Appendix E – Environmental Protection Measures
Energy Fuels Resources Corporation (“Energy Fuels”) plans to construct and operate the Piñon Ridge Mill Facility (the “Project” or the “Facility”) in Montrose County, Colorado in order to process uranium and vanadium ore mined from its existing nearby operations and from area mines owned and operated by others. The following discussion presents an overview of the environmental control measures proposed for the Facility’s primary components.

**Mill Facility**

The primary mill facilities will be enclosed within metal buildings with concrete floors designed with concrete curbs, spill collection sumps and other forms of secondary containment in areas where reagents, process solutions and finished products (e.g., uranium oxide ["U₃O₈"] concentrate [called yellowcake] and vanadium oxide [“V₂O₅”] concentrate) are handled and stored. Piping will be designed to be chemically resistant and will be double-walled or contained within lined trenches in those areas outside the buildings where secondary containment systems would not otherwise be present. Leak detection and emergency shutoff systems will be installed in critical areas to minimize the volume of a release should a leak or equipment failure occur. Spill control kits will be present at strategic locations and employees will be trained in the proper methods for controlling, cleaning up and reporting spills of the various chemicals and process solutions present in the mill. Should a release extend outside of a controlled area, the cleanup would be strictly regulated by the Colorado Department of Public Health and Environment (“CDPHE”) requiring extensive sampling and monitoring to verify the adequacy of the cleanup effort.

Air emissions will be controlled through a variety of methods starting with the use of water sprays at the ore dumping platform, ore stockpiles and conveyor hopper. A dust collecting baghouse will be installed at the conveyor hopper to capture any dust generated during ore feeding into the hopper and conveyor system. From the hopper, the ore will be transported by conveyor to the semi-autogenous grinding (“SAG”) Mill where it will be mixed with water and reagents. A dust scrubber will be installed at the SAG Mill to capture any dust generated during mixing prior to the ore being converted to slurry form. Gas scrubbers will be installed at all emission points during the processing of the slurry ore, including the pre-leach, leach, solvent extraction, precipitation, drying and packaging systems.

The plant will also be designed with newer technology that reduces the number and quantity of emissions. A good example of this is the yellowcake dryer system. Older dryers used a roasting method where hot gasses were passed through the yellowcake. These gases were then directed through a scrubber before being emitted. In the dryer proposed for the Facility, the yellowcake is totally contained within the dryer, which is heated externally by steam. Other improvements include using automated equipment within hermetically sealed rooms to package the yellowcake and vanadium oxide produced. The intent of these technical improvements and emission control devices is to limit exposure of mill employees and the general public to “as low as reasonably achievable” (“ALARA”) levels of radiation and fugitive dust.
Waste Management Facilities

Tailings Cells
The tailings cells are designed and will be constructed to prevent seepage of solution from the tailings slurry to the surrounding environment. Figure E-1, Tailings Containment System, provides a schematic cross section of the proposed liner system. The design provides a double layer liner system with an intervening Leak Detection System ("LDS") over the limits of the tailings cells to contain process solutions, enhance solution collection and protect groundwater. The liner system design consists of upper and lower 1.5-millimeter thick (60-mil) high density polyethylene ("HDPE") geomembrane liners. A reinforced geosynthetic clay liner ("GCL") placed on a prepared subgrade will underlie the lower (secondary) layer of the HDPE liner system. Designed to collect any leakage through the upper geomembrane liner, the LDS consists of an HDPE geonet on the base of the tailings cells and drainage geocomposite on the sideslopes, which convey solution to a collection sump for monitoring and recycle. Additionally, the design of Tailings Cell A provides a split configuration, which allows half of the cell to be decommissioned and repaired while continuing mill operations if problems with the liner system develop. Tailings Cells B and C may also be constructed as split cells, depending on operations at the time of construction.

The tailings slurry consists of the sandy waste material and process water. After the tailings are deposited, the sands will settle and the water will be pumped back to the mill for reuse via a barge-mounted pump. The solution pond area will be kept small to reduce the amount of water held within the tailings sands. The sandy beach area will be sprayed with water from the evaporation ponds, as necessary, to control windblown fugitive dust. The evaporation pond water contains high levels of salt that create a hard, wind-resistant layer on top of the tailings sands. An underdrain system will capture the solution percolating down through the sands. The conveyance pipes, for pumping tailings to the tailings cells and for pumping reclaimed solution back to the mill, will be constructed of HDPE and will be installed within lined trenches to meet requirements for double containment.

Evaporation Ponds
Similar to the tailings cells, the evaporation ponds are designed with a double layer liner system with an intervening LDS layer. The evaporation system will consist of a series of approximately four-acre ponds with the process water being introduced at one end of the series and flowing from one pond to the next. Enhanced evaporation systems such as sprinklers will be employed in the center ponds to increase the rate of evaporation during the warm-weather months. The process water contained in the evaporation ponds is unsuitable for wildlife consumption; therefore, netting installed over the evaporation pond area will prevent waterfowl and other migratory birds from accessing the pond water. The entire Facility will be surrounded with chain-link fencing topped with barbed wire; accordingly, livestock and wildlife will not have access to the pond area.

Ore Pad Facility
The ore pad is designed as a zero-discharge facility with berms surrounding its perimeter to isolate drainage and with the pad base sloped to a lined stormwater pond. The stormwater pond is separated from the ore pad by a concrete sediment trap and sediments collected in the trap will be excavated as needed and placed back on the pad. The pad design incorporates an
engineered liner system consisting of a GCL placed over prepared subgrade and overlain by compacted native soils (i.e., cushion material) and gravel (i.e., roadbase).

Fugitive dust emissions will be controlled during ore dumping operations by a bank of water sprays installed along the dump points. Moisture will also be added as needed to the stacked ore using a water truck. Magnesium chloride will be applied to the primary access roads and stockpile pad to further reduce fugitive dust emissions.

The stormwater pond design incorporates a single composite liner system consisting of an HDPE geomembrane overlying GCL, overlying prepared subgrade soils. The pond is sized to contain runoff from the 100-year design storm event and pass the 1,000-year design storm event (to subsequent containment) with additional capacity provided by one foot of freeboard. Water collected in the stormwater pond will be pumped back onto the stockpile for dust control, as needed, or used in the mill process.

**Delivery and Storage of Consumables**

Chemicals, reagents and diesel fuel will be delivered to the Reagent Unloading Area located on the south end of the mill (see Figure 5, Mill Facility, in the main body of this application). The Reagent Unloading Area is located outside the restricted area (i.e., Mill License boundary) so that delivery trucks will not be exposed to mill process areas where radiation levels are controlled and closely monitored. Bulk shipments of liquid reagents and fuels (e.g., sulfuric acid, sodium chlorate, kerosene, and diesel fuel) will be pumped from the Reagent Unloading Area to tanks that are located within various areas of the mill. Product lines, to the storage tanks and from the storage tanks to the processing buildings, are designed to be chemically resistant to corrosion (e.g., carbon steel or HDPE) and enclosed within a second line with leak detection. Bulk shipments of dry chemicals and reagents such as sodium carbonate and ammonium sulfate will be blown into storage tanks located at the Reagent Unloading Area. Similarly, propane will be delivered directly to tanks located within a fenced area adjacent to the Reagent Unloading Area.

Packaged shipments of chemicals and reagents such as sodium hydroxide and diatomaceous earth will be offloaded at the warehouse along with parts, lubricants and other chemicals needed in the daily operation of the mill. These products will be packaged in drums, plastic totes, and crates. As shown on Figure 5, Mill Facility, in the main body of this application, the warehouse is located on the south side of the mill facility next to the Reagent Unloading Area.
Multi-layer liner system under sides and bottoms of tailing cell

High Density Polyethylene ("HDPE") Geomembrane
HDPE Geonet (on base) / Drainage Geocomposite (on sideslopes)
HDPE Geomembrane
Geosynthetic Clay Liner (GCL)

Dewatered Tailings
Compacted Soil

Radon Barrier

LINER DETAIL