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DIVISION OF OIL, GAS AND MINING

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TO: File

THRU: Daron Haddock, Permit Supervisor *DARH*

FROM: Sharon Falvey, Senior Reclamation Specialist *SKF*

RE: Addition of Federal Lease U-024316, Co-Op Mining Company, Bear Canyon Mine, ACT/015/025-97I, Folder #2, Emery County, Utah

SUMMARY:

The permittee submitted this amendment for Division approval on March 28, 1997. The main issues addressed in this submittal include the change in environmental resource information, the changes to the PHC, the review of baseline information and, changes in Water Monitoring. This document will need to be blended with the existing TA so that it covers all technical reviews beyond those related solely to this amendment.

Analysis:

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

GENERAL

Regulatory Reference: R645-301-411, -301-521, -301-721.

As mining has progressed some of the general understanding of the environmental ground water resources have changed. Related changes in section 7.1.2 and 7.1.3 have been incorporated into this amendment. Major changes are identified and discussed below:

1. The plan previously stated that the potentiometric surface is considerably below the Star Point-Blackhawk contact in the area of the mine. Now the plan states that separate and distinct aquifers exist in the Spring Canyon, Storrs and Panther tongues of the Star Point Sandstone rather than one single aquifer within the Star Point/Blackhawk Formation. The separate formations are unsaturated in the southern portions of the permit area.

The separateness of the formations in the Star Point under the mine is plausible. However, the following statements are presented to lend caution to the amount of validity that can be placed on applying these statements to areas up gradient of the mined area.

- a. The wells were drilled following mining. Therefore, it is unknown what the water elevation in the formations were prior to mining. However the outcrops of the formation may essentially function similar to a well drawing down the potentiometric surface to some distance up gradient of the outcrops.
- b. Lateral flow between the tongues of the formation is likely to be greater than vertical flow through the formation and could result in a separate piezometric surfaces but, could still have a common hydrologic contour up gradient from the drilled wells.

The previous statement that the potentiometric surface is separate in the southern part of the permit area is not inaccurate but, does not definitively provide information on the potentiometric surface to the north of the minesite (See the findings section under Hydrologic Resource Information in this TA).

Because of unanswered questions about the potentiometric surface to the north of the mined area the Division believes the operator may be able to answer these questions through another series of in-mine drilling. Assuming the Tank Seam is above the potentiometric surface and would not effect this surface through the proposed mining, drilling downward to each of the potentiometric surfaces at the location furthest north in the proposed mine workings may provide information with which greater confidence can be placed in determining the potentiometric surfaces to the north of the mined area.

2. Previously the permittee indicated that Bear Spring flow is derived from water bearing zones north of the mine site and includes water originating from the Star Point Blackhawk contact, cut by the fault to the north of the springs.

The permittee no-longer provides a statement in this section about the area that recharges Big Bear Spring. General recharge information is provided under section 7.1.33. Snowmelt at higher elevations provides the recharge for the ground water system and is controlled by; permeability of the strata; surface relief and, rate of snowmelt. The formation outcrops and alluvium are considered the principal recharge sources. Big Bear Spring is considered to have a component of modern water recharge as is suggested by tritium dating conducted on the spring.

3. Previously the permittee stated that Big Bear Spring fault and related sub-parallel fault zones are the primary control for a major amount of ground water occurring in the permit area. Now, the permittee states that the relative dryness of the faults and the existence of fault gouge in the mine indicate that little or no flow across these faults occur.

Clarification of this statement can be found on page 7-16 where the plan states "secondary permeability due to voids in joints or fractures, may occur in a near vertical direction." Additional information can be found in appendix 7-J pg. 2-7 in the plan. Groundwater has entered the mine through roof bolt holes and fractures. In appendix 7-J, page 2-13, the plan states that drainage of water from faults and fractures produces the largest volumes of water flowing into the mine. The description under section 7.1.4 suggests that flows exist which move downward through permeable strata, faults and joints and then move laterally until other permeable strata, faults and, joints allow vertical movement. In appendix 7-J, page 2-5, Big Bear and Birch Springs are stated to issue from fault and joint zones of the Panther Tongue of the Starpoint.

Other statements in the plan are found on page 7-5 and include the following:

- a. Joint systems at the surface are expected to be generally closed or possibly non-existent with depth,
 - b. Minor localized flow is expected to take place through the joint or fracture system with no affect on regional flow patterns and; outcrop examinations indicate that joint systems are not extensively interconnected.
4. Previously the permittee stated that secondary permeability is present along the near-vertical joints and bedding plains. Now, the permittee states that permeability is generally low with the exception of the Castlegate Sandstone.

The Castlegate Sandstone was indicated to have a porosity of 0.22. The statement on permeability and porosity is more descriptive for the Star Point formation in section 7.1.4. The peak flows and quick recharge of some springs supports the concept that recharge occurs through permeable fracture flows because the recharge occurred quickly in Big Bear Spring in 1996-1997.

Findings:

The permit does not meet the requirements of this section. The permittee must provide the following in accordance with:

R645-301-722, Correct the statements made in section 7.1.2 to reflect information found elsewhere in the plan to make the plan clear and concise.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

Baseline Information

This section reviews baseline information as it is related to the proposed tank seam lease addition, added as an attachment to appendix 7-J.

Ground-water information

Recently obtained data is presented for ground water observation wells in table 2-4. No stratigraphic logs or completion data was presented for SDH-1, SDH-2 or SDH-3. The stratigraphic logs would provide useful information in development of the CHIA.

Table 2-4 includes water elevations for DH-1A, DH-2 and DH-3A obtained in December 1995; water elevations from drill holes SDH-1, obtained in August 1994; water elevations in SDH-2 and SDH-3, obtained in August 1995; and drill holes MW-117 and MW-116, obtained in September 1996.

The location of SDH-3 was not provided on the monitoring location map. In a telephone discussion with Charles Reynolds, environmental specialist for the Co-Op Mining Company, Charles indicated that only one sample was obtained from well SDH-1 before the well failed. SDH-2 has a faulty water monitoring device, which the mine intends to correct.

SDH-1 and SDH-2 lie between the same geologic fault features north of the minesite and may provide data pertinent to the operations. The MW wells lie outside of these geologic

structures and could be influenced separately but, may provide some additional insight to the geohydrology of the area.

The information for SDH-3 is on the opposite side of the Trail Canyon Fault and was not considered associated with this proposed mining block. Little information on Trail Canyon Mine and water associated with it's workings is provided. The information from SDH-3 may provide information pertinent to the Trail Canyon Mine and possibly recharge relationships with Big Bear spring. The stratigraphic logs would provide useful information in development of the CHIA.

Findings in the March 9, 1995 TA stated the following:

“The drilling of DH-4 does not change the conclusions of the past CHIA but, does indicate that any future mining in the Federal lease to the north should be examined to determine the impacts of future mining and interception of the water table.”

The separate potentiometric surface of the Starpoint is provided to support a determination that no adverse impact is expected to occur due to mining the Tank Seam. However, there are still unanswered questions about the potentiometric surface to the north of the mine site. Refer to the “Environmental Description” heading in this T.A. The information relating the extent of the mine workings to the uppermost known potentiometric surface of the Blackhawk/Starpoint aquifer was provided in the informal conference. That information should be incorporated in the plan with the northern most extent of workings identified.

Spring Data

Baseline spring sampling was conducted for the sites as identified in table 1 below. The sampling period for most sites was conducted from 1993 through 1994 for sites in McCadden Hollow. While the sampling period for springs within Bear Creek Canyon were conducted between 1993 and 1996.

With the available information on the McCadden Hollow Springs it seems as though the recharge area for most of these sites are localized. With the exception of FBC-4 and FBC-13 which may have a more extensive recharge since flow was observed throughout the monitoring period. These springs appear to be associated with fault/fracture systems and are located at the northern most portion of the canyon. FBC-13 flowed at the highest rate and ranged from 22 to 60 gallons per/minute over the period for which data was collected.

The proposed extent of mining is approximately 2,250.00 feet away from the southern most spring FBC-2 (estimated by the Division from information contained on plates 7-4 and 3-4C). Information on the localized area dip for McCadden Hollow were not presented on the geologic map. However, the regional dip of the lower coal bed north of McCadden Hollow is presented by Dohling 1972, as dipping to the south. Therefore, the likelihood of these springs being impacted during this proposed mining phase would be low. For the presented assumptions and the information reviewed the baseline monitoring for the springs in McCadden Hollow is determined adequate.

The sampling period for springs in Bear Canyon provided a minimum of 2 samples per quarter over the period sampled (except for the 1st quarter when access is difficult). These sites are located above the coal seam and adjacent to the area proposed to be mined. The Bear Canyon Fault is near the springs. The porosity of the fractures/fault system may play a part in flows at these springs. Spring flows from FBC-12 have ranged from 21 to 100 gpm while flows from site 16-7-13-1 ranged from 4 to 12 gpm. These sites are potentially more susceptible to the effects from mining because they are closer to the proposed extent of the mine. However, they do issue out of the formation above the mine and on the east side of the Bear Creek Fault. The furthest proposed extent of mining occurs to the south of these springs and on the west side of the Bear Creek Fault. A 50 foot buffer is proposed along the Creek without pulling the development pillars in order to protect Bear Creek and the Castlegate outcrop. Based on the information reviewed for the Bear Creek Canyon area springs, the operator has obtained adequate baseline data for the proposed tank seam mine operation.

Table 1: Baseline Spring Sampling

Site/Location	Date	Site Condition	Comments
FBC-2/McCadden Hollow.	08/01/91	Flowing	Available in the existing plan.
	10/04/92, 6/21/93, 6/16/94.	Not found	
	3/22/93	No Access	
FBC-3/McCadden Hollow.	08/01/91	Flowing	Available in the existing plan.
	6/21/93,10/15/93,6/16/94	Not found	

	3/22/93	No Access	
FBC-4/McCadden Hollow.	6/24/93, 8/29/93, 10/15/93, 6/15/94, 8/30/94, 10/31/94.	Flowing	Existing plan baseline sample obtained 08/01/91, 10/13/92.
	3/22/93, 3/30/94,	No Access	
FBC-12/Bear Creek Canyon.	6/29/93, 8/29/93, 10/15/93, 6/15/94, 8/29/94, 10/31/94.	Flowing	
	3/22/93, 3/30/94,	No Access	
FBC-13/North Slope McCadden Hollow.	8/29/93, 10/15/93, 6/15/94, 8/30/94, 10/31/94, 6/28/95.	Flowing	Not found on map.
	3/22/93, 3/30/94.	No Access	
16-7-13-1/ Bear Creek Canyon.	6/8/94, 10/28/94, 7/10/95, 10/18/95, 7/18/96.	Flowing	Associated Water Right.
	3/22/93, 3/29/95	No Access	

Surface-water Information

No changes in the surface water collection were presented associated with the new lease area. Surface water for the McCadden Hollow Drainage was collected from 1993 through 1994. See table 2. As stated above, the regional dip of the lower coal bed north of McCadden Hollow dips to the south, the likelihood of the springs being impacted during this proposed mining phase is considered low because these springs issue above the coal and are dissected by the drainage north of the area proposed to be mined. This drainage is described as an intermittent drainage. With the exception of spring run off and precipitation events, it seems as though the base flows are probably fed by the springs from the north side of the drainage (the combined upstream spring flows values are almost equal to the stream flow for measurements made within the same time). For the presented assumptions and the information reviewed the baseline monitoring for the surface water in McCadden Hollow is determined adequate.

Table 2: Surface Water Sampling

Site/Location	Date	Site Condition	Comments
FBC-1/McCadden Hollow.	6/21/93, 8/29/93, 10/15/93, 6/16/94	Flowing	Existing plan baseline sample obtained 07/31/91
	8/30/94,10/31/94	Dry	Existing plan dry baseline sample obtained 10/04/92
	3/22/93, 3/30/94	No Access	

Baseline Cumulative Impact Area Information

The Division is concurrently conducting an update of the CHIA based on the changes submitted in the PHC. Most of these changes are related to current operations and are not directly a result of the proposed Tank Seam Amendment.

Because of the questions raised in the previous paragraphs the Division believes the operator may be able to answer these questions through another series of in-mine drilling. Assuming the Tank Seam is above the potentiometric surface and would not effect this surface through the proposed mining, drilling downward to each of the potentiometric surfaces at the location furthest north in the proposed mine workings may provide information to determine whether the potentiometric surfaces converge upgradient of the existing wells.

Alternative Water Source Information

On page 1-11 the plan states "...mitigating measures will be employed if any significant impact occurs." Because this is an underground coal mining activity the requirements of R645-301-727 do not apply. The plan meets the minimum requirements of R645-301-727.

Probable Hydrologic Consequences Determination

The plan states the following on page 1-8. "Bear Canyon Mine will have no impact on the quantity of groundwater." The plan should clarify this statement presenting discussions of ground water quantity changes contained elsewhere in the plan. The plan contains an incorrect statement suggesting the mine will not affect creek flow. The mine has an on-going minewater discharge that has increased creek flows and has removed groundwater from its stored location. An incorrect statement is made that suspended sediments will be mitigated. A mitigation plan for suspended sediments was not found in the plan. This sentence should be re-stated to be clear and accurate.

The current mining of Lease U-024316 will occur in the Tank Seam only until additional hydrologic and geologic information can be obtained. The Blind Canyon and Tank Seam have recoverable reserves in this lease.

Findings:

The plan does not meet the requirements of this section. The Permittee should provide the following in accordance with:

R645-301-730, Provide stratigraphic logs and completion data for SDH-1, SDH-2, SDH-3 and the MW wells with related potentiometric surface elevation discussions.

R645-301-742, Provide information relating the extent of the proposed mine workings for the Tank Seam to the uppermost potentiometric surface of the Blackhawk/Starpoint aquifer for incorporation into the plan.

R645-301-711. Provide a clear statements of the past and present operations and historical flow patterns at the minesite. Beginning on page 1-8, the plan says that the Bear Canyon Mine will have no impact on the quantity of groundwater and the mine will not affect creek flow. The mine has an on going minewater discharge that has increased creek flows and has removed groundwater from its stored location. The statement that suspended sediments will be mitigated should be re-stated to be clear and accurate. A mitigation plan for suspended sediments was not found in the plan.

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MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

Analysis:

Monitoring Sampling Location Maps

The amendment includes a monitoring and sample location map. However, previously monitored sites are no longer present on the map. The permit must contain a map that shows all previous and existing monitoring sites.

Findings:

The plan does not meet the requirements of this section. The Permittee should provide the following in accordance with:

R645-301-720, Provide water monitoring maps that depicts the location of all previously monitored and existing monitoring sites. Plate-2 should also be updated according to the proposed monitoring site plan.

OPERATION PLAN

HYDROLOGIC OPERATIONAL INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; 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.

Ground-water Monitoring

The Table 7.1-6 indicates under the heading "Type of data Collected and Reported" that ground water quality monitoring for springs will be obtained once for a low flow sample. It is assumed this refers to the baseline data collected and not the quarterly collection. The reclamation monitoring was previously approved for a single sample at low flow. However, this may need to be changed in the future based on information collected until the time when reclamation occurs. The reason this should be assessed is because the potential for impact to water quality is greatest during high flow period if water from the mine is reaching the source. The plan currently meets the minimum requirements of this section. The proposed ground water monitoring is considered adequate for the proposed tank seam amendment.

Surface-water Monitoring

No changes in the surface water collection were presented associated with the new lease area. The existing surface water monitoring is considered adequate for the proposed tank seam amendment.

The reclamation monitoring was previously approved for a single sample at low flow. However, this may need to be changed in the future based on information collected until the time when reclamation occurs. The reason this should be assessed is because the potential for impact to water quality may be greatest during high base flow periods if water from the mine is recharging the streams.

Findings:

The plan meets the minimum requirements of this section as it relates to the tank seam amendment.

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Recommendation

The permittee should submit the information requested prior to approval of this plan. The information on the potentiometric surface in relation to the location of the proposed mine area is critical to the determination of no disturbance to the hydrologic balance outside of the permit area as it is related to the tank seam. Other information is related to clarifying the existing permit.