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TO: File

THRU: Daron Haddock, Permit Supervisor 

FROM: David Darby, Senior Reclamation Hydrologist 

RE: Hydrologic Technical Analysis, Cyprus Plateau Mining Corporation, Star Point Mine, ACT/007/006-98B, Folder #2, Carbon County, Utah

SUMMARY

This review incorporates an evaluation of hydrologic material submitted since the original submittal of September 27, 1996. A response to was provided on June 23, 1997. The response was reviewed and comments were again relegated to the applicant on September 16, 1997. A partial response was again submitted by the applicant on November 14, 1997 and revisions to Chapters 3 and 4 were submitted on February 3, 1998. A forth round submittal received.

CPMC is proposing to cease coal mining operations at the Star Point #2 Mine during 1998. Mining took place in the vicinity of the Star Point operations prior to the passage of SMCRA. There was substantial disturbance to the surface from those operations which CPMC will reclaim. CPMC has submitted hydrologic information to describe baseline conditions that existed before mining operations and operational data to help identify changes while mining. CPMC will continue monitoring to identify any impacts after mining operations cease.

This review analyzes the operation and reclamation plans in the hydrologic section of the MRP. All other hydrologic sections not appearing under this review have been determined complete.

Only one hydrologic deficiency remains which is listed in the Reclamation Section under diversion structures.

TECHNICAL ANALYSIS

OPERATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

Analysis:

Groundwater Monitoring

CPMC described groundwater rights and presented a list identifying ownership and purpose of use in Table 724-100a. CPMC identifies 88 groundwater rights (Map 731.800a) on and adjacent to the mining operations. Eight of the water rights are classified a "domestic" or "other", the other eighty springs are classified as "stock watering".

The location of seeps and springs which have been identified throughout surface investigation are shown on Map 728a. The operator has drilled several wells within the permit area which are used for water level or quality monitoring. There are three east of the Bear Canyon Graben, one south of Gentry Ridge and one located in Little Park Canyon near Castle Valley Ridge. These wells are shown on Maps 728a and 728b.

Springs, wells and in-mine sites were monitored to garner information on quality, flow and levels. The information is summarized in tables and graphs in the MRP and discussed under each section.

Operational monitoring of the groundwater systems include the collection of quarterly ground water samples since 1980. Additional springs were added to the monitoring plan in 1985 representative of Gentry Ridge. Expansion of the permit area into Castle Valley Ridge necessitated the addition of seven ground and three surface water monitoring sites. CPMC developed a data base program for all water quality data collected to date. Data and statistical summaries are presented in text and exhibits. The applicant has provided extensive summaries and comparisons between constituents, sites and geologic units on pages 700-35 through 700-41.

Groundwater flow is identified on Page 700-65. Available data was used by the applicant to establish the general direction and flow patterns of groundwater through formations and units. Geologic structure within the permit area strongly influence the flow patterns.

Stratigraphy, faulting, fracturing, sand channel and attitude of the strata all influence the pattern of groundwater flow. Monitoring has provided the tools to identify the transmissivities of some units and the vertical and horizontal flow patterns.

Groundwater monitoring will be conducted with the same frequency during reclamation as it currently is during the operational phase. Monitoring will continue until sufficient information is collected to determine if impacts have occurred. This information is addressed in the operational section of this TA.

Findings:

The groundwater information is complete.

Groundwater Monitoring

Analysis:

CPMC presents a hydrologic plan in Section 700 of the MRP. The applicant has assembled historic and operational information to summarize the surface and groundwater hydrology of the mine plan area. The applicant begins describing sampling and analysis information on 700-34. Water monitoring stations are displayed on Map 222.200a of the MRP.

The MRP presents the location of all water bodies in Table 722.100a. It also identifies the spring sites inventoried during the 1986 and 1991 field inventory. The in-mine water monitoring sampling locations are outlined in Table 722.100b. Additional water well data is identified in Table 722.400a.

CPMC has collected baseline and operational data for surface and groundwater quality and quantity for the past 20 years, since the passage of the Surface Mining Control and Reclamation Act. The information is presented in Exhibits 722.100a through 724.100a. The sampling and analysis procedures are adequate to meet the requirements of the regulations.

Findings:

CPMC has provided complete information for this section.

Surface-water Information

Analysis

CPMC submitted plans to protect the quality and quantity of surface water within the MRP. The data collected during baseline and operational phases provided a basis to assess

mining activity trends and project possible reclamation situations..

CPMC describes surface water conditions in Section 700 and surface water rights as seen in Map 731.800b. Surface water quality and quantity issues are presented to identify potential impacts to water rights and water uses. The applicant describes and discusses surface water recharge sources, seasonal variations, water quality influences and potential impacts. The applicant discusses the potential of interbasin transfers of water, impacts to culinary water supplies and mitigation prospects.

CPMC proposes methods for surface water protection by establishing hydrologic structures sized to control the flows and energy coming from disturbed areas. Calculations were submitted to establish the expected flows and sediment load to be handled by diversion and treatment structures. Runoff volumes were calculated using the USDA Soil Conservation Service (curve number method) for estimating runoff volumes from unmeasured areas.

CPMC reported streamflow data collected from a variety of sampled sources. Peak flows and flood recurrence intervals were calculated to estimate the potential of flood frequencies.

Peak flows were calculated to develop design standards for channels, sedimentation pond containment and treatment volumes.

Surface water monitoring will be conducted with the same frequency during reclamation as it currently is during the operational phase. Monitoring will continue until sufficient information is collected to determine if impacts have occurred. This information is addressed in the operational section of this TA.

Findings:

The surface water information is complete.

Surface Water Monitoring

Surface-water monitoring information is found in Section 724.200 beginning on page 700-42. Surface-water quality information begins on page 700-47 and quantity information is found on pages 700-42 through 700-47. CPMC submitted maps (Map 722.200 a) and information identifying all water bodies on the permit area. The permit and adjacent areas exhibit a rugged topography varying between 7,000 to 10,120 feet in elevation. Ephemeral drainages are common to the Wasatch Plateau area. These stream types are shown to exist on the permit area, perennial streams exist where at higher elevations or where springflow coalesces and causes flow at lower elevations. Most smaller channels are ephemeral in and transmit flows in response to rainfall. Ephemeral streams are harder to monitor and usually produce large volumes

of sediment and perennial streams.

Findings:

CPMC reported streamflow data collected from a variety sampled sources. Peak flows and flood recurrence intervals were calculated to estimate the potential of flood frequencies. Surface water rights in and adjacent to the mine plan property were researched and listed in Table 724.200b. The list identifies the owner and purpose of use for the water right.

Surface-water monitoring plans for reclamation are the same as the plans for operational. This information is addressed in the operational section of this TA.

Water quality assessments were conducted to identify the quality and characteristics of water sources.

Findings:

Surface water monitoring information is complete.

Runoff Control

All temporary structures used during the operation phase and those used during the first and second part of the reclamation phase are designed to control the 10 yr-6 hr precipitation storm and will be removed on final reclamation. Permanent structures are designed to control the 100 yr-6 hr precipitation event. Permanent structures consist of permanent channels and culverts constructed to transmit flows under the retained county road.

CPMC provided sizing calculations for culverts and channels that control runoff flows during reclamation. Sizing calculations are presented in Exhibit 761a for 20 watersheds. A major concerns in reclaiming the site is designing reclamation channels suitable for the steep terrain.

Surface water flow volumes were determined by direct measurements or by using the curve number technique based on the triangular unit hydrograph approach of the U.S. Soil Conservation Service and a design precipitation event determined from the NOAA Atlas 2, Volume VI-Utah.

The applicant states that reclaimed channels will be constructed to conform as closely as possible to pre-mining conditions. All channels to be reclaimed will be surveyed at least 60 days prior to construction to evaluate slope stability. Many of the disturbed slopes are very steep. The use of riprap for slope protection becomes taxed to the point that of design cannot be accurately determined. The main access roadway, designated County Highway 290, will be left

as a travel route.

All siltation structures will be maintained and systematically removed during reclamation according to the reclamation plan in Section 500. Post mining reclamation contours are identified on Maps 542a through 542c..

Findings:

The surface-water runoff control plan is complete and accurate.

Acid- and Toxic-forming Materials

Analysis:

CPMC submitted soil studies in Section 200 to help identify potential acid- and toxic-forming material which may be encountered during reclamation. CPMC presents a study prepared by Kent A Crofts in Exhibit 231.200a which discusses and identifies samples taken to evaluate toxic and acid forming materials. The study presents an analysis of toxic and hazardous constituents concludes that acid- and toxic-forming materials are not believed to be a problem.

Findings:

The applicant plans to cover coal refuse and toxic materials with at least 4 feet of soil. The hydrology discussion on acid- and toxic-forming materials is adequate and does not require any further information. However, further findings found under the Soil Resource section of this TA may require addition information regarding cover needs.

Transfer of Wells

Analysis:

CPMC discusses the reclamation of all shafts and wells in Section 500. Prior to abandonment CPMC would contact the Division and seal all wells according to federal and state requirements. All wells will be filled with a non-porous material, sealed and capped to prevent exchanges of fluids between strata.

Findings:

The plan for transferring of wells is complete. CPMC will not transfer any well without prior approval by the Division.

Discharges Into an Underground Mine

Analysis:

CPMC states on page 700-118 that they do not plan to discharge water into the mine but if a need were to arise the Division would be notified. All in-mine diversions are addressed in Sections 731.100, 731.522 and 731.800.

Findings:

The information on discharging into the mines is complete and accurate.

Gravity Discharges

Analysis:

Gravity discharges are located on page 700-118. Section 731.520 and 731.522 say that gravity discharges from the mine are not likely, because of the gradient of the geology.

Findings:

The information on gravitational discharges from the mines is complete and accurate.

Water-Quality Standards and Effluent Limitations

Analysis:

Water quality standards and effluent limitations are addressed on page 700-185. Briefly CPMC says that they will meet all limits.

Findings:

Water-quality standards and effluent limitation are adequately addressed.

Diversions

Analysis:

The reclamation diversion plans are located beginning on page 700-187. Maps 761a through 761g show the reclamation drainage and designs for the mine. Map 742a identifies the proposed 54" half round CMP for Ditch No. 14. Page 700-188 says that reclaimed channel

designs are in Exhibit 761a. Natural drainage patterns will be restored during reclamation. CPMC identifies the type of channel will be constructed in Table 761a, broad swale or riprap design. Table 761b identifies the particular channel dimensions, slope, depth and volume. Table 761c summarizes culvert design (diameter, peak flow and outlet velocity).

The applicant addressed the culvert issue identified in the last deficiency review. Diversion ditch, half round culvert, will not be used in reclamation. The designs have been removed from Maps 542.200c and 761c.

Findings:

The proposal for reclamation diversion plans are complete.

Stream Buffer Zones

Analysis:

Stream buffer zone information is provided on page 700-116. The Corner Canyon Fan Breakout is the only facility considered to be in a stream buffer zone according to the MRP. This area is not near any "aquatic resource" but CPMC has marked the buffer zone anyway.

Findings:

Stream buffer zone information is complete.

Sediment Control Measures

Analysis:

CPMC proposes to control sediment from the reclaimed areas using existing sedimentation control structures, constructing 3:1 terraced side slopes; using mulch to help hold soils, roughen slopes by pocking and revegetating slopes. CPMC intends to use sedimentation ponds and ASCA's, until they are removed when regrading reaches the pond site. The company has provided a time table, Table 542.100a, which indicates the sequence and timing for removing sediment control structures during reclamation.

The reclamation plan calls for the removal of Ponds 5, 6, 7 and 9 from Area 1, Pond 3 from Area 2 and Pond 4 during reclamation of Areas 1 and 9. Sedimentation locations and designs were submitted under the Map Section in Section 700 of the MRP. The plans show pond configurations, sizes and associated outflow controls.

Findings:

CPMC has submitted plans to remove sedimentation ponds during reclamation activities. Information for sedimentation containment structures is complete.

Siltation Structures and Sedimentation Ponds

Analysis:

The reclamation plan for the Star Point mine includes designs for siltation structures and sediment ponds.

Findings:

Siltation structures and sediment pond designs and timetables were submitted and considered complete..

Exemptions for Siltation Structures

Analysis:

There are no exemptions of siltation structures. During operations the mine operated several alternate sediment control areas (ASCA's) which will be removed and incorporated in to the reclamation process that drain to the a sedimentation pond.

Findings:

This section is complete.

Discharge Structures

Analysis:

Discharge structures are identified in the sediment pond maps 733.120a through 733.120 j. All spillway and outflow control dimensions accompany the maps.

Findings:

This section is complete

Impoundments

See Sediment Control Measures.

Casing and Sealing of Wells

CPMC describes the permanent sealing and casing of wells on page 700-191 of the revised submittal (11/13/97). Monitoring wells will be surveyed until no longer required. All sealing of wells will be conducted according to the methods outlined in Section 551 and at the discretion of the Division. Each well will be backfilled, sealed and capped to prevent contact with the coal seams and to prevent interchange of fluids between formations.

Findings

The information provided by CPMC for casing and sealing monitoring wells is sufficient.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Affected area boundary maps

Analysis

The Division received updated reclamation topographic maps (Map 542.200a-542.200c) in the October 2, 1998 submittal. The maps identify the final configuration of slopes on disturbed areas. The legend identifies areas described as retained cut slopes and highwalls. Highwalls and cut slopes are partially backfilled at the base of the cut to give a sloping effect to the excavated wall. The legend indicates that the highwalls and cut slopes will be retained, the legend should be modified to state that partial backfilling will take place. The contours for backfilled areas appear to represent a gradation to approximate original contour (AOC).

The applicant provided updated reclamation water shed and diversion maps (Maps 761a, 761b and 761c) identifying watershed areas and reclamation contour designs.

Findings

The information provided by CPMC for operation and reclamation boundary maps is

sufficient to make a determination for development and impact. A deficiency identified for diversion ditch SPRD-32 for reclamation may require future changes and submittal of Map 761c.

Reclamation surface and subsurface manmade features map

Analysis

Maps 761a and 761c were updated and identify the channels and contours that will remain after reclamation. Reclamation topographic maps identify the reclamation areas and proposed surface work. The roadway currently providing access to the property and mine workings is a county road that will be left intact. The applicant has identified all culverts associated with the county road. They will remain in place and are the responsibility of the County.

Findings

The information provided by CPMC for structures and features boundary maps is sufficient.

Control facilities maps

Analysis

The Division received several maps (Maps 731.720a-731.720e) with the October 2, 1998 submittal identifying the locations of surface water and sediment control facilities. The maps identify diversions, bridges, streams, channels, ponds, ditches and alternate sediment control areas that is planned for reclamation.

Findings

The information provided by CPMC for treatment maps is sufficient.

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Sampling and Analysis

Analysis:

Sampling and analysis is covered on page 700-34. The MRP describes procedures that are acceptable under the coal mining regulations.

Findings:

The sampling and analysis procedures are adequate to meet the requirements of the regulations.

Baseline Information

Analysis:

Baseline information begins on page 700-35. It is separated into groundwater information, surface-water information, geologic information and climatological information. These are individually addressed in corresponding sections of this TA.

Findings:

CPMC has provided complete and accurate baseline information.

Groundwater information

Analysis:

Groundwater baseline information is found on pages 700-35 through 700-41. Water rights and water quality begins on pages 700-35 and 700-38, respectively.

Findings:

The groundwater information is complete and accurate.

Surface-water Information

Analysis:

Surface-water baseline information is in found section 724.200 beginning on page 700-42. Surface-water quality information begins on page 700-47 and quantity (rights) information is found on pages 700-42 through 700-47.

Findings:

The surface-water baseline information is complete and accurate.

Diversions

Analysis:

The applicant resubmitted Maps 761a, 761b and 761c identifying hydrologic structures to be left in place or constructed after reclamation. The applicant indicates that culverts SPRC-17a, SPRCb, SPRC18, SPRC19a, SPRC-19b, SPRC-20a and SPRC-20b will be constructed.

The applicant also plans to construct diversion ditch SPRD-32 which will run perpendicular to the reclaimed slope capturing runoff from drainage RWS-32, diverting it away from a reclaimed area. It is not know when this diversion will be removed.

Findings:

R645-301-761, Diversions constructed to divert runoff away from mine facilities and which operate perpendicular to the natural or reclaimed slope are considered temporary structures and are required to be removed. The applicant should consider alternate sediment control measures and/or channels which will carry flows which will not require maintenance.

Climatological Information

Analysis:

Climatological baseline information is found on pages 700-51 through 700-52.

Findings:

The climatological information is complete and accurate.

Probable Hydrologic Consequences Determination

Analysis:

The probable hydrologic consequences (PHC) determination is found on pages 700-54 through 700-93. The PHC is included in Section 728 through 728.400. On page 700-93 the CPMC refers the read to section 200 for information on acid and toxic-forming materials.

This section indicates that there is no acid or toxic-forming potential in the Star Point Mine; however, greater analysis on the information provided by CPMC regarding this topic is addressed in the Soils Environmental Resource section of this TA.

Findings:

The PHC is complete and accurate; however, discussion on acid- and toxic-forming materials is subject to findings under the Soils Resource section of this TA.

RECOMMENDATIONS:

The applicant has adequately addressed the requirements of the hydrologic regulations under the Operation Plan, however there is one issue under the Reclamation Plan that is unresolved.

The PHC is complete and accurate; however, discussion on acid- and toxic-forming materials is subject to findings under the Soils Resource section.

R645-301-761, The permanent use of diversion ditch SPRD-32 does not conform to regulatory requirements for removing temporary diversions, and plans should be submitted to transport flows from drainage area RWS-32.