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Subject: Response to March 23, 1992 Technical Deficiencies, Blue Blaze Coal Company, Blue Blaze Mine

Dear Ms. Grubaugh-Littig:

The following information is submitted on behalf of Blue Blaze Coal Company in response to your letter of March 23, 1992 to Mr. William R. Skaggs regarding Technical Deficiencies Related to Ground Water Report Submitted by EarthFax Engineering, Blue Blaze Coal Company, Blue Blaze Mine, PRO/007/020, Folder #2, Carbon County, Utah. If discrepancies exist between the following responses, the above-referenced EarthFax report, and previous information submitted to the Utah Division of Oil, Gas & Mining "the Division") regarding the proposed Blue Blaze Mine, the later information should be considered most current and accurate.

Response to Comment 731.211 and 731.212

Groundwater monitoring during operation of the mine will consist of the following three parts:

- Collection of flow and water-quality data from springs at Station Nos. 1, 2, and 4,
- Collection of flow and water-quality data from sustained inflows to the mines, if they occur,
- Collection of water-level data from holes LMC-3 and LMC-4,
- Deepening of holes LMC-1 and LMC-2 into the Star Point Sandstone, completion of these holes as monitoring wells, drilling and completion of an in-mine monitoring well from the Castlegate A seam into the Star Point Sandstone, and monitoring of these wells, and
- Reporting of monitoring data to the Division.

Flow and water-quality data are currently collected from three springs within the permit area. Monitoring of these springs will continue once each calendar quarter that the springs are accessible during mining operations. The data to be collected from these springs are listed in Table 1. This table was derived from a review of the historic monitoring data provided in the permit application package. Chemical parameters included in previous monitoring efforts that have consistently been below the detection limit and/or below the drinking-water standard have not been included in Table 1. Hardness was also dropped from the list since the primary ions that cause hardness (calcium, magnesium, iron, and manganese) will be individually monitored. All other previous monitoring parameters have been included.

As indicated in the March 11 submittal and in the remainder of this submittal, significant sustained inflows to the mine workings are not anticipated. However, if an inflow of water

TABLE 1

GROUNDWATER LONG-TERM MONITORING PARAMETERS

Field Parameters	
Flow (gpm) or Depth to Water (ft)	pH (standard units)
Specific Cond. (μmhos/cm @ 25 °C)	Temperature (°C)
Laboratory Parameters (mg/l)	
Bicarbonate	Boron, Total
Calcium	Carbonate
Chloride	Fluoride
Iron, Total	Magnesium
Manganese, Total	Mercury, Total
Nitrogen, Ammonia	Nitrogen, Nitrate
Nitrogen, Nitrite	Potassium
Sodium	Sulfate
Sulfide	Total Dissolved Solids
Quality Assurance Checks	
Total Anions (meq/l)	Total Anions (meq/l)
Cation/Anion Difference	Calculated TDS

Note: Data to be collected once each calendar quarter.

is encountered, and that flow exceeds 1 gpm for a period of at least 30 days, flow and water quality data will be collected from that inflow once each quarter as long as the inflow point remains accessible during mining operations. Data will be collected as close to the point of issuance as possible to prevent contamination by mining operations. During the first two years of monitoring, the data listed in Table 2 will be collected from mine inflows. Table 2 was developed to coincide with the previous baseline monitoring list to provide consistency. Following this initial baseline period, future monitoring will continue on a quarterly basis as long as the location is accessible in accordance with Table 1 unless the data indicate that an alternative monitoring program is necessary. Any alternative to Table 1 for the mine inflows will be proposed to the Division prior to implementation.

Water-level data will be collected from holes LMC-3 and LMC-4 once each calendar quarter that the holes are accessible during mining operations. These data will be collected using an electronic water-level indicator. To protect the surface at each hole, a 5-foot long section of 2-inch diameter steel casing, fitted with a cement basket at its lower end, will be inserted 3 feet into each hole. The annulus between the outside of the casing and the hole wall will then be filled with concrete. The concrete will extend approximately 3 inches above the ground surface, forming a pad measuring approximately 2 feet by 2 feet. The pad will be sloped away from the exterior of the casing to preclude ponding of water on the pad. The top of the casing will be fitted with a cap and a lock to prevent unauthorized entry. All water-level measurements will be corrected to depth from ground surface to permit correlation with previous measurements.

To better predict the potential for groundwater inflows to occur to the Hiawatha seam during mining, two existing drill holes (LMC-1 and LMC-2) will be deepened to extend into approximately 30 feet into the uppermost saturated zone beneath the Hiawatha seam (assumed to be a lens of the Star Point Sandstone). As noted in the March 11 submittal, these were initially drilled as exploratory holes and then plugged to depths of approximately 600 feet (LMC-1) and 50 feet (LMC-2) below ground surface. These holes will be deepened from the surface using air rotary drilling rigs. It is currently anticipated that the existing hole diameter (4.75 inches) will be maintained during deepening. Following completion, the holes will be renumbered (to designate their conversion to monitoring wells) as BBCC-1 and BBCC-2 (see Figure 1).

Due to the great anticipated depth to water in each of the completed monitoring wells (greater than 500 feet), sampling of the wells for water-quality analyses is not considered practical. Therefore, the wells will be completed for water-level measurements only using one-inch diameter steel casing and slotted screen. Based on the typical fine-grained nature of the Star Point Sandstone, the aperture of the screen slots will be 0.010 inch. The screen will extend approximately 20 feet below the depth at which water was first encountered. The remainder of the hole below the bottom of the screen will serve as a point of accumulation for cuttings and sediment that sloughs from the edges of the hole during the short time prior to completion.

Following placement of the screen and casing, a sand filter pack will be emplaced in the hole using a one-inch diameter tremie pipe. The filter pack will consist of 20- to 40-mesh silica sand. The sand will be poured slowly into the tremie pipe and washed into the hole with water to prevent bridging in the pipe. Sufficient filter pack material will be added to extend

TABLE 2

GROUNDWATER BASELINE MONITORING PARAMETERS

Field Parameters	
Flow (gpm) or Depth to Water (ft)	pH (standard units)
Specific Cond. (μmhos/cm @ 25 °C)	Temperature (°C)
Laboratory Parameters (mg/l)	
Aluminum, Total	Arsenic, Total
Barium, Total	Bicarbonate
Boron, Total	Cadmium, Total
Calcium	Carbonate
Chloride	Chromium, Total
Copper, Total	Fluoride
Hardness, Total	Iron, Total
Lead, Total	Magnesium
Manganese, Total	Mercury, Total
Molybdenum, Total	Nickel, Total
Nitrogen, Ammonia	Nitrogen, Nitrate
Nitrogen, Nitrite	Phosphorus, Total
Potassium	Selenium, Total
Sodium	Sulfate
Sulfide	Total Dissolved Solids
Total Suspended Solids	Zinc
Quality Assurance Checks	
Total Anions (meq/l)	Total Anions (meq/l)
Cation/Anion Difference	Calculated TDS

Note: Data to be collected once each calendar quarter.