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State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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July 6, 1999

Chuck Semborski, Environmental Supervisor
Energy West
P. O. Box 310
Huntington, Utah 84528

Re: Revised Chapter 9 Approval, PacifiCorp, Des Bee Dove, ACT/015/017, Deer Creek Mine, ACT/015/018-98C, and Cottonwood/Wilberg, ACT/015/019 Mines, File #2, Emery County, Utah

Dear Mr. Semborski:

The Hydrology sections, (chapter 9), of the three referenced mines are approved effective June 17, 1999. Since the revisions deal mainly with the reformatting of chapter 9 a revised CHIA is not required. This is noted as well in Jim Smith's technical analysis of April 9. The technical analysis prepared by Jim Smith on June 4, 1999 is also provided for your records.

TECHNICAL ANALYSIS of April 9, 1999

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR Sec. 783., et. al.

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Sampling and analysis.

Water quality sampling and analysis of samples collected by PacifiCorp are done according to the "Standard Methods for the Examination of Water and Wastewater" (Section R645-301-723 Sampling and Analysis).

Baseline information.

The revision of Chapter 9 contains no changes to the hydrologic monitoring program, although it does contain additional information on previously approved changes to monitoring in Rilda and Mill Fork Canyons. Baseline data for Mill Fork Canyon are being collected from fourth quarter 1998 to

fourth quarter 2000 (Appendix A).

Isotopic data are discussed in Chapter 9 and in Hydrologic Support Information 11, but sampling and analysis for isotopes are not part of baseline or operational monitoring.

Resistivity - Induced Polarization (IP) surveys were conducted in Rilda (1989 and 1992), Mill Fork (1989), and Cottonwood (1992) Canyons and across the Left Fork Fault Zone (year unknown). Locations are shown on HM-7. The report by Geo-Western on the 1989 Rilda Canyon and Mill Fork resistivity survey was previously in section 4 of the supplementary information of the MRP but it is not in Hydrologic Support Information 4 in the revised Chapter 9. Drawing GENS1338D (profiles of 1992 Rilda Canyon resistivity survey lines) and the pseudo sections of lines, R-7, R-8, and R-9 were previously in section 9 of the supplementary information of the MRP, but they are not in Hydrologic Support Information 9 in the revised Chapter 9. There is no information in the MRP on the Left Fork Fault Zone survey other than the line locations shown on HM-7.

Ground-water information.

Ground water in the Roans Canyon fault is described on pages 59 through 62. The Roans Canyon fault was first encountered in 1985, and again in 1989, in a series of horizontal borings intended to evaluate the porosity of the fault system and the potential for dewatering the system before mining operations encountered and crossed the fault. The conclusion from these tests appears to be that there is "limited lateral communication along the fault". The mean residence time of the water apparently was not determined. No data or other information are provided. The location of these borings is not given in Chapter 9.

The fault was encountered at the 3rd North, 1st and 2nd Right entries in Peak discharge from the fault zone was 5,000 gpm, but flow decreased to 150 gpm at the last measurement.1990. On page 60 it is stated that the last measurement of discharged water from this area was in 1989, apparently a typographical error. Mean residence time was not determined.

TW-10, a 1,100 foot-long horizontal hole, was drilled into the Roans Canyon fault system in or sometime prior to 1989. It was bored in the area where the 3rd North entries now cross the fault. It was determined during drilling that the water flowing from the bore-hole was from a highly fractured sandstone channel. Iron oxide was described as ubiquitous throughout the sandstone, and water temperature was 4.1° C cooler than the average temperature of other ground waters in the mine. These indicate good communication between the water in the fault and the atmosphere. TW-10 is beneath 1,200 feet of cover, but the surface above TW-10 is near highly fractured cliff-faces that are open to recharge. Tritium content of 20.8 TU in a 1996 sample from TW-10 indicated recent recharge, even though the mean residence time based on ^{14}C dating was 3,800 years.

A ground-water sample for determining mean residence time was collected at the 3rd South Seals in 1997 in an attempt to ascertain if ground water discharging from the Roans Canyon fault at locations deeper in the mine and farther from cliff-faces at the surface (presumably the 1st and 2nd Right entries) was from an active system similar to that at TW-10. Water in the sump at the 3rd South Seals apparently contained mostly water from the Roans Canyon fault and Straight Canyon syncline area of the mine, but it also included water from other in-mine sources and process water from Huntington Creek. The sample contained only 0.9 TU and had a ^{14}C based mean residence time of 12,000 years.

Based on this sample it was concluded that ground water from the Roans Canyon fault that entered the mine at locations deeper in the mine, locations that are not readily associated with cliff-faces at the surface, was ancient and not in communication with the surface. It is not clear the water sample collected at the 3rd South Seals is representative, for dating purposes, of ground water from the Roans Canyon fault deeper in the mine, presumably 1st and 2nd Right entries of 4th North.

Ground water levels in Rilda canyon are discussed on pages 103 and 104, with reference made to Figure HF-25 for water depth information from piezometers P-1 through P-5. Water-level data from P-3 are discussed again on pages 158, 163, 164, and possibly other places in the MRP. Figure H-25 shows water depth information for wells EM-47, P-1, P-4, P-5, P-6, and P-7 from 1993 to 1997, but nothing for P-2 or P-3, which were either offset or replaced by P-6 and P-7 in 1990 (p. 89). There are no data on HF-25 from earlier than 1993 although the text refers to earlier data, especially data from P-3.

Historical monitoring data collected at the Beaver Creek Coal Company Number 4 Mine will be incorporated into PacifiCorp's data base (p. 117).

Surface-water information.

Monitoring in Mill Fork Canyon was initiated in 1997. Monitoring of Mill Fork is discussed on pages 106 and 107; otherwise, no changes to the surface-water monitoring plan were noted in the revised Chapter 9. Data for Mill Fork are stated to be in the Annual Reports, but no discussion of data collected to date is in the revised Chapter 9. The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

Rilda Canyon has been monitored only since 1989, and Mill Fork only since 1997. Pages 135 and 144 have been revised to indicate this, but on page 109 it is incorrectly stated that all surface waters have been monitored since 1979.

In Appendix A it indicates that baseline data for Mill Fork Canyon are to be collected from fourth quarter 1998 to fourth quarter 2000. However, in the section on Mill Fork on page 117 it states that baseline quality analysis was conducted during 1997 and will be repeated every five years: it isn't clear what the statement on page 117 refers to.

Baseline cumulative impact area information.

At this time it does not appear information in the revised Chapter 9 will affect the CHIA.

Modeling.

Modeling has not been used.

Alternative water source information.

PacifiCorp and NEWUA cooperated in developing a comprehensive mitigation plan, the agreement being signed April 7, 1994. As part of the agreement, PacifiCorp built a water treatment

plant and storage system at the confluence of Meetinghouse and Huntington Canyons. Ownership was transferred to NEWUA. A copy of the agreement is in Appendix D.

Probable hydrologic consequences determination.

The PHC determination section refers to section R645-301-722 for data used to arrive at the conclusions of the PHC (p. 133) and a detailed description of the geology (p. 134). There is no section R645-301-722 where it is expected, between sections R645-301-721 and R645-301-723.

The PHC now contains information on effects on macroinvertebrates from discharging water from the Deer Creek Mine into the Deer Creek and Huntington drainages: in the revised Chapter 9 the 1994 Environmental Monitoring Summary by Ecosystem Research Institute has replaced the 1990 Ecosystem Research Institute report and Technical Memorandum in Hydrologic Support Information 3. (The even-numbered pages in the copy of the report in Hydrologic Support Information 3 were copied off-center and text and numbers have been clipped.) The 1990 Ecosystem Research Institute investigation that was previously in the PHC determined the pre-discharge geomorphological conditions and predicted the impacts of the discharge to water quality; was based on field investigations, computer simulation modeling, and review of historical water quality data; and was the basis for the Utah Department of Health issuing a temporary discharge permit for the Deer Creek drainage in 1990: a regular UPDES permit has since been issued (Appendix B). The two studies are complementary so the purpose for removing the 1990 report and references to it in the PHC is not clear; however, replacing the old study with the new one does not affect the PHC determination nor alter the conclusions or findings of the Division.

The PHC lists conclusions from the October 1997 report by Mayo & Associates in Hydrologic Support Information 11:

- all ground waters are of meteoric origin;
- there are active and inactive ground-water regimes;
- the active regime includes ground water in alluvium and the Flagstaff Formation and extends 500 to 1,000 feet into cliff faces of all bedrock formations, with the possible exception of the Mancos Shale;
- waters in the active regime are in direct hydraulic connection with the surface, are recharged by modern precipitation, and fluctuate at rates that can be attributed to climatic and seasonal variability;
- solute concentrations of active regime waters do not exhibit significant seasonal variability;
- the inactive regime includes ground water that is in vertically and horizontally isolated sandstone channels and that is not in direct communication with the surface (is more than 500 to 1,000 feet from cliff faces). Except where exposed near cliff-faces, faults are part of the inactive regime and are not conduits for water from the surface;
- ground water in the inactive regime has mean residence time of 2,000 to 12,000 years and does not evidence influence by annual or short term climatic variability;
- limited hydraulic communication between waters in the inactive regime is indicated by mean residence times of 2,000 to 12,000 years for ground waters discharging into mines, rates of flow into mines that decline rapidly after initial exposure, and unsaturated conditions in some sandstone channels exposed or drilled into during

mining operations;

- limited hydraulic connection between the inactive regime and the surface is indicated because ground-waters in the inactive regime are not of "infinite age" and calculated steady-state recharge rates for faults and sandstone channels in the inactive regime are 0.001 to 1.23 gpm;
- the 6,000 year mean residence time of ground water sampled from the Star Point Sandstone at well TM-3 indicates the Star Point Sandstone is in the inactive regime, even though it is under confined conditions on the south flank of the Straight Canyon Syncline where it upwells through the floor of the Cottonwood Mine;
- ground-water regimes in the Star Point Sandstone and Blackhawk Formation are not really extensive, so piezometric surface maps are not meaningful;
- stream-flow is dependent on snow melt and precipitation, and there is no apparent connection between stream-flow and ground water in the mines;
- discharge hydrographs and isotope data indicate that ground water discharging into the Rilda Canyon collection system is of modern origin and not related to ground water encountered in the mines;
- isotope data indicated ground water discharging from glacial moraine deposits near Cottonwood Spring in Cottonwood Canyon is of modern origin and not related to ground water encountered in the mines.

The Mayo & Associates report in Hydrologic Support Information 11, as summarized above, agrees with information and conclusions already in the current PHC and supports the PHC determination of the revised Chapter 9. It includes findings on: whether adverse impacts may occur to the Hydrologic balance; availability of ground water and surface water; acidity, total suspended and dissolved solids, and other important water quality parameters; and on what impact the proposed operation will have on a sediment yield from the disturbed area and on flooding or streamflow alteration.

As stated above, Mayo & Associates concluded that ground-water regimes in the Star Point Sandstone and Blackhawk Formation are not really extensive, so piezometric surface maps are not meaningful. However, on page 19 of revised Chapter 9 is the statement that "Drill holes completed in the Deer Creek Wilberg/Cottonwood mines defined the piezometric gradient in the lower Blackhawk Star Point Formation and confirmed the groundwater flow to conform with the topographic relief and structural features...," with reference made two piezometric surface maps on Figures HF-5A and -5B that do show the effects of topography and structure; however, those mapped piezometric surfaces cover limited areas, each map being based on four wells (different wells for each map) that lie within a square mile. The concept that there is a Star Point Blackhawk piezometric surface and that mining is affecting it is also supported by the discussions of well TM-3 in relation to well CCCW-1S on pages 47 and 48 and in relation to water entering through the floor of the Hiawatha seam in the Trail Mountain Mine on page 65 through 67. It may be that the piezometric conditions indicated for these small areas do not apply generally to the larger area, and there are indications to support the conclusion that there is not an interconnected, regional ground-water system in the Star Point Sandstone and Blackhawk Formation. Mapping of piezometric surfaces throughout the Wasatch Plateau and Book Cliffs coal fields has produced inconsistent results.

The finding on acid-forming or toxic-forming materials and the potential for contamination of surface or ground water supplies is in section R645-301-100, Hydrologic Balance Protection. For

detailed information, R645-301-731.300 refers to Waste Rock Permit applications.

The well head protection zones and management areas for the NEWUA spring collection system in Rilda Canyon were first created in 1989-1990 under the draft Wellhead Protection Program. They remain unchanged under the Drinking Water Source Protection rules adopted in 1993.

NEWUA and PacifiCorp cooperated in developing a comprehensive mitigation plan should underground mining interfere with water flow from the Rilda Canyon springs, including construction of a water treatment plant and storage system in Huntington Canyon. Mining beneath the Right Fork of Rilda Creek is with a "no subsidence/long term stability" design due to the environmental sensitivity of the area. If mining encounters the faults associated with the Mill Fork graben and if ground water is present, permanent seals will be installed to control ground-water flow (pp. 169-171).

Ground-water monitoring plan.

There are no changes to the ground-water monitoring plan.

Surface-water monitoring plan.

Monitoring in Mill Fork Canyon was initiated in 1997. Monitoring of Mill Fork is discussed on pages 106 and 107; otherwise, no changes to the surface-water monitoring plan were noted in the revised Chapter 9. Data for Mill Fork are stated to be in the Annual Reports, but no discussion of data collected to date is in the revised Chapter 9. The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

Findings:

Information in the hydrologic resource section is not considered adequate to meet the requirements of this section. Prior to approval PacifiCorp must provide the following information:

R645-301-121.200, -724. Even-numbered pages in the copy of the report by Ecosystem Research Institute in Hydrologic Support Information 3 were copied off-center and text and numbers have been clipped.

R645-301-121.200, -722.300. The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

R645-301-724.100. Ground water levels in Rilda Canyon are discussed on pages 103 and 104, with reference made to Figure HF-25 for water depth information from piezometers P-1 through P-5. Water-level data from P-3 are discussed again on pages 158, 163, 164, and possibly other places in the MRP. Figure H-25 shows water depth information for wells EM-47, P-1, P-4, P-5, P-6, and P-7 from 1993 to 1997, but nothing for P-2 or P-3 (which were either offset or replaced by P-6 and P-7 in 1990, p. 89). There are no data on HF-25 from earlier than 1993 although the text refers to earlier data, especially data from P-3.

R645-301-121.200, -724. The Roans Canyon fault was encountered at the 3rd North, 1st and 2nd Right entries in 1990. On page 60 it is stated that the last measurement of discharged water from this area was in 1989, apparently a typographical error.

R645-301-121.200, -724.200. In Appendix A it indicates that baseline data for Mill Fork Canyon are to be collected from fourth quarter 1998 to fourth quarter 2000. However, in the section on Mill Fork on page 117 it states that baseline quality analysis was conducted during 1997 and will be repeated every five years: it isn't clear what the statement on page 117 refers to.

R645-301-121.200, -724.200. Rilda Canyon has been monitored only since 1989, and Mill Fork only since 1997. Pages 135 and 144 has been revised to indicate this, but it incorrectly states on page 109 that all surface waters have been monitored since 1979.

R645-301-121.200, -724.300. The PHC refers to section R645-301-722 for data used to arrive at the conclusions of the PHC (p. 133) and a detailed description of the geology (p. 134). There is no section R645-301-722 where it is expected, between sections R645-301-721 and R645-301-723.

R645-301-724.300. The report by Geo-Western on the 1989 Rilda Canyon and Mill Fork IP - resistivity survey was previously in section 4 of the supplementary information of the MRP but it is not in Hydrologic Support Information 4 in the revised Chapter 9.

R645-301-724.300. Elevation profiles of 1992 Rilda Canyon IP - resistivity survey lines on Drawing GENS1338D and the pseudo sections of lines, R-7, R-8, and R-9 were previously in section 9 of the supplementary information of the MRP but are not in Hydrologic Support Information 9 in the revised Chapter 9.

R645-301-724.300. There is no information in the MRP on the Left Fork Fault Zone IP - resistivity survey other than the line locations shown on HM-7.

R645-301-724.310. The Roans Canyon fault was encountered in 1985 and again in 1989 in a series of horizontal borings. The conclusion from these tests appears to be that there is "limited lateral communication along the fault." No data or information on these tests are provided. The location of these borings is not given in Chapter 9.

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:

Coal Resource and Geologic Information Maps.

Drawing GENS1338D, elevation profiles of Rilda Canyon resistivity survey lines R-7, R-8,

and R-9, and the pseudo sections of the three lines are in the current MRP but they are not in the revised Chapter 9.

Most information concerning geology and springs on Drawing CE-10844-EM in the current MRP is now on maps HM-1 and HM-4 in the revised Chapter 9; however, the location of Little Bear spring is not shown these maps. It is stated in the text that the relationship of Little Bear spring to Mill Fork graben is shown on HM-6. The location of Little Bear spring is on HM-6 but HM-6 does not show the faults or graben. The relationship between Little Bear Spring and Mill Fork graben, along with some other geologic information not on any of the maps in the revised Chapter 9, is clearly shown on Drawing CE-10844-EM that is proposed to be removed from the MRP.

Monitoring Sampling Location Maps.

Map HM-1 shows locations of springs, streams, wells and piezometers, and flumes, and HM-8 shows these items in more detail in the area around the Rilda Canyon spring-water collection system. Several other maps also show some of these features. The text refers in several places to piezometers P2 and P3, which are earlier wells replaced by P6 and P7 in 1990. Locations of P2 and P3 are not shown on any map, and it is unclear from the text if P6 and P7 were bored in the exact locations as P-2 and P-3 or were offsets to those two original wells.

Monitoring in Mill Fork Canyon was initiated in 1997. Monitoring of Mill Fork is discussed on pages 106 and 107; otherwise, no changes to the surface-water monitoring plan were noted in the revised Chapter 9. Data for Mill Fork are stated to be in the Annual Reports, but no discussion of data collected to date is in the revised Chapter 9. The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

The Roans Canyon fault was first encountered by in 1985, and again in 1989, in a series of horizontal borings. The location of these borings is not given or shown on a map in the revised Chapter 9.

Subsurface Water Resource Maps.

Contours on map HM-8 show ground water elevations in Rilda Canyon. Piezometric surfaces from 1990 and 1991 studies, based on in-mine bore-holes, are shown on Figures HF-5A and HF-5B. There is no map of regional ground-water levels: Energy West contends that it is not possible to map a regional piezometric surface. It may be that the piezometric conditions indicated for these small areas do not apply generally to the larger area, and there are indications that support the conclusion that there is not an interconnected, regional ground-water system in the Star Point Sandstone and Blackhawk Formation. Mapping of piezometric surfaces throughout the Wasatch Plateau and Book Cliffs coal fields has produced inconsistent results.

Surface Water Resource Maps.

HM-8 shows the Rilda Canyon spring-water collection system. HM-1 and several other maps show locations of surface water bodies such as streams, lakes, ponds, springs, constructed or natural drains, and irrigation ditches within the proposed permit and adjacent areas.

Well Maps.

Gas wells, mainly in Cottonwood Canyon, are shown on map HM-1. No water wells are shown on the maps or mentioned in the text.

Certification.

Except for HM-6, which is a copy of a USGS map, maps and cross sections HM-1 through HM-11 in Chapter 9 are certified by a licensed professional engineer.

Findings:

Maps, plans, and cross sections of resource information are not considered adequate to meet the requirements of this section. Prior to approval PacifiCorp must provide the following information:

R645-301-121.200, -722.300. (repeat) The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

R645-301-724.300. Most information concerning geology and springs on Drawing CE-10844-EM in the current MRP is now on maps HM-1 and HM-4 in the revised Chapter 9; however, the location of Little Bear spring is not shown these maps. It is stated in the text that the relationship of Little Bear spring to Mill Fork graben is shown on HM-6. The location of Little Bear spring is on HM-6 but HM-6 does not show the faults or graben. The relationship between Little Bear Spring and Mill Fork graben, along with some other geologic information not on any of the maps in the revised Chapter 9, is clearly shown on Drawing CE-10844-EM that is proposed to be removed from the MRP.

R645-301-724.300. Drawing GENS1338D, elevation profiles of Rilda Canyon resistivity survey lines R-7, R-8, and R-9, and the pseudo sections of the three lines are in the current MRP but they are not the revised Chapter 9.

R645-301-722.300. The Roans Canyon fault was first encountered in 1985 and again in 1989 in a series of horizontal borings. The location of these borings is not given in Chapter 9.

OPERATION PLAN

HYDROLOGIC 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.

Analysis:

Ground-water monitoring.

There are no changes to the ground-water monitoring plan.

Surface-water monitoring.

Monitoring in Mill Fork Canyon was initiated in 1997. Monitoring of Mill Fork is discussed on pages 106 and 107; otherwise, no changes to the surface-water monitoring plan were noted in the revised Chapter 9. The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

Findings:

Information in the hydrologic operations section is not considered adequate to meet the requirements of this section. Prior to approval PacfiCorp must provide the following information:

R645-301-121.200, -722.300. (repeat) The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

Monitoring and sample location maps.

Monitoring in Mill Fork Canyon was initiated in 1997. The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

Findings:

Maps, plans, and cross sections of mining operations are not considered adequate to meet the requirements of this section. Prior to approval PacfiCorp must provide the following information:

R645-301-121.200, -722.300. (repeat) The monitoring points in Mill Fork Canyon are identified as MFC1 and MFC2 on page 116, as MFA01 and MFA02 in Appendix A, and as MFA01 and MFB02 on maps HM-1 and HM-4.

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

HYDROLOGIC INFORMATION

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

Analysis:

Other treatment facilities.

The water treatment plant, built in Huntington Canyon as part of the mitigation agreement between PacifiCorp and NEWUA, is the property of NEWUA and NEWUA is responsible for maintenance and upkeep. This plant and its operation are not part of PacifiCorp's mining operations and will not be involved in mine reclamation.

Findings:

To the limited extent that it was examined, information on reclamation in the revised Chapter 9 is considered adequate to meet the requirements of this section.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

The application for permit revision has been reviewed by the Division, and it has been determined that a new or updated CHIA is not required.

TECHNICAL ANALYSIS of June 4, 1999

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR Sec. 783., et. al.

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Baseline information.

The revision of Chapter 9 contains no changes to the hydrologic monitoring program, although it does contain additional information on previously approved changes to monitoring in Rilda and Mill Fork Canyons. Monitoring data collected by Beaver Creek Coal Company - No. 4 Mine and by the USGS (site No. 86 - Open File Report) have been incorporated into PacifiCorp's hydrologic database (p.112), but there is no discussion of the data in the revised Chapter 9. Operational water quality monitoring was conducted in Mill Fork Canyon during 1997 and 1998. In accordance with the Hydrologic Monitoring Plan, baseline water quality analysis was initiated in the fourth quarter 1998 and will continue until the fourth quarter 2000, and after that baseline analyses will be performed every 5 years (p.112 and Appendix A).

Resistivity - Induced Polarization (IP) surveys were conducted in Rilda (1989 and 1992), Mill Fork (1989), and Cottonwood (1992) Canyons and across the Left Fork Fault Zone (year unknown). Locations are shown on HM-7. The report by Geo-Western on the 1989 Rilda Canyon and Mill Fork resistivity survey (lines R-1 to R-6) is in Hydrologic Support Information 4 in the revised Chapter 9. Elevation profiles (Drawing GENS1338D) and pseudo sections of lines R-7, R-8, and R-9 for the 1992 Rilda Canyon resistivity survey are in Hydrologic Support Information 9.

There is no information in the MRP on the Left Fork Fault Zone survey other than the line locations shown on HM-7. In the cover letter sent with the May 3 submittal it is explained that the Left Fork survey was for mine planning purposes and not part of a hydrologic investigation. The graben does not control hydrology where it was intercepted in the mine but it did limit reserves due to roof control problems.

Ground-water information.

Ground water in the Roans Canyon fault is described on pages 57 through 59. The Roans Canyon fault was first encountered in 1985, and again in 1988, in a series of horizontal borings intended to evaluate the porosity of the fault system and the potential for dewatering the system before mining operations encountered and crossed the fault. The conclusion from these tests

appears to be that there is "limited lateral communication along the fault". The mean residence time of the water apparently was not determined at the time it was first encountered in these borings. Reports on the borings and related hydrogeologic analyses were prepared by Williams and Associates for the 1985 investigation and by Hydro-Search, Inc. for the 1988 - 1989 investigation: these two reports are in Hydrologic Support Information 1.

The Roans Canyon fault was encountered at the 3rd North 1st and 2nd Right entries in 1990. Peak discharge from the fault zone was 5,000 gpm, but flow had decreased to 150 gpm at the last measurement of water from this area in 1991. Mean residence time of this water was not determined.

Ground water levels in Rilda canyon are discussed on pages 99 through 101, with reference made to Figure HF-25 for water depth information from piezometers P-1 through P-7. P-2 and P-3 were offset and replaced by P-6 and P-7 in 1990 (p. 87) and Figure H-25 shows water depth information for wells EM-47, P-1, P-2, P-3, P-4, P-5, P-6, and P-7 from 1986 through 1998.

Probable hydrologic consequences determination.

The 1994 Environmental Monitoring Summary by Ecosystem Research Institute (Hydrologic Support Information 3) has replaced the 1990 Ecosystem Research Institute report and Technical Memorandum that was previously in the MRP. The even-numbered pages of this report in the November 1998 submittal were copied off-center and as a result text and numbers were clipped along the right edge and holes for the three-ring binder obliterated some data. PacifiCorp sent a totally legible copy of the report with the April submittal.

Surface-water monitoring plan.

Monitoring in Mill Fork Canyon was initiated in 1997 and is discussed on pages 111 and 112 and in Appendix A. The monitoring points in Mill Fork Canyon are identified on maps HM-1 and HM-4. Operational water quality monitoring was conducted in Mill Fork Canyon during 1997 and 1998. In accordance with the Hydrologic Monitoring Plan, baseline water quality analysis was initiated in the fourth quarter 1998 and will continue until the fourth quarter 2000. After that, operational monitoring will be performed with baseline analyses performed every 5 years (p. 112 and Appendix A).

Appendix A (page 9, note to RCF1) and map HM-1 have been updated to include the monitoring point adjacent to EM-163 in upper Rilda Canyon. During mining of the North Rilda Leases, flow will be measured yearly during base flow conditions (p. 110).

Findings:

Information in the hydrologic resource section is considered adequate to meet the requirements of this section.

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:

Coal Resource and Geologic Information Maps.

The relationship between Little Bear Spring and Mill Fork graben is clearly shown on Drawing CE-10844-EM, which is to be removed from the MRP. HM-6, which is a reproduction of a USGS map, shows the location of Little Bear spring but does not show the faults or graben. Most information concerning geology and springs that is shown on Drawing CE-10844-EM is now on maps HM-1, HM-4, and HM-7; however, of these three maps only HM-7 shows the location of Little Bear spring and it's relationship to the graben identified in the Huntington #4 Mine (Mill Fork graben).

Monitoring Sampling Location Maps.

Map HM-1 shows locations of springs, streams, wells and piezometers, and flumes, and HM-8 shows these items in more detail in the area around the Rilda Canyon spring-water collection system. Several other maps also show some of these features. P2 and P3, which are referred to several places in the text, were shallow piezometers that are not on most maps because they were replaced in 1990 by deeper offsetting piezometers P6 and P7.

Monitoring in Mill Fork Canyon was initiated in 1997. Monitoring of Mill Fork is discussed on pages 111 and 112 and in Appendix A. Locations of the monitoring points in Mill Fork Canyon, MFA01 and MFB02, are on maps HM-1 and HM-4.

The Roans Canyon fault was encountered in 1985 and again in 1989 in a series of horizontal borings. The location of these borings is shown on maps in the consultants reports in Hydrologic Support Information 1.

Certification.

In addition to HM-7, revised versions of HM-1, HM-2, HM-4, HM-5, HM-9, and HM-10 have been submitted. All these maps are certified by a qualified, registered professional engineer or land surveyor.

Findings:

Maps, plans, and cross sections of resource information are considered adequate to meet the

requirements of this section.

A stamped approved incorporated copy of Chapter 9 is provided to update your current Mining and Reclamation Plans.

Please call if you have any questions.

Sincerely,

Joseph C. Helfrich
Permit Supervisor

tam
Enclosure: Approved Amendment
cc: Ranvir Singh, OSM
Richard Manus, BLM, Updates
Janette Kaiser, USFS, Updates (2 copies)
Mark Page, Water Rights, w/o
Dave Ariotti, DEQ, w/o
Bill Bates, DWR, w/o
David Terry, SITLA, w/o
Price Field Office, Updates
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