Port of Seattle
Lora Lake Apartments Site

Remedial Investigation/ Feasibility Study

Volume II

Appendix F
Lora Lake Apartments Parcel Remedial Investigation Data Report

Attachment F.4
Data Validation Reports

FINAL

EcoChem, INC.
Environmental Data Quality

DATA VALIDATION REPORT

Port of Seattle
Lora Lake Apartments RI/FS

Revision 1

Prepared for:

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EcoChem Project: C15210-1

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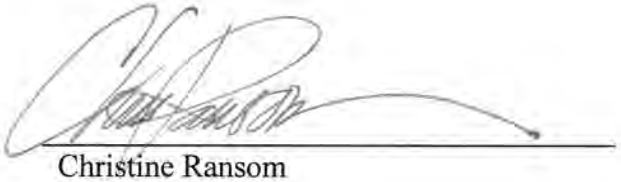
Approved for Release:



Christine Ransom
Project Manager
EcoChem, Inc.

PROJECT NARRATIVE

Basis for the Data Validation

This report summarizes the results of validation performed on stormwater and quality control (QC) sample data for the Lora Lake Apartments Remedial Investigation/Feasibility Study. The dioxin data received full validation (Level IV); all other parameters received summary validation (Level III). Field blank data received compliance screening (Level II). A complete list of samples is provided in the **Sample Index**.

Frontier Analytical Laboratory (El Dorado Hills, California) performed the Dioxin/Furan analyses. Analytical Resources, Inc. (Tukwila, Washington) performed all other analyses. The analytical methods and EcoChem project chemists are listed in the table below.

Analysis	Method	Primary Review	Secondary Review
Volatile Organic Compounds	SW8260C & SW8260C-SIM	D. Kerlin	C. Ransom/C. Mott
BTEX	SW8021Mod	J. Maute/D. Kerlin	C. Ransom
Dioxin Furan Compounds	EPA 1613	M. Swanson	C. Mott
Polynuclear Aromatic Hydrocarbons	SW8270D	M. Brindle/J. Maute	C. Mott/C. Ransom
Pentachlorophenol	SW8041	M. Brindle	C. Mott
Total Petroleum Hydrocarbons – Diesel Range	NWTPH-Dx	J. Maute	C. Ransom
Total Petroleum Hydrocarbons – Gasoline Range	NWTPH-Gx		
Total and Dissolved Arsenic	EPA 200.8		
Total Solids, Total Suspended Solids, pH, TOC	EPA 160.2, EPA 160.3, EPA 150.1 Plumb 1981		

The data were reviewed using guidance and quality control criteria documented in the analytical methods; *Port of Seattle Lora Lakes Apartments, Remedial Investigation/Feasibility Study Work Plan*; *National Functional Guidelines for Inorganic Data Review* (USEPA 1994 & 2004); and *National Functional Guidelines for Organic Data Review* (USEPA 1999 & 2008).

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as **APPENDIX A**. A Qualified Data Summary Table is included in **APPENDIX B**. Communications are included in **Appendix C**. Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) is also submitted with this report.

Sample Index
Lora Lake Apartments RI/FS
Analytical Resources Incorporated

SDG	Sample ID	ARI Lab ID	VOC	BTEX	VOC-SIM	PAH	PCP	Dx	Gx	Metal	TOC/TS	pH/TSS
RG51	PSB12-0-0.5-072810	10-18183-RG51A	✓			✓	✓	✓	✓	✓		
	PSB12-1.5-2.0-072810	10-18184-RG51B	✓			✓	✓	✓	✓	✓		
	PSB12-2-4-072810	10-18185-RG51C	✓			✓	✓	✓	✓	✓		
	PSB12-8-10-072810	10-18186-RG51D	✓				✓	✓	✓	✓	✓	
	PSB12-8-10-072810-D	10-18187-RG51E	✓			✓	✓	✓	✓	✓	✓	
	PSB12-14-17-072810	10-18188-RG51F	✓			✓	✓	✓	✓	✓	✓	
	PSB12-4-6-072810	10-18189-RG51G	✓				✓	✓	✓	✓		
	PSB12-TB	10-18190-RG51H	✓						✓			
RG54	PSB14-0-.5-072810	10-18202-RG54A	✓			✓	✓	✓	✓	✓		
	PSB14-1.5-2.0-072810	10-18203-RG54B	✓			✓	✓	✓	✓	✓		
	PSB14-2-4-072810	10-18204-RG54C	✓			✓	✓	✓	✓	✓		
	PSB14-7-9-072810	10-18206-RG54E	✓			✓	✓	✓	✓	✓	✓	
	PSB14-12-14-072810	10-18207-RG54F	✓			✓	✓	✓	✓	✓	✓	
	PSB14-TB	10-18208-RG54G	✓						✓			
	PSB17-0-0.5-072810	10-18209-RG54H	✓			✓	✓	✓	✓	✓		
	PSB17-1.5-2-072810	10-18210-RG54I	✓			✓	✓	✓	✓	✓		
	PSB17-2-4-072810	10-18211-RG54J	✓			✓	✓	✓	✓	✓		
	PSB17-4-6-072810	10-18212-RG54K	✓			✓	✓	✓	✓	✓	✓	
	PSB17-10-13-072810	10-18213-RG54L	✓			✓	✓	✓	✓	✓		
RG58	PSB22-0-0.5-072910	10-18236-RG58A	✓			✓	✓	✓		✓		
	PSB22-1.5-2-072910	10-18237-RG58B	✓			✓	✓	✓		✓		
	PSB22-2-4-072910	10-18238-RG58C	✓			✓	✓	✓		✓		
	PSB22-4-6-072910	10-18239-RG58D	✓			✓	✓	✓		✓		
	PSB22-17-19-072910	10-18240-RG58E	✓			✓	✓	✓	✓	✓	✓	
	PSB22-19-20-072910	10-18241-RG58F	✓			✓	✓	✓	✓	✓	✓	
	PSB23-0-0.5-072910	10-18242-RG58G				✓	✓	✓		✓		
	PSB23-1.5-2-072910	10-18243-RG58H				✓	✓	✓		✓		
	PSB23-2-4-072910	10-18244-RG58I				✓	✓	✓		✓		
	PSB23-4-6-072910	10-18245-RG58J				✓	✓	✓		✓		
	PSB23-14-16.5-072910	10-18246-RG58K	✓			✓	✓	✓	✓	✓	✓	
	PSB23-16.5-19-072910	10-18247-RG58L	✓			✓	✓	✓	✓	✓	✓	
	PSB24-0-0.5-072910	10-18248-RG58M				✓	✓	✓		✓		
	PSB24-1.5-2-072910	10-18249-RG58N				✓	✓	✓		✓		
	PSB24-2-4-072910	10-18250-RG58O				✓	✓	✓		✓		
	PSB24-2-4-072910-D	10-18251-RG58P				✓	✓	✓		✓		
	PSB24-4-6-072910	10-18252-RG58Q				✓	✓	✓		✓		
	PSB24-14-16-072910	10-18253-RG58R	✓			✓	✓	✓	✓	✓	✓	
	PSB24-16-17-072910	10-18254-RG58S	✓			✓	✓	✓	✓	✓	✓	
	PSB22-TB	10-18255-RG58T	✓						✓			
	PSB23-TB	10-18256-RG58U	✓						✓			
	PSB24-TB	10-18257-RG58V	✓						✓			
RG60	PSB13-0-0.5-072910	10-18279-RG60A	✓			✓	✓	✓	✓	✓		
	PSB13-1.5-2-072910	10-18280-RG60B	✓			✓	✓	✓	✓	✓		
	PSB13-2-4-072910	10-18281-RG60C	✓			✓	✓	✓	✓	✓		
	PSB13-4-6-072910	10-18282-RG60D	✓			✓	✓	✓	✓	✓		
	PSB13-11-13-072910	10-18283-RG60E	✓			✓	✓	✓	✓	✓	✓	
	PSB13-14.5-16.5-072910	10-18284-RG60F	✓			✓	✓	✓	✓	✓	✓	
	PSB13-TB	10-18285-RG60G	✓			✓	✓	✓	✓	✓		

Sample Index
Lora Lake Apartments RI/FS
Analytical Resources Incorporated

SDG	Sample ID	ARI Lab ID	VOC	BTEX	VOC-SIM	PAH	PCP	Dx	Gx	Metal	TOC/TS	pH/TSS
RG78	PSB9A-11-13.5-073010	10-18433-RG78A	✓			✓	✓	✓	✓	✓	✓	
	PSB9A-1.5-2-073010	10-18434-RG78B	✓			✓	✓	✓	✓	✓		
	PSB9A-2-4-073010	10-18435-RG78C	✓			✓	✓	✓	✓	✓	✓	
	PSB9A-4-6-073010	10-18436-RG78D	✓			✓	✓	✓	✓	✓		
	PSB9A-0-0.5-073010	10-18437-RG78E	✓			✓	✓	✓	✓	✓		
	PSB10-0-0.5-073010	10-18438-RG78F	✓			✓	✓	✓	✓	✓		
	PSB10-1.5-2-073010	10-18439-RG78G	✓			✓	✓	✓	✓	✓		
	PSB10-2-4-073010	10-18440-RG78H	✓			✓	✓	✓	✓	✓		
	PSB10-4-6-073010	10-18441-RG78I	✓			✓	✓	✓	✓	✓		
	PSB10-8.5-10-073010	10-18442-RG78J	✓			✓	✓	✓	✓	✓	✓	
	PSB10-14-15-073010	10-18443-RG78K	✓			✓	✓	✓	✓	✓	✓	
	PSB10-20-25-073010	10-18444-RG78L	✓			✓	✓	✓	✓	✓		
	PSB9-TB	10-18445-RG78M	✓						✓			
	PSB10-TB	10-18446-RG78N	✓						✓			
	PSB9-8.5-9.5-073010	10-18451-RG78S				✓	✓	✓		✓		
RG79	PSB11-0-0.5-073010	10-18505-RG79A	✓			✓	✓	✓	✓	✓		
	PSB11-1.5-2-073010	10-18506-RG79B	✓			✓	✓	✓	✓	✓		
	PSB11-2-4-073010	10-18507-RG79C	✓			✓	✓	✓	✓	✓		
	PSB11-2-4-073010-D	10-18508-RG79D	✓			✓	✓	✓	✓	✓		
	PSB11-4-6-073010	10-18509-RG79E	✓			✓	✓	✓	✓	✓		
	PSB11-11-13-073010	10-18511-RG79G	✓			✓	✓	✓	✓	✓	✓	
	PSB11-14-16-073010	10-18512-RG79H	✓			✓	✓	✓	✓	✓	✓	
	PSB11-TB	10-18514-RG79J	✓						✓			
	PSB15-0-0.5-073010	10-18515-RG79K	✓			✓	✓	✓	✓	✓		
	PSB15-1.5-2-073010	10-18516-RG79L	✓			✓	✓	✓	✓	✓		
	PSB15-2-4-073010	10-18517-RG79M	✓			✓	✓	✓	✓	✓		
	PSB15-4-6-073010	10-18518-RG79N	✓			✓	✓	✓	✓	✓		
	PSB15-13-15-073010	10-18519-RG79O	✓			✓	✓	✓	✓	✓	✓	
	PSB15-17-19-073010	10-18520-RG79P	✓			✓	✓	✓	✓	✓	✓	
	PSB15-17-19-073010-D	10-18521-RG79Q	✓			✓	✓	✓	✓	✓	✓	
	PB15-TB	10-18523-RG79S	✓						✓			
RG94	MW14-15-16.5-080210	10-18594-RG94A	✓			✓	✓	✓	✓	✓	✓	
	MW14-22.5-24-080210	10-18595-RG94B	✓			✓	✓	✓	✓	✓	✓	
	MW13-10-11.5-080210	10-18596-RG94C	✓			✓	✓	✓	✓	✓	✓	
	MW13-14-14.5-080210	10-18597-RG94D	✓			✓	✓	✓	✓	✓	✓	
	MW13-18.5-19.5-080210	10-18598-RG94E	✓			✓	✓	✓	✓	✓	✓	
	MW13-18.5-19.5-080210-D	10-18599-RG94F	✓			✓	✓	✓	✓	✓		
	MW12-5.5-7.5-080210	10-18600-RG94G	✓			✓	✓	✓	✓	✓		
	MW12-8-9.5-080210	10-18601-RG94H	✓			✓	✓	✓	✓	✓	✓	
	MW12-10-11.5-080210	10-18602-RG94I	✓			✓	✓	✓	✓	✓	✓	
	MW12-17.5-19-080210	10-18603-RG94J	✓			✓	✓	✓	✓	✓	✓	
	MW12-ER-080210	10-18604-RG94K	✓			✓	✓	✓	✓	✓		
	MW12-TB-080210	10-18605-RG94L	✓						✓			

Sample Index
Lora Lake Apartments RI/FS
Analytical Resources Incorporated

SDG	Sample ID	ARI Lab ID	VOC	BTEX	VOC-SIM	PAH	PCP	Dx	Gx	Metal	TOC/TS	pH/TSS
RI46	MW-02-081110	10-19678-RI46A	✓			✓	✓	✓	✓	✓		✓
	MW-03-081110	10-19679-RI46B	✓			✓	✓	✓	✓	✓		✓
	MW-03-081110-D	10-19680-RI46C	✓			✓	✓	✓	✓	✓		✓
	MW-04-081110	10-19681-RI46D	✓			✓	✓	✓	✓	✓		✓
	MW-14-081110	10-19682-RI46E	✓			✓	✓	✓	✓	✓		✓
	MW-12-081210	10-19683-RI46F	✓			✓	✓	✓	✓	✓		✓
	MW-13-081210	10-19684-RI46G	✓			✓	✓	✓	✓	✓		✓
	MW-10-081210	10-19685-RI46H	✓			✓	✓	✓	✓	✓		✓
	MW-11-081210	10-19686-RI46I	✓			✓	✓	✓	✓	✓		✓
	081110-TB	10-19687-RI46J	✓						✓			
	081210-TB	10-19688-RI46K	✓						✓			
RI65	MW-09-081310	10-19847-RI65A	✓			✓	✓	✓	✓	✓		✓
	MW-08-081310	10-19848-RI65B	✓			✓	✓	✓	✓	✓		✓
	MW-07-081310	10-19849-RI65C	✓			✓	✓	✓	✓	✓		✓
	MW-01-081310	10-19850-RI65D	✓			✓	✓	✓	✓	✓		✓
	MW-05-081310	10-19851-RI65E	✓			✓	✓	✓	✓	✓		✓
	081310-TB	10-19852-RI65F	✓						✓			
RK21	MW15-50-55-082310	10-21245-RK21A	✓				✓				✓	
	MW16-39-40-082410	10-21246-RK21B	✓				✓				✓	
	MW16-39-40-082410-D	10-21247-RK21C	✓				✓					
RK57	PSB12-8-10-072810	10-21438-RK57A				✓						
	PSB12-4-6-072810	10-21439-RK57B				✓						
RK76	PSB25-1-2-082510	10-21625-RK76A								✓		
	PSB25-0-1-082510	10-21626-RK76B								✓		
	PSB25-2-4-082510	10-21627-RK76C								✓		
	PSB25-14-15-082510	10-21629-RK76E						✓				
	PSB25-18-20-082510	10-21630-RK76F						✓				
	PSB25-18-20-082510-D	10-21631-RK76G						✓				
	PSB26-0-2-082510	10-21632-RK76H								✓		
	PSB26-2-4-082510	10-21633-RK76I								✓		
	PSB26-14-15-082510	10-21635-RK76K						✓				
	PSB26-16-18-082510	10-21636-RK76L						✓				
	PSB27-0-0.5-082610	10-21638-RK76N								✓		
	PSB27-1.5-2-082610	10-21639-RK76O								✓		
	PSB27-2-4-082610	10-21640-RK76P								✓		
	PSB27-10-12-082610	10-21642-RK76R						✓				
	PSB27-8-10-082610	10-21643-RK76S						✓				
RK83	PSB20-0-0.5-082510	10-21692-RK83A	✓			✓	✓	✓	✓	✓		
	PSB20-2-4-082510	10-21693-RK83B	✓			✓	✓	✓	✓	✓		
	PSB20-1.5-2-082510	10-21694-RK83C	✓			✓	✓	✓	✓	✓		
	PSB20-11.5-13.5-082510	10-21695-RK83D	✓			✓	✓	✓	✓	✓	✓	
	PSB20-4-6-082510	10-21696-RK83E	✓			✓	✓	✓	✓	✓		
	PSB20-2-4-082510-DUP	10-21697-RK83F	✓			✓	✓	✓	✓	✓		
	PSB20-TB-082610	10-21698-RK83G	✓			✓	✓	✓	✓	✓		
	PSB16-2-4-082510	10-21699-RK83H	✓			✓	✓	✓	✓	✓		
	PSB16-0-0.5-082510	10-21700-RK83I	✓			✓	✓	✓	✓	✓		
	PSB16-1-2-082510	10-21701-RK83J	✓			✓	✓	✓	✓	✓		
	PSB16-4-6-082510	10-21703-RK83L	✓			✓	✓	✓	✓	✓		
	PSB16-13-15-082510	10-21704-RK83M	✓			✓	✓	✓	✓	✓	✓	
	PSB16-TB-082610	10-21705-RK83N	✓						✓			

Sample Index
Lora Lake Apartments RI/FS
Analytical Resources Incorporated

SDG	Sample ID	ARI Lab ID	VOC	BTEX	VOC-SIM	PAH	PCP	Dx	Gx	Metal	TOC/TS	pH/TSS
RK84	PSB21-0-0.5-082510	10-21706-RK84A	✓			✓	✓	✓	✓	✓		
	PSB21-1.5-2-082510	10-21707-RK84B	✓			✓	✓	✓	✓	✓		
	PSB21-2-4-082510	10-21708-RK84C	✓			✓	✓	✓	✓	✓		
	PSB21-4-6-082510	10-21709-RK84D	✓			✓	✓	✓	✓	✓		
	PSB21-6-7-082510	10-21710-RK84E	✓			✓	✓	✓	✓	✓	✓	
	PSB21-9-11-082510	10-21711-RK84F	✓			✓	✓	✓	✓	✓	✓	
	PSB21-TB-082610	10-21712-RK84G	✓						✓			
	PSB19-0-1-082510	10-21713-RK84H	✓			✓	✓	✓	✓	✓		
	PSB19-1-2-082510	10-21714-RK84I	✓			✓	✓	✓	✓	✓		
	PSB19-2-4-082510	10-21715-RK84J	✓			✓	✓	✓	✓	✓		
	PSB19-13-15-082510	10-21716-RK84K	✓			✓	✓	✓	✓	✓	✓	
	PSB19-TB-082610	10-21717-RK84L	✓									
RK86	PSB18-12.5-15-082610	10-21721-RK86A	✓			✓	✓	✓	✓	✓	✓	
	PSB18-4-6-082610	10-21722-RK86B	✓			✓	✓	✓	✓	✓		
	PSB18-2-4-082610	10-21723-RK86C	✓			✓	✓	✓	✓	✓		
	PSB18-1.5-2-082610	10-21724-RK86D	✓			✓	✓	✓	✓	✓		
	PSB18-0-0.5-082610	10-21725-RK86E	✓			✓	✓	✓	✓	✓		
	PSB18-12.5-15-082610-D	10-21726-RK86F	✓			✓	✓	✓	✓	✓	✓	
	PSB18-19-20-082610	10-21727-RK86G	✓			✓	✓	✓	✓	✓	✓	
	PSB18-7-9-082610	10-21728-RK86H	✓			✓	✓	✓	✓	✓	✓	
	PSB18-TB-082610	10-21729-RK86I	✓						✓			
RK89	MW17-50-51-082610	10-21749-RK89A	✓				✓				✓	
	MW17-TB-082610	10-21750-RK89B	✓									
RM65	MW-15-091310	10-23082-RM65A		✓	✓	✓	✓	✓				✓
	MW-16-091310	10-23083-RM65B		✓	✓	✓	✓	✓				✓
	MW-17-091310	10-23084-RM65C		✓	✓	✓	✓	✓				✓
	MW-16-091310-D	10-23085-RM65D		✓	✓	✓	✓	✓				✓
RM67	PSB17-4-6-072810	10-23079-RM67A				✓						
	MW15-50-55-082310	10-23698-RN62A				✓		✓				
	MW16-39-40-082410	10-23699-RN62B				✓		✓				
	MW17-50-51-082610	10-23700-RN62C				✓		✓				
RN62	MW15-50-55-082310	10-23698-RN62A				✓		✓				
	MW16-39-40-082410	10-23699-RN62B				✓		✓				
	MW17-50-51-082610	10-23700-RN62C				✓		✓				
RR22	PSB16-2-4-082510	10-26379-RR22A		✓					✓			
	PSB16-0-0.5-082510	10-26380-RR22B		✓					✓			
	PSB16-1-2-082510	10-26381-RR22C		✓					✓			

Sample Index
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Frontier Analytical Laboratory

SDG	Sample ID	Laboratory ID	Dioxin
6268	PSB12-0-0.5-072810	6268-001-SA	✓
	PSB12-1.5-2.0-072810	6268-002-SA	✓
	PSB12-2-4-072810	6268-003-SA	✓
6269	PSB14-0-.5-072810	6269-001-SA	✓
	PSB14-1.5-2.0-072810	6269-002-SA	✓
	PSB14-2-4-072810	6269-003-SA	✓
	PSB17-0-0.5-072810	6269-004-SA	✓
	PSB17-1.5-2-072810	6269-005-SA	✓
	PSB17-2-4-072810	6269-006-SA	✓
	PSB17-4-6-072810	6269-007-SA	✓
	PSB17-10-13-072810	6269-008-SA	✓
6271	PSB13-0-0.5-072910	6271-001-SA	✓
	PSB13-1.5-2-072910	6271-002-SA	✓
	PSB13-2-4-072910	6271-003-SA	✓
6272	PSB1-0-0.5-072910	6272-001-SA	✓
	PSB1-1.5-2.0-072910	6272-002-SA	✓
	PSB1-1.5-2.0-072910	6272-002-SA	✓
	PSB2-0-0.5-072910	6272-003-SA	✓
	PSB2-0-0.5-072910	6272-003-SA	✓
	PSB2-1.5-2-072910	6272-004-SA	✓
	PSB3-0-0.5-072910	6272-005-SA	✓
	PSB3-1.5-2-072910	6272-006-SA	✓
6273	PSB04-0.0-0.5-072810	6273-001-SA	✓
	PSB04-1.5-2.0-072810	6273-002-SA	✓
	PSB05-0-0.5-072810	6273-003-SA	✓
	PSB05-1.5-2.0-072810	6273-004-SA	✓
	PSB06-0-0.5-072810	6273-005-SA	✓
	PSB06-1.5-2.0-072810	6273-006-SA	✓
	PSB06-1.5-2.0-072810D	6273-007-SA	✓
	PSB07-0-0.5-072810	6273-008-SA	✓
	PSB07-1.5-2.0-072810	6273-009-SA	✓
	PSB08-0.0-0.5-072810	6273-010-SA	✓
	PSB08-1.5-2.0-072810	6273-011-SA	✓
6274	PSB9A-1.5-2-073010	6274-001-SA	✓
	PSB9A-2-4-073010	6274-002-SA	✓
	PSB9A-0-0.5-073010	6274-003-SA	✓
	PSB10-0-0.5-073010	6274-004-SA	✓
	PSB10-1.5-2-073010	6274-005-SA	✓
	PSB10-2-4-073010	6274-006-SA	✓
6276	PSB11-0-0.5-073010	6276-001-SA	✓
	PSB11-1.5-2-073010	6276-002-SA	✓
	PSB11-2-4-073010	6276-003-SA	✓
	PSB11-2-4-073010-D	6276-004-SA	✓
	PSB15-0-0.5-073010	6276-005-SA	✓
	PSB15-1.5-2-073010	6276-006-SA	✓
	PSB15-2-4-073010	6276-007-SA	✓
	PSB15-4-6-073010	6276-008-SA	✓
	PSB15-13-15-073010	6276-009-SA	✓
	PSB15-17-19-073010	6276-010-SA	✓
	PSB15-17-19-073010-D	6276-011-SA	✓

Sample Index
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SDG	Sample ID	Laboratory ID	Dioxin
6277	MW14-0-0.5-080210	6277-001-SA	✓
	MW14-1.5-2-080210	6277-002-SA	✓
	MW13-0-0.5-080210	6277-003-SA	✓
	MW13-1.5-2-080210	6277-004-SA	✓
	MW12-0-0.5-080210	6277-005-SA	✓
	MW12-1.5-2-080210	6277-006-SA	✓
6278	PSB22-0-0.5-072910	6278-001-SA	✓
	PSB22-1.5-2-072910	6278-002-SA	✓
	PSB23-0-0.5-072910	6278-003-SA	✓
	PSB23-1.5-2-072910	6278-004-SA	✓
	PSB24-0-0.5-072910	6278-005-SA	✓
	PSB24-1.5-2-072910	6278-006-SA	✓
6311	MW-02-081110	6311-001-SA	✓
	MW-03-081110	6311-002-SA	✓
	MW-03-081110-D	6311-003-SA	✓
	MW-04-081110	6311-004-SA	✓
	MW-14-081110	6311-005-SA	✓
	MW-12-081210	6311-006-SA	✓
	MW-13-081210	6311-007-SA	✓
	MW-10-081210	6311-008-SA	✓
	MW-11-081210	6311-009-SA	✓
6312	MW-09-081310	6312-001-SA	✓
	MW-08-081310	6312-002-SA	✓
	MW-07-081310	6312-003-SA	✓
	MW-01-081310	6312-004-SA	✓
	MW-05-081310	6312-005-SA	✓
6330	PSB21-0-0.5-082510	6330-001-SA	✓
	PSB21-1.5-2-082510	6330-002-SA	✓
	PSB21-2-4-082510	6330-003-SA	✓
	PSB19-0-1-082510	6330-004-SA	✓
	PSB19-1-2-082510	6330-005-SA	✓
	PSB19-2-4-082510	6330-006-SA	✓
6331	PSB20-0-0.5-082510	6331-001-SA	✓
	PSB20-2-4-082510	6331-002-SA	✓
	PSB20-1.5-2-082510	6331-003-SA	✓
	PSB20-2-4-082510-DUP	6331-004-SA	✓
	PSB16-2-4-082510	6331-005-SA	✓
	PSB16-0-0.5-082510	6331-006-SA	✓
	PSB16-1-2-082510	6331-007-SA	✓
	PSB16-4-6-082510	6331-008-SA	✓
	PSB16-13-15-082510	6331-009-SA	✓
6332	PSB18-2-4-082610	6332-001-SA	✓
	PSB18-1.5-2-082610	6332-002-SA	✓
	PSB18-0-0.5-082610	6332-003-SA	✓

Sample Index
Lora Lake Apartments RI/FS
Frontier Analytical Laboratory

SDG	Sample ID	Laboratory ID	Dioxin
6364	PSB12-4-6-072810	6364-001-SA	✓
	PSB14-4-7-072810	6364-002-SA	✓
	PSB14-7-9-072810	6364-003-SA	✓
	PSB06-2-4-072810	6364-004-SA	✓
	PSB06-4-6-072810	6364-005-SA	✓
	PSB13-4-6-072910	6364-006-SA	✓
	PSB1-2-4-072910	6364-007-SA	✓
	PSB10-4-6-073010	6364-008-SA	✓
	PSB10-8.5-10-073010	6364-009-SA	✓
	PSB11-4-6-073010	6364-010-SA	✓
	PSB11-7.5-9.5-073010	6364-011-SA	✓
6365	MW13-2-4-080210	6365-001-SA	✓
	MW12-2-4-080210	6365-002-SA	✓
	SSB10-0-0.5-080310	6365-003-SA	✓
	SSB10-1.5-2-080310	6365-004-SA	✓
	SSB01-0-0.5-080310	6365-005-SA	✓
	SSB01-1.5-2-080310	6365-006-SA	✓
	SSB02-0-0.5-080310	6365-007-SA	✓
	SSB3-0-0.5-080610	6365-008-SA	✓
	SSB5-0-0.5-080610	6365-009-SA	✓
	SSB5-1.5-2-080610	6365-010-SA	✓
	SSB4-0-0.5-090910	6365-011-SA	✓

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Volatile Organic Compounds by SW846 Method 8260C

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Level III) was performed on all soil data. Compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	7 Soil, 1 Trip Blank
RG54	10 Soil, 1Trip Blank
RG58	10 Soil, 3 Trip Blank
RG60	6 Soil, 1 Trip Blank
RG78	12 Soil, 2 Trip Blank
RG79	14 Soil, 2 Trip Blank
RG94	10 Soil, 1 Trip Blank, 1 Equipment Rinsate
RK21	3 Soil
RK83	11 Soil, 2 Trip Blank
RK84	10 Soil, 2 Trip Blank
RK86	8 Soil, 1 Trip Blank
RK89	1 Soil, 1 Trip Blank

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG RG54: The laboratory noted on the cooler receipt form that no vials were received for Sample PSB17-TB. No data was reported for this sample.

SDG RG79: The Sample ID listed on the chain of custody (COC) did not match the Sample ID reported on the laboratory data sheets for laboratory sample ID RG79S. The Sample ID listed on the COC was PSB15-TB while the Sample ID reported on the laboratory data sheets was PB15-TB. The ID was corrected in the EDD; no further action was taken

SDG RK83: The date sampled listed on the chain of custody (COC) did not match the date sampled reported on the laboratory data sheets for Samples PSB20-TB-082610 and PSB16-TB-082610. The date sampled on the COC was 08/26/10 while the date sampled reported on the laboratory data sheets was 08/25/10. The client was contacted and confirmed that the correct date sampled was 08/25/10.

SDG RK84: The date sampled listed on the chain of custody (COC) did not match the date sampled reported on the laboratory data sheets for Samples PSB21-TB-082610 and PSB19-TB-082610. The date sampled on the COC was 08/26/10 while the date sampled reported on the laboratory data

sheets was 08/25/10. The client was contacted and confirmed that the correct date sampled was 08/25/10.

SDG RK86: A sample result summary form was not included in the data package for Sample PSB18-TB-082610. The laboratory was contacted and a summary form submitted 11/23/2010.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation	1	Matrix Spike/Matrix Spike Duplicate (MS/MSD)
	GC/MS Instrument Performance Check	1	Field Duplicates
	Initial Calibration (ICAL)		Internal Standards
	Continuing Calibration (CCAL)		Target Analyte List
	Laboratory Blanks	1	Reporting Limits
1	Field Blanks		Compound Identification
1	Surrogate Compounds		Reported Results
	Laboratory Control Samples (LCS/LCSD)		

[1] Quality control results are discussed below, but no data were qualified.
[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. Several coolers were received outside of these limits, with temperatures ranging from 0.0°C to 7.5°C. The temperature outliers did not impact data quality; therefore no qualifiers were assigned.

Field Blanks

Up to three trip blank samples were submitted in each SDG as shown in the following table. There were no target analytes detected in any of the trip blanks.

SDG	Trip Blank ID	Trip Blank ID	Trip Blank ID
RG51	PSB12-TB		
RG54	PSB14-TB	--	--
RG58	PSB22-TB	PSB23-TB	PSB24-TB
RG60	PSB13-TB	--	--
RG78	PSB9-TB	PSB10-TB	--
RG79	PSB11-TB	PSB15-TB	--
RG94	MW12-TB-080210	--	--
RK83	PSB20-TB-082610	PSB16-TB-082610	--
RK84	PSB21-TB-082610	PSB19-TB-082610	--
RK86	PSB18-TB-082610	--	--
RK89	MW17-TB-082610	--	--

SDG RG94: One equipment rinse blank, MW12-ER-080210 was submitted. No target analytes were detected in this blank.

Surrogate Compounds

SDG RG58: The recoveries for the surrogate d4-1,2-dichloroethane were greater than the upper control limit of 122% for Samples PSB23-TB and PSB24-TB. No target analytes were detected in these samples; no action was necessary based on the potential high bias.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed when adequate sample was available. If MS/MSD were not performed, laboratory precision and accuracy was evaluated using the LCS/LCSD analyses.

The MS/MSD recovery values were within the criteria of 50-150%, with the exceptions noted below. No action was taken if only one of the MS/MSD recoveries was outside of the control limits.

RPD values were within the criteria of 50%.

SDGs RG54, RG58, RG60, RK83, & RK89: Due to limited sample volume, MS/MSD were not analyzed with these SDGs.

SDG RG78: QC Sample PSB10-8.5-10-073010: MSD recovery for tetratchloroethene – low bias. MS recovery within criteria; no further action required.

SDG RK79: QC Sample PSB11-4-6-073010: MSD recovery for tetratchloroethene – low bias. MS recovery within criteria; no further action required.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

Duplicate samples were submitted with each SDG as shown in the following table. No target analytes were detected in any of these samples; field precision was acceptable.

SDG	Sample	Duplicate
RG51	PSB12-8-10-072810	PSB12-8-10-072810-D
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D
RG79	PSB15-17-19-073010	PSB15-17-19-073010-D
RG94	MW13-18.5-19.5-080210	MW13-18.5-19.5-080210-D
RK21	MW16-39-40-082410	MW16-39-40-082410-D
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D

Reporting Limits

SDG RK84: The reporting limit (RL) of 3.1 µg/kg for Sample PSB21-6-7-082510 exceeded the QAPP specified RL of 1.0 µg/kg due to the high moisture content of the sample. No action was taken other than to note the discrepancy.

IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample/laboratory control sample (LCS/LCSD), and MS/MSD recoveries, except as noted above. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Volatile Organic Compounds by SW846 Method 8260C-SIM

This report documents the review of analytical data from the analysis of storm water samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Level III) was performed on all groundwater data and compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RI46	9 Groundwater, 2 Trip Blank
RI65	5 Groundwater, 1 Trip Blank
RM65	4 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation	1	Matrix Spike/Matrix Spike Duplicate (MS/MSD)
	GC/MS Instrument Performance Check	1	Field Duplicates
	Initial Calibration (ICAL)		Internal Standards
	Continuing Calibration (CCAL)		Target Analyte List
	Laboratory Blanks		Reporting Limits
1	Field Blanks		Compound Identification
1	Surrogate Compounds		Reported Results
	Laboratory Control Samples (LCS/LCSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

SDG RM65: As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. The temperature for one sample cooler was 1.6°C, which is less than the advisory temperature range. The temperature outlier did not impact data quality and no data were qualified.

Field Blanks

SDG RI46: Two trip blanks, 081110-TB and 081210-TB, were submitted. No target analytes were detected in these blanks.

SDG RI65: One trip blank, 081310-TB was submitted. No target analytes were detected in this blank.

Surrogate Compounds

SDG RI46: The recoveries for the surrogate d4-1,2-dichloroethane were greater than the upper control limit of 122% for six samples. There were no analytes detected in these samples; no action was necessary based on the potential high bias.

SDG RI65: The recoveries for the surrogate d4-1,2-dichloroethane were greater than the upper control limit of 122% for two samples. There were no analytes detected in these samples; no action was necessary based on the potential high bias.

Matrix Spike/Matrix Spike Duplicate Samples

SDG RG58: Due to limited sample volume, matrix spike/matrix spike duplicate samples (MS/MSD) were not analyzed. Precision and accuracy were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results.

SDG RG79: For QC Sample PSB11-4-6-073010, the MSD recovery for tetratchloroethene was less than the lower control limit. The MS recovery was acceptable; therefore no action was taken.

The RPD for tetrachloroethane was greater than the control limit; this analyte was not detected in the parent sample; no qualification of data was necessary.

Field Duplicates

The relative percent difference (RPD) value control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG RI46: One set of field duplicates, MW-03-081110 and MW-03-081110-D was submitted. No target analytes were detected in either sample; field precision was acceptable.

SDG RM65: One set of field duplicates, MW-16-091310 and MW-16-091310-D was submitted. No target analytes were detected in either sample; field precision was acceptable.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values, except as noted above. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values, except as previously noted.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Polycyclic Aromatic Hydrocarbons by SW846 Method 8270D

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Level III) was performed on all soil data. Compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	5 Soil
RG54	10 Soil
RG58	19 Soil
RG60	6 Soil
RG78	13 Soil
RG79	14 Soil
RG94	10 Soil & 1 Equipment Rinsate
RK57	2 Soil
RK83	12 Soil
RK84	10 Soil
RK86	8 Soil
RM67	1 Soil
RN62	3 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG RG51: Samples PSB12-8-10-072810 and PSB12-4-6-072810 were included on the chain-of-custody, but no results were reported. These samples were analyzed and reported in SDG RK57.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

2	Holding Times and Sample Preservation	1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	GC/MS Instrument Performance	1	Field Duplicates
	Initial Calibration (ICAL)		Internal Standards
	Continuing Calibration (CCAL)		Target Analyte List
	Laboratory Blanks	1	Reporting Limits
1	Field Blanks		Compound Identification
2	Surrogate Compounds		Reported Results
	Laboratory Control Samples (LCS/LCSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. Several coolers were received with temperatures ranging from 0.0°C to 7.5°C, which are outside of the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

SDG RG79: Sample PSB15-13-15-073010 was re-extracted and reanalyzed after the 14 day holding time. There were no positive results for this sample; reporting limits were estimated (UJ-1) to indicate a potential low bias.

SDG RG94: Sample MW12-ER-080210 was re-extracted and reanalyzed after the 7 day holding time. There were no positive results for this sample; reporting limits were estimated (UJ-1).

SDG RN62: Three soil samples were removed from frozen archive and analyzed within advisory holding times for frozen samples. The samples in SDG RN62 were originally logged under SDGs RK21 and RK89.

Field Blanks

SDG RG94: One equipment rinsate blank, MW12-ER-080210, was submitted. No target analytes were detected in this blank.

Surrogate Compounds

SDG RG54: The recoveries for p-terphenyl-d14 were less than the lower control limit of 40% in samples PSB14-0-0.5-072810 (20.4%), PSB14-7-9-072810 (30.4%) and PSB14-1.5-2.0-072810 (38.8%). All results for these samples were estimated (J/UJ-13) to indicate a potential low bias.

SDG RG60: The recoveries for p-terphenyl-d14 were less than the lower control limit in samples PSB13-0-0.5-072910 (4.7%), PSB13-1.5-2-072910 (21.3%), and PSB13-2-4-072910 (11.5%). The

samples were re-extracted and reanalyzed, with elevated reporting limits. All results from the original analyses of samples PSB13-1.5-2-072910 and PSB13-2-4-072910 were estimated (UJ-13) to indicate a potential low bias. Because the surrogate recovery for sample PSB13-0-0.5-072910 was less than 10%, the results from the re-analysis should be used for this sample.

SDG RG78: The recoveries for p-terphenyl-d14 were less than the lower control limit in samples PSB9A-0-0.5-073010 (5.0%) and PSB9A-2-4-073010 (38.6%). The results for Sample PSB9A-2-4-073010 were estimated (UJ-13) to indicate a potential low bias. Sample PSB9A-0-0.5-073010 was re-extracted and reanalyzed with acceptable surrogate recoveries.

Matrix Spike/Matrix Spike Duplicate

SDG RG78: Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed using Sample PSB10-8.5-10-073010. The MS %R value for dibenzo(a,h)anthracene was less than the lower control limit. The MSD recovery was acceptable; no qualifiers were assigned for the single outlier.

SDGs RK83 & RN62: No MS/MSD samples were analyzed due to insufficient sample volume. Laboratory control samples/laboratory control sample duplicates (LCS/LCSD) were analyzed and used to evaluate laboratory accuracy and precision.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than 2x the RL.

Duplicate samples are listed in the table below. All field precision criteria were met.

SDG	Sample	Duplicate
RG51/RK57*	PSB12-8-10-072810	PSB12-8-10-072810-D
RG58	PSB24-2-4-072910	PSB24-2-4-072910-D
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D
	PSB15-17-19-073010	PSB15-17-19-073010-D
RG94	MW13-18.5-19.5-080210	MW13-18.5-19.5-080210-D
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D

*The parent sample was in SDG RK57.

Reporting Limits

The samples listed in the table below were analyzed at dilution. Reporting limits were elevated accordingly.

SDG	Sample	Dilution Factor
RG79	PSB11-0-0.5-073010	3x
	PSB11-1.5-2-073010	10x
	PSB11-2-4-073010	10x
	PSB11-2-4-073010-D	10x
	PSB11-11-13-073010	3x
RK83	PSB16-1-2-082510	3x
RK84	PSB21-2-4-082510	3x
	PSB19-0-1-082510	3x

Reported Results

SDG RG54: Sample PSB14-0-0.5-072810 was re-extracted and re-analyzed due to a low surrogate recovery in the original analysis. Both sets of data were reported. In order to achieve the lowest possible reporting limits, the results form the original analysis should be used. Results for the re-analysis were labeled do-not-report (DNR-11).

SDG RG60: Samples PSB13-0-0.5-072910, PSB13-1.5-2-072910, and PSB13-2-4-072910 were re-extracted and reanalyzed due to low surrogate recoveries in the original analyses. Both sets of data were reported. In order to achieve the lowest possible reporting limits, the results from the original analyses should be used for samples PSB13-1.5-2-072910 and PSB13-2-4-072910. Results from the re-analyses of these two samples were labeled do-not-report (DNR-11). The surrogate recovery for Sample PSB13-0-0.5-072910 was less than 10%; therefore the results from the re-analysis should be used for this sample. Results from the original analysis were labeled do-not-report (DNR-11).

SDG RG78: Sample PSB9A-0-0.5-073010 was re-extracted and reanalyzed due to a low surrogate recovery in the original analysis. Both sets of data were reported. The surrogate recovery for Sample PSB9A-0-0.5-073010 was less than 10%; therefore the results from the re-analysis should be used. Results from the original analysis were labeled do-not-report (DNR-11).

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values; precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

Data were estimated due to exceeded holding times and surrogate recovery outliers. Results were labeled DNR to indicate which result, from multiple analyses (dilutions, etc.), should not be used.

Data labeled as DNR should not be used for any purpose. All other data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Polycyclic Aromatic Hydrocarbons by SW846 Method 8270D SIM

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Level III) was performed on all data. Refer to the **Sample Index** for a complete list of samples..

SDG	Number of Samples
RI46	9 Groundwater
RI65	5 Groundwater
RM65	4 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG RM65: The analysis of samples for polycyclic aromatic hydrocarbons (PAH) was not specified on the chain of custody (COC). All samples were analyzed for PAH by 8270D SIM.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation	1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	GC/MS Instrument Performance Check	1	Field Duplicates
	Initial Calibration (ICAL)		Internal Standards
	Continuing Calibration (CCAL)		Target Analyte List
	Laboratory Blanks		Reporting Limits
	Field Blanks		Compound Identification
	Surrogate Compounds		Reported Results
	Laboratory Control Samples (LCS/LCSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures ranging from 1.6°C to 13.2°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Matrix Spike/Matrix Spike Duplicates

SDG RM65: Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy was evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries. Precision was evaluated using the LCS/LCSD and field duplicate relative percent difference (RPD) values.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SDG RI46: One set of field duplicates, Samples MW-03-081110 & MW-03-081110-D, was submitted. No positive results were reported in the sample or duplicate. Field precision was acceptable.

SDG RM65: One set of field duplicates, Samples MW-16-091310 & MW-16-091310-D, was submitted. No positive results were reported in the sample or duplicate. Field precision was acceptable.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values. Precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Pentachlorophenol by EPA Method 8041

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Level III) was performed on all groundwater data and compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	7 Soil
RG54	10 Soil
RG58	19 Soil
RG60	6 Soil
RG78	13 Soil
RG79	14 Soil
RG94	10 Soil & 1 Equipment Rinsate
RK21	3 Soil
RK83	12 Soil
RK84	10 Soil
RK86	8 Soil
RK89	1 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation	1	Field Duplicates
	Initial Calibration (ICAL)		Retention Time Window
	Continuing Calibration (CCAL)		Target Analyte List
	Laboratory Blanks		Compound Identification
2	Surrogate Compounds	2	Compound Quantitation
	Laboratory Control Samples (LCS)	1	Reporting Limits
1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. Several coolers were received outside of these limits, with temperatures ranging from 0.0°C to 7.5°C. The temperature outliers did not impact data quality; therefore no qualifiers were assigned.

Surrogate Compounds

The percent recovery (%R) values for the surrogate 2,4,6-tribromophenol were less than the lower control limit in several samples. Associated positive results were estimated (J-13) and non-detects were estimated (UJ-13) to indicate a potential low bias. If the recovery was less than 10%, non-detected results were rejected (R-13) due to the extreme low bias. The number of outliers for each SDG is as follows:

SDG	Number of Outliers	Qualifier
RG54	5 Results	J/UJ
RG58	3 Results	UJ
RG60	2 Results	UJ
RG78	6 Results	J/UJ
RG79	5 Results	UJ
RG94	2 results	UJ
RK83	4 Results	J/UJ
	2 Results	R
RK86	2 Results	UJ

Matrix Spike/Matrix Spike Duplicates

SDG RG79: Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed using Sample PSB11-4-6-073010. The MSD percent recovery (%R) value for pentachlorophenol was greater than the upper control limit. The MS %R value for this analyte was within the control limits; therefore no action was taken.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than 2x the RL.

Duplicate samples are listed in the table below. All field precision criteria were met.

SDG	Sample	Duplicate
RG51	PSB12-8-10-072810	PSB12-8-10-072810-D
RG58	PSB24-2-4-072910	PSB24-2-4-072910-D

SDG	Sample	Duplicate
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D
	PSB15-17-19-073010	PSB15-17-19-073010-D
RK21	MW16-39-40-082410	MW16-39-40-082410 –D
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D

Compound Quantitation

SDG RK83: The percent difference (%D) between the primary column and confirmation column was greater than the control limit of 40% for Sample PSB16-2-4-082510. The pentachlorophenol result for this sample was estimated (J-3).

Reporting Limits

SDG RG79: Samples PSB11-1.5-2-073010, PSB11-2-4-073010, PSB11-2-4-073010-D, and PSB15-0-0.5-073010 were analyzed at a 10x dilution. The reporting limits were adjusted accordingly.

IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exception noted above, accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample and MS/MSD recoveries; precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

Data were qualified based on surrogate recovery outliers and second column confirmation outliers. Data were rejected due to surrogate recovery values less than 10%.

Data that have been rejected are not useable for any purpose. All other data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Pentachlorophenol by EPA Method 8041

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Level III) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RI46	9 Groundwater
RI65	5 Groundwater
RM65	4 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation	1	Field Duplicates
	Initial Calibration (ICAL)		Second Column Confirmation
	Continuing Calibration (CCAL)		Retention Time Window
	Laboratory Blanks		Target Analyte List
	Surrogate Compounds		Reporting Limits
	Laboratory Control Samples (LCS/LCSD)		Compound Identification
1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures ranging from 1.6°C to 13.2°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate samples were not analyzed due to insufficient sample volume. Laboratory precision and accuracy were evaluated using the results from the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SDG RI46: One set of field duplicates, Samples MW-03-081110 & MW-03-081110-D, was submitted. No positive results were reported in the sample or duplicate. Field precision was acceptable.

SDG RM65: One set of field duplicates, Samples MW-16-091310 & MW-16-091310-D, was submitted. No positive results were reported in the sample or duplicate. Field precision was acceptable.

IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate and LCS/LCSD recoveries. Precision was also acceptable as demonstrated by the LCS/LCSD and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
BETX by Method SW8021B Mod
Gasoline Range Organics by NWTPH-Gx

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all groundwater data and compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	7 Soil, 1 Trip Blank
RG54	10 Soil, 1 Trip Blank
RG58	6 Soil, 3 Trip Blank
RG60	6 Soil, 1 Trip Blank
RG78	13 Soil, 2 Trip Blank
RG79	14 Soil, 2 Trip Blank
RG94	10 Soil, 2 Trip Blank
RK83	8 Soil, 1 Trip Blank
RK84	10 Soil, 2 Trip Blank
RK86	8 Soil, 1 Trip Blank
RR22	3 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG RG54: The trip blank sample PSB17-TB was recorded on the chain of custody but not received by the laboratory.

SDG RK83: The sampling date of 08/26/2010 on the chain of custody (COC) for the trip blank sample PSB20-TB-082610 was incorrect. The client was contacted and it was confirmed that 8/25/2010 was the correct date.

Samples PSB16-2-4-082510, PSB16-0-0.5-082510, and PSB16-1-2-082510 were marked for analysis on the COC, but the samples were not analyzed with the other samples in this SDG. The laboratory analyzed the samples at a later date and reported the results in SDG RR22.

SDG RK84: The sampling dates of 08/26/2010 on the COC for the trip blanks PSB21-TB-082610 and PSB19-TB-082610 were incorrect. The client was contacted and it was confirmed that 8/25/2010 was the correct date.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

2	Holding Times and Sample Preservation		Laboratory Control Samples (LCS)
	Initial Calibration (ICAL)	1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Duplicates
	Blanks		Target Analyte List
1	Field Blanks		Reporting Limits
	Surrogate Compounds	2	Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. Several coolers were received with temperatures ranging from 0.0°C to 7.5°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

SDG RK83: Samples PSB16-4-6-082510 and PSB16-13-15-082510 were analyzed after the 14 day holding time. The gasoline range organics (GRO) results for these two samples were estimated (J-1) to indicate a potential low bias. Benzene, toluene, ethylbenzene, and xylene (BTEX) were reported by method 8260C and no further action was necessary.

SDG RR22: Samples PSB16-2-4-082510, PSB16-0-0.5-082510, and PSB16-1-2-082510 were analyzed 37 days after the 14 day holding time. When the results for the BTEX compounds were compared to the raw data from the 8260C analyses in SDG RK83, the 8260C results confirmed the results from the 8021B analyses; therefore, the results were estimated (J/UJ-1) rather than rejected.

Field Blanks

Up to three trip blank samples were submitted in each SDG as shown in the following table. There were no target analytes detected in any of the trip blanks.

SDG	Trip Blank ID	Trip Blank ID	Trip Blank ID
RG51	PSB12-TB	--	--
RG54	PSB14-TB	--	--
RG58	PSB22-TB	PSB23-TB	PSB24-TB
RG60	PSB13-TB	--	--
RG78	PSB9-TB	PSB10-TB	--
RG79	PSB11-TB	PSB15-TB	--
RG94	MW12-TB-080210	--	--
RK83	PSB20-TB-082610		--
RK84	PSB21-TB-082610	PSB19-TB-082610	--
RK86	PSB18-TB-082610	--	--

SDG RG94: One equipment rinsate, MW12-ER-080210, was submitted. There were no target analytes detected in this blank.

Matrix Spike/Matrix Spike Duplicates

SDG RG54: The matrix spike duplicate sample (MSD) %R value for ethylbenzene was within the control limits%; therefore no action was taken for the MS %R outlier. The relative percent difference (RPD) for ethylbenzene was greater than the control limit of 50%. This compound was not detected in the parent sample; therefore no qualification was necessary.

SDG RK83: No MS/MSD samples were analyzed with this SDG. Laboratory precision and accuracy were evaluated using the results from the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses.

SDG RK84: For QC sample PSB19-13-15-082510, the matrix spike (MS) %R value for ethylbenzene was less than the lower control limit of 50%. The MSD recovery was acceptable; therefore no action was taken. The relative percent difference (RPD) for ethylbenzene was greater than the control limit of 50%. This compound was not detected in the parent sample; therefore no qualification was necessary.

SDG RR22: No MS/MSD samples were analyzed with this SDG. Laboratory precision and accuracy were evaluated using the results from the LCS/LCSD) analyses.

Field Duplicate

The RPD value control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the two times the RL.

Duplicate samples were submitted with each SDG as shown in the following table. Field precision was acceptable for all SDGs.

SDG	Sample	Duplicate
RG51	PSB12-8-10-072810	PSB12-8-10-072810-D
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D
	PSB15-17-19-073010	PSB15-17-19-073010-D
RG94	MW13-18.5-19.5-080210	MW13-18.5-19.5-080210-D
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D

Reported Results

SDG RK83: Samples PSB16-4-6-082510 and PSB16-13-15-082510 were analyzed after the 14 day holding time. Benzene, toluene, ethylbenzene, and xylene were also reported for these two samples by method 8260C. The results for these compounds from the method 8021 analysis were flagged as do-not-report (DNR-11).

Reporting Limits

SDG RK83: Sample PSB20-2-4-082510 was analyzed with a reduced sample size due to a high concentration of xylene in the sample. Reporting limits were elevated accordingly.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, MS/MSD and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries. Precision was acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

Data were estimated because of holding time outliers. Results were flagged DNR to indicate which result, from multiple analyses, should not be used.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
BETX by Method SW8021B Mod and SW8260B
Gasoline Range Organics by NWTPH-Gx

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all groundwater data and compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RI46	9 Groundwater, 1 Trip Blank
RI65	5 Groundwater, 1 Trip Blank
RM65	4 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation		Laboratory Control Samples (LCS/LCSD)
	Initial Calibration (ICAL)		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Duplicates
	Laboratory Blanks		Target Analyte List
1	Trip Blanks	1	Reporting Limits
	Surrogate Compounds	1	Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures ranging from 1.6°C to 13.2°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Trip Blanks

SDG RI46: Two trip blanks, 081110-TB and 081210-TB, were submitted. No target analytes were detected in these blanks.

SDG RI65: One trip blank, 081310-TB, was submitted. No target analytes were detected.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG RI46: One set of field duplicates, MW-03-081110 and MW-03-081110-D, were submitted. All field duplicate precision criteria were met.

SDG RM65: One set of field duplicates, MW-16-091310 and MW-16-091310-D were submitted. No target analytes were detected in either sample; field precision was acceptable.

Reporting Limits

The reporting limit of 1.0 µg/L for all BETX analytes (benzene, toluene, ethylbenzene, xylenes) exceeded the (QAPP) specified reporting limit of 0.25 µg/L.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) percent recovery values. Precision was acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Diesel Range Organics by NWTPH-Dx

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all soil data and compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	7 Soil
RG54	10 Soil
RG58	19 Soil
RG60	6 Soil
RG78	13 Soil
RG79	15 Soil
RG94	10 Soil, 1 Equipment Rinsate
RK76	7 Soil
RK83	12 Soil
RK84	10 Soil
RK86	8 Soil
RN62	3 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1 Holding Times and Sample Preservation
Initial Calibration (ICAL)
1 Continuing Calibration (CCAL)
Laboratory Blanks
1 Field Blanks
Surrogate Compounds
Laboratory Control Samples (LCS/LCSD)
Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
1 Field Duplicates
1 Reporting Limits
Reported Results

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[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2.0°C to 6°C. Several coolers were received outside of these limits, with temperatures ranging from 0.0°C to 7.5°C. The temperature outliers did not impact data quality; therefore no qualifiers were assigned.

SDG RN62: Three soils samples were removed from frozen archives and analyzed within advisory holding times for frozen samples. The samples in SDG RN62 were originally logged under SDGs RK21 and RK89.

Continuing Calibration

Continuing calibration verification standards were analyzed at the required frequency. The percent difference (%D) values were within the criteria of +/- 15%.

Field Blanks

SDG RG94: One equipment rinsate, MW12-ER-080210, was submitted. No target analytes were detected in this blank.

Field Duplicates

The relative percent difference (RPD) value control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than two times the RL.

Duplicate samples were submitted with each SDG as shown in the following table. Field precision was acceptable for all SDGs.

SDG	Sample	Duplicate
RG51	PSB12-8-10-072810	PSB12-8-10-072810-D
RG58	PSB24-2-4-072910	PSB24-2-4-072910-D
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D
	PSB15-17-19-073010	PSB15-17-19-073010-D
RG94	MW13-18.5-19.5-080210	MW13-18.5-19.5-080210-D
RK76	PSB25-18-20-082510	PSB25-18-20-082510-D
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D

Reporting Limits

SDG RG79: Samples PSB11-0-0.5-073010 (2x), PSB11-1.5-2-073010 (20x), PSB11-2-4-073010 (20x), PSB11-2-4-073010-D (10x), PSB11-11-13-073010 (10x), and PSB11-14-16-073010 (10x), were analyzed at dilutions. The reporting limits were adjusted accordingly.

SDG RK83: Sample PSB16-1-2-082510 was analyzed at a 10x dilution. The reporting limits were adjusted accordingly.

SDG RK84: Sample PSB21-6-7-082510 reporting limits were greater than quality assurance project plan (QAPP) required reporting limits.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD), and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries. Precision was also acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Motor Oil and Diesel Range Organics by NWTPH-Dx

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RI46	9 Groundwater
RI65	5 Groundwater
RM65	4 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG RM65: The analysis of samples for NWTPH-Dx was not specified on the chain of custody (COC). All samples were analyzed by this method.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation		Laboratory Control Samples (LCS/LCSD)
	Initial Calibration (ICAL)	1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Precision (Duplicates and Replicates)
	Blanks		Target Analyte List
	Trip Blanks		Reporting Limits
	Surrogate Compounds		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures ranging from 1.6°C to 13.2°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Matrix Spike/Matrix Spike Duplicate Samples

SDGs RI46 & RM65: Matrix spike and matrix spike duplicate samples (MS/MSD) were not analyzed. Laboratory accuracy and precision were evaluated using the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries and relative percent difference (RPD) values.

Field Duplicates

The RPD control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG RI46: One set of field duplicates, MW-03-081110 and MW-03-081110-D, was submitted. All field duplicate precision criteria were met.

SDG RM65: One set of field duplicates, Samples MW-16-091310 & MW-16-091310-D, was submitted. No positive results were reported in the sample or duplicate. Field precision was acceptable.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RIFS
Dioxin/Furan Compounds by Method 1613

This report documents the review of analytical data from the analyses of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. Full validation (Level IV) was performed on all data. The **Sample Index** contains a complete list of samples.

SDG	Number of Samples
6268	3 Soil
6269	8 Soil
6271	3 Soil
6272	6 Soil
6273	11 Soil
6274	6 Soil
6276	11 Soil
6277	6 Soil
6278	6 Soil
6330	6 Soil
6331	9 Soil
6332	3 Soil
6364	11 Soil
6365	11 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

1	Holding Times and Sample Preservation		Ongoing Precision and Recovery (OPR)
	System Performance and Resolution Checks	1	Field Duplicates
	Initial Calibration (ICAL)		Target Analyte List
	Calibration Verification (CVER)	2	Reported Results
	Method Blanks		Compound Identification
2	Labeled Compound Recovery	1	Calculation Verification
2	Matrix Spike/Matrix Spike Duplicates (MS/MSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

All SDGs: The samples were transferred from Analytical Resources, Inc (ARI) to Frontier Analytical Laboratory. As stated in validation guidance documents, samples should be maintained within the advisory temperature range of 2°C to 6°C. The temperatures recorded by Frontier were as low as 0.0°C, which is less than the lower control limit. The temperature outliers did not impact data quality and no data were qualified.

Labeled Compound Recovery

The labeled compound percent recovery (%R) values were within the QAPP specified control limits of 70% - 130%, with the exceptions noted below. For recoveries less than the lower control limit, the results for the associated compounds were estimated (J/UJ-13) to indicate a potential low bias. For recoveries greater than the upper control limit, the results for the associated compounds were estimated (J-13) to indicate a potential high bias. Outliers in the following samples resulted in qualification of data.

SDG	Sample ID	Number of Outliers	Bias
6268	PSB12-0-0.5-072810	8	Low
	PSB12-1.5-2.0-072810	2	Low
	PSB12-2-4-072810	2	Low
6269	PSB17-10-13-072810	1	Low
6272	PSB1-1.5-2.0-072910	2	Low
	PSB2-0-0.5-072910	2	Low
	PSB2-1.5-2-072910	2	Low
	PSB3-0-0.5-072910	1	Low
	PSB3-1.5-2-072910	2	Low
6273	PSB04-1.5-2.0-072810	2	Low
6274	PSB9A-1.5-2-073010	3	Low
	PSB9A-2-4-073010	2	Low
	PSB9A-0-0.5-073010	2	Low
6276	PSB11-2-4-073010	1	Low
	PSB11-2-4-073010-D	1	Low
	PSB15-2-4-073010	3	Low
	PSB15-17-19-073010	2	Low
	PSB15-17-19-073010-D	2	Low
6277	MW13-0-0.5-080210	1	High
	MW12-0-0.5-080210	1	High
6278	PSB23-0-0.5-072910	1	High
6330	PSB21-2-4-082510	2	Low
	PSB19-0-1-082510	1	High
6330	PSB19-2-4-082510	1	Low
6331	PSB20-2-4-082510	2	Low
	PSB20-1.5-2-082510	1	Low

SDG	Sample ID	Number of Outliers	Bias
6331	PSB16-0-0.5-082510	5	Low
	PSB16-1-2-082510	2	Low
	PSB16-13-15-082510	3	Low
6332	PSB18-1.5-2-082610	15	Low
	PSB18-0-1.5-082610	1	Low
6364	PSB12-4-6-072810	1	Low
	PSB14-4-7-072810	1	High
	PSB06-2-4-072810	2	Low
	PSB06-4-6-072810	1	Low
	PSB10-8.5-10-073010	1	Low
6365	SSB10-0-0.5-080310	2	Low
	SSB3-0-0.5-080610	3	Low

Matrix Spike/Matrix Spike Duplicates

SDG 6273: The matrix spike/matrix spike duplicate (MS/MSD) analyses were performed using Sample PSB06-0-0.5-072810. The percent recovery (%R) values for 1,2,3,4,6,7,8-HpCDF were greater than the QAPP specified upper control limit of 130%. The result for this analyte in the parent sample only was estimated (J-8) to indicate a potential high bias.

The RPD values for 1,2,3,4,6,7,8-HpCDF and OCDF were greater than the control limit of 30%. The results for these analytes in the parent sample were estimated (J-9).

Field Duplicates

The RPD value control limit is 30% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL. No data were qualified based on field duplicate precision outliers; however users of the data should consider the impact of field precision on the reported results.

SDG 6273: The data for one field duplicate set, PSB06-1.5-2.0-072810 and PSB06-1.5-2.0-072810-D, were submitted. The RPD for OCDF (33.9%) was greater than the control limit.

SDG 6276: The data for two field duplicate sets were submitted: PSB11-2-4-073010 & PSB11-2-4-073010-D and PSB15-17-19-073010 & PSB15-17-19-073010-D. All field precision criteria were met.

SDG 6331: The data for one field duplicate set, PSB20-2-4-082510 and PSB20-2-4-082510-Dup, were submitted. The RPD for OCDD (34.5%) was greater than the control limit.

Reported Results

Several samples were reanalyzed at dilution due to analyte concentrations that exceeded the calibration range of the instrument. In each case, the laboratory reported only the most appropriate positive result for each congener from either the original or diluted analysis.

The laboratory assigned "D and/or M" flags to several of the reported homologue group totals to indicate that a diphenyl ether (D) or some other interference (M) was present, resulting in a high bias in the reported result. All analytes that were "D" and/or "M" flagged were estimated (J-14).

SDG 6274: Results in three samples were estimated (J-14).

SDG 6276: Results in four samples were estimated (J-14).

SDG 6330: Results in five samples were estimated (J-14).

SDG 6331: One result was estimated (J-14).

SDG 6332: Results in one sample were estimated (J-14).

SDG 6364: Results in five samples were estimated (J-14).

SDG 6365: Results in five samples were estimated (J-14).

Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the above noted exceptions, accuracy was acceptable, as demonstrated by the labeled compound, OPR, and MS/MSD %R values; and precision was acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

Data were estimated based on labeled compound and MS/MSD recovery outliers, MS/MSD precision outlier, and interference from diphenyl ether.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Dioxin/Furan Compounds by Method 1613

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. Full validation (Level IV) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
6311	9 Groundwater
6312	5 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

1	Holding Times and Sample Preservation		Ongoing Precision and Recovery (OPR)
	System Performance and Resolution Checks	1	Field Duplicates
	Initial Calibration (ICAL)		Target Analyte List
	Calibration Verification (CVER)	2	Reported Results
	Method Blanks		Compound Identification
2	Labeled Compound Recovery	1	Calculation Verification
	Matrix Spike/Matrix Spike Duplicates (MS/MSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

All SDGs: The samples were transferred from Analytical Resources, Inc (ARI) to Frontier Analytical Laboratory. As stated in validation guidance documents, samples should be maintained within the advisory temperature range of 2°C to 6°C. The temperatures recorded by Frontier were as low as 0.0°C, which is less than the lower control limit. The temperature outliers did not impact data quality and no data were qualified.

Labeled Compound Recovery

Labeled compounds were added to every sample as specified in the method. The percent recovery (%R) values were within the QAPP specified control limits of 70% - 130%, with the exceptions noted below. All recovery outliers were less than the lower control limit of 70%; associated results were estimated (J/UJ-13) to indicate a potential low bias. Outliers in the following samples resulted in qualification of data:

SDG	Sample ID	Number of Outliers	Bias	Qualifiers
6311	MW-02-081110	4	Low	UJ-13
	MW-04-081110	2	Low	
	MW-10-081210	3	Low	
	MW-11-081210	3	Low	
	MW-13-081210	16 (all)	Low	
	MW-12-081210	5	Low	J/UJ-13

Field Duplicates

The relative percent difference (RPD) control limit is 30% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG 6311: The data for one field duplicate set, MW-03-081110 and MW-03-081110-D, were submitted. There were no positive results for either sample; field precision was acceptable.

Reported Results

Several samples were reanalyzed at dilution due to analyte concentrations that exceeded the calibration range of the instrument. In each case, the laboratory reported only the most appropriate positive result for each congener from either the original or diluted analysis.

The laboratory assigned "D and/or M" flags to several of the reported homologue group totals to indicate that a diphenyl ether (D) or some other interference (M) was present, resulting in a high bias in the reported result. All analytes that were "D" and/or "M" flagged were estimated (J-14).

SDG 6312: All homologue group totals that were "D and/or M" flagged by the laboratory were estimated (J-14).

Calculation Verification

All SDG: Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the above noted exceptions, accuracy was acceptable as demonstrated by the labeled compound, matrix spike/matrix spike duplicate (MS/MSD), and OPR %R values. Precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

Data were estimated based on labeled compound recovery outliers and interference from diphenyl ether.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Total Arsenic and Lead by EPA 6010B

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all soil data. Compliance screening (Level II) was performed on all field blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	7 Soil
RG54	10 Soil
RG58	19 Soil
RG60	6 Soil
RG78	13 Soil
RG79	14 Soil
RG94	10 Soil, 1 Equipment Rinsate
RK76	8 Soil
RK83	12 Soil
RK84	10 Soil
RK86	8 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1 Holding Times and Sample Preservation
Initial Calibration
Continuing Calibration Verification
CRDL Standards
Laboratory Blanks
1 Field Blanks
Laboratory Control Samples (LCS)
1 Matrix Spikes (MS)
1 Reference Materials
2 Laboratory Duplicates
1 Field Duplicates
Interference Check Samples
Target Analyte List
Reporting Limits
Reported Results

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[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. Several coolers were received with temperatures ranging from 0.0°C to 7.5°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Field Blanks

SDG RG94: One equipment rinsate, MW12-ER-080210, was submitted. No target analytes were detected in this blank.

Matrix Spikes

SDG RG94: Matrix spikes were not analyzed for the water field blank sample. The laboratory control sample (LCS) was used to evaluate laboratory accuracy for the field blank sample.

Reference Materials

The certified reference material (CRM) ERA lot number D053540 was analyzed with the soil samples, with exceptions noted below. All recoveries were within the certified acceptance ranges.

SDGs RG94, RK83, RK84, & RK86: A certified reference material was not analyzed with these samples. Laboratory control samples (LCS) and matrix spike (MS) samples were used to evaluate laboratory accuracy.

Laboratory Duplicates

Laboratory duplicates were analyzed at the proper frequency of one per 20 samples or one per batch for the soil samples. The following acceptance criteria were used to evaluate precision: the relative percent difference (RPD) control limit not to exceed 20% was required for results greater than 5x the reporting limit (RL). The absolute difference between the sample and replicate must be less than 2x the RL for results less than 5x the RL.

For RPD or absolute difference values exceeding the control limits, associated positive results and non-detects were estimated (J/UJ-9). The following outliers were noted:

SDG RG79: QC Sample PSB11-4-6-073010: lead (166%)

SDG RK76: QC Sample PSB25-1-2-082510: lead (43.5%)

Field Duplicates

The relative percent difference (RPD) value control limit is 20% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the two times the RL.

Duplicate samples and any outliers are noted in the table below. No data were qualified based on field duplicate precision outliers; however data users should consider the impact of field precision on the reported results.

SDG	Sample	Duplicate	Outliers
RG51	PSB12-8-10-072810	PSB12-8-10-072810-D	
RG58	PSB24-2-4-072910	PSB24-2-4-072910-D	
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D	Lead RPD 52.6%
	PSB15-17-19-073010	PSB15-17-19-073010-D	
RG94	MW13-18.5-19.5-080210	MW13-18.5-19.5-080210-D	
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D	
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D	

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample, reference material, and matrix spike sample percent recovery values. With the above noted exceptions, precision was also acceptable as demonstrated by the laboratory and field duplicate RPD values.

Data were qualified based on laboratory duplicate RPD outliers.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Dissolved Arsenic and Lead by EPA 200.8

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RI46	9 Groundwater
RI65	5 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation		Laboratory Duplicates
	Initial Calibration	1	Field Duplicates
	Continuing Calibration Verification		Interference Check Samples
	CRDL Standards		Internal Standards
	Laboratory Blanks		Target Analyte List
	Laboratory Control Samples (LCS)		Reporting Limits
	Matrix Spike (MS)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures ranging from 1.6°C to 13.2°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG RI46: One set of field duplicates, MW-03-081110 and MW-03-081110-D, was submitted. All field duplicate precision criteria were met.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample and matrix spike sample percent recovery values. Precision was also acceptable as demonstrated by the laboratory and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Total Solids by 160.3M and Total Organic Carbon by Plumb, 1981

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RG51	7 Soil
RG54	10 Soil
RG58	19 Soil
RG60	6 Soil
RG78	13 Soil
RG79	15 Soil
RG94	10 Soil
RK21	2 Soil
RK83	12 Soil
RK84	10 Soil
RK86	8 Soil
RK89	1 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation	2	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Initial Calibration	2	Laboratory Replicates
	Calibration Verification	1	Field Duplicates
	Laboratory Blanks		Reporting Limits
	Laboratory Control Samples (LCS)		Reported Results
1	Reference Materials		

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample shipping coolers should arrive at the laboratory within the advisory temperature range of 2° to 6°C. Several coolers were received with temperatures ranging from 0.0°C to 7.5°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Reference Materials

The certified reference material NIST #8704 was analyzed with all TOC samples. All recoveries were within the certified acceptance ranges.

Matrix Spikes

Matrix spikes (MS) were analyzed at the proper frequency of one per 20 samples or one per batch for total organic carbon (TOC). The recoveries were within the QAPP specified criteria of 80%-120%, with the exceptions noted below. For recoveries greater than the upper control limit, positive results in the associated samples were estimated (J-8) to indicate a potential high bias. There were no recoveries that were less than the lower control limit.

The following outliers resulted in qualification of data:

SDG RK83: (Batch QC): TOC (high bias)

SDG RK89: (Batch QC): TOC (high bias)

Laboratory Replicates

Laboratory triplicates were analyzed for total solids and TOC. The percent relative standard deviation (%RSD) values were less than the QAPP specified criterion of 20%, with the exceptions noted below.

For %RSD values that exceeded the control limit, associated positive results and non-detects were estimated (J/UJ-9).

SDG RG94: QC Sample MW12-8-9.5-080210: TOC (30.1%)

Field Duplicates

The relative percent difference (RPD) control limit is 20% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the two times the RL.

Duplicate samples and any outliers are noted in the table below. No data were qualified based on field duplicate precision outliers; however data users should consider the impact of field precision on the reported results.

SDG	Sample	Duplicate	Outliers
RG51	PSB12-8-10-072810	PSB12-8-10-072810-D	
RG58	PSB24-2-4-072910	PSB24-2-4-072910-D	
RG79	PSB11-2-4-073010	PSB11-2-4-073010-D	
	PSB15-17-19-073010	PSB15-17-19-073010-D	TOC RPD 24.3%
RG94	MW13-18.5-19.5-080210	MW13-18.5-19.5-080210-D	
RK83	PSB20-2-4-082510	PSB20-2-4-082510-D	
RK86	PSB18-12.5-15-082610	PSB18-12.5-15-082610-D	

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. with the exceptions noted above, accuracy was acceptable as demonstrated by the laboratory control sample, matrix spike, and reference material percent recovery values; and precision was acceptable as demonstrated by the laboratory replicate %RSD and field duplicate RPD values.

Data were qualified based on matrix spike %R and laboratory replicate %RSD outliers.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
pH by EPA 150.1 and Total Suspended Solids by EPA 160.2

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Level III) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
RI46	9 Groundwater
RI65	5 Groundwater
RM65	4 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Holding Times and Sample Preservation		Laboratory Replicates
	Laboratory Blanks	1	Field Duplicates
	Laboratory Control Samples (LCS)		Reporting Limits
	Matrix Spikes (MS)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Holding Times and Sample Preservation

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures ranging from 1.6°C to 13.2°C, which are outside the advisory temperature range. The temperature outliers did not impact data quality and no data were qualified.

Field Duplicates

The relative percent difference (RPD) control limit is 20% (25% for pH) for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG RI46: One set of field duplicates, MW-03-081110 and MW-03-081110-D, was submitted. All field duplicate precision criteria were met.

SDG RM65: One set of field duplicates, Samples MW-16-091310 & MW-16-091310-D, was submitted. No positive results were reported in the sample or duplicate. Field precision was acceptable.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample percent recovery values. Precision was acceptable as demonstrated by the laboratory and field replicate RPD values.

No results were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

1	Holding Time/Sample Preservation
2	Chromatographic pattern in sample does not match pattern of calibration standard.
3	Compound Confirmation
4	Tentatively Identified Compound (TIC) (associated with NJ only)
5A	Calibration (initial)
5B	Calibration (continuing)
6	Field Blank Contamination
7	Lab Blank Contamination (e.g., method blank, instrument, etc.)
8	Matrix Spike(MS & MSD) Recoveries
9	Precision (all replicates)
10	Laboratory Control Sample Recoveries
11	A more appropriate result is reported (associated with “R” and “DNR” only)
12	Reference Material
13	Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards)
14	Other (define in validation report)
15	GFAA Post Digestion Spike Recoveries
16	ICP Serial Dilution % Difference
17	ICP Interference Check Standard Recovery
18	Trip Blank Contamination
19	Internal Standard Performance (e.g., area, retention time, recovery)
20	Linear Range Exceeded
21	Potential False Positives
22	Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix)

EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Hold Time	Waters: 14 days preserved 7 Days: unpreserved (for aromatics) Solids: 14 Days	J(+)/UJ(-) if hold times exceeded If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ)	1
Tuning	BFB Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Storage Blank	One per SDG <CRQL	U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule	7
Trip Blank	Frequency as per project QAPP	Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned	18
Field Blanks (if required in QAPP)	No results > CRQL	Apply 5X/10X rule; U(+) < action level	6

EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) in parent sample if RPD > CL	9
LCS *low conc. H2O VOA*	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS *regular VOA (H2O & solid)*	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	Added to all samples Within method control limits	J(+) if %R >UCL J(+)/UJ(-) if %R <LCL but >10% (see PJ[1]) J(+)/R(-) if <10%	13
Internal Standard (IS)	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% RT>30 seconds, narrate and Notify PM	19
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R(+) common laboratory contaminants See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

PJ[1] No action if there are 4+ surrogates and only 1 outlier.

EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	Water: J(+)/UJ(-) if ext. > 7 and < 21 days J(+)/R(-) if ext > 21 days (EcoChem PJ) Solids/Wastes: J(+)/UJ(-) if ext. > 14 and < 42 days J(+)/R(-) if ext. > 42 days (EcoChem PJ) J(+)/UJ(-) if analysis >40 days	1
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Field Blanks (Not Required)	No results > CRQL	Apply 5X/10X rule; U(+) < action level	6

EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) in parent sample if RPD > CL	9
LCS low conc. H2O SVOA	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS regular SVOA (H2O & solid)	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% RT>30 seconds, narrate and Notify PM	19
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R(+) common laboratory contaminants See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Dx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature & Preservation	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C	1
Holding Time	Ext. Waters: 14 days preserved 7 days unpreserved Ext. Solids: 14 Days Analysis: 40 days from extraction	J(+)/UJ(-) if hold times exceeded J(+)/R(-) if exceeded > 3X (EcoChem PJ)	1
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: $R^2 \geq 0.990$ If used, RSD of response factors ≤20%	Narrate if fewer than 5 calibration levels or if %R >15% J(+)/UJ(-) if R^2 <0.990 J(+)/UJ(-) if %RSD > 20%	5A
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 85% to 115%	Narrate if frequency not met. J(+)/UJ(-) if %R < 85% J(+) if %R >115%	5B
Method Blank	At least one per batch (≤20 samples) No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.	7
		U (at reported sample value) if sample result is ≥ RL and < 5X blank result	7
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in the field blank after method blank qualifiers are assigned.	6
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J(+) if both %R > upper control limit (UCL) J(+)/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier	8
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (≤10 samples) RPD ≤ lab control limit	J(+) if RPD > lab control limits	9
LCS (not required by method)	%R within lab control limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% (EcoChem PJ)	10

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Dx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Surrogates	2-fluorobiphenyl, p-terphenyl, o-terphenyl, and/or pentacosane added to all samples (inc. QC samples). %R = 50-150%	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (EcoChem PJ)	13
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J(+)	2
Field Duplicates	Use project control limits, if stated in QAPP EcoChem default: water: RPD < 35% solids: RPD < 50%	Narrate (Use Professional Judgement to qualify)	9
Two analyses for one sample (dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported. (See TM-04)	11

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Gasoline Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Gx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature & Preservation	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C	1
Holding Time	Waters: 14 days preserved 7 days unpreserved Solids: 14 Days	J(+)/UJ(-) if hold times exceeded J(+)/R(-) if exceeded > 3X (EcoChem PJ)	1
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: $R^2 \geq 0.990$ If used, RSD of response factors ≤20%	Narrate if fewer than 5 calibration levels or if %R >15% J(+)/UJ(-) if R^2 <0.990 J(+)/UJ(-) if %RSD > 20%	5A
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 80% to 120%	Narrate if frequency not met. J(+)/UJ(-) if %R < 80% J(+) if %R >120%	5B
Method Blank	At least one per batch (≤10 samples) No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.	7
		U (at reported sample value) if sample result is ≥ RL and < 5X blank result	7
Trip Blank (if required by project)	No results >RL	Action is same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned.	18
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in field blank after method and trip blank qualifiers are assigned.	6
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J(+) if both %R > upper control limit (UCL) J(+)/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier	8
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (≤10 samples) RPD ≤ lab control limit	J(+) if RPD > lab control limits	9

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Gasoline Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Gx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
LCS (not required by method)	%R within lab control limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% (EcoChem PJ)	10
Surrogates	Bromofluorobenzene and/or 1,4-difluorobenzene added to all samples (inc. QC samples). %R = 50-150%	J(+)/UJ(-) if %R < LCL J(+) if %R >UCL J(+)/R(-) if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (EcoChem PJ)	13
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J(+)	2
Field Duplicates	Use project control limits, if stated in QAPP EcoChem default: water: RPD < 35% solids: RPD < 50%	Narrate outliers If required by project, qualify with J(+)/UJ(-)	9
Two analyses for one sample (e.g., dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported. (See TM-04)	11

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Waters/Solids < 4°C Tissues <-10°C	EcoChem PJ, see TM-05	1
Holding Time	Extraction - Water: 30 days from collection *Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days* Extraction - Soil: 30 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext > 30 days J(+)/UJ(-) if analysis > 40 Days EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 304.9824 Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift	R(+/-) if not met	14
Window Defining Mix and Column Performance Mix	Window defining mixture/Isomer specificity std run before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) x = ht. of TCDD y = baseline to bottom of valley For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290)	J(+) if valley > 25%	5A (ICAL) 5B (CCAL
Initial Calibration	Minimum of five standards %RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD <35% for labeled compounds under 1613b)	J(+) natives if %RSD > 20%	5A
	Abs. RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 >15 min on DB-225	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Continuing Calibration	Analyzed at the start and end of each 12 hour shift. %D+/-20% for native compounds %D +/-30% for labeled compounds (Must meet limits in Table 6, Method 1613B) (If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4)	Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers. For native compound %D outliers: 8290: J(+)/UJ(-) if %D = 20% - 75% J(+)/R(-) if %D > 75% 1613: J(+)/UJ(-) if %D is outside Table 6 limits J(+)/R(-) if %D is +/- 75% of Table 6 limit	5B
	Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL.	EcoChem PJ, see ICAL section of TM-05	
	RRT of all other compounds must meet Table 2 of 1613B.	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10	If <10, elevate Det. Limit or R(-)	
Method Blank	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	7
Field Blanks (Not Required)	No positive results	If sample result <5X action level, qualify U at reported value.	6
LCS / OPR	Concentrations must meet limits in Table 6, Method 1613B or lab limits.	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
MS/MSD (recovery)	May not analyze MS/MSD %R should meet lab limits.	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) in parent sample if RPD > CL	9

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Lab Duplicate	RPD <25% if present.	J(+)/UJ(-) if outside limts	9
Labeled Compounds / Internal Standards	*Method 8290:* %R = 40% - 135% in all samples *Method 1613B:* %R must meet limits specified in Table 7, Method 1613	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in Table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation idenfication criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration Tissues: Frozen	EcoChem Professional Judgment - no qualification based on cooler temperature outliers J(+)/UJ(-) if pH preservation requirements are not met	1
Holding Time	180 days from date sampled Frozen tissues - HT extended to 2 years	J(+)/UJ(-) if holding time exceeded	1
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r > 0.995	J(+)/UJ(-) if r < 0.995 (multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J(+)/UJ(-) if %R 75-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run %R within ±10% of true value	J(+)/UJ(-) if %R = 75-89% J(+) if %R 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B

Initial and Continuing Calibration Blank (ICB/CCB)	After each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		(Refer to TM-02 for additional information)
			7

Reporting Limit Standard	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Sb, Pb, Tl)	R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl) J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl) J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl) R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl)	14
Interference Check Samples (ICSA/ICSAB)	ICSAB %R 80 - 120% for all spiked elements | ICSA | < MDL for all unspiked elements except: K, Na	For samples with Al, Ca, Fe, or Mg > ICS levels R(+/-) if %R < 50% J(+) if %R >120% J(+)/UJ(-) if %R= 50 to 79% Use Professional Judgment for ICSA to determine if bias is present see TM-09 for additional details	17
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U(+) results < action level	7
Laboratory Control Sample (LCS)	One per matrix per batch		10
	Blank Spike: %R within 80-120%	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J(+)/UJ(-) if < LCL, J(+) if > UCL	

EcoChem Validation Guidelines for Metals Analysis by ICP
(Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Matrix Spikes	One per matrix per batch 75-125% for samples less than 4x spike level	J(+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30% or J(+)/UJ(-) if Post Spike %R 75-125% Qualify all samples in batch	8
Post-digestion Spike	If Matrix Spike is outside 75-125%, spike at twice the sample conc.	No qualifiers assigned based on this element	
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples >RL and < 5x RL (Diff < 2x RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids) qualify all samples in batch	9
Serial Dilution	5x dilution one per matrix %D < 10% for original sample conc. > 50x MDL	J(+)/UJ(-) if %D >10% qualify all samples in batch	16
Field Blank	Blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J(+)/UJ(-) in parent samples only	9
Linear Range	Sample concentrations must fall within range	J values over range	20

EcoChem Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration	EcoChem Professional Judgment - no qualification based on cooler temperature outliers J(+)/UJ(-) if pH preservation requirements are not met	1
Holding Time	180 days from date sampled Frozen tissues - HT extended to 2 years	J(+)/UJ(-) if holding time exceeded	1
Tune	Prior to ICAL monitoring compounds analyzed 5 times wih Std Dev. ≤ 5% mass calibration <0.1 amu from True Value Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height	Use Professional Judgment to evaluate tune J(+)/UJ(-) if tune criteria not met	5A
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r>0.995	J(+)/UJ(-) if r<0.995 (for multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J(+)/UJ(-) if %R 75-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run ±10% of true value	J(+)/UJ(-) if %R = 75-89% J(+) if %R 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B

Initial and Continuing Calibration Blanks (ICB/CCB)	After each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		refer to TM-02 for additional details
			7

Reporting Limit Standard (CRI)	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Co,Mn, Zn)	R(-),(+) < 2x RL if %R < 50% (< 30% Co,Mn, Zn) J(+) < 2x RL, UJ(-) if %R 50-69% (30%-49% Co,Mn, Zn) J(+) < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn) R(+) < 2x RL if %R > 180% (200% Co, Mn, Zn)	14
Interference Check Samples (ICSA/ICSAB)	Required by SW 6020, but not 200.8 ICSAB %R 80% - 120% for all spiked elements | ICSA | < IDL (MDL) for all unspiked elements	For samples with Al, Ca, Fe, or Mg > ICS levels R(+/-) if %R < 50% J(+) if %R >120% J(+)/UJ(-) if %R = 50% to 79% Use Professional Judgment for ICSA to determine if bias is present see TM-09 for additional details	17
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U(+) results < action level	7

EcoChem Validation Guidelines for Metals Analysis by ICP-MS
(Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Laboratory Control Sample (LCS)	One per matrix per batch Blank Spike: %R within 80%-120%	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J(+)/UJ(-) if < LCL, J(+) if > UCL	
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	One per matrix per batch 75-125% for samples where results do not exceed 4x spike level	J(+) if %R>125% J(+)/UJ(-) if %R <75% J(+)/R(-) if %R<30% or J(+)/UJ(-) if Post Spike %R 75%-125% Qualify all samples in batch	8
Post-digestion Spike	If Matrix Spike is outside 75-125%, Spike parent sample at 2x the sample conc.	No qualifiers assigned based on this element	
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples > RL and < 5 x RL (Diff < 2x RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL all samples in batch	9
Serial Dilution	5x dilution one per matrix %D < 10% for original sample values > 50x MDL	J(+)/UJ(-) if %D >10% All samples in batch	16
Internal Standards	Every sample SW6020: 60%-125% of cal blank IS 200.8: 30%-120% of cal blank IS	J (+)/UJ (-) all analytes associated with IS outlier	19
Field Blank	Blank < MDL	Action level is 5x blank conc. U(+) sample values < AL in associated field samples only	6
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J(+)/UJ(-) in parent samples only	9
Linear Range	Sample concentrations must fall within range	J values over range	20

EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration	EcoChem Professional Judgment - no qualification based on cooler temperature outliers J(+)/UJ(-) if pH preservation requirements are not met	1
Holding Time	28 days from date sampled Frozen tissues: HT extended to 6 months	J(+)/UJ(-) if holding time exceeded	1
Initial Calibration	Blank + 4 standards, one at RL r > 0.995	J(+)/UJ(-) if r<0.995	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±20% of true value	J(+)/UJ(-) if %R = 65%-79% J(+) if %R = 121-135% R(+/-) if %R < 65% R(+) if %R > 135%	5A
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run %R within ±20% of true value	J(+)/UJ(-) if %R = 65%-79% J(+) if %R = 121-135% R(+/-) if %R < 65% R(+) if %R > 135%	5B

Initial and Continuing Calibration Blanks (ICB/CCB)	after each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		refer to TM-02 for additional details
			7

Reporting Limit Standard (CRA)	conc at RL - analyzed beginning of run %R = 70-130%	R(-),(+)<2xRL if %R <50% J(+)<2x RL, UJ(-) if %R 50-69% J(+) <2x RL if %R 130-180% R(+)<2x RL if %R>180%	14
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U(+) results < action level	7
Laboratory Control Sample (LCS)	One per matrix per batch		10
	Blank Spike: %R within 80-120%	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J(+)/UJ(-) if < LCL, J(+) if > UCL	
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One per matrix per batch 5% frequency 75-125% for samples less than 4x spike level	J(+) if %R>125% J(+)/UJ(-) if %R <75% J(+)/R(-) if %R<30% all samples in batch	8
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples > RL and < 5x RL (Diff < 2x RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL all samples in batch	9

EcoChem Validation Guidelines for Mercury Analysis by CVAA (Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Field Blank	Blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5x RL: Water: Diff<RL Solid: Diff < 2x RL	J(+)/UJ(-) in parent samples only	9
Linear Range	Sample concentrations must be less than 110% of high standard	J values over range	20

EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler Temperature 4°C ±2°C Preservation: Method Specific	Use Professional Judgment to qualify based to qualify for coole temp outliers J(+)/UJ(-) if preservation requirements not met	1
Holding Time	Method Specific	Professional Judgment J(+)/UJ(-) if holding time exceeded J(+)/R(-) if HT exceeded by > 3X	1
Initial Calibration	Method specific r>0.995	Use professional judgment J(+)/UJ(-) for r < 0.995	5A
Initial Calibration Verification (ICV)	Where applicable to method Independent source analyzed immediately after calibration %R method specific, usually 90% - 110%	R(+/-) if %R significantly < LCL J(+)/UJ(-) if %R < LCL J(+) if %R > UCL R(+) if %R significantly > UCL	5A
Continuing Cal Verification (CCV)	Where applicable to method Every ten samples, immed. following ICV/ICB and end of run %R method specific, usually 90% - 110%	R(+/-) if %R significantly < LCL J(+)/UJ(-) if %R < LCL J(+) if %R > UCL R(+) if %R significantly > UCL	5B

Initial and Continuing Cal Blanks (ICB/CCB)	Where applicable to method
	After each ICV and CCV every ten samples and end of run
	| blank| < MDL
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		refer to TM-02 for additional details
			7

Method Blank	One per matrix per batch
	(not to exceed 20 samples)
	blank < MDL
		Action level is 5x absolute value of blank conc.
		For (+) blk value, U(+) results < action level
		For (-) blk value, J(+)/UJ(-) results < action level
			7

Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Matrix Spike	One per matrix per batch; 5% frequency 75-125% for samples less than 4 x spike level	J(+) if %R > 125% or < 75% UJ(-) if %R = 30-74% R(+/-) results < IDL if %R < 30%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL Diff <RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL all samples in batch	9

EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Field Blank	blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5X RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff<RL Solid: Diff < 2X RL	J(+)/UJ(-) in parent samples only	9

EcoChem, INC.
Environmental Data Quality

APPENDIX B
QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
Lora Lake Apartments RI/FS

SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
6312	MW-01-081310	6312-004-SA	EPA 1613 D/F	Total HxCDF	133	pg/L	D,M	J	14
6312	MW-01-081310	6312-004-SA	EPA 1613 D/F	Total PeCDF	1460	pg/L	D,M	J	14
6312	MW-01-081310	6312-004-SA	EPA 1613 D/F	Total TCDF	531	pg/L	D,M	J	14
6311	MW-02-081110	6311-001-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	5.04	pg/L	U	UJ	13
6311	MW-02-081110	6311-001-SA	EPA 1613 D/F	1,2,3,7,8-PeCDF	1.55	pg/L	U	UJ	13
6311	MW-02-081110	6311-001-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	1.59	pg/L	U	UJ	13
6311	MW-02-081110	6311-001-SA	EPA 1613 D/F	OCDD	9.64	pg/L	U	UJ	13
6311	MW-04-081110	6311-004-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	4.19	pg/L	U	UJ	13
6311	MW-04-081110	6311-004-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDD	2.58	pg/L	U	UJ	13
6311	MW-10-081210	6311-008-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	4.68	pg/L	U	UJ	13
6311	MW-10-081210	6311-008-SA	EPA 1613 D/F	OCDD	10.2	pg/L	U	UJ	13
6311	MW-10-081210	6311-008-SA	EPA 1613 D/F	OCDF	8.56	pg/L	U	UJ	13
6311	MW-11-081210	6311-009-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	5.74	pg/L	U	UJ	13
6311	MW-11-081210	6311-009-SA	EPA 1613 D/F	OCDD	8.66	pg/L	U	UJ	13
6311	MW-11-081210	6311-009-SA	EPA 1613 D/F	OCDF	8.26	pg/L	U	UJ	13
6277	MW12-0-0.5-080210	6277-005-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	7.09	pg/g	J	J	13
6311	MW-12-081210	6311-006-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDD	7.05	pg/L	J	J	13
6311	MW-12-081210	6311-006-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	2.41	pg/L	U	UJ	13
6311	MW-12-081210	6311-006-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	4.76	pg/L	U	UJ	13
6311	MW-12-081210	6311-006-SA	EPA 1613 D/F	OCDD	24.3	pg/L	J	J	13
6311	MW-12-081210	6311-006-SA	EPA 1613 D/F	OCDF	8.36	pg/L	U	UJ	13
RG94	MW12-10-11.5-080210	10-18602-RG94I	Plumb,1981	Total Organic Carbon	0.115	%		J	9
RG94	MW12-17.5-19-080210	10-18603-RG94J	Plumb,1981	Total Organic Carbon	0.062	%		J	9
RG94	MW12-17.5-19-080210	10-18603-RG94J	SW8041	Pentachlorophenol	7.4	ug/kg	U	UJ	13
6365	MW12-2-4-080210	6365-002-SA	EPA 1613 D/F	Total HxCDF	103	pg/g	D,M	J	14
6365	MW12-2-4-080210	6365-002-SA	EPA 1613 D/F	Total PeCDD	11.1	pg/g	M	J	14
6365	MW12-2-4-080210	6365-002-SA	EPA 1613 D/F	Total PeCDF	32.9	pg/g	D,M	J	14
6365	MW12-2-4-080210	6365-002-SA	EPA 1613 D/F	Total TCDF	21	pg/g	D,M	J	14
RG94	MW12-8-9.5-080210	10-18601-RG94H	Plumb,1981	Total Organic Carbon	0.151	%		J	9
RG94	MW12-ER-080210	10-18604-RG94K	SW8270D	Benzo(a)anthracene	1	ug/L	U	DNR	11
RG94	MW12-ER-080210	10-18604-RG94KRE	SW8270D	Benzo(a)anthracene	1	ug/L	U	UJ	1
RG94	MW12-ER-080210	10-18604-RG94K	SW8270D	Benzo(a)pyrene	1	ug/L	U	DNR	11
RG94	MW12-ER-080210	10-18604-RG94KRE	SW8270D	Benzo(a)pyrene	1	ug/L	U	UJ	1
RG94	MW12-ER-080210	10-18604-RG94K	SW8270D	Chrysene	1	ug/L	U	DNR	11
RG94	MW12-ER-080210	10-18604-RG94KRE	SW8270D	Chrysene	1	ug/L	U	UJ	1
RG94	MW12-ER-080210	10-18604-RG94K	SW8270D	Dibenz(a,h)anthracene	1	ug/L	U	DNR	11
RG94	MW12-ER-080210	10-18604-RG94KRE	SW8270D	Dibenz(a,h)anthracene	1	ug/L	U	UJ	1
RG94	MW12-ER-080210	10-18604-RG94K	SW8270D	Indeno(1,2,3-cd)pyrene	1	ug/L	U	DNR	11
RG94	MW12-ER-080210	10-18604-RG94KRE	SW8270D	Indeno(1,2,3-cd)pyrene	1	ug/L	U	UJ	1
RG94	MW12-ER-080210	10-18604-RG94K	SW8270D	Total Benzofluoranthenes	1	ug/L	U	DNR	11
RG94	MW12-ER-080210	10-18604-RG94KRE	SW8270D	Total Benzofluoranthenes	1	ug/L	U	UJ	1
6277	MW13-0-0.5-080210	6277-003-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	8.48	pg/g	J	J	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDD	8.01	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	4.24	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	9.24	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDD	5.03	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDF	3.56	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDD	6.01	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	3.43	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDD	5.6	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	4.48	pg/L	U	UJ	13

Qualified Data Summary Table
Lora Lake Apartments RI/FS

SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,7,8-PeCDD	4.96	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	1,2,3,7,8-PeCDF	3.39	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	3.8	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	3.55	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	2,3,7,8-TCDD	3.05	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	2,3,7,8-TCDF	1.72	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	OCDD	14.4	pg/L	U	UJ	13
6311	MW-13-081210	6311-007-SA	EPA 1613 D/F	OCDF	14.3	pg/L	U	UJ	13
RG94	MW13-10-11.5-080210	10-18596-RG94C	Plumb,1981	Total Organic Carbon	0.09	%		J	9
RG94	MW13-14-14.5-080210	10-18597-RG94D	Plumb,1981	Total Organic Carbon	0.132	%		J	9
RG94	MW13-18.5-19.5-080210	10-18598-RG94E	Plumb,1981	Total Organic Carbon	0.037	%		J	9
RG94	MW14-15-16.5-080210	10-18594-RG94A	Plumb,1981	Total Organic Carbon	0.107	%		J	9
RG94	MW14-22.5-24-080210	10-18595-RG94B	Plumb,1981	Total Organic Carbon	0.043	%		J	9
RG94	MW14-22.5-24-080210	10-18595-RG94B	SW8041	Pentachlorophenol	7.3	ug/kg	U	UJ	13
RK89	MW17-50-51-082610	10-21749-RK89A	Plumb,1981	TOC	0.412	%		J	8
6273	PSB04-1.5-2.0-072810	6273-002-SA	EPA 1613 D/F	OCDD	249	pg/g		J	13
6273	PSB04-1.5-2.0-072810	6273-002-SA	EPA 1613 D/F	OCDF	28.2	pg/g		J	13
6273	PSB06-0-0.5-072810	6273-005-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	799	pg/g		J	8,9
6273	PSB06-0-0.5-072810	6273-005-SA	EPA 1613 D/F	OCDF	4060	pg/g		J	9
6364	PSB06-2-4-072810	6364-004-SA	EPA 1613 D/F	OCDD	184	pg/g		J	13
6364	PSB06-2-4-072810	6364-004-SA	EPA 1613 D/F	OCDF	19.3	pg/g		J	13
6364	PSB06-4-6-072810	6364-005-SA	EPA 1613 D/F	OCDD	13.2	pg/g		J	13
6274	PSB10-0-0.5-073010	6274-004-SA	EPA 1613 D/F	Total HxCDF	3720	pg/g	D,M	J	14
6274	PSB10-0-0.5-073010	6274-004-SA	EPA 1613 D/F	Total PeCDF	369	pg/g	D,M	J	14
6274	PSB10-0-0.5-073010	6274-004-SA	EPA 1613 D/F	Total TCDF	68.9	pg/g	D,M	J	14
RG78	PSB10-0-0.5-073010	10-18438-RG78F	SW8041	Pentachlorophenol	53	ug/kg		J	13
6274	PSB10-1.5-2-073010	6274-005-SA	EPA 1613 D/F	Total HxCDF	3240	pg/g	D,M	J	14
6274	PSB10-1.5-2-073010	6274-005-SA	EPA 1613 D/F	Total PeCDF	291	pg/g	D,M	J	14
6274	PSB10-1.5-2-073010	6274-005-SA	EPA 1613 D/F	Total TCDF	59.9	pg/g	D,M	J	14
RG78	PSB10-14-15-073010	10-18443-RG78K	SW8041	Pentachlorophenol	5.9	ug/kg	U	UJ	13
6274	PSB10-2-4-073010	6274-006-SA	EPA 1613 D/F	Total HxCDF	6730	pg/g	D,M	J	14
6274	PSB10-2-4-073010	6274-006-SA	EPA 1613 D/F	Total PeCDF	641	pg/g	D,M	J	14
6274	PSB10-2-4-073010	6274-006-SA	EPA 1613 D/F	Total TCDF	171	pg/g	D,M	J	14
6364	PSB10-4-6-073010	6364-008-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	42.2	pg/g	D,M	J	14
6364	PSB10-4-6-073010	6364-008-SA	EPA 1613 D/F	Total HxCDF	2920	pg/g	D,M	J	14
6364	PSB10-4-6-073010	6364-008-SA	EPA 1613 D/F	Total PeCDF	293	pg/g	D,M	J	14
6364	PSB10-4-6-073010	6364-008-SA	EPA 1613 D/F	Total TCDF	56	pg/g	D,M	J	14
6364	PSB10-8.5-10-073010	6364-009-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	15.6	pg/g	D,M	J	14
6364	PSB10-8.5-10-073010	6364-009-SA	EPA 1613 D/F	OCDD	40000	pg/g	*	J	13
6364	PSB10-8.5-10-073010	6364-009-SA	EPA 1613 D/F	Total HxCDF	1100	pg/g	D,M	J	14
6364	PSB10-8.5-10-073010	6364-009-SA	EPA 1613 D/F	Total PeCDF	111	pg/g	D,M	J	14
6364	PSB10-8.5-10-073010	6364-009-SA	EPA 1613 D/F	Total TCDF	43.1	pg/g	D,M	J	14
6272	PSB1-1.5-2.0-072910	6272-002-SA	EPA 1613 D/F	OCDD	2230	pg/g		J	13
6272	PSB1-1.5-2.0-072910	6272-002-SA	EPA 1613 D/F	OCDF	214	pg/g		J	13
RG79	PSB11-0-0.5-073010	10-18505-RG79A	SW6010B	Lead	12	mg/kg		J	9
RG79	PSB11-0-0.5-073010	10-18505-RG79A	SW8041	Pentachlorophenol	12	ug/kg		J	13
6276	PSB11-1.5-2-073010	6276-002-SA	EPA 1613 D/F	Total HxCDF	183000	pg/g	D,M	J	14
6276	PSB11-1.5-2-073010	6276-002-SA	EPA 1613 D/F	Total PeCDF	13200	pg/g	D,M	J	14
6276	PSB11-1.5-2-073010	6276-002-SA	EPA 1613 D/F	Total TCDF	1860	pg/g	D,M	J	14
RG79	PSB11-1.5-2-073010	10-18506-RG79B	SW6010B	Lead	304	mg/kg		J	9
RG79	PSB11-1.5-2-073010	10-18506-RG79B	SW8041	Pentachlorophenol	2400	ug/kg		J	13

Qualified Data Summary Table
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SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
RG79	PSB11-11-13-073010	10-18511-RG79G	SW6010B	Lead	162	mg/kg		J	9
RG79	PSB11-14-16-073010	10-18512-RG79H	SW6010B	Lead	45	mg/kg		J	9
6276	PSB11-2-4-073010	6276-003-SA	EPA 1613 D/F	OCDD	4280000	pg/g	*	J	13
6276	PSB11-2-4-073010	6276-003-SA	EPA 1613 D/F	Total HpCDF	460000	pg/g	D,M,*	J	14
6276	PSB11-2-4-073010	6276-003-SA	EPA 1613 D/F	Total HxCDF	83500	pg/g	D,M,*	J	14
6276	PSB11-2-4-073010	6276-003-SA	EPA 1613 D/F	Total PeCDF	8040	pg/g	D,M	J	14
6276	PSB11-2-4-073010	6276-003-SA	EPA 1613 D/F	Total TCDF	1040	pg/g	D,M	J	14
RG79	PSB11-2-4-073010	10-18507-RG79C	SW6010B	Lead	1680	mg/kg		J	9
RG79	PSB11-2-4-073010	10-18507-RG79C	SW8041	Pentachlorophenol	1100	ug/kg		J	13
6276	PSB11-2-4-073010-D	6276-004-SA	EPA 1613 D/F	OCDD	5000000	pg/g	*	J	13
6276	PSB11-2-4-073010-D	6276-004-SA	EPA 1613 D/F	Total HpCDF	520000	pg/g	D,M,*	J	14
6276	PSB11-2-4-073010-D	6276-004-SA	EPA 1613 D/F	Total HxCDF	98600	pg/g	D,M,*	J	14
6276	PSB11-2-4-073010-D	6276-004-SA	EPA 1613 D/F	Total PeCDF	9910	pg/g	D,M	J	14
6276	PSB11-2-4-073010-D	6276-004-SA	EPA 1613 D/F	Total TCDF	1270	pg/g	D,M	J	14
RG79	PSB11-2-4-073010-D	10-18508-RG79D	SW6010B	Lead	2880	mg/kg		J	9
6364	PSB11-4-6-073010	6364-010-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	347	pg/g	D,M	J	14
6364	PSB11-4-6-073010	6364-010-SA	EPA 1613 D/F	Total HxCDF	22600	pg/g	D,M *	J	14
6364	PSB11-4-6-073010	6364-010-SA	EPA 1613 D/F	Total PeCDF	2280	pg/g	D,M	J	14
6364	PSB11-4-6-073010	6364-010-SA	EPA 1613 D/F	Total TCDF	318	pg/g	D,M	J	14
RG79	PSB11-4-6-073010	10-18509-RG79E	SW6010B	Lead	131	mg/kg		J	9
6364	PSB11-7.5-9.5-073010	6364-011-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	212	pg/g	D,M	J	14
6364	PSB11-7.5-9.5-073010	6364-011-SA	EPA 1613 D/F	Total HxCDF	17500	pg/g	D,M,*	J	14
6364	PSB11-7.5-9.5-073010	6364-011-SA	EPA 1613 D/F	Total PeCDF	2120	pg/g	D,M	J	14
6364	PSB11-7.5-9.5-073010	6364-011-SA	EPA 1613 D/F	Total TCDF	466	pg/g	D,M	J	14
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDD	148	pg/g		J	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	33.5	pg/g		J	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	0.988	pg/g	J	J	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDD	4.41	pg/g	J	J	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	1,2,3,7,8-PeCDF	0.373	pg/g	U	UJ	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	0.827	pg/g	J	J	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	OCDD	1670	pg/g		J	13
6268	PSB12-0-0.5-072810	6268-001-SA	EPA 1613 D/F	OCDF	148	pg/g		J	13
6268	PSB12-1.5-2.0-072810	6268-002-SA	EPA 1613 D/F	OCDD	4600	pg/g		J	13
6268	PSB12-1.5-2.0-072810	6268-002-SA	EPA 1613 D/F	OCDF	585	pg/g		J	13
6268	PSB12-2-4-072810	6268-003-SA	EPA 1613 D/F	OCDD	6740	pg/g		J	13
6268	PSB12-2-4-072810	6268-003-SA	EPA 1613 D/F	OCDF	681	pg/g		J	13
6364	PSB12-4-6-072810	6364-001-SA	EPA 1613 D/F	OCDD	11100	pg/g	*	J	13
RG60	PSB13-0-0.5-072910	10-18279-RG60A	SW8270D	Benzo(a)anthracene	75	ug/kg	U	DNR	11
RG60	PSB13-0-0.5-072910	10-18279-RG60A	SW8270D	Benzo(a)pyrene	75	ug/kg	U	DNR	11
RG60	PSB13-0-0.5-072910	10-18279-RG60A	SW8270D	Chrysene	20	ug/kg	U	DNR	11
RG60	PSB13-0-0.5-072910	10-18279-RG60A	SW8270D	Dibenz(a,h)anthracene	75	ug/kg	U	DNR	11
RG60	PSB13-0-0.5-072910	10-18279-RG60A	SW8270D	Indeno(1,2,3-cd)pyrene	20	ug/kg	U	DNR	11
RG60	PSB13-0-0.5-072910	10-18279-RG60A	SW8270D	Total Benzofluoranthenes	20	ug/kg	U	DNR	11
RG60	PSB13-1.5-2-072910	10-18280-RG60B	SW8270D	Benzo(a)anthracene	75	ug/kg	U	UJ	13
RG60	PSB13-1.5-2-072910	10-18280-RG60BRE	SW8270D	Benzo(a)anthracene	20	ug/kg	U	DNR	11
RG60	PSB13-1.5-2-072910	10-18280-RG60B	SW8270D	Benzo(a)pyrene	75	ug/kg	U	UJ	13
RG60	PSB13-1.5-2-072910	10-18280-RG60BRE	SW8270D	Benzo(a)pyrene	6.5	ug/kg	U	DNR	11
RG60	PSB13-1.5-2-072910	10-18280-RG60B	SW8270D	Chrysene	75	ug/kg	U	UJ	13
RG60	PSB13-1.5-2-072910	10-18280-RG60BRE	SW8270D	Chrysene	20	ug/kg	U	DNR	11
RG60	PSB13-1.5-2-072910	10-18280-RG60B	SW8270D	Dibenz(a,h)anthracene	19	ug/kg	U	UJ	13
RG60	PSB13-1.5-2-072910	10-18280-RG60BRE	SW8270D	Dibenz(a,h)anthracene	360	ug/kg	U	DNR	11

Qualified Data Summary Table
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SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
RG60	PSB13-1.5-2-072910	10-18280-RG60B	SW8270D	Indeno(1,2,3-cd)pyrene	19	ug/kg	U	UJ	13
RG60	PSB13-1.5-2-072910	10-18280-RG60BRE	SW8270D	Indeno(1,2,3-cd)pyrene	360	ug/kg	U	DNR	11
RG60	PSB13-1.5-2-072910	10-18280-RG60B	SW8270D	Total Benzofluoranthenes	19	ug/kg	U	UJ	13
RG60	PSB13-1.5-2-072910	10-18280-RG60BRE	SW8270D	Total Benzofluoranthenes	360	ug/kg	U	DNR	11
RG60	PSB13-11-13-072910	10-18283-RG60E	SW8041	Pentachlorophenol		ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8041	Pentachlorophenol	19	ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8270D	Benzo(a)anthracene	360	ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60CRE	SW8270D	Benzo(a)anthracene	19	ug/kg	U	DNR	11
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8270D	Benzo(a)pyrene	360	ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60CRE	SW8270D	Benzo(a)pyrene	6.7	ug/kg	U	DNR	11
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8270D	Chrysene	360	ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60CRE	SW8270D	Chrysene	19	ug/kg	U	DNR	11
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8270D	Dibenz(a,h)anthracene		ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60CRE	SW8270D	Dibenz(a,h)anthracene		ug/kg	U	DNR	11
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8270D	Indeno(1,2,3-cd)pyrene		ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60CRE	SW8270D	Indeno(1,2,3-cd)pyrene		ug/kg	U	DNR	11
RG60	PSB13-2-4-072910	10-18281-RG60C	SW8270D	Total Benzofluoranthenes		ug/kg	U	UJ	13
RG60	PSB13-2-4-072910	10-18281-RG60CRE	SW8270D	Total Benzofluoranthenes		ug/kg	U	DNR	11
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8041	Pentachlorophenol	8.5	ug/kg		J	13
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8041	Pentachlorophenol	8.5	ug/kg		J	13
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Benzo(a)anthracene	19	ug/kg	U	UJ	13
RG54	PSB14-0-.5-072810	10-18202-RG54ARE	SW8270D	Benzo(a)anthracene	72	ug/kg	U	DNR	11
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Benzo(a)anthracene	19	ug/kg	U	DNR	11
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Benzo(a)pyrene	19	ug/kg	U	UJ	13
RG54	PSB14-0-.5-072810	10-18202-RG54ARE	SW8270D	Benzo(a)pyrene	72	ug/kg	U	DNR	11
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Benzo(a)pyrene	19	ug/kg	U	DNR	11
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Chrysene	10	ug/kg	J	J	13
RG54	PSB14-0-.5-072810	10-18202-RG54ARE	SW8270D	Chrysene	72	ug/kg	U	DNR	11
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Chrysene	10	ug/kg	J	DNR	11
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Dibenz(a,h)anthracene	19	ug/kg	U	UJ	13
RG54	PSB14-0-.5-072810	10-18202-RG54ARE	SW8270D	Dibenz(a,h)anthracene	72	ug/kg	U	DNR	11
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Dibenz(a,h)anthracene	19	ug/kg	U	DNR	11
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Indeno(1,2,3-cd)pyrene	19	ug/kg	U	UJ	13
RG54	PSB14-0-.5-072810	10-18202-RG54ARE	SW8270D	Indeno(1,2,3-cd)pyrene	72	ug/kg	U	DNR	11
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Indeno(1,2,3-cd)pyrene	19	ug/kg	U	DNR	11
RG54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Total Benzofluoranthenes	19	ug/kg	U	UJ	13
RG54	PSB14-0-.5-072810	10-18202-RG54ARE	SW8270D	Total Benzofluoranthenes	72	ug/kg	U	DNR	11
RH54	PSB14-0-.5-072810	10-18202-RG54A	SW8270D	Total Benzofluoranthenes	19	ug/kg	U	DNR	11
RG54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Benzo(a)anthracene	20	ug/kg	U	UJ	13
RH54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Benzo(a)anthracene	20	ug/kg	U	UJ	13
RG54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Benzo(a)pyrene	20	ug/kg	U	UJ	13
RH54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Benzo(a)pyrene	20	ug/kg	U	UJ	13
RG54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Chrysene	20	ug/kg	U	UJ	13
RH54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Chrysene	20	ug/kg	U	UJ	13
RG54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Dibenz(a,h)anthracene	20	ug/kg	U	UJ	13
RH54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Dibenz(a,h)anthracene	20	ug/kg	U	UJ	13
RG54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Indeno(1,2,3-cd)pyrene	20	ug/kg	U	UJ	13
RH54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Indeno(1,2,3-cd)pyrene	20	ug/kg	U	UJ	13
RG54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Total Benzofluoranthenes	20	ug/kg	U	UJ	13
RH54	PSB14-1.5-2.0-072810	10-18203-RG54B	SW8270D	Total Benzofluoranthenes	20	ug/kg	U	UJ	13
6364	PSB14-4-7-072810	6364-002-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	24.4	pg/g		J	13

Qualified Data Summary Table
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SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
6364	PSB14-7-9-072810	6364-003-SA	EPA 1613 D/F	Total HxCDF	527	pg/g	D,M	J	14
6364	PSB14-7-9-072810	6364-003-SA	EPA 1613 D/F	Total PeCDF	121	pg/g	D,M	J	14
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8041	Pentachlorophenol	9.4	ug/kg		J	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8041	Pentachlorophenol	9.4	ug/kg		J	13
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Benzo(a)anthracene	19	ug/kg	U	UJ	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Benzo(a)anthracene	19	ug/kg	U	UJ	13
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Benzo(a)pyrene	19	ug/kg	U	UJ	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Benzo(a)pyrene	19	ug/kg	U	UJ	13
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Chrysene	19	ug/kg	U	UJ	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Chrysene	19	ug/kg	U	UJ	13
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Dibenz(a,h)anthracene	19	ug/kg	U	UJ	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Dibenz(a,h)anthracene	19	ug/kg	U	UJ	13
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Indeno(1,2,3-cd)pyrene	19	ug/kg	U	UJ	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Indeno(1,2,3-cd)pyrene	19	ug/kg	U	UJ	13
RG54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Total Benzofluoranthenes	19	ug/kg	U	UJ	13
RH54	PSB14-7-9-072810	10-18206-RG54E	SW8270D	Total Benzofluoranthenes	19	ug/kg	U	UJ	13
6276	PSB15-0-0.5-073010	6276-005-SA	EPA 1613 D/F	Total HpCDF	68900	pg/g	D,M,*	J	14
6276	PSB15-0-0.5-073010	6276-005-SA	EPA 1613 D/F	Total HxCDF	13000	pg/g	D,M,*	J	14
6276	PSB15-0-0.5-073010	6276-005-SA	EPA 1613 D/F	Total PeCDF	1870	pg/g	D,M	J	14
6276	PSB15-0-0.5-073010	6276-005-SA	EPA 1613 D/F	Total TCDF	566	pg/g	D,M	J	14
RG79	PSB15-0-0.5-073010	10-18515-RG79K	SW6010B	Lead	245	mg/kg		J	9
RG79	PSB15-1.5-2-073010	10-18516-RG79L	SW6010B	Lead	21	mg/kg		J	9
RG79	PSB15-1.5-2-073010	10-18516-RG79L	SW8041	Pentachlorophenol	6.7	ug/kg	U	UJ	13
RG79	PSB15-13-15-073010	10-18519-RG79O	SW6010B	Lead	165	mg/kg		J	9
RG79	PSB15-13-15-073010	10-18519-RG79O	SW8270D	Benzo(a)anthracene	60	ug/kg	U	UJ	1
RG79	PSB15-13-15-073010	10-18519-RG79O	SW8270D	Benzo(a)pyrene	60	ug/kg	U	UJ	1
RG79	PSB15-13-15-073010	10-18519-RG79O	SW8270D	Chrysene	60	ug/kg	U	UJ	1
RG79	PSB15-13-15-073010	10-18519-RG79O	SW8270D	Dibenz(a,h)anthracene	60	ug/kg	U	UJ	1
RG79	PSB15-13-15-073010	10-18519-RG79O	SW8270D	Indeno(1,2,3-cd)pyrene	60	ug/kg	U	UJ	1
RG79	PSB15-13-15-073010	10-18519-RG79O	SW8270D	Total Benzofluoranthenes	60	ug/kg	U	UJ	1
6276	PSB15-17-19-073010	6276-010-SA	EPA 1613 D/F	OCDD	1270	pg/g		J	13
6276	PSB15-17-19-073010	6276-010-SA	EPA 1613 D/F	OCDF	12	pg/g	J	J	13
RG79	PSB15-17-19-073010	10-18520-RG79P	SW6010B	Lead	2	mg/kg	U	UJ	9
6276	PSB15-17-19-073010-D	6276-011-SA	EPA 1613 D/F	OCDD	1560	pg/g		J	13
6276	PSB15-17-19-073010-D	6276-011-SA	EPA 1613 D/F	OCDF	11.3	pg/g	J	J	13
RG79	PSB15-17-19-073010-D	10-18521-RG79Q	SW6010B	Lead	2	mg/kg		U	9
6276	PSB15-2-4-073010	6276-007-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	520	pg/g		J	13
6276	PSB15-2-4-073010	6276-007-SA	EPA 1613 D/F	OCDD	21200	pg/g	*	J	13
6276	PSB15-2-4-073010	6276-007-SA	EPA 1613 D/F	OCDF	2420	pg/g		J	13
RG79	PSB15-2-4-073010	10-18517-RG79M	SW6010B	Lead	34	mg/kg		J	9
RG79	PSB15-2-4-073010	10-18517-RG79M	SW8041	Pentachlorophenol	14	ug/kg		J	13
RG79	PSB15-4-6-073010	10-18518-RG79N	SW6010B	Lead	43	mg/kg		J	9
6331	PSB16-0-0.5-082510	6331-006-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	1780	pg/g		J	13
6331	PSB16-0-0.5-082510	6331-006-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDF	65.4	pg/g		J	13
6331	PSB16-0-0.5-082510	6331-006-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	43.6	pg/g		J	13
6331	PSB16-0-0.5-082510	6331-006-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	7.95	pg/g		J	13
6331	PSB16-0-0.5-082510	6331-006-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	50	pg/g		J	13
6331	PSB16-0-0.5-082510	6331-006-SA	EPA 1613 D/F	Total HxCDF	1260	pg/g	D,M	J	14
RR22	PSB16-0-0.5-082510	10-26380-RR22B	NWTPHG	Gasoline Range Hydrocarbons	20	mg/kg		J	1
RR22	PSB16-0-0.5-082510	10-26380-RR22B	SW8021BMod	Benzene	10	ug/kg	U	UJ	1
RR22	PSB16-0-0.5-082510	10-26380-RR22B	SW8021BMod	Ethylbenzene	10	ug/kg	U	UJ	1

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SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
RR22	PSB16-0-0.5-082510	10-26380-RR22B	SW8021BMod	m,p-Xylene	22	ug/kg		J	1
RR22	PSB16-0-0.5-082510	10-26380-RR22B	SW8021BMod	o-Xylene	10	ug/kg	U	UJ	1
RR22	PSB16-0-0.5-082510	10-26380-RR22B	SW8021BMod	Toluene	56	ug/kg		J	1
6331	PSB16-1-2-082510	6331-007-SA	EPA 1613 D/F	OCDD	3480	pg/g		J	13
6331	PSB16-1-2-082510	6331-007-SA	EPA 1613 D/F	OCDF	329	pg/g		J	13
RR22	PSB16-1-2-082510	10-26381-RR22C	NWTPHG	Gasoline Range Hydrocarbons	2.9	mg/kg	U	UJ	1
RR22	PSB16-1-2-082510	10-26381-RR22C	SW8021BMod	Benzene	7.2	ug/kg	U	UJ	1
RR22	PSB16-1-2-082510	10-26381-RR22C	SW8021BMod	Ethylbenzene	7.2	ug/kg	U	UJ	1
RR22	PSB16-1-2-082510	10-26381-RR22C	SW8021BMod	m,p-Xylene	14	ug/kg	U	UJ	1
RR22	PSB16-1-2-082510	10-26381-RR22C	SW8021BMod	o-Xylene	7.2	ug/kg	U	UJ	1
RR22	PSB16-1-2-082510	10-26381-RR22C	SW8021BMod	Toluene	7.2	ug/kg	U	UJ	1
RK83	PSB16-1-2-082510	10-21701-RK83J	SW8041	Pentachlorophenol	6.5	ug/kg	U	UJ	13
6331	PSB16-13-15-082510	6331-009-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	1.2	pg/g	J	J	13
6331	PSB16-13-15-082510	6331-009-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	0.282	pg/g	U	UJ	13
6331	PSB16-13-15-082510	6331-009-SA	EPA 1613 D/F	OCDF	3.83	pg/g	J	J	13
RK83	PSB16-13-15-082510	10-21704-RK83M	NWTPHG	Gasoline Range Hydrocarbons	3.3	mg/kg	U	J	1
RK83	PSB16-13-15-082510	10-21704-RK83M	Plumb,1981	Total Organic Carbon	0.15	%		J	8
RK83	PSB16-13-15-082510	10-21704-RK83M	SW8021BMod	Benzene	8.2	ug/kg	U	DNR	11
RK83	PSB16-13-15-082510	10-21704-RK83M	SW8021BMod	Ethylbenzene	8.2	ug/kg	U	DNR	11
RK83	PSB16-13-15-082510	10-21704-RK83M	SW8021BMod	m,p-Xylene	16	ug/kg	U	DNR	11
RK83	PSB16-13-15-082510	10-21704-RK83M	SW8021BMod	o-Xylene	26	ug/kg		DNR	11
RK83	PSB16-13-15-082510	10-21704-RK83M	SW8021BMod	Toluene	8.2	ug/kg	U	DNR	11
RK83	PSB16-13-15-082510	10-21704-RK83M	SW8041	Pentachlorophenol	6.9	ug/kg	U	R	13
6331	PSB16-2-4-082510	6331-005-SA	EPA 1613 D/F	Total TCDF	14.6	pg/g	M	J	14
RR22	PSB16-2-4-082510	10-26379-RR22A	NWTPHG	Gasoline Range Hydrocarbons	3	mg/kg	U	UJ	1
RR22	PSB16-2-4-082510	10-26379-RR22A	SW8021BMod	Benzene	7.6	ug/kg	U	UJ	1
RR22	PSB16-2-4-082510	10-26379-RR22A	SW8021BMod	Ethylbenzene	7.6	ug/kg	U	UJ	1
RR22	PSB16-2-4-082510	10-26379-RR22A	SW8021BMod	m,p-Xylene	15	ug/kg	U	UJ	1
RR22	PSB16-2-4-082510	10-26379-RR22A	SW8021BMod	o-Xylene	7.6	ug/kg	U	UJ	1
RR22	PSB16-2-4-082510	10-26379-RR22A	SW8021BMod	Toluene	7.6	ug/kg	U	UJ	1
RK83	PSB16-2-4-082510	10-21699-RK83H	SW8041	Pentachlorophenol	11	ug/kg	P	J	3,13
RK83	PSB16-4-6-082510	10-21703-RK83L	NWTPHG	Gasoline Range Hydrocarbons	3.3	mg/kg	U	J	1
RK83	PSB16-4-6-082510	10-21703-RK83L	SW8021BMod	Benzene	8.3	ug/kg	U	DNR	11
RK83	PSB16-4-6-082510	10-21703-RK83L	SW8021BMod	Ethylbenzene	8.3	ug/kg	U	DNR	11
RK83	PSB16-4-6-082510	10-21703-RK83L	SW8021BMod	m,p-Xylene	17	ug/kg	U	DNR	11
RK83	PSB16-4-6-082510	10-21703-RK83L	SW8021BMod	o-Xylene	8.3	ug/kg	U	DNR	11
RK83	PSB16-4-6-082510	10-21703-RK83L	SW8021BMod	Toluene	8.3	ug/kg	U	DNR	11
RK83	PSB16-9.5-10-082510	10-21702-RK83K	SW8041	Pentachlorophenol	7.6	ug/kg	U	R	13
RG54	PSB17-0-0.5-072810	10-18209-RG54H	SW8041	Pentachlorophenol	6.4	ug/kg	U	UJ	13
RH54	PSB17-0-0.5-072810	10-18209-RG54H	SW8041	Pentachlorophenol	6.4	ug/kg	U	UJ	13
6269	PSB17-10-13-072810	6269-008-SA	EPA 1613 D/F	OCDD	25.5	pg/g		J	13
RG54	PSB17-10-13-072810	10-18213-RG54L	SW8041	Pentachlorophenol	6.7	ug/kg	U	UJ	13
RH54	PSB17-10-13-072810	10-18213-RG54L	SW8041	Pentachlorophenol	6.7	ug/kg	U	UJ	13
RG54	PSB17-4-6-072810	10-18212-RG54K	SW8041	Pentachlorophenol	6.7	ug/kg	U	UJ	13
RH54	PSB17-4-6-072810	10-18212-RG54K	SW8041	Pentachlorophenol	6.7	ug/kg	U	UJ	13
6332	PSB18-0-0.5-082610	6332-003-SA	EPA 1613 D/F	OCDD	56200	pg/g		J	13
6332	PSB18-0-0.5-082610	6332-003-SA	EPA 1613 D/F	Total HxCDF	1030	pg/g	D,M	J	14
6332	PSB18-0-0.5-082610	6332-003-SA	EPA 1613 D/F	Total PeCDF	407	pg/g	D,M	J	14
6332	PSB18-0-0.5-082610	6332-003-SA	EPA 1613 D/F	Total TCDF	182	pg/g	D,M	J	14
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDD	5.09	pg/g		J	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	1.37	pg/g	J	J	13

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SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	0.473	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDD	0.4	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDF	0.259	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDD	0.507	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	0.261	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	0.287	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	1,2,3,7,8-PeCDF	0.306	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	0.295	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	0.307	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	2,3,7,8-TCDD	0.32	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	2,3,7,8-TCDF	0.216	pg/g	U	UJ	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	OCDD	41	pg/g		J	13
6332	PSB18-1.5-2-082610	6332-002-SA	EPA 1613 D/F	OCDF	4.24	pg/g	J	J	13
RK86	PSB18-12.5-15-082610	10-21721-RK86A	SW8041	Pentachlorophenol	6.9	ug/kg	U	UJ	13
RK86	PSB18-12.5-15-082610-D	10-21726-RK86F	SW8041	Pentachlorophenol	6.9	ug/kg	U	UJ	13
6330	PSB19-0-1-082510	6330-004-SA	EPA 1613 D/F	OCDD	48300	pg/g		J	13
6330	PSB19-0-1-082510	6330-004-SA	EPA 1613 D/F	Total PeCDF	164	pg/g	D,M	J	14
6330	PSB19-0-1-082510	6330-004-SA	EPA 1613 D/F	Total TCDF	53.3	pg/g	D,M	J	14
6330	PSB19-1-2-082510	6330-005-SA	EPA 1613 D/F	Total HxCDF	128	pg/g	D,M	J	14
6330	PSB19-1-2-082510	6330-005-SA	EPA 1613 D/F	Total PeCDF	51.4	pg/g	D,M	J	14
6330	PSB19-1-2-082510	6330-005-SA	EPA 1613 D/F	Total TCDF	18.4	pg/g	D,M	J	14
6330	PSB19-2-4-082510	6330-006-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	19.1	pg/g		J	13
6272	PSB2-0-0.5-072910	6272-003-SA	EPA 1613 D/F	OCDD	1550	pg/g		J	13
6272	PSB2-0-0.5-072910	6272-003-SA	EPA 1613 D/F	OCDF	137	pg/g		J	13
6331	PSB20-0-0.5-082510	6331-001-SA	EPA 1613 D/F	Total HxCDF	188	pg/g	D,M	J	14
6331	PSB20-0-0.5-082510	6331-001-SA	EPA 1613 D/F	Total PeCDF	56.1	pg/g	D,M	J	14
6331	PSB20-0-0.5-082510	6331-001-SA	EPA 1613 D/F	Total TCDF	15.4	pg/g	D,M	J	14
6331	PSB20-1.5-2-082510	6331-003-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	1.69	pg/g	J	J	13
RK83	PSB20-1.5-2-082510	10-21694-RK83C	SW8041	Pentachlorophenol	6.6	ug/kg	U	UJ	13
RK83	PSB20-11.5-13.5-082510	10-21695-RK83D	Plumb,1981	Total Organic Carbon	0.098	%		J	8
6331	PSB20-2-4-082510	6331-002-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	0.887	pg/g	J	J	13
6331	PSB20-2-4-082510	6331-002-SA	EPA 1613 D/F	OCDF	69.9	pg/g		J	13
RK83	PSB20-4-6-082510	10-21696-RK83E	SW8041	Pentachlorophenol	6.5	ug/kg	U	UJ	13
6272	PSB2-1.5-2-072910	6272-004-SA	EPA 1613 D/F	OCDD	4290	pg/g		J	13
6272	PSB2-1.5-2-072910	6272-004-SA	EPA 1613 D/F	OCDF	337	pg/g		J	13
6330	PSB21-0-0.5-082510	6330-001-SA	EPA 1613 D/F	Total HxCDF	83.5	pg/g	D,M	J	14
6330	PSB21-0-0.5-082510	6330-001-SA	EPA 1613 D/F	Total PeCDF	49.2	pg/g	D,M	J	14
6330	PSB21-0-0.5-082510	6330-001-SA	EPA 1613 D/F	Total TCDF	36.5	pg/g	D,M	J	14
6330	PSB21-1.5-2-082510	6330-002-SA	EPA 1613 D/F	Total TCDF	20.2	pg/g	D,M	J	14
6330	PSB21-2-4-082510	6330-003-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	92.5	pg/g		J	13
6330	PSB21-2-4-082510	6330-003-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	4.17	pg/g	J	J	13
6330	PSB21-2-4-082510	6330-003-SA	EPA 1613 D/F	Total HxCDF	90.2	pg/g	D,M	J	14
6330	PSB21-2-4-082510	6330-003-SA	EPA 1613 D/F	Total PeCDF	58.6	pg/g	D,M	J	14
6330	PSB21-2-4-082510	6330-003-SA	EPA 1613 D/F	Total TCDF	35.8	pg/g	D,M	J	14
RG58	PSB22-1.5-2-072910	10-18237-RG58B	SW8041	Pentachlorophenol	6.6	ug/kg	U	UJ	13
RG58	PSB22-17-19-072910	10-18240-RG58E	SW8041	Pentachlorophenol	7.1	ug/kg	U	UJ	13
RG58	PSB22-19-20-072910	10-18241-RG58F	SW8041	Pentachlorophenol	7.4	ug/kg	U	UJ	13
6278	PSB23-0-0.5-072910	6278-003-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	1.88	pg/g	J	J	13
RK76	PSB25-0-1-082510	10-21626-RK76B	SW6010B	Lead	37	mg/kg		J	9
RK76	PSB25-1-2-082510	10-21625-RK76A	SW6010B	Lead	36	mg/kg		J	9
RK76	PSB25-2-4-082510	10-21627-RK76C	SW6010B	Lead	48	mg/kg		J	9

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SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
RK76	PSB26-0-2-082510	10-21632-RK76H	SW6010B	Lead	123	mg/kg		J	9
RK76	PSB26-2-4-082510	10-21633-RK76I	SW6010B	Lead	2	mg/kg	U	UJ	9
RK76	PSB27-0-0.5-082610	10-21638-RK76N	SW6010B	Lead	39	mg/kg		J	9
RK76	PSB27-1.5-2-082610	10-21639-RK76O	SW6010B	Lead	152	mg/kg		J	9
RK76	PSB27-2-4-082610	10-21640-RK76P	SW6010B	Lead	131	mg/kg		J	9
6272	PSB3-0-0.5-072910	6272-005-SA	EPA 1613 D/F	OCDD	30100	pg/g	*	J	13
6272	PSB3-1.5-2-072910	6272-006-SA	EPA 1613 D/F	OCDD	468	pg/g		J	13
6272	PSB3-1.5-2-072910	6272-006-SA	EPA 1613 D/F	OCDF	59.9	pg/g		J	13
6274	PSB9A-0-0.5-073010	6274-003-SA	EPA 1613 D/F	OCDD	3030	pg/g		J	13
6274	PSB9A-0-0.5-073010	6274-003-SA	EPA 1613 D/F	OCDF	653	pg/g		J	13
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8041	Pentachlorophenol	38	ug/kg		J	13
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8270D	Benzo(a)anthracene	20	ug/kg	U	DNR	11
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8270D	Benzo(a)pyrene	20	ug/kg	U	DNR	11
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8270D	Chrysene	20	ug/kg	U	DNR	11
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8270D	Dibenz(a,h)anthracene	20	ug/kg	U	DNR	11
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8270D	Indeno(1,2,3-cd)pyrene	20	ug/kg	U	DNR	11
RG78	PSB9A-0-0.5-073010	10-18437-RG78E	SW8270D	Total Benzofluoranthenes	13	ug/kg	J	DNR	11
6274	PSB9A-1.5-2-073010	6274-001-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	16.2	pg/g		J	13
6274	PSB9A-1.5-2-073010	6274-001-SA	EPA 1613 D/F	OCDD	379	pg/g		J	13
6274	PSB9A-1.5-2-073010	6274-001-SA	EPA 1613 D/F	OCDF	156	pg/g		J	13
RG78	PSB9A-1.5-2-073010	10-18434-RG78B	SW8041	Pentachlorophenol	19	ug/kg		J	13
6274	PSB9A-2-4-073010	6274-002-SA	EPA 1613 D/F	OCDD	119	pg/g		J	13
6274	PSB9A-2-4-073010	6274-002-SA	EPA 1613 D/F	OCDF	23.6	pg/g	J	J	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8041	Pentachlorophenol	13	ug/kg	P	J	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8270D	Benzo(a)anthracene	19	ug/kg	U	UJ	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8270D	Benzo(a)pyrene	19	ug/kg	U	UJ	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8270D	Chrysene	19	ug/kg	U	UJ	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8270D	Dibenz(a,h)anthracene	19	ug/kg	U	UJ	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8270D	Indeno(1,2,3-cd)pyrene	19	ug/kg	U	UJ	13
RG78	PSB9A-2-4-073010	10-18435-RG78C	SW8270D	Total Benzofluoranthenes	19	ug/kg	U	UJ	13
RG78	PSB9A-4-6-073010	10-18436-RG78D	SW8041	Pentachlorophenol	6.5	ug/kg	U	UJ	13
6365	SSB01-0-0.5-080310	6365-005-SA	EPA 1613 D/F	Total HxCDF	16.5	pg/g	D,M	J	14
6365	SSB01-0-0.5-080310	6365-005-SA	EPA 1613 D/F	Total PeCDD	17.9	pg/g	M	J	14
6365	SSB01-0-0.5-080310	6365-005-SA	EPA 1613 D/F	Total PeCDF	18.8	pg/g	D,M	J	14
6365	SSB01-1.5-2-080310	6365-006-SA	EPA 1613 D/F	Total HxCDF	66	pg/g	D,M	J	14
6365	SSB01-1.5-2-080310	6365-006-SA	EPA 1613 D/F	Total PeCDD	15.7	pg/g	M	J	14
6365	SSB01-1.5-2-080310	6365-006-SA	EPA 1613 D/F	Total PeCDF	80.9	pg/g	D,M	J	14
6365	SSB01-1.5-2-080310	6365-006-SA	EPA 1613 D/F	Total TCDF	63.2	pg/g	D,M	J	14
6365	SSB02-0-0.5-080310	6365-007-SA	EPA 1613 D/F	Total HxCDF	76.7	pg/g	D,M	J	14
6365	SSB02-0-0.5-080310	6365-007-SA	EPA 1613 D/F	Total PeCDF	48.5	pg/g	D,M	J	14
6365	SSB02-0-0.5-080310	6365-007-SA	EPA 1613 D/F	Total TCDF	20.7	pg/g	D,M	J	14
6365	SSB10-0-0.5-080310	6365-003-SA	EPA 1613 D/F	OCDD	411	pg/g		J	13
6365	SSB10-0-0.5-080310	6365-003-SA	EPA 1613 D/F	OCDF	37.8	pg/g		J	13
6365	SSB3-0-0.5-080610	6365-008-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	0.832	pg/g	J	J	13
6365	SSB3-0-0.5-080610	6365-008-SA	EPA 1613 D/F	OCDD	1050	pg/g		J	13
6365	SSB3-0-0.5-080610	6365-008-SA	EPA 1613 D/F	OCDF	70.9	pg/g		J	13
6365	SSB5-0-0.5-080610	6365-009-SA	EPA 1613 D/F	Total HxCDF	71.7	pg/g	D,M	J	14
6365	SSB5-0-0.5-080610	6365-009-SA	EPA 1613 D/F	Total PeCDF	46.2	pg/g	D,M	J	14

EcoChem, INC.
Environmental Data Quality

APPENDIX C
COMMUNICATION RECORDS

dorothy kerlin

From: Chris Ransom
Sent: Wednesday, October 06, 2010 9:10 AM
To: dorothy kerlin
Subject: FW: Lora Lake Trip Blanks

Looks like an error on the COC for the trip blank sampling date – should be the same as the samples.

From: Megan McCullough [mailto:Megan.McCullough@floydsnider.com]
Sent: Tuesday, October 05, 2010 6:24 PM
To: Chris Ransom
Subject: RE: Lora Lake Trip Blanks

Yes – that is weird – we collected samples over the course of 2 days, and delivered them all to the lab at the end... so we collected samples on the 25th, and 26th – all the trips accompanied the samples the entire time, but were all labeled and dated at the end of the collection period – so that's our error...

Does that make sense?

Thanks!
Megan

From: Chris Ransom [mailto:cransom@ecochem.net]
Sent: Monday, October 04, 2010 4:03 PM
To: Megan McCullough
Subject: Lora Lake Trip Blanks

Hi Megan,

I've got a question for you about how the trip blanks were handled. We have an SDG, RK84, with soil samples collected on 8/25, but the TB has a collection data of 8/26 and the sample log-in summary says that ARI prepared the trip blank on 8/26. The collection time is 14:30 and the receipt time is 15:45. Did they deliver a trip blank to you in the field or did the perhaps pick up the samples in the field and bring a trip blank with them? It's just odd to see a TB with a collection date that is not the same as, or prior to, the samples.

Thanks

Chris

dorothy kerlin

From: Chris Ransom
Sent: Wednesday, October 06, 2010 9:10 AM
To: dorothy kerlin
Subject: FW: Lora Lake Trip Blanks

Looks like an error on the COC for the trip blank sampling date – should be the same as the samples.

From: Megan McCullough [mailto:Megan.McCullough@floydsnider.com]
Sent: Tuesday, October 05, 2010 6:24 PM
To: Chris Ransom
Subject: RE: Lora Lake Trip Blanks

Yes – that is weird – we collected samples over the course of 2 days, and delivered them all to the lab at the end... so we collected samples on the 25th, and 26th – all the trips accompanied the samples the entire time, but were all labeled and dated at the end of the collection period – so that's our error...

Does that make sense?

Thanks!
Megan

From: Chris Ransom [mailto:cransom@ecochem.net]
Sent: Monday, October 04, 2010 4:03 PM
To: Megan McCullough
Subject: Lora Lake Trip Blanks

Hi Megan,

I've got a question for you about how the trip blanks were handled. We have an SDG, RK84, with soil samples collected on 8/25, but the TB has a collection data of 8/26 and the sample log-in summary says that ARI prepared the trip blank on 8/26. The collection time is 14:30 and the receipt time is 15:45. Did they deliver a trip blank to you in the field or did the perhaps pick up the samples in the field and bring a trip blank with them? It's just odd to see a TB with a collection date that is not the same as, or prior to, the samples.

Thanks

Chris

dorothy kerlin

From: dorothy kerlin
Sent: Monday, October 11, 2010 10:46 AM
To: Chris Ransom
Subject: Lora Lake RIFS, C15210-1, SDG RK86; Missing Trip Blank data.

Chris,

The trip blank PSB18-TB-082610 (RK86I) analysis data sheets were not included in the data package provided.

The sample is included on the instrument summary forms in the raw data and there was raw data for the sample on pages 307-311 of the data package. The results for the sample were included in the EDD as well.

Could the lab please re-submit the analysis data sheets for the sample?

Dorothy.Kerlin
EcoChem, Inc.
Project Chemist

710 Second Ave, Suite 660, Seattle, WA 98104
DIRECT: 206.233.9332 ext. X113 • FAX: 206.233.0114
EMAIL: dkerlin@ecochem.net

EcoChem, INC.
Environmental Data Quality

DATA VALIDATION REPORT

Port of Seattle
Lora Lake Apartments RI/FS
Groundwater Monitoring and Archived Soils

Prepared for:

Floyd/Snider
601 Union Street, Suite 600
Seattle, WA 98101

Prepared by:

EcoChem, Inc.
710 Second Avenue, Suite 660
Seattle, Washington 98104

EcoChem Project: C15210-3

April 8, 2011

Approved for Release:

Christine Ransom
Project Manager
EcoChem, Inc.

PROJECT NARRATIVE

Basis for the Data Validation

This report summarizes the results of data validation performed on groundwater, archived soil, and quality control (QC) sample data for the Remedial Investigation/Feasibility Study at Lora Lake Apartments, Burien, WA. The dioxin data received full validation (EPA Stage 4); all other parameters received summary validation (EPA Stage 2B). Field blank data received compliance screening (EPA Stage 2A). A complete list of samples is provided in the **Sample Index**.

Frontier Analytical Laboratory (El Dorado Hills, California) performed the dioxin/furan analyses. Analytical Resources, Inc. (Tukwila, Washington) performed all other analyses. The analytical methods and EcoChem project chemists are listed in the table below.

Analysis	Method	Primary Review	Secondary Review
Volatile Organic Compounds	SW8260C SIM	G. Esler	C. Ransom
BTEX	SW8021Mod	J. Maute	
Dioxin Furan Compounds	EPA 1613	M. Swanson	
Polynuclear Aromatic Hydrocarbons	SW8270D SIM	G. Esler	
Pentachlorophenol	SW8041		
Total Petroleum Hydrocarbons – Diesel Range	NWTPH-Dx	J. Maute	
Total Petroleum Hydrocarbons – Gasoline Range	NWTPH-Gx		
Total and Dissolved Arsenic	EPA 200.8		
Total Solids, Total Suspended Solids, pH, TOC	EPA 160.2, EPA 160.3, EPA 150.1 Plumb 1981		

The data were reviewed using guidance and quality control criteria documented in the analytical methods; *Port of Seattle Lora Lake Apartments, Remedial Investigation/Feasibility Study Work Plan*; *National Functional Guidelines for Inorganic Data Review* (USEPA 1994 & 2004); *National Functional Guidelines for Organic Data Review* (USEPA 1999 & 2008); and *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005).

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as **APPENDIX A**. A Qualified Data Summary Table is included in **APPENDIX B**. Communications are included in **Appendix C**. Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) is also submitted with this report.

Sample Index
Lora Lake Apartments RI/FS - Groundwater Monitoring
Analytical Resources Inc.

SDG	Sample ID	Laboratory ID	VOC	BTEX	PAH	PCP	TPHDx	TPHGx	Metals	TSS
SF26	MW11-011911	11-1071-SF26A	✓	✓	✓	✓	✓	✓	✓	✓
	MW10-011911	11-1072-SF26B	✓	✓	✓	✓	✓	✓	✓	✓
	MW07-011911	11-1073-SF26C	✓	✓	✓	✓	✓	✓	✓	✓
	MW14-011911	11-1074-SF26D	✓	✓	✓	✓	✓	✓	✓	✓
	TB-01-011911	11-1075-SF26E	✓							
	TB-02-011911	11-1076-SF26F	✓							
	TB-03-011911	11-1077-SF26G	✓							
	TB-04-011911	11-1078-SF26H	✓							
SF50	MW13-012011	11-1198-SF50A	✓	✓	✓	✓	✓	✓	✓	✓
	MW06-012011	11-1199-SF50B	✓	✓	✓	✓	✓	✓	✓	✓
	MW12-012011	11-1200-SF50C	✓	✓	✓	✓	✓	✓	✓	✓
	MW04-012011	11-1201-SF50D	✓	✓	✓	✓	✓	✓	✓	✓
	MW17-012011	11-1202-SF50E	✓	✓	✓	✓	✓	✓	✓	✓
	MW03-012011	11-1203-SF50F	✓	✓	✓	✓	✓	✓	✓	✓
	TB-012011	11-1204-SF50G	✓							
SF76	MW-15-012111	11-1418-SF76A	✓	✓	✓	✓	✓	✓		✓
	MW-05-012111	11-1419-SF76B	✓	✓	✓	✓	✓	✓	✓	✓
	MW-16-012111	11-1420-SF76C	✓	✓	✓	✓	✓	✓		✓
	MW-02-012111	11-1421-SF76D	✓	✓	✓	✓	✓	✓	✓	✓
	MW-09-012111	11-1422-SF76E	✓	✓	✓	✓	✓	✓	✓	✓
	MW-08-012111	11-1423-SF76F	✓	✓	✓	✓	✓	✓	✓	✓
	MW-01-012111	11-1424-SF76G	✓	✓	✓	✓	✓	✓	✓	✓
	MW-01-012111-D	11-1425-SF76H	✓	✓	✓	✓	✓	✓	✓	✓
	TB-012111	11-1426-SF76I	✓							

Sample Index
Lora Lake Apartments RI/FS - Groundwater Monitoring
Frontier Analytical Laboratory

SDG	Sample ID	Laboratory ID	Matrix	Dioxins
6546	MW-05-012111	6546-001-SA	Groundwater	✓
	MW-02-012111	6546-002-SA	Groundwater	✓
	MW-09-012111	6546-003-SA	Groundwater	✓
	MW-08-012111	6546-004-SA	Groundwater	✓
	MW-01-012111	6546-005-SA	Groundwater	✓
	MW-01-012111-D	6546-006-SA	Groundwater	✓
6547	MW11-011911	6547-001-SA	Groundwater	✓
	MW10-011911	6547-002-SA	Groundwater	✓
	MW07-011911	6547-003-SA	Groundwater	✓
	MW14-011911	6547-004-SA	Groundwater	✓
6548	MW13-012011	6548-001-SA	Groundwater	✓
	MW06-012011	6548-002-SA	Groundwater	✓
	MW12-012011	6548-003-SA	Groundwater	✓
	MW04-012011	6548-004-SA	Groundwater	✓
	MW03-012011	6548-005-SA	Groundwater	✓
6556	PSB05-4-5-072810	6556-001-SA	Soil	✓
6557	PSB12-14-17-072810	6557-001-SA	Soil	✓
6558	PSB2-4-6-072910	6558-001-SA	Soil	✓

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Volatile Organic Compounds by SW846 Method 8260C-SIM

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all groundwater data and compliance screening (EPA Stage 2A) was performed on all trip blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater, 4 Trip Blank
SF50	6 Groundwater, 1 Trip Blank
SF76	8 Groundwater, 1Trip Blank

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

SDG SF76: Via an email dated January 24, 2011, the client requested VOC 8260C-SIM analyses for samples MW-09-012111, MW-08-012111, MW-01-012111, and MW-01-012111-D.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Matrix Spike/Matrix Spike Duplicate (MS/MSD)
	GC/MS Instrument Performance Check	1	Field Duplicates
	Initial Calibration (ICAL)		Internal Standards
	Continuing Calibration (CCAL)		Target Analyte List
	Laboratory Blanks		Reporting Limits
	Field Blanks		
	Surrogate Compounds		
	Laboratory Control Samples (LCS/LCSD)		

[1] Quality control results are discussed below, but no data were qualified.
[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

SDG SF26: According to the associated Cooler Receipt Form, air bubbles < 2mm were observed in the vials for TB-02-011911, TB-03-011911, and TB-04-011911. The air bubbles were not of significant size to impact data quality and no action was taken.

Trip Blanks

SDG SF26: Four trip blanks, TB-01-011911, TB-02-011911, TB-03-011911, and TB-04-011911, were submitted. No target analytes were detected in these blanks.

SDG SF50: One trip blank, TB-012011 was submitted. No target analytes were detected in this blank.

SDG SF76: One trip blank, TB-012111 was submitted. No target analytes were detected in this blank.

Field Duplicates

The relative percent difference (RPD) value control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. Field precision was acceptable.

IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample (LCS/LCSD), and matrix spike sample (MS/MSD) recovery values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Polycyclic Aromatic Hydrocarbons by SW846 Method 8270D SIM

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater
SF50	6 Groundwater
SF76	8 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Control Samples (LCS/LCSD)
	GC/MS Instrument Performance Check		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Initial Calibration (ICAL)	1	Field Duplicates
	Continuing Calibration (CCAL)		Internal Standards
	Laboratory Blanks		Target Analyte List
	Trip Blanks		Reporting Limits
	Surrogate Compounds		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. Field precision was acceptable.

III. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Pentachlorophenol by EPA Method 8041

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater
SF50	6 Groundwater
SF76	8 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times	1	Field Duplicates
	Initial Calibration (ICAL)		Second Column Confirmation
	Continuing Calibration (CCAL)		Retention Time Window
	Laboratory Blanks		Target Analyte List
	Surrogate Compounds		Reporting Limits
	Laboratory Control Samples (LCS/LCSD)		
	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SDG SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. Field precision was acceptable.

IV. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample (LCS/LCSD), and matrix spike sample (MS/MSD) %R values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Motor Oil and Diesel Range Organics by NWTPH-Dx

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater
SF50	6 Groundwater
SF76	8 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Control Samples (LCS/LCSD)
	Initial Calibration (ICAL)		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Duplicates
	Blanks		Target Analyte List
	Trip Blanks		Reporting Limits
	Surrogate Compounds		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

Duplicate samples and any outliers are noted below. No data were qualified based on field duplicate precision outliers; however data users should consider the impact of field precision on the reported results.

SDG SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. The motor oil range hydrocarbon results were less than five times the RL and the difference between the sample and duplicate was greater than the RL.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample (LCS) and matrix spike sample (MS/MSD) %R values. With the exception noted above, precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
BETX by Method SW8021B Mod and SW8260B
Gasoline Range Organics by NWTPH-Gx

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all groundwater data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater
SF50	6 Groundwater
SF76	8 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Control Samples (LCS/LCSD)
	Initial Calibration (ICAL)		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Duplicates
	Laboratory Blanks		Target Analyte List
	Trip Blanks	1	Reporting Limits
	Surrogate Compounds		Reported Results

[1] Quality control results are discussed below, but no data were qualified.
[2] Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. All field duplicate precision criteria were met.

Reporting Limits

The reporting limit of 1.0 µg/L for all BETX analytes (benzene, toluene, ethylbenzene, xylenes) exceeded the (QAPP) specified reporting limit of 0.25 µg/L.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) percent recovery values. Precision was acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Dioxin/Furan Compounds by Method 1613

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. Full validation (EPA Stage 4) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
6546	6 Groundwater
6547	4 Groundwater
6548	5 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

1	Sample Receipt, Preservation, and Holding Times		Ongoing Precision and Recovery (OPR)
	System Performance and Resolution Checks	1	Field Duplicates
	Initial Calibration (ICAL)		Target Analyte List
	Calibration Verification (CVER)	2	Reported Results
	Method Blanks		Compound Identification
2	Labeled Compound Recovery	1	Calculation Verification
1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

The samples were transferred from Analytical Resources, Inc (ARI) to Frontier Analytical Laboratory. As stated in validation guidance documents, samples should be maintained within the advisory temperature range of 2°C to 6°C. The temperatures recorded by Frontier were as low as 0.0°C, which is the lower control limit. The temperature outliers did not impact data quality; therefore no action was taken.

Labeled Compound Recovery

The labeled compound percent recovery (%R) values were within the QAPP specified control limits of 70% - 130%, with the exceptions noted in the table below. All of the recovery outliers were less than the lower control limit. The results for the associated compounds were estimated (J/UJ-13) to indicate a potential low bias. See the **Qualified Data Summary Table** in **APPENDIX B** for a complete list of qualified results.

SDG	Sample ID	Number of Outliers	Bias
6546	MW-05-012111	2	Low
	MW-01-012111	2	Low
	MW-01-012111-D	14	Low
6547	MW11-011911	9	Low
6548	MW13-012011	3	Low
	MW12-012011	2	Low
	MW04-012011	1	Low
	MW03-012011	7	Low

Matrix Spike/Matrix Spike Duplicates

SDGs 6546 and 6547: Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy was evaluated from the on-going precision and recovery (OPR) standard recoveries. Precision within the analytical batch could not be assessed.

Field Duplicates

The relative percent difference (RPD) control limit is 30% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL. No data were qualified based on field duplicate precision outliers; however data users should consider the impact of field precision on the reported results.

SDG 6546: The data for one field duplicate set, MW-01-012111 and MW-01-011111-D, were submitted. Field precision criteria were not met for total TCDD, total PeCDD, and total TCDF.

Reported Results

The laboratory assigned "D and/or M" flags to several of the reported homologue group totals to indicate that a diphenyl ether (D) or some other interference (M) was present, resulting in a high bias in the reported result. All analytes that were "D" and/or "M" flagged were estimated (J-14).

SDG 6546: The 1,2,3,6,7,8-HxCDF results for samples MW-01-012111 and MW-01-012111D were flagged as "D,M" by the laboratory to indicate the presence of diphenyl ether interferences. These results are considered to be "estimated maximum potential concentrations" (EMPC) and

as such should be considered not-detected at the reported value. The 1,2,3,6,7,8-HxCDF results for these two samples were qualified as not-detected (U-22).

Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exceptions noted above, accuracy was acceptable as demonstrated by the labeled compound, ongoing precision (OPR), and matrix spike sample MS/MSD recovery values. Precision was acceptable for SDG 6548 based on the MS/MSD relative percent difference values; precision could not be assessed for SDG 6546 and SDG6547.

Data were estimated based on labeled compound recovery outliers and interference from diphenyl ether. Detection limits were also elevated based on diphenyl ether interferences.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RIFS
Dioxin/Furan Compounds by Method 1613

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. Full validation (EPA Stage 4) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
6556	1 Soil
6557	1 Soil
6558	1 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

1	Sample Receipt, Preservation, and Holding Times		Ongoing Precision and Recovery (OPR)
	System Performance and Resolution Checks	1	Field Duplicates
	Initial Calibration (ICAL)		Target Analyte List
	Calibration Verification (CVER)	2	Reported Results
	Method Blanks		Compound Identification
2	Labeled Compound Recovery	1	Calculation Verification
1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

The samples were transferred from Analytical Resources, Inc (ARI) to Frontier Analytical Laboratory. As stated in validation guidance documents, samples should be maintained within the advisory temperature range of 2°C to 6°C. The temperatures recorded by Frontier were as low as 0.0°C, which is the lower control limit. The temperature outliers did not impact data quality; therefore no data were qualified.

Labeled Compound Recovery

The labeled compound percent recovery (%R) values were within the QAPP specified control

limits of 70% - 130%, with the following exception:

SDG 6557: The recovery for the labeled compound 13C-OCDF was less than the lower control limit in Sample PSB12-14-17-072810. The OCDF result for this sample was estimated (J-13) to indicate a potential low bias.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy was evaluated from the on-going precision and recovery (OPR) standard recoveries. Precision within the analytical batch could not be assessed.

Field Duplicates

No field duplicates were submitted.

Reported Results

SDG 6557: The laboratory assigned "D,M" flags to indicate that diphenyl ether (D) or some other interference (M) were present. In the case of individual congeners, the result should be considered as an "estimated maximum potential concentration". The "D,M" flagged result for 1,2,3,6,7,8-HxCDF in Sample PSB12-14-17-072810 was qualified as not-detected (U-22). In the case of homologue group totals, the interferences represent a potential high bias. The results for Total TCDF, Total PeCDF, and Total HxCDF in this sample were estimated (J-14).

Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable as demonstrated by the labeled compound and OPR recoveries, with the exception noted above. Precision could not be evaluated.

Data were estimated based on labeled compound recovery outliers and interference from diphenyl ether. The detection limit for one result was elevated due to diphenyl ether interference.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
Dissolved Arsenic and Lead by EPA 200.8

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater
SF50	5 Groundwater
SF76	6 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Duplicates
	Initial Calibration	1	Field Duplicates
	Continuing Calibration Verification		Interference Check Samples
	CRDL Standards		Internal Standards
	Laboratory Blanks		Target Analyte List
	Laboratory Control Samples (LCS)		Reporting Limits
	Matrix Spike (MS)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. All field duplicate precision criteria were met.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample (LCS) and matrix spike sample (MS) recovery values. Precision was also acceptable as demonstrated by the laboratory duplicate and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS
pH by EPA 150.1 and Total Suspended Solids by EPA 160.2

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
SF26	4 Groundwater
SF50	6 Groundwater
SF76	8 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times	2	Laboratory Duplicates
	Laboratory Blanks	1	Field Duplicates
	Laboratory Control Samples (LCS)		Reporting Limits
	Matrix Spikes (MS)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.6°C. The temperature outliers did not impact data quality and no action was taken.

Laboratory Duplicates

With the exception noted below, the laboratory duplicate relative percent difference (RPD) values were less than the QAPP specified criterion of 20% (for TSS) and 25% (for pH). For

RPD values that exceeded the control limit, associated positive results and non-detects were estimated (J/UJ-9).

SDGs SF50 & SF76: QC Sample MW13-012011: TSS (87.2%)

Field Duplicates

The RPD control limit is 20% (25% for pH) for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

Duplicate samples and any outliers are noted below. No data were qualified based on field duplicate precision outliers; however data users should consider the impact of field precision on the reported results.

SDG SF76: One set of field duplicates, MW-01-012111 and MW-01-012111-D, was submitted. The relative percent difference for TSS was greater than the control limit, at 69.2%.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample percent recovery values. With the exception noted above, precision was acceptable as demonstrated by the laboratory and field duplicate RPD values.

Data were qualified based on a laboratory duplicate RPD outlier.

All data, as qualified, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

1	Holding Time/Sample Preservation
2	Chromatographic pattern in sample does not match pattern of calibration standard.
3	Compound Confirmation
4	Tentatively Identified Compound (TIC) (associated with NJ only)
5A	Calibration (initial)
5B	Calibration (continuing)
6	Field Blank Contamination
7	Lab Blank Contamination (e.g., method blank, instrument, etc.)
8	Matrix Spike(MS & MSD) Recoveries
9	Precision (all replicates)
10	Laboratory Control Sample Recoveries
11	A more appropriate result is reported (associated with “R” and “DNR” only)
12	Reference Material
13	Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards)
14	Other (define in validation report)
15	GFAA Post Digestion Spike Recoveries
16	ICP Serial Dilution % Difference
17	ICP Interference Check Standard Recovery
18	Trip Blank Contamination
19	Internal Standard Performance (e.g., area, retention time, recovery)
20	Linear Range Exceeded
21	Potential False Positives
22	Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix)

EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Hold Time	Waters: 14 days preserved 7 Days: unpreserved (for aromatics) Solids: 14 Days	J(+)/UJ(-) if hold times exceeded If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ)	1
Tuning	BFB Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Storage Blank	One per SDG <CRQL	U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule	7
Trip Blank	Frequency as per project QAPP	Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned	18
Field Blanks (if required in QAPP)	No results > CRQL	Apply 5X/10X rule; U(+) < action level	6

EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) in parent sample if RPD > CL	9
LCS *low conc. H2O VOA*	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS *regular VOA (H2O & solid)*	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	Added to all samples Within method control limits	J(+) if %R >UCL J(+)/UJ(-) if %R <LCL but >10% (see PJ[1]) J(+)/R(-) if <10%	13
Internal Standard (IS)	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% RT>30 seconds, narrate and Notify PM	19
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R(+) common laboratory contaminants See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

PJ[1] No action if there are 4+ surrogates and only 1 outlier.

EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	Water: J(+)/UJ(-) if ext. > 7 and < 21 days J(+)/R(-) if ext > 21 days (EcoChem PJ) Solids/Wastes: J(+)/UJ(-) if ext. > 14 and < 42 days J(+)/R(-) if ext. > 42 days (EcoChem PJ) J(+)/UJ(-) if analysis >40 days	1
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Field Blanks (Not Required)	No results > CRQL	Apply 5X/10X rule; U(+) < action level	6

EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) in parent sample if RPD > CL	9
LCS low conc. H2O SVOA	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS regular SVOA (H2O & solid)	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% RT>30 seconds, narrate and Notify PM	19
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R(+) common laboratory contaminants See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext/analyzed > HT J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ)	1
Resolution Check	Beginning of ICAL Sequence Within RTW Resolution >90%	Narrate (Use Professional Judgement to qualify)	14
Instrument Performance (Breakdown)	DDT Breakdown: < 20% Endrin Breakdown: <20% Combined Breakdown: <30% Compounds within RTW	J(+) DDT NJ(+) DDD and/or DDE R(-) DDT - If (+) for either DDE or DDD J(+) Endrin NJ(+) EK and/or EA R(-) Endrin - If (+) for either EK or EA	5A
Retention Times	Surrogates: TCX (+/- 0.05); DCB (+/- 0.10) Target compounds: elute before heptachlor epoxide (+/- 0.05) elute after heptachlor epoxide (+/- 0.07)	NJ(+)/R(-) results for analytes with RT shifts For full DV, use PJ based on examination of raw data	5B
Initial Calibration	Pesticides: Low=CRQL, Mid=4X, High=16X Multiresponse - one point Calibration %RSD<20% %RSD<30% for surr; two comp. may exceed if <30% Resolution in Mix A and Mix B >90%	J(+)/UJ(-)	5A
Continuing Calibration	Alternating PEM standard and INDA/INDB standards every 12 hours (each preceeded by an inst. Blank) %D < 25% Resolution >90% in IND mixes; 100% for PEM	J(+)/UJ(-) J(+)R(-) if %D > 90% PJ for resolution	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL) U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value)	7
Instrument Blanks	Analyzed at the beginning of every 12 hour sequence No analyte > 1/2 CRQL	Same as Method Blank	7
Field Blanks	Not addressed by NFG No results > CRQL	Apply 5X rule; U(+) < action level	6

EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One set per matrix per batch Method Acceptance Criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One set per matrix per batch Method Acceptance Criteria	J(+) in parent sample if RPD > CL	9
LCS	One per SDG Method Acceptance Criteria	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	TCX and DCB added to every sample %R = 30-150%	J(+)/UJ(-) if both %R = 10 - 60% J(+) if both >150% J(+)/R(-) if any %R <10%	13
Quantitation/ Identification	Quantitated using ICAL calibration factor (CF) RPD between columns <40%	J(+) if RPD = 40 - 60% NJ(+) if RPD >60% EcoChem PJ - See TM-08	3
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used to avoid reporting two results for one sample	11
Sample Clean-up	GPC required for soil samples Florisil required for all samples Sulfur is optional Clean-up standard check %R within CLP limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL	14
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate (Qualifiy if required by project QAPP)	9

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Dx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature & Preservation	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C	1
Holding Time	Ext. Waters: 14 days preserved 7 days unpreserved Ext. Solids: 14 Days Analysis: 40 days from extraction	J(+)/UJ(-) if hold times exceeded J(+)/R(-) if exceeded > 3X (EcoChem PJ)	1
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: $R^2 \geq 0.990$ If used, RSD of response factors ≤20%	Narrate if fewer than 5 calibration levels or if %R >15% J(+)/UJ(-) if R^2 <0.990 J(+)/UJ(-) if %RSD > 20%	5A
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 85% to 115%	Narrate if frequency not met. J(+)/UJ(-) if %R < 85% J(+) if %R >115%	5B
Method Blank	At least one per batch (≤20 samples) No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.	7
		U (at reported sample value) if sample result is ≥ RL and < 5X blank result	7
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in the field blank after method blank qualifiers are assigned.	6
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J(+) if both %R > upper control limit (UCL) J(+)/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier	8
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (≤10 samples) RPD ≤ lab control limit	J(+) if RPD > lab control limits	9
LCS (not required by method)	%R within lab control limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% (EcoChem PJ)	10

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Dx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Surrogates	2-fluorobiphenyl, p-terphenyl, o-terphenyl, and/or pentacosane added to all samples (inc. QC samples). %R = 50-150%	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (EcoChem PJ)	13
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J(+)	2
Field Duplicates	Use project control limits, if stated in QAPP EcoChem default: water: RPD < 35% solids: RPD < 50%	Narrate (Use Professional Judgement to qualify)	9
Two analyses for one sample (dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported. (See TM-04)	11

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Gasoline Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Gx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature & Preservation	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C	1
Holding Time	Waters: 14 days preserved 7 days unpreserved Solids: 14 Days	J(+)/UJ(-) if hold times exceeded J(+)/R(-) if exceeded > 3X (EcoChem PJ)	1
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: $R^2 \geq 0.990$ If used, RSD of response factors ≤20%	Narrate if fewer than 5 calibration levels or if %R >15% J(+)/UJ(-) if R^2 <0.990 J(+)/UJ(-) if %RSD > 20%	5A
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 80% to 120%	Narrate if frequency not met. J(+)/UJ(-) if %R < 80% J(+) if %R >120%	5B
Method Blank	At least one per batch (≤10 samples) No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.	7
		U (at reported sample value) if sample result is ≥ RL and < 5X blank result	7
Trip Blank (if required by project)	No results >RL	Action is same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned.	18
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in field blank after method and trip blank qualifiers are assigned.	6
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J(+) if both %R > upper control limit (UCL) J(+)/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier	8
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (≤10 samples) RPD ≤ lab control limit	J(+) if RPD > lab control limits	9

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Gasoline Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Gx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
LCS (not required by method)	%R within lab control limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% (EcoChem PJ)	10
Surrogates	Bromofluorobenzene and/or 1,4-difluorobenzene added to all samples (inc. QC samples). %R = 50-150%	J(+)/UJ(-) if %R < LCL J(+) if %R >UCL J(+)/R(-) if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (EcoChem PJ)	13
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J(+)	2
Field Duplicates	Use project control limits, if stated in QAPP EcoChem default: water: RPD < 35% solids: RPD < 50%	Narrate outliers If required by project, qualify with J(+)/UJ(-)	9
Two analyses for one sample (e.g., dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported. (See TM-04)	11

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Waters/Solids < 4°C Tissues <-10°C	EcoChem PJ, see TM-05	1
Holding Time	Extraction - Water: 30 days from collection *Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days* Extraction - Soil: 30 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext > 30 days J(+)/UJ(-) if analysis > 40 Days EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 304.9824 Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift	R(+/-) if not met	14
Window Defining Mix and Column Performance Mix	Window defining mixture/Isomer specificity std run before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) x = ht. of TCDD y = baseline to bottom of valley For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290)	J(+) if valley > 25%	5A (ICAL) 5B (CCAL
Initial Calibration	Minimum of five standards %RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD <35% for labeled compounds under 1613b)	J(+) natives if %RSD > 20%	5A
	Abs. RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 >15 min on DB-225	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Continuing Calibration	Analyzed at the start and end of each 12 hour shift. %D+/-20% for native compounds %D +/-30% for labeled compounds (Must meet limits in Table 6, Method 1613B) (If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4)	Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers. For native compound %D outliers: 8290: J(+)/UJ(-) if %D = 20% - 75% J(+)/R(-) if %D > 75% 1613: J(+)/UJ(-) if %D is outside Table 6 limits J(+)/R(-) if %D is +/- 75% of Table 6 limit	5B
	Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL.	EcoChem PJ, see ICAL section of TM-05	
	RRT of all other compounds must meet Table 2 of 1613B.	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10	If <10, elevate Det. Limit or R(-)	
Method Blank	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	7
Field Blanks (Not Required)	No positive results	If sample result <5X action level, qualify U at reported value.	6
LCS / OPR	Concentrations must meet limits in Table 6, Method 1613B or lab limits.	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
MS/MSD (recovery)	May not analyze MS/MSD %R should meet lab limits.	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) in parent sample if RPD > CL	9

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Lab Duplicate	RPD <25% if present.	J(+)/UJ(-) if outside limts	9
Labeled Compounds / Internal Standards	*Method 8290:* %R = 40% - 135% in all samples *Method 1613B:* %R must meet limits specified in Table 7, Method 1613	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in Table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation idenfication criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration Tissues: Frozen	EcoChem Professional Judgment - no qualification based on cooler temperature outliers J(+)/UJ(-) if pH preservation requirements are not met	1
Holding Time	180 days from date sampled Frozen tissues - HT extended to 2 years	J(+)/UJ(-) if holding time exceeded	1
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r > 0.995	J(+)/UJ(-) if r < 0.995 (multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J(+)/UJ(-) if %R 75-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run %R within ±10% of true value	J(+)/UJ(-) if %R = 75-89% J(+) if %R 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B

Initial and Continuing Calibration Blank (ICB/CCB)	After each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		(Refer to TM-02 for additional information)
			7

Reporting Limit Standard	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Sb, Pb, Tl)	R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl) J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl) J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl) R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl)	14
Interference Check Samples (ICSA/ICSAB)	ICSAB %R 80 - 120% for all spiked elements | ICSA | < MDL for all unspiked elements except: K, Na	For samples with Al, Ca, Fe, or Mg > ICS levels R(+/-) if %R < 50% J(+) if %R >120% J(+)/UJ(-) if %R= 50 to 79% Use Professional Judgment for ICSA to determine if bias is present see TM-09 for additional details	17
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U(+) results < action level	7
Laboratory Control Sample (LCS)	One per matrix per batch		10
	Blank Spike: %R within 80-120%	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J(+)/UJ(-) if < LCL, J(+) if > UCL	

EcoChem Validation Guidelines for Metals Analysis by ICP
(Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Matrix Spikes	One per matrix per batch 75-125% for samples less than 4x spike level	J(+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30% or J(+)/UJ(-) if Post Spike %R 75-125% Qualify all samples in batch	8
Post-digestion Spike	If Matrix Spike is outside 75-125%, spike at twice the sample conc.	No qualifiers assigned based on this element	
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples >RL and < 5x RL (Diff < 2x RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids) qualify all samples in batch	9
Serial Dilution	5x dilution one per matrix %D < 10% for original sample conc. > 50x MDL	J(+)/UJ(-) if %D >10% qualify all samples in batch	16
Field Blank	Blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J(+)/UJ(-) in parent samples only	9
Linear Range	Sample concentrations must fall within range	J values over range	20

EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler Temperature 4°C ±2°C Preservation: Method Specific	Use Professional Judgment to qualify based to qualify for coole temp outliers J(+)/UJ(-) if preservation requirements not met	1
Holding Time	Method Specific	Professional Judgment J(+)/UJ(-) if holding time exceeded J(+)/R(-) if HT exceeded by > 3X	1
Initial Calibration	Method specific r>0.995	Use professional judgment J(+)/UJ(-) for r < 0.995	5A
Initial Calibration Verification (ICV)	Where applicable to method Independent source analyzed immediately after calibration %R method specific, usually 90% - 110%	R(+/-) if %R significantly < LCL J(+)/UJ(-) if %R < LCL J(+) if %R > UCL R(+) if %R significantly > UCL	5A
Continuing Cal Verification (CCV)	Where applicable to method Every ten samples, immed. following ICV/ICB and end of run %R method specific, usually 90% - 110%	R(+/-) if %R significantly < LCL J(+)/UJ(-) if %R < LCL J(+) if %R > UCL R(+) if %R significantly > UCL	5B

Initial and Continuing Cal Blanks (ICB/CCB)	Where applicable to method
	After each ICV and CCV every ten samples and end of run
	| blank| < MDL
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		refer to TM-02 for additional details
			7

Method Blank	One per matrix per batch
	(not to exceed 20 samples)
	blank < MDL
		Action level is 5x absolute value of blank conc.
		For (+) blk value, U(+) results < action level
		For (-) blk value, J(+)/UJ(-) results < action level
			7

Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Matrix Spike	One per matrix per batch; 5% frequency 75-125% for samples less than 4 x spike level	J(+) if %R > 125% or < 75% UJ(-) if %R = 30-74% R(+/-) results < IDL if %R < 30%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL Diff <RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL all samples in batch	9

EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Field Blank	blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5X RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff<RL Solid: Diff < 2X RL	J(+)/UJ(-) in parent samples only	9

EcoChem, INC.
Environmental Data Quality

APPENDIX B
QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
Lora Lake Apartments RI/FS Groundwater Monitoring

SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
SF50	MW13-012011	11-1198-SF50A	EPA 160.2	Total Suspended Solids	1.1	mg/L		J	9
SF50	MW06-012011	11-1199-SF50B	EPA 160.2	Total Suspended Solids	3.2	mg/L		J	9
SF50	MW12-012011	11-1200-SF50C	EPA 160.2	Total Suspended Solids	1.6	mg/L		J	9
SF50	MW04-012011	11-1201-SF50D	EPA 160.2	Total Suspended Solids	2.8	mg/L		J	9
SF50	MW17-012011	11-1202-SF50E	EPA 160.2	Total Suspended Solids	9.0	mg/L		J	9
SF50	MW03-012011	11-1203-SF50F	EPA 160.2	Total Suspended Solids	1.1	mg/L	U	UJ	9
SF76	MW-15-012111	11-1418-SF76A	EPA 160.2	Total Suspended Solids	48.5	mg/L		J	9
SF76	MW-05-012111	11-1419-SF76B	EPA 160.2	Total Suspended Solids	2.6	mg/L		J	9
SF76	MW-16-012111	11-1420-SF76C	EPA 160.2	Total Suspended Solids	32.3	mg/L		J	9
SF76	MW-02-012111	11-1421-SF76D	EPA 160.2	Total Suspended Solids	1.1	mg/L	U	UJ	9
SF76	MW-09-012111	11-1422-SF76E	EPA 160.2	Total Suspended Solids	1.0	mg/L	U	UJ	9
SF76	MW-08-012111	11-1423-SF76F	EPA 160.2	Total Suspended Solids	1.1	mg/L	U	UJ	9
SF76	MW-01-012111	11-1424-SF76G	EPA 160.2	Total Suspended Solids	5.1	mg/L		J	9
SF76	MW-01-012111-D	11-1425-SF76H	EPA 160.2	Total Suspended Solids	10.5	mg/L		J	9
6546	MW-05-012111	6546-001-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	5.71	pg/L	J	J	13
6546	MW-05-012111	6546-001-SA	EPA 1613 D/F	Total TCDF	14.4	pg/L	D,M	J	14
6546	MW-05-012111	6546-001-SA	EPA 1613 D/F	Total PeCDF	17.9	pg/L	D,J,M	J	14
6546	MW-05-012111	6546-001-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	1.88	pg/L	U	UJ	13
6546	MW-01-012111	6546-005-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	9.83	pg/L	D,J,M	UJ	13,22
6546	MW-01-012111	6546-005-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	1.85	pg/L	U	UJ	13
6546	MW-01-012111	6546-005-SA	EPA 1613 D/F	Total PeCDD	112	pg/L	M	J	14
6546	MW-01-012111	6546-005-SA	EPA 1613 D/F	Total TCDF	1440	pg/L	D,M	J	14
6546	MW-01-012111	6546-005-SA	EPA 1613 D/F	Total PeCDF	3090	pg/L	D,M	J	14
6546	MW-01-012111	6546-005-SA	EPA 1613 D/F	Total HxCDF	410	pg/L	D,M	J	14
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	2,3,7,8-TCDD	4.54	pg/L	U	UJ	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	94.9	pg/L		J	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	4.25	pg/L	U	UJ	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	6.56	pg/L	D,J,M	UJ	13,22
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	4.02	pg/L	U	UJ	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,7,8-PeCDF	13	pg/L	J	J	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	2,3,7,8-TCDF	3.1	pg/L	U	UJ	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDD	920	pg/L		J	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	8.75	pg/L	J	J	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDD	5.61	pg/L	U	UJ	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	17.4	pg/L	J	J	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDD	46.6	pg/L	J	J	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	Total PeCDD	161	pg/L	M	J	14
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	Total TCDF	984	pg/L	D,M	J	14
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	Total PeCDF	2320	pg/L	D,M	J	14
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	Total HxCDF	331	pg/L	D,M	J	14
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDF	3.89	pg/L	U	UJ	13
6546	MW-01-012111-D	6546-006-SA	EPA 1613 D/F	OCDF	294	pg/L		J	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	3.76	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	2,3,7,8-TCDD	1.81	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	2,3,7,8-TCDF	1.15	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDF	2.29	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	2.27	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	2.4	pg/L	U	UJ	13

Qualified Data Summary Table
Lora Lake Apartments RI/FS Groundwater Monitoring

SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	2.52	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	OCDF	4.68	pg/L	U	UJ	13
6547	MW11-011911	6547-001-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	2.58	pg/L	U	UJ	13
6548	MW13-012011	6548-001-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	3.61	pg/L	U	UJ	13
6548	MW13-012011	6548-001-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	1.69	pg/L	U	UJ	13
6548	MW13-012011	6548-001-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	1.46	pg/L	U	UJ	13
6548	MW12-012011	6548-003-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	1.87	pg/L	U	UJ	13
6548	MW12-012011	6548-003-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	1.25	pg/L	U	UJ	13
6548	MW04-012011	6548-004-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	6.37	pg/L	J	J	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	2.52	pg/L	U	UJ	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	OCDF	8.4	pg/L	U	UJ	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	4.96	pg/L	U	UJ	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	1,2,3,4,6,7,8-HpCDF	2.61	pg/L	U	UJ	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	1,2,3,7,8,9-HxCDF	2.59	pg/L	U	UJ	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	2.28	pg/L	U	UJ	13
6548	MW03-012011	6548-005-SA	EPA 1613 D/F	1,2,3,4,7,8-HxCDF	2.3	pg/L	U	UJ	13
6557	PSB12-14-17-072810	6557-001-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	11	pg/g	D,M	U	22
6557	PSB12-14-17-072810	6557-001-SA	EPA 1613 D/F	OCDF	3460	pg/g		J	13
6557	PSB12-14-17-072810	6557-001-SA	EPA 1613 D/F	Total TCDF	42.9	pg/g	D,M	J	14
6557	PSB12-14-17-072810	6557-001-SA	EPA 1613 D/F	Total PeCDF	101	pg/g	D,M	J	14
6557	PSB12-14-17-072810	6557-001-SA	EPA 1613 D/F	Total HxCDF	682	pg/g	D,M	J	14

EcoChem, INC.
Environmental Data Quality

DATA VALIDATION REPORT

Port of Seattle
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring

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July 8, 2011

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PROJECT NARRATIVE

Basis for the Data Validation

This report summarizes the results of validation performed on groundwater, soil, and quality control (QC) sample data for the Lora Lake Apartments Remedial Investigation/Feasibility Study. The dioxin data received full validation (EPA Stage 4); all other parameters received summary validation (EPA Stage 2B). Field blank data received compliance screening (EPA Stage 2A). A complete list of samples is provided in the **Sample Index**.

Frontier Analytical Laboratory (El Dorado Hills, California) performed the Dioxin/Furan analyses. Analytical Resources, Inc. (Tukwila, Washington) performed all other analyses. The analytical methods and EcoChem project chemists are listed in the table below.

Analysis	Method	Primary Review	Secondary Review
Volatile Organic Compounds	SW8260C-SIM	M. Swanson	C. Ransom
BTEX	SW8021Mod		
Polynuclear Aromatic Hydrocarbons	SW8270D		
Pentachlorophenol	SW8041	M. Brindle	
Total Petroleum Hydrocarbons – Diesel Range	NWTPH-Dx	M. Swanson	
Total Petroleum Hydrocarbons – Gasoline Range	NWTPH-Gx		
Dioxin Furan Compounds	EPA 1613		C. Mott
Total and Dissolved Arsenic	EPA 200.8	J. Maute	C. Ransom
Total Suspended Solids, pH	EPA 160.3, EPA 150.1		

The data were reviewed using guidance and quality control criteria documented in the analytical methods; *Port of Seattle Lora Lakes Apartments, Remedial Investigation/Feasibility Study Work Plan*; *National Functional Guidelines for Inorganic Data Review* (USEPA 1994 & 2004); *National Functional Guidelines for Organic Data Review* (USEPA 1999 & 2008); and *USEPA National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (USEPA, September 2005).

EcoChem's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reason codes, and validation criteria are included as **APPENDIX A**. A Qualified Data Summary Table is included in **APPENDIX B**. Data Validation Worksheets will be kept on file at EcoChem, Inc. A qualified laboratory electronic data deliverable (EDD) is also submitted with this report.

Sample Index
Lora Lake Apartments RI/FS - 2nd Quarter 2011 Groundwater Monitoring
Analytical Resources Inc.

SDG	Sample ID	Laboratory ID	VOC	PAH	PCP	BTEX	TPHGx	TPHDx	Metals	pH/TSS
ST98	MW02-042611	11-9409-ST98A	✓	✓	✓	✓	✓	✓	✓	✓
	MW03-042611	11-9410-ST98B	✓	✓	✓	✓	✓	✓	✓	✓
	MW13-042611	11-9411-ST98C	✓	✓	✓	✓	✓	✓	✓	✓
	MW06-042611	11-9412-ST98D	✓	✓	✓	✓	✓	✓	✓	✓
	TB-042611	11-9413-ST98E	✓							
SU21	MW07-042711	11-9507-SU21A	✓	✓	✓	✓	✓	✓	✓	✓
	MW11-042711	11-9508-SU21B	✓	✓	✓	✓	✓	✓	✓	✓
	MW10-042711	11-9509-SU21C	✓	✓	✓	✓	✓	✓	✓	✓
	MW09-042711	11-9510-SU21D	✓	✓	✓	✓	✓	✓	✓	✓
	MW08-042711	11-9511-SU21E	✓	✓	✓	✓	✓	✓	✓	✓
	MW12-042711	11-9512-SU21F	✓	✓	✓	✓	✓	✓	✓	✓
	TB-042711	11-9513-SU21G	✓							
SU53	MW5042811	11-9621-SU53A	✓	✓	✓	✓	✓	✓	✓	✓
	MW15042811	11-9622-SU53B	✓	✓	✓	✓	✓	✓		✓
	MW4042811	11-9623-SU53C	✓	✓	✓	✓	✓	✓	✓	✓
	MW17042811	11-9624-SU53D	✓	✓	✓	✓	✓	✓		✓
	MW14042811	11-9625-SU53E	✓	✓	✓	✓	✓	✓	✓	✓
	MW16042811	11-9626-SU53F	✓	✓	✓	✓	✓	✓		✓
	TB-042811	11-9627-SU53G	✓							
SU73	MW-01-042911	11-9762-SU73A	✓	✓	✓	✓	✓	✓	✓	✓
	MW-01-042911-D	11-9763-SU73B	✓	✓	✓	✓	✓	✓	✓	✓
	TB-042911	11-9764-SU73C	✓							

Sample Index
Lora Lake Apartments RI/FS - 2nd Quarter 2011 Groundwater Monitoring
Frontier Analytical Laboratory

SDG	Sample ID	Laboratory ID	Dioxins
6739	MW02-042611	6739-001-SA	✓
6739	MW03-042611	6739-002-SA	✓
6739	MW13-042611	6739-003-SA	✓
6739	MW06-042611	6739-004-SA	✓
6740	MW07-042711	6740-001-SA	✓
6740	MW11-042711	6740-002-SA	✓
6740	MW10-042711	6740-003-SA	✓
6740	MW09-042711	6740-004-SA	✓
6740	MW08-042711	6740-005-SA	✓
6740	MW12-042711	6740-006-SA	✓
6742	MW5042811	6742-001-SA	✓
6742	MW4042811	6742-002-SA	✓
6742	MW14042811	6742-003-SA	✓
6743	MW-01-042911	6743-001-SA	✓
6743	MW-01-042911-D	6743-002-SA	✓
6744	B312-042911	6744-001-SA	✓
6744	B310-042911	6744-002-SA	✓
6744	B311-042911	6744-003-SA	✓

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
Volatile Organic Compounds by SW846 Method 8260C-SIM

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all groundwater data and compliance screening (EPA Stage 2A) was performed on all trip blank data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater, 1 Trip Blank
SU21	6 Groundwater, 1 Trip Blank
SU53	6 Groundwater, 1 Trip Blank
SU73	2 Groundwater, 1 Trip Blank

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Control Samples (LCS/LCSD)
	GC/MS Instrument Performance Check		Matrix Spike/Matrix Spike Duplicate (MS/MSD)
	Initial Calibration (ICAL)	1	Field Duplicates
	Continuing Calibration (CCAL)		Internal Standards
	Laboratory Blanks		Target Analyte List
1	Field Blanks		Reporting Limits
	Surrogate Compounds		

[1] ***Quality control results are discussed below, but no data were qualified.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, with the lowest at 0.4°C. The temperature outliers did not impact data quality and no action was taken.

SDG SU53: The collection date for Sample TB-042811 was recorded as 4/7/11 on the chain-of -custody (COC) record. All other samples in this SDG were collected on 4/28/11, which was also the date used in the trip blank sample ID. No further action was taken beyond noting this discrepancy.

Field Blanks

SDG ST98: One trip blank, TB-0426011 was submitted. No target analytes were detected in this blank.

SDG SU21: One trip blank, TB-0427011 was submitted. No target analytes were detected in this blank.

SDG SU53: One trip blank, TB-0428011 was submitted. No target analytes were detected in this blank.

SDG SU73: One trip blank, TB-042911 was submitted. No target analytes were detected in this blank.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SDG SU73: One set of field duplicates were submitted: MW-01-042911 & MW-01-042911-D. All field precision criteria were met.

IV. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample (LCS/LCSD), and matrix spike sample (MS/MSD) recovery values. Precision was also acceptable as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
Polycyclic Aromatic Hydrocarbons by SW846 Method 8270D-SIM

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater
SU21	6 Groundwater
SU53	6 Groundwater
SU73	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times	1	Field Duplicates
	Initial Calibration (ICAL)		Retention Time Window
	Continuing Calibration (CCAL)		Target Analyte List
1	Laboratory Blanks		Compound Identification
1	Field Blanks		Compound Quantitation
	Surrogate Compounds		Reporting Limits
2	Laboratory Control Samples (LCS/LCSD)	2	Reported Results
1	Matrix Spikes/Matrix Spike Duplicates (MS/MSD)		

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, with the lowest at 0.4°C. The temperature outliers did not impact data quality and no action was taken.

Laboratory Blanks

SDGs ST98 & SU21: The target analyte indeno(1,2,3-c,d)pyrene was detected in the method blank. This analyte was not detected in any of the associated field samples; therefore no qualification of data was necessary.

Field Blanks

No field blanks were submitted.

Laboratory Control Samples

SDG SU73: The laboratory control sample (LCS) percent recovery (%R) value for benzo(a)pyrene was less than the lower control limit of 40%. All results for benzo(a)pyrene in the associated samples were estimated (J/UJ-10) to indicate a potential low bias.

Field Duplicate

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SDG SU73: One set of field duplicates was submitted, MW-01-042911 & MW-01-042911-D. All field precision criteria were met.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the exception noted above, accuracy was acceptable as demonstrated by the surrogate, laboratory control sample and matrix spike/matrix spike duplicate (MS/MSD) recoveries. Precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

Data were estimated based on an LCS recovery outlier.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
Pentachlorophenol by EPA Method 8041

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources, Inc., Tukwila, Washington. Summary validation (Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater
SU21	6 Groundwater
SU53	6 Groundwater
SU73	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Initial Calibration (ICAL)	1	Field Duplicates
	Continuing Calibration (CCAL)		Second Column Confirmation
	Laboratory Blanks		Retention Time Window
1	Field Blanks		Target Analyte List
	Surrogate Compounds		Reporting Limits
	Laboratory Control Samples (LCS)		

[1] ***Quality control results are discussed below, but no data were qualified.***[2]

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, with the lowest at 0.4°C. The temperature outliers did not impact data quality and no action was taken.

Field Blanks

No field blanks were submitted.

Field Duplicates

The field duplicate relative percent difference (RPD) control limit is 50% for concentrations greater than 5x the reporting limit (RL). For concentrations less than 5x the RL, the difference between the sample result and the duplicate result must be less than the RL.

SDG SU73: One set of field duplicates, MW-01-042911 and MW-01-042911-D, was submitted. Field precision was acceptable.

III. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample, and matrix spike sample (MS/MSD) recoveries. Precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
Motor Oil and Diesel Range Organics by NWTPH-Dx

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater
SU21	6 Groundwater
SU53	6 Groundwater
SU73	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Control Samples (LCS/LCSD)
	Initial Calibration (ICAL)		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Duplicates
	Blanks		Target Analyte List
1	Field Blanks		Reporting Limits
	Surrogate Compounds		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.4°C. The temperature outliers did not impact data quality and no action was taken.

Field Blanks

No field blanks were submitted.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SU73: One set of field duplicates, MW-01-042911 and MW-01-042911-D, was submitted. No target analytes were detected in the sample or duplicate. Field precision was acceptable.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the surrogate, laboratory control sample, and matrix spike sample (MS/MSD) recoveries. Precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
BETX by Method SW8021B Mod
Gasoline Range Organics by NWTPH-Gx

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all groundwater data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater
SU21	6 Groundwater
SU53	6 Groundwater
SU73	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Control Samples (LCS/LCSD)
	Initial Calibration (ICAL)		Matrix Spikes/Matrix Spike Duplicates (MS/MSD)
	Continuing Calibration (CCAL)	1	Field Duplicates
	Laboratory Blanks		Target Analyte List
	Field Blanks	1	Reporting Limits
	Surrogate Compounds		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received with temperatures less than the lower limit, ranging down to 0.4°C. The temperature outliers did not impact data quality and no action was taken.

Field Blanks

No field blanks were submitted.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SU73: One set of field duplicates, MW-01-042911 and MW-01-042911-D, was submitted. All field duplicate precision criteria were met.

Reporting Limits

The reporting limit of 1.0 µg/L for all BTEX analytes (benzene, toluene, ethylbenzene, xylenes) exceeded the (QAPP) specified reporting limit of 0.25 µg/L.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) percent recovery values. Precision was acceptable as demonstrated by the MS/MSD, LCS/LCSD, and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
Dioxin/Furan Compounds by Method 1613

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. Full validation (EPA Stage 4) was performed on all data. The **Sample Index** contains a complete list of samples.

SDG	Number of Samples
6739	4 Groundwater
6740	6 Groundwater
6742	3 Groundwater
6743	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

1	Sample Receipt, Preservation, and Holding Times	1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)
	System Performance and Resolution Checks		Ongoing Precision and Recovery (OPR)
	Initial Calibration (ICAL)	1	Field Duplicates
	Calibration Verification (CVER)		Target Analyte List
	Method Blanks	2	Reported Results
1	Field Blanks		Compound Identification
2	Labeled Compound Recovery	1	Calculation Verification

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

The samples were transferred from Analytical Resources, Inc (ARI) to Frontier Analytical Laboratory. As stated in validation guidance documents, samples should be maintained within the advisory temperature range of 2°C to 6°C. The temperatures recorded by Frontier were as low as 0.0°C, which is less than the control limit. The temperature outliers did not impact data quality and no action was taken.

Field Blanks

No field blanks were submitted.

Labeled Compound Recovery

Several labeled compound percent recovery (%R) values were outside of the QAPP specified control limits of 70% - 130%. For recoveries less than the lower control limit, the results for the associated compounds were estimated (J/UJ-13) to indicate a potential low bias. For recoveries greater than the upper control limit, positive results for the associated compounds were estimated (J-13) to indicate a potential high bias. Outliers in the following samples resulted in qualification of data.

SDG	Sample ID	Outlier Compounds	Bias
6739	MW13-042611	13C-1,2,3,6,7,8-HxCDD	Low
		13C-1,2,3,6,7,8-HxCDF	
		13C-1,2,3,7,8-PeCDD	
		13C-1,2,3,7,8-PeCDF	
		13C-2,3,4,7,8-PeCDF	
		13C-OCDF	
6742	MW5042811	13C-OCDF	Low
	MW14042811	13C-OCDF	
	MW4042811	13C-OCDD	
		13C-1,2,3,4,7,8,9-HpCDF	
		13C-OCDF	

Matrix Spike/Matrix Spike Duplicates

SDGs 6740, 6742, & 6743: Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed for these SDG. Laboratory accuracy was evaluated from the on-going precision and recovery (OPR) standard recoveries. For any SDG that did not include a field duplicate, precision within the analytical batch could not be assessed.

Field Duplicates

The RPD value control limit is 30% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL. No data were qualified based on field duplicate precision outliers; however users of the data should consider the impact of field precision on the reported results.

SDG 6743: The data for one field duplicate set, MW-01-042911 and MW-01-042-D, were submitted. The RPD values for 1,2,3,4,6,7,8-HpCDD, OCDD, total PeCDD, total HxCDD, total HpCDD, total HxCDF, and total HpCDF were greater than the control limit.

Reported Results

The laboratory assigned "D and M" flags to several of the reported homologue group totals to indicate that a diphenyl ether (D) and some other interference (M) was present, resulting in a high bias in the reported result. All analytes that were "D" and "M" flagged were estimated (J-14).

Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the above noted exceptions, accuracy was acceptable as demonstrated by the labeled compound, OPR, and MS/MSD %R values. Precision was also acceptable as demonstrated by the MS/MSD and field duplicate RPD values.

Data were estimated based on labeled compound recovery outliers and interference from diphenyl ether.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Soils
Dioxin/Furan Compounds by Method 1613

This report documents the review of analytical data from the analysis of soil samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Frontier Analytical Laboratory, El Dorado Hills, California. Full validation (EPA Stage 4) was performed on all sediment data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
6734	6 Soil

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The quality control (QC) requirements reviewed are summarized in the following table:

1	Sample Receipt, Preservation, and Holding Times	1	Matrix Spike/Matrix Spike Duplicates (MS/MSD)
	System Performance and Resolution Checks		Ongoing Precision and Recovery (OPR)
	Initial Calibration (ICAL)	1	Field Duplicates
	Calibration Verification (CVER)		Target Analyte List
	Method Blanks		Reported Results
1	Field Blanks		Compound Identification
2	Labeled Compound Recovery	1	Calculation Verification

[1] ***Quality control results are discussed below, but no data were qualified.***
[2] ***Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.***

Sample Receipt, Preservation, and Holding Times

The samples were transferred from Analytical Resources, Inc (ARI) to Frontier Analytical Laboratory. As stated in validation guidance documents, samples should be maintained within the advisory temperature range of 2°C to 6°C. The temperatures recorded by Frontier were as low as 0.0°C, which is less than the lower control limit. The temperature outliers did not impact data quality and no action was taken.

Field Blanks

No equipment rinsate samples were submitted with this data package.

Labeled Compound Recovery

In Sample LL-A2-0-0.5-041811, the percent recovery (%R) value for 13C-2,3,4,6,7,8-HxCDF was 66.8%, which is less than the lower control limit of 70%. The native compound in this sample was estimated (J-13) to indicate a potential low bias.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) samples were not analyzed. Laboratory accuracy was evaluated from the on-going precision and recovery (OPR) standard recoveries. Precision within the analytical batch could not be assessed.

Field Duplicates

No field duplicate samples were submitted with this data package.

Calculation Verification

Several results were verified by recalculation from the raw data. No calculation or transcription errors were found.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. With the above noted exception, accuracy was acceptable as demonstrated by the labeled compound and OPR %R values.

One data point was estimated based on a labeled compound recovery outlier.

All data, as qualified, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
Dissolved Arsenic and Lead by EPA 200.8

This report documents the review of analytical data from the analysis of groundwater samples and the associated laboratory quality and field control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater
SU21	6 Groundwater
SU53	3 Groundwater
SU73	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Duplicates
	Initial Calibration	1	Field Duplicates
	Continuing Calibration Verification		Interference Check Samples
	CRDL Standards		Internal Standards
	Laboratory Blanks		Target Analyte List
	Laboratory Control Samples (LCS)		Reporting Limits
	Matrix Spike (MS)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received. One cooler was received with a temperature less than the lower limit, at 0.4°C. The temperature outlier did not impact data quality and no action was taken.

Field Duplicates

The relative percent difference (RPD) control limit is 50% for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SU73: One set of field duplicates, MW-01-042911 and MW-01-042911-D, was submitted. All field duplicate precision criteria were met.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample and matrix spike sample recovery values. Precision was also acceptable as demonstrated by the laboratory duplicate and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

DATA VALIDATION REPORT
Lora Lake Apartments RI/FS – 2nd Qtr 2011 Groundwater Monitoring
pH by EPA 150.1 and Total Suspended Solids by EPA 160.2

This report documents the review of analytical data from the analyses of groundwater samples and the associated laboratory and field quality control (QC) samples. Samples were analyzed by Analytical Resources Incorporated, Tukwila, Washington. Summary validation (EPA Stage 2B) was performed on all data. Refer to the **Sample Index** for a complete list of samples.

SDG	Number of Samples
ST98	4 Groundwater
SU21	6 Groundwater
SU53	6 Groundwater
SU73	2 Groundwater

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

1	Sample Receipt, Preservation, and Holding Times		Laboratory Duplicates
	Laboratory Blanks	1	Field Duplicates
	Laboratory Control Samples (LCS)		Reporting Limits
	Matrix Spikes (MS)		Reported Results

[1] ***Quality control results are discussed below, but no data were qualified***

Sample Receipt, Preservation, and Holding Times

As stated in validation guidance documents, sample coolers should arrive at the laboratory within the advisory temperature range of 2°C to 6°C. Several coolers were received. One cooler was received with a temperature less than the lower limit, at 0.4°C. The temperature outlier did not impact data quality and no action was taken.

Field Duplicates

The relative percent difference (RPD) control limit is 20% (25% for pH) for results greater than five times the reporting limit (RL). For results less than five times the RL, the difference between the sample and duplicate must be less than the RL.

SDG SU73: One set of field duplicates, MW-01-042911 and MW-01-042911-D, was submitted. All field duplicate precision criteria were met.

III. OVERALL ASSESSMENT

As determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the laboratory control sample percent recovery values. Precision was acceptable as demonstrated by the laboratory and field duplicate RPD values.

No data were qualified for any reason.

All data, as reported, are acceptable for use.

EcoChem, INC.
Environmental Data Quality

APPENDIX A

DATA QUALIFIER DEFINITIONS, REASON CODES, AND CRITERIA TABLES

DATA VALIDATION QUALIFIER CODES
Based on National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.

DATA QUALIFIER REASON CODES

1	Holding Time/Sample Preservation
2	Chromatographic pattern in sample does not match pattern of calibration standard.
3	Compound Confirmation
4	Tentatively Identified Compound (TIC) (associated with NJ only)
5A	Calibration (initial)
5B	Calibration (continuing)
6	Field Blank Contamination
7	Lab Blank Contamination (e.g., method blank, instrument, etc.)
8	Matrix Spike(MS & MSD) Recoveries
9	Precision (all replicates)
10	Laboratory Control Sample Recoveries
11	A more appropriate result is reported (associated with “R” and “DNR” only)
12	Reference Material
13	Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards)
14	Other (define in validation report)
15	GFAA Post Digestion Spike Recoveries
16	ICP Serial Dilution % Difference
17	ICP Interference Check Standard Recovery
18	Trip Blank Contamination
19	Internal Standard Performance (e.g., area, retention time, recovery)
20	Linear Range Exceeded
21	Potential False Positives
22	Elevated Detection Limit Due to Interference (i.e., laboratory, chemical and/or matrix)

EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Hold Time	Waters: 14 days preserved 7 Days: unpreserved (for aromatics) Solids: 14 Days	J(+)/UJ(-) if hold times exceeded If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ)	1
Tuning	BFB Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Storage Blank	One per SDG <CRQL	U(+) the specific analyte(s) results in all assoc.samples using the 5x or 10x rule	7
Trip Blank	Frequency as per project QAPP	Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned	18
Field Blanks (if required in QAPP)	No results > CRQL	Apply 5X/10X rule; U(+) < action level	6

EcoChem Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) in parent sample if RPD > CL	9
LCS *low conc. H2O VOA*	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS *regular VOA (H2O & solid)*	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	Added to all samples Within method control limits	J(+) if %R >UCL J(+)/UJ(-) if %R <LCL but >10% (see PJ[1]) J(+)/R(-) if <10%	13
Internal Standard (IS)	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% RT>30 seconds, narrate and Notify PM	19
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R(+) common laboratory contaminants See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

PJ[1] No action if there are 4+ surrogates and only 1 outlier.

EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	Water: J(+)/UJ(-) if ext. > 7 and < 21 days J(+)/R(-) if ext > 21 days (EcoChem PJ) Solids/Wastes: J(+)/UJ(-) if ext. > 14 and < 42 days J(+)/R(-) if ext. > 42 days (EcoChem PJ) J(+)/UJ(-) if analysis >40 days	1
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Field Blanks (Not Required)	No results > CRQL	Apply 5X/10X rule; U(+) < action level	6

EcoChem Validation Guidelines for Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) in parent sample if RPD > CL	9
LCS low conc. H2O SVOA	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS regular SVOA (H2O & solid)	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R <LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% RT>30 seconds, narrate and Notify PM	19
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R(+) common laboratory contaminants See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext/analyzed > HT J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ)	1
Resolution Check	Beginning of ICAL Sequence Within RTW Resolution >90%	Narrate (Use Professional Judgement to qualify)	14
Instrument Performance (Breakdown)	DDT Breakdown: < 20% Endrin Breakdown: <20% Combined Breakdown: <30% Compounds within RTW	J(+) DDT NJ(+) DDD and/or DDE R(-) DDT - If (+) for either DDE or DDD J(+) Endrin NJ(+) EK and/or EA R(-) Endrin - If (+) for either EK or EA	5A
Retention Times	Surrogates: TCX (+/- 0.05); DCB (+/- 0.10) Target compounds: elute before heptachlor epoxide (+/- 0.05) elute after heptachlor epoxide (+/- 0.07)	NJ(+)/R(-) results for analytes with RT shifts For full DV, use PJ based on examination of raw data	5B
Initial Calibration	Pesticides: Low=CRQL, Mid=4X, High=16X Multiresponse - one point Calibration %RSD<20% %RSD<30% for surr; two comp. may exceed if <30% Resolution in Mix A and Mix B >90%	J(+)/UJ(-)	5A
Continuing Calibration	Alternating PEM standard and INDA/INDB standards every 12 hours (each preceeded by an inst. Blank) %D < 25% Resolution >90% in IND mixes; 100% for PEM	J(+)/UJ(-) J(+)R(-) if %D > 90% PJ for resolution	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL) U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value)	7
Instrument Blanks	Analyzed at the beginning of every 12 hour sequence No analyte > 1/2 CRQL	Same as Method Blank	7
Field Blanks	Not addressed by NFG No results > CRQL	Apply 5X rule; U(+) < action level	6

EcoChem Validation Guidelines for Pesticides, PCBs, Herbicides, and Phenol by GC/ECD (Based on Organic NFG 1999 & EPA SW-846 Methods 8081/8082/8041/8151)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One set per matrix per batch Method Acceptance Criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One set per matrix per batch Method Acceptance Criteria	J(+) in parent sample if RPD > CL	9
LCS	One per SDG Method Acceptance Criteria	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
LCS/LCSD *(if required)*	One set per matrix and batch of 20 samples RPD < 35%	J(+)/UJ(-) assoc. cmpd. in all samples	9
Surrogates	TCX and DCB added to every sample %R = 30-150%	J(+)/UJ(-) if both %R = 10 - 60% J(+) if both >150% J(+)/R(-) if any %R <10%	13
Quantitation/ Identification	Quantitated using ICAL calibration factor (CF) RPD between columns <40%	J(+) if RPD = 40 - 60% NJ(+) if RPD >60% EcoChem PJ - See TM-08	3
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used to avoid reporting two results for one sample	11
Sample Clean-up	GPC required for soil samples Florisil required for all samples Sulfur is optional Clean-up standard check %R within CLP limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL	14
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate (Qualifiy if required by project QAPP)	9

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Dx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature & Preservation	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C	1
Holding Time	Ext. Waters: 14 days preserved 7 days unpreserved Ext. Solids: 14 Days Analysis: 40 days from extraction	J(+)/UJ(-) if hold times exceeded J(+)/R(-) if exceeded > 3X (EcoChem PJ)	1
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: $R^2 \geq 0.990$ If used, RSD of response factors ≤20%	Narrate if fewer than 5 calibration levels or if %R >15% J(+)/UJ(-) if R^2 <0.990 J(+)/UJ(-) if %RSD > 20%	5A
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 85% to 115%	Narrate if frequency not met. J(+)/UJ(-) if %R < 85% J(+) if %R >115%	5B
Method Blank	At least one per batch (≤20 samples) No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.	7
		U (at reported sample value) if sample result is ≥ RL and < 5X blank result	7
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in the field blank after method blank qualifiers are assigned.	6
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J(+) if both %R > upper control limit (UCL) J(+)/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier	8
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (≤10 samples) RPD ≤ lab control limit	J(+) if RPD > lab control limits	9
LCS (not required by method)	%R within lab control limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% (EcoChem PJ)	10

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Diesel & Residual Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Dx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Surrogates	2-fluorobiphenyl, p-terphenyl, o-terphenyl, and/or pentacosane added to all samples (inc. QC samples). %R = 50-150%	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (EcoChem PJ)	13
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J(+)	2
Field Duplicates	Use project control limits, if stated in QAPP EcoChem default: water: RPD < 35% solids: RPD < 50%	Narrate (Use Professional Judgement to qualify)	9
Two analyses for one sample (dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported. (See TM-04)	11

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Gasoline Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Gx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature & Preservation	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C	1
Holding Time	Waters: 14 days preserved 7 days unpreserved Solids: 14 Days	J(+)/UJ(-) if hold times exceeded J(+)/R(-) if exceeded > 3X (EcoChem PJ)	1
Initial Calibration	5 calibration points (All within 15% of true value) Linear Regression: $R^2 \geq 0.990$ If used, RSD of response factors ≤20%	Narrate if fewer than 5 calibration levels or if %R >15% J(+)/UJ(-) if R^2 <0.990 J(+)/UJ(-) if %RSD > 20%	5A
Mid-range Calibration Check Std.	Analyzed before and after each analysis shift & every 20 samples. Recovery range 80% to 120%	Narrate if frequency not met. J(+)/UJ(-) if %R < 80% J(+) if %R >120%	5B
Method Blank	At least one per batch (≤10 samples) No results >RL	U (at the RL) if sample result is < RL & < 5X blank result.	7
		U (at reported sample value) if sample result is ≥ RL and < 5X blank result	7
Trip Blank (if required by project)	No results >RL	Action is same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned.	18
Field Blanks (if required by project)	No results > RL	Action is same as method blank for positive results remaining in field blank after method and trip blank qualifiers are assigned.	6
MS samples (accuracy) (if required by project)	%R within lab control limits	Qualify parent only, unless other QC indicates systematic problems. J(+) if both %R > upper control limit (UCL) J(+)/UJ(-) if both %R < lower control limit (LCL) No action if parent conc. >5X the amount spiked. Use PJ if only one %R outlier	8
Precision: MS/MSD or LCS/LCSD or sample/dup	At least one set per batch (≤10 samples) RPD ≤ lab control limit	J(+) if RPD > lab control limits	9

EcoChem Validation Guidelines for Total Petroleum Hydrocarbons-Gasoline Range

(Based on EPA National Functional Guidelines as applied to criteria in NWTPH-Gx, June 1997, Wa DOE & Oregon DEQ)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
LCS (not required by method)	%R within lab control limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL J(+)/R(-) if any %R <10% (EcoChem PJ)	10
Surrogates	Bromofluorobenzene and/or 1,4-difluorobenzene added to all samples (inc. QC samples). %R = 50-150%	J(+)/UJ(-) if %R < LCL J(+) if %R >UCL J(+)/R(-) if any %R <10% No action if 2 or more surrogates are used, and only one is outside control limits. (EcoChem PJ)	13
Pattern Identification	Compare sample chromatogram to standard chromatogram to ensure range and pattern are reasonable match. Laboratory may flag results which have poor match.	J(+)	2
Field Duplicates	Use project control limits, if stated in QAPP EcoChem default: water: RPD < 35% solids: RPD < 50%	Narrate outliers If required by project, qualify with J(+)/UJ(-)	9
Two analyses for one sample (e.g., dilution)	Report only one result per analyte	"DNR" (or client requested qualifier) all results that should not be reported. (See TM-04)	11

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler/Storage Temperature	Waters/Solids < 4°C Tissues <-10°C	EcoChem PJ, see TM-05	1
Holding Time	Extraction - Water: 30 days from collection *Note:* Under CWA, SDWA, and RCRA the HT for H2O is 7 days* Extraction - Soil: 30 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext > 30 days J(+)/UJ(-) if analysis > 40 Days EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 304.9824 Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift	R(+/-) if not met	14
Window Defining Mix and Column Performance Mix	Window defining mixture/Isomer specificity std run before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) x = ht. of TCDD y = baseline to bottom of valley For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290)	J(+) if valley > 25%	5A (ICAL) 5B (CCAL
Initial Calibration	Minimum of five standards %RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD <35% for labeled compounds under 1613b)	J(+) natives if %RSD > 20%	5A
	Abs. RT of $^{13}C_{12}$-1234-TCDD >25 min on DB5 >15 min on DB-225	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Continuing Calibration	Analyzed at the start and end of each 12 hour shift. %D+/-20% for native compounds %D +/-30% for labeled compounds (Must meet limits in Table 6, Method 1613B) (If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the two CCAL may be used to calculate samples per Method 8290, Section 8.3.2.4)	Do not qualify labeled compounds. Narrate in report for labeled compound %D outliers. For native compound %D outliers: 8290: J(+)/UJ(-) if %D = 20% - 75% J(+)/R(-) if %D > 75% 1613: J(+)/UJ(-) if %D is outside Table 6 limits J(+)/R(-) if %D is +/- 75% of Table 6 limit	5B
	Abs. RT of $^{13}C_{12}$-1234-TCDD and $^{13}C12$-123789-HxCDD +/- 15 sec of ICAL.	EcoChem PJ, see ICAL section of TM-05	
	RRT of all other compounds must meet Table 2 of 1613B.	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10	If <10, elevate Det. Limit or R(-)	
Method Blank	One per matrix per batch No positive results	If sample result <5X action level, qualify U at reported value.	7
Field Blanks (Not Required)	No positive results	If sample result <5X action level, qualify U at reported value.	6
LCS / OPR	Concentrations must meet limits in Table 6, Method 1613B or lab limits.	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
MS/MSD (recovery)	May not analyze MS/MSD %R should meet lab limits.	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) in parent sample if RPD > CL	9

EcoChem Validation Guidelines for Dioxin/Furan Analysis by HRMS
(Based on EPA Reg. 10 SOP, Rev. 2, 1996 & EPA SW-846, Methods 1613b and 8290)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Lab Duplicate	RPD <25% if present.	J(+)/UJ(-) if outside limts	9
Labeled Compounds / Internal Standards	*Method 8290:* %R = 40% - 135% in all samples *Method 1613B:* %R must meet limits specified in Table 7, Method 1613	J(+)/UJ(-) if %R = 10% to LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
Quantitation/ Identification	Ions for analyte, IS, and rec. std. must max w/in 2 sec. S/N >2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in Table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation idenfication criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (EcoChem PJ)	9
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

EcoChem Validation Guidelines for Metals Analysis by ICP (Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration Tissues: Frozen	EcoChem Professional Judgment - no qualification based on cooler temperature outliers J(+)/UJ(-) if pH preservation requirements are not met	1
Holding Time	180 days from date sampled Frozen tissues - HT extended to 2 years	J(+)/UJ(-) if holding time exceeded	1
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r > 0.995	J(+)/UJ(-) if r < 0.995 (multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J(+)/UJ(-) if %R 75-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run %R within ±10% of true value	J(+)/UJ(-) if %R = 75-89% J(+) if %R 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B

Initial and Continuing Calibration Blank (ICB/CCB)	After each ICV and CCV
	every ten samples and end of run
	| blank | < IDL (MDL)
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		(Refer to TM-02 for additional information)
			7

Reporting Limit Standard	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Sb, Pb, Tl)	R(-)/J(+) < 2x RL if %R <50% (< 30% Sb, Pb, Tl) J(+) < 2x RL, UJ(-) if %R 50-69% (30-49% Sb, Pb,Tl) J(+) < 2x RL if %R 130-180% (150-200% Sb, Pb, Tl) R(+) < 2x RL if %R > 180% (200% Sb, Pb, Tl)	14
Interference Check Samples (ICSA/ICSAB)	ICSAB %R 80 - 120% for all spiked elements | ICSA | < MDL for all unspiked elements except: K, Na	For samples with Al, Ca, Fe, or Mg > ICS levels R(+/-) if %R < 50% J(+) if %R >120% J(+)/UJ(-) if %R= 50 to 79% Use Professional Judgment for ICSA to determine if bias is present see TM-09 for additional details	17
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U(+) results < action level	7
Laboratory Control Sample (LCS)	One per matrix per batch		10
	Blank Spike: %R within 80-120%	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J(+)/UJ(-) if < LCL, J(+) if > UCL	

EcoChem Validation Guidelines for Metals Analysis by ICP
(Based on Inorganic NFG 1994 & 2004)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Matrix Spikes	One per matrix per batch 75-125% for samples less than 4x spike level	J(+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30% or J(+)/UJ(-) if Post Spike %R 75-125% Qualify all samples in batch	8
Post-digestion Spike	If Matrix Spike is outside 75-125%, spike at twice the sample conc.	No qualifiers assigned based on this element	
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples >RL and < 5x RL (Diff < 2x RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL (2x RL for solids) qualify all samples in batch	9
Serial Dilution	5x dilution one per matrix %D < 10% for original sample conc. > 50x MDL	J(+)/UJ(-) if %D >10% qualify all samples in batch	16
Field Blank	Blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J(+)/UJ(-) in parent samples only	9
Linear Range	Sample concentrations must fall within range	J values over range	20

EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	Cooler Temperature 4°C ±2°C Preservation: Method Specific	Use Professional Judgment to qualify based to qualify for coole temp outliers J(+)/UJ(-) if preservation requirements not met	1
Holding Time	Method Specific	Professional Judgment J(+)/UJ(-) if holding time exceeded J(+)/R(-) if HT exceeded by > 3X	1
Initial Calibration	Method specific r>0.995	Use professional judgment J(+)/UJ(-) for r < 0.995	5A
Initial Calibration Verification (ICV)	Where applicable to method Independent source analyzed immediately after calibration %R method specific, usually 90% - 110%	R(+/-) if %R significantly < LCL J(+)/UJ(-) if %R < LCL J(+) if %R > UCL R(+) if %R significantly > UCL	5A
Continuing Cal Verification (CCV)	Where applicable to method Every ten samples, immed. following ICV/ICB and end of run %R method specific, usually 90% - 110%	R(+/-) if %R significantly < LCL J(+)/UJ(-) if %R < LCL J(+) if %R > UCL R(+) if %R significantly > UCL	5B

Initial and Continuing Cal Blanks (ICB/CCB)	Where applicable to method
	After each ICV and CCV every ten samples and end of run
	| blank| < MDL
		Action level is 5x absolute value of blank conc.
		For (+) blanks, U(+) results < action level
		For (-) blanks, J(+)/UJ(-) results < action level
		refer to TM-02 for additional details
			7

Method Blank	One per matrix per batch
	(not to exceed 20 samples)
	blank < MDL
		Action level is 5x absolute value of blank conc.
		For (+) blk value, U(+) results < action level
		For (-) blk value, J(+)/UJ(-) results < action level
			7

Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Matrix Spike	One per matrix per batch; 5% frequency 75-125% for samples less than 4 x spike level	J(+) if %R > 125% or < 75% UJ(-) if %R = 30-74% R(+/-) results < IDL if %R < 30%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x RL Diff <RL for samples >RL and <5 x RL (may use RPD < 35%, Diff < 2X RL for solids)	J(+)/UJ(-) if RPD > 20% or diff > RL all samples in batch	9

EcoChem Validation Guidelines for Conventional Chemistry Analysis (Based on EPA Standard Methods)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Field Blank	blank < MDL	Action level is 5x blank conc. U(+) sample values < action level in associated field samples only	6
Field Duplicate	For results > 5X RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff<RL Solid: Diff < 2X RL	J(+)/UJ(-) in parent samples only	9

EcoChem, INC.
Environmental Data Quality

APPENDIX B
QUALIFIED DATA SUMMARY TABLE

Qualified Data Summary Table
Lora Lake Apartments RI/FS 2nd Quarter 2011 Groundwater Monitoring

SDG	Sample ID	Laboratory ID	Method	Analyte	Result	Units	Lab Qual	DV Qual	DV Reason
SU73	MW-01-042911	11-9762-SU73A	SW8270D SIM	Benzo(a)pyrene	0.0057	ug/L	J	J	10
SU73	MW-01-042911-D	11-9763-SU73B	SW8270D SIM	Benzo(a)pyrene	0.0086	ug/L	J	J	10
SU74	B312-042911	11-9772-SU74A	SW8270D SIM	Benzo(a)pyrene	0.01	ug/L	U	UJ	10
SU74	B310-042911	11-9773-SU74B	SW8270D SIM	Benzo(a)pyrene	0.01	ug/L	U	UJ	10
SU74	B311-042911	11-9774-SU74C	SW8270D SIM	Benzo(a)pyrene	0.01	ug/L	U	UJ	10
6734	LL-HA2-0-0.5-041811	6734-003-SA	EPA 1613 D/F	2,3,4,6,7,8-HxCDF	24.3	pg/g		J	13
6739	MW13-042611	6739-003-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDD	2.96	pg/L	U	UJ	13
6739	MW13-042611	6739-003-SA	EPA 1613 D/F	1,2,3,6,7,8-HxCDF	1.55	pg/L	U	UJ	13
6739	MW13-042611	6739-003-SA	EPA 1613 D/F	1,2,3,7,8-PeCDD	1.78	pg/L	U	UJ	13
6739	MW13-042611	6739-003-SA	EPA 1613 D/F	1,2,3,7,8-PeCDF	1.5	pg/L	U	UJ	13
6739	MW13-042611	6739-003-SA	EPA 1613 D/F	2,3,4,7,8-PeCDF	1.56	pg/L	U	UJ	13
6739	MW13-042611	6739-003-SA	EPA 1613 D/F	OCDF	3.04	pg/L	U	UJ	13
6742	MW5042811	6742-001-SA	EPA 1613 D/F	OCDF	10.6	pg/L	J	J	13
6742	MW4042811	6742-002-SA	EPA 1613 D/F	1,2,3,4,7,8,9-HpCDF	1.94	pg/L	U	UJ	13
6742	MW4042811	6742-002-SA	EPA 1613 D/F	OCDD	66.9	pg/L		J	13
6742	MW4042811	6742-002-SA	EPA 1613 D/F	OCDF	6.5	pg/L	U	UJ	13
6742	MW14042811	6742-003-SA	EPA 1613 D/F	OCDF	2.59	pg/L	U	UJ	13
6743	MW-01-042911	6743-001-SA	EPA 1613 D/F	Total HxCDF	183	pg/L	D,M	J	14
6743	MW-01-042911	6743-001-SA	EPA 1613 D/F	Total PeCDF	547	pg/L	D,M	J	14
6743	MW-01-042911	6743-001-SA	EPA 1613 D/F	Total TCDF	333	pg/L	D,M	J	14
6743	MW-01-042911-D	6743-002-SA	EPA 1613 D/F	Total HxCDF	103	pg/L	D,M	J	14
6743	MW-01-042911-D	6743-002-SA	EPA 1613 D/F	Total PeCDF	508	pg/L	D,M	J	14
6743	MW-01-042911-D	6743-002-SA	EPA 1613 D/F	Total TCDF	248	pg/L	D,M	J	14
6744	B312-042911	6744-001-SA	EPA 1613 D/F	OCDF	4	pg/L	U	UJ	13

Port of Seattle
Lora Lake Apartments Site

Remedial Investigation/ Feasibility Study

Volume II

Appendix F
Lora Lake Apartments Parcel Remedial Investigation Data Report

Attachment F.5
Groundwater Sampling Collection Forms

FINAL

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-01 Date of Collection: 8/13/10

Field Personnel: MM, AM

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): ~0.33 L/min

Well Damage Description: _____ Purge Rate Comments: turned down rate after about

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): 1.8L to avoid drawdown

Depth of water (from top of well casing): 17.38' Time: 12:40 Well Casing Type/Diameter: _____

After 5 minutes of purging (from top of casing): _____

Begin purge (time): 13:04

End purge (time): 13:17

Gallons purged: ~1.75

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/cm)	Turbidity (NTU)	Temp (C/F) circle one	Comments/Meters ORP	DTW
13:04	0.5L	1.22	3.28	1.092	18.8NTU	18.84	-131.8	17.70
13:08	~1.8L	1.93	0.23	1.082	9.55	15.87	-132.6	17.80
13:11	~2.8L	1.86	0.00	1.089	3.89	15.41	-129.4	18.15
13:14	~3.5L	1.84	0.00	1.089	1.67	15.35	-132.4	18.33
13:17	~4.0L	1.75	0.00	1.092	1.04	15.47	-135.3	18.39

Sampling Data

Sample No: MW-01-081310 Location and Depth: MW-01, @ 19' btoc

Date Collected (mo/dy/yr): 8/13/10 Time Collected: 13:30 ☐ AM ☒ PM Weather: Sunny

Type: ☒ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☒ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: peristaltic

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear, slight - mod HC odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
Dioxin	2x 1L Amb	-	
DX, TPH, cPAH	5x .5L Amb	-	
Metals, pH	2x .5L Poly	-	low vol. for pH anal.
TSS	1x 1L. poly	-	
VOCs, BETX, GX	6x VOAs	HCl	

Additional Containers etc: _____

Additional Information

Duplicate Samples: _____

Comments (Calculations, etc.): well purged dry during sample collection

Signature: _____ Date: 8/13/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-2 Date of Collection: 8/11/10

Field Personnel: K. Andersen, M. McCullough

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): ~ 1/4 (0.25)

Well Damage Description: none Purge Rate Comments:

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 1.02 gal

Depth of water (from top of well casing): 7.36 ft Time: 10:25 Well Casing Type/Diameter: 2" Sch. 40 PVC

After 5 minutes of purging (from top of casing): 7.42 ft

Begin purge (time): 10:25

End purge (time): 10:50

Gallons purged: ~1.5 gal.

Purge water disposal method: Ground ☐ Other ☒ drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (C/F) circle one	ORP	Comments/Meters	DTW (ft)
10:30	~½ L	6.30	8.49	0.301	6.22	14.58	4.9	VERY clear!	7.42
10:35	~2 ½ L	5.93	7.09	0.295	6.17	13.96	16.4		7.42
10:40	~~2 ½~~ L	5.93	7.26	0.295	4.22	13.92	20.8		7.42
10:45	~~3 ½~~ L	5.93	7.20	0.293	4.97	13.84	24.8		7.42
10:50	~4.3/4 L	5.93	7.30	0.293	1.90	13.64	27.4		7.43

Sampling Data

Sample No: MW-02-081110 Location and Depth: MW-2, 10 ft

Date Collected (mo/dy/yr): 8/11/10 Time Collected: 10:55 ☒ AM ☐ PM Weather: Sunny, 75°

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: disposable tubing - Poly + Silicone

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
PAH/PCP	3x 500 mL amber		
TPH-Dx	3x 500 mL amber		
BETX + TPH-g	2x 40 mL VOA	HCl	
VOC	9x 40mL VOA	HCl	
metals	1x 500 mL HDPE	~~HNO3~~ ONA	
pH	1x 500 mL HDPE		

Additional Containers etc: dioxin (2x 1L amber) TSS (1x 1L HDPE)

Additional Information

Duplicate Samples: none

Comments (Calculations, etc.):

Signature: Date: 8/11/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-3 Date of Collection: 8/11/10

Field Personnel: K. Anderson, M. McCullough

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): ~1/3 L/min

Well Damage Description: n/a Purge Rate Comments:

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 0.85 13-23 ft Screen

Depth of water (from top of well casing): 18.22 ft Time: 1220 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 18.43

Begin purge (time): 1220

End purge (time): ~~1300~~ 1200

Gallons purged: ~~~~ ~1 3/4

Purge water disposal method: Ground ☐ Other ☒

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (C) (F) circle one	ORP	Comments/Meters	DTW
1225	1 2/3 L	6.38	4.68	0.244	~~5.99~~	15.43	-37.4	VERY clear	18.43
1230	3 ~~3/4~~ L	6.63	3.45	0.247	~~3.33~~ 4.16	14.94	-25.4		18.43
1235	3 3/4 L	6.66	3.29	0.248	2.48	14.82	-20.2		18.46
1240	4 1/2 L	6.66	3.62	0.249	1.09	14.70	-9.3		18.47
1245	5 1/2 L	6.62	3.97	0.249	1.76	14.70	-5.1		18.47
~~1250~~	~~7~~	~~6.90~~	~~4.09~~	~~0.250~~	0.85	14.59	-13.7		18.48

Sampling Data

Sample No: MW-03-083110 Location and Depth: MW-3 / 8 ft

Date Collected (mo/dy/yr): 8/11/10 Time Collected: 1300 ☐ AM ☒ PM Weather: sunny, ~75° F

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: disposable tubing - poly + silicone

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
cPAH/PCP	3 x 500mL amber		
TPH - Dx	2 x 500 mL amber		
BETX + TPH-g	2 x 40mL VOA	HCl	
VOC	4 x 40mL VOA	HCl	
metals	1 x 500 mL HDPE		
pH	1 x 500 mL HDPE		

Additional Containers etc: Dioxin (2x 1L amber) TSS (1x 1L HDPE)

Additional Information

Duplicate Samples: MW-03-083110-D (collected ~~1455~~ 1305)

Comments (Calculations, etc.):

Signature: Date: 8/11/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-4 Date of Collection: 8/11/10

Field Personnel: K. Anderson, M. McCullough

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): ~1/2 L/min

Well Damage Description: n/a Purge Rate Comments:

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 1.35 gal

Depth of water (from top of well casing): 16.88 ft Time: 1415 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 17.06

Begin purge (time): 1420

End purge (time): 14:45

Gallons purged: ~2 gal.

Purge water disposal method: Ground ☐ Other ☒

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (°C/°F) circle one	ORP	Comments/Meters	DTW (ft)
1425	~2L	6.79	1.39	0.207	-1.58	14.37	-64.7	VERY clear!	17.06
1430	~3L	6.91	0.55	0.209	1.22	13.83	-61.7		17.04
1435	~4.5L	6.97	0.92	0.213	0.47	13.80	-57.3		17.05
1440	~5½L	7.18	1.27	0.217	1.20	13.81	-59.3		17.04
1445	~7L	7.13	1.33	0.224	-1.99	13.76	-53.6		17.03

Sampling Data

Sample No: MW-04-081110 Location and Depth: MW-4 / 21 ft below TOC

Date Collected (mo/dy/yr): 8/11/10 Time Collected: 1450 ☐ AM ☒ PM Weather: sunny, ~70 °F

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: disposable tubing - poly + silicone

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
cPAH/PCP	3 x 500mL	amber	
TPH - Dx	2 x 500 mL	amber	
BETX+ TPH-g	2 x 40 mL VOA	HCl	
VOC	4 x 40mL VOA	HCl	
Metals (diss)	1 x 500 mL HDPE		
TSS	1 x 500 mL HDPE		

Additional Containers etc: dioxin (2 x 1L amber) TSS (1 x 1L HDPE)

Additional Information

Duplicate Samples: n/a

Comments (Calculations, etc.):

Signature: Date: 8/11/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-05

Date of Collection: 8/13/10

Field Personnel: MM, AM

Well Purge Data

Well Condition: good Secure: ☑ Yes ☐ No Purge Rate (L/min): ~0.3 L/min

Well Damage Description: _____ Purge Rate Comments: _____

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): _____

Depth of water (from top of well casing): 21.00 Time: 14:15 Well Casing Type/Diameter: _____

After 5 minutes of purging (from top of casing): _____

Begin purge (time): 14:29

End purge (time): 14:45

Gallons purged: ~1.3 gal

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (C)(F) circle one	Comments/Meters ORP	DTW
14:33	0.5L	6.50	0.00	0.595	2.70	18.36	-84.7	21.12
14:36	~1.4L	6.76	0.00	0.577	3.38	15.51	-97.6	20.98
14:39	~2.5L	7.10	0.00	0.574	3.07	14.83	-105.7	21.08
14:42	~3.4L	7.31	0.00	0.572	2.64	14.68	-110.1	21.08

Sampling Data

Sample No: MW-05-081310 Location and Depth: MW-05, 24' btoc

Date Collected (mo/dy/yr): 8/13/10 Time Collected: 14:45 ☐ AM ☑ PM Weather: sunny

Type: ☐ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☒ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: peristaltic

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear, hydrocarbon odor

Sample Description After Purge/During Sample Collection: _____

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
Dioxin	2x 1L amber	—	
CPAH, PCP, PX	5x 0.5L amber	—	
metals, pH	2x 0.5 poly	—	
TSS	1x 1L poly		
VOCs BETX, Gx	6x VOA	HCl	

Additional Containers etc: _____

Additional Information

Duplicate Samples: _____

Comments (Calculations, etc.): _____

Signature: _____ Date: 8/13/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-6 Date of Collection: 8/12/10

Field Personnel: MM TS

Well Purge Data

Well Condition: Good Secure: ☒ Yes ☐ No Purge Rate (L/min): _____

Well Damage Description: lock, sl. loose Purge Rate Comments: _____

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): _____

Depth of water (from top of well casing): 14.35 Time: 10:50 Well Casing Type/Diameter: _____

After 5 minutes of purging (from top of casing): 14.72

Begin purge (time): 10:50

End purge (time): 11:30

Gallons purged: _____

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (C°/F°) circle one	Comments/Meters
	.5L	–	–	–	125	–	Insufficient volume, Collected for Dx only – no purge.

Sampling Data

Sample No: MW-06-081210 Location and Depth: MW-6

Date Collected (mo/dy/yr): 8/12/10 Time Collected: 11:30 ☒ AM ☐ PM Weather: clear, sunny

Type: ☒ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☐ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: peristaltic

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): sl. yellow color, no odor, slightly turbid (125 NTU)

Sample Description After Purge/During Sample Collection: _____

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
TPH-Dx	1 x 5 L A	–	Collected 1 bottle for Dx – Did not collect water quality – ~.5L purged prior to sample, turbidity only 125 NTU – Pumped dry after .3 L. collected allowed to regrow, then collected additional .25 L.

Additional Containers etc: _____

Additional Information

Duplicate Samples: _____

Comments (Calculations, etc.): Total depth = 14.85 → .5 ft H_2O – insufficient H_2O to well to fill tubing – Cannot collect sample – Collected 1 jar for potential DX

Signature: _____ Date: 8/12/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-07 Date of Collection: 8/13/10

Field Personnel: M.M, AM

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): .4 L/m.

Well Damage Description: _____ Purge Rate Comments: –

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): .88 gal

Depth of water (from top of well casing): 14.80' Time: 11:05 Well Casing Type/Diameter: 2" Sch 40 PVC

After 5 minutes of purging (from top of casing): 14.98'

Begin purge (time): 11:07

End purge (time): 11:23

Gallons purged: ~1.75 gal.

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity ~~(mc/m)~~ mS/cm	Turbidity (NTU)	Temp (C°/F°) circle one	ORP	Comments/Meters DTW
11:10	1.2 L.	8.47	0.70	0.312	2.52	17.27	-106.7	14.98
11:13	2.4 L.	8.49	0.0	0.312	1.87	16.42	-107.3	14.98
11:16	3.6 L.	8.19	0.0	0.312	0.58	16.15	-109.2	14.99
11:19	4.8 L.	7.97	0.0	0.312	0.47	16.04	-109.3	14.99'
11:22	6.0 L.	7.86	0.0	0.311	0.47	16.04	-108.6	15.01'

Sampling Data

Sample No: MW-07-081310 Location and Depth: MW-07, 20' btoc

Date Collected (mo/dy/yr): 8/13/10 Time Collected: 11:23 ☒ AM ☐ PM Weather: sunny, 75°

Type: ☒ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☒ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: peristaltic

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no turb., slight-mod sulfur-like dsl petroleum odor.

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
Dioxin	2x 1L Amb	–	
cPAH, PCP, DX	5x .5L Amb	–	
VOCs, BETX, GX	6x 40ML	HCL	
PH	.5L poly	–	
Metals	.5L poly	–	
TSS	1L poly	–	

Additional Containers etc: _____

Additional Information

Duplicate Samples: _____

Comments (Calculations, etc.): TD=25'

Signature: _____ Date: 8/13/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-08 Date of Collection: 8/13/10

Field Personnel: MM, AM

Well Purge Data

Well Condition: _____ Secure: ☐ Yes ☐ No Purge Rate (L/min): 0.5L/min

Well Damage Description: _____ Purge Rate Comments: _____

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): _____

Depth of water (from top of well casing): 10.58 Time: 9:29 Well Casing Type/Diameter: _____

After 5 minutes of purging (from top of casing): _____

Begin purge (time): 09:37

End purge (time): 9:56

Gallons purged: ~4 gallons

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity ~~(mc/m)~~ mS/cm	Turbidity (NTU)	Temp (C°/F°) circle one	ORP Comments/Meters	DTW
9:38	1L	6.83	5.14	0.303	0.48	17.09	-24.3	11.20
9:41	3L	6.76	3.24	0.304	3.55	14.71	-11.9	11.25
9:44	4.5L	6.86	2.81	0.304	3.64	14.78	-4.7	11.34
9:47	6.0L	6.95	2.51	0.300	8.84	14.63	-3.0	11.40
9:50	7.5L	7.02	2.30	0.310	8.59	14.69	-2.25	11.44

Sampling Data

Sample No: MW-08-081310 Location and Depth: MW-08, 20' btoc

Date Collected (mo/dy/yr): 8/13/10 Time Collected: 10:00 ☑ AM ☐ PM Weather: Sunny

Type: ☒ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☒ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: peristaltic

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no turb, no odor

Sample Description After Purge/During Sample Collection: _____

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
Dioxin	4 x 1L amber	-	ms/msD - extra jars
cPAH, PCP, Dx	10 x 0.5L amber	-	ms/msD - extra jars
VOCs, BTEX, GX	18 x VOA	HCL	ms/msD - extra VOA
pH	0.5L poly	-	
metals	2 x 0.5L poly	-	ms/msD - extra jar
TSS	1L poly	-	

Additional Containers etc: _____

Additional Information

Duplicate Samples: _____

Comments (Calculations, etc.): TD = 25'

Signature: _____ Date: 8/13/10

Time	Vol	pH	DO (mg/L)	Cond (ms/cm)	Turb. NTU	Temp	ORP	DTW
9:53	9L	7.21	2.13	0.311	5.66	14.63	-5.9	11.5
9:56	10.5	7.36	1.93	0.313	4.70	14.59	-8.9	11.53

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-9 Date of Collection: 8/12/10

Field Personnel: MM TS

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): 0.5 L/min

Well Damage Description: none Purge Rate Comments: none

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): [redacted]

Depth of water (from top of well casing): 13.05 Time: 1428 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 13.13

Begin purge (time): 1633

End purge (time): 1642

Gallons purged: 1 gal

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (~~mS/cm~~ mS/cm)	Turbidity (NTU)	Temp (C/F) circle one	ORP	Comments/Meters
1634	0.5L	7.45	1.33	0.378	4.89	18.33	-62.9	13.13
1638	2.5L	7.65	0	0.370	2.51	16.86	-47.0	13.08
1642	4.5L	7.23	0	0.367		17.72	-37.5	

Sampling Data

Sample No: — Location and Depth: MW-9, 17'

Date Collected (mo/dy/yr): Time Collected: ☐ AM ☐ PM Weather:

Type: ☐ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☐ Unfiltered Other:

Sample Collected with: ☐ Bailer ☐ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure:

Initial Sample Description (Color, Turbidity, Odor, Other):

Sample Description After Purge/During Sample Collection:

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations

Additional Containers etc: No Sample Collected

Additional Information

Duplicate Samples:

Comments (Calculations, etc.): on peristaltic pump

Battery died. Stopped purging

Signature: [signature] Date: 8/12/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-09 Date of Collection: 8/13/10

Field Personnel: M.M, AM

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): .5L/m

Well Damage Description: Purge Rate Comments:

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 13.10 Time: 08:20 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 13.10

Begin purge (time): 08:34

End purge (time): 08:53

Gallons purged: 2 gal.

Purge water disposal method: Ground ☐ Other ☒

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity ~~(ms/m)~~ mS/cm	Turbidity (NTU)	Temp (C°/F°) circle one	Comments/Meters ORP	PTW
08:39	1L.	8.06	3.53	0.437	1.67	16.91	7.7	13.10'
08:42	2.5L.	6.87	0.74	0.403	0.64	15.81	0.5	13.11'
08:45	4.5L.	6.76	0.29	0.394	1.45	15.62	-4.1	13.16'
08:48	5.5L.	6.76	0.09	0.390	0.71	15.48	-11.5	13.10'
08:51	7L.	6.71	0	0.386	0.71	15.51	-16	13.10'

Sampling Data

Sample No: MW-09-08/3/10 Location and Depth: MW-09, 17' btoc

Date Collected (mo/dy/yr): 8/13/10 Time Collected: 08:53 ☒ AM ☐ PM Weather: Sunny

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: peristaltic Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: -disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear.

Sample Description After Purge/During Sample Collection: clear.

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
PCB, cPAH, DX	5x .5L AG	-	
Dioxin	2x 1L. AG	-	
TPH Gx/VOCs, BTEX	6 v 40mL VOA	HCl	
TSS 1x	1L Poly	-	
pH, metals 2x	.5L poly	-	

Additional Containers etc:

Additional Information

Duplicate Samples:

Comments (Calculations, etc.):

Signature: Date: 8/13/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-10 Date of Collection: 8/12/10

Field Personnel: TS MM

Well Purge Data

Well Condition: good Secure: ☐ Yes ☒ No Purge Rate (L/min): 0.3 L/min

Well Damage Description: j-plg to tight + locked off well. Purge Rate Comments: none

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 1.054 gal

Depth of water (from top of well casing): 13.78' Time: 14:55 Well Casing Type/Diameter: 2" Sch 40 PVC

After 5 minutes of purging (from top of casing): 13.81

Begin purge (time): 15:15

End purge (time): 1540

Gallons purged: 3 gal

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (~~ms/cm~~ ms/cm)	Turbidity (NTU)	Temp (C/F) circle one	ORP	Comments/Meters DTW
1518	1 L	6.66	1.53	0.258	0.29	15.77	5.5	13.81
1523	2.5L	6.81	1.61	0.259		15.37	1.0	13.82
1528	4L	6.93	1.57	0.259	6.54	15.32	-3.2	13.81
1533	5.5L	7.11	1.50	0.259	0.77	15.34	-46.4	13.82
1538	7L	6.99	1.44	0.260	<1	15.39	-25.8	13.82

Sampling Data

Sample No: MW10-081210 Location and Depth: MW-10, 16.6' btoc

Date Collected (mo/dy/yr): 8/12/10 Time Collected: 15:40 ☐ AM ☒ PM Weather: Clear Sunny, 80°F

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear no odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
PCP, cPAH, DX	5x .5L Amber	—	
Dioxin	2x 1L Amber	—	
VOCs, Gx, BTEX	6x VOAs	HCL	
TSS	1L Poly	—	
pH	.5L poly	—	
Metals	.5L poly	—	

Additional Containers etc:

Additional Information

Duplicate Samples:

Comments (Calculations, etc.): 6.2' H_2O

Signature: Tricia Stevens Date: 8/12/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-11 Date of Collection: 8/12/10

Field Personnel: TS MM

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): 0.3 L/m

Well Damage Description: none J-cap loose Purge Rate Comments:

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): 1.36 gal.

Depth of water (from top of well casing): 11.42' Time: 1340 Well Casing Type/Diameter: 2" sch 40 PVC

After 5 minutes of purging (from top of casing): 11.5'

Begin purge (time): 1350

End purge (time): 1415

Gallons purged: ~2 gal.

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity ~~(ms/m)~~ mS/cm	Turbidity (NTU)	Temp (C/F) circle one	ORP	Comments/Meters	DTW
1354	1 L	6.51	1.19	0.193	3.77	18.07	-74.0		11.50'
1359	2.5 L	6.28	0.51	0.193	1.43	17.54	-55.4		11.53'
1404	4 L	6.21	0.38	0.193	1.84	17.45	-41.4		11.51'
1409	5.5 L	6.17	0.16	0.192	1.15	17.46	-35.9		11.52'
1414	7 L	6.14	0.05	0.192	0.95	17.46	-30.8		11.52'

Sampling Data

Sample No: MW-11-081210 Location and Depth: MW-11, 15' btoc

Date Collected (mo/dy/yr): Time Collected: 14:30 ☐ AM ☒ PM Weather: Sunny - 78°

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: disposable

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Description After Purge/During Sample Collection: Same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
PCP, cPAHs, Dx	5x .5L Amb.	-	
Dioxin	2x 1.0L Amb.	-	
VOCs, GX, BETX	6x VOAs	HCl	
TSS	1L. Poly	-	
pH	.5L. Poly	-	
Metals	.5L poly	-	

Additional Containers etc:

Additional Information

Duplicate Samples:

Comments (Calculations, etc.):

Signature: Date: 8/12/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-12

Date of Collection: 8/12/10

Field Personnel: M.M. / T.S.

Well Purge Data

Well Condition: good- new Secure: ☒ Yes ☐ No Purge Rate (L/min): .3 L/m.

Well Damage Description: none Purge Rate Comments: TD=16'

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 1.36 gal.

Depth of water (from top of well casing): 8.15 Time: 09:12 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing):

Begin purge (time): 09:40

End purge (time): 10:00

Gallons purged: 2 gal.

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	(0.17)	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (C/F) circle one	ORP	Comments/Meters	DTW
09:40	.5L.	8.51	5.46	0.429		12.94	-93.7		8.41'
09:46	2L.	6.76	2.22	0.420	0.57	12.49	-38.7		8.65'
09:50	3.5L.	6.84	1.80	0.419	0.65	12.41	-31.7		8.71'
09:55	5L.	6.88	1.58	0.417	0.40	12.32	-28.0		8.78'
10:00	6.5L	6.89	1.50	0.417	0.60	12.28	-26.1		8.83

Sampling Data

Sample No: MW-12-081210 Location and Depth: MW-12, 12' btoc

Date Collected (mo/dy/yr): 8/12/10 Time Collected: 10:15 ☒ AM ☐ PM Weather: overcast, 65°

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: peristaltic

Sample Decon Procedure: disposable poly + ~~tef~~ silicon tubing

Initial Sample Description (Color, Turbidity, Odor, Other): v. clear, no odor.

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
cPAH / PCP	3x .5L Amber	~~HCl~~	
TPH-Dx	2x .5L Amb	—	
TPH-Gx + BETX	2x 40ml VOA	HCl	
VOCs	4x VOAs	HCl	
Metals	1x .5L Poly	—	
TSS	1x 1L Poly	—	

Additional Containers etc: pH - 1x.5L Poly Dioxin - 2x 1L. Amber

Additional Information

Duplicate Samples: —

Comments (Calculations, etc.): —

Signature: Date: 8/12/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-13 Date of Collection: 8/12/10

Field Personnel: TS MM

Well Purge Data

Well Condition: good Secure: ☒ Yes ☐ No Purge Rate (L/min): .3 L/m.

Well Damage Description: None Needs lock Purge Rate Comments:

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): 1.36 gal.

Depth of water (from top of well casing): 12.17' Time: 11:35 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing):

Begin purge (time): 11:40

End purge (time): 12:04

Gallons purged: ~2 gal

Purge water disposal method: Ground ☐ Other ☒ Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity ~~mS/m~~ mS/cm	Turbidity (NTU)	Temp (C°/F°) circle one	ORP Comments/Meters	DTW
11:40	.5L.	7.96	4.44	tot. 2.05		13.47	-72	12.32'
11:47	2L.	6.64	1.56	0.210	0.77	12.94	-24.2	12.31'
11:52	3.5L.	6.60	1.00	0.213	1.14	13.03	-16.0	12.32'
11:57	5L	6.60	0.85	0.216	1.15	13.00	-13.3	12.30
12:02	6.5L	6.61	0.77	0.218	0.99	13.14	-9.6	12.31

Sampling Data

Sample No: MW-13-081210 Location and Depth: MW-13, 16' BTOC

Date Collected (mo/dy/yr): 8/12/10 Time Collected: 12:05 ☐ AM ☒ PM Weather: Sunny, 75°

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: peristaltic Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: dispos. Poly + silicon

Sample Decon Procedure: none needed

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
PCP, cPAH, DX	.5L. Amber	—	x 5 bottles
Dioxin	2x 1L. Amb.	—	
VOCs, Gx, BETX	6x VOA	HCl	
pH, Metals	2x .5L Poly	—	
TSS	1x 1L. Poly	—	

Additional Containers etc:

Additional Information

Duplicate Samples: —

Comments (Calculations, etc.):

Signature: Date: 8/12/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-14 Date of Collection: 8/11/10

Field Personnel: L. Anderson, M. McCullough

Well Purge Data

Well Condition: good - new Secure: ☒ Yes ☐ No Purge Rate (L/min): 1/3 2 L/min

Well Damage Description: none Purge Rate Comments: none

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): 1.19 gal

Depth of water (from top of well casing): 16.70 Time: 15:35 Well Casing Type/Diameter: 2" PVC / screen 10-23ft

After 5 minutes of purging (from top of casing): 15.71

Begin purge (time): 15:40

End purge (time): 16 05

Gallons purged: ~2 3/8

Purge water disposal method: Ground ☐ Other ☒ drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (C°F) circle one	ORP Comments/Meters	DTW (ft)
1543	~1 L	6.66	8.72	0.242		15.11	9.5 VERY clear!	15.71
1550	~2 3/4 L	6.41	8.02	0.248	0.74	14.74	28.9	15.72
1555	~4 L	6.40	7.84	0.247	-0.86	14.68	36.5	15.71
1600	~5 L	6.40	7.91	0.246	-1.63	14.76	42.1	15.71
1605	~6 1/2 L	6.4	7.46	0.247	-1.78	14.73	48.2	15.72

Sampling Data

Sample No: MW-14-081110 Location and Depth: MW-14 / 19ft

Date Collected (mo/dy/yr): 8/11/10 Time Collected: 1610 ☐ AM ☒ PM Weather: sunny, ~70°F

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: disposable tubing - poly + silicone

Initial Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Description After Purge/During Sample Collection: same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
cPAH / PCP	3 x 500 mL	amber	
TPH - Dx	2 x 500 mL	amber	
BTEX + TPH-g	2x 40mL VOA	HCl	
VOC	4x 40 mL VOA	HCl	
Metals	1 x 500 mL	HDPE	
pH	1 x 500ml	HDPE	

Additional Containers etc: dioxin (2x 1L amber), TSS (1x 1L HDPE)

Additional Information

Duplicate Samples:

Comments (Calculations, etc.):

Signature: Date: 8/11/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-15 Date of Collection: 9/13/10

Field Personnel: M. McCullough, A. McKay

Well Purge Data

Well Condition: good - new Secure: ☒ Yes ☐ No needs lock

Well Damage Description:

Purge Rate (L/min): 0.15 L/m

Purge Rate Comments: slowed rate to reduce drawdown

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No

One Casing Volume (gal): TD = 56.2', 6.5 gal

Depth of water (from top of well casing): 17.93' Time: 11:45

Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 18.9'

Begin purge (time): 12:50

End purge (time): 14:02

Gallons purged: 9.75 LITERS

Purge water disposal method: Ground ☐ Other ☒ Drummed

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (~~mS/m~~) mS/cm	Turbidity (NTU)	Temp (C/F) circle one	ORP Comments/Meters	DTW
13:02	1.25L	8.20	2.16	0.299	>9000	14.7	-191	18.9'
13:12	2.25L	8.06	0.81	0.243	837	14.29	-209	20.3'
13:17	3.0 L.	8.46	0.00	0.226	567	14.25	-226	20.95'
13:22	3.75L	8.36	1.75	0.212	293	14.58	-192.4	21.60'
13:27	4.5L	8.44	0.00	0.213	269	14.20	-224.4	22.10'

→ cont.

Sampling Data

Sample No: MW 15 - 091310 Location and Depth: MW-15, 0.9' above well bottom - 55.3' BTOC

Date Collected (mo/dy/yr): 09/13/10 Time Collected: 14:02 ☐ AM ☒ PM Weather: overcast

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Bladder Made of: ☒ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: alconox/H2O wash, DI rinse + disposable bladder/tubing

Initial Sample Description (Color, Turbidity, Odor, Other): v. turbid, reduced w/ purge - sample slightly turbid, no settled solids, slight to mod. HC odor, no sheen

Sample Description After Purge/During Sample Collection:

Sample Analyses

Analytes		Containers	Preservatives	Any Noted Deviations
PCP	2x	.5L AG	–	
VOCs		6x 40mL VOA	HCl	
CPAH	2x	.5L AG	–	collected + held for potential analy.
TPH-Dx	2x	.5L AG	–	collected + held for potential analy.
pH	1x	.5L Poly	–	
TSS	1x	1L Poly	–	

Additional Containers etc:

Additional Information

Duplicate Samples:

Comments (Calculations, etc.):

Signature: Date: 9/13/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-15 Cont

Date of Collection: _____

Field Personnel: _____

Well Purge Data

Well Condition: _____ Secure: ☐ Yes ☐ No Purge Rate (L/min): _____

Well Damage Description: _____ Purge Rate Comments: _____

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): _____

Depth of water (from top of well casing): _____ Time: _____ Well Casing Type/Diameter: _____

After 5 minutes of purging (from top of casing): _____

Begin purge (time): _____

End purge (time): _____

Gallons purged: _____

Purge water disposal method: Ground ☐ Other ☐

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (~~mS/cm~~ mS/cm)	Turbidity (NTU)	Temp (C/F) circle one	ORP	Comments/Meters DTW
13:32	5.25L.	8.48	0	0.211	218	14.17	-230.2	22.35'
13:37	6 L	8.86	0	0.207	211	14.11	-239.6	22.9'
13:42	6.75L.	8.54	0	0.208	151	14.14	-240.7	23.1'
13:47	7.5L.	8.49	0	0.207	114	14.13	-244	23.4'
13:52	8.25L.	8.46	0	0.206	99	14.08	-244	23.6'
13:57	9.0L.	8.40	0	0.205	73.6	14.09	-249.3	23.7'

Sampling Data

14:02	9.75L.	8.36	0	0.204	65.9	14.08	-251.3	23.8'

Sample No: _____ Location and Depth: _____

Date Collected (mo/dy/yr): _____ Time Collected: _____ ☐ AM ☐ PM Weather: _____

Type: ☐ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☐ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☐ Pump Other: _____ Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon Other: _____

Sample Decon Procedure: _____

Initial Sample Description (Color, Turbidity, Odor, Other): _____

Sample Description After Purge/During Sample Collection: _____

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations

Additional Containers etc: _____

Additional Information

Duplicate Samples:

Comments (Calculations, etc.):

Signature: _____ **Date:** _____

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-16 Date of Collection: 9/13/10

Field Personnel: M. McCullough, A. McKay

Well Purge Data

Well Condition: good, new Secure: ☒ Yes ☐ No Purge Rate (L/min): 0.3 L/m

Well Damage Description: needs lock Purge Rate Comments: –

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): TD = 42.60, 5.3 gal

Depth of water (from top of well casing): 11.54' Time: 16:10 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 11.84'

Begin purge (time): 16:10

End purge (time): 16:25

Gallons purged: 4.1 LITERS

Purge water disposal method: Ground ☐ Other ☒ Drummed

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/cm)	Turbidity (NTU)	Temp (°F) circle one	ORP	Comments/Meters	DTW
16:13	0.5L	7.83	2.83	0.294	38.0	16.44	-116.7		11.84
16:18	2.1L	8.30	0.75	0.302	22.7	14.40	-171.2		11.92
16:21	3.1L	8.33	0.31	0.303	14.4	14.24	-165.2		11.90
16:24	4.1L	8.23	0.68	0.302	8.12	14.14	-141.0		11.88

Sampling Data

Sample No: MW16-091310 Location and Depth: MW-16, @ 40' BTOC

Date Collected (mo/dy/yr): 9/13/10 Time Collected: 16:30 ☐ AM ☒ PM Weather: overcast

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Bladder Made of: ☒ Stainless Steel ☐ PVC ☐ Teflon Other: disp. bladders

Sample Decon Procedure: Alconox + H2O wash, DI rinse, disposable bladders/tubing

Initial Sample Description (Color, Turbidity, Odor, Other): clear, slt. odor, no sheen

Sample Description After Purge/During Sample Collection: Same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
cPAH	2x-5L AG	–	
TPH-Dx	2x .5L AG	–	
PCP	2x .5L AG	–	
VOCs	6x 40mL VOA	HCl	
TSS	1x 1L Poly	–	
pH	1x 0.5L Poly	–	

Additional Containers etc:

Additional Information

Duplicate Samples: MW16-091310-D

Comments (Calculations, etc.): Same sample kit/lot as parent, time 16:30

Signature: Date: 9/13/10

GROUNDWATER SAMPLE COLLECTION FORM

ATTACHMENT B.4

Lora Lake Apartments RI Supplemental Site Investigation

Well ID: MW-17 Date of Collection: 9/13/10

Field Personnel: Maya McCullough, Amanda McKay

Well Purge Data

Well Condition: good-new Secure: ☒ Yes ☐ No Purge Rate (L/min): 0.15 L/m

Well Damage Description: neck lock Purge Rate Comments: --

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): TD=52', 6.15 gal

Depth of water (from top of well casing): 15.82 Time: 15:02 Well Casing Type/Diameter: 2" PVC

After 5 minutes of purging (from top of casing): 17.5'

Begin purge (time): 15:02

End purge (time): 15:20

Gallons purged: 2.15 Liters

Purge water disposal method: Ground ☐ Other ☒ Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	DO (mg/L)	Conductivity (ms/m)	Turbidity (NTU)	Temp (C°/F°) circle one	ORP	Comments/Meters DTW
15:06	.5L	8.11	3.75	0.257	23.7	16.17	-117.8	17.5
15:09	.95L	8.35	2.29	0.257	21.4	16.18	-141.5	17.82
15:12	1.35L	8.44	1.43	0.260	16.1	14.85	-148.9	18.04
15:15	1.8L	8.57	1.05	0.260	16.3	14.62	-150.7	18.22
15:18	2.15L	8.59	0.77	0.260	14.4	14.47	-152.0	18.30

Sampling Data

Sample No: MW-17-09130 Location and Depth: MW-17, 51' BTOC

Date Collected (mo/dy/yr): 9/13/10 Time Collected: 15:20 ☐ AM ☒ PM Weather: Overcast

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Bladder Made of: ☒ Stainless Steel ☐ PVC ☐ Teflon Other:

Sample Decon Procedure: alconox + H2O wash, DI rinse + disposable tubing & bladder

Initial Sample Description (Color, Turbidity, Odor, Other): Clear, no odor, no sheen

Sample Description After Purge/During Sample Collection: Same

Sample Analyses

Analytes	Containers	Preservatives	Any Noted Deviations
PCP	2x .5L AG	-	
VOCs	6x 40ml. VOA	HCl	
CPAH	2x .5L AG	-	
TPH-Dx	"	-	
TSS	1x 1L POLY	-	
pH	1x 1L POLY	-	

Additional Containers etc:

Additional Information

Duplicate Samples:

Comments (Calculations, etc.):

Signature: Date: 9/13/10

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/21/11
Field Personnel: KMA, TS

Purge Data

Well ID: MW-1 Secure: ☒ Yes ☐ No Well Condition/Damage Description:

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): rate= 0.15 L/min

Depth of water (from top of well casing): 14.11 Well Casing Type/Diameter/Screened Interval: 2" PVC, 10-20ft

After 5 minutes of purging (from top of casing): 14.51

Begin purge (time): 1545

End purge (time): 1620

Gallons purged: 1 1/4

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1600	14.51	1/3 gal	6.93	1.52	0.858	4.95	12.48	-63	Slight sheen/odor initial purge
1605	14.55	1/2 gal	6.94	0.91	0.863	2.12	12.55	-64	slowed pump rate to minimize drawdown
1610	14.64	2/3 gal	6.95	0.84	0.866	2.13	12.54	-55	
1615	14.81	1 gal	6.97	0.77	0.871	4.44	12.53	-55	
1620	14.89	1 1/4 gal	6.96	0.63	0.872	~1.20	12.53	-56	VERY unproductive

Sampling Data

Sample No: MW-01-012111 Location and Depth: MW-1, 15ft

Date Collected (mo/dy/yr): 1/21/2011 Time Collected: 1620 ☐ AM ☒ Weather: cool, cloudy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri

Sample Decon Procedure: disp. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, moderate to strong HC odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
drum	1L amber + 4x 500mL	amber	duplicate samples MW-01-012111-D
cPAH/PCP	6x 500 mL amber		time 1640
TPH-Dx	4x 500 mL amber		
TSS	2x 1 L HDPE		
As/Pb	2x 500 mL HDPE		
pH	2x 500mL HDPE		
VOC	8x 40 mL VOA		
Gas/BETX	4x 40 mL VOA		

Signature: Date: 1/21/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/21/2011
Field Personnel: KMA, TS

Purge Data

Well ID: MW-2 Secured: ☒ Yes ☐ No Well Condition/Damage Description: good

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): pump rate = 0.25 L/min
Depth of water (from top of well casing): 8.74
Well Casing Type/Diameter/Screened Interval: 2" PVC, 5-15 ft
After 5 minutes of purging (from top of casing): 8.83
Begin purge (time): 1230
End purge (time):
Gallons purged:
Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1235	8.83	½ gal	7.27	8.65	0.089	2.78	9.48	126	
1240	8.84	½ gal	7.30	7.83	0.095	1.11	9.42	165	
1245	8.84	½ gal	7.31	7.59	0.095	-0.07	9.40	178	
1250	8.84	1 gal	7.32	7.52	0.095	1.75	9.39	187	

Sampling Data

Sample No: MW-02-012111 Location and Depth: MW-2, 10 ft
Date Collected (mo/dy/yr): 1/21/2011 Time Collected: 1250 ☐ AM ☒ Weather:
Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri-
Sample Decon Procedure: disp. tubing
Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
dioxins	2x 1L amber		
cPAH/PCP	3x 500 mL amber		
TPH-Dx	2x 500 mL amber		
As + PB	500 mL HDPE		
TSS	1 L HDPE		
pH	500 mL HDPE		
VOC	4x 40 mL VOA	HCl	
Gas/BETX	2x 40 mL VOA	HCl	

Signature: _____ **Date:** 1/21/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 11/20/2011
Field Personnel: KMA TS

Purge Data

Well ID: MW-3 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
rate = 0.25 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 15.66 Well Casing Type/Diameter/Screened Interval: 2" PVC, 13-23ft

After 5 minutes of purging (from top of casing): 15.68

Begin purge (time): 1600

End purge (time): 1630

Gallons purged:

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1605	15.68	1 gal	6.79	3.41	0.256	4.26	11.85	[illegible]	KMA
1610	15.68	2 gal	6.71	7.78	0.228	3.88	10.94	[illegible]	
1615	15.68	3 gal	6.71	7.03	0.217	3.06	11.21	[illegible]	
1620	15.68	4 gal	6.69	6.46	0.218	2.19	11.71	[illegible]	206
1625	15.68	1 ½ gal	6.68	6.63	0.219	1.43	11.67	209	
1630	15.68	1 ½ gal	6.64	7.09	0.225	3.61	11.48	213	

Sampling Data

Sample No: MW03-01211 Location and Depth: MW-3 / 18ft

Date Collected (mo/dy/yr): 11/20/11 Time Collected: 1630 ☐ AM ☒ Weather: cool, cloudy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: pen

Sample Decon Procedure: disp - Mixing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Diesel	2x 1L amber		
cPAH / PCP	3x 500 mL amber		
TPH - DX	3x 500 mL amber		
TSS	1 L HDPE		
pH	500 mL HDPE		
Alk + Ph	500 mL HDPE		
VOC	4x 40mL VOA	HCl	
TPH-G/BTEX	2x 40mL VOA	HCl	

Signature: Date: 11/20/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/20/11
Field Personnel: KMA, TS

Purge Data

Well ID: MW-4 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): Pump rate = 0.25 L/min

Depth of water (from top of well casing): 14.63 Well Casing Type/Diameter/Screened Interval: 2" pvc / 11-26 ft

After 5 minutes of purging (from top of casing): 14.80

Begin purge (time): 1414

End purge (time): 1450

Gallons purged: 13/4

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1420	14.80	1/4 gal	6.13	5.27	0.216	30.2	8.25	219	
1425	14.80	1/2 gal	6.14	4.84	0.222	20.7	9.24	195	
1430	14.80	3/4 gal	6.19	4.03	0.218	19.9	10.84	177	
1435	14.80	1 gal	6.22	3.49	0.216	13.3	11.02	185	
1440	14.80	1 1/4 gal	6.22	3.45	0.220	7.15	11.09	189	
1445	14.80	1 1/2 gal	6.23	3.34	0.223	5.78	11.22	196	
1450	14.80	1 3/4 gal	6.24	3.26	0.224	2.94	11.38	200	

Sampling Data

Sample No: MW04-012011 Location and Depth: MW-4, 18.5 ft

Date Collected (mo/dy/yr): 1/20/2011 Time Collected: 1450 ☐ AM ☒ Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: disp. Nitrile

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
diesel	2x 1 L amber		
cPAH / PCP	3x 500mL amber		
TPH-Dx	2x 500mL amber		
TSS	1L HDPE		
Tot Pb	500mL HDPE		
pH	500 mL HDPE		
VOC	4x 40mL VOA	HCl	
TPH-G/BETX	2x 40 mL VOA	HCl	

Signature: Date: 1/20/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/21/11
Field Personnel: KMA, TS

Purge Data

Well ID: MW-5 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

pump rate =

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 19.19

Well Casing Type/Diameter/Screened Interval: 2" PVC / 13-28ft

After 5 minutes of purging (from top of casing): 19.21

Begin purge (time): 0945

End purge (time): 1010

Gallons purged: 1 2/3

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0950	19.21	1/3 gal	7.01	1.11	0.615	3.27	12.26	10	
0955	19.21	2/3 gal	7.06	0.87	0.615	0.38	12.35	7	
1000	19.22	1 gal	7.14	0.78	0.613	-0.25	12.46	3	
1005	19.22	1 1/3	7.14	0.76	0.613	3.33	12.45	3	
1010	19.22	1 2/3	7.14	0.75	0.613	-2.36	12.46	3	

Sampling Data

Sample No: MW05 - 012111 Location and Depth: MW-5, 21 ft

Date Collected (mo/dy/yr): 1/21/2011 Time Collected: 1016 ☒ AM ☐ Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri

Sample Decon Procedure: disp. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Diesel	2x 1 L amber		
cPAH / PCP	3x 500 mL amber		
TPH - DX	2x 500mL amber		
TSS	1L HDPE		
As + Pb	500mL HDPE		
pH	500mL HDPE		
VOC	4x 40mL VOA	HCl	
Gas / BETX	2x 40mL VOA	HCl	

Signature: Date: 1/21/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA
Date of Collection: 1/20/11
Field Personnel: TS KA

Purge Data

Well ID: MW-6 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Well is in fine condition - good pump rate = 1/3 gal/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 8.25 Well Casing Type/Diameter/Screened Interval: 2" PVC / 5-15'

After 5 minutes of purging (from top of casing): 9.1

Begin purge (time): 10 05

End purge (time): 10 40

Gallons purged: 2.8 gal

Purge water disposal method: IDW Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1015	9.15	.8 gal	5.71	3.79	0.174	4.29	11.10	267	
1025	9.25	1.6 gal	6.43	5.49	0.252	1.82	10.89	187	
1030	9.26	2 gal	6.58	5.11	0.271	5.52	11.05	181	
1035	9.3	2.4	6.66	4.49	0.277	6.17	11.03	181	
1040	9.35	2.8	6.70	4.42	0.282	18.5	11.05	178	

Sampling Data

Sample No: MW-6-012011 Location and Depth: MW-6 10'

Date Collected (mo/dy/yr): 01/20/11 Time Collected: 1040 ☐ AM ☐ Weather: Cloudy / Raining

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: Peristaltic

Sample Decon Procedure: Disposable tubing

Sample Description (Color, Turbidity, Odor, Other): Clear no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxin	2x1L amber		
PAH/PCP	3x500ml amber		
TPH-Dx	2x500ml amber		
As/Pb	500ml HDPE		
TSS	1L HDPE		
VOC	4x 40ml VOA	HCL	
PH	500ml HDPE		
TPH-G/BTEX	2x 40ml VOA	HCL	

Signature: Tim Sloan **Date:** 1/20/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA
Date of Collection: 1/19/2011
Field Personnel: KMA, AM

Purge Data

Well ID: MW-7 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
rate ~ 0.4 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 11.20 ft Well Casing Type/Diameter/Screened Interval: 2" PVC, 15-25 ft

After 5 minutes of purging (from top of casing): 11.39 ft

Begin purge (time): 1357

End purge (time): 1432

Gallons purged: 3.5 gal

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1402									
~~1355~~	11.39	½ gal	5.76	1.88	0.326	~~34.4~~	13.63	-31	had to shorten tubing to achieve vacuum
1407	11.39	1 gal	5.82	1.24	0.326	29.0	13.79	-46	
1412	11.39	1½ gal	5.78	0.96	0.327	19.5	13.93	-54	
1417	11.39	2 gal	5.90	0.82	0.328	16.7	13.98	-56	
1422	11.39	2½ gal	5.96	0.70	0.326	8.47	14.01	-55	
1427	11.39	3 gal	6.02	0.57	0.325	7.12	14.09	-53	
1432	11.39	3½ gal	6.02	0.53	0.326	8.46	14.15	-52	

Sampling Data

Sample No: MW07-011911 Location and Depth: MW-7, 17 ft

Date Collected (mo/dy/yr): 1/19/2011 Time Collected: 1432 ☐ AM ☒ Weather: cool, clear

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri

Sample Decon Procedure: disp. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
dioxins	2x 1L amber		MS/MSD
TPH-Dx	2x 500 mL amber		MS/MSD
PCP/PAH	3x 500 mL amber		MS/MSD
As & Pb	500 mL HDPE		
pH	500 mL HDPE		
TSS	1L HDPE		MS/MSD
VOC	~~4x~~ 40 mL VOA	HCl	~~MS/MSD~~ KMA
TPH-G/BTEX	2x 40 mL VOA	HCl	

Signature: Date: 1/19/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/21/11
Field Personnel: CA, TS

Purge Data

Well ID: MW-8 Secure: ☐ Yes ☐ No Well Condition/Damage Description: good

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): flow rate = 0.33 L/min
Depth of water (from top of well casing):
Well Casing Type/Diameter/Screened Interval: 2" PVC, 10-20ft
After 5 minutes of purging (from top of casing): 8.50
Begin purge (time): 1430
End purge (time):
Gallons purged:
Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1435	8.23	½ gal	7.20	1.64	0.265	1.70	11.63	222	
1440	8.26	1 gal	7.25	1.35	0.269	-0.53	11.65	220	
1445	8.26	1½ gal	7.28	1.16	0.268	-0.80	11.71	220	
1450	8.26	2 gal	7.31	0.98	0.269	-0.47	11.74	220	
1455	8.27	2½ gal	7.33	0.87	0.273	2.82	11.79	221	

Sampling Data

Sample No: MW-08-012111 Location and Depth: MW-8, 15ft
Date Collected (mo/dy/yr): 1/21/11 Time Collected: 1455 ☐ AM ☒ Weather:
Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic
Sample Decon Procedure: disp tubing
Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
diesel	2 x 1L amber		
cPAH/PCP	3x 500 mL amber		
TPH – Dx	2x 500 mL amber		
TSS	1L HDPE		
As/Pb	500mL HDPE		
pH	500mL HDPE		
VOC	4x 40mL VOA	HCl	
Gas/BETX	4x 40mL VOA	HCl	

Signature: _____ **Date:** 1/21/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/21/11
Field Personnel: TS KA

Purge Data

Well ID: MW-09
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: Good condition
Pumping Flow Rate = 0.25 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal):

Depth of water (from top of well casing): 12.11
Well Casing Type/Diameter/Screened Interval: 2" PVC 10-20'

After 5 minutes of purging (from top of casing): 12.16

Begin purge (time): 1200

End purge (time): 1430

Gallons purged: 1.5 Gallons

Purge water disposal method: IDW Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1210	12.16	2.5L	7.04	2.83	0.356	-0.17	12.01	212	
1215	12.17	3.75L	7.12	2.26	0.355	-0.16	12.06	211	
1220	12.17	5L	7.17	2.33	0.359	0.84	12.09	209	
1225	12.16	6.25L	7.21	2.25	0.361	0.48	12.11	209	

Sampling Data

Sample No: MW-09-012111
Location and Depth: MW-09 14'
Date Collected (mo/dy/yr): 01/21/11
Time Collected: 1430
☐ AM ☒ PM Weather: Cloudy and wet

Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: Peristaltic

Sample Decon Procedure: Disposable

Sample Description (Color, Turbidity, Odor, Other): Not turbid, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
VOC	4-40ml VOA	HCl	
TPH-Gx/BTEX	2-40ml VOA	HCl	
cPAH/PCP	3-500ml Amber		
TPH-Dx	2-500ml Amber		
Dioxin	2-1L amber		
TSS	1-1L HDPE		
pH	1-500ml HDPE		
As+Pb	1-500ml HDPE		

Signature: Tasha Stevens **Date:** 1/21/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 11/19/2014
Field Personnel: KM, AM

Purge Data

Well ID: MW-10 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
rate 250 ml/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 12.81 Well Casing Type/Diameter/Screened Interval: 2" PVC, 10-20 ft

After 5 minutes of purging (from top of casing):

Begin purge (time): 11:25

End purge (time): 1156

Gallons purged: 2.5

Purge water disposal method: IDW Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
11:33	12.80	2L	5.52	3.43	0.124	2.41	12.10	203	
11:38	12.81	3.25L	5.54	3.24	0.123	2.90	12.20	204	
11:42	12.81	4.25L	5.54	3.19	0.125	0.75	12.31	204	
11:46	12.81	5.25L	5.56	2.89	0.127	1.92	12.30	204	
11:50	12.82	6.25L	5.56	2.67	0.130	1.15	12.44	204	
11:54	12.81	7.25L	5.57	2.52	0.131	0.85	12.46	204	

Sampling Data

Sample No: MW10-01910 Location and Depth: MW 10 - 10ft

Date Collected (mo/dy/yr): 11/19/14 Time Collected: 1156 ☒ AM ☐ Weather: cold, clear

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri.

Sample Decon Procedure: disp. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
diesel	2x 1L amber		
PAH/PCP	3x 500mL amber		
TPH-DX	2x 500mL amber		
As + Pb	500mL HDPE		
TSS	1L HDPE		
pH	500 mL HDPE		
VOC	4x 40mL VOA	HCl	
TPH-G / BTEX	2x 40mL VOA	HCl	

Signature: Date: 11/19/2014

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/19/11
Field Personnel: KMA, AM

Purge Data

Well ID: MW-11 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

rate 0.33 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 10.01 ft Well Casing Type/Diameter/Screened Interval: 2" PVC, 10-20 ft

After 5 minutes of purging (from top of casing): 10.09 ft

Begin purge (time): 1017

End purge (time): 1042

Gallons purged: ~2

Purge water disposal method: IDW drums

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1022	10.09	1/3 gal	10.36	4.56	0.266	2.08	10.95	193	slowed rate b/c of drawdown
1027	10.09	2/3 gal	10.29	4.17	0.264	0.17	10.99	198	
1032	10.09	1 gal	10.12	3.91	0.261	-0.86	11.03	203	
1037	10.09	1½ gal	9.98	3.74	0.259	1.69	11.06	207	
1042	10.09	2 gal	9.95	3.74	0.259	-0.34	11.08	208	
									calibrated WQ meter except cond

Sampling Data

Sample No: MWN-011911 Location and Depth: MW11, 15 ft

Date Collected (mo/dy/yr): 1/19/2011 Time Collected: 1042 ☒ AM ☐ Weather: cold, clear

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: disposable tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH + PCP	3x 500 mL amber	—	
TPH-Dx + oil	2x 500 mL amber	—	
TPH-G + BTEX	2x 40 mL VOA	HCl	
As + Pb	500 mL HDPE		
VOC	4x 40 mL VOA	HCl	
TSS	1 mL HDPE		
pH	500 mL HDPE		
DioxM	2x 1L amber		

Signature: Date: 1/19/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/20/2011
Field Personnel: KMA, TJ

Purge Data

Well ID: MW-12 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
pump rate ~ 0.5 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): [illegible] Well Casing Type/Diameter/Screened Interval: 2" PVC, 7-17 ft

After 5 minutes of purging (from top of casing): 5.43

Begin purge (time): 1100

End purge (time): 1125

Gallons purged: 1 1/3

Purge water disposal method:

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1110	5.43	1/3 gal	6.21	0.48	0.356	0.97	8.21	226	
1115	5.45	1/3 gal	6.22	0.50	0.356	0.26	8.21	227	
1120	5.45	1/3 gal	6.22	0.52	0.355	-0.13	8.20	227	
1125	5.45	1/3 gal	6.22	0.53	0.355	-2.78	8.21	227	

Sampling Data

Sample No: MW2-012011 Location and Depth: MW12- 12 ft

Date Collected (mo/dy/yr): 1/20/11 Time Collected: 1125 ☒ AM ☐ Weather: cold, rainy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri.

Sample Decon Procedure: disp. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Diesel	2x 1L amber		
TPH - Dx	2x 500mL amber		
cPAH/PCP	3x 1000 mL amber		
TSS	1 L HDPE		
Ass Pb	500 mL HDPE		
pH	500 mL HDPE		
VOC	4x 40mL VOA	HCl	
TPH-G/BETX	2x 40mL VOA	HCl	

Signature: [signature] **Date:** 1/20/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA
Date of Collection: 1/20/2011
Field Personnel: KA, TS

Purge Data

Well ID: MW-13 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
pump rate = 0.3 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 8.55 ft Well Casing Type/Diameter/Screened Interval: 2" PVC / 10-20ft

After 5 minutes of purging (from top of casing): 8.70 ft

Begin purge (time): 0835

End purge (time): 0900

Gallons purged: 1 2/3 gal

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0840	8.70	1/3 gal	5.62	4.57	0.175	4.17	10.72	266	
0845	8.68	2/3 gal	5.65	4.47	0.174	2.79	10.72	266	
0850	8.68	1 gal	5.69	4.21	0.174	1.92	10.97	265	
0855	8.68	1 1/3 gal	5.71	3.97	0.174	2.02	11.05	266	
0900	8.68	1 2/3 gal	5.71	3.79	0.174	1.79	11.10	267	

Sampling Data

Sample No: ~~MW13-0120~~ MW13-01202011 Location and Depth: MW13- 15 ft

Date Collected (mo/dy/yr): 1/20/2011 Time Collected: 0900 ☒ AM ☐ Weather: rainy, hail, cold.

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri

Sample Decon Procedure: dis. tubing

Sample Description (Color, Turbidity, Odor, Other): clear no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
diesel	6x 1L amber		MS/MSD
cPAH/PCP	9x 500 mL amber		MS/MSD
TPH-Dx	6x 500 mL amber		MS/MSD
TSS	3x 1L HDPE		MS/MSD
pH	500 mL HDPE		
As & Pb	500 mL HDPE		
VOC	4x 40 mL VOA	HCl	
Gas/BETX	2x 40 mL VOA	HCl	

Signature: Date: 1/20/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/19/11
Field Personnel: KA AM

Purge Data

Well ID: MW-14 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

rate = 0.3 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): Well Casing Type/Diameter/Screened Interval: 2" PVC / 19.5 - 24.5 ft

After 5 minutes of purging (from top of casing): 12.93

Begin purge (time): 1558

End purge (time): 1618

Gallons purged: 1 1/2

Purge water disposal method: 3DW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1603	12.93	1/3 gal	5.77	8.55	0.242	5.11	13.17	200	pH still
1608	12.93	2/3	5.78	6.57	0.245	-2.99	13.25	206	not working
1613	12.93	1 gal	5.79	6.02	0.245	-2.61	13.26	209	on WQ.
1618	12.93	1 1/2 gal	5.80	5.84	0.246	-3.13	13.23	214	

Sampling Data

Sample No: MW14-011911 Location and Depth: MW 14, 21 ft

Date Collected (mo/dy/yr): 1/19/2011 Time Collected: 1618 ☐ AM ☒ PM Weather: cool, clear

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri

Sample Decon Procedure: dis p. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
~~Methane~~ dioxin	6x 1L Amber		~~MS/MSD~~ DNA
PAH/PCB	2x 500 mL amber		
TPH-Dx	6x 500 mL amber		
TSS	2x 1L HDPE		
pH	3x 500mL HDPE		MS/MSD
As / Pb	3x 500mL HDPE		MS/MSD
VOC	12x 40mL VOA	HCl	MS/MSD
TPH-Gx ~~BTEX~~	6x 40mL VOA	HCl	MS/MSD

Signature: **Date:** 1/19/2011

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI Date of Collection: 1/21/11

Project Number: POS-LLA Field Personnel: TS KA

Purge Data

Well ID: MW-15 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good, no damage

Used duct tape to hold tubing to bladder pump

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 7.5 gal Flow rate ≈ 1/8 L/min

Depth of water (from top of well casing): 15.59' Well Casing Type/Diameter/Screened Interval: 2" PVC 47-57 → screen

After 5 minutes of purging (from top of casing): ~~15.40'~~

Begin purge (time): 830

End purge (time): 925

Gallons purged: ~~15~~ 1.5 gal

Purge water disposal method: 10w Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
850	12.49	1.25L	6.93	1.61	0.232	41.6	11.28	-133	
~~855~~	18.25	1.75L	7.00	1.30	0.230	34.3	11.39	-144	
900	18.62	2.5L	6.99	1.22	0.231	28.4	11.45	-148	
905	18.99	3 L	7.05	1.06	0.230	30.9	11.50	-151	
910	19.31	3.75 L	7.11	0.97	0.229	31.7	11.53	-156	
915	19.81	4.25 L	7.16	0.99	0.228	27.7	11.52	-155	
~~920~~	21.13	5L	7.22	0.98	0.228	29.2	11.09	-159	

Sampling Data

Sample No: MW-15-012111 Location and Depth: MW-15 52 ft

Date Collected (mo/dy/yr): 01/21/11 Time Collected: 925 ☒ AM ☐ Weather: Cloudy and Rainy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: Bladder

Sample Decon Procedure: Disposable tubing and alconox: rinse on pump

Sample Description (Color, Turbidity, Odor, Other): Turbidity is higher than other wells - lots of rain this AM

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH / PCP	3 - 500 ml amber		
TPH-DX	2 - 500ml amber		
TSS	1 L HDPE		
~~pH~~	500ml HDPE		
VOC	4 x 40ml VOA	HCl	
TPH-G / BTEX	2 x 40 ml VOA	HCl	

Signature: [signature] Date: 1/21/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 1/21/11
Field Personnel: TS KA

Purge Data

Well ID: MW-16 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good, no damage

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No
One Casing Volume (gal): Flow rate = 0.25 L/min
Depth of water (from top of well casing): 8.82
Well Casing Type/Diameter/Screened Interval: 2" PVC 37.25 - 47.25
After 5 minutes of purging (from top of casing): 9.15
Begin purge (time): 11:15
End purge (time): 12:15
Gallons purged: 4 gallons
Purge water disposal method: IDW Drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1130	9.12	3.75 L	7.01	2.40	0.338	25.5	12.15	64	
1135	9.11	5 L	7.08	2.48	0.333	27.9	12.21	52	
1140	9.12	6.25 L	7.17	2.52	0.329	36.9	12.24	36	
1145	9.07	7.5 L	7.21	2.69	0.329	36.3	12.26	32	
1150	9.08	8.75 L	7.36	3.50	0.321	29.7	12.15	23	
1200	9.10	10.25 L	7.36	3.00	0.327	27.3	12.21	17	
1205	9.09	12.5 L	7.34	2.81	0.326	23.7	12.00	19	
1210	9.12	13.75 L	7.36	2.79	0.327	22.0	12.21	16	

Sampling Data

Sample No: MW-16-012111 Location and Depth: MW 42'
Date Collected (mo/dy/yr): 01/21/11 Time Collected: 1220 ☐ AM ☒ PM Weather: Cloudy / Raining
Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☑ Unfiltered Other:
Sample Collected with: ☐ Bailer ☑ Pump Other: Type: Bladder
Sample Decon Procedure: Disposable tubing and alkonox on pump
Sample Description (Color, Turbidity, Odor, Other): Slightly turbid, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
CDAH / PCP	3 - 500ml Amber		
TPH Dx	2 - 500ml Amber		
TSS	1 L HDPE		
pH	500ml HDPE		
VOC	4x40ml VOA	HCl	
TPH-Gx / BTEX	2x40ml VOA	HCl	

Signature: Tricia Sims **Date:** 1/21/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI Date of Collection: 1/20/11

Project Number: POS-LLA Field Personnel: TS KA

Purge Data

Well ID: MW-17 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good condition

Purged ~1gal in 1/2 hr before "Begin purge" time while messing with pump

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): Pump rate = 0.25 L/min

Depth of water (from top of well casing): 14.25' Well Casing Type/Diameter/Screened Interval: 2" PVC 41.5 - 51.5

After 5 minutes of purging (from top of casing): 14.85

Begin purge (time): 1505

End purge (time): 1540

Gallons purged: 2 GALLONS

Purge water disposal method: IDW Drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1510	14.81	1.25L	6.24	3.26	0.224	13.1	11.36	200	
1515	14.81	2.5L	6.57	1.40	0.260	13.5	12.34	-48	
1520	14.81	3.75L	6.66	0.99	0.260	8.56	12.42	-69	
1525	14.81	5L	6.69	0.89	0.264	9.64	12.42	-75	
1530	14.81	6.25L	6.73	0.72	0.268	8.63	12.47	-84	
1535	14.81	7.5L	6.79	0.63	0.271	6.51	12.48	-90	
1540	14.80	8.75L	6.84	0.58	0.273	6.11	12.49	-95	

Sampling Data

Sample No: MW-17-012011 Location and Depth: MW-17 45'

Date Collected (mo/dy/yr): 01/20/11 Time Collected: 1545 ☐ AM ☒ PM Weather: Overcast

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: Bladder

Sample Decon Procedure: Disposable tube

Sample Description (Color, Turbidity, Odor, Other): Clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
~~Dioxins~~	~~2x1L Amber~~		
cPAH / PCP	3 x 500ml amber		
TPH-Dx	2 x 500ml amber		
TSS	1L HDPE		
~~As + Pb~~	~~500ml HDPE~~		
pH	500ml HDPE		
VOC	4 x 40ml VOA	HCl	
TPH-G / BTEX	2 x 40ml VOA	HCl	

Signature: Tom/Cer Storms **Date:** 1/26/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/29/11
Field Personnel: TS EM

Purge Data

Well ID: MW-1 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good
Rate = ¼ L/min

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): 0.9 gal

Depth of water (from top of well casing): 14.51 Well Casing Type/Diameter/Screened Interval: 2" PVC, Screen = 10-20ft

After 5 minutes of purging (from top of casing): 15.03

Begin purge (time): 0908

End purge (time): 0955

Gallons purged: ~ 3 gal

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

5.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0912	14.81	1L	7.13	1.38	0.759	27.8	10.41	122	
0917	15.22	2.25L	7.15	0.91	0.742	3.36	11.09	-12	
0922	15.39	3.5L	7.19	0.76	0.740	-0.70	11.26	-44	
0927	15.55	4.75L	7.20	066	0.740	-1.51	11.37	-58	
0932	15.76	6L	7.22	0.55	0.736	-2.40	11.46	-71	
0937	15.65	7.25L	7.25	0.56	0.737	0.16	11.59	-83	
0942	16.01	8.5L	7.27	0.51	0.737	-0.05	11.65	-85	
0947	16.16	9.75L	7.26	0.45	0.732	—	11.60	-89	
0952	16.20	11L	7.26	0.42	0.741	0.77	11.92	-91	

Sampling Data

Sample No: MW-01-042911 + MW-01-042911-D Location and Depth: MW-1, 18'

Date Collected (mo/dy/yr): 04/29/11 Time Collected: 0955 ☒ AM ☐ PM Weather: Mostly cloudy, dry
1000 = Duplicate

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: ~~Peristaltic~~ Type: peristaltic

Sample Decon Procedure: Disposable tubing, alconox

Sample Description (Color, Turbidity, Odor, Other): Slight sheen, petroleum smell, collected duplicate

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH/PCP/TPH-dx	5 x 500ml Amber	—	+ 5 x 500ml amber for duplicate
BTEX/TPH-gx/VOC	6 x 40ml VOA	HCL	+ 6 x 40ml VOA for duplicate
Dioxin Furan	2 x 1L Amber	—	+ 2 x 1L amber for duplicate
TSS	1 x 1L HDPE	-	+ 1 x 1L HDPE for duplicate
pH	1x 500ml HDPE	—	+ 1 x 500ml HDPE for duplicate
As ? Pb	1x 500ml HDPE	HNO_3	lab filtered and preserved + 1 x 500 ml HDPE for duplicate

Signature: Zeke Stero Date: 4/29/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/26/11
Field Personnel: KMA

Purge Data

Well ID: MW-2 Secure: ☒ Yes ☐ No Well Condition/Damage Description: rate ~ 1/4 L/hr

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): ~3

Depth of water (from top of well casing): 5.14 ft Well Casing Type/Diameter/Screened Interval: 2" PVC, 5-15 ft

After 5 minutes of purging (from top of casing): 5.21 ft

Begin purge (time): 0955

End purge (time): 1020

~~Liters~~ Gallons purged: 6 1/4

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged (L)	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1000	5.21	1 1/4	6.61	9.16	0.079	3.97	10.21	85	
1005	5.20	2 1/2	6.29	9.30	0.080	5.43	10.08	133	
1010	5.18	3 3/4	6.31	9.13	0.081	4.33	10.09	142	
1015	5.20	5	6.30	9.04	0.081	1.82	10.08	151	

Sampling Data

Sample No: MW02 - 042611 Location and Depth: MW-2, 10 ft

Date Collected (mo/dy/yr): 4/26/11 Time Collected: 1020 ☒ AM ☐ PM Weather: cool, cloudy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri

Sample Decon Procedure: disp. tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH / PCP / TPH-Dx	5x 500 mL amber		
VOC / TPH-G / BETX	6x 40 mL VOA	HCl	
Dioxin	2x 1L amber		
As / Pb	500 mL HDPE		
TSS	1 L HDPE		
pH	500 mL HDPE		

Signature: Date: 4/26/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/26/11
Field Personnel: AM, KA

Purge Data

Well ID: MW-03 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
rate ~ 1/4 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): ~ 4.5 gal

Depth of water (from top of well casing): 16.09 ft Well Casing Type/Diameter/Screened Interval: 2" PVC, 13-23ft

After 5 minutes of purging (from top of casing): _____

Begin purge (time): 1300

End purge (time): 1325

~~Gallons~~ liters purged: ~6L

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:04	16.16 ft	~1L	6.39	9.25	0.171	3.52	12.90	174	
13:09	16.19	~2.25L	6.37	10.53	0.172	1.86	12.63	177	
13:14	16.19	~3.5L	6.33	11.87	0.175	3.44	12.21	183	
13:19	16.19	~4.75L	6.33	11.90	0.178	3.35	12.08	185	
13:24	16.19	~6L	6.32	11.83	0.17	1.68	11.97	186	

Sampling Data

Sample No: MW03-042611 Location and Depth: MW-3, 16 ft

Date Collected (mo/dy/yr): 4/26/11 Time Collected: 1325 ☐ AM ☒ PM Weather: cool, sunny

Type: ☒ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☒ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Type: peri-

Sample Decon Procedure: disp- tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH/ PCP/ TPH-Dx	5x 500mL amber		
Dioxin	2x 1L amber		
VOC/ ~~TPH-Gx~~/ BETX	6x 40mL VOA	HCl	
As/Pb	500 mL HDPE		
TSS	1L HDPE		
pH	500 mL HDPE		

Signature: [signature] Date: 4/26/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/28/11
Field Personnel: KA, LG

Purge Data

Well ID: MW-4 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good, tubing set @ 18.5 * pump 0.25 L/m

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 14.91 Well Casing Type/Diameter/Screened Interval: 2", 11-25.75

After 5 minutes of purging (from top of casing): 15.03

Begin purge (time): 12:40

End purge (time): 1 30

Gallons purged: 2.0

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1245	15.03	0.5L	7.17	5.73	0.093	0.00	14.31	95	* Turbidity w/
1250	15.04	1L	6.37	2.40	0.190	30.8	13.42	123	turbidity meter
1255	15.04	1.5L	6.28	2.33	0.195	22.4	13.27	127	
100	15.03	2.25L	6.28	2.42	0.201	13.1	13.24	129	
105	15.04	3.25L	6.30	2.69	0.205	9.78	13.24	131	
110	15.04	4.25L	6.25	2.89	0.207	6.22	13.22	138	
115	15.04	5.5L	6.35	3.10	0.208	6.64	13.19	137	
120	15.04	6.75L	6.46	3.26	0.210	3.45	13.21	134	
125	15.04	8L	6.46	3.34	0.210	4.80	13.21	134	

Sampling Data

Sample No: MW-4 042811 Location and Depth: 25.75'

Date Collected (mo/dy/yr): 4/28/11 Time Collected: 130/1330 ☐ AM ☒ PM Weather: cloudy, breezy, ~50

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: n/a

Sample Description (Color, Turbidity, Odor, Other): clear, no apparent odor, low turbidity

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH, PCP, TPH	5x 0.5 L amber	none	
dioxin/furan	2x 1 L amber	none	
BTEX, VOC, TPHg	6x 40ml VOA	HCL	
diss arsenic, lead, pH	2 x 500ml hdpe	none	
TSS	1-1L hdpe	none	

Signature: Date: 4/28/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/28/2011
Field Personnel: KMA, LG

Purge Data

Well ID: MW-5 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good, pump rate ~ 0.25 l/m
Horiba WQ meter

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 19.40 Well Casing Type/Diameter/Screened Interval: 2" PVC / 13-28ft

After 5 minutes of purging (from top of casing):

Begin purge (time): 8:42

End purge (time): 9:15

Gallons purged: 2g

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments (Turbidity Meter, LG)
~~9216~~	~~19.46~~		6.51	2.14	0.270	~~354.4~~	9.76	250	~~1.46 NTU~~ LG
851	19.49	0.75g	6.51	7.14	0.270	54.4	9.76	250	1.46 NTU
856	19.50	1.0g	6.43	0.70	0.519	0.0	11.34	242	0.05 NTU
901	19.50	1.25g	6.45	0.61	0.502	0.0	11.42	224	-0.06 NTU
906	19.50	1.5g	6.46	0.53	0.500	0.0	11.48	203	0.92 NTU
912	19.50	1.75g	6.46	0.49	0.498	0.0	11.56	184	-0.04 NTU

Sampling Data

Sample No: MW-5 042811 Location and Depth: tubing set @ 21 ft., MW-5

Date Collected (mo/dy/yr): 04/28/11 Time Collected: 915 ☒ AM ☐ PM Weather: cloudy, 50°, breezy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: n/a

Sample Description (Color, Turbidity, Odor, Other): clear, no apparant odor, low to no turbidity

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
BTEX, TPH$_g$, VOCs	6x40ml VOAs	HCL	
cPAH, RP, TPH$_{hd}$	5x500ml amber	none	
Diss. Arsenic, lead	1-500ml hdpe	none	
Dioxin/Furan	2x1L amber	none	
TSS	1-1L hdpe	none	
pH	1-500ml hdpe	none	

Signature: Date: 4/28/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/26/11
Field Personnel: AM, KA

Purge Data

Well ID: MW-6 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

Depth Sounder decontaminated Prior to Placement in Well: ☒ ~~Yes~~ ☐ No

~250ml/min

One Casing Volume (gal): ~3 gal

Depth of water (from top of well casing): 10.86 ft

Well Casing Type/Diameter/Screened Interval: 2" PVC / 5-15 ft

After 5 minutes of purging (from top of casing): 11.00

Begin purge (time): 15:25

End purge (time): 1600

~~Gallons~~ purged: ~8

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
15:29	11.00	1L	6.07	3.32	0.299	4.09	12.84	193	
15:34	11.13	~2.25L	6.05	2.93	0.319	2.44	12.33	193	
15:39	11.20	~3.5L	6.04	2.23	0.375	0.39	11.93	190	
15:44	11.21	~4.75L	6.06	1.92	0.430	~0.0	11.07	192	
15:49	11.21	~6L	6.07	1.23	0.527	~0.0	11.27	165	
15:52	11.21	~6.75L	6.07	1.20	0.521	~0.0	11.27	160	
15:55	11.21	~7.5L	6.07	1.17	0.507	~0.0	11.25	150	

Sampling Data

Sample No: MW06-042611 Location and Depth: MW-6, 12 ft

Date Collected (mo/dy/yr): 4/26/11 Time Collected: 14:00 ☐ AM ☒ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure:

Sample Description (Color, Turbidity, Odor, Other): no odor, clear

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxins	2 x 1L Amber		
cPAH/PeP/TPH-D	5x500ml Amber		
As/Pb (dis)	500 ml HPDE		
VOC/BTEX/TPH-G	6x40ml VOA	HCL	
pH	500ml HPDE		
TSS	1L HDPE		

Signature: [signature] Date: 4/26/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/27/11
Field Personnel: AM, EB

Purge Data

Well ID: MW-7 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

~ 200 mL/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): (0.17) x (25-12) = 2.17 gallons

Depth of water (from top of well casing): 12.21 ft Well Casing Type/Diameter/Screened Interval: 2" PVC / 15-25 ft

After 5 minutes of purging (from top of casing): 12.39 ft

Begin purge (time): 8:43

End purge (time): 9:13

~~Gallons~~ L purged: 6 L

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
8:48	12.39	~1 L	6.98	1.16	0.334	3.22	12.02	155	
8:53	12.40	~2 L	6.99	1.12	0.330	2.37	12.13	123	
8:58	12.40	~3 L	7.00	0.97	0.323	2.05	12.33	22	
9:03	12.40	~4 L	7.01	0.84	0.323	~0.0	12.33	-17	
9:08	12.40	~5 L	7.01	0.75	0.323	2.83	12.36	-31	
9:13	12.40	~6 L	7.01	0.64	0.323	1.70	12.42	-43	

Sampling Data

Sample No: MW07-042711 Location and Depth: MW-07

Date Collected (mo/dy/yr): 4/27/11 Time Collected: 9:15 ☒ AM ☐ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: dedicated

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxin	2X 1L amber		
cPAH/PCP/TPH-Dx	5X 500ml amber		
~~6X40A~~ VOCs/TPH-Gx	6X 40ml VOA	HCL	
As/Pb BTEX	1X 500ml HPDE		
TSS	1X 1L HPDE		
pH	1X 500 ml HPDE		

Signature: Date: 4/27/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/27/11
Field Personnel: AM, EB

Purge Data

Well ID: MW-08 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good

~200 ml/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No

One Casing Volume (gal):

Depth of water (from top of well casing): 8.69 feet

Well Casing Type/Diameter/Screened Interval: 2" PVC / 10-20 feet

After 5 minutes of purging (from top of casing): 8.90 ft

Begin purge (time): 13:51

End purge (time): 14:16

Gallons purged:

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:56	8.90 ft	~1L	6.29	1.80	0.326	2.48	12.09	168	
14:01	8.95 ft	~2L	6.28	1.64	0.323	3.15	12.01	167	
14:06	8.98 ft	~3L	6.26	1.36	0.319	4.58	11.95	165	
14:11	9.00 ft	~4L	6.25	1.21	0.314	0.31	11.94	162	
14:16	9.00 ft	~5L	6.23	1.11	0.307	~0.27	11.93	161	

Sampling Data

Sample No: MW08-042711 Location and Depth: MW08, ~15ft

Date Collected (mo/dy/yr): 4/27/11 Time Collected: 14:17 ☐ AM ☒ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: dedicated equipment

Sample Description (Color, Turbidity, Odor, Other): no odor, clear

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxin	2 x 1L amber		
CPAH/PCP/TPH-D	5x 500ml amber		
VOCs/BTEX/TPH-G	6x 40ml VOA	HCL	
TSS	1x 1L HPDE		
pH	1x 500ml HPDE		
As/Pb	1x 500 ml HPDE		

Signature: Date: 4/27/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/27/11
Field Personnel: AM, EB

Purge Data

Well ID: MW-09 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good

~200 ml/min

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 12.26 feet Well Casing Type/Diameter/Screened Interval: 2" PVC / 10-20 feet

After 5 minutes of purging (from top of casing): 12.29 ft

Begin purge (time): 12:48

End purge (time): 13:08

Gallons purged:

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
12:53	12.29	~1L	6.21	1.65	0.363	0.61	12.45	149	
12:58	12.29	~2L	6.23	1.48	0.372	1.19	12.28	145	
13:03	12.30	~3L	6.29	1.05	0.391	4.11	11.95	135	
13:08	12.30	~4L	6.28	0.98	0.393	0.97	11.90	134	

Sampling Data

Sample No: MW09-042711 Location and Depth: MW09, ~15 ft

Date Collected (mo/dy/yr): 4/27/11 Time Collected: 13:10 ☐ AM ☐ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: dedicated equipment

Sample Description (Color, Turbidity, Odor, Other): no odor, clear

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxin	2 x 1L amber		
cPAH/PCP/TPH-Dx	5 x 500ml amber		
VOCs/BTEX/TPH-Gx	6 x 40ml VOA	HCL	
TSS	1 x 1L HPDE		
pH	1 x 500ml HPDE		
As/Pb	1 x 500 ml HPDE		

Signature: Date: 4/27/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA
Date of Collection: 4/27/11
Field Personnel: AM, EB

Purge Data

Well ID: MW-10
Secure: ☒ Yes ☐ No
Well Condition/Damage Description: Good
~200 ml/min
Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No
One Casing Volume (gal): ~1.2 gallons
Depth of water (from top of well casing): 12.98 feet
Well Casing Type/Diameter/Screened Interval: 2" PVC / 10-20 feet
After 5 minutes of purging (from top of casing): 13.01 ft
Begin purge (time): 11:17
End purge (time): 11:40
Gallons purged:
Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
11:22	13.01	~1L	6.77	3.46	0.224	1.73	12.75	31	
11:27	13.01	~2L	6.78	3.24	0.227	4.16	12.70	31	
11:32	13.00	~3L	6.79	2.86	0.223	1.54	12.65	33	
11:37	13.00	~4L	6.81	2.66	0.235	4.41	12.68	36	

Sampling Data

Sample No: MW10-042711
Location and Depth: MW10 ~ 15 ft
Date Collected (mo/dy/yr): 4/27/11
Time Collected: 11:40 ☐ AM ☐ PM
Weather:
Type: ☒ Ground Water ☐ Surface Water Other:
Sample: ☐ Filtered ☒ Unfiltered Other:
Sample Collected with: ☐ Bailer ☒ Pump Other:
Type: peristaltic
Sample Decon Procedure: dedicated equipment
Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
DioXin	2x 1L amber		
cPAH/PCP/TPH-Dx	5x 500 ml amber		
VOCs/TPH-Gx/BTEX	8x 40 ml VOA	HCL	
TSS	1x 1L HPDE		
pH	1x 500 ml HPDE		
As/Pb	1x 500 ml HPDE		

Signature:
Date: 4/27/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/27/11
Field Personnel: AM, EB

Purge Data

Well ID: MW-11 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good

≈ 200 ml/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): 1.7 gallons

Depth of water (from top of well casing): 10.20 ft Well Casing Type/Diameter/Screened Interval: 2" PVC / 10-20 ft

After 5 minutes of purging (from top of casing): 10.27 ft

Begin purge (time): 10:14

End purge (time): 10:39

~~Gallons~~ purged: ≈ 6 L

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
10:19	10.27	≈1L	6.98	3.15	0.257	1.24	11.86	-18	
10:24	10.25	≈2L	6.73	2.86	0.242	2.42	11.65	-2	
10:29	10.26	≈3L	6.26	2.40	0.220	5.07	11.29	38	
10:34	10.25	≈4L	6.27	2.24	0.219	3.33	11.30	47	
10:39	10.26	≈5L	6.25	2.16	0.218	2.17	11.30	52	

Sampling Data

Sample No: MW11-042711 Location and Depth: MW-07

Date Collected (mo/dy/yr): 4/27/11 Time Collected: 10:40 ☒ AM ☐ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: dedicated

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxin	2 X 1 L amber		
cPAH / PCP / TPH-Dx	5 X 500 mL amber		
VOCs / TPH-Gx / BTEX	6 X 40 mL VOA	HCL	
As / Pb	1 X 500 mL HPDE		
TSS	1 X 1 L HPDE		
pH	1 X 500 mL HPDE		

Signature: Erin Johnson Date: 4/27/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/27/11
Field Personnel: AM, EB

Purge Data

Well ID: MW-12 Secure: ☒ Yes ☐ No Well Condition/Damage Description: Good

~200 mL/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal):

Depth of water (from top of well casing): 5.43 Well Casing Type/Diameter/Screened Interval: 2" PVC / 7-17 ft

After 5 minutes of purging (from top of casing): 5.81

Begin purge (time): 15:09

End purge (time): 15:50

Gallons purged:

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
15:14	5.81	~1L	5.94	1.52	0.269	9.71	10.69	178	15:22
15:19	5.82	~2L	5.90	1.46	0.292	20	9.92	176	← stopped - had to
15:40	5.65	~3L	5.88	1.91	0.320	~0	10.23	176	get new battery
15:45	5.80	~4L	5.94	1.74	0.317	2.96	10.03	173	for turb. meter
15:50	5.79	~5L	5.96	1.52	0.318	~0	9.83	172	stated 15:38

Sampling Data

Sample No: MW12-042711 Location and Depth: MW12, ~12 ft

Date Collected (mo/dy/yr): 4/27/11 Time Collected: 15:50 ☐ AM ☒ PM Weather: raining

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peristaltic

Sample Decon Procedure: dedicated

Sample Description (Color, Turbidity, Odor, Other): no odor, clear

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
Dioxin	5 x 500 ml amber		
cPAH / PCP / TPH-Dx	2 x 1L amber		
VOCs, BTEX / TPH-Gx	6 x 40ml VOA	HCl	
TSS	1 x 1L HPDE		
pH	1 x 500ml HPDE		
As / Pb	1 x 500ml HPDE		

Signature: Date: 4/27/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/26/11
Field Personnel: KMA, AM

Purge Data

Well ID: MW-13 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
rate ~ 1/5 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): ~4 gal

Depth of water (from top of well casing): 9.59 ft Well Casing Type/Diameter/Screened Interval: 2" PVC / 10-20ft

After 5 minutes of purging (from top of casing): 9.70 ft

Begin purge (time): 1415

End purge (time): 1450

~~Gallons~~ Liters purged: ~7 l

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
H20	9.70	~1L	6.13	4.69	0.155	48.8	12.01	191	
1425	9.70	~2L	6.10	4.51	0.161	41.6	11.88	191	
1430	9.70	~3L	6.09	4.36	0.163	18.7	11.79	190	
1435	9.71	~4L	6.07	4.54	0.164	9.90	11.69	190	
1440	9.71	~5L	6.07	4.88	0.166	10.91	11.63	187	
1445	9.71	~6L	6.09	5.11	0.167	5.21	11.58	185	

Sampling Data

Sample No: MW13-042611 Location and Depth: MW-13, 15 ft

Date Collected (mo/dy/yr): 4/26/11 Time Collected: 1450 ☐ AM ☒ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: peri.

Sample Decon Procedure: disp- tubing

Sample Description (Color, Turbidity, Odor, Other): clear, no odor, slightly turbid

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH/PCP/TPH-Dx	5x 500mL amber		
Dioxin	2x 1L amber		
TB/Pb (diss)	500 mL HDPE		
VOC/BETX/TPH-Gx	6x 40mL VOA	HCl	
pH	500 mL HDPE		
TSS	1L HDPE		

Signature: Date: 4/26/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: _____
Field Personnel: _____

Purge Data

Well ID: MW-14 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good, removed std H_2O from KB (not above pvc)
~0.25 L/m pump rate

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): _____

Depth of water (from top of well casing): 13.15 Well Casing Type/Diameter/Screened Interval: 2" 19.5-24.5

After 5 minutes of purging (from top of casing): 13.14

Begin purge (time): 240

End purge (time): 3:09

Gallons purged: ~1.25

Purge water disposal method: drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
245	13.14	1L	6.44	7.32	0.238	-0.57	13.80	105	
250	13.14	2L	6.43	7.21	0.238	1.10	13.74	111	
255	13.14	3L	6.49	7.08	0.238	0.19	13.64	118	
300	13.19	4L	6.59	7.03	0.239	4.23	13.61	121	
305	13.18	5L	6.59	7.03	0.239	-0.77	13.61	131	

Sampling Data

Sample No: MW-14 042811 Location and Depth: LLA- MW-14, 24.5' bgs

Date Collected (mo/dy/yr): 4/28/11 Time Collected: 310 1410 ☐ AM ☒ PM Weather: cloudy, breezy, 50

Type: ☒ Ground Water ☐ Surface Water Other: _____ Sample: ☐ Filtered ☒ Unfiltered Other: _____

Sample Collected with: ☐ Bailer ☒ Pump Other: _____ Type: peristaltic

Sample Decon Procedure: n/c

Sample Description (Color, Turbidity, Odor, Other): clear, no apparent odor, low turbidity

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH, TPH, PCP	5 x 500 ml-amber	none	
BTEX, VOCs, TPHg	6 x 40ml VOA	HCL	
dioxin/furan	2 x 1L amber	none	
diss arsenic, lead, ph	2 x 500ml hdpe	none	lab w/ filter, preserve
TSS	1 x 1L hdpe	none	

Signature: _____ Date: 4/28/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA
Date of Collection: 4/28/11
Field Personnel: ICA LB

Purge Data

Well ID: MW-15 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): ~12 gal

Depth of water (from top of well casing): 15.44 ft Well Casing Type/Diameter/Screened Interval: 2" PVC, 47-57'

After 5 minutes of purging (from top of casing): 24.31 ft

Begin purge (time): 1025

End purge (time):

Liters
Gallons purged:

Purge water disposal method:

rate ~ 1/3 L/min, slowed to 1/5 L/min

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1030	24.31	~2L	7.48	5.32	0.261	14.9	12.45	-21	
1035	↓	~3 2/3 L	7.67	4.86	0.196	12.7	12.71	-56	
1040	28.04	~5 1/3 L	7.75	3.61	0.193	5.72	12.72	-84	
1045	29.71	~7L	7.74	3.22	0.193	6.68	12.74	-91	turned down pressure
1050	31.56	~9 1/3 L	7.76	2.36	0.192	3.05	12.74	-108	slowed rate again
1105	30.60	~12L	7.83	1.60	0.191	0.84	12.68	-122	
1110	29.90	~13L	7.81	1.39	0.191	0.05	12.68	-125	

Sampling Data

Sample No: MW15 - 042811 Location and Depth: MW15, 52 ft

Date Collected (mo/dy/yr): 4/28/11 Time Collected: 1115 ☒ AM ☐ PM Weather:

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: bladder pump

Sample Decon Procedure: disp tubing + bladders

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
BTEX, TPHg, VOCs	6x 40ml VOAs	HCl	
CPAH, PCP, TPHd	5x 500ml amber	none	
~~TSS arsenic, lead, pH~~	~~2x 500ml hdpe~~	~~none~~	metals pres/filtered at lab
~~MW~~ Dioxin/furan	~~2x 1L amber~~	~~none~~	
TSS	1-1L hdpe	none	
~~DUP~~			

Signature: Date: 4/28/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA
Date of Collection: 4/28/11
Field Personnel: KMA, LG

Purge Data

Well ID: MW-16 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good

begin rate ~.5 L/min, slowed to ~.2, sped to 1/3 L/min

Depth Sounder decontaminated Prior to Placement in Well: ☒ Yes ☐ No One Casing Volume (gal): ~11 gal

Depth of water (from top of well casing): 8.95 Well Casing Type/Diameter/Screened Interval: 2" PVC / 47.5-57.5 ft

After 5 minutes of purging (from top of casing):

Begin purge (time): 1530

End purge (time):

Gallons purged:

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1535	9.40	~1 L	7.43	1.57	0.303	35.3	12.73	82	
1540	9.39	~2L	7.37	1.65	0.301	27.4	12.72	80	
1545	9.39	~3L	7.29	2.27	0.297	25.1	12.68	69	
1550	9.39	~4L	7.22	2.84	0.296	25.4	12.68	63	slowed rate
1555	9.37	~5L	7.19	3.01	0.296	21.2	12.67	59	
1600	9.30	~6L	7.19	3.09	0.297	18.7	12.68	55	slowed rate again
1605	9.11	~6.75L	7.18	3.12	0.296	19.6	12.73	53	
1610	9.11	~7.5L	7.11	3.07	0.297	22.0	12.69	53	sped up
1615	9.50	~9L	7.14	3.09	0.297	15.9	12.73	50	
1620		~11L	7.18	3.58	0.295	14.6	12.79	47	
1625	9.60	~12L	7.16	4.04	0.294	11.9	12.79	47	

Sampling Data

~~1535~~ 1630 – 9.81 NTU

Sample No: MW16-042811 Location and Depth: MW-16 / 52.5 ft

Date Collected (mo/dy/yr): 4/28/11 Time Collected: 1630 ☐ AM ☒ PM Weather: cool, sunny

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: bladder

Sample Decon Procedure: disp. bladder + tubing, alconox + di. water for pump body

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
cPAH/PCP/TPH-Dx	5x 300mL amber		high turbidity - not clearing
VOC/BETX/TPH-G	6x 40mL VOA	HCl	
TSS	1 L HDPE		
pH	500mL HDPE		

Signature: Date: 4/28/11

GROUNDWATER SAMPLE COLLECTION FORM

Project Name: Lora Lake Apartments RI
Project Number: POS-LLA

Date of Collection: 4/28/11
Field Personnel: ICA LG

Purge Data

Well ID: MW-17 Secure: ☒ Yes ☐ No Well Condition/Damage Description: good
rate ~ 0 1/4 l/min

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): ~ 10 gal

Depth of water (from top of well casing): 14.50 ft Well Casing Type/Diameter/Screened Interval: 41.5 - 51.5 ft

After 5 minutes of purging (from top of casing): 15.45 ft

Begin purge (time): 1335

End purge (time): 1405

Liters
Gallons purged: ~6

Purge water disposal method: IDW drum

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged	pH	DO (mg/L)	Conductivity (mS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1340	15.45	~1.25 l	7.68	0.66	0.219	7.79	13.10	-58	
1345	15.49	~2.5 l	7.70	0.60	0.217	8.28	12.90	-59	slowed rate to ~.2 l/min
1350	15.39	~3.5 l	7.77	0.52	0.217	7.97	12.93	-36	
1355	15.34	~4.5 l	7.75	0.48	0.217	1.73	12.92	-58	
1400	15.34	~5.5 l	7.71	0.46	0.217	~~5.84~~ 1.62	12.92	-73	

Sampling Data

Sample No: MW17-042811 Location and Depth: MW-17 / 46.5 ft

Date Collected (mo/dy/yr): 4/28/11 Time Collected: 1405 ☐ AM ☒ PM Weather: cool, cloudy, windy

Type: ☒ Ground Water ☐ Surface Water Other: Sample: ☐ Filtered ☒ Unfiltered Other:

Sample Collected with: ☐ Bailer ☒ Pump Other: Type: bladder

Sample Decon Procedure: disp. bladder/tubing, pump decon w/ alconox + d.i. H_2O

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Analytes	Containers:	Preservatives	Deviations/Comments:
~~CRAM~~/PCP/TPH-Dx	5x 500mL amber		
VOC/BETX/TPH-G	6x 40 mL VOA	HCl	
pH	500 mL HDPE		
TSS	1L HDPE		

Signature: Date: 4/28/11