WATER AND WASTEWATER PLAN

PIÑON RIDGE MILL FACILITY
MONTROSE COUNTY, COLORADO

Submitted To

Colorado Department of Public Health and Environment
Radiation Management Program
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Submitted and Prepared By

ENERGY FUELS RESOURCES CORPORATION

44 Union Boulevard, Suite 600
Lakewood, Colorado 80228

October 2009

1.0 Introduction **1-1**

2.0 Water Supply **2-1**

2.1 Non-Potable Water **2-1**

Production Well Field Supply 2-1
Contingency Water Supply 2-2

2.2 Potable Water Supply **2-3**

3.0 Water Systems **3-1**

3.1 Mill Production Water System (non-potable) **3-1**

3.2 Potable Water Systems **3-2**

4.0 Wastewater Systems **4-1**

4.1 Mill Tailings **4-1**

4.2 Mill Wastewater **4-1**

4.3 Administration Building Wastewater **4-2**

List of Figures

Figure 1.1	Site Layout
Figure 2.1	Water Supply System
Figure 2.2	Off-Site Water Supply Locations
Figure 3.1	Supply Water and Wastewater Flow Diagram
Figure 3.2A	Administration Building Potable and Septic Systems
Figure 3.2B	Mill Facility Potable and Septic Systems

List of Appendices

Appendix A	Contingency Water Supplies
Appendix B	Absorption Field Septic System Design – Kleinfelder

Units of Measure and Abbreviations

%	Percent
CCD	Counter-Current Decantation
Energy Fuels	Energy Fuels Resources Corporation
Golder	Golder Associates, Inc.
gpm	Gallons per minute
LCRS	Leak Control and Recovery System
PW	Production Well
RWST	Raw Water Storage Tank
SAG	Semi-Autogenous Grinding
SX	Solvent Extraction

1.0 Introduction

The Piñon Ridge Mill site, owned by Energy Fuels Resources Corporation (Energy Fuels), is located in Montrose County, Colorado between the towns of Bedrock and Naturita. The mill site consists of two separate facilities. The first is the Administration Building located in the northeast corner of the property. The second is the Mill Facility consisting of the processing area in the south central portion of the property and tailings cells and evaporation ponds extending through the central and north central portion of the property, respectively. The site layout showing both the Mill Facility and Administration Building is presented in Figure 1.1. The Mill Facility will be used to process uranium and vanadium ores and dispose of solid and liquid wastes generated during processing. The Administration Building will provide offices for mine and mill personnel.

The Water and Wastewater Plan describes the water supply, water consumption, wastewater streams, and water recycling streams at the facilities. The Mill Facility and Administration Building will require potable and non-potable water. This plan discusses the primary and contingency non-potable water supply sources, the potable water source, and the quantities of water required for the mill processes. The plan also discusses the water delivery systems and quantities of water provided by those systems. The plan concludes by describing the wastewater systems and recycling systems employed at the facilities.

2.0 Water Supply

This section provides additional detail regarding the supply of water to the Piñon Ridge Mill. The water is supplied by two systems. The first is non-potable water for mill processing, dust suppression, truck and equipment washing, and fire suppression. The second is potable water for bathrooms, showers, and laboratory needs.

2.1 Non-Potable Water

The Non-Potable Water is supplied to the mill from two sources. The main source is a well field located to the south and west of the Mill Facility. Contingency water supplies were also identified to provide backup for the production well field in the event it does not produce sufficient quantities of water needed for processing.

Production Well Field Supply

A deep production well field will provide the primary supply of non-potable water to the Piñon Ridge Mill. The water was identified by Golder Associates Inc. (Golder) under contract with Energy Fuels to characterize the groundwater and evaluate the potential supply. Groundwater exploration borings were drilled and pump tested to characterize the local groundwater systems and to determine the optimum location to drill production wells. Golder identified a 40 foot to 80 foot thick aquifer in the Chinle and Moenkopi formations in the southwestern portion of the site. The aquifer is recharged from Davis Mesa. Groundwater is present at the toe of Davis Mesa, but absent in areas closer to the center of the valley including areas under most of the tailings cells and all of the evaporation ponds due to the influence of the salt and gypsum dome uplift present in the center of the valley.

Three production wells were subsequently completed with two on the south end of the mill site and a third located on adjoining private property to the west. These wells are designated PW-1, PW-2, and PW-3, and are shown on Figure 2.1. Up to four additional wells will be drilled in the area designated on the map in Figure 2.1 for future production well locations.

Based on an aquifer pump test conducted at the three production wells and subsequent modeling, Golder determined that the aquifer is capable of providing 104 gallons per minute (gpm) to 175 gpm on a sustainable basis (Golder 2008).

Eastern Paradox Valley where the mill site is located is designated by the Colorado Division of Water Resources as a non-critical area; therefore, neither augmentation nor a water right is required to use the water. Energy Fuels has, however, filed water

rights with the intent to secure a priority for these wells. The groundwater in the Chinle and Moenkopi Formations is tributary to the Dolores River.

The non-potable water supply will be required for process water in the mill, to provide fire suppression water, and for dust suppression on the property. The water provided from the production field will not meet drinking water standards. Energy Fuels will evaluate the cost to treat the water to potable water standards, but currently plans to provide potable water from another source (see section 2,2).

Based on a study done by CH2M Hill (Basic Engineering Report and Cost Estimates, February 2009), the mill will require 130 gpm for the mill process. The fire suppression system, truck wash system, and dust suppression system will require an additional 11 gpm. The total mill needs are estimated to be 141 gpm of non-potable water during operations.

A comparison of the production field water production rates and the design mill water requirements shows that the well field should meet most if not all of the mill's non-potable water needs. In a worse case situation, where the field provides only 104 gpm, additional water would be required. As described below, Energy Fuels has developed several contingency water supplies in the event that additional non-potable water is needed.

Contingency Water Supply

Contingency water supplies have been identified in the event that the deep production wells cannot sustain the 141 gpm of non-potable water required by the mill. The Town of Naturita has agreed to furnish up to 150,000 gallons of untreated water per 24-hour period (equivalent to 104 gpm) from their existing raw water rights for a period up to 40 years. The Town of Naturita's water originates from the San Miguel River and is suitable for mill use. The letter agreement from the town of Naturita, dated June 3, 2009, and a copy of the Town of Naturita water rights for this water are provided in Appendix A.

The proposed haul route from Naturita to the mill is 14 miles in length. The untreated water would be obtained from the Old Water Treatment Plant and trucked to the mill in 5,500 gallon water trucks. Assuming that 37 gpm of additional makeup water is needed (i.e., 141 gpm consumed – 104 gpm from the well field), about 10 truck loads of non-potable water would need to be delivered each day The water supply location of the Old Water Treatment Plant in Naturita can be seen in Figure 2.2.

Reams Construction, in their letter dated May 29, 2009, also agreed to sell and deliver raw water to the mill from their senior water rights on Naturita Creek and the San

Miguel River. Reams Construction has a fleet of 5,500-gallon tankers that provide water to companies and domestic users in the region. The letter from Reams Construction and copies of their water rights are also provided in Appendix A.

2.2 Potable Water Supply

This section of the plan describes the potable water supply sources and quantities of water required for the Mill Facility and Administration Building.

Potable water will be supplied for water coolers, showers, sinks, bathrooms, and laboratory use at the Mill Facility. Potable water will be supplied for water coolers, showers, and bathrooms at the Administration Building.

The potable water consumption was estimated to be 30,000 gallons per week by CH2M Hill, which equates to approximately three (3) gpm. The 30,000 gallons per week will meet the consumptions needs of the 25 day-shift personnel at the Administration Building and Mill Facility and the 60 personnel on rotating shifts at the mill (i.e., four 15-person crews). The reference calculations can be found in the Addendum to the Special Use Permit Application for the Piñon Ridge Mill Facility submitted to Montrose County in April, 2009.

The water on-site does not meet drinking water standards and the cost to treat to standards is believed to be higher than importing water from the Town of Naturita's water treatment plant. The actual costs will be evaluated in the future. The current plan is to truck the water from the Town of Naturita in 5,500 gallon trucks to storage tanks at the Mill Facility and the Administration Building. There will be about 1 truck per day to provide this water. The truck will load at the Town of Naturita treated water facilities near the town hall (see Figure 2.2).

3.0 Water Systems

The Piñon Ridge Mill will have a non-potable water system that will supply 141 gpm of water to mill processes, fire suppression, and dust suppression. The potable water systems will supply three (3) gpm at the Mill Facility and Administration Building combined. The preliminary layouts and general operation of the systems are described in the following sections of the plan.

3.1 Mill Production Water System (non-potable)

Non-potable water will be supplied to the Piñon Ridge Mill Facility from a supply water tank, the mill Raw Water Storage Tank (RWST), within the mill property. The uses of the non-potable water include the mill production, fire suppression, and dust suppression. The supply water tank will be replenished from the primary and/or contingency water supplies discussed in section 2.1.

The non-potable water supply is provided by deep production wells located west and south of the Mill Facility. There are currently three wells installed as seen on Figure 2.1. Up to four additional future wells are planned for the area in the west. The submersible well pumps in the well field (i.e., area around PW-3) will pump to a 5,000 gallon sand tank located east of the wells. A booster pump will be provided to pump the water from the initial sand tank through the main pipeline to PW-1, where a second 5,000 gallon sand tank will be located. Another booster pump will pump the water on down the mainline past PW-1 to a 60,000 gallon storage tank located near PW-2. This tank will be supplied by the PW-3 well field area, PW-1, and PW-2. The well pump on PW-2 will allow direct filling of the 60,000 gallon storage tank. The production water will then gravity flow from the 60,000 storage tank into the mill's RWST located outside the Precipitation and Packaging Building.

The Contingency Supply of non-potable water trucked from the Town of Naturita to the mill site would be off-loaded at the Reagents Unloading Area where a booster pump can pump the water to the RWST.

The RWST has a capacity of 320,000 gallons, of which 180,000 gallons is dedicated to the Fire Suppression System. The supply water is pumped from the RWST via pipeline to points of use within the Mill Facility. The majority of the water is added as makeup water at the Semi-Autogenous Grinding (SAG) mill. The balance of the water is used for makeup water in the boilers, mixing of reagents, dust suppression on the roads and ore pad, gland water for centrifugal pumps, and minor uses within the solvent extraction and precipitation and packaging systems.

A flow diagram (Figure 3.1) shows the movement of the supply water as it becomes process water and flows through the mill system. There are numerous water conservation measures incorporated in the design to recycle water and reduce consumption. The design of the mill allows for a number of recycle circuits that minimize the use of additional water. As seen on Figure 3.1, the dashed lines represent the recycle circuits that are present in all major functional areas of the mill. The current mill process design has reduced water consumption by nearly 50% from the original design.

3.2 Potable Water Systems

Potable water is supplied to two distinct systems. The first is located at the Mill Facility and the other at the Administration Building. The systems are virtually identical. A 5,500 gallon water truck brings potable water from the Town of Naturita and fills the 12,000 gallon potable water storage tank at each facility. A booster pump supplies potable water to the potable water system at each site. The potable water tank at the Administration Building is located on the northwest side of the building as seen on Figure 3.2A. The potable water tank at the Mill Facility is located west of the Change House and Laboratory Building as seen on Figure 3.2B.

Recycling features are employed at the mill site. All of the gray water (i.e, wastewater from sinks, showers, and the laboratory area) is recycled through the Process Water Tanks as seen on Figure 3.1.

4.0 Wastewater Systems

This section provides an overview of the wastewater management practices at the Piñon Ridge Mill Facility and Administration Building. The mill process water flow and the resulting solid and liquid waste from processing are discussed. The sanitary sewer systems at both the Mill Facility and Administration Building are also discussed.

4.1 Mill Tailings

The milling process includes grinding and leaching the ore to liberate uranium and vanadium from the solid matrix. The metals enter into solution and are separated from the barren solid waste in the Counter Current and Decantation (CCD) thickeners. The metal-bearing solution flows from the top of the first thickener and is directed to the next step in the processing circuit. The solid waste, consisting predominantly of fine-grained sands, is pumped from the bottom of the last thickener to the tailings box. At the tailings box, the solids are mixed with barren waste water, referred to as raffinate (see below), and are then pumped to an active tailings cell. The tailings cells are permanent disposal facilities consisting of three liners with a leak collection and recovery (LCRS) system between the primary and secondary liners. In the tailings cell, the solids settle out of solution while most of the wastewater remains at the top of the tailings cell, where it is recovered and pumped back to the mill for reuse.

4.2 Mill Wastewater

Mill wastewater is created from three sources in the mill. The first is the barren process water that remains after the uranium and vanadium have been recovered from the process solution. The second is the gray water that comes from the sinks, showers, and laboratory drains. The third is the water from the commodes and urinals that is handled in the sanitary septic system.

Process Wastewater

The supply water enters the mill through the supply water system as described previously. Once the supply water is utilized in the milling process, it is termed process water. The process water is utilized in all areas of the plant and is recycled wherever practicable. After uranium and vanadium have been recovered from the process stream in the Solvent Extraction (SX) Building, the barren solution (i.e. raffinate) is pumped to the tailings box where it is used to dilute the tailings as described above. Excess raffinate, which contains high salt levels, is pumped to the evaporation pond where the water is allowed to evaporate and the salts precipitate out in the bottom of the lined ponds.

A large portion of the tailings water is recovered. A floating barge-mounted pump on top of the cell's water pool pumps process water back to the Return Water Tank in the mill for reuse. There is also a drainage layer above the tailings liner system that collects water that percolates through the tailings, which is then pumped back to the water pool on top. A portion of the wastewater remains entrained within the tailings solids.

During processing, a small amount of the process water evaporates from open storage tanks in the system or is exhausted from air pollution control scrubbers on process tanks. The flow diagram in Figure 3.1 reflects flow of the water from the supply system (light blue) to the process system (green), to the recycle system (green dashed). The makeup water that is added in the milling process represents about 40% of the total process flows (i.e. 130 gpm makeup water of 318 gpm process flows).

Gray Water

The gray water is used water from the showers, sinks, and laboratory. The gray water system is represented in Figure 3.1 by the gray dashed line. It should be noted that 100% of the gray water is recycled into the process water system through the process water tank. The source water for the gray water is the potable water system.

Septic System Wastewater

The sanitary septic system handles waste from the urinals and commodes in the mill. The 3,475 square foot septic system was designed by Kleinfelder to handle 3,885 gallons per day (Kleinfelder 2008). The design can be reviewed in the design report included in Appendix B of this document. The water from the potable water system flows to the bathrooms and then from the urinals and commodes into the septic system. The septic system layout and location can be seen on Figure 3.2B.

4.3 Administration Building Wastewater

The Administration Building has a potable water supply that feeds through the building. All building drains, water coolers, commodes and urinals drain to the sanitary septic system. The sanitary septic layout and location can be seen on Figure 3.2A. The 544 square foot system was designed by Kleinfelder to dispose of 608 gallons per day (Kleinfelder 2008). The design can be reviewed in the design report included in Appendix B of this document.

References:

Golder Associates, Inc., 2008. "Water Supply Evaluation, Piñon Ridge Project, Montrose County, Colorado." November.

Energy Fuels Resources Corporation, 2009. "Addendum to the Special Use Permit Application, Piñon Ridge Mill Facility, Montrose County, Colorado." April.

Kleinfelder, 2008. "Absorption Field Septic System Design Mill Facility and Administration Building, Piñon Ridge Project, Montrose County, Colorado." June 17.