INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

July 27, 2015

C/015/0019
Received 7/28/15
Task ID #4960

Utah Division of Oil, Gas, and Mining
Coal Program
1594 West North Temple
Salt Lake City, UT 84114-5801

Subj: Amendment to Revise the Cottonwood/Wilberg Mine Reclamation Plan, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah.

PacifiCorp, by and through its managing agent, Interwest Mining Company (IMC), hereby submits an amendment to revise its reclamation plan to the Cottonwood/Wilberg Mine permit. Cut and fill estimates have been recalculated utilizing Carlson Civil Software which allows three dimensional design for slopes as well as more accurate cut and fill estimates. Maps 4-1, 4-1 and 4-3 have been amended to illustrate the new contours.

The Sediment Control Plan was also revised to utilize best technology currently available (BTCA). IMC incorporated deep gouging techniques on steep slopes in place of the existing design for contour and collection ditches. Using BTCA allows the removal of the sediment ponds at reclamation without the additional contributions of sediment to stream flow or outside the permit area. Justifying the revised sediment control techniques, IMC used RUSLE2 to model soil loss for the slopes in the disturbed and undisturbed areas. Results of this modeling found that the deep gouging and mulching techniques protects off-site areas from sedimentation until vegetation is established.

A discussion paper for utilizing alternative sediment control measures is attached. The paper discusses concerns with the existing sediment control plan, the flexibility given to the Division to determine BTCA for a site, options for sediment control including the risks associated with each of the options listed, and recommendations for sediment control measures for the Cottonwood/Wilberg Mine.

A Redline/Strike-out copy of the revised text for the reclamation plan is included as well as the associated revised reclamation maps. C1/C2 forms are attached.

If there is any questions or concerns with the submittal, please contact Dennis Oakley at 435-687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Geology and Environmental Affairs Manager

Enclosures

Cc File
Scott Child

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: PacifiCorp

Mine: Cottonwood/Wilberg Mine **Permit Number:** C/015/0019

Title: Amendment to Revise Final Reclamation Plan for the Grimes Wash Facility, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Description, Include reason for application and timing required to implement:

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☒ Yes ☐ No 15. Does the application require or include soil removal, storage or placement?
☐ Yes ☒ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☒ Yes ☐ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☒ Yes ☐ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☒ Yes ☐ No 21. Have reclamation costs for bonding been provided?
☒ Yes ☐ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Kenneth Fleck (Print Name) — Kenneth S. Fleck — Manager of Environmental Affairs — JULY 28, 2015 (Sign Name, Position, Date)

Subscribed and sworn to before me this 28 day of July, 2015

Stefanie Andrus
Notary Public

My commission Expires: May 12, 2019

Attest: State of Utah } ss:
County of Emery

NOTARY PUBLIC
STEFANIE ANDRUS
Commission No. 683252
Commission Expires
MAY 12, 2019
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining

Form DOGM- C1 (Revised March 12, 2002)

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: PacifiCorp
Mine: Cottonwood/Wilbert Mine **Permit Number:** C/019/0019
Title: Amendment to Revise Final Reclamation Plan for the Grimes Wash Facility, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Volume 2, Part 4, Reclamation Plan (entire section)
☒ Add	☐ Replace	☐ Remove	Volume 2, Part 4, Appendix A, RUSLE2 Results and Map
☐ Add	☒ Replace	☐ Remove	Volume 6, 4-2: CM-10378-WB (1 of 2 and 2 of 2), 4-3: CM-10484-WB
☐ Add	☐ Replace	☒ Remove	Volume 6, Maps, 4-1: CM-10500-WB
☐ Add	☐ Replace	☒ Remove	Volume 6, Map 4-2: 7704-C45 (3 of 3)
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**
Note that the contents of Maps 4-1 and 4-2 were combined and amended into Map 4-2.	

Discussion of the Alternative Sediment Control Measures

For the Cottonwood Mine

History

The Wilberg Mine was acquired by Peabody Coal Company in 1958. In March 1977, Utah Power and Light (UP&L) acquired the mine from Peabody Coal and was officially listed as the lessee on September 1, 1977. In 1982, UP&L successively bid the South Lease (U-47978) federal coal tract.

On July 1, 1985, the Wilberg Mine and the South Lease area were separated into two distinct mines; the Wilberg Mine (MSHA ID No. 42-00080) and Cottonwood Mine (MSHA ID No. 42-01944). Each mine operated independently of the other utilizing separate equipment and ventilation systems. The Wilberg portals are located on the north coal outcrop in Grimes Wash on the southern end of East Mountain. Mine personnel and coal transfer facilities were located at the Wilberg portal. Together, these two mines became the Cottonwood/Wilberg Mine Complex.

The Cottonwood/Wilberg Mine has not produced coal since 1994. The mine operated as a coal transportation facility from 1994 to 2001 as coal produced from the Trail Mountain Mine was transported from its mine site in Cottonwood Creek Canyon through the underground Cottonwood/Wilberg mine workings to the Grimes Wash loadout. In 2001, PacifiCorp terminated production from the Trail Mountain Mine and constructed permanent seals in all portals of both the Trail Mountain and Cottonwood/Wilberg mines. Demolition and other reclamation activities of the mine site commenced in November 2014.

Facilities

The Wilberg and Cottonwood portals are located on the south coal outcrop of Grimes Wash. These portals provided for men and equipment access, underground conveyor belt coal haulage system, and mine ventilation. Although they are separate underground operations, the two mines shared common surface facilities, thus forming the Cottonwood/Wilberg complex.

The Cottonwood/Wilberg Mine surface facilities occupied approximately twenty acres of disturbed land at the confluence of the left and right forks of the Grimes Wash. The surface facilities included coal handling, electrical substation, equipment maintenance, material storage, parking areas and drainage and sediment control structures. Two regulated MSHA ponds provided sediment control for the twenty acre disturbance; the North Pond and South Pond. The South Pond includes the UPDES discharge point. The sediment ponds were designed to trap and settle coal fines and other potential pollutants prior to discharging into the downstream area of the Grimes Wash outside the permitted disturbed area.

Existing Reclamation Design

In September 1977, when Utah Power and Light Company acquired the Wilberg mine from Peabody Coal Company, it immediately began permitting the mine as Surface Mine Control and Reclamation Act (SMCRA) had been newly enacted. Under SMCRA, the Office of Surface Mining Reclamation and Enforcement (OSMRE) was created within the Department of the Interior and was charged with the responsibility of preparing regulations and providing assistance to states to carry out regulatory activities. Title V of the SMCRA statute gave OSMRE broad authority to regulate specific management practices before, during, and after mining operations. With these new regulations for coal mining and reclamation operations affecting mining operations, UP&L began constructing plans according to the requirements of SMCRA. The Division of Oil, Gas, and Mining (DOGM) would soon take the enforcement responsibilities under the oversight of OSMRE. The Best Technology Currently Available (BTCA) for sediment control at that time was sediment ponds. OSMRE implemented the statutory hydrologic balance protection performance standard by requiring that all surface drainage from disturbed areas pass through sedimentation ponds before leaving the permit area. Therefore, with this requirement ponds were designed, constructed, and maintained for the operations of the mine.

Along with this BTCA for sediment control, OSMRE required that after reclamation, sedimentation ponds would remain in place until at least two (2) years after the last augmented seeding. Based on this requirement, the ponds for the operation processes of the mine were designed and developed to divert all runoff from the disturbed areas of the minesite into the sedimentation pond. For reclamation, the design included routing runoff through diversion ditches constructed along the contour. These contour ditches are to be spaced 40 feet apart on all reclaimed slopes. The contour ditches were designed to drain into collection ditches which were proposed to be constructed parallel to the major drainage channels of the Left Fork and Right Fork of the Grimes Wash. These collection ditches would then drain into the ponds.

This restoration concept of the channel design is to “duplicate the stream bed gradient, meandering location, together with drops, riffles and pools reducing excessive velocities during heavy runoffs.” The channel design is based on passing safely a 100 year/24 hour storm event with 3.5 inches of precipitation as compared to the federal and state minimum requirements of 100 year/6 hour storm event.

The pre-mining channel of the Left Fork and Right Fork of the Grimes Wash was historically eroded to bedrock. The channel grade is steep and consists of rifts, pools, and drops. As one inspects the exposed outcropping bedrock of the Starpoint Sandstone, the steepness of the pre-mining channel can be envisioned. In the undisturbed subdrainages adjacent to the disturbed area, large drops of 25 to 50 feet can be seen. The plan for the reclaimed channels

take into account the natural drops and ledges of those that existed in these two channels and attempts to mimic these pre-mining conditions into the reclamation design. PacifiCorp believes the design of the reclaimed channels is practical and will blend in well with the adjacent undisturbed drainages.

Concerns of the Existing Design of the Sediment Control Plan

The region surrounding the Cottonwood/Wilberg Mine has historically experienced isolated thunderstorms with typical rainfall amounts of 1 to 2 inches and greater. Although these amounts do not normally exceed the design storm event of 3.5 inches, the storms typically occur within 20 to 60 minutes. Precipitation greatly exceeds the infiltration capacity of the soil and hillslopes experience large amounts of runoff. Runoff concentrates on these hillslopes as it flows to the lower elevations. A large amount of sediment is brought with these heavy runoff occurrences.

As mentioned above, the sediment control plan of the existing reclamation plan proposes to construct ditches along the contour to collect runoff from the reclaimed slopes and divert this flow through the sediment ponds. After a storm that produces runoff, these ditches could become filled with sediment and require inspection to ensure there were no obstructions that would impact runoff. The ditches would require routine maintenance activities to function as designed. Maintenance liability would be a burden to the operator as it would require a crew with hand tools to patrol the site on a regular basis. PacifiCorp prefers a less costly, less burdensome, and more efficient technique for its sediment and erosion control measures.

The plan mentions that "each ditch will contain approximately 1 cubic foot of water per lineal foot of ditch." PacifiCorp believes that the design for concentrating flow in ditches on a 1½ - 2:1 slope has an unreasonably high susceptibility for failure. If a ditch at the top of the slope should fail, stress would be put on the ditch immediately below. Each ditch has the potential to spill its entire contents of water and sediment. The potential energy contained in that amount of water holds excessive erosion and rilling capabilities, conceivably damaging the slope as well as the main constructed channel. Large amounts of sediment (above background levels) could potentially be sent down the stream impacting the areas outside the permit area.

When considering the upper areas of the reclaimed site for repair, access for equipment could be impossible to navigate. As noted in the permit, the upper areas of the left and right forks consist of drops, therefore eliminating any access from the channel bottom. Roads would need to be constructed on the slope needlessly disturbing considerably more area than was damaged by the probable failure.

Utah Coal Program Guidelines for Sediment Control

The Directive Number Tech-003 of the Utah Coal Regulatory Program requires that "Utah coal mines design, construct, and maintain appropriate sediment controls using Best Technology Currently Available (BTCA) to: (1) prevent to the extent possible, additional contributions of sediment to streamflow or runoff outside the permit area, (2) meet the applicable effluent limits, and (3) minimize erosion, to the extent possible." As noted in Tech-003, this statement is meant to clarify the Division's position on Alternative Sediment Control.

The goal of the Utah Program is to control runoff and sediment from disturbed areas and not adversely impact downstream areas or undisturbed areas outside the permitted disturbed area. According to Tech-003, two classes of sediment control measures are acceptable as BTCA: 1) Sediment Ponds or other treatment facilities, and 2) Alternate sediment control measures (ASCM).

The regulatory basis for the Directive is found in the Utah Coal Rules R645-301-741 thru R645-301-742.126 and 742.240. These rules cover the General Requirements for sediment control to prevent additional contributions of sediment to streamflow, meet effluent limitations, and minimize erosion. The methods used for sediment control include retaining sediment within the disturbed area, diverting runoff away from the disturbed area, divert runoff using pipes, or other methods to reduce overland flow or trap sediment.

Under Section 5 of Tech-003, titled Procedures, paragraph A indicates that siltation structures are the preferred BTCA. However, it also alludes that if the structure is not a benefit to the overall protective measure for the site, then ASCM shall be utilized. PacifiCorp believes (as stated in the goals of the Directive) that the intent of the Utah Program concerning sediment control is to "control runoff and sediment from disturbed areas so that coal mining surface disturbances do not have an adverse impact on streamflow or on contiguous disturbed areas outside the permitted disturbed area."

PacifiCorp concludes that the existing sediment control design for the Cottonwood/Wilberg Mine lacks prudent engineering design and ignores advances in sediment control practices. Concentrating runoff in ditches on 1½:1 slopes carries too high of risk for failure. PacifiCorp believes that the collection ditches constructed parallel to the reclaimed main channels in the Right and Left fork of Grimes Wash have a high probability for failure and have the potential to damage the constructed main channels.

Several variations to the original design could be implemented for reclamation. Options are as follows:

1. Change nothing and keep the existing sediment control plan.

2. Remove the contour ditches from the slopes and regrade as proposed in the existing plan. Retain collection ditches and pond.

3. Remove contour ditches. Remove collection ditches. Implement an alternative sediment control strategy (pocking/mulching) for the slopes. Retain ponds.

4. Remove contour ditch. Remove collection ditches. Remove ponds. Implement an alternative sediment control strategy.

There are inherent risks associated with each option listed above.

Option 1 carries a very high degree of risk for failure of the ditches and channel and ignores advances in sediment control practices. There is no practical access for repair of any damage that may occur. Concentrated flows contain potentially high sediment load reaching off-site areas. If no failure occurs within the two year time period for pond retention and the Division allows removal of ponds, there is no practical access to remove the ditches on the slopes or next to the channel. Removal would require construction of roads on the reclaimed slopes to access the ditches which would cause additional disturbance of 5 to 10% of the total disturbed area. There is no allowance within the Utah Coal Regulations to redisturb an area without restarting the minimum responsibility period of 10 full years for attaining the vegetation success standards.

Repair of the ditches or channels is allowed as outlined in R645-301-357.360. However, disturbance for road building would almost certainly be in excess of allowable 3% disturbance (R645-301-357.361) for repair or reseeding after the first 2 years but prior to the end of the 6th year. Any area larger than 3% of the total disturbed would be considered augmentative and would restart the responsibility period time clock. R645-301-357.364 states that repair of rills and gullies which result from a deficient surface water control plan as defined by the reoccurrence of rill and gullies, would be considered augmentative and would restart the responsibility period time clock.

Therefore, PacifiCorp concludes that by allowing the construction of contour and collection ditches on the reclaimed slopes for surface water control, it would risk a prolonged responsibility period resulting in higher reclamation costs for repair and monitoring.

Option 2, again carries the potential failure of collection ditches and reclaimed channel. Without providing a superior erosion and sediment control technique to control overland flows, flows could concentrate, erode the slopes, and transport potentially high sediment load to off-site areas. If no failure occurs within the two year time period for pond retention and the Division allows removal of ponds, access to remove the collection ditches raises the same concerns as outlined above in Option 1.

As in Option 1, if rill and gullies occur on the slopes to a point where repair is needed, PacifiCorp has concerns with complying with the requirements of R645-301-357.360 thru R645-301-357.365 and prolonging the responsibility period and increasing reclamation costs.

Implementing an alternative sediment control strategy (pocking/mulching) as outlined in Option 3 would retain water and sediment on the slopes. However, without bypassing the undisturbed runoff from upland areas, the ponds would be greatly undersized to handle the runoff for the entire Grimes Wash drainage area. The non-compliant ponds would be too small to provide adequate treatment and adversely impact the streamflow to areas outside the permit area.

When evaluating the opportunity for Option 4 (see supporting information below), PacifiCorp considered implementing an alternative sediment control strategy (pocking/mulching) for better sediment control of the site. This proven strategy would retain water and sediment on the slopes. Water made available on the slopes would enhance vegetation growth. Modeling using RUSLE2 demonstrates that soil loss from the disturbed area is approximately equal to or less than soil loss from the undisturbed area. This option indicates the lowest risk for causing off-site impacts in regards to sediment control. The sediment and erosion technology used in Option 4 has a 15 year proven track record for success in many sites[1] around the area

Option 4 proves to be the “best fit” for the Cottonwood/Wilberg mine site involving the least amount of risk. However, to facilitate in permitting and compliance of the Utah Coal Regulations, the Division must issue an exemption to R645-301-763.200 to allow BTCA for alternate sediment control measures. The Division does have the discretion under Tech-003 to determine the best technology currently available on a case by case basis considering the techniques used and the data provided in support of the technique to control sediment and erosion.

Supporting Information for Option 4

As an alternative (and a present day industry standard for sediment and erosion control) to constructing contour and collection ditches, PacifiCorp and others[1] have had excellent success utilizing deep gouging (pocking) techniques for sediment control. Using this technique for controlling sediment, models have shown that the disturbed or reclaimed areas produce a lower sediment load compared to that of the undisturbed or background areas. Modeling data utilizing RUSLE2 is shown in the table below for the areas of the Cottonwood/Wilberg Mine. This data shows that sedimentation within the reclaimed disturbed areas is controlled through deep gouging, mulching, and tackifying practices and these areas produce similar or lower amounts of sediment than the surrounding undisturbed areas.

The existing sediment ponds at the Cottonwood/Wilberg Mine are situated in the narrow canyon of the Grimes Wash at the lower extents of the disturbance. The ponds take up nearly the entire width of the canyon. Because of the failure concerns mentioned above, PacifiCorp proposes to remove the sediment ponds as part of the final reclamation activity, but prior to the two (2) year requirement as dictated by R645-301-763.100. This proposal is similar to the highly successful reclamation project of the Des Bee Dove Mine. PacifiCorp has revised the Cottonwood/Wilberg reclamation plan as outlined below.

Sediment Control Measures Utilizing Best Technology Currently Available (BTCA)

Sediment transport will be controlled as required by R645-301-552.100 and R645-301-742 of the Utah Coal Regs. Best Technology Currently Available (BTCA) measures will utilize deep gouging (pocking) techniques which influences water retention and enhances plant growth. These protective measures prevent additional contributions of sediment to the streamflow or runoff outside the permit area and will be used as a permanent control measure in lieu of siltation structures throughout the responsibility period.

Backfilling and grading shall be conducted starting in the upper reaches of the disturbed areas and then working down canyon. After each section is backfilled and graded, the area will be covered with a hay mulch at a rate of 2000 lbs/acre. Once the mulch is evenly spread over the surface, deep gouging (pocking) techniques for sediment control will be used. These techniques incorporate the hay in the planting medium stabilizing the top depth of the soil surface by utilizing a track-hoe or similar machine to roughen the disturbed area in a random and discontinuous fashion using mechanical means.

[1]Des Bee Dove Mine, Star Point Mine (Lion's Deck Mine #1), White Oak Mine (AML Project), Horse Canyon Mine, Sunnyside Mine (AML Project), Willow Creek Mine (Schoolhouse Canyon), and others. Personal communication with DOGM staff and personal witness to sites.

Pockmarks created are approximately 3.0' feet in diameter and 1.5' feet deep. The pockmarks are designed to capture or trap precipitation, promoting infiltration and eliminating runoff. Gouging serves to control erosion through water retention, thus enhancing vegetation growth.

Once pocking is completed in an area, the area will be seeded using the approved seed mix and sprayed with a wood-fiber mulch at a rate of 2000 lbs/acre. A tackifier will be added to the hydromulch at a rate of 500 lbs/acre to stabilize the soil surface to minimize erosion.

Because of the water retaining capabilities of deep gouging techniques, contributions of sediment beyond background levels are not projected to contribute suspended solids and sediment to ephemeral drainages.

During reclamation, drainage that occurs in the disturbed area from a storm event will also be treated. When disturbed culverts are removed, the remaining end of the culvert will be left opened. A berm will be constructed to route runoff towards the culvert inlet. A sediment trap will be placed in front of the culvert inlet so that runoff will be treated before entering the disturbed culvert. This treatment will trap sediment and keep most of the soil from unprotected slopes out of the pond and stream. Runoff will be treated again by the sediment pond. As reclamation of the slopes and channels reach the location of the ponds, the ponds will be removed starting with the North Pond and finishing with the South Pond. Once these ponds are removed, sediment control will be maintained by the deep gouging, mulching and tackifying techniques.

The intent of the sediment control measures proposed is to prevent, to the extent possible, additional contributions of sediment to the ephemeral channel outside of the disturbed area. To estimate the amount of sediment that might reach the receiving channel outside the permit area, the Revised Universal Soil Loss Equation (RUSLE) was used to model sediment loss from the reclaimed area. The estimate is then compared to an area that is undisturbed. In this case, the pinyon/juniper area on the west side of the canyon was used. This comparison will help determine the effectiveness of the BTCA for sediment control.

RUSLE2 Results* for Soil Loss on Slopes

Profile	Length Slope (ft)	Steepness (%)	Soil Loss (t/ac/yr)
LS-1 (disturbed)	273	51	3.0
LS-2 (disturbed)	363	34	1.2
LS-3 (undisturbed)	150	65	2.7

*The management practices used for calculating soil loss were chosen to best mimic the pocking operations, vegetation types, and cover of the sediment and erosion control areas using the data provided in the RUSLE2 program.

The above table shows that the soil loss for the modeled disturbed area is approximately equal to or less than the modeled undisturbed area. More importantly, the table demonstrates that the BTCA meets the criteria of the Utah Coal Program for preventing to the extent possible, additional contributions of sediment to streamflow or runoff outside the permit area, meeting the applicable effluent limits, and minimizing erosion.

Conclusion

This discussion has demonstrated that the existing reclamation plan for the Cottonwood/Wilberg Mine lacks a prudent engineering design and relies on outdated technologies for sediment control. The design carries a high probability for failure and potentially contributing large sediment loads to the streamflow outside the permit area, potentially requires re-disturbance of reclaimed areas for repair, increases reclamation costs, and potentially prolongs the responsibility period time clock.

The goal of the Utah Program is to control runoff and sediment from disturbed areas and not adversely impact downstream areas or undisturbed areas outside the permitted disturbed area. The Utah Program, through Directive Number Tech-003, accepts not only Sediment Ponds or other treatment facilities for BTCA, but also accepts alternate sediment control measures that must: 1) prevent additional contributions of sediment to streamflow, 2) meet effluent limitations, and 3) minimize erosion. The Division is given discretion, through SMCRA, to determine the best technology currently available on a case by case basis considering economics, devices used, and techniques developed as authorized by the Act and the R645 Rules.

PacifiCorp believes that it should not be held to a reclamation design developed 35 years ago that it considers to have a high risk for failure as well as being difficult and costly to maintain. The design is outdated and lacks prudent engineering design.

PacifiCorp has proposed a technique that has been proven to prevent additional contributions of sediment to streamflow, retains water on the slope enhancing plant growth, is technically sound for minimizing erosion, and has been successfully utilized throughout this region as an

accepted practice. For these reasons, PacifiCorp requests an exemption from R645-301-763.100 and be allowed to use BTCA as described herein for designing and implementing an appropriate reclamation plan for the Cottonwood/Wilberg Mine.

RECLAMATION PLAN

Structure Removal

Once mining has ceased, the surface facilities will be dismantled and removed from the permit area. Starting at the mine portals, all belt lines, crushing and screening systems, electrical systems, truck loadouts, surface buildings and fan installations will be torn down and hauled from the permit area.

The concrete silo will be torn down, broken up and buried against the east highway cut in the lower parking lot. All other concrete foundations that would be above final grade will be removed and buried with the silo material or buried in other areas requiring fill. Refer to Items 1-A ~~thru 3-A~~ and 2-A in Appendix C for demolition of the structures at the Cottonwood/Wilberg Mine.

During construction of the facility, it was found necessary to install shotcrete on certain areas of the rock outcrop for safety reasons. In some cases it was necessary to secure loose boulders of the cliff face with chain link fencing prior to coating with shotcrete. During reclamation, attempts will be made to safely remove the shotcrete from the cliff faces. If it cannot be done safely, the shotcrete will remain. Leaving the shotcrete in place will not affect the post mining land use described as grazing, wildlife, and recreation.

Portal Sealing

Final stages of mining (second mining), as pillars are extracted near the portal entrances inside, office and warehouse facilities will be dismantled and portal sealing will begin. Wilberg's portal entries are all up-dip of the extracted seam and require no drains or special hydrological containment seals (see Protection of the Hydrological Balance section). Seals are proposed as shown on Figure 1 (refer to Part 4 - Figures).

The Cottonwood/Wilberg portals and breakouts will be sealed before backfilling and grading is started.

Due to the natural dip of the strata, the Trail Mountain Access (TMA) portal (final reclamation in November 2014) is the lowest within the existing Cottonwood/Wilberg mine permit area. Groundwater intercepted during mining activities will flow toward the TMA portal. To prepare for the permanent discharge, PacifiCorp installed a series of three sediment traps located 100 feet apart within the mine to settle out particles prior to discharge. A solid block seal (built to MSHA requirements) was constructed 25 feet inby the portal entrance. A French drain system was installed with 6" perforated PVC pipe behind the seal. A secondary decant pipe was installed at the bottom of the seal along with a backup decant line installed 2 feet from the roof. Each line was fitted with a shut-off valve. Granite drain rock of 2-4 inch sizing was placed over the perforated drain line. Pea sized granite gravel was placed over the drain rock as a filtering system. The thickness of the filtering system is approximately 4 feet thick.

Mine water is discharged through the seal into a 6 inch buried PVC that parallels the Emery County Road 506 for approximately 200 feet below the portal. The pipe drops into a 36 inch bypass culvert which discharges into the Cottonwood Canyon Creek. Since 2001 the discharge of mine water has averaged approximately 21 gpm. This discharge is considered permanent for post-mining land use. PacifiCorp currently possesses a UPDES permit (#UT0022896-001) for this site and monitors the quality and quantity on a monthly basis.

~~The total remaining portals or breakouts to be sealed is 15~~ (refer to Part 4: Appendix A - High Wall Survey).

Cottonwood/Wilberg Mines List of Portals (refer to Highwall Survey: Part 4 Appendix A)*		
Location (Number of Portals)	**Development Date**	**Status**
Grimes Wash		
Wilberg Mine Fan (1)	Prior to 1973	~~Active Mine Fan~~ Sealed May 2001
Wilberg Fan Portal (1)	1978	Sealed with cement plug in 1985
Wilberg Belt Portal (1)	Prior to 1973	~~Active~~ Sealed May 2001
Wilberg Intake Portal (1)	Prior to 1973	~~Active~~ Sealed May 2001
Underground Offices (4)	1975-1976	Active (not a portal)
Shop Portals (1)	Prior to1973	Active (not a portal)
Old Portals behind water tank (2)	Prior to 1973	~~Active~~ Sealed May 2001
Wilberg Intake Portals (3)	May 1977	Sealed with cement plug in 1985
Mine Access to Cottonwood (2)	1982	~~Active~~ Sealed May 2001
Cottonwood Intake Portals (2)	1985	~~Active~~ Sealed May 2001
Cottonwood Fan Access Tunnel (2)	1982	~~Active~~ Sealed May 2001
Cottonwood Fan Portal (1)	1984	~~Active~~ Sealed May 2001
Cottonwood Belt Portal (1)	1984	~~Active~~ Sealed May 2001
Cottonwood Canyon		
Cottonwood Diesel Roadway (1)	1995	~~Active~~ Sealed May 2001, Reclaimed Nov 2014
Cottonwood Belt Portal (1)	1995	~~Active~~ Sealed May 2001, Reclaimed Nov 2014
Miller Canyon (3) (Reclaimed 6/1999)	1981	Reclaimed in 1999 Phase III Bond Release Accepted on October 4, 2010
Channnel Canyon Intakes (2) (Reclaimed 8/1997)	1989	Reclaimed in 1997 Phase III Bond Release Accepted March 1998

* Refer to Item 2-A in Appendix C.

Asphalt Removal

The asphalt and gravel road base from the service road, truck turn around, upper parking lot, portal bench, south Wilberg portals, and south Wilberg storage pad will be removed and disposed of off-site. Refer to Appendix C, Item ~~3-A~~ 1-DD for quantities removed.

Channel Restoration

On completion of mining and beginning reclamation, buried diversion piping in the right and left forks of Grimes Wash ~~to just below the confluence~~, will be excavated and removed.

Reclamation concept for hydrological concerns will involve removing the buried diversion culverts and returning the channel to its natural configuration; bedrock channel with rifts, pools, and drops. Large boulders will be placed to minic the ephemeral characteristics as found in the native areas above and below the disturbed area. Transition areas shall include a riprap channel designed and built to withstand the expected runoff water flows. ~~a two-stage approach. Stage One will see reclamation remove all the surface facilities, buried diversion, backfill and grading and near total restoration of the drainage stream beds. During Stage One of the two sedimentation basins will remain with diversion of undisturbed surface waters. Ponds will function as they have during mining.~~

~~Upon acceptance by the authority of revegetation of the reclaimed area following the extended bonding period, the two sedimentation ponds and buried diversion piping will be removed and final backfilling and grading, channel restoration, duel culverting under the access road, and revegetation of this area will be completed.~~

~~Original engineering drawings show present buried diversions were placed generally along the existing stream bed. Both left and right forks will be excavated to the original bedrock channel insuring original grade and location.~~

~~Restoration concept will be to duplicate stream bed gradient, meandering location, together with drops, riffles and pools reducing excessive velocities during heavy runoffs.~~ Channel design is based on passing safely a 100 year/24 hour storm event with 3.5 inches of precipitation as compared to the federal and state minimum requirements of 100 year/6 hour storm event. Refer to the Hydrologic calculations for final reclamation in Appendix XV.

The drainage pattern consists of the main branch of Grimes Wash (left fork) and the Right Fork. Both drainages are extremely steep and have scoured the channel to bedrock. At their confluence the grade flattens rapidly allowing channels to be regraded to a moderate slope.

A rip-rapped channel design to carry the peak flows calculated for both east and west watersheds will be ~~emplaced~~ constructed as shown on Map 4-1. Although Map 4-1 (and others) show a continuous riprapped constructed channel, the channel will only be constructed in those areas where the bedrock is not located (i.e. transition areas). Watershed characteristics are depicted in Table 1 (refer to Part 4 - Tables). The curve number derivation is shown in Table 2 (refer to Part 4 - Tables), and height, flow and velocity are summarized for various channel slopes in Appendix XV. Hydrological procedures and calculations are described in the Appendix. Watersheds and subdrainages are depicted on the drainage map in Appendix XV.

In the areas where bedrock is located and fill extends to the base of the channel, ~~channel~~ reconstruction will consist of a trapezoidal design using bedrock as a base with both filter and rip-rap sides whose slope shall not be steeper than 50 percent (2H:1V), refer to Part 4: Figure 2 and the channel design in Appendix XV.

Where the historic flows have carved a channel in the bedrock, no riprap shall be used in the side slopes. Where the channel consists of fill in the base and side slopes, both filter and riprap channel construction shall be used. The following describes the specifications of the filter and riprap channel construction.

Filter and rip-rap gradation shall consist of aggregate materials with weight and size approximating the following ratios:

d_{15} Filter	d_{15} Rip-rap
d_{85} Base	d_{85} Filter

Granular size gravel smaller than 3" and larger than #4 sieve. Sand smaller than #4 and larger than #200.

Rip-rap shall be composed of graded mixtures down to the one inch size particle such that 50 percent of the mixture by weight shall be larger than the D_{50} size. This mixture shall contain sufficient gradation to fill the void when placed. The diameter of the largest stone shall be 1.25 x D_{50} and the rip-rap thickness shall not be less than 1.5 times the largest stone diameter. Rip-rap D_{50} maximum shall not exceed one-third the bottom width of the channel bottom.

RIP-RAP GRADATION

	Steep Slopes	Mild Slopes
D_{Max} / D_{50}	1.25	2
D_{50} / D_{10-20}	2-3	2-3

Determination of the mean rip-rap diameter (D_{50}) was based on maximum shear stress using the methodology presented by Anderson, et al (1970) as follows:

$$T_{max} = 5D_{50} \quad (1)$$

$$T_0 = c\ 62.4\ d\ S \quad (2)$$

where,

T_{max} =	the maximum shear stress than the rip-rap can sustain in pounds/sq. ft.
T_0 (T 0) =	the actual shear stress on the channel in pounds/sq. ft.
D_{50} =	the mean rip-rap diameter in feet
D =	the flow depth in feet
S =	the channel slope (ft/ft)
62.4 =	the unit weight of water in pounds/cu.ft.
C =	the channel shape coefficient (see following table)

Channel shape coefficients for sides of trapezoidal shaped channel with 2:1 side slopes:

Bottom width/depth	C
1.0	1.3
2.2	1.2
4.3	1.1
6.3	1.0

Two constraints associated with the use of equations 1 and 2 are:

1. T_{max} should be less than 15 pounds/sq.ft.
2. the maximum rip-rap size, D_{max}, should not exceed approximately 1/3 of the channel width.

Both constraints limit the mean rip-rap diameter to three feet for the channel conditions at the Wilberg site (assuming a 10-foot bottom width for the channel). By combining equations 1 and 2 with the Manning equation and assuming one dimensional flow, the following equation is obtained:

$$D_{50} = 9.8\ C\ (nq)^{0.6}\ S^{0.7} \qquad (3)$$

where the additional variables are:

n = Manning's roughness coefficient

q = discharge per unit width of channel

It can be seen from equation 3 that with the rip-rap diameter fixed and the roughness and flow conditions established, the slope of the channel is the only variable that can be adjusted to meet rip-rap stability requirements.

Therefore, equation 3 was used to establish criteria for maximum slope conditions along the channel reach, assuming a D_{50} of 3 feet. The difference between the actual slope conditions and the maximum allowable slope will be the fall that will have to be incorporated into drop structures along the channel profile. The fall will take place over natural ledges along the channel profile which will be excavated in bedrock during channel restoration.

Channel slope data, channel hydraulic data, and channel profiles for the Left Fork, Right Fork and Main channels are presented on Maps 4-2.

Sidewall construction of the rip-rapped channel shall incorporate a 9-inch granular filter on which a 4.50 foot thick rip-rap protective covering will be placed. Construction and placement of the rock shall, where possible, enhance pooling and energy disposition.

Section Reference

Anderson, A.G., A.S. Paintal, and J. T. Davenport. 1970.
Tentative design procedure for rip-rap lined channels. University of Minnesota, National Cooperative Highway Research Program Report 108. Highway Research Board.

Sedimentation Control – Alternative Sediment Control Measures

The mine contracted the development of a reclamation plan for the site in the 1980's. In this plan, sediment control was provided by the use of contour and collection ditches. Because of the erosional characteristics of the available soil materials combined with bedrock expressions in the channel with exposed drops, it is the conclusion of PacifiCorp that contour and collection ditches have a high probability for failure as caused by concentrating overland flow which allows for head cutting in the collection ditches and/or breaching of the contour ditches. Because of the potential drops of the natural bedrock, equipment access to repair these failed areas will likely be impossible. ~~Sediment control is provided in several ways. First, a series of small contour ditches spaced approximately 40 feet apart. Each ditch will contain approximately one cubic foot of water per lineal foot of ditch. This provides not only water retention to lesson runoff and reduced sediment loading but enhances soil moisture for plants adjacent to the ditches. Second, the entire revegetation area is covered with a two inch blanket of mulch and anchored with a vexar netting. And last, two sedimentation ponds connected by a collection system which parallels the major drainage channels.~~

~~Contour Ditches~~

~~This system of parallel ditches with provisions for excess overflow into collection ditches will provide a major restraint of runoff water during initial revegetation of reclamation. Hydrological, each ditch should retain about 30% of the calculated runoff:~~

~~40 x .824 ÷ 12 = 2.7 cubic feet/foot~~

~~Stability of each ditch will be given by compacting the surface before the ditches are constructed.~~ As an alternative (and a present day industry standard for sediment and erosion control) to constructing contour and collection ditches, PacifiCorp and others have had excellent success

utilizing deep gouging techniques for sediment control. Using this technique for controlling sediment, models have shown that the disturbed or reclaimed areas produce a reduced sediment load than that of the undisturbed or background areas. Modeling data utilizing RUSLE is shown in the Tables Section for the areas of the Cottonwood/Wilberg Mine. This data shows that sedimentation within the disturbed area is controlled through deep gouging, mulching, and tackifying practices and produces similar or less amounts of sediment as the undisturbed areas.

The existing sediment ponds at the Cottonwood/Wilberg Mine are situated in the narrow canyon of the Grimes Wash at the lower portions of the disturbance. The ponds take up nearly the entire width of the canyon. Because of the failure concerns mentioned above, PacifiCorp proposes to remove the sediment ponds as part of the final reclamation activity, but prior to the two (2) years after the last augmented as dictated by R645-301-763.100.

Justification for removing the ponds prior to the two (2) year requirement is fully detailed in the following section.

Sediment Control Measures Utilizing Best Technology Currently Available (BTCA)

Sediment transport will be controlled as required by R645-301-552.100 and R645-301-742 of the Utah Coal Regs. Best Technology Currently Available (BTCA) measures will utilize deep gouging (pocking) techniques which encourges water retention and enhances plant growth. These protective measures to prevent additional contributions of sediment to the streamflow or runoff outside the permit area will be used as a permanent control measure in lieu of siltation structures throughout the responsibility period.

Backfilling and grading shall be conducted starting in the upper reaches of the disturbed areas and then working down canyon. After each section is backfilled and graded, the area will be covered with a hay mulch at a rate of 2000 lbs/acre. Once the mulch is evenly spread over the surface, deep gouging (pocking) techniques for sediment control will be used. These techniques require a track-hoe or similar machine to roughen the disturbed area in a random and discontinuous fashion using its bucket. Pockmarks created are approximately 3.0' feet in

diameter and 1.5' feet deep. The pockmarks are designed to capture and trap precipitation, influencing infiltration. Gouging serves to control erosion through water retention, thus enhancing vegetation growth.

Once pocking is completed in an area, the area will be seeded (refer to Final Revegetation Procedures below) and sprayed with a wood-fiber mulch at a rate of 2000 lbs/acre. A tackifier will be added to the hydromulch at a rate of 500 lbs/acre to stabilize the soil surface to minimize erosion.

Because of the water retaining capabilities of deep gouging techniques, contributions of sediment beyond background levels are not expected to contribute suspended solids and sediment to receiving streams.

Drainage that occurs in the disturbed area from a storm event will also be treated. When disturbed area culverts are removed, the remaining end of the culvert will be left opened. A berm will be constructed to route runoff towards the culvert inlet. A sediment trap will be placed in front of the culvert inlet so that runoff will be treated before entering the disturbed culvert. This treatment will keep most of the soil from unprotected slopes out of the pond. Runoff will be treated again as it enters the sediment pond. As reclamation of the slopes and channels reach the location of the ponds, the ponds will be removed starting with the North Pond and finishing with the South Pond. Once these ponds are removed, sediment control shall be maintained by the deep gouging, mulching and tackifying techniques (mulching and tackifying are described in the section titled Revegetation).

The intent of the sediment control measures used are to prevent, to the extent possible, additional contributions of sediment to the ephemeral channel outside of the disturbed area. To estimate the amount of sediment that might reach the receiving channel outside the permit area, the Revised Universal Soil Loss Equation (RUSLE) was used to model sediment loss from the reclaimed area. The estimate is then compared to an area that is undisturbed. In this case, the pinyon/juniper area on the west side of the canyon was used. This comparison will help

determine the effectiveness of the BTCA for sediment control. Refer to the Tables Tab for RUSLE data summary.

BACKFILLING AND GRADING

In general, the backfilling and grading of the disturbed areas will consist of removing the fill pads and backfilling the cut areas. ~~This will occur in two stages. Stage I (refer to Appendix C for quantities cut, regraded and/or moved - Items 3-B thru 3-X) reclamation will recontour the disturbed areas of the Right and Left forks of the Grimes Wash.~~ The work will start in the upper areas of the disturbed area and systematically work downslope to the entrance gate. There is approximately 176,455 bank cubic yards (BCY) of material to be cut and approximately ~~143,879~~ 155,830 ~~bank cubic yards (~~BCY~~)~~ of material will be backfilled and graded within ~~these~~ the disturbed areas of the Cottonwood/Wilberg Mine. ~~Approximately 59,543 BCY will be cut from between stations 5+00 and 11+00. This material will be moved to the remaining stations in the Left and Right forks and used as fill material. The remaining 84,336 BCY of material will be backfilled and graded within the stations to recontour the disturbed areas as illustrated on~~ There is a difference of 12% between the cut and fill estimates, leaving approximately 20,625 BCY of extra material. This material will be used in areas where more fill could enhance the slope, or will be blended into the reclaimed slopes. See Plate 4-1, ~~map CM-10500-WB and~~ 4-2, and ~~Plate~~ 4-3, ~~Map CM-10484-WB~~ in Volume 6 for plan and cross-sectional view of the proposed reclamation contours. ~~An access road will remain in the Right Fork of the Grimes Wash as part of the Stage I reclamation~~. The ponds shall be the last major structures to be removed during backfilling and grading operations. Pond removal was previously described. The access road will be completely removed and recontoured to the entrance gate.

~~During Stage II of final reclamation (refer to Appendix C for quantities cut, regraded and/or moved - Items 3-Y thru 3-JJ), the access road and the north and south sediment ponds will be removed (refer to Plate 4-2, map CM-10378-WB, 1 of 3 in Volume 6). Approximately 57,368 BCY of material will be backfilled and graded within these remaining areas to complete final reclamation. Approximately 15,721 BCY will be cut from between stations 16+00 and 19+00. This material will be moved to the remaining stations in the Right Fork and the main channel below the confluence of the Right and Left forks. Approximately 41,647 BCY of material will be~~

~~backfilled and graded within the stations to recontour the remaining disturbed areas as illustrated on Plate 4-2, map CM-10378-WB, 1of-2 and Plate 4-3, map CM-10484-WB in Volume 6. The referenced Plate 4-3 illustrates cross-sections of the area to be reclaimed.~~

Waste Rock Storage Facilities

Old Waste Site: Located 1.5 miles south of the Cottonwood/Wilberg Mine, this 48.62 acre site was originally designed as an open storage and truck loadout for the Cottonwood/Wilberg Mine. The Right-of-Way grant was issued by the Bureau of Land Management in 1977 but subsequent developments, specifically a concrete storage silo for coal storage constructed at the mine site, changed the need for this site. A modification was submitted to use this land for underground development waste storage in connection with underground development ongoing in the Cottonwood/Wilberg Mine. The Right-of-Way UTU-37642 has been modified to accommodate coal bed methane degasification conducted by Texaco Inc. Listed below is a list the acreage descriptions of the Right-of-Way including original grant, modifications and disturbance associated with the facility:

BLM Right-of-Way UTU-37642

Original Grant	48.62 acres
1997 Relinquishment (Texaco Well 35-14)	1.08 acres
1999 Relinquishment (Texaco Well 34-80)	12.98 acres
TOTAL RIGHT-OF-WAY UTU-37642	34.56 acres
Disturbed Area	~~0.00~~ 1.86 acres
Reclaimed Area (Phase III Released July 2009)	13.81 acres

Approximately 13.81 acres of the old waste rock site has been reclaimed. Material to cover the waste rock was taken from the perimeter berms. Phase 1 bond release was approved on July 22, 1999. Phase III bond release was approved July 22, 2009.

Highwall Elimination

Final reclamation of highwalls at the Cottonwood/Wilberg mines is accomplished in three phases; demolition, earthwork, and revegetation. These phases follow strict requirements set forth by the Utah Coal Rules R645-301-100 through 800. Highwalls at the Cottonwood/Wilberg

mines were inventoried by Office of Surface Mining and the Division of Oil, Gas and Mining in 1997. Eighteen (18) areas of concern were identified and are listed in Part 4 Appendix A. Eight (8) of the areas considered highwalls were constructed prior to the ruling (May 3, 1978) of the Surface Mining Control and Reclamation Act (SMCRA). Seven (7) highwall portals were constructed after that date. Three (3) of the sites have no associated highwalls. Sites constructed prior to May 3, 1978 need only to eliminate highwalls to the extent practical using all reasonably available spoil. All post SMCRA sites are required to completely eliminate highwalls. Part 4, Appendix B exhibits the extent of backfill that will be used to eliminate as practical or eliminate completely these highwalls. This is shown in a photo essay of each of these portals. All highwalls at the Cottonwood/Wilberg mines will be eliminated concurrently with final reclamation activities. Detailed scheduling and cost estimations are located in Part 4 Appendix C

Acid and Toxic Material Handling

All acid and toxic forming material will be buried with at least four feet of material during the backfilling and grading cycle. When feasible, this will be accomplished within 30 days after the material is first exposed. Temporary storage of the material, beyond 30 days must be approved by the Division.

Rip-rap Installation and Drainage Structure Removal

During the backfilling and grading cycle, rocks suitable for rip-rap will be sorted from the excavation and placed in the restructured drainage channel. The amount of rip-rap material is approximately 7% of the total. The majority of the material was originally taken from rock cuts; therefore, sufficient material for rip-rap is available.

As the backfilling and grading progresses and the drainage structures are exposed they will be removed and disposed of off the permit area.

Temporary Sedimentation Control Facilities

~~To aid in erosion control on the large fill slopes, small ridges or contours will be made on 10 foot intervals, sloped at 2% toward the rip-rap channel.~~

All drop drains, culvert inlets, etc. that divert disturbed runoff to the sedimentation ponds which are located below areas where earthwork activities are being performed, shall be left in place so as to protect off-site areas from sedimentation. The use of straw bales, wattles, siltation fence, or other appropriate sediment control device may be necessary to temporarily control sedimentation.

Once earthwork activities are completed in an area, permanent sediment control will be installed. Permanent sediment control includes incorporating hay into the topsoil, deep gouging, seeding, and finally, applying hydromulch and tackifier to the surface.

Soil Stabilization of Rills and Gullies

Rills and gullies, which develop in areas that have been regraded and topsoiled, which disrupt the approved postmining land use, or reestablishment of the vegetative cover, or cause or contribute to violation of water quality standards for receiving streams, will be filled, regraded, or otherwise stabilized; topsoil will be replaced; and the areas will be reseeded or replanted. ~~Based on our present maintenance program for fill slopes, we estimate 32 hours per year of work will be needed.~~

Sediment Control Structure Removal

Once the bonding period is complete and revegetation is satisfactory, ~~the~~ all sediment ~~ponds/basins at Cottonwood/Wilberg will be backfilled and graded. Material in the embankments will be used as backfill~~ control structures shall be removed. Sediment control structures include, but are not limited to, silt fences, sediment traps, check dams, straw logs, etc. Once the structure is removed, the area, if necessary, will be regraded and reseeded with the appropriate seed mix.

Final Reclamation Slope Stability

The final contours and slopes will be reconstructed to approximate original contour. No reconstruction slopes are greater than 1.5H: 1V.

Cottonwood/Wilberg Facilities Area

Slope stability analyses were performed by Johansen and Tuttle Engineering in 1989 (see Appendix IV). The following is a summary of the results of these.

Maximum Height of Fill (H) = 60'
C = 0
γ = 120 pcf
Slope = 1.5H:1V
$\emptyset = 40^{o}$ (min) SF = 1.3

Roberts & Schaefer specifications for Class C fills will be used.
(See information in Part 3 - Structural Stability)

Plan for Grading Along the Contour

A final grading, preparation of overburden before replacement of topsoil, and placement of topsoil, shall be done along the contour to minimize subsequent erosion and instability. If such grading, preparation, or placement along the contour is hazardous to equipment operators, then grading, preparation, or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation, or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

Cessation of Operations-Temporary

PacifiCorp commits that before temporary cessation of mining and reclamation operations for a period of thirty (30) days or more, or as soon as it is known that a temporary cessation will extend beyond thirty (30) days, a Notice of Intention to Cease or Abandon Operations will be submitted to the Division. This notice shall include a statement of the exact number of surface acres and the horizontal and vertical extent of sub-surface strata which have been in the permit area prior to cessation or abandonment, the extent and kind of reclamation of surface area which will have been accomplished, and identification of backfilling, regrading, revegetation,

environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

REVEGETATION

~~Interim Stabilization and Vegetation Plan~~

~~There are five major fills at the Cottonwood/Wilberg Mine with bare open slopes generally with a south or southeast aspect. With the proposed reclamation plan these fills would provide the soil material for the final contouring and grading. Plate 4-3 (map CM-10484-WB) shows the location of substitute topsoil to be used for final reclamation. Because no topsoil was stockpiled and the native soils on these steep slopes provide very little topsoil material, these materials will need to become the planting medium. An off-site source is impractical. The fill material was tested in 1980, 1983, and again in 2001 for its physical and chemical properties. Refer to Appendix D for the results of the 2001 soil sampling program.~~

~~The soil material in the fills was originally derived from sandstone and shale parent materials. The soil material particles are mostly sand with textures from sandy loam to loamy sands (Refer to Part 4 Appendix D: Soil of the Wilberg Mine Site). The water holding capacity is low, typical of sandy soils.~~

~~They are calcareous soils as indicated by a pH of 7.5-8.5 and calcium carbonate equivalents above eight percent (Refer to Part 4 Appendix D: Soil of the Wilberg Mine Site). Salt content is too low for any harmful affects on plants. Potassium, phosphates and nitrogen, important plant nutrients, are very low indicating the need for fertilization to insure plant growth. The organic material is principally coal debris; the nitrogen percentage ratio is too low.~~

~~PacifiCorp shall restore areas impacted by subsidence caused by surface cracks or other subsidence features such as escarpments (not to include naturally occurring escarpments which are not a result of mining) which are of a size or nature that could, in the Division's determination, either injure or kill grazing livestock. Restoration shall include recontouring of the affected land surface including measures to prevent rilling, and revegetation in accordance with the approved permanent revegetation plan in the PAP. Restoration shall be undertaken after~~

annual subsidence survey data indicate that the surface has stabilized but in all cases restoration and revegetation shall be completed prior to bond release.

PacifiCorp shall compensate surface owners, except for land owned by PacifiCorp, for lands which cannot be safely grazed due to hazards caused by surface effects of subsidence, with land (in close proximity) of comparable size and grazing capacity to be used for grazing until restoration of the damaged land is achieved.

PacifiCorp shall compensate, at a fair market value, owners of livestock which are injured or killed as a direct result of surface hazards caused by subsidence.

Interim Revegetation (Prior to 1989)

Fill Slopes

The fill slopes at the upper equipment yard, upper parking lot, silo area, sedimentation ponds and roadways require interim stabilization.

The interim revegetation will provide information for developing a final revegetation plan by:

1. Developing the fill material as a substitute for topsoil by establishing a root system in the top layers along with organic material buildup and an environment suitable for micro-organism colonization.
2. Provide a detailed analysis of soil productivity with a series of tests over the life of the mine. This will be the basis for fertilization and soil handling at the final revegetation.

The upper 18" fill layer will become the "topsoil" by nature of its established plant community with micro-organisms, organic deposition, nutrient soil cycles, root zone, etc. At final reclamation this "topsoil" will be removed and stored during the redistribution of fill and grading. Then the temporarily stored "topsoil" will be placed on the newly graded surfaces 6-12 inches deep at random locations. This will increase the variability of the soil surface and serve as a catalyst for the final seedings and plantings.

The following interim seed mix was applied for soil stabilization in November of 1988. The areas (see 1988 Vegetation Monitoring Report) were hydroseeded and hydromulched using the

methods and fertilizer application rates described below. Interim revegetation monitoring will be conducted according to Division Guidelines as described on the following pages. The plant species were selected on the basis of their drought tolerance, alkalinity tolerance, vegetative growth form (cover soil surface), root systems (both taproot and spreading) and nitrogen fixation potential. Because the slope's aspects emulate the pinyon-juniper plant community on steep slopes most species selected were native to the reference area.

Common Name	Scientific Name	Lbs/Acre Equivalent PLS*
GRASSES		
Thickspike Wheatgrass	Agropyron dasystachyum	5
Western Wheatgrass	Agropyron smithii	6
Bluebunch Wheatgrass	Agropyron spicatum	3
Indian Ricegrass	Oryzopsis hymenoides	4
Squirreltail	Sitanion hystrix	3
Greatbasin Wildrye	Elymus cinereus	3
FORBS		
Pacific Aster	Aster chilensis	0.2
Northern Sweetvetch	Hedysarum boreale	1
Yellow Sweetclover	Melilotus officinalis	1
Alfalfa	Medicago sativa	1
Palmer Penstemon	Penstemon palmeri	1

Mechanics of Interim Revegetation (Prior to 1989)

Fill Slopes

The fill slopes are relatively small areas and because of the steepness, all of the seeding and planting work was done by hydroseeding. These slopes are severe planting sites and successful establishment of a vegetation cover will require close attention to details, some favorable growing conditions and repeated efforts. The criteria for interim revegetation success will be the establishment of at least 60% ground cover on the majority of the slope. This may require a three to seven year period.

Seeding (November 1988)

1. Slopes were cleaned of debris.
2. The seed mixture (described above) was applied by hydroseeder at the specified rates.
3. The hydromulch/tackifier/fertilizer mixture was applied at the following rates:

Sylva fiber hydromulch	2000 lbs/acre
Organic tackifier	120 lbs/acre
Ammonium nitrate	50 lbs/acre
Triple superphosphate	75 lbs/acre

Maintenance and Monitoring (refer to Part 4: Figure 3)

1. Signs will be placed around the planted slopes.
2. Weed control will not be undertaken unless it is determined necessary due to weed dominance and delayed rate of succession. Studies indicate that competition from weeds, including Salsola kali, is greatly reduced within three (3) years after revegetation. Preliminary on-site studies support published reports on this matter. All noxious weeds will be eradicated if they become established on the site.
3. Rodent damage, on revegetated areas, will be assessed and species specific control measures will be implemented as necessary.
4. A site visit will be scheduled at least once each year to check on fitness of the sites and progress of the plant growth. Observations will be made to assess potential problems including: erosion, animal impacts, unusual conditions (e.g. abnormal plant growth, areas of poor vegetation, etc.). Erosion will be repaired as discussed earlier (refer to Soil Stabilization of Rills and Gullies).
5. Ground cover will be assessed by ocular estimation using meter square quadrants. Interim revegetation will be determined successful when erosion is effectively controlled or ground cover is a least 60%.
6. An annual report that summarizes the year's work will be placed in the Company's files and forwarded to DOGM.
7. The soil materials on the fill slopes will be sampled at five year intervals to record productivity changes. Analysis of these samples will be placed in Part 4, Appendix D. Five samples at 0-6", 6"-12", & 12"-18" depths will be composites for each of the five fill slopes for analysis. Analyses will be performed in accordance with Division Guidelines and will include:

    1. Soil Texture
    2. pH
    3. Electrical Conductivity
    4. Sodium Adsorption Ratio
    5. Organic Carbon/Organic Matter
    6. Saturation Percentage
    7. Available water capacity (1/3 and 14 atmosphere water)
    8. Standard Fertility Test (for P and K analysis)
    9. Field estimate of percent Rock Fragments (by volume)

Additional sampling will be conducted, as needed to delineate any problem areas identified during initial sampling.

Interim Revegetation (1989-Future)

When necessary to effectively control erosion on disturbed areas, seeding and planting will take place as contemporaneously as practicable with the completion of backfilling and grading. The following seed mixture and planting will be applied at the specified rates. The species were recommended by the US Forest Service as being consistent with the management plan for the area. (Please refer to the Final Reclamation Plan, for justification of introduced species.)

Common Name	**Scientific Name**	**Lbs/Acre Equivalent PLS***
GRASSES		
Thickspike wheatgrass	Agropyron dasystachyum	2
Crested wheatgrass	Agropyron cristatum	1
Western wheatgrass	Agropyron smithii	3
Intermediate wheatgrass	Agropyron intermedium	3
Smooth brome grass	Bromus inermis	2
Indian ricegrass	Oryzopsis hymenoides	2
Needle-and-thread grass	Stipa comata	2
FORBS		
Pacific aster	Aster chilensis var. adscendens	0.2
Utah vetch	Hedysarum boreale	1
Yellow sweetclover	Melilotus officinalis	2
Alfalfa	Medicago sativa var. nomad	1.5
Eaton penstemon	Penstemon eatonii	0.4
	TOTAL	20.1

*Application rates result in approximately 80 seeds/ft^2.

SHRUBS		
Serviceberry	Amelanchier alnifolia	100
Fourwing saltbush	Atriplex canescens	50
Snowberry	Symphoricarpos oreophilus	100
Winterfat	Ceratoides lanata	50

Interim Revegetation Methods (1989-Future)

1. Seedbed Preparation

   Seeding will take place as contemporaneously as practicable following soil placement; therefore, the seedbed will be in a condition suitable for seed application. However, if a surface crust has developed it will be broken up by hand or mechanical tilling.

2. Seeding

~~The seed mixture will be hand broadcast with "hurricane spreaders" or applied by hydroseeder at the specified rate.~~

~~3. Fertilizer Application~~

~~The following fertilizer combination will be applied by hand broadcasting with "hurricane spreaders" or as a separate operation of hydroseeding:~~

~~Ammonium Nitrate~~	~~40 lbs/acre~~
~~Triple Superphosphate~~	~~35 lbs/acre~~

~~4. Seed Covering~~

~~Following hand broadcasting of the seed mixture and fertilizer, the sites will be hand or mechanically raked to cover the seeds.~~

~~5. Mulch Application~~

~~Following hand broadcasting and raking, the seeded areas will be covered with hay mulch (2 tons per acre) and netting or erosion control mulch blanket. The netting or blanket will be mechanically anchored per the manufacturers specifications.~~

~~Following hydroseeding, a hydromulch with tackifier will be applied at the rate of approximately 2000 lbs/acre.~~

~~The criteria for interim revegetation success will be the establishment of at least 60% ground cover, on the majority of the slope, which prevents or minimizes erosion. Maintenance and monitoring will be conducted as described earlier, refer to "Mechanics of Interim Revegetation".~~

Test Plots

Test plots were established on a fill slope at the mine site to test the final revegetation seed mix. The test plots were located in area W2-West (see Map 2-18). Slope and vegetation test plots exposure will be relatively constant throughout the area. Division approval was obtained prior to installation of the test plots. Observations indicate that moisture may be the primary factor affecting vegetation growth at the mine site. Therefore, the test plots were designed to test the final revegetation seed mix and plantings under various moisture conditions and mulch applications.

Because of the limited size of the slopes involved, the test plot sizes were limited. The plot layout and design is illustrated on Figure 4 (refer to Part 4: Figures). The design provides for eight (8) seeding, mulch, and irrigation combinations.

The test plot areas ~~will be~~ were divided into eight (8) individual plots, each one 20 feet by 20 feet. Each plot ~~will be~~ was separated from adjacent plots by a buffer area five (5) feet in width. Each plot ~~will be~~ was permanently staked and the entire test area ~~will be~~ was fenced. The test plots were installed in the fall of 1989 with seeding being done as late in the season as possible.

Prior to seeding, the test plot area was treated with Round-up herbicide per manufacturer's recommendations to remove existing vegetation. The soil surface was roughened using hand tools to prepare the seedbed.

The final revegetation seed mixture (detailed in the Final Vegetation Plan) was applied on all test plots as described in the Final Revegetation Plan. Following seeding, the following fertilizer mixture was applied, per DOGM recommendations:

Ammonium Nitrate	30-50 lbs/acre
Triple Phosphate	30-40 lbs/acre

The plots ~~will~~ were then ~~be~~ hand-raked to cover the seed and fertilizer.

Following seed and fertilizer application, the various mulch treatments were applied as indicated on Part 4: Figure 4. During hydromulch application, adjacent plots were covered to prevent contamination due to overspray or wind drift.

During the spring of 1991, containerized plants were planted as described in the Final Revegetation Methods.

Irrigation was applied during the first two (2) years (growing seasons) following seeding. After dicussion with the Division, irrigation was terminated after the second growing season. Irrigation began with the onset of spring and terminated at the first fall frost.

Irrigation was applied once per week unless determined otherwise based on soil moisture and plant vigor appearance. Soil moisture conditions were determined weekly by soil probing to a six (6) inch depth.

Irrigation was supplied from a water truck using a hand-held sprayer attached to a hose. The amount of water applied was quantified. Water was applied to the point of surface saturation or penetration to six (6) inches on the control plot. All irrigated plots were watered equally. Irrigation commenced in the early evening and be completed by sundown.

Maintenance, monitoring and sampling methods and schedules were as specified for Final Reclamation Sampling. A minimum of 15, 1/4 meter quadrants ~~will be~~ were evaluated per plot. Success standards ~~will be~~ were as specified for the reference area (refer to Part 2: Vegetation Information for the Wilberg Mine).

Final Revegetation Plan

The upper 18" of the slope material will be the planting medium, ~~as explained in the interim plan~~. Seeding will take place as contemporaneously with soil grading as is practicable in late fall or early spring. If considerable time (i.e. over one month) lapses between soil grading or seedbed preparation and seeding, the soil will be protected with a mulch cover, which will be mechanically or chemically anchored. A cover of hay mulch or hydromulch will be applied at a rate sufficient to provide 50 percent ground cover. ~~The plantings will be randomly spaced and clumped for wildlife enhancement. Grazing will be enhanced by establishment of grasses. Grazing will not be allowed on the land until after bond release.~~ Fencing will be installed if necessary to preclude grazing.

The final revegetation plan may be revised to incorporate the results of the ~~interim revegetation and~~ test plots. Revisions will be approved by the Division prior to implementation.

Topsoil Handling

As has been discussed previously, the upper 18" of fill material will be removed from the fill slopes and used as the planting medium (topsoil). It is estimated this will yield approximately 10,000 cubic yards of "substitute topsoil". Refer to Plate 4-3 (map CM-10484-WB) in Volume 6 for locations of substitute topsoil areas.

During backfilling and grading, all acid and toxic materials will be covered with at least four (4) feet of non-toxic material. When feasible, this will occur within 30 days after the material is first exposed. Temporary storage of the material, beyond 30 days must be approved by the Division.

Following the backfilling and grading, the surface of the backfilled material will be in an uncompacted rough condition. If areas develop where the surface is not in such condition, the material will be ripped and roughened using track-hoes, dozers and/or hand tools to eliminate slippage surfaces and promote root penetration. Topsoil material will be redistributed on the regraded areas using backhoes, excavators and dozers to achieve redistribution.

Following redistribution the topsoil will be sampled and analyzed as described in Divisions "Guidelines for Management of Topsoil and Overburden" ~~for Underground and Surface Coal Mines~~ January 2008.

Because all surface disturbances occurs on Forest Service land, the USFS has provided the Cottonwood/Wilberg Mine with ~~both interim and~~ a final revegetation seed mix proposed for use. Plant species in ~~both~~ the mix are currently in use by the Manti-LaSal National Forest and commonly occur on the Wasatch Plateau. ~~Both seed mixes will be evaluated in field trials proposed for initiation in fall 1989.~~ ~~As~~ The mix includes ~~six (6) introduced~~ species, ~~field trials will be conducted to demonstrate whether the introduced species can~~ to establish a diverse, effective and permanent cover capable of achieving the postmining land use.

~~The following information is provided for each of the introduced species as further justification for their use:~~

~~Alfalfa and Yellow Sweetclover~~

~~These species are included in the interim seed mixture (and yellow sweetclover in the final mixture) because of, (1) their nitrogen fixing ability; (2) deep tap roots; (3) highly rated forage quality; and (4) ability to encourage natural plant succession.~~

~~Smooth Brome~~

~~The following evidence suggests Smooth Brome is a deep rooting species that is ideally suited for inclusion in the interim seed mix. The maximum reported rooting depth for Smooth Brome given by Wyatt, et al (1980) was 76 cm. Nicholas (1979) reported of 17 grass species she evaluated, Smooth Brome had the highest overall root/shoot ration (0.87). Dayton (1937) reported roots of Smooth Brome commonly penetrate to depths of five (5) feet or more. In addition to its deep rooting system, its sod forming growth habits are ideally suited to control erosion. These characteristics justify its use for inclusion in the interim revegetation seed mixture.~~

~~Small Burnet~~

~~Small Burnet is included because of its ability to establish on disturbed sites and promote natural plant succession. According to Plummer, et al (1968), Small Burnet is a preferred plant for wildlife during late winter and early spring. Its relatively short persistence makes it an ideal nurse crop and successional species.~~

~~Intermediate Wheatgrass~~

~~The outstanding root growth characteristics of Intermediate Wheatgrass make this species ideal for interim and final revegetation in maintaining the viability of the soil biota. In a greenhouse study, Nicholas (1979) reported this species ranked fourth of seventeen species in overall root/shoot ratio (.75) and second of the seventeen species in root biomass (40.15%). In another greenhouse study, McGinnies and Crofts (1986) found Intermediate Wheatgrass to have higher root/shoot ratios (1.29) in unfertilized treatment than Smooth Brome (0.49) or Slender Wheatgrass (0.19). McGinnies and Nicholas~~

~~(1982) reported Intermediate Wheatgrass produced the highest root yields of seventeen species tested on raw spoil.~~

~~Crested Wheatgrass~~

~~Crested Wheatgrass is valued as a long-lived drought-resistant species which is easily established (SCS Bulletin TP-157, 1982). The species is equally valuable for its high productivity. Pallatablility is reported as excellent in the spring and late fall (SCS Plant Materials Guide, 1988).~~

Seed Mixture - Final Revegetation

Common Name	Scientific Name	Lbs/Acre Equivalent PLS*
GRASSES		
Western wheatgrass	Agropyron smithii	~~3~~2
~~Intermediate wheatgrass~~	~~Agropyron intermedium~~	~~3~~
Bluebunch wheatgrass	Agropyron spicatum	3
Indian ricegrass	Oryzposis hymenoides	~~3~~2
Needle and thread grass	Stipa comata	~~2~~1
Thickspike wheatgrass	Agropyron dasystachyum	~~2~~3
Basin Wildrye	Leymus cinereus	2
FORBS		
Blueleaf aster	Aster glaucodes	0.5
~~Utah sweet vetch~~	~~Hedysarum boreale~~	~~1~~
Small burnet	Sanguisorba minor	~~3~~2
Lewis flax	Linum Lewisii	1
~~Globemallow~~	~~Sphaeralcea coccinea~~	~~0.5~~
~~Yellow sweetclover~~	~~Melilotus officinalis~~	~~2~~
Palmer's Penstemon	Penstemon palmari	0.5
	~~TOTAL~~	~~24.0~~

~~*Application rates result in approximately 80 seeds/ft^2.~~

SHRUBS		
Serviceberry	Amelanchier Alnifolia	~~400~~2
Fourwing saltbush	Atriplex canescens	~~400~~2
~~Green Mormon tea~~	~~Ephedra viridis~~	~~400~~
~~Big white rabbitbrush~~	~~Chrysothamnus nauseosus var. albicaulis~~	~~200~~
Shadscale saltbush	Atriplex confertifolia	0.5
Big Wyoming Sagebrush	Artemisia tridentate Spp. wyomingensis	0.5
~~TREES~~		
~~Douglas fir~~	~~Pseudotsuga menziesii~~	~~120~~
~~Colorado blue spruce~~	~~Picea pungens~~	~~80~~
	~~TOTAL~~	~~1600~~

Final Revegetation Methods

1. Seedbed Preparation

~~Seeding will take place as contemporaneously as practicable following soil placement; therefore, the seedbed will be in a condition suitable for seed~~

application. However, if a surface crust has developed it will be broken up by hand or mechanical tilling.

2. Seeding

The seed mixture will be hand broadcast with "hurricane spreaders" or applied by hydroseeder at the specified rates. All seed will be inspected by a Utah Department of Agriculture inspector at the time of application.

3. Fertilizer Application

The fertilizer mixture will be applied by hand broadcasting with "hurricane spreaders" or as a separate operation of hydroseeding. Application rates will be determined from soil analysis of the "topsoil". (soil sampling will conducted according to the Divisions Guidelines for Management of Topsoil and Overbuden for Underground and Surface Coal Mines.)

4. Seed Covering

Following hand broadcasting of the seed mixture and fertilizer, the sites will be hand or mechanically raked to cover the seeds.

5. Mulch Application

Following hand broadcasting and raking, the seeded areas will be covered with hay mulch (2 tons per acre) and netting or erosion control mulch blanket. The netting or blanket will be mechanically anchored per the manufacturers specifications. Hay used for mulch will be inspected by a Utah Department of Agriculture inspector at the time of application.

6. During the spring following seeding, containerized stock of the shrub and tree species will be planted by hand. At each planting site, a basin will be created to retain moisture. A fertilizer tablet will be placed near the root zone of each plant and each planting will be hand watered. The plants will be grouped in the following manner to achieve layering:

   a. Plant groups will be randomly located throughout the reclaimed site at the rate of two hundred (200) groups per acre.
   b. Plant group dimensions and plant spacing will vary. Layering will be as follows:

Lower Layer =	Ephedra viridis
	Atriplex canescens
Middle Layer =	Amelanchier alnifolia

~~Chrysothamnus nauseosus~~
~~Upper Layer = Pseudotsuga menziesii~~
~~Picea pungens~~

~~c. Group composition:~~
~~Lower Layer = 4 shrubs~~
~~Middle Layer = 3 shrubs~~
~~Upper Layer = 1 tree~~

~~7. The two sedimentation ponds will be revegetated with the above techniques at end of ten year responsibility period.~~

~~8. Irrigation application will be determined from test plot studies.~~

Seeding will take place as contemporaneously as is practical following contouring/pocking of the area being reclaimed. Certified weed free alfalfa hay will be incorporated into the soil following contouring at a rate of 2000 lbs/acre. Fertilizer will be applied by hand and incorporated during this revegetation sequence. The rate of application will be 30-50 lbs/acre or as recommended by the manufacturer.

2 Deep Gouging or Pocking

Pocking techniques will mix the straw mulch into the upper portion of the soil. The pocks will be made using the bucket of a track-hoe or similar machine to roughen the disturbed area in a random and discontinuous fashion. Pockmarks created are approximately 3.0' feet in diameter and 1.5' feet deep. The pockmarks are designed to capture or trap precipitation, influencing infiltration. Gouging serves to control erosion through water retention, thus enhancing vegetation growth.

3 Seeding

The seed mixture (refer to table above) will be broadcast using a “hurricane spreader” or applied using a hydro seeder. If the seed mixture is broadcast, seeding will take place immediately after pocking. If the seed mixture is hydro seeded, a small amount of wood fiber mulch will be added to mark the area of coverage during application.

4 Mulching

After the seed is applied, the entire area will be hydromulched with a wood fiber or other acceptable mulch and will be applied at a rate of at least 1500 lbs./acre for cover and protection. A tackifier (plantago or other similar tackifier) will be added to the mulch and applied at a rate recommended by the manufacturer (typically approximately 150 lbs/acre). Mulch and tackifier will be applied simultaneously.

Maintenance and Monitoring

1. Signs will be placed around the planted slopes for their protection.

2. Weed control will not be undertaken unless it is determined necessary due to weed dominance and delayed rate or succession. Studies indicate that competition from weeds, including Salsola kali, is greatly reduced within three (3) years after revegetation. Preliminary on-site studies support published reports on this matter. All noxious weeds will be eradicated if they become established on the site.

3. Rodent damage on revegetated areas will be assessed species specific control measures will be implemented as necessary.

4. A site visit will be scheduled each spring to check on fitness of the sites and check progress of the plant growth.

5. ~~Annual monitoring will include inspection for rills and gullies. Should these be present, they will be filled and replanted as described earlier, refer to Soil Stablization of Rills and Gullies Section.~~ Annual monitoring will also include inspection for rills and gullies. Should these be present, they will be filled and the soil reseeded. Rill and gully repair will follow the regulations set forth in the Coal Rules R645-301-357.360 through R645-301-357.365. As repairs are recognized, the Division will be notified and the affected area will be reported in the annual vegetation report.

~~6. Monitoring will be conducted in accordance with Division Guidelines as indicated in the following section, Maintenance and Monitoring.~~

7. Maintenance and monitoring activities will be reported in the Annual Vegetation Monitoring Report.

Sampling for Ten Year Responsibility Period and Bond Release (refer to Part 4: Figure 5)

1. All sampling will be undertaken in the late summer for maximum plant growth.

2. The line intercept or ocular estimation methods will be used to measure cover and species composition.

3. The point-center quarter method will be used to measure shrub and tree density.

4. Sample size for ground cover and shrub density will be tested at a 90 percent confidence level using a one-tail "t" test with a 10 percent change in the mean.

5. Productivity measurements will be a double sampling procedure of clipped plots and ocular estimates. Rectangular plots (6.27" x 100") will be randomly located in reference areas and revegetation sites. Sampling will be at the 90% confidence level.

6. The reference areas will be checked to detect any changes from man-induced activities and to verify they are in fair or better condition.

7. Revegetation Success:

~~a. Sampling of reference sites at end of ten year responsibility period will be conducted concurrently with final reclamation sampling, using the same methodology. The range condition of all reference areas will be re-assessed in 1989. This will be repeated every five year.~~

~~b. Ground cover is established for two consecutive years at the end of responsibility period at 90 percent of reference site ground cover.~~

~~c. At least 80% of the shrubs and trees will have been in place for a least 8 growing seasons, the tree or shrub is alive and healthy.~~

~~d. The woody plants established on the revegetated site are equal to or greater than 90 percent of the stocking of live woody plants of the same life form of the approved reference areas with 90 percent statistical confidence.~~

~~e. Productivity will equal 90 percent of that of the reference areas at 90 percent statistical confidence.~~

~~f. A one tail students "t" test of the sample means will be used for the statistical test.~~

All vegetation sampling will be undertaken in the late summer for maximum plant growth. The line intercept or ocular estimation methods will be used to measure cover and species composition. The point-center quarter method will be used to measure shrub and tree density.

Productivity measurements will be a double sampling procedure of clipped plots and ocular estimates. Rectangular plots (6.27 in. x 100 in.) will be randomly located in reference areas and revegetation sites. Sampling will be at the 90% confidence level.

The reference area will be checked to detect any change from natural or man-induced activities and to verify they are in fair or better condition. Sampling of the reference sites at the time of bond release will be conducted concurrently with final reclamation sampling, using the same methodology used to sample the reclaimed areas.

The standards for success to be applied for ground cover and production of living plants on the reclaimed areas at the Cottonwood/Wilberg Mine will be at least equal to 90% (with a 90% confidence level) to that of the respective reference area at the time of bond release. For example, the reclaimed riparian area will be

compared to the riparian reference area for cover and production. Cover in the reclaimed areas will not be less than that required to achieve the approved post-mining land use.

Revegetation for tree and shrub species will be considered successful when the tree and shrub count in the reclaimed areas are similar at the time of bond release to the count in the reference area.

During the 4th year after revegetation, the point-quarter or other accepted method will again be used to determine the density of trees and shrubs in the reclaimed areas. Locations of monitoring will be random within each of the reclaimed areas and recorded. The final 25% of the tree and shrub live plantings will be included in the 4th year density counts. This process will be repeated in the 8th year.

At the time of bond release, or after the 10 year responsibility period has passed, similarity between the reclaimed area and corresponding reference area will compare life forms and/or species present in each community by the use of similarity indices. Indices of similarity provide the means of mathematically comparing the plant communities in the two areas. One of, or a combination of the three indices found in the Vegetation Guidelines, Appendix B will be used to determine the similarity between the reclaimed and reference area. If another index (or combination thereof) is used, Division approval will be required. Similarity will be considered successful when the index value is at least 70% of the reference area.

All vegetation monitoring data will be reported annually. This report will contain a narrative of the actual monitoring methods used, results, and a discussion of the overall success or failure of each area. Raw data sheets will also be included in the annual reports. Standards attained at the time of bond release will be approved by the Division of Wildlife Resources (DWR) and the Division of Oil, Gas and Mining.

WASTE ROCK DISPOSAL SITE AND WILBERG DRAIN FIELD

(Old Waste Rock Site: UTU-37642 – Phase III Bond Release Accepted July 22, 2009)

New Waste Rock Site: UTU-65027

This site has been transferred (May 2015) to the Trail Mountain Mine permit C/015/0009 (now owned by Bowie Resources Inc.) and is specific only to this facility.

Wilberg Drain Field

~~The drain field will be harrowed by tractor and revegetated with the same techniques and seed mixture as the waste rock site. Costs are included in reclamation costs.~~

Final revegetation at the drain field was completed in March 2015. This included roughening of the access road and reseeding it.

Final Revegetation Seed Mixture (Old Waste Rock Site and Drain Field)

Species	Planting Rate (PLS/acre)
GRASSES	
Western wheatgrass	2.0
Indian ricegrass	2.0
Needle-and-thread grass	2.0
Galleta	2.0
Crested wheatgrass	1.0
	9.0
FORBS	
Scarlet globemallow	1.0
Yellow sweet clover	1.0
	2.0
SHRUBS	
Four-wing Saltbush	2.0
Curlleaf Mountain Mahogany	2.0
Ephedra Mormon Tea	4.0
Vasey Big Sagebrush	0.2
	8.2
TOTAL	19.2

This seed mix and planting rate is as requested by the BLM and approved by the DOGM. The introduction of Crested Wheatgrass is at the insistence of the BLM and as requested by DOGM will be monitored following reclamation of successive cells for dominance of species. The seed mix will be revised if necessary. See Appendix VII.

Reclamation of the Cottonwood Fan Portal Area

Final reclamation of the Cottonwood Fan Portal was completed in November 1998 and Phase III Bond Release was accepted on September 28, 2010. Approximately 1.86 acres of disturbance exists at this location. The disturbed area includes the Trail Mountain Access (TMA) portal and belt portal, collectively called the Cottonwood Canyon Facilities. These facilities were demolished and final reclamation was completed in November 2014.

Surface Exploration Drill Holes

Initial stages of development required surface exploration drilling. From 1976 through 1999 PacifiCorp drilled approximately 150 exploration holes.

Authority to conduct such activities was gained through the State of Utah, US Geological Survey and the US Forest Service and BLM. Privately-owned surface was secured separately.

All surface drilled exploration holes were reclaimed according to the US Geological Survey's published Drill Hole Plugging Procedure in the form of stipulations for approval.

Each exploration drill site has been reclaimed and approved by the appropriate agency.

POSTMINING USES

Geographically, the site of the Cottonwood/Wilberg portal (surface operations) is restricted by a narrow canyon headed with two drainages, the left and right forks of Grimes Wash. Both tributaries are non-accessible beyond the portal site limiting uses, excepting wildlife use.

It is planned, following mining, to restore the affected by the mining operation to its pre-mining state. Principal land use after reclamation shall be grazing and wildlife habitat. Grazing permits are presently issued for areas surrounding the surface operations by both the US Forest Service

and the Bureau of Land Management. Both agencies have stated no foreseeable changes to its present use.

According to the Manti-LaSal National Forest Land and Resource Management Plan (1986), the main portal area is within the Forest Service MMA classification. This classification emphasizes Leasable Mineral Development and includes areas where land surface is, or will be, used for mineral development facilities. The surrounding area is classified GWR, General Big Game Winter Range. It is inaccessible from East Mountain but will probably be utilized by BLM permittees whose cattle would naturally migrate north into the portal area from the adjacent BLM allotments which include the waste rock site. Both those areas will be established to meet the requirements of grazing and wildlife and will be fenced during rehabilitation to allow for vegetation success.

The ~~Proposed~~ Cottonwood Fan Portal site is located on fee land within Forest Service grazing allotments. Postmining land use is basically wildlife habitat. Due to the steep slopes and exposed hard rock surfaces that are now present, probability of range grazing is minimal. Approximately 7.47 acres have been reclaimed (completed 1998) and Phase III Bond Release was granted on September 28, 2010.

Of the remaining 1.86 acres of disturbance, the land ~~will be recontoured~~ has been reclaimed (final reclamation completed in November 2014) to ~~there~~ its approximate original slopes, drainages opened, and vegetation ~~reestablished~~ planted to meet the reference area's cover, species density, and productivity as measured ~~at the time of reclamation~~ during reference area monitoring. Applicant feels that the ten years following mining (bond period), there is sufficient time to manage the vegetation establishment of growth to meet the requirements of the post mine land use as stated.

PROTECTION OF PUBLIC PARKS AND HISTORIC PLACES

No public parks are located in or adjacent to the permit area. Cultural resource information contained in this application was based on field surveys contracted to AERC (Archeological Environmental Research Corporation) and conducted under the auspices of Richard Hauck.

Several separate surveys were conducted. Prior to the construction of the Wilberg Mine portal site and associated offsite facilities, archeological surveys were conducted. Results of these surveys disclosed several sites adjacent to Grimes Wash. These reports are included in the Environment Section.

During the planning of the ~~proposed~~ Cottonwood fan portal site (site reclaimed in 1998, Phase III Bond Release in 2010) and utility corridor, an archeological survey was conducted. It also identified several sites. Although this project has since been reduced to only the proposed fan portal, this report is also included.

The delineated Old Johnson Mine area is outside the reclamation area of the Cottonwood Fan Portal site disturbance, and was protected from any disturbance. The roadway in front of the old portal was utilized for access into the disturbed area for reclamation of the Cottonwood Fan Portal. Final reclamation of the Cottonwood Fan Portal was completed in November 1998. A berm was established along the outside slope above the weigh shed etc. to provide protection and keep any material or rocks from entering the potential historic site area. The roadway was reclaimed as close to existing conditions as possible.

For lands within the permit area not covered by planned surface disturbances, but yet could be affected by subsidence, a general 15 percent random survey was conducted. Basis of this survey was extrapolated from requirements mandated by OSM for authorization to mine coal from the Des Bee Dove Mine, an adjacent mine. Results of this survey are contained in the report found in the Environment Section.

SUBSIDENCE CONTROL PLAN

The following discusses the subsidence control plan and historical mining methods conducted by PacifiCorp. This information will be retained in this plan for historical reference. The mine was sealed in 2001 and, therefore, no underground mining has been conducted since that time. In November 2014, demolition activities commenced and final reclamation of the mine site will follow.

This section describes in further detail the applicant's design of mine plan ensuring minimal environmental impacts, specifically surface subsidence effects of the on-going Cottonwood/Wilberg Mine. Operation Plan describes in detail the proposed methods of coal resource extraction and mine development. Geology Description presents the detailed geological information, site specific and general, which provides an analytical base for mine plan and subsidence control design. The following subsections described the principal factors involved in controlling subsidence impacts resultant of the proposed mining operations.

Subsidence Damage Probability Survey

A survey has been conducted on that portion of East Mountain surface which could possibly be affected by the mining of coal from the Cottonwood/Wilberg Mine.

It has been determined that there are renewable resources present in the area in the forms of springs, water seeps, grazing land, timber and wildlife habitat.

The water seeps and springs are numerous and varied in nature; a few are perennial during the unfrozen months, while some dry up over the summer and some only appear in "wet" years.

Most of these springs emanate from permeable beds in the North Horn Formation. Recharge of these limited perched aquifers is formed by water migrating from the higher elevations of East Mountain located to the northwest of the permit area. Initially this water migrates vertically down from the surface through fractures in the North Horn Formation where it is free to move laterally. A few springs emanate from the Starpoint Sandstone which is also a limited perched aquifer.

The hydrologic monitoring plan has been designed to identify any hydrologic effects of these aquifers that are induced by mining subsidence.

There is one small building on the surface above the Cottonwood/Wilberg Mine area. It is a wooden, one-room cabin which has a measured floor area of 168 square feet. Water is piped to

this cabin from Burnt Tree Spring, a short distance away and flows by gravity through a pipe laid on the surface of the ground.

There are no electrical power lines, oil or gas wells, pipelines or other utility structures which would be affected by surface subsidence within the Cottonwood/Wilberg Mine limits with the exception of a small waterline from Burnt Tree Springs used for stock watering. Timber and wildlife would probably not be affected.

There are minor stock watering troughs in various places and these are usually located close by springs or seeps.

Mining Method

PacifiCorp intends to minimize surface effects of subsidence by adopting, wherever practical, the longwall method of mining and mining the coal deposit as completely as possible. Those areas within the mine limits not mined by the longwall method will be mined by continuous miner in order to extract the maximum amount of the coal reserve possible. A further description of the mining operation is found in the Operation portion of this permit.

The longwall mining method allows almost total extraction of the mineral and induces caving of the immediate and upper roof strata. The caving process propagates upwards to a horizon located at a distance equal to approximately 35 to 50 times the mining height over the coal seam as indicated by the data (refer to Part 4: Figure 6). The curve in the figure shows the elongation of a borehole due to caving of the overburden over a longwall panel (from Dahl and von Schonfeldt).

The differential settlement of the overburden was normalized by dividing it by the seam thickness. As can be seen, the deformation decreases from a maximum of 1 at the seam roof to near 0 at approximately 37 times the mining height above the coal seam. The deformation or deflection above this horizon is essentially continuous; the upper strata settle down on the gob without any further increase in volume (porosity).

A similar conclusion was reached by Orchard in 1973 and is illustrated in Part 4: Figure 7 and Figure 8.

It is PacifiCorp's intent to mine areas as wide and long as present mining technology allows in order to minimize the area which would be on the sloping edge of the subsidence trough. Also, the pillars of support for the longwall gate roads have been designed on the yielding pillar principle so that they will eventually yield to destruction. This has been proven in practice in the mines, therefore, will not affect the subsidence trough.

The size of the normal coal pillars used in the mine planning for both the Blind Canyon and Hiawatha Seams to ensure stability has been determined by basic calculation for the deepest expected cover, from prior mining practice in the area, and a USBM study (Pariseau). Experience has also shown that in multi-seam mining circumstance columnizing main development pillars in both these seams is essential for main stability.

The mine plan indicates that only first mining, i.e., forming pillars only, will protect high voltage power line structure from any possible subsidence. Barrier size for this essential protection has been devised from data obtained from ongoing subsidence monitoring survey (USBM Algire) on East Mountain.

Full extraction areas (room-and-pillar panels with pillar removal and longwall panels) are, by definition, planned and controlled subsidence areas. It is anticipated that this planned subsidence will result in a generally uniform lowering of the surface lands in broad areas, thereby limiting the extent of material damage to those lands and causing no appreciable change to present land uses. The extent of these full extraction areas is shown on Map 3-1 thru 3-2. Subsidence prediction work has shown the expected maximum planned and controlled subsidence will vary from 0 to 15 feet assuming that the total cumulative extraction from the two minable seams will not exceed 20 feet.

<u>Subsidence Damage Prevention Measures</u>

The proposed mining plan has been designed in such a way as to align the full extraction panels parallel to the margin faults and joints. This alignment with respect to jointing will prevent the formation of irregular sawtooth subsidence cracks in the overlying surface lands.

In order to more accurately forecast the overall extent and the amount of subsidence, PacifiCorp conducted subsidence studies, similar to those done by the NCB and Abel and Gentry, in cooperation with the US Bureau of Mines (Algire), refer to 1981 Annual Subsidence Report.

The results of these studies were used to developed information which, when interpolated into proven existing formulas and models, will allow prediction of probable behavior during and after mining.

Extensive field geologic investigation for the past years is designed to locate all faults in the lease area. The mine plan is designed to:

a. Clear all coal to these faults.
b. Prove by actual eventual contact in mining and underground drilling the size and direction of these disturbances.

All mining, except for planned breakouts, is stopped at a minimum distance of 200 feet from any outcrop line. Experience to date, except for one occasion, has shown that "burned coal" is always encountered before this minimum distance is reached.

Subsidence monitoring indicates that when pillar mining is adjacent to "burned coal" the subsidence continues over the burned coal area minimizing the sloping edge of the subsidence trough.

To date mining has shown extreme changes in roof conditions in both the Blind Canyon and Hiawatha seams when ancient river channel scours are encountered. The ongoing surface drilling of the lease area, in those areas not yet reached by actual underground mining, indicates little or no change in normal roof conditions or coal strength. Therefore, no new problems are anticipated from these factors that should cause any alteration to the basic mine plan as submitted.

Subsidence monitoring plans have been submitted for the Deer Creek and Cottonwood Mines and are included in the Appendix.

A photogrammetrical subsidence monitoring plan was initiated and first flown during August 1980. In addition, a site specific longwall panel (the first longwall panel being mined in the Wilberg Mine) was monumented and monitored by conventional survey methods. The last ground survey was done in 1988. No ground survey was done in 1987.

Results of both monitoring systems provide a base on which predictable subsidence can be forecasted. It was determined that aerial photographic means provided a better method to monitor that large area of East Mountain so conventional surveys were discontinued. Information relating to subsidence information can be found in the Annual Subsidence Reports.

Regarding the seeps and springs, PacifiCorp has been actively monitoring these, together with water generated within the mines since 1978 and has set up an organization with the full intention of monitoring them for the next several years.

The hydrologic monitoring indicates that mining under the seeps and springs at the depths of cover of Cottonwood Mine, up to 2,400 feet, does not dry up the seep or spring. This phenomenon is most probably due to the presence of bentonitic shale layers in the overburden which swell when wet forming an impervious clay layer. This healing characteristic is expected to seal subsidence cracks to prevent downward migration of water and subsequent loss of springs and other water sources.

The Cottonwood Mine will be mining some 8 feet of coal at depths from 1,500 to 2,400 feet of cover. Therefore, it is PacifiCorp's belief that the seeps and springs on East Mountain will not be adversely affected.

Regarding the small wooden building on East Mountain (located on PacifiCorp fee porperty), subsidence studies (NCB) show that structures constructed of rigid materials such as brick work,

concrete or stone work suffer greater damage than buildings with frame construction. Therefore, it is PacifiCorp's belief that the cabin referred to will not suffer material damage.

Mitigation of Subsidence Damage Effects

Should material damage be incurred by the cabin despite the planned subsidence damage prevention measures, the applicant will repair the damage caused by subsidence resulting from the applicant's activities or compensate the owner of the cabin for such damage.

Any roads, fences, stock ponds, earth dams or water troughs, which are materially damaged by subsidence will be repaired and regraded to restore them to their pre-subsidence usefulness.

Should significant subsidence impacts occur, the applicant will restore, to the extent technologically and economically feasible, those surface lands that were reduced in reasonably foreseeable use as a result of such subsidence, to a condition capable of supporting reasonably foreseeable uses that such lands were capable of supporting before subsidence.

In the event that surface waters above the Wilberg Mine are diminished as a result of the operations of the applicant, including any subsidence therefrom, to the extent that appropriated surface water is measurably diminished, applicant will comply with the following:

In order to fulfill the requirement to restore the land affected by permittee's mining operations to a condition capable of supporting the current and postmining land uses which are stated in the permit (Cottonwood/Wilberg Mine Plan, refer to Postmining Land Use), the permittee will replace water determined to have been lost or adversely affected as a result of permittee's mining operations if such loss or adverse impact occurs prior to final bond release. The water will be replaced from an alternate source in sufficient quantity and quality to maintain the current and postmining land uses which are stated in the permit.

During the course of regular monitoring activities required by the permit, or as the permittee otherwise acquires knowledge, the permittee will advise the Division of the loss or adverse occurrence discussed above, within ten working days of having determined that it has occurred.

Within ten working days after the Division notifies the permittee in writing that it has determined that the water loss is the result of the permittee's mining operation, the permittee shall meet with the Division to determine if a plan for replacement is necessary, and if so, to establish a schedule for submittal of a plan to replace the affected water. Upon acceptance of the plan by the Division, the plan shall be implemented. Permittee reserves the right to appeal the Division's water loss determination as well as the proposed plan and schedule for water replacement as provided by Utah Code Ann. 40-10-22 (3)(a).

All cabins that could be effected by subsidence have been surveyed and documented and are included in the Appendix.

Subsidence Control

PacifiCorp will conduct the underground mining operations so as to prevent subsidence from causing material damage to the surface and to maintain the value and reasonable foreseeable use of that surface in accordance with the preceding subsidence control plan.

Public Notice

Applicant will not mine in any areas that would allow potential subsidence effects (as indicated by the angle of draw) to effect any area outside of the lease and permit boundary until those constraint on coal recovery is resolved by the OSM and the BLM Branch of Solid Minerals or permission is granted by the adjacent surface agencies.

A mining schedule has been submitted to the affected surface owners which details the area in which mining is to take place and the planned date of the mining activity.

Subsidence Monitoring

Applicant will conduct monitoring by photogrammetry methods as detailed in the Subsidence Monitoring Plan (Appendix XVI).

Subsidence related escarpment failures and surface cracking have occurred in Newberry Canyon (Cottonwood 6th and 7th East longwall panels, reclaimed in 1998) and the Right Fork of Grimes Wash (Deer Creek 9th East - Wilberg 1st Right room-and-pillar sections, reclaimed in 1997).

Subsidence in the Right Fork of Grimes Wash area was first documented in the 1981 Subsidence Monitoring Report. Maximum subsidence in this area is approximately twenty-five (25) feet. Surface fractures which have created a graben-like structure have begun to fill in naturally since 1981. To protect livestock, UP&L erected a fence around the area where fractures are of sufficient magnitude to pose a hazard. Escarpment failure in this area has been confined to a small portion (approximately 700 feet) of the east side of the Right Fork. No raptor nests have been impacted. This area was reclaimed in September 1997. The fence remains to deter livestock and wildlife grazing within the reclaimed area and will be removed once revegetation efforts are determined to be successful.

Subsidence monitoring began in Newberry Canyon in August 1986 as part of the Golden Eagle Nesting/Cliff Subsidence Monitoring Plan developed for this area (see Appendix XVI, Part H). Subsidence related escarpment failure first occurred in October 1986 and continued intermittently through 1988 as reported in the 1988 Cliff Subsidence/Eagle Monitoring Report. Surface fractures were observed in July 1987 along the north ridge of Newberry Canyon, as reported in the document entitled "Assessment of Mining Related Impacts in Newberry Canyon", submitted to the Utah DOGM. Total vertical displacement in this area is less than five (5) feet. This area was reclaimed in August 1998.

Two inactive golden eagle nests were destroyed as a result of escarpment failure; however, no impact to nesting has occurred. Nesting and production of young by the resident pair of eagles has occurred in 1987, 1988 and 1989.

The above memtioned study, “Assessment of Mining Related Impacts in Newberry Canyon”, found that mining related impacts to the environmental resources associated with longwall mining results from three effects; surface cracking, escrapment failure, and talus deposition. The major imapct resulting from the formation of surface cracks is to land use, primarily grazing and

recreation (hunting). This imapcts limits accessibility and raises safety concerns. Mitigation of these areas is comparatively unconstrained when accessible. Backfilling, recontouring and revegetation projects occur after subsidence discontinues.

Escarpment failure can potentially have greater impacts as it speeds up the natural process of cliff spalling. Cliff spalling disrupts raptor nest locations and/or suitable nest sites. Major spalling occurred in Newberry Canyon during the entire 1987 breeding season. This includes the phases when disturbance would be most disruptive; nest selection, breeding, egg laying and incubation. Although spalling was in progress, successful nesting occurred. Mitigation was based on the reaction of the breeding raptor pair to the loss of the nests in 1986. As memtioned above, nesting and production of young by the resident pair of eagles occurred in 1987, 1988, and 1989.

The major imapcts caused by talus deposition is visual. Visual impacts are experienced along the Cottonwood/Wilberg mine access road. This road does not receive substantial public use; therefore, maximum visual imapcts to the general public does not occur.

Mitigation for the resulting impacts through talus removal is unfeasible and revegetation is of only limited feasibility. Therefore, mitigation can be accomplished most effectively through improvement of habitat for the impacted species in another area, or enhancement of habitat for another selected species.

PROTECTION OF FISH AND WILDLIFE

The portal facilities of the Cottonwood/Wilberg Mine are located in the lower reaches of a mountainous drainage called Grimes Wash. This ~~active~~ area (portal facilities demolition commenced in November 2014) consists of about 20 acres and is physically separated from the remaining permit area by imposing and inaccessible cliffs that rise over 1,600 feet vertically from the active portal area.

The east escarpment face of the Wasatch Plateau is used extensively by nesting raptors. Most of the escarpment face is naturally inaccessible so the birds are undisturbed by man. Nest sites in

Grimes Wash are in inaccessible cliffs (refer to Annual Raptor Reports on file for raptor activity and nest status).

Excepting the occasional use for exploration, the wildlife inhabitants on top of East Mountain are relatively unaffected during the mining operation and require no special plans other than the hydrological and subsidence monitoring now initiated.

There are no prime fisheries located on the East Mountain plateau within the permit area.

A 69 KV line serves as the power source of the Cottonwood/Wilberg complex. Mostly single pole and suspension insulators, this transmission line provides sufficient phase to phase and phase to ground clearance to preclude electrical contact of raptors including eagles. The structure types are approved as eagle-safe by USFWS by letter dated November 26, 1982 from the DOGM. This power line was removed in March 2015.

Although Grimes Wash is not a fishery, it is a tributary to Cottonwood Creek (Straight Canyon) which is a limited fishery.

Protection from coal dust and increased sediments to these waters is by diversion of the natural flowing waters throughout piping systems past the mining area proper. Two sedimentation ponds have been installed for control of sediment and coal dust from storm runoff waters within the portal facilities area. ~~Coal is transported by trucks on hard-surfaced roads. Truck covers are not necessary as the moisture of processed coal is sufficient to prevent flowing coal dust; plus the loaded coal trucks negotiating the 12% grade are limited to slow speeds.~~

~~To reduce the undue disturbance and killing of wildlife the video produced by UDWR at Price has been obtained to instruct all the coal mining company employees of the value of all wildlife and problems inherent to Utah wildlife. This instructional video has been shown at employee training sessions so all employees receive the information.~~

~~This series explains the effect of harassing wildlife during their different life stages and the needs of species resident to Utah. During winter wildlife are always in a depleted condition. Unnecessary disturbance by man causes them to use up critical limited energy reserves, which often times results in mortality. In less severe cases the fetus being carried by mammals may be aborted or absorbed by the animal, thus reducing reproductive success of a population.~~

During breeding seasons, disturbance by man can negatively affect the number of breeding territories for some species of wildlife. Disturbance can also interrupt courtship displays and preclude timely interaction between breeding animals. This can result in reduced reproductive success and ultimate reductions in population levels.

Early in the rearing process, young animals need the peace and tranquillity normally afforded by remote wildlands. It is also during this crucial period that young animals gain the strength and ability to elude man and other predators.

This especially applies to raptors which may be attracted to the cliff sites adjacent to the mine for a nest site. These species readily abandon nesting and rearing efforts if intruded upon by man. Any nest initiated adjacent to the existing facilities would not require cessation of operations because this nesting action signifies acceptance of the present situation. All golden eagle nests will be reported to the USFWS, Salt Lake City and UDWR in Price.

If any additional mine related developments are planned in the raptor nesting zone they will require prior consultation with the UDWR and USFWS to determine impacts, if any, and mitigation requirements for implementation of development plans.

Information regarding mule deer seasonal distribution and numbers within the permit area is not available due to the dynamic characteristics of the deer herds involved. UDWR personnel indicate such information would not be truly representative of the demographics of the deer population; therefore, it is not available from them.

~~If hazardous areas are identified on the Wilberg Mine access road, within the permit area, appropriate mitigating measures will be instituted based on consultation with UDWR personnel.~~

~~A flyer containing the following information on avoiding deer vehicle collisions has been distributed during training to all employees:~~

1. ~~Drivers are to be aware of deer in the area.~~
2. ~~Be aware that deer are most active at night and during dawn and dusk.~~
3. ~~At night, flash lights at deer on road to break their trance and allow them to react to the oncoming vehicle.~~

~~This instruction includes the precaution against shooting at raptors.~~

~~Personnel involved in surface construction operations will be advised of the critical value of snake dens. They will be advised to be particularly observant for concentrations of snakes during the months of April, May, September and October. Such concentrations indicate the presence of snake dens. If a den is located, it will be reported to the UDWR for assistance in the necessary mitigating measures.~~

~~Surface water disturbance due to subsidence on East Mountain from mining activities in the Cottonwood/Wilberg Mine will be addressed as stated in Part 4: Mitigation of Subsidence Damage Effects.~~

~~The interim reclamation plans provide for the stabilization of all the fill slopes with a vegetative cover. Because the fill slopes are intertwined with the mine facilities, the planting mixture is designed more for soil stabilization than for an attraction to wildlife. The large mammals especially would be a nuisance in and around the operation and the operations a hazard to them.~~ The final reclamation plan will restore the stream channels and revegetate the disturbed sites. The planting mix of forbs, grasses, shrubs and trees is similar to the adjacent native plant communities and ~~would~~ will provide food and cover for wildlife through grouping of shrub plantings. See details in Final Reclamation section.

The UDWR general mitigation plan for the East Mountain area follows. Applicant has stated compliance to these recommendations insofar as they are applicable. Additional specific monitoring and mitigation plans are discussed in Appendix XVI.

Applicant will not use persistent pesticides on the area during underground coal mining and reclamation activities, unless approved by the Division.

~~The necessary measures will be taken at the Cottonwood Mine to prevent, control and suppress range, forest and coal fires resulting from its mining operations.~~

Tables

USDA NRCS Natural Resources Conservation Service

RUSLE2 Erosion Calculation Record

Note: LS-1 is the slope modeled for erosivity on the east side of the canyon within the disturbed area boundary. The management practices noted below were chosen to best mimic the pocking operations of the proposed reclamation plan sediment and erosion control practice. PacifiCorp believes that the calculated soil loss results in a higher value than what the actual soil loss would be utilizing the pocking practice. RUSLE2 does not provide this type of calculation within its management database.

profiles\LS-1

Inputs:
Location: Utah\Emery County\UT_Emery_R_13
Soil: DZG2 Gerst-Strych-Rock outcrop complex, 30 to 65 percent slopes\Strych very cobbly loam 20%
Slope length (horiz): 273 ft
Avg. slope steepness: 51 %
Contouring: c. perfect contouring no row grade
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)

Base management: Strip/Barrier Managements\Bare ground; rough surface*

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/15/0	Add mulch		70
4/15/0	Plow, moldboard 10 inch depth		70
4/15/0	Add mulch		70

Outputs:
T value: 5.0 t/ac/yr
Soil loss for cons. plan: 3.0 t/ac/yr

USDA NRCS Natural Resources Conservation Service

RUSLE2 Erosion Calculation Record

Info: : LS-2 is the slope modeled for erosivity on the east side of the canyon between the confluence of the Right Fork and Left Fork of the reestablished portion of the Grimes Wash. The management practices noted below were chosen to best mimic the pocking operations of the proposed reclamation plan sediment and erosion control practice. PacifiCorp believes that the calculated soil loss results in a higher value than what the actual soil loss would be utilizing the pocking practice. RUSLE2 does not provide this type of calculation within its management database.

profiles\LS-2

Inputs:
Location: Utah\Emery County\UT_Emery_R_13
Soil: DZG2 Gerst-Strych-Rock outcrop complex, 30 to 65 percent slopes\Strych very cobbly loam 20%
Slope length (horiz): 363 ft
Avg. slope steepness: 34 %
Contouring: c. perfect contouring no row grade
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)

Base management: Strip/Barrier Managements\Bare ground; rough surface*

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/15/0	Add mulch		72
4/15/0	Plow, moldboard 10 inch depth		72
4/15/0	Add mulch		72

Outputs:
T value: 5.0 t/ac/yr
Soil loss for cons. plan: 1.2 t/ac/yr

USDA NRCS Natural Resources Conservation Service

RUSLE2 Erosion Calculation Record

Info: LS-3 is the slope modeled for erosivity on the west side of the canyon within the vegetation reference area. The management practices noted below were chosen to best mimic the vegetation types and cover of the reference area using the limited data provided within the RUSLE datebase. Grazing has also been utilized as a management practice.

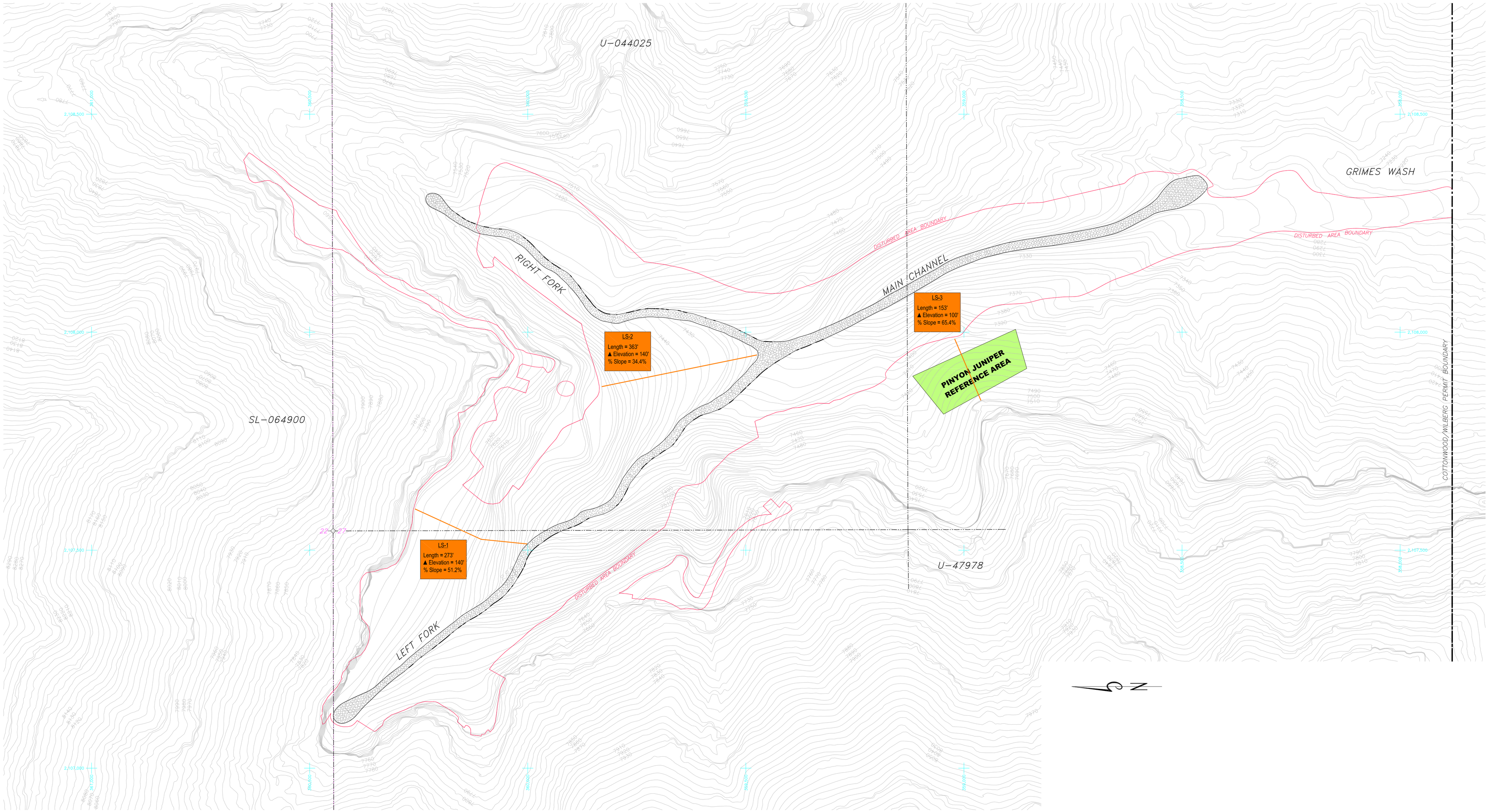
profiles\LS-3

Inputs:
Location: Utah\Emery County\UT_Emery_R_13
Soil: DZG2 Gerst-Strych-Rock outcrop complex, 30 to 65 percent slopes\Strych very cobbly loam 20%
Slope length (horiz): 150 ft
Avg. slope steepness: 65 %
Contouring: default
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)

Base management: LS-3

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/1/0	Begin growth	Forest and Range\Range Southern desert shrub	0.000076
6/15/0	Graze, continuous, light hoof traffic	Forest and Range\Range Southern desert shrub	0.54
10/15/0	No operation		0.33

Outputs:
T value: 5.0 t/ac/yr
Soil loss for cons. plan: 2.7 t/ac/yr



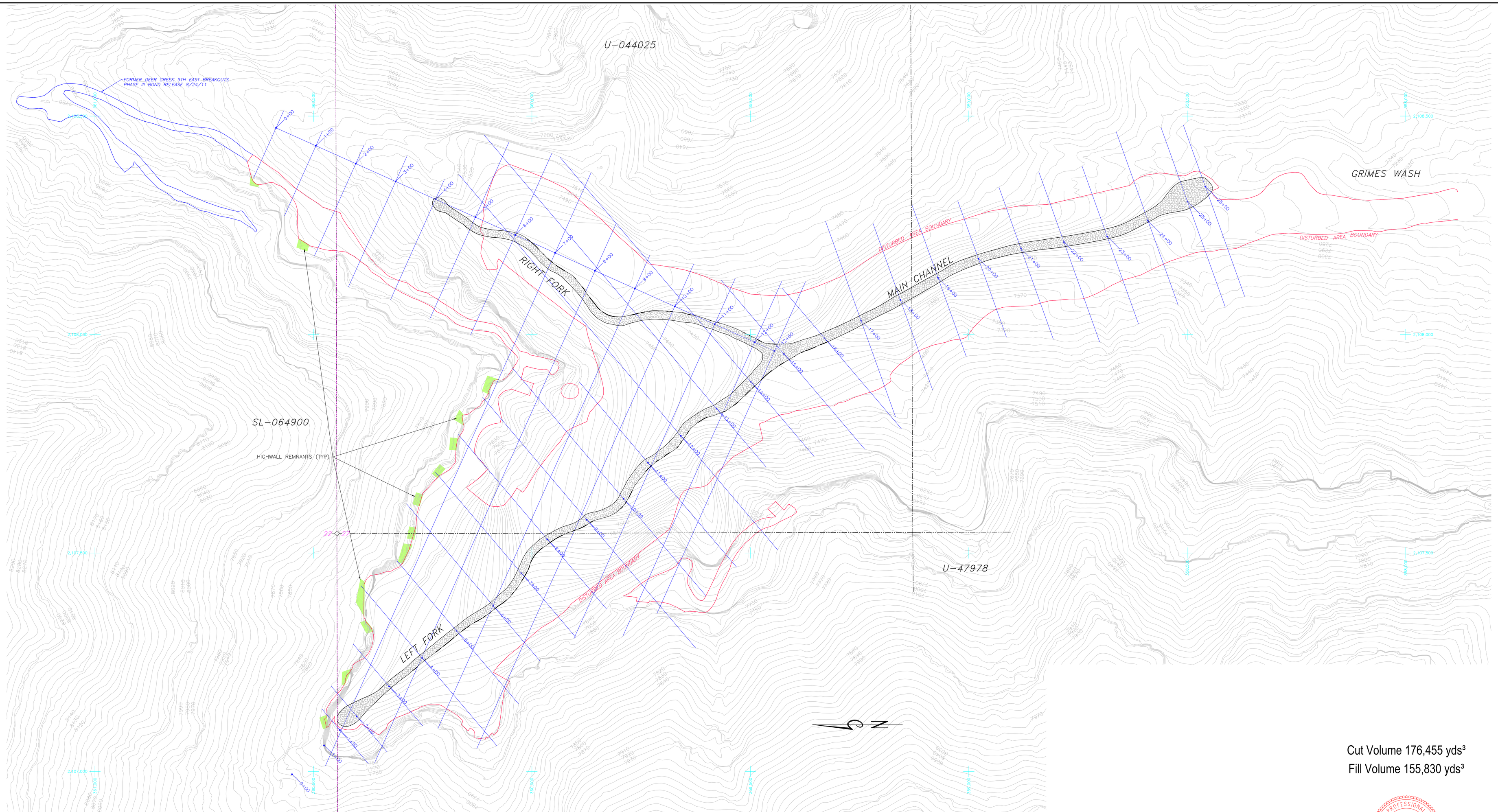
CAD FILE NAME/DISK#: RUSLE CALC

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD/WILBERG MINE
FINAL RECLAMATION MAP
RUSLE SLOPES FOR SOIL LOSS CALCS

DATE	REVISIONS	BY	CHK.
7/2015	ADDED RUSLE LENGTH SLOPES FOR SOIL LOSS CALCS	DCO	

DRAWN BY: K.J.L. & D.C.O.
SCALE: 1"=100'
DATE: JUNE 21, 2015
DRAWING #: .....
SHEET 1 OF 1
REV. ___



DRAINAGE	FROM STATION	TO STATION	100 YEAR FLOW (cfs)	MAX. CHANNEL SLOPE %	BOTTOM WIDTH (ft)	WATER DEPTH (ft) *	RIPRAP THICKNESS (ft) **
RIGHT FORK	0+00	9+00	656	7%	10	2.6	3.75
LEFT FORK	0+00	2+00	NA	NA	NA	NA	NA
	2+00	4+60	416	2%	10	2.9	3.75
	4+60	16+00	416	11%	10	1.7	3.75
MAIN CHANNEL	16+00	22+63	1070	5%	10	3.6	3.75
	22+63	23+40	1070	0%	10	11	3.75

NOTES:

1. SEE SHEET 2 FOR PROFILES
2. THIS MAP IS BASED ON THE HUNTER PLANT STATE PLANE COORDINATE DATUM, T.17S., R.7E. S.L.B. & M.
3. HUNTER PLANT C.A.F. = 1.0003022, EAST MTN. C.A.F. 1.000435
4. * ALL CHANNELS WILL BE CONSTRUCTED TO PROVIDE A 2.0' FREE BOARD
5. ** D_{50} = 3.0' RIPRAP, MAXIMUM RIPRAP = $D_{50} \times 1.25$
6. MAXIMUM SLOPE FOR RIPRAP STABILITY, DETERMINED FROM EQUATION $D_{50} = 9.8\ C\ (nq)^{0.6}\ S^{0.7}$
7. MANNING n = .035 FOR COMPOSITE BEDROCK AND RIPRAP CHANNEL

Cut Volume 176,455 yds³

Fill Volume 155,830 yds³

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

4-2

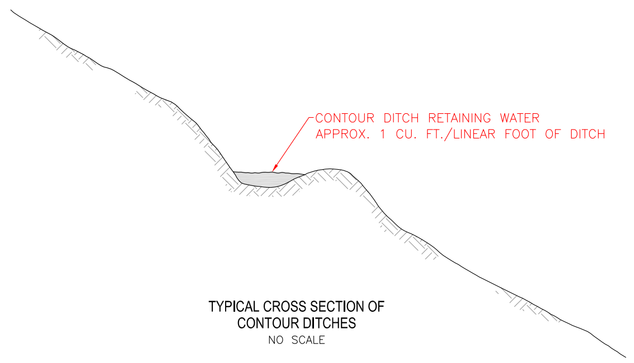
CAD FILE NAME/DISK#: REVISED PERMIT MAPS FOR COTTONWOOD RECLAMATION PLAN

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

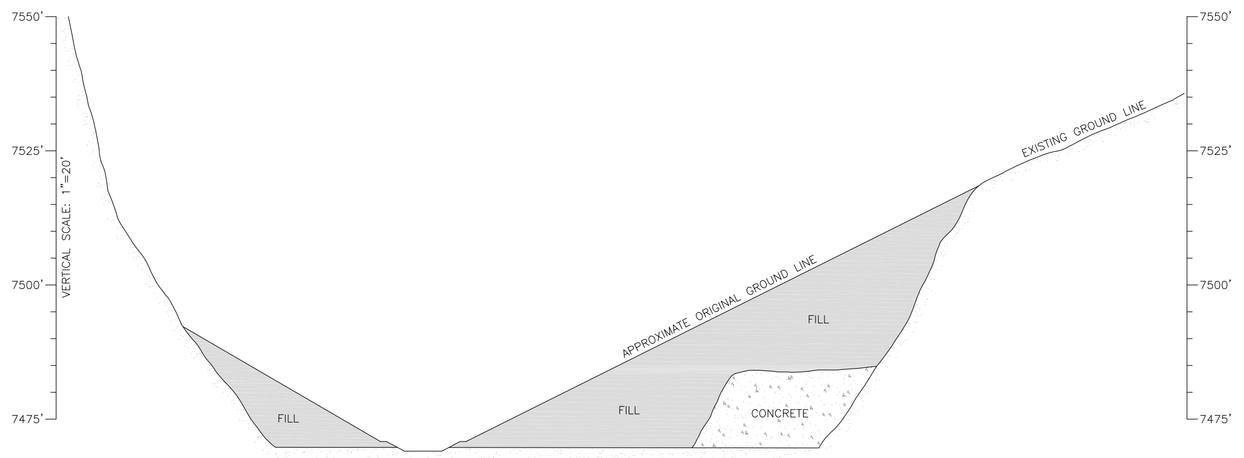
COTTONWOOD/WILBERG MINE FINAL RECLAMATION MAP

DATE	REVISIONS	BY	CHK.
7-24-15	REVISED TO REFLECT A SINGLE PHASE RECLAMATION VS. 2 PHASES	KJL	
5-29-15	REVISED UTILIZING CARLSON SOFTWARE & AEROQUEST TOPOGRAPHY	KJL	
10-31-11	ADDED 9TH EAST BREAKOUT PHASE III BOND RELEASE DELINEATION	KJL	
12-20-00	CONVERTED DRAWING TO AUTOCAD/REVISED MASS BALANCE TABLE	KJL	
8-29-89	REVISED CONTOUR LINES & MASS BALANCE TABLE	J&T	TJF
8-31-89	REVISED UP&L CO. PERMIT BOUNDARY LEASE U-044025	KJL	TJF
6-1-89	CHANGED CONTOUR LINES & ADDED MASS BALANCE TABLE		LJG
3-1-89	REVISED TITLE BLOCK TO INCLUDE COTTONWOOD MINE	JRG	
11-5-84	REVISED RIPRAP THICKNESS	SMC	
8-7-84	REVISED DRAINAGE TABLE	SMC	
5-1-84	REALIGNED DIVERSION CHANNELS TO ORIGINAL FORMATION	SMC	
1-13-84	ADDED SHEET 2 & PROFILE STATIONING	SMC	
11-12-83	UPDATED FINAL RECLAMATION CONTOURS	SMC	
29 SEPT 83	PROPERTY BOUNDARY REVISED TO INCLUDE SPECIAL USE PERMITS	AWB	SMC
9-22-81	ADDED FEDERAL COAL LEASE U-47978	SMC	SMC

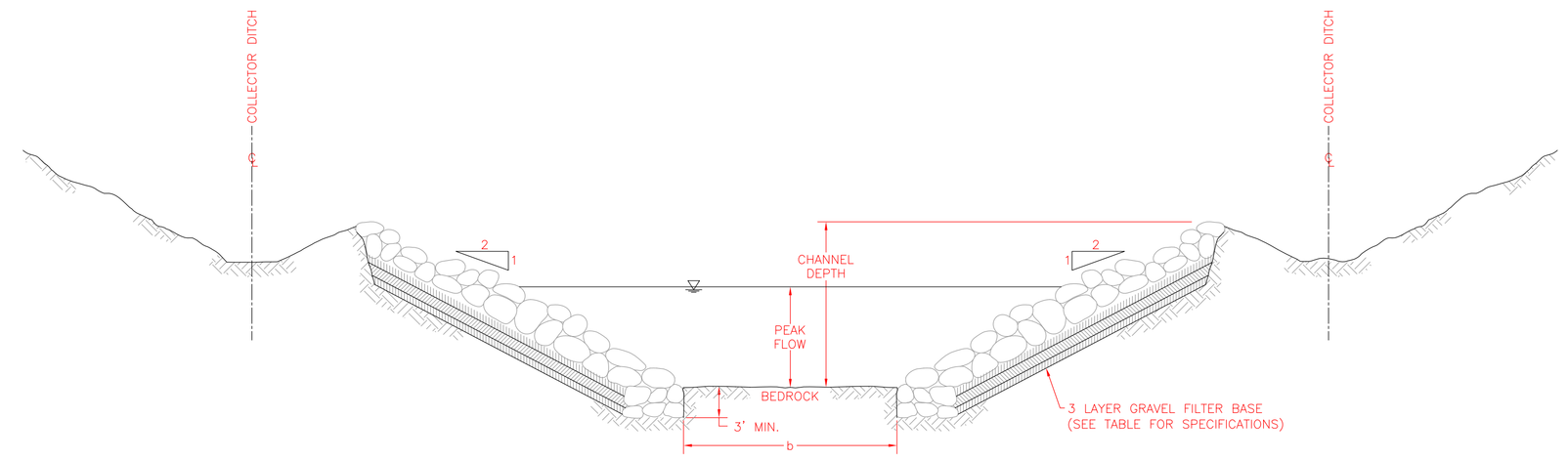
DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JULY 24, 2015
CM-10378-WB
DRAWING #:
SHEET 1 OF 2
REV. ___



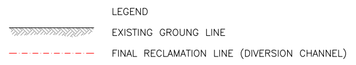
TYPICAL CROSS SECTION OF
CONTOUR DITCHES
NO SCALE

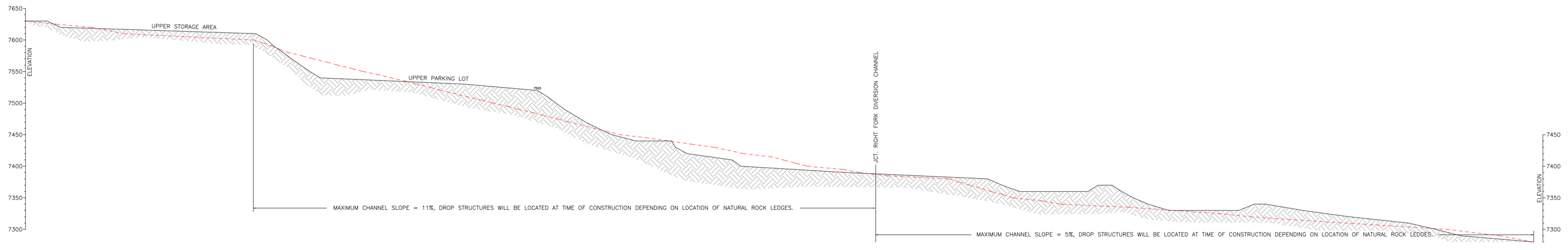


TYPICAL CROSS SECTION
HORIZONTAL SCALE: 1"=40'

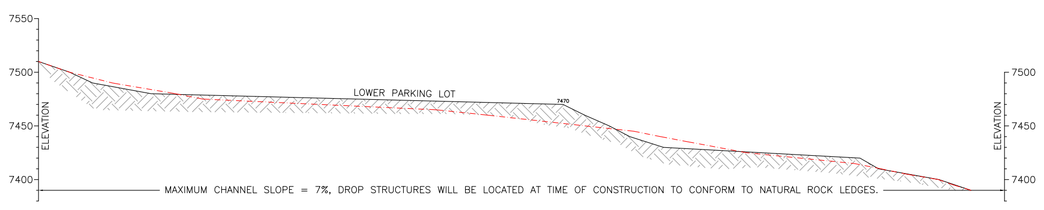


TYPICAL CHANNEL DRAINAGE CROSS SECTION
WITH SEDIMENT COLLECTOR DITCHES
NO SCALE

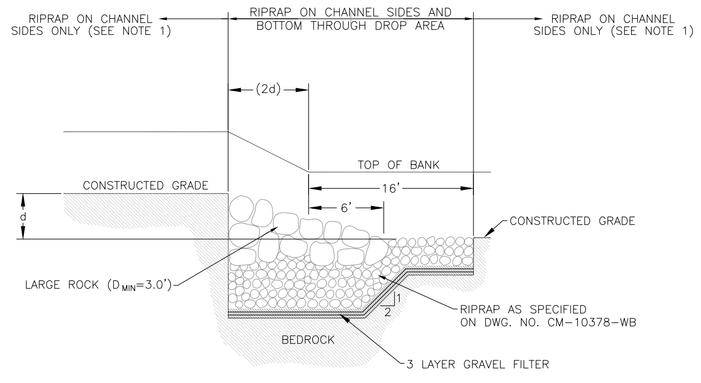




LEFT FORK



RIGHT FORK

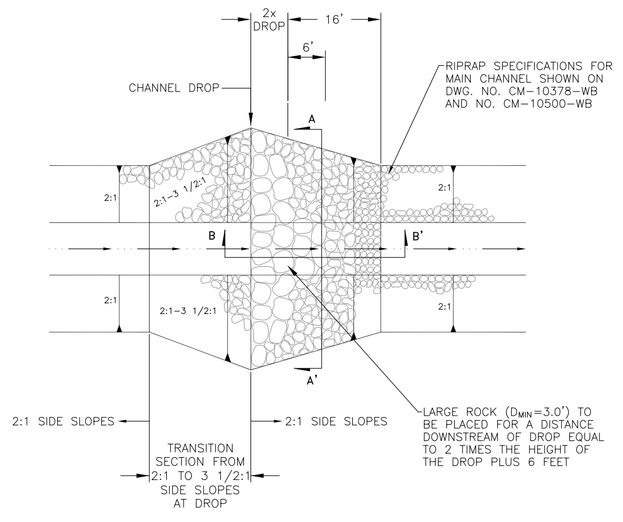


SECTION B-B'
TYPICAL DROP STRUCTURE RIPRAP DETAILS
NOT TO SCALE

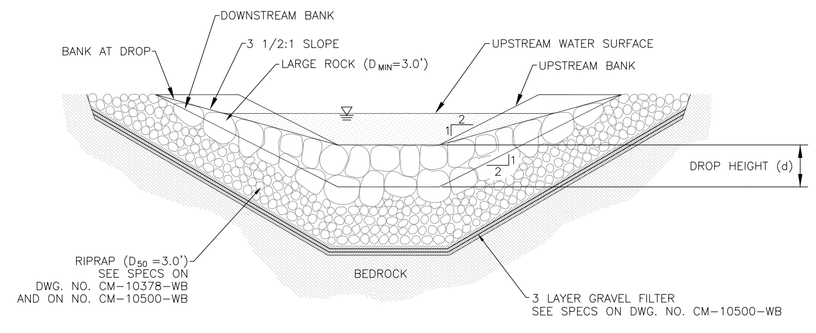
GRAVEL FILTER & RIPRAP SPECIFICATIONS					
	D_{15} (MM)	D_{50} (MM)	D_{85} (MM)	D_{MAX} (FT)	THICKNESS (INCHES)
BOTTOM LAYER	0.42	1.09	2.00	–	6
MIDDLE LAYER	4.76	12.00	25.40	–	6
TOP LAYER	38.10	95.00	152.00	–	8
RIPRAP	365.00	914.00	–	3.75	

NOTES:

1. CHANNEL BOTTOM IS TO BE RIPRAPPED WHEN COMPETENT BEDROCK IS NOT FOUND.
2. MAX. CHANNEL SLOPE VARIES BETWEEN 5 AND 11 PERCENT.
3. MAX. DROP HEIGHT (d) IS 5 FEET.
4. CONSTRUCTED DROP HEIGHT TO BE DETERMINED IN FIELD.



TYPICAL DROP STRUCTURE - PLAN VIEW
NOT TO SCALE



TYPICAL SECTION A-A'
NOT TO SCALE

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

4-2

CAD FILE NAME/DISK#: REVISED PERMIT MAPS FOR COTTONWOOD RECLAMATION PLAN

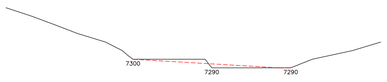
DATE	REVISIONS	BY	CHK.
7-24-15	REVISED TO REFLECT A SINGLE PHASE RECLAMATION VS. 2 PHASES	KJL	
5/29/15	REVISED UTILIZING CARLSON SOFTWARE & AEROQUEST TOPOGRAPHY	KJL	
1/3/01	CONVERTED TO AUTOCAD	KJL	
3/1/89	CHANGED TITLE BLOCK	JRG	
10/25/84	ADDED TYPICAL DROP STRUCTURE CROSS SECTION	AWB	SMC
8/7/84	REVISED CHANNEL PROFILE TO INCLUDE DROP STRUCTURES	SMC	SMC
5/3/84	PROFILE REVISED TO MATCH REVISED DIVERSION CHANNEL	LJG	SMC

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

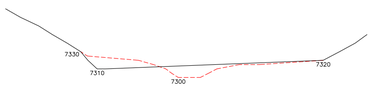
COTTONWOOD/WILBERG MINE
FINAL RECLAMATION MAP

DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JULY 24, 2015
DRAWING #: CM-10378-WB
SHEET 2 OF 2
REV. ---

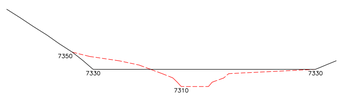
STA. 25+50



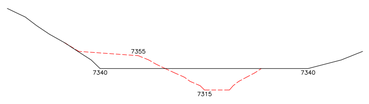
STA. 25+00



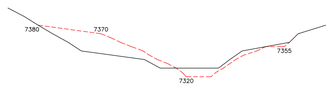
STA. 24+00



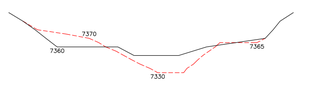
STA. 23+00



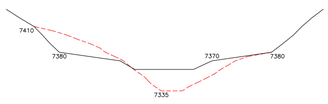
STA. 22+00



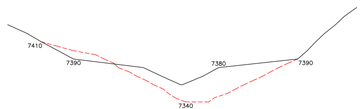
STA. 21+00



STA. 20+00



STA. 19+00



STA. 18+00

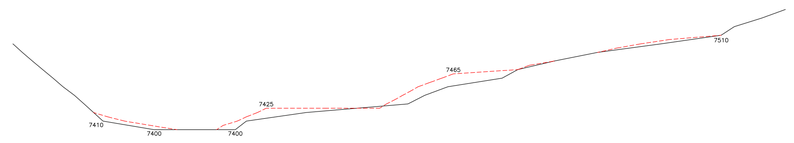
STA. 17+00

STA. 16+00

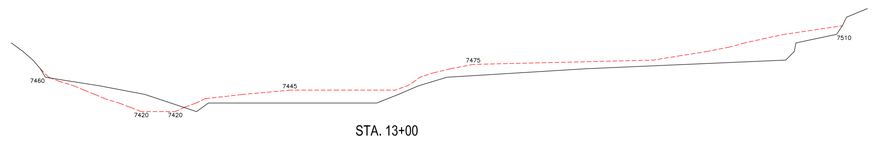
STA. 15+00

MAIN CHANNEL

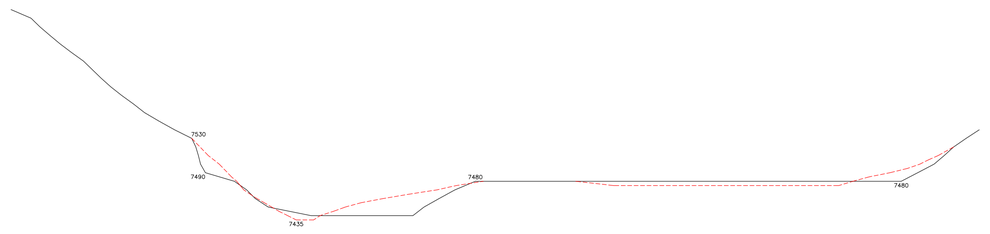
NOTE:
SEE CM-10378-WB SHEET 1 OF 2 FOR LOCATION OF CROSS SECTIONS



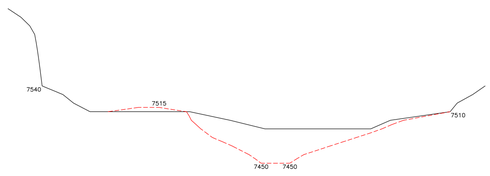
STA. 14+00



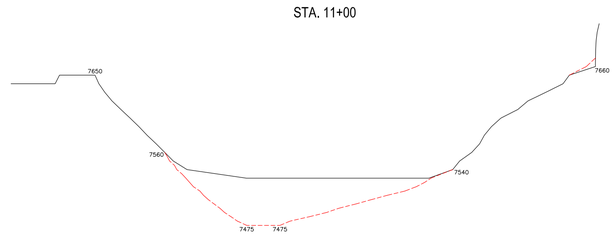
STA. 13+00



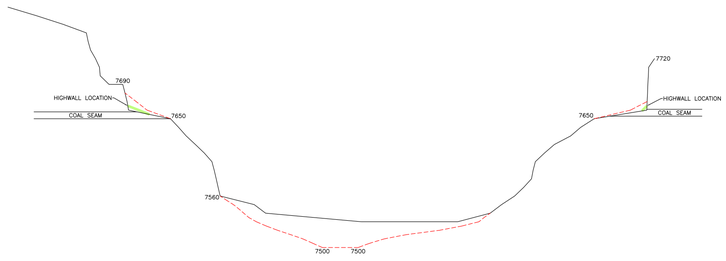
STA. 12+00



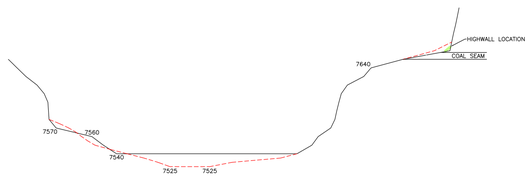
STA. 11+00



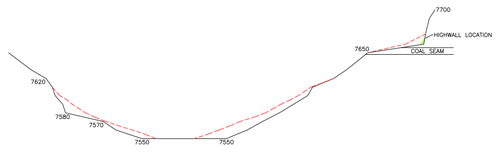
STA. 10+00



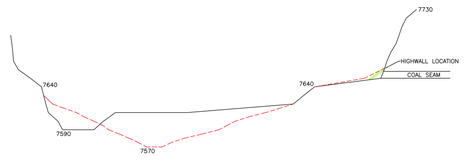
STA. 9+00



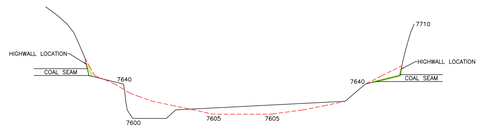
STA. 8+00



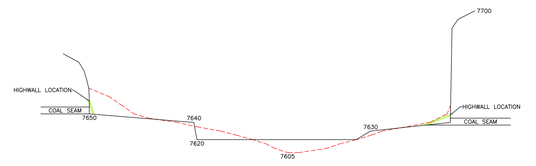
STA. 7+00



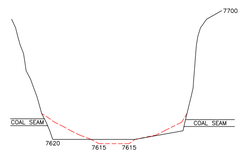
STA. 6+00



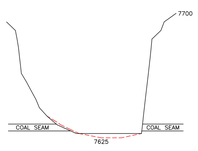
STA. 5+00



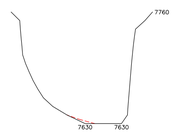
STA. 4+00



STA. 3+00



STA. 2+00



STA. 1+50

LEFT FORK

Cut Volume 176,455 yds³
Fill Volume 155,830 yds³

LEGEND

EXISTING GROUND LINE
FINAL RECLAMATION LINE

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

4-3

CAD FILE NAME/DISK#: REVISED PERMIT MAPS FOR COTTONWOOD RECLAMATION PLAN

DATE	REVISIONS	BY	CHK.
7-24-15	REVISED TO REFLECT A SINGLE PHASE RECLAMATION VS. 2 PHASES		
5-29-15	REVISED UTILIZING CARLSON SOFTWARE & AEROQUEST TOPOGRAPHY	KJL	
11-13-01	ADDED SUBSTITUTE TOPSOIL LOCATIONS	KJL	
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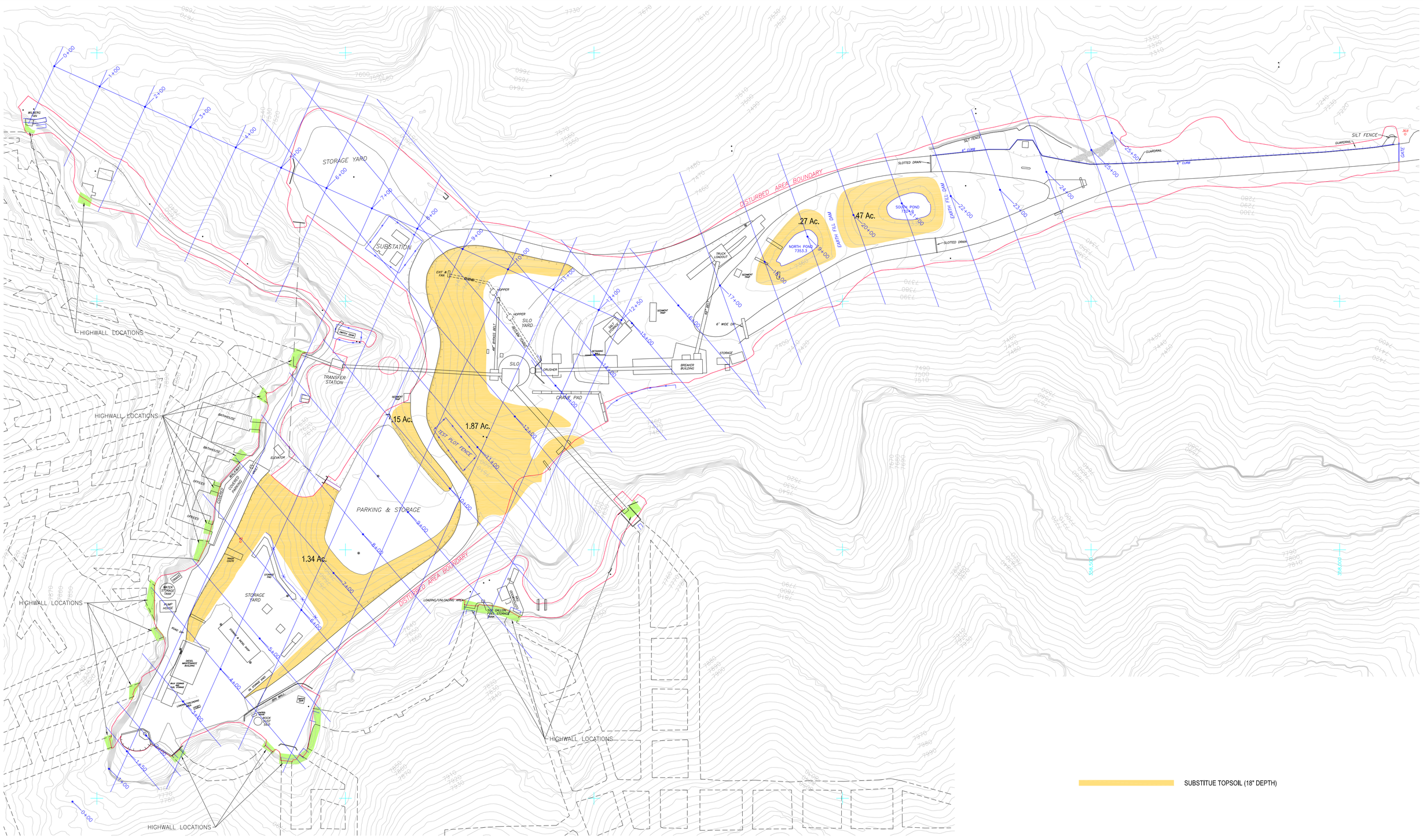
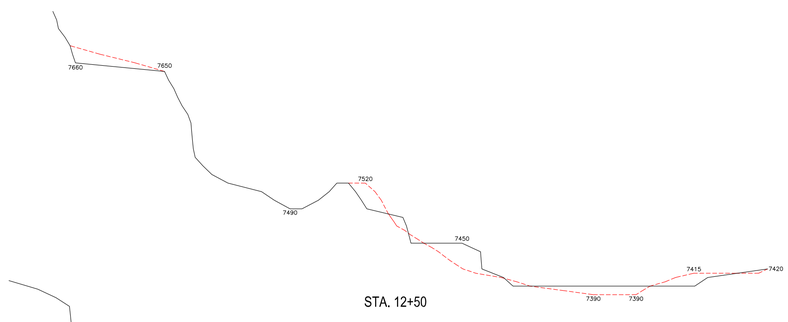
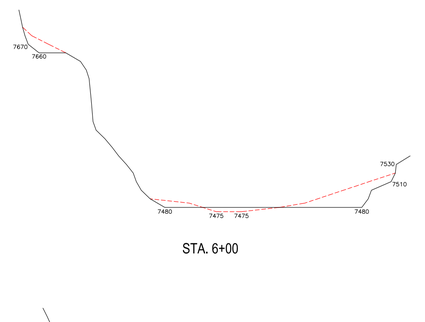
INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

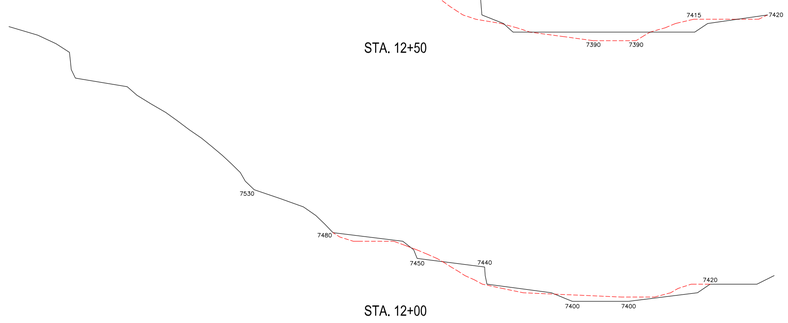
COTTONWOOD/WILBERG MINE DISTURBED MINE PLAN AREA CROSS SECTIONS

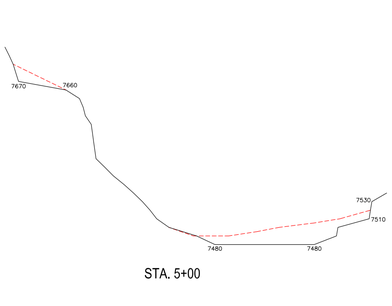
DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JULY 24, 2015
DRAWING #: CM-10484-WB
SHEET 1 OF 2
REV. ___

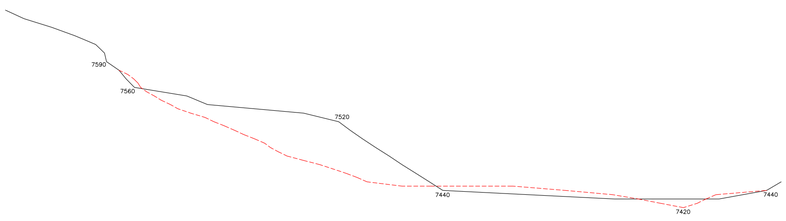


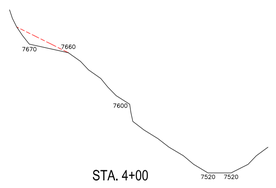


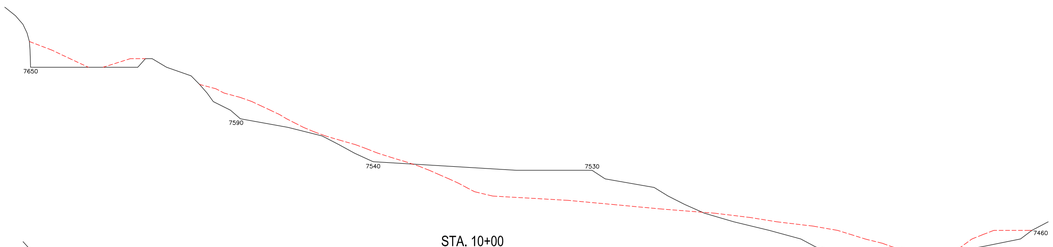


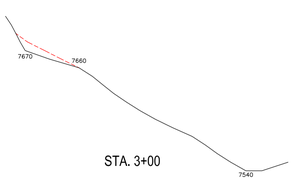


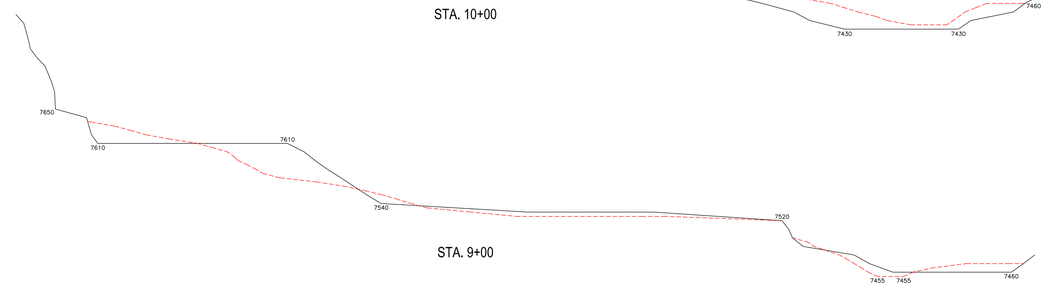


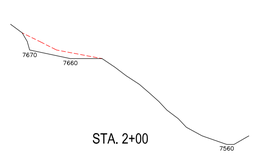


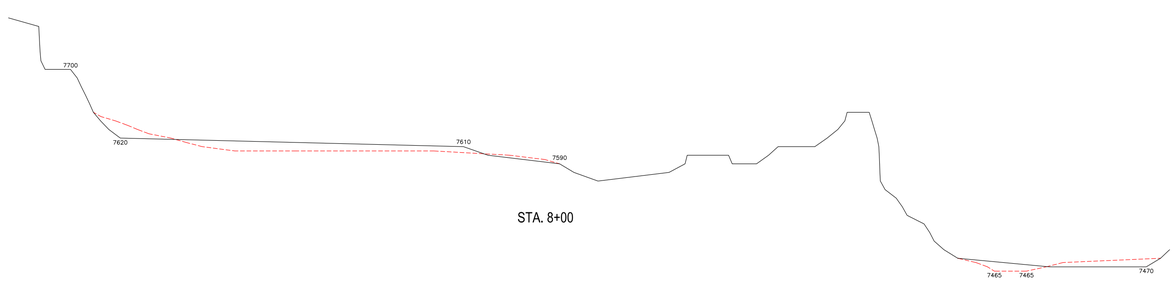


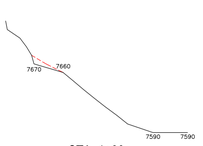


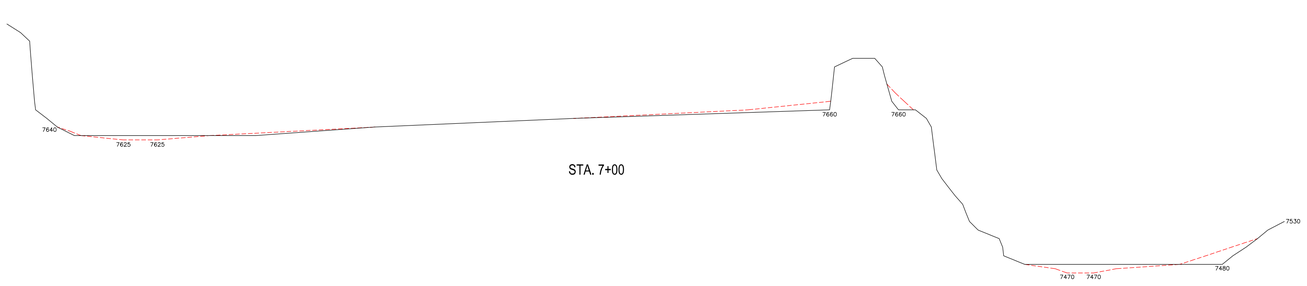


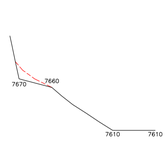












RIGHT FORK

Cut Volume 176,455 yds³

Fill Volume 155,830 yds³

LEGEND

EXISTING GROUND LINE

FINAL RECLAMATION LINE

SUBSTITUE TOPSOIL (18" DEPTH)

NOTE:
SEE CM-10378-WB SHEET 1 OF 2 FOR LOCATION OF CROSS SECTIONS

DATE	REVISIONS	BY	CHK.
7-24-15	REVISED TO REFLECT A SINGLE PHASE RECLAMATION VS. 2 PHASES	KJL	
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LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

4-3

CAD FILE NAME/DISK#: REVISED PERMIT MAPS FOR COTTONWOOD RECLAMATION PLAN

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD/WILBERG MINE DISTURBED MINE PLAN AREA CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JULY 24, 2015
DRAWING #: CM-10484-WB
SHEET 2 OF 2
REV. ___