

**GROUND WATER QUALITY DISCHARGE PERMIT UGW370007
STATEMENT OF BASIS**

**Energy Fuels Resources Corporation
Energy Queen Mine
La Sal, Utah**

February 13, 2009

Purpose

Energy Fuels Resources Corporation proposes to reactivate the Energy Queen uranium mine (formerly called the Hecla shaft) near La Sal, Utah. Before mining can commence, ground water will need to be removed from the flooded mine workings and stored in a no-discharge pond prior to treatment to meet effluent discharge limits under an existing Utah Pollutant Discharge Elimination System (UPDES) Permit. This Ground Water Quality Discharge Permit will require best available technology and ground water compliance monitoring for a 1.5 million gallon untreated water pond, an adjacent concrete filter pad, and a treatment plant with multimedia filters. Discharge minimization technology will be required for the existing single synthetic lined pond, which will be used as a contingency pond.

Hydrogeology

Regional. The Energy Queen mine is located on the southwestern flank of the La Sal Mountains basin where structural geology plays an important role in ground water flow. The mine site is located immediately northeast of the axis of the southeast flank of the Black Ridge Syncline, which plunges to the northwest. The regional ground water flow direction is to the west-southwest and most ground water production in the vicinity of the mine is from the basal unit of the Burro Canyon aquifer. The Dakota and Burro Canyon Formations are nearly indistinguishable and are collectively referred to as the Dakota-Burro Canyon Formation in the area. The Brushy Basin Member of the Morrison Formation underlies the basal sandstone of the Burro Canyon aquifer and serves as a regional aquitard that inhibits vertical movement of ground water. Thickness of the Brushy Basin Member ranges from 300 to 450 feet in the vicinity of the site. Ground water is present in deep regional aquifers from 1,000 to 2,000 feet below the site in the Jurassic Entrada and Navajo Sandstones, and the Triassic Wingate Sandstone. These regional aquifers outcrop on the west flanks of the La Sal Mountains about five miles north of the site. More than 500 feet of low permeability aquitard formations separate the Burro Canyon aquifer from the deep regional aquifers.

Local. The mine site rests on a thin, variable layer of eolian and alluvial sands and silts. Below the surficial layer is approximately 30 feet of unconsolidated sands and gravels left as an erosional deposit from the La Sal Mountains. A discontinuous gray Dakota shale is present in the southeast part of the site and serves as an infiltration barrier for perched ground water found in monitoring wells HMW-1 through HMW-5 and MW-4.

Depth to ground water in the perched aquifer ranges from 20 to 45 feet below ground surface. The next water-bearing geologic unit is the Dakota-Burro Canyon Formation, which contains saturated sandstones ranging from 10 to 30 feet thick separated by low permeability siltstones, mudstones, and shales. The gray Dakota shale is either absent or thin and fractured in the northwest part of the site where water is able to infiltrate into the Dakota-Burro Canyon sandstone units rather than perching on the shale. This is indicated in boring logs for monitoring wells MW-1, MW-2B, and MW-3 where the top of the gray shale is present at a depth of 40 feet but ground water is not encountered until reaching the deeper Dakota-Burro Canyon sandstones at depths ranging from 75 to 97 feet. The Dakota-Burro Canyon Formation is underlain by siltstones, mudstones, and shales of the Brushy Basin Member of the Morrison Formation. The shallow ground water trend generally follows the base of the Burro Canyon Formation, which also becomes deeper to the northwest along the regional plunging syncline trend. Below the Brushy Basin Member is the Saltwash Member of the Morrison Formation, which contains the uranium bearing sandstone ore. A limited amount of ground water is present in the channel sandstones that are located between the Brushy Basin and Salt Wash mudstones of the Morrison Formation at depths ranging between 200 and 1,000 feet. However, because of the mineralized nature of these formations, this ground water contains elevated concentrations of arsenic, selenium, radium, and uranium above ground water quality standards.

Ground Water Quality

Ground Water Classification. The uppermost shallow ground water at the site is in a perched alluvial aquifer in the southeast area near the ponds, and the Dakota/Burro Canyon sandstone aquifer in the northwest area near the ore pad. In accordance with UAC R317-6-3.5 and ground water quality data provided in Appendices II and III of the permit application, ground water in compliance monitoring wells HMW-4, MW-1, MW-2B, and MW-3 is classified as Class II Drinking Water Quality Ground Water. In accordance with UAC R317-6-3.6 and ground water quality data provided in Appendices II and III of the permit application, ground water in compliance monitoring wells HMW-1, HMW-2, HMW-3, HMW-5, and MW-4 is classified as Class III Limited Use Ground Water based on elevated concentrations of uranium, molybdenum, and gross alpha above the ground water quality standards in UAC R317-6-2.

As required in Part I.H.2 of the permit, an accelerated background monitoring program will be completed by the permittee to collect data for calculating well-specific background ground water quality statistics. After securing Executive Secretary approval of the Accelerated Background Monitoring Report, background concentrations will be adjusted in accordance with the reopener provision in Part IV.O.2 of the permit.

Class II Protection Levels. In accordance with UAC R317-6-4.5, Class II ground water will be protected for use as drinking water or other similar beneficial use with conventional treatment prior to use. Class II protection levels are established in accordance with the following criteria in UAC R317-6-4.2B:

- a. Total dissolved solids (TDS) may not exceed the greater of 1.25 times the background concentration or the background plus two standard deviations.
- b. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.25 times the background concentration, 0.25 times the ground water quality standard, or background plus two standard deviations; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.
- c. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.25 times the ground water quality standard, or the limit of detection.

Because the accelerated background monitoring program has not been completed, interim Class II protection levels were established by the greater of 1.25 times the background concentration or 0.25 times the ground water quality standard. In accordance with Part V.0.3 of the permit, protection levels may be adjusted when the accelerated background monitoring program has been completed by the permittee and approved by the Executive Secretary.

Class III Protection levels. In accordance with UAC R317-6-4.6, Class III ground water will be protected as a potential source of drinking water after substantial treatment, and as a source of water for industry and agriculture. Class III protection levels are established in accordance with the following criteria in UAC R317-6-4.2B:

- a. TDS may not exceed the greater of 1.25 times the background concentration or the background plus two standard deviations.
- b. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.5 times the background concentration, 0.5 times the ground water quality standard, or background plus two standard deviations. If the background concentration exceeds the ground water quality standard no increase will be allowed.
- c. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.5 times the ground water quality standard, or the limit of detection.

Because the accelerated background monitoring program has not been completed, interim Class III protection levels were established by the greater of 1.5 times the current background concentration or 0.5 times the ground water quality standard. In accordance with Part V.0.3 of the permit, protection levels may be adjusted when the accelerated background monitoring program has been completed by the permittee and approved by the Executive Secretary.

Compliance Monitoring Program. A quarterly compliance monitoring program will commence when dewatering operations begin. The following key leakage parameters were selected for compliance monitoring based on their high concentrations in the mine water compared to concentrations in shallow ground water:

- Arsenic
- Molybdenum
- Selenium
- TDS
- Uranium
- Gross alpha
- Radium-226 + Radium-228.

In addition, samples will be analyzed for the following major ions:

- Bicarbonate
- Carbonate
- Calcium
- Magnesium
- Potassium
- Sodium.

Source Water Monitoring. The mine water stored in the Untreated Water Pond will be sampled quarterly to characterize the source term of the mine water over time. Quarterly source water samples from the Untreated Water Pond will be analyzed for the following key leakage parameters, which were selected based on their high concentrations in the mine water compared to concentrations in shallow ground water:

- Arsenic
- Molybdenum
- Selenium
- TDS
- Uranium
- Gross alpha
- Radium-226 + Radium-228.

A full suite analysis of mine water from the Untreated Water Pond will be conducted on an annual basis for the parameters listed in Table 1 of the Water Quality Sampling and Analysis Plan provided in Appendix V of the permit application.

Best Available Technology (BAT)

Untreated Water Pond. The Untreated Water Pond will be a no-discharge facility with a capacity of 1.5 million gallons. The pond will be constructed with a double 60-mil high density polyethylene (HDPE) flexible membrane liner with a leak detection and collection system. The design specifications for the five-part composite bottom liner system with leak detection will be as follows from bottom to top:

1. 6-inch prepared subgrade, scarified and compacted.
2. Minimum 12-inch pond liner bedding layer placed in 6-inch lifts.
3. 60-mil HDPE lower geomembrane liner.
4. Geonet drainage layer reporting to a 4-foot by 4-foot leak detection sump.
5. 60-mil HDPE upper geomembrane liner.

Filter Pad. The filter pad will be constructed of 12 inches of reinforced concrete sloped, curbed, and situated so that all fluids or backwash draining from the filter bags will discharge directly into the Untreated Water Pond.

Contingency Pond. The Contingency Pond will be a minimum discharge technology pond with a capacity of approximately 1 million gallons. All existing geomembranes will be examined and repaired in accordance with the approved Construction Permit. The liner is constructed of the following layers from bottom to top.

1. 12-inch compacted soil subgrade.
2. 40-mil HDPE geomembrane liner.

BAT Performance Monitoring

Best available technology monitoring will include minimum vertical freeboard, maximum allowable leakage rate, and maximum allowable head monitoring. These performance standards are based on the precedence of previous ground water discharge permits and *Action Leakage Rates For Leak Detection Systems* (EPA, January 1992).

Minimum Vertical Freeboard. A minimum of 24 inches of vertical freeboard shall be maintained to ensure total containment of untreated mine water and filter backwash.

Maximum Allowable Leakage Rate. The leak detection system is the primary compliance monitoring point because it is the early warning system that demonstrates protection of ground water quality. The maximum allowable leakage rate established by EPA is 200 gallons per acre per day. Based on a pond area of approximately one acre, the maximum allowable leakage rate through the primary HDPE liner is 200 gallons per day.

Maximum Allowable Head. The maximum allowable head imposed on the secondary HDPE liner and leak detection sump is one foot. Any fluids collected in the leak detection sump will be pumped back to the Untreated Water Pond so that the water level in the leak detection sump is always less than one foot. As long as the leak detection system complies with the BAT performance standards of the permit, the facility is compliant with the BAT requirements of the permit. Any discharge from the secondary HDPE liner via manufacturer defects is considered a *de minimus* discharge. In the event that the leak detection system has flows or heads that exceed the BAT performance standards of the permit, a BAT failure exists and the permittee will be required to regain BAT by a number of solutions including identifying and repairing the BAT failure such as a liner leak, or conducting contaminant transport modeling to demonstrate that ground water quality is protected despite the exceedence of BAT performance standards.

Potential Impacts to Ground Water

Potential impacts to ground water have been minimized by employing best available technology for the Untreated Water Pond and Filter Pad, and discharge minimization technology for the Contingency Pond. The Division of Water Quality will provide periodic onsite inspections during construction and operation of the facilities described above. The BAT performance monitoring plan, which the permittee is required to be submitted to the Executive Secretary, will ensure that the facility is operated in accordance with design specifications and will also ensure that any early indications of facility problems will be detected early and resolved. In addition to BAT performance monitoring, ground water quality monitoring of the perched aquifer will be conducted to determine if ground water quality has been impacted by the Untreated Water Pond.

Compliance Schedule Items

Accelerated Background Ground Water Monitoring Report. The Permittee shall submit a background ground water monitoring report for Executive Secretary approval 60 days after the accelerated background monitoring program has been completed in accordance with the following requirements:

- a) At least eight (8) samples will be collected for each compliance monitoring well and parameter over a two year period at a quarterly sampling frequency utilizing the procedures outlined in the approved Water Quality Sampling Plan and Quality Assurance Project Plan.
- b) Each sampling event will include independent grab samples for each compliance monitoring well.
- c) Samples will be analyzed for all parameters listed in Table 1 of the permit plus the major ions bicarbonate, carbonate, calcium, magnesium, potassium, and sodium.
- d) All data for each well and parameter will be validated and the following statistical calculations will be performed and reported:
 - Mean concentration
 - Standard deviation
 - Mean concentration plus 2 standard deviations
 - Mean concentration times 1.25 for Class II ground water wells
 - Mean concentration times 1.5 for Class III ground water wells.

In accordance with Part V.0.3 of the permit, ground water protection levels may be adjusted when the accelerated background monitoring program has been completed by the permittee and approved by the Executive Secretary.

Water Quality Sampling Plan and Quality Assurance Project Plan. The permittee submitted a Water Quality Sampling Plan and Quality Assurance Project Plan with the permit application. These plans will be an enforceable Appendix A of the permit, and shall be updated and/or modified as required by the Executive Secretary. The revised plan will be submitted for Executive Secretary approval, within 60 days following receipt of notice from the Executive Secretary, that updates or revisions to the plan are required.

BAT Performance Monitoring Plan. The Permittee shall submit a BAT monitoring plan to the Executive Secretary and secure approval of the plan prior to the start of dewatering operations. The plan will include all procedures and methods sufficient to ensure compliance with the BAT performance standards of Part I.D.2 of the permit, including minimum vertical freeboard of the ponds, maximum allowable leakage rate and maximum allowable head for the Untreated Water Pond leak detection system. The approved document will become an enforceable Appendix C to this permit.

Final Conceptual Closure Plan and Duty to Reapply. The Permittee shall submit a final conceptual closure plan at least 180 days prior to the expiration date of this permit. Also to be submitted at this time will be a reapplication for the ground water discharge permit which will include an updated operational plan describing the proposed operational and closure activities to occur in the next five-year term of the permit. The Permittee shall resubmit the plan with 60 days of receipt of notice from the Executive Secretary and correct any deficiencies noted in the agency review.

Permit Application Documents

The following documents are considered part of the ground water quality discharge permit application and will be kept as part of the administrative file.

1. Mine Water Treatment and Discharge Alternatives, Energy Queen Mine, prepared by Tetra Tech for Energy Fuels Resources Corporation, June 6, 2007.
2. Review of June 6, 2007 Draft Report Titled "Mine Water Treatment and Discharge Alternatives, Energy Queen Mine", technical memorandum prepared by Gary Merrell of URS Corporation to Rob Herbert, Division of Water Quality.
3. Conceptual Plan for Water Treatment System at the Energy Queen Mine, prepared by Tetra Tech for Energy Fuels Resources Corporation, July 2, 2008.
4. Comments on Conceptual Plan for Water Treatment System at the Energy Queen Mine, prepared by Woodrow Campbell, P.E., of the Division of Water Quality to Mr. Zach Rogers, Energy Fuels Resources Corporation, July 23, 2008.
5. Engineering Design Drawings and Construction Specifications, Energy Queen Mine, prepared by Tetra Tech for Energy Fuels Resources, August 11, 2008.
6. Construction Permit for Energy Queen Mine Water Treatment System, issued by Walter L. Baker, P.E, Executive Secretary of the Utah Water Quality Board, September 15, 2008.
7. Energy Queen Mine Ground Water Discharge Permit Application and Supporting Documents, prepared and submitted by Tetra Tech for Energy Queen Resources Corporation, October 31, 2008.