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United States Department of the Interior
OFFICE OF SURFACE MINING
Reclamation and Enforcement
BROOKS TOWERS
1020 15TH STREET
DENVER, COLORADO 80202

SEP 23 1983

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SEP 26 1983
DIVISION OF
OIL, GAS & MINING

Mr. James Smith
Division of Oil, Gas and Mining
4241 State Office Building
Salt Lake City, UT 84114

JIM
SEP 26 1983

Dear Mr. Smith:

I am enclosing two determination of adequacy reviews prepared for hydrologic aspects of the Deer Creek and Des-Bee-Dove mines. Please review these documents for interpretation of the Division's policy and regulations. The OSM Project Leader will telephone the Division's Project Leader for these two mines shortly after you receive this letter to get an early reading of your reaction. Please request complete responses from the applicant such that they will be received by OSM no later than November 9, 1983. I realize that this will be a fairly short review time for you, but we are making every effort to keep our permit application reviews on schedule, and I believe this should be adequate for a "major issue" assessment. Because of our very tight schedules, these documents need to be forwarded to the applicant within one week of receipt.

Please telephone Shirley Lindsay or Walter Swain at 303-837-3806 if you have any comment or if there is any question.

Sincerely,

Richard E. Dawes

for Allen D. Klein
Administrator
Western Technical Center

Enclosures

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Deer Creek Mine
Utah Power & Light Company

DETERMINATION OF ADEQUACY (DOA) - HYDROLOGIC DISCIPLINE

UMS 771.23 Permit Applications - General Requirements for Format and Contents

(b) Considerable revision has been made in hydrologic information since the initial permit application package (PAP) was submitted in April, 1981. This revised information is currently contained in a number of documents including various modifications, the ACR response and the hydrologic monitoring reports. This PAP must be revised so that it is current, free of internal contradictions, and presented clearly and concisely. The original format of the document is satisfactory, but the necessary revisions must be made.

UMC 783.14 Geology Description

(a)(2)(i) Show the location of long-term water producing areas in the mine (in addition to the location of sampling sites in the mine). The location of long-term water producing areas should be based on identification of geologic features and/or measured water yield from specific areas of the mine. Four types of long-term water sources were identified in your response and shown schematically in Figure 8. These must be shown on an appropriate scale map (see comment under UMC 783.25).

UMC 783.15 Ground Water Information

The applicant indicates in the ACR response that three in-mine drill holes completed in Deer Creek mine have been developed into water monitoring holes. Supply the following information on each monitoring hole.

1. Location map showing the monitoring hole.

2. Standard well hole logging information including description of the stratigraphy encountered by the test hole.

3. Well completion specifications, including:

   a. vertical location* and length of screened interval.

   b. vertical location*, length, and type of seal above the screen

   c. total depth of drill hole.

   *Note: Vertical location should be referenced to a specific datum and to the top of the aquifer.

The information presented in Figure 6 of the Hydrologic Monitoring Report for 1982 details the perched aquifer within the strata overlying the coal seam in the Deer Creek mine. Supply references and/or geologic data in support of this map.

It should be recognized in the PAP that the perched aquifers within the Black Hawk Formation are recharged by faults and fractures in East Mountain. The hydrologic monitoring data collected to date shows a distinct increase in mine dewatering during the snow melt infiltration period of the year. The complexity of the aquifer in the Black Hawk Formation is evident. Several important factors must be addressed regarding this aquifer, including: (1) the long-term water-producing areas in the mine (see comment under UMC 783.14); and, (2) monitoring of mine dewatering activities (see comment under UMC 784.14).

UMC 783.25 Cross-Sections, Maps and Plans

(b) In the ACR response Figure 9 is presented to show the location of long-term sampling locations in the mine. This map is actually titled "Deer Creek Mine with Topography and Overlying Spring". It appears that the applicant intended to submit Figure 6 from the Hydrologic Monitoring Report for 1982. A new map must be prepared showing the location of in-mine monitoring points using a map of the appropriate scale and detail such as CM-10376-DR and CM-10277-DR. Location of long-term water producing areas in the mine should also be shown on this map.

The ACR response indicates that three in-mine drill holes have been developed into water monitoring holes. The locations of these holes are not shown on Figure 6. Please indicate these monitoring locations on the new map requested in this section.

UMC.784.14 Reclamation Plan: Protection of the Hydrologic Balance

(b)(1) Present the methodology used in the hydrograph determination. It is obvious that the SCS curve number method is the underlying basis for the computer program, but the routing aspects are not discussed. Appendix IX should be revised to thoroughly present the procedure.

Provide a sketch of the location of the various subareas as given in Table 1 and 2 of the reclamation plan. The applicant should also explain his selection of a hydrologic Class B for subarea IVb. Reference to an available SCS handbook pertinent for the region would suffice.

Submit detailed information on the hydraulic and channel stability calculations for the reclaimed reach of Deer Creek. The final reclamation map gives channel gradients of 17%, but design calculations show gradients of only up to 15%. No riprap design calculations are given for the channel. Conventional riprap design is limited to Froude numbers of less than 0.8 (the Froude number is the channel mean velocity divided by the square root of the product of gravitational acceleration and flow depth). Information provided by the applicant indicates that hydraulic conditions in the proposed channel would be severe and would require other means in addition to riprap to stabilize the channel. (The best means of accomplishing a stable channel would be to reduce the channel gradient.)

The existing waste rock fill creates a very steep gradient which will make restoration of a stable channel difficult. Regulations that must be addressed regarding how a stable restored channel might be designed are as follows:

(1) UMC 817.72(d) requires that runoff from the area above a valley fill shall be diverted away from the fill; (2) UMC 817.43(f) requires that a channel lining be designed to safely sustain design velocities; and, (3) UMC 817.44(b)(1) requires use of channel linings, retention basins and channel roughness measures for permanent diversions, with the channel capacity as required by UMC 817.44(b)(2).

With regard to the requirements of UMC 817.72(d), the applicant should consider evaluating the bedrock beneath a strip along the south side of the the fill for suitability as a permanent channel. Exposed bedrock on the hillside could provide the bed and right bank of the restored channel. Resistant sandstone members in the exposed geologic section could provide channel drops, which would reduce the gradient along the reach of Deer Creek to be restored. It would be necessary to submit plans for adequate disposal of excess materials at a suitable place on the permit area or at a disposal site outside the permit area. The channel would need to be riprap lined on the north bank and where it passes along nonresistant bedrock. Boulders on the channel bed may be needed to provide roughness in steep reaches and at the outlets of plunge pools. The waste rock fill would constitute the foundation of the north bank of the restored channel. Since the fill is permeable, a layer of nonpermeable material should be installed before the riprap lining is placed on the fill. The applicant should address measures to be implemented during mining for separating and storing competent waste rock that would be suitable for riprap material with which to line the restored channel.

The applicant has shown energy dissipators at the confluence of Deer Creek and Elk Canyon Creek, and at the upper end of the pad. Provide details of these dissipators and either a description of the design procedure or an acceptable reference.

A two-foot ditch is shown for use during Stage I of reclamation. Discharge and velocity values must be provided for each segment of this system based on a 2-year recurrence interval. Channel lining requirements must be tabulated for each segment.

Show the hydraulic calculations for the remaining culvert section adjacent to the sediment pond during Stage I. The plan shows significant skew between the channel and the culvert alignments. Provide details of the culvert intake, including channel transition. A brief description or reference to the design procedure must be provided.

(b)(3) It has been pointed out in the hydrologic monitoring reports that dewatering of aquifers encountered by mining in the Black Hawk Formation occurs close to the active mine faces and at several other locations in the mine. Monitoring of mine water production must include the following:

1. Long-term water producing areas within the mine workings including:

   a. structural rolls

   b. Deer Creek and Pleasant Valley fault systems

   c. fractures and joints

   d. surface and in-mine drill holes

   e. fluvial channel sandstone deposits

2. Each inflow to and outflow from the main sump area on a continous basis. Information on the origin of inflows and destination of outflow is required.

Such a monitoring program is needed to accurately portray dewatering activities in the mine. Monitoring of required water quality parameters should occur at monthly intervals.

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Des-Bee-Dove Mine

Utah Power & Light Company

DETERMINATION OF ADEQUACY (DOA) - HYDROLOGIC DISCIPLINE

UMC 771.23 Permit Applications - General Requirements for Format and Contents

The permit application package (PAP) for Des-Bee-Dove mine was submitted in March, 1981. Since that time, additional information pertinent to the plan has been submitted to the Division and OSM in the form of letters and the ACR Response (July, 1983). OSM requests that the applicant revise the PAP so that it is current, free of internal contradictions, and presented clearly and consisely. The original format of the document is satisfactory, but the necessary revisions must be made.

UMC 783.13 Description of Hydrology and Geology

General Requirements

Clarify the hydrologic procedures used to estimate runoff for the 100-year, 24-hour storm event. The PAP (Appendix XII) references map A-1 as illustrating delineation of subwatershed areas, however this map is not included. Please furnish this map.

The hydrologic discussions in both the PAP and the ACR Response indicate that delineated subwatershed areas were evaluated based on slope, aspect, vegetative cover, and soil hydrologic group. It is unclear how these characteristics were applied to evaluate runoff response; please clarify the procedure used. If subwatershed characteristics were used in the hydrologic calculations, they should be furnished.

It is unclear how the hydrograph analysis was reevaluated in the ACR Response. Based on objections by the Division (in the ACR) to the applicant's use of a 2.5-inch rainfall amount to characterize the 100-year, 24-hour storm, the applicant reevaluated the hydrograph analysis and submitted results in the ACR Response for a storm event producing 3.5 inches of rainfall. Please furnish better documentation of the methodology applied to reevaluate the hydrograph analysis. In particular, the applicant should explain how, for an increase in rainfall from 2.5 inches to 3.5 inches, the peak discharge is determined to decrease from 288 cfs to 159 cfs. Time to hydrograph peak was stated to equal 12.1 hours for the 3.5-inch storm as compared to 10.8 minutes for the 2.5-inch storm. These vast differences require explanation in light of the fact that the same SCS methodology (Equations 1-4) is described in each case.

Calculations have not been reworked for the 10-year, 24-hour storm event. Should it be assumed that the characteristics for this event as shown on page 4-3 are correct? If so, please explain why the peak discharge for the 10-year, 24-hour storm producing 1.8 inches of rain is 173 cfs, whereas the peak discharge for the 100-year, 24-hour storm generating 3.5 inches of rain is only 159 cfs. Provide the pertinent input parameters and describe the methodology applied in detail sufficient to verify the calculations and results obtained.

UMC 783.15 Groundwater Information

(a)(4) Update the permit application with information describing the occurrences, quantity and quality of subsurface water that has been encountered during mining operations in the Des-Bee-Dove Mine.

UMC 783.16 Surface Water Information

General Requirements

(a) More specific information is required pertaining to the surface drainage system in the immediate mine area. In particular, any available data regarding runoff quantity or quality for the wash below the Des-Bee-Dove mine area should be included in the permit application. Although the wash in which the Des-Bee-Dove mine is located is stated to be generally dry (ephemeral), such information as has been collected by UP&L describing the frequency of occurrence and magnitude of runoff in the wash, as well as the variability in runoff quality, should be included.

(b) The relationship that has been derived between precipitation and spring discharge (UP&L hydroligic monitoring reports) should be included and discussed in the hydrology section of the permit application.

UMC 783.18 Climatological Information

Provide climatological information that is representative of average annual and seasonal conditions; the permit contains a description of climatological conditions for only the 1979 water year.

UMC 784.12 Operation Plan: Existing Structures

It is unclear how the water for the Des-Bee-Dove mine operation is distributed and what sources are used to supply the mining needs. Discuss the water distribution system and indicate the quantity of water diverted to the Little Dove sump from the Wilberg mine. What quantities of water are used in the mines and which sources (trucking and pumping system, pipeline and Wilberg mine) supply the water? Page 3-28 of the permit application indicates a connection exists between the Deer Creek mine and the Little Dove sump. Is this statement correct or should the statement indicate the connection is to the Wilberg mine? Please clarify.

The drainage system map (map 3-4) shows two 36-inch-diameter culverts on pad no. 2, a 24-inch culvert near the tipple on pad no. 1 and a 36-inch culvert adjacent to the fill slope on pad no. 1. What discharges are these culverts designed to pass? What are the design slopes and flow velocities through the culverts at design discharges? Please provide this and other information necessary for compliance with 784.12(a) and (b) governing design and performance of these structures.

UMC 784.14 Reclamation Plan: Protection of Hydrologic Balance

In the ACR Response, the applicant proposed a change to the routing of the reclamation drainage diversion across pad no. 1. This change in plans was precipitated by the Division's objections to the passage of flows down the fill slope of the pad. The applicant's revised plan calls for alignment of the diversion channel along the route of the existing haul road. In the ACR Response, the applicant states that a trapezoidal ditch will be constructed "on bedrock where the haul road is now located;" yet a few sentences later it is indicated that the north edge of the road fill will function as the south abutment of the ditch. These two statements are somewhat contradictory. The first statement implies that the road is on bedrock, yet, the second statement indicates the road is on fill material. The design and construction of a stable drainage diversion channel through this section of the disturbed area is a critical aspect of the reclamation plan. Before this plan can be judged on its technical merits, it is required that the applicant make a determination of the composition of the material in which the diversion channel is to be excavated. A diversion channel situated on bedrock may require vastly different protection measures as compared to a diversion channel excavated through dumped fill material.

Additional information is required pertaining to the riprap-lined reclamation channel through the mine area. Details of channel design and construction are not sufficiently addressed in the ACR Response. For example, the riprap lining is stated to be composed of 50% 3-foot rock, 30% 2-foot rock, and 20% 1-foot rock. What design criteria were applied to determine these rock sizes and gradation? The composition of the underlying (base) material must be determined so that its erosion potential and the need for a granular filter layer can be examined.

The ACR Response indicates that a cascading rock fan will be constructed of "large boulders and heavy riprap." This statement is not sufficiently descriptive of the structure design. What constitutes large boulders and heavy riprap and what criteria have been applied to design this structure? Maps showing the reclamation channel which accompanied the ACR Response show the cascading rock fan passing down a slope of approximately 50 percent. Please show complete design parameters and calculations used to size this section of the diversion. Construction methods and equipment should also be discussed. Rock durability and stability are critical aspects of revetment in a permanent diversion channel conveying high velocity flows on this steep slope. Please note the source and composition of rock to be used as riprap. The applicant should address energy dissipation requirements [per UMC 817.43 (f)(3)] at the terminal point of the diversion channel where flows are conveyed to the natural drainage. Page 4-9 states that a 3-foot high course of riprap facing will be emplaced completely across the downstream embankment face. Please show a diagram(s) of the proposed structure including pertinent dimensions. What criteria were applied to design this energy dissipation structure (i.e. what velocity is permissible in the natural channel)?

The cross-sectional dimensions and materials used for the ford should be indicated. Have channel freeboard requirements and the possibility of additional freeboard needs at the sharp channel bend near the rock fan been accounted for in the channel design as per UMC 817.43 (f)(2)? Reference is made to an anti-velocity (energy dissipation?) structure at the upstream end of the diversion channel. How will a velocity reduction be accomplished and what is the magnitude of the velocity (energy) reduction? More information is needed to properly address these areas of concern than the rather sketchy level of detail provided in the ACR response.

UMC 784.14 (b)(3) requires that the reclamation plan include a description of the water monitoring program to be employed during and after mining activities. This information must be provided. In particular, what is the schedule for the collection, recording, and reporting of this information for the Des-Bee-Dove mine area and what methodologies are utilized and/or contemplated for the reclamation period?

The permit application is deficient in terms of addressing the probable hydrologic consequences of mining operations at Des-Bee-Dove as required by UMC 784.14 (c). In particular, page 2-129 states that "disturbance or interruption of aquifers within the underground mine complex will have no effect on downstream alluvial floors, insomuch as the water will eventually reach the downstream portions of the drainage system through one system or another." Can this statement be substantiated? That the water will eventually reach downstream areas implies there may be some temporal effect of mining operations on groundwater movement. In general, the applicant is cautioned against the use of broad, general statements which cannot be substantiated; these are not useful in making determinations of compliance.

UMC 784.16 Reclamation Plan: Ponds, Impoundment Banks, Dams, and Embankments

On pages 4-17 and 4-18 of the permit application, it is indicated that measures will be taken to ensure that the surface water which flows through and adjacent to the mine will meet effluent limitations set forth in UMC 817.42. What specific methodologies are proposed for meeting these effluent limitations?

When does reclamation of the sediment pond occur in relation to the reclamation schedule presented on the following page?

UMC 784.23 Operation Plan: Maps and Plans

The ACR Response indicates that mine water requirements at the Des-Bee-Dove mine are now met to some degree through a pipeline connection to the Wilberg mine. Diversion of runoff into the Beehive portals no longer takes place. The surface drainage map (3-4) should be revised to portray the current drainage pattern at the mine. The applicant should also indicate what measures have been implemented to keep runoff from entering the Beehive portals.

The applicant was requested (in the ACR) to supply maps of the current water supply and distribution system within the mine. This topic was not addressed in the ACR Response. Please furnish this information.

UMC 817.46 Hydrologic Balance: Sedimentation Ponds

Page 3-45 states that "Company states the sediment pond meets the performance standards of Subchapter K and requires no modification." Since the purpose of the application is to demonstrate compliance with applicable state and federal regulations, a blanket statement that a structure meets the Permanent Program Performance Standards of Chapter K (UMC Par. 810-817) is not adequate. Provide complete information and appropriate calculations to show that applicable performance criteria are or will be met. Documentation should also be included which shows approval of the sediment pond design by appropriate state and federal agencies.

Supporting information used to calculate required sediment pond capacity and related design calculations is generally lacking in either the main body of the permit application or in Appendix VII. Appendix VII contains calculations for 17 sub-watershed areas used to describe the contributing watershed to the Des-Bee-Dove sediment pond, however no map is included showing these subareas. Please provide this mapping. Further, the worksheets in Appendix VII indicate that an area of appoximately 6,000,000 ft^2(noted to be above the mine) was subtracted from the sediment pond drainage area. Please provide an explanation for the assumption that this area is noncontributory to the sediment pond.

Sediment pond storage calculations on Sheet 2 of Appendix VII are based on a disturbed area of 12.1 acres, whereas the main body of the permit application indicates that the disturbed mine area is approximately 20 acres. Please clarify this difference. The calculations on Sheet No. 3 are not sufficiently documented to enable an understanding of the rationale applied by the applicant to compute sediment pond volume.

Sheet No. 4 of Appendix VII, pertaining to spillway capacity, uses the Rational equation with a C equal to 0.3. What was the basis for selection of this value? Additionally, it is indicated that spillway capacity was designed based on the 25-year, 6-hour storm producing 1.7 inches of rainfall. UMC 817.46(i) requires that the combination of principal and emergency spillways have the capacity to safely discharge runoff from a 25-year, 24-hour storm event or larger event as specified by the Division. Furnish documentation verifying that this requirement is met by the sediment pond design.

Are the calculation sheets in Appendix VII indicating spillway dimensions and capacity correct? The sediment pond spillway is indicated to consist of a trapezoidal channel with a 6-foot bottom width and 2:1 sideslopes. Sediment pond drawing no. 01-52-1-015 in Appendix VII indicates that the spillway has an 8-foot bottom width and 1.5:1 sideslopes. Please clarify this discrepancy. The applicant should also furnish a stage-discharge relationship to illustrate spillway performance characteristics.

The permit application makes no mention of whether or not freeboard was considered and pond embankment height increased by 5% to allow for settlement as per UMC 817.46(j) and UMC 817.46(k), respectively.

In Appendix VIII, a report on inspection of the Des-Bee-Dove sediment pond (by J. P. Davison of Morrison-Knudson Company, Inc.) references an alteration to the underdrain inlet to protect it with a riser pipe and incorporate an oil collecting device. The sediment pond details should be amended to illustrate these design changes.

UMC 817.47 Hydrologic Balance: Discharge Structures

What procedure was used to assess the need for and design riprap protection for the existing culvert inlets and outlets, sediment pond inlet and outlet channels, and the sediment pond underdrain outlet? What is the size distribution of rock used as riprap at these locations and what is the thickness of the rock layer? Is a granular filter layer required to prevent erosion of the base material? Provide details of all filter and riprap design procedures and incorporate into the permit application.