



State of Utah

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DIVISION OF OIL, GAS AND MINING

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August 27, 1997

TO: File

THRU: Daron Haddock, Permit Supervisor *DH*

FROM: Jess Kelley, Reclamation Engineer *JK*

RE: Cottonwood Fan Portal Reclamation, PacifiCorp, Cottonwood/Wilberg Mine, ACT/015/019-97C, Folder #2, Emery County, Utah

SUMMARY:

The Cottonwood Fan Portal area was initially disturbed in the early 1980s. At that time, it was the intention of the permittee to construct a fan portal and a facilities pad there. However, conditions changed and this plan was never carried out. The salvaged topsoil and subsoil material remained where they had been stockpiled and the cuts for the planned facilities remained, but no facilities were built and nothing further was done with the area.

In 1995, the permittee notified the Division that it planned to reclaim the area sometime in the spring and summer of 1997. The Division then decided to review the reclamation plan, which it had approved in the 1980s, for technical adequacy and regulatory compliance. The Division found the reclamation plan to be technically and regulatorily deficient and remanded it to the permittee for revision. The permittee then resubmitted the reclamation plan, for Division review, in July of 1997.

This memorandum constitutes this writer's review of the revised reclamation plan which was submitted in July of 1997. It is written in a form in which it can be incorporated directly into the current technical analysis (TA) for this site.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

APPROXIMATE ORIGINAL CONTOUR RESTORATION

Analysis:

Information regarding the restoration of the Cottonwood Fan Portal area to its approximate original contour are found on pages 5 through 7 of Section 500, in Appendix A, and on Plates 5-1, 5-2, 5-3 and 5-5. See also **BACKFILLING AND GRADING** below.

On April 15, 1997, Division personnel and representatives of the permittee visited the Cottonwood Fan Portal site in order to determine the best way to reclaim the site. During that visit, it became obvious that the site could not be restored to its exact original contour. The excessive slope length, subsurface seeps, and rock strata which slope outward would make the resulting slope unstable.

However, the area will be restored to a configuration which both approximates the original contour and attains the necessary stability. Exposed coal seams will be covered. Ledges and cutslopes will be backfilled. Seeps which might jeopardize fill stability will be drained through gravel underdrains. Vegetation will be reestablished. These reclamation measures will serve to blend the site into the surrounding topography and make it aesthetically and geomorphically compatible with the surrounding area. The net result is shown by computer-assisted photographic reconstructions in Appendix A.

Findings:

The plan fulfills the requirements of this section.

BACKFILLING AND GRADING

Analysis:

Information regarding the final backfilling and grading of the Cottonwood Fan Portal area is found on pages 5 through 8 of Section 500 and on Plates 5-1, 5-2, 5-3 and 5-5. See also **APPROXIMATE ORIGINAL CONTOUR RESTORATION** above.

For purposes of backfilling and grading, 5 main terraces have been identified on the hillside of the Cottonwood Fan Portal area. These have been designated, from lowest to highest, Terrace 1, Terrace 2, Terrace 3, Terrace 4 and Terrace 4A. Terraces 1 and 2, the lowest terraces, are the areas of most concern. Both contain sizable ledges and Terrace 1 contains an exposed coal seam which must and will be covered.

Fill material for the reclamation of the Cottonwood Fan Portal area will be taken from the 2 adjacent stockpiles shown on Plates 5-2 and 5-5. Plate 5-2 shows the extent of fill placement on the 5 main terraces. Subsoil will be taken from the subsoil stockpile which lies near the Diesel roadway portal and topsoil will be taken from the topsoil stockpile near the lower sediment pond. The subsoil pile contains approximately 7960 cubic yards and the topsoil pile contains approximately 990 cubic yards. According to the soil placement tables on Plate 5-5, 1551 cubic yards of subsoil and 1031 cubic yards of topsoil will be required.

The values of soil material properties determined for the rest of the site were also used to evaluate the stability of the fills at the Cottonwood Fan Portal site. These are:

Cohesion c = 1872 psf
Density (W) = 120 pcf
Friction Angle (ϕ) = 27.3 degrees

An analysis done using these properties yields the following slope parameters:

Maximum Fill Height (H) = 90 feet
Maximum Slope = 1.5h:1v
Safety Factor (SF) = 1.3

Terrace 1 will receive enough fill material to completely cover the exposed coal seam and backfill most of the overlying ledge. The fill will be placed at a maximum slope of 1.5h:1v, which will provide a static stability safety factor of 1.3. Gravel drains will be incorporated into the fill to drain water from seeps. Boulder-size rocks from nearby will be placed along the toe of this fill to further enhance its stability. This is important because the fill will be placed on a solid rock stratum which slopes away from the face of the ledge.

Terrace 2 will receive enough material to backfill all but the upper 1 or 2 feet of the overlying ledge. This fill will also be placed at a maximum slope of 1.5h:1v in order to provide a static stability safety factor of 1.3.

Terraces 3, 4 and 4A will each receive 1 to 2 feet of material. This material will be used to fill the voids at the base of the cuts and will also provide a layer of suitable plant

growth medium for revegetation.

A diversion along the entire length of the upper boundary of the site collects undisturbed runoff and discharges it into a nearby natural drainage. At its lower end, it makes a right-angle turn on unconsolidated material in order to reach that natural drainage. This diversion has been stable for many years and will thus be left in place. However, it will be modified at its lower end to eliminate the right-angle turn and thus take a straight route to the natural drainage.

Findings:

The plan fulfills the requirements of this section.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Analysis:

Affected area boundary maps.

In 1997, the reclamation plan for the Cottonwood Fan Portal area was modified. As part of the modified plan, the reclamation maps were also modified. The affected area remained unchanged except for a small addition which was made to its southeast corner to accommodate the rerouting of the main undisturbed drainage in that area.

The affected area boundary of the Cottonwood Fan Portal area, as modified in 1997, is shown on Plates 5-1--Cottonwood Fan Portal Reclamation Slope, 5-2--Cottonwood Fan Portal Proposed Soil Placement, and 5-5--Cottonwood Fan Portal Final Reclamation. These maps were certified by John Christensen, a professional engineer licensed and registered in the state of Utah.

Bonded area map.

In 1997, the reclamation plan for the Cottonwood Fan Portal area was modified. As part of the modified plan, the reclamation maps were also modified. The bonded area remained unchanged except for a small addition which was made to its southeast corner to accommodate the rerouting of the main undisturbed drainage in that area.

The bonded area boundary of the Cottonwood Fan Portal area, as modified in 1997, is shown on Plates 5-1--Cottonwood Fan Portal Reclamation Slope, 5-2--Cottonwood Fan Portal Proposed Soil Placement, and 5-5--Cottonwood Fan Portal Final Reclamation. These maps were certified by John Christensen, a professional engineer licensed and registered in the state of Utah.

Reclamation backfilling and grading maps.

In 1997, the reclamation plan for the Cottonwood Fan Portal area was modified. As part of the modified plan, the reclamation maps were also modified. Maps 5-2--Cottonwood Fan Portal Proposed Soil Placement and 5-5--Cottonwood Fan Portal Final Reclamation show the details of reclamation backfilling and grading in plan view. Map 5-3--Cottonwood Fan Portal Reclamation Slope Cross Sections, which actually consists of 2 plates, shows the backfilling and grading plan in cross section. These maps were certified by John Christensen, a professional engineer licensed and registered in the state of Utah.

Reclamation facilities maps.

In 1997, the reclamation plan for the Cottonwood Fan Portal area was modified. As part of the modified plan, the reclamation maps were also modified. Map 5-5--Cottonwood Fan Portal Final Reclamation shows the reclamation facilities, which consist only of diversion ditches and 2 sediment ponds, in plan view. This map was certified by John Christensen, a professional engineer licensed and registered in the state of Utah.

Final surface configuration maps.

In 1997, the reclamation plan for the Cottonwood Fan Portal area was modified. As part of the modified plan, the reclamation maps were also modified. Map 5-5--Cottonwood Fan Portal Final Reclamation shows the final surface configuration in plan view. Map 5-3--Cottonwood Fan Portal Reclamation Slope Cross Sections, which actually consists of 2 plates, shows the final surface configuration in cross section. These maps were certified by John Christensen, a professional engineer licensed and registered in the state of Utah.

Reclamation treatments maps.

In 1997, the reclamation plan for the Cottonwood Fan Portal area was modified.

As part of the modified plan, the reclamation maps were also modified. Map 5-2--Cottonwood Fan Portal Proposed Soil Placement shows the extent of topsoil placement. Map 5-6--Cottonwood Fan Portal Revegetated Areas shows the revegetation plan. Map 3-13--Cottonwood Fan Portal Hydrological Map shows the drainage control plan, including water monitoring points and UPDES discharge points. These maps were certified by John Christensen, a professional engineer licensed and registered in the state of Utah.

Findings:

The plan fulfills the requirements of this section.

BONDING AND INSURANCE REQUIREMENTS

Analysis:

Determination of bond amount.

In 1995, the permittee notified the Division that it planned to reclaim the Cottonwood Fan Portal area sometime in 1997. The Division then decided to review the reclamation plan, which it had approved in the 1980s, for technical adequacy and regulatory compliance. The Division found the reclamation plan to be technically and regulatorily deficient and remanded it to the permittee for revision. The permittee then resubmitted the reclamation plan, for Division review, in July of 1997.

A cover letter from the permittee which accompanies the July, 1997 submittal explains that the reclamation cost estimate for the Cottonwood Fan Portal area has not been changed from what it is in the approved plan. This is because it would make no sense to repeatedly redo the entire reclamation cost estimate with each interim revision of the reclamation plan before the entire plan is approved by the Division. Thus, after the details of the reclamation plan have been worked out and the entire plan is acceptable to the Division, the permittee will submit a revised overall reclamation cost estimate and, if necessary, revise the reclamation bond in accordance with that estimate.

Findings:

The plan does not fulfill the requirements of this section.

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The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-542.800, R645-301-820.100

After the details of the reclamation plan have been worked out and the entire plan is acceptable to the Division, the permittee will submit a revised overall reclamation cost estimate and, if necessary, revise the reclamation bond in accordance with that estimate.

RECOMMENDATION:

It is recommended that the revised reclamation plan for the Cottonwood Fan Portal area, except the reclamation cost estimate, be approved. It is further recommended that, after the Division finds the plan acceptable, but before it formally approves the plan, the permittee submit a revised overall reclamation cost estimate and, if necessary, revise the reclamation bond in accordance with that estimate.