

015/015 Incoming

#5243

Bronco Utah Operations LLC
PO Box 527
Emery, Utah 84522
801-286-2301

August 22, 2016

VIA E-MAIL

Mr. Daron Haddock
Utah Division of Oil, Gas and Mining
Coal Program
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801

RECEIVED

AUG 25 2016

DIV. OF OIL, GAS & MINING

**RE: Bronco Utah Operations LLC
Emery Mine
DOG M Permit No. C/015/0015
Emery Groundwater Well Evaluation & Rehabilitation Revision
Clean Copy Submittal Task ID 5243**

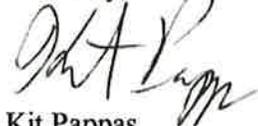
Mr. Haddock:

Per your conditional approval letter dated August 17, 2016, enclosed are two copies of the above mentioned submittal including executed C1 form, C2 form, revised pages, and revised Plate VI-4 (Ground/Surface Water Monitoring Map). A CD with the submittal in pdf format is included.

This revision includes an inserted Appendix VI-19 titled Groundwater Well Integrity Evaluation & Rehabilitation Report as well as additional supporting figures. The report summarizes the effort initiated by CONSOL Energy Inc. to rehabilitate several wells beginning in early-2015.

If you have any questions concerning this request, please contact me at 435-286-2027.

Sincerely,



Kit Pappas
Environmental Manager

Attachments Application for Coal Permit Processing (2)
 Electronic CD

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: Bronco Utah Operations LLC (BUOLLC)

Mine: Emery Mine

Permit Number: 015/0015

Title: Groundwater Well Evaluation & Rehabilitation Revision

Description, Include reason for application and timing required to implement:

Permit 015/0015 Groundwater Well Evaluation & Rehabilitation Revision clean copy tsk 5243

8/16

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

- | | |
|---|---|
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ <input type="checkbox"/> increase <input type="checkbox"/> decrease. |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 2. Is the application submitted as a result of a Division Order? DO# _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 4. Does the application include operations in hydrologic basins other than as currently approved? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 6. Does the application require or include public notice publication? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 7. Does the application require or include ownership, control, right-of-entry, or compliance information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 9. Is the application submitted as a result of a Violation? NOV # _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 10. Is the application submitted as a result of other laws or regulations or policies?
<i>Explain:</i> _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 11. Does the application affect the surface landowner or change the post mining land use? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2) |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 13. Does the application require or include collection and reporting of any baseline information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 15. Does the application require or include soil removal, storage or placement? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 19. Does the application require or include certified designs, maps or calculation? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 20. Does the application require or include subsidence control or monitoring? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 21. Have reclamation costs for bonding been provided? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 23. Does the application affect permits issued by other agencies or permits issued to other entities? |

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

DAN R. BAKER
Print Name

Dan R. Baker PRES; CEO
Sign Name, Position, Date 8-22-2016

Subscribed and sworn to before me this 22 day of AUGUST, 2016

Jah @ Lynn
Notary Public

My commission Expires: UTAH 3-7, 2018
Attest: State of UTAH)
County of CARBON) ss:

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining <div style="text-align: center; color: blue; font-weight: bold; font-size: 1.2em;">RECEIVED</div> <div style="text-align: center; color: red; font-weight: bold; font-size: 1.1em;">AUG 25 2016</div> <div style="text-align: center; color: blue; font-weight: bold; font-size: 1.1em;">DIV. OF OIL, GAS & MINING</div>
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To better assess conditions at the Emery wells, the model output was evaluated to determine the potential effects of mining on the potentiometric surface at the location of these wells. As noted in Figure 2 of Appendix VI-15, the northern boundary of the MODFLOW model was approximately 8,800 feet south of the Emery wells. At this northern model boundary, the model results indicate that groundwater levels in the Upper Ferron sandstone will drop 1.6 feet from 2007 to 2016, the period when active mining is planned to cease. From 2016 to 2026, groundwater levels at the northern model boundary are predicted to increase to approximately 5.4 feet above 2007 levels. Twenty years after mining ceases (2036), the model predicts that the head at the northern model boundary will be approximately 12.7 feet above 2007 levels. The predicted heads in 2026 and 2036 are calculated to be higher than 2007 levels primarily because of the high transmissivity and lateral recharge in the vicinity of the Joe's Valley-Paradise fault zone.

Although the MODFLOW evaluation concentrated on the upper Ferron Sandstone, observations discussed earlier in this section indicate that potentiometric-surface impacts to the middle and lower Ferron Sandstone will be less than those in the upper Ferron Sandstone. Given the distance of the Emery town wells from the modeled area and their completion zones, the effects of mining on water levels at the Emery town wells are predicted to be much less than those predicted to occur in the upper Ferron Sandstone at the model boundary (i.e., these impacts will be minimal at the town wells, if at all).

In 2010, the inoperative pump was pulled from Emery Town Well #2 and the air line used to collect water-level data was found to be faulty. It is not known when the air line became damaged but the 2007 (and perhaps the 1979) data reported for the well may be unreliable. Since the air line was removed, an electronic water-level probe has been used to collect data from this well. Data presented in Figure VI-21 indicate that water levels in Well #2 have remained relatively constant since 2010 when consistent water-level data collection began. A notable exception to this conclusion occurred in March 2013 when a new water-level probe was put into service. However, given the consistency of the water levels in Well #2 during the period of 2011 through 2012 as well as those since the change in probes, together with the information presented above, is it apparent that mining at the Emery Mine has not adversely impacted the available water at the Emery Town Wells.

Water levels in well H(U) monitoring the Upper Ferron sandstone have declined substantially since mid-2005. This well is located in Section 20, T. 22 S., R. 6 E. immediately north of the permit area boundary, as indicated on Plate VI-4. Mining occurred in an area approximately 2,500 feet southwest of this well in 1989 and, over a period of about 15 years, expanded to a location about 6,000 feet southeast of well H(U). As noted in Figure VI-22, water levels remained fairly constant in this well from 1979 until mid-2005, during the period when mining was occurring in the general area of the well. These levels then increased dramatically in the last half of 2005 and have declined since then. Water levels stabilized in 2013 and 2014 and then declined rapidly again in 2015.

As a point of comparison, Figure VI-22 also provides water-level data obtained from monitoring well Muddy #1. This well is also completed in the Upper Ferron sandstone and is located in the southeast portion of the permit area, in Section 33, T. 22 S., R. 6 E. Muddy #1 is located about 500 feet east of an area that was mined beginning in 1945 and adjacent to other areas that were mined from 1990 through 2005. Water levels in this well have remained essentially constant since monitoring began in 1979.

Figure VI-22 also depicts average annual rates at which water has been discharged from the Emery Mine since 1979. During the period of 1979 through 2004, average discharge rates varied between a low of 0.54 cfs (in 2002) and a high of 1.33 cfs (in 1993). Water levels increased in well H(U) approximately 27 feet in mid-2005 during a three-year period when the rate of discharge from the mine was lower than in previous years, perhaps suggesting a response to the lower rate of discharge. However, no influence on water levels is obvious at Muddy #1 during the period of decreased pumping rates. Mine-water discharge rates from 2006 through 2010 were within the range when water levels in H(U) were historically unaffected by changes in discharge even though levels in that well experienced a decline of over 50 feet during that period. Water levels in H(U) then stabilized in spite of a sharp increase in pumping rates in 2011 and then exhibited a dramatic decrease following a period of much lower discharge from 2013 through 2015. Furthermore, water levels in well Muddy #1 remained largely unaffected by any changes in mine-water discharge rates.

It is not possible to state that water levels at well H(U) have been unaffected by pumping of groundwater encountered in the Emery Mine. However, it is also obvious that mine-water pumping alone cannot account for the decline in water levels observed at that well. The available data do not allow a definitive conclusion to be drawn concerning the reason for the decreased water levels in well H(U).

The Division of Oil, Gas and Mining has also expressed concern about a decline in water levels in monitoring well RDA-4. This well monitors conditions in the alluvium adjacent to Quitcupah Creek in Section 32, T. 22 S., R. 6 E. (see Plate VI-4). Hydrographs of water-level data measured at this well and adjacent wells are provided in Figure VI-23. This figure also provides data for the Palmer Hydrological Drought Index ("PHDI"). The area where these wells are located has not been subjected to underground mining since the early 1980s.

As indicated, water levels in RDA-4 have declined approximately 6 feet since January 2010. Water levels in RDA-2 and RDA-6 declined approximately 3 feet and 10 feet, respectively, during the same period. The PHDI data indicate that this period has been subject to increasing drought severity. Given the lack of mining in the area and the increasing severity of drought conditions, it is concluded that the declines in water levels in this alluvial aquifer were caused by natural climatic conditions.

Two springs have historically issued from the Ferron Sandstone adjacent to the permit area (SP-15 from the upper Ferron Sandstone and SP-16 from the lower Ferron Sandstone). Both of these springs are located near the formation outcrop, making model predictions less precise. However, the model results indicate that the potentiometric surface will decline approximately 24.1 feet at the location of SP-15 from 2007 to 2016 (the period of active mining and dewatering) and subsequently recover to approximately 4.1 feet below 2007 levels by 2036. Data contained in Appendix VI-1 indicate that no flow has occurred at SP-15 since June 2000. The model data imply that this condition will continue for some time in the future.

Quantitative predictions of potentiometric surface impacts at SP-16 are not possible since modeling concentrated on the upper Ferron Sandstone and since SP-16 is located near the formation outcrop just east of the model boundary. This spring is not currently used for beneficial purposes. Given the generally lesser mining-related impacts on the lower as compared to the upper Ferron Sandstone and the fact that this spring is located updip of the upper Ferron Sandstone outcrop, impacts to the potentiometric surface at this location should be less than those predicted for SP-15.

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Surface Water Protection. To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic or toxic drainage, prevents, to the extent possible, additional contributions of suspended solids to streamflow outside the permit area, and otherwise prevents water pollution. Additionally, Consol will maintain adequate runoff- and sediment-control facilities to protect local surface waters.

VI.3.1.2 Water Monitoring

Groundwater Monitoring. Groundwater monitoring is conducted in the permit and adjacent areas according to the water monitoring plans presented in Table VI-17. The locations of the monitoring points are presented on Plate VI-4. The monitoring plans were developed based on information presented in the PHC determination, the baseline hydrologic data, the 2011 re-evaluation presented in Appendix VI-17, and the geology chapter of this document.

An extensive evaluation of the integrity of the Emery monitoring wells was undertaken in 2015 and 2016. Some wells had been reportedly "obstructed", some of the water-level data had been apparently improperly reported, and other data integrity concerns existed. A summary of this evaluation and the steps taken to correct integrity issues is provided in Appendix VI-19. This information was also considered when developing the groundwater monitoring program presented in Table VI-17 and Plate VI-4.

The monitoring programs provide data that are reviewed and compared to the baseline data. Any significant changes are evaluated to determine their impact on the hydrologic balance. Results of these evaluations are submitted periodically to the Division.

Sampling for the Emery Mine area is accomplished in accordance with the schedule outlined in Table VI-17. Monitoring at locations that are inaccessible during winter months are sampled three times per year. All other sites are monitored quarterly. Groundwater monitoring data are submitted to the Division by the end of the quarter following sampling. Monitoring data are submitted in an annual summary by March 31 of the subsequent year.

Groundwater monitoring will continue through the mining and post-mining periods until bond release. The monitoring requirements, including the analytical parameters and the sampling frequency may be modified in the future in consultation with the Division if the data demonstrate that such a modification is justified.

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of groundwater in the permit and adjacent areas have been installed, maintained, and operated in accordance with accepted procedures. Where feasible, this equipment will be removed or properly abandoned by Consol when no longer needed.

Surface Water Monitoring. Surface water monitoring is conducted in the permit and adjacent areas based upon the monitoring plans contained in Table VI-17. Surface water monitoring locations are identified on Plate VI-4. The parameters monitored meet the requirements of R614-301-731.222.1, 40 CFR 122 and 123, R614-301-751, and the applicable UPDES permits.

Surface water monitoring data are submitted to the Division by the end of the quarter following sampling. Monitoring data are submitted in an annual summary by March 31 of the

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TABLE VI-17

Emery Mine Hydrologic Monitoring Program

Parameter	Surface Water Monitoring Stations	Sampled Wells	Other Wells	Springs/Seeps	UPDES Outfalls
Monitoring Site Names	SWMS-1A, SWMS-2, SWMS-3, SWMS-4, SWMS-5, SWMS-8, SWMS-9, SWMS-10	Emery Town ^(a) , Kemmerer, RDA-2, RDA-4, RDA-6, SM1-3, TP-U, USGS4-1	H-U, MUDDY #1, Pump 3 MW, R-1, R-2B, R-2M	SP-10, SP-11, SP-13, SP-14, SP-15	001, 002, 003, 004, 005, 006, 007, 009
Monitoring Frequency	Quarterly	Quarterly, except RDA wells (annual)	Quarterly	Quarterly flows. Samples in 2 nd and 3 rd quarters	Per permit
Field Measurements					
Flow	X			X	X
Water Level		X	X		
pH (field)	X	X		X	X
Sp. Cond. (field)	X	X		X	
Water Temp. (field)	X	X		X	
Laboratory Measurements					
Total Settleable Solids	X				
Total Suspended Solids	X				X
Total Dissolved Solids	X	X		X	X
Total Hardness (as CaCO ₃)	X	X		X	
Oil and Grease	X				X
Acidity (as CaCO ₃)	X				
Carbonate	X	X		X	
Bicarbonate	X	X		X	
Alkalinity (as CaCO ₃)					
Calcium, Total	X				
Calcium, Dissolved	X	X		X	
Chloride	X	X		X	
Iron, Total	X				X
Iron, Dissolved		X		X	
Magnesium, Total	X				
Magnesium, Dissolved		X		X	
Manganese, Total	X				
Manganese, Dissolved		X		X	
Potassium, Total	X				
Potassium, Dissolved		X		X	
Sodium, Total	X				
Sodium, Dissolved		X		X	
Sulfate		X		X	

^(a) Due to physical limitations in the Emery town wells (see text), water-quality samples will be collected from Well #1 and water-level data will be collected from Well #2. Consol will evaluate data collected from the Emery town wells, using hydrographs and other appropriate means, and submit a report of findings to DOGM with the annual report.

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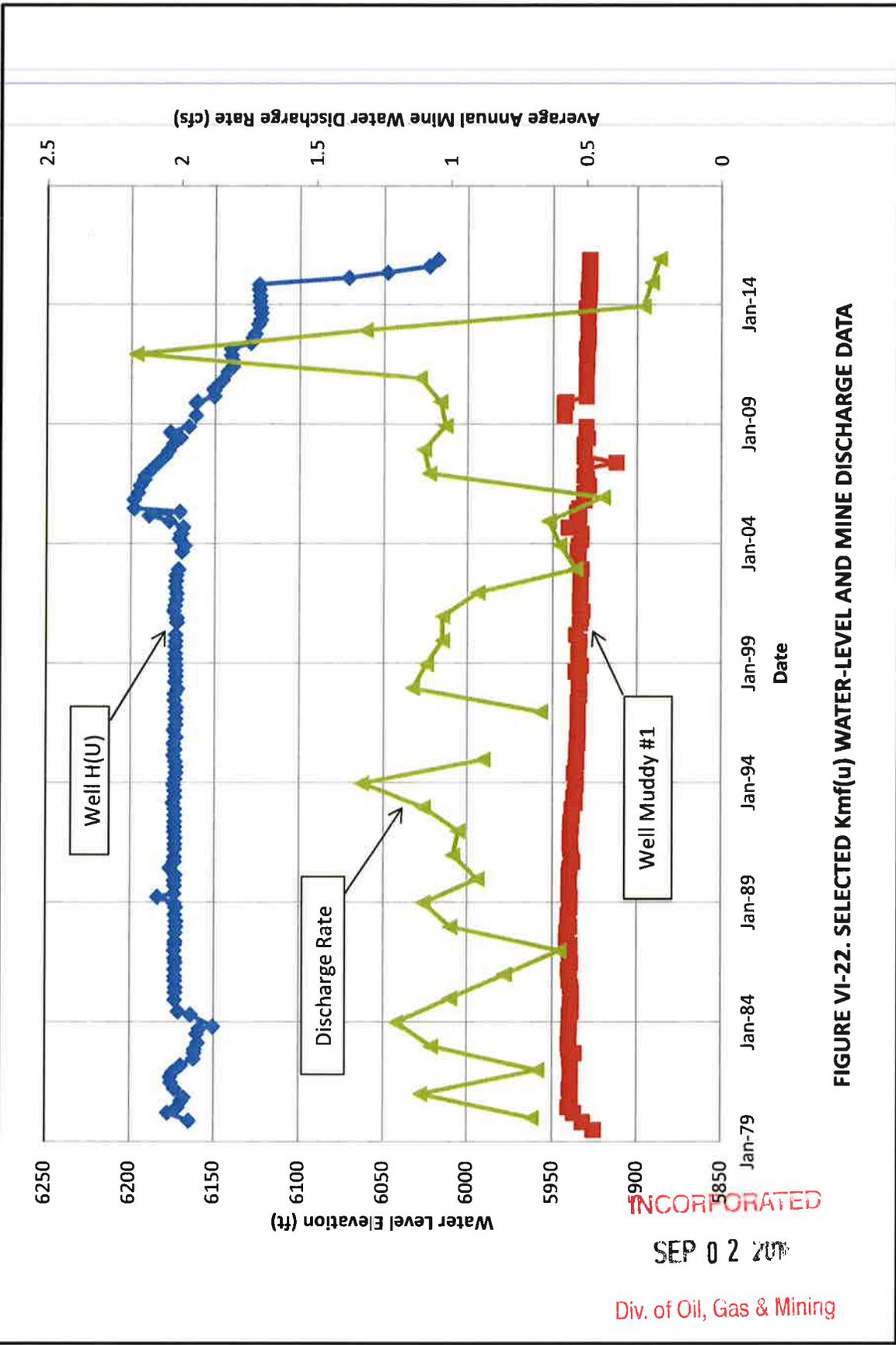


FIGURE VI-22. SELECTED KmF(u) WATER-LEVEL AND MINE DISCHARGE DATA

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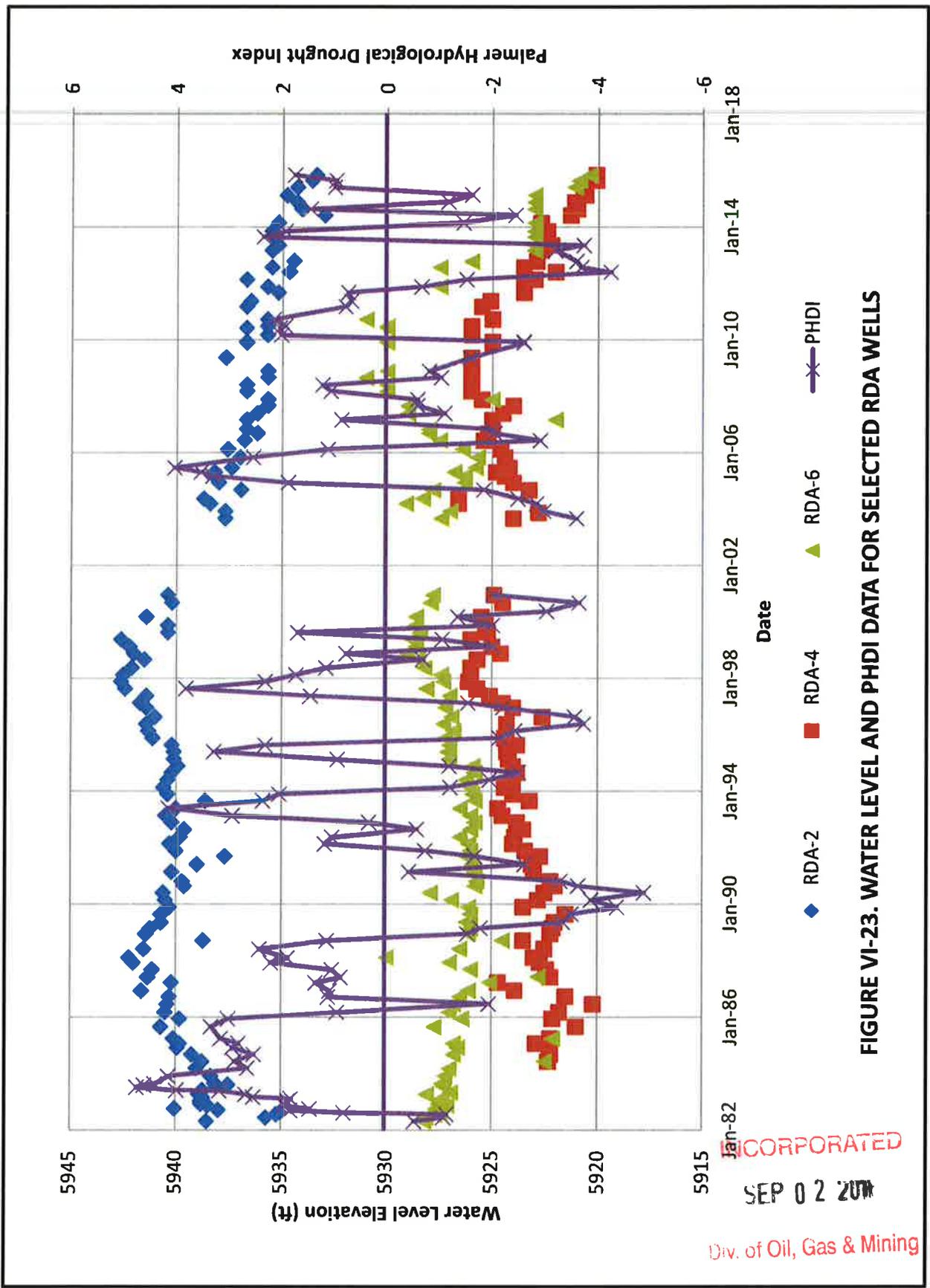


FIGURE VI-23. WATER LEVEL AND PHDI DATA FOR SELECTED RDA WELLS

APPENDIX VI-19

Groundwater Well Integrity Evaluation & Rehabilitation Report

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Div. of Oil, Gas & Mining

Inserted 8/2016

**EMERY MINE
GROUNDWATER MONITORING PROGRAM
WELL INTEGRITY EVALUATION AND REHABILITATION**

Beginning in 2015, the Emery Mine undertook an evaluation of the integrity of monitoring wells associated with their operation. This evaluation was prompted by some wells within the Emery Mine monitoring network reportedly being “obstructed”, some water-level data being improperly reported, and other data integrity concerns. The following represents the results of that evaluation and the mitigation efforts that have been undertaken through June 2016. This information is summarized in Table 1.

- Kemmerer-L: This is a flowing well completed in the lower Ferron Sandstone that has been fitted with a pressure gauge. However, the pressure gauge began reporting spurious data in 2009 and was subsequently replaced the end of the 2011 or beginning of 2012. Therefore, the depth-to-water data reported in the database for 2009-2011 are not considered valid. Furthermore, beginning in 2002, the pressure data (measured in psi) were reported sometimes as the depth to water, sometimes as the flow from the well, and sometimes as a comment only. Between 1995 and 2002, the depth-to-water data are all reported as "0", which Russel Jensen (the mine technician) indicated was the common practice at the time for all pressure measurements. Thus, the water-level data contained in the DOGM database need to be converted by DOGM from a positive pressure value to a negative depth value for the period of 1995 through the present.
- Muddy #2: Attempts were made in the spring and fall of 2015 to clear obstructions from this monitoring well, which is completed in the upper Ferron Sandstone. These attempts were unsuccessful. Muddy #2 is located approximately 2000 feet northeast of Muddy #1 in an area where the upper Ferron Sandstone is adequately monitored by Muddy #1. Therefore, this well will be dropped from the monitoring network.
- Pump 3 MW: A well was drilled adjacent to the Pump 3 borehole in January 2011 to monitoring water levels at this point of discharge from the Emery Mine. This well encountered the top of the mined-out area at a depth of 751 feet and the bottom of the mine works at a depth of 758.5 feet. The well was completed with 2-inch diameter steel casing and 20 feet of 2-inch diameter 0.010-slot screen. A log of this well is included at the end of this document. Since coal was mined from the upper Ferron Sandstone, water level data will be collected from this well to monitor groundwater levels in the upper Ferron Sandstone at this location.
- R1-L: This is a flowing well completed in the lower Ferron Sandstone that has been fitted with a pressure gauge. Similar to Kemmerer-L, it appears that pressure measurements (in psi) were entered into the DOGM database as the depth to water since at least 1994. Some of these pressure measurements were entered as negative values and some were entered as positive values. In any case, none of the values were properly entered into the database, requiring that the database be corrected by DOGM.

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- RDA-6: Beginning in March 2008, the depth to water in this well (which monitors the alluvial aquifer adjacent to Quitchupah Creek) was consistently reported at about 12 feet. In 2012, the database indicates that an "obstruction" was encountered at this depth. Mr. Jensen cleaned this well in April 2015 by injecting high pressure water until the water discharging from the well was clear. It appeared that the obstruction was a dead animal. He then bailed water from the well. Given the obstruction that was in the well, the data obtained from this well are not considered valid for the period of 2008-2014. DOGM should modify the database to remove data from the "water level" column for this period, with an indication that the well was obstructed during that period. The well should now be yielding accurate water-level data.
- SM1-3: This well, which monitors the alluvial aquifer adjacent to Christiansen Wash, filled with sediment from runoff during a storm event in the fall of 2014. Mr. Jensen injected water under high pressure into this well in April 2015 and cleaned it out. Although a sample collected from this well in September 2015 suggested that this well rehabilitation effort likely affected the water quality to some degree, this well should now yield acceptable water-level data.
- T1-U: The depth and completion of this well are unknown, although it was constructed to monitor the upper Ferron Sandstone. Based on the logs of nearby wells (T2 and TP), this well is likely about 380 to 420 feet deep. The database indicates that this well is dry at reported depths ranging from 13 to 330 feet. Repeated attempts to extend a probe to the bottom of the well have verified that the well is currently either obstructed or the casing is broken and offset at a depth of 43 feet. Since the area beneath the well was mined in the mid- to late-1980s, it is possible that the well casing broke due to subsidence. Recent data in the DOGM database report the depth to water for well T1-U as being 43 feet, when this is actually the depth to the obstruction or offset. This should be corrected in the DOGM database. Given the inadequacy of well T1-U for monitoring the upper Ferron Sandstone, nearby well TP-U was cleaned in October 2015 by injecting water under high pressure and bailing the excess water from the well. The depth to water in the well was subsequently measured as 394 feet. The applicant proposes to substitute well TP-U for well T1-U to monitor groundwater in this area of the mine site.
- USGS1-2: Attempts were made in the spring and fall of 2015 to clear obstructions from monitoring well USGS1-2 which is completed in the upper Ferron Sandstone. These attempts were unsuccessful. This well is located about 4000 feet northeast of Muddy #1 in an area where additional groundwater level data would be helpful for interpreting the influence of mining on the groundwater regime. Therefore, the applicant will evaluate additional methods for removing the obstruction from this well in attempt to render USGS1-2 useful for the collection of water-level data.
- USGS4-1: A field evaluation in 2015 indicated that this well (completed in the Blue Gate Shale) is functioning properly but has been dry since 2007. Unfortunately, the depth-to-water data reported in the DOGM database since that time are actually the depth of the well. The database should be changed by DOGM to remove the water-level data for that period and simply indicate that the well is dry.

TABLE 1

Summary of Monitoring Well Evaluation and
Rehabilitation Efforts

Monitoring Well	Summary of Rehabilitation Effort	Data Concerns	Future Use
Kemmerer-L	Pressure gauge replaced in 2011 or 2012.	Water-level data improperly reported from 1995 through 2015. Requires database correction by DOGM.	Continue use as a valid monitoring point.
Muddy #2	Attempts to clear obstructions from this well have been unsuccessful. The general area is adequately monitored by Muddy #1.	This well will be dropped from the monitoring network.	Remove from the monitoring network.
Pump 3 MW	Drilled in January 2011.	Add to the monitoring network.	Add to the active monitoring network.
R1-L	It appears that the pressure gauge is operating properly.	Pressure data have been improperly reported since at least 1994. Requires database correction by DOGM.	Continue use as a valid monitoring point.
RDA-6	Well obstruction removed in April 2015.	Data not valid for 2008-2014. Requires database correction by DOGM.	Continue use as a valid monitoring point.
SM1-3	Well cleaned in April 2015.	Data apparently valid.	Continue use as a valid monitoring point.
T1-U	Casing is apparently offset. Use nearby TP-U for future data collection.	Well reported as "dry" when in fact it was broken. Requires database correction by DOGM.	Remove from the monitoring network.
TP-U	Use in place of T1-U.	Prior data adequate.	Add to the active monitoring network.
USGS1-2	Attempts to clean the well in 2015 were unsuccessful. Pursue alternate cleaning methods.	Prior data adequate.	Add to the active monitoring network.
USGS4-1	Well is functioning properly.	Depth of well reported as depth to water since 2007. Requires database correction by DOGM.	Continue use as a valid monitoring point.

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LOG OF BORING Well 3

(Page 1 of 4)

Colidation Coal Compay
Emery Mine
Emery, Utah
Project UC982-27

Date Started : January 28, 2011
Date Completed : January 31, 2011
Hole Diameter : 6 7/8"
Drilling Method : Air Rotary
Sampling Method : Grab

Logged By : K. Blauer
Northing Coord. : N 6760982.021
Easting Coord. : E 1702684.889
Drilled By : Mike Zimmerman Well
Surface Elevation : 6098.76 ft amsl

Depth in Feet	Surf. Elev. 6098.76	Water Level	GRAPHIC	DESCRIPTION	Well: Well 3 Elev: 6098.76 ft amsl	Well Construction Information
0	6099			SHALE. Weathered. Very soft.	<p>Cover</p> <p>2-inch Steel</p> <p>Neat Cement</p>	<p>WELL CONSTRUCTION</p> <p>Date Compl. : Jan 31 2011 Hole Diameter : 6 7/8" Drill. Method : Air Rotary Company Rep. : K. Blauer</p> <p>WELL CASING</p> <p>Material : Black Steel Diameter : 2-inch Joints : Coupled Joint</p> <p>WELL SCREEN</p> <p>Material : Stainless Steel Diameter : 2-inch Joints : Flush Joint Opening : 0.010 Slot</p> <p>ANNULUS SEAL</p> <p>Type : Neat Cement</p> <p>NOTES: This well was drilled to monitor water levels in the abandon works. A cement basket was installed at 718' below ground surface and cement was tremied into the annular space from the cement basket up to the surface in several lifts.</p> <p style="text-align: center;">INCORPORATED</p> <p style="text-align: center;">SEP 02 2011</p> <p style="text-align: center;">Div. of Oil, Gas & Mining</p>
10	6089			SHALE. Hard. Sandy very fine grained. 10 YR 6/1. Gray		
20	6079					
30	6069					
40	6059					
50	6049					
60	6039					
70	6029					
80	6019					
90	6009					
100	5999					
110	5989					
120	5979					
130	5969					
140	5959					
150	5949					
160	5939					
170	5929					
180	5919					
190	5909					
200						



LOG OF BORING Well 3

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Colidation Coal Compay
Emery Mine
Emery, Utah
Project UC982-27

Date Started : January 26, 2011
Date Completed : January 31, 2011
Hole Diameter : 6 7/8"
Drilling Method : Air Rotary
Sampling Method : Grab

Logged By : K. Blauer
Northing Coord. : N 6760982.021
Easting Coord. : E 1702684.889
Drilled By : Mike Zimmerman Well
Surface Elevation : 6098.76 ft amsl

Depth in Feet	Surf. Elev. 6098.76	Water Level	GRAPHIC	DESCRIPTION	Well: Well 3 Elev: 6098.76 ft amsl	Well Construction Information
200	5899			SHALE as above,	<p>2-inch Steel</p> <p>Neat Cement</p>	WELL CONSTRUCTION Date Compl. : Jan 31 2011 Hole Diameter : 6 7/8" Drill. Method : Air Rotary Company Rep. : K. Blauer WELL CASING Material : Black Steel Diameter : 2-inch Joints : Coupled Joint WELL SCREEN Material : Stainless Steel Diameter : 2-inch Joints : Flush Joint Opening : 0.010 Slot ANNULUS SEAL Type : Neat Cement
210	5889					
220	5879					
230	5869					
240	5859					
250	5849					
260	5839					
270	5829					
280	5819					
290	5809					
300	5799					
310	5789					
320	5779					
330	5769					
340	5759					
350	5749					
360	5739					
370	5729					
380	5719					
390	5709					
400						

NOTES:
This well was drilled to monitor water levels in the abandon works.

A cement basket was installed at 718' below ground surface and cement was tremied into the annular space from the cement basket up to the surface in several lifts.

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LOG OF BORING Well 3

(Page 3 of 4)

Colidation Coal Company
Emery Mine
Emery, Utah
Project UC982-27

Date Started : January 26, 2011
Date Completed : January 31, 2011
Hole Diameter : 6 7/8"
Drilling Method : Air Rotary
Sampling Method : Grab

Logged By : K. Blauer
Northing Coord. : N 6760982.021
Easting Coord. : E 1702684.889
Drilled By : Mike Zimmerman Well
Surface Elevation : 6098.76 ft amsl

Depth in Feet	Surf. Elev. 6098.76	Water Level	GRAPHIC	DESCRIPTION	Well: Well 3 Elev: 6098.76 ft amsl	Well Construction Information
400	5699			SHALE as above	<p>2-inch Steel</p> <p>Neat Cement</p>	<p>WELL CONSTRUCTION</p> <p>Date Compl. : Jan 31 2011 Hole Diameter : 6 7/8" Drill. Method : Air Rotary Company Rep. : K. Blauer</p> <p>WELL CASING</p> <p>Material : Black Steel Diameter : 2-inch Joints : Coupled Joint</p> <p>WELL SCREEN</p> <p>Material : Stainless Steel Diameter : 2-inch Joints : Flush Joint Opening : 0.010 Slot</p> <p>ANNULUS SEAL</p> <p>Type : Neat Cement</p> <p>NOTES: This well was drilled to monitor water levels in the abandon works. A cement basket was installed at 718' below ground surface and cement was tremied into the annular space from the cement basket up to the surface in several lifts.</p> <p style="text-align: center;">INCORPORATED</p> <p style="text-align: center;">SEP 02 2011</p> <p style="text-align: center;">Div. of Oil, Gas & Mining</p>
410	5689					
420	5679					
430	5669					
440	5659					
450	5649					
460	5639					
470	5629					
480	5619					
490	5609					
500	5599					
510	5589					
520	5579					
530	5569					
540	5559					
550	5549					
560	5539					
570	5529	▽				
580	5519					
590	5509					
600						



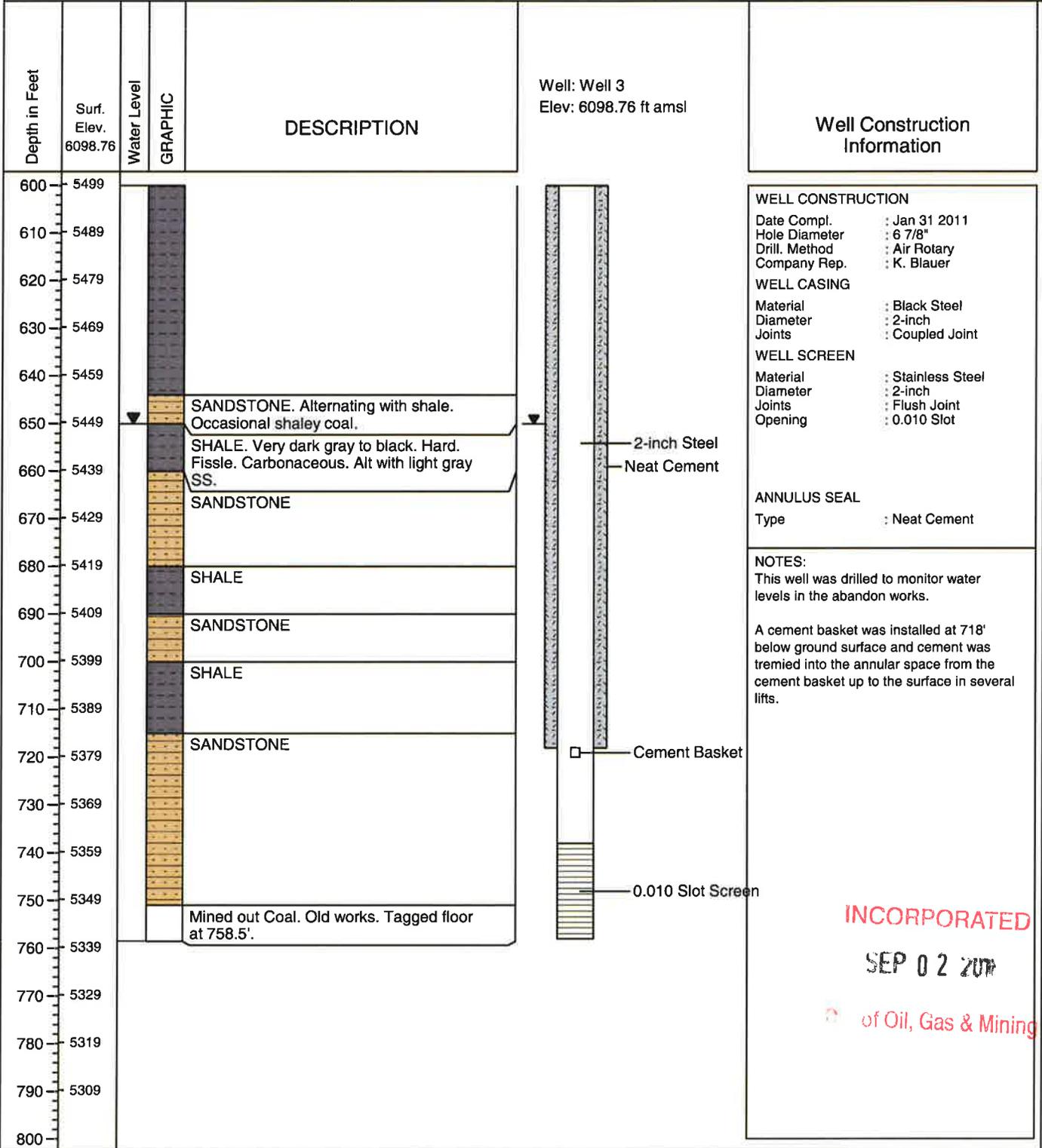
LOG OF BORING Well 3

(Page 4 of 4)

Colldation Coal Compay
Emery Mine
Emery, Utah
Project UC982-27

Date Started : January 26, 2011
Date Completed : January 31, 2011
Hole Diameter : 6 7/8"
Drilling Method : Air Rotary
Sampling Method : Grab

Logged By : K. Blauer
Northing Coord. : N 6760982.021
Easting Coord. : E 1702684.889
Drilled By : Mike Zimmerman Well
Surface Elevation : 6098.76 ft amsl



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