RHR
ROCA HONDA RESOURCES LLC

Via Electronic Delivery

August 5, 2014

Mr. David Mayerson
Mining Environmental Compliance Section
New Mexico Environment Department
1190 St. Francis Dr.
Santa Fe, NM

RE: DP-1717, Roca Honda Mine Southern Pipeline Alternative

Dear Mr. Mayerson:

As we recently discussed, Roca Honda Resources (RHR) has been re-evaluating plans for the disposition of water that will be produced from mine dewatering. Preliminary engineering evaluations, feasibility studies and regulatory evaluations suggest that a development alternative that would convey treated water via a buried pipeline from the mine to a point or points of use in the Rio San Jose in or near the Village of Milan may be a viable option. In anticipation of moving forward with further evaluation of this option, and in accordance with our recent discussion, we have prepared a Work Plan that describes how we propose to characterize the potential discharge area or zone in the Rio San Jose.

We look forward to any input you may have regarding the proposed Work Plan. Please don't hesitate to contact me or Dan Kapostasy with any questions. We also appreciate your timely input regarding the bench test work for the water treatment plant that is currently underway.

Sincerely,

Michael Neumann

Michael Neumann
Manger, New Mexico Operations

cc: Mr. Kurt Vollbrecht, NMED
Mr. David Clark, MMD
Mr. Michael Mariano, NMSLO
Mr. Kevin Myers, NMOSE
Mr. Mathew Wonder, NMDG&F
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ROCA HONDA RESOURCES, LLC

WORK PLAN FOR EVALUATION OF THE POTENTIAL EFFECTS OF DISCHARGE ALONG THE RIO SAN JOSE

ROCA HONDA MINE DISCHARGE PERMIT APPLICATION (DP-1717)

AUGUST 2014

Submitted to
New Mexico Environment Department
Ground Water Quality Bureau
&
New Mexico Mining and Minerals Division
Energy, Minerals and Natural Resources Department
&
U.S. Forest Service (Cibola National Forest)

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Prepared by:

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1.0 Introduction

Roca Honda Resources, LLC (RHR) has prepared this Work Plan at the request of the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) Mining Environmental Compliance Section following a meeting with NMED staff on July 10, 2014 regarding Discharge Permit Application DP-1717. Due to a proposed change in the location of the discharge of treated mine water from the Roca Honda Mine, it was deemed appropriate to evaluate the effects, if any, on the receiving drainage of the mine water, the Rio San Jose (RSJ).

Current plans describe RHR as treating mine water onsite in a water treatment plant and discharging the water approximately 8 miles north of the project site into an irrigation system designed for a local rancher. The water would be stored in the Laguna Polvadera, a natural impoundment, a storage tank, or discharged into San Lucas Canyon. A proposed alternative is to discharge the treated water into the RSJ near the Village of Milan. The purpose of this Work Plan is to provide details regarding characterization of the RSJ to better evaluate this alternative.

The treated mine water will be discharged under a National Pollutant Discharge Elimination System (NPDES) permit and will be treated to meet effluent limitations established by the U.S. EPA. The discharged treated mine water will also meet New Mexico Water Quality Control Commission (WQCC) standards as set forth in NMAC Section 206.2.3103, human health standards for groundwater.

This Work Plan will further detail the approach and methods to collect, analyze, and evaluate the data to address potential impacts on the RSJ from treated mine water discharge. The results will be utilized for the Discharge Plan, the Mine Permit Application, the NPDES Permit, and the Environmental Impact Statement.

1.1 Background

The Rio San Jose forms at the confluence of Bluewater Creek and Mitchell Draw approximately 10 miles northwest of the village of Milan and the RHR proposed discharge point (Figure 1-1). Most of the upstream section of the channel (above Grants) is highly engineered and the channel has been straightened, dredged, and leveed for agricultural use and flood control. The Rio San Jose receives water from the Bluewater Dam which flows down Bluewater Creek into the Rio San Jose. Additional water inflow from Mitchell Draw is seasonal and flows correspond with the summer monsoon season. Downstream of the discharge point on the eastern side of Grants, the city’s wastewater treatment plant supplied a perennial flow of approximately 1-2 cubic feet per second since about 1978 (Risser, 1982). The wastewater treatment plant closed in the early 1990s and current wastewater from a new plant is used as irrigation on the city’s golf course. Further downstream, east of the city of Grants, the RSJ is perennial due to flow from Ojo del Gallo and Horace Springs. The RSJ flows through both the Pueblo of Acoma and Laguna Pueblo on its course to its confluence with the Rio Puerco.

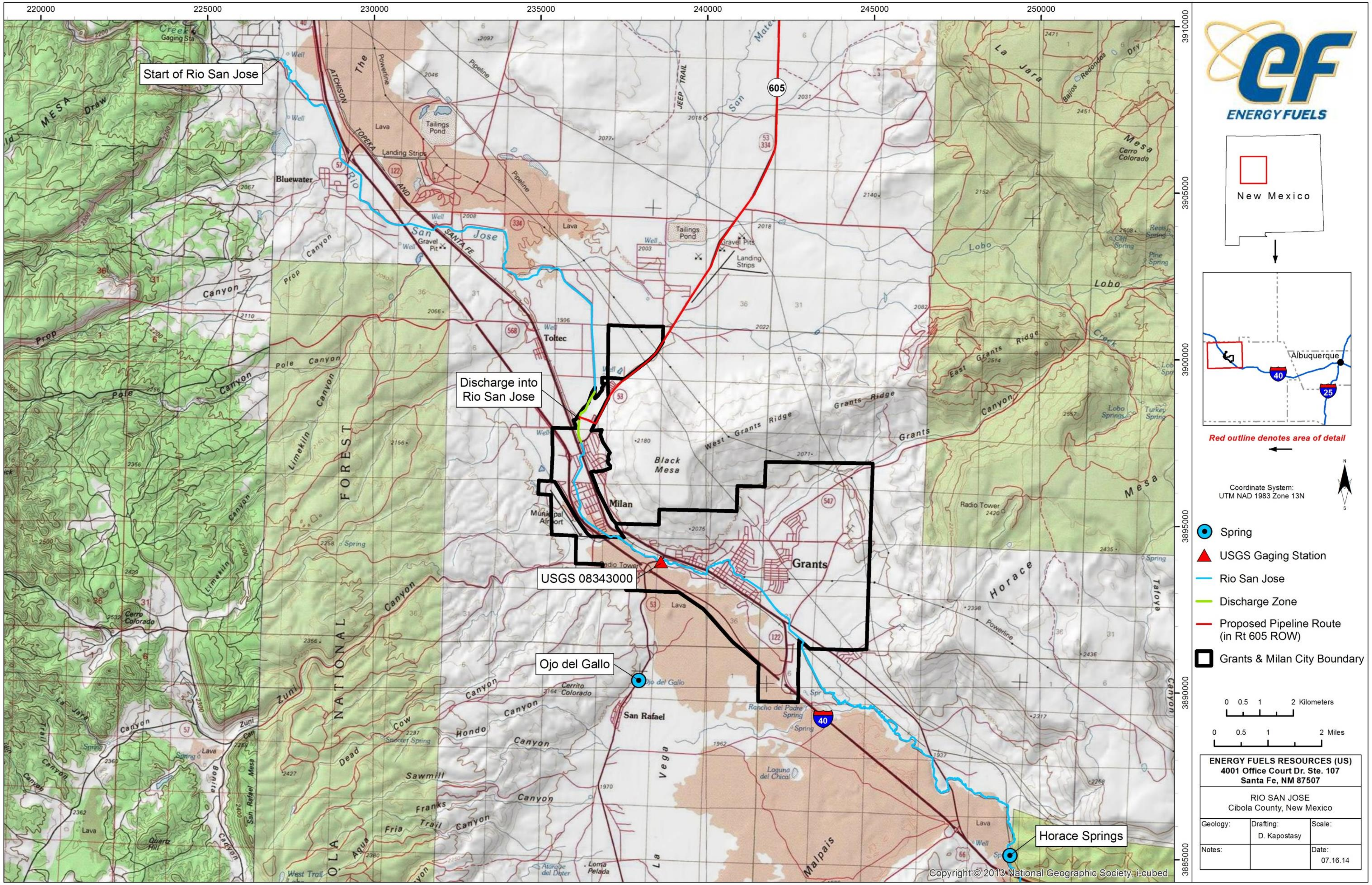

Figure 1-1. Location Map of the Rio San Jose

The USGS maintained a stream gage in the RSJ on the western end of Grants (Figure 1-1 that operated between 1912 and 2011 (USGS 08343000). Data from this gage indicate that flow through the city of Grants is intermittent and seasonal, corresponding to spring runoff and the summer monsoon season. Figure 1-2 presents the hydrograph from station 08343000. The USGS also collected water samples at the gage location between 1973 and 2010. The water quality data is presented in Appendix A of this Work Plan.

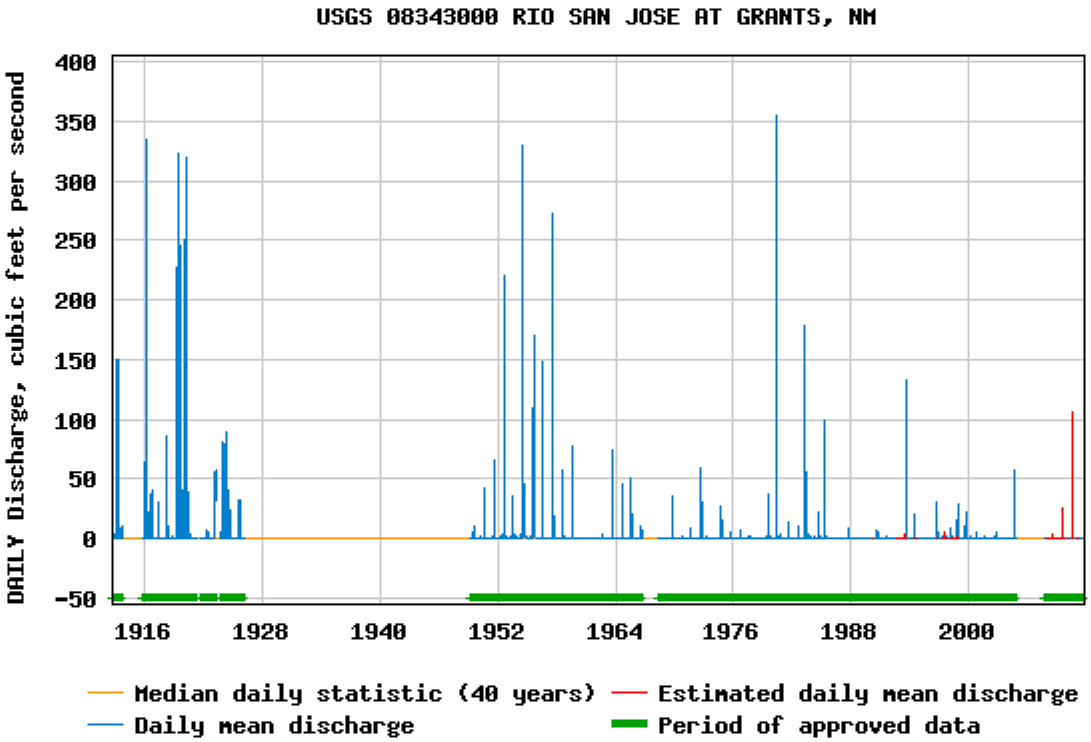

Figure 1-2. Hydrograph from USGS Gaging Station 08343000 in the Rio San Jose

The EPA as part of their 5-year plan to address contamination from historic uranium mining and milling flew a series of aerial radiological surveys over the Grant/Milan area (USEPA, 2010). One of those surveys flew along the length of the RSJ from upstream of the proposed discharge point through the city of Grants. Data collected in the study includes gamma count rate (in cps), exposure rate (in µR/hr), and soil uranium concentration (in pCi/g). A review of this report shows no “hot spots” or areas of concern in or along the RSJ with regards to radiometric contamination. While additional characterization work needs to be completed as described in this Work Plan, results of EPA’s radiological survey provide useful information and can be used to support the findings of this Plan.

2.0 Scope of Work

A Work Plan regarding the characterization of San Mateo Creek was submitted to and reviewed by NMED in January 2011. That Work Plan described in detail work that needed to be completed to characterize San Mateo Creek in order to accept discharge water from the Roca Honda Mine. San Mateo Creek received discharge from various uranium mines in the past and there was concern about possible remobilization of contaminants from mine water discharge. The same concerns do not apply to the RSJ, so while the general methods of characterization presented in the January 2011 Work Plan will be similar, the extent of characterization required is less exhaustive.

NMED requested in a letter dated July 27, 2010 that RHR accomplish the following two tasks for the characterization of San Mateo Creek.

1. Develop a comprehensive plan for sampling both shallow alluvial groundwater and sediments within San Mateo Creek, including sampling at various depth to address vertical heterogeneity.
2. Demonstrate that applicable surface water standards will not be exceeded as a result of the discharge.

This work plan will address the same tasks only as related to the RSJ rather than San Mateo Creek.

Strathmore's (now Energy Fuels) SOP-007 "Sediment Sampling" was relied on for development of this Work Plan. SOP-007 summarizes the technical guidance provided in the USEPA and USGS documents listed in the References. Additional SOPs were also used in development of this Work Plan, and are mentioned below where necessary.

2.1 Task 1 – Identify Sediment Sampling Locations

RHR will concentrate on defining the existing (i.e., baseline) chemistry of the Rio San Jose sediments. This task will identify sampling locations to capture baseline data above and below the proposed discharge point.

Selection of sample sites within the streambed will take into account the fact that under non-flood conditions the Rio San Jose is normally dry or slightly saturated, from the proposed RHR discharge point through the city of Grants. RHR sample locations will be selected to: 1) determine existing conditions in the RSJ; and 2) obtain representative samples of RSJ alluvium at regular intervals. If necessary, the proposed locations will be adjusted based on site access, property boundaries, and surface obstructions. The field team will observe the area to be sampled and select a cross-section upstream of visible signs of trash, culvert entries, bridges, and slumping banks, areas where the potential for atypical sediment contamination is high. Due to a lack of tributaries upstream of the discharge point, only the RSJ channel will be sampled. As stated above the main two sources of water in the RSJ upstream of the discharge point are Bluewater Creek and Mitchell Draw.

At each sample location several depositional zones representing upstream influences and various flow regimes will be sampled; e.g., left bank, right bank, and center channel. In order to accomplish this, each sample location will be transected and 6 to 10 sub-samples will be collected from the same depth along the transect and mixed to form a composite sample. Samples will be collected and composited at two depths: 0.5 and 1.5 feet below streambed surface. The number of samples from each transect will be based on the areal size of the channel; that is, the wider the channel, the greater the number of sub-samples collected. Compositing sub-samples from the same depth across a stream transect will smooth the local scale variability and provide samples that are more representative of the average or mean contaminant concentrations at that depth.

The sample collection strategy for bed sediment focuses on obtaining samples of sediments from natural depositional zones, i.e., locations in streams where the energy regime is low and fine-grained particles accumulate in the stream bed. Depositional zones can cover large areas at some sites and small pockets at other sites.

The approximate locations of the ten (10) sediment sampling sites are shown in Figure 2-1. The proposed RHR treated mine water discharge point is indicated as a reference point. The first two sample locations are located upstream from the proposed discharge and will be used to determine the contamination, if any, in sediments upstream of the proposed discharge. Sample location three is located at the current proposed discharge location. Six of the remaining seven locations are in the channel of the RSJ and will be used to determine baseline quality of the stream bed and determine the extent of contamination, if any, downstream of the discharge point. One of the sample locations is at the USGS gaging station 08343000 and another is at the former discharge location of the city of Grants wastewater treatment facility. The final sample location is in a tributary to the RSJ coming out of Lobo Canyon. This location was selected to determine the contamination, if any, being contributed by tributaries to the RSJ.

To date none of these sample locations have been field checked for access or suitability. The exact locations of the samples are subject to change, but the number and purpose of these samples will not.

2.2 Task 2 – Collect Sediment Samples for Analysis

2.2.1 General Sampling Procedures

The following procedures will be performed before the field team enters the first location or collects the first sample. The Field Leader will secure permission to enter the property and explain to the land owners what work is being conducted. Additional steps that will be performed before sampling such as health and safety and quality assurance and quality control briefings are discussed in Section 3 of this Work Plan. The details of equipment decontamination and sample handling/chain-of-custody are discussed in Strathmore Standard Operating Procedures (SOPs) Nos. 003 and 006 (adopted by Energy Fuels).

Stakes or flags will be used to identify and mark the sampling locations prior to sample collection. Field personnel will use topographic maps and aerial maps on which the sample sites have been identified and global positioning system (GPS) coordinates noted, so that future samples could be collected at the same locations if desired. Walking and placement of non-sampling equipment in the sample collection area will be avoided.

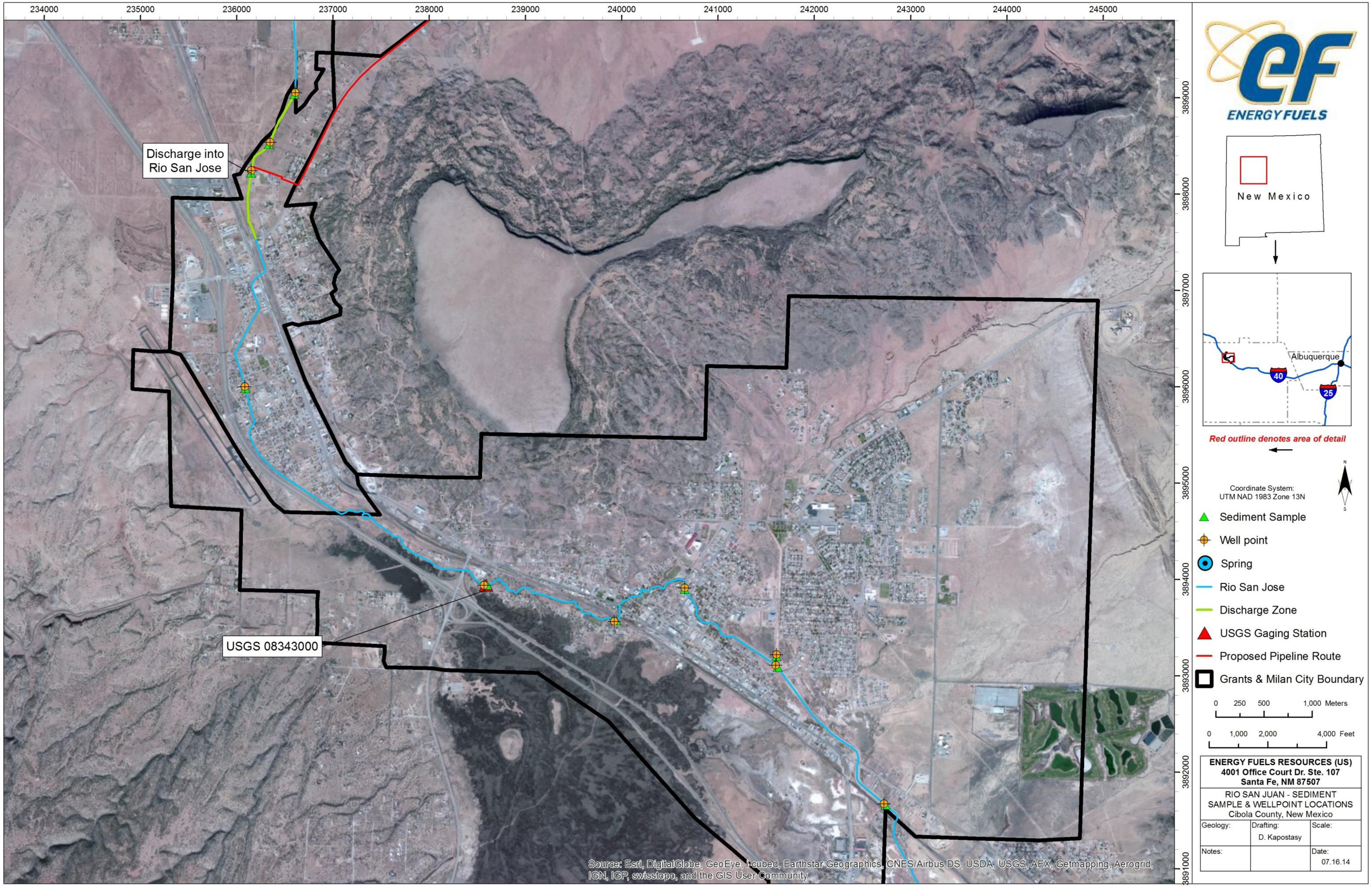

Figure 2-1. Sediment and Well Point Location Ma

2.2.2 Equipment Cleaning

All equipment will be cleaned prior to field activities and between sample sites. Initial cleaning procedures are designed to remove paper, glue, plasticizers, oils, and metals from the new sampling and processing equipment. The clean equipment will be separated and stored in a plastic bag. Dedicated equipment for sediment samples is impractical due to the large number of sediment samples which will be required. An extra set of equipment will be available if equipment is damaged or lost. Sampling equipment will be cleaned between samples in the field (SOP-003).

2.2.3 Sample Collection

Sample sites will be photographed and GPS coordinates recorded before samples are collected. A diagram of the sampling location will be recorded in the field logbook. The date and time of sample collection, sample number, sample team members, weather conditions, air temperature, sample container, sample collection method, sample volume, and field observations will be recorded in the field logbook and other appropriate forms. The volume of sample to be collected is a function of the analytical requirements, as provided by the analytical laboratory.

This Work Plan proposes sediment sampling at 0.5 feet and at 1.5 feet below the surface. The spoon and scoop method for shallow samples and the auger method for below surface samples are both discussed in Strathmore SOP-007 (adopted by Energy Fuels), *Sediment Sampling*. Sieving will be conducted at the analytical laboratory and the quantity of sample requested by the laboratory will account for the sieving losses. The sample locations will be left as they were found by placing any waste in trash bags and carrying it back to the vehicle for proper disposal. Excess sediment from auger holes will be replaced in the hole to not leave an open hazard to wildlife or cattle.

2.2.4 Sample Processing

Sediment samples for several types of analyses can be processed from the composite sample. The analytical laboratory will sieve a portion of the sample to less than 63 micron and analyze for trace elements, major ions, and organic and inorganic carbon. A second portion will be sieved to less than 2.0 mm and analyzed for organic contaminants, total-organic carbon, total-inorganic carbon, and percent moisture. The third portion will also be sieved to less than 2.0 mm and analyzed for percent particle-size distribution less than 63 micron (sand/silt). Samples will be properly packaged, documented and shipped to the laboratory. Chain-of-custody forms will be maintained for each complete sample.

Appendix B to this Work Plan presents the analytical methods to be used for the sediment samples and also includes methods for water samples discussed in the following section. Appendix C is a table of the proper containers, preservation and holding times for sediment and water samples.

2.3 Task 3 – Install Well Points/Monitor Wells at Selected Locations

The installation of small diameter wells using well points will aid in determining whether the alluvium of the Rio San Jose is saturated. Well points will allow the measurement of water levels to construct a water table map and the collection of water samples to characterize the existing chemistry of the groundwater in the alluvium if sufficient quantities are present. Figure 2-1 shows the proposed ten (10) well point locations. Well point locations were selected to be in the same locations as sediment samples so that comparisons can be made between sediment chemistry and water chemistry at certain locations.

Prior to installation of the well points, stakes or flags will be used to identify and mark the sampling locations. Field personnel will use topographic maps and aerial maps on which the sample sites have been identified and GPS coordinates noted and will verify that they are at the correct site(s).

A soil auger will be used to remove the initial 10 or 20 feet of alluvial material from the well point site. The well point will then be driven into the bottom of the prepared hole as deeply as possible or at least 2 feet and preferably 5 feet below the water table.

2.4 Task 4 – Collect Water Level Data and Water Samples from Well Points/Monitor Wells

Water levels will be measured in the well point wells. If a sufficient number of water levels can be obtained, a water table map of the alluvial groundwater system will be constructed.

Assuming sufficient quantities of water to facilitate sampling, groundwater from the well points will be sampled by use of a portable pump. Groundwater sampling procedures outlined in Strathmore SOP 002 (adopted by Energy Fuels) will be followed, and the samples will be sent to an accredited laboratory. The analytical methods for water samples are presented in Appendix B and the collection containers, preservation techniques, and holding times for water samples are presented in Appendix C. The three sample locations used for sediment organic analysis will be used for organic analysis in the three groundwater samples if groundwater can be collected.

2.5 Determine Saturated and Unsaturated Water Chemistry after Treated Water Discharge

RHR will discharge water that meets WQCC and NPDES standards. A bench scale test is currently underway, which will confirm the quality of effluent water being discharged into the Rio San Jose. The water will have a near neutral pH meaning that it would contribute less to the remobilization of constituents than rain water, which typically is slightly acidic. The continual flow of clean water will raise the alluvial static water level and recharge aquifers at various locations along the stream channel just as natural storm water flows would. Data collected under the Groundwater Monitoring Plan will be compared to the data collected under of the previously described tasks to determine whether changes in groundwater chemistry occur due to discharge of treated mine water.

2.6 Determine Treated Water Discharge Effect on Surface Water Quality

The water discharged from the RHR mine will be treated with barium chloride, filtered to remove solids, and processed through an ion exchange facility as necessary to remove any constituents of concern. The treated water will be sampled and analyzed in accordance with approved permit requirements. Except during times of high precipitation, RSJ is ephemeral/intermittent through the village of Milan and city of Grants. Under non-flood conditions, the entire flow of RSJ below the RHR discharge point will likely consist of treated mine water. WQCC surface water standards in RSJ will therefore not be exceeded if the quality of the treated mine water does not exceed standards.

3.0 Project Requirements

3.1 Personnel and Equipment

The equipment required to implement the tasks identified in Section 2 of this Work Plan is specified in the applicable Strathmore SOPs (adopted by Energy Fuels), or in the operating procedures supplied by the subcontractors performing the work (if applicable). Personnel will be designated by RHR prior to commencing field activities.

3.2 Health and Safety

The field work will be performed in accordance with the Energy Fuels Health and Safety Program. A qualified health and safety representative will conduct health and safety briefing before field work begins for all staff involved in the sampling activities. The representative will assign the field leader to conduct daily reminders every morning before work begins for as long as the sampling continues. The briefings will be noted in the log book.

3.3 Environmental Compliance

No federal or state environmental regulations are applicable for the sediment sampling or well point installation and sampling, however, the various guidelines listed under "References" will be utilized to collect and analyze the samples. Permissions for access will be obtained and the property and any livestock will be respected by not disturbing any more area than necessary and not leaving trash.

3.4 Quality Assurance/Quality Control

All work on the task will comply with the requirements of the Strathmore SOPs (adopted by Energy Fuels). Quality control will be provided through the use of qualified, trained personnel using tested procedures and properly maintained equipment. The following specific quality assurance requirements apply to this task:

- Planning: Copies of the Work Plan and applicable procedures will be reviewed by the personnel assigned to the task.
- Responsibilities: Responsibilities and authorities will be assigned between Energy Fuels and subcontractor personnel.
- Training: The Field Leader will brief all field personnel on health and safety and quality assurance before the work begins and document the briefings in the log book.
- Documentation: The Field Leader will maintain a field log book of the daily activities.
- Samples Control: The samples collected will be handled and labeled according to SOP 006.
- Analyses: The samples will be analyzed by an EPA certified commercial laboratory.

Quality data begins with this detailed Work Plan as guidance for the sampling effort. The Field Leader will be experienced and the field members will be trained to the Work Plan. The procedures and guidance from references for selecting the sample locations, for cleaning of equipment, for collection of samples, for preservation and shipping samples will be followed. The sample analyses will be performed by an EPA certified analytical laboratory. Field instruments and equipment will be operated in accordance with manufacturer instructions. If equipment calibration is required it will be completed before sampling begins and on a regular basis if required by the manufacturer. Field duplicate samples will be taken as a quality control measure and recorded in the log book.

The Field Leader will be responsible for the field log and will train any field members not familiar with log book protocols. Information to be recorded daily includes weather, field conditions at each sample location, personnel involved, sample numbers, sample quantities, photos, GPS coordinates, equipment malfunctions, calibration details, deviations in procedures, and reference to Chain of Custody forms and shipping information. Any additional information the field team believes would be useful for interpretation of results will be recorded.

3.5 Schedules and Deliverables

The implementation of the field sampling will begin after approval of this Work Plan. The actual schedule will remain flexible to accommodate staffing, budgets, and avoid rainy periods. The results of the field tests and the analyses will be incorporated in the Discharge Plan, and/or documents or reports required by the NMED or other regulatory agencies.

4.0 References

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Appendix A

Water Quality Data from USGS Gaging Station 08343000

Water Quality Data for USGS Gaging Station 08343000

Parameter	Unit	Sample-1	Sample-2	Sample-3	Sample-4	Sample-5	Sample-6	Sample-7	Sample-8
Sample Date		10/2/1973	10/11/1973	04/18/1980	04/19/1980	04/22/1980	04/29/1980	01/13/2004	08/05/2010
Sample Time		10:15	15:15	16:25	13:35	15:05	13:15		16:00
Water Temp.	˚C	10	16	14	14	16	4.5		21.5
Discharge Vol.	cfs	7.2	4.6	45	163	246	76		109
Gage Ht.	ft								3.78
Conductivity	us/cm	1210		510		310	300		
Hydrogen Ion	mg/l			0.00003		0.00002	0.00001		
pH				7.6		7.8	8		
CO2	mg/l			6.4		3			
Carbonate	mg/l			130		97			
Total Nitrogen	mg/l			15		2			
Organic N	mg/l			14		1.6			
Ammonia as N	mg/l			0.15		0.34			
Ammonia + Organic N as N	mg/l			14		1.9			
Nitrate + Nitrite unfiltered	mg/l			1.1		0.13			
Nitrate + Nitrite filtered	mg/l			0.69		0.1			
Orthophosphate	mg/l			0.34		0.12			
Phosphorous as P	mg/l			3.8		0.61			
Orthophosphate as P	mg/l			0.11		0.04			
Organic Carbon	mg/l		2	160		33			
Hardness	mg/l			250		130			
Noncarbonate Hardness	mg/l			120		35			
Calcium	mg/l			75		39			
Magnesium	mg/l			16		8.4			
Sodium	mg/l			13		5.9			
Sodium Adsorption Ratio	number			0.4		0.2			
Sodium fraction of cations	%			10		9			
Potassium	mg/l			11		2.4			
Chloride	mg/l			12		2.7			
Sulfate	mg/l			130		49			
Fluoride	mg/l			0.3		0.3			
Silica	mg/l			1.9		39			
Boron	mg/l			80	50	50			
Boron, Suspended	mg/l				60				
Boron - unfiltered	mg/l				110				
Molybdenum	mg/l				0				
Molybdenum, Suspended	mg/l				0				
Molybdenum - unfiltered	mg/l				0				
Vanadium	mg/l				5				
Selenium	mg/l			1	1	0			
Selenium, suspended	mg/l				1				
Selenium - unfiltered	mg/l				2				
Gross Alpha					5.6		2.7		
Gross Alpha, suspended					82		15		
Gross Beta					6.2		4.2		
Gross Beta, suspended					120		14		
Radium - 226					0.13		0.07		
Gage height above datum	m								1.15
Instantaneous Discharge	cms	0.2	0.13	1.3	4.6	7	2.2		3.1
Fecal coliform	colonies/100 ml	8	1						
Dissolved Solids	mg/l			356		172			
Dissolved Solids (sum)	mg/l			341		206			
Dissolved Solids	t/day			43.3		114			
Dissolved Solids	t/ac-ft			0.48		0.23			
Suspended Sed.	% < 0.0625mm			99	95	91	60		
Ammonia as NH4	mg/l			0.18		0.41			
Phosphorous as P	mg/l			12		1.9			
Nitrate as N	mg/l			67		9			
Gross Alpha	um/l				8.2		4		
Gross Alpha, suspended	um/l				120		22		

Water Quality Data for USGS Gaging Station 08343000

Parameter	Unit	Sample-1	Sample-2	Sample-3	Sample-4	Sample-5	Sample-6	Sample-7	Sample-8
Gross Beta	pCi/l				5.9		4		
Gross Beta, suspended	pCi/l				110		13		
Suspended Sed.	mg/l			8300	4050	1290	524		
Suspended Sed. Discharge	t/day			1010	1780	857	108		
Specific Conductance	us/cm							990	291

Appendix B

Analytes and Methods to be Used in Water/Sediment Sampling

Analyte	Method for Determination in Water (EPA* or SMEWW**)	Lab detection limits for Water (mg/L unless noted)	Method for Determination in Sediment	Lab Detection Limits for Sediments(mg/L unless noted)
Suspendable or settleable solids	SMEWW Method 2540F		NA	
Floating solids	SMEWW Method 2530B		NA	
Oil and grease	SW846 Method 1664A		SW846 Method 9071B	
Particle size analysis/texture			ASA 15-5	1(%) 1 (%)
Moisture			D2974	0.1 (%)
pH	EPA Method 150.1/A 4500 H B	0.01 (s.u.)	ASAM 10-3.2	0.01
Color	SMEWW Method 2120B	5.0 (c.u.)	NA	5.0
Odor	SMEWW Method 2150B	1 (T.O.N.)	NA	1
Hardness as CaCO3	A2340B	1	NA	1
Concentrations of plant nutrients	See specific methods below		See specific methods below	
E. coli	A9223 B		NA	
Toxic pollutants	See specific methods below		See specific methods below	
Radioactivity	See specific methods below		See specific methods below	
Pathogens	See specific methods below		NA	
Temperature	Field Measurement; SMEWW Method 2550B		NA	
Turbidity	Field Measurement using EPA Method 180.1		NA	
Conductivity	A 2510 B/EPA Method 2510B	1 (umhos/cm)		
Solids, TDS @ 180C	Field Measurement using SMEWW Method 2540B	10	NA	10
Dissolved gases (nitrogen, oxygen, and ammonia)	Field Measurement		SMEWW Method 2710B	
MAJOR IONS				
Alkalinity, Total as CaCO3	E310.1/A2320 B	1.0	NA	
Carbonate as CO3	E310.1/A2320 B	1.0	NA	
Bicarbonate as HCO3	E310.1/A2320 B	1.0	NA	
Hydroxide as OH	E310.1/A2320 B	1.0	NA	
Calcium	EPA Method 200.7	1	Total. SW846 Method 6010B	
Chloride	EPA Method 300.0	1	E300.0	
Fluoride	A4500-F C/Technicon 370-7WE	0.1	A4500-F C	
Magnesium	EPA Method 200.7	1	Total. SW846 Method 6010B	
Nitrogen, Nitrate as N	EPA Method 353.2	0.1	NA	
Nitrogen, Nitrate+Nitrite as N	EPA Method 353.2	0.1	NA	
Nitrogen, Kjeldahl Total as N	EPA Method 351.2	0.5	NA	
Potassium	EPA Method 200.7	1	Total. SW846 Method 6010B	
Sulfate	EPA Method 300.0	1	E300.0	
NON-METALS				
Cyanide, Total	Kelada-01	0.005	NA	
Phosphate	SMEWW Method **365.1**		NA	
METALS DISSOLVED				
Aluminum	EPA Method 200.7	0.1	Total. SW846 E6010.20	0.5

Analyte	Method for Determination in Water (EPA* or SMEWW**)	Lab detection limits for Water (mg/L unless noted)	Method for Determination in Sediment	Lab Detection Limits for Sediments(mg/L unless noted)
Antimony	EPA Method 200.8	0.05	Total. SW846 E6010.20	0.5
Arsenic	EPA Method 200.8	0.001	Total. SW846 E6010.20	0.5
Barium	EPA Method 200.8	0.1	Total. SW846 E6010.20	0.5
Beryllium	EPA Method 200.7	0.01	Total. SW846 E6010.20	0.5
Boron	EPA Method 208.7	0.1	Total. SW846 E6010.20	0.5
Cadmium	EPA Method 208.8	0.01	Total. SW846 E6010.20	0.5
Chromium	EPA Method 208.8	0.05	Total. SW846 E6010.20	0.5
Cobalt	EPA Method 208.8	0.01	Total. SW846 E6010.20	0.5
Copper	EPA Method 208.8	0.01	Total. SW846 E6010.20	0.5
Iron	EPA Method 208.8	0.03	Total. SW846 E6010.20	0.03
Lead	EPA Method 208.8	0.05	Total. SW846 E6010.20	0.05
Manganese	EPA Method 200.7	0.01	Total. SW846 E6010.20	0.01
Mercury	Total. Not filtered and analyzed by EPA Method 245.1	.0001	Total. SW846 Method 7471B	0.05
Molybdenum	EPA Method 200.8	0.1	Total. SW846 E6010.20	0.5
Nickel	EPA Method 200.8	0.05	Total. SW846 E6010.20	0.5
Selenium, total recoverable	Not filtered and analyzed by EPA Method 200.8	0.001	Total. SW846 E6010.20	0.5
Silver	EPA Method 200.8	0.01	Total. SW846 E6010.20	0.5
Thallium	EPA Method 200.8	0.1	Total. SW846 E6010.20	0.5
Uranium	EPA Method 200.8	0.0003	Total. SW846 E6010.20	0.5
Vanadium	EPA Method 200.8	0.1	Total. SW846 E6010.20	0.5
Zinc	Dissolved. Filtered and analyzed by EPA Method 200.8	0.01	Total. SW846 E6010.20	0.5
METALS-TOTAL				
Uranium	EPA Method 200.8	0.0003	Total. SW846 E6010.20	0.5
RADIONUCLIDES-TOTAL				
Gross alpha	E900.0		EPA Method 900.1	0.1
Radium 226	E903.0		EPA Method 903.0	
Radium 226 +Radium 228	Calculation		EPA Method 903.0 and 904.0 modified	
Radon-222	ASTM D5072-09	100	NA	
Strontium 90	EPA Method 905.0		EPA Method 905.0	0.5
Thorium	EPA Method 907.0		EPA Method 908.0	0.1
Tritium	EPA Method 906.0			
ORGANOCHLORINE PESTICIDES				

Analyte	Method for Determination in Water (EPA* or SMEWW**)	Lab detection limits for Water (mg/L unless noted)	Method for Determination in Sediment	Lab Detection Limits for Sediments(mg/L unless noted)
2,3,7,8-TCDD dioxin	EPA Method 1613B		SW846 Method 8290	
Aldrin	EPA Method 608		SW846 Method 8081A	0.00170 (mg/kg)
alpha-BHC	EPA Method 608		SW846 Method 8081A	0.00170 (mg/kg)
beta-BHC	EPA Method 608		SW846 Method 8081A	0.00170 (mg/kg)
gamma-BHC (Lindane)	EPA Method 608		SW846 Method 8081A	0.00170 (mg/kg)
Chlordane	EPA Method 608		SW846 Method 8081A	0.0170 (mg/kg)
4,4'-DDT and derivatives	EPA Method 608		SW846 Method 8081B	0.00170 (mg/kg)
Dieldrin	EPA Method 608		SW846 Method 8081A	0.00170 (mg/kg)
Alpha-Endosulfan	EPA Method 608		SW846 Method 8081A	0.00170 (mg/kg)
Toxaphene	EPA Method 608		SW846 Method 8081A	0.167(mg/Kg)
PCBs	EPA Method 608		SW8082	0.00170 (mg/kg)
SYNTHETIC ORGANIC COMPOUNDS				
1,2,4 Trichlorobenzene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
1,2 Diphenylhydrazine	EPA Method 625		SW846 Method 8270C	
1,2,4,-Trichlorobenzene	EPA Method 625		SW846 Method 8270C	
1,3-Dichlorobenzene	EPA Method 625		SW846 Method 8270C	0.33 (mg/kg)
2-Methyl-4, 6-dinitrophenol	EPA Method 625		SW846 Method 8270C	
2,4,6-Trichlorophenol	EPA Method 625		SW846 Method 8270C	0.33 (mg/kg)
2,4-Dichlorophenol	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
2,4-Dimethylphenol	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
SYNTHETIC ORGANIC COMPOUNDS				
2,4-Dinitrophenol	EPA Method 625	10	SW846 Method 8270C	1.7 (mg/kg)
2,4-Dinitrotoluene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
2-Chloronaphthalene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
2-Chlorophenol	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
3,3', Dichlorobenzidine	EPA Method 625	10	SW846 Method 8270C	0.67 (mg/kg)
Acenaphthene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Anthracene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Benzidine	EPA Method 625	20	SW846 Method 8270C	0.33 (mg/kg)
Benzo(a)anthracene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Benzo(a)pyrene	EPA Method 625	10	SW846 Method	0.33 (mg/kg)

Analyte	Method for Determination in Water (EPA* or SMEWW**)	Lab detection limits for Water (mg/L unless noted)	Method for Determination in Sediment	Lab Detection Limits for Sediments(mg/L unless noted)
			8270C	
Benzo(b)fluoranthene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Benzo(k)fluoranthene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Bis(2-chloroethyl) ether	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Bis(2-chloroisopropyl) ether	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Bis(2-ethylhexyl) phthalate	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Butylbenzyl phthalate	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Chrysene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Dibenz(a,h)anthracene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Di-n-butyl phthalate	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Diethyl phthalate	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Dimethyl phthalate	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Fluorene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Fluoranthene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Hexachlorobenzene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Hexachlorobutadiene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Hexachlorocyclopentadiene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Hexachloroethane	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Ideno(1,2,3-cd)pyrene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Isophorone	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Nitrobenzene	EPA Method 625		SW846 Method 8270C	0.33 (mg/kg)
N-Nitrosodimethylamine	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
N-Nitrosodi-n-propylamine	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
N-Nitrosodiphenylamine	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Penta-chlorophenol	EPA Method 625	10	SW846 Method 8270C	1.7 (mg/kg)
Penanthrene	EPA Method 625	10		
Phenol	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)
Pyrene	EPA Method 625	10	SW846 Method 8270C	0.33 (mg/kg)

*EPA U.S.	Environmental Protection Agency
**SMEWW	Standard Methods for the Examination of Water and Wastewater
NA	Not applicable

Appendix C

Analytical Method, Container, Preservation, and Holding Time Requirements

Analytical Method	Analyte	Containers P=Plastic G=Glass	Preservation	Holding Times
Water Samples				
EPA Method 1103.1	E. coli	P	None	24 hours
SMEWW Method 2540F	Suspendable or Settleable Solids (water)	P or G	Cool, 4 °C	7 days
SMEWW Method 2530B	Floating solids (water)	P	None	7 days
SW846 Method 1664A	Oil and Grease (water)	G	H_2SO_4 to pH<2 cool, 4 °C	20 days
SMEWW Method 2120B	Color	P or G	Cool, 4 °C	NA
SMEWW Method 2150B	Odor and Taste	G	None	48 hours
EPA Method 200.7	Metal ions by ICP (filtered water)	P or G	Filter (0.45 micron), then add HNO_3 to pH<2	6 months
EPA Method 200.7	Metal ions by ICP (unfiltered water)	P or G	HNO_3 to pH<2	6 months
SMEWW 4500-Cl G	Residual chlorine (water)	P or G	None	Analyze immediately
SMEWW Method 4500 CN^- I (macro distillation, colorimetric finish).	Cyanide (weak acid dissociable) (water)	P or G	N_2O_4 to pH>12 cool, 4 °C	14 days
SMEWW Method 4500 CN-C	Cyanide dissolved (water)	P or G	N_2O_4 to pH>12 cool, 4 °C	14 days
SMEWW Method 353.1	Nitrite (water)	P or G	Cool, 4 °C	48 hours
SMEWW Method 353.2	Nitrate (water)	P or G	Cool, 4 °C	48 hours
SMEWW Method 4500-Norg B	TKN (water)	P	H_2SO_4 to pH<2, cool, 4 °C	28 days
SMEWW Method **365.1**	Phosphate (water)	P or G	H_2SO_4 to pH<2, cool, 4 °C	28 days
EPA Method 200.8	Uranium (water)	P or G	HNO_3 to pH<2	6 months
SMEWW 7110C	Adjusted gross alpha (water)	P or G	HNO_3 to pH<2	6 months
SMEWW Methods 903.0 and 904.0	Radium 226 + Radium 228 (water)	P or G	HNO_3 to pH<2	6 months
SMEWW Method 7500-Rn B	Radon-222 (water)	G	Cool, 4 °C	4 days
EPA Method 608	Organochlorine Pesticides (water)	G	None	7 days
EPA Method 100.1	Asbestos (water)	P	None	48 hours
SMEWW Method 625	Semivolatile Organics (water)	G	$Na_2S_2O_3$	7 days extraction, 40 days analysis
SMEWW Method 624	Volatile Organic Compounds (water)	VOA vials	HCL<2	14 days
EPA Method 1613B	2,3,7,8-TCDD Dioxin (water)	G	None	21 days