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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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April 15, 2015

TO: Internal File

THRU: Steve Christensen, Permit Supervisor *SKC*  
Daron Haddock, Coal Program Manager *DARH*

FROM: Peter Hess, En Sci III, Engineering Evaluation *PHH by SRS*

SUBJECT: 5<sup>th</sup> North Mains Stream Crossing Area, Energy West Mining Company, Deer Creek Mine, C/015/0018, Task ID #4867

#### SUMMARY:

The Permittee, Energy West Mining Company, submitted an application to address commitments made within the approved mining and reclamation plan to evaluate the geotechnical conditions of the five entry development section driven under the right fork of Rilda Canyon. The entries have stood for sixteen years, and overburden thickness varies from 162 feet to 213 feet, right / center / left obtained from core hole data.

This geotechnical inspection was conducted on January 30, 2015 by Messrs. Ken Fleck and Chuck Semborski, both of whom are registered professional geologists in the State of Utah.

R645-301-511.200 states that each permit application will include descriptions of "the proposed mining operation and its potential impacts to the environment as well as methods and calculations utilized to achieve compliance with design criteria".

This tech memo will address the effectiveness of the pillar design and entry configuration left under the right fork of Rilda Canyon and its potential to impact that drainage in the future.

**It must be stated that there is never a guaranty than an area will remain stable throughout eternity once it has been undermined.** This memo is an evaluation of what has been implemented relative to the mine design in this area and its potential to effectively support the right fork of Rilda Canyon.

# **RECLAMATION PLAN**

## **PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL ISSUES**

Regulatory Reference: R645-301-333, -301-342, -301-358.

### **Analysis:**

The mine workings map submitted with the geotechnical report prepared by Mr. Fleck and Mr. Semborski provides a great deal of information relative to the support provided by the remaining coal pillars. The route traveled by the two inspectors is depicted in highlighter yellow.

The area was developed in the Blind Canyon seam to provide access to the 5<sup>th</sup> North Mains in the Blind Canyon Seam in Rilda Right, and to rock tunnel down to the Hiawatha seam. The drawing states that the Hiawatha seam workings can be viewed on drawing # DU1817G. Seals have been installed in the NE end of the 5<sup>th</sup> North Mains stream crossing area. These entries slope down to the NE to provide the Hiawatha seam access.

The pillar design in the 1400 foot development area is generally on 80' X 120' center design. A few have longer centers. Five entries were driven, and the cross-cuts are staggered to minimize the roof span lengths at the intersections. Based on the submitted photos, the entries appear to be 20 feet in width, with an approximate height of nine to ten feet.

Geologic information in the right fork of the Rilda drainage was obtained from eight surface drill holes. Core data from EM-160, EM-161, and EM-162 (right to left, across the panel) show overburden depth above the entries varying from 161.6' to 212.7' (approximately 100 feet to the left of #1 entry). Core data from these three bores was submitted as part of the application. The thickness of the sandstone member varies from 36' @ EM-160 to 46.5' @ EM-161 to 46.4' @ EM-162. Additional information provided by the Permittee (4/14/2015) references a Beam Analysis of the sandstone member above the Blind Canyon coal seam at exploration drill hole site EM-158, where the sandstone member is approximately 33 feet thick. That analysis, which is contained in the Deer Creek MRP, (Volume 11A, Appendix Volume, Engineering Section 500, Appendix A, Attachment #3) determined that a Factor of Safety of 4.92 for the roof beam at EM-158 exists. Therefore, subsidence in this area is highly unlikely.

The Permittee provided twenty photographs of the underground workings which were traveled during this geotechnic evaluation.

Photo #13 shows debris on both the left and right side of the entry (Entry 1 XC 9 to the right). It appears that the debris on the left is block stopping material. The debris to the right appears that it might be gob material. The roof line in this photo is undulating, with the roof support screen pushed up across the roof line and secured with roof bolts.

Photo #16 is taken in entry #5 (extreme right hand entry) and shows rib bolts installed with holey boards at approximate eye level. However, the right rib in this area appears solid with no sign of slacking or possible failure signs.

The remaining photos, 1-12, 14-15 and 17-20 show straight, vertical ribs in the entries, with flat roof, supported with wire screen and roof bolts. No timbers, cribs or roof support “cans” are observed in these photos.

This area is under very shallow cover. Subsidence data provided for four monitoring points installed in the right fork of Rilda Canyon (RC-1 through RC-4) indicates that very little surface deformation has occurred since monitoring of these points began in 1998. Please refer to the five charts provided in the geotechnical report submittal.

Core hole data for exploration holes EM-160, EM-161 and EM-162 was provided and reviewed by the Division. A sandstone which varies in thickness from 36 feet @ EM-160 to 46.5 feet @ EM-161 (center entry of 5<sup>th</sup> North Mains) to 46.4 feet @ EM-162 (left side of section) is the main support member over this mining area. The sandstone lies ten feet above the Blind Canyon roof line in the center entry and is considered “secondary” roof. This information substantiates what is visible in the twenty photographs provided in the TID 4867 tech report.

The geotechnical report states that the closest area where secondary longwall extraction mining has occurred is 2800 feet away. Therefore, abutment loading from the longwall panels is too far away to affect the 5<sup>th</sup> North Mains area.

The Division requested that the Permittee provide a flooding analysis of the 5<sup>th</sup> North Mains stream crossing area (underlies the right fork of Rilda Canyon). This was forwarded to the Division by Mr. Ken Fleck, P.G., on April 15, 2015.

Quoting Mr. Fleck, “should ground water enter the area of the 5<sup>th</sup> North stream crossing after mine closure, it will be prevented from entering the North Rilda area of extracted panels by the seals already installed at 5<sup>th</sup> North Mains Crosscut 11.5. Water in the Hiawatha seam workings will likewise be prevented from entering the North Rilda area by seals at 6<sup>th</sup> North Mains, Crosscut 10, and watertight bulkheads to be constructed at 1<sup>st</sup> Right Mains, Crosscut 4.5”.

Evaluation of this complete information package leads to this conclusion; the shallow cover and thick sandstone member above the large pillars make it appear highly unlikely that the light weight above these pillars could push them down into the mudstone / siltstone bottom, should it become saturated. The safety factor determination (Beam Analysis, Deer Creek MRP, (Volume 11A, Appendix Volume, Engineering Section 500, Appendix A, Attachment #3) of 4.92 definitely shows that it would not be a roof failure that would lead to subsidence in the stream crossing area. Pillar punching into the bottom is a possibility, but it appears unlikely.

The conclusion of the submitted report states that the Permittee feels that no additional roof support is required in this area. As permanent sealing of the Mine will occur in the very near future, it will be impossible to re-access the 5<sup>th</sup> North Mains stream crossing area to install additional support.

The geotechnical report and evaluation of long term stability for the 5<sup>th</sup> North Mains stream crossing area is P.G. certified by Mr. Kenneth S. Fleck, Utah registered professional geologist.

## **Findings:**

The Permittee's report includes a discussion on the potential for the flooding of the 5th North Mains area. Should water encroach upon the pillars or inundate the mine floor, it is possible, but appears highly unlikely, that the structural integrity of the area could be affected.

The submitted information adequately addresses the commitment made by the Permittee, Energy West Mining Company, to evaluate the structural stability of the 5<sup>th</sup> North Mains area.

**It must be stated that there is never a guaranty than an area will remain stable throughout eternity once it has been undermined.** The information provided in the Permittee's geotechnical report is sufficient to make a determination that the area will remain stable beneath the right fork of Rilda Canyon for many years.

## **RECOMMENDATION:**

Final approval is recommended. The Permittee has provided the Division with information which is adequate to make a determination of long term stability in the right fork of Rilda Canyon of the Deer Creek Mine.

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