

DIVISION OF
OIL, GAS & MINING

Draft

Determination of Completeness
for the
Emery Deep Mine

BIO/WEST, Inc.

*Resource Management
and Problem Solving Services*



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OIL, GAS & MINING

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Determination of Completeness
for the
Emery Deep Mine

Prepared for:

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October 21, 1983

DETERMINATION OF COMPLETENESS
for the
Emery Deep Mine
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UMC 771.27 Verification of Application

The application must be verified under oath (i.e. notarized) by a responsible official of the applicant that the information contained therein is true and correct to the best of the official's information.

DETERMINATION OF COMPLETENESS

The applicant has supplied a notarized statement of verification.

UMC 782.13 Identification of Interests

(a) (2) There are several discrepancies pertaining to permit area surface and coal ownership as contained in Sections 4.3.1, 4.3.2, and Plates 4-1, 4-2, and 4-3. The missing or conflicting data are discussed by section below and should be corrected by the applicant.

Section 19, Township 22 South, Range 6 East, Surface ownership. The name, address and phone number of A. Olsen has not been included in 4.3.1; Plates 4-1 and 4-3 depict different Utah Power & Light boundaries; Plates 4-1 and 4-3 show, respectively, George Olsen and E. Olsen as owners of W1/2 SE1/4 SW1/4.

Section 20, Township 22 South, Range 6 East, Surface ownership. The SW1/4 SE1/4 and SE1/4 SW1/4 are owned by Dermis Jensen according to Plate 4-3; Plate 4-1 shows E. Bryant as owner. Plate 4-1 gives L. Mangum and Plate 4-3 gives D. Mangum as owners of SW1/4 SW1/4.

Section 21, Township 22 South, Range 6 East, Surface ownership. Plate 4-3 indicates that Dermis Jensen is owner of SW1/4 NE1/4. Plate 4-1 does not indicate this, nor is Jensen's name or address included in list of surface owners (page 4-2).

Section 28, Township 22 South, Range 6 East, Surface ownership. List of owners (page 4-3) includes John Lewis; however, neither Plates 4-1 nor 4-3 indicate that he owns surface property in Section 28.

Section 29, Township 22 South, Range 6 East. surface ownership. List of owners (page 4-3) and Plate 4-1 give R. Anderson, et al. as owners of SW1/4 NW1/4, NW1/4 SW1/4; however, Plate 4-3 gives George Olsen as owner. Plate 4-3 indicates Randall Jensen is owner of SE1/4 NE1/4; however, Plate 4-1 indicates Cedar Ridge. List of owners include L. Mangum; Plate 4-3 shows only Donald Mangum.

Section 30, Township 22 South, Range 6 East, Surface ownership. NE1/4 NW1/4, Plate 4-1 shows Earl Olsen as owner. Plate 4-3 shows George Olsen; list of owners includes James Olsen and John Lewis, neither of which are shown on Plate 4-1. Coal ownership. NW1/4 SW1/4, Plate 4-3 indicates lease from R. Lewis to Consolidation Coal Company (Consol), Plate 4-2 does not indicate Lewis ownership.

(e) Several inconsistencies are noted in surface and coal ownership contiguous to the permit area, which should be corrected or clarified by the applicant.

Section 19, Township 22 South, Range 6 East. Plate 4-1 indicates that the surface of NW1/4 is owned by A. Olsen. His name and address has not been provided in 4.3.1.

Section 21, Township 22 South, Range 6 East. Plate 4-1 indicates Dermis Jensen is surface owner of NE1/4 NE1/4, his name and address must be supplied in 4.3.1 The address of LDS must be supplied.

Section 22, Township 22 South, Range 6 East. Plate 4-1 and Section 4.3.1 indicate J. and L. Kingston are owners of E1/2 SW1/4, SW1/4 NW1/4 and NW1/4 SW1/4; Plate 4-3 shows J.O. Kingsley as owner (surface).

Section 27, Township 22 South, Range 6 East. Plates 4-1, 4-2 and 4-3 indicate L. Hunter owns surface and coal of SW1/2 NE1/4; his name and address must be supplied in 4.3.1 and 4.3.2.

Section 30, Township 22 South, Range 6 East. Supply the address of Ralph Lewis surface and coal owner of NW1/4 NW1/4. Also, Plate 4-2 indicates the coal here is owned by Emery County; this discrepancy needs to be corrected.

Section 25, Township 22 South, Range 5 East. Plate 4-1 indicates G. Lewis and Robert Lewis own tracts in SE1/4. Names and addresses should be added to 4.3.1. Plate 4-2 shows that Kemmerer owns the coal in the W1/2 NE1/4; the name and address must be added to 4.3.2.

Section 36, Township 22 South, Range 5 East. Plate 4-1 shows J. Lewis is owner of surface; 4.3.1 lists Robert Lewis.

Section 6, Township 23 South, Range 6 East. Sections 4.3.1 and 4.3.2 do not list the state as owner of surface and coal of SW1/4 NW1/4 as indicated on Plates 4-1 and 4-3. Also, addresses of state and federal lessors need to be included in 4.3.1 and 4.3.2.

DETERMINATION OF COMPLETENESS

The applicant has supplied revised maps showing the appropriate surface and coal owners. A new list has been provided with correct addresses.

UMC 782.15 Right of Entry and Operation Information

(a) The applicant needs to provide the dates of execution of surface leases with private individuals and identify the specific lands to which the documents pertain. The document descriptions must also specifically delineate the legal rights claimed by the applicant.

DETERMINATION OF COMPLETENESS

Additional information requested on the leases has been supplied along with an identification of the legal rights claimed by the applicant.

UMC 783.14 Geology Description

The lack of drill log data makes it difficult to assess in detail the geologic setting of the operation. Drill log data should be provided in sufficient detail to answer the following concern:

1. To evaluate the accuracy of the cross-sections which have been submitted, drill logs for holes used in constructing the cross-sections should be provided.

DETERMINATION OF COMPLETENESS

Copies of drill logs used in constructing the geologic cross-sections have been identified.

2. It is not possible to tell in most instances on which strata the chemical testing was done. Some of the holes sampled for analysis are shown on the cross-sections, but this identification is not complete.

DETERMINATION OF COMPLETENESS

All geochemical test holes have been located on the cross-sections or the plan view map as appropriate.

3. Drill log data should be submitted in sufficient detail to identify the location of the outcrop of the Ferron Sandstone. Preferably the top of the outcrop of the sandstone unit should be shown on a map and drill logs used to develop this map supplied. This information is needed to be able to more accurately describe potential impacts of mining on the hydrologic system since the Ferron Sandstone will be substantially altered by mining (see related questions under UMC 783.15 and 784.14).

DETERMINATION OF COMPLETENESS

The applicant has supplied a map showing the location of the Ferron Sandstone outcrop and supplied drill logs which verify this information in the permit area.

Plate 7-8 indicates that coarse Quaternary deposits are present throughout much of the permit area and may form shallow unconfined aquifers. However, with the exception of cross-section A-A', none of these deposits are shown on the cross-section. The applicant should clarify this apparent discrepancy.

DETERMINATION OF COMPLETENESS

Cross-sections have been revised to show the required information.

The text states in 6.6.1 that lineaments and "highly jointed areas" may create roof control problems and that these areas have been mapped by Consol from aerial photographs. This information should be correlated with enhancement of subsidence impacts and ground water inflows if possible. If there is any correlation, a copy of the map should be provided.

DETERMINATION OF COMPLETENESS

The applicant has provided the background report discussing the lineament study and provided information on correlation of lineaments with field observations.

The applicant should identify on Plate 6-1 the location of the drill holes which were sampled for chemical analysis. Due to the number of holes drilled, it is difficult at best to locate any of these holes. The sampling which was done should be representative of the conditions to be encountered during mining and a reasonable distribution of samples should have been collected. In particular coal seams, partings, and roof and floor rock should have been sampled to determine the potential for water quality degradation.

DETERMINATION OF COMPLETENESS

All geochemical test holes have been located on Plate 6-1.

UMC 783.15 Ground Water Information

The discharge characteristics of the Upper Ferron Sandstone have not been adequately described by the applicant so that hydrologic impacts can be assessed. The discharge of ground water to the alluvium in the creeks was not adequately evaluated. The value cited of 0.4 cfs was derived by USGS for a proposed surface mine and incorporated a reduction in flow to the alluvium due to drawdown by the mine. Also, this evaluation assumes that seepage from the Ferron occurs only downstream of the mine. Since the Ferron is located above the underground workings and apparently forms the cliff above the portals, it would be reasonable to assume that the discharge would occur where the Ferron was dissected by Christiansen Wash, just upstream of the surface facilities and to a certain extent in Quitchupah Creek. Therefore, the applicant should reevaluate the potential drawdown effects of mining on the streams.

A map showing the outcrop of the Ferron would delineate where the discharge could be occurring had water not already been intercepted by mining. This would then show where discharges can be expected once mining is completed and the water levels reestablished. Figure 7-2 is not adequate to depict this because of the overlay of the Quaternary deposits.

DETERMINATION OF COMPLETENESS

The applicant has submitted the revised surficial geology map. A clarification of natural discharges of the Upper Ferron Sandstone Aquifer was provided.

On page 3-49 of the permit application, the applicant mentioned that additional wells had been put in and were to be monitored for water levels and water quality. If possible, this information should be incorporated into the permit application and interpreted as to mining impacts on the ground water hydrology.

DETERMINATION OF COMPLETENESS

The information requested on the new wells has been provided in the permit application. It can be found in Section 7.1.

In the ACR response for the preparation facility, well data for several wells which were monitored for water levels was submitted. However, the well identification was missing from the top of the page. The wells should be identified and located on a map if not already done so.

DETERMINATION OF COMPLETENESS

The discrepancy in well identification has been clarified.

UMC 783.16 Surface Water Information

The applicant should quantify the relative contributions to stream flow by irrigation return flows (direct and through seepage), aquifer discharge and overland flow. Without this information on a seasonal basis, an evaluation of the surface water impacts cannot be performed.

DETERMINATION OF COMPLETENESS

The applicant has sufficiently quantified the contributions of irrigation return flows, aquifer discharge and overland flow to allow an assessment of surface water impacts from mining.

Section 7.2.7 (referenced on page 7-158) is missing and should be provided.

DETERMINATION OF COMPLETENESS

The applicant has clarified this discrepancy by explaining that the reference was a typographical error. The appropriate reference is 7.2.6, which provides the necessary information.

UMC 783.19 Vegetation Information

The applicant should provide a map that overlays vegetation types over disturbed and proposed disturbed areas. This was done for the preparation plant but not the mine area.

DETERMINATION OF COMPLETENESS

The applicant's response indicated that Plate 9-1 had been revised to include previously disturbed areas and proposed disturbance areas. However, no such areas could be identified on Plate 9-1. There are no legend entries for these types of areas, nor is there any indication of revision.

What is the source for the statement "14 threatened and endangered plant species are reported for Emery county?" What is the source for the report that S. wrightiae is from the area?

DETERMINATION OF COMPLETENESS

The applicant provided the following citation: USDI-BLM 1979. Reclaimability Analysis of the Emery coal field. Emery, Utah EMRIA Report No. 16 p 125, 126.

UMC 783.20 Fish and Wildlife Resources

(b) On page 10-15, Part 10.2.4, a more detailed description of consultation with appropriate agencies should be included, such as names of individuals and the date of contact (see UMC 771.23[d]).

DETERMINATION OF COMPLETENESS

The applicant has provided a list of the individuals and agencies consulted.

The Wildlife Map 10-1, Appendix A, should include permit area boundaries and indicate areas of disturbance.

DETERMINATION OF COMPLETENESS

The applicant has revised Plate 10-1 to show the permit boundary, presently disturbed areas, and areas of future disturbance.

A description of the methods used to determine the values of prairie dogs as a prey species for predatory birds and mammals as discussed on page 10-12, should be included.

DETERMINATION OF COMPLETENESS

The applicant has provided a discussion of the methods.

UMC 783.22 Land-Use Information

Since the applicant is proposing to reclaim the surface facilities in part as rangeland, the grazing conditions, capacities and productivity of the existing lands must be described to provide a comparison with the postmining land-use.

DETERMINATION OF COMPLETENESS

The applicant has provided information showing the vegetation type, production, vegetation cover, and major species on the rangelands within the mine disturbance boundary. However, the applicant should discuss the grazing history, including the number of animals and kinds of animals that have used the area.

UMC 783.25 Cross-sections, Maps and Plans

(a) The applicant should provide elevations of the drill holes for which drill logs will be submitted.

DETERMINATION OF COMPLETENESS

The drill log data shows the elevations of the drill holes.

UMC 784.11 Operation Plan: General Requirements

(b)(1) An analysis should be provided on the feasibility of reclaiming the evaporation lagoon. If significant salts have accumulated in the area, will it be possible to reclaim the site? If the soil in the bottom of the lagoon is toxic to the growth of plants, the applicant must provide plans for covering of the soil with suitable growth medium or removal and disposal. If this becomes necessary, costs for this activity must be included in the bond amount.

DETERMINATION OF COMPLETENESS

The applicant has identified an area of the evaporation lagoon that can be considered toxic and has provided plans for removal of the material prior to revegetation. A cost for this activity was included in the bond estimate.

(b)(3) Coal handling and storage areas are discussed in Section 3.2.4; however, the applicant must also include a discussion of maintenance of these facilities.

For the reclamation of the coal handlings and storage areas, the applicant must show either how coal will be removed from the site and be properly disposed, or if coal will be left in these areas; i.e., material left on the base of the areas mixed with overburden and not able to be utilized; the applicant must show that the coal will be covered with four feet of material unless testing shows that less material can be utilized. If the coal is to be hauled out, the applicant must show how much material is involved, where it will be disposed of and that the disposal area meets the requirements of the regulations. The cost associated with this activity must be included in the bond amount.

DETERMINATION OF COMPLETENESS

Information has been provided on the maintenance and reclamation of these areas. Coal will be removed where it occurs in depths greater than four feet to a depth of four feet and the excavation will be backfilled with material in the road embankments. The applicant has not specifically stated that the coal that might exist in depths of less than four feet will also be covered with four feet of material. The applicant must provide information on the amount of cover that will be placed over coal that might exist at the site in depths of less than four feet.

UMC 784.12 Operation Plan: Existing Structures

(a) The applicant shall provide plans and calculations for drainage structures associated with mine yard roads if any other than those shown on Plate 13-5 exist. The applicant shall also provide a general description of the construction and materials of the mine yard roads in Section 3.2.3.42 of the permit application.

DETERMINATION OF COMPLETENESS

Sufficient information has been presented on the construction and drainage of the mine yard roads.

UMC 784.13 Reclamation Plan: General Requirements

(a) Plate 3-7 indicates that there will be a new portal developed in this permit term. If this is the case, then sufficient information must be supplied by the applicant about this area to show compliance with Subchapter K.

DETERMINATION OF COMPLETENESS

The applicant has stated that there will be no new construction of surface facilities during this permit term due to reduced market conditions requiring that less coal be mined.

The applicant must provide statements of compliance with UMC 817.131 and that signs will be constructed and used as per the requirements of UMC 817.11.

DETERMINATION OF COMPLETENESS

Information has been provided which shows compliance with UMC 817.131 along with information on signs and markers.

(b)(2) The applicant should provide a detailed breakdown of the costs which were developed for the bond estimate. The bond must be estimated assuming that a contractor would be required to do the work. As such contractor fees would have to be added to the bond amount. This estimate should incorporate the following concerns:

A detailed breakdown of structures removal costs similar to what was presented in the response to the preparation plant ACR. In addition, the reference(s) utilized to develop these costs should be noted.

The costs for backfilling and grading should show the volume of material to be handled, haul distances, equipment to be utilized and productivity of that equipment, and unit costs on a per yard or per hour basis. References utilized to develop this estimate must be documented.

A breakdown of the cost related to closure of the portals must be provided.

The costs which were utilized for each stage of revegetation should be referenced.

Maintenance costs should be included which consider such costs as repair of rills and gullies, monitoring of sediment pond discharge to determine when the ponds could be removed, maintenance of the ponds if they are to be left in place for a substantial period of time. If these costs are included in the monitoring costs, a detailed breakdown of that cost is needed.

Costs for mitigation of impacts to water wells and impacts resulting from subsidence, if appropriate, must be included in the bond estimate (see comments under UMC 784.14 and 784.20).

DETERMINATION OF COMPLETENESS

A detailed breakdown of all costs related to reclamation have been provided as requested except for subsidence impacts. The applicant must include a cost for the mitigation of subsidence impacts expected over the 10 year responsibility period. From the subsidence that has occurred to date, and from information presented in the Geotechnical section of the ACR response, it is evident that there will be significant lowering of the ground surface, and that the lowering will be differential, creating areas where ponding might occur. As such, the applicant will be required to grade these areas to reestablish positive drainage. In areas where subsidence affects irrigation channels, the applicant will be responsible for reestablishment of the drainage in these channels. Since these types of occurrences are already evident within 2 years of mining, it is fairly certain that additional subsidence will occur over the mine during the 10 year responsibility period. As such, the mitigation of these impacts must be provided for the bond estimate. These costs would include an estimated depth of grading over a certain portion of the 5 year permit area. If any structures will be undermined during this permit term and if the applicant is not planning on leaving any pillars to protect the structure, then repair or replacement of the structure must also be included in the bond amount.

(b)(3) The applicant must supply contour maps or cross-sections sufficient to show the anticipated final surface configurations required by this part. The amounts of material to be backfilled to close portals and the amount of material to be graded in the sediment pond areas and the roads must be quantified and supporting calculations supplied. This information should be utilized to substantiate the bond amounts.

DETERMINATION OF COMPLETENESS

The applicant has supplied a post-mining contour map which shows the anticipated final configuration of the surface. In addition, the amount of material required to backfill the areas to be reclaimed has been determined.

Specific plans for the handling of the material coming from the reclamation of the lagoon must be provided. These plans should show where the material is to be placed, how it will be stabilized and what the water control structures will be.

DETERMINATION OF COMPLETENESS

The applicant has provided plans for the removal of toxic material from the evaporation lagoon.

Though the area is fairly flat lying, it may be to the applicant's benefit to grade along the contour where possible to prevent erosion in an area that will be difficult to revegetate. If this is not required, the applicant should provide information as to how grading will occur.

DETERMINATION OF COMPLETENESS

The applicant has provided plans for grading of the site along the contour.

(b)(4) Since no topsoil is available from the disturbed areas, the applicant needs to propose substitute material. As per UMC 817.22(e), the applicant must demonstrate that the substitute material is equal to or more suitable for sustaining the vegetation than is the available topsoil and the substitute material is the best available to support the vegetation.

DETERMINATION OF COMPLETENESS

On the existing facilities sites, the applicant proposes excavation (to a maximum of 4 feet) of gravels and coal materials overlying the original surface. In "isolated" areas where gravels and coal materials extend beyond 4 feet in depth, "topsoil and dirt materials" from the reclaimed road and borrow site will be used as "fill" material. The applicant also proposes a revegetation demonstration site be established in an area where gravels and coal material will be excavated. The demonstration site will include seeding and transplanting. Since the applicant is proposing to use what is no longer topsoil, but a substitute medium, physical and chemical testing should be done in conjunction with the demonstration site to determine the suitability of the exposed surface material as a topsoil substitute. Also, the "topsoil and dirt material" from the reclaimed road areas and borrow site should be included in any testing and demonstration if they are to be substituted for topsoil. The applicant needs to supply a topsoil (or substitute material) balance showing whether or not there is sufficient material from the reclaimed road and borrow site. This should include an estimate of the surface area and depth of coverage.

(b)(5) The applicant must clarify which seed mixture will be used, those included in Chapter 10, Appendix C, or those in Chapter 3.

Although several seed mixes are proposed for different plant associations, please indicate which mix will be used for each vegetation type that is or will be disturbed.

Alternative species are listed with each seed mix. Specifically, what species will be used? What species will they replace?

It is suggested that the applicant develop new seed mixes, giving consideration to the native species in each vegetation type (as indicated in the vegetation study) and local conditions.

The applicant must provide justification for the use of introduced plant species and show that they are compatible with the plant and animal species of the area as required in UMC 817.112.

DETERMINATION OF COMPLETENESS

The applicant has provide two seed plans. Seed Plan A for the mixed desert shrub, annual forb, and rock outcrop talus communities and Seed Plan B for the greasewood shrubland and riparian meadow communities. The applicant has not provided adequate information to justify the use of introduced species. The applicant should supply information that indicates the introduced species are essential to establish an effective cover for erosion control, and that the introduced species will not out-compete the native species. The test plots, described in UMC 784.13 Reclamation Plan General Requirements, could supply some of the needed information.

The 104.2 acres of disturbed area shown on Table 9-2 as "nonaffected areas" should be clarified. If these areas are to be used for the mine operation, they should be included as part of the affected area and assigned to the vegetation community which existed on them prior to disturbance.

DETERMINATION OF COMPLETENESS

The applicant indicates that the area appears to have been greasewood shrublands, and commits to reclaiming it as such.

The methods proposed to be used to determine the success of the vegetation as required in UMC 817.116 should be described.

DETERMINATION OF COMPLETENESS

The applicant should include a monitoring schedule and comparisons of woody plant density and diversity. Each revegetated area must be compared to the reference area for the vegetation type existing prior to disturbance or presumed to have existed prior to disturbance. Measurement techniques and statistical adequacy should be discussed.

The applicant should describe the proposed methods for weed control in the revegetated areas.

DETERMINATION OF COMPLETENESS

The applicant has supplied a weed control plan.

Temporary and contemporaneous reclamation should be addressed by the applicant, including: methods to be employed for seeding and mulching; seed mix(es) to be used for outcrops on dams, embankments, road cuts, etc.; and irrigation and pest (weed) control measures (if used) according to UMC 817.100.

DETERMINATION OF COMPLETENESS

The applicant indicates that there will be no additional disturbance. However, Table 9-2 (Vegetation) and Map 10-1 (Wildlife) indicate future areas of disturbance. The applicant should commit to revegetating any disturbed areas as contemporaneously as practicable. The objective of contemporaneous reclamation should be permanent rather than temporary, or is indicated in the applicant's response.

As per UMC 817.115, the applicant should include a discussion of grazing management as it pertains to revegetated areas.

DETERMINATION OF COMPLETENESS

The applicant states that no grazing during the liability period is anticipated.

The applicant must describe the methods to be used in planting and seeding the evaporation lagoon. The applicant must include in the plans for reclamation of the mine discharge sedimentation pond road a discussion of seed bed preparation which includes ripping the roadbed. Also, the applicant must describe the spray and curlex blanketing mulching methods in more detail, and the rate of application of mulching materials should be described for each proposed method, including the straw mulch method.

DETERMINATION OF COMPLETENESS

The applicant has described the seeding and mulching methods to be used in revegetation of the evaporation lagoon and mine discharge sedimentation road.

Seedbed preparation should include plans for ripping areas that have become compacted as a result of mining activities.

DETERMINATION OF COMPLETENESS

The applicant indicates that ripping will be used in all areas which have become compacted as a result of mining activities.

As per UMC 817.114, the applicant needs to provide a discussion of mulching and other soil stabilizing practices for all regraded and top-soiled areas, not just to those "with erosion problems." The applicant must also describe the rate of application of the straw mulch.

DETERMINATION OF COMPLETENESS

The applicant has supplied a discussion of mulching and stabilization practices for all reclaimed areas.

(b)(7) The applicant must provide a discussion of the proposed method for disposing of toxic-forming and fire hazard materials, such as waste oil, in addition to other general debris discussed on page 3-14.

DETERMINATION OF COMPLETENESS

A discussion on the disposal of waste material at the mine has been provided indicating where material will be stored and finally disposed.

(b)(8) The methodology for sealing mine entrances is described in 3.5.3.1. The applicant states that "the piezometric surface of the Ferron aquifer is well below the present mine openings; therefore, these openings need only be sealed against entrance of people, wildlife and surface runoff." Once pumping of the mine is terminated, however, this may not be the case, and ground water could exit through improperly sealed mining openings. This circumstance is made more likely by the fact that the Upper and Lower Ferron aquifers are known contributors of subsurface outflow to Quitchupah Creek and Christiansen Wash (page 7-55). The applicant should re-assess plans for sealing mine openings to preclude disruption of the hydrologic balance, and to comply with performance standards established in Subchapter K.

DETERMINATION OF COMPLETENESS

Information has been provided on the closure of the portals relative to potential discharge from the Ferron sandstone. The applicant has provided plans for placement of a discharge pipe in the portals. Water from the pipe will discharge into the sedimentation ponds in the facilities area. The size of the pipe(s) must be provided to ensure that they will be of sufficient size to handle an "adequate" amount of outflow. Possibly the figure of 0.4 cfs could be utilized to size the pipes. The location of the piping to the sediment ponds must be shown on a plan view map. In addition, there is some concern surrounding the location of the pipe(s). They are shown on the diagram as being elevated to a certain extent. If ponding of the water should occur behind the backfilled material due to the position of the pipe, then discharge through the fill material could occur. It is probably advantageous, however, to locate the pipe in this manner to prevent discharge of sediment from the floor. The applicant should provide plans for sealing of the backfill material below the pipe to prevent discharge through the backfill.

In addition, the applicant needs to describe plans for sealing of boreholes, wells and exploration wells.

DETERMINATION OF COMPLETENESS

Information has been provided detailing the method which will be used to seal all drill holes.

UMC 784.14 Reclamation Plan: Protection of the Hydrologic Balance

(a)(1) The applicant must provide an analysis of the impacts of Total Dissolved Solids (TDS) loading and other applicable contaminants in both surface and ground waters and submit plans for mitigation of these impacts if necessary. It appears that the water entering the mine is from the Ferron Sandstone and that degradation of the water is occurring in the mine. To be able to assess impacts resulting specifically from mining, the applicant must evaluate the quality of the water in the Upper Ferron upgradient of mining, and then assess the quality of water downgradient of mining. Apparently, contamination of the Ferron Sandstone is occurring due to intercommunication between aquifers in existing wells. The applicant should make an estimate as to the extent of this degradation as compared to the degradation of these aquifers due to well contamination, then the apparent impact of mining is minimized. There appears to be only two wells for which quality data has been collected exclusively in the Upper Ferron and these are located just to the northeast of the mine. Most likely they do not represent the undisturbed condition of the aquifer. As such, unless there are other data available, there is not enough information to assess how the quality of the Ferron Sandstone aquifer is changing as a result of mining and well contamination because there are no data on the quality of the aquifer prior to any disturbance. This issue is critical in determining the life of mine impacts on the hydrologic system. The mining operation could eventually intercept a significant portion of the water in the Upper Ferron as it moves from the recharge area in the fault zone. The question then becomes what is the effect of discharge from the Ferron Sandstone to the local stream. If the quality in that aquifer is good prior to disturbance, is it serving to dilute the dissolved solids levels in the streams thus enhancing their usefulness? If mining intercepts this water and degrades it to the extent that it apparently has been (the U.S. Geological Survey [USGS] well shows a TDS level of about 900 milligrams per liter [mg/l] while the mine discharge is between 4,000 to 7,000 mg/l), what will be the effect on downstream and downgradient water users? Also, since the undisturbed state of the aquifer is unknown, this difference in quality may even be more significant especially as mining moves closer to the recharge zone and could potentially intercept even higher quality water. This analysis must also include Muddy Creek and Miller Canyon (see related question under [a] [3]).

DETERMINATION OF COMPLETENESS

The applicant responded that the undisturbed water quality of the Upper Ferron aquifer was adequately evaluated through the analysis of water samples collected from roof fall areas in mine, and from a few wells in the permit area, as presented in Tables 7-4 and 7-5 of the permit application. A perusal of the tables, however, indicates that only two wells (USGS 1-2 and EMIRA #3) are completed solely in the Upper Ferron aquifer, and that the range of TDS values reported for the roof-fall sampling sites is from 700 to over 5900 mg/l.

The two wells are located very close to disturbed areas and hence may not fully represent undisturbed conditions. The information indicates that background water quality in the Upper Ferron aquifer may not yet be fully evaluated. Although no further information is requested from the applicant at this time, it should be noted that the installation of additional wells may be necessary to adequately monitor undisturbed conditions during the permit term. This situation will be evaluated closely during the TA portion of the permit review. The applicant has provided a projection of salt loading and other applicable contaminants that can be used to evaluate impacts to surface water from mine discharge during the five-year permit term.

(a)(2) Given that there is no assessment of the effects of degraded Quitchupah Creek waters on Ivie Creek, the impacts to water users (along Ivie and Muddy creeks) must be quantified or the applicant must justify why this should not be required. According to page 7-163, there are no surface water rights on or immediately adjacent to the mine area, but no information is given as to the presence of water rights on Ivie and Muddy creeks. If there are such rights, there is a potential for serious water quality impacts which must be addressed.

DETERMINATION OF COMPLETENESS

The applicant has provided information concerning the existence of surface water rights for Ivie Creek and portions of Muddy Creek. As a point of clarification, however, a discussion of surface water rights for Muddy Creek below its confluence with Ivie Creek should be presented. The information provided by the applicant did not clearly address the types of water rights that will be impacted below the confluence since this area was considered outside the influence of the mine. Information on the types of water rights near the gaging station below I-70 could prove to be valuable in assessing the significance of the impact of increased TDS loading to Muddy Creek, as the applicant has projected that the TDS contribution from the mine as measured at the station will increase from 9 percent to 18 percent during the five-year permit term.

The applicant must provide a more specific plan as to the replacement of the wells which will most likely be impacted by mining. This should include plans for redrilling the wells or other alternatives as appropriate.

DETERMINATION OF COMPLETENESS

The applicant provided the necessary information to address impacts to water supply wells in the area. Two wells, the Bryant well and the Lewis well have been identified as affected by mining and the applicant has made the necessary adjustments to these wells.

(a)(3) A quantitative impact analysis must be provided concerning the quantity of surface and ground water which will be depleted in areas within and adjacent to the mine plan area particularly as it applies to agricultural production for the life of mine. If ground water recharge to the creeks, seeps and springs is severely depleted, and assuming this represents the base flow or part of the flow in the creeks, how will this affect water quality, wildlife and aquatic habitats and water use. This analysis should include Quitchupah Creek downstream of the mine, Ivie Creek, Muddy Creek and water flows in Miller Canyon. It is not clear that Muddy Creek and Miller Creek are beyond the influence of mining because according to Plate 7-4, they are possibly recharged by the Upper Ferron. Ground water diverted to the mine may deplete flows in these areas. Effects of the flow reduction in Muddy Creek should be assessed under normal and low flow conditions.

DETERMINATION OF COMPLETENESS

The applicant has provided sufficient data to support quantitative impact analysis concerning the disruption of groundwater recharge to alluvium along the stream channels. The applicant provided water quality data for alluvial wells in the area. The remaining concerns raised in this ACR comment are discussed under 783.15 and 784.14 (c).

(b)(1) In Section 3.4.3.2 of the application, the applicant states that mining will be conducted so as to minimize water level declines. Specifically what does the applicant intend to do to minimize this impact.

The applicant had not adequately dealt with one part of the surface water control plan: the berms around the yard area. The narrative in Section 3.2.3.39 must be expanded to explain that some of the facility area runoff does not flow into a sediment pond, but is held in catchment areas adjacent to the berms as shown in Plate 13-3. In addition, that plate should clearly show that runoff from the stockpile area cannot flow into Quitchupah Creek, as it appears that there is a break in the berm section where that could possibly happen.

DETERMINATION OF COMPLETENESS

Plate 13-3 has been revised to adequately illustrate the effectiveness of the berm around the mine yard area in preventing runoff from disturbed areas from flowing into Quitchupah Creek.

Drawings showing surface water control structures are generally adequate with the exception that plans for the mine discharge pond were not provided so that the design adequacy of the operation and reclamation plan for this structure can be evaluated.

DETERMINATION OF COMPLETENESS

The applicant has provided a plan view and cross section of the as-built pond on Plate 13-5a. This is sufficient to evaluate the design adequacy and operation of the reclamation plan.

A plan for disposing of sediment cleaned out of the ponds and stored above pond 3 should be provided for final reclamation and included in Section 3.5.3.3 of the permit application.

DETERMINATION OF COMPLETENESS

An explanation has been provided for the sediment storage pile reclamation plan. Now that the mine discharge pond has accumulated a significant amount of sediment, the applicant should also indicate where that material will be stored after clean-out.

Quantitative analyses for runoff, sediment volume and effluent limits are provided in Chapter 13. The choice of K factor (0.35) should be further documented to show that it is reasonable for disturbed areas and stockpiles in the pond watersheds. The background calculations and the numbers provided for L and S as used in the USLE equation must be clearly referenced to a map showing surface drainage and disturbed areas. L and S should not be computed for the drainage basin slope, but rather for the landslope within the drainage basin. Thus, the L and S factor may increase substantially and significantly affect the gross erosion estimate. Additionally, the applicant should provide the 1:200 map mentioned on page 13-32.

DETERMINATION OF COMPLETENESS

Choice of K factor has been adequately substantiated. The applicant reviewed the L and S factors and stated that they were conservatively chosen. This will be verified during the technical analysis. A check of plate 13-1 showed that it could be used in lieu of the 1:200 map mentioned in the design information.

The applicant must clarify that the sediment pond slide gate will be closed at all times until decanting is required. Otherwise, detention time calculations given on page 13-49 shall be expended to minimum detention time required to achieve effluent limitations. To show this, the applicant may need to provide inflow/outflow hydrographs.

DETERMINATION OF COMPLETENESS

The applicant has stated that the slide gate will be closed except during decanting. This response is adequate.

(b)(3) Based upon the above discussions and the response that the applicant provides as to the significance of these concerns, the ground water monitoring plan may need to be revised.

DETERMINATION OF COMPLETENESS

The applicant provided reference to discussions held with DOGM on September 13, 1983. The groundwater monitoring plan will be reviewed and modified as necessary in the TA phase of the permit review. Sufficient information has been provided to begin the TA phase of the review.

(c) The applicant should reevaluate the quantity of ground water which will enter the mine as operations continue. The following factors should be incorporated into the analysis:

1. increase in the fracturing of the roof material to the Ferron Sandstone due to retreat mining and increased overburden depths; and
2. increase in the hydraulic head of water in the Ferron Sandstone.

Both of these factors would lead to an increase in the quantity of flow into the mine. Extrapolation of ground water inflows in the existing mine may not be valid.

DETERMINATION OF COMPLETENESS

The applicant makes reference to a new computer simulation of mine inflows to be anticipated over the five-year permit term. This simulation was performed using the CONOSIM model.

In order to evaluate the reasonableness of the model results, the applicant should provide a narrative which explains the assumptions, boundary conditions, calibration values and other pertinent information which were utilized in the simulation. At this time sufficient information to evaluate and verify the CONOSIM results has not been provided.

A similar analysis was apparently performed previously, as described on p.p. 7-88 to 7-91 of the permit application. Again, little documentation was provided in the text so that the calculations could be verified. Of importance is the fact that these same calculations were also used to project five-year water level declines in the Upper Ferron Sandstone, shown on Plate 7-5 of the permit application. It appears that the CONOSIM results, presented in the applicant's ACR response (p. 44) supercede the calculated inflows presented on p. 7-90 of the permit application. However, the applicant did not provide a corresponding five-year water-level decline projection map for the new CONOSIM inflow results. Since the two sets of projected inflows differ (as evidenced by the two years of overlap, 1984 and 1985) the applicant should revise Plate 7-5 to agree with the new CONOSIM inflow projections. If the applicant feels that the drawdowns shown in Plate 7-5 are still valid, he should state his reasons why and also provide all the necessary information utilized to initially prepare Plate 7-5. The brief

discussion on p. 7-89 is insufficient to assess the model and supporting calculations used to generate Plate 7-5.

The applicant has stated that the inflows to the mine were reevaluated using the CONOSIM model. Information must be provided on how the model handled increase in inflows due to fracturing of the roof materials and caving. Specifically, what was the height of caving anticipated and over what time frame was the analysis done. As pillars fail, it can be expected that significant caving will occur. However, the problem is complex as is evident in the discussion on the lineament study. Three of the major roof falls were associated with "high long term groundwater inflow areas" and other roof fall areas showed only moderate increases in inflow. How was this issue dealt with in the model? Is there any other field observations that might correlate water inflows and roof falls such as the height of the cave or the type of roof material?

UMC 784.20 Subsidence Control Plan

On page 12-4 of the permit application, Consol states that on-going analyses were being conducted in the areas of subsidence and ground water hydrology. If that investigation has been completed, it should be submitted. Also, if there is any additional subsidence data which has been collected since the permit application was completed, this should also be submitted.

DETERMINATION OF COMPLETENESS

Information has been provided on subsidence of the surface over the past 2 years.

The subsidence discussion does not clearly indicate that the pillar stumps that will be left to support the roof and prevent surface subsidence will be stable in the long-term. An analysis of this issue should be provided as it could be reasonably expected that these stumps will deteriorate and fail, subsiding the surface. This type of subsidence could be expected to create differential settlement on the surface and disrupt irrigation flows. If data are used from old sections of the operation in an analysis of this issue, comparison of the extraction ratio, seam depth and thickness, and coal and overburden characteristics between the areas should be made. If it cannot be shown that these pillars will be stable in the long-term, then the applicant must submit information required by (c) and (d) of this part. If necessary, the cost of mitigation of impacts must be included in the bond amount.

DETERMINATION OF COMPLETENESS

A revised geotechnical section has been provided discussing anticipated subsidence and mitigation of subsidence. A cost for mitigation of subsidence impacts has not been included in the bond amount. See comments under UMC 784.13(b)(2).

The area that the applicant intends to leave whole pillars to protect surface structures and streams should be defined by the expected angle of draw. This angle may define an area where retreat mining should not occur which is greater than the one pillar width that the applicant intends to leave. An operations map should be provided showing where these pillars are to be left.

DETERMINATION OF COMPLETENESS

The angle of draw has been used by the applicant to define the area where pillars will be left to protect the surface. The applicant did not provide an operations map showing the location of these areas. These areas must be defined in order to evaluate whether or not all "significant structures" and renewable resources will be protected and that the mining operation will be conducted to protect these structures and renewable resources. The applicant states in section 12.4.3.1 Subsidence Control, that final planning of mining sections "should" incorporate the application of steps 1. and 2. for surface protection. An operation plan must be provided which shows that the mining plan "will" incorporate these steps. This must be done for anticipated mining over the five-year permit term.

The Cultural Resources survey submitted in the ACR response for the preparation plant shows a study area which does not include the entire area overlying the underground workings. If there are structures which can be considered Cultural Resources, then protection of these structures must be addressed.

DETERMINATION OF COMPLETENESS

The applicant has stated that a Cultural Resources survey of the area will be conducted prior to mining under any unsurveyed area. The applicant must state a duration of time prior to mining that this will take place in order to ensure that there will be adequate time to evaluate the site and obtain approval from the regulatory authority for mitigation or removal plans.

NOTE TO DOGM: Since we are not reviewing Cultural Resources, someone on the staff of DOGM should evaluate the response by Consol and the Determination of Completeness to ensure that this is an appropriate approach.

PREIMINARY ALLUVIAL VALLEY FLOOR DETERMINATION

Within the Emery Mine plan area and adjacent lands, several streams exist which may qualify as Alluvial Valley floors (AVF). These streams are: Quitchupah Creek, Christiansen Wash, Muddy Creek and Ivie Creek. The preliminary AVF findings for each of these streams are outlined below. Included with each is a justification as to why the finding was made. If a finding could not be made, a discussion explaining the circumstances is included.

Quitchupah Creek

A positive AVF determination is made for all portions of Quitchupah Creek, above the confluence with Christiansen Wash. The applicant contends that Quitchupah Creek is not an AVF on the basis that:

irrigation waters are not supplied solely from Quitchupah Creek;

the quality of Quitchupah Creek water would pose a salinity hazard if used alone; and

storage facilities would be required to provide sufficient water for agricultural purposes.

The applicant's contentions are not sufficient to allow a negative AVF determination to be made. Although it is true that the irrigation waters diverted from Quitchupah Creek are vastly supplemented from the Muddy Creek diversions, there is sufficient water available in Quitchupah Creek alone to support irrigation. If the Muddy Creek waters were not available, Quitchupah Creek could probably support several hundred acres of flood irrigation activities, based on a mean annual water yield of 1,800 acre-feet. The areas irrigated by Quitchupah Creek alone would, therefore, not be as large as the irrigation area shown on Plate 8 of the application; however, it still would be of sufficient size to justify a positive AVF finding.

Quitchupah Creek is also exclusively utilized for flood irrigation, contrary to the applicant's contentions. As shown on Plate 8 of the permit application, 100+ acres are being irrigated (without the use of storage facilities) in an alluvial area approximately two miles upstream from the permit boundary. This demonstrates that it is a regional practice to utilize water solely from Quitchupah Creek. In lieu of other information, this fact also shows that the water quality of Quitchupah in this area is adequate for irrigation use, and the irrigation activities can be established without the use of storage facilities.

At this time, a definitive finding cannot be made for the lower portion of Quitchupah Creek, below the confluence with Christiansen Wash. In this area, the terrain becomes more rugged, and as a consequence, the alluvial deposits are much more limited than what occurs above Christiansen Wash. No agricultural activities were identified in this area. The deposits are of sufficient width and areal extent to qualify as potential AVF (page 1-5, OSM June 11, 1980 Alluvial Valley Floor Guidelines). However, it is unknown to what degree the lands in this area are flood irrigable, consistent with regional practice in the area. In order to demonstrate that the lands are not flood irrigable, the applicant must show that there is no regional precedence to practice flood irrigation on valley floor lands of similar physical condition to those encountered along Quitchupah Creek below Christiansen Wash.

The assumption can be made that irrigation activities have been confined to the areas above Christiansen Wash because of the large abundance of relatively flat bottom lands and pediment lands located north of the confluence. This can be readily seen on Plate 8 of the permit application. However, if these lands were not available, or if there were to be a change in land use in the areas above Christiansen Wash such that irrigation practices were not feasible, then it can also be assumed that the lands below the confluence along Quitchupah Creek would become much more attractive for agricultural purposes. The alluvial land along Quitchupah Creek below the confluence with Christiansen Wash must, therefore, be viewed as a potential AVF. A negative determination cannot be made at this time. Given the physical characteristics of lower Quitchupah Creek, a negative determination can only be made if it is shown that regionally, there is no precedence to utilize valley floor lands of similar size and condition. Such a regional inventory should consider those lands within several counties or tens of miles about the permit area (OSM June 11, 1980 OSM Guidelines). This information has not been provided in the permit application.

Muddy Creek

A positive AVF finding is made for Muddy Creek, at all areas shown on Plate 8 of the permit application where unconsolidated stream laid deposits are present. The positive finding is made on the basis of established agricultural activities, sufficient water availability activities and sufficient areal extent of alluvial deposits. Muddy Creek also exhibits the highest overall water quality of the streams in the study area. Mean specific conductivity values above Emery are around 0.405 mmhos/cm, with a range of 0.198 to 0.264 mmhos/cm. This information is based on five samples. Downstream, the water quality degrades to the point where the mean specific conductivity value is 2.99 mmhos/cm at the Muddy Creek - Ivie Creek confluence. Muddy Creek is in part fed by Miller Canyon, a spring-fed tributary of Muddy Creek which may be subject to water loss as a result of drawdown in the Ferron Sandstone. The applicant must provide information regarding the importance of Miller Canyon water to the established agricultural activities located downstream of the Miller Canyon - Muddy Creek confluence, and on the nature of impacts which could occur in the Miller Canyon watershed.

Ivie Creek

A definitive finding cannot be made for Ivie Creek, although it is likely that Ivie Creek is also a potential AVF. The findings for Ivie Creek are analogous to those listed for lower Quitchupah Creek. In order to demonstrate that Ivie Creek is not an AVF, the applicant must show that it is not a regional practice to utilize similarly sized land parcels for irrigation. On the basis of size criteria, the alluvial lands along Ivie Creek qualify for further consideration as potential AVF.

No agricultural activities exist along Ivie Creek in the study area. However, as explained for lower Quitchupah Creek, it may be feasible to utilize the alluvial lands along Ivie Creek for agricultural purposes if the more attractive lands above the confluence of Christiansen Wash and Quitchupah Creek were not available. Lack of agricultural activities along Ivie Creek, therefore, does not constitute proof that such activities are not possible.

The water quality of Ivie Creek is on the poor side and generally would not be recommended for irrigation under ordinary conditions, on the basis of very high salinity. Four water quality samples obtained from Ivie Creek showed mean specific conductance levels for 3.27 mmhos/cm. The range was 2.03 to 4.19 mmhos/cm. The applicant should, however, address the water quality of irrigation waters used in the region, in an effort to identify if irrigation is practiced using similar quality water. If there is a regional precedence to utilize similar quality water, then a negative AVF determination cannot be made on the basis of water quality alone.

Ivie Creek is generally out of the area which could be impacted by mining, with the exception of receiving water discharges routed through lower Quitchupah Creek. A positive AVF finding for Ivie Creek should not prove to be a barrier to mining, provided the applicant quantifies impacts to Ivie Creek as a result of mine water discharge, and adequately demonstrates that the impact is not significant.

Christiansen Wash

Although Christiansen Wash is the smallest drainage in the study area, it presents the most complex situation regarding an AVF determination. The wash traverses the irrigated lands which are fed by water diverted from Muddy Creek. No water, however, has historically been diverted directly from Christiansen Wash channel. Christiansen Wash, therefore, does not present the same type of situation which exists along Quitchupah Creek whereby Quitchupah Creek waters are utilized contemporaneously with Muddy Creek irrigation waters. In order to make an AVF determination, one must analyze the Christiansen Wash AVF characteristics separately, as if the Muddy Creek diversion were not being utilized. Unfortunately, the flow characteristics and quality of Christiansen Wash are greatly influenced by irrigation return flows from

the Muddy Creek irrigation water, so the characteristics of Christiansen Wash under natural conditions are generally unknown.

Christiansen Wash drains an area of 11 square miles, which is approximately 2.6 percent of the drainage area of Quitchupah Creek (415 sq mi). Both streams are perennial. Assuming that the overall basin yields are comparable, Christiansen Wash should, under natural conditions, yield approximately 47 acre-feet of water (2.6 percent of Quitchupah Creek's mean annual yield of 1,800 acre-feet). Given the four acre-feet/acre irrigation demands of the region, Christiansen Wash would be able to support, at a maximum, an area of only 11 acres in size, assuming that the total flow for the year would be available. This approach is also thought to be relatively conservative, since the majority of the Quitchupah Creek watershed exists in the upper reaches of the Wasatch Plateau, where higher amounts of precipitation would be expected. The same is not true for Christiansen Wash. Given this, the mean annual flow for Christiansen Wash under natural conditions should be slightly less than 47 acre-feet.

This information, coupled with the fact that Christiansen Wash has never been historically diverted for irrigation use, indicates that Christiansen Wash does not possess any AVF characteristics which may be considered significant. Given the AVF size criteria alone, Christiansen Wash would most likely not qualify as a AVF. The final declaration should consider regional practices; however, the preponderance of information indicates that Christiansen Wash is not an AVF.

Summary

Four perennial streams exist in the Emery Mine study area: Quitchupah Creek; Muddy Creek; Ivie Creek; and, Christiansen Wash. Both Quitchupah Creek and Christiansen Wash traverse through the permit area, Muddy Creek and Ivie Creek are located in the adjacent lands. Quitchupah and Christiansen Wash are, therefore, subject to the greatest potential impact.

A positive AVF determination is made for Muddy Creek and upper sections of Quitchupah Creek, above Quitchupah Creek - Christiansen Wash confluence. A positive determination is made on the basis of sufficient water availability, areal extent of alluvial deposits, and established artificial flood irrigation activities.

A potential AVF determination is made for lower Quitchupah Creek (below the Christiansen Wash confluence) and for Ivie Creek. Neither site is currently being utilized for agricultural activities within the study area. Both areas present less attractive conditions than those which exist in the upper portion of Quitchupah Creek, due to a much more limited extent of alluvium, and steeper topography. However, it appears both areas could be utilized for agricultural activities if necessary, and the extent of the deposits do meet the AVF size criteria. An assessment of regional practices would be necessary to make a final AVF determination.

A negative AVF determination is proposed for Christiansen Wash. Christiansen Wash has never been utilized for irrigation activities and generally would not be able to support a land area compatible with the AVF size criteria. A review of regional practices should be performed prior to making the final determination.

Information Requested from the Applicant

The applicant should provide an assessment of regional irrigation practices, to determine if there is a regional precedence to utilize similarly sized alluvial lands possessing analogous biologic, geologic, soils and hydrologic characteristics as exist along lower Quitchupah and Ivie creeks. A negative determination cannot be made without this information. The scope and areal extent of the survey must be consistent with Part I of the OSM June 11, 1980 Alluvial Valley Floor Guidelines. In lieu of this information, a positive AVF determination can be supported.

If a positive determination is made for both lower Quitchupah Creek and Ivie Creek, the information requested in the ACR (under impacts to the hydrologic balance) will be sufficient to also address AVF impacts. The same holds true for Muddy Creek and Upper Quitchupah Creek. As a result, there is no need to request further information for AVF impacts at this time.

DETERMINATION OF COMPLETENESS

The applicant has provided a new AVF report, prepared by Kaman Temp Corporation, which addresses the concerns raised in the ACR. Sufficient information has been provided to begin the TA phase of the permit review.

A negative AVF determination is proposed for Christiansen Wash. Christiansen Wash has never been utilized for irrigation activities and generally would not be able to support a land area compatible with the AVF size criteria. A review of regional practices should be performed prior to making the final determination.

Information Requested from the Applicant

The applicant should provide an assessment of regional irrigation practices, to determine if there is a regional precedence to utilize similarly sized alluvial lands possessing analogous biologic, geologic, soils and hydrologic characteristics as exist along lower Quitchupah and Ivie creeks. A negative determination cannot be made without this information. The scope and areal extent of the survey must be consistent with Part I of the OSM June 11, 1980 Alluvial Valley Floor Guidelines. In lieu of this information, a positive AVF determination can be supported.

If a positive determination is made for both lower Quitchupah Creek and Ivie Creek, the information requested in the ACR (under impacts to the hydrologic balance) will be sufficient to also address AVF impacts. The same holds true for Muddy Creek and Upper Quitchupah Creek. As a result, there is no need to request further information for AVF impacts at this time.

DETERMINATION OF COMPLETENESS

The applicant has provided a new AVF report, prepared by Kaman Temp Corporation, which addresses the concerns raised in the ACR. Sufficient information has been provided to begin the TA phase of the permit review.

SOCIOECONOMICS

Although the following is not required by the regulations of the Coal Mining and Reclamation Permanent Program, it would be very useful in completing the socioeconomic assessment that is required by the National Environmental Policy Act (NEPA):

1. The number of employees (construction, operation) by year that are associated with the coal preparation plant. Also, average annual salary information for mine workers would be useful.
2. Any information that might be available concerning where existing and/or future employees may reside and their mode of transportation to work, i.e., carpool, private auto, busing program, etc.
3. Any data the company can provide concerning tax revenues contributed to the County and local municipalities.

It would also be useful to the analysis if the company would provide documentation of any past and/or future contributions or assistance given to communities surrounding the mine (e.g., financial contributions, employee transportation, housing assistance to employees, participation in community social/recreation programs, etc.)

TECHNICAL ANALYSIS QUESTIONS ON EMERY DEEP MINE RELATED TO SUBSIDENCE

The geotechnical section of the ACR Response was reviewed in greater detail to determine possible deficiencies at this time so that the Technical Analysis phase will be able to be completed within the required time frames.

The applicant has provided information relating to the prediction of the extent of subsidence at the Emery mine. The approach primarily centered on the stability of pillars in the mine. That is pillar failure will lead to subsidence or if a stable pillar is constructed, no subsidence will occur.

Initially the applicant identified a minimum size pillar and determined the depth at which failure of the pillar would occur and thus subsidence in Section 12.4.2.1. Areas where the depth of overburden was less than this predicted depth would not subside. The analysis which was utilized by the applicant closely followed the method described by Holland (1962). The following questions concern this analysis:

The value for "K" that was used was 2432 (psi feet⁵). Assuming that the "K" value would have been determined using methods proposed by Holland, $K = \text{ultimate compressive strength of the coal} \times (\text{the edge dimension of the cube used to determine the compressive strength})^5$. The applicant has stated that the compressive strength of the coal is 5000 psi. From Peng (1978, page 185) this would appear to be the strength of a 2 inch cube. Therefore the "K" value would be equal to 7071 psi inches⁵ or 2041 psi feet⁵ compared to 2432 used by in the analysis. Information must be provided showing how the "K" value was determined or references sited showing that 2432 is appropriate.

It is not certain how the applicant determined the area supported by the pillar (AT). Upon evaluating figures 12-2 and 12-3, and figuring that the smallest stump shown would represent the 15 foot square pillar and by defining the tributary area as that area half the distance to the adjacent pillars, the tributary area appears to be 2358 square feet and 1693 square feet in the respective figures. This value would substantially alter the stability of the pillar stumps. The applicant must show how the tributary areas were defined.

A safety factor of one was used in the analysis. Since the evaluation has been used to evaluate the stability of the pillars to support the surface and prevent subsidence, the safety factor must be greater than one. Holland recommended a safety factor of two in his presentation.

In addition, he stated that if there is water in the workings, which would be the case at Emery after mining is complete and the water table has reestablished, that it would decrease the stability of the pillars. Therefore, the applicant should use a safety factor of at least 2 plus some additional amount for the conditions at the mine with respect to water. If the safety factor is not required, then additional information must be provided showing why and this information must be referenced.

The allowable load in bearing on the roof and floor rock must be evaluated. Holland has stated that this is approximately one-half to two-thirds of the unconfined compressive strength of these strata.

The applicant must consider all of the above questions and reevaluate the minimum depth of cover where the pillars will become unstable.

An analysis was also presented in Section 12.4.2.1 on the design of pillars at depths of greater than the 214 feet. Several parameters were identified for this analysis. The following questions concern the parameters identified:

An average center to center pillar width (stump width) of 40 feet was used in the analysis. Why wasn't the minimum pillar width used in the above analysis used? It will still be this minimum pillar width which will initially fail. Once this pillar fails, it is likely that additional stresses will be placed on adjacent larger pillars due to the sandstone layer in the roof material. This would then increase the pillar load, decrease the safety factor, and failure would be more likely. Once time effects are considered, failure would be reasonably certain. The applicant must evaluate failure based upon the weakest pillar in the system and also evaluate how the failure of this pillar will impact other pillars in the section.

The applicant must identify how the angle of draw was determined.

References must be supplied showing how the caving height factors and the equation for effective mining height were determined.

The design of pillars for control of subsidence is discussed in Section 12.4.3.1 of the ACR response. Many of the above questions relate to this section also. In particular, the question on safety factor. Changes to this section may be appropriate once the above questions on Section 12.4.2.1 are addressed.

The applicant has requested that monitoring for subsidence be discontinued after two years above a mined section. Due to the time involved in pillar deterioration and thus the period of time until subsidence would be expected, the applicant should continue to monitor the site for a longer period of time. It is uncertain what this time should be. The applicant should commit to monitoring at least during this permit term to attempt to identify the effects of time on pillar deterioration. This time frame should be reevaluated during the next permit review.

TECHNICAL ANALYSIS QUESTIONS ON EMERY DEEP MINE RELATED TO PERMIT TERM

Map 3-7, which shows anticipated mining over the next five years must be updated. Currently Map 3-7 only shows anticipated mining through 1985. It is expected that the permit will run from 1984 to 1989. Due to the slow down in mining, it may be possible that the anticipated mining during the permit term is still in this area. Of so, the applicant need only submit a table comparing the year of mining on Map 3-7 to the anticipated year of mining during the permit term. In addition, the actual permit boundary will only be the area encompassing the anticipated five years of mining. On Map 3-7 the permit boundary has been shown as much larger than the anticipated five years of mining. The applicant must provide a statement indicating that the permit boundary is only that area encompassed by the anticipated five years of mining for all maps showing the permit boundary.

Map 3-8 shows additional permit terms. On this map, the years 1980 to 1985 are shown for the area indicated as the permit boundary in Map 3-7. However, Map 3-7 indicates that mining will extend beyond the projected five years. In addition, this map is most likely out of date due to the slow down in operations. Therefore, the applicant must provide a table correlating the dates shown on Map 3-8 to dates which reflect current projections. In addition, it would appear that the five year projection for 1980 to 1985 was incorrect and the areas should be revised to reflect information from Map 3-7.

TECHNICAL ANALYSIS QUESTIONS ON EMERY DEEP MINE RELATED TO RECLAMATION

The applicant is proposing to use four seed mixes: Seed Plan A for the mild desert shrub, annual forb, and rock outcrop/talus communities; Seed Plan B for the greasewood shrubland and riparian meadow communities; a separate seed mix for the evaporation lagoon; and a separate seed mixture for the mine discharge sedimentation pond road. From this and the applicant's response to ACR questions related to Revegetation Success it appears that the applicant does not intend to reclaim areas based on the vegetation types which existed (or are presumed to have existed) prior to mining disturbance. Of particular concern is the use of Seed Plan B in revegetating both the greasewood shrubland and riparian meadow communities. There also seems to have been little consideration given to the pre-disturbance community (communities) that existed prior to disturbance at the evaporation lagoon and mine discharge sedimentation pond road.

The applicants reclamation of the existing facilities (p. 28 of Consol: Response to the ACR) propose to excavate gravels and coal materials now covering the original surface to a depth of four feet. The applicant maintains that this would be the "original topsoil," however, the surface would not actually be equivalent to "topsoil." It is BIO/WEST's opinion that the applicant should justify the use of this substitute material (see DDG). It would probably be helpful if the DOGM staff reviewed this portion of the plan to ensure concurrence with our opinion.



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