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**State of Utah**  
DEPARTMENT OF NATURAL RESOURCES

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**Division of Oil, Gas and Mining**  
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**Technical Analysis and Findings**  
**Utah Coal Regulatory Program**

**PID:** C0250005  
**TaskID:** 4652  
**Mine Name:** COAL HOLLOW  
**Title:** ADDITION OF UNDERGROUND MINING

**Summary**

This amendment to mine an additional sixty two acres of coal using underground mining technology was accepted for review on August 15, 2014. Portals will be developed from Pit 11 (as shown on Dwg 5-10A and Dwg 5-3B) to recover 725,000 tons of coal using a continuous miner and first mining only (Chap. 5, p. 5-22). With with this additional surface acreage, the total disturbed area will be 483 acres. The permit area remains 721 acres. Underground mining will not extend the life of mine beyond year six or 2017 (Chap. 5, p. 5-24 and Dwg 5-10A) .

*Deficiencies Details:*

None

pburton

The Division requires additional information from the Permittee to analyze and determine whether or not the Permittee has a sufficient amount of bond in place to continue mining in the Phase III area.

*Deficiencies Details:*

None

phess

**General Contents**

**Right of Entry**

*Analysis:*

Underground mining will take place in fee coal located in T39 S, R 5 W Sec 20, S1/2 SW1/4, owned by C. Burton Pugh, Roger M. Pugh and Margaret Moyers (Exhibits 1, 3, and 4 in. Appendix 1-2 Confidential Folder). Burton Pugh's lease dated 9/10/2014 grants "the right right to conduct mining activities using all available methods for the extraction, mining and removal of the coal" (Article 1, Sec. 1.01(ii)). Similar language is found in the lease agreements with Roger Pugh and Margaret Moyers.

**Permit Term**

*Analysis:*

Disturbed acreage is listed by mining phase in Section 116 of the MRP. Section 116 should be updated with this application along with drawings 5-16A, 5-18, 5-19, 5-38 and 5-38A.

The permit term is not extended by this application beyond 6 years (2017) at which time Pit 11 will be reclaimed. If the Permittee has an interest in extending the underground operations eastward into adjacent lands and thereby delaying reclamation of pit 11, then a statement of the interest in contiguous lands should be declared in accordance with R645-301-112.800. If there is no interest in contiguous lands, then application should provide a narrative and timeline for reclamation of the portals and the pit in which they are located.

*Deficiencies Details:*

R645-301-116, Disturbed acreage is listed by mining phase in Section 116 of the MRP. Section 116 should be updated with this application along with drawings 5-16A, 5-18, 5-19, 5-38 and 5-38A.

R645-301-112.800, The permit term is not extended by this application beyond 6 years (2017) at which time Pit 11 underground access will be reclaimed. If the Permittee has an interest in extending the underground operations eastward into adjacent lands and thereby delaying reclamation of pit 11, then a statement of the interest in contiguous lands should be declared in accordance with R645-301-112.800. If there is no interest in contiguous lands, then application should provide a narrative and timeline for reclamation of the portals and the pit in which they are located.

pburton

**Permit Application Format and Contents**

*Analysis:*

There are several pagination and formatting problems within the application submitted to the Division as well as problems within the currently approved MRP.

*Deficiencies Details:*

R645-301-121 The proposed clean-copy version of page 7-97 does not contain the information changed in the red-line version of the application.

R645-301-121 The following sets of pages within the approved MRP have information cut off between pages: 7-4 to 7-5, 7-12 to 7-13, 7-23 to 7-24, and 7-25 to 7-26. Please correct these problems.

adaniels

**Permit Application Format and Contents**

*Analysis:*

Clarify referenced rule: Rule R645-301-624.400 does not exist.

*Deficiencies Details:*

Clarify referenced rule: Rule R645-301-624.400 does not exist.

kstorrar

**Permit Application Format and Contents**

*Analysis:*

*Deficiencies Details:*

R645-301-121.200, The pagination of the Table of Contents is not accurate and must be revised.

pburton

**Environmental Resource Information**

## Geologic Resource Information

### Analysis:

The applicant does not discuss the underlying geology or aquifer characteristics of the strata directly above or below the area of underground mining. The referenced cross-sections in Drawing 7-15B show a northeast to southwest trending Tropic Shale paleo-valley filled with alluvial deposits. Beginning at cross-section B-B' the alluvial deposits progressively thicken northeasterly towards E-E'. Another cross-section to the north of E-E' is necessary in order to make certain the Tropic Shale is present and adequately thick enough to act as a confining layer between the 'Potential Coarse Grained Alluvium' aquifer and the Smirl coal seam.

### Deficiencies Details:

R645-301-622.200, -624.110, -642.210; R645-301-722, -725.100: Need a geologic cross-section between drill holes CH-1-05 and CH-2-05 (extrapolation may be necessary below abandonment depth of well CH-2-05), north of cross-section E-E' in drawing 7-15. Cross-section should include:

- 1) the sink valley fault
- 2) geologic stratum
- 3) aquifer contained within alluvium and pre-mining potentiometric surface
- 4) delineation between 'Fine Grained Alluvium' and 'Potential Coarse Grained Alluvium' if present

kstorrar

## Probable Hydrologic Consequences Determination

### Analysis:

The PHC was not updated with the proposal to underground mine. This should be updated to evaluate whether there are any impacts with the change in mining plan to the hydrologic balance. The approved PHC also includes a discussion of actions to be taken if pits 13, 14, and 15 are mined. It is unclear if any of these actions are still applicable if the underground mining plan is approved. The Permittee should determine if mining of pits 13, 14, and 15 is still a possibility if they get approval to underground mine through those proposed panels. Up-gradient alluvial groundwater drainage into mine pits is mitigated in the MRP by backfilling pits within 60 to 120 days after pit mining is complete. The MRP underground mining revision will keep pits and portals open for a longer period of time than previously anticipated. Appreciable groundwater inflow into the open pits during the extended time may dewater up-gradient water resources.

### Deficiencies Details:

R645-301-728.350 Update section 728, Probable Hydrologic Consequences, of the MRP to include an evaluation of potential impacts to the hydrologic balance with the addition of underground mining.

R645-301-728.334 In multiple sections of the PHC, groundwater impacts are evaluated based on the intention of leaving pits open less than 60 to 120 days. The pits where the underground mining portals will be located will be left open for a longer period of time, so these sections of the PHC should be updated to assess impacts of leaving these pits open.

R645-301-728.400 If pits 13, 14, and 15 will no longer be surfaced mined due to proposed underground mining, commitments in the current PHC regarding the construction of a low-permeability barrier should be evaluated to determine if this information is still needed in the plan. Section 731.530 of the approved MRP should also be updated to indicated that the water-replacement well has already been drilled.

adaniels

## Maps Subsurface Water Resources

### Analysis:

While reviewing the hydrology sections of the approved MRP, it was noticed that maps 7-4 and 7-5 have an out-dated permit boundary on them.

### Deficiencies Details:

R645-301-722 Please update maps 7-4 and 7-5 of the approved MRP, to contain the most current permit boundary.

adaniels

## Maps Surface Water Resource

### Analysis:

While reviewing the hydrology sections of the approved MRP, it was noticed that maps 5-25 and 5-26 have an out-dated permit boundary on them.

### Deficiencies Details:

R645-301-722 Please update maps 5-25 and 5-26 of the approved MRP, to contain the most current permit boundary.

adaniels

## Operation Plan

### Mining Operations and Facilities

### Analysis:

#### TYPE AND METHOD OF MINING OPERATIONS

REGULATORY REFERENCE: R645-301-521.141

#### Analysis:

Page 5-12, section 521.141 and Page 23, briefly discusses the addition of underground coal mining methods utilizing a continuous miner, shuttle cars, and a roof bolter to develop the BLM right of way toward the two sections of SITLA coal ESE of the present mine.

Page 5-25, red font / underlined text discusses the second type of mining implemented at Coal Hollow, the highwall method. Page 5-26, red font / underline discusses the three methods of coal mining which have been utilized at the Coal Hollow mine. These were discussed previously in section 522.

This is the third type of mining to be implemented at Coal Hollow with surface mining and highwall mining being the first two. Coal brought to the surface will flow onto a stacking conveyor and stockpile as shown on Drawing 5-3B.

The P.E. certification on Drawing 5-3B is out of date, and it should be re-evaluated for the drawings revisions.

Page 5-26, section 523, Mining Method(s) states that there are no underground mines within 500 feet of the permit boundary. The red line revised text of this section states that "No surface mining or reclamation activities are proposed to take place within 500 feet of the underground mine." This statement should be re-evaluated by the Permit applicant as its stated meaning is that no backfilling, grading, topsoiling or re-vegetation work can occur within 500 feet of the underground Coal Hollow Mine.

R645-301-524.212 comes from the Blasting and Explosives section of the R645 coal mining rules, and its intent was to forbid the initiation of overburden surface shots when the blast area was within 500 feet of an underground mining operation. It is obvious that ground vibration from a burden shot using hundreds of thousands of pounds of ANFO could shake underground roof conditions. This would in turn affect the safety of the underground miners. To say that no reclamation activities will occur within 500 feet of the underground mine may prevent some stage of reclamation of the final pits which were mined and still need reclamation.

Page 5-36 contains a revision to the Underground Mining Facilities. The revised text discusses the proposed mine fan, stacking conveyor, and portable generator, all of which are considered temporary. All of these new underground components will be located in the bottom of Pit 11, where the face-up drift entries will be located (See Drawing 5-3B).

The added description of the mining method to be implemented to recover underground reserves meets the requirements of this section. The red line revised text of this section states that "No surface mining or reclamation activities are proposed to take place within 500 feet of the underground mine." This statement should be re-evaluated by the Permit applicant as its stated meaning is that no backfilling, grading, topsoiling or re-vegetation work can occur within 500 feet of the underground Coal Hollow Mine. The Division expects that all reclamation of the surface mined pits (with the exception of Pit 11) be completed within one year of the initiation of underground mining.

In accordance with the requirements of R645-301-524.212, Drawing 5-3B should be re-certified for the Task ID # 4652 application.

### Deficiencies Details:

R645-301-525.212, Blasting within 500 feet of an active or abandoned underground mine. The added description of the mining method to be implemented to recover underground reserves meets the requirements of this section. However, the red line revised text of this section states that "No surface mining or reclamation activities are proposed to take place within 500 feet of the underground mine." This statement should be re-evaluated by the Permit applicant as its stated meaning is that no backfilling, grading, topsoiling or re-vegetation work can occur within 500 feet of the underground Coal Hollow Mine.

R645-301-525.212 references that if a Permittee needs to blast within 500 feet of an active or abandoned underground mine, that an anticipated blast design be submitted to the Division. No blast design was submitted as part of the Task ID # 4652 application. The revised text (no surface mining or reclamation activities are proposed to take place) dictates that no reclamation activities will occur within 500 feet of the deep mine face-up. The Division expects that all reclamation of the surface mined pits (with the exception of Pit 11) be completed within one year of the initiation of underground mining. In accordance with the requirements of R645-301-524.212, Drawing 5-3B should be re-certified for the Task ID #4652 application.

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## Mining Operations and Facilities

### Analysis:

R645-301-515.311 Text was added to the MRP to include the monitoring and maintain the portals to the underground operations during temporary cessation. The operator provided updated section 521 of the original MRP operation plan to include underground operations by an underground miner as a third alternative to coal recovery operations. Section R645-301-521.142 was added to address the regulations regarding subsidence mining and identified that subsidence will be prevented. The application shows the updated mine facilities to include the underground mining facilities show in Drawing 5-3 B.

### Deficiencies Details:

In accordance with R645-301-515.321 the statement in this section needs to be updated to include any potential underground opening closures and water treatment activities that will continue during the temporary cessation.

R645-301-521.141 the text was edited to include the updated Drawings, however, the text only references surface mining while the Drawings include surface and underground mining. Following said paragraph in section 521.141 a new paragraph was added describing the underground operations but only references Drawings 5-3B and 5-10A when Drawings 5-3, 5-9A, 5-10A and 5-38 (as currently labeled) also show relevant information. As per R645-301-521.141, this section of text should be edited to include all the properly labeled Drawings that are relevant to understanding both surface and underground operations.

The text in the section 526 mine facilities R645-301-121,-121.100 for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-521.142 states that subsidence will be prevented by following the recommendations provided in the reference Norwest Corporation letter report, Appendix 5-9. The attached report included recommendations of a seven or five entry designs but does not reference or detail the calculations for pillar stability of the three entry design shown on Drawing 5-10A. See subsidence control plan section for further discussion. The calculations for pillar safety and percent extraction for the proposed five underground sections is not included and should be to verify no subsidence around the portals where overburden is relatively thin.

R645-301-521.162 text needs to be updated to include a yearly and overall disturbance sequence for the permitted area on Drawing 5-2 for open pit mining, alternative method of highwall mining, and underground mining.

R645-301-521.163 needs to be updated to include specific reclamation techniques required for reclamation of underground operations as well as the area of land shown on the updated Drawing 5-3.

R645-301-521.170 the transportation facilities text and drawings need to be updated to include the new conveyor system and the portal access/haul road associated with underground operations.

cparker

## Mining Operations and Facilities

### Analysis:

Drawing 5-10A indicates that the portals will be developed from Pit 11. Cross-section 5-3B shows portal pad development with benches every fifty feet. As discussed during a recent site visit, the portals may be developed in Pit 10 rather than Pit 11 as shown on Drawing 5-10A and if so, the benches developed in pit 10 are at 40 ft. intervals. A commitment to provide as-built maps for Drawing 5-10A and 5-3B is requested in the MRP.

*Deficiencies Details:*

R645-301-121.100, As discussed during a recent site visit, the portals may be developed in Pit 10 rather than Pit 11 as shown on Drawing 5-10A and if so, the benches developed in pit 10 are at 40 ft. intervals rather than the 50 ft. intervals shown on Dwg 5-3B. A commitment to provide as-built maps for Drawing 5-10A and 5-3B is requested in the MRP.

pburton

## **Air Pollution Control Plan**

*Analysis:*

The applicant will need to update the current plan to include emissions from generators and any other emission type equipment that may be needed to facilitate under ground mining activities and provide the appropriate approvals from the Division of Air Quality.

*Deficiencies Details:*

R645-301-422; The applicant will need to update the current plan to include emissions from generators and any other emission type equipment that may be needed to facilitate under ground mining activities and provide the appropriate approvals from the Division of Air Quality.

jhelfric

## **Coal Recovery**

*Analysis:*

### **COAL RECOVERY**

REGULATORY REFERENCE: R645-301-522

*Analysis:*

Page 5-22 contains a revised potential recovered tons chart which shows the amount of recoverable tons available from the addition of underground mining within the Coal Hollow Mine permit area.

The chart shows that 3,298,000 tons of coal have been recovered from the surface mining operation, and that a projected tonnage of 725,000 tons is recoverable from the development of the underground mine. A 45 % recovery factor for the underground mining reserves is stated.

Page 5-24 contains a revised / red font chart enumerating the tons anticipated to be mined during years 4,5, and 6. The Year 6 tonnage is listed as being 431,000 tons.

*Findings:*

The anticipated recoverable tonnage is low at 45 %, but this supports the geotechnical information that no subsidence will occur in the Coal Hollow Mine if a 50 % or less extraction ratio is met.

phess

## **Coal Recovery**

*Analysis:*

The application shows the updated quantity tables to include the underground operations and adjusted surface operations. The application shows the updated produced tons table with underground operations for years four through six.

*Deficiencies Details:*

R645-301-121,-121.100 The redline section of Chapter 5, page 5-22 through 5-26 does not use the latest incorporated version of the MRP that the Division has on file. The current version of the MRP has incorporated task items #4517 (3/21/2014) and #4605 (6/25/2014) which supersedes all prior versions.

R645-301-522 requires a discussion of the underground operation designs that will utilize an extraction of 50% or less, and a pillar width/height ratio in excess of 4.0 to negate any subsidence as a best technology currently available to maintain the environmental integrity of the site so that re-affecting the land in the future through coal mining and reclamation operations is minimized. In the event the portals will remain open and future underground operations are to occur outside the current permit boundary a discussion of such intents should also be included. The reference Norwest Report (appendix 5-9) reference designs for the Federal Right of Way and not sections within the permitted area.

R645-301-523 The opening text of this section needs to be updated to reflect the underground mining methods as well as the open pit methods, including underground mining equipment.

R645-301-523 The following paragraph needs to be updated to reflect the updated alternative option tons produced from 3.0 million tons of coal to 3.5 million tons of coal with an update life approximation.

R645-301-523.100,-523.200.-523.220 Additional detail must be added to describe the sequence of mining and reclamation activities associated with Pit 9 Panel 3, Pit 10, and Pit 11 reclamation. If the portals are install within Pit 10 instead of Pit 11, as shown on Figure 5-10A, Pit 9 will likely fall within the 500 feet radius and will need to be addressed as to what its current state will be at the point of start of underground mining.

cparker

## Subsidence Control Plan Subsidence

### Analysis:

R645-301-525, Subsidence Control Plan  
REGULATORY REFERENCE: R645-301-525

### Analysis:

Appendix 5-9 contains two letters from the Norwest Corporation which discuss the design of pillar dimensions in various areas of the Mine. All designs were made to keep the extraction ratios less than 50 % in order to minimize the possibility of subsidence.

### Geotechnical Report from Norwest Corporation

The Permittee, Alton Coal Development, LLC received a geotech report from Norwest Corporation mining engineer John C. Lewis, Utah registered professional engineer on March 19, 2013 which contains two parts. The first part discusses the subject of "Pillar Dimensions for the Federal Right-of-Way". This right-of-way is necessary to access the SITLA coal reserves in T40 S, R 5 W, Section 2 and T 39 S, R 5 W, Section 36 which are located ESE of the Alton Coal Mine.

The second part of the geotech report discusses "Pillar Dimensions in Areas with Less than 300 feet Overburden".

### Part One

The Federal ROW is 16,500 feet long, and will consist of seven entries driving due east off of the highwall of Pit 11 (east side). As shown on Drawing 5-10A, (See Task ID #4652 application), panels having seven entries will be driven north to enhance recovery of the reserves.

The Norwest analysis divides the BLM right-of-way into four distinct areas which vary according to the amount of overburden above them. Norwest used the stability program Analysis of Retreat Mining Pillar Stability (ARMPS) 6.2.01 to calculate the stability factors of the analyzed pillar sizes based on estimates of the loads applied to, and the load bearing capacities of pillars during both the development (first mining) and the extraction (second mining) of them.

ARMPS is a single seam analysis package, and the results which have been generated by it have been supported by 600 case histories in ten different coal producing states.

ACD has developed the following parameters for the entry heights and widths;

- 1) A mining height of 12 feet will be met.
- 2) Entry widths of 20 feet will be developed.
- 3) An average compressive strength of 900 p.s.i. will be utilized to determine the sizes of each pillar in each area.
- 4) A cross-cut angle of 90 degrees will be used..
- 5) Extraction percentages were calculated by using Carlson Software Underground Mining Module's "advanced projections" capability.

The Norwest report contains a FIGURE 2, Federal ROW Cross-Section A-A', which shows a longitudinal cross section of the Smirl coal seam in the Coal Hollow Mine permit area. Figure 2 shows the borders between the four areas discussed and the overburden depths above each.

### Area 1 / 7 Entry Configuration / Overburden Depth ranges from 310 feet to 677 feet

In Area 1, Norwest suggests the use of pillars having 80' X 80' centers. This size of pillar will provide a safety factor of 2.0 to 3.5 in the amount of overburden shown in Table 1 (See page 5 of the Norwest report). The Area of Extraction shown in Table 1 for burden depths of 310 feet to 700 feet varies from 47.1 % to 41.7 %.

As both ratios are less than 50 %, and no pillaring will be conducted, no widespread subsidence should occur in the Area 1 mining area. This determination is also based on information contained in Chapter II, of the "Subsidence" training manual prepared by the U. S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, subtitled Relationship Between Subsidence and Percent Extraction, Figure 2.2.

"Subsidence results as an elastic compression of the coal pillars" (quoted from reference material listed above).

### Area #2 / 7 Entry Configuration / Overburden Depth Ranging from 683 feet to 1000 feet

Area #2 will cross the Bald Knob fault (200 foot displacement). Table 2 shows the optimum pillar dimensions for each cross-section with its overburden depths. Norwest recommends pillars having 100 foot centers between each of the seven

entries. The distances between the cross cuts for burden depths of 700 to 1000 feet can be varied from 100 feet, to 104 feet, with a maximum of 116 feet. These dimensions, will according to ARMPS ensure a safety factor of 2.00 or greater up to 2.32 for all pillars developed within area #2. The extraction ratio for the pillars developed in Area #2 varies from 33.7 % to 38.1 %.

#### Area #3 / 7 Entry Configuration / Overburden Depth Ranging from 1000 feet to 1,389 feet

Area #3 will continue with the seven entry configuration. Table 3 shows the optimum pillar dimensions for each cross-section with its overburden depth. Norwest recommends pillars having 120 foot centers between each of the seven entries. The distances between the cross cuts for burden depths of 1000 feet to 1,389 feet can be varied from 120 feet, to a maximum of 198 feet. Norwest recommends that the optimum pillar dimensions for Area 3 be 120 foot centers by 120 to 145 feet. These dimensions, will, according to ARMPS, ensure a safety factor of 2.00 or greater up to 2.22 for all pillars developed within area #3. The extraction ratio for the pillars developed in Area #3 varies from 30.1% to 32.4%.

Area #4 / 7 Entry Configuration / Overburden Depth Ranging from 621 feet to 1000 feet. These burden depths are similar to those overlying the cross-sections in Area #2. Thus, the centers between each of the seven entries should be maintained at 100 feet, with cross-cut centers to be maintained at 100 feet or greater. A safety factor of 2.0 or greater can be expected with these pillars, which have a similar extraction ration of 33 to 38%.

Page 6-10, section 623-300; Subsidence Control Plan; this section states that "the underground mining has limited extraction with no subsidence. Refer to Appendix 5-9 for the geotechnical report and design information. Due to the design and mining method of underground mining in this plan, no subsidence is projected and no monitoring is planned". The limiting 50 % extraction ratio designed into the Coal Hollow Mine will generally ensure that no subsidence will occur in the coal recovery areas. However, this generalization does not take into account geologic anomalies which could assist with primary roof failures, particularly if roof cracking extends into the upper alluvium. In shallow cover, primary roof failures can develop into "sinkhole" failures to the surface.

#### Findings:

The pillar designs submitted by Norwest Corporation for the BLM right-of-way which will allow Alton Coal Development to access the two sections of SITLA coal reserves located ESE of the Alton Mine are adequate to support the secondary loading of the Tropic Shale over the development entries.

#### Part 2 / Letter #2 from Norwest Corporation dated March 19, 2013 / Pillar Dimensions in Areas with Less than 300 ft Overburden

This letter was written by Mr. John C. Lewis, P.E. of Norwest Corporation in response to the inquiry asked by the senior Manager of Alton Coal Development, Mr. Larry W. Johnson.

ACD asked what pillar dimension should be utilized when mining at burden depths of 300 feet or less. Norwest response stated that "in order to prevent potential pillar failure, ...minimum pillar widths of 48 feet X 48 feet ( 68 foot centers X 68 foot centers)" (should be maintained / PHH) .

Norwest recommended that "in order to provide indefinite pillar stability, the percentage of extraction should be maintained to less than 50% for any given mining development". This can not be assumed as correct if the mining area, as developed, is allowed to flood (even after mining is completed).

Extraction ratios for the five entry square configuration pillars and the seven entry are 53.6% and 52.5% respectively. Since both the main entry and panel configurations exceed the 50 % extraction limit, the pillar dimensions for both the five entry and the seven entry configurations must be increased (See Page 2, of Letter #2, Appendix 9).

Norwest does not recommend mining in areas that have less than 120 feet of burden. Although no pillar extraction is to be practiced in the Coal Hollow underground mine, "sinkhole" type surface affects can occur where the tropic shale can not bridge the 20 foot entry width.

#### Deficiencies Details:

#### R645-301-525.311, Utilization of Subsidence Technology / R645-301-525.490, Other Information

The Task ID #4652 application utilizes the information contained in Appendix 5-9 as technical support for the five entry and seven entry development systems which are intended to prevent subsidence and material damage to the extent economically and technologically feasible, maintain mine stability, and maintain the value and reasonably foreseeable use of the surface lands (See R645-301-525.311).

Appendix 5-9 is to be added to the mining and reclamation plan. It discusses entry width, cutting height, # of entries, extraction ratios, etc. and its contents meet the requirements of R645-301-525.240.

The submitted geotechnical report does not meet the requirements of the R645 Coal Mining Rules for the following reasons;

1) Appendix 5-9 was not P.E. certified by Mr. John C. Lewis. The Division can require that a subsidence control plan be certified under R645-301-525.490, Other Information. A sufficient amount of technical support was used in determining the pillar sizes for the different overburden depths and multiple entry configurations and the Division believes this technology is

adequate to support the requested P.E. certification.

2) Although the pillar designs and their respective extraction ratios indicate that no subsidence will occur over the developed workings, the Division requires that in accordance with;

a. R645-301-525.440, A description of the monitoring, if any, needed to determine the commencement and degree of subsidence so that when appropriate other measures can be taken to prevent, reduce, or correct material damage.

b. The Division requires that the Permittee conduct surface walkovers of the developed panel areas within 60 days of completion of the mining of the land above the panel recovery areas, and at least once during the year following the completion of mining in the these areas.

c. If the walkovers determined that no affects or voids have developed to the surface, the Permittee will document this and forward same to the Division.

d. If surface cracking, or sinkhole type subsidence or other surface impacts are noted during surface walkovers, they will be documented, and located on a surface topographic map, reported to the Division, photographed, and repaired. The repair plan shall be approved by the Division prior to initiation of the field work (See R645-301-525.480).

If the surface monitoring indicates that no deformation is occurring, the Permittee can apply to the Division to discontinue the approved monitoring plan, based upon adequate documentation of the monitoring surveys.

phess

## **Subsidence Control Plan Subsidence**

### *Analysis:*

R645-301-332. The application updated Section 332, Subsidence section, of the original MRP to reflect the change in operations to include the addition of the proposed underground mining within the original permitted area.

All proposed underground operations will take place within the already approved permitted area.

There are no anticipated impacts of subsidence associated with the underground mining due to underground mining designed as such that subsidence is minimal or is not expect to occur.

Pillar stability designs will be engineered to make the possibility of collapse extremely unlikely by:  
maintaining pillar stability at 2.0 or greater  
an aerial extraction of 50% or less  
a pill width/height ratio in excess of 4.0

NIOSH and ARMPS programs, both industry standard programs, were used to for stability analysis to achieve previously stated designs. The application states that due to no anticipated subsidence, no mitigation will be required by the permittee.

Further details of the design methods are discussed in Section 525 of Chapter 5 and in Northwest letter in Appendix 5-9. Said geotechnical report states that Norwest does not recommend mining in areas that have less than 120 feet of overburden.

### *Deficiencies Details:*

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-525.300,-525.310,-525.311 The application details how subsidence control measures in regards to underground mining operations are not required due to supporting details in Norwest's geotechnical report. The supports as designed are intended to prevent subsidence for any reasonable foreseeable use of surface lands. However Norwest's report is insufficient to meet R645-301-525.240 due to:

Appendix 5-9 calculations reference underground operations outside of the existing permitted area. The Division requests that the PE Mr. John C. Lewis stamp the subsidence control plan due to high level of certainty required in the calculations to guarantee no subsidence for the underground designs within the permitted area.

R645-301 525.440 requires that appropriate monitoring and mitigation plan be included in the application so that in the event of any unexpected subsidence, proper procedures can be implemented. Such monitoring events could include surface inspections after panels have been completely mined out with documentation and notification to the Division in the event of any changes or repairs.

cparker

## **Subsidence Control Plan Slides and Other Damage**

*Analysis:*

Section -533.700-744 Impoundments-Plans and -537 regraded slopes the application updates the MRP text to reflect the underground mine operations.

*Deficiencies Details:*

R645-301-533.700-714 The current MRP needs to be updated to reflect the changes in reclamation timing due to underground mining as it currently reflects the timing shown in Drawing 5-38.

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

cparker

## **Fish and Wildlife Protection and Enhancement Plan**

*Analysis:*

Development or first mining typically does not produce any noticeable subsidence. However second or retreat mining in a room and pillar operation will subside the surface. The text on Page 3-43 of the application should include a reference to the appropriate section of the MRP where the predicted subsidence information can be located. The text also needs to be revised to include a description of the anticipated impacts of subsidence on renewable resource lands and how such impacts will be mitigated.

*Deficiencies Details:*

R645-3-1-332; Development or first mining typically does not produce any noticeable subsidence. However second or retreat mining in a room and pillar operation will subside the surface. The text on Page 3-43 of the application should include a reference to the appropriate section of the MRP where the predicted subsidence information can be located. The text also needs to be revised to include a description of the anticipated impacts of subsidence on renewable resource lands and how such impacts will be mitigated.

jhelfric

## **Topsoil and Subsoil**

*Analysis:*

No changes have been made to the topsoil handling plans with this amendment.

pburton

## **Road System Other Transportation Facilities**

*Analysis:*

The application shows the updated transportation facilities to include the underground operations.

*Deficiencies Details:*

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-534.100-200,-534.300-340 The current MRP needs to be updated to reflect the changes in reclamation timing due to underground mining as it currently reflects the timing shown in Drawing 5-38. The needs to be an added discussion of the portal access road proposed in the amendment as well as figure updated.

R645-301-527.100 Clarification is need as to what haul road is being used as portal access and to remove coal from the underground stockpile outside the portals.

R645-301-527.200 Specification for each road along with maintenance plans need to be provided

R645-301-527.200 the following needs to be address according to the state regulation:

- 1) Clarification is need if the seven primary roads listed in the original MRP include the portal access/haul road to the underground facilities
- 2) A description of the portal access road is required.
- 3) A description of the shuttle cars, underground conveyor system and conveyor stacking systems is required.

cparker

## Spoil Waste Refuse Piles

### Analysis:

R645-301-535.130, Placement of Excess Spoil

#### EXCESS SPOIL

##### Analysis:

Page 5-45 contains a four line text revision in red font / underline stating that the underground mining drift entries will be developed in the bottom of an exposed pit, where the coal has been removed. The highwall in the area has been laid back to provide a safe work area. Cross sections are shown on Drawing 5-3B. Cover and overburden depths are discussed in Section 627.

There will not be any additional overburden removal associated with the portal face up areas. Some clean up of slumped material may be necessary if weathering of the highwall occurs.

Page 5-75 states in the red font / underline revision that the underground mining will be accessed through portals in an existing pit. There will not be any additional overburden removal required to develop the drift entries.

##### Findings:

No additional overburden is to be removed from or adjacent to Pit 11.

phess

## Spoil Waste Excess Spoil

### Analysis:

The application shows the updated transportation facilities to include the underground operations as well as mentioning that waste incurred during underground operations will be stored in the excess spoil pile. The application states that waste from the underground mine operations will not be placed underground.

### Deficiencies Details:

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-528.200 This section needs to be updated to reflect the scenario that Pit 10 or Pit 11 will remain open with continued underground mining operations and how overburden will be placed in the surrounding pits within 500 ft of the proposed portals before underground operations begin.

cparker

## Hydrologic Ground Water Monitoring

### Analysis:

Alluvial ground water levels are not mapped between the north-eastern wells (C1, UR, Y-99) and the next set of wells to the south (Y-102, Y-61). It is difficult to map this area because no wells exist in this zone, but it will be important to monitor the groundwater in this area while underground mining in the northeast of the permit area takes place.

In the absence of additional ground-water data it is unclear if a ground-water divide coincides with the Lower Robinson Creek and the Sink Valley surface water divide or if the Sink Valley receives the majority of up-gradient ground-water recharge as shown in Figure 21. If the ground-water and surface water divides coincide, the current wells north of the proposed underground mining area would be located in the Lower Robinson Creek aquifer. This would mean there are no up-gradient wells of the proposed underground mining area.

### Deficiencies Details:

R645-301-731.211. Deficient in monitoring groundwater quantity up-gradient of the proposed underground mining areas 1st N, 2nd N, 3rd N, and 4th N. Groundwater wells north of the proposed underground mining are either not screened deep enough (Y-99) to measure the 'Potential Coarse Grained Alluvium Zone' water-levels shown in cross-section E-E' (Drawing 7-15B) or the well (UR-70) is not within the ground-water basin directly up-gradient of the underground mining area. The

Permittee needs to install a well within the coarse grained alluvium of the Sink Valley ground-water basin, near the north-south permit boundary, and directly up-gradient of the 4th N underground mining zone (shown in Drawing 5-10A).

kstorrar

## Hydrologic Gravity Discharge From Underground Mine

### Analysis:

The Permittee didn't include any discussion about the possibility of groundwater that could be encountered in the underground workings of the mine. The Permittee should include a plan to handle and monitor any intercepted groundwater, taking into account volume, quality, duration of flow, as well as clearly setting monitoring and reporting requirements.

### Deficiencies Details:

R645-301-731 The Permittee should include a plan to handle and monitor any intercepted groundwater, taking into account volume, quality, duration of flow, as well as clearly setting monitoring and reporting requirements.

adaniels

## Hydrologic Impoundments

### Analysis:

Several corrections were made throughout the MRP to state that there are five impoundments instead of four. This correction was missed in paragraph one of page 7-55 and paragraph two of 7-54.

### Deficiencies Details:

R645-301-733 Please update page 7-55 paragraph one, and 7-54 paragraph two, to include the correction that there are five sediment impoundments instead of four.

adaniels

## Maps Affected Area

### Analysis:

The application updated or added Drawings 5-3, 5-3B, 5-9A, 5-10A, and 5-15 to reflect the addition of underground mining as a third coal recovery operation.

### Deficiencies Details:

R645-301-121.200, -141, -512.100, -512.110 Drawings submitted with permit applications will be presented in a consolidated format, to the extent possible, and will include all the types of information that are set forth on U.S. Geological Survey of the 1:24,000 scale series.

The Drawings in the application need to be updated in accordance with R645-301-141 USGS 1:24,000 Drawings include a scale and a scale bar. The Drawing formats, as submitted, leave a chance for misinterpretations due to resizing during printing. A scale bar helps maintain accuracy regardless of the printed format.

In accordance with R645-301-121.200, for clarification, on Drawing 5-3 the area currently show just as the portals should be relabeled "Portals and Underground Facilities/ Structures Area" because this area calls out the portals and numerous other facilities/structures associated with the underground operations such as a the portal access ramp, underground product conveyor belt, radial stacker belt, ventilation fan, a generator pad, sump pond, and coal stockpile.

Format errors on Drawing 5-3B are erroneous or misleading include:

- 1) Updated with a current PE stamp
- 2) The date on the title blocks is 2008
- 3) Drawn by employee no longer involved in operations
- 4) Scale ratio is ambiguous and liable to misreading without a bar or reference sheet size\*
- 5) Updated with labels on the elevation of the contours on the plan view
- 6) Details of the shotcrete around the portals
- 7) Details of the generator pad and fan

Drawing 5-9A and Drawing 5-10A are presumably mislabeled. Both updated Drawings show the surface and underground

operations, though in the in Table of Contents Drawings 5-9A and 5-10A are labeled "Surface & Highwall Mining." Either the number is wrong or the title needs to be updated to reflect the underground operations as well.

Within the application the details on the shotcrete around the portals and the generator pad are missing.

The following Drawings likely need to be added or updated to reflect the new underground operations:

5-2 Disturbance Sequence

5-8B Facilities and Structural Electrical

5-8C Facilities and Structural Water plan

5-16A Overburden Removal Sequence

5-18 Overburden removal Sequence

5-19 Overburden Removal Stages

5-22 Primary Mine Haul Roads Plan View

5-36 Post mining Topography-Cross section F-F' needs to be updated

5-38 Reclamation Sequences

5-38A Reclamation Sequences

cparker

## Maps Certification Requirements

### Analysis:

Drawing 5-3B should be updated with a current P.E. stamp and certification, in accordance with the requirements of R645-301-512.100 and -512.110.

Appendix 5-9, (the geotechnical report with the pillar designs at the various overburden depths) is a significant part of the subsidence control plan and it must be certified by a Utah professional engineer.

Drawing 5-10A can not be P.E. certified at this time because it shows the projected workings and not the actual workings within the Mine.

### Deficiencies Details:

R645-301-512.100 and -512.110 / R645-301-525.490 and -525.300

Drawing 5-3B should be updated with a current P.E. stamp in accordance with R645-301-512.100 and -512.110.

Appendix 5-9 must be P.E. certified to support the subsidence control plan for the Alton underground mine.

phess

## Maps Certification Requirements

### Analysis:

The application updated or added Drawings 5-3, 5-3B, 5-9A, 5-10A, and 5-15. All drawings have been certified by a Utah Registered PE as required in R645-301-512. In the application R645-301-513.300 was not updated so any underground development waste, coal processing waste or excess spoil will not be disposed of in the underground mine workings.

### Deficiencies Details:

R645-301-513.500 was not updated to include the sealing of the portals at the conclusion of underground mining activities and final reclamation. It is mentioned in section 529 but also needs to be updated here as well.

R645-301-513.700 requires the permittee to show the nature, timing, and sequence of the surface coal mining and reclamation activities that propose to mine closer than 500 ft to an active underground mine for approval by the division and MSHA. Clarification in text and on Drawing 5-38 is required for the sequence of reclamation of Pit 10, Pit 11, and Pit 9 Panel 3.

cparker

## Reclamation Plan

### General Requirements

*Analysis:*

The application updates the MRP text to reflect the underground mine portal closure in accordance with approved MSHA plans and backfill.

*Deficiencies Details:*

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-541.300,-513.500,-529, -542.700 A discussion needs to be added discussing how underground facilities will be removed.

R645-301-542.100 Needs to be updated to reflect the time table reclamation of portal sealing and reclamation of remaining open pits within 500 ft of the portals.

R645-301-542.300 Missing drawing reclamation cross sections

R645-301-542.800 Reclamation costs need to be updated in Appendix 8-1 to reflect underground facilities reclamation.

cparker

## **Backfill and Grading General**

*Analysis:*

The application updates the MRP text to reflect the underground mine portal will be accessed through exiting pits and no additional overburden will be associated with the underground mining.

*Deficiencies Details:*

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-553 text needs to be updated to include the timeline of sealing portals in junction with no surface activities within 500 ft of the portals until underground operations have ceased.

cparker

## **Mine Openings**

*Analysis:*

**Mine Openings**

REGULATORY REFERENCE: 30 CFRSec.817.13, 817.14,817.15;

**Analysis:**

The following pages and sections refer to the management of the underground mine openings associated with the Alton Coal underground operation;

1) Page 5-51, Section 529, Management of Mine openings

2) Page 5-50, section 528.340, Return of Pit 11 Spoil Material from the excess spoils pile to the Pit 11 area after underground operations have ended

3) Page 5-63, section 535.500, Disposal of Excess Spoil At Drift Entries; all spoil removed from the Pit 11 area to mine the pit coal and develop the underground entries will be recovered from the excess spoil pile. This will be used in the closing off of the underground face up entries and Pit 11.R645-301-513, -301-529,-301-551,

4) Page 5-64, Section 540, RECLAMATION PLAN, section 541.100-400 General ; "Underground mine portals will be closed in accordance with approved MSHA plans and backfilled".

5) Page 5-68, Section 542.700, Final Abandonment of Mine Openings and Disposal Areas

"Underground mine portals will be closed in accordance with approved MSHA plans and backfilled".

6) Page 5-70, Section 551; SEALING AND CASING OF UNDERGROUND OPENINGS

"When no longer required, underground mine openings will be closed in accordance with MSHA approved requirements and backfilled".

**Findings:**

All six pages of the revisions made relative to the permanent closing and sealing of the underground portals say that the underground portals will be sealed according to the MSHA approved plans, which require sealing by backfilling of the Pit 11

area.  
The Division does not know if MSHA or the USDO/ BLM would require concrete block seals 25 feet inby the highwall of each of the drift entries.  
No mention is made of the R645 Coal Mining Rules which require the permanent closure of underground mine openings.

*Deficiencies Details:*

R645-301-513, -301-529,-301-551  
The following pages, and sections refer to the management of the underground mine openings associated with the Alton Coal underground operation;  
1) Page 5-51, Section 529, Management of Mine openings  
2) Page 5-50, section 528.340, Return of Pit 11 Spoil Material from the excess spoils pile to the Pit 11 area after underground operations have ended  
3) Page 5-63, section 535.500, Disposal of Excess Spoil At Drift Entries; all spoil removed from the Pit 11 area to mine the pit coal and develop the underground entries will be recovered from the excess spoil pile. This will be used in the closing off of the underground face up entries and Pit 11.  
4) Page 5-64, Section 540, RECLAMATION PLAN, section 541.100-400 General ; "Underground mine portals will be closed in accordance with approved MSHA plans and backfilled".  
5) Page 5-68, Section 542.700, Final Abandonment of Mine Openings and Disposal Areas  
"Underground mine portals will be closed in accordance with approved MSHA plans and backfilled".  
6) Page 5-70, Section 551; SEALING AND CASING OF UNDERGROUND OPENINGS  
"When no longer required, underground mine openings will be closed in accordance with MSHA approved requirements and backfilled".  
All six pages of the revisions made relative to the permanent closing and sealing of the underground portals say that the underground portals will be sealed according to the MSHA approved plans, which require sealing by backfilling of the Pit 11 area.  
The Division does not know if MSHA or the USDO/ BLM would require concrete block seals 25 feet inby the highwall of each of the drift entries.  
No mention is made of the R645 Coal Mining Rules which require the permanent closure of underground mine openings. Reference R645-301-513, -301-529,-301-551 in the application for clarification that the Division is responsible for the enforcement of same.

phess

## Mine Openings

*Analysis:*

The application shows the updated MSHA approval requirement for sealing underground mine openings.

*Deficiencies Details:*

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

The Division does not know if MSHA will require specific closure designs for each of the drift entries. No mention is made of the R645 Coal mining rules which require the permanent closure of underground access points.

cparker

## Topsoil and Subsoil

*Analysis:*

No changes were made to the soil redistribution plans with this amendment.

pburton

## Bonding Determination of Amount

*Analysis:*

Determination of Bond Amount

**Analysis:**

At this time, the transition from the highwall mining method to the continuous miner / shuttle car scenario will not require the construction of any permanent facilities. A stacking conveyor, portable AC / DC generator and a portable mine fan will be used to develop the first several hundred feet of the underground mine entries. All of these can be removed when more permanent facilities are required (such as an electrical substation). The amount of bond which is currently posted (\$ 10,000,000) is needed to reclaim Phases I and II of the Coal Hollow project (\$ 8,976,000 is required to reclaim the coal recovery areas and specialized areas). Although, there is no need to increase the direct cost associated with demolition of the underground mine facilities at this time, there is no bond posted to cover the initiation of mining activities for the Phase III areas (highwall trench development for highwall mining).

The \$ 10,000,000 bond which is currently in place may not be adequate to ensure the reclamation of the mining areas designated as being part of Phase III at Coal Hollow. In order to clarify the amount of acres disturbed by surface mining, and highwall mining, the Permittee will provide a current map of the Coal Hollow Mine showing the following;

- 1) the identification number of each pit which has been backfilled and rough graded, with the status of progress completed (acreage).
- 2) the identification number of each pit which has been subsoiled, with the status of progress completed (acreage).
- 3) the identification number of each pit which has been topsoiled, with the status of the completed topsoiling activity (acreage completed).
- 4) the ID number of each pit which has been seeded, with the status of the seeding process (acreage completed).
- 5) the acreage which has been undermined using highwall mining methods, and the locations where this method has been implemented.
- 6) the acreage of operations for both Phase II and Phase III is to be shown on Map 5-3.

The Permittee must provide adequate information to the Division to support a Division finding as to whether or not sufficient bond is in place at this time. If this can not be shown, the Permittee must either post additional bond in an amount to be determined by the Division, or cease coal recovery activities while continuing reclamation work until adequate bond can be posted.

*Deficiencies Details:*

**Findings:**

Based on the current information provided by the MRP, it is not clear as to whether the Permittee has a sufficient amount of bond posted to reclaim all of the disturbed acreage at the Mine. It appears that the posted \$ 10,000,000 may be insufficient to allow the initiation of mining activities in Phase III. Pit sequencing and methods of recovery have been varied numerous times by the Permittee, and in this proposal, Task ID #4652, the Permittee is suggesting that an approval for an underground mine be granted. In this operation, coal recovery and reclamation work must be jointly co-ordinated to ensure that reclamation is not allowed to fall behind by more than 60 days following completion of coal recovery from each pit (See Chapter 5, page 5-59). However, that plan was approved in January of 2010 for a coal stripping operation only. We now have two methods of mining in operation, with a third being proposed.

The currently approved reclamation plan is outdated, and it does not provide adequate information as to the progression of reclamation work following coal recovery by stripping or highwall mining. In accordance with the requirements of;

- 1) R645-301-121.200, "The permit application will be clear and concise, "and
- 2) R645-301-812-700, "The Division will require in the permit that adequate bond coverage be in effect at all times" and
- 3) R645-301-820.130, "The Operator will identify the initial and successive areas or increments for bonding on the permit application map submitted for approval as provided in the application, and will specify the bond amount to be provided for each area or increment".

The \$ 10,000,000 bond which is currently in place may not be adequate to ensure the reclamation of the mining areas designated as being part of Phase III at Coal Hollow. In order to clarify the amount of acres disturbed by surface mining, and highwall mining, the Permittee will provide a current map of the Coal Hollow Mine showing the following;

- A) the identification number of each pit which has been backfilled and rough graded, with the status of progress completed (acreage).
- B) the identification number of each pit which has been subsoiled, with the status of progress completed (acreage).
- C) the identification number of each pit which has been topsoiled, with the status of the completed topsoiling activity (acreage completed).
- D) the ID number of each pit which has been seeded, with the status of the seeding process (acreage completed).
- E) the acreage which has been undermined using highwall mining methods, and the locations where this method has been implemented.
- F) the acreage of operations for both Phase II and Phase III is to be shown on Map 5-3.

The Permittee must provide adequate information to the Division to support a Division finding as to whether or not sufficient bond is in place at this time. If this can not be shown, the Permittee must either post additional bond in an amount to be determined by the Division, or cease coal recovery activities while continuing reclamation work until adequate bond can be posted.

4) R645-301-511, General Requirements. Each permit application will include descriptions of R645-301-511.300, Reclamation, and

5) R645-301-512.100, Cross Sections and Maps. "Cross sections and maps will be updated as required by the Division". The maps which must be updated are the following; Drawings 5-3, 5-38, 5-18 and 5-19.

phess

## **Bonding Determination of Amount**

### *Analysis:*

The application updates the MRP text to reflect the underground mine operations and that the underground operations are covered under the current bond due to less disturbance.

### *Deficiencies Details:*

R645-301-121,-121.100 The text included for this section in the redline is the original MRP and is not current version of the MRP for this section.

R645-301-820.112 Section needs to be updated as coal mining and reclamation operations on succeeding increments are initiated and conducted within the permit area, the permittee will file with the Division an additional bond or bonds to cover such increments in accordance with R645-830.400.

R645-301-830.140 Appendix 8-1 needs to be updated to reflect the new underground mining reclamation costs in detail so that the Division can determine the appropriate bond amount.

cparker