T E C H N I C A L M E M O R A N D U M

Utah Coal Regulatory Program

April 2, 2004

TO: Internal File

FROM: Dana Dean, P.E., Senior Reclamation Hydrologist

RE: Refuse Pile Redesign and Post Mining Land Use Change, Plateau Mining Corporation, Willow Creek Mine, C/007/0038, Task ID #1875

SUMMARY:

Plateau Mining Corporation submitted an application on December 22, 2003 to amend the Mining and Reclamation Plan (MRP) for the Willow Creek Mine. The Division found the application deficient and asked for more information on February 18, 2004. The Permittee responded with additional information on March 22, 2004.

The Permittee would like to change the postmining land use of a 46.2 acre portion of the permitted area to industrial so that the Price River Water Improvement District (PRWID) may expand their facilities to meet the growing needs of the area's population. The changes to the hydrologic reclamation would be minor and would mostly involve leaving hydraulic structures in place to support the industrial use.

The Permittee would also like to change the reclamation of the large refuse pile in Schoolhouse Canyon so that it has a more natural shape. This will also change the flow path of any storm water from the approved reclamation plan to a more natural path. However, the new drainage path will involve a large reclamation channel built on top of the refuse. The design of this and associated channels is very important and the Division will scrutinize it in detail to ensure the designs are adequate.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

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:

General

Once the Division approves the postmining land use of industrial and the Permittee implements it, the Permittee will reclaim all existing hydraulic structures not associated with that land use. If the Permittee is unable to implement the land use, the Permittee must reclaim all operational structures not necessary for the stability of the final reclamation. The structures that the Permittee will retain to support the industrial postmining land use are CGD-3, CGD-4, CGD-14, CGC-1, CGC-2, CGC-3, CGC-5, and CGC-11 (See Map "Exhibit 3.4-9")

Transfer of Wells

The Permittee does not plan to transfer any wells to another party for further use. The Permittee will remove the piezometers in the downstream embankment of Pond 013 during the Schoolhouse Canyon reclamation. The Permittee has already sealed the slurry injection wells discussed in Section 3.10 of the MRP and reclaimed the immediate surrounding area.

Diversions: General

All diversions are designed based on an "SCS type b storm". The reference cited in the original application does not refer to a "type b storm" in those terms nor could the Division find a reference to it as a "type b storm" in any standard references. Most current standard references refer to a type II storm to be used in Utah and it is the only type of storm accepted and used by OSM, the NRCS, and other State agencies that administer SMCRA. The Permittee has now included a complete reference for the "type b storm", which is actually *figure b* on page 21.81 of the former Soil Conservation Service's National Engineering Handbook (this section most recently updated in 1972).

The Division accepts the storm shown in *figure b* (for 6-hour storms only) only because it more closely reflects the type of storms found to be typical to Utah. The type II storm assumes

that the precipitation is almost equally distributed over the storm's duration, with about 50% occurring before the mid-point and 50% after. The distribution in *figure b* assumes that more of the precipitation comes at the beginning of the storm (50% occurs when the storm is $^{4}/_{10}$ complete). Since studies such as those done by Richardson (Richardson, E.A. 1971. *Estimated Return Periods for Short Duration Precipitation in Utah.* Utah State Univ., Department of Soils and Biometeorology Bulletin #1.), and Farmer and Fletcher (Farmer, E.E. and J.E. Fletcher. 1971. *Precipitation Characteristics of Summer Storms at High Elevation Stations in Utah.* USDA Forest Service Research Paper INT-110) have shown that storms in the coal mining areas of Utah generate most of the precipitation in the first ¼ of the duration; the *figure b* distribution is acceptable.

All diversion channels are designed with 2:1 side slopes, except the operational channels CGD-3 and CGD-4, which were constructed with 1:1 side slopes.

In all riprapped channels the filter blanket thickness will be ½ of the riprap thickness, or 6", whichever is greater. In all cases the riprap thickness will be twice the D_{50} riprap size. When transitioning downstream from a steep channel slope to a flat channel slope the Permittee will extend the larger riprap size from the steep slope into the flatter slope section for at least 15 feet to minimize erosion.

The Permittee has clarified the statements referring to riprap design on page 3.4-28 (previously p. 3.4-29) omitting the reference to Simons, et al (1982) and stating that they will use the Searcy (1967) method for designing all riprap sizes . Also, a nomograph for the maximum velocity for a riprap channel referred to on page 15 of the diversion design calculations that was missing is now included.

Each channel will have a minimum freeboard of 0.5 feet.

The Permittee did not present a detailed riprap and filter design, though they have committed to do so before implementation.

Diversions: Refuse Pile Flows

The Permittee designed all diversions associated with the refuse pile to safely pass the peak runoff from a 100 year 6 hour storm as required by R645-301-745.222. The design storm event is 2.10 inches.

As mentioned above, the Permittee used an "SCS type b storm" (*figure b distribution)* hydrograph to design the diversions.

Each structure and its design is discussed below:

CGRD-1

CGRD-1 is the main channel that runs the length of the canyon on top of and in the middle of the refuse pile. It will need to contain all runoff from CGRWS-1 and as appropriate from side channels CGRD-2, CGRD-3, CGRD-4, and CGRD-5. It is very important that this channel function properly or the stability of the entire refuse pile could be compromised.

The Permittee was very conservative in the design of this channel and it should function properly, even for a type II storm peak discharge calculations. The channel will be 8 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1.5 feet (See Figure 3, and Table 3.4-7). The D_{50} riprap size is 12 inches.

The *figure b* peak discharge for this structure is 36.92 cfs. The type II storm peak discharge is 76.72 cfs. The structure, as designed, can handle a peak discharge of over 100 cfs.

CGRD-2

CGRD-2 is the uppermost side channel flowing into CGRD-1. It will collect the runoff from CGRWS-2 and divert it into CGRD-1.

The channel will be 3 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1 foot (See Figure 4, and Table 3.4-7). The D_{50} riprap size is 6 inches.

The *figure b* peak discharge for this structure is 4.36 cfs.

CGRD-3

CGRD-3 will collects the runoff from CGRWS-3 and divert it into CGRD-1.

The riprapped portion of the channel will be 3 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1 foot (See Table 3.4-7). The D_{50} riprap size is 6 inches.

The unlined portion of the channel will be 3 feet wide at the bottom with 2:1 side slopes, and a depth of 1 foot (See Table 3.4-7).

The *figure b* peak discharge for this structure is 1.80 cfs.

CGRD-4

CGRD-4 will collects the runoff from CGRWS-4 and divert it into CGRD-1.

The riprapped portion of the channel will be 3 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1 foot (See Figure 4, and Table 3.4-7). The D_{50} riprap size is 6 inches.

The unlined portion of the channel will be 3 feet wide at the bottom with 2:1 side slopes, and a depth of 1 foot (See Figure 5, and Table 3.4-7).

The *figure b* peak discharge for this structure is 1.82 cfs.

CGRD-5

CGRD-5 is the lowermost side channel flowing into CGRD-1. It will collect the runoff from CGRWS-5 and divert it into CGRD-1.

The riprapped portion of the channel will be 3 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1 foot (See Figure 4, and Table 3.4-7). The D_{50} riprap size is 6 inches.

The unlined portion of the channel will be 3 feet wide at the bottom with 2:1 side slopes, and a depth of 1 foot (See Figure 5, and Table 3.4-7).

The *figure b* peak discharge for this structure is 3.08 cfs.

Culvert CGC-5

The operational culvert CGC-5 will remain in place and receive the flow from CGRD-1. It is a 60" concrete culvert. Table 3.4-3 of the MRP states that this culvert has a capacity of 185 cfs, which is adequate for the design event.

Diversions: Miscellaneous Flows

The Permittee has designed several other diversion channels to carry the flow from smaller watersheds to different discharge points. The Permittee has designed each diversion to contain the peak discharge from a 10-year 6-hour storm as per R645-301-742.333. The storm event is 1.40 inches.

Each structure and its design is discussed below:

CGRD-6

CGRD-6 will carry the runoff from CGRWS-6 to the operational culvert CGC-1.

The channel will be 3 feet wide at the bottom with 2:1 side slopes, and a depth of 1 foot (See Figure 5, and Table 3.4-7). The channel will not have a riprap lining.

The *figure b* peak discharge for this structure is 0.12 cfs.

CGRD-7

CGRD-7 will carry the flow from CGD-14 to CGD-3.

The channel will be 3 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1 foot (See Figure 4, and Table 3.4-7). The D_{50} riprap size is 6 inches.

The *figure b* peak discharge for this structure is 3.6 cfs.

CGRD-8

CGRD-8 will carry the runoff from a small area above the inlet of CGC-2 to CGD-3.

The channel will be 3 feet wide at the bottom (top of riprap) with 2:1 side slopes, and a depth of 1 foot (See Figure 4, and Table 3.4-7). The D_{50} riprap size is 6 inches.

The *figure b* peak discharge for this structure is 2.5 cfs.

CGRD-9

CGRD-9 will carry the runoff from CGRWS-9 to CGC-5.

The channel will be triangular with 2:1 side slopes, and a depth of 1.25 feet (See Figure 2, and Table 3.4-7). The channel will be unlined.

The *figure b* peak discharge for this structure is 3.08 cfs.

CGRD-10

CGRD-10 will carry the runoff from CGRWS-8 to WCRD-17B.

The channel will be triangular with 1.5:1 side slopes, and a depth of 1.5 feet (See Table 3.4-7). The channel will be unlined.

The *figure b* peak discharge for this structure is 2.24 cfs.

CGRD-11

CGRD-11 will carry the runoff from CGRWS-10 to WCRD-17B.

The channel will be triangular with 3:1 side slopes, and a depth of 1.25 feet (See Figure 2, and Table 3.4-7). The channel will be unlined.

The *figure b* peak discharge for this structure is 0.96 cfs.

Culvert CGC-1

The operational culvert CGC-1 will remain in place and receive the flow from CGRD-6. It is an 18" corrugated metal pipe (CMP) culvert. Table 3.4-3 of the MRP states that this culvert has a capacity of 11 cfs, which is adequate for the design event.

Culvert CGC-2

The operational culvert CGC-2 will remain in place and receive the flow from CGD-3. It has two 84" CMP culverts. Table 3.4-3 of the MRP states that these culverts have a combined capacity of 900 cfs, which is adequate for the design event.

Sediment Control Measures

The Permittee will reclaim Ponds 011, 012A, 012B, and 013 during the shaping of the channel. Between the time the ponds are removed and the time vegetation begins to grow and control sediment the Permittee will implement alternative sediment control measures (ASCM's). They include:

- Placement of growth media,
- Incorporation of hay mulch into the growth media,
- Deep gouging of the growth media,
- Seeding the prepared growth media,
- Addition of more mulch following seeding, and
- Physically or chemically anchoring the final mulch layer.

Modified Universal Soil Loss Equation (MUSLE) calculations presented by the Permittee show that sediment loss immediately following reclamation will be just 0.12 tons/acre/yr compared to 20.78 tons/acre/year pre-mining.

The Permittee will use straw bales and/or silt fences when necessary between the removal of sedimentation ponds and the application of the ASCM's.

Siltation Structures: Sedimentation Ponds

Pond 013 will remain in place and operational during the construction of the upper channel (See Map 3.4-8 of the MRP, Exhibit 13 for the locations of the sedimentation ponds). The Permittee will not remove it until they need to build the channel through it and they have treated most of the upstream reclamation with deep gouging and mulching for alternative sediment control.

The Permittee will retain Ponds 011, 012A, and 012B until the majority of the land reporting to them is treated with deep gouging and mulching, then the Permittee will backfill them to blend in with the contour of the reclamation.

Discharge Structures

The Permittee has presented riprap designs for each of the culverts discharging outside the permit area. The discharge at CGC-1 does not require riprap, since the flow velocity will be just 3.48 fps. The discharge at CGC-2 will require 20" riprap. The discharge at CGC-5 will require 40" riprap.

Findings:

The information provided is adequate to meet the minimum requirements of the Regulations.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

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

Analysis:

Reclamation Treatments Maps

Table 3.4-7 indicates that channel CGRD-2 will have riprap along its entire length, however Figures 4 and 5 previously depicted a portion of the channel as unlined. The Permittee previously did not depict CGRD-3 or CGRD-10 in any of the figures. The Permittee has cleared up the design of CGRD-2 on Figure 4 and depicted CGRD-3 on Figures 4 and 5.

In the text, Table 3.4-7, and in Figure 2 channels CGRD-9 and CGRD-11 are triangular with 3:1 side slopes, however they were previously depicted on Figure 5 as trapezoidal with 2:1 side slopes. The Permittee has cleared this up by depicting them properly on Figure 2.

Exhibit 3.4-9 shows the final reclamation topography and diversions. Exhibit 3.4-11 shows the watersheds and associated diversions. Exhibit 3.4-12 shows the area to be treated with the ASCM's.

Findings:

The information provided is adequate to meet the minimum requirements of the Regulations.

RECOMMENDATIONS:

The Division should approve the application.

O:\007038.WIL\FINAL\dd_1875.doc