l
NWTPH-Dx	Lube Oil	0.198	0.196	1		0.472	0.481	mg/l
NWTPH-Dx	DRO	1.02	0.996	2		0.236	0.24	mg/l

Method	Analyte	2A-W-20-1106	2A-W-2-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
NWTPH-Dx	Lube Oil	0.853	0.711	18		0.472	0.481	mg/l
NWTPH-Dx	DRO	1.58	1.53	3		0.236	0.24	mg/l

Method	Analyte	5-W-10-1106	5-W-1-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
6020	Arsenic	0.0053	0.00519	2		0.001	0.001	mg/l
6020	Arsenic	0.00544	0.0053	3		0.001	0.001	mg/l
6020	Lead	0.00023	0.00029	23		0.001	0.001	mg/l
6020	Lead	0.00052	0.00051	2		0.001	0.001	mg/l

(continued on the next page)

Method	Analyte	**MW-270-1106**	**MW-27-1106**	RPD	Qualifier	Duplicate RL	Sample RL	Units
MTCA PAHs	**Chrysene**	**0.492**	**0.717**	**37**	**J**	**0.0943**	**0.0943**	**ug/l**
MTCA PAHs	Pyrene	0.308	0.342	10		0.0943	0.0943	ug/l
NWTPH-Dx	Lube Oil	3.3	3.94	18		2.36	2.36	mg/l
NWTPH-Dx	DRO	3.78	4.31	13		1.18	1.18	mg/l

Method	Analyte	MW-310-1106	MW-31-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
6020	Arsenic	0.0002	0.00018	11		0.001	0.001	mg/l
6020	Arsenic	0.00032	0.00027	17		0.001	0.001	mg/l
6020	Lead	0.00012	0.00012	0		0.001	0.001	mg/l

Method	Analyte	MW-90-1106	MW-9-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
MTCA PAHs	Acenaphthene	0.143	0.138	4		0.0943	0.0943	ug/l
MTCA PAHs	Fluorene	0.183	0.175	4		0.0943	0.0943	ug/l
NWTPH-Dx	Lube Oil	0.187	0.194	4		0.472	0.472	mg/l
NWTPH-Dx	DRO	0.584	0.622	6		0.236	0.236	mg/l

Method	Analyte	MW-150-1106	MW-15-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
NWTPH-Dx	DRO	0.139	0.117	17		0.238	0.238	mg/l

Method	Analyte	MW-400-1106	MW-4-1106	RPD	Qualifier	Duplicate RL	Sample RL	Units
NWTPH-Dx	Heavy Oil	0.104	0.139	29		0.481	0.476	mg/l
NWTPH-Dx	DRO	0.096	0.0972	1		0.24	0.238	mg/l

BPK0738: <u>8270C-SIM</u>: In the field duplicates, MW-270-1106 and MW-27-1106, the RPD for the analyte chrysene exceeded the QC limits of 0-30% at 37%. This analyte was qualified as J to indicate estimated concentrations in both samples.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

22. Were qualitative criteria for organic target analyte identification met?		Yes	**X**	No	LH	Initials

Comments: Trained laboratory personnel reviewed retention times and chromatography in accordance with the laboratory's internal QA/QC program. Laboratory personnel noted the following data outliers.

BPK0738: <u>NWTPH-Dx</u>: DRO was noted by the laboratory to have a chromatographic pattern not consistent with diesel fuel in samples 1C-W-1-1106 and 1C-W-4-1106. DRO was qualified as J to indicate estimated concentrations in these samples.

DRO was noted by the laboratory to be due to overlap from a heavy oil range product in samples 1A-W-1-1106, 1A-W-10-1106, MW-10-1106. DRO was qualified as J to indicate estimated concentrations in these samples.

BPL0058: <u>NWTPH-Dx</u>: Heavy oil range hydrocarbons was noted by the laboratory to be due to hydrocarbons eluting primarily in the diesel range. Heavy oil range hydrocarbons was qualified as J to indicate an estimated concentration in this sample.

Heavy oil range hydrocarbons was noted by the laboratory to not have the pattern and range consistent with typical petroleum products in sample MW-21-1106. The laboratory further noted that heavy oil range hydrocarbons might be due to biogenic interference in this sample. Heavy oil range hydrocarbons was qualified as J to indicate an estimated concentration in this sample.

(continued on the next page)

Comments: BPL0058: NWTPH-Dx (continued): DRO in samples 1A-W-2-1106, 2A-W-9-1106, MW-17-1106, MW-21-1106, MW-28-1106, and MW-6-1106 was noted by the laboratory as having a hydrocarbon pattern that most closely resembles weathered diesel. Heavy oil range hydrocarbons in sample MW-28-1106 was noted by the laboratory as having a hydrocarbon pattern that most closely resembles a blend of weathered diesel as well as possible oil and/or biogenic interference. DRO in sample 1B-W-2-1106 was noted by the laboratory as not having a distinct diesel pattern and possibly being due to heavily weathered diesel. DRO in samples 2A-W-10-1106, 2A-W-1-1106, 2A-W-11-1106, MW-18-1106, MW-3-1106, MW-39-1106, and MW-7-1106 was noted as not having a distinct diesel pattern and possibly being due to heavily weathered diesel or biogenic interference. These analytes were qualified as J to indicate estimated concentrations.

BPK0738 and BPL0058: NWTPH-Dx: DRO in samples 1B-W-1-1106, 2A-W-20-1106, 2A-W-2-1106, 2A-W-4-1106, 2A-W-6-1106, 5-W-2-1106, MW-20-1106, MW-22-1106, MW-26-1106, MW-270-1106, MW-27-1106, MW-35-1106, MW-36-1106, MW-37-1106, MW-90-1106, MW-9-1106, and MW-8-1106, lube oil range hydrocarbons in samples 1B-W-1-1106, 2A-W-20-1106, 2A-W-2-1106, 2A-W-4-1106, 2A-W-6-1106, 5-W-2-1106, MW-20-1106, MW-26-1106, MW-270-1106, MW-27-1106, MW-35-1106, MW-36-1106, and MW-37-1106, and heavy oil range hydrocarbons in sample MW-8-1106 were noted as being a complex mixture of diesel range and heavy oil range organics. These analytes were qualified as J in these samples to indicate estimated concentrations.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

23. Were 100% of the EDD concentrations and reporting limits compared to the hardcopy data reports?	**X**	Yes		No	LH	Initials

Comments: There were no discrepancies between the EDD concentrations and reporting limits and the hardcopy data reports.

Duplicate results from reanalysis were evaluated by the data validator who determined the most reliable results based on data verification rules, method knowledge, and professional judgment. Duplicate results, determined to be less reliable, were designated as not reportable in the database.

24. General Comments: Data were evaluated based on verification criteria set forth in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review*, document number USEPA-540-R-04-009, January 2005, and *USEPA CLP National Functional Guidelines for Inorganic Data Review*, document number EPA540/R-04/004 of October 2004 as they applied to the reported methodology. Field duplicate RPD control limits were taken from the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, February 1988, upheld in DRAFT 1993.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 4-7).

ENSR | AECOM

Prepared for:
The Burlington Northern and Santa Fe Railway Company
Skykomish

Organic Data Verification Report
BNSF Skykomish
Groundwater Samples, July and August 2007

Prepared for:
Steve Howard
Project Manager

Prepared by:
Ann Biegelsen
Environmental Quality Assurance Chemist

The RETEC Group, Inc.
September 24, 2007
Document No.: 01140-204-0340

Merged with ENSR in 2007
RETEC

Overview

The samples analyzed for the BNSF Skykomish Groundwater sampling event from July 31st and August 1st 2007 are listed in the Table of Samples Analyzed (page 2). Data verification was performed on thirty nine groundwater samples, and one equipment rinse blank sample.

The samples were analyzed by TestAmerica of Bothell, WA. The verified analyses were: Diesel Range Hydrocarbons and Lube Oil Range Hydrocarbons by NWTPH-Dx (without Silica Gel Clean-up); and Diesel Range Hydrocarbons and Lube Oil Range Hydrocarbons by NWTPH-Dx (with Silica Gel Clean-up).

Analysis of Semi Volatile Organic Compounds (SVOCs) Tentatively Identified Compounds (TICs) by SW846 GC/MS method 8270C were performed but were not verified as part of this data review, as no sample chromatogram or TIC spectra were included in the data deliverable.

The RETEC Analytical Data Verification Checklist is presented as pages 5-9. Data were evaluated based on verification criteria set forth in the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review, document number USEPA-540-R-04-009, January 2005 (Draft Final) with additional reference to USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, document number EPA 540/R-99-008 of October 1999, as they applied to the reported methodology. Field duplicate RPD control limits were taken from the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, February 1988, upheld in DRAFT 1993.

The following data components were reviewed during the data validation procedure:

Submitted Deliverables
Case Narratives
Chain-of-Custody form(s) and sample integrity
Sample results, reporting detection limits, method detection limits, dilution factors
Holding times
Method blank results
Equipment rinse blank results
LCS/LCSD (blank spike) results
MS (matrix spike) results
Laboratory duplicate results
Organic surrogate recoveries
Blind field duplicate results
Electronic data deliverables (EDDs)

Data Validation Qualifiers Assigned During this Review

J estimated concentration

Assigned qualifiers are detailed in the RETEC Analytical Data Verification Checklist and are summarized in the Table of Qualified Analytical Results (pages 3-4).

Overall Data Assessment

Precision, accuracy, method compliance, and completeness of the data set have been determined to be acceptable, based on the data submitted. The data are suitable for their intended use with the qualifications noted.

Table of Samples Analyzed
BNSF Skykomish
Groundwater with Water QC
TestAmerica Laboratory Bothell Report BQH0048
July and August 2007 Sampling

Matrix	Sample ID	Parent Sample ID	Sample Date and Time		Lab SDG	Lab Sample ID
Groundwater	1A-W-1-0707		7/31/2007	15:25	BQH0048	BQH0048-06
Groundwater	1A-W-30-0707	1A-W-3-0707	7/31/2007	17:00	BQH0048	BQH0048-10
Groundwater	1A-W-3-0707		7/31/2007	17:52	BQH0048	BQH0048-09
Groundwater	1A-W-4-0707		7/31/2007	14:10	BQH0048	BQH0048-11
Groundwater	1A-W-5-0707		7/31/2007	15:05	BQH0048	BQH0048-12
Groundwater	1B-W-1-0707		7/31/2007	9:15	BQH0048	BQH0048-18
Groundwater	1B-W-2-0707		7/31/2007	14:15	BQH0048	BQH0048-05
Groundwater	1B-W-3-0707		7/31/2007	9:38	BQH0048	BQH0048-01
Groundwater	1C-W-1-0707		7/31/2007	10:40	BQH0048	BQH0048-02
Groundwater	1C-W-2-0707		8/1/2007	12:10	BQH0048	BQH0048-36
Groundwater	1C-W-3-0707		7/31/2007	11:30	BQH0048	BQH0048-03
Groundwater	1C-W-4-0707		7/31/2007	12:10	BQH0048	BQH0048-04
Groundwater	2A-W-100-0707	2A-W-1-0707	7/31/2007	15:45	BQH0048	BQH0048-08
Groundwater	2A-W-10-0707		7/31/2007	12:15	BQH0048	BQH0048-22
Groundwater	2A-W-1-0707		7/31/2007	16:02	BQH0048	BQH0048-07
Groundwater	2A-W-11-0707		7/31/2007	10:10	BQH0048	BQH0048-19
Groundwater	2A-W-22-0707		7/31/2007	16:00	BQH0048	BQH0048-15
Groundwater	2A-W-6-0707		7/31/2007	16:55	BQH0048	BQH0048-31
Groundwater	2A-W-9-0707		7/31/2007	12:45	BQH0048	BQH0048-23
Groundwater	2B-W-4-0707		7/31/2007	17:00	BQH0048	BQH0048-14
Groundwater	5-W-14-0707		8/1/2007	8:45	BQH0048	BQH0048-37
Groundwater	5-W-15-0707		8/1/2007	10:20	BQH0048	BQH0048-38
Groundwater	5-W-16-0707		8/1/2007	12:45	BQH0048	BQH0048-40
Groundwater	5-W-17-0707		8/1/2007	11:50	BQH0048	BQH0048-39
Groundwater	5-W-18-0707		8/1/2007	9:10	BQH0048	BQH0048-32
Groundwater	5-W-190-0707	5-W-19-0707	8/1/2007	10:15	BQH0048	BQH0048-34
Groundwater	5-W-19-0707		8/1/2007	10:00	BQH0048	BQH0048-33
Groundwater	5-W-20-0707		8/1/2007	11:15	BQH0048	BQH0048-35
Groundwater	5-W-4-0707		7/31/2007	9:50	BQH0048	BQH0048-24
Groundwater	MW-160-0707	MW-16-0707	7/31/2007	8:45	BQH0048	BQH0048-17
Groundwater	MW-16-0707		7/31/2007	8:35	BQH0048	BQH0048-16
Groundwater	MW-19-0707		7/31/2007	8:50	BQH0048	BQH0048-25
Groundwater	MW-3-0707		7/31/2007	11:25	BQH0048	BQH0048-21
Groundwater	MW-34-0707		7/31/2007	11:00	BQH0048	BQH0048-26
Groundwater	MW-35-0707		7/31/2007	12:00	BQH0048	BQH0048-27
Groundwater	MW-37-0707		7/31/2007	16:05	BQH0048	BQH0048-13
Groundwater	MW-38-0707		7/31/2007	14:10	BQH0048	BQH0048-28
Groundwater	MW-39-0707		7/31/2007	14:40	BQH0048	BQH0048-29
Groundwater	MW-4-0707		7/31/2007	10:50	BQH0048	BQH0048-20
Water QC	MW-500-0707	Equipment Rinse Blank	7/31/2007	15:00	BQH0048	BQH0048-30

Table of Qualified Analytical Results
BNSF Skykomish
Groundwater with Water QC
TestAmerica Laboratory Bothell Report BQH0048
July and August 2007 Sampling

Lab SDG	Sample ID	Method	Analyte	Concentration		Qualifier	Reason Code
BQH0048	1A-W-1-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.202	mg/l	J	BRL
BQH0048	1A-W-30-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.118	mg/l	J	BRL
BQH0048	1A-W-30-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.147	mg/l	J	BRL
BQH0048	1A-W-3-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.116	mg/l	J	BRL
BQH0048	1A-W-3-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.155	mg/l	J	BRL
BQH0048	1B-W-1-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.141	mg/l	J	BRL
BQH0048	1B-W-2-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.203	mg/l	J	BRL
BQH0048	1C-W-1-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.107	mg/l	J	BRL
BQH0048	1C-W-1-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.129	mg/l	J	BRL
BQH0048	1C-W-4-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.240	mg/l	J	BRL
BQH0048	1C-W-4-0707	NWTPH-Dx w/SG	Diesel Range Hydrocarbons	0.123	mg/l	J	BRL
BQH0048	2A-W-100-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.384	mg/l	J	BRL
BQH0048	2A-W-10-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.0955	mg/l	J	BRL
BQH0048	2A-W-10-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.322	mg/l	J	CHRO
BQH0048	2A-W-1-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.425	mg/l	J	BRL
BQH0048	2A-W-11-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	1.12	mg/l	J	CHRO
BQH0048	2A-W-11-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.884	mg/l	J	CHRO
BQH0048	2A-W-6-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.135	mg/l	J	BRL
BQH0048	2A-W-6-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.768	mg/l	J	CHRO
BQH0048	2A-W-6-0707	NWTPH-Dx w/SG	Diesel Range Hydrocarbons	0.223	mg/l	J	BRL
BQH0048	2A-W-9-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.195	mg/l	J	BRL
BQH0048	2A-W-9-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.728	mg/l	J	CHRO
BQH0048	5-W-15-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.182	mg/l	J	BRL, SUR
BQH0048	5-W-18-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.248	mg/l	J	BRL
BQH0048	5-W-18-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.588	mg/l	J	CHRO
BQH0048	5-W-18-0707	NWTPH-Dx w/SG	Diesel Range Hydrocarbons	0.0485	mg/l	J	BRL
BQH0048	5-W-20-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.216	mg/l	J	BRL
BQH0048	5-W-20-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.527	mg/l	J	CHRO
BQH0048	5-W-20-0707	NWTPH-Dx w/SG	Diesel Range Hydrocarbons	0.0391	mg/l	J	BRL
BQH0048	5-W-4-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.193	mg/l	J	BRL
BQH0048	5-W-4-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.311	mg/l	J	CHRO
BQH0048	MW-3-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.130	mg/l	J	BRL
BQH0048	MW-34-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.0488	mg/l	J	BRL
BQH0048	MW-35-0707	NWTPH-Dx w/SG	Diesel Range Hydrocarbons	0.0686	mg/l	J	BRL
BQH0048	MW-37-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.223	mg/l	J	BRL
BQH0048	MW-37-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.553	mg/l	J	CHRO
BQH0048	MW-39-0707	NWTPH-Dx	Lube Oil Range Hydrocarbons	0.380	mg/l	J	BRL
BQH0048	MW-39-0707	NWTPH-Dx	Diesel Range Hydrocarbons	0.681	mg/l	J	CHRO

Table Definitions continued on next page

Qualifier Definitions
J – Estimated concentration.

Reason Code Definitions
BRL – Concentration reported is greater than the MDL but less than the reporting limit.
CHRO – Chromatographic interference may have effected the quantitation of the detected result.
SUR – Surrogate recovery is outside quality control limits.

RETEC ANALYTICAL DATA VERIFICATION CHECKLIST

Project Name: BNSF Skykomish	Laboratory: TestAmerica of Bothell, WA
Project Reference: 2007 2nd Quarter Groundwater Monitoring	Sample Matrix: Groundwater with Water QC
RETEC Project: 01140-204-0340	Sample Start Date: 07/31/2007
Verified By/Date Verified: Ann Biegelsen / 09/24/2007	Sample End Date: 08/01/2007

Samples Analyzed: Refer to the Table of Samples Analyzed (page 2).

Parameters Verified: Diesel Range Hydrocarbons and Lube Oil Range Hydrocarbons by NWTPH-Dx (without Silica Gel Clean-up); and Diesel Range Hydrocarbons and Lube Oil Range Hydrocarbons by NWTPH-Dx (with Silica Gel Clean-up).

Analysis of Semi Volatile Organic Compounds (SVOCs) Tentatively Identified Compounds (TICs) by SW846 GC/MS method 8270C were performed but were not verified as part of this data review, as no sample chromatogram or TIC spectra were included in the data deliverable.

Not all samples were analyzed for every parameter. Refer to individual Chain of Custody reports for the exact analyses requested.

Laboratory Project IDs: BQH0048

PRECISION, ACCURACY, METHOD COMPLIANCE, AND COMPLETENESS ASSESSMENT

Precision:	**X**	Acceptable		Unacceptable	AB	Initials

Comments: Precision is the measure of variability of individual sample measurements. Field precision was determined by comparison of field duplicate sample results. Laboratory precision was determined by examination of laboratory duplicate results. Evaluation of both field and laboratory duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD QC limits were set at 0-30% for water samples. Laboratory RPD limits referenced EPA published QC limits. No data require qualification based on field or laboratory duplicate precision measurements, and overall field and laboratory precision is acceptable. Precision measurements are reviewed in items 17, 20, and 21.

Accuracy:	**X**	Acceptable		Unacceptable	AB	Initials

Comments: Field accuracy, a measure of the sampling bias, was determined by reviewing equipment rinse blank results for evidence of sample contamination stemming from field activities. Laboratory accuracy is a measure of the system bias, and was measured by evaluating laboratory control sample/laboratory control sample duplicate (LCS/LCSD), matrix spike/matrix spike duplicate (MS), and organic system monitoring compounds (surrogate) percent recoveries (%Rs). LCS/LCSD %Rs, which demonstrated the overall performance of the analysis, were compared to EPA published QC limits. MS %Rs, which provided information on sample matrix interferences, were compared to EPA published QC limits or laboratory control charted limits. System monitoring compound or surrogate recoveries, which measured system performance and efficiency during organic analysis, were compared to EPA published QC limits or laboratory control charted limits. Although one data point requires qualification based on a surrogate %R outlier (see item 14), overall field and laboratory accuracy is acceptable. Accuracy measurements are reviewed in items 12, 14, 15 and 16.

Method Compliance:	**X**	Acceptable		Unacceptable	AB	Initials

Comments: Method compliance was determined by evaluating sample integrity, holding time, and laboratory blanks against method specified requirements, while applying EPA data validation guidelines. Additionally, footnotes about chromatographic interference affecting analyte quantitation were noted by the laboratory and considered in data qualification during this data review. Although some data require qualification based on analytes detected below the laboratory reporting limits (RLs) but above the laboratory method detection limits (MDLs) (see item 6), or based on chromatographic interference (see item 22), overall method compliance is acceptable based on the supplied data. Method compliance measurements are reviewed in items 4, 6, 8, 11, 13, 18, 19, 20 and 22.

RETEC ANALYTICAL DATA VERIFICATION CHECKLIST

Completeness:	X	Acceptable		Unacceptable	AB	Initials
Comments: Completeness is the overall ratio of the number of samples planned versus the number of samples with verified analyses. Completeness goals are set at 90-100%. Determination of completeness included a review of chain of custody records, laboratory analytical methods and detection limits, laboratory case narratives, and project requirements. Completeness also included 100% review of the laboratory sample data results, QC summary reports, and electronic data deliverables (EDDs). All of the data received from the laboratory are useable with qualification. Completeness of the data is 100% and is acceptable.						
VERIFICATION CRITERIA CHECK						
Data verification flags used in this review: J – estimated concentration The following comments requiring qualification are in bold type. The other comments are of interest, but qualification of the samples was not necessary. Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 3-4).						
1. Did the laboratory identify any non-conformances related to the analytical results?	**X**	Yes		No	AB	Initials
Explanation by laboratory: Sample Receipt: The samples were received August 1st, 2007 by TestAmerica-Seattle. The temperature of the samples at the time of receipt was 14.7 °C. Sample Analysis: No anomalies regarding the laboratory sample analyses were noted in the laboratory case narrative. Assigned laboratory flags were noted and considered as part of this data review. Data qualification, if any, related to the laboratory observations are discussed in the following sections.						
2. Were sample Chain-of-Custody forms complete?	**X**	Yes		No	AB	Initials
Comments: COC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt.						
3. Were all the analyses requested for the samples on the COCs completed by the laboratory?	**X**	Yes		No	AB	Initials
Comments: All requested analyses as documented on original COC records were completed by the laboratory.						
4. Were samples received in good condition and at the appropriate temperature?		Yes	**X**	No	AB	Initials
Comments: Samples were collected over a two day period and were delivered to the laboratory within 5 hours of the collection of the last sample on the second day. The laboratory noted in the case narrative that samples were received in good condition with cooler temperatures outside the 4°C ± 2°C acceptance range at 14.7°C. Additional information was requested and the laboratory provided the Test America Sample Receipt Checklist which indicated that samples were received at 8.6°C, 8.0°C, 8.4°C, 9.0°C, 6.8°C, 10.8°C, 14.7°C, 10.3°C, 3.3°C, 2.7°C, 6.0°C, and 11.8°C. There was no further information as to which samples were received at which temperature. The laboratory has been reminded that the notation of the sample receipt temperature needs to be specific to the samples and not just noted as the highest temperature recorded for a group of coolers. The majority of the samples were received within 24 hours of sampling, and evidence of cooling is demonstrated. As no Volatile Organic Compounds (VOCs) are requested for these samples, professional judgment determines samples received at elevated temperature do not require qualification based on this discrepancy.						
5. Were the requested analytical methods in compliance with WP/QAPP, permit, or COC?	**X**	Yes		No	AB	Initials
Comments: Reported methods and target analyte lists were in compliance with COC records.						

6. Were detection limits in accordance with WP/QAPP, permit, or method?	**X**	Yes		No	AB	Initials
Comments: Reported detection limits are achievable by the quoted methods. **Analytes reported below the laboratory reporting limits (RLs), but above the laboratory method detection limits (MDLs), were qualified as J to indicate that the concentrations are estimated.** Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 3-4).						
7. Do the laboratory reports include only those constituents requested to be reported for a specific analytical method?	**X**	Yes		No	AB	Initials
Comments: Only the requested target analytes were reported.						
8. Were sample holding times met?	**X**	Yes		No	AB	Initials
Comments: Extraction and analytical holding times were met for all samples and analyses.						
9. Were correct concentration units reported?	**X**	Yes		No	AB	Initials
Comments: Correct concentration units were reported. All parameters are reported in units of mg/L (ppm).						
10. Were the reporting requirements for flagged data met?	**X**	Yes		No	AB	Initials
Comments: Data validation qualifiers override assigned laboratory flags.						
11. Were laboratory blank samples free of target analyte contamination?	**X**	Yes		No	AB	Initials
Comments: All laboratory blanks were free of target analyte contamination.						
12. Were trip blank, field blank, and/or equipment rinse blank samples free of target analyte contamination?	**X**	Yes		No	AB	Initials
Comments: There were no target analytes detected in the equipment rinse blank samples.						
13. Were instrument calibrations within method control limits?	NA	Yes	NA	No	AB	Initials
Comments: Not applicable for this level of data verification – Instrument calibration data were not supplied in analytical laboratory reports and were therefore not included in this data review.						
14. Were surrogate recoveries within control limits?	**X**	Yes		No	AB	Initials
Comments: Surrogate percent recoveries (%Rs) for organic analyses were within data verification QC criteria for all samples, with the following exception. **<u>Method NWTPH-Dx</u>: In the analysis of sample 5-W-15-0707 surrogate octacosane was recovered outside the laboratory QC limits of 68-125% at 128%. As the elevated recovery indicates possible high bias, only detected results require qualification. Target analyte PHC AS DIESEL FUEL was detected in this sample and has been qualified as J to indicate the concentration is estimated.** Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 3-4).						

15. Were laboratory control sample recoveries within control limits?	**X**	Yes		No	AB	Initials
Comments: LCS and LCSD (blank spike) recoveries were within data verification or laboratory control-charted QC limits for all target analytes.						
16. Were matrix spike recoveries within control limits?	**X**	Yes		No	AB	Initials
Comments: Project specific MS recoveries for target analytes were within data verification QC limits. MS spike recoveries for non-project samples were not considered since matrix similarity to project samples could not be guaranteed.						
17. Were RPDs within control limits?	**X**	Yes		No	AB	Initials
Comments: Laboratory RPDs for target analytes in LCS/LCSD samples were within data verification control limits All laboratory duplicate samples met data verification RPD criteria.						
18. Were organic system performance criteria met?	NA	Yes	NA	No	AB	Initials
Comments: Not applicable for this level of data verification – Organic system performance data was not supplied in analytical laboratory reports and was therefore not included in this data review.						
19. Were internal standards within method criteria for GC/MS sample analyses?	NA	Yes	NA	No	AB	Initials
Comments: Not applicable – Internal standard addition is not required for the reported methods.						
20. Were inorganic system performance criteria met?	NA	Yes	NA	No	AB	Initials
Comments: Not applicable – There were no inorganic parameters requested for the samples in this data set.						
21. Were blind field duplicates collected? If so, discuss the precision (RPD) of the results.	**X**	Yes		No	AB	Initials

Duplicate Sample No.	1A-W-30-0707	Primary Sample No.	1A-W-3-0707
Duplicate Sample No.	2A-W-100-0707	Primary Sample No.	2A-W-1-0707
Duplicate Sample No.	5-W-190-0707	Primary Sample No.	5-W-19-0707
Duplicate Sample No.	MW-160-0707	Primary Sample No.	MW-16-0707

Comments: The RPDs for the duplicates were within the 0-30% data validation QC limits for water samples as indicated in the table below, or RPDs were not applicable due to results that were undetected in both samples. Field duplicate and native sample concentrations that were both undetected are not reflected in the table below since RPDs are not applicable. There were no analytes detected in samples 5-W-19-0707, 5-W-190-0707, MW-16-0707, or MW-160-0707.

The following RPDs were calculated:

Method	Analyte	1A-W-3-0707	1A-W-30-0707	RPD	Qualifier	Samp RL	Dup RL	Units
NWTPH-Dx	Lube Oil Range Hydrocarbons	0.116	0.118	1.71		0.472	0.49	mg/l
NWTPH-Dx	PHC AS DIESEL FUEL	0.155	0.147	5.30		0.236	0.245	mg/l

Method	Analyte	2A-W-1-0707	2A-W-100-0707	RPD	Qualifier	Samp RL	Dup RL	Units
NWTPH-Dx	Lube Oil Range Hydrocarbons	0.425	0.384	10.14		0.481	0.472	mg/l
NWTPH-Dx	PHC AS DIESEL FUEL	0.959	0.924	3.72		0.24	0.236	mg/l

No data require qualification based on the field duplicate RPD results.

22. Were qualitative criteria for organic target analyte identification met?	**X**	Yes		No	AB	Initials

Comments: Retention times and chromatography were reviewed by trained laboratory personnel in accordance with the laboratory's internal QA/QC program. Except as described, no data outliers were noted, and no raw data was included in the laboratory report therefore, further review of sample chromatograms during data verification could not be performed.

<u>Method NWTPH-Dx</u>: For the Lube Oil Range Hydrocarbons and PHC AS DIESEL FUEL results in sample 2A-W-11-0707 and for the PHC AS DIESEL FUEL result in sample MW-37-0707, laboratory footnotes indicate that the hydrocarbons present are a complex mixture of diesel range and heavy oil range organics. As precise quantitation of a mixture of analytes is not possible, professional judgment determines these results require qualifiers of J to indicate the analyte is present and the concentration is estimated.

For the PHC AS DIESEL FUEL results in samples 2A-W-10-0707, 2A-W-6-0707, 2A-W-9-0707, 5-W-4-0707, and MW-39-0707, laboratory footnotes indicate detected hydrocarbons in the diesel range do not have a distinct diesel pattern and may be due to heavily weathered diesel. As precise quantitation of a weathered diesel mix is not possible, professional judgment determines these results require qualifiers of J to indicate the analyte is present and the concentration is estimated.

For the PHC AS DIESEL FUEL results in samples 5-W-18-0707 and 5-W-20-0707, laboratory footnotes indicate detected hydrocarbons in the diesel range do not have a distinct diesel pattern and may be due to heavily weathered diesel or possibly biogenic interference. As precise quantitation of a weathered diesel mix is not possible, professional judgment determines these results require qualifiers of J to indicate the analyte is present and the concentration is estimated.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 3-4).

23. Were 100% of the EDD concentrations and reporting limits compared to the hardcopy data reports?	**X**	Yes		No	AB	Initials

Comments: With the exception of some significant figures differences, there were no discrepancies between the EDD concentrations and reporting limits and the hardcopy data reports. Significant figures were corrected. Qualifiers and Reason codes were added to the EDD query and the EDD query table was returned to the project database manager with this data verification report

It is recommended that for the equipment rinse blank sample, the sample matrix be changed from WG (indicating groundwater) to WQ (indicating water QC).

Entries in the detect flag column of TR were changed to Y to indicate the analyte was detected. These results require J qualification as described in item 6, due to concentrations below the laboratory RLs, but above the MDLs.

24. General Comments: Data were evaluated based on verification criteria set forth in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review*, document number USEPA-540-R-04-009, January 2005 (Draft Final) with additional reference to *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review*, document number EPA 540/R-99-008 of October 1999, as they applied to the reported methodology. Field duplicate RPD control limits were taken from the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, February 1988, upheld in DRAFT 1993.

Refer to the Table of Qualified Analytical Results for a listing of the samples, analytes, and concentrations qualified (pages 3-4).