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DEPARTMENT OF NATURAL RESOURCES

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Technical Analysis and Findings
Utah Coal Regulatory Program

PID: C0150018
TaskID: 4762
Mine Name: DEER CREEK MINE
Title: TRANSFER WELL MONITORING

Summary

Energy West Mining Company (the Permittee) submitted an amendment to simultaneously amend the Deer Creek and Trail Mountain MRP's to the Division of Oil, Gas and Mining (the Division) on December 12, 2014. This amendment is reviewed by the Division under Task ID# 4762. The task seeks to transfer six water monitoring wells that are currently monitored under the Deer Creek MRP to be monitored under the Trail Mountain MRP. It will also add a copy of the 1992 Hydrogeologic Investigation of Cottonwood Canyon Creek found within the Deer Creek MRP to the Trail Mountain MRP. The monitoring wells are located on Cottonwood Canyon Creek and were installed in the early 1990's to monitor the potentiometric surface of the Star Point, Blackhawk Formation, and the alluvial aquifer within the canyon bottom. These wells and the subsequent hydrogeologic investigation were the Permittee's response to a citizen complaint that the Cottonwood Spring had dried up around the same period in time underground mining contacted and crossed the Roans Canyon fault. The citizen complaint was fully resolved in the mid-1990's.

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General Contents

Reporting of Technical Data

Analysis:

The application does not meet the minimum Permit Application Format and Contents requirement of being clear and concise R645-301-121. Two edits are necessary for the Trail Mountain Water Monitoring Program table to clean it up and make it more easily understood. 1) The UPDES point for Trail Mountain Mine Discharge should be UT-0023728-002 it is currently referenced as UT-0023728-001. 2) The (*) symbol next to 'Level Only' in the REMARKS column for the six wells being added should be removed if they are not referencing a disclaimer or comment.

Deficiencies Details:

The application does not meet the minimum Permit Application Format and Contents requirement of being clear and concise R645-301-121. Two edits are necessary for the Trail Mountain Water Monitoring Program table to clean it up and make it more easily understood. 1) The UPDES point for Trail Mountain Mine Discharge should be UT-0023728-002 it is currently referenced as UT-0023728-001. 2) The (*) symbol next to 'Level Only' in the REMARKS column for the six wells being added should be removed if they are not referencing a disclaimer or comment.

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Operation Plan

Hydrologic Ground Water Monitoring

Analysis:

Hydrogeology background:

In 1991, there was a citizen complaint that Cottonwood Spring in Cottonwood Canyon Creek had dried up due to the underground workings of the Deer Creek Mine (the Permittee). Around this same time, underground mining in Deer Creek had contacted the Roans Canyon fault and intercepted a steady flow of a significant volume of water. The fault crossed Cottonwood Canyon just upstream of Cottonwood Spring, so the complaint contended the dewatering of the fault had caused the spring to stop flowing. This brought about an extensive hydrogeologic system investigation by the Permittee of the spring and its connection or lack thereof to the underground workings of the Deer Creek Mine in East Mountain.

As part of the Permittee's investigation a series of wells up-canyon from the spring were installed in the alluvium of Cottonwood Canyon Creek and into the underlying bedrock. Wells CCCW-1A, CCCW-2A, and CCCW-3A are screened in the alluvial and colluvial deposits in the valley bottom of Cottonwood Canyon. Wells CCCW-IS and CCCW-3S L are screened in the Star Point Sandstone, and CCCW-3S U is screened in the Blackhawk Formation. The alluvial wells are unconfined aquifers, while the wells ending in the bedrock units are confined aquifers. The economical coal seams (Blind Canyon and Hiawatha) are located within the lower portion of the Blackhawk Formation, stratigraphically above the Star Point Sandstone (Drawing HM-12). Using the data from these wells, the study concluded the alluvial aquifer was the sole water source for Cottonwood Spring. It determined the alluvial aquifer is hydrologically isolated from the Roans Canyon fault and the Star Point and lower Blackhawk Formation confined aquifers. The study further argued the alluvial aquifer is recharged by annual precipitation and the drier climate had led to the demise of the spring's flow and not underground mining activity in Deer Creek.

Ken Wyatt of the Division of Oil, Gas and Mining (the Division) analyzed the hydrology and hydrogeology of Cottonwood Spring, Cottonwood Canyon Creek, the Roans Canyon fault and their relationship with underground mining in Deer Creek. The Division's findings disagreed with the Permittee and are outlined in an internal memo dated October 16, 1998 (M:FILES\COAL\PERMITS\015\C0150018\1998\INTERNAL\0008.pdf). In brief, the Division concluded the Roans Canyon fault discharges to the Cottonwood Canyon Creek alluvial aquifer and contributes to the flow in Cottonwood Spring. The Division based this finding on a number of factors. First, by calculating the theoretical alluvial aquifer discharge at the location of the spring showed it was unlikely that discharge rates were fully supplied from the alluvial sediments. Second, in-mine wells showed the piezometric head of water within Roans Canyon fault was higher than the elevation of Cottonwood Spring and allowing discharge from the fault to flow to the spring. Third, the underground activities received a sustained and significantly large volume of water when the Roans Canyon fault and sympathetic faults were intercepted. It was probable the water that once flowed to Cottonwood Spring was now the source of the uptick in discharge rates at the Deer Creek portals.

Analysis:

The application to remove the six wells: CCCW-1A, CCCW-IS, CCCW-2A, CCCW-3A, CCCW-3S U, and CCCW-3S L, from the Deer Creek water monitoring program and add them to the Trail Mountain water monitoring program adequately addresses hydraulic performance standards as given under Ground-Water Monitoring in R645-301-731.210. The application to add a copy of the Cottonwood Canyon Creek 1992 hydrogeologic investigation pertaining to these wells to the Trail Mountain MRP adequately addresses hydraulic performance standards as given under Probably Hydrologic Consequences (PHC) Determination R645-301-728. The wells are located in Cottonwood Canyon Creek and have continuously monitored water levels at three locations in the unconfined alluvial aquifer and at three locations in confined bedrock aquifers from 1993 to the present. The water level in each well has been relatively stable with no major long term trends since monitoring began (Figure 1).

With the December 2014 closure of the Deer Creek Mine and the unlikely extraction of additional coal from East Mountain due to minimal reserves that are of low grade, these wells are of little use for the Deer Creek Mine. They will be much better suited to monitor the Roans Canyon fault zone during the future potential mining of the Cottonwood tract in the Trail Mountain mine. It will be important to closely monitor the Roans Canyon fault zone during the Cottonwood tract mining operations because the fault is a conduit for significant quantities of water. Current mapping of the fault shows it as being truncated by the Joes Valley graben at its western-most extent, where subsequently contacts the Joes Valley Reservoir. If underground mining lowers the piezometric head within the Roans Canyon fault below the surface elevation of Joes Valley Reservoir, there is the potential for the Roans Canyon fault to transmit significant quantities of water from the reservoir into the underground workings.

Findings:

The transfer of monitoring wells CCCW-1A, CCCW-IS, CCCW-2A, CCCW-3A, CCCW-3S U, and CCCW-3S L from the Deer Creek MRP to the Trail Mountain MRP meets the minimum hydrology requirements per the Divisions rules R645-301-731.210. Adding a copy of the Cottonwood Canyon Creek 1992 hydrogeologic investigation meets the minimum hydrology requirements per the Division rules R645-301-728.

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Reclamation Plan

Bonding and Insurance General

Analysis:

In the Deer Creek Mine MRP there is no reclamation bond posted to cap and seal the five wells that are being transferred in this amendment to the Trail Mountain MRP (Volume 2, Part 4, R645-301-800). There is one less well than points monitored because CCCW-3S L and CCCW-3S U are screened in the same well. An adequate amount of bond needs to be posted to cover the Permanent Casing and Sealing of Wells per R645-301-820, R645-301-830, and R645-301-765.

Deficiencies Details:

The application does not meet the minimum bonding requirements to File a Bond with a Determination of Bond Amount per the Division's rules R645-301-820 and R645-301-830. A reclamation bond needs to be posted for the five wells to cover the Permanent Casing and Sealing of Wells per R645-301-765.

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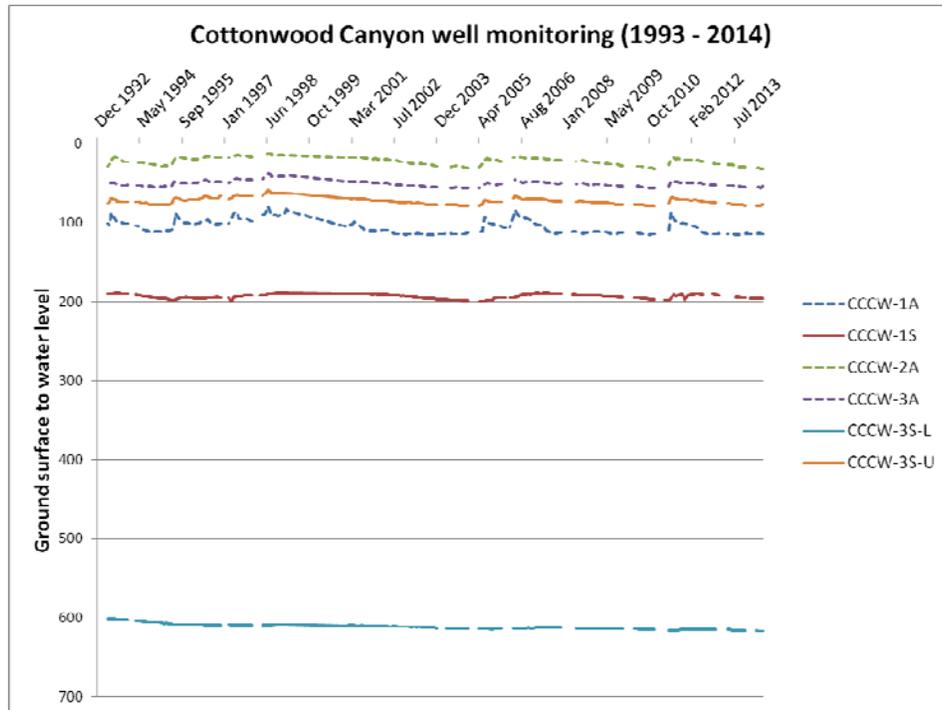


Figure 1. Water levels in Cottonwood Canyon wells monitored from 1993 to 2014. Wells screened in alluvium are dashed; well screened in the Starpoint or Blackhawk formations are solid. Breaks in data are from when wells were inaccessible due to weather. (Data point CCCW-3A 5/23/2006 was a major outlier and was excluded from the graph)