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FILE ACT/015/025
#2
C.C. HUGHMEIN

CO-OP MINING COMPANY

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June 12, 1991

Tom Munson
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center
Salt Lake City,Utah 84180

RE: Drilling Program

Dear Mr. Munson;

I am submitting the enclosed Underground Drilling Program prepared by Earthfax Engineering Company as the Co-op Mining Company proposal to help determine the ground water level below the Bear Canyon Mine. If this meets your approval, we would like to begin drilling as soon as possible.

Yours Truly,

Wendell Owen
Resident Agent

Wendell Owen

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UNDERGROUND DRILLING PROGRAM

CO-OP MINING COMPANY
Huntington, Utah

Prepared By:

EARTHFAX ENGINEERING, INC.
Midvale, Utah

June, 1991

Co-Op Mining Company
Underground Drilling Program

Co-Op Mining Company (Co-Op) proposes an underground drilling program for the purpose of characterizing the groundwater system underlying the Bear Canyon Mine. This drilling is proposed to be conducted in two phases. First, a single pilot hole will be drilled to identify the subsurface conditions and the depth to groundwater below the mine. Second, if water is encountered, three additional holes will be drilled to further characterize the groundwater conditions below the mine. All of these holes are proposed for locations which will be accessible during the anticipated life of the operation.

Co-Op invites representatives of the Utah Division of Oil, Gas, and Mining (Division) to observe the drilling activities and to participate in logging of the holes. In the event that the Division wishes to participate, Co-Op will notify the Division one week prior to the commencement of the drilling activities.

Phase 1

The first phase of drilling will consist of drilling a 1-7/8" diameter borehole from the floor of the mine at location D-1. The floor of the mine is located on the base of the Bear Canyon Seam at an approximate elevation of 7,545 feet. Previous drilling for coal exploration, conducted by Co-Op, has identified that the Bear Canyon Seam is approximately 40 to 80 feet above the base of the Hiawatha Seam, the base of the Blackhawk Formation. Based on the data available (Doelling, 1970, and USGS, 1981), the Star Point Sandstone in the mine area is between 350-450 feet thick. It is currently anticipated that this initial hole will be drilled through the entire thickness of the Star Point Sandstone to the top of the Mancos Shale Formation. Therefore, the anticipated depth for this pilot hole would be a maximum of approximately 520 feet or an elevation of 7,025. According to the potentiometric surface prepared by Montgomery (1991), the depth to water is anticipated to be approximately 235

feet below the mine. In the event that coal seams are encountered, Co-Op will contact the Division to discuss the problems encountered and to determine an alternative course of action.

Drilling activities will be conducted using an underground drill. The drilling will be conducted using water and cuttings will be collected at the surface of the hole. Occurrence of water in the subsurface will be evaluated by the relative returns flow at the surface. It is planned that the return flows will be collected by sandbagging around the hole and diverting the water to one point. A portable flume will be installed to measure the relative changes in the return flow rate from the collected flow. Co-Op proposes to utilize EarthFax Engineering, Inc. (EarthFax) to log the well and to monitor the water returns at the surface. Any changes in lithology and water inflows to the hole will be recorded and reported.

Following completion of the drilling, the hole will be allowed to stand for a period (i.e., 3-5 days) to permit the static water level to be measured. If groundwater is encountered, the hole will be completed with 1-inch I.D. threaded PVC pipe. The lower 20 feet of the holewill be completed with a No. 10 slot screen. As the Star Point Sandstone is anticipated to be a competent formation, the completion will consist of a flush surface casing and will be sealed with a neat cement only in the top 20 to 30 feet. This cement seal will be to both prevent material from the mine from entering the well and to prevent damage to the well resulting from floor heave from the mining operation. Cementing will be accomplished using a cement basket placed on the 1-inch casing at least 20 feet below the mine floor. The neat cement will be triemed via a 1/2-inch trieme line until return of cement is observed at the surface of the hole.

Phase 2

If water is encountered during the Phase 1 drilling, Co-Op proposes to drill three additional holes. The locations of these holes are shown as D-2, D-3, and D-4 on the attached

map. These holes will also be drilled with a 1-7/8-inch diameter drill and will be monitored by EarthFax for lithology and water inflows. The holes will be advanced to a depth at least 50-feet below the top of the saturated zone. Completion of the holes will be similar to well D-1, with 1-inch I.D. threaded PVC pipe, a flush surface casing, and a cement seal in the top 20 to 30 feet of the hole.

The four wells will be sampled for water quality using a bailer. Bailing will continue until subsequent bailers yield similar results on pH, conductivity, and temperature mearsurements prior to sample collection. The water quality parameters to be analyzed for are the baseline list of parameters presented in the Bear Canyon Mine M&RP. These wells will be sampled on a quarterly basis until baseline conditions have been identified.

To assist in the determination of aquifer characteristics, slug tests will be conducted in each well. This testing will consist of injection tests, where a slug of known volume is injected into the well and the subsequent rise and recovery in the water level of the well is recorded. The water level will be recorded using a datalogger and a 0-10 psi pressure transducer. These data will then be reduced and analyzed using the appropriate method of either Bower and Rice (1976) or Cooper, Bredehoeft, and Papadopulos (1967). This information will be used with the development of a potentiometric map to provide a determination of the direction and rate of groundwater flow.

As part of the second phase, the elevation of the Big Bear and Birch Springs will be determined. Additionally, the stratigraphic section where water at the springs originates will be determined and a correlation of the depth of water encountered in the subsurface will be conducted. This will assist in the determination of the connection of the waters underlying the mines with the spring flows.