TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 5, 2006

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor, Task Manager
Joseph C. Helfrich, Environmental Scientist/Biology, Team Lead

FROM: Peter H. Hess, Environmental Scientist/Engineering

RE: Lease Addition U-46484 & U-61049, Co-Op Mining Company, Bear Canyon Mines #3 and #4, C/015/0025, Task ID #2597

SUMMARY:

The Permittee submitted an application to the Division on July 21, 2005 to add additional acreages to several of the Federal coal leases as well as fee coal. Those acreages and lease identification numbers include the following:

1) U-024316.....80 acres
2) U-61049.....2,196.09 acres
3) U-46484.....1,400 acres
4) U-61048.....1,108.27 acres
5) Fee Coal.....2,740.00 acres
Total Added Acreage.....7,524.36 acres

This additional permit acreage will have a significant effect on the life of the Bear Canyon operation, increasing its permitted acreage from 3,336.18 acres to 10,840.54 acres. The 7,524.36 acres being added is being referred to as the Mohrland Addition.

The first review generated relative to this application was designated as Task ID #2292. Numerous deficiencies were returned to the Permittee to address.

The Permittee responded on May 21, 2006. The Division has assigned this project an identification of Task ID #2526 for the review of the Permittee's response for record keeping purposes.

The Permittee responded to the deficiencies aired by the Division and the USFS on August 9, 2006. The Division review of that response has been identified as Task ID #2597.

This technical memo will address the adequacy of the Task ID #2597 response as it relates to the engineering discipline of the R645 Coal Mining Rules.

TECHNICAL ANALYSIS:

OPERATION PLAN

MINING OPERATIONS AND FACILITIES

Regulatory Reference: 30 CFR 784.2, 784.11; R645-301-231, -301-526, -301-528.

Analysis:

General

The Task ID #2292 submittal adds additional acreages of coal reserves to the Bear Canyon operation. There are no additional surface facilities anticipated at this time of application. All reserves mined from the Tank seam (#4 Mine) in the Mohrland area are projected to come outside through the #3 Mine located in the Wild Horse Ridge addition of Bear Canyon.

Type and Method of Mining Operations

The submittal states on Page 5-10 (Task ID #2292 application) under section R645-301-523 Mining Method that a new method of mining is to be initiated. In addition to continuous mining methods, the retreating longwall method of secondary extraction is to be implemented. Continuous mining will be used to develop the secondary extraction areas.

The application states that the operation will produce between 750,000 and 2,000,000 tons per year with two to four (continuous) miner sections working 360 days (See page 5-14, Recovery Rate of the application). The response received on May 21, 2006 (Task ID #2526) does not contain a revision to page 5-14 that would reflect additional tonnage recovered by a longwall recovery method.

Facilities and Structures

The structures which exist at the Bear Canyon operation include the scale house / administration building, the maintenance shop, fuel storage tanks, coal processing tipple / truck loading facilities, ventilation fans for the Mines, electrical substation, above ground conveyors,

sediment control devices, and topsoil storage piles. All are depicted on Plates 5-2A through 5-2G.

Findings:

The minimum regulatory requirements of this section have not been met. In accordance with the requirements of:

R645-301-523; Mining Methods; the Permittee must describe the anticipated annual production for each of the following mining methods; (1) continuous mining primary development; (2) continuous mining secondary extraction; (3) longwall secondary extraction.

EXISTING STRUCTURES

Regulatory Reference: 30 CFR 784.12; R645-301-526.

Analysis:

The Bear Canyon MRP contains photos and descriptions of the facilities that are in place at the site in Appendix 5-A. The Permittee updated Appendix 5-A and resubmitted the file as part of Task ID #2526.

Two errors were noted with the revised Appendix 5-A:

1) Photo #11 (page 5A-16, Appendix 5-A) depicts two coal storage bins which were utilized as part of the Bear Canyon #1 Mine. The bin in the foreground has been reclaimed, and thus no longer exists. The bin in the background which blended coals from the Blind Canyon seam as well as the Hiawatha seam (#1 Mine) is in the process of being reclaimed with those facilities as of the date of this document.

2) Photo #8 (page 5A-14, Appendix 5-A) depicts the transformer sub-station which was associated with the Bear Canyon #1 and #2 Mines. The substation has been de-energized for some time and is in the process of being reclaimed, as of the date of this document.

The two errors identified in Appendix 5-A, Table 5A-1 (Task ID #2526 response) have been corrected with the August 9, 2006 (Task ID #2597) response. Both facilities have been noted as being reclaimed.

Findings:

The application meets the minimum regulatory requirements of this section of the R645 Coal Mining Rules.

RELOCATION OR USE OF PUBLIC ROADS

Regulatory Reference: 30 CFR 784.18; R645-301-521, -301-526.

Analysis:

There are no mining activities being conducted or being proposed within 100 feet of a public road right-of-way. Although an Emery County road terminates at the Permittee's gate, same is a great distance from the mining activities being conducted. There is no need to relocate this road.

Findings:

This requirement is not applicable to this submittal.

COAL RECOVERY

Regulatory Reference: 30 CFR 817.59; R645-301-522.

Analysis:

Coal recovery is addressed on page 5-14, **Recovery Rate** of the Task ID #2292 submittal. Utilizing continuous miner advance and retreat techniques, a seventy percent recovery rate has been determined. Table 5-1, Coal Reserves – Bear Canyon Mine lists the in place tonnage, as well as the recoverable tons for six Federal coal leases (U-61048, U-61049, U-024316, U-024318, U-020668, and U-38727). Tonnages for the fee coal area are also listed.

Based upon information learned during a meeting with the USDOI / Bureau of Land Management / SLO on July 11, 2006, the coal reserves associated with Federal lease U-46484 are segregated on the east end of the lease by the Bear Canyon fault and several smaller faults. In order for that lease to be mined in a cost efficient manner, the Permittee must develop the underground workings such that the lease can be accessed from the north side. It is not known if the Permittee has any exploration data for the lease area. Page 5-15, as received on August 9, 2006, contains information relative to in place tonnage, as well as recoverable tons from Federal lease U-46484. Thus, Table 5-1 has been updated to correctly include the recoverable tonnage to be mined.

The Permittee has not provided any confirmation from the USDOI / BLM / SLO that a resource recovery and protection plan (R2P2) has been developed, reviewed or approved by the Federal agency responsible for reviewing the efficient recovery of minerals from the associated Federal leases. The Permittee must provide a document indicating approval of the R2P2 to the Division prior to incorporating these leases into the Bear Canyon permit area.

The Permittee has provided a copy of the lease information for the 2,740 acres of fee coal owned by C.O. P. Coal Development Company. This agreement is included in the R2P2 information and is considered current.

Findings:

In accordance with the requirements of this section, the Permittee must provide the following:

R645-301-522, Coal Recovery; Confirmation from the USDOI / BLM / SLO that the resource recovery and protection plan(s) is adequate for each of the Federal coal leases which is being proposed for addition to the Bear Canyon Mine permit area.

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-724.

Analysis:

Renewable Resources Survey

R645-301-525.110; The Permittee has submitted three maps (Plate 7-4, Water Monitoring; Plate 7-12, Water Monitoring; and Plate 7N-2, Appendix 7N (water monitoring locations) depicting water monitoring locations as part of the Task ID #2597 submittal.

Plate 7N-2 depicts the water monitoring sites used for the Appendix 7N study, "Revised Hydrogeologic Evaluation of Bear Canyon Mine Permit and Proposed Expansion Areas".

Plate 7-12 depicts all of the State appropriated water rights held in the proposed lease addition.

Plate 7-12 is submitted at a scale of one-inch equals 1,000 feet, (or 1:12,000).

Pre-Subsidence surface contours are clearly shown.

There are no commercial buildings or residential dwellings depicted.

Water rights for the proposed lease addition are listed in Chapter 7, Table 7-6, Page 7-32. Quantity and quality information relative to these water sources is contained in the Utah DOGM water-monitoring database. The Permittee has committed to monitoring all water sources within the proposed permit addition.

Although R645-301-525.110 is not specifically addressed on page 5-16 of the Task ID #2597 submittal, Plate 7-12 and other information that is easily accessible meets the requirements of that section of the R645 Coal Mining rules.

Subsidence Control Plan

R645-301-525, Subsidence Control Plan

The Permittee's response (Task ID #2597) received on August 9, 2006 contains a revised page 5-16 which provides direction to Appendix 5-C. "Subsidence monitoring points are shown on Plate 5-3. **Appendix 5-C** contains the subsidence monitoring and control plan."

Appendix 5-C begins by discussing subsidence controls that have been implemented relative to secondary pillar extraction utilizing continuous miner methods. A revision added to page 5-16, section **R645-301-525 Subsidence Control Plan** contains the following statement; "An escarpment stability and subsidence evaluation was performed by Malecki Technologies. This report calculated the maximum subsidence effects of longwall mining and then reduced them by 50% for room and pillar. In the areas where longwall mining will take place the maximum effects will be used." (See Page 13, bullet #3 of "Modeling of Castlegate Sandstone Escarpment Stability" by Maleki Technologies, Inc.) This report is included as Appendix 5Q."

Appendix 5Q contains a single document titled "Modeling of Castlegate Escarpment Stability" by Maleki Technologies, Inc., Consulting Mining and Geotechnical Engineers. The document evaluates surface subsidence in the Wild Horse Ridge addition of the Bear Canyon permit area. The affects of secondary coal extraction on the stability of the escarpments located in that area is also part of the evaluation.

The submittal states on Page 5-10 (Task ID #2526 application) under section R645-301-523 Mining Method that a new method of mining is to be initiated. In addition to continuous mining methods, the retreating longwall method of secondary extraction is to be implemented. Continuous mining will be used to develop the secondary extraction areas.

Longwall extraction methods utilize technology that provides for planned subsidence in a predictable and controlled manner, (See R645-301-525.311).

The Permittee has submitted revisions to the currently approved subsidence control plan / subsidence monitoring regime as part of Appendix 5-C. The approved plan only addresses monitoring of secondary mining areas using continuous mining pillar extraction methods. The proposed revisions to this section of the MRP will address longwall secondary retreat methods.

The revisions submitted to the subsidence control and monitoring plan rely heavily on the report authored by Mr. Hamed Malecki, "Prediction of Surface Deformation Resulting From Longwall Mining Over the Bear Canyon Reserve".

R645-301-525.312 requires that if a Permittee employs mining technology that provides for planned subsidence in a predictable and controlled manner, the Permittee must take necessary and prudent measures ...to minimize material damage to the extent economically and technologically feasible to non-commercial buildings and occupied residential dwellings... There are no non-commercial buildings or occupied residential dwellings within the proposed lease addition. Therefore, the requirements of this section are not applicable to the proposed lease addition.

The Permittee has indicated on page 5-18 (Chapter 5, Task ID #2597 submittal) that a section of the Left Fork of Fish Creek where it flows through a portion of Federal lease U-61049 and private property lies over a mineable portion of that lease. It is believed that this area exists where the amount of overburden beneath the stream channel varies from 800 to 900 feet. Plate 7-4 depicts this area, which lies in the NW1/4 NE1/4 of Section 19. Therefore, the potential exists, that if secondary extraction is practiced through this area, subsidence could affect this stream. Plate 7-4 indicates that this area will be monitored while undermining.

The Permittee must clearly define how it will monitor and/or protect this area. The Permittee must correlate this location with a map of the underground workings showing the protection area, and blocks of coal that are being proposed to be left to protect it.

There are no impoundments or dams within the proposed lease addition that require protection.

In order to minimize or prevent damage, the Permittee must describe what considerations the designing mining engineer utilizes relative to the layout of the underground mine workings in order to minimize or prevent damage to surface areas where planned subsidence is not projected to be used. These considerations may include:

1) Orientation of longwall and /or pillar panels to strike/dip of the seam.
2) Width of longwall panels.
3) The design of non-yielding pillars for bleeder and /or sub-main protection.

4) The design of yielding pillars for gate roads between adjacent longwall panels and their affect on the subsidence trough profile throughout.
5) The design of barriers to protect surface features requiring protection.

The Division is aware that the Permittee does not intend to utilize barrier abutments between adjacent longwall panels for the purpose of ground control. These are generally only used where deep cover is being undermined.

R645-301-525.410 requires that the Permittee include, as part of the method of underground extraction, a description of the method of underground mining including the size, sequence and timing of the development of the underground workings. This map must show when and where specific portions of the mine's workings will be developed and extracted. This map is also needed to ensure that surface property owners are properly notified at least six months in advance of mining in accordance with the requirements of R645-301-525.700.

The Permittee has submitted, as part of the Task ID #2597 application, a projection of the proposed #4 Mine workings in the Tank seam (See Plate LMU-3). The first longwall panel to be extracted (TS LW 1) is depicted as being extracted from June of 2007 through September of 2007. This panel has dimensions of 4080 feet by 400 feet (face width).

Sequential longwall panels with their projected extraction dates are also depicted, as well as areas that will see secondary extraction via continuous mining methods. Thus, the Bear Canyon Mines operation is the only coal mining operation in the State of Utah that will utilize both longwall and continuous mining secondary extraction methods to recover this resource.

R645-301-525.420 requires that the application contain a map of the underground workings that describes the location and extent of the areas in which planned-subsidence mining methods will be used, and that identifies all areas where the measures described in 525.440, 525.450, and 525.470 will be taken to prevent or minimize subsidence and subsidence related damage.

Plate LMU-3 meets the requirements of this regulation because the locations of barriers (support pillars of coal) which will be left, the locations where planned subsidence is to be implemented, and areas where pillar's designs are implemented to prevent or minimize to the extent possible (i.e., yielding pillars in the gate roads) subsidence related damage. As previously noted, barrier pillars between adjacent longwall panels are not being implemented as part of secondary recovery in the Tank seam due to the shallow cover.

Section **3.0 MINING, GEOLOGIC CONDITIONS AND SUBSIDENCE CHARACTERISTICS,** pages 7-11, (MTI report) describes the methods which the Permittee,

through consultation with MTI, have implemented to reduce the potential for subsidence related cracking near the surface.

As described in **3.1, Conceptual Mine Layout Designs**, C.W. Mining engineers have oriented the longwall panels that are being proposed in the Federal lease addition on a bearing of N 55 degrees W. MTI determined in 2001 that major geologic joint sets have an orientation of either N 15 degrees W, or N 85 degrees W. Thus, the panel orientation varies at least 30 degrees from either of the major geologic joint sets (i.e., slip surfaces) in the area. MTI states that this offset alignment is beneficial for the stability of development workings because it avoids alignment of joints and mine openings. This 30-degree offset in the orientation of the longwall panels with the major joint sets also "increases its chances of limiting the number and length of mining induced surface fracturing at final mining boundaries".

MTI also states that this 30-degree variance in orientation is effective in reducing the potential for subsidence related cracking at the surface.

The second mining engineering design method utilized by C.W. Mining Company to minimize the potential for subsidence related damage to surface lands is the utilization of yielding pillars for gate road support. These yieldable pillars are developed on fifty-foot centers, utilizing three mine entries. Thus, two complete pillars are developed per cross-cut.

The size of the yielding pillars has been selected by the C.W. Mining staff in order to control gate road pillar bumps. The thirty-foot wide pillars will reduce the potential for strain energy accumulation. The size was selected, based upon successful experience in the East Mountain and Trail Mountain longwall operations (i.e., Energy West Mining Company).

These yieldable pillars have also been shown to collapse completely as the adjacent panels are extracted on retreat, rendering virtually no effect on the subsidence trough being generated. The tensile stresses that are accumulative over the gate road entries ("transient" subsidence, see page 5 of the MTI report) in adjacent panels crush out. This has been confirmed by Dyni, 1991. Thus, the subsidence trough is extended across adjacent panels until the width of the lease is extracted.

The use of barrier pillars to protect either critical areas of the underground workings or surface features which have been identified as needing protection is discussed on pages 5-16, and 5-17. A minimum barrier width of 100 feet is left to prevent the transfer of mining induced subsidence impacts across boundaries and property adjacent to the permit boundary. The Permittee claims that this 100-foot width is adequate to protect property from subsidence effects transmitted via the influence of angle of draw within the area.

Mine main and sub-main entries are protected by barriers having a minimum width of 100 feet to assure protection of those entries for their usable life.

Outcrop protection is discussed on page 5-17 of the MRP. Outcrops in the Bear Canyon permit area are either buried under overburden, or are burned some distance from the surface. Where neither condition exists, the coal is weathered or oxidized, and its marketable quality is jeopardized. Mining is stopped within 200 feet of the surface to minimize the potential for this negative affect on Mine product, as well as to leave support for the outcrop area.

Barriers are not left where natural surface features and streams will require protection as it is not always possible to leave barriers directly beneath the feature. Coal burn may surround the area directly beneath the surface feature, or the surface feature may lie over the burnt coal/unburned coal interface. As coal burn material has no structural support, leaving a barrier here would "cause an interruption between the natural and man made subsidence causing greater impacts to the surface. Because of this, no barrier will be left in these areas unless it is needed for roof stability or temperature considerations (MSHA), in which case the minimum possible size will be used".

R645-301-525.430 requires a description of the physical conditions that will be encountered in the Federal lease addition area, such as:

i. depth of strata being mined
ii. seam thickness
iii. multiple coal seams
iv. dip of coal seam(s)
v. lithology of overlying strata
vi. the angle of draw which the Permittee feels is applicable in predicting where potential surface impacts could occur adjacent to the mine workings
vii. nature of the overburden
viii. strength characteristics of overlying strata and mine floor (tensile, compressive)
ix. near surface geology
x. geologic discontinuities (major fault areas)
xi. fractures and lineaments
xii. degree of extraction
xiii. surface topography
xiv. groundwater
xv. water level elevation and fluctuation
xvi. rate of face advance
xvii. production scheduling when mining through critical areas

Most of this information can be obtained from the Malecki report, "Prediction of Surface Deformation Resulting from Longwall Mining Over the Bear Canyon Reserve", pages 8 and 9. Page 8 contains descriptive text in the section **3.2, Geology, Rock Strength, and Stress Field,** which discusses the anticipated surface affects resulting from single and dual seam coal extraction.

Section **4.0 Predicted Ground Movements** (pages 14 through 16), describes the method used by Malecki Technologies, Inc., to predict the amount of subsidence occurring following extraction of longwall panels in both the Tank seam and Hiawatha seams in this proposed lease expansion. The MTI group used a "three dimensional influence function method while accounting for site specific conditions using subsidence data collected from the neighboring Deer Creek Mine" (Energy West Mining Company).

This type of modeling "relies on the influence of an extracted volume on the displacement components of a remote point on the surface" (MTI report, page 14).

The MTI group made subsidence calculations for three longwall blocks consisting of vertical movements, changes in surface slopes, and strains. Blocks 1 and 2 have been evaluated in the Tank seam. Block #3 has been evaluated for the Hiawatha seam.

Block #1 consists of five longwall panels having face widths varying from 500 to 640 feet. Seam thickness varies from five to 7.6 feet; an extraction height of 7 feet has been assumed.

Block #2 consists of four longwall panels having a face width of 600 to 800 feet. All four panels will be retreated from the NW to SE. Seam thickness varies from 5 to 8 feet. An extraction height of 7 feet has been assumed.

Block #3 consists of four longwall panels having face width of 640 feet, retreated from NW to SE. Seam thickness varies from 5 to 15 feet, with a fixed extraction height of 8 feet, (See pages 14 and 15 of the Malecki report).

The MTI group made subsidence predictions for each of the three mining blocks mentioned above using a numerical model calibrated with base line subsidence data from the Energy West East Mountain mining area.

As shown in Table 1, Predicted Subsidence Parameters for Single and Two Seam Extraction Design Options, surface areas being undermined via extraction of the Tank seam are predicted to settle (for Blocks 1 and 2) just under five feet (4.9 feet).

In areas where portions of the extracted Tank seam are underlain by mineable reserves in the Hiawatha seam, (where the two mined coal seams will account for 15 feet of the stratagraphic column), the MTI model anticipates a settling of the surface of 10.4 feet.

Subsidence studies conducted by the USBM in the East Mountain area report angles of draw ranging from 16 to 33 degrees with an average of 25 degrees. A final subsidence factor of 67 percent for single seam mining was determined. Thus, the 4.9 feet predicted by the MTI model for a 7-foot seam is realistic when compared to the 67 percent subsidence factor developed by the USBM (4.69 feet in a seven foot seam).

The Malecki report makes the following statements:

1) "Similarities in geology and geometry (i.e., mine design factors based upon depth of cover, face width, yielding gate pillars, and mining height) between the proposed lease addition area and East Mountain (Energy West Mining Company) justify the use of back (i.e., reverse) analysis of parameters for the predictive model."
2) "Some uncertainty exists for predictions made with the model due to variations in geology and mining geometry, including actual mining heights. Precise estimates of subsidence can only be achieved as site specific data become available and mine plans are finalized."

Thus, the aforementioned establishes the need to monitor subsidence over the extracted areas in order to determine whether the predictive model can be considered accurate enough to use for analysis of future subsidence mechanisms.

Performance Standards For Subsidence Control

Section **5.0 MONITORING PROGRAM** of the Malecki report (page 23) suggests a limited monitoring plan to verify if the predictive modeling is accurate. The report recommends the following:

1) Establish a monument line across the first longwall block (500 to 640 foot face width); locate this monument line near the center of this block.
2) Establish this monument line on 50-foot centers for a detailed comparison of the MTI model predictions.
3) Measurements should include a precision level survey to measure.
   a) Vertical settlement.
   b) Horizontal strain, using a steel tape extensometer.

GPS methods may be used; aerial photographic methods are another alternative.

This monitoring will provide data to determine site-specific angle of draw, subsidence factor, and tensile strains that can be used for more accurate subsidence prediction in the Bear Canyon lease addition area. The Malecki report states that "the arrangement and location of the monument line or method of survey can vary according to site-specific conditions influenced by topography, roads, etc."

The Malecki report states "C.W. Mining has not observed surface cracking above the existing Wild Horse Ridge panels (continuous mining pillar extraction) and thus does not foresee the need for detailed monitoring". Supporting this is the statement "USBM researchers report very few mining induced cracks over East Mountain. This coincides with the USBM study (Fejes, 1985) that "*there were no visual effects within the subsidence area. The local vegetation were not altered, and no surface fissures were detected*" (See MTI report, page 15, section **4.2 Model Calibration**).

The MTI group believes "a visual inspection is deemed sufficient over the deeper mines. The survey data should include crack location, orientation, horizontal length, and width."

MTI thus recommends a limited monitoring program so that the presence of surface cracks (if any exist) can be verified.

The Permittee has submitted revised pages 5C-7 and 5C-8 which reflect the installation of seven new subsidence monitoring points relative to Federal lease U-61049 (points 51-57). Six of these points are adjacent to existing roads in the area. These points are all located in Federal lease U-61049, as follows:

a) Point 51 is located in Section 13, T16S, R7E.
b) Points 52, 53, 56, and 57 are located in Section 18, T16S, R8E.
c) Point 55 is located in Section 19, T16S, R8E.
d) Point 54 is located out side of the Federal lease boundary for U-61049 and U-38727.

The Permittee has also committed to establishing the survey monument line across the first panel on 50-foot centers as recommended within the Malecki report, (section **5.0 MONITORING PROGRAM**), page 23. Points 25A-K will determine if the Malecki model is accurately depicting what is really happening over the mined area.

Additional survey monitoring lines will be established one year prior to mining at a spacing of 250 feet as recommended in Attachment 3, (i.e., the Malecki report). If subsidence occurs as the Malecki model predicts, the 250-foot spacing will continue. If it is determined that the subsidence profile is not following the profile predicted by the Malecki model, additional

monitoring points will be added to determine what is actually occurring and the Bear Canyon model will be updated accordingly (See page 5C-8).

The Permittee proposed monitoring plan also commits to the following:

1) Subsidence stations will be field-surveyed annually.
2) A field observation shall be made yearly of the mining area, including escarpment areas and obvious mining related impacts will be noted and located on a map.
3) A copy of the map showing the noted mining related impacts will be kept at the mine office, and available for inspection.
4) A copy of this same map will be forwarded to the Division as part of the annual subsidence report.

The Permittee's proposed monitoring plan appears to be logical; however, the Division would like to make the following recommendations:

1) Monitoring Points 25A-K will be installed over a panel having a face width varying from 500 to 640 feet. If the data compiled from this survey line confirms that the Malecki model is accurate, additional monitoring of panels #2 and #3 is felt to be redundant. If the Malecki model is shown to be inaccurate, then the additional survey lines at this face width are felt warranted.
2) The Division feels that the Permittee should commit to the monument survey line as the panel face widths are increased to the maximum 800-foot width, (Block 2 face width).

The Permittee's proposed monitoring plan is deficient; in accordance with:

1) **R645-301-525.440**, the Permittee must commit to installing **ONE** subsidence monitoring point in each longwall panel as close to the longitudinal and latitudinal center of the panel as possible in order to determine when subsidence has reached its maximum in that area. Comparison of this data with adjacent monitoring points will determine if the subsidence trough is at the supercritical stage.

2) **R645-301-525.440,** the Permittee must commit to **compiling an analysis** of the subsidence monitoring data that is submitted with the annual monitoring report for the area that was extracted during the current monitoring year. An analysis of the monitoring data for previous years over areas adjacent to those extracted during the current monitoring years is also required. However, the analysis of data for areas which have been extracted two years prior to the current monitoring year **IS NOT NECESSARY**.

Plate 5-3 has been updated to show the potential subsidence zone for the lease additions. The Malecki modeling analysis used an angle of draw of 35 degrees in order to reduce subsidence and strains over the gate pillars, (E-mail communication between Mark Reynolds and MTI on August 24, 2006). Mr. Malecki used an angle of draw varying from 25 to 30 degrees in his written report to calculate a smaller influence zone (460-750 feet) in agreement with values reported by the USBM. The subsidence contours are depicted in one-foot increments, and show the maximum subsidence amount of ten feet, (as predicted within the MTI report, "Prediction of Surface Deformation Resulting from Longwall Mining Over the Bear Canyon Reserve"). Thu, Plate 5-3 depicts the maximum amount of subsidence in the areas where both the Tank and Hiawatha seams will be extracted.

The Permittee must revise Plate 5-3 to accurately reflect the area of potential subsidence about the perimeter of the projected mine workings using the selected angle of draw determined above and the average depth of overburden within the mining area.

R645-301-525.410, Method of Coal Removal

The application states on Page 5-10 that it is the Permittee's intent to implement retreating longwall secondary extraction methods to extract coal. Plate LMU-3, Tank Seam / B Seam Projected Mining accurately depicts the size, sequence and timing of the development and extraction of the underground workings. Similarly, Plate LMU-5, Hiawatha Seam Projected Mining shows the projected sizes of the longwall panels and the development / extraction dates through the year 2021.

R645-301-525.200, Protected Areas

The application mentions on Page 5-19 that no buildings have been identified above the potential subsidence zone (in the newly proposed lease addition). There are no abandoned oil or gas wells within the permit boundary. The Permittee has verbally stated that there is only one escarpment in the proposed permit area that would require protection.

The last area of concern is the potential for loss of raptor nesting areas in escarpment areas. The Permittee states on Page 5C-9 "no active nests have been identified in the potential subsidence area" (of the new lease addition/PHH). Nest locations are confidential information and are shown on Plate 5-3A (confidential folder).

The application is deficient; in accordance with the requirements of:

R645-301-525.200, R645-301-358.200; The Permittee must describe what measures are to be taken to prevent damage to this area from the underground secondary coal extraction activities. The Permittee must provide a map that correlates the surface location of this area to

be protected with the underground workings, and how the protection area correlates with the extraction area, (i.e., how does the surface location correlate with the longwall face).

Performance Standards For Subsidence Control

Page 5-18, **Protection of Natural Surface Structures & Streams** of the Task ID #2292 submittal discusses the methods to be utilized by the Permittee to protect escarpments, raptors, and down stream water quality. A portion of Fish Creek, where it flows through a portion of Federal lease U-61049 and private property are to be protected by establishing a zone, as described in Appendix 5-C. **The Permittee must provide a map that correlates the surface location of this area to be protected with the underground workings, and how the protection area correlates with the extraction area, (i.e., how does the surface location correlate with the longwall face).**

Bear Creek flows through a mineable portion of Federal lease U-024316. This submittal is proposing to add 80 acres of reserves to this lease. Page 1-7 provides the legal descriptions for the lease areas to be added / approved by this submittal. The eighty acres being added to Federal lease U-024316 is the E1/2 NW1/4, which is more than a thousand feet from the Bear Creek channel. Therefore, the precautions used by the Permittee are not applicable to the area where the eighty acres are being added to the Bear Canyon permit area.

R645-301-525.500, et al.; Repair of Damage

The Permittee discusses potential negative effects of secondary longwall extraction in the lease addition being proposed in Chapter 5, page 5C-9 of the Task ID #2597 submittal.

Loss of riparian water and State appropriated water rights is of greatest concern to the surface management agency as well as the Division. The Permittee states that one area of concern is an area of Fish Creek in section 19 between two areas of lease U-61049 where water sources could be impacted. The Permittee proposes to monitor the area for water loss as it is being undermined.

Due to the depth of overburden in the new lease addition, the Permittee anticipates that no State appropriated water rights are expected to be impacted.

The Permittee commits to take action in the following manner, if mining related subsidence causes a loss of water; "if it is determined that a loss of water, (i.e., a water right) can no longer meet its beneficial use in its new location, the Permittee will replace the water right in a manner approved by the water right holder.

"If the water is displaced, and it is determined that the water right can still meet its beneficial use, the Permittee will take no action to replace the water."

"Water replacement may include, but is not limited to transferring water rights owned by Co-Op to the owner, or drilling wells."

The Permittee states that the loss of surface vegetation damaged by methane liberation through fissures caused by mining subsidence is of little concern because the Permittee has never encountered methane gas underground. The Permittee is proposing to develop new coal reserves that may have mining conditions unfamiliar to the Permittee, i.e., methane gas liberation. Thus, the provided text does not constitute a mitigation plan, should problems arise.

The application is deficient. In accordance with the requirements of:

R645-301-525.480, the Permittee must revise the proposed text to indicate that water will be replaced even if it is only displaced. It is felt that displaced water may not be able to meet its established beneficial use in a particular area. No range limit has been established to provide guidance relative to still "meets beneficial use".

Notification

The Permittee has provided projection maps of the #4 Mine workings depicting the anticipated dates when development mining will cross into the proposed lease additions. The map does not show the surface landowner delineations, but section lines are depicted such that the required notification letters can be sent in the time frame mandated under **R645-301-525.700.** The Permittee's response received August 9, 2006, (Task ID #2597) indicated that Plate 5-1A, 5-1B, and 5-1C now correlate with Plates 1-1, Permit Area, Plate 1-2, Surface Ownership, and Plate 1-3, Sub-Surface Ownership.

By coordinating Plates 1-2, Surface Ownership and Plate LMU-3, Tank seam projected mining, the Permittee can notify each of the respective land owners involved at least six months prior to crossing beneath a property boundary, meeting the requirements of R645-301-525.700.

Findings:

The application does not meet the minimum regulatory requirements of this section. The Permittee's proposed monitoring plan is deficient; in accordance with the requirements of:

R645-301-525.440, the Permittee must commit to installing **ONE** subsidence monitoring point in each longwall panel as close to the longitudinal and latitudinal center of the panel as possible in order to determine when subsidence has reached its

maximum in that area. Comparison of this data with adjacent monitoring points will determine if the subsidence trough is at the supercritical stage.

R645-301-525.440, the Permittee must commit to **compiling an analysis** of the subsidence monitoring data that is submitted with the annual monitoring report for the area that was extracted during the current monitoring year. An analysis of the monitoring data for previous years over areas adjacent to those extracted during the current monitoring years is also required. However, the analysis of data for areas which have been extracted two years prior to the current monitoring year **IS NOT NECESSARY.**

R645-301-512.130; Surface Configurations. The Permittee must revise Plate 5-3 to accurately reflect the area of potential subsidence about the perimeter of the projected mine workings using the selected angle of draw determined above and the average depth of overburden within the mining area.

R645-301-525.200, R645-301-358.200; (1) The Permittee has indicated on page 5-18 (Chapter 5, Task ID #2597 submittal) that a section of the Left Fork of Fish Creek where it flows through a portion of Federal lease U-61049 and private property lies over a mineable portion of that lease. It is believed that this area exists where the amount of overburden beneath the stream channel varies from 800 to 900 feet. Plate 7-4 depicts this area, which lies in the NW1/4 NE1/4 of Section 19. Therefore, the potential exists, that if secondary extraction is practiced through this area, subsidence could affect this stream. Plate 7-4 indicates that this area will be monitored while undermining. **(2)** The Permittee must clearly define how it will monitor and/or protect this area. The Permittee must correlate this location with a map of the underground workings showing the protection area, and blocks of coal that are being proposed to be left to protect it. **(3)** The last area of concern is the potential for loss of raptor nesting areas in escarpment areas. The Permittee states on Page 5C-9 "no active nests have been identified in the potential subsidence area" (of the new lease addition/PHH). Nest locations are confidential information and are shown on Plate 5-3A (confidential folder). **(4)** The Permittee must describe what measures are to be taken to prevent damage to this area from the underground secondary coal extraction activities. The Permittee must provide a map that correlates the surface location of this area to be protected with the underground workings, and how the protection area correlates with the extraction area, (i.e., how does the surface location correlate with the longwall face). **(5)** Page 5-18, **Protection of Natural Surface Structures & Streams** of the Task ID #2292 submittal discusses the methods to be utilized by the Permittee to protect escarpments, raptors, and down stream water quality. A portion of Fish Creek, where it flows through a portion of Federal lease U-61049 and private

property are to be protected by establishing a zone, as described in Appendix 5-C. **The Permittee must provide a map that correlates the surface location of this area to be protected with the underground workings, and how the protection area correlates with the extraction area, (i.e., how does the surface location correlate with the longwall face).**

R645-301-525.480, the Permittee must revise the proposed text to indicate that water will be replaced even if it is only displaced. It is felt that displaced water may not be able to meet its established beneficial use in a particular area. No range limit has been established to provide guidance relative to still "meets beneficial use".

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Regulatory Reference: 30 CFR Sec. 784.24, 817.150, 817.151; R645-301-521, -301-527, -301-534, -301-732.

Analysis:

Road Classification System

All eleven roads within the Bear Canyon Mines disturbed area have been classified as primary, (See page 5-21, section R645-301-527 Transportation Facilities of the approved MRP). All roads associated with the lease additions are the property of the surface landowner.

As such, surface roads in Federal leases U-024316, U-46484, U-61048 and U-61049 are owned either by the Forest Service or the C. O. P. Coal Development Company.

If the Permittee has a need to utilize any FS roads in the future, it will be necessary for them to obtain a Road Use Permit from that agency.

Plans and Drawings

Maps, plans and drawings of the eleven primary roads within the Bear Canyon Mine disturbed area are contained on Plates 5-2 and 5-4, as well as Appendices 5-J and 5-K.

Chapter 5, page 5-21 of the Bear Canyon MRP makes the following statement; "construction of the Mohrland Road is discussed in Appendix 5-L." At the present time, Appendix 5-L does not exist. The Permittee intends to do this permitting in the future. Plans and drawings will be submitted at that time.

Primary Road Certification

Plates 5-2A-G depict the plan views of the surface facilities associated with the Bear Canyon Mines from the ball park area to the #'s 1, 2, 3, and 4 Mine portal areas. Thus, all of the eleven primary roads are depicted. Mr. Charles Reynolds, General Manager, and Utah registered professional engineer has placed his P.E. certification on each of these maps. Similarly, Plate 5-4A-D contains cross-sections and P.E. certifications for the primary access road (coal haul road / Bear Canyon), the Shop road and pond "A" access road (4B), the shower house road and #2 Mine road (reclaimed) ((4C)), and the #1 and #2 conveyor access roads, and the #3 Mine access road in the Wild Horse Ridge area, (4D).

Appendix 5-K contains cross sections and stability analyses for the #4 Mine, or Tank seam primary road. Neither the road design nor the stability analyses have a certification by a Utah registered professional engineer. Thus, the requirements of R645-301-512.200 have not been met.

The response received from the Permittee on August 9, 2006 (Task ID #2597) indicates that the required "as-built" maps and P.E. certification for the #4 Mine Tank seam access road have been forwarded to the Division as part of Task ID #2588. The review / approval of that information is pending, as of the date of this document.

Findings:

The minimum regulatory requirements of this section have been met.

SPOIL AND WASTE MATERIALS

Regulatory Reference: 30 CFR Sec. 701.5, 784.19, 784.25, 817.71, 817.72, 817.73, 817.74, 817.81, 817.83, 817.84, 817.87, 817.89; R645-100-200, -301-210, -301-211, -301-212, -301-412, -301-512, -301-513, -301-514, -301-521, -301-526, -301-528, -301-535, -301-536, -301-542, -301-553, -301-745, -301-746, -301-747.

Analysis:

Coal Mine Waste

Page 5-26 of the Task ID #2292 application contains one text change on page 5-26. That change proposes to change the location for the final disposal of coal mine waste from the #3 and #4 Mines from Slurry Pond 5A at the Hiawatha Complex (C/007/011) to Refuse Pile 1 (MSHA ID #1211-UT-09-02157-04) at the same site. Refuse Pile 1 is adjacent to and NE of the old railroad depot / station location at the Hiawatha site.

The Division should make sure that the Permittee has changed the location for final deposition of the Bear Canyon waste in the Refuse Pile #1 area of the Hiawatha permit in that respective mining and reclamation plan.

Refuse Piles

As previously noted, all coals produced in the #3 and #4 Mines will be brought to the surface out of the #3 Mine belt portal. Coal processing waste will be generated at the Bear Canyon tipple, and material that is not picked off, and crushed for use as road base underground will be shipped to the Hiawatha permit area (C/007/011) for final disposal in Refuse Pile #1.

Impounding Structures

There are no impoundments associated with the Task ID #2292 application.

Burning And Burned Waste Utilization

This section is not applicable to this amendment.

Return of Coal Processing Waste to Abandoned Underground Workings

Coal processing waste will not be returned to abandoned underground workings.

Excess Spoil:

No spoil is generated at the Bear Canyon mining operation.

Findings:

The minimum requirements of this section have been addressed.

SUPPORT FACILITIES AND UTILITY INSTALLATIONS

Regulatory Reference: 30 CFR Sec. 784.30, 817.180, 817.181; R645-301-526.

Analysis:

Appendix 5-A, Table 5A-1, Existing Structures (page 5A-2) was resubmitted as part of the Task ID #2597 response. Corrections have been made to Table 5A-1 to depict the structures that have been built relative to the Wild Horse Ridge addition.

Findings:

The application meets the minimum regulatory requirements of this section of the R645 Coal Mining Rules.

SIGNS AND MARKERS

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

Analysis:

The requirements of this section have been addressed within the currently approved mining and reclamation plan for the Bear Canyon operation.

Findings:

The minimum regulatory requirements of this section have been previously addressed.

USE OF EXPLOSIVES

Regulatory Reference: 30 CFR Sec. 817.61, 817.62, 817.64, 817.66, 817.67, 817.68; R645-301-524.

Analysis:

There are no proposed changes to this section of the approved mine plan.

Findings:

The minimum regulatory requirements of this section have been previously addressed.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

Affected Area Maps

Revised maps that have been submitted relative to this application include Plate 1-1, Permit Area Map, and Plate 5-3, Subsidence Map. Problems have been identified with Plate 5-3, Subsidence Map, in that the areas of potential surface impact have not been correctly identified.

Mining Facilities Maps

Plates 5-2A through 5-2H are contained in the Bear Canyon reformatted mining and reclamation plan, and have been approved and incorporated by the DOGM.

Mine Workings Maps

Mine workings are depicted on Plates 5-1A and 5-1C for the Blind Canyon seam (#3 Mine) and the Tank seam (#4 Mine) respectively. The Plates that have been re-submitted as part of Task ID #2526 are certified by a Utah registered professional engineer.

Plates 5-1A and 5-1C show the anticipated dates of secondary extraction for the mining sections in the Blind Canyon and Tank seams respectively.

Monitoring and Sampling Location Maps

Plates 7-4A, Spring Canyon Potentiometric Surface, 7N-2, Water Sampling Locations and 7-4, Water Monitoring have been submitted as part of the Task ID #2292 application.

Plate 5-3, Subsidence Map depicts subsidence monitoring station locations, escarpment locations, potential subsidence zones, and mine workings for the #1 and #2 Bear Canyon Mines. Mine workings for the #3 and #4 active mines are also shown.

Plate 5-3, Subsidence Map, has been certified by Mr. Mark Reynolds, a Utah registered professional engineer.

Certification Requirements

All of the plates submitted as part of the Task ID #2597 deficiency response have been certified by a Utah registered professional engineer.

Findings:

The application meets the minimum regulatory requirements.

RECLAMATION PLAN

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

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

Analysis:

Certification Requirements.

None of the cross sections for the cut and fill drawings shown in Appendix 5K, Attachment A are P.E. certified. These include the following:

a) TS-16, Sections 1, 2, 3, and 4.
b) TS-17, cross sections 0+00 through 3+50.

These cross sections depict both the pre-mining and post-mining surface configurations and as such, are considered as part of the requirements meeting final surface configuration maps, as well as reclamation backfilling and grading maps. "As builts" of the reclamation work including an aerial view drawing will be required post-reclamation.

The response received from the Permittee on August 9, 2006 (Task ID #2597) indicates that all cross-sections depicted in Appendix 5K have been resubmitted with the snow storage amendment response (Task ID #2588).

Findings:

The applicant's response meets the minimum regulatory requirements of this section of the R645 Coal Mining rules.

RECOMMENDATIONS:

The Bear Canyon lease addition application (Task ID #2597) does not meet the minimum regulatory requirements of the R645 Coal Mining Rules.

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