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State of Utah

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August 13, 1998

TO: File

THRU: Joe Helfrich, Permit Supervisor

FROM: Sharon Falvey, Senior Reclamation Hydrologist SKF

RE: Wellington Preparation Plant, Division Order 98A, 7/22/98, Nevada Electric Investment Company, Wellington Preparation Plant, ACT/007/012-DO98-A, Folder #2, Carbon County, Utah

SUMMARY:

This amendment was submitted to provide water monitoring for the operations conducted at the Modular Coal Fines Wash Plant. The information submitted is considered to meet the minimum regulatory requirements. This document can be directly inserted into the existing Technical Analyses.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION:

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-720.

Analysis:

Sampling and Analysis

The plan makes a commitment to sample according to the current edition of "Standard Methods for the Examination of Water and Wastewater". Review of data collected indicated problems in collection methods. The permittee has included a section on sampling methodology in section 7.31, appendix 7.31-1, however, the statements are general and noncommittal. As part of the effort in screening the data, data with a cation/anion balance with greater than a 10% margin of error was not included in the summary statistics. Although this may be appropriate for some analyses complete disregard of the values may not be prudent in all cases. Review of all data collected for the samples outside of the error margin may allow for reasonable use of most of the data with the exception of a few parameters. At any case all sample results must be submitted to the Division. When the error is unacceptable the sample should be re-analyzed and another sample should be obtained.

Baseline Information

Adjacent Area Water Rights and Points of Diversion

This site was in operation prior to the enactment of the 1987 mining law. Much of the information collected is operational because mining already occurred at this site. A summary of surface and groundwater rights information is presented in tables 7.24-3 and 7.24-4. The main purpose of obtaining the water rights summary is to be able to contact water users in case of a water impact or emergency of a harmful nature.

Information on water use is described in the permit. The major use in the area is irrigation. Two points shown with the same water right number define either multiple diversion points or, the beginning and end of a reach where water may be diverted. Water rights described, in the legend of drawing G9-3507, as being unapproved are in the approval process.

Water diversion information is illustrated on drawing G9-3507. Water user claim numbers are located in table 7.24-4. The operator was requested to clarify the source location of these sites because some of the water rights are difficult to locate on the map. However, minimum requirements for providing permit and adjacent area water rights are met with this submittal.

Ground-Water Information: Quantity and Occurrence

The local groundwater consists of shallow alluvial waters. The Blue Gate Shale Member serves as a confining layer for the alluvial groundwater. The Ferron Sandstone formation is also located in the permit area in the vicinity of Wellington. This formation is a groundwater source near the town of Emery. Local oil well logs described the Ferron as containing "little" fresh water suggesting it is a poor groundwater source near the loadout. Based on this information, the potential for groundwater impact is determined to be limited to the alluvial aquifers within the Preparation Plant and Slurry impoundment areas. No springs or seeps were identified in the permit area although one spring issues from alluvium along the Price River two miles north east of the facilities.

Groundwater seasonal water quality and quantity were summarized in the plan for the alluvial systems. Seasonal well fluctuations are stated to generally be highest in late spring to early fall. Alluvial water elevations fluctuate with climatic variability.

Slurry Impoundment Area: Quantity and Occurrence

Two flow gradients can occur from the slurry cells based on operating conditions or precipitation events. The predominate alluvial ground water flow direction is toward the Price River in a southerly direction. A small local area (subsurface flow) occurs toward the Siaperas ditch at the north west end of the slurry cells when the water in the slurry cells is elevated above the ditch. This occurs when water in well GW-3 rises above the 20.6 foot level (depth to water is less than 20.6 feet) below the top of the casing. This flow direction was present during slurry operations. Since mining operations propose using a dredge, the localized flow toward the Siaperas ditch may exist during operations. A generalized potentiometric surface map is presented on E9-3451A.

Wellington Load Out Area: Ground-Water Quality

The groundwater at the loadout is stated to have a higher salt content than the slurry area and is a strong sodium sulfate type water.

Slurry Impoundment: Ground-Water Quality

Water quality at the GW-1 and new well GW-15b probably best describes the background water quality for waters upstream of the slurry cell. Average, maximum and minimum values are presented for this site in table 2.24-3a. The signature of these waters is primarily a calcium sulfate.

Because no pre-disturbance information exists actual baseline information is not available. However, well GW-1 is considered out of the range of influence of the slurry operations and may be used as a "baseline" well. The new wells GW-15A and GW-15B will monitor upstream waters at the elevation of the Siaperas Ditch and in deeper alluvium. This site will help clarify the application of information collected at GW-3. The plan indicates GW-3 is an undisturbed groundwater monitoring station under table 7.28-2. The division does not feel this site represents undisturbed groundwater for the following reasons:

1. Slurry discharged from the slurry pipelines previously drained toward the embankment where GW-3 is located. This is evidenced by the abandoned drainage channel features.

2. When water at GW-3 is at a depth above 20', the gradient of the water is toward the Siaperas ditch and is influenced by the slurry water. According to table 7.22-1, GW-3 has a depth below casing of 22 feet, and the screened interval is

from 9-22 feet. This well is not developed deep enough to determine influences on the alluvium but, may detect upward movements of salts.

3. GW-3 is in the embankment of the slurry cells immediately adjacent to the slurry and has likely been influenced by slurry water quality from capillary action, diffusion and the evaporative draw from the low point in the Siaperas Ditch.

Water quality information was provided by the applicant for new wells GW-15a, GW-15b, and GW-16. Additional samples are presently being collected on a monthly basis during filling of the clear water pond, prior to operations to add water quality data information for these wells.

Surface-Water Information: Quantity and Occurrence

The Price River surface water monthly flow information and average daily flows were presented for 1972 through 1986. The data are collected at a USGS gauging station below Miller Creek near Wellington. Seasonal variation can be observed from the average daily flows over this period of record. The greatest flow rates occurred during the months of March through June while the lowest flow rates occur in December and January. The minimum monthly flow, 243 cfs, occurred in June 1978 and the maximum monthly flow, 53,960 cfs, occurred in June 1983 for the period of record from 1983 through 1986. The highest frequency of maximum monthly flow occurrences were observed in the month of May. Average daily flows were observed to be as low as 8 cfs during January and June and as high as 1,799 cfs, also in June, based on the information presented in table 7.28-3b.

Surface-Water Information: Water Quality

Mundorf (1972) reports that at Wellington, total dissolved solids concentrations range from 600 to 2,400 mg/l in the Price River. The major cations and anions are a variable mixed type. Downstream of Wellington, at Woodside, the dissolved-solids concentration typically range from 2,000 to 4,000 milligrams per liter and major water constituents are sodium sulfate. The high sodium sulfate waters are related to the increased contact with the Bluegate Shale Member.

Water Use In Mining

The plan shows Genwal Coal Company Inc. with IPA and NEICO to be owners of water right 91-215, 91-216, and 91-371. According to COVOL an agreement to lease 5 cfs (equal to 3620 AF/year) was granted by EarthCo.

Current projected uses for the COVOL Wash Plant are; 4.6 cfs used for phase I startup; and, 2 cfs/year average with a maximum use of 3 cfs for the summer months during Phase II.

Site water diversion locations including; the dam and sluiceway to the pumphouse; the track hopper; and a "dust suppression water source" are shown on Exhibit 712d. Previous operations at the Preparation Plant area used the track hopper for road watering. Based on the location of the diversion point, it appears that water right 91-254 is associated with the track hopper. This right allows water to be withdrawn from an underground sump for industrial use. The preparation plant area is no longer operating and the structure associated with the track hopper is within a portion of the site requested for bond release.

Baseline Cumulative Impact Area Information

The Division has not revised the cumulative impact area assessment (CHIA) at this time. A full cumulative impact area assessment should be completed for this site for the operation plan.

Modeling

Some modeling, analysis and statistical data have been used in the plan. Monitoring data has also been included.

Alternative Water Source Information

The plan includes a statement in section 7.27, "In the event the owner/operator's actions result in diminution or interruption of the water rights of a legitimate water user, the owner/operator will make available water from the owner/operator owned or controlled water rights during the diminution or interruption" and, " In the event that the quality of water becomes unsuitable for use by a legitimate water user due to action by the owner/operator, the owner/operator will make available water from their owned water rights during the period of unsuitable water quality." No water rights were presented as being owned or controlled by the operator "EarthCo", however, rights are controlled by Genwal Coal Company with IPA and NEICO.

The plan includes a statement in section 7.28,"However, in the unlikely event that a significant diminution in water level in the surrounding wells or in the stream flow were to be caused by the EarthCo Wellington Loadout Operation, EarthCo will replace the water rights with on-site water which they have access to through agreements with the underlying water right owners, NEICO, Genwal, and IPA.

The water rights indicated to belong to the owner is approximately 7,297 acre feet/ year from water rights 91-215, 91-216, and 91-371. The replacement of a water right would need to be coordinated between the State Water Rights Department, Division of Water Quality, and the Division of Oil Gas and Mining as appropriate.

Probable Hydrologic Consequences

The potential water quality impacts at the Wellington site determined to be most critical include increases in TDS, leaching of salts including boron and selenium from the slurry cells, and the potential for hydrocarbon and chemical contamination to reach alluvial waters at the preparation plant. Ultimately these waters reach the Price River.

Water Use

Historic water uses included irrigation of test plots in 1987, and Price River water utilized for slurry operations. Current water rights leased to the COVOL are for 5 cfs or a maximum of 3620 AF annually. The estimates of water use for slurry operations is presented in the following table.

Table 1.

Estimated Water Use for Slurry Operations

Activity	Rate	Solids/tons per hour
Tailings discharge	2044 gpm	21
Dredge Mining slurry	1847 gpm	115.5
Operation Phase	Rate	AF/year
Phase I	2045 gpm	3299
Phase II (over 3 years)	710 gpm-852 gpm	1145- 1374

Water Quality Impacts

Water quality data at the Wellington Plant show concentrations for many parameters were decreased in 1985 and 1986. The plan, sites increased precipitation during this period being attributed to the dilution effect on Magnesium, Sulfate, Chloride, Manganese and TDS. The plan should also be note that during 1984 the load out was idled which may also have had an affect on these constituents.

Data analyses of wells surrounding the Slurry Cells indicate there is a greater concentration of TDS at GW-2 and GW-3. The plan suggests the increased TDS in the Ground water near wells GW-2 and GW-3 is a result of regional irrigation, groundwater flow, and evaporation. The assumption is that the Siaperas Ditch influences and concentrates salts in this area which affects the concentrations at the wells. Although salt concentrations will occur in this area from evaporation, there is some information which suggests this is not the only factor controlling water quality in this area. (See: "Potential Groundwater Impacts" of this TA).

Information in the PAP includes a discussion of trends in water quality for postmining reclamation conditions related to water availability and climatic changes. Although boron and selenium are identified as having a potential to impact water, data were not collected until recently for analysis of these parameters. The plan does discuss characteristics and presence of boron and selenium determined through slurry analysis (saturated paste method). The soil analysis completed for the upper depths of slurry show accumulations of salts that are probably attributable to capillary actions and diffusion driven by evapotranspiration. The potential for impacts resulting from high boron and selenium to groundwater are found within section 7.28. Increases in boron over the amount needed by some plant species can be toxic to plants. With pH values above 6.6, selenium found within the refuse ponds may potentially be leached. Selenium values reported in appendix B show concentrations ranging from 0.025 to 0.40 mg/l.

Table 2. **Slurry Tailings Analyses.**

Slurry Tailings								
Sample	**CEC (meq/ 100 g)**	**Sodium meq/l**	**SAR**	**Boron (ppm)**	**AB-DPTA Se (ppm)**	**Total Sulfur %**	**T.S. ABP t/100t**	**Neut. Pot. t/100t**
Washed tails	11.0	3.11	0.78	1.39	0.04	0.76	74.3	98.1

Table 3. **Tailings Water and Water Quality Data.**

Water Quality Data								
Sample	**TDS (mg/l)**	**Sodium (mg/l)**	**Magne-sium (mg/l)**	**Boron (mg/l)**	**Selenium (mg/l)**	**Sulfate (mg/l)**	**Cl (mg/l)**	**Calcium (mg/l)**
Tailings water	1,500	34.1	73.9	0.30	ND*	837	20.5	258
GW-1 Average 1991-1997	4879	540	249	0.95*	ND*	2582	82	445
*GW-15b 11/1997	2890	237	139	0.5	ND	2110	50	341
*GW-16 11/1997	3820	417	233	0.16	ND	1950	66	274
GW-6 Average 1991-1997	4523	669	251	0.95*	ND*	2582	88	288
SW-1 Average 1995-1997	1606	226	92	NA	NA	828	51	152
SW-2 Average 1995-1997	2700	389	150	NA	NA	1500	104	250

ND Not detected by lab.
* Only one sample available in August 1997.
NA Not available.

The plan states that the slurry tails will concentrate up to about 135 % of the solids component of make up water, based on results using the estimated operating water balance. Details as to how the bench test was conducted was not provided. Covol leachate sample was analyzed through standard soil paste extract procedures over a 24-hour period.

To determine the potential impact that the cycled water will have on the recycled water chemistry, the permittee provided an analyses for the addition of the sodium silicate to the make-up water. Data used in this comparison was obtained from averages at Site SW-4 (water sampled during previous operations at the Siaperas ditch). Using this information a calculation for SAR at steady state was presented. The SAR was indicated to increase from 7.3 to 9.2. The water source is better represented by SW-2. Using the averages from 1995 through 1997 and the make up water inputs, provided in the plan, this water has an SAR of 4.8 and the steady state water would have an SAR of 6.6. Calculating an estimate for TDS (sum of the cations meq/l *.66) the TDS would increase to roughly 4,000 mg/l. Information provided in Table 3 above suggests that this value will not exceed values presently observed in ground water wells GW-1 and GW-6. It would, however, exceed the average at site SW-2 if discharge would occur.

Acid and Toxic

The permittee's discussion in section 7.28.3.3 details the analysis of the leachate sampling from the refuse pile, and includes pH, acidity as $CACO_3$, calcium, sodium, and Total Dissolved Solids. Data obtained from the slurry cells included analysis for sulfur and the Acid Base Potential. Analysis of leachate samples from the Coarse Refuse Pile and fine refuse basin were presented in tables 7.28-5 and 7.28-6. Leachate samples indicate a potential to have high salts, a basic pH and high sodium adsorption ratio. Comparisons were made with the values from the Leachate from the plant refuse pile with the TDS values from GW-14. Leachate from the Fine Refuse Basin was not presented in these tables.

Samples of the slurry were collected and analyzed to an 8 foot depth. The information provided does not suggest acid forming constituents are present. However, the samples may not necessarily represent the extent of waste material found below the 8 foot depth. The fine slurry materials are shown to be as deep as 5,362 feet at cross section A-A' on Exhibit E9-34-60, near the adjacent hill slope. According to the Slope Stability Evaluation US Steel Tailings Dike Appendix C, the lower refuse dike is approximately 35 feet high. The current elevation of the tailings is approximately 5,370 feet while the dike elevation is approximately 5,383 feet. Therefore, the depth of slurry is at least 22 feet deep in some places.

The characterization of material below the 8 foot depth is not described in the data. Well water sample analyses for pH in the slurry area have been as low as 6.62 in GW-2 (December, 1987) and in GW-4 (March 1992), otherwise pH values are near or above 7. Available data indicate there is little potential for acid formation at the Wellington Preparation Plant at both the slurry and Plant Refuse piles. However, boron and selenium values were considered to have a potential for impact.

Although it is believed an upward concentration of salts generally exists, the quantity of downward leaching of salts, boron, and selenium for moist seasons and along the contact between the alluvium and slurry materials remain unknown. The presented saturated paste data samples show a decrease in boron with depth through the slurry. Also, an accumulation of boron is shown near the surface. Although the concentration of boron is occurring in the upper zone, monitoring is not adequate to determine to what degree precipitation or alluvial waters affect the transport through the profile. It is unknown, if significant leaching or accumulation occurs below the 8 foot interval. Assessment of water moving down through the profile or alluvial water table fluctuations within the interface of the slurry are largely unknown.

It was estimated, in the plan through modeling, an approximate increase of TDS to groundwater and surface waters from the slurry cells under non operating conditions will be 0.4 to 7.5 % and the plan suggests an increase of other parameters would be similar. When comparing TDS at GW-1 and GW-4 the data show increases are between 5% and 77% greater at the downstream station, while increases in TDS between SW-1 and SW-2 varied from 2% to 64%. Unfortunately, most surface water and ground water data were obtained on different days and are not located far enough downstream to measure influences of alluvial waters below the slurry cells. Natural variation vs. influences from the operations are difficult to determine by the sampling program existing through 1996.

No boron or selenium data were available for much of the recent water monitoring program. Selenium and boron are regulated state water quality standards for the Price River. The permittee has added total and dissolved selenium and boron to the operational water monitoring parameters in table 7.24-2 (revised 11/10/94).

In a discussion with Dave Hansen it was indicated that the rate of transmissivity in the aquifer could not affect the well sampling enough to require same day sampling. This may be true, although the samples adjacent to the Siaperas Ditch and Price River could be influenced by surface waters.

The plan states the average tested permeability, according to table 7.22-8, is 0.019 feet per minute. Average velocity was estimated to be 0.3 feet per day at this rate the water would travel between GW-1 and GW-4 in approximately 57 years. However, additional information conflicts somewhat with the average presented.

The applicant has provided the results of the Rollins Brown and Gunnel (1978) Field Permeability test in table 7.22-7. It is interesting to note that the logs of this report show sections of each test have variable permeabilities. Table 1 illustrates some of the larger permeabilities found and their respective depths from the surface of the dike.

The Rollins Brown and Gunell Report makes the following statements:" The foundation materials has a wide range of permeability rates. The rates are generally greater than 5,000 ft/year or approximately 13.9 ft/day." The information in this report suggest that the rate of flow in the alluvium may be greater than that described in table 7.22-8.

Table 4
Permeable Zones from Boreholes
Rollings Brown and Gunnell 1978 Appendix C

Borehole location and comments	Bore Hole ID	Depth from surface of the dike and permeability
Upper Dike (west end) Crest at time of survey (5380') First 15-20 feet is Coal Refuse The dike is approximately 15 feet high.	1	15-25' >15,00 ft/year 25-30' 3,727 ft/year 45-47' >20,000 ft/year
	2	10-20' >15,000 ft/year 30-55' 1,670 to >20,000 ft/year
	3	Top 47' 1,274 ft/day to 31,000 ft/year
	4	10-15' 2,894 ft/year 20-40' 4,768 - 720,000 ft/day
Upper Dike (west) Crest at time of survey	5	10-15' 11,086 ft/day 20-40' 7,455 to 15,083 ft/year
Lower Dike (south east) Permeability rate increases with depth.	8	40-50' 1,550 to 3,765 ft/year
	9	40-50' 1,302 to 3,065 ft/year
	10	40-50' 1,004 to 1,144 ft/year
Lower Water Dike (north west)	11	35-50' 5,325 to 9,535 ft/year
Clear Water Dike (south east) 5370 foot embankment elevation. Dike is approximately 35 feet high.	14	45-50' 1,885 to 1,449 ft/year
	15	40-50' 1,028 to 1,268 ft/year
	16	40- 45' 1,414 ft/year
Clear Water Dike (north west)	17	25-40' 1,562 to 2,800 ft/year

The plan includes a commitment to sample GW-2 for depth to water only and to sample GW-15a and GW-15b, GW 16, and GW-17 according to the groundwater monitoring parameters. GW-15a and GW-15b, GW 16, and GW-17 were developed in November 1997.

GW-5 was abandoned and sealed in November 1997. Concurrence of drilling location was obtained prior to drilling new wells. The permittee has committed to conduct a permeability test on each of these new wells prior to February 1, 1998, to clarify the discrepancies presented in the previous discussions.

The MRP states that the operator will attempt to collect "same day" samples at stations SW-1, SW-2, SW-4, GW-3, GW-15 and GW-16. Same day collection does appear to be important at surface and groundwater sites SW-1 and SW-2 in conjunction with GW- 4, GW-6 and GW-16, and potentially at the ponded area near GW-3 in conjunction with GW-15 and GW-3. Except for the fact that there may be no water at GW-3, there is no reason why this cannot be done on one day during a three month (quarterly) period.

Potential Surface Water Impacts

Potential for impacts to surface water at this site would travel occur through two mechanisms. One, the shallow alluvial waters discharging to the Price River, and two the surface water runoff to the Price River. The plan concluded the drainage of toxic constituents into the surface water would be minimal due to the large retention volume found in the ponds during the operations phase. The volume of water retained reduces runoff to surface waters. However, it increases potential for leaching of salts from the slurry cell area through the alluvial aquifer to the Price River. The plan identifies the greatest potential for precipitation is during November and March. The fact that groundwater data from 1993 and 1992 shows highest elevations and highest variation in TDS in the station downstream of the slurry cells in March indicates an increase in TDS occurs with increased precipitation. The plan does refer to precipitation data to develop a conclusion regarding the groundwater quality changes in relation to precipitation but did not include travel time in this comparison.

The potential for increased contributions of sediment off site is minimized through the Sedimentation and Erosion Control Plan. Since the reclamation phase includes regrading the dikes, topsoil and vegetative cover may play a more important role in the runoff water contributions during this phase.

Potential Groundwater Impacts

Because the track hopper building was essentially a well completed within the water table, it was felt this area was a potential source of contamination. Past operations use this as a water source and retained a pump in the building to draw water for road watering. A discussion regarding the monitoring of the track hopper is presented in section 7.31.21. The plan suggests the water at this site was not developed for monitoring and is therefore, not representative of local ground water. The track hopper is considered a sink according to the plan. Due to a constant evaporation draw, water seeps through the concrete structure into the track hopper. According to the plan there is no source within the building which can drive a reverse gradient.

The evaporation process occurring during the operational phase could have a potential to affect surrounding ground and surface waters since this water has a long history of being used for dust control. The evaporation concentrates the salts and increases dissolved solids in the track hopper. It is recognized that Mancos shale around the site may also contribute to increased dissolved solids, sodium, calcium, and sulfate. A full baseline water quality sample was obtained on April 30, 1994. These results were compared with compiled averages and maximums from Wells GW-1, GW-7, GW-13 and GW-14. A summary of the data was provided in table 731.21-3. This data shows pH, magnesium, chlorine and manganese exceed historic averages. A copy of the lab results were included in the 4/30/96 submittal.

Available data indicates there is an increased TDS at GW-2 and GW-3. The plan attributes this to regional irrigation waters and the evaporative affects of the Siaperas Ditch. However, addition information indicates this is not the only factor with a potential to affect the water quality at these wells. The discharge from the slurry processing has historically followed a drainage pattern that brings the operational slurry discharge water past GW-3. With the evaporative draw at the Siaperas ditch, it is likely that slurry water's have also influenced water in this well.

Data analysis by the division indicates there is an increased contribution in TDS to the down gradient wells GW-4 and GW-6. Site GW-4 has increased TDS over GW-1 for 90% of the comparable data sets. The down gradient increases could come from the slurry materials and may be controlled by the hydraulic conductivity of the slurry material where it contacts the alluvium.

The plan concludes that little or no impact to the groundwater system would be anticipated for the following reasons:

A. ***Levels monitored at stations GW-1, GW-2, and GW-3 and GW-14 (stations considered to be background) indicate concentrations equal to or significantly greater than concentrations recorded at other stations. Increased TDS at GW-2 and GW-3 are believed to be increasing due to a natural phenomenon related to irrigation and evaporation.***

GW-3 and GW-2 should not be analyzed as an average for background data, with the intent of comparing alluvial waters upstream and downstream of the slurry cells because of the following factors:

1. Well GW-3 when it is above the 20.6 level would be measuring water with influences from the slurry cells. According to table 7.22-1, GW-3 has a depth below casing of 22 feet and the screened interval is from 9-22 feet, therefore,

this well is not developed deep enough to determine influences on the alluvium but, may detect upward movements of salts.

Available data indicates there is an increased TDS at GW-2 and GW-3. The plan attributes this to regional irrigation waters and the evaporative affects of the Siaperas Ditch. However, addition information indicates this is not the only factor with a potential to affect the water quality at these wells. The discharge from the slurry processing has historically followed a drainage pattern that brings the operational slurry discharge water past GW-3. With the evaporative draw at the Siaperas ditch, it is likely that slurry water's have also influenced water in this well.

2. GW-2 is noted to be measuring clays or the shale. It is not comparable to the alluvial waters and, is not likely to be influenced by the irrigation waters. A review of GW-2 confirms the well water elevation has been 0.5 to 16.3 feet below the bottom of the Siaperas Ditch (Midterm Permit Response Memo, June, 1995).

GW-1 and GW-14 appear to have little potential adverse influence from mining operations and could be considered background. In the June 5, 1995 response memo, the consultant noted that care should be exercised when interpreting data at GW-3. GW-3 could be used as a comparative tool to identify the local concentration of salts and/or determine if a pattern exists between concentrations at GW-3 and downstream wells.

B. ***The probability that the reverse gradient toward the Siaperas Ditch would occur is low based on the fact that the basin drains away from the area and accumulations in the Lower basin would reach 5374.5 feet and sufficient time to develop a reversed gradient would not occur. However, a localized condition may occur when the water elevation exceeds the elevation of the Siaperas Ditch.***

Data show past, and occasionally, present well water elevations above 20.6 feet. This is when a local reversed gradient at Well GW-3 would occur. However, the overall alluvial gradient is toward the south. Current data comparisons do not account for this local gradient influence.

C. ***A comparison of Stations GW-4, GW-5 and GW-6 to that of baseline stations shows that water quality at the natural outfall to the basin is either equal to or superior to baseline water quality. If the slurry basins were producing poor quality water, these stations should be the first indicator.***

The plan states that the preparation plant area is a high sodium sulfate type water. Generally, waters in contact with the Bluegate Shale will have a higher sodium sulfate type water. When well data is compared, these comparisons should take into consideration local differences. When comparing GW-1 with G-4, and GW-6 the site specific data show increases in TDS downstream of GW-1 at stations GW-4 and GW-6. When comparing data for the wells developed in the Bluegate Shale, and the wells influenced by the Price River, with the wells in alluvial waters it will bias what affect the slurry cell may have on the alluvial waters downstream of the cells.

Data analysis by the Division indicates there is an increased contribution in TDS to the down gradient wells GW-4 and GW-6. Site GW-4 has increased TDS over GW-1 for 90% of the comparable data sets. The down gradient increases could come from the slurry materials and may be controlled by the hydraulic conductivity of the slurry material where it contacts the alluvium. This analysis conflicts with the applicants statement that GW-5, GW-6 and GW-4 when compared with the natural outfall of the refuse basins has equal or superior water quality. These differences may arise because the permittee considers GW-2 and GW-3 as background stations and the Division does not.

D. ***Water quality concentrations collected at all ground water stations appear stable over time, meaning there are no clearly definable trends which have been observed and/or are continuing to occur since the late 1980's.***

An analysis which separates the data into appropriate time periods would be prudent. Logical periods to compare data include; the time span from first data collection up to 1984 when the load out idled, and from when the load out idled to the present date. High precipitation years and drought years should be compared for climatic affects.

Earlier statements indicate a dilution of some ions with the additional increased precipitation. Available data also show an increase in concentrations of some constituents when the slurry operations ceased. These constituents appear to be generally maintained at the concentration reached following termination of the slurry operations. Rather than averaging the data, analyses of the data according to the factors which may influence the data through the operational phases should be presented. Analysis of data should account for travel time.

E. ***Operations ceased adding materials and water to the slurry ponds in the early 1980's. The only water currently entering the ponds is through rainfall or natural runoff, neither of which contain high mineral contents that potentially occur in slurry water.***

The salts accumulating at the surface due to evaporation influences or other constituents in the slurry materials may be leached from the slurry during high precipitation or high water table periods.

F. ***Decreased inflows experienced since operations ceased have translated to a decreased leaching potential of slurry material.***

Decreased inflow does decrease the leaching potential below that experienced during the operational period. However, weathering and salt accumulations may have a large impact if enough water is available to flush the constituents.

The plan compares GW-4, GW-5 and GW-6, to that of "baseline" stations GW-1, GW-2 and GW-3. However, it was already indicated that GW-2, and GW-3 may be affected by the evaporative process of the Siaperas ditch at GW-3 and that GW-2 does not represent alluvial waters. When a comparison is made between non-mining influenced GW-1 with downstream wells GW-4 and GW-6, generally, there is an increase in TDS at GW-4 and GW-6 with a smaller increase between GW-1 and GW-6, than between GW-1 and GW-4. Since GW-4 is nearer to the base of the slurry cells this influence could be attributed to either increased concentration of salt in the downstream direction related to irrigation, leaching from the slurry cells, or influences from the Blue Gate Shale below the site. GW-6 is near the Price River and it is likely influenced by the alluvial Price River water which may account for the lower TDS values at GW-6 in comparison to GW-4.

The water elevations between GW-1 and GW-4 follow a similar pattern supporting the conclusion that alluvial waters flow between north and south ends of the slurry cells. No additional irrigation influenced inflows exist between sites GW-1 and GW-4. Relationships between water quality, evaporative rates, and available water, should be made to determine what portion of the increased TDS concentrations are related to slurry waters using information from the new wells. The sources of water which should be considered in water quality analysis include; irrigation water, slurry water, and precipitation.

The farmland north of the slurry cells has not been irrigated in the recent past. If the Siaperas ditch is the source of increased evaporation, you might expect to see an increased concentration of salts in a planar direction near the source of the Siaperas ditch and you would see a climatic variation in TDS at the well and ditch waters between the moist and dry seasons. This variability may be dependant on whether the wetting front will move the salts through the system out of influence of the well or will dilute the salts. One would expect to see a decrease in TDS during the wet season if water is in adequate quantity to leach the salts or provide dilution. One would see an increase in TDS in wells GW-1 and GW-3 when evaporation is dominating during the summer periods. At this time the determination of impacts related to irrigation waters, natural occurrences and the slurry cells can not be determined. A comparison of data to the Palmer Hydrologic Drought Index should be conducted.

To rectify this situation additional wells GW-15a, GW-15b, GW-16 and GW-17 were installed to measure aerial and vertical water quality variations in the undisturbed and disturbed area. GW-15 is up-gradient from the Upper Refuse Basin near the Siaperas ditch, and GW-16 is installed near the base of the Clear Water Pond. GW-17 is installed within the lower slurry cell but, was dry at installation.

Data comparisons and supporting statistics were not presented in a manner which lends credence to the conclusions drawn. A combination of analyzing data relative to timing, operating conditions, and comparable monitoring points will allow an accurate analysis of the PHC for this site. With data collected from the new wells the PHC can be updated. Updates should include updating graphs and making appropriate water quality comparisons.

Organic Compounds and Hydrocarbons

A direct connection between the surface water and ground water can occur with underground tanks. In previous operations at the preparation plant, oil storage areas, with the exception of an un-bermed concrete pad, were located on soil with the potential for direct connection to the groundwater, therefore, contamination could have reached groundwater from those operations. The plan indicates a bermed concrete containment will be used for the above ground tanks. These containment area dimensions would need to be included in the plan. The Operator has recently removed the tanks at this site. Storage tanks used or added to the site will require construction of the proposed containment structures. Other potential contamination sources included PCB transformers that were removed in July of 1992.

Facilities maps showed locations of Tanks and, Oil Drum Storage Area FF. The area adjacent to the tank contained additional Oil Storage areas. Diesel and gasoline based product locations are shown on Map 712d. The shop building contained oil, grease, and antifreeze, etc. The area surrounding the main office included areas such as: the truck wash down area and steam cleaning area where de-greasers are used, the oil changing area, and the oil and antifreeze storage area. Facilities area EE was used for Non Coal Waste Storage and is in an alternate sediment control area.

Dust suppressants used at the preparation plant (west of the Price River) were identified as soap and water. The plant contained drums of antifreeze in the area adjacent to the office. Antifreeze has been used as dust suppressant over the loaded train cars.

The flotation agents to be used in the slurry processing include propylene glycol, No. 2 diesel, and sodium silicate. Information provided including; the Material Safety Data Sheets, diesel oil biodegradation, and Hazardous waste status for these chemicals under steady state, suggests that the processing and application rate will not result in concentrations that would constitute toxic or hazardous waste for the slurry tails and recycled slurry water.

Findings:

The plan meets the minimum requirements for this section.

OPERATIONAL 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:

General Water Monitoring

Water quality monitoring parameters are shown in table 7.24-2 for groundwater and are shown in table 7.24-5 for surface water. The total and dissolved forms of selenium and boron were added as quarterly sampling parameters, in tables 7.24-2 and 7.24-5, for surface and groundwater sites. A commitment was made to include comparisons of boron and selenium concentrations in water, in the annual reports, as the information becomes available. Wells GW-4, GW-6 and surface water sites SW-4 and SW-5 will be monitored for BTEX-N and Propylene glycol beginning in the 3rd quarter 1998. The applicants water monitoring parameters in tables 7.24-5 and 7.24-2 are based on down stream uses and state and federal water quality standards.

Well GW-2 did not have a well cover over the metal casing as observed in the site visit on March 7, 1995. The well in this condition does not meet the requirements of R645-031-731.225. The precipitation which occurred prior to the site visit, probably entered the well and may be the reason for recent (3rd and 4th quarter of 1995) increases of water at the well. This well should be appropriately capped since the intent is to retain this as a monitoring well.

Ground Water data collected in 1987, during coal slurry operations, indicates an increase in boron concentration occurred between GW-1 and GW-4 and between SW-1 and SW-2. Boron concentrations have exceeded the 0.75 state water quality limit for Class 4 waters. Data representative of current conditions are not available for boron. In order to determine water quality impacts total and dissolved boron should be compared for related surface and groundwater sites.

Surface-water Monitoring

The following surface water monitoring sites are used to monitor for potential impacts at the Wellington site. SW-1 and SW-2 are used to monitor the Price River above and below the Preparation Plant. SW-3 and SW-4 are in the ephemeral drainage above and below the Siaperas ditch north of the slurry cells. SW-5, SW-6 and SW-7 were set at the inlet and outlets of the slurry cells to monitor changes in water quality as water is cycled through the system. SW-8 was to be used to determine water quality utilized and discharged from the preparation plant.

The surface water monitoring stations will be monitored quarterly. However, the plan indicated stations would not be monitored during local precipitation events. In table 7.28-2, monitoring of each surface water station was discussed in terms of the overall value of monitoring each station during precipitation events based upon the program already in place.

The permittee proposes that SW-3 will again be monitored to describe the waters upstream of the disturbed area and to determine if downstream water quality changes occur from the adjacent slurry cells. This site was described as being located in the Siaperas ditch above the disturbed area (location shown on E9-3451 is poorly placed) and is an ephemeral system. If flow is obtained downstream at SW- 4 during an event the data from SW-3 would be of importance to the operator.

SW-4 is placed at the down stream of the Siaperas ditch to determine the affects of water contributions from the slurry cells. This channel flowed when the slurry operations were conducted at the preparation plant. Flow occurred intermittently without operations being conducted although, standing water has been observed in the Siaperas ditch.

Monitoring sites SW-5, SW-6 and SW-7 are related to the slurry impoundments at the spillway outlets. Currently no UPDES discharge points are shown on the Watershed monitoring map for the slurry impoundments. It is not clear whether their UPDES permits reflect this. A discharge monitoring point is not required unless the site discharges. If this site does discharge the permittee would be in violation of the state regulations.

SW-8 was monitored at the overflow of the plant water sump. The plan indicates that data from this site was unavailable since 1988 when cessation of operations at the plant eliminated overflow.

SW-2 will be used for sampling water quantity (flow rate) only, beginning in 1996. Site SW-2a will be monitored for water quality at the downstream section below the influence of groundwater flow from the slurry cells.

There have been problems obtaining specific flow data on the Price River in the past. This information is important to determining affects of the Price River on water monitoring well GW-6 and other wells. Flow values for the Price River Surface Water were presented as being ">10 cfs" for high flows. On March 7, 1995, a site visit was conducted with Mel Coonrod, Environmental Industrial Services and other Permittee representatives. During the visit it was indicated that flow depths along the weir were actually recorded for dates where flow is reported to (>10 cfs)". In a phone conversation with Dave Hansen, Hydrologic consultant Hansen Allen and Luce, it was indicated that this information is not available. Flows recorded with a greater than or less than sign may be considered a violation of R645-

301-731.222.1. A commitment to submit all field data when requested by the Division is stated in the plan. It was also indicated that a U.S.G.S. gaging station upstream of the site may still provide measured flows. It was requested this information be provided but, none was available. The site also has a stilling well that is no longer operable but could be improved and provide data for determining high flow rates.

Groundwater Monitoring

The plan discusses grouping of monitoring stations for comparison purposes for water monitoring analysis in table 7.28-2. The plan indicates GW-1, GW-2 and GW-3 are grouped together and they monitor undisturbed groundwater quality (since flow is from a northerly direction). However, a comparison of GW-1 to GW-4 and GW-6 provides a better comparison on resulting probable hydrologic impacts in the alluvial waters upstream and downstream of the slurry cells, for the following reasons:

1. Well GW-2 was either completed in a tight clay formation or in shale. It is not likely this well represents timely or accurate alluvial water quality data. Therefore, concentrations due to irrigation water are not likely to be realized at this well and this well should not be used as data to compare alluvial water quality.

2. Well GW-3 is completed 7 feet into the alluvium and is approximately at the same elevation as the Siaperas ditch. This water may be affected by evaporative influences of the Siaperas ditch. The water quality at GW-3 is influenced by water in contact with the slurry when the water elevation is above 20.6 feet from the top of the casing. (GW-3 may provide an indication of the potential for influences of TDS from the slurry).

Well GW-17 was completed in the slurry cells to allow a determination of the impacts resulting from the slurry verses natural background increases. New wells GW-15a, GW-15b, GW-16 and GW-17 were installed in November, 1997. GW-2 is proposed to be used only for depth to water and GW-5 was abandoned in November, 1977.

The plan states that attempts will be made to collect both surface and groundwater samples on the same day. Collection of "same day" surface and groundwater samples is important at stations SW-2 and GW-6, GW-4 and GW-16; and at SW-4 and GW-2 and GW-3 and GW-15, since there is a potential connection between surface and groundwater at these stations.

The Permittee has been unable to produce information on the screened interval for the following wells. GW-1, GW-4, GW-5, GW-7, GW-9, GW-10, GW-11, GW-12, GW-13. The Division has requested review of the field notes for the down-hole camera investigation and any other well investigation data. Data for some of these wells is in Appendix 6. No pumping test or other tests for transmissivity of wells GW-15, GW-16 or GW-17 was presented.

Acid- and Toxic-forming Materials

The determination of the potential for Acid and Toxic forming materials was based on leachate samples from the coarse refuse pile and the slurry refuse basins. The results indicate a high SAR in the Coarse Plant Refuse Pile, and selenium and boron concentrations exist in the slurry cells. The frothing agent used for the fines removal process was determined to be non-toxic and non hazardous at the proposed application rate and at steady-state. Monitoring for BTEX-N and propylene glycol are conducted to demonstrate the hydrologic balance is protected and water quality criteria are met. See further discussions under Environmental Resource Information of this TA.

Coarse Refuse Pile

The high SAR at the Plant Coarse Refuse Pile was not considered leachable: sodium must be replaced by another cation and with the lack of moisture probably would not be leached downward far enough to affect groundwater. The leachate sample had 1,270 ppm sodium; a basic pH value of 8.4 and TDS 7,040 mg/l. While observed values of water quality data from GW 14 (1985 through 1989) varied from 2,218 to 5,330 mg/l with an average of 3,701 mg/l Sodium; pH values varied from 6.54 to 7.9; and TDS values varied from 8,050 to 17,728 mg/l (the unit mg/l was assumed since the Table 7.24 provides no units). If the leachate and well water were directly comparable it would indicate pH values are the only notable difference. The information provided indicates there would be little potential impact to downstream uses for the sampled constituents.

The Plant Refuse pile will be covered with 4 feet of topsoil. The total water holding capacity is expected to be greater than 7 inches. With the average annual rainfall of 8 inches and the average annual (pan) evaporation rate of thirty inches leachate is not expected to move through the pile to the underlying groundwater. A soil and water balance accounting was not presented and the calculations assume the rainfall and evaporation are evenly distributed over time.

Slurry Cells

The evaporative component may be more dominate than the downward component for water migration when operations are idled. With that in mind, the occurrence of water in the alluvium below the site may increase the opportunity for continued salt accumulation over time. The degree and propensity for this to occur can not be determined with the existing data. During moist climatic periods the mobile salts which may have accumulated through time could be leached downward.

The following measures are provided during the reclamation period to minimize acid and toxic forming potential: 1) Diverting water around the slurry cells thus, minimizing water available for leaching and, 2) Leaving a roughened surface to maximize plant water uptake (this may however increase the salt movement to the surface and, 3) Evaporation rates are greater than precipitation rates (this should be estimated based on monthly averages at a minimum not annual averages).

Water-Quality Standards and Effluent Limitations

No discharge is proposed to occur from the clear water pond. Such a discharge would result in a violation of state water quality and effluent limitations. Data collected from the wells developed in 1997 will allow further discussion and characterization of boron, selenium and leachable salts from operations conducted at the slurry cells.

Other Hydrologic Protection Measures

Map E9-3341 provides the facilities map showing an oil storage area, fuel storage building, and the non-coal waste storage area. The location of diesel and gasoline are shown on Map 712d. Text includes discussions of truck wash down areas and oil changing areas on page 14 and 16 in section 7.28. Table 7.28.4 in the PAP, lists chemicals currently stored. In the past chemicals were stored within the beltline and power building. The shop building was used to house all other oil, grease, antifreeze etc. and was used at the site for all truck maintenance. Number 2 diesel and propylene glycol are used in the flotation process. Trucks too large to fit in the shop were cleaned and had their oil changed in back of the shop. Currently maintenance operations are performed at the fueling station.

The gas and diesel storage tank enclosures were designed. See section 7.28.3. Tanks were removed and a commitment to remove any contaminated soil was included in the plan. A discussion is included in section 7.28.3 and attached design calculations are included in appendix 7.28-1 for sizing of containment berms for storage tanks areas. The plan describes several scenarios for the preparation plant area. The plan also presented designs for a 2 " steel pipe with valve and screw cap and 4" concrete filled pipes for drain protection. None of these designs were implemented.

The coal washing plant area will provide a hydrocarbon storage tanks within leak proof synthetic liners and earthen berms. Following construction the as-built design for these areas should be included in the plan. Oil is stored at the Coval Wash Plant in a 10,000 gallon above ground tank. The operator did not identify how the No. 2 diesel and propylene glycol are stored.

A spill prevention and countermeasure plan certified and dated December 6, 1993, is contained in Appendix K. The main components identified by the plan are:

1. Any leaks, damage or unusual conditions will be reported immediately.

2. Diesel, gasoline and stoker oil tanks will be visually inspected regularly.

3. Transformers and components will be checked regularly for leaks or other damage.

4. Repairs will be completed as soon as possible.

5. Absorbent material such as oil-dry, straw, sawdust, rags or earth shall be used to soak up spilled fluids and will be maintained on site for emergency use.

6. Oil soaked materials will be collected and placed in barrels and disposed of as contaminated materials

Diversions

Information on diversions are presented in sections 7.42 and in Hydrologic Appendices. The upgraded haul road diversions are found in the As-built Facilities amendment revised 2/23/90. DD-1 and DD-2 are no longer a part of the facilities drainage area. The peak flow designs for DD-3 were provided and a design flow depth was presented with a minimum depth of one foot. The culvert designs for C-10, C-11 and an Unnamed Culvert (C-12?) are found in Watershed #4 and C2, C-4, C-6, C-7, C-10, were all presented in Watershed No 1 computations. The culverts were designed to handle the 10 year-6 hour event assuming 0.1 cfs per acre of runoff.

Table 2
Undisturbed Drainage Diversions

Diversion	Design Life	Design Event	Function
UD-1	Temporary Diversion	10 year-6 hour	Collects flow from Watershed #2 and #3 diverts water around preparation plant area.
UD-1A	Temporary Diversion	100 year-6 hour	Collects flow from Watershed #2 and #3 diverts water around preparation plant area and diverts water around the Plant refuse pile.
Siaperas Ditch	Permanent Diversion	100 year-6 hour	Collects flow from Watershed #9 and diverts water around the Slurry Impoundments.
Pipeline Slurry South and North Ditches	Temporary	10 year-6 hour	Collects flow from disturbed areas in Watershed #8 and diverts therm to the Pipeline Slurry Sediment Pond.
Permanent Diversion	Permanent	100 year-6 hour	Collects all undisturbed flow north of the Slurry Cells and diverts water into the Siaperas ditch.
UD-2	Haul Road Diversion		Collects drainage from south side of haulroad to CU-1 and crosses under the road.
UD-3	Haul Road Diversion		Collects drainage from south side of haulroad to CU-1 and crosses under the road.
UD-4	Haul Road Diversion		Collects drainage from south side of haul road and diverts water under the road through CU-2.
UD-5	Haul Road Diversion		Collects drainage from south side of haul road and diverts water under the road through CU-2.
CU-1	Haul Road Diversion		Passes drainage under road to SAE-1.
CU-2	Haul Road Diversion		Passes drainage under road to SAE-7.

Table 3
Disturbed Drainage Diversions

DD-3	Pad Drainage Area	10 year-6 hour	Diverts Drainage from pad area to Plant Sedimentation Pond.
DD-4	Pad drainage and Pond Discharge Ditch	10 year-24 hour	Takes drainage from the Plant Sedimentation pond to the area between the Railroad and Plant Refuse Pile.
C-5, C-4, C-7 and C-8	Preparation Plant Railroad Spur	10 year-6 hour	Passes drainage from Watershed #1 along railroad spur. To C-9 under the railroad spur.
C-9	Preparation Plant Railroad Spur	10 year-6 hour	Passes drainage from the Watershed #1 under the railroad spur. The unnamed north-south culvert near C-9 should be removed as it appears to drain into Watershed #4. A berm just south of C-8 should be built to a height to 2.6 feet higher than the top of the inlet to C-22 to prevent water from entering Watershed #4 .
C-21, C-22 and C-24	Preparation Plant Railroad Spur	10 year-6 hour	Passes drainage under the Denver and Rio Grande Western Railroad. It is recommended that a berm be built south of the inlet C-22 to a height of the top of the 36 inch culvert so flow will pass through the culvert before overflowing to Watershed #4.
C-10 , C-11, C-23, C-24 and an un-numbered culvert	Preparation Plant Watershed #4	10 year - 6 hour	Passes drainage from the Road Pond and Auxiliary Ponds to the Dryer pond. In the future the ponds are proposed to be removed and water will drain from the disturbed area to the pond.

A nick point has occurred in the Permanent Diversion. The plan commits to fill in the excavated area. Onal desi salgns included the pond on Exhibit E9-3427.

Sections of the south pipeline slurry ditch steeper than 4% will be stabilized using an erosion control blanket such as North American Green C125 flexible channel liner. The plan commits to using the erosion control blanket according to manufacturers recommendations. The plan provide the necessary information for implementation of this project. A Manning's "n" of 0.035 is used, to provide the tractive force determination, however the manufactures co-efficient indicate Manning"s "n" from 0.022 to 0.014 should be used for the proposed blanket at the potential depths of flow. The proposed use is for areas where the gradient is from 4 to 21%. Even though the design for a 0.21 ft/ft bed slope slightly exceeds the allowable tractive force, the design flow is moderately conservative based on the information presented in the plan. Assuming the values used in the design computations are representative of the site, the use of the proposed blanket up to 0.21 ft/ft bed slope reaches the upper limit for applicable use of this product. Therefore, the potential for failure is greater at that gradient.

At the Coal Washing Facilities area two 12 inch diameter pipelines will carry water along Farnham Road from a supply well and the Clear Water Pond. These pipes will parallel the Farnham Road on the east side (Drawing 712 a 1 of 2). One 12 inch tailings pipeline will carry tailings across the coarse refuse pile to the NW tailings impoundment.

Sub-basins for the Modular Tailings Facility Area were designated as 7A through 7G; and are shown on drawing T1-9597. The site will be graded at 2 percent to drain to the Lower Refuse Basin. Up-gradient runoff will be directed around the pad. Calculations for drainage from the site is required to be designed for the 100-year 6-hour precipitation event (R645-301-746.212). Where drainage flows over material that is not part of the refuse pile the design requirements are for the 10-year, 6-hour precipitation event. The presented designs are sized for the 10-year, 24-hour precipitation event. A few of the presented designs were checked to determine if the submittal meets the minimum requirements. For the peak flows evaluated, the submitted design flows exceeded the 100-year, 6-hour design flows using the SCS type-b method (The type-b method results in the least conservative design). Because the design flows for the evaluated ditches exceeded the values obtained using the 100-year, 6-hour peak event the remainder were assumed to also exceed or meet minimum design standards, therefore, the proposal is considered to have met minimum design requirements for the ditch and culvert designs.

Stream Buffer Zones

Stream Buffer Zones were established in the August 22, 1984 permit approval. Suspension bridges carrying slurry pipelines; a diversion dam and sluiceway to divert water to the pumphouse; and a bridge for an access road were constructed prior to enactment of the Surface Mining Control and Reclamation Act in the buffer zone. Buffer zones signs were placed within 100 feet from the Price River. In section 5.21 the plan states that the buffer zone signs are placed so as not to affect water quality. For clarification, the intent of the regulation is to exclude disturbance in those areas unless approval is granted by the Division, as well as to protection the water and riparian resource.

Sediment control measures.

The inspection description includes the weekly requirements for the Clearwater Pond and Lower and Upper Refuse impoundments and is presented in section 5.14 (5/2/94). Other sedimentation ponds will be inspected quarterly

At the Modular Tailings Facility Area, all site grading and diversions direct runoff to the lower sedimentation pond. According to the plan, runoff from the fresh water supply line will be treated by Alternate Sediment Control areas 4 & 5, as depicted in exhibit F9-117, 2 of 2 or, will drain to the slurry impoundments and Clear Water Pond.

Based on the small size of the additional area to be disturbed the amount of additional runoff that may reach the slurry cells would be negligible. The existing capacity of the impoundments is considered adequate to treat runoff. The plan indicates this capacity will not decrease below that which is required.

Other erosion control methods include berms to retain runoff and slope ravel. Additionally, interim vegetation and slope matting will be placed on steep fill slopes and the flotation cell pad.

Regarding construction activities near the stream buffer zone, a commitment is provided that no construction will take place within 100 feet on either side of the Price River. Signs will be placed to at the edge of the 100 foot buffer zone.

According to discussions with Daron Haddock, Permit Supervisor UDOGM , the power poles owned and controlled by Utah Power and Light would not be considered under the purview of the R645 regulatory requirements. The plan states that these poles are owned and controlled by UP&L. The existing plan shows the disturbed area associated with power line as being adjacent to the water line therefore, the power poles at the tailings facility appear to be treated by alternate sediment control areas 4 and 5 and the slurry cell system regardless of the ownership and operations.

Alternate Sediment Control Measures

ASCA#1 receives runoff from Watershed #1 and passes the waters to the opposite side of the railroad spur. Watershed #1 has not been disturbed in conjunction with the mining operations but was utilized previously by the county and the power utility company, however the applicant has removed information verifying the previous disturbance.

ASCA#7 utilizes the present practice of silt fences and straw bales as means for alternate sediment control. In the response memo (May 2, 1994) the Permittee, proposed to reclaim ASCA #7 through reseeding the disturbed area. The existing silt fence and straw bale system was to be maintained until revegetation was successful.

The existing silt fences at ASCA #7 has piping regularly occurring through the fence. In field conditions it was recognized the fence is constantly maintained but does not function well (i.e. may not meet Best Technology Available) for this area. This area has a low potential impact with current operations relative to downstream conditions since the drainage passes through Mancos Shale. Performance standards and field inspections will determine the success of the design.

ASCA #3, ASCA #4, ASCA #5, sediment control measures include using a berms and silt fences.

Sediment Ponds

References to cross-sections provided for the Road Pond and Auxiliary Pond emergency spillways are found on Drawing 712d. Sediment clean-out elevations and sediment storage volumes are on the stage capacity curves for the Auxiliary, Road and Dryer sediment ponds (see Sheets 2 through 4 of 4 in the Hydrologic Appendix Watershed #4).

The Road, Auxiliary and Dryer sedimentation ponds are in series. The design flow rates for the Road, Auxiliary, and Dryer Sediment pond spillways were derived based upon information supplied in the Hydrologic Appendix. Hydrologic calculations include: cover type (Sheet 2 of 7), Curve Numbers (Sheet 3 of 7), time of concentration (Sheets 6 & 7 of 7, 10-year 24-hour HEC-1 model printout with peak flows summarized on Sheet 13 of 13, and 25 year 6-hour HEC-1 model printout with peak flow summarized on Sheet 10 of 10). Emergency spillway locations presented for the Auxiliary Pond and Road Pond are found on sheet 712d.

The Road Pond emergency spillway is designed to spill out of the south end. The control point is set by the road elevation. The emergency spillway for the Auxiliary Pond occurs over the topographically low south portion of the pond. Although the permittee's spillway designs are not conventional, the velocity of the design flow across the site was not considered erosive. Because the ponds are incised and the surrounding area is flat, impacts due to failure of the pond would be negligible.

The Dryer Sediment pond is shown to contain the 10-year 24-hour precipitation event from Watershed #4 and is shown to pass the Peak 25-year 6-hour storm event through an open channel spillway when the pond is full. Design depth across the spillway is 13 cfs as presented in Appendix L, and is certified by Dan Guy, Blackhawk Engineering. This information was submitted without the permittee's signature but, relies on information already provided in the plan. The constructed depth of the spillway is shown to be 2 feet which provides more than a foot of freeboard and is therefore considered adequate. The sediment storage requirements were estimated to be 0.036 AF per year. The sediment clean-out level of 5330.31 had an estimated volume of 0.84 AF and exceeds the computed annual sediment volume required. The designed sediment volume is considered adequate.

Currently the proposed principle spillway elevation for the Dryer pond is at 5336.9 according to Map 712D. The existing drop inlet structure and the emergency spillway (at 5337.9 feet) are proposed to be removed and replaced with an open channel spillway. The principle spillway for the Auxiliary pond is at 5335.9 (with a riser) according to Map 712D, while the emergency spillway is at 5340.6 according to the spillway designs. The current principle and emergency spillway for the Road Pond is at 5336.5 and 5339.3 respectively as shown on Map 712D. Because the dryer pond primary spillway is at 5336.91 feet, water will rise to this elevation in the Auxiliary and Road ponds prior to spilling through the Dryer Pond spillway.

Relative elevations are included on Maps 712E and 712D. With the ponds operating in series, the proposed changes design meet the requirements of R645-301-742.300 and R645-301-742.200.

The Dryer Pond decant is proposed to be located at approximately 5.3 feet below the primary spillway, at 5331.62 feet. The sediment clean out level is at 5330.31 feet, or 1.31 feet below the proposed decant level. The decant information is provided in Appendix L Volume III-C and is described as a portable pump with a floating inverted inlet. The intake is designed to draw down water from 12 inches below the water surface to prevent oil and grease entry. The intake is located one foot above the sediment level. The plan meets minimum design requirements for decants.

It should be noted that the proposed designs may not be considered adequate should the pond be used for anything other than a sedimentation pond. For example, this design would not be appropriate for treating water that may be used as a retention pond in coal processing procedures. Specifically an oil skimmer of some type may be necessary for process waters discharging from the spillway.

Other Treatment Facilities

No other treatment facilities are used at the Wellington Preparation Plant.

Impoundments

History

In 1978 the upper refuse pond was removed from service and all clarification processes were completed in the lower pond. In 1983 the height of the lower slurry pond embankments (Lower Refuse dike) was increased 11.1 feet, changing the initial configuration. Work was completed in the spring of 1984. The proposed change to extend the North Dike and Upper refuse dike was never completed, but was proposed to be completed in 1985. (Rollings Brown and Gunnel report Appendix E 1983).

North Dike

The North Dike was formed by dumping material excavated for a trench (the Siaperas ditch) and was not compacted according to information presented in Appendix C. Seepage has been observed at the downstream face of this dike. Most sands start at a depth of approximately 15 feet from the top of the embankment.

Upper Refuse Dike

Historically, seepage has been reported to have occurred around the left abutment of the upper tailings dike in the natural materials. The upper 15 to 25 feet are composed of coal refuse. Silt and granular materials are the foundation materials. It was expected that the subsurface materials were saturated on both sides of the dike. The Upper Refuse Dike is approximately 20 feet high. Most sands start at a depth greater than 20 feet from the top of the embankment. Sandy soils are found below the Upper Refuse Dike at test holes numbers 2, 3, and 4. The location of these drill holes may represent the most likely place for movement of water through the alluvium below the upper refuse basin, in other words, in the central portion of the Upper Refuse Dike embankment.

Lower Refuse Dike

The Lower Refuse Dike within the embankment was determined to consist primarily of silty clays to the base of the structure and is underlain with sandy gravel to gravelly sands. It could be anticipated that some seepage would occur below this dike. The most extensive portions of gravel are under drill holes 10 and 11 to the center and north west of the center of the dike. The Lower Refuse Dike is approximately 35' high. Most sands are located at a depth greater than 35 to 40 feet from the top of the embankment. It was noted that no seepage was seen through the embankment 1 year after the 1983 dike expansion.

Clear Water Dike

The embankment of the Clear Water Dike also consists mostly of silty clays with some sand lenses. The phreatic surface was determined likely to exist throughout the embankment. Seepage appeared to occur under the dike. The sandy gravelly portions were found under test holes 15, 16, and 14 from the center to the south of the dike. Most sands are located at a depth greater than 35 to 40 feet from the top of the embankment.

The Permittee has provided calculations for the runoff from Watershed #7 (Refuse Basin) generated by the PMP-6 hour event estimated to be 439.1 acre feet. The capacity of the basin was calculated to be 763.6 acre feet. The calculated runoff from the PMP would occupy only 58% of the capacity of the basin.

Current Conditions

The north-west area of the Upper Refuse Pond is diked to separate initial plant tailings and to facilitate settling of wastes. This impoundment is a sub-structure to the existing impoundments which have previously been determined to meet the minimum criteria for impoundments. Existing culverts and decant structures used to pass water between the structures will be refurbished.

Casing and Sealing of Wells

The plan includes a commitment in 7.38 and 7.48 that monitoring and water wells will be temporarily or permanently sealed in compliance with **R645-301-748**. In section **731.400** of the plan it is stated that exploratory and monitoring wells will be sealed in accordance with requirements of the State Engineer and DOGM. In section 5.40 of the plan it is stated that the well casing will be removed at 2 feet below final grade and filled with soil from the pump house.

Water wells and ground water monitoring wells are permitted by the State Engineer through the Utah Division of Water Rights. Water and monitoring wells must be installed, operated, and closed in accordance with Utah Code Section 73-3-25 and Utah Rules for Water Well Drillers. The plan included a commitment to follow these regulations.

Findings:

The plan meets the minimum requirements of this section.

SIGNS AND MARKERS

Regulatory Reference: 30 CFR Sec. 817.11; R645-301-521.

Analysis:

Signs and markers have been posted and are maintained at access areas from public roads; at topsoil stockpiles; and at the stream buffer zones along the Price River.

Findings:

The plan meets the requirements of this section.

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 and sample location maps are provided. No UPDES discharge points were labeled for the slurry operations, therefore, it is assumed this is a non discharging structure.

Findings:

The plan meets the minimum requirements of this section.

RECOMMENDATION:

The information submitted for the Division Order amendment 98-A satisfies the division order and can be approved.

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