

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

#3883
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August 2, 2011

TO: Internal File *PHH*

THRU: Daron Haddock, Coal Program Supervisor, Team Lead

FROM: Peter Hess, Environmental Scientist III *PHH by SHS*

RE: Winter Quarters Slope Construction Surface Blasting Plan, Canyon Fuel Company, LLC, Skyline Mine, C/007/005, Task ID # 3883

SUMMARY:

The Permittee, Canyon Fuel Company, LLC, submitted a tunnel blasting plan prepared by the contractor selected to develop this mine access, Harrison Western Construction Corporation on July 29, 2011. This memo will address the adequacy of the submitted plan with regard to R645-301-524, Blasting and Explosives.

USE OF EXPLOSIVES

Analysis:

General Requirements

The R645 Coal Mining Rules require that, "for the purposes of underground coal mining," ...rules "R645-301-524.100 through 524.700 apply to surface blasting activities incident to underground coal mining, including, but not limited to, initial rounds of slopes and shafts". Thus, the initial rounds for the slope tunnel development are subject to surface blasting requirements of the R645 Coal Mining Rules.

In accordance with the requirement under R645-301-524.220, the blast design may be submitted before the blast, if approved by the Division. This rule is pertinent to this application, as only the initial round(s) is subject to the requirements of R645-301-524. There is no clear cut definition of what is meant by "initial rounds of slopes and shafts" incident to underground coal mining. This reviewer believes that, based upon the facts that once the entry has been developed in ten feet it must be:

- 1) Ventilated by some means and installed at a distance no greater than 10 feet from the area of deepest penetration.

2) Adequately supported to within a specified distance from the face.

Therefore, once the entry has been developed to a penetration depth of ten feet or more, it is considered as being underground, and under the jurisdiction of underground mining law including explosive usage (30 CFR Part 75, Subpart N, Explosives and Blasting).

This memo will review the submitted blasting plan as it pertains to one blast round, or a penetration depth of ten feet.

Page 2, section 3.0, BLASTING SUMMARY, of the submitted blasting plan states that "all blasting shall be conducted at the direction of a certified blaster". This commitment meets the requirement of R645-301-524.110.

The certified blaster who will be responsible for the initial rounds of the slope tunnel construction is Mr. Iver John Iverson, who is employed by Harrison Western Construction Corporation, Lakewood, Colorado. Mr. Iverson is certified as a blaster by the State of California, Division of Occupational Safety and Health as a blaster for General Underground Tunneling. He also holds State of California certifications for testing of combustible gas levels, and as a safety representative / underground mining and tunneling. The State of California has an OSM approved blaster certification program for surface coal mine blasting, and thus, a reciprocal agreement with the State of Utah, the State of California and the U.S. Office of Surface Mining exists. Mr. Iverson is qualified to prepare, sign and submit a prepared blast design to meet the requirements of R645-301-524.220, 524.230 and 524.240.

"Certificates of blaster certification will be carried by blasters or will be on file at the permit area during blasting operations". This statement meets the requirements of R645-301-524.120.

"Any non-certified persons assigned to the blast crew or who assist in the use of explosives will be given on-the-job training by the certified blaster in the use of explosives". This statement complies with the requirement of R645-301-524.140.

"The use of explosives will comply with all appropriate Utah and federal laws and regulations. Explosives materials will be stored in accordance with the American Table of Distances and will be transported, carried, handled, charged, fired, destroyed or used otherwise in accordance with 30 CFR 75, Subpart N and ATF regulations". These requirements meet the stipulations mandated under R645-301-524.800.

PREBLASTING SURVEY

Section 6.0 PREBLAST NOTIFICATION & PREBLASTING SURVEY, Page 5 of the Task ID # 3883 discusses the fact that the blasting area (which is contained within the permit

area / slope tunnel entrance) is more than ½ miles from any residents or owners of dwellings or other structures. Therefore, there is no one to notify regarding how to request a pre-blast survey.

According to the cover letter submitted with the application (dated July 29, 2011), the entrance to the rock slope is 8,900 feet (1.7 miles) from the nearest inhabited structure. Again, this confirms that the letters required to request a pre-blast survey are un-necessary.

“Town of Scofield officials and the Carbon County Sheriff will be notified prior to surface blasting” (Page 5, Section 6.0). Relative to the aforementioned notification, the Division recommends that Canyon Fuel Company, LLC document each notification process with the appropriate date, time, and method of notification.

This same section also discusses the notification of area residents by a newspaper of general circulation of the initiation of blasting for the slope tunnel construction. This would occur at least ten (10) days, but not more than thirty (30) days before the initiation of blasting activities. This is necessary to ensure that the general public has been notified that blasting will be initiated at approximately a specific date and time. This section addresses the requirement of R645-301-524.460.

GENERAL PERFORMANCE STANDARDS

The submitted blast design is contained on Pages 3 and 4, Section 4.0, **BLAST DESIGN**. Page 3 depicts a PLAN VIEW which shows the depth of the blast round at ten feet (TYP). The “face” is depicted on Page 4. The proposed tunnel entry is depicted as having a 23 foot width, with a height of 12.75 feet (Area of 293.25 square feet).

Eleven series of holes are depicted, with each series having an 8 millisecond delay. Two relief holes are shown in the center of the face, each having a 2 to 5 inch diameter.

In accordance with the requirements of **R645-301-524.230**, **the submitted blast design must contain:**

- 1) Sketches of the drill patterns. This has been submitted as pages 3 and 4.
- 2) Delay periods. Eleven 8 millisecond delay periods are depicted on Page 4 of the blasting plan submitted by Harrison Western Construction Corporation.
- 3) No decking will be used as part of this blast design, as it does not involve overburden removal in a surface mining operation.
- 4) The type and the amount of explosives to be used

On August 4, 2011, the Permittee (Canyon Fuel Company, LLC) and Harrison Western Construction Corporation submitted additional information relative to the type, size, and amount of explosives to be used for the tunneling. The blasting plan approved by MSHA lists DYNO AP or DYNO E-5 or similar packaged, detonator sensitive emulsion (packaged) as the explosive to be used. Approximately 11.52

pounds of explosive will be used in each hole (as noted by Jon Nelson, Project Manager, HWCC). A powder factor, (the ratio of pounds of explosive per cubic yard of broken material) of 6.6 has been given. Electric detonators will be used to initiate the detonation.

The Division has determined that this powder factor is acceptable when it is compared to a charge weight for 60 holes as proposed for a 300 square foot area heading in sandstone and shale material. Borehole depth as depicted on Page 3 of the submitted plan shows a maximum depth of ten (10) feet. 30 CFR 75.1332(d) says "each borehole 4 or more feet deep shall be stemmed for at least 24 inches." Thus the maximum length of explosive in each hole can only be eight feet. If the proposed blast design uses 1 and 1/4" X 12 inch cartridges (1.66 pounds per cartridge (See DYNO AO information, Page 2)) and 60 holes are charged, the maximum weight of explosives used per round would be $(8 \times 1.66)60 = 798$ pounds.

This can be used to determine a powder factor of $798 \text{ pounds} / 109 \text{ CY} / \text{shot} = 7.32$. This powder factor is based on the assumption that all holes, including the 24 trim holes located about the entry perimeter, will each be charged with 13.28 pounds of explosive. To charge the trim holes this heavy would result in overbreak on the tunnel sides and roof creating excessive support problems.

Thus the given Powder Factor of 6.6 is within the range to be accepted as part of this plan.

- 5) Critical dimensions. As is noted above, the slope tunnel will be drilled and shot to deliver an entry size having a 23 foot width, and an approximate 13 foot height. This blast design requirement has been met.
- 6) The blast design must include a description and location of the structures which require protection. The closest structure to the blast area which must be considered as possibly needing protection is greater than one mile from the permit area (Distance >5,280 feet).
Using a Scale Distance Factor of 65, the Legal Weight of explosives which can be shot from a single borehole is $(5280/65) \times (5280/65) = 6,598$ pounds of explosive per borehole or per 8 MS delay. Page 3 of the submitted blasting plan states that a maximum of sixty holes may be detonated in a single blast, with a maximum charge weight of ninety-six (96) pounds of explosives in any eight (8) millisecond (delay/PHH) period. Therefore the maximum legal weight which would require that seismic monitoring be implemented is more than 68 times the amount of explosives which will be shot in any of the eleven delay periods. No monitoring is necessary.
- 7) R645-301-524.240 requires that "the anticipated blast design must be prepared and signed by a certified blaster..." This requirement has not been met and is therefore a deficiency.

R645-301524.240, Blast Design Certification; the certified coal mine surface blaster responsible for the initial tunneling rounds must sign the anticipated blast design prior to receiving a Division approval for this application.

BLASTING SIGNS, WARNINGS, AND ACCESS CONTROL

Section 11.0 ADDITIONAL PRECAUTIONS, page 6, contains eight bullet statements as follows:

- #5 Blasting warning signs reading “Blasting Area” will be posted outside the permit area at the point where any road provides access to the blasting area”.
- #6 “Access to the blasting area will be controlled to prevent presence of livestock or unauthorized persons by chain-link fencing. The chain-link fence will remain in place prior to and throughout the duration of surface blasting operations”.
- #7 “Audible pre-blast signals will be sounded prior to each surface blast. These signals shall be audible for up to one-half (1/2) mile and will occur once at five (5) minutes prior to the blast and once at one (1) minute prior to the blast”.

CONTROL OF ADVERSE EFFECTS

- 8) The blast design must include a discussion of the methods used to protect the public and meet the applicable air-blast, fly rock, and ground vibration standards in R645-301-524.600.

Air-blast

Air blast is discussed in section 7.0 page 5 of the Winter Quarters Slope Construction Plan, AIRBLAST & PEAK PARTICLE-VELOCITY LIMITS. The application states that “there are no occupied dwellings or residents, or public buildings, schools, churches, community or institutional buildings, or other structures within one-half (1/2) mile of the permit area.”

As stated in the cover letter dated July 29, 2011 for the Winter Quarters Ventilation Facility Slope Construction surface Blasting Plan, the blast site is 1.7 miles from any structure which exempts this project from most of the monitoring requirements. This distance is more than three times the distance used to determine the need for pre-blast surveys for occupied dwellings or public buildings.

Also, the longitudinal axis of the slope where the surface blasting will occur is approximately ninety degrees out of line with the longitudinal axis of Winter Quarters Canyon. Any effects created by the blasting would have to rebound off the opposite Canyon slope, and turn down the Canyon traveling the 1.7 miles. Sound and air waves propagate from a source in a

radial fashion. They can rebound (off the opposite canyon wall, but they do not make ninety degree turns and then travel in a straight fashion.

There will be no effects from air blast 1.7 miles from the blast site.

Flyrock

Section 11.0 ADDITIONAL PRECAUTIONS, page 6 of the submitted proposed plan states "blasting mats will be hung over the blasting area to prevent flyrock". The size of the detonation charge is not sufficient to cast fly rock outside the permit boundary.

Ground Vibration

The estimated peak particle velocity (ground vibration) caused by the detonation of an 800 pound charge at a blast site 1.7 miles from the closest residential or public structure is calculated to be 0.01608 inches per second. This PPV is well below the Maximum Allowable Limit of 0.75 inches per second for structures greater than 5001 feet from the blast site. There will be no effect from ground vibration at the closest structure. The Maximum Allowable PPV Limit (.75 inches per second) is 47 times more powerful than the PPV which will be generated by the 800 pound detonation.

Records of Blasting Operations

Section 10.0 Blasting Records

The proposed blasting plan states on Page 6 that "blasting records for surface blasts shall contain the information as required by Utah Administrative Code R645-301-524.700 to 524.760. Such blasting records shall be maintained at the mine site for at least (3) years and available for inspection by the Division or the public upon request."

This commitment meets the requirements of R645-301-524.700 et al.

Findings:

The application is deficient. In accordance with the minimum regulatory requirement of **R645-301-524.240**, the anticipated blast design for the initial round(s) must be signed by the certified blaster preparing it.

The signed document must then be forwarded to the Division.

RECOMMENDATION:

The submitted blast design should receive a conditional approval, pending receipt of a signed copy of the anticipated blast design prepared by the authorized certified surface blaster, Mr. Iver John Iverson.

At that time, final approval is recommended.

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