W A T E R Q U A L I T Y
MEMORANDUM
Utah Coal Regulatory Program

December 19, 2018

TO: Internal File

THRU: Steve Christensen, Permit Supervisor

FROM: Keenan Storrar, Hydrologist

RE: Second Quarter 2018 Water Monitoring, Alton Coal Development LLC, Coal Hollow, C/025/0005, Task ID #5746

The Coal Hollow mine is an active surface mine. The permit application was approved on October 15, 2009 and a Permit was issued to Alton Coal Development, LLC (ACD) on November 8, 2010. Mining activity commenced in November 2010.

The water monitoring program for the Coal Hollow mine is described in Section 731.200 of the MRP. Water monitoring locations are listed in Table 7-5 and are shown on Drawing 7-10. Monitoring protocols are described in Table 7-4 and the specific protocol(s) assigned for each location are listed in Table 7-5. Operational/Reclamation and Baseline monitoring parameters are listed for surface water on Table 7-6A and Table 7-6B, respectively, and for groundwater on Table 7-7A and 7-7B, respectively. Special Condition No. 4 of the mine Permit requires the Permittee to monitor for selenium where water leaves the mine site, during operational and reclamation phases.

The 85.88 acre Dame Lease IBC has been highwall mined. A couple boreholes undermined or nearly undermined wells, springs, and seeps in the NE ¼ sec. 29, T39S, R5W. The water levels in wells C2, C3, and C4 fluctuated in response to groundwater discharge into Highwall Trench 2. The Division required weekly water monitoring beginning one month prior, during, and one month after highwall mining has ceased at these wells. Water level monitoring then switched to monthly for the six months after highwall mining ceased. The Permittee began weekly monitoring the sites weekly in June, 2014 and continued through October 2015. The highwall trench is completely backfilled and quarterly monitoring has resumed for these wells. Graphs of water levels for these wells are included at the end of this report.

The North Private Lease (NPL) was permitted in September 2017. This lease addition adds a significant number of monitoring points to the MRP. The monitoring points include springs, streams, and wells within and adjacent to the permit area.

This report was prepared from monitoring data queried from the UDOGM database. The data that support this report were collected and submitted to the database by Alton Coal Development (ACD).

1. Were data submitted for all required sites?

Springs YES [X] NO [ ]

Seventeen springs are monitored quarterly (Table 7-5). Nine springs are monitored for field parameters only: Sorensen Spring, SP-3, SP-16, SP-22, SP-23, Hill Spring, Alkali Seep, Dakota Seep, and Seep Z. Eight springs are monitored for field parameters and operational analyses: SP-4, SP-6, SP-8, SP-14, SP-20, SP-33, Pond Spring, and Coyote Seep. Sorensen spring, SP-8, SP-14, SP-20, and SP-22 have weekly measurements beginning one month prior to highwall mining and continuing until one month after highwall mining in the area, followed by monthly measurements for a period of six months. SP-3 is a control spring discharge measurement for the area.

Flow measurements at each spring during the quarter are shown below:

SAMPLE	SITE	Flow (gpm)
ALKALI SEEP	Dakota Formation seep	0
COYOTE SEEP	Alluvial seep in North Lease	0
DAKOTA SEEP		0
HILL SPRING	Spring in Simpson Hollow	0.949
POND SPRING	Spring in Simpson Hollow	11
SEEP Z	Dakota Formation seep	0.047
SORENSON SPRING	Alluvial spring Sink Valley	0.086
SP-14	Alluvium - Sink Valley	< .25
SP-16	(Teal Spring) - Alluvium -Sink Valley	0.476
SP-20	Alluvium - Sink Valley	7.25
SP-22	Alluvium - Sink Valley	0.357
SP-23	Alluvium - Sink Valley	0.221
SP-3	Pediment Alluvium - Lower Sink Valley Wash	6.82
SP-33	(Johnson Spring) - Alluvium - Sink Valley	3.39
SP-4	Alluvium/Fault? - Lower Sink Valley Wash	0.643
SP-6	Alluvium - seep in Sink Valley	< 5.
SP-8	Alluvial spring at Dames Ranch	15.7

Streams YES [ ] NO [X]

Twenty stream sites are monitored quarterly. Operational analyses are performed for BLM-1, SW-2 (Kanab Creek below Robinson Creek); SW-3 (Kanab Creek above permit area); SW-4 and SW-5 Lower Robinson Creek [LRC] above permit area and above Kanab Creek, respectively); SW-6 (Sink Valley wash at permit boundary); SW-8 (Swapp Hollow Creek above permit area); SW-9 (Sink Valley Wash below permit area); SW-1; SW-1M; Kanab at C.R.; SW-11; April Creek; and SW-15. Field parameters are measured at RID-1 (irrigation ditch in Robinson Creek) and SW-101 (LRC in permit area); SW-1A; RSD-1; Priscilla Creek; EW-1. BLM-1, SW-5, SW-6, and SW-9 are monitored quarterly for total and dissolved selenium.

SW-8 needs to be uploaded to the database. I've emailed the operator and have notified them to do this.

Wells YES [ ] NO [X]

Table 7-5 in the Water Monitoring Program identifies the wells monitored quarterly. Wells Y-100 and Y-101 were added for underground mining in the South lease. Most wells are monitored for depth to water except for 11 wells monitored for depth and operational parameters: Y-61 (artesian Sink Valley alluvium above mining), LR-45 (LRC alluvium below mining), LS-28, LS-85 (artesian Sink Valley alluvium below mining), SS-30 (Sink Valley alluvium below mining); UR-70 (LRC alluvium above mining); Y-103; NLP-4; NLP-5; NLP-12; NLP-13. Several wells are expected to be destroyed or rendered inoperable due to mining activities (MRP page 7-59). These wells are to be monitored quarterly until they are destroyed or rendered inoperable. Wells C0-18 and C0-54 were destroyed Fourth Quarter of 2011. C9-15, C9-25, C9-40 were destroyed in Q3 of 2013, Y-38 in Q4 2013, and C7-20 in Q3 2014.

It will be important to monitor the CN and CLEM wells to the east and south of open-pit mining in the North Private Lease.

SS-75 in the South Lease is also showing a drawdown which is probably in response to up-gradient mining activities. In the past groundwater discharges into HWT2 impacted the water levels in C3 and C4 wells.

According to the Permittee's commitment in Appendix 7-1 the PHC must be updated regarding the fall in water levels and to estimate the re-saturation time of the backfill in the South Private Lease.

NPL-6 and NPL-7 need to be uploaded. I've notified the operator about this. I've also asked the operator to update the water monitoring program to indicate which well monitoring sites have been mined through.

UPDES YES [X] NO [ ]

Discharges from the Coal Hollow mine are authorized under UPDES General Permit for Coal Mining application number UT0025992. The UPDES permit expires on July 31, 2018 and authorizes discharges from nine outfalls: 001, 001B, 002, 003, 004, 005, 006, 007, and 008. In the South lease, these outfalls correspond to sediment ponds 1, 1B, 2, 3 and 4 and discharge location 005. In the NPL 005 and 006 may discharge storm water runoff from Ponds 5 and 6, respectively. Pond 7 (outfall 007) and Pond 9 (outfall 008) have not yet been constructed. Pond 7 with outfall 007 may discharge ground water in addition to storm water runoff. Sediment pond locations are shown on Drawing 5-25. The UPDES permit identifies monitoring frequency and required parameters, effluent limitations, and storm water requirements.

The Operator has submitted data electronically to the Division's water database this quarter. Special Condition No. 1 of the mine Permit requires the Operator to submit water quality data for the Coal Hollow Mine in an electronic format through the Electronic Data Input web site.

2. Were all required parameters reported for each site?

Springs YES [X] NO [ ]

Springs were monitored for the required field and operational parameters specified in the MRP.

Streams YES [X] NO [ ]

Stream samples were analyzed for the required operational monitoring parameters specified in the MRP. Permit Special Condition No. 4 requires selenium monitoring where water leaves the mine site during operational and reclamation phases. All operational samples from stream sites are being analyzed for dissolved selenium, while only BLM-1, SW-5, SW-6, and SW-9 are required.

Wells YES [X] NO [ ]

UPDES YES [X] NO [ ]

The Operator has submitted data electronically to the Division's water database. In addition to the monitoring requirements established by the UPDES permit, Special Condition No. 4 of the mine Permit requires the Permittee to monitor for selenium where water leaves the mine site, during operational and reclamation phases.

3. Were irregularities found in the data?

Listed parameters are more than two standard deviations above the mean.

Springs YES [ ] NO [X]

Streams YES [ ] NO [X]

SW-2: TSS

There have been significant spikes in T-Se in the past few years (see Figure 2). Chemtech-Ford has difficultly processing Selenium when samples are murky. In an effort to processes murky samples they dilute samples X5 raising the detection limit to <100.

Wells YES [X] NO [ ]

LS-28: Cl, SO_4

NLP-13: SO_4, T-Alk

NLP-4: Depth

The C-2, C-3, C-4 wells fluctuated in response to development and backfilling of HWT 2. Overall the water level appears to be settling at or a few feet below the original level. See the water level graphs at the end of this report.

UPDES YES [ ] NO [X]

4. On what date does the MRP require a five-year re-sampling of baseline water data.

Re-sampling for baseline parameters is due every five years during the third or first quarter. Baseline parameters for surface water and groundwater monitoring are listed in Table 7-6B and Table 7-7B, respectively. Assuming that the five-year baseline resampling will coincide with permit renewal, the next baseline re-sampling is due during third or fourth quarter 2020.

5. Based on your review, what further actions, if any, do you recommend? YES [X] NO [ ]

a. Lamb Canal should be reactivated for the North Private Lease amendment.
b. Monitor down gradient wells in Sink Valley and the C-series wells.
c. Monitor alluvium groundwater depths in the NPL.

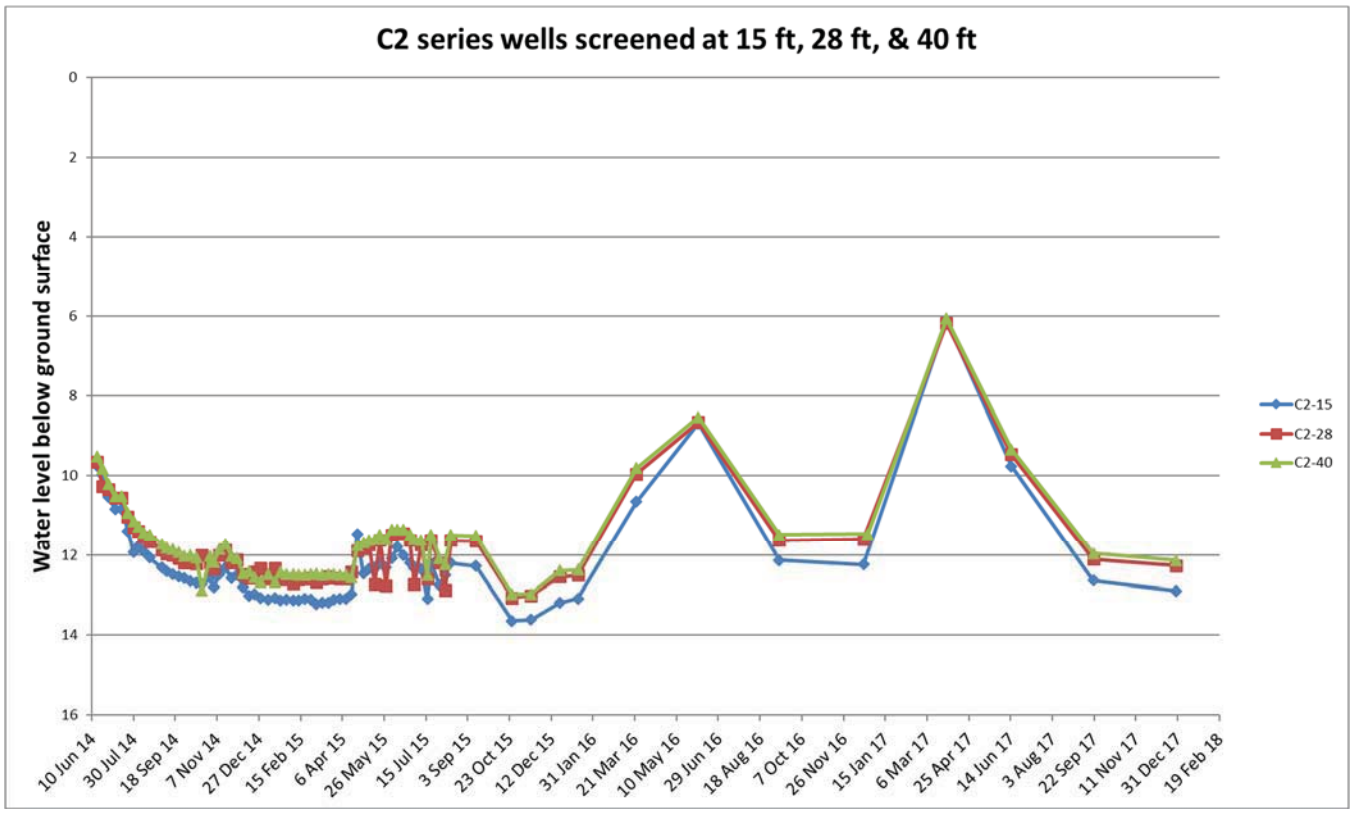
6. Does the Mine Operator need to submit more information to fulfill this quarter's monitoring requirements? YES [X] NO [ ]

I've emailed the operator and mine hydrologist to acquire the data.

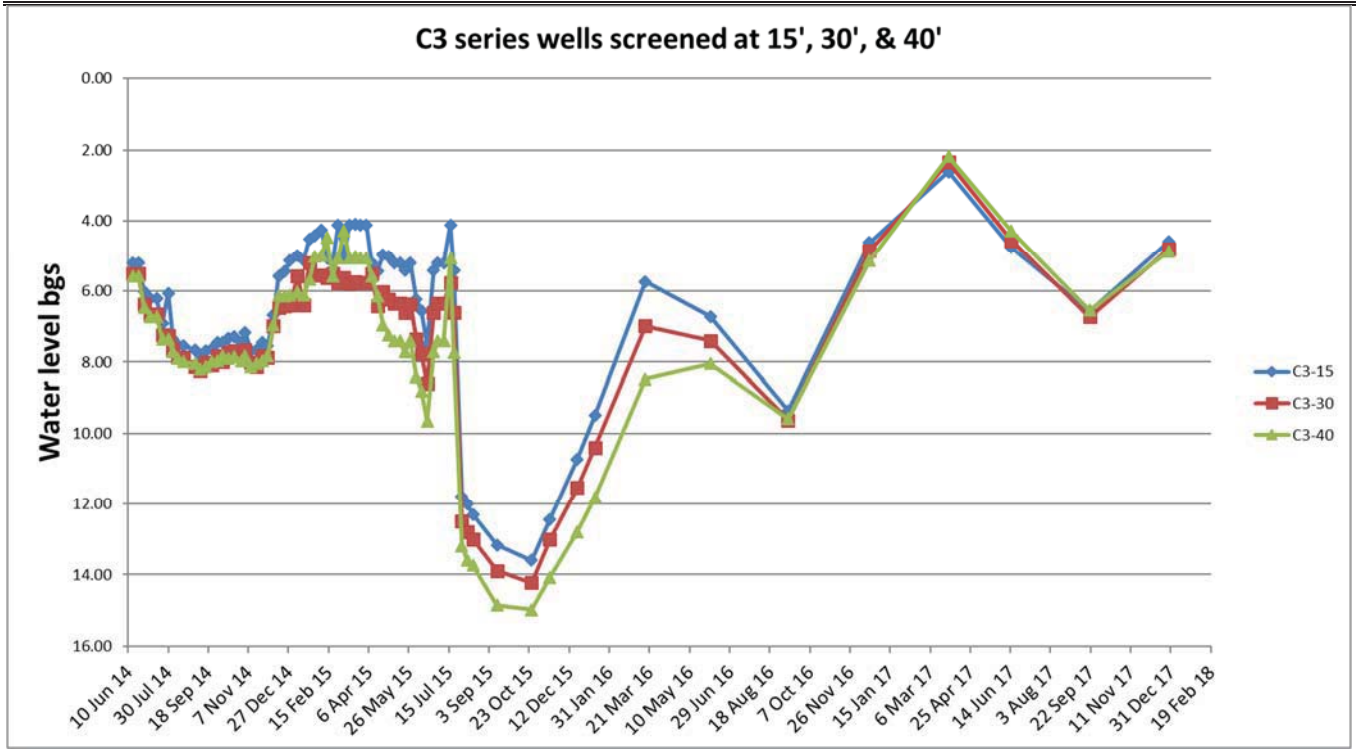
7. Follow-up from last quarter, if necessary.
All missing data from last quarter has been entered into the database.

Highwall Trench 2 monitoring wells: C-2, C-3, C-4

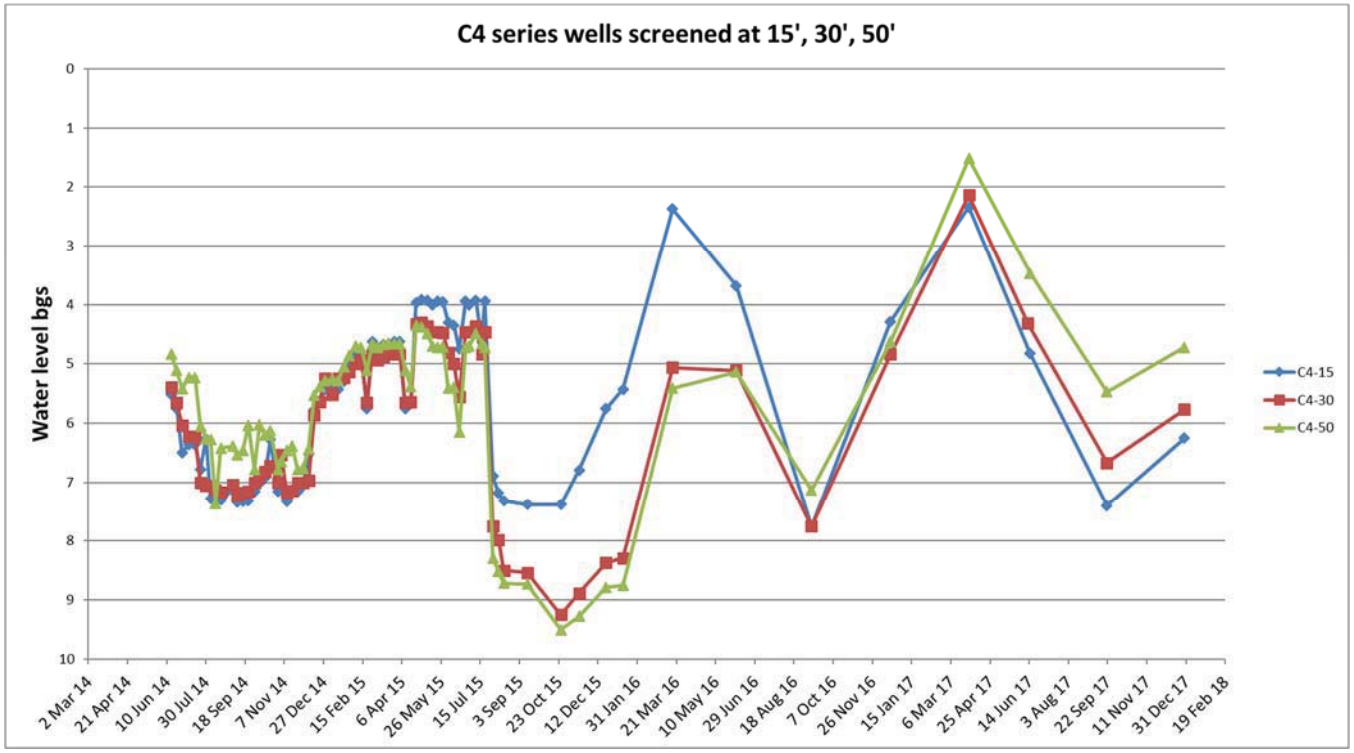
These wells saw a dramatic drop as groundwater discharged into the open pit of HWT 2. HWT 2 is backfilled and water levels appear to be stabilizing and recovering. The C-series wells are just east of the permit boundary in the South Private Lease.



C2 wells located in the south lease to the east of Highwall Trench 2. Water level appears to be stabilizing a couple feet below pre-mining water table.



C3 wells located in the south lease to the east of Highwall Trench 2. Water level appears to be stabilizing at about the pre-mining water table.



C4 wells located in the south lease to the east of Highwall Trench 2. Water level appears to be stabilizing at about the pre-mining water table. Confining pressure within the alluvial deposits appears to be influencing the spread in water level data.